



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

SUBJECT: Recommendation for Determination of
Imminent and Substantial Endangerment
at the US Titanium NPL Site, Piney River, Virginia

FROM: Myles Bartos, On-Scene Coordinator,
Eastern Response Section (3SD31)

Lisa Denmark, Remedial Project Manager,
DE, VA, WV Remedial Section (3SD23)

TO: Paul Leonard, Acting Director
Superfund and Emergency Management Division

Because of the factors outlined below, I have determined that a threat to the public health or welfare or the environment exists at the U. S. Titanium Superfund Site (Site) and I recommend that a finding be made that there may be an imminent and substantial endangerment to the public health or welfare or the environment because of an actual or threatened release of a hazardous substance at or from the Site.

1. Site Name and Location: US Titanium Site, North Bank of Piney River and East of Virginia Route 151, Piney River, VA

2. Owner/Operator: Solvay

3. Population Information/Area Description:

<100 persons (estimated) (live or work) within 1 mile
radius. The area is primarily: Rural

4. Access: restricted X unrestricted

Site is unrestricted with some areas fenced, however, due to Rails to Trails path, there are significant unrestricted areas. The drum mound area is fenced and is the focus of this document.

5. Coordination with Other Authorities:

X Commonwealth of Virginia Contact: Mr. William Lindsey, VDEQ RPM,
Environmental Cleanup Program

6. Site Characteristics:

The Site is a 50-acre area located adjacent to the Piney River, in Piney River, Nelson County, Virginia. The geographic coordinates of the approximate center of the Site are 37.70987778 degrees north latitude and 79.01805556 degrees west longitude. The Site is surrounded by woodlands and farming properties. The Piney River flows through the Site. The Site is primarily open space though a Virginia Blue Ridge Railway's Rails to Trails Pathway which goes through the Site allowing public access to the trail.

From 1944 to 1971, the American Cyanamid Corporation operated a plant at the Site which manufactured titanium dioxide, a white pigment used as a whitening agent in paper, paints, cosmetics, and soap. Titanium dioxide was mined in the area from raw titanium ore within the local Ilmenite bedrock. The titanium ore was treated with concentrated sulfuric acid and the resultant titanium compound was selectively extracted and processed into pure titanium dioxide. A by-product of this process, known as copperas or ferrous sulfate, was over time stockpiled at the Site. In December 1993, American Cyanamid Corporation spun-off its global chemicals business as a separate company which became Cytec Industries Inc. (Cytec). Responsibility for the environmental cleanup at the Site was transferred to Cytec as part of the spin-off. In December 2015, Solvay acquired Cytec.

In February 2016, Solvay discovered what appeared to be a decades-old mound containing partially buried scrap metal, pipe, rusted out drum carcasses and other miscellaneous debris (Drum Disposal Mound or Mound), portions of which are exposed on the south side of the Mound. The Drum Disposal Mound is located south of the Rails-to-Trails Pathway, east of Area 5, north of the Piney River, and northwest of groundwater monitoring well, EPA-2. The Mound is approximately 9,000 square feet in area with a maximum height of nine feet above ground surface.

In August 2016, Solvay conducted radiological field screening of the Mound and associated sampling. The radiological field screening triggered a geiger counter reading two orders of magnitude above background readings. On October 10, 2016, Solvay submitted a monthly progress report to EPA and the Virginia Department of Environmental Quality (VDEQ) notifying the Agencies of the Mound. On October 12, 2016, EPA On-Scene Coordinator (OSC) Myles Bartos was mobilized to the Site to investigate the Mound.

At EPA's direction Solvay installed a fence around the Mound in December 23, 2016 and performed a groundwater and soil investigation at the Mound. Solvay submitted a Groundwater and Soil Investigation Report (SI Report) to EPA and VDEQ for approval on November 20, 2018. EPA and VDEQ approved the SI Report on March 28, 2019. The SI Report is attached, and data is described below.

7. Hazardous Substance(s) Present:

The main constituents of concern (COCs) at the Mound are metals, dioxins, furans, polychlorinated biphenyls (PCBs), and Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM):

a. Metals

Iron: Seven of 48 soils samples collected and analyzed for iron exceeded the regional screening level (RSL) of 82,000 milligrams per kilogram (mg/kg) for residential soil. These were soil samples SS-7(5'), Field Duplicate (collected from SS-11(0-2')), SS-11(4-5'), SS-11(8-9'), SS-15, SS-25, and SS-30, with a maximum recorded concentration of 160,000 mg/kg in sample location SS-30. This concentration of 160,000 mg/kg is the residential removal management level (RML). The concentrations of iron observed within the Mound soils, native soils beneath, and shallow surrounding soils are likely a result of historical Site operations, as iron is a typical COC found at historical titanium dioxide sites.

Lead: Four of 48 soil samples collected and analyzed for lead exceeded the residential RSL (400 mg/kg) and the industrial RML (800 mg/kg). These soil samples were SS-7(4'), Field Duplicate (collected from SS-11(0-2')), SS-11(4-5'), and SS-12(4'), with a maximum recorded concentration of 2,070 mg/kg in sample location SS-12(4'). The exceedances were only recorded in the fill material within the Mound.

Mercury: Seven of 48 soil samples collected and analyzed for mercury, exceeded the relevant residential RSL (11 mg/kg), with a maximum recorded concentration of 98.5 mg/kg. The exceedances were located primarily within the Mound fill material and shallow surrounding soils in the immediate vicinity of the Mound (not outside the fenced area) and are likely attributed to historical Site operations. These concentrations exceed the residential RML of 33 ppm. The industrial RML for mercury is 140 mg/kg.

b. PCBs

One soil sample of 46 soil samples collected and analyzed for the PCB-Aroclor 1232, Field Duplicate 1, (collected from SS-11(0-2')) exceeded the industrial RSL (720 ug/kg), with a concentration of 2,360 ug/kg. In addition, five soil samples of the 46 soil samples collected and analyzed for the PCB-Aroclor 1260 exceeded the industrial RSL (990 ug/kg). These soil samples were: SS-9(0-2'), SS-11(0-2), Field Duplicate 1 (collected from SS-11(0-2')), SS-12(0-2'), and SS-17, with a maximum recorded concentration of 6,730 ug/kg (SS-9(0-2')). The soil samples that recorded RSL exceedances for PCBs appear to be concentrated within the fill materials of the Mound and the shallow soils within the Mound's immediate vicinity. The historical uses or processes at the Site that would have contributed to the elevated concentrations of PCBs observed within the Mound soil are

unknown. PCBs were widely deployed as a component of transformer fluids and such use at the Site could be expected based on the years of operation. Further, a study conducted by Hu et al. (2011)² found that PCBs can be linked with the production of titanium dioxide white pigments, which were historically produced at the Site. As such, it is possible that the concentrations of PCBs observed within the Mound are a result of historical plant processes.

c. Dioxins and Furans

Four of 46 soil samples collected and analyzed for 2,3,7,8- tetrachlorodibenzop-Dioxin (2,3,7,8,-TCDD), exceeded the RSL (22 nanograms/kilogram; ng/kg). These were soil samples Field Duplicate 1 (collected from SS-11(0-2')), SS-12(0-2'), SS-12 (4'), and SS- 20, with a maximum concentration of 290 ng/kg (SS-20). One of the four soil samples collected and analyzed for dioxins and furans under EPA Method 8290 exceeded the Toxic Equivalency Concentration (TEC) of 22 ng/kg, with a maximum TEC of 28.06 ng/kg recorded in sample location SS-36 (18-24"). According to the EPA's 2001 document for inorganic chemical listings at titanium dioxide sites⁵, 2,3,7,8,- TCDD is a COC that is associated with titanium dioxide production waste streams. As such, the concentrations of 2,3,7,8,-TCDD recorded in the Mound soil and surrounding shallow soil samples are likely a result of historical Site operations. The RML for residential is 0.00015ppm.

d. TENORM

On October 21, 2016, Cytex submitted the Debris Mound Characterization Report to the USEPA and VDEQ, which documented the August 31, 2016 Mound sampling activities. EPA determined based on the findings from the initial Mound sampling activities that select materials within the Mound contain concentrations of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) that exceed the EPA's CERCLA, Title 40 Code of Federal Regulations (CFR) Part 192 remediation goals for CERCLA sites with radioactive contamination. In its October 13, 2016 Final Event Notification (Virginia Department of Health's Office of Radiological Health [VDH] 2016), the VDH indicated that the Mound does not present a radiological threat to public or worker safety at the area surveyed, as long as the area remains undisturbed (ERM 2016).

As documented within the International Atomic Energy Agency's (IAEA) 2012 Safety Report Series: *Radiation Protection and NORM Residue Management in the Titanium Dioxide and Related Industries*, radioactive elements such as uranium, thorium, and radium are commonly found at titanium sites due to the sulfate processing of the titanium ore.

During an August 2016 sampling event at the Drum Disposal Mound, several non-soil materials discovered within the Mound were found to be emitting levels

of radiation greater than the Site-specific background threshold, which was established as 1.5 times the background of 13,000 counts per minute by way of a Ludlum model 2221 meter with a 44-20 probe. These non-soil materials resembled the materials found within the former processing plant onsite, which consisted of filter cloth material and refractory-like material. Confirmation samples were collected from six test pit locations within the Mound.

8. Threat to Public Health or Welfare or the Environment: (References are to Section 300.415 of the NCP)
 - a. 300.415(b)(2)(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants

Virginia Blue Ridge Railway's Rails to Trails Pathway (Trail) is an open access, public trail that bisects the Site. The Trail is the starting location for the Virginia Blue Ridge Railway and is well advertised on county and trail websites welcoming the public (see sites listed below). The Trail is open year-round for horseback riding, walking, biking, and running along with recreational use of the Piney River for fishing. Picnic tables and benches exist along this Trail along with signage about the history of the railroad. EPA uses this area to distribute Site factsheets, as well.

Websites:

<https://www.virginia.org/listings/OutdoorsAndSports/VirginiaBlueRidgeRailwayTrailNelsonCounty/>

<http://www.nelsoncounty-va.gov/wp-content/uploads/Map-of-Trail-13.pdf>

<http://nelsoncounty.com/outdoor-adventures/biking/>

The Trail provides open and easy access to the Drum Disposal Mound. Access to the Site is uncontrolled. Based on RPM observation, dozens of people use the path weekly. While the Drum Disposal Mound is now temporarily fenced, there is no monitoring. Additionally, there are no other restrictions in place that would deter or otherwise prevent access to the Mound. It is likely that human exposures occurred prior to installing the fencing around the Mound. It is also possible that historical run off from rain events have caused contaminants to migrate to the river. The Mound is in a flood plain and it is possible that flood waters could carry these contaminants to the river.

There is an actual or potential exposure to the following contaminants in or around the mound: iron, lead, mercury, dioxins, furans, PCBs, and TENORM. All these contaminants are listed hazardous substances and have exceeded various screening or removal management levels developed by EPA. The main constituents of concern at the Mound are lead and iron.

The RSL for lead in a residential area is 400 ppm. Lead is poisonous to humans by ingestion and inhalation. Lead is neurotoxic to infants and developing fetuses. Human

systemic effects by ingestion and inhalation are loss of appetite, anemia, malaise, insomnia, headache, irritability, muscle and joint pains, tremors, hallucinations, distorted perceptions, muscle weakness, gastritis and liver changes. Lead also effects the human nervous system, the blood system and the kidneys. Chronic exposure can lead to irreversible vascular sclerosis, tubular cell atrophy, interstitial fibrosis and glomerular sclerosis. Severe toxicity can cause sterility, miscarriage and neonatal mortality and morbidity. Acute exposure to arsenic can affect the stomach and intestines, with symptoms such as pain, nausea, vomiting, and diarrhea. Chronic exposure can lead to hyperpigmentation and hyperkeratosis.^{2,3,4}

Iron exposure is also serious and poses a threat to children. Most notably high levels of iron can cause liver failure, which can develop within a few days if iron poisoning is not treated. Bleeding or blood clot problems may also develop during this time. If liver failure does not occur and the iron poisoning is not effectively treated, scarring of the stomach and intestines may result. This scarring can cause major digestive problems. Permanent scarring of the liver, known as cirrhosis, can also follow iron poisoning.⁵

- b. 300.415(b)(2)(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems.

The Site was listed on the National Priorities List for its impact on the local ecosystem. Six major fish kills occurred in the Piney River between 1977 and 1981, killing over 228,000 fish. These fish kills are attributable to contamination from the Site which is consistent with the contamination found at the Mound.

Material in the Mound is not properly contained, and a permanent cap is not present. Loose soil is providing cover in some areas but could easily be removed in a flooding event. Therefore, if the Site were to experience a large rain or flooding event, the shallow and non-engineered cover material currently on the Mound could easily wash lead contamination and other COCs into the Piney River. Once washed into the Piney River, the contamination could potential further degrade the recovering Piney River while leaving the buried material further exposed allowing an exposure pathway for human and animals. This washing-away is likely what has occurred over time to reveal the material in the Mound decades after it was buried.

Solvay completed the most recent Ecological Assessment (EA) at the Site on May 15, 2018. This EA focused on the entire Site, including on-site discharges and groundwater interfaces, but was not specific to the Mound addressed in this Endangerment Determination. The EA concluded that the Site's seasonal discharge of the groundwater into the on-site surface water drainages does not appear to be causing any significant environmental or ecological condition of concern within the Piney River. In addition, no significant Site-related effects to terrestrial habitats or receptors were identified.

However, the contaminants in the Mound are consistent with historical Site contaminants. These contaminants have shown to have negative impacts on the environment surrounding the Site, including a fish kill. The presence of these contaminants, the location they are in, and the overall state and condition in which they exist creates a potential for release and exposure to sensitive ecosystems.

- c. 300.415(b)(2)(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.

The conditions at the Site create the potential for Site-related COCs including iron, lead, dioxins, furans, PCBs, and TENORM, to migrate to the Piney River. Specifically, because the Drum Disposal Mound does not have an engineered cap or any physical barrier in place, this material is not secured and could be carried away via storm water or floodwaters.

- d. 300.415(b)(2)(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

The Drum Disposal Mound is located in a primarily rural area. The Mound is in a Commonwealth of Virginia Regulated Floodway per the Virginia Flood Risk Information System (VFRIS) found at <http://cmap2.vims.edu/VaFloodRisk/vfris2.html>. Precipitation leading to flooding in this area could potentially cause the migration of hazardous substances including metals, PCBs, dioxins, and furans to areas beyond the Mound. Contaminated material in the Mound is not properly contained and a permanent cap is not present. Loose soil is providing cover in some areas of the Mound but that soil could easily be removed during a flooding event and carried to the nearby Piney River. In fact, historically, fish kills occurred here because of Site conditions.

- e. 300.415(b)(2)(vii): The availability of other appropriate federal or state response mechanisms to respond to the release.

The Commonwealth of Virginia has indicated to EPA that it cannot perform a cleanup at the Site.

9. List of Supporting Documents:
POLREP #1, Initial and Final. US Titanium. Myles Bartos. October 18, 2016,
Draft Revised Debris Mound Characterization Report
Ecological Assessment Report (4th Rev). ERM. November 17, 2017.

Citations:

1. US EPA. October 2001. "Final Titanium Dioxide Listing Background Document for the Inorganic Chemical Listing Determination.
2. ATSDR Toxicological profile for Lead.
<https://www.atsdr.cdc.gov/ToxProfiles/TP.asp?id=96&tid=22#bookmark03>
3. Peter Jennrich, "The Influence of Arsenic, Lead, and Mercury on the Development of Cardiovascular Diseases," ISRN Hypertension, vol. 2013, Article ID 234034, 15 pages, 2013. <https://doi.org/10.5402/2013/234034>
4. ATSDR Lead Fact sheet: <https://www.atsdr.cdc.gov/toxfaqs/tfacts13.pdf>. February 1, 2019.
5. Iron Poisoning. <https://www.healthline.com/health/iron-poisoning#complications-and-risks>. February 1, 2019.

Action by the Approving Official:

I have reviewed the above-stated facts and based upon those facts and the information compiled in the documents described above, I hereby determine that the release or threatened release of hazardous substances at and/or from the Site presents or may present an imminent and substantial endangerment to the public health or welfare or to the environment.

Paul Leonard
Acting Director
Superfund and Emergency Management Division

Date

2. ATSDR Toxicological profile for Lead.
<https://www.atsdr.cdc.gov/ToxProfiles/TP.asp?id=96&tid=22#bookmark03>
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Paul Leonard, Acting Director
Superfund and Emergency Management Division

July 2, 2019
Date