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Date: APR 3 0 2012
Refer To: ENV-RCRA-12-0022
LAUR: 12-20080

Mr. John E. Kieling, Acting Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Dear Mr. Kieling:

SUBJECT: RISK ASSESSMENT FOR CLOSURE OF THE TECHNICAL AREA 54, AREA L STORAGE SHAFTS 36 AND 37 INTERIM STATUS CONTAINER STORAGE UNIT, LOS ALAMOS NATIONAL LABORATORY, EPA ID# NM 0890010515

The purpose of this letter is to respond to our February 16, 2012 teleconference concerning the subject closure plan and closure certification report for this unit. In our letter to the New Mexico Environment Department Hazardous Waste Bureau (NMED-HWB) dated July 13, 2011 (reference ENV-RCRA- 11-0121), the National Nuclear Security Administration (NNSA) and Los Alamos National Security LLC (LANS) (collectively the Permittees) requested the NMED-HWB review and approval of the previously-submitted documents. NMED's questions regarding the risk assessment reported in those documents were discussed during the conference call.

Technical Area 54 (TA-54), Area L, Storage Shafts 36 and 37 are listed as "TA-54 Area L Container Storage Unit (below ground)" within *Table J-1, Active Portion of the Facility,* in Attachment J of the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (the Permit). Table J-1 lists the unit as "Wastes removed and unit undergoing closure, closure certification incomplete". In 2005, the sampling and analysis plan was submitted to the NMED-HWB. In 2005, closure of the unit was performed in accordance with the *"Los Alamos National Laboratory Technical Area* 54, *Area L, Storage Shafts* 36 *and* 37 *Closure Sampling and Analysis Plan,"* which was submitted to the NMED-HWB on April 21, 2005 (NMED LANL Administrative Record Index no. 11881).

Following completion of the closure activities, the *Closure Certification Report for the Technical Area 54, Area L Storage Shafts 36 and 37 Container Storage Unit* was submitted to the NMED-HWB (on October 19, 2006; reference NMED LANL Administrative Record Index no. 11957). The unit has been stabilized and secured awaiting final resolution since that time.

In the February 16, 2012 conference call, NMED-HWB personnel inquired about the conclusions of the human health risk assessment. The assessment was derived from surface wipe samples collected from the floor and walls of each shaft and analyzed to verify completion of decontamination. The attached white paper is a response to those questions.

The risk assessment performed to support shaft closure and submitted with the Closure Certification Report for the Technical Area 54, Area L Storage Shafts 36 and 37 demonstrated that residual levels of waste lead residues on the interior of each shaft would pose no unacceptable risks to a female worker from fugitive dust released from the surfaces of the shafts. The risk assessment used the California Department of Toxic Substance Control (DTSC) model which was based on the EPA's Adult Lead Model (ALM). This model had been used in previous closures approved by NMED-HWB including TA-50, Building-37, rooms 115, 116, 117, the controlled air incinerator exhaust equipment, and TA-55, Building 4, B38.

The risk assessment submitted with the Closure Certification Report found no significant contribution of residual lead from fugitive dust to the blood lead levels of a female worker or her fetus. The model has been updated since the report to include both an occupational exposure for a female worker and a residential exposure for a child. Both models were run using the maximum residual lead concentration from the closure data. Both of these models were run for comparison and no significant health affect was found for the female worker, fetus, or a residential child (Enclosure 1).

Calculations were also performed to determine the contribution of the residual lead to soil, if the shafts were left in place and backfilled with crushed tuff. Using the maximum residual lead concentration, it was determined that there would be no significant rise in tuff lead concentrations above background (Enclosure 2).

Based upon these results, LANL is requesting that the risk assessment for the Storage Shafts 36 and 37 unit be reviewed and determined to be appropriate for the clean closure. If this review determines that the demonstration of the removal of hazardous constituents is sufficient for the purposes of the closure standard, the closure can be approved in a manner similar to the previous closures.

If further discussion is necessary or if additional information is needed, please contact Mark Haagenstad of the Water Quality and RCRA Group at (505) 665-2014.

Sincerely,

A R Grieggs

Anthony R. Grieggs
Group Leader
Water Quality & RCRA Group
Los Alamos National Laboratory

Sincerely,

Gene E Turner

Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Department of Energy
Los Alamos Site Office

ARG:GET:MH:WC/lm

Enclosure:	1	Review of the Risk Assessment of Residual Lead Concentrations on Shaft Walls Supporting Closure of TA-54 Area L Shafts 36 and 37
Enclosure:	2	Table 1 Calculation of Blood Lead Concentrations Using the Modified Version of the EPA Adult Lead Model (DTSC, 2011)

Cy: Carl A. Beard, PADOPS, w/o enc., A102, (E-File)
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INDEPENDENT REGISTERED PROFESSIONAL ENGINEER'S CERTIFICATION

This certification was prepared in accordance with generally accepted professional engineering principles and practice pursuant to the requirements of 20.4.1 NMAC, Subpart VI, §265.115 [10-1-03], for an independent registered professional engineer's certification. These services have been performed with the care and skill ordinarily exercised by members of the profession practicing under similar conditions at the same time and in the same manner or in a similar locality. No other warranty is either expressed or implied. The finding and certification are based on reviewing the risk assessment results documented in *Review of the Risk Assessment of Residual Lead Concentrations on Shaft Walls Supporting Closure of TA-54 Area L Shafts 36 and 37*.

With the signature and seal below, I certify that the information presented in the *Review of the Risk Assessment of Residual Lead Concentrations on Shaft Walls Supporting Closure of TA-54 Area L Shafts 36 and 37* is, to the best of my knowledge and belief, true, accurate, and complete.

Respectfully,

Adelante Consulting, Inc.

CHARLES J. ENGLISH, JR.
NEW MEXICO
17350
LICENSED PROFESSIONAL ENGINEER

3-20-12

Charles J. English, Jr.
New Mexico Registered Professional Engineer No. 17350
Expires December 31, 2012

ENCLOSURE 1

Review of the Risk Assessment of Residual Lead Concentrations on the Shaft Walls Supporting Closure of Ta-54 Area L Shafts 36 and 37

ENV-RCRA-12-0022

LAUR: 12-20080

APR 3 0 2012

Date: ______________________________

Review of the Risk Assessment of Residual Lead Concentrations on Shaft Walls Supporting Closure of TA-54 Area L Shafts 36 and 37

March 2012

Introduction:

In 2005 and 2006 a sampling and analysis plan (LANL, 2005(1)) and closure certification report (LANL, 2006) were submitted to the New Mexico Environment Department Hazardous Waste Bureau (NMED-HWB) for the Technical Area 54 (TA-54), Area L, Storage Shafts 36 and 37. These storage shafts are listed as "TA-54 Area L Container Storage Unit (below ground)" within Table J-1, *Active Portion of the Facility,* in Attachment J of the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (the Permit). Table J-1 lists the unit as "Wastes removed and unit undergoing closure, closure certification incomplete". In a July 13, 2011 letter to the New Mexico Environment Department, the National Nuclear Security Administration (NNSA) and Los Alamos National Security LLC (LANS) (collectively the Permittees) requested the review of these documents and identification of issues that led to the incomplete status of this certification of closure. This review is being performed as requested by NMED in a February 16, 2012 conference call.

The Permittees conducted closure activities in 2005 for the TA-54, Area L, Storage Shafts 36 and 37. Closure of the unit was performed in accordance with the Los Alamos National Laboratory Technical Area 54, Area L, Storage Shafts 36 and 37 Closure Sampling and Analysis Plan, which was submitted to the NMED-HWB on April 21 , 2005 (LANL, 2005(1)). Decontamination of each shaft was achieved by removal of all additional waste residuals, dust, and debris at the base of each shaft using a high-capacity vacuum unit equipped with high-efficiency particulate air filtration. The dust and debris were sampled and surface wipe samples were collected from the floor and walls of each shaft and analyzed to verify decontamination. A human health risk assessment (HHRA) performed on residual lead residues on the interior surface of each shaft demonstrated no unacceptable risk to human health.

The Closure Certification Report for the Technical Area 54, Area L Storage Shafts 36 and 37 Container Storage Unit was originally submitted to the NMED-HWB on October 19, 2006 (LANL, 2006). The report contains a specific description of closure activities and certifications by facility representatives and by an independent registered professional engineer, as required by 40 CFR § 265.115. The unit has been stabilized and secured by concrete blocks and steel covers, stormwater controls, and access control at TA-54 awaiting final resolution since that time.

Review of the Human Health Risk Assessment for Shafts 36 and 37

The Closure Certification Report contains a human health risk assessment (HHRA) performed to support storage unit closure. The HHRA methodology is fully described in Attachment D of the Certification Report. The HHRA was performed for an occupational exposure of a female worker to fugitive dust released from the surfaces of the storage units. The HHRA determines that no other exposure pathways are complete. The exposure point concentration used in the HHRA was the maximum lead concentration reported for swipes of the storage unit walls. The HHRA methodology was based on the Adult Lead Model (ALM) developed by the United States Environmental Protection Agency (EPA, 2003); however, the ALM does not address the inhalation pathway. Therefore, the HHRA used a model developed by the California Department of Toxic Substances Control (DTSC) which addresses multiple exposure pathways, including inhalation of dust (DTC, 2000). The model is based on the assumption that the fetus of a pregnant worker is the most sensitive population. The DTSC currently estimates that a one ug/dL incremental increase in a child's (or fetus's) blood lead reduces the child's IQ by up to 1 point (DTSC, September 2011).

The DTSC methodology was also used as a closure determination for the HHRAs performed for certification of the closure of TA-50, Building-37, rooms 115, 116, 117, and the controlled air incinerator exhaust equipment (LANL, 2004 [1-3]). These reports were formally submitted to NMED on September 9, 2004. The HHRAs for these closure reports were also based on maximum reported lead concentrations of surface wipe samples from container storage unit walls. The DTSC lead model was used for evaluation of occupational exposures of a pregnant worker to lead for these closure reports. The HHRAs demonstrated that there were no occupational hazards to the worker or fetus due to the presence of residual lead. NMED determined that these other units were closed correctly and approved the closure certification reports in letters dated November 15, 2004. Additionally, the same HHRA methodology was also used for the closure of TA-55, Building 4, B38 (LANL, 2005). The closure certification report was submitted to NMED on May 26, 2005 (LANL, 2005(2)) and approved in a letter from NMED on January 3, 2006.

The HHRA performed for the Shafts 36 and 37 storage units used the same methodology and occupational exposure scenario for the previously approved closures by NMED. The HHRA concluded that, due to the storage unit configuration, the only complete exposure pathway was inhalation of fugitive dust by a worker stationed above the storage units. The exposure scenario very conservatively assumed that surface dust from the storage units could be released into the atmosphere and inhaled by a pregnant worker. Exposure factors used in the HHRA are discussed in the HHRA methodology. The assessment found that there was no significant contribution to the baseline blood lead concentration (2.2 ug/dL)[1] of the worker or a developing fetus (2.0 ug/dL)[2].

The DTSC model has been updated since the performance of the Shafts 36 and 37 storage units HHRA. It is now called Leadspread8 (DTSC 2011, http://www.dtsc.ca.gov/AssessingRisk/leadspread8.cfm). The updated model was used to verify the results reported in the Closure Certification Report. The model uses an occupational exposure scenario for a pregnant worker. The current occupational version only includes the ingestion pathway because it is the dominant and therefore, most conservative exposure pathway (see pathway contributions in Table 2). In the following scenario it is assumed the fugitive dust settles on work surfaces and exposure is by incidental ingestion. Table 1 shows the results for a pregnant woman worker for ingestion of soil and dust at the observed concentration of 0.182 ug/cm^2, assuming that the measured concentration in ug/cm is equal to the concentration of dust in ug/g (same assumption as used in the HHRA). There is no significant contribution to fetal blood lead levels. The industrial preliminary remediation goal for soil calculated using this model is 318 ug/g, more than 2 orders of magnitude greater than residual lead concentrations.

The current DTSC childhood residential model (DTSC 2011) was also run for comparison, although this exposure scenario is not realistic, given the present configuration of the stabilized storage units and their location within the controlled TA-54 industrial site. Table 2 shows the exposure assumptions and the results for the maximum residual lead concentration found in the storage units. There is no

[1] The baseline blood lead level is the upper value of the plausible range reported for women 20 to 49 years of age in the United States.

[2] The fetal baseline blood lead concentration is assumed to be 90% of the maternal baseline concentration.

significant contribution to blood lead levels of a child, at the observed maximum concentration, for the residential scenario.

If the storage units are left in place the residual lead could potentially affect soil lead concentrations. A calculation was performed to determine the total amount of lead on the interior surface of each storage unit, conservatively using the maximum observed concentration for each from wipes of the walls (Table 3). The total residual lead on the surface of each storage unit is approximately 0.037 g. It was then assumed that the storage units were filled with crushed Qbt tuff for further stability after the RCRA closure or, potentially, as a response to other corrective action activities at Area L. The average bulk density of Qbt tuff is 1.2 g/cm^3 (LANL, 2011). It was assumed that crushing and packing reduces the bulk density to 80% of the original or 0.97 g/cm^3. This is a conservative assumption, because the lower the bulk density of the fill, the greater the contribution of residual lead will be to the final concentration. The Qbt tuff has a back ground lead concentration of 11.2 ug/g (LANL, 1998). When the amount of lead on the storage units' surfaces (0.037 g) is added to the background amount of lead added in the tuff fill for shafts 36 and 37 (40.73 g and 136.78 g respectively), the soil lead concentration is not significantly increased above the background concentration (Table 3).

Conclusions

The Closure Certification Report for the Technical Area 54, Area L Storage Shafts 36 and 37 was submitted to NMED in September 2006 and contains a HHRA performed to support shaft closure. The HHRA is based on the occupational exposure of a female worker to fugitive dust released from the surfaces of the shafts and used the DTSC model, based on the EPA's ALM. This model had been used in previous closures approved by NMED including TA-50, Building-37, rooms 115, 116, 117, the controlled air incinerator exhaust equipment, and TA-55, Building 4, B38.

The HHRA found no significant contribution of residual lead from fugitive dust to the blood lead levels of a female worker or her fetus. The model has been updated since the report to include both an occupational exposure for a female worker and a residential exposure for a child. Both models were run for comparison, using the maximum residual lead concentration from the closure data. No significant health affect was found for the female worker, fetus, or a residential child.

Calculations were also performed to determine the contribution of the residual lead to soil if the shafts were left in place and backfilled with crushed tuff. Using the maximum residual lead concentration, it was determined that there would be no significant rise in tuff lead concentrations above background.

ENCLOSURE 2

Table 1 Calculation of Blood Lead Concentrations Using the Modified Version of the EPA Adult Lead Model (DTSC, 2011)

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Table 1 - Calculation of Blood Lead Concentrations Using the Modified Version of the EPA Adult Lead Model (DTSC, 2011)

Variable	Description of Variable	Units	
PbS	Soil lead concentration	ug/g or ppm	0.182
Rfetal/maternal	Fetal/maternal PbB ratio	-	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSDi	Geometric standard deviation PbB	-	1.8
PbB0	Baseline PbB	ug/dL	0.00
IRS	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.05
AFS, D	Absorption fraction (same for soil and dust)	-	0.12
EFS, D	Exposure frequency (same for soil and dust)	days/yr	250
ATS, D	Averaging time (same for soil and dust)	days/yr	365
PbBadult	PbB of adult worker, geometric mean	ug/dL	0.00
PbBfetal, 0.90	90th percentile PbB among fetuses of adult workers	ug/dL	0.00
PbBt	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	1
P(PbBfetal> PbBt)	Probability that fetal PbB > PbBt, assuming lognormal distribution	%	0.0%

Table 2 - Calculation of Blood Lead Concentrations for a Child Using a Residential Scenario and the Lead Risk Assessment Spreadsheet 8 (DTSC, 2011)

INPUT						
MEDIUM	Units	LEVEL				
Lead in Soil/Dust	ug/g	0.2				
Respirable Dust	ug.m^3	1.5				
EXPOSURE PARAMETERS						
	units	children				
Days per week	days/wk	7				
Geometric Standard Deviation		1.6				
Blood lead level of concern	ug/dL	1				
Skin area, residential	cm^2	2900				
Soil adherence	ug/cm^2	200				
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001				
Soil ingestion	mg/day	100				
Soil ingestion, pica	mg/day	200				
Ingestion constant	(ug/dl)/(ug/day)	0.16				
Bioavailability unitless		0.44				
Breathing rate	m^3/day	6.8				
Inhalation constant	(ug/dl)/(ug/day)	0.192				
OUTPUT						
Percentile Estimate of Blood Pb (ug/dl)				PRG-90		
	50th	90th	98th	ug/g		
BLOOD Pb, CHILD	0	0	0	77		
BLOOD Pb, PICA CHILD	0	0	0	39		
PATHWAYS						
CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dL	percent	PEF	ug/dL	percent
Soil Contact	5.80E-05	0.00	1%		0.00	0%
Soil Ingestion	7.00E-03	0.00	99%	1.40E-02	0.00	100%
Inhalation	2.00E-06	0.00	0%		0.00	0%

Table 3 – Calculation of the Total Amount of Residual Lead in Each Shaft and the Contribution to the Lead Concentration of Tuff Potentially Used as Fill to Stabilize the Shafts.

Total lead potentially in Shaft 36, Area L						
	Lead	Dimensions of Shaft				
	Maximum Concentration (ug/100cm^2)	Depth (27.25 ft) (cm)	Diameter (30 in) (cm)	Radius (15 in) (cm)		
	18.2	830.6	76.2	38.1		
Calculation of Total Lead on Shaft Surface						
Surface Area of Cylinder Open at the Top: A=πr^^{2}+2πrh						
Surface Area of Shaft 36:	(π x [38.1cm]^2) + (2 x π x 38.1cm x 831cm) =				203392	cm^2
Total Amount of Lead on Shaft Surface:	(18.2μg/100cm^2) x 201578cm^2 =				37017	ug
Conversion to grams:	37017μg x 1 x 10-6 g/ug =				0.037	g
Calculation of Weight of Tuff Used as Fill for Shaft 36						
Volume of Shaft 36:	V=π(r^2)h=				3787750	cm^3
Density of tuff fill[1]:					0.96	g/cm^3
Weight of fill:	W=3787750cm^3*0.96g/cm^3=				3636240	g
	W=3636240g*1kg/1000g=				3636.2	kg
Background concentration of lead in Qbt2/Qbt3/Qbt4 tuff =					11.2	mg/kg
Amount of lead in 3636.2 kg of tuff =					40.73	g
Plus amount of lead on surface of shaft =					40.76	g
Final concentration of lead in Shaft fill =					11.2	mg/kg
Total lead potentially in Shaft 37, Area L						
	Lead	Dimensions of Shaft				
	Maximum Concentration (ug/100cm^2)	Depth (35.75 ft) (cm)	Diameter (48 in) (cm)	Radius (24 in) (cm)		
	8.63	1089.7	121.9	61		
Surface Area of Cylinder Open at the Top: A=πr^2+2πrh						
Surface Area of Shaft 36:	(π x [61cm]^2) + (2 x π x 61cm x 1089.7 cm) =				429039	cm^2
Total Amount of Lead:	(8.63μg/100cm^2) x 429039cm^2 =				37026	ug
Conversion to grams:	37026μg x 1 x 10-6 g/ug =				0.037	g
Calculation of Weight of Tuff used as fill for Shafts 37						
Volume of Shaft 37:	V=π(r^2)h=				12721280	cm^3
Density of tuff fill[1]:					0.96	g/cm^3
Weight of fill:	W=12721280cm^3*0.96g/cm^3=				12212428	g
	W=12212428g*1kg/1000g=				12212.4	kg
Background concentration of lead in Qbt2/Qbt3/Qbt4 tuff =					11.2	mg/kg
Amount of lead in 12721.3 kg of tuff =					136.78	g

Plus amount of lead on surface of shaft =				136.82	g
Final concentration of lead in Shaft fill =				11.2	mg/kg
1. Tuff density is the average of values cited in MDA L CME Report Rev2 (LANL, 2011) adjusted to 80% of in situ for crushing and packing. This is a conservative assumption, because a lower density increases the effect of added lead.					
Conclusion					
The NMED risk-based residential screening value for lead is 400 mg/kg of soil.					
The contribution of the residual lead on the surface of each shaft is conservatively estimated at 0.037 g.					
If the shafts are filled with crushed QBT tuff having a background concentration of lead of 11.2 mg/kg of soil, the soil concentration of lead will not be significantly affected by the residual lead on the interior of the shafts.					
The soil concentration of lead will remain at the background soil lead concentration, well below the residential screening value of 400 mg/kg soil.					

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