



MEMORANDUM

To: Mayor James R. Bowlin and City Council Members

From: Ryan S. Thomas, City Administrator

Date: May 6, 2016

Re: Ellisville Superfund Site
Final Report from Environmental Stewardship Concepts

Attached for your information is the Final Report from Environmental Stewardship Concepts concerning their review of EPA documents related to the Ellisville Superfund Site. The Final Report has incorporated comments received following the presentation on March 28, 2016.

It would be my intent to now submit this Report to the EPA, seeking action in accordance with the recommendations identified. I will be available for any questions or comments at the May 9, 2016 City Council Work Session.

RST

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Report to the City of Wildwood on Ellisville Site EPA documents
Prepared by ESC, LLC
May 6, 2016

This report examines the EPA documents (reports, letters, data, etc.) produced after the removal action at the Ellisville Site, consisting of the Strecker Forest and Bliss properties conducted during 2014. The main contaminants are dioxins and furans as well as PCBs; EPA considers these the "driver" contaminants; dozens or more organic chemicals were found on the Bliss property and the border with the Strecker Forest property.

Specific documents:

1. Removal Action Report, August 6, 2015
2. Removal Action Report, Appendix D: 42 files with Chain-of-Custody Records and Lab results for samples collected and analyzed as part of the removal action
3. EPA Archive folder with 26 files of data, analyses, reports and memos
4. Letter from City of Wildwood to EPA, August 25, 2015
5. EPA response to Wildwood, December 9, 2015
6. EPA summary document, July 16, 2016
7. EPA Regional Screening Levels (<http://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2015>)

SUMMARY & EVALUATION

The Removal Action Report reports on the removal action work conducted under EPA authority in 2014. The removal action occurred at the northeast corner of the Strecker Forest property and the adjacent Bliss property.

The description of the site is incomplete (Section 3, page 3) in not discussing groundwater as a contaminated medium in the original site investigation or in subsequent monitoring. The groundwater monitoring was turned over to the state and monitoring results indicated the presence of a number of volatile and semi-volatile organic chemicals, all of which are site-related. These chemicals are discussed below.

The removal action was conducted to achieve a goal of 820 ppt of dioxin in surface soils and 2460 ppt of dioxin in subsurface soils in the remediated area denoted by EPA as recreational areas. Both recreational standards are dioxin levels greater than unrestricted (i.e. residential) soil clean-up standards applied elsewhere in the country at a wider range of contaminated sites being addressed by state or federal regulations. As

a reference, the EPA regional soil clean-up standards for dioxin are 5.5 ppt and 55 ppt for cancer and non-cancer, respectively, for residential land use (EPA document on Regional Soil PRGs USEPA PRG for Dioxin in Surface Soil, 2013 and EPA RSL from web site: <http://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2015>). The clean-up levels for the removal action at the Ellisville site in 2014 were for recreational use (non home site) and require institutional controls (ICs) to restrict access and use of the site and prevent residential construction or land disturbance at depth on the Strecker Property and the adjacent portions of the Bliss property. The files received by ESC, LLC include a restrictive environmental covenant that implements the land disturbance and residential restrictions. ICs would be needed and are called for by EPA to prevent unrestricted access and residential construction/use of the site that remains contaminated with dioxins above the recreational clean-up levels set by EPA for this site.

The Removal Action Report provides the data on soil remaining after the first round of soil removals conducted in May through July of 2014. Results of these soil samplings are presented in Tables 1 (EA 3), 2 (EA 2) & 3 (EA 1) of the EPA report. Some of the soil samples from the floor of the excavated cells, subsurface and sidewall sampling exceeded the dioxin levels that EPA determined were the clean-up goals. The initial removal action at parts of EA 3 and all of EA 2 succeeded in achieving the target clean-up dioxin levels. The Tables suggest, but do not clearly indicate that original soil samples were followed by samples with results that meet the EPA remediation goals

The removal action at EA 1, in the northeast corner of the Strecker property on the border with the Bliss property and along the creek presented challenges. The contractors had to remove soil and debris to a depth of 8 feet or more in places of EA 1. In Table 3, the results for samples along the creek, SFRA 157 & 158 (dioxin levels of 7,173 and 3,384 ppt, respectively) exceed the remediation goals set by EPA. These results present a problem for concluding that the remedy succeeded in reducing the soil dioxin levels to 820 ppt/2460 ppt for surface and subsurface soil, respectively.

The soil removed by the EPA contractors was also sampled to determine the appropriate disposal facility. These results, presented in Table 4, indicate that indeed, the soil removed from the EA's was highly contaminated with dioxin. Soil dioxin concentrations of the soil removed (mixed together in composite samples in the disposal containers) ranged from a low of 151 ppt to more than 42,000 ppt. Most sample concentrations were thousands of ppt dioxin.

Soil samples were also collected from a few other locations, to check if there was soil above the clean-up goals set for this action. The additional soil samples were in the

vicinity of Areas 1 and 2 near the temporary retention pond and Bliss barn on or near the property line. The results of this sampling are in Table 5 and results from three samples exceeded the clean-up goals, and additional soil was removed in Area 1, southeast corner. Most of the results in these samples were well above EPA RSL dioxin level. These extra areas (EA 1) where dioxin levels exceeded the site specific clean-up levels were remediated, according to the EPA report.

Furthermore, sampling at sites 34, 35, and 36 (in EA 3, cells D and E) indicated the presence of VOCs, PAHs, and phthalates that are over 1000 ppb, exceeding natural background levels that are normally not present, or present in trace amounts. The EPA Report highlights a number of these chemicals that are present in concentrations above detection limits, or reporting limits (SFRA 34, 35, 36 Level 2 Report Final Report Test America.pdf from Test America to Tetra Tech). These chemicals include xylenes, benzenes, pyrene, toluene, and acetone. Additionally, Bis(2-ethylexyl) phthalate (a carcinogen) was present in over 1000 ppb in sample 128. According to toxicology summaries from EPA and the Centers for Disease Control and Prevention, these contaminants can pose a significant risk to human health, including lung impairment, liver and kidney damage, and cancer, and therefore need to be addressed. Data from SFRA 34, 35, 36 (Analytical Report from Test America, 5/15/2014), indicate the chemicals with high concentrations in soil. These chemicals pose a risk to human health and the environment based on the nature of the chemicals present and the concentrations detected. Xylene concentrations in SFRA 34, 35, and 36 ranged from 9400-16000 ppb. If these chemicals remain, health threats may exist for different groups of people. The spatial extent has not been determined, the depth distribution has not been determined, and the downstream and groundwater distributions have not been assessed for these chemicals. EPA needs to provide sampling that confirms all areas meet appropriate standards.

No groundwater sampling was conducted as part of the 2014 removal action. Previous groundwater sampling efforts indicated the presence of more than a dozen volatile and semi-volatile organic chemicals (solvents, plasticizers and industrial compounds), one reason why the City of Wildwood and citizens were concerned.

The standard procedure during a removal action is to sample the area following the removal to insure that the remaining soil meets the clean-up goals. In the present case, samples were collected and analyzed (Removal Action Report, Tables 1, 2, 3 & 4), indicating which samples had elevated dioxin levels and required additional removal. The text of the report indicates that additional removal and sampling was conducted (see below), but no results are given in the report itself. The text refers to Appendix D

for the results. We were unable to locate any confirmation samples taken after the second round of soil removal. The Removal Action Report states:

5.2 Soil Excavation, page 7

*After excavation of the cells to the depth that had been indicated during RSE activities, post-excavation samples were collected. A nine-aliquot surface soil sample was collected from the floor of the excavated cells. Additionally, a nine-aliquot soil sample was collected from each of the completed side wall faces. Equal portions of each of the side wall samples were then homogenized into one ICS sample and submitted with the floor sample to CFA for dioxin TEQ analysis. Laboratory data were typically provided on a 72-hour turnaround basis. **Additional excavation was conducted when the sample results exceeded RALs.** If a combined side wall sample for an excavation area exceeded the appropriate RAL, archived samples from each of the individual walls (following ICS protocol) were submitted for analysis to determine where additional excavation would be required.*

5.2.1 Excavation Area 3, pg. 8

*On April 29, 2014, **additional excavation was conducted in EA 3 cells D and E, because previous post-excavation sample results remained above the dioxin TEQ RAL.** In the central portion of these cells, additional odorous, stained soil and debris were exposed; excavation was again halted, and it was determined that additional disposal profile sampling would occur.*

5.2.3 Excavation Area 1, pg. 10

*Additional roadway construction and tree clearing were required before excavation at EA 1 to allow movement of roll-off boxes to the area. On May 1 and 2, 2014, the contaminated area that had been identified during assessment activities was excavated to 3 feet bgs. **Post-excavation sampling results exceeded the RALs, so additional excavation was required.** On May 16, 2014, additional soil was excavated from EA 1; the area was expanded in all directions, and an additional foot was excavated from the floor of the area. **Laboratory results from post-excavation samples collected from the floor and walls (SFRA-46 through -51) were received on May 23, 2014, and all results still exceeded the RALs.***

5.4 Additional Soil Sampling, pg. 15

***Additional soil sampling activities occurred during the RA to confirm that no additional dioxin-contaminated areas would have to be addressed.** The area between EA 3 and EA 2 was divided into two subareas: the south half was identified as EA 4, and the north half was designated as EA 5. The east boundary of these areas was the horse arena, and the west boundary was the roadway next to the west side of EA 3 and EA 2 (see Appendix A, Figure 3). Previous surface soil sampling had not identified elevated concentrations of dioxin within these areas.*

Several issues arise from the 2014 removal action, indicated in the 2015 Removal Report:

1.) Soil a few feet deep in at least one area sampled has high concentrations of a long list of organic chemicals (SFRA 34, 35, 36 Analytical Report from Test America dated 5/15/2014) both solvents and semi-volatile chemicals including xylenes, acetone, and Bis(2-ethylhexyl) phthalate, not found in the natural environment. The presence of these chemicals indicates a likely human source. The fact that these chemicals are found in higher concentrations below the surface suggests that the solvents have been washed into the soil by surface waters (precipitation) and probably occur in the underlying groundwater (consistent with previous groundwater sampling data). Because the underlying material is highly fractured (karst formation), the groundwater moves readily in vertical and horizontal directions, moving contaminants with the groundwater and surface water. This situation needs to be investigated and remedied.

2.) The Removal Action Report indicates that additional soil samples were collected from within and outside the target areas (specifically in EA 4 and 5 on the property line), and elevated dioxin levels were reported from samples in EA 1, indicating that the original remediation of the contaminated area was not adequate and did not capture the entire extent of contamination. Additional sampling is needed, moving outward from the removal areas of the 2014 removal action, until samples have met the cleanup targets (820 ppt and 2460 ppt for recreational use). If sampling reaches the area intended for residential use, presumably the residential standards of 5.5 ppt/ 55 ppt for residential use will apply. The original sampling to date has not provided a complete set of data that indicate all soils meet the appropriate standards throughout the property, whether residential or recreational.

3.) EPA summary 2015: EPA indicates that a 5 year review was not conducted because other efforts are in place and adequate to serve the same or similar purpose. There is no indication that ESC, LLC can discern, that indicates that a five year review is an option- it is a required element. The five year review is intended to begin when construction begins and continue as long as site contaminants remain. EPA responses do not provide an authority by which five year reviews are suspended or abandoned. If five year reviews had been conducted, they should have shown that contaminants were still present at unacceptable levels, at least in the groundwater and in the northeast corner of the Strecker property where historical records indicated the previous removal action level has been replaced by more stringent standards. The current efforts and the proposed future monitoring activities are needed in addition to a required 5-year CERCLA review.

4.) The retention pond constructed near the horse barn was used to collect rainwater from EA 3, where the rainwater infiltrated and evaporated. Previous sampling in the area had not identified elevated dioxin concentrations. Yet no post removal action testing for dioxins was completed within or directly around the retention pond.

5.) Strecker Forest Development Site

Post sampling analysis has indicated that a large number of chemicals remain at the Ellisville Site (samples SFRA 34, 35, 36) notably in the northeast corner of the Strecker Forest property near the 2014 removal action. The average concentration of toxic contaminants in the northeast area is not acceptable for residential use (see Table 1 below). Institutional controls, such as the use of fencing and information signs around the contaminated area, will need to be implemented. However, there is significant evidence that institutional controls are not fully effective at protecting human health over the long or short term. A GAO study found that relying on institutional controls as a major component of remedial action can jeopardize the effectiveness of the remedy (2005). Fencing and signs will not stop children from unknowingly playing in contaminated areas. Signs are also significantly less effective at communicating health risks to non-English speakers.

Table 1: Post-excavation dioxin levels, numbers taken from EPA Archive Document: Post-Excavation Dioxin Concentrations in Soil

Area	Dioxin in ppt
DU 44D	226
SU 36B	138
DU 42B	644
DU 41B	202
DU 41C	82
DU 41D	190
DU 40D	226
DU 40C	331
DU 40B	104
DU 39	263
	2406
mean	240.6

6.) We identified errors in the file names and contents in Appendix D as follows:

- No data for sample 163 are presented in Tables 1-5.
- No follow up confirmation sample results are clearly labeled as such and presented for samples after the second round of soil removal in those areas

where initial confirmation sampling indicated exceedances. The data need to be clearly identified or presented, as the case might be.

- The file for samples 149 through 159 contains a repeat of data for samples 160-161.
- The file for samples 129-133 has no cover sheet, chain of custody or transmittal letter.

RECOMMENDATIONS

1. Considering that the existing sample results indicate elevated concentrations of dioxin and other toxic chemicals, an interim safety institutional control measure is needed. EPA needs to install fencing and signs around the contaminated area making it clear that the contaminated area is a threat to human health.
2. Continue sampling soil and groundwater and removing contaminated materials until the site is clean.
3. Reinstate the five year review process.
4. Implement additional sampling to delineate the extent of contamination.
5. Correct the errors in the files sent to the City.
6. Match the existing soil data with the groundwater data and initiate any needed remedial actions to correct the contamination of soil and groundwater.
7. Because two of the three Ellisville site properties have recent documentation of contamination, no part of the Ellisville Site should be delisted. The current work on the Bliss/Strecker Forest properties of the Ellisville Site, and the Callahan Property indicate contamination remaining in surface and/or subsurface soils. The contamination at the Bliss/Strecker Forest property had contamination known to be a significant threat to health and the environment. Further investigation of the Callahan property was not conducted after chemicals were identified during a groundwater well installation. Therefore, EPA has not affirmatively demonstrated that the Ellisville Site as a whole is free from significant threats to human health.

Sources

United States Environmental Protection Agency. July 2013. *Preliminary Remediation Goals (PRGs) for Dioxin in Surface Soil Proposed Strecker Forest Development, Wildwood, Missouri*. United States Government Accountability Office. January 2005. "HAZARDOUS WASTE SITES: Improved Effectiveness of Controls at Sites Could Better Protect the Public." GAO-05-163.