

Waynesboro Plant RCRA Corrective Actions Briefing Paper

October 9, 2013

Introduction

DuPont has conducted numerous field studies under the Resource Conservation and Recovery Act (RCRA) Corrective Action permit at the Waynesboro Plant. These investigations have included the characterization of solid waste management units (SWMUs), monitoring of groundwater, and outfall discharge monitoring. The results of these studies indicate that mercury-impacted groundwater is not interacting with river water. However, monitoring has shown that discharges from the plant outfalls contribute to the mercury loading in the South River.

In addition to traditional soil and water investigations, DuPont performed a thorough assessment of the plant storm sewer system in the former mercury area and has characterized impacted sewer sections that are contributing to mercury loading at the plant outfalls. In 2010, a sewer investigation and Interim Measures were performed that included cleaning of impacted sewer segments and isolation and abandonment of known sources of mercury. Additional Interim Measure activities are currently in progress at the plant as part of the Railroad Avenue Interim Measures (RRIM). The RRIM includes sliplining and abandoning sewer lines and temporary using filtration features to reduce mercury discharges during remedial activities.

History

In 1929, DuPont began operations at the Waynesboro site, which is situated on 177 acres along the South River. Initial operations included the manufacture of acetate flake and yarn from 1929-1977. This process included the use of mercury from 1929-1950. Other products manufactured at the site include Orlon, Permasep, Lycra and BCF Nylon. In 2003, the plant assets were sold to Koch Industries (INVISTA). Upon the completion of the Corrective Action Program, the land will be transferred to INVISTA.

RFI Investigation

The RCRA Facility Investigation (RFI) was conducted in three phases to characterize SWMUs where hazardous substances may have impacted the environment. Twenty SWMUs were identified in the original Corrective Action permit. All units have been fully characterized for releases of constituents and potential impacts to the environment. The RFI Report was submitted in November 2009 and revised in August 2012. Comments from EPA have been received, and the final revision is in progress.

The Phase I RFI conducted in 2000-2001 consisted of soil and groundwater sampling at 10 SWMUs. Eighty-six soil samples and 40 groundwater samples were collected for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, methyl mercury, hexamethylene diamine (HMD), dimethyl formamide (DMF), and N,N-dimethylacetamide (DMAC). This included water-level measurements and slug testing for

hydrogeologic evaluations. Out of the 10 SWMUs that were investigated, the Phase I RFI results indicated that SWMU 1 (Mercury Recovery Area) and SWMU 4 (Incineration Area) required further evaluation and that the Northeast Area water-level depression should be investigated. The remaining SWMUs would be investigated in subsequent phases.

During the Phase II RFI (2004-2005), additional sampling was conducted at the remaining SWMUs and two areas of concern (AOCs). This investigation included collecting 68 soil samples and 65 groundwater samples for the same constituents as in the Phase I RFI. Also in this investigation were a soil gas sampling program at SWMU 1 for the presence of mercury vapor and a geologic investigation at the Northeast Area. The Phase II RFI detected low levels of mercury in groundwater in the deep clastic zone present in Northeast Area. Mercury was further characterized at SWMU 1 and SWMU 4, and benzene and mercury were detected in groundwater downgradient of SWMU 6/7 (former sludge pond). No further investigation was recommended for SWMUs 10, 13, 20 and AOCs 1 and 2; however, additional investigation was recommended at SWMUs 1, 4, 6, 7, and the Northeast Area.

The Phase III RFI, completed in July 2007, included collecting 76 soil samples and five groundwater samples at three SWMUs for the same constituents as in previous investigations. Soil samples were collected at SWMU 1 to confirm previous soil gas results, and the former process ditches at the Chemical Building were sampled for mercury. Geoprobe soil sampling was performed at SWMU 4 for further delineation of mercury and at SWMU 6/7 for initial characterization of soils. Two new wells were drilled to assess potential migration of constituents from SWMU 6/7. The Northeast Area was investigated by locating and logging plant Well #1, an off-line bedrock production well located in SWMU 1, and conducting a long term water level study. This investigation concluded that additional sampling was needed at SWMUs 1, 4, 7 and that groundwater from Well #1 should be sampled.

Phase IIIa RFI, conducted in 2008, focused on the relationship between areas impacted by mercury and the plant outfalls. Test pits and structures suspected of containing mercury at SWMU 1 were excavated, and soil borings were conducted to determine the nature and extent of these areas. Additional delineation of mercury in soil was also performed at SWMUs 4 and 7. Although unfiltered groundwater samples collected from Well #1 were found to be slightly above the mercury criteria, the dissolved phase was well below.

Of the 20 units identified in the RCRA Corrective Action Permit, 17 are recommended for no further action. Two AOCs that were added after the permit was issued are also recommended for no further action. However, the following three units are recommended to be carried forward into the Corrective Measures Study (CMS):

- SWMU 1 (Mercury Recovery Area)
- SWMU 4 (Incinerator Area)
- SWMU 7 (Sludge Pond)

Groundwater

DuPont has been conducting semi-annual groundwater monitoring activities at the former DuPont Waynesboro Plant since 2004. The program was implemented as a recommendation of the Phase I RFI, which concluded that localized groundwater on the site was impacted by mercury.

Groundwater monitoring results continue to show that mercury impacts to groundwater at the site are primarily localized to known source areas. No widespread area of dissolved-phase mercury impact-to-groundwater (or “plume”) has been identified at the site. Groundwater mercury concentrations at the site perimeter, monitored by a network of wells located along the river, indicate that there is no impact to adjacent surface-water bodies from groundwater contribution. On-site groundwater is not used as a source of drinking water and poses no foreseeable risk to human health.

In the northeast section of the plant, collocated with the former mercury area, is a depression of the water table. In the middle of the depression is Well #1, the decommissioned bedrock well. Geophysical logging, analytical testing, and a year-long water-level study have shown that Well #1 is not a conduit for downward migration of mercury and is not responsible for the water table depression. However, pumping of two other plant production wells, Wells #2 and #3, has been shown to correlate to the depression. Although the pumping of these wells appears to be related to the depression, routine sampling results show that mercury is not being drawn downward.

Outfall Monitoring

Outfall monitoring has been performed since 2003 to assess and monitor the loading of mercury under base flow and storm flow conditions to the South River. The first phase sampled one storm and one base flow event at eight outfalls and 10 upstream locations. No significant mercury was detected in baseflow or first flush storm samples; however, mercury was detected in flow weighted composites [up to 1.7 micrograms per liter ($\mu\text{g/L}$)] during the storm event. Estimated loading rates were low relative to the mass observed in the South River.

During the Phase II Outfall monitoring in 2004-2005, 10 sewer locations were sampled during three base flows and one storm flow event. Also sampled were sediments and water in upstream portions of the sewer. This investigation concluded that the amount of mercury that is bioavailable was 20 to 29% under base flow conditions and 32 to 33% for storm flow conditions. The highest concentrations of mercury in sewer sediments and water occurred in portions of the sewer near the former Chemical Building and SWMU-1.

The Phase III Outfall program conducted from 2005-2007 included the sampling 10 sewer locations over an 18-month program to support the Total Maximum Daily Load (TMDL) program. Fifteen base flow and six storm events were sampled. The data show that the highest mercury concentrations occur at Outfall 011, but it was in diversion to wastewater treatment plant and, at that time, did not discharge to the river. The outfall with the highest loading rate to the river is Outfall 001.

The Phase IV Outfall program was initiated in June 2007 and will continued to monitor 10 outfall locations. The program consisted of monthly base flow events and two storm events per year. The results were similar to the previous phases.

Sewer Investigation

The investigation was completed in three phases and characterized sewer systems that are collocated with former mercury operating areas. During the study, the flow paths, structure, and capacity of specific sewers were documented, and mercury-impacted sediments within the sewers were delineated. The most significant achievement was the removal in 2010 of approximately 521 kg (1,148 lbs) of mercury from the system during sewer cleaning activities. This effort, which was done in conjunction with the Interim Measures, represents the first significant mercury remediation effort at the facility.

The first phase of the sewer investigation began in 2006 with the construction of a geographic information system (GIS) database followed by a field survey in 2007. Based on the findings of the first phase, a second phase was recommended to conduct a closed circuit television (CCTV) to inspect sewers around the former Chemical Building. The initial CCTV inspection, conducted during the summer of 2008, found significant sediment and debris in portions of the sewer that prevented a complete inspection. Therefore, the recommendation was made to clean the sewers and remove blockages to allow completion of the CCTV inspection during the third phase.

From September to December 2010, DuPont implemented the third phase of the sewer investigation, which resulted in removing approximately 27 cubic yards of mercury-impacted sediments in the sewer system around the former Chemical Building. The sediments were removed because they were believed to be a contributor to mercury detected in the Outfall 001 discharges. After cleanout, the sewers were inspected by CCTV to characterize the system and locate zones of infiltration if present. In addition, approximately 85 sewer water and sediment samples were collected from upstream portions of the Outfalls 003, 010, and 011 systems to identify potential source areas.

The third phase of the sewer investigation was performed in conjunction with an Interim Measures effort. The Interim Measures, described in the next section, were implemented to cut off and remove sources of mercury that were contributing to the Pump House Sewer (PHS). Because both the sewer investigation and Interim Measures called for removing mercury-impacted sediments, these tasks were implemented together to economize the removal and disposal costs.

The sewer investigation concluded that mercury sources have impacted the PHS and Chemical Sewer in the area of the former Chemical Building and former Mercury Recovery Area. Although no significant sediment sources were identified in the sewers that drain to Outfalls 003, 010, and 011, low levels of mercury are present in the water collected from these systems. Therefore, DuPont recommended a plan to reduce mercury inputs to the sewer system and thereby decrease the concentration of mercury in outfall discharge water.

Interim Measures

Observations made during the RFI identified mercury source areas impacting a portion of the sewer system that passes through SWMU 1. Water that flows through this portion of the sewer system, identified as the Pump House Sewer (PHS), is ultimately discharged at Outfall 001 and is a source of mercury loading to the river.

In an effort to mitigate this condition, DuPont implemented Interim Measures at SWMU 1. The objective was to reduce the impact from the SWMU 1 source area to the PHS. To achieve this objective, the Interim Measures included the following:

- Re-directing roof drains from the source area in the vicinity of the L-50 Building
- Cleaning out the steam trap in the vicinity of L-50 Building
- Cleaning out PHS pipe lines and catch basins along Railroad Avenue
- Cleaning out and filling in the former solids collection pit

The Interim Measures were successfully implemented during the fall of 2010. During Interim Measure activities, approximately 27 cubic yards of sediment and debris containing mercury were removed from the site. Samples were taken in two locations before and after the Interim Measures and analyzed for total and dissolved mercury. This initial monitoring following the implementation of Interim Measures shows a reduction in mercury concentration at one location. Although a small amount of sediment remained in the other location of the sewer pipe near the sample point, continuing sample results show a reduction in mercury concentration. This sediment will be cleaned out in conjunction with future sewer cleaning activities.

A second round of Interim Measures has been initiated along Railroad Avenue. This phase will implement the recommendations of the Sewer Investigation and will include cleaning, sliplining, abandonment, and temporary filtration of water during remediation.

Mercury Inspection and Abatement

In October 2007, DuPont implemented a program to inspect drainage structures near the former Chemical Building for the presence of mercury. Small pellet sized amounts of free mercury that were visible at a drainage box along Railroad Avenue were removed and disposed of in October 2007. Since removal, no recoverable free mercury has been observed. The inspections are conducted on a monthly basis.

Future Anticipated Activities

- RFI and Risk Assessment Report approval (2013)
- Railroad Avenue Interim Measures (2013 - 2014)
- Semiannual Groundwater Monitoring (ongoing)
- Quarterly Outfall Monitoring (ongoing)
- Corrective Measures Study Report submission (2013)
- Remedial Design (2014-15)
- Final Remedial Action commencement (2015-16)