



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

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February 6, 2003

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Mr. Delmar Noyes,  
Office of River Protection  
United States Department of Energy  
P.O. Box 450, MSIN: H6-60  
Richland, Washington 99352

Dear Mr. Noyes,

Re: Characterization and Toxicity of Tank Farm Air Emissions

The Washington State Department of Ecology (Ecology) is concerned with continuing worker exposure and vapor release incidents at the United States Department of Energy (USDOE), Office of River Protection (ORP), Single and Double-Shell Tank System. Over the years, a number of technical reviews and occurrence reports document such incidents, including Independent Technical Review of the Hanford Tank Farm Operations (DOE/EM-0095P, July 1992) and Report on the EH Special Review of Occupational Safety and Health Programs for the Hanford High-Level Waste Tanks (DOE/EH-0289T, November 1992). Ecology continues to receive vapor release reports, suggesting safety concerns about tank emissions are not resolved.

Tentative tank headspace data tend to validate the issue that vapor toxicity may be understated. It is not clear to Ecology whether the problem is being addressed at a level sufficient to support timely permitting decisions for tank waste retrieval and storage. The Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA), Occupational Safety and Health Act (OSHA), and other interrelated laws and regulations all plainly require identification and control of hazards to human health and/or the environment.

Ecology is very interested in understanding ORP's current actions to manage the effects and mitigate toxic air emissions in the tank farms, including engineering and administrative controls. Therefore, Ecology requests the following information:

- What measures have been taken to characterize gaseous/vapor emissions from the Single and Double-Shell Tank system and dust, fumes, and mists from areas of contamination associated with these systems? Characterization includes identification of toxic compounds and mass emission rates for each compound during quiescent storage and waste processing (i.e., salt-well pumping, waste mixing and degassing, evaporation/

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distillation [242-A Evaporator operations], in-tank evaporation [C-103 organic layer removal, C-106 heel evaporation], evaporator process condensate treatment [Effluent Treatment Facility], tank filling, and miscellaneous operations including waste coring and lancing, construction, and maintenance activities). Provide references and sources to this information, and please clarify the quality of the data.

- Information on the gas/vapor headspace composition is available in the TWINS database. Which of these toxic compounds have been positively identified in the headspace of tanks, and at what concentration? Please provide any information regarding the mass emission rate (concentration in units of mass over volume, concomitant with flow rate in units of volume over time) during various processing and storage activities listed in the first bullet.
- What, if any, analytical work has been done to confirm the presence or absence of toxic substances in the tank waste matrices (liquid, solid, and gas). Specifically, volatile and semi-volatile tank waste constituents that are amenable to mass transfer to the tank vapor space during quiescent storage and under tank waste processing conditions. Such wastes may not be amenable to removal by off-gas controls presently used in tank ventilation systems (e.g., HEPA filters).
- Provide a list of primary analytes of concern for environmental assessment and permitting, monitoring, control, hazard communication, and record keeping. Which toxics are currently monitored on a periodic basis during tank farm activities and waste processing described in the first bullet? How are they measured, where are they measured, what levels have been found, and what is the quality of the data?
- Provide any supportive evidence from worker health evaluations concerning the nature and severity of these exposures. This data might include, but not be limited to, field monitoring data, statistical evaluation of medical monitoring, and history related to previous worker exposures, results and evaluation of biological indices measured following exposure, etc., if such data exists. Provide procedures followed in the event of an exposure incident. Provide procedures followed to ensure against an exposure incident. Provide constituents tracked for exposure history.
- Provide any and all published or unpublished toxicological studies and/or evaluations done on vapors/gases, fumes, dusts, and mists emanating from Single and Double-Shell Tanks and associated media including soil, liquid, and equipment and/or debris.

Ecology is aware that certain routine and non-routine activities (salt-well pumping, retrieval [sluicing], mixing) increase emissions. Certainly trapped gas is commonly released by mixing, and this process has been the main mitigation for trapped gas (e.g., SY-101). Trapped gas is also

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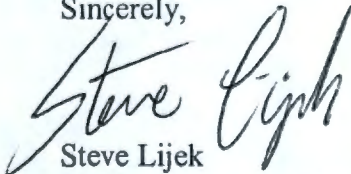
released during salt-well pumping. Sluicing also generates aerosols which may substantially increase the mass transfer of volatile and semi-volatile compounds from the liquid into the vapor phase. Other activities and processes are also considered to increase formation and mass transfer rates of air toxics. As retrieval operations become more common these emissions are very likely to increase.

Ecology is also aware of spontaneous releases that occur without any certain or specific triggering phenomenon. Ecology understands fugitive releases like this occur periodically; these are often problematic because they are unanticipated and workers may be ill prepared for them. Ecology expects such incidents to be well documented in the facility operating record. Ecology requests the bulleted information above as it applies to both storage and retrieval activities, and releases to the air from waste-intrusive activities and fugitive emission events.

Characterization and control of SST and DST emissions must be addressed and resolved prior to initiating a number of activities key to cleaning up the Single-Shell Tanks, operating the Double-Shell Tanks, and delivering feed to the Vitrification Plant. ORP recognizes this is a characterization issue that impacts Project W-314: ORP's contractor considers the need to quantify toxic air emissions and/or to install a treatment system for controlling air emissions a "risk" to the project. Ecology cannot approve or permit tank farm cleanup work without first resolving this issue.

If you have any questions please do not hesitate to contact me at 736-3095.

Sincerely,



Steve Lijek  
Environmental Engineer  
Nuclear Waste Program

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