



NEVADA DIVISION OF  
**ENVIRONMENTAL  
PROTECTION**

STATE OF NEVADA  
Department of Conservation & Natural Resources

Steve Sisolak, *Governor*  
Bradley Crowell, *Director*  
Greg Lovato, *Administrator*

September 8, 2021

Jay A. Steinberg  
Nevada Environmental Response Trust  
35 East Wacker Drive, Suite 690  
Chicago, IL 60601

Re: **Tronox LLC (TRX) Facility**  
**Nevada Environmental Response Trust (Trust) Property**  
**NDEP Facility ID #H-000539**  
Nevada Division of Environmental Protection (NDEP) Response to:  
*Baseline Health Risk Assessment for OU-2 Soil Gas and Groundwater*  
Dated: July 23, 2021

Dear Mr. Steinberg,

The NDEP has received and is reviewing the Trust's above-identified Deliverable.

The NDEP understands that the calculated excess lifetime cancer risk for the residential vapor intrusion scenario in the Baseline Health Risk Assessment (BHRA) did not exceed  $2 \times 10^{-5}$  for soil gas or groundwater. The excess lifetime cancer risk calculations for vapor intrusion are within the United States Environmental Protection Agency's (US EPA) acceptable risk range of  $10^{-6}$  to  $10^{-4}$ . The risk driver for the soil gas samples in Operable Unit 2 (OU-2) was identified to be chloroform, contributing to over 97% of the total increased risk for the location.

All data collected and evaluated to date has continued to show that all of the evaluated receptors including the residential vapor intrusion pathway are below long-term health-based thresholds in OU-2.

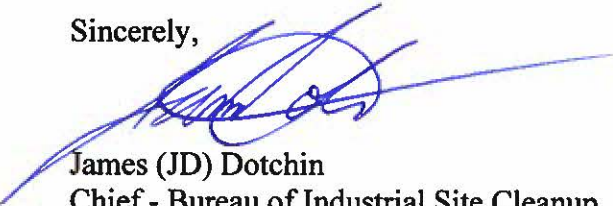
The Johnson and Ettinger (J&E) Model (2017) with the site-specific input data was used to estimate the range of potential indoor air impacts and associated human health risks of OU-2 BHRA area. As all models carry some degree of uncertainty and out of the abundance of caution the NDEP and the US EPA Region 9 request that NERT prepare a modification to the Work Plan to complete a targeted indoor air investigation to confirm that chloroform indoor air levels remain below long-term health-based thresholds and to allow direct comparisons between modeled indoor air estimates and direct indoor air measurements. This investigation should focus on areas with elevated groundwater and soil gas concentrations in the Eastern portion of the Pittman residential area in Henderson, NV.

The US EPA Region 9 has provided the attached September 11, 2020 letter to provide additional justification for the requested indoor air investigation.

The agencies (NDEP and US EPA Region 9) will require this additional line of evidence for NERT to complete the Baseline Health Risk Assessment for Operable Unit 2.

Please prepare and submit the requested OU-2 BHRA Work Plan modification by September 30, 2021.

Sincerely,



James (JD) Dotchin  
Chief - Bureau of Industrial Site Cleanup  
NDEP-Las Vegas City Office

JD:jd

Attachment: September 11, 2020 US EPA Region 9 Letter

EC:

Jeffrey Kinder, Deputy Administrator NDEP  
Frederick Perdomo, Deputy Administrator NDEP  
James Dotchin, NDEP BISC Las Vegas  
Carlton Parker, NDEP BISC Las Vegas  
Samantha Thompson, PIO, DCNR  
Allan Delorme, Ramboll Environ  
Andrew Barnes, Geosyntec  
Andrew Steinberg, Nevada Environmental Response Trust  
Anna Springsteen, Neptune & Company Inc.  
Betty Kuo Brinton, MWDH2O  
Brian Waggle, Hargis + Associates  
Carol Nagai, MWDH2O  
Carrie Hunt, Olin Corporation  
Chris Ritchie, Ramboll Environ  
Christine Klimek, City of Henderson  
Chuck Elmendorf, Stauffer Management Company, LLC  
Dan Pastor, P.E. TetraTech  
Dave Share, Olin  
Dave Johnson, LVVWD  
David Parker, Central Arizona Water Conservation District  
Derek Amidon, Tetrattech  
Ebrahim Juma, Clean Water Team  
Ed Modiano, de maximis, inc.  
Eric Fordham, Geopentech  
Gary Carter, Endeavour  
Greg Kodweis, SNWA  
Jay Steinberg, Nevada Environmental Response Trust  
Jeff Gibson, Endeavour  
Jill Teraoka, MWDH2O  
Joanne Otani  
Joe Kelly, Montrose Chemical Corporation of CA  
Joe Leedy, Clean Water Team  
John Edgcomb, Edgcomb Law Group  
John Pekala, Ramboll Environ  
John Solvie, Calrk County Water Quasslity  
Kelly McIntosh, GEI Consultants  
Kirk Stowers, Broadbent & Associates  
Kirsten Lockhart, Neptune & Company Inc.  
Kim Kuwabara, Ramboll Environ  
Kurt Fehling, The Fehling Group  
Kyle.Hansen, Tetrattech

Lee Farris, BRC  
Marcia Scully, Metropolitan Water District of Southern California  
Maria Lopez, Water District of Southern California  
Mark Duffy, U.S. Environmental Protection Agency, Region 9  
Mark Paris, Landwell  
Michael J. Bogle, Womble Carlyle Sandridge & Rice, LLP  
Michael Long, Hargis +  
Mickey Chaudhuri, Metropolitan Water District of Southern California  
Nicholas Pogoncheff, PES Environmental, Inc.  
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Jodi Bechtel, Clark County Department of Environment and Sustainability  
Ryan Turner, City of Henderson  
Timothy Buchanan, City of Henderson  
Kathleen Richards, City of Henderson  
Brian Northam, Southern Nevada Health District



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
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San Francisco, CA 94105-3901

Mr. James (JD) Dotchin  
Chief, Bureau of Industrial Site Cleanup  
Nevada Division of Environmental Protection  
Department of Conservation and Natural Resources  
375 E. Warm Spring Rd., Suite 200 Las Vegas, NV. 89119

Re: Justification for Focused Indoor Air Investigation for Chloroform at Nevada Environmental Response Trust Site, Operable Unit-2

Dear Mr. Dotchin:

Consistent with both your request and previous dialogue between Nevada Division of Environmental Protection (NDEP) & U.S. Environmental Protection Agency (EPA), we strongly recommend that the Nevada Environmental Response Trust (NERT) conduct a focused, site-specific indoor air investigation for chloroform at prioritized residential locations within the NERT Operable Unit-2 (OU-2) plume footprint. Given the subsurface findings, we feel it prudent and protective of public health to conduct a limited and focused indoor air investigation at areas where soil vapor concentrations exceed a site-specific, risk-based threshold. The recommended health-based threshold for chloroform and technical support for pursuing this focused investigation are detailed below.

While we understand that remedial activities at the NERT Site are based on Lead Agency-approved and Non-Lead Agency-reviewed remedial investigation and risk assessment workplans, we clearly view the supplemental activities recommended herein as entirely consistent with the overarching objectives within the workplans with respect to protecting public health and assessing potential vapor intrusion threats at the NERT Site. Briefly, EPA's National Cleanup Programs routinely request multiple lines of scientific evidence when subsurface fate and transport modelling predicts a complete exposure pathway – accompanied with health risk-estimates within the range of acceptability – but subject to a significant degree of uncertainty.

According to the *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (EPA 2015)*, “**multiple lines of evidence are particularly important for supporting ‘no-further-action’ decisions regarding the vapor intrusion pathway (e.g., pathway incomplete determinations) to reduce the chance of reaching a false-negative conclusion (i.e., concluding vapor intrusion does not pose unacceptable human health risk, when it actually poses an unacceptable human health risk).**”

We consider the Johnson and Ettinger (J&E) Model to represent one specific tool (or line of evidence), to estimate the range of potential indoor air impacts and concomitant human health risks at contaminated

sites. That is to say, subsurface fate and transport model predictions are but one, of several lines, of scientific evidence that should be carefully weighed with the other lines of evidence when characterizing the full dimension of the vapor intrusion threat.

When applying both historic and current subsurface media contaminant concentrations (shallow soil vapor), the J&E Model predicts that the vapor intrusion pathway at discrete locations within OU-2 is, indeed, complete. To date at the NERT Site, modeled health risk-estimates within a range of acceptability have been used as a technical justification for reliance on this sole line of evidence for the protection of public health. However, in addition to the inherent uncertainties associated with modeled health risk-estimates, previous subsurface characterization efforts within OU-2 were subject to additional levels of uncertainty due to modifications of EPA's version of the J&E subsurface fate and transport model, and a pending updated chloroform risk assessment from the Agency's Integrated Risk Information System (IRIS).

A limited and focused indoor air investigation is therefore strongly recommended. This focused investigation should be designed to develop an additional line of scientific evidence and the findings will be used for several purposes. Results from this investigation will be used to confirm that chloroform indoor air levels remain below chronic, health-based thresholds, and to also facilitate direct comparisons between the range of modelled indoor air estimates and findings from direct measurement of indoor air quality within residential locations proximate to the OU-2 chloroform plume.

Primarily, we recommend verification that chloroform concentrations within indoor **air are within the acceptable carcinogenic risk-range and remain less than the  $1 \times 10^{-4}$  acceptable cancer-risk threshold concentration** ( $12 \mu\text{g}/\text{m}^3$ ). This effort is directly protective of public health. It should be noted that typical indoor air screening investigations apply the point of departure, or  $1 \times 10^{-6}$  excess cancer risk-level ( $0.12 \mu\text{g}/\text{m}^3$  Chloroform), as the acceptable remedial metric. However, because of potential anthropogenic background indoor sources of chloroform, we have proposed applying the lowest-bound of the acceptable carcinogenic risk-range as a contaminant-specific remedial metric.

Secondarily, because measured indoor air concentrations can represent a more direct metric for the determination of a site-specific health risk estimate, these efforts will be used to reduce the level of uncertainty associated with exclusive reliance on modeled health risk-estimates. We also propose to contrast the range of empirical attenuation factors (calculated from the ratio of measured indoor air concentrations to the underlying measured soil gas concentrations) with J&E Model calculated attenuation factors. By comparing not only the empirical and calculated attenuation factors, but also the number of residences sampled, the building conditions, proximity to soil gas "source zones," and seasonal variation – the representativeness of the site-specific attenuation factor can be effectively evaluated.

Soil gas data will be used to select priority areas for indoor air investigation using a residential exposure scenario. **Locations within or near residential land use where chloroform soil gas concentration at 15 ft below ground surface is above  $4,000 \mu\text{g}/\text{m}^3$**  (obtained by dividing an indoor air concentration of  $12 \mu\text{g}/\text{m}^3$  by an assumed median attenuation factor of 0.003, which is an order of magnitude less than the more conservative generic EPA attenuation factor of 0.03). In addition, the potential range of estimates assessed by the model should be presented and discussed in the uncertainty analyses of the model results around the median value.

**If chloroform concentrations in indoor air are found above 12 µg/m<sup>3</sup>** and therefore posing an unacceptable chronic human health risk, NERT and other BMI Companies contributing to the OU-2 Chloroform release should develop a series of appropriate health-based response actions.

Please let me know if you have any questions. Our hope is that we can work together on approving a plan in the next month.

Sincerely,

Nicole G. Moutoux  
Assistant Director  
Land, Chemicals and Redevelopment Division