Final

Five-Year Review Report
Bay Head Road Annex
IR Program Site 1

Former Naval Surface Warfare Center
Carderock Division
Annapolis Detachment

Contract Task Order 0024

April 2010

Prepared for

Naval Facilities Engineering Command
Washington

Under the

AGVIQ–CH2M HILL JV III Program
Contract N40080-07-D-0301

Prepared by

Chantilly, Virginia

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LIST OF ACRONYMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Contaminants of Potential Concern
CSF	Cancer Slope Factor
CTA	Children's Theatre of Annapolis
DDD	Dichloro-diphenyl-dichloroethane
DDE	Dichloro-diphenyl-dichloroethylene
DDT	Dichloro-diphenyl-trichloroethane
DOD	Department of Defense
EBS	Environmental Baseline Survey
EPA	U.S. Environmental Protection Agency
ERC	Ecological Risk Characterization
FOST	Finding of Suitability to Transfer
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IR	Installation Restoration
JMWA	J.M. Waller Associates, Inc.
MDE	Maryland Department of the Environment
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NSWC	Naval Surface Warfare Center
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose Factor
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SI	Site Inspection
TBC	To Be Considered
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound

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Navy Five-Year Review Signature Cover
Key Review Information

SITE IDENTIFICATION		
Site name: Bay Head Road Annex, IR Program Site 1, Former Naval Surface Warfare Center – Carderock Division, Annapolis Detachment		
EPA ID: MD 3170000167		
Region: 3	**State:** MD	**City/County:** Annapolis/Anne Arundel County

SITE STATUS	
NPL status: Not on the NPL	
Remediation status (choose all that apply): Complete (Institutional controls)	
Multiple Operational Units?: No	**Number of Sites/OUs:** 1/Not Applicable
Construction completion date: Not Applicable	
Fund/PRP/Federal Facility Lead: Federal Facility	**Lead Agency:** Department of the Navy, Naval Facilities Engineering Command Washington
Has site been put into reuse?: Yes	

REVIEW STATUS	
Who conducted the review (EPA Region, State, Federal Agency): Naval Facilities Engineering Command Washington	
Author name: David Steckler	**Author title:** Remedial Project Manager
Author affiliation: Department of the Navy, Naval Facilities Engineering Command Washington	
Review period: December 2004 – December 2009	
Date(s) of site inspection: June 25, 2009	
Highlight: Statutory	
Policy type: Ongoing	
Review number: 2	
Triggering action: Signing of Previous Five-Year Review Report	
Triggering action date: May 24, 2005	
Due date ***(five years after triggering action date)*****:** May 24, 2010	

Five-Year Review Summary Form, cont'd.

Issues:

None.

Recommendations and Follow-up Actions:

None.

Protectiveness Statement(s):

The remedy of institutional controls (deed restriction; residential use prohibited) for the former Bay Head Road Annex is protective of human health and the environment. The remedy is functioning as intended. The current and expected future land use as a public park is consistent with the institutional controls established for the site. The exposure assumptions and toxicity data used at the time of the final remedy selection are still valid. No other information has been identified that could call into question the protectiveness of the final remedy.

Other Comments:

None.

Next Review:

The next Five-Year Review for the former Bay Head Road Annex will be completed within five years of the signature date of this report.

Signature of U.S. Department of the Navy and Date:

Captain Ramè Hemstreet
Commanding Officer
Naval Facilities Engineering Command Washington

18 Feb 10
Date

Robert F. Lewandowski
BRAC Environmental Coordinator
BRAC PMO Northeast

4 Mar 2010
Date

EXECUTIVE SUMMARY

This document presents the findings of the Second Five-Year Review Report for the Installation Restoration (IR) Site 1, Bay Head Road Annex, Naval Surface Warfare Center (NSWC) – Carderock Division, Annapolis Detachment located in Anne Arundel County in Annapolis, Maryland. The final remedy for the site consisted of an institutional control in the form of a deed restriction, which prohibited permanent residential land use in order to protect human health.

The remedy of institutional controls (deed restriction; residential use prohibited) for the former Bay Head Road Annex is protective of human health and the environment. The remedy is functioning as intended. The current and expected future land use as a public park is consistent with the institutional controls established for the site. The exposure assumptions and toxicity data used at the time of the final remedy selection are still valid. No other information has been identified that could call into question the protectiveness of the final remedy.

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1.0 INTRODUCTION

This document presents the results of the Second Five-Year Review Report, undertaken to determine whether or not the final remedy at the former Bay Head Road Annex, IR Site 1, NSWC – Carderock Division, Annapolis Detachment, Annapolis, Maryland is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports.

The Navy prepared this Five-Year Review Report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states the following:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The United States (U.S.) Environmental Protection Agency (EPA) clarified this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.*

On behalf of Naval Facilities Engineering Command (NAVFAC) Washington, CH2M HILL, conducted this Five-Year Review in response to Task Order 0024 under Contract Number N40080-07-D-0301. Representatives of CH2M HILL conducted a site inspection on June 25, 2009. This report documents the results of the Five-Year Review process.

This is the second Five-Year Review Report prepared for the former Bay Head Road Annex. The review was conducted in accordance with the EPA *Comprehensive Five-Year Review Guidance* (EPA, 2001) and Navy policy (Department of the Navy, 2001a). A summary of the previous Five-Year Review Report completed for the former NSWC Annapolis is provided below:

- First Five-Year Review Report: Completed by J.M. Waller Associates, Inc. (JMWA) on behalf of NAVFAC Washington in December 2004 (Navy signature on May 24, 2005). The report noted the site-wide deed restriction prohibiting residential land use. The report concluded that the

remedy was functioning as intended by the ROD. The report also concluded that the remedy was protective of human health and the environment. Although the report listed three issues as safety hazards found in the site inspection, no issues were identified related to site operations or implementation of identified remedy. The report recommended that the Navy or Anne Arundel County (Maryland) address and fix the three safety issues.

The triggering action for this statutory review was the signing of the First Five-Year Review Report on May 24, 2005. The review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

After World War II, the Army recognized the need for an air defense system capable of engaging high-speed, maneuverable targets. In 1945, the Army initiated a research and development program for the Nike I defensive missile system to protect major metropolitan areas and strategic military installations from aerial attack. During the mid-1950s, the Department of the Army purchased the parcel of land to be used as a Launch Area in the Nike Missile Defense System for the cities of Annapolis and Washington, DC.

The Bay Head Road Annex Launch Area, designated W-26 Nike Battery, was used by the Army for Nike missile defense operations from 1954 until 1969. Maintenance activities by the Army during that sixteen-year period required the storage, handling, and disposal of missile components and propellants as well as solvents, fluids, fuels, and other materials necessary for operations and maintenance. Hazardous materials and waste were commonly generated at Nike missile sites and often disposed of onsite.

Several former Nike missile site structural features remain onsite, including one former missile launching pad and separate fueling, generator, assembly, storage, and wastewater disposal areas. The missile launching pad consists of one concrete structure, approximately seventeen feet deep, which was used to store the missiles.

After Nike Battery deactivation, the Facility was used by the Navy to conduct burn tests to determine heat resistant properties of materials for use onboard Navy ships. Materials were burned in a concrete pit and analyzed for off-gas production and fire hazard potential. The Navy's operations at the Facility ended in the late 1990s. In 1999, a company called the Children's Theatre of Annapolis (CTA) officially became a tenant from the Department of Defense (DOD) and used the former Navy buildings for set construction and storage.

At the time of the site inspection from the First Five-Year Review in March 2004, nearly all of the Facility had been developed, cleared of trees, and only a small portion remained covered in natural vegetation. Facility access was restricted by fences, but there was access to areas formerly used by the Army and the Navy. Separate areas existed for recreational activities with two baseball fields, a picnic pavilion, and a restroom/locker room located in the southern portion of the Facility. A septic system was located between the ball fields. This septic system, which included drain and leaching fields, served the pavilion between the two baseball fields.

Since the last Five-Year Review, the construction of the main stage building of the children's theater has been completed. These facilities are used at various times throughout the year for performing plays and holding workshops, camps, and auditions. The first demolition of several former Navy buildings began in November 2006. In total, nine buildings, two former missile launching pads, the pavilion, septic field, burn pad, and evaporation pond have all been demolished and/or removed from the property.

Specifically, the two former missile launching pads have been covered to form a parking lot for the children's theater. The pavilion between the former baseball fields has been removed. The baseball fields and former septic field have been replaced by three soccer fields. Old fencing

along the western boundary of the property has been replaced by new fencing. The soccer fields began development in Spring 2008 and were completed in September 2008. Permanent light structures were built in April 2009. Current construction, including leveling and grading, is taking place to install a walking/bike path through the park. Future plans include installing a concessions stand by renovating a former Navy building and constructing a children's playground.

The review period for the first Five-Year Review Report began in March 2001 and was completed in May 2005. The date of the Site Inspection was March 22, 2004. The report was completed and officially signed May 24, 2005.

The review period for this second Five-Year Review Report is from May 2005 to May 2010. The date of the Site Inspection was June 25, 2009. Table 2-1 summarizes the complete site chronology.

TABLE 2-1

CHRONOLOGY OF SITE EVENTS
BAY HEAD ROAD ANNEX
ANNAPOLIS, MARYLAND

Event	Date
Bay Head Road Annex Launch Area, designated W-26 Nike Battery, was used by the Army for Nike missile defense operations	1954 - 1969
Property transferred from Army to Navy	1971
Navy conducted research related to burn testing	1972 – 1981
Property used as equipment/supply storage facility	1981 – 1985
Two Preliminary Assessment (PA) Reports were prepared for the Navy	1985 and 1990
Navy conducted a Site Inspection (SI) in accordance with the recommendations identified in the 1990 PA	1991
Phase I Environmental Baseline Survey (EBS) was performed	1995
Children's Theatre of Annapolis becomes tenant of property	1999
Remedial Investigation (RI) was performed	2000
Record of Decision (ROD) completed and signed	2001
Finding of Suitability to Transfer (FOST) completed and signed	2001
Facility transferred from the Department of Defense to Anne Arundel County	2004
First Five-Year Review Completed and Signed	
Demolition and removal of former Navy buildings began	2006
Construction of auditorium for the Children's Theatre of Annapolis completed	2008
Three soccer fields installed on property	2008
Permanent light structures installed for soccer fields	2009
Construction of new walking/bike path	Current

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3.0 BACKGROUND

3.1 PHYSICAL CHARACTERISTICS

The former Bay Head Road Annex site consists of a tract of land approximately twenty-four acres in size, located on the peninsula between the Magothy and Severn Rivers, less than two miles from the Chesapeake Bay. Figure 3-1 shows the location of the Bay Head Road Annex in relation to the surrounding area. The topographic relief across the property is approximately fifteen feet, ranging from thirteen to twenty-eight feet above mean sea level (msl). The lowest elevations are in the northeast portion of the site, which borders an unnamed tributary to the Little Magothy River. The highest elevations are found in the eastern portion of the property centered on the three former missile magazines. The property is relatively flat but has a gradual decrease in grade to the northeast, coinciding with the unnamed tributary noted above. Two north-trending, shallow, grass-lined swales provide surface water drainage. The western swale encircles the former septic system and drains to the north where it intersects with an east-trending swale that discharges to the sodded area along the northern property boundary. The eastern swale is less pronounced and discharges both along the eastern and northeastern property boundaries.

The property is underlain by interbedded clay, silt, and sand, identified as the Talbot Formation (Department of the Navy, 2001b). Depth to groundwater varies from 16 feet in the southeast portion of the site to 9 feet in the northwest. Flow is toward the unnamed stream at an estimated velocity of 0.48 feet per day (Department of the Navy, 2001b).

3.2 LAND AND RESOURCE USE

Residential areas to the north and west surround the former Bay Head Road Annex. U.S. Routes 50 and 301 are located south of the site with undeveloped land, residential areas, and Sandy Point State Park to the east. Current land use at the property is recreational as it is a public park. There are three soccer fields used by youth athletic teams and permanent lighting structures around the fields. There are no residences on the property, nor are there plans for future residential use. Figure 3-2 shows a layout of the property using the aerial imagery from 2007. Figure 3-3 shows the aerial imagery with the property boundaries and several highlighted areas.

There are no permanent water bodies at the site. Surface water runoff from the site is directed to the storm water drainage system with discharge to the drainage basin of the Little Magothy River and ultimately to the Chesapeake Bay.

3.3 BASIS FOR REMEDIAL ACTION

The need for remedial action at the former Bay Head Road Annex was based on site history, the nature and extent of contamination, and the results of human health and ecological risk assessments. Each of these is discussed in the following sections.

3.3.1 History of Contamination

Two Preliminary Assessment (PA) Reports were prepared for the Facility in 1985 and 1990 by the Navy. The PAs identified potential locations of contamination (e.g., missile assembly building, missile fueling and war heading area, transformer locations, magazine drainage area, septic system, possible disposal areas, etc.). Test results of soil and sediment sampling from the 1985 PA revealed low levels of toluene, a common degreasing solvent, and the pesticide Dichlorodiphenyltrichloroethane (DDT) and its breakdown products Dichloro-diphenyl-dichloroethane (DDD) and Dichloro-diphenyl-dichloroethylene (DDE) in several of the samples collected. The results of the 1985 groundwater sampling revealed low concentrations of oil and grease in one of the two samples collected. The 1990 PA concluded with recommendations for further evaluation in accordance with the Superfund Site Assessment process. Therefore, the Bay Head Road Annex facility was officially established as IR Site 1, and a Site Inspection (SI) was scheduled under the Navy's IR program.

In 1991, the Navy conducted an SI in accordance with the recommendations identified in the 1990 PA to evaluate potential groundwater, surface water, sediment, and soil contamination. The SI concluded that low levels of inorganic metals and organic contaminants were present in soil, sediment, surface water and groundwater at the site. The analytical results for metals in surface soil samples were compared with published background concentrations, and were reported at levels that did not exceed background ranges established by the U.S. Geological Survey (USGS). The organics, specifically the polycyclic aromatic hydrocarbons (PAHs), were within ranges representative of urban areas; therefore, a Remedial Investigation (RI) was not recommended due to the low concentrations reported, and the lack of an active source of contamination.

A Phase I Environmental Baseline Survey (EBS) was conducted in 1995, as the site was scheduled for closure under the Base Realignment and Closure (BRAC) IV program. The purpose of the Phase I EBS was to assess the existing environmental information related to storage, release, treatment, or disposal of hazardous substances or petroleum products and to document the environmental condition of the property. The septic system located near the center of the site was identified in the EBS as an Area of Concern (AOC) due to the potential introduction of metals from the overflow of a thermal metal coating process used by the Navy. A further assessment was deemed necessary to determine the nature and extent of potential contaminants on site and if current and future exposures to the contaminants posed human and/or ecological risks based on the proposed recreational land use.

An RI was recommended at that time to further assess the septic system and the surrounding environment. The RI consisted of sampling surface and subsurface soil, sediment, and groundwater. An assessment of the inactive septic system was also conducted, including collection of sludge and leaching well soil and water samples. Analytical sample results were compared to the EPA's Region III Risk-Based Concentrations (RBCs) and ecologically-based screening values. RBCs were developed using highly conservative exposure scenarios suggested by the EPA and the best available toxicological data. They represent conditions that are protective of human health. The ecologically-based screening values are designed to be protective of animal organisms.

Description of Contamination

A number of preliminary human and ecological chemicals of potential concern (COPCs) were identified in the RI after screening the analytical results against the identified human and ecological risk screening criteria. Organic and inorganic compounds with concentrations that exceeded the human and ecological risk screening criteria were identified as COPCs and the corresponding sample locations were plotted on a site drawing. Since the highest chemical concentrations are typically found closest to the source, sample concentrations were evaluated with respect to location to identify potential source areas.

Consequently, two potential source areas with elevated human and ecological contaminants were identified: the bermed evaporation pond southwest of the former burn pad with PAHs as a concern for humans, and the surface area in the vicinity of soil sample S-5 with pesticides as an ecological concern. Although elevated levels of some metals and PAHs in individual surface soil samples appeared to be greater than background concentrations (indicating they occurred as a result of site-related activities), no additional source areas were identified.

An evaluation of the potential fate and transport of contaminants was conducted by EA Engineering, Science, and Technology, Inc. (EA). Each contaminant was assessed for its potential for future migration by sediment and soil erosion and leaching from soil by precipitation. Contaminant migration was assessed for groundwater, surface water, and air. In summary, it was determined that contaminants could leach from soil and sediment, and surface water and groundwater could transport contaminants offsite. However, potential down gradient groundwater exposures were deemed low due to the low-level concentrations of the contaminants and the relative immobility of metals and pesticides in groundwater. Contaminant transport in air was not considered a significant pathway due to soil cover, soil type, and general high moisture content.

3.3.2 Summary of Site Risks

A Human Health Risk Assessment (HHRA) and Ecological Risk Characterization (ERC) were conducted as part of the RI to assess the human health and ecological risks that could result if the contamination at the site were not remediated. The HHRA was prepared to evaluate the magnitude of potential adverse effects on human health associated with current or future recreational and residential exposures to site-related chemicals. The ERC was conducted to characterize the potential threats to ecological receptors posed by contaminants at the site.

Human Health Risks

The site was evaluated for potential risks to people who used the site at the time of the assessment as well as people who may use the site in the future. Cancer and non-cancer risks were calculated based on current and future land use at the site, which is recreational. Potentially exposed population groups for the assessment included recreational users, community gardeners, maintenance workers, construction workers, and adult and child residents. The results of the assessment indicated that there were no unacceptable risks to any of these populations. It should

be noted, however, that the residential scenario only included exposure to groundwater and did not include exposure to soil and sediment.

Exposure Assessment

Onsite and offsite recreational users (ages one to five and six to fifteen), community gardeners (children and adults), maintenance workers, construction workers, and adult and child residents (groundwater only) were the potential receptors evaluated in the risk assessment. No unacceptable cancer or non-cancer risks were calculated for the identified receptor populations based on reasonable maximum exposures.

Toxicity Assessment

Carcinogenic risk was calculated based on cancer slope factors (CSFs) developed by the EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of lifetime cancer risk associated with exposure at that intake level. The "upper-bound" reflects the conservative estimate of the risks calculated from the CSFs. Using this approach makes under-estimates of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies of chronic animal bioassays to which animal-to-human extrapolation and uncertainly factors have been applied. No cancer risks in excess of the EPA identified acceptable range of 10^{-4} through 10^{-6} were identified for any receptor population evaluated.

The evaluation of non-carcinogenic effects is based on the Hazard Index (HI), which is the summation of the Hazard Quotients (HQs) for individual chemicals. The HQ is a comparison of chemical-specific chronic exposure doses with the corresponding protective doses derived from health criteria. EPA recommends that remedial actions may be warranted for sites where the HI is greater than 1.0. No non-cancer risks with an HI in excess of 1.0 were identified for any receptor population evaluated.

In summary, no unacceptable cancer or non-cancer risks were calculated for the identified receptor populations based on reasonable maximum exposures.

Ecological Risk Characterization Results

An ERC conforming to Steps 1 and 2 of the eight-step ecological risk assessment process for Superfund was completed to assess potential risks to ecological receptors from contaminant exposure. These steps included a screening-level problem formulation, ecological effects evaluation, exposure estimate, and risk calculation. The results indicated that ecological screening criteria were exceeded for maximum concentrations of seven metals including aluminum, antimony, cadmium, lead, manganese, silver, and zinc; the polychlorinated biphenyl (PCB) Aroclor 1260; and pesticides 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. When mean concentrations were used, six chemicals fell below the screening level, indicating that even slightly elevated analyte concentrations were not widespread at the site. Only the concentration of 4,4'-DDT indicated a potential problem. The highest concentration of 2.7 mg/kg was found at

soil sample S-5, but it was an order of magnitude greater than the values at any other location. This indicated a point source problem that increased potential ecological risk. However, the overall ecological risks were minimal because the value only slightly exceeded the potential risk threshold. Also, the affected area in the vicinity of S-5 was small and represented minimal wildlife habitat. Down-gradient samples were collected and DDT concentrations were non-detectable. The RI revealed little evidence of significant DDT transport via surface water, groundwater, or air.

Therefore, based on these conclusions, no unacceptable ecological risk was identified.

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4.0 REMEDIAL ACTIONS

The results of the human and ecological risk assessments completed for the Bay Head Road Annex revealed no unacceptable levels of risk based on the identified levels of exposure. Given the exposure assumptions developed for the human health risk assessment, the primary remedial action objective was to prevent land use that may permit human exposures greater than those associated with recreational use. Under this remedy, an institutional control as a deed restriction prohibiting future residential development was implemented at the time of property transfer.

The ROD states in Section 9.1 that, "*institutional controls will be implemented to restrict future use of the site to non-residential use. The deed restrictions will be detailed in the FOST.*" The covenant and restriction regarding permanent residential use that was incorporated into the transfer deed from the Finding of Suitability to Transfer (FOST) [Department of the Navy, 2001c] states:

> "*Covenant and Restriction Regarding Permanent Residential Use:*
>
> *GRANTEE is prohibited from using PREMISES for permanent residential purposes. GRANTEE hereby covenants, on behalf of itself, its successors, and its assigns, that no permanent residence shall be constructed or otherwise developed on the PREMISES and that no portion of the PREMISES shall be used as a permanent residence."* (US Navy, 2001a.)

The institutional controls were verified in the transfer deed. Copies of the deed are on file at the Anne Arundel County Courthouse at the Department of Public Land Records.

The selected remedy protects human health by prohibiting future residential use, thereby limiting human exposure to contaminants present at the site.

The selected remedy is in full compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and provides long-term effectiveness and permanence. The selected remedy poses no risk to the community during its implementation.

In accordance with Section 121 of CERCLA, a ROD was issued for the former Bay Head Road Annex in March 2001, which called for the deed restriction outlined in the FOST. This restriction was recorded into the transfer deed. The remedial action is to be reviewed at least once every five years to re-evaluate site conditions, confirm the presence of institutional controls, and determine the need for further remedial action to protect human health.

4.1 SYSTEM OPERATION/OPERATION AND MAINTENANCE

There are no active remediation systems in operation at the former Bay Head Road Annex as the remedy is an institutional control. There have been no operation and maintenance costs incurred to date.

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5.0 PROGRESS SINCE THE LAST REVIEW

This is the second Five-year Review Report for the Bay Head Road Annex. Since the last Five-Year Review, there have been minor land development and construction projects. None of these changes have affected the protectiveness of the remedy.

At the time of the last Five-Year Review in summer 2004, JMWA visited the Anne Arundel County Courthouse in an attempt to obtain a copy of the deed, but was not able to locate it. After further discussions with the Navy it was determined that the deed was with the Department of the Interior and was still in transition of being turned over to Anne Arundel County. At the time of the last report, it had not been determined when Anne Arundel County would obtain the deed. Since then, the property was officially transferred on September 3, 2004 and is currently owned by the Anne Arundel County Department of Parks and Recreation.

Based on the site inspection from the previous Five-Year Review, three access control issues were identified. All three of these issues have either been corrected or deemed acceptable during this review. These three issues are identified below based on the previous site inspection conducted on March 22, 2004:

- The inspection noted that *"there is an opening in the southern fence line that appears to have been used for human entrance and exit onto the property."* The recommended action according to the previous Five-Year Review was to fix the hole in the fence. However, since access controls were not listed with institutional controls and because the property is now a public park, the hole in the fence is no longer an issue that needs to be addressed. It does not affect the protectiveness of the remedy and therefore is no longer a concern.

- During the site inspection, *"one of the missile magazine hatches over one of the Nike missile underground storage areas was open and was not secured behind a fence on the property. This is a physical hazard to anyone who is already on the property; this would include those who use the children's theater on the property."* There was no evidence of this in the most recent 2009 site inspection and the issue has been corrected. It is believed that the underground storage area was filled to become part of the main parking lot.

- *"A portion of the fence surrounding the former launch area is missing thereby allowing easy access to those who use the children's theater on the property."* There was no evidence of this issue in the most recent site inspection. The site inspection confirmed that this issue has also been corrected.

Therefore, there were no issues identified during this Five-Year Review related to site operations or implementation of the remedy for the former Bay Head Road Annex site. All three issues identified in the previous Five-Year Review have been corrected or are deemed acceptable. Table 5-1 documents the issues from the last Five-Year Review and the follow-up actions pertaining to them.

TABLE 5-1

PROGRESS ON ACTION ITEMS FROM 2005 REPORT
BAY HEAD ROAD ANNEX
ANNAPOLIS, MARYLAND

Issues from First Five-Year Review Report, May 2005				Status – June 2009	
Issues from Previous Review	**Recommendations/ Follow-up Actions**	**Party Responsible**	**Milestone Date**	**Affects Protectiveness**	**Action Taken and Outcome**
Hole in fence along southern property boundary	Repair the fence	Navy/Dept of Rec. and Parks	March 2004	No	County is aware of hole in fence, but poses no risk as site is now public park. No further action.
Hatch covering missile storage area left open	Close and secure hatch	Navy	March 2004	No	Former missile silo has been paved over by parking lot. No further action.
Piece of fence surrounding former missile launch area missing	Install additional fence	Navy	March 2004	No	Former missile silo has been paved over by parking lot. No further action.

6.0 FIVE YEAR REVIEW PROCESS

6.1 ADMINISTRATIVE COMPONENTS

The EPA and MDE were notified of the initiation of the Five-Year Review in June, 2009. Mr. David Steckler, the Remedial Project Manager (RPM) for NAVFAC Washington, led the Five-Year Review team for the former Bay Head Road Annex site. Mr. Robert Stroud, RPM for the EPA, and Mr. Curtis DeTore, RPM for the MDE, participated in the review. CH2M HILL prepared the review document under contract to the Navy. The components of the review process included the following:

- Community involvement
- Document review
- Data review
- Site inspection
- Interviews
- Five-Year Review report development

6.2 COMMUNITY INVOLVEMENT

A public notice was published in both *The Baltimore Sun* and *The Capital* newspapers on July 17, 2009 indicating that a Five-Year Review was being conducted at the former Bay Head Road Annex site. The purpose of the public notice was to inform members of the community that the Five-Year Review was being conducted, to provide information on where the documents used for the review can be obtained, and how the community can contribute during the review process. No comments have been received from the public as of September 4, 2009.

Upon completion of the Five-Year Review Report, notices will be sent to the same newspapers indicating that the results of the review are available to the public at the location identified below:

U.S. Naval Academy
Environmental Division
Attn: Mr. Jeffrey Morris
Halligan Hall (Building 181)
181 Wainwright Road
Annapolis, MD 21402
Phone: 410-293-1025
Email: jeffrey.w.morris@navy.mil

6.3 DOCUMENT REVIEW

The Five-Year Review included a review of relevant investigation and decision documents. The documents reviewed include the following:

- EA Engineering, Science, and Technology, Inc. 2000 (. *Remedial Investigation, Naval Surface Warfare Center, Carderock Division-Annapolis Detachment, Bay Head Road Annex, IR Program Site 1, Annapolis, Maryland.* Final prepared for Department of the Navy Engineering Field Activity Chesapeake. January.

- EA Engineering, Science, and Technology, Inc., 2001. *Site Inspection Study, David Taylor Research Center, Bay Head Road Annex, Annapolis, Maryland.* October.

- Department of the Navy, Engineering Field Activity Chesapeake, 2001. *Finding of Suitability to Transfer (FOST) – Naval Surface Warfare Center, Carderock Division, Annapolis Detachment, Annapolis, Maryland.* May.

- Department of the Navy, Engineering Field Activity Chesapeake, 2001. *Record of Decision – Bay Head Road Annex, IR Program Site 1, Former Naval Surface Warfare Center-Carderock Division, Annapolis Detachment, Annapolis, Maryland.* March.

- Department of the Navy, Naval Facilities Engineering Command Washington, 2005. *Final Five-Year Review for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center, Carderock Division, Annapolis Detachment, Annapolis, Maryland.* Completed by J.M Waller Associates. December 2004 (Navy signature May 24, 2005).

6.4 DATA REVIEW

The remedy for the former Bay Head Road Annex involved a deed restriction to prohibit land from residential use. No sampling or monitoring has occurred at the property since the last Five-Year Review conducted in 2004. Therefore, there is no monitoring or sampling data to review for this Five-Year Review. Data reviewed for this review consist of the documents identified in Section 6.4 and the Site Inspection, Interviews, and Public Records review discussed below.

6.5 SITE INSPECTION

Representatives of CH2M HILL performed an official site inspection of the former Bay Head Road Annex on June 25, 2009. The purpose of the inspection was to assess the protectiveness of the remedy of institutional controls.

The site was being used for recreational purposes as park athletic fields and for the Children's Theater of Annapolis building. The only construction activities identified during the site inspection were related to the construction of a proposed foot/bike path on the park. There was no evidence of residential buildings or residential activities on the site. Appendix A contains the Site Inspection Checklist. Photographs taken during the site inspection are included in Appendix B.

As discussed in Section 5 and Table 5-1, three issues identified in the previous Five-Year Review completed in 2004 were reviewed during the site inspection. Based on the site inspection, these issues have either been corrected or are deemed acceptable.

Based on the site inspection, no significant issues or deficiencies were identified and no activities were observed that would have violated the institutional controls for the site.

6.6 PUBLIC RECORDS

A search was performed in the Anne Arundel County Department of Land Records to inspect the Quitclaim Deed. Based on visual inspection of the deed on July 9, 2009, the item addressing the institutional control at the site has been addressed. The institutional control restricting residential land use is currently being implemented.

6.7 INTERVIEWS

As part of the Five-Year Review process, interviews were conducted with six interviewees representing the Navy, EPA, MDE, the Children's Theatre of Annapolis, and the Anne Arundel County Department of Parks and Recreation. Requests for an interview with the local community association (Bay Head Community Association) were also made; no response was received. Appendix C contains the interview list and interview sheets.

No problems were identified by the interviewees related to the implementation of institutional controls (deed restriction for non-residential use). Overall, there has been minimal activity related to this site since the last five-year review; the Navy, EPA, and MDE indicated they have not received any concerns or complaints regarding the remedy or the site in general. Overall, the interviewees expressed satisfaction with the transfer of the property to Anne Arundel County (Department of Parks and Recreation) with development into a useful recreational area.

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7.0 TECHNICAL ASSESSMENT

7.1 QUESTION A

IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The review of documents, site interviews, and the results of the site inspection indicate that the final remedy is functioning as intended by the ROD. The intent of the institutional control implemented is to limit use and development of the property with a deed restriction. There are no signs of residential development of the property. The Anne Arundel County Office of Planning and Zoning has confirmed that this property is designated as recreational. In summary, the institutional controls are functioning as intended in preventing human exposure to any potential site-related contaminants.

7.2 QUESTION B

ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEAN-UP LEVELS, AND REMEDIAL ACTION OBJECTIVES (RAOs) USED AT THE TIME OF REMEDY SELECTION STILL VALID?

The current and expected future land use for the site is recreational (Bay Head Park). Human health risks were previously estimated in the 2000 Remedial Investigation for the following receptors for both surface soil and total soil (surface and subsurface soil) media: recreational child (ages 1 to 5 and 6 to 15); adult community gardener; maintenance worker; and construction worker. There are no changes in the human health exposure pathways, receptors, or site conditions that would affect the protectiveness of the remedy.

The human health risk assessment process in the 2000 Remedial Investigation was reviewed specifically for the selection of COPCs (based on the application of the May 19, 2009 Regional Screening Levels, http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm) and estimation of carcinogenic and non-carcinogenic risk.

- No additional COPCs would be identified using the 2009 Regional Screening Levels in comparison to the RBCs used in the 2000 Remedial Investigation (i.e., although the 2009 screening values for some constituents [e.g., cobalt] are lower than the 2000 values, the maximum detected concentration for these constituents do not exceed the 2009 values and therefore no additional COPCs would be identified).

- Current toxicity factors (based on the 2009 Regional Screening Levels) consisting of the cancer slope factors (CSFs) and reference dose factors (RfDs) for the identified COPCs were compared with those used in the 2000 Remedial Investigation (refer to table below). All the CSFs and RfDs are the same for the 2009 and 2000 values with the exception of Iron which has a higher RfD in 2009 (i.e., calculated non-carcinogenic risk for iron using 2009 RfD would be lower than the 2000 calculation).

COPC	CSF (mg/kg-day)$^{-1}$ [Oral]		RfD (mg/kg-day) [Oral]	
	2009	2000	2009	2000
Aluminum	NA	NA	1.0	1.0
Antimony	NA	NA	0.0004	0.0004
Arsenic	1.5	1.5	0.0003	0.0003
Cadmium	NA	NA	0.001	0.001
Chromium	NA	NA	0.003	0.003
Iron	NA	NA	0.7	0.3
Manganese	NA	NA	0.024	0.02
Vanadium	NA	NA	0.007	0.007
Benzo(a)pyrene	7.3	7.3	NA	NA
4,4-DDT	0.34	0.34	0.0005	0.0005
NA = not applicable				

Therefore, there does not appear to be any changes in the toxicity factors or COPCs at the site that could affect the protectiveness of the remedy. The exposure assumptions, toxicity data, and RAOs used for the remedy selection are still valid for the purposes of this five-year review.

7.3 QUESTION C

HAS ANY OTHER INFORMATION COME TO LIGHT THAT CALLS INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No information has been identified that calls into question the protectiveness of the remedy.

7.4 TECHNICAL ASSESSMENT SUMMARY

According to the information presented herein, the final remedy is functioning as intended by the ROD. There have been no changes in the physical condition of the site or site use (current or expected future land use) that would affect the protectiveness of the remedy. There is no other information that calls into question the effectiveness of the remedy. As long as the institutional control of a deed restriction to prohibit residential use is enforced, risk levels to humans should remain within acceptable levels.

8.0 ISSUES

There were no issues identified within this Five-Year Review.

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9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations or follow-up actions identified within this Five-Year Review.

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10.0 PROTECTIVENESS STATEMENT

The remedy of institutional controls (deed restriction, residential use prohibited) for the former Bay Head Road Annex is protective of human health and the environment. The remedy is functioning as intended. The current and expected future land use as a public park is consistent with the institutional controls established for the site. The exposure assumptions and toxicity data used at the time of the final remedy selection are still valid. No other information has been identified that could call into question the protectiveness of the final remedy.

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11.0 NEXT REVIEW

The next Five-Year Review for the former Bay Head Road Annex will be completed within five years of the signature date of this report. It is expected to be completed and provided to the EPA and MDE by May 2015.

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12.0 REFERENCES

EA Engineering, Science, and Technology, Inc., 1991. *Site Inspection Study, David Taylor Research Center, Bay Head Road Annex, Annapolis, Maryland.* October.

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EPA, 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments.* Interim Final. EPA 540-R-99-006. Edison, NJ.

EPA, 2001. *Comprehensive Five-Year Review Guidance, Office of Emergency and Remedial Response, EPA-R-01-007.* June.

Department of the Navy 2001a. *Navy/Marine Corps Policy for Conducting Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Statutory Five-year Reviews.* November.

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APPENDIX A

SITE INSPECTION CHECKLIST

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Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Former NSWC Annapolis Detachment – Bay Head Road Annex	**Date of inspection: June 25, 2009**
Location and Region: Annapolis, MD	**EPA ID: MD 3170000167**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: Sunny, hot, 85° F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____N/A_____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

2. **O&M staff** _____N/A_____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency United States Environmental Protection Agency
Contact Robert Stroud — RPM — 8/7/09 — 410-305-2748
Name — Title — Date — Phone no.
Problems; suggestions; ☒ Report attached See Appendix C – No problems noted

Agency Maryland Department of the Environment
Contact Curtis DeTore — RPM — 7/28/09 — 410-537-3344
Name — Title — Date — Phone no.
Problems; suggestions; ☒ Report attached See Appendix C – No problems noted

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☒ Report attached.

Jeffrey Morris – Former Remedial Project Manager, NAVFAC Washington

David Steckler – Remedial Project Manager, NAVFAC Washington

Kathy Swekel – Executive Director, Children's Theatre of Annapolis

Mark Garrity – Parks Administrator, Anne Arundel County Department of Recreation and Parks

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

   Remarks_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks_____
_____

IV. O&M COSTS ☐ Applicable ☒ N/A

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A
Remarks Human-sized opening on southern fence. Appears to be used for entry and exit.
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____
_____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks Property user aware of past vandalism incidents, but no sign of vandalism observed during site inspection.

2. **Land use changes on site** ☒ Applicable ☐ N/A

Remarks Site now used for recreational purposes including sports fields. The children's theatre is complete and no longer under construction._____
_____

3. **Land use changes off site** ☐ Applicable ☒ N/A

Remarks_____
_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____
_____

B. Other Site Conditions

Remarks _____
_____
_____
_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____
_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent_____ Depth_____
Remarks_____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____
_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks_____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent_____ Height_____
Remarks_____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks_____
_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____
_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks_____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____
_____

2. **Performance Monitoring** Type of monitoring_____
☐ Performance not monitored
Frequency_____ ☐ Evidence of breaching
Head differential_____
Remarks_____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks_____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks_____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks_____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters_____
☐ Additive (*e.g.*, chelation agent, flocculent)_____
☐ Others_____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually_____
☐ Quantity of surface water treated annually_____
Remarks_____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks_____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks_____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks_____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

D. Monitoring Data ☐ Applicable ☒ N/A

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The institutional controls in the form of deed restrictions in place and seem to be functioning effectively. There is no evidence to suggest the restrictions on residential land use are being broken. The site inspection verified that institutional controls are still in place.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

N/A

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, which suggest that the protectiveness of the remedy may be compromised in the future. N/A
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. N/A

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APPENDIX B

SITE PHOTOGRAPHS

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Children’s Theatre of Annapolis Building – East View

Children’s Theatre of Annapolis Building and Building 217 – North View

Children's Theatre of Annapolis Building – Southwest View

Former Navy Buildings 215 and 218 – East View

Former Navy Buildings from South Soccer Fields – East View

West Soccer Field (Former Septic Field) – North View

South Soccer Fields – Northwest View

Soccer Fields – South View

APPENDIX C

INTERVIEWS

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INTERVIEW RECORD

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Jeffrey Morris	Environmental Division Director	NAVFAC Washington	July 7, 2009
Name	Title/Position	Organization	Date
David Steckler	Navy RPM	NAVFAC Washington	July 8, 2009
Name	Title/Position	Organization	Date
Kathy Swekel	Executive Director	Children's Theatre of Annapolis	June 25, 2009
Name	Title/Position	Organization	Date
Mark Garrity	Parks Administrator	Anne Arundel Co Dept. of Recreation and Parks	July 7, 2009
Name	Title/Position	Organization	Date
Robert Stroud	Region III RPM	U.S. EPA	August 7, 2009
Name	Title/Position	Organization	Date
Curtis DeTore	RPM	MDE – Federal Facilities Division	July 28, 2009
Name	Title/Position	Organization	Date

Bay Head Five-Year Review Interview Information

Date of Interview Form Completion	**July 7, 2009**
Interviewee Name	**Jeff Morris**
Title	**Environmental Division Director**
Organization	**NAVFAC WASH Public Works Department Annapolis**
Address	**181 Wainwright Road** **Annapolis, MD 21402**
Phone	**410-293-1025**
Email	**Jeffrey.w.morris@navy.mil**
Person conducting Interview (if applicable)	**N/A**
Type of Interview Method	**Questionnaire**

Interview Questions

Background Information

1. What is your overall impression of the project? (General sentiment)

Response – **The conversion of the Bay Head Road site from a Navy lab to a county park has gone pretty well, from what I have seen. The Annapolis Children's' Theater, which was a tenant at the site during the reuse phase of BRAC, remains at the site today and is apparently thriving. The former ball fields have been restored and provided with lighting.**

2. What effects have site operations had on the surrounding community?

Response – **As mentioned above, the children's theater is thriving, providing kids an opportunity to participate and producing plays for the community to enjoy. Although I haven't personally witnessed any sporting events at the park, one can easily infer from the fields and the lights that events are taking place.**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – **No.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – **No.**

5. Do you feel well informed about the site's activities and progress?

Response – **Reasonably. I no longer live in the vicinity of the park and only drop by occasionally to see how it's progressed. Sometimes I see articles in the local paper about the park or theater.**

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response **– No.**

State and Local Considerations

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, give purpose and results.

Response – **The sole official activities have been two site visits in support of 5-year reviews.**

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – **No.**

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – **Not that I'm aware of.**

Performance and Operations and Maintenance (O&M) Problems

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – **Yes. It was land-use controls and appears to be working fine, as the site is recreational in nature.**

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – **No.**

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision (ROD)?

Response **– No.**

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response – **No.**

Bay Head Five-Year Review Interview Information

Date of Interview Form Completion	**8 July 2009**
Interviewee Name	**David Steckler**
Title	**Remedial Project Manger**
Organization	**NAVFAC Washington**
Address	**1314 Harwood Street, SE** **Washington Navy Yard, DC 203274**
Phone	**202.685.8056**
Email	**David.steckler@navy.mil**
Person conducting Interview (if applicable)	

Interview Questions

Background Information

1. What is your overall impression of the project? (General sentiment)

Response - **The Navy is conducting this project in order to comply with our CERCLA responsibilities.**

2. What effects have site operations had on the surrounding community?

Response - **My knowledge is somewhat limited. My understanding is that for the most part, the community is pleased with the use of the Bay Head Road property.**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – **Only as discussed above.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – **No.**

5. Do you feel well informed about the site's activities and progress?

Response - **Yes.**

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response - **No.**

State and Local Considerations

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Response - **No.**

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – **No.**

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response - **Not to my knowledge.**

Performance and Operations and Maintenance (O&M) Problems

10. Is the remedy functioning as expected? How well is the remedy performing?

Response - **The remedy is performing as intended.**

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response - **No.**

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision (ROD)?

Response - **No.**

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response - **No.**

Bay Head Five-Year Review Interview Information

Date of Interview Form Completion	**June 25, 2009**
Interviewee Name	**Kathy Swekel**
Title	**Executive Director**
Organization	**Children's Theatre of Annapolis**
Address	**Bay Head Park** **1661 Bay Head Road** **Annapolis, MD 21409**
Phone	**410-757-2281**
Email	**childrenstheatre@verizon.net**
Person conducting Interview (if applicable)	**Geoff Kiffe**
Type of Interview Method	**In Person**

Interview Questions

Background Information

1. What is your overall impression of the project? (General sentiment)

Response – **The site is fine, but underfunding by the county government has been a problem. The overall plan for reuse is good, but it takes time. So far, it has been very slow to redevelop.**

2. What effects have site operations had on the surrounding community?

Response – **I believe there has been a positive response. This area had been in desperate need of recreational facilities. Some members have negative views of the ball fields because of the lights in the park. They are a nuisance for the adjacent neighbors. Also some neighbors think this is their park, but even though it is a public park, the gates are locked after dark. I'd say there has been a 95% positive response overall**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – **The park is being utilized well. Management has been pretty good about keeping the site maintained and operating well. My main concern is the funding from the county.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – **Yes. During the construction process, there were many incidents of vandalism, mostly graffiti. There were about six acts of vandalism in total. Trespassers were pretty frequent in 2008 and 2009.**

5. Do you feel well informed about the site's activities and progress?

Response – **I feel pretty well informed. I am the primary contact with the park and county officials. Some community members may not feel well informed, but it is their job to find the information.**

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response – **I am surprised that the Navy is still involved in the site.**

State and Local Considerations

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Response – **Sort of. If there is contact, I have to engage in the communication. The county is not very open about their plans.**

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – **No.**

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – **Not that I am aware of. The Department of Recreation and Parks regulations have to be followed now.**

Performance and Operations and Maintenance (O&M) Problems

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – **Yes. They keep the site maintained pretty well.**

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – **The County owns the property and maintains it. It is mostly used for youth sports organizations and the Children's Theatre here.**

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision (ROD)?

Response – **No.**

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response **– No. There just needs to be more funding available in order to complete the project.**

Bay Head Five-Year Review Interview Information

Date of Interview Form Completion	**July 7, 2009**
Interviewee Name	**Mark Garrity**
Title	**Parks Administrator**
Organization	**Anne Arundel County Department of Recreation and Parks**
Address	**1 Harry Truman Parkway** **Annapolis, MD 21401**
Phone	**410-222-7300**
Email	**rpgarr00@aacounty.org**
Person conducting Interview (if applicable)	**Geoff Kiffe**
Type of Interview Method	**Phone**

Interview Questions

Background Information

1. What is your overall impression of the project? (General sentiment)

Response – **The project has been executed and maintained well. It has enhanced the quality of life in the area because of the park.**

2. What effects have site operations had on the surrounding community?

Response – **It has definitely improved the aesthetic appearance of the property. It has also enhanced the recreational facilities in the area.**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – **No.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – **No, not that I know of.**

5. Do you feel well informed about the site's activities and progress?

Response **– Yes.**

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response – **The park has been a positive addition to the community in terms of adding recreational facilities to the area.**

State and Local Considerations

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Response – **Yes. Contract inspectors are out regularly, probably weekly. Park rangers perform safety checks and community outreach programs, they are out there weekly. Maintenance supervisors perform inspections and maintenance activities every other week or so.**

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response **– No.**

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – **No.**

Performance and Operations and Maintenance (O&M) Problems

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – **Yes. It seems to be going very well.**

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – **There is not continuous operations and maintenance, but the maintenance workers are there frequently for the inspections and maintenance work.**

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision (ROD)?

Response – **No.**

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response – **No. Everything is going pretty well.**

Bay Head Five-Year Review Interview Information

Date of Interview Form Completion	**7/28/2009**
Interviewee Name	**Curtis DeTore**
Title	**Section Head, Federal Facilities Division**
Organization	**Maryland Department of the Environment**
Address	**1800 Washington Blvd. Suite 645** **Baltimore, MD 21230-1719**
Phone	**410-537-3791**
Email	**cdetore@mde.state.md.us**
Person conducting Interview (if applicable)	
Type of Interview Method	**questionnaire**

Interview Questions

Background Information

1. What is your overall impression of the project? (General sentiment)

Response – **Since the last 5-Year Review, this office has had no interaction with the site.**

2. What effects have site operations had on the surrounding community?

Response – **None that this office is aware of.**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – **No.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – **No.**

5. Do you feel well informed about the site's activities and progress?

Response – **Since the last 5-Year Review, there has been no reason (as far as this office knows) for any information sharing.**

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response – **No.**

State and Local Considerations

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Response – **No.**

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response **– No.**

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response **– No.**

Performance and Operations and Maintenance (O&M) problems

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – **Yes. The remedy is functioning as designed.**

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – **There is no O&M presence associated with this office.**

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision (ROD)?

Response – **No.**

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response **– No.**

Interview Information

Date of Interview Form Completion	**August 7, 2009**
Interviewee Name	**Robert W. Stroud**
Title	**Remedial Project Manager**
Organization	**US EPA Region III**
Address	**701 Mapes Road Fort Meade, MD 20755**
Phone	**410-305-2748**
Email	**stroud.robert@epa.gov**
Person conducting Interview (if applicable)	**n/a**
Type of Interview Method	**questionnaire**

Interview Questions

Background Information

1. What is your overall impression of the project? (General sentiment)

Response – **A good scientifically sound decision was made.**

2. What effects have site operations had on the surrounding community?

Response – **None to my knowledge.**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – **None that I am aware of.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response **– None that I am aware of.**

5. Do you feel well informed about the site's activities and progress?

Response **- Have not seen any progress reports since the last 5 year review.**

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response - **None at this time.**

State and Local Considerations

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Response - **No there has not.**

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – **No there has not.**

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – **None that I am aware of.**

Performance and Operations and Maintenance (O&M) problems

10. Is the remedy functioning as expected? How well is the remedy performing?

Response - **It was as of the last Five-Year Review**.

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – **Not sure about an O&M presence.**

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision (ROD)?

Response - **No problems have been encountered since the last 5-year review.**

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response - **None at this time.**