REMOVAL ACTION DESIGN ENGINEERING REPORTS FOR REMOVAL OF SILVER CONTAMINATED SOIL SITE 5 NSWC INDIAN HEAD MD

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HALLIBURTON NUS

Removal Action Design Engineering Reports for Removal of Silver Contaminated Soil at Installation Restoration Site 5 Indian Head Division Naval Surface Warfare Center

Indian Head, Maryland

Northern Division
Naval Facilities Engineering Command
Contract Number N62472-90-D-1298
Contract Task Order 0157

Halliburton NUS
CORPORATION

Removal Action Design Engineering Reports

for

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Engineering Evaluation/ Cost Analysis (EE/CA) Report for Installation Restoration Site 5 - Swale 2 Indian Head Division Naval Surface Warfare Center

Indian Head, Maryland

Northern Division
Naval Facilities Engineering Command
Contract Number N62472-90-D-1298
Contract Task Order 0157

April 1994

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ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) REPORT FOR INSTALLATION RESTORATION SITE 5 - SWALE 2 INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity, Chesapeake
Environmental Branch, Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

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1.0 INTRODUCTION

The Northern Division of the Naval Facilities Engineering Command has issued Contract Task Order Number 0157 (CTO 0157) to Halliburton NUS Environmental Corporation (Halliburton NUS), under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298. CTO 0157 is for the engineering and design of a removal action Installation Restoration (IR) Site 5 at the Indian Head Division, Naval Surface Warfare Center (NSWC) in Indian Head, Maryland.

CTO 157 consists of tasks to: (1) Prepare an Engineering Evaluation/Cost Analysis (EE/CA) regarding proposed remediation alternatives for the non-time critical removal of silver contaminated soil; and, (2) prepare engineering plans and specifications for the implementation of the selected removal action alternative.

This EE/CA report is based on the results of the sampling and analysis work that was performed by Halliburton NUS at Site 5 in February, 1994. The results of that sampling and analysis activity are summarized in the Field Sampling Report issued by Halliburton NUS in April, 1994 (Reference 6). Information reported in the Field Sampling Report supports the delination of silver contaminated soils. The EE/CA provides analyses to support decisions to select the appropriate technology that will prevent, minimize, and mitigate potential impacts to human health and the environment.

Background information and a review of the analytical data from IR Site 5 are presented in this section. Impacts of silver contamination at IR Site 5 are presented in Section 2.0. Removal action objectives are presented in Section 3.0. Removal action alternatives are presented and analyzed in Sections 4.0 and 5.0, respectively. A comparative analysis of the alternatives and recommendations are contained in Section 6.0.

1.1 SITE DESCRIPTION

Indian Head Division, Naval Surface Warfare Center (NSWC) is located 25 miles south of Washington, DC. adjacent to the town of Indian Head, in west-central Charles County, Maryland. The primary mission of Indian Head Division NSWC is the development and production of propellent and explosive ingredients and formulants used in ordnance devices.

The project site (IR Site 5) is located on the southwestern side of Building 731, which is located on Voegeli Road on NSWC (Figure 1-1). The site consists of two depressions emanating from the southeast (Swale 1)

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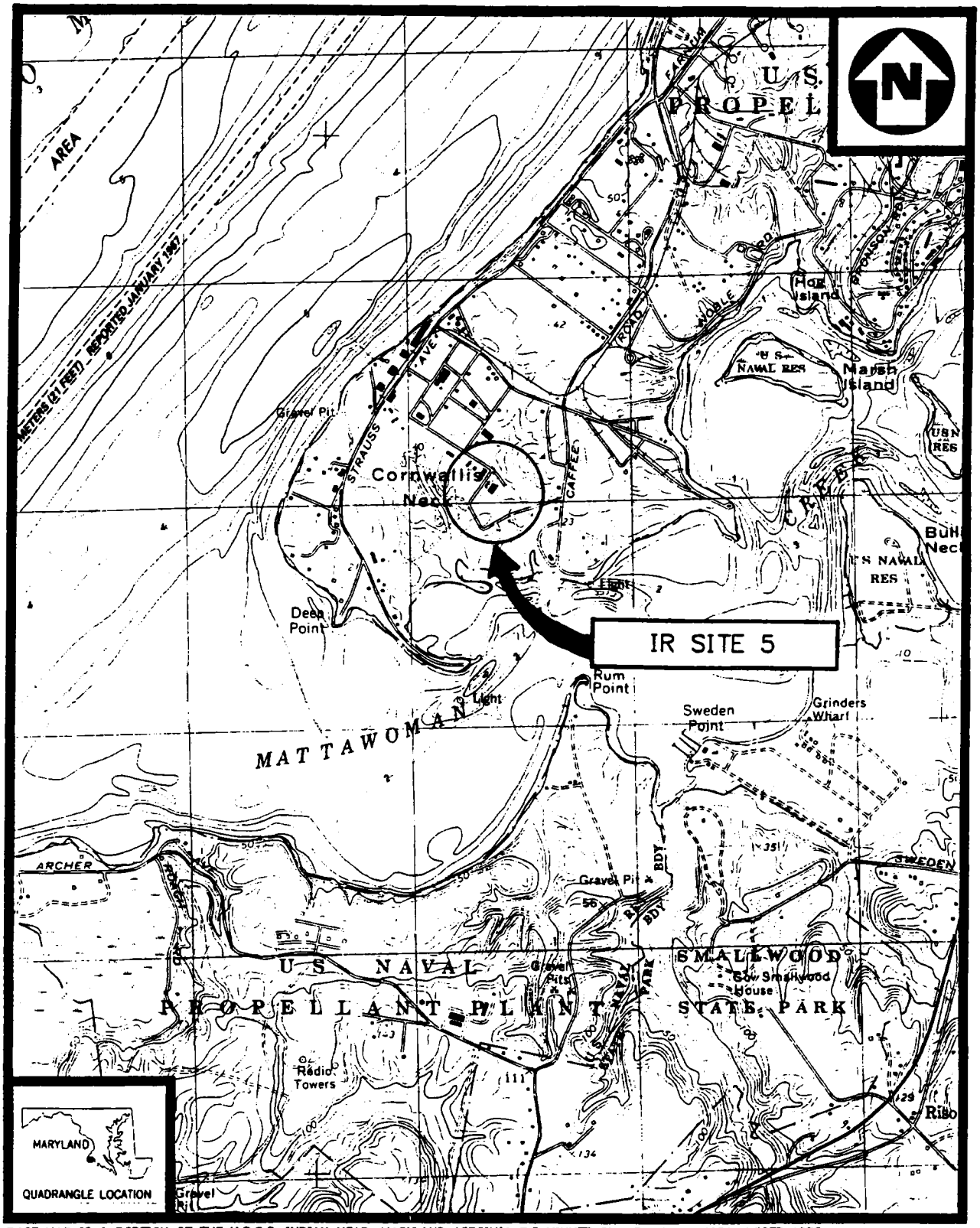

BASE MAP IS A PORTION OF THE U.S.G.S. INDIAN HEAD, MARYLAND–VIRGINIA 7.5 MINUTE QUADRANGLE, PHOTOREVISED 1978.

LOCATION MAP OF INDIAN HEAD PENINSULA

FIGURE 1-1

INDIAN HEAD, MARYLAND

0 2000 4000

SCALE IN FEET

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and southwest (Swale 2) corners of Building 731. Soils in these swales had been contaminated by silver-ladened photographic processing wastewaters released from Building 731 between 1953 and 1965. Photographic operations are still performed in Building 731. However, the spent fixer is now collected and the silver is recovered.

1.2 PROJECT BACKGROUND

A removal action was performed on Swale 1 during the period from November, 1992 to January, 1993. The removal action included the excavation of soils and sediments exhibiting silver concentrations greater than 10 mg silver/kg soil; treatment of the excavated soils through solidification/stabilization; and, placement of the treated material into an earthen explosion barrier as part of Military Construction (MILCON) Project 059. The results of the removal action were documented by ABB Environmental Services, Inc., in a Removal Action Findings Report (Reference 1).

Previous sampling at IR Site 5 (Reference 2) indicated that some soils and sediments in Swale 2 also exceeded the 10 mg/kg level. In February, 1993, Halliburton NUS conducted additional field sampling to further determine and validate the horizontal and vertical extents of silver contamination within Swale 2. A review of this field sampling activity is presented in the Field Sampling Report (Reference 6).

1.3 ANALYTICAL RESULTS

Two primary objectives of the NUS Field Sampling Activity were:

- Determine the horizontal and vertical extents of silver contamination, above the 10 mg/kg total silver action level, within Swale 2. The 10 mg/kg total silver remediation goal was established during previous negotiations between the Navy and the State of Maryland.

- Determine the nature of the contamination by analyzing four samples with the highest total silver concentrations for toxicity characteristics using the Toxicity Characteristic Leaching Procedure (TCLP).

1.3.1 Field Sampling Results

The horizontal extent of Swale 2 silver contamination, above the 10 mg/kg action level, for surface (0-12 inches) and for subsurface (18 - 24) inch soil samples was approximated using mathematically generated concentration contours (see Figures 1-2 and 1-3, respectively). Silver contamination within Swale 2 was

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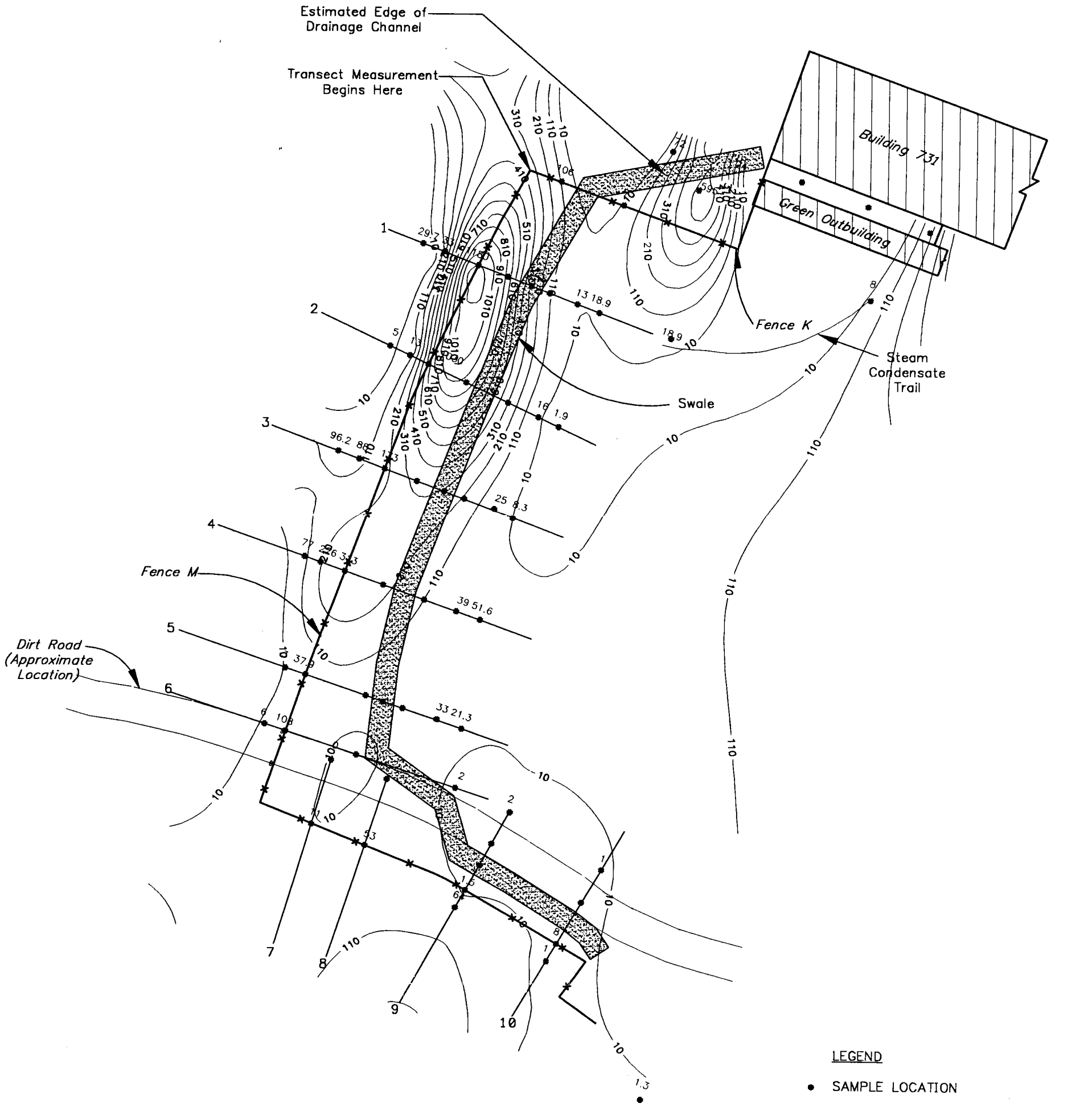

SILVER CONCENTRATION CONTOURS – 1 INCH SURFACE SAMPLES
IR SITE 5
SWALE #2
INDIAN HEAD, MARYLAND

FIGURE 1-2

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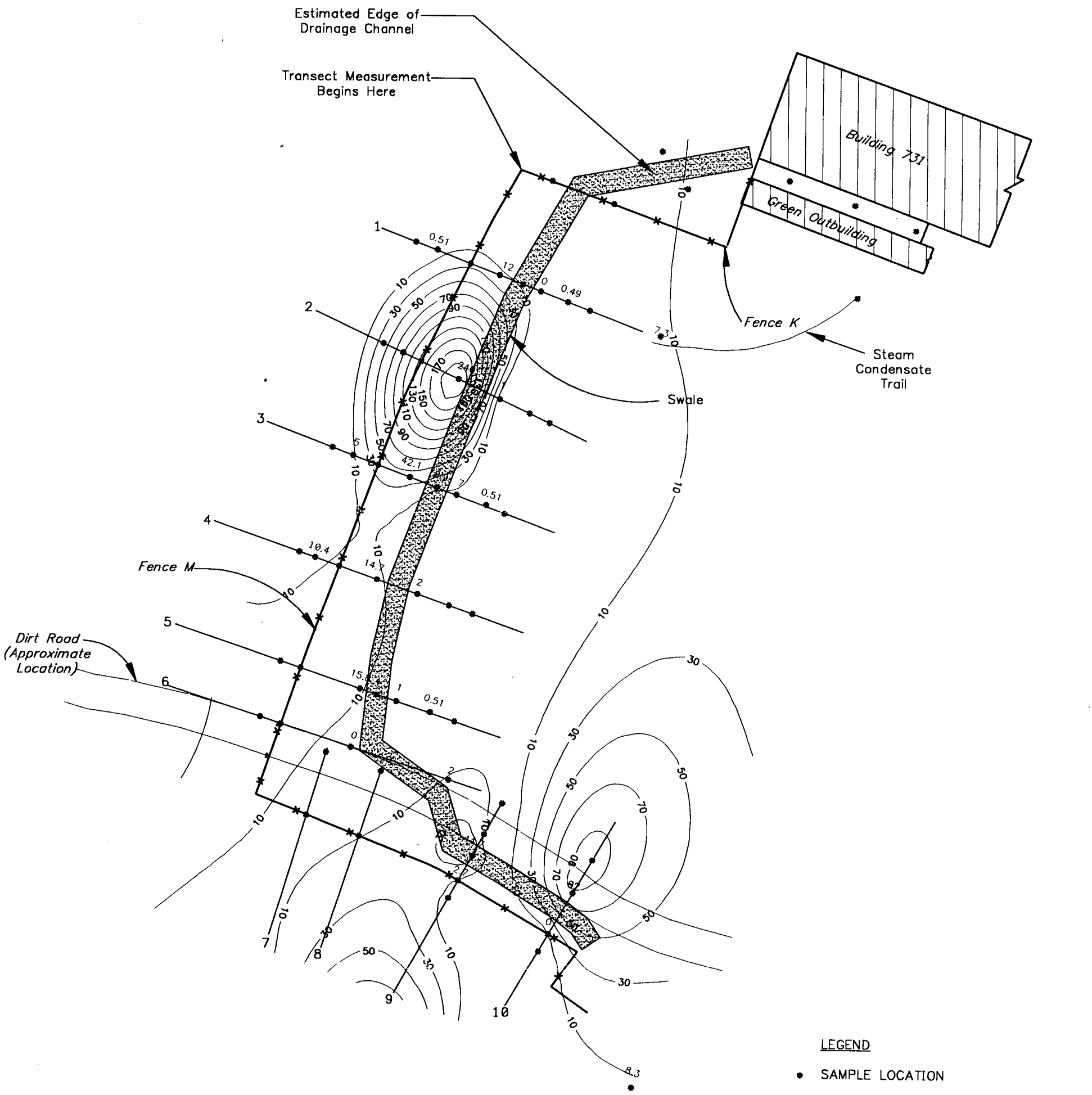

SILVER CONCENTRATION CONTOURS – 18–24 INCH SAMPLES
IR SITE 5
SWALE #2
INDIAN HEAD, MARYLAND

FIGURE 1–3

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found to extend westward beyond Fence M, and extends up to 72 feet east of Fence M. The horizontal extent of for silver contamination in the subsurface was generally found within the limits of the surface contamination. Subsurface contamination was found within the middle of the swale and concentrated in two areas near transects 2 and 10. Given this information, the proposed limits for silver contamination within Swale 2 have been indicated on Figure 1-4.

1.3.2 TCLP Results

Analytical results for the TCLP analysis are presented in Table 1-1. Analyses were performed on four samples with the highest total silver concentrations. TCLP results indicate that the soil at IR Site 5 do not exhibit the characteristic of toxicity as defined in 40 Code of Federal REgulation (CFR) 261.24.

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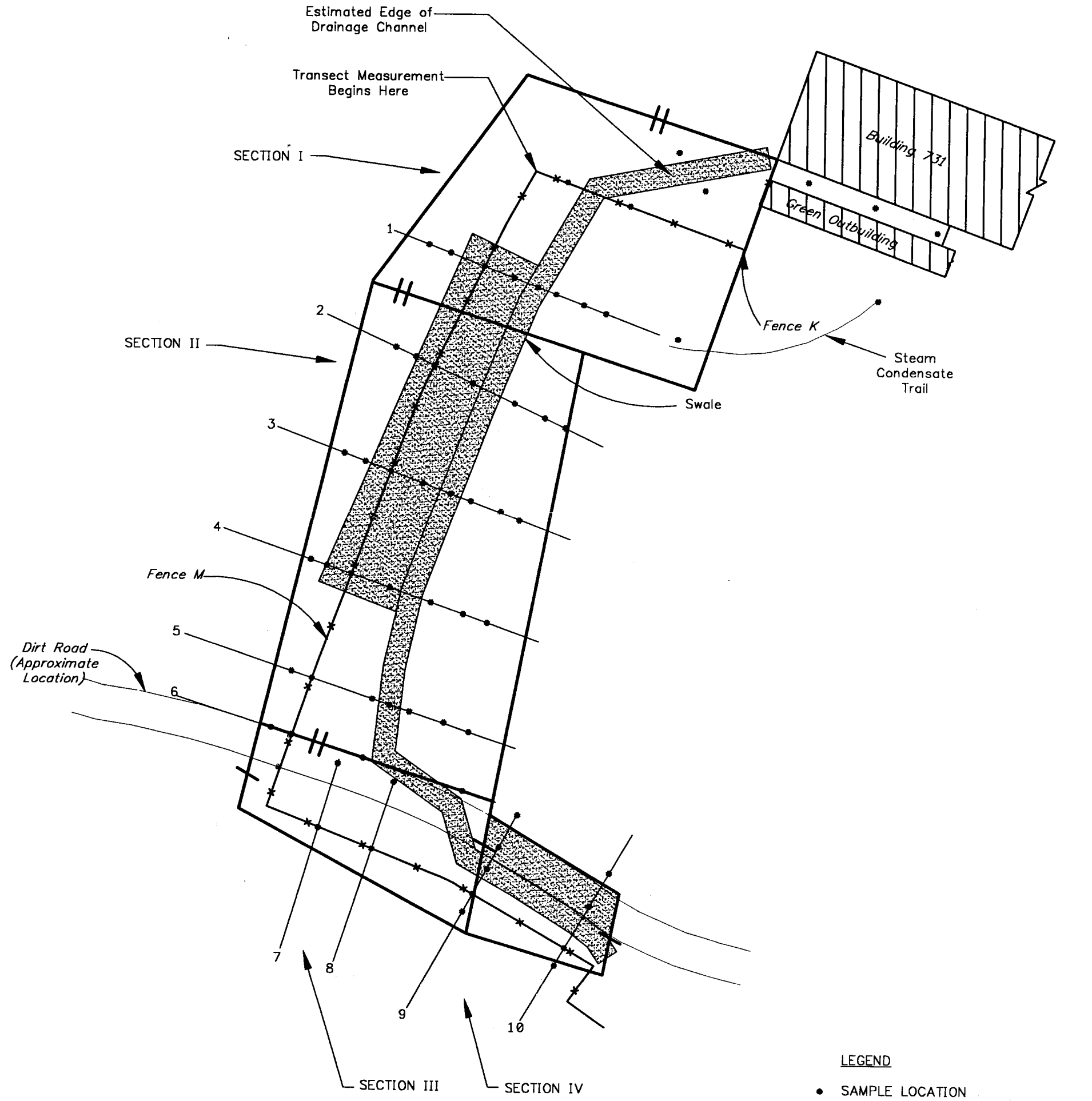

ESTIMATED HORIZONTAL LIMITS
OF SILVER CONTAMINATION
IR SITE 5
SWALE #2
INDIAN HEAD, MARYLAND

FIGURE 1-4

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TABLE 1-1

SOIL SAMPLE RESULTS - TCLP, SILVER
IR SITE 5 - SWALE 2
INDIAN HEAD, MARYLAND

Sample Number	Location	Depth	Date	Time	Tracking Number	TCLP (μg/L)
TR01-01	Located 49 feet south of corner of Fence M and K forming Transect 01. This transect is perpendicular to Fence M. Sample was collected at fence.	1 inch	02/09/94	3:15 PM	TR01-01-01	ND*
TR01-04	Located 25 feet east of Fence M on Transect 01.	1 inch	02/09/94	3:10 PM	TR01-04-01	102
TR02-01	Located 51 feet south of Transect 01, forming Transect 02. This sample was collected at Fence M on Transect 02.	1 inch	02/09/94	2:45 PM	TR02-01-01	ND*
TR04-01	Located 200 feet south of the corner of Fence M and Fence K, forming Transect 04. This sample was collected at the fence.	1 inch	02/22/94	2:30 PM	TR04-01-01	47.7

* ND = Non-detect concentration.

2.0 IMPACTS OF SILVER CONTAMINATION AT SITE 5

A naturally occurring metal in the environment, silver is present in greatest amounts at IR Site 5 in the oxidized form as a result of release from a photographic processing facility.

Silver contamination at IR Site 5 was investigated with regard to human and ecological impacts. Both direct and indirect human exposure pathways were assessed, and both terrestrial and aquatic ecosystems were investigated as part of this EE/CA. The results of that assessment and investigation are presented in this section of the EE/CA report.

2.1 HUMAN HEALTH IMPACTS

Information about the toxicity of silver in humans is drawn largely from evidence obtained from observation of individuals receiving silver containing medications. Silver has been used for centuries as an astringent agent and disinfectant. It has been employed in the treatment of syphilis, used as a material for prostheses, and as a fungicide, among other medical uses. Commercially, silver is used as a chemical catalyst, in photographic materials and electrical components, and as dental amalgam.

Argyria, the only considerable critical health effect of low to moderate exposure to silver, is a medically benign but permanent bluish-grey discoloration of the skin. Evidence suggests that the silver is somewhat uniformly deposited in the skin tissue and that silver stimulates the production of melanin. Affected skin areas exposed to sunlight are further discolored by the reduction of silver in the dermis.

The development of modern antibiotics has eliminated most medical uses of silver. Consequently, reported cases of argyria have declined significantly. However, an abundance of toxicological information regarding silver and associated effects is available. Because of the low dosages used for therapeutic benefits, argyria is the predominant effect reported for silver toxicity in humans.

Animal studies have reported other toxic effects associated with exposure to silver at higher concentrations. Cardiovascular toxicity and hepatotoxicity are noted in rats subjected to silver in drinking water. Olcott (1950) administered 0.1% silver in water to rats and noted statistically significant increases in the incidence of ventricular hypertrophy. Post mortem examination indicated significant pigmentation, but the hypertrophy could not be attributable to the discoloration.

Hepatic necrosis and ultrastructural changes in the liver have been noted by Wagner, et al. (1975, 1967, and 1968) in selenium and Vitamin E-deficient rats. However, significant tolerance to silver exposure, to dosages as high as 140 mg/Kg-day (0.01% Ag in water), was noted by the researchers for rats without selenium or Vitamin E deficiencies.

Radioactive silver tracer studies in rats indicate that intramuscularly administered silver accumulates in the liver and is discharged in bile to the gastrointestinal tract to be purged in fecal material. Lower dosages (amount not specified) resulted in over 95% removal in the feces. Higher doses (0.4 and 4.0 mg/Kg-day) in the form of silver nitrate resulted in accumulation of silver primarily in the liver and GI tract and decreasing removal efficiency (Scott and Hamilton, 1950). Other studies have concluded that subjects with high exposure to selenium are more susceptible to argyria (Berry and Galle, 1982).

Silver is not classified with regard to human carcinogenicity. However, some animal studies that have been conducted have resulted in the generation of localized sarcomas at the point of implantation or injection of metallic silver. The results of these studies are questionable and not supported by other studies. Inert materials (such as plastic and ivory) implanted subcutaneously in test species have demonstrated the occurrence of solid-state carcinogenicity in the form of local fibrosarcomas. Also, two other studies (Schmahl and Steinhoff, 1960 and Furst and Schlauder, 1977) utilizing colloidal suspensions and metal powders of silver injected subcutaneously and intramuscularly, respectively, indicated no significant incidence of tumor formation. Consquently, the USEPA has concluded that there is no evidence of carcinogenicity in humans due to silver exposure, despite extensive and frequent therapeutic usage.

2.1.1 Direct Human Exposure to Silver at Site 5

Direct exposure with silver in surface soils at Site 5 can be realized by ingestion of site soils, inhalation and ingestion of fugitive dusts from the site, and via dermal contact with the soils. Contact with the sediment in the swale is not likely in view of the fact that site access is restricted and that significant accumulation of water and sediments does not regularly occur as evidenced by the presence of extensive vegetation in the swale. It is assumed that the conservative soil evaluations will sufficiently characterize exposure to sediment.

According to the EPA Integrated Risk Information System, silver is not classifiable with regard to human carcinogenicity. Potential noncarcinogenic health risks associated with silver are evaluated by utilizing the Reference Dose (RfD). An RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. RfDs are developed for chronic and/or sub-chronic

human exposure to hazardous chemicals and are based on the assumption that thresholds exist for certain toxic effects. The RfD is usually expressed as an acceptable dose (mg) per unit body weight (kg) per unit time (day). The RfD is derived by dividing the no-observed-adverse-effect level (NOAEL) or the lowest-observed-adverse-effect level (LOAEL) by an uncertainty factor (UF) times a modifying factor.

The silver action levels for IR Site 5 presented in this EE/CA Report are for human exposure to silver assuming an occasional trespass scenario. This occasional trespass scenario assumes that an adult receptor (military/industrial land use scenario) is exposed to the soil via incidental ingestion (at a rate of 50 mg/day) and dermal exposure. The action levels are based on the person being exposed to silver in the soil for 50 days per year over a 30 year period. The levels are based on a oral RfD of 5×10^{-3} mg/kg/day. Given the exposure assumptions of a trespass scenario, the silver concentrations in soil must exceed the calculated action levels before deleterious health effects will occur. Using guidance provided in Risk Assessment Guidance for Superfund - Volume I (Part A) (USEPA, December 1989) for the oral and dermal exposure routes and a fugitive dust emissions model developed by Cowherd, et al. (1985) for fugitive dust emissions, the following action levels for occasional receptors at IR Site 5 are as follows:

- 51,100 mg/kg of silver for incidental ingestion
- 102,200 mg/kg of silver for dermal contact
- 1×10^{8} mg/kg of silver for inhalation of fugitive dust

Maximum silver concentrations in the soils collected at IR Site 5 do not exceed these action levels. Therefore, no action is required at IR Site 5 based on a direct human exposure pathway. Action level calculations are presented in Appendix B of this EE/CA Report.

2.1.2 Indirect Human Exposure to Silver at IR Site 5

Humans could be indirectly exposed to the silver contamination at IR Site 5 through consumption of fish. However, it is unlikely that this exposure could result in a significant exposure to silver to any given receptor. This conclusion is supported by several factors, listed below:

- Sediments in the swale are not discharged at any significant rate to the Mattawoman Creek.
- Silver concentrations in soil do not currently pose a threat to human receptors.
- Silver bioaccumulation in aquatic species is not significant (BCF = 0.5).
- Significant silver contamination in soil is not believed to have migrated beyond the limits of IR Site 5.

In conclusion, no significant indirect exposure routes for the silver contamination at IR Site 5 exist for human receptors.

2.2 ECOLOGICAL IMPACT

Surface water and sediment sampling was not performed at IR Site 5, consequently, a direct evaluation of the effects of silver contamination on ecological receptors cannot be made. However, a qualititative evaluation of the potential risks can be presented. Previous studies performed in this area has indicated that the silver contamination has extended to downstream environments (Reference 2). These environments include wetlands and estuarine habitats, both considered to be potentially sensitive to chemical contamination.

Ecological impacts associated with silver contamination of aquatic habitats have not been studied in considerable detail when compared to other, more toxic metals such as mercury. However, the toxic nature of this inorganic compound in nature has been ascertained. In freshwater aquatic environments, comparatively low concentrations of silver can adversely affect receptors, and a chronic Ambient Water Quality Criteria (AWQC) value of 0.12 μg/L has been established. In marine environments, chronic toxicity data are not available, and an acute AWQC of 2.3 μg/L has been established.

2.2.1 Aquatic Ecosystems

No permanent aquatic environments exist at IR Site 5. However, aquatic organisms may be present, and therefore, exposed to contaminants, in at downslope drain locations. In addition, the consumption of contaminated prey items may represent a significant exposure route to higher trophic organisms such as fish. Dietary exposure may similarly be important for wading birds such as the great blue heron (Ardea herodias), whose diet is comprised largely of aquatic organisms (Scott, 1987), and semi-aquatic mammals such as the raccoon (Procyon lotor), mink (Mustela vison), and river otter (Lutra canadensis) all of which feed heavily on crustaceans, molluscs, and, in the case of mink and otter, fish (Webster et al., 1985).

2.2.2 Terrestrial Ecosystems

In the forested areas surrounding the drainage ditch, downstream wetlands, and Mattawoman Creek, terrestrial animals such as white-tailed deer (Odocoileus virginianus) and a number of birds of prey [e.g., osprey (Pandion haliaetus) and northern harrier (Circus cyaneus)] may be exposed to silver by feeding on contaminated biota or through the incidental ingestion of soil or sediment. This is not expected to be a

significant route of exposure however, because these species are wide ranging and spend only a small portion of their lives feeding in this relatively small area.

2.3 SUMMARY OF SILVER IMPACTS AT IR SITE 5

As previously described, the silver contamination in the soils at IR Site 5 does not appear to present a problem with regard to direct exposure to humans. In addition, the limited areal extent of silver contamination in soil, as well as the relatively low concentrations detected, suggests that the potential risk to terrestrial wildlife is also low. However, no data are available to evaluate the effects that may be incurred to aqauatic environments directly exposed to silver containing media at the environments receiving discharge from the site. The risks to organisms that feed on aquatic organisms are not likely to be high because of the tendency of silver to not accumulate in biological tissue. The area in the vicinity of and downstream of IR Site 5 is actively fished. However, it is not believed that the accumulated silver contamination in the fish may pose a risk to human consumption.

3.0 REMOVAL ACTION OBJECTIVE

Prior to implementation of a removal action, the site must be evaluated to determine if site conditions justify a removal action. Paragraph (b)(2) of Section 300.415 of the NCP lists the following factors that should be considered when determining the appropriateness of a removal action:

(1) Actual or potential exposure to hazardous substances or pollutants or contaminants of nearby populations, animals, or food chain.

(2) Actual or potential contamination of drinking water supplies or sensitive ecosystems.

(3) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

(4) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.

(5) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

(6) Threat of fire or explosion.

(7) The availability of other appropriate Federal or state response mechanisms to respond to the release.

(8) Other situations or factors which may pose threats to public health or welfare or the environment.

The above factors were considered during the EE/CA process. As described in Section 2.0, the silver contamination at IR Site 5 does not present a direct risk to human health. However, there has been no investigative work to assess what effect, if any, the silver contamination has on the biota and ecosystems down-gradient from IR Site 5 and potential human exposure through fish consumption.

The area of IR Site 5 contained within the investigation area, (approximately 600 feet long and 120 feet wide) is known to be contain varying concentrations of silver. Previously conducted investigations have indicated that silver is also present in the surface water of downstream environments and can be assumed to be present in the sediments. These media may be serving as a source for continuing downstream area contamination in the wetlands and estuarine environments near Mattawoman Creek.

The objective of this removal action is to eliminate, the potential for the transport of silver into the downstream environment and to expedite the completion of total site cleanup. All removal action alternatives under consideration must eliminate existing and potential future sources of silver contamination and should not interfere with any future remedial actions at the site. The scope of this removal action is limited to the silver contamination in the area immediately adjacent to Building 731.

3.1 REMOVAL ACTION SCHEDULE

Removal action, if appropriate, will begin after completion of removal action design. Major factors that will influence the removal action schedule include: completion of design; procurement of a remediation contractor; approval of a treatment/disposal option; permitting requirements; and weather.

3.2 ARARs AND TBC CRITERIA

One of the primary concerns during the development of removal action alternatives for hazardous waste sites under CERCLA is the degree of human health and environmental protection afforded by a given remedy. Section 121 of CERCLA requires that primary consideration be given to alternatives that attain or exceed applicable, or relevant and appropriate requirements (ARARs). The purpose of this requirement is to make CERCLA response actions consistent with other pertinent Federal and state environmental requirements. Although IR Site 5 is not a CERCLA site, ARARs and TBC criteria were reviewed in order to develop and assess the removal action alternatives.

ARARs may include the following:

- Any standard, requirement, criterion, or limitation under Federal environmental law.

- Any promulgated standard, requirement, criteria, or limitation under a state environmental or a facility-siting law that is more stringent than the associated Federal standard, requirement, criterion, or limitation.

A requirement may be either "applicable" or "relevant and appropriate," but not both. Definitions of the two types of ARARs as well as other "to be considered" (TBC) criteria are given below:

- Applicable Requirements - Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law that directly and fully address a hazardous substance, pollutant, contaminant, remedial action, or location.

- Relevant and Appropriate Requirements - Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, or location, address problems or situations sufficiently similar (relevant) to those encountered at the site, that their use is well suited (appropriate) to the particular site. Requirements must be relevant and appropriate to be an ARAR.

- To Be Considered (TBC) Criteria - TBC Criteria are non-promulgated, non-enforceable guidelines or criteria that may be useful for developing remedial action, or necessary for determining what is protective to human health and/or the environment. Examples of TBC criteria include EPA Drinking Water Health Advisories, Carcinogenic Potency Factors, and Reference Doses.

Section 121(d)(4) of CERCLA allows the selection of a remedial alternative that will not attain all ARARs if any of six conditions for a waiver of ARARs exist. These conditions are as follows: (1) the remedial action is an interim measure whereby the final remedy will attain the ARAR upon completion; (2) compliance will result in greater risk to human health and the environmental than other options; (3) compliance is technically impracticable; (4) an alternative remedial action will attain the equivalent of the ARAR; (5) for state requirements, the state has not consistently applied the requirement in similar circumstances; and (6) compliance with the ARAR will not provide a balance between protecting public health, welfare, and the environment at the facility with the availability of Superfund money for response at other facilities (fund-balancing). Since a removal action is an interim measure, complete compliance with ARARs is not required. Compliance with ARARs and TBCs, will be accomplished to the maximum extent practicable.

ARARs fall into three categories, based on the manner in which they are applied. The characterization is not perfect, as many requirements are combinations of the three types of ARARs. These categories are as follows:

- Contaminant-specific - Health- and/or risk-based numerical values or methodologies that establish concentration or discharge limits for particular contaminants. Examples of contaminant-specific ARARs include Maximum Contaminant Levels (MCLs) and Clean Water Act (CWA) water quality criteria. Contaminant-specific ARARs and TBSs are presented in Table 3-1.

- Location-specific - Restrictions based on the concentration of hazardous substances or the conduct of activities in specific locations. These may restrict or preclude certain remedial actions or may apply only to certain portions of a site. Examples of location-specific ARARs include RCRA location requirements and floodplain management requirements. Location-specific areas and TBCs are presented in Table 3-2.

- Action-specific - Technology- or activity-based controls or restrictions on activities related to management of hazardous waste. Action-specific ARARs and TBCs are presented in Table 3-3.

In general, the contaminant-specific ARARs and TBCs are considered during the assessment of risks to human health and the environment. These ARARs and TBCs are also considered in the development of remedial action objectives. The action-specific ARARs and TBCs, which affect the implementation and/or operation of the remedial alternatives, are primarily used to assess the feasibility of remedial technologies and alternatives.

3.2.1 Classification of Silver-Contaminated Soil

ARARs for silver contamination are presented in Table 3-1. As shown in these tables, no ARARs were identified that specifically address silver contaminated soil and establish cleanup levels. However, if the soils are excavated and sent off site for disposal because of contamination, they will be considered wastes. The contaminated soils do not exhibit any other characteristics identified in RCRA Subpart C regulations and are therefore not classified as hazardous.

3.3 REMOVAL ACTION OBJECTIVE AND RATIONALE

There are no identified direct human exposure pathways associated with IR Site 5 that pose an unacceptable risk at this time. The objective of the EE/CA removal action at IR Site 5 is the removal of all contaminated soils at concentrations above 10 mg/kg in order to eliminate the potential for release of silver into the downstream aquatic environment. The 10 mg/kg cleanup level is an agreed upon level between the Navy and the State of Maryland. The same cleanup level was used for remediating Swale 1 and is also appropriate for Swale 2. The removal action goal is protective of public health and the environment.

TABLE 3-1

CONTAMINANT-SPECIFIC ARARS AND TBCS
IR SITE 5 - SWALE 2
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

ARAR/TBC	Requirement	Requirement Synopsis	Comments
Federal Requirements Surface Water	Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs and non-zero MCLGs) (40 CFR 141.11-141.16)	MCLs have been promulgated for a number of common organic and inorganic contaminants. These levels regulate contaminant concentration in public drinking water supplies.	When the risks to human health due to consumption of groundwater were assessed, concentrations of concern were compared to their MCLs. The secondary MCL for Silver is 0.01 mg/L.
Federal Requirements Surface Water	SDWA Maximum Contaminant Level Goals (MCLGs) (40 CFR 141)	MCLGs are health-based limits and do not consider cost or feasibility. As health goals, MCLGs are established at levels at which no known or anticipated adverse effects on the health of persons occur and which allow for an adequate margin of safety.	If technically feasible, these levels are to be considered when other human health threats at the site justify setting lower cleanup levels. No MCLG exists for silver.
Federal Requirements Surface Water	Clean Water Act (CWA) - Ambient Water Quality Criteria (AWQC) - Protection of Freshwater Aquatic Life, Human Health - Fish Consumption	AWQC are developed under the Clean Water Act (CWA) as guidelines from which states develop water quality standards. A more stringent AWQC for aquatic life may be found relevant and appropriate rather than an MCL, when protection of aquatic organisms is being considered at a site.	The CWA will be considered when determining cleanup levels. The AWQC established for silver for the protection of aquatic life is 0.12 μg/L (freshwater chronic value).
Criteria, Advisories, and Guidance to be Considered - Surface Water	EPA Risk Reference Doses (RfDs)	EPA RfDs are levels established to characterize risks due to exposure to contaminants in surface water sediment, as well as other media.	EPA RfDs were used to characterize risks due to exposure to contaminants in surface water and sediment, as well as other media.

TABLE 3-1 (Continued)
CONTAMINANT-SPECIFIC ARARS AND TBCS
IR SITE 5 - SWALE 2
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

ARAR/TBC	Requirement	Requirement Synopsis	Comments
Criteria, Advisories, and Guidance to be Considered - Surface Water	EPA Carcinogen Assessment Group Potency Factors	EPA Carcinogenic Potency Factors are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	These factors were used to assess health risks from carcinogens present at the site.
Criteria, Advisories, and Guidance to be Considered - Surface Water	EPA Health Advisories and Acceptable Intake Health Assessment Documents	Intended for use in qualitative public health evaluation of remedial alternatives.	To be used, if adequate data exist, in assessing health risks from ingesting surface water and sediment at the site.
FDA Action Limit	No FDA Action Limit has been published for silver.		Edible portion only (excludes head, scales, viscera, and inedible bones).

TABLE 3-2

LOCATION-SPECIFIC ARARS AND TBCS
IR SITE 5 - SWALE 2
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

ARAR/TBC	Requirement	Requirement Synopsis	Comments
Federal Requirements Wetlands/Floodplain	Clean Water Act (CWA) 404 (33 USC 1344 40 CFR 230)	Applies to dredge and fill activities. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available.	This requirement is applicable to any action that may affect wetlands.
Federal Requirements Wetlands/Floodplain	Fish and Wildlife Coordination Act	This regulation requires that any Federal agency that proposes to modify a body of water must consult with the U.S. Fish and Wildlife Services. This is addressed under CWA regulations at 40 CFR 230.	If an alternative modifies a body of water, the U.S. Fish and Wildlife Services must be consulted.
Federal Requirements Wetlands/Floodplain	Endangered Species Act of 1973 (16 USC 1531 et seq.); 36 CFR 800	This regulation requires action to conserve endangered species or threatened species, including consultation with the Department of the Interior.	This requirement is applicable to any remedial action that may involve endangered species.

TABLE 3-3

ACTION-SPECIFIC ARARS AND TBCS
IR SITE 5 - SWALE 2
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

ARAR/TBC	Requirement Synopsis	Comments
Federal Requirements RCRA Facility Standards and Land Disposal Restrictions (40 CFR 264)	Facility standards specify design, groundwater monitoring, and closure, and post-closure care for specific types of facilities. Land disposal restrictions exist for specified wastes without approved treatment.	Any onsite remedial alternatives must conform, to the extent feasible to the governing technical standards.
Federal Requirements CWA - National Pollutant Discharge Elimination System (NPDES) (40 CFR 122, 125)	Any point-source discharge must meet NPDES permitting requirements, which include compliance with corresponding water quality standards; establishment of a discharge monitoring system; and completion of regular discharge monitoring records.	Process water used on site and discharged to a surface water body will need to comply with the water quality standards.
Federal Requirements Occupational Safety and Health Administration (OSHA) Regulations for Worker Safety (29 CFR 1910)	Contains safety and health standards for workers at hazardous waste sites.	The implementation of all proposed cleanup alternatives will meet OSHA standards. The requirements are applicable for all actions at the site.
Federal Requirements CWA Dredge and Fill Regulations (40 CFR 230)	This regulation outlines requirements for discharge of dredged or fill material. Under this requirement, no activity that affects a wetland shall be permitted if a practicable alternative exists; all impacts must be mitigated.	During the detailed analysis of alternatives, the effects on wetlands must be evaluated. This requirement would be applicable to any dredging or filling.
Federal Requirements Clean Air Act (CAA) National Ambient Air Quality Standards (NAAQS) for Total Suspended Particulates (40 CFR 129.105, 750)	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter.	Fugitive dust emissions from site excavation activities will be maintained below 260 μ/m^3 (primary standard) by dust suppressants, if necessary. This requirement will be applicable if any excavation occurs.

TABLE 3-3 (Continued)
ACTION-SPECIFIC ARARS AND TBCS
IR SITE 5 - SWALE 2
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

ARAR/TBC	Requirement Synopsis	Comments
Federal Requirements Protection of Archaeological Resources (32 CFR Part 229, 229.4;43 CFR Part 107, 171.1-171-5)	This regulation develops procedures for the protection of archaeological resources.	If archaeological resources are encountered during soil excavation, they must be reviewed by Federal and state archaeologists. This requirement is applicable to any excavation on site.
Federal Requirements Department of Transportation (DOT) Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-171.5)	This regulation outlines procedures for the packaging, labeling, manifesting, and transporting of hazardous materials.	Hazardous materials will be packaged, manifested, and transported to a licensed off site disposal facility in compliance with these regulations. These regulations are applicable for any action that includes off site transportation of hazardous materials.

4.0 REMOVAL ACTION ALTERNATIVES

This section reviews the EE/CA removal action alternatives for IR Site 5, Swale 2. Although these removal actions vary in effectiveness, implementability, and cost, they are all viable alternatives and address silver contamination contained in Swale 2. The area to be addressed by the EE/CA removal action is shown on Figure 1-4 of this report. Three removal action alternatives were considered:

- Alternative 1: Excavation, stabilization, and placement of contaminated soil at NSWC
- Alternative 2: Excavation and placement of contaminated soil at NSWC
- Alternative 3: Consolidation and capping of the silver contaminated region.

As indicated in the field sampling report prepared by Halliburton NUS, silver contaminated soil within Swale 2 is not classified as a hazardous waste according to RCRA Subpart C.

4.1 ALTERNATIVE 1: EXCAVATION, STABILIZATION, AND PLACEMENT OF CONTAMINATED SOIL AT NSWC

Under this alternative, silver contaminated soil would be excavated from Swale 2 and batch-stabilized using a cement-based or pozzolanic-based stabilizing agent. The stabilized soil would then be loaded and transported by truck to the Rum Point gravel pit at NSWC, where it would be placed as backfill.

4.2 ALTERNATIVE 2: EXCAVATION AND PLACEMENT OF CONTAMINATED SOIL AT NSWC

The general remediation process used for this alternative would be similar to Alternative 2 except that the excavated soil would not be stabilized prior to placement in the Rum Point gravel pit.

4.3 ALTERNATIVE 3: CONSOLIDATION AND CAPPING OF THE CONTAMINATED REGION

In this remediation alternative, silver contaminated soil within Swale 2 would not be removed from the site. Silver contaminated soil within the contaminated region identified on Figure 1-4 would be consolidated in the central portion of the swale (shaded area on Figure 1-4). In this way, excavation would be primarily confined to the surface layer, and the removal of deeper contaminated soil would be significantly reduced to a few localized areas. The consolidated soils would be graded to minimize surface water runoff. The soils would be capped with an impervious layer to prevent infiltration of rain water.

5.0 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Analysis for the four removal action alternatives with regard to effectiveness, implementability, and cost are presented in this section of the report.

Effectiveness is the ability of the alternative to reduce the risks of the site and includes:

- Protectiveness - Protectiveness includes protecting the community and workers during the removal action, threat reduction and potential exposure to remaining risks, time until protection is achieved, compliance with ARARs and other criteria, environmental impacts (overall protection of human health and the environmental), and long-term reliability for providing continued protection.

- Ability to Achieve Removal Objectives - This factor considers the ability to achieve the desired level of treatment or cleanup and any residual effect concerns.

Implementability is the ability of the alternative to be carried out at the site and includes:

- Technical Feasibility - The ability to physically implement the alternative as designed and in a manner that complies with the removal action objective.

- Availability - The availability of equipment, material, personnel, and facilities to implement the alternative, and provide any necessary post-removal site control.

- Administrative Feasibility - Acceptance of the alternative by the state and community and the ability to obtain the necessary approvals.

The costs associated with these alternatives include: (1) engineering (treatability studies, design, permitting, health and safety, sampling and analysis, inspection, etc.), and (2) construction costs. Appendices A and B contain pertinent cost and volume calculations, respectively, for the three remediation alternatives.

5.1 ALTERNATIVE 1: EXCAVATION, STABILIZATION AND PLACEMENT

Under this alternative, all of the silver contaminated soil within the boundaries established by Figure 1-4 for Swale 2 would be removed from the site. Approximately 3,075 yd^3 would be excavated and batch-stabilized with a cement-based or pozzolanic-based stabilizing agent. The stabilized soil would be transported by truck to the Rum Point gravel pit at the NSWC, and used as backfill. The gravel pit is approximately 15 miles from IR Site 5.

Effectiveness - Exposure risks created by the existing state of the silver contaminated swale are significantly reduced by this removal action. Risk reduction is completely effected in a relatively short timeframe, with little or no maintenance required to maintain this risk level.

Implementability - This technically unsophisticated remediation alternative is a well understood, widely used and accepted method of waste disposal. The manpower and equipment required to accomplish a high level of cleanup under this alternative are readily available.

Cost - The cost for this alternative is primarily comprised of construction expenses. Total cost for this alternative is approximately $768,000.

5.2 ALTERNATIVE 2: EXCAVATION AND PLACEMENT

Under this alternative, all of the silver contaminated soil within the boundaries established by Figure 1-4, for Swale 2 would be removed from the site. Excavated soil would not be stabilized, however, prior to transporting it to the NSWC Rum Point gravel pit.

Effectiveness - Exposure risks created by the existing state of the silver contaminated swale are significantly reduced by this removal action. Risk reduction is completely effected in a relatively short timeframe, with little or no maintenance required to retain this risk level for the long-term.

Implementability - This technically unsophisticated remediation alternative is a well understood, widely used and accepted method of waste disposal. The manpower and equipment required to accomplish a high level of cleanup under this alternative are readily available.

Cost - Cost for this alternative is primarily comprised of construction expenses. Total cost for this alternative is approximately $425,000.

5.3 ALTERNATIVE 3: CONSOLIDATION AND CAPPING

Silver contaminated soil would not be removed from Swale 2 under this remedial action alternative. Contaminated soil within the boundaries established for Swale 2 by Figure 1-4 would be consolidated within a 15 to 20 foot centralized section along the entire length of the drainage area. This area is shaded in Figure 1-4. The consolidated soil would be placed to achieve a 2 to 1 slope and would be capped by the following layers:

- 1 foot layer of low conductivity soil (10^{-7} cm/sec)
- 2 foot layer of clean backfill
- 6 inch layer of topsoil
- revegetated

Approximately 2,406 yd^3 of soil would be relocated to the central portion of the swale by this activity.

Effectiveness - Exposure risks created by the existing state of the silver contaminated portion of the swale are reduced by this removal action in a relatively short span of time. A considerable amount of periodic maintenance will be required, however, for this minimal level of risk to the preserved.

Implementability - This technically unsophisticated remediation alternative is a well understood and widely used as a method of waste containment. The manpower and equipment required to accomplish a high level of cleanup under this alternative is readily available. Regulatory acceptance of this alternative could be difficult due to the need to monitor the long-term effectiveness of the cap.

Cost - Costs for this alternative contain both fixed and recurring components. While the initial costs for consolidating the soil and constructing the cap are relatively low at approximately $289,000, the ongoing expenses incurred for cap security and maintenance may eventually exceed this construction expense.

6.0 SUMMARY AND RECOMMENDED ALTERNATIVES

6.1 COMPARATIVE ANALYSIS

The performance evaluations for each of the three remediation alternatives considered for use at IR Site 5, Swale 2 are summarized according to Effectiveness, Implementability, and Cost in Table 6-1. The final selection of a remediation alternative for IR Site 5, Swale 2 is made by identifying the most effective alternative which can be readily implemented for the lowest cost.

Excavation and landfilling alternatives are considered more effective than the on-site consolidation and capping alternative. On-site capping maintains a risk of future release to the sensitive environments of the downstream marshes and an aquatic environment at IR Site 5. The stabilization alternative is considered slightly more effective than the straight excavation and landfilling alternative since stabilization provides the added protection against silver migration. The location of the Rum Point Gravel Pit and the low potential for silver to leach from the soils make both excavation options highly effective for meeting the removal action objectives.

All three alternatives are technical feasible. The techniques are commonly used and there are many sources for equipment and personnel capable of implementing any one of these alternatives. The administrative feasibility of on-site consolidation and capping is considered low from a regulatory acceptance perspective. The ability to ensure the cap's integrity is maintained over time is a potential source of concern for the state.

Costs are also shown on Table 6-1. Excavation, stabilization, and landfilling is the most expensive alternative. Initial costs of the on-site consolidation and capping are the lowest, however, cap maintanance costs over a 20 year period are considerable. Excavation and landfilling at the Rum Point Gravel Pit is the least total cost alternative.

6.2 RECOMMENDATION

add that this is ROD ALT. #2

Excavation and landfilling at the Rum Point Gravel Pit is the proposed removal ~~action alternative~~. This alternative is effective in meeting the objectives of the removal action and is protective of the environment. Excavation and landfilling is easily implemented at a reasonable cost and the removal action can be completed in a short period of time.

TABLE 6-1

COMPARISON OF ALTERNATIVES FOR EFFECTIVENESS
SITE 5 - SWALE 2
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

Alternative	Effectiveness	Cost	Implementability
1. Excavation, Stabilization, and Placement	High	$768,000	High
2. Excavation and Placement	Moderate/High	$425,000	High
3. Consolidation and Capping	Moderate	$404,000[1]	Moderate

(1) Includes present value for $10,000 annual maintenance expense at 6% over 20 years ($114,700).

REFERENCES

1. ABB Environmental Services (ABB-ES), 1993. Removal Action Findings Report.

2. ABB Environmental Services (ABB-ES), 1991. Draft Site Characterization and Remediation Evaluation Report.

3. USEPA, December 1989. Risk Assessment Guidance for Superfund - Volume I, Human Health Evaluation Manual (Part A). Interim Final. EPA/540/1-89/002. Office of Emergency and Remedial Response, Washington, D.C. 20450.

4. USEPA, December 1991. Risk Assessment Guidance for Superfund - Volume I, Human Health Evaluation Manual (Part B), "Development of Risk-based Preliminary Remediation Goals". Interim. OSWER Directive 9285.7-01B. Office of Emergency and Remedial Response, Washington, D.C. 20450.

5. USEPA, 1993. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. Office of Emergency and Remedial Response. EPA/540-R-93-057. August 1993.

6. Halliburton NUS Environmental Corporation, 1994. Field Sampling Report for Site 5 - Swale 2.

APPENDIX A

COST ESTIMATES

Engine ng Evaluation
C Analysis

NAVAL SURFACE WARFARE CENTER													
Indian Head, Maryland													
Alternative 2: Excavation and Placement													
												TOTAL	
ITEM	QUANTITY	UNIT	UNIT COST					TOTAL COST				DIRECT	COMMENTS
			Sub.	Mat.	Labor	Equip		Sub.	Mat.	Labor	Equip	COST	
Mobilization/Demobilization													
1) Office Trailer	1	Mos.	$500.00					$500	$0	$0	$0	$500	
2) Equipment Mobilization	1	LS	$12,500.00					$12,500	$0	$0	$0	$12,500	
3) Equipment Demobilization	1	LS	$9,000.00					$9,000	$0	$0	$0	$9,000	
Decontamination Facilities													
1) Decon Services	1	Mos.	$1,000.00					$1,000	$0	$0	$0	$1,000	
2) Decon Water	500	Gal.	$0.20					$100	$0	$0	$0	$100	
3) Personnel Decon Pad													
a) Concrete Pad - 4"	2	CY.		$70.00	$125.00	$5.00		$0	$140	$250	$10	$400	
b) Curb	40	LF.		$3.07	$1.99	$0.05		$0	$123	$80	$2	$204	
4) Clean Water Storage Tank	1	LS		$1,000.00	$200.00			$0	$1,000	$200	$0	$1,200	1000 Gallon
Access Road													
1) Access Road	610	SY.		$6.00	$0.90	$0.90		$0	$3,660	$549	$549	$4,758	
CLEARING													
1) Clear & Grub	0.5	Acre			$920.00	$1,100.00		$0	$0	$460	$550	$1,010	
SWALE REMEDIATION													
1) Excavation	3075	CY.			$4.00	$5.00		$0	$0	$12,300	$15,375	$27,675	
2) Hauling Excavated Soil	3075	CY			$2.39	$7.50		$0	$0	$7,349	$23,063	$30,412	
3) Place, Spread & Compact	3075	CY			$0.84	$2.67		$0	$0	$2,583	$8,210	$10,793	
RESTORATION													
1) Clean Backfill	3075	CY		$4.00	$2.70	$7.43		$0	$12,300	$8,303	$22,847	$43,450	
2) Place, Spread & Compact	3075	CY			$0.84	$2.67		$0	$0	$2,583	$8,210	$10,793	
3) Revegetation	8	MSF		$24.60	$8.40	$6.68		$0	$197	$67	$53	$317	
Total								$23,100	$17,420	$34,724	$78,870	$154,113	
Burden @ 30% Labor Cost										$10,417		$10,417	
Labor @ 10% Labor Cost										$3,472		$3,472	
Material @ 10% Material Cost									$1,742			$1,742	
SubContract @ 10% of Sub. Cost								$2,310				$2,310	
Total Direct Cost								$25,410	$19,162	$48,613	$78,870	$172,054	
Indirects @ 75% of Total Dir. Lab. Cost										$36,460		$36,460	
Profits @ 10% of Total Direct Cost												$17,205	
Total												$225,719	
Health & Safety Monitoring @ 10% of Total												$22,572	
Total Field Cost												$248,291	
Contingency @ 20% Total Field Cost												$49,658	
TOTAL CONSTRUCTION COST												$297,950	
Engineering Cost: Permitting, Design Engineering, Health & Safety Plan, Sampling & Analysis, Report Preparation												$127,000	
TOTAL PROJECT COST: ALT. #2												$424,950	

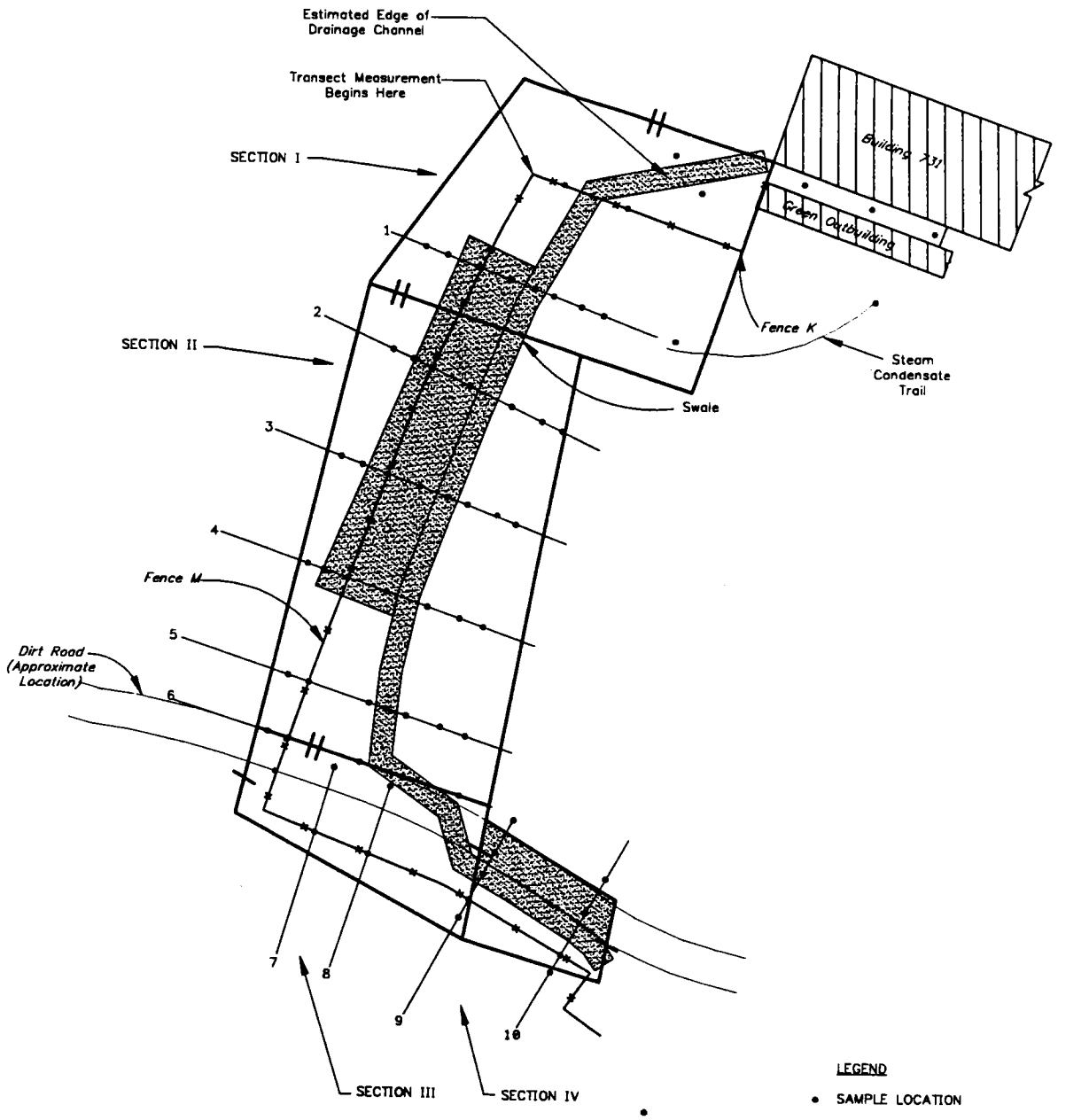
NAVAL SURFACE WARFARE CENTER													
Indian Head, Maryland													
Alternative 1: Excavation and Stabalization and Placement													
												TOTAL	
ITEM	QUANTITY	UNIT	UNIT COST					TOTAL COST				DIRECT	COMMENTS
			Sub.	Mat.	Labor	Equip		Sub.	Mat.	Labor	Equip	COST	
Mobilization/Demobilization													
1) Office Trailer	1	Mos.	$500.00					$500	$0	$0	$0	$500	
2) Equipment Mobilization	1	LS	$12,500.00					$12,500	$0	$0	$0	$12,500	
3) Equipment Demobilization	1	LS	$9,000.00					$9,000	$0	$0	$0	$9,000	
Decontamination Facilities													
1) Decon Services	1	Mos.	$1,000.00					$1,000	$0	$0	$0	$1,000	
2) Decon Water	750	Gal.	$0.20					$150	$0	$0	$0	$150	
3) Personnel Decon Pad													
a) Concrete Pad - 4"	2	CY.		$70.00	$125.00	$5.00		$0	$140	$250	$10	$400	
b) Curb	40	LF.		$3.07	$1.99	$0.05		$0	$123	$80	$2	$204	
4) Clean Water Storage Tank	1	LS		$1,000.00	$200.00			$0	$1,000	$200	$0	$1,200	1000 Gallon
Access Road													
1) Access Road	610	SY.		$6.00	$0.90	$0.90		$0	$3,660	$549	$549	$4,758	
CLEARING													
1) Clear & Grub	0.5	Acre			$920.00	$1,100.00		$0	$0	$460	$550	$1,010	
SWALE REMEDIATION													
1) Treatability Study	1	LS	$30,000.00					$30,000	$0	$0	$0	$30,000	
2) Excavation	3075	CY.			$4.00	$5.00		$0	$0	$12,300	$15,375	$27,675	
3) Stabilization	3075	CY.	$60.00					$184,500	$0	$0	$0	$184,500	
4) Hauling Stabilized Soil	3075	CY			$2.39	$7.50		$0	$0	$7,349	$23,063	$30,412	
5) Place, Spread & Compact	3075	CY			$0.84	$2.67		$0	$0	$2,583	$8,210	$10,793	
RESTORATION													
1) Clean Backfill	3075	CY		$4.00	$2.70	$7.43		$0	$12,300	$8,303	$22,847	$43,450	
2) Place, Spread & Compact	3075	CY			$0.84	$2.67		$0	$0	$2,583	$8,210	$10,793	
3) Revegetation	8	MSF		$24.60	$8.40	$6.68		$0	$197	$67	$53	$317	
Total								**$237,650**	**$17,420**	**$34,724**	**$78,870**	**$368,663**	
Burden @ 30% Labor Cost										$10,417		$10,417	
Labor @ 10% Labor Cost										$3,472		$3,472	
Material @ 10% Material Cost									$1,742			$1,742	
SubContract @ 10% of Sub. Cost								$23,765				$23,765	
Total Direct Cost								**$261,415**	**$19,162**	**$48,613**	**$78,870**	**$408,059**	
Indirects @ 75% of Total Dir. Lab. Cost										$36,460		$36,460	
Profits @ 10% of Total Direct Cost												$40,806	
Total												**$485,325**	
Health & Safety Monitoring @ 10% of Total												$48,532	
Total Field Cost												**$533,857**	
Contingency @ 20% Total Field Cost												$106,771	
TOTAL CONSTRUCTION COST												$640,629	
Engineering Cost: Permitting, Design Engineering, Health & Safety Plan, Sampling & Analysis, Report Preparation												$127,000	
TOTAL PROJECT COST: ALT. #1												**$767,629**	

NAVAL SURFACE WARFARE CENTER													
Indian Head, Maryland													
Alternative 3: Excavation and Capping													
												TOTAL	
ITEM	QUANTITY	UNIT	UNIT COST					TOTAL COST				DIRECT	COMMENTS
			Sub.	Mat.	Labor	Equip		Sub.	Mat.	Labor	Equip	COST	
Mobilization/Demobilization													
1) Office Trailer	1	Mos.	$500.00					$500	$0	$0	$0	$500	
2) Equipment Mobilization	1	LS	$12,500.00					$12,500	$0	$0	$0	$12,500	
3) Equipment Demobilization	1	LS	$9,000.00					$9,000	$0	$0	$0	$9,000	
Decontamination Facilities													
1) Decon Services	1	Mos.	$1,000.00					$1,000	$0	$0	$0	$1,000	
2) Decon Water	500	Gal.	$0.20					$100	$0	$0	$0	$100	
3) Personnel Decon Pad													
a) Concrete Pad - 4"	2	CY.		$70.00	$125.00	$5.00		$0	$140	$250	$10	$400	
b) Curb	40	LF.		$3.07	$1.99	$0.05		$0	$123	$80	$2	$204	
4) Clean Water Storage Tank	1	LS		$1,000.00	$200.00			$0	$1,000	$200	$0	$1,200	1000 Gallon
Access Road													
1) Access Road	610	SY.		$6.00	$0.90	$0.90		$0	$3,660	$549	$549	$4,758	
CLEARING													
1) Clear & Grub	0.5	Acre			$920.00	$1,100.00		$0	$0	$460	$550	$1,010	
SWALE REMEDIATION													
1) Excavation	2406	CY.			$4.00	$5.00		$0	$0	$9,624	$12,030	$21,654	
3) Low Permeable Soil Layer - 12"	484	CY		$8.00	$2.70	$7.43		$0	$3,872	$1,307	$3,596	$8,775	
a) Place, Spread & Compact	484	CY			$0.84	$2.67		$0	$0	$407	$1,292	$1,699	
4) Backfill Layer - 24"	968	CY		$4.00	$2.70	$7.43		$0	$3,872	$2,614	$7,192	$13,678	
a) Place, Spread & Compact	968	CY			$0.84	$2.67		$0	$0	$813	$2,585	$3,398	
5) Topsoil Layer - 6"	242	CY		$6.00	$2.70	$7.43		$0	$1,452	$653	$1,798	$3,903	
a) Place, Spread & Compact	242	CY			$0.63	$0.57		$0	$0	$152	$138	$290	
6) Revegetation	8	MSF		$24.60	$8.40	$6.68		$0	$197	$67	$53	$317	
Total								**$23,100**	**$14,316**	**$17,176**	**$29,796**	**$84,387**	
Burden @ 30% Labor Cost										$5,153		$5,153	
Labor @ 10% Labor Cost										$1,718		$1,718	
Material @ 10% Material Cost									$1,432			$1,432	
SubContract @ 10% of Sub. Cost								$2,310				$2,310	
Total Direct Cost								**$25,410**	**$15,747**	**$24,046**	**$29,796**	**$94,999**	
Indirects @ 75% of Total Dir. Lab. Cost										$18,035		$18,035	
Profits @ 10% of Total Direct Cost												$9,500	
Total												**$122,533**	
Health & Safety Monitoring @ 10% of Total												$12,253	
Total Field Cost												**$134,787**	
Contingency @ 20% Total Field Cost												$26,957	
TOTAL CONSTRUCTION COST												**$161,744**	
Engineering Cost: Permitting, Design Engineering, Health & Safety Plan, Sampling & Analysis, Report Preparation												$127,000	
TOTAL PROJECT COST: ALT. #3												**$288,744**	

APPENDIX B

PROJECT CALCULATIONS

Engine[illegible]g Evaluation
C[illegible]Analysis



ESTIMATED HORIZONTAL LIMITS
OF SILVER CONTAMINATION
IR SITE 5
SWALE #2
INDIAN HEAD, MARYLAND

HALLIBURTON NUS
Environmental Corporation

CLIENT	JOB NUMBER
U.S. NAVY - INDIAN HEAD, MARYLAND	
SUBJECT: SWALE 2 EXCAVATION	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CF			4/4/94

VOLUME OF EXCAVATED SOIL

SWALE 2 EXCAVATION will consist of uniform removal of 12 in. surface layer over the entire bounded area of the figure. Excavation of additional 18 in. of soil will be removed from the shaded region of the figure.

ASSUMPTIONS FOR EXCAVATION:

- BASED ON THE FIGURE INCLUDED IN THESE CALCULATIONS.

1. UNIFORM ELEVATION ALONG ANY WEST ⟶ EAST TRANSECT LINE — VOLUME CALCULATIONS CAN BE BASED ON STANDARD SQUARE AND RECTANGULAR SHAPES.

2. SIDEWALL COLLAPSE OF VERTICAL TRENCH WALLS IS NEGLIGIBLE.

3. CONSISTENT WITH NUS AND AB&B SAMPLING RESULTS, DEPTH CONTAMINATION OF SWALE 2 SOIL IS CONFINED TO A 15 FT. SECTION CENTERED IN THE SHADED REGION OF THE SWALE.

4. VOLUME OF EXCAVATED SOIL WILL BE MINIMIZED BY LIMITING EXCAVATION BOUNDARIES TO 10 MG/KG CONCENTRATION GRADIENTS CALCULATED AND PLOTTED ON THE FIGURE, BY THE MATHEMATICAL MODEL.

CLIENT	JOB NUMBER
US NAVY - INDIAN HEAD, MARYLAND	
SUBJECT: SWALE 2 EXCAVATION	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF			4/4/94

ALTERNATIVE I (AND) ALTERNATIVE 2

(Excavation, Stabilization & Placement (AND) Excavation & Placement)

- Based on Contamination boundary lines indicated on the Figure. Swale 2 is devided into four sections for volumetric calculations of excavated soil. Each section is accurately approximated by a trapezoidal shape.

12 in. Excavation

SECTION I

- Parallel sides indicated by " 11 "

width of Trapezoid I : 115 Ft.
length of Parallel sides of Trapezoid : 120 FT
155 FT

AREA, SECTION I : $= \frac{1}{2}(115\ FT.)(120\ FT + 155\ FT) = 15813\ FT^2 \cong \underline{15820\ FT^2}$

SECTION II

- Parallel sides indicated by " 11 ".

width of trapezoid II : 207 FT
LENGTH OF PARALELL SIDES OF TRAPEZOID : 100 FT
108 FT

AREA, SECTION II $= \frac{1}{2}(207\ FT)(100\ FT + 108\ FT) = 21528\ FT^2 \cong \underline{21530\ FT^2}$

CLIENT	JOB NUMBER
U.S. NAVY - INDIAN HEAD, MARYLAND	
SUBJECT: SWALE 2 EXCAVATION	
BASED ON	DRAWING NUMBER
BY: CSF / CHECKED BY: [illegible] / APPROVED BY:	DATE: 4/4/94

SECTION III:

- PARALELL SIDES IDICATED BY " / "

HEIGHT OF TRAPEZOID III: 112 FT.
LENGTH OF PARALELL SIDES OF TRAPEZOID: 40 FT.
60 FT.
AREA, SECTION III: $\frac{1}{2}(112 \text{ FT.})(40 \text{ FT.} + 60 \text{ FT.})$
$= \underline{5600 \text{ FT}^2}$

SECTION IV:

- PARALELL SIDES INDICATED BY: " / "

HEIGHT OF TRAPEZOID IV: 66 FT.
LENGTH OF PARALELL SIDES OF TRAPEZOID: 37 FT.
55 FT.
AREA, SECTION IV: $\frac{1}{2}(66 \text{ FT.})(37 \text{ FT} + 55 \text{ FT.})$
$= 3036 \text{ FT}^2 \triangleq \underline{3040 \text{ FT}^2}$

SECTION BETWEEN BUILDING 731 AND GREEN OUTBUILDING:

- REGION APPROXIMATED BY A RECTANGLE

LENGTH OF REGION (East to West): 85 Ft.
WIDTH OF REGION: 10 Ft.

AREA OF SECTION: 85 Ft. X 10 Ft = $\underline{850 \text{ Ft}^2}$

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE 4 OF 5

CLIENT	JOB NUMBER
U S NAVY - INDIAN HEAD, MA	RYLAND
SUBJECT	
SWALE 2 EXCAVATION	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
JKL	AR		4/4/94

TOTAL AREA OF SECTIONS I, II, III, IV AND REGION BETWEEN THE 2 BUILDINGS:

$15820\ Ft^2 + 21530\ Ft^2 + 5600\ Ft^2 + 3040\ Ft^2 + 850\ Ft^2 =$

$46840\ Ft^2$

$5205\ YD^2$

TOTAL VOLUME OF SOIL EXCAVATED IN SECTIONS I, II, III, IV AND REGIONS BETWEEN THE 2 BUILDINGS: (12 in. excavation)

$46840\ Ft^2 \times 1\ Ft = 46840\ Ft^3$

$\cong 1735\ YD^3$

CLIENT	JOB NUMBER
US NAVY - INDIAN HEAD, MARYLAND	
SUBJECT: SWALE 2 EXCAVATION	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
[illegible]	[illegible]		4/4/94

30 INCH EXCAVATION:

- THE SHADED PORTION OF THE FIGURE WILL BE USED AS A GUIDE TO DETERMINE THE LENGTH OF THE DEPTH EXCAVATION ALONG THE CENTERAL SWALE (C_L).
- ADDITIONAL DEPTH EXCAVATION WILL BE MADE AT THE TWO SUBSECTIONS: 1) ALONG TRANSECTS 1 - 4
  2) ALONG TRANSECTS 9 - 10.

Central Swale Section (C_L)

TOTAL LENGTH OF SHADED REGION (FOR C_L): 501 FT
WIDTH OF EXCAVATED TRENCH IN SHADED REGION: 15 FT
ADDITIONAL DEPTH OF EXCAVATED TRENCH: 1.5 FT.

TOTAL VOLUME OF SOIL EXCAVATED ALONG Central Swale:
501 Ft. x 15 Ft x 1.5 Ft. = 11,273 Ft^3 ≈ 11,280 Ft^3
≈ 418 YD^3

SUBSECTION ALONG TRANSECTS (1-4):
- APPROXIMATED USING FORMULA FOR RECTANGLE

TOTAL LENGTH OF REGION (NORTH TO SOUTH): 175 FT
TOTAL WIDTH OF REGION (East to West): 40 FT
ADDITION DEPTH OF EXCAVATED TRENCH: 1.5 FT

TOTAL VOLUME OF SOIL EXCAVATED IN SUBSECTION:

175 Ft x 40 Ft. x 1.5 Ft = 10,500 Ft^3 ≈ 390 YD^3

CLIENT	JOB NUMBER
US NAVY - INDIAN HEAD, MARYLAND	
SUBJECT: SWALE 2 EXCAVATION	
BASED ON	DRAWING NUMBER
BY: CJF / CHECKED BY: / APPROVED BY:	DATE: 4/4/94

SUBSECTION ALONG TRANSECT (9-10):

- APPROXIMED USING FORMULA FOR A TRAPEZOID
- PARALELL SIDES INDICATED BY: " 1 "

WIDTH OF TRAPEZOID: 17 Ft.
LENGTH OF PARALELL SIDES: 21 Ft.
18 Ft.

AREA OF SUBSECTION: $\frac{1}{2}(17\ Ft.)(21\ Ft + 18\ Ft.) = 332\ Ft^2$

TOTAL VOLUME OF EXCAVATED SUBSECTION:

$332\ Ft.^2 \times 1.5\ Ft = \underline{498\ Ft^3} \cong \underline{\underline{19\ YD^3}}$

TOTAL VOLUME OF ADDITIONAL DEPTH EXCAVATION AT IR SITE 5, SWALE 2:

$418\ YD^3 + 390\ YD^3 + 19\ YD^3 = \underline{\underline{827\ YD^3}}$

TOTAL VOLUME OF SOIL EXCAVATED FOR:

ALTERNATIVE I: EXCAVATION, STABILIZATION, PLACEMENT
ALTERNATIVE II: EXCAVATION, PLACEMENT

$1735\ YD^3$ (page 4) + $827\ YD^3$ (page 6) = $2562\ YD^3$

ADD: 20% BULKING FACTOR: $513\ YD^3$

$\underline{\underline{3075\ YD^3}}$

CLIENT	JOB NUMBER
US NAVY - INDIAN HEAD, MD	EKLAND
SUBJECT	
SWALE 2 CONSOLIDATION + CAPPING	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF			4/4/94

ALTERNATIVE 3
CONSOLIDATION AND CAPPING

- ALL CONTAMINATED SOIL LOCATED OUTSIDE THE CENTER-SWALE AREA INDICATED BY THE SHADED REGION ON THE FIGURE WILL BE RELOCATED AND COMPACTED WITHIN THIS AREA.

VOLUME OF

- CALCULATED BY DEDUCTING THE VOLUME OF SOIL WITHIN THE 15 FT. WIDE SHADED SECTION ALONG THE CENTER OF THE SWALE FROM THE TOTAL SOIL EXCAVATED AT THE SITE.

TOTAL VOLUME OF SILVER-CONTAMINATED SOIL WITHIN SWALE 2:

2,562 YD^3 (page 6 of calculations)

TOTAL VOLUME OF CONTAMINATED SOIL WITHIN THE 15 FT. WIDE SHADED SECTION ALONG THE CENTER OF SWALE 2:

501 FT LONG X 15 FT WIDE X 2 FT DEEP = 15030 FT^3

$\triangleq$ 557 YD^3

TOTAL VOLUME OF CONTAMINATED SOIL TO BE RELOCATED TO CENTER OF SWALE:

2,562 YD^3 − 557 YD^3 = 2005 YD^3

+ 401 YD^3 (20% bulking)

2406 YD^3

CLIENT	JOB NUMBER		
US NAVY - INDIAN HEAD,	MARYLAND		
SUBJECT			
SWALE 2 CONSOLIDATION & CAPPING			
BASED ON	DRAWING NUMBER		
BY	CHECKED BY	APPROVED BY	DATE
CBF			4/4/94

VOLUME OF SOIL REQUIRED FOR CAPPING

- VOLUMES BASED ON AREA OF CENTER OF SWALE 2 INDICATED BY SHADED REGION ON THE FIGURE.

12 in Low Permeable Layer

501 Ft long x 20 Ft wide x 1 FT DEEP = 10020 Ft^3

$\hat{=}$ 372 YD^3

ADD: 30% F.S. FOR CAP CURVATURE & CONTOUR: 112 YD^3

TOTAL VOL. LOW PERM SOIL: 484 YD^3

24 in BACKFILL LAYER

TOTAL VOLUME OF BACKFILL REQUIRED: 484 YD^3

x 2 (1 Ft LAYERS)

= 968 YD^3

6 in TOPSOIL LAYER

TOTAL VOLUME OF TOPSOIL REQUIRED: 484 YD^3

x 0.5 (6 in Layer)

= 242 YD^3

APPENDIX C

RISK ASSESSMENT CALCULATIONS

Environmental Permits Report

for

Removal of Silver Contaminated Soil at Installation Restoration Site 5 Indian Head Division Naval Surface Warfare Center

Indian Head, Maryland

Northern Division
Naval Facilities Engineering Command
Contract Number N62472-90-D-1298
Contract Task Order 0157

April 1994

2.10 - 4/1/1994 - 00028

D-04-94-2

ENVIRONMENTAL PERMITS REPORT
FOR
REMOVAL OF SILVER CONTAMINATED SOIL AT INSTALLATION RESTORATION SITE 5
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity, Chesapeake
Environmental Branch Code 18
Naval Facilities Engineering Command
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:
HALLIBURTON NUS Corporation
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0157

APRIL 1994

SUBMITTED BY:

KEVIN F. DONNELLY, P.E.
PROJECT MANAGER
HALLIBURTON NUS CORPORATION
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
HALLIBURTON NUS CORPORATION
WAYNE, PENNSYLVANIA

TABLE OF CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

This Environmental Permits Report (Report) was prepared under Subtask 1.4 of Contract Task Order (CTO) No. 0157, under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298. Under this CTO No. 0157, Halliburton NUS is performing engineering and design services and provide construction phase services for removal of silver-contaminated soil at Site 5 at the Indian Head Division, Naval Surface Warfare Center (NSWC) in Indian Head, Maryland.

1.1 BACKGROUND INFORMATION

The Indian Head Division, NSWC, is located approximately 25 miles southwest of Washington, D.C., in the northwestern section of Charles County, Maryland. It consists of the main area and the Stump Neck Annex. The main area of the NSWC contains approximately 2,500 acres. The main area of the NSWC is located on a peninsula bounded by the Potomac River to the northwest and Mattawoman Creek to the south and southeast. The Stump Neck Annex is slightly less than 1,000 additional acres and located southwest of the main area and Mattawoman Creek.

Between 1953 and 1965, spent fixer from photographic developing operations was released from the southwest corner of Building 731 causing silver contamination in the surrounding soils. A swale and its surrounding area (identified as Swale 2) which runs from the southwest corner of Building 731 was confirmed to be contaminated with silver. The area of contamination, determined by sampling efforts, is contained to an area measuring approximately 45,900 square feet as shown in Figure 1-1. Photographic operations are still performed in Building 731, but the spent fixer is now collected and the silver is recovered.

1.2 GENERAL PROJECT DESCRIPTION

The contaminated soil which consists of the flood area of Swale 2 is approximately 500 feet long and 75 feet wide. The contamination begins at the southwest corner of Building 731. The contamination extends southward to a dirt access road 400 feet from Building 731. The swale follows the road for approximately 100 feet then discharges under the road via an 8-inch CMP culvert to a rock outlet. The swale is overgrown with field grasses and has a drop of approximately 28 feet.

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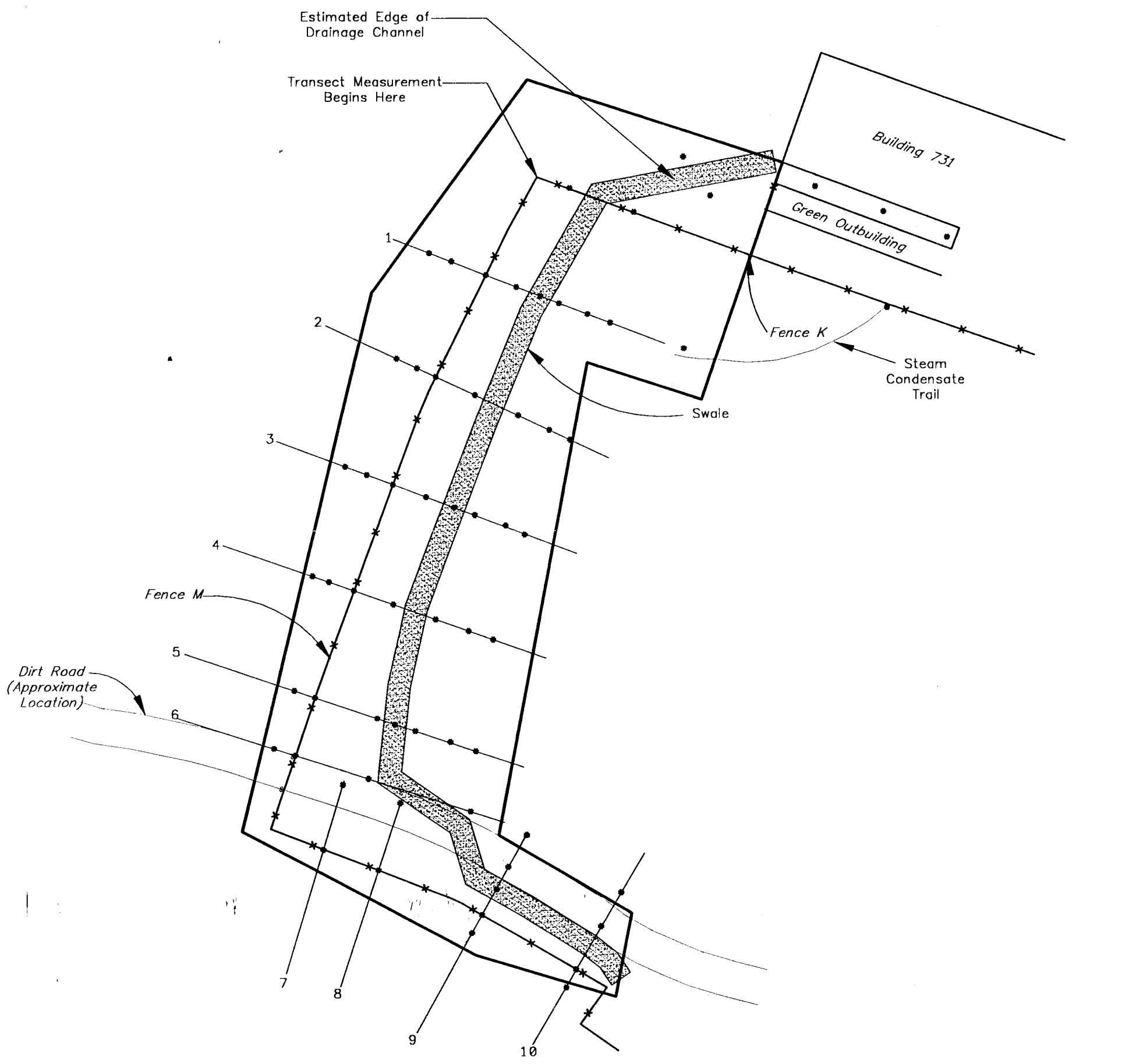


LEGEND

- SAMPLE LOCATION
- FENCE
- LIMIT OF SURFACE EXCAVATION
- LIMIT OF SUBSURFACE EXCAVATION

0 50 100

SCALE IN FEET

ESTIMATED LIMITS
OF SILVER CONTAMINATION
IR SITE 5
SWALE #2
INDIAN HEAD, MARYLAND

FIGURE 1-1

HALLIBURTON NUS
Environmental Corporation

The removal action will consist of establishing erosion and sedimentation controls, general site preparation work, excavation of soils in excess of 10 mg/kg total silver, placement and capping of the contaminated soil, and restoration of the sites. The estimated construction period is expected to be less than 4 weeks.

1.3 PURPOSE

The purpose of this report is to comply with the amended Executive Order 12088, "Federal Compliance With Pollution Control Standards" and to comply with applicable Federal, state, local, and interstate pollution control standards governing air quality, water quality, solid waste, and hazardous waste.

This report identifies the type of permits required, the permitting agency, the procedures, times and fees required to complete the permit applications, applicability of waivers or variances, and monitoring requirements associated with applicable permits.

1.4 REPORT ORGANIZATION

This report consists of the following sections:

- Section 1.0 - Introduction
- Section 2.0 - Proposed Removal Action
- Section 3.0 - Permitting Requirements
- Section 4.0 - Permit Applications

Section 1.0 represents a brief introduction and summarizes background information. Section 2.0 describes the removal action project. Permitting requirements are presented in Section 3.0 and information regarding permit applications are presented in Section 4.0.

2.0 PROPOSED REMOVAL ACTION

2.1 REMOVAL ACTION OBJECTIVES

The objectives of the proposed removal action at Site 5 are to remove silver-contaminated soil from Swale 2, place the excavated soil from Swale 2 in a secure location on the NSWC, and restore the swale area.

2.2 REMOVAL ACTION DESCRIPTION

The removal action will consist of establishing erosion and sediment controls, general site preparation work, excavation of silver-contaminated soil, placement of the contaminated soil on the NSWC, and restoration of the sites. The estimated construction period is expected to be less than 4 weeks. The major items of construction to be performed during the work are summarized as follows:

- **Erosion and Sediment Controls**. Silt fencing will be installed, construction entrances will be built, and a dike will be constructed in accordance with the erosion and sediment control plan.

- **General Site Preparation**. The area in which construction activities will be performed will be cleared and grubbed. The disturbed area will be restricted to only those areas necessary to perform the work.

- **Excavation of Silver Contaminated Soil**. Approximately 2,500 cubic yards of silver-contaminated soil will be excavated from the swale area.

- **Placement of the Excavated Soil**. The excavated soil will be placed in the Rum Point disposal area at the Stump Neck Annex of the NSWC. The contaminated soil will be covered with a cap and revegetated.

- **Restoration of the Site**. The swale area will be backfilled and regraded. All disturbed areas will be reseeded.

3.0 REQUIRED PERMITS

Based on TCLP analytical results, Site 5 soils are not classified as hazardous wastes; therefore, no hazardous waste handling treatment and disposal permits are required. However, permits required to perform earth moving construction work must be obtained.

Table 3-1 presents a project permit checklist to assess what (if any) permits may be required for specific projects to assure regulatory compliance. This table lists the type of permits/license/certification that may be required by government agencies for specific types of projects. As shown on Table 3-1, based on review of the permit checklist the following permits must be addressed:

- **Stormwater**. A waiver is applicable because the project will not increase runoff from the area.

- **Erosion and Sediment Control Plan**. An Erosion and Sediment Control Plan is required because more than 5,000 square feet is disturbed by construction activities.

No fees or monitoring requirements are associated with any of the required permits.

3.1 FEDERAL PERMITS

The United States Environmental Protection Agency (EPA) does not require any permits for this project. The Army Corps of Engineers (COE) does not require direct application for permits.

3.2 STATE PERMITS

MDE requires submission of a Stormwater Management Design or Waiver Application and an Erosion and Sedimentation Control Plan. The actions required to fulfill the state requirements are as described in Section 4.0.

3.3 LOCAL PERMITS

The NSWC, Indian Head, is a Federal facility that is located on land owned by the government; therefore, it is not subject to local codes, permits, and inspection requirements typically required.

TABLE 3-1

PROJECT PERMIT CHECKLIST
SITE 5, NSWC
INDIAN HEAD, MARYLAND

Type of Project	Type of Permit/License Certification	Issuing Agency	Applicability	Reason
Stationary Air Emission Source	Permit-to-Construct/Modify Source Permit-to-Operate	State	Not applicable	Discharge of air emissions will not occur.
Construction in Floodplain, Waterway, or Wetlands in Maryland	Permit to Construct/Joint Permit	State COE	Not applicable	Excavation will not occur in a waterway and thus a Joint Permit is not required.
Wastewater Discharge to "Waters of the U.S."	Permit-to-Discharge (NPDES)	State or EPA	Not applicable	A joint source discharge requiring an NPDES permit will not be required. Wastewaters will not be treated.
Wastewater Discharge to Sewer	Sewer-Use Permit (if to municipality POTW)	State or local	Not applicable	No wastewater discharge will occur.
Potable Water Treatment	Permit-to-Operate	State	Not applicable	Water is not being treated.
Underground Injection for Waste Disposal	Permit-to-Operate	State or EPA	Not applicable	Underground injection will not be performed.
Ocean Dumping	Permit-to-Dump	EPA	Not applicable	Ocean dumping will not be performed.
Dredging	Dredge/Fill Permit Ocean Disposal Permit State Water Quality Cert.	COE COE State	Not applicable	Dredging is not being performed. Soil from a stream bed will be removed, but the stream will be diverted and no water will exist at time of construction.
Structure in Navigable Waters	Section 10 Permit	COE	Not applicable	Structures are not being built in navigable waters.
Stormwater Discharge to "Waters of the U.S."	Permit-to-Construct/Modify Source	State	Applicable	Stormwater waiver will be applied for as discussed in Section 4.1.
Earth Moving Operations	Permit to Construct/Erosion and Sediment Control Plan	State	Applicable	An Erosion and Sediment Control Plan must to be submitted for approval as discussed in Section 4.2.
Fill Wetlands	Dredge/Fill Permit State Water Quality Cert. State Wetland Permit	COE State	Not applicable	The project is not proposing to fill in a wetlands area.

TABLE 3-1
PROJECT PERMIT CHECKLIST
SITE 5, NSWC
INDIAN HEAD, MARYLAND
PAGE TWO

Type of Operation/Facility	Type of Permit/License Certification	Issuing Agency	Applicability	Reason
Solid Waste Landfills/Dumps	Permit-to-Operate	State	Not applicable	The disposal area is not considered a landfill.
Hazardous Waste Generation	EPA Identification Number	EPA	Not applicable	Hazardous wastes will not be generated.
Hazardous Waste Transporting	State Waste Hauler License/Permit	State	Not applicable	Standards applicable to transport of hazardous waste (40 CFR Part 263) are not applicable to onsite transportation of the excavated soils for this project because the soil is not considered to be a hazardous waste.
Hazardous Waste Treatment, Storage, Disposal	Permit-to-Construct Permit-to-Operate (Part B Permit)	State or EPA	Not applicable	Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities (TSDFs) (40 CFR Part 264) are not applicable to this project because the material is not classified as a hazardous waste.
Underground Tanks	Permit-to-Construct Permit-to-Operate Registration	State or EPA	Not applicable	No underground tanks exist within this project.
Pesticide Application	Applicator Certification	DOD	Not applicable	Pesticides will not be used.

4.0 PERMIT APPLICATIONS

The permits required for this project are obtained through the Maryland Department of the Environment (MDE). A Stormwater Management Waiver and an Erosion and Sediment Control Plan was prepared by Halliburton NUS for submission to the MDE by the Navy.

4.1 STORMWATER MANAGEMENT WAIVER

Stormwater Management Regulations are provided to protect, maintain, and enhance the public health, safety, and general welfare by establishing minimum requirements and procedures to control adverse impacts associated with increased stormwater runoff. One of the primary objectives of Stormwater Management Regulations is to prevent increased stormwater runoff caused by land development.

The MDE may grant a waiver of the stormwater management requirements for state and Federal projects if a Stormwater Management Waiver Application is submitted by the applicant. A copy of the Stormwater Management Waiver Application is provided in Appendix A. This project qualifies for a Stormwater Waiver under Section 2.3(a)(iii), which states: "A project is eligible for a waiver of stormwater management for both quantitative and qualitative control if the applicant can demonstrate to the Administration that: the proposed project shall return the disturbed area to a predevelopment runoff condition at the conclusion of the project (i.e., pipeline projects, bridge deck replacements, resurfacing or existing roadways, certain underground projects)."

The Stormwater Management Waiver Application documents that the proposed project does not increase the amount of stormwater runoff after construction from its preconstruction condition.

A copy of the Stormwater Management Waiver Application is provided in Appendix A. A complete Stormwater Management Waiver Application and corresponding information was submitted by Halliburton NUS to the Navy via a separate submittal.

On Navy approval of the submittal, the Stormwater Management Waiver Application package should be sent to:

Department of the Environment
Sediment and Stormwater Administration
2500 Broening Highway
Building 70, 1st Floor
Baltimore, MD 21224

4.2 EROSION AND SEDIMENT CONTROL PLAN

Erosion and Sediment Control Plans are prepared to assure provisions are made to protect, maintain, and enhance the public health, safety, and general welfare by controlling the adverse impacts associated with accelerated soil erosion and resultant sedimentation caused by land disturbance activities.

An Erosion and Sediment Control Plan was prepared following the guidelines provided by the Sediment and Stormwater Administration of the Maryland Department of the Environment. (Erosion and Sediment Control Guidelines for State and Federal Projects, January 1990 and the 1991 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

A copy of the Erosion and Sediment Control Plan Transmittal Form is provided in Appendix B. Halliburton NUS provided an Erosion and Sediment Control Plan Report (April 1994) for Navy review.

Upon Navy approval of the plan, the Erosion and Sediment Control Plan should be sent to the following address for review and comments:

Maryland Department of the Environment
Sediment and Stormwater Administration
Plan Review Division
2500 Broening Highway
Baltimore, MD 21224

APPENDIX A

STORMWATER WAIVER APPLICATION

DEPARTMENT OF THE ENVIRONMENT
STORMWATER MANAGEMENT ADMINISTRATION
STORMWATER MANAGEMENT WAIVER APPLICATION

Owner: NAVFAC, EFACHES
Address: Building 212
Washington Navy Yard
Washington, D.C.
Consultants: Halliburton NUS

MDE No.: _____
Project No.: _____
Description: Removal of silver-contaminated soil
Location: Indian Head Division
NSWC, Indian Head, Maryland

I/We, the Owner/Owners hereby request a Waiver be granted for the above referenced project in accordance with the following section(s) of the Stormwater Management Guidelines for State and Federal Projects:

Section				Minimum Evidence Required
☐	2.3	(a)	(i)	Contract plans and provisions, stormwater management report, infiltration investigation.
☒	2.3	(a)	(ii)	Contract plans and provisions.
☐	2.3	(a)	(iii)	Contract plans and provisions.
☐	2.3	(b)	(i)	Contract plans and provisions, stormwater management report, infiltration investigation, downstream impact investigation.
☐	2.3	(b)	(ii)	Contract plans and provisions, stormwater management report, infiltration investigation, downstream impact investigation.
☐	2.3	(b)	(iii)	Contract plans and provisions, infiltration investigation, downstream impact investigation.

Other evidence submitted: See attached project description and construction drawings.

_____
Owner's Signature

_____
Date

Approved Denied

Reason: _____

By:

_____
Water Resources Engineer

_____
Date

Submit to: Department of the Environment
Sediment and Stormwater Administration
2500 Broening Highway
Building 30, First Floor
Baltimore, Maryland 21224

If a project involves a waiver request for more than one drainage area, please submit a separate Stormwater Management Waiver Application for each drainage area.

APPENDIX B

EROSION AND SEDIMENT CONTROL PLAN TRANSMITTAL FORM

TRANSMITTAL FORM

MARYLAND
DEPARTMENT OF THE ENVIRONMENT
SEDIMENT AND STORMWATER ADMINISTRATION
PLAN REVIEW DIVISION
2500 BROENING HIGHWAY
BALTIMORE, MARYLAND 21224
TELEPHONE: (301)-631-3563

APPLICATION FOR SEDIMENT CONTROL/STORMWATER MANAGEMENT APPROVAL

CONTRACT NUMBER: N62472-90-D-1298, CTO 157
PROJECT DESCRIPTION: Removal of silver-contaminated soil

PROJECT SIZE DISTURBED (ACRES): 1.0
PROJECT LOCATION/TOWN: Indian Head
PROJECT LOCATION/COUNTY: Charles County
INFORMATION ENCLOSED: Drawings, calculations, erosion and sediment control plan report

APPLICANT NAME: Engineering Field Activity - Chesapeake
APPLICANT ADDRESS: Building 212
Washington Navy Yard
Washington, DC 20374-212
APPLICANT CONTACT NAME: Allen M. Wilson, Code 402
APPLICANT PHONE NUMBER: (202) 433-3318
FAX MACHINE NUMBER: (202) 433-6202

If a consultant(s) has/have been retained, please provide the following information for each consultant:

CONSULTANT NAME: Halliburton NUS Corporation
PROJECT ENGINEER: Anthony P. Klimek, P.E.
CONSULTANT ADDRESS: Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220
CONSULTANT CONTACT NAME: Kevin F. Donnelly, P.E.
CONSULTANT PHONE NUMBER: (412) 921-8195
FAX MACHINE NUMBER: (412) 921-4040

Please submit a complete application with the initial project submittal to the Department at the above address. Projects which involve less than 5,000 square feet and less than 100 cubic yards of earth disturbance do not require approval of the Department.

APPENDIX C

DRAWINGS

DRAWINGS TO BE PROVIDED

APPENDIX D

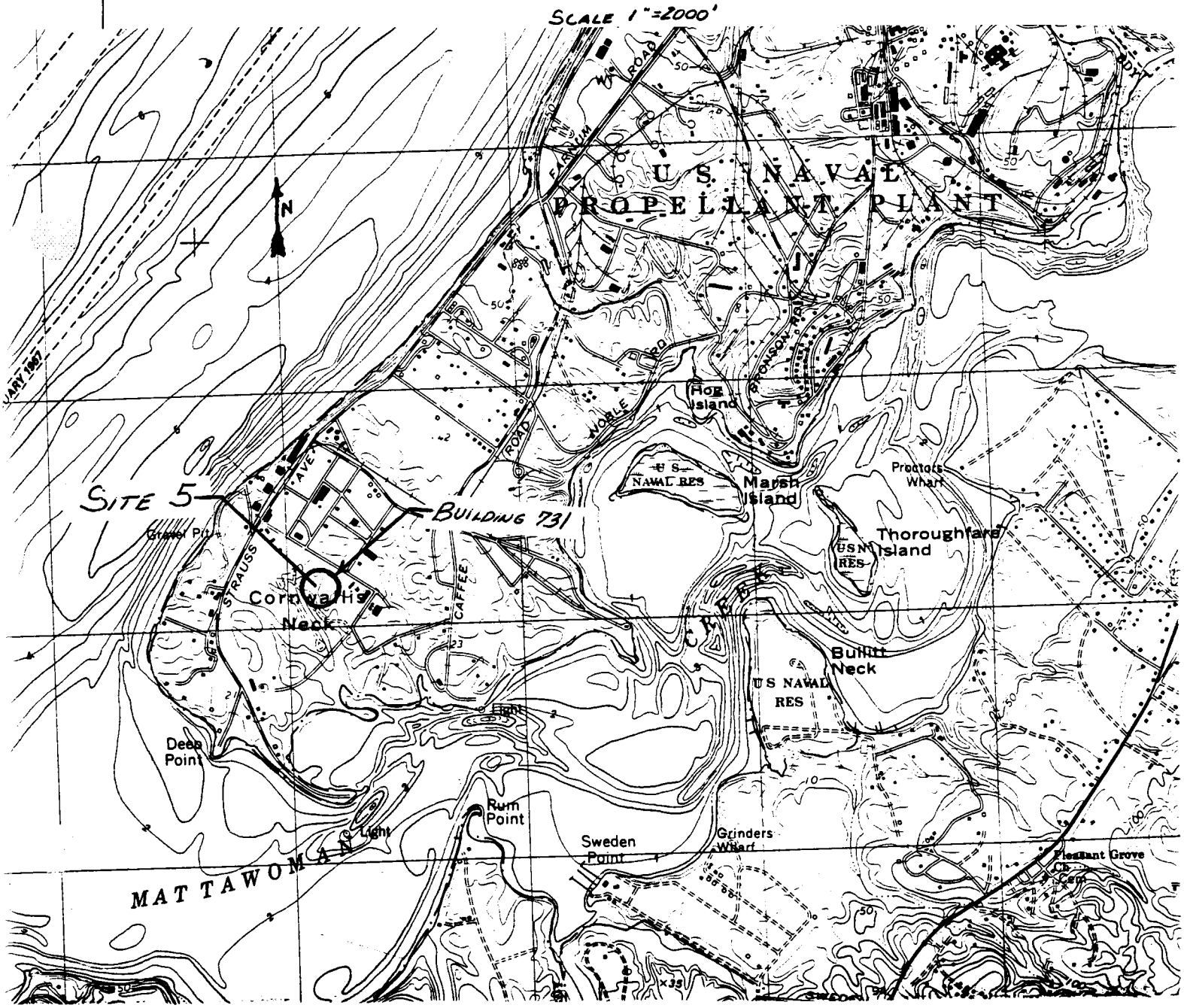
DESIGN CALCULATIONS

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE 1 OF

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			3/22/94

Indian Head Division
Naval Surface Warfare Center
Indian Head, MD
Site 5 - Silver Site
Bldg. 731

Source: USGS, 1978
Indian Head Quad



CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE 2 OF

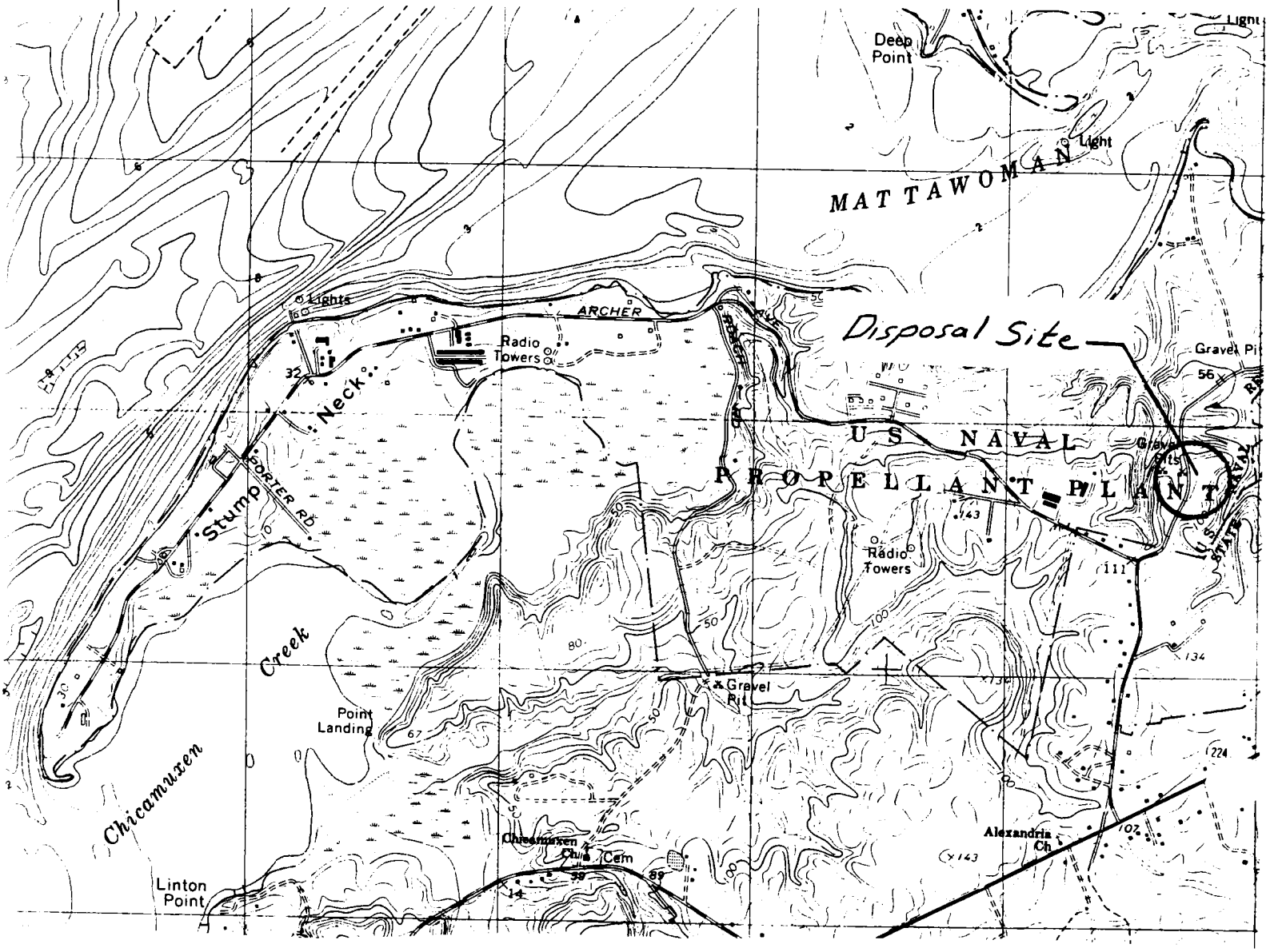
CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			3/22/94

Indian Head Division
Naval Surface Warefare Center
Indian Head, MD

Stump Neck Annex

Disposal Site

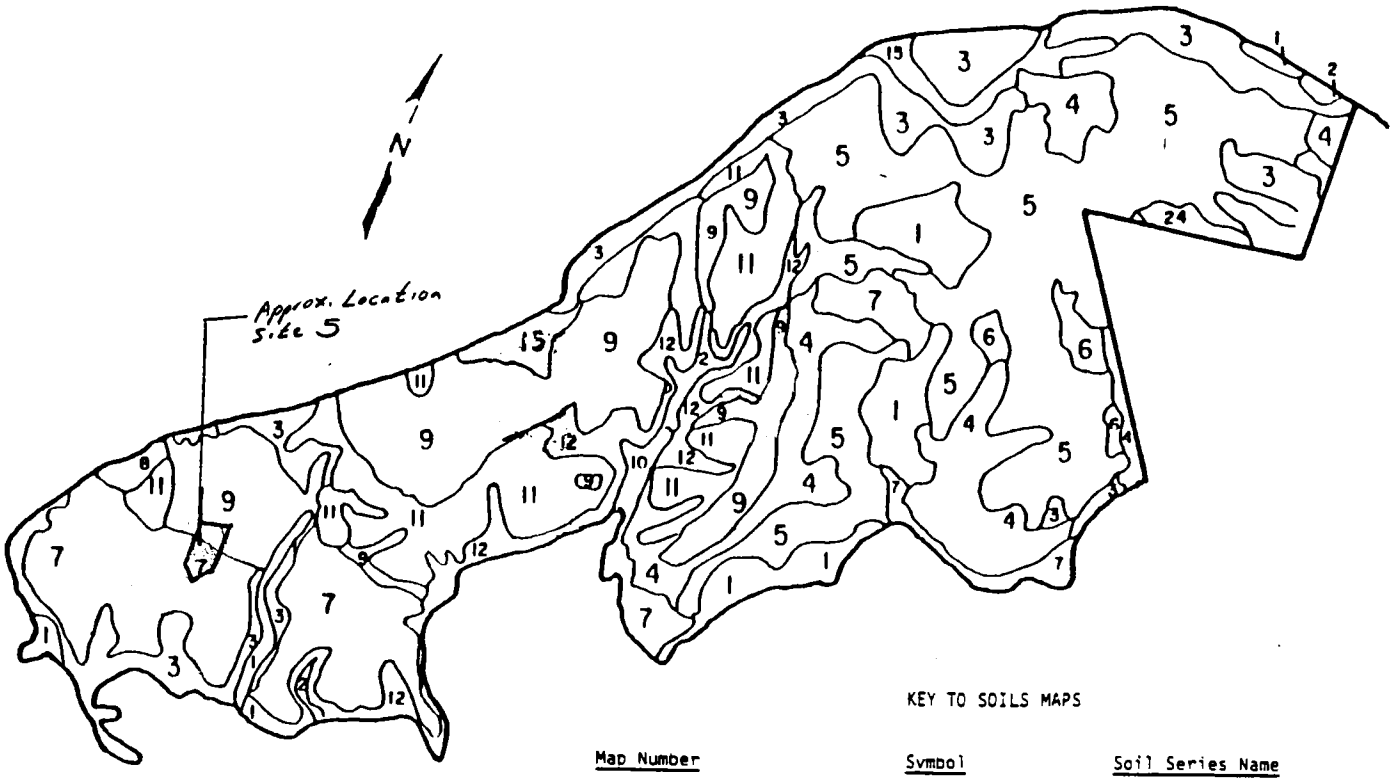
USGS, 1978
Indian Head Quad



CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY RFS	CHECKED BY	APPROVED BY	DATE 3/22/94

Site 5 - Soils Delineation Map



SCALE (FT)
0 1000 2000 3000

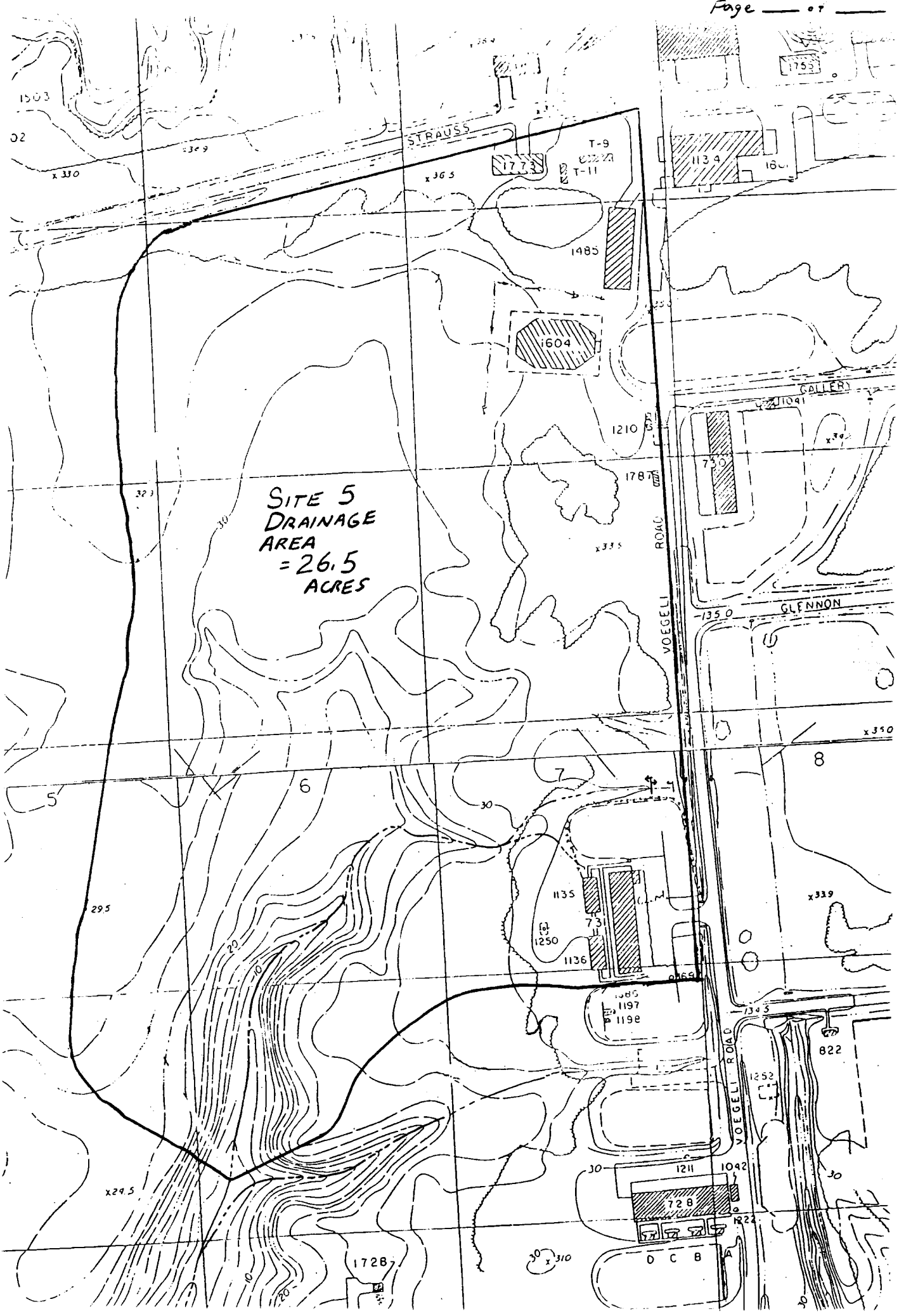
KEY TO SOILS MAPS

Map Number	Symbol	Soil Series Name
1	Cu	Cut-and-Fill Land
2	Bo	Bibb Silt Loam
3	GvE	Gravelly Land: Steep
4	Au	Aura Gravelly Sandy Loam
5	Bi	Beltsville Silt Loam
7	Kp	Keyport Silt Loam
8	Gp	Gravell and Borrow Pits
9	Ek	Elkton Silt Loam
10	Tm	Tidal Marsh
11	Ms	Matawan Loamy Sand
12	Sa	Sandy Land: Steep
13	Rd	Rumford Loamy Sand
15	Sh	Sassafias Sandy Loam
17	Ga	Galestown Loamy Sand
18	Ot	Otbelto Silt Loam
19	Wo	Woodstown Sandy Loam
20	Ex	Exum Silt Loam
21	Mn	Matapeake Silt Loam
22	Mu	Mattapex Silt Loam

REF: Initial Assessment Study
NEESA 13-021
Fred C. Hart Associates, Inc
May, 1993.

ORIGIONAL SOURCE:

USDA Soil Conservation Service
Soil Survey of Charles County, Maryland


SITE 5
DRAINAGE
AREA
= 26.5
ACRES
STRAUSS
VOEGELI ROAD
GLENNON
GALLERI
T-9
T-11
1773
1485
1604
1210
1787
1041
730
1350
1135
730
1250
1136
1197
1198
1211
1042
728
822
1252
1224
1728
1503
1755
1139
x330
x369
x365
x335
x350
x339
x295
x310
295
30
20
10
A
B
C
D

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			3/30/94

I: Runoff

- Drainage Area:
  Public Works Office Drawings, Base maps
  Planimeter: 26.5 acres

- Soil Classification:
  50% Keyport; 50% Elkton

- Runoff Curve Number: 71.3

- Storm Event: 24 hrs; Appendix B, Type II Dist.

Design based on 10 year storm event:

$$S = \frac{1000}{71.3} - 10 = 4.02$$

$$P_{10} = 5.2$$

$$I_a = 0.2S = 0.2(4.02) = 0.80$$

$$Q = \frac{(P_2 - I_a)^2}{(P - I_a) + S} = \frac{(5.2 - 0.80)^2}{(5.2 - 0.80) + 4.02} = 2.3 \text{ inches}$$

Check using Figure 2-1, TR55 ~ O.K.

Worksheet 2: Runoff curve number and runoff

Page — of —

Project NSWC - INDIAN HEAD By RS Date 3/30/94

Location INDIAN HEAD, MD; Site 5 Checked ____ Date ____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☑ acres ☐ mi^2 ☐ %	Product of CN x area
Keyport, C	Woods, Good	70			5.0	350
(C/D) Elkton, C	Woods, Good	70			7.5	525
Elkton, D	Woods, Good	79			7.5	592.5
Keyport, C	Brush, Good	65			6.5	422.5

1/ Use only one CN source per line. Totals = 26.5 1890

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1890}{26.5} = 71.3$; Use CN = 71

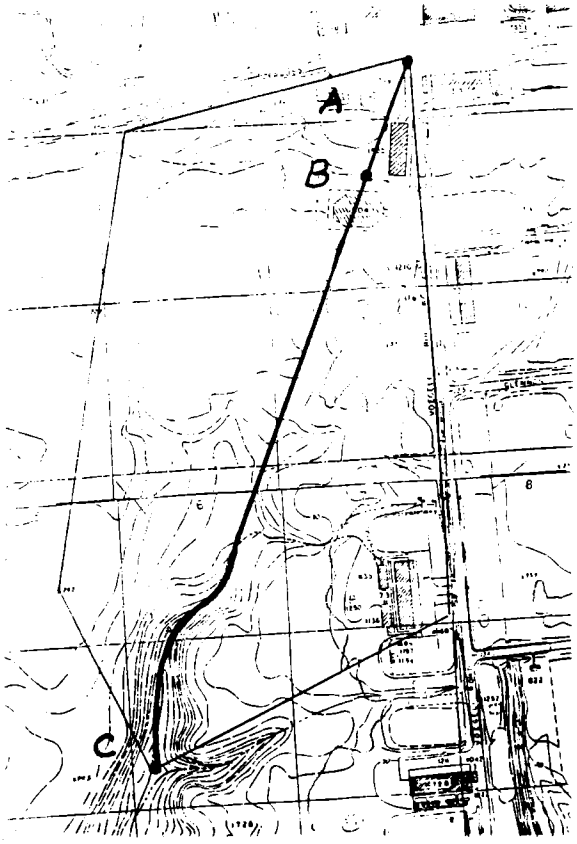
2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2 yrs	10 yrs	100 yrs
Rainfall, P (24-hour) ..... in	3.2	5.2	7.6
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)		2.3	

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			

II Travel Time



Segment:

AB: Sheet flow
max 300'

BC: Shallow Conc. flow
1600'

Based on TR-55 description

AB: Dense Grasses $n = 0.24$

BC: ½ Woods: Lt-Dense Under brush $n = 0.60$
½ Dense Grasses: $n = 0.24$

Note: For Shallow Concentrated flow use figure 3-1 and un-paved for both woods & grass Areas.

Slope
BC ~ 26' drop ~ 1600' = 0.016

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project NSWC - INDIAN HEAD By RF Date 3/30/94

Location Site 5 Checked ____ Date ____

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			Grass			
2. Manning's roughness coeff., n (table 3-1) ..			0.24			
3. Flow length, L (total L ≤ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		3.2			
5. Land slope, s	ft/ft		0.027			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+		= 0.51
Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L	ft		1600			
9. Watercourse slope, s	ft/ft		0.016			
10. Average velocity, V (figure 3-1)	ft/s		2.0			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.22	+		= 0.22
Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					0.73

Worksheet 4: Graphical Peak Discharge method

Project NSWC - INDIAN HEAD By RL Date _____

Location SITE 5 Checked _____ Date _____

Circle one: (Present) Developed _____

1. Data:

   Drainage area ..... A_m = 0.0414 mi^2 (acres/640)

   Runoff curve number .... CN = 71 (From worksheet 2)

   Time of concentration .. T_c = 0.73 hr (From worksheet 3)

   Rainfall distribution type = II (I, IA, II, III)

   Pond and swamp areas spread throughout watershed ..... = ~ percent of A_m (— acres or mi^2 covered)

			Storm #1	Storm #2	Storm #3
2.	Frequency	yr	2	10	100
3.	Rainfall, P (24-hour)	in		5.2	
4.	Initial abstraction, I_a ..... (Use CN with table 4-1.)	in		0.817	
5.	Compute I_a/P			0.157	
6.	Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-II)	csm/in		410	
7.	Runoff, Q ..... (From worksheet 2).	in		2.3	
8.	Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)			—	
9.	Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs		39.0	

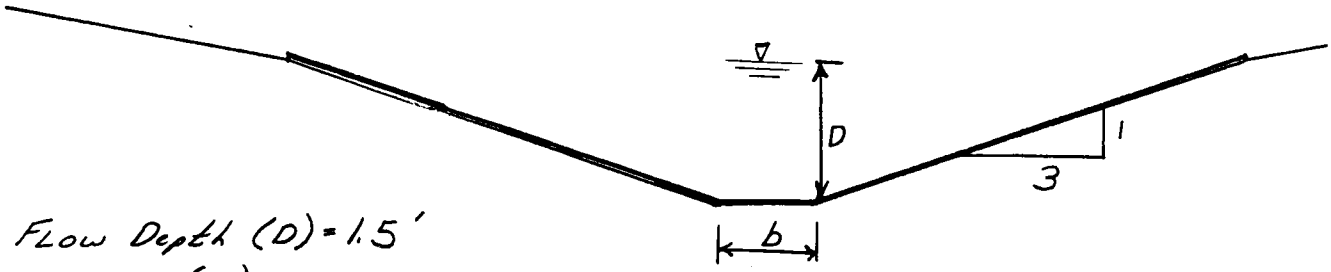
CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT	JOB NUMBER
NSWC - INDIAN HEAD	1370
SUBJECT: SITE 5	
BASED ON: REF: Hydraulic (HAND book)	DRAWING NUMBER
BY: RFS / CHECKED BY	APPROVED BY / DATE: 7/30/94

III SWALE RECONSTRUCTION:

10 year storm Design:

39.0 cfs



Flow Depth (D) = 1.5'
Slope (S) = 0.027
Mannings 'n' = 0.04 (re-veg mat)
Side Slope: 3-1
Bottom width: 1'

REF:
HANDBOOK of Hydro.
BAXTER & KING,
McGRAW-Hill

$D/b = 1.5$

k' (TABLE 7-11) = 10.45

$$Q = \frac{k'}{n} b^{2.667} S^{.5} = \left(\frac{10.45}{.04}\right)(1)^{2.667}(.027)^{.5} = 42.93 \text{ cfs}$$

ok

$A = D(3D) + D(b) = 1.5(4.50) + 1.5(1.0) = 8.25 \text{ ft}^2$

$V = Q/A = 43/8.25 = 5.2 \text{ ft/sec}$

10 year storm = 39 cfs < 43 cfs ok

Jute mat ~ 5 ft/sec ≅ 5.2 ft/sec ok

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT	JOB NUMBER		
NSWC - INDIAN HEAD	1370		
SUBJECT			
BASED ON	DRAWING NUMBER		
BY: RFS	CHECKED BY:	APPROVED BY:	DATE: 3/30/94

IV Removal Site

- It is not economically logical to design runoff control for 26 acres on this project. Therefore, sand bags will be placed at the perimeter of the excavation to divert the rain water around the disturbed area.

  ∴ Dike construction will be based on the area of construction.

V Disposal Site

- Review of the contours indicate flow away from disposal area, therefore, TR-55 calc. do not pertain to this area.

- Disposal area is an existing disposal and borrow soil area currently in a disrupted state.

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT	JOB NUMBER		
NSWC - INDIAN HEAD	1370		
SUBJECT: SITE 5			
BASED ON: E&S state requirement	DRAWING NUMBER		
BY: RFS	CHECKED BY	APPROVED BY	DATE: 7/30/94

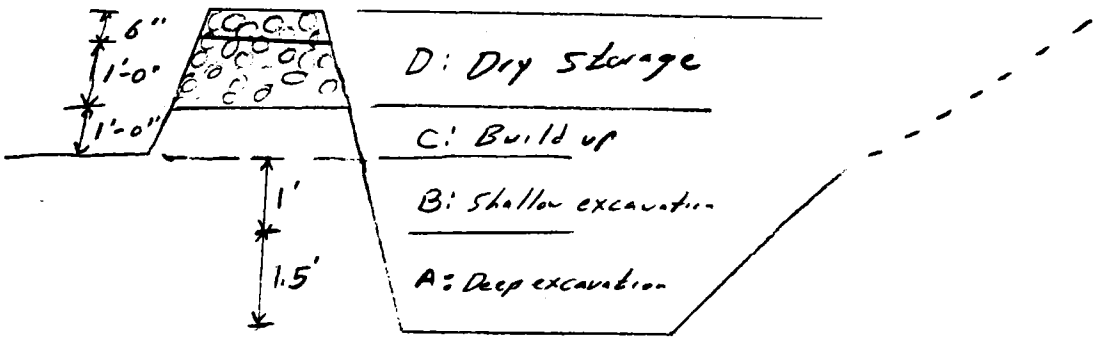
VI CONSTRUCTION AREA

Disturbed Area = 1.0

- Dike Design

Required storage: 1800 cf/acre wet storage
1800 cf/acre Dry storage

Width of excavation at end of contamination = 50' wide
deep excavation = 10' wide
lenght along access road = 100'



DS: C =
1.0 x 50 x 40 = 2000 cf

WS: A = 1.5' x 10' x 20' = 300
B: 1.0' x 50' x 20' = 1000
C: 1.0 x 50' x 30' = 1650
2950 cf

Erosion and Sediment Control Plan Report

for

Removal of Silver Contaminated Soil at Installation Restoration Site 5 Indian Head Division Naval Surface Warfare Center

Indian Head, Maryland

Northern Division
Naval Facilities Engineering Command
Contract Number N62472-90-D-1298
Contract Task Order 0157

April 1994

D-04-94-1

EROSION AND SEDIMENT CONTROL PLAN REPORT
FOR
REMOVAL OF SILVER-CONTAMINATED SOIL AT
INSTALLATION RESTORATION SITE 5
INDIAN HEAD DIVISION, NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Engineering Field Activity, Chesapeake
Environmental Branch Code 405
Washington Navy Yard, Building 212
Washington, D.C. 20374-2121

Submitted by:
Halliburton NUS Corporation
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0157

APRIL 1994

SUBMITTED BY:

KEVIN F. DONNELLY, P.E.
PROJECT MANAGER
HALLIBURTON NUS CORPORATION
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
HALLIBURTON NUS CORPORATION
WAYNE, PENNSYLVANIA

TABLE OF CONTENTS

1.0 INTRODUCTION

This Erosion and Sediment Control Plan Report is for the excavation and removal of silver-contaminated soil from an existing swale and its subsequent placement in a former borrow pit. The soil to be removed is located at Installation Restoration Site 5 (Site 5) at the Indian Head Division, Naval Surface Warfare CLEAN (NSWC) in Indianhead, Maryland. The excavated contaminated soil will then be placed in a former borrow pit located in the Stump Neck Annex of the NSWC. The Indian Head Division, NSWC is part of the Engineering Field Activity, Chesapeake. It consists of the main area and the Stump Neck Annex. The Indian Head NSWC is located approximately 25 miles southwest of Washington, D.C., in the northwestern section of Charles County, Maryland. The main area of the NSWC is located on a peninsula bounded by the Potomac River to the northwest and Mattawoman Creek to the south and southeast. The Stump Neck Annex area is located southeast of the main area and Mattawoman Creek.

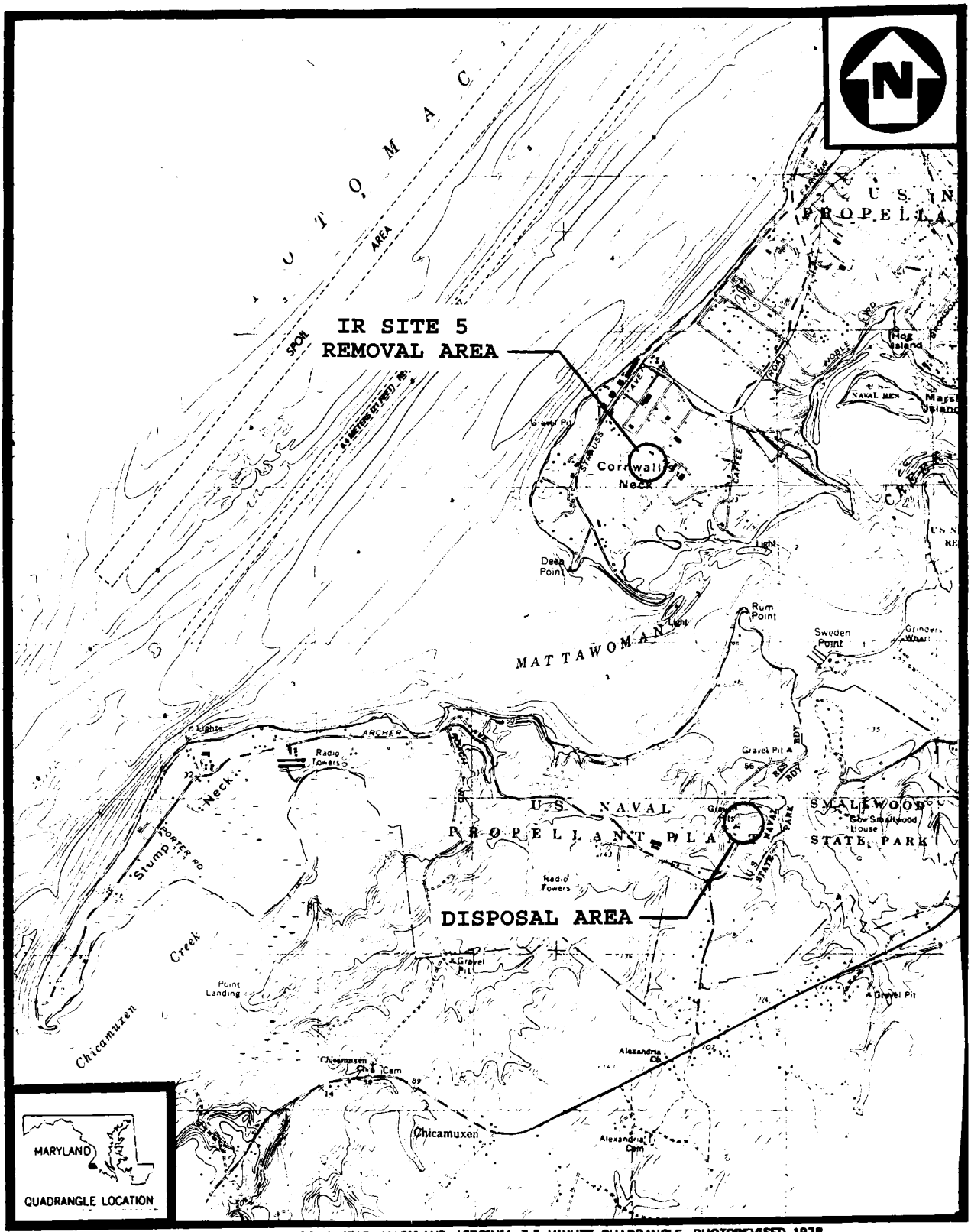
Site 5 is located within the main area of the Naval Surface Warfare Center, approximately one-quarter mile west of Caffee Road. The area of Site 5 to be disturbed consists of a swale (Swale 2) emanating from the southwest corners of Building 731. Previous investigations have confirmed the presence of silver contamination along approximately 500 linear feet of Swale 2. The swale was contaminated with silver from spent fixer, which was released from Building 731 between 1953 and 1965. Photographic operations are still performed in Building 731. Spent fixer is now collected and the silver is recovered. Sampling and analysis activities have determined the horizontal and vertical limits of this silver contamination within Swale 2. The disposal area is located in the Stump Neck Annex area of the NSWC Indian Head near Rum Point. The location of the removal and disposal site are presented in Figure 1-1.

1.1 GENERAL PROJECT DESCRIPTION

The silver-contaminated soil which consists of the flood area of Swale 2 is approximately 500 feet long and 75 feet wide. The contamination begins at the southwest corner of Building 731; it extends approximately 400 feet south-southwest of Building 731 to a dirt access road. The swale follows the dirt road for approximately 100 feet before discharging under the road through an 8-inch CMP culvert to a rock outlet. The swale is overgrown with field grasses and drops of 28 feet.

The removal action will consist of establishing erosion and sediment controls, general site preparation work, excavation of soils in excess of 10 mg/kg total silver placement and capping of the contaminated soil, and restoration of the sites. The estimated construction period is expected to be less than 4 weeks.

ACAD: 0040\BASE.DWG VIEW = 3 08/06/92 MJJ



BASE MAP IS A PORTION OF THE U.S.G.S. INDIAN HEAD, MARYLAND—VIRGINIA 7.5 MINUTE QUADRANGLE, PHOTOREVISED 1978.

LOCATION MAP OF INDIAN HEAD PENINSULA

INDIAN HEAD, MARYLAND

FIGURE 1-1

1 MILE
0
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
5 0

HALLIBURTON NUS
Environmental Corporation

1.2 SEQUENCE OF CONSTRUCTION

The time to perform the required construction activities is estimated to be less than 4 weeks. The major construction activities are as follows:

- **Step 1 - Mobilization and Erosion and Sediment Control Devices**

  Equipment and personnel will be mobilized to the site. A dike will be constructed at the downstream end of Swale 2 and a sandbag diversion will be constructed upstream and parallel to Swale 2. Silt fencing and rock construction entrances will be installed at both for removal and placement sites.

- **Step 2 - Site Preparation**

  Clearing and grubbing will be performed during this task.

- **Step 3 - Excavate Contaminated Soil**

  Silver-contaminated soil from the swale area will be excavated and verification sampling performed.

- **Step 4 - Reconstruct Swale**

  After verification sampling indicates that contaminated soil has been removed, the swale will be backfilled, regraded and lined with revegetation matting.

- **Step 5 - Revegetate Disturbed Areas**

  All areas disturbed by construction activities will be graded to drain and seeded.

- **Step 6 - Demobilization**

  After construction activities are completed, the erosion and sediment control devices will be removed, disturbed areas revegetated, and equipment and personnel demobilized.

2.0 ANALYSIS

Technical Release 55 (TR-55) Procedures were used to calculate storm runoff volumes and peak rates of discharge for the 24-hour, 10-year storm event for the Site 5 removal area.

Runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, soil moisture, antecedent rainfall, cover type, amount of impervious surfaces, and surface retention. Travel time is determined primarily by slope, length of flow path, depth of flow, and roughness of flow surface. Peak discharges are based on the relationship of these parameters and on the total drainage area of the watershed being considered.

The Rum Point disposal site does not receive runoff and is an active soil disposal and borrow site. TR-55 calculations are not appropriate for the disposal site, but proper erosion and sedimentation controls (i.e., silt fence and a construct entrance) are required.

Hydrological and hydraulic calculations for this project are presented in Appendix A of this report.

Erosion and Sediment control-related construction drawings are provided in Appendix B of this report.

3.0 CONCLUSIONS

The entire project will disturb a relatively small area, approximately 1 acre, and occur in a short time period of less than 4 weeks. Appropriate steps will be implemented to control runoff during construction by means of a dike and sandbag diversion system. These measures will reduce the amount of sediment loss and site restoration will establish long-term erosion and sediment control capable of handling the calculated 24-hour, 10-year storm velocity.

APPENDIX A

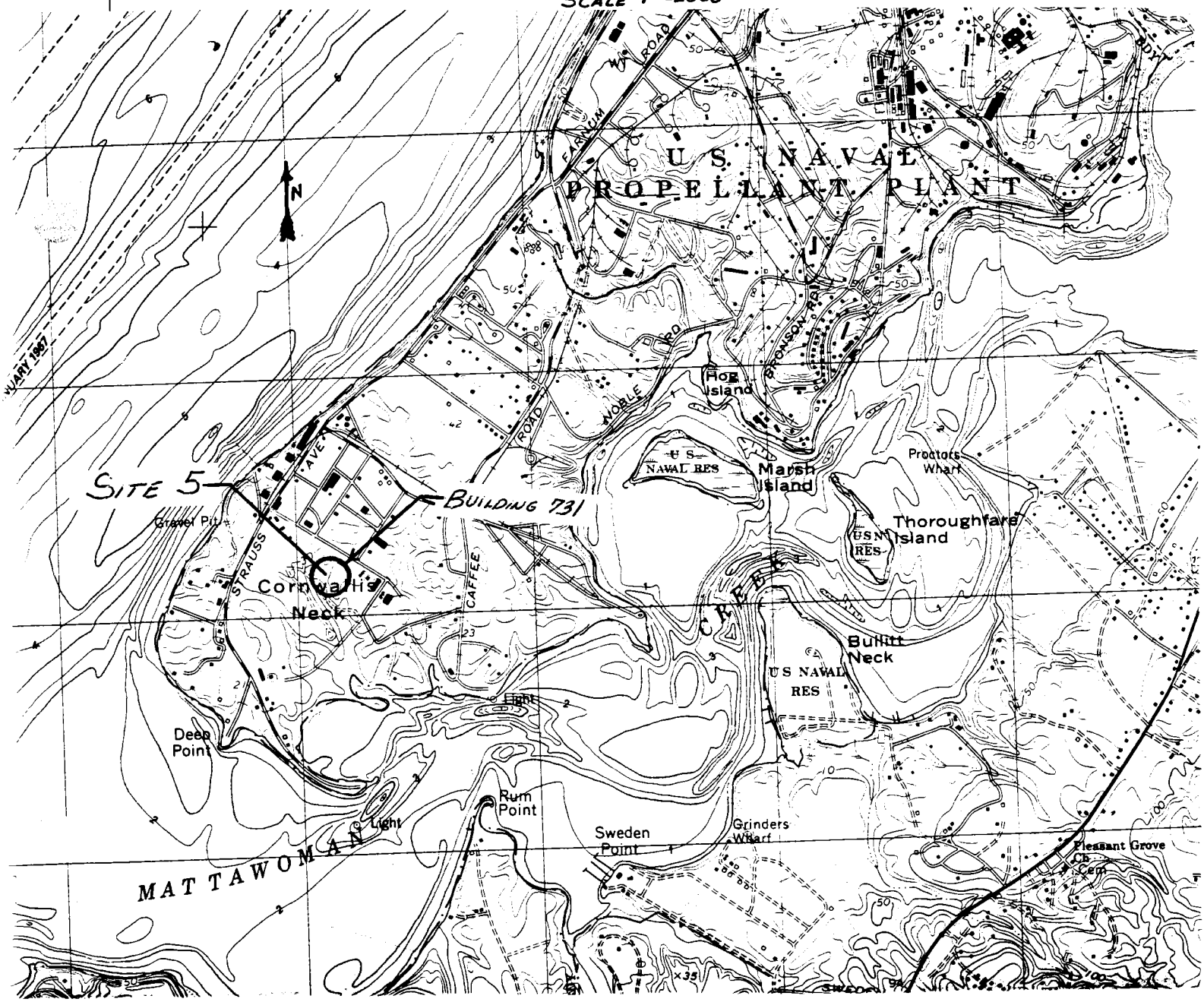
DESIGN CALCULATIONS

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE 1 OF

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			3/22/94

Indian Head Division
Naval Surface Warfare Center
Indian Head, MD
Site 5 - Silver Site
Bldg. 731

Source: USGS, 1978
Indian Head Quad



CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE 2 OF ____

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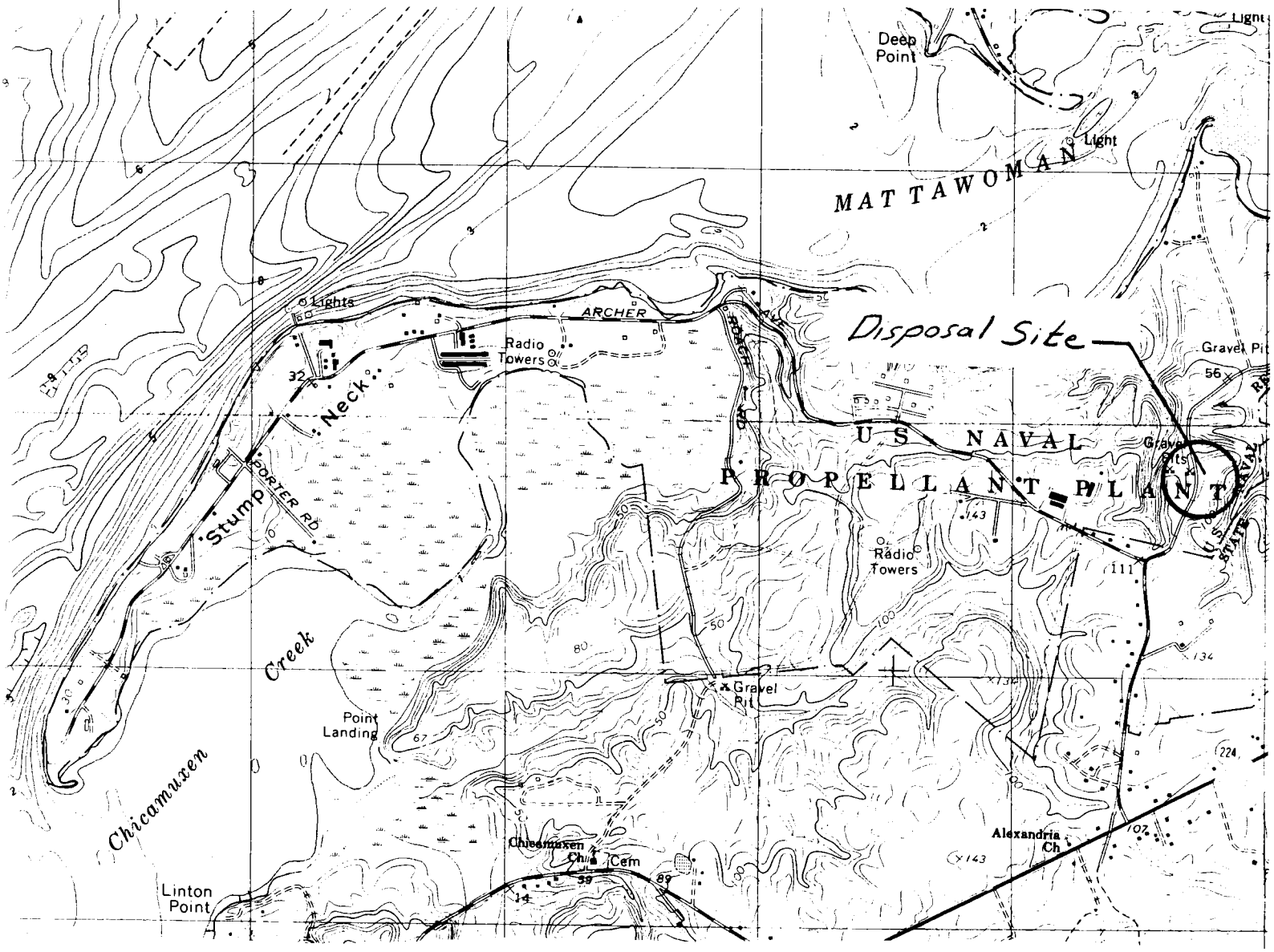
Indian Head Division
Naval Surface Warefare Center
Indian Head, MD

Stump Neck Annex

Disposal Site

USGS, 1978
Indian Head Quad



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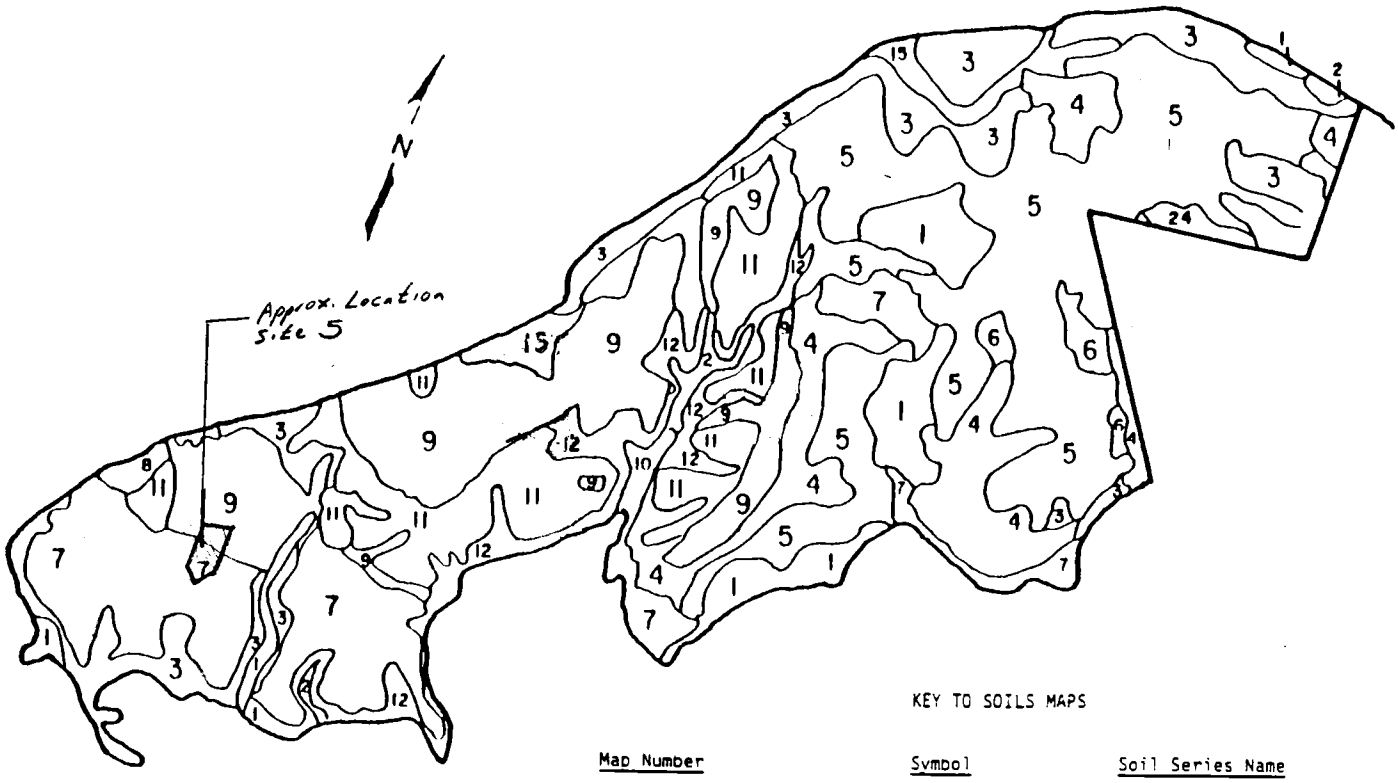
Site 5 - Soils Delineation Map



KEY TO SOILS MAPS

Map Number	Symbol	Soil Series Name
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2	Bo	Bibb Silt Loam
3	GvE	Gravelly Land: Steep
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5	Bi	Beltsville Silt Loam
7	Kp	Keyport Silt Loam
8	Gp	Gravell and Borrow Pits
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12	Sa	Sandy Land: Steep
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17	Ga	Galestown Loamy Sand
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22	Mu	Mattapex Silt Loam

REF: Initial Assessment Study
NEESA 13-021
Fred C. Hart Associates, Inc
May, 1993.

ORIGIONAL SOURCE:

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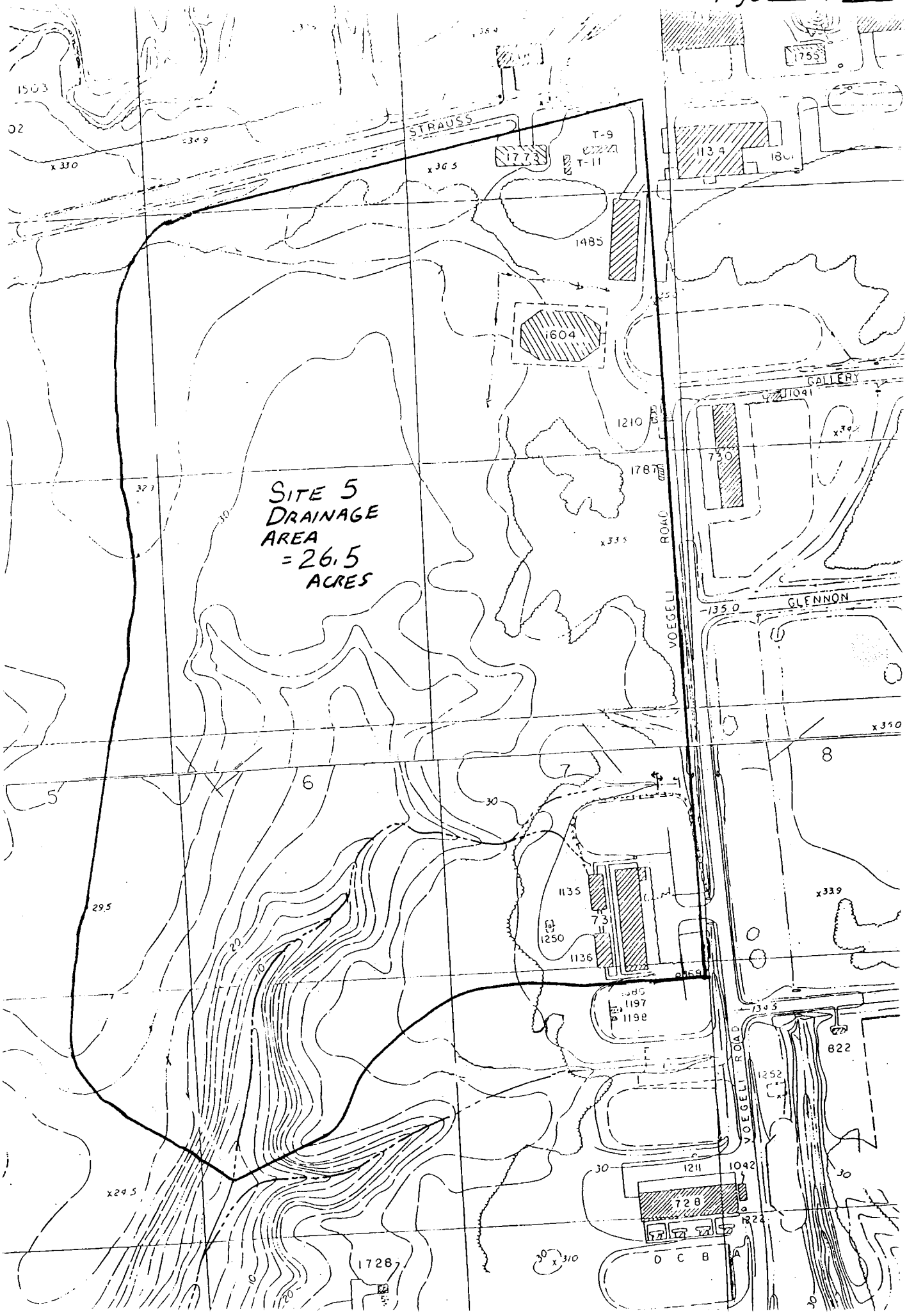
Soil Survey of Charles County, Maryland


SITE 5
DRAINAGE
AREA
= 26.5
ACRES
STRAUSS
VOEGELI ROAD
GLENNON
GALLERY
1503
1773
T-9
T-11
1485
1604
1210
1178
1041
1350
1135
1136
1250
1197
1198
1252
822
1211
1042
728
1728
O C B

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			3/30/94

I: Runoff

- Drainage Area:
  Public Works Office Drawings, Base maps
  Planimeter: 26.5 acres

- Soil Classification:
  50% Keyport; 50% Elkton

- Runoff Curve Number: 71.3

- Storm Event: 24 hrs; Appendix B, Type II Dist.

Design based on 10 year storm event:

$$S = \frac{1000}{71.3} - 10 = 4.02$$

$$P_{10} = 5.2$$

$$I_a = 0.2S = 0.2(4.02) = 0.80$$

$$Q = \frac{(P_2 - I_a)^2}{(P - I_a) + S} = \frac{(5.2 - 0.80)^2}{(5.2 - 0.80) + 4.02} = 2.3 \text{ inches}$$

Check using Figure 2-1, TR55 ~ O.K.

Worksheet 2: Runoff curve number and runoff

Page — of —

Project NSWC - INDIAN HEAD By RS Date 3/30/94

Location INDIAN HEAD, MD; Site 5 Checked ____ Date ____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
Keyport, C	Woods, Good	70			5.0	350
(C/D) Elkton, C	Woods, Good	70			7.5	525
(C/D) Elkton, D	Woods, Good	79			7.5	592.5
Keyport, C	Brush, Good	65			6.5	422.5
	Totals =				26.5	1890

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1890}{26.5} = 71.3$; Use CN = 71

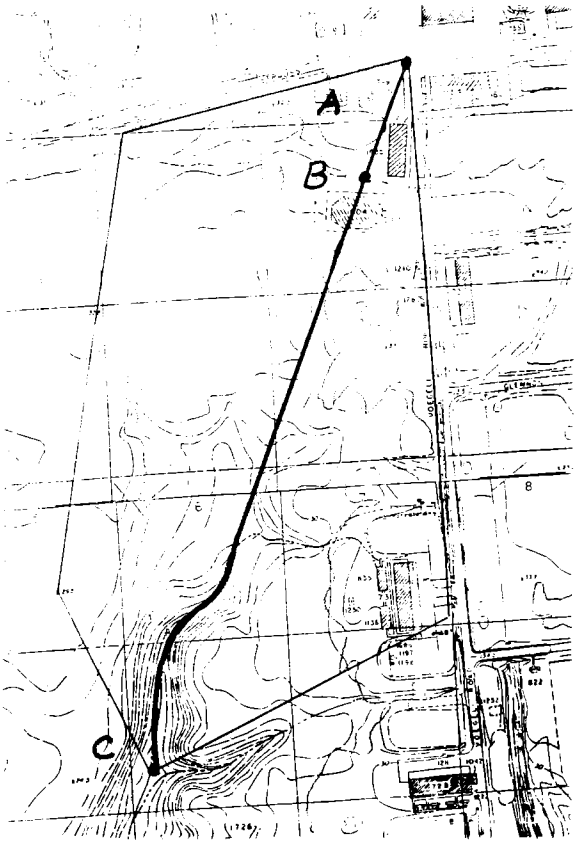
2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	2 yrs	10 yrs	100 yrs
Rainfall, P (24-hour) ..... in	3.2	5.2	7.6
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)		2.3	

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT	JOB NUMBER		
NSWC - Indian Head	1370		
SUBJECT	Hydrologic Calculations		
BASED ON	TR-55 Guidance	DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE
RFS			

II Travel Time



Segment:

AB: Sheet flow
max 300'

BC: Shallow Conc. flow
1600'

Based on TR-55 description

AB: Dense Grasses $n = 0.24$

BC: ½ Woods: Lt-Dense
under brush $n = 0.60$
½ Dense Grasses: $n = 0.24$

Note: For Shallow Concentrated flow
use figure 3-1 and un-paved
for both woods & grass Areas.

Slope
BC ~ 26' drop ~ 1600' = 0.016

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project NSWC - INDIAN HEAD By [illegible] Date 3/30/94

Location Site 5 Checked ____ Date ____

Circle one: (Present) Developed

Circle one: T_c (T_t) through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB			
1. Surface description (table 3-1)			Grass			
2. Manning's roughness coeff., n (table 3-1) ..			0.24			
3. Flow length, L (total L ≤ 300 ft)	ft		300			
4. Two-yr 24-hr rainfall, P_2	in		3.2			
5. Land slope, s	ft/ft		0.027			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.51	+		= 0.51
Shallow concentrated flow		Segment ID	BC			
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L	ft		1600			
9. Watercourse slope, s	ft/ft		0.016			
10. Average velocity, V (figure 3-1)	ft/s		2.0			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.22	+		= 0.22
Channel flow		Segment ID				
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, p_w	ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft					
15. Channel slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s					
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr			+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr					0.73

Worksheet 4: Graphical Peak Discharge method

Project NSWC - INDIAN HEAD By [illegible] Date _____

Location SITE 5 Checked _____ Date _____

Circle one: (Present) Developed _____

1. Data:

Drainage area ..... A_m = 0.0414 mi^2 (acres/640)

Runoff curve number .... CN = 71 (From worksheet 2)

Time of concentration .. T_c = 0.73 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = ~ percent of A_m (— acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2	10	100
3. Rainfall, P (24-hour)	in		5.2	
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in		0.817	
5. Compute I_a/P			0.157	
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-II)	csm/in		410	
7. Runoff, Q ..... (From worksheet 2).	in		2.3	
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)			—	
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs		39.0	

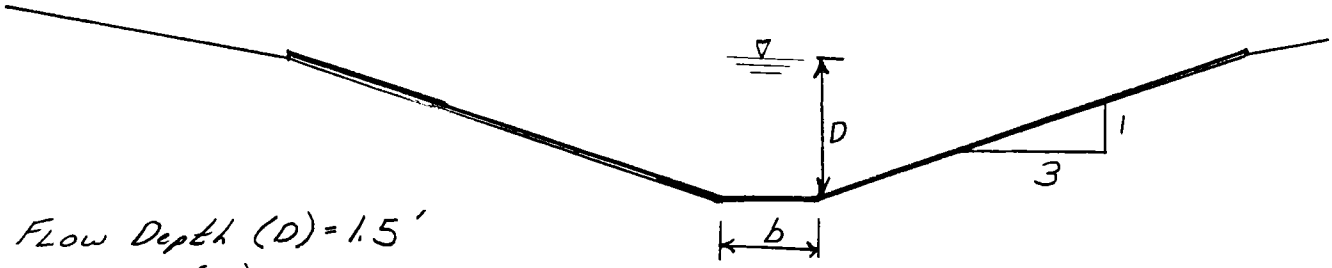
CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT	JOB NUMBER		
NSWC - INDIAN HEAD	1370		
SUBJECT: SITE 5			
BASED ON: REF: Hydraulic (HANDbook)	DRAWING NUMBER		
BY: RFS	CHECKED BY	APPROVED BY	DATE: 7/30/94

III SWALE RECONSTRUCTION:

10 year storm Design:

39.0 cfs



Flow Depth (D) = 1.5'
Slope (S) = 0.027
Mannings "n" = 0.04 (re-veg mat)
Side Slope: 3-1
Bottom width: 1'

REF:
HANDBOOK of Hydro.
BAXTER & KING,
McGRAW-Hill

$D/b = 1.5$

k' (TABLE 7-11) = 10.45

$$Q = \frac{k'}{n} b^{2.667} S^{.5} = \left(\frac{10.45}{.04}\right)(1)^{2.667}(.027)^{.5} = 42.93 \text{ cfs}$$

ok

$$A = D(3D) + D(b) = 1.5(4.50) + 1.5(1.0) = 8.25 \text{ ft}^2$$

$$V = Q/A = 43/8.25 = 5.2 \text{ ft/sec}$$

10 year storm = 39 cfs < 43 cfs ok

Jute mat ~ 5 ft/sec ≅ 5.2 ft/sec ok

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT	JOB NUMBER		
NSWC - INDIAN HEAD	1370		
SUBJECT			
BASED ON	DRAWING NUMBER		
BY: RFS	CHECKED BY:	APPROVED BY:	DATE: 3/30/94

IV Removal Site

- It is not economically logical to design runoff control for 26 acres on this project. Therefore, sand bags will be placed at the perimeter of the excavation to divert the rain water around the disturbed area.

∴ Dike construction will be based on the area of construction.

V Disposal Site

- Review of the contours indicate flow away from disposal area, therefore, TR-55 calc. do not pertain to this area.

- Disposal area is an existing disposal and borrow soil area currently in a disrupted state.

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT	JOB NUMBER		
NSWC - INDIAN HEAD	1370		
SUBJECT: SITE 5			
BASED ON: E&S State requirement	DRAWING NUMBER		
BY: RFS	CHECKED BY	APPROVED BY	DATE: 3/30/94

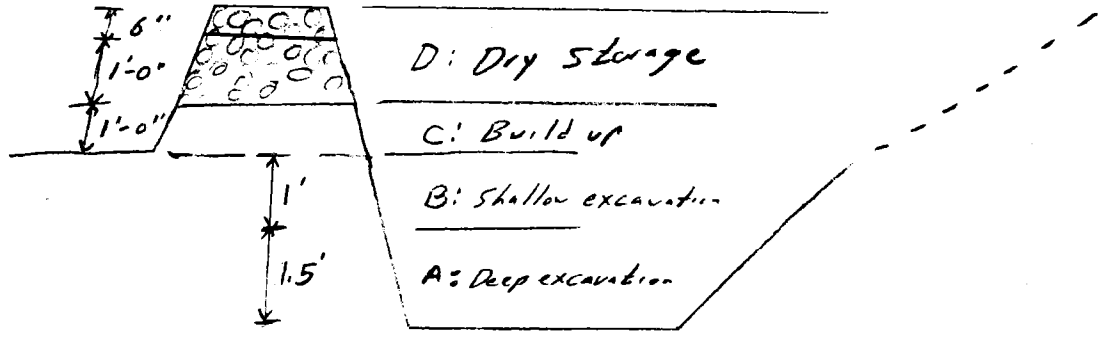
VI CONSTRUCTION AREA

Disturbed Area = 1.0

- Dike Design

Required storage: 1800 cf/Acre wet storage
1800 cf/Acre Dry storage

Width of excavation at end of contamination = 50' wide
deep excavation = 10' wide
lenght along access road = 100'



DS: C =
1.0 x 50 x 40 = 2000 cf

WS: A = 1.5' x 10' x 20' = 300
B: 1.0' x 50' x 20' = 1000
C: 1.0 x 50' x 30' = 1650
2950 cf

APPENDIX B

DESIGN DRAWINGS

DRAWINGS TO BE PROVIDED

DEPARTMENT OF THE ENVIRONMENT

2500 Broening Highway, Baltimore, Maryland 21224
Area Code 301 • 631-

William Donald Schaefer
Governor

Martin W. Walsh, Jr.
Secretary

MDE No. _____

Revision Date _____

_____
_____
_____
Engineer/Phone No.

_____
Assigned to

Submittal Dates	Review Dates and Initials
_____	_____
_____	_____
_____	_____

EROSION AND SEDIMENT CONTROL PLAN REVIEW CHECKLIST

Re: _____
_____
_____

Design Approval Date _____

Your submission for Erosion and Sediment Control Plan approval has been reviewed. The review was made per the following minimum acceptable criteria checklist. Return checklist with resubmittal.

LEGEND

___ Acceptable X Unacceptable INC Incomplete

R Required N/A Not Applicable NR Not Reviewed

REVIEW

1st	2nd	3rd	SUPPORTING INFORMATION
___	___	___	Transmittal explaining purpose of submission
___	___	___	Sediment Control/Stormwater Management Application (first time submission only)
___	___	___	Storm drain plans

SEDIMENT CONTROL PLAN

___ ___ ___A) Title Sheet(s)
___ ___ ___1) Vicinity Map (Site Shown, North Arrow, Scale (1"=2000' max))
___ ___ ___2) Project Information (title block, contract number)
___ ___ ___a) Ownership information (signature, address, telephone number)
___ ___ ___3) Note to Contractor: "Erosion and Sediment Control will be Strictly Enforced"

General

Existing: 1"=50' maximum scale, 2' contours, initial phase sediment controls
Proposed: 1"=50' maximum scale, 2' contours, final phase sediment controls (may be on same sheet as existing-legibility permitting)
Concept: 1"=200' maximum scale, existing topo, all offsite drainage areas, initial phase sediment control concept

___ ___ ___B) Plan(s)
___ ___ ___1) Scale (1"=50' or other pre-approved scale)
___ ___ ___2) North Arrow
___ ___ ___3) Legend (includes all E&S Control measures used)
___ ___ ___4) Contours (2' max intervals: existing and proposed)
___ ___ ___5) Limits of Disturbance outlined
___ ___ ___6) Initial (clearing and grubbing) phase sediment controls
___ ___ ___a) Labeled
___ ___ ___b) Located by station and offset from established baseline
___ ___ ___c) Details from 1983 Standards and Specifications referenced
___ ___ ___7) Erosion and Sediment Control measures for final phase (finish grading and stabilization)
___ ___ ___a) Labeled
___ ___ ___b) Located by station and offset from established baseline
___ ___ ___c) Details from 1983 Standards and Specifications referenced
___ ___ ___8) Sediment Traps: Inflow protection, outflow location, baffles
___ ___ ___9) Sediment Basins (TSB): need items from TSB Design Data Sheet inflow protection, outfall location and baffles as necessary
___ ___ ___10)Drainage area to each E&S Control measure shown (off-site: ref 200 scale)
___ ___ ___11)Property Lines shown
___ ___ ___12)Existing and proposed tree lines shown
___ ___ ___13)Proposed buffer areas
___ ___ ___14)Offsite areas (acreage) entering site
___ ___ ___15)Existing and proposed improvements (streets, buildings, utilities, etc.)
___ ___ ___16)Limits of wetlands (may req. DNR approval)
___ ___ ___17)Limits of 100 year floodplain (may req. DNR approval)
___ ___ ___18)Location and dimensions of outfall protection
___ ___ ___19)Location and control of stockpiles
___ ___ ___20)Topo extends 75' downstream of storm drain outfalls
___ ___ ___21)Outfall protection design

___ ___ ___22)Proposed slopes: not to exceed 2:1; none to exceed 3:1 in lawn maintenance areas; slopes greater than 3:1 in non-lawn maintenance areas must specify low maintenance ground cover
___ ___ ___23)Slope drainage properly conveyed (storm drains outfall to toe of slopes)
___ ___ ___24)Drainage Area Map (200 scale Sediment Control concept)
___ ___ ___a) Locations of Clear Water Diversions
___ ___ ___b) Discharge points, Q10 and V10
___ ___ ___c) Existing drainage divides
___ ___ ___d) Initial phase sediment controls
___ ___ ___25)Sequence of Construction

___ ___ ___C) Notes, Details and Specifications
___ ___ ___1) Owner/Developer's Certification
___ ___ ___a) Design Certification
___ ___ ___2) Standard Stabilization Note
___ ___ ___3) Standard General Notes
___ ___ ___4) Detail and Spec. for each E&S Control measure (copied from 1983 or current Standards and Specifications for Soil Erosion and Sediment Control only)
___ ___ ___5) Specific details for engineering structures
___ ___ ___6) Spec.'s for vegetative practices
___ ___ ___7) Sequence of construction (mention pre-construction meeting and consider all stages of site conditions with regard to sediment control)
___ ___ ___8) Inspection checklist on plan
___ ___ ___9) Applicant information (name, address, telephone number)
___ ___ ___10)Name(s), Address(es) and Telephone Number(s) of
___ ___ ___a) Owner and/or Developer
___ ___ ___b) Contractor
___ ___ ___c) Project Manager/Engineer (signed by P.E., R.L.S, or R.L.A.)
___ ___ ___11)Proposed grading and earth disturbance including:
___ ___ ___a) Surface area involved;
___ ___ ___b) Volume of spoil material, spoil location;
___ ___ ___c) Volume of borrow material, borrow location; and
___ ___ ___d) Limits of grading, including limits of mass clearing and grading whenever possible.

COMMENTS

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

STORMWATER MANAGEMENT WAIVER

PROJECT DESCRIPTION
FOR
STORMWATER MANAGEMENT WAIVER

A Stormwater Management Waiver is hereby requested for the Removal of Silver-Contaminated Soil Project (Project). The Project is located at Site 5 - Building 731 at the Indian Head Division, Naval Surface Warfare Center (NSWC) in Indian Head, Maryland. Site 5 is located on an unnamed tributary to Mattawoman Creek. The waiver request is based on Section 2.3(a)(ii) of the Stormwater Management Guidelines for state and Federal projects. Section 2.3(a)(ii) reads as follows:

2.3 (a) A project is eligible for a waiver of stormwater management for both quantitative and qualitative control if the applicant can demonstrate to the Administration that:

ii. The proposed project shall return the disturbed area to a pre-development runoff condition at the conclusion of the project.

Silver-contaminated soil will be excavated from a drainage swale that is approximately 500 feet long. The area tributary to the drainage swale to be excavated is approximately 26 acres. The drainage area is relatively flat, and is primarily wooded, vegetated and undeveloped. The area to be disturbed is approximately 500 feet long, 85 feet wide and covers approximately 1 acre. Approximately 2,500 cubic yards of soil will be excavated. After the soil has been excavated from the swale, the drainage swale will be backfilled, lined with revegetation matting, and the area restored to pre-existing conditions. The excavated soil will be placed in a former borrow pit on the Stump Neck Annex portion of the NSWC facility. The excavated soil will be covered with clean soil and seeded. All disturbed areas will be revegetated. Construction activities are expected to be completed in less than 4 weeks.

The Site 5 swale and the borrow pit will be restored in a manner that will minimize erosion and sedimentation and will be similar to pre-construction conditions. As a result, the project will have no long-term effect on the drainage characteristics of the watersheds. The Project will not permanently increase the peak runoff from the areas (the runoff for Site 5 area is estimated to be 39 cfs for a 24-hour, 10-year storm flow). Therefore, a Stormwater Management Waiver is requested for this Project.

DEPARTMENT OF THE ENVIRONMENT
STORMWATER MANAGEMENT ADMINISTRATION
STORMWATER MANAGEMENT WAIVER APPLICATION

Owner: NAVFAC, EFACHES
Address: Building 212
Washington Navy Yard
Washington, D.C.
Consultants: Halliburton NUS

MDE No.: _____
Project No.: _____
Description: Removal of silver-contaminated soil
Location: Indian Head Division
NSWC, Indian Head, Maryland

I/We, the Owner/Owners hereby request a Waiver be granted for the above referenced project in accordance with the following section(s) of the Stormwater Management Guidelines for State and Federal Projects:

Section				Minimum Evidence Required
☐	2.3	(a)	(i)	Contract plans and provisions, stormwater management report, infiltration investigation.
☒	2.3	(a)	(ii)	Contract plans and provisions.
☐	2.3	(a)	(iii)	Contract plans and provisions.
☐	2.3	(b)	(i)	Contract plans and provisions, stormwater management report, infiltration investigation, downstream impact investigation.
☐	2.3	(b)	(ii)	Contract plans and provisions, stormwater management report, infiltration investigation, downstream impact investigation.
☐	2.3	(b)	(iii)	Contract plans and provisions, infiltration investigation, downstream impact investigation.

Other evidence submitted: See attached project description and construction drawings.

_____
Owner's Signature

_____
Date

Approved Denied

Reason: _____

By:

_____
Water Resources Engineer

_____
Date

Submit to: Department of the Environment
Sediment and Stormwater Administration
2500 Broening Highway
Building 30, First Floor
Baltimore, Maryland 21224

If a project involves a waiver request for more than one drainage area, please submit a separate Stormwater Management Waiver Application for each drainage area.