



BY EMAIL: Randy.Chapman@deq.virginia.gov

March 2, 2016

Virginia Department of Environmental Quality
Northern Regional Office
Attn: Randy Chapman
13901 Crown Court
Woodbridge, Virginia 22193

**RE: Dominion Crystal Substation; Initial Abatement Measures Report
DEQ Pollution Complaint Tracking #2016-3142**

Dear Mr. Chapman:

We received your February 2, 2016 and February 23, 2016 letters regarding the January 24, 2016 mineral oil spill at the Crystal Substation. Attached is the requested Initial Abatement Measures Report for the incident.

If you have any questions, please call me at 804-273-2929 or Jason Ericson at (804) 317-9464.

Sincerely,

A handwritten signature in black ink that reads "Cathy Taylor". The signature is fluid and cursive, with the first name "Cathy" and last name "Taylor" clearly distinguishable.

Cathy Taylor
Director, Electric Environmental Services

Cc:

Northern Regional Office Remediation: nroremediation@deq.virginia.gov
Joseph Glassman; Joseph.Glassman@deq.virginia.gov

INITIAL ABATEMENT REPORT

Site Name:

Dominion Virginia Power – Crystal Substation

Site Address:

S 18th Street & S Fern Street
Arlington, Virginia 22202

PC #:

2016-3142

Report Date:

February 26, 2016

Mailing Address:

Dominion Virginia Power
2400 Grayland Avenue
Richmond, Virginia 23220

Telephone:

(804) 257-4933

Prepared By:



John M. Black

DVP Environmental Compliance Program Manager
Dominion Substation Operations Support

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Photographs

- Exhibit A – Damaged Transformer
- Exhibit B – Initial Containment Activities
- Exhibit C – Roaches Run Outfall
- Exhibit D – Initial Clean-Up Activities
- Exhibit E - Site Restored to Pre-spill Condition

APPENDIX A	Topographic Map and Aerial Photographs
APPENDIX B	Safety Data Sheet (SDS)
APPENDIX C	Disposal Manifests
APPENDIX D	Lab Analysis
APPENDIX E	Bioremediation Application

1.0 GENERAL SITE INFORMATION

Crystal Substation is an electrical distribution facility owned and operated by Dominion Virginia Power (Dominion). The facility was placed in service in 1970. The enclosed site covers approximately 0.44 acres and is located at S 18th Street and S Fern Street, Arlington, Virginia. The site contains various types and sizes of mineral oil-filled electrical equipment located on concrete foundations. Soil underlying the facility is primarily clay. The nearest surface water is Roaches Run, a tributary of the Potomac River. Included in Appendix A is a topographic map showing the location of the substation and locations of stormwater drop inlets between the Substation and Roaches Run.

2.0 SOURCE OF SPILL AND INITIAL CONTAINMENT ACTIVITIES

- On Sunday, January 24, 2016, at approximately 0754 hrs, Transformer #1 at Crystal Substation experienced an internal electrical failure causing an excessive build-up of pressure inside the unit. The excessive pressure caused the casing to rupture near the top and pump piping to break near the bottom (See Exhibit A).
- Mineral oil is used as a coolant and insulator for the internal electrical components of the transformer. The transformer's main compartment oil capacity, as listed on the nameplate, was 13,075 gallons. The transformer's Load Tap Changer (LTC) and Selector compartments capacities, as listed on the nameplate, were 375 gallons and 520 gallons, respectively, bringing the estimated total quantity of mineral oil in the unit to 13,970 gallons. The LTC compartment was intact and the Selector compartment was partially intact. The estimated amount of oil spilled is approximately 13,500 gallons. The Material Safety Data Sheet for the oil can be found in Appendix B. The cause of the failure is currently under investigation.
- Due to the instantaneous release of pressure from the transformer main compartment, some oil sprayed into the driveway area of the Station. The bulk of the oil spilled entered a concrete walled area around the transformer. Initial containment activities by Dominion personnel included the deployment of sorbents to contain free product and inspection of the concrete walled area around the transformer. Oil had moved out of the walled area via various electrical conduits and cable ways into two immediately adjacent electrical cable vaults and, subsequently, migrated through the electrical cable ducts into 3 in-ground electrical vaults located just outside of the Station. These vaults do not contain drains. Additionally, electrical vaults and a stormwater drop inlet downgrade of the Substation were inspected and no additional oil in these vaults was observed, nor was there any oil observed in the stormwater drop inlet. The oil appeared to be confined to the 2 vaults inside and 3 vaults immediately adjacent to the Substation. Oil spill response contractors arrived on-site and began recovering free product from the vaults. These activities were conducted the day of the spill. (Exhibit B)

3.0 INITIAL ABATEMENT, REMEDIAL ACTIONS, AND WASTE DISPOSAL

- Mr. Mark Miller, Virginia Department of Environmental Quality (VDEQ) PREP Coordinator, was notified via voicemail at approximately 1300 hrs on 1/24/16. Phone contact was made with Mr. Miller shortly, thereafter. Dominion's Regional Operations Center notified Arlington County.
- HEPACO, Inc., Fredericksburg, VA and Woodward Inc., Manakin-Sabot, VA were notified to respond to the spill. HEPACO, Inc. arrived at the site at approximately 1330 hrs on 1/24/16. Woodward Inc. arrived at the site at approximately 0900 hrs on 1/25/16. HEPACO, Inc. and Woodward Inc. performed the remainder of the abatement and remedial activities on behalf of Dominion. Dominion personnel remained on-site to provide continued environmental and safety oversight throughout the entire clean-up process.

Free Product Removal

- Impacted electrical vaults were initially pumped empty of oil and water. Inspection of the vaults and pumping, when necessary, is ongoing. The accumulation of oily water in the vaults has significantly diminished. As of 2/26, only a light sheen has been visible in standing water in the vaults. These vaults and associated cable ducts will be cleaned in conjunction with a project to replace the oil impacted electrical cables. This project will run concurrently with returning the Substation to normal operation over the next several months.
- Stormwater flow within the Substation infiltrates a drain tile system connected to a 12" discharge pipe. This buried pipe carries stormwater from inside the Station to an Arlington County stormdrain drop inlet located in the sidewalk in front of the Facility. Access to this drop inlet was accomplished on 1/25 after removing snow that had been piled on top during the City's recent snow removal efforts prior to the spill. No oil was observed in this drop inlet. Sorbent materials were placed in the drop inlet to provide containment should any snow melt from inside the Station carry oil into the Station drainage system. Subsequent inspections on 1/26 and the morning of 1/27 showed no visible signs of oil. EPA (Charlie Fitzsimmons) and DEQ (Joe Glassman) representatives attended these inspections. On 1/25 EPA (Charlie Fitzsimmons, On Scene Coordinator) suggested the National Response Center be notified due to the potential for oil to enter the stormwater system. This notification was made at approximately 1300 hrs on 1/25.

- In the afternoon of 1/27, DEQ (Mark Miller) visited the site and inspection of the drop inlet in front of Station found a small amount of oily emulsion contained by the sorbent materials. This emulsion was removed by vacuum truck. Arlington County was contacted to assist with the inspection of downgrade stormdrain drop inlets and to help determine the location of the area stormwater system discharge point. No oil was observed in the downgrade drop inlets. The system discharge point was indicated to be at Roaches Run. Due to the snow, we were unable to access the Roaches Run outfall until 1/28. No visible signs of oil were observed. The stormwater drainage system for the Substation, along with the oil containment systems for the transformers, are being redesigned to remove the potential for oil to enter the stormwater drainage discharge pathway. Construction efforts are underway to make these changes.
- No oil has been observed during the daily inspections of the Roaches Run stormwater outfalls, subsequent to the observation of the small oil emulsion in the stormdrain drop inlet in front of the Station (Exhibit C).
- Inspection and recovery of observed oily water from the vaults will continue until the electrical cable vaults and duct systems are cleaned in conjunction with electrical cable replacements.
- Inspection and recovery of any observed oily water from the stormwater drop inlet in front of the Substation will continue until the above mentioned construction of the stormwater drainage and transformer containment re-designs are completed.
- Based on daily estimates, approximately 11,120 gallons of free product was collected from the damaged transformer, the electrical vault system and other areas inside the Substation. In total, approximately 32,770 gallons of oil, oil/water mixture and approximately 250 pounds of spent absorbents were collected for disposal. Collected liquids and drums of spent sorbents were transported to HEPACO's facility in Fredericksburg, VA to await proper disposal. Disposal manifests are included in Appendix C.

Soil Removal

- Between 1/24/16 and 2/2/16, visibly impacted gravel/soil was excavated from multiple areas within the Substation (Exhibit D). Based on visual observations, no impacted soil outside the confines of the Substation were encountered. On 2/1/16, prior to backfilling the area in preparation for the transformer removal, confirmatory soil samples were collected to determine if the excavated areas of the substation were satisfactorily clean. Confirmatory sample results ranged from <10 ppm Diesel Range Organics (DRO) to 718 ppm DRO. Excavated areas were backfilled with clean stone. (Exhibit E). The analytical results can be found in Appendix D.

- Approximately 229 tons of impacted soil and stone were removed for proper disposal. Disposal Manifest can be found in Appendix C.

Summary

Estimated quantity of oil spilled –	~13,500 G
Free product recovered (includes oil removed from unit) -	~11,120 G
Oil entrained in removed soil\gravel and walled area #3 stone fill -	~1,967 G

4.0 REMEDIATION ASSESSMENT/ADDITIONAL ACTIONS

- Visual indications of the spill impact were evident in the gravel and on the surface of the underlying clay. The removal of this contaminated media by excavation, to a depth that ranged from a few inches to over 3 ½ feet, appeared to be sufficient to achieve a clean-up down to visibly clean soil. Visual and olfactory senses, along with DRO lab analysis, were used to confirm that adequate clean-up had been achieved. While the actual depth to groundwater at this location is unknown, no groundwater was encountered during the excavation of any impacted areas. Based on the initial abatement and remedial activities undertaken to remove impacted soil from the Substation, this portion of the spill has been satisfactorily cleaned up and no long term adverse environmental effect is believed to remain that would require additional removal actions.
- During the spill event, oil migrated into a cable trough that contains control wiring for the electrical equipment within the Substation. This trough consists of concrete panel sides embedded in underlying clay soil. The bottom of the trough consists of a layer of 6-8 inches of coarse sand/gravel mixture spread over the clay bottom between the panels to support the control cables. Insulated cables and wire that control all aspects of the operation and monitoring of the electrical functions of the substation are laid on top of the supporting media. The configuration of the cable trough is such that during the initial release of oil, this trough acted as a pathway that backed up the flow and allowed oil to infiltrate the sand mixture through gaps in the concrete outside panels. Removal of contaminated sand mixture was accomplished with a vacuum truck. The logistical and safety problems associated with relocating the control wiring to effect complete removal of the sand media without damaging the cables is prohibitive. While mineral oil dielectric fluid will degrade naturally over time, Dominion proposes the use of a petrophillic microorganism solution, Micro-Blaze® (or similar), be applied to the remaining sand media (~450 sq. feet) in the cable trough to enhance and speed up the natural degradation process of the mineral oil. The Micro-Blaze® will be mixed with clean water per the manufacturer's instructions and applied to the impacted areas of the cable trough utilizing a small hand held pump sprayer. A similar process was successfully used at another Dominion substation with the approval of the Northern Region VDEQ Office. This approach would be the most effective, non-destructive method, to remediate the cable trough media. Pre-treatment samples of the media will be collected to determine starting contamination levels. Post-treatment sampling will be periodically conducted to monitor the status of degradation. Product information and the Material Safety Data Sheet (MSDS) for Micro-Blaze® is included in Appendix E.

- Oil from the spill migrated into the electrical underground cable distribution system associated with the Substation. This system consist of a series of underground concrete vaults of varying sizes through which insulated electrical cables pass to distribute electrical service to the surrounding area. These vaults contain no drains and are interconnected by a series of concrete encased duct (conduit) banks which provide a pathway for the cables from vault to vault. The impacted vaults include the two large vaults within the Substation and three additional vaults located immediately adjacent to the north, south and east outside walls of the Substation. Inspections of downgrade connecting vaults have found no evidence of oil intrusions. Oil from the spill remains in this closed system from the coating of interior portions of the vaults and duct bank piping, as well as the coating of the insulated cable inside the duct banks. Reliability concerns will require that the impacted cable be replaced. During this process the impacted vaults and associated duct bank piping will be cleaned. A contractor will be utilized to perform the cleaning and will collect for proper disposal all rinse water and sorbents. This project will be worked in conjunction with returning the Substation to normal operation over the next few months. Vaults associated with this system will continue to be periodically inspected, and accumulated impacted water removed, until final cleaning has been completed.