EPA-1317

Reid Rosnick/DC/USEPA/US		To	Tom Peake
01/05/2011 07:14 AM		cc	
		bcc	
		Subject	Fw: Rescheduled: Status meeting on uranium work (Jan 6 01:00 PM EST)

Tom,

I won't be here, but I guess I can call-in.

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

----- Forwarded by Reid Rosnick/DC/USEPA/US on 01/05/2011 07:14 AM -----

Rescheduled: Status meeting on uranium work

Thu 01/06/2011 1:00 PM - 2:00 PM

Attendance is **required** for Reid Rosnick

Chair: **Tom Peake/DC/USEPA/US**

Rooms: 1310L Room 509/DC-1310L-OAR

Tom Peake has rescheduled this meeting. You have not yet responded.

Sorry about the change, but not everybody could make the 11 am time. I hope you can all make the 1 pm time.

Required:	Andrea Cherepy/DC/USEPA/US@EPA, Brian Littleton/DC/USEPA/US@EPA, Kenneth Czyscinski/DC/USEPA/US@EPA, Reid Rosnick/DC/USEPA/US@EPA, Valentine Anoma/DC/USEPA/US@EPA

Description

EPA-1077

Sarah Fields
<sarah@uraniumwatch.org>

01/05/2011 02:22 PM

To Reid Rosnick
cc Travis Stills, Sharyn Cunningham
bcc
Subject Subpart W Letter to Cotter

Hello Reid,

During this morning's conference call re the Subpart W review, Cotter stated that they had not received
any request for information from the EPA.
Cotter was sent a letter in 2009 asking them for information; at least a letter that is addressed
to them is on the Subpart W Review website:

http://www.epa.gov/radiation/docs/neshaps/subpart-w/uranium%20cotter%20test.pdf

Sarah Fields
Uranium Watch

EPA-2290

Reid Rosnick/DC/USEPA/US		To	Sarah Fields
01/07/2011 08:28 AM		cc	Travis Stills, Sharyn Cunningham
		bcc	
		Subject	Re: Subpart W Letter to Cotter

Hello Sarah,

You are correct that Cotter was sent a letter in 2009. That letter was an information request from our enforcement office, and asked for a number of items that are related to our discussion from Wednesday. However, the debate on Wednesday was focused on whether our contractor, in preparing the risk assessment draft document within the last 2 months, contacted Cotter for real-time radon flux data, as well as meteorological data specific to the Canon City area. As we discussed on Wednesday, most of that data is available on-line at NRC's ADAMS website. I am waiting for confirmation from the contractor on exactly how they obtained the Cotter data.

Separately, I saw that there was a BLM/USFS public meeting last night regarding the plan of operations amendment for the expansion of the LaSal mine. I would be interested in your take on the meeting. Thank you.

Reid

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1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Sarah Fields   Hello Reid, During this morning's confe...   01/05/2011 02:22:51 PM

From: Sarah Fields <sarah@uraniumwatch.org>
To: Reid Rosnick/DC/USEPA/US@EPA
Cc: Travis Stills <emlc@frontier.net>, Sharyn Cunningham <sharyn@bresnan.net>
Date: 01/05/2011 02:22 PM
Subject: Subpart W Letter to Cotter

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http://www.epa.gov/radiation/docs/neshaps/subpart-w/uranium%20cotter%20test.pdf

Sarah Fields
Uranium Watch

EPA-2700

Sarah Fields <sarah@uraniumwatch.org>

01/07/2011 11:51 AM

To Reid Rosnick

cc

bcc

Subject Re: Subpart W Letter to Cotter

Reid,

The BLM/USFS Meeting on the expansion of the La Sal Mine is on January 13. I will not be there. I had already made plans
to go to Denver for the NRC uranium recovery workshop long before the BLM announced the scoping meeting in La Sal.

There are a number of outstanding issues related to the La Sal Mines, including Subpart B compliance.

Sarah

On Jan 7, 2011, at 6:28 AM, Rosnick.Reid@epamail.epa.gov wrote:

Hello Sarah,

You are correct that Cotter was sent a letter in 2009. That letter was an information request from our enforcement office, and asked for a number of items that are related to our discussion from Wednesday. However, the debate on Wednesday was focused on whether our contractor, in preparing the risk assessment draft document within the last 2 months, contacted Cotter for real-time radon flux data, as well as meteorological data specific to the Canon City area. As we discussed on Wednesday, most of that data is available on-line at NRC's ADAMS website. I am waiting for confirmation from the contractor on exactly how they obtained the Cotter data.

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1200 Pennsylvania Ave., NW
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rosnick.reid@epa.gov

From: Sarah Fields <sarah@uraniumwatch.org>

To: Reid Rosnick/DC/USEPA/US@EPA

Cc: Travis Stills <emlc@frontier.net>, Sharyn Cunningham <sharyn@bresnan.net>

Date: 01/05/2011 02:22 PM

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Sarah Fields
Uranium Watch

EPA-1686

Angelique Diaz/R8/USEPA/US	To	Reid Rosnick
01/10/2011 03:27 PM	cc	Deborah Lebow-Aal, Kenneth Distler
	bcc	
	Subject	Fw: Google Alert - in situ uranium

Reid, let's talk about this sometime this week. Christiansen is one of the facilities that we have Rn data from for the ponds. Looking back it looks like they have one pond just over 5 acres. We haven't received any Rad NESHAPs information (e.g., modification approval request) from the company.

-Angelique

-----Forwarded by Angelique Diaz/R8/USEPA/US on 01/10/2011 01:18PM -----

To: Angelique Diaz/R8/USEPA/US@EPA
From: Google Alerts <googlealerts-noreply@google.com>
Date: 01/08/2011 07:28AM
Subject: Google Alert - in situ uranium

News **3** new results for **in situ uranium**

Uranium One opens its mine
Gillette News Record
The Christensen Ranch operation is an **in-situ uranium** mine, meaning it is not an open-pit mine but rather works using many wells drilled into the rock. **...**
See all stories on this topic »

2 challenge EPA permit for Powertech test in Colo.
Bloomberg
Powertech would use information from the test to apply for a permit to recover **uranium** through **in situ** mining. This week, James Woodward and a group called **...**
See all stories on this topic »

Licence approval for US **uranium** mill
World Nuclear News
At the present time, only one conventional mill is operational in the USA, and most of the country's **uranium** production comes from **in situ** recovery (ISR) **...**
See all stories on this topic »

Web **1** new result for **in situ uranium**

State OKs **uranium** mill near Naturita - Silobreaker
Uranerz estimates there is 5.5 million pounds of **uranium** in the **in-situ** recovery (ISR) site, which is located ... [Published 15 hours ago by Casper Star **...**
www.silobreaker.com/state-oks-uranium-mill-near-naturita-5_...

Tip: Use a plus sign (+) to match a term in your query exactly as is. Learn more.

EPA-2498

Reid Rosnick/DC/USEPA/US
01/12/2011 06:39 AM

To Tom Peake
cc Loren Setlow
bcc
Subject Re: Schedules for 192 and Subpart W

Hi Tom,

I haven't seen Ray Lee in a long time. Has he entered this information into RAPIDS yet?

-----Tom Peake/DC/USEPA/US wrote: -----

To: Setlow.Loren@epamail.epa.gov, Reid Rosnick/DC/USEPA/US@EPA, Andrea Cherepy/DC/USEPA/US@EPA, Valentine Anoma/DC/USEPA/US@EPA, Kenneth Czyscinski/DC/USEPA/US@EPA
From: Tom Peake/DC/USEPA/US
Date: 01/11/2011 04:59PM
Cc: Daniel Schultheisz/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA
Subject: Schedules for 192 and Subpart W

FYI,
The attached file has our schedules for 192 and Subpart W that we need to make since they are going forward in the Tier 1 document and briefings. The Fall of 2012 is problematic because of the elections. Due to a potential change in administration we should try to get our regulations to OMB as early in 2012 as we can--September may be too late.

May the force be with us!

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

(See attached file: Tier 1 Deliverable Dates 192 and Subpart W.docx)

[attachment "Tier 1 Deliverable Dates 192 and Subpart W.docx" removed by Reid Rosnick/DC/USEPA/US]

EPA-2481

Reid Rosnick/DC/USEPA/US

01/12/2011 07:36 AM

To Lindsey Bender

cc

bcc

Subject Peer Review

Hi Lindsey,

Tom told me that you are planning to have the granite countertop document peer reviewed. Can you give me an idea of the process that you will be using? Does it involve the SAB? How will you get the independent reviewers, things like that. The reason I'm asking is that I have a risk assessment document for the Subpart W rulemaking that I will need to have peer reviewed. Thanks, I appreciate it very much!

Reid

EPA-1414

Reid Rosnick/DC/USEPA/US

01/25/2011 06:28 AM

To Tom Peake

cc Andrea Cherepy, Lee Veal, Setlow.Loren

bcc

Subject Re: Availability on Feb 9 ~11 am to hear about economic analysis approach for the uranium work?

I'll be there.

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Tom Peake Hi, Lee is inviting us to meet as a group... 01/24/2011 08:53:03 AM

From: Tom Peake/DC/USEPA/US
To: Reid Rosnick/DC/USEPA/US@EPA, Setlow.Loren@epamail.epa.gov
Cc: Andrea Cherepy/DC/USEPA/US@EPA, Lee Veal/DC/USEPA/US@EPA
Date: 01/24/2011 08:53 AM
Subject: Availability on Feb 9 ~11 am to hear about economic analysis approach for the uranium work?

Hi,
Lee is inviting us to meet as a group with Val Anoma to hear the plans for the economic analysis. Are you available after the RPD management meeting on the 9th? The starting time would be around 11. I think Alan (who, by the way, has an economics background) is interested, too.

Tom Peake
Director
Center for Waste Management and Regulations
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Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
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Washington, DC 20005

EPA-5654

Jonathan Edwards/DC/USEPA/US

01/27/2011 10:52 AM

To Mike Flynn

cc Alan Perrin, Tom Peake

bcc

Subject Report Out on Gina Briefing

Mike---

We had a good conversation with Gina this morning and as in the past she was very interested in our activities and asked a lot of questions....I left you a detailed voicemail on all this....biggest action item is an aggressive reworking of our milestones and schedules on UMTRCA 40CFR192 and also on subpart W.
---Jon

EPA-1978

Reid Rosnick/DC/USEPA/US		To	Tom Peake
01/31/2011 01:23 PM		cc	
		bcc	
		Subject	W Time Frames

Tom,

As requested, here's what I've been thinking about the Subpart W time frames. I assumed that the timeframe up to submission of the Options Selection package remains the same, since we have issues with contracts, etc. I figured that we could shave time off the back end of the schedule by limiting the time for various activities (e.g., preamble writing, time between FAR and OMB submission, and time from OMB approval to proposal...

Risk assessment peer review	Summer 2011
Economics Analysis	Summer 2011
Options Selection Package	August 2011
Options Selection	October 2011
FAR	January 2012
OMB	February 2012
Proposal	May 2012

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rosnick.reid@epa.gov

EPA-4157

Daniel Schultheisz/DC/USEPA/US		To	Raymond Lee
02/02/2011 12:05 PM		cc	
		bcc	
		Subject	Revising Timelines for part 192 and subpart W

Ray:

Alan suggested that it would be useful to show the original and revised timelines side by side, so that it could easily be seen which steps are being accelerated or truncated. I think you did these originally. Do you plan to be in the office tomorrow? It shouldn't take much time to prepare these (enlighten me if that's a bad assumption). Thanks.

Dan

EPA-4204

Daniel Schultheisz/DC/USEPA/US

02/02/2011 01:19 PM

To Raymond Lee
cc
bcc
Subject Re: Revising Timelines for part 192 and subpart W

Reid and Andrea are working on the intermediate steps for the revised timelines. We'll get together tomorrow. Thanks.

Raymond Lee   Hi Dan, I do plan to be in tomorrow. Y...   02/02/2011 01:14:25 PM

From: Raymond Lee/DC/USEPA/US
To: Daniel Schultheisz/DC/USEPA/US@EPA
Date: 02/02/2011 01:14 PM
Subject: Re: Revising Timelines for part 192 and subpart W

Hi Dan,

I do plan to be in tomorrow. Yes, I did do the original project slides - we just had the timelines as one bar, but didn't have them split up by milestones/steps. So I'm thinking it will be a brand new file that we're creating, but hopefully we should have something good to send on by the end of tomorrow.

I know we discussed the timelines at the meeting yesterday...is there a final milestones list for both actions that you could send to me?

Thanks!

Ray

-----Daniel Schultheisz/DC/USEPA/US wrote: -----

To: Raymond Lee/DC/USEPA/US@EPA
From: Daniel Schultheisz/DC/USEPA/US
Date: 02/02/2011 12:05PM
Subject: Revising Timelines for part 192 and subpart W

Ray:

Alan suggested that it would be useful to show the original and revised timelines side by side, so that it could easily be seen which steps are being accelerated or truncated. I think you did these originally. Do you plan to be in the office tomorrow? It shouldn't take much time to prepare these (enlighten me if that's a bad assumption). Thanks.

Dan

EPA-3550

Emily Atkinson/DC/USEPA/US

02/03/2011 10:30 AM

To Andrea Cherepy, Betsy Forinash, Brian Littleton, Daniel Schultheisz, Ed Feltcorn, Jonathan Walsh, Kathleen Economy, Kenneth Czyscinski, Lindsey Bender, Loren Setlow, Mike Eagle, Rajani Joglekar, Reid Rosnick, Shankar Ghose, Tom Peake, Valentine Anoma

cc

bcc

Subject Overview of Economic Analysis for SubPart W and 40 CFR 192 | Sent on behalf of Val Anoma

Meeting

Date 02/09/2011

Time 03:00:00 PM to 04:00:00 PM

Chair Emily Atkinson

Invitees

Required Andrea Cherepy; Betsy Forinash; Brian Littleton; Daniel Schultheisz; Ed Feltcorn; Jonathan Walsh; Kathleen Economy; Kenneth Czyscinski; Lindsey Bender; Loren Setlow; Mike Eagle; Rajani Joglekar; Reid Rosnick; Shankar Ghose; Tom Peake; Valentine Anoma

Optional

FYI

Location

EPA-2272

Tom Peake/DC/USEPA/US

02/09/2011 12:49 PM

To Raymond Lee

cc "Loren Setlow", "Andrea Cherepy", "Reid Rosnick"

bcc

Subject Re: New Dates for 192 & Subpart W

Yes, a doozy.
I'll catch up with you later today.
Tom
Raymond Lee

----- Original Message -----
From: Raymond Lee
Sent: 02/09/2011 12:47 PM EST
To: Tom Peake
Subject: New Dates for 192 & Subpart W

Hi Tom,

I was just given the low-down on the situation with these two rules (since I had a conflict yesterday for the meeting) and wow, it looks like our timeline just shrunk considerably. Based on that, I need to complete the reg. agenda exercise today for these two entries. And since you were present at the management meeting and probably have a better idea on general dates (as opposed to Reid and Loren), I thought it'd be best to get this info from you.

In RAPIDS/SCOUT, these are the dates that need to be updated for both rules:

- Options Selection
- Final Agency Review
- Package to OMB for Review
- Administrator's Signature
- FR publication

I know things are kind of in flux, but just general dates will do at this point, since we just need to have something in the system.

Thanks!

Ray

Ray Lee | Center for Radiation Information and Outreach (CRIO) | US EPA | Phone 202.343.9463 | Fax 202.343.2305 | lee.raymond@epa.

EPA-3521

Tom Peake/DC/USEPA/US

02/09/2011 03:18 PM

To: Andrea Cherepy, Daniel Schultheisz, Kathleen Economy, Kenneth Czyscinski, Reid Rosnick, Tony Nesky, Valentine Anoma

cc: Alan Perrin, Brian Littleton, Jonathan Edwards

bcc:

Subject: Uranium regulation progress/coordination weekly meeting

This standing meeting will be to go over weekly or other milestones, identify issues and needs, ensure coordination and generally make sure that the 40 CFR 192 and Subpart W remain on schedule.

EPA-2452

Tom Peake/DC/USEPA/US
02/10/2011 08:49 AM

To Setlow.Loren, Andrea Cherepy, Reid Rosnick
cc
bcc
Subject Let's meet with NRDC as well as NMA

Loren et al,
I know we had talked about having a meeting with Katie Sweeney before you retire, but I would also like to meet with NRDC's Geoff Fettus as well. I think Reid should be at the meetings, too, since Subpart W will most likely come up. After we get these meetings set up, we'll need to talk a few minutes to get a mutual understanding of what we want and what to expect from each of them.

Thanks.

Tom Peake
Director
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US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

EPA-2280

Reid Rosnick/DC/USEPA/US		To	Beth Miller
02/10/2011 02:20 PM		cc	
		bcc	
		Subject	Re: Fw: Re: Subpart W Webpage

Yeah, I hope its not too much trouble. I'll be teleworking tomorrow, but just let me know and I'll look at them.

Reid J. Rosnick
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U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Beth Miller Are you ok with these changes before I... 02/10/2011 02:13:16 PM

From: Beth Miller/DC/USEPA/US
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 02/10/2011 02:13 PM
Subject: Fw: Re: Subpart W Webpage

Are you ok with these changes before I make them tomorrow?
-----Forwarded by Beth Miller/DC/USEPA/US on 02/10/2011 02:12PM -----

To: Beth Miller/DC/USEPA/US@EPA
From: Jessica Wieder/DC/USEPA/US
Date: 02/10/2011 11:13AM
Subject: Re: Subpart W Webpage

Absolutely fine.

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
(202) 343-9201

Beth Miller---02/10/2011 11:11:18 AM---Yes I will be happy to correct the webpage. Is tomorrow ok I don't have dreamweaver on my home comp

From: Beth Miller/DC/USEPA/US
To: Jessica Wieder/DC/USEPA/US@EPA
Date: 02/10/2011 11:11 AM
Subject: Re: Subpart W Webpage

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-----Jessica Wieder/DC/USEPA/US wrote: -----

To: Beth Miller/DC/USEPA/US@EPA
From: Jessica Wieder/DC/USEPA/US
Date: 02/10/2011 10:50AM
Subject: Subpart W Webpage

Beth - I need your help with the Subpart W Webpage.
http://epa.gov/radiation/neshaps/subpartw/rulemaking-activity.html

First - Reid asked that we remove Loren from the contacts at the bottom of the page.

Second - Under Documents - Both the current actions and the historical documents need to be arranged chronologically... starting with the earliest documents and leading to the most recent. I would be happy to review before it is posted.

Can you help with this?

Jessica

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
(202) 343-9201

EPA-2281

Beth Miller/DC/USEPA/US		To	Reid Rosnick
02/10/2011 02:22 PM		cc	
		bcc	
		Subject	Re: Fw: Re: Subpart W Webpage

ok sounds great.

-----Reid Rosnick/DC/USEPA/US wrote: -----

To: Beth Miller/DC/USEPA/US@EPA
From: Reid Rosnick/DC/USEPA/US
Date: 02/10/2011 02:20PM
Subject: Re: Fw: Re: Subpart W Webpage

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Jessica

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
(202) 343-9201

EPA-2119

Reid Rosnick/DC/USEPA/US	To	Raymond Lee
02/11/2011 09:55 AM	cc	Jonathan Edwards, "Perrin Alan", Tom Peake, Andrea Cherepy
	bcc	
	Subject	Re: New Dates for 192 & Subpart W

Hi Ray,

No problem. These are tentative, as you noted.

- Options Selection - 6/11
- Final Agency Review - 8/11
- Package to OMB for Review - 9/11
- Administrator's Signature - 12/11
- FR publication - 12/11

-----Raymond Lee/DC/USEPA/US wrote: -----

To: Reid Rosnick/DC/USEPA/US@EPA
From: Raymond Lee/DC/USEPA/US
Date: 02/10/2011 05:50PM
Subject: Re: New Dates for 192 & Subpart W

Hi Reid,

Per my e-mail below, I have been holding off on submitting the details of our reg. agenda exercise based on all of this new info we've been getting from the AA. I just chatted with Tom and he said you're working from home tomorrow, so if you could just give me some dates (I understand they're just estimates at this point) for the milestones I've listed below as soon as you can, that would be great. Just go ahead and send it to me and cc Tom & Andrea on it, as well as Jon and Alan, so that they can pass it by Mike first before I put it into the system. I've told my contact over in OPAR that
we would have everything in by COB tomorrow.

Thanks! :)

Ray

Ray Lee | Center for Radiation Information and Outreach (CRIO) | US EPA | Phone 202.343.9463 | Fax 202.343.2305 | lee.raymond@epa.

Raymond Lee---02/09/2011 12:47:28 PM---Hi Tom, I was just given the low-down on the situation with these two rules (since I had a conflict

From: Raymond Lee/DC/USEPA/US
To: Tom Peake/DC/USEPA/US@EPA
Date: 02/09/2011 12:47 PM
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Ray

Ray Lee | Center for Radiation Information and Outreach (CRIO) | US EPA | Phone 202.343.9463 | Fax 202.343.2305 | lee.raymond@epa.g

EPA-2073

Tom Peake/DC/USEPA/US
02/11/2011 10:39 AM

To Reid Rosnick, Raymond Lee
cc Jonathan Edwards, "Perrin Alan", Andrea Cherepy
bcc
Subject Re: New Dates for 192 & Subpart W

Reid,
Thanks for the dates.

Do these new dates include risk assess peer review or no peer review?

Also, what are your assumptions about the completion of the econ analysis for your dates?

Thx.
Tom

From: Reid Rosnick
Sent: 02/11/2011 09:55 AM EST
To: Raymond Lee
Cc: Jonathan Edwards; "Perrin Alan" <perrin.alan@epa.gov>; Tom Peake; Andrea Cherepy
Subject: Re: New Dates for 192 & Subpart W

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To: Reid Rosnick/DC/USEPA/US@EPA
From: Raymond Lee/DC/USEPA/US
Date: 02/10/2011 05:50PM
Subject: Re: New Dates for 192 & Subpart W

Hi Reid,

Per my e-mail below, I have been holding off on submitting the details of our reg. agenda exercise based on all of this new info we've been getting from the AA. I just chatted with Tom and he said you're working from home tomorrow, so if you could just give me some dates (I understand they're just estimates at this point) for the milestones I've listed below as soon as you can, that would be great. Just go ahead and send it to me and cc Tom & Andrea on it, as well as Jon and Alan, so that they can pass it by Mike first before I put it into the system. I've told my contact over in OPAR that
we would have everything in by COB tomorrow.

Thanks! :)

Ray

Ray Lee | Center for Radiation Information and Outreach (CRIO) | US EPA | Phone 202.343.9463 | Fax 202.343.2305 | lee.raymond

Raymond Lee---02/09/2011 12:47:28 PM---Hi Tom, I was just given the low-down on the situation with these two rules (since I had a conflict

From: Raymond Lee/DC/USEPA/US
To: Tom Peake/DC/USEPA/US@EPA
Date: 02/09/2011 12:47 PM
Subject: New Dates for 192 & Subpart W

Hi Tom,

I was just given the low-down on the situation with these two rules (since I had a conflict yesterday for the meeting) and wow, it looks like our timeline just shrunk considerably. Based on that, I need to complete the reg. agenda exercise today for these two entries. And since you were present at the management meeting and probably have a better idea on general dates (as opposed to Reid and Loren), I thought it'd be best to get this info from you.

In RAPIDS/SCOUT, these are the dates that need to be updated for both rules:

- Options Selection
- Final Agency Review
- Package to OMB for Review
- Administrator's Signature
- FR publication

I know things are kind of in flux, but just general dates will do at this point, since we just need to have something in the system.

Thanks!

Ray

Ray Lee | Center for Radiation Information and Outreach (CRIO) | US EPA | Phone 202.343.9463 | Fax 202.343.2305 | lee.raymond

EPA-2289

Beth Miller/DC/USEPA/US		To	Reid Rosnick
02/11/2011 10:57 AM		cc	Glenna Shields
		bcc	
		Subject	Fw: Subpart W Webpage

I updated the rulemaking-activity.html webpage. If you have any questions please let me know. Thanks

----- Forwarded by Beth Miller/DC/USEPA/US on 02/11/2011 10:56 AM -----

From: Jessica Wieder/DC/USEPA/US
To: Beth Miller/DC/USEPA/US@EPA
Date: 02/10/2011 11:13 AM
Subject: Re: Subpart W Webpage

Absolutely fine.

Jessica Wieder
U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
(202) 343-9201

Beth Miller   Yes I will be happy to correct the webp...   02/10/2011 11:11:18 AM

From: Beth Miller/DC/USEPA/US
To: Jessica Wieder/DC/USEPA/US@EPA
Date: 02/10/2011 11:11 AM
Subject: Re: Subpart W Webpage

Yes I will be happy to correct the webpage. Is tomorrow ok I don't have dreamweaver on my home computer.

-----Jessica Wieder/DC/USEPA/US wrote: -----

To: Beth Miller/DC/USEPA/US@EPA
From: Jessica Wieder/DC/USEPA/US
Date: 02/10/2011 10:50AM
Subject: Subpart W Webpage

Beth - I need your help with the Subpart W Webpage.
http://epa.gov/radiation/neshaps/subpartw/rulemaking-activity.html

First - Reid asked that we remove Loren from the contacts at the bottom of the page.

Second - Under Documents - Both the current actions and the historical documents need to be arranged chronologically... starting with the earliest documents and leading to the most recent. I would be happy to review before it is posted.

Can you help with this?

Jessica

Jessica Wieder

U.S. Environmental Protection Agency
Radiation Protection Division
Center for Radiation Information
(202) 343-9201

EPA-1774

Reid Rosnick/DC/USEPA/US	To	Tom Peake
02/11/2011 02:16 PM	cc	rosnick.reid, Lee.Raymond, Alan Perrin, Jonathan Edwards, Daniel Schultheisz, Kenneth Czyscinski, Andrea Cherepy
	bcc	
	Subject	Re: Please look over this Subpart W schedule and let me know how/if it should be changed

It looks fine to me. You should capitalize the "O" in EO.

-----Tom Peake/DC/USEPA/US wrote: -----

To: rosnick.reid@epa.gov
From: Tom Peake/DC/USEPA/US
Date: 02/11/2011 01:36PM
Cc: Lee.Raymond@epamail.epa.gov, Alan Perrin/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Daniel Schultheisz/DC/USEPA/US@EPA, Kenneth Czyscinski/DC/USEPA/US@EPA, Andrea Cherepy/DC/USEPA/US@EPA
Subject: Please look over this Subpart W schedule and let me know how/if it should be changed

Reid,
I took the dates you sent and put them in a format like we have for part 192. Please look it over and make any changes and get it back soon today. Jon and Alan meet with Mike later this afternoon and they plan to give him the two schedules. As an FYI I have included the 192 schedule we came up with yesterday afternoon.
Thanks.

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

(See attached file: 40 CFR Part 192 Deliverable Dates.docx) (See attached file: Subpart W Deliverable Dates.docx)

[attachment "40 CFR Part 192 Deliverable Dates.docx" removed by Reid Rosnick/DC/USEPA/US]
[attachment "Subpart W Deliverable Dates.docx" removed by Reid Rosnick/DC/USEPA/US]

EPA-1217

Tom Peake/DC/USEPA/US
02/11/2011 02:25 PM

To: Reid Rosnick
cc: Alan Perrin, Andrea Cherepy, Daniel Schultheisz, Jonathan Edwards, Kenneth Czyscinski, Lee.Raymond, rosnick.reid
bcc:
Subject: Re: Please look over this Subpart W schedule and let me know how/if it should be changed--Reconciling econ analysis schedule with options selection

Reid,
I saw that the peer review for the economic analysis (July) is after your options selection date (June). Is the economic analysis peer review not pertinent to your schedule?

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

EPA-1012

"Zach Rogers" <z.rogers@energyfuels.com>

02/15/2011 12:59 PM

To Reid Rosnick

cc

bcc

Subject Subpart W Conference Call information

Reid,

I was unable to participate in the Jan 5, 2011 conference call and was looking for minutes for that meeting but I don't see them posted to the Subpart W website. Do you know when they will be posted? Also, when is the next conference call scheduled?

ENERGY FUELS RESOURCES CORPORATION
Zach Rogers, P.E. | **Environmental Engineer**
Direct: 303.974.2151 | Fax: 303.974.2141 | Cell: 303.916.8541
zrogers@energyfuels.com
44 Union Boulevard, Suite 600
Lakewood, Colorado 80228

EPA-2132

Reid Rosnick/DC/USEPA/US
02/15/2011 01:08 PM

To "Zach Rogers"
cc
bcc
Subject Re: Subpart W Conference Call information

Zach,

I hope to have the minutes posted by the end of the week. The next conference call will be April 7, 2011 at 11 AM EST.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

"Zach Rogers" Reid, I was unable to participate in the... 02/15/2011 12:59:17 PM

From: "Zach Rogers" <z.rogers@energyfuels.com>
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 02/15/2011 12:59 PM
Subject: Subpart W Conference Call information

Reid,
I was unable to participate in the Jan 5, 2011 conference call and was looking for minutes for that meeting but I don't see them posted to the Subpart W website. Do you know when they will be posted? Also, when is the next conference call scheduled?

ENERGY FUELS RESOURCES CORPORATION
Zach Rogers, P.E. | **Environmental Engineer**
Direct: 303.974.2151 | Fax: 303.974.2141 | Cell: 303.916.8541
zrogers@energyfuels.com
44 Union Boulevard, Suite 600
Lakewood, Colorado 80228

EPA-2723

"Zach Rogers" <z.rogers@energyfuels.com>

02/15/2011 01:20 PM

To Reid Rosnick

cc

bcc

Subject RE: Subpart W Conference Call information

Thanks Reid. I'll keep an eye out for those minutes.

ENERGY FUELS RESOURCES CORPORATION
Zach Rogers, P.E. | Environmental Engineer
Direct: 303.974.2151 | Fax: 303.974.2141 | Cell: 303.916.8541
zrogers@energyfuels.com
44 Union Boulevard, Suite 600
Lakewood, Colorado 80228

From: Rosnick.Reid@epamail.epa.gov [mailto:Rosnick.Reid@epamail.epa.gov]
Sent: Tuesday, February 15, 2011 11:09 AM
To: Zach Rogers
Subject: Re: Subpart W Conference Call information

Zach,

I hope to have the minutes posted by the end of the week. The next conference call will be April 7, 2011 at 11 AM EST.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

From: "Zach Rogers" <z.rogers@energyfuels.com>
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 02/15/2011 12:59 PM
Subject: Subpart W Conference Call information

Reid,
I was unable to participate in the Jan 5, 2011 conference call and was looking for minutes for that meeting but I don't see them posted to the Subpart W website. Do you know when they will be posted? Also, when is the next

conference call scheduled?

ENERGY FUELS RESOURCES CORPORATION

Zach Rogers, P.E. | **Environmental Engineer**

Direct: 303.974.2151 | Fax: 303.974.2141 | Cell: 303.916.8541

zrogers@energyfuels.com

44 Union Boulevard, Suite 600

Lakewood, Colorado 80228

__________ Information from ESET NOD32 Antivirus, version of virus signature database 5877 (20110215) __________

The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

__________ Information from ESET NOD32 Antivirus, version of virus signature database 5877 (20110215) __________

The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

EPA-1527

Reid Rosnick/DC/USEPA/US
02/15/2011 01:28 PM

To Beth Miller
cc
bcc
Subject Subpart W Website

Hi Beth,

Will you be in the office tomorrow or Thursday? I have a couple of things that need to be inserted into the Subpart W public website.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-1060

"Paulson, Oscar (CCC)" <Oscar.Paulson@riotinto.com>

02/16/2011 11:27 PM

To "Steve Marschke"

cc Reid Rosnick, "Rose Gogliotti", Brian Littleton, "Abe Zeitoun"

bcc

Subject RE: Sweetwater Data

Dear Mr. Marschke:

The required environmental data to perform a radon risk assessment for the Sweetwater Uranium Project is either already in the possession of the Environmental Protection Agency (EPA) or publically available. The following applies to the required data:

- Radon flux testing data for the Sweetwater Uranium Project tailings impoundment for calendar years 1990 to 2010 has been submitted to the Agency as required by 40 CFR Part 61 Subpart W. and is already available to Agency staff.
- Meteorological data in the Revised Environmental Report dated August 1994, represents a good long term summary of site's meteorological conditions and as such is representative and suitable for use. This document is available on the Nuclear Regulatory Commission's (NRC's) web site at the link below:
- http://pbadupws.nrc.gov/docs/ML0810/ML081010327.pdf
- The meteorological data provided in this document including, I believe, joint frequency distributions, is site specific data.
- Upwind and downwind radon activity data for ambient air collected using Landauer, Inc.'s TrakEtch devices has been submitted semiannually to the Nuclear Regulatory Commission (NRC) as part of the facility's semiannual 40.65 Reports and is publically available in the Commission's online ADAMS system.
- In addition, I believe that upwind and downwind radon activity data for ambient air was summarized in a submittal to the Commission in either the first half of 1998 or 1999 so that the submittal plus any 40.65 Reports submitted from its date forward, provide a complete set of upwind and downwind radon activity data for the site. In any event, upwind and downwind radon activity data is submitted semiannually in the required 40.65 Reports and is available in the ADAMS system. I can check on the 1998 summary report when I return to the office and probably provide a link to it on the Nuclear Regulatory Commission's (NRC's) web site.

I am traveling this week and will return to the site on Tuesday, February 21, 2011. I would like to work with you upon my return to ensure that the risk assessment completed for the Sweetwater Uranium Project is based upon actual site conditions and measurements. Should you have any questions please call me at that time.

Oscar Paulson

Facility Supervisor
Kennecott Uranium Company
Sweetwater Uranium Project
P.O. Box 1500
42 Miles Northwest of Rawlins
Rawlins, Wyoming 82301-1500

Telephone: (307)-324-4924
Fax: (307)-324-4925
Cellular: (307)-320-8758

E-mail: oscar.paulson@riotinto.com

From: Steve Marschke [mailto:smarschke@scainc.com]
Sent: Monday, February 14, 2011 3:46 PM
To: Paulson, Oscar (CCC)
Cc: Rosnick.Reid@epamail.epa.gov; Rose Gogliotti; Brian Littleton; Abe Zeitoun
Subject: Sweetwater Data

Dear Mr Paulson,

I'm working with Reid Rosnick and Brian Littleton of the EPA on the radon risk assessment from uranium recovery facilities. As you know, we performed the draft assessment for the Sweetwater site using CAP88, meteorological data that was obtained from the CAP88 library for Rock Spring WY, and radon release estimates based on data from the 1994 Revised Environmental and from the 2004 license renewal request.

Reid asked me to contact you to see if you wanted to provide us with any updated meteorological, radon release, or other data that we could use as we finalize the risk assessment.

Thanks for your help,
Steve

EPA-1605

Reid Rosnick/DC/USEPA/US

02/21/2011 07:05 AM

To Loren Setlow

cc

bcc

Subject Re: Invitation: Meeting with NRDC and other Environmental NGOs (Feb 23 10:00 AM EST in Natural Resources Defense Council
1200 New York Avenue, N.W. #400
)

Hi Loren,

Tom and I have a conflict at 10, a meeting with DOE and Region 2. Any chance we can move it to the afternoon?

Calendar Entry

Meeting Invitation Loren Setlow has invited you to a meeting

Subject
Meeting with NRDC and other Environmental NGOs

When

Begins:	02/23/2011 10:00 AM
Ends:	02/23/2011 11:00 AM

Where

Location	Natural Resources Defense Council 1200 New York Avenue, N.W. #400

Chair
Loren Setlow/DC/USEPA/US

Invitees
To (required): Andrea Cherepy/DC/USEPA/US@EPA, Daniel Schultheisz/DC/USEPA/US@EPA, Reid Rosnick/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA
cc (optional):

Description / Agenda

To meet with Geoff Fettus of NRDC regarding our ong work. NRDC may be inviting additional participants tha environmental NGOs as a phone conference. Sorry abo with the Division meeting--if this is a problem, we may a little later in the morning.

EPA-991

"VonTill, Bill" <Bill.VonTill@nrc.gov>

02/23/2011 03:58 PM

To Loren Setlow, Tom Peake, Reid Rosnick

cc "Cohen, Stephen", "Comfort, Gary"

bcc

Subject RE: EPA-NRC 2/22/11 Meeting Attendees

Thanks Loren

This is probably for Reid, but can we get a copy of the NMA letter to EPA relative to their argument that heap leach cells shouldn't be included in Subpart W?

Thanks

-----Original Message-----
From: Setlow.Loren@epamail.epa.gov [mailto:Setlow.Loren@epamail.epa.gov]
Sent: Tuesday, February 22, 2011 3:46 PM
To: Perrin.Alan@epamail.epa.gov; Cherepy.Andrea@epamail.epa.gov; Littleton.Brian@epamail.epa.gov; Schultheisz.Daniel@epamail.epa.gov; Edwards.Jonathan@epamail.epa.gov; Rosnick.Reid@epamail.epa.gov; Stahle.Susan@epamail.epa.gov; Peake.Tom@epamail.epa.gov; Comfort, Gary; Danna, James; Piccone, Josephine; Striz, Elise; Mattsen, Catherine; VonTill, Bill; Ginsberg.Marilyn@epamail.epa.gov
Subject: EPA-NRC 2/22/11 Meeting Attendees

All,
Attached is a PDF copy of the meeting attendee list for our discussions held today with phone numbers and e-mail addresses.

Thanks for coming,
Loren Setlow

(See attached file: epa-nrc mtg attendees.2 22 2011.pdf)

EPA-3536

Tom Peake/DC/USEPA/US

02/23/2011 04:06 PM

To Andrea Cherepy, Daniel Schultheisz, Kathleen Economy, Kenneth Czyscinski, Reid Rosnick, Tony Nesky, Valentine Anoma

cc Alan Perrin, Brian Littleton, Jonathan Edwards

bcc

Subject Information Update - Room has changed: Uranium regulation progress/coordination weekly meeting

This standing meeting will be to go over weekly or other milestones, identify issues and needs, ensure coordination and generally make sure that the 40 CFR 192 and Subpart W remain on schedule.

EPA-992

"VonTill, Bill" <Bill.VonTill@nrc.gov>

02/23/2011 04:07 PM

To Loren Setlow

cc "Comfort, Gary", Reid Rosnick, "Cohen, Stephen", Tom Peake

bcc

Subject RE: EPA-NRC 2/22/11 Meeting Attendees

Thanks, and again, congrats on your retirement and enjoy it!

Cheers

-----Original Message-----
From: Setlow.Loren@epamail.epa.gov [mailto:Setlow.Loren@epamail.epa.gov]
Sent: Wednesday, February 23, 2011 4:06 PM
To: VonTill, Bill
Cc: Comfort, Gary; Rosnick.Reid@epamail.epa.gov; Cohen, Stephen; Peake.Tom@epamail.epa.gov
Subject: RE: EPA-NRC 2/22/11 Meeting Attendees

Bill,
Reid is still out sick, but I'm sure that either Tom or Reid should be able to get that to you in the next few days.

--Loren

From: "VonTill, Bill" <Bill.VonTill@nrc.gov>
To: Loren Setlow/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA, Reid Rosnick/DC/USEPA/US@EPA
Cc: "Cohen, Stephen" <Stephen.Cohen@nrc.gov>, "Comfort, Gary" <Gary.Comfort@nrc.gov>
Date: 02/23/2011 03:58 PM
Subject: RE: EPA-NRC 2/22/11 Meeting Attendees

Thanks Loren

This is probably for Reid, but can we get a copy of the NMA letter to EPA relative to their argument that heap leach cells shouldn't be included in Subpart W?

Thanks

-----Original Message-----
From: Setlow.Loren@epamail.epa.gov [mailto:Setlow.Loren@epamail.epa.gov]

Sent: Tuesday, February 22, 2011 3:46 PM
To: Perrin.Alan@epamail.epa.gov; Cherepy.Andrea@epamail.epa.gov; Littleton.Brian@epamail.epa.gov; Schultheisz.Daniel@epamail.epa.gov; Edwards.Jonathan@epamail.epa.gov; Rosnick.Reid@epamail.epa.gov; Stahle.Susan@epamail.epa.gov; Peake.Tom@epamail.epa.gov; Comfort, Gary; Danna, James; Piccone, Josephine; Striz, Elise; Mattsen, Catherine; VonTill, Bill; Ginsberg.Marilyn@epamail.epa.gov

Subject: EPA-NRC 2/22/11 Meeting Attendees

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Thanks for coming,
Loren Setlow

(See attached file: epa-nrc mtg attendees.2 22 2011.pdf)

EPA-3568

Reid Rosnick/DC/USEPA/US
02/24/2011 07:45 AM

To "VonTill, Bill"
cc "Comfort, Gary", Loren Setlow, "Cohen, Stephen", Tom Peake, Andrea Cherepy
bcc
Subject RE: EPA-NRC 2/22/11 Meeting Attendees

Hi Bill,

Sorry I couldn't attend the meeting, I've been fighting the flu.

In answer to your question, there is no NMA letter to EPA arguing that heap leach cells are not subject to NESHAP Subpart W. As you know, there was a presentation (by Chris Pugsley I believe) at the Uranium Recovery Workshop in Denver regarding this issue. Also, I had a conversation with Katie Sweeney and Tony Thompson in which they verbally told me of their argument (the ore in the pile does not become byproduct material or tailings until after the final leaching takes place, after which the pile is closed), but nothing was written or sent to us. Perhaps the confusion is from a "preamble" that was written in several responses to our enforcement requests back in 2009. In that preamble, an argument was made for why evaporation ponds should not be regulated under Subpart W, but there was no mention of heap leach. Here is a link to the preamble that was included in the response from Cotter:

http://www.epa.gov/radiation/docs/neshaps/subpart-w/2009-05-28cottersresponsetoepasrequestforinformation.pdf

The first 10 pages or so contain the argument. I hope this helps, please let me know if you have any other questions or comments. Thanks

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

"VonTill, Bill" Thanks Loren This is probably for Reid,... 02/23/2011 03:58:44 PM

From: "VonTill, Bill" <Bill.VonTill@nrc.gov>
To: Loren Setlow/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA, Reid Rosnick/DC/USEPA/US@EPA
Cc: "Cohen, Stephen" <Stephen.Cohen@nrc.gov>, "Comfort, Gary" <Gary.Comfort@nrc.gov>
Date: 02/23/2011 03:58 PM
Subject: RE: EPA-NRC 2/22/11 Meeting Attendees

Thanks Loren

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Thanks

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Subject: EPA-NRC 2/22/11 Meeting Attendees

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Thanks for coming,
Loren Setlow

(See attached file: epa-nrc mtg attendees.2 22 2011.pdf)

EPA-993

Reid Rosnick/DC/USEPA/US

02/24/2011 07:45 AM

To "VonTill, Bill"

cc "Comfort, Gary", Loren Setlow, "Cohen, Stephen", Tom Peake, Andrea Cherepy

bcc

Subject RE: EPA-NRC 2/22/11 Meeting Attendees

Hi Bill,

Sorry I couldn't attend the meeting, I've been fighting the flu.

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The first 10 pages or so contain the argument. I hope this helps, please let me know if you have any other questions or comments. Thanks

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

"VonTill, Bill" Thanks Loren This is probably for Reid,... 02/23/2011 03:58:44 PM

From: "VonTill, Bill" <Bill.VonTill@nrc.gov>
To: Loren Setlow/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA, Reid Rosnick/DC/USEPA/US@EPA
Cc: "Cohen, Stephen" <Stephen.Cohen@nrc.gov>, "Comfort, Gary" <Gary.Comfort@nrc.gov>
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Subject: EPA-NRC 2/22/11 Meeting Attendees

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Loren Setlow

(See attached file: epa-nrc mtg attendees.2 22 2011.pdf)

EPA-994

"VonTill, Bill" <Bill.VonTill@nrc.gov>

02/24/2011 07:53 AM

To Reid Rosnick

cc "Comfort, Gary", Loren Setlow, "Cohen, Stephen", Tom Peake, Andrea Cherepy

bcc

Subject RE: EPA-NRC 2/22/11 Meeting Attendees

Thanks Reid

Hope you are feeling better.

From: Rosnick.Reid@epamail.epa.gov [mailto:Rosnick.Reid@epamail.epa.gov]
Sent: Thursday, February 24, 2011 7:46 AM
To: VonTill, Bill
Cc: Comfort, Gary; Setlow.Loren@epamail.epa.gov; Cohen, Stephen; Peake.Tom@epamail.epa.gov; Cherepy.Andrea@epamail.epa.gov
Subject: RE: EPA-NRC 2/22/11 Meeting Attendees

Hi Bill,

Sorry I couldn't attend the meeting, I've been fighting the flu.

In answer to your question, there is no NMA letter to EPA arguing that heap leach cells are not subject to NESHAP Subpart W. As you know, there was a presentation (by Chris Pugsley I believe) at the Uranium Recovery Workshop in Denver regarding this issue. Also, I had a conversation with Katie Sweeney and Tony Thompson in which they verbally told me of their argument (the ore in the pile does not become byproduct material or tailings until after the final leaching takes place, after which the pile is closed), but nothing was written or sent to us. Perhaps the confusion is from a "preamble" that was written in several responses to our enforcement requests back in 2009. In that preamble, an argument was made for why evaporation ponds should not be regulated under Subpart W, but there was no mention of heap leach. Here is a link to the preamble that was included in the response from Cotter:

http://www.epa.gov/radiation/docs/neshaps/subpart-w/2009-05-28cottersresponsetoepasrequestforinformation.pdf

The first 10 pages or so contain the argument. I hope this helps, please let me know if you have any other questions or comments. Thanks

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

From: "VonTill, Bill" <Bill.VonTill@nrc.gov>
To: Loren Setlow/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA, Reid Rosnick/DC/USEPA/US@EPA
Cc: "Cohen, Stephen" <Stephen.Cohen@nrc.gov>, "Comfort, Gary" <Gary.Comfort@nrc.gov>
Date: 02/23/2011 03:58 PM
Subject: RE: EPA-NRC 2/22/11 Meeting Attendees

Thanks Loren

This is probably for Reid, but can we get a copy of the NMA letter to EPA relative to their argument that heap leach cells shouldn't be included in Subpart W?

Thanks

-----Original Message-----
From: Setlow.Loren@epamail.epa.gov [mailto:Setlow.Loren@epamail.epa.gov]
Sent: Tuesday, February 22, 2011 3:46 PM
To: Perrin.Alan@epamail.epa.gov; Cherepy.Andrea@epamail.epa.gov; Littleton.Brian@epamail.epa.gov; Schultheisz.Daniel@epamail.epa.gov; Edwards.Jonathan@epamail.epa.gov; Rosnick.Reid@epamail.epa.gov; Stahle.Susan@epamail.epa.gov; Peake.Tom@epamail.epa.gov; Comfort, Gary; Danna, James; Piccone, Josephine; Striz, Elise; Mattsen, Catherine; VonTill, Bill; Ginsberg.Marilyn@epamail.epa.gov
Subject: EPA-NRC 2/22/11 Meeting Attendees

All,
Attached is a PDF copy of the meeting attendee list for our discussions held today with phone numbers and e-mail addresses.

Thanks for coming,
Loren Setlow

(See attached file: epa-nrc mtg attendees.2 22 2011.pdf)

EPA-2116

Reid Rosnick/DC/USEPA/US		To	Andrea Cherepy
02/24/2011 01:26 PM		cc	
		bcc	
		Subject	Subpart W Website

http://www.epa.gov/radiation/neshaps/subpartw/rulemaking-activity.html

----
Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
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Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-1428

Tom Peake/DC/USEPA/US

02/28/2011 01:51 PM

To Valentine Anoma

cc Andrea Cherepy, Valerie Daigler, Reid Rosnick, Setlow.Loren

bcc

Subject Need to modify the economic work assignment

Val,
I reviewed the economic work assignment and think that, given the accelerated schedules of both rules, we need to make sure the economic work assignment covers both Subpart W and 192. Thus you should have one task that addresses Subpart W and one that addresses 192. Also, I think we need to have some specific economic analysis identified for ISLs in the 192 portion of the work. Please work with Andrea (x9317) to come up with some specific issues. Loren has provided some information in recent emails that can be used.

Thanks.

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

EPA-1929

Reid Rosnick/DC/USEPA/US

03/04/2011 09:14 AM

To Mike Boyd

cc

bcc

Subject See Below

Is there anything you need from me regarding Subpart W? Let me know.

NRC Regulatory Information Conference – On March 8, Mike Boyd will give a presentation titled "U.S. EPA's Radiation Protection Program -- A 2011 Update" at the U.S. Nuclear Regulatory Commission's annual Regulatory Information Conference in Rockville, MD. His presentation will provide information on EPA's plans for updating Federal Guidance Technical Reports 11, 12, and 13 (standard methods for radionuclide dose and risk assessments). In addition, plans for updating 40 CFR part 192 (uranium mill tailings rule), 40 CFR 61, Subpart W (radon emissions standards for uranium mill tailings), and considerations for a possible update to the fuel cycle regulations at 40 CFR 190 will be discussed.

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rosnick.reid@epa.gov

EPA-1031

Brian Littleton/DC/USEPA/US	To	"Steve Marschke"
03/08/2011 10:37 AM	cc	"Abe Zeitoun", Reid Rosnick, "Rose Gogliotti"
	bcc	
	Subject	Re: Fw: Canon City Met Data

Steve,
We prefer to have the report as complete as possible before finalizing it. That being said, at this time I would wait for the Canon City data to be incorporated into the report. If there becomes a time that we realize that the data will not be available to incorporate into our report, or will not be available in a timely fashion to meet the March 26, 2011 contract deadline, then please be prepared to finalize immediately.

But for right now, we can hold off for at least a week.

Regarding a conference call, I would want to wait until Reid Rosnick is available, and he is out sick until 3/15. So sometime after that would be good.

Brian

****
Brian Littleton
EPA, Office of Air and Radiation/Radiation Protection Division
1200 Pennsylvania Avenue, NW - Mailcode 6608J
Washington D.C. 20460
(202) 343-9216

"Steve Marschke" Hi Brian and Ried, We've been worki... 03/07/2011 10:52:46 AM

From:	"Steve Marschke" <smarschke@scainc.com>
To:	Reid Rosnick/DC/USEPA/US@EPA, Brian Littleton/DC/USEPA/US@EPA
Cc:	"Rose Gogliotti" <rgogliotti@scainc.com>, "Abe Zeitoun" <azeitoun@scainc.com>
Date:	03/07/2011 10:52 AM
Subject:	Fw: Canon City Met Data

Hi Brian and Ried,

We've been working on addressing the comments received on the draft Risk Assessment report (WA 1-04, Task 4). We also revised the Sweetwater CAP88 run to include new meteorological data provided by Oscar Paulson. As you can see from the email below from Jim Cain, we have not received the Canon City met data.

I've been waiting until we get that data, re-run CAP88, and revise the report, before sending the revised report back to you.

We were scheduled to have a conference call February 25th, but cancelled because we hadn't sent you the revised report. Please let me know if you want to see the report as it now stands, or wait until we get the Canon City met data and finish all the revisions. Also, when would you like to have a conference call -- now or after we complete the Canon City update?

Thanks,
Steve

----- Original Message -----
From: Jim Cain
To: Steve Marschke
Sent: Monday, February 28, 2011 2:14 PM
Subject: RE: Canon City Met Data

Steve

I was out ill part of last week but have not yet gotten clearance to send info.

I will let you know as soon as I hear.

Jim Cain
Environmental Coordinator/Radiation Safety Officer
Canon City Milling Facility
PO Box 1750
Canon City CO 81215-1750
719 275 7413 ext 212
719 275 1669 (fax)
303 669 9812 (mobile)

From: Steve Marschke [mailto:smarschke@scainc.com]
Sent: Wednesday, February 23, 2011 9:42 AM
To: Jim Cain
Cc: Rosnick.Reid@epamail.epa.gov; Rose Gogliotti; Brian Littleton; Abe Zeitoun
Subject: Fw: Canon City Met Data

Dear Mr Cain,

It was good talking with you this morning.

As I mentioned, we're working on the radon risk assessment from uranium facilities for EPA. We've modeled each facility using the best data we could find in the open literature. I found reference to the Canon City met tower in the open literature (e.g., the recently published ATSDR report), but was unable to locate any data collected by that tower. If you could provide me with joint frequency data for a representative period (ATSDR used 2008 data, which would be fine), we would use that data in our assessment, instead of data for Colorado Springs from the CAP88 library.

Also, we're basing our radon releases on the 1999 through 2009 reported fluxes from the Primary and Secondary Impoundments, and have assumed that other sources would be small. If you have better information on the site's annual radon release, we'd be happy to receive it and use it in our assessment.

Thanks for your help,
Steve

----- Original Message -----
From: Steve Marschke
To: jim.cain@cottercc.com
Cc: Rosnick.Reid@epamail.epa.gov ; Brian Littleton ; Abe Zeitoun
Sent: Monday, February 14, 2011 5:19 PM
Subject: Canon City Met Data

Dear Mr Cain,

I'm working with Reid Rosnick and Brian Littleton of the EPA on the radon risk assessment from uranium recovery facilities. As you know, we performed the draft assessment using CAP88, meteorological data that was obtained from the CAP88 library for Colorado Springs, and radon release estimates based on the radon fluxes reported in the semi-annual effluent reports that are submitted to the Colorado Dept of Public Health and Environment.

From talking with Reid, I understand that you have offered to supply us with meteorological data from the onsite tower. I would greatly appreciate that data, either as joint frequency tables, or in CAP88's STAR format. Likewise, please feel free to forward any additional data that you might have that would enhance the risk assessment, e.g., the annual radon release estimates.

Thanks for your help,
Steve

EPA-2469

Brian Littleton/DC/USEPA/US

03/08/2011 03:40 PM

To "Steve Marschke"

cc "Abe Zeitoun", Reid Rosnick, "Rose Gogliotti"

bcc

Subject Re: Fw: Canon City Met Data

I'm good with that. We made an attempt.
Brian

****
Brian Littleton
EPA, Office of Air and Radiation/Radiation Protection Division
1200 Pennsylvania Avenue, NW - Mailcode 6608J
Washington D.C. 20460
(202) 343-9216

"Steve Marschke" Hi Brian and Reid, As Jim Cain's em... 03/08/2011 02:52:39 PM

From: "Steve Marschke" <smarschke@scainc.com>
To: Reid Rosnick/DC/USEPA/US@EPA, Brian Littleton/DC/USEPA/US@EPA
Cc: "Rose Gogliotti" <rgogliotti@scainc.com>, "Abe Zeitoun" <azeitoun@scainc.com>
Date: 03/08/2011 02:52 PM
Subject: Fw: Canon City Met Data

Hi Brian and Reid,

As Jim Cain's email below indicates, we will NOT be getting any additional data from Cotter for the Canon City site. So SC&A will proceed to address the comments that we've received and finalize the WA 1-04, Task 4 Risk Assessment report.

Steve

----- Original Message -----
From: Jim Cain
To: Steve Marschke
Sent: Tuesday, March 08, 2011 2:34 PM
Subject: RE: Canon City Met Data

Steve

I am unable to provide this information to you at this time. As you stated, ATSDR was provided the 2008 JFD by our contractor and perhaps you can recover it from them. As far as the other sources of radon from the site, that was modeled in the MILDOS runs for all years. We currently still have ore on two ore pads and other surfaces are modeled based on the radium concentration of the soils.

Jim Cain
Environmental Coordinator/Radiation Safety Officer
Canon City Milling Facility
PO Box 1750
Canon City CO 81215-1750
719 275 7413 ext 212
719 275 1669 (fax)
303 669 9812 (mobile)

From: Steve Marschke [mailto:smarschke@scainc.com]
Sent: Wednesday, February 23, 2011 9:42 AM
To: Jim Cain
Cc: Rosnick.Reid@epamail.epa.gov; Rose Gogliotti; Brian Littleton; Abe Zeitoun
Subject: Fw: Canon City Met Data

Dear Mr Cain,

It was good talking with you this morning.

As I mentioned, we're working on the radon risk assessment from uranium facilities for EPA. We've modeled each facility using the best data we could find in the open literature. I found reference to the Canon City met tower in the open literature (e.g., the recently published ATSDR report), but was unable to locate any data collected by that tower. If you could provide me with joint frequency data for a representative period (ATSDR used 2008 data, which would be fine), we would use that data in our assessment, instead of data for Colorado Springs from the CAP88 library.

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Thanks for your help,
Steve

----- Original Message -----
From: Steve Marschke
To: jim.cain@cottercc.com
Cc: Rosnick.Reid@epamail.epa.gov ; Brian Littleton ; Abe Zeitoun
Sent: Monday, February 14, 2011 5:19 PM
Subject: Canon City Met Data

Dear Mr Cain,

I'm working with Reid Rosnick and Brian Littleton of the EPA on the radon risk assessment from uranium recovery facilities. As you know, we performed the draft assessment using CAP88, meteorological data that was obtained from the CAP88 library for Colorado Springs, and radon release estimates based on the radon fluxes reported in the semi-annual effluent reports that are submitted to the Colorado Dept of Public Health and Environment.

From talking with Reid, I understand that you have offered to supply us with meteorological data from the onsite tower. I would greatly appreciate that data, either as joint frequency tables, or in CAP88's STAR format. Likewise, please feel free to forward any additional data that you might have that would enhance the risk assessment, e.g., the annual radon release estimates.

Thanks for your help,
Steve

EPA-1899

Reid Rosnick/DC/USEPA/US

03/16/2011 05:07 PM

To Tom Peake

cc

bcc

Subject Wednesday

HI Tom,

Interesting conference call this afternoon. The consultations may be a big time draw. I have been hoping that we could use all of the meetings with the tribes in lieu of consultations. Too bad about Andrea, when it rains, it pours.

I worked about 6 hours today, after a 10:30-1:00 nap. Brian and I received the revised risk assessment for Subpart W. I spent a good portion of the time today reviewing it, and Brian and I have a conference call with SC&A tomorrow to discuss. We still have some issues with the document.

If OK, I'd like to do it again tomorrow, and then come in on Friday.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-2550

Reid Rosnick/DC/USEPA/US

03/18/2011 09:11 AM

To Tom Peake

cc Brian Littleton

bcc

Subject Today's conference call

Tom,

We're postponing the Subpart W conference call with you until sometime after Wednesday of next week. It's not so urgent that we can't wait till you're in the office. Have a good weekend.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
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1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-1979

Andrea Cherepy/DC/USEPA/US	To	Tom Peake
03/18/2011 05:33 PM	cc	Reid Rosnick
	bcc	
	Subject	Fw: Titan Uranium USA Sheep Mountain Project, Fremont County, Wyoming

FYI

----- Forwarded by Andrea Cherepy/DC/USEPA/US on 03/18/2011 05:29 PM -----

From:	Toby Wright <wrightenv@gmail.com>
To:	Deborah Lebow-Aal/R8/USEPA/US@EPA
Cc:	Andrea Cherepy/DC/USEPA/US@EPA, Gregory L Adams <gla1wyo@bresnan.net>, Chris Healey <cmhealey@titanuranium.com>, Doug Beahm <dbeahm@wyoming.com>
Date:	03/18/2011 01:46 PM
Subject:	Titan Uranium USA Sheep Mountain Project, Fremont County, Wyoming

Dear Ms. Lebow;

I was referred to you by Andrea Cherepy of EPA HQ. I am working with Titan Uranium USA (Titan) on a uranium mining project and would like to initiate discussion with EPA regarding this project.

Titan Uranium USA Inc. (Titan) proposes to construct and operate the Sheep Mountain uranium recovery facility (mill) to process uranium ore from Titan's adjacent mines and from area mines owned and operated by other entities in order to produce uranium oxide (U_3O_8) concentrate and to dispose of the resulting processing wastes in on-site tailings cells. The proposed project is located approximately 8 road miles South of Jeffrey City, Wyoming (Township 28 North, Range 92 West, Sections 4, 5, 9, 16, 17, 20, 21, 27, 29, 30, 32 and 33). The project is entirely within a previously mined and reclaimed area that maintains an active Permit to Mine (No. 381C) administrated by the Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD) in consultation with the US Bureau of Land Management (BLM). The mining will be regulated by the WDEQ-LQD and BLM, while the uranium recovery activities will be regulated by the U.S. Nuclear Regulatory Commission (NRC). Appropriate EPA regulations will also apply to aspects of this project

Uranium recovery will be performed by standard heap leach methods on double lined leach pads with double lined process ponds using sulfuric acid as the leach solution. The uranium recovery facility will consist of the heap leach pads, process ponds, and a processing plant. Leach solution processing will be performed in an on-site processing plant using a solvent extraction circuit, a precipitation circuit and drying and packaging circuits producing the final yellow cake product. The spent heap, after leaching is completed, would be reclaimed in-place with all appropriate dismantled mill components and associated process wastes (tailings). An appropriate cover would be placed over these tailings to ensure long-term stabilization. The proposed uranium recovery facility is located entirely on Federal land (BLM) while the adjacent mines are located on a mixture of Federal land (BLM) and State lands.

Titan would like to initiate discussions with EPA Region 8 regarding this project and EPA's understanding of the changes to 40 CFR Part 192 that are in process and 10 CFR Part 61, subpart W. I would like to propose a meeting in the afternoon of Thursday April 7th. If that does not work for you and your staff, could you please propose an alternate date and time. Thank you in advance for your help.

--

Toby Wright
Wright Environmental Services Inc.
3801 Automation Way, Suite 100
Fort Collins, CO 80525

[(970) 231-1160](tel:9702311160)
WrightEnv@gmail.com

EPA-3268

Tim Benner/DC/USEPA/US	To	David Carson, Souhail Al-Abed, Thabet Tolaymat
03/22/2011 10:12 AM	cc	Carlos Nunez
	bcc	Tim Benner
	Subject	Subpart W Workgroup Meeting

And to follow up on the last email, there will also be a workgroup meeting on April 6, which you are all invited to attend.

Tim Benner
ORD / OSP
202-564-6769

----- Forwarded by Tim Benner/DC/USEPA/US on 03/22/2011 10:11 AM -----

Subpart W Workgroup Meeting

Wed 04/06/2011 1:00 PM - 2:00 PM

Attendance is for Tim Benner

Chair: **Reid Rosnick/DC/USEPA/US**

Location: Call-in number - 866-299-3188 Conference Code 2023439563

Rooms: 1310L Room 502/DC-1310L-OAR@EPA

Required:	Andrea Cherepy/DC/USEPA/US@EPA, Angelique Diaz/R8/USEPA/US@EPA, CharlesA Hooper/R7/USEPA/US@EPA, Charlie Garlow/DC/USEPA/US@EPA, Davis Zhen/R10/USEPA/US@EPA, George Brozowski/R6/USEPA/US@EPA, Lena Ferris/DC/USEPA/US@EPA, Marilyn Ginsberg/DC/USEPA/US@EPA, Robert Duraski/R8/USEPA/US@EPA, Robert Dye/R7/USEPA/US@EPA, Scott Whitmore/R8/USEPA/US@EPA, Stephen Hoffman/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, Tim Benner/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA

Description

[attachment "Subpart W Peer Review.docx" deleted]
[attachment "GACT.docx" deleted]

We will be discussing direction for the next 6 months as well as any comments on the two attached documents: Optons for Peer Review of the Subpart W Risk Document, and Rationale for using a GACT standard.

Personal Notes

EPA-2567

Reid Rosnick/DC/USEPA/US

03/22/2011 05:00 PM

To Deborah Lebow-Aal

cc Kenneth Distler, Tom Peake

bcc

Subject Re: Fw: Titan Uranium USA Sheep Mountain Project, Fremont County, Wyoming

Hi Deb,

Sure, I'll participate. They might be curious about Subpart W applying to heap leach piles. The afternoon of April 7 is good for me.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

-----Deborah Lebow-Aal/R8/USEPA/US wrote: -----

To: Reid Rosnick/DC/USEPA/US@EPA
From: Deborah Lebow-Aal/R8/USEPA/US
Date: 03/22/2011 04:53PM
Cc: Kenneth Distler/R8/USEPA/US@EPA
Subject: Fw: Titan Uranium USA Sheep Mountain Project, Fremont County, Wyoming

Reid, as you can see below, this company wants to come in and talk to us about the regulations - 40 CFR part 192 and Subpart W. I will call them to find out if that's all they want to talk to us about, because I am guessing there is not much we can tell them at this point, but if they still want to talk to us, would you like to participate?

Deborah Lebow Aal
U.S. Environmental Protection Agency
Region 8 Air Program
Acting Director, Air Program
1595 Wynkoop Street
Denver, CO 80202
303 312-6223

----- Forwarded by Deborah Lebow-Aal/R8/USEPA/US on 03/22/2011 02:50 PM -----

From: Toby Wright <wrightenv@gmail.com>

To: Deborah Lebow-Aal/R8/USEPA/US@EPA
Cc: Andrea Cherepy/DC/USEPA/US@EPA, Gregory L Adams <gla1wyo@bresnan.net>, Chris Healey <cmhealey@titanuranium.com>, Doug Beahm <dbeahm@wyoming.com>
Date: 03/18/2011 11:46 AM
Subject: Titan Uranium USA Sheep Mountain Project, Fremont County, Wyoming

---

Dear Ms. Lebow;

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Titan would like to initiate discussions with EPA Region 8 regarding this project and EPA's understanding of the changes to 40 CFR Part 192 that are in process and 10 CFR Part 61, subpart W. I would like to propose a meeting in the afternoon of Thursday April 7th. If that does not work for you and your staff, could you please propose an alternate date and time. Thank you in advance for your help.

--
Toby Wright
Wright Environmental Services Inc.
3801 Automation Way, Suite 100
Fort Collins, CO 80525
(970) 231-1160
WrightEnv@gmail.com

EPA-2168

Albion Carlson/R8/USEPA/US

03/23/2011 10:36 AM

To Reid Rosnick

cc Scott Whitmore

bcc

Subject Fw: Subpart W Workgroup

Reid,

About a year ago I was assigned to take over the radionuclide Subpart B and Subpart W responsibilities in Region 8's technical enforcement program from Scott Whitmore. I plan to be on the call April 6th. Please put me on your email roster as the contact from our group. Thanks,

Albion Carlson

----- Forwarded by Albion Carlson/R8/USEPA/US on 03/23/2011 08:20 AM -----

Re: Subpart W Workgroup

Scott Whitmore to: Albion Carlson 03/22/2011 04:57 PM

From: Scott Whitmore/R8/USEPA/US

To: Albion Carlson/R8/USEPA/US@EPA

Invitation: Subpart W Workgroup Meeting

Wed 04/06/2011 11:00 AM - 12:00 PM

Attendance is **required** for Scott Whitmore

Chair: **Reid Rosnick/DC/USEPA/US**

Location: Call-in number - 866-299-3188 Rooms: 1310L Room 502/DC-1310L-OAR@EPA

Conference Code 2023439563

Andrea Cherepy/DC/USEPA/US@EPA, Angelique Diaz/R8/USEPA/US@EPA, CharlesA Hooper/R7/USEPA/US@EPA, Charlie Garlow/DC/USEPA/US@EPA, Davis Zhen/R10/USEPA/US@EPA, George Brozowski/R6/USEPA/US@EPA, Lena Ferris/DC/USEPA/US@EPA, Marilyn Ginsberg/DC/USEPA/US@EPA, Robert Duraski/R8/USEPA/US@EPA, Robert Dye/R7/USEPA/US@EPA, Scott Whitmore/R8/USEPA/US@EPA, Stephen Hoffman/DC/USEPA/US@EPA, Stuart Walker/DC/USEPA/US@EPA, Susan Stahle/DC/USEPA/US@EPA, Tim Benner/DC/USEPA/US@EPA, Tom Peake/DC/USEPA/US@EPA

[attachment "Subpart W Peer Review.docx" deleted by Albion Carlson/R8/USEPA/US] [attachment "GACT.docx" deleted by Albion Carlson/R8/USEPA/US]

We will be discussing direction for the next 6 months as well as any comments on the two attached documents: Optons for Peer Review of the Subpart W Risk Document, and Rationale for using a GACT standard.

Albion Carlson Sure, I'll participate. 03/22/2011 02:20:17 PM

From: Albion Carlson/R8/USEPA/US

To: Scott Whitmore/R8/USEPA/US@EPA

Date: 03/22/2011 02:20 PM
Subject: Re: Subpart W Workgroup

Sure, I'll participate.

Scott Whitmore There is a Subpart W workgroup call sc... 03/22/2011 01:52:34 PM

Subpart W Workgroup

Scott Whitmore to: Albion Carlson 03/22/2011 01:52 PM

There is a Subpart W workgroup call scheduled for April 6, 2011 at 11:00am MT. I received a meeting invite. If you would like to participate, let me know. I'll give you the info.

EPA-2169

Reid Rosnick/DC/USEPA/US
03/23/2011 10:42 AM

To Albion Carlson
cc Scott Whitmore
bcc
Subject Re: Fw: Subpart W Workgroup

Albion,

Thanks, I'll add you to the mailing list.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-3299

Reid Rosnick/DC/USEPA/US

03/24/2011 10:46 AM

To pvegidi

cc

bcc

Subject Status of Cotter Impoundments

Hello Phil,

I hope this note finds you well. I have a quick hypothetical question on Cotter, if you're not the correct person, could you please forward.

If Cotter decides to renew their license, would they be required to construct a new tailings impoundment rather than continue use of the existing impoundment(s)? Thanks

Reid

Reid J. Rosnick
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1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-1181

Reid Rosnick/DC/USEPA/US		To	ron.linton
03/24/2011 11:37 AM		cc	
		bcc	
		Subject	Question About Heap Leach

Hello Ron,

I have a quick question about heap leach that I saw on the NRC website. At http://www.nrc.gov/materials/uranium-recovery/extraction-methods/comparison.html regarding the approximate size of heaps, it states that the heap piles are limited in size to 40 acres. Would you please give me a reference for that size limitation? Thank you.

Reid

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Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-1583

Reid Rosnick/DC/USEPA/US	To	Robert Dye
03/24/2011 11:47 AM	cc	
	bcc	
	Subject	Re: Updates on the Subpart W Rulemaking

Hi Bob,

Sorry for the delay, I was waiting to see if there were other conflicts, and unfortunately, or surprisingly, everyone was fine with the scheduled time, so I think I'm going to leave it as is. I'm sorry this is a conflict for you.

Reid

Reid J. Rosnick
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1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Robert Dye Just wanted to make sure you saw my... 03/22/2011 10:19:18 AM

From: Robert Dye/R7/USEPA/US
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 03/22/2011 10:19 AM
Subject: Re: Updates on the Subpart W Rulemaking

Just wanted to make sure you saw my comment on the meeting you scheduled. I accepted it but commented that it is the same time as the ORIA Managers' Monthly call. If you could shift your call 1 hour either way those impacted could make both calls. thanks

Bob Dye
Radiation and Indoor Air
EPA Region 7
901 N. 5th Street
Kansas City, KS 66101
(913) 551-7605
fax (913)551-7844
dye.robert@epa.gov

EPA-2710

EAS.System@EPA

03/24/2011 04:35 PM

To Reid Rosnick

cc

bcc

Subject EAS Document Notification: For your reference: Award: EP-D-10-042/2-03

Award: EP-D-10-042/2-03 has been approved by Jared Van Buskirk in EAS.
Description: Technical/Regulatory Support for Subpart W of NESHAPS
Owner: Valerie Daigler
Contract Specialist: Nnenna Njoku
Contracting Officer: Jared Van Buskirk
Project Officer: Valerie Daigler
Site: OAR/ORIA
Contracting Office: SRRPOD

EPA-3304

Reid Rosnick/DC/USEPA/US

03/25/2011 09:16 AM

To dfrydenlund

cc

bcc

Subject Question

Hi David,

I have a quick question on the status of Cell 3 at the White Mesa mill. In your 2009 response to our Section 114 request for information you stated that Cell 3, an impoundment in existence before December 31, 1989, was near capacity, although currently in operation. I know that I have probably asked you this but I can't find your response. Do you have a timeframe in mind when Cell 3 will reach capacity? Thanks

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-3305

David Frydenlund <DFrydenlund@denisonmines.com>

03/28/2011 11:41 AM

To Reid Rosnick

cc Harold Roberts

bcc

Subject RE: Question

Reid,

Cell 3 is almost full. We have placed as much tailings sands into it as we can at this time. We are now pumping any residual free solution out of the cell and contouring the sands. We will then determine if any more solids need to be added to the cell to fill it to the specified final elevation.

We currently expect to be able to make these final adjustments and close out Cell 3 by the end of this year.

Dave

David Frydenlund
Vice President, Regulatory Affairs, Counsel and Corp Secretary

t: 303-389-4130 | f: 303-389-4125
1050 17th Street, Suite 950
Denver, CO, US, 80265

DENISON MINES (USA) CORP
www.denisonmines.com

From: Rosnick.Reid@epamail.epa.gov [mailto:Rosnick.Reid@epamail.epa.gov]
Sent: Friday, March 25, 2011 7:17 AM
To: David Frydenlund
Subject: Question

Hi David,

I have a quick question on the status of Cell 3 at the White Mesa mill. In your 2009 response to our Section 114 request for information you stated that Cell 3, an impoundment in existence before December 31, 1989, was near capacity, although currently in operation. I know that I have probably asked you this but I can't find your response. Do you have a timeframe in mind when Cell 3 will reach capacity? Thanks

Reid

Reid J. Rosnick

Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

EPA-3355

Reid Rosnick/DC/USEPA/US
03/29/2011 09:22 AM

To DFrydenlund
cc
bcc
Subject RE: Question

Thanks, Dave,

Sorry for not responding earlier, I'm at home recovering from pneumonia.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

-----David Frydenlund <DFrydenlund@denisonmines.com> wrote: -----
To: Reid Rosnick/DC/USEPA/US@EPA
From: David Frydenlund <DFrydenlund@denisonmines.com>
Date: 03/28/2011 11:39AM
Cc: Harold Roberts <HRoberts@denisonmines.com>
Subject: RE: Question

Reid,

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David Frydenlund
Vice President, Regulatory Affairs, Counsel and Corp Secretary

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t: 303-389-4130 | f: 303-389-4125
1050 17th Street, Suite 950
Denver, CO, US, 80265

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Reid

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1200 Pennsylvania Ave., NW

Washington, DC 20460
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rosnick.reid@epa.gov

EPA-1008

Sarah Fields
<sarah@uraniumwatch.org>

03/29/2011 06:33 PM

To Reid Rosnick

cc

bcc

Subject Subpart W Rulemaking Historical Documents

Dear Mr. Rosnick,

I note that the Subpart W review documents on the Subpart W Rulemaking Activity Website in the Historical Rulemakings section includes the Draft EIS for the Proposed Radionuclides rulemaking, dated February 1989. However, this is only Volume 1 of a 3-volume draft EIS.

I request that the all 3 volumes of the Final EIS, September 1989, be placed with the Historical Rulemakings documents.

Sarah Fields
Uranium Watch

EPA-1849

Reid Rosnick/DC/USEPA/US		To	Sarah Fields
03/31/2011 07:11 AM		cc	
		bcc	
		Subject	Re: Subpart W Rulemaking Historical Documents

Hello Sarah,

Sorry for not responding sooner, but as you can imagine, things are very hectic here. Our Division has the lead on the reactor incidents in Japan, through our RadNet array.

In response to your question I checked the website, and the 3 documents you have requested are directly below the draft Volume 1 of the EIS.

http://www.epa.gov/radiation/docs/neshaps/subpart-w/historical-rulemakings/risk-assessments-methodology-eis-neshaps-for-radionuclides.pdf

http://www.epa.gov/radiation/docs/neshaps/subpart-w/historical-rulemakings/risk-assessments-methodology-eis-neshaps-for-radionucl%20%281%29.pdf

http://www.epa.gov/radiation/docs/neshaps/subpart-w/historical-rulemakings/riskassessmentsmethodology-%20eis-neshapsforradionucl%282%29.pdf

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Sarah Fields Dear Mr. Rosnick, I note that the Subpa... 03/29/2011 06:33:36 PM

From: Sarah Fields <sarah@uraniumwatch.org>
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 03/29/2011 06:33 PM
Subject: Subpart W Rulemaking Historical Documents

Dear Mr. Rosnick,

I note that the Subpart W review documents on the Subpart W Rulemaking Activity Website in the Historical Rulemakings section includes the Draft EIS for the Proposed Radionuclides rulemaking, dated February 1989. However, this is only Volume 1 of a 3-volume draft EIS.

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Sarah Fields
Uranium Watch

EPA-1994

Tom Peake/DC/USEPA/US

01/11/2011 04:59 PM

To: Setlow.Loren, Reid Rosnick, Andrea Cherepy, Valentine Anoma, Kenneth Czyscinski

cc: Daniel Schultheisz, Jonathan Edwards, Alan Perrin

bcc:

Subject: Schedules for 192 and Subpart W

FYI,
The attached file has our schedules for 192 and Subpart W that we need to make since they are going forward in the Tier 1 document and briefings. The Fall of 2012 is problematic because of the elections. Due to a potential change in administration we should try to get our regulations to OMB as early in 2012 as we can--September may be too late.

May the force be with us!

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

Tier 1 Deliverable Dates 192 and Subpart W.docx

40 CFR 192 and Subpart W Deliverable Dates

Draft January 3, 2011

40 CFR 192*	Revised Schedule
Risk Assessment/Peer Review Complete	Fall 2011
Economics Analysis	Summer 2011
SAB Advisory (important, but not critical path)	November 2011
Summary info	November 2011
Opt selection pkg prior to opt selection	December 2011
Option selection	*February 2012*
FAR Agency Reg Rev	June 2012
To OMB	September 2012 (need to try for August)
Proposal in FR	*December 2012 (it's a goal!)*

*Assumptions: We have Loren's replacement hired as a TENORM subject matter expert and someone else to manage the regulatory process; and we don't have continued poor performance issues with the contracts office. We also realize that the Fall of 2012 puts us in dicey territory with the election. *Italicized* items are the ones listed in the ORIA Priority Tiering.

Subpart W	Revised Schedule
Risk Assessment	Winter 2010
Peer Review Complete	Summer 2011
Economics Analysis	Summer 2011
Opt selection pkg 2 months prior to opt selection	September 2011
Option selection	November 2011
FAR Agency Reg Rev	1st quarter 2012
To OMB	June 2012
Proposal in FR	November 2012

EPA-1994

Tom Peake/DC/USEPA/US

01/11/2011 04:59 PM

To Setlow.Loren, Reid Rosnick, Andrea Cherepy, Valentine Anoma, Kenneth Czyscinski

cc Daniel Schultheisz, Jonathan Edwards, Alan Perrin

bcc

Subject Schedules for 192 and Subpart W

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May the force be with us!

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Risk Assessment	Winter 2010
Peer Review Complete	Summer 2011
Economics Analysis	Summer 2011
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Option selection	November 2011
FAR Agency Reg Rev	1st quarter 2012
To OMB	June 2012
Proposal in FR	November 2012

EPA-2370

Reid Rosnick/DC/USEPA/US		To	Beth Miller
01/19/2011 09:58 AM		cc	
		bcc	
		Subject	Re: Fw: TENORM Laws and Regulations page

40 CFR part 61 - Dec. 1989.pdf

Here you go.

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Beth Miller   Do you have a link or a pdf for the below. Thank...   01/19/2011 09:47:47 AM

From: Beth Miller/DC/USEPA/US
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 01/19/2011 09:47 AM
Subject: Fw: TENORM Laws and Regulations page

Do you have a link or a pdf for the below. Thanks
----- Forwarded by Beth Miller/DC/USEPA/US on 01/19/2011 09:47 AM -----

From: Marisa Savoy/DC/USEPA/US
To: Beth Miller/DC/USEPA/US@EPA
Date: 01/18/2011 11:04 AM
Subject: TENORM Laws and Regulations page

page - http://www.epa.gov/radiation/tenorm/regs.html#uraniummines

Need link to: *U.S. EPA 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants; Radionuclides: Final Rule and Notice of Reconsideration [Federal Register, 54 FR 240, December 15,1989.]* under the more info graphic

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 61

[FRL-3657-4]

RIN 2060-AC47

National Emission Standards for Hazardous Air Pollutants; Radionuclides

AGENCY: Environmental Protection Agency [EPA].

ACTION: Final rule and notice of reconsideration.

SUMMARY: This final rule announces the Administrator's final decisions on National Emission Standards for Hazardous Air Pollutants (NESHAPs) under section 112 of the Clean Air Act for emissions of radionuclides from the following source categories: DOE Facilities, Licensees of the Nuclear Regulatory Commission and Non-DOE Federal Facilities, Uranium Fuel Cycle Facilities, Elemental Phosphorus Plants, Coal-Fired Boilers, High-level Nuclear Waste Disposal Facilities, Phosphogypsum Stacks, Underground and Surface Uranium Mines, and the operation and disposal of Uranium Mill Tailings Piles. The final rule also responds to the major public comments on the March 7, 1989 proposed decisions for these categories (54 FR 9612). EPA is conducting this rulemaking pursuant to a voluntary remand and a schedule issued by the U.S. Court of Appeals for the D.C. Circuit which requires final action by October 31, 1989. In addition EPA is granting a reconsideration of the standards of 40 CFR part 61, subpart I concerning emissions from facilities licensed by the Nuclear Regulatory Commission, with respect to the issues of duplicative regulation and possible effects on medical treatment.

DATES: Effective Date: December 15, 1989. Subpart I is stayed until March 15, 1990. Comments on subpart I may be submitted on or before February 13, 1990. The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of December 15, 1989. Under section 307(b)(1) of the CAA, judicial review of decisions under section 112 is available only by filing a petition for review in the United States Court of Appeals for the District of Columbia Circuit within 60 days of today's publication of these rules. Under section 307(b)(2) of the CAA, the requirements that are the subject of today's notice may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

ADDRESS: Comments on subpart I should be submitted (in duplicate if possible) to: Central Docket (A-130), Environmental Protection Agency, Attn: Docket No. A-79-11, Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: James M. Hardin, Environmental Standards Branch, Criteria and Standards Division (ANR-460), Office of Radiation Programs, Environmental Protection Agency, Washington DC 20460, (202) 475-9610.

SUPPLEMENTARY INFORMATION:

Motion for Reconsideration

For any party who wishes to present new information to EPA, regarding the appropriateness of these rules, a Petition for Reconsideration may be filed under section 307(d)(7)(B).

Docket

The rulemaking record is contained in Docket No. A-79-11 and contains information considered in determining health effects, listing radionuclides as hazardous air pollutants, and setting standards. It also contains all comments received from the public during the comment period. This docket is available for public inspection and copying between 8:00 a.m. and 3:00 p.m. on weekdays. A reasonable fee may be charged for copying.

A single copy of the Background Information Document and Economic Assessment (which, combined, form the final Environmental Impact Statement (EIS)) have been placed in the docket. Other documents available include: A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions from NRC-Licensed and Non-DOE Federal Facilities (October 1989); Procedures Approved for Demonstrating Compliance with 40 CFR part 61, subpart I (October 1989); and User's Guide for the COMPLY Code (October 1989). Copies of these documents may be obtained by writing to: Director, Criteria and Standards Division (ANR-460), Office of Radiation Programs, Environmental Protection Agency, Washington, DC 20460.

Table of Contents

I. Definitions

A. Terms

Activity—The amount of a radioactive material. It is a measure of the transformation rate of radioactive nuclei at a given time. The customary unit of activity, the curie, is 3.7×10^{10} nuclear transformations per second.

Agreement State—Any state with which the Nuclear Regulatory Commission or the former Atomic Energy Commission has entered into an effective agreement under subsection 274(b) of the Atomic Energy Act.

Annualized Cost—A stream of annual payments for a determined time period, equal in value to a one-time payment based on a selected rate of interest.

By-product Material—Any radioactive material (except source material and special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material and wastes from the processing of ores primarily to recover their source material content.

Dose Standard—A regulatory standard that requires a regulated facility to limit its emissions to the level necessary to ensure that no individual receives an effective dose equivalent greater than the specified level.

Effective Dose Equivalent (EDE)—The sum of the risk-weighted organ dose equivalent commitments. The effective dose equivalent has the same risk (for the model used to derive the weighting factors) as a uniform dose equivalent to all organs and tissues. For the purposes of these standards, "effective dose equivalent" means the result of the calculation used to determine the dose equivalent to the whole body, by taking into account the specific organs receiving radiation, the dose each organ receives, and the risk per unit dose to that organ. A description of the weighting factors used in the calculation of the EDE is described in detail in the International Commission on Radiological Protection's Publication No. 26, Pergamon Press, New York (1982).

Flux standard—A regulatory standard that limits the amount of radon that can emanate per square meter of regulated material per second, averaged over a single source.

Half-Life—The time in which half the atoms of a particular radioactive substance transform, or decay, to another nuclear form.

Incidence—This term denotes the predicted number of fatal cancers in a population from exposure to a pollutant. Other health effects (non-fatal cancers, genetic, and developmental) are noted separately.

Maximum Individual Risk—The maximum additional cancer risk of a person due to exposure to an emitted pollutant for a 70-year lifetime.

Pathway—A way that radionuclides might contaminate the environment or reach people, e.g. air, water, food.

Radionuclide—A type of atom which spontaneously undergoes radioactive decay.

Source Term—The amount of radioactive material emitted to the atmosphere from a source, either estimated, measured or reported, that is used in the risk assessment.

Transuranic—An element with an atomic number greater than the atomic number of uranium.

Uranium Fuel Cycle—The operations of milling of uranium ore, chemical conversion of uranium, isotopic enrichment of uranium, fabrication of uranium fuel, generation of electricity by a light-water-cooled nuclear power plant using uranium fuel, and reprocessing of spent uranium fuel, to the extent that these directly support the production of electrical power for public use utilizing nuclear energy. This definition does not include mining operations, operations at waste disposal sites, transportation of any radioactive material in support of these operations, or the reuse of recovered non-uranium special nuclear and by-product materials from the cycle.

B. Acronyms

AEA—Atomic Energy Act, 42 U.S.C. 2011 *et seq.*
ALARA—As low as reasonably achievable
AMC—American Mining Congress
ANPR—Advanced Notice of Proposed Rulemaking
CAA—The Clean Air Act, 42 U.S.C. 7401 *et seq.*
CAP-88—Clean Air Act Assessment Package-1988
CERCLA—Comprehensive Environmental Response Compensation and Liability Act, 42 U.S.C. 9601 *et seq.*
CFR—Code of Federal Regulations
BID—The Background Information Document prepared in support of this rulemaking (Volume 1 of the EIS)
EIA—The Economic Impact Assessment prepared in support of this rulemaking (Volume 2 of the EIS)
EIS—Environmental Impact Statement
DOE—United States Department of Energy
EDF—Environmental Defense Fund
EPA—United States Environmental Protection Agency
HLW—High-Level Radioactive Waste
ICRP—International Commission on Radiological Protection
MSHA—Mine Safety and Health Administration
mrem—millirem, 1×10^{-3} rem
NAAQS—National Ambient Air Quality Standards
NESHAP—National Emission Standard for Hazardous Air Pollutants
NCRP—National Council on Radiation Protection and Measurements
NRC—United States Nuclear Regulatory Commission
NRDC—Natural Resources Defense Council, Inc.
pCi—picocurie, 1×10^{-12} curie
UFC—Uranium Fuel Cycle
UMTRCA—Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. 7901, *et seq.*

II. EPA NESHAPs Policy

This section provides a description of the EPA's approach for the protection of public health under section 112. In protecting public health with an ample margin of safety under section 112, EPA strives to provide maximum feasible protection against risks to health from hazardous air pollutants by (1) protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1 in 1 million and (2) limiting to no higher than approximately 1 in 10 thousand the maximum estimated risk that a person living near a plant would have if he or she were exposed to the emitted pollutant for 70 years. Implementation of these goals is by means of a two-step standard-setting approach, with an analytical first step to determine an "acceptable risk" that considers all health information, including risk estimation uncertainty, and includes a presumptive limit on maximum individual lifetime risk (MIR) of approximately 1 in 10 thousand. A second step follows in which the actual standard is set at a level that provides "an ample margin of safety" in consideration of all health information, including the number of persons at risk levels higher than approximately 1 in 1 million, as well as other relevant factors including costs and economic impacts, technological feasibility, and other factors relevant to each particular decision. Applying this approach to the radionuclide source categories in today's notice results in controls that protect over 90 percent of the persons within 80 kilometers (km) of these sources at risk levels no higher than approximately 1 in 1 million.

A principle that accompanies these numerical goals is that the state of the art of risk assessment does not enable numerical risk estimates to be made with comparable confidence. Therefore, judgment must be used in deciding how numerical risk estimates are considered with respect to these goals. As discussed below, uncertainties arising from such factors as the lack of knowledge about the biology of cancer causation and gaps in data must be weighed along with other public health considerations. Many of the factors are not the same for different pollutants, or for different source categories.

A. Background

On March 7, 1989, EPA proposed decisions on standards under section 112 for twelve source categories of radionuclides. A principal aspect of the proposal, and the basis for the proposed decisions on the source categories, were four proposed approaches for decisions under section 112 as mandated by the D.C. Circuit's decision in *NRDC* v. *EPA*, 824 F.2d at 1146 (1987) (the *Vinyl Chloride* decision). The *Vinyl Chloride* decision required the Administrator to exercise his judgment under section 112 in two steps: first, a determination of a "safe" or "acceptable" level of risk considering only health factors, followed by a second step to set a standard that provides an "ample margin of safety", in which costs, feasibility, and other relevant factors in addition to health may be considered.

The four proposed approaches were designed to provide for consideration of a variety of health risk measures and information in the first step analysis under the *Vinyl Chloride* decision—the determination of "acceptable risk." Included in the alternative approaches were three that consider only a single health risk measure in the first step: (1) Approach B, which considers only total cancer incidence with 1 case per year as the limit for acceptability; (2) Approach C, which considers only the maximum individual risk ("MIR") with a limit of 1 in 10 thousand for acceptability; and (3) Approach D, which considers only the maximum individual risk with 1 in 1 million as the limit. The fourth approach, Approach A, was a case-by-case approach that considers all health risk measures, the uncertainties associated with them, and other health information.

In the second step, setting an "ample margin of safety", each of the four approaches considers all health risk and other information, uncertainties associated with the health estimates, as well as costs, feasibility, and other factors which may be relevant in particular cases. The proposal solicited comment on each of the approaches for implementing the *Vinyl Chloride* decision. The Agency received many public comments on the approaches from citizen's groups, companies and industry trade groups, state and local governments, and individuals.

B. General NESHAP Policy Considerations

The purpose of this section is to discuss the appropriate criteria for determining an "acceptable risk" and an "ample margin of safety". In its determination, EPA will consider measures of health risk, and limitations and uncertainties of the risk estimation methods and basic data. A discussion of these factors follows. The framework adopted in this proceeding has already been selected in the Benzene NESHAP and will also become the policies for decisions on future NESHAPs but will not apply to other Agency programs or other sections of the Clean Air Act.

1. Selection of Approach

Based on the comments and the record developed in the rulemaking, EPA selected an approach announced in the notice on benzene standards published on September 14, 1989 (54 FR 38044), based on Approaches A and C but also incorporating consideration of incidence from Approach B and consideration of health protection for the general population on the order of 1 in 1 million from Approach D. Thus, in the first step of the *Vinyl Chloride* inquiry, EPA will consider the extent of the estimated risk were an individual exposed to the maximum level of a pollutant for a lifetime. The EPA will generally presume that if the risk to that individual is no higher than approximately 1 in 10 thousand, that risk level is considered acceptable and EPA then considers the other health and risk factors to complete an overall judgment on acceptability. The presumptive level provides a benchmark for judging the acceptability of maximum individual risk, but does not constitute a rigid line for making that determination.

The Agency recognizes that consideration of maximum individual risk—the maximum estimated risk of contracting cancer following a lifetime of exposure to the emitted pollutant—must take into account the strengths and weaknesses of this measure of risk. It is estimated based on the assumption of continuous exposure for 24 hours per day for 70 years. As such, it does not necessarily reflect the true risk, but displays a conservative risk level which is an upperbound that is unlikely to be exceeded. The Administrator believes that an MIR of approximately 1 in 10 thousand should ordinarily be the upper end of the range of acceptability. As risks increase above this benchmark, they become presumptively less acceptable under section 112. They then would be weighed with the other health risk measures and information in making an overall judgment on acceptability. Or, the Agency may find, in a particular case, that a risk that includes MIR less than the presumptively acceptable level is unacceptable in the light of other health risk factors.

In establishing a presumption for MIR, rather than a rigid line for acceptability, the Agency intends to weigh it with a series of other health measures and factors. These include the overall incidence of cancer or other serious health effects within the exposed population, the numbers of persons exposed within each individual lifetime risk range and associated incidence within a radius around facilities, the science policy assumptions and estimation uncertainties associated with the risk measures, weight of the scientific evidence for human health effects, and other quantified or unquantified health effects.

The EPA also considers incidence to be an important measure of the health risk to the exposed population. Incidence measures the extent of health risk to the exposed population as a whole, by providing an estimate of the occurrence of cancer or other serious health effects in the exposed population. The EPA believes that even if the MIR is low, the overall risk may be unacceptable if significant numbers of persons are exposed to a hazardous air pollutant, resulting in a significant estimated incidence. Consideration of this factor would not be reduced to a specific limit or range, such as the 1 case per year limit included in proposed Approach B, but estimated incidence would be weighed along with other health risk information in judging acceptability.

The limitation of MIR and incidence are put into perspective by considering how these risks are distributed within the exposed population. This information includes both individual risk, including the number of persons exposed within each risk range, as well as the incidence associated with the persons exposed within each risk range. In this manner, the distribution provides an array of information on individual risk and incidence for the exposed population.

Particular attention will also be accorded to the weight of evidence presented in the risk assessment of potential human carcinogenicity or other health effects of a pollutant. While the same numerical risk may be estimated for an exposure to a pollutant judged to be a known human carcinogen, and to a pollutant considered a possible human carcinogen based on limited animal test data, the same weight cannot be accorded to both estimates. In considering the potential public health effects of the two pollutants, the Agency's judgment on acceptability, including the MIR, will be influenced by the greater weight of evidence for the known human carcinogen.

In the *Vinyl Chloride* decision, the Administrator is directed to determine a "safe" or "acceptable" risk level, based on a judgment of "what risks are acceptable in the world in which we live." 824 F.2d at 1165. To aid in this inquiry, the Agency compiled and presented a "Survey of Societal Risk" in its March 1989 proposal (54 FR 9621–22). As described there, the survey developed information to place risk estimates in perspective and to provide background and context for the Administrator's judgment on the acceptability of risks "in the world in which we live." Individual risk levels in the survey ranged from 10^{-1} to 10^{-7} (that is, the lifetime risk of premature death ranged from 1 in 10 to 1 in 10 million), and incidence levels ranged from less than 1 case per year to estimates as high as 5,000 to 20,000 cases/year. Everyday risks include risks from natural background radiation as well as risks from home accidents. Natural background radiation (excluding radon) at sea level creates individual lifetime cancer risks in the range of 3 in 1,000 and an estimated 10,000 cancer cases per year. Naturally occurring radon in homes poses an additional source of radiation risk, and these risks can be as high as 1 in 100 to 1 in 10. EPA estimates that this causes an estimated 8,000 to 40,000 cancer cases per year. In the U.S., accidents, natural disasters, and rare diseases pose individual risks of death from 1 in 10,000 (e.g., tripping and falling which cause approximately 470 deaths per year) to 1 in 10,000,000 (e.g., rabies, which causes an average of 1.5 deaths per year).

Judgments on risks have also spanned a broad range of risk levels. The NCRP, following recommendations of the International Commission on Radiological Protection, has recommended that maximum individual exposures from non-medical, manmade radiation be limited to an amount corresponding to risks of 3 in 1,000. It is important to note that the recommendations of national and international bodies are coupled with recommendations that radiation doses should be "as low as reasonably achievable" (ALARA). The implementation of ALARA requires a site-specific consideration of the cost effectiveness of controls that could be added to reduce radiation doses.

The EPA concluded from the survey that no specific factor in isolation could be identified as defining acceptability under all circumstances, and that the acceptability of a risk depends on consideration of a variety of factors and conditions. However, the presumptive level established for MIR of approximately 1 in 10 thousand is within the range for individual risk in the survey, and provides health protection at a level lower than many other risks common "in the world in which we live." And, this presumptive level also comports with many previous health risk decisions by EPA premised on controlling maximum individual risks to approximately 1 in 10 thousand and below.

In today's decisions, EPA is using this approach based on the judgment that the first step judgment on acceptability cannot be reduced to any single factor. The EPA believes that the level of the MIR, the distribution of risks in the exposed population, incidence, the science policy assumptions and uncertainties associated with the risk measures, and the weight of evidence that a pollutant is harmful to health are all important factors to be considered in the acceptability judgment. The EPA concluded that this approach best incorporates all vital health information and enables the Agency to weigh it appropriately in making a judgment. In contrast, the single measure Approaches B, C, and D, while providing simple decisionmaking criteria, provide an incomplete set of health information for decisions under section 112. The Administrator believes that the acceptability of risk under section 112 is best judged on the basis of a broad set of health risk measures and information. As applied in practice, the EPA's approach is more protective of public health than any single factor approach. In the case of the radionuclide sources regulated here, more than 90 percent of the population living within 80 km would be exposed to risks no greater than approximately 1 in 1 million and, the total number of cases of death or disease estimated to result would be kept low.

Under the two-step process specified in the *Vinyl Chloride* decision, the second step determines an "ample margin of safety," the level at which the standard is set. This is the important step of the standard-setting process at which the actual level of public health protection is established. The first step consideration of acceptability is only a starting point for the analysis, in which a ceiling for the ultimate standard is set. The standard set at the second step is the legally enforceable limit that must be met by a regulated facility.

Even though the risks judged "acceptable" by EPA in the first step of the *Vinyl Chloride* inquiry are already low, the second step of the inquiry, determining an "ample margin of safety," again includes consideration of all of the health factors, and whether to reduce the risks even further. In the second step, EPA strives to provide protection to the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1 in 1 million. In the ample margin decision, the Agency again considers all of the health risk and other health information considered in the first step. Beyond that information, additional factors relating to the appropriate level of control will also be considered, including costs and economic impacts of controls, technological feasibility, uncertainties, and any other relevant factors. After considering all of these factors, the Agency will establish the standard at a level that provides an ample margin of safety to protect the public health, as required by section 112. The Agency terms its approach the "multifactor approach."

2. Format of Standards

The format of the standards for the various source categories varies because of the differing properties of the sources and the radionuclides they emit. Area sources emitting radon are best monitored by flux measurements. Thus, flux standards are most appropriate. For other categories, mixtures of radionuclides are best related to public health through the use of the concept of dose. EPA has promulgated dose standards to limit emissions in those cases where it is appropriate. Where a single radionuclide is emitted or a single radionuclide emission limit would serve to limit all others, EPA has promulgated an emission limit for that radionuclide. All standards include releases from accidents and accidental releases can result in a violation of the standard. However, releases from accidents shall not be considered when determining whether or not a facility should be granted permission to construct or modify under §§ 61.07 and 61.08. Releases that are not routine but are more likely than not to occur are included in determining whether such approval shall be granted.

Plants are required to monitor their operations continuously and keep records of the results of their monitoring onsite for five years. Plant owners will have to certify on a semiannual basis that no changes in operations that would require new testing have occurred. Although the report is based on a calendar year, the emission limit applies to any year, i.e. any period of 12 consecutive months.

III. Historical Background of Radionuclide NESHAPs

On December 27, 1979, EPA listed radionuclides as a hazardous air pollutant under section 112 of the CAA (44 FR 76738, December 27, 1979). EPA determined that radionuclides are a known cause of cancer and genetic damage and that radionuclides cause or contribute to air pollution that may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, and therefore constitute a hazardous air pollutant within the meaning of section 112(a)(1).

EPA then determined that radionuclides presented a risk warranting regulation under Section 112, and listed the pollutant under that section. Once listed, radionuclides became subject to the requirement of section 112(b)(1)(B) that EPA establish National Emission Standards for Hazardous Air Pollutants (NESHAPs) at a "level which (in the judgment of the Administrator) provides an ample margin of safety to protect the public health from such hazardous air pollutant," or find that they are not hazardous and delist them.

On April 6, 1983, EPA proposed standards regulating radionuclide emissions from four source categories: (1) Elemental phosphorus plants, (2) DOE facilities, (3) NRC-licensed facilities and non-DOE federal facilities (NRC-licensees), and (4) underground uranium mines. The Agency simultaneously proposed decisions not to regulate several other categories: (1) Coal-fired boilers, (2) the phosphate industry, (3) other extraction industries, (4) uranium fuel cycle facilities, (5) uranium mill tailings, (6) high level radioactive waste facilities, and (7) low energy accelerators (48 FR 15076, April 6, 1983). In February 1984, the Sierra Club filed suit in the U.S. District Court for the Northern District of California to compel EPA to take final action on the proposed standards. *Sierra Club* v. *Ruckelshaus*, No. 84-0656. EPA was subsequently ordered by the Court to promulgate final standards or make a finding that radionuclides are not hazardous air pollutants and delist them.

In October 1984, EPA withdrew the proposed emission standards for elemental phosphorus plants, DOE facilities, and NRC licensees, finding that the control practices already in effect for those categories protected the public from exposure to radionuclides with an ample margin of safety. EPA, therefore, concluded that no additional requirements were necessary (49 FR 43906, October 31, 1984). In the notice, EPA also withdrew proposed standards for underground uranium mines but stated its intention to promulgate a different standard for that category and simultaneously published an Advance Notice of Proposed Rulemaking (ANPR) for radon-222 emissions from underground uranium mines to solicit additional information on control methods. EPA also published an ANPR for radon-222 emissions from licensed uranium mills. EPA affirmed its decision not to regulate the other categories: coal-fired boilers, the phosphate industry, other extraction industries, uranium fuel cycle facilities, and high level radioactive waste. The Agency also decided to study further the category of phosphogypsum stacks to determine the need for a standard.

On December 11, 1984, the U.S. District Court for the Northern District of California found EPA in contempt of its order to promulgate final standards and again directed that EPA issue final radionuclide emission standards for the original four categories or make a finding that radionuclides are not hazardous air pollutants. EPA complied with the court order by promulgating standards for radionuclides emissions from elemental phosphorus plants, DOE facilities, and NRC-licensees (50 FR 7280, February 6, 1985) and a work practice standard for radon-222 emissions from underground uranium mines (50 FR 15385, April 17, 1985). On September 24, 1986, EPA promulgated a final rule regulating radon-222 emissions from licensed uranium mill processing sites by establishing work practices for new tailings (51 FR 34056, September 24, 1986).

The Environmental Defense Fund (EDF), the Natural Resources Defense Council (NRDC), and the Sierra Club filed petitions for review of the October 1984 withdrawals and final decisions not to regulate, the February 1985 standards for the three source categories and the April 1985 standard for underground uranium mines. The April 1985 standard for underground uranium mines was also challenged by the American Mining Congress (AMC). In November 1986, AMC and EDF filed petitions challenging the standard for licensed uranium mill processing sites.

On July 28, 1987, the U.S. Court of Appeals for the D.C. Circuit remanded to the Agency an emissions standard for vinyl chloride which had also been promulgated under Section 112 of the CAA. *Natural Resources Defense Council, Inc.* v. *EPA*, 824 F.2d 1146 (D.C. Cir. 1987) (*Vinyl Chloride*). The Court in *Vinyl Chloride* concluded that the Agency improperly considered cost and technological feasibility without first making a determination based exclusively on risk to health.

In light of that decision, EPA concluded that the standards for elemental phosphorus plants, DOE facilities, NRC-licensees, and underground uranium mines should be reconsidered and on November 16, 1987, moved the D.C. Circuit Court for a voluntary remand of the challenged decisions. EPA also agreed to reexamine all issues raised by the parties to the litigation. On December 8, 1987, the Court granted EPA's motion for voluntary remand and established a time schedule for EPA to propose regulatory decisions for all radionuclide source categories within 180 days and finalize them within 360 days. On March 17, 1988, the Court granted a subsequent EPA motion and modified the order to require proposed regulatory decisions by February 28, 1989 and final action by August 31, 1989.

On April 1, 1988, EPA also requested a remand for its standard for licensed uranium mill tailings. On August 3, 1988 the Court granted EPA's motion and put the uranium mill tailings NESHAP on the same schedule as the other radionuclide NESHAPs.

On March 7, 1989, EPA published a proposed NESHAP which described four possible policy approaches for regulating emissions of radionuclides. Public hearings were held on April 10, 11, 13, and 14, 1989.

On July 14, 1989, the court granted EPA's request for an extension until October 31, 1989 for final action.

IV. Characterization of the Risks of Radiation

A. Sources of Radiation

Every day each person is exposed to radiation from a variety of natural and manmade sources. Natural sources of radiation include cosmic rays, radon, and other terrestrial sources. Manmade radiation includes medical and dental X-rays, fallout from above ground nuclear weapons testing and industrial sources.

The earth's atmosphere acts as a shield to cosmic rays, absorbing much of the radiation. People receive a higher dose of cosmic rays at higher altitudes because there is less atmosphere to shield them from cosmic rays. For example, people living in the mountains receive a higher dose than people living at sea level, and people are exposed to even higher levels when flying in an airplane. Terrestrial radiation comes from the small amount of radionuclides that are naturally present in all matter: soil, air, food, clothes, and even our bodies.

Radon is a radionuclide that is produced as a radioactive decay product of the radium which is naturally found in soil. Radon is always present in the ambient air at levels which are estimated to pose some health risk. In addition, radon often gets trapped in homes, leading to even higher estimated health risks. EPA has issued recommendations to homeowners for reducing these risks.

This rulemaking deals with sources of radionuclide emissions, including radon, from industrial sources. Although the amount of radiation dose that most people receive as a result of these emissions is typically lower than their natural background dose, the resulting risk can still be significant. A source does not present an acceptable risk simply by being less than natural background. It is important to note that total background radiation from all sources, including naturally occurring radon, results in a calculated individual lifetime risk of fatal cancer of approximately one in one hundred. In most cases, little can be done to reduce most of this radiation exposure which people receive from natural background.

Industrial sources of radionuclide emissions in the air include a wide variety of facilities, ranging from nuclear power facilities to hospitals to uranium mill tailing piles. Industry uses hundreds of different radionuclides in solid, liquid, and gaseous forms, emitting different types of radiation (alpha, beta, gamma) at various energy levels. Industrial sources of radionuclide emissions fall into two major categories. The first include industries that use radioactive materials and have emissions as a result of an inability to completely contain the materials they use. For example, hospitals use radionuclides as part of their radiology departments. Since many of the radionuclides they use are gases, liquids capable of evaporation, or solid capable of sublimation, some radionuclides inevitably are released into the environment. The other type of source is that which releases radionuclides (usually radon) as an unintended consequence of another activity, such as mining or milling. An example of this is phosphogypsum stacks (piles). These piles of waste material emit radon because radium (from which radon is produced by radioactive decay) is found naturally in the same soils that are the source of phosphate rock.

B. Health Effects of Radiation

The level and type of hazard posed by radionuclides vary, depending on such characteristics as the radionuclide's radioactive half-life, the type of radiation it emits, the energy level of the emission(s), and its ability to concentrate in the body. Different radionuclides will irradiate different parts of the body causing different types of cancers.

There are three major types of long-term health impacts from exposure to radiation: Cancer, hereditary effects, and developmental effects on fetuses such as mental retardation. Since there is such a strong foundation for quantifying the risk of fatal cancer, EPA's consideration of fatal cancers is the principal health consideration in this rulemaking. However, it is important to note that other health effects have also been considered in the rulemaking. The other effects are not specifically addressed in this discussion because none of them pose a more severe risk to health. In addition, risk distribution of health effects from radiation from most of the sources considered for regulation show that fatal cancers occur much more frequently than non-fatal cancers and cancers generally occur more often than genetic or developmental effects. For sources that emit radon, no genetic or developmental effects, and very few non-fatal cancers are expected.

Numerous studies have demonstrated that radiation is a carcinogen. It is assumed that there is no completely risk-free level of exposure to radiation to cause cancer. Health effects from radiation have been observed in studies of occupationally exposed workers and of the survivors of the Hiroshima and Nagasaki atomic bombs. This information has been verified with studies of animals in laboratories. However, the effects of radiation doses at low levels of exposure can only be predicted by extrapolating from the observed effects at higher doses since we do not have direct evidence of cancer causation at low exposure levels. Some pollutants cause diseases that are unique to the pollutant; for example, asbestos causes asbestosis. Radiation, however, causes some of the same types of cancers, e.g. leukemia and lung and liver cancer, that are caused by other factors. Since these cancers are not uniquely associated with radiation, it is not possible to differentiate cancers caused by radiation from other cancers.

The second type of effect is the induction of hereditary effects in descendants of exposed persons, which vary in degree and effect and may even be fatal. It is assumed that there is no completely risk-free level of exposure for hereditary effects. Although hereditary effects have been observed in experimental animals at high doses, they have not been confirmed at low doses in studies of humans.

Based on extensive scientific evidence, EPA believes it prudent to assume that carcinogens, including radionuclides, pose a risk of health effects even at low levels of exposure. Based on this science policy judgment, EPA calculates health risk estimates assuming that the risk of incurring either cancer or hereditary effects is linearly proportional to the dose received in the relevant tissue. However, the severity of either effect is not related to the amount of dose received. That is, once a cancer or an hereditary effect has been induced, its severity is independent of the dose.

Regarding cancer, there continues to be divided opinion on how to interpolate between the absence of radiation effect at zero dose and the observed effects of radiation (mostly at high doses) in order to estimate the most probable effects at doses that represent small increases above natural background radiation. Most scientists believe that available data best support use of a linear model for estimating such effects. Others, however, believe that other models, which usually predict somewhat lower risk, provide better estimates. These differences of opinion have not been resolved to date by studies of the effects of radiation in humans, the most important of which are those of the survivors of the Hiroshima and Nagasaki atomic bombs.

Some studies have recently been completed, and others are now underway to reassess radiation dose calculations for the survivors of the Hiroshima and Nagasaki atomic bombs and to provide improved estimates of risk. These studies may reduce the uncertainty associated with extrapolation from high doses to low doses. These studies may also result in an increase of the estimated risk per unit dose. But they will not address the question of whether a threshold exists. EPA is monitoring the progress of this work and will initiate reviews of the risks of exposure to low levels of radiation upon its completion.

C. Risk Assessment

1. Risk Measures Considered in NESHAP Policy

In decisions on cancer risks from stationary sources of hazardous air pollutants, the Agency has estimated three measures of health risk. These are termed "maximum individual risk", "risk distribution", and "incidence". Each of these combines an estimate of the dose/response for a pollutant with estimates of exposure to the pollutant. The response estimated is the pollutant-related increase in the probability that an individual will contract fatal cancer in his or her lifetime. The exposure estimated is the average daily exposure assuming exposure for 70 years.

a. *Maximum Individual Risk.* Individual risk is expressed as an estimated probability, e.g., 1 in 100 (10^{-2}), 1 in 1,000 (10^{-3}), 1 in 10,000 (10^{-4}). Thus, a 1×10^{-3} individual risk is an added "chance" of 1 in 1,000 of contracting fatal cancer sometime in the individual's lifetime.

In this discussion, the maximum individual lifetime risk is the maximum additional cancer risk of any person due to exposure to an emitted pollutant for a 70-year lifetime. The maximum individual risk is sometimes called the maximum exposed individual risk. This estimate is based on the fact that the concentration of an emission, and the consequent risk, diminishes with distance from its source. For radionuclide NESHAP decisions, the practice has been to estimate exposure according to census data on residence locations. It has also been estimated in some other Agency decisions as the maximum at the source perimeter.

The maximum individual lifetime risk is different from average individual risk which is sometimes estimated for sources like public drinking water systems or food in which the concentration of a pollutant and other factors are assumed to be equal at all distribution locations. This distinction is particularly relevant when considering the maximum risk one might find acceptable from different sources. In using the maximum individual risk in acceptable risk decisions for hazardous air pollutants, its limitations should be considered. Used alone, the measure does not tell how many people may be so affected; it relates only to the risk to the most exposed individual(s).

b. *Risk Distribution.* A risk distribution estimates how many persons within a certain distance (e.g. 80 km) of a source of pollutant emissions are at what level of individual risk. Typically, the distribution is given for *10-fold increments of individual risk.* Such a distribution provides the decisionmaker with information on both the individual risk level for those exposed and the number of persons exposed at each level. For NESHAP and other decisions, the Agency has examined risk distributions both as measures of risk and to compare the effects of various strategies for risk reductions across a source category.

In making an acceptable risk decision, one relevant consideration is how many people are exposed at each risk level, e.g. a 10^{-2} risk might be acceptable if only one person were at that level, but not if 1 000 people were subject to it. Similarly, the numbers of persons exposed at various individual risk levels could be an important element in deciding on acceptable risk. The risk distribution could be used in similar ways to consider whether an ample margin of safety exists.

c. *Incidence.* Incidence is an estimate of population, rather than individual, risk. It is derived by multiplying individual risk by the estimate of the number of persons at that level of risk and summing the results over all risk levels. This number, which provides a lifetime population risk figure, is then divided by 70 (years) to give an annual fatal cancer incidence estimate. The incidence parameter can be used as an estimate of impact on the entire exposed population within a given area by totalling the incidence associated with each increment of individual risk. Incidence can also be portrayed along with individual risk and population numbers in a risk distribution. Typically, the Agency weighs incidence estimates in conjunction with maximum individual risk or average individual risk estimates. Estimated incidence generally is a particularly informative parameter when looking at aggregate risk from a category of like sources. One feature to take into account whenever it is used is its dependence on the size of the source category.

2. Uncertainties in Risk Measures

Each of the three risk parameters defined above has three elements. These are the estimated response per unit of pollutant concentration (e.g. pCi/l in air), the estimated exposure concentration, and the estimation of the number and location of the population residing in the area of the sources (usually taken from census data).

Uncertainties exist in estimating each of these elements for a variety of reasons including the fact that the relevant data and our understanding of the biological events involved are not complete. Where data gaps exist, qualitative and quantitative assumptions are made based on our present understanding of the biological mechanisms of cancer causation, estimates of air dispersion, engineering estimates, and other factors. Selection of certain assumptions to be used is a *policy decision.* The Agency has published guidelines covering many of these for both cancer risk assessment and exposure assessment ("Final Guidelines for Carcinogen Risk Assessment," (51 FR 33992, September 24, 1986) and "Final Guidelines for Estimating Exposures," (51 FR 33042, September 24, 1986)).

The following is a discussion of methods used to calculate the three parameters, together with a few examples of the uncertainties.

Risk assessment, under EPA guidelines, takes into account the nature and amount of evidence that the agent will cause the effect of concern in humans as well as the uncertainties of interpretation of data and its quantification. When the toxicity data from human studies are available, as in the case of radionuclides (which is a known human carcinogen), there is less uncertainty about the hazard of dose/response than when the data is solely from animal studies. Nevertheless, important uncertainties enter into the analysis even when human data is available. Examples include the fact that human epidemiological studies are often retrospective and measure effects of exposure that occurred many years in the past. The level of exposure to the agent at that time usually must be estimated and cannot be verified. Also, in certain categories of human studies, the studies are often of workers exposed to the pollutant. Worker populations are not representative of the general population with respect to age or sex. Workers are also generally the healthier segment of the population. These factors can lead to over- or underestimation of risk.

When data from animal studies are used, uncertainties about exposure can be experimentally controlled, but other uncertainties arise. Many of these concern the extrapolation from data collected in animal tests to estimate effects on humans. The extrapolation has to try to account for many factors, such as the equivalent dose for humans and laboratory animals given the size differences and the potential differences in metabolism and excretion of a chemical pollutant.

In addition, uncertainties arise in extrapolating the observed dose/response relationship from either workplace or animal test exposures to the usually lower dose levels of the general population.

In estimating exposure, the dispersion of a pollutant from a source is usually quantified by a predictive mathematical model using a known or model source emission rate, temperature and velocity characteristics, and weather patterns at a nearby recording weather station. The model predicts the concentration of the dispersed pollutant at various distances from the source. Standard assumptions are that the population around the source resides there for a 70-year lifetime and is continuously exposed to the modeled concentrations. The amount of emissions can be derived from sampling and analysis of emissions at the source or from engineering estimates, with more or less uncertainty associated with each method according to the type of emission. There are varying degrees of accuracy and precision in sampling, analysis, or estimates of emissions. Therefore, the uncertainties involved in the method of estimating individual exposure and the number of individuals exposed are numerous. Thus, it is evident that uncertainty is difficult to quantify. However, the Agency has completed a preliminary uncertainty analysis of risk from radionuclide emissions from a limited number of facilities using Monte Carlo simulation techniques. Instead of discreet values, distributions were used for factors having a significant effect on outcome. The results suggest that the risks calculated represent essentially median values if the receptor remains a that location for 70 years.

3. Methodology

To take into account the buildup of radioactivity in the body and the environment, the risk assessment models incorporate the concepts of committed dose and the dose committed by an annual release into the environment or, equivalently, the annual dose received at equilibrium as a result of constant annual releases over long periods of time.

In attempting to make these estimates, EPA has tried at all times to give "best estimates" of the radionuclide concentrations in the environment and individual and population risks. Wherever possible, measured or reported data of emissions, meteorology and population were used. Where estimates were used, EPA has tried to use the most likely numbers in its assessments. When model facilities were used, they were designed to be representative of actual facilities. EPA's risk assessments are based on a current "snapshot" of each industrial source category as it now stands. EPA has not estimated the maximum conceivable risks that may result from the facilities analyzed at some point in the future. Future risks may be higher or lower depending on whether people move closer to, or further away from, the facilities studied and whether the emissions from those facilities increase or decrease. This is not to say that there is little or no uncertainty in the final results. As in all such assessments, the analyses have considerable uncertainty. EPA's analyses are not designed to consistently overestimate or underestimate risks.

The level of uncertainty is greater in the estimate of the maximum individual risk than in the estimate of population risk. Many possible errors in the analysis can cancel out in assessments of populations. For example, local meteorological conditions may cause more radionuclides to go in one direction than another. This effect may cause an overestimate or underestimate of the maximum individual risk, depending on where the most exposed individual is located. However, this source of error tends to be less important in population estimates, since the analysis integrates individual doses to a large number of people. If one person gets a larger risk due to local dispersion effects, it means that another person is getting less. Consequently, when the individual risks are summed, local conditions will not cause a serious error in the value for total population risk.

In estimating the radiation exposure to the most exposed individual, EPA assumes that the person receiving the maximum individual risk lives for a 70-year lifetime at the same site. EPA then makes its best estimate of the risks to that individual.

EPA recognizes that most people will not actually live their entire life in the same location. Nevertheless, EPA makes this assumption as a matter of policy and does not believe that it diminishes the validity of its risk assessments. EPA has made this assumption for several reasons. First, EPA is attempting to estimate the maximum individual risk, and it is completely possible that an individual could live in the same place for his or her entire life. Use of different assumptions could lead, in some cases, to underestimating the actual maximum risk.

Second, a large fraction of the risk can occur in less than the same fraction of the 70 years. Risk is not independent of age. Children appear to be more susceptible to the effects of radiation than adults. In addition, due to their youth, they generally have a longer time in which to develop the cancer caused by the radiation (and they are less likely to die of something else before they contract and die of the cancer). Due to these two factors, younger people are at a greater risk from the same dose than older people. (See Table 1). If EPA were to reduce the number of years of assumed exposure to less than a lifetime, it is unclear what number of years should be used or where to place those years within a lifetime. For example, should EPA assume that a person lives in the same place from birth to age 19 or from age 35 to 50? Generally, in the first case, the risk is 8 times greater than in the second case. Finally, the difference that would be caused by assuming a shorter period of exposure is not very significant. For an assumed constant rate of exposure, people receive over 60% of their total lifetime risk during their first nineteen years. To change the period of exposure from 70 years to the first 19 years of life would change the final result by less than a factor of 2.

Many commenters, including the SAB, disagreed with EPA's decision to use 70 year exposures in calculating maximum individual risk. However, as stated above, EPA believes that this is the correct method for doing risk assessments for NESHAPs. Had EPA used another method of calculating the maximum individual risk, it might have found it necessary to find a different, possibly more stringent benchmark for determining acceptable risk.

Third, the conservatism of this assumption counters two important and unknown uncertainties that can lead to an underestimation of risk. The first is the susceptibility of some members of the population to radiation. Scientific studies have shown that not all people respond in the same way to the same biological insult; some members of the population are more susceptible than the population as a whole. This problem is especially acute for the radon sources. Estimates of the risk of exposure to radon are largely based on epidemiological studies of miners, i.e. adult males. It is known that children seem to be more susceptible to radiation than adults. In addition, for some cancers, women are more susceptible than men; this may be true for lung cancer.

The second factor that EPA has been unable to quantify, but which would lead to an underestimation of the risk, is the synergistic effects of radiation with other pollutants. Radiation is not the only carcinogen in the environment. There are large numbers of carcinogens and potential carcinogens in the environment. Radionuclides are not the only carcinogens that cause cancer by first causing genetic damage. In addition, some chemicals may disrupt or stop the body's natural repair mechanisms. It is possible that some of these pollutants work synergistically with radiation to increase the effect of radiation above what it would be otherwise. While EPA's relative risk model takes into account the effect of chemicals that are widely distributed in the environment, there are hundreds of chemicals that are concentrated in local areas, and the effects of these chemicals are not and can not be taken into account. However, EPA's inability to quantify this potential increase in risk does not mean that this effect does not exist or that it should not be considered.

TABLE 1—AGE DEPENDENCE OF RISK DUE TO WHOLE BODY RADIATION

Assumed Percentage of Total Lifetime Risk As A Function Of Ages At Which Radiation Exposure Occurs [1]

Period of exposure (ages)	Percentage of lifetime risk	Cumulative percentage of lifetime risk [1]
0 to 9	30	30
10 to 19	30	60
20 to 34	20	80
35 to 50	10	90
50+	10	100

[1] Exposure is at a constant rate for a lifetime.

4. *Technology Availability and Plant Closure Considerations*

In the benzene NESHAP, as well as in this NESHAP for radionuclides, EPA has considered only factors relating to risks to public health in deriving alternative "acceptable" levels of risk. However, in evaluating whether to further reduce the risk to provide for an ample margin of safety, EPA has also considered the extent to which plants would be forced to: (a) Install control technologies which are not cost effective or fully demonstrated and/or (b) curtail or stop production. These considerations are reflected in today's proposal to the extent that they apply to affected radionuclide sources.

With regard to the availability of technology to control air pollutants, EPA has in this case considered a technology available if it has been installed on a commercial scale in the United States and adequate data have been collected on plant and control equipment characteristics and performance. However, at various times in the past, EPA has considered emission standards which force plants to install technologies which do not meet these current "availability" criteria or cause facilities to curtail production or shut down. For example, EPA has in the past considered a technology "available" if it has been commercially demonstrated in other countries, even if no units have been installed in the United States. Also, EPA has considered bench- or pilot-scale demonstrations in order to judge reasonableness of expenditures for commercial demonstration of a given technology.

D. Effective Dose Equivalent

Since 1985, when EPA proposed dose standards regulating NRC-licensees and DOE facilities, a different methodology for calculating dose has come into widespread use, the effective dose equivalent (EDE). In 1987, EPA, in recommending to the President new guidance for workers occupationally exposed to radiation, accepted this methodology for the regulation of risks from radiation. This method, which was originally developed by the International Commission on Radiological Protection, will be used in all the dose standards promulgated by EPA in this notice. In the past, EPA dose standards were specified in terms of limits for specific organ doses and the "whole body dose", a methodology which is no longer consistent with current practices of radiation protection.

The EDE is simple, is more closely related to risk, and is recommended by the leading national and international advisory bodies. By changing to this new methodology, EPA will be converting to the commonly accepted international method for calculating dose. This will make it easier for the regulated community to understand and comply with our standards.

The EDE is the weighted sum of the doses to the individual organs of the body. The dose to each organ is weighted according to the risk that dose represents. These organ doses are then added together, and that total is the effective dose equivalent. In this manner, the risk from different sources of radiation can be controlled by a single standard. The weighting factors for the individual organs are listed in Table 2.

TABLE 2—WEIGHTING FACTORS FOR INDIVIDUAL ORGANS

Organ	Factor
Lung	.12
Breast	.15
Thyroid	.03
Gonads	.25
Bone Surface	.03
Red Bone Marrow	.12
Remainder	.30

EPA's risk models differ from those underlying the ICRP recommendations, primarily due to advances in the field of radiation risk estimation since the ICRP recommendations were published. As a result, the risks calculated by EPA are not strictly proportional to the EDE derived using ICRP quality factors and organ weighting factors. While the risk methodology underlying the ICRP EDE differs from that used by EPA, the widespread acceptance of the EDE approach make it a reasonable basis for regulation under the CAA.

E. Science Advisory Board Review

Beginning in 1984, EPA's Science Advisory Board (SAB) has conducted reviews of the risk assessment methods used in this rulemaking. EPA has worked closely with the SAB with respect to their comments and findings and believes it has been responsive to them.

In 1984, the SAB recommended that available scientific information be integrated into an assessment document that would lead from identification of emission sources through calculation of radiation dose and health risk and the associated degrees of uncertainty. This has been done in the Environmental Impact Statement accompanying this rulemaking.

In 1988 and again in 1989, the SAB considered the scientific merits of the EIS prepared by the Agency in support of this rulemaking. Estimates of health risk factors were found to be acceptable. Given below are some important specific SAB comments and the Agency's responses.

SAB Comment: EPA should use the effective dose equivalent concept for regulations protecting people from exposure to radiation.

EPA Response: This has been done in the final rules.

SAB Comment: EPA should use simple screening methods in implementation procedures such that only the largest users of radionuclides are required to report annually to EPA.

EPA Response: A simple screening procedure has been made part of the final rule.

SAB Comment: EPA should be certain that the data used to derive its estimates of risk are the most current available, and wherever practicable to base their assessments on consensus documents.

EPA Response: EPA agrees. The SAB has given specific advice on risk factors for low-LET radiation and for radon. The SAB approaches to these risk factors have been used in the risk assessments supporting this rulemaking. The Agency acknowledges that the BEIR–III report on which some of the risk factors are based may become out of date due to new data that are becoming available. EPA's risk factors will be revised to reflect these recent developments and to incorporate this newer data as soon as it is practical to do so. Preliminary information indicates that the most probable effect of this new information will be to increase somewhat the estimate of the number of health effects due to a unit dose of radiation. The size of this increase is not likely to be large enough to affect the decisions made under this rulemaking.

SAB Comment: The actual objective of the risk assessment should be made clear.

EPA Response: EPA has improved the presentation of risk in the EIS by more clearly stating overall assessment objectives. In particular, assessment objectives are carefully defined in terms of the individual and populations at risk. The number of people at risk and incidence is presented by range of risk. Radiation risks are compared with other risks and other radiation control recommendations. The objective of obtaining a best estimate of the dose and health implications for real persons and for populations is now explained in more detail together with explanations of how these groups are to be defined.

SAB Comment: EPA should use best estimates and ranges in the specification of risk and provide a detailed explanation of the uncertainties in the estimates themselves.

EPA Response: EPA agrees, but this is a large task. For the short term, we have performed a sensitivity analysis of the most important parameters using simplifying assumptions and have performed preliminary uncertainty analyses using a Monte Carlo simulation. These analyses have been presented in support of the final rule. For the long term, an Agency task group has been formed to plan and conduct more complete studies of the uncertainty question. This longer term effort will take a number of years to complete and will be dependent on the resources available.

EPA acknowledges the uncertainty in risk estimates, considers them when making risk management decisions and recognizes that a more complete quantitative analysis of uncertainty would be an improvement. However, it does not believe that such a complete analysis would change the decisions made in this rulemaking. A more complete discussion of uncertainty is to be found in chapter 7, volume 1 of the EIS.

V. Decision to List Under Section 112

Section 122(a) of the CAA required EPA to determine whether or not "emissions of radioactive pollutants * * * will cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health." Once an affirmative determination is made, that section requires EPA to list the substance under section 108(a)(1), governing National Ambient Air Quality Standards (NAAQS), 111(b)(1)(A), governing New Source Performance Standards, or 112(b)(1)(A), governing NESHAPs. The initial decision to list a substance does not constitute a decision to regulate any particular source category. EPA analyzed numerous studies which indicated that exposure to radionuclides can cause three major types of health effects: cancer, genetic damage, and developmental effects. After considering these health effects, EPA judged that radionuclides cause or contribute to air pollution which "may reasonably be anticipated to endanger public health" and that they should be listed under section 112(b)(1)(A) (44 FR 76738, Dec. 27, 1979). That decision was the first step in the regulatory process, and it was challenged in the current litigation. As a result, EPA has reevaluated the decision and the comments from the public during this rulemaking and has come to the conclusion that the original listing under section 112 is correct.

The first part of the listing decision, the "hazardousness" of radionuclides, is unchallenged. The evidence that radionuclides can cause cancer has, if anything, increased since 1979; see Volume 1 of the BID. The evidence now suggests that the risks from radiation exposure are higher than was believed at that time. While some people have expressed the view that, even though radiation can cause cancer, the amount of radionuclides that are released from a given source or industry is insignificant and do not present a risk, EPA believes that the results of the risk assessments for the source categories demonstrate the risk to public health that results from radionuclide emissions from industrial sources. Furthermore, as already discussed, EPA assumes radiation to be a non-threshold pollutant. This assumption, and EPA's risk assessments, support the listing decision.

Section 112(b)(1)(A) applies not merely to any "air pollutant" as do sections 108 and 111, but to a "hazardous air pollutant" that is defined as a pollutant that "causes or contributes to air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible or incapacitating reversible illness." Once a pollutant is determined to be a hazardous air pollutant, the only remaining step is for the Administrator to determine whether emissions of the pollutant present a risk warranting regulation under section 112—that is, whether it is a hazardous air pollutant "for which he intends to establish an emission standard" under that section. EPA has determined that radionuclides not only pose a risk of carcinogenicity and mutagenicity when emitted into the air (see, National Academy of Sciences, Commission on Biological Effects of Ionizing Radiation, Reports Number 3 and 4) but also are emitted in sufficient quantities as to create a risk warranting listing under section 112. Therefore, EPA reaffirms its prior conclusion that radionuclides should be listed for regulation under section 112.

EPA notes that several sources included among the source categories addressed by this rulemaking present very small risks when viewed individually. Several are predicted to emit a level resulting in an incidence of less than one case of cancer every 1000 years, and an associated MIR well below 1×10^{-4}, or even 1×10^{-6}. Based on this, it has been suggested that EPA should apply a significance test to these sources, and determine that they do not warrant regulation based on the insignificance of the risks presented.

EPA considers it unnecessary to reach that argument here. EPA applied the significance test of the Supreme Court's OSHA benzene opinion in its prior rulemakings on radionuclides to determine whether each source category warranted regulation. See *Industrial Union Dept., AFL-CIO* v. *American Petroleum Institute*, 448 U.S. 607 (1980) (interpreting the Occupational Safety and Health Act of 1970 as requiring that benzene sources be regulated only if they present "significant" risks); see also 50 FR 5189–5194 (Feb. 6, 1985), 49 FR 43905–43915 (Oct. 31, 1984) (discussing the requirement that risks from radionuclide air emission sources be significant in order to be regulated under Clean Air Act Section 112); Memorandum of A. James Barnes, General Counsel, to the Administrator of EPA entitled "Final Action on Radionuclides" (Oct. 23, 1984) (same); but see *Sierra Club* v. *Ruckelshaus*, 602 F. Supp. 892 (N.D. Cal. 1984). However, EPA believes it is unnecessary to reach this issue at this time since EPA believes that its standards should have no practical effect on the facilities to which such a test might have applicability. But see CAA section 307(d)(7)(B). Based on the record, EPA judges that the facilities that might be deemed to pose insignificant risks individually already emit radionuclides at levels well below the final standard. And, implementation of a significance test to each individual source would, for some source categories such as the NRC licensee category which contains several thousand sources, present huge implementation and resource problems for the Agency to examine each source individually.

The standards would have no practical impact on operations of sources that might be deemed to pose insignificant risks, other than to assure that emissions from these sources could not increase so as to exceed the standard. Moreover, imposition of standards assure that EPA would be notified of significant increases in emissions at these sources, or other relevant changes in circumstances, such as changes in the location or exposure of the most exposed individual, that might require additional regulatory attention.

VI. Discussion of Source Categories

The regulatory decisions reached today are based on the risk assessments and other factors available in the rulemaking record. This rule is also based on consideration of information received during the comment period to the rulemaking.

A. Department of Energy Facilities

1. Introduction

The DOE administers many facilities, including government-owned, contractor-operated facilities across the country. Some facilities conduct nuclear energy and weapons research and development, some enrich uranium and produce plutonium for nuclear weapons and reactors, and some process, store and dispose of radioactive wastes. These facilities contain significant amounts of radioactive material and emit radionuclides into the air. Other facilities contain large stockpiles of waste ore which emit large quantities of radon. A discussion of those DOE facilities appears as a separate section later in this Preamble. EPA is considering the two categories separately in this rulemaking because the two categories employ different control methods. Some of the DOE facilities emitting radionuclides are on large sites covering hundreds of square miles in remote locations. Some of the smaller sites resemble typical industrial facilities and are located in suburban areas.

In total, DOE has approximately 30 major sites that emit radionuclides. These facilities emit a wide variety of radionuclides in various physical and chemical states. Emissions from various DOE facilities represent many types of radionuclides and both internal and external dose pathways (although specific facilities may emit only one or two radionuclides affecting only one pathway).

DOE facilities are presently covered by a radionuclide NESHAP which limits emissions such that no individual receives a whole body dose of 25 mrem/y or receives a dose of 75 mrem/y to any organ. DOE also controls releases from these facilities under DOE orders which limit calculated doses to the general public to less than 100 mrem/y from all sources and pathways. By incorporating the ALARA concept into its Orders, DOE has kept the dose to the public well below 100 mrem/y. The NESHAP also mandates that DOE send annual reports of emissions to EPA. The information gathered from these reports contributed to EPA's risk assessment of DOE facilities.

2. Estimates of Exposure and Risk

EPA's risk assessment of DOE facilities is a site-by-site assessment. Emissions are based on DOE's 1986 report of emissions, meteorological data are from on-site towers or from nearby weather stations, and population distributions within 80 km are based on U.S. census tract data. EPA has updated its risk assessment with information received during the comment period. EPA has a high degree of confidence in the results of this risk assessment.

According to EPA's analysis, all DOE facilities are in compliance with the current NESHAP. The risk to the most exposed individual is approximately 2.0×10^{-4}. DOE facilities are estimated to cause 0.28 fatal cancers per year to the exposed populations within 80 km of all DOE facilities. Most of the exposed population has a lifetime fatal cancer risk of less than 1×10^{-6}.

Table 3 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level.

3. Application of Decision Methodology to the DOE Facilities Source Category

The decision that results from the application of the multifactor policy approach to the DOE source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 2.0×10^{-4}. In establishing the policy for setting NESHAPs in the context of benzene, the Agency determined that emissions resulting in a lifetime MIR no greater than approximately 1×10^{-4} are presumptively acceptable. In light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emissions and exposure, as well as the recognition that in achieving compliance, sources will generally control so as to ensure that a buffer exists below the actual level of a standard, EPA judges that the MIR of 2.0×10^{-4} is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. EPA then considered the other risk factors in order to determine whether the baseline level is acceptable.

The estimated annual incidence is 0.28 fatal cancers per year, or 1 case every 4 years; in addition, there would be an approximately equal number of non-fatal cancers per year. Very few people are at risks greater than 1.0×10^{-4}, and approximately 98% of people within 80 km of DOE facilities receive risks of less than 1×10^{-6}.

After examining these factors, the Administrator has determined that the baseline emission levels and risks from DOE facilities are acceptable.

Decision on Ample Margin of Safety. In addition to reexamining all the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from DOE facilities. The results of this analysis may be seen in Table 4. Alternative I, a standard of 10 mrem/y, representing the current baseline emissions, was compared with alternative II, a standard of 3 mrem/y a standard, equivalent to 1×10^{-4}.

A comparison of the two alternatives indicates that only a very small reduction in incidence would occur, from 0.28 to 0.25, or 1 case every 33 years, with a concommitant reduction in MIR from 2×10^{-4} to 1×10^{-4}. Based on this very small reduction in incidence, the small decrease in individual risk that would result, and on the costs of achieving Alternative II, EPA has determined that a 10 mrem standard provides an ample margin of safety by continuing regulation of this category to insure that the current levels of emissions are not increased. Requirements of the rule, such as the submission of yearly reports and obtaining prior approval of new construction or modification, assure that DOE facilities will keep emissions at or below an acceptable level insuring an ample margin of safety. Moreover, because each facility subject to this rule must demonstrate compliance with the 10 mrem/y ede emissions standard, it is likely that most, if not all, exposed individuals will receive a dose significantly less than 10 mrem/y ede. Therefore, EPA believes that limiting emissions to their current level by imposition of a standard of 10 mrem/y EDE to replace the previous standard, will protect public health with an ample margin of safety. EPA is promulgating a NESHAP mandating that radionuclide emissions from DOE facilities shall not cause any individual to receive a dose of greater than 10 mrem/y ede.

TABLE 3.—DOE FACILITIES

[*Description:* The facilities owned and controlled by DOE. These include nuclear weapons production, testing and research facilities and other nuclear research and production facilities. There are 30 major DOE facilities that release radionuclides into the air.]

	Alternative I (baseline)	Alternative II
Maximum individual risk (lifetime)	2.0×10^{-4}	1×10^{-4}
Incidence within 80 km (death/y)	0.28	0.25
Risk individual		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	(*)	(*)
E-5 to E-4	590,000	560,000
E-6 to E-5	1M	250,000
less E-6	65M	66M
Risk incidence		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	(*)	(*)
E-5 to E-4	0.23	0.22
E-6 to E-5	0.032	0.0074
less E-6	0.010	0.014

Other Health Impacts: Total cancers no more than twice fatal cancers.

* There are fewer than 25 people at this risk. However, we cannot quantify the number because detailed demographics have not been obtained.

TABLE 4.—DOE FACILITIES

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	2.0×10^{-4}	0.28					
II	1.0×10^{-4}	0.25	0.03	0.03	$ 5.9M	$ 0.2M	$ 0.2M

Comments: Alternative I: Baseline rule, emission limit of 10 mrem/y ede—highest emissions are from Los Alamos and Oak Ridge.
Alternative II: Emission limit of 3 mrem/y ede (equivalent to a MIR of 1×10^{-4})—the following controls are needed: Los Alamos—beam stops and delay lines; Oak Ridge—HEPA filters, particulate scrubbers, and tritiated water capture.

4. Implementation

a. *Introduction.* ORP's experience in implementing the existing radionuclide NESHAP covering DOE facilities has shown that implementation of the current standard has several problems. EPA has developed a new system for implementing the NESHAP designed to overcome the limitations in the present standard.

b. *Yearly Reports.* The implementation system for the NESHAP is designed to provide EPA with yearly reports on the levels of emissions from regulated facilities and resulting doses. Presently, DOE facilities monitor their emissions and make annual reports to EPA. These reports shall continue under the new NESHAP. Although the report is based on a calendar year the dose standard applies to any year, i.e. any period of 12 consecutive months. Since these reports provide EPA with the information it needs, DOE facilities are exempted from the requirements of 61.10.

c. *Methods of Measurement.* Because the thresholds for measurement are much lower than the standard, under certain circumstances the concentration and potential doses associated with release points that are above the threshold may be so low that direct measurement may not be practical. With prior EPA approval, DOE may determine these emissions through alternate procedures.

d. *Definition of a Facility.* A problem in implementing the current standard is the ambiguity associated with the present definition of a facility. To resolve this ambiguity, the new rule specifies that all the buildings, structures and operations within one contiguous site shall be considered a single facility. For example, the entire DOE facility at Oak Ridge, Tennessee must meet the current standard of 10 mrem/y ede, instead of each individual building meeting the 10 mrem/y ede standard.

e. *Distinction Between Construction and Modification.* A potential problem resulting from EPA's definition of a facility as all the buildings, structures and operations within a given plant site, is confusion over whether the construction of a new building is part of an existing facility, is new construction, or is a modification of an existing facility. This rule specifies that the construction of a new building is new construction at the facility and not a modification of the facility. This distinction is important because all new construction needs to be checked to see whether or not it needs prior approval but modifications which do not cause a net increase in the rate of emissions from the facility do not need prior approval.

f. *Prior Approval of New Construction or Modification.* EPA will not change the basic definition of modification that exists at 40 CFR 61.15. A change that will result in any increase in the rate of emissions is a modification, no matter how small that increase is. This includes cases where the modification has the potential to increase emissions above prior actual emissions. However, to reduce unnecessary paperwork, it is appropriate to avoid applications for approval in cases of small changes.

Therefore, EPA is promulgating a system under which DOE facilities will use CAP-88 to determine the dose to the most exposed individual due to the modification or new construction. If the estimated maximum individual dose added by the new construction or modification is less than 1% of the standard, then the modification or new construction does not need prior approval.

In making the determination of dose for this purpose, DOE must use the emission factors and source term determination from "BID: Procedures Approved for Demonstrating Compliance with the Dose Limits Established by 40 CFR part 61, subpart I." (BID: Compliance) or other procedures for which EPA has granted prior approval.

B. Nuclear Regulatory Commission Licensed and Non-DOE Federal Facilities

1. Introduction

NRC-licensed, Agreement state-licensed, and non-DOE federal facilities include over 6,000 different facilities. These facilities include research and test reactors, hospitals, clinics, the radiopharmaceutical industry, low level nuclear waste disposal facilities, and other research and industrial facilities. These facilities are located in all fifty states. EPA estimates that virtually every American lives within 80 km of an NRC licensee.

The facilities in this category emit a large number of radionuclides. These radionuclides affect individuals by inhalation, ingestion, ground deposition and immersion pathways. Individual facilities may emit only one or two radionuclides affecting only one or two pathways.

Emissions from this source category are presently covered by a radionuclide NESHAP which mandates that emissions do not cause any individual to receive a whole body dose of more than 25 mrem/y or receive a dose of 75 mrem/y to any organ. Two categories of NRC-licensees have been exempted from coverage by the existing NESHAP: High-level nuclear waste (HLW) facilities and uranium fuel cycle (UFC) facilities. There are two types of HLW facilities, management and disposal facilities. The disposal of HLW, which occurs at a few unique facilities, is considered as a separate source category. The management, processing and storage of HLW that occurs at a NRC-licensee is included in the estimate of emissions of the licensee used in the analysis that underlies the rule for this category. UFC facilities, which are distinctly different facilities, are being analyzed as a separate source category.

2. Estimates of Exposure and Risk

EPA's risk assessment of this category combined an analysis of the nine sub-categories that make up this category. Due to the wide scope of this category, EPA's risk assessment of this source category includes both the largest known emitters and model facilities with model populations. The estimates of maximum individual risk are based on the assessment of the largest known emitters.

The analysis of the largest sources was based on information compiled from previously existing databases and information received from some of the sources themselves. The model facilities were developed after reviewing data from surveys conducted by the NRC and the Conference of Radiation Control Program Directors. The use of model facilities increases the uncertainty of the risk assessment. Especially uncertain are estimates of the population within given risk ranges.

The estimates of population risks are based on extrapolations from model facilities using census tract data. Frequency distributions do not take into account overlapping sources.

The results of this analysis show a maximum individual risk of 1.6×10^{-4}. EPA estimates that this category results in 0.16 fatal cancers per year. Although virtually the entire U.S. population is exposed to emissions from this category, EPA's analysis shows that less than 0.5% of the U.S. population receives a lifetime fatal cancer risk greater than 1×10^{-6}. Some of the larger NRC-licensees release small amounts of iodine-125 and iodine-131; these radionuclides can cause thyroid cancer, which is usually non-fatal.

Table 5 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level.

3. Application of the Decision Methodology to the NRC Licensees and non-DOE Federal Facilities Source Category

The decision that results from the application of the multifactor approach to the NRC-licensees and non-DOE Federal facilities source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 1.6×10^{-4}. In establishing the policy for setting NESHAPs in the context of benzene, the Agency determined that emissions resulting in a lifetime MIR no greater than approximately 1×10^{-4} are presumptively acceptable. In light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emissions and exposure, as well as the recognition that in achieving compliance sources will generally control so as to ensure a buffer exists below the actual level of a standard, EPA judges that the MIR of 1.6×10^{-4} is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. EPA then considered the other risk factors in order to make an overall determination on acceptability.

Very few people are at risks greater than 1.0×10^{-4} and approximately 99% of people within 80 km of NRC licensees are at risk levels of less than 1×10^{-6}. The estimated annual incidence is 0.16 fatal cancers per year, or 1 case every 6 years. In addition, there would be an estimated annual incidence of approximately 0.8 non-fatal cancers per year, most of which is attributable to thyroid cancer caused by emissions of radioactive iodine from hospitals and radiopharmaceutical manufacturers (thyroid cancer is also treated with iodine treatments).

After examining these factors, the Administrator concludes that baseline emissions are acceptable for this source category.

Decision on Ample Margin of Safety. In addition to re-examining all the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emission from NRC facilities. The results of this analysis may be seen in Table 6. Due to a lack of detailed information on all NRC licensees, EPA has analyzed model facilities. Alternative I, a standard of 10 mrem/y representing the current baseline emissions, was compared with Alternative II, a standard of 3 mrem/y, a standard equivalent to 1×10^{-4}.

EPA's risk assessment indicates that no reduction in incidence would occur and only a small reduction of the MIR would occur if reduction of current emissions to Alternative II levels were required. In this source category almost all the incidence comes from people whose risk level is less than 1×10^{-6}. This means that small reductions in the emissions of a few licensees have little, if any, effect on the number of health effects, both fatal and non-fatal, in the population. The costs associated with these reductions are $5,000,000 with an annualized cost of $2,400,000 for compliance with Alternative II. Based on the very small reductions in the risks to public health and the costs of achieving Alternative II, EPA has determined that Alternative I protects the public health with an ample margin of safety.

EPA has decided to continue regulation of this category to insure that the current levels of emissions are not increased. Requirements of the rule, such as the submission of yearly reports and obtaining prior approval of new construction or modification, will assure that NRC licensees will keep emissions at or below levels insuring an ample margin of safety. Moreover, because each facility subject to this rule must demonstrate compliance with the 10 mrem/y ede emissions standard, it is likely that most, if not all, exposed individuals will receive a dose significantly less than 10 mrem/y ede. EPA believes that limiting emissions with a baseline standard, represented by a level of 10 mrem/y ede, will therefore protect public health with an ample margin of safety. Furthermore, to insure that the risk of nonfatal thyroid cancer does not increase, the standard further provides that no more than 3 mrem/y ede out of the 10 mrem/y ede can come from any of the isotopes of iodine. Therefore, EPA is promulgating a NESHAP mandating that radionuclide emissions from NRC licensees shall not cause any individual to receive a dose of greater than 10 mrem/y ede, of which no more than 3 mrem/y ede can come from isotopes of iodine.

TABLE 5—NRC LICENSEES

[*Description:* There are about 6,000 NRC material licensees: Radiopharmaceutical manufacturers and users, sealed sources manufacturers, research reactors, industrial and university laboratories, and low-level waste disposal facilities.]

	Alternative I (baseline)	Alternative II
Maximum individual risk (lifetime)	1.6×10^{-4}	1×10^{-4}
Incidence within 80 km (death/y)	0.16	0.16
Risk individual:		
E–2 to E–1	0	0
E–3 to E–2	0	0
E–4 to E–3	(*)	(*)
E–5 to E–4	5,000	5,000
E–6 to E–5	780,000	780,000
less E–6	240M	240M
Risk incidence:		
E–2 to E–1	0	0
E–3 to E–2	0	0
E–4 to E–3	(*)	(*)
E–5 to E–4	0.0024	0.0024
E–6 to E–5	0.027	0.027
less E–6	0.13	0.13

* There are fewer than 25 people at this risk. However, we cannot quantify the number because detailed demographics have not been obtained.

Other Health Impacts: Total cancers are approximately 5 times higher than the number of fatal cancers because risks from some of the largest facilities in this source category are caused predominately by iodine which causes thyroid cancer.

TABLE 6—NRC LICENSEES

Alternative	MIR	Incidence	Increment, incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	1.6×10^{-4}	0.16					
II	1.0×10^{-4}	0.16	<0.01	<0.01	$5M	$2.4M	$2.4M

Comments: For this category, non-fatal cancer risk is appreciably higher than the fatal cancer risk because most of the risk is due to I–131 and I–125 exposure (thyroid).

Alternative I: Baseline rule, 10 mrem/y ede—As a practical matter, this alternative is the same as the current NESHAP.

Alternative II: Emission limit of 3 mrem/y ede (equivalent to a MIR of 1×10^{-4})—cost estimates are very uncertain. Several hundred facilities would install controls or measure emissions to demonstrate compliance. Thousands would have to report to EPA.

4. Implementation

a. *Introduction.* The system for implementing this NESHAP is described in "A Guide for Determining Compliance with Clean Air Act Standards for Radionuclide Emissions From NRC-Licensed and Non-DOE Federal Facilities." The Agency has also developed the COMPLY Computer Code, for use with "MS–DOS" or "PC–DOS," computers to assist the regulated community in determining compliance with the standard. For more information, see "Draft User's Guide for the COMPLY Code" and "Background Information Document—Procedures Approved for Demonstrating Compliance with 40 CFR part 61, subpart I."

b. *Yearly Reports.* The implementation system for the NESHAP is designed to provide EPA with yearly reports on the levels of emissions and the dose caused by those emissions from regulated facilities. There are over 6,000 NRC-licensees, many of which possess very small amounts of radionuclides. EPA considers that the emissions from most sources in this category are so low that reporting should not be necessary. EPA has developed a system to determine whether or not reporting is required by estimating the dose caused by a facility's emissions. As long as the dose to the maximum individual is 10% of the standard or less, the facility does not have to report. With this provision, EPA currently estimates that less than 300 facilities would have to report to EPA.

The Agency has developed a system for dose determination that is based on screening models originally developed by the NCRP. This system is a series of screening tests each more complicated and more realistic than the previous one. Using this system, each affected facility will, annually, have to check to see whether or not it needs to report to EPA. Even if it does not have to report, it must keep records of the results for 5 years to demonstrate that it has checked to see whether or not it needs to report. Although the report is based on a calendar year, the dose standard applies to any year, i.e. any period of 12 consecutive months.

In order to simplify calculation of the source term, the Agency will allow the use of EPA-approved emission factors. The derivation of these emission factors is explained in "BID: Compliance." These factors are applied to the quantity of radionuclides used annually at the facility. Radionuclides in sealed containers are excluded. The results of these calculations are used as the input of emissions for the screening model mentioned above.

For the calculation of dose from low level radioactive waste, facilities must use CAPP–88 or another model which has prior approval from EPA.

Since these reports will provide EPA with the information it needs, NRC-licensees are exempted from the requirements of § 61.10.

c. *Prior Approval for Modification or New Construction.* EPA has decided that the system discussed for DOE facilities also be used for this source category except that the sources will not use CAP–88 to calculate the doses. Instead they will use the screening models (COMPLY code) described in the BID.

5. Reconsideration of NRC Licensee Category

Late in the rulemaking, issues related to the application of the standard in Subpart I to NRC licensees were presented to EPA which raised serious concerns about possible effects of duplicative, and perhaps conflicting, standards on NRC-licensees, including, for example, the use of radioisotope therapies by the National Institutes of Health (NIH) and other medical facilities. The concerns arise from the fact that these licensees would be regulated by both a Clean Air Act standard under Subpart I and an existing NRC standard under 10 CFR part 20. While the level of health protection achieved under the NRC standard is generally comparable to that required by EPA's rule, the two standards are very different in form, and the means of demonstrating compliance with each standard impose significantly different regulatory requirements. The basic issue is whether these different regulatory requirements will discourage the use of radioisotopes in medical and experimental therapies. In addition, NRC has raised the issue of whether regulation of its licensees under a Clean Air Act standard provides any additional public health benefits.

EPA has expressed similar concerns in past proceedings on this regulation. In its **Federal Register** notice of October 31, 1984, EPA stated, with respect to NRC-licensed facilities, that the record "does not support the conclusion that regulation of (these) * * * facilities is necessary to protect public health with an ample margin of safety." 49 **Federal Register** at 43912. In its **Federal Register** notice of February 6, 1985 (50 FR 5190) EPA stated that:

> EPA continues to believe existing emissions from these sources are already so low that the public health is already protected with an ample margin of safety * * *

Nevertheless, due to the court-ordered deadline for completion of the rulemaking by October 31, EPA has determined that it must promulgate the final standard under Subpart I at this time. However, in recognition of the serious nature of these concerns, and the need to further investigate and resolve these matters, EPA has concluded that it should treat the comments and information filed by NIH and NRC as petitions for reconsideration of the standard with respect to the range of issues raised by NRC and NIH, and EPA is granting reconsideration. For this purpose, a comment period of 60 days from the date of publication of this notice is hereby established for the purpose of receiving further information and comments on these issues, and a 3 month stay of subpart I, as provided for under 307(d)(7)(B), shall commence on the [date of publication]. Comments should be submitted (in duplicate if possible) to: Central Docket (A-130), Environmental Protection Agency, Attn: Docket No. A-79-11, Washington, DC 20460. After considering the information received, and other available information pertaining to these issues, EPA will issue a decision on the need for further rulemaking on the standard in subpart I.

C. Uranium Fuel Cycle Facilities

1. Introduction

Uranium Fuel Cycle (UFC) facilities are the facilities used in the conversion of uranium ore to electric power. They include uranium mills and tailings (non-radon emissions), uranium hexafloride conversion plants, light-water uranium fuel fabrication plants, commercial light-water nuclear power plants, and fuel reprocessing plants. These facilities are licensed by the NRC. (Uranium fuel enrichment facilities are not included in this category because they are included in the DOE facilities source category. Reprocessing plants are not included since the only one ever operated is being decommissioned and no reprocessing can occur under current policies. If a new one were to be opened in the future, it would be covered by the rule.) These facilities involve operations with the potential for large releases of radionuclides.

These facilities are not currently covered by a NESHAP. However, all releases from these facilities (air, water and direct gamma radiation) are covered under the Uranium Fuel Cycle Standard, 40 CFR part 190. This standard was promulgated by EPA under the authority of the AEA and is implemented and enforced by NRC. Under the standard, the combined releases of all UFC facilities must not cause any member of the public to receive a dose of more than 25 mrem/y to the whole body or to any organ except the thyroid (which can receive 75 mrem/y). In the past, the Administrator decided not to regulate this category under section 112, because he determined that the AEA standard protected public health with an ample margin of safety. EPA's decision not to regulate this category is one of the issues in the current litigation.

2. Estimates of Exposure and Risk

EPA's risk assessment for this category is the combination of the results of the assessments of the different types of facilities included in this category. The source term for emissions from uranium mill tailing piles is estimated for operable mills using NRC's methodology. Fugitive dust emissions from a tailing pile are assumed to be a function of meteorological conditions (wind, rainfall, temperature), ore composition, particle size and other factors. The estimate does not include radon releases which are covered by a separate NESHAP. Meteorological and population data are based on actual mill sites. The assessment of the two uranium hexafluoride conversion plants is based on reported emissions and census population distributions and meteorological data from nearby airports.

The assessment for fuel fabrication plants is based on reported emissions and census population distributions from the largest facility. The emission estimate for nuclear power plants is based on actual releases from operating plants. Population data is taken from NRC reference populations. Assessments consider effects of multiple reactors at a site, but not the overlap of multiple sites. The results of the analysis show that the most exposed individual receives a dose associated with an increased risk of fatal cancer of 1.5×10^{-4}. There is a predicted incidence of 0.1 fatal cancer per year in the population, with almost all the population risk received by people with a lifetime risk of less than 1×10^{-6}. Virtually the entire U.S. population lives within 80 km of at least one UFC facility.

Table 7 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level.

3. Application of Decision Methodology to the Uranium Fuel Cycle Source Category

The decision that results from the application of the multifactor approach to the UFC facilities source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is approximately 1.5×10^{-4}. In establishing the policy for setting NESHAPs in the context of benzene, the Agency determined that emissions resulting in a lifetime MIR no greater than approximately 1×10^{-4} are presumptively acceptable. In light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emissions and exposure, as well as the recognition that in achieving compliance, sources will generally control so as to ensure a buffer exists below the actual level of a standard, EPA judges that the MIR of 1.5×10^{-4} is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. EPA then considered the other risk factors in order to make an overall decision on acceptability. The estimated annual incidence is 0.1 fatal cancer per year, and approximately 99% of that risk is borne by people whose risk is less than 1×10^{-4}. Only 60 individuals incur a risk greater than 1×10^{-4}, and the incidence in the level greater than 1×10^{-4} is only 0.00093.

After examining these factors, the Administrator has determined that the baseline risks from UFC facilities are acceptable.

TABLE 7—URANIUM FUEL CYCLE FACILITIES

[Description: The facilities that convert uranium ore into electric power. They include operating uranium mills (nonradon emissions), uranium hexafluoride conversion plants, fuel fabrication plants, nuclear power reactors. About 135 facilities make up this category.]

	Alternative I (baseline)	Alternative II
Maximum individual risk (lifetime)	1.5×10^{-4}	3.0×10^{-5}
Incidence within 80 km (death/y)	0.1	0.1
Risk individual:		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	60	0
E-5 to E-4	6,600	4,000
E-6 to E-5	42,000	20,000
less E-6	240M	240M
Risk incidence:		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	0.0002	0
E-5 to E-4	0.0012	0.001
E-6 to E-5	0.0002	0.0006
less E-6	0.094	0.094

Other Health Impacts: Total cancers no more than twice fatal cancers.

TABLE 8—URANIUM FUEL CYCLE FACILITIES

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	1.5×10^{-4}	0.1					
II	3.0×10^{-5}	0.1	<0.01	<0.01	$75M	$31M	$31M

Comments:
Alternative I: Baseline rule, 10 mrem/y ede—the dose from one uranium mill is of this magnitude.
Alternative II: Emission limit of 1 mrem/y ede (equivalent to a MIR of 3×10^{-5})—Most of the incidence is due to power reactors and only a few are affected by this alternative, so there is little reduction in incidence. Additional controls are required for uranium mills and uranium conversion plants.

Decision on Ample Margin of Safety. In addition to reexamining all the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from UFC facilities. The results of this analysis may be seen in Table 8. To reduce the complexity of studying the costs and benefits of all different control options, EPA has concentrated on the facilities with the largest emissions. Alternative I, a standard of 10 mrem/y representing the current baseline emissions, was compared with Alternative II, a standard of 1 mrem/y, equivalent to 3×10^{-5}.

EPA's risk assessment indicates that a small reduction in the MIR and an estimated reduction of incidence by less than one case every 100 years would occur by reducing emissions from their present levels to a level equivalent to 1×10^{-4}. This occurs because the incidence from this source category is caused by the large number of people, each of whom is at very low risk levels. This results in a situation where small reductions in emissions from a couple of facilities that are above the level of Alternative II, achieve effectively no reduction in the public health impact from the source category. Based on these factors and on the costs of achieving Alternative II (Table 8), EPA has determined that the current emission level provides an ample margin of safety. Therefore, EPA believes that limiting emissions to their current level by imposition of a standard of 10 mrem/y ede, will protect public health with an ample margin of safety.

EPA has decided to regulate this category to insure that the current levels of emissions are not increased. The requirements of the rule assure that UFC facilities will keep emissions at or below the level of the standard, thereby insuring an ample margin of safety. The reporting provisions also provide the public with information on the emissions from the facility and provides them with assurance that the emissions will remain safe with an ample margin of safety, regardless of changes in the facility or the local population. Moreover, because each facility subject to this rule must demonstrate compliance with the 10 mrem/y ede emissions standard, it is likely that most, if not all, exposed individuals will receive a dose significantly less than 10 mrem/y ede. Therefore, EPA is promulgating a NESHAP mandating that radionuclide emissions from UFC facilities shall not cause any individual to receive a dose greater than 10 mrem/y ede.

4. Implementation

EPA has determined that the same level of regulation is appropriate for both UFC facilities and NRC-licensees. Therefore, EPA has removed the exemption for UFC facilities in the NRC-licensee NESHAP and will regulate them exactly the same as other licensees, including reporting and recordkeeping requirements.

EPA approves the use of the current version of NRC regulatory guidances for use in determining the emissions from UFC facilities and will consider making a technical change to this rule to allow use of updated versions when they become available.

D. Elemental Phosphorus Plants

1. Introduction

Elemental phosphorus plants extract pure phosphorus from ore for use in the chemical industry. These facilities emit radionuclides into the air because phosphate ore is high in uranium and its decay products. These decay products, especially polonium-210 and lead-210, become volatilized during the extraction process and are released into the atmosphere. There are eight (5 operational, 3 standby) elemental phosphorus plants located in four different states. However, most of the emissions come from two plants in Idaho.

Due to the types of radionuclides emitted by these plants, virtually all the dose is received by the lung through the inhalation pathway causing an increased risk of lung cancer. This risk can be controlled through the use of a standard which directly limits emissions of polonium-210 (control measures which limit polonium-210 also limit emissions of lead-210). There is no need to write dose standards.

Elemental phosphorus plants are currently regulated by a NESHAP that limits their emissions to no more than 21 curies of polonium-210 annually.

2. Estimates of Exposure and Risk

EPA's risk assessment of elemental phosphorus plants is a site-by-site assessment of operating and standby plants, based on monitored data and throughput. Changes in the risk assessment since the proposal are the result of corrected meteorological data. Maximum individual risks were assessed at actual residences or at a location 1500 m in the predominant wind direction. The location of nearby populations was taken from census tract data.

According to the assessment, EPA estimates that the most exposed individual receives a lifetime fatal cancer risk of 5.7×10^{-4}. There is an increased incidence of 0.072 fatal cancer per year in the nearby (within 80 km) population, or 1 case every 14 years. Over 75% of the exposed population receives risks of less than 1×10^{-6}.

Table 9 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level.

3. Application of Decision Methodology to the Elemental Phosphorus Plants Source Category

The decision that results from the application of the multifactor approach to the elemental phosphorus plants source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 5.7×10^{-4}. This is higher than the presumptively safe level. The estimated annual incidence is 0.072 fatal cancer per year. There are an estimated 5000 people that are exposed to risk levels greater than 1×10^{-4}, and an estimated 365,000 people that are exposed to risk levels greater than 1×10^{-6}. After examining these factors, the Administrator has determined that the risk level represented by the baseline is unacceptable. EPA then considered Alternatives II and III to determine an acceptable risk level. A reduction in emissions to 2 curies/y Po-210 would reduce the incidence to 0.024, or 1 case every 40 years and expose no one to a risk level greater than 1×10^{-4}. This equals the level that is presumptively safe. Therefore, the acceptable level of emissions of polonium-210 is a level that limits the maximum individual risk to any individual of 1×10^{-4}, represented by an emissions level of 2 curies/y Po-210.

TABLE 9—ELEMENTAL PHOSPHORUS PLANTS

[Description: These plants extract pure phosphorus for use in the chemical industry. They emit polonium-210 and lead-210 because these materials are present in phosphate ore and are vaporized by the high temperature in the process. There are 8 elemental phosphorus plants, of which 5 are currently operating. The majority of emissions come from 2 plants in Idaho.]

	Alternative I (baseline)	Alternative II	Alternative III
Maximum individual risk (lifetime)	5.7×10^{-4}	1×10^{-4}	1×10^{-5}
Incidence within 80 km (death/y)	0.072	0.024	0.0022
Risk individual:			
E–2 to E–1	0	0	0
E–3 to E–2	0	0	0
E–4 to E–3	5,000	0	0
E–5 to E–4	110,000	20,000	0
E–6 to E–5	250,000	330,000	17,000
less E–6	1.5M	1.5M	1.8M
Risk incidence:			
E–2 to E–1	0	0	0
E–3 to E–2	0	0	0
E–4 to E–3	0.010	0	0
E–5 to E–4	0.040	0.0051	0
E–6 to E–5	0.016	0.013	0.00040
less E–6	0.0058	0.0059	0.0018

Other Health Impacts: Non-fatal cancers no more than 5% of deaths.

TABLE 10—ELEMENTAL PHOSPHORUS PLANTS

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	5.7×10^{-4}	0.072					
II	1×10^{-4}	0.024	0.048	0.048	$8.5M	$2.4M	$2.4M
III	1×10^{-5}	0.0022	0.022	0.070	$35M	$18M	$20M

Comments:
Alternative I: Baseline rule, emission limit of 10 Ci/y Po-210—highest current emission rate is 10 curies/y Po-210.
Alternative II: Emission limit of 2 Ci/y Po-210, high energy scrubbers on the two largest plants.
Alternative III: Fabric filters on the two largest plants. High energy scrubbers on all other plants.

Decision on Ample Margin of Safety. In addition to reexamining all the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from elemental phosphorus plants. The results of this analysis may be seen in Table 10. Alternative II, a standard of 2 curies/y of polonium-210 representing the acceptable level, was compared with Alternative III, which would require a collection of work practices.

A comparison of the two alternatives indicates that in absolute terms, a very small reduction in incidence would occur, from 0.024 to 0.0022, representing an estimated savings of 1 life every 45 years. Level III would also lower the MIR by one order of magnitude to 1×10^{-6}. EPA examined these very small reductions in risks, and the relatively large costs of achieving Alternative III, and has determined that Alternative II protects the public health with an ample margin of safety. Therefore, EPA is establishing a NESHAP limiting emissions from elemental phosphorus plants to 2 curies/y of polonium-210, as compared to the existing standard of 21 curies/y.

4. Implementation

The current NESHAP for elemental phosphorus plants required each plant to either conduct an initial test on its emissions or get a waiver from testing. After this original report no further testing was required, unless plant operations were changed significantly. EPA plans to continue this system, without the waiver provisions. Tests conducted under the current NESHAP are still valid if conditions have not changed.

Plants will be required to monitor their operations continuously and keep records of the results of their monitoring onsite for five years. Plant owners will have to certify on a semiannual basis that no changes in operations that would require new testing have occurred. Although the report is based on a calendar year the emission limit applies to any year, i.e. any period of 12 consecutive months.

Since the reports provide EPA with the information it needs, elemental phosphorous plants are exempted from the requirements of § 61.10.

E. Coal-Fired Utility and Industrial Boilers

1. Introduction

This category covers electrical utility and industrial boilers which emit the radionuclides naturally present in coal. Coal contains only minute amounts of radionuclides. This category is being considered because large boilers burn large quantities of coal and are so widely dispersed throughout the nation that the radionuclide emissions are estimated to cause 0.8 fatal cancer a year among the U.S. population.

Emissions from coal-fired boilers are presently regulated under National Ambient Air Quality Standards for particulate matter. In addition, the larger new coal-fired boilers have to meet New Source Performance Standards (NSPS). Coal-fired boilers are regulated for the other pollutants they emit including SO_2 and particulates.

2. Estimates of Exposure and Risk

EPA's risk assessment of coal-fired boilers is based on extrapolations of estimated radionuclide emissions based on actual particulate emissions with model populations. Estimates of emissions are from the reference facilities with the largest emissions. Population risks are based on emissions from typical plants. These emissions were analyzed on four sites: urban, suburban, rural and remote. Further information was received from a recent study of emissions from coal-fired boilers done by the Office of Air Quality, Planning and Standards. EPA assumed that the entire U.S. population lives within 80 km of at least one coal fired boiler.

EPA estimates that the maximum individual risk is 2.5×10^{-5} and that there are 0.8 fatal cancer a year caused by radionuclide emissions from both utility and industrial coal fired boilers. Virtually all the fatal cancer risk is borne by individuals whose lifetime fatal cancer risk is less than 1×10^{-6}.

Table 11 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level.

3. Application of Decision Methodology to Coal-Fired Boilers Source Category

The decision that results from the application of the multifactor approach to the coal-fired boilers source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 2.5×10^{-5} which is below the presumptively safe level. The estimated annual incidence within 80 km is 0.8 fatal cancer per year. Over 99% of the incidence comes from people whose individual risk is less than 1×10^{-6}. Almost everyone in the U.S. lives within 80 kilometers of a coal-fired boiler, which results in a risk which is very evenly and equitably distributed. Therefore, EPA concludes that the baseline risk level is acceptable.

TABLE 11—COAL-FIRED BOILERS

[Description: Over 1,500 electrical utility and large industrial boilers release the small amounts of radionuclides naturally found in coal along with the non-radioactive particulates.]

	Alternative I (Baseline)	Alternative II
Maximum individual risk (lifetime)	2.5×10^{-5}	1×10^{-6}
Incidence within 80 km (death/y)	0.8	0.4
Risk individual:		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	0	0
E-5 to E-4	(*)	0
E-6 to E-5	130,000	(*)
less E-6	240M	240M
Risk incidence		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	0	0
E-5 to E-4	(*)	0
E-6 to E-5	0.001	(*)
less E-6	0.8	0.4

* We believe that people are at this risk level but all 1,500 facilities in this category have not been characterized.

Other Health Impacts: Total cancers no more than twice fatal cancers.

TABLE 12—COAL-FIRED BOILERS

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline):							
(util)	2.5×10^{-5}	0.4					

TABLE 12—COAL-FIRED BOILERS—Continued

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
(inds)	*7×10^{-6}	*0.4					
Alternative II:							
(util)	1×10^{-7}	0.2	0.2	0.2	$13B	$4.4B	$4.4B
(inds)	*1×10^{-4}	*0.2	*0.2	*0.2		*$1.7B	*$1.7B

*Office of Air Quality Planning and Standards values (Draft—Coal and Oil Combustion Study, 1988).

Comments:

Alternative I: Baseline, no rule—utility boilers: current emissions as controlled by NSPS, PSD, and SIP; industrial boilers: current emissions as controlled by SIP.

Alternative II: Utility boilers: retrofit of all sources to meet NSPS (particulate standard). Assumes ESPs are used to retrofit to an emission limit of 13 ng/joule (NSPS revised). Retrofit would yield additional health benefits due to reductions in particulate emissions.

Industrial boilers: retrofit all units >2MM Btu/h with ESPs.

Decision on Ample Margin of Safety. In addition to reexamining all the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from coal-fired boilers. The results of this analysis may be seen in Table 12. Alternative I, baseline emissions, was compared with Alternative II, which would require retrofitting existing sources to meet the NSPS. EPA's risk assessment indicates that the baseline MIR from coal-fired boilers, 2.5×10^{-5}, is very low, well below the presumptively safe level of approximately 1×10^{-4}. The risk is very evenly distributed among the population. The costs of Alternative II are extremely large. EPA examined the small risks presented by coal-fired boilers and the very large costs of achieving Alternative II, and determined that the current level of emissions represents an ample margin of safety. In addition, since all new facilities will have to meet NSPS, the effect of the NESHAP would solely be to require retrofitting of existing boilers. The NSPS provides assurance that the risks from coal-fired boilers will be reduced over time.

Therefore, EPA has determined that current levels of radionuclide emissions from coal-fired boilers represent a level of risk that protects the public health with an ample margin of safety.

F. High-Level Nuclear Waste Disposal Facilities

1. Introduction

Management and storage operations for high-level nuclear waste, spent fuel and transuranic waste are addressed in the categories for DOE facilities and NRC-licensed and non-DOE Federal facilities described above. This category addresses facilities constructed and dedicated to long term disposal of such materials pursuant to regulations to be promulgated at 40 CFR 191. Site characterization studies for the first such repository are being conducted by DOE and currently center on Yucca Mountain, Nevada. In addition, DOE is constructing an experimental Waste Isolation Pilot Plant (WIPP) which may be dedicated as a disposal facility.

2. Estimates of Exposure and Risk

EPA's risk assessment of HLW disposal facilities is based upon DOE engineering estimates for conceptual designs for the WIPP in New Mexico, and a permanent repository at Yucca Mountain. They were analyzed by EPA and are believed to be reasonable. Population data was taken from U.S. census data at these sites. Although the decision on Yucca Mountain's acceptability as a disposal site has not yet been made, EPA has analyzed the Yucca Mountain site in order to incorporate site specific information into the analysis.

EPA estimates that the maximum individual risk is 7×10^{-6} and that there would be 0.0000043 fatal cancers a year caused by radionuclide emissions from HLW disposal facilities to less than 1 million people within 80 km of these facilities. All the fatal cancer risk is borne by individuals whose total fatal cancer risk is less than 1×10^{-6}.

The reason that the emissions and risks are so low is the nature of the disposal operations. Most material will be brought to the site already sealed and buried below ground. Normal operations preclude any significant air emissions.

Table 14 presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level.

3. Application of Decision Methodology to the High Level Waste Source Category

The decision that results from the application of the multifactor approach to the HLW disposal facilities source category is described below.

Decision on Safe With an Ample Margin of Safety. As stated above, the individual risks from HLW disposal facilities are very small, 7×10^{-6}, much less than the 1×10^{-4} benchmark. In addition, there would be 0.0000043 fatal cancer a year from radionuclide emissions from disposal of HLW, see Table 13. The emissions and risk levels are so low that it was not necessary to evaluate any alternatives. The Administrator determines that the estimate of emissions from disposal of HLW represents a level that will protect public health with an ample margin of safety.

Operations involving the management, processing or storage of high-level waste, the operations from which an increase in emissions are more likely to occur, are regulated under NESHAPS controlling emissions from NRC-licensees, uranium fuel cycle facilities and DOE facilities. Disposal operations involve burying sealed containers of radioactive material, operations from which emissions are unlikely to occur. Therefore, EPA believes that there is no reason to expect that emissions to air would significantly increase, and, since the expected emissions are so low, no NESHAP is needed.

TABLE 13—HIGH LEVEL NUCLEAR WASTE DISPOSAL FACILITIES

[Description: Facilities designed to dispose of high level nuclear waste. There are no currently operating facilities. A geological repository is being considered for Yucca Mountain, Nevada. The Waste Isolation Pilot Plant now under construction in New Mexico, may also become a disposal facility. Baseline emissions are estimates of expected emissions. No alternatives are given due to expected risks well below 1×10^{-4}.]

	Alternative I (Baseline)
Maximum individual risk (lifetime)	7.0×10^{-6}
Incidence within 80 km (death/y)	.0000043
Risk individual:	
E-2 to E-1	0
E-3 to E-2	0

TABLE 13—HIGH LEVEL NUCLEAR WASTE DISPOSAL FACILITIES—Continued

[Description: Facilities designed to dispose of high level nuclear waste. There are no currently operating facilities. A geological repository is being considered for Yucca Mountain, Nevada. The Waste Isolation Pilot Plant now under construction in New Mexico, may also become a disposal facility. Baseline emissions are estimates of expected emissions. No alternatives are given due to expected risks well below 1×10^{-4}.]

	Alternative I (Baseline)
E-4 to E-3	0
E-5 to E-4	0
E-6 to E-5	0
less E-6	101,000
Risk incidence:	
E-2 to E-1	0
E-3 to E-2	0
E-4 to E-3	0
E-5 to E-4	0
E-6 to E-5	0
less E-6	0.0000043

Other Health Impacts: Total cancers no more than twice fatal cancers.

G. Radon Releases from Department of Energy Facilities

1. Introduction

The DOE administers many facilities, including government-owned, contractor-operated facilities across the country. Some of these facilities have large stockpiles of radium-containing material. Because this material has a high radium content it emits large quantities of radon. This material is stored in at least six different sites (at five locations) owned or controlled by DOE in Missouri, New Jersey, New York, Ohio and Utah. DOE is presently in the process of taking remedial action at these sites to dispose of the material on a long-term basis under procedures defined by Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or has completed required action and placed residues in interim storage. DOE has entered into or is negotiating a CERCLA compliance agreement for these remedial actions in accordance with CERCLA requirements, EPA policy and Executive Order 12580. The agreement for the DOE Monticello site has incorporated a 20 pCi/m^2−s flux standard through reference to DOE guidelines and 40 CFR 192.

The current NESHAP covering DOE facilities does not regulate radon emissions. Environmental groups challenged EPA in court to address the problem of radon emissions from DOE facilities. In March, EPA proposed that these facilities be regulated under a NESHAP; one option in that proposal would have limited emissions of radon from DOE facilities to no more than 20 pCi/m^2−s.

2. Estimates of Exposure and Risk

EPA's risk assessment of DOE facilities is a site-by-site assessment of current emissions. Radon emission estimates were mostly measured values provided by DOE or estimated from measured radium-226 concentrations in the wastes. The meteorological data were taken from nearby stations and populations are based on U.S. census tract data.

According to EPA's analysis, lifetime fatal cancer risk to the most exposed individual is 1.4×10^{-3}. DOE facilities cause an estimated 0.08 fatal cancer per year, or approximately 1 case every 12 years to the 28 million persons within 80 km of the DOE facilities. Approximately 75% of the risk to that population comes from individuals whose risk is over 1×10^{-6}. It is noted that this analysis does not consider the planned remedial actions which will be implemented under CERCLA, as amended, in conjunction with either Interagency Agreements or Federal Facilities Agreements with EPA.

Table 14 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for lower emission levels identified as Alternatives II, and III.

3. Application of Decision Methodology to the Radon Emissions From DOE Facilities Source Category

The decision that results from the application of the multifactor approach to the DOE radon source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 1.4×10^{-3} which is higher than the presumptively safe level. EPA has considered other risk factors to determine whether the baseline risk is acceptable. The estimated annual incidence is approximately 0.072 fatal cancers per year, and approximately 75% of that risk is borne by people whose risk is over 1×10^{-6}. Over 2,000 people are exposed to risks greater that 1×10^{-4}. Considering all of these factors, especially the high level of maximum individual risk, the baseline is unacceptable.

EPA next examined several alternatives before determining the acceptable level; those alternatives and the risks they present are presented in Table 14. After examining these different options, the Agency determined that Alternative II, setting a NESHAP limiting radon emissions to 20 pCi/m^2–s, is acceptable. The maximum individual risk that results from this alternative, 1.8×10^{-4}, which in light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emission and exposure, as well as the recognition that in achieving compliance sources will generally control so as to ensure that a buffer exists below the actual level of a standard, is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. Over 99% of the population would be exposed to risks of less than 1×10^{-6}. In addition, the incidence level is only 0.040 fatal cancers per year and 0.0021 non-fatal cancers annually. Only a few people (approximately 100) would be exposed to risks greater than 1×10^{-4}; the predicted rate of fatal cancer among this group is less than 1 every 5,000 years.

Decision on Ample Margin of Safety. In addition to reexamining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower radon emissions from DOE facilities. The results of this analysis can be seen in Table 15. When EPA examined the control technology necessary to lower radon emissions from DOE facilities it concluded that the only technologically feasible control is burying the sources of radon emissions. The examined options Alternative II, and Alternative III, differ only in the amount of dirt that is used to bury the radium bearing waste. The costs and benefits of controlling emissions to various levels can be seen in Table 15.

A comparison of the two alternatives indicates that a very small reduction in incidence of 0.009, would result from imposing Alternative III, representing an estimated savings of 1 life every 111 years: the change in maximum individual risk would also be very small. EPA examined this very small reduction in incidence and maximum individual risk and the costs of achieving Alternative III and has determined that Alternative II provides an ample margin of safety. Therefore, EPA has decided to regulate this category by setting a

NESHAP limiting emissions from these sources to 20 pCi/m^2–s. This rule will assure that all DOE radon sites (radium-226 byproduct material disposal and storage sites) resulting from DOE cleanup and restoration under CERCLA will be covered by the rule. This standard will protect public health with an ample margin of safety.

TABLE 14—RADON FROM DOE FACILITIES

[Description: Radon released from waste materials left behind from the Manhattan project and the early days of the Atomic Energy Commission. These wastes are currently stored at six facilities controlled by DOE.]

	Alternative I (baseline)	Alternative II	Alternative III
Maximum individual risk (lifetime)	1.4×10^{-3}	1.8×10^{-4}	1×10^{-4}
Incidence within 80 km (death/y)	0.072	0.040	0.012
Risk individual:			
E-2 to E-1	0	0	0
E-3 to E-2	30	0	0
E-4 to E-3	2,000	100	0
E-5 to E-4	8,200	3,600	470
E-6 to E-5	360,000	92,000	19,000
less E-6	28M	28M	28M
Risk incidence:			
E-2 to E-1	0	0	0
E-3 to E-2	0.00056	0	0
E-4 to E-3	0.0058	0.00019	0
E-5 to E-4	0.0031	0.0014	0.00015
E-6 to E-5	0.0067	0.0026	0.00052
less E-6	0.054	0.036	0.011

Other Health Impacts: Non-fatal cancers no more than 5% of deaths.

TABLE 15—RADON FROM DOE FACILITIES

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	1.4×10^{-3}	0.072	—	—	—	—	—
II	1.8×10^{-4}	0.040	0.032	0.032	$29M	$1.5M	1.5M
III	1.0×10^{-4}	0.012	0.028	0.060	$26M	$1.3M	$2.8M

Comments:
Alternative I: Baseline; no rule—Self-regulated by DOE.
Alternative II: Cover source to limit emissions to 20 pCi/m^2–s—This is the same level as the current AEA rule set by EPA for uranium mill tailings.
Alternative III: Cover source to limit emissions to 2 pCi/m^2–s—Most of the cost is to control emissions from the Monticello tailings pile.

4. Implementation

This NESHAP is a flux standard that limits the emission of radon from DOE facilities. The standard limits the amount of radon that can be emitted per unit area (m^2) per unit of time (s). This standard is not an average per facility but is an average per radon source. This will require that all radon sources must be disposed of in a manner that will reduce the radon flux to meet the standard.

Currently, all DOE radon sites have completed construction of interim storage facilities or have signed or are negotiating cleanup agreements under CERCLA with EPA regional offices. All existing agreements require that the waste be covered to reduce the radon flux to 20 pCi/m^2-s. This rule will assure that all future agreements will require that the radon flux be reduced to at least this level.

While EPA believes that DOE will be able to meet this standard, EPA recognizes that in some cases DOE may need some time to perform all the actions necessary to reduce radon emissions to the required levels. In such a case, DOE may request a waiver of the compliance deadline of up to two years, under section 112(c)(1)(b)(ii) of the CAA. If two years is not sufficient time to complete remediation of the sites, EPA is prepared to discuss extended schedules for compliance. EPA recognizes that the requirements of CERCLA and other environmental laws will have to be considered in these discussions. This process will ensure that these sites are cleaned up as quickly as possible.

EPA believes that the existing oversight of DOE sites through the CERCLA program is sufficient to protect the public health, therefore, EPA is requiring no additional reporting or implementation requirements for this source category. Unlike the other categories that may be regulated by other laws, these sites are reporting and will continue to report to EPA regional offices, providing EPA with all the information it needs to assure compliance with this standard. Therefore, these DOE facilities are exempted from the requirements of § 61.10.

R

H. Phosphogypsum Stacks

1. Introduction

Phosphogypsum stacks are large piles of waste from wet acid phosphorus fertilizer production. Phosphogypsum stacks are found at 41 different sites in 12 states. Because phosphate ore contains a relatively high concentration of uranium and radium, phosphogypsum stacks are also high in these elements. The presence of radium in the stacks causes them to release radon into the atmosphere.

2. Estimates of Exposure and Risk

EPA has performed a pile-by-pile assessment of radon releases at 58 phosphogypsum stacks at 41 sites. Radon emissions are based on measured radon fluxes at stacks in Florida and Idaho which, combined with the radium content of the phosphate rock, allowed EPA to estimate emissions from the other stacks. The maximum individual risks estimates are based on the locations of nearby residents obtained from industry or topographical maps. Where information was unavailable, people were assumed to be 800 meters from the site boundary. Populations within 80 km were taken from census tract data. The risk assessment presented with the proposal has been updated in response to new information provided from the comments.

The estimated maximum individual risk of fatal cancer from radon emissions from phosphogypsum stacks is 9×10^{-5}. The radon emissions are estimated to cause 0.95 fatal cancers and 0.047 non-fatal cancers per year to the 95 million people within 80 km. Approximately 90% of the risk to the population is borne by people whose risk is less than 1×10^{-5}, and 33% of the risk is borne by people whose risk is less than 1×10^{-6}.

Table 16 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level identified as Alternative II.

3. Application of Decision Methodology to Phosphogypsum Source Category

The decision that results from the application of the multifactor approach to the phosphogypsum source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 9×10^{-5} which is less than the benchmark of approximately 1×10^{-4} and is, therefore, presumptively safe. While the incidence is 0.95, it results from the low levels of risk to the millions of persons included within the modelling radius, with the bulk of the incidence from people whose individual risk is less than 1×10^{-5}. Over 77% of the population is exposed to risks of less than 1×10^{-6}. EPA has concluded that the baseline risk is acceptable.

Decision on Ample Margin of Safety. In addition to reexamining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower radon emissions from phosphogypsum stacks. The results of this analysis can be seen in Table 17. The examined options, Alternative I and Alternative II, differ only in the amount of dirt that is used to bury the radium bearing waste. The costs and benefits of controlling emissions to various levels can be seen in Table 17.

A comparison of the two alternatives indicates that a small reduction in incidence would occur from imposing Alternative II, 0.16; this represents an estimated incidence reduction of 1 life every 6 years. Simultaneously the maximum individual risk would be reduced only marginally, from 9.1×10^{-5} to 8.2×10^{-5}. EPA examined this small reduction in incidence and maximum individual risk and the relatively large costs to achieve these small reductions in risks and determined that Alternative I provides an ample margin of safety. EPA has concluded that a standard is warranted for this category. Setting a standard will treat phosphogypsum stacks the same way that other radium bearing wastes (uranium mill tailings) are being treated. A standard will also ensure that the public will be protected with an ample margin of safety in all cases. Therefore, EPA has decided to regulate this category by setting a NESHAP limiting emissions from these sources to no more than 20 pCi/m^2-s.

4. Implementation

This standard is in the form of a work practice standard that initially directs that the phosphogypsum by-product be disposed into stacks or old phosphate mines, and imposes on those stacks or mines a standard to ensure that they do not emit radon into the ambient air in an amount greater than a flux of 20 pCi/m^2-s. EPA has settled on this form of a standard pursuant to its authority under CAA section 112(e) to set a work practice standard when it is "not feasible to prescribe or enforce an emission standard" because the hazardous air pollutant cannot be emitted through a conveyance designed or constructed to emit or capture such air pollutant. Given the size of the stacks, use of a conveyance to capture the radon emitted by the stacks is utterly impractical. Without requiring the radium-rich phosphogypsum be first disposed into large, manageable stacks or mines, which is generally what has been done with the existing phosphogypsum, the phosphogypsum may be incorporated into other products or otherwise diffused throughout the country, such that the Agency will be unable to ensure that the phosphogypsum's radon emissions do not present an unacceptable risk to public health.

Once the phosphogypsum is deposited in stacks, an additional requirement of 20 pCi/m^2-s is sufficient to ensure the continued safety of the public with an ample margin of safety. This numerical standard simply ensures maintenance of the status quo as EPA believes all existing phosphogypsum stacks meet these requirements without the need for additional control technology.

Under this NESHAP, all phosphogypsum stacks will be limited in the amount of radon they may release. The standard limits the amount of radon that can be emitted per unit area (m^2) per unit of time (s). This standard is an average per stack.

Ninety days after the effective date of this rule or sixty days after the stack becomes inactive, whichever is later, the operator must test the stack to determine whether or not the stack is in compliance with the flux standard. The stack is considered inactive if it is no longer being used for the disposal of phosphogypsum or for waste water management operations associated with the mining and milling of phosphogypsum. If a stack has not been used for two years, it is presumed to be inactive.

Once testing demonstrates that the stack is in compliance, it does not have to be tested again. EPA expects that few, if any, stacks will be used after they are tested; however, if the stack is used again, it ceases to be inactive. When it ceases to be used subsequently, it again becomes inactive and must be retested.

Since EPA has all the current information it needs on phosphogypsum stacks, they are exempted from the requirements of § 61.10.

TABLE 16—DISPOSAL OF PHOSPHOGYPSUM STACKS

[Description: Large piles of waste from wet acid phosphorous fertilizer production. Radon is released from the uranium decay product found in phosphate ore. There are about 60 stacks on 40 sites.]

	Alternative I (baseline)	Alternative II
Maximum individual risk (lifetime)	9.1×10^{-5}	8.2×10^{-5}
Incidence within 80 km (death/y)	0.95	0.79
Risk individual:		
E–2 to E–1	0	0
E–3 to E–2	0	0
E–4 to E–3	0	0
E–5 to E–4	400,000	250,000
E–6 to E–5	17M	14M
less E–6	77M	81M
Risk incidence:		
E–2 to E–1	0	0
E–3 to E–2	0	0
E–4 to E–3	0	0
E–5 to E–4	0.092	0.055
E–6 to E–5	0.54	0.41
less E–6	0.32	0.33

Other Health Impacts: Non-fatal cancers no more than 5% deaths.

TABLE 17—DISPOSAL OF PHOSPHOGYPSUM STACKS

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	9.1×10^{-6}	0.95					
II	8.2×10^{-6}	0.79	0.16	0.16	$450M	$43M	$43M

Comments:

Alternative I: Baseline rule, cover source to limit emissions to 20 pCi/m²–s—Stacks have emissions of 4 to 15 pCi/m²–s; no cover would be needed. This rule would be equivalent to the current AEA rule set by EPA for uranium mill tailings.

Alternative II: Cover source to limit emissions to 6 pCi/m²–s—Stacks are covered with 0.5 meters of dirt. Usually dirt is not locally available and must be hauled to the site.

I. Underground Uranium Mines

1. Introduction

When these mines are operating, their ventilation systems emit large amounts of radon into the atmosphere. The levels of radon in an unventilated mine are a hazard to the miners. Ventilating to reduce radon exposure to the miners increases exposure to the general population.

Underground uranium mines are regulated by an existing NESHAP. This NESHAP requires bulkheading of unused portions of the mines in an effort to reduce the internal wall surface area of the mine and thereby reduce radon emissions into the mine air. EPA has found that this system is unworkable for existing mines, and it is unproven for new mines. The interiors of existing mines are so extensively interconnected that any attempt at bulkheading either produces no results or prevents fresh air from getting to the miners.

2. Estimates of Exposure and Risk

EPA's risk assessment of underground uranium mines is a site-by-site assessment of all operating or operable mines. Emission estimates were based on radon concentration or working level measurements and ventilation rates provided by mine operators. The meteorological data were taken from nearby stations and populations from 5 to 80 km are based on U.S. census tract data. Population distributions within 5 km were taken from site visits or obtained from mine owners.

The maximum individual risk of fatal cancer from radon emissions from underground uranium mines is 4×10^{-3}. The radon emissions are estimated to cause 0.79 fatal cancers per year to the population within 80 km.

Table 18 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for lower emission levels identified as alternatives II and III.

Unlike other tables in this notice, Table 18 includes two different estimates of risks for each option. The reason for the two calculations is the large uncertainty of how the regulated community would comply with a standard at the level represented by the alternative. Options available include bulkheading, reducing their hours of operation, or shutting down. The wide range of options available to mine owners greatly increases the difficulty of predicting what will be the impacts of the various regulatory options.

EPA has calculated the possible risks resulting from the regulatory options using two different methods. The first method assumes that all mines whose emissions result in doses higher than the standard will reduce their emissions sufficiently to meet the standard. EPA then uses these reduced emissions to calculate the new health impacts. This method creates what EPA considers to be the expected risks associated with that option.

However, to achieve the standard by reducing emissions, some mines will have to make very dramatic reductions in emissions, reductions that may be too costly for the mine to remain in operation. The second method used to calculate risks (marked with a + on the tables) assumes that all mines causing doses in excess of the standard simply shut down, except in those cases where the mine owner could meet the standard by reducing their emissions by less than 25%. EPA believes that this method will calculate the maximum health benefit that could occur as a result of this rulemaking. This second method of calculating risks shows a lower figure for the total population exposed because the mines which are assumed to be shut down would expose no one.

TABLE 18—UNDERGROUND URANIUM MINES

[Description: Underground mines used to produce uranium ore. Only 15 are still operating. Emissions come from operations when mines are ventilated to reduce radon exposure to miners.]

	Alternative I (baseline)	Alternative II	Alternative II+	Alternative III	Alternative III+
Maximum individual risk (lifetime)	4.4×10^{-3}	3×10^{-4}	3×10^{-4}	1×10^{-4}	1×10^{-4}
Incidence within 80 km (death/y)	0.79	0.24	0.05	0.09	0.009
Risk individual:					
E–2 to E–1	0	0	0	0	0
E–3 to E–2	(*)	0	0	0	0
E–4 to E–3	90,000	3,500	3,500	0	0
E–5 to E–4	1.6M	330,000	78,000	120,000	11,000
E–6 to E–5	450,000	1.8M	240,000	1.5M	110,000
less E–6	51,000	100,000	26,000	600,000	20,000

TABLE 18—UNDERGROUND URANIUM MINES—Continued

[Description: Underground mines used to produce uranium ore. Only 15 are still operating. Emissions come from operations when mines are ventilated to reduce radon exposure to miners.]

	Alternative I (baseline)	Alternative II	Alternative II+	Alternative III	Alternative III+
Risk incidence:					
E-2 to E-1	0	0	0	0	0
E-3 to E-2	(*)	0	0	0	0
E-4 to E-3	0.21	0.008	0.008	0	0
E-5 to E-4	0.55	0.13	0.037	0.032	0.0038
E-6 to E-5	0.030	0.11	0.011	0.055	0.0047
less E-6	0.00040	0.0006	0.0002	0.0060	0.00017

+ Analysis assumes closure of all mines that do not meet the standard, if the mines operate in such a way that they meet the standard population risks will increase.

* Less than 25 people at this risk. However, we cannot quantify the number because detailed demographics have not been obtained.

Other Health Impacts: Non-fatal cancers no more than 5% of deaths.

TABLE 19—UNDERGROUND URANIUM MINES

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (baseline)	4.4×10^{-3}	0.79					
II	3.0×10^{-4}	0.24	0.55	0.55	$0	$0.4M	$0.4M
II+	3.0×10^{-4}	0.05	0.74	0.74	(1)	(1)	(1)
III	1.0×10^{-4}	0.09	0.15	0.70	$0	$0.4M	$0.8M
III+	1.0×10^{-4}	0.009	0.04	0.78	(1)	(1)	(1)

[1] Costs not calculated.

Comments:

Alternative I: Baseline, no rule.

Alternative II: 10 mrem/y ede. Affects 9 mines, estimates assume all mines over the standard reduce emissions by a sufficient amount to meet the standard. This is assumed to be equivalent to the expected results of the standard.

Alternative II+: 10 mrem/y ede. Affects 9 mines, estimates assume that 5 mines that exceed the standard by more than 25% close down, the other 4 mines reduce emissions. This represents the maximum reduction in health effects to be expected.

Alternative III: 3 mrem/y ede. Affects 9 mines, estimates assume all 9 mines over the standard reduce emissions by a sufficient amount to meet the standard. This is assumed to be equivalent to the expected results of the standard.

Alternative III+: 3 mrem/y ede. Affects 9 mines, estimates assume that all 9 mines that exceed the standard close down. This represents the maximum reduction in health effects to be expected.

3. Application of Decision Methodology to the Underground Uranium Mine Source Category

The decision that results from the application of the multifactor approach to the underground uranium mines source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 4×10^{-3} which is much higher than the presumptively safe level. Considering the high level of individual risk, the presumption is very strong that the baseline is unacceptable. The estimated annual incidence is approximately 0.79 fatal cancers per year, and over 90 percent of that risk is borne by people whose risk is over 1×10^{-4}. Over 90,000 people are exposed to risks greater than 1×10^{-4}. These factors support the judgment that the risk level represented by the baseline is unacceptable.

EPA examined several alternatives before determining the acceptable level; those alternatives and the risks they present are illustrated in Table 18. After examining these different Alternatives, the Agency determined that Alternative II, setting a NESHAP limiting emissions from underground uranium mines to 10 mrem/y ede which results in a maximum individual risk of 3×10^{-4} less than 10 percent of the population exposed to risks less than 1×10^{-4} (this is due to the unusual demographics of the risk assessment area, which contains unevenly distributed population centers as opposed to the more normal situation where the population is more evenly distributed), and an incidence of 0.24 fatal cancers per year is acceptable.

In establishing the policy for setting NESHAPS in the context of the earlier benzene decision, the Agency determined that emissions resulting in a lifetime MIR no greater than approximately 1×10^{-4} are presumptively acceptable. In light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emission and exposure, as well as the recognition that in achieving compliance sources will generally control so as to ensure that a buffer exists below the actual level of a standard, EPA judges that the MIR of 3×10^{-4} is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. Next, EPA examined the other risk information on this category. Radon causes only lung cancer, which means that emissions from underground uranium mines will cause only 0.012 non-fatal cancers a year. In addition, it must be noted that for most of the people whose risks are above 1×10^{-4}, very few, if any, would receive risks as high as 3×10^{-4}, the risk level equivalent to 10 mrem/y. Only the few individuals who are closest to the mines would receive a dose approaching 10 mrem/y. Everyone else would receive progressively smaller doses and risks as distance from the mine increases. For the vast majority of people whose risk is above 1×10^{-4}, their dose will be much closer to 3 mrem/y than it will be to 10 mrem/y.

Decision on Ample Margin of Safety. In addition to reexamining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from underground uranium mines. The results of this analysis can be seen in Table 19. EPA has considered Alternatives II and III for underground uranium mines. Since different mine owners may use different methods to reduce the risk to the maximum individual, there is a great deal of uncertainty in assessing the costs and the benefits going from Alternative II to Alternative III. The range of the benefits of controlling emissions to various levels can be seen in Table 19.

A comparison of the two alternatives indicates that a small reduction in incidence would occur, from a range of 0.24 to 0.05 (approximately 1 every 4 to 20 years), to a range of 0.09 to 0.009 (approximately 1 every 11 to 111 years). This reduction must be compared to the increased difficulty and expense that would be incurred by 9 of the 15 underground uranium mines in further reducing the dose to the maximum individual by a factor of 3 and the questionable feasibility of the control technology. EPA has determined that the level of Alternative II protects public health with an ample margin of safety. Therefore, EPA is setting a NESHAP limiting the dose to the maximally exposed individual to 10 mrem/y ede.

4. Implementation

This standard is an effective dose equivalent standard. Mines are limited in the amount of dose their radon emissions can cause to the nearby population. Due to Mine Safety and Health Administration (MSHA) regulations, which are designed to protect the miners from high levels of radon in the mine, the exhaust fans must be operating whenever there are miners working in the mine. This limits EPA flexibility in developing other types of standards to control radon emissions.

Under this rule, uranium mine owners will have to measure their emissions of radon, find the location of the maximally exposed individual, use that information as input into the COMPLY computer code, calculate the dose to the maximum exposed individual, and report the results to EPA. Since enforcement of the standard will be based on the results of these calculations, mine owners can comply with the new limit by whatever method or combinations of methods they choose.

J. Surface Uranium Mines

1. Introduction

Surface mining is accomplished by the excavation of one or more pits to expose uranium ore for removal. This technique accounted for about 45 percent, on average, of the uranium ore tonnage produced in this country between 1956 and 1985. However, much of today's uranium production is from underground mines and other sources.

In the past, annual production from surface mines ranged from a few hundred tons of ore to 100,000 tons or more from as many as 1200 mines. Due to the dramatic decline in the uranium industry since 1981, the number of surface mines in operation in the U.S. has dropped from 50 in 1981 to just 2 in 1987; one of these is scheduled to close in 1993.

During surface mining, topsoil (called overburden) may be segregated and saved for reclamation; overburden is piled on land beside the pit. The pit and overburden represent a large surface area from which radon can escape into the atmosphere. Radon emissions from the pit and overburden are higher than normal soil because the rock surrounding uranium deposits has higher radium concentrations than normal soil.

Health, safety and environmental hazards associated with uranium mining are regulated by a variety of Federal and State laws. As a result of the laws and regulations, many of the inactive uranium mines, are in various stages of reclamation by the placement of an earthen cover over the pit and the overburden. This reclamation of the mines significantly reduces radon emissions. In the past, EPA decided not to promulgate a NESHAP for this category. That decision was challenged in litigation and is being reexamined in this rulemaking.

2. Estimates of Exposure and Risk

EPA conducted a field study during the summer of 1988 to obtain information with which to model the surface mining industry so that estimates of risk from surface mining could be made. Radiometric surveys were conducted of the two active mines, located in Texas and Wyoming, and 25 inactive mines located in Arizona, New Mexico, Colorado, South Dakota, Texas and Wyoming. In addition, the demographic and meteorologic data were gathered in and around each mining site.

The maximum individual risk of fatal cancer from radon emissions from surface uranium mines is 5×10^{-5}. The radon emissions are estimated to cause 0.026 fatal cancers per year to the population within 80 km. Over 95 percent of the risk to the population is borne by people whose risk is less than 1×10^{-6}, and over 75 percent of the risk is borne by people whose risk is less than 1×10^{-6}.

Table 20 presents example scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level identified as Alternative II.

3. Application of Decision Methodology to Surface Uranium Mine Source Category

The decision that results from the application of the multifactor approach to the surface uranium mine source category is described below.

Decision on Acceptable Risk. As stated earlier, the maximum individual risk to any individual is 5×10^{-5} which is lower than the benchmark of approximately 1×10^{-4}. The estimated annual incidence within 80 km is 0.026 fatal cancers per year. In addition, only 24,000 people out of 30 million (<0.1 percent) are exposed to risks greater than 1×10^{-6}. Based on these factors EPA concludes that the baseline risk is acceptable.

Decision on Ample Margin of Safety. In addition to reexamining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower radon emissions from surface uranium mines. The results of this analysis can be seen in Table 21. The examined options, Alternative I and Alternative II, differ only in the amount of dirt that is used to bury the radium bearing waste. The costs and benefits of controlling emissions to various levels can be seen in Table 21.

A comparison of the two alternatives indicates that a very small reduction in incidence would occur from moving to Alternative II, 0.022, representing an estimated incidence reduction of 1 life every 45 years. In addition, a small reduction in maximum individual risk would result, from 4.8×10^{-5} to 2.4×10^{-5}. EPA examined these small reductions in incidence, and maximum individual risk and the costs of achieving Alternative II and has determined that Alternative I would provide an ample margin of safety to protect public health.

In addition, this source category is already regulated by a host of state and federal mine reclamation laws. Due to the depressed state of the uranium mining industry, there is no reason to believe that new surface mines will be constructed. The presence of these laws, the very low maximum individual risk and incidence level associated with this category, and the depressed nature of the industry lead EPA to the decision that it is unnecessary for EPA to set a NESHAP for this source category. Therefore, no standard is promulgated regulating emissions from surface uranium mines.

TABLE 20.—SURFACE URANIUM MINES

[Description: Open pit mines excavations to unearth uranium ore. Only two are operating (one of which will close in 1993); about twelve hundred are closed and will not reopen.]

	Alternative I (baseline)	Alternative II
Maximum individual risk (lifetime)	4.8×10^{-5}	2.4×10^{-5}
Incidence within 80 km (death/y)	0.026	0.0038
Risk individual		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	0	0
E-5 to E-4	4,000	3,000
E-6 to E-5	200,000	80,000
less E-6	30M	30M
Risk incidence		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	0	0
E-5 to E-4	0.001	0.0008
E-6 to E-5	0.005	0.0020
less E-6	0.020	0.0010

Other Health Impacts: Non-fatal cancers no more than 5% of deaths.

TABLE 21.—SURFACE URANIUM MINES

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	4.8×10^{-5}	0.026					
II	2.4×10^{-5}	0.0038	0.022	0.022	$15M	$0.6M	$0.5M

Comments:

Alternative I: Baseline, no rule—State reclamation rules apply. Analysis assumes larger production mines characterize the risk associated with surface uranium mining. Analysis is based on 25 mines. States with reclamation requirements included Colorado, Texas, Utah, Wyoming and South Dakota.

Alternative II: Cover source to limit emissions to 40 pCi/m^2-s—Assumes 0.2 meters of dirt cover.

K. Operating Uranium Mill Tailings Piles

I. Introduction

The process of separating uranium from its ore creates waste material called uranium mill tailings. Since uranium ore generally contains less than 1 percent uranium, uranium milling produces large quantities of tailings. These tailings are collected in impoundments that vary in size from 20 to 400 acres. The tailings contain large amounts of radium, and, therefore, they emit large quantities of radon. There are 26 NRC-licensed uranium mills in the western United States. Due to the depressed state of the uranium industry, most of these mills are not currently operating.

The Uranium Fuel Cycle standard, 40 CFR part 190, does not regulate radon emissions from the tailings piles. Radon emissions during operations are currently regulated by a NESHAP 40 CFR part 61, subpart W, which is a work practice standard specifying two methods, one of which must be used in the construction of any new tailings impoundment. The piles must ultimately be disposed of in accordance with an EPA Atomic Energy Act regulation, 40 CFR part 192, which is implemented by the NRC.

For the current radionuclides NESHAP rulemaking, EPA is promulgating rules for three different subcategories that deal with mill tailings: operating mill tailings—existing piles, operating mill tailings—new technology, and disposal of uranium mill tailings (as a separate source category; see section VII.L of this notice).

This source category, operating mill tailings, has two subcategories because existing and future mill tailings piles present different problems. Existing mill tailings piles are large piles of wastes that emit radon. Radon emissions from these piles are retarded by the presence of water. However, if operations cease, and the pit is allowed to dry out, emissions can increase significantly.

New piles can be designed to overcome this problem in one of two ways: (1) Limit the size of the pile, which limits the radon source; or (2) utilize a disposal system, continuous disposal, that does not allow large piles to accumulate. The new technology is not feasible for old piles, as it is easier and cheaper and releases less radon to simply cover up the existing piles, rather than to break them up into a series of smaller piles and dispose of them separately.

2. Estimates of Exposure and Risk

EPA's risk assessment of operating uranium mill tailings is a site-by-site assessment of all 12 licensed mills that are either currently operating or on standby. Emissions were estimated from the radium-226 concentrations in the tailings, the amount of tailings, and the assumption that 1 pCi/g of radium-226 in the tailings produces 1 pCi/m^2-s of radon. The meteorological data was taken from nearby stations and populations from 5 to 80 km are based on U.S. census tract data. Populations within 5 km were counted at each of the sites. EPA analyzed current emissions and the emissions that would be expected when new tailings impoundments are created in the future.

EPA estimates that the lifetime fatal cancer risk to the most exposed individual is 3×10^{-5} from the twelve licensed piles that are either operating or on standby. Uranium mill tailings are estimated to cause 0.004 fatal cancers per year, approximately 1 case every 250 years to the 2 million persons within 80 km of the tailings piles. This risk is much lower than the estimated risks presented in the proposed rule. The reason for the great reduction in the risk calculated is that EPA has received and confirmed information during the comment period that these piles are mostly wet or covered with clay. This greatly reduces the rate of radon emissions from the piles, greatly reducing the risks that they pose.

EPA's analysis of new technologies is based on one set of model mills. By creating a set of model mills the analysis provides a meaningful comparison of the different technological alternatives, unaffected by assumptions about the number and locations where new mills and new piles might be constructed. However, this may understate the incidence from these piles if more mills are constructed, than are included in this analysis.

Tables 22, 23, 24 and 25 present example scenarios to show how different emission levels would result in different health risk profiles. Tables 22 and 23 provide information on existing piles; Tables 24 and 25 provide information on the options for new piles. The tables present the risk estimates at baseline in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level.

3. Application of Decision Methodology to the Operating Mill Tailings Piles Source Category

The decisions that result from the application of the multifactor approach to the operating uranium mill tailings piles source category is described below. Two separate decisions were made: one for existing piles and the other for new piles.

a. *Existing Mill Tailings Piles.* Decision on Acceptable Risk. As stated earlier, the maximum individual risk is 3×10^{-5} which is clearly below the benchmark level of approximately 1×10^{-4} and is, therefore, presumptively safe. The estimated annual incidence within 80 km is 0.0043 fatal cancers per year, which is less than one case every 200 years. Only 240 people are exposed to risks greater than 1×10^{-5} and 97 percent of the people exposed have risks less than 1×10^{-6}. Based on these factors, EPA has concluded that the baseline risks are acceptable.

Decision on Ample Margin of Safety. In addition to re-examining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from operating uranium mill tailings piles. The results of this analysis can be seen in Table 23. As explained above, the risks from current emissions are very low. A NESHAP requiring that emissions from operating mill tailings piles limit their emissions to no more than 20 pCi/m^2 – s represents current emissions. EPA has determined that the risks are low enough that it is unnecessary to reduce the already low risks from the tailings piles further.

However, EPA recognizes that the risks from mill tailings piles can increase dramatically if they are allowed to dry and remain uncovered. An example of how high the risks can rise if the piles are dry and uncovered can be seen in the proposed rule, 54 FR 9645. That analysis assumed that the piles were dry and uncovered and the risks were as high as 3×10^{-3} with 1.6 fatal cancers per year. Therefore, EPA is promulgating a standard that will limit radon emissions to an average of 20 pCi/m^2 – s. This rule will have the practical effect of requiring the mill operators to keep their piles wet or covered. At the point that a mill decides to no longer keep the piles emissions below the standard, the pile should be disposed of, otherwise the piles increased radon emissions are likely to present unacceptably high risks.

EPA recognizes that in the case of a tailings pile which is not synthetically or clay lined (the clay lining can be the result of natural conditions at the site) water placed on the tailings in an amount necessary to reduce radon levels, can result in ground water contamination. In addition, in certain situations the water can run off and contaminate surface water. EPA cannot allow a situation where the reduction of radon emissions comes at the expense of increased pollution of the ground or surface water. Therefore, all piles will be required to meet the requirements of 40 CFR 192.32(a) which protects water supplies from contamination. Under the current rules, existing piles are exempt from these provisions, this rule will end that exemption.

b. *New Mill Tailing Impoundments.* Decision on Acceptable Risk. In establishing the policy for setting NESHAPS in the context of the earlier benzene decision, the Agency determined that emissions resulting in a lifetime MIR no greater than approximately 1×10^{-4} are presumptively acceptable. In light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emission and exposure, as well as the recognition that in achieving compliance sources will generally control so as to ensure that a buffer exists below the actual level of a standard, EPA judges that the maximum individual risk to any individual from Alternative I, which represents a continuation of current practice, is 1.6×10^{-4} is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. The estimated annual incidence is 0.014 fatal cancers per year or approximately 1 case every 70 years. In addition there would be an estimated 0.0007 non-fatal cancers per year. Only 20 people are at risks greater than 1.0×10^{-4} and approximately 18 percent of people within 80 km of mill tailings piles receive risks of less than 1×10^{-6}. After examining these factors, the Administrator has determined that the baseline risks from new uranium mill tailings impoundments are acceptable.

Decision on Ample Margin of Safety. In addition to re-examining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower emissions from new uranium mill tailings impoundments. The results of this analysis can be seen in Table 25. The examined options, Alternative I, Alternative II, and Alternative III, represent different methods of disposal. Alternative I is the use of one large impoundment, Alternative II is the use of phased disposal, and Alternative III is the use of continuous disposal.

A comparison of the alternatives indicates that very small reductions in incidence would occur, 0.005 in going from Alternative I to Alternative II, and 0.008 in going from Alternative I to Alternative III. In addition, the maximum individual risk would be reduced from 1.6×10^{-4} to 9×10^{-5} or 6×10^{-5}. In addition both Alternatives II and III will assure that over 97 percent of the population will be exposed to risks less than 1×10^{-6}. EPA examined this small reduction in incidence and maximum individual risk and the small costs of changing work practices, but also considered the uncertainties in this analysis. EPA believes that for this category, the economic assessment is especially uncertain. This uncertainty make this analysis different from the other analyses conducted by EPA in this rulemaking.

The uncertainty arises because it assumes a steady state industry over time. If the uranium market once again booms there would be increased risks associated with Alternative I. If the industry then experienced another economic downturn, the costs of Alternative I would increase because of the economic waste that occurs when a large impoundment is constructed and not filled. The risks can also increase if a company goes bankrupt and cannot afford the increased costs of closing a large impoundment and the pile sits uncovered emitting radon. The risks can also increase if many new piles are constructed, creating the potential for the population and individual risks to be higher than EPA has calculated.

These uncertainties significantly affect the accuracy of the analysis and given the small cost of going to Alternatives II and III, EPA has determined that in order to protect the public with an ample margin of safety, both now and in the future, new mill tailings impoundments must use phased or continuous disposal.

EPA believes that in the long run mill owners will save money using continuous disposal, however, this technology has not been used in uranium operations in this country. Given the resulting uncertainty about the technological feasibility of this disposal method, EPA is also allowing them to use Alternative II which is phased disposal, since it also protects public health with an ample margin of safety. Either one of these technologies will assure that future risks will be kept under control by assuring that only small amounts of tailings are uncovered at any time. This will prevent mill tailings from becoming a large problem in the future.

TABLE 22.—OPERATING URANIUM MILL TAILINGS PILES—EXISTING PILES

[Description: Piles of uranium mill tailings at the 11 licensed operating uranium mill sites.]

	Alternative I (baseline)
Maximum individual risk (<lifetime exposure)	2.9×10^{-5}
Incidence within 80 km	0.0043
Risk individual	
E-2 to E-1	0
E-3 to E-2	0
E-4 to E-3	0
E-5 to E-4	240
E-6 to E-5	60,000
less E-6	1.9M
Risk incidence	
E-2 to E-1	0
E-3 to E-2	0
E-4 to E-3	0
E-5 to E-4	0.000057
E-6 to E-5	0.0023
less E-6	0.0020

Other Health Impacts: Non-fatal cancers no more than 5 percent deaths.

TABLE 23.—OPERATING URANIUM MILL TAILINGS—EXISTING PILES

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	2.9×10^{-5}	0.0043					

Comments:

Alternative I: Baseline rule—Flux standard for operating piles of 20 pCi/m^2–s.

TABLE 24.—OPERATING URANIUM MILL TAILINGS PILES—NEW TECHNOLOGIES [1]

[Description: The different methods of disposal that can be used for the construction of new uranium mill tailings piles by uranium milling companies.]

	Alternative I (baseline)	Alternative II	Alternative III
Maximum individual risk (lifetime)	1.6×10^{-4}	9×10^{-5}	6×10^{-5}
Incidence within 80 km (death/y)	0.014	0.009	0.006
Risk individual			
E-2 to E-1	0	0	0
E-3 to E-2	0	0	0
E-4 to E-3	20	0	0
E-5 to E-4	6,800	100	100
E-6 to E-5	680,000	20,000	20,000
less E-6	120,000	780,000	780,000
Risk incidence			
E-2 to E-1	0	0	0
E-3 to E-2	0	0	0
E-4 to E-3	0.00009	0	0
E-5 to E-4	0.0014	0.00009	0.00005
E-6 to E-5	0.012	0.0001	0.0005
less E-6	0.001	0.009	0.0055

[1] Risks are for only one model mill: Numbers should be used for comparison purposes only.

Other Health Impacts: Non-fatal cancers no more than 5 percent of deaths

TABLE 25.—OPERATING URANIUM MILL TAILINGS—NEW TECHNOLOGIES [1]

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	1.6×10^{-4}	0.014					
II	9.0×10^{-5}	0.009	0.005	0.005	$ 6.3M	$ 0.5M	$ 0.5M
III	6.0×10^{-5}	0.006	0.006	0.006	<$ 1.0M>	<$ 0.08M>	<$ 0.08M>

[1] All estimates for a single model mill Alternative II and III are each compared to Alternative I.

Comments:

Alternative I: Baseline, no rule—current technology is used. Single large impoundment.

Alternative II: Current NESHAP—several small impoundments with 40 acre limit (phased disposal).

Alternative III: Current NESHAP—tailings are dried and disposed of immediately (continuous disposal). Total capital cost is less than other two alternatives. Costs and incidence reductions are compared to baseline alternative.

4. Implementation

The NESHAP for existing mill tailings piles is a flux standard that limits the emission of radon from the piles. The standard limits the amount of radon that can be emitted per unit area (m^2) per unit of time (s). This standard is not an average per facility but is an average per radon source. The mill will annually test its impoundments and report the results to EPA.

The NESHAP for new impoundments is a work practice standard that requires mill operators to manage their tailings in a way that will reduce radon emissions. Mill operators will not be allowed to build any new mill tailings impoundment which does not meet this work practice standard. EPA will receive information on the construction of new impoundments through the requirements for EPA to approve of new construction under 40 CFR part 61, subpart A.

Since EPA already has or will receive through these reports the information it needs, uranium mill tailings are exempted from the requirements of § 61.10.

L. Disposal of Uranium Mill Tailings Piles

1. Introduction

After uranium mill tailings impoundments can no longer be used, they must be disposed of. In addition to the fourteen licensed piles that commercial licensees are decommissioning, DOE controls 24 abandoned uranium mill tailings piles. The 1978 Uranium Mill Tailings Radiation Control Act (UMTRCA) gave DOE responsibility for remedial actions at these latter sites. This Act also required EPA to set environmental standards to control releases from uranium mill tailings impoundments. EPA promulgated standards for both types of sites at 40 CFR part 192. That regulation limits post-closure radon releases to 20 pCi/m^2-s from the tailings piles.

In the past, EPA decided not to regulate under the CAA the disposal of uranium mill tailing impoundments which are regulated under UMTRCA. That decision was challenged in the litigation, so EPA is reexamining it.

2. Estimates of Exposure and Risk

EPA's risk assessment of uranium mill tailings is a site-by-site assessment of all 24 inactive piles and the 14 licensed piles that are being decommissioned. An uncertainty in this risk assessment occurs because DOE currently has plans to relocate eleven of the inactive mill tailings piles to unpopulated areas; in addition, DOE plans to stabilize the remaining 13 piles pursuant to the 40 CFR part 192 standards. EPA has considered information in the rulemaking record concerning DOE's plans in its determination on this category.

Emissions were estimated from the area of each tailings pile and an assumed radon flux of 20 pCi/m^2-s for reclaimed piles unless information existed which demonstrated that the radon flux would be less, and 1 pCi/m^2-s per pCi/g of radium for unreclaimed piles. Where specific documentation existed, such as contracts or agreements with regulatory agencies, EPA assumed that piles would be disposed of according to existing plans at the time scheduled. Meteorological data were taken from nearby stations, and populations from 5 to 80 km are based on U.S. census tract data. Populations within 5 km were measured at the sites. According to EPA's analysis, the lifetime fatal cancer risk to the most exposed individual is 3×10^{-4}. These tailings piles are estimated to cause 0.070 fatal cancers per year or approximately 1 case every 14 years, to the 9.4 million persons within 80 km.

Table 28 presents two alternative scenarios to show how different emission levels would result in different health risk profiles. The table presents the risk estimates at baseline, Alternative I, in terms of estimated annual fatal cancer incidence, maximum individual lifetime risk, total population exposed at or above particular risk levels (i.e., risk distribution), and annual incidence attributable to the population exposed at each risk level. The table also presents available estimates of annual incidence and maximum individual lifetime risk for a lower emission level identified as Alternative II.

3. Application of Decision Methodology to the Disposal of Uranium Mill Tailings Category

The decision that results from the application of the multifactor approach to the disposed uranium mill tailings source category is described below.

Decision on Acceptable Risk. In establishing the policy for setting NESHAPS in the context of the earlier benzene decision, the Agency determined that emissions resulting in a lifetime MIR no greater than approximately 1×10^{-4} are presumptively acceptable. In light of the numerous uncertainties in both establishing the parameters for the risk assessment and in modelling actual emission and exposure, as well as the recognition that in achieving compliance sources will generally control so as to ensure that a buffer exists below the actual level of a standard, EPA judges that the maximum individual risk of 3×10^{-4} is essentially equivalent to the presumptively safe level of approximately 1×10^{-4}. The estimated annual incidence is 0.070 fatal cancers per year or 1 case every 14 years; in addition, there would be 0.0035 non-fatal cancers per year. Only 200 people are at risks greater than 1.0×10^{-4}, and approximately 86 percent of the people within 80 km are at risk levels of less than 1×10^{-6}.

After examining these factors, the Administrator has determined that the baseline risks from the disposal of uranium mill tailings impoundments are acceptable.

Decision on Ample Margin of Safety. In addition to reexamining all of the health-related factors discussed above, EPA has also examined the cost, scientific certainty, and technological feasibility of control technology necessary to lower radon emissions from the disposal of uranium mill tailings piles. The results of this analysis can be seen in Table 27. The examined options, Alternative I and Alternative II, differ only in the amount of dirt that is used to bury the radium bearing waste.

A comparison of the two alternatives indicates that a small reductions in incidence would occur, 0.044; this represents an estimated incidence reduction of 1 life every 23 years. In addition, the maximum individual risk is reduced from 3.0×10^{-4} to 8.7×10^{-6}. EPA examined these small reduction in incidence and maximum individual risk and the relatively large costs of achieving Alternative II, $158 million in capital costs and $13 million in annualized costs and determined that

Alternative I protects public health with an ample margin of safety.

Although this category is already regulated under 40 CFR part 192, EPA believes that a NESHAP would still serve a useful purpose. The existing UMTRCA regulations set no time limits for the disposal of the piles. Some piles have remained uncovered for decades emitting radon. Although recent action has been taken to move toward disposal of these piles, some of them may still remain uncovered for years. In addition, a rule would assure that piles which are not ready for disposal at this time will be disposed of in a timely manner after they are removed from service. As a result, this NESHAP would reduce radon emissions from uncovered piles and assure that the public will be protected. Therefore, EPA has decided to regulate this category by setting a NESHAP limiting emissions from these sources to no more than 20 pCi/m^2-s.

TABLE 26.—DISPOSAL OF URANIUM MILL TAILINGS

[Description: The disposal of uranium mill tailings piles when they are no longer used for the disposition of new tailings. Twenty-four piles are controlled by DOE; 26 piles are controlled by individual uranium milling companies.]

	Alternative I (baseline)	Alternative II
Maximum individual risk (lifetime)	3.0×10^{-4}	8.7×10^{-5}
Incidence within 80 km (death/y)	0.070	0.026
Risk individual		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	200	0
E-5 to E-4	33,000	3,000
E-6 to E-5	1.3M	138,000
less E-6	8.1M	9.3M
Risk incidence		
E-2 to E-1	0	0
E-3 to E-2	0	0
E-4 to E-3	0.00052	0
E-5 to E-4	0.0089	0.0014
E-6 to E-5	0.030	0.0049
less E-6	0.031	0.020

Other Health Impacts: Non-fatal cancers no more than 5% of deaths.

TABLE 27.—DISPOSAL OF URANIUM MILL TAILINGS

Alternative	MIR	Incidence	Increment incidence reduction	Total incidence reduction	Increment capital cost	Increment annualized cost	Total annualized cost
I (Baseline)	3.0×10^{-4}	0.070					
II	8.7×10^{-4}	0.026	0.044	0.044	$200M	$16M	$16M

Comments:

Alternative I: Baseline rule: Cover source to limit emissions to 20 pCi/m^2-s—the same level as the current AEA rule set by EPA.

Alternative II: Cover source to limit emissions to 6 pCi/m^2-s.

4. Implementation

Under this NESHAP, all uranium mill tailings will have to be covered to reduce the amount of radon they release. The standard limits the amount of radon that can be emitted per unit area (m^2) per unit of time (s). This standard is an average per mill tailings pile.

Piles must be tested when disposal operations are completed but before the disposed pile is turned over to a government organization charged with long term ownership. Since these reports of the testing will provide EPA with the additional information it needs, uranium mill tailings are exempted from the requirements of § 61.10.

This standard, like all NESHAPs, requires compliance by existing sources within 90 days after the effective date in accordance with the CAA, 42 U.S.C. 7412(c)(1)(B)(i). However, EPA is aware that many sources covered by this subpart will not be able to come into compliance that quickly. EPA is making a generic finding that at least two years is required for the disposal of uranium mill tailings and that during that period all persons will be protected from imminent endangerment from uranium mill tailings piles. This finding also applies to piles that are not yet ready for disposal but will cease to be operational at some point in the future.

If the two year period is not enough time for these piles to dry out and be covered and disposed of then EPA is prepared to develop expeditious compliance schedules in consultation with affected parties within the framework of the enforcement mechanisms of 42 U.S.C. 7413, as appropriate. In these discussions with DOE, EPA will consider the restraints on DOE discussed in Senate Report No. 100–543, accompanying Pub. L. 100–616, 100th Congress, 2nd Sess., reprinted in 1988 U.S. Code Cong. & Ad. News, 4329 *et seq.* EPA recognizes that the requirements of CERCLA and other environmental laws will also have to be considered in these consultations.

VII. Responses to Legal and Policy Comments

On March 7, 1989, the EPA published in the **Federal Register** proposed National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclides emitted to ambient air from 12 source categories. The **Federal Register** notice requested public comments on the proposed NESHAPs, and the specific risk management approaches that were used to develop the standards. Informal public hearings were held in Washington DC and Las Vegas, NV., to give interested parties an opportunity to present their views, and written comments were solicited. Comments were received from almost 300 individuals and organizations representing government agencies, industry and other members of the regulated community, environmental and public interest groups, and the general public. This section of the preamble discusses the legal and policy-related comments received during the comment period. A separate Response to Comments Document was prepared which addresses comments relating to modeling and compliance procedures, as well as comments particular to each source category.

1. Interpretation of Vinyl Chloride Decision

Comment: Several commenters discussed the fact that the D.C. Circuit decision in *Natural Resources Def. Council, Inc.* v. *EPA*, 824 F.2d 1146 (1987) (*Vinyl Chloride*) recognizes that EPA may deem some level of cancer risk as acceptable, in light of the fact that many carcinogenic substances are assumed not to have a threshold value below which they pose no risk. The issue raised by these commenters is what level of risk from radionuclide emissions could be characterized as "acceptable" under the Court of Appeals' ruling, particularly in light of such court decisions as *Alabama Power Co.* v. *Costle*, 636 F.2d at 323 (D.C. Cir. 1979) and *Public Citizen* v. *Young*, 831 F.2d at 1108 (D.C. Cir. 1987).

In the context of the *Vinyl Chloride* decision, the issue is whether the "acceptable" risk is equated with *de minimis* risk, and is thereby defined as "trivial" or "of no value," or whether some higher level of risk is considered acceptable under the court's ruling.

It was argued that the *Alabama Power* and *Public Citizen* cases support the contention that acceptable risk and *de minimis* risk are synonymous, and that, consequently, only "trivial" risk "of no value" can be interpreted as "acceptable risk" under the *Vinyl Chloride* decision. Moreover, the risk cannot be dismissed as "trivial" unless EPA demonstrates a public consensus that the risk levels are unworthy of preventive response. Hazardous air pollutant-induced cancer risks of 6×10^{-3}, 1×10^{-3}, or 1×10^{-4} are not in this category, and EPA may not be able to show such consensus even for risks of 1×10^{-6}. Similarly, it was posited that *Public Citizen* and *Vinyl Chloride* support the position that only a *de minimis* level of risk (e.g., 1×10^{-6} or lower) can be considered acceptable, and that this position is consistent with the CAA focus on public health and providing an ample margin of safety.

Several commenters disagreed with the previous comments. These commenters argued that a safe level is not the equivalent of a *de minimis* risk level and distinguished between *de minimis* risks, which are too trivial to warrant regulation, and a broad zone of higher risks that may still satisfy the court's definition of "acceptable risk." The commenters pointed to the fact that the court used the latter term intentionally in the *Vinyl Chloride* decision, and was aware of the differing legal meaning of *de minimis*. The commenters also cited the *Alabama Power* and *Public Citizen* cases, stating that those decisions held *de minimis* risk to be applicable except for those instances where Congress had already been "extraordinarily rigid" in establishing regulatory requirements.

Commenters also pointed out that the court in the *Vinyl Chloride* decision specifically stated that "acceptable risk" does not necessarily mean risk free. They argued that the court defined something as "unsafe" when it exposes humans to a "significant risk of harm." The fact that a risk is not *de minimis* does not mean that it poses a "significant risk of harm." For instance, the examples of "acceptable risk" cited by the court, such as driving a car or breathing city air have a higher than *de minimis* risk. Therefore, using this example as a guide, there is no basis for regulation of certain categories of sources since risks significantly above this level may be judged "acceptable" under the *Vinyl Chloride* decision.

Some commenters stated that the "acceptable risk" finding derives directly from the text and legislative history of Section 112 of the CAA, while the *de minimis* concept is a nonstatutory doctrine identified as a risk test by the court in the *Alabama Power* and *Public Citizen* cases. Thus, the "acceptable" and *de minimis* risk test serve much different functions in public health regulation.

Response: As the commenters acknowledge, the *Vinyl Chloride* decision recognizes that EPA may find some level of cancer risk to be "acceptable." In its explanation of the term, the court cited the preamble to the Federal Register notice announcing the final *Vinyl Chloride* regulations:

> Scientific uncertainty, due to the unavailability of dose/response data and the 20-year latency period between initial exposure to vinyl chloride and the occurrence of disease, makes it impossible to establish any definite threshold below which there are no adverse effects to human health." [citation omitted] 824 F.2d 1146, (D.C. Cir. 1987).

The court explained that "the Congressional mandate to provide "an ample margin of safety" to "protect the public health" requires the Administrator to make an initial determination of what is "safe." This determination must be based exclusively upon the Administrator's determination of the risk to health at a particular emission level. The Administrator's decision does not require a finding that "safe" means "risk free." 824 F.2d at 1164.

Where the commenters differ is over what level of risk from radionuclides emissions can be considered an "acceptable risk" within the meaning of the *Vinyl Chloride* decision. Some argue that in order to be "acceptable", the risk must be no more than *de minimis* within the meaning of *Alabama Power* and *Public Citizen*, while others dispute this position.

The EPA does not interpret "acceptable risk", for purposes of Section 112, as synonymous with or limited to *de minimis* risk as described in *Alabama Power* and *Public Citizen*. The *Vinyl Chloride* decision, while going into great detail in discussing the concepts of both "acceptable risk," and "ample margin of safety," never mentioned the concept of *de minimis* risk. What the court did say was that Congress exhibited no intent to require EPA to prohibit emissions of all nonthreshold pollutants, and, citing the Supreme Court decision in *Industrial Union Dept., AFL–CIO* v. *American Petroleum Institute*, 448 U.S. 607 (1980) stated that "safe does not mean risk free." 824 F.2d at 1153.

The court declined to restrict the Administrator to any particular method of determining what constitutes an acceptable risk but explained simply that "the Administrator must determine what inferences should be drawn from available scientific data and decide what risks are acceptable in the world in which we live." 824 F.2d at 1166.

By way of example, the court referred to language in the Supreme Court's *Industrial Union* decision, to the effect that driving a car or breathing city air are risk-laden activities that society does not consider "unsafe." 824 F.2d at 1165. Thus, the determination of what is an "acceptable risk" is discretionary with the Administrator, and involves evaluation of existing scientific data and uncertainties concerning that data.

The EPA disagrees with the commenters' contention that *Public Citizen* demonstrates that "acceptable risk" is limited to *de minimis* risk. *Public Citizen* involved a Food and Drug Administration (FDA) statute prohibiting use of any food coloring additive "found * * * to induce cancer in man or animal." 831 F.2d at 1109. The FDA in that case argued that a *de minimis* exception, allowing use of the challenged additives when the cancer risks involved are trivial, could properly be interpreted into the statute. The court however, while acknowledging that the cancer risks were indeed trivial, held that the statute imposed an absolute ban once a finding of carcinogenicity had been made, and therefore no *de minimis* exception could be employed.

The situation in *Public Citizen* involving a "no-risk" statute is markedly different from the facts of the *Vinyl Chloride* case. In the *Vinyl Chloride* case the court interpreted the Clean Air Act as *not* equating "safe" with "risk free." 824 F.2d at 1153 [citations omitted]. Indeed, as explained above, the *Vinyl Chloride* court specifically used examples of activities having acceptable levels of risk "in the world in which we live" 824 F.2d at 1165 [citations omitted], but which exceed the *de minimis* concept described in *Alabama Power*. Thus, unless the *Vinyl Chloride* decision is read to broaden the *de minimis* concept from triviality to a level which is acceptable in the world in which we live, the dicta in *Public Citizen* is an apparent misconstruction of the *en banc Vinyl Chloride* opinion. Furthermore, *Public Citizen* did not deal with a statute requiring a determination of a "safe" level, and therefore cannot reasonably be compared to Section 112 of the CAA, and the court's analysis of risk in the *Vinyl Chloride* opinion.

Finally, the *Vinyl Chloride* court's citation of *Alabama Power* does not constitute adoption of the *de minimis* concept. As stated above, the *Vinyl Chloride* decision makes no mention of the *de minimis* concept, and cites *Alabama Power* following a discussion of risks found acceptable by the Supreme Court in *Industrial Union* which clearly exceed *de minimis*. Therefore, at most, *Alabama Power* was apparently cited as *an example* of a risk level, which would, of course, be considered "acceptable." Obviously, the enumeration of other, higher, risks precludes the interpretation that the court was equating the *de minimus* concept and "safe" or "acceptable risk" in *Vinyl Chloride*. In conclusion, EPA does not believe that the terms *de minimis* and "acceptable risk" are synonymous. Further, EPA believes that it is not required by *Vinyl Chloride* to reduce risk to a *de minimis* level.

Comment: One commenter argued that EPA has ignored the precedent established in the D.C. Circuit decision in *Ethyl Corp.* v. *EPA*, 541 F.2d 1 (1976) (*en banc*). This commenter argued that the decision established a "significant increment" test that must be satisfied before EPA can set a standard under section 112, a test that Congress adopted in amending section 112 in 1977.

Response: The commenter has misconstrued not only the teaching of the D.C. Circuit in *Ethyl*, but the Congressional intent in modifying section 112 to follow the court's ruling. First, the *Ethyl* decision does not apply directly to section 112, as the court was construing the language of section 211(c)(1)(A) as it then existed in that case; in addition, the decision involved lead, which unlike radionuclides, is a threshold pollutant. Second, while the court did describe a portion of its reasoning by using the phrase "significant increment", that was not the basic holding of the case. In fact, the court rejected exclusive use of such a test, in stating that Congress " * * * did not mean for 'endanger' to be measured only in incremental terms." 541 F2d. at 30–31. Third, while Congress did adopt language for section 112(a)(1) prescribing the definition of a "hazardous air pollutant" ("an air pollutant * * * which in the judgment of the Administrator causes or contributes to air pollution which may reasonably be anticipated to result in") from the reasoning of the *Ethyl* court, its purpose was to emphasize the preventive or precautionary nature of the Act. *1977 Legislative History*, 2516. In adopting this approach, the House Report stated that the " * * * language is intended to emphasize the necessarily judgmental element in the task of predicting future health risks of present action and to confer upon the Administrator the requisite authority to exercise such judgment." *Id.* at 2518. Finally, the Administrator has, in this rulemaking, used a significance test in its decisions on listing radionuclides and on standards for each of the source categories, as described in the Federal Register notice. But, it has not used it in the manner that the commenter has urged, which would eviscerate the true meaning of the *Ethyl* decision and Congressional endorsement of it. EPA believes that its use of a "significance" test here is fully consistent with the statute, its legislative history, and applicable case law, including the Supreme Court's decision in the OSHA benzene case.

Comment: Several commenters addressed the *Vinyl Chloride* court's finding on acceptable risk versus zero risk. Several commenters felt that "acceptable" risk which the court equated with being "safe" is not zero risk; while the scientific approach can reduce uncertainty, life cannot be risk free.

Response: The D.C. Circuit Court in *Vinyl Chloride* held that the Administrator is required, under section 112, to make an initial determination of what is "safe." 824 F.2d 1164. The court went on to state specifically that the "Administrator's decision does not require a finding that "safe" means "risk free" *Id.*, and further stated that the Administrator must decide "what risks are acceptable in the world in which we live." 824 F.2d at 1165. Thus, the *Vinyl Chloride* court made it clear that "safety" or "acceptable risk" is not to be equated with zero risk. The *Vinyl Chloride* court cites the Supreme Court decision in *Industrial Union Dept., AFL-CIO* v. *American Petroleum Institute*, 448 U.S. 607 (1980) as support for the proposition that zero risk is not mandated, stating that *Industrial Union* holds that "something is 'unsafe' only when it threatens humans with a 'significant risk of harm'." 824 F.2d at 1153. *Industrial Union* is clearly an appropriate precedent here.

Comment: The EPA's proposed approaches were based on a two-step decision process, and some commenters also interpreted the *Vinyl Chloride* decision as requiring a two-step process. Other commenters disagreed, stating that the the *Vinyl Chloride* decision does not mandate a two-step procedure for making section 112 decisions, but made clear that an integrated, single-step procedure could be used as long as the decision satisfied both the "acceptable risk" and the "ample margin of safety" criteria. Thus, for example, if existing emissions pose risks that are well below the acceptable risk, the Administrator could determine that both the acceptable risk criterion and the reasonable degree of protection criterion are satisfied in one step.

Response: The court in *Vinyl Chloride* specifically addressed the one or two-step process question, stating as follows:

> In response to the facts presented in this case we have analyzed this issue by using a two-step process. We do not mean to indicate that the Administrator is bound to employ this two-step process in setting every emission standard under section 112. If the Administrator finds that some statistical methodology removes sufficiently the scientific uncertainty present in this case, then the Administrator could conceivably find that a certain statistically determined level of emissions will provide an ample margin of safety. If the Administrator uses this methodology, he cannot consider cost and technological feasibility: these factors are no longer relevant because the

Administrator has found another method to provide an "ample margin" of safety. 824 F.2d at 1165 n. 11.

Thus, *Vinyl Chloride* does not mandate a two-step process in all cases. However, if a one-step process were utilized, the Administrator could not consider cost or technological feasibility.

Comment: One commenter wrote that the *Vinyl Chloride* opinion states that "the Administrator 'may, and perhaps must' include additional control measures where technologically feasible, in order to reduce public exposure by a cancer-causing chemical 'to the lowest feasible level'." The commenter therefore believed the correct interpretation of section 112 of the CAA according to *Vinyl Chloride* is that "EPA must provide such additional protection as is feasible at the second-step 'ample margin of safety' determination."

Response: In the March 7, 1989, notice proposing emission standards for radionuclides, EPA raised the question of whether to require all technically feasible controls for which costs are reasonable no matter how small the risk reduction. The *Vinyl Chloride* case provided that technological feasibility can be considered under section 112, so long as it is not considered in the "acceptable risk" determination, but only in the "ample margin of safety" determination. ("Since we cannot discern clear Congressional intent to preclude consideration of cost and technological feasibility in setting emission standards under section 112, we necessarily find that the Administrator may consider these factors." 824 F.2d at 1163.) The court explained that "it is not the court's intention to bind the Administrator to any specific method of determining what is 'safe' or what constitutes an 'ample margin'." 824 F.2d at 1166. Thus, the court provided that technological feasibility may be considered under section 112, at the "ample margin of safety" step in the analysis, and that it is within the discretion of the Administrator to determine what weight it is to be given, along with other relevant considerations such as the cost of additional controls. Because the court has specifically sanctioned the consideration of costs as well as feasibility of controls, it is clear that *Vinyl Chloride* does not require imposition of the maximum feasible controls without regard to cost or effectiveness: "Section 112(b)(1)'s command to provide an ample margin of safety to protect public health is self-contained, and the absence of enumerated criteria may well evince a Congressional intent for the Administrator to supply reasonable ones." 824 F.2d at 1159.

2. Regulatory Approaches

The comments on the four approaches proposed by EPA for making the acceptable risk decision and for providing an ample margin of safety were generally polarized: Approach A was favored largely by industry; Approach D was favored by many private citizens, State regulatory agencies, and public interest groups; Approach B received essentially no support; and, while approach C was criticized by many industries, private citizens, State regulatory agencies and public interest groups, it received some support from other commenters within these groups. In addition, alternative approaches were suggested by several commenters with some favoring a higher acceptable risk level and others a zero emissions approach.

The EPA considered all of these comments in selecting the final policy for setting standards under section 112. This was done in light of the *Vinyl Chloride* decision; the final policy is described above in this **Federal Register** notice. The EPA response to these comments are presented below.

In considering the comments on the proposed approaches and alternative suggestion for a policy under section 112, EPA viewed the comments in the context that some positions and concerns expressed by the commenters were diametrically opposed to one another. Thus, EPA realized that no response could completely resolve these positions and concerns. Accordingly, after thoroughly viewing and considering these comments, EPA selected a final policy for setting standards under section 112.

The following sections are split into discussions of the four alternative approaches presented in the March 7, 1989 **Federal Register** notice and by ancillary issues that were relevant to selecting the final policy for setting NESHAPs. The main position and concerns presented by commenters are followed by an EPA response to the comments in the context of the final policy.

Approach A Comments: Many commenters favored Approach A on the basis that it would be flexible, not overly simplistic nor based on a single risk measure, that it would take into account all relevant health information and uncertainties in risk estimation, and it would be a more balanced and rational approach than the other approaches. Many commenters rejected Approach A because they did not find it stringent enough. On the other hand, some commenters felt the preferred level for the MIR of 10^{-4} or less was unnecessarily restrictive. One commenter suggested that Approach A should be modified to increase the maximum lifetime risk limit to 25 mrem/y ede. Several commenters found Approach A unacceptable because it does not establish a consistent and equitable policy, thereby allowing different acceptable risk decisions for different pollutants and source categories.

Response: The EPA agrees with many of these comments and, thus, the final policy, like proposed Approach A, is flexible, provides an equitable response to regulation of air toxics under section 112, and takes into account all the relevant health information and uncertainty in the risk assessment. The final policy is not overly simplistic (that is, based on a single risk measure) and is clearly consistent with the EPA's guidelines for cancer risk assessment for full disclosure of risk uncertainties and quantitative range of risks. The EPA appreciates the position of commenters who supported the EPA's concern that risk estimates less than 1×10^{-6} should be given less weight than risk estimates greater than 1×10^{-4}. The EPA believes, though, that it should reduce risks to less than 1×10^{-6} for as many exposed people as reasonably possible. The EPA also agrees with commenters that proposed Approach A may not be stringent enough, and, therefore, even though the final policy is similar to proposed Approach A, the application to the final policy results in lower levels of emissions. Regarding the maximum lifetime risk limit, the EPA has considered the recommendation of the NCRP, ICRP, and other expert advisory committees and in the context of the source categories herein considered, has concluded that individual dose levels greater than 10 mrem/y ede are inconsistent with the requirements of section 112.

The EPA also does not agree with commenters who said that several aspects of Approach A (e.g., its flexibility and consideration of uncertainty) would lead to an inconsistent policy allowing different acceptable risk decisions for different pollutants and source categories. The EPA believes that the uncertainties within different risk assessments can appropriately result in different acceptable risk decisions. For example, while EPA believes that the risk assessment may be overstated or understated in certain cases, there is no specific way to account for this belief other than to qualitatively consider it in the acceptable risk decision; EPA sees this as an appropriate use of its expert judgment. In addition, EPA does not agree with commenters who said that the uncertainty of a risk assessment should only be considered in the ample margin of safety decision. Risk assessments are only as good as the weakest information and modeling tools used in the assessments, and the value of the results of these assessments must be considered every time they are used; to ignore the uncertainty of these assessments is scientifically unsound and could result in similarly unsound decisions that may be viewed as inconsistent.

Approach B Comments: No commenters favored Approach B. The commenters who opposed this approach generally fell into two groups: industries, who generally felt that Approach B was too conservative and narrow; and State governments, private citizens, and public interest groups, who felt that Approach B was not stringent enough.

Many commenters rejected Approach B (also C and D) because it is based on a single measure of acceptable risk (incidence in Approach B) and does not allow EPA to consider the full range of available health information. Some commenters opposed Approach B because the incidence is often greatly dependent on the definition of the source category. Most of these commenters felt that Approach B did not consider the maximum exposed individual and did not protect smaller populations from high risk when total incidence is low.

Response: The EPA agrees with most of these comments. The final policy, unlike proposed Approach B, provides an equitable response to regulation of air toxics under section 112 by providing for the consideration of the MIR, yet takes into account all the other relevant health information and uncertainty in the risk assessment, including incidence. The final policy is not overly simplistic (that is, based on a single risk measure) and is clearly consistent with the EPA's guidelines for cancer risk assessment for full disclosure of risk uncertainties and quantitative range of risks. The EPA appreciates the concern of commenters that incidence is often greatly dependent on the definition of the source category.

Approach C Comments: Approach C was supported by several commenters as being a straight-forward, bright-line approach. In contrast, some commenters found Approach C too conservative, inflexible, and limiting of the information which could be considered by the Administrator in making the acceptable risk decision. Many other commenters rejected Approach C because they did not find it stringent enough.

Response: The EPA agrees with many of these comments. The EPA utilizes a level of approximately 1×10^{-4} as an appropriate presumptive benchmark of acceptability in employing its selected policy approach. At the same time, EPA agrees with commenters that Approach C was inflexible and did not consider all the relevant health information and uncertainty in the risk assessment. Accordingly, as indicated in the discussion of the final policy, EPA believes that MIR levels greater than approximately 1×10^{-4} are presumptively unacceptable, but that the risk estimates must be considered in light of all the relevant health information and the uncertainties in the risk assessment. As part of this perspective, EPA agrees that exposures to background concentrations and multiple sources of a pollutant may be considered to the extent that it is practical and reasonable to do so.

Approach D Comments: A large group of public interest groups, and private citizens supported this approach. Their primary reason for support was because this was the most stringent approach, but other reasons included consistency with existing State air toxics programs and Federal regulations and accounting for underestimation of risk. A few commenters favored Approach D in order to protect public health in a multiple carcinogen environment.

The commenters who rejected Approach D did so for a variety of reasons. Some found Approach D too conservative, inflexible, and limiting in the information which could be considered in the acceptable risk decision. Several commenters disagreed with those who argue that a 1×10^{-6} acceptable risk level is justified due to concern about exposure to multiple chemicals; these commenters said that section 112 regulatory decisions should not be based on concerns about chemical exposures that have little relevance to the pollutant and source category being regulated.

Many commenters felt either that even the risk level of 1×10^{-6} given in Approach D was unacceptable or not protective enough of public health, or that "acceptable" risk should mean zero risk.

Response: The EPA agrees with commenters that felt that Approach D was too conservative, inflexible, and limiting of the information which could be considered in the acceptable risk decision. However, much of the intent of Approach D has been incorporated in the methodology adopted which seeks to protect as large a portion of the exposed population as possible to risks no higher than approximately 1×10^{-6}. The EPA also agrees with commenters who stated that consistency with State and Federal regulations must be viewed in light of the purpose and actual implementation of those regulations and, specifically, agrees that comparing NESHAP requirements with State programs (many of which are guidelines and contain waivers or flexibility if technology cannot achieve the programs' stated goals) is inappropriate. Also, EPA finds the comment that there is a public consensus that only an MIR of 1×10^{-6} or less is acceptable to be difficult to support given the wide range of positions expressed in this rulemaking.

While EPA agrees that multiple exposures to hazardous air pollutants are important to understand and consider in the EPA's overall implementation of its public health mandates, EPA disagrees that these exposures should be routinely evaluated and considered in selecting standards under section 112. In taking this position, EPA is agreeing with commenters who said using these exposures explicitly in selecting standards would be very difficult and possibly impractical. The EPA also disagrees with commenters who said that even the risk level of 1×10^{-6} given in Approach D was unacceptable or not protective enough of public health, or that "acceptable" risk is zero risk.

Alternative Acceptable Risk Approaches: Several commenters proposed variations on, or alternatives to, the EPA's four proposed approaches for determining acceptable risk. Several of these were modifications to the case-by-case approach. Another group argued for more stringent criteria than Approach D, with a ultimate goal of zero risk. A third group provided various other alternative acceptable risk levels.

Comment: Several commenters advocated higher levels of acceptable risk than those proposed in any of the EPA's approaches. Some did so by explicitly referencing guidance issued by the ICRP, the NCRP, or other groups involved with radiation health protection that sanction greater risks than those proposed by EPA.

Response: The EPA does not agree with the commenters who advocated higher levels of risk than any considered in the March 7, 1989, Federal Register notice. While some commenters interpreted the *Vinyl Chloride* decision to mandate these high risk levels, EPA believes that the *Vinyl Chloride* decision requires EPA to consider societal risks in making an expert judgment on acceptability. The EPA completed such considerations, made an expert judgment and, consequently, selected a presumptive MIR level of approximately 1×10^{-4}. For the sources considered in this notice, EPA believes that associated risks in the range of 1×10^{-2} and 1×10^{-3} are too high, and presumptively unacceptable.

3. *Risk Comparisons in the Acceptable Risk Decision:* Several commenters expressed positions on whether comparison of hazardous air pollutant risk with other risks encountered by society should be considered in making the acceptable risk decision. Some commenters thought comparisons were appropriate while others did not.

Comment: Several commenters thought that as part of the acceptable risk decision, EPA should compare risks from radiation with other risks that are encountered in ordinary life and accepted by society. They generally used comparative risks as an argument in favor of Approach A and as evidence that risks of 1×10^{-4}, or even higher, could be considered acceptable. The commenters said such comparisons are consistent with the *Vinyl Chloride* decision's reference to consider the acceptability of risk in "the world in which we live." Many commenters listed several activities encountered in daily life which entail lifetime risks in the 1×10^{-3} to 1×10^{-4} range as evidence that this level of risk could be considered acceptable.

Others said the comparison is not valid because risks such as driving a car are voluntary, whereas pollutant exposures are involuntary.

Response: The *Vinyl Chloride* decision provides for such comparisons and for EPA to make an expert judgment of the acceptability of the risks for sources of hazardous air pollutants. However, EPA believes that it is prudent to view such comparisons cautiously and to reflect the uncertainty in such comparisons in the EPA's decisions on the acceptability of the risks for sources of hazardous air pollutants. Factors, such as whether the risks are voluntary, controllable, man-made, and uncertain, lead EPA to be cautious in making such comparisons. After considering these risks, EPA has determined that MIR's greater than approximately 1×10^{-4} are presumptively unacceptable and are considered in making an overall judgment on acceptability along with other relevant health and risk factors, including uncertainty.

However, in this regard, it is important to point out that MIR estimates are based on a different and, more conservative, concept than average-risk expressions such as the risks associated with motor vehicles, or the risk of being killed by lightning. Average risks generally apply to the total population and do not reflect the distribution of risks across a population. For example, the average lifetime risk of death due to motor vehicle accidents is about 5×10^{-3}. A city with a population of 2 million might, therefore, expect about 150 traffic-related deaths every year even though some members of this population are at greater risk. On average, this 150 deaths every year does not express the incidence rate for those members of the population. In contrast, if the MIR at a typical industrial facility located in a city of 2 million population is 5×10^{-3}, the annual estimated incidence would only be about 1 death in 20 years (0.05 cases/year). And, the "average" individual risk to the exposed population is typically much lower, by orders of magnitude, than the MIR. Thus, while EPA believes that MIR risks greater than approximately 1×10^{-4} are presumptively not acceptable, EPA maintains that commenters who apply the MIR to entire populations are improperly characterizing population risks as well as the MIR.

Comment: Several commenters said that if levels of exposure are within the bounds of variation in ambient background levels, the activity should not be regulated. In addition, an annual dose of 10 mrem/y ede is probably within the normal variations seen in natural background; therefore, a cumulative dose of this magnitude from all man-made sources and pathways appears to be acceptable when considering risks if the ALARA principal is followed and enforced.

Response: The EPA believes that comparison of estimated MIR levels to natural background risk levels is irrelevant. What EPA considers important is the incremental risk associated with a particular activity. Reference to natural background risk levels is only acceptable in deciding what benchmark society deems acceptable.

4. *Ample Margin of Safety Decision:* Some commenters expressed opinions on what factors should be considered in the decision on what level of regulation provides an "ample margin of safety" as required by section 112 of the CAA and the *Vinyl Chloride* decision. Some commenters argued for strong consideration of health effects and uncertainties, while others emphasized consideration of economic impacts or a balancing of multiple factors.

Comment: Several commenters suggested that in the ample margin of safety decision, EPA should give greater consideration to health effects, noncancer effects, alternative exposure pathways, co-emitted pollutant risks, nonquantified health effects, interactions among pollutants, and uncertainties not taken into account in the EPA's risk estimates. It was also suggested that an "ample margin of safety" means no less than elimination of all avoidable risks.

Some commenters identified additional economic factors that they thought should be considered and that would lead to more stringent regulatory decisions. For instance, there are many costs to society associated with the deaths and illnesses associated with pollution, such as emotional costs to families, medical costs of treatment and institutionalization, and weakening of the gene pool.

Response: EPA disagrees with the comment that an "ample margin of safety" requires the elimination of all avoidable risks. The *Vinyl Chloride* decision does not require this degree of stringency. EPA did consider non-fatal cancers and genetic effects in developing this rule; additional health and economic information was considered to the extent that it exists in the rulemaking record. EPA will continue to endeavor to consider fully all relevant factors in the selection of final standards under section 112.

5. *Risk Assessment and Treatment of Uncertainty:* The response to the EPA's solicitation of comment regarding the treatment of uncertainty varied from approval of the EPA's position to suggestions that uncertainty should force stricter standards, or conversely, prohibit restrictive standards. One group of commenters stated that EPA had shown a good appreciation of the uncertainty associated with the scientific evaluation of health data and the exposure data used in estimating risk. Commenters also provided recommendations on which step of the decision process was the appropriate place for the consideration of uncertainty.

Comment: Some commenters favored consideration of uncertainties in the acceptable risk step of the decision process, while others felt it is more appropriate to consider uncertainties only in the ample margin of safety step, and still others advocated consideration during both steps. Some stated that questions of uncertainty and conservatism cannot be separated or deferred from the determination of acceptable risk, while others felt that consideration of uncertainty should be deferred until the ample margin of safety step. Most of these latter commenters believed that the MIR should be the sole criterion for making the acceptable risk decision, and that uncertainties and other factors are best considered in the ample margin of safety step. In so doing, some added that these uncertainties should not be addressed by incorporating unscientific, over-conservative assumptions into the risk assessments.

Response: The EPA believes that it is essential to consider the quality of the information it uses to make decisions when the decisions are being made. Thus, EPA agrees with commenters that stated that it would be inappropriate to evaluate the "safe" level and the "margin of safety" without taking the uncertainties (both scientific and technological) into account. Because EPA has concluded that many factors should be considered in making the acceptable risk decision, the EPA disagrees with commenters who believed that MIR should be the sole criterion for making the acceptable risk decision and that uncertainties and other factors are best considered in the ample margin of safety step.

Comment: When estimates are imprecise, accurate quantified statements of uncertainty are essential; these factors must be actively involved in the decision-making process both for regulations and site-specific permitting decisions.

Response: The EPA has initiated a substantial effort to quantify the uncertainty in its radiation risk estimates. However, until quantitative uncertainty estimates are available, the Agency must base its decisions on the current measures of uncertainty at its disposal.

Comment: It would be inconsistent with the EPA's distinction between risk assessment and risk management for the Agency to deal with bona fide scientific questions at the stage of deciding what probability of contracting cancer is "acceptable." Risk considerations alone should be dealt with in this first step. Moreover, an adequate data base must be established for technical, scientific, and economic considerations before these can be balanced with acceptable risks.

Response: The EPA disagrees that bona fide scientific questions are inappropriate at the risk management step. The EPA's risk assessments are based on what it considers the best available scientific evidence, with conservative but reasonable assumptions made when necessary. At the risk management step, the decisionmakers need to know the uncertainties associated with the risk estimates and the range of scientific opinion regarding the assumptions that have been included in the assessment.

Comment: Some commenters suggested that the proposed rules are improperly based on incomplete technical analyses.

Response: The final rules are the result of extensive research and technical analysis conducted over a period of several years, and, thus, the record underlying the rules is reasonably complete and accurate. Commenters' technical comments, as well as those of other commenters, are incorporated into the record to the extent they proved pertinent. In arriving at the acceptable risk decisions under CAA section 112 for these rules, costs and technological feasibility were not considered. Such were considered along with the health-related factors, however, in determining whether more stringent rules were needed in arriving at the statutorily required ample margin of safety.

Comment: Several commenters have asserted that EPA's risk assessments are not realistic but are worst case estimates. Some commenters objected to EPA's assumption that people living in the vicinity of radionuclide sources were exposed continuously, for a 24 hours per day 70-year lifetime, to predicted long-term ambient radionuclide levels. Commenters maintained that the average lifetime of an industrial facility is considerably less than 70 years, and that few individuals would be expected to live in the same location for their entire lives.

Response: The EPA recognizes that the assumption of 70 years of continuous exposure constitutes a simplification of actual conditions and represents, in part, a policy judgment by EPA, but feels that this assumption is preferable to other alternatives. Although emissions of radionuclides from industrial sources would reasonably be expected to change over time, such changes cannot be predicted with any certainty. In lieu of closing, plants may elect to replace or even expand their operations and subsequently increase their emissions. The 70-year exposure duration represents a steady-state emissions assumption that is consistent with the way in which the measure of carcinogenic strength is expressed (i.e., as the probability of contracting cancer based upon a lifetime [70 year] exposure to a unit concentration). Constraining the analysis to an "average" plant lifetime carries the implication that no one could be exposed for a period longer than the average. Since by definition, some plants would be expected to emit longer than the average, this assumption would tend to underestimate the possible MIR. The EPA agrees that the U.S. population is highly mobile. However, adjusting the exposure assumptions to constrain the possibility of exposure to emissions implies that exposure during the periods away from the residence are zero. In addition, a less-than-lifetime assumption would also have a proportional impact on the estimated MIR, suggesting that no individual could be exposed for 70 years. On balance, EPA believes that the present assumption of continuous exposure is consistent with the steady-state nature of the analysis and with the stated purpose of making plausible, if conservative, estimates of the potential health risks. It is the EPA's opinion that this assumption, while representing in part a policy judgment by EPA, continues to be preferable to adopting a shorter lifetime figure, both in view of the shortcomings of such alternatives and in the absence of compelling evidence to the contrary.

Comment: The EPA should measure the gain in risk reduction made against the costs to reach such gain and compare the benefits against the increased risk borne by workers.

Response: The EPA does consider both the incremental reduction in risk and the costs at the ample margin of safety step. The EPA is unaware of any increase in worker exposure that will be caused by the promulgated NESHAPs.

6. Scope of the Regulations

Comment: Several commenters stated that NESHAPS should be developed for other sources or categories of radionuclide emissions including that from Naturally Occurring Radioactive Materials (NORM) contamination of oil and gas production equipment and in construction materials, and also from naturally occurring radon in the soil that underly residences, schools, businesses and offices. They questioned whether emanation rates of radon (222 and 220) from coal stockpiles, boilers, fly ash, and bottom ash significant for regulation under the NESHAP program.

Response: The EPA believes that the source categories evaluated in this rulemaking represent the sources with the greatest potential for causing unacceptable risks from radionuclide emissions to ambient air. The Agency has examined the potential problem of radon in natural gas provided to homes and found that the transit times allow for the decay of the radon to acceptable levels. Emissions of radon from coal piles and coal ash piles has also been examined, as part of the CERCLA rulemaking on Reportable Quantities, with similar results. EPA will continue to look at these and other potential sources to see if they are appropriate sources for regulation under section 112. Finally, it must be noted that EPA's authority under CAA Section 112 is limited to the regulation of source categories of toxics to ambient air and, thus, lacks authority to regulate or control naturally ocurring radon in soils that underly homes or businesses under this code section.

Comment: Consideration should be given to the problems presented by overlapping sources, any increase in the number of facilities within each category over time, and the goal of controlling the total incremental pollution for all radionuclide emissions from all source points in all twelve source categories.

Response: The Agency agrees and its policies on acceptable risk levels are based, in part, on assuring that risks caused by overlapping and multiple sources do not result in individuals receiving an unacceptable level of exposure and risk. Explicitly accounting for overlapping and multiple sources of exposure greatly complicates the calculation of exposures and risks. Since concentrations of radionuclides decline rapidly with distance from a source, however, it is highly unlikely that any individual could be the most exposed individual for more than one source. In most cases, members of the public will receive risks less than 1×10^{-4} from more than one source.

Comment: The standards should address cumulative health impacts resulting from exposures to multiple radiological and nonradiological pollutants emitted by the same or multiple sources located in relative proximity to one another.

Response: Although EPA has been unable to quantify cumulative and synergistic health impacts for multiple hazardous materials and sources have not been accurately qualified, it is our judgment that if such effects could be accurately quantified, they would not substantially alter EPA's conclusions in this rulemaking.

Comment: The standards consider only fatal cancers and fail to take into account the entire range of chronic debilitating and incapacitating diseases that may result from radionuclide emissions.

Response: EPA has taken into account the entire range of chronic debilitating and incapacitating diseases that may result from radionuclide emissions.

Comment: Proposed standards are based on what the EPA perceives as achievable rather than a safe level of airborne radioactivity emissions; this is not an appropriate basis for setting air emission standards under the Act.

Response: The EPA believes that its standards ensure an acceptable level of risk to public health with an ample margin of safety as required by the Clean Air Act and the decision in *Vinyl Chloride*. The Agency has established a threshold presumption that lifetime fatal cancer risks to individuals of approximately 1×10^{-4} are acceptable under the *Vinyl Chloride* decision, and has attempted to assure that as many persons as possible do not receive lifetime risks greater than 1×10^{-6}.

Comment: The potential effect of the proposed rule on Federal preemption in the area of regulation of facilities needs to be carefully considered. Nuclear facilities are unique and complex, and consistent regulation is in the best interest of the public. Congress determined that national regulation of nuclear power plants is appropriate in establishing the Atomic Energy Act.

Response: The Agency agrees that consistent regulation is in the interest of the public and has promulgated national emissions standards that apply to nuclear power plants. However, the Clean Air Act does not preempt state standards that are at least as stringent as those set by the Federal Government.

Comment: The consistency of these standards with other existing and proposed radiation standards, for air pathways and other pathways, should be discussed.

Response: As noted in the March 7, 1989 **Federal Register** notice for the proposed standards, the statutory requirements of CAA section 112 differ from the requirements of other authorities under which the EPA and other regulatory bodies set radiation standards. Therefore, the first priority for EPA is to assure that the regulations promulgated are in accordance with its statutory mandate.

Comment: All facilities that emit similar radionuclides should be held to the same emission standards; a remote facility should not be allowed higher emission rates than an urban facility, nor should a government or municipal facility be allowed higher emission rates than a private or industrial facility.

Response: The EPA's decisionmaking approach in setting final rules assures that all members of the public are adequately protected, regardless of the source of their exposure or their choice of residence in an urban, suburban, rural, or remote area of the country. The EPA believes that different source categories may be treated differently even if they emit similar pollutants, so long as the final standard protects public health with an ample margin of safety.

Comment: The Clean Air Act does not allow for dose standards.

Response: We disagree with those commenters stating that Congress in directing the Agency to set emission standards did not authorize that those standards be set in terms of dose to an individual. CAA section 302(k) defines the term "emission standard" to include limits on the quantity, rate, or concentration of an air pollutant and the Agency views dose standards fully consistent with that definition. In many cases, because there are over two hundred known radionuclides, numerous different ones are emitted from an individual source. In addition, the risk due to each is a further function of many factors such as particle size and exact chemical state. An emission standard for radionuclides based on quantity at the stack would often be complex to the point of impracticality. A dose standard provides a better approach to protecting the public since it allows the establishment of a uniform limit based on consideration of all of the factors related to the particular mix of radionuclides emitted from each source. Moreover, this approach is supported by radiation protection experts and the regulated community.

Comment: Some commenters posit that Clean Air Act Section 112 does not, or should not, authorize EPA to regulate radionuclide air emissions from those sources, or categories of sources, that are already regulated pursuant to the Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. No. 95-604, 92 Stat. 3021 (codified in scattered sections of 42 U.S.C.) ("UMTRCA"). These commenters reason that because UMTRCA was promulgated subsequent to the last comprehensive revisions to the Clean Air Act, and, because UMTRCA's statutory scheme is more specifically focused upon the sources to which it applies than is the Clean Air Act, EPA's authority under CAA Section 112 is, in effect, preempted.

Response: EPA disagrees that it lacks authority to regulate, under CAA Section 112, the radionuclide air emissions of sources also regulated under UMTRCA. Indeed, UMTRCA itself resolves this issue by quite explicitly stating that "[n]othing in this chapter applicable to byproduct material * * * shall affect the authority of the [EPA] under the Clean Air Act of 1970, as amended * * *" 42 U.S.C. section 2022(e). The legislative history is similar: "Authorities of the EPA under other laws would not be abridged by the new requirements." H. Rep. No. 1480, 95th Cong., 2d Sess. 8, reprinted in, 1978 U.S. Code Cong. & Admin. News 7433, 7444. In other words, there is no indication that Congress intended UMTRCA to preempt EPA's regulatory authority under the Clean Air Act; rather Congress expressly contemplated EPA authority to simultaneously regulate under both legislative schemes.

7. Procedural

Comment: Many commenters felt that the affected parties familiar with the proposed standards have not had adequate time to thoroughly review available documents, and many stated that many supporting documents were not available until mid-April. In addition, several stated that the material contained significant errors.

Response: The EPA made every effort to notify affected parties of the rulemaking action, and it timely prepared and distributed the background materials supporting the proposed rules. However, the court order under which this rulemaking has been conducted necessitated strict adherence to the schedule for public comments and hearings. The Agency is not aware of any significant errors in the risk assessment. Where additional or new information was provided or developed during the comment period, it has been incorporated into the Final Environmental Impact Statement (FEIS), also referred to as the Background Information Document (BID).

Comment: The Proposed Rulemaking Notice, published in the Federal Register on March 7, 1989, does not identify those who participated in its preparation. The authors of the Draft Environmental Impact Statement (DEIS) do not appear to represent the kinds of knowledge, experience, and expertise necessary for the task.

Response: The DEIS does identify the ORP staff members who contributed to the development of the background material and indicates that S. Cohen and Associates, Inc., the Office's Technical Support Contractor, provided considerable technical support and analysis. The Agency disagrees strongly that the participants in this effort lack the necessary knowledge, experience, and expertise to prepare the proposal or final rulemaking packages.

Comment: The conclusion of the Regulatory Flexibility Act analysis that this rule will have little or no impact on small businesses because virtually all small businesses regulated under this rule already comply with the proposed standards is unsupported.

Response: The final rule for NRC-Licensed and Non-DOE Federal facilities is the only NESHAP with the potential to affect small businesses. That standard is a baseline standard, which indicates that EPA is unaware of any particular facility that does not comply with the final rule. In doing its risk assessment, EPA looked at model facilities with relatively large emissions for that class of facility to ensure that the risk was not underestimated. Therefore, EPA believes that it is highly unlikely that any small business would have emissions which would exceed the standard.

Comment: An international panel of recognized health professionals and epidemiologist should review and comment on the health effects of these very low levels of proposed radiation protection standards.

Response: The Agency invited comments from all interested parties during the public comment period. Further, it has reviewed and considered the findings and recommendations of the NCRP, the ICRP, UNSCEAR, and the NAS in developing its risk coefficients. Finally, the risk coefficients used in this risk assessment were reviewed and approved by the Agency's Science Advisory Board.

Comment: Even among the various sources proposed for regulation in this rulemaking there does not appear to be an even handed application of the EPA's own analysis. The different regulatory standards proposed by the EPA for the various sources are irrational.

Response: The EPA disagrees. The proposed regulations were developed on a consistent basis for each of the four approaches. For the final rule, the EPA used a single approach to determine the level of each standard it set. The EPA believes that consistency among the standards has been achieved.

Comment: The EPA should defer final action in this rulemaking to permit public comment on the Science Advisory Board's Review of EPA's proposal.

Response: The court imposed schedule for this rulemaking does not permit the Agency to extend the public comment period.

Comment: The EPA should propose its enforcement policy for public review and comment.

Response: The EPA does not plan at this time to create a specific enforcement policy for these rules, but instead currently intends to enforce them in the same manner that it enforces other Clean Air Act standards.

8. Decision to List Under Section 112

The FR notice requested comments on the appropriateness of listing radionuclides as hazardous air pollutants under section 112 of the Act. Comments on this issue ranged from unequivocal support for listing to questions as to the justification for listing under this section of the Act. Many, while not necessarily opposing listing, stated that their particular source or source category should not be regulated under the Act due to the insignificant risks to public health presented, or, in light of the existence of other regulations.

Comment: Several commenters stated that the listing under section 112 is appropriate because a hazardous air pollutant includes those substances that may result in an increase in mortality or an increase in serious irreversible or incapacitating reversible illness. The EPA should apply the same risk assessment criteria to radionuclides that are applied to other toxic air pollutants regulated under section 112. Such an approach is the only way that the health protection goals will be achieved.

Response: The EPA agrees that listing under section 112 is appropriate, and it does apply the same approach and criteria to all risk assessments and standard setting under section 112. However, differences in our knowledge about different hazardous materials, differences in the modes of exposure (pathways), and differences in the assessment of exposure lead to different risk assessment methods.

Comment: Many oppose the listing of radionuclides for three main reasons: (1) Radionuclide emissions from all source categories constitute only 1/30th of natural background, which is an insignificant amount; (2) concentrations released into the general environment as a matter of routine emissions do not constitute the degree of hazard which section 112 was meant to regulate; and (3) there is no evidence with respect to the health effects of low level radionuclide emissions.

Response: The EPA believes that its listing of radionuclides as hazardous air pollutants under section 112 is proper and is compelled by both the weight of the scientific evidence and the Administrator's statutory duties under the Act. While the EPA agrees that there is no conclusive human epidemiological data demonstrating health effects at low levels of exposure, we believe that the preponderance of the scientific evidence (both human epidemiology at higher levels of exposure and the data from non-human sources) indicates that the linear non-threshold dose response model is consistent with the available data and its utilization for regulatory purposes is appropriate. The EPA disagrees that the levels of risks posed by releases of radioactive materials into the air are below those the Congress intended to regulate under section 112. Finally, the EPA does not consider the comparison of the risks posed by man-made sources to the risks from background to be relevant. The level of exposure corresponding to safe with an ample margin of safety, not background, is the appropriate criterion for regulation under section 112. Many risks associated with natural background radiation are relatively high and, thus, are not appropriate as a benchmark for evaluating the need for regulation.

Comment: Some commenters felt that regulation of radionuclides under section 112 is appropriate but that EPA should exempt some categories of industries that are regulated under other authorities, unless the current emissions within the source category can be shown to be unsafe.

Response: The Agency has concluded that for source categories where emissions present or potentially present unacceptable risks, it should not defer to other regulatory authorities.

9. Technological and Economic Factors

Comment: The EPA should not be concerned with availability or feasibility of controls. It should simply establish the requirement and let industry determine how it will meet it.

Response: In determining the safe level, EPA agrees. Thus, at that stage it does not consider either the availability or feasibility of controls. These are considered, however, at the second step ample margin of safety determination. Moreover, where possible, such as with the NESHAP for underground uranium mines, the regulated community is given wide latitude in selecting the combination of controls and/or work practices that will allow them to meet the mandated level of the standard.

Comment: The factors the EPA should consider before requiring control technology include: commercial vendor availability, adaptability from other uses, readily understood and applicable operating principles, costs and health benefits. Availability to U.S. industry should not be based on foreign commercialization.

Response: In general, these are the factors that the EPA considers. However, the EPA sees no reason to automatically preclude a technology solely because it has been developed and commercialized only outside of the U.S.

Comment: A technological development that has been demonstrated to reduce emissions and is in use in or outside the U.S. should be considered available and required.

Response: The EPA agrees that the availability of demonstrated control technology should be considered. However, the requirement of additional controls, at the ample margin of safety step, rests also on consideration of costs and other factors.

Comment: Because of the existing regulatory framework that forces the use of control technology pursuant to the ALARA principle, the nuclear industry is already at a very low level of emissions and further regulation is merely duplicative.

Response: The EPA agrees that the emissions from many segments of the nuclear industry are at low levels. The EPA does not anticipate that facilities with state-of-the art control systems will need additional controls to comply with the limits of the NESHAP. However, EPA does not agree that in all circumstances regulation under CAA section 112 is unnecessary and indeed has determined that final rules are needed for the radionuclide source categories identified.

Comment: The EPA should not promulgate additional radionuclide emission regulations for the uranium fuel cycle (UFC) including nuclear power plants. The industry has a proven record of protecting the public health and safety from airborne radioactive emissions. This results from the conservative design of the facilities, the careful operating philosophy employed in these facilities, and the existing framework of EPA and NRC regulations. The public already enjoys better protection from UFC radionuclide emissions than from almost any other industry's emissions.

Response: As stated in the FR notice, the Administrator has determined that regulation of potentially significant risks should not be deferred to other regulatory authorities. Based on its evaluation of the doses and risks caused by UFC facilities, the EPA does not believe that non-milling facilities will have to modify their operations to comply with the NESHAP. However, EPA has agreed to reconsider the issue of duplication of regulation as described in the discussion on subpart I.

Comment: The DOE is concerned that the EPA has proposed an outdoor radon concentration standard that is far below the level the EPA is willing to allow indoors.

Response: The authorities under which the NESHAPs and indoor radon guidance are promulgated are entirely different. The EPA does not have the authority to mandate indoor radon levels. Its guidance to homeowners is based on a single screening measurement, the protocols for which are designed not to provide an average exposure level but a maximum exposure level. Therefore, comparison with the limits established by the NESHAP is invalid.

Comment: Regulations that have the effect of forcing use of control technology are clearly inappropriate where the technology has not been shown to be currently available.

Response: CAA section 112 requires EPA to set a safe or acceptable level without regard to the availability of control technology. Nevertheless, as a practical matter, while NESHAPs allow for use of new technologies, none of the promulgated NESHAPs requires the development of new technologies.

Comment: A strong regulatory stance by the EPA in requiring pollution controls will act to stimulate innovation, reduce prices via increased sales of control technologies and processes, and reduce risk.

Response: This stimulation of innovation and price competition in the effluent control industry, while a laudable public goal, is not a requirement under section 112 of the Act. Rather, the purpose and focus of NESHAPs is to protect public health with an ample margin of safety.

Comment: EPA should include avoided costs, e.g. possible tort judgments, including punitive damages, in determining the level of the final standard at the ample margin of safety step of the decision-making process.

Response: In theory, the EPA agrees. However, as a practical matter, it is often difficult to arrive at even an approximation of avoided costs when dealing with specific source categories. They are simply too speculative, especially given that the source categories are often comprised of thousands of individual facilities.

Comment: Cost as used in the ample margin of safety discussion should include all of the costs identifiable with the decision; this would include value of the facility, economic effects on the community, and social effects of labor force dislocation.

Response: To the extent that the EPA is able to develop quantitative estimates of these costs they are considered pursuant to the decision-making process. However, as already noted, such costs are often only available, if at all, as rough, qualitative estimates.

Comment: Industry should meet the criteria irrespective of costs or technological feasibility.

Response: The EPA agrees with respect to meeting the levels determined to be "safe." The EPA disagrees with respect to the determination of the needed ample margin of safety.

Comment: Fundamental fairness prohibits the EPA from imposing controls that cost more than some ceiling amount per estimated death prevented.

Response: Since the *Vinyl Chloride* decision precludes consideration of cost when determining what constitutes "safe," all sources must meet the standards or utilize controls to the degree necessary to bring their emissions into compliance, regardless of the cost.

Comment: EPA has not explained the basis for abandoning the existing regulatory program for uranium mill tailings disposal in favor of regulation under the CAA. The UMTRCA, passed subsequent to the CAA, provides flexibility.

Response: The Administrator has determined not to defer to other regulatory authorities when the risk merits issuance of a NESHAP under section 112 of the Act. However, the requirements of the other regulations must still be met.

Comment: If post-closure emissions are to be actively regulated under the standard, the EPA should address financial assurances for evaluation, monitoring, reporting, facility modification request, and remedial actions.

Response: Given the one-time nature of the post-closure monitoring requirements for phosphogypsum stacks and uranium mill tailings disposal sites, the EPA does not believe that the small financial burden requires specific financial assurance requirements. Details of monitoring and reporting requirements are included in the appropriate Subparts.

Comment: The proposal fails to address the occupational dose increment resulting from the installation, operation, and maintenance of the additional equipment and systems required for compliance; the collective occupational exposures required for some of these additions will be at higher individual doses and of significantly more consequence than the questionable savings in public risk.

Response: The lack of specific instances makes it impossible to fully address this concern. The EPA is not aware of any instance where a NESHAP will require emission controls that will result in a significant occupational exposure. Where controls may be required, for example at elemental phosphorus plants, they supplement or replace existing, less effective, controls. The exposure resulting from installation should be minimal since the process will be shut down, and exposures received during maintenance should be comparable.

Comment: Consideration should be given to whether public welfare would not be improved by diverting moneys from regulatory procedures with no measurable effect on human health, to research efforts, which have resulted in considerable advantages to the public health and well being. Human costs to those dependent on the industry as well as other adverse environmental repercussions caused by a shift away from nuclear power toward more polluting technologies, will far outweigh any theoretical public health benefit.

Response: The suggested cost-benefit determination is outside the purview of the Agency. However, given the concerns of the National Institutes of Health that health care may be affected, EPA has agreed to reconsider this issue.

Comment: The statement that demand for nuclear energy is on the decline due to reduced demand for nuclear generated electricity is fallacious. Also, while the analysis recognizes that these regulations will worsen the already weak position of the domestic uranium industry, it does not examine the adverse effects that will have on the national trade deficit.

Response: Imported uranium is a trivial component of the United States trade deficit.

Comment: The EPA estimates costs associated with the alternative regulatory approaches for each source category but the total fuel cycle cost will be passed through to nuclear utilities and should be assessed on that basis. This includes sources under subparts B, H, I, K, R, S, T, and W.

Response: Costs associated with the final rule are not significant compared with the total fuel cycle costs. There would be no significant impacts.

VIII. Miscellaneous

A. Docket

The docket is an organized and complete file of all information considered by EPA in the development of the standards. The docket allows interested persons to identify and locate documents so they can effectively participate in the rulemaking process. It also serves as the record for judicial review.

Transcripts of the hearings, all written statements, the Agency's response to comments, and other relevant documents have been placed in the docket and are available for inspection and copying during normal working hours.

B. General Provisions

Except where otherwise specifically stated, the general provisions of 40 CFR part 61, subpart A apply to all sources regulated by this rule.

C. Paperwork Reduction Act

The information collection requirements in this final rule have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* and have been assigned OMB control number 2060–0191.

D. Executive Order 12291

Under Executive Order 12291, EPA is required to judge whether this regulation is a "major rule" and therefore subject to certain requirements of the Order. The EPA has determined that regulations promulgated today will result in none of the adverse economic effects set forth in section I of the Order as grounds for finding a regulation to be a "major rule." These regulations are not major because (1) nationwide annual compliance costs do not meet the $100 million threshold; (2) the regulations do not significantly increase prices or production costs; and (3) the regulations do not cause significant adverse effects on domestic competition, employment, investment, productivity, innovation, or competition in foreign markets.

All of the final regulations presented in this notice were submitted to OMB for review as required by Executive Order 12291. Any written comments from OMB to EPA and any written EPA response to those comments has been included in the docket.

E. Regulatory Flexibility Analysis

Section 603 of the Regulatory Flexibility Act, 5 U.S.C. 603, requires EPA to prepare and make available for comment an "initial regulatory flexibility analysis" in connection with any rulemaking for which there is a statutory requirement that a general notice of proposed rulemaking be published. The "initial regulatory flexibility analysis" describes the effect of the proposed rule on small business entities.

However, section 604(b) of the Regulatory Flexibility Act provides that section 603 "shall not apply to any proposed . . . rule if the head of the Agency certifies that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."

EPA believes that virtually all small businesses are currently in compliance with these rules. In addition, EPA has placed reporting exemptions in the rule for NRC-licensees to limit the amount of paperwork that would be required by the smaller operators. Therefore, this rule will have little or no impact on small businesses. A small business is one that has 750 employees or fewer.

For the preceding reasons, I certify that this rule will not have significant economic impact on a substantial number of small entities.

List of Subjects in 40 CFR Part 61

Air pollution control, Arsenic, Asbestos, Beryllium, Benzene, Incorporation by reference, Mercury, Radionuclides, Vinyl chloride.

Dated: October 31, 1989.

William G. Rosenberg,

Acting Administrator.

Part 61 of chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 61—[AMENDED]

1. The authority citation for part 61 continues to read as follows:

Authority: 42 U.S.C. 7401, 7412, 7414, 7416, 7601.

2. Part 61 is amended by revising subparts B, H, I, K and W and by adding subparts R and T to read as follows. These subparts are effective December 15, 1989. Subpart I is stayed until March 15, 1989.

Subpart B—National Emission Standards for Radon Emissions From Underground Uranium Mines

§ 61.20 Designation of facilities.

The provisions of this subpart are applicable to the owner or operator of an active underground uranium mine which:

(a) Has mined, will mine or is designed to mine over 100,000 tons of ore during the life of the mine; or

(b) Has had or will have an annual ore production rate greater than 10,000 tons, unless it can be demonstrated to EPA that the mine will not exceed total ore production of 100,000 tons during the life of the mine.

§ 61.21 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or subpart A of part 61. The following terms shall have the following specific meanings:

(a) *Active mine* means an underground uranium mine which is being ventilated to allow workers to enter the mine for any purpose.

(b) *Effective dose equivalent* means the sum of the products of absorbed dose and appropriate factors to account for differences in biological effectiveness due to the quality of radiation and its distribution in the body of reference man. The unit of the effective dose equivalent is the rem. The method for calculating effective dose equivalent and the definition of reference man are outlined in the International Commission on Radiological Protection's Publication No. 26.

(c) *Underground uranium mine* means a man-made underground excavation made for the purpose of removing material containing uranium for the principal purpose of recovering uranium.

§ 61.22 Standard.

Emissions of radon-222 to the ambient air from an underground uranium mine shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/y.

§ 61.23 Determining compliance.

(a) Compliance with the emission standard in this subpart shall be determined and the effective dose equivalent calculated by the EPA computer code COMPLY-R. An underground uranium mine owner or operator shall calculate the source terms to be used for input into COMPLY-R by conducting testing in accordance with the procedures described in Appendix B, Method 115, or

(b) Owners or operators may demonstrate compliance with the emission standard in this subpart through the use of computer models that are equivalent to COMPLY-R provided that the model has received prior approval from EPA headquarters. EPA may approve a model in whole or in part and may limit its use to specific circumstances.

§ 61.24 Annual Reporting Requirements.

(a) The mine owner or operator shall annually calculate and report the results of the compliance calculations in section 61.23 and the input parameters used in making the calculation. Such report shall cover the emissions of a calendar year and shall be sent to EPA by March 31 of the following year. Each report shall also include the following information:

(1) The name and location of the mine.

(2) The name of the person responsible for the operation of the facility and the name of the person preparing the report (if different).

(3) The results of the emissions testing conducted and the dose calculated using the procedures in § 61.23.

(4) A list of the stacks or vents or other points where radioactive materials are released to the atmosphere, including their location, diameter, flow rate, effluent temperature and release height.

(5) A description of the effluent controls that are used on each stack, vent, or other release point and the effluent controls used inside the mine, and an estimate of the efficiency of each control method or device.

(6) Distances from the points of release to the nearest residence, school, business or office and the nearest farms producing vegetables, milk, and meat.

(7) The values used for all other user-supplied input parameters for the computer models (e.g., meteorological data) and the source of these data.

(8) Each report shall be signed and dated by a corporate officer in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

(b) If the facility is not in compliance with the emission standard of § 61.22 in the calendar year covered by the report, the facility must then commence reporting to the Administrator on a monthly basis the information listed in paragraph (a) of this section for the preceding month. These reports will start the month immediately following the submittal of the annual report for the year in noncompliance and will be due 30 days following the end of each month. This increased level of reporting will continue until the Administrator has determined that the monthly reports are no longer necessary. In addition to all the information required in paragraph (a) of this section, monthly reports shall also include the following information:

(1) All controls or other changes in operation of the facility that will be or are being installed to bring the facility into compliance.

(2) If the facility is under a judicial or administrative enforcement decree the report will describe the facilities performance under the terms of the decree.

(c) The first report will cover the emissions of calendar year 1990.

(Approved by the Office of Management and Budget under Control Number 2060–0191.)

§ 61.25 Recordkeeping requirements.

The owner or operator of a mine must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. In addition, the documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with the standard. These records must be kept at the mine or by the owner or operator for at least five years and upon request be made available for inspection by the Administrator, or his authorized representative.

§ 61.26 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart H—National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities

Sec.

§ 61.90 Designation of facilities.

The provisions of this subpart apply to operations at any facility owned or operated by the Department of Energy that emits any radionuclide other than radon-222 and radon-220 into the air, except that this subpart does not apply to disposal at facilities subject to 40 CFR part 191, subpart B or 40 CFR part 192.

§ 61.91 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or 40 CFR part 61, subpart A. The following terms shall have the following specific meanings:

(a) *Effective dose equivalent* means the sum of the products of absorbed dose and appropriate factors to account for differences in biological effectiveness due to the quality of radiation and its distribution in the body of reference man. The unit of the effective dose equivalent is the rem. For purposes of this subpart, doses caused by radon-222 and its respective decay products formed after the radon is released from the facility are not included. The method for calculating effective dose equivalent and the definition of reference man are outlined in the International Commission on Radiological Protection's Publication No. 26.

(b) *Facility* means all buildings, structures and operations on one contiguous site.

(c) *Radionuclide* means a type of atom which spontaneously undergoes radioactive decay.

(d) *Residence* means any home, house, apartment building, or other place of dwelling which is occupied during any portion of the relevant year.

§ 61.92 Standard.

Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.

§ 61.93 Emission monitoring and test procedures.

(a) To determine compliance with the standard, radionuclide emissions shall be determined and effective dose equivalent values to members of the public calculated using EPA approved sampling procedures, computer models CAP–88 or AIRDOS–PC, or other procedures for which EPA has granted prior approval. DOE facilities for which the maximally exposed individual lives within 3 kilometers of all sources of emissions in the facility, may use EPA's COMPLY model and associated procedures for determining dose for purposes of compliance.

(b) Radionuclide emission rates from point sources (stacks or vents) shall be measured in accordance with the following requirements or other procedures for which EPA has granted prior approval:

(1) Effluent flow rate measurements shall be made using the following methods:

(i) Reference Method 2 of Appendix A to part 60 shall be used to determine velocity and volumetric flow rates for stacks and large vents.

(ii) Reference Method 2A of Appendix A to part 60 shall be used to measure flow rates through pipes and small vents.

(iii) The frequency of the flow rate measurements shall depend upon the variability of the effluent flow rate. For variable flow rates, continuous or frequent flow rate measurements shall be made. For relatively constant flow rates only periodic measurements are necessary.

(2) Radionuclides shall be directly monitored or extracted, collected and measured using the following methods:

(i) Reference Method 1 of Appendix A part 60 shall be used to select monitoring or sampling sites.

(ii) The effluent stream shall be directly monitored continuously with an in-line detector or representative samples of the effluent stream shall be withdrawn continuously from the sampling site following the guidance presented in ANSIN13.1–1969 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities" (including the guidance presented in Appendix A of ANSIN13.1) (incorporated by reference—see § 61.18) The requirements for continuous sampling are applicable to batch processes when the unit is in operation. Periodic sampling (grab samples) may be used only with EPA's prior approval. Such approval may be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. In such cases, grab samples shall be collected with sufficient frequency so as to provide a representative sample of the emissions.

(iii) Radionuclides shall be collected and measured using procedures based on the principles of measurement described in Appendix B, Method 114. Use of methods based on principles of measurement different from those described in Appendix B, Method 114 must have prior approval from the Administrator. EPA reserves the right to approve measurement procedures.

(iv) A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114.

(3) When it is impractical to measure the effluent flow rate at an existing source in accordance with the requirements of paragraph (b)(1) of this section or to monitor or sample an effluent stream at an existing source in accordance with the site selection and sample extraction requirements of paragraph (b)(2) of this section, the facility owner or operator may use alternative effluent flow rate measurement procedures or site

selection and sample extraction procedures provided that:

(i) It can be shown that the requirements of paragraph (b) (1) or (2) of this section are impractical for the effluent stream.

(ii) The alternative procedure will not significantly underestimate the emissions.

(iii) The alternative procedure is fully documented.

(iv) The owner or operator has received prior approval from EPA.

(4)(i) Radionuclide emission measurements in conformance with the requirements of paragraph (b) of this section shall be made at all release points which have a potential to discharge radionuclides into the air in quantities which could cause an effective dose equivalent in excess of 1% of the standard. All radionuclides which could contribute greater than 10% of the potential effective dose equivalent for a release point shall be measured. With prior EPA approval, DOE may determine these emissions through alternative procedures. For other release points which have a potential to release radionuclides into the air, periodic confirmatory measurements shall be made to verify the low emissions.

(ii) To determine whether a release point is subject to the emission measurement requirements of paragraph (b) of this section, it is necessary to evaluate the potential for radionuclide emissions for that release point. In evaluating the potential of a release point to discharge radionuclides into the air for the purposes of this section, the estimated radionuclide release rates shall be based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal.

(5) Environmental measurements of radionuclide air concentrations at critical receptor locations may be used as an alternative to air dispersion calculations in demonstrating compliance with the standard if the owner or operator meets the following criteria:

(i) The air at the point of measurement shall be continuously sampled for collection of radionuclides.

(ii) Those radionuclides released from the facility, which are the major contributors to the effective dose equivalent must be collected and measured as part of the environmental measurement program.

(iii) Radionuclide concentrations which would cause an effective dose equivalent of 10% of the standard shall be readily detectable and distinguishable from background.

(iv) Net measured radionuclide concentrations shall be compared to the concentration levels in Table 2 of Appendix E to determine compliance with the standard. In the case of multiple radionuclides being released from a facility, compliance shall be demonstrated if the value for all radionuclides is less than the concentration level in Table 2, and the sum of the fractions that result when each measured concentration value is divided by the value in Table 2 for each radionuclide is less than 1.

(v) A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114.

(vi) Use of environmental measurements to demonstrate compliance with the standard is subject to prior approval of EPA. Applications for approval shall include a detailed description of the sampling and analytical methodology and show how the above criteria will be met.

§ 61.94 Compliance and reporting.

(a) Compliance with this standard shall be determined by calculating the highest effective dose equivalent to any member of the public at any offsite point where there is a residence, school, business or office. The owners or operators of each facility shall submit an annual report to both EPA headquarters and the appropriate regional office by June 30 which includes the results of the monitoring as recorded in DOE's Effluent Information System and the dose calculations required by § 61.93(a) for the previous calendar year.

(b) In addition to the requirements of paragraph (a) of this section, an annual report shall include the following information:

(1) The name and location of the facility.

(2) A list of the radioactive materials used at the facility.

(3) A description of the handling and processing that the radioactive materials undergo at the facility.

(4) A list of the stacks or vents or other points where radioactive materials are released to the atmosphere.

(5) A description of the effluent controls that are used on each stack, vent, or other release point and an estimate of the efficiency of each control device.

(6) Distances from the points of release to the nearest residence, school, business or office and the nearest farms producing vegetables, milk, and meat.

(7) The values used for all other user-supplied input parameters for the computer models (e.g., meteorological data) and the source of these data.

(8) A brief description of all construction and modifications which were completed in the calendar year for which the report is prepared, but for which the requirement to apply for approval to construct or modify was waived under § 61.96 and associated documentation developed by DOE to support the waiver. EPA reserves the right to require that DOE send to EPA all the information that normally would be required in an application to construct or modify, following receipt of the description and supporting documentation.

(9) Each report shall be signed and dated by a corporate officer or public official in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

(c) If the facility is not in compliance with the emission limits of § 61.92 in the calendar year covered by the report, then the facility must commence reporting to the Administrator on a monthly basis the information listed in paragraph (b) of this section, for the preceding month. These reports will start the month immediately following the submittal of the annual report for the year in noncompliance and will be due 30 days following the end of each month. This increased level of reporting will continue until the Administrator has determined that the monthly reports are no longer necessary. In addition to all the information required in paragraph (b) of this section, monthly reports shall also include the following information:

(1) All controls or other changes in operation of the facility that will be or are being installed to bring the facility into compliance.

(2) If the facility is under a judicial or administrative enforcement decree, the report will describe the facilities performance under the terms of the decree.

(d) In those instances where the information requested is classified, such information will be made available to EPA separate from the report and will be handled and controlled according to applicable security and classification regulations and requirements.

(Approved by the Office of Management and Budget under Control Number 2060–0191.)

§ 61.95 Recordkeeping requirements.

All facilities must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine effective dose equivalent. This documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with the standard. These records must be kept at the site of the facility for at least five years and, upon request, be made available for inspection by the Administrator, or his authorized representative.

§ 61.96 Applications to construct or modify.

In addition to any activity that is defined as construction under 40 CFR part 61, subpart A, any fabrication, erection or installation of a new building or structure within a facility that emits radionuclides is also defined as new construction for purposes of 40 CFR part 61, subpart A.

(b) An application for approval under § 61.07 or notification of startup under § 61.09 does not need to be filed for any new construction of or modification within an existing facility if the effective dose equivalent, caused by all emissions from the new construction or modification, is less than 1% of the standard prescribed in § 61.92. For purposes of this paragraph the effective dose equivalent shall be calculated using the source term derived using Appendix D as input to the dispersion and other computer models described in § 61.93. DOE may, with prior approval from EPA, use another procedure for estimating the source term for use in this paragraph. A facility is eligible for this exemption only if, based on its last annual report, the facility is in compliance with this subpart.

(c) Conditions to approvals granted under § 61.08 will not contain requirements for post approval reporting on operating conditions beyond those specified in § 61.94.

§ 61.97 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart I—National Emission Standards for Radionuclide Emissions From Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H

§ 61.100 Applicability.

The provisions of this subpart apply to Nuclear Regulatory Commission-licensed facilities and to facilities owned or operated by any Federal agency other than the Department of Energy, except that this subpart does not apply to disposal at facilities regulated under 40 CFR part 191, subpart B, or to any uranium mill tailings pile after it has been disposed of under 40 CFR part 192, or to low energy accelerators, or to any NRC-licensee that possesses and uses radionuclides only in the form of sealed sources.

§ 61.101 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or subpart A of part 61. The following terms shall have the following specific meanings:

(a) *Agreement State* means a State with which the Atomic Energy Commission or the Nuclear Regulatory Commission has entered into an effective agreement under subsection 274(b) of the Atomic Energy Act of 1954, as amended.

(b) *Effective dose equivalent* means the sum of the products of absorbed dose and appropriate factors to account for differences in biological effectiveness due to the quality of radiation and its distribution in the body of reference man. The unit of the effective dose equivalent is the rem. For purposes of this subpart doses caused by radon-222 and its decay products formed after the radon is released from the facility are not included. The method for calculating effective dose equivalent and the definition of reference man are outlined in the International Commission on Radiological Protection's Publication No. 26.

(c) *Facility* means all buildings, structures and operations on one contiguous site.

(d) *Federal facility* means any facility owned or operated by any department, commission, agency, office, bureau or other unit of the government of the United States of America except for facilities owned or operated by the Department of Energy.

(e) *NRC-licensed facility* means any facility licensed by the Nuclear Regulatory Commission or any Agreement State to receive title to, receive, possess, use, transfer, or deliver any source, by-product, or special nuclear material.

(f) *Radionuclide* means a type of atom which spontaneously undergoes radioactive decay.

§ 61.102 Standard.

(a) Emissions of radionuclides, including iodine, to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.

(b) Emissions of iodine to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 3 mrem/yr.

§ 61.103 Determining compliance.

(a) Compliance with the emission standard in this subpart shall be determined through the use of either the EPA computer code COMPLY or the alternative requirements of Appendix E. Facilities emitting radionuclides not listed in COMPLY or Appendix E shall contact EPA to receive the information needed to determine dose. The source terms to be used for input into COMPLY shall be determined through the use of the measurement procedures listed in § 61.107 or the emission factors in Appendix D or through alternative procedures for which EPA has granted prior approval; or,

(b) Facilities may demonstrate compliance with the emission standard in this subpart through the use of computer models that are equivalent to COMPLY, provided that the model has received prior approval from EPA headquarters. Any facility using a model other than COMPLY must file an annual report. EPA may approve an alternative model in whole or in part and may limit its use to specific circumstances.

§ 61.104 Reporting requirements.

(a) The owner or operator of a facility subject to this subpart must submit an annual report to the EPA covering the emissions of a calendar year by March 31 of the following year.

(1) The report or application for approval to construct or modify as

required by 40 CFR part 61, subpart A and § 61.106, must provide the following information:

(i) The name of the facility.

(ii) The name of the person responsible for the operation of the facility and the name of the person preparing the report (if different).

(iii) The location of the facility, including suite and/or building number, street, city, county, state, and zip code.

(iv) The mailing address of the facility, if different from item (iii).

(v) A list of the radioactive materials used at the facility.

(vi) A description of the handling and processing that the radioactive materials undergo at the facility.

(vii) A list of the stacks or vents or other points where radioactive materials are released to the atmosphere.

(viii) A description of the effluent controls that are used on each stack, vent, or other release point and an estimate of the efficiency of each device.

(ix) Distances from the point of release to the nearest residence, school, business or office and the nearest farms producing vegetables, milk, and meat.

(x) The effective dose equivalent calculated using the compliance procedures in § 61.103.

(xi) The physical form and quantity of each radionuclide emitted from each stack, vent or other release point, and the method(s) by which these quantities were determined.

(xii) The volumetric flow, diameter, effluent temperature, and release height for each stack, vent or other release point where radioactive materials are emitted, the method(s) by which these were determined.

(xiii) The height and width of each building from which radionuclides are emitted.

(xiv) The values used for all other user-supplied input parameters (e.g., meteorological data) and the source of these data.

(xv) A brief description of all construction and modifications which were completed in the calendar year for which the report is prepared, but for which the requirement to apply for approval to construct or modify was waived under section 61.106, and associated documentation developed by the licensee to support the waiver. EPA reserves the right to require that the licensee send to EPA all the information that normally would be required in an application to construct or modify, following receipt of the description and supporting documentation.

(xvi) Each report shall be signed and dated by a corporate officer or public official in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

(b) Facilities emitting radionuclides in an amount that would cause less than 10% of the dose standard in § 61.102, as determined by the compliance procedures from § 61.103(a), are exempt from the reporting requirements of § 61.104(a). Facilities shall annually make a new determination whether they are exempt from reporting.

(c) If the facility is not in compliance with the emission limits of § 61.102 in the calendar year covered by the report, the facility must report to the Administrator on a monthly basis the information listed in paragraph (a) of this section, for the preceding month. These reports will start the month immediately following the submittal of the annual report for the year in noncompliance and will be due 30 days following the end of each month. This increased level of reporting will continue until the Administrator has determined that the monthly reports are no longer necessary. In addition to all the information required in paragraph (a) of this section, monthly reports shall also include the following information:

(1) All controls or other changes in operation of the facility that will be or are being installed to bring the facility into compliance.

(2) If the facility is under a judicial or administrative enforcement decree the report will describe the facilities performance under the terms of the decree.

(d) The first report will cover the emissions of calendar year 1990.

§ 61.105 Recordkeeping requirements.

The owner or operator of any facility must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. This documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with the standard, and, if claimed, qualification for exemption from reporting. These records must be kept at the site of the facility for at least five years and upon request be made available for inspection by the Administrator, or his authorized representative.

§ 61.106 Applications to construct or modify.

(a) In addition to any activity that is defined as construction under 40 CFR part 61, subpart A, any fabrication, erection or installation of a new building or structure within a facility is also defined as new construction for purposes of 40 CFR part 61, subpart A.

(b) An application under § 61.07 does not need to be filed for any new construction of or modification within an existing facility if one of the following conditions is met:

(1) The effective dose equivalent calculated by using methods described in § 61.103, that is caused by all emissions from the facility including those potentially emitted by the proposed new construction or modification, is less than 10% of the standard prescribed in § 61.102.

(2) The effective dose equivalent calculated by using methods described in § 61.103, that is caused by all emissions from the new construction or modification, is less than 1% of the limit prescribed in § 61.102. A facility is eligible for this exemption only if the facility, based on its last annual report, is in compliance with this subpart.

§ 61.107 Emission determination.

(a) Facility owners or operators may, in lieu of monitoring, estimate radionuclide emissions in accordance with Appendix D, or other procedure for which EPA has granted prior approval.

(b) Radionuclide emission rates from point sources (e.g. stacks or vents) shall be measured in accordance with the following requirements:

(1) Effluent flow rate measurements shall be made using the following methods:

(i) Reference Method 2 of Appendix A to part 60 shall be used to determine velocity and volumetric flow rates for stacks and large vents.

(ii) Reference Method 2A of Appendix A to part 60 shall be used to measure flow rates through pipes and small vents.

(iii) The frequency of the flow rate measurements shall depend upon the variability of the effluent flow rate. For variable flow rates, continuous or frequent flow rate measurements shall be made. For relatively constant flow rates only periodic measurements are necessary.

(2) Radionuclides shall be directly monitored or extracted, collected, and measured using the following methods:

(i) Reference Method 1 of Appendix A part 60 shall be used to select monitoring or sampling sites.

(ii) The effluent stream shall be directly monitored continuously using an in-line detector or representative samples of the effluent stream shall be withdrawn continuously from the sampling site following the guidance presented in ANSIN13.1-1969 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities" (including the guidance presented in Appendix A of ANSIN13.1) (incorporated by reference—see § 61.18). The requirements for continuous sampling are applicable to batch processes when the unit is in operation. Periodic sampling (grab samples) may be used only with EPA's prior approval. Such approval may be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. In such cases, grab samples shall be collected with sufficient frequency so as to provide a representative sample of the emissions.

(iii) Radionuclides shall be collected and measured using procedures based on the principles of measurement described in Appendix B, Method 114. Use of methods based on principles of measurement different from those described in Appendix B, Method 114 must have prior approval from the Administrator. EPA reserves the right to approve alternative measurement procedures in whole or in part.

(iv) A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114.

(3) When it is impractical to measure the effluent flow rate at an existing source in accordance with the requirements of paragraph (b)(1) of this section or to monitor or sample an effluent stream at an existing source in accordance with the site selection and sample extraction requirements of paragraph (b)(2) of this section, the facility owner or operator may use alternative effluent flow rate measurement procedures or site selection and sample extraction procedures provided that:

(i) It can be shown that the requirements of paragraphs (b) (1) and (2) of this section are impractical for the effluent stream.

(ii) The alternative procedure will not significantly underestimate the emissions.

(iii) The alternative procedure is fully documented

(iv) The owner or operator has received prior approval from EPA.

(4)(i) Radionuclide emission measurements in conformance with the requirements of paragraph (b) of this section shall be made at all release points which have a potential to discharge radionuclides into the air in quantities which could cause an effective dose equivalent in excess of 1% of the standard. All radionuclides which could contribute greater than 10% of the potential effective dose equivalent for a release point shall be measured. For other release points which have a potential to release radionuclides into the air, periodic confirmatory measurements should be made to verify the low emissions.

(ii) To determine whether a release point is subject to the emission measurement requirements of paragraph (b) of this section, it is necessary to evaluate the potential for radionuclide emissions for that release point. In evaluating the potential of a release point to discharge radionuclides into the air, the estimated radionuclide release rates shall be based on the discharge of the uncontrolled effluent stream into the air.

(5) Environmental measurements of radionuclide air concentrations at critical receptor locations may be used as an alternative to air dispersion calculations in demonstrating compliance with the standards if the owner or operator meets the following criteria:

(i) The air at the point of measurement shall be continuously sampled for collection of radionuclides.

(ii) Those radionuclides released from the facility, which are the major contributors to the effective dose equivalent must be collected and measured as part of the environmental measurements program.

(iii) Radionuclide concentrations which would cause an effective dose equivalent greater than or equal to 10% of the standard shall be readily detectable and distinguishable from background.

(iv) Net measured radionuclide concentrations shall be compared to the concentration levels in Table 2 of Appendix E to determine compliance with the standard. In the case of multiple radionuclides being released from a facility, compliance shall be demonstrated if the value for all radionuclides is less than the concentration level in Table 2 and the sum of the fractions that result when each measured concentration value is divided by the value in Table 2 for each radionuclide is less than 1.

(v) A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114.

(vi) Use of environmental measurements to demonstrate compliance with the standard is subject to prior approval of EPA. Applications for approval shall include a detailed description of the sampling and analytical methodology and show how the above criteria will be met.

(c) The following facilities may use either the methodologies and quality assurance programs described in paragraph (b) of this section or may use the following:

(1) Nuclear power reactors may determine their radionuclide emissions in conformance with the Effluent Technical Specifications contained in their Operating License issued by the Nuclear Regulatory Commission. In addition, they may conduct a quality assurance program as described in the Nuclear Regulatory Commission's Regulatory Guide 4.15 dated February 1979.

(2) Fuel processing and fabrication plants and uranium hexafluoride plants may determine their emissions in conformance with the Nuclear Regulatory Commission's Regulatory Guide 4.16 dated December 1985. In addition, they may conduct a quality assurance program as described in the Nuclear Regulatory Commission's Regulatory Guide 4.15 dated February 1979.

(3) Uranium mills may determine their emissions in conformance with the Nuclear Regulatory Commission's Regulatory Guide 4.14 dated April 1980. In addition, they may conduct a quality assurance program as described in the Nuclear Regulatory Commission's Regulatory Guide 4.15 dated February 1979.

61.108 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart K—National Emission Standards for Radionuclide Emissions From Elemental Phosphorus Plants

Sec.

§ 61.120 Applicability.

The provisions of this subpart are applicable to owners or operators of calciners and nodulizing kilns at elemental phosphorus plants.

§ 61.121 Definitions.

(a) *Elemental phosphorus plant* or *plant* means any facility that processes phosphate rock to produce elemental phosphorus. A plant includes all buildings, structures, operations, calciners and nodulizing kilns on one contiguous site.

(b) *Calciner* or *Nodulizing kiln* means a unit in which phosphate rock is heated to high temperatures to remove organic material and/or to convert it to a nodular form. For the purpose of this subpart, calciners and nodulizing kilns are considered to be similar units.

§ 61.122 Emission standard.

Emissions of polonium-210 to the ambient air from all calciners and nodulizing kilns at an elemental phosphorus plant shall not exceed a total of 2 curies a year.

§ 61.123 Emission testing.

(a) Each owner or operator of an elemental phosphorus plant shall test emissions from the plant within 90 days of the effective date of this standard and annually thereafter. The Administrator may temporarily or permanently waive the annual testing requirement or increase the frequency of testing, if the Administrator determines that more testing is required.

(b) The Administrator shall be notified at least 30 days prior to an emission test so that EPA may, at its option, observe the test.

(c) An emission test shall be conducted at each operational calciner or nodulizing kiln. If emissions from a calciner or nodulizing kiln are discharged through more than one stack, then an emission test shall be conducted at each stack and the total emission rate from the calciner or kiln shall be the sum of the emission rates from each of the stacks.

(d) Each emission test shall consist of three sampling runs that meet the requirements of § 61.125. The phosphate rock processing rate during each run shall be recorded. An emission rate in curies per metric ton of phosphate rock processed shall be calculated for each run. The average of all three runs shall apply in computing the emission rate for the test. The annual polonium-210 emission rate from a calciner or nodulizing kiln shall be determined by multiplying the measured polonium-210 emission rate in curies per metric ton of phosphate rock processed by the annual phosphate rock processing rate in metric tons. In determining the annual phosphate rock processing rate, the values used for operating hours and operating capacity shall be values that will maximize the expected processing rate. For determining compliance with the emission standard of § 61.122, the total annual emission rate is the sum of the annual emission rates for all operating calciners and nodulizing kilns.

(e) If the owner or operator changes his operation in such a way as to increase his emissions of polonium-210, such as changing the type of rock processed, the temperature of the calciners or kilns, or increasing the annual phosphate rock processing rate, then a new emission test, meeting the requirements of this section, shall be conducted within 45 days under these conditions.

(f) Each owner or operator of an elemental phosphorus plant shall furnish the Administrator with a written report of the results of the emission test within 60 days of conducting the test. The report must provide the following information:

(1) The name and location of the facility.

(2) The name of the person responsible for the operation of the facility and the name of the person preparing the report (if different).

(3) A description of the effluent controls that are used on each stack, vent, or other release point and an estimate of the efficiency of each device.

(4) The results of the testing, including the results of each sampling run completed.

(5) The values used in calculating the emissions and the source of these data.

(6) Each report shall be signed and dated by a corporate officer in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

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§ 61.124 Recordkeeping requirements.

The owner or operator of any plant must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used in emission testing. This documentation should be sufficient to allow an independent auditor to verify the accuracy of the results of the emission testing. These records must be kept at the site of the plant for at least five years and, upon request, be made available for inspection by the Administrator, or his authorized representative.

§ 61.125 Test methods and procedures.

(a) Each owner or operator of a source required to test emissions under § 61.123, unless an equivalent or alternate method has been approved by the Administrator, shall use the following test methods:

(1) Test Method 1 of Appendix A to 40 CFR part 60 shall be used to determine sample and velocity traverses;

(2) Test Method 2 of Appendix A to 40 CFR part 60 shall be used to determine velocity and volumetric flow rate;

(3) Test Method 3 of Appendix A to 40 CFR part 60 shall be used for gas analysis;

(4) Test Method 5 of Appendix A to 40 CFR part 60 shall be used to collect particulate matter containing the polonium-210; and

(5) Test Method 111 of Appendix B to 40 CFR part 61 shall be used to determine the polonium-210 emissions.

§ 61.126 Monitoring of operations.

(a) The owner or operator of any source subject to this subpart using a wet-scrubbing emission control device shall install, calibrate, maintain, and operate a monitoring device for the continuous measurement of the pressure loss of the gas stream through the scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±250 pascal (±1 inch of water). Records of these measurements shall be maintained at the source and made available for inspection by the Administrator, or his authorized representative for a minimum of 5 years.

(b) The owner or operator of any source subject to this subpart using an electrostatic precipitator control device shall install, calibrate, maintain, and operate a monitoring device for the continuous measurement of the primary and secondary current and the voltage in each electric field. Records of these measurements shall be maintained at the source and made available for inspection by the Administrator, or his authorized representative for a minimum of 5 years.

(c) For the purpose of conducting an emission test under § 61.123, the owner or operator of any source subject to the provisions of this subpart shall install, calibrate, maintain, and operate a device for measuring the phosphate rock feed to any affected calciner or nodulizing kiln. The measuring device used must be accurate to within ±5 percent of the mass rate over its operating range. Records of these measurements shall be maintained at the source and made available for inspection by the Administrator, or his authorized representative for a minimum of 5 years.

§ 61.127 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart Q—National Emission Standards for Radon Emissions From Department of Energy Facilities

§ 61.190 Designation of facilities.

The provisions of this subpart apply to the design and operation of all storage and disposal facilities for radium-containing material (i.e., byproduct material as defined under section 11.e(2) of the Atomic Energy Act of 1954 (as amended)) that are owned or operated by the Department of Energy that emit radon-222 into air, including these facilities: The Feed Materials Production Center, Fernald, Ohio; the Niagara Falls Storage Site, Lewiston, New York; the Weldon Spring Site, Weldon Spring, Missouri; the Middlesex Sampling Plant, Middlesex, New Jersey; the Monticello Uranium Mill Tailings Pile, Monticello, Utah. This subpart does not apply to facilities listed in, or designated by the Secretary of Energy under Title I of the Uranium Mill Tailings Control Act of 1978.

§ 61.191 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or subpart A of part 61. The following terms shall have the following specific meanings:

(a) *Facility* means all buildings, structures and operations on one contiguous site.

(b) *Source* means any building, structure, pile, impoundment or area used for interim storage or disposal that is or contains waste material containing radium in sufficient concentration to emit radon-222 in excess of this standard prior to remedial action.

§ 61.192 Standard.

No source at a Department of Energy facility shall emit more than 20 pCi/m^2–s of radon-222 as an average for the entire source, into the air. This requirement will be part of any Federal Facilities Agreement reached between Environmental Protection Agency and Department of Energy.

§ 61.193 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart R—National Emission Standards for Radon Emissions From Phosphogypsum Stacks

§ 61.200 Designation of facilities.

The provisions of this subpart apply to the owners and operators of the phosphogypsum that is produced as a result of phosphorus fertilizer production and all that is contained in existing phosphogypsum stacks.

§ 61.201 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or subpart A of part 61. The following terms shall have the following specific meanings:

(a) *Inactive stack* means a stack to which no further routine additions of phosphogypsum will be made and which is no longer used for water management associated with the production of phosphogypsum. If a stack has not been used for either purpose for two years it is presumed to be inactive.

(b) *Phosphogypsum stacks* or *stacks* are piles of waste from phosphorus fertilizer production containing phosphogypsum. Stacks shall also include phosphate mines that are used for the disposal of phosphogypsum.

§ 61.202 Standard.

All phosphogypsum shall be disposed of in stacks or in phosphate mines which shall not emit more than 20 pCi/m^2–s of radon-222 into the air.

§ 61.203 Radon monitoring and compliance procedures.

(a) Sixty days following the date at which a stack becomes an inactive stack, or ninety days after the effective date of this rule if the stack is already inactive, the owners or operators of inactive phosphogypsum stacks shall test the stacks in accordance with the procedures described in 40 CFR part 61, Appendix B, Method 115. EPA shall be notified at least 30 days prior to an emissions test so that EPA may, at its option, observe the test. If meteorological conditions are such that a test cannot be properly conducted, then the owner or operator shall notify EPA and test as soon as conditions permit.

(b) Ninety days after the testing is required, the owner or operator shall provide EPA with a report detailing the actions taken and the results of the radon-222 flux testing. Each report shall also include the following information:

(1) The name and location of the facility,

(2) A list of the stacks at the facility including the size and dimensions of the stack,

(3) The name of the person responsible for the operation of the facility and the name of the person preparing the report (if different),

(4) A description of the control measures taken to decrease the radon flux from the source and any actions taken to insure the long term effectiveness of the control measures, and

(5) The results of the testing conducted, including the results of each measurement.

(6) Each report shall be signed and dated by a corporate officer in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

(c) If year-long measurements are made in accordance with Method 115 Appendix B to part 61 this report shall include the results of the first measurement period and provide a schedule for the measurement frequency to be used. An additional report containing all the information in paragraph (b) of this section shall be submitted ninety days after completion of the final measurements.

(d) If at any point an owner or operator once again uses a stack for the disposal of phosphogypsum or for water management, the stack ceases to be in inactive status and the owner or operator must notify EPA in writing within 45 days. When the owner or operator ceases to use the stack it will once again become inactive and require retesting and reporting.

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§ 61.204 Recordkeeping requirements.

An owner or operator subject to this subpart must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. This documentation should be sufficient to allow an independent auditor to verify the correctness of the determination made concerning the facility's compliance with the standard. These records must be kept by the owner or operator for at least five years and upon request be made available for inspection by the Administrator, or his authorized representative.

§ 61.205 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart T—National Emission Standards for Radon Emissions From the Disposal of Uranium Mill Tailings

Sec.

§ 61.220 Designation of facilities.

The provisions of this subpart apply to the owners and operators of all sites that are used for the disposal of tailings, and that managed residual radioactive material or uranium byproduct materials during and following the processing of uranium ores, commonly referred to as uranium mills and their associated tailings, that are listed in, or designated by the Secretary of Energy under Title I of the Uranium Mill Tailings Control Act of 1978 or regulated under Title II of the Uranium Mill Tailings Control Act of 1978.

§ 61.221 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or subpart A of part 61. The following terms shall have the following specific meanings:

(a) *Long term stabilization* means the addition of material on a uranium mill tailings pile for purpose of ensuring compliance with the requirements of 40 CFR 192.02(a) or 192.32(b)(i). These actions shall be considered complete when the Nuclear Regulatory Commission determines that the requirements of 40 CFR 192.02(a) or 192.32(b)(i) have been met.

(b) *Operational* means a uranium mill tailings pile that is licensed to accept additional tailings, and those tailings can be added without violating subpart W or any other Federal, state or local rule or law. A pile cannot be considered operational if it is filled to capacity or the mill it accepts tailings from has been dismantled or otherwise decommissioned.

(c) *Uranium byproduct material* or *tailings* means the waste produced by the extraction or concentration of uranium from any ore processed primarily for its source material content. Ore bodies depleted by uranium solution extraction and which remain underground do not constitute byproduct material for the purposes of this subpart.

§ 61.222 Standard.

(a) Radon-222 emissions to the ambient air from uranium mill tailings pile that are no longer operational shall not exceed 20 pCi/m^2–s of radon-222.

(b) Once a uranium mill tailings pile or impoundment ceases to be operational it must be disposed of and brought into compliance with this standard within two years of the effective date or within two years of the day it ceases to be operational whichever is later. If it is not physically possible for a mill owner or operator to complete disposal within that time, EPA shall, after consultation with the mill owner or operator, establish a compliance agreement which will assure that disposal will be completed as quickly as possible.

§ 61.223 Compliance procedures.

(a) Sixty days following the completion of covering the pile to limit radon emissions but prior to the long term stabilization of the pile, the owners or operators of uranium mill tailings shall conduct testing for all piles within the facility in accordance with the procedures described in 40 CFR part 61, Appendix B, Method 115, or other procedures for which EPA has granted prior approval.

(b) Ninety days after the testing is required, each facility shall provide EPA with a report detailing the actions taken and the results of the radon-222 flux testing. EPA shall be notified at least 30 days prior to an emission test so that EPA may, at its option, observe the test. If meteorological conditions are such that a test cannot be properly conducted, then the owner or operator shall notify EPA and test as soon as conditions permit. Each report shall also include the following information:

(1) The name and location of the facility.

(2) A list of the piles at the facility.

(3) A description of the control measures taken to decrease the radon flux from the source and any actions taken to insure the long term effectiveness of the control measures.

(4) The results of the testing conducted, including the results of each measurement.

(5) Each report shall be signed and dated by a corporate officer or public official in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

(c) If year long measurements are made in accordance with Method 115 of Appendix B of part 61, this report shall include the results of the first measurement period and provide a schedule for the measurement frequency to be used. An additional report shall be submitted ninety days after completion of the final measurements.

(d) If long term stabilization has begun before the effective date of the rule then testing may be conducted at any time, up to 60 days after the long term stabilization is completed.

(e) If the testing demonstrates that the pile meets the requirement of § 61.222(a) and long term stabilization has been completed then the pile is considered disposed for purposes of this rule.

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§ 61.224 Recordkeeping requirements.

The owner or operator must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. This documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with the standard. The Administrator shall be kept apprised of the location of these records and the records must be kept for at least five years and upon request be made available for inspection by the Administrator, or his authorized representative.

§ 61.225 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

Subpart W—National Emission Standards for Radon Emissions From Operating Mill Tailings

Sec.

§ 61.250 Designation of facilities.

The provisions of this subpart apply to owners or operators of facilities licensed to manage uranium byproduct materials during and following the processing of uranium ores, commonly referred to as uranium mills and their associated tailings. This subpart does not apply to the disposal of tailings.

§ 61.251 Definitions.

As used in this subpart, all terms not defined here have the meaning given them in the Clean Air Act or 40 CFR part 61, subpart A. The following terms shall have the following specific meanings:

(a) *Area* means the vertical projection of the pile upon the earth's surface.

(b) *Continuous disposal* means a method of tailings management and disposal in which tailings are dewatered by mechanical methods immediately after generation. The dried tailings are then placed in trenches or other disposal areas and immediately covered to limit emissions consistent with applicable Federal standards.

(c) *Dewatered* means to remove the water from recently produced tailings by mechanical or evaporative methods such that the water content of the tailings does not exceed 30 percent by weight.

(d) *Existing impoundment* means any uranium mill tailings impoundment which is licensed to accept additional tailings and is in existence as of December 15, 1989.

(e) *Operation* means that an impoundment is being used for the continued placement of new tailings or is in standby status for such placement. An impoundment is in operation from the day that tailings are first placed in the impoundment until the day that final closure begins.

(f) *Phased disposal* means a method of tailings management and disposal which uses lined impoundments which are filled and then immediately dried and covered to meet all applicable Federal standards.

(g) *Uranium byproduct material or tailings* means the waste produced by the extraction or concentration of uranium from any ore processed primarily for its source material content. Ore bodies depleted by uranium solution extraction and which remain underground do not constitute byproduct material for the purposes of this subpart.

§ 61.252 Standard.

(a) Radon-222 emissions to the ambient air from an existing uranium mill tailings pile shall not exceed 20 pCi/m^2-s of radon-222.

(b) After December 15, 1989, no new tailings impoundment can be built unless it is designed, constructed and operated to meet one of the two following work practices:

(1) Phased disposal in lined tailings impoundments that are no more than 40 acres in area and meet the requirements of 40 CFR 192.32(a) as determined by the Nuclear Regulatory Commission. The owner or operator shall have no more than two impoundments, including existing impoundments, in operation at any one time.

(2) Continuous disposal of tailings such that tailings are dewatered and immediately disposed with no more than 10 acres uncovered at any time and operated in accordance with § 192.32(a) as determined by the Nuclear Regulatory Commission.

(c) All mill owners or operators shall comply with the provisions of 40 CFR 192.32(a) in the operation of tailings piles, the exemption for existing piles in 40 CFR 192.32(a) notwithstanding.

§ 61.253 Determining compliance.

Compliance with the emission standard in this subpart shall be determined annually through the use of Method 115 of Appendix B. When measurements are to be made over a one year period, EPA shall be provided with a schedule of the measurement frequency to be used. The schedule may be submitted to EPA prior to or after the first measurement period. EPA shall be notified 30 days prior to any emissions test so that EPA may, at its option, observe the test.

§ 61.254 Annual reporting requirements.

(a) The owners or operators of operating existing mill impoundments shall report the results of the compliance calculations required in § 61.253 and the input parameters used in making the calculation for each calendar year shall be sent to EPA by March 31 of the following year. Each report shall also include the following information:

(1) The name and location of the mill.

(2) The name of the person responsible for the operation of the facility and the name of the person preparing the report (if different).

(3) The results of the testing conducted, including the results of each measurement.

(4) Each report shall be signed and dated by a corporate officer in charge of the facility and contain the following declaration immediately above the signature line: "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001."

(b) If the facility is not in compliance with the emission limits of § 61.252 in the calendar year covered by the report, then the facility must commence reporting to the Administrator on a monthly basis the information listed in paragraph (a) of this section, for the preceding month. These reports will start the month immediately following the submittal of the annual report for the year in noncompliance and will be due 30 days following the end of each month. This increased level of reporting will continue until the Administrator has determined that the monthly reports are no longer necessary. In addition to all the information required in paragraph (a) of this section, monthly reports shall also include the following information:

(1) All controls or other changes in operation of the facility that will be or are being installed to bring the facility into compliance.

(2) If the facility is under a judicial or administrative enforcement decree, the report will describe the facilities performance under the terms of the decree.

(c) The first report will cover the emissions of calendar year 1990.

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§ 61.255 Recordkeeping requirements.

The owner or operator of the mill must maintain records documenting the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. In addition, the documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with the standard. These records must be kept at the mill for at least five years and upon request be made available for inspection by the Administrator, or his authorized representative.

§ 61.256 Exemption from the reporting and testing requirements of 40 CFR 61.10.

All facilities designated under this subpart are exempt from the reporting requirements of 40 CFR 61.10.

§ 61.03 [Amended]

3. By adding to the list of System International units of measure in § 61.03(a) an entry for "m^2" following "m=meter" to read as follows:

m^2=square meter

4. By adding to the list of other units of measure in § 61.03(b) an entry for "Ci" following "cc"; an entry for "pC;" following "oz"; and an entry for "mrem" following "ml" to read as follows:

Ci=curie

* * * * *

mrem=millirem=10^{-3} rem

* * * * *

pCi=picocurie=10^{-12} curie

5. Section 61.18 is amended by adding paragraph (c) to read as follows:

§ 61.18 Incorporations by reference.

* * * * *

(c) The following material is available for purchase from the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

(1) ANSI N13.1—1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities." IBR approved for §§ 61.93(b)(2)(ii); 61.107(b)(2)(ii); and Method 114, par. 2.1 of Appendix B to part 61.

Appendix B to Part 61—[Amended]

6. By amending Method 111 of Appendix B as follows:

a. Section 4.1 is revised to read as follows:

4.1 Sample Preparation.

The glass fiber filter and acetone rinse from Method 5 of Appendix A to 40 CFR part 60 are combined and dissolved as described below.

4.1.1 Add polonium-209 tracer to the acetone rinse in the glass beaker from Method 5 in an amount approximately equal to the amount of polonium-210 expected in the total particulate sample. Add 16 M nitric acid to the beaker to digest and loosen the residue.

4.1.2 Transfer the residue from the glass beaker to a teflon beaker containing the glass fiber filter. Rinse the glass beaker with 16 M nitric acid. If necessary reduce the volume in the beaker by evaporation until all of the nitric acid from the glass beaker has been transferred to the teflon beaker.

4.1.3 Add 30 ml of 29 M hydrofluoric acid to the teflon beaker and evaporate to near dryness on a hot plate in a properly operating hood. Caution: Do not allow the residue to go to dryness and overheat; this will result in loss of polonium.

4.1.4 Repeat step 4.1.3 until filter is dissolved.

4.1.5 Add 100 ml of 16 M nitric acid to the residue in the teflon beaker and evaporate to near dryness. Caution: Do not allow the residue to go to dryness.

4.1.6 Add 50 ml of 16 M nitric acid and 10 ml of 12 M perchloric acid to the teflon beaker and heat until dense fumes of perchloric acid are evolved.

4.1.7 Repeat steps 4.1.3 to 4.1.6 as necessary until sample is completely dissolved.

4.1.8 Add 10 ml of 12 M hydrochloric acid and evaporate to dryness. Repeat additions and evaporations several times.

4.1.9 Transfer the sample to a 250 ml volumetric flask and dilute to volume with 3 M hydrochloric acid.

b. Section 4.4.2 is removed and sections 4.4.3 through 4.4.8 are redesignated as sections 4.4.2 through 4.4.7 respectively.

c. In section 5.1, Equation 111–3 is amended by removing "A=picocuries of polonium-210 per filter" and adding "A= picocuries of polonium-210 in the particulate sample".

d. In section 5.2, Equation 111–4 is amended by revising the entry for "A=" to read "A= picocuries of polonium-210 in the particulate sample as determined by A in Equation 111–3".

e. Section 9.1.2 is removed.

7. By adding Method 114 to the methods in Appendix B to part 61 to read as follows:

Method 114—Test Methods for Measuring Radionuclide Emissions from Stationary Sources

1. Purpose and Background

This method provides the requirements for: (1) Stack monitoring and sample collection methods appropriate for radionuclides; (2) radiochemical methods which are used in determining the amounts of radionuclides collected by the stack sampling and; (3) quality assurance methods which are conducted in conjunction with these measurements. These methods are appropriate for emissions for stationary sources. A list of references is provided.

Many different types of facilities release radionuclides into air. These radionuclides differ in the chemical and physical forms, half-lives and type of radiation emitted. The appropriate combination of sample extraction, collection and analysis for an individual radionuclide is dependent upon many interrelated factors including the mixture of other radionuclides present. Because of this wide range of conditions, no single method for monitoring or sample collection and analysis of a radionuclide is applicable to all types of facilities. Therefore, a series of methods based on "principles of measurement" are described for monitoring and sample collection and analysis which are applicable to the measurement of radionuclides found in effluent streams at stationary sources. This approach provides the user with the flexibility to choose the most appropriate combination of monitoring and sample collection and analysis methods which are applicable to the effluent stream to be measured.

2. Stack Monitoring and Sample Collection Methods

Monitoring and sample collection methods are described based on "principles of monitoring and sample collection" which are applicable to the measurement of radionuclides from effluent streams at stationary sources. Radionuclides of most elements will be in the particulate form in these effluent streams and can be readily collected using a suitable filter media. Radionuclides of hydrogen, oxygen, carbon, nitrogen, the noble gases and in some circumstances iodine will be in the gaseous form. Radionuclides of these elements will require either the use of an in-line or off-line monitor to directly measure the radionuclides, or suitable sorbers, condensers or bubblers to collect the radionuclides.

2.1 Radionuclides as Particulates. The extracted effluent stream is passed through a filter media to remove the particulates. The filter must have a high efficiency for removal of sub-micron particles. The guidance in ANSI N13.1—1969 shall be followed in using filter media to collect particulates (incorporated by reference–see § 61.18).

2.2 Radionuclides as Gases.

2.2.1 The Radionuclide Tritium (H–3). Tritium in the form of water vapor is collected from the extracted effluent sample by sorption, condensation or dissolution techniques. Appropriate collectors may include silica gel, molecular sieves, and ethylene glycol or water bubblers.

Tritium in the gaseous form may be measured directly in the sample stream using Method B–1, collected as a gas sample or may be oxidized using a metal catalyst to tritiated water and collected as described above.

2.2.2 Radionuclides of Iodine. Iodine is collected from an extracted sample by sorption or dissolution techniques. Appropriate collectors may include charcoal, impregnated charcoal, metal zeolite and caustic solutions.

2.2.3 Radionuclides of Argon, Krypton and Xenon. Radionuclides of these elements are either measured directly by an in-line or off-line monitor, or are collected from the extracted sample by low temperature sorption techniques. Appropriate sorbers may include charcoal or metal zeolite.

2.2.4 Radionuclides of Oxygen, Carbon, Nitrogen and Radon. Radionuclides of these elements are measured directly using an in-line or off-line monitor. Radionuclides of carbon in the form of carbon dioxide may be collected by dissolution in caustic solutions.

2.3 Definition of Terms

In-line monitor means a continuous measurement system in which the detector is placed directly in or adjacent to the effluent stream. This may involve either gross radioactivity measurements or specific radionuclide measurements. Gross measurements shall be made in conformance with the conditions specified in Methods A–4, B–2 and G–4.

Off-line monitor means a measurement system in which the detector is used to continuously measure an extracted sample of the effluent stream. This may involve either gross radioactivity measurements or specific radionuclide measurements. Gross measurements shall be made in conformance with the conditions specified in Methods A–4, B–2 and G–4.

Sample collection means a procedure in which the radionuclides are removed from an extracted sample of the effluent using a collection media. These collection media include filters, absorbers, bubblers and condensers. The collected sample is analyzed using the methods described in Section 3.

3. Radionuclide Analysis Methods

A series of methods based on "principles of measurement" are described which are applicable to the analysis of radionuclides collected from airborne effluent streams at stationary sources. These methods are applicable only under the conditions stated and within the limitations described. Some methods specify that only a single radionuclide be present in the sample or the chemically separated sample. This condition should be interpreted to mean that no other radionuclides are present in quantities which would interfere with the measurement.

Also identified (Table 1) are methods for a selected list of radionuclides. The listed radionuclides are those which are most commonly used and which have the greatest potential for causing dose to members of the public. Use of methods based on principles of measurement other than those described in this section must be approved in advance of use by the Administrator. For radionuclides not listed in Table 1, any of the described methods may be used provided the user can demonstrate that the applicability conditions of the method have been met.

The type of method applicable to the analysis of a radionuclide is dependent upon the type of radiation emitted, i.e., alpha, beta or gamma. Therefore, the methods described below are grouped according to principles of measurements for the analysis of alpha, beta and gamma emitting radionuclides.

3.1 Methods for Alpha Emitting Radionuclides

3.1.1 Method A–1, Radiochemistry-Alpha Spectrometry.

Principle: The element of interest is separated from other elements, and from the sample matrix using radiochemical techniques. The procedure may involve precipitation, ion exchange, or solvent extraction. Carriers (elements chemically similar to the element of interest) may be used. The element is deposited on a planchet in a very thin film by electrodeposition or by coprecipitation on a very small amount of carrier, such as lanthanum fluoride. The deposited element is then counted with an alpha spectrometer. The activity of the nuclide of interest is measured by the number of alpha counts in the appropriate energy region. A correction for chemical yield and counting efficiency is made using a standardized radioactive nuclide (tracer) of the same element. If a radioactive tracer is not available for the element of interest, a predetermined chemical yield factor may be used.

Applicability: This method is applicable for determining the activity of any alpha-emitting radionuclide, regardless of what other radionuclides are present in the sample provided the chemical separation step produces a very thin sample and removes all other radionuclides which could interfere in the spectral region of interest. APHA–605(2), ASTM–D–3972(13).

3.1.2 Method A–2, Radiochemistry-Alpha Counting.

Principle: The element of interest is separated from other elements, and from the sample matrix using radiochemistry. The procedure may involve precipitation, ion exchange, or solvent extraction. Carriers (elements chemically similar to the element of interest) may be used. The element is deposited on a planchet in a thin film and counted with a alpha counter. A correction for chemical yield (if necessary) is made. The alpha count rate measures the total activity of all emitting radionuclides of the separated element.

Applicability: This method is applicable for the measurement of any alpha-emitting radionuclide, provided no other alpha emitting radionuclide is present in the separated sample. It may also be applicable for determining compliance, when other radionuclides of the separated element are present, provided that the calculated emission rate is assigned to the radionuclide which could be present in the sample that has the highest dose conversion factor. IDO–12096(18).

3.1.3 Method A–3, Direct Alpha Spectrometry.

Principle: The sample, collected on a suitable filter, is counted directly on an alpha spectrometer. The sample must be thin enough and collected on the surface of the filter so that any absorption of alpha particle energy in the sample or the filter, which would degrade the spectrum, is minimal.

Applicability: This method is applicable to simple mixtures of alpha emitting radionuclides and only when the amount of particulates collected on the filter paper are relatively small and the alpha spectra is adequately resolved. Resolutions should be 50 keV (FWHM) or better, ASTM–D–3084(16).

3.1.4 Method A–4, Direct Alpha Counting (Gross alpha determination).

Principle: The sample, collected on a suitable filter, is counted with an alpha counter. The sample must be thin enough so that self-absorption is not significant and the filter must be of such a nature that the particles are retained on the surface.

Applicability: Gross alpha determinations may be used to measure emissions of specific radionuclides only (1) when it is known that the sample contains only a single radionuclide, or the identity and isotopic ratio of the radionuclides in the sample are well-known, and (2) measurements using either Method A–1, A–2 or A–5 have shown that this method provides a reasonably accurate measurement of the emission rate. Gross alpha measurements are applicable to unidentified mixtures of radionuclides only for the purposes and under the conditions described in section 3.7. APHA–601(3), ASTM–D–1943(10).

3.1.5 Method A–5, Chemical Determination of Uranium.

Principle: Uranium may be measured chemically by either colorimetry or fluorometry. In both procedures, the sample is dissolved, the uranium is oxidized to the hexavalent form and extracted into a suitable solvent. Impurities are removed from the solvent layer. For colorimetry, dibenzoylmethane is added, and the uranium is measured by the absorbance in a colorimeter. For fluorometry, a portion of the solution is fused with a sodium fluoride-lithium fluoride flux and the uranium is determined by the ultraviolet activated fluorescence of the fused disk in a fluorometer.

Applicability: This method is applicable to the measurements of emission rates of uranium when the isotopic ratio of the uranium radionuclides is well known. ASTM–E–318(15), ASTM–D–2907(14).

3.1.6 Method A–6, Radon-222—Continuous Gas Monitor.

Principle: Radon-222 is measured directly in a continuously extracted sample stream by passing the air stream through a calibrated scintillation cell. Prior to the scintillation cell, the air stream is treated to remove particulates and excess moisture. The alpha particles from radon-222 and its decay products strike a zinc sulfide coating on the inside of the scintillation cell producing light pulses. The light pulses are detected by a photomultiplier tube which generates electrical pulses. These pulses are processed by the system electronics and the read out is in pCi/l of radon-222.

Applicability: This method is applicable to the measurement of radon-222 in effluent streams which do not contain significant quantities of radon-220. Users of this method should calibrate the monitor in a radon calibration chamber at least twice per year. The background of the monitor should also be checked periodically by operating the instrument in a low radon environment. EPA 520/1-89-009(24).

3.1.7 Method A-7, Radon-222-Alpha Track Detectors

Principle: Radon-222 is measured directly in the effluent stream using alpha track detectors (ATD). The alpha particles emitted by radon-222 and its decay products strike a small plastic strip and produce submicron damage tracks. The plastic strip is placed in a caustic solution that accentuates the damage tracks which are counted using a microscope or automatic counting system. The number of tracks per unit area is correlated to the radon concentration in air using a conversion factor derived from data generated in a radon calibration facility.

Applicability: Prior approval from EPA is required for use of this method. This method is only applicable to effluent streams which do not contain significant quantities of radon-220, unless special detectors are used to discriminate against radon-220. This method may be used only when ATDs have been demonstrated to produce data comparable to data obtained with Method A-6. Such data should be submitted to EPA when requesting approval for the use of this method. EPA 520/1-89-009(24).

3.2 Methods for Gaseous Beta Emitting Radionuclides.

3.2.1 Method B-1, Direct Counting in Flow-Through Ionization Chambers.

Principle: An ionization chamber containing a specific volume of gas which flows at a given flow rate through the chamber is used. The sample (effluent stream sample) acts as the counting gas for the chamber. The activity of the radionuclide is determined from the current measured in the ionization chamber.

Applicability: This method is applicable for measuring the activity of a gaseous beta-emitting radionuclide in an effluent stream that is suitable as a counting gas, when no other beta-emitting nuclides are present. DOE/EP-0096(17), NCRP-58(23).

3.2.2 Method B-2, Direct Counting With In-line or Off-line Beta Detectors.

Principle: The beta detector is placed directly in the effluent stream (in-line) or an extracted sample of the effluent stream is passed through a chamber containing a beta detector (off line). The activities of the radionuclides present in the effluent stream are determined from the beta count rate, and a knowledge of the radionuclides present and the relationship of the gross beta count rate and the specific radionuclide concentration.

Applicability: This method is applicable only to radionuclides with maximum beta particle energies greater then 0.2 MeV. This method may be used to measure emissions of specific radionuclides only when it is known that the sample contains only a single radionuclide or the identity and isotopic ratio of the radionuclides in the effluent stream are well known. Specific radionuclide analysis of periodic grab samples may be used to identify the types and quantities of radionuclides present and to establish the relationship between specific radionuclide analyses and gross beta count rates.

This method is applicable to unidentified mixtures of gaseous radionuclides only for the purposes and under the conditions described in section 3.7.

3.3 Methods for Non-Gaseous Beta Emitting Radionuclides.

3.3.1 Method B-3, Radiochemistry-Beta Counting.

Principle: The element of interest is separated from other elements, and from the sample matrix by radiochemistry. This may involve precipitation, distillation, ion exchange, or solvent extraction. Carriers (elements chemically similar to the element of interest) may be used. The element is deposited on a planchet, and counted with a beta counter. Corrections for chemical yield, and decay (if necessary) are made. The beta count rate determines the total activity of all radionuclides of the separated element. This method may also involve the radiochemical separation and counting of a daughter element, after a suitable period of ingrowth, in which case it is specific for the parent nuclide.

Applicability: This method is applicable for measuring the activity of any beta-emitting radionuclide, with a maximum energy greater than 0.2 MeV, provided no other radionuclide is present in the separated sample. APHA-608(5).

3.3.2 Method B-4, Direct Beta Counting (Gross beta determination).

Principle: The sample, collected on a suitable filter, is counted with a beta counter. The sample must be thin enough so that self-absorption corrections can be made.

Applicability: Gross beta measurements are applicable only to radionuclides with maximum beta particle energies greater than 0.2 MeV. Gross beta measurements may be used to measure emissions of specific radionuclides only (1) when it is known that the sample contains only a single radionuclide, and (2) measurements made using Method B-3 show reasonable agreement with the gross beta measurement. Gross beta measurements are applicable to mixtures of radionuclides only for the purposes and under the conditions described in section 3.7. APHA-602(4), ASTM-D-1890(11).

3.3.3 Method B-5, Liquid Scintillation Spectrometry.

Principle: An aliquot of a collected sample or the result of some other chemical separation or processing technique is added to a liquid scintillation "cocktail" which is viewed by photomultiplier tubes in a liquid scintillation spectrometer. The spectrometer is adjusted to establish a channel or "window" for the pulse energy appropriate to the nuclide of interest. The activity of the nuclide of interest is measured by the counting rate in the appropriate energy channel. Corrections are made for chemical yield where separations are made.

Applicability: This method is applicable to any beta-emitting nuclide when no other radionuclide is present in the sample or the separated sample provided that it can be incorporated in the scintillation cocktail. This method is also applicable for samples which contain more than one radionuclide but only when the energies of the beta particles are sufficiently separated so that they can be resolved by the spectrometer. This method is most applicable to the measurement of low-energy beta emitters such as tritium and carbon-14. APHA-609(6), EML-LV-539-17(19).

3.4 Gamma Emitting Radionuclides

3.4.1 Method G-1, High Resolution Gamma Spectrometry.

Principle: The sample is counted with a high resolution gamma detector, usually either a Ge(Li) or a high purity Ge detector, connected to a multichannel analyzer or computer. The gamma emitting radionuclides in the sample are measured from the gamma count rates in the energy regions characteristic of the individual radionuclide. Corrections are made for counts contributed by other radionuclides to the spectral regions of the radionuclides of interest. Radiochemical separations may be made prior to counting but are usually not necessary.

Applicability: This method is applicable to the measurement of any gamma emitting radionuclide with gamma energies greater than 20 keV. It can be applied to complex mixtures of radionuclides. The samples counted may be in the form of particulate filters, absorbers, liquids or gases. The method may also be applied to the analysis of gaseous gamma emitting radionuclides directly in an effluent stream by passing the stream through a chamber or cell containing the detector. ASTM-3649(9), IDO-12096(18).

3.4.2 Method G-2, Low Resolution Gamma Spectrometry.

Principle: The sample is counted with a low resolution gamma detector, a thallium activated sodium iodide crystal. The detector is coupled to a photomultiplier tube and connected to a multichannel analyzer. The gamma emitting radionuclides in the sample are measured from the gamma count rates in the energy regions characteristic of the individual radionuclides. Corrections are made for counts contributed by other radionuclides to the spectral regions of the radionuclides of interest. Radiochemical separation may be used prior to counting to obtain less complex gamma spectra if needed.

Applicability: This method is applicable to the measurement of gamma emitting radionuclides with energies greater than 100 keV. It can be applied only to relatively simple mixtures of gamma emitting radionuclides. The samples counted may be in the form of particulate filters, absorbers, liquids or gas. The method can be applied to the analysis of gaseous radionuclides directly in an effluent stream by passing the gas stream through a chamber or cell containing the detector. ASTM-D-2459(12), EMSL-LV-0539-17(19).

3.4.3 Method G-3, Single Channel Gamma Spectrometry.

Principle: The sample is counted with a thallium activated sodium iodide crystal. The detector is coupled to a photomultiplier tube connected to a single channel analyzer. The activity of a gamma emitting radionuclide is determined from the gamma counts in the energy range for which the counter is set.

Applicability: This method is applicable to the measurement of a single gamma emitting radionuclide. It is not applicable to mixtures of radionuclides. The samples counted may be in the form of particulate filters, absorbers, liquids or gas. The method can be applied to the analysis of gaseous radionuclides directly in an effluent stream by passing the gas stream through a chamber or cell containing the detector.

3.4.4 Method G–4, Gross Gamma Counting.

Principle: The sample is counted with a gamma detector usually a thallium activated sodium iodine crystal. The detector is coupled to a photomultiplier tube and gamma rays above a specific threshold energy level are counted.

Applicability: Gross gamma measurements may be used to measure emissions of specific radionuclides only when it is known that the sample contains a single radionuclide or the identity and isotopic ratio of the radionuclides in the effluent stream are well known. When gross gamma measurements are used to determine emissions of specific radionuclides periodic measurements using Methods G–1 or G–2 should be made to demonstrate that the gross gamma measurements provide reliable emission data. This method may be applied to analysis of gaseous radionuclides directly in an effluent stream by placing the detector directly in or adjacent to the effluent stream or passing an extracted sample of the effluent stream through a chamber or cell containing the detector.

3.5 Counting Methods. All of the above methods with the exception of Method A–5 involve counting the radiation emitted by the radionuclide. Counting methods applicable to the measurement of alpha, beta and gamma radiations are listed below. The equipment needed and the counting principles involved are described in detail in ASTM–3648(8).

3.5.1 Alpha Counting:

- *Gas Flow Proportional Counters.* The alpha particles cause ionization in the counting gas and the resulting electrical pulses are counted. These counters may be windowless or have very thin windows.
- *Scintillation Counters.* The alpha particles transfer energy to a scintillator resulting in a production of light photons which strike a photomultiplier tube converting the light photons to electrical pulses which are counted. The counters may involve the use of solid scintillation materials such as zinc sulfide or liquid scintillation solutions.
- *Solid-State Counters.* Semiconductor materials, such as silicon surface-barrier p-n junctions, act as solid ionization chambers. The alpha particles interact which the detector producing electron hole pairs. The charged pair is collected by an applied electrical field and the resulting electrical pulses are counted.
- *Alpha Spectrometers.* Semiconductor detectors used in conjunction with multichannel analyzers for energy discrimination.

3.5.2 Beta Counting:

- *Ionization Chambers.* These chambers contain the beta-emitting nuclide in gaseous form. The ionization current produced is measured.
- *Geiger-Muller (GM) Counters-or Gas Flow Proportional Counters.* The beta particles cause ionization in the counting gas and the resulting electrical pulses are counted. Proportional gas flow counters which are heavily shielded by lead or other metal, and provided with an anti-coincidence shield to reject cosmic rays, are called low background beta counters.
- *Scintillation Counters.* The beta particles transfer energy to a scintillator resulting in a production of light photons, which strike a photomultiplier tube converting the light photon to electrical pulses which are counted. This may involve the use of anthracene crystals, plastic scintillator, or liquid scintillation solutions with organic phosphors.
- *Liquid Scintillation Spectrometers.* Liquid scintillation counters which use two photomultiplier tubes in coincidence to reduce background counts. This counter may also electronically discriminate among pulses of a given range of energy.

3.5.3 Gamma Counting:

- *Low-Resolution Gamma Spectrometers.* The gamma rays interact with thallium activated sodium iodide or cesium iodide crystal resulting in the release of light photons which strike a photomultiplier tube converting the light pulses to electrical pulses proportional to the energy of the gamma ray. Multi-channel analyzers are used to separate and store the pulses according to the energy absorbed in the crystal.
- *High-Resolution gamma Spectrometers.* Gamma rays interact with a lithium-drifted (Ge(Li)) or high-purity germanium (HPGe) semiconductor detectors resulting in a production of electron-hole pairs. The charged pair is collected by an applied electrical field. A very stable low noise preamplifier amplifies the pulses of electrical charge resulting from the gamma photon interactions. Multichannel analyzers or computers are used to separate and store the pulses according to the energy absorbed in the crystal.
- *Single Channel Analyzers.* Thallium activated sodium iodide crystals used with a single window analyzer. Pulses from the photomultiplier tubes are separated in a single predetermined energy range.

3.5.4 Calibration of Counters. Counters are calibrated for specific radionuclide measurements using a standard of the radionuclide under either identical or very similar conditions as the sample to be counted. For gamma spectrometers a series of standards covering the energy range of interest may be used to construct a calibration curve relating gamma energy to counting efficiency.

In those cases where a standard is not available for a radionuclide, counters may be calibrated using a standard with energy characteristics as similar as possible to the radionuclide to be measured. For gross alpha and beta measurements of the unidentified mixtures of radionuclides, alpha counters are calibrated with a natural uranium standard and beta counters with a cesium-137 standard. The standard must contain the same weight and distribution of solids as the samples, and be mounted in an identical manner. If the samples contain variable amounts of solids, calibration curves relating weight of solids present to counting efficiency are prepared. Standards other than those prescribed may be used provided it can be shown that such standards are more applicable to the radionuclide mixture measured.

3.6 Radiochemical Methods for Selected Radionuclides. Methods for a selected list of radionuclides are listed in Table 1. The radionuclides listed are those which are most commonly used and which have the greatest potential for causing doses to members of the public. For radionuclides not listed in Table 1, methods based on any of the applicable "principles of measurement" described in section 3.1 through 3.4 may be used.

3.7 Applicability of Gross Alpha and Beta Measurements to Unidentified Mixtures of Radionuclides. Gross alpha and beta measurements may be used as a screening measurement as a part of an emission measurement program to identify the need to do specific radionuclide analyses or to confirm or verify that unexpected radionuclides are not being released in significant quantities.

Gross alpha (Method A–4) or gross beta (Methods B–2 or B–4) measurements may also be used for the purpose of comparing the measured concentrations in the effluent stream with the limiting "Concentration Levels for Environmental Compliance" in Table 2 of Appendix E. For unidentified mixtures, the measured concentration value shall be compared with the lowest environmental concentration limit for any radionuclide which is not known to be absent from the effluent stream.

TABLE 1.—LIST OF APPROVED METHODS FOR SPECIFIC RADIONUCLIDES

Radionuclide	Approved methods of analysis
Am-241	A–1, A–2, A–3, A–4
Ar-41	B–1, B–2, G–1, G–2, G–3, G–4
Ba-140	G–1, G–2, G–3, G–4
Br-82	G–1, G–2, G–3, G–4
C-11	B–1, B–2, G–1, G–2, G–3, G–4
C-14	B–5
Ca-45	B–3, B–4, B–5
Ce-144	G–1, G–2, G–3, G–4
Cm-244	A–1, A–2, A–3, A–4
Co-60	G–1, G–2, G–3, G–4
Cr-51	G–1, G–2, G–3, G–4
Cs-134	G–1, G–2, G–3, G–4
Cs-137	G–1, G–2, G–3, G–4
Fe-55	B–5, G–1
Fe-59	G–1, G–2, G–3, G–4
Ga-67	G–1, G–2, G–3, G–4
H-3 (H_2O)	B–5
H-3 (gas)	B–1
I-123	G–1, G–2, G–3, G–4
I-125	G–1
I-131	G–1, G–2, G–3, G–4
In-113m	G–1, G–2, G–3, G–4
Ir-192	G–1, G–2, G–3, G–4
Kr-85	B–1, B–2, B–5, G–1, G–2, G–3, G–4
Kr-87	B–1, B–2, G–1, G–2, G–3, G–4

TABLE 1.—LIST OF APPROVED METHODS FOR SPECIFIC RADIONUCLIDES—Continued

Radionuclide	Approved methods of analysis
Kr-88	B-1, B-2, G-1, G-2, G-3, G-4
Mn-54	G-1, G-2, G-3, G-4
Mo-99	G-1, G-2, G-3, G-4
N-13	B-1, B-2, G-1, G-2, G-3, G-4
O-15	B-1, B-2, G-1, G-2, G-3, G-4
P-32	B-3, B-4, B-5
Pm-147	B-3, B-4, B-5
Po-210	A-1, A-2, A-3, A-4
Pu-238	A-1, A-2, A-3, A-4
Pu-239	A-1, A-2, A-3, A-4
Pu-240	A-1, A-2, A-3, A-4
S-35	B-5
Se-75	G-1, G-2, G-3, G-4
Sr-90	B-3, B-4, B-5
Tc-99	B-3, B-4, B-5
Te-201	G-1, G-2, G-3, G-4
Uranium (total alpha)	A-1, A-2, A-3, A-4
Uranium (Isotopic)	A-1, A-3
Uranium (Natural)	A-5
Xe-133	G-1
Yb-169	G-1, G-2, G-3, G-4
Zn-65	G-1, G-2, G-3, G-4

4. Quality Assurance Methods

Each facility required to measure their radionuclide emissions shall conduct a quality assurance program in conjunction with the radionuclide emission measurements. This program shall assure that the emission measurements are representative, and are of known precision and accuracy and shall include administrative controls to assure prompt response when emission measurements indicate unexpectedly large emissions. The program shall consist of a system of policies, organizational responsibilities, written procedures, data quality specifications, audits, corrective actions and reports. This quality assurance program shall include the following program elements:

4.1 The organizational structure, functional responsibilities, levels of authority and lines of communications for all activities related to the emissions measurement program shall be identified and documented.

4.2 Administrative controls shall be prescribed to ensure prompt response in the event that emission levels increase due to unplanned operations.

4.3 The sample collection and analysis procedures used in measuring the emissions shall be described including where applicable:

4.3.1 Identification of sampling sites and number of sampling points, including the rationale for site selections.

4.3.2 A description of sampling probes and representativeness of the samples.

4.3.3 A description of any continuous monitoring system used to measure emissions, including the sensitivity of the system, calibration procedures and frequency of calibration.

4.3.4 A description of the sample collection systems for each radionuclide measured, including frequency of collection, calibration procedures and frequency of calibration.

4.3.5 A description of the laboratory analysis procedures used for each radionuclide measured, including frequency of analysis, calibration procedures and frequency of calibration.

4.3.6 A description of the sample flow rate measurement systems or procedures, including calibration procedures and frequency of calibration.

4.3.7 A description of the effluent flow rate measurement procedures, including frequency of measurements, calibration procedures and frequency of calibration.

4.4 The objectives of the quality assurance program shall be documented and shall state the required precision, accuracy and completeness of the emission measurement data including a description of the procedures used to assess these parameters. Accuracy is the degree of agreement of a measurement with a true or known value. Precision is a measure of the agreement among individual measurements of the same parameters under similar conditions. Completeness is a measure of the amount of valid data obtained compared to the amount expected under normal conditions.

4.5 A quality control program shall be established to evaluate and track the quality of the emissions measurement data against preset criteria. The program should include where applicable a system of replicates, spiked samples, split samples, blanks and control charts. The number and frequency of such quality control checks shall be identified.

4.6 A sample tracking system shall be established to provide for positive identification of samples and data through all phases of the sample collection, analysis and reporting system. Sample handling and preservation procedures shall be established to maintain the integrity of samples during collection, storage and analysis.

4.7 Periodic internal and external audits shall be performed to monitor compliance with the quality assurance program. These audits shall be performed in accordance with written procedures and conducted by personnel who do not have responsibility for performing any of the operations being audited.

4.8 A corrective action program shall be established including criteria for when corrective action is needed, what corrective actions will be taken and who is responsible for taking the corrective action.

4.9 Periodic reports to responsible management shall be prepared on the performance of the emissions measurements program. These reports should include assessment of the quality of the data, results of audits and description of corrective actions.

4.10 The quality assurance program should be documented in a quality assurance project plan which should address each of the above requirements.

5. References

(1) American National Standards Institute, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities", ANSI-N13.1-1969, American National Standards Institute, New York, New York (1969).

(2) American Public Health Association, "Methods of Air Sampling", 2nd Edition, Method 605, "Tentative Method of Analysis for Plutonium Content of Atmospheric Particulate Matter". American Public Health Association, New York, NY (1977).

(3) Ibid, Method 601, "Tentative Method of Analysis for Gross Alpha Radioactivity Content of the Atmosphere".

(4) Ibid, Method 602, "Tentative Method of the Analysis for Gross Beta Radioactivity Content of the Atmosphere".

(5) Ibid, Method 608, "Tentative Method of Analysis for Strontium-90 Content of Atmospheric Particulate Matter".

(6) Ibid, Method 609, "Tentative Method of Analysis for Tritium Content of the Atmosphere".

(7) Ibid, Method 603, "Tentative Method of Analysis for Iodine-131 Content of the Atmosphere".

(8) American Society for Testing and Materials, 1986 Annual Book ASTM Standards, Designation D-3648-78, "Standard Practices for the Measurement of Radioactivity". American Society for Testing and Materials, Philadelphia, PA (1986).

(9) Ibid, Designation D-3649-85, "Standard Practice for High Resolution Gamma Spectrometry".

(10) Ibid, Designation D-1943-81, "Standard Test Method for Alpha Particle Radioactivity of Water".

(11) Ibid, Designation D-1890-81, "Standard Test Method for Beta Particle Radioactivity of Water".

(12) Ibid, Designation D-2459-72, "Standard Test Method for Gamma Spectrometry of Water".

(13) Ibid, Designation D-3972-82, "Standard Test Method for Isotopic Uranium in Water by Radiochemistry".

(14) Ibid, Designation D-2907-83, "Standard Test Methods for Microquantities of Uranium in Water by Fluorometry".

(15) Ibid, Designation E-318, "Standard Test Method for Uranium in Aqueous Solutions by Colorimetry".

(16) Ibid, Designation D-3084-75, "Standard Practice for Alpha Spectrometry of Water".

(17) Corley, J.P. and C.D. Corbit, "A Guide for Effluent Radiological Measurements at DOE Installations", DOE/EP-0096, Pacific Northwest Laboratories, Richland, Washington (1983).

(18) Department of Energy, "RESL Analytical Chemistry Branch Procedures Manual", IDO-12096, U.S. Department of Energy, Idaho Falls, Idaho (1982).

(19) Environmental Protection Agency, "Radiochemical Analytical Procedures for Analysis of Environmental Samples", EMSL-LV-0539-17, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada (1979).

(20) Environmental Protection Agency, "Radiochemistry Procedures Manual", EPA 520/5-84-006, Eastern Environmental Radiation Facility, Montgomery, Alabama (1984).

(21) National Council on Radiation Protection and Measurements, NCRP Report

No. 50, "Environmental Radiation Measurements", National Council on Radiation Protection and Measurement, Bethesda, Maryland (1976).

(22) Ibid, Report No. 47, "Tritium Measurement Techniques". (1976).

(23) Ibid, Report No. 58 "A Handbook of Radioactivity Measurement Procedures" (1985).

(24) Environmental Protection Agency, "Indoor Radon and Radon Decay Product Measurement Protocols", EPA 520/1–89–009, U.S. Environmental Protection Agency, Washington, DC (1989).

8. By adding Method 115 to the list of methods in Appendix B to part 61 to read as follows:

Method 115—Monitoring for Radon-222 Emissions

This Appendix describes the monitoring methods which must be used in determining the radon-222 emissions from underground uranium mines, uranium mill tailings piles, phosphogypsum stacks, and other piles of waste material emitting radon.

1. Radon-222 Emissions from Underground Uranium Mine Vents

1.1 Sampling Frequency and Calculation of Emissions. Radon-222 emissions from underground uranium mine vents shall be determined using one of the following methods:

1.1.1 Continuous Measurement. These measurements shall be made and the emissions calculated as follows:

(a) The radon-222 concentration shall be continuously measured at each mine vent whenever the mine ventilation system is operational.

(b) Each mine vent exhaust flow rate shall be measured at least 4 times per year.

(c) A weekly radon-222 emission rate for the mine shall be calculated and recorded weekly as follows:

$$A_w = C_1Q_1T_1 + C_2Q_2T_2 + \ldots C_iQ_iT_i$$

Where:

A_w = Total radon-222 emitted from the mine during week (Ci)

C_i = Average radon-222 concentration in mine vent i(Ci/m^3)

Q_i = Volumetric flow rate from mine vent i(m^3/hr)

T_i = Hours of mine ventilation system operation during week for mine vent i(hr)

(d) The annual radon-222 emission rate is the sum of the weekly emission rates during a calendar year.

1.1.2 Periodic Measurement. This method is applicable only to mines that continuously operate their ventilation system except for extended shutdowns. Mines which start up and shut down their ventilation system frequently must use the continuous measurement method describe in Section 1.1.1 above. Emission rates determined using periodic measurements shall be measured and calculated as follows:

(a) The radon-222 shall be continuously measured at each mine vent for at least one week every three months.

(b) Each mine vent exhaust flow rate shall be measured at least once during each of the radon-222 measurement periods.

(c) A weekly radon-222 emission rate shall be calculated for each weekly period according to the method described in Section 1.1.1. In this calculation T=168 hr.

(d) The annual radon-222 emission rate from the mine should be calculated as follows:

$$A_y = \frac{52 - W_s}{n} \quad (A_{w1} + A_{w2} + \ldots A_{wi})$$

Where:

A_y = Annual radon-222 emission rate from the mine(Ci)

A_{wi} = Weekly radon-222 emission rate during the measurement period i (Ci)

n = Number of weekly measurement periods per year

W_s = Number of weeks during the year that the mine ventilation system is shut down in excess of 7 consecutive days, i.e. the sum of the number of weeks each shut down exceeds 7 days

1.2 Test Methods and Procedures

Each underground mine required to test its emissions, unless an equivalent or alternative method has been approved by the Administrator, shall use the following test methods:

1.2.1 Test Method 1 of Appendix A to part 60 shall be used to determine velocity traverses. The sampling point in the duct shall be either the centroid of the cross section or the point of average velocity.

1.2.2 Test Method 2 of Appendix A to part 60 shall be used to determine velocity and volumetric flow rates.

1.2.3 Test Methods A–6 or A–7 of Appendix B, Method 114 to part 61 shall be used for the analysis of radon–222. Use of Method A–7 requires prior approval of EPA based on conditions described in Appendix B.

1.2.4 A quality assurance program shall be conducted in conformance with the programs described for Continuous Radon Monitors and Alpha Track Detectors in EPA 520/1–89–009. (2)

2. Radon–222 Emissions from Uranium Mill Tailings Piles

2.1 Measurement and Calculation of Radon Flux from Uranium Mill Tailings Piles.

2.1.1 Frequency of Flux Measurement. A single set of radon flux measurements may be made, or if the owner or operator chooses, more frequent measurements may be made over a one year period. These measurements may involve quarterly, monthly or weekly intervals. All radon measurements shall be made as described in paragraphs 2.1.2 through 2.1.6 except that for measurements made over a one year period, the requirement of paragraph 2.1.4(c) shall not apply. The mean radon flux from the pile shall be the arithmetic mean of the mean radon flux for each measurement period. The weather conditions, moisture content of the tailings and area of the pile covered by water existing at the time of the measurement shall be chosen so as to provide measurements representative of the long term radon flux from the pile and shall be subject to EPA review and approval.

2.1.2 Distribution of Flux Measurements. The distribution and number of radon flux measurements required on a pile will depend on clearly defined areas of the pile (called regions) that can have significantly different radon fluxes due to surface conditions. The mean radon flux shall be determined for each individual region of the pile. Regions that shall be considered for operating mill tailings piles are:

(a) Water covered areas,

(b) Water saturated areas (beaches),

(c) Dry top surface areas, and

(d) Sides, except where earthen material is used in dam construction.

For mill tailings after disposal the pile shall be considered to consist of only one region.

2.1.3 Number of Flux Measurements. Radon flux measurements shall be made within each region on the pile, except for those areas covered with water. Measurements shall be made at regularly spaced locations across the surface of the region, realizing that surface roughness will prohibit measurements in some areas of a region. The minimum number of flux measurements considered necessary to determine a representative mean radon flux value for each type of region on an operating pile is:

(a) Water covered area—no measurements required as radon flux is assumed to be zero,

(b) Water saturated beaches—100 radon flux measurements,

(c) Loose and dry top surface—100 radon flux measurements,

(d) Sides—100 radon flux measurements, except where earthern material is used in dam construction.

For a mill tailings pile after disposal which consists of only one region a minimum of 100 measurements are required.

2.1.4 Restrictions to Radon Flux Measurements. The following restrictions are placed on making radon flux measurements:

(a) Measurements shall not be initiated within 24 hours of a rainfall.

(b) If a rainfall occurs during the 24 hour measurements period, the measurement is invalid if the seal around the lip of the collector has washed away or if the collector is surrounded by water.

(c) Measurements shall not be performed if the ambient temperature is below 35°F or if the ground is frozen.

2.1.5 Areas of Pile Regions. The approximate area of each region of the pile shall be determined in units of square meters.

2.1.6 Radon Flux Measurement. Measuring radon flux involves the adsorption of radon on activated charcoal in a large-area collector. The radon collector is placed on the surface of the pile area to be measured and allowed to collect radon for a time period of 24 hours. The radon collected on the charcoal is measured by gamma-ray spectroscopy. The detailed measurement procedure provided in Appendix A of EPA 520/5–85–0029(1) shall be used to measure the radon flux on uranium mill tailings, except the surface of the tailings shall not be penetrated by the lip of the radon collector as directed in the procedure, rather the collector shall be carefully positioned on a flat surface with soil or tailings used to seal the edge.

2.1.7 Calculations. The mean radon flux for each region of the pile and for the total pile shall be calculated and reported as follows:

(a) The individual radon flux calculations shall be made as provided in Appendix A EPA 86 (1). The mean radon flux for each region of the pile shall be calculated by summing all individual flux measurements for the region and dividing by the total number of flux measurements for the region.

(b) The mean radon flux for the total uranium mill tailings pile shall be calculated as follows.

$$J_s = \frac{J_1 A_1 + \ldots J_2 A_2 \ldots J_i A_i}{A_t}$$

Where:

J_s = Mean flux for the total pile (pCi/m²-s)
J_i = Mean flux measured in region i (pCi/m²-s)
A_i = Area of region i (m²)
A_t = Total area of the pile (m²)

2.1.8 Reporting. The results of individual flux measurements, the approximate locations on the pile, and the mean radon flux for each region and the mean radon flux for the total stack shall be included in the emission test report. Any condition or unusual event that occurred during the measurements that could significantly affect the results should be reported.

3.0 Radon-222 Emissions from Phosphogypsum Stacks.

3.1 Measurement and Calculation of the Mean Radon Flux. Radon flux measurements shall be made on phosphogypsum stacks as described below:

3.1.1 Frequency of Measurements. A single set of radon flux measurements may be made after the phosphogypsum stack becomes inactive, or if the owner or operator chooses, more frequent measurements may be made over a one year period. These measurements may involve quarterly, monthly or weekly intervals. All radon measurements shall be made as described in paragraphs 3.1.2 through 3.1.6 except that for measurements made over a one year period, the requirement of paragraph 3.1.4(c) shall not apply. For measurements made over a one year period, the radon flux shall be the arithmetic mean of the mean radon flux for each measurement period.

3.1.2 Distribution and Number of Flux Measurements. The distribution and number of radon flux measurements required on a stack will depend on clearly defined areas of the stack (called regions) that can have significantly different radon fluxes due to surface conditions. The mean radon flux shall be determined for each individual region of the stack. Regions that shall be considered are:

(a) Water covered areas,
(b) Water saturated areas (beaches),
(c) Loose and dry top surface areas,
(d) Hard-packed roadways, and
(e) Sides.

3.1.3 Number of Flux Measurements. Radon flux measurements shall be made within each region on the phosphogypsum stack, except for those areas covered with water. Measurements shall be made at regularly spaced locations across the surface of the region, realizing that surface roughness will prohibit measurements in some areas of a region. The minimum number of flux measurements considered necessary to determine a representative mean radon flux value for each type of region is:

(a) Water covered area—no measurements required as radon flux is assumed to be zero,
(b) Water saturated beaches—50 radon flux measurements,
(c) Loose and dry top surface—100 radon flux measurements,
(d) Hard-packed roadways—50 radon flux measurements, and
(e) Sides—100 radon flux measurements.

A minimum of 300 measurements are required. A stack that has no water cover can be considered to consist of two regions, top and sides, and will require a minimum of only 200 measurements.

3.1.4 Restrictions to Radon Flux Measurements. The following restrictions are placed on making radon flux measurements:

(a) Measurements shall not be initiated within 24 hours of a rainfall.
(b) If a rainfall occurs during the 24 hour measurement period, the measurement is invalid if the seal around the lip of the collector has washed away or if the collector is surrounded by water.
(c) Measurements shall not be performed if the ambient temperature is below 35 °F or if the ground is frozen.

3.1.5 Areas of Stack Regions. The approximate area of each region of the stack shall be determined in units of square meters.

3.1.6 Radon Flux Measurements. Measuring radon flux involves the adsorption of radon on activated charcoal in a large-area collector. The radon collector is placed on the surface of the stack area to be measured and allowed to collect radon for a time period of 24 hours. The radon collected on the charcoal is measured by gamma-ray spectroscopy. The detailed measurement procedure provided in Appendix A of EPA 520/5-85-0029(1) shall be used to measure the radon flux on phosphogypsum stacks, except the surface of the phosphogypsum shall not be penetrated by the lip of the radon collector as directed in the procedure, rather the collector shall be carefully positioned on a flat surface with soil or phosphogypsum used to seal the edge.

3.1.7 Calculations. The mean radon flux for each region of the phosphogypsum stack and for the total stack shall be calculated and reported as follows:

(a) The individual radon flux calculations shall be made as provided in Appendix A EPA 86 (1). The mean radon flux for each region of the stack shall be calculated by summing all individual flux measurements for the region and dividing by the total number of flux measurements for the region.

(b) The mean radon flux for the total phosphogypsum stack shall be calculated as follows.

$$J_s = \frac{J_1 A_1 + J_2 A_2 + \ldots J_i A_i}{A_t}$$

Where:

J_s = Mean flux for the total stack (pCi/m²-s)
J_i = Mean flux measured in region i (pCi/m²-s)
A_i = Area of region i (m²)
A_t = Total area of the stack

3.1.8 Reporting. The results of individual flux measurements, the approximate locations on the stack, and the mean radon flux for each region and the mean radon flux for the total stack shall be included in the emission test report. Any condition or unusual event that occurred during the measurements that could significantly affect the results should be reported.

4.0 Quality Assurance Procedures for Measuring Rn-222 Flux

A. Sampling Procedures

Records of field activities and laboratory measurements shall be maintained. The following information shall be recorded for each charcoal canister measurement:

(a) Site
(b) Name of pile
(c) Sample location
(d) Sample ID number
(e) Date and time on
(f) Date and time off
(g) Observations of meteorological conditions and comments

Records shall include all applicable information associated with determining the sample measurement, calculations, observations, and comments.

B. Sample Custody

Custodial control of all charcoal samples exposed in the field shall be maintained in accordance with EPA chain-of-custody field procedures. A control record shall document all custody changes that occur between the field and laboratory personnel.

C. Calibration Procedures and Frequency

The radioactivity of two standard charcoal sources, each containing a carefully determined quantity of radium-226 uniformly distributed through 180g of activated charcoal, shall be measured. An efficiency factor is computed by dividing the average measured radioactivity of the two standard charcoal sources, minus the background, in cpm by the known radioactivity of the charcoal sources in dpm. The same two standard charcoal sources shall be counted at the beginning and at the end of each day's counting as a check of the radioactivity counting equipment. A background count using unexposed charcoal should also be made at the beginning and at the end of each counting day to check for inadvertent contamination of the detector or other changes affecting the background. The unexposed charcoal comprising the blank is changed with each new batch of charcoal used.

D. Internal Quality Control Checks and Frequency

The charcoal from every tenth exposed canister shall be recounted. Five percent of the samples analyzed shall be either blanks (charcoal having no radioactivity added) or samples spiked with known quantities of radium-226.

E. Data Precision, Accuracy, and Completeness

The precision, accuracy, and completeness of measurements and analyses shall be within the following limits for samples measuring greater than 1.0 pCi/m^2-s.

(a) Precision: 10%

(b) Accuracy: ±10%

(c) Completeness: at least 85% of the measurements must yield useable results.

5.0 References

(1) Hartley, J.N. and Freeman, H.D., "Radon Flux Measurements on Gardinier and Royster Phosphogypsum Piles Near Tampa and Mulberry, Florida," U.S. Environmental Protection Agency Report, EPA 520/5-85-029, January 1986.

(2) Environmental Protection Agency, "Indoor Radon and Radon Decay Product Measurement Protocols", EPA 520/1-89-009, U.S. Environmental Protection Agency, Washington, DC. (1989).

9. By adding Appendix D to part 61 to read as follows:

Appendix D to Part 61—Methods for Estimating Radionuclide Emissions

1. Purpose and Background

Facility owners or operators may estimate radionuclide emissions to the atmosphere for dose calculations instead of measuring emissions. Particulate emissions from mill tailings piles should be estimated using the procedures listed in reference #2. All other emissions may be estimated by using the "Procedures" listed below, or using the method described in reference #1.

2. Procedure

To estimate emissions to the atmosphere:

(a) Determine the amount (in curies) used at facilities for the period under consideration. Radioactive materials in sealed packages that remain unopened, and have not leaked during the assessment period should not be included in the calculation.

(b) Multiply the amount used by the following factors which depend on the physical state of the radionuclide. They are:

(i) 1 for gases;

(ii) 10^{-3} for liquids or particulate solids; and

(iii) 10^{-6} for solids.

If any nuclide is heated to a temperature of 100 degrees Celsius or more, boils at a temperature of 100 degrees Celsius or less, or is intentionally dispersed into the environment, it must be considered to be a gas.

(c) If a control device is installed between the place of use and the point of release, multiply emissions from (b) by an adjustment factor. These are presented in Table 1.

TABLE 1.—ADJUSTMENT TO EMISSION FACTORS FOR EFFLUENT CONTROLS

Controls	Types of radionuclides controlled	Adjustment factor to emissions	Comments and conditions
HEPA filters	Particulates	0.01	Not applicable to gaseous radionuclides; periodic testing is prudent to ensure high removal efficiency.
Fabric filter	Particulates	0.1	Monitoring would be prudent to guard against tears in filter.
Sintered metal	Particulates	1	Insufficient data to make recommendation.
Activated carbon filters	Iodine gas	0.1	Efficiency is time dependent; monitoring is necessary to ensure effectiveness.
Douglas bags: Held one week or longer for decay	Xenon	0.5/wk	Based on xenon half-life of 5.3 days;
Douglas bags: Released within one week	Xenon	1	Provides no reduction of exposure to general public.
Venturi scrubbers	Particulates	0.05	Although venturis may remove gases, variability in gaseous removal efficiency dictates adjustment factor for particulates only.
	Gases	1	
Packed bed scrubbers	Gases	0.1	Not applicable to particulates.
Electrostatic precipitators	Particulates	0.05	Not applicable for gaseous radionuclides
Xenon traps	Xenon	0.1	Efficiency is time dependent; monitoring is necessary to ensure effectiveness.
Fume hoods	All	1	Provides no reduction to general public exposures.
Vent stacks	All	1	Generally provides no reduction of exposure to general public.

References

(1) Environmental Protection Agency, "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclides Emissions from NRC-Licensed and Non-DOE Federal Facilities", EPA 520/1-89-002, January 1989.

(2) Nuclear Regulatory Commission, "Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Milling Operations", U.S. Nuclear Regulatory Commission Regulatory Guide 3.59, March 1987.

10. By adding Appendix E part 61 to read as follows:

Appendix E to Part 61—Compliance Procedures Methods for Determining Compliance With Subpart I

1. Purpose and Background

This Appendix provides simplified procedures to reduce the burden on Nuclear Regulatory Commission (NRC) licensees, and non-Department of Energy Federal facilities in determining compliance with 40 CFR part 61, subpart I. The procedures consist of a series of increasingly more stringent steps, depending on the facility's potential to exceed the standard.

First, a facility can be found in compliance if the quantity of radioactive material possessed during the year is less than that listed in a table of annual possession quantities. A facility will also be in compliance if the average annual radionuclide emission concentration is less than that listed in a table of air concentration levels. If the facility is not in compliance by these tables, it can establish compliance by estimating a dose using screening procedure developed by the National Council on Radiation Protection and Measurements with a radiological source term derived using EPA approved emission factors. These procedures are described in a "Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions From NRC-Licenced and Non-DOE Federal Facilities."

A user-friendly computer program called COMPLY has been developed to reduce the burden on the regulated community. The Agency has also prepared a "User's Guide for the COMPLY Code" to assist the regulated community in using the code, and in handling more complex situations such as multiple release points. The basis for these compliance procedures are provided in "Background Information Document: Procedures Approved for Demonstrating Compliance with 40 CFR part 61, subpart I". The compliance model is the highest level in the COMPLY computer code and provides for the most realistic assessment of dose by allowing the use of site-specific information.

2. Table of Annual Possession Quantity

(a) Table 1 may be used for determining if facilities are in compliance with the standard. The possession table can only be used if the following conditions are met:

(i) No person lives within 10 meters of any release point; and

(ii) No milk, meat, or vegetables are produced within 100 meters of any release point.

(b) Procedures described in Reference (1) shall be used to determine compliance or exemption from reporting by use of Table 2.

TABLE 1.—ANNUAL POSSESSION QUANTITIES FOR ENVIRONMENTAL COMPLIANCE

[Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
Ac-225	9.6E−05	9.6E−02	9.6E+01
Ac-227	1.6E−07	1.6E−04	1.6E−01
Ac-228	3.4E−03	3.4E+00	3.4E+03
Ag-106	1.6E+00	1.6E+03	1.6E+06
Ag-106m	2.6E−03	2.6E+00	2.6E+03
Ag-108m	6.5E−06	6.5E−03	6.5E+00
Ag-110m	9.4E−05	9.4E−02	9.4E+01
Ag-111	6.7E−02	6.7E+01	6.7E+04
Al-26	4.0E−06	4.0E−03	4.0E+00
Am-241	2.3E−06	2.3E−03	2.3E+00
Am-242	1.8E−02	1.8E+01	1.8E+04
Am-242m	2.5E−06	2.5E−03	2.5E+00
Am-243	2.3E−06	2.3E−03	2.3E+00
Am-244	4.6E−02	4.6E+01	4.6E+04
Am-245	7.0E+00	7.0E+03	7.0E+06
Am-246	9.8E−01	9.8E+02	9.8E+05
Ar-37	1.4E+06		
Ar-41	1.4E+00		
As-72	2.9E−02	2.9E+01	2.9E+04
As-73	6.0E−02	6.0E+01	6.0E+04
As-74	4.3E−03	4.3E+00	4.3E+03
As-76	8.8E−02	8.8E+01	8.8E+04
As-77	7.9E−01	7.9E+02	7.9E+05
At-211	1.0E−02	1.0E+01	1.0E+04
Au-193	4.2E−01	4.2E+02	4.2E+05
Au-194	3.5E−02	3.5E+01	3.5E+04
Au-195	3.3E−03	3.3E+00	3.3E+03
Au-198	4.6E−02	4.6E+01	4.6E+04
Au-199	1.5E−01	1.5E+02	1.5E+05
Ba-131	1.0E−02	1.0E+01	1.0E+04
Ba-133	4.9E−05	4.9E−02	4.9E+01
Ba-133m	9.3E−02	9.3E+01	9.3E+04
Ba-135m	5.8E−01	5.8E+02	5.8E+05
Ba-139	4.7E+00	4.7E+03	4.7E+06
Ba-140	2.1E−03	2.1E+00	2.1E+03
Ba-141	1.3E+00	1.3E+03	1.3E+06
Ba-142	1.1E+00	1.1E+03	1.1E+06
Be-7	2.3E−02	2.3E+01	2.3E+04
Be-10	3.0E−03	3.0E+00	3.0E+03
Bi-206	3.1E−03	3.1E+00	3.1E+03
Bi-207	8.4E−06	8.4E−03	8.4E+00
Bi-210	4.2E−03	4.2E+00	4.2E+03
Bi-212	4.7E−02	4.7E+01	4.7E+04
Bi-213	6.0E−02	6.0E+01	6.0E+04
Bi-214	1.4E−01	1.4E+02	1.4E+05
Bk-249	7.0E−04	7.0E−01	7.0E+02
Bk-250	1.0E−01	1.0E+02	1.0E+05
Br-77	7.5E−02	7.5E+01	7.5E+04
Br-80	1.2E+01	1.2E+04	1.2E+07
Br-80m	1.5E+00	1.5E+03	1.5E+06
Br-82	1.6E−02	1.6E+01	1.6E+04
Br-83	9.9E+00	9.9E+03	9.9E+06
Br-84	5.6E−01	5.6E+02	5.6E+05
C-11	1.3E+00	1.3E+03	1.3E+06
C-14	2.9E−01	2.9E+02	2.9E+05
Ca-41	2.7E−02	2.7E+01	2.7E+04
Ca-45	5.8E−02	5.8E+01	5.8E+04
Ca-47	1.1E−02	1.1E+01	1.1E+04
Cd-109	5.0E−03	5.0E+00	5.0E+03
Cd-113	3.3E−04	3.3E−01	3.3E+02
Cd-113m	4.4E−04	4.4E−01	4.4E+02
Cd-115	5.4E−02	5.4E+01	5.4E+04
Cd-115m	1.0E−02	1.0E+01	1.0E+04
Cd-117	5.6E−02	5.6E+01	5.6E+04
Cd-117m	1.3E−01	1.3E+02	1.3E+05
Ce-139	2.6E−03	2.6E+00	2.6E+03
Ce-141	1.8E−02	1.8E+01	1.8E+04
Ce-143	1.0E−01	1.0E+02	1.0E+05
Ce-144	1.7E−03	1.7E+00	1.7E+03
Cf-248	2.0E−05	2.0E−02	2.0E+01
Cf-249	1.7E−06	1.7E−03	1.7E+00
Cf-250	4.0E−06	4.0E−03	4.0E+00
Cf-251	1.7E−06	1.7E−03	1.7E+00
Cf-252	6.4E−06	6.4E−03	6.4E+00
Cf-253	3.3E−04	3.3E−01	3.3E+02

TABLE 1.—ANNUAL POSSESSION QUANTITIES FOR ENVIRONMENTAL COMPLIANCE—Continued

[Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
Cf-254	3.6E−06	3.6E−03	3.6E+00
Cl-36	1.9E−04	1.9E−01	1.9E+02
Cl-38	6.5E−01	6.5E+02	6.5E+05
Cm-242	6.0E−05	6.0E−02	6.0E+01
Cm-243	3.3E−06	3.3E−03	3.3E+00
Cm-244	4.2E−06	4.2E−03	4.2E+00
Cm-245	2.3E−06	2.3E−03	2.3E+00
Cm-246	2.3E−06	2.3E−03	2.3E+00
Cm-247	2.3E−06	2.3E−03	2.3E+00
Cm-248	6.4E−07	6.4E−04	6.4E−01
Cm-249	4.6E+00	4.6E+03	4.6E+06
Cm-250	1.1E−07	1.1E−04	1.1E−01
Co-56	2.4E−04	2.4E−01	2.4E+02
Co-57	1.6E−03	1.6E+00	1.6E+03
Co-58	9.0E−04	9.0E−01	9.0E+02
Co-58m	1.7E−01	1.7E+02	1.7E+05
Co-60	1.6E−05	1.6E−02	1.6E+01
Co-60m	4.0E+00	4.0E+03	4.0E+06
Co-61	3.8E+00	3.8E+03	3.8E+06
Cr-49	9.0E−01	9.0E+02	9.0E+05
Cr-51	6.3E−02	6.3E+01	6.3E+04
Cs-129	1.5E−01	1.5E+02	1.5E+05
Cs-131	2.8E−01	2.8E+02	2.8E+05
Cs-132	1.3E−02	1.3E+01	1.3E+04
Cs-134	5.2E−05	5.2E−02	5.2E+01
Cs-134m	3.2E−01	3.2E+02	3.2E+05
Cs-135	2.4E−02	2.4E+01	2.4E+04
Cs-136	2.1E−03	2.1E+00	2.1E+03
Cs-137	2.3E−05	2.3E−02	2.3E+01
Cs-138	4.4E−01	4.4E+02	4.4E+05
Cu-61	4.0E−01	4.0E+02	4.0E+05
Cu-64	5.2E−01	5.2E+02	5.2E+05
Cu-67	1.5E−01	1.5E+02	1.5E+05
Dy-157	4.4E−01	4.4E+02	4.4E+05
Dy-165	5.6E+00	5.6E+03	5.6E+06
Dy-166	8.1E−02	8.1E+01	8.1E+04
Er-169	4.0E−01	4.0E+02	4.0E+05
Er-171	3.6E−01	3.6E+02	3.6E+05
Es-253	2.6E−04	2.6E−01	2.6E+02
Es-254	2.3E−05	2.3E−02	2.3E+01
Es-254m	1.8E−03	1.8E+00	1.8E+03
Eu-152	1.6E−05	1.6E−02	1.6E+01
Eu-152m	3.5E−01	3.5E+02	3.5E+05
Eu-154	2.0E−05	2.0E−02	2.0E+01
Eu-155	5.2E−04	5.2E−01	5.2E+02
Eu-156	3.2E−03	3.2E+00	3.2E+03
F-18	5.6E−01	5.6E+02	5.6E+05
Fe-52	4.9E−02	4.9E+01	4.9E+04
Fe-55	1.4E−01	1.4E+02	1.4E+05
Fe-59	1.3E−03	1.3E+00	1.3E+03
Fm-254	1.8E−02	1.8E+01	1.8E+04
Fm-255	4.0E−03	4.0E+00	4.0E+03
Fr-223	1.4E−01	1.4E+02	1.4E+05
Ga-66	5.6E−02	5.6E+01	5.6E+04
Ga-67	1.1E−01	1.1E+02	1.1E+05
Ga-68	7.6E−01	7.6E+02	7.6E+05
Ga-72	3.6E−02	3.6E+01	3.6E+04
Gd-152	4.4E−06	4.4E−03	4.4E+00
Gd-153	2.0E−03	2.0E+00	2.0E+03
Gd-159	6.8E−01	6.8E+02	6.8E+05
Ge-68	2.3E−04	2.3E−01	2.3E+02
Ge-71	2.6E+00	2.6E+03	2.6E+06
Ge-77	1.0E−01	1.0E+02	1.0E+05
H-3	1.5E+01	1.5E+04	1.5E+07
Hf-181	2.5E−03	2.5E+00	2.5E+03
Hg-193m	9.5E−02	9.5E+01	9.5E+04
Hg-197	2.4E−01	2.4E+02	2.4E+05
Hg-197m	2.5E−01	2.5E+02	2.5E+05
Hg-203	5.2E−03	5.2E+00	5.2E+03
Ho-166	2.8E−01	2.8E+02	2.8E+05
Ho-166m	6.0E−06	6.0E−03	6.0E+00
I-123	4.9E−01	4.9E+02	4.9E+05
I-124	9.3E−03	9.3E+00	9.3E+03
I-125	6.2E−03	6.2E+00	6.2E+03

TABLE 1.—ANNUAL POSSESSION QUANTITIES FOR ENVIRONMENTAL COMPLIANCE—Continued

[Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
I-126	3.7E−03	3.7E+00	3.7E+03
I-128	9.3E+00	9.3E+03	9.3E+06
I-129	2.6E−04	2.6E−01	2.6E+02
I-130	4.6E−02	4.6E+01	4.6E+04
I-131	6.7E−03	6.7E+00	6.7E+03
I-132	2.0E−01	2.0E+02	2.0E+05
I-133	6.7E−02	6.7E+01	6.7E+04
I-134	3.2E−01	3.2E+02	3.2E+05
I-135	1.2E−01	1.2E+02	1.2E+05
In-111	4.9E−02	4.9E+01	4.9E+04
In-113m	2.1E+00	2.1E+03	2.1E+06
In-114m	4.9E−03	4.9E+00	4.9E+03
In-115	2.7E−04	2.7E−01	2.7E+02
In-115m	1.4E+00	1.4E+03	1.4E+06
In-116m	3.5E−01	3.5E+02	3.5E+05
In-117	1.3E+00	1.3E+03	1.3E+06
In-117m	7.6E−02	7.6E+01	7.6E+04
Ir-190	3.5E−03	3.5E+00	3.5E+03
Ir-192	9.7E−04	9.7E−01	9.7E+02
Ir-194	2.5E−01	2.5E+02	2.5E+05
Ir-194m	1.5E−04	1.5E−01	1.5E+02
K-40	6.8E−05	6.8E−02	6.8E+01
K-42	2.9E−01	2.9E+02	2.9E+05
K-43	6.0E−02	6.0E+01	6.0E+04
K-44	4.9E−01	4.9E+02	4.9E+05
Kr-79	7.0E+00		
Kr-81	1.8E+02		
Kr-83m	2.0E+04		
Kr-85	8.4E+02		
Kr-85m	1.1E+01		
Kr-87	2.0E+00		
Kr-88	4.2E−01		
La-140	1.6E−02	1.6E+01	1.6E+04
La-141	1.1E+00	1.1E+03	1.1E+06
La-142	2.3E−01	2.3E+02	2.3E+05
Lu-177	1.4E−01	1.4E+02	1.4E+05
Lu-177m	3.5E−04	3.5E−01	3.5E+02
Mg-28	2.1E−02	2.1E+01	2.1E+04
Mn-52	3.5E−03	3.5E+00	3.5E+03
Mn-52m	5.2E−01	5.2E+02	5.2E+05
Mn-53	5.7E−02	5.7E+01	5.7E+04
Mn-54	2.5E−04	2.5E−01	2.5E+02
Mn-56	2.5E−01	2.5E+02	2.5E+05
Mo-93	1.5E−03	1.5E+00	1.5E+03
Mo-99**	5.7E−02	5.7E+01	5.7E+04
Mo-101	8.4E−01	8.4E+02	8.4E+05
Na-22	3.2E−05	3.2E−02	3.2E+01
Na-24	2.6E−02	2.6E+01	2.6E+04
Nb-90	2.5E−02	2.5E+01	2.5E+04
Nb-93m	1.2E−02	1.2E+01	1.2E+04
Nb-94	6.0E−06	6.0E−03	6.0E+00
Nb-95	2.3E−03	2.3E+00	2.3E+03
Nb-95m	2.0E−02	2.0E+01	2.0E+04
Nb-96	2.5E−02	2.5E+01	2.5E+04
Nb-97	1.0E+00	1.0E+03	1.0E+06
Nd-147	3.0E−02	3.0E+01	3.0E+04
Nd-149	1.1E+00	1.1E+03	1.1E+06
Ni-56	2.0E−03	2.0E+00	2.0E+03
Ni-57	2.1E−02	2.1E+01	2.1E+04
Ni-59	2.2E−02	2.2E+01	2.2E+04
Ni-63	1.4E−01	1.4E+02	1.4E+05
Ni-65	7.0E−01	7.0E+02	7.0E+05
Np-235	3.0E−02	3.0E+01	3.0E+04
Np-237	1.8E−06	1.8E−03	1.8E+00
Np-238	1.9E−02	1.9E+01	1.9E+04
Np-239	1.0E−01	1.0E+02	1.0E+05
Np-240	6.5E−01	6.5E+02	6.5E+05
Np-240m	4.7E+00	4.7E+03	4.7E+06
Os-185	9.2E−04	9.2E−01	9.2E+02
Os-191m	9.0E−01	9.0E+02	9.0E+05
Os-191	3.8E−02	3.8E+01	3.8E+04
Os-193	2.9E−01	2.9E+02	2.9E+05
P-32	1.7E−02	1.7E+01	1.7E+04
P-33	1.2E−01	1.2E+02	1.2E+05

TABLE 1.—ANNUAL POSSESSION QUANTITIES FOR ENVIRONMENTAL COMPLIANCE—Continued

[Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
Pa-230	6.3E−04	6.3E−01	6.3E+02
Pa-231	8.3E−07	8.3E−04	8.3E−01
Pa-233	9.3E−03	9.3E+00	9.3E+03
Pa-234	9.3E−02	9.3E+01	9.3E+04
Pb-203	8.3E−02	8.3E+01	8.3E+04
Pb-205	1.2E−02	1.2E+01	1.2E+04
Pb-209	1.1E+01	1.1E+04	1.1E+07
Pb-210	5.5E−05	5.5E−02	5.5E+01
Pb-211	1.2E−01	1.2E+02	1.2E+05
Pb-212	6.0E−03	6.0E+00	6.0E+03
Pb-214	1.2E−01	1.2E+02	1.2E+05
Pd-103	2.1E−01	2.1E+02	2.1E+05
Pd-107	8.2E−02	8.2E+01	8.2E+04
Pd-109	9.4E−01	9.4E+02	9.4E+05
Pm-143	7.6E−04	7.6E−01	7.6E+02
Pm-144	1.1E−04	1.1E−01	1.1E+02
Pm-145	5.2E−04	5.2E−01	5.2E+02
Pm-146	4.4E−05	4.4E−02	4.4E+01
Pm-147	2.6E−02	2.6E+01	2.6E+04
Pm-148	1.7E−02	1.7E+01	1.7E+04
Pm-148m	7.6E−04	7.6E−01	7.6E+02
Pm-149	2.8E−01	2.8E+02	2.8E+05
Pm-151	1.2E−01	1.2E+02	1.2E+05
Po-210	9.3E−05	9.3E−02	9.3E+01
Pr-142	2.8E−01	2.8E+02	2.8E+05
Pr-143	1.0E−01	1.0E+02	1.0E+05
Pr-144	1.5E+01	1.5E+04	1.5E+07
Pt-191	6.4E−02	6.4E+01	6.4E+04
Pt-193	2.1E−02	2.1E+01	2.1E+04
Pt-193m	4.8E−01	4.8E+02	4.8E+05
Pt-195m	1.4E−01	1.4E+02	1.4E+05
Pt-197	1.1E+00	1.1E+03	1.1E+06
Pt-197m	3.6E+00	3.6E+03	3.6E+06
Pu-236	7.0E−06	7.0E−03	7.0E+00
Pu-237	2.3E−02	2.3E+01	2.3E+04
Pu-238	2.7E−06	2.7E−03	2.7E+00
Pu-239	2.5E−06	2.5E−03	2.5E+00
Pu-240	2.5E−06	2.5E−03	2.5E+00
Pu-241	1.3E−04	1.3E−01	1.3E+02
Pu-242	2.5E−06	2.5E−03	2.5E+00
Pu-243	3.8E+00	3.8E+03	3.8E+06
Pu-244	2.4E−06	2.4E−03	2.4E+00
Pu-245	2.1E−01	2.1E+02	2.1E+05
Pu-246	4.8E−03	4.8E+00	4.8E+03
Ra-223	1.3E−04	1.3E−01	1.3E+02
Ra-224	3.2E−04	3.2E−01	3.2E+02
Ra-225	1.3E−04	1.3E−01	1.3E+02
Ra-226	5.5E−06	5.5E−03	5.5E+00
Ra-228	1.3E−05	1.3E−02	1.3E+01
Rb-81	4.2E−01	4.2E+02	4.2E+05
Rb-83	1.4E−03	1.4E+00	1.4E+03
Rb-84	2.0E−03	2.0E+00	2.0E+03
Rb-86	1.7E−02	1.7E+01	1.7E+04
Rb-87	1.0E−02	1.0E+01	1.0E+04
Rb-88	1.7E+00	1.7E+03	1.7E+06
Rb-89	6.4E−01	6.4E+02	6.4E+05
Re−184	1.8E−03	1.8E+00	1.8E+03
Re-184m	3.6E−04	3.6E−01	3.6E+02
Re-186	1.9E−01	1.9E+02	1.9E+05
Re-187	9.3E+00	9.3E+03	9.3E+06
Re-188	3.7E−01	3.7E+02	3.7E+05
Rh-103m	1.7E+02	1.7E+05	1.7E+08
Rh-105	3.4E−01	3.4E+02	3.4E+05
Ru-97	8.3E−02	8.3E+01	8.3E+04
Ru-103	3.1E−03	3.1E+00	3.1E+03
Ru-105	2.9E−01	2.9E+02	2.9E+05
Ru-106	5.9E−04	5.9E−01	5.9E+02
S-35	7.5E−02	7.5E+01	7.5E+04
Sb-117	2.0E+00	2.0E+03	2.0E+06
Sb-122	3.9E−02	3.9E+01	3.9E+04
Sb-124	6.0E−04	6.0E−01	6.0E+02
Sb-125	1.4E−04	1.4E−01	1.4E+02
Sb-126	1.8E−03	1.8E+00	1.8E+03
Sb-126m	7.6E−01	7.6E+02	7.6E+05

TABLE 1.—ANNUAL POSSESSION QUANTITIES FOR ENVIRONMENTAL COMPLIANCE—Continued

[Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
Sb-127	2.0E−02	2.0E+01	2.0E+04
Sb-129	1.8E−01	1.8E+02	1.8E+05
Sc-44	1.4E−01	1.4E+02	1.4E+05
Sc-46	4.0E−04	4.0E−01	4.0E+02
Sc-47	1.1E−01	1.1E+02	1.1E+05
Sc-48	1.1E−02	1.1E+01	1.1E+04
Sc-49	1.0E+01	1.0E+04	1.0E+07
Se-73	1.6E−01	1.6E+02	1.6E+05
Se-75	1.1E−03	1.1E+00	1.1E+03
Se-79	6.9E−03	6.9E+00	6.9E+03
Si-31	4.7E+00	4.7E+03	4.7E+06
Si-32	7.2E−04	7.2E−01	7.2E+02
Sm-147	1.4E−05	1.4E−02	1.4E+01
Sm-151	3.5E−02	3.5E+01	3.5E+04
Sm-153	2.4E−01	2.4E+02	2.4E+05
Sn-113	1.9E−03	1.9E+00	1.9E+03
Sn-117m	2.3E−02	2.3E+01	2.3E+04
Sn-119m	2.8E−02	2.8E+01	2.8E+04
Sn-123	1.8E−02	1.8E+01	1.8E+04
Sn-125	7.2E−03	7.2E+00	7.2E+03
Sn-126	4.7E−06	4.7E−03	4.7E+00
Sr-82	1.9E−03	1.9E+00	1.9E+03
Sr-85	1.9E−03	1.9E+00	1.9E+03
Sr-85m	1.5E+00	1.5E+03	1.5E+06
Sr-87m	1.2E+00	1.2E+03	1.2E+06
Sr-89	2.1E−02	2.1E+01	2.1E+04
Sr-90	5.2E−04	5.2E−01	5.2E+02
Sr-91	1.2E−01	1.2E+02	1.2E+05
Sr-92	2.5E−01	2.5E+02	2.5E+05
Ta-182	4.4E−04	4.4E−01	4.4E+02
Tb-157	2.2E−03	2.2E+00	2.2E+03
Tb-160	8.4E−04	8.4E−01	8.4E+02
Tc-95	9.0E−02	9.0E+01	9.0E+04
Tc-95m	1.4E−03	1.4E+00	1.4E+03
Tc-96	5.6E−03	5.6E+00	5.6E+03
Tc-96m	7.0E−01	7.0E+02	7.0E+05
Tc-97	1.5E−03	1.5E+00	1.5E+03
Tc-97m	7.2E−02	7.2E+01	7.2E+04
Tc-98	6.4E−06	6.4E−03	6.4E+00
Tc-99	9.0E−03	9.0E+00	9.0E+03
Tc-99m	1.4E+00	1.4E+03	1.4E+06
Tc-101	3.8E+00	3.8E+03	3.8E+06
Te-121	6.0E−03	6.0E+00	6.0E+03
Te-121m	5.3E−04	5.3E−01	5.3E+02
Te-123	1.2E−03	1.2E+00	1.2E+03
Te-123m	2.7E−03	2.7E+00	2.7E+03
Te-125m	1.5E−02	1.5E+01	1.5E+04
Te-127	2.9E+00	2.9E+03	2.9E+06
Te-127m	7.3E−03	7.3E+00	7.3E+03
Te-129	6.5E+00	6.5E+03	6.5E+06
Te-129m	6.1E−03	6.1E+00	6.1E+03
Te-131	9.4E−01	9.4E+02	9.4E+05
Te-131m	1.8E−02	1.8E+01	1.8E+04
Te-132	6.2E−03	6.2E+00	6.2E+03
Te-133	1.2E+00	1.2E+03	1.2E+06
Te-133m	2.9E−01	2.9E+02	2.9E+05
Te-134	4.4E−01	4.4E+02	4.4E+05
Th-226	3.0E−02	3.0E+01	3.0E+04
Th-227	6.4E−05	6.4E−02	6.4E+01
Th-228	2.9E−06	2.9E−03	2.9E+00
Th-229	4.9E−07	4.9E−04	4.9E−01
Th-230	3.2E−06	3.2E−03	3.2E+00
Th-231	8.4E−01	8.4E+02	8.4E+05
Th-232	6.0E−07	6.0E−04	6.0E−01
Th-234	2.0E−02	2.0E+01	2.0E+04
Ti-44	5.2E−06	5.2E−03	5.2E+00
Ti-45	4.0E−01	4.0E+02	4.0E+05
Tl-200	4.4E−02	4.4E+01	4.4E+04
Tl-201	1.8E−01	1.8E+02	1.8E+05
Tl-202	1.0E−02	1.0E+01	1.0E+04
Tl-204	2.5E−02	2.5E+01	2.5E+04
Tm-170	2.4E−02	2.4E+01	2.4E+04
Tm-171	5.9E−02	5.9E+01	5.9E+04
U-230	5.0E−05	5.0E−02	5.0E+01

TABLE 1.—ANNUAL POSSESSION QUANTITIES FOR ENVIRONMENTAL COMPLIANCE—Continued

[Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
U-231	1.4E−01	1.4E+02	1.4E+05
U-232	1.3E−06	1.3E−03	1.3E+00
U-233	7.6E−06	7.6E−03	7.6E+00
U-234	7.6E−06	7.6E−03	7.6E+00
U-235	7.0E−06	7.0E−03	7.0E+00
U-236	8.4E−06	8.4E−03	8.4E+00
U-237	4.7E−02	4.7E+01	4.7E+04
U-238	8.6E−06	8.6E−03	8.6E+00
U-239	8.3E+00	8.3E+03	8.3E+06
U-240	1.8E−01	1.8E+02	1.8E+05
V-48	1.4E−03	1.4E+00	1.4E+03
V-49	1.3E+00	1.3E+03	1.3E+06
W-181	1.1E−02	1.1E+01	1.1E+04
W-185	1.6E−01	1.6E+02	1.6E+05
W-187	1.1E−01	1.1E+02	1.1E+05
W-188	1.0E−02	1.0E+01	1.0E+04
Xe-122	7.6E−02	7.6E+01	7.6E+04
Xe-123	1.6E+00	1.6E+03	1.6E+06
Xe-125	6.0E−01		
Xe-127	7.0E+00		
Xe-129m	7.6E+01		
Xe-131m	2.2E+02		
Xe-133	5.2E+01		
Xe-133m	6.0E+01		
Xe-135	7.6E+00		
Xe-135m	4.2E+00		
Xe-138	9.9E−01		
Y-86	2.8E−02	2.8E+01	2.8E+04
Y-87	2.3E−02	2.3E+01	2.3E+04
Y-88	2.5E−04	2.5E−01	2.5E+02
Y-90	1.1E−01	1.1E+02	1.1E+05
Y-90m	4.3E−01	4.3E+02	4.3E+05
Y-91	1.8E−02	1.8E+01	1.8E+04
Y-91m	1.6E+00	1.6E+03	1.6E+06
Y-92	7.0E−01	7.0E+02	7.0E+05
Y-93	3.8E−01	3.8E+02	3.8E+05
Yb-169	5.5E−03	5.5E+00	5.5E+03
Yb-175	2.1E−01	2.1E+02	2.1E+05
Zn-62	8.6E−02	8.6E+01	8.6E+04
Zn-65	4.4E−04	4.4E−01	4.4E+02
Zn-69	2.7E+01	2.7E+04	2.7E+07
Zn-69m	2.0E−01	2.0E+02	2.0E+05
Zr-86	2.4E−02	2.4E+01	2.4E+04
Zr-88	2.7E−04	2.7E−01	2.7E+02
Zr-89	1.6E−02	1.6E+01	1.6E+04
Zr-93	2.8E−03	2.8E+00	2.8E+03
Zr-95	6.4E−04	6.4E−01	6.4E+02
Zr-97	4.6E−02	4.6E+01	4.6E+04

*Radionuclides boiling at 100 °C or less, or exposed to a temperature of 100 °C, must be considered a gas. Capsules containing radionuclides in liquid or powder form can be considered to be solids.

**Mo-99 contained in a generator to produce Technetium-99 can be assumed to be a solid.

3. Table of Concentration Levels

(a) Table 2 may be used for determining if facilities are in compliance with the standard.

1. The concentration table as applied to emission estimates can only be used if all releases are from point sources and concentrations have been measured at the stack or vent using EPA-approved methods, and the distance between each stack or vent and the nearest resident is greater than 3 times the diameter of the stack or vent. Procedures provided in Ref. (1) shall be used to determine compliance or exemption from reporting by use of Table 2.

2. The concentration table may be used to determine compliance with the standard based on environmental measurements provided these measurements are made in conformance with the requirements of § 61.107(b)(5).

4. NCRP Screening Model

The procedures described in Reference (4) may be used to determine doses to members of the general public from emissions of radionuclides to the atmosphere. Both the total dose from all radionuclides emitted, and the dose caused by radioactive iodine must be considered in accordance with the procedures in Ref. (1).

5. The COMPLY Computer Code

The COMPLY computer code may be used to determine compliance with subpart I. The compliance model in the COMPLY computer code may be used to determine the dose to members of the general public from emissions of radionuclides to the atmosphere. The EPA may add radionuclides to all or any part of COMPLY to cover radionuclides that may be used by the regulated community.

TABLE 2.—CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE

Radionuclide	Concentration (Ci/m³)	Radionuclide	Concentration (Ci/m³)
Ac-225	9.1E−14	Bi-207	1.0E−14
Ac-227	1.6E−16	Bi-210	2.9E−13
Ac-228	3.7E−12	Bi-212	5.6E−11
Ag-106	1.9E−09	Bi-213	7.1E−11
Ag-106m	1.2E−12	Bi-214	1.4E−10
Ag-108m	7.1E−15	Bk-249	5.6E−13
Ag-110m	9.1E−14	Bk-250	9.1E−11
Ag-111	2.5E−12	Br-77	4.2E−11
Al-26	4.8E−15	Br-80	1.4E−08
Am-241	1.9E−15	Br-80m	1.8E−09
Am-242	1.5E−11	Br-82	1.2E−11
Am-242m	2.0E−15	Br-83	1.2E−08
Am-243	1.8E−15	Br-84	6.7E−10
Am-244	4.0E−11	C-11	1.5E−08
Am-245	6.3E−09	C-14	1.0E−11
Am-246	1.2E−09	Ca-41	4.2E−13
Ar-37	1.6E−03	Ca-45	1.3E−12
Ar-41	1.7E−09	Ca-47	2.4E−12
As-72	2.4E−11	Cd-109	5.9E−13
As-73	1.1E−11	Cd-113	9.1E−15
As-74	2.2E−12	Cd-113m	1.7E−14
As-76	5.0E−11	Cd-115	1.6E−11
As-77	1.6E−10	Cd-115m	6.3E−13
At-211	1.1E−11	Cd-117	6.7E−11
Au-193	3.8E−10	Cd-117m	1.6E−10
Au-194	3.2E−11	Ce-139	2.6E−12
Au-195	3.1E−12	Ce-141	6.3E−12
Au-198	2.1E−11	Ce-143	3.0E−11
Au-199	4.8E−11	Ce-144	6.2E−13
Ba-131	7.1E−12	Cf-248	1.8E−14
Ba-133	5.9E−14	Cf-249	1.4E−15
Ba-133m	5.9E−11	Cf-250	3.2E−15
Ba-135m	1.8E−10	Cf-251	1.4E−15
Ba-139	5.6E−09	Cf-252	5.6E−15
Ba-140	1.3E−12	Cf-253	3.1E−13
Ba-141	1.4E−09	Cf-254	3.0E−15

TABLE 2.—CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE—Continued

Radionuclide	Concentration (Ci/m³)	Radionuclide	Concentration (Ci/m³)
Ba-142	1.3E−09	Cl-36	2.7E−15
Be-7	2.3E−11	Cl-38	7.7E−10
Be-10	1.6E−12	Cm-242	5.3E−14
Bi-206	2.3E−12	Cm-243	2.6E−15
Cm-244	3.3E−15	Eu-156	1.9E−12
Cm-245	1.8E−15	F-18	6.7E−10
Cm-246	1.9E−15	Fe-52	5.6E−11
Cm-247	1.9E−15	Fe-55	9.1E−12
Cm-248	5.0E−16	Fe-59	6.7E−13
Cm-249	3.7E−09	Fm-254	2.0E−11
Cm-250	9.1E−17	Fm-255	4.3E−12
Co-56	1.8E−13	Fr-223	3.3E−11
Co-57	1.3E−12	Ga-66	6.2E−11
Co-58	6.7E−13	Ga-67	7.1E−11
Co-58m	1.2E−10	Ga-68	9.1E−10
Co-60	1.7E−14	Ga-72	3.8E−11
Co-60m	4.3E−09	Gd-152	5.0E−15
Co-61	4.5E−09	Gd-153	2.1E−12
Cr-49	1.1E−09	Gd-159	2.9E−10
Cr-51	3.1E−11	Ge-68	2.0E−13
Cs-129	1.4E−10	Ge-71	2.4E−10
Cs-131	3.3E−11	Ge-77	1.0E−10
Cs-132	4.8E−12	H-3	1.5E−09
Cs-134	2.7E−14	Hf-181	1.9E−12
Cs-134m	1.7E−10	Hg-193m	1.0E−10
Cs-135	4.0E−13	Hg-197	8.3E−11
Cs-136	5.3E−13	Hg-197m	1.1E−10
Cs-137	1.9E−14	Hg-203	1.0E−12
Cs-138	5.3E−10	Ho-166	7.1E−11
Cu-61	4.8E−10	Ho-166m	7.1E−15
Cu-64	5.3E−10	I-123	4.3E−10
Cu-67	5.0E−11	I-124	6.2E−13
Dy-157	5.0E−10	I-125	1.2E−13
Dy-165	6.7E−09	I-126	1.1E−13
Dy-166	1.1E−11	I-128	1.1E−08
Er-169	2.9E−11	I-129	9.1E−15
Er-171	4.0E−10	I-130	4.5E−11
Es-253	2.4E−13	I-131	2.1E−13
Es-254	2.0E−14	I-132	2.3E−10
Es-254m	1.8E−12	I-133	2.0E−11
Eu-152	2.0E−14	I-134	3.8E−10
Eu-152m	3.6E−10	I-135	1.2E−10
Eu-154	2.3E−14	In-111	3.6E−11
Eu-155	5.9E−13	In-113m	2.5E−09
In-114m	9.1E−13	Nb-95	2.2E−12
In-115	7.1E−14	Nb-95m	1.4E−11
In-115m	1.6E−09	Nb-96	2.4E−11
In-116m	4.2E−10	Nb-97	1.2E−09
In-117	1.6E−09	Nd-147	7.7E−12
In-117m	9.1E−11	Nd-149	7.1E−10
Ir-190	2.6E−12	Ni-56	1.7E−12
Ir-192	9.1E−13	Ni-57	1.8E−11
Ir-194	1.1E−10	Ni-59	1.5E−11
Ir-194m	1.7E−13	Ni-63	1.4E−11
K-40	2.7E−14	Ni-65	8.3E−10
K-42	2.6E−10	Np-235	2.5E−11
K-43	6.2E−11	Np-237	1.2E−15
K-44	5.9E−10	Np-238	1.4E−11
Kr-79	6.3E−09	Np-239	3.8E−11
Kr-81	2.1E−07	Np-240	7.7E−10
Kr-83m	2.3E−05	Np-240m	5.6E−09
Kr-85	1.0E−08	Os-185	1.0E−12
Kr-85m	1.3E−08	Os-191m	2.9E−10

TABLE 2.—CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE—Continued

Radionuclide	Concentration (Ci/m³)	Radionuclide	Concentration (Ci/m³)
Kr-87	2.4E−09	Os-191	1.1E−11
Kr-88	5.0E−10	Os-193	9.1E−11
La-140	1.2E−11	P-32	3.3E−13
La-141	7.7E−10	P-33	2.4E−12
La-142	2.7E−10	Pa-230	3.2E−13
Lu-177	2.4E−11	Pa-231	5.9E−16
Lu-177m	3.6E−13	Pa-233	4.8E−12
Mg-28	1.5E−11	Pa-234	1.1E−10
Mn-52	2.8E−12	Pb-203	6.2E−11
Mn-52m	6.2E−10	Pb-205	5.6E−12
Mn-53	1.5E−11	Pb-209	1.3E−08
Mn-54	2.8E−13	Pb-210	2.8E−15
Mn-56	2.9E−10	Pb-211	1.4E−10
Mo-93	1.1E−12	Pb-212	6.3E−12
Mo-99	1.4E−11	Pb-214	1.2E−10
Mo-101	1.0E−09	Pd-103	3.8E−11
Na-22	2.6E−14	Pd-107	3.1E−11
Na-24	2.6E−11	Pd-109	4.8E−10
Nb-90	2.6E−11	Pm-143	9.1E−13
Nb-93m	1.0E−11	Pm-144	1.3E−13
Nb-94	7.1E−15	Pm-145	6.2E−13
Pm-146	5.3E−14	Re-184m	3.7E−13
Pm-147	1.1E−11	Re-186	1.8E−11
Pm-148	5.0E−12	Re-187	2.6E−10
Pm-148m	6.7E−13	Re-188	1.7E−10
Pm-149	4.2E−11	Rh-103m	2.1E−07
Pm-151	7.1E−11	Rh-105	1.3E−10
Po-210	7.1E−15	Ru-97	6.7E−11
Pr-142	1.1E−10	Ru-103	2.6E−12
Pr-143	7.1E−12	Ru-105	2.8E−10
Pr-144	1.8E−08	Ru-106	3.4E−13
Pt-191	4.3E−11	S-35	1.3E−12
Pt-193	1.8E−11	Sb-117	2.4E−09
Pt-193m	4.8E−11	Sb-122	1.4E−11
Pt-195m	3.2E−11	Sb-124	5.3E−13
Pt-197	4.0E−10	Sb-125	1.6E−13
Pt-197m	2.6E−09	Sb-126	1.4E−12
Pu-236	5.9E−15	Sb-126m	9.1E−10
Pu-237	1.9E−11	Sb-127	7.1E−12
Pu-238	2.1E−15	Sb-129	7.7E−11
Pu-239	2.0E−15	Sc-44	1.7E−10
Pu-240	2.0E−15	Sc-46	4.2E−13
Pu-241	1.0E−13	Sc-47	3.6E−11
Pu-242	2.0E−15	Sc-48	9.1E−12
Pu-243	4.2E−09	Sc-49	1.2E−08
Pu-244	2.0E−15	Se-73	1.7E−10
Pu-245	2.1E−10	Se-75	1.7E−13
Pu-246	2.2E−12	Se-79	1.1E−13
Ra-223	4.2E−14	Si-31	5.6E−09
Ra-224	1.5E−13	Si-32	3.4E−14
Ra-225	5.0E−14	Sm-147	1.4E−14
Ra-226	3.3E−15	Sm-151	2.1E−11
Ra-228	5.9E−15	Sm-153	5.9E−11
Rb-81	5.0E−10	Sn-113	1.4E−12
Rb-83	3.4E−13	Sn-117m	5.6E−12
Rb-84	3.6E−13	Sn-119m	5.3E−12
Rb-86	5.6E−13	Sn-123	1.1E−12
Rb-87	1.6E−13	Sn-125	1.7E−12
Rb-88	2.1E−09	Sn-126	5.3E−15
Rb-89	7.1E−10	Sr-82	6.2E−13
Re-184	1.5E−12	Sr-85	1.8E−12
Sr-85m	1.8E−09	Th-232	6.2E−16
Sr-87m	1.4E−09	Th-234	2.2E−12
Sr-89	1.8E−12	Ti-44	6.2E−15

TABLE 2.—CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE—Continued

Radionuclide	Concentration (Ci/m³)	Radionuclide	Concentration (Ci/m³)
Sr-90	1.9E−14	Ti-45	4.8E−10
Sr-91	9.1E−11	Tl-200	4.5E−11
Sr-92	2.9E−10	Tl-201	1.0E−10
Ta-182	4.5E−13	Tl-202	5.0E−12
Tb-157	2.5E−12	Tl-204	1.2E−12
Tb-160	7.7E−13	Tm-170	3.3E−12
Tc-95	1.0E−10	Tm-171	2.6E−11
Tc-95m	1.4E−12	U-230	1.5E−14
Tc-96	5.6E−12	U-231	4.2E−11
Tc-96m	6.7E−10	U-232	1.3E−15
Tc-97	7.1E−13	U-233	7.1E−15
Tc-97m	7.1E−12	U-234	7.7E−15
Tc-98	6.7E−15	U-235	7.1E−15
Tc-99	1.4E−13	U-236	7.7E−15
Tc-99m	1.7E−09	U-237	1.0E−11
Tc-101	4.5E−09	U-238	8.3E−15
Te-121	1.0E−12	U-239	4.3E−09
Te-121m.	1.2E−13	U-240	1.3E−10
Te-123	1.4E−13	V-48	1.0E−12
Te-123m.	2.0E−13	V-49	1.6E−10
Te-125m.	3.6E−13	W-181	6.7E−12
Te-127	1.0E−09	W-185	2.6E−12
Te-127m.	1.5E−13	W-187	7.7E−11
Te-129	7.7E−09	W-188	5.3E−13
Te-129m.	1.4E−13	Xe-122	9.1E−11

TABLE 2.—CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE—Continued

Radionuclide	Concentration (Ci/m³)	Radionuclide	Concentration (Ci/m³)
Te-131	9.1E−11	Xe-123	1.6E−09
Te-131m.	1.0E−12	Xe-125	1.1E−11
Te-132	7.1E−13	Xe-127	8.3E−09
Te-133	9.1E−10	Xe-129m.	9.1E−08
Te-133m.	2.2E−10	Xe-131m.	2.6E−07
Te-134	5.3E−10	Xe-133	6.2E−08
Th-226	3.4E−11	Xe-133m.	7.1E−08
Th-227	3.8E−14	Xe-135	9.1E−09
Th-228	3.1E−15	Xe-135m.	5.0E−09
Th-229	5.3E−16	Xe-138	1.2E−09
Th-230	3.4E−15	Y-86	3.0E−11
Th-231	2.9E−10	Y-87	1.7E−11
Y-88	2.7E−13	Zn-65	9.1E−14
Y-90	1.3E−11	Zn-69	3.2E−08
Y-90m	1.9E−10	Zn-69m	1.7E−10
Y-91	2.1E−12	Zr-86	2.4E−11
Y-91m	1.3E−09	Zr-88	3.1E−13
Y-92	8.3E−10	Zr-89	1.3E−11
Y-93	2.9E−10	Zr-93	2.6E−12
Yb-169	3.7E−12	Zr-95	6.7E−13
Yb-175	4.3E−11	Zr-97	3.8E−11
Zn-62	9.1E−11		

6. References

(1) Environmental Protection Agency, "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclides Emissions from NRC-Licensed and Non-DOE Federal Facilities", EPA 520/1–89–002, October 1989.

(2) Environmental Protection Agency, "User's Guide for the COMPLY Code", EPA 520/1–89–003, October 1989.

(3) Environmental Protection Agency, "Background Information Document: Procedures Approved for Demonstrating Compliance with 40 CFR part 61, subpart I", EPA 520/1–89–001, January 1989.

(4) National Council on Radiation Protection and Measurement, "Screening Techniques for Determining Compliance with Environmental Standards" NCRP Commentary No. 3, Revision of January 1989 with addendum of October, 1989.

[FR Doc. 89–26330 Filed 12–11–89; 11:12 am]

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EPA-2632

Reid Rosnick/DC/USEPA/US
01/20/2011 11:51 AM

To Tom Peake
cc
bcc
Subject Fw: NEI Nuclear Fuel Supply Forum - January 26, 2010

FYI

Reid J. Rosnick
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rosnick.reid@epa.gov

----- Forwarded by Reid Rosnick/DC/USEPA/US on 01/20/2011 11:51 AM -----

From: "PHELPS, Suzanne" <srp@nei.org>
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 01/19/2011 12:23 PM
Subject: NEI Nuclear Fuel Supply Forum - January 26, 2010

Reid,

To follow up on our conversations from back in December, I have attached the preliminary program for our Nuclear Fuel Supply Forum that will be held January 26. As you will see, we have scheduled your remarks for about 2:30 p.m. I have listed the title of "EPA Regulatory Initiatives" as a placeholder. If you have a preferred topic listing, just let me know. Also, I have attached a speaker registration form that you should fill out and return so we have your information listed correctly.

If you are going to use any PowerPoint slides, please try to get a copy to me by COB on January 25, along with a short bio that the session chairman can use to introduce you.

We are looking forward to hearing from you. Please let me know if you have any questions.

Suzanne R. Phelps
Senior Project Manager, Fuel Supply

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 Prelim Agenda 13Jan11.doc FS11 January Comp Speaker Reg Form.pdf

Complimentary Speaker
Register online at
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Nuclear Fuel Supply Forum

W
Washington, D.C.
January 26, 2011

☐ Dr. ☐ Mr. ☐ Ms.

Name ____________________ Badge Name (Nickname) ____________________

Organization ____________________ Plant Name (if applicable) ____________________ Title ____________________

Mailing Address ____________________ City/State/Zip Code/Country ____________________

Phone Number ____________________ Fax ____________________

E-mail Address ____________________

Attendee Events
Wednesday, January 26
Reception 4–5:30 p.m.
Will Attend ☐

Guest Event (ages 12 and up)
Wednesday, January 26
Reception 4–5:30 p.m.
Guest Names: ____________________
Will Attend ☐

Registration Fee

☐ Complimentary

Guest Registration Fee (guest of attendee only)
☐ Wednesday Reception $65 (ages 12 and up)

Total of All Expenses $______________

Send ***registration form*** *to:*
Linda Wells
Phone: 202.739.8039 / Fax: 202.833.2282
E-mail: registrar@nei.org

Please indicate any special needs:

Please ensure your registration is received by January 19, 2011. Registrations received after that date will not be placed on the conference participants list.

A $75 cancellation fee will be applied to all refund requests on or before January 3, 2011. Unfortunately, refunds cannot be provided for cancellations received after January 3; however, we would be pleased to accept a substitute.

NEI
NUCLEAR ENERGY INSTITUTE

Preliminary
Agenda
1/18/11

Nuclear Fuel Supply Forum

W Hotel
Washington, D.C.
January 26, 2011

Registration and
Continental Breakfast
Great Room Foyer
9:00 – 9:30 a.m.

General Session
Great Room
9:30 a.m.–3:30 p.m.

9:30 a.m.–12:30 p.m.
Welcome and Morning Session Chair
Kenny Church
Manager, Nuclear Fuel Supply
Duke Energy Corporation

DOE Nuclear Programs
R. Shane Johnson
Chief Operating Officer for Nuclear Energy
U.S. Department of Energy

Outlook for 112th Congress
Alex Flint
Senior Vice President, Governmental Affairs
Nuclear Energy Institute

Chinese Resource Strategies – Implications for the West
Dr. Theodore Moran
Professor, School of Foreign Service
Georgetown University

A Commissioner's View on Fuel Facility Regulation
William D. Magwood
Commissioner
U.S. Nuclear Regulatory Commission

Legislation to Support US Industry
The Honorable John Barrasso (WY)
U.S. Senate

Lunch
Altitude Room
12:30–1:30 p.m.

1:30 – 3:30 p.m.
Afternoon Session Chair
Paul Goranson
President
Cameco Resources

A Congressional Outlook on Nuclear Energy
The Honorable Brian Bilbray (CA-50th)
U.S. House of Representatives

Nuclear Energy Financial Outlook
Richard Myers
Vice President, Policy Development
Nuclear Energy Institute

EPA Regulatory Initiatives
Reid Rosnick
Radiation Protection Division
U.S. Environmental Protection Agency

Virginia Uranium Study Update
Patrick Wales
Project Manager
Virginia Uranium, Inc.

Summary and Adjournment
Paul Goranson
President
Cameco Resources

Reception
Altitude Room
4–5:30 p.m.

EPA-2515

Reid Rosnick/DC/USEPA/US

01/20/2011 11:52 AM

To Tom Peake

cc

bcc

Subject Presentation

NEI Reg Update Jan 2011_2.pptx

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U.S. EPA RADIATION REGULATIONS UPDATE

Reid J. Rosnick
Radiation Protection Division
NEI Nuclear Fuel Supply Forum Meeting
January 26, 2011

Purpose of Presentation & Outline

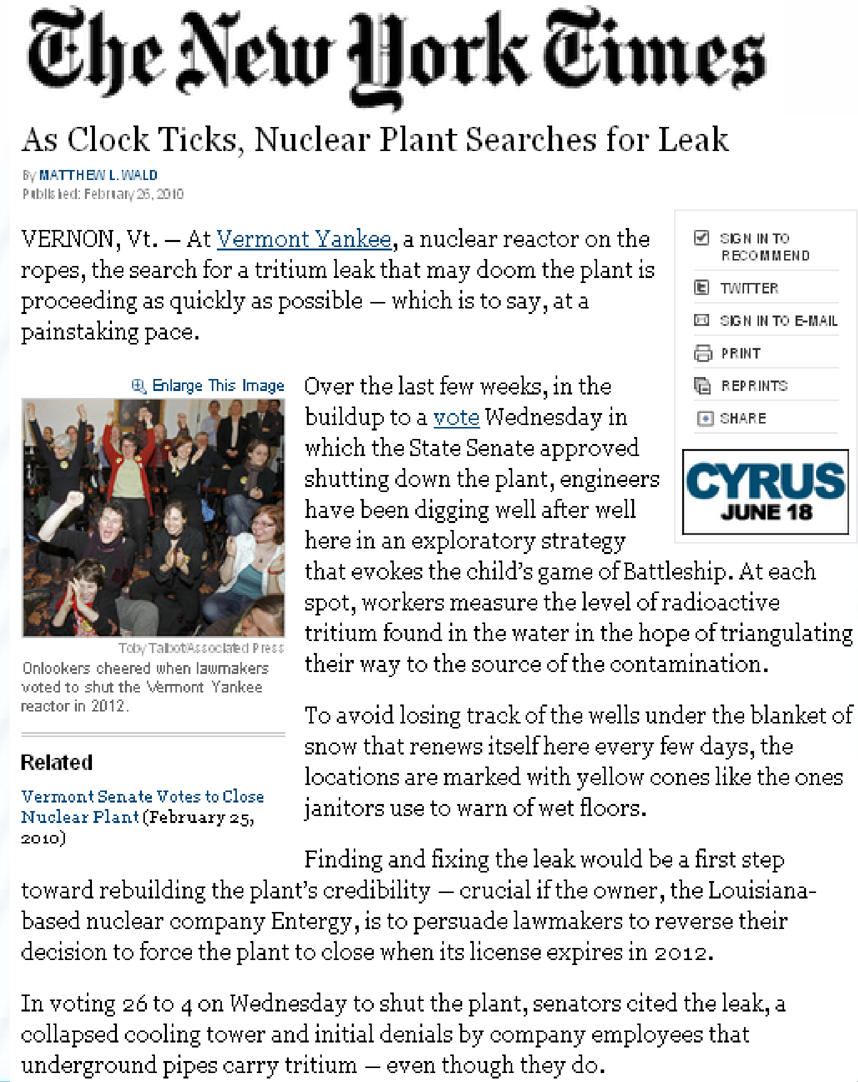
- Purpose: Provide background on radiation regulatory actions underway or under consideration
- 40 CFR 190 (radiation protection standards for nuclear power operations)
- 40 CFR 192 (issued under authority of Uranium Mill Tailings Radiation Control Act (UMTRCA))
- 40 CFR 61, Subpart W (radon emissions from uranium mill tailings under Clean Air Act)

History

- 40 CFR Part 190 establishes radiation protection standards for nuclear power operations (Jan 13, 1977)
- Applies to U milling, U conversion & enrichment, U fuel fabrication, nuclear power plants, & reprocessing facilities
- Specifies standards for U Fuel Cycle which include:
  - ✓ Public dose limit of 25/75/25 mrem/yr to whole body/thyroid/other organs
  - ✓ Annual limits on total quantities of radioactivity entering the environment for certain radionuclides per Gigawatt electricity produced
    - 50,000 curies Kr-85
    - 5 millicuries I-129
    - 0.5 millicuries combined of Pu 239 & other alpha emitters

Technical Considerations

- GW protection – Current standard does not have groundwater protection requirements
  - ✓ Recent experience has shown that the potential for groundwater contamination exists (Tritium leaks)
  - ✓ Rule did not anticipate GW problems and did not analyze them



The New York Times

As Clock Ticks, Nuclear Plant Searches for Leak

By MATTHEW L. WALD
Published: February 25, 2010

VERNON, Vt. — At Vermont Yankee, a nuclear reactor on the ropes, the search for a tritium leak that may doom the plant is proceeding as quickly as possible — which is to say, at a painstaking pace.

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Toby Talbot/Associated Press

Onlookers cheered when lawmakers voted to shut the Vermont Yankee reactor in 2012.

Related

Vermont Senate Votes to Close Nuclear Plant (February 25, 2010)

Over the last few weeks, in the buildup to a vote Wednesday in which the State Senate approved shutting down the plant, engineers have been digging well after well here in an exploratory strategy that evokes the child's game of Battleship. At each spot, workers measure the level of radioactive tritium found in the water in the hope of triangulating their way to the source of the contamination.

To avoid losing track of the wells under the blanket of snow that renews itself here every few days, the locations are marked with yellow cones like the ones janitors use to warn of wet floors.

Finding and fixing the leak would be a first step toward rebuilding the plant's credibility — crucial if the owner, the Louisiana-based nuclear company Entergy, is to persuade lawmakers to reverse their decision to force the plant to close when its license expires in 2012.

In voting 26 to 4 on Wednesday to shut the plant, senators cited the leak, a collapsed cooling tower and initial denials by company employees that underground pipes carry tritium — even though they do.

Dose Issues

- Before “effective dose,” there was “critical organ dose” (ICRP 2, 1959) and focus on radiation doses to whole body, thyroid, and any other organ
- Over time there have been changes in both the biokinetics and dosimetric models
- Updated radiation protection limits –ICRP Report #103 allows for standards to consider vulnerable sub-populations
  - ✓ Standards protective of children
  - ✓ Environmental justice concerns – Native Americans
- Radionuclide “caps” (release limits) were developed based on collective dose—Is it still appropriate?
  - ✓ Proving compliance is difficult if not impossible on facility basis (based on per Gigawatt of electricity)

Other Technology Considerations

Some new applications for nuclear energy were not considered and are not covered by existing standards

- Thorium based fuel cycles
- Non-electrical energy production
  - ✓ Hydrogen cell generation
- Long term “interim” storage of spent fuel
  - ✓ 50 – 100+ years of storage possible, instead of months as envisioned in regulation
  - ✓ At current & decommissioned reactor sites, potential centralized facility(ies)
  - ✓ Fuel cladding degrades over time, releasing gases

So, Why Consider This Now? Confluence of Technical and Policy Issues

- Growing concern over groundwater contamination at/around nuclear power plants
- Re-invigorated interest in advanced nuclear technologies
  - ✓ Nuclear power seen as a possibility in reducing greenhouse gases
  - ✓ Reprocessing of spent nuclear fuel gaining interest
- Opportunity to update dosimetry
- Realization that the current construct of the regulation creates problems with enforcement (not focused on individual facilities)

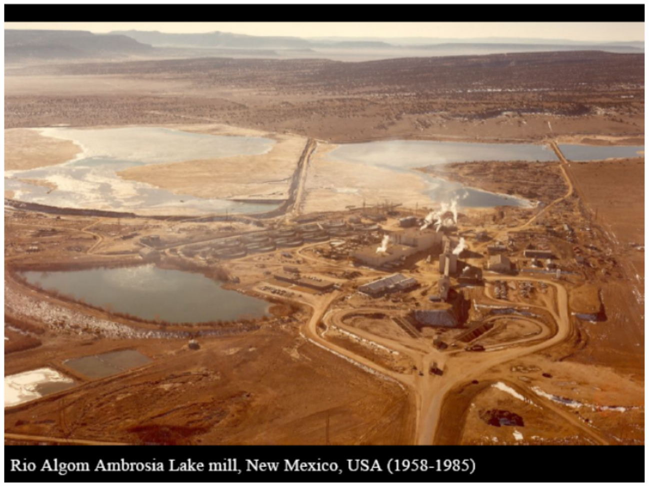
40 CFR 190 Summary

- We are currently considering whether a formal regulatory review of 40 CFR 190 is necessary
- If EPA proceeds with reviewing and revising this standard, the stakeholder review process would be an important factor in the Agency's decisions
- Would have multiple opportunities for input
  - Anticipate would do an ANPR
  - Anticipate we would have public meetings in several cities
  - Web

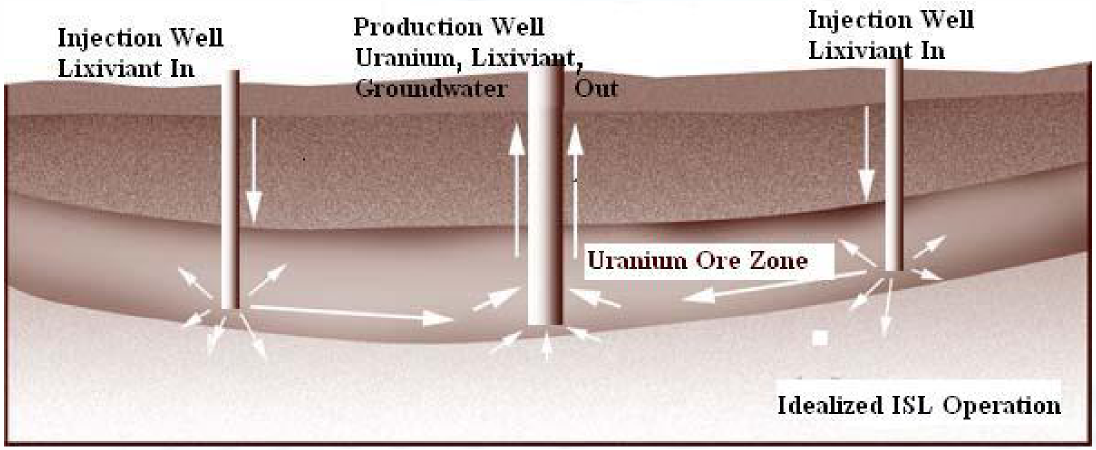
40 CFR 192: Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings

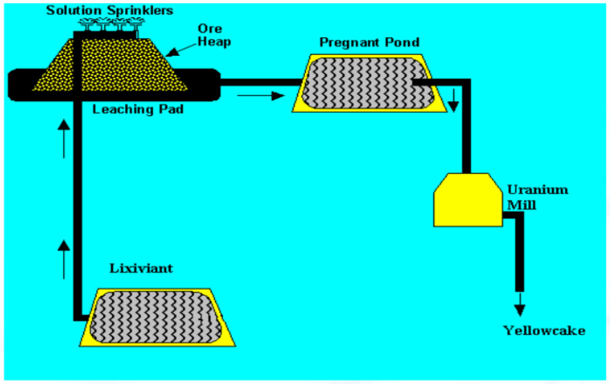
- Establishes standards for active and closed mill sites, including soil, bldg clean-up requirements
- Implemented for their oversight of uranium and thorium extraction facility licensing, operations, sites, and wastes by
  - ✓ U.S. Nuclear Regulatory Commission (NRC) and its Agreement States, and
  - ✓ U.S. Department of Energy (DOE)
- Applies to byproduct material from conventional mills, In Situ Leach/Recovery (ISL/ISR) facilities, and heap leach facilities, <u>but not conventional mines (open pit or underground)</u>
  - ✓ ISL/ISR considered to be “underground milling”

Background

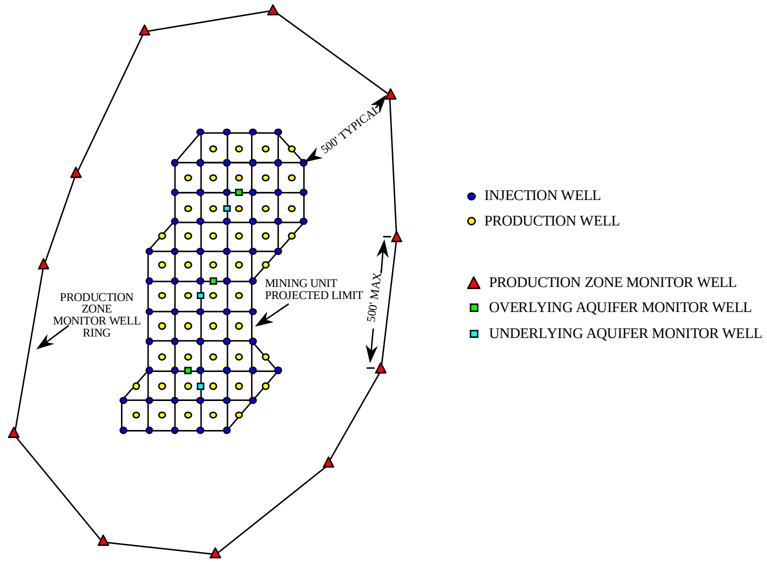


Conventional Surface mill





Heap leaching



Reason for Review and Update

- Over 25 years since originally finalized, ~15 years since last update for groundwater protection
- Lacks explicit provisions for In Situ Leach/Recovery (ISL/ISR), now principal means of uranium recovery in U.S., and for heap leach facilities
- Changes in EPA protective standards for hazardous substances in groundwater and drinking water
- Changes in economics of extraction & site remediation
- Changes in dose factors for radiation/radon, principal scenarios for exposure, free release of sites (ISL/ISR's) after decommissioning
- Potential for uranium extraction in new areas (e.g., VA, MI)

Status of 40 CFR 192 Efforts

- Regulation is under formal review

- Focus has been:
  - ✓ External -- Public information meetings
  - ✓ Internal -- Organization and technical review

40 CFR 61 Subpart W Summary

- Applies to radon emissions from operating uranium mill tailings
  - Radon emissions flux standard: 20 pCi/m^2-sec
- After 12/15/1989, new impoundments were required to meet one of two new work practices
  - ✓ Phased disposal – Impoundment size $\leq$ 40 acres
  - ✓ Continuous disposal – dewatered tailings with no more than 10 acres uncovered
  - ✓ Both must meet design, construction, ground-water monitoring standards at 40 CFR 192.32(a)
- Work practices were designed to achieve at least equivalent emissions reductions as obtained by the numerical standard

Review of Subpart W

- Review began after receiving Notice of Intent to Sue (NOI) by two Colorado environmental groups
  - ✓ Based on EPA's alleged failure to review & revise regulation within ten years after enactment of Clean Air Act Amendments of 1990 (11/15/2000)
  - ✓ Plaintiffs filed suit against EPA in October 2008
  - ✓ Settlement agreement reached November 2009

- EPA is currently reviewing with intent to revise Subpart W, projected proposal, late next year

Subpart W, continued

- In Situ Leach (ISL) extraction is becoming more commonplace and does not generate significant tailings, but wastes containing uranium byproduct material are placed in evaporation ponds/impoundments
- ISL, U mill, heap leach operations expected
- Regulatory Reviews
  - ✓ of the current standard
  - ✓ of the original EPA radon risk assessment

Subpart W, Scientific Data/Research

- Review and compile a list of existing & proposed U mill tailing facilities & the containment technologies being used, as well as proposed
- Compare & contrast those technologies with the engineering requirements of RCRA Subtitle C land disposal facilities, which are used as the design basis for existing uranium byproduct material impoundments
  - ✓ Review regulatory history of Rad-NESHAPS and Subpart W, Tailings impoundment technologies, and radon measurement method
  - ✓ Comparison of 1989 risk assessment with current risk assessment approaches (adequacy and appropriateness)

Status of 40 CFR Part 61, Subpart W

- Regulation is under formal review
- Focus has been:
  - External -- Public information meetings to address settlement agreement requirements
  - Internal -- Technical review

Thank You

EPA-2665

Reid Rosnick/DC/USEPA/US
01/20/2011 01:03 PM

To "PHELPS, Suzanne"
cc
bcc
Subject Re: NEI Nuclear Fuel Supply Forum - January 26, 2010

Hello Suzanne,

Per your request I have attached my presentation (your agenda title is fine), along with the completed registration form and a short bio.

NEI Reg Update Jan 2011_2.pptx   Rosnick Registration.pdf   Reid Rosnick bio information.docx

I assume you'll want me at the meeting at the beginning of the afternoon session. If there is anything else you need, please let me know. I look forward to meeting you.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

"PHELPS, Suzanne"   Reid, To follow up on our conversations from...   01/19/2011 12:23:54 PM

From: "PHELPS, Suzanne" <srp@nei.org>
To: Reid Rosnick/DC/USEPA/US@EPA
Date: 01/19/2011 12:23 PM
Subject: NEI Nuclear Fuel Supply Forum - January 26, 2010

Reid,

To follow up on our conversations from back in December, I have attached the preliminary program for our Nuclear Fuel Supply Forum that will be held January 26. As you will see, we have scheduled your remarks for about 2:30 p.m. I have listed the title of “EPA Regulatory Initiatives” as a placeholder. If you have a preferred topic listing, just let me know. Also, I have attached a speaker registration form that you should fill out and return so we have your information listed correctly.

If you are going to use any PowerPoint slides, please try to get a copy to me by COB on January 25, along with a short bio that the session chairman can use to introduce you.

We are looking forward to hearing from you. Please let me know if you have any questions.

Suzanne R. Phelps

Senior Project Manager, Fuel Supply

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Sent through outbound.mailwise.com[attachment "Prelim Agenda 13Jan11.doc" deleted by Reid Rosnick/DC/USEPA/US] [attachment "FS11 January Comp Speaker Reg Form.pdf" deleted by Reid Rosnick/DC/USEPA/US]

Complimentary Speaker
Register online at
www.nei.org

Nuclear Fuel Supply Forum

W
Washington, D.C.
January 26, 2011

☐ Dr. ☒ Mr. ☐ Ms.

Reid J. Rosnick — Reid

Name — Badge Name (Nickname)

U.S. EPA — Geologist

Organization — Plant Name (if applicable) — Title

1200 Pennsylvania Ave, NW (6608J) Washington, DC 20460

Mailing Address — City/State/Zip Code/Country

202-343-9563 — 202-343-2304

Phone Number — Fax

rosnick.reid@epa.gov.

E-mail Address

Attendee Events — Will Attend ☐
Wednesday, January 26
Reception 4–5:30 p.m.

Guest Event (ages 12 and up) — Will Attend ☐
Wednesday, January 26
Reception 4–5:30 p.m.
Guest Names:

Registration Fee

☒ Complimentary

Guest Registration Fee (guest of attendee only)
☐ Wednesday Reception $65 (ages 12 and up)

Total of All Expenses $ Ø

*Send **registration form** to:*
Linda Wells
Phone: 202.739.8039 / Fax: 202.833.2282
E-mail: registrar@nei.org

Please indicate any special needs:

Please ensure your registration is received by January 19, 2011. Registrations received after that date will not be placed on the conference participants list.

A $75 cancellation fee will be applied to all refund requests on or before January 3, 2011. Unfortunately, refunds cannot be provided for cancellations received after January 3; however, we would be pleased to accept a substitute.

NEI
NUCLEAR ENERGY INSTITUTE

Reid Rosnick is an Environmental Scientist for EPA’s Office of Air and Radiation, Radiation Protection Division. A trained hydrogeologist, he has over 25 years of experience in hazardous and radioactive waste management issues. He was a RCRA land disposal permit writer for the Maryland Department of the Environment before coming to EPA in the 1980s. At EPA he has worked on numerous ground-water contamination issues, as well as making contributions to the regulation of the Waste Isolation Pilot Plant, and most recently the radiation standards for the proposed Yucca Mountain repository. He is currently the lead for the review of the NESHAP radon standards for operating uranium mill tailings.

U.S. EPA RADIATION REGULATIONS UPDATE

Reid J. Rosnick

Radiation Protection Division

NEI Nuclear Fuel Supply Forum Meeting

January 26, 2011

Purpose of Presentation & Outline

- Purpose: Provide background on radiation regulatory actions underway or under consideration
- 40 CFR 190 (radiation protection standards for nuclear power operations)
- 40 CFR 192 (issued under authority of Uranium Mill Tailings Radiation Control Act (UMTRCA))
- 40 CFR 61, Subpart W (radon emissions from uranium mill tailings under Clean Air Act)

History

- 40 CFR Part 190 establishes radiation protection standards for nuclear power operations (Jan 13, 1977)
- Applies to U milling, U conversion & enrichment, U fuel fabrication, nuclear power plants, & reprocessing facilities
- Specifies standards for U Fuel Cycle which include:
  - ✓ Public dose limit of 25/75/25 mrem/yr to whole body/thyroid/other organs
  - ✓ Annual limits on total quantities of radioactivity entering the environment for certain radionuclides per Gigawatt electricity produced
    - 50,000 curies Kr-85
    - 5 millicuries I-129
    - 0.5 millicuries combined of Pu 239 & other alpha emitters

Technical Considerations

- GW protection – Current standard does not have groundwater protection requirements
  - ✓ Recent experience has shown that the potential for groundwater contamination exists (Tritium leaks)
  - ✓ Rule did not anticipate GW problems and did not analyze them

The New York Times

As Clock Ticks, Nuclear Plant Searches for Leak

By MATTHEW L. WALD
Published: February 26, 2010

VERNON, Vt. — At Vermont Yankee, a nuclear reactor on the ropes, the search for a tritium leak that may doom the plant is proceeding as quickly as possible — which is to say, at a painstaking pace.

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Enlarge This Image

Toby Talbot/Associated Press

Onlookers cheered when lawmakers voted to shut the Vermont Yankee reactor in 2012.

Related

Vermont Senate Votes to Close Nuclear Plant (February 25, 2010)

Over the last few weeks, in the buildup to a vote Wednesday in which the State Senate approved shutting down the plant, engineers have been digging well after well here in an exploratory strategy that evokes the child's game of Battleship. At each spot, workers measure the level of radioactive tritium found in the water in the hope of triangulating their way to the source of the contamination.

To avoid losing track of the wells under the blanket of snow that renews itself here every few days, the locations are marked with yellow cones like the ones janitors use to warn of wet floors.

Finding and fixing the leak would be a first step toward rebuilding the plant's credibility — crucial if the owner, the Louisiana-based nuclear company Entergy, is to persuade lawmakers to reverse their decision to force the plant to close when its license expires in 2012.

In voting 26 to 4 on Wednesday to shut the plant, senators cited the leak, a collapsed cooling tower and initial denials by company employees that underground pipes carry tritium — even though they do.

Dose Issues

- Before "effective dose," there was "critical organ dose" (ICRP 2, 1959) and focus on radiation doses to whole body, thyroid, and any other organ
- Over time there have been changes in both the biokinetics and dosimetric models
- Updated radiation protection limits –ICRP Report #103 allows for standards to consider vulnerable sub-populations
  - ✓ Standards protective of children
  - ✓ Environmental justice concerns – Native Americans
- Radionuclide "caps" (release limits) were developed based on collective dose—Is it still appropriate?
  - ✓ Proving compliance is difficult if not impossible on facility basis (based on per Gigawatt of electricity)

Other Technology Considerations

Some new applications for nuclear energy were not considered and are not covered by existing standards

- Thorium based fuel cycles
- Non-electrical energy production
  - ✓ Hydrogen cell generation
- Long term “interim” storage of spent fuel
  - ✓ 50 – 100+ years of storage possible, instead of months as envisioned in regulation
  - ✓ At current & decommissioned reactor sites, potential centralized facility(ies)
  - ✓ Fuel cladding degrades over time, releasing gases

So, Why Consider This Now? Confluence of Technical and Policy Issues

- Growing concern over groundwater contamination at/around nuclear power plants
- Re-invigorated interest in advanced nuclear technologies
  - Nuclear power seen as a possibility in reducing greenhouse gases
  - Reprocessing of spent nuclear fuel gaining interest
- Opportunity to update dosimetry
- Realization that the current construct of the regulation creates problems with enforcement (not focused on individual facilities)

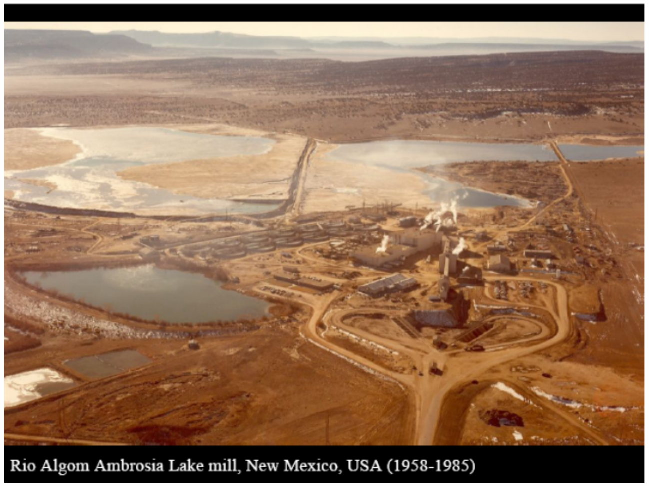
40 CFR 190 Summary

- We are currently considering whether a formal regulatory review of 40 CFR 190 is necessary
- If EPA proceeds with reviewing and revising this standard, the stakeholder review process would be an important factor in the Agency's decisions
- Would have multiple opportunities for input
  - Anticipate would do an ANPR
  - Anticipate we would have public meetings in several cities
  - Web

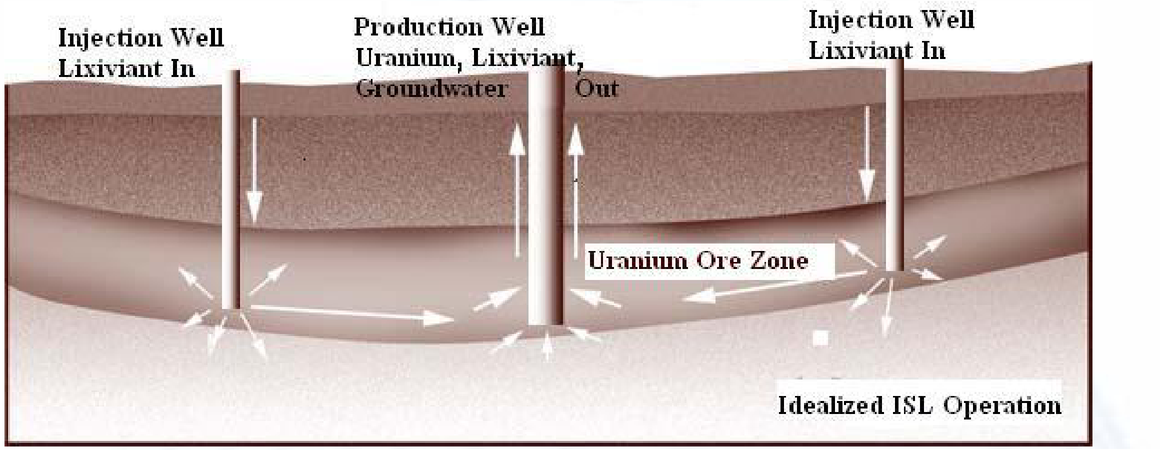
40 CFR 192: Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings

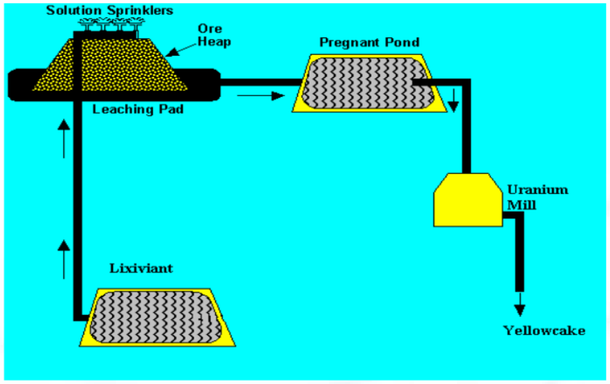
- Establishes standards for active and closed mill sites, including soil, bldg clean-up requirements
- Implemented for their oversight of uranium and thorium extraction facility licensing, operations, sites, and wastes by
  - ✓ U.S. Nuclear Regulatory Commission (NRC) and its Agreement States, and
  - ✓ U.S. Department of Energy (DOE)
- Applies to byproduct material from conventional mills, In Situ Leach/Recovery (ISL/ISR) facilities, and heap leach facilities, <u>but not conventional mines (open pit or underground)</u>
  - ✓ ISL/ISR considered to be "underground milling"

Background

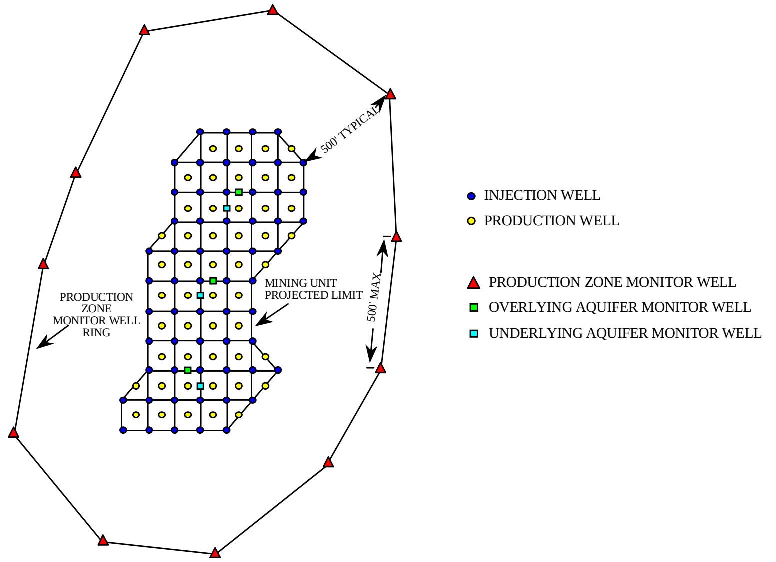


Conventional Surface mill





Heap leaching



Reason for Review and Update

- Over 25 years since originally finalized, ~15 years since last update for groundwater protection
- Lacks explicit provisions for In Situ Leach/Recovery (ISL/ISR), now principal means of uranium recovery in U.S., and for heap leach facilities
- Changes in EPA protective standards for hazardous substances in groundwater and drinking water
- Changes in economics of extraction & site remediation
- Changes in dose factors for radiation/radon, principal scenarios for exposure, free release of sites (ISL/ISR's) after decommissioning
- Potential for uranium extraction in new areas (e.g., VA, MI)

Status of 40 CFR 192 Efforts

- Regulation is under formal review
- Focus has been:
  - External -- Public information meetings
  - Internal -- Organization and technical review

40 CFR 61 Subpart W Summary

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  - ✓ Review regulatory history of Rad-NESHAPS and Subpart W, Tailings impoundment technologies, and radon measurement method
  - ✓ Comparison of 1989 risk assessment with current risk assessment approaches (adequacy and appropriateness)

Status of 40 CFR Part 61, Subpart W

- Regulation is under formal review
- Focus has been:
  - External -- Public information meetings to address settlement agreement requirements
  - Internal -- Technical review

Thank You

EPA-5599

Tony Nesky

To

cc

bcc

Subject UPLOAD C:\Users\ANesky\Desktop\June14search\CorpusReport-Draft.doc

- CorpusReport-Draft.doc

EPA Review of Standards for Uranium and Thorium Milling Facilities

PUBLIC INFORMATION MEETING
Corpus Christi, Texas
November 4, 2010

On November 4, 2010, EPA held two public information meetings in Corpus Christi, TX to provide an overview of the review of 40 CFR Part 192 and the revision of 40 CFR Part 61 (Subpart W) and to seek public input.

MEETING STRUCTURE

Two meetings were held for the convenience of the participants: one in the afternoon and one in the evening. Both meetings began with opening remarks and introductions. Loren Setlow and Tom Peake of EPA's Radiation Protection Division (RPD) opened each meeting by giving a presentation on the EPA's review of 40 CFR Part 192 and planned revision of 40 CFR Part 61 (Subpart W). The presentation was followed by a question and answer session. Participants were invited to submit their questions on an index card so that they could be read aloud for the benefit of all. After the question and answer session, the public was invited to provide input by signing up for five-minute presentations. In the remaining time, the floor was opened up for additional audience questions and input. George Brozowski of EPA Region 6 served as facilitator. Tony Nesky of the Radiation Protection Division took notes.

ATTENDANCE

Thirty-four people attended the afternoon session, with twenty-nine people signing-in. Twenty-four people attended the evening session; of those, nineteen had attended the afternoon session earlier in the day. In opening the afternoon session, facilitator George Brozowski asked participants about their affiliations. Seven people indicated affiliation with industry, two with non-governmental organizations, and two indicated that they were attending as private landowners. George also asked participants to indicate how far they had travelled to attend the meeting. A majority—twenty –five people—traveled between 20 and 50 miles to reach the meeting. Three persons had to travel more than 50 miles, and three people had to travel more than 100 miles. Appendix A lists registered participants in the afternoon session. Appendix B lists the registered participants in the evening session.

AFTERNOON SESSION

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations given in the afternoon session are summarized as follows—

Raul M. Ramirez
Brooks County, TX

Mr. Ramirez is the county judge from Brooks County, where there is double-digit unemployment. He considers Brooks County to be fortunate to have the uranium industry, which provides over 200 jobs whose dollars multiply seven times. He considers them good partners; they are supportive of the volunteer department in a rural area. Mr. Ramirez said that Brooks County does not want increased government regulations that will negatively impact the uranium industry.

Dick Messbarger
Kingsville Industrial Foundation, Kingsville, TX

Mr. Messbarger stated that he was representing the Kingsville Industrial Foundation, which is a non-profit private organization whose focus is on job retention and recruitment and expansion of the job base. The Industrial Foundation hired Texas A&I University to evaluate a proposed mine in the area. Texas A&I concluded that the process was safe, and even took party status in the hearing with the Texas Water Commission. The president of the university, the mayor, and the head of the King Ranch all went to Austin testify in favor of the mine.

The Industrial Foundation hired a firm for an economic impact analysis for the one operation in Kleberg County. The analysis was done in 2008 based on 2007 expenditures, and showed that URI salaries, royalties, and expenditures contributed about $30 million in a county with a population of 10,000 people. The industry has had a significant economic impact over a ten year timeframe. The taxes it generated have funded construction of a new school. The Industrial Foundation finds that the uranium industry has been a vital part of the South Texan economy, contributing jobs and expanding the tax base.

Mike Kezar
Chairman, Texas Mining and Reclamation Association, Austin, TX

Mr. Kezar represented the Texas Mining and Reclamation Association, a non-profit trade association. Texas has the eighth largest mining market in the country. The mining industry in Texas provides over 14,000 direct jobs and over 200,000 indirect jobs, contributing $30 billion to the state economy. A typical uranium mining operation provides 100 high-quality career jobs. TMRA asks for oversight that is consistent, and asks that EPA consider that the impact of additional regulations on short term and long term viability of uranium industry in Texas.

Harry Anthony
Uranium Energy Corporation, Corpus Christi, TX.

Mr. Anthony represented the headquarters location of Uranium Energy Corporation in Corpus Christi. Uranium Energy Company is a U.S. energy company with about 55 employees and a number of projects in South Texas. Mr. Anthony said that he has seen good changes in the industry over the last 35 years, with more stringent regulations from TCEQ, commenting "the industry has abided by those regulations over the years." . He noted that there has been technological improvement in the process, so that there are no ponds are no longer used, and concluded "… the industry has certainly addressed issues that have come up from Washington and also from Austin, while competing worldwide with other countries that have stable regulations."

Mr. Anthony presented a series of examples of successful land restoration of former uranium mining sites. He specifically referred to one site that had been reclaimed, "The well fields are for unrestricted use, and are used for cattle crazing." He showed photographs of another site saying "Today you would never know that anything was there."

Mr. Anthony concluded his presentation by saying "I don't think that the industry needs additional regulations to impede its growth. As you know, we import about 95 percent of our uranium from foreign sources. We consume about 55 to 60 million pounds per year, and produce about three million. We need to get this industry restarted and any additional, undue regulation is not conducive to getting it started."

Mark Peliza
URI, Inc., Lewisville, TX

Mr. Peliza stated that he has been in the ISR business for 33 years, most of them in Texas, commenting "We have more ISR in Texas than in other states combined. There is more to see here."

Mr. Peliza said that that he had worked with TCEQ and its predecessors for years and that sites have all been regulated well, "We don't have a lot of legacy operations and issues." He said "Almost all uranium mining sites have gone through a formal PA process, much like an EIS." There has been a public participation process much like an EIS. There are many "green books" that predicted how the sites would proceed.

He discussed site cleanup. “We have years and years of monitoring data. We have sites that are in stability modes. There are 26 operations and 86 areas, of which 70 have been approved for restoration.”

He concluded, “You need to look at the reports to see if there are holes in the regulations. If there are, they need to be fixed. If not, do not add regulations to burden the industry.”

Steve Brown
Senes Centennial, CO

Mr. Brown stated that he has been practicing health physics for 40 years and is certified by the Health Physics Board. He is a member of the Health Physics Society. Mr. Brown submitted extensive comments in writing, but wanted to address the adequacy of the radiological exposure criteria in the EPA and Texas rules. He addressed three questions—

1. Are the existing regulations adequate to protect public health?
2. What is known about the potential health effects to populations living near uranium recovery facilities?
3. What are the circumstances of the known health effects (i.e., lung cancer) among miners in the 1950s and 60s?

He noted that he lives in Colorado, so his background exposure is 400 millirem per year. In Texas the background is 300 millirem per year, and in coastal states, it is 150. The difference in background radiation between the coastal areas and Colorado is higher than the 25 millirem per year that EPA promulgated under 40 CFR 190.

Mr. Brown noted that the amount of the maximum amount of radon emissions allowed under the standard at 40 by 80 acre impoundment is “equivalent to the amount of radon emissions that the surface of the earth emits in a couple of miles of Texas farmland, everywhere in Texas and most other places” Mr. Brown also stated that there have been numerous studies of people living around uranium mines and mills in the United States, specifically in Montrose County, Colorado, Grants, New Mexico, and here in Karnes County, Texas. He cited the conclusion of a study from Vanderbilt University’s Ingram Cancer Center, “No unusual patterns of cancer mortality could be seen in Karnes County over a period of 50 years, suggesting that the uranium mining and milling operations had not increased cancer rates among residents.” He added, “We associated uranium with lung cancer because of earlier unregulated mines 50 years ago.”

Charlie Ragland
Alice, TX

Mr. Ragland represented himself as a landowner and expressed concern about the impacts of regulation on industry. “We are in a sparsely populated county. There is not any industry to speak of in Duval County, aside from the oil and gas and ranching business. If you change the rules and try to tighten them up, it will have a negative economic impact. The method of operations has changed, and the mine will be a positive flow of income to Duval County.”

Mark Walsh
STOP, Kleberg County, TX

Mr. Walsh said that he lives in Kleberg County and represents STOP—South Texas Opposes Pollution. STOP is a group of residents that live in and around the area where uranium mining takes place. Mr. Walsh noted that uranium mining has been going on since 1983, and that there had been an investigation in 1988 because a permit was issued after some citizens complained that there may be some health issues and some contamination of water.

Mr. Walsh said that the permit required water to be restored to its original pre-mining quality, but that many experts and even uranium miners have said, “No, it can’t be restored to its original quality.” STOP’s question is: “Why have a permit if technical experts say that pre-mine quality cannot be achieved?”

Mr. Walsh also raised another issue regarding restoration, mentioning that there was a five-year estimated plan to cleanup. He said that restoration had started in 1988, but we are only halfway to restoration. He said that only eight fields are restored, four were progress, and another seven have yet to begin restoration. Mr. Walsh asked what could be done to prevent delays in restoration for another 20 years. He also noted that permit amendments were issued frequently, and that in some situations, the amendments were still not able to restore the water back to its original quality.

Mr. Walsh also had questions about TCEQ’s participation. He said that STOP complained that restorations had to be completed before others could begin, and an administrative judge agreed, but TCEQ overturned it. He said that STOP often finds that the Commissioners of TCEQ have overruled staff and even an administrative judge, and” that is a concern for protecting water quality.” STOP requests that EPA conduct a complete review of uranium mining in Kleberg County, We are asking EPA for help to get this done.”

Katherine Armstrong
Austin, TX

Ms. Armstrong introduced herself as a former Chairman of Texas Parks and Wildlife, and as an expert on the concerns of private landowners concerns. She values regulatory oversight from EPA and TCEQ. She has studied the issues, and looks at uranium recovery as a resource and property right, commenting, “…most of the private landowners I know are comfortable with the level of regulations that are going on and with the information that they get from the EPA and Texas Commission on Environmental Quality.” She believes that ISR is a safe process.

She noted that when her family makes a business decision to use the minerals on property, it “will make it possible to steward our land, protect our wildlife, recover habitat and do all the amazing things that are done in Texas on private land to the benefit of all.” She continued, “There aren’t enough taxpayer dollars in the world to do the private land stewardship that goes on private lands in Texas today.” Ms. Armstrong said that she supported the good work that EPA does, but asked: “Just don’t go so far that you kill the ability of private landowners to recover and develop this natural resource.”

Mr. Lupe Canales
Jim Hogg County, TX

Mr. Carnales introduced himself as the County Judge from Jim Hogg County, which he described as a rural area that is "economically devastated." He continued: "If you take away uranium mining, you will kill Jim Hogg County. We lost 30 percent of oil and gas in last two years." Mr. Canales said that the uranium industry was all that it is left, and citizens have to go to neighboring Brooks County for work. Mr. Carnales brought four businesses in, the most important of which is an Alco, which he described as "a mini-Wall Mart." A Quiznos brought in 18 jobs and most recently a Subway brought in another 15 jobs, but according to Mr. Lupe, "this is not enough, and these are not high-paying jobs. We need the uranium industry to stay where it is and to provide jobs to Duval County and other counties like ours."

Mr. Ted Long
Goliad County, TX

Ted Long introduced himself as having been a Goliad County Commissioner for ten years and commented "Everything I have heard was rather disturbing. I want to ask everybody. Is there anybody is this room that drinks water? Anybody? Is there anybody who has kids that drink water? Grandkids? Is there anybody planning on having anybody that drinks water? Future generations?" Mr. Long said that he was concerned about the drinking water supply, and asked EPA not to relax the rules.

Venice Scheurich
Coastal Bend Sierra Club, Corpus Christi, TX

Ms. Scheurich said that she had come to the meeting to talk about the statistical methodology used in deriving estimates for restoration table standards for post-mining groundwater restoration. "Four years ago, when uranium companies intensified their interest in mining in several South Texas counties within our region, the Coastal Bend Sierra Club began studying the in-situ mining process. Now, I believe that some of the discoveries we made on statistical matters may have an important connection to whether EPA is able to properly administer its mandate regarding the Safe Drinking Water Act. And I believe this because the statistical documentation, which I will also leave attached to the comments, indicates that pre-mining baseline groundwater quality has been, and is being, incorrectly assessed by present state regulations here."

According to Ms. Scheurich, the Sierra Club study indicated that restoration efforts for groundwater almost always fail. The Sierra Club believes that it has found "an extremely serious" sampling design flaw in one of the first steps of the regulatory process, the results of which "are really severe, because the resulting flawed process of estimating groundwater has an direct impact on whether EPA will grant an aquifer exemption, therefore whether the spirit or intent of the Safe Water Drinking Act is being violated."

The Coastal Bend Sierra Club asked two questions—

1. "What is EPA's justification for continuing to accept estimates of pre-mining groundwater quality based on selected, biased samples when EPA makes decisions on whether or not to grant an aquifer exemption?"
2. "Does EPA's acceptance of flawed estimates of groundwater quality from a mining company's application for an aquifer exemption result in one or more violations of the Safe Water Drinking Act?"

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
Are the folks at the table here decision-makers?	George answered that the review was a joint effort with the EPA Regions. Loren elaborated that EPA has a workgroup with 30 members across the agency. The workgroup is developing an options document for the Assistant Administrator of the Air Division. The workgroup has to come to agreement to select an option for the Assistant Administrator. The EPA representatives at the meeting are the decision-makers because they are preparing the final document that goes to the Assistant Administrator, and will select the option to make changes, leave the rule as is, or make minor changes. If EPA goes forward with any changes, we would issue a draft rule in 2012 that would be subject to public comment. The EPA representatives here are the decision makers, but the authority resides with the Assistant Administrator.
How close is EPA to deciding whether to revise the rule?	Loren replied that there are a couple of months of review left, and that EPA is considering the input from the on-line discussion forum and public meetings.
If EPA begins updating rules, will this have an effect on the processing of aquifer exemptions under review?	Loren answered that the aquifer exemption process is independent of this rule, but offered to pass along information to the appropriate persons at EPA.
Have you found pre-mining water or ore that meet EPA's MCLs?	Loren answered that EPA has seen a number of things, but the review is not complete and it is too early to make any conclusions.

Have there been any monitoring results for radon flux that raise concerns about the safety of project employees and the public?	Loren answered that there have been a couple of results that were high, and that EPA has been in discussions with the industries involved.
Is EPA looking at radon from natural gas and farming?	George Brozowski told the audience that the Region makes test kits available. Aside from that, the Region is not looking at radon per se. George invited the questioner to elaborate.
The questioner continued—	
I came from industry. Natural gas averages 1,500 pCi/liter. Gas in my house varied from 140 to 160 pCi/liter. In the summer, because of the time it takes to get it to Denver, it dropped to about 35 pCi/liter. Why are you concerned with uranium when natural gas affects 11,000 times more people than the uranium industry?	George said he would refer the question to others in EPA. Loren added that there was a study in 1970s that determined a level at which a homeowner would have to take actions.
Could changes in 40 CFR 192 result in retrofitting of old UMTRCA tailings sites?	Loren answered that any changes could be applicable to facilities institutionally controlled by DOE, so EPA has to look at costs to the government as well as public protection.
Will cost versus risk be considered?	Loren replied that cost-benefit analysis is required by legislation. The EPA Radiation Protection Division has an economist on its staff, and appreciates comments on the economic aspects of this rule. He added that EPA has a website that explains the development of regulations from start to finish— http://www.epa.gov/lawsregs/brochure/developing.html He explained that the analytic blueprint is deliberative. If EPA decides to make any changes to the rule, it will share the analytic blueprint and supporting materials on its website.

I am interested in the NESHAP applications package for XXX in Colorado. There was a study to calculate fusion coefficients to generate water. The conclusion was that the coefficients were so low that the radon didn't come out of the water. It's on your website.

Tom Peake answered that Reid Rosnick of the EPA Radiation Protection Division is the flux from evaporation ponds under different conditions. He noted that EPA has not made a decision on either 40 CFR 192 or the NESHAP. The purpose of this meeting is to get input to help EPA in its decision-making.

EVENING SESSION

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations given in the evening are summarized as follows--

Ty Embry

Texas Mining and Reclamation Association (TMRA), Austin TX

Mr. Embry spoke on behalf of the owner-operators of the uranium committee of the Texas Mining and Reclamation Association (TMRA) uranium committee, and addressed the cost and benefits of the possible revision of 40 CFR Part 192 and Part 61 Subpart W. TMRA thinks it is important that EPA understands Texas state law and the amount of oversight of the uranium industry, particularly in light of recent state legislation. Under Senate Bill 1604, House Bill 3837 and House Bill 3838, Texas consolidated oversight under TCEQ and clarified oversight under the railroad commission, TCEQ and local authorities. There were lengthy extensive stakeholders input in the rulemaking process, both in the Railroad Commission and the TCEQ. In the railroad, it went from 2007 to 2010, and in TCEQ it went from 2007 to 2009, and there was extensive opportunity for stakeholder input. TMRA does not think that additional Federal regulations are needed because of the extent of existing regulatory oversight.

Rich Jacoby

Texas Radiation Advisory Board, TX

Mr. Jacoby said that it was his understanding that a lot of people participating in the afternoon session expressed the opinion that the existing rules were protective. He agrees that that they are. Since most of the mining is done by ISR, Mr. Jacoby does not believe that the standards at 40 CFR Part 192 are applicable, because the ISR method is so much safer in terms of effluents and releases from the site. Mr. Jacoby finds it difficult to shoehorn ISR under the existing 192 regulations, which he thinks are perfectly protective for conventional mining, and often overly protective for ISR. Mr. Jacoby would like to see the implementation of performance-based licenses.

Mr. Jacoby thinks that Texas' integration of groundwater and radiation protection is a system that works, and would hate to see it interrupted, commenting "We have a lot of data in Texas that I hope you will look at. We don't have a lot of radon emissions. We don't have a lot of ponds; people are moving toward the use of tanks."

Mr. Jacoby concluded by saying that the industry strives for regulatory certainty, asking EPA "Please don't make regulations that confuse ISR with mill tailings facilities."

Steve Brown

SENES, Centennial, CO

Mr. Brown is a practicing health physicist, who spoke to the radiological criteria of 40 CFR Part 192 and Subpart W. Mr. Brown presented the argument the current standards are already protective, stating "regulating to them does not really have any impact in controlling doses to the population of the United States." He suggested comparison of the rates in the regulations with natural background rates, saying "Our lifestyles, what we eat, where we choose to live, the things we do in our lives, have much greater impact on the radiation exposure of the American population." He continued, "I live in Colorado, my background exposure is about 450 millirem per year. The average U.S. population dose is about 310 millirem per year. In the coastal plains states, New Jersey, Virginia, Oregon, about 150 millirem per year, so the delta, depending on where one lives in the United States, can be about 200-300 millirem per year, and much of that is from radon relative to the 25 and 100 millirem standards."

Mr. Brown said that he had measured radon emissions from tailings ponds for years and found nothing. He concluded that regulations as they exist relative to the radiological criteria are protective, and reiterated his opinion that controlling to 25 or 100 millirem per year does not have a great impact on dose to the American population.

Sister Elizabeth Riebschlaeger

Cuero, TX

Sister Riebschlaeger began her remarks by thanking EPA for its presence here, saying "It represents to me a willingness to be accountable to citizens and to everyone involved in the decision-making process." When balancing the needs of business development and environment, Sister Riebschlaeger asked that rural communities be considered first. "The ranching industries and farming industries are primary to rural areas, especially in the area around Goliad." She expressed the concern that the experience of the Karnes City mine not be repeated. Sister Riebschlaeger asked the regulatory agencies to take a long-range view of the value of our environment as primary to any development in the future, because "public health is essential to any business development and to the workforce."

Mina Williams

Coastal Bend Sierra Club, Corpus Christi, TX

Ms. Williams said that she had heard that people can buy land over exempted aquifer areas and drink the groundwater. She commented "It's expensive to have the landowner bear the cost of having his or her own well tested in order to protect himself against the possibility of what

Venice spoke of today: inappropriate tests for establishing baseline. Thereafter we can never establish what baseline was after the area has been disturbed. And so this gets very complicated."

She asked for clarification about use of water from an exempted aquifer.

Loren Setlow answered—

"There is no method for revoking an exempted aquifer. EPA is considering a method for revocation."

Ms. Williams said that should a deed should indicate that a piece of property lies above an exempted aquifer and asked for clarification.

Loren Setlow responded—

"The aquifer exemption, when it applies, applies to the use of that prohibits the use of that aquifer for public drinking water. The fact that it is contaminated, and not suitable for a public supply does not exempt the individual who owns that property from using it as a drinking water supply, even if it is to their detriment. Now I cannot speak to the disclosure laws in the state of Texas."

Ms. Williams said that she would like to be told that a piece of property she was buying had an aquifer that had been condemned by EPA and was non-potable.

Loren Setlow responded—

"EPA Region 6 in this instance would pull those records from the office of groundwater and drinking water. I would also assume that the state keeps those records."

Susan Jablonski of TCEQ also responded that TCEQ considered revocation in the rulemaking, and changed requirements to include notification for surface and subsurface rights. The commission didn't pass the revocation rule, but wants to make this information more accessible."

Jeff Hill, an attorney, added—

"Your question is difficult to answer because there are at least two animals called aquifer exemption. One is the aquifer exemption, which is issued by TCEQ. The other is a petition to the US EPA for a Federal aquifer exemption which is a program amendment to the state program. They have slightly different standards and have slightly different processes for approval. The question needs to be addressed specifically to the location with which you are concerned. Denver, CO rules don't help you much in Texas."

Kerry Culpepper
Karnes County, TX

Ms. Culpepper stated that she lives in Karnes County about three football field from those uranium mines. She urged caution about regulation, and gave an example of children growing up near uranium mines in Karnes County. “These kids went out and all got in a tailing pile, because they put fish in there. They were fishing and they fell in. There’s nothing wrong with any of those children. They’re grown men, they’re doing great. So we can’t just get overboard with this stuff.”

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
Are the folks at the table here decision-makers?	George Brozowski replied that he was from the Regional office, and will be working with other Regional offices, notably Region 6 and Region 9, to come up with a final conclusion. Loren Setlow replied that he was working with our regional offices in Region 7 and Region 5 to develop an option paper for the Assistant Administrator of the Office of Air and Radiation. EPA is conducting the analysis to determine to revise the rule, make minor revisions, or leave it as is. If EPA decides to go through with a rule, draft language will be published and there will be the opportunity for public comment during public hearings.
Will the presentation be on the website?	The presentation and meeting notes will be posted on the website.
Who made the list of license applications?	Loren replied that the NRC made the list. Tom Peake added that NRC had approved the license of the Moore Ranch in Wyoming since the publication of the list.
Assuming limited government resources, how does EPA justify this rulemaking effort?	Loren replied that EPA has been conducting reviews with limited staff for a long time. The Uranium Mill Tailings Radiation Control Act (UMTRCA) specifically states that the EPA should review the rule and make revisions from time to time. EPA must take changes in science into account.
Isn’t there a greater bang for the buck to be had elsewhere in the EPA or the Federal Budget?	Loren replied that Agency evaluated possibilities for a number of analysis, and determined that it was worthwhile to undertake this review. “It is not a zero-sum game in terms of ranking these against others, although this is not going to have a ten or 100 million dollar impact, but it may have

QUESTION	EPA RESPONSE
	environmental impact if we do decide to change the rule." Loren reiterated that EPA is required to do a cost-benefit analysis of any revised rule."
Are constituents other than uranium—molybdenum, iron, arsenic— that are liberated in the ISR process, taken into account in an aquifer exemption granted by EPA?	Loren replied that he could not speak about what constituents are considered in the aquifer exemption process, but did note that the EPA Office of Water looks at the aquifer's potability, its mineral characteristics, and its total dissolved solids (TSS). The requirements for aquifer exemptions can be found in 40 CFR Part 144.
Who was on the Texas committee who wrote the regulations for the uranium mining? How many lobbyists were involved?	Loren replied that he could not speak to that question, as the purpose of the meeting was to discuss EPA's rules. Susan Jablonski of TCEQ replied that that TCEQ had an extensive stakeholder process when they developed the rule, and that some people in the room had participated in it. Ms. Jablonski said that it had been an open process.
What are the justifications for aquifer exemptions?	Loren replied that he didn't have the list with him, but that the requirements could be found in 40 CFR Part 144. Tom Peake added that granting an aquifer exemption requires documentation that the groundwater quality is so poor that it can never be used as a public drinking water supply.
Does EPA have any examples of successful restoration of aquifers to baseline conditions?	Loren replied that he could not provide an answer, as EPA is still studying this. He mentioned that the U.S. Geological Survey had some published studies.
I did not hear you mention Region 9. Don't they have all Indian countries?	George Brozowski replied that Region 9 is involved and that they have Apache and Navajo territories.
Regulators in Texas have 30 years experience in regulating uranium extraction. What will EPA do?	Loren replied that EPA has reached out to states to share their information, and will continue to do so. EPA will also ask for the input from the people of Texas for reports and information that they think is important to review. EPA will also look at what has happened since the regulations were developed to determine if revisions are needed.
Where does the water sample come from? From the mining company, from the locals, from the water district?	Loren answered that this was the jurisdiction of the state regulator. There is nothing in the rule that specifies where the sample comes from. The rule does not address that issue. EPA is taking a look at the information that is available on

QUESTION	EPA RESPONSE
	this matter.
This question was followed by a series of questions and answers:	
Available from where?	Loren replied that EPA is looking at the wealth of information for establishing baseline water quality and restoration under such programs as RCRA and CERCLA.
In other words, you look at the sample that the uranium company provides when you're considering whether an aquifer exemption is granted.	Loren replied that he could not provide answers on aquifer exemptions.
You still haven't answered my questions.	Tom Peake answered that EPA sets standards and the agreement states implement them.
My original question was—"Are constituents other than uranium considered in aquifer exemptions?"	Tom Peake answered that other constituents were considered in granting the exemptions.
What went into EPA's coming to the conclusion that ISR ponds fall under Subpart W??	Loren replied that the liquids generated by the process of uranium extraction meet the definition of wastes under Subpart W. The water contains dissolved radium and the numbers are such that the radon emissions from dissolved uranium can equal those of tailings piles. In some cases of excursion, EPA has 7000 pCI/L from dissolved radium. We saw numbers of 7000 pCi from dissolved radium.
Is this information publically available?	Loren replied that EPA presented this information at the National Mining Association meeting and will post it on the Subpart W page of its website.
Can you discuss the court cases that required EPA to review this standard, aside from the Colorado one already discussed?	Loren replied that he thought the suits were found in favor of the Environmental Defense Fund in 1990 or 1991. In one case, a Court ruled that NRC did not have to adopt all of EPA's language. In the 1990s, there was another decision that EPA did not have oversight authority over NRC's determination of alternative concentration limits were to make a decision on an alternative concentration limit on restoration.

QUESTION	EPA RESPONSE
What sites are testing new groundwater restoration techniques?	EPA has not completed this study yet and thus cannot give an answer.
What labs are evaluating it?	Same answer as above.
Are there research gaps?	Same answer as above.
If the EPA fails to set up an aquifer exemption, is it a takings case?	Loren replied that it varies from case to case. EPA is not required to grant an aquifer exemption if the criteria are not met.
What happens to the residue from mining water?	Susan Jablonski of TCEQ replied that the residues must be disposed of as licensed waste, and that for the most part, disposal of such wastes takes place outside of Texas.
How are mining wastes disposed?	Susan Jablonski replied that they are generally disposed by deep well injection.

FOLLOW-UP ACTIONS

EPA committed to the following actions during the meeting—

- Look into exposure from radon in household natural gas.
- Provide information to water program on citizen concerns for aquifer exemptions.
- Provide information to Mr. Ted Long on aquifer exemptions.

APPENDIX A: ATTENDANCE LIST, AFTERNOON SESSION

Attendance: EPA Public Information Meeting, Corpus Christi, TX, Afternoon of Nov.4, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Harry Anthony	Uranium Energy Corporation	500 N. Shoreline Suite 800 Corpus Christi, TX 78411	361-888-8235	hanthony@uraniumenergy.com
Katherine Armstrong	Self (landowner)	919 Congress #1400 Austin, TX 785701		katarmine@earthlink.net
Alejandro C. Garcia	Duval Co.	P.O Box 684 San Diego, TX 78384	361-207-1165	
Steve Brown	SENES, Inc	Centennial, CO	303-524-1519	sbrown@senses.ca
G.S. Canales	Jim Hogg	804 N. Pine Hebronville TX 78311	361-527-3015	
Ty Embry	Owner/Operator Members at Texas Mining and Reclamation Association	816 Congress Ave Suite 1900 Austin, TX 78701	512-322-5829	tembrey@lglawfirm.com
Yaneth Gambra	TAMUK	13833 Paddlewheel Corpus Christi 78410	361-241-1253	yaneth.gambra@yahoo.com
Christian Goff	Pure Energy	Austin, TX		
J.M. Holland	URI, Inc.	641 E. FM 118 Kingsville TX 78363	361-595-5731	jmholland@uraniumresources.com
Craig W. Holmes	URANERZ	8107 Pommelhouse Austin, TX 78759	512-250-8151	Pommelhouse@scbglobal.net
Mike Kezar	100 Congress Ave Suite 1100 Austin, TX	512-236-2325		
Ted Long	Goliad County	388 E Fm1961 Goliad, TX 77963	361-564-2214	Tmlong4@gmail.com
Peter Luthiger	MULLC			pluthiger@mestanauranium.com
W.M. McKnight	UEC	215 Lllano Dr. Portland, TX 78374	361-643-7701	
Darin McCoig	URI, Inc.	641 E. FM 118 Kingsville TX 78363	361-595-0403	dammcoig@uraniumresources.com
Dick Messbarger	Kingsville Industrial	341 Brenda Kingsville,TX	361-597-6438	edc@kingsville.org

Attendance: EPA Public Information Meeting, Corpus Christi, TX, Afternoon of Nov.4, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
	Foundation			
Mark Pelizza	URI, Inc.	Lewisville, TN	214-683-8889	mspelizza@uraniumresources.com
Charles H. Ragland	La Palangana Ranch	585 CR 381 Alice, TX 78332	936-348-4896	charlesragland@netzero.net
John D. Ragland	La Palangana Ranch		701-2458	
Raul M.Ramirez	Brooks County	P.O. Box 515 Falfurrias, TX	361-325-5604 ext. 15	
Venice Scheurich	Coastal Bend Sierra Club	P.O. Box 10101 Corpus Christi, TX 78160	361-241-4289	Jave241@sbcglobal.net
Curt Sealy	Global Solutions	1609 Catron Ave Albuquerque, NM	970-640-6590	csealy@globalsolu.com
Gary Smith	TCEQ			gsmith@tceq.state.tx.us
Mark Walsh	STOP	3931 Boad Kingsville, TX	361-595-1265	markwalsh@yahoo.com
Shuangzhea Wang	TAMUK			Shuangzhea.wang@tamuk.edu
Kathleen Webb	Uranium Energy Corporation	6100 Indian School NE Suite 225 Albuquerque, NM 87110		kwebb@uraniumenergy.com
Matt Welch	UEC	815-A Brazos Suite 436 Austin, TX 78701		Mattwelch.aol.com
Mina Williams	Coastal Bend Sierra Club	141 Naples St. Corpus Christi, TX 78404	361-882-1179	Mina141@sbcglobal.net

APPENDIX B: ATTENDANCE LIST, EVENING SESSION

Attendance: EPA Public Information Meeting, Corpus Christi, TX, Afternoon of Nov.4, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Harry Amthor	UEC	500 N. Shoreline, Suite 800 N Corpus Christi, TX 78411		
Ed Brezinski	Uranium Energy Corporation	1134 Farmington Ave. West Hartford, CT 06107	860-595-9951	ebrezinski@uraniumenergy.gov
Steve Brown	SENES, Inc	Centennial, CO	303-524-1519	sbrown@senses.ca
Ty Embry	Owner/Operator Members at Texas Mining and Reclamation Association	816 Congress Ave Suite 1900 Austin, TX 78701	512-322-5829	tembrey@lglawfirm.com
Jeri Kalpack				
Ted Long	Goliad County	358 E. FM 1961 Goliad, TX 77963	361-564-2214	tmlong4@gmail.com
Peter Luthiger	MULLC			pluthiger@mestanauranium.com
W.M. McKnight	UEC	215 Lllano Dr. Portland, TX 78374	361-643-7701	wmcknight@hotmail.com
Sr. Elizabeth Reibslaeger	self	P.O. Box 364 Cuero, TX 77954	361-676-2921	ElizRccvi@sbcglobal.net
Venice Scheurich	Coastal Bend Sierra Club	P.O. Box 10101 Corpus Christi, TX 78160	361-241-4289	Jave241@sbcglobal.net
Curt Sealy	Global Solutions	1609 Catron Ave Albuquerque, NM	970-640-6590	csealy@globalsolu.com
Matt Welch	UEC	815-A Brazos Suite 436 Austin, TX 78701	512-416-0088	Mattwelch.aol.com
Mina Williams	Coastal Bend Sierra Club	141 Naples St. Corpus Christi, TX 78404	361-882-1179	Mina141@sbcglobal.net

EPA-2304

Emily Atkinson/DC/USEPA/US

01/31/2011 11:23 AM

To Jonathan Edwards

cc Reid Rosnick

bcc

Subject Uranium Extraction Email | Reid Rosnick

Jon,

Below are the email addresses, text and attachment for the uranium extraction operating facilities notice (as prepared by Reid Rosnick) for your approval. Let us know if you would like to see any changes.

Barring any changes, at your earliest availability it can be emailed out from your Lotus Notes account.

Emily

To Regional Air Directors:
perkins.stephen@epa.gov, finazzo.barbara@epa.gov, Katz.judith@epa.gov, banister.beverly@epa.gov, newton.cheryl@epa.gov, edlund.carl@epa.gov, weber.rebecca@epa.gov, videtich.callie@epa.gov, jordan.deborah@epa.gov, albright.rick@epa.gov

CC Regional Water Directors and RPD Staff:
perkins.stephen@epa.gov, finazzo.barbara@epa.gov, capacasa.jon@epa.gov, giattina.jim@epa.gov, hyde.tinka@epa.gov, flores.miguel@epa.gov, spratlin.william@epa.gov, hoskie.sadie@epa.gov, strauss.alexis@epa.gov, bussell.mike@epa.gov, rosnick.reid.epa.gov, peake.tom@epa.gov, stahle.susan@epa.gov

MEMORANDUM

SUBJECT: Uranium Extraction Operating Facilities Notice

FROM: Jonathan Edwards, Director
Radiation Protection Division

TO: EPA Regional Air Directors

The uranium extraction industry is increasing the number of operating facilities and may be expanding into new states, such as Virginia and Michigan. The Clean Air Act applies to these facilities in the pre-construction phase and during the operation of the facilities. Very few states have been delegated the authority for this part of Clean of the Air Act, so Regional EPA offices typically have the responsibility for implementing the statute and regulations for these facilities.

I have attached a policy memorandum regarding the applicability of the Clean Air Act NESHAP Subpart W requirements to uranium recovery facilities. The memo was sent from Tom Peake, Director of ORIA's Center for Waste Management and Regulations, to the Region 8 Indoor Air Toxics and Transportation Unit, after consultation with the Office of General Counsel. The Region had asked for clarification regarding the types of uranium recovery facilities subject to the Subpart W requirements.

When the regulation was promulgated in 1989, the majority of facilities were classic tailings impoundments. However, over the past 25 years there has been a switch in process to in-situ leach (ISL) facilities. Evaporation ponds are the predominant unit at ISL facilities, and this memo clarifies which units are subject to the requirements. ORIA has determined that any type of uranium recovery facility that is managing uranium byproduct material or tailings during its operation is subject to Subpart W. These facilities include, but are not limited to, conventional mills, in-situ leach facilities and heap leach facilities, -- specifically the structures at the facilities that are used to manage or contain the uranium byproduct material. Common names for these structures include, but are not limited to, impoundments, tailings impoundments, evaporation or holding ponds and heap leach piles. Applicability is based on what an individual structure contains.

I am also copying this memo to the Regional Water Directors for their information and distribution, because ISL facilities are also managed under the underground injection well regulations. If you have any questions, please contact Reid Rosnick of my staff at 202-343-9563, or rosnick.reid@epa.gov.

Attachment

MemoReg8SubpartApplicabilityRev1.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 22 2010

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Applicability of Subpart W to Uranium Recovery Facilities

FROM: Tom Peake, Director Tom Peake
Center for Waste Management and Regulations

TO: Deborah Lebow-Aal, Chief
Indoor Air Toxics and Transportation Unit, EPA Region 8

You have asked for clarification regarding the types of uranium recovery facilities that are subject to the requirements in 40 CFR Part 61, Subpart W, National Emission Standards for Radon Emissions from Operating Mill Tailings ("Subpart W"). Subpart W applies to "owners or operators of facilities licensed to manage uranium byproduct material during and following the processing of uranium ores, commonly referred to as uranium mills and their associated tailings." 40 CFR 61.250. Subpart W defines "uranium byproduct material or tailings" as "the waste produced by the extraction or concentration of uranium from any ore processed primarily for its source material content." 40 CFR 61.251(g). Thus, any type of uranium recovery facility that is managing "uranium byproduct material or tailings" during its operation is subject to Subpart W. Such facilities may include, but are not limited to, conventional mills, in-situ leach facilities and heap leach facilities.

Subpart W requirements specifically apply to the structures at the uranium recovery facilities that are used to "manage" or contain the "uranium byproduct material or tailings." Common names for these structures may include, but are not be limited to, impoundments, tailings impoundments, evaporation or holding ponds, and heap leach piles. However, the name itself is not important for determining whether Subpart W requirements apply to that structure; rather, applicability is based on what these structures contain.

Privileged and Confidential Internal Deliberative Material

EPA-988

"Uranium Workshop" <UraniumWorkshop@nma.org>

02/02/2011 03:15 PM

To Reid Rosnick

cc

bcc

Subject Topic and Speaker Suggestions for 2011 URW NMAID=108150

1 attachment

2011 URW Speaker and Topic Suggestion Form.doc

Memorandum

TO:	2010 URW Participants
FROM:	Katie Sweeney, National Mining Association Steve Cohen, Nuclear Regulatory Commission
DATE:	February 2, 2011
SUBJECT:	Topic and Speaker Suggestions for 2011 URW

The 2011 Uranium Recovery Workshop (URW) will be May 25-26 at The Grand Hyatt, Denver, CO. Information will be sent in the coming weeks but please be sure to mark your calendar.

Program development is beginning and we would like to know if you have any suggestions for topics or speakers that should be considered for the workshop. Past programs have been very timely and responsive to the issues before the industry. We want to be sure this year's workshop meets your expectations.

Attached is a form for you to complete and return to Katie Sweeney at ksweeney@nma.org. Thank you for your ideas and we look forward to seeing you at the May workshop.

Enclosure

Uranium Recover Workshop
May 25-26, 2011
Denver, CO

Speaker Suggestions

The program development for the 2011 Uranium Recovery Workshop is beginning and we would like to have your suggestions for speakers and topics that should be considered for the workshop. If you have any ideas or suggestions, please complete the form and return it to Katie Sweeney at ksweeney@nma.org.

Topic: ____

____

Speaker Name: ____

Organization: ____

E-mail: __________________________________ Telephone: ________________

Submitted by: ____

E-mail: __________________________________ Telephone: _________________

EPA-2263

Jonathan Edwards/DC/USEPA/US

02/03/2011 10:25 AM

To perkins.stephen, finazzo.barbara, Katz.judith, banister.beverly, newton.cheryl, edlund.carl, weber.rebecca, videtich.callie, jordan.deborah, albright.rick

cc perkins.stephen, finazzo.barbara, capacasa.jon, giattina.jim, hyde.tinka, flores.miguel, spratlin.william, hoskie.sadie, strauss.alexis, bussell.mike, rosnick.reid, peake.tom, stahle.susan, Mike Flynn, Alan Perrin, Loren Setlow, Daniel Schultheisz, Rafaela Ferguson

bcc

Subject Uranium Extraction Operating Facilities Notice

MEMORANDUM

SUBJECT: Uranium Extraction Operating Facilities Notice

FROM: Jonathan Edwards, Director
Radiation Protection Division (ORIA)

TO: EPA Regional Air Directors

The uranium extraction industry is increasing the number of operating facilities and may be expanding into new states, such as Virginia and Michigan. The Clean Air Act applies to these facilities in the pre-construction phase and during the operation of the facilities. Very few states have been delegated the authority for this part of Clean Air Act, so Regional EPA offices typically have the responsibility for implementing the statute and regulations for these facilities.

I have attached a policy memorandum regarding the applicability of the Clean Air Act NESHAP Subpart W requirements to uranium recovery facilities. The memo was sent from Tom Peake, Director of ORIA's Center for Waste Management and Regulations, to the Region 8 Indoor Air Toxics and Transportation Unit, after consultation with the Office of General Counsel. The Region had asked for clarification regarding the types of uranium recovery facilities subject to the Subpart W requirements.

When the regulation was promulgated in 1989, the majority of facilities were classic tailings impoundments. However, over the past 25 years there has been a switch in process to in-situ leach (ISL) facilities. Evaporation ponds are the predominant unit at ISL facilities, and this memo clarifies which units are subject to the requirements. ORIA has determined that any type of uranium recovery facility that is managing uranium byproduct material or tailings during its operation is subject to Subpart W. These facilities include, but are not limited to, conventional mills, in-situ leach facilities and heap leach facilities, -- specifically the structures at the facilities that are used to manage or contain the uranium byproduct material. Common names for these structures include, but are not limited to, impoundments, tailings impoundments, evaporation or holding ponds and heap leach piles. Applicability is based on what an individual structure contains.

I am also copying this memo to the Regional Water Directors for their information and distribution, because ISL facilities are also managed under the underground injection well regulations. If you have any questions, please contact Reid Rosnick of my staff at 202-343-9563, or rosnick.reid@epa.gov.

Attachment

MemoReg8SubpartApplicabilityRev1.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 22 2010

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Applicability of Subpart W to Uranium Recovery Facilities

FROM: Tom Peake, Director Tom Peake
Center for Waste Management and Regulations

TO: Deborah Lebow-Aal, Chief
Indoor Air Toxics and Transportation Unit, EPA Region 8

You have asked for clarification regarding the types of uranium recovery facilities that are subject to the requirements in 40 CFR Part 61, Subpart W, National Emission Standards for Radon Emissions from Operating Mill Tailings ("Subpart W"). Subpart W applies to "owners or operators of facilities licensed to manage uranium byproduct material during and following the processing of uranium ores, commonly referred to as uranium mills and their associated tailings." 40 CFR 61.250. Subpart W defines "uranium byproduct material or tailings" as "the waste produced by the extraction or concentration of uranium from any ore processed primarily for its source material content." 40 CFR 61.251(g). Thus, any type of uranium recovery facility that is managing "uranium byproduct material or tailings" during its operation is subject to Subpart W. Such facilities may include, but are not limited to, conventional mills, in-situ leach facilities and heap leach facilities.

Subpart W requirements specifically apply to the structures at the uranium recovery facilities that are used to "manage" or contain the "uranium byproduct material or tailings." Common names for these structures may include, but are not be limited to, impoundments, tailings impoundments, evaporation or holding ponds, and heap leach piles. However, the name itself is not important for determining whether Subpart W requirements apply to that structure; rather, applicability is based on what these structures contain.

EPA-2191

Jonathan Edwards/DC/USEPA/US

02/03/2011 06:48 PM

To "Reid Rosnick", Rafaela Ferguson

cc

bcc

Subject Fw: Uranium Extraction Operating Facilities Notice

FYI

Sent from my BlackBerry Wireless Handheld (www.BlackBerry.net)

Jonathan Edwards

----- Original Message -----

From: Jonathan Edwards

Sent: 02/03/2011 11:04 AM EST

To: esher.diana@epa.gov; flournoy.karen@epa.gov

Subject: Fw: Uranium Extraction Operating Facilities Notice

FYI. (Apologies! You were inadvertently left of the original email.) ---Jon

----- Forwarded by Jonathan Edwards/DC/USEPA/US on 02/03/2011 11:02 AM -----

From:	Jonathan Edwards/DC/USEPA/US
To:	perkins.stephen@epa.gov, finazzo.barbara@epa.gov, banister.beverly@epa.gov, newton.cheryl@epa.gov, edlund.carl@epa.gov, weber.rebecca@epa.gov, videtich.callie@epa.gov, jordan.deborah@epa.gov, albright.rick@epa.gov
Cc:	perkins.stephen@epa.gov, finazzo.barbara@epa.gov, capacasa.jon@epa.gov, giattina.jim@epa.gov, hyde.tinka@epa.gov, flores.miguel@epa.gov, hoskie.sadie@epa.gov, strauss.alexis@epa.gov, bussell.mike@epa.gov, rosnick.reid@epa.gov, peake.tom@epa.gov, stahle.susan@epa.gov, Mike Flynn/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA, Loren Setlow/DC/USEPA/US@EPA, Daniel Schultheisz/DC/USEPA/US@EPA, Rafaela Ferguson/DC/USEPA/US@EPA
Date:	02/03/2011 10:25 AM
Subject:	Uranium Extraction Operating Facilities Notice

MEMORANDUM

SUBJECT: Uranium Extraction Operating Facilities Notice

FROM: Jonathan Edwards, Director
Radiation Protection Division (ORIA)

TO: EPA Regional Air Directors

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Attachment

MemoReg8SubpartApplicabilityRev1.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 22 2010

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Applicability of Subpart W to Uranium Recovery Facilities

FROM: Tom Peake, Director Tom Peake

Center for Waste Management and Regulations

TO: Deborah Lebow-Aal, Chief

Indoor Air Toxics and Transportation Unit, EPA Region 8

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EPA-1773

Tom Peake/DC/USEPA/US	To	rosnick.reid
02/11/2011 01:36 PM	cc	Lee.Raymond, Alan Perrin, Jonathan Edwards, Daniel Schultheisz, Kenneth Czyscinski, Andrea Cherepy
	bcc	
	Subject	Please look over this Subpart W schedule and let me know how/if it should be changed

Reid,
I took the dates you sent and put them in a format like we have for part 192. Please look it over and make any changes and get it back soon today. Jon and Alan meet with Mike later this afternoon and they plan to give him the two schedules. As an FYI I have included the 192 schedule we came up with yesterday afternoon.
Thanks.

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

40 CFR Part 192 Deliverable Dates.docx Subpart W Deliverable Dates.docx

40 CFR Part 192 Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Meet with workgroup	February 2011
Finalize work assignments - with focus on ISL (economic analyses, risk assessment, document for SAB)	March 2011
Develop peer review plans: • economic analyses • risk assessment	ASAP
Risk Assessment	June 30, 2011
Economic Analyses	June 30, 2011
Begin drafting rule/revisions	ASAP
Peer review of economics analyses	July 29, 2011
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Distribute FAR package to participating AAs and RAs (no sooner than 15 working days after the FAR package is distributed)	September 12, 2011
Final Agency Review	October 3, 2011
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Transmit final package to OPEI	November 4, 2011
OMB Review	November 18, 2011
Proposed Rule to the Office of Federal Register	February 17, 2012

40 CFR Part 61 Subpart W Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Quarterly calls with stakeholders per consent agreement	Jan, April, Aug, Dec
Finalize work assignments for next contract period	March 2011
Risk Assessment (finalize)	March, 2011
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Transmit final package to OPEI	
OMB Review	September, 2011
Proposed Rule to the Office of Federal Register	December, 2011

EPA-1999

Tom Peake/DC/USEPA/US	To	Alan Perrin
02/11/2011 03:02 PM	cc	Jonathan Edwards, Reid Rosnick
	bcc	
	Subject	updated Subpart W dates

Alan,
I made a couple of minor changes given Reid's response.

Tom Peake
Director
Center for Waste Management and Regulations
US EPA (6608J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
phone: 202-343-9765

Physical Location and for deliveries:
Room 529
1310 L St, NW
Washington, DC 20005

Subpart W Deliverable Dates.docx

40 CFR Part 61 Subpart W Deliverable Dates (Revised Schedule)

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Transmit final package to OPEI	September, 2011
OMB Review	September, 2011
Proposed Rule to the Office of Federal Register	December, 2011

EPA-6343

Mike Flynn/DC/USEPA/US

02/11/2011 06:46 PM

To Gina McCarthy

cc Janet McCabe, Jonathan Edwards, Alan Perrin, Anna Duncan, Don Zinger

bcc

Subject Revised Schedules for Radiation Rules

Gina,

Following up from our recent meetings with you on the radiation rules, we've revised our rule schedules (attached) for both the standards for Uranium and Thorium Mill Tailings (40 CFR 192) and the revisions to the NESHAP for active uranium mills (Part 261, Subpart W).   We've cut both schedules by close to a year, by targeting/narrowing the scope and streamlining multiple steps throughout the process.   We would have a proposal out late this year for Subpart W and early next year for Part 192. Depending on comments, we would aim to complete final rules later in 2012.   Please let us know if these timelines are more in line with your thinking.

I have also attached a draft one-pager on the proposed revisions to the Standards for Nuclear Power Operations (Part 190).   We are working on an ANPR which we expect to complete later this Spring. Given the potential interest this may generate, you indicated you wanted to flag this for the Administrator.

Let me know if you have any comments or would like to discuss any of these materials.

Thanks, Mike

61spW_timeline_2-11-11.docx 192_timeline_2-11-11.docx 190_one-page_2-11-11_v1.docx

Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395

40 CFR Part 192 Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Meet with workgroup	February 2011
Finalize work assignments – with focus on ISL (economic analyses, risk assessment, document for SAB)	March 2011
Develop peer review plans: • economic analyses • risk assessment	ASAP
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EPA's Proposed Revisions to 40 CFR Part 190:
Environmental Radiation Protection Standards for Nuclear Power Operations

Statutory Authority: EPA is responsible for developing environmental standards for nuclear power operations to protect public health and the environment.

Description: 40 CFR 190 contains standards for normal operations of nuclear power plants and other nuclear fuel cycle operations, including uranium milling, conversion, enrichment, and reprocessing. This regulation was established by EPA in 1977; it has never been revised.

Technical Rationale:

- The 1977 regulations contain no groundwater protection.
- New nuclear fuel cycle technologies exist, including new types of reactors and fuels.
- The practice of lengthy interim storage of spent nuclear fuel was not envisioned in 1977.
- The understanding of radiation risks to humans has advanced.
- New methods exist for representing the level of radiation doses and effects.
- The current collective dose requirement of the regulation is difficult to enforce.

Policy Rationale: Emerging national policy and public opinion.

- Interest in nuclear power has increased as a means to reduce GHG, support energy independence, and accommodate energy sector growth.
- New national strategies are under consideration for radioactive waste management, including reprocessing spent nuclear fuel.
- Updated environmental standards would be available for the construction of new nuclear facilities and the relicensing of operating facilities; updated standards will provide regulatory certainty in a long-dormant industry that now anticipates growth.
- Industry, NRC, DOE, and Congress have expressed interest in updated standards.
- Updated standards could inform the work of the Blue Ribbon Commission on America's Nuclear Future and help EPA respond to the Commission's recommendations.

Outreach: Interest in issue requires effective outreach to stakeholders and the public.

- Internal EPA offices – OW, OCIR, OSWER
- Other Federal departments – e.g., NRC, DOE, CEQ/White House
- Environmental groups – NRDC, Sierra Club
- Industry groups – NEI, EEI
- Communities located adjacent to facilities regulated by 40 CFR 190
- Concerned citizens

Anticipated Response:

- Changes to the rule may be misperceived as weakening the standards, resulting in a negative response from environmentalists and accusations that EPA is paving the way to rebuild the nuclear power industry and enable reprocessing.
- A separate groundwater regulation is deemed unnecessary by NRC and the industry, but industry is likely to favor the updated changes to the method for calculating doses.

Timing: ANPR internal draft by the end of March; ANPR published in Federal Register Summer 2011.

40 CFR Part 61 Subpart W Deliverable Dates (Revised Schedule)

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EPA-6343

Mike Flynn/DC/USEPA/US

02/11/2011 06:46 PM

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cc Janet McCabe, Jonathan Edwards, Alan Perrin, Anna Duncan, Don Zinger

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Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395

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OMB Review	November 18, 2011
Proposed Rule to the Office of Federal Register	February 17, 2012

EPA-1753

Deborah Lebow-Aal/R8/USEPA/US

02/14/2011 05:22 PM

To: Sara Laumann, Kenneth Distler, Reynolds.Cynthia, Albion Carlson, Angelique Diaz, Robert Duraski, Richard Mylott, Steven Pratt, Reid Rosnick, Susan Stahle

cc:

bcc:

Subject: Letter to Christiensen Ranch/Irigaray re Subpart W requirements

Below is the letter we sent to Uranium One alerting them to the fact that Subpart W applies to ISR facilities and to the fact that we have not received a Subpart W application for approval to construct from them and we are aware that they have reopened. Thanks for all your help

Deborah Lebow Aal
U.S. Environmental Protection Agency
Region 8 Air Program
Unit Chief, Indoor Air, Toxics, & Transportation Unit
1595 Wynkoop Street
Denver, CO 80202
303 312-6223

Document.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

FEB 11 2011

Ref: 8P-AR

Jon F. Winter
Manager, Environmental and Regulatory Affairs
Uranium One Americas
907 N. Poplar Street
Suite 260
Casper, WY 82601

Re: Subpart W Requirements for Christiensen Ranch/Irigaray ISR

Dear Mr. Winter:

You are receiving this letter as an operator of In Situ Recovery (ISR) uranium facilities, including the Christiensen Ranch/Irigaray ISR located in Johnson and Campbell Counties, Wyoming. This letter outlines the applicability and requirements of 40 CFR Part 61, Subpart W, National Emission Standards for Radon Emissions from Operating Mill Tailings ("Subpart W") to ISR uranium facilities.

Subpart W applies to "owners or operators of facilities licensed to manage uranium byproduct material during and following the processing of uranium ores, commonly referred to as uranium mills and their associated tailings." (See 40 CFR §61.250) Subpart W defines "uranium byproduct material or tailings" as "the waste produced by the extraction or concentration of uranium from any ore processed primarily for its source material content."(See 40 CFR §61.251(g)) Thus, any type of uranium recovery facility that is managing uranium byproduct material or tailings, including, but not limited to, ISR facilities, is subject to Subpart W. The requirements of Subpart W specifically apply to the structures at the uranium ISR facility which are used to manage or contain the uranium byproduct or tailings. At ISR facilities, common names for these structures include, but are not limited to, evaporation or holding ponds. Subpart W therefore applies to the ponds at the Christensen Ranch/Irigaray ISR facility as well as other operating ISR facilities.

Subpart W requires that ISR operators meet either the standard in 40 CFR §61.252(a) for those facilities in existence prior to 1989 or choose one of the two work practice standards in 40 CFR §61.252(b) for facilities constructed after 1989. In addition to the requirements of Subpart W, the requirements in 40 CFR Part 61 Subpart A ("Subpart A") General Provisions apply to Subpart W regulated structures at ISR facilities. Subpart A, 40 CFR §61.07, requires owners or operators to submit to EPA an approval application for either construction or modification of Subpart W regulated structures (i.e., evaporation or holding ponds). Resuming operation of the ponds is considered to be a modification, requiring that a modification approval application be submitted to EPA before the modification is planned to commence.

We understand that the Christiensen Ranch/Irigaray facilities have resumed operation. We have not received an approval application for the ponds onsite, as required by 40 CFR §61.07. We look forward to receiving the applications for Christensen Ranch/Irigaray, as well as the required construction or modification approval applications for other current and future operating ISR facilities. This letter grants no relief to the owner or operator from the legal responsibility for compliance with any applicable provisions of 40 CFR Part 61 Subparts A and W, or any other applicable Federal, State or local requirement. If you have any questions please contact Deborah Lebow Aal of my staff at (303) 312-6223 or lebow-aal.deborah@epa.gov.

Sincerely,

Stephen S. Tuber
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

cc: John Corra, Director, WYDEQ
Steve Ingle, Land Quality Division, WYDEQ
Bill von Till, Chief – Uranium Recovery Licensing Branch, NRC
Robert Dye, U.S. Environmental Protection Agency, Region 7

EPA-1458

Deborah Lebow-Aal/R8/USEPA/US

02/14/2011 05:27 PM

To Reid Rosnick
cc
bcc
Subject Fw: R8 FOIA Control Sheet Package - Case #: 08-FOI-00035-11

Reid, can you refresh my memory on this FOIA. My FOIA folks here are saying that Angelique didn't reply to this FOIA, but that's not like her, and I recall something about you and Sue taking this FOIA on?

Deborah Lebow Aal
U.S. Environmental Protection Agency
Region 8 Air Program
Unit Chief, Indoor Air, Toxics, & Transportation Unit
1595 Wynkoop Street
Denver, CO 80202
303 312-6223

----- Forwarded by Deborah Lebow-Aal/R8/USEPA/US on 02/14/2011 03:22 PM -----

From: Maureen Brennan/R8/USEPA/US
To: Deborah Lebow-Aal/R8/USEPA/US@EPA
Cc: Kay Cavanah/R8/USEPA/US@EPA
Date: 02/11/2011 01:13 PM
Subject: Fw: R8 FOIA Control Sheet Package - Case #: 08-FOI-00035-11

Hi Deb,

Kay asked me to send you an electronic copy of FOIA 35-11. The attachments are below.

I just talked to Vicki Ferguson. She will be sending an updated list for the Congressional request. I explained to her that Angelique is out on maternity leave, that you will be pulling the information together on this FOIA, but that some information might be in her files and on her computer. Vicki asked me to send her an email on this, she will send it on to HQ and ask how we should proceed.

I am going to check my files on all the OPRA FOIAs as well, to see if I have anything additional to add.

Maureen Brennan
Secretary/OPRA FOIA Coordinator
Office of Partnerships & Regulatory Assistance
U.S. EPA, Region 8
303-312-6294

----- Forwarded by Maureen Brennan/R8/USEPA/US on 02/11/2011 01:06 PM -----

From: Maureen Brennan/R8/USEPA/US
To: Kay Cavanah/R8/USEPA/US@EPA, Maureen Brennan/R8/USEPA/US
Date: 10/21/2010 11:25 AM
Subject: R8 FOIA Control Sheet Package - Case #: 08-FOI-00035-11

Request for Documents for Case # '08-FOI-00035-11'. Due date: 11/18/2010.

Assigned to: Air A fee waiver has been requested on this FOIA. Before starting any work on this FOIA, please estimate your expenses for this FOIA and let Vicki Ferguson know if it will exceed the threshold payment. If it does, she will need to send the fee waiver request to HQ to see if it meets the standards.

R8 FOIA Control Sheet Package - Case #- 08-FOI-00035-11.doc Request Description.tif

Uranium Watch
76 S Main #7 | P. O. Box 344
Moab, Utah 84532
435-210-0166

October 20, 2010

via electronic mail

Ms. Vicki Ferguson
Region 8, Mailcode: 8-OC
U.S. Environmental Protection Agency
1595 Wynkoop Street
Denver, Colorado 80202-1129
r8foia@epa.gov

RE: Freedom of Information Act Request

Dear Ms. Ferguson:

Pursuant to the Freedom of Information Act (FOIA) and the Environment Protection Agency (EPA) implementing regulations, I request the following agency records:

1. All documents pertaining to the EPA's consideration of submittals from myself, Sarah M. Fields, to the EPA regarding the implementation of the 40 C.F.R. Part 61 radionuclide National Emission Standards for Hazardous Air Pollutants. These submittals include:

A. August 26, 2009, e-mail to Reid Rosnick, Radiation Protection Division, EPA Headquarters, regarding "Major Source" of Radionuclide Emissions/40 CFR Part 70.

B. August 27, 2009, e-mail to Reid Rosnick, regarding "Major Source" of Radionuclide Emissions/40 CFR Part 70, responsive to Mr. Rosnick's August 27 reply to my August 26 e-mail.

C. November 23, 2009, letter to Reid Rosnick, regarding 40 C.F.R. Part 61 radionuclide NESHAP program. The letter includes two memos (dated November 22, 2009), entitled *Question Of Issuance of Title V or Part 70 (State) Permits for 40 C.F.R. Part 61 Radionuclide NESHAP Sources* and *State Programs For Part 61 Radionuclide NESHAPS: Statements in EPA and State of Utah Documents.* This letter was submitted via electronic and first class mail.

[If you need a copy of these documents, please let me know.]

RECORDS RESPONSE:

Records responsive to this request would include, but not be limited to: internal correspondence between EPA staff at Region 8 and headquarters or other EPA regions; correspondence between EPA Region 8 and EPA primacy states and other federal or state entities; reports; meeting agendas and meeting summaries; opinions; memoranda; phone notes; and any other document related to the EPA's consideration of the submittals listed above. Correspondence includes electronic and conventional mail.

Please provide any documents that are in electronic form or can be placed in electronic form (PDF file) on a computer disc.

I am sending a similar FOIA request to the EPA Headquarters.

REQUEST FOR WAIVER OF FEES

I request a waiver of fees and submit answers to the following questions, in support of that request.

1. A clear statement of your interest in the requested documents, the use proposed for the documents and whether you will derive income or other benefits from such use.

The documents requested relate to the EPA's consideration of issues pertaining to the EPA and EPA primacy states' 40 C.F.R. Part 61 radionuclide NESHAP program, brought forward to the EPA by Uranium Watch. It has been over a year since these questions and issues were brought before the EPA, but the EPA has failed to respond and has given no indication regarding when it intends to respond. These records relate to the consideration of issues that impact the health and safety of the requestor and the public.

Requestor will review the information and make pertinent information in the documents publicly available on the Uranium Watch website (www.uraniumwatch.org).

To the best of requestor's knowledge, requestor has no financial interest that would be furthered by the release of the requested records.

2. A statement of how the public will benefit from such use and from the release of the requested documents.

Records will enable the public to better understand the regulatory program implementing the radionuclide NESHAPS. The only way for the public to understand the issues involved in the Part 61 regulatory program and the current 40 C.F.R. Part 61, Subpart W review is to be aware of the EPA's consideration of the regulatory issues.

3. If specialized use of the documents or information is contemplated, a statement of your qualifications that are relevant to the specialized use.

Requestor does not contemplate any "specialized use" of the requested documents.

4. A statement indicating how you plan to disseminate the documents or information to the public.

Requestor will disseminate the documents via the Uranium Watch website and will communicate information related to the requested documents to interested members of the public via electronic communications.

5. Any additional information you deem relevant to your request for a fee waiver (e.g., Technical Assistance Grant from EPA).

Uranium Watch is a non-profit, public-interest educational organization under the fiscal umbrella of Living Rivers, a 501(3)(c) tax-exempt organization. Our mission is to encourage and further informed public participation in local, state, and federal decision making related to uranium recovery activities.

Additional Fee Waiver Information

1. *For the disclosure to be "likely to contribute" to an understanding of specific government operations or activities, the releasable material must be meaningfully informative in relation to the subject matter of the request.*

The subject matter of the request relates to the implementation of the radionuclide NESHAPS program by the EPA and EPA authorized state governments.

2. The disclosure must contribute to the understanding of the public at large, as opposed to the understanding of the requester or a narrow segment of interested persons. One's status as a representative of the news media alone is not enough.

The public at large has an interest in the EPA's implementation of the Clean Air Act and the control of hazardous air pollutants. The public has an interest in the EPA's implementation of its oversight over regulated sources and state regulatory programs associated with Part 61 radionuclide sources.

The documents would provide the public with information about the EPA's implementation of 40 C.F.R. Part 61. Documents related to the implementation of that program, as have been requested, can provide this information.

3. *Disclosure must contribute "significantly" to public understanding of government operations or activities.*

One of the most basic government activities, particularly an EPA activity, is the implementation of laws and regulations that are protective of environment and public health and safety. The only way to know if a regulatory program is being properly implemented and whether changes are warranted in any aspect of a regulatory program (the regulations themselves and/or the implementation of the program) is to review the records that document the EPA's consideration of pertinent regulatory issues. The documents requested would provide that information. Therein is their significance.

The interested public that is directly impacted and will benefit from the release of the requested records spans the states where there are facilities or proposed facilities regulated under the Part 61 radionuclide NESHAP program (including Arizona, Colorado, Nebraska, New Mexico, South Dakota, Utah, Virginia, and Wyoming), so this is not a narrow segment of the public.

If you have any questions regarding this request, please feel free to contact me.

Sincerely,

Sarah M. Fields
Program Director
sarah@uraniumwatch.org

Region 8
FREEDOM OF INFORMATION ACT REQUEST
08-FOI-00035-11

REQUESTER: Sarah Fields

COMPANY: Uranium Watch

FEE CATEGORY: Other

REQUEST DATE: October 20, 2010

RECEIVED DATE: October 20, 2010

SUBJECT: Radionuclide National Esmission Standards for Hazardous Air Pollutants

DUE DATE: November 18, 2010

FEE WAIVER REQUESTED: Yes. If “YES”, please contact Vicki Ferguson IMMEDIATELY at (303) 312-6856 to discuss fees.

ASSIGNMENTS:
R8-OPRA - AR

SPECIAL INSTRUCTIONS:

A fee waiver has been requested on this FOIA. Before starting any work on this FOIA, please estimate your expenses for this FOIA and let Vicki Ferguson know if it will exceed the threshold payment. If it does, she will need to send the fee waiver request to HQ to see if it meets the standards.

IF COSTS ARE EXPECTED TO EXCEED $25, CONTACT REQUESTER FOR PAYMENT COMMITMENT BEFORE PROCESSING REQUEST.

FOIA COORDINATORS CHECKLIST
TURNED IN WITH EACH CLOSEOUT RESPONSE

Is the FOIA done on time? **Yes**___ **No**___
If No, should this be in the complex track? **Yes**___ **No**___
Has the FOIA been responded to in full? **Yes**___ **No**___
If No, are other arrangements mentioned in the letter? **Yes**___ **No**___

Have modifications to the original request been made? **Yes**___ **No**___
If yes, are the agreed-upon modifications enclosed? **Yes**___ **No**___

Have the search, review and copying costs for **all parties** involved been totaled correctly and the forms **legibly** signed? **Yes**___ **No**___

Did the requester agree to pay fees over $25 **Yes**___ **No**___ **N/A** ___
If over $250, did the requester prepay before commencing work? **Yes**___ **No** ___ **N/A**___

If this is a partial or full denial letter, did RC (Regional Counsel) concur? **Yes**___ **No**___ **N/A**___
Is this denial letter signed by the ARA? **Yes**___ **No**___ **N/A**__

If there are "no records or a partial/full denial" is appeal language provided in closeout letter? **Yes**___ **No**___

Has there been a mention of costs in the letter? (Either-didn't meet billing threshold or there will be a bill under separate cover?) **Yes**___ **No**___

Did the LEAD include all names/phone numbers of those that participated in the FOIA? **Yes**___ **No**___

Was a bill sent to Finance via FOIA Central? **Yes**___ **No**___ **N/A**___
(If yes, please attach to the closeout letter package.)

Did the Regional FOIA Officer review this letter? **Yes** ___ **No** ___

________________________________ ________________________________
Program Office FOIA Coordinator **ARA FOIA Coordinator**

F R E E D O M
O F I N F O R M A T I O N
R E Q U E S T

- UPON RECEIPT OF FOIA, **IMMEDIATELY** EXAMINE TO DETERMINE IF YOU SHOULD BE ANSWERING THIS; IF NOT, ***CONTACT YOUR ARA'S FOIA COORDINATOR IMMEDIATELY!***

- IF THIS FOIA WILL COST MORE THAN $25 TO PRODUCE (SEARCH, REVIEW & COPYING FEES) CONTACT THE REQUESTER TO GET "FEE APPROVAL" **BEFORE PROCEEDING.** We bill for $14.01-$25 with no permission required.

  REMEMBER, ***ALL OFFICES*** *PARTICIPATE IN THE TOTALING OF COSTS AND NEED TO BE COORDINATED FROM THE* ***BEGINNING.***

- IF REQUEST IS ***DENIED***, **YOU MUST COORDINATE** WITH A REGIONAL COUNCIL ATTORNEY.

- TO BILL REQUESTER, PREPARE THE ELECTRONIC BILLING FORM (ON 8-NET) UPON COMPLETION OF THE OUTGOING LETTER. SEE PAGE 2 FOR INSTRUCTIONS. REMEMBER TO TOTAL **THE COSTS FOR ALL** OFFICES.

- ONE OUTGOING LETTER TO THE REQUESTER, WHICH IS TO BE COORDINATED WITH **ALL** OFFICES INVOLVED.

IF YOU ARE THE LEAD OFFICE:

- It is **your** responsibility to coordinate the outgoing response letter. You need to take the responses provided to you by the other offices and incorporate their **responses** and **costs** into **your** outgoing letter.

IF YOU ARE NOT THE LEAD OFFICE:

- You need to IMMEDIATELY make contact with the LEAD to discuss the FOIA, costs, etc. and give your response **and the charges incurred** for search, review and copying costs to the **LEAD** Office ***AT LEAST 2 days*** prior to the due date so that this information can be incorporated into the outgoing letter.

OVER

IMMEDIATELY UPON RECEIPT OF THIS FOIA, PLEASE CONTACT THE APPROPRIATE INDIVIDUAL(S) BELOW TO FIND OUT ***WHO*** HAS BEEN ASSIGNED THIS FOIA WITHIN THEIR RESPECTIVE ARA OFFICES. ALSO, PLEASE MAKE

CERTAIN YOU ARE THE PROPER PERSON TO RECEIVE THIS FOIA. **IF NOT**, PLEASE NOTIFY THE APPROPRIATE ARA FOIA COORDINATOR BELOW **IMMEDIATELY**!!!

EC/EJ:	**Dayle DeArvil 303-312-6911**
	Barbara Hanna: 312-6050
EPR	**Judy Hansen: 312-6417**
OPRA	**Maureen Brennan: 312-6294**
TMS	**Ginger Mottu: 312-7059**
MONTANA OFFICE :	**Debbie Clevenger (406) 457-5004**

DON'T FORGET: SAMPLE LETTERS, APPEAL LANGUAGE, REGION 8 FOIA PROCESS INFORMATION AND AUTOMATIC BILLING ARE ON THE 8-NET -- (SEE BELOW)

FOIA BILL

- **ON EPA 8-NET: Regional Tools: FOIA CENTRAL"**
  Select: *"Submit a FOIA Bill"*
  This goes directly to CarlettaLynn Sudduth, the FOIA Billing person, who will acknowledge receipt within 24 hours; if NOT, call Lynn @ 312-6632.

FOIA SAMPLE LETTERS

- These are also under the ***EPA 8-NET, AS ABOVE.*** Please. call for clarification.

REMEMBER: WE ONLY HAVE ***20 BUSINESS DAYS*** TO ANSWER FOIAs Doing FOIAs is not a luxury -- it's the law!

I WILL GIVE *MINI-FOIA TRAINING SESSIONS* AT ANY TIME FOR YOUR STAFF. JUST CALL VICKI TO SCHEDULE

Administrative Costs must be calculated for EACH FOIA, based on your actual hourly salary - *for actual time spent, per MINUTE* for ALL those that worked on the FOIA. (This is turned into Congress each year.)

FOR ANY QUESTIONS CONCERNING FOIAS, CONTACT VICKI FERGUSON @ EXT. 312-6856

FOIA CHARGES - 8-FOI #_______________ **Fill out Part 2 EVEN if requester was not billed.**

1. Use this table to figure **<u>FOIA BILLABLE CHARGES</u>** to requester

Costs: Clerical Staff - $4.00/15 minutes
Professional Staff - $7.00/15 minutes
Manager's Time - $10.25/15 minutes

Pls Note: *****Must spend <u>HALF</u> of the 1/4 hour in order to bill** ****

Photocopies $.15/page (double-sided $.30)

Authentication Actual Time to Complete + $1 EACH for Seal & Ribbon

NEW: ***No Fee Charged for <$14.00***
Bills sent between $14.01-25.00,<u>NO</u> **payment assurance required**
<u>Assurance</u> of payment from requester for amounts >$25.00
******* CHARGES OVER $250 MUST BE PREPAID *******

Time	**Amount** $	**Task**
		Search & Review
N/A		# of copies (<u>color copies extra</u>, computer copies too)
		$2.00 Cost of Disk/Mailer
		Computer Time-<u>Not</u> our Personal Computers
		Authentication Time + $1 Each for Seal & Ribbon
TOTAL	$	

2. Use this table to figure **<u>ADMINISTRATIVE COSTS</u>** to government.

When billable costs DO NOT meet billing threshold, only fill in Admin. Cost Section

Administrative cost figured in **1 minute increments** x **<u>employee salary</u>** **- FOR ALL EMPLOYEES INVOLVED IN RESPONDING TO FOIA**. **<u>NOT</u> BILLED TO REQUESTER**.

Time	**Amount $**	**Task**
		Initially read FOIA
		Search & Review
		Copying time/costs ($.15/page)
		Authentication
		Phone call(s) to REQUESTER
		Phone calls to FOIA Office, colleagues, attorneys
		Typing & proofing letter/envelope
		Proof & Sign FOIA + **ALL** Concurrences
		"Other" time spent on FOIA
		Computer Time/Programming Costs
		Maps/Disks/CD ROM, Photos, Etc. Costs
TOTAL	$	

Complete & return to **<u>your ARAship's</u>** ***<u>FOIA COORDINATOR</u>*** with a <u>copy</u> of FOIA closeout letter.

<u>Preparer's name -- Printed</u>:

____

EPA FOIA POLICY: **To make the fullest possible disclosure of information without Unjustifiable expense or unnecessary delay to any requestor.**

FOIA AUTHORITY: 5 U.S.C. 552–EPA REGULATIONS TITLE 40 CFR, CHAPTER 1, PART 2
SEE EPA FOIA MANUAL 1550 FOR ADDITIONAL GUIDANCE

CHARGES EXCEEDING $250.00 ARE TO BE PREPAID BY REQUESTER!!

FOIA EXEMPTIONS

FOIA establishes nine exemptions which provide the only basis for withholding information. The exemptions may apply singly or in combination to a given request.

EXEMPTION 1 Matters of National Defense or Foreign Policy

EXEMPTION 2 Internal Agency Rules

EXEMPTION 3 Information Exempted by Other Statutes

EXEMPTION 4 Trade Secrets, Commercial, or Financial Information (Confidential Business Information)

EXEMPTION 5 Privileged Inter- or Intra-Agency Memoranda

EXEMPTION 6 Personal Privacy

EXEMPTION 7 Records or Information Compiled For Law Enforcement Purposes

EXEMPTION 8 Records of Financial Institutions

EXEMPTION 9 Geological or Geophysical Information and Data Concerning Wells

FOIA FEE SCHEDULE

Manual and Computer Search for Records:
EPA Employees: for each 1/4 hour or portion thereof:
Clerical: $4.00/15 min.
Professional: $7.00/15 min.
Manager's: $10.25/15 min.

Contractor Employees:
Actual charges up to but not exceeding the rate charged had EPA employees conducted the search.

PLUS: Contractor operators (actual charges up to but not exceeding the rate charged had EPA employees conducted the search).

PLUS: Actual computer resource usage charges.

<u>Search/Review of Records (EPA Employees)</u>:

NEW: Charged for **each** 1/4 hour; must spend **HALF of the 1/4 Hour In Order to Charge**:

Reproduction of Documents:
(Paper copy of paper original): $0.15 per page
Computer Printouts: $0.15 per page

Certification or Authentication of Records
(by Office of Regional Counsel): **Actual Cost**!

FOIA FEES (continued)

FEES WILL BE ASSESSED ACCORDING TO THE 4 CATEGORIES OF REQUESTS:

<u>COMMERCIAL USE REQUEST</u>:
Requestor charged for search, review, and duplication costs.

<u>EDUCATIONAL AND NON-COMMERCIAL SCIENTIFIC INSTITUTIONS</u>
Requestor charged for duplication costs **excluding the first 100 pages (NO fee will be charged for search or review time)**.

<u>REPRESENTATIVES OF THE NEWS MEDIA</u>
Requestor charged for duplication costs **excluding the first 100 pages (NO fee will be charged for search or review time)**.

<u>ALL "OTHER" REQUESTS</u>:
Requestor charged for search and duplication time **excluding the FIRST 2 hours of search time and the FIRST 100 pages of duplication.**

No fee will be charged if the total fee under any category is less than $14.00.

EPA-1919

Reid Rosnick/DC/USEPA/US

02/16/2011 09:16 AM

To Beth Miller

cc

bcc

Subject Sub W

Subpart W Quarterly Conference Call Notes - 010511.docx

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Subpart W Quarterly Conference Call w/ Interested Stakeholders

January 5, 2011

ATTENDEES

EPA: Reid Rosnick, Angelique Diaz

CCAT: Sharyn Cunningham, Paul Carestia, Anita (?), Lynn (Holtz) Minasi, Kay Hawklee

Industry: Oscar Paulson (Kennecott), Josh Leftwich (Cameco), Katie Sweeney (NMA), Jim Cain (Cotter), John Cash, Penny Goppler (Ur Energy), Tom Pout & Nick Billstein (Strathmore)

Sarah Fields (Uranium Watch)

Steve Brown (SENES)

Jan Johnson (Tetratech)

Travis Stills, Energy Minerals Law Center

Reid: Overview of what we've been working on since last conference call

Risk Assessment from Contractor

- Workgroup comments due 1/18/2011. March/April for final document. Peer review process when finalized
- Oscar: when peer reviewed, will the group that peer reviews this be the same group 192 was soliciting nominations for? Reid – possibly, but we haven't solicited nominations yet for Subpart W.
- Oscar: When contractor did the risk assessment, what input was considered in the risk assessment? Were epidemiological studies by John Boice (?) of Vanderbilt used? Reid – don't believe they were included. Described the data used and the acceptable risk from previous study. *Update – Reid has located a paper co-authored by Dr. Boice titled "Cancer incidence and mortality in populations living near uranium milling and mining operations in Grants, New Mexico, 1950-2004." I would be interested in knowing if this is the study Oscar mentioned.*
- Paul: Cotter assumptions are "wrong and absurd" – majority covered by water was the assumption
- Jim: Wasn't contacted by contractor
- Oscar: Data from 1969 exists. Provided substantial data to S. Cohen.

- Steve: GEIS for ISL from NRC has an "excellent summary"
- Basically, everyone is saying that actual site-specific data should be included.
- Oscar: concerned about the validity of the data. He said he sent Reid corrected data for the Sweetwater site.
- Steve: there needs to be an opportunity for the site operators to comment on the validity of the data. Reid – that opportunity will be given
- Travis: data should be on website. Reid – Document is in draft form and comments from workgroup must be addressed. Nothing will go on website that doesn't reflect current ideas. Travis: just the data should be available to the public and thinks per the agreement the data should be on the website. Reid – spirit and intent of consent agreement being followed, but we want to make sure what is on the website is valid and not misleading.
- Process for Peer Review: Internal nomination process but reviewers may not be internal. Oscar – EPA put together a 40 CFR part 192 peer review group and in that case there was a solicitation in the FR for nominees from the public. Reid – that may be the route that we take, Reid will take to management.

Economic Impact Analysis

- Katie: how can we know the benefits and impacts if we don't know what is proposed? Reid – about to say that progress is slow for this document because we don't have all the necessary data yet.
- Economist on staff (Val Anoma) has taken over the contract

National Academy of Sciences Committee on U Mining in Virginia

- Reid – summary of committee's role
- Oscar – Texas data will be applicable to Virginia because of the high moisture
- Travis – encouraging that we are looking at relationship between mining and milling and we should be looking at Subpart B revision and cumulative sources should be looked at. Hope we are looking at both from a rulemaking perspective. Reid – Subpart B is a separate and distinct regulation and in the review/revision of Subpart W we won't be addressing Subpart B in this rulemaking.
- Sarah – in Paradox valley we have a proposed uranium mill with a surface mining operation (Cotter) and under Rad NESHAPs there is no standard for Rn released from surface mining operation, thinks that in Subpart W should take into consideration the radon from uranium mines in the vicinity of the uranium mill.
- Travis – widely held view that regulations as they stand do not protect resources, human health and the environment as required by the CAA. Thinks that as they stand the provisions of other Subparts are in sufficient.

- Sarah – thinks we should also look at particulate emissions from other sources at the mill and we should look at all radionuclide sources from a mill when considering risks from radon. Should look at the whole operation and what the community is being exposed to.
- Oscar – particulate emissions already regulated under AEA by NRC under 10 CFR Part 20, specifically related to dose limits to general public and nearest resident.
- Steve – 100mrem/yr includes particulates and radon in NRC regulations
- Reid – Particulates already accounted for and not included as part of Subpart W review

Reid's Follow-ups

- Why Cotter not contacted (will verify if S. Cohen spoke with CDPHE or NRC) *Update: As soon as funding is in place, SC&A will be contacting Cotter and open dialogue with Kennecott. Others are invited to share data.*
- Peer review information/process. *Update: Management will be making a determination on whether the peer review will be internal or external.*
- Exploring issue of impoundments in area where precipitation exceeds evaporation Oscar – look at two conventional operations in Washington where there is substantial precipitation (in Eastern Washington) Jim Cain – where was meteorological data obtained? Cotter has data.
- Travis – inadequacies in Subpart A expressed, namely the lack of a public comment requirement - Reid – if we had sufficient resources we'd look at NESHAP Subparts A, B, etc. now. As such, those portions will have to wait.

Next call. 4/7/2011, 11am EST

EPA-4700

Tony Nesky/DC/USEPA/US

02/22/2011 03:57 PM

To Andrea Cherepy

cc Loren Setlow, Daniel Schultheisz, Tom Peake, Glenna Shields

bcc

Subject Materials from 192 Public Outreach Meetings: Meeting Reports and Submissions from Texas Meetings:

Dear Andrea:

Per our discussion in this morning's meeting, I am attaching *draft* reports from the public outreach meetings in Tuba City, AZ, and Corpus Christi, TX. A final report from the Casper and Denver meetings is also attached.

The other attachments were submitted to us by speakers at the Corpus Christi meetings.

Tony Nesky
Center for Radiation Information and Outreach
Tel: 202-343-9597
nesky.tony@epa.gov

UEC-Reclaimed-Sites-of SoTX.pdf Senes-Exisiting192std-is-protective.pdf

SierraClub-Statistical-Critique-GW-Sampling-Aquifer-Exemption.pdf STOP-Ur-MiningIssues-KleburgCoTX.pdf CorpusReport-Draft.doc

TubaCityReport-Draft.doc EPA 40 CFR 192 Review - Public Information Meetings Report FINAL.pdf

Reclaimed ISR Sites of South Texas

UEC
Uranium Energy Corp

Successful Legacy of In-Situ Recovery

One of the best kept secrets in Texas is that uranium has been continually mined since the late 1950s. Uranium mining was initially conducted by open-pit mining followed by conventional milling to produce “yellowcake” which is harnessed to produce electrical energy in nuclear power plants.

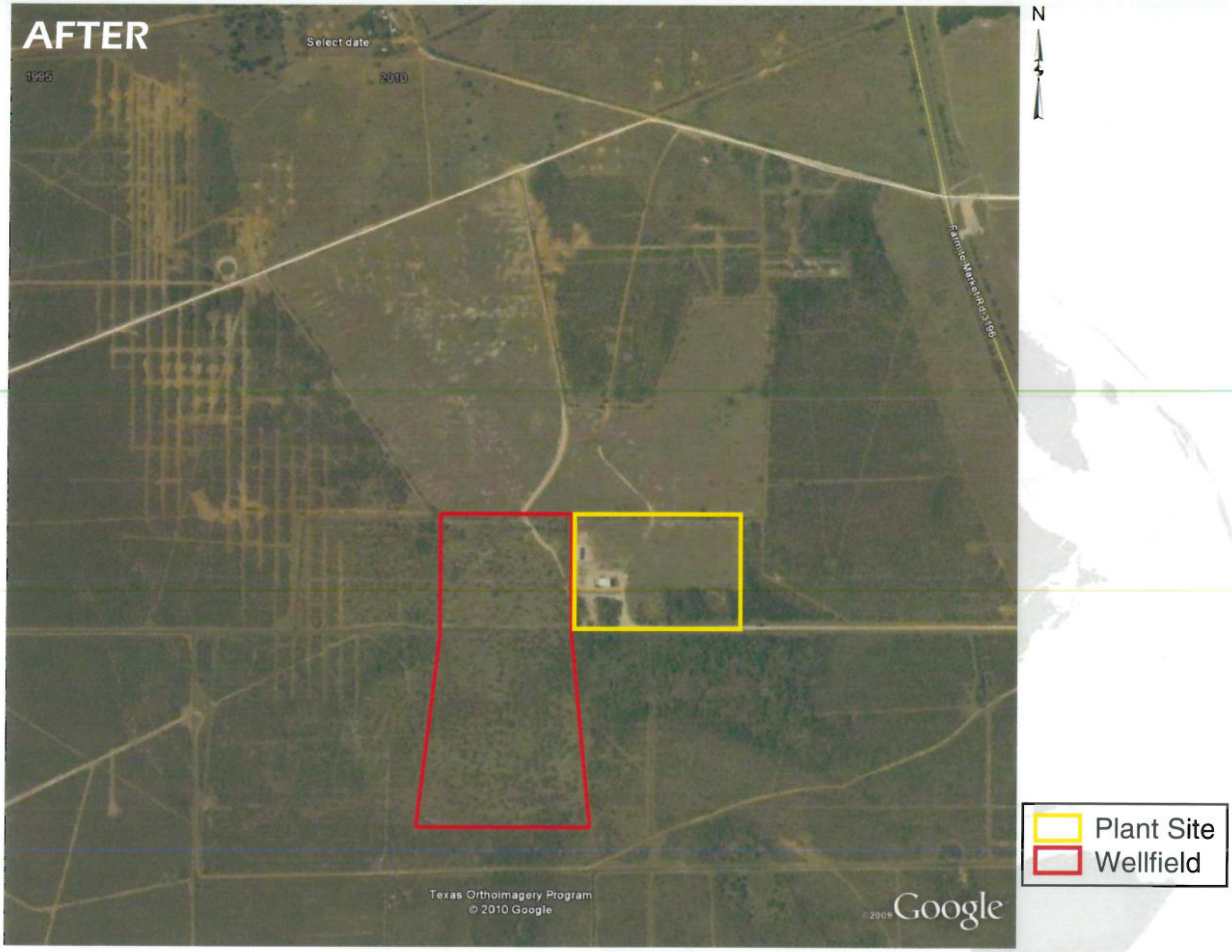
In the early 1970s, a new environmentally sensitive means of extraction was developed in South Texas addressing concerns about the disturbance of the surface of the land, dewatering portions of the aquifer to enable men and equipment to work beneath the surface, and later forming vast areas of mill tailings from the processing of ores. It was at this time that South Texas gave birth to ***In-Situ Recovery (ISR)*** and has ever since been the ISR capital of the western world.

The following images were compiled from archived and recent photographs, as well as satellite imagery over a decade of licensed ISR operations in South Texas. In each case, groundwater was restored consistent with baseline quality and approved by the Texas Commission of Environmental Quality (TCEQ). Subsequently each wellfield and all associated physical structures and equipment were reclaimed and the land returned to the surface owner for “unrestricted use.” Surface reclamation was regulated and final approval was overseen and approved by the TCEQ. The illustrations presented show either cleared land supporting cattle operations and/or reclaimed brush suitable for nature habitat to populate.

Unless you were intimately associated with one of the projects illustrated in the following pages and knew its original location, the existence of prior mining in all these examples is non-detectable.

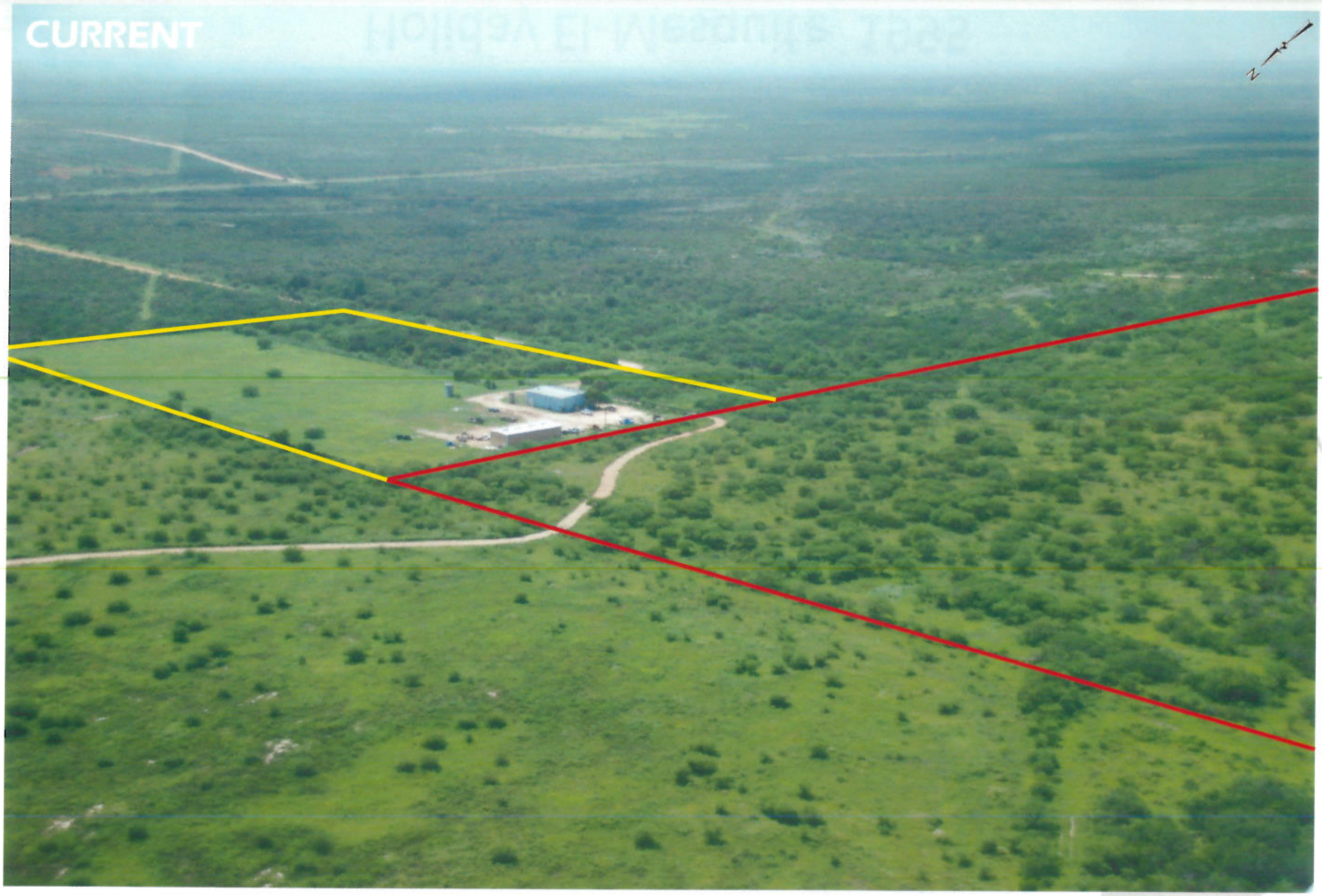
These are successful mining legacies that are quietly unheralded, and optically undetected for all the obvious reasons.

Uranium Energy Corp



Palangana 2008

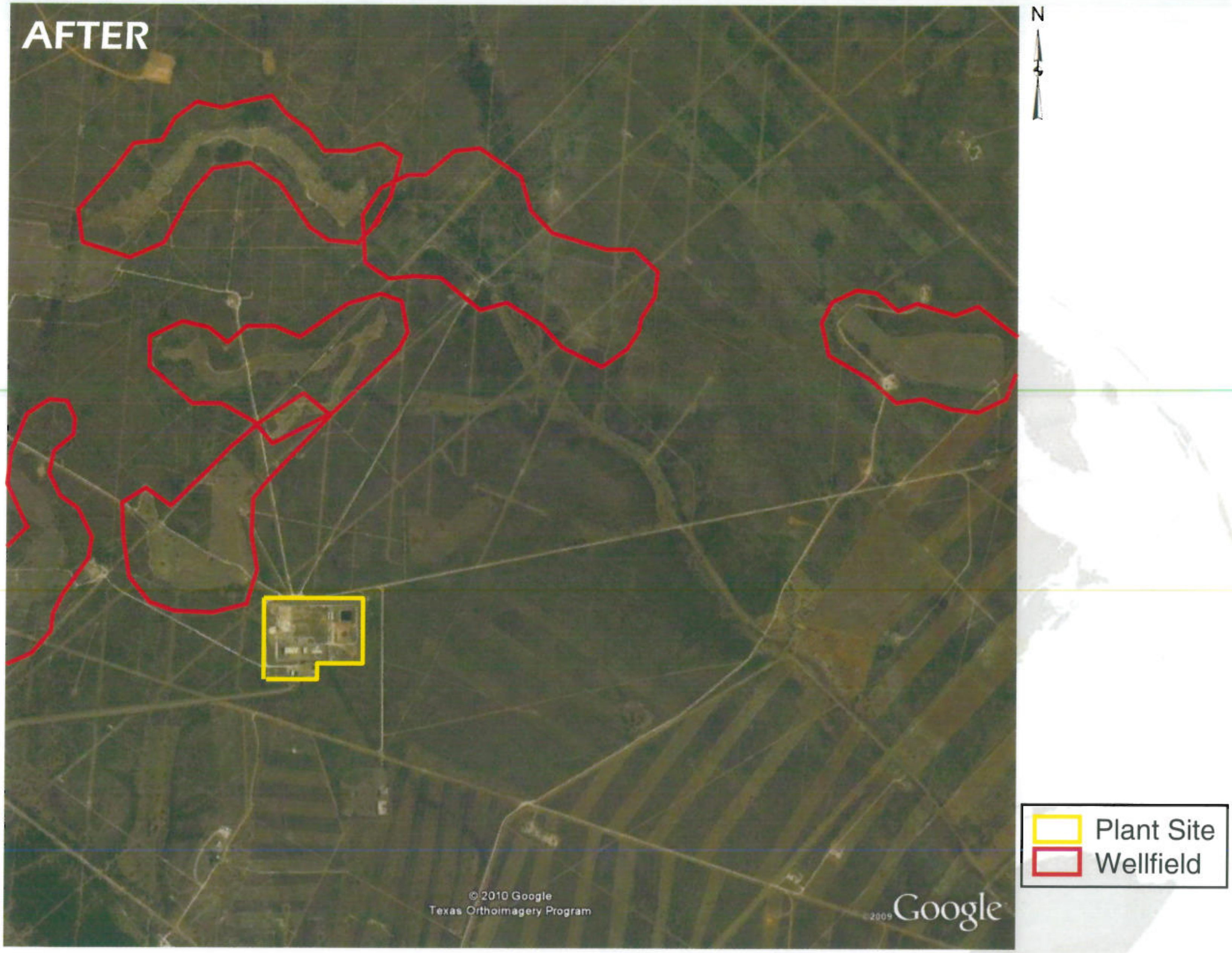
Uranium Energy Corp



UEC
Uranium Energy Corp

UEC, Palangana 2010

Plant Site
Wellfield



Uranium Energy Corp

Holiday El-Mesquite 2008

Holiday El-Mesquite 2010

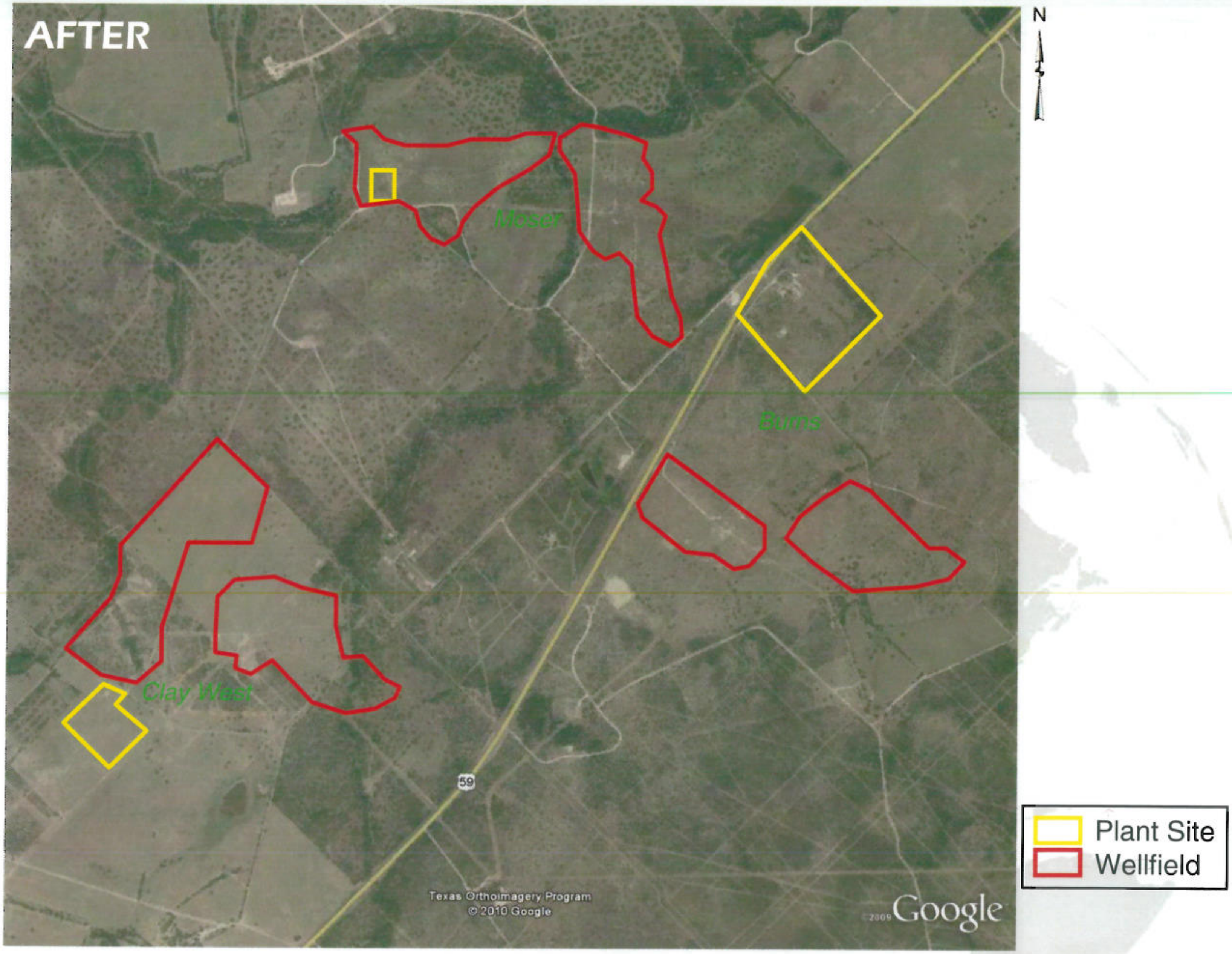
Plant Site
Wellfield

UEC
Uranium Energy Corp

Uranium Energy Corp

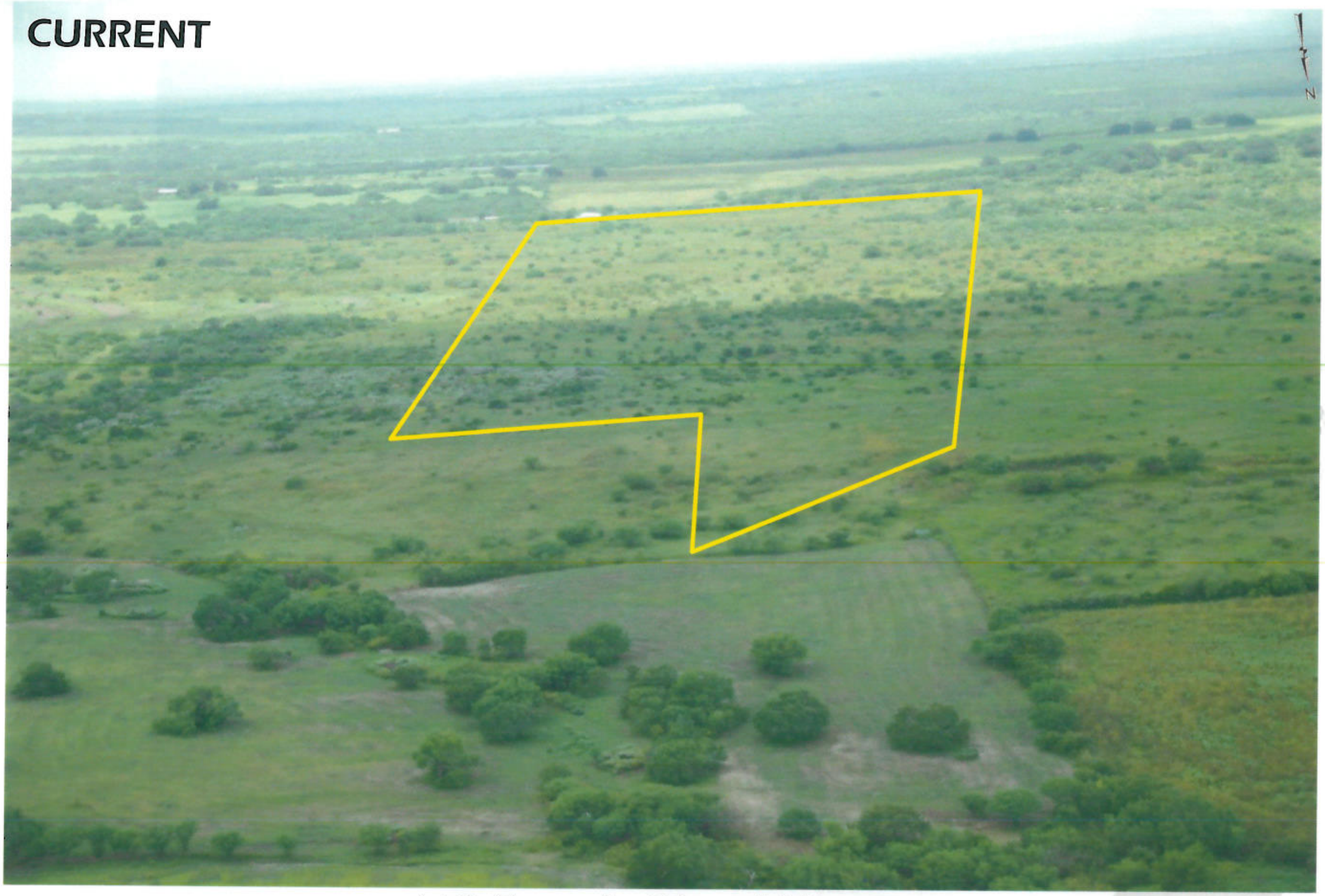
Holiday El-Mesquite 2010

Plant Site
Wellfield



Uranium Energy Corp

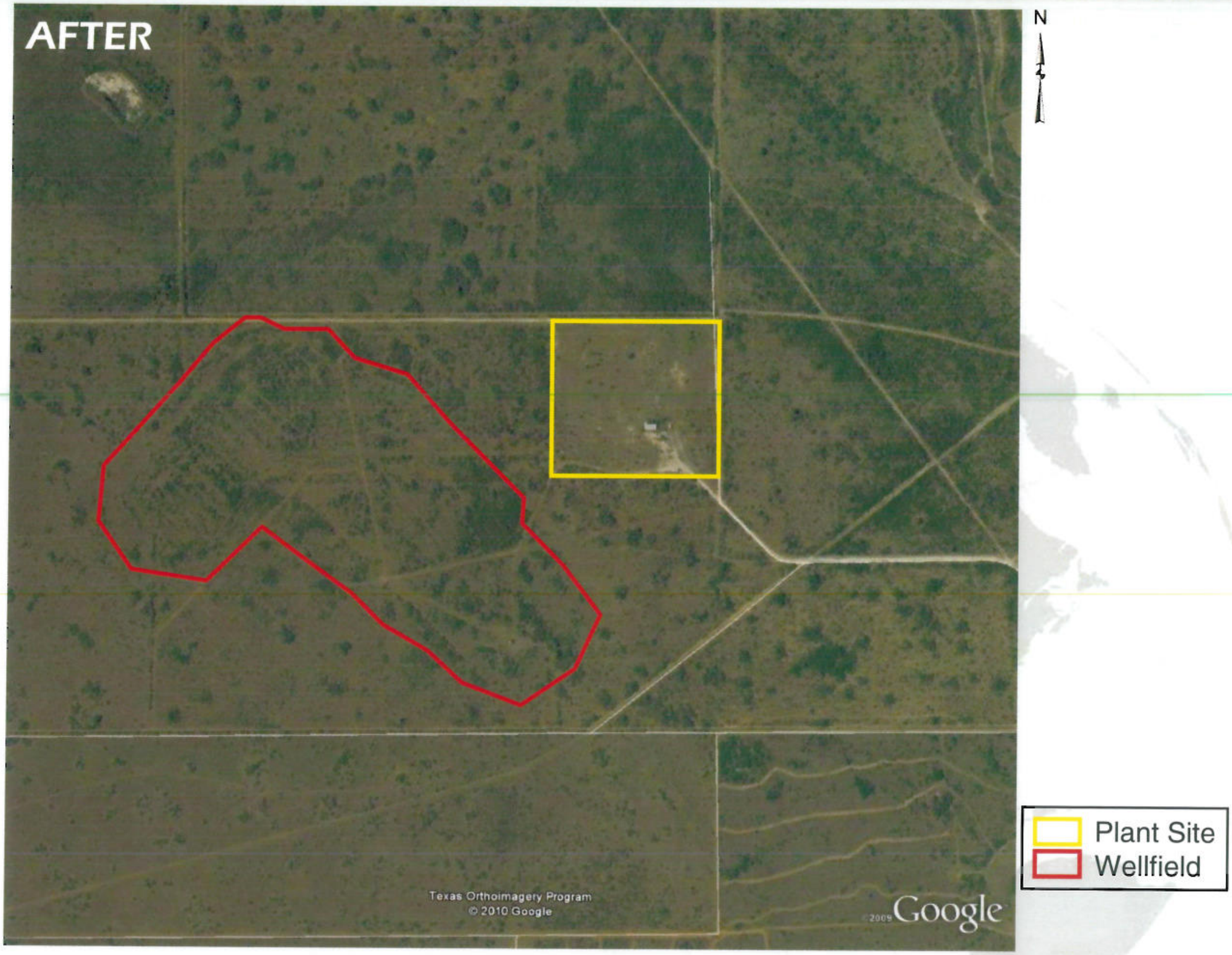
US Steel, Operations 2008



US Steel, Clay West Processing Plant 2010

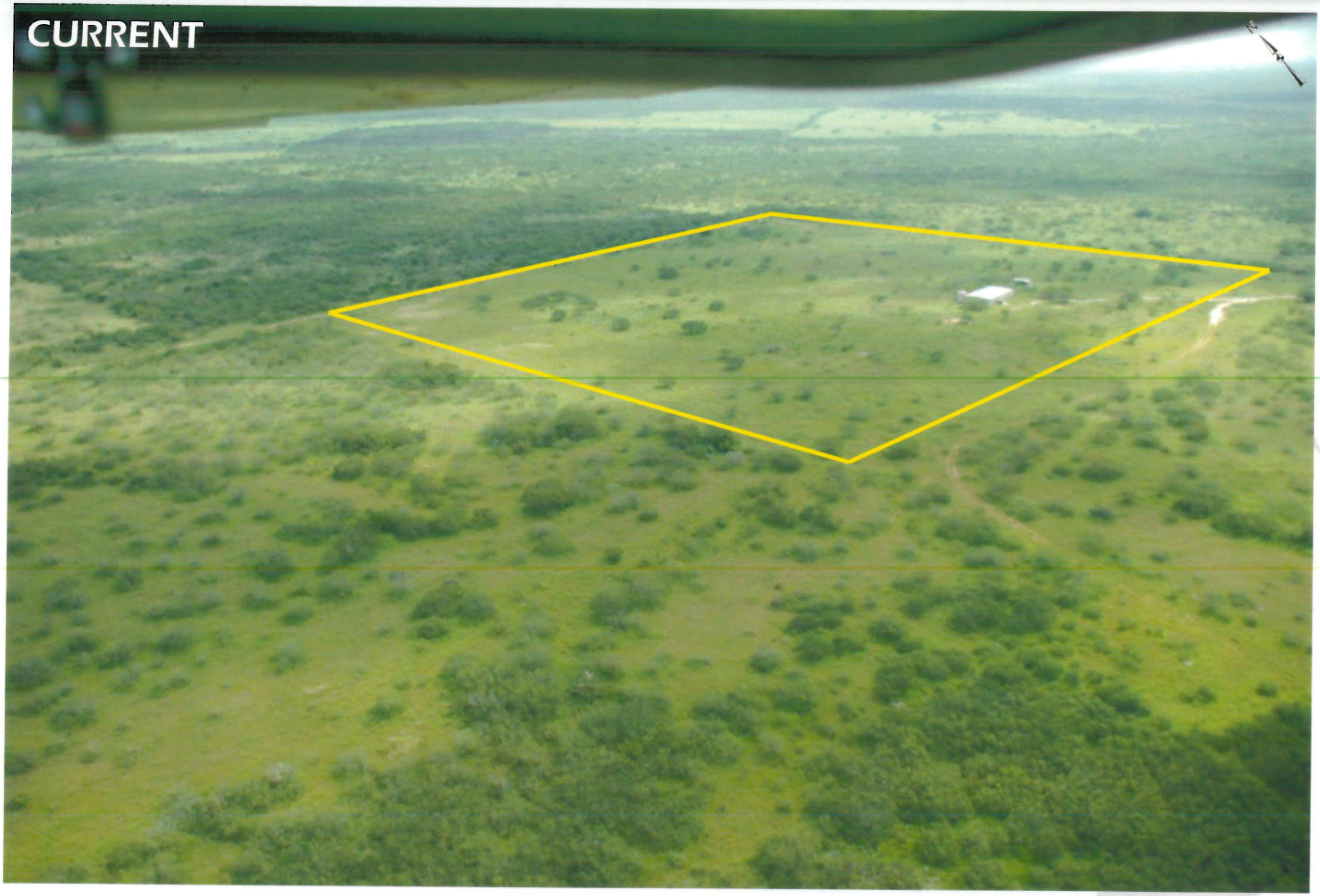
Plant Site
Wellfield

Uranium Energy Corp



Uranium Energy Corp

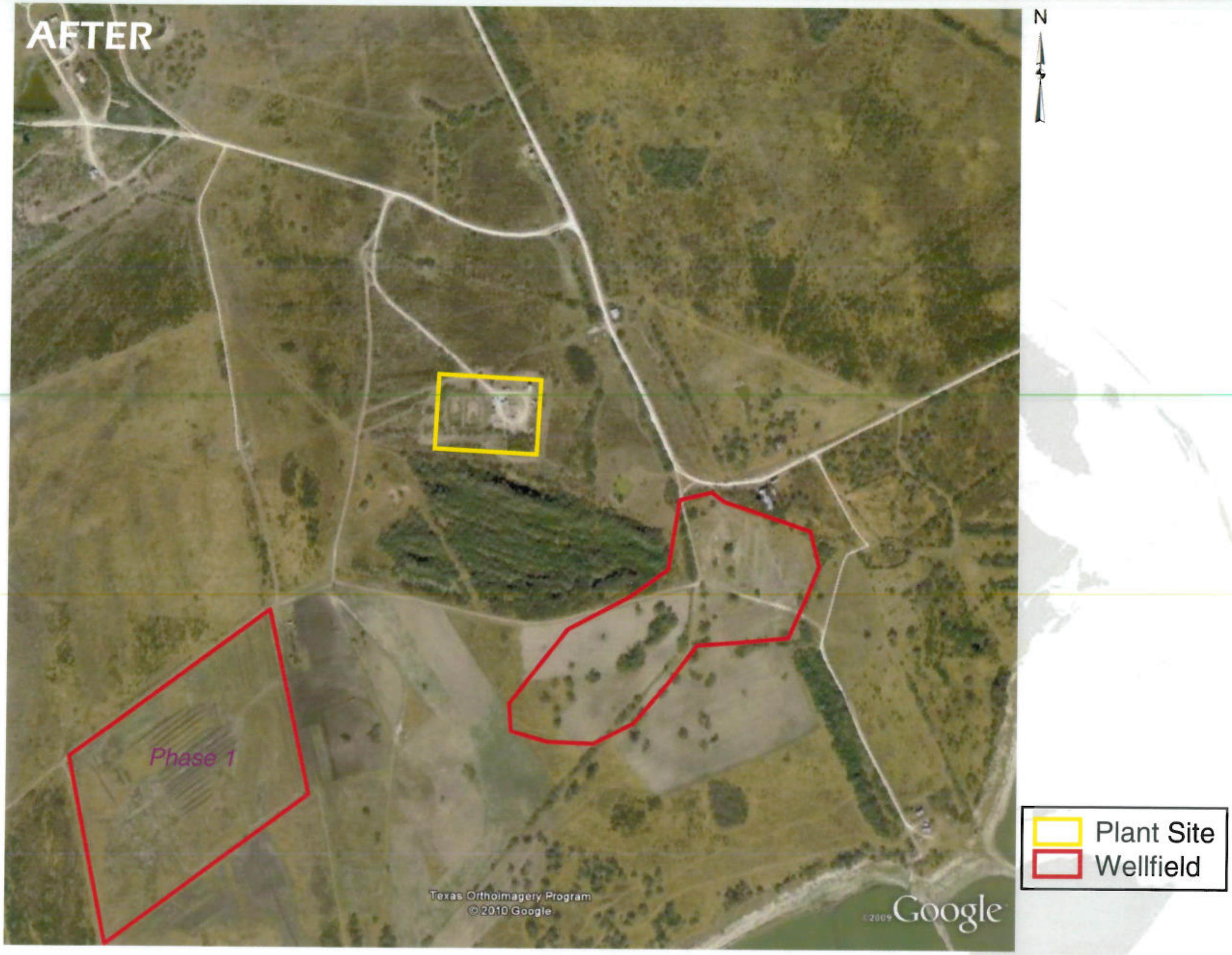
Conoco, Trevino 2008



UEC
Uranium Energy Corp

Conoco, Trevino 2010

Plant Site
Wellfield

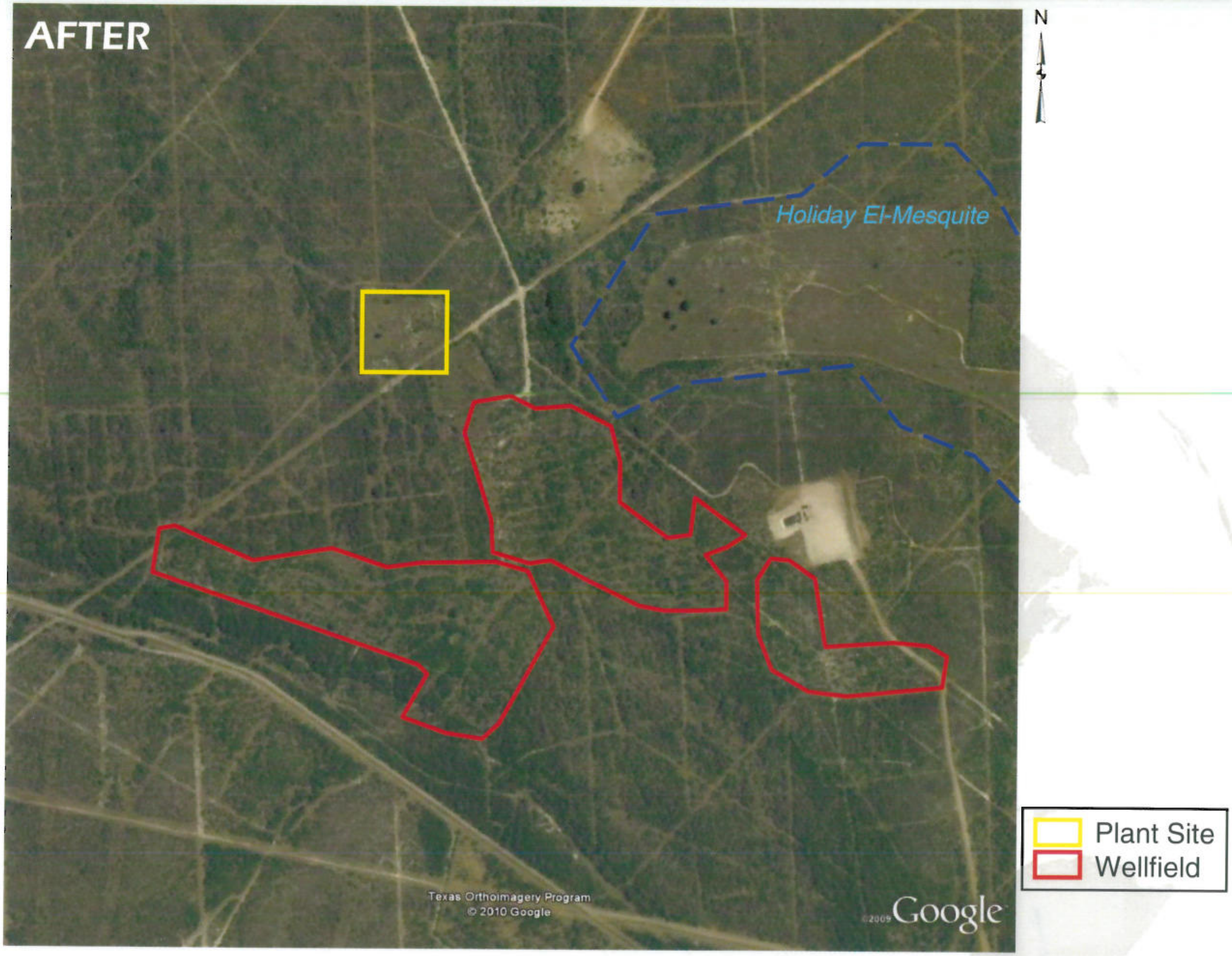


Uranium Energy Corp

Everest, Mt. Lucas 2009

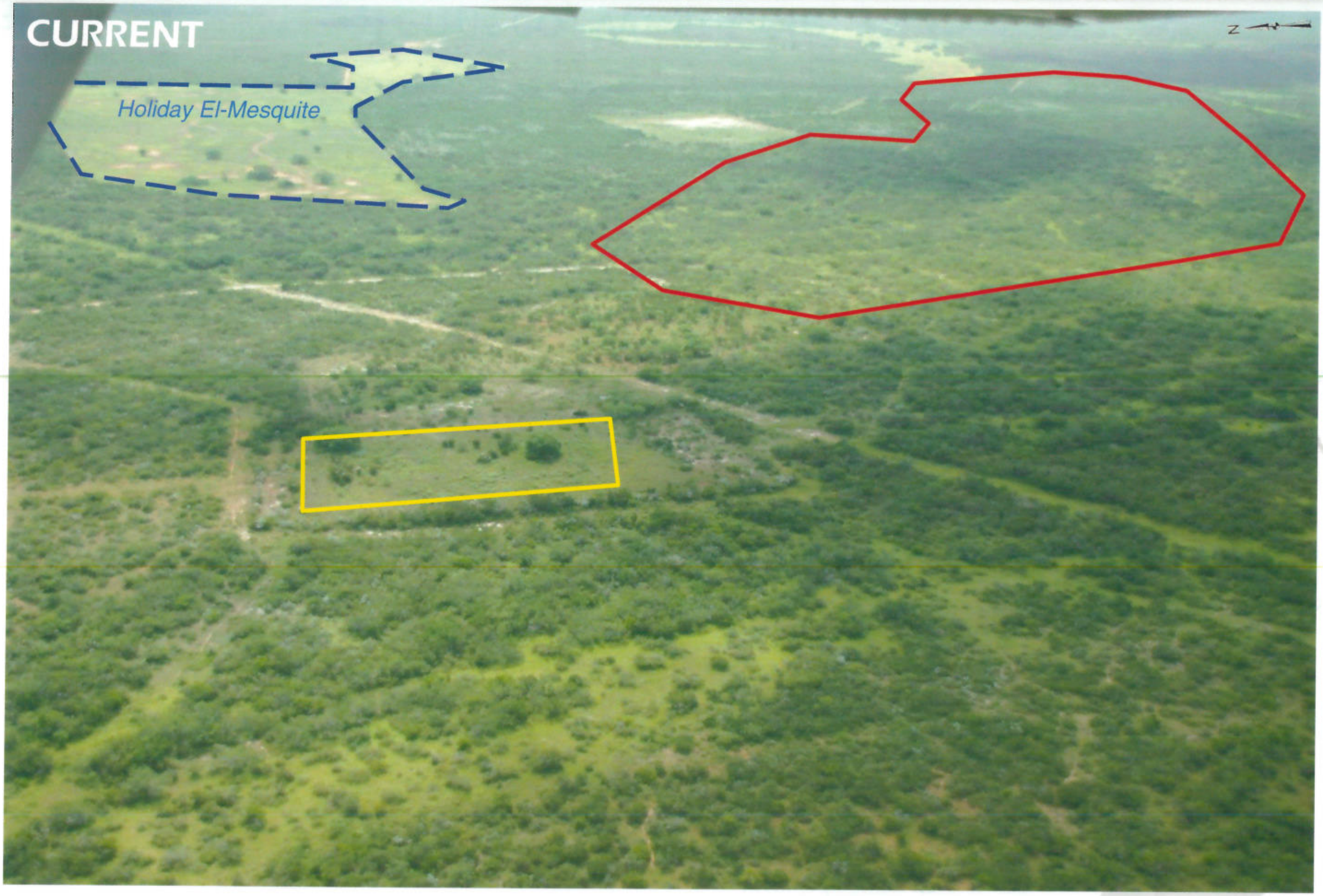
STMV, Mt. Lucas 2010

Plant Site
Wellfield



Uranium Energy Corp

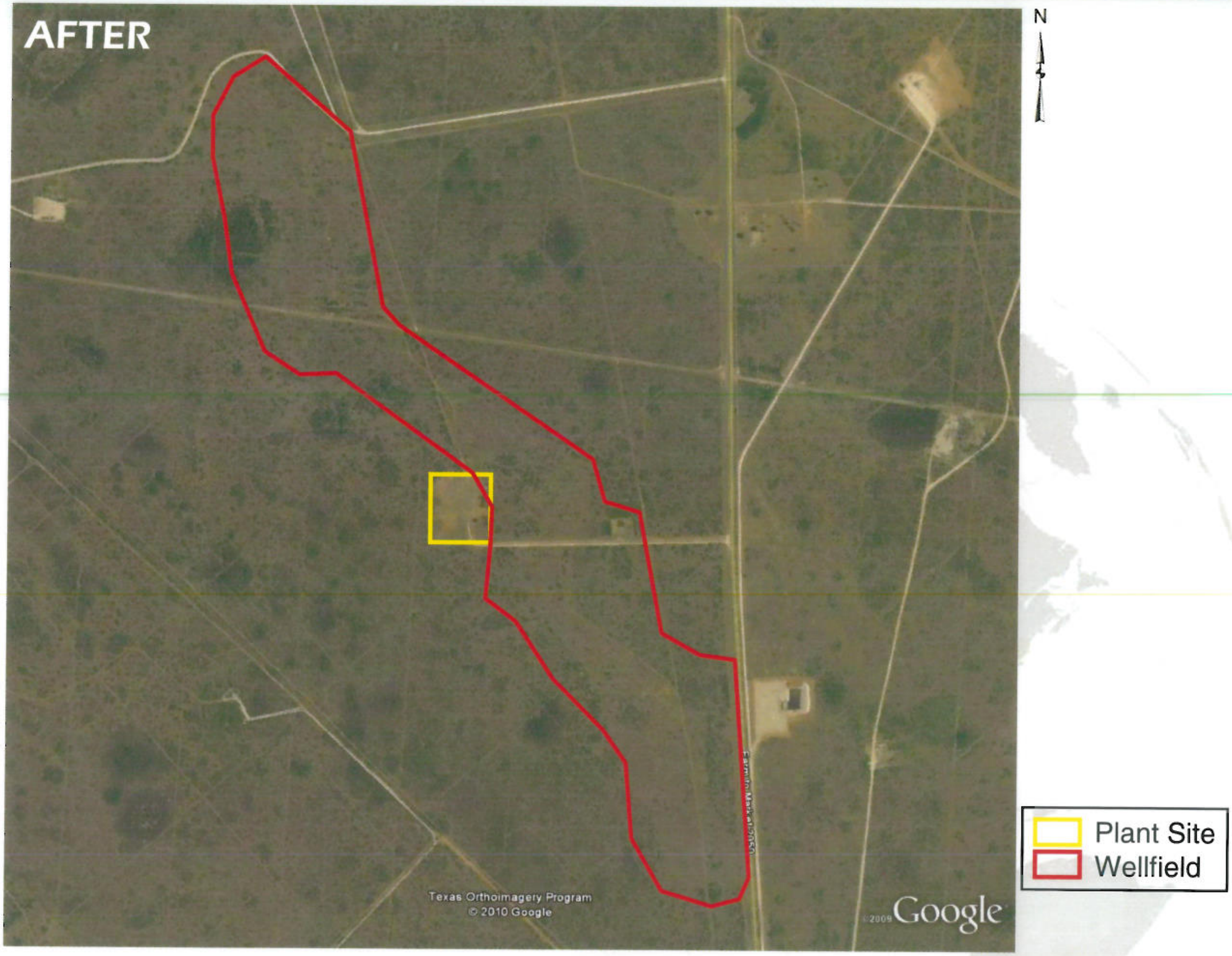
URI, Benavides 2008



URI, Benavides 2010

Plant Site
Wellfield

Uranium Energy Corp



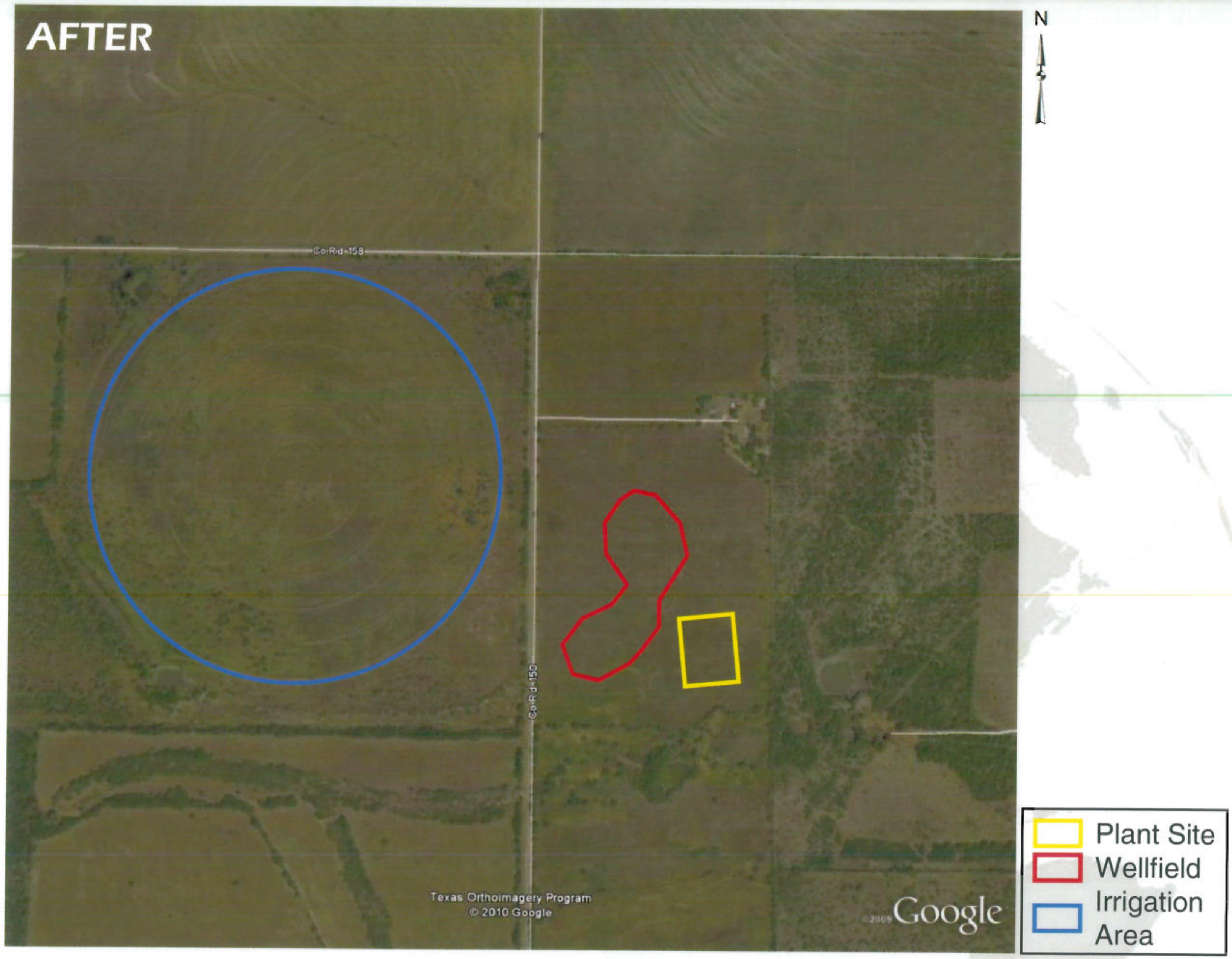
Uranium Energy Corp

Tenneco, West Cole 2008

Uranium Energy Corp

Plant Site
Wellfield

Tenneco, West Cole 2010



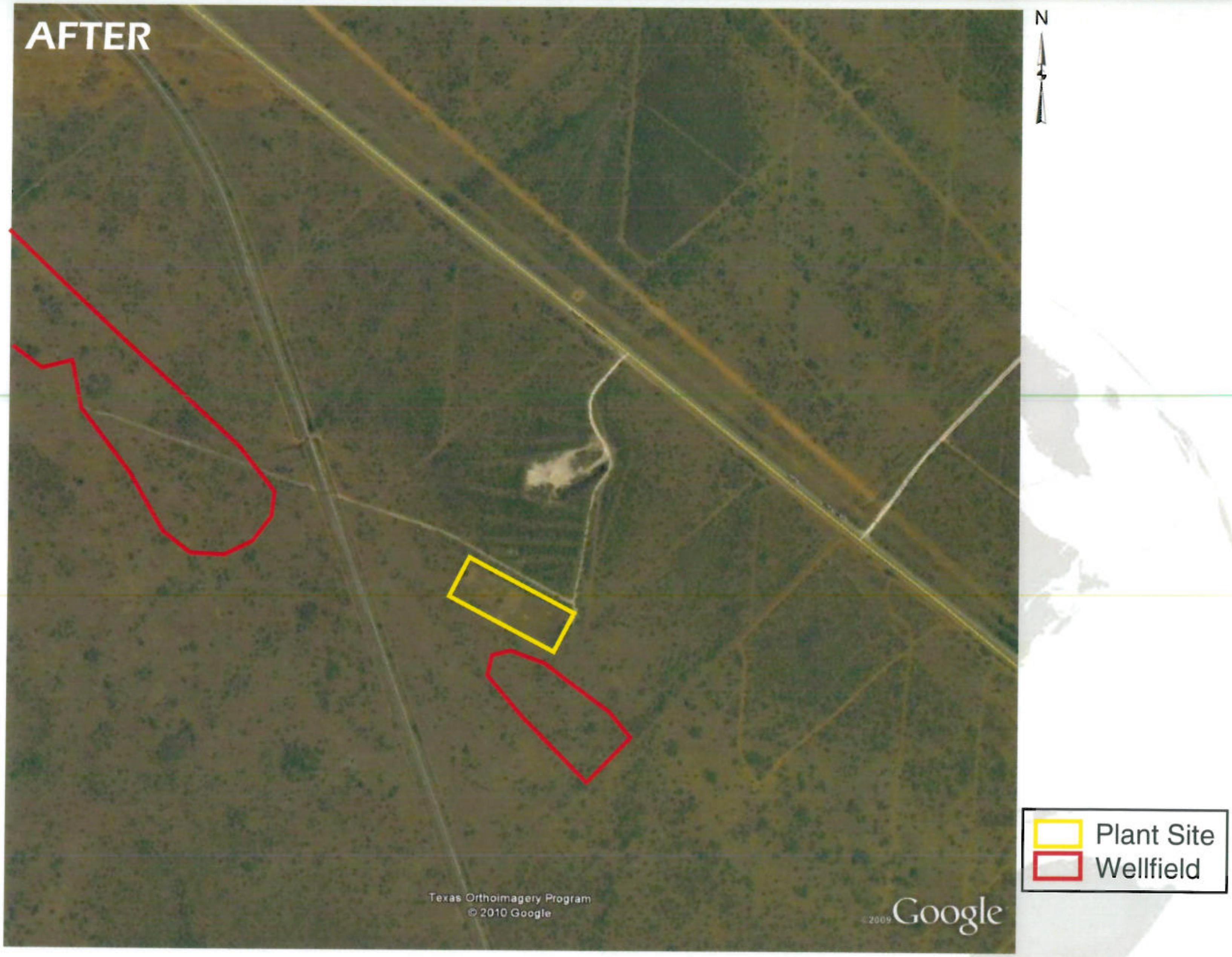
Uranium Energy Corp

IEC, Pawnee 2008

Uranium Energy Corp

IEC, Pawnee 2010

Yellow	Plant Site
Red	Wellfield
Blue	Irrigation Area



Uranium Energy Corp

URI, Bruni 2008

Uranium Energy Corp

URI, Bruni 2010

Plant Site
Wellfield

Uranium Mining Issues in Kleberg County, Texas

Introduction and History

From 1983 to 1988 there were many discussions and meetings held to consider the advisability of in-situ uranium mining in Kleberg County, Texas. One group of landowners and citizens organized to strongly oppose uranium mining because of the possible dangers of water contamination and health related illnesses. But in spite of many citizen objections the Texas Commission on Environmental Quality (TCEQ) granted Uranium Resources, Inc. (URI) a mining permit in1988.

Permit Requirement

TCEQ's in-situ uranium mining permits require that **water quality in the aquifer be restored to pre-mining conditions**. However, technical experts and uranium miners agree that this is not possible. They say once the mining field is disturbed by the injection of oxygen or other chemicals which cause the precipitation of uranium and other toxic chemicals, small amounts of oxygen remain in the aquifer sediment layers and cannot be totally removed by the restoration process. Hence, there will always be a slow release of uranium and other toxic chemicals into the aquifer. This renders the mining permit standard of returning the water to its original quality unachievable. **Our question is...why issue a uranium mining permit, if technical experts and miners themselves agree that pre-mining water quality standards can not be achieved?**

Restoration

TCEQ's mining permit for Kleberg County contained a five year mine plan that included initial mining, water restoration, water stabilization and surface reclamation. **During the last 22 years URI has mined in three separate Production Authorization Areas (PAA) but they have failed to complete water restoration in any of the three areas and they have yet to establish water stabilization and surface reclamation in any of the three areas.** According to URI's quarterly restoration reports they have 19 well fields to restore in the three PAA's and as of the end of the Second Quarter of 2010, eight well fields have been restored, four are in progress and restoration activities are yet to begin in seven well fields. They predict it will take until September of 2013 to conclude the water restoration, stabilization and surface reclamation of all areas. **Our question is...what can be done to prevent them from delaying restoration for another 20 years?**

Restoration Amendments

According to TCEQ documents **over 95% of uranium miners have asked TCEQ for restoration amendments** to their restoration tables at least once and in some cases, several times. It seems TCEQ has granted all requests. When TCEQ was asked why not force mining companies to meet their original water restoration table values, they commented it would be too costly as regards labor expenses for mining companies and the extended restoration process uses up too much of the limited supply of groundwater. As mentioned above URI"s mining permit plan contained a five year mine plan that included initial mining, water restoration, stabilization and surface reclamation but they have continuously ignored the plan. **Our question is...what can EPA do to enforce URI to comply with water restoration as contained in the mine plan requirements?**

Contested Case Hearings

A Public Hearing (Contested Case Hearing) was granted to STOP (South Texas Opposes Pollution) by TCEQ and conducted from August 1-5, 2005. STOP presented numerous issues for consideration to TCEQ's assigned State Office of Administrative Hearings (SOAH) judge. The judge accepted two of STOP's issues, i.e., installation of more monitoring wells to detect excursions and to restore water quality in Production Authorization Area (PAA) One before proceeding to mine in Area Three.

TCEQ Comissioners met in February 2006 to consider the decisions of the SOAH Administrative Judge. After some brief discussions with the TCEQ staff, the **TCEQCommissioners over-ruled the Administrative Judge on both findings.** In addition, there are other examples where the TCEQ Commissioners have over ruled their own staff and the Administrative Judges' recommendations. This seems to indicate that citizen involvement in Contested Case Hearings as outlined by TCEQ is meaningless.

Conclusion
It is our understanding that TCEQ is responsible to monitor and enforce URI's mining permit requirements and regulations but it is apparent after 22 years they have not done their job. **STOP would like to request that EPA conduct a complete investigation of URI's mining operations in Kleberg County, report their findings, and establish some corrective enforcement measures with timeline requirements. After 22 years of frustration we need your help. What can you do to help us?**

Submitted by South Texas Opposes Pollution (STOP)
Mark M. Walsh, Secretary/Treasurer
3931 Boyd Ave.
Kingsville, Texas
Kleberg County, Texas

EPA MEETING COMMENTS RE URANIUM: CORPUS CHRISTI NOV. 4, 2010

My name is Venice Scheurich.
I am the Conservation Chair of the Coastal Bend Sierra Club.

My remarks will pertain to statistical methodology used in deriving estimates for the Restoration Table standards for post-mining groundwater restoration. I have some expertise in both applied and mathematical statistics, and have included a copy of my CV with these comments.

Four years ago, when uranium companies intensified their interest in mining in several South Texas counties within our region, the Coastal Bend Sierra Club began studying the in situ mining process.

I believe the discoveries we made on statistical matters have an important connection to whether EPA is properly administering its mandate in the *Safe Drinking Water Act.*

I believe this because the statistical documentation attached to the following comments indicates that pre-mining baseline groundwater quality has been and is being incorrectly assessed by present State regulations.

What surfaced immediately in our study of uranium mining in Texas was the disturbing fact that post-mining efforts by companies to restore groundwater to pre-mining quality almost always failed. This was especially true for uranium. Therefore, my comments here are specific to uranium in groundwater.

In trying to understand why mining companies were not able to clean uranium out of the groundwater to levels they had agreed to when the Texas Commission on Environmental Quality (TCEQ) granted their permits, we focused on how the estimates for restoration values were obtained.

We learned that compiling a TCEQ Permit Application's Restoration Table which contains values for uranium and other components is a multi-step process.

To our astonishment, we found an extremely serious sampling design flaw in one of the very first steps of this TCEQ regulatory process.

The error is that TCEQ's regulations allow companies to *choose* locations for all baseline wells which provide samples for estimating pre-mining groundwater quality. These *selections* are made *after* the company has test results from hundreds of boreholes drilled during the exploration phase. Data from this biased, statistically invalid sample is then used in subsequent steps which are involved in establishing the Restoration Table.

I examined baseline data from three different mining applications in three different counties within our region and found that in all cases companies used data obtained from this type of biased sampling.

[SEE INSERT 1 FOR DISCUSSION.]

In addition to allowing companies to use statistically biased data sets to derive restoration standards, TCEQ's regulations also allow companies to calculate these estimated values by questionable interpretation and manipulation of the data.

To see if companies were taking advantage of this opportunity, I examined the actual results of the baseline data analyses in the three counties mentioned above. Predictably, in all three cases, the companies chose analysis and interpretation of data which tilted baseline restoration values in their favor.

[SEE INSERT 2 FOR DISCUSSION.]

And further, in reading TCEQ's responses to several sets of recent public comments, I found numerous examples of TCEQ's having recommended or defended use of erroneous statistical procedures in their uranium mining regulations found in 30 TAC Chapter 331 and in the March 6, 2009, edition of the *Texas Register* which discussed recent revisions in uranium mining regulations.

[SEE INSERT 3 FOR DISCUSSION.]

Having spent over two decades of my professional life teaching college mathematics and statistics, and having also done some statistical consulting, I found these fundamental statistical errors in the regulations perplexing.

It is disturbing that TCEQ's regulations contain no protocols to assure that samples are independent and representative, even though TCEQ's statements (March 6, 2009, *Texas Register*) repeatedly stress the importance of samples having these properties. (See INSERT 3.)

The implications of this absence of protocols are profound because statistically biased baseline samples are being used to estimate pre-mining groundwater quality. The resulting flawed process of estimating groundwater quality has a direct impact on whether EPA will grant an aquifer exemption and therefore whether the spirit and intent of the *Safe Drinking Water Act* have been violated.

Perhaps a main reason there are numerous serious statistical flaws in TCEQ's regulations and many of their official statements is, as we have learned, that the Agency employs no credentialed statisticians.

Given that EPA is responsible for granting aquifer exemptions prior to ISL mining and for enforcing the *Safe Drinking Water Act*, and given the ease with which a statistically unbiased sample of locations for baseline wells could be obtained in the production zone of the production area, the Coastal Bend Sierra Club asks the following questions:

1. What is the justification for EPA's continuing to accept estimates of pre-mining groundwater quality based on selected, biased samples when EPA makes decisions on whether or not to grant aquifer exemptions?

2. Does EPA's acceptance of flawed estimates of groundwater quality from a mining company's application for an aquifer exemption result in one or more violations of the *Safe Drinking Water Act*?

I am attaching three inserts and several additional pages of documentation to these comments to support and clarify the statement I have just made.

The Coastal Bend Sierra Club is grateful to the EPA for the opportunity to comment on this important matter.

Venice Scheurich
11/4/2010

INSERT 1

The first example discussed below uses data from Uranium Energy Corporation's (UEC's) Permit Application UR03075 PAA 1.

The company applying for a 36 acre production area authorization in Goliad County, Texas, after drilling and analyzing data from more than 230 exploration boreholes in the proposed production area, chose 10 locations for baseline wells , which yielded estimates for the initial Restoration Table values. (See attached Figure 1-4, etc., dated August 25, 2008.)

Several months later, the company chose 8 additional sites and drilled more baseline wells. Data from these 8 wells was combined with data from the initial 10 wells and yielded revised estimates which were used to construct a new Restoration Table. (See attached Figure 1-4, etc., dated March 25, 2009.)

The company claimed that this larger sample size of 18 wells would provide more accuracy in estimates. This statement is, of course, misleading and false because the sample contains selection bias, which by definition is present in a non-random, selected sample.

[NOTE: All uranium values which I cite in my inserts are in micrograms per liter whereas UEC and TCEQ usually cite values in milligrams per liter.]

Not surprisingly, uranium values were much higher (mean = 218, median = 146) in the second set of 8 wells than they were in the initial sample of 10 (mean = 33, median = 21). Note that lumping the two data sets together to obtain revised restoration values based on 18 baseline wells yielded a mean = 115 and a median = 71.

Of course, no one knows what number a valid statistical sample, based on a systematic grid or random sample would have yielded. But it is clear that UEC's methods, which TCEQ's regulations allow, produce biased estimates.

Several years ago, a similar situation occurred when Uranium Resources, Inc. (URI) applied for a permit for a production area authorization, PAA 3, in Kleberg County, Texas. (See the attached Kleberg County documents.) Initially 11 baseline wells, BL8501 – BL8511, were selected and later 16 more were added. Again, the company had drilled hundreds of boreholes and analyzed the data before selecting sites for baseline wells.

The third example is from URI's Vasquez mine in Duval County, Texas. (See the Duval County attachment.) In this case, the initial estimate of 51 for uranium in the Restoration Table was based on a selected sample of only three locations for baseline wells. Several years later, URI selected two additional sites and the data from those wells was combined with the initial three to yield a uranium estimate of 33. For this mine, only five baseline wells were used.

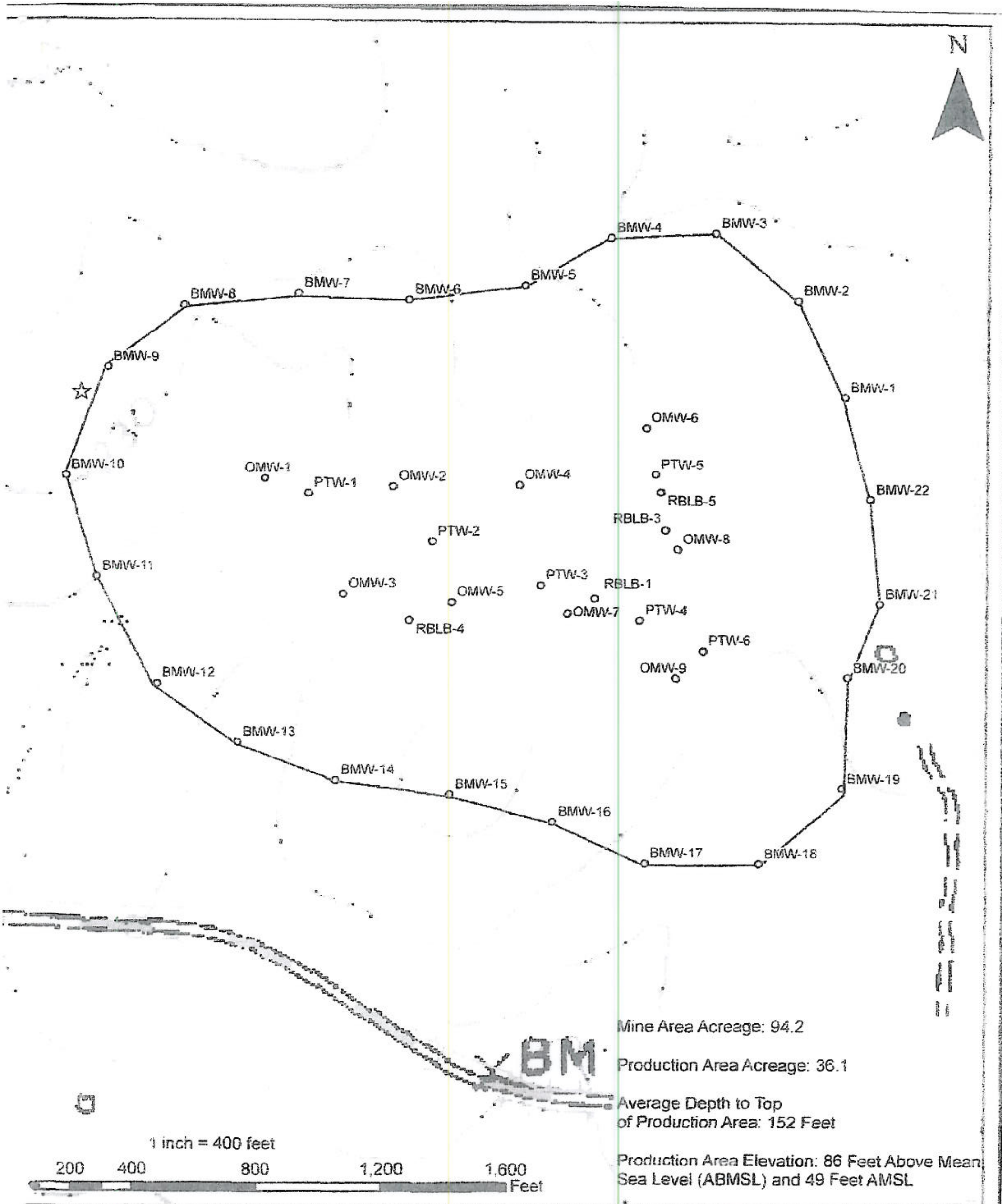


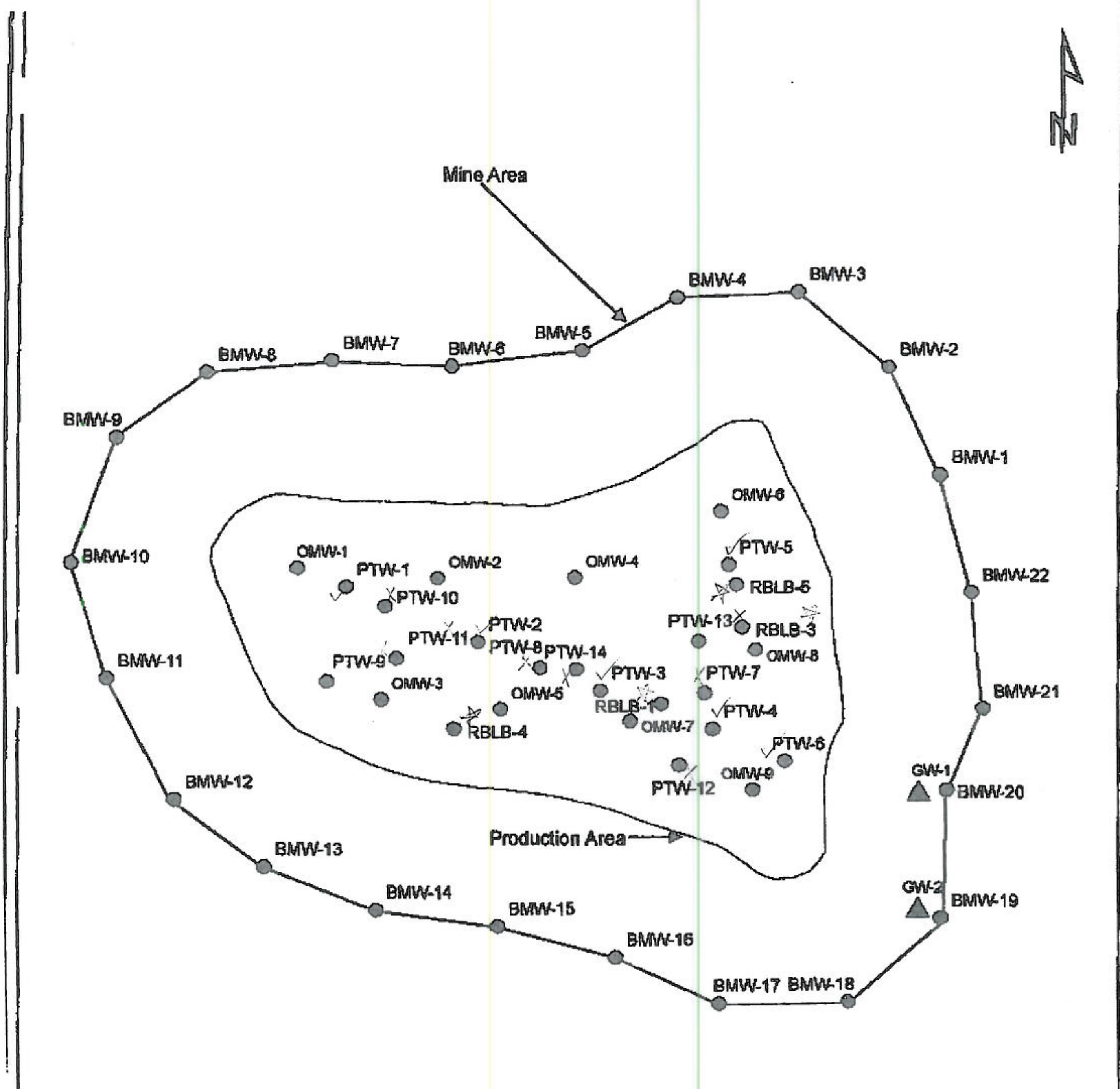
Figure 1-4 Draft **Production Area Map**	○ Baseline/Monitor Wells Production Zone: 36.147 Acres Mine Area Boundary: 94.155 Acres	USGS Topographic Map ☆ Proposed Plant Site	Drawn By: J.D. Checked by: J.L. & C.H. Date: August 25, 2008

Referring again to Figure 1-4, it can be seen that PA-1 has 36 acres of production area and 9 overlying monitor wells. The distribution of the wells above the 36 acre production zone provides significant coverage for monitoring purposes. The well pattern also served to allow baseline water quality to be assessed throughout the overlying 36 acre zone.

With respect to characterizing Production Area baseline water quality, § 331.104(a)(2) requires the collection of a minimum of one or more samples from at least 5 designated production zone wells. In developing Production Area baseline water quality, UEC exceeded the minimum requirement by completing 17 wells. Sample analyses from 10 of the wells are included in this submission. Seven additional wells are scheduled to be sampled in early September. TCEQ is planning to collect samples from some of the baseline wells during the September sampling period. UEC plans to supplement the production zone water quality baseline data with results from the upcoming sampling.

Expanding the number of samples throughout the Production Area will significantly improve the accuracy of baseline conditions, and this in turn will allow for significant improvement in reaching the goals set out in the required Restoration Table.

Not true for selected samples



Mine Area Acreage: 94.2 acres
Production Area Acreage: 36.1 acres
Average Depth to Production Zone: 152'
Production Zone Elevation: 86' above mean sea level (MSL) to 49' above MSL

Figure 1-4 Production Area Map 1 inch equals 400 feet 0 100 200 400 600 800 1,000 Feet	Legend Proposed Location of Production Zone Guard Well Production Zone Monitor Well Overlying Monitor Well	UEC	Figure 1-4 Drawn By: M.S. Checked by: C.H. & J.L. Date: March 25, 2008

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Not for selected samples

Expanding the number of samples throughout the Production Area will significantly improve the accuracy of baseline conditions, and this in turn will allow for significant improvement in reaching the goals set out in the required Restoration Table.

As described above on page 1-4, UEC actually installed 8 additional production zone baseline wells, and thus there is a total of 18 monitor wells in the production area.

by the pattern of uranium levels falling by two orders of magnitude from the first to the third round of testing. These declines were not sporadic. Indeed, these levels declined for all 18 baseline wells used for the PA-1 baseline water quality. It is worth revisiting Goliad County Cross-Examination Exhibit 1 from the hearing.[80] The decline in uranium concentration in the RBLBs and PTWs is uniform as seen below:

Well — Uranium in BL Wells

PTW	U-1 mg/l	U-2 mg/l	U-3 mg/l	Ra-1 pCi/l	Ra-2 pCi/l	Ra-3 pCi/l	1st Sample	2nd Sample	3rd Sample
1	0.032	<0.003	<0.003	17.0	38.0	16.0	4/29/08	7/14/09	11/16/09
2	0.009	0.014	0.004	17.0	17.0	10.0	4/29/08	7/15/09	11/10/09
3	0.009	0.03	<0.003	38.0	36.0	38.0	5/8/08	7/16/09	11/16/09
4	0.059	0.09	0.004	196.0	217.0	213.0	5/8/08	7/16/09	11/10/09
5	0.005	<0.0030	<0.003	357.0	549.0	830.0	5/12/08	7/21/09	11/16/09
6	0.010	<0.0030	<0.003	202.0	253.0	253.0	5/12/08	7/20/09	11/10/09
outlier → 7	$\boxed{0.804}$	0.010	0.005	1684.0	2000.0	1590.0	9/9/08	7/20/09	11/10/09
8	0.134	0.019	0.010	397.0	326.0	311.0	9/3/08	7/15/09	11/10/09
9	0.135	0.010	<0.003	394.0	343.0	306.0	9/8/08	7/14/09	11/16/09
10	0.099	0.020	<0.003	68.0	359.0	63.0	9/8/08	7/13/09	11/16/09
11	0.166	0.007	0.003	296.0	55.0	386.0	9/10/08	7/9/09	11/16/09
12	0.163	0.07	0.003	477.0	345.0	392.0	9/9/08	7/16/09	11/10/09
13	0.156	0.0160	0.006	10.0	324.0	208.0	9/9/08	7/20/09	11/16/09
14	0.086	0.005	0.007	224	198.0	157.0	7/2/08	7/15/09	11/10/09
RBLB									
1	0.062	0.07	0.013						
3	0.080	0.150	0.008						
4	0.006	0.004	<0.003						
5	0.060	0.005	0.003						
AVERAGE	**0.115**	**0.029**	**0.005**						
RANGE OF U VALUES	**0.009 - 0.804**	**<0.0030- 0.150**	**<0.003- 0.01**						

Added in 2009

Note: Only the first (highlighted) were used in UEC's application. After the contested case hearing, the judge required that the other two rounds of test results be included in determing baseline. VS

Mr. Murry from the TCEQ also testified that the numbers had changed from Round 1 to Round 2 and Round 3.[81] Mr. Murry did not evaluate this new data because it was not submitted to the agency by UEC but was instead provided during discovery,[82] further revealing the failure of UEC to timely provide new information to the TCEQ staff in violation of 30 T.A.C.

[80] Goliad County has electronically recreated Goliad County Cross-Examination Exhibit 1 and is incorporated herein as depicted.

[81] 7 TR. 1316:21 – 23 (Murry).

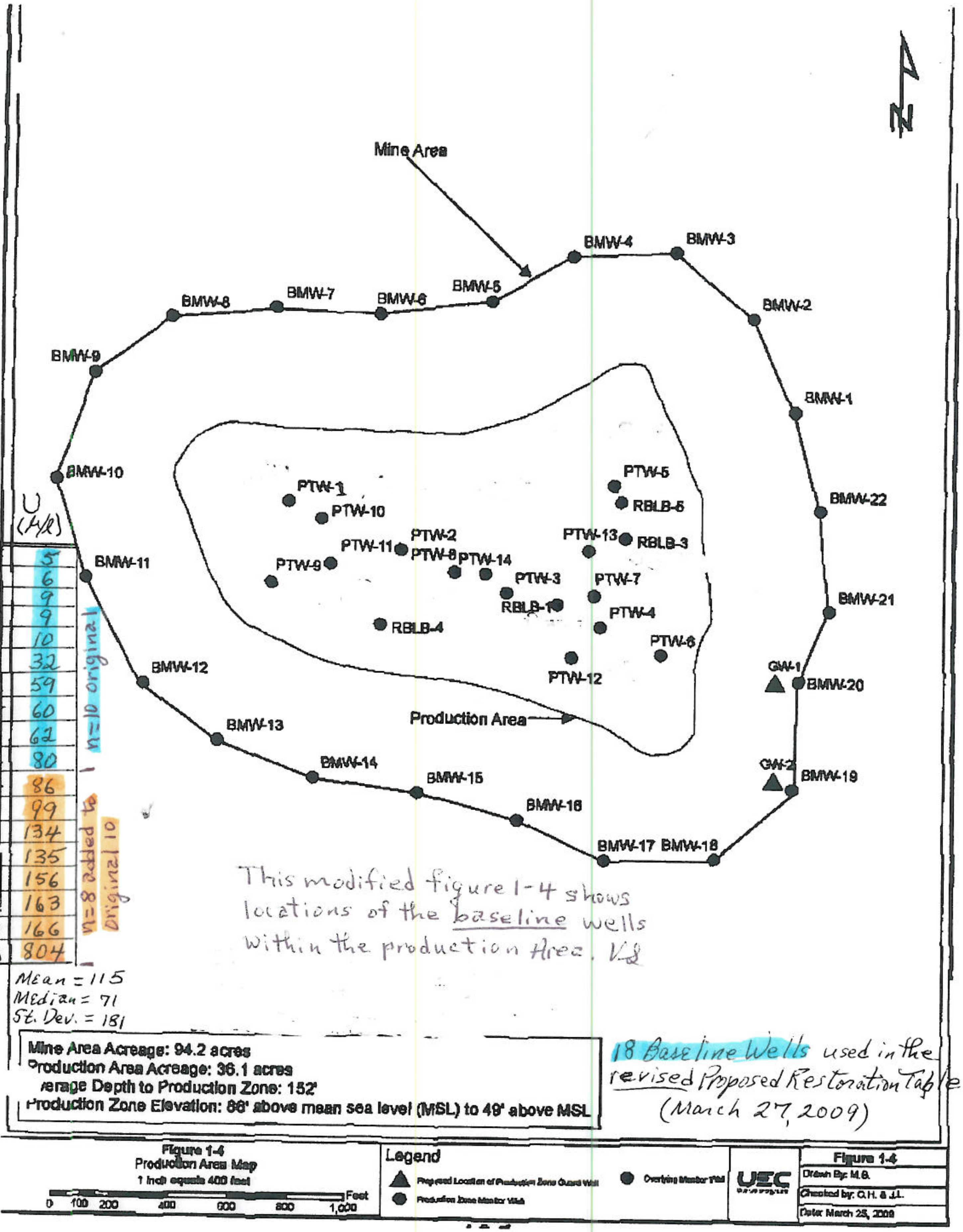
[82] 7 TR. 1313:1 – 4 (Murry).

Well	U (µg/l)
PTW 5	5
RBLB 4	6
PTW 2	9
PTW 3	9
PTW 6	10
PTW 1	32
PTW 4	59
RBLB 5	60
RBLB 1	62
RBLB 3	80
PTW 14	86
PTW10	99
PTW 8	134
PTW 9	135
PTW 13	156
PTW 12	163
PTW 11	166
PTW 7	804

n=10 original

n=8 added to original 10

Mean = 115
Median = 71
St. Dev. = 181



This modified figure 1-4 shows locations of the baseline wells within the production Area. VL

18 Baseline Wells used in the revised Proposed Restoration Table (March 27, 2009)

Goliad County

PAA-3 Baseline Wells
Pre-mining Water Quality Summary

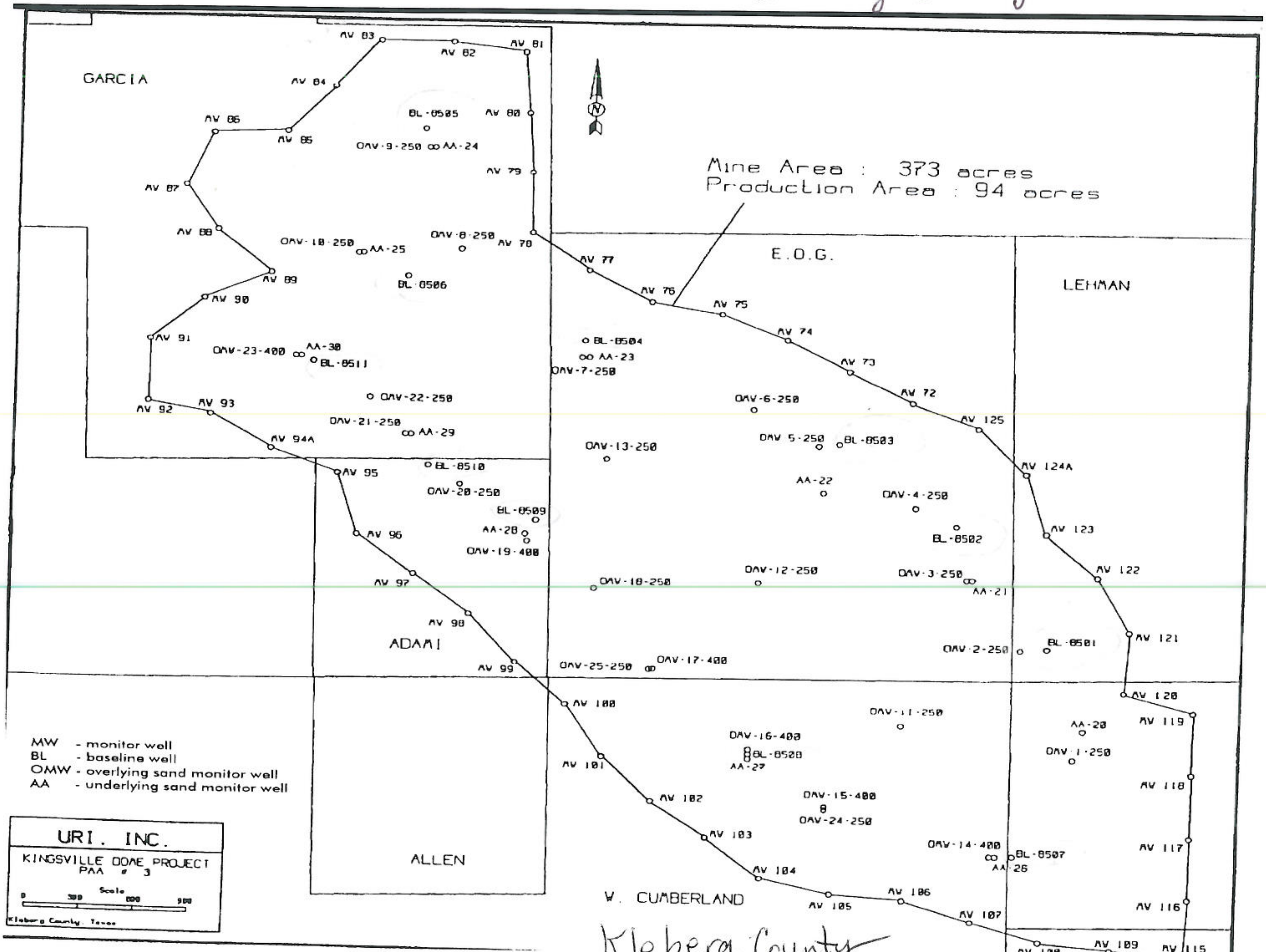
Constituent	Units	Minimum	Average	Maximum
Calcium	mg/L	10	16	25
Magnesium	mg/L	1.5	3.8	6.0
Sodium	mg/L	203	387	480
Potassium	mg/L	7.7	16.1	31.0
Carbonate	mg/L	0	16	49
Bicarbonate	mg/L	95	165	321
Sulfate	mg/L	183	349	487
Chloride	mg/L	138	275	362
Fluoride	mg/L	0.00	0.19	2.10
Nitrate (as N)	mg/L	0.49	0.67	0.97
Silica	mg/L	17	20	23
pH	SU	7.69	8.70	9.6
TDS	mg/L	667	1143	1440
EC	µmhos	1120	1825	2820
Alkalinity	mg/L	78	162	263
Arsenic	mg/L	0.003	0.009	0.025
Cadmium	mg/L	<0.0001	NA	0.0001
Iron	mg/L	<0.01	0.01	0.04
Lead	mg/L	<0.001	NA	0.001
Manganese	mg/L	<0.01	NA	0.01
Mercury	mg/L	<0.0001	<0.0001	<0.0001
Selenium	mg/L	<0.001	0.014	0.063
Ammonia	mg/L	<0.01	0.18	0.40
Molybdenum	mg/L	0.02	0.30	3.20
Radium 226	pCi/L	0.3	23.3	78
Uranium	mg/L	0.032	0.351	1.54

Source:

Rice (2006)

Effects of URI's KVD Mine on Groundwater Quality

Kleberg County



Kleberg County

URI Duval County

URI, Inc.
Permit No. UR03050

Vasquez Mine

31 July 2008

RESTORATION TABLE

Parameter	units	1998 (PAA1) Concentration	2006 (PAA2) Concentration	Draft 2008 Concentration	EPA Drinking
Calcium	(mg/l)	86	54 (56)	57	
Magnesium	(mg/l)	60	33 (34)	34	
Sodium	(mg/l)	560	411	413	
Potassium	(mg/l)	34	24	24	
Carbonate	(mg/l)	1	2	2	
Bicarbonate	(mg/l)	341	381	363	
Sulfate	(mg/l)	150	92 (94)	107	**250
Chloride	(mg/l)	906	538	557	**250
Nitrate-N	(mg/l)	0.01	0.01 (.00)	0.06	*10
Fluoride	(mg/l)	1.10	0.84 (.82)	0.94	*4
Silica	(mg/l)	57	49	48	
TDS	(mg/l)	2044	1427	1438	**500
Conductivity	(µmhos)	3573	2480	2488	
Alkalinity	(mg/l)	280	312	301	
pH	(s.u.)	7.95	6-9	6-9	**6.5 – 8.5
Arsenic	(ug/l)	61	40	41	*10
Cadmium	(ug/l)	0	0	.2	*5
Iron	(ug/l)	30	40	50	**300
Lead	(ug/l)	0	0	0	
Manganese	(ug/l)	20	20	20	**50
Mercury	(ug/l)	0	0	0	*2
Molybdenum	(ug/l)	180	80 (90)	140	
Selenium	(ug/l)	1	1	5	*50
Uranium	(ug/l)	45	51 (10)	33	*30
Ammonia-N	(mg/l)	0.15	0.52	0.41	
Radium-226	(pCi/l)	78.93	78.90	50.54	*5

* Primary Drinking Water Standard Listed Contaminant

** Secondary Drinking Water Standard Listed Contaminant

( ) value that should be listed

n=3, 7, 15, 131 $\xrightarrow{2006}$ $\bar{x}$ = 51, Med. = 15 µ/l

n=5, 2, 7, 8, 15, 131 $\xrightarrow{2008}$ $\bar{x}$ = 32.6, Med. = 8

Note: This handout was distributed by TCEQ's Fred Duffy, geologist for the Underground Injection Program (UIC), at the July 31, 2008 meeting in Benavides.

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URI, Inc.
Permit No. UR03050

July 2008

Permitting History of Vasquez Project

Base Permit

May 1991 - URI submitted applications to TWC and TDH.

Aug. 15, 1997 – Initial Base Permit issued by TNRCC.
Contained one production area authorization (PAA) of approx. 454 acres.

July 17, 1998 – EPA approved aquifer exemption.

Production Area PAA1

September 24, 1999 - issuance date.
PAA1 approx. 154 acres, PAA2 approx. 89 acres (Attachment D).

October 15, 2004 - mining operations begin.

Production Area PAA2

November 23, 2005 – issuance date.
Mine area 102 acres, production area 34 acres (Attachment 1).

Base Permit

April 25, 2006 – amended.

Production Area PAA2

August 2006 – mining operations begin.

October 3, 2006 – amended; expanded (5 acres) northwest corner of PAA to the west, replaced MWs 55-58 with MWs 28-31.

August 13, 2007 – request for amendments; add baseline wells MW55 and MW56, revise restoration tables.

Waste Disposal Well Permit - issued Nov. 3, 1980, WDW185 put in-service 9/1981.

TCEQ Handout

INSERT 2

In all three cases which were cited in INSERT 1, the <u>selected</u> samples of baseline well locations yielded data sets that were skewed upward.

The most striking example of TCEQ's allowing companies to use inappropriate manipulation of data to obtain an estimated baseline and restoration value for uranium in groundwater is seen in the following data set from URI's Vasquez mine in Duval County. (Recall the Vasquez mine attachment to INSERT 1.)

Following are uranium values (micrograms per liter) from five baseline wells: 2, 7, 8, 15, 131.

This sample yielded a mean = 32.6 and a median = 8.

TCEQ regulations in 30 TAC 331 allowed URI to use the sample mean of 32.6 as an estimate without any discussion of or adjustment for the impact of the 131 value, which is clearly an outlier.

This is allowed in TCEQ's regulations despite the fact that the statistical literature makes it clear that the use of the sample mean to estimate the central tendency of a distribution is only appropriate when a <u>random</u> (statistically valid) sample indicates that the population from which the sample is drawn follows a normal or lognormal distribution.

Unfortunately, the <u>selected</u> sampling which TCEQ allows prevents the necessary test (Shapiro-Wilk, for example) from being <u>legitimately</u> performed to establish whether the sample provides evidence that the population values follow such a distribution.

In spite of the 131 value's being a clear outlier, and in spite of the non-randomness of the sample data's preventing the appropriate test from being performed, TCEQ's regulations allow the sample mean of 32.6 to be used as the estimate of pre-mining uranium content in the groundwater, and that value is then also used as the post-mining restoration standard for uranium.

Noting that the uranium estimate of 32.6 exceeds the EPA safe level of 30, but the median of eight is far below EPA's maximum allowable level for uranium in safe drinking water, it is clear that this statistical issue could sometimes be crucial in whether or not EPA grants an aquifer exemption.

More statistical misinformation from TCEQ is found in the January 28, 2010, *Executive Director's Response to Public Comment* taken at the Goliad, Texas, public meeting re UR0375 PAA1 on October 5, 2009.

An illustration of this is found on pages 44-45 in TCEQ's Response 62 to Comment 62.

In Comment 62, TCEQ was asked by the Coastal Bend Group Sierra Club (CBGSC) to explain how Uranium Energy Corp. (UEC) guarded against selection bias when they chose locations for baseline wells.

The Executive Director's Response 62 states: "The Executive Director evaluated the location of the baseline wells by visual inspection of well locations in Figure 1-4. Baseline wells are distributed throughout the proposed production area, with no obvious grouping of wells. The Executive Director finds the baseline well locations acceptable, and has no reason to consider the locations invalid for providing unbiased groundwater quality data."

This response reveals a lack of understanding of how vitally important <u>statistically unbiased samples</u> are in estimating population parameters. It also reveals a total lack of understanding of how to evaluate whether a sampling procedure has adequately minimized selection bias.

Similar misunderstandings of statistical principles and applications are revealed in TCEQ's explanatory comments of the revisions to 30 TAC 331 which were published in the March 6, 2009, edition of the *Texas Register*. (Please find attached several pages from this edition with pertinent statements highlighted.)

You will note that <u>some</u> of the highlighted passages are well-written from a statistical standpoint. However, the recent comments from the Goliad County case, which I have just referenced, demonstrate that TCEQ often does not evaluate permit applications in a way which is consistent with their statements in the *Texas Register*.

As a case in point, note the green highlighted passage (34 TexReg 1668) re using the sample mean from small, skewed data sets to estimate the population mean. TCEQ's explanation here is appropriate, but they have no valid way of judging whether a sample is representative, and in practice, they do not require a company to use a non-parametric estimate such as the median even when it would be appropriate to do so.

For another example of the discrepancy between TCEQ's well-written statistical statements and their failure to follow them when they evaluate permit applications, note the green highlighted passage (34 TexReg 1650) re outliers.

The reference cited by TCEQ states that "improper sampling" is one reason for discarding outliers. However, TCEQ apparently does not understand that allowing companies to <u>choose locations</u> for baseline wells is an instance of "improper sampling." In the Vasquez mine case, (see INSERT 2) the outlier of 131 was included and the sample mean, rather than the sample median, is used to estimate the uranium restoration value. Similarly, in the Goliad County case (See INSERT 1) 804—a clear outlier—was not discarded.

Now note (34 TexReg 1668) the passage highlighted in pink for an example of an erroneous TCEQ recommendation. In this situation where data from a <u>selected</u> sample is used, there should be no discussion about the power of a statistical hypothesis test because it would be incorrect to perform such a test on this kind of data. (See the comments in INSERT 2 and also on the first page of this INSERT re the Shapiro-Wilk Test.)

TCEQ apparently does not recognize that it is incorrect to use <u>selected</u> sample data to perform a statistical hypothesis test for determining distributional characteristics of the population from which the selected sample was taken. This reveals a lack of understanding of when it is inappropriate and incorrect to use <u>inferential</u> statistical methodology.

Note also the pink highlighted passage (34 TexReg 1652). This passage reveals a lack of awareness by TCEQ that the Agency needs the help of credentialed statisticians in judging the validity of sampling designs.

Finally, a puzzling statement by TCEQ (34 TexReg 1652) is highlighted in yellow. This statement is especially perplexing since TCEQ claims that under their regulations, <u>all samples</u> <u>must be representative</u>—<u>yet the regulations give no protocols</u> <u>to assure that samples are representative</u>.

I will be glad to provide additional documentation upon request.

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Comment 94: GCGCD asked if the wells used for establishing baseline and restoration compliance are screened to sample the water through the entire thickness of the sand or just the ore body section, and, if the production sand zone is 75 feet thick and the ore thickness within that zone is twenty feet thick, is it statistically valid to collect a baseline water sample from only the ore layer in the water sand?

Response 94: The Executive Director determined that the applicant used appropriate screen lengths for the baseline wells. Each of UEC's 20 baseline wells were screened through the zone where uranium mineralization appears to be the most intense (based on gamma ray response), although the gamma ray response generally indicates uranium mineralization to some degree through the entire sand. The constituents for which baseline will be determined occur in the aqueous phase, which is to say they are dissolved in the groundwater. None of these fours sands is overly thick so the distribution of each of the constituents in the groundwater should be relatively uniform simply from mixing. Under these conditions, groundwater samples from each screened interval should be representative of groundwater quality in each respective sand.

Comment 95: GCGCD commented that the ore zone in the proposed exemption zone is only a fraction of the total aquifer exemption volume and asked if TCEQ is allowing baseline to be established with water samples collected only from ore zones, and if so, what is the statistical justification for this approach?

Response 95: The vertical extent of the proposed aquifer exemption is from the top of Sand A to the base of Sand D as depicted in the UEC application because uranium mineralization has been found in all four of the sands (A through D) of the Goliad Formation at the UEC site. The Executive Director notes that the area extent of the requested exemption includes the combined areas of the four sand layers identified in the UEC application (one in each of the four sands), even though no single ore body extends over the entire area requested for exemption. Because the areas of the ore bodies overlap, the Executive Director believes it would be appropriate to designate the combined vertical and area extent as the exempt aquifer, rather than designating four separate areas for exemption, one for each ore body, each with a corresponding vertical extent.

Comment 96: GCGCD asked, in evaluating groundwater quality data, what valid statistical procedures are used to test the sample populations for normal or log normal distributions.

Response 96: There are numerous methods for assessing whether or not data are from a normal or lognormal distribution. The Executive Director recommends use of the Shapiro-Wilk Test (for 50 or less sample results) and the Shapiro-Francia Test (for over 50 sample results) for making a decision to accept or reject normality or lognormality of a data set. [89]

[89] Robert D. Gibbons. Statistical Methods for Groundwater Monitoring, Chapter 11 (1994).

Comment 97: GCGCD asked if it is the TCEQ's policy to allow sample averaging of data when it does not follow a normal or log normal distribution.

Response 97: The Executive Director allows averaging of data if the data are from a continuous, infinite distribution. "Averaging" is equated with the statistical procedure called "x-bar," which adds all the values and divides this sum by the number of values. It also is called the sample mean. This method is an estimation technique and is used to estimate the true mean of distribution. It is the best linear unbiased estimation of the mean for any continuous, infinite distribution and is the minimum value unbiased estimator of the mean for a normal distribution.[90]

Comment 98: GCGCD asked, if the monitoring well ring is the point of compliance for restoration, is it statistically valid to collect baseline samples only from within the ore zone?

Response 98: The monitor well ring is used as the point of compliance to determine if there are excursions of mining fluids from the production zone; the monitor well ring is not the point of compliance for aquifer restoration. Aquifer restoration is required for the portion of the aquifer that is affected by mining solutions. This generally is the production zone within the production area. It is the groundwater in the production zone within the production area that is affected by mining and must be restored to pre-mining conditions as provided in 30 TAC § 331.107. Therefore, baseline groundwater samples used to determine restoration values are from wells completed in the production zone within the production area. Samples collected from wells completed in the production zone but outside of the production area (such as a monitor well) would not be representative of the groundwater within the production zone of the production area.

Comment 99: GCGCD asked whether the baseline samples were collected from a well that was screened only in the ore zone, or across the entire thickness of the sand; are the baseline monitor wells located randomly across the extent of the proposed well fields or biased toward the most concentrated ore zones; is there a sampling plan that prescribes how to locate the baseline monitor wells; and is there a procedure for collecting water samples including purging, stabilization, and filtering?

Response 99: Based on a comparison of the geophysical well logs for the 20 baseline wells to the well completion reports for these 20 wells,[91] baseline wells typically were screened across the zone with the highest gamma ray response, which should correspond to the zones with the highest uranium content. The TCEQ has no sampling plan that prescribes how to locate baseline monitor wells. Baseline wells should be located so as to provide representative groundwater samples from the production zone within the production area. Uranium concentrations from

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[90] Richard O. Gilbert, Statistical Methods for Environmental Pollution Monitoring, 141 (1987).

[91] Both of these can be found in Appendix B of the application.

Comment 60

Richard and Catherine Bettge commented that water quality and quantity will not be restored to baseline levels after mining is complete because the drilling of exploration wells resulted in comingling and aeration of the water sands, resulting in inaccurate baseline data.

Response 60

The Executive Director does not agree that exploration or drilling activities prevent the accurate determination of baseline quality or affect restoration techniques. Exploration drilling involves no injection of fluids into the groundwater formation. The borehole is filled with drilling mud, and additional mud is added as the borehole depth is advanced. Because exploration wells drilled in this area generally are a few hundred feet or less in depth, they can be drilled in a day or two, limiting the amount of time the formation is exposed to the drilling mud. The Executive Director understands that some exploration boreholes were left unplugged beyond the time limits allowed by the Railroad Commission, but the Executive Director is not aware of contamination of groundwater that is attributable to unplugged boreholes. The Executive Director understands that the Railroad Commission investigated the concerns that UEC had left boreholes unplugged, and that the matter was resolved to the satisfaction of the RRC.

Comment 61

GCGCD expressed concern as to whether or not the water quality test used to develop restoration table values accurately represents the quality of groundwater prior to exploration. GCGCD stated they wished to participate in new verification water quality tests.

Response 61

As discussed in Response 61, the Executive Director finds no evidence that exploration drilling affected groundwater quality. Therefore, the Executive Director finds no need for new groundwater sampling to establish pre-mining groundwater quality. The TCEQ cannot require UEC to grant permission to GCGCD to enter property to take groundwater samples.

Comment 62

CBGSC asked how UEC guarded against selection bias when they chose locations for the samples of wells. Lynn and Ginger Cook commented that the statistical methodology used for determining baseline groundwater quality may provide biased values and should be considered invalid.

Response 62

The Executive Director reviewed the baseline information in the application and determined that it meets the requirements of 30 TAC §331.104. The Executive Director evaluated the location of the baseline wells by visual inspection of the well locations on Figure 1-4. Baseline wells are distributed throughout the proposed production area, with no obvious grouping of wells. The Executive Director finds the baseline well locations acceptable, and has no reasons to consider the locations invalid for providing unbiased groundwater quality data.

Comment 63

GCGCD commented that the portion of the aquifer considered for exemption lies within the proposed monitor well ring. GCGCD also commented that because the monitor well ring is the point of compliance for migrating mining fluids, the entire volume of groundwater within the mine area will be contaminated by the mining process. Because of this situation, GCGCD contends that it is invalid to determine pre-mining groundwater quality only on data from analysis of groundwater samples collected from wells competed in the production zone within the production area, as this will result in a pre-mining groundwater quality that is biased high. By determining pre-mining groundwater quality in this manner, GCGCD concludes that UEC will be allowed to restore groundwater to artificially high values, thereby destroying good quality water that now exists throughout most of the mine area.

Response 63

The Executive Director notes that the area requested for an aquifer exemption extends beyond the mine area of the requested production area authorization.[72] The Executive Director does not agree that groundwater in the production zone throughout the entire mine area will be affected by *in situ* mining or that pre-mining groundwater quality should be based on data from analysis of groundwater samples from the production zone throughout the mine area, rather than just from the production area.[73]

The groundwater quality in the production zone within the production area, as least for certain constituents,[74] is different from that in the production zone from the perimeter of the production zone outwards to the monitor well ring. This is because the groundwater in the production zone within the production area is in contact with uranium mineralization, which affects the quality of that groundwater. Groundwater in the production zone outwards from the production area is not in contact with uranium mineralization, and therefore its quality is not affected by uranium mineralization. Data from analysis of groundwater samples collected from the production zone over the entire mine area would not be representative of groundwater quality in the production zone within the production area. Using data from analysis of groundwater samples collected over the entire mine area to determine the groundwater quality in the production zone within the production area would yield results that are biased low.

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[72] See Figure 1-3, Mine Location Map, UEC PAA1 application.

[73] The production area is that area defined by a line generally through the outer perimeter of injection and recovery wells used for mining (30 TAC §331.2(81), whereas the mine area is defined by a line through the ring of monitor wells installed to monitor the production zone (30 TAC §331.2(62). The production area lies within the mine area

[74] For example, the average groundwater values for uranium and radium-226 in the production zone within the production area are 0.115 mg/l and 333 pCi/l, respectively, whereas the average groundwater values for these two constituents in the production zone outwards from the production area are 0.02 mg/l and 12.1 pCi/L, respectively (Table 5.2 and Table 5.3, UEC PAA1 application).

tinguish between wells completed in the production zone of the production area and other wells. Mesteña recommended that proposed revised §331.107(1)(A) be revised to allow for baseline determination as is currently allowed under §331.104(d)(1). TMRA and URI submitted comments and recommendations similar to Mesteña's.

The revisions to §331.107(a)(1)(A) are based on the premise that groundwater quality in the production zone within the production area (that is, the area that contains the zone of uranium mineralization to be mined), may be, at least for certain constituents, different from the groundwater quality in the production zone outside of the production area (that is, the area of the production zone peripheral to, but beyond the mineralized area). For aquifer restoration, it is the quality of groundwater in the production zone within the production area that is of interest. It is this groundwater quality that represents the pre-mining groundwater quality of the zone to be mined, and that will be affected by in situ mining. Therefore, although the commission understands that any estimation of groundwater quality in any zone within any area is improved with additional data, all data used to determine groundwater quality should be representative of the particular groundwater. The groundwater quality data from the production zone outside the production area is not necessarily representative of the groundwater quality in the production zone within the production area. Therefore, the commission again emphasizes that the establishment of baseline for aquifer restoration (or for any groundwater baseline conditions, for that matter) should be based on representative data.

The commission acknowledges that under previous §331.107(d)(1), determination of baseline was based on the higher of two sample means: the sample mean of data from wells completed in the production zone of the production area (production area baseline wells); or the sample mean of data from wells completed in the production zone outside the production area (the production zoned monitor wells). The commission fails to understand, however, how this method provides a good estimate of the groundwater quality in the production zone within the production area. Using this methodology, a person is assuming two separate populations (the groundwater quality in the production zone in the production area, and the groundwater quality in the production zone outside the production area), computing a point estimate of the true mean of each population, and then choosing the higher estimate as representative of the true mean of the population represented by the groundwater in the production zone within the production area.

A more defensible methodology would be to use an appropriate statistical test to compare the two sample data sets to determine if they were from the same population. If the test indicated they were from the same population, then the sample mean could be computed using the combined data from both populations. Because of the increased sample size, this estimate of the true mean would have less associated variance than either estimate based on the separate data sets, and therefore would provide a better estimate of the true mean. The commission contends such a methodology could be proposed by an applicant under new §331.107(a)(1)(2).

The CBGSC also commented on proposed new §3312.107(a)(1)(A), stating that determination of restoration values on the sample mean from a limited sample data set was unadvisable because the sample mean is sensitive to extreme values (CBGSC provided an example based on data from the Vasquez Mine in Duval County to illustrate this effect). CBGSC recommended that in situations where the sample data set includes extreme values, the sample median should be used instead of the sample mean. An individual commented that companies are allowed to use a small sample size to calculate a sample mean, and if the sample data set contain outliers, the sample mean will be biased. The individual also commented that using a small sample data set to identify the distributional characteristics of the underlying distribution is not a statistically sound practice.

The commission agrees that the sample mean can be influenced by extreme values, be they extremely high or extremely low, and that extreme values have less effect on the sample median. The method described in new §331.107(a)(1)(A) presently is allowed under §331.104(d)(1) and was retained to allow its use, albeit in a more restricted manner in that restoration values must be based on data from wells completed in the production zone within the production area. In such cases as the example provided by CBGSC, the commission can determine that a sample data set is not representative, as required under revised §331.104(a), and require additional samples from existing baseline wells or the completion of additional baseline wells. Alternatively, under new §331.107(b), the commission may allow use of the sample median. The commission notes that in the case of a small data set that has an extreme value, which can significantly affect the sample mean, use of the sample median is a example of accommodation of an outlier. The commission also agrees that the power associated with a statistical hypothesis test used to determine the distributional characteristic of the population from which the sample is drawn will increase as the sample size increases (the term "sample size," as used in statistics, refers to the number of realizations drawn from a population; that is, the number of samples taken). Any test for determining normality should be done using a suitable sample size, and the commission would take this factor into consideration regarding any test used to test data.

KHH commented that under proposed revised §331.107(d), the informational requirements for the semi-annual aquifer restoration report are burdensome to both the operator and the commission, and that the informational requirements for water levels, hydrographs, and potentiometric maps provide no meaningful measure of aquifer restoration progress. KHH suggested these requirements be eliminated.

The purpose of the revisions to §331.107(d) was to identify specific information that should be included in these semi-annual reports. The requested information is the type that typically is collected during restoration activities. With regards to potentiometric maps, the commission considers such maps a basic element of any groundwater report. However, the requirement for hydrographs of each baseline and monitor well is not essential to evaluating aquifer restoration progress. Section 331.107(d) is revised to remove this requirement.

TMRA commented that the wording "have been restored to the values. . ." at proposed new §331.107(e) is inconsistent with the wording "levels consistent with the values. . ." as used in §331.107(b). Different wording invites confusion unless it is meant to indicate a different threshold. If it does indicate a different threshold, the difference in thresholds is unclear as well as why a different threshold is intended.

The commission agrees with this comment, and notes that the definition of the term "restored aquifer" at §331.2(89) was revised to delete the phrase "levels consistent with restoration table values or better as verified by an approved sampling program" in tive, as required under §331.014(a). No changes were made in response to this comment.

GCGCD and STOP also recommended for baseline samples in the mine and production areas: "(3). Valid statistical tests shall be performed on the water quality data for each well to remove outliers and determine the distribution of the data. If data for a groundwater quality parameter are distributed normally or log-normally, the mean (average) may be calculated (minus outliers) for that parameter. For data that are not distributed normally or log-normally, the median value shall be used for the parameter (minus outliers), or additional samples may be collected to retest the distribution. If outliers are removed, a minimum of three samples must remain to calculate the mean or median for a parameter."

The commission agrees that "valid" statistical methods should be used in any statistical analysis, and a discussion of the term "valid" is provided in a previous response. However, the commission opposes the arbitrary elimination of outliers. Although statistical tests should be performed to identify any potential outliers, the commission does not agree that all outliers should be summarily discarded. Any outlier (either high or low) should not be discarded unless it is determined its value was the result of a typographical or transcription error, faulty analysis, or improper sampling. Methods may be used to accommodate an outlier (for example, see Outliers in Statistical Data by V. Barnett and T. Lewis, 1994, 3rd edition, John Wiley and Sons), but one should never be discarded except under the above-mentioned circumstances. Also, the commission notes that the sample mean (average) is a point estimate of the true mean of a distribution, and the sample median is a point estimate of the true median of a distribution. For a normal distribution (or any other symmetrical distribution, for that matter), the true mean equals the true median, whereas in a log-normal distribution the true mean is greater than the true median (see Statistical Methods for Environmental Pollution Monitoring, 1987, by Richard O. Gilbert, page 171). Therefore, the commission does not see the logic in using the sample mean for data presumed to be from a population characterized by a normal or log-normal distribution, but using sample median for data presumed not to be from a population characterized by one of these distributional types. Lastly, the commission notes that use of the sample median is a method used to accommodate outliers. No changes were made in response to this comment.

GCGCD and STOP also recommended for baseline samples in the mine and production areas: "(4). If multiple wells are installed at a monitoring location, the mean or median from each well will be used to determine the baseline value for each parameter at the well location. A valid statistical test will be performed with the mean or median values to determine the distribution of each parameter. If a normal or log-normal distribution is demonstrated, the mean (average) can be calculated for the parameter. For data that do not follow a normal or log-normal distribution, the median value shall be used to represent the parameter for that well location."

The commission agrees that all wells installed at a monitoring location should be sampled. However, with regards to use of the sample mean or sample median, the commission offers the same explanation provided in response to the commenters' item (3). That is, the commission does not agree that a sample mean should be used for data presumed to be from a normally or log-normally distributed population and that a sample median should be used for data presumed to be from a population that is not normally or log-normally distributed. No changes were made in response to this comment.

GCGCD and STOP also recommended for baseline samples in the mine and production areas: "(5). Baseline water quality in the mine area and production area will be established independently and calculated using the mean or median for each parameter from each well location. A valid statistical test will be performed with the mean or median values to determine the distribution of each parameter."

The commission agrees that groundwater quality in the baseline wells should be established independently from groundwater quality in the monitor wells, but again emphasizes that groundwater quality in the baseline wells (those wells completed in the production zone of the production area) is to be used for aquifer restoration goals and groundwater quality in the monitor wells is to be used for detection of excursions. With respect to the suggested use of mean and median, the commission does not agree that a sample mean should be used for data presumed to be from a normally or log-normally distributed population and that a sample median should be used for data presumed to be from a population that is not normally or log-normally distributed. No changes were made in response to this comment.

GCGCD and STOP also recommended for baseline samples in the mine and production areas: "(6). The baseline water quality for the mine area and production area will serve as the restoration values for the mine area and production area. Each area will be restored to its pre-mining baseline levels."

The commission again emphasizes that aquifer restoration is required for the area where the production zone is mined using in situ techniques; that is the production zone within the production area. It is the groundwater in this zone within the production area that is affected by injection of mining fluids, and therefore must be restored to pre-mining conditions. For the mine area, which is the area enclosed by the ring of production zone monitor wells that surround the production area, groundwater quality is determined so that any injected mining fluids that migrate from the production zone within the production area can be detected. Because mining fluids are not purposefully injected into the production zone outwards from the production area, this part of the production zone should not be affected by mining fluids, except for short periods of time during an excursion. All excursions must be addressed in accordance with the existing requirements in §331.106. No changes were made in response to this comment.

For baseline samples for the monitoring well ring, GCGCD recommended a methodology consisting of six items. Items 1 through 5 in this recommended methodology are identical to items 1 through 5 of their recommended methodology for baseline samples in the mine and production zone, in items 1 through 5 for the production areas. For these five items, the commission's responses are identical, respectively, to the responses to items 1 through 5 of GCGCD's recommended methodology for baseline sample in the production and mine area. Item 6 of GCGCD's recommended methodology for baseline samples for the monitor well ring was as follows: "(6). Upper control limits for excursions will be calculated for the baseline values using a valid statistical test (e.g., upper 95% confidence interval)."

The commission agrees that the term "control parameter" is defined at §331.2(28) as a groundwater constituent monitored on a routine basis to detect or confirm the presence of mining solutions in a monitor wells. The term "upper limit" is defined at

Sierra Club and STOP recommended the proposed rules be revised to include the following specific requirements: 1) A statistically valid number of monitor wells in the production zone, including the strata above and below the mining, sufficient to determine the water quality and detect any excursion in a timely manner; 2) A valid and accurate statistical testing of the monitoring wells to determine pre-mining baseline; 3) Upper control limits based on a valid statistical test or the monitor well baseline, such as the upper 95% confidence interval; 4) Nested wells where the thickness of the sand is too great for a single screen interval; 5) Restoration of the Mine Area and the monitor well area to actual pre-mining concentrations; and 6) Notice requirements to the TCEQ and property owners within two hours if there is a change in concentration of any constituent which may affect drinking water quality of a private well.

The commission offers the following comments on each of these respective suggested requirements: 1) The commission is unclear as to the meaning of "a statistically valid number of monitor wells." The number of monitor wells should be dependent on such considerations as geology and hydrogeology, and the commission is uncertain how this would be determined in a statistical manner. No changes were made in response to this comment; 2) The commission agrees that determination of pre-mining baseline for excursion detection is essential, and notes this subject is addressed in new §331.104(e). Under new §331.104(e), any statistical test chosen by an applicant or operator must be approved by the executive director, who will evaluate the proposed method. No changes were made in response to this comment; 3) As expressed in the previous comment, the commission agrees that determination of baseline for excursion detection should be based on appropriate statistical tests. With regards to the provided example of an upper 95% confidence interval, the commission notes that use of this method carries the same observations the commission makes in a subsequent response regarding use of a tolerance interval. That is, the commission does not agree that a tolerance interval methodology must be used, but that the choice of statistical method for a hypothesis test should be based on the appropriateness of the method to the distributional characteristics of the data. No changes were made in response to this comment; 4) The commission agrees that multiple monitor wells may be necessary at a single monitoring location in certain circumstances, such as excessive sand thickness. However, the commission can require such wells, when necessary, under §331.103, Production Area Monitor Wells. No changes were made in response to this comment; 5) The commission disagrees that aquifer restoration should be required for the area between the production area and the surrounding monitor well ring. It is within the production zone of the production area that mining fluids are injected, and it is groundwater in this zone within this area that will require restoration. Any excursions of mining fluids from this zone will be detected in the monitor wells, prompting remediation of the excursion in accordance with the requirements of existing §331.106. No changes were made in response to this comment; and 6) Under proposed §331.106, an operator is required to notify the commission of any excursions, sample the affected wells for an expanded list of groundwater parameters, and initiate actions to clean up the groundwater in the affected wells to baseline quality for the monitor wells. Also, when mining fluids are present in a monitor well, the operator must increase the sampling frequency to twice a week (§331.105(4)). These actions provide a rapid response to an excursion, and are designed to ensure an excursion is contained and remedied, preventing it from further migration and possibly affected off-site wells. Although the commission can and would notify any property owner if it thought an excursion could affect that property owner's well, it sees no need to require notification of landowners in the event of any excursion. In addition, the executive director is required under TWC, §5.235 to notify a county judge and county health officials when the executive director acquires information that confirms that a potential public health hazard exists because usable groundwater has been or is being contaminated. No changes were made in response to this comment.

CBGSC commented that a valid statistical analysis of sample data requires samples to be obtained from wells located on a systematic grid across the entire mining areas surrounded by monitor wells or randomly selected with an appropriate statistical procedure, and that no such requirements for locating baseline wells are included in the proposed rules. CBGSC emphasized that without these requirements, data resulting from sampling of baseline wells cannot be representative in a statistical sense, and will not yield valid statistical results.

The commission agrees that data used to establish baseline should be representative of the groundwater for which baseline is to be established. In evaluating an applicant's proposed baseline determination, the commission takes into consideration whether the samples used to establish baseline are representative, and has revised §331.104(a) to require representative samples. Obtaining representative samples would certainly involve evaluation of the locations of baseline wells, and any evaluation by the commission regarding whether samples are representative would include consideration of how the baseline wells were located.

CBGSC recommended that because data obtained from sampling of baseline wells are all-important in establishing aquifer restoration values, the commission should consult with the most highly qualified statisticians specializing in applied sampling design in order to establish protocols for obtaining a systematic or random sample of baseline wells. CBGSC emphasized that establishment of such protocols would assure that data used to determine aquifer restoration values are statistically sound.

The commission appreciates that there are statisticians that specialize in sample design, and that the establishment of such protocols are valuable in assuring that aquifer restoration values are determined in a statistically sound manner. The commission notes that there are agency employees that have statistical expertise to address issues, such as sample design, and that numerous guidance documents and texts on statistical analysis also are available to agency staff.

An individual commented that they were surprised to learn that groundwater at in situ uranium mining sites in Texas has never been restored to pre-mining groundwater quality.

Commission records indicate that with the exception of one production area authorization (Production Area Authorization UR01941PAA3 at COGEMA's O'Hearn Mine), aquifer restoration values at all other sites were amended to allow for higher concentrations of certain groundwater constituents to meet aquifer restoration requirements. As discussed in a previous response, the commission notes that at these sites, the concentration of many of the groundwater constituents were reduced to the initially-established aquifer restoration values, but that for other constituents, concentrations were reduced by restoration efforts, but not to the initially-established restoration values. All amendments to restoration values were in accordance with the requirements of existing §331.107(f). The commission also

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EDUCATION:

MA / Mathematics, 1965
UNIVERSITY OF ILLINOIS AT URBANA

BS / Mathematics and Education, 1959
TEXAS A. AND I. UNIVERSITY AT KINGSVILLE

POSTGRADUATE COURSES:

Demography, 1977
Analysis of Categorical Data, 1976
HARVARD UNIVERSITY SCHOOL OF PUBLIC HEALTH

Design of Experiments, Special Topics in Biostatistics, 1975
VANDERBILT UNIVERSITY MEDICAL SCHOOL

Statistics and Disease Control, Statistics and Health Services, 1974
Sampling Human Populations, Intermediate Biostatistics, 1973
UNIVERSITY OF TEXAS SCHOOL OF PUBLIC HEALTH

Theory of Statistics, 1972
Statistical Methods, 1972
Vector Spaces, 1969
TEXAS A. AND I. UNIVERSITY

Linear Algebra, Real Analysis, 1970
COLORADO COLLEGE

Selected Topics in Modern Mathematics, 1963
UNIVERSITY OF TEXAS AT AUSTIN

PROFESSIONAL EMPLOYMENT:

Professor of Mathematics, 1985 - 1997
Associate Professor of Mathematics, 1977 - 1985
Assistant Professor of Mathematics, 1972 - 1977
Instructor of Mathematics, 1967 - 1972
DEPARTMENT OF MATHEMATICS, DEL MAR COLLEGE

PREVIOUS EMPLOYMENT:

Teacher of High School Mathematics
PUBLIC SCHOOLS, Corpus Christi, Texas

Teacher of Junior High School Mathematics
PUBLIC SCHOOLS, Kingsville, Texas

Teacher of High School Science and Mathematics
PUBLIC SCHOOLS, Vashon, Washington

PART-TIME APPOINTMENTS:

Sabbatical Lecturer, Department of Mathematics and Statistics
UNIVERSITY OF MASSACHUSETTS AT AMHERST

Teaching Assistant in Statistical Epidemiology,
Department of Biostatistics
HARVARD UNIVERSITY SCHOOL OF PUBLIC HEALTH

TRAINEESHIPS/ FELLOWSHIPS:

Sabbatical Lectureship in Statistics, 1981
UNIVERSITY OF MASSACHUSETTS AT AMHERST

NSF Faculty Fellowship in Science, 1976 - 1977
HARVARD UNIVERSITY SCHOOL OF PUBLIC HEALTH

Traineeship Grants from U. S. Public Health Service, 1974 - 1975
UNIVERSITY OF TEXAS SCHOOL OF PUBLIC HEALTH
VANDERBILT UNIVERSITY MEDICAL SCHOOL

NSF Summer Institute for College Mathematics Teachers, 1970
COLORADO COLLEGE

NSF Academic Year Fellowship, 1964 - 1965
UNIVERSITY OF ILLINOIS AT URBANA

NSF Summer Institute for Secondary School Mathematics Teachers, 1963
UNIVERSITY OF TEXAS AT AUSTIN

PROFESSIONAL ACTIVITIES RELATED TO FACULTY POSITION:

Designed and monitored statistics curriculum. Analyzed data and consulted with administrators and colleagues in many disciplines -- including health sciences. Served on numerous college-wide and departmental committees. Taught five, sometimes six, classes per semester. Actively participated in proceedings of the National Council of Teachers of Mathematics. Reviewed eight mathematics manuscripts for Wadsworth Publishing Company.

OTHER PROFESSIONAL ACTIVITIES:

Consulted with a member of Pharmacy Administration at Spohn - Memorial Hospital re data on ciprofloxacin. Consulted with a physician re cervical dysplasia and HPV data. Consulted with a physical therapist re knee function data. Served as moderator for a conference of scientists and government officials re pesticide problems in South Texas. Provided testimony to the Texas Department of Agriculture on behalf of the Texas Pesticide Abuse Coalition. Reviewed a manuscript for a text in statistical epidemiology for Dr. Colin White, Professor of Biometry, School of Medicine, Yale University. Worked with the Director of Research at Corpus Christi State School re data analysis for one of the school's training programs. Worked with a pre-medical student to analyze data from Boston Childrens' Hospital.

PUBLICATIONS:

Scheurich, Venice; Graham, Billie; and Drolette, Margaret: *Expected Grades Versus Specific Evaluations of the Teacher as Predictors of Students' Overall Evaluation of the Teacher.* Research in Higher Education, Vol. 19, No. 2, 159 - 173, 1983.

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Public Information Meetings on EPA Review of Standards for Uranium and Thorium Milling Facilities, 11-4-10, Corpus Christi, TX

Comments by Steven H Brown, CHP

I am Steven Brown from Centennial Colorado. I appreciate the opportunity to provide these comments for EPA's consideration regards to review of EPA standards for Uranium and Thorium Milling Facilities @ 40 CFR Parts 61 and 192.

I have been a practicing health physicist for over 40 years. I am certified by the American Board of Health Physics and a Diplomat of the American Academy of Health Physics. I am a past president of Central Rocky Mountain Chapter of the Health Physics Society.

The Health Physics Society, formed in 1956, is a scientific organization of professionals who specialize in radiation safety. Its mission is to support its members in the practice of their profession and to promote excellence in the science and practice of radiation safety. Today its nearly 6,000 members represent all scientific and technical areas related to radiation safety including academia, government, medicine, research and development, analytical services, consulting, and industry in all 50 states and the District of Columbia.

In my few minutes before you today, I would like to provide EPA with some broad scientific perspectives related to the adequacy of existing public exposure standards for uranium mills and in situ recovery facilities that are promulgated in 40 CFR Parts 61, 190 and 192. Specifically, these are the 20 picocuries per meter squared per second (pCi / m2-sec) radon flux criteria for uranium mill tailings impoundments specified in Part 61 Subpart W and Part 192, Subpart D as well as the 25 mrem /year public exposure standard in Part 190 as referenced in Part 192. I also will be subsequently submitting an expanded, written version of the comments I am providing orally today.

My remarks will address three questions:

1. Are the existing regulations (Federal and Texas) for uranium milling facilities (including in situ recovery plants) adequate to protect the public from additional radiation exposure above our natural background exposure?
2. What is known about the potential health effects to populations living in the vicinity of uranium mines and mills?
3. What is known about the health impacts (e.g., lung cancer) to many uranium miners who worked underground in the 1950s and 1960s?

1. Are the existing regulations (Federal or Texas) for uranium milling facilities (including in situ recovery plants) adequate to protect the public from additional radiation exposure above our natural background exposure?

Our lifestyles, where we choose to live, what we eat and drink, has a much larger impact on our radiation exposure than exposure at current regulatory limits. The basic regulatory limits that operating uranium mills and ISRs must comply with are 100 millirem* per year from all sources including radon and 25 millirem / year excluding radon** (US Nuclear Regulatory Commission: 10 CFR 20 and 10 CFR 40 Appendix A; US Environmental Protection Agency: 40 CFR 190; Texas Department of State Health Services, Title 25 of the Texas Administrative Code, Chapter 289)

*NOTE: a millirem is a unit of effective radiation dose. It is related to the amount of energy absorbed by human tissue and other factors. 1,000 millirem = one rem.

** Radon is a naturally occurring radioactive gas, which is released into the atmosphere at the Earth's surface from the decay of radium. Both radium and radon are daughter products of uranium.

Now lets compare these numbers to the annual radiation doses we receive as citizens of planet Earth. Figure 1 below depicts the typical components of human exposure in the US to ionizing radiation.

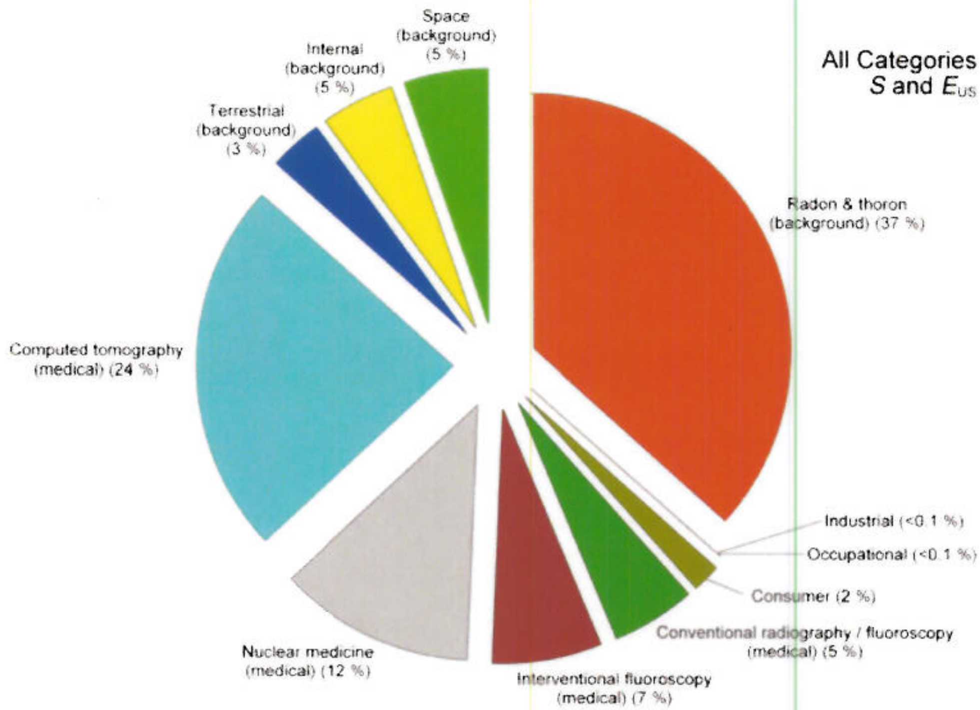


Figure 1: Percent contribution of various sources of exposure to the total radiation dose of a typical resident in the US. Reproduced from National Council on Radiation Protection and Measurements. Report No. 160, *Ionizing Radiation Exposure of the Population in the United States.* 2009.

As can be seen from figure 1, background radiation exposure is about 50% of the total exposure; the other 50% is primarily from medical exposures. Consumer products we use everyday that contain radioactive materials (e.g., smoke detectors, luminous watches, etc) contribute about 2 % of our dose. Other man made sources of radiation, including the nuclear industry, contribute < 0.1% of our annual dose.

Natural background can vary considerable from place to place across the United States or over relatively small areas within a region. This is due to effects of elevation (higher cosmic radiation exposure at higher elevations), greater levels of naturally occurring radioactive elements in soil and water in mineralized areas (e.g., igneous formations in Rocky Mountains) and other factors like local geology and chemistry. This is depicted in Table 1, which compares average annual background radiation exposure for the US, all of Colorado and Leadville, CO. (high elevation and in mineralized area) as contrasted to coastal areas like Virginia and Oregon. This table shows the major components of natural background radiation including terrestrial radiation (uranium, radium, thorium and a naturally radioactive form of potassium in soil, rocks and water), cosmic radiation (high energy rays from space) and internal radiation (from food, water and radon gas from natural uranium decaying in the ground).

The data in Table 1 demonstrates that the differences in annual background exposure based on where one chooses to live, what one chooses to eat and drink have a much greater impact on public exposure than the regulatory dose limits we discussed above.

Source	US Avg.[1]	Colorado [2]	Leadville, CO. [2]	Virginia [3]	Oregon [3]
Cosmic Radiation	31	50	85	28	28
Terrestrial Radiation	19	49	97	20	27
Radon and Other Internal	260	301	344	182	102
Totals	310	400	526	230	157

TABLE 1: Comparison of average radiation backgrounds in US (units of millirem / yr)

[1] National Council on Radiation Protection and Measurements. Report No. 160, *Ionizing Radiation Exposure of the Population in the United States.* 2009.
[2] Moeller D, Sun LSC. *Comparison of Natural Background Dose Rates for Residents of the Amargosa Valley, NV, to those in Leadville, CO, and the States of Colorado and Nevada.* Health Physics 91:338-353; 2006
[3] USEPA. Assessment of Variations in Radiation Exposure in the United States. Contract Number EP-D-05-002 (Revision 1). Washington, DC. 2006

Because background radiation varies significantly across the U.S., it follows that population exposure varies accordingly. As indicated in Table 1, If one chooses to live in Colorado vs. Oregon, e.g., the difference in your annual radiation dose is > 240 mrem /yr which is more than twice the Federal and Texas public exposure limit for uranium mills of 100 mrem /yr. Or in other words, if you are a resident of Colorado and leave to visit your sister for a month in Oregon, you could "save" 20 – 30 mrem of exposure, which is about equal to the EPA 40 CFR 190 limit of 25 mrem /year excluding radon.

Specifically regarding natural background exposure to radon, note that Figure 1 and Table 1 demonstrate that radon can contribute > > 50 % of our total background exposure and over 300 mrem / yr in the Rocky Mountain States (due to higher levels of natural uranium and radium in the soil and rocks than, e.g., the coastal plains of the US).

It is recognized that EPA's public exposure criteria for radon in 40 CFR 61, Subpart W and Part 192, Subpart D is expressed as a "flux" (emission rate from a surface) of 20 pCi/m2-sec. This limit however includes natural background, which is typically a few pCi/m^2-sec almost anywhere on the earth's surface and can be several times higher than this in mineralized areas. So in some places, the EPA radon flux limit could be just 2 or 3 times the existing background rate. More importantly however, the basic public annual exposure criteria of 100 mrem /year must be met.

2. What is known about the potential health effects to populations living in the vicinity of uranium mines and mills?

Uranium is a heavy metal and acts similarly to other heavy metals in the body (like molybdenum, lead, mercury). Accordingly, for natural uranium, national and international human exposure standards are based on the possible *chemical toxicity* of uranium (e.g., effect on kidney—nephrotoxicity), not on radiation and possible "cancer effects" (radiotoxicity). However, there has never been a death or permanent injury to a human from uranium poisoning.

See e.g.: (1) U.S. Nuclear Regulatory Commission. *Standards for Protection Against Radiation*; 10 CFR 20, Appendix B. 1992. (2) International Commission on Radiological Protection. Limits for Intakes of Radionuclides by Workers. ICRP Publication 30, 1979. (3) US Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry. *Toxicological Profile for Uranium.* 1999. *(4) Acute Chemical Toxicity of Uranium.* Kathryn, RL and Burkin, RK. Health Physics, 94(2), pp 170-179, February 2008)

Regarding ionizing radiation in general, the health effects are well understood. No health effects have been observed in human populations at the exposure levels within the range and variability of natural background exposures in the US. An official position of the National Health Physics Society is that below 5,000 – 10,000 millirem (which includes the range of both occupational and environmental exposures), risks of health effects are either to small to be observed or non- existent (see *Radiation Risks in Perspective* @ hps.org/hpspublications/positionstatements). International and national authorities that establish exposure standards for workers and the public rely on the work of scientific committees of the highest professional standing for their evaluations of the scientific information on the health effects of ionizing radiation. These scientific committees include the United Nations Scientific Committee on the Effects of Ionizing Radiation (UNSCEAR); the International Commission on Radiological Protection (ICRP); the National Academy of Science's Biological Effects of Ionizing Radiation (BEIR) Committee, the National Council on Radiation Protection and Measurements (NCRP) and others.

But what about the specific concerns regarding health effects to populations living close to uranium recovery facilities? Despite much confusion and misunderstanding, possible health effects in populations living near uranium mines and mills have been well studied. No additional effects have been observed when compared to the health status of other similar populations not living nearby. A few sources providing the scientific evidence that supports this very important point include:

US Department of Health and Human Services, Public Health Services, Agency for Toxic Substance and Disease Registry, *Toxicological Profile for Uranium*, 1999. Chapter 1: Public Health Statement for Uranium, Section 1.5: How Can Uranium Effect My Health? – " No human cancer of any type has ever been seen as a result of exposure to natural or depleted uranium" (Available at: http://www.atsdr.cdc.gov/toxprofiles/tp150.html)

Cancer and Noncancer Mortality in Populations Living Near Uranium and Vanadium Mining and Milling Operations in Montrose County, Colorado, 1950 -2000. Boice, JD, Mumma, MT et al. International Epidemiology Institute, Rockville, MD and Vanderbilt University, Vanderbilt-Ingram Cancer Center, Nashville, TN. Journal of Radiation Research, 167:711-726; 2007: " The absence of elevated mortality rates of cancer in Montrose County over a period of 51 years suggests that the historical milling and mining operations did not adversely affect the health of Montrose County residents"

Cancer Mortality in a Texas County with Prior Uranium Mining and Milling Activities, 1950 – 2001. Boice, JD, Mumma, M et al. International Epidemiology Institute, Rockville, MD and Vanderbilt University, Vanderbilt-Ingram Cancer Center, Nashville, TN Journal of Radiological Protection, 23:247 – 262; 2003 – "No unusual patterns of cancer mortality could be seen in Karnes County over a period of 50 years suggesting that the uranium mining and milling operations had not increased cancer rates among residents".

Cancer Incidence and Mortality in Populations Living Near Uranium Milling and Mining Operations in Grants, New Mexico, 1950–2004. Boice, JD, Mumma, M et al. International Epidemiology Institute, Rockville, MD and Vanderbilt University, Vanderbilt-Ingram Cancer Center, Nashville, TN. Journal of Radiation Research, 174, 624–636. 2010 – "With the exception of male lung cancer (*in former underground miners*), this study provides no clear or consistent evidence that the operation of uranium mills and mines adversely affected cancer incidence or mortality of county residents".

3. But what about the known health impacts (e.g., lung cancer) to many uranium miners who worked underground in the 1950s and 1960s?

These miners worked in conditions that by today's standards we would consider unacceptable. They were exposed to very high levels of "radon daughters" (which are decay products of uranium) in poorly ventilated underground mines. Many of these miners also had severe smoking habits, which enhanced the ability of the radon daughters to deliver radiation dose to the lung. Follow up of 68,000 former miners over many years indicated the occurrence of about 2700 lung cancers in this population; much higher than the expected incidence. This is an incidence rate of about 4%. As a point of comparison, the incident rate of lung cancer in Caucasian males today is about 0.4 % (Dr. John Boice, International Epidemiology Institute, Vanderbilt University – personal communication)

These conditions existed before we had Federal Agencies (Occupational Safety and Health Administration - OSHA, Mine Safety and Health Administration - MSHA, US Nuclear Regulatory Commission - NRC) and laws to better protect workers throughout American industry (construction, manufacturing, farming, mining, etc). Based on the best scientific information available, we consider as safe the occupational exposure standards we have today as enforced by these agencies. The level of exposure of some of these early uranium miners was 100 times or greater than our current Federal standards.

As just one of many possible historical comparisons regards to working conditions in American industry decades ago, it is of note that almost 100 men died from construction and related accidents in the building of the Hoover Dam in the 1920s, long before Federal regulations were in place to protect workers. These circumstances would of course also be unacceptable today

Conclusions:

(1) The existing public radiation exposure criteria for uranium mills and in situ recovery facilities in 40 CFR Parts 61, 190 and 192 are adequately protective since they represent small fractions of the natural radiation background variation across the US. Our lifestyles, where we choose to live, what we eat and drink, has a much larger impact on our radiation exposure than exposure at these very low regulatory limits.

(2) Regarding ionizing radiation in general, the health effects are well understood. No health effects have been observed in human populations at the exposure levels within the range and variability of natural background exposures in the US.

(3) The possibility of health effects in populations living near uranium mines and mills over 50 years have been well studied by national scientific bodies of the highest professional standing. No additional effects have been observed when compared to the health status of other similar populations not living nearby.

(4) However, given that 40 CFR 192 was released in 1983, changes and updates have been made in the basic dosimetry models and science we use today to estimate radiological doses and risks. Accordingly, EPA should consider reassessing exposure terminology and criteria (e.g., as used in 40 CFR 190) to be consistent with current national and international methods and models, e.g., (1) International Commission on Radiological Protection, 2008. "Publication 103 Recommendations of the ICRP, Annals of the ICRP." 2008 and (2) National Research Council, 2006. "Health Risks for Exposure to Low Levels of Ionizing Radiation; BEIR VII, Phase II."

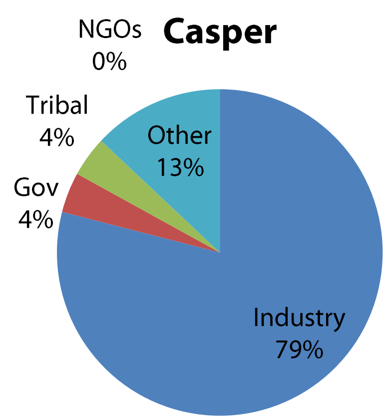
PUBLIC INPUT MEETINGS REPORT

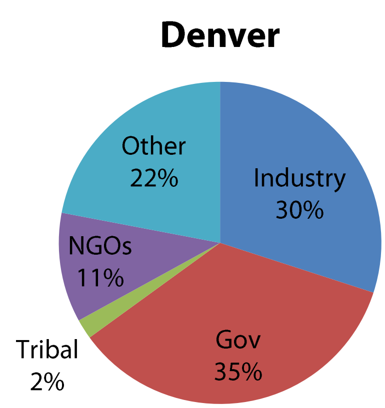
The US Environmental Protection Agency (EPA) is reviewing and may revise its regulatory standards, 40 CFR Part 192, for uranium and thorium milling. One of the many components of this review will involve input from the public. As such, EPA held two public information meetings: one in Casper, Wyoming and another in Denver, Colorado on May 24, 2010, and May 26, 2010, respectively. The purpose of these meetings was to provide the public an overview of the regulatory review and existing standards and to seek public input on the review of 40 CFR Part 192. Training Resources Group, Inc. (TRG) was contracted to provide assistance in meeting facilitation, coordination, and note-taking. This report summarizes the proceedings of the two meetings.

ATTENDANCE

Combined, the attendee mix had a variety of representation from industry, government, NGOs, tribal communities, and other stakeholders. The Wyoming meeting had a total of 24 attendees: 19 individuals from industry, 1 individual from government, 1 individual representing tribal communities, and 3 individuals with other or unspecified affiliation. Turnout for the Denver meeting was markedly higher, presumably due to the concurrent National Mining Association meetings taking place at the same facility. 93 attendees registered for the Denver meeting, though the actual count may be slightly higher as some attendees did not wish to sign in at the registration table. Of the 93 recorded attendees, 28 individuals were from industry, 33 individuals were from government, 2 individuals were from tribal communities, 10 individuals were from NGOs, and 20 other individuals (subcontractors, community members, affiliation not specified, or other).

For the complete registration list, see attached document, 'EPA 40 CFR 192 Review – Public Information Meetings Registration.'





MEETING STRUCTURE

Both in Casper and Denver, the meetings began with opening remarks and introductions. EPA representative Loren Setlow from the Office of Radiation and Indoor Air then provided an overview (with assistance from Dan Jackson of EPA Region 8) of EPA regulatory review and existing standards. Members of the audience were then given the opportunity to submit questions to EPA. Following this Q&A session, the public was invited to provide input by signing up for five-minute presentations. In the remaining time, the floor was opened up for additional audience questions and input. Finally, Mr. Setlow thanked the audience for their participation and reiterated the Agency's commitment to continuing outreach, collecting and analyzing information, maintaining transparency, and collaborating with industry and state and federal agencies throughout the review process.

PUBLIC INPUT PRESENTATIONS

The EPA invited members of the public to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

In Casper, Wyoming, two individuals signed up to provide input and a total of four* individuals gave presentations; two individuals were from industry, one was affiliated with a tribal commission, and the last was a private citizen. In Denver, Colorado, 17 individuals signed up and 14* provided input. At this meeting, public input was given by two individuals affiliated with industry; one individual from government; eight individuals from environmental or community groups; one individual from an association related to Tribal communities; and two individuals speaking as a private citizen or community member.

The majority of presentations included requests for EPA to further examine and/or consider revising specific issues, such as new dose limits, ACLs, cleanup methods and standards, reclamation milestones, groundwater corrective action plans, and Subpart W. Many raised concerns over impacts to human health and the environment, especially to children and indigenous populations. On the other hand, a few questioned whether the costs associated with revising the regulations were warranted, given the (perceived) low level of health and safety risk involved in uranium milling and mining. Several presenters entreated EPA to consider impacts to the Navajo Nation and other indigenous communities, specifically concerning drinking water and the proposal of four new facilities on Navajo lands. Environmental justice concerns, primarily the ability to participate in this and other regulatory review processes or related meetings, were also raised.

Finally, the majority of speakers expressed their appreciation to EPA both for conducting this review and for the opportunity to provide input during the process. A few presenters also extended invitations to EPA representatives to visit their communities to engage with those directly impacted by uranium milling and mining.

Below are the presentations captured from both meetings; EPA responses are included in italics.

Notes:

*This number includes the two individuals who signed up to provide public input during the designated time as well as the two individuals who provided input in the 'open floor' session.

**Of the 17 individuals who signed up to present input, three actually used their time to ask questions, making for a total of 14 public input presentations. We have included the questions from the three individuals in the Q&A section of the report.

CASPER, WYOMING

Oscar Paulson

Kennecott Uranium Company

The scope of regulations is large – they cover a lot of things: cleanup of soils, alternate concentration limits, groundwater protection, effluent limitations to radon, radon releases following barrier replacement, radiation protection standards for state reference CFR Part 190. Given the broad scope of regulations and the efforts that will be required to do work for revision, is it necessary? Very low risks of Uranium recovery operations, conventional or ISR.

In the case of 20 pCi/m2-sec standard for radon emission – the Agency has said itself that the risks from current emissions are very low. From the preamble the Subpart W NESHAP from December 15, 1989: A NESHAP requiring that emissions from operating mill tailings piles limit their emissions to no more that 20 pCi/m2-sec represents current emissions. "EPA has determined that risks are low enough that it is unnecessary to reduce the already low risk from the tailings piles further."

Other have looked into releases of radiation from sites – related to background:

- Dr. Gail La Pint's talk in 1994, related to background and dose: exposure to 15 millirems over a 70-year lifetime would result in a risk of 0.04%, a decade lower on this log scale. Added to the risk associated with low average and high annual doses from background, this risk is barely distinguishable. 15 millirems represents 5% of the annual average dose and is lost within the range of background. A lot of these doses from these facilities are very low and would be lost within background and indistinguishable from it.
- National Academy of Sciences: the NAS concluded that persons living at "distances greater than a kilometer (1.6 miles) from most uncontrolled Uranium mill tailings piles, and perhaps someone closer to some piles, would experience no significant increase in the lifetime radon lung cancer risk from the pile."
- EIS for the HRI facility in New Mexico: maximum estimated dose was less than 1% of the permissible limit and consistent with NCRP's negligible individual risk level (i.e. 1 millirem/year), defined as a level of average annual excess risk of fatal health defects attributable to radiation, below which further effort to reduce radiation level to the individual is unwarranted.

Two major epidemiological studies by Dr. J.D. Boice related to radiation risk to milling sites:

- Cancer mortality in a Texas county with prior uranium mining and milling activity, 1950-2001. In Karnes Country, "no unusual patterns of cancer mortality can be seen in Karnes County in a period of over 50 years, suggesting that the uranium mining and milling operations had not increased cancer rates among residents."
- Cancer and noncancer mortality in persons living near uranium and vanadium mining and milling operations in Montrose County, Colorado, 1950-2000. Results: "there was no difference between the total cancer mortality rate in Montrose County and those in the comparison counties."

Risk should be the driving force of any regulatory effort. From the literature I've looked at, I cannot see any levels of risk that would justify this type of work.

David Hare
Wind, River and Environmental Quality Commission for the Wind River Indian Reservation

This is regarding an existing UMTRA site: Riverton site, on which I've been collecting data for the past 15 years.

I asked about DOE following tribal water quality standards. The tribes have adopted standards for tribal lands, including drinking water aspects to quality standards as most streams and rivers are considered potential drinking water sources. Currently, uranium levels are above those standards; adjacent tributaries and wetlands and stream with high level of uranium.

Bob Hopkins
Energy consumer

In terms of BTUs per capita, nuclear energy makes a great difference in how you live your life. No US or international energy producer produces more energy to use in our homes that has lower fatality rate (deaths per BTU).

Nuclear power is one of most well-studied environmental issues in the world, bar none. We know more about the little piece of emission that comes out of uranium. Can't change facts of life, or the physics. There is no safer energy than nuclear power. As far as I know, there have been only one or two deaths due to nuclear power in the US (research reactor in Idaho). We know what we're doing in this business – I'm not in the business. I would prefer nuclear power than anything from windmill, coal, etc.

EPA needs to think about this before you promulgate any more regulations on the industry.

Loren Setlow, EPA: Before we develop any new regulations, there are a host of things we need to do to review: looking at the Paperwork Reduction Act, impacts on energy in the US, impacts to the industry that may be impacted by what we do (small business entities, etc); obligated as an Agency to follow dictates of the Mining and Mineral Policy after 1980. Also, the determination of this Administration that it will look towards greater reliance on nuclear energy. Under UMTRCA, requirements to look at standards we do have – looking at changes that have occurred since 1980, instances of excursions, and performance of the industry and the regulatory bodies. As a result of the risk assessment that we do, some sections could be grandfathered and left alone as an option should we decide to proceed. We will look at variety of things – we owe it to the public to do that as it's been so long since these rules were originally put out. Your comments have been heard – thank you.

Wayne Heili
Uranerz Energy

The presentation reviews current regulations that EPA enforces with the uranium industry. The discussion lacked topic points in the announcement. Given the lack of coverage on subject matter, EPA did not justify its proceeding with revisions. It is prudent to review the regulations, but without any identified benefits, I don't see benefits to take on the cost of revising.

Loren Setlow, EPA: To clarify, we have not said we're revising these regulations. This is a pre-proposal stage. We're seeking public input on a variety of topics. We're developing our own information but seeking public input on issues to see areas of concern or support for current development (e.g. no harm from existing or changing standards). When and if EPA does develop new standards, all the information from our own review and the input we've utilized to develop the regulation will be put in a docket so people can understand the basis for review. This is an opportunity to learn what's on people's minds regarding developments on this particular activity.

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Oscar Paulson
Kennecott Uranium Company

- These regulations – 40 CFR 192 – are broad in scope and impact a lot of things: radon emission standards, release standards for soils and buildings; incorporate the double liner standards for impoundments, and subsume and incorporate alternate concentration limits. This is important because in a recent regulatory issue summary, the NRC stated that ISR licensees, must use 10 CFR 40 Appendix A criteria 5, which are the ACL standards used in groundwater standards in ISLs. Thus, changes in these regulations will impact ISLs and other things, since they would also impact existing NRC regulations and guidance, such as NUREG 1569 and NUREG 1620.
- Uranium recovery operations – both conventional or ISL – are very low risk, low dose-type operations because you're dealing with low-activity and naturally-occurring materials. In the case of groundwater restoration for ISLs, in-situ operations occur within exempted portions of aquifers. In these aquifers, once exempted, always exempted, so no one will have access to these waters.
- As a general rule, within the portions of these exempted aquifers that contain deposits, the groundwater has high levels of naturally occurring radionuclides – generally radium and possibly uranium. These are naturally contaminated, and because of the high levels of radium, they are naturally unusable. You could take water and treat the water to get it below the drinking standard to use it, but you wouldn't want to do that because concentrating the radium in a charcoal filter or non-exchange residue would be concentrating radioactive material. There are levels of radionuclides in some aquifers (specifically, referring to Geology of the Lost Creek Schroeckingerite deposits, Sweetwater County, Wyoming. U.S. Geological Survey Bulletin 1087-J) where they had documented levels of uranium in groundwater as high as 46 parts per million.
- With all of these high levels of naturally-occurring radionuclides in these aquifers; the fact that they're exempted; and that these operations generally low risk; under those circumstances, are the efforts to be spent on the reviews of these regulations worthwhile?

Loren Setlow, EPA: There is no provision under the existing regulation in allowing or disallowing the *repeal of an exemption. However, regardless of exemption status, the aquifer portion that is affected by the ISL activity still has to meet other standards. The portion that is not exempted is still USDW and beyond the exemption boundary cannot be affected by contamination moving beyond the exempted area. In terms of no access to water afterwards, the exemption only removes the portion of the aquifer from protection as a drinking water source, but it does not preclude it as a source of other uses, such as agricultural or industrial.*

Deb Harris
Wyoming Department of Environmental Quality

At least for the DEQ, we would like to see if you could consider revision to ACLs to protect human health. We have worked with NRC and have had a good working relationship with them. I'm not sure how the revisions you are considering would impact the NRC and us, but we do have some concerns that we would still like to still see ACLs and MCLs be protective.

Sarah Fields
Uranium Watch

I come from southeastern Utah, which is the center of (conventional) uranium mining/milling activities. Utah is an agreement state. I have several points I would like to make:

- It is important that EPA look at the history of all Title I sites. Particularly for conventional mills, regulation of Title I mills is a history of regulatory failures.
- I'm not sure what documents you'll be looking at. NRC should make available documents from 1975 to 1999. NRC took off from their electronic reading room, the Title I regulatory documents post 1999, so many of those are not readily available. NRC should also make available all pertinent regulatory documents, so you can see what actually happened at each of these Title I sites.
- There's an issue, particularly in New Mexico, where 11e.(2) byproduct materials were disposed of as backfill. Except for one, none of those mines were reclaimed according to EPA standards – they were ignored.
- Also part of 192 has a requirement of the establishment of reclamation milestones to be included in reclamation plans for mill tailing impoundments. This is associated with EPA's rescission of 40 CFR Part 61 Subpart T. With the Atlas Uranium Mill, those milestones were a joke. There are two tailing impoundments (White Mesa and Canyon City). At White Mesa, no reclamation milestones are included in the license, and none for the impoundment undergoing reclamation at the Cotter Mill in Canon City.
- In Part 192, you have a requirement for groundwater corrective action. At the former Atlas Mill, they had an exceedance of the standards and there was no groundwater action plan. Unfortunately, there seems to be no requirement that groundwater action plans actually work to reduce the amount of radium, uranium, and other unwanted chemical constituents in the groundwater. There was a continuous process of contamination of ground and surface water in Atlas water and that contamination continues today. Oakridge determined that the groundwater corrective action plan approved by NRC actually increased the amount of unwanted radioactive activity and other constituents in the groundwater. You can require a corrective action plan, but if you don't set requirements in it to be effective, it's meaningless.
- In the history of 192, you've had numerous problems in implementation. You need to take a hard look.

Loren Setlow, EPA: A clarification: when Congress enacted UMTRCA, gave EPA a standard setting responsibility, but it left to NRC and agreement states the overseeing responsibilities. EPA has limited ability to do much, except through NEPA and discussions with agencies in what they are doing. The ultimate decision makers are DOE and NRC. EPA has limited authority under Congressional direction. Nevertheless, we are committed to conducting this review of operation facilities.

Phil Egidi

I have been working on uranium recovery cleanups since 1983. I have a lot of experience under both Titles: EPA removal actions at Monticello; Title I mill site characterization at Bendix Field Engineering; Monticello superfund site at Jim Morat; and Title II regulation. I have lots of experience under both Titles, mostly from an implementation standpoint.

I would like you to consider the following:

- Look at standards with new dose limits because so many things have changed since UMTRCA was promulgated, particularly the public dose limit coming down to 100 millirems/year. The EIS EPA did – their default scenarios showed 5 pCi of radium coming out to about 135 millirems. There are questions about the protectiveness of the 5 pCi/gram limit. Would like to see the 15 go away because it's not been very workable and it's not been health-based.
- ALARA on the NRC and agreement states side of the house. It's an effective concept but not reflected in standards.
- ACLs for groundwater but no supplemental standards under Title II. It requires an NRC paper trail. You can get an ACL but not one for soil. Would like you to consider looking at that.
- UMTRCA also has no surface activity criteria, no surface release limits for material or equipment. Also no uranium cleanup standard. Time and time again, we will find properties with uranium contamination that has not been cleaned up because it was not radium-226. It's been difficult.
- I would also like to recognize Loren for the uranium overburden work on the TENORM side. It was very important for recognition of the exposure kids were getting on tribal lands.
- Hydrology – standard for Vanadium. The MCL for uranium has changed, and Colorado has promulgated a groundwater standard for molybdenum – please look at it.
- DOE – relative to $250,000 in 1978 dollars for transfer – it's been very problematic. The Legacy Management Office in Grand Junction has a lot of experience and that value is problematic to DOE. Please look at that language.
- Impoundment designs in Appendix A: with changes in water balance caps, etc. would like there to be some flexibility for cap design and liner design. The practice has changed. Lots of efforts on ground with caps and liners – hopeful that can be considered.

I would like to extend an invitation for you to come to Grand Junction and have a meeting there. It would be important because of the legacy we have there. Colorado Department of Health has had an office there since 1969. It is ground zero for radon program and uranium mill tailings in America. We have lots of experience in cleanup and the legacy leftover. UMTRA program ended in 1998, and we still estimate 300,000-400,000 yards of tailing existing in Grand Junction. We have program that is still actively monitoring.

Mario Atencio
MASE, KIVA Club, ENDAUM, CARE

EPA is here to protect us. When you talk about extended outreach to communities, I ask that you open your eyes to real human costs. Industry is here to talk about cost ratio analyses. In the US, a human life is priced at about $7 million, which is ludicrous. Think about your children, wife, and mother – are they worth $7 million dollars? Is it really rational thinking that an aquifer, when permeable, the uranium and alkaloid will stay in one place and that exemption will not hurt anyone?

NRC granted license to HRI to mine an aquifer that's a source of drinking water. That's irrational. You say, it's just environment, but people are part of the environment. I'm an advisor to people to realize what existence is, what environment is, to rethink natural parks and why it's sacred.

You're bound by regulations and bureaucracies but EPA was created in the 70s to help people. It's hard to say no to licenses. You say you want to go back to pre-mining existing conditions. In some points, it's pristine. Industry can argue, but radon does come out of plugs. I've seen videos of it. Elevated levels of birth defects in Shiprock, New Mexico. Over 1,000 sites in Navajo – nothing has been reclaimed. Kids play on tailing piles. They don't know what they are.

Go wherever you come from – look down and think about what is the real human cost of mining aquifers of people may or may not drink from. Industry will say that given the cost-benefit ratio, but there's no guarantee that people may never drink from this aquifer, but it's life. You don't do that to water. You are 90-some percent water.

Please look at the human impacts and judicial decisions that happened with Church Rock and Crown Point. You are the people who sign off on these things – you look at the environmental impacts. People nitpick at definitions but realize this kills people. Thank you for listening and opening your mind.

Loren Setlow, EPA: We've been working with the Navajo Nation, including our 5-year plan to address contamination problems with the Navajo communities. I have experienced things you have talked about. We have a special responsibility in EPA's tribal requirements and policies and executive order to take all this into consideration – tribal consultations. We've already gone to the Navajo Nation and have told them we want to listen to them and other tribes. This effort – before regulation – is usually not the practice. We appreciate your comments.

Nadine Fadilla
Multicultural Alliance for a Safer Environment, Navajo and Pueblo from New Mexico

MASE is a coalition of community groups in New Mexico – we work to address uranium legacy and to stop new mining in this area.

I'm part of the delegation that traveled to Denver to attend the conference. Our primary concern is the four ISL mines being proposed on the Navajo Nation. The Navajo Nation has a ban on uranium mining, and the local communities around Crown Point and Church Rock continue to oppose those projects.

That's a huge issue of concern to us. Communities in the Navajo Nation still rely on that groundwater as the sole source of drinking water. Those four proposed mines would irreversibly contaminate the sole source of drinking water for 15,000 of our community members.

We also ask that you consider the high rates of birth defects and cancer that our communities continue to suffer from, as well as the issues of environmental racism we're dealing with.

Shannon Frances
Colorado American Indian Movement

I was born in Tuba city and raised in Shiprock and Tuba City. If I wanted to return to farm and live there – it's a dead zone. You can't grow anything – grass, roses – everything dies. It never rains in Shiprock – I wonder why.

We don't drink the water. I can't return home to grow anything. If I returned, I would run risk of poisoning my children. We're connected to the elements – water, soil, air – we're connected to the land, whether it's contaminated or not. How can I return to my homeland in conditions as is? I can't. Ethically, what would you do? It's something that's important to me and my family. They still live there. They don't drink the water but it's our home. We're fighting to protect it.

I'm a perma-culture design instructor. Perma-culture (permanent agriculture) came from indigenous knowledge. The principles are care for the Earth, care for the people, and share abundance. That's an alignment of indigenous knowledge. As indigenous caretakers, we are here to protect what was given to us by our creator.

Come out to our communities, meet the people and the chapters, and listen to our stories. Work with the people directly. It means something.

I would like to learn more about health impact assessments. I would like to go back to my people with information so they are informed of what's going on.

I'm trying to teach bio-remediation: weaving traditional ecological knowledge with innovative science. Ruma-composting – composting with worms to make healthy soil. I understand that there's a long process with uranium tailing and toxic soil. I would like you to answer my question earlier re: reducing agents. I would like to start learning how to do bio-remediation, and any studies you could recommend, I would appreciate.

Jennifer Nordstrom
Think Outside the Bomb Network

Think Outside the Bomb is the largest youth network for nuclear abolition in the US. Since 2005, we've organized national and regional conferences, focusing on education and community organization and creative expression.

This year, we're working in New Mexico and throughout the region to call attention upon the impacts and health and public safety of all these nuclear projects, especially those associated with uranium mining and nuclear weapons production.

I'd like to thank the people before me about human impacts because it's an ethical issue.

From Think Outside the Bomb: because EPA has jurisdiction over ISL mines in terms of SDWA, we request that the EPA not give the underwater injecting control permits for the four proposed mines on Navajo lands. These mines would exceed MCLs. The dissenting judge in the 10th Circuit Court of Appeals decision, delivered on May 18th, said about the Hydro Resources Inc. mine proposed on Navajo land that "HRI plans to mine the site, which will result in total radiation 9 to 15 times the permitted regulatory limit."

Currently, it's used as drinking water, and is the sole source for many communities. These mines can affect drinking water for 15,000 people. It is EPA's responsibility to protect this drinking water, and ask that you not issue those underwater injection control permits.

Dan Jackson, EPA: For the issuance of a UIC permit, that's accompanied by a draft permit with public notice and comment period for a minimum of 30 days, for which time EPA takes comments on the draft permit action and responds to them once the final decisions have been approached. Get in touch with the UIC program in Region 9 in San Francisco to request to be put on notification for any actions you have concerns about. You can also email uranium.review@epa.gov and the information for Region 9 will be forwarded to you.

Lisa Fithian
ACT

I want to express gratitude for this opportunity to participate.

I ask EPA to step forward in this next period with courage. The world is in crisis – there is devastation in oceans, land, and air. You've heard of a legacy of action again indigenous populations.

The vast majority of people in room and this conference are white. We have privilege and are afforded a lifestyle leading to the destruction of the planet and the decimation of cultures across the world. We have the power of our presence, but we can't come to the conference without paying $250. You all are in position to do something about it. We will continue to act. We will not allow the opening of these four mines.

At what point will we, in the position of privilege, say enough is enough? We have to change the course. Let's try to create a situation where the environment is truly protected, the people are truly protected, and the water is treated as scared as the land and air.

Steven Stormoen
Think Outside the Bomb Network, Coalition to Free the University of California

A sociological theory that's gaining traction in environmental science: evolution of species follows not a slow and steady process but punctuated equilibrium. It is characterized by periods of stasis broken up by periods of rapid change, usually marked by some disastrous catalyst. Following this model, so too will this process come to describe global warming and the degradation of the environment, which in its current process, threatens to make our planet uninhabitable for our children. In some areas, like the Four Corners region or the Gulf of Mexico, sooner than others.

In 25, 50, 150 years, we'll come to understand, global temperatures rose and the coral reefs never recovered. BP spilled an unfathomable amount of oil into the Gulf of Mexico and the fisheries never recovered. Once upon a time, some accident happened and those exempted aquifers with ISL mines leaked and the water tables in those surrounding areas...you get the picture...they never recovered.

In light of the BP spill, we have to acknowledge that accidents do and they eventually will happen. When they happen, they are disastrous. How can we afford to take the risk with substances with half lives in the 10,000s or 100,000s of years? In this light, how can any standards of radionuclides or other hazardous materials in our drinking water (or water which may become our drinking water) be acceptable?

My advice for the EPA, NMA, NRC, and private uranium mining companies: listen to the native people and representatives of affected communities in this room. Stop this process now; stop new permits – it's not worth it.

Matthew Garrington
Environment Colorado

Environment Colorado is an environmental advocacy organization with 40,000 members and activists across the state. Thank you for this opportunity, and I look forward to participating in this process. I am very encouraged that EPA is looking at this tonight.

I encourage us to take a hard look at natural attenuation as a method applied for cleanup, even for Title I legacy sites. In Colorado, both the Grand Junction and Durango uranium mills saw an increased level of contamination, so I question whether it's good strategy to employ, even at sites that haven't been active in quite some time.

A critique on the process: it is discouraging that the NRC and NMA are holding a conference where people who may be less able to afford to attend have to pay twice the amount to attend. From a process standpoint, it is unfortunately and reflects poorly on the NRC.

Related to Class III permits under SDWA: thank you to the EPA for committing to a strong public process for those permits. I would also like to affirm some disappointments in draft guidance that could constitute a binding norm in how this would move forward. In 2008, the EPA engaged in conversations with the industry it was regulating. They did speak with the Department of Natural Resources in Colorado and Wyoming; however, there was no notice to the public that these conversations were happening and no opportunities for comment. I would strongly recommend that the EPA consider having open public meetings, even for regulation guidance on those Class III permits. There are some controversial projects for in-situ uranium mining in Colorado, such as the Centennial Projects in Weld County. I think it reflects poorly on the EPA to not offer up public opportunity to address what the guidance may look like for the Class III permit.

Dan Jackson, EPA: Regarding the guidance issue: we put down some talking points and it was unfortunately got termed as a guidance because it's not. A true guidance in the EPA would undergo public review and comment. For that document, we were recording some discussions and the purpose was to put down ideas. It was not an official guidance.

Katie Sweeney
National Mining Association

There have been a lot of eloquent speakers – I've heard and learned a lot. Regarding the applicability of Subpart W to recovery operations or even evaporation ponds at conventional milling facilities, it appears to be a closed issue in EPA's mind, but legally, it's not a closed issue. Industry would probably strongly disagree with EPA's interpretation of whether Subpart W should or has ever applied. Legally, if you look at the history of those regulations, disagree with whether Subpart W does apply.

Gerald Brown
Community of Church Rock

I have worked with EPA in the past and have worked with the community of Church Rock. A lot of the issues raised are environmental justice issues. We need to continue to improve on the relationship of interactions, not just with EPA as a regulatory agency. Not just Navajo and EPA, but those grassroots individuals. We need to bring them up to par. Communication is key. As we address one another, we talk about regulatory communication, but we are not on the same page. It goes back to those environmental justice issues, education, and low income community individuals. It's not an easy question to answer but it's something I'd like to see. We talk about five-year plans and integrating our communities, but we have to somehow deal with this communication gap and the miscommunication of all our technical reports. Any technical reports – we have our technical liaison but he's just one person. How do you as EPA address that? How to get more funding to get more individuals to do outreach?

Carolina Reyes
Multicultural Alliance for a Safer Environment

I drove some of the representatives from the Navajo Nation here. I dislike environmental injustice and environmental racism. I've seen and heard too much of it. To me, as a person, that's ignorance. I don't mean to be antagonistic. When dealing with issues on daily basis – those of you from the industry or who deal with regulations, ask yourself, am I an environmental racist? Do I allow environmental injustice to continue and occur?

Those permits are not going to continue and they will not pass. We will be watching you. We will be there. We will always stop it.

AUDIENCE QUESTIONS to EPA

Meeting attendees were given the opportunity to ask questions to the EPA representatives at two different points during the meetings. The majority of questions concerned existing regulations – getting clarification about issues such as aquifer exemptions (Safe Drinking Water Act), monitoring (Subpart A), occupational safety (Federal Radiation Protection Guidance), and human health and safety (Subpart D). Many questions were also posed about the EPA's review of the standards – attendees were curious to hear what information EPA might take into account for analysis and what aspects of the regulation would be under consideration for revision. Other recurring question topics were: reclamation technology, restoration of groundwater, and tribal considerations (tribal standards, consultations, outreach).

CASPER, WYOMING

QUESTION	EPA RESPONSE
Regarding the Riverton site, when natural attenuation was selected by DOE as remediation option, the Uranium standard (MCL for SDWH) was 0.044; shortly after the EPA changed the standard to 0.033. Is the DOE required to meet State or Tribal Water Quality Standards, which are based on EPA guidance?	DOE's requirements must still meet requirements in CFR 40 Part 192 – the MCLs or background. Beyond that, for decisions on alternate concentration limits, there are 20-some factors they must also consider.
ISR has been prominent since well before 1995 revisions to Part 192. What changes in industry technologies are you referring to?	The use of ISL/ISR technologies is not referenced in the existing rule, except in the preamble and the definition of by-product material. We will look at various aspects of the technologies, such as the use of injection in production wells, surface piping, and processing facilities.
The distance between the monitor well ring and aquifer exemption boundary has not been specified. What is the distance and how is it determined?	It is not necessarily a set distance. For the application by EPA under the Safe Drinking Water Act, the regulations and exemption criteria require that the applicant for Class III injection well show that the well is (or is expected to be) commercially producible. In Region 8, we try to ascertain how much of that ore zone and the leaching operations will be affecting the aquifer relative to the need to commercially produce the ore body. Due to the impacts and potential impacts on underground sources of drinking water, the idea is to keep impacts as small as feasible. What's been happening is the licensee – the state or NRC – has been utilizing the same basic concept for their submissions to the federal or state licensing agencies as well as the request that comes for the injection well permits to EPA. Under 40 CFR 192 Subpart D, the point of compliance (for monitoring) is defined, but

	the determination of that is left to discretion of NRC or agreement states.
What do you project the costs of the revisions to be for the US taxpayers?	Not currently revising the rule, so it's just the salaries and the analyses that we're conducting. No exact figure – in the low 100,000s for the review.
What is the definition of "commercially producible"?	There is no regulatory definition of "commercially producible. In the application for Class III injection wells under SDWA, we would look at the zone – the ore body – expected to be recovered over a reasonable life of the project. We rely on what comes in with the injection well application. Generally, the boundaries of ISL ore bodies tend to be fairly distinct and we've got good information from groundwater modeling and ore studies provided by applicant to define the limits. This question is addressing the SDWA requirements under USC regulations, which is not up for Agency review at this time.
When considering revisions to or promulgation of regulations, how does the EPA determine risk and at what level of risk are regulations needed?	In the review, we will look at: - risk assessments conducted in 1983 when the rule was first promulgated – those are well documented processes - any changes in the risk assessment methodologies - dose and risk conversion factors that have been updated - international and national recommendations from the National Research Council and ICRP - EPA's risk range: one death in 10,000 to one death in 100,000 for exposures to the contaminants (1/10,000 to 1/100,000 risk range) and changes to risk assessment This will be a transparent process – we will use as many peer review models as possible and will make available the factors we've utilized in this review. We will also be looking towards industry and stakeholders for inputs.
Will this review take into account other elements, metals? We're finding high levels of vanadium, nickel, sediments – is there intention to look at sediment standards for some of these elements associated with uranium milling?	Everything is on the table – it's been long time since the rule has been reviewed. We want to see how well the rule has performed since it's been put out. Instances where Title I mills have gone on to become Superfund sites. Where have there been problems with excursions? Going to also look at various heavy metals, both in surface and groundwater. EPA does represent the tribes in a trust capacity. DOE has been open to discussions with EPA but they're not required in their standards or management of facilities to consult with us on ACL determinations. Nevertheless, we have been able to have discussions with them, and our regional office has been monitoring the situation. Region 9 is working closely with the Navajo Nation and Hopis in monitoring what DOE has been doing.

You referred to in your presentation, in-situ holding ponds and how they would be addressed in this consideration for rule-making. Why is in-situ impounding facilities being rolled into Subpart W and what's the thought process behind it? John Cash	I'm on the work group for Subpart W. Those facilities are being covered under the definition of impoundment and by-product material in that regulation. When UMTRCA was promulgated, Congress included provisions that EPA would develop own regulation for these facilities under CAA and CWA. This creates "dual regulation." It was recognized and authorized by Congress. In that review, we needed to review evaporation ponds and their contributions of radon, certainly under the Subpart W. There may be some benefits – we'll be providing information on the Subpart W website on this: last summer, we required operating companies to monitor radon emissions from their evaporation ponds. The results were surprising, but not surprising from what we expected – in those evaporation ponds, there were a number of facilities that had higher concentrations of dissolved radon than radon in the air near those facilities which exceeded the flux standard under the Subpart W. We've informed the NRC about it. Value in understanding it because of the potential impacts as occupational exposure to workers in facilities with evaporation ponds. We will also look at risk to public from facilities with evaporation ponds.
Will you compare that to total radon emissions from coal fire plants? What's that number versus a uranium mine? Is this the problem or that? Or, is there a problem at all?	That's a good question. No NESHAP standards on that yet. Mr. Reid Rosnik is the work group leader for that rule. You can submit the question at UraniumReview@epa.gov and he'll get back to you. We will be at the National Uranium Mining meeting as well. *Comment from audience member (Oscar Paulson)*: Regarding particulate emissions from coal, there was a webpage on the Oakridge National Lab site maintained by Dr. Alex Gabbard on radionuclide particulates in coal mines. He cites EPA studies from the late 1970s.

DENVER, COLORADO

QUESTION	EPA RESPONSE
Is it economically or technologically possible to reclaim wells to pristine condition? How will companies reclaim aquifers? Mario Atencio *Multicultural Alliance for a Safer Environment (New Mexico), Navajo Nation*	We can set standards for what we think is protective and it's up to the regulating agency (NRC or agreement state) to provide for restoration. This is part of our review to see what has happened in the history of these facilities – their ability to restore and meet our criteria. How protective are existing regulations and standards and how they have applied? The means that industry use is known as 'pump and treat.' They take water out of ground, treat it, and put additional water into aquifer until water is stabilized to restoration target. They also use injection of reducing agent to stop or mitigate release of

	radium or uranium or other metals to reach the point of stability.
Is there any EPA regulations by which can un-exempt an exempt aquifer? Once exempted, always exempted? Katie Sweeney *National Mining Association*	Yes, once it takes place, that portion of the aquifer is removed from protection under SDWA for a drinking water source. We don't have regulation to reverse the exemption process. It will always be considered exempted.
During the May 24, 2010 public meeting, EPA stated that some or all of the data collected by the uranium recovery licensees, at request of EPA during 2009 3rd quarter, related to their evaporation ponds, was turned over to NRC due to occupational exposure concern. What were those concerns that were brought up by EPA? Were they related to radon-222 or radium? If in fact data was provided to NRC, to whom was it provided; who in EPA provided it; and for which facilities? Oscar Paulson *Kennecott Uranium Company*	Yes, EPA sent out to all uranium operators a section 112 letter from our Office of Enforcement and Compliance Assurance a couple years ago. We've collected radon flux data, and last year, asked facilities to provide us data from evaporation ponds. That information has not left our office. We're working with Region 8 to take the data that has been given and turn into flux data numbers. It has not left our office. We have had discussions with NRC. The common knowledge is that evaporation ponds emit no radon. The data we've received from the last 6-8 months show that this is not the case. We're working to quantifying the data to see if we can get a flux rate to see if it's above or below 20 pCi/m2-sec. We want to get those calculations done in the next several weeks. I have no knowledge of reporting 'public health issues.' I've spoken with Bill von Till at NRC. In my discussions with Bill, I've promised him that once data is packaged up, we'll send it to him. It will also be posted onto the Subpart W website.
The definition of impoundment includes the ability to hold free liquids. Heap leach pads are designed to discharge all free liquids. Does EPA's 40 CFR 192 determination apply to heap leach apply to the heap leach pads or just the liquid holding ponds? John Hamrick *Cotter*	Interpreted by the NRC, the standards for 40 CFR 192 would be applied. NRC will be in the process of determining how best to apply them. The point here is that if you have input for us regarding the existing standards and how they might be applied or improved to reflect issues related to heap leach or ISL, we would appreciate that.
Do these regulations do anything to improve worker protection related to ore crushing and dust in the mills, including dust from yellow cake operations or acid leach? Do they address ingested, radioactive dust that passes through the digestive system? Jerry Pyfer	The standards do apply to occupation exposure – there's a specific reference to the federal protection required for radiation. However, the NRC and agreement states have their own requirements for occupational protection standards.

1. For groundwater quality and evaluating restoration over the past 40 years, I suppose what you'll be doing is looking at groundwater restoration success and how close that got to pre-mining conditions and conducting an assessment to see that it's acceptable?

2. There's a mountain of data on pre-mining water quality on ISL sites. In Texas, we do production-ary authorizations, which are detailed analyses on water quality. In Wyoming, mine unit packages are prepared. There's as much pre-mining water quality data available for review as post-restoration water quality data. Will you do a side-by-side evaluation of water quality by look at the pre-mining and post-restoration to look at the toxicity of that water that might have existed before mining? I think this is very important because there is a lot of criticism from the public aimed at our industry of the water quality after restoration.

Mark Pelizza
Uranium Resources

1. Looking at our standards for restoration to background or equivalent to MCLs or application of ACL process – what happened to various well fields and operations? What were the targets restorations, what was achieved by the operators, and how the operations were received by the regulatory agency?

2. We have been in contact with Texas DEQ. We intend to talk about further fields – we have some data, but not all. It will be part of our analysis.

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1. What is the status of the 1994 proposed revisions to the Federal Radiation Protection Guidance? How is the Radiation Protection Guidance going to impact what you may look at for dose limits?

2. Do you consider the public dose limits to be 500 milligrams/year or 100 milligrams/year?

Phil Egidi

1. At the current time, the Agency has not re-started up its review. EPA under its authority from the Atomic Energy Act and authority given to it at its establishment, picked up standard settings requirements that were originally included in the authority of the Atomic Energy Commission, including radiation protection for the general public. The last version was from 1960 – very dated – there have been many changes since that time. EPA considered revising that in 1990s and in early 2000, but it has been put on hold due to resource constraints. We haven't restarted efforts that this point and I am not sure when that will happen. We are going on with current guidance that might be appropriate in conducting our review.

2. EPA has a risk standard of 1x10-4 to 1x10-6 – we will be using that Agency standard in our general review.

1. Do you have reason to believe that existing ISR or milling facilities, operating under current radiation standards, are harming tribes or children? What effects have been demonstrated and in what studies? (Subpart D) 2. Based on NAS BEIRV V and VII studies, is 25 millirem a reasonable limit, in light of the optimization recommendations delineated in ICRP60 and 103 with regard to social, economic, and health considerations? I'm considering specifically at 142.41(d): whole body+organ limit = 25 millirem ea. Tom Johnson	1. We're still in the process of collecting data. We are conducting a GIS study on locations of existing, closed, and potential facilities to look at demographics associated with these facilities to look at effects on children, tribes, and other disadvantaged populations. We know that potential impacts to children can be more substantial as far as risk. We have heard that the Navajo Nation, in particular, has suffered from increased incidences of cancers. These were previous operations on the reservation, including uranium mines, and the fact that there's naturally occurring uranium in soils there. We'll have to take a look at that. 2. We are going to be looking at updated recommendations of advisory boards and panels, including the ICRP and BEIR VII report. As part of our review, we will examine how existing standards have worked with that, both radon protection and exposure. We will look at the existing standard for dose for public in our review.
1. Several family members have passed away from cancer in the Shiprock area, and we have many concerns around safe drinking water. What are the reducing agents? You said they try to stop contamination and leaking – how do you know they're safe for our communities? 2. Can we get this presentation? Shannon Frances *Colorado American Indian Movement*	1. Reducing agents will be included in our review. 2. It will also be put on website, or you can email uraniumreview@epa.gov. Also, we do have a big outreach effort, especially to the tribes. We've recently given a presentation to the National Tribal Water Council. I will be speaking at the National Tribal Science Forum in Michigan as well as the Navajo Uranium Contamination Workshop in Tuba City. We hope to have similar public meetings; it will depend on the timing and resources. We are very concerned on the impacts on the tribes – Hopis, Navajo, Pueblo – the southwestern communities
Can you provide an example of a mine that has used ISL method that was successful in restoring the water to pre-existing condition without it relaxing the government remediation standards? Nadine Fadilla *Multicultural Alliance for a Safer Environment, Navajo and Pueblo from New Mexico*	We are conducing reviews. I've heard statements that there's a facility that has done it. There are other studies from the USGS about many facilities in Texas that have had one or two or more constituents that went above baseline for MCL.

How long does it take until it's actually safe? In Shiprock, people are living there and there are high rates of cancer. For a dead zone, how long does it take to remediate the soil? Is there a microclimate zone that is created? Shannon Francis *Colorado American Indian Movement*	One of the problems we have with many of the lands out there is that there are both naturally occurring uranium and arsenic and other metals in the soil. If there is a contaminated site, you have to look at the source of the contamination and the growing conditions of that soil. In terms of water, that's a hydrological cycle and to my knowledge, I've not seen anything where uranium mining and production has affected the precipitation rate.
In Subpart A Section 192.02, it says standards are designed to be (a) effective for 1000 years, and footnote 1 says monitoring after disposal is not required after a year or so. Footnote 2 says that for at least a one year period, the standard only applies to the atmosphere. Is that true? Are there no standards there? Darrell Alex *Multicultural Alliance for a Safer Environment*	Subpart A refers to closed uranium mills. It was a design standard; once the site is reclaimed to a certain radiation level...the site is held in perpetuity by DOE. DOE does annual inspections of these facilities. The design standard was designed for 1,000 years.
1. How does EPA assess its interaction with tribal members? Do you have a survey or a format to assess yourself in your effectiveness in interaction with Navajo? How do you assess your effectiveness to the communities? Do you have any documentation with metrics? 2. Does EPA have any tools to assist low income communities to travel or attend these community meetings? Are there any incentives through which EPA can reimburse community members? Gerald Brown *Community of Church Rock*	1. EPA has policy of tribal consultation with tribes affected by potential rule-making. In this case, it's a review. We have already opened the door with the Navajo and are considering sending a letter to the President of the Navajo Nation. I would suggest that chapters bring it up to the National Council. I'll personally make sure we demonstrate what we've done in meeting your concerns. If in fact this were to go to a regulation, we're required under executive order and EPA requirements to talk about all the steps we've taken for this consultation. This Administration and this EPA Administrator have stated that we are going to redouble our effort to work with the First Nations. 2. We don't have the funds for it, but whatever methods we use, we intend to make sure it reaches those communities.

How far are the aquifer exemption boundaries set in monitoring ring and how are they calculated? For the monitoring ring, how far out? Is it based on time of travel? Will it be set at a 500-foot boundary? Does the industry know? Parker Sokolosky *Wyoming Department of Environmental Quality*	The DEQ will also be looking at permit application. It is based upon the conditions at the site. It is not necessarily 50 or 200 feet; that's why I said the cartoon depiction is not to scale. The conditions at the site are the most important considerations – it will show where the commercial producibility of the ore body extends. We use that information to define what area will be considered for the exemption. For state permitting action, EPA would not set the exemption area. The state would do that. The EPA has an approval process and retains a responsibility for approving an aquifer exemption by the state. It is approved as a revision to the delegated program. Once the state makes the application and provides the data that shows the criteria for exemption has been met and they believe exemption is warranted, they will forward that to EPA and EPA will make a decision. We have no guidance on distance. The criteria for exemption look at commercial producibility. It would be tied to closely to the commercial producibility for that zone.
In some instances, that authority to determine the exemption area has not been delegated to a state. In Colorado, South Dakota, and tribal lands in New Mexico, the EPA would make those determinations, correct? Matthew Garrington *Environment Colorado*	Yes, for non-delegated UIC programs, the EPA would be in a situation to determine the area to be exempted. That exemption becomes part of the draft permit action so there's an opportunity for public comment that would be connected to permit.
What direction is EPA going to go with in regards to generic EIS and EIS? To me, it sounds like rubber-stamping EIS. Is there a constant baseline level? What's the difference between the two? Mario Atencio *MASE, KIVA Club / ENDAUM / CARE*	The NRC developed a generic EIS, which looked at the production process for ISLs/ISRs. NRC developed scenarios and gave information about previous studies. They looked at regions in the US where they anticipated development to take place. The intent was to provide a basic document to be a reference document for individual site assessments conducted for new license applications. Originally, they intended to conduct environmental assessments and make determinations based on the review, be it an EIS or not, as part of the NEPA requirement, or associated with a license approval. There was a determination from the new NRC Chairman that they would prepare an EIS for every new application. They are called a Supplemental EIS because they're still using the GEIS as the basis for their review. They also provided a more extended review in accordance with NEPA and their own regulations for new facilities. EPA had commented on the draft and final GEISs as well as three draft SEISs for new facilities. We had some real concerns with those drafts, and NRC is trying to address those concerns as they move forward.

TRG RECOMMENDATIONS for FUTURE PUBLIC INFORMATION MEETINGS

- Continue to follow the design (see attached document, 'EPA 40 CFR 192 Review – Public Information Meetings Micro Agenda') we developed together and further enhanced in Denver. The kinds of things that worked well were to have the facilitator be really explicit about the meeting objective, agenda, and ground rules at the very beginning; allowing participants to ask their own questions (and submit them in writing); giving the public opportunity to make informal presentations; and reserving time at the end for general questions or comments.

- Take steps to further enhance the presentation portion of the agenda. In Denver, we worked to enhance the PowerPoint slides and the presenter responded to some tips to improve his presentation effectiveness; more of this could be done.

- Continue to engage a support team as you did in Wyoming and Denver – and depending on the size of expected participants, two will most likely be sufficient: one to facilitate and one to help with registration and shift to take notes.

- Consider modifying some of the logistics of the meeting such as: including 2-3 notecards in the folders in advance; providing pens for each participant; asking participants to leave a business card at the registration table (in addition or in lieu of signing in) to help with handwriting interpretation; assigning numbers for public presentations to avoid the facilitator mispronouncing people's names.

EPA Review of Standards for Uranium and Thorium Milling Facilities

PUBLIC INFORMATION MEETING
Corpus Christi, Texas
November 4, 2010

On November 4, 2010, EPA held two public information meetings in Corpus Christi, TX to provide an overview of the review of 40 CFR Part 192 and the revision of 40 CFR Part 61 (Subpart W) and to seek public input.

MEETING STRUCTURE

Two meetings were held for the convenience of the participants: one in the afternoon and one in the evening. Both meetings began with opening remarks and introductions. Loren Setlow and Tom Peake of EPA's Radiation Protection Division (RPD) opened each meeting by giving a presentation on the EPA's review of 40 CFR Part 192 and planned revision of 40 CFR Part 61 (Subpart W). The presentation was followed by a question and answer session. Participants were invited to submit their questions on an index card so that they could be read aloud for the benefit of all. After the question and answer session, the public was invited to provide input by signing up for five-minute presentations. In the remaining time, the floor was opened up for additional audience questions and input. George Brozowski of EPA Region 6 served as facilitator. Tony Nesky of the Radiation Protection Division took notes.

ATTENDANCE

Thirty-four people attended the afternoon session, with twenty-nine people signing-in. Twenty-four people attended the evening session; of those, nineteen had attended the afternoon session earlier in the day. In opening the afternoon session, facilitator George Brozowski asked participants about their affiliations. Seven people indicated affiliation with industry, two with non-governmental organizations, and two indicated that they were attending as private landowners. George also asked participants to indicate how far they had travelled to attend the meeting. A majority—twenty –five people—traveled between 20 and 50 miles to reach the meeting. Three persons had to travel more than 50 miles, and three people had to travel more than 100 miles. Appendix A lists registered participants in the afternoon session. Appendix B lists the registered participants in the evening session.

AFTERNOON SESSION

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations given in the afternoon session are summarized as follows—

Raul M. Ramirez
Brooks County, TX

Mr. Ramirez is the county judge from Brooks County, where there is double-digit unemployment. He considers Brooks County to be fortunate to have the uranium industry, which provides over 200 jobs whose dollars multiply seven times. He considers them good partners; they are supportive of the volunteer department in a rural area. Mr. Ramirez said that Brooks County does not want increased government regulations that will negatively impact the uranium industry.

Dick Messbarger
Kingsville Industrial Foundation, Kingsville, TX

Mr. Messbarger stated that he was representing the Kingsville Industrial Foundation, which is a non-profit private organization whose focus is on job retention and recruitment and expansion of the job base. The Industrial Foundation hired Texas A&I University to evaluate a proposed mine in the area. Texas A&I concluded that the process was safe, and even took party status in the hearing with the Texas Water Commission. The president of the university, the mayor, and the head of the King Ranch all went to Austin testify in favor of the mine.

The Industrial Foundation hired a firm for an economic impact analysis for the one operation in Kleberg County. The analysis was done in 2008 based on 2007 expenditures, and showed that URI salaries, royalties, and expenditures contributed about $30 million in a county with a population of 10,000 people. The industry has had a significant economic impact over a ten year timeframe. The taxes it generated have funded construction of a new school. The Industrial Foundation finds that the uranium industry has been a vital part of the South Texan economy, contributing jobs and expanding the tax base.

Mike Kezar
Chairman, Texas Mining and Reclamation Association, Austin, TX

Mr. Kezar represented the Texas Mining and Reclamation Association, a non-profit trade association. Texas has the eighth largest mining market in the country. The mining industry in Texas provides over 14,000 direct jobs and over 200,000 indirect jobs, contributing $30 billion to the state economy. A typical uranium mining operation provides 100 high-quality career jobs. TMRA asks for oversight that is consistent, and asks that EPA consider that the impact of additional regulations on short term and long term viability of uranium industry in Texas.

Harry Anthony
Uranium Energy Corporation, Corpus Christi, TX.

Mr. Anthony represented the headquarters location of Uranium Energy Corporation in Corpus Christi. Uranium Energy Company is a U.S. energy company with about 55 employees and a number of projects in South Texas. Mr. Anthony said that he has seen good changes in the industry over the last 35 years, with more stringent regulations from TCEQ, commenting "the industry has abided by those regulations over the years." . He noted that there has been technological improvement in the process, so that there are no ponds are no longer used, and concluded "… the industry has certainly addressed issues that have come up from Washington and also from Austin, while competing worldwide with other countries that have stable regulations."

Mr. Anthony presented a series of examples of successful land restoration of former uranium mining sites. He specifically referred to one site that had been reclaimed, "The well fields are for unrestricted use, and are used for cattle crazing." He showed photographs of another site saying "Today you would never know that anything was there."

Mr. Anthony concluded his presentation by saying "I don't think that the industry needs additional regulations to impede its growth. As you know, we import about 95 percent of our uranium from foreign sources. We consume about 55 to 60 million pounds per year, and produce about three million. We need to get this industry restarted and any additional, undue regulation is not conducive to getting it started."

Mark Peliza
URI, Inc., Lewisville, TX

Mr. Peliza stated that he has been in the ISR business for 33 years, most of them in Texas, commenting "We have more ISR in Texas than in other states combined. There is more to see here."

Mr. Peliza said that that he had worked with TCEQ and its predecessors for years and that sites have all been regulated well, "We don't have a lot of legacy operations and issues." He said "Almost all uranium mining sites have gone through a formal PA process, much like an EIS." There has been a public participation process much like an EIS. There are many "green books" that predicted how the sites would proceed.

He discussed site cleanup. “We have years and years of monitoring data. We have sites that are in stability modes. There are 26 operations and 86 areas, of which 70 have been approved for restoration.”

He concluded, “You need to look at the reports to see if there are holes in the regulations. If there are, they need to be fixed. If not, do not add regulations to burden the industry.”

Steve Brown
Senes Centennial, CO

Mr. Brown stated that he has been practicing health physics for 40 years and is certified by the Health Physics Board. He is a member of the Health Physics Society. Mr. Brown submitted extensive comments in writing, but wanted to address the adequacy of the radiological exposure criteria in the EPA and Texas rules. He addressed three questions—

1. Are the existing regulations adequate to protect public health?
2. What is known about the potential health effects to populations living near uranium recovery facilities?
3. What are the circumstances of the known health effects (i.e., lung cancer) among miners in the 1950s and 60s?

He noted that he lives in Colorado, so his background exposure is 400 millirem per year. In Texas the background is 300 millirem per year, and in coastal states, it is 150. The difference in background radiation between the coastal areas and Colorado is higher than the 25 millirem per year that EPA promulgated under 40 CFR 190.

Mr. Brown noted that the amount of the maximum amount of radon emissions allowed under the standard at 40 by 80 acre impoundment is “equivalent to the amount of radon emissions that the surface of the earth emits in a couple of miles of Texas farmland, everywhere in Texas and most other places” Mr. Brown also stated that there have been numerous studies of people living around uranium mines and mills in the United States, specifically in Montrose County, Colorado, Grants, New Mexico, and here in Karnes County, Texas. He cited the conclusion of a study from Vanderbilt University’s Ingram Cancer Center, “No unusual patterns of cancer mortality could be seen in Karnes County over a period of 50 years, suggesting that the uranium mining and milling operations had not increased cancer rates among residents.” He added, “We associated uranium with lung cancer because of earlier unregulated mines 50 years ago.”

Charlie Ragland
Alice, TX

Mr. Ragland represented himself as a landowner and expressed concern about the impacts of regulation on industry. “We are in a sparsely populated county. There is not any industry to speak of in Duval County, aside from the oil and gas and ranching business. If you change the rules and try to tighten them up, it will have a negative economic impact. The method of operations has changed, and the mine will be a positive flow of income to Duval County.”

Mark Walsh
STOP, Kleberg County, TX

Mr. Walsh said that he lives in Kleberg County and represents STOP—South Texas Opposes Pollution. STOP is a group of residents that live in and around the area where uranium mining takes place. Mr. Walsh noted that uranium mining has been going on since 1983, and that there had been an investigation in 1988 because a permit was issued after some citizens complained that there may be some health issues and some contamination of water.

Mr. Walsh said that the permit required water to be restored to its original pre-mining quality, but that many experts and even uranium miners have said, “No, it can’t be restored to its original quality.” STOP’s question is: “Why have a permit if technical experts say that pre-mine quality cannot be achieved?”

Mr. Walsh also raised another issue regarding restoration, mentioning that there was a five-year estimated plan to cleanup. He said that restoration had started in 1988, but we are only halfway to restoration. He said that only eight fields are restored, four were progress, and another seven have yet to begin restoration. Mr. Walsh asked what could be done to prevent delays in restoration for another 20 years. He also noted that permit amendments were issued frequently, and that in some situations, the amendments were still not able to restore the water back to its original quality.

Mr. Walsh also had questions about TCEQ’s participation. He said that STOP complained that restorations had to be completed before others could begin, and an administrative judge agreed, but TCEQ overturned it. He said that STOP often finds that the Commissioners of TCEQ have overruled staff and even an administrative judge, and” that is a concern for protecting water quality.” STOP requests that EPA conduct a complete review of uranium mining in Kleberg County, We are asking EPA for help to get this done.”

Katherine Armstrong
Austin, TX

Ms. Armstrong introduced herself as a former Chairman of Texas Parks and Wildlife, and as an expert on the concerns of private landowners concerns. She values regulatory oversight from EPA and TCEQ. She has studied the issues, and looks at uranium recovery as a resource and property right, commenting, “…most of the private landowners I know are comfortable with the level of regulations that are going on and with the information that they get from the EPA and Texas Commission on Environmental Quality.” She believes that ISR is a safe process.

She noted that when her family makes a business decision to use the minerals on property, it “will make it possible to steward our land, protect our wildlife, recover habitat and do all the amazing things that are done in Texas on private land to the benefit of all.” She continued, “There aren’t enough taxpayer dollars in the world to do the private land stewardship that goes on private lands in Texas today.” Ms. Armstrong said that she supported the good work that EPA does, but asked: “Just don’t go so far that you kill the ability of private landowners to recover and develop this natural resource.”

Mr. Lupe Canales
Jim Hogg County, TX

Mr. Carnales introduced himself as the County Judge from Jim Hogg County, which he described as a rural area that is "economically devastated." He continued: "If you take away uranium mining, you will kill Jim Hogg County. We lost 30 percent of oil and gas in last two years." Mr. Canales said that the uranium industry was all that it is left, and citizens have to go to neighboring Brooks County for work. Mr. Carnales brought four businesses in, the most important of which is an Alco, which he described as "a mini-Wall Mart." A Quiznos brought in 18 jobs and most recently a Subway brought in another 15 jobs, but according to Mr. Lupe, "this is not enough, and these are not high-paying jobs. We need the uranium industry to stay where it is and to provide jobs to Duval County and other counties like ours."

Mr. Ted Long
Goliad County, TX

Ted Long introduced himself as having been a Goliad County Commissioner for ten years and commented "Everything I have heard was rather disturbing. I want to ask everybody. Is there anybody is this room that drinks water? Anybody? Is there anybody who has kids that drink water? Grandkids? Is there anybody planning on having anybody that drinks water? Future generations?" Mr. Long said that he was concerned about the drinking water supply, and asked EPA not to relax the rules.

Venice Scheurich
Coastal Bend Sierra Club, Corpus Christi, TX

Ms. Scheurich said that she had come to the meeting to talk about the statistical methodology used in deriving estimates for restoration table standards for post-mining groundwater restoration. "Four years ago, when uranium companies intensified their interest in mining in several South Texas counties within our region, the Coastal Bend Sierra Club began studying the in-situ mining process. Now, I believe that some of the discoveries we made on statistical matters may have an important connection to whether EPA is able to properly administer its mandate regarding the Safe Drinking Water Act. And I believe this because the statistical documentation, which I will also leave attached to the comments, indicates that pre-mining baseline groundwater quality has been, and is being, incorrectly assessed by present state regulations here."

According to Ms. Scheurich, the Sierra Club study indicated that restoration efforts for groundwater almost always fail. The Sierra Club believes that it has found "an extremely serious" sampling design flaw in one of the first steps of the regulatory process, the results of which "are really severe, because the resulting flawed process of estimating groundwater has an direct impact on whether EPA will grant an aquifer exemption, therefore whether the spirit or intent of the Safe Water Drinking Act is being violated."

The Coastal Bend Sierra Club asked two questions—

1. "What is EPA's justification for continuing to accept estimates of pre-mining groundwater quality based on selected, biased samples when EPA makes decisions on whether or not to grant an aquifer exemption?"
2. "Does EPA's acceptance of flawed estimates of groundwater quality from a mining company's application for an aquifer exemption result in one or more violations of the Safe Water Drinking Act?"

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
Are the folks at the table here decision-makers?	George answered that the review was a joint effort with the EPA Regions. Loren elaborated that EPA has a workgroup with 30 members across the agency. The workgroup is developing an options document for the Assistant Administrator of the Air Division. The workgroup has to come to agreement to select an option for the Assistant Administrator. The EPA representatives at the meeting are the decision-makers because they are preparing the final document that goes to the Assistant Administrator, and will select the option to make changes, leave the rule as is, or make minor changes. If EPA goes forward with any changes, we would issue a draft rule in 2012 that would be subject to public comment. The EPA representatives here are the decision makers, but the authority resides with the Assistant Administrator.
How close is EPA to deciding whether to revise the rule?	Loren replied that there are a couple of months of review left, and that EPA is considering the input from the on-line discussion forum and public meetings.
If EPA begins updating rules, will this have an effect on the processing of aquifer exemptions under review?	Loren answered that the aquifer exemption process is independent of this rule, but offered to pass along information to the appropriate persons at EPA.
Have you found pre-mining water or ore that meet EPA's MCLs?	Loren answered that EPA has seen a number of things, but the review is not complete and it is too early to make any conclusions.

Have there been any monitoring results for radon flux that raise concerns about the safety of project employees and the public?	Loren answered that there have been a couple of results that were high, and that EPA has been in discussions with the industries involved.
Is EPA looking at radon from natural gas and farming?	George Brozowski told the audience that the Region makes test kits available. Aside from that, the Region is not looking at radon per se. George invited the questioner to elaborate.
The questioner continued—	
I came from industry. Natural gas averages 1,500 pCi/liter. Gas in my house varied from 140 to 160 pCi/liter. In the summer, because of the time it takes to get it to Denver, it dropped to about 35 pCi/liter. Why are you concerned with uranium when natural gas affects 11,000 times more people than the uranium industry?	George said he would refer the question to others in EPA. Loren added that there was a study in 1970s that determined a level at which a homeowner would have to take actions.
Could changes in 40 CFR 192 result in retrofitting of old UMTRCA tailings sites?	Loren answered that any changes could be applicable to facilities institutionally controlled by DOE, so EPA has to look at costs to the government as well as public protection.
Will cost versus risk be considered?	Loren replied that cost-benefit analysis is required by legislation. The EPA Radiation Protection Division has an economist on its staff, and appreciates comments on the economic aspects of this rule. He added that EPA has a website that explains the development of regulations from start to finish— http://www.epa.gov/lawsregs/brochure/developing.html He explained that the analytic blueprint is deliberative. If EPA decides to make any changes to the rule, it will share the analytic blueprint and supporting materials on its website.

I am interested in the NESHAP applications package for XXX in Colorado. There was a study to calculate fusion coefficients to generate water. The conclusion was that the coefficients were so low that the radon didn't come out of the water. It's on your website.

Tom Peake answered that Reid Rosnick of the EPA Radiation Protection Division is the flux from evaporation ponds under different conditions. He noted that EPA has not made a decision on either 40 CFR 192 or the NESHAP. The purpose of this meeting is to get input to help EPA in its decision-making.

EVENING SESSION

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations given in the evening are summarized as follows--

Ty Embry

Texas Mining and Reclamation Association (TMRA), Austin TX

Mr. Embry spoke on behalf of the owner-operators of the uranium committee of the Texas Mining and Reclamation Association (TMRA) uranium committee, and addressed the cost and benefits of the possible revision of 40 CFR Part 192 and Part 61 Subpart W. TMRA thinks it is important that EPA understands Texas state law and the amount of oversight of the uranium industry, particularly in light of recent state legislation. Under Senate Bill 1604, House Bill 3837 and House Bill 3838, Texas consolidated oversight under TCEQ and clarified oversight under the railroad commission, TCEQ and local authorities. There were lengthy extensive stakeholders input in the rulemaking process, both in the Railroad Commission and the TCEQ. In the railroad, it went from 2007 to 2010, and in TCEQ it went from 2007 to 2009, and there was extensive opportunity for stakeholder input. TMRA does not think that additional Federal regulations are needed because of the extent of existing regulatory oversight.

Rich Jacoby

Texas Radiation Advisory Board, TX

Mr. Jacoby said that it was his understanding that a lot of people participating in the afternoon session expressed the opinion that the existing rules were protective. He agrees that that they are. Since most of the mining is done by ISR, Mr. Jacoby does not believe that the standards at 40 CFR Part 192 are applicable, because the ISR method is so much safer in terms of effluents and releases from the site. Mr. Jacoby finds it difficult to shoehorn ISR under the existing 192 regulations, which he thinks are perfectly protective for conventional mining, and often overly protective for ISR. Mr. Jacoby would like to see the implementation of performance-based licenses.

Mr. Jacoby thinks that Texas' integration of groundwater and radiation protection is a system that works, and would hate to see it interrupted, commenting "We have a lot of data in Texas that I hope you will look at. We don't have a lot of radon emissions. We don't have a lot of ponds; people are moving toward the use of tanks."

Mr. Jacoby concluded by saying that the industry strives for regulatory certainty, asking EPA "Please don't make regulations that confuse ISR with mill tailings facilities."

Steve Brown
SENES, Centennial, CO

Mr. Brown is a practicing health physicist, who spoke to the radiological criteria of 40 CFR Part 192 and Subpart W. Mr. Brown presented the argument the current standards are already protective, stating "regulating to them does not really have any impact in controlling doses to the population of the United States." He suggested comparison of the rates in the regulations with natural background rates, saying "Our lifestyles, what we eat, where we choose to live, the things we do in our lives, have much greater impact on the radiation exposure of the American population." He continued, "I live in Colorado, my background exposure is about 450 millirem per year. The average U.S. population dose is about 310 millirem per year. In the coastal plains states, New Jersey, Virginia, Oregon, about 150 millirem per year, so the delta, depending on where one lives in the United States, can be about 200-300 millirem per year, and much of that is from radon relative to the 25 and 100 millirem standards."

Mr. Brown said that he had measured radon emissions from tailings ponds for years and found nothing. He concluded that regulations as they exist relative to the radiological criteria are protective, and reiterated his opinion that controlling to 25 or 100 millirem per year does not have a great impact on dose to the American population.

Sister Elizabeth Riebschlaeger
Cuero, TX

Sister Riebschlaeger began her remarks by thanking EPA for its presence here, saying "It represents to me a willingness to be accountable to citizens and to everyone involved in the decision-making process." When balancing the needs of business development and environment, Sister Riebschlaeger asked that rural communities be considered first. "The ranching industries and farming industries are primary to rural areas, especially in the area around Goliad." She expressed the concern that the experience of the Karnes City mine not be repeated. Sister Riebschlaeger asked the regulatory agencies to take a long-range view of the value of our environment as primary to any development in the future, because "public health is essential to any business development and to the workforce."

Mina Williams
Coastal Bend Sierra Club, Corpus Christi, TX

Ms. Williams said that she had heard that people can buy land over exempted aquifer areas and drink the groundwater. She commented "It's expensive to have the landowner bear the cost of having his or her own well tested in order to protect himself against the possibility of what

Venice spoke of today: inappropriate tests for establishing baseline. Thereafter we can never establish what baseline was after the area has been disturbed. And so this gets very complicated."

She asked for clarification about use of water from an exempted aquifer.

Loren Setlow answered—

"There is no method for revoking an exempted aquifer. EPA is considering a method for revocation."

Ms. Williams said that should a deed should indicate that a piece of property lies above an exempted aquifer and asked for clarification.

Loren Setlow responded—

"The aquifer exemption, when it applies, applies to the use of that prohibits the use of that aquifer for public drinking water. The fact that it is contaminated, and not suitable for a public supply does not exempt the individual who owns that property from using it as a drinking water supply, even if it is to their detriment. Now I cannot speak to the disclosure laws in the state of Texas."

Ms. Williams said that she would like to be told that a piece of property she was buying had an aquifer that had been condemned by EPA and was non-potable.

Loren Setlow responded—

"EPA Region 6 in this instance would pull those records from the office of groundwater and drinking water. I would also assume that the state keeps those records."

Susan Jablonski of TCEQ also responded that TCEQ considered revocation in the rulemaking, and changed requirements to include notification for surface and subsurface rights. The commission didn't pass the revocation rule, but wants to make this information more accessible."

Jeff Hill, an attorney, added—

"Your question is difficult to answer because there are at least two animals called aquifer exemption. One is the aquifer exemption, which is issued by TCEQ. The other is a petition to the US EPA for a Federal aquifer exemption which is a program amendment to the state program. They have slightly different standards and have slightly different processes for approval. The question needs to be addressed specifically to the location with which you are concerned. Denver, CO rules don't help you much in Texas."

Kerry Culpepper
Karnes County, TX

Ms. Culpepper stated that she lives in Karnes County about three football field from those uranium mines. She urged caution about regulation, and gave an example of children growing up near uranium mines in Karnes County. "These kids went out and all got in a tailing pile, because they put fish in there. They were fishing and they fell in. There's nothing wrong with any of those children. They're grown men, they're doing great. So we can't just get overboard with this stuff."

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
Are the folks at the table here decision-makers?	George Brozowski replied that he was from the Regional office, and will be working with other Regional offices, notably Region 6 and Region 9, to come up with a final conclusion. Loren Setlow replied that he was working with our regional offices in Region 7 and Region 5 to develop an option paper for the Assistant Administrator of the Office of Air and Radiation. EPA is conducting the analysis to determine to revise the rule, make minor revisions, or leave it as is. If EPA decides to go through with a rule, draft language will be published and there will be the opportunity for public comment during public hearings.
Will the presentation be on the website?	The presentation and meeting notes will be posted on the website.
Who made the list of license applications?	Loren replied that the NRC made the list. Tom Peake added that NRC had approved the license of the Moore Ranch in Wyoming since the publication of the list.
Assuming limited government resources, how does EPA justify this rulemaking effort?	Loren replied that EPA has been conducting reviews with limited staff for a long time. The Uranium Mill Tailings Radiation Control Act (UMTRCA) specifically states that the EPA should review the rule and make revisions from time to time. EPA must take changes in science into account.
Isn't there a greater bang for the buck to be had elsewhere in the EPA or the Federal Budget?	Loren replied that Agency evaluated possibilities for a number of analysis, and determined that it was worthwhile to undertake this review. "It is not a zero-sum game in terms of ranking these against others, although this is not going to have a ten or 100 million dollar impact, but it may have

QUESTION	EPA RESPONSE
	environmental impact if we do decide to change the rule." Loren reiterated that EPA is required to do a cost-benefit analysis of any revised rule."
Are constituents other than uranium—molybdenum, iron, arsenic— that are liberated in the ISR process, taken into account in an aquifer exemption granted by EPA?	Loren replied that he could not speak about what constituents are considered in the aquifer exemption process, but did note that the EPA Office of Water looks at the aquifer's potability, its mineral characteristics, and its total dissolved solids (TSS). The requirements for aquifer exemptions can be found in 40 CFR Part 144.
Who was on the Texas committee who wrote the regulations for the uranium mining? How many lobbyists were involved?	Loren replied that he could not speak to that question, as the purpose of the meeting was to discuss EPA's rules. Susan Jablonski of TCEQ replied that that TCEQ had an extensive stakeholder process when they developed the rule, and that some people in the room had participated in it. Ms. Jablonski said that it had been an open process.
What are the justifications for aquifer exemptions?	Loren replied that he didn't have the list with him, but that the requirements could be found in 40 CFR Part 144. Tom Peake added that granting an aquifer exemption requires documentation that the groundwater quality is so poor that it can never be used as a public drinking water supply.
Does EPA have any examples of successful restoration of aquifers to baseline conditions?	Loren replied that he could not provide an answer, as EPA is still studying this. He mentioned that the U.S. Geological Survey had some published studies.
I did not hear you mention Region 9. Don't they have all Indian countries?	George Brozowski replied that Region 9 is involved and that they have Apache and Navajo territories.
Regulators in Texas have 30 years experience in regulating uranium extraction. What will EPA do?	Loren replied that EPA has reached out to states to share their information, and will continue to do so. EPA will also ask for the input from the people of Texas for reports and information that they think is important to review. EPA will also look at what has happened since the regulations were developed to determine if revisions are needed.
Where does the water sample come from? From the mining company, from the locals, from the water district?	Loren answered that this was the jurisdiction of the state regulator. There is nothing in the rule that specifies where the sample comes from. The rule does not address that issue. EPA is taking a look at the information that is available on

QUESTION	EPA RESPONSE
	this matter.
This question was followed by a series of questions and answers:	
Available from where?	Loren replied that EPA is looking at the wealth of information for establishing baseline water quality and restoration under such programs as RCRA and CERCLA.
In other words, you look at the sample that the uranium company provides when you're considering whether an aquifer exemption is granted.	Loren replied that he could not provide answers on aquifer exemptions.
You still haven't answered my questions.	Tom Peake answered that EPA sets standards and the agreement states implement them.
My original question was—"Are constituents other than uranium considered in aquifer exemptions?"	Tom Peake answered that other constituents were considered in granting the exemptions.
What went into EPA's coming to the conclusion that ISR ponds fall under Subpart W??	Loren replied that the liquids generated by the process of uranium extraction meet the definition of wastes under Subpart W. The water contains dissolved radium and the numbers are such that the radon emissions from dissolved uranium can equal those of tailings piles. In some cases of excursion, EPA has 7000 pCI/L from dissolved radium. We saw numbers of 7000 pCi from dissolved radium.
Is this information publically available?	Loren replied that EPA presented this information at the National Mining Association meeting and will post it on the Subpart W page of its website.
Can you discuss the court cases that required EPA to review this standard, aside from the Colorado one already discussed?	Loren replied that he thought the suits were found in favor of the Environmental Defense Fund in 1990 or 1991. In one case, a Court ruled that NRC did not have to adopt all of EPA's language. In the 1990s, there was another decision that EPA did not have oversight authority over NRC's determination of alternative concentration limits were to make a decision on an alternative concentration limit on restoration.

QUESTION	EPA RESPONSE
What sites are testing new groundwater restoration techniques?	EPA has not completed this study yet and thus cannot give an answer.
What labs are evaluating it?	Same answer as above.
Are there research gaps?	Same answer as above.
If the EPA fails to set up an aquifer exemption, is it a takings case?	Loren replied that it varies from case to case. EPA is not required to grant an aquifer exemption if the criteria are not met.
What happens to the residue from mining water?	Susan Jablonski of TCEQ replied that the residues must be disposed of as licensed waste, and that for the most part, disposal of such wastes takes place outside of Texas.
How are mining wastes disposed?	Susan Jablonski replied that they are generally disposed by deep well injection.

FOLLOW-UP ACTIONS

EPA committed to the following actions during the meeting—

- Look into exposure from radon in household natural gas.
- Provide information to water program on citizen concerns for aquifer exemptions.
- Provide information to Mr. Ted Long on aquifer exemptions.

APPENDIX A: ATTENDANCE LIST, AFTERNOON SESSION

Attendance: EPA Public Information Meeting, Corpus Christi, TX, Afternoon of Nov.4, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Harry Anthony	Uranium Energy Corporation	500 N. Shoreline Suite 800 Corpus Christi, TX 78411	361-888-8235	hanthony@uraniumenergy.com
Katherine Armstrong	Self (landowner)	919 Congress #1400 Austin, TX 785701		katarmine@earthlink.net
Alejandro C. Garcia	Duval Co.	P.O Box 684 San Diego, TX 78384	361-207-1165	
Steve Brown	SENES, Inc	Centennial, CO	303-524-1519	sbrown@senses.ca
G.S. Canales	Jim Hogg	804 N. Pine Hebronville TX 78311	361-527-3015	
Ty Embry	Owner/Operator Members at Texas Mining and Reclamation Association	816 Congress Ave Suite 1900 Austin, TX 78701	512-322-5829	tembrey@lglawfirm.com
Yaneth Gambra	TAMUK	13833 Paddlewheel Corpus Christi 78410	361-241-1253	yaneth.gambra@yahoo.com
Christian Goff	Pure Energy	Austin, TX		
J.M. Holland	URI, Inc.	641 E. FM 118 Kingsville TX 78363	361-595-5731	jmholland@uraniumresources.com
Craig W. Holmes	URANERZ	8107 Pommelhouse Austin, TX 78759	512-250-8151	Pommelhouse@scbglobal.net
Mike Kezar	100 Congress Ave Suite 1100 Austin, TX	512-236-2325		
Ted Long	Goliad County	388 E Fm1961 Goliad, TX 77963	361-564-2214	Tmlong4@gmail.com
Peter Luthiger	MULLC			pluthiger@mestanauranium.com
W.M. McKnight	UEC	215 Lllano Dr. Portland, TX 78374	361-643-7701	
Darin McCoig	URI, Inc.	641 E. FM 118 Kingsville TX 78363	361-595-0403	dammcoig@uraniumresources.com
Dick Messbarger	Kingsville Industrial	341 Brenda Kingsville,TX	361-597-6438	edc@kingsville.org

Attendance: EPA Public Information Meeting, Corpus Christi, TX, Afternoon of Nov.4, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
	Foundation			
Mark Pelizza	URI, Inc.	Lewisville, TN	214-683-8889	mspelizza@uraniumresources.com
Charles H. Ragland	La Palangana Ranch	585 CR 381 Alice, TX 78332	936-348-4896	charlesragland@netzero.net
John D. Ragland	La Palangana Ranch		701-2458	
Raul M.Ramirez	Brooks County	P.O. Box 515 Falfurrias, TX	361-325-5604 ext. 15	
Venice Scheurich	Coastal Bend Sierra Club	P.O. Box 10101 Corpus Christi, TX 78160	361-241-4289	Jave241@sbcglobal.net
Curt Sealy	Global Solutions	1609 Catron Ave Albuquerque, NM	970-640-6590	csealy@globalsolu.com
Gary Smith	TCEQ			gsmith@tceq.state.tx.us
Mark Walsh	STOP	3931 Boad Kingsville, TX	361-595-1265	markwalsh@yahoo.com
Shuangzhea Wang	TAMUK			Shuangzhea.wang@tamuk.edu
Kathleen Webb	Uranium Energy Corporation	6100 Indian School NE Suite 225 Albuquerque, NM 87110		kwebb@uraniumenergy.com
Matt Welch	UEC	815-A Brazos Suite 436 Austin, TX 78701		Mattwelch.aol.com
Mina Williams	Coastal Bend Sierra Club	141 Naples St. Corpus Christi, TX 78404	361-882-1179	Mina141@sbcglobal.net

APPENDIX B: ATTENDANCE LIST, EVENING SESSION

Attendance: EPA Public Information Meeting, Corpus Christi, TX, Afternoon of Nov.4, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Harry Amthor	UEC	500 N. Shoreline, Suite 800 N Corpus Christi, TX 78411		
Ed Brezinski	Uranium Energy Corporation	1134 Farmington Ave. West Hartford, CT 06107	860-595-9951	ebrezinski@uraniumenergy.gov
Steve Brown	SENES, Inc	Centennial, CO	303-524-1519	sbrown@senses.ca
Ty Embry	Owner/Operator Members at Texas Mining and Reclamation Association	816 Congress Ave Suite 1900 Austin, TX 78701	512-322-5829	tembrey@lglawfirm.com
Jeri Kalpack				
Ted Long	Goliad County	358 E. FM 1961 Goliad, TX 77963	361-564-2214	tmlong4@gmail.com
Peter Luthiger	MULLC			pluthiger@mestanauranium.com
W.M. McKnight	UEC	215 Lllano Dr. Portland, TX 78374	361-643-7701	wmcknight@hotmail.com
Sr. Elizabeth Reibslaeger	self	P.O. Box 364 Cuero, TX 77954	361-676-2921	ElizRccvi@sbcglobal.net
Venice Scheurich	Coastal Bend Sierra Club	P.O. Box 10101 Corpus Christi, TX 78160	361-241-4289	Jave241@sbcglobal.net
Curt Sealy	Global Solutions	1609 Catron Ave Albuquerque, NM	970-640-6590	csealy@globalsolu.com
Matt Welch	UEC	815-A Brazos Suite 436 Austin, TX 78701	512-416-0088	Mattwelch.aol.com
Mina Williams	Coastal Bend Sierra Club	141 Naples St. Corpus Christi, TX 78404	361-882-1179	Mina141@sbcglobal.net

EPA Review of Standards for Uranium and Thorium Milling Facilities

PUBLIC INFORMATION MEETING
Tuba City Arizona
September 15, 2010

On September 15, 2010 EPA held a public information meeting in Tuba City, Arizona to provide the public an overview of the regulatory review and existing standards and to seek public input on the review of 40 CFR Part 192 and the revision of 40 CFR Part 61 (Subpart W).

MEETING STRUCTURE

The meeting began with opening remarks and introductions. Loren Setlow and Reid Rosnick of EPA's Radiation Protection Division (RPD) opened the meeting by giving a presentation on the EPA's review of 40 CFR Part 192 and 40 CFR Part 61 (Subpart W). The presentation was followed by a question and answer session. Participants were invited to submit their questions on an index card so that they could be read aloud for the benefit of all. After the question and answer session, the public was invited to provide input by signing up for five-minute presentations. In the remaining time, the floor was opened up for additional audience questions and input. Linda Reeves of EPA Region 9 served as facilitator. Tony Nesky of RPD took notes. Loren Setlow, Reid Rosnick and Linda Reeves closed the meeting by thanking the group for their participation, and sharing parts of their lives. Loren noted that the many comments on water usage had been loudly heard, and that EPA's review of the rule will examine water usage and constituents for which MCLs have not been determined.

There was one question about the purpose of the meeting. Lillie Lane of the Navajo EPA asked if this meeting was informational only or a hearing as part of a rulemaking. She expressed concern that the U.S. EPA could go back to Washington saying that they held a hearing in Tuba City and that everyone agreed. Loren Setlow replied that the purpose of the meeting was informational and that the U.S. EPA wanted to know what was on everyone's mind as it reviewed the uranium and thorium rules. Loren reminded participants that they could sign up to speak or sign up for questions at any time.

ATTENDANCE

Thirty people signed up to attend the meeting, though attendance was probably higher as people continued to join the meeting after the registration desk closed. Facilitator Linda Reeves asked participants about their affiliations. Seven people indicated affiliation with the Navajo Nation, and one person indicated affiliation with the Hopi Nation. Three persons indicated that they were attending for a government agency, and one person was attending for a mining company. Linda also asked participants to indicate how far they had travelled to attend the meeting. Three people only had to travel a short distance—5 miles or less. Four persons travelled up to 100 miles to reach the meeting, and the rest—25 people—had to travel more than 500 miles. Appendix A contains the list of registered participants.

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
What are the methods to protect surface soils?	Loren answered that the only protection standards currently in the rule are for uranium and radium. The rule is silent on other heavy metals.
Can RCRA be changed to include radioactive materials as hazardous, either specific properties like flammable corrosive items, or numerical levels?	Loren noted that the rule review is not part of the RCRA program, and any revision of the rule would under UMTRCA authority. Reid noted that RCRA does not specifically include radionuclides, which have historically been regulated under the Atomic Energy Act. He acknowledged that the regulatory scheme can be complicated, and that radionuclides are covered under various statues under AEA, CAA. RCRA standards for surface impoundment were used in Subpart W because they were the best designs at the time. When regulating radionuclides, EPA "borrows" from the best practices from the various statues. Reid completed his answer by noting that addition of radionuclides in RCRA would require reauthorization of RCRA. Loren added that the addition of radionuclides to RCRA had been considered years ago, but the determination was made not to include it.
What about airborne dust? What about the constituents attached to dust blowing in the wind?	At operating mill facilities, the NRC converts the levels that can be emitted in dust. They are covered in NRC licenses. Loren added that constituents in dusts part of the consideration the impacts to surrounding communities in 40 CFR Part 192, but were not determined to be a sufficient hazard to require regulations He said that EPA will examine this issue again.
Do you look at other countries' rules, such as those of the European Union?	Yes, EPA does look at the rules of other countries.
Can you explain the standards applicable to Uranium Recovery and the role of the EPA, the NRC, and the Tribal Environmental Protection Agencies?	Loren answered that authority depends on who has the permits. He cited a hypothetical example of an ISL facility in Wyoming. In this case, the NRC grants the license, the State of Wyoming gives a mining permit. Each under their own authority inspects the facility, and checks for leaks and excursion. Each can independently undertake an enforcement action to make them clean up the facility. He

QUESTION	EPA RESPONSE
	continued that EPA has an agreement with NRC under the Superfund, and that EPA has the authority permits for Underground Injection Controls. He added that EPA tries to work with its sister agencies to provide oversight.
What about the tribal role?	Loren answered that if it facility has an excursion or contamination event—the roles depend on whether the facilities are operating or closed. The NRC has authority for operating facilities. If the facilities are on tribal land or there is an excursion on tribal land, the tribe has authority. The NRC also has some agreements with tribes. DOE is the regulator of closed facilities. The DOE will work with the tribes, and EPA will step in to provide the tribe with assistance.
Why does the U.S. continue to extract on indigenous lands? What are the negative truths on how native land will be affected?	Loren said that he would try to address the first question. He began by noting that the U.S. needs uranium for its nuclear power plants and weapons. Currently the U.S. is an importer of uranium from Canada, Australia, and Kazakhstan. The demand for uranium is growing in China and India. Uranium mining has thus become a matter of national security. The Minerals Policy Act of 1980 requires the U.S. to increase extraction of minerals domestically as a matter of national security. EPA's role in uranium milling is somewhat limited. We have a real responsibility to work with tribes, as government to government. Every agency has an agreement with Tribes. We are trying to work with tribes and work on the important. The NRC has opened up lines of communication on these complicated issues. EPA takes tribal issues into consideration when reviewing Environmental Impact Statements, which note when areas of the land are considered sacred. Loren added that EPA has had a policy for protection of Native Americans since the 1980s and there is an Executive Order as well. EPA did a review of the locations of uranium mills, and found that 75% of the sites were on federal and tribal lands. EPA recognizes the disproportionate impacts. Reid referred to the question about "negative truths," noting that there is a "negative truth" one mile and a half up the road, and that EPA will try its best to prevent effects.
What is your timeline for	Loren answered that EPA will complete its UMTRCA

QUESTION	EPA RESPONSE
issuing the draft regulations?	review early next year, and that any revision would be issued in early 2012. Reid answered that the review of Subpart W is further along. EPA has completed risk assessments on all facilities to determine if the flux standard is still protective. Reid hopes that EPA can propose a rule within 13 months.
Will these rules affect new ISL facilities that have permits approved, but are not producing uranium?	Loren answered that the facilities will be bound by the conditions in the existing regulations.
Would current UMTRCA sites, including the four on the Navajo Nation, have to abide by these revised regulations?	Loren answered that it depends on how extensively the rule is revised. For example, if an old facility is not lined, they would have to dig up tailings and rebuild the impoundment. *Comment from the audience (Sarah Fields)*: It will cost $1 billion to do that as a result of the failure of the existing Part 191 regulations.
Subpart W affects only ISR, right? Is there a proposal to regulate conventional mines, too?	Reid answered that Subpart W applies to conventional, ISL, and heap leach facilities and that any revision would apply to all three types.
What is the process to override an aquifer exemption, and why doesn't that decision go public?	Loren said that he would do his best to answer this question, but will refer the question to Region 9. He said that there is no provision to override it in the existing regulation. He cited the example of Crown Point, where the exemption was granted by a state agency. EPA disapproved but was overturned by the circuit courts. Loren brought up a hypothetical situation where EPA could ask a state to reconsider an aquifer exemption, but he asked the questioner to see him in person after the meeting.
What are the financial requirements of milling companies to protect the taxpayers form bankruptcies and fly by night operations?	Loren observed that there were not many fly-by-night milling facilities as these are extensive operations. NRC has its own regulations for bonding and surety. States also have financial requirements in their permits. EPA's UIC program also has a bonding requirement for ISL facilities. NRC has the strongest requirements. The expenses [of a bankrupt facility] would be great for the federal government, so the

QUESTION	EPA RESPONSE
	Superfund is reviewing them to determine if they are adequate.
Does EPA have any compensation program like those under DOJ that are affected by mining operations?	Loren answered that the only ones he knew were here at the Navajo Nation for the rebuilding and relocation of homes.
How are background levels set? Give examples of radius, depth, and number of samples.	Loren and Reid answered that background levels are set using the MARSSIM Manual, which has been agreed to by EPA and NRC. It sets forward a set of principles about the surveys that have to be taken and how to determine background statistically. It can also look outside the boundaries of the contaminated sites The manual is available on our website at epa.gov/radiation.
What are the penalties for violation and how much wiggle room is there in the law?	Loren answered that the regulatory agencies--the states and NRC issue the penalties. The Superfund applies if the facility is closed and has formulas for penalties.
Are you reviewing them?	Loren replied that EPA does not have authority to issue bonding requirements under UMTRCA.
So its sounds like you don't have power to penalize except Superfund?	Loren explained that there are penalties for stormwater violations under the Safe Water Drinking Act and penalties for excursions under the Clean Water Act. Reid added that EPA's Office of Enforcement handles penalties. Each region has their office, and enforcement is usually done at the Regional level. Andy Bain of Region 9 answered that Region 9 was able to use CERCLA authority to clean up houses contaminated with mine wastes. He added that there is an exclusion to use monies to address Uranium Mills. There is no sunset provision to address soil contamination from after 1978.
What is the time frame to protect drinking water and adjacent areas?	Loren answered that that NRC-regulated facilities have up to up to six months to clean up the facility from the time of the excursion. Under UMTRCA requirements they have up to 18 months to clean up the facilities after milling has stopped. At conventional mills the monitoring is done on an annual basis, so that it is possible that an excursion could be missed.

QUESTION	EPA RESPONSE
What are the methods for the public to monitor the testing and monitoring data? Will the data be kept back by corporate secrecy?	Loren replied that monitoring data is provided to the NRC. NRC includes it in their ATOMS system, which is accessible by the Internet.
Can the Navajo Nation request a workshop to be better understand the rulemaking and ISL implications? Can your office set this up?	Loren replied that EPA would be happy to help, and will work with the Navajo Nation to set up a workshop.
What is EPA doing now to address health hazards of the present population including vegetation? Be specific.	Loren replied that the EPA in Region 6 is looking at groundwater studies. In Wyoming, where the DOE wanted to allow an alternative concentration limit at milling facilities, EPA recognized that ranchers watered livestock just off the site so it asked the state and DOE to consider these impacts.
Why doesn't thorium have a drinking water MCL?	No one from EPA could answer this question, so EPA offered to get back to the questioner.
Can you gather information about the operations at the Rare Metals site in the 1970s?	Loren noted that there is data available about the site that was published in the Environmental Impact Statement. The data is on our website. Other information is available on the Rare Metals site is available at the DOE. Records may exist at the old AEC for abandoned and closed facilities. Loren didn't know how to retrieve these records so he asked the questioner to provide contact information.
We have a lot of people who are sick in the area south of rare metals. Three is no vegetation, livestock are deformed from uranium contamination, and there are high rates of disease in our population; cleft palate, cancer, Bells Palsy, and no one ever talks about it.	Loren replied that the Regional Office would handle this complaint, and asked the questioner to provide contact information. *The questioner replied*: "That was 50 years ago, and we are still feeling the effects. All this is going on, and continues to go on--just leave us alone."

QUESTION	EPA RESPONSE
Can the people who live nearby Rare Metals facility be compensated because they were relocated there to make way for a mine?	No one from EPA could answer this question.
I'm confused by everyone's roles. Could I get a list of everyone's authorities and activities?	Loren referred the questioner to a five-year plan that lists what the agencies are doing and noted that there is also information on Region 9's websites.
What are issues related to thorium?	Loren answered that the issues are how thorium will be milled, what the emissions are, and the natural decay of thoron. EPA does not have a model facility for thorium, so we will model on thoron outgassing, and from there look at risk assessment for radon gas impacts. *Comment from the floor:* Radon from thorium has a shorter half life, and its decay products have a short half-life and are more active. I don't think it's an improvement on uranium.
Does your current risk assessment address restoration to baseline after uranium is extracted, and if so, how?	Loren replied that this risk assessment has not been done yet. It will include impacts to those adjacent and all exposure pathways, groundwater use, housing on or adjacent to the facility, the length of exposure by ingestion versus inhalation, scenarios for operating versus non-operating. He replied that EPA will look at exposure scenarios for operating versus non-operating, and look at the risk to determine a remediation point. He invited suggestions from the public.
Follow-on question: What is baseline? What is the exact concentration of anions, cations? Will they be the same after the uranium is removed?	Loren explained that the companies in their restoration use a variant of pump and treat. They will inject things like sulfide to stop the leaching of uranium to change pH to neutral. There are so many other minerals in the ground; the process may not work for every mineral. They will replace certain volume of waters several times and evaporate the sludge, or pump into ground. They may do these four and five times, but some time up to 10 times the volume of the aquifer. The original baseline may be the same for some

QUESTION	EPA RESPONSE
	constituents, but not for all.
Does the Energy Policy Act of 2005 cover uranium extraction on tribal lands under the tribal energy agreements?	No one knew. EPA offered to get back to the questioner.
What process would one person need to do to get a well re-opened?	EPA will defer that question to the Water Resources Board.
Is there a timeframe for Subpart W under Consent Decree?	Reid answered that it was a Consent Agreement, not a decree. The consent agreement is on our website. There is no court ordered deadline, but I want it in place within 13 months.

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations are summarized as follows--

Sarah Fields
Uranium Watch, Moab Utah

Ms. Fields has problem with 40 CFR Part 61Subpart A, General Requirements. She sees a total breakdown in application approval process, believing it to a "rubberstamp" process in Utah. Ms.

Fields wants the process to be more than a rubberstamp; it should provide a great deal of information and the chance for public participation.

Ms. Fields believes that mine owners are not complying with requirements and suspects that mills are not either. Ms Fields thinks that approval of a new tailings cell under 40 CFR Part Subpart A should be for a set period of time, not for decades.

She said that the biggest problem in Subpart W and 192 is the time gap for radon release between operations and installation of a final barrier. Tailings blow around, and there is a lot of radioactive particulate matter.

Ms. Fields commented that there is supposed to be a tailings closure plan, and reclamation milestones with public notice, but there was none at Cotter. The tailings impoundment closed in 2005, and there were not miles tones or notices.

Ms. Fields said that Colorado doesn't think it needs to measure the radon flux at the Cotter pile and that "apparently EPA gave them a pass. Everything looks good on paper, but you don't have the enforcement."

Allison Gibbon
Sierra Club

Ms. Gibbon said that the Sierra Club will stand behind the toughest regulations possible to protect our environmental, people and wildlife. She commented "It is great that you are here to talk to the people who have suffered the travesties of the past. There are many permits in the Grand Canyon areas, there are now mines proposed on the North Rim that affect the Hualapai and Havasupai, but it is hard for them to travel to Tuba City for this meeting. The Arizona One mine was approved in the eighties, sat idle for year, and reopened without needing reconsideration. They are on public lands, and when the mine opens they are fenced up and not longer public. There is no way to completely cleanup the tailings. There should be total cost accounting on the cleanup. A Canadian company is running the mine and selling the uranium to Korea and Japan, so there are not national security issues. You should consider this in the rule. Thank you for listening."

EPA Response and Discussion:

Loren clarified the EPA is authorized under UMTRCA to regulate mills not mines, and regulates stormwater discharges, groundwater quality, and air emissions.

There was a follow-on question to this clarification: "Are the regulations on conventional mines being updated?" Reid answered that they were not, but that he was aware of the Arizona One Issues, and was working with Region 9, who has the lead on these issues.

Michelle Dinuyache
Community Member, Fort Defiance, Arizona

Ms. Dinuyache commented on risk assessment and recommended that EPA obtain information on inputs to models from tribal representatives to ensure the assessments were fully representative of lifestyles.

She also commented on dose and risk factor scenarios. For 40 CFR Part 192, she recommended a risk-based approach that based standards on the low end of the range.

EPA Response and Discussion:

Loren replied that the regional offices will be soon approaching the tribes for the tribal specific input to reflect lifestyles.

David L Neztsosie
Shadow Mountain, AZ

"For 30 years, mining went on, mills were developed next to streams, near communities, and abandoned overnight. So it has spread by wind and other seasonal weather. It has been determined that this is a good location for wind farms. So how much of a down winder are we? There are sicknesses related to uranium in my hometown, respiratory and nervous disease, it is troubling my mom and dad. Two of my youngest sisters have died for it, aged 30 years. I can see that in the community. Authorities and the people's government do not seem to agree how uranium can be related to health problems. Somebody's windmill was taken down because of its high concentration of uranium [in the well water]. Abandoned mines collect water, sheep drink the water. You can go miles before you reach another water resource.

Although mines have been remediated, this is only a "band-aid" solution. Horses and livestock would step into holes and fall. People east of me have a high content of uranium in their only drinking water and give it to their live stock. "

EPA Response and Discussion:

Loren Setlow of EPA replied: A good piece of the meeting today dealt with water problems. EPA realizes that this is a very large problem, and that when a well is posted and shut down, it is a very large problem to find a replacement when a well is shut down. EPA is doing the best it can to identify other water sources for these communities, and knows that the Navajo Nation has forbidden further mining on its lands.

Cassandra Bloedel
Navajo Nation EPA

"I was going to request EPA HQ continue to look at all the data for Tuba City Dump, Highway 160 because there is thorium in the groundwater, and BLA [the Bureau of Land Management] is ignoring that fact. It is important that EPA determine MCLs for all radionuclides. We have copper and arsenic in the groundwater. The former Rare Metals site had arsenic products, and we found them at Highway 160, and these facts are being pushed to the side. In any new development process, you have to recognize that it will generate radionuclides.

We had to go to the forensic analysis of the uranium isotopes to relate Highway 160 to the mill. You may have to establish MCLs for isotopes.

I missed the fact that water was being reinjected into the Navajo Aquifer. It is the main source of potable water. They are only publishing reports on certain constituents. What about the others—arsenic, molybdenum?

Crown Point is within a quarter mile of the community, and it is upgradient. The aquifer is fractured, and shallow groundwater contamination will contaminate deeper groundwater.

Look at data that have been released. Look at the Navajo reports presented to Congress. Thank you for your time and being here."

EPA Response and Discussion:

Loren Setlow of EPA thanked Ms. Bloedel for the discussion of thorium and mentioned noted that the existing standards issued in 1995 did include a few substances that did not have drinking water MCLs, particularly silver and molybdenum, which are typically found with uranium. Loren said that EPA will look at thorium and vanadium in its review of 40 CFR 192.

Carl Holliday
Navajo Nation, Monument Valley, AZ

Mr. Holliday expressed appreciation what Sandra said, commenting "Our concerns seem to fall on deaf ears." He expressed concern about the application of uranium limits to thorium, questioning whether the dose equivalents were high compared to uranium or gamma radiation. He asked for clarification.

He also had a question about exposure rates: "If you have 600 or 700 lbs of uranium in a pond, how does it not show up somewhere else?"

Loren Setlow replied by giving a history of the radon dose to the public. The dose looks at dose from all parts, 25% to whole organism, and the 75% to any organ (Not sure I got it right--Tony). EPA is giving the radon dose a hard look in this review; it is an upper limit, and we could be made more protective. He also said that EPA was looking at thorium in ISL ponds.

Esther Honyestewa
Hotevilla, AZ

Thanks to the people coming from the U.S government. We have a lot of issues on the reservation. We have a lot of issues concerning our water here. We have an issue on the Peaks, and not one member came out, so it is not that important, but springs are being contaminated. You came out.

I'm from Hopi, and I am concerned about water. Our water is sacred here, and we do not waste water. It looks like this is another project to take water away. The uranium a mile away has really affected our land. If our water goes away, we will go away. Our pure water is becoming contaminated. Our people are dying from all the things the government is doing to the land. We cannot mess with Mother Earth.

Our farmers work hard for the families. My family was one of the ones shipped to Rare Metals when the hospital was being built. My Dad planted right outside the Mill tailing, we ate it, and a lot of people in my family have cancers. Think about that when you write your rule. We don't have it easy—this is dry desert, and people want to take our water. All the water underneath is one body of water, and we need to respect that water.

Why do we want to make bombs? That is not right We are here to help each other, not hurt each other. We are a spiritual people--we have prayers for everything. Our plants are not what they used to be. I'm a farmer and I'm proud of it, and I want my grandkids to be proud of it. Water is sacred. Do your mining somewhere else."

Harrilene Yazcie
Greasewood, AZ

Ms. Yazcie said she understood the Federal government's position where it had to balance public comments with national needs. She commented, "With all the contamination, as well as the water, it leaves little room for development—not just economic development, but also subsistence development. You need to find the balance between what is right from the nation, as well has what is respectful for the indigenous peoples. There is no wiggle room. You are forced to make decisions that keep you up at night. The fundamental reasons we are facing these issues are due to violence—it was all for greed or gain. There are a few things. I've learned when you listen to numbers. The use of water on Navajo is 10 to 15 gallons per person per day, but we pay more per capita. Phoenix, Arizona has more boats per capita than the state of Minnesota. The mindset is to pay $5 for 7400 gallons, 170 gallons per day per person.

So when you re-inject thorium into the Navajo Aquifer, children die in infancy. When a child laughs, we Navajo have a celebration, because it means that the child is a person. That will be denied someone, because you can't determine background, because you can't determine MCLs?"

David Assisi

"I wish all the agencies involved could learn how to work as a team. Is it in the 5 year plan? It seems that everyone is pursuing this individually. The aquifer could be a precious resource. In 1996 we had the worst drought, springs weren't putting out, but some other ones did. The Navajo EPA was surprised—50 to 100 gallons per minute. The water—anything we can do to save it, that's what I'm interested in. Thank you for the chance to speak."

FOLLOW-UP ACTIONS

EPA committed to the following actions during the meeting—

- Provide Mr. Holliday of the Navajo Nation with information on thorium dose equivalents.
- Examine the following during the review of 40 CFR 192—
    - Water usage in In-Situ Leaching
    - MCLs for thorium
    - Pathways associated with Native American lifestyles
    - Pathways from radionuclides in dust.
- Set up a rulemaking and/or ISL workshop with the Navajo Nation. The workshop should address rules in greater detail, explain jargon, and enable citizens to provide relevant comments to a proposed rule.
- Respond to Ms. Cassandra Bloedel of the Navajo EPA on why there is no drinking water MCL for thorium.
- Respond to Ms. Esther Honyestewa on where to get operations information for old AEC rare metals sites.
- Refer Mr. Alden Seweyestewa to the Regional Office for information on illness from possible uranium contamination.
- Reply to Ms. Michelle Dinuyache's question on the process required to override an aquifer exemption.
- Get back to the person who asked if the Energy Policy Act of 2005 covers uranium extraction on tribal lands.

APPENDIX A: ATTENDANCE LIST

Attendance--EPA Public Information Meeting, Tuba City, AZ, September 15, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
John Acothley				
Melvin Acothley	self	P.O. Box 2526 Tuba City, AZ	928-206-4143	macothley@hotmail.com
Rudy Acothley				
Andrew Bain	EPA	Region 9, San Francisco, CA		bain.andrew@epa.gov
Denise Begaye	RECA	P.O. Box 3072, Ktown, AZ	928-255-3477	
Jerry Bigun	Navajo Nation EPA-NSP			
Vianu Blackhorn	student			
C. Bloedel	Navajo Nation EPA	P.O. Box 339, Window Rock, AZ		
Alex Brock		P.O. Box 1225, Tuba City, AZ 86045	928-600-6428	alexbrock@tlhealth.org
Lydia Chang	NRC			
Emerson D.				
Michele Dinuyache	Navajo Nation EPA	Window Rock, AZ		
Stephen B. Etstty	Navajo Nation EPA	P.O. Box 339, Window Rock, AZ,86515		
Sarah Fields	Uranium Watch	P.0 Box 344, Moab Utah, 84532	435-210-0166	sarah@uraniumwatch.org
Pamela Hill	Uranium Industry	28 N 100 E, Kanab, UT 84741	303-335-6425	phill2647@msn.com
Julie Holiday	RECA	P.O. Box 1553, Kayenta, UT 84741	303-335-6425	

Attendance--EPA Public Information Meeting, Tuba City, AZ, September 15, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Esther K. Honyestwa	self	P.O. Box 256, Hotevilla, AXZ 86030	928-401-6542	
Yvonne Hoosava	UVM Community Member	P.O. Box 595, Tuba City, AZ		yhoosava@yahoo.com
Lilli Lane	Navajo Nation EPA	Window Rock, AZ		
Cardis Mayweather	ATSDR	4771 Buford Hwy NE Atlanta, GA 30341		heb8@cdc.gov
Chandra Manadhar	Navajo Nation EPA-RCRA			
David L. Neztsosie	Cameron Chapter Community	P.O. Box 741, Tuba City, AZ		dlneztsosie@yahoo.com
Vernon Nez	Navajo Nation EPA-Superfund	Box 339, Window Rock, AZ 86515		vfnneparcra@yahoo.com
Billy Orman	self	P.O. Box 989, Tuba City, AZ 86049	928-283-4640	
Tere Orman	self	P.O. Box 989, Tuba City, AZ 86048	928-283-4639	
Angela Ragin-Wilson	ATSDR	4770 Buford Hwy NE Atlanta, GA 30341		aragin@cdc.gov
Alden Seweyestewa	self	Box 1605 Tuba City, AZ 86045	928-550-0192	
Beverly Smith	RECA	5303 E. Cortland Blvd, Flagstaff, AZ 86004		Beverly.Smith@nau.edu
Libby Vianu	ATSDR			vianu.libby@epa.gov
Beatrice Watson			928-863-9190	
Freida S. White	Navajo Nation EPA-Superfund		928-401-0953	
Harrilene Yazcie	BIA - NRO	P.O. Box 301, Gallup, NM 87301		

EPA-5609

Tony Nesky

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EPA Review of Standards for Uranium and Thorium Milling Facilities

PUBLIC INFORMATION MEETING
Tuba City Arizona
September 15, 2010

On September 15, 2010 EPA held a public information meeting in Tuba City, Arizona to provide the public an overview of the regulatory review and existing standards and to seek public input on the review of 40 CFR Part 192 and the revision of 40 CFR Part 61 (Subpart W).

MEETING STRUCTURE

The meeting began with opening remarks and introductions. Loren Setlow and Reid Rosnick of EPA's Radiation Protection Division (RPD) opened the meeting by giving a presentation on the EPA's review of 40 CFR Part 192 and 40 CFR Part 61 (Subpart W). The presentation was followed by a question and answer session. Participants were invited to submit their questions on an index card so that they could be read aloud for the benefit of all. After the question and answer session, the public was invited to provide input by signing up for five-minute presentations. In the remaining time, the floor was opened up for additional audience questions and input. Linda Reeves of EPA Region 9 served as facilitator. Tony Nesky of RPD took notes. Loren Setlow, Reid Rosnick and Linda Reeves closed the meeting by thanking the group for their participation, and sharing parts of their lives. Loren noted that the many comments on water usage had been loudly heard, and that EPA's review of the rule will examine water usage and constituents for which MCLs have not been determined.

There was one question about the purpose of the meeting. Lillie Lane of the Navajo EPA asked if this meeting was informational only or a hearing as part of a rulemaking. She expressed concern that the U.S. EPA could go back to Washington saying that they held a hearing in Tuba City and that everyone agreed. Loren Setlow replied that the purpose of the meeting was informational and that the U.S. EPA wanted to know what was on everyone's mind as it reviewed the uranium and thorium rules. Loren reminded participants that they could sign up to speak or sign up for questions at any time.

ATTENDANCE

Thirty people signed up to attend the meeting, though attendance was probably higher as people continued to join the meeting after the registration desk closed. Facilitator Linda Reeves asked participants about their affiliations. Seven people indicated affiliation with the Navajo Nation, and one person indicated affiliation with the Hopi Nation. Three persons indicated that they were attending for a government agency, and one person was attending for a mining company. Linda also asked participants to indicate how far they had travelled to attend the meeting. Three people only had to travel a short distance—5 miles or less. Four persons travelled up to 100 miles to reach the meeting, and the rest—25 people—had to travel more than 500 miles. Appendix A contains the list of registered participants.

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
What are the methods to protect surface soils?	Loren answered that the only protection standards currently in the rule are for uranium and radium. The rule is silent on other heavy metals in soil.
Can RCRA be changed to include radioactive materials as hazardous, either specific properties like flammable corrosive items, or numerical levels?	Loren noted that the rule review is not part of the RCRA program, and any revision of the rule would under UMTRCA authority. Reid noted that RCRA does not specifically include radionuclides, which have historically been regulated under the Atomic Energy Act (AEA). He acknowledged that the regulatory scheme can be complicated, and that radionuclides are covered under various statutes such as the AEA, Clean Air Act (CAA). Resource Conservation and Recovery Act (RCRA) standards for surface impoundments were used in Subpart W because they were the best designs at the time. When regulating radionuclides, EPA "borrows" from the best practices from the various statutes. Reid completed his answer by noting that addition of radionuclides in RCRA would require reauthorization of RCRA. Loren added that the addition of radionuclides to RCRA had been considered years ago, but the determination was made not to include it.
What about airborne dust? What about the constituents attached to dust blowing in the wind?	At operating mill facilities, the NRC converts the levels that can be emitted in dust. They are covered in NRC licenses. Loren added that constituents in dusts are part of the consideration of impacts to surrounding communities in 40 CFR Part 192, but were not determined to be a sufficient hazard to require regulations He said that EPA will examine this issue again.
Do you look at other countries' rules, such as those of the European Union?	Yes, EPA does look at the rules of other countries.
Can you explain the standards applicable to Uranium Recovery and the role of the EPA, the NRC, and the Tribal Environmental Protection Agencies?	Loren answered that authority depends on who has the permits. He cited a hypothetical example of an ISL facility in Wyoming. In this case, the NRC grants the license, the State of Wyoming gives a mining permit. Each under their own authority inspects the facility, and checks for leaks and excursions. Each can independently undertake an

QUESTION	EPA RESPONSE
	enforcement action to make them clean up the facility. He continued that EPA's Superfund program has an interagency agreement with NRC, and that EPA has the authority under the Safe Drinking Water Act to issue Underground Injection Control permits for ISLs. He added that EPA tries to work with its sister agencies to provide oversight.
What about the tribal role?	Loren answered that if it facility has an excursion or contamination event—the roles depend on whether the facilities are operating or closed. The NRC has authority for operating facilities. If the facilities are on tribal land or there is an excursion on tribal land, the tribe has authority. The NRC also has some agreements with tribes. DOE is the regulator of closed facilities. The DOE will work with the tribes, and EPA will step in to provide the tribe with assistance under its Trust authority if asked.
Why does the U.S. continue to extract uranium on indigenous lands? What are the negative truths on how native land will be affected?	Loren said that he would try to address the first question. He began by noting that the U.S. needs uranium for its nuclear power plants and weapons. Currently the U.S. is an importer of uranium from countries such as Canada, Australia, and Kazakhstan. The demand for uranium is growing in China and India. Uranium mining has thus become a matter of national security. EPA's role in uranium milling is somewhat limited. We have a real responsibility to work with tribes, as government to government. EPA takes tribal issues into consideration when reviewing Environmental Impact Statements, which should identify areas of the land considered sacred. Loren added that EPA has had a policy for protection of Native Americans since the 1980s and there is an Executive Order as well. EPA developed a database of the locations of uranium mines and mills, and found that 75% of the sites were on federal and tribal lands. EPA recognizes the disproportionate impacts. Reid referred to the question about "negative truths," noting that there is a "negative truth" one mile and a half up the road, and that EPA will try its best to prevent effects.
What is your timeline for issuing the draft regulations?	Loren answered that EPA will complete its UMTRCA review early next year, and that any revision would be issued in 2012. Reid answered that the review of Subpart W is

QUESTION	EPA RESPONSE
	further along. EPA has completed risk assessments on all facilities to determine if the flux standard is still protective. Reid hopes that EPA can propose a rule within 13 months.
Will these rules affect new ISL facilities that have permits approved, but are not producing uranium?	Loren answered that the facilities will be bound by the conditions in the existing regulations if licenses are issued before new EPA regulations are finalized.
Would current UMTRCA sites, including the four on the Navajo Nation, have to abide by these revised regulations?	Loren answered that it depends on how extensively the rule is revised. For example, if an old facility is not lined, they would have to dig up tailings and rebuild the impoundment. *Comment from the audience (Sarah Fields)*: It will cost $1 billion to do that as a result of the failure of the existing Part 191 regulations.
Subpart W affects only ISR, right? Is there a proposal to regulate conventional mines, too?	Reid answered that Subpart W applies to conventional, ISL, and heap leach facilities and that any revision would apply to all three types.
What is the process to override an aquifer exemption, and why doesn't that decision go public?	Loren said that he would do his best to answer this question, but will refer the question to Region 9. He said that there is no provision to override it in the existing regulation. He cited the example of Crown Point, where the exemption was granted by a state agency. EPA disapproved but was overturned by the Circuit Court of Appeals. Loren brought up a hypothetical situation where EPA could ask a state to reconsider an aquifer exemption, but he asked the questioner to see him in person after the meeting.
What are the financial requirements of milling companies to protect the taxpayers form bankruptcies and fly by night operations?	Loren observed that there were not many fly-by-night milling facilities as these are extensive and expensive operations. NRC has its own regulations for bonding and surety. States also have financial requirements in their permits. EPA's UIC program also has a bonding requirement for ISL facilities. NRC has the strongest requirements. The expenses [of a bankrupt facility] would

QUESTION	EPA RESPONSE
	be great for the federal government, so the Superfund is reviewing this problem in a separate rulemaking to determine if they are adequate.
Does EPA have any compensation program like those under DOJ that are affected by mining operations?	Loren answered that the only ones he knew were here at the Navajo Nation for the rebuilding and relocation of homes. EPA does not have the authority to compensate individuals for radiation exposures.
How are background levels set for site reclamation? Give examples of radius, depth, and number of samples.	Loren and Reid answered that one way background levels for site reclamation may be set is using procedures explained in the MARSSIM Manual, which has been agreed to by EPA and several other federal agencies. It sets forward a set of principles about the surveys that have to be taken and how to determine background statistically. It can also look outside the boundaries of the contaminated sites The manual is available on our website at epa.gov/radiation. The EPA Superfund program, if it is involved, may establish their own methods for determining what constitutes “background”.
What are the penalties for violation and how much wiggle room is there in the law?	Loren answered that the regulatory agencies--the states and NRC issue the penalties for pollution events at operating uranium processing facilities.
Are you reviewing them?	Loren replied that EPA does not have authority to issue bonding requirements under UMTRCA.
So its sounds like you don’t have power to penalize except Superfund?	Loren explained that there are penalties for stormwater violations under the Clean Water Act, and penalties for ISL groundwater excursions under the Safe Water Drinking Act. Reid added that EPA’s Office of Enforcement handles penalties. Each region has their office, and enforcement is usually done at the Regional level. Andy Bain of Region 9 answered that Region 9 was able to use CERCLA authority to clean up houses contaminated with mine wastes. He added that there is an exclusion to use monies to address Uranium Mills. There is no sunset provision to address soil contamination from after 1978.
What is the time frame to protect drinking water and adjacent areas?	Loren answered that that NRC-regulated facilities must respond within 90 days from the time of identifying an excursion has occurred. Under UMTRCA requirements they

QUESTION	EPA RESPONSE
	have up to 18 months to respond after milling has stopped. At conventional mills the monitoring is done on an annual basis, so that it is possible that an excursion could be missed once it begins.
What are the methods for the public to monitor the testing and monitoring data? Will the data be kept back by corporate secrecy?	Loren replied that monitoring data is provided to the NRC. The NRC would have to be asked about access to this information.
Can the Navajo Nation request a workshop to be better understand the rulemaking and ISL implications? Can your office set this up?	Loren replied that EPA would be happy to help, and will speak with the Navajo Nation to set up a workshop.
What is EPA doing now to address health hazards of the present population including vegetation? Be specific.	Loren replied that the EPA-is looking at groundwater studies. In one previous instance for example in Wyoming, where the DOE wanted to allow an alternative concentration limit at milling facilities, EPA recognized that ranchers watered livestock just off the site so it asked the state and DOE to consider these impacts.
Why doesn't thorium have a drinking water MCL?	No one from EPA could answer this question, so EPA offered to get back to the questioner.
Can you gather information about the operations at the Rare Metals site in the 1970s?	Loren noted that there is data available about the site that was published in reports we published when we were last finalizing our regulations on 40 CFR 192. The data is on our website. Other information is available on the Rare Metals site is available at the DOE. Records may exist at the old AEC for abandoned and closed facilities. Loren didn't know how to retrieve these records so he asked the questioner to provide contact information.
We have a lot of people who are sick in the area south of rare metals. Three is no vegetation, livestock are deformed from	Loren replied that the Regional Office would handle this complaint, and asked the questioner to provide contact information.

QUESTION	EPA RESPONSE
uranium contamination, and there are high rates of disease in our population; cleft palate, cancer, Bells Palsy, and no one ever talks about it.	*The questioner replied*: "That was 50 years ago, and we are still feeling the effects. All this is going on, and continues to go on--just leave us alone."
Can the people who live nearby Rare Metals facility be compensated because they were relocated there to make way for a mine?	No one from EPA could answer this question.
I'm confused by everyone's roles. Could I get a list of everyone's authorities and activities?	Loren referred the questioner to the five-year plan for cleanup of uranium contamination on the Navajo Nation that lists what the agencies are doing and noted that there is also information on Region 9's websites.
What are issues related to thorium?	Loren answered that the issues are how thorium will be milled, what the emissions are, and the natural decay of thoron. EPA does not have a model facility for thorium, so we will model on thoron outgassing, and from there look at risk assessment for radon gas impacts. *Comment from the floor:* Radon from thorium has a shorter half life, and its decay products have a short half-life and are more active. I don't think it's an improvement on uranium.
Does your current risk assessment address restoration to baseline after uranium is extracted, and if so, how?	Loren replied that this risk assessment has not been done yet. It will include impacts to those adjacent and all exposure pathways, groundwater use, housing on or adjacent to the facility, the length of exposure by ingestion versus inhalation, scenarios for operating versus non-operating. He also invited suggestions from the public.
Follow-on question: What is baseline? What is the exact concentration of anions, cations? Will they be the same after the uranium is removed?	Loren explained that the companies in their restoration for ISL facilities use a variant of pump and treat. They will inject things like sulfide to stop the leaching of uranium to change pH to neutral. There are so many other minerals in the ground; the process may not work for every mineral. They will replace certain volumes of waters several times and evaporate the sludge, or in some cases have gotten

QUESTION	EPA RESPONSE
	authority to pump into deep aquifers. They may do these four and five times, but some time up to 10 times the volume of the aquifer. The original baseline could possibly be met for some constituents, but historical data indicates this may not occur for all.
Does the Energy Policy Act of 2005 cover uranium extraction on tribal lands under the tribal energy agreements?	No one knew. EPA offered to get back to the questioner.
What process would one person need to do to get a well re-opened?	EPA will defer that question to the Water Resources Board.
Is there a timeframe for Subpart W under Consent Decree?	Reid answered that it was a Consent Agreement, not a decree. The consent agreement is on our website. There is no court ordered deadline, but I want it in place within 13 months.

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations are summarized as follows--

Sarah Fields

Uranium Watch, Moab Utah

Ms. Fields has a problem with 40 CFR Part 61 Subpart A, General Requirements. She sees a total breakdown in application approval process, believing it to be a "rubberstamp" process in Utah. Ms. Fields wants the process to be more than a rubberstamp; it should provide a great deal of information and the chance for public participation.

Ms. Fields believes that mine owners are not complying with requirements and suspects that mills are not either. Ms Fields thinks that approval of a new tailings cell under 40 CFR ~~Part~~ Subpart A should be for a set period of time, not for decades.

She said that the biggest problem in Subpart W and 192 is the time gap for radon release between operations and installation of a final barrier. Tailings blow around, and there is a lot of radioactive particulate matter.

Ms. Fields commented that there is supposed to be a tailings closure plan, and reclamation milestones with public notice, but there was none at Cotter. The tailings impoundment closed in 2005, and there were no milestones or notices.

Ms. Fields said that Colorado doesn't think it needs to measure the radon flux at the Cotter pile and that "apparently EPA gave them a pass". Everything looks good on paper, but you don't have the enforcement."

Allison Gibbon
Sierra Club

Ms. Gibbon said that the Sierra Club will stand behind the toughest regulations possible to protect our environmental, people and wildlife. She commented "It is great that you are here to talk to the people who have suffered the travesties of the past. There are many permits in the Grand Canyon areas, there are now mines proposed on the North Rim that affect the Hualapai and Havasupai, but it is hard for them to travel to Tuba City for this meeting. The Arizona One mine was approved in the eighties, sat idle for year, and reopened without needing reconsideration. They are on public lands, and when the mine opens they are fenced up and no longer public. There is no way to completely clean up the tailings. There should be total cost accounting on the cleanup. A Canadian company is running the mine and selling the uranium to Korea and Japan, so there are not national security issues. You should consider this in the rule. Thank you for listening."

EPA Response and Discussion:

Loren clarified the EPA is authorized under UMTRCA to regulate mills not mines, and regulates stormwater discharges, groundwater quality, and air emissions.

There was a follow-on question to this clarification: "Are the regulations on conventional mines being updated?" Reid answered that they were not, but that he was aware of the Arizona One Issues, and was working with Region 9, who has the lead on these issues.

Michelle Dinuyache
Community Member, Fort Defiance, Arizona

Ms. Dinuyache commented on risk assessment and recommended that EPA obtain information on inputs to models from tribal representatives to ensure the assessments were fully representative of lifestyles.

She also commented on dose and risk factor scenarios. For 40 CFR Part 192, she recommended a risk-based approach that based standards on the low end of the range.

EPA Response and Discussion:

Loren replied that the regional offices will be soon approaching the tribes for the tribal specific input to reflect lifestyles.

David L Neztsosie
Shadow Mountain, AZ

"For 30 years, mining went on, mills were developed next to streams, near communities, and abandoned overnight. So it has spread by wind and other seasonal weather. It has been determined that this is a good location for wind farms. So how much of a down winder are we? There are sicknesses related to uranium in my hometown, respiratory and nervous disease, it is troubling my mom and dad. Two of my youngest sisters have died for it, aged 30 years. I can see that in the community. Authorities and the people's government do not seem to agree how uranium can be related to health problems. Somebody's windmill was taken down because of its high concentration of uranium [in the well water]. Abandoned mines collect water, sheep drink the water. You can go miles before you reach another water resource.

Although mines have been remediated, this is only a "band-aid" solution. Horses and livestock would step into holes and fall. People east of me have a high content of uranium in their only drinking water and give it to their livestock. "

EPA Response and Discussion:

Loren Setlow of EPA replied: A good piece of the meeting today dealt with water problems. EPA realizes that this is a very large problem, and that when a well is posted and shut down, it is a very large problem to find a replacement. EPA is doing the best it can to identify other water sources for these communities, and knows that the Navajo Nation has forbidden further mining on its lands.

Cassandra Bloedel
Navajo Nation EPA

"I was going to request EPA HQ continue to look at all the data for Tuba City Dump, Highway 160 because there is thorium in the groundwater, and BLA [the Bureau of Land Management] is ignoring that fact. It is important that EPA determine MCLs for all radionuclides. We have copper and arsenic in the groundwater. The former Rare Metals site had arsenic products, and we found them at Highway 160, and these facts are being pushed to the side. In any new development process, you have to recognize that it will generate radionuclides.

We had to go to the forensic analysis of the uranium isotopes to relate Highway 160 to the mill. You may have to establish MCLs for isotopes.

I missed the fact that water was being reinjected into the Navajo Aquifer. It is the main source of potable water. They are only publishing reports on certain constituents. What about the others—arsenic, molybdenum?

Crown Point is within a quarter mile of the community, and it is upgradient. The aquifer is fractured, and shallow groundwater contamination will contaminate deeper groundwater.

Look at data that have been released. Look at the Navajo reports presented to Congress. Thank you for your time and being here."

EPA Response and Discussion:

Loren Setlow of EPA thanked Ms. Bloedel for the discussion of thorium and mentioned noted that the existing standards issued in 1995 did include a few substances that did not have drinking water MCLs, particularly silver and molybdenum, which are typically found with uranium. Loren said that EPA will look at thorium and vanadium in its review of 40 CFR 192.

Carl Holliday
Navajo Nation, Monument Valley, AZ

Mr. Holliday expressed appreciation what Sandra said, commenting "Our concerns seem to fall on deaf ears." He expressed concern about the application of uranium limits to thorium, questioning whether the dose equivalents were high compared to uranium or gamma radiation. He asked for clarification.

He also had a question about exposure rates: "If you have 600 or 700 lbs of uranium in a pond, how does it not show up somewhere else?"

Loren Setlow replied by giving a history of the radiation dose to the public. The dose limit in the current rule is an annual 25 milirems to a member of the public, and 75 millirems to any organ. EPA is giving the radiation dose a hard look in this review. He also said that EPA would be looking at thorium in groundwater.

Esther Honyestewa
Hotevilla, AZ

Thanks to the people coming from the U.S government. We have a lot of issues on the reservation. We have a lot of issues concerning our water here. We have an issue on the Peaks, and not one member came out, so it is not that important, but springs are being contaminated. You came out.

I'm from Hopi, and I am concerned about water. Our water is sacred here, and we do not waste water. It looks like this is another project to take water away. The uranium a mile away has really affected our land. If our water goes away, we will go away. Our pure water is becoming contaminated. Our people are dying from all the things the government is doing to the land. We cannot mess with Mother Earth.

Our farmers work hard for the families. My family was one of the ones shipped to Rare Metals when the hospital was being built. My Dad planted right outside the Mill tailing, we ate it, and a lot of people in my family have cancers. Think about that when you write your rule. We don't have it easy—this is dry desert, and people want to take our water. All the water underneath is one body of water, and we need to respect that water.

Why do we want to make bombs? That is not right. We are here to help each other, not hurt each other. We are a spiritual people--we have prayers for everything. Our plants are not what they used to be. I'm a farmer and I'm proud of it, and I want my grandkids to be proud of it. Water is sacred. Do your mining somewhere else."

Harrilene Yazzie
Greasewood, AZ

Ms. Yazcie said she understood the Federal government's position where it had to balance public comments with national needs. She commented, "With all the contamination, as well as the water, it leaves little room for development—not just economic development, but also subsistence development. You need to find the balance between what is right from the nation, as well has what is respectful for the indigenous peoples. There is no wiggle room. You are forced to make decisions that keep you up at night. The fundamental reasons we are facing these issues are due to violence—it was all for greed or gain. There are a few things~~.~~ I've learned when you listen to numbers. The use of water on Navajo is 10 to 15 gallons per person per day, but we pay more per capita. Phoenix, Arizona has more boats per capita than the state of Minnesota. The mindset is to pay $5 for 7400 gallons, 170 gallons per day per person.

So when you re-inject thorium into the Navajo Aquifer, children die in infancy. When a child laughs, we Navajo have a celebration, because it means that the child is a person. That will be denied someone, because you can't determine background, because you can't determine MCLs?"

David Assisi

"I wish all the agencies involved could learn how to work as a team. Is it in the 5 year plan? It seems that everyone is pursuing this individually. The aquifer could be a precious resource. In 1996 we had the worst drought, springs weren't putting out, but some other ones did. The Navajo EPA was surprised—50 to 100 gallons per minute. The water—anything we can do to save it, that's what I'm interested in. Thank you for the chance to speak."

APPENDIX A: ATTENDANCE LIST

Attendance--EPA Public Information Meeting, Tuba City, AZ, September 15, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
John Acothley				
Melvin Acothley	self	P.O. Box 2526 Tuba City, AZ	928-206-4143	macothley@hotmail.com
Rudy Acothley				
Andrew Bain	EPA	Region 9, San Francisco, CA		bain.andrew@epa.gov
Denise Begaye	RECA	P.O. Box 3072, Ktown, AZ	928-255-3477	
Jerry Bigun	Navajo Nation EPA-NSP			
Vianu Blackhorn	student			
C. Bloedel	Navajo Nation EPA	P.O. Box 339, Window Rock, AZ		
Alex Brock		P.O. Box 1225, Tuba City, AZ 86045	928-600-6428	alexbrock@tlhealth.org
Lydia Chang	NRC			
Emerson D.				
Michele Dinuyache	Navajo Nation EPA	Window Rock, AZ		
Stephen B. Etsitty	Navajo Nation EPA	P.O. Box 339, Window Rock, AZ,86515		
Sarah Fields	Uranium Watch	P.0 Box 344, Moab Utah, 84532	435-210-0166	sarah@uraniumwatch.org
Pamela Hill	Uranium Industry	28 N 100 E, Kanab, UT 84741	303-335-6425	phill2647@msn.com
Julie Holiday	RECA	P.O. Box 1553, Kayenta, UT 84741	303-335-6425	

Attendance--EPA Public Information Meeting, Tuba City, AZ, September 15, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Esther K. Honyestwa	self	P.O. Box 256, Hotevilla, AXZ 86030	928-401-6542	
Yvonne Hoosava	UVM Community Member	P.O. Box 595, Tuba City, AZ		yhoosava@yahoo.com
Lilli Lane	Navajo Nation EPA	Window Rock, AZ		
Cardis Mayweather	ATSDR	4771 Buford Hwy NE Atlanta, GA 30341		heb8@cdc.gov
Chandra Manadhar	Navajo Nation EPA-RCRA			
David L. Neztsosie	Cameron Chapter Community	P.O. Box 741, Tuba City, AZ		dlneztsosie@yahoo.com
Vernon Nez	Navajo Nation EPA-Superfund	Box 339, Window Rock, AZ 86515		vfnneparcra@yahoo.com
Billy Orman	self	P.O. Box 989, Tuba City, AZ 86049	928-283-4640	
Tere Orman	self	P.O. Box 989, Tuba City, AZ 86048	928-283-4639	
Angela Ragin-Wilson	ATSDR	4770 Buford Hwy NE Atlanta, GA 30341		aragin@cdc.gov
Alden Seweyestewa	self	Box 1605 Tuba City, AZ 86045	928-550-0192	
Beverly Smith	RECA	5303 E. Cortland Blvd, Flagstaff, AZ 86004		Beverly.Smith@nau.edu
Libby Vianu	ATSDR			vianu.libby@epa.gov
Beatrice Watson			928-863-9190	
Freida S. White	Navajo Nation EPA-Superfund		928-401-0953	
Harrilene Yazzie	BIA - NRO	P.O. Box 301, Gallup, NM 87301		

EPA-6351

Mike Flynn/DC/USEPA/US		To	Gina McCarthy
03/04/2011 01:47 PM		cc	
		bcc	
		Subject	Fw: Revised Schedules for Radiation Rules

Gina,

Just resending for your information. We are proceeding to develop these rules on the revised, more expedited schedules. If you have any questions or want to discuss, just let me know.

Thanks, Mike

Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395
----- Forwarded by Mike Flynn/DC/USEPA/US on 03/04/2011 01:44 PM -----

From:	Mike Flynn/DC/USEPA/US
To:	Gina McCarthy/DC/USEPA/US@EPA
Cc:	Janet McCabe/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA, Anna Duncan/DC/USEPA/US@EPA, Don Zinger/DC/USEPA/US@EPA
Date:	02/11/2011 06:46 PM
Subject:	Revised Schedules for Radiation Rules

Gina,

Following up from our recent meetings with you on the radiation rules, we've revised our rule schedules (attached) for both the standards for Uranium and Thorium Mill Tailings (40 CFR 192) and the revisions to the NESHAP for active uranium mills (Part 261, Subpart W). We've cut both schedules by close to a year, by targeting/narrowing the scope and streamlining multiple steps throughout the process. We would have a proposal out late this year for Subpart W and early next year for Part 192. Depending on comments, we would aim to complete final rules later in 2012. Please let us know if these timelines are more in line with your thinking.

I have also attached a draft one-pager on the proposed revisions to the Standards for Nuclear Power Operations (Part 190). We are working on an ANPR which we expect to complete later this Spring. Given the potential interest this may generate, you indicated you wanted to flag this for the Administrator.

Let me know if you have any comments or would like to discuss any of these materials.

Thanks, Mike

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Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency

Phone: (202) 343-9320
Fax: (202) 343-2395

40 CFR Part 192 Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Meet with workgroup	February 2011
Finalize work assignments – with focus on ISL (economic analyses, risk assessment, document for SAB)	March 2011
Develop peer review plans: • economic analyses • risk assessment	ASAP
Risk Assessment	June 30, 2011
Economic Analyses	June 30, 2011
Begin drafting rule/revisions	ASAP
Peer review of economics analyses	July 29, 2011
Peer review of risk assessment	July 29, 2011
Options Selection (6 months before signature)	August 3, 2011
Brief OMB Desk Officers	August 2011
Develop package for FAR: • FAR announcement memo from lead RSC representative • Draft action memorandum • Current workgroup membership list • Draft action • Draft preamble that addresses statues and EOs, if any, and text of the action • Draft Regulatory Impact Analysis (RIA), or other appropriate economic and scientific supporting analysis (if required) • Draft information collection request (if required) • Draft communications strategy	ASAP
Distribute FAR package to participating AAs and RAs (no sooner than 15 working days after the FAR package is distributed)	September 12, 2011
Final Agency Review	October 3, 2011
Develop final package for OPEI and OMB: • Draft action memorandum (2 copies) • Copy of the preamble and rule • Copy of FAR memos addressing substantive comments and non-concurrences (this will not go to OMB) • Copy of the EO 12866 form (SF 83) • Electronic version of the preamble and rule	ASAP
Transmit final package to OPEI	November 4, 2011
OMB Review	November 18, 2011
Proposed Rule to the Office of Federal Register	February 17, 2012

EPA's Proposed Revisions to 40 CFR Part 190:
Environmental Radiation Protection Standards for Nuclear Power Operations

Statutory Authority: EPA is responsible for developing environmental standards for nuclear power operations to protect public health and the environment.

Description: 40 CFR 190 contains standards for normal operations of nuclear power plants and other nuclear fuel cycle operations, including uranium milling, conversion, enrichment, and reprocessing. This regulation was established by EPA in 1977; it has never been revised.

Technical Rationale:

- The 1977 regulations contain no groundwater protection.
- New nuclear fuel cycle technologies exist, including new types of reactors and fuels.
- The practice of lengthy interim storage of spent nuclear fuel was not envisioned in 1977.
- The understanding of radiation risks to humans has advanced.
- New methods exist for representing the level of radiation doses and effects.
- The current collective dose requirement of the regulation is difficult to enforce.

Policy Rationale: Emerging national policy and public opinion.

- Interest in nuclear power has increased as a means to reduce GHG, support energy independence, and accommodate energy sector growth.
- New national strategies are under consideration for radioactive waste management, including reprocessing spent nuclear fuel.
- Updated environmental standards would be available for the construction of new nuclear facilities and the relicensing of operating facilities; updated standards will provide regulatory certainty in a long-dormant industry that now anticipates growth.
- Industry, NRC, DOE, and Congress have expressed interest in updated standards.
- Updated standards could inform the work of the Blue Ribbon Commission on America's Nuclear Future and help EPA respond to the Commission's recommendations.

Outreach: Interest in issue requires effective outreach to stakeholders and the public.

- Internal EPA offices – OW, OCIR, OSWER
- Other Federal departments – e.g., NRC, DOE, CEQ/White House
- Environmental groups – NRDC, Sierra Club
- Industry groups – NEI, EEI
- Communities located adjacent to facilities regulated by 40 CFR 190
- Concerned citizens

Anticipated Response:

- Changes to the rule may be misperceived as weakening the standards, resulting in a negative response from environmentalists and accusations that EPA is paving the way to rebuild the nuclear power industry and enable reprocessing.
- A separate groundwater regulation is deemed unnecessary by NRC and the industry, but industry is likely to favor the updated changes to the method for calculating doses.

Timing: ANPR internal draft by the end of March; ANPR published in Federal Register Summer 2011.

40 CFR Part 61 Subpart W Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Quarterly calls with stakeholders per consent agreement	Jan, April, Aug, Dec
Finalize work assignments for next contract period	March 2011
Risk Assessment (finalize)	March, 2011
Economic Analyses (should have limited impact on Subpart W)	June 30, 2011
Begin drafting rule/revisions	Ongoing
Options Selection (6 months before signature)	June, 2011
Develop package for FAR: • FAR announcement memo from lead RSC representative • Draft action memorandum • Current workgroup membership list • Draft action • Draft preamble that addresses statues and EOs, if any, and text of the action • Draft Regulatory Impact Analysis (RIA), or other appropriate economic and scientific supporting analysis (if required) • Draft information collection request (if required) • Draft communications strategy	ASAP
Peer review of economics analyses (not critical for Subpart W)	July 29, 2011
Distribute FAR package to participating AAs and RAs (no sooner than 15 working days after the FAR package is distributed)	
Final Agency Review	August, 2011
Develop final package for OPEI and OMB: • Draft action memorandum (2 copies) • Copy of the preamble and rule • Copy of FAR memos addressing substantive comments and non-concurrences (this will not go to OMB) • Copy of the EO 12866 form (SF 83) • Electronic version of the preamble and rule	ASAP
Transmit final package to OPEI	September, 2011
OMB Review	September, 2011
Proposed Rule to the Office of Federal Register	December, 2011

EPA-5609

Tony Nesky

To

cc

bcc

Subject UPLOAD C:\Users\ANesky\Desktop\June14search\EPAPublic-Information-Mtg-TubaCityAZ.docx

- EPAPublic-Information-Mtg-TubaCityAZ.docx

EPA Review of Standards for Uranium and Thorium Milling Facilities

PUBLIC INFORMATION MEETING
Tuba City Arizona
September 15, 2010

On September 15, 2010 EPA held a public information meeting in Tuba City, Arizona to provide the public an overview of the regulatory review and existing standards and to seek public input on the review of 40 CFR Part 192 and the revision of 40 CFR Part 61 (Subpart W).

MEETING STRUCTURE

The meeting began with opening remarks and introductions. Loren Setlow and Reid Rosnick of EPA's Radiation Protection Division (RPD) opened the meeting by giving a presentation on the EPA's review of 40 CFR Part 192 and 40 CFR Part 61 (Subpart W). The presentation was followed by a question and answer session. Participants were invited to submit their questions on an index card so that they could be read aloud for the benefit of all. After the question and answer session, the public was invited to provide input by signing up for five-minute presentations. In the remaining time, the floor was opened up for additional audience questions and input. Linda Reeves of EPA Region 9 served as facilitator. Tony Nesky of RPD took notes. Loren Setlow, Reid Rosnick and Linda Reeves closed the meeting by thanking the group for their participation, and sharing parts of their lives. Loren noted that the many comments on water usage had been loudly heard, and that EPA's review of the rule will examine water usage and constituents for which MCLs have not been determined.

There was one question about the purpose of the meeting. Lillie Lane of the Navajo EPA asked if this meeting was informational only or a hearing as part of a rulemaking. She expressed concern that the U.S. EPA could go back to Washington saying that they held a hearing in Tuba City and that everyone agreed. Loren Setlow replied that the purpose of the meeting was informational and that the U.S. EPA wanted to know what was on everyone's mind as it reviewed the uranium and thorium rules. Loren reminded participants that they could sign up to speak or sign up for questions at any time.

ATTENDANCE

Thirty people signed up to attend the meeting, though attendance was probably higher as people continued to join the meeting after the registration desk closed. Facilitator Linda Reeves asked participants about their affiliations. Seven people indicated affiliation with the Navajo Nation, and one person indicated affiliation with the Hopi Nation. Three persons indicated that they were attending for a government agency, and one person was attending for a mining company. Linda also asked participants to indicate how far they had travelled to attend the meeting. Three people only had to travel a short distance—5 miles or less. Four persons travelled up to 100 miles to reach the meeting, and the rest—25 people—had to travel more than 500 miles. Appendix A contains the list of registered participants.

AUDIENCE QUESTIONS TO EPA

QUESTION	EPA RESPONSE
What are the methods to protect surface soils?	Loren answered that the only protection standards currently in the rule are for uranium and radium. The rule is silent on other heavy metals in soil.
Can RCRA be changed to include radioactive materials as hazardous, either specific properties like flammable corrosive items, or numerical levels?	Loren noted that the rule review is not part of the RCRA program, and any revision of the rule would under UMTRCA authority. Reid noted that RCRA does not specifically include radionuclides, which have historically been regulated under the Atomic Energy Act (AEA). He acknowledged that the regulatory scheme can be complicated, and that radionuclides are covered under various statutes such as the AEA, Clean Air Act (CAA). Resource Conservation and Recovery Act (RCRA) standards for surface impoundments were used in Subpart W because they were the best designs at the time. When regulating radionuclides, EPA "borrows" from the best practices from the various statutes. Reid completed his answer by noting that addition of radionuclides in RCRA would require reauthorization of RCRA. Loren added that the addition of radionuclides to RCRA had been considered years ago, but the determination was made not to include it.
What about airborne dust? What about the constituents attached to dust blowing in the wind?	At operating mill facilities, the NRC converts the levels that can be emitted in dust. They are covered in NRC licenses. Loren added that constituents in dusts are part of the consideration of impacts to surrounding communities in 40 CFR Part 192, but were not determined to be a sufficient hazard to require regulations He said that EPA will examine this issue again.
Do you look at other countries' rules, such as those of the European Union?	Yes, EPA does look at the rules of other countries.
Can you explain the standards applicable to Uranium Recovery and the role of the EPA, the NRC, and the Tribal Environmental Protection Agencies?	Loren answered that authority depends on who has the permits. He cited a hypothetical example of an ISL facility in Wyoming. In this case, the NRC grants the license, the State of Wyoming gives a mining permit. Each under their own authority inspects the facility, and checks for leaks and excursions. Each can independently undertake an

QUESTION	EPA RESPONSE
	enforcement action to make them clean up the facility. He continued that EPA’s Superfund program has an interagency agreement with NRC, and that EPA has the authority under the Safe Drinking Water Act to issue Underground Injection Control permits for ISLs. He added that EPA tries to work with its sister agencies to provide oversight.
What about the tribal role?	Loren answered that if it facility has an excursion or contamination event—the roles depend on whether the facilities are operating or closed. The NRC has authority for operating facilities. If the facilities are on tribal land or there is an excursion on tribal land, the tribe has authority. The NRC also has some agreements with tribes. DOE is the regulator of closed facilities. The DOE will work with the tribes, and EPA will step in to provide the tribe with assistance under its Trust authority if asked.
Why does the U.S. continue to extract uranium on indigenous lands? What are the negative truths on how native land will be affected?	Loren said that he would try to address the first question. He began by noting that the U.S. needs uranium for its nuclear power plants and weapons. Currently the U.S. is an importer of uranium from countries such as Canada, Australia, and Kazakhstan. The demand for uranium is growing in China and India. Uranium mining has thus become a matter of national security. EPA’s role in uranium milling is somewhat limited. We have a real responsibility to work with tribes, as government to government. EPA takes tribal issues into consideration when reviewing Environmental Impact Statements, which should identify areas of the land considered sacred. Loren added that EPA has had a policy for protection of Native Americans since the 1980s and there is an Executive Order as well. EPA developed a database of the locations of uranium mines and mills, and found that 75% of the sites were on federal and tribal lands. EPA recognizes the disproportionate impacts. Reid referred to the question about “negative truths,” noting that there is a “negative truth” one mile and a half up the road, and that EPA will try its best to prevent effects.
What is your timeline for issuing the draft regulations?	Loren answered that EPA will complete its UMTRCA review early next year, and that any revision would be issued in 2012. Reid answered that the review of Subpart W is

QUESTION	EPA RESPONSE
	further along. EPA has completed risk assessments on all facilities to determine if the flux standard is still protective. Reid hopes that EPA can propose a rule within 13 months.
Will these rules affect new ISL facilities that have permits approved, but are not producing uranium?	Loren answered that the facilities will be bound by the conditions in the existing regulations if licenses are issued before new EPA regulations are finalized.
Would current UMTRCA sites, including the four on the Navajo Nation, have to abide by these revised regulations?	Loren answered that it depends on how extensively the rule is revised. For example, if an old facility is not lined, they would have to dig up tailings and rebuild the impoundment. *Comment from the audience (Sarah Fields)*: It will cost $1 billion to do that as a result of the failure of the existing Part 191 regulations.
Subpart W affects only ISR, right? Is there a proposal to regulate conventional mines, too?	Reid answered that Subpart W applies to conventional, ISL, and heap leach facilities and that any revision would apply to all three types.
What is the process to override an aquifer exemption, and why doesn't that decision go public?	Loren said that he would do his best to answer this question, but will refer the question to Region 9. He said that there is no provision to override it in the existing regulation. He cited the example of Crown Point, where the exemption was granted by a state agency. EPA disapproved but was overturned by the Circuit Court of Appeals. Loren brought up a hypothetical situation where EPA could ask a state to reconsider an aquifer exemption, but he asked the questioner to see him in person after the meeting.
What are the financial requirements of milling companies to protect the taxpayers form bankruptcies and fly by night operations?	Loren observed that there were not many fly-by-night milling facilities as these are extensive and expensive operations. NRC has its own regulations for bonding and surety. States also have financial requirements in their permits. EPA's UIC program also has a bonding requirement for ISL facilities. NRC has the strongest requirements. The expenses [of a bankrupt facility] would

QUESTION	EPA RESPONSE
	be great for the federal government, so the Superfund is reviewing this problem in a separate rulemaking to determine if they are adequate.
Does EPA have any compensation program like those under DOJ that are affected by mining operations?	Loren answered that the only ones he knew were here at the Navajo Nation for the rebuilding and relocation of homes. EPA does not have the authority to compensate individuals for radiation exposures.
How are background levels set for site reclamation? Give examples of radius, depth, and number of samples.	Loren and Reid answered that one way background levels for site reclamation may be set is using procedures explained in the MARSSIM Manual, which has been agreed to by EPA and several other federal agencies. It sets forward a set of principles about the surveys that have to be taken and how to determine background statistically. It can also look outside the boundaries of the contaminated sites The manual is available on our website at epa.gov/radiation. The EPA Superfund program, if it is involved, may establish their own methods for determining what constitutes "background".
What are the penalties for violation and how much wiggle room is there in the law?	Loren answered that the regulatory agencies--the states and NRC issue the penalties for pollution events at operating uranium processing facilities.
Are you reviewing them?	Loren replied that EPA does not have authority to issue bonding requirements under UMTRCA.
So its sounds like you don't have power to penalize except Superfund?	Loren explained that there are penalties for stormwater violations under the Clean Water Act, and penalties for ISL groundwater excursions under the Safe Water Drinking Act. Reid added that EPA's Office of Enforcement handles penalties. Each region has their office, and enforcement is usually done at the Regional level. Andy Bain of Region 9 answered that Region 9 was able to use CERCLA authority to clean up houses contaminated with mine wastes. He added that there is an exclusion to use monies to address Uranium Mills. There is no sunset provision to address soil contamination from after 1978.
What is the time frame to protect drinking water and adjacent areas?	Loren answered that that NRC-regulated facilities must respond within 90 days from the time of identifying an excursion has occurred. Under UMTRCA requirements they

QUESTION	EPA RESPONSE
	have up to 18 months to respond after milling has stopped. At conventional mills the monitoring is done on an annual basis, so that it is possible that an excursion could be missed once it begins.
What are the methods for the public to monitor the testing and monitoring data? Will the data be kept back by corporate secrecy?	Loren replied that monitoring data is provided to the NRC. The NRC would have to be asked about access to this information.
Can the Navajo Nation request a workshop to be better understand the rulemaking and ISL implications? Can your office set this up?	Loren replied that EPA would be happy to help, and will speak with the Navajo Nation to set up a workshop.
What is EPA doing now to address health hazards of the present population including vegetation? Be specific.	Loren replied that the EPA-is looking at groundwater studies. In one previous instance for example in Wyoming, where the DOE wanted to allow an alternative concentration limit at milling facilities, EPA recognized that ranchers watered livestock just off the site so it asked the state and DOE to consider these impacts.
Why doesn't thorium have a drinking water MCL?	No one from EPA could answer this question, so EPA offered to get back to the questioner.
Can you gather information about the operations at the Rare Metals site in the 1970s?	Loren noted that there is data available about the site that was published in reports we published when we were last finalizing our regulations on 40 CFR 192. The data is on our website. Other information is available on the Rare Metals site is available at the DOE. Records may exist at the old AEC for abandoned and closed facilities. Loren didn't know how to retrieve these records so he asked the questioner to provide contact information.
We have a lot of people who are sick in the area south of rare metals. Three is no vegetation, livestock are deformed from	Loren replied that the Regional Office would handle this complaint, and asked the questioner to provide contact information.

QUESTION	EPA RESPONSE
uranium contamination, and there are high rates of disease in our population; cleft palate, cancer, Bells Palsy, and no one ever talks about it.	*The questioner replied*: "That was 50 years ago, and we are still feeling the effects. All this is going on, and continues to go on--just leave us alone."
Can the people who live nearby Rare Metals facility be compensated because they were relocated there to make way for a mine?	No one from EPA could answer this question.
I'm confused by everyone's roles. Could I get a list of everyone's authorities and activities?	Loren referred the questioner to the five-year plan for cleanup of uranium contamination on the Navajo Nation that lists what the agencies are doing and noted that there is also information on Region 9's websites.
What are issues related to thorium?	Loren answered that the issues are how thorium will be milled, what the emissions are, and the natural decay of thoron. EPA does not have a model facility for thorium, so we will model on thoron outgassing, and from there look at risk assessment for radon gas impacts. *Comment from the floor:* Radon from thorium has a shorter half life, and its decay products have a short half-life and are more active. I don't think it's an improvement on uranium.
Does your current risk assessment address restoration to baseline after uranium is extracted, and if so, how?	Loren replied that this risk assessment has not been done yet. It will include impacts to those adjacent and all exposure pathways, groundwater use, housing on or adjacent to the facility, the length of exposure by ingestion versus inhalation, scenarios for operating versus non-operating. He also invited suggestions from the public.
Follow-on question: What is baseline? What is the exact concentration of anions, cations? Will they be the same after the uranium is removed?	Loren explained that the companies in their restoration for ISL facilities use a variant of pump and treat. They will inject things like sulfide to stop the leaching of uranium to change pH to neutral. There are so many other minerals in the ground; the process may not work for every mineral. They will replace certain volumes of waters several times and evaporate the sludge, or in some cases have gotten

QUESTION	EPA RESPONSE
	authority to pump into deep aquifers. They may do these four and five times, but some time up to 10 times the volume of the aquifer. The original baseline could possibly be met for some constituents, but historical data indicates this may not occur for all.
Does the Energy Policy Act of 2005 cover uranium extraction on tribal lands under the tribal energy agreements?	No one knew. EPA offered to get back to the questioner.
What process would one person need to do to get a well re-opened?	EPA will defer that question to the Water Resources Board.
Is there a timeframe for Subpart W under Consent Decree?	Reid answered that it was a Consent Agreement, not a decree. The consent agreement is on our website. There is no court ordered deadline, but I want it in place within 13 months.

PUBLIC PRESENTATIONS

Members of the public were invited to provide five-minute presentations on the following topics:

- Changes in uranium industry technologies (such as utilization of the In-Situ Leaching recovery process as the principal current technology for extracting uranium) and their potential environmental impacts
- Revisions in EPA drinking and groundwater protection standards
- Judicial decisions concerning the existing regulations
- Issues relating to children's health, Tribal impacts, and environmental justice
- Dose and risk factors and scenarios for assessing radiological and non-radiological risk
- Facilities proposed in states outside existing uranium mining and milling areas
- Costs and benefits of possible revisions.

Presentations are summarized as follows--

Sarah Fields

Uranium Watch, Moab Utah

Ms. Fields has a problem with 40 CFR Part 61 Subpart A, General Requirements. She sees a total breakdown in application approval process, believing it to be a "rubberstamp" process in Utah. Ms. Fields wants the process to be more than a rubberstamp; it should provide a great deal of information and the chance for public participation.

Ms. Fields believes that mine owners are not complying with requirements and suspects that mills are not either. Ms Fields thinks that approval of a new tailings cell under 40 CFR ~~Part~~ Subpart A should be for a set period of time, not for decades.

She said that the biggest problem in Subpart W and 192 is the time gap for radon release between operations and installation of a final barrier. Tailings blow around, and there is a lot of radioactive particulate matter.

Ms. Fields commented that there is supposed to be a tailings closure plan, and reclamation milestones with public notice, but there was none at Cotter. The tailings impoundment closed in 2005, and there were no milestones or notices.

Ms. Fields said that Colorado doesn't think it needs to measure the radon flux at the Cotter pile and that "apparently EPA gave them a pass". Everything looks good on paper, but you don't have the enforcement."

Allison Gibbon
Sierra Club

Ms. Gibbon said that the Sierra Club will stand behind the toughest regulations possible to protect our environmental, people and wildlife. She commented "It is great that you are here to talk to the people who have suffered the travesties of the past. There are many permits in the Grand Canyon areas, there are now mines proposed on the North Rim that affect the Hualapai and Havasupai, but it is hard for them to travel to Tuba City for this meeting. The Arizona One mine was approved in the eighties, sat idle for year, and reopened without needing reconsideration. They are on public lands, and when the mine opens they are fenced up and no longer public. There is no way to completely clean up the tailings. There should be total cost accounting on the cleanup. A Canadian company is running the mine and selling the uranium to Korea and Japan, so there are not national security issues. You should consider this in the rule. Thank you for listening."

EPA Response and Discussion:

Loren clarified the EPA is authorized under UMTRCA to regulate mills not mines, and regulates stormwater discharges, groundwater quality, and air emissions.

There was a follow-on question to this clarification: "Are the regulations on conventional mines being updated?" Reid answered that they were not, but that he was aware of the Arizona One Issues, and was working with Region 9, who has the lead on these issues.

Michelle Dinuyache
Community Member, Fort Defiance, Arizona

Ms. Dinuyache commented on risk assessment and recommended that EPA obtain information on inputs to models from tribal representatives to ensure the assessments were fully representative of lifestyles.

She also commented on dose and risk factor scenarios. For 40 CFR Part 192, she recommended a risk-based approach that based standards on the low end of the range.

EPA Response and Discussion:

Loren replied that the regional offices will be soon approaching the tribes for the tribal specific input to reflect lifestyles.

David L Neztsosie
Shadow Mountain, AZ

"For 30 years, mining went on, mills were developed next to streams, near communities, and abandoned overnight. So it has spread by wind and other seasonal weather. It has been determined that this is a good location for wind farms. So how much of a down winder are we? There are sicknesses related to uranium in my hometown, respiratory and nervous disease, it is troubling my mom and dad. Two of my youngest sisters have died for it, aged 30 years. I can see that in the community. Authorities and the people's government do not seem to agree how uranium can be related to health problems. Somebody's windmill was taken down because of its high concentration of uranium [in the well water]. Abandoned mines collect water, sheep drink the water. You can go miles before you reach another water resource.

Although mines have been remediated, this is only a "band-aid" solution. Horses and livestock would step into holes and fall. People east of me have a high content of uranium in their only drinking water and give it to their livestock. "

EPA Response and Discussion:

Loren Setlow of EPA replied: A good piece of the meeting today dealt with water problems. EPA realizes that this is a very large problem, and that when a well is posted and shut down, it is a very large problem to find a replacement. EPA is doing the best it can to identify other water sources for these communities, and knows that the Navajo Nation has forbidden further mining on its lands.

Cassandra Bloedel
Navajo Nation EPA

"I was going to request EPA HQ continue to look at all the data for Tuba City Dump, Highway 160 because there is thorium in the groundwater, and BLA [the Bureau of Land Management] is ignoring that fact. It is important that EPA determine MCLs for all radionuclides. We have copper and arsenic in the groundwater. The former Rare Metals site had arsenic products, and we found them at Highway 160, and these facts are being pushed to the side. In any new development process, you have to recognize that it will generate radionuclides.

We had to go to the forensic analysis of the uranium isotopes to relate Highway 160 to the mill. You may have to establish MCLs for isotopes.

I missed the fact that water was being reinjected into the Navajo Aquifer. It is the main source of potable water. They are only publishing reports on certain constituents. What about the others—arsenic, molybdenum?

Crown Point is within a quarter mile of the community, and it is upgradient. The aquifer is fractured, and shallow groundwater contamination will contaminate deeper groundwater.

Look at data that have been released. Look at the Navajo reports presented to Congress. Thank you for your time and being here."

EPA Response and Discussion:

Loren Setlow of EPA thanked Ms. Bloedel for the discussion of thorium and mentioned noted that the existing standards issued in 1995 did include a few substances that did not have drinking water MCLs, particularly silver and molybdenum, which are typically found with uranium. Loren said that EPA will look at thorium and vanadium in its review of 40 CFR 192.

Carl Holliday
Navajo Nation, Monument Valley, AZ

Mr. Holliday expressed appreciation what Sandra said, commenting "Our concerns seem to fall on deaf ears." He expressed concern about the application of uranium limits to thorium, questioning whether the dose equivalents were high compared to uranium or gamma radiation. He asked for clarification.

He also had a question about exposure rates: "If you have 600 or 700 lbs of uranium in a pond, how does it not show up somewhere else?"

Loren Setlow replied by giving a history of the radiation dose to the public. The dose limit in the current rule is an annual 25 milirems to a member of the public, and 75 millirems to any organ. EPA is giving the radiation dose a hard look in this review. He also said that EPA would be looking at thorium in groundwater.

Esther Honyestewa
Hotevilla, AZ

Thanks to the people coming from the U.S government. We have a lot of issues on the reservation. We have a lot of issues concerning our water here. We have an issue on the Peaks, and not one member came out, so it is not that important, but springs are being contaminated. You came out.

I'm from Hopi, and I am concerned about water. Our water is sacred here, and we do not waste water. It looks like this is another project to take water away. The uranium a mile away has really affected our land. If our water goes away, we will go away. Our pure water is becoming contaminated. Our people are dying from all the things the government is doing to the land. We cannot mess with Mother Earth.

Our farmers work hard for the families. My family was one of the ones shipped to Rare Metals when the hospital was being built. My Dad planted right outside the Mill tailing, we ate it, and a lot of people in my family have cancers. Think about that when you write your rule. We don't have it easy—this is dry desert, and people want to take our water. All the water underneath is one body of water, and we need to respect that water.

Why do we want to make bombs? That is not right. We are here to help each other, not hurt each other. We are a spiritual people--we have prayers for everything. Our plants are not what they used to be. I'm a farmer and I'm proud of it, and I want my grandkids to be proud of it. Water is sacred. Do your mining somewhere else."

Harrilene Yazzie
Greasewood, AZ

Ms. Yazcie said she understood the Federal government's position where it had to balance public comments with national needs. She commented, "With all the contamination, as well as the water, it leaves little room for development—not just economic development, but also subsistence development. You need to find the balance between what is right from the nation, as well has what is respectful for the indigenous peoples. There is no wiggle room. You are forced to make decisions that keep you up at night. The fundamental reasons we are facing these issues are due to violence—it was all for greed or gain. There are a few things~~.~~ I've learned when you listen to numbers. The use of water on Navajo is 10 to 15 gallons per person per day, but we pay more per capita. Phoenix, Arizona has more boats per capita than the state of Minnesota. The mindset is to pay $5 for 7400 gallons, 170 gallons per day per person.

So when you re-inject thorium into the Navajo Aquifer, children die in infancy. When a child laughs, we Navajo have a celebration, because it means that the child is a person. That will be denied someone, because you can't determine background, because you can't determine MCLs?"

David Assisi

"I wish all the agencies involved could learn how to work as a team. Is it in the 5 year plan? It seems that everyone is pursuing this individually. The aquifer could be a precious resource. In 1996 we had the worst drought, springs weren't putting out, but some other ones did. The Navajo EPA was surprised—50 to 100 gallons per minute. The water—anything we can do to save it, that's what I'm interested in. Thank you for the chance to speak."

APPENDIX A: ATTENDANCE LIST

Attendance--EPA Public Information Meeting, Tuba City, AZ, September 15, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
John Acothley				
Melvin Acothley	self	P.O. Box 2526 Tuba City, AZ	928-206-4143	macothley@hotmail.com
Rudy Acothley				
Andrew Bain	EPA	Region 9, San Francisco, CA		bain.andrew@epa.gov
Denise Begaye	RECA	P.O. Box 3072, Ktown, AZ	928-255-3477	
Jerry Bigun	Navajo Nation EPA-NSP			
Vianu Blackhorn	student			
C. Bloedel	Navajo Nation EPA	P.O. Box 339, Window Rock, AZ		
Alex Brock		P.O. Box 1225, Tuba City, AZ 86045	928-600-6428	alexbrock@tlhealth.org
Lydia Chang	NRC			
Emerson D.				
Michele Dinuyache	Navajo Nation EPA	Window Rock, AZ		
Stephen B. Etsitty	Navajo Nation EPA	P.O. Box 339, Window Rock, AZ,86515		
Sarah Fields	Uranium Watch	P.0 Box 344, Moab Utah, 84532	435-210-0166	sarah@uraniumwatch.org
Pamela Hill	Uranium Industry	28 N 100 E, Kanab, UT 84741	303-335-6425	phill2647@msn.com
Julie Holiday	RECA	P.O. Box 1553, Kayenta, UT 84741	303-335-6425	

Attendance--EPA Public Information Meeting, Tuba City, AZ, September 15, 2010				
Name	**Representing**	**Address**	**Phone No.**	**Email**
Esther K. Honyestwa	self	P.O. Box 256, Hotevilla, AXZ 86030	928-401-6542	
Yvonne Hoosava	UVM Community Member	P.O. Box 595, Tuba City, AZ		yhoosava@yahoo.com
Lilli Lane	Navajo Nation EPA	Window Rock, AZ		
Cardis Mayweather	ATSDR	4771 Buford Hwy NE Atlanta, GA 30341		heb8@cdc.gov
Chandra Manadhar	Navajo Nation EPA-RCRA			
David L. Neztsosie	Cameron Chapter Community	P.O. Box 741, Tuba City, AZ		dlneztsosie@yahoo.com
Vernon Nez	Navajo Nation EPA-Superfund	Box 339, Window Rock, AZ 86515		vfnneparcra@yahoo.com
Billy Orman	self	P.O. Box 989, Tuba City, AZ 86049	928-283-4640	
Tere Orman	self	P.O. Box 989, Tuba City, AZ 86048	928-283-4639	
Angela Ragin-Wilson	ATSDR	4770 Buford Hwy NE Atlanta, GA 30341		aragin@cdc.gov
Alden Seweyestewa	self	Box 1605 Tuba City, AZ 86045	928-550-0192	
Beverly Smith	RECA	5303 E. Cortland Blvd, Flagstaff, AZ 86004		Beverly.Smith@nau.edu
Libby Vianu	ATSDR			vianu.libby@epa.gov
Beatrice Watson			928-863-9190	
Freida S. White	Navajo Nation EPA-Superfund		928-401-0953	
Harrilene Yazzie	BIA - NRO	P.O. Box 301, Gallup, NM 87301		

EPA-6351

Mike Flynn/DC/USEPA/US		To	Gina McCarthy
03/04/2011 01:47 PM		cc	
		bcc	
		Subject	Fw: Revised Schedules for Radiation Rules

Gina,

Just resending for your information.   We are proceeding to develop these rules on the revised, more expedited schedules. If you have any questions or want to discuss, just let me know.

Thanks, Mike

Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency
Phone: (202) 343-9320
Fax: (202) 343-2395

----- Forwarded by Mike Flynn/DC/USEPA/US on 03/04/2011 01:44 PM -----

From:	Mike Flynn/DC/USEPA/US
To:	Gina McCarthy/DC/USEPA/US@EPA
Cc:	Janet McCabe/DC/USEPA/US@EPA, Jonathan Edwards/DC/USEPA/US@EPA, Alan Perrin/DC/USEPA/US@EPA, Anna Duncan/DC/USEPA/US@EPA, Don Zinger/DC/USEPA/US@EPA
Date:	02/11/2011 06:46 PM
Subject:	Revised Schedules for Radiation Rules

Gina,

Following up from our recent meetings with you on the radiation rules, we've revised our rule schedules (attached) for both the standards for Uranium and Thorium Mill Tailings (40 CFR 192) and the revisions to the NESHAP for active uranium mills (Part 261, Subpart W).   We've cut both schedules by close to a year, by targeting/narrowing the scope and streamlining multiple steps throughout the process.   We would have a proposal out late this year for Subpart W and early next year for Part 192. Depending on comments, we would aim to complete final rules later in 2012.   Please let us know if these timelines are more in line with your thinking.

I have also attached a draft one-pager on the proposed revisions to the Standards for Nuclear Power Operations (Part 190).   We are working on an ANPR which we expect to complete later this Spring.   Given the potential interest this may generate, you indicated you wanted to flag this for the Administrator.

Let me know if you have any comments or would like to discuss any of these materials.

Thanks, Mike

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Mike Flynn, Director
Office of Radiation and Indoor Air (MC-6601-J)
U.S. Environmental Protection Agency

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40 CFR Part 192 Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Meet with workgroup	February 2011
Finalize work assignments – with focus on ISL (economic analyses, risk assessment, document for SAB)	March 2011
Develop peer review plans: • economic analyses • risk assessment	ASAP
Risk Assessment	June 30, 2011
Economic Analyses	June 30, 2011
Begin drafting rule/revisions	ASAP
Peer review of economics analyses	July 29, 2011
Peer review of risk assessment	July 29, 2011
Options Selection (6 months before signature)	August 3, 2011
Brief OMB Desk Officers	August 2011
Develop package for FAR: • FAR announcement memo from lead RSC representative • Draft action memorandum • Current workgroup membership list • Draft action • Draft preamble that addresses statues and EOs, if any, and text of the action • Draft Regulatory Impact Analysis (RIA), or other appropriate economic and scientific supporting analysis (if required) • Draft information collection request (if required) • Draft communications strategy	ASAP
Distribute FAR package to participating AAs and RAs (no sooner than 15 working days after the FAR package is distributed)	September 12, 2011
Final Agency Review	October 3, 2011
Develop final package for OPEI and OMB: • Draft action memorandum (2 copies) • Copy of the preamble and rule • Copy of FAR memos addressing substantive comments and non-concurrences (this will not go to OMB) • Copy of the EO 12866 form (SF 83) • Electronic version of the preamble and rule	ASAP
Transmit final package to OPEI	November 4, 2011
OMB Review	November 18, 2011
Proposed Rule to the Office of Federal Register	February 17, 2012

EPA's Proposed Revisions to 40 CFR Part 190:
Environmental Radiation Protection Standards for Nuclear Power Operations

Statutory Authority: EPA is responsible for developing environmental standards for nuclear power operations to protect public health and the environment.

Description: 40 CFR 190 contains standards for normal operations of nuclear power plants and other nuclear fuel cycle operations, including uranium milling, conversion, enrichment, and reprocessing. This regulation was established by EPA in 1977; it has never been revised.

Technical Rationale:

- The 1977 regulations contain no groundwater protection.
- New nuclear fuel cycle technologies exist, including new types of reactors and fuels.
- The practice of lengthy interim storage of spent nuclear fuel was not envisioned in 1977.
- The understanding of radiation risks to humans has advanced.
- New methods exist for representing the level of radiation doses and effects.
- The current collective dose requirement of the regulation is difficult to enforce.

Policy Rationale: Emerging national policy and public opinion.

- Interest in nuclear power has increased as a means to reduce GHG, support energy independence, and accommodate energy sector growth.
- New national strategies are under consideration for radioactive waste management, including reprocessing spent nuclear fuel.
- Updated environmental standards would be available for the construction of new nuclear facilities and the relicensing of operating facilities; updated standards will provide regulatory certainty in a long-dormant industry that now anticipates growth.
- Industry, NRC, DOE, and Congress have expressed interest in updated standards.
- Updated standards could inform the work of the Blue Ribbon Commission on America's Nuclear Future and help EPA respond to the Commission's recommendations.

Outreach: Interest in issue requires effective outreach to stakeholders and the public.

- Internal EPA offices – OW, OCIR, OSWER
- Other Federal departments – e.g., NRC, DOE, CEQ/White House
- Environmental groups – NRDC, Sierra Club
- Industry groups – NEI, EEI
- Communities located adjacent to facilities regulated by 40 CFR 190
- Concerned citizens

Anticipated Response:

- Changes to the rule may be misperceived as weakening the standards, resulting in a negative response from environmentalists and accusations that EPA is paving the way to rebuild the nuclear power industry and enable reprocessing.
- A separate groundwater regulation is deemed unnecessary by NRC and the industry, but industry is likely to favor the updated changes to the method for calculating doses.

Timing: ANPR internal draft by the end of March; ANPR published in Federal Register Summer 2011.

40 CFR Part 61 Subpart W Deliverable Dates (Revised Schedule)

Major Milestones & Intermediate Steps

Quarterly calls with stakeholders per consent agreement	Jan, April, Aug, Dec
Finalize work assignments for next contract period	March 2011
Risk Assessment (finalize)	March, 2011
Economic Analyses (should have limited impact on Subpart W)	June 30, 2011
Begin drafting rule/revisions	Ongoing
Options Selection (6 months before signature)	June, 2011
Develop package for FAR: • FAR announcement memo from lead RSC representative • Draft action memorandum • Current workgroup membership list • Draft action • Draft preamble that addresses statues and EOs, if any, and text of the action • Draft Regulatory Impact Analysis (RIA), or other appropriate economic and scientific supporting analysis (if required) • Draft information collection request (if required) • Draft communications strategy	ASAP
Peer review of economics analyses (not critical for Subpart W)	July 29, 2011
Distribute FAR package to participating AAs and RAs (no sooner than 15 working days after the FAR package is distributed)	
Final Agency Review	August, 2011
Develop final package for OPEI and OMB: • Draft action memorandum (2 copies) • Copy of the preamble and rule • Copy of FAR memos addressing substantive comments and non-concurrences (this will not go to OMB) • Copy of the EO 12866 form (SF 83) • Electronic version of the preamble and rule	ASAP
Transmit final package to OPEI	September, 2011
OMB Review	September, 2011
Proposed Rule to the Office of Federal Register	December, 2011

EPA-6351

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03/04/2011 01:47 PM		cc	
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EPA-1047

"Mandeville, Douglas" <Douglas.Mandeville@nrc.gov>

03/25/2011 02:05 PM

To Reid Rosnick

cc "Linton, Ron", "VonTill, Bill"

bcc

Subject FW: Question About Heap Leach

1 attachment

NRC Regulatory Guide 3.11.pdf

Hi Reid –

I work with Ron Linton in the uranium recovery licensing branch at the NRC. Ron had forwarded me your email below about the size of heap piles. The discussion on size restrictions comes from Subpart W of the NESHAPS regulations, which identify two options for disposal in impoundments. I've attached a copy of NRC Reg Guide 3.11 (Design, Construction, and Operation of Embankment Retention Systems at Uranium Recovery Facilities) – the second paragraph of page 5 provides a discussion.

Doug

Douglas T. Mandeville
U.S. NRC
Uranium Recovery Licensing Branch
301-415-0724

From: Rosnick.Reid@epamail.epa.gov [mailto:Rosnick.Reid@epamail.epa.gov]
Sent: Thursday, March 24, 2011 11:37 AM
To: Linton, Ron
Subject: Question About Heap Leach

Hello Ron,

I have a quick question about heap leach that I saw on the NRC website. At http://www.nrc.gov/materials/uranium-recovery/extraction-methods/comparison.html regarding the approximate size of heaps, it states that the heap piles are limited in size to 40 acres. Would you please give me a reference for that size limitation? Thank you.

Reid

Reid J. Rosnick
Radiation Protection Division (6608J)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

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U.S. NUCLEAR REGULATORY COMMISSION

November 2008
Revision 3

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 3.11

(Draft was issued as DG-3032, dated January 2008)

DESIGN, CONSTRUCTION, AND INSPECTION OF EMBANKMENT RETENTION SYSTEMS AT URANIUM RECOVERY FACILITIES

A. INTRODUCTION

This guide describes some engineering practices and methods generally considered by the U.S. Nuclear Regulatory Commission (NRC) to be satisfactory for the design, construction, and inspection of embankment retention systems used for retaining liquid and solid wastes from uranium recovery operations. These practices and methods are the result of NRC review and action on a number of specific cases, and they reflect the latest general engineering approaches that are acceptable to the NRC staff. If future information results in alternative methods, the NRC staff will review such methods to determine their acceptability. Separate guidance (Refs. 1–3) addresses the closure of retention systems.

Licensees who process or refine uranium ores in a milling operation are required by Title 10, Section 20.1101, "Radiation Protection Programs," of the *Code of Federal Regulations* (10 CFR 20.1101) to use, to the extent practical, procedures and engineering controls based on sound radiation protection principles, to maintain occupational radiation exposure and radiation exposure to members of the public that are as low as is reasonably achievable (ALARA). In addition, Subpart B, "Environmental Standards for the Uranium Fuel Cycle," of 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," requires that the annual dose equivalent not exceed $25x10^{-5}$ sieverts (Sv) (25 millirem (mrem)) to the whole body, $75x10^{-5}$ Sv (75 mrem) to the thyroid, and $25x10^{-5}$ Sv (25 mrem) to any other organ of any member of the public as the result of exposures to radiation (radon and its daughters excepted) from uranium fuel cycle operations, including planned discharges of radioactive

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This guide was issued after consideration of comments received from the public.

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materials to the general environment. Liquid and solid wastes generated in uranium recovery operations typically contain radioactive materials in excess of the discharge limits and are generally confined by an embankment retention system.

This regulatory guide contains information collection requirements covered by 10 CFR Part 20 and 10 CFR Part 40 and that the Office of Management and Budget (OMB) approved under OMB control numbers 3150-0014 and 3150-0020, respectively. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

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B. DISCUSSION

Background

The milling of uranium ores results in the production of large volumes of liquid and solid wastes (tailings). These tailings are usually stored behind manmade retaining structures, following the practice of the nonuranium mining industry. In addition, other liquid wastes from operations and ground-water corrective action activities at uranium recovery facilities are often retained behind evaporation pond embankments. The design and construction of early tailings retention structures were based largely on mining experience, with little use of design concepts. These empirical approaches resulted in various mining dam mishaps and failures (Refs. 4 and 5). The 1972 failure of Buffalo Creek Dam in West Virginia resulted in the U.S. Congress passing a national dam safety law affecting all water-impounding structures in excess of either 7.62 meters (25 feet) in height or 61,674 cubic meters (50 acre-feet) in impoundment capacity (Ref. 6).

Wastes from uranium recovery operations, unlike most nonuranium mine wastes, contain concentrations of radioactive materials in excess of allowable discharge limits (Ref. 7). Furthermore, the most significant radioactive element in the wastes is radium-226, which has a half-life of about 1600 years (Ref. 8). Therefore, it is necessary to confine such wastes to prevent or control their release to the environment, not only during the operation of the uranium recovery facility, but also for generations after operations have ceased. The embankments, foundation, and any abutments need to be stable under all conditions to prevent the uncontrolled release of the retained liquid or semifluid wastes. Seepage from the tailings cell or evaporation pond, which contains dissolved radium and other toxic substances (Ref. 8), needs to be controlled under normal and severe operating conditions to prevent the possibility of unacceptable contamination of the ground water or nearby streams. The impoundment and embankments need to be designed to prevent wind and water erosion during operation, and after facility closure in the case of reclaimed tailings impoundments.

Factors pertaining to safety, contamination, and environmental damage determine the basic requirements in planning and constructing retention systems. To achieve the basic requirements, the design must be based on a thorough understanding of both the geotechnical and hydrological problems involved and the requirements of the uranium recovery operation.

The latest advances in geotechnical engineering, together with engineering experience and knowledge in the field of water storage dams and retention structures, can be used in the design and construction of uranium recovery retention systems. The basic concepts of conventional water storage impoundments can be suitably modified to produce economical designs that will ensure the stability of the retention system and minimal contamination.

1. General Planning, Siting, and Design Considerations

Because the prime functions of the retention system are to store radioactive solids and/or to provide temporary storage of contaminated water for clarification and evaporation, the system must be designed and constructed to remain stable for its intended life. It must provide the required storage at any given time, and it must provide sufficient control of seepage to prevent unacceptable contamination of adjacent land, waterways, and ground waters. It must also be designed to be resistant to wind and water erosion during and after facility operations.

The planning, siting, and design of uranium recovery retention systems need to ensure that such systems meet any other regulatory and permitting requirements for a proposed impoundment that exist outside NRC's regulations (10 CFR Part 40, Appendix A) and regulatory process.

The siting and design should consider the requirements of the U.S. Environmental Protection Agency's (EPA) national emission regulations at Subpart W, "National Emissions Standards for Radon Emissions from Operating Mill Tailings," of 40 CFR Part 61, "National Emission Standards for Hazardous Air Pollutants." Subpart W requires that "… no new tailings impoundment can be built unless it is designed, constructed, and operated to meet one of the two following work practices: (1) Phased disposal in lined tailings impoundments that are no more than 40 acres in area and meet the requirements of 40 CFR 192.32(a) as determined by the Nuclear Regulatory Commission. The owner or operator shall have no more than two impoundments, including existing impoundments, in operation at any one time. (2) Continuous disposal of tailings such that tailings are dewatered and immediately disposed with no more than 10 acres uncovered at any time and operated in accordance with 40 CFR 192.32(a) as determined by the Nuclear Regulatory Commission." Furthermore, the design should consider the requirements of 40 CFR 264.221 addressing surface impoundment design and operation. An applicant or licensee should consider these EPA regulations during the preliminary design and planning stages of the tailings retention system.

1.1 Site Evaluation

The goal in the siting and design of uranium recovery retention systems is to achieve permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces and to do so without ongoing maintenance. In the selection of alternative tailings disposal sites or in the evaluation of the adequacy of existing tailings sites, all site features that will contribute to this goal should be considered, including (1) remoteness from populated areas, (2) hydrologic and other natural conditions as they contribute to continued immobilization and isolation of contaminants from ground-water sources, and (3) potential for minimizing erosion, disturbance, and dispersion by natural forces over the long term. In the selection of disposal sites, primary emphasis must be given to the isolation of tailings or wastes, a matter having long-term impacts, as opposed to the consideration of only short-term convenience or benefits, such as minimization of transportation or land acquisition costs. While isolation of tailings will be a function of both site conditions and engineering design, siting features are the primary consideration for ensuring permanent isolation of wastes given the long-term nature of the tailings hazards.

To the extent possible, sites should be selected that are at or near the top of local drainage divides and/or are not located in floodplains or flood-prone areas. Such site selection will avoid the need for diversion channels or extensive riprap protection to prevent erosion of the toes and slopes of the embankments.

The "prime option" for the disposal of tailings is placement below grade. Where full below-grade burial is not feasible, the size of retention structures, as well as the size and steepness of slopes associated with exposed embankments, must be minimized by excavation to the maximum extent reasonably achievable given the geologic and hydrologic conditions at a site. In these cases, it must be demonstrated that an above-grade disposal program will provide equivalent isolation of the tailings from natural erosion forces.

In selecting any site for uranium recovery waste retention, detailed local conditions, including climate, ground-water and surface-water hydrology, geology, and seismology, need to be assessed and their impacts evaluated.

1.2 Field Exploration

Subsurface investigations at the site of the retention system and at possible borrow areas need to be of adequate scope to determine the suitability of the foundation and the availability and characteristics of embankment materials. Borings should be drilled along the axis of the retention structure and at critical locations perpendicular to the axis to establish geologic sections and ground-water conditions. Generally, borings should extend to a depth in the natural soils at least equal to the height of the planned embankment section. A minimum of 4.57 meters (15 feet) into natural soils is required for small retention structures. The investigations should cover classification, physical and chemical properties, location, and extent of soil and rock strata, and variations in ground-water conditions. Evaluation of ground water should be focused on the uppermost aquifer. The field exploration should identify this aquifer, its flow direction, and the distance from the impoundment to potential down-gradient users. In addition, the background ground-water quality of the uppermost aquifer should be obtained in accordance with the preoperational guidance in Regulatory Guide 4.14, Revision 1, "Radiological Effluent and Environmental Monitoring at Uranium Mills," issued April 1980. Observation of ground-water conditions should be recorded over a sufficient period to permit the ground-water depths and range of seasonal fluctuations to be established.

The foundation conditions must be determined to assess the ability of subsurface materials to support the embankments without failure and without excessive total or differential settlement. The permeability of foundation soils and rocks must be ascertained to estimate the seepage potential. The availability of suitable borrow material for retention system construction must be assessed with consideration of the construction sequence and schedule.

Information is needed on the characteristics of the underlying soil and geologic formations, particularly as they will control transport of contaminants and solutions. This includes detailed information concerning extent, thickness, uniformity, shape, and orientation of underlying strata. Hydraulic gradients and conductivities of the various formations must be determined. This information must be gathered from borings and field survey methods taken within the proposed impoundment area and in surrounding areas where contaminants might migrate to ground water. Hydrologic parameters such as permeability may not be determined on the basis of laboratory analysis of samples alone; a sufficient amount of field testing (e.g., pump tests) must be conducted to ensure an adequate understanding of actual field properties.

1.3 Laboratory Tests

Testing soil samples of foundation and embankment materials from the field investigation should result in detailed knowledge of such physical and mechanical properties as classification, gradation, shear strength, consolidation, permeability, sedimentation, compaction, piping and cracking susceptibility, and wind-water erosion characteristics.

2. Design Analysis

Design analysis should consider stability, settlement, seepage, hydrologic analyses, liner stability, and liner compatibility. Specifically, the design must ensure that retention system failure will not occur. Historical records (Refs. 9–12) indicate that most failures associated with tailings retention systems have been caused by overtopping by flood waters, erosion, piping in the retention embankment or the foundation, foundation failure, slope failure, or liquefaction.

2.1 Stability and Failure Analyses

2.1.1 Slope Stability

Slope failure occurs when an outer portion of an embankment slides downward and outward with respect to the remaining part of the embankment. The slide generally occurs along a fairly well-defined slip surface.

2.1.1.1 Methods of Analyses

Stability analyses involve comparing the shearing stresses along potential failure surfaces with the available shearing resistance along those surfaces. The factor of safety is the ratio of the available shear strength to the developed maximum shear stress.

A number of computer programs can be used to perform slope stability analyses. Computer programs provide an easier means to (1) consider complex slope geometries and subsurface soil layering, (2) use a number of different types of soil in the analysis, (3) search for circular, wedge, and noncircular failure surfaces, (4) consider different models to represent soil strength, and (5) consider different loading conditions. When used properly, these programs can allow a designer to consider a significant number of potential slip surfaces. Commercially available programs also may allow calculation of the factor of safety using several of the methods identified below. Despite these advantages, the output from a computer program needs to be checked carefully to verify that the critical surface with the lowest factor of safety has been identified, the critical surface represents a possible or realistic scenario, and computational problems resulting from the parameters used are minimized. For complicated situations, it may be prudent to verify the analysis with a second computer program or a hand calculation.

2.1.1.2 Static Stability Analysis

Limit Equilibrium

Conventional limit equilibrium methods of slope stability analysis evaluate the equilibrium of a soil mass tending to move down slope under the influence of gravity. Many methods use the limit equilibrium approach. Various publications (Refs. 13–15) offer detailed discussions. The following provides a brief overview of several of these methods:

- *Friction Circle Method*—This method considers the entire sliding block as a rigid free body and makes assumptions regarding the distribution of normal stresses along the failure surface. It can be used only to evaluate failure surfaces that are circles or single straight lines and is most suited to homogeneous soil conditions. The Logarithmic Spiral Method is a different version of this method.

- *Method of Slices*—This method divides the free body into many vertical slices, and the equilibrium of each slice is considered. The best known and most widely used versions of this method are the Ordinary Method of Slices, the Swedish Circle Method, Modified Swedish Method, Simplified Bishop Method, Spencer's Method, and Morgenstern-Price Method. Although this method can be used to analyze wedge and noncircular slip surfaces, certain methods, such as the Ordinary Method of Slices and Simplified Bishop Method, require a circular slip surface. The analyses should consider both shallow slip surfaces that run through the embankment as well as deep slip surfaces that run beneath the embankment (Refs. 16 and 17).

- *Wedge Method*—This method is used whenever the failure surface can be satisfactorily approximated by a series of straight lines (usually two or three).

- *Special Cases*

  - Infinite Slope—This analysis is suited to cases in which a slip surface may form parallel to the face of the slope. This type of failure can be approximated using a circular surface with a large radius. However, a simple approach has been developed based on equilibrium of forces. Several publications (Refs. 15–18) discuss this situation in detail.

  - Geomembranes—If a geomembrane is to be used as a component of a retention system, a stability analysis of a layer of cover soil on top of the geomembrane may be needed. This type of analysis can be sensitive to the slope angle and the interface friction between the cover soil and the geomembrane (Refs. 19 and 20).

Deterministic versus Probabilistic Analyses

In traditional deterministic approaches to slope stability analysis, the foundation soil properties, pore pressure, geometry, and loading conditions are held constant, and one of the analysis techniques identified above is used to calculate the factor of safety. In this approach, the numerical values used in the analysis do not account for the inherent variability of material properties, pore pressures, and loading conditions that can exist within a given slope. Probabilistic methods make it possible for a slope stability analysis to consider the variability of these parameters. While the use of probabilistic methods is not required when designing an embankment or retention system, it can aid in the interpretation of an analysis. Reference 21 further discusses probabilistic methods in slope stability analysis.

Finite Element Method

The finite element method (FEM) is most useful when calculating the stresses, pore pressures, and deformation of a slope. FEM can be used to calculate a factor of safety in a slope stability analysis, but this requires additional steps beyond the typical FEM output. FEM usually requires information about the stress-strain behavior of soil to provide a reasonable answer. This can require complex laboratory testing. Because of the considerable time and effort required to develop an accurate and representative understanding of the soil conditions, FEM is best suited to aiding the interpretation of difficult slope stability problems. Examples of situations in which FEM may be applicable include (1) pore pressure dissipation and corresponding strength gain in tailings slimes, (2) settlement of an embankment as it is raised, (3) consolidation of soft soils beneath an embankment, and (4) identifying areas of displacement near critical structures. References 15 and 22 further discuss FEM.

2.1.1.3 Dynamic (Seismic) Stability Analysis

In areas where embankments are subjected to seismic disturbances, seismic stability analyses should be performed. Seismic vibrations can cause liquefaction of saturated or nearly saturated loose sands and sensitive silts (Ref. 4). The dynamic shearing stresses induced during the seismic events can cause excessive deformation, distortion, or even shear failure of the embankment (Refs. 23 and 24).

Seismic stability analyses of embankments are conventionally made using pseudostatic methods (Ref. 25). In this approach, the stability of a potential sliding mass is determined assuming static loading conditions, and the computation accounts for the effects of an earthquake by including an equivalent horizontal force acting on the potential sliding mass. The horizontal force representing earthquake effects is expressed as the product of the weight of the sliding mass and a seismic coefficient. The value of the seismic coefficient is normally selected on the basis of the seismicity of the region in which the embankment is to be constructed.

During earthquakes, large cyclic inertia forces are induced in embankments. In certain zones of an embankment, the inertia forces may be sufficiently large and may occur often enough to cause permanent displacements. Newmark (Ref. 26), Goodman and Seed (Ref. 23), and Makdisi and Seed (Refs. 27 and 28) have proposed procedures for estimating the magnitude of these displacements. These approaches are more involved than conventional methods and have been used successfully to predict the surface displacements of embankments. Other approaches may be used; however, good engineering judgment should be exercised in the selection of soil characteristics, the application of the approach to the soil type and saturation conditions, and the evaluation of the results obtained.

In dealing with saturated, cohesionless soils, the dynamic analysis procedures developed by Seed et al. (Ref. 29) provide a basis for assessing the stability and deformation of the embankment during earthquakes. This type of analysis may be used to predict the development of the liquefaction zone and the anticipated movements, deformation, and stability of the embankment and its foundation. However, good engineering judgment based on adequate data must be exercised in the selection of soil characteristics for use in the analyses, the detailed steps followed to conduct the analyses, and the evaluation of the results obtained.

Reference 30 contains a detailed discussion and applicable guidelines for seismic analysis and design of tailings embankments.

2.1.1.4 Loading Conditions and Factors of Safety

A tailings embankment and its foundation are subjected to shear stresses imposed by the weight of the embankment, the filling of the impoundment, seepage, or earthquake forces. The cases for which stability analyses are necessary include the following:

- *End of construction*—Analyses of the upstream and downstream slopes are needed for the end-of-construction conditions if the embankment and its foundation are partially or entirely composed of impervious soils. The unconsolidated undrained shear strength should be used in the analyses for slow-draining soils, while consolidated drained shear strength should be used for free-draining soils in which excess pore pressures would not develop.

- *Partial pool with steady seepage*—Analyses of the upstream slope are needed for several intermediate pool stages with corresponding steady seepage conditions. The analyses account for a reduction in effective normal stresses when pore water pressure that developed during construction or filling did not dissipate before the subsequent partial pool condition. The lower strength from either the consolidated undrained shear test or consolidated drained shear test is used in the analyses. The minimum factor of safety should be determined as a function of pool elevations.

- *Maximum storage pool with steady seepage*—This condition may develop and may be critical to downstream slope stability. A flow net would be helpful in determining the phreatic line and seepage forces. Shear strength selection should be the same as for the partial pool with steady seepage condition.

- *Earthquake*—In areas subject to seismic shocks, appropriate earthquake forces need to be added onto the previous loading conditions in the stability analyses.

The use of a factor of safety in stability analyses should allow sufficient margin for variations between the parameters used in the design and those existing in the field, as well as consideration of the limits of strains. Many soils undergo relatively large plastic strains as the applied shear stresses approach the shear strength of the soil.

When choosing the factor of safety, the analyst needs to consider the consequence of a failure, the tolerable limits of strains, and the degree of confidence in engineering parameters used in the analyses. The minimum factor of safety suggested in the regulatory position of this guide presumes that the stability analysis has been sufficient to locate the critical failure surface and that parameters used in the analysis are known, with reasonable certainty, to represent actual conditions of the dam and its foundation. Otherwise, higher factors of safety would be required.

2.1.2 *Liquefaction*

Liquefaction impacts on stability need to be considered, if potentially liquefiable soils exist below the site of a retention system. Evaluation of liquefaction potential should include laboratory testing, in situ testing, and comparisons to similar soil deposits. The following five screening criteria should be used to determine whether there are potentially liquefiable soils at a site (Ref. 31):

(1) *Geologic age and origin*—If a soil layer is a fluvial, lacustrine, or aeolian deposit of Holocene age, a greater potential for liquefaction exists than for till, residual deposits, or older deposits.

(2) *Fines content and plasticity index*—Liquefaction potential in a soil layer increases with decreasing fines content and plasticity of the soil. Cohesionless soils having less than 15 percent (by weight) of particles smaller than 0.005 millimeters, a liquid limit less than 35 percent, and an in situ water content greater than 0.9 times the liquid limit may be susceptible to liquefaction (Ref. 32).

(3) *Saturation*—Although soils with low water content have been reported to liquefy, at least 80- to 85-percent saturation is generally deemed to be a necessary condition for soil liquefaction. The highest anticipated temporal phreatic surface elevations should be considered when evaluating saturation.

(4) *Depth below ground surface*—If a soil layer is within 15.24 meters (50 feet) of the ground surface, it is more likely to liquefy than deeper layers.

(5) *Soil penetration resistance*—Seed et al. (Ref. 33) state that soil layers with a normalized standard penetration test (SPT) blowcount [(N1)60] less than 22 have been known to liquefy. Marcuson et al. (Ref. 34) suggest an SPT value of [(N1)60] less than 30 as the threshold to use for suspecting liquefaction potential. Liquefaction also has been shown to occur if the normalized cone penetration test cone resistance is less than 1.59 megapascals (157 tons per square foot) (Ref. 35).

If three or more of the above criteria indicate that liquefaction is not likely, the potential for liquefaction can be dismissed. Otherwise, a more rigorous analysis of the liquefaction potential at a facility is required. However, even if three or more of the liquefaction evaluation criteria indicate that liquefaction is unlikely, historical evidence of past liquefaction or sample testing data collected during the subsurface investigation may raise enough of a concern that a full liquefaction analysis still should be done.

If liquefaction potential exists at a retention system site, additional subsurface investigation may be necessary. Once all testing is complete, a factor of safety against liquefaction should be calculated for each critical layer that may liquefy. Seed and Idriss (Ref. 36) outline one procedure for evaluating liquefaction potential. A liquefaction analysis should, at a minimum, include the following:

- development of a detailed understanding of site conditions, the soil stratigraphy, material properties and their variability, and the areal extent of potential critical layers
- development of simplified cross-sections amenable to analysis
- calculation of the force required to liquefy the critical zones (resisting force), based on the characteristics of the critical zone(s) (e.g., fines content, normalized standardized blow count, overburden stresses, level of saturation)
- calculation of the design earthquake effect (driving force) on each potentially liquefiable layer using the site-specific, in situ soil data and an understanding of the earthquake magnitude potential for the facility
- computation of the factor of safety against liquefaction (resisting force divided by driving force) for each liquefaction susceptible critical layer

2.1.3 *Settlement*

If the foundation beneath an embankment retention system consists of layers of compressible soils or weathered rock, or if the bedrock profile is very irregular, differential settlements could result from uneven loading or variable thicknesses in the compressible soils. Total settlement and differential settlements may cause cracking and/or excessive strain in the embankments or other retention system components that could lead to system failure.

The magnitude of the anticipated settlement can be estimated from the results of laboratory consolidation tests on samples recovered from the compressible foundation strata and remolded embankment materials. The rate of settlement also can be estimated. However, the potential error in estimating the time for settlement to occur is significant, since settlement is influenced by soil drainage, which is controlled by minute geological details that may not be detected during the geotechnical investigation. Predictions based on laboratory data can be modified by actual measurements to provide reasonably accurate long-term estimates. Settlement should be calculated along as many cross-sections as are necessary to ensure that the expected amounts of overall and differential settlement that the engineered components of the facility will experience have been adequately estimated.

After total and differential settlement analyses have been performed, the engineered components of the waste retention system, such as geotextiles, geomembranes, clay liners, drainage layers, leachate collection piping, and waste piping, should be analyzed for tensile strain. The analysis should verify that the components can maintain their integrity when subjected to the induced strain associated with the settlement determined in the total and differential settlement analyses. If analysis indicates that total and differential settlement along any cross-section is likely to damage an engineered component, or to cause the engineered component to be unable to meet the minimum design criteria, then the retention system must be redesigned to eliminate the adverse effects of total and differential settlement. Methods such as overbuilding, surcharging, removal of the material causing the problem, or engineered reinforcement can be used to mitigate the effects of settlement.

2.2 Water Control and Management

2.2.1 *Impoundment Storage Capacity*

Some catchment area will always contribute runoff into the tailings retention system. This generally will be the area of the system itself, given requirements for below-grade impoundments, but might, in some cases, be a larger area incorporating the drainage area of streams entering a valley in which a retention embankment is constructed. Substantial runoff volumes and flows can result from heavy precipitation or snowmelt over relatively small catchment areas.

Because the probability of occurrence of large floods on small drainage basins in arid regions is very small and onsite personnel should be available to repair any minor damage that could occur, the staff may accept less conservative options for determining the design-basis flood. For small retention systems built in isolated areas where failure would neither jeopardize human life nor create damage to property or the environment beyond the licensee's legal liabilities and financial capabilities, the design need not use extremely conservative flood design criteria. However, the selection of the design flood needs to be at least compatible with the hazard category guidelines set forth by the U.S. Army Corps of Engineers (Ref. 37). If impoundments are designed to contain only direct precipitation that falls into the reservoir area, a single occurrence of the 6 hour probable maximum precipitation (PMP) may be used to determine storage capacity and freeboard requirements. If the tailings retention system has some external drainage area, and hydraulic structures (such as diversion channels) are needed to safely divert the probable maximum flood (PMF), the peak PMF inflows and runoff used to design such structures should be determined in accordance with the suggested flood design criteria in NUREG-1623, "Design of Erosion Protection for Long-Term Stabilization," (Ref. 2).

If decant or other reclaim systems have not been designed specifically to handle the design flood, other measures need to be taken. Those other measures may be one or a combination of the following:

- The whole volume of flood runoff is stored. Sufficient freeboard should always be available to provide the necessary storage capacity without overtopping the embankment, as well as adequate protection against wave runup.

- Diversion channels are provided to convey runoff water safely past the retention system.

Determination of the freeboard necessary at any time to store flood runoff will require information on pond storage versus elevation, anticipated embankment settlement versus time, and the expected runup of wind-generated waves. Reference 38 presents procedures for determining wave runup. It is important that the embankment construction schedule ensure that the required freeboard is always available.

Adequate slope protection is needed to guard the embankment against wind and water erosion, weathering, and ice damage. Methods for protecting slopes include dumped riprap, precast and cast-in-place concrete pavements, bituminous pavement, soil cement, tailings beaches, sodding, and planting. The necessary upstream slope protection depends on the expected wind velocity and duration and the size and configuration of the reservoir at the water-surface elevation. Reference 38 provides methods and criteria for the selection and design of slope protections. If the toe of the embankment is subject to flooding or erosion from nearby streams or arroyos, it may be necessary to provide erosion protection for the toes and exterior side slopes. NUREG-1623 (Ref. 2) provides guidance for determining design floods and erosion protection.

2.2.2 *Diversion Channel Design*

Any channels that are needed to protect against flooding and erosion of embankments or tailings should be designed to safely pass a PMF with minimal, if any, damage to the channel. The essential criterion is that no release of tailings or contaminated materials should occur during a PMF, with the recognition that onsite personnel can repair minor damage within a short period of time. For example, a channel could be designed to pass only a 100-year flood, so long as the PMF does not result in the release of contaminated material.

2.2.3 *Seepage and Hydrostatic Uplift Analyses*

Since regulations require retention systems to be lined, seepage analysis for embankment stability purposes is unnecessary. However, special design features, such as impervious liners and collection systems, are needed to maintain the quality and quantity of seepage from the retention system within tolerable limits of water supply and pollution control requirements. Section 2.2.4 of this regulatory guide details seepage control considerations.

Hydrostatic uplift may affect the subbase or engineered components of a waste containment facility anytime ground water exists at a facility. When an excavation or a portion of a waste containment facility is to be constructed at a depth at which a phreatic surface of ground water or piezometric pressures are present, the potential adverse effects on the waste containment facility need to be taken into account. An unstable condition caused by hydrostatic uplift may develop when the hydrostatic uplift force overcomes the downward force created by the weight of the overlying soil. If the area acted on by the hydrostatic force is sufficiently great, excess water pressure may cause overlying soil to rise, creating a failure known as "heave." Although heave can take place in any soil, it will most likely occur at an interface between a relatively impervious layer (such as a clay liner) and a saturated, relatively pervious base.

2.2.4 *Seepage Control*

The potential for seepage at an embankment retention system can be controlled through two means. The first is to employ a system to provide a method to dewater tailings after they are placed in the retention system. The other means is to install a liner system.

Regulations focus on using synthetic liners for the retention systems. However, a design should consider that, with an impervious bottom, process liquids and/or infiltration into the impoundment can result in excessive buildup of liquids after closure. The minimization of this potential for "bathtubbing" should be addressed through discussion of mitigative design aspects, including plans for operational dewatering (see 2.2.4.1 below) and future construction of an infiltration barrier in the closure cover.

2.2.4.1 Dewatering

Regulations require that new tailings impoundment retention systems be dewatered by a drainage system installed at the bottom of the impoundment. The goal of the drainage system is to lower the phreatic surface within the waste materials to reduce the head acting on the liner system. This can be accomplished by several methods. One method is to include a highly permeable layer immediately above the liner system and slope the liner system to a low point. A pump or gravity drain system can then be used to remove the collected liquids from this low point. An alternative method would be to pump liquids out of vertical wells within the tailings. In either case, the potential clogging of the drainage materials should be addressed. The U.S. Department of Agriculture (USDA) Engineering Handbook (Ref. 39) offers examples of design methods for soil filters. References 40 and 41 outline methods for designing synthetic filters.

2.2.4.2 Liners

An embankment retention system for uranium recovery wastes is required to have a liner to prevent the migration of wastes to surrounding soil, ground water, or surface water during its operation and closure period. The design of a liner system should consider subgrade material, type of liner system, liner system protection, and leak detection. A complete liner system design also should address anticipated installation techniques and operating practices. Sections 3 and 4 of this regulatory guide present specific items related to construction and operation respectively.

Subgrade

Proper design and understanding of the subgrade soils is very important to the success of a liner system. Design of the subgrade should consider the available soils, focusing on their gradation and moisture/density relationships. The subgrade surface needs to be competent and able to withstand the anticipated construction traffic. As previously mentioned in Section 2.1.3, a settlement analysis should be performed on the subgrade soils. The purpose of this analysis is to demonstrate that the anticipated settlement of the subgrade will not damage the liner system. The amount of settlement will depend on several factors, including the soil type, subgrade drainage condition, the depth and weight of the material that will be placed on the liner, and the rate of placement of the material on the liner system.

As discussed in Section 2.2.3, the subgrade design should consider the location and potential changes in the ground-water table. If a retention system is located in an area where the water table could rise above the bottom of the liner system, an underdrain may be required to prevent the development of upward water pressure on the liner.

Liner System Selection

The choice of the liner system should consider several factors. A key factor is the liner material's physical and chemical inertness when exposed to the waste materials within the retention system. The chemical qualities of the tailings, slurry, and/or liquid wastes must be assessed to determine the impacts on liners and/or the environment, if contamination resulting from seepage or surface water runoff occurs.

One issue specific to earthen liner layers is the potential for the hydraulic conductivity to increase with time (Ref. 42). Excessive settlement or desiccation can lead to the development of cracks within an earthen layer. This increases the hydraulic conductivity which in turn decreases the effectiveness of the liner system. The subgrade design should address settlement, and desiccation should be handled through an understanding of the subgrade soil conditions and an identification of the proper moisture content range during design.

The advantages of a synthetic liner system include a significantly reduced thickness, a greater resistance to cracking, and a much lower hydraulic conductivity (typically several orders of magnitude lower than an earthen liner system). The design of a synthetic liner system should consider the method of placement, the seaming techniques, and the puncture resistance. Lupo and Morrison (Refs. 43 and 44) outline current design approaches using synthetic materials for mining applications. Theory and design methods to evaluate puncture resistance have been developed and can be used to evaluate the puncture resistance of synthetics for different conditions (Refs. 45–47).

Protection of the Liner System

Ultraviolet radiation, wave action, surface runoff, foot traffic, animals, ice, wind, and construction equipment may damage a liner system. Therefore, a liner system design should consider various protective measures to prevent damage. Protective measures may be particularly important when a synthetic liner is used. Possible protection methods include soil covers, sand bags, game-proof fences, and access restrictions.

Soil covers can protect against ultraviolet radiation, wave action, animals, wind, and construction equipment. The design should address certain aspects of soil covers, including sloughing during heavy precipitation or during rapid drawdown of the liquid within the retention system and erosion during high-precipitation events. The stability of soil covers placed over synthetic liners may need to be analyzed. A series of properly arranged sandbags can be an effective method of protecting a synthetic liner from wind damage. The sandbags need to have an appropriate weight, spacing, and anchoring system to provide the required resistance to wind forces. Use of sandbags as protection has the added benefit of preserving access to the liner for visual inspection and repair. A game-proof fence may need to be installed around the perimeter of the embankment system. The fence should be designed to prevent entry of sharp-hoofed animals such as antelope, deer, and cattle. The fence should be of sufficient height and strength to preclude entry of species known to be in the area.

Leak Detection

A leak detection system is required with a synthetic liner. The leak detection system should be designed to identify the approximate locations of leaks so repairs can be made and to isolate leaks so that they can be controlled. The leak detection system generally consists of either a highly permeable soil or synthetic material such as a geonet located immediately beneath the synthetic liner. This highly permeable layer should be designed to drain to sumps where the leakage can be monitored. Consideration should be given to developing a contoured grading plan that has a series of peaks and valleys for the liner and leak detection system to identify the approximate location of any leak. The design of a leak detection system also should establish an allowable leakage rate (ALR). The ALR should take into account anticipated defect rates in the synthetic layer, hydraulic head conditions on the liner system, and flow rates within the detection layer. If leakage is found in the detection system at a rate greater than the ALR, remedial action is necessary.

3. Construction Considerations

Construction approaches for impoundments are closely related to the specific site and operational conditions. As discussed in Section 1.1 of this guidance, the prime option identified in Criterion 3 of Appendix A, “Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content,” to 10 CFR Part 40, “Domestic Licensing of Source Material,” is to locate an impoundment below grade. However, certain geologic or hydrogeologic features at a site may make it impractical to locate an impoundment entirely below grade. Given the flexibility provided by Criterion 3, three possible construction scenarios exist:

(1) *Full excavation*—In this scenario, the impoundment would be constructed by excavation to a depth sufficient to accommodate the tailings volume. Depending on the topography of the site, a small perimeter embankment may be required to prevent storm-water runoff from entering the impoundment. This scenario would result in excess soil that would have to be disposed of or used elsewhere.

(2) *Partial excavation*—Under this scenario, the site conditions prevent full excavation of the impoundment. A portion of the retention system would be excavated and an embankment would be built around the excavated cell to create the required disposal capacity. In this scenario, the depth of excavation and height of the perimeter embankment will dictate whether there will be a balanced soil cut and fill, some excess soil to use elsewhere, or a need for some additional borrow material.

(3) *No excavation*—This scenario should be considered only when adverse site conditions exist, such as a high ground-water table or bedrock near the ground surface. The impoundment would be created by constructing an embankment around its perimeter. This scenario would require that a borrow source for embankment material be located in the general vicinity of the impoundment.

The construction of embankment retention systems generally involves both excavation and filling in some specified order. For any of the construction scenarios identified above, successful embankment retention system construction requires understanding the moisture/density relationships of the soils, providing adequate compaction, and preventing poor-quality soils from being incorporated into the embankment retention system fill materials. Much additional information on the characteristics of foundations is obtained during clearing and stripping operations, which may confirm or contradict design assumptions based on earlier geotechnical investigations. Weather and ground-water conditions during construction may significantly alter water contents of proposed fill material or create seepage and/or hydraulic conditions, necessitating modifications in design. Projects must be evaluated and "reengineered" continuously during construction to ensure that the final design is compatible with conditions encountered during construction. Construction supervision, management, and monitoring of the embankment and associated structures are a critical part of the overall project management plan. Once the facility is placed into operation, observations, surveillance, inspections, and continuing evaluation are required to ensure the satisfactory performance of the retention system (see Section 4 of this regulatory guide).

Installation of a synthetic liner system should focus on minimizing liner damage. Damage can occur in the form of wrinkles, improper seaming techniques, poor synthetic panel orientation, and punctures caused by construction equipment. The potential for wrinkle development can be minimized by orienting panels properly, seaming within the allowable range of temperatures, and compacting the subgrade properly. Synthetic liner manufacturers often provide specific guidance on proper techniques for minimizing wrinkles. Seams typically constitute the weakest portion of a synthetic liner system. Therefore, the layout of the synthetic panels should minimize the location of seams in high-stress areas. Punctures can be minimized by following manufacturer recommendations for allowable ground pressures and minimum protective cover requirements for construction equipment working on a synthetic liner. Quality assurance practices during synthetic liner installation need to be rigorous, and a leak location survey after synthetic liner installation may be beneficial.

The construction plans should include construction specifications for excavation, embankment construction, subgrade preparation, liner placement, and the like. The general construction considerations for earthwork listed below should be considered as minimum guidelines, with the understanding that additional or more stringent specifications may be required depending on individual site conditions:

- A geotechnical or construction inspector should be on site during embankment construction.

- Fill material should be taken from an approved, designated borrow area. It should be free of roots, stumps, wood, rubbish, stones greater than 6 inches, and frozen or other objectionable materials.

- Areas on which fill is to be placed should be scarified before its placement.

- The compaction requirements for the fill material should include the percent of maximum dry density for the specified density standard, allowable range of moisture content, and maximum loose lift thickness.

- Fill material should be compacted with appropriate compaction equipment such as a sheepsfoot, rubber-tired, or vibratory roller. The number of required passes by the compaction equipment over the fill material may vary with soil conditions.

- Fill material should contain sufficient moisture to allow the required degree of compaction to be obtained with the equipment used.

- Field density tests should be performed regularly throughout the embankment construction. Many factors influence the frequency and location of control tests. Typically, a routine control test should be performed for every 764.5 to 2293.6 cubic meters (1000 to 3000 cubic yards) of compacted material or as directed by the geotechnical engineer.

- Proper subgrade preparation during construction is necessary for the installation of a liner system. The site of the retention system should be cleared of all debris, vegetation, and potential root systems. The surface should be graded so that it is smooth and free of protruding rock particles. The soil may need to be moisture conditioned to prevent it from drying out before the liner is put into use.

- To the extent possible, synthetic liner seams should run up and down and not across a slope. They should not be located near the crest of a slope. Seams should be tested for integrity along their entire length using methods recommended by the manufacturer. Seaming should be performed only under the supervision of experienced personnel.

In general, widely accepted construction standards and specifications for embankments, such as those developed by the USDA Soil Conservation Service or the U.S. Army Corps of Engineers, should be followed (Refs. 48 and 49).

4. Inspection and Maintenance

Different conditions can develop throughout the active life of the retention system. Such changes can significantly affect the conditions governing the stability of a retention system. Therefore, a continuous program of inspection of the retention system is needed, beginning with the start of construction, through the waste disposal, and, in the case of tailings disposal areas, continuing after reclamation. Each site and structure has its own characteristics and its own susceptibilities to problems, and the inspection program should be tailored to consider these. Thorough physical examination is an essential part of the inspection program. The optimal frequency of inspections depends on the size and condition of the facilities, the character of the foundation, the regional geological setting, and the consequences of failure in jeopardizing human health and safety and inflicting property and environmental damage. Monitoring and analysis of performance data are necessary to ensure detection of adverse conditions.

Before the start of waste disposal, records of ground-water levels (including seasonal fluctuations), ground-water quality, ground elevations, and background radioactivities at the site should be compiled and compared with the operational conditions of the impoundment. Data gathered in accordance with Regulatory Guide 4.14 will be useful in these comparisons. As soon as waste disposal begins, inspection should be performed at regular intervals to check the condition of the retention systems and associated facilities and to evaluate their structural safety and operational adequacy. A detailed, systematic inspection program should consist of, but not necessarily be limited to, the elements described in the sections below.

4.1 Engineering Data Compilation

Engineering data related to the design, construction, and operation of the retention systems should be compiled and, to the extent practicable, included in the initial inspection report. Most engineering data are readily available in documents filed for the license application. A detailed reference to the original documents kept at the project site should be adequate. These data should include the following items, as available and applicable:

- general project data, including regional vicinity maps showing the project location and the upstream and downstream drainage areas, and as-built drawings and photographs of the retention system

- hydrologic and hydraulic data, including drainage area and basin characteristics, waste storage volume, surcharge capacity for floods, rate of waste inflow, elevation of the maximum design pool, and freeboard height

- foundation data and geological features, including boring logs, geological maps, profiles, and cross-sections

- properties of embankment and foundation materials, including results of laboratory and field tests, and assumed design material properties

- principal design assumptions and analyses, including hydrologic and hydraulic analyses, stability and stress analyses, and seepage and settlement analyses

- pertinent construction photographs and records, including construction control tests, construction problems and modifications, and maintenance repairs

4.2 Inspection Programs

The retention system inspection program should be established and conducted systematically to minimize the possibility of overlooking any significant features. A detailed checklist should be developed and followed to document the observations of each significant feature. Photographs for comparison of previous and present conditions should be used as a part of the inspection program. The inspection program should include, but not be limited to, the following as appropriate:

- Daily Inspection

  - Pond water elevations should be examined and recorded to ensure that minimum freeboard is maintained.

  - The slurry transport system should be examined for any evidence of obstruction of the pipes or pumps caused by waste clogging or ice accumulation. The pipe couplings should be examined for leakage of waste, and any flow rate sensor should be tested.

- The retention embankments should be visually inspected for signs of erosion, cracking, slumping, movement, or concentration of seepage.

- The liner system should be inspected to identify any damage to the liner and any operating practices that may contribute to liner damage. The inspection should include a visual check of the presence of animals and the accumulation of water in the leak detection system.

- Monthly Inspection

  - Slurry transport pipes should be examined using an ultrasonic device at locations where pipes cross streams or other natural water courses or where a rupture of the pipe could be expected to affect the stability of the retention system.

  - Channels should be examined for channel bank erosion, bed aggradation or degradation and siltation, obstruction to flow, undesirable vegetation, or any unusual or inadequate operational behavior.

- Quarterly Inspection

  - The top of the embankment and downstream toe areas should be examined and surveyed, if necessary, for any evidence of unusual localized or overall settlement or depressions.

  - Embankment slopes should be examined for irregularities in alignment and variance from originally constructed slopes, unusual changes from original crest alignment and elevation, evidence of movement at or beyond the toe, erosion, and surface cracks that indicate movement.

  - The downstream embankment slopes and toes, and other downstream areas, should be examined for evidence of existing or past seepage, springs, and wet or boggy areas.

  - The slope protection should be examined for erosion-formed gullies and wave-formed notches and benches. The adequacy of slope protection against waves and surface runoff that may occur at the site should be evaluated. The condition of vegetation or any other types of protective covers should be evaluated, when pertinent.

  - Any installed instrumentation, such as survey monuments, settlement plates or gauges, and/or piezometers, should be examined and tested for proper functioning. The available records and readings of these instruments should be reviewed to detect any unusual performance or distress of the structure. Immediately following installation or the discovery of an unusual condition, all instrumentation readings should be taken more frequently than once a quarter (e.g., daily or weekly) until the patterns of the structural behaviors are stabilized.

  - The maintenance of operating facilities and features (such as pumps and valves) that pertain to the safety of the retention system should be examined to determine the adequacy and quality of the maintenance procedures followed in maintaining the retention system in a safe operating condition.

  - The general long-term performance of the liner, such as its resistance to degradation, should be examined.

- Special Inspections

  - Unscheduled inspections should be performed after the occurrence of significant earthquakes, tornadoes, floods, intense local rainfalls, or other unusual events.

  - The NRC's implementation of the National Dam Safety Program and its associated guidelines may require special inspections of any uranium recovery site embankments that fall within the scope of the program. The Federal Emergency Management Agency guidelines for dam safety (Ref. 50) specifically include tailings dams in its program and define a dam in the following manner:

    > Any artificial barrier, including appurtenant works, which impounds or diverts water, and which (1) is twenty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse, to the maximum water storage elevation or (2) has an impounding capacity at maximum water storage elevation of fifty acre-feet or more.

4.3 <u>Technical Evaluation</u>

The existing conditions of the retention system should be evaluated annually unless changing conditions dictate a shorter period. This evaluation should include an assessment of the hydraulic and hydrologic capacities, water quality, and structural stability and should take into account both existing conditions and any changing conditions. In addition, surface-water and ground-water sampling data collected in accordance with Regulatory Guide 4.14 should be examined at the time of the technical evaluation to detect any patterns that could be a sign of failure of seepage control measures or foundation distress.

4.4 <u>Inspection Reporting</u>

A report should be prepared to present the results of each technical evaluation and the inspection data accumulated since the last report. These documents should be kept at the project site for reference purposes, available for inspection by regulatory authorities, and retired only upon termination of the project. Any abnormal hazardous conditions observed during the inspection should be reported immediately to the NRC staff.

4.5 <u>Inspection Personnel</u>

An experienced professional who is thoroughly familiar with the investigation, design, construction, and operation of these types of facilities should direct the planning and conduct of the inspections and evaluations. At each facility, this individual should ensure that all field inspectors are trained to recognize and assess signs of possible distress or abnormality.

C. REGULATORY POSITION

Basic design criteria generally are drawn from 10 CFR Part 40, Appendix A, and describe the latest approaches approved by the NRC for compliance with the applicable regulations. Information related to the investigation, engineering design, proposed construction, inspection, and performance of a uranium recovery waste retention system should address all applicable areas discussed in Section B of this regulatory guide. If an applicant proposes the use of an alternative method or new information that may be developed in the future, the NRC will review the proposal and, if acceptable, approve its use.

1. Basic Design Criteria

a. The "prime option" for disposal of tailings is placement below grade. Where full below-grade burial is not practicable, the size of retention structures and the size and steepness of slopes associated with exposed embankments must be minimized by excavation to the maximum extent reasonably achievable or appropriate, given the geologic and hydrologic conditions at a site (10 CFR Part 40, Appendix A, Criterion 3).

b. Stability of the retention system should be ensured under all conditions of construction and operation. In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the impoundment (10 CFR Part 40, Appendix A, Criterion 5A(5)).

c. The magnitude of total and differential settlement should be within tolerable limits that will not result in harmful cracking and embankment instability.

d. Unless exempted under the regulations in Criterion 5A(3) of Appendix A to 10 CFR Part 40, liners and leak detection systems need to be included in the design of retention systems per 10 CFR Part 40, Appendix A, Criteria 5A(1), 5A(2), and 5E(1), and considering EPA requirements in 40 CFR 264.221.

e. Freeboard must be sufficient at all times to prevent overtopping by flood inflows and wind-generated waves and should include an allowance for settlement of the foundation and embankments (10 CFR Part 40, Appendix A, Criterion 5A(4)). Adequate slope protection should be provided for the embankment against wind and water erosion, weathering, and ice damage.

f. Upstream rainfall catchment areas must be minimized to decrease erosion potential and the size of the floods that could erode or wash out sections of the tailings retention system (10 CFR Part 40, Appendix A, Criterion 4(a)). The surcharge capacity of the retention system must be adequate to store a PMF, calculated using the 6-hour PMP.

2. Methods of Analysis

a. The PMF should be based on the 6-hour PMP and should be developed in accordance with procedures provided in NUREG-1623 (Ref. 2).

b. Wave runup may be determined using procedures discussed in the U.S. Army Corps of Engineers "Coastal Engineering Manual," issued April 2002 (Ref. 38).

c. The static stability of the embankment should be analyzed using commonly accepted detailed stability methods. The analysis should use appropriate static soil and rock properties established on tested representative samples over anticipated in situ and placement conditions. Results of a manual check of the computer stability analysis outcome should be presented to illustrate adopted design procedures and criteria.

d. Conventional pseudostatic analysis may be considered acceptable if the seismic coefficient appropriately reflects the geologic and seismologic conditions of the site and if the materials are not subject to significant loss of strength under dynamic loads. Liquefaction potential and the dynamic stability of the tailing dam and foundation should be assessed using appropriate state-of-the-art methods. Reference 30 will be used to determine the extent of the required dynamic analyses. The analyses should employ appropriate dynamic material properties established on representative materials through adequate field and laboratory testing.

e. The loading conditions to be evaluated in embankment stability analyses and corresponding minimum factors of safety are as follows:

Loading Condition	**Minimum Factor of Safety**
End of construction	1.3
Partial pool with steady seepage	1.5
Maximum pool with steady seepage	1.5
Earthquake (in combination with the above conditions)	1.0

f. Evaluation of liquefaction potential should include laboratory testing, in situ testing, and comparisons to similar soil deposits. Screening criteria should be used to determine whether there are potentially liquefiable soils at a site. The factor of safety for liquefaction potential should be greater than 1.0.

g. Appropriate laboratory test results should be used to estimate the rate and magnitude of settlement.

3. Construction Methods

a. Mill tailings embankment retention systems should use conventional acceptable engineering practices of construction control for water retention dams (e.g., controls on foundation preparation, suitability of materials, proper placement, field moisture, and density).

b. Installation of a synthetic liner system should focus on minimizing liner damage. Damage can occur in the form of wrinkles, improper seaming techniques, poor synthetic panel orientation, and punctures caused by construction equipment.

4. Inspection and Maintenance

a. A detailed, systematic inspection and maintenance program should be established to detect and repair damage that might lessen the integrity of the retention system. Generally, visual inspections performed on a regular basis and supplemented by adequate instrumentation are acceptable. A detailed checklist should be developed and followed to document the observations of each significant feature. The inspection program should use photographs to compare previous and present conditions. In addition, the program should include radiometric and water quality surveys.

b. Daily inspections of tailings or waste retention systems should be planned, conducted, evaluated, and documented under the direction of an experienced professional who is thoroughly familiar with the investigation, design, construction, and operation of these types of facilities. The licensee should retain documentation (i.e., a record) of each daily inspection for 3 years after the documentation is made. The NRC must be immediately notified of any failure in a tailings or waste retention system that results in a release of tailings or waste into unrestricted areas or of any unusual conditions (conditions not contemplated in the design of the retention system) that, if not corrected, could indicate the potential for, or lead to, failure of the system and result in a release of tailings or waste into unrestricted areas.

c. Unscheduled inspections should be performed after the occurrence of significant earthquakes, tornadoes, floods, intense local rainfalls, or other unusual events. The NRC's implementation of the National Dam Safety Program and its associated guidelines may require special inspections of any uranium recovery site embankments that fall within the scope of the program.

d. The inspection and maintenance program should start at the beginning of construction and continue at least through the operation of the facility.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC's plans for using this regulatory guide. The NRC does not intend or approve any imposition or backfit in connection with its issuance.

In some cases, applicants or licensees may propose or use a previously established acceptable alternative method for complying with specified portions of the NRC's regulations. Otherwise, the methods described in this guide will be used in evaluating compliance with the applicable regulations for license applications, license amendment applications, and amendment requests.

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EPA-1832

Kenneth Distler/R8/USEPA/US

04/07/2011 04:34 PM

To Reid Rosnick, Angelique Diaz

cc

bcc

Subject presentation

EPA 4 7 11.pdf

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Air Program
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SHEEP MOUNTAIN URANIUM PROJECT
CROOKS GAP, WYOMING

TITAN
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US EPA Project Meeting
April 7, 2011

TSX.V - TUE FRANKFURT - T4X

WWW.TITANURANIUM.COM

Introductions

Greg Adams – VP Development

Doug Beahm – BRS Engineering

Toby Wright – Wright Env. Services

AGENDA

Introductions

- Greg Adams/Titan Uranium, VP Development
- Deborah Lebow-Aal/EPA Region 8 Air Program

Introduction to Titan Uranium USA

Project Overview:

- Doug Beahm/BRS Engineering
- Toby Wright/Wright Env. Services

Issues for Discussion

- Status of 40 CFR 192 GW standards update
- Status of Active Heaps & Inactive Heaps
- Status of Process Ponds & Waste Storage Tanks

PROJECT OVERVIEW

- Location
- Project Scope
  - Mining
  - Milling

Sheep Mountain Project Location

PROJECT OVERVIEW

- Site Location
  - Fremont , Wyoming
  - Existing Uranium Mine Permit 381C
- Historical Operation
  - Western Nuclear Crooks Gap Project
    - Mined 1956 – 1988, processed at Split Rock Mill
  - US Energy
    - 1988 Sheep Mountain Underground
    - Partial reclamation since 1988, no new operation


Wyoming
Gas Hill Uranium District
Jeffrey City, WY
Sheep Mountain Project
Green Mountain/Big Eagle
URE Lost Creek
Sweetwater Mill
Image USDA Farm Service Agency
Image © 2010 DigitalGlobe
© 2010 Google
13 T 271301.31 m E 4729138.97 m N elev 6273 ft
Eye alt 88.42 mi
Google

Titan Sheep Mountain Project:

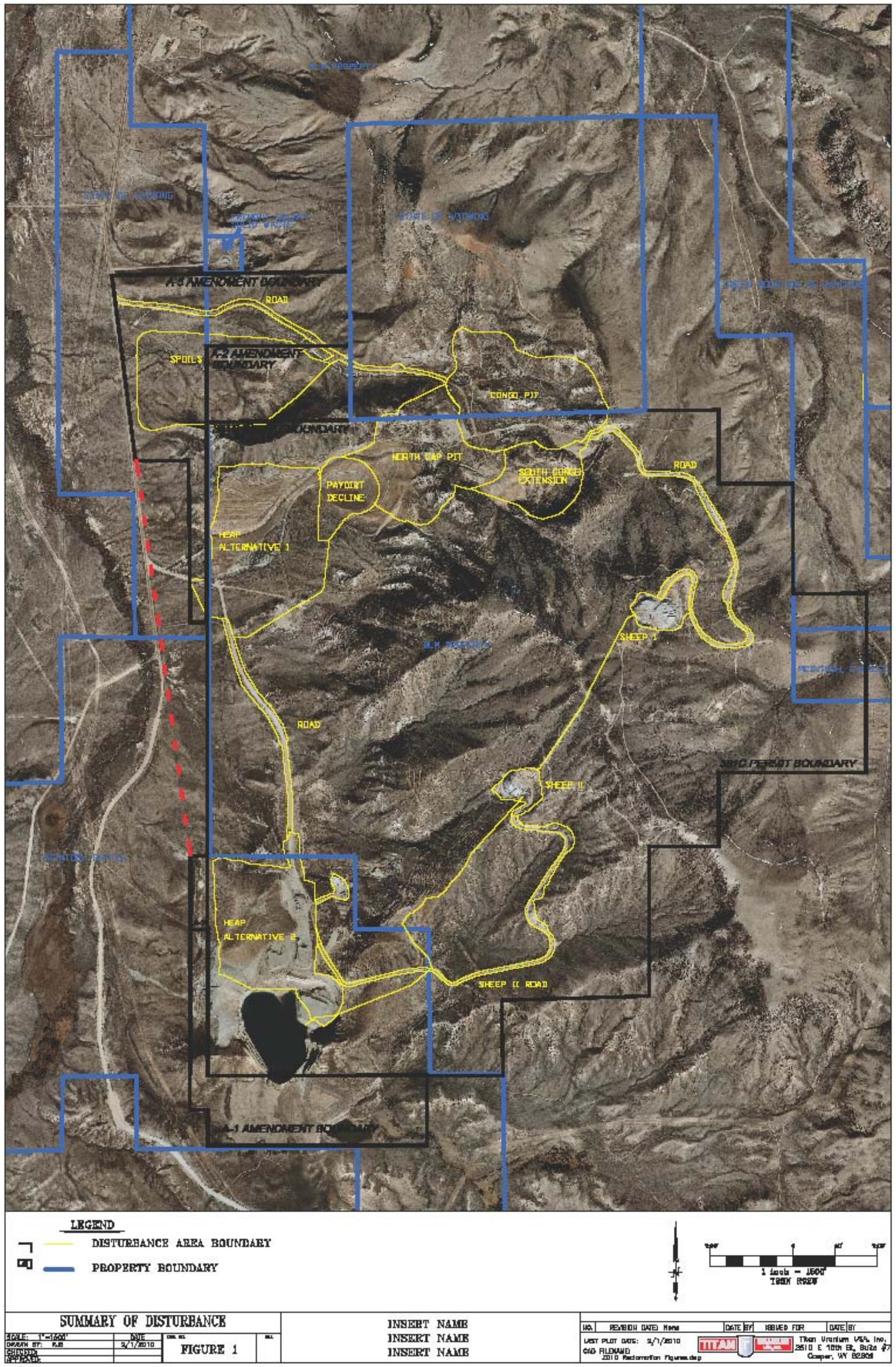
- Mine
  - Underground and Open Pit Mining
  - Current Mine Permit (381C)
    - Updating POO, Reclamation Plan & Bond
- Uranium Recovery
  - Heap Leach with Central Processing Plant
  - Within existing WDEQ Mine Permit (381C)

Project Scope:

- Mine
  - 15 Year Mine Lifecycle, may be extended
  - Congo Pit Area
    - Mine waste trucked to South and West waste piles
    - All mine waste to be returned to pit or used in reclamation
  - Sheep Mountain Underground
    - To extent possible all wastes reclaimed in old mine workings
    - Ore transported to the heap from underground via conveyors

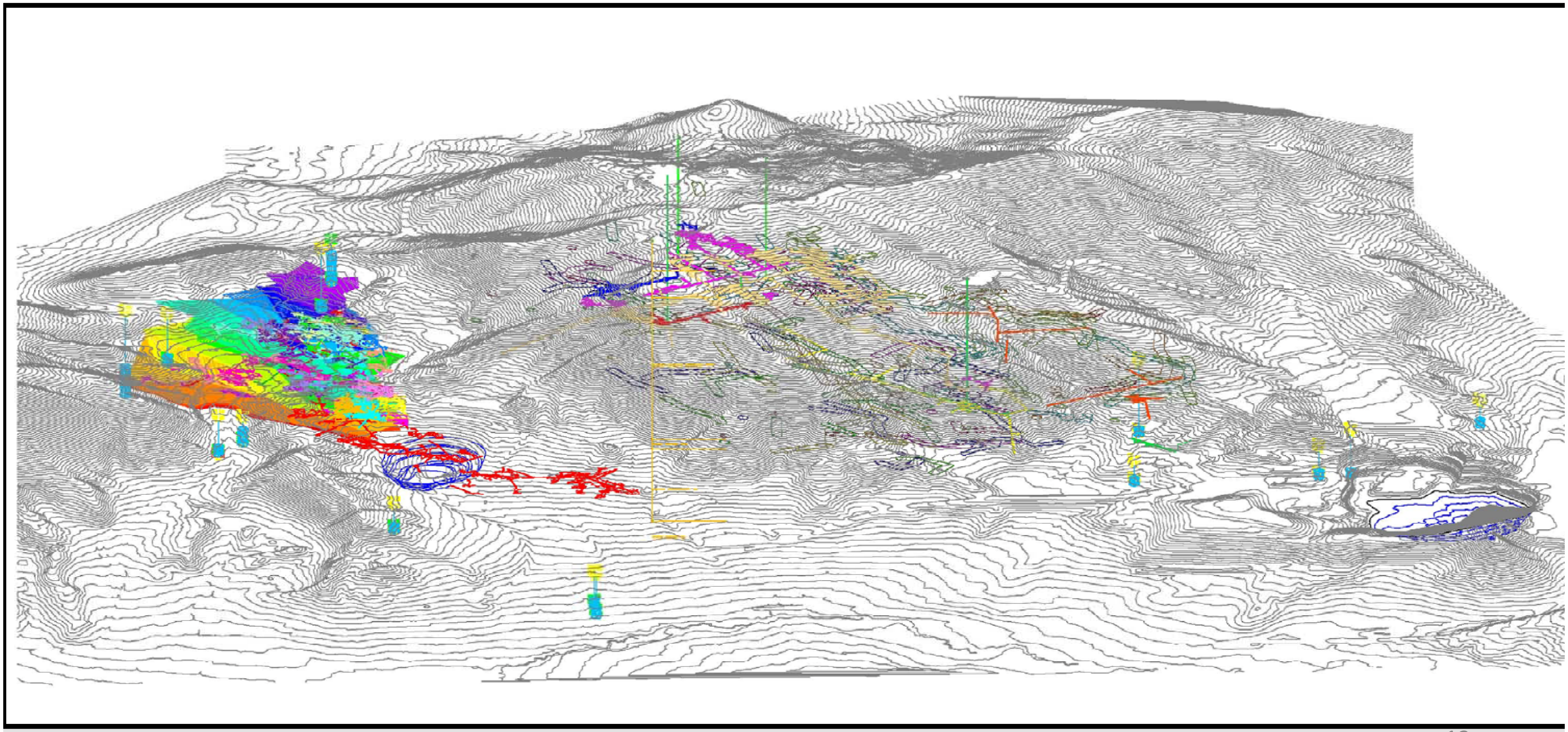
Project Scope:

- Mill
  - 15 year operational lifecycle, may be extended
  - Heap Leach Pads
    - Double lined pads with leak detection, clay underliner
    - Five 16 acre cells planned (approx. 80 acre footprint)
    - Up to 50 ft lifts being evaluated
    - Sulfuric acid lixiviant
  - Double lined process ponds with leak detection, clay underliner
    - Barren/Pregnant
    - Liquid waste in evaporation ponds
  - Central Processing Plant
    - Solvent Extraction with IX Polishing
    - Vacuum Driers
    - Final Product is drummed yellow cake



- **Existing Mine Permit 381C**
  - 3,625 acres total area
- **Proposed Disturbance (667 acres)**
  - Mine: 457 acres (258 Disturbed)
    - Congo/North Gap Pits
    - Sheep Mtn. Underground
    - Waste Rock/Topsoil Storage
    - Buildings & Infrastructure
    - All proposed mine disturbance on previously disturbed land
  - Licensed Area: 210 acres (161 Disturbed)
    - Heap Leach Pads
    - Process/Waste Ponds
    - Central Processing Plant

3D View Mining and Monitor Wells



Status of Baseline Studies

Pre-Operational Baseline Studies Status

- Cultural Resources
- Wildlife
- Vegetation & Soils
- Surface Water
- Groundwater
- Radiological Characterization

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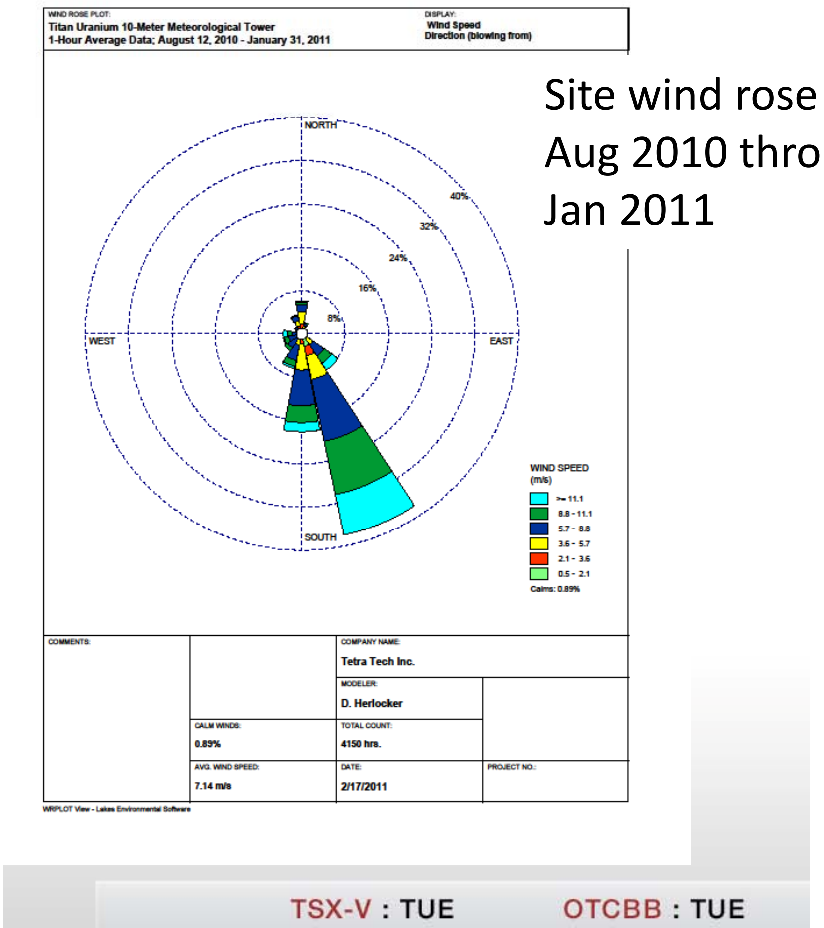
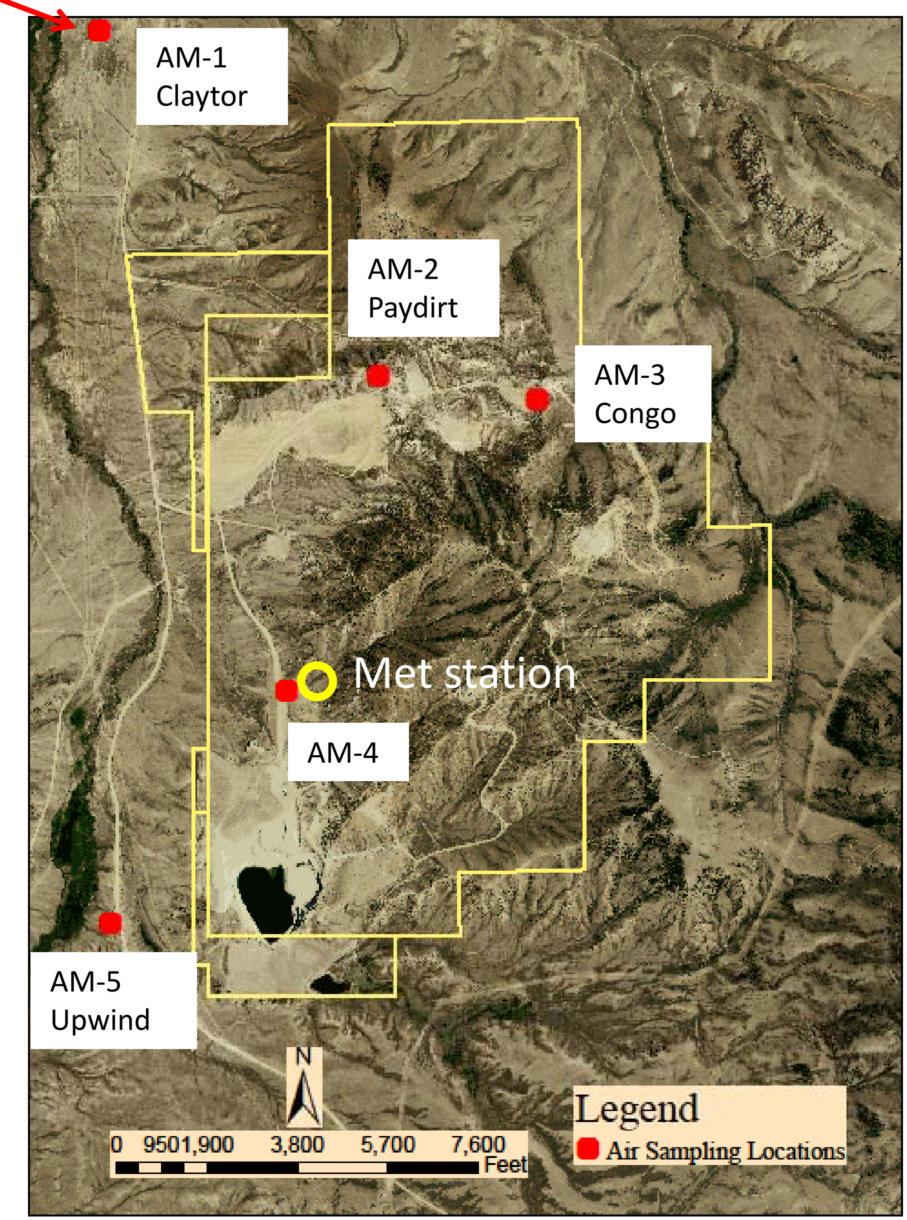
Topic Area	Status	Actions Pending
Cultural Resources	• Reviewed existing surveys • Consulted with BLM on scope of additional surveys • Completed additional surveys • Submitted findings to BLM	• BLM Review • SHPO Review • Incorporate results into ER
Wild Life	• Raptor surveys complete • Songbird surveys complete • Waterfowl surveys complete • Small mammal surveys complete	• Incorporate results into ER
Vegetation	• Vegetation surveys complete • No T&E Species present • One BLM sensitive species found o Limber Pine o No impacted by proposed disturbance • Completed 3 rounds of veg. sampling as per Reg Guide 4.14	• Incorporate results into ER
Soils & Sediment	• Collected soil samples as per Reg. Guide 4.14 (surface & subsurface) • Collected sediment samples as per Reg. Guide 4.14 @ SW sampling locations	• Incorporate results into ER
Surface Water	• Quarterly SW flow measurements • Monthly flowing SW quality sampling • Quarterly Pit Lake quality sampling	• Data analysis • Incorporate results into ER
Groundwater	• Quarterly Sampling • Reg. Guide 4.14 and WDEQ parameters	• Data analysis • Incorporate results into ER
Meteorological	• Continuous data since July 2010 • 2 m & 10 m instrumentation • Instrumentation meets most Reg. Guide 3.36 requirements	• MILDOSE Modeling • Update with 4 quarters of data
Air Quality	• Quarterly sampling from 5 locations since July 2010 • All parameters and reporting limits as per Reg. Guide 4.14	• Data analysis • Incorporate results into ER
Socio\Env. Justice	• Ongoing	• Complete analysis • Incorporate results into ER

Nearest Resident

Air sampler locations:
Additional monitoring locations once radiation control boundary location is finalized



Site wind rose
Aug 2010 through
Jan 2011



Groundwater Hydrogeology

- Historical Conceptual model
  - Battle Spring Fm. host upper most aquifer
    - Fine to coarse grained sandstone with discontinuous siltstone and claystone lenses
    - Unconfined aquifer
  - Recharge from north
  - Regional discharge to south
- New Studies Ongoing
  - Sampling existing wells in place since 1988
  - Replacing historical wells abandoned in 2001
  - Evaluating aquifer properties

Status of NRC/BLM/State Permit Applications & NEPA

Coordinating Permitting & Licensing

- NRC & BLM will develop separate EIS Documents
- Titan is planning on parallel WDEQ, BLM & NRC submittals
    - Q3 2011
    - WDEQ-LQD/BLM
        - Plan of Ops, Rec. Plan & Bond Est., Env. Report
    - NRC
        - Application with Technical Report & Env. Report
- Coordinating communications w/ NRC, BLM and WDEQ

NRC Licensing & NEPA

- Scope of NRC EIS Encompasses:
  - Milling: Heap Leach & Central Processing Plant
  - Mining is a ***Connected Action***
  - BLM would be a Cooperating Agency

Separate or combined NEPA processes require coordination and communication

- Planning Application to NRC Submittal in Q3, 2011

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BLM Permitting & NEPA

- Scope of BLM EIS Encompasses:
  - Mine: open pit and underground, mine dewatering, operations, reclamation
  - Milling: Heap Leach & Central Processing Plant
    - Includes long-term disposal of 11e.(2) byproduct material, land transfer
    - BLM has indicated that they will reference rather than duplicate NEPA analyses for impacts addressed in the NRC NEPA process as much as possible
    - NRC would be Cooperating Agency
- Planning WDEQ\BLM Submittal in Q3, 2011

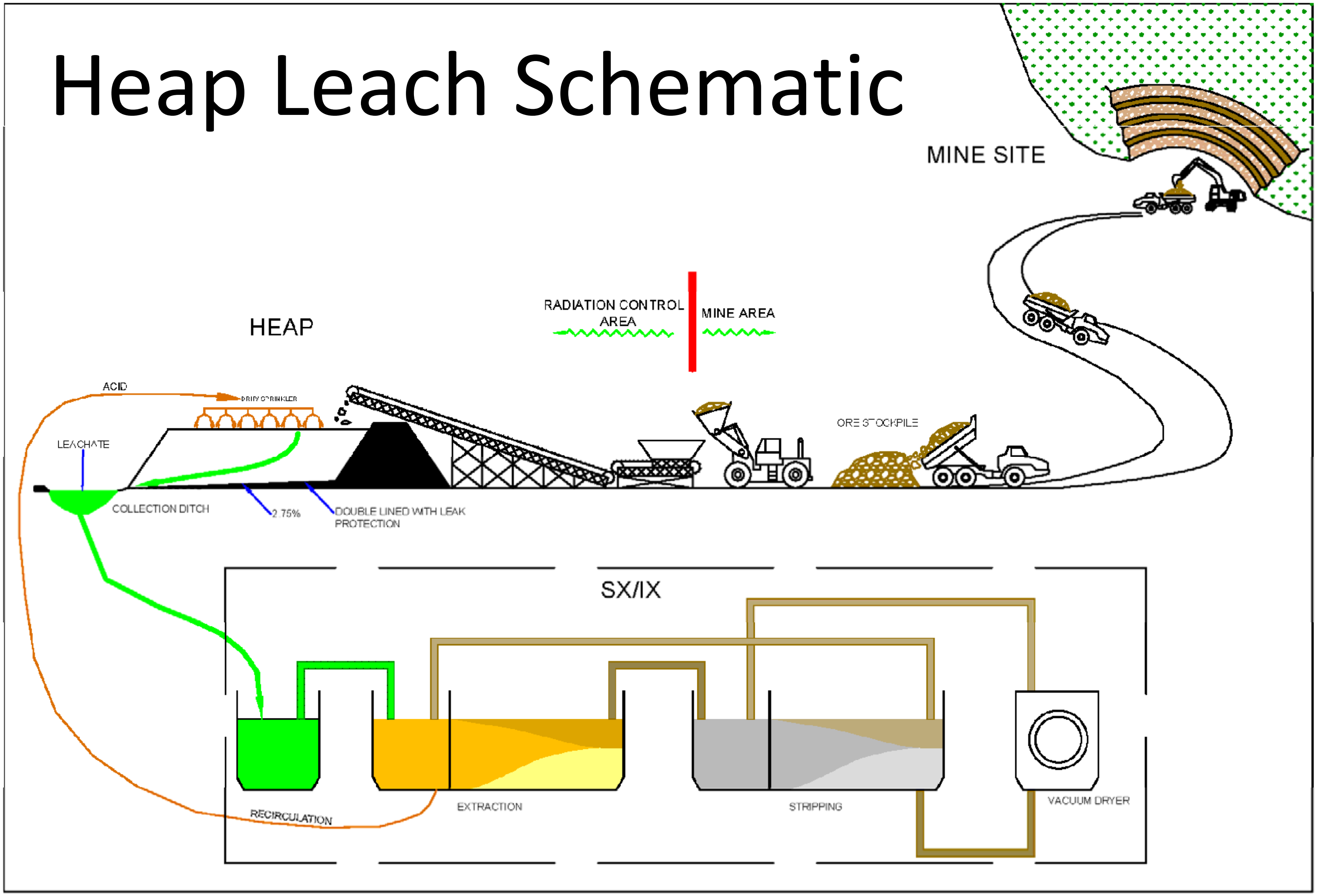
Separate or combined NEPA processes require coordination and communication

BLM Permitting & NEPA

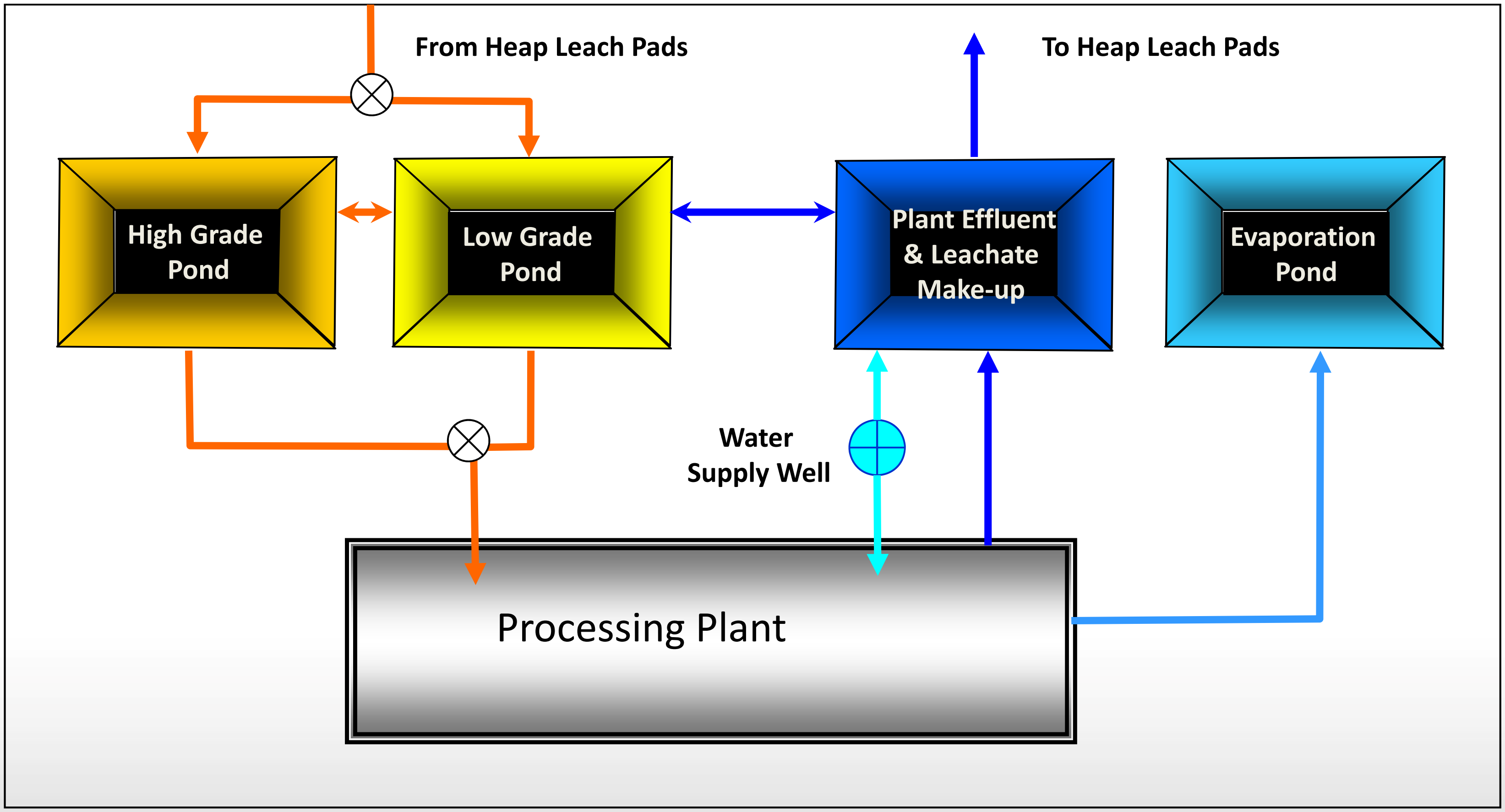
- BLM anticipates publication in Q2 or Q3 2011
- Titan has submitted to BLM a draft cost recovery MOU for 3rd Party NEPA Contractor
- RFP for procurement of 3rd Party NEPA Contractor in process
  - Anticipate NEPA Contractor for bLM selection in Q2 2011

Heap Leach Process

Heap Leach Schematic



Conceptual Recovery System Layout



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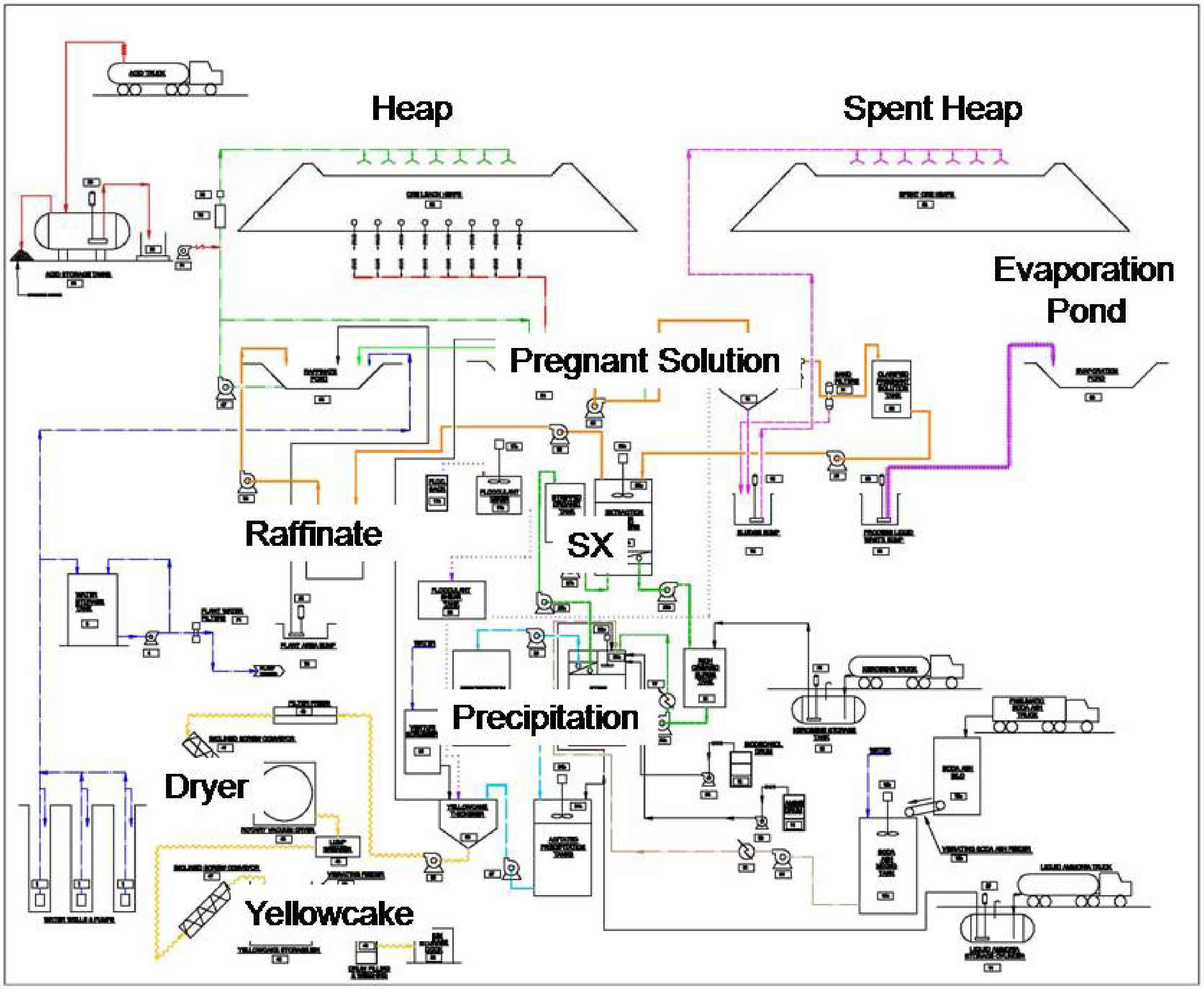
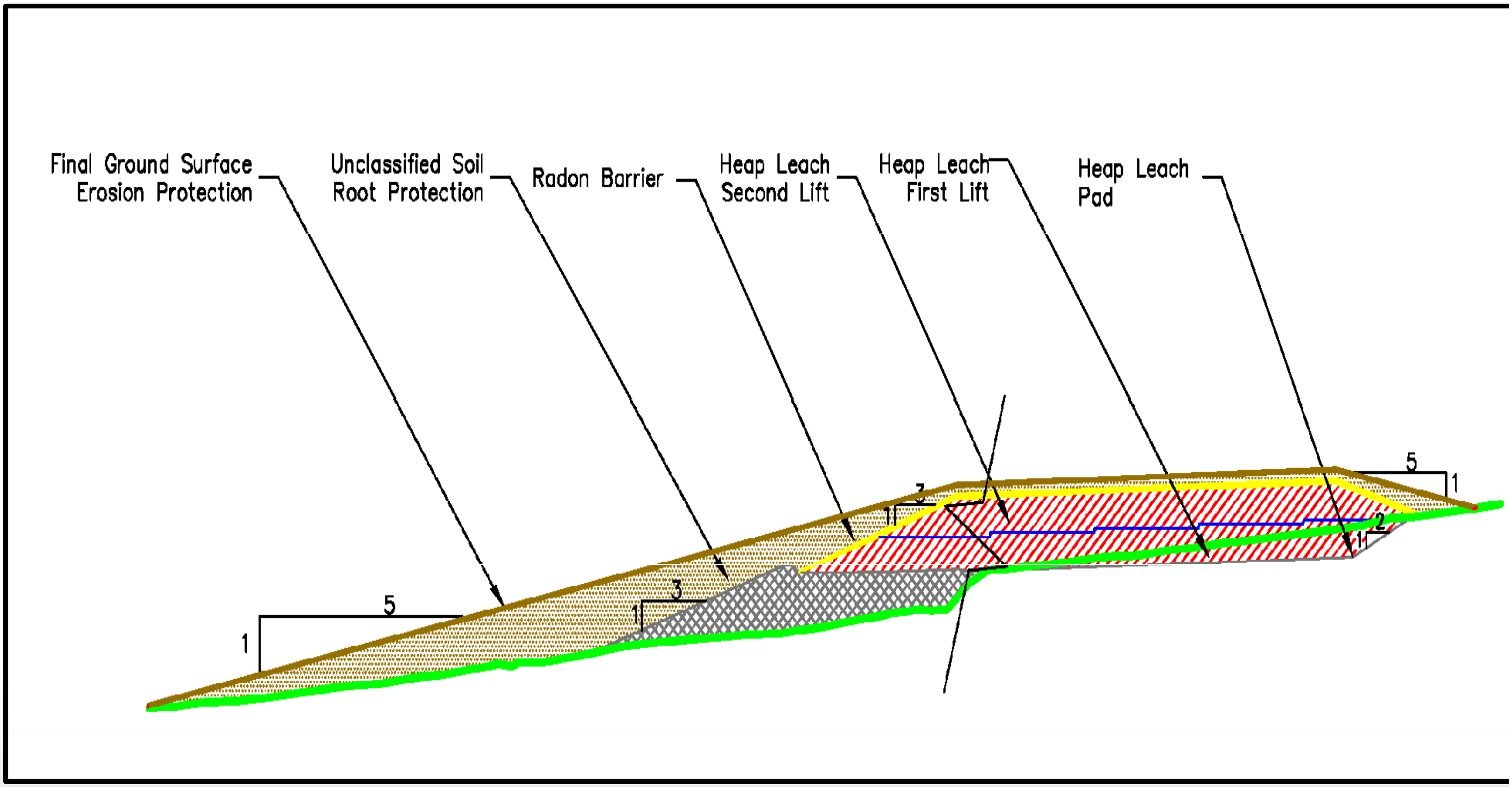


Key Points

- Active heap leach pad is part of the "mill" and the active leaching is milling
- Process Ponds are parts of the mill and will not contain any waste streams
- Milling begins with the stacking of the ore on the pad
- Milling ends when uranium recovery is complete



Final Ground Surface
Erosion Protection
Unclassified Soil
Root Protection
Radon Barrier
Heap Leach
Second Lift
Heap Leach
First Lift
Heap Leach
Pad
5
1
3
1
3
1
5
1
2
1

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Constituent	Initial Grade	Tails	Recovery	Leachate
	mg/Kg	mg/Kg		mg/L or pCi/L
Aluminum	2,920	2,810	4%	203
Arsenic	3.0	1.8	40%	1.1
Barium	10.0	10.4	-4%	0.1
Boron	4.0	3.6	10%	0.9
Cadmium	0.2	0.2	30%	0.3
Calcium	499.0	275.0	45%	445
Chromium	3.5	3.0	14%	1.1
Copper	6.0	3.4	43%	3.9
Iron	5,010	3,910	22%	498
Lead	15.0	10.9	27%	2.8
Magnesium	533	420	21%	250
Manganese	31.4	19.1	39%	10.5
Molybdenum	2.7	2.0	26%	0.0
Nickel	1.1	0.2	82%	0.8
Potassium	857	783	9%	58.0
Selenium	6.2	5.4	13%	0.0
Uranium	894	21	98%	1,047
Vanadium	4.8	3.6	25%	3
Zinc	11.3	8.6	24%	5
226Radium	237	233	2%	6,700
230Thorium	570	37	94%	587,290
210Lead	169	114	33%	29,400

Heap/ISR Comparison

- **ISR**
  - Processing brings Formation Ground Water with elevated Radon into CPP.
  - Flow rates 3,500 – 7,000 gpm
- **HEAP LEACH**
  - 98% of radium remains in the heap
  - Short lixiviant residence time in heap
  - Average Flow Rate @ Sheep 350 gpm
  - Low radon levels expected in leachate sent to plant

Heap/Conventional Comparison

- **CONVENTIONAL MILLING PHYSICALLY ALTERS ORE**
  - Processing brings **ore** and associated **radium** into Mill
  - Grinding reduces grain size
  - Milling process separates sands and slimes
  - Slimes concentrate **radium**, retain moisture, have low strength
  - Resulting in lengthy process (decades) to stabilize and reclaim
- **HEAP LEACH DOES NOT PHYSICALLY ALTER ORE**
  - 98% of radium remains in the Heap
  - Heap remains comingled
    - No grinding; no sand slime separation; no concentration of radium
  - Built on a liner with a positive drain
  - Reclamation can proceed efficiently

Mill Details

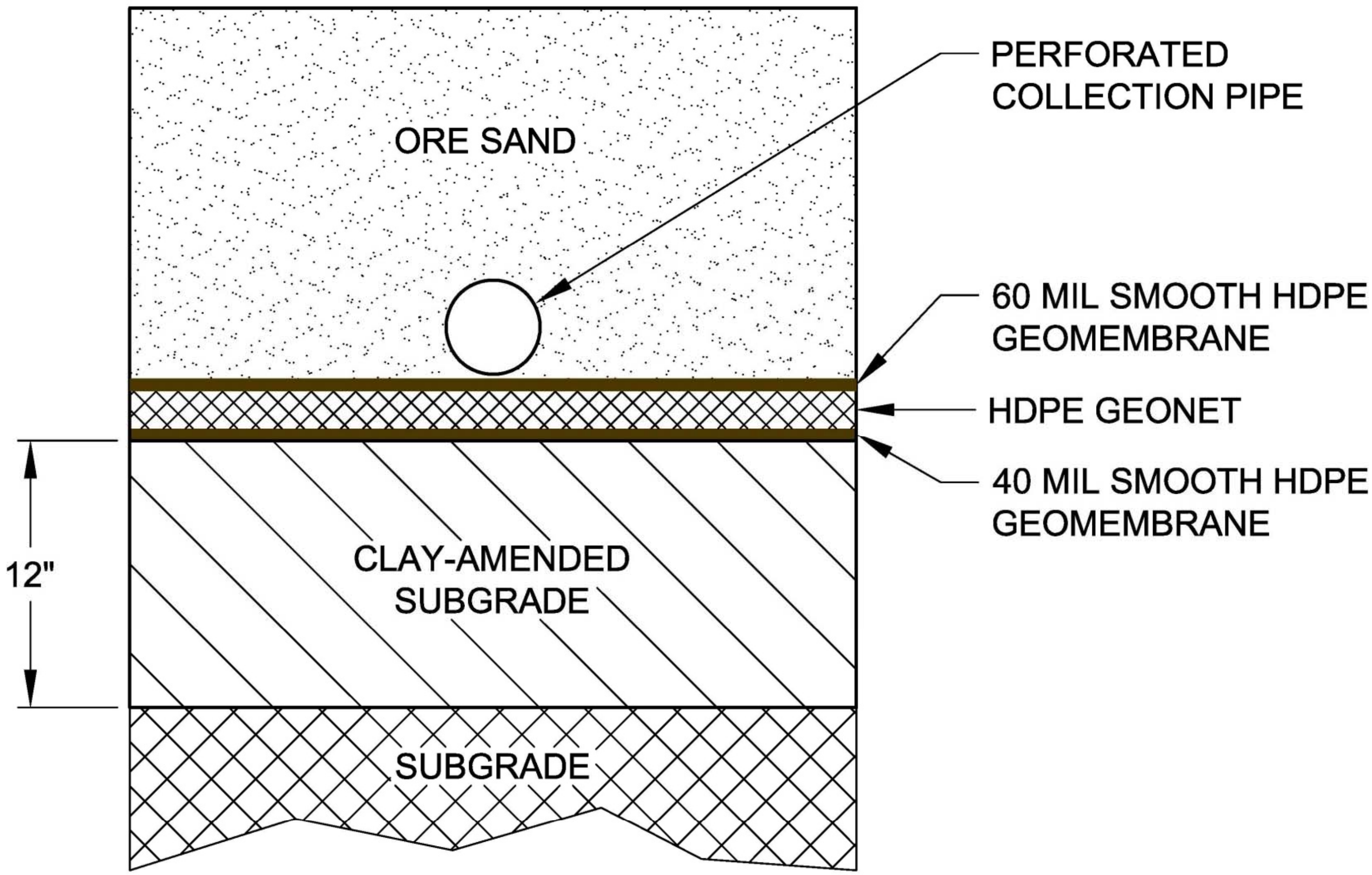
Heap & Pond Liner Details

Heap Cap and Cover

Heap Leach Facility

Heap Leach Pad

- Double lined, leak detection, clay amended sub grade
- Loading up to 2,600 tons/day, roughly 1,800 cy/day
- 25 ft lifts, maximum height 50 ft
- 200 ft wide by 1,600 ft long lifts installed via continuous stacker
- Stacking and leaching of lifts is phased to minimize amount of uncovered spent heap (tailings)
- Lixiviant is 1 normal H_2SO_4
  - applied at 0.005 gpm/sq ft
- Approx. 1.6 acres under primary leach at any one time
  - 360 gpm of leachate in process


ORE SAND
PERFORATED COLLECTION PIPE
60 MIL SMOOTH HDPE GEOMEMBRANE
HDPE GEONET
40 MIL SMOOTH HDPE GEOMEMBRANE
12"
CLAY-AMENDED SUBGRADE
SUBGRADE

Mobile Grasshopper / Radial
Stacking
Courtesy: Terra Nova Technologies, Inc.
Santee, CA
www.tnt.inc.com


Ore Stacker

<u>Heap Leach Facility (con't)</u>

Active milling cycle includes:

- Stacking
- Primary leach
- "Resting" heap to enhance recovery
- Secondary leach
- Rinse
- Draindown

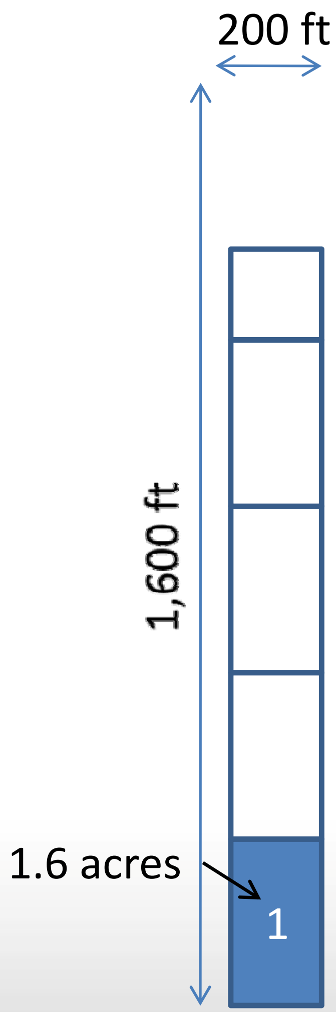
Once active leaching and uranium recovery is complete, heap becomes ***inactive*** tailings

Heap Leach Facility (con't)

- Up to 45 acres of heap open at any one time
  - < 40 acres would be spent heap (tailings)
- A single heap leach pad (one continuous liner) may at any one time contain:
  - Open and unloaded pad
  - Un-leached ore
  - Ore under active leaching (milling)
  - Ore being "rested" between leach cycles (milling)
  - Ore being rinsed for final value recovery and heap detoxification (milling)
  - Spent ore (tailings) waiting to be covered
  - Spent ore (tailings) being covered
  - Covered spent ore (tailings)

Conceptual Heap Sequencing

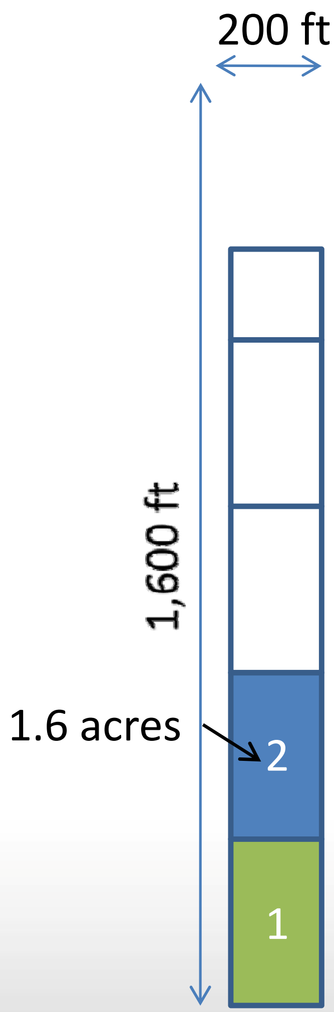
Stacking and Leaching Sequence



Stacker loads ore on to pad

- Placement of Ore (milling)
- Leaching of Ore (milling)
- Resting Ore (milling)
- Spent Ore (Tailings)

Stacking and Leaching Sequence



Placement of Ore (milling)

Leaching of Ore (milling)

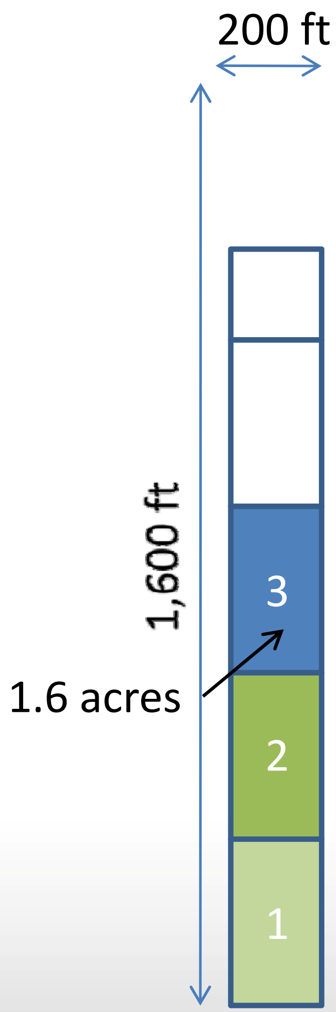
Resting Ore (milling)

Spent Ore (Tailings)

Stacker retreats as it stacks ore

Ore Leaching follows stacking in 1.6 acre increments
0.005 gpm/sq ft x 1.6 acres = 360 gpm

Stacking and Leaching Sequence



Stacker retreats as it stacks ore

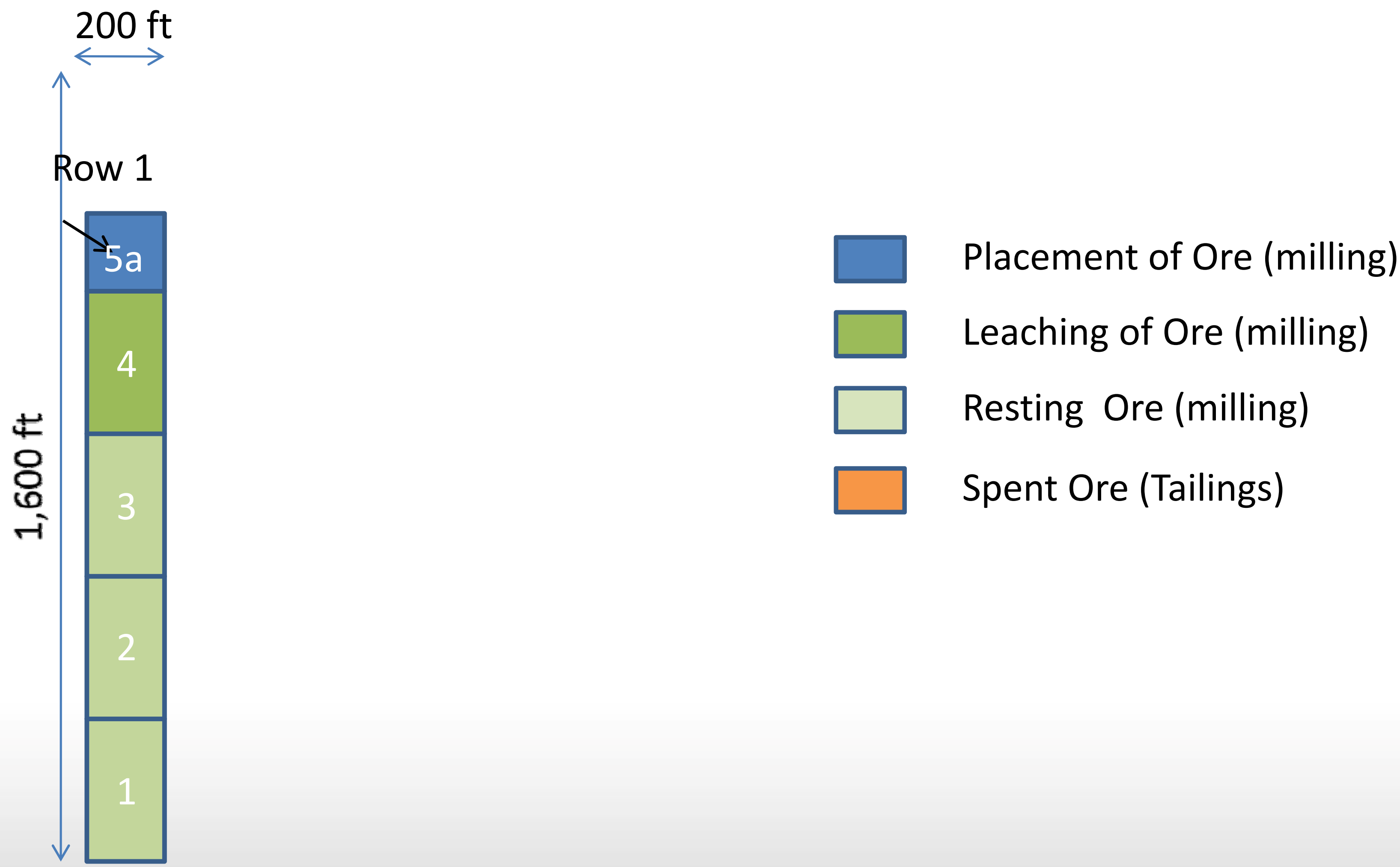
- Placement of Ore (milling)
- Leaching of Ore (milling)
- Resting Ore (milling)
- Spent Ore (Tailings)

Ore Leaching follows stacking in 1.6 acre increments
0.005 gpm/sq ft x 1.6 acres = 350 gpm

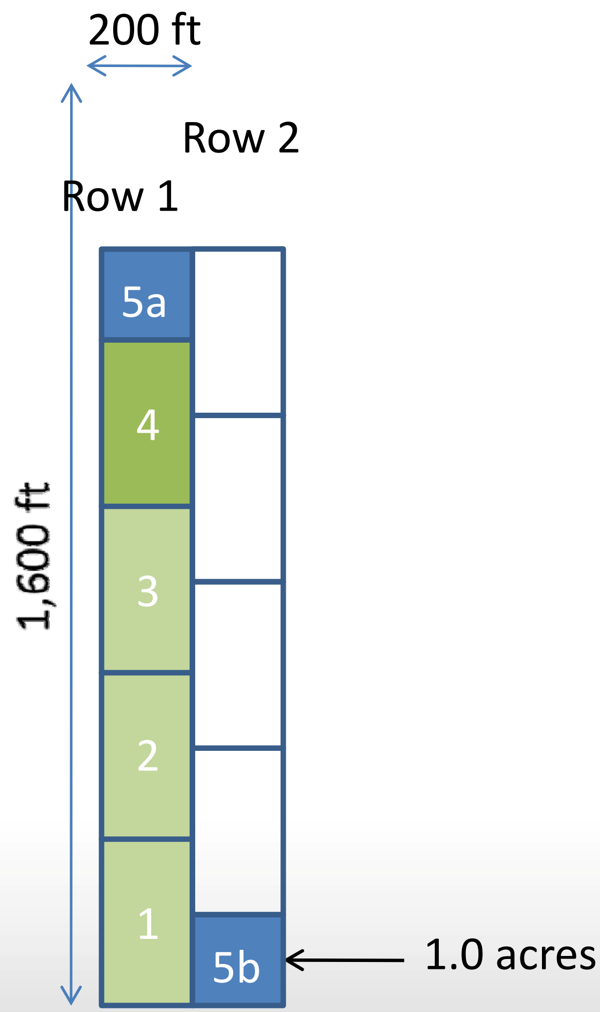
Ore is rested to allow additional oxidation


200 ft
1.6 acres
1,600 ft
4
3
2
1
Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)

Stacking and Leaching Sequence



Stacking and Leaching Sequence



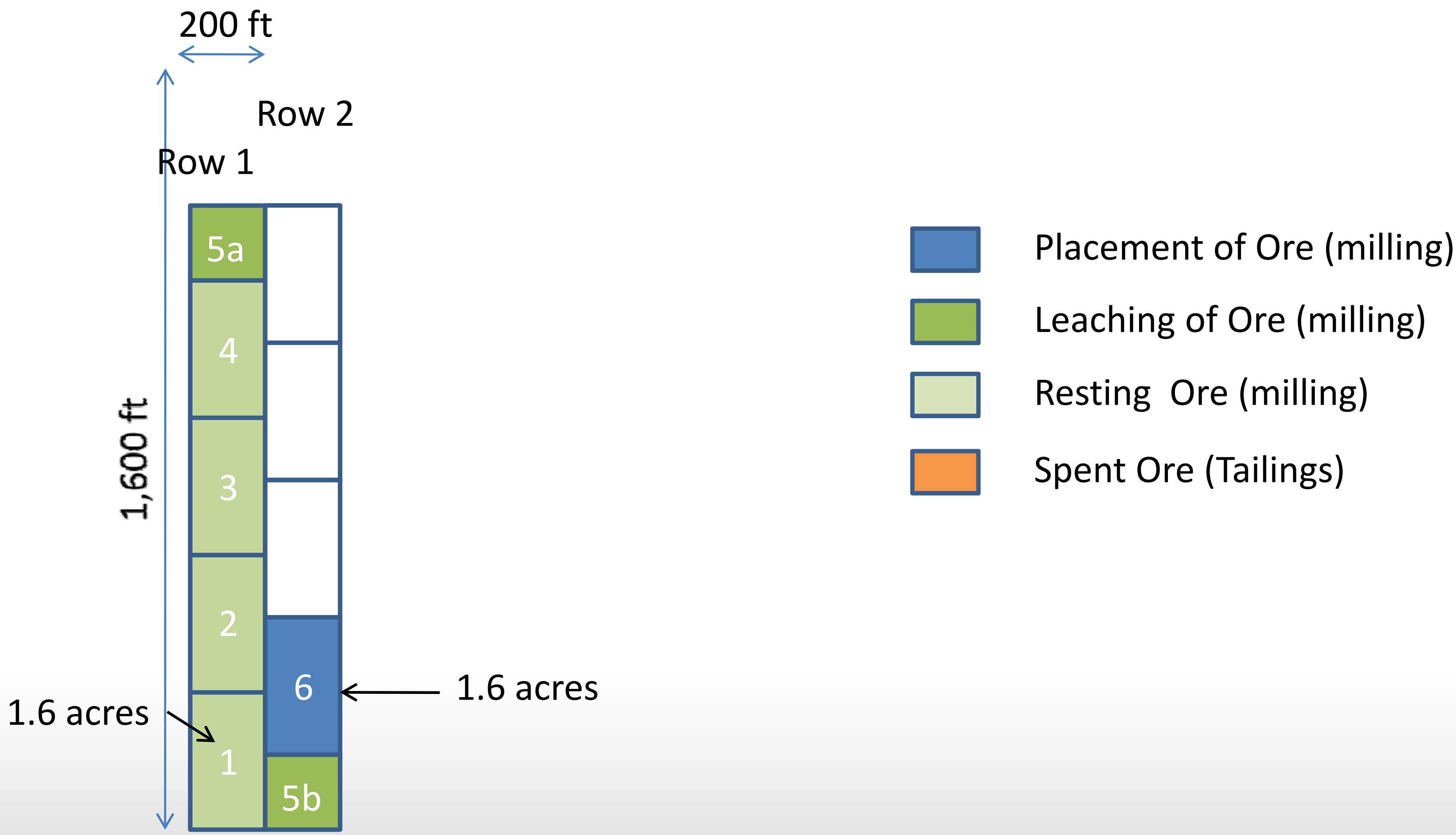
Placement of Ore (milling)

Leaching of Ore (milling)

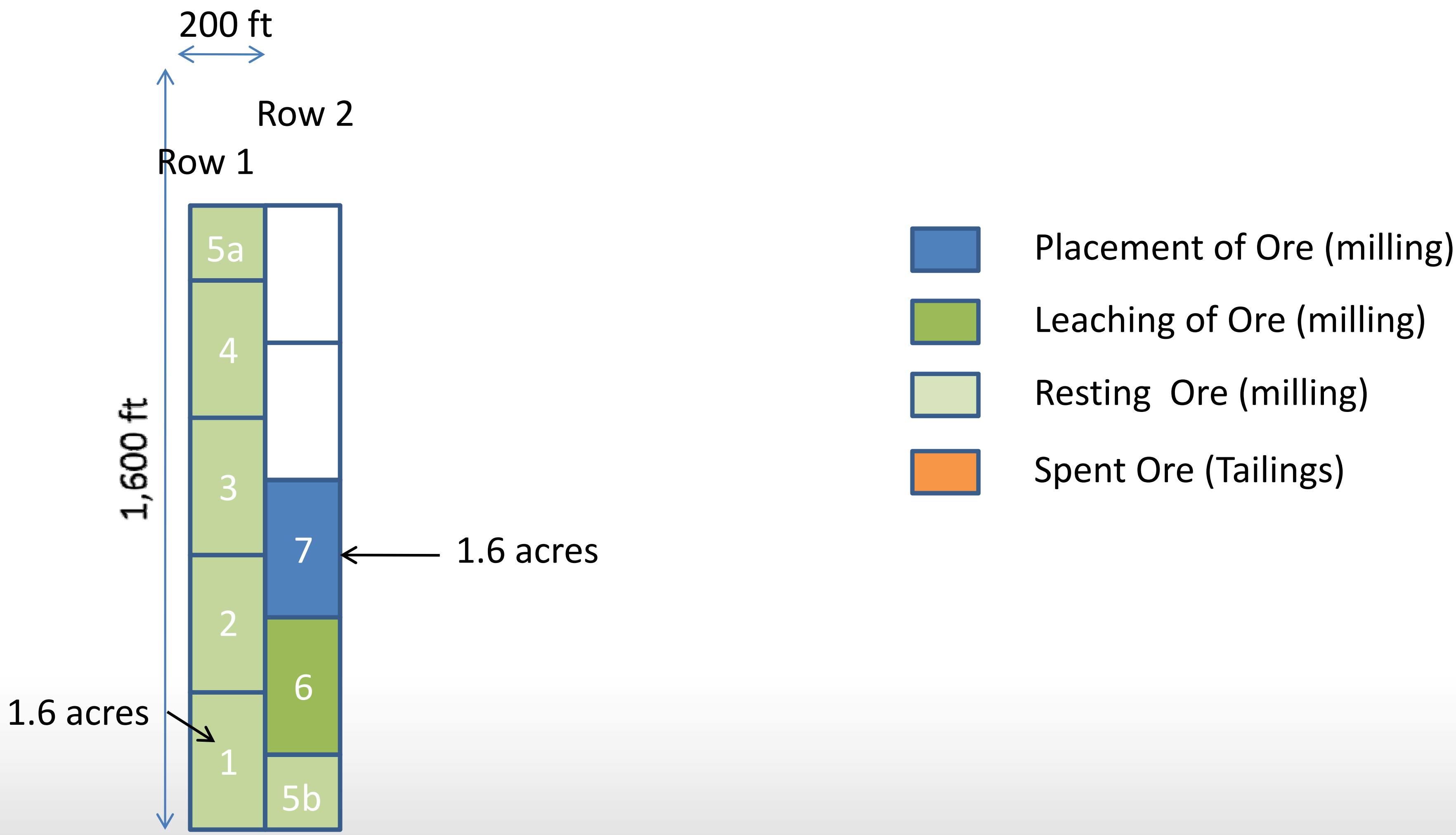
Resting Ore (milling)

Spent Ore (Tailings)

Stacking and Leaching Sequence

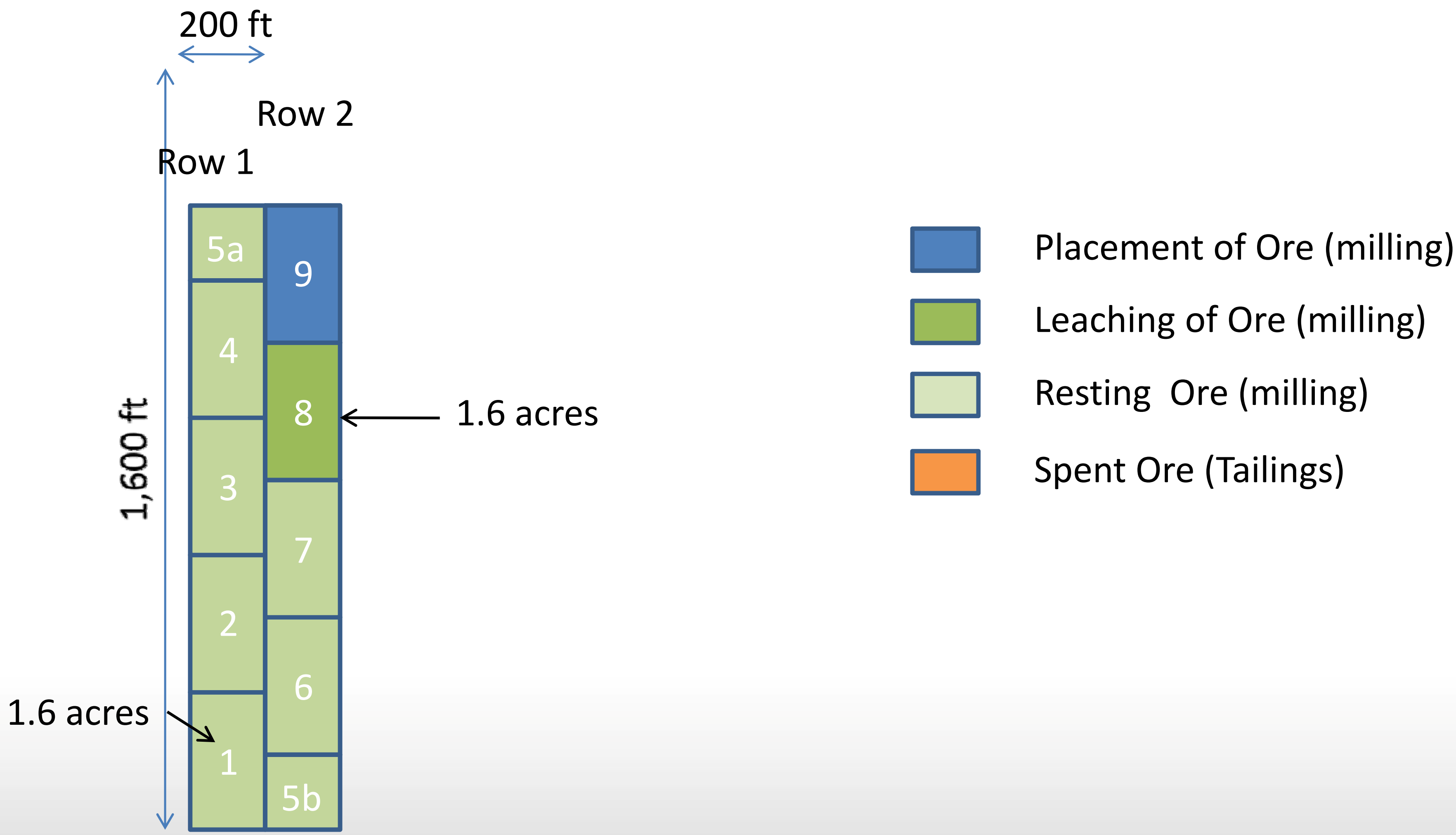


Stacking and Leaching Sequence

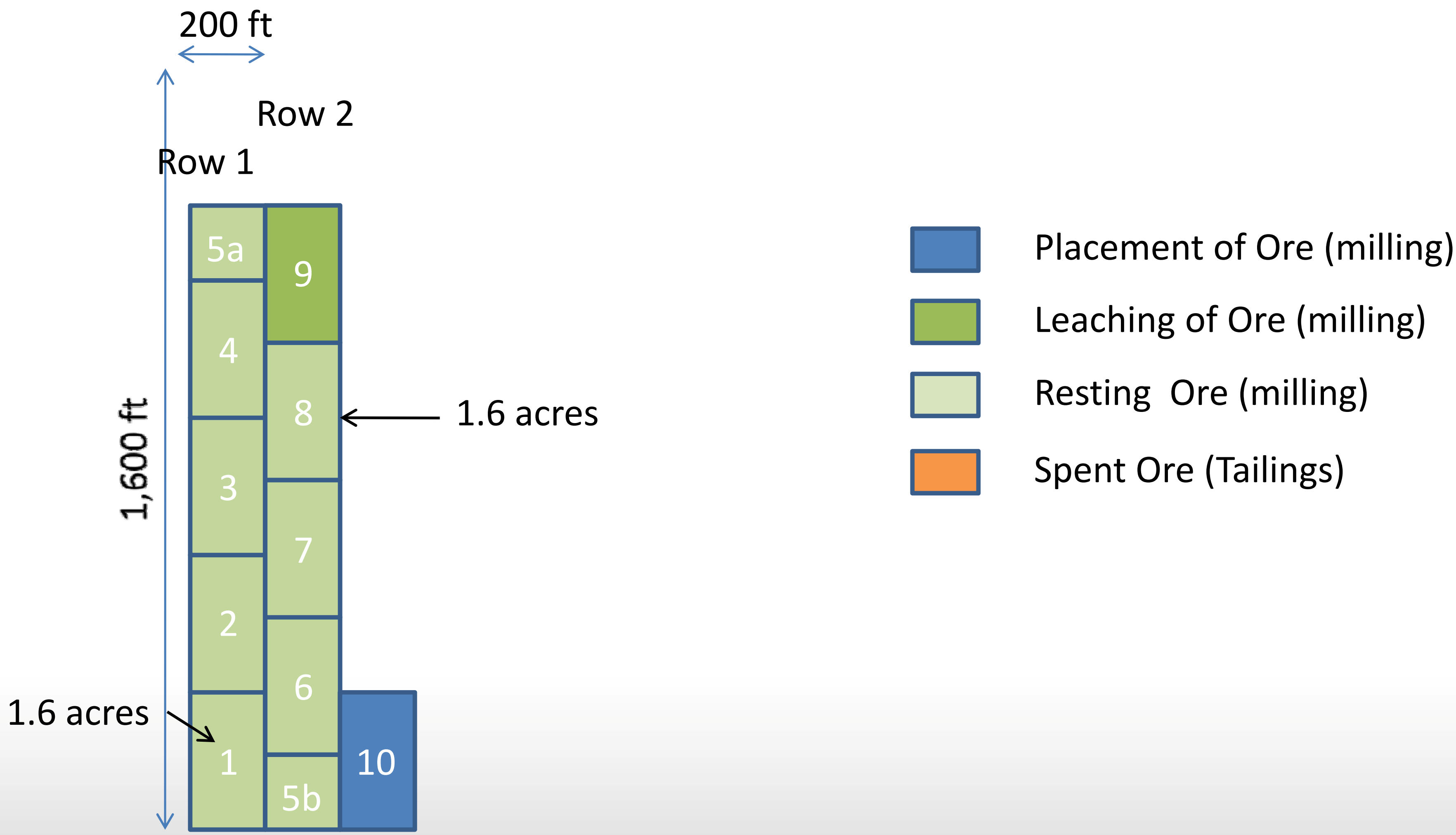


Stacking and Leaching Sequence

Stacking and Leaching Sequence



Stacking and Leaching Sequence



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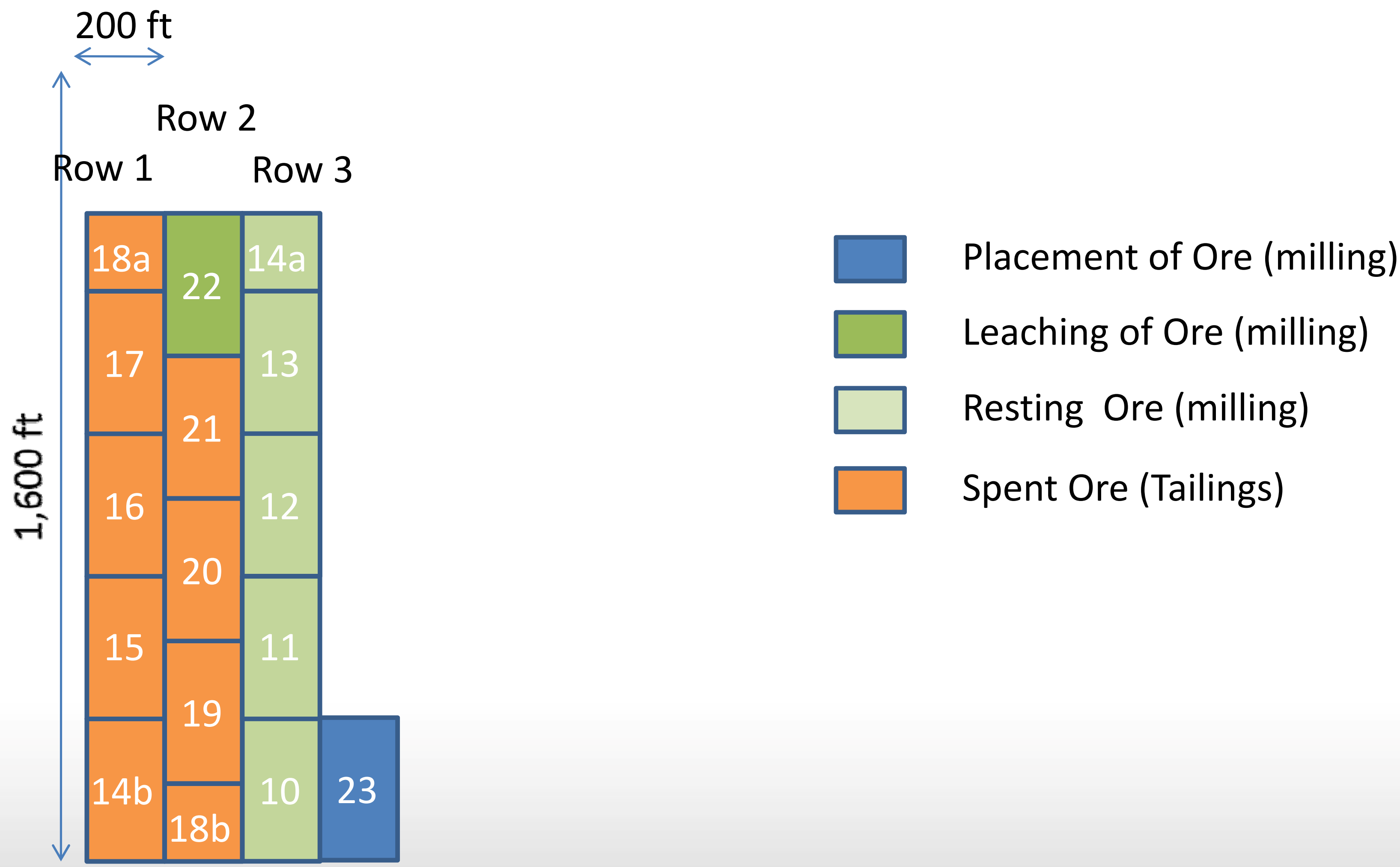
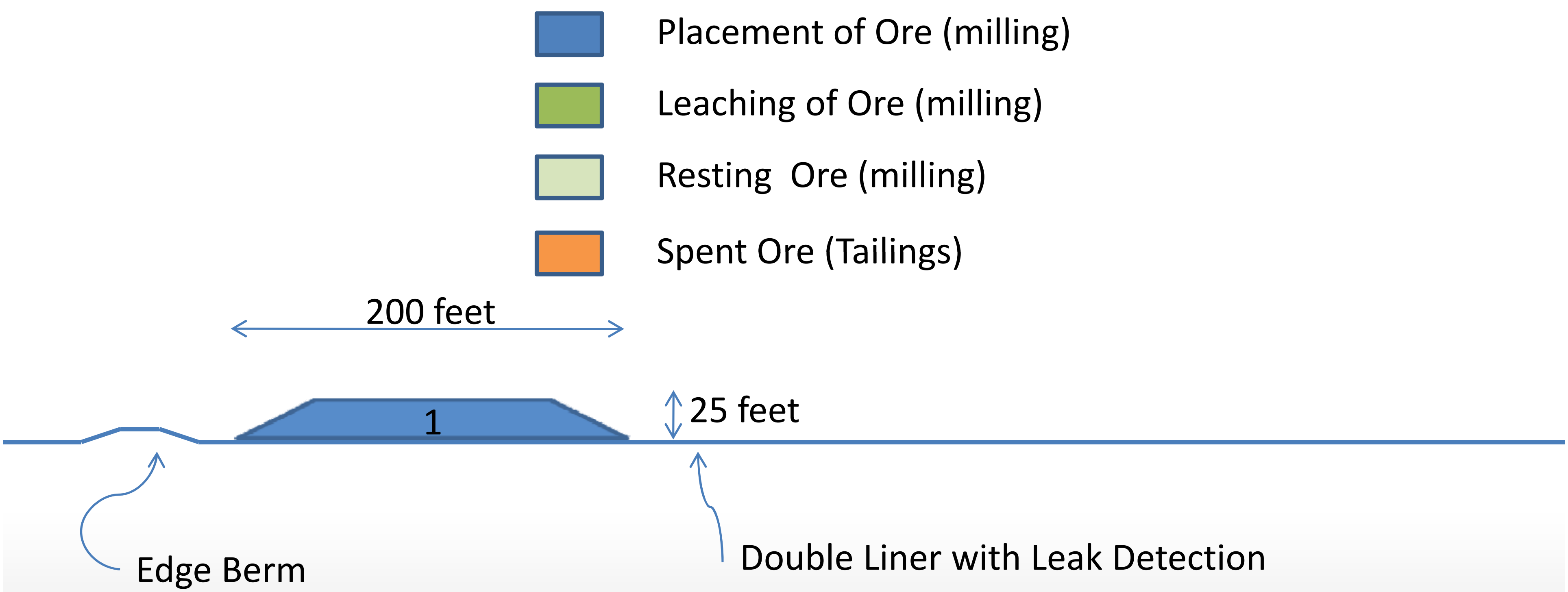
Stacking and Leaching Sequence



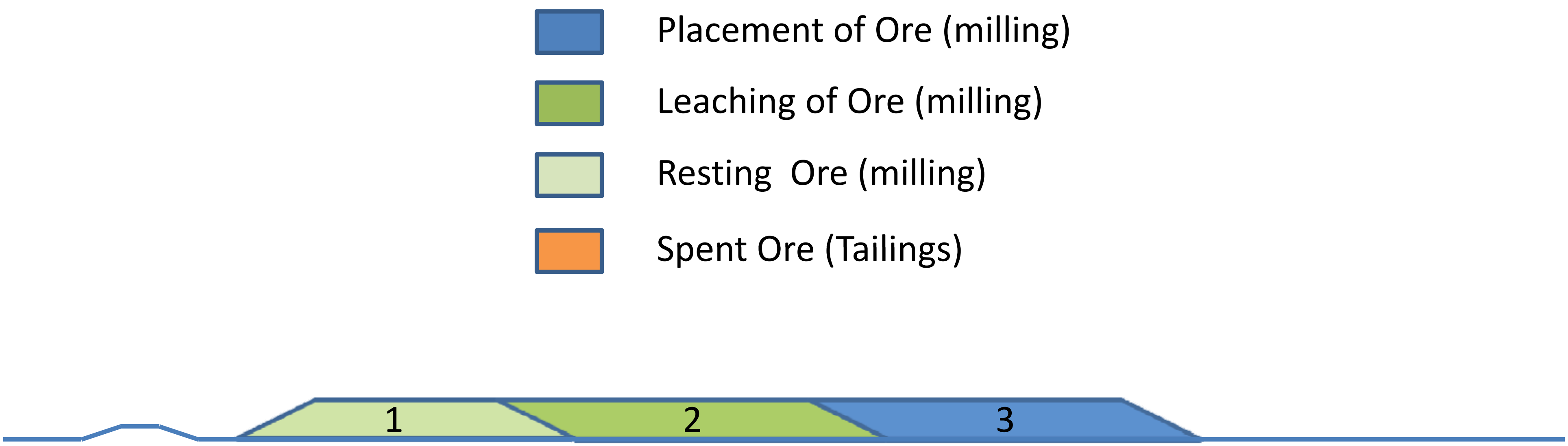

Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)
200 feet
1
25 feet
Edge Berm
Double Liner with Leak Detection

Placement of Ore (milling)

Leaching of Ore (milling)

Resting Ore (milling)

Spent Ore (Tailings)


Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)
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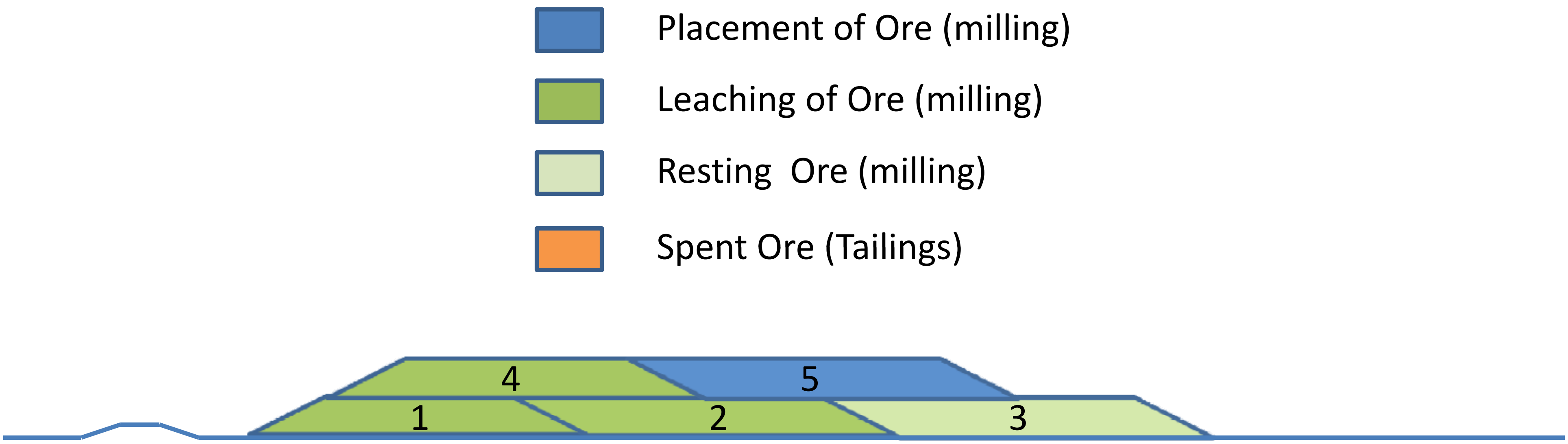
Placement of Ore (milling)

Leaching of Ore (milling)

Resting Ore (milling)

Spent Ore (Tailings)


Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)
4
5
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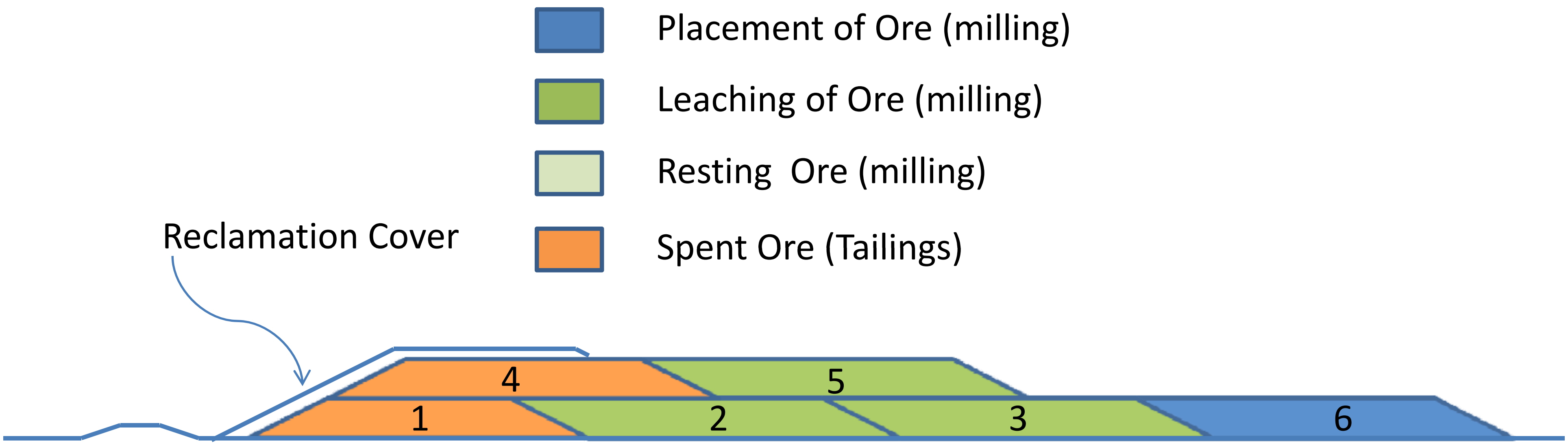
Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)
Reclamation Cover
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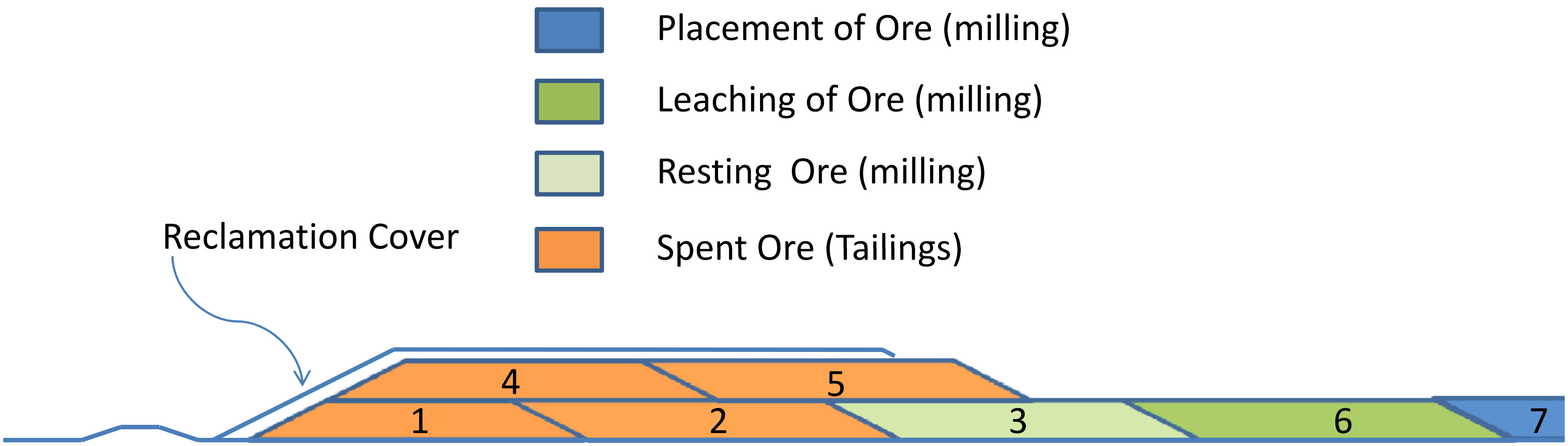
Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)
Reclamation Cover
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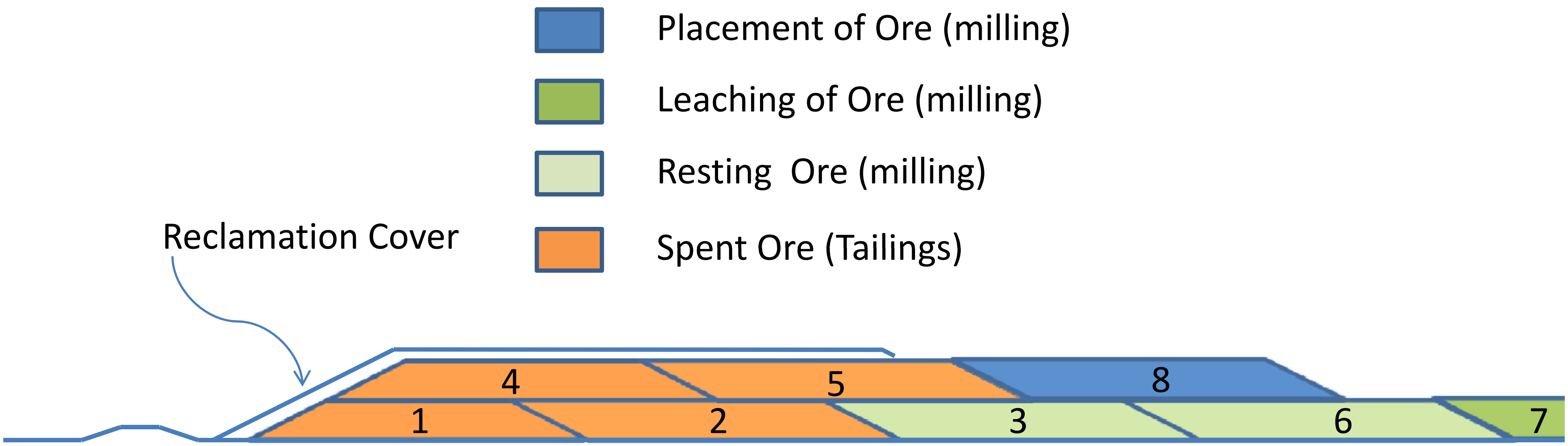
Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Reclamation Cover
Spent Ore (Tailings)
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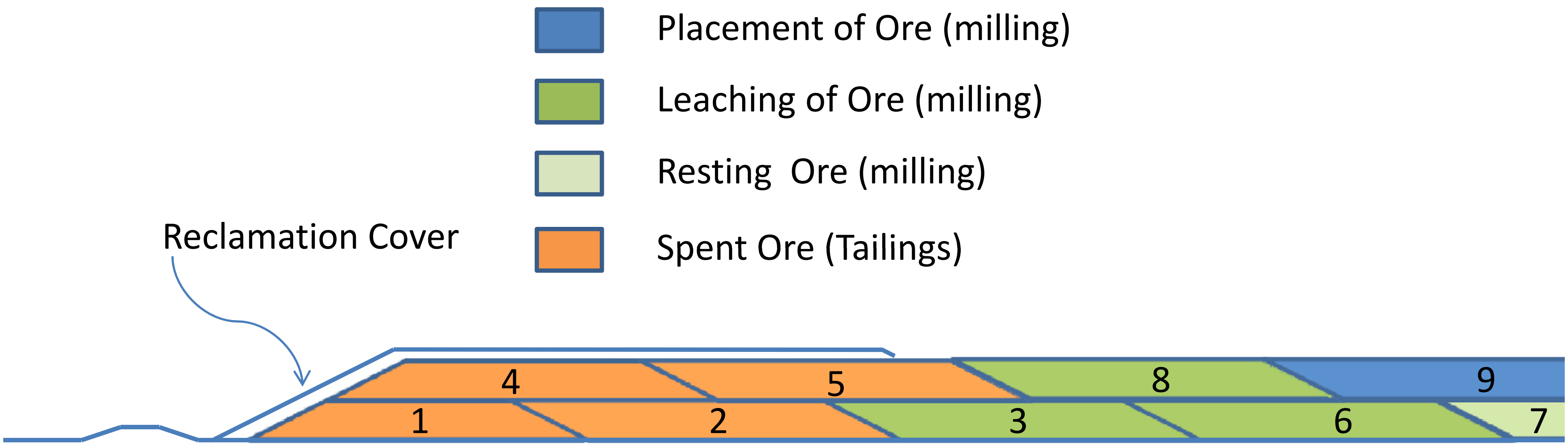
Placement of Ore (milling)
Leaching of Ore (milling)
Resting Ore (milling)
Spent Ore (Tailings)
Reclamation Cover
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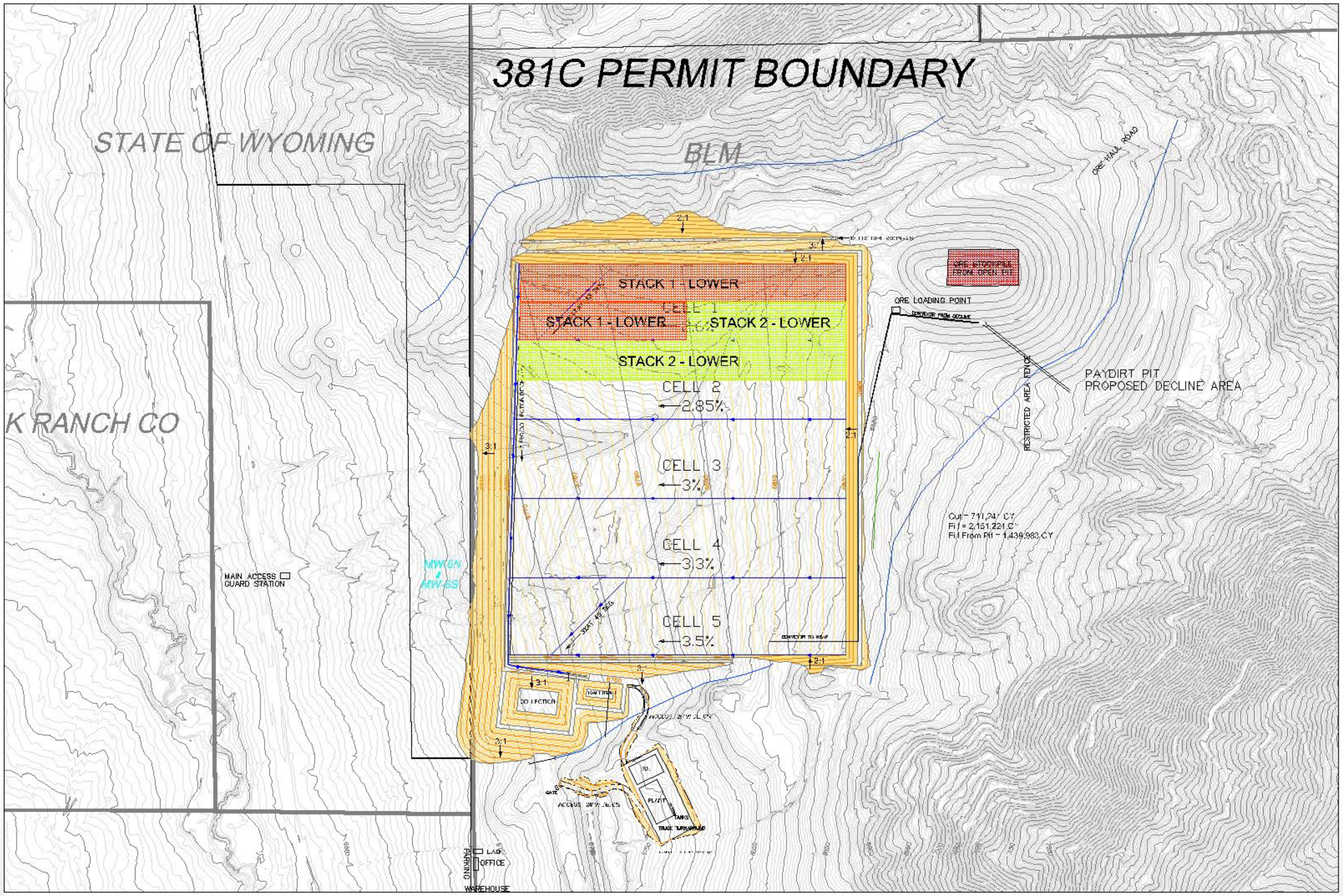
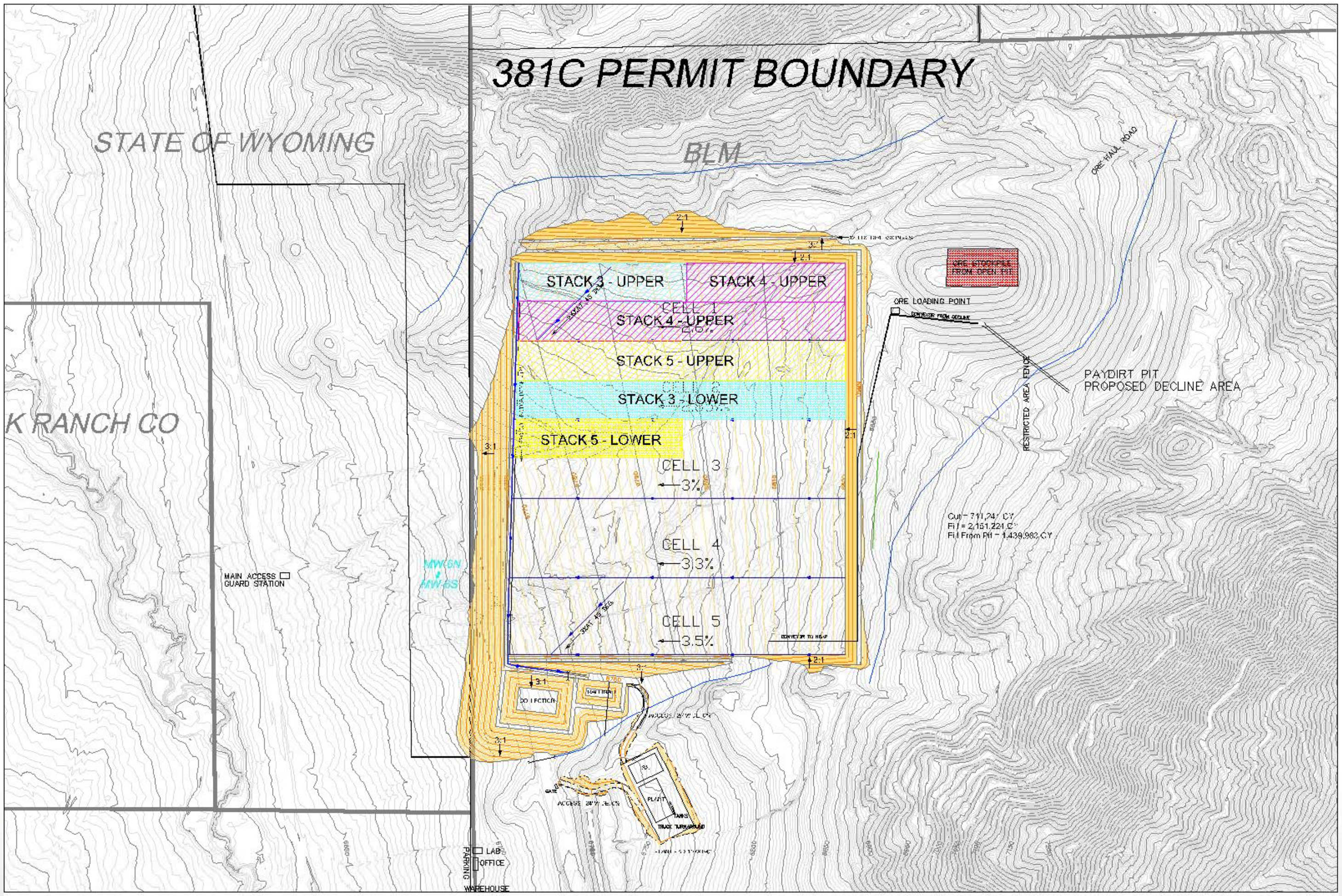
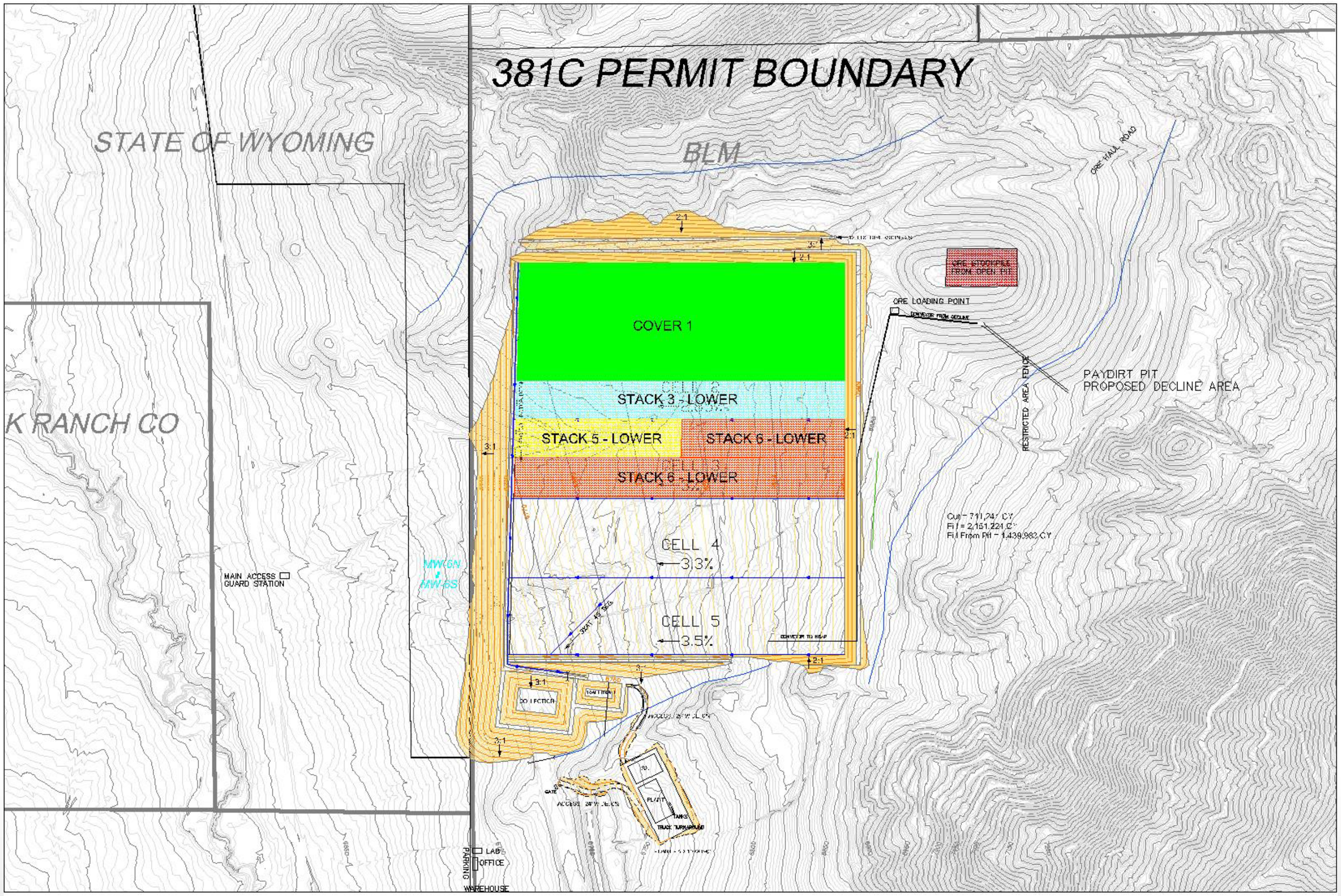

381C PERMIT BOUNDARY
STATE OF WYOMING
BLM
K RANCH CO
STACK 1 - LOWER
STACK 1 - LOWER
STACK 2 - LOWER
STACK 2 - LOWER
CELL 1
CELL 2
2.85%
CELL 3
3%
CELL 4
3.3%
CELL 5
3.5%
ORE LOADING POINT
PAYDIRT PIT
PROPOSED DECLINE AREA
RESTRICTED AREA FENCE
ORE HAUL ROAD
MAIN ACCESS
GUARD STATION
MW-5N
MW-5S
LAB
OFFICE
PARKING
WAREHOUSE
PLANT
3:1
2:1


381C PERMIT BOUNDARY
STATE OF WYOMING
BLM
K RANCH CO
STACK 3 - UPPER
STACK 4 - UPPER
STACK 4 - UPPER
STACK 5 - UPPER
STACK 3 - LOWER
STACK 5 - LOWER
CELL 3
3%
CELL 4
3.3%
CELL 5
3.5%
ORE LOADING POINT
PAYDIRT PIT
PROPOSED DECLINE AREA
RESTRICTED AREA FENCE
MAIN ACCESS GUARD STATION
LAB
OFFICE
PARKING
WAREHOUSE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STATE OF WYOMING
BLM
K RANCH CO
COVER 1
STACK 3 - LOWER
STACK 5 - LOWER
STACK 6 - LOWER
STACK 6 - LOWER
CELL 4
3.3%
CELL 5
3.5%
PAYDIRT PIT
PROPOSED DECLINE AREA
ORE LOADING POINT
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MAIN ACCESS
GUARD STATION
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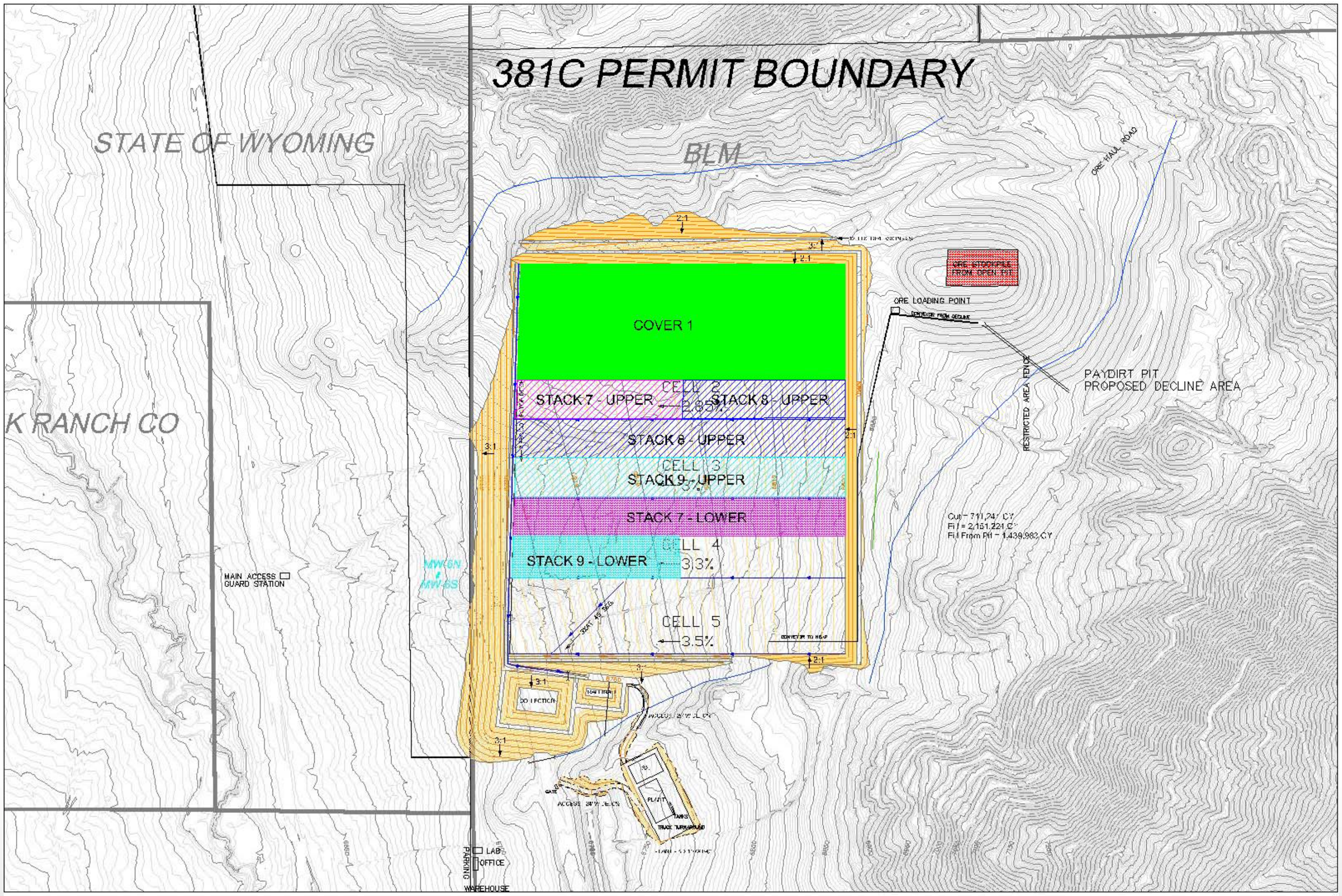
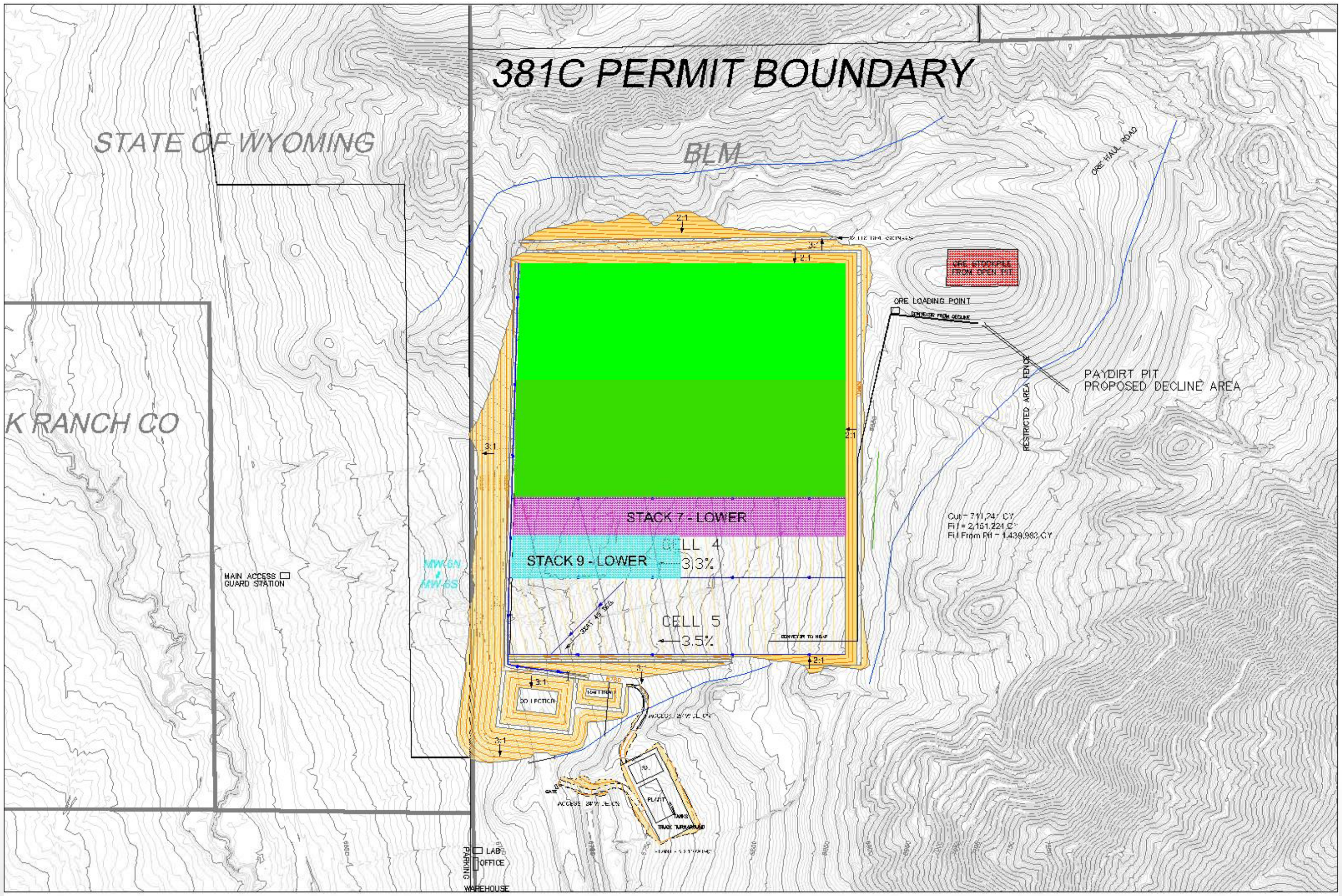
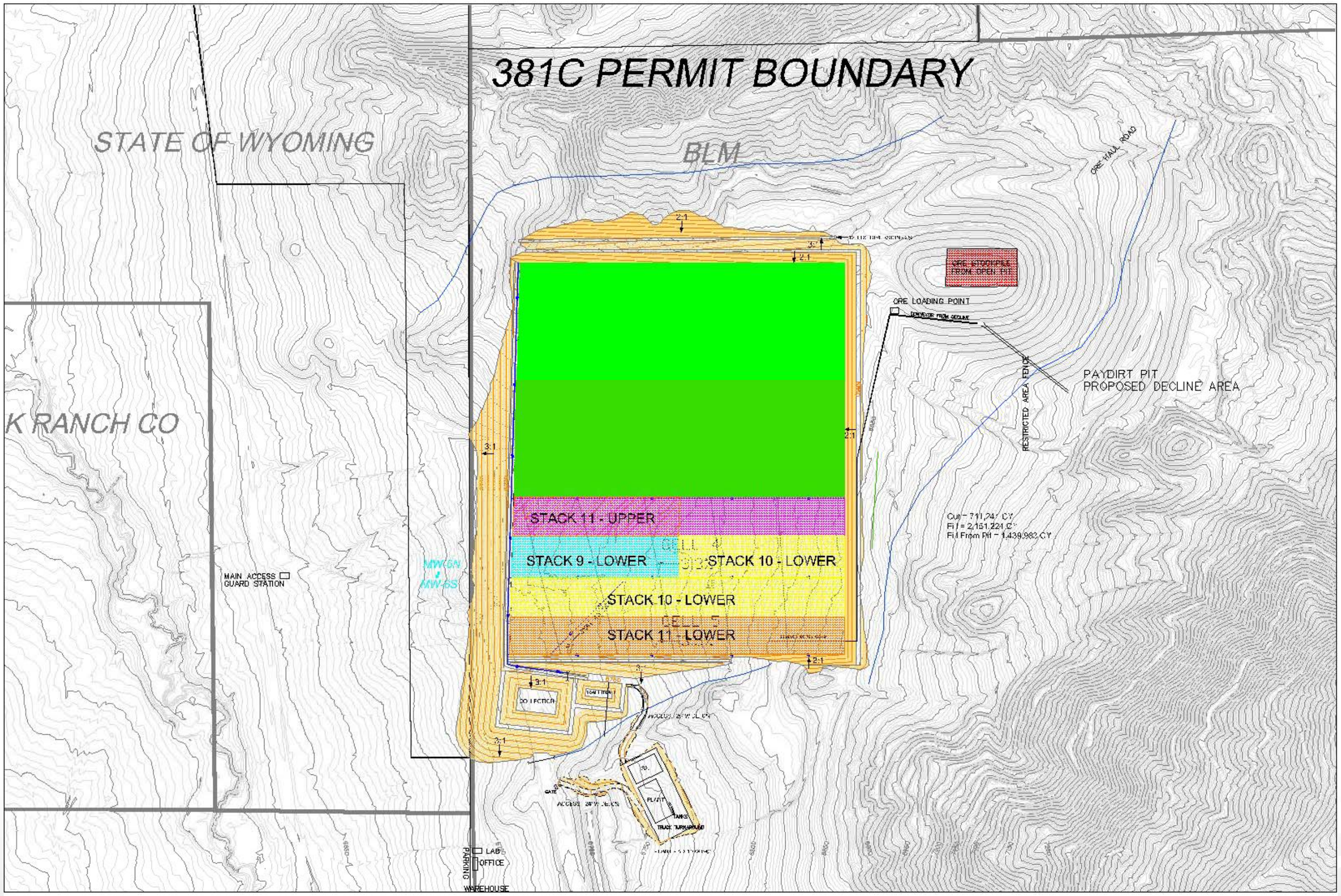
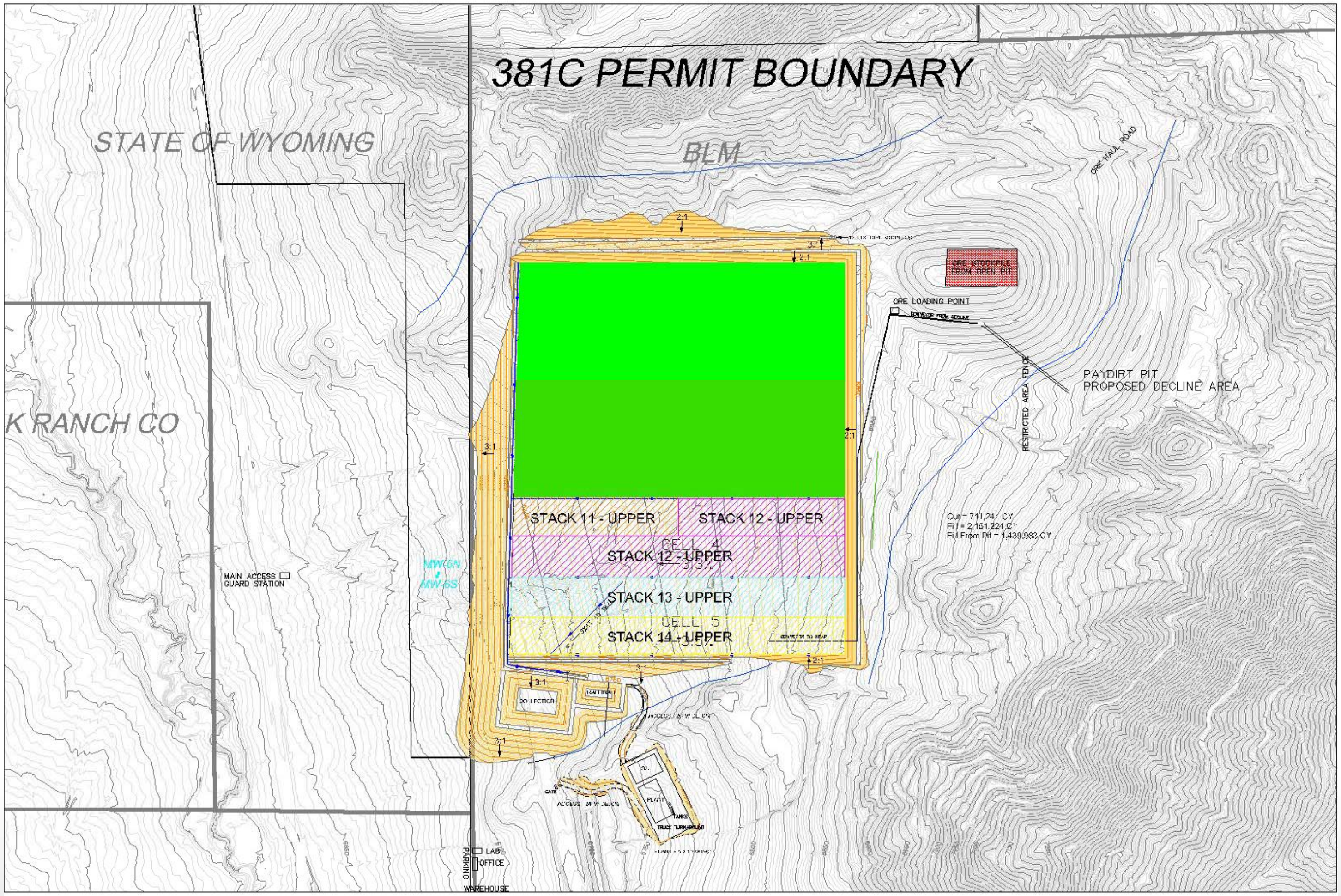
LAB
OFFICE
PARKING
WAREHOUSE


381C PERMIT BOUNDARY
STATE OF WYOMING
BLM
K RANCH CO
COVER 1
STACK 7 - UPPER
CELL 2
2.85%
STACK 8 - UPPER
STACK 8 - UPPER
CELL 3
STACK 9 - UPPER
STACK 7 - LOWER
STACK 9 - LOWER
CELL 4
3.3%
CELL 5
3.5%
ORE HAUL ROAD
ORE LOADING POINT
RESTRICTED AREA FENCE
PAYDIRT PIT
PROPOSED DECLINE AREA
MAIN ACCESS
GUARD STATION
LAB
OFFICE
PARKING
WAREHOUSE


381C PERMIT BOUNDARY
STATE OF WYOMING
BLM
K RANCH CO
ORE LOADING POINT
PAYDIRT PIT
PROPOSED DECLINE AREA
STACK 7 - LOWER
STACK 9 - LOWER
CELL 4
3.3%
CELL 5
3.5%
MAIN ACCESS
GUARD STATION
LAB
OFFICE
PARKING
WAREHOUSE

TITAN
URANIUM USA INC

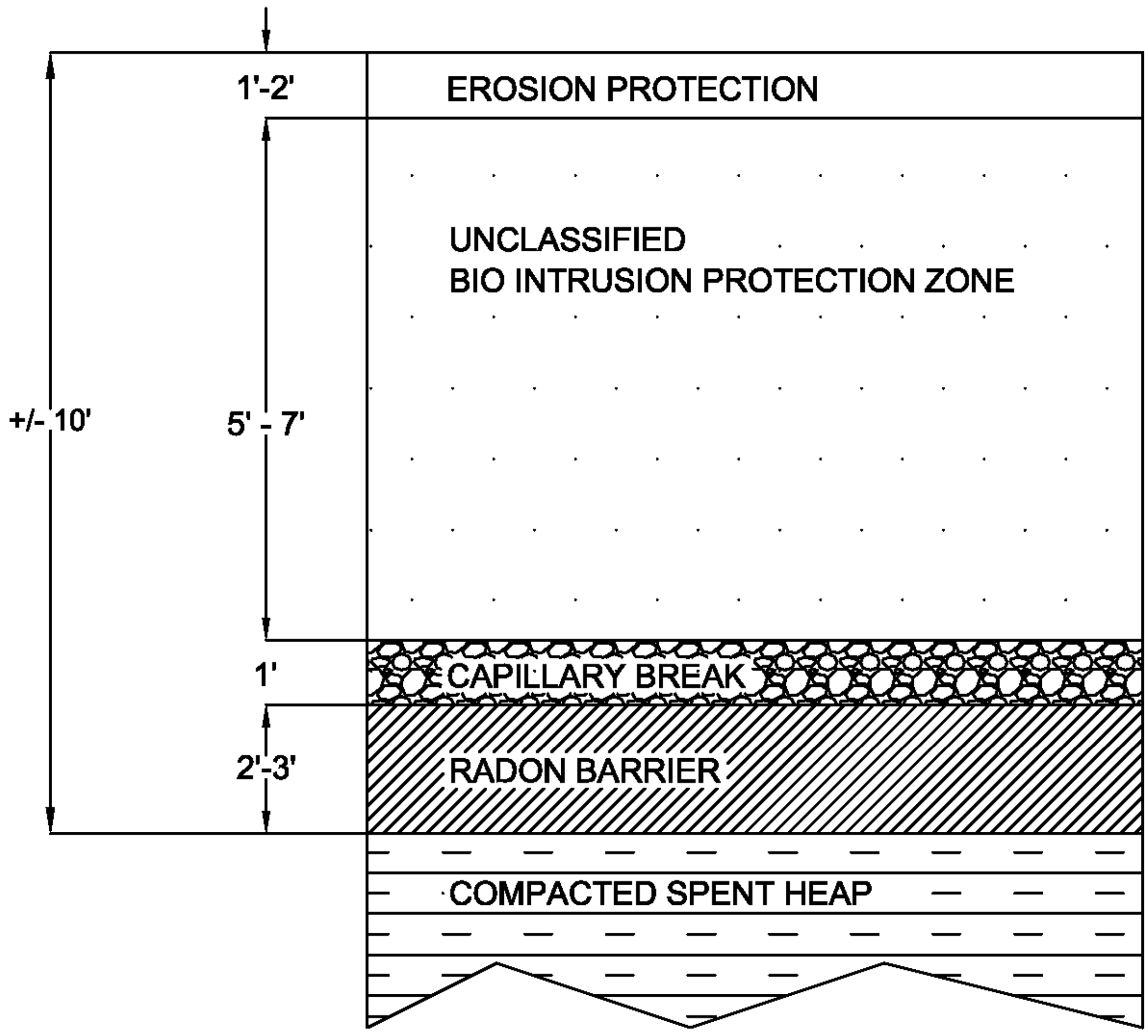



381C PERMIT BOUNDARY
STATE OF WYOMING
BLM
K RANCH CO
STACK 11 - UPPER
STACK 12 - UPPER
CELL 4
STACK 12 - UPPER
STACK 13 - UPPER
CELL 5
STACK 14 - UPPER
ORE LOADING POINT
PAYDIRT PIT
PROPOSED DECLINE AREA
RESTRICTED AREA FENCE
MAIN ACCESS
GUARD STATION
COLLECTION
LAB
OFFICE
PARKING
WAREHOUSE

Heap Leach Facility (con't)

- Start reclamation of spent heap surface after uranium recovery (milling) of heap section is complete on individual stacking rows:
  - Compaction and minor grading of heap surface
  - Placement of final radon barrier
  - Biointrusion layer
  - Freeze/thaw protection
  - Radon flux verification measurements
  - Erosion protection (rip rap)

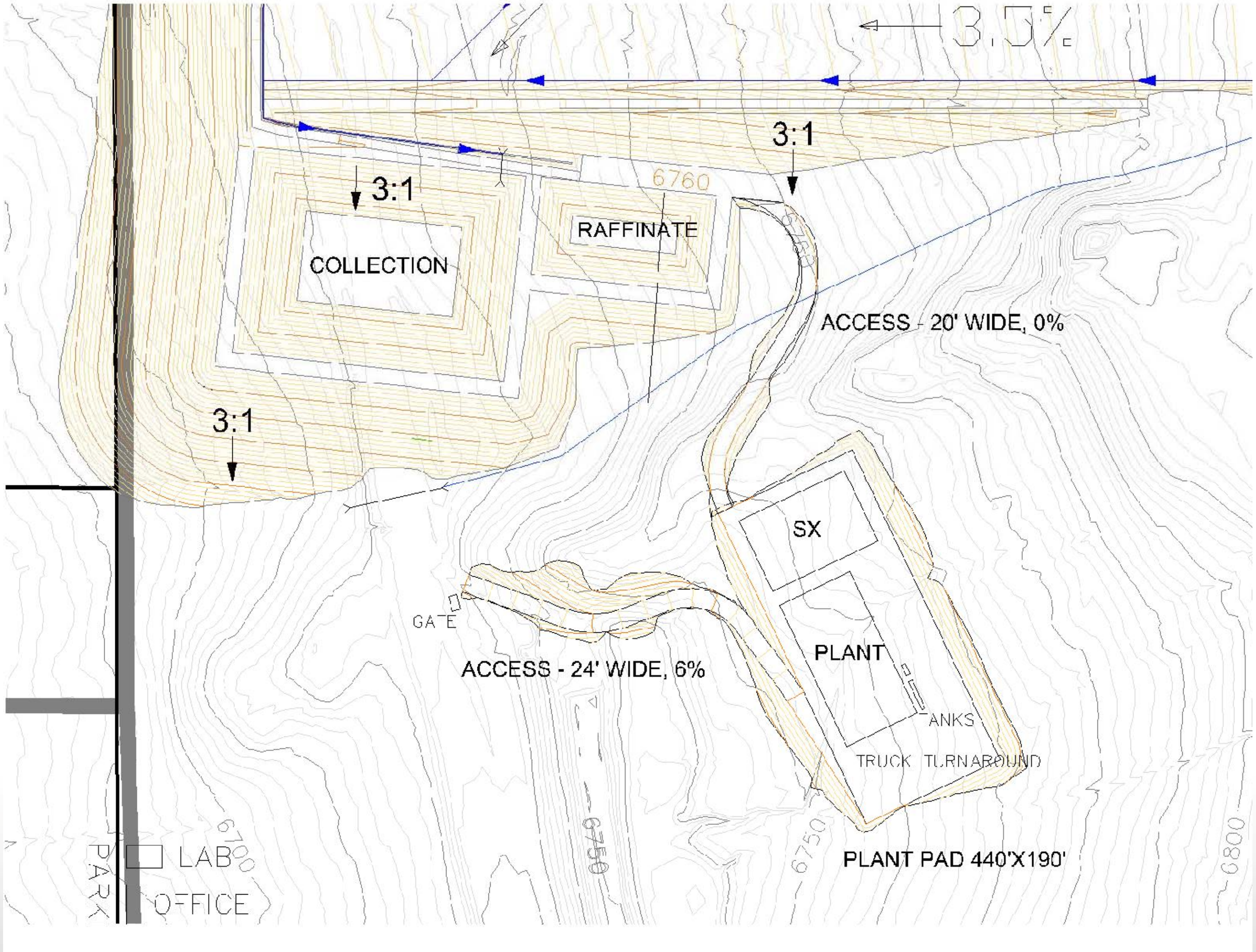
Heap Cap and Cover Detail

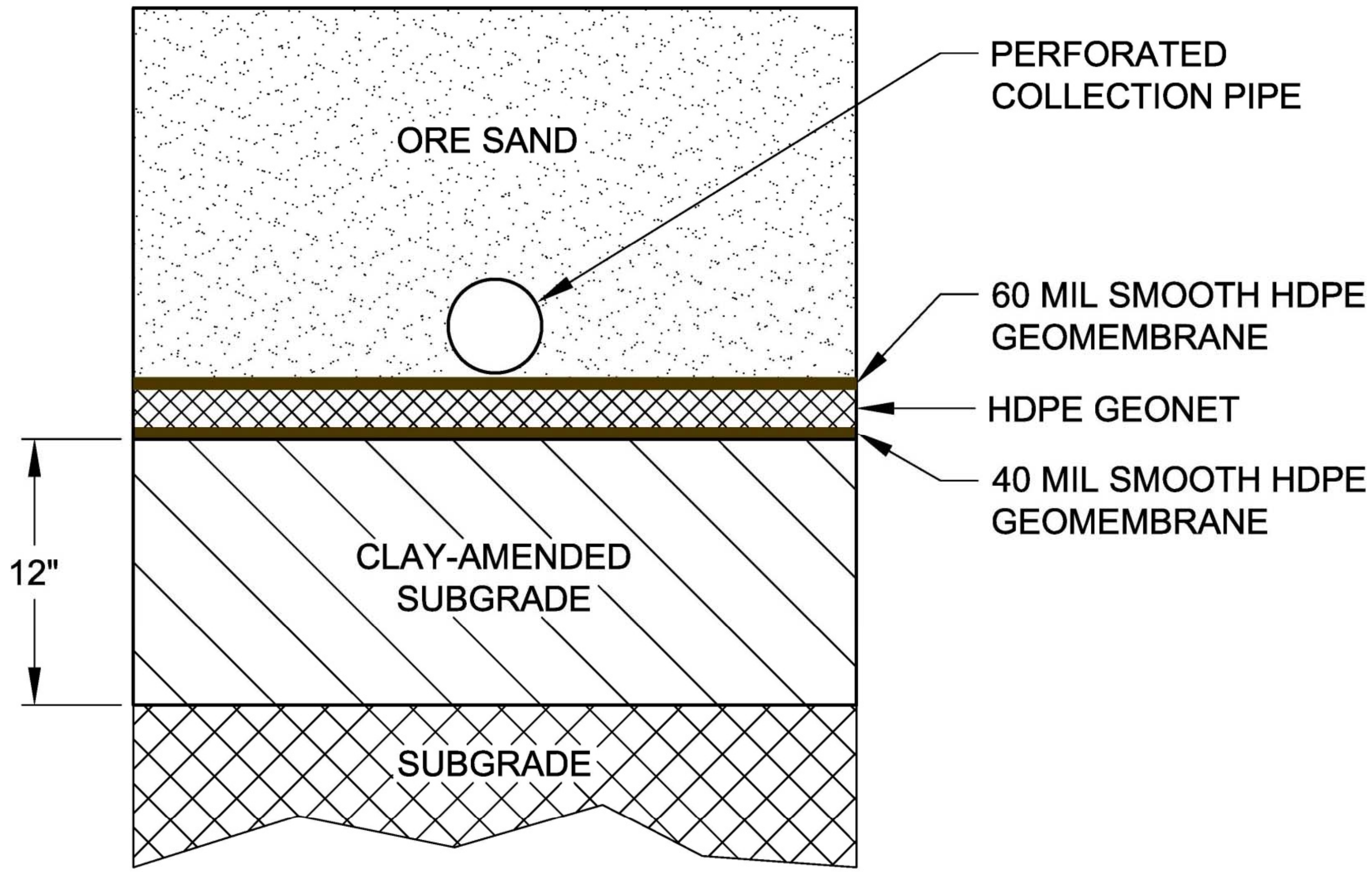


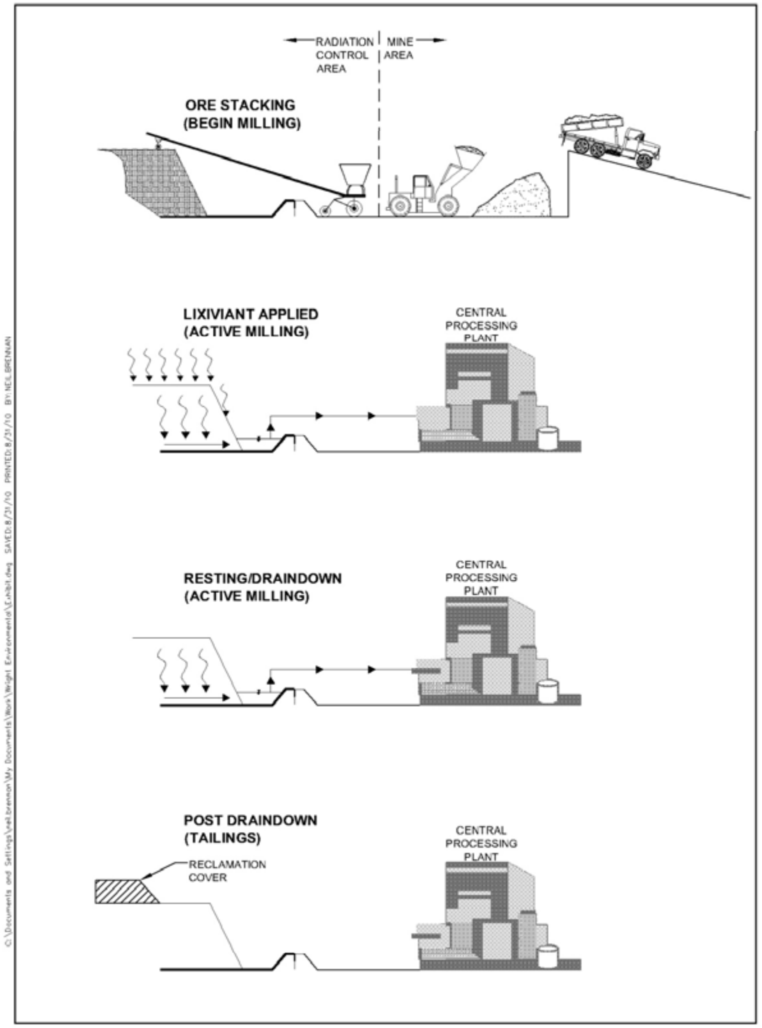
<u>Heap Leach Facility (con’t)</u>

Process Ponds

- Double lined, leak detection, clay amended sub-grade
- <u>Barren Pond</u> (raffinate, lixiviant make up)
  - acid addition
  - make up water
- <u>Pregnant Pond</u> (collection)
  - Loaded raffinate
  - Blending of leachates for grade control
- Analogous to mill leach process tanks
- Will not contain any wastes or “tailings”
- ***Active*** leach pads as well as ***process*** ponds are part of the mill, no wastes ever present
- Only after uranium recovery is complete are tailings present


3.5%
3:1
3:1
6760
RAFFINATE
COLLECTION
ACCESS - 20' WIDE, 0%
3:1
SX
GATE
PLANT
ACCESS - 24' WIDE, 6%
ANKS
TRUCK TURNAROUND
6700
6750
6750
6800
LAB
PARK
OFFICE
PLANT PAD 440'X190'


PERFORATED
COLLECTION PIPE
ORE SAND
60 MIL SMOOTH HDPE
GEOMEMBRANE
HDPE GEONET
40 MIL SMOOTH HDPE
GEOMEMBRANE
12"
CLAY-AMENDED
SUBGRADE
SUBGRADE



Status of Active Heaps and 10 CFR Part 61, subpart W

•Active heap is active "milling"

•Heap material during active milling is not 11e.(2) byproduct material

•Have rad. monitoring and rad. protection programs to ensure public and occupational exposures remain ALARA

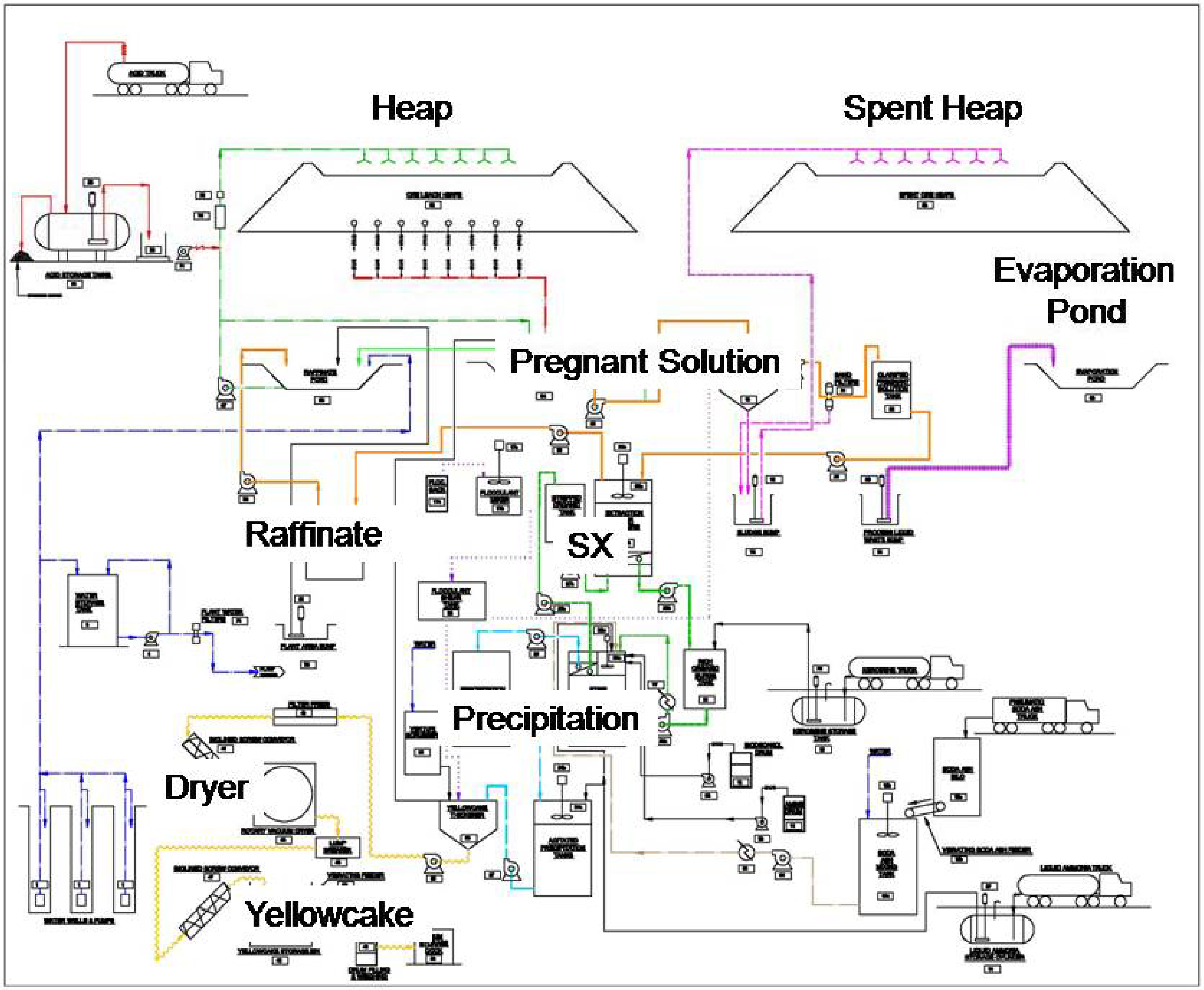
•"Resting" a heap is part of active milling

•Heap becomes 11e.(2) when drain down and recovery of values is completed and the heap is inactive

Central Processing Plant

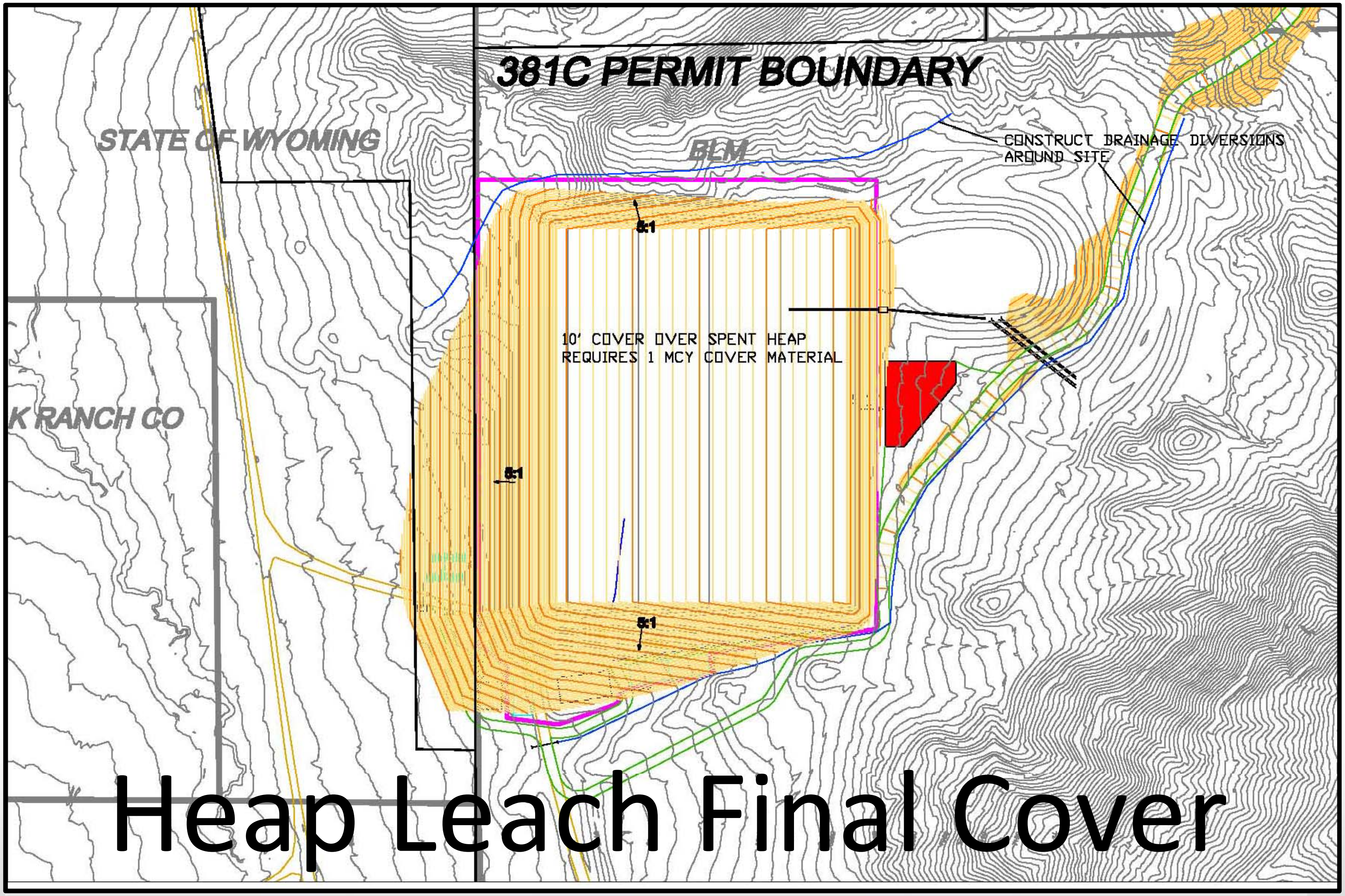
- SX
- IX Polishing
- Precipitation
- Vacuum Drying & Drumming
- Process Bleed to Tanks

- Operations
  - Process flow rates approx. 360gpm,
    - low anticipated Rn-222 levels
  - Process bleed rates of 5% to 10%
    - 18 to 35 gpm
  - 10 gpm waste stream from precipitation circuit
  - Liquid wastes will be managed in double lined evaporation ponds with leak detection and clay subliner

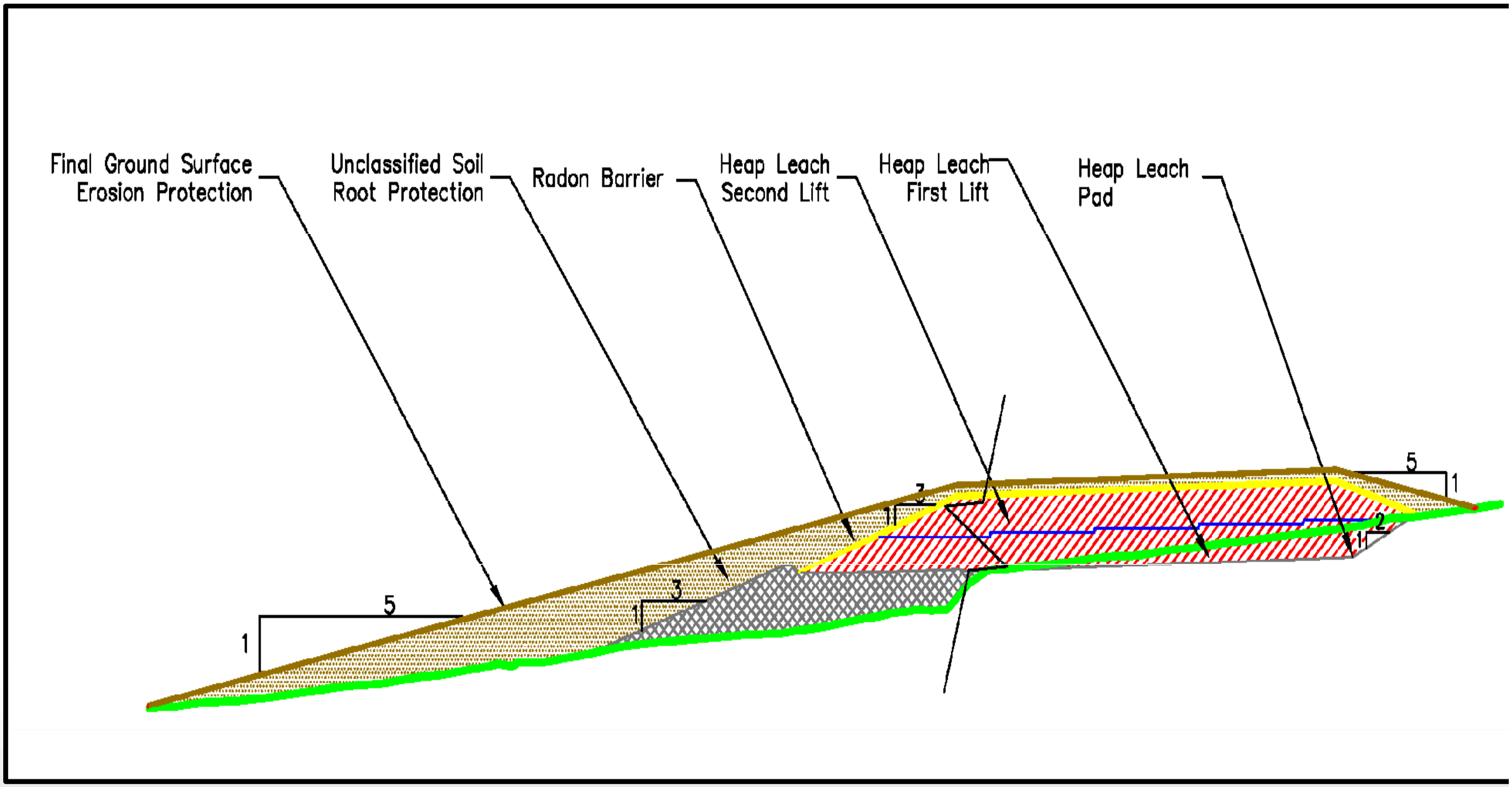

Heap
Spent Heap
Evaporation Pond
Pregnant Solution
Raffinate
SX
Precipitation
Dryer
Yellowcake

Mine and Reclamation Planning

TITAN
URANIUM USA INC



Heap Leach Final Cover


Final Ground Surface
Erosion Protection
Unclassified Soil
Root Protection
Radon Barrier
Heap Leach
Second Lift
Heap Leach
First Lift
Heap Leach
Pad
5
1
3
1
3
1
5
1
2
1

Items for Discussion

Issues for Discussion

- Status of 40 CFR 192 GW standards update
- Status of Active Heaps & Inactive Heaps
- Status of Process Ponds
- Other?

Our Understanding

- There are no size limits on the size of ***active*** heaps
- Heap pad designs are approved solely by NRC
- Process ponds that will never contain wastes are part of the mill
- Process Pond designs are approved solely by NRC
- Heap material only become tailings (11e.(2) byproduct material) once active uranium recovery is complete

Our Understanding (con't)

- Part 61, subpart W applies only to spent heap material (tailings)
- We are practicing *phased disposal* of tailings
- We are allowed no more than two 40 acre cells in area of exposed tailings
- We will have appropriate environmental monitoring and radiation programs in place to ensure compliance with 10 CFR Part 20 subpart B and subpart C requirements

40 CFR Part 61.250 (subpart W)

- (b) *Continuous disposal* means a method of tailings management and disposal in which tailings are dewatered by mechanical methods immediately after generation. The dried tailings are then placed in trenches or other disposal areas and immediately covered to limit emissions consistent with applicable Federal standards.
- (c) *Dewatered* means to remove the water from recently produced tailings by mechanical or evaporative methods such that the water content of the tailings does not exceed 30 percent by weight.
- (e) Operational means that an impoundment is being used for the ***continued placement* of new tailings** *[emphasis added]* or is in standby status for such placement. ***An impoundment is in operation from the day that tailings are first placed in the impoundment until the day that final closure begins*** *[emphasis added]***.**
- (f) *Phased disposal* means a method of tailings management and disposal which uses lined impoundments which are filled and then immediately dried and covered to meet all applicable Federal standards.

- Section 101(8) of the Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. 7911(8).
  “Tailings" means the remaining portion of a metal-bearing ore after some or all of such metal, such as uranium, has been extracted.

EPA-2342

Reid Rosnick/DC/USEPA/US		To	Beth Miller
04/13/2011 10:51 AM		cc	
		bcc	
		Subject	Minutes

SubpartW_4-7-2011_QuarterlyConfCall.docx

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U.S. Environmental Protection Agency
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Washington, DC 20460
202.343.9563
rosnick.reid@epa.gov

Subpart W Quarterly Conference Call
April 7, 2011, 11:00 am – 12:00 pm
Washington, DC

[DRAFT] Conference Call Notes

Meeting Participants:

EPA HQ:	Reid Rosnick, Emily Atkinson, Sue Stahle
EPA Regions:	None
CCAT:	Sharyn Cunningham, Paul Carestia, Lynn Holtz Minasi, Kay Hawklee
Industry:	Oscar Paulson (Kennecott), Wayne Heili (URS Energy)
Other:	Sarah Fields (Uranium Watch), Travis Stills (Energy Minerals Law Center),

Status Update on Action Items from Last Call

R. Rosnick: Lets begin with a brief discussion of actions I had as follow-ups from the last conference call, as well as new topics that have come up since our last call.

As you can imagine my office has been decimated on technical expertise with the Japan reactors incident. Most of the people in our office have been giving information to the public from that incident and it has been difficult to focus on anything other than the Japanese incident.

On follow-up issues, back in January there was some question on whether or not EPAs contractor on various risk calculations for various scenarios had actually contacted some of the facilities that are either operating or on stand-by. Once we received funding for our contractor because it had lapsed – they began a dialogue with Oscar Paulson of Kennecott and Jim Cain of Cotter. Both gentlemen were able to point us in the direction of NRC data or EPA data held by Colorado Public Health and Environment. That is underway and we have followed up with that. It is in process. As a result, we have discovered that we may not have had all of the data to work with but do now. That information was provided to the contractor and they are now following up. We do not have a revised report with the risk calculations, but expect to have one in several weeks.

O. Paulson: Had I already stated that the document had gone around for review?

R. Rosnick: The original first draft had been developed by the contractor, and there have been comments from the work group back to the contractor. As a result of that review, we were made aware of more data available and now the contractor has that new data, as well as the original work group comments, which are being incorporated.

O. Paulson Most if not all of the information we have related to radon flux measurements is all public record. Most is either submitted to the EPA and/or NRC.

R. Rosnick: I have your email to the contractor in front of me and we appreciate you helping to direct us to that information.

T. Stills: Are you aware that Cotter is no longer monitoring radon flux at their impoundments?

R. Rosnick: I had spoken to someone at CDPHE and since the impoundments were no longer operating and they intended to close, we discussed whether or not it was still required to do the radon testing. They felt the Subpart W requirements pertained specifically to operating impoundments and once a facility is going into a non-operational status, the measurements are no longer required.

P. Carestia: Once they announce they are going to close, they now fall under the milestones provision they are still required to do one final flux test.

S. Fields: Isn’t it the EPA that makes the call that monitoring must continue and not the Colorado Department of Health. I think the EPA should make a decision about that and it should be made publically available. The milestones as part of the license should be part of the plan and the EPA should require them to continue to monitor. The EPA is not taking a hard enough line with this facility because this should all have been included in the milestones.

?: Are the milestones used to establish the cap? I think the decommissioning plan should include these milestones, but it may not.

The EPA told them they should have done the tests in June 2010, but they refused to do it. I don’t think we have seen anything from them since them, even though they did not have the milestones in their plan.

R. Rosnick: Unfortunately we don’t have a Region 8 representative on the line today to fill us in on the details of on-going conversations they have had with that facility and with CDPHE.

S. Fields: The Colorado Public Health Department is currently in violation of their agreement with NRC because they haven’t gotten the plan in place for public comment.

R. Rosnick: Your concern is a licensing requirement so it should be brought up with the NRC.

S. Fields: Subpart C can be requested by anyone, including the EPA.

R. Rosnick: At this point, if it is an issue with the reclamation plan, the State and Region 8 are the best resources to answer questions.

T. Stills: A lot of this goes to the point that this falls under the Subpart W plan. Some companies take advantage of the interim time between when a plant stops receiving waste and when they shut down is a problem that the EPA should consider.

R. Rosnick: Yes, the EPA will be looking at that. These facilities were built and operating before the 1989 published guidelines with strict rules.

T. Stills: I don't see why EPA is making that distinction.

R. Rosnick: The original distinction came in because there were a number of impoundments that could not be retrofitted. Those facilities were given a radon flux standard if they were pre-1989. Post 1989 facilities were asked to conform to different standards, work practice standards.

R. Rosnick: Update on the risk document that is still in draft form – ORIA management chain is still discussing what type of peer-review will take place. In January we discussed a peer-review process similar to the one being considered for 40 CFR 192 rulemaking. No decision has been made on that – issues and options have been presented. Hopefully by the time of our next call I will have more information for you on that.

The next issue to follow-up on – issues of impoundments where precipitation exceeds evaporation and we are in the process of obtaining and reviewing data that is available.

Subpart W references 40 CFR 192.32(a), and those are the UMTRCA standards for tailings impoundments. That regulation references 40 CFR 264.221 and at that regulation you find surface impoundments design and operating requirements for hazardous waste surface impoundments regulated under the Resource Conservation and Recovery Act (RCRA). If you look at 40 CFR 264.221(g) and (h) there are requirements that can be used to ensure proper operation of tailings impoundments. §264.221(g) states that impoundments must be designed, constructed, maintained and operated to prevent overtopping resulting from normal or abnormal operations; overfilling; wind and rain action; rainfall; run-on; malfunctions of level controllers, alarms and other equipment; and human error. §264.221(h) states that impoundments must have dikes that are designed, constructed and maintained with sufficient structural integrity to prevent massive failure of the dikes. In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the unit. We are reviewing the language in the regulation. This regulation for design and monitoring the facilities is a strict one and it is where we are starting from. We will continue to look at this; we are concerned that more facilities may exist in areas where precipitation exceeds evaporation.

T. Stills: Is a numeric emissions limit still being considered as part of this review?

R. Rosnick: It is being considered as an option. One of the issues that we are reviewing is that for impoundments regulated under Subpart W, not all contain solid tailings; the current method for determining radon flux is Method 115. One of the things we will be asking for comment on is are there any other methods that are more precise or easier to use without the loss of data quality, as compared to method 115? With areas without a solid surface, what methods are available to give us good radon readings? We are in the process of determining if they are efficient and on par with the Method 115 monitoring system.

O. Paulson: Besides Washington State, there are four facilities of impoundments in Texas (processing into the 1990's) by General Atomics and Chevron (Patamaria). One was in Ray Point, TX in the late 1960's, and one in Carnes County and the Conoco Conquista. Phil Saver and Chuck McClendon have been there a long time.

R. Rosnick: One of the things I can look at is getting in touch with the Texas groups to obtain any information they have for those facilities.

O. Paulson: You were talking about alternative methods and at one of the workshops Dr. Ken Baker and Al Cox presented a paper on radon measurements on fluid, essentially using a floating version of Method 115. They essentially put a life preserver out on the pond to get measurements. The Uranium Industry may be publishing information on other methods in the future.

R. Rosnick: I was at that meeting too and it is certainly a novel idea. We will be asking others to contribute information on any new methods other than the one we currently use. If others have good ideas, we want to see and review them.

There is one other type of uranium recovery operation I would like to discuss: heap leach pile. They have not existed in the US for a long time. There are some proposals for starting up new heap leach piles and I would like to know from the group if there are any historical radon measurements taken at former heap leach piles.

O. Paulson: I am not, but I am aware of one by Energy Fields or UMETCO.

T. Stills: Colorado license was operational until a few years ago. You said there are some proposals, can you list them. Durita – NRC documents and federal register documents. It was still licensed within the last 5 or 6 years. The ground water contamination was measured and it is now a DOE site.

R. Rosnick: I know of one – I believe it is Sheep Mountain, WY. There have been talks ongoing for the construction and operation of a heap leach pile with the NRC. That is the only one I am aware of.

S. Fields: I do have one issue that may come up with the Uranium Mill in Paradox Valley – having mines underground or surface mines right next to the Subpart W regulated site. Then you have a situation with emissions from a mill and a mine simultaneously. How would the EPA take into consideration two impact facilities with radon emissions from two types of facilities right next door to one another? Currently the EPA has not radon standards for pit mines. I just wonder in looking at Subpart W facilities, if you are really going to look at the Subpart W facility as totally independent of neighboring faculties that may contribute to pollution?

R. Rosnick: Well, I haven't given this any thought, but I assume the Region 8 people have. My hunch is that you could determine the difference between the radon and segregate between the radon values between the mine and Subpart W facility. I would expect the NRC guidelines for emission release could be useful. Good background monitoring would be the key to this. I would suspect it probably has been done and I would guess our Region 8 people have thought about this and have taken steps to accommodate that.

T. Stills: Are you looking at the mills located in the same geographic footprint and the health impacts with accumulative impacts? Because that is the way the industry is headed. Are you looking at that in the Subpart W review?

R. Rosnick: On this example, we don't have a lot to look at since it hasn't begun construction yet.

T. Stills: I would hope that in the absence of data you would regulate more rather than less if there is not data, since this is hazardous material.

O. Paulson: To be complete we should review what the future will look like with facilities located next to each other and how radon emissions will be impacted.

S. Fields: There is no provision under Subpart A for background monitoring prior to the installation of a radon facility. I think the EPA should take a look at the requirements that should be provided if facilities are located next to one another.

R. Rosnick: Subpart W includes tailings piles, which exist in heap leach piles. This is one school of thought we are reviewing. So we are looking at this entire spectrum. There may be other collection ponds, evaporation ponds that may contain material that would fall under Subpart W. Where does the radon fit within our regulations?

S. Fields: This was discussed at the NRC workshop in January about whether Subpart W would cover heap leach piles. The EPA has full authority to create another subpart or regulate radionuclide material.

R. Rosnick: If you have any ideas or thoughts about this, please submit them to me. It is an interesting thing to debate and we would be more than happy to take your thoughts on this.

T. Stills: I appreciate the various debates we have had, they have been interesting and some have been productive. We, however, are past due on when the updates and revisions will be proposed. If you gamed us I would be stunned. If you have moved it out, we are at least owed an explanation.

R. Rosnick: Winter 2011 is not coming up until December 2011. I have not moved the date at all. Maybe this is a semantics problem, but winter 2011 has always meant December 2011.

O. Paulson: Mines have been co-located with pits and it is really nothing new. Separating radon from pits and mines may be difficult. With the high variability in the background and margin of error, soil radon levels and mine/pit radon levels – as it is all coming together the process will have to be carefully thought out before it is implemented.

R. Rosnick: We are going to be asking for new methods for how to measure radon levels in all these areas as they converge.

S. Cunningham: On the website you posted the ATSDR health assessment. That was a draft out for public comment, and the comment period ended in November 2010. In the title on the website, that is not evident. I would just like to request that is updated.

R. Rosnick: If that is the case, then I apologize and I will have it corrected. When the finalized document is released, I would appreciate if it could be submitted to me and I will post it on the website.

T. Stills: I would like to see more information listed on the website for us to review, as well as to have the 2010 FOIA responded to in the near future.

R. Rosnick: The FOIA is being processed. We attempted to contact you several times after we received the request, in an attempt to determine the scope of your inquiry, and you refused to speak with us. We are now going through every document that that might possibly be pertinent to your request. I have been doing a lot of juggling between the rulemaking and the FOIA. I suspect that we will complete the task and submit the information to you by no later than May 15.

Our next call is on July 7th at 11am EDT. Until we speak again, have a nice Spring.

ACTION ITEM:

- Reid: Reclamation plan and radon test milestones for the facility from Region 8 staff
- Reid: One of the things I can look at is getting in touch with the Texas groups to obtain any information they have for those facilities. Phil Saver has been there a long time.
- Reid: Will update the health assessment to reflect it is a draft.
- Reid: Post contractor emails and any others that have gone to me or the Regions.