



AQS, Inc.  
2112 Deer Run Drive  
South Weber, Utah 84405

(801) 476-1365  
www.aqsnet.com

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Mr. James Bearzi  
Hazardous Waste Bureau  
2905 Rodeo Park Dr. E/Bldg 1  
Santa Fe, NM 87505

RE: Evaluation of the Ecological Risk Screening Assessment for Dioxins/Furans for the Open Burning Treatment Units (TA-16-388 and TA-16-399), June 2009

Dear Mr. Bearzi:

This letter addresses Los Alamos National Laboratory's (LANL) ecological risk screening assessment for dioxin and furan congeners detected in soil samples associated with the Open Burning Treatment Units at Technical Area 16 (TA-16-388 and TA-16-399). LANL collected five soil samples and analyzed the samples for dioxin and furan congeners. An additional sample was collected to represent background concentrations (sample 09RCRA462). LANL did not include a screening assessment against the results from the background soil location nor did LANL provide any comparison to the background data. The results of the screening assessment conducted by LANL indicated that there were elevated hazard quotients (HQs) for the shrew and deer mouse, based on both the maximum TCDD toxicity equivalent concentration (TEC) and the mean TCDD TEC. LANL defended the results as being over conservative and provided a discussion of the uncertainties associated with the analysis along with a comparison of the detected levels to levels of dioxins detected across LANL.

This review was conducted to assess the screening assessment by LANL and to discern whether the assessment provides sufficient information to indicate that operation of the Open Burning Treatment Units at TA 16 would not result in undue environmental risk.

As part of this review, it was assumed that all the data collected to support this evaluation have been reviewed, validated, and deemed acceptable for use in a risk assessment. Our review of the LANL assessment included these steps:

1. Verification of the screening level assessment provided by LANL
2. Evaluation of the background sample datum,
3. Recommendations.

Verification of the screening level assessment provided by LANL



A review of the screening level calculations was conducted and the results provided by LANL could be replicated. The analysis followed approved methodologies.

However, the evaluation did not include assessment of either the kestrel or robin (avian receptors), as LANL does not have toxicity reference values (TRVs) for dioxin/furans in their EcoRisk database (October 2008). A notice of deficiency (NOD) comment would typically be drafted concerning this issue. In order to expedite evaluation of this site, a review of literature resulted in TRVs for both of these receptors (Sample *et al* 1996:

<http://www.esd.ornl.gov/programs/ecorisk/documents/tm86r3.pdf>). As part of this review, these TRVs from Sample *et al* were applied to determine screening level HQs for the kestrel and robin. The HQs were determined following the LANL methodology and input parameters in the "Screening-Level Ecological Risk Assessment Methods, Revision 2". The resulting HQs for avian receptors are shown in Table 1. For both the kestrel and robin using the maximum TCDD TEC, the resulting HI is above the target level of one. The HI is below the target level for both receptors when using the average TCDD TEC.

<b>TCDD TEC</b>	<b>Kestrel</b>	<b>Robin</b>
Maximum	<b>3.75E+00</b>	<b>3.75E+00</b>
Average	8.59E-01	8.59E-01

(Using a TRV of 2.8E-06 from Sample *et al* 1996, and intertaxon uncertainty factor of 5)

The average concentration is typically not applied as an exposure point concentration (EPC) when conducting risk assessments. Environmental Protection Agency (EPA) and State of New Mexico guidance indicates that for a screening assessment, the maximum detected concentration should be applied for the EPC. If a more refined analysis is required, then the 95-percent upper confidence level (95UCL) should be determined using distributional-based statistical methods for use as the EPC. A concern with LANL's screening assessment is that too few data (only five) were collected to confidently determine a 95UCL (EPA guidance and LANL indicate a minimum of eight samples are required to determine a 95UCL).

In looking at the HQs from the initial screening assessment using maximum concentrations, additional analyses/refinement is needed. LANL provided some refinement of the evaluations, incorporating area use factors and population use factors. The refinement evaluates each receptor's population territory size in relation to the size of the open burning treatment facility (2.6 hectares). The results of this refinement reduce all HQs to less than the target level of one for all receptors except the shrew and deer mouse, regardless of whether background is included (see Table 2).

<b>TCDD TECs</b>	<b>Kestrel</b>	<b>Robin</b>	<b>Red Fox</b>	<b>Cotton- tail</b>	<b>Shrew</b>	<b>Deer Mouse</b>	<b>Earth- worm</b>	<b>Plant</b>
Max	2.30E-03	5.80E-01	5.47E-04	4.58E-03	<b>6.03E+00</b>	<b>1.53E+01</b>	2.10E-06	NA
Avg.	5.27E-04	1.33E-01	1.25E-04	1.05E-03	<b>1.38E+00</b>	<b>3.50E+00</b>	4.81E-07	NA
"Bkgnd"	6.27E-06	1.58E-03	1.49E-06	1.25E-05	1.64E-02	4.17E-02	5.72E-09	NA

Based upon this refined assessment, LANL concluded that there are no unacceptable ecological risks, even though the deer mouse and shrew still show elevated HQs. According to LANL’s guidance for ecological risk assessments, a more refined assessment for the shrew and deer mouse should have been conducted. While LANL does provide a discussion of the uncertainties associated with the assessment to include the conservativeness built into input data, LANL should have conducted a more refined assessment in accordance with the “Screening-Level Ecological Risk Assessment Methods, Revision 2”. As indicated before, however, no conclusive risk decisions should be made using only five data points.

Evaluation of the “background” sample datum

Following LANL’s methodology, a screening assessment using both the maximum TCDD TEC and average TCDD TEC was conducted for the “background” datum. The results indicated that for all receptors, the HQs were below the target level of one. In addition, the “background” concentration and TCDD TEC were lower than the samples identified as being potentially impacted by the open burning treatment units. However, a determination can not be made as to whether this datum is representative of background through a comparison to the other five samples alone. Further, it is unlikely that the location of the “background” sample has not been impacted to some extent by past operation of the units. In order to assess whether this sample is truly representative of background, a review of wind rose data (to ensure the location is upwind of the treatment unit), an evaluation of the deposition map from modeling, and a statistical comparison to other samples not impacted by site activities would be required. Table 3 provides a summary of the calculate TEC for background and resulting HQs for each receptor.

<b>Table 3. Evaluation of “Background” Sample 09RCRA462</b>								
<b>TCDD TEC (mg/kg)</b>	<b>Kestral</b>	<b>Robin</b>	<b>Red Fox</b>	<b>Cotton- tail</b>	<b>Shrew</b>	<b>Deer Mouse</b>	<b>Earth- worm</b>	<b>Plant</b>
2.86E-08	1.02E-02	1.02E-02	2.39E-02	5.96E-04	9.87E-02	4.93E-02	5.72E-09	NA

NA – phytotoxicity data not available.

Recommendations

Based upon the above review and additional analyses of the data provided in LANL’s ecological risk screening assessment for the open burning treatment units at TA-16, a conclusive determination as to whether operation of the Open Burning Treatment Units at TA-16 will result in excess ecological risk can not be made at this time. The conclusion supported by LANL is based upon limited data (five site-related samples). Five samples can not adequately define the nature and extent of dioxin/furan contamination from past operations from the TA-16 open burning treatment units. Sufficient samples should be collected to statistically determine an appropriate EPC.

Another concern is that the assessment only evaluates exposure to dioxins/furans. Sufficient data has not been provided to demonstrate that there are not additional constituents of potential ecological concern that could contribute to excess risk.

LANL has indicated that dioxins/furans are ubiquitous to the area. However, this risk assessment is being conducted to support permitting of a unit not in support of corrective actions. As such, background levels of dioxins/furans should not be removed from considered in the risk analysis but rather the risk should reflect risk to process emissions (future operations).

It is our recommendation that additional samples under a compliance monitoring program should be collected to fully characterize the site and to update the ecological risk assessment. The sampling should also include analyses of metals, explosive, organics, perchlorate, and dioxins/furans.

The attached spreadsheet provides the supporting calculations discussed in this letter.

If you or any of your staff have questions, please contact me at (801) 451-2864 or via email at [paigewalton@msn.com](mailto:paigewalton@msn.com).

Thank you,

Paige Walton  
AQS Senior Scientist and Project Lead

Enclosure (Excel file – for internal review only)

cc: John Kieling NMED (electronic)  
Joel Workman, AQS (electronic)

## TA-16 Open Burning Units - Ecological Risk Screening Calculation Check Sheet

Congener	Sample 09RCRA460 (mg/kg)	Sample 09RCRA461 (mg/kg)	Sample 09RCRA463 (mg/kg)	Sample 09RCRA464 (mg/kg)	Sample 09RCRA465 (mg/kg)	Sample 09RCRA432 (mg/kg)
2,3,7,8-TCDD	ND	ND	ND	ND	ND	ND
1,2,3,7,8-PeCDD	ND	ND	ND	ND	1.92E-06	ND
1,2,3,4,7,8-HxCDD	4.19E-07	ND	ND	ND	5.38E-06	ND
1,2,3,6,7,8-HxCDD	7.15E-07	ND	ND	ND	1.06E-05	ND
1,2,3,7,8,9-HxCDD	7.26E-07	ND	ND	ND	1.14E-05	ND
1,2,3,4,6,7,8,-HpCDD	2.08E-05	4.22E-06	4.41E-06	1.08E-05	2.92E-04	1.83E-06
OCDD	1.41E-04	2.07E-05	2.70E-05	3.22E-05	1.55E-03	1.22E-05
2,3,7,8-TCDF	1.83E-07	ND	ND	ND	2.01E-07	ND
1,2,3,7,8-PeCDF	ND	ND	ND	ND	ND	ND
2,3,4,7,8-PeCDF	ND	ND	ND	6.33E-07	7.15E-07	ND
1,2,3,4,7,8-HxCDF	4.95E-07	ND	ND	7.30E-07	3.21E-06	ND
1,2,3,6,7,8-HxCDF	5.39E-07	ND	ND	1.02E-06	3.96E-06	ND
2,3,4,6,7,8-HxCDF	7.23E-07	ND	ND	1.09E-06	5.33E-06	ND
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HpCDF	1.04E-05	1.63E-06	1.20E-06	5.09E-06	8.44E-05	6.31E-07
1,2,3,4,7,8,9-HpCDF	5.35E-07	ND	ND	1.38E-06	5.95E-06	ND
OCDF	1.77E-05	2.54E-06	2.83E-06	1.07E-05	1.87E-04	1.17E-06

## TRVS

	KESTRAL	ROBIN	RED FOX	COTTONTAIL	SHREW	MOUSE	WORM	PLANT
TCDD - LANL	N/A	N/A	1.20E-06	4.80E-05	2.90E-07	5.80E-07		5 N/A
TCDD - OTHER*	2.80E-06	2.80E-06						

\*Kestral and Robin TRVs based on Sample, et al, 1996. <http://www.esd.ornl.gov/programs/ecorisk/documents/tm86r3.pdf>  
 Test dose of 1.4E-05 NOAEL, applied intertaxon uncertainty factor of 5

LANL TA-16 Open Burning Units Ecological Screening Assessment Check Calculations

Initial Screening Assessment

	EPC	KESTRAL	ROBIN	RED FOX	COTTONTAIL	SHREW	MOUSE	WORM	PLANT
TCDD TEC - max	1.05E-05	<b>3.75E+00</b>	<b>3.75E+00</b>	<b>8.74E+00</b>	2.18E-01	<b>3.62E+01</b>	<b>1.81E+01</b>	2.10E-06	NA
TCDD TEC - avg.	2.40E-06	8.59E-01	8.59E-01	<b>2.00E+00</b>	5.01E-02	<b>8.29E+00</b>	<b>4.15E+00</b>	4.81E-07	NA
TCDD TEC - bkgnd	2.86E-08	1.02E-02	1.02E-02	2.39E-02	5.96E-04	9.87E-02	4.93E-02	5.72E-09	NA

Receptor	population		
	home range	area	PAUF
kestral	106	4240	6.13E-04
robin	0.42	16.8	1.55E-01
red fox	1038	41520	6.26E-05
cottontail	3.1	124	2.10E-02
shrew	0.39	15.6	1.67E-01
mouse	0.077	3.08	8.44E-01
worm			

	Hazard Quotients								
	EPC	KESTRAL	ROBIN	RED FOX	COTTONTAIL	SHREW	MOUSE	WORM	PLANT
TCDD TEC - max	1.05E-05	2.30E-03	5.80E-01	5.47E-04	4.58E-03	<b>6.03E+00</b>	<b>1.53E+01</b>	2.10E-06	NA
TCDD TEC - avg.	2.40E-06	5.27E-04	1.33E-01	1.25E-04	1.05E-03	<b>1.38E+00</b>	<b>3.50E+00</b>	4.81E-07	NA
TCDD TEC - bkgnd	2.86E-08	6.27E-06	1.58E-03	1.49E-06	1.25E-05	1.64E-02	4.17E-02	5.72E-09	NA

LANL TA-16 Open Burning Units Ecological Screening Assessment Check Calculations

TEF	Sample 09RCRA460 (mg/kg)	Sample 09RCRA461 (mg/kg)	Sample 09RCRA463 (mg/kg)	Sample 09RCRA464 (mg/kg)	Sample 09RCRA465 (mg/kg)	Sample 09RCRA43 2 (mg/kg)
1.00E+00						
1.00E+00					1.92E-06	
1.00E-01	4.19E-08				5.38E-07	
1.00E-01	7.15E-08				1.06E-06	
1.00E-01	7.26E-08				1.14E-06	
1.00E-02	2.08E-07	4.22E-08	4.41E-08	1.08E-07	2.92E-06	1.83E-08
3.00E-04	4.23E-08	6.21E-09	8.10E-09	9.66E-09	4.65E-07	3.66E-09
1.00E-01	1.83E-08				2.01E-08	
3.00E-02						
3.00E-01				1.90E-07	2.15E-07	
1.00E-01	4.95E-08			7.30E-08	3.21E-07	
1.00E-01	5.39E-08			1.02E-07	3.96E-07	
1.00E-01	7.23E-08			1.09E-07	5.33E-07	
1.00E-01						
1.00E-02	1.04E-07	1.63E-08	1.20E-08	5.09E-08	8.44E-07	6.31E-09
1.00E-02	5.35E-09			1.38E-08	5.95E-08	
3.00E-04	5.31E-09	7.62E-10	8.49E-10	3.21E-09	5.61E-08	3.51E-10
<b>TEC:</b>	<b>7.45E-07</b>	<b>6.55E-08</b>	<b>6.50E-08</b>	<b>6.59E-07</b>	<b>1.05E-05</b>	<b>2.86E-08</b>
<b>TEC MAX:</b>	<b>1.05E-05</b>					
<b>TEC AVG:</b>	<b>2.40E-06</b>					
<b>BKND:</b>	<b>2.86E-08</b>					