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July 13, 2013

DCN: NMED-2013-11

Mr. David Cobrain
New Mexico Environment Department (NMED)
Hazardous Waste Bureau
2905 Rodeo Park Dr. E/Bldg 1
Santa Fe, NM 87505

RE: Development of vapor screening levels for use at the Transuranic Waste Facility (TWF) at Los Alamos National Laboratory's (LANL) Material Disposal Area (MDA) C.

Dear Mr. Cobrain:

This letter serves as a deliverable and addresses derivation of vapor screening levels for use at LANL. Vapor screening levels were originally developed in August 2012 for select depths as identified by Mr. Ben Wear. However, Mr. Wear has recently requested development of screening levels for additional depths, to include 5 feet below ground surface (ft bgs) and 7.5 ft bgs. The August 2012 screening levels have been updated to include these two additional depths and to incorporate updated toxicity information from the May 2013 Regional Screening Level database for industrial worker indoor air as available. It should be noted that the previously submitted screening levels for methylene chloride, tetachloroethylene and trichloroethylene have been revised to reflect updated inhalation data.

Table 1 presents the SGSLs for organic chemicals at depths of 5, and 7.5 ft bgs. Table 2 presents the SGSLs for organic chemicals at depths of 10, 50, and 90 ft bgs with updated values denoted in red font. Table 3 presents the SGSL for tritium.

Table 1. Vapor Screening Levels for Organic Chemicals at the Transuranic Waste Facility

Constituent	Soil-gas Screening Level for 5 ft bgs Sampling Depth[a,b,c,d,e] ($\mu g/m^3$)	Soil-gas Screening Level for 7.5 ft bgs Sampling Depth[a,b,c,d,e] ($\mu g/m^3$)
Acetone	2.73E+08	3.07E+08
Benzene	3.41E+04	3.95E+04
Methyl bromide	4.97E+04	5.88E+04
Methylethylketone (2-butanone)	4.81E+07	5.62E+07
Carbon disulfide	6.31E+06	7.21E+06

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Carbon tetrachloride	4.42E+04	5.19E+04
Chlorobenzene	4.97E+05	5.87E+05
Chloroform	1.08E+04	1.23E+04
Methyl chloride (chloromethane)	7.59E+05	8.52E+05
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	NA
Dichlorodifluoromethane	1.03E+06	1.22E+06
1,1-Dichloroethane	1.73E+05	2.04E+05
1,1-Dichloroethylene	1.86E+06	2.16E+06
cis-1,2-Dichloroethylene[e]	5.85E+05	6.91E+05
1,2-Dichloropropane	2.65E+04	3.11E+04
Ethylbenzene	1.10E+05	1.29E+05
4-Ethyltoluene[e]	4.70E+07	5.46E+07
2-Hexanone	2.32E+05	2.52E+05
Methylene chloride	5.34E+06	6.11E+06
Styrene	1.00E+07	1.19E+07
Tetrachloroethylene	4.08E+05	4.83E+05
Toluene	4.70E+07	5.46E+07
1,1,2-Trichloro-1,2,2-trifluoroethane	2.87E+08	3.37E+08
1,1,1-Trichloroethane	4.86E+07	5.71E+07
Trichloroethylene	1.94E+04	2.27E+04
Trichlorofluoromethane	6.63E+06	7.70E+06
1,2,4-Trimethylbenzene	7.47E+04	9.00E+04
1,3,5-Trimethylbenzene[e]	7.49E+04	9.03E+04
Vinyl chloride (chloroethene)	5.68E+04	6.47E+04
Xylenes (total)	9.73E+05	1.14E+06
o-Xylene	9.41E+05	1.09E+06
p-Xylene	9.77E+05	1.15E+06
m-Xylene	1.01E+06	1.20E+06

[a] Attenuation coefficients were derived via utilization of USEPA (2004) advanced soil-gas Johnson and Ettinger model).

[b] RSL = Regional Screening Level, USEPA Region 9, cancer-risk based levels adjusted to a 1E-05 cancer risk, May 2013.

[c] Final soil gas screening levels were calculated by dividing the RSL by the attenuation coefficient (RSL/α); methodology is derived from Equation 19 in USEPA's (2004) User's Guide to Evaluating Subsurface Vapor Intrusion Into Buildings.

[d] NA = not available. RSLs are not available for this constituent and no appropriate surrogate constituent.

[e] RSLs were not available for these constituents and the following surrogate values were applied:

trans-1,2-dichloroethylene was used as a surrogate for cis-1,2-dichloroethylene;
toluene was used as a surrogate for 4-ethyltoluene;
1,2,4-trimethylbenzene was used as a surrogate for 1,3,5-trimethylbenzene.

Table 2. Vapor Screening Levels for Organic Chemicals at the Transuranic Waste Facility

Constituent	Soil-gas Screening Level for 10 ft bgs Sampling Depth[a,b,c,d,e] ($\mu g/m^3$)	Soil-gas Screening Level for 50 ft bgs Sampling Depth[a,b,c,d,e] ($\mu g/m^3$)	Soil-gas Screening Level for 90 ft bgs Sampling Depth[a,b,c,d,e] ($\mu g/m^3$)
Acetone	3.41E+08	8.82E+08	1.42E+09
Benzene	4.50E+04	1.32E+05	2.19E+05
Methyl bromide	6.78E+04	2.13E+05	3.57E+05
Methylethylketone (2-butanone)	6.44E+07	1.95E+08	3.25E+08
Carbon disulfide	8.10E+06	2.24E+07	3.66E+07
Carbon tetrachloride	5.96E+04	1.82E+05	3.05E+05
Chlorobenzene	6.77E+05	2.12E+06	3.56E+06
Chloroform	1.38E+04	3.83E+04	6.27E+04
Methyl chloride (chloromethane)	9.44E+05	2.43E+06	3.91E+06
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	NA	NA
Dichlorodifluoromethane	1.42E+06	4.59E+06	7.76E+06
1,1-Dichloroethane	2.35E+05	7.32E+05	1.23E+06
1,1-Dichloroethylene	2.45E+06	7.13E+06	1.18E+07
cis-1,2-Dichloroethylene[e]	7.97E+05	2.49E+06	4.18E+06
1,2-Dichloropropane	3.57E+04	1.09E+05	1.83E+05
Ethylbenzene	1.49E+05	4.62E+05	7.75E+05
4-Ethyltoluene[e]	6.22E+07	1.83E+08	3.04E+08
2-Hexanone	2.71E+05	5.83E+05	8.94E+05
Methylene chloride (revised)	6.88E+06	1.92E+07	3.15E+07
Styrene	1.37E+07	4.34E+07	7.31E+07
Tetrachloroethylene (revised)	5.58E+05	1.76E+06	2.95E+06
Toluene	6.22E+07	1.83E+08	3.04E+08
1,1,2-Trichloro-1,2,2-trifluoroethane	3.87E+08	1.19E+09	1.98E+09
1,1,1-Trichloroethane	6.55E+07	2.01E+08	3.36E+08
Trichloroethylene (revised)	2.60E+04	7.94E+04	1.33E+05
Trichlorofluoromethane	8.76E+06	2.58E+07	4.29E+07
1,2,4-Trimethylbenzene	1.05E+05	3.50E+05	5.95E+05
1,3,5-Trimethylbenzene[e]	1.06E+05	3.52E+05	5.99E+05
Vinyl chloride (chloroethene)	7.26E+04	1.99E+05	3.26E+05
Xylenes (total)	1.31E+06	4.02E+06	6.72E+06
o-Xylene	1.24E+06	3.67E+06	6.09E+06
p-Xylene	1.32E+06	4.06E+06	6.80E+06
m-Xylene	1.38E+06	4.39E+06	7.40E+06

[a] Attenuation coefficients were derived via utilization of USEPA (2004) advanced soil-gas Johnson and Ettinger model).
[b] RSL = Regional Screening Level, USEPA Region 9, cancer-risk based levels adjusted to a 1E-05 cancer risk, May 2013.
[c] Final soil gas screening levels were calculated by dividing the RSL by the attenuation coefficient (RSL/α);

methodology is derived from Equation 19 in USEPA's (2004) User's Guide to Evaluating Subsurface Vapor Intrusion Into Buildings.
[d] NA = not available. RSLs are not available for this constituent and no appropriate surrogate constituent.
[e] RSLs were not available for these constituents and the following surrogate values were applied:
trans-1,2-dichloroethylene was used as a surrogate for cis-1,2-dichloroethylene;
toluene was used as a surrogate for 4-ethyltoluene;
1,2,4-trimethylbenzene was used as a surrogate for 1,3,5-trimethylbenzene.

Table 3. Vapor Screening Levels for Radionuclides at the Transuranic Waste Facility

Radionuclides	Soil-gas Screening Level for 5 ft bgs Sampling Depth[a] (pCi/m^3)	Soil-gas Screening Level for 7.5 ft bgs Sampling Depth[a] (pCi/m^3)	Soil-gas Screening Level for 10 ft bgs Sampling Depth[a] (pCi/m^3)	Soil-gas Screening Level for 50 ft bgs Sampling Depth[a] (pCi/m^3)	Soil-gas Screening Level for 90 ft bgs Sampling Depth[a] (pCi/m^3)
Tritium	2.25E+06	2.31E+06	2.36E+06	3.22E+06	4.07E+06

[a] Oak Ridge National Laboratory 2010 Preliminary Remediation Goal (PRG) for industrial indoor air assuming continual source (no decay) http://epa-prgs.ornl.gov/radionuclides/download.html. pCi/m^3 = picocuries per cubic meter. The PRG for tritium is based on a carcinogenic endpoint and has been adjusted to a target risk level of 1E-5.

References

United States Environmental Protection Agency (USEPA), 2004. *User's Guide to Evaluating Subsurface Vapor Intrusion Into Buildings.* http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm

USPEA Regional Screening Levels, 2013. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

USEPA/Oak Ridge National Laboratory, 2010. Preliminary Remediation Goal for Radionuclides. (http://epa-prgs.ornl.gov/radionuclides/)

The supporting Excel spreadsheets used to derive the screening levels have also been provided to you electronically for internal use and for your files.

If you have any questions, please contact me at (801) 451-2864 or via email at paigewalton@msn.com.

Thank you,

Paige Walton
AQS Senior Scientist and Program Manager

cc: Ben Wear, NMED (electronic)
Joel Workman, AQS (electronic)