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ENTERED

December 28, 2005

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building One
Santa Fe, New Mexico 87505-6303

Reference: Work Assignment No. 06110.290.0002; State of New Mexico Environment Department, Santa Fe, New Mexico; Human Health and Ecological Risk Assessment Support; Chloride, Sulfate and Benzene Toxicity Issues, Task 2 deliverable.

Dear Mr. Cobrain:

Enclosed please find the deliverable for the above-referenced work assignment. The deliverable consists of discussions of the toxicity of benzene, chloride, and sulfate.

As noted in an email to Ms. Paige Walton (TechLaw) from Hope Monzeglio, dated December 23, 2005, Ms. Monzeglio had some questions concerning the toxicity of benzene to aquatic life and the overall toxicity of chloride and sulfate.

The document is formatted in Word. The deliverable was emailed to you on December 28, 2005 at dave.cobrain@state.nm.us and to Hope Monzeglio at hope.monzeglio@state.nm.us. A hard (paper) copy of the letter will be sent to you via mail.

If you have any questions, please call me at (303) 763-7188 or Ms. Paige Walton at (801) 451-2978.

Sincerely,

June K. Dreith
Program Manager

Enclosure

cc: Hope Monzeglio, NMED
Paige Walton, TechLaw

TASK 2 DELIVERABLE

BENZENE, CHLORDE, AND SULFATE TOXICITY ISSUES

Human Health and Ecological Risk Assessment Support

Submitted by:

TechLaw, Inc.
560 Golden Ridge Road
Suite 130
Golden, CO 80401-9532

Submitted to:

Mr. David Cobrain

State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building One
Santa Fe, New Mexico 87505

In response to:

Work Assignment No. 06110.290

December 28, 2005

BENZENE, CHLORDE, AND SULFATE TOXICITY ISSUES

Chloride and Sulfate

The question presented was to provide a source and toxicity description for chloride and sulfate.

Based upon a review of available literature, chloride and sulfate are relatively non-toxic constituents. The ATSDR (Agency for Toxic Substances and Disease Registry, www.atsdr.cdc.gov), IRIS (Integrated Risk Information System, www.epa.gov/iris), HEAST (Health Effects Assessment Summary Tables), RAIS (Department of Energy's Risk Assessment Information System, http://risk.lsd.ornl.gov), and California EPA toxicity (http://www.oehha.ca.gov) databases do not provide any toxicity information related to chloride. The only one of these databases to provide information on sulfate is the RAIS database, which indicates that, "no inhalation, or developmental toxicity data were available and no carcinogenicity data were located" (RAIS, http://risk.lsd.ornl.gov/tox/profiles/sulfate_c_V1.shtml). The California database provides an acute reference exposure level (for inhalation) of 120 ug/m^3 per a one hour period, for mild respiratory irritation.

A paper published by Acu Cell (http://www.acu-cell.com/fcl.html) provided a recommended daily intake level (RDI, which is similar to a recommended daily allowance) for adults over 18 years of age as 1.8 g to 5.1 grams. For infants the RDI was listed as 0.3 g to 0.7 g. However, these values do not suggest a limiting intake level or level of toxicity. This information was confirmed with the document "Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate (2004)," (Food and Nutrition Board, http://www.iom.edu/?id=3788&redirect=0), which indicated that chloride dietary intake level is based upon sodium chloride, but there is no RDA or upper limit established and that there is no RDA for sulfate.

In conclusion, the little toxicological data and discussions that were located in literature indicate that chloride and sulfate are relatively non-toxic.

The United States Environmental Protection Agency (EPA) has established National Secondary Drinking Water Regulations (SMCLs) that set non-mandatory water quality standards for chloride and sulfate. These are not enforceable standards are only established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color and odor. The EPA does not consider chloride or sulfate to present a risk to human health at the SMCLs. For chloride, the SMCL is 250 mg/L and sulfate, 250 mg/L. (Refer to the EPA Ground Water and Drinking Water website for specific values: http://www.epa.gov/safewater/mcl.html)

Benzene

The question presented was to provide a source and brief description that identified benzene as a toxic substance to aquatic life.

There is very little environmental data demonstrating the toxicity of benzene to aquatic life. However, several references were identified indicating the toxicity of benzene to aquatic life, especially fish. The EPA database, Ecotox (www.epa.gov/ecotox), provides several of these references. In addition, the Royal Society Chemistry (www.rsc.org) provides a summary of benzene toxicity to aquatic life; including fish, invertebrates, and bioaccumulation factors. The U.S. Army Corps of Engineers/EPA Residue-Effects Database (ERED) is a compilation of data, taken from the literature (http://el.erdc.usace.army.mil/ered/). ERED also provides several references of studies addressing the toxicity of benzene on aquatic life.

However, the best reference to use for referencing a specific toxicity reference value for benzene may be the Los Alamos National Laboratory EcoRisk database (current version is 2.2, release data September 2005). This database provides ecological screening levels for various ecological receptors. The following information was obtained from EcoRisk:

Sediment/Soil: Aquatic community organisms, sediment: 5.7E-02 mg/kg.
Water: Aquatic community organism s, water: 4.5E+01 µg/L

The Toxicity Reference Value (TRV) summary reports from EcoRisk are provided on the following pages. Please note that the summaries were copied as presented in the database.

TRV Summary Report *Ecorisk Database Release 2.2 (September 2005)*

Aquatic community organisms – sediment

***TRV Summary ID:** 10605

GMM TRV ID:

LANL TRV: YES **Data Source:** LANL derived value based on secondary data

Analyte Name: Benzene **Analyte Code:** 71-43-2 **Analyte Group:** Volatile Organic Compound

ESL Receptor Group: AQ(s) **Functional Group:** A **ESL Media:** SEDIMENT

Test Chemical Code: 71-43-2

Test Organism ID: SED **Test Organism Common Name:** Aquatic community organism

Final TRV: LANL SQB 0.057 mg/kg **Exposure Route** DC_SED

Derivation Notes: Sediment quality benchmark (SQB) calculated by Equilibrium Partitioning (EqP) method using Tier II SCV water quality value (0727). EqP method is detailed in 0711, and is based on EPA

Uncertainty:

Calculations: Sediment TRV, based on EqP approach (0733), is equal to: foc*Koc*surface water TRV. Where foc = fraction of organic carbon, and Koc = organic carbon partition coefficient. Numbers are presented on a dry-weight basis.

Log Kow: 2.13 **KocVu:** =(0.00028+LogKow*0.983) **Foc:** assumed to be 1 percent

Text Last Updated On: 12-May-05 **Value Last Updated On:** 30-Jun-99

Confidence Rating: **NMED Concurrence Date:**

Note - Further details on the study/ effects/ toxicity values reviewed for Tier 2 and 3 TRVs (i.e., LANL GMM and CS TRVs) are provided in the PTSE Part 1 (Study Details) and 2s (Study Evaluations) and in the Part 3 (TRV Summary)

Data Set Distribution Comments:

Lowest LOAEL (LOEC) Comparison:

LANL CS TRV Comparison:

ORNL CS TRV Comparison:

USEPA R6 CS TRV Comparison:

SNL CS TRV Comparison:

REFERENCE LIST	Ref ID	Citation
Primary Toxicity Study Reference CS TRV:	0001	NOT APPLICABLE
Primary Toxicity Study Reference(s) GMM TRV:	**(NOT APPLICABLE, if no references are listed in this section)**	
TRV reference: 0711	Ryti, R, E Kelly, M Hooten, G. Gonzales, G McDermott, and L Soholt. 1999 (April). Screening Level Ecological Risk Assessment Methods. LA-UR-99-1405. Los Alamos National Laboratory, Los	
Additional References*:	0001	NOT APPLICABLE
	0001	NOT APPLICABLE
	0001	NOT APPLICABLE
	0001	NOT APPLICABLE
	0001	NOT APPLICABLE

** Citations for up to 5 additional references associated with this TRV are listed. If the Ref ID for one or more additional references is 0001 that indicates that there are not any or anymore references.*

TRV Summary Report

Ecorisk Database Release 2.2 (September 2005)

Aquatic organisms - water

***TRV Summary ID:** 8084

GMM TRV ID:

LANL TRV: YES **Data Source:** LANL value based on secondary data

Analyte Name: Benzene **Analyte Code:** 71-43-2 **Analyte Group:** Volatile Organic Compound

ESL Receptor Group: AQ(w) **Functional Group:** A **ESL Media:** WATER

Test Chemical Code: 71-43-2

Test Organism ID: WEO **Test Organism Common Name:** Aquatic community organism

Final TRV: ORNL benchmark 45.5 µg/L **Exposure Route** DC_W

Derivation Notes: Tier II Secondary Chronic Value (SCV) for fresh water from Suter, 1996 (Ref ID 0727) calculated using a modified version of the USEPA, 1993 (Ref ID 1181) Tier II methodology as presented in Suter II and Mabrey, 1994 (Ref ID 0115). These Tier II values differ from the standard method values in two ways. First, in order to increase the ability to calculate a value, daphnid data is not required. Second, non-standard LC50s and EC50s are used when data is limited providing the deviation from the standard methods will not result in a higher endpoint value. Tier II values were developed to be able to establish aquatic life criteria when fewer data are available than are required by the NAWQC. This Tier II value is expected to represent a concentration that would be greater than the NAWQC in no more than 20% of cases if sufficient data were available to

Uncertainty:

Calculations:

Log Kow: **KocVu:** **Foc:**

Text Last Updated On: 27-Sep-04 **Value Last Updated On:** 30-Jun-99

Confidence Rating: **NMED Concurrence Date:**

Note - Further details on the study/ effects/ toxicity values reviewed for Tier 2 and 3 TRVs (i.e., LANL GMM and CS TRVs) are provided in the PTSE Part 1 (Study Details) and 2s (Study Evaluations) and in the Part 3 (TRV Summary)

Data Set Distribution Comments:

Lowest LOAEL (LOEC) Comparison:

LANL CS TRV Comparison:

ORNL CS TRV Comparison:

USEPA R6 CS TRV Comparison:

SNL CS TRV Comparison:

REFERENCE LIST	Ref ID	Citation
Primary Toxicity Study Reference CS TRV:	0001	NOT APPLICABLE

Primary Toxicity Study Reference(s) GMM TRV: **(NOT APPLICABLE, if no references are listed in this section)**

TRV reference: 0727 Suter, GW. 1996. Toxicological benchmarks for screening contaminants of potential concern for effects on freshwater biota, in Environmental Toxicology and Chemistry 15:1232-1241.

Additional References*:	0001	NOT APPLICABLE
	0001	NOT APPLICABLE
	0001	NOT APPLICABLE
	0001	NOT APPLICABLE
	0001	NOT APPLICABLE

** Citations for up to 5 additional references associated with this TRV are listed. If the Ref ID for one or more additional references is 0001 that indicates that there are not any or anymore references.*