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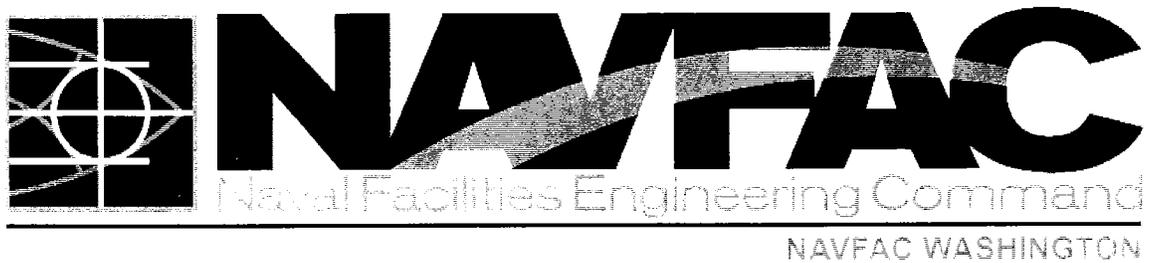
FINAL WORK PLAN FOR ADDITIONAL INVESTIGATION AT SITE 8 AND SITE 56 NSWC
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Final

Work Plan for Additional Investigation at Sites 8 and 56

Naval District Washington, Indian Head
Indian Head, Maryland



Prepared for

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CH2MHILL

Work Plan for Additional Investigation at Sites 8 and 56, NDWIH, Indian Head, Maryland

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Introduction

This work plan presents the proposed approach for sampling sediment and fish tissue downgradient of Site 8, Mercury Contamination at Building 766, and Site 56, Lead Contamination at Industrial Wastewater (IW) Outfall 87. Both sites are located at the Naval District Washington, Indian Head (NDWIH), in Indian Head, Maryland.

This work plan supplements and references the following documents:

- ABB Environmental Services, May 1991. *Technical Memorandum – Site 8 Nitroglycerin Plant Office*, Indian Head Naval Ordnance Station, Indian Head, MD, Chapter 4 – Mercury Speciation Study.
- Brown and Root Environmental, July 1995. *Summary Biomonitoring Report for Site 8 – Nitroglycerine Plant Office*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland.
- Brown and Root Environmental, February 1996. *Summary Biomonitoring Report for IR Site 56 – IW87 Lead Contaminated Outfall*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland.
- CH2M HILL, June 2004. *Draft Desktop Evaluation for Site 8 – Mercury Contamination at Building 766, and Site 56 – Lead Contamination at Industrial Wastewater Outfall 87*, Naval District Washington Indian Head (herein referred to as DTE).
- CH2M HILL, April 2005. *Final Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30* (herein referred to as the SSP Investigation Work Plan).

- Halliburton NUS, January 1993. *Site Characterization Report for Site 8 – Nitroglycerin Plant Office at Indian Head Division Naval Surface Warfare Center.*
- Halliburton NUS, April 1995. *Post Removal Action Report for Site 8 – Nitroglycerin Plant Office at Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland.*
- OHM Remediation Services Corporation, February 1997. *Draft Final Summary Report for Removal of Lead-Contaminated Soil at Site 56, Naval Surface Warfare Center, Indian Head, Maryland (herein referred to as Site 56 Post-RA Report).*
- Tetra Tech NUS, July 1999. *Remedial Investigation Report for Sites 12, 39/41, 42, and 44, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland (herein referred to as the Site 12 RI Report).*
- Tetra Tech, NUS, June 2004. *Master Plans for Installation Restoration Program Environmental Investigations, Naval District Washington, Indian Head, Indian Head, Maryland (herein referred to as Master Work Plan).*
- USEPA, October 2004. OSWER 9240.I-45, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final (EPA 540-R-04-004).*

This work plan also incorporates discussions held during a March 8, 2005, teleconference with Naval Facilities Engineering Command (NAVAFAC) Washington, NDWIH, U.S. Environmental Protection Agency (EPA), EPA Biological Technical Assistance Group (EPA-BTAG), and CH2M HILL. The meeting discussion is summarized in a telephone conversation record entitled "Sites 8 and 56 Desktop Evaluation (DTE) Technical Memorandum," dated March 8, 2005. The Maryland Department of the Environment (MDE) provided concurrence with the March 8, 2005, discussions in e-mail correspondence dated May 5, 2005.

Rationale for Field Investigation

The DTE summarized historical site usage, removal actions, and investigation results from Site 8, Site 56, and the downstream marsh/pond area. As described in the DTE, historic operations at Sites 8 and 56 released mercury and lead, respectively, into downstream stream channels and the marsh/pond area. Sediment removal actions were performed at Sites 8 and 56 in 1994 and 1996, respectively, to address lead and mercury in downstream sediments. Tables 1 and 2 summarize the residual mercury and residual lead concentrations, respectively, in sediment from different areas within Sites 8 and 56. The data presented are the most recent obtained from the various sources reviewed during preparation of the DTE.

From October 1992 until November 1995, whole-body fish samples and other aquatic organisms were collected from the pond and two control sites as part of a quarterly biomonitoring program. Samples collected between October 1992 and October 1994 were analyzed for mercury, and samples collected between April 1994 and November 1995 were analyzed for lead. During the biomonitoring program, the three fish species collected most frequently were brown bullhead (*Ameiurus nebulosus*), eastern mosquitofish (*Gambusia holbrooki*), and bluegill (*Lepomis macrochirus*). All fish of each species were combined and homogenized, with one analysis performed per composite species sample. Analytical results from the tissue analyses are presented in Table 3 (mercury) and Table 4 (lead).

Although mercury levels in the pond sediment samples were found to be higher than those at the control sites, there did not appear to be a corresponding increase in mercury levels detected in fish and other aquatic organisms at Site 8. Only one fish species, the eastern mosquitofish (*Gambusia holbrooki*), appeared to contain tissue concentrations of mercury that were above background, but predatory fish species (e.g., white crappie) in the Site 8 pond that feed on *Gambusia* did not contain elevated levels of mercury. There was no evidence to suggest that fish and wildlife at Site 8 were affected by mercury contamination. Similarly, biomonitoring data yielded no evidence of food chain biomagnification and no evidence to suggest that fish at Site 8 were affected by elevated levels of lead in the sediments.

The metals detected in fish tissue were found at low enough concentrations that the DTE recommended no further action for Sites 8 and 56. The team, however, agreed during the March 8, 2005, teleconference that additional investigation was warranted for the following reasons:

- Current sediment concentrations of lead and mercury should be determined for locations downstream of the Site 8 and Site 56 removal actions. Downstream sediment samples from the middle and lower sections of the main stream channel have not been collected since the sediment removal action was performed at Site 8 in 1994.
- Current fish tissue concentrations of mercury and lead should be assessed in the pond. Fish tissue samples from the pond have not been collected since the last biomonitoring study was performed, in November 1995.
- Current sediment concentrations of lead and mercury should be assessed in the pond. Sediment samples have not been collected from the pond since 1997.

The Indian Head Installation Restoration Team (IHIRT) will use the data to make a risk management decision for closure of Sites 8 and 56.

Objectives

The objectives for this additional investigation are to characterize current lead and mercury concentrations in:

- The middle and lower sections of the stream and the pond sediment and compare the results to historical concentrations to determine if the concentrations have changed
- Fish tissue from the pond and compare the results to historical concentrations to determine if the concentrations have changed and to assess bioavailability of lead and mercury in fish

Figure 1 shows the proposed locations for sediment and fish tissue sampling.

Scope of Work

Field activities to be conducted under this work plan consist of the following:

- Mobilization/demobilization
- Sediment sampling in the middle and lower sections of the stream
- Sediment sampling in the pond
- Fish tissue sampling in the pond

- Quality assurance/quality control (QA/QC) sampling
- Surveying of sample locations
- Decontamination of sampling equipment
- Investigation-derived waste (IDW) handling

Each of these activities is discussed in detail below.

Mobilization/Demobilization

Mobilization activities will be coordinated with the Navy and will include staking out sample locations and orienting field staff to the site. Prior to mobilization, CH2M HILL field personnel will review this work plan. The Navy will verify the accessibility of the investigation area (accessibility may be an issue because of nearby site operations by NDWIH personnel). Demobilization will consist of following proper decontamination procedures for all personnel and equipment and making sure that the site is left in its original condition prior to mobilization.

Sediment Sampling in the Middle and Lower Sections of the Stream

Figure 1 shows the proposed locations of eight sediment samples in the middle and lower sections of the stream. These samples will be analyzed for total lead and total mercury using the EPA CLP Inorganics SOW ILM04 protocol.

Stream sediment samples will be biased toward areas where sediment deposition has occurred; these depositional areas will be selected as close as possible to their respective proposed sediment sampling locations, shown in Figure 1. If no apparent depositional areas are observed, this will be noted in the field log book, and the sediment sample will be collected from the proposed locations themselves.

Sediment samples will be collected using a hand core sampler with precleaned liner tubes and core catchers, if necessary. This methodology will ensure minimal loss of fine material from the upper sediment during sediment collection. The core liner will be inserted into the sediment to a depth of at least 6 inches and will be capped after insertion to prevent loss of the sample upon retrieval. After retrieval, the top 6 inches of the core will be extruded with a wooden dowel from the bottom end into a precleaned stainless steel bowl and homogenized. The samples will then be transferred to the sampling container, which will then be placed in a cooler with ice and stored at 4 degrees Celsius.

Sediment Sampling in the Pond

Figure 1 shows the proposed four sediment sample locations in the pond. The sediment samples will be analyzed for lead and mercury using the same methods described above for stream sediment samples.

Pond sediment samples will be collected using a hand core sediment sampler with precleaned core liner tubes and core catchers, if necessary. The sediment core sampler will be inserted into the pond sediments to a depth of at least 6 inches. Depending on the depth of water at each sample station, a T-handle with the necessary number of 5-foot extension rods will be used to reach the pond bottom. After retrieval, each sediment core will be extruded and processed as described above for the stream sediment samples, in order to capture the 0 to 6 inch sediment interval below the sediment-water interface. If insufficient

sample volume is recovered using the hand core sampler, then a Ponar grab sampler will be utilized to collect sediment samples from the pond.

Each sample will be placed in a stainless steel bowl, homogenized, and transferred to the sampling containers, which will then be placed in a cooler with ice and stored at 4 degrees Celsius.

Fish Tissue Sampling in the Pond

The sampling effort proposed below is designed to replicate the previous biomonitoring methodology to maximize data comparability. During the previous sampling, performed between 1992 and 1994, fish were collected using a variety of methods, including baited trap nets, baited minnow traps, monofilament gill nets, and electrofishing. The three fish species that were collected most frequently over the seven sampling events were brown bullhead, eastern mosquitofish, and bluegill. Seven other fish species were collected at various times during the biomonitoring, but only on one sampling date each. These species consist of carp, shiner (*Notropis sp.*), creek chubsucker (*Erimyzon oblongus*), mummichog (*Fundulus heteroclitus*), pumpkinseed (*Lepomis gibbosus*), warmouth (*Lepomis gulosus*), and white crappie (*Pomoxis annularis*).

The three fish species caught most frequently during previous sampling events -- brown bullhead, eastern mosquitofish, and bluegill -- will be targeted for collection during this sampling event. These species will provide data for comparison with historical fish tissue data from the pond.

Figure 1 shows the location of the pond. Individual bluegill and bullhead samples will be collected from two areas of the pond: the northern portion of the pond, in the vicinity of sediment sample IS08PS02, and the southern end of the pond, near sediment sample IS08PS04 and the pond outlet. Four eastern mosquitofish samples will be collected from the pond in the same locations as the sediment samples.

Each sample of bullhead and bluegill will consist of one individual fish, assuming that the fish are large enough to provide sufficient tissue for a sample. Because of their smaller size, the bluegill may require more than one individual fish to provide sufficient tissue for laboratory analysis. Each eastern mosquitofish sample will consist of at least 10 individual fish. If insufficient fish tissue is collected at one or more of the sampling locations, then tissue collected from an adjacent sampling location will be composited to provide a sample for laboratory analysis. Midsize specimens will be collected for each species, avoiding very young and very old individuals, in order to get a good representation of the population. In the unlikely event that these species are not found during sampling, one or more of the other species collected historically will be collected preferentially over any new fish species encountered.

Fish will be collected using a combination of baited trap nets and baited minnow traps, and possibly an experimental mesh monofilament gill net. The trap nets and minnow traps will be placed near the shore in 1 to 3 feet of water and left overnight. Nontarget fish species will be recorded and released.

The length and weight of each fish constituting the composite species samples will be recorded. Each composite fish sample will be homogenized in the laboratory, and one

subsample of the homogenized whole-body composite will be analyzed from each species sample. The samples will be analyzed for total lead and total mercury, percent lipids, and percent moisture. Tissue samples will be analyzed for total lead and total mercury using the EPA CLP Inorganics SOW ILM04 protocol.

Sampling Frequency, QA/QC Samples, and Sample Handling

Table 5 presents the sample media, number of samples, and analyses for this investigation. The appropriate number of field QA/QC samples – including field blanks, equipment blanks, duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples – will be analyzed in addition to laboratory QA/QC samples. Table 6 presents the analytical procedures and the frequency at which field QA/QC samples will be collected. Tables 7 and 8 list the sample containers, preservatives, and holding times required for the intended analyses for the fish tissue and sediment samples. Samples will be labeled, handled, documented, packaged, and shipped as detailed in the Master Work Plan and utilizing the protocol from the remedial investigation. An equipment blank will be taken at the end of the sampling to demonstrate that decontamination of the equipment was acceptable.

Survey of Sample Locations

The horizontal locations (northing and easting coordinates) of the sediment samples will be surveyed with a portable global positioning system (GPS) unit. The horizontal locations will be referenced to the 1983 North American datum.

Decontamination of Sampling Equipment

All nondedicated sampling equipment will be decontaminated prior to sampling activities and after each use. To minimize the amount of liquid IDW, disposable liners will be used for sampling activities. Decontamination procedures are presented in the SOP provided in the Master Work Plan.

IDW Handling

A minimal amount of IDW, consisting entirely of decontamination fluids, will be generated during this sampling program. Decontamination fluids will be stored in 5-gallon buckets for sampling and disposed of in accordance with procedures set forth in the SSP Investigation Work Plan. All personal protective equipment used during sampling will be disposed of in the facility dumpsters.

Documentation

All sampling and field information will be documented in a field log book.

Data Comparison

Following laboratory analysis of the samples, a third-party data validator will validate the data. For each environmental medium sampled (stream sediment, pond sediment, and fish tissue), the validated data (or, “new data”) will be compared against previous sampling data (or, “historical data”) to assess comparability of the datasets. During the March 8, 2005, teleconference call, team members agreed that if the lead and mercury concentrations are lower than those from previous sampling events, this would suggest that there is no further impact from Sites 8 and 56 and no further action would be warranted for these sites.

However, if the concentrations are not lower than previous sampling results, then the team will have to make a risk management decision as to the path forward for these sites.

On the basis of discussions during an IHIRT Partnering Meeting on June 30, 2005, and a subsequent conference call on July 6, 2005, IHIRT agreed on a protocol for comparing new and historical datasets. Depending on the sample medium, the comparison protocol will comprise the Analytical Variability Evaluation or Statistical Comparison or both. These components are described in the paragraphs that follow.

Analytical Variability Evaluation

In order to determine if the new data are comparable to historical data, an analytical variability evaluation will be performed. The rationale for this procedure is laid out below.

USEPA has published guidelines for data validation of inorganic environmental samples under the CERCLA program (USEPA, 2004). In this document, USEPA establishes acceptable ranges of concentrations for duplicate laboratory analyses to account for variability in sampling and laboratory procedures, methods, instrumentation, and ambient conditions. The ranges are calculated using the relative percent difference (RPD) between the primary sample concentration and the duplicate sample concentration (see equation below).

$$RPD = ([S - D] / [S + D]/2) \times 100$$

where:

S = primary sample concentration

D = duplicate sample concentration

The RPD calculation does not apply when the concentrations are close to the reporting limit (lowest calibration point) or when both samples are nondetects, as the RPD between very small concentrations is much higher than between midrange concentrations. The guidance directs an upper range equal to the reporting limit for aqueous samples that is less than five times the reporting limit and an upper range equal to twice the reporting limit for soil samples less than five times the reporting limit.

Section VI.C of the USEPA document indicates an acceptable range of ± 20 percent RPD for aqueous samples and ± 35 percent RPD for soil samples. Concentrations that fall within these ranges are considered equally representative of the true concentration. Based on this guidance, an acceptable range of ± 35 percent has been selected for sediment samples.

On the basis of the USEPA guidelines referenced above, an analytical variability evaluation will be performed on the new and historical datasets:

Use a change in concentration of ± 35 percent, based on (1) maxima for pond sediment and fish tissue and (2) means for stream sediment, in decision rules as the margin for determining an increase in constituent concentrations. This margin accounts for the inherent variability associated with laboratory analysis, as well as the potential uncertainty associated with potential differences in the size and age of individual fish used in the composite sample.

Figure 2 presents a schematic of three possible outcomes stemming from a comparison of the new dataset to the historical dataset based on the ± 35 percent variability of the analytical results described above. These possible outcomes are:

- Improbable increase in constituent concentrations
- Possible increase in constituent concentrations
- Probable increase in constituent concentrations

As described below, the outcome of this comparison will be used to recommend the appropriate next step at Site 8, Site 56, and the pond.

Statistical Comparison

Because a sufficient population of stream sediment samples will be collected during the investigation at Sites 8 and 56, new and historic stream sediment data will be statistically compared, in addition to the analytical variability evaluation described above.

The objective of the statistical comparison is to determine whether a statistically significant increase in lead or mercury has occurred since the historic samples were collected. The first step of the statistical analysis will be to determine whether the datasets are normally distributed. If the data are found to be normally distributed, then a Student's *t*-Test will be performed to determine if statistically significant increases in lead and mercury concentrations have occurred. If the data are not normally distributed, then a Wilcoxon Rank Sum Test will be performed to compare the data sets.

Data Comparison Summary

The analytical variability evaluation and statistical comparison methods described above are presented schematically in Figure 3. The following summarizes the comparison procedures for each environmental medium; these procedures will be followed for both lead and mercury concentrations.

- **Stream sediment samples** – Historical and new data will be compared using both the analytical variability evaluation on the mean concentrations and the statistical comparison procedures described above.
- **Pond sediment and fish tissue samples** – Historical and new data will be compared using the analytical variability evaluation on the maximum concentrations. (Each species of fish will be evaluated separately to determine whether any of the species have shown a probable increase in lead or mercury concentrations).

Data Evaluation

The results of the data comparison presented above will be used to recommend the appropriate next steps at Sites 8 and 56. The following paragraphs provide the decision logic that will be followed in performing this comparison to determine the appropriate site management decision for Site 8, Site 56, and the pond.

It should be noted that the decision logic presented in this work plan is intended neither to be overly prescriptive nor to anticipate every possible outcome stemming from the data comparison described above. The decision logic is intended to provide the recommended

path forward for Site 8, Site 56, and the pond to expedite IHIRT concurrence on the site management decisions for each of these locations. Regardless of the outcome of the data comparison, IHIRT will discuss the results of the comparison and reach consensus on the appropriate next step for each of the sites before any further steps are taken.

The following decision logic will be followed for both lead and mercury concentrations:

Step 1: Compare Mercury/Lead Concentrations in Fish Tissue and Pond Sediment

Four general outcomes exist when comparing current and previous mercury and lead concentrations in fish tissue and pond sediment:

- **Scenario A** – Concentrations in fish tissue have increased (i.e., possible or probable increase as defined in Figure 2), but concentrations in pond sediment have decreased from those in the historical dataset
- **Scenario B** – Concentrations in both fish tissue and pond sediment in the new dataset have increased from those in the historical dataset
- **Scenario C** – Concentrations in fish tissue have decreased, but concentrations in pond sediment have increased from those in the historical dataset
- **Scenario D** – Concentrations in both fish tissue and pond sediment have decreased from those in the historical dataset

Each of these scenarios is displayed schematically in Figure 4.

Step 2: Compare Mercury/Lead Concentrations in Stream Sediment

Once the appropriate scenario from step 1 has been determined, a comparison between the current and previous mercury/lead concentrations in the stream sediment will be performed to determine the appropriate next step for Sites 8 and 56. As shown in Figure 4, one or more of the following site management recommendations will be made at Sites 8 and 56 depending on the outcome of this second comparison:

- Sites 8 and 56 will be recommended for closure under any of the four scenarios from step 1 if maximum mercury or lead concentrations in stream sediment have decreased from those in the earlier dataset.
- A Screening Ecological Risk Assessment (SERA) will be performed for the stream and pond if either lead or mercury concentrations have increased in fish tissue and in stream sediments (possible under Scenario A or Scenario B). The results of the SERA will be used to guide risk management decisions for Sites 8 and 56.
- Further evaluation of historic fish data will be performed if either lead or mercury concentrations in fish tissue have increased, but concentrations have declined in the pond and stream sediments (Scenario A). The purpose of the evaluation will be to determine if the increase in fish tissue concentrations might be related to differences in age or size of fish collected. Under this outcome, Sites 8 and 56 will be recommended for closure.

- A source evaluation and SERA for the pond will be performed if lead or mercury concentrations in fish tissue and pond sediments have increased, but concentrations have declined in stream sediments (Scenario B). Under this outcome, Sites 8 and 56 would be recommended for closure, but additional evaluation of the pond would be required to identify whether other sources contributing to the lead or mercury concentrations might exist.
- Future biomonitoring will be performed if lead and mercury concentrations decline in fish tissue but increase in stream sediments. This outcome is possible under Scenario C (biomonitoring in the pond and stream) or Scenario D (biomonitoring only in the stream). This outcome would indicate that lead and mercury accumulation in the food chain has not increased but that a potential source is still present in the stream sediments, which would warrant future biomonitoring in the pond.

Data Reporting

Field activities, analytical results, data evaluation and interpretation, and recommendations based on the decision logic provided in Figure 4 will be presented in a technical memorandum for submittal to the IHIRT.

Standard Operating Procedures

Fieldwork will follow the standard operating procedures provided in the Master Work Plan and will be consistent with procedures described in the SSP Investigation Work Plan.

Health and Safety

Health and safety procedures will follow those described in the Master Work Plan, the CH2M HILL Master Health and Safety Plan for NDWIH, and the Sites 8 and 56 Specific Health and Safety Plan.

Schedule

Fieldwork is anticipated to occur in conjunction with field investigations for other sites. This work is planned for fall 2005.

TABLE 1
Residual Mercury Concentrations in Sediment, Sites 8 and 56
NDWIH, Indian Head, Maryland

Area Name	# Samples	Mean	Median	Range	Date Sampled	Source Report
Building 766 Area	3	0.19	0.03	ND—0.518	Aug. 1994	1995 Site 8 Post-RA Report
Upper Section of Stream	21	1.30	0.46	ND—8.65	Aug. 1994	1995 Site 8 Post-RA Report
Midsection of Stream	18	0.39	ND	ND—0.48 K(m)	Sept. 1992	1993 Site Characterization Report
Lower Section of Stream	36	4.20	ND	ND—7.4 K(m)	Sept. 1992	1993 Site Characterization Report
Marsh/Pond Area	3	0.12	0.1	0.09—0.16	Oct. 1997	1999 Site 12 Remedial Investigation Report
Area Downstream of Noble Road	12	0.39	ND	ND—1.6	Sept. 1992	1993 Site Characterization Report

All units are in milligrams per kilogram
 ND—Value is non-detect as reported by the laboratory
 K(m)—Positive result is estimated and biased high due to high matrix spike recovery
 Mean is calculated as average of all normal samples; nondetect values were included in the mean as one half the nondetect (U-flagged) analytical result.

TABLE 2
Residual Lead Concentrations in Sediment, Sites 8 and 56
NDWIH, Indian Head, Maryland

Area Name	# Samples	Mean	Median	Range	Date Sampled	Source Report
Midsection of Stream	1	8.73	8.73	8.73*	May 1994	April 1994 Biomonitoring Report
IW-87 Outfall Area	14	10.2	8.65	2.6—20.5	Sept. 1996	1997 Site 56 Post-RA Report
Lower Section of Stream	4	530	636	40.6—811	May 1994	April 1994 Biomonitoring Report
Marsh/Pond Area	3	40	39.6J	28.1J— 52.2J	Oct. 1997	1999 Site 12 Remedial Investigation Report

* Only one sample was collected in 1994.

All units are in milligrams per kilogram.
 ND—Value is nondetect as reported by the laboratory
 K(m)—Positive result is estimated and biased high due to high matrix spike recovery.
 Mean is calculated as average of all normal samples; nondetect values were included in the mean as one half the nondetect (U-flagged) analytical result.

TABLE 3
Historical Mercury Concentrations in Fish Tissue, Site 8
NDWIH, Indian Head, Maryland

Species	Oct 92	Jan 93	Apr 93	Jul 93	Oct 93	Apr 94	Oct 94
Brown bullhead*	0.04 (3)			0.05 (2)	0.05 (1)		0.06 (2)
Mosquitofish*	0.06 (16)	0.15 (4)			0.12 (36)		0.27 (75)
Bluegill*	0.02 (11)	0.02 (6)	0.06 (1)	0.09 (2)		0.07 (3)	0.07 (4)
Gizzard shad	—	—	—	—	—	—	—
Goldfish	—	—	—	—	—	—	—
Common carp	—	—	—	—	—	—	—
Creek chubsucker	—	0.03 (1)	—	—	—	—	—
Largemouth bass	—	—	—	—	—	—	—
Largemouth bass	—	—	—	—	—	—	—
White crappie	—	—	—	—	—	—	0.06 (2)
Black crappie	—	—	—	—	—	—	—
Pumpkinseed	—	—	—	—	—	0.09 (3)	—
Carp	—	—	—	—	—	0.03 (2)	—
Shiner	—	—	—	—	0.05 (4)	—	—
Mummichog	—	—	0.03 (8)	—	—	—	—
Warmouth	—	—	—	0.23 (1)	—	—	—
Crayfish	—	—	—	0.07 (2)	0.09 (4)	—	—

All units are in milligrams per kilogram.

Parentheses indicate the number of fish comprising the sample that was analyzed.

* Fish species targeted for sampling during the 2005 investigation. The maximum concentration for each species is shown in bold and italics.

Data are from *Summary Biomonitoring Report for Site 8—Nitroglycerin Plant Office*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, July 1995.

TABLE 4
Historical Lead Concentrations in Fish Tissue, Sites 8 and 56
NDWIH, Indian Head, Maryland

Species	Apr 94	Oct 94	Aug 95	Nov 95
Brown bullhead ^a		0.5 (2)		1.2 (4)
Mosquitofish ^a		0.2 (75)	0.3 (100+)	
Bluegill ^a	<0.2 ^b (3)	0.2 U (4)	0.2 (12)	0.4 (12)
Gizzard shad			1.6 (1)	0.7 (6)
Goldfish			0.3 (2)	0.4 (3)
Common carp	<0.2 ^b (2)		0.4 (2)	<0.2 ^b (1)
Creek chubsucker			0.4 (3)	0.4 (2)
Largemouth bass			0.7 (1)	0.2 U (2)
Largemouth bass			0.2 U (3)	
White crappie		0.2 U (2)	0.2 U (8)	<0.2 ^b (2)
Black crappie			<0.2 (3)	<0.2 ^b (6)
Pumpkinseed	0.2 U (3)			
Carp				
Shiner				
Mummichog				
Warmouth				
Crayfish				

All units are in milligrams per kilogram.
Parentheses indicate the number of fish composing the sample.
U—Nondetect, level shown is the detection limit.

^aFish species targeted for sampling during the 2005 investigation. The maximum concentration for each species is shown in bold and italics.

^bDetected, but below measurable quantity.

Data are from: *Summary Biomonitoring Report for Lead at Site 8—Nitroglycerin Plant Office*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, July 1995.

Summary Biomonitoring Report for IR Site 56—IW87, Lead Contaminated Outfall, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, February 1996.

TABLE 5
Sampling and Analysis Summary, Sites 8 and 56
NDWIH, Indian Head, Maryland

Media	Number of Samples	Analysis/ Method	Procedures
Sediment in Middle and Lower Sections of the Stream	8	Mercury, Lead, and Percent Moisture by CLP ILM04	Obtain sediment samples with a hand core sediment sampler
Sediment in the Pond	4	Mercury, Lead, and Percent Moisture by CLP ILM04	Obtain sediment samples with a hand core sediment sampler
Fish Tissue in the Pond	8	Mercury, Lead, and Percent Moisture by CLP ILM04* Percent Lipids	Catch fish using a combination of baited fish traps, baited minnow traps, and possibly an experimental mesh monofilament gill net.

*Tissue laboratory may not be able to perform the CLP ILM04 method and may request lead, mercury, and percent moisture by SW846.

TABLE 6
Summary of Samples to be Submitted for Analysis, Sites 8 and 56
NDWIH, Indian Head, Maryland

Matrix	Laboratory Parameter (Method)	Samples	Field Duplicates ¹	Field Blanks ²	Equipment Blanks ³	Trip Blanks	Solids Total	Aqueous Total	MS/MSDs ⁴
Sediment in Middle and Lower Sections of the Stream	Lead, Mercury, and Percent Moisture by CLP ILM04	8	1	1	1	—	9	2	1/1
Sediment in the Pond	Lead, Mercury, and Percent Moisture by CLP ILM04	4	1	—	—	—	5	—	—
Fish Tissue in the Pond ⁴	Lead, Mercury, and Percent Moisture by CLP ILM04*	8	1	—	—	—	9	—	1/1
	Percent lipids	8	—	—	—	—	8	—	1/1

¹Field duplicates are collected at a rate of 1 per 10 samples per matrix. Field duplicates will be collected from one fish species rather than from all three species that are sampled.

²Field blanks are collected at a rate of 1 per sampling event per week.

One equipment blank is collected at the beginning of the sampling event to show that decontamination procedures were acceptable.

³Up to eight fish tissue samples will be collected: 2 individual bluegill samples, 2 individual bullhead samples, and 4 composite eastern mosquitofish samples. Fewer than 8 samples will be collected if insufficient numbers of fish are caught during the sampling effort. Other fish species will be collected if bluegill, bullhead, or eastern mosquitofish are not encountered.

⁴Matrix Spikes/Matrix Spike Duplicates (MS/MSDs) are collected at a frequency of 1 per 20 per matrix. MS/MSDs represent samples for which extra volume must be collected for the laboratory to perform required QC analyses. Triple the normal volumes will be collected for all analyses.

*Tissue laboratory may not be able to perform the CLP ILM04 method and may request lead, mercury, and percent moisture by SW846.

TABLE 7

Summary of Required Containers, Preservatives, and Holding Times for Sediment and Fish Tissue Samples
Sites 8 and 56, NDWIH, Indian Head, Maryland

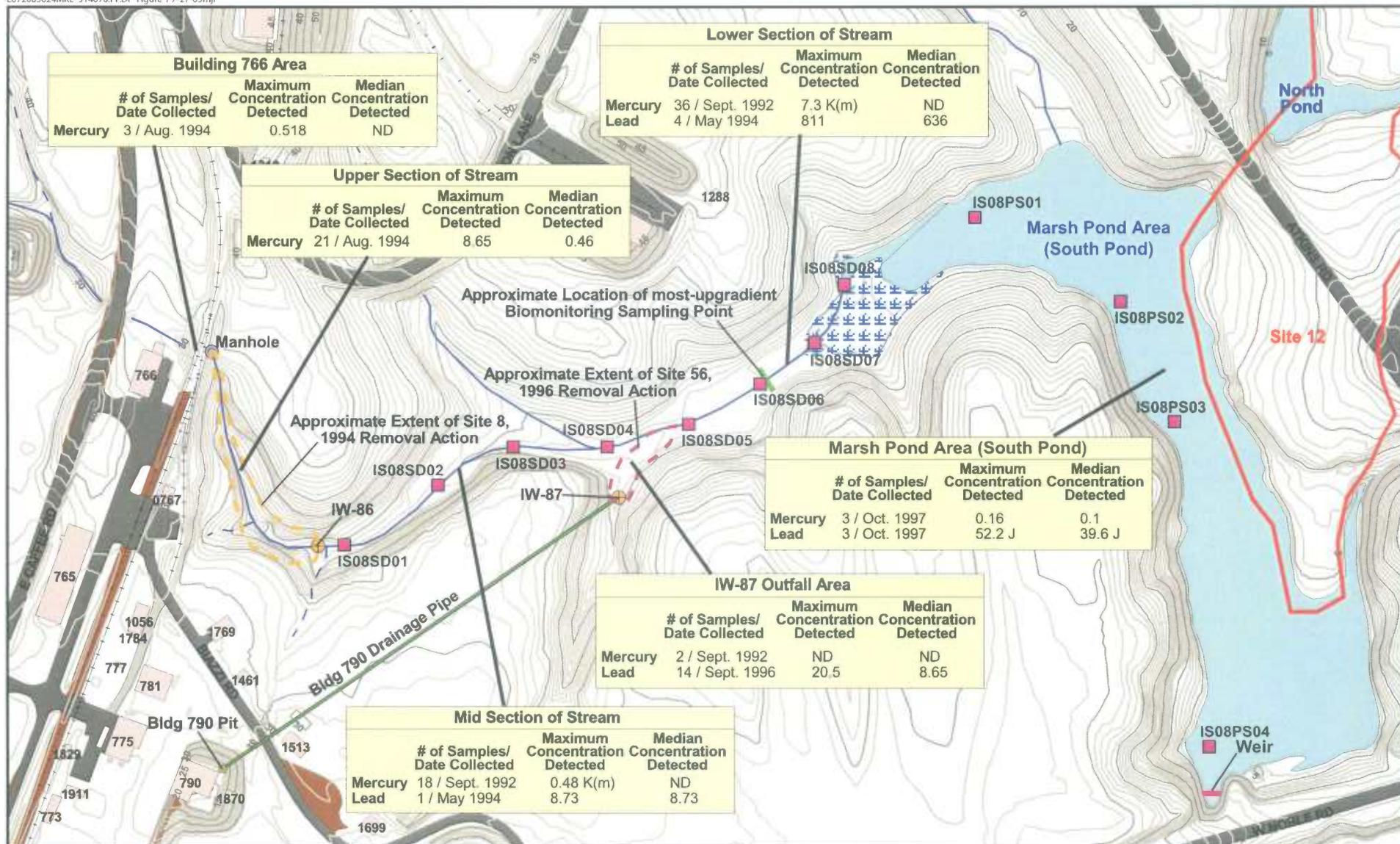
Sampling Medium	Parameters	Container Type	Preservation	Holding Time	Notes
Sediment (middle and lower sections of the stream and Pond)	Mercury, Lead, and Percent Moisture	One 8-oz jar	Cool to 4°C	6 months (28 days for Mercury)	All parameters can be analyzed from the same 8-oz jar
Fish Tissue (Pond)	Mercury, Lead, Percent Moisture, Percent Lipids	2 quart zip-lock bags (double bagged)*	Cool to 4°C	6 months (28 days for Mercury)	Composite sample generated in lab; field duplicate collected from composite sample in lab

* Ice in between and around bags

TABLE 8

Summary of Required Containers, Preservatives, and Holding Times for Liquid Samples
Sites 8 and 56, NDWIH, Indian Head, Maryland

Parameter	Container Type	Preservation	Holding Time
Lead and Mercury by CLP ILM04	One 500-ml plastic	Nitric acid to pH <2 and cool to 4°C	6 months (28 days for mercury)



- LEGEND**
- Sediment Sample Location
 - Approximate Extent of Site 8, 1994 Removal Action
 - Approximate Extent of Site 56, 1996 Removal Action
 - Building 790 Drainage Pipe
 - Perennial Swale
 - Intermittent Swale
 - Elevation Contours (1ft Interval)

- Railroads
- Marsh
- Buildings
- Asphalt Road
- Dirt Road
- Gravel Road



All results in mg/kg (milligrams per kilogram)
 ND - Non Detect
 K(m) - Positive result is estimated and biased high due to high matrix spike recovery
 J - Analyte was positively identified but the quantitation is an estimate

Figure 1
 Sediment Sample Locations
 Sites 8 and 56 Work Plan
 NDWIH, Indian Head, Maryland

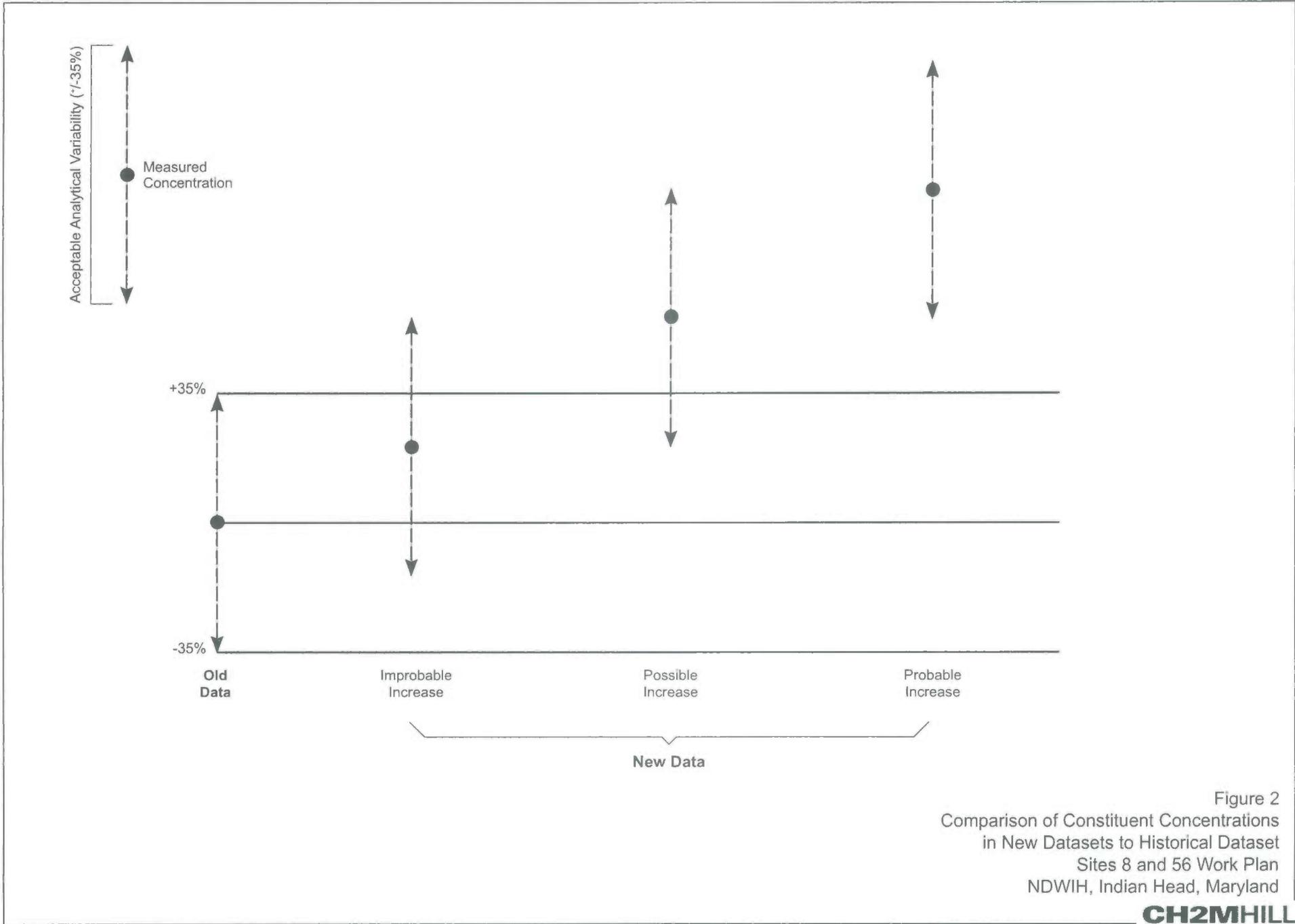


Figure 2
 Comparison of Constituent Concentrations
 in New Datasets to Historical Dataset
 Sites 8 and 56 Work Plan
 NDWIH, Indian Head, Maryland

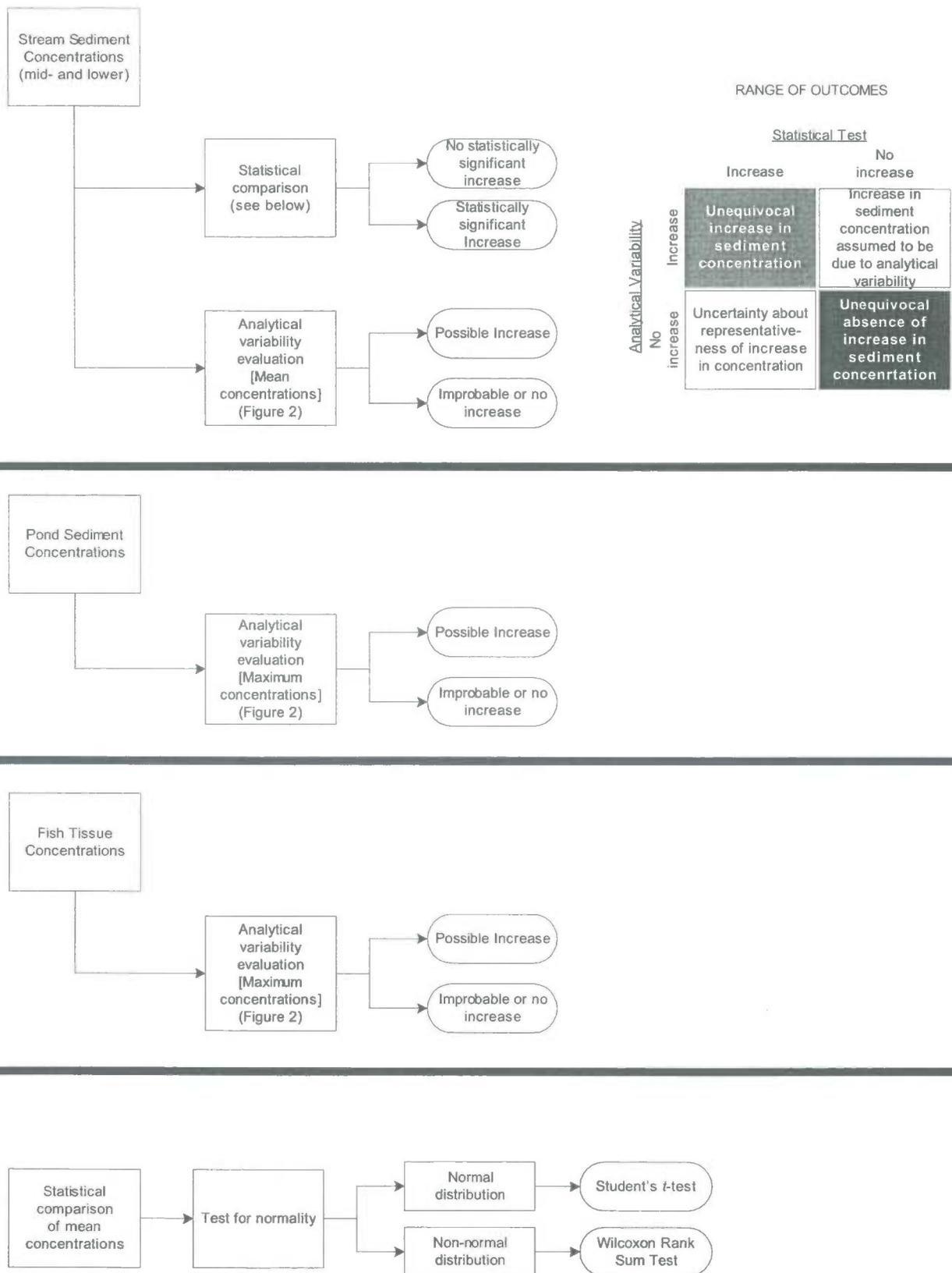
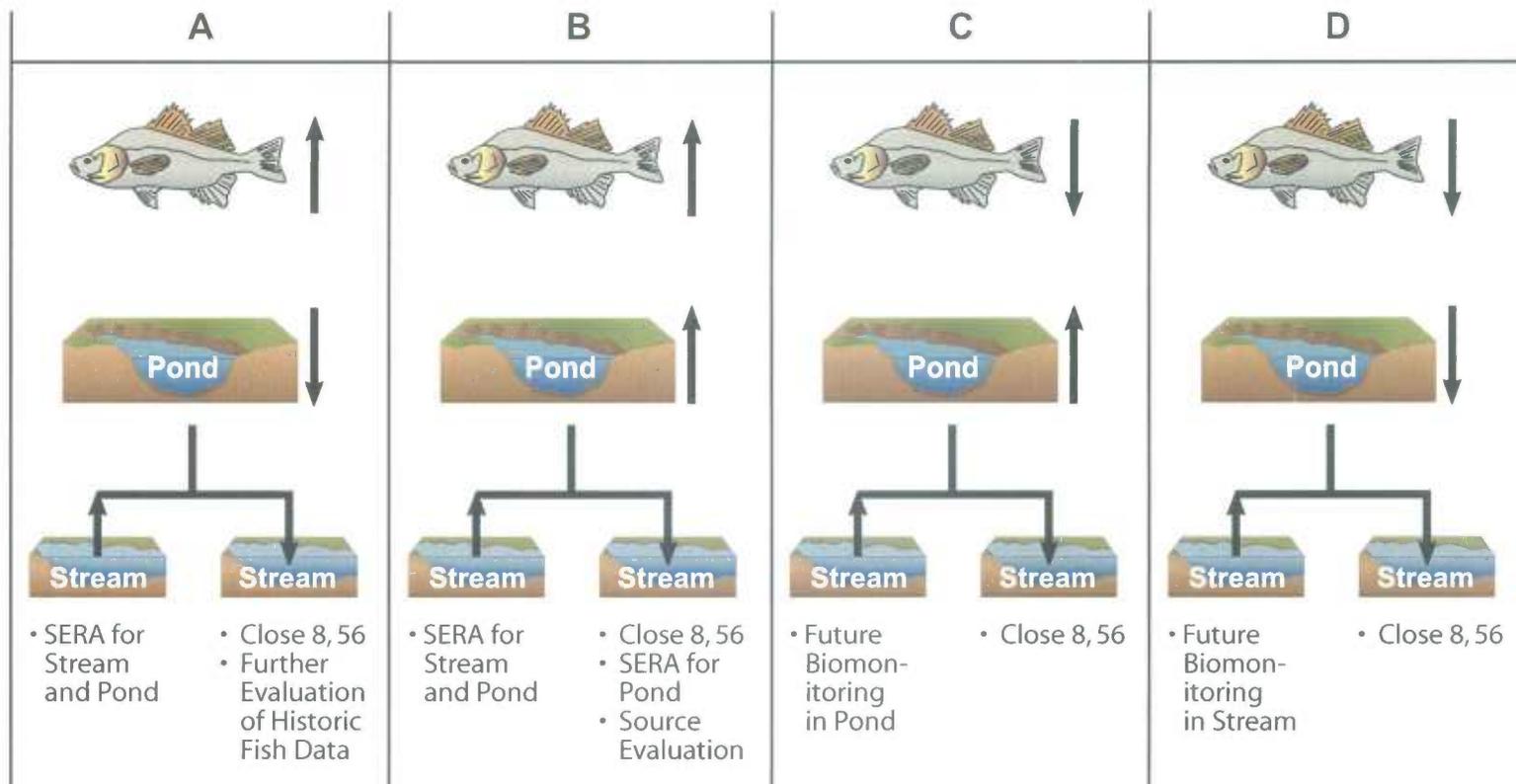


Figure 3
Proposed Data Comparison Approach for Stream Sediment,
Pond Sediment, and Fish Tissue Samples
Sites 8 and 56 Work Plan
NDWIH, Indian Head, Maryland



Possible or probable increase in concentration
 Decreasing concentration



Lead or Mercury concentration in stream sediment



Lead or Mercury concentration in fish tissue



Lead or Mercury concentration in pond sediment

Figure 4
 Decision Logic for Recommending the Next Steps
 at Site 8, Site 56, and Pond
 Sites 8 and 56 Work Plan
 NDWIH, Indian Head, Maryland



MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Robert L. Ehrlich, Jr.
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Secretary

Michael S. Steele
Lt. Governor

Jonas A. Jacobson
Deputy Secretary

November 30, 2005

Shawn Jorgensen
Naval District Washington, Indian Head
Code HN2SJ, Bldg. 289
101 Strauss Avenue
Indian Head, MD 20640-5035

RE: Final Work Plan for Additional Investigation at Sites 8 and 56, Naval
District Washington Indian Head, September 2005

Dear Mr. Jorgensen:

The Federal Facilities Division of the Maryland Department of the Environment's Hazardous Waste Program has no comment on the above referenced document. This document accurately addresses comments previously provided during Indian Head Installation Restoration Team meetings.

If you have any questions, please contact me at (410) 537-3791.

Sincerely,

Curtis DeTore
Remedial Project Manager
Federal Facilities Division

CD:mh

cc: Mr. Dennis Orenshaw
Mr. Jeff Morris
Mr. Horacio Tablada
Mr. Harold L. Dye, Jr.





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September 26, 2005

314070.PP.FP
05-CEE-0540

Commander
NAVFAC Washington
Mr. Jeff Morris, Code C21CE
Washington Navy Yard, Bldg. 212
1314 Harwood St., SE
Washington DC 20374-5018

Subject: Navy CLEAN II Program
Contract N62470-02-D-3052
Contract Task Order 0050
Work Plan for Additional Investigation at Sites 8 and 56
Naval District Washington, Indian Head, Indian Head, MD

Dear Jeff:

CH2M HILL is pleased to submit two hard copies and two CDs of the above-referenced document. Copies of the document have also been distributed as shown below.

If you have any questions regarding this deliverable, please do not hesitate to contact me at (314) 421-0313 ext. 221.

Sincerely,

CH2M HILL

Christopher E. English, P.E.
Project Manager

STL\LETTER 092605 Sites 8 & 56 WP.doc

Jeff Morris

Page 2

September 26, 2005

314070.PP.FP

c: Shawn Jorgensen/NDWIH (2 hard copies, 10 CDs)
 Curtis DeTore/MDE (1 hard copy, 1 CD)
 Dennis Orenshaw/USEPA (1 hard copy, 1 CD)
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Enclosures