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Restoration
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Environmental Science and Waste Technology (E)
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Los Alamos, New Mexico 87545
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U.S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
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3/1082/16/16-0216

▲
DEC 1999
RECEIVED

Date: December 7, 1999
Refer to: E/ER-99-315

Mr. John Kieling
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: REQUEST FOR "NO LONGER CONTAINED IN" DETERMINATION FOR SOLID WASTE MANAGEMENT UNIT 16-021(c)-99, THE 260 OUTFALL

Dear Mr. Kieling:

The purpose of this letter is to request that the New Mexico Environment Department Hazardous and Radioactive Materials Bureau (NMED-HRMB) use their discretionary authority to determine that environmental media generated during the Interim Measure (IM) at Solid Waste Management Unit (SWMU) 16-021(c)-99, the 260 Outfall, do not warrant management as F-listed hazardous waste.

Details of IM activities and associated regulatory issues, including seeking a "no longer contained in" determination, were discussed with Kim Birdsall-Hill and Eliza Frank of your staff on August 11 and October 14, 1999. The revised presentation package from the October 14, 1999 meeting is enclosed; the additional information that NMED-HRMB requested is incorporated into the presentation package. The IM involves removing source-term material [soil, sediment, and/or tuff contaminated with barium and high explosive (HE) constituents] from the drainage area in an effort to reduce potential contaminant migration. As discussed, some of the source-term material may contain low levels of toluene, acetone, and trichloroethene that are known or believed to have originated from processes for which listed wastes are identified.

The Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project proposes to use the Environmental Protection Agency (EPA) Region 6 Human Health Medium-Specific Screening Levels (MSSLs) for comparison to as-found concentrations to determine whether any of the organic constituents detected in excavated environmental media from the Solid Waste Management Unit (SWMU) 16-021(c)-99 warrant management as F-listed hazardous waste. The proposed MSSLs are based on the industrial receptor using direct exposure routes (inhalation, ingestion, and dermal contact) and are derived using conservative exposure parameters for reasonable maximum exposure. These MSSLs, based on an industrial receptor, are appropriate because the environmental media excavated during the IM will be properly disposed in a Subtitle D engineered facility.



The organic constituents, maximum concentration detected to date, and the proposed MSSLS are shown in the table below:

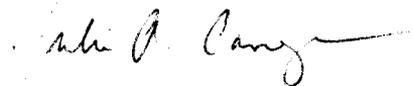
Organic Constituent	Maximum Concentration (mg/kg)	MSSL (mg/kg)
toluene	0.003	520
acetone	0.43	5800
trichloroethene	ND	6

ND – not detected

As discussed at our December 6, 1999 meeting with NMED-HRMB, if the as-found concentrations for toluene, acetone, and/or trichloroethene in the excavated environmental media are equal to or exceed the MSSLS, the material will be managed as F-listed (F005, F003, and/or F002) hazardous waste. If the as-found concentrations in the excavated environmental media are below the MSSLS, the material will be managed as solid waste unless and until it meets another listing criteria or exhibits a hazardous characteristic. Notably, any environmental media containing acetone would not qualify as F-listed hazardous waste since it would not exhibit the characteristic of ignitability. Trichloroethene has yet to be detected; however, trichloroethene may be detected during IM activities because of its known use as a solvent at Building TA-16-260.

The LANL ER Project believes that a "no longer contained in" determination for the organic constituents listed above would expedite the IM by simplifying waste segregation and storage requirements and reducing overall project costs. The LANL ER Project looks forward to a continuing dialogue for developing an appropriate remediation strategy with NMED-HRMB. If you have any questions, please contact Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808.

Sincerely,



Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,



Theodore J. Taylor, Program Manager
Department of Energy
Los Alamos Area Office

JC/TT/NR/ev

Enclosure: Presentation Package

Mr. John Kieling
E/ER:99-315

-3-

December 7, 1999

Cy (w/enc.):

M. Buksa, E/ET, MS M992
J. Mose, LAAO, MS A316
T. Taylor, LAAO, MS A316
J. Parker, NMED-AIP
S. Yanicak, NMED-AIP, MS J993
RPF, (ER Catalog # 19990158), MS M707

Cy (w/o enc.):

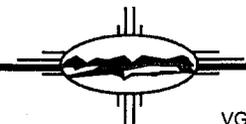
J. Canepa, E/ER, MS M992
T. Grieggs, ESH-19, MS M992
D. Hickmott, EES-1, MS D462
D. McInroy, E/ER, MS M992
W. Neff, E/ET, MS M992
A. Dorries, EES-13, MS M992
V. Rhodes, E/ER, MS M992
H. Wheeler-Benson, ESH-19, MS M992
J. Bearzi, NMED-HRMB
E/ER File, MS M992

TA-16-260 Contained-in Waste Determination and Other Issues

D.D. Hickmott

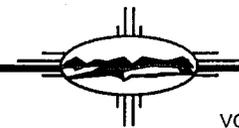
M.L. Hogg

10/14/99



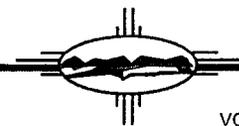
Outline

- **Purpose**
- **260 IM waste issues**
- **Risk-based 'contained-in' waste determination background**
- **Risk-based calculations**
- **Examples of risk-based 'contained-in' waste determinations**
- **Other 260 IM/CMS issues**



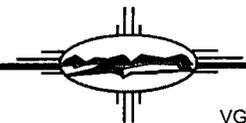
Purpose

- **To request a contained-in determination from NMED for the following F-listed constituents in the excavated IM waste:**
Acetone, Benzene, Butanone[2-], Chlorobenzene, Dichlorobenzene[1,2-], Methylene chloride, Tetrachloroethene, Toluene, Trichloroethane[1,1,1-], Trichloroethene, Trichlorofluoromethane
- **To discuss other regulatory issues related to the 260 IM project**



260 IM Waste Issues

- **Contaminated environmental media waste will be generated during 260 IM source removal excavation**
- **This waste will contain low levels of F-listed constituents (e.g., toluene, possibly TCE and others)**



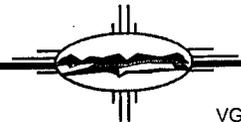
260 IM Waste Issues (cont.)

- **Risk-based contained-in waste determination would minimize permitting requirements, simplify waste segregation and RCRA storage requirements, and reduce costs**
- **Without contained-in determination, there would potentially be significant delay of IM**



260 IM Waste Issues (cont.)

- **Risk-based contained-in waste determination would apply only to excavated environmental media**
- **Environmental media waste would meet all LDR treatment standards before disposal (including treatment standards for the F-listed constituents)**



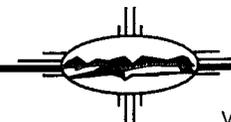
Potential Types/Amounts of 260 IM Waste

Without Determination	
RCRA Codes ^A	Volume ^B
D003, D030, D005, F005, F002	~2,300 yd ³

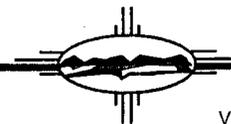
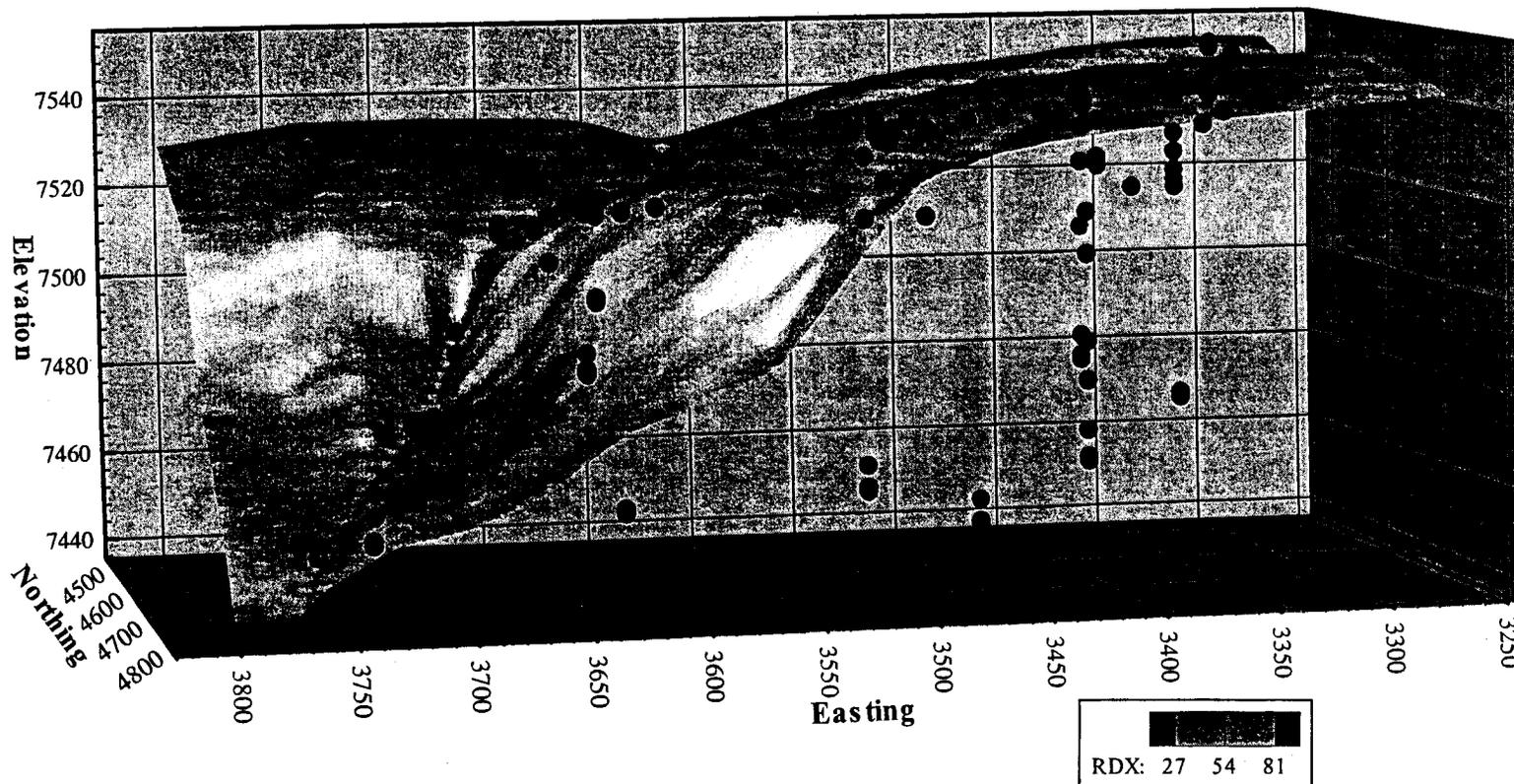
With Determination	
RCRA Codes	Volume
none	~2,200 yd ³
D003, D030, D005	<100 yd ³

^A Multiple RCRA codes indicate that waste could be characterized with one or more of the codes

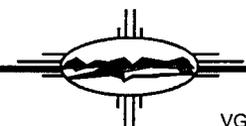
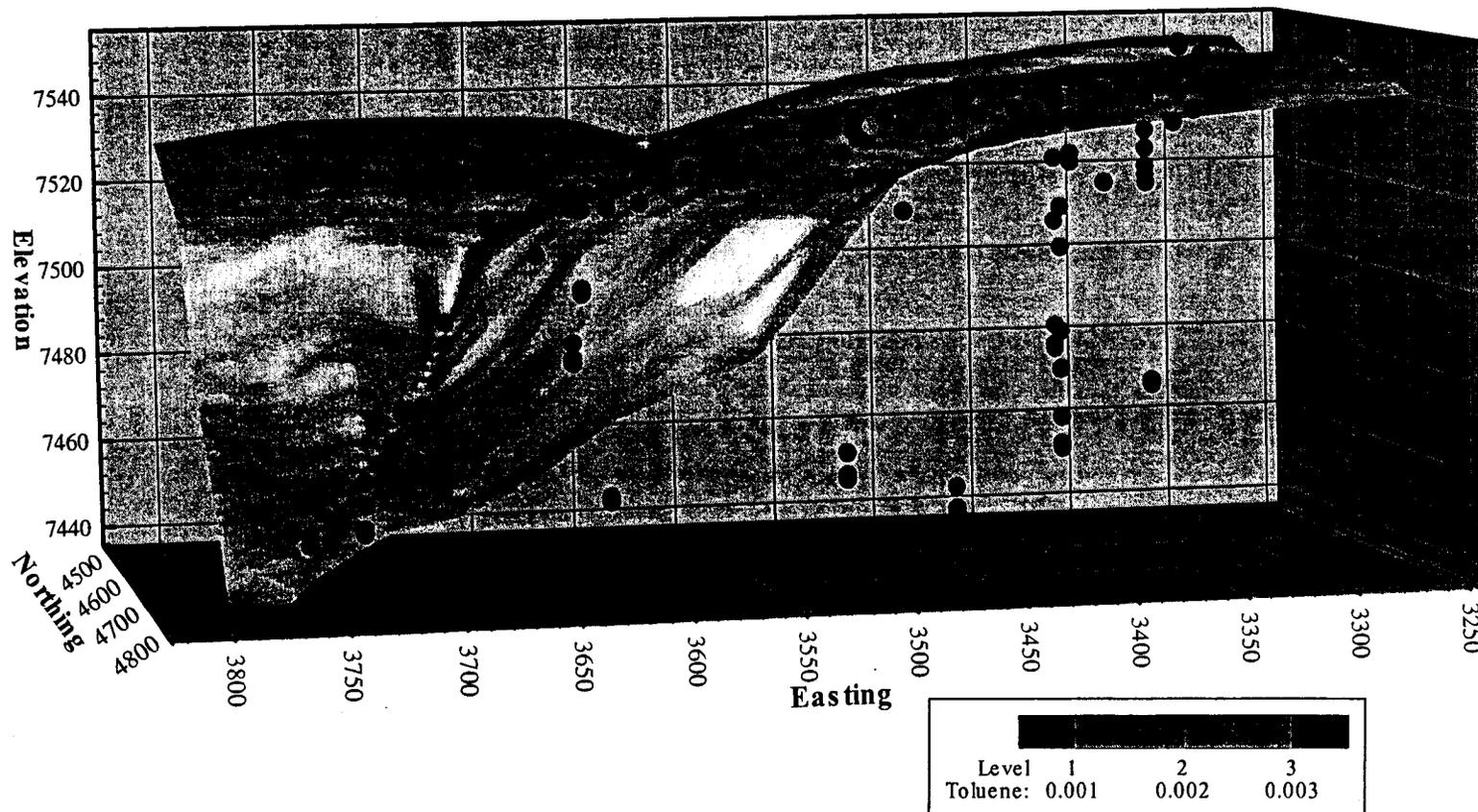
^B Waste volume is an in-situ estimate



RDX Concentrations in 260 Drainage

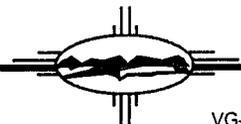


Toluene Concentrations in 260 Drainage



Contained-in Policy Regulatory Background

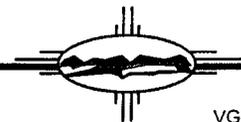
- **The contained-in policy for contaminated environmental media was first articulated in a November 13, 1986 EPA memorandum, "RCRA Regulatory Status of Contaminated Groundwater"**
- **It has been updated many times in Federal Register preambles [e.g., 53 FR 31138, 31142, 31148 (Aug. 17, 1988); and 57 FR 21450, 21453 (May 20, 1992)]**
- **Discussed in many EPA memos and correspondence (RCRA Permit Policy Compendium, July 1997)**
- **Detailed discussion in HWIR-Media proposal preamble, 61 FR 18795 (April 29, 1996)**



Contained-in Policy Guidance

- **“EPA generally considers contaminated environmental media to contain hazardous waste...when they are contaminated with concentrations of hazardous constituents from listed hazardous waste that are above health-based levels.”**
- **“EPA considers contaminated environmental media to no longer contain hazardous waste...when concentrations of hazardous constituents from listed hazardous wastes are below health-based levels.”**

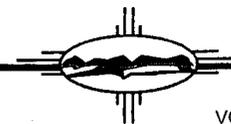
(From "Management of Remediation Waste Under RCRA", EPA OSWER EPA530-F-98-026)



Region 6/NMED

Human Health Risk-Based Screening Levels

- From EPA Region 6 Human Health Medium-Specific Screening Levels (June 1999)
- Screening Levels for both Residential and Industrial Receptors
- Conservatively Based on Exposure to Soils via *Ingestion, inhalation of particulates and volatile chemicals, and dermal absorption.*
- The Screening Level Methodology back calculates a soil concentration from a target risk of 10^{-6} (for carcinogens) or hazard quotient of 0.1 (for noncarcinogens)



Comparison to Region 6/NMED Human Health Risk-Based Guidance

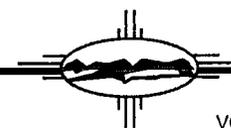
Constituent	Human Health Risk-Based Screening Level (Residential receptor)(mg/kg)	Human Health Risk-Based Screening Level (Industrial receptor)(mg/kg)	Maximum Levels in 260 Drainage ^b (mg/kg)	Maximum Levels in Boreholes ^b (mg/kg)
Acetone	150 ^a	580 ^a	0.073	0.43
Benzene	0.67	1.4	0.002	ND
Butanone[2-]	700 ^a	2600 ^a	0.0048	0.011
Chlorobenzene	5.4 ^a	18 ^a	ND	0.001
Dichlorobenzene[1,2-]	370 sat	370 sat	0.01	ND
Methylene chloride	8.6	19	0.0073	ND
Tetrachloroethene	4.9	13	ND	0.002
Toluene	520 sat	520 sat	0.003	ND
Trichloroethane[1,1,1-]	71 ^a	140 ^a	0.065	ND
Trichloroethene	2.7	6	ND	ND
Trichlorofluoromethane	38 ^a	130 ^a	0.01	ND

^a 1/10th of EPA Region 6 screening level for a noncarcinogen (per NMED guidance)

^b Maximum detected concentrations

sat = based on soil saturation limit

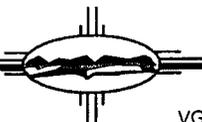
ND = no data



Formula and Parameters (Region 6/NMED)

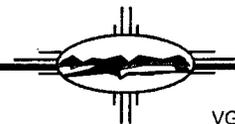
$$C \text{ (mg/kg)} = \frac{\text{THQ} \times \text{BW}_{\text{cx}} \times \text{AT}_n}{\text{EF}_r \times \text{ED}_c \left[\left(\frac{1}{\text{RfD}_o} \right) \times \left(\frac{\text{IRS}_c}{10^6 \text{ mg/kg}} \right) + \left(\frac{1 \times \text{SA}_c \times \text{AF} \times \text{ABS}}{\text{RfD}_o \times 10^6 \text{ mg/kg}} \right) + \left(\frac{1}{\text{RfD}_i} \times \frac{\text{IRA}_c}{\text{VF}_s} \right) \right]}$$

Parameter / Definition (units)	Default	Reference
RfD _o /Reference dose oral (mg/kg-d)	chemical-specific	IRIS, HEAST, or NCEA
RfD _i /Reference dose inhaled (mg/kg-d)	chemical-specific	IRIS, HEAST, or NCEA
THQ/Target hazard quotient	1	--
BW _c /Body weight, child (kg)	15	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
AT _n /Averaging time-noncarcinogens (days)	ED*365	
SA _c /Exposed surface area, child (cm ² /day)	0.2	see text
AF/Adherence factor, child (mg/cm ²)	0.2	see text
ABS/Skin absorption (unitless)	0.1	Dermal Assessment, see text
IRA _c /Inhalation rate, child (m ³ /day)	10	RAGS (Part A), EPA 1989 (EPA/540/1-89/002)
IRS _c /Soil ingestion, child (mg/day)	200	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EF _r /Exposure frequency, residential (d/y)	350	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
ED _c /Exposure duration, child (years)	6	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
VF _s /Volatilization factor for soil (m ³ /kg)	chemical-specific	Soil Screening Guidance (EPA 1996a,b)



TA-16-260 Site-Specific Screening Values

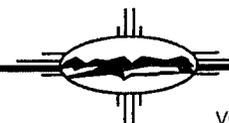
- **Consistent with EPA guidance on development of risk-based Preliminary Remediation Goals**
- **Screening Levels for industrial / commercial, environmental worker, and trail user**
- **Conservatively Based on Exposure to Soils via *Ingestion, inhalation of particulates and volatile chemicals, and dermal absorption***



TA-16-260 Site-Specific Screening Values

Constituent	TA-16 Site-Specific Risk-Based Screening Levels (mg/kg)				Maximum Levels in 260 Drainage ^a (mg/kg)
	Industrial Worker	Construction Worker	Trail User	Environmental Worker	
Toluene	49,000	25,000	38,000	81,000	0.003

^a Maximum detected concentrations
ND = no data



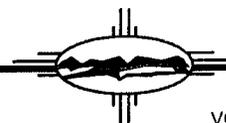
Formula and Parameters (Site-Specific)

$SAL_{nc} (mg/kg) =$

$HQ \times BW \times AT$

$$EF \times ED \left[\left[IR_i \times \frac{1}{PEF} \times ET \times \frac{1}{RfD_i} \right] + [(IR_s \times FI \times CF) + (SA \times CF \times AF \times ABS)] \left[\frac{1}{RfD_o} \right] \right]$$

Parameter / Definition (units)	Environmental Worker	Trail User	Industrial/ Construction
HQ/target hazard quotient (unitless)	1	1	1
BW/body weight (kg)	70	70	70
AT/average time (period over which exposure is averaged – days) noncarcinogenic effects	2555	9125	9125/365
EF/exposure frequency (days/year)	150	250	250
ED/exposure duration (years)	7	25	25/1.0
IR _i /inhalation rate (m ³ /hour)	1.5	1.7	1.7/2.2
PEF/particulate emission factor (m ³ /kg)	1.316 x 10 ⁹	1.316 x 10 ⁹	1.316 x 10 ⁹
ET/exposure time (hours/day)	8	0.5	4/8
RfD _i /inhalation reference dose (mg/kg-day)	chemical-specific	chemical-specific	chemical-specific
IR _s /ingestion rate (mg soil/day)	100	100	100/480
FI/fraction ingested from contaminated source (unitless)	1	0.0625	1
CF/conversion factor (kg/mg)	1E-06	1E-06	1E-06
SA/skin surface area available for contact (cm ² /event)	3200	5300	3200
AF/soil to skin adherence factor (mg/cm ²)	1.0	1.0	1.0
ABS/absorption factor (unitless)	chemical-specific	chemical-specific	chemical-specific
RfD _o /oral reference dose (mg/kg-day)	chemical-specific	chemical-specific	chemical-specific



Migration to Groundwater Soil Screening Levels (SSLs)*

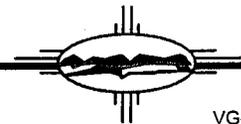
- **Generic SSLs for migration to groundwater were developed assuming future residential land use and exposure parameters consistent with EPA's concept of "Reasonable Maximum Exposure"**
- **Conservative default values are provided to calculate generic SSLs where site-specific information is not available**
- **Migration to groundwater SSLs are based on: nonzero MCLGs, MCLs, a 10^{-6} cancer risk, or hazard quotient of 1**
- **Models incorporate a number of simplifying assumptions:**

* EPA (1996)



SSL- Simplifying Assumptions

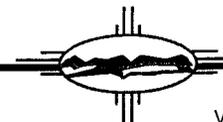
- **SSL models assume an infinite source**
- **DAF (dilution attenuation factor) of 20 indicates that 1/20th of soil concentration is constantly present in the groundwater. EPA considers DAF of 20 protective even for sites with shallow groundwater**
- **SSL models assume no degradation (chemical or biological) in the soil or aquifer**



Comparison to Soil Screening Levels (SSLs)

Constituent	Generic SSLs for migration to groundwater (mg/kg) DAF 20	Maximum Levels in 260 Drainage ^a (mg/kg)	Maximum Levels in Boreholes ^a (mg/kg)
Acetone	16	0.073	0.43
Benzene	0.03	0.002	ND
Butanone[2-]	10,000	0.0048	0.011
Chlorobenzene	1	ND	0.001
Dichlorobenzene[1,2-]	17	0.01	ND
Methylene chloride	0.02	0.0073	ND
Tetrachloroethene	0.06	ND	0.002
Toluene	12	0.003	ND
Trichloroethane[1,1,1-]	2	0.065	ND
Trichloroethene	0.06	ND	ND
Trichlorofluoromethane	30,000	0.01	ND

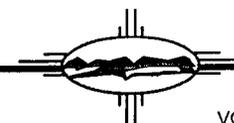
^a Maximum detected concentrations
 DAF= dilution-attenuation factor
 ND = no data



Revised Comparison to (SSLs)

Constituent	CAS Number	Generic SSLs for migration to groundwater (mg/kg)			Levels in 260 Drainage ^a (mg/kg)	Levels in Boreholes ^a (mg/kg)
		DAF 1	DAF 10	DAF 20		
Acetone	67-64-1	0.8	8	16	0.073	0.43
Benzene	71-43-2	0.002	0.015	0.03	0.002	ND
Butanone[2-]	78-93-3	500	5000	10,000	0.0048	0.011
Chlorobenzene	108-90-7	0.07	0.50	1	ND	0.001
Dichlorobenzene[1,2-]	95-50-1	0.9	8.5	17	0.01	ND
Methylene chloride	75-09-2	0.001	0.01	0.02	0.0073	ND
Tetrachloroethene	127-18-4	0.003	0.03	0.06	ND	0.002
Toluene	108-88-3	0.6	6	12	0.003	ND
Trichloroethane[1,1,1-]	71-55-6	0.1	1	2	0.065	ND
Trichloroethene	79-01-6	0.003	0.03	0.06	ND	ND
Trichlorofluoromethane	75-69-4	1500	15,000	30,000	0.01	ND

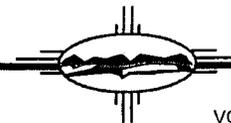
^a Maximum detected concentrations
 DAF= dilution-attenuation factor
 ND = no data



Formula and Parameters

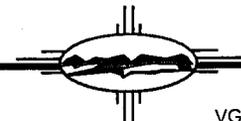
$$C_t = C_w \left[(K_{oc} f_{oc}) + \frac{\theta_w + \theta_a H'}{\rho_b} \right]$$

Parameter / Definition (units)	Default
C_t /screening level in soil (mg/kg)	--
C_w /target leachate concentration (mg/L)	(nonzero MCLG, MCL, or HBL) x 20 DAF
K_{oc} /soil organic carbon-water partition coefficient (L/kg)	chemical-specific
f_{oc} /organic carbon content of soil (kg/kg)	0.002 (0.2%)
θ_w /water-filled soil porosity (L_{water}/L_{soil})	0.3 (30%)
θ_a /air-filled soil porosity (L_{air}/L_{soil})	0.13
n /total soil porosity (L_{pore}/L_{soil})	0.43
ρ_b /dry soil bulk density (kg/L)	1.5
H' /dimensionless Henry's law constant	$H \times 41$, where 41 is a conversion factor
H /Henry's law constant ($atm \cdot m^3/mol$)	chemical-specific



LANL Ecological Screening Levels (ESLs)

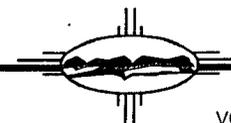
- **ESLs are species-specific. Nine individual ESLs have been established for use at LANL**
- **Conservative assumptions include:**
 - **maximum chemical bio-availability**
 - **receptor receives all its exposure from contaminated site**
 - **receptor weight is minimized while dietary-intake rates are maximized**
- **These assumptions may lead to an overestimate of potential risk and, likewise, to conservative estimates for ESLs**



Comparison to Ecological Screening Levels

Constituent	Ecological Screening Level (mg/kg)	Maximum Levels in 260 Drainage ^d (mg/kg)	Maximum Levels in Boreholes ^d (mg/kg)
Acetone	1.85 ^a	0.073	0.43
Benzene	68 ^a	0.002	ND
Butanone[2-]	962 ^a	0.0048	0.011
Chlorobenzene	24 ^b	ND	0.001
Dichlorobenzene[1,2-]	13 ^{b,c}	0.01	ND
Methylene chloride	6.7 ^a	0.0073	ND
Tetrachloroethene	5 ^a	ND	0.002
Toluene	94 ^a	0.003	ND
Trichloroethane[1,1,1-]	3000 ^a	0.065	ND
Trichloroethene	2.5 ^a	ND	ND
Trichlorofluoromethane	ND	0.01	ND

- ^a ESL for deer mouse
^b ESL for earthworm
^c based on 1,4-dichlorobenzene
^d Maximum detected concentrations
 ND = no data

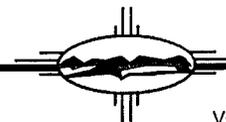


Comparison to Land Disposal Restrictions

Constituent	LDR Phase IV (mg/kg)	Maximum Levels in 260 Drainage ^a (mg/kg)	Maximum Levels in Boreholes ^a (mg/kg)
Acetone	160	0.073	0.43
Benzene	10	0.002	ND
Butanone[2-]	36	0.0048	0.011
Chlorobenzene	6	ND	0.001
Dichlorobenzene[1,2-]	6	0.01	ND
Methylene chloride	30	0.0073	ND
Tetrachloroethene	6	ND	0.002
Toluene	10	0.003	ND
Trichloroethane[1,1,1-]	6	0.065	ND
Trichloroethene	6	ND	ND
Trichlorofluoromethane	30	0.01	ND

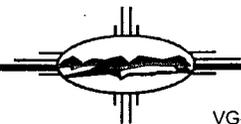
^a Maximum detected concentrations

ND = no data



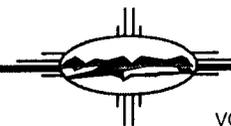
Examples of Contained-in Waste Determinations

- **At DOE's Pantex facility, the Texas Natural Resource Conservation Commission (TNRCC) approved use of Risk Reduction Standard (2) to make contained-in waste determinations. If environmental media can be shown to be at protective levels, the TNRCC considers them to no longer contain listed hazardous waste.**
- **For a dry cleaning facility, TNRCC issued memorandum authorizing use of Risk Reduction Standard (2) and Land Disposal Restrictions to make contained-in waste determinations for soils containing low levels of tetrachloroethene.**



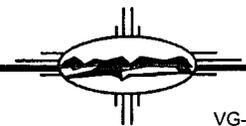
Summary - 260 IM Contained-in

- **Concentrations of potential F-listed constituents in waste are low, far less than calculated risk based levels**
- **LANL recommends using residential human-health based levels because:**
 - **it is conservative and consistent with other contained-in determinations**
 - **landfill disposal presents minimal ecological or groundwater pathways**
- **Path Forward?**



IM Strategy - Update

- **DOD and EPA representatives at ITRD meeting strongly recommended soil blending in place for D003 wastes as a safety precaution**
- **ZVI pilot results promising for RDX and TNT, problematic for HMX. Composting being considered as treatment backup**



Other 260 Regulatory Issues?

- **Status of permitting? How to proceed with Temporary Authorization (if deemed necessary)**
- **Status of NMED discussion on pilot-scale deployment of passive barrier unit?**
- **Path forward on CMS?**
- **Can LANL potentially begin IM prior to finalization/submittal of plan to NMED?**

