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EPA ID #: VAD046960449
Last Updated: 12/15/2008

Current Progress at the Site

Extensive progress has been made with the evaluation of the BWX Technologies, Inc. (BWXT) Mt. Athos Site in Campbell County, Virginia. This facility is approximately 50-years old and is located on the James River near Lynchburg, Virginia.

In 1986, BWXT identified volatile organic compounds (VOCs) in a groundwater monitoring well at their Mt. Athos site. The primary VOC found was trichloroethylene (TCE), which was used as a degreasing solvent. BWXT subsequently notified regulatory agencies and initiated a program of groundwater monitoring to better define the extent of VOC contamination. This program involved the installation of 36 groundwater-monitoring wells and quarterly monitoring of these wells for VOCs. In addition, BWXT sampled drinking water wells on site and on adjacent properties for VOCs, and none were detected. BWXT has since eliminated the use of TCE as a degreasing solvent and has made substantial improvements to its waste management program. BWXT drinking water wells were monitored for VOCs on a regular basis until they were abandoned in 2004.

On September 27, 1991 BWXT executed an Administrative Consent Order with the Environmental Protection Agency (EPA) Region III to perform corrective action at the Mt. Athos site in accordance with the Resource Conservation and Recovery Act (RCRA). The Consent Order specifies that BWXT perform a RCRA facility investigation (RFI) at the Mt. Athos site to define the nature and extent of any releases of past raw products or wastes, and perform a Corrective Measures Study (CMS) to identify and evaluate alternatives for corrective action.

On August 30, 1996 the final RFI report was completed and submitted to EPA Region III. EPA Region III subsequently approved the final RFI Report on September 13, 1996. The RFI report identifies three separate groundwater plumes (A, B, and C) that are contaminated with trichloroethylene (TCE), tetrachloroethylene (PCE), and related degradation constituents at concentrations greater than drinking water standards.

From 1993 through 1995, BWXT initiated three remediation pilot studies to test different corrective action technologies for treatment of VOCs in groundwater and in soils at the site. These consist of: (1) a soil vapor extraction (SVE) system for removal of VOCs from soils in the main source area, (2) a groundwater pump and treatment system for controlling and reducing the size of the center of the main plume, and (3) an air injection system to reduce the VOC concentrations in the plume near the James River. After a trial study period, BWXT determined that the SVE system was the only pilot system that was effectively achieving its objectives. As a result, the SVE system remained in operation, while the operations of the other two systems were discontinued. The SVE system is currently operating at the site.

BWXT performed a Supplemental Soil Gas Survey to resolve an EPA concern related to elevated TCE groundwater concentrations in a portion of Plume A near the James River. The supplemental Soil Gas Survey Report was submitted to the EPA in September 1998, in which BWXT concluded that the TCE concentrations in this area were not the result of a TCE source area near the River, but were most likely due to a localized upwelling of TCE contaminated groundwater.

In September 1997, BWXT submitted a CMS based on Monitored Natural Attenuation (MNA) of groundwater plumes A, B, and C. To support MNA, EPA Region III requested that BWXT conduct a study of the James River surface water and sediments to determine if the VOCs present in groundwater discharging to the River pose a threat to human health or the environment.

In the spring of 1998, EPA Region III determined that the BWXT site did not qualify for MNA as the sole means for site remediation. EPA Region III also determined that traditional corrective measures could not be evaluated without first determining the areas that may have been impacted by VOCs present in the groundwater plumes. The potential impact areas include river water and river sediment. At the request of the U.S. Fish & Wildlife Service, a mussel survey was also required to investigate the River habitat for the endangered James River Spiny mussel.

The results of the initial fieldwork indicated that there was minimal sediment in the James River at the Mt. Athos site. Due to the paucity of available sediment for study, EPA Region III and BWXT selected the Rapid Bioassessment Protocol III (RBP III) for evaluating impact to the River. The RBP III involves a survey of benthic organisms, and is a good indicator of whether any of the VOC plumes are impacting the River. The RBP III fieldwork was completed on November 24, 1998.

The results of the RPB-III Study and the James River Spiny mussel Survey were submitted to the EPA in the "James River Instream Study" on April 1999. The RBP-III results indicated that near shore benthic communities adjacent to the BWXT site were not affected. Furthermore, there was no evidence of the endangered James River Spiny mussel in the River adjacent to the BWXT site. The survey area was generally unsuitable to support any significant population of native fresh water mussel. The study concluded that the natural flow of groundwater into the James River from the BWXT Mt. Athos Site does not pose an ecological risk to the River. For human health, this portion of the James River is currently classified as a Class II surface water body, which means the surface water body is not designated for drinking water use. The levels for the Constituents of Concern (e.g. TCE) were below the Federal Water Quality Criteria for a surface water body not designated as a source of drinking water.

In June 1998, BWXT began dewatering an inactive emergency pond (IEP) in support of a Nuclear Regulatory Commission (NRC) timeliness and decommissioning action. BWXT subsequently decided to evaluate the temporary IEP dewatering system as a potential corrective action technology for contaminated groundwater in Area A. In February 2001, BWXT submitted the "RCRA Corrective Measure Alternative Evaluation" that assessed the effectiveness of the dewatering system in cleaning up groundwater. In the study, BWXT concluded that the dewatering system was effectively removing TCE from groundwater and recommended installing a permanent system. After EPA approval, the installation of a permanent groundwater collection and treatment system was completed in March 15, 2001, and the system is currently in operation.

On December 15, 2000, BWXT completed two "Documentation of Environmental Indicator (EI) Determinations", one for "Current Human Exposures Under Control" and one for "Migration of Contaminated Groundwater Under Control". The EIs are a means of evaluating and reporting on the acceptability of current site conditions. Following EPA guidance for evaluation of the EIs, BWXT asserted in the determinations that both (1) current human exposures are under control and (2) the migration of contaminated groundwater is under control at the Mt. Athos site. The first EI indicates that there are no unacceptable human health risks at the site. The second EI indicates that the migration of contaminated groundwater at the site has stabilized, and that groundwater discharges to surface water are currently acceptable. EPA subsequently concurred with BWXT's evaluation of the EI determinations. The achievement of these EIs represents an important interim milestone in the RCRA corrective action process.

BWXT and EPA agreed to a modified CMS that will involve a long-term alternative screening study of the two corrective action technologies in operation at the site. In support of the alternative screening study, BWXT agreed to develop a site-monitoring plan to evaluate the long-term effectiveness of the SVE system and the IEP groundwater pump and treatment system in meeting cleanup objectives. The site-monitoring plan will also define the environmental data

to be collected to ensure that site contamination continues to pose no risk to human health or the ecology of the James River.

In April 2001, as a first step in the development of the site-monitoring plan, BWXT submitted the "Comprehensive Baseline Monitoring Plan". This plan provided for a comprehensive sampling and analysis of all groundwater wells within Areas A, B, and C. The groundwater data collected from this study were used to establish baseline groundwater conditions at the site, and to select the long-term monitoring wells for the site-monitoring plan. In support of the site-monitoring plan, BWXT constructed and developed six new "sentinel" groundwater monitoring wells in May 2001, three each in Area A and Area B. These new wells were located directly adjacent to the James River in Area A and B within areas of expected locally high VOC concentrations based on previous soil gas, groundwater, and surface water data. The wells were located in these areas to monitor groundwater conditions as close to the groundwater/surface water interaction zone as possible. The sampling of all groundwater wells, including the new sentinel wells, was completed in August 2001.

The analytical results from the August 2001 groundwater sampling were presented in the "Comprehensive Baseline Monitoring Report" issued in February 2002. The primary findings of the report included: (1) the size and shape of the groundwater plumes in Areas A, B, and C have remained relatively constant over time, (2) the total mass of TCE in Areas A and C have decreased over time, (3) intrinsic biodegradation processes are contributing to the decrease in solvent concentrations in groundwater, and (4) current groundwater concentrations at the site confirm EPA's EI determinations in 2000. The report recommended that groundwater samples should be collected in Areas A, B, and C on an annual basis, and further proposed a set of wells in each area to be included in the annual sampling event. The report also recommended that surface water samples be collected near the bank of the James River in Area A to confirm that the results of the November 1998 RBP III are still valid. EPA reviewed the report, and in June 2002 accepted the recommendations of the report with some modifications to the monitoring well network. The final list of monitoring wells to be utilized in the annual sampling program include 32 wells in Area A, 15 wells in Area B, and 19 wells in Area C.

In November 2002, BWXT completed groundwater and surface water sampling for the 2002 annual sampling event at the locations designated in the Comprehensive Baseline Monitoring Report. The draft report was submitted for EPA review in June 2003. The 2003 groundwater sampling event commenced in May 2003.

In May 2001, BWXT discovered the presence of PCE and TCE in groundwater at a former landfill, designated as Landfill 1, at the Mt. Athos site. Landfill 1 was used by BWXT from 1973 to 1977 for the disposal of solids generated from the treatment of industrial wastewater from the Nuclear Products Division non-radioactive pickling process. The solids were buried in trenches defined by a previous investigation at the landfill in May 1999 to support an NRC timeliness and decommissioning action. BWXT submitted a "Data Summary Report for Landfill 1" to EPA in May 2001 that summarized the groundwater data at the landfill. In conjunction with the Data Summary Report, BWXT also submitted a "Work Plan for Environmental Assessment at Landfill 1" that established a recommended approach for investigating the VOC contamination at the landfill. The work plan detailed a two-phase study, involving a soil gas survey to map VOC concentrations in soil gas above the contaminated groundwater, followed by a sampling program to define areas of VOC contamination in soil and groundwater.

After EPA approval of the Landfill 1 work plan, BWXT initiated the soil gas survey in June 2001. BWXT submitted a "Soil Gas Survey Report" to EPA in September 2001 presenting the results of the survey. The soil gas survey identified the areas of VOC contamination in soil gas that were the focus of the subsequent soil and groundwater investigation at the landfill. Before the second phase of the investigation began, BWXT modified the work plan to include the sampling and analysis of the wastewater treatment solids deposited in the landfill. The second phase of the investigation was performed in September 2001. The results of the second phase demonstrated that the concentrations of VOCs detected in the landfill solids and the surrounding soil were insignificant. Although VOCs were detected in the groundwater samples, the concentrations were significantly lower than those reported in the previous monitoring well data.

As a result, the work plan was modified in November 2001 to employ an alternate well drilling technique that was expected to provide more consistent groundwater results.

The Landfill 1 groundwater investigation resumed in November 2001 using the alternate drilling approach. During this field effort, landfill solids were encountered in drilling a temporary monitoring well outside the boundaries of the previously defined landfill trenches. As a result, the groundwater investigation was not completed at this time. BWXT submitted a "Supplemental Assessment Report" for Landfill 1 to EPA in December 2001 detailing the results of the landfill investigation up to this point. BWXT also initiated a new investigation of the landfill in December 2001 to redefine the boundaries of the landfill trenches. This investigation discovered the existence of two additional, smaller trenches to the west of the six previously known trenches.

The groundwater investigation at Landfill 1 resumed again in January 2002 with the construction of the remaining temporary monitoring wells specified in the work plan. After the additional wells were completed, all the temporary and permanent wells at the landfill were sampled and analyzed for VOCs.

The results of the January 2002-groundwater investigation were presented in a report entitled "Groundwater Assessment at Landfill 1", issued in April 2002. The report indicated that a solvent plume is present around the landfill, consisting of primarily PCE, and its degradation products. The PCE plume appears to be centered near a monitoring well to the southeast of the landfill trenches. The Landfill 1 plume does not intersect the James River. The report proposed that a number of the temporary wells be converted to permanent monitoring wells and that some new permanent wells be constructed to better define the lateral extent of the plume. EPA reviewed the report, and in June 2002 accepted the recommendations of the report with some modifications to the monitoring well network. The final list of wells will bring the number of permanent monitoring wells around Landfill 1 to 14 wells. The new monitoring wells were constructed and the temporary wells converted to permanent wells at Landfill 1 in July 2002. All Landfill 1 monitoring wells were sampled in January 2003. The analytical results will be presented in the addendum to the 2003 groundwater monitoring report for Areas A, B, and C. The Landfill 1 wells were included in the 2003 groundwater-sampling event for Areas A, B, and C, and will be sampled on the same schedule as the other site monitoring wells in the future.

In May of 2005, BWXT submitted a draft "In Situ Remedial Technology Evaluation" to look at different technologies in targeting the source area within the "A" Plume. Reducing contamination in the source area will speed up the groundwater clean-up. EPA approved the Evaluation report in November 2005. BWXT submitted a "Pre-Design Source Target Area Workplan in October 2006. This Workplan will look at characterizing the source area before the actual in situ chemical oxidation pilot is conducted. Characterization took place in early 2007. BWXT notified EPA that based on the initial characterization, in situ chemical oxidation would not be effective. On May 8, 2008, BWXT submitted a Draft Workplan for the Source Target Area, which calls for enhanced anaerobic bioremediation. The draft workplan calls for a pilot test initially, using an emulsified vegetable oil. EPA approved the plan in July 2008.

Site Description

The BWX Technologies, Inc. (BWXT) Mt. Athos site is located near Lynchburg, Virginia on a 560-acre site adjacent to the James River in the northeast corner of Campbell County. The Mt. Athos site consists of the following three facilities: the BWXT Nuclear Products Division (NPD) and the Lynchburg Technology Center (LTC) headquarters of BWX Technologies Inc., an operating unit of McDermott International; and the Framatome ANP (formerly B&W Fuel Company [BWFC]), an operating unit of the French nuclear company, Framatome. The NPD is a manufacturer of nuclear components for government agencies and the U.S. Department of Energy (DOE). In addition, the NPD operates a uranium recovery facility and a uranium downblending facility. The LTC is the headquarters of BWX Technologies Inc. and houses several BWXT Services, Inc. (BWXS) laboratories. Framatome ANP supports the maintenance

and refurbishment of equipment to service commercial nuclear reactors.

Site Responsibility

RCRA Corrective Action activities at this facility are being conducted under the direction of EPA Region III with assistance from the Commonwealth of Virginia.

Contaminants

The complete list of contaminants of concern identified in the RFI include TCE, PCE, bromoform, chloroform, methylene chloride, cis-1,2-dichloroethylene, trans-1, 2-dichloroethylene, trichlorofluoromethane, and vinyl chloride. No immediate threats to human health or the environment have been identified.

Community Interaction

The BWXT Mt. Athos Site borders the James River on a relatively secluded 560-acre site. The nearest community is located within 5 miles of the facility. Public interest in the project has so far been minimal. No public meetings have been required to date.

Institutional Controls

No institutional controls are currently in place.

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For more information about EPA's corrective action web page, including Environmental Indicators, please visit our site at: www.epa.gov/reg3wcmd/correctiveaction.htm

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