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EVALUATION REPORT
Remediation of Former Drywells 20-08 and 34-07

US Navy Installation Restoration (IR) Program, Site 1
Naval Weapons Industrial Reserve Plant (NWIRP)

Former Northrop Grumman Corporation
Bethpage Plant 3 Facility, Bethpage, NY

April 14, 2004

Prepared for:
Bethpage Restoration Advisory Board
Bethpage, New York

Funded by:
Naval Facilities Engineering Command
EFA Northeast
10 Industrial Highway, Mailstop #82
Lester, PA 19113-2090

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NWIRP, BETHPAGE, NY

APRIL 14, 2004

EXECUTIVE SUMMARY

Holzmacher, McLendon, and Murrell, P.C. (H2M) conducted an independent evaluation of the environmental investigation and assessment of two former drywells, identified as Drywells 20-08 and 34-07, located at the Naval Weapons Industrial Reserve Plant (NWIRP) in Bethpage, NY. The purpose of this evaluation was to provide the Bethpage Restoration Advisory Board (BRAB) with an independent environmental review of the investigation, remediation and remedial feasibility study associated with polychlorinated biphenyl (PCB) contamination at former drywells 20-08 and 34-07. Drywells 20-08 and 34-07 were utilized as part of the Northrop Grumman Corporation (NGC) facility stormwater drainage system and were interconnected with other drainage structures and on-site recharge basins.

H2M's environmental evaluation was funded under a Technical Assistance for Public Participation (TAPP) contract by the Naval Facilities Engineering Command, EFA Northeast (Lester, PA). This review specifically focused on two reports prepared by Roux Associates, Inc. and their affiliated engineering firm Remedial Engineering, P.C. (Islandia, NY). These reports are identified as:

1. Plant 3 Drywells 20-08 and 34-07, Site Characterization Report, September 15, 2000.
2. Focused Feasibility Study, Plant 3 Drywells 20-08 and 34-07, August 15, 2001.

The Site Characterization Report was prepared on behalf of NGC to delineate the extent of PCB contamination in soils and characterize groundwater quality in the vicinity of Drywells 20-08 and 34-07. The Report summarized characterization efforts to delineate soils in the vicinity of each drywell, both laterally and vertically, with PCB contamination exceeding New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objectives (RSCOs). The characterization effort for soils was comprehensive and included sampling vertically from grade to approximately 54-56 feet below grade and radially, in an "X" pattern, outward from the center of each

drywell location up to approximately 30 feet. At the time of the investigation, the total volume of impacted soil, i.e., soils exceeding the NYSDEC RSCO of 1 milligram per kilogram (mg/kg) for surface soils and 10 mg/kg for subsurface soils, was estimated to be 750 cubic yards at Drywell 20-08 and 625 cubic yards at Drywell 34-07. However, an excavation to remove all impacted soils would necessitate the removal of approximately 2,200 cubic yards of soil at Drywell 20-08 and 2,900 cubic yards at Drywell 34-07. It is H2M's opinion that the soil characterization effort was thorough and documented the extent of PCB impacts.

Characterization efforts for groundwater were not as comprehensive as with soil but consisted of collecting samples in close proximity to each drywell and approximately 75 feet hydraulically downgradient from each drywell. Groundwater samples were collected near each drywell from a depth of 55-65 feet below grade. Groundwater was encountered at a depth of approximately 54 feet below grade. Groundwater samples downgradient from each drywell were collected at a depth of 65-75 feet below grade. All groundwater samples were collected and analyzed in both an unfiltered and filtered condition. PCBs were detected in all unfiltered groundwater samples above the NYSDEC Class GA Water Quality Standard of 0.09 micrograms per liter (µg/l). PCBs were also detected in the filtered sample downgradient from Drywell 20-08. The Site Characterization Report concluded that PCBs have not significantly impacted groundwater and that no further groundwater investigation at the drywells is warranted. It is H2M's opinion that since groundwater impacts were detected at distances of 75 feet downgradient of the drywells, additional groundwater delineation efforts should be conducted. At a minimum, PCBs should be included as a parameter for analysis in select monitoring wells as part of the existing groundwater monitoring program. In addition, groundwater samples should also be collected upgradient of the two drywells to confirm that the drywells are in fact the source of the PCBs and that there are no other upgradient source areas contributing to the PCBs detected in groundwater.

The Focused Feasibility Study was prepared by Roux Associates subsequent to the Site Characterization Report to develop, screen and select feasible remedial alternatives to address PCB impacted soils in the vicinity of Drywells 20-08 and 34-07. Potential remedial alternatives were evaluated, screened, and compared on the basis of compliance with Federal and State remediation guidelines, protection of human health and the environment, short-term effectiveness, long-term effectiveness, reduction of PCB toxicity or mobility, implementability, cost and community

acceptance. The Focused Feasibility Study was based on identifying remedial alternatives for soils only. Groundwater was not considered. An additional report, identified as *Plant 3 Drywells 20-08 and 34-07 Exposure Assessment* was prepared, also by Roux Associates, in October 2000. In this report, the risk associated with the identified level of groundwater impacts from PCBs was determined to be zero considering there is an incomplete pathway for exposure to the groundwater from a human health perspective. Additionally, groundwater at the NWIRP site is controlled by an existing and elaborate containment and treatment system. However, H2M understands that the groundwater containment and treatment system does not monitor for PCB contamination. The Exposure Assessment also concluded for soils, that the lack of a pathway for exposure to soils below typical construction depths and surface soils, once asphalt surfaces are restored in the areas of the drywells, that the risk level is zero. Therefore, the remediation of soils was deemed as not warranted.

Regardless of the Exposure Assessment conclusions, the Focused Feasibility Study was performed to evaluate remedial alternatives for PCB impacted soils, as mentioned. Remedial technologies evaluated included: 1) no action, 2) in-situ soil vapor extraction (SVE), 3) ex-situ dispersive chemical reaction, 4) in-situ thermal desorption, and 5) excavation with off-site disposal. The no action alternative was included as a required "baseline" remedial alternative. As part of the no action alternative, it was assumed that the existing two-foot layer of non-impacted soils would remain in place, the existing asphalt at Drywell 20-08 would be repaired, that asphalt would be installed at Drywell 34-07, and that a deed restriction would be placed in the areas of impact near both drywells. Following screening and comparison, the no action alternative was selected as the recommended alternative with in-situ thermal desorption identified as the second recommended alternative.

In summary, it is H2M's opinion that the soil characterization efforts were thorough and extensive. H2M does not disagree with the Exposure Assessment, which concluded that soil excavation was not warranted due to an incomplete exposure pathway. The conclusions of the Focused Feasibility Study, which specified "no action" as the recommended alternative, also seem appropriate. With proper site maintenance, paving of the impacted drywell areas, a protective deed restriction and future property use for commercial or industrial applications, exposure is not a significant concern. H2M recommends that with regards to groundwater, additional delineation be performed to determine the lateral extents of PCB impacts even though, as concluded in the Exposure Assessment, an incomplete pathway exists for exposure to groundwater. This may be accomplished by, at a minimum,

incorporating PCBs as a monitored parameter in the existing groundwater monitoring program. This is not necessary at all groundwater monitoring wells but initially, sampling should be performed at existing monitoring wells located hydraulically downgradient from Plant 3 and Drywells 20-08 and 34-07. Based on a review of monitoring well locations depicted on Drawings 2 and 3, titled Water-Table Configuration and Horizontal Groundwater Flow Directions in the Shallow and Intermediate Zone, respectively, as prepared and included by Arcadis in the *Quarterly Groundwater Monitoring Report for Quarters 1 to 3 of 2003* for Operable Unit 2 of the Northrop Grumman Site, H2M recommends that PCBs be added as a routine monitoring parameter in downgradient wells identified as GM-12S, GM-12I, GM-16SR, GM-16I, HN-40S and HN-40I. Upgradient monitoring wells should also be installed and sampled or temporary sampling points should be installed to confirm the source of the PCBs detected in groundwater.

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NWIRP, BETHPAGE, NY

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REMEDIATION OF FORMER DRYWELLS 20-08 AND 34-07
NWIRP, BETHPAGE, NY

APRIL 14, 2004

1.0 INTRODUCTION

On behalf of the Bethpage Restoration Advisory Board (BRAB), Holzmacher, McLendon, and Murrell, P.C. (H2M) conducted an evaluation of an environmental investigation and exposure assessment with regards to polychlorinated biphenyl (PCB) contamination at two former drywells within the former Northrop Grumman Corporation (NGC) Plant 3 Facility in Bethpage, NY. Plant 3 is part of the Bethpage Naval Weapons Industrial Reserve Plant (NWIRP). The drywells were designated as numbers 20-08 and 34-07 and served as an integral component of the on-site stormwater drainage system. Funding for H2M's environmental evaluation was provided under a Technical Assistance for Public Participation (TAPP) contract by the Naval Facilities Engineering Command, EFA Northeast (Lester, PA).

The purpose of this evaluation report was to provide the BRAB with an independent review of the investigation and remedial feasibility study associated with the PCB contamination at former drywells 20-08 and 34-07. This review specifically focused on two reports prepared by Roux Associates, Inc. and their affiliated engineering firm Remedial Engineering, P.C. (Islandia, NY): 1) *Plant 3 Drywells 20-08 and 34-07, Site Characterization Report*, dated September 15, 2000, and 2) *Focused Feasibility Study, Plant 3 Drywells 20-08 and 34-07*, dated August 15, 2001.

The Site Characterization Report summarized environmental investigation efforts to delineate the PCB contamination in the soils in the vicinity of Drywells 20-08 and 34-07 and characterize potential groundwater impacts. Soil delineation involved a comprehensive sampling program to identify all soils, both laterally and vertically, around each drywell with PCB contamination that exceeded the New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objectives (RSCOs). The NYSDEC RSCO for PCB contamination in soils is 1 mg/kg for surface soils and 10 mg/kg for subsurface soils. At the time of the investigation, the total volume of impacted soils exceeding the RSCOs was estimated to be 750 cubic yards at Drywell 20-08 and 625 cubic yards at Drywell 34-07. However, an excavation to remove all impacted soils would necessitate the

removal of approximately 2,200 cubic yards of soil at Drywell 20-08 and 2,900 cubic yards at Drywell 34-07.

Groundwater characterization efforts involved the installation of permanent monitoring wells hydraulically downgradient from each drywell. A total of two monitoring wells were installed at each drywell location. Each drywell had one monitoring well installed in close proximity to the drywell and a second well downgradient at a radial distance of approximately 75 feet. Groundwater samples collected near each drywell were screened from a depth of 55-65 feet below grade. Samples collected downgradient from each drywell were screened at a depth of 65-75 feet below grade. Groundwater was encountered at a depth of approximately 54 feet below grade. All groundwater samples were collected and analyzed in both unfiltered and filtered condition. PCBs were detected in all unfiltered groundwater samples above the NYSDEC Class GA Water Quality Standard of 0.09 µg/l. PCBs were also detected in the filtered sample downgradient from Drywell 20-08. The Site Characterization Report concluded that PCBs have not significantly impacted groundwater and that no further groundwater investigation at the drywells is warranted.

Based on the results of the Site Characterization Report, a Focused Feasibility Study was prepared to investigate remedial alternatives for the PCB impacted soils around Drywells 20-08 and 34-07. Potential remedial alternatives were evaluated, screened, and compared on the basis of compliance with Federal and State remediation guidelines, protection of human health and the environment, short-term effectiveness, long-term effectiveness, reduction of PCB toxicity or mobility, implementability, cost and community acceptance. The Focused Feasibility Study was based on identifying remedial alternatives for soils only. Groundwater was not considered. An earlier report prepared by Roux Associates in October 2000, which was not reviewed as part of H2M's independent evaluation, titled *Plant 3 Drywells 20-08 and 34-07 Exposure Assessment*, identified the risk level from PCB groundwater impacts as zero considering an incomplete pathway existed for exposure to the groundwater from a human health perspective. The Exposure Assessment also concluded that soil remediation was not warranted due to the lack of an exposure pathway to soils located below typical construction depths of 14 feet. Once asphalt surfaces are restored in the areas of the drywells, exposure to surface soils less than 14 feet also have a risk level of zero.

Despite the conclusions of the Exposure Assessment with regards to soils, the Focus Feasibility Study evaluated the following remedial alternatives for the PCB impacted soils: 1) no action, 2) in-situ soil vapor extraction (SVE), 3) ex-situ dispersive chemical reaction, 4) in-situ thermal desorption, and 5) excavation with off-site disposal. The no action alternative, with a two-foot layer of non-impacted soils, asphalt capping and a deed restriction was selected as the recommended alternative. In-situ thermal desorption was identified as the second recommended alternative.

2.0 BACKGROUND

The identification of PCB impacts at Drywells 20-08 and 34-07 followed environmental investigations performed by NGC as part of efforts to vacate the 105-acre NWIRP property. A remediation effort was initiated for closure of these structures under the United States Environmental Protection Agency (USEPA) Underground Injection Control (UIC) program, which is administered locally by the Nassau County Department of Health (NCDH). Upon discovery of PCB impacts at the subject drywells, remediation activities were performed to excavate the drywells and surrounding soils. Using conventional construction and shoring methods, soils were excavated to a practical depth of 28 feet below grade. Endpoint samples collected at the base of the excavation identified additional PCB contamination above cleanup guidelines. Subsequently, the USEPA requested an investigation to further delineate PCB contamination in the vicinity of the drywells, thereby providing the impetus for the site characterization effort performed by Roux Associates.

2.1 Purpose of Evaluation Report

The purpose of this environmental review is to provide an independent evaluation of the actions, methodology, conclusions and recommendations regarding PCB contamination at Drywells 20-08 and 34-07. The results of our review and recommendations are provided herein.

3.0 REVIEW OF SITE CHARACTERIZATION REPORT

3.1 Purpose of Site Characterization Report

A Site Characterization Report for Plant 3 Drywells 20-08 and 34-07, dated September 15, 2000, was prepared by Roux Associates on behalf of the Northrop Grumman Corporation (NGC). This effort was initiated at the request of the USEPA following identification of PCB

contamination in the soils after a UIC remediation program. Soils had been excavated around and beneath the drywells to a depth of approximately 28 feet using conventional shoring techniques. PCBs, detected at the base of the excavation above the NYSDEC RSCO, prompted further action.

The objectives of the Site Characterization Report were to delineate the extent of PCB impacts at the drywells both laterally and vertically, characterize groundwater impacts and determine the potential remediation area.

3.2 Site Characterization Report Methodology and Results

To accomplish the objectives of the Site Characterization Report, namely the characterization of soil and groundwater for PCB contamination, a soil and groundwater sampling program was performed.

3.2.1 Soil Characterization

Soil sampling was performed through the installation of temporary soil borings and the collection of soil samples in two-foot increments to a maximum depth of 68 feet below grade. The groundwater interface was encountered at approximately 54 feet below grade. In total, Roux Associates conducted 17 soil borings with eight borings at Drywell 20-08 and nine at Drywell 34-07. The soil borings were located around the perimeter of each drywell. Roux Associated also utilized data from soil borings conducted previously through center of each drywell. Initially, four borings were positioned approximately 10 feet in radial distance from the center of each drywell at a 90-degree separation. Additional soil borings were "stepped-out" from these borings at increasing radial distances of approximately 10 feet, as necessary, depending on whether PCB impacts were identified. This method enabled the lateral delineation of PCB impacts.

Soil samples were generally collected and analyzed for PCBs at two-foot increments. Including both Drywell 20-08 and 34-07, a total of 363 samples were collected. Laboratory services for all PCB analytical work was performed in accordance with a

NYSDEC Analytical Services Protocol (ASP) Category B data package. Requisite quality assurance and quality control samples were also collected.

At Drywell 20-08, PCB contamination was identified in the soils at a maximum concentration of 45,000 mg/kg at 24 to 26 feet below grade, significantly exceeding the NYSDEC RSCO of 10 mg/kg for subsurface soils. Additional contamination above the RSCO was documented at radial distances of up to 30 feet from the center of the drywell and to a depth of 54 feet below grade at concentrations between 11 mg/kg and 5,500 mg/kg. The identified PCB contamination was discontinuous and relatively interspersed among soils with non-detectable concentrations of PCBs or PCB concentrations less than the RSCO. Most soil with PCB concentrations above the RSCO was encountered at depths between 24 and 54 feet below grade. The total volume of PCB impacted soils above the RSCO was estimated to be approximately 750 cubic yards. However, accessing the impacted soils at Drywell 20-08 would necessitate the excavation of approximately 2,150 cubic yards.

At Drywell 34-07, the maximum PCB concentration was 25,000 mg/kg at a depth of 28 to 29 feet below grade, less than the highest concentration at Drywell 20-08, but still significantly above the NYSDEC RSCO of 10 mg/kg. Soils exceeding the RSCO were encountered at radial distances of up to 20 feet from the center of the drywell and depths from 4 to 56 feet below grade. As with the results observed at Drywell 20-08, the PCB impacts were discontinuous through the delineated area, with PCB concentrations generally decreasing with depth. The total volume of PCB impacted soils above the RSCO was estimated to be approximately 625 cubic yards. However, accessing the impacted soils at Drywell 34-07 would necessitate the excavation of approximately 2,850 cubic yards.

The Site Characterization Report, with regards to soil, concluded that 1) PCB impacts were successfully delineated both horizontally and vertically, and 2) there was a significant decrease in the concentration of PCBs with depth and distance from the drywells.

3.2.2 Groundwater Characterization

PCB impacts to groundwater were characterized through the installation of four permanent monitoring wells. Two monitoring wells were installed at each drywell; one well located in close proximity to the drywell and a second well located approximately 75 hydraulically downgradient of the drywell. At each drywell, groundwater was encountered at a depth of approximately 54 feet below grade. The monitoring wells in proximity to each drywell were constructed with 10 feet of slotted screen at 55 to 65 feet below grade. The hydraulically downgradient wells were constructed with the screened interval between 65 and 75 feet below grade.

Groundwater samples were collected from each monitoring well and analyzed in both an unfiltered and filtered condition. Filtering groundwater samples is typically performed to remove sediment and eliminate contaminant contributions from solid materials, as opposed to a dissolved fraction. In all four monitoring wells, PCBs were detected in all unfiltered samples at concentrations ranging from 1.4 µg/l (parts per billion (ppb)) to 12 µg/l. These values exceed the NYSDEC Class GA Water Quality Standard of 0.09 µg/l. In the filtered samples, PCBs were detected only in the well downgradient of Drywell 20-08 at a concentration of 2.1 µg/l. A second sample from this monitoring well confirmed the detection of PCBs in the filtered sample with a reported concentration of 1.5 µg/l.

With regards to groundwater, the Site Characterization Report concluded that the PCB contamination encountered in the filtered groundwater sample collected from the monitoring well downgradient of Drywell 20-08 was the result of PCBs sorbing onto suspended sediment less than 0.45 microns in size. A 0.45-micron filter was used to filter the groundwater samples. The Site Characterization Report concluded that further groundwater investigation was not warranted.

3.3 Evaluation of Site Characterization Report

3.3.1 Soil Characterization Effort

The soil investigation and sampling program to characterize soils horizontally and vertically at Drywells 20-08 and 34-07 impacted with PCB contamination above the

NYSDEC RSCO was comprehensive. The approach and methodology to characterize the PCB impacts, through soil borings that are positioned in an "X" pattern with an increasing radial distance to encounter non-impacted soils, was also sound. The sampling frequency included the analysis of 363 samples with all analytical work performed as a NYSDEC ASP Category B data package. This provides credence and quality assurance to the results. With regards to soil, the Site Characterization Report concluded that PCBs were successfully delineated both horizontally and vertically, and that there was a significant decrease in the concentration of PCBs with depth and distance from the drywells. H2M concurs with both conclusions.

3.3.2 Groundwater Characterization Effort

The characterization effort for groundwater included the installation and sampling of four permanent monitoring wells. This effort appeared limited, especially in comparison with the comprehensive soil sampling program. Groundwater samples were collected in close proximity to each drywell and hydraulically downgradient from each drywell at a distance of approximately 75 feet. Samples collected near each drywell were screened from a depth of 55-65 feet below grade. Groundwater was encountered at a depth of approximately 54 feet below grade. Samples collected downgradient from each drywell were screened at a depth of 65-75 feet below grade. This sampling methodology appeared to attempt to compensate for a known transport mechanism for PCBs, which is, that they tend to sink in groundwater. Samples were collected and analyzed in both an unfiltered and filtered condition. The purpose of the latter method is to demonstrate that the PCBs are not dissolved in the groundwater, can be removed by filtering all solids, and that PCBs typically migrate through groundwater by way of attachment to colloidal (i.e., small, solid) particles.

The sampling results documented PCB contamination above the NYSDEC Class GA Water Quality Standard of 0.09 µg/l in all unfiltered samples. In the filtered samples, PCB contamination was detected above 0.09 µg/l in the monitoring well downgradient from Drywell 20-08. As stated in the Site Characterization Report, it is possible that the detected PCBs were due to PCB sorption to particles less than the

effective pore size of the filter media. This conclusion is likely justified considering that the solubility of PCBs is relatively low and less than the detected concentration.

Overall, the groundwater characterization effort was significantly less comprehensive than the soil program. H2M does not disagree with the conclusions of the Site Characterization report with regards to groundwater that 1) PCBs were detected and 2) PCBs in soils have not significantly impacted groundwater quality. However, considering PCBs were detected in both unfiltered and filtered groundwater samples at a distance of approximately 75 feet from Drywell 20-08, additional monitoring is recommended. It cannot be discounted that the detected PCB concentrations may be due to on-site contamination from another source, but future monitoring of PCBs is recommended and the inclusion of PCBs as a potential parameter of concern in the existing on-site groundwater monitoring program appears justified. Monitoring for PCBs would not be necessary at all groundwater monitoring wells but specifically at monitoring well locations hydraulically downgradient from Plant 3 and Drywells 20-08 and 34-07. H2M reviewed the *Quarterly Groundwater Monitoring Report for Quarters 1 to 3 of 2003* for Operable Unit 2, prepared by Arcadis on behalf of Northrop Grumman Corporation. Based on wells identified within this Report, H2M recommends initially sampling downgradient wells identified as GM-12S, GM-12I, GM-16SR, GM-16I, HN-40S and HN-40I for PCBs. In addition, H2M recommends the installation of upgradient monitoring wells (in relation to Drywells 20-08 and 34-07) or temporary groundwater sampling points to confirm that there are no other potential upgradient sources of PCBs.

4.0 REVIEW OF FOCUSED FEASIBILITY STUDY

4.1 Purpose of Focused Feasibility Study

A Focused Feasibility Study for Plant 3 Drywells 20-08 and 34-07, dated August 15, 2001, was prepared by Roux Associates subsequent to the Site Characterization Report to develop, screen and select feasible remedial alternatives to address the PCB impacted soils. The Focused Feasibility Study was based on identifying remedial alternatives for the PCB impacted soils. Groundwater was not considered nor addressed as part of the Focused Feasibility Study. An Exposure Assessment report for PCB impacts at Drywells 20-08 and

34-07, prepared by Roux Associates in October 2000 and prior to the Focused Feasibility Study, assessed the potential threat to human health and the environment from the detected PCBs. The risk associated with the identified level of PCB groundwater impacts was determined to be zero considering there was an incomplete exposure pathway to the groundwater as well as consideration that the groundwater at the NWIRP site is currently controlled by an existing and elaborate containment and treatment system.

4.2 Focused Feasibility Study Methodology and Results

The objectives of the Focused Feasibility Study were to identify and evaluate potential remedial technologies for soils with PCB contamination above the NYSDEC RSCO, conduct an initial screening of feasible technologies, and perform a detailed analysis and comparison of feasible remedial alternatives. Potential response actions to address the PCB contamination included 1) no action, 2) institutional controls, 3) containment, 4) stabilization, 5) in-situ treatment, 6) ex-situ treatment, 7) removal, treatment and disposal, and 8) source removal and disposal. As part of the Focused Feasibility Study, a number of remedial technologies were initially screened within each of these response action categories. Following the initial screening, select remedial technologies were identified for further evaluation. Feasible remedial technologies evaluated included: no action, in-situ soil vapor extraction (SVE), ex-situ dispersive chemical reaction (DCR), in-situ thermal desorption and excavation with off-site disposal. Of these, only no-action, thermal desorption and excavation were determined to be feasible alternatives and were further evaluated based on the following criteria (from 40 CFR 300.430): 1) compliance with established guidelines (Applicable or Relevant and Appropriate Requirements (ARARs) and State Criteria Guidelines (SCGs)), 2) overall protection of human health and the environment, 3) short-term effectiveness, 4) long-term effectiveness and permanence, 5) reduction of PCB toxicity, mobility or volume through treatment, 6) implementability, 7) cost and 8) community acceptance.

The no action alternative was included as a required "baseline" remedial alternative. As part of the no action alternative, it was assumed that the existing two-foot layer of non-impacted soils would remain in place, the existing asphalt at Drywell 20-08 would be repaired, that asphalt would be installed at Drywell 34-07, and that a deed restriction would be placed in the

areas of impact near both drywells. Following screening and comparison, the no action alternative was selected as the recommended alternative with in-situ thermal desorption identified as the second recommended alternative. Justification for this conclusion was that:

- PCBs are generally immobile in soils,
- there are two feet of clean soils above the PCB impacted soils,
- the highest PCB impacted soils are encountered at depths of least 14 feet below grade,
- potential exposure scenarios with excavation and transport are avoided,
- the future development of the site is projected to be for commercial or industrial use with a deed restriction,
- conservative risk calculations indicate no potential risk for commercial or industrial activities, and
- low cost.

4.3 Evaluation of Focused Feasibility Study

The Focused Feasibility Study identified and evaluated potential remedial technologies for addressing PCB soil contamination at the Plant 3 Drywells 20-08 and 34-07. An Exposure Assessment, prepared by Roux Associates and as described in Section 4.1, was performed prior to the Focused Feasibility Study to serve as a risk assessment for potential impacts from PCB soil and groundwater contamination to human health and the environment. For groundwater, the Exposure Assessment concluded that there was an incomplete pathway for exposure. For soil, the risk of exposure to PCB contamination was minimal considering the depth of contamination, future site use and evaluation of the possible exposure scenarios.

Despite the results of the Exposure Assessment, which concluded that further groundwater or soil remediation was not warranted, the Focused Feasibility Study was performed to evaluate potential remedial alternatives to address the PCB impacted soils. Consideration was given to all relevant remedial technologies with possible application to PCB remediation under a few response scenarios, which included: 1) no action, 2) institutional controls, 3) containment, 4) stabilization, 5) in-situ treatment, 6) ex-situ treatment, 7) removal, treatment and disposal, and 8) source removal and disposal. After evaluation of the most appropriate

remedial technologies, the feasibility study concluded with "no action" as the recommended alternative.

It is H2M's opinion that the Focused Feasibility Study methodology was thorough and sufficiently comprehensive to examine all feasible, applicable and/or appropriate remedial technologies that could be applied for addressing PCB contamination in soils at Drywells 20-08 and 34-07. The evaluation of feasible alternatives with promulgated or recommended guidelines, protection of human health and the environment, short-term effectiveness, long-term effectiveness, reduction of toxicity/mobility, implementability, cost, and community acceptance was also thorough. H2M concurs with the conclusions of the Focused Feasibility Study and the identification of "no action," together with an environmental easement that includes both engineering controls (i.e., a two-foot layer of non-impacted soils with asphalt cap) and institutional controls (i.e., deed restriction) as the recommended alternative for PCB impacts to soils.

It should be noted that the BRAB has concern regarding the proposed environmental easement (i.e., engineering and institutional controls) proposed as part of the no action alternative. An environmental easement is an enforcement mechanism used for property where a remedial program leaves residual contamination that renders the property suitable for some, but not all uses, or includes engineering controls (e.g., cover material and asphalt cap) that must be maintained to be effective.

Pursuant to the recently enacted Brownfields legislation, an "Environmental Easement":

- Can only be created by the property owner (the "grantor") through a written instrument (i.e., deed restriction) recorded in the appropriate county recording office (e.g., county clerk).
- Can only be granted by the State (the "grantee") and can only be removed or amended by a written instrument executed by the Commissioner of the NYSDEC.
- Is binding upon all subsequent owners and occupants of the property. The deed for the property (as well as any other written instruments conveying any interest in the property) must contain a prominent notice that it is subject to an environmental easement.

- May be enforced in perpetuity against the granter, subsequent owners of the property, lessees, and any person using the property by its grantor, by the State, or by the municipality in which the property is located.

The new legislation requires local governments that receive applications for building permits or other applications affecting the land use or development of the property subject to an environmental easement to notify and refer the application to the NYSDEC. The NYSDEC must determine whether the application is consistent with the environmental easement and notify the local government of its determination in a timely fashion, considering the time frame for the local government's review of the application. The BRAB's concern is that applications for property development and/or building permits are typically submitted to the Town Planning and/or Building Departments, which might not be aware of an environmental easement filed with the Town Clerk, and that applications affecting the land use could be processed without the requisite NYSDEC review and approval. Mechanisms should be established at both the County and Town level to ensure that information regarding the environmental easement is shared with any and all County and Town agencies with jurisdiction to issue or approve applications that affect the future land use and development of the property.

5.0 CONCLUSIONS AND RECOMMENDATIONS

On behalf of the Bethpage RAB, H2M conducted an independent evaluation of the environmental investigation of PCB contamination at two drywells located at Plant 3 of the former Bethpage NWIRP. Specifically reviewed were two reports, prepared by Roux Associates on behalf of Northrop Grumman Corporation, including a Site Characterization Report (September 15, 2000) and a Focused Feasibility Study (August 15, 2001). The Site Characterization Report was prepared to summarize site investigation activities to delineate soils with PCB contamination in the vicinity of the two drywells and characterize potential groundwater impacts. It is H2M's opinion that the soil characterization program was comprehensive and the methodologies sound, and we concur with Roux's conclusions. Groundwater characterization was not as comprehensive as the soil delineation effort. Groundwater sampling was limited to two monitoring wells for each drywell from which samples were collected within one screened interval. Groundwater sampling identified PCBs in all samples collected when analyzed without filtering. Note that filtering groundwater samples can help

determine the transport mechanism considering PCB mobility in groundwater is typically due to transport on colloidal particles. PCBs have low solubility and therefore do not readily dissolve in groundwater. This results in a low overall mobility. Installation and sampling of additional monitoring wells would have enabled a better determination of the source of the PCB impacts detected in the groundwater samples (i.e., whether the PCBs detected in the groundwater are due to PCB impacts at the subject drywells or whether there may be contributing sources upgradient of the drywells). A profile well at each monitoring well location would have also enabled a more thorough vertical delineation. Considering groundwater sampling data confirmed PCB impacts in the groundwater at a radial distance of 75 feet from each drywell, H2M recommends that PCB sampling be performed at existing downgradient groundwater monitoring locations and/or that PCBs be incorporated into the existing site-wide groundwater monitoring program, at locations downgradient from Drywells 20-08 and 34-07. H2M recommends initial PCB sampling at existing downgradient monitoring wells identified as GM-12S, GM-12I, GM-16SR, GM-16I, HN-40S and HN-40I. The monitoring well designations were obtained from the *Quarterly Groundwater Monitoring Report for Quarters 1 to 3 of 2003* for Operable Unit 2, prepared by Arcadis on behalf of Northrop Grumman Corporation. H2M also recommends the installation of upgradient monitoring wells (in relation to Drywells 20-08 and 34-07) or temporary groundwater sampling points to confirm that the two drywells are in fact the source of the PCBs and that there are no other upgradient source areas contributing to the PCBs detected in groundwater.

Subsequent to the environmental investigation and PCB characterization efforts, a feasibility study (Focused Feasibility Study) was performed to evaluate remedial alternatives for the PCB impacted soils. Following a risk assessment and thorough remedial alternative screening, it was determined that "no action," together with an environmental easement (i.e., both engineering and institutional controls) was the recommended alternative. H2M concurs with the conclusions of the Focused Feasibility Study. Considering future commercial/industrial site use, paving of the impacted areas and implementation of a deed restriction, "no action" is a supportable alternative. As noted previously, the BRAB would like assurances that the proposed environmental easement (i.e., deed restriction) is adequately protective as relates to maintaining the soil cover/asphalt cap and restricting any disturbance of the subsurface soils in the vicinity of the two drywells, and that mechanisms be established to ensure that any County or Town agency with authority to approve applications that affect the use or development of the property be aware of the environmental easement.