

# Final Work Plan

## Investigation of Groundwater Flow and Perchlorate at Site 21, Indian Head Division-NSWC

### Indian Head, Maryland

PREPARED FOR: Jeff Morris/EFACHES  
Dennis Orenshaw/EPA Region III  
Curtis DeTore/MDE  
Heidi Morgan/IHDIV-NSWC

PREPARED BY: David Steckler/CH2M HILL

COPIES: Margaret Kasim/CH2M HILL  
Bob Root/CH2M HILL  
Anne Estabrook/CH2M HILL

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## Introduction

This technical memorandum (memo) presents the revised proposed scope of work for investigation activities at Site 21, Indian Head Division – Naval Surface Warfare Center (IHDIV-NSWC). The *Draft Final Remedial Investigation Report for Sites 11, 13, 17, 21 and 25* (CH2M HILL, 2002) identified perchlorate in the groundwater sample collected from the upgradient monitoring well for Site 21. Pre-feasibility study (FS) sampling performed after the report was completed confirmed the presence of perchlorate at Site 21. Because the perchlorate was identified in the upgradient monitoring well, the source was not readily identifiable. The report also noted that the groundwater flow regime at Site 21 was not well defined.

Based on a discussion at the September 2002 Indian Head Installation Restoration Team (IHIRT) meeting, an additional field effort was proposed with the following objectives: (1) identify the source of perchlorate in groundwater; (2) determine the areal and vertical extent of perchlorate in groundwater in the vicinity of the suspected source; and (3) better define the groundwater flow directions at the site. A draft work plan was submitted to the IHIRT on October 24, 2002 followed by further clarification of the scope during the October 2002 IHIRT meeting.

On November 13, 2002, a draft final work plan memorandum reflecting changes in the objective and scope agreed to during the November 7, 2002, conference call was submitted to the IHIRT. Based on a comment from the EFACHES NTR on the draft final work plan, the only change that is incorporated in this final document is that all boreholes will be left open pending the 24-hour turnaround time analytical results for perchlorate and a discussion by the IHIRT to decide if monitoring wells should be installed.

## Background

Site 21, the Bronson Road Landfill, is located between Building 602 and Bronson Road. In August of 2000, four groundwater samples were collected from monitoring wells installed earlier in the month. The samples were analyzed for perchlorate as well as for other parameters. Concentrations of perchlorate were detected in IS21MW01 and IS21MW04 at 2 micrograms per liter ( $\mu\text{g}/\text{L}$ ) and 2,000  $\mu\text{g}/\text{L}$ , respectively. Monitoring well IS21MW04 is located upgradient of the landfill, which suggests that material disposed of at the landfill is not the source of the perchlorate. Additionally, a literature search conducted at IHDIV-NSWC did not identify a potential source at Site 21. Pre-FS sampling conducted in July 2002 (CH2M HILL, 2002) confirmed the presence of perchlorate in groundwater. It should be noted that perchlorate was not detected in the sample collected from IS21MW01 and the concentration observed in the sample collected from IS21MW04 increased to 2,900  $\mu\text{g}/\text{L}$  for the July 2002 sampling event.

The draft final report also concluded that the groundwater flow regime was not well defined at Site 21. One monitoring well, IS21MW04, was installed upgradient of the landfill and three monitoring wells were installed downgradient of the landfill. Water levels measured in the four wells during the initial and follow-up sampling indicate that groundwater generally flows from the northeast to the southwest. However, at times, flow to the west and northwest is expected, most notably in the northern portion of the site. Additionally, there is some uncertainty that groundwater encountered at IS21MW04 flows toward the landfill or may flow more toward the east because the well is near the top of a topographic rise that may represent a groundwater divide.

## Proposed Scope of Work

Based on a discussion during the November 7, 2002, conference call, the objective of the additional field effort at Site 21 was revised to: determine if perchlorate in groundwater is associated with the landfill (Site 21). To accomplish this objective, the following scope of work is proposed.

Soil borings will be advanced using a hollow-stem auger (HSA) rig at the seven (7) locations shown on Figure 1. Each boring will be placed 50 feet from monitoring well IS21MW04. The north, south, and east locations will provide analytical results in those three geographic directions from IS21MW04. The borings located in an arc from northwest to southwest will provide spatial data between monitoring wells IS21MW04 and IS21MW01 (to the west) and between IS21MW04 and the landfill (Site 21). By this approach, the direction the perchlorate is migrating will be determined.

During advancement of each boring, split-spoon samples will be collected every 5 feet for lithology and soil samples will be collected at the surface and at the interval identified as having the highest silt and clay content, the most likely interval in which to find residual perchlorate. Hydropunch<sup>®</sup> groundwater samples will be collected nominally at two depths at each location. At the time of the August 2000 sampling, the water level in well IS21MW04 was approximately at the same depth as the top of the screen, which is 5 feet in length. However, since the drought began, the water level in the well likely has dropped in elevation. The shallow sample will be collected from a depth equivalent to the center of the

IS21MW04 screen that currently remains below the water table, in order to obtain information on current conditions. The deeper sample will be collected from a few feet deeper than the shallow sample in order to sample groundwater quality that may be more representative of conditions during the August 2000 sampling, when the water table was higher. All samples will be submitted to an analytical laboratory for perchlorate using United States Environmental Protection Agency (EPA) Method 314. Twenty-four hour turnaround time will be requested.

Following the completion of soil and groundwater sampling, all boreholes will remain open pending review of the analytical results and discussion of the results by the IHIRT via a conference call to determine if monitoring wells should be installed. Boreholes not converted to monitoring wells will be abandoned by tremie-grouting with cement/bentonite slurry. Boreholes converted to monitoring wells will be installed following standard operation procedures for installation of monitoring wells at Indian Head.

It is likely that, as the samples proposed above are collected and analyzed, a pattern of perchlorate detections reflecting groundwater flow will emerge (i.e., a plume of perchlorate moving in the direction of groundwater flow may be defined). This preliminary 'picture' of groundwater flow will be evaluated in conjunction with water level data collected during the two previous rounds of groundwater sampling to determine if the perchlorate is associated with the landfill (Site 21). The analytical results will be presented in a technical memorandum and submitted to the IHIRT. A conference call will be held to discuss the data obtained and agree on a course of action on how to proceed with the site.

The following should be noted:

- First, soil samples will be withheld from the analytical laboratory pending the results of groundwater sampling. If perchlorate is detected and is determined to be associated with the landfill, the soil samples may be analyzed for perchlorate. The decision to analyze soil samples will be made by the IHIRT in a conference call.
- Second, additional sampling may be performed if the IHIRT decides to better define the distribution of the perchlorate in the groundwater following evaluation of the groundwater analytical results.

## Schedule

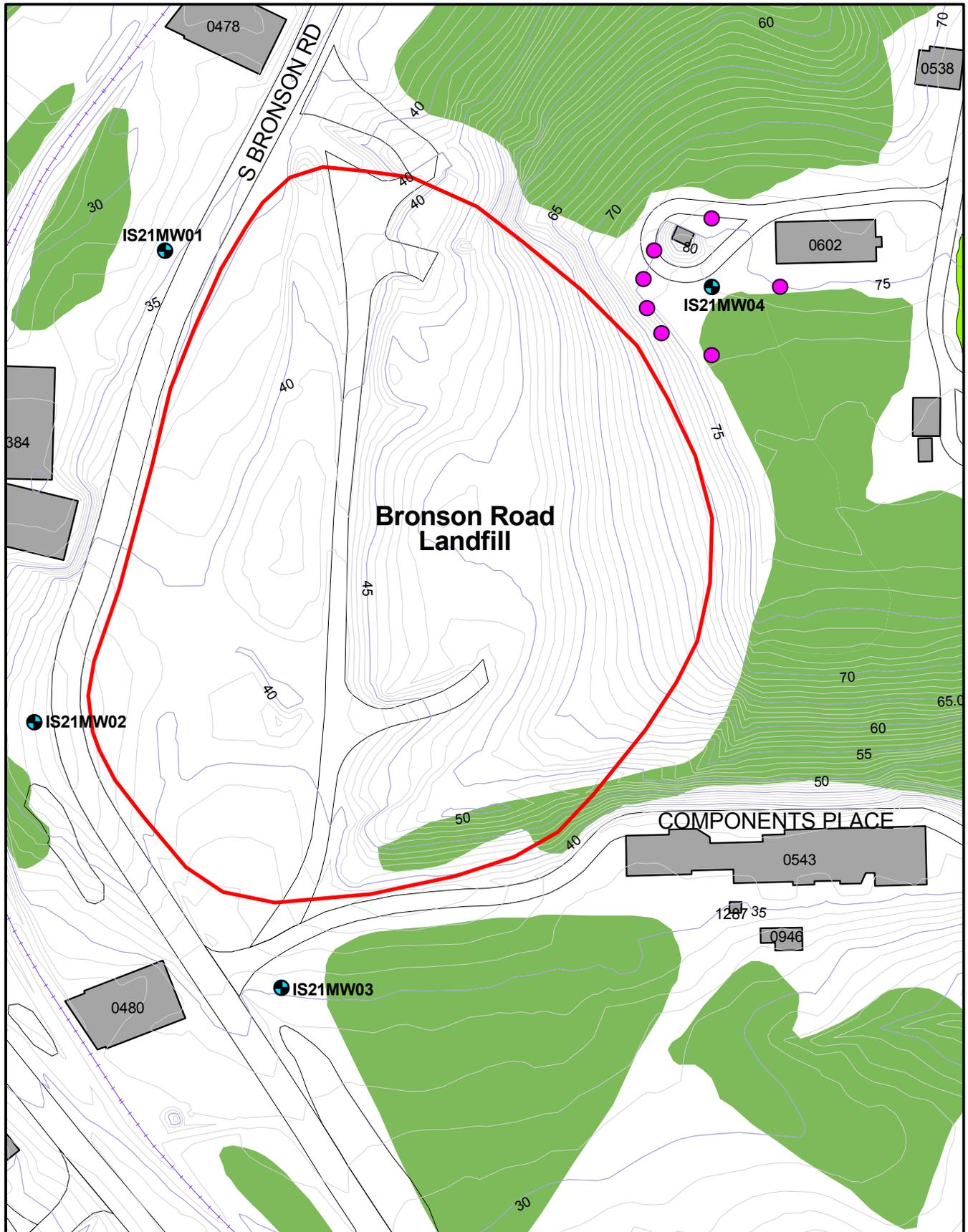
The schedule for fieldwork is constrained by the presence of a bald eagle nest located at Site 21. According to Ms. Heidi Morgan, the upcoming nesting season of the eagle is from December 15, 2002, through June 15, 2003. No heavy equipment can be used at the site during this time; therefore, field activities need to be conducted as soon as possible. The following schedule is proposed to meet the December 15, 2002, deadline:

- Initial soil and groundwater sampling and figure generation/distribution and conference call: December 2-6, 2002. The figure will show the sample locations and perchlorate concentration at each location.
- Possible monitoring wells: December 9-13, 2002.

## References

CH2M HILL. August 2002. *Draft Final Remedial Investigation Report, Sites 11, 13, 17, 21, and 25, Indian Head Division—NSWC, Indian Head, Maryland.*

CH2M HILL. October 2002. *Technical Memorandum: Pre-Feasibility Study Groundwater Sampling Activities Site 21 (Bronson Road Landfill), Indian Head Division-NSWC, Indian Head, Maryland*



**LEGEND**

-  Monitoring Well Location
-  Proposed Sampling Locations
-  IR Site Location
-  Buildings

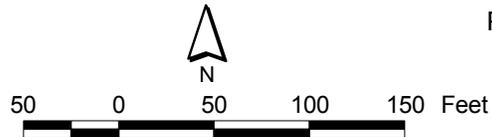


Figure 1  
Proposed Soil and Groundwater  
Sampling Locations  
Site 21  
IHDIV-NSWC  
Indian Head, Maryland