

August 23, 2013

Mr. Weiquan Dong, PE
Bureau of Corrective Actions, Special Projects Branch
Nevada Division of Environmental Protection
2030 E. Flamingo Rd., Suite 230
Las Vegas, Nevada 89119

Re: Compilation of Select Health Risk Assessment Documents for Parcels A and B: 2008 to 2013, and Request for a No Further Action Determination, Nevada Environmental Response Trust Site, Henderson, Nevada

Dear Mr. Dong:

On behalf of the Nevada Environmental Response Trust (the Trust), this letter transmits the *Compilation of Select Health Risk Assessment Documents for Parcels A and B: 2008 to 2013*, dated August 23, 2013. This Compilation was prepared at the request of the Nevada Division of Environmental Protection (NDEP),¹ with the objective of assembling into one “binder” the key health risk assessment (HRA) documents that have been completed for indoor air (for the vapor intrusion pathway) at Parcels A and B. Although not specifically requested by NDEP, the final risk assessment and April 8, 2008 No Further Action (NFA) determination² for Parcel A and B soils are also included in the binder. In the final section of this letter, the Trust is requesting an NFA determination for Parcels A and B to address the vapor intrusion pathway. In support of this request, the final soil and indoor air HRAs are summarized and cumulative risk estimates are presented.

Summary of the Indoor Air HRA and Soil HRA

The Parcels A and B conceptual site model (CSM) identified soil and indoor air (vapor intrusion pathway) as the exposure media of concern at the parcels. The HRAs for these two media are summarized below.

- **Soil:** The final HRA for soils (Soil HRA) is reported in *Technical Memorandum – Data Review for 2007 Tronox Parcels A/B Investigation*.³ The Soil HRA evaluated potential cancer risks and noncancer effects for exposures of a commercial/industrial worker to residual chemicals in soils from 0 to 10 feet (ft) below ground surface (bgs)⁴. In addition, cancer risks were evaluated for potential exposures of a construction worker, future maintenance worker, and current/future on-site trespasser to asbestos fibers in surface soils. The estimated cancer risks for exposures of a future commercial/industrial worker were 1×10^{-6} for non-radionuclides and 3×10^{-6} for radionuclides (cumulative risk of

¹ Conference Call re: Response to Comments Parcels A&B Soil Gas Health Risk Assessment, Meeting Minutes, July 26, 2013

² NDEP, 2008. *NDEP Response to Technical Memorandum – Data Review for 2007 Tronox Parcels A/B Investigation, Dated February 11, 2008*. April 8.

³ Basic Environmental Company (BEC), 2008. *Technical Memorandum – Data Review for 2007 Tronox Parcels A/B Investigation, BMI Industrial Complex, Clark County, Nevada, Revision 1*. February 11.

⁴ One sample (SA27) was collected in Parcels A/B from 20-21.5 ft bgs during the Phase A investigation in November 2006.

4×10^{-6}),⁵ at the low end of the target risk range of 1×10^{-6} to 1×10^{-4} established by the U.S Environmental Protection Agency (USEPA).⁶ The hazard index (HI), a measure of the potential for noncancer effects, was below USEPA's comparison benchmark of 1,^{4,7} indicating little potential for the occurrence of non-cancer health effects. For asbestos, risks to construction workers, future maintenance workers, and current/future on-site trespassers were less than 1×10^{-6} for chrysotile fibers. Risks for amphibole fibers ranged from zero⁸ to 5×10^{-6} , zero to 1×10^{-7} , and zero to 3×10^{-9} for construction workers, future maintenance workers, and current/future on-site trespassers, respectively.

NDEP issued a NFA determination for Parcels A and B soils less than 10 ft bgs on April 8, 2008,⁹ with the following conditions specified for deeper soils and groundwater:

1. The property owner retains the responsibility to address any environmental impacts to groundwater beneath the property referred to as Parcels A and B. As such, additional investigation may be necessary on this property for activities such as well or soil boring installations or other investigative or remedial efforts.
2. The materials presented to NDEP do not evaluate the possibility of vapor intrusion concern from contamination in groundwater. It is anticipated that this issue will be addressed as part of the investigation of groundwater issues in the region.
3. The site soils beneath 10 ft bgs have not been evaluated to date. The property owner should note that these soils should not be disturbed without additional investigation or evaluation.
4. To limit liability, the property owner should ensure that activities at the property do not exacerbate existing subsurface environmental conditions.
5. The site use is suitable for purposes of commercial or industrial use only.

A soil gas investigation and indoor air HRA (Indoor Air HRA) for the vapor intrusion pathway were completed to address the second condition noted above, i.e., "the possibility of vapor intrusion concern from contamination in groundwater."

- Indoor air: The final Indoor Air HRA is presented in *Revised Technical Memorandum – Screening-Level Indoor Air Health Risk Assessment for the 2008 Tronox Parcels A/B Soil Gas Investigation*,¹⁰ as supplemented by analyses presented in *Response to NDEP Comments on Revised Technical Memorandum: Screening-Level Indoor Air Health Risk Assessment for the 2008 Tronox Parcels A/B Soil Gas Investigation (ENVIRON Supplemental*

⁵ All risk results are presented to one significant figure and will therefore differ slightly from those presented in reports. In some cases, risks reported in the text and tables of this letter may not add due to rounding.

⁶ National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule (40 CFR Part 300).

⁷ Ibid.

⁸ No amphibole fibers were detected on Parcels A and B. Because the best estimate for amphibole fibers was based on the number of fibers measured, the risk was reported as "zero."

⁹ NDEP, 2008. NDEP Response to Technical Memorandum – Data Review for 2007 Tronox Parcels A/B Investigation, Dated February 11, 2008. April 8.

¹⁰ Northgate Environmental Management, Inc. (Northgate), 2010. Revised Technical Memorandum – Screening-Level Indoor Air Health Risk Assessment for the 2008 Tronox Parcels A/B Soil Gas Investigation. November 12.

Analyses).¹¹ The Indoor Air HRA was based on soil gas samples collected in 2008 at 5 ft bgs. The Parcels A and B CSM identified groundwater as the source of volatile organic compounds (VOCs) in soil gas (as supported by site history and soil and groundwater investigations); further, NDEP also identified groundwater as the source for the vapor intrusion pathway in their April 8, 2008 NFA determination. As presented in ENVIRON's supplementary analyses¹² for Parcels A and B, a review of chloroform (the primary groundwater contaminant) concentrations in groundwater samples collected since 2008 (the year soil gas samples were collected) shows that chloroform concentrations have remained approximately the same or show a general downward trend as compared with the 2008/2009 chloroform results, validating use of the 2008 soil gas results for estimating risk.¹³ Further, groundwater transport of VOCs onto Parcels A and B is controlled by the Olin Chlor-Alkali/Stauffer/Syngenta/Montrose (OSSM) treatment plant, which ENVIRON understands will remain under NDEP oversight and in operation for as long as required to prevent off-site migration of VOCs.

The Indoor Air HRA evaluated potential cancer risks and noncancer effects to a commercial/industrial worker associated with inhalation of VOCs in indoor air. The estimated cancer risks for exposures of a future commercial/industrial worker range from 5×10^{-7} to 1×10^{-6} , at or below the low end of the target risk range of 1×10^{-6} to 1×10^{-4} . The HIs range from 0.002 to 0.0008, well below the health benchmark of 1.

Cumulative Risk

The following table presents the chemical and radiological cancer risks and HIs for soil pathways, the vapor intrusion risks for indoor air, and the cumulative risks for potential exposures of commercial/industrial workers.

Cancer Risks and Hazard Indices for Commercial/Industrial Workers

Health Endpoint	Soil [a]	Indoor Air [b]	Cumulative
Cancer Risk	4×10^{-6}	5×10^{-7} to 1×10^{-6}	4×10^{-6} to 5×10^{-6}
Hazard Index	0.1	0.002 to 0.0008	0.1

[a] Soil risks are the sum of the risks from chemicals and radionuclides.

[b] Two indoor air concentrations were estimated based on 1) a scaled average vapor flow rate (Q_{soil}) and an indoor air exchange rate of 1 per hour, and 2) a calculated Q_{soil} and an indoor air exchange rate of 2 per hour.

¹¹ ENVIRON, 2013. Response to NDEP Comments on Revised Technical Memorandum: Screening-Level Indoor Air Health Risk Assessment for the 2008 Tronox Parcels A/B Soil Gas Investigation, BMI Industrial Complex, Clark County, Nevada, dated November 12, 2010. May 3.

¹² Ibid.

¹³ At NDEP's request, ENVIRON also estimated risks for exposure to indoor air using groundwater concentrations as the source term, as presented in the *ENVIRON Supplemental Analyses*. However, the risk estimates based on the soil gas data as presented herein are considered to provide the best estimates for risk management purposes. Soil gas measurements are collected closer to the point of exposure and modeling assumptions are simplified when using soil gas data as compared with groundwater data. Further, biodegradation of petroleum hydrocarbons (including benzene, detected in Parcel A/B groundwater) is not accounted for in the Johnson and Ettinger model such that predicted indoor air concentrations can be substantially overestimated.

As shown in the above table, the estimated cumulative cancer risks from soil-related pathways and the indoor air pathway range from 4×10^{-6} to 5×10^{-6} (depending on the value of Q_{soil} used for estimating risks for the vapor intrusion pathway), at the low end of USEPA's target risk range of 1×10^{-6} to 1×10^{-4} . The primary contributors to cancer risk for the soil-related pathways are, for chemicals, dioxins/furans, beta-BHC, benzo(a)pyrene, hexachlorobenzene; and for radionuclides, uranium-233/234, uranium-235/236, and uranium-238. For indoor air, the primary contributor to cancer risk is chloroform. The cumulative HI for commercial/industrial workers for soil-related and indoor air pathways is 0.1, well below the health benchmark of 1.

No Further Action Determination

Following NDEP approval of the Indoor Air HRA, environmental investigation and HRA tasks for Parcels A and B will be complete. Based on the environmental investigations and findings of the HRAs for soil (0-10 ft bgs) and indoor air (vapor intrusion pathway), the Trust concludes that an NFA determination is warranted and requests that NDEP issue the NFA determination for soils less than 10 ft bgs at Parcels A and B. The Trust is currently preparing an Environmental Covenant which the Trust understands is a condition to receiving an NFA determination from NDEP. The Environmental Covenant will include the following activity and use limitation: Prior to engaging in any grading, digging, construction, and/or building at a depth below the finished grade of nine (9) ft, the Property Owner shall notify NDEP by certified mail return receipt requested. The Property Owner shall not excavate beneath ten (10) ft below the ground surface without NDEP approval of a Soil Management Plan prepared by the Property Owner.

Please contact John Pekala at (602) 734-7710 or Allan DeLorme at (510) 420-2565 if you have any comments or questions regarding the technical information in this letter or the attached document. Questions regarding the legal description of the property or the Environmental Covenant should be directed to the Trust.

Sincerely,



John M. Pekala, PG
Senior Manager
Nevada CEM #2347, expires 9/20/2014



Allan J. DeLorme, PE
Principal

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