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August 26, 2024

TO: Sean Owens, Douglas County

FROM: Jack Denman, ERO Resources Corporation

RE: Phase II Limited Site Investigation
Louviers Chemours Option 1 Parcel

This memorandum details the Phase II Limited Site Investigation (LSI) conducted by ERO Resources Corporation (ERO) of the Option 1 Parcel within the Chemours Land Exchange project in Louviers, Colorado. The work was designed based on ERO's December 6, 2023 Phase I Environmental Site Assessment for the overall Chemours Land Exchange. This LSI was conducted by ERO in accordance with ERO's March 12, 2024 sampling proposal and Work Plan provided to and authorized by Douglas County. Investigation locations are shown on Figure 1 (attached).

As detailed herein and supported by the attached laboratory documentation, this investigation has identified the following environmental conditions with respect the Option 1 Parcel:

- Detected Perfluorooctanoic Acid (PFOA) concentrations in surface soils within the known Fire Training Area that are up to two orders of magnitude greater than the current EPA cleanup levels. Additional testing is necessary to determine the extent of PFOA soil contamination and to design any remedial action.
- Soils at Denuded Area 3 contain polyaromatic hydrocarbon (PAH) concentrations that exceed current EPA unrestricted/residential land use cleanup levels. Additional testing is necessary to determine the extent of PAH soil contamination and to design any remedial action.
- Soils at Denuded Area 5 contain lead concentrations that exceed current EPA cleanup levels for unrestricted/residential land use. Additional testing is necessary to determine the extent of lead soil contamination and to design any remedial action.
- Regulated professional remediation activities will be required to remove the asbestos-containing materials observed throughout the Option 1 Parcel as well as the 6-inches of underlying soil in areas where such materials are present. Any soil disturbing activities must be performed under Colorado's solid-waste regulation 6 CCR 1007-2, Section 5.5.

Area-specific details of ERO's investigation are provided below, organized by investigation task.

Task 1. PFOA/PFOS Groundwater Sampling

This task was revised upon lack of access granted for site groundwater monitoring wells. No groundwater sampling for Perfluorooctanoic Acid (PFOA) or Perfluorooctyl Sulfonate (PFOS) was conducted.

Task 1-REV. Fire Training Area Soil Sampling

Firefighting foams potentially containing PFOA/PFOS were reportedly used within an area demarcated in a 2022 report detailing PFOA/PFOS sampling with PFOA concentrations detected in groundwater downgradient of the fire training area[1]. The source of the PFOA groundwater contamination has been identified as a one-time use of firefighting foam during a 1986 training exercise[2], however no surveyed information regarding the size or location beyond the illustrations within the cited reports is known. For these reasons, ERO's approach was to conduct a screening of surface soils within the Firefighting-foam Training Area (FTA) previously illustrated. The screening consisted of gridding the area and collecting a discrete surface soil sample from an area within each grid that was likely to have had foam accumulation or surface sheet flow deposition after the 1986 event. The screening assumed that surface topography has not changed significantly since 1986.

Methods

Prior to sampling activities, ERO hand measured the presumed FTA area based on previous map data and field observations. The area was demarcated into grids measuring 30-feet by 30-feet, elongated along the northeasterly-trending shape of the historical reported area of use (Figure 2). Wood stakes were used to mark the grid corners. Prior to selecting a sample location, ERO surveyed each grid for low-lying areas, either within swales or within shallow drainages, to identify likely locations for potential sediment or foam accumulation from gravity flow. If no low-lying areas were present, or if the same low-lying area was duplicated in an adjacent grid, upland areas were chosen for sampling. To avoid and minimize cross-contamination by sampling and/or decontamination equipment, discrete samples were collected from single point-locations within each grid. No composite samples were collected.

In general, sampling protocols generally followed industry best practices and pertinent portions of AECOM's 2021 PFOA/PFOS sampling plan[3] and the Michigan Department of Environmental Quality Soil PFOS Sampling Guidance[4] (cited by EPA as guidance) pertaining to soil sampling. Sampling consisted of using new, PFOA/PFOS-free, powderless nitrile gloves to scoop and place soils directly into laboratory-provided, certified clean sample containers specifically designated for PFOA/PFOS sampling. Samples were placed directly in the container, the container capped, and labeled with provided labels with a ball-point pen. Samples were placed in an iced cooler and transported to Eurofins Laboratory in Wheat Ridge, Colorado for PFOA/PFOS analysis by EPA Method 1633. A total of 10 soil samples were collected from across the FTA. For quality assurance and quality control (QA/QC), one ambient field blank was collected by placing an aliquot of laboratory-provided, PFOA/PFOS-free reagent water in a sample container for the same analyses. In addition, one background soil sample (sample ID: FTA-BG) was collected in the same manner as FTA samples from the westerly portion of the Chemours property

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[1] AECOM. 2022. Results from PFOA/PFOS Sampling & Review of Site Groundwater Conditions and Request for Conditional Closure, Louviers Site, Louviers, Colorado. April 26.

[2] AECOM 2021. Perfluorooctanoic Acid (PFOA) and Perfluotooctyl Sulfonate (PFOS) Groundwater Screening Proposal Chemours Louviers Works, Douglas County, Colorado. June.

[3] AECOM 2021.

[4] https://www.michigan.gov/-/media/Project/Websites/PFAS-Response/Sampling-Guidance/General.pdf

(location shown on Figure 1). Because only dedicated sampling equipment was used, a decontamination/rinsate blank was not collected or analyzed.

Results

PFOA/PFOS concentrations and sample location descriptions are presented in Table 1 with the laboratory report attached to this memorandum. Soil sample results were compared to current U.S. EPA Regional Screening Level (EPA RSL) for unrestricted residential land use as well as industrial land use[5]. Although numerous additional compounds were detected in soils, because only PFOA/PFOS groundwater concentrations were reported by AECOM[6], these are the only analytes detailed in Table 1. Although not presented herein, none of the additional compound concentrations exceeded the current EPA RSLs for unrestricted residential land use.

PFOA was detected in nine of the surface soil samples at concentrations ranging from 0.062 micrograms per Kilogram (µg/Kg) up to 6.0 µg/Kg (Table 1). The most recent EPA RSL for PFOA in soils is 0.078 µg/Kg for industrial land use and 0.019 µg/Kg for unrestricted/residential land use.

PFOS was detected in all samples at concentrations ranging from a 0.17 µg/kg to 0.56 µg/kg. The most recent EPA RSL for PFOS in soils is 58.0 µg/Kg for industrial land use and 6.3 µg/Kg for unrestricted/residential land use.

Table 1. PFOA/PFOS soil sample results.

Sample ID	Analyte Concentration (µg/kg)		Sampled Location Description
	PFOA	PFOS	
FTA-0/0	1.0	0.28	Upland grasses above drainage.
FTA-0/30	0.3	0.32	Grassy area at head of small drainage.
FTA-30/0	1.1	0.19J	Upland grasses above drainage.
FTA-30/30	0.75	0.19J	Grasses in swale at base of berm in drainage.
FTA-60/0	1.4	0.36	In drainage in central portion of survey area.
FTA-60/30	0.29	0.27	Upland grasses at north base of berm.
FTA-90/0	0.062	0.56	Upland grasses outside of drainage.
FTA-90/30	0.11	0.48	Grassland swale at base of soil berm.
FTA-120/0	<0.041	0.31	Grassy swale above drainage.
FTA-120/30	6.0	0.17J	Within drainage and low point at confluence of two drainage pipes.
FTA-BG	<0.042	0.17J	Background from upland grassy area in westerly portion of the overall Chemours property.
EPA Industrial RSL	*0.078*	*58*	
EPA Residential RSL	*0.019*	*6.3*	

"<" Analyte not detected above stated laboratory method detection limit (MDL).

"J" Concentration estimated above MDL but below laboratory reporting limit.

Neither PFOA/PFOS compounds were detected in the ambient blank sample.

Within the background soil sample, PFOA was not detected above the laboratory method detection limit (MDL) and an estimated PFOS concentration was detected at 0.17 µg/kg, above the MDL, but below the laboratory reporting limit (RL).

[5] https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables. Last updated May 2024.

[6] AECOM 2022.

Conclusion

Based on this assessment:

- Detected PFOA concentrations in surface soils within the known FTA are up to two orders of magnitude greater than the current EPA cleanup levels;
- Detected PFOS and additional, related compounds are at concentrations below current EPA cleanup levels for all land uses; and
- Additional testing is necessary to determine the extent of PFOA soil contamination and to design any remedial action.

Task 2. Building Foundation Soils Assessment

Previously documented remedial actions for several locations within the facility addressed soil contamination associated with historical activities, however closure documents and field observations note that numerous building foundations remain that may hide, obscure, or otherwise have restricted the evaluation of subsurface soils for historical impacts. Specifically, these locations include:

- SWMU 29 (PETN-NG Manufacturing Area)
- SWMU 31A (PETN Nitrator Drains)
- SWMU 31B (Acetone Recovery Tower Drains)
- SWMU 31E (New Plant Laboratory and New Power House Drain)

Methods

On June 5, 2024, ERO collected vertical composite of soils within the top 6-inches of soil against the existing building foundation at locations shown on Figure 3 and Figure 4. For samples within the footprint of the New Plant Laboratory Building (SWMU 31E, Figure 4), ERO cut a concrete core through the foundation floor in two locations to access the subsurface soils beneath. At each sample location, ERO excavated a shallow soil pit using a clean shovel. A gloved hand was then used to expose a fresh soil surface to prevent cross-contamination from sampling equipment. A vertical composite of exposed soils across the fresh soil face was collected using the gloved hand. The soil was then placed place in a new Zip-lock bag and mixed to homogenize the vertical length of soil. The final sample was then collected from the resulting mixture, packaged in laboratory- provided sample jars and submitted to Eurofins Laboratory in Wheat Ridge, Colorado under chain of custody protocol for the RCRA Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) by EPA Method 6020/7471; polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270, and explosives by EPA Method 8330.

Results

Soil sample results were compared to current EPA RSLs for unrestricted residential land use as well as Risked-Based Concentrations (RBCs) presented in the 2008 Human Health Risk Assessment for the Dupont Louviers site[7], used for soil screening as part of facility closure. Sample results are discussed below with the laboratory report attached.

[7] Corporate Remediation Group (CRG). 2008. Human Health Baseline Risk Assessment, DuPont Louviers Site, Louviers, Colorado. March.

PAHs

Five locations exceed the RBCs for benzo(a)pyrene (BaP) of 0.0148 mg/Kg with sample results ranging from 0.020 to 0.051 mg/Kg. All BaP concentrations are below the current EPA RSL for unrestricted/residential land use for BaP of 0.11 mg/Kg. No other PAH compounds exceeded either screening level.

Conclusion – Based on the results of this assessment, site conditions appear consistent with those presented in the closure documentation reviewed by ERO.

Metals

None of the sampled locations exceeded either screening level for any of the RCRA metals.

Conclusion – Based on the results of this assessment, site conditions appear consistent with those presented in the closure documentation reviewed by ERO.

Explosives

None of the sampled locations exceeded either screening level for explosive compounds.

Conclusion – Based on the results of this assessment, site conditions appear consistent with those presented in the closure documentation reviewed by ERO.

Task 3. Denuded Soils Assessment

As documented in ERO's Phase I ESA, several areas of denuded vegetation were observed near the former New Plant Laboratory area (SWMU 31E; Figure 5). No direct rationale for the lack of vegetation within these areas has been identified. For these reasons, these areas were proposed for additional assessment as part of this LSI.

Methods

ERO identified five primary areas of denuded vegetation for assessment. Each area was segmented into quadrants. One surface soil aliquot was collected from each quadrant and placed into a new Zip-Lock bag. Once all four aliquots were collected – in separate bags – equal volumes of soil were collected from each bag and placed in a new Zip-Lock bag and mixed thoroughly. A final sample was collected from the mixed soil and placed in laboratory-provided sample jars. The jars were labeled and placed in an iced cooler for transport to Eurofins Laboratory in Wheat Ridge, Colorado under chain of custody protocol for analysis of RCRA metals, PAHs, and explosives by methods discussed above as well as pH and Nitrates/Nitrites by EPA method 300.0.

Results

Soil sample results were compared to current EPA RSLs for unrestricted/residential land use as well as RBCs used for soil screening as part of facility closure. Sample results are discussed below with the laboratory report attached.

PAHs

BaP was detected in samples from Denuded Areas 1, 2, and 5 at concentrations between 0.006 and 0.051 mg/Kg, above and below the RBC, but below the current EPA RSL for unrestricted/residential land use of 0.11 mg/Kg.

The remaining denuded areas contained PAH concentrations or associated laboratory detection limits (for non-detected analytes) that were both above and below the RBC, but all were below EPA RSLs for unrestricted/residential land use.