

Study of State Soil Arsenic Regulations

Conducted by the Association for the Environmental Health of Soils
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Objective: The objective of the survey is to determine how arsenic in soil is regulated nationally. The following series of questions were developed to help define how soil screening thresholds and remedial action levels are established, and how risk assessment is used in the process.

As of December 1, 1998 a total of 34 (out of 50) states had responded. These include: Alabama, Alaska, Arizona, Arkansas, California, Connecticut, Delaware, Denver, Florida, Hawaii, Illinois, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Mississippi, Missouri, Montana, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Virginia, Washington, Wyoming.

Section I - General Information

- 2a. What is the range of naturally occurring background concentrations for soil arsenic in your state? (see Table 2)
- 2b. How was this background concentration established? (see Table 2)
- 2c. How does your state use background concentration in soil criteria? (see Table 2)
- 2d. Does your state consider adjacent property backgrounds, even if above naturally occurring background, in enforcing cleanup levels?

Yes **21** No **9** Don't Know **4**

Yes - AL, AR, CA, DE, FL, IL, HI², KY³, ME, MD, MI⁴, MS, MO, NJ⁵, NY, ND, OK, SC, TX, WA, WY

No - AK, AZ, CO¹, CT, KS, NH, OH, OR, VA

Don't know - IA, MT, NM, TN

Notes- **Colorado:** Primary consideration is whether adjacent property was impacted by Waste or not.¹

Hawaii: Sometimes.²

Kentucky: To determine levels that must be remediated.³

Michigan: Sometimes, but only if it is not attributable to a release.⁴

New Jersey: Adjacent property levels are considered only if they represent natural background.⁵

Table 2

State	Range 2a.	Established 2b.	Use 2c.
AK	17.3 mg/kg	Geochemical Atlas of Alaska	Compare the statistical mean conc for each Hazd substance/compare the max hazd substance conc detected.
AL	.1 - 10	US Geological Survey 1984	RCRA clean closure: to indicate disposal activities
AZ	1.4 - 97 mg/kg	USGS sampling of surficial soils in Boerngen & Shacklette, 1981, USGS Open-file Report 81-197.	Naturally occurring contaminate levels can be used as cleanup levels.
AR	1.1 - 16.7 ppm	Regional numbers	Considered on site specific basis after screening process.
CA	5-40(SF Bay Area) 5-20(southern cal.) thousands(gold country)	Background levels of trace elements in Southern California soils, Contract #89-T0081, Cal. EPA/Protocol for determining background conc of metals in soils at Lawrence Berkeley National Laboratory, 1995.	Realistic standard in setting cleanup levels.
CO	4 - 40 ppm	Site-specific data collection	If risk-based clean-up levels fall below background, the background values are used as the clean-up standards
CT	Up to 10 ppm	DEP paper covering New England w/CT data	Criterion for soil cleanup
DE	0.4 mg/kg	From historical site investigations	Risk assessments, remediation standard requirements
FL	0 - 3 mg/kg	Empirically	To modify the SCTL (Soil Concentration Target Limit)
HI	0.93 to 5 mg/kg	The background samples are collected from noncontaminated areas or from subsurface of the study areas. Statistical analyses were applied. Further studies are needed to confirm naturally occurring background concentrations.	To establish action levels
IL	0.35 - 24.0 ppm	Survey of data reported to agency during site investigation.	Chemicals may be excluded as chemical of concern for a site by comparison to background and background conc. may be used as remediation objectives.
IA	5 - 10 mg/kg	Approximation based on experience	Informally, no action required when near background levels.
KS	Non detect - <100 mg/kg	Review of data selected from various sites across the state.	As a Tier 1 approach, use background if exceeds 10 ⁻⁶ cancer or H.I. = 1.0
KY	0.1 - 10 mg/kg	Based on analyzing samples from across the state which were labeled as "background"	To determine presence or absence of contamination
ME	1 - 28 mg/kg	Based on data available from 5 sites in Maine	Inorganic contaminants present at concentrations greater than soil criteria; background is considered the critical benchmark
MD	No background est.	Not available	No state soil criteria
MI	0.1 - 11.0 mg/kg	Background as conc established through a MI background soil survey conducted by Waste Management Division.	A background concentration is used as a default cleanup criterion when it is higher than the calculated criteria.
MS	0 - 26 ppm (4 - 10 Avg.)	USGS paper 1270- Elemental Concentration in Soils & Other Surficial Materials...	Background concentration can be considered as an alternative cleanup standard.
MO	Not available	Chemical analysis of many soil samples taken during an agriculture soil survey which included soil chemical characteristic information.	Don't usually set cleanup goals lower than proven background concentrations.
MT	Non detect – 100's ppm in geothermic areas.	Via soil testing (mostly XRF).	Take them into account, but use risk based human health numbers as action levels.
NH	0 - 12 mg/kg	From a database of soil samples from playgrounds and background levels at sites that are then used for biosolid applications. The 95th percentile value of the data is used.	Background is used as a cleanup standard when risk based numbers are lower.
NM	.015 - 17.00 mg/kg	Testing done by Sandia Labs	To establish cleanup of contaminated sites.
NJ	0.02 – 350 ppm	DEP background testing and review of sites under DEP oversight	Legislation states that remediation is not to be required below regional natural background levels.
NY	3 - 12 ppm	Site specific data is preferred but literature data is used	For inorganic materials, background is used as the starting point in determining the soil cleanup level.
ND	<0.1 - 34 mg/kg	Use of documented studies by USGS in Region	Comparative background to established contamination
OH	Non detect - 30 ppm	Using site data from several RCRA facilities that established background conc. for their sites	Setting up cleanup standards for metals only.
OK	0 - 32 mg/kg	USGS Soil survey and site specific background determinations for a variety of sites.	Sometimes criteria for no further action – sometimes for screening.
OR	1 - 10 ppm	Limited survey of cleanup sites	Natural background is considered to be protective of human health & the environment. Cleanup to background concentration, if higher than risk-based concentration.

Table 2 (continued)

State	Range 2a.	Established 2b.	Use 2c.
SC	2 - 11 mg/kg	Average of sites sampled statewide	To determine clean-up levels in most cases.
TN	0.1 - 120 ppm	TN Division of Superfund - from EPA or state site inspections.	Used to evaluate whether concentrations at a site are within natural background. Not all Divs. use background
TX	1 – 18 ppm	US Geological Survey	It can be used to screen contaminants from a risk assessment; it can be used as a cleanup level.
VA	Varies from site to site	By sampling	Not available
WA	0.5 - 28.6 mg/kg	Background soil survey	Background concentration of 20 mg/kg is used as the cleanup standard if the human health value is below background. 1.67 mg/kg for human health
WY	Not available	Not available	Site specific only - won't allow use of regional background

3a. What are the sources of soil arsenic at contaminated INDUSTRIAL sites?

Source	States Reporting Sources
Mining wastes	AK, AL, AR, AZ, CA(>100 sites), CO(>25 sites), FL, KY, ME, MD, MT(>50 sites), OH(2 sites), OK(2 sites), OR, SC, TN, WA, WY
Coal dust	AL, AZ, DE, FL, KS(20-25 manufactured coal gas sites), KY, MD, NH(>2 sites), OR, SC, TN, WA
Coal gasification facility	FL(23 sites), ND(1 site)
Fly ash	AK, AL, AR, AZ, FL, KY, ME, OH(3 sites), SC, TN, TX, WA
Foundries	KY
Glass manufacturing	FL(1 site), IL(1 site)
Hazardous Waste Treatment	OH
Highway recycling facility	ND(1 site)
Phosphate fertilizers	AL, AR, AZ, DE, FL, KS(at least 1 site), MS, TN, TX, WA
Treated wood	AK, AL(5 sites), AR, AZ, CA(>100 sites), CO(~5 sites), DE, FL, HI, IL(2 sites), ME, MD, MS, MO(at least 1 site), NH(>1 site), NY, OH(4 sites), OK (10-15 sites), OR, SC, TN, TX, WA, WY
Pesticides, herbicides, defoliants, ripening agent	AL(3 sites), AR, AZ, CA(>1000 sites), CO(~5 sites), FL, HI, IL(several sites), ME, MD, MS, MO(>3 sites), NH(>2 apple orchard sites), NJ, NY, OH(2 sites), OK, OR, TN, TX, WA
Potliners (AL production)	AL(2 sites)
Recovered screened material (RSMs) or other backfilled materials	FL, MD, NH(>3 sites), OR, TN, WA
Land applied domestic wastewater sludge	AL, FL, KY, OR, SC, TN, TX, WA
Land applied industrial wastewater sludge	AL, FL, MS, OR, SC, TN, TX, WA
Landfilled pharmaceutical waste & wastewater sludge	IA(2 sites)
Lead-acid battery recycling	FL
Livestock dip vats	AL, AR, FL, MS, OK, OR, TN, TX, WA
Metal finishing	OH
Metal plates	KY
Paint shops	OH
Raw materials assoc. with manufacturing processes	NJ
Sand and gravel facilities/operations	MD
Shot rock	AK
Smelters	OK(17 sites), TX
Steel production waste	AL(2 sites), FL(3 sites)
Waste management facility	NH(1 site)

Note: Industrial site source data not available for - CT, MI, NM and VA.

3b. What ranges of soil arsenic contamination are found in your state's Industrial sites?

Range	States that reported
<1 mg/kg	AR , FL, KY, MD, MT, NJ, ND, OH, TN, TX
1-10 mg/kg	AR, AZ, DE, FL, IL, IA, KY, MD, MS, MT, NJ, ND, OH, OR, TN, TX
10-100 mg/kg	AR, AZ, CA, CO, DE, FL, HI, IL, KY, ME, MD, MS, MT, NH, NJ, ND, OH, OK, OR, SC, TN, TX
100-1000 mg/kg	AR, AZ, CA, CO, DE, FL, HI, IL, KY, ME, MD, MS, MT, NJ, ND, OK, OR, SC, TN, TX
>1000 mg/kg	CA, CO, DE, FL, HI, IA, KS, KY, MS, MO, MT, NJ, OR, TN, TX, WA

Note: New York reported – Approx ½ dozen inactive hazardous waste sites have been driven by arsenic contamination with levels in the hundreds and thousands of ppm.

4a. What are the sources of soil arsenic at contaminated RESIDENTIAL/ RECREATIONAL sites?

Source	States Reporting Sources
Mining wastes	AK, AR, AZ, CA(>1000 sites), CO(>25 sites), MD, MO(at least 2 sites), MT(>50 sites), OH, OK(2 sites), OR, SC, TN, WA
Coal dust	KS(20-25 manufactured coal gas sites), KY, MD, OR, TN, WA
Fly ash	AK, AZ, FL, OH, TN, WA
Glass manufacturing	IL(1 site)
Phosphate fertilizers	AR, AZ, FL, MS, SC, TN, TX, WA
Treated wood	AK, CA (~20 sites), CO(~5 sites), CT, FL, MD, OK, OR, TN, TX, WA
Pesticides, herbicides, defoliants, ripening agent	AR, AZ, CA(>1000 sites), CO(~5 sites), CT(many sites), FL, HI, KY, MD, NH, ND, NY, OK, TN, TX, WA
Agricultural uses	AZ, CA(>1000 sites), CT(many sites), FL, HI, KY, MS, NH(2 sites), NJ, ND, OR, TX, WA
Right-of-way	AZ, CA(>1000 sites), FL, MS, OR, WA
Manufacturing	OR, TX, WA
Golf course	AZ, FL, NJ, OR, WA
Recovered screened material (RSMs) or other backfilled materials	MD, NH(1 thermally treated site), OR , TN, WA
Land applied domestic wastewater sludge	OR, TN, WA
Land applied industrial wastewater sludge	OR, TN, WA
Landfilled pharmaceutical waste & wastewater sludge	IA(2 sites)
Livestock dip vats	FL, OK, OR, TN, WA
Shot rock	AK
Smelters	OK(17 sites), TX, WA
Plating activities	TX

Note: Residential source data not reported for: AL, DE, ME, MI, NM, VA, WY

4b. What ranges of soil arsenic contamination are found in your state's Residential sites?

Range	States that reported
<1 mg/kg	AL, AR, AZ, DE, FL, KS, KY, MD, MS, MT, NJ, ND, OH, TX
1-10 mg/kg	AL, AR, AZ, CA, DE, FL, IA, KS, KY, MD, MS, MT, NJ, ND, OH, OK, OR, SC, TX
10-100 mg/kg	AL, AR, AZ, CA, CO, CT, FL, HI, IL, IA, KS, MD, MS, MO, MT, NH, NJ, ND, OK, OR, SC, TN, TX, WA(estimate)
100-1000 mg/kg	CA, CO, FL, MT, ND, OR, TX
>1000 mg/kg	CA, CO, MT, OR, TX, WA

5a. What are the sources of soil arsenic at contaminated AGRICULTURAL sites?

Source	State reporting source
Phosphate fertilizers	AZ, FL, SC, TX, WA
Pesticides	AR, AZ, CA, CT ¹ (many sites), FL, HI, KY, MS, NH(2 sites), NJ, ND, TX, WA
Herbicides	AR, AZ, CA, FL, HI, KY, MS, TX, WA
Defoliant	AR, AZ, CA, FL, KY, MS, TX, WA
Ripening Agents	AZ, TX, WA
Land applied domestic wastewater sludge	AZ, KY, WA
Land applied industrial wastewater sludge	AZ, SC, WA
Landfilled pharmaceutical waste & wastewater sludge	IA(2 sites)
Livestock dip vats	FL, MS, TX, WA
Mine smelting fallout	MT(>10 sites)

Note: Agricultural sources not reported for: AK, AL, CO, DE, IL, KS, MD, ME, MI, MO, NM, NY, OH, OK, OR, TN, VA, WY

CT¹ – agricultural sites are not affected by remediation standards

5b. What ranges of soil arsenic contamination are found in your state's Agricultural sites?

Range	States that reported
<1 mg/kg	AZ, KY, MS, MT, ND, TX
1-10 mg/kg	AZ, CA, FL, KY, MS, MT, ND, SC, TX
10-100 mg/kg	AZ, CA, CT, FL, KY, MS, MT, NH, NJ, ND, SC, TX, WA
100-1000 mg/kg	FL, MS, MT, NJ, ND, SC, WA
>1000 mg/kg	MS, MT

SECTION II - REGULATIONS

Definitions

Notification level: The level at which the state must be notified.

Action level (soil screen level): The level at which some type of action must be undertaken (e.g., risk assessment, institutional controls).

Cleanup level: The level to which remediation methods must attain.

6. Does your state have notification levels for soil arsenic?

Yes **4** No **27** Don't Know **3**

Yes - AL, DE, NM, SC

No - AK, AR, AZ, CA, CT, FL, HI, IL, IA, KS, KY, MD, MI, MS, MT, NH, NJ, ND,
NY, OH, OK, OR, TN, TX, VA, WA, WY

Don't Know - CO, ME, MO

If yes, please specify what level and give the rationale for it:

State	Area	Level	Rationale
AL	Industrial	5 ppm	TCLP for RCRA at generation
DE	Restricted	61 ppm	Protection of Human health
DE	Non-restricted	2 ppm	Protection of Human health
NM	Industrial	5 mg/L	RCRA reg limit for spills
NM	Residential	5 mg/L	RCRA reg limit for spills
NM	Agricultural	5 mg/L	RCRA reg limit for spill
NM	Recreational	5 mg/L	RCRA reg limit for spills
SC	Industrial	5 ppm	RCRA TCLP limit as hazardous waste

7. Does your state have action levels (i.e. soil screening levels) for soil arsenic?

Yes **23** No **8** Don't know **1**

Yes – AK, AL, AR, CA, CO, FL, HI, IL, KS, KY, MD, MI, MS, MO, MT, NH, NJ, ND,
OH, OK, OR, SC, TX

No – AZ, CT, IA, ME, NY, VA, WA, WY

Don't Know - NM

7. Continued:

If yes, please specify what level and give the rationale for it:

Industrial

State	Level	Rationale
AL	Background	Or Region 3 guidance RAGS, Region 4 CA guidance
AR	2.4 ppm	Carcinogenic effects
CO	4 ppm	Carcinogenic risk at 10^{-6} (Region III screening tables)
FL	3.7 mg/kg	1.0E-06 acceptable cancer risk level
HI	22 mg/kg	Based on non-carcinogenic effects; site specific risk assessment using industrial exposure factors may result in higher cleanup values
IL	3.0 ppm	1.0E-06 acceptable cancer risk level
KS	29 mg/kg	Threat to groundwater leachate dilution factor = 20
KY	0.85 mg/kg	Risk - based cleanup
MD	3.8 mg/kg	USEPA Region III Risk-Based Concentration (RBC), Maryland also considers issues such as mobility, populations exposed, ARARS
MI	23,000 ppb	Threat to groundwater leachate; based on drinking water criteria
MO	11 ppm	Any use soil levels. Above this level, institutional controls are required, then levels are based on risk
MT	500 ppm	Cancer risk (EPA)
NH	12 ppm	Background
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels at sites under review
ND		Above background
OH	~9.0 mg/kg	Site-specific cleanup standard based on a 1×10^{-5} risk goal and using industrial exposure factors
OK	20 mg/kg	Related to natural occurrence
OR	3 mg/kg	Risk-based (or natural background if higher)
SC	3.8 mg/kg	EPA Region III RBC Table
TX	200 ppm	Health-based policy level; can be lowered due to cross-media concerns

7. Continued:

Residential

State	Level	Rationale
AK	0.1 mg/kg	Migration to groundwater
AR	0.38 ppm	Carcinogenic effects
AR	22 ppm	Non-carcinogenic effects
CO	0.4 ppm	Carcinogenic risk at 10 ⁻⁶ (region III screening tables)
FL	0.8 ppm	1.0E-06 acceptable cancer risk level using default exposure assumptions
HI	22 mg/kg	Based on non-carcinogenic effects
IL	0.4 ppm	1.0E-06 Cancer risk
KS	Background or 11 mg/kg	10 ⁻⁵ cancer risk per KAR 28-78-11
KY	0.14 mg/kg	Risk-based cleanup
MD	0.43 mg/kg	USEPA Region III RBC
MI	6,600 ppb	Protection for human health via long-term soil ingestion and dermal exposure
MS		10 ⁻⁶ risk
MO	11 ppm	
MT	250 ppm	Cancer risk (EPA)
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels at sites under review
ND		Above background
OH	~4.0 mg/kg	Site-specific cleanup standard based on a 1x10 ⁻⁵ risk goal using residential exposure factors
OK	0.4 mg/kg	From EPA SSL document or natural background for the area
OR	0.4 mg/kg	Risk-based (or natural background if higher)
SC	0.43 mg/kg	EPA Region III RBC Table
TX	20 ppm	Health-based policy level; can be lowered due to cross-media concerns

Agricultural

State	Level	Rationale
MD	0.43 mg/kg	USEPA Region III RBC
MO	11 ppm	Any use soil levels. Above this level, institutional controls are required, then levels are based on risk
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels at sites under review
OH	~4.0 mg/kg	Site-specific cleanup standard based on a 1x10 ⁻⁵ risk goal using residential exposure factors
OR	Site-specific	Risk-based (or natural background if higher)

Recreational

State	Level	Rationale
MD	0.43 mg/kg	USEPA Region III RBC
MO	11 ppm	Any use soil levels. Above this level, institutional controls are required, then levels are based on risk
MT	1000 ppm	Cancer risk (EPA)
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels at sites under review
OH	~4.0 mg/kg	Site-specific cleanup standard based on a 1x10 ⁻⁵ risk goal using residential exposure factors
OR	Site-specific	Risk-based (or natural background if higher)

8. Does your state have specific cleanup levels for soil arsenic?

Yes **21** No **11** Don't know **0**

Yes- AK, AL, AZ, CT, FL, IL, KS, KY, ME, MI, MO, NH, NJ, NM, NY, OH, OR, SC, TN, TX, WA

No- AR, CA, CO, HI, IA, MD, MS, MT, ND, VA, WY

State	Comment
CO	Cleanup levels are site-specific and based on risk assessment considerations
HI	Site specific based on risk assessment
MI	The specific cleanup level is dependent upon the pathway that exceeds MI's Part 201 cleanup criteria
NM	RCRA regulatory limit threshold of 5.0 mg/l
NY	Determination of soil cleanup levels occurs on a site specific basis; the process starts with numerical soil cleanup objectives and ends with a site specific cleanup level after consideration of the alternatives
OH	Regarding SSLs, we do not have SSLs but do calculate site-specific cleanup standards based on a 1×10^{-5} risk goal; usually site-specific background concentrations are used; background standards have very specific criteria
OK	Site-specific
SC	Normally we would require cleanup to background level(s)

8. continued: If yes: a. please specify what level and give the rationale for it:

INDUSTRIAL

State	Level	Rationale
AL	Background	(RCRA) or site-specific risk based similar to Superfund RAG and Region 4 Guidance
AZ	10 mg/kg	Statewide average background level
CO	100-1000 ppm	Site-specific and based on risk assessment considerations
CT	10 ppm	Background
FL	3.7 mg/kg or site-specific	1×10^{-6} acceptable cancer risk level
IL	3.0 ppm	1×10^{-6} cancer risk ; Tier 1 (baseline) cleanup level, which may be modified by site-specific information and/or exclusion of pathways of exposure
KS	29 mg/kg	Tier 2 number; threat to groundwater, leachate dilution factor = 20
KY	0.85 mg/kg	Risk-based cleanup
ME	30 mg/kg	Direct contact risk to human health
MO	11 ppm	Deed restrictions and/or registry of the site is required if less than residential cleanup (11 ppm) is used
NH	12 ppm	background
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels found at sites under review
OR	Site-specific	Risk-based or natural background if higher
TN	16 ppm	We use EPA's proposed RPI Guidance Levels and proposed subpart S Fed. Reg. 7-27, 1990, vol. 55 (only one level for sites – 16 ppm)
WA	200 ppm	Human-health
TX	200 ppm	Health-based policy level; can be lowered due to cross-media concerns

8. continued:

RESIDENTIAL

State	Level	Rationale
AK	8 mg/kg (ingestion)	Arctic Zone – based on climate variations throughout state
AK	5 mg/kg (ingestion)	Under 40 inch zone – based on climate variations throughout state
AK	0.1 mg/kg (migration to groundwater)	Under 40 inch zone - based on climate variations throughout state; Over 40 inch zone - based on climate variations throughout state
AK	4 mg/kg (ingestion)	Over 40 inch zone - based on climate variations throughout state
AZ	10 mg/kg	Statewide average background level
CO	40-250 ppm	Site-specific and based on risk assessment considerations
CT	10 ppm	Background
FL	0.8 mg/kg	1 X 10 ⁻⁶ acceptable cancer risk level using default exposure assumptions
IL	0.4 ppm	1 X 10 ⁻⁶ cancer risk ; Tier 1 (baseline) cleanup level, which may be modified by site-specific information and/or exclusion of pathways of exposure
KS	11 mg/kg	Tier 2 number; 1 X 10 ⁻⁵ cancer risk per KAR 28-78-11
KY	0.14 mg/kg	Risk-based cleanup
ME	10 mg/kg	Direct contact risk to human health
MO	11 ppm	Any use level established by state health department
NH	12 ppm	Background
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels found at sites under review
NY	7.5 ppm	Background
OR	Site-specific	Risk-based or natural background if higher
TN	16 ppm	We use EPA's proposed RPI Guidance Levels and proposed subpart S Fed. Reg. 7-27, 1990, vol. 55 (only one level for sites – 16 ppm)
TX	20 ppm	Health-based policy level; can be lowered due to cross-media concerns
WA	20 ppm	Background - Note: proposed level of 7 ppm is under consideration

AGRICULTURAL

State	Level	Rationale
FL	Site-specific	1 X 10 ⁻⁶ acceptable cancer risk level using default exposure assumptions
MO	11 ppm	Deed restrictions and/or registry of the site is required if less than residential cleanup (11 ppm) is used
NH	12 ppm	Background
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels found at sites under review
OR	Site-specific	Risk-based or natural background if higher
TN	16 ppm	We use EPA's proposed RPI Guidance Levels and proposed subpart S Fed. Reg. 7-27, 1990, vol. 55 (only one level for sites – 16 ppm)

8. continued:

RECREATIONAL

State	Level	Rationale
CO	100-1000 ppm	Site-specific and based on risk assessment considerations
FL	Site-specific	1 X 10 ⁻⁶ acceptable cancer risk level using default exposure assumptions
MO	11 ppm	Deed restrictions and/or registry of the site is required if less than residential cleanup (11 ppm) is used
NH	12 ppm	Background
NJ	20 ppm	Based on background studies and the 95 th percentile of background levels found at sites under review
OR	Site-specific	Risk-based or natural background if higher
TN	16 ppm	We use EPA's proposed RPI Guidance Levels and proposed subpart S Fed. Reg. 7-27, 1990, vol. 55 (only one level for sites – 16 ppm)

8. continued

b. If yes, are the cleanup levels:

The following 26 states replied: AK, AL, AZ, CA, CO, CT, FL, HI, IL, IA, KS, KY, ME, MI, MS, MO, NH, NJ, NM, NY, OH, OK, OR, SC, TX, WA

Note: NJ – because arsenic criteria are based on background and background is greater than the health based level, there is no need for criteria based on land use. Everything basically defaults to background.
 NY – cleanup objectives are based on unrestricted use which is the starting point in determining soil cleanup levels on a site specific basis.

	Yes	No	Don't know	Planned
Tiered?	AK, AL, AZ, FL, IL, KS, ME ¹ , MI, NH, TX, WA	CT, KY, OH, OR, SC	MO, NM	IA
Based on current use?	AK, AL, AZ, CA, CO, FL, HI, IL, KS, KY, ME, MI, MS, NH, OK, OR, SC, TX, WA	CT, MO, OH	NM	IA
Based on future use?	AK, AL ² , AZ, CA, CO, FL, HI, IL, KS, KY, ME, MI, MS, MO, NH, OH ³ , OK, OR, SC, TX, WA	CT	NM	IA
Based on groundwater considerations?	AK, AL ² , AZ, CA., CO ⁴ , FL, IL, KS, ME, MI, MS, OK, OR, SC, WA	CT, HI, IA, MO, NH, OH ⁵ ,	NM	

¹ ME – we have a default level, a guide method for multiple contamination, and a full risk assessment option

² AL – non residential standards requiring contingent management standards.

³ OH – residential or industrial; if industrial must be deed restricted.

⁴ CO – sometimes based on groundwater considerations.

⁵ OH – the cleanup standard given (4 ppm) was not based on any groundwater considerations; however, if groundwater is an issue at the site, the cleanup standard would be adjusted.

9. What regulations drive soil arsenic cleanup levels at contaminated sites? Check as many as apply.

The following 34 states replied: AK, AL, AR, AZ, CA, CO, CT, DE, FL, HI, IL, IA, KS, KY, ME, MD, MI, MS, MO, MT, NH, NJ, NM, ND, NY, OH, OK, OR, SC, TN, TX, VA, WA, WY

Note: DE – any combination of any regulatory agency listed below.

TN – RCRA and drinking water standards dictate guidance levels.

VA – risk-based, site-specific.

	Industrial	Residential	Agricultural	Recreational
CERCLA	AK, AL, AZ, CO, FL, HI, IL, IA, KS, KY, ME, MD, MI, MO, MT, NH, ND, NY, OH, OK, SC, TX, WA	AK, AL, AR, AZ, CA, CO, FL, HI, IL, KS, KY, ME, MD, MI, MS, MO, MT, NY, OH, OK, SC, TX, WA	AK, AL, AZ, FL, HI, KY, ME, MI, MO, NY, OK	AK, AL, AZ, CO, FL, HI, KY, ME, MI, MO, MT, NY
TSCA	MI	MI, MS	MI	MI
RCRA	AK, AL, AR, AZ, CA, FL, IL, KS, KY, MI, MO, NH, NM, ND, OH, OK, SC, TX, WA, WY	AK, AL, AR, AZ, CA, FL, KS, KY, MI, MS, MO, NM, OH, OK, TX, WA, WY	AK, AL, AR, AZ, FL, KY, MI, MO, NM, OK, WY	AK, AL, AR, AZ, FL, KY, MI, MO, NM, WY
Drinking water standards	AK, AL, AR, AZ, CA, CO, FL, IL, KS, KY, ME, MD, MI, MO, MT, ND, NY, OH, SC, TX, WA, WY	AK, AL, AR, AZ, CA, CO, FL, IL, KS, KY, ME, MD, MI, MO, MT, ND, NY, OH, OK, SC, TX, WA, WY	AK, AL, AR, AZ, CA, FL, KY, ME, MI, MO, ND, NY, WY	AK, AL, AR, AZ, CA, CO, FL, KY, ME, MI, MO, MT, ND, NY, WY
Surface water standards	AK, AR, AZ, FL, KS, KY, ME, MD, MI, MT, ND, NY, OH, TX, WA, WY	AK, AR, AZ, FL, KS, KY, ME, MD, MT, ND, NY, OH, OK, TX, WA, WY	AK, AR, AZ, FL, KY, ME, ND, NY, OK, WY	AK, AR, AZ, FL, KY, ME, MT, ND, NY, OK, WY
State regulations	AK, AL, AR, AZ, CT, FL, IL, IA, KS, KY, ME, MD, MI, MO, MT, NH, NJ, NM, NY, OH, OK, OR, SC, TX, WA, WY	AK, AL, AR, AZ, CT, FL, IL, IA, KS, KY, ME, MD, MS, MO, MT, NH, NJ, NM, NY, OH, OK, OR, SC, TX, WA, WY	AK, AL, AR, AZ, FL, IA, KY, ME, MO, NH, NJ, NM, NY, OK, OR, WY	AK, AL, AR, AZ, FL, IA, KY, ME, MO, MT, NH, NJ, NM, NY, OK, OR, WY
County regulations				
Municipal regulations				
Other (please specify)				
Voluntary cleanup & property redevelopment program	KS	KS		

10. What other issues drive soil arsenic cleanup levels at contaminated sites? Check as many as apply.

The following 27 states replied: AL, AR, AZ, CA, CO, DE, FL, IL, IA, KS, KY, ME, MI, MS, MO, MT, NJ, ND, NY, OH, OK, OR, SC, TN, TX, WA, WY

Note: MI – depends on the specifics of the site in question.

TN uses their own Guidance Levels to drive cleanup levels.

	Industrial	Residential	Agricultural	Recreational
Legislative mandate	DE, FL, IL, IA, KS, KY, MO, NJ, OR, SC	DE, FL, IL, IA, KS, KY, NJ, OR	FL, IA, NJ, OR	FL, IA, NJ, OR
Action groups	DE, FL, KS, ND, SC	CA, DE, FL, KS, NY	FL, SC	CA, FL
Public concern/awareness	AZ, DE, FL, ME, MT, ND, OH, OK, SC, WY	AZ, CA, DE, FL, ME, MT, ND, NY, OH, OK, WY	AZ, FL, ME, OK, SC, WY	AZ, CA, FL, ME, MT, OK, WY
Groundwater pathway/ Leachability	AL, AR, AZ, CA, CO, DE, FL, IL, IA, KS, ME, MO, MT, ND, OH, OK, SC, TX, WA, WY	AL, AR, AZ, CA, CO, DE, FL, IL, KS, ME, MS, MT, ND, NY, OH, OK, TX, WA, WY	AL, AR, AZ, CA, FL, ME, OK, SC, WY	AL, AR, AZ, CA, FL, ME, MT, ND, OK, WY
Surface water pathway	AL, AR, AZ, CA, CO, DE, FL, KS, ME, MT, ND, OH, OK, SC, TX, WA, WY	AL, AR, AZ, CA, CO, DE, FL, KS, ME, MS, MT, ND, NY, OH, OK, TX, WA, WY	AL, AR, AZ, CA, FL, ME, OK, SC, WY	AL, AR, AZ, CA, FL, KY, ME, MT, ND, OK, WY
Wildlife criteria	AL, AR, AZ, FL, ME, OH, OK, SC, TX, WY	AL, AR, AZ, FL, ME, MS, NY, OH, OK, TX, WY	AL, AR, AZ, CA, FL, ME, OK, SC, WY	AL, AR, AZ, CA, CO, FL, ME, ND, OK, WY
Politics	CO, DE, FL, MO, OH, SC, WA	CA, CO, DE, FL, OH, WA	FL	CA, CO, FL
Other (please specify)				
State regulatory agencies		CO		CO

11a. Does your state have regulations similar to the US EPA’s Part 503 regulations that govern the land application of biosolids derived from domestic wastewater sludges?

Yes **22** No **1** Don’t know **11**

Yes- AK, AZ, CA, FL, HI, IL, IA, KY, MD, MI, MS, MO, NH, NJ, NM, NY, OK, OR, SC, TX, WA, WY

No- KS

Don’t know- AL, AR, CO, CT, DE, ME, MT, ND, OH, TN

11b. If yes, do these regulations set arsenic levels in biosolids?

Yes **15** No **5** Don’t know **8**

WY Yes- AK, AZ, CA, FL, HI, IA, MI, MO, NH, NJ, OR, SC, TX, WA,

No- IL, KY, MD, MS, NY

Don’t know- AL, ME, MT, NM, ND, OH, TN

If yes:

a. What are the acceptable levels for arsenic in biosolids?

State	Acceptable levels for arsenic in biosolids
AK	Ranges from 30-73 mg/kg (dry weight basis) – depending on monofill conditions
AZ	Same as EPA – 75 mg/kg ceiling pollutant concentration, 41 kg/hectare (≈19 mg/kg) cumulative loading rate
CA	Proposed regulation of 200 mg/kg
FL	40 mg/kg
HI	Same as EPA’s Part 503 regulations
IA	50 mg/kg
MI	Same as Part 503 - 41 mg/kg dry weight
MO	Same as EPA’s
NH	Current standard is 75 mg/kg; proposed future standard is 32 mg/kg; both are based on dry weight
NJ	Same as presented in Part 503 regulations
OR	41 mg/kg monthly average and 75 mg/kg maximum
SC	41 mg/kg
TX	Ceiling concentration of 75 mg/kg (dry wt basis); monthly average sludge concentration of 41 mg/kg (dry wt basis)
WY	The standards are analogous to those in the Federal Regulations

11b. continued

- b. How do these regulations interact with your state's soil arsenic cleanup requirements?

State	Interaction
AK	No interaction
AZ	Biosolids for application/cleanup levels for required remediations. Exceeding the application concentration does not trigger cleanup
CA	No interaction whatsoever
FL	Not consistent
IA	They do not
MI	Unable to answer
MO	No known interaction
NH	There is little interaction
NJ	No problem in the interaction noted
OR	They do not
SC	They are in line and acceptable as total metal concentrations
WY	Limited interaction since WY does not have soil arsenic cleanup requirements

SECTION III - REMEDIATION

12. Please indicate the types of soil arsenic remedial technologies that your state allows. Of those allowed, which have shown success (please indicate percent successful if appropriate)? Check as many as apply.

The following 30 states replied: AK, AL, AR, AZ, CA, CO, DE, FL, HI, IL, IA, KS, KY, MD, MI, MS, MO, MT, NH, ND, NJ, NY, OH, OK, OR, SC, TN, TX, WA, WY

Technology	Allowed	Successful	Unsuccessful
In situ soil washing	DE, IL, KY, MI, MS, MO, ND, OH, OR, TX, WA	MI	
Ex situ soil washing	AZ, CO, DE, FL, IL, KY, MI, MS, MO, ND, OH, OR, TX, WA	AZ, CO, MI (100%), OR	
Excavation/landfill disposal	AL (2), AZ, CA, CO, DE, FL, IL, KS, KY, MD, MI, MS, MO, MT, NH, ND, NY, OH, OK, OR, SC, TX, WA, WY	AL (2), AZ, CA, CO, DE, FL, KS, KY, MI (100%), MT, NH, NJ, NY, OH, OK, OR, SC, TX, WY	
Electrokinetics	DE, FL, IL, KY, MI, MS, MO, ND, OH, OR, TX, WA	MI (has not been tried yet)	
Phytoremediation	DE, FL, IL, KY, MI, MS, MO, ND, OH, OR, TX, WA	MI (red stage only)	
Stabilization	AL (1), AZ, DE, FL, IL, KS, KY, MI, MS, MO, MT, ND, NY, OH, OK, OR, SC, TX, WA	AL (1), AZ, DE, FL, MI (100%), MT, NJ, NY, OH, OK, OR, SC	
Vitrification	AZ, DE, FL, IL, KY, MI, MS, MO, MT, ND, OH, OR, TX, WA	AZ, MI (100%), MT	
Other (please specify)			
Cover to mitigate	CO	CO	
Direct exposure	CO		
Phosphate amendment	CO		
Capping/Slurry wall	FL, IA, TX	FL, IA, TX	
Soil dilution	MT	MT	

12. continued

State	Comment
AK	In my experience, arsenic has not driven any cleanups; any of the below (technologies) could be considered
AL	None are specifically disallowed; selection is site-specific
AR	Determined on case-by-case basis during Feasibility Studies
DE	Phytoremediation is under consideration on current site
HI	HI will consider any technology but effectiveness must be shown
IL	There is no prohibition on remedial technologies, but demonstrations of effectiveness may be required
KS	Would consider any technology provided it met acceptable criteria
MO	Technologies used are considered on a site specific basis. Compliance with cleanup goals, cost and implementability are considered. Unaware of any regulations that prohibit use of any specific technology.
NJ	Allow available technology once it is determined to be appropriate and feasible at a site.
OH	Only RCRA closure program has had experience with removal/excavation or landfill disposal of arsenic contamination above background levels or risk-based standards, whichever is applicable.
TN	All technologies would be considered on a site specific basis.
WA	A lot has been tried with varying degrees of success.

13. Can reducing exposure (e.g., prevention of possible exposure via restricted access or barriers such as pavement) impact cleanup activities?

Yes **30** No **1** Don't know **1**

Yes- AK, AL, AR, AZ, CA, CO, DE, FL, HI, IL, IA, KS, KY, ME, MD, MI, MS, MO, MT, NH, ND, NJ, NY, OH, OK, OR, SC, TN, TX, WA

No- WY

Don't know- NM

If yes, is an institutional control (e.g., deed restriction, deed notification) required? If yes, please specify what type.

Yes **27** No **1** Don't know **3**

Yes- AK, AL, AR, AZ, CA, CO, DE, FL, IL, IA, KS, KY, ME, MD, MI, MS, MO, MT, NH, NJ, NY, OH, OK, OR, SC, TX, WA

No- HI

Don't know- NM, ND, TN

State	
AK	Restriction or notification depending upon site factors could be applied
AL	Deed restriction (RCRA)
AR	Dependent on site specific conditions whether a restriction or notification is warranted
AZ	A legal mechanism such as post-closure permit or deed restriction
CA	Restriction which accompanies title to property
CO	Barriers must be maintained via legal mechanisms (unsure of extent of mechanisms)
FL	Deed restriction, deed notification, record in books of public record
IL	Restrictions on property use and/or groundwater use are included in "No Further Remediation" letter, and must be filed with county recorder
IA	Per proposed rules only - environmental easement granted to the state
KS	Groundwater use, fencing, land-use
KY	Deed restriction if waste left in-place
ME	We prefer deed restriction/notices
MI	Deed restrictions
MS	Deed restrictions
MO	The property would be placed on MO Registry of Contaminated Sites; this also contains requirements for notification of prospective buyers, state approval for change of use and notices in the property chain of title
MT	Currently in process – will probably be a deed restriction
NH	Activity and use restriction placed in the deed
NJ	Deed notice
OH	Deed restriction
OK	Notice to deed
OR	Deed restriction of use of property
SC	Land use restriction
TX	Deed notification is required by the state; deed restriction may be requested by the property owner where wastes are to be left on site

SECTION IV – ANALYTICAL

14a. What analytical methods for soil arsenic detection does your state require? Use? Allow? Check as many as apply.

The following 29 states replied: AK, AL, AZ, CA, CO, DE, FL, HI, IL, KS, KY, ME, MD, MI, MS, MO, MT, NH, NM, ND, NY, OH, OK, OR, SC, TN, TX, WA, WY

Note: AL: any that are appropriate SW-846 methods;

TN: any appropriate SW-846 Method;

WY: no specific requirements.

NH: 7060A is preferred; data from other appropriate SW846 methods will be accepted

Instrumental Analysis Method	Required	Used	Allowed
US EPA SW-846 Method 6010 (ICP-AES)		AZ, CA, CO, DE, FL, KS, ME, MD, MT, NJ, ND, NY, OH, OK, OR, TX, WA	AK, CA, CO, DE, FL, HI, IL, KS, ME, MD, MI, MS, NM, ND, NJ, NY, OH, OR, TX
US EPA SW-846 Method 6020 (ICP-MS)		AZ, CA, CO, DE, FL, KS, ND, NY, OK, TX, WA	AK, CA, CO, DE, FL, HI, IL, KS, ME, MD, MI, MS, NM, ND, NJ, NY, OH, OR, TX
US EPA SW-846 Method 7060A (AA, furnace technique)	NH	AZ, CA, CO, DE, FL, KS, KY, ME, MD, MO, MT, NH, NJ, OH, OK, OR, TX, WA	AK, CA, CO, DE, FL, HI, IL, KS, ME, MD, MI, MS, NM, ND, NJ, OH, OR, SC, TX
US EPA SW-846 Method 7061A (AA, gaseous hydride)		AZ, CA, CO, DE, FL, KS, NY, OH, TX, WA	AK, CA, CO, DE, FL, HI, IL, KS, ME, MD, MI, MS, NM, ND, NJ, NY, OH, OR, SC, TX
US EPA SW-846 Method 7062 (AA, gaseous borohydride)		CO, DE, FL, KS, NY, OH	AK, CO, DE, FL, HI, IL, KS, ME, MI, MS, NM, ND, NJ, NY, OH, OR
US EPA SW-846 Method 7063 (anode stripping voltametry)		DE, KS, NY, OH	AK, DE, HI, IL, KS, ME, MS, NJ, NM, ND, NY, OH, OR
Other (please specify)			
Water Methods 200.7		IL	
US EPA SW-846 Method 6010B	SC		

14a. continued

Extraction/Digestion Method	Required	Used	Allowed
US EPA SW-846 Method 3050	KY, NH, OK	CA, CO, DE, FL, IL, KS, MD, NH, NJ, NY, TX	AK, CA, CO, DE, FL, HI, IL, KS, MD, MI, MS, NM, ND, NJ, NY, OH, OR, TX
US EPA SW-846 Method 3050B		CA, CO, DE, KS, MD, NJ, NY, OR, TX	AK, CA, CO, DE, HI, IL, KS, ME, MD, MI, MS, NM, ND, NJ, NY, OH, OR, SC, TX
US EPA SW-846 Method 3051		CA, CO, DE, FL, KS, NJ, NY, OR, TX	AK, CA, CO, DE, FL, HI, IL, KS, MI, MS, NM, ND, NJ, NY, OH, OR, SC, TX
US EPA SW-846 Method 3051A	OK	CA, CO, DE, FL, MO, TX	AK, CA, CO, DE, FL, HI, IL, ME, MI, MS, NM, ND, OH, TX
US EPA SW-846 Method 3052		CA, CO, DE, FL, KS, NJ, NY	AK, CA, CO, DE, FL, HI, IL, KS, ME, MI, MS, NM, ND, NJ, NY, OH, OR, SC
Other (please specify)			
WET (Waste Extraction Test, CA Code of Regulations) Title 22, ch. 11, Article 5, Appendix 11	CA		
TCLP (as developed by CA)	CA		
US EPA SW-846 Method 3050A		IL	
State derived method based on SW-864 Method 3050A		IL	
Method 1311	SC		

14b. Has your state compared the recoveries obtainable from each method? If yes, please specify.

Yes **3** No **15** Don't know **10**

Yes- CA, DE, FL

No- AK, HI, KS, KY, ME, MI, MS, MO, NH, NY, OH, OK, OR, TX, WY

Don't know- AL,AZ, IL, IA, MT, ND, NJ, SC, TN, WA

State	
CA	WET test vs others
DE	Required by all laboratories as part of approval process to perform work under HSCA
FL	It is being done by the University of Florida
MI	The recoveries obtainable from each method have been compared by the EPA

Definitions

PQL: practical quantitation limit.

MDL: method detection limit.

15. Are MDLs or PQLs specified in the analytical methods used by your state for soil arsenic?

Yes **18** No **5** Don't know **6**

Yes- AK, AZ, CA, DE, IL, KS, KY, MI, MS, NH, NJ, NY, OH, OK, OR, SC, TX (laboratory specified; values below are generally used), WA

No- CO, FL, HI, IA, ME

Don't know- AL, MO, MT, NM, ND, TN

If yes: a. What MDL and PQL values are used?

Instrumental Analysis Method	MDL	PQL
US EPA SW-846 Method 6010 (ICP-AES)	5 ppm (NY) 0.2 mg/kg (OR) 2.5 ppm (WA soil)	25 ppm (WA soil) 50 µg/L (TX)
US EPA SW-846 Method 6020 (ICP-MS)	5 ppb (MI) 40 ppb (NY)	1 ppm (NY) 20 µg/L (TX)
US EPA SW-846 Method 7060A (AA, furnace technique)	0.015 mg/kg (KY) 5 ppb (MI) ≅ 200 µg/kg (MO) 1 mg/kg (NH) 0.5 mg/kg (OR) 0.05 ppm (WA soil)	0.1 ppm (IL) ≅ 500 µg/kg (MO) 0.5 ppm (WA soil)
US EPA SW-846 Method 7061A (AA, gaseous hydride)	5 ppb (MI) 0.1 ppm (WA soil)	1 ppm (WA soil) 5 µg/L (TX)
US EPA SW-846 Method 7062 (AA, gaseous borohydride)	5 ppb (MI)	
US EPA SW-846 Method 7063 (anode stripping voltametry)	5 ppb (MI)	
Other (please specify)		
IL Method 200.7	2.0 ppm (IL)	
Groundwater 7061	2 ppb (WA)	20 ppb (WA)
Groundwater 6010	53 ppb (WA)	530 ppb (WA)

Extraction/Digestion Method	MDL	PQL
US EPA SW-864 Method 3050	0.015 mg/kg (KY) 5 ppb (MI) < 0.5 mg/kg (NH)	
US EPA SW-864 Method 3050B	5 ppb (MI)	
US EPA SW-864 Method 3051	5 ppb (MI)	
US EPA SW-864 Method 3051A	5 ppb (MI)	
US EPA SW-846 Method 3052		
Other (please specify)		

15a. continued:

State	What MDL and PQL values are used?
AK	As specified by EPA method
AL	40CFR264 App. IX
AZ	MDLs from SW-846; PQLs established by lab when applying for licensure through AZ Dept. of Health Services
CA	Based upon statistical calculation of replicate sample matrix spikes. CA maintains a large hazardous materials laboratory to advise on MDL & PQL for individual matrices.
DE	MDLs are laboratory specific; PQLs are laboratory specific from HSCA samples.
IA	Will be developed under proposed rules
MO	Indicated 'don't know' but gave values in 15a
MS	MDLs are in each of the EPA methods and PQLs are media specific
NJ	All analytical work must be generated by a certified lab. Lab regulations require the lab to develop method specific and instrument specific MDLs. For the PQL's, the DEP uses what ever the method states
NY	MDLs and PQLs are not required for sample preparation
OH	MDLs for RCRA; MDLs vary - method and instrument specific; PQLs are 5 to 10 times MDL
OK	Depends on the lab
SC	Uses SW-846 Methods 6010 and 1311 for MDLs

b. How were the MDL and PQLs derived?

The following 13 states replied: DE, IL, KS, KY, MI, MS, MO, NH, NY, OH, OR, SC, TX

State	MDL Derivation
DE	Federal Register outlined
IL	By laboratory
KS	40 CFR 136 App. B
KY	40 CFR 136 App. A
MI	Survey of MI labs and published methods – to meet risk-based levels
MS	EPA method, EPA derivation – see methods
MO	CFR 40 MDL calculation derives what can be seen in a matrix; we take this value and multiply by the appropriate dilution factors to convert to µg/kg
NH	State lab sets an estimated quantitation limit based on available analytical literature
NY	Actual MDLs are sample dependent and may vary as the matrix varies.
OH	SW-846 Chapter 3, Inorganic Analytes
OR	As specified in 40 CFR Part 136 App. B
SC	Spike sample analyzed at reporting level method 200.7 EPA Drinking Water
TX	Should be determined using protocol in 40CFR Part 136, App B, and include the optional step 7 to verify the reasonableness of the calculated MDL

15b. continued:

State	PQL Derivation
DE	HSCA samples
IL	From SW-846
KS	40 CFR 136 App. B
MS	EPA method, EPA derivation – see methods
MO	CFR 40 MDL calculation derives what can be seen in a matrix; we take this value and multiply by the appropriate dilution factors to convert to $\mu\text{g}/\text{kg}$
NY	Quantitation limits are set at the concentrations equivalent to the concentration of the lowest calibration standard
TX	Should be equal to or greater than the lowest non-zero standard in the calibration curve

16a. Does your state have any regulatory definitions for MDL or PQL? If yes, please specify:

Yes **12** No **12** Don't know **6**

Yes- AK, DE, FL, IL, MI, NJ, NY, OH, OR, SC, TX, WA
 No- CA, CO, HI, IA, KS, KY, ME, MS, NH, ND, OK, WY
 Don't know- AL, AZ, MO, MT, NM, TN

State	
DE	Outlined SOPCAP of HSCA
FL	FAC Chapter 62-4; MDL = smallest concentration of an analyte that can be measured and reported with 99% confidence that the concentration will be greater than zero; PQL = lowest level that can be reliably achieved during routine laboratory operative conditions within specified limits of precision and accuracy
IL	ADL (Acceptable Detection Limit) = the detectable concentration of a substance which is equal to the lowest appropriate Practical Quantitation Limit (PQL); PQL = Practical Quantitation Limit or estimated quantitation limit which is the lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specified laboratory analytical method during routine laboratory operating conditions in accordance with "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA SW-846). When applied to filtered water samples, PQL includes the method detection limit or estimated detection limit in accordance with the applicable method revision in "Methods for the Determination of Organic Compounds in Drinking Water, Supplement II" (EPA/600/4-88/039), and "Methods for the Determination of Organic Chemicals in Drinking Water, Supplement III" (EPA/600/R-95/131).
MI	CFR 40 Part 136 Appendix B
NJ	PQL's are specified for individual compounds in the groundwater quality standards (GWQS). MDL's are specified in the state lab. Certification regulations.
NY	MDL = the amount of material necessary to produce a detector response that can be identified and reliably quantified; these numbers are not absolute detection limits; actual MDLs are sample dependent and may vary as the matrix varies. PQL = quantitation limits set at the concentration equivalent to the concentration of lowest calibration standard. NOTE: the moisture content of the soil samples is not considered in the MDL or PQL/CRQL calculation; however, soil sample results for arsenic are required to be reported corrected for moisture content.
OH	Same definition as in SW-846 and RAGS
OR	Consistent with 40 CER 136 App. B
SC	Standard methods
TX	30 TAC 335 Subchapter S defines PQL as the concentration of an analyte which can be reliably quantified within specific limits of precision and accuracy during routine laboratory operating conditions
WA	May be used; too complicated to explain here

16b. Has your state conducted any independent testing to determine MDLs and PQLs for soil arsenate or other analytes? If yes, please specify:

Yes **4** No **17** Don't know **8**

Yes- CA, DE, FL, OR
 No- AK, CO, HI, IA, KS, KY, MI, MS, MO, NH, ND, NY, OH, OK, SC, TX, WY
 Don't know- AZ, IL, ME, MT, NJ, NM, TN, WA

State	
CA	Routinely done by the CA Hazardous Materials Laboratory
OR	Precision and accuracy testing with other national, state and private labs

Definitions

TCLP: Toxicity Characteristic Leaching Procedure.

SPLP: Synthetic Precipitation Leaching Procedure.

17a. Does your state use the TCLP or SPLP procedure to evaluate the leaching potential of arsenic in soils? If yes, please specify:

Yes **31** No **1** Don't know **0**

Yes- AK, AL, AR, AZ, CA, CO, DE, FL, HI, IA, IL, KY, ME, MD, MI, MO, MS, MT, ND, NH, NJ, NM, NY, OH, OK, OR, SC, TN, TX, WA, WY

No- KS

Procedure	State
TCLP	AL, CA, KY, ME, MO, MS, MT, ND, NM, NH, NY, SC, WA
SPLP	
TCLP & SPLP	AK, AR, AZ, CO, FL, IL, MI, NJ OH, OK, OR, TX
Not specified	DE, HI, MD, TN, WY

State	
AZ	Guidance for determining potential impacts to groundwater relies on relationship between total metals concentration and leachable fraction using TCLP or SPLP
CO	Definition of hazardous waste (TCLP) and to simulate rainfall leaching (SPLP)
HI	For RCRA disposal of hazardous wastes
IA	For evaluating "special waste authorization" to landfills only
IL	Both methods are allowed, resulting aqueous concentration is compared directly with the groundwater standard or health advisory concentration
MD	Used to determine if a waste can be classified as "hazardous"
NH	TCLP is used for RCRA disposal of hazardous waste decisions
NJ	TCLP is used for disposal classification. SPLP is one of the options used to determine a site specific impact to groundwater criteria.
OH	TCLP for waste analysis purposes and for determining potential leachability of contaminated soil' SPLP for voluntary action program sites
OK	TCLP usually, occasionally SPLP
OR	Either method depending on objective of analysis
TN	On a site specific basis to determine potential to impact groundwater
TX	TCLP for disposal; SPLP for soils to be left in place
WA	TCLP has been used although not a requirement

17b. If your state does not use the TCLP or SPLP procedure, are other procedures used? If yes, please specify:

Yes 8 No 3 Don't know 2

Yes- CA, DE, FL, KS, NH, NJ, OK, WA

No- IA, MO, OH

Don't know- NM, TN

State	
CA	The WET test
DE	Developed procedure of all pH levels to determine the leachability of lead, arsenic oxides in a stabilization process
FL	Partition equations, etc.
KS	Various models approved by KDHE that are public domain
NH	EP toxicity test is used for hazardous waste disposal
NJ	Modeling using SESOIL is an option; other models proposed by RPs will be evaluated
OK	Did not specify
WA	Batch tests (desorption)

18. Does your state have any policies or regulations that prohibit the regulation of soil contaminants like arsenic at or below the MDL or PQL? If yes, please specify

Yes **10** No **13** Don't know **8**

Yes- FL, DE, IA, IL, MS, NH, NJ OH, OK, TX

No- AK, AZ, CO, HI, IA, KY, MI, ND, NY, OR, SC, WA, WY

Don't know- AR, CA, KS, ME, MO, MT, NM, TN

Note: IA proposed rules only

State	
FL	62-770 and 62-785 FAC
DE	Remediation standards are above the PQL; client may use formal risk-based approach if they so choose
IL	If a risk-based remediation objective is less than the Acceptable Detection Limit (ADL) ¹ , then the ADL becomes the remediation objections
MI	Criteria defaults to MDL
MS	We have specific guidance which allows for the MDL to be considered but not the PQL
NH	Risk-based standards are not set below MDL's. Arsenic background is above the MDL so this does not drive the risk based cleanup level for arsenic.
NJ	GWQS specify the use of the higher of the PQL or the human health based criteria. The policy for soil is to use the PQL, if the human health based criteria is less than the PQL. For arsenic, this is irrelevant due to the background arsenic levels.
OH	We do not regulate below the MDL; below the MDL is considered clean
OK	Cleanup levels will not be set below PQLs
TX	30 TAC 335 specifies if the cleanup level or background concentration is less than the PQL, then the PQL becomes the cleanup level

¹ADL = the detectable concentration of a substance which is equal to the lowest appropriate practical concentration limit (PQL).

19. Does your state have a special sampling protocol/procedure for heavy metals in soils? If yes, please specify.

Yes **9** No **17** Don't know **4**

Yes- CA, CO, DE, KY, ME, MS, MT, OK, SC

No- AK, AZ, FL, HI, IA, KS, MI, MO, NH, NJ, ND, NY, OH, OR,
TX, WA, WY

Don't know- AR, IL, NM, TN

Note: OH only requires representative samples

State	Sampling Protocol/Procedure
CA	Defined in "HML Users Manual" Section 3.4, Revision 7, Dec. 31, 1993
CO	Protocols require collection of surface soil samples 0-2 in and sieving of soil to <250 um fraction
DE	SOPQAP and QAPP (Quality Assurance Project Plan)
KY	SOP for state personnel
ME	Based on guidance from EPA/SW846 Methods
MS	Allow for the use of an EPA developed protocol/procedure
MT	Several site specific protocols/procedures
OK	Depends on site and type of contamination
SC	SOP's based on Region IV EPA SOPQAM

SECTION V - RISK ASSESSMENT

20. For risk assessment purposes, what value does your state use for soil ingestion?

The following 24 states replied: AK, AL, AZ, CA, CO, FL, IL, IA, KS, KY, ME, MD, MI, MS, NH, NJ, NY, OH, OK, OR, SC, TX, VA, WA, WY

State	Industrial		Residential		Agricultural		Recreational	
	Child	Adult	Child	Adult	Child	Adult	Child	Adult
AK			4 mg/kg ¹					
AR	200 mg/d	50 mg/d	200 mg/d	100 mg/d	200 mg/d	50-100 mg/d	200 mg/d	50-100 mg/d
AZ		50 mg/d(non-residential)	200 mg/d	100 mg/d				
CA	NA	50 mg/d	200 mg/d	100 mg/d	NA	480 mg/d	Site specific	Site specific
CO	NA	50 mg/kg/d	200 mg/kg/d	100 mg/kg/d	Site specific	Site specific	Site specific	Site specific
FL		50 mg/d	200 mg/d (aggregate)					
IL	NA	50/480 mg/d ²	200/114 ³	NA				
IA		50 mg/d	200 mg/d	100 mg/d				
KS	NA	38	11	11				
KY		0.85 mg/kg		0.14 mg/kg				
ME	100 mg/d	50 mg/d	200 mg/d	100 mg/d	Site specific	Site specific	Site specific	Site specific
MD		50 mg	200 mg	100 mg				
MI		50 mg/d	200 mg/d	100 mg/d				
MS			200 mg/d	100 mg/d				
NH	200/100 mg/d ⁴	100 mg/d	200/100 mg/d	100 mg/d	200/100 mg/d	100 mg/d	200/100 mg/d	100 mg/d
NJ		100 mg/d	200 mg/d		Site specific	Site specific	Site specific	Site specific
NY		~34 mg/d	~68 mg/d	~10 mg/d	Site specific; ~68 mg/d default	Site specific; ~10 mg/d default	Site specific; ~68 mg/d default	Site specific; ~10 mg/d default
OH	Not considered	Site specific (~9 mg/kg)	Site specific (~4 mg/kg)	Site specific (~4 mg/kg)			Site specific (~4 mg/kg)	Site specific (~4 mg/kg)
OK	NA	50 or 480	200	100	100	50	100	50
OR	NA	50 mg/d	200 mg/d	100 mg/d	Site specific	Site specific	Site specific	Site specific
SC	1.9 mg/kg	3.8 mg/kg	0.022 mg/kg	0.043 mg/kg				
TX		50 mg/day	200 mg/day	100 mg/day				
VA	Site specific	Site specific	Site specific	Site specific	Site specific	Site specific	Site specific	Site specific
WA		50 mg/d		200 mg/d				
WY	Not established	Not est.	Not est.	Not est.	Not est.	Not est.	Not est.	Not est.

NA = not applicable

¹ AK applies this value to both children and adults based on childhood exposure

² 50 mg/d for industrial/commercial workers, 480 for construction/emergency repair workers

³ 200 for non-carcinogens, 114 (mg-y)/(kg-d) for carcinogens

⁴ 200 mg/d for children aged 2-6 yr; 100 mg/d for children aged 7-16 yr

If other (e.g., pica children), please specify

State	Other
AL	AL uses Superfund RAGS & RCRA Guidance
AR	Site specific conditions could warrant greater or lesser levels being used. Age-adjusted ingestion factor for soils 114 (mg.yr)/(kg.dy)
AZ	Allow site specific risk assessment option
FL	Residential aggregate value of 120 mg/d
ME	ME considers both children < 6 (200 mg/d) and children 6-18 (100 mg/d) as well as adults in risk assessments
MD	Construction workers = 480 mg; trespassers = 100 mg
NJ	NJ follows EPA guidance
NY	Acute soil ingestion by children = 1g/d
OH	Do not generally consider pica children/other sensitive subpopulations in RCRA program. Use RME values

21. Does your state take into consideration oral bioavailability for soil arsenic in the risk assessment process?

Yes **10** No **15** Don't know **6**

Yes- AZ, CA, CO, IL, KS, MI, NY, OK, TX, WY

No- AK, AR, FL, HI, IA, KY, ME, MD, MS, NH, NJ, OH, OR, SC, WA

Don't know- AL, MO, MT, NM, TN, VA

If yes:

- a. What value is used?
- b. How was this value derived?

State	Value	Derivation
AZ	Site specific	Site specific
CA	Varies	Site specific experiments on soils
CO	10-80%	Site specific in vivo bioavailability studies or extrapolation from geochemical speciation data
IL	Site specific	Must be derived as part of a site specific risk assessment
KS	100%	Risk Assessment Guidance for Superfund; OSWER Guidance
KY	100%	
MI	50%	By promulgated rule
NY	100%	Default
OK	Varies	Depends on testing of waste
TX	Site specific	Site specific
WY	Not available	Not available

¹NY will consider alternative value if supported by site specific data

² OH only considers oral bioavailability when looking at oral absorption values for estimating dermal exposures (i.e., for calculating absorbed doses); in those cases an oral absorption value of 98% is used based on ATSDR tox profile.

- 22a. In the risk assessment process, what measurement does your state use for surface depth in your exposure evaluations?
- 22b. How were these surface depths selected (e.g., professional judgment, state policy)?

The following 26 states replied: AK, AR, AZ, CA, CO, FL, HI, IL, IA, KS, KY, MD, ME, MI, MO, MS, MT, NH, NJ NY, OH, OK, OR, SC, TX, WA, WY

Please note: AL uses RAG and Region 4 CA Guidance, AZ uses 1-2 ft for Non-Residential sites, based on professional judgment; SC normally uses surface soils unless information exists that contamination may be deeper or in groundwater.

INDUSTRIAL

State	<1 foot	1 – 2 feet	>2 feet	Other (please specify)	How depths selected
AK				15 ft	Based upon conservative construction practices
AR	X				Professional judgment
AZ		X			Professional judgment
CA		X			Professional judgment
CO				0-2 in or 0-2 cm	Professional judgment
FL				0-2 ft	Professional judgment, state policy
HI	X				Professional judgment
IL				Site specific up to 3 ft	Based on known or anticipated use
IA				< 2 ft	Professional judgment
KS	X	X			Professional judgment
KY	X				Regional policy
MD	X	X		Also site-by-site basis	Professional judgment
ME				Site specific	If < 8-10 ft, excavation controls required
MI	X				Professional judgment
MO				0-2 ft	Professional judgment
MT				0-2 in	SOP (per Clark Fork Basin SAP)
NH				Site specific	State policy
NJ	X			0-6 in	State policy (technical requirements for site remediation)
NY	X				Professional judgment
OH	X				State policy
OK	X			Construction depth	Consultation with EPA
OR				3 ft	Professional judgment
SC	X	X			Professional judgment
TX				< 2 ft	State rule
WA				15 ft	Assumed depth of basement
WY	X				Professional judgment

22a and b continued:

22a. In the risk assessment process, what measurement does your state use for surface depth in your exposure evaluations?

22b. How were these surface depths selected (e.g., professional judgment, state policy)?

RESIDENTIAL

State	<1 foot	1 – 2 feet	>2 feet	Other (please specify)	How depths selected
AK				15 ft	Based upon conservative construction practices
AR	X				Professional judgment
AZ		X			Professional judgment
CA		X	X		Professional judgment
CO				0-2 in or 0-2 cm	Professional judgment
FL				0-2 ft	Professional judgment, state policy
HI	X				Professional judgment
IL				Site specific up to 3 ft	Based on known or anticipated use
IA				< 2 ft	Professional judgment
KS	X	X			Professional judgment
KY	X				Regional policy
MD	X	X		Also site-by-site basis	Professional judgment
ME				8-10 ft	8-10 ft excavation requirement for new construction – due to frost
MI	X				Professional judgment
MO				0-2 ft	Professional judgment
MS				0-2 ft ingestion; 2-14 ft ingestion or protection of groundwater	State policy
MT				0-2 in	SOP (per Clark Fork Basin SAP)
NH				Site specific	State policy
NJ	X			0-6 in	State policy (Technical requirement for site remediation)
NY	X				Professional judgment
OH	X				State policy
OK	X	X			Consultation with EPA
OR				3 ft	Professional judgment
SC	X	X			Professional judgment
TX				< 2 ft	State rule
WA				15 ft	Assumed depth of basement
WY	X				Professional judgment

22a and b continued:

22a. In the risk assessment process, what measurement does your state use for surface depth in your exposure evaluations?

22b. How were these surface depths selected (e.g., professional judgment, state policy)?

AGRICULTURAL

State	<1 foot	1 – 2 feet	>2 feet	Other (please specify)	How depths selected
AK				15 ft	Based upon conservative construction practices
AR		X			Professional judgment
CA		X	X		Professional judgment
CO				0-2 in or 0-2 cm	Professional judgment
FL				0-2 ft	Professional judgment, state policy
HI	X				Professional judgment
IL				Site specific up to 3 ft	Based on known or anticipated use
ME				8-10 ft Site specific	Considered a subset of residential
MO				0-2 ft	Professional judgment
NH				Site specific	State policy
NJ	X			0-6 in	State policy (Technical requirements for site remediation)
NY	X				Professional judgment
OK	X	X	X		Consultation with EPA
OR				3 ft	Professional judgment
SC	X	X			Professional judgment
WA				15 ft	Assumed depth of basement
WY	X				Professional judgment

22a and b continued:

22a. In the risk assessment process, what measurement does your state use for surface depth in your exposure evaluations?

22b. How were these surface depths selected (e.g., professional judgment, state policy)?

RECREATIONAL

State	<1 foot	1 – 2 feet	>2 feet	Other (please specify)	How depths selected
AK				15 ft	Based upon conservative construction practices
AR	X				Professional judgment
CA		X			Professional judgment
CO				0-2 in or 0-2 cm	Professional judgment
FL				0-2 ft	Professional judgment, state policy
HI	X				Professional judgment
IL				Site specific up to 3 ft	Based on known or anticipated use
MD	X	X		Also site-by-site basis	Professional judgment
ME				Site specific	If < 8-10 ft, excavation controls required
MO				0-2 ft	Professional judgment
MT				0-2 in	SOP (per Clark Fork Basin SAP)
NH				Site specific	State policy
NJ	X			0-6 in	State policy (Technical requirements for site remediation)
NY	X				Professional judgment
OH	X				State policy
OK	X				Consultation with EPA
OR				3 ft	Professional judgment
SC	X	X			Professional judgment
WA				15 ft	Assumed depth of basement
WY	X				Professional judgment

23a. In the risk assessment process, what does your state consider to be the acceptable carcinogenic risk level for individual carcinogens?

The following 28 states responded: AK, AL, AR, AZ, CA, CO, FL, HI, IL, IA, KS, KY, MD, ME, MI, MO, MS, MT, NH, ND, NY, OH, OK, OR, SC, TX, WA, WY

Acceptable level	State
1×10^{-4}	KS (if only carcinogen-of-concern)
1×10^{-4} to 1×10^{-6}	AL (tiered), AR ² , CA, CO, HI
1×10^{-5}	AK ¹ , AZ (class B & C carcinogens), MD, ME (ILCR), MI, OH, WA (industrial)
1×10^{-5} to 1×10^{-6}	OK
1×10^{-6}	AZ (class A carcinogens), FL, IL, IA ³ , MO, MS, MT, NH (ELCR) ⁴ , NJ, ND, OR, TX, WA (residential), WY
Other	KY (0.14 mg/kg), NY (case-by-case basis), SC (site specific background levels)

¹ AK with screening at 1×10^{-6}

² AR range varies if Class A or B carcinogens are present (i.e., 1×10^{-5} to 1×10^{-6})

³ IA per proposed rule only

⁴ NH: 1×10^{-5} risk assessment, 1×10^{-6} look-up tables

23b. Does your state have an acceptable level for cumulative risk? If yes, please define:

Yes **22** No **4** Don't know **5**

Yes- AK, AR, AZ, CA, FL, HI, IL, KS, KY, MD, ME, MI, MS, NH, OH, OK, OR, SC, TX, VA, WA, WY

No- IA, ND, NJ, NY

Don't know- CO, MO, MT, NM, TN

Acceptable level for carcinogens	State
1×10^{-4}	CA, HI ¹ , KS, TX ²
1×10^{-4} to 1×10^{-6}	AZ, IL, MD, MS, VA
1×10^{-5}	AK, AR, MI, ³ NH (ELCR), OH, OR
$\leq 1 \times 10^{-5}$	ME
1×10^{-6}	FL, WY
$< 1 \times 10^{-6}$	KY
Other	SC ⁴

¹ HI: site specific but no greater than 1×10^{-4}

² TX: for multiple contaminants

³ MI: for chemicals known to result in toxicological interactions

⁴ SC: see 40 CFR 503, Feb. 19, 1995, p. 9392

Acceptable level for non-carcinogens	State
HI = 1	AR
HI \leq 1	FL, KS, VA, NH
HI < 1	OK, WA