

NETL Industry Programs Presentation (12-17-2000)

Title Slide: Hello, I am Linda Petersen, and I am here representing the Transuranic & Mixed Waste Focus Area, formerly the Mixed Waste Focus Area.

Our program has changed in two ways. Its name now reflects the transuranic element of the work we have always done. (It is also more difficult to pronounce 10x fast!). And the program is now co-managed in the field by Bill Owca from DOE-ID and Roger Nelson from the Carlsbad Field Office. Other than this, the program has not changed significantly.

By the way, Bill Owca sends his greetings. He usually gives this presentation. However, we ARE 17 days into the new fiscal year. And I'm not sure, but I think Bill has already expended his travel budget for the year!

My presentation today is about our anticipated applied research needs for Fiscal Year 2001 and beyond.

Key Discussion Points: I plan to discuss: the TMFA mission; the timeline we apply to Applied Research Calls; our program's technical objectives; and the program's technical structure before getting into specific applied research opportunities.

Regarding our **Mission:** The TMFA supplies technology solutions to our customers, the managers of mixed low level and mixed Transuranic waste throughout the DOE complex. We call these people our End Users.

We invest in solutions that will be deployed, and will have significant impact on our national mixed waste condition. We do this by:

- working closely with our user community to identify solutions that meet their needs
- and by working in partnership with them to ensure that these solutions are deployed.

Planning Horizon: We've learned from experience that technology development, demonstration, and deployment takes time, even under the best of circumstances. So, our vision for Applied Research must be out several years. This means that applied research projects starting in 2002 should reflect a deployment condition in the 2006 time frame at the earliest.

After applied research, there are still exploratory development, advanced development, engineering development, and demonstration to be achieved before a technology can be deployed.

Timing is one thing. Focus is another. As the kinks in the WIPP pipeline are worked out, as privatized contracts come on line, and as treatment capacity becomes available throughout the DOE complex in the next few years, our FA's technology development program should start to focus on a few critical items.

There will still be plenty of work left to do, but most challenges will be related to smaller quantity waste streams, and will be ancillary to primary treatment systems. The applied research needs we envision are discrete and relatively limited in scope and application. Yet they are very challenging.

Believe it or not, we have been working on the easy stuff. What remains is the really hard stuff. The challenge with mixed waste has always been its variable nature and combinations of matrices and contaminants. In the future, these mixtures will be even more challenging.

Technical Objectives: As I said, our objective is to provide solutions to End User needs. While this seems simple, is easy to lose sight of with all that is involved in research and development. So, I have listed here what we are attempting to accomplish:

- We want to enable sites to characterize containerized waste.
- We want enable them to handle and package waste for treatment or transportation.
- We want them to be able sites to use the TRUPACT to the maximum extent possible
- We want to provide treatments that are deployable alternatives to incineration.
- We want to maximize the deployability of waste stabilization technologies.
- We want to solve our users difficult or unique waste treatment and disposal problems.
- And, we want to improve off-gas monitoring and control systems

As I go through our applied research needs, remember these are our underlying objectives.

Produce Lines and Work Packages: Before I get into the specific applied research areas that we anticipate for Fiscal Year 2001 and beyond, I would like to digress into a brief lesson in bureaucracy. No DOE presentation would be complete with this!

Our program planning is structured in two levels. The first is product lines. This is an artificial budget planning level. Our three product lines are:

1. Material Handling and Characterization Solutions
2. Non-thermal treatment solutions
3. Thermal Treatment Solutions

The second program level is work packages within these three product lines. "Like activities are grouped within each work package. I am showing these to you, not bore you, but to show you how to access information within our Focus Area. Our website is broken into the same work packages, and it contains lots of information.

We, of course made the titles of our Work Packages as long and hard to appreciate as possible. I will simplify them in this discussion. Our Work Packages Are:

Under Product line 1:

WP-01: Non-Destructive Characterization

WP-03: Material Handling

WP-05: Payload Enhancement for transporting TRU waste

Under Product Line 2:

WP-07: Alternatives to Incineration

WP-08: Unique waste solutions

Product Line 3:

WP-06: Off-gas control and monitoring (We may also refer to this as emissions or effluent control & monitoring)

Don't worry about memorizing these. Just realize that, on our web site, technical information is broken out by work package. We have individual technical managers dedicated to each work package, and significant technical planning and reporting occurs at that level.

So if you need information on a subject, look in the work package that seems most appropriate. If you don't find a match, then it's probably in Unique waste, our catch-all category.

Focus area personnel and end users collected and ranked potential applied research areas from documented and undocumented needs and from environmental research trends. They ranked these into 3 groups:

- The 4 top-ranking research areas are in the first group. These are our top priority for the upcoming Applied Research Call.
- The 3 middle-ranking research areas will be our secondary priority for the upcoming Applied Research Call.
- And the 4 areas in the 3rd group will be our third priority for the upcoming call.

I'll now present where we see applied research opportunities in the coming years, by, you guessed it, Product Line and Work Package.

Have you noticed that sometimes a lot of time and effort is needed before technological advances occur? Look at how long it took us to get from the abacus through slide rules and to hand-held calculators. (It's a good thing DOE wasn't funding that project!)

Characterization still holds a number of interesting and challenging opportunities. As you can see, I've listed two areas of interest here. Both of these areas involve non-destructively assaying containerized waste or pieces of equipment for radiological or

hazardous contaminants. We intuitively know that crystal balls aren't reliable for this work. And tricorders are still a long way off, unless you know something I don't!

The first research area, one of our top-ranking activities, involves the Characterization of Radionuclides in Remote Handled Waste Containers. While non-destructive characterization methods are commercially available for contact-handled waste, these methods are not applicable to remote-handled wastes, primarily because the presence of large background signals makes it difficult to distinguish weak waste signals.

Another research area involves the Characterization of RCRA Materials (metals and organics) in Remote-Handled Waste Containers. Non-destructive assay for organic contaminants in containers is probably one of the most challenging problems we face. Our focus area personnel are tracking projects that characterize these materials in contact-handled waste containers. When these systems are developed and demonstrated, we will use the information gained to develop research requirements for characterization in remote-handled containers.

Payload Enhancement for TRU waste transportation presents us with some challenging, yet fairly small, applied research projects.

The TRUPACT transporter is licensed and being used regularly for shipping TRU waste to WIPP. However, the license to use this container was based on very conservative assumptions and calculations, which precludes a significant quantity of waste from being shipped. We have been successfully supporting research and development to enable additional waste to be shipped untreated.

We intend to continue working those activities, including new Hydrogen Getter Materials. Current getter materials don't perform well in the presence of VOC's, which much of the TRU waste contains. The Focus Area is currently monitoring 3 getter materials projects. Based on project results, new R&D requirements will be developed that meet the transportation container requirement sets.

The 2nd research area within this work package involves the Use on Non-Hydrogenous Materials. We currently line drums with polyethylene liners and package newly generated wastes in polyethylene bags. These hydrogenous materials, in the presence of radionuclides, lead to undesirable hydrogen gas generation. We would like to eliminate this gas generation source material.

No pun intended, but Incineration has been a hot topic for DOE recently. **Alternatives to Incineration** have been under development for many years, and interest in them has ebbed and flowed. This interest is currently on the upswing, for several reasons. The MACT rule makes incinerators harder to operate. Resistance to incineration among the DOE-affected communities seems to be on the rise. And some small quantity, difficult-to-treat, wastes may not be appropriate for incineration.

In the Applied Research Area, the problem we are currently considering involves mixed transuranic wastes with high activity Plutonium-238 contamination. We would like to find an alternative to incineration that either removes the Pu-238 or separates the hazardous/organic constituents from these wastes.

In our catch-all work package, **Unique Waste**, a top-ranking area of research interest involves Predicting Long Term Behavior using Short Term Performance Testing. The EPA and the Nuclear Regulatory Commission currently require the evaluation of waste form performance via a series of short-term performance tests. But various stakeholder groups have challenged the reliability of these tests as a method of predicting long-term waste performance.

Another research area in the unique waste work package involves the Selection of Materials of Use in Extreme Environments. Many non-thermal treatment facilities have experienced material failures during operation due to extreme operating conditions. We are collecting information of these failures and attempting to develop research requirements for materials used in these applications.

There are still technology needs to be addressed in the area of **Emissions Monitoring and Removal**. They aren't the "new treatment system" kind of thing, but they are things that will facilitate permitting or improve operations.

Two research areas relate to Dioxins and Furans...Three Universities, under an EPA project, are identifying the mechanisms by which dioxins and furans form in thermal treatment facility off-gas systems. We would like to build on these efforts, by using their results...

FIRST...by developing research requirements for dioxins and furans in NON-THERMAL treatment facility off-gas systems.

ALSO...by targeting a call for next generation THERMAL treatment facility off-gas systems in this research area.

And finally, Focus Area are currently monitoring several EPA and DOE Emissions Monitoring and Control Device projects. Based on the results of these projects...

We will develop R&D requirements for the next generation of monitors and control devices for NON-THERMAL treatment facilities.

And we will develop similar R&D requirements for the next generation of monitors and control devices for THERMAL treatment facilities

Instead of a **summary**, I'd like to refer you to the TMFA web site, where you can get a lot of good information on technical problems, solution plans, technical documents, and contacts. Please don't hesitate to contact us if you have any questions or great ideas. Thank you!