

ENGINEERING EVALUATION/COST ANALYSIS

SITE 20 REMOVAL ACTION
NAVAL WEAPONS STATION EARLE

SEPTEMBER 20, 1994

1.0 EXECUTIVE SUMMARY

An Engineering Evaluation/Cost Analysis (EE/CA) is a comparative analysis of remedial options for a National Priority List (NPL) site. The EE/CA develops, evaluates and selects alternatives that will provide an effective interim remedy which is consistent with anticipated final remediation goals.

Naval Weapons Station (WPNSTA) Earle, Site 20 has been used for disposal of blasting grit and the contaminants associated with the paint removed by the grit. These contaminants would be metals and semi-volatiles. Elevated levels of chromium, copper, nickel, lead and zinc were found in the grit and an adjacent drainage ditch during the Site Investigation. Any volatiles associated with the paint would have evaporated during drying or would have been released during the blasting process.

The objective of this removal action is to minimize the potential threat to a nearby wetlands area by removing an obvious source of contamination. This objective will be achieved by excavating the grit piles, sediments from an adjacent drainage ditch, and any impacted soils, then disposing it off-site. Other removal action alternatives considered were institutional controls, containment, and a no action option. No action is not a technology but it is an option. This option entails taking no remedial measures.

This EE/CA has been prepared to provide documentation in the NWS Earle administrative record for the removal action selection at Site 20. Following a public comment period of at least 30 days, a responsiveness summary will be prepared to address any concerns which may arise.

2.0 SITE CHARACTERIZATION

2.1 SITE DESCRIPTION AND BACKGROUND

The location of the site, based on the United States Geological Survey Marlboro Quadrangle Topographic Map is located at 74 8'32" north latitude and 40 15'32" west longitude. The site is located in Monmouth County, New Jersey.

Site 20 consists of a large metal frame building (544) that is surrounded on two sides by approximately 20 foot high mounds of crushed stone with small piles of blasting grit southwest of the building. The site is southeast of Midway Road and surrounded by woodlands. A gravel road accesses Site 20 from Midway Road. The surface of the site behind Building 544 is sand and gravel with traces of blasting grit material. A shallow drainage depression measuring approximately 300 feet in length and 0.5 to 1.5 feet deep runs the length of the site behind Building 544 and discharges toward the northeast to the wetlands area.

Building 544 housed blasting operations for the removal of paint from mines. The paint removed from mines, along with spent grit, is disposed of behind Building 544. Assuming a steady-state operation (i.e. paint applied this year will be removed over subsequent years), approximately three gallons of zinc chromate primer, 40 gallons of latex and lead based paints, and 10 gallons of copper based paints were stripped per year. This process occurred for approximately 30 years. Therefore the volume of approximately 1600 gallons of paint equivalent has been disposed at this site.

2.2 PREVIOUS REMOVAL ACTIONS

In late August 1993, the Navy submitted a Work Plan for Soil Contamination Removal at Site 20. The U.S. Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection and Energy (NJDEPE) both reviewed the Work Plan and submitted their comments. It was then determined that an Engineering Evaluation/Cost Analysis (EE/CA) with an Action Memorandum should be the primary document for the Site 20 removal action.

2.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

The RI/FS for NWS Earle Site 20 indicated concentrations of chromium, copper, nickel, lead, and zinc in the soils are elevated and their presence is consistent with its past use as a grit (sand) blasting area. However, there is no visual evidence of extensive contamination of surrounding soils. These metals typically are attenuated in soils.

2.4 ANALYTICAL DATA

Field investigation conducted during the Phase II Site Investigation (S.I.) study and the Remedial Investigation obtained soil samples from the site at locations that appeared to have the highest potential for containing paint chip contaminants. The waste material (blasting grit) is staged in open piles on the site (see figure 1) and surface drainage has washed some material toward a marsh area northeast of the site. The analyses of the R.I. samples are shown in Table 1-1 and the Phase II S.I. samples are shown in Table 1-2.

During the R.I., five sediments samples were taken, one in the blasting grit area (Sample 20-001) and four in the drainage ditch (Samples 20-002, 20-003, 20-004, 20-005). One subsurface sample was taken in the drainage ditch at the farthest downgradient point at a depth of approximately 2 feet (Sample 20-005). All five sediment samples were analyzed for TAL inorganic. Two of these, 20-003 and 20-005, were also analyzed for pesticides, PCB's and BNA's. The single subsurface soil sample was analyzed for VOC's.

Samples were taken at two depths (0.5'-1' and 2.5'-3') for each of the five Phase II S.I. soil boring locations (20A - 20E). These samples were analyzed for petroleum hydrocarbons and toxic metals (Zn, Cr, Pb, and Ti). All of these analytes were found to be within regulatory limits. Contamination at the site is restricted to the grit piles and the shallow depression located behind Building 544.

2.5 SITE RISK ASSESSMENT

This risk assessment describes potential health and environmental concerns associated with NWS Earle Site 20. Contamination at the site is restricted to the shallow depression located behind Building 544. The contamination of Site 20 is a potential threat to the environment. The wetlands northeast of the site receive runoff from the site via the drainage ditch. Actual or threatened releases of pollutants and contaminants from this site, if not addressed by implementing a remedial action, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

3.1 STATUTORY LIMITS ON REMOVAL ACTIONS

Removal actions are generally limited by statute to a maximum cost of two million dollars and a maximum duration of 12 months, except as provided for under two types of exemptions available (emergency and consistency). The 12-month time limit and two-million-dollar statutory limit are governed by applicable portions of CERCLA Section 104(b)(1). As described in this report, the proposed removal action is to incur costs of less than two million dollars and occur within a time period much shorter than 12 months.

3.2 DETERMINATION OF REMOVAL SCOPE

The scope of this work is limited to removing grit piles (approximately 150 cubic yards) and areas of sediment in the adjacent drainage ditch (approximately 50 cubic yards) down to a depth of 3 inches.

3.3 DETERMINATION OF REMOVAL SCHEDULE

The schedule for characterization, clean up and disposal for this removal action is dependent upon Defense Environmental Restoration Account funding but is planned for 1 November 1994 to 1 May 1995. A removal action implementation schedule will be developed subsequent to the Public Comment period.

4.0 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

4.1 NO ACTION

No action is not a technology but it is an option. This option entails taking no remedial measures. No action does not include future monitoring or contamination migration assessment. This option is generally considered as a baseline for comparison to other remedial actions.

INITIAL SCREENING:

The Remediation Installation/Feasibility Study (RI/FS) sediment sample data from the drainage ditch at Site 20 exceeds the New Jersey Non-Residential surface soil clean-up standards and NOAA'S sediment quality criteria (Effects Range-Low). The no action alternative would permit continued potential migration of contaminants into a nearby ecologically sensitive wetland area via surface drainage and erosion processes. The only reduction of contaminant toxicity, mobility or volume would be due to natural biodegradation. Remedial action objectives would not be met by the no action alternative and therefore is ruled out in the initial screening.

4.2 INSTITUTIONAL CONTROLS AND CONTAINMENT

Institutional controls and containment is a grouping of options that would slow or stop the contaminant exposure to receptors, and in some cases the environment. These options include land use restrictions, capping with various materials, and containment via stabilization and solidification.

4.2.1 LAND USE RESTRICTIONS

Land use restriction is the official limiting of access to the sites, either by Naval instruction or by local code. Site 20 is within a Naval Installation that presently has limited access to the public.

INITIAL SCREENING:

Land use restriction would provide very limited protection and assessment of future land use and property ownership or control can not be firmly established. Contamination would continue to potentially leach into soils and groundwater as well as being transported via erosion/depositional processes. The only method for contamination abatement would be natural attenuation. This option has been screened out due to the ineffectiveness of this option as a means to remove the contamination.

4.2.2 CAPPING

The construction of a cap over Site 20 using any of the available capping materials such as asphalt, concrete, clay, bentonite, or synthetic membranes to provide a low permeability cover is an option.

INITIAL SCREENING:

Prior to capping, all contaminated soil in and around the existing drainage swale or in close proximity to the water table would require excavation and subsequent placement on higher ground. The installation of a cap utilizing any of the available capping materials would prevent or reduce infiltration of contaminants into the soil matrix, however the possibility of the capping material settling, cracking, eroding or being compromised by deep rooted plants or burrowing animals can not be discounted. Regrading of the area or capping of the drainage swale would also be required involving significant equipment and manpower resources. The installation of any capping material will require continued inspection and maintenance of the area. Most importantly cleanup levels will not be attained as the only way contaminant levels will be reduced will be through natural attenuation. The inability of utilizing this technology to meet the remediation goals removes it from further consideration.

4.2.3 IN SITU CONTAINMENT, STABILIZATION/SOLIDIFICATION

In solidification, a reagent is added to transform the contaminated soil into a solid like material. The chemistry of the waste is not necessarily modified by solidification: however, the waste is microencapsulated by the solidified matrix. In stabilization, a reagent is added to transform the material so that the hazardous constituents are in their least mobile or toxic form. When both solidification and stabilization are performed, the handling and physical characteristics of the waste are improved. The surface area of the waste mass across which transfer or loss of contaminant can occur is decreased, and the solubility of the hazardous constituents is limited.

INITIAL SCREENING:

Although this option is technically feasible and may be effective in holding the contaminants in place, the ultimate leachability is not guaranteed. Due to the close proximity of a critical receptor (wetlands area) this option has been eliminated from further consideration.

4.3 EXCAVATION AND OFF-SITE DISPOSAL OF BLASTING GRIT

Implementation of this alternative would require the use of heavy equipment to excavate and remove the blasting grit, sediment in the drainage ditch and any surrounding contaminated soil at site 20. The quantity of the contaminated sediment and soils (approximately 50 cubic yards) and blasting grit (approximately 150 cubic yards) to be removed would be based on NJDEPE soil cleanup criteria. The removed grit, contaminated sediment, and visually impacted soil would be placed into roll-off containers provided by a New Jersey permitted waste disposal facility. The containers would be appropriately covered and removed by the disposal facility for subsequent disposal. Follow up soil sampling and analysis would be conducted to determine the need for any future remedial actions for Site 20. Clean earth would be brought in and used as backfill where necessary, but its use would be limited because the grit pile would not need to be replaced and the drainage ditch will not be significantly altered.

INITIAL SCREENING:

This option will provide for an effective interim remedy to remove the source of contamination from a nearby ecologically sensitive (wetland) area.

5.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Based on the initial screening of alternatives, the removal/remedial action which provides the most effective solution and is consistent with any anticipated long term remediation objectives for Site 20 is the option identified in paragraph 4.3. The estimated cost of accomplishing this removal action is identified in Appendix A.

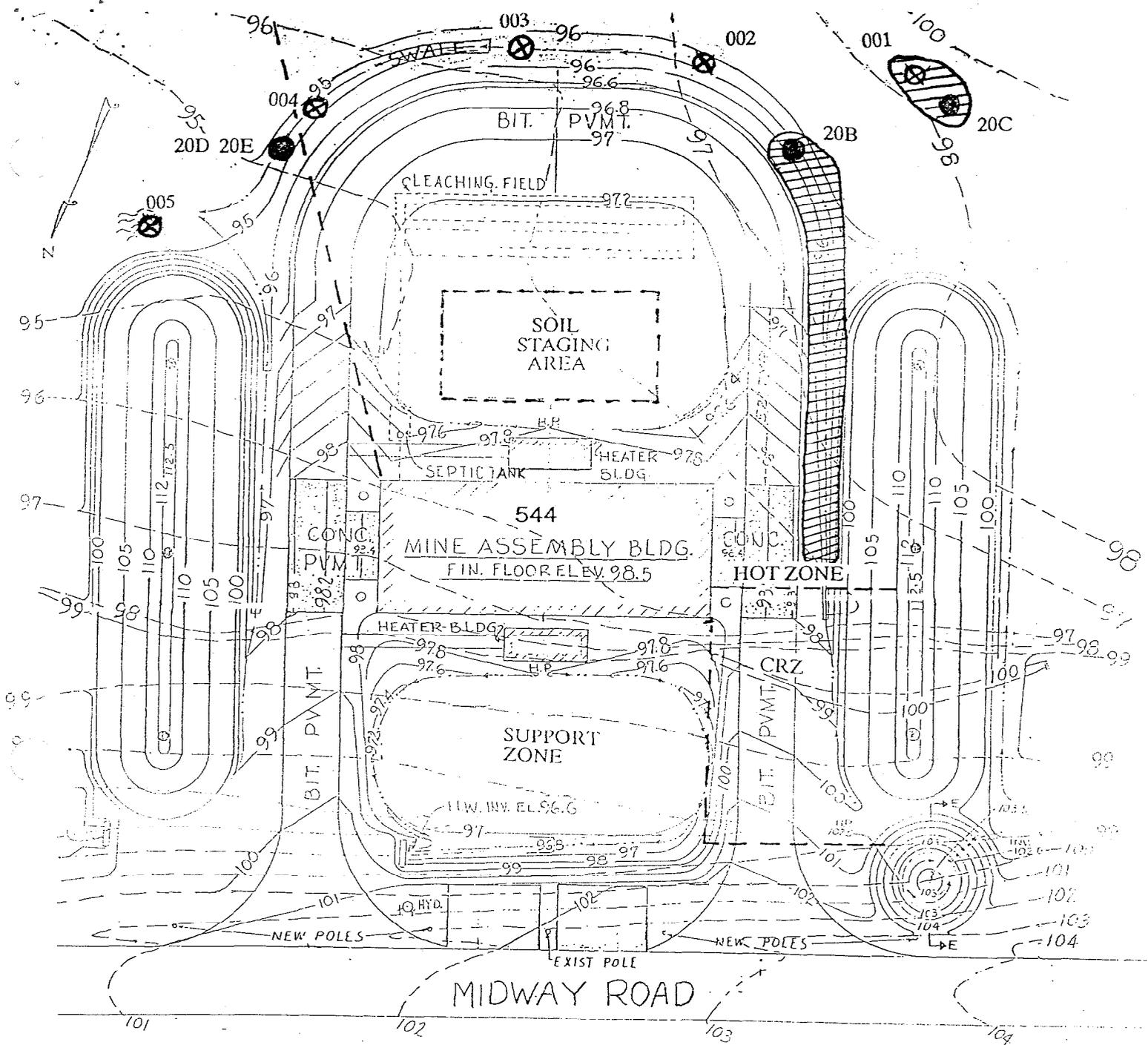
A front end loader will remove the grit pile. Approximately 200 cubic yards are expected to be removed. The removed material will be deposited in roll-off containers within the removal area. Fugitive dust emissions from this controlled area will be kept to a minimum by use of a water spray. At the end of each day's activities, a tarpaulin will be secured over the containers. Erosion of the excavated area will be controlled by silt fencing (see figure 2). The actual amount of impacted soils to be excavated will be determined by visual observation. A significant color difference exists between the grit, known as black beauty, and the indigenous soils. All visible traces of the grit will be removed and then the soil will be sampled to determine remaining contaminant levels. Since the extent of excavation will be determined by observation of grit mixed with soil, the entire amount will be handled as one composite. Samples will be taken at the base of excavation after removal. Both metal and semi-volatile samples will be obtained from each of 12 sampling points.

6.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

The recommended alternative provides excellent protection to human health and the environment by removing an uncontrolled source of contamination which poses potential risk to ecological receptors, to an appropriate recycling or disposal facility.

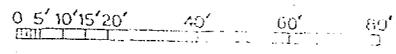
All excavated materials will be disposed in accordance with appropriate RCRA standards as determined by chemical analysis. The RCRA Hazardous Waste characteristic test will be performed in accordance with guidance provided by the NJDEPE's Waste Classification Unit, within the Bureau of Advisement and Manifest. The Toxic Characteristic Leaching Procedure (TCLP test) will be used to determine toxicity. If the excavated material is determined to be hazardous, off-site disposal will be in a RCRA permitted landfill. If the waste is classified as New Jersey Class ID27, it will be transported by Navy owned dump trucks registered by NJDEPE to Monmouth County landfill. If the waste material is non-hazardous use of the State's soil re-use/recycling options will be considered. The fill material to backfill the excavated area will be obtained from a clean borrow area in a remote section of the NWPNSTA Earle. This fill material will be analyzed to determine natural conditions. All post-excavation sampling and backfilling will be in accordance with the "Technical Requirements for Site Remediation" (N.J.A.C. 7:26E). The estimated cost is based on landfill of an ID27 waste but would be reduced if recycling is feasible.

The New Jersey Non-Residential Surface Soil Clean-up Standards and NOAA's Sediment Quality Criteria (Effects Range-Low) will be used as clean up criteria for this removal action. A risk assessment based upon the verification sampling analytical results will be used to determine the need for any additional remediation.



20A

LEGEND	
	BLASTING GRIT
	PHASE II (1986) SOIL BORING
	PHASE III (1991) SEDIMENT OF WASTE MATERIAL SAMPLE



SCALE

FIGURE 1 SITE 20 – GRIT BLASTING AREA AT BUILDING 544 SAMPLING LOCATIONS, NWS EARLE, NJ

Table 1-1 cont...
 Summary of Sediment and Soil Sample Analytical Results
 NWS Earle, Site 20 (Cr it Blast Disposal)

Site (D.s)	20-001-D001 Sediment Sample 20-01	20-002-D001 Sediment Sample 20-02	20-003-D001 Sediment Sample 20-03	20-004-D001 Sediment Sample 20-04	20-005-D001 Sediment Sample 20-05	20-005-D001 Replicate	20-005-D101 Sediment Sample 20-05 (Dup)	20-005-D201 Sediment Sample 20-05 (Eq. Blank)	20-005-D201 Replicate	20-005-S002 Soil Sample 20-05	20-005-S102 Soil Sample 20-05 (Dup)	20-005-S202 Soil Sample 20-05 (Eq. Blank)	NJDEPB Guidelines (b) (mg/lp)
Inorganics (mg/kg): Blanks (mg/l)													
Aluminum	7720	4700	17300	6650	9710	10475	NR	U .018	NR	NR	NR	NR	-
Arsenic	3.5	2.8	2.7	0.79	4.6	3.6	NR	U .0018	NR	NR	NR	NR	2/2 (c)
Barium	146	48.6	325	142	99.8	113	NR	U .0040	NR	NR	NR	NR	700/47000
Beryllium	5.1	2.5	9.9	6.5	2.5	2.8	NR	U .0005	NR	NR	NR	NR	1/1
Calcium	5220	1220	6750	3240	2750	2902	NR	0.11	NR	NR	NR	NR	-
Cadmium	1.3	U 0.83	1.8	U 0.80	U 1.5	U 1.5	NR	U .0034	NR	NR	NR	NR	1/100
Cobalt	64.0	13.4	62.6	33.6	13.6	16.7	NR	U .0063	NR	NR	NR	NR	-
Chromium	83.5	54.7	204	120	171	176	NR	U .012	NR	NR	NR	NR	-
Copper	1120	261	859	461	333	372	NR	0.012	NR	NR	NR	NR	600/600
Iron	35500	16800	54100	26000	23500	25606	NR	0.015	NR	NR	NR	NR	-
Potassium	553	971	1936	604	834	937	NR	U 0.14	NR	NR	NR	NR	-
Magnesium	1250	871	2280	1100	1580	1655	NR	U .052	NR	NR	NR	NR	-
Manganese	759	100	329	714	160	175	NR	U .0009	NR	NR	NR	NR	-
Nickel	711	117	423	220	80.1	90.6	NR	U .0036	NR	NR	NR	NR	250/2400
Lead	710	306	780	429	383	348	NR	0.0017	NR	NR	NR	NR	100/600
Antimony	U 1.8	U 1.8	U 2.2	3.4	4.6	7.1	NR	U .0075	NR	NR	NR	NR	14/340
Selenium	1.9	0.61	1.8	1.8	2.9	3.2	NR	U .0013	NR	NR	NR	NR	63/3100
Vanadium	12.7	30.5	42.3	15.7	47.4	50.7	NR	U .0026	NR	NR	NR	NR	370/7100
Zinc	2720	960	2890	1760	700	765	NR	0.012	NR	NR	NR	NR	1500/1500
% Solids (%)	80.0	80.8	88.4	83.7	43.7	43.5	NR	NR	NR	42.1	42.5	NR	-
Pesticide/PCB (µg/kg)	U 240	NR	U 430	NR	U 670	NR	U 740	U 1.0	NR	NR	NR	NR	

Legend: U = Not detected (b) = Soil cleanup criteria (rev'd 3/8/93)
 NR = Not Requested (c) = Residential/nonresidential soils
 J = Below Detection limit
 (a) = Refer to June 90 QAAP
 Replicate = Lab QA sample

Table 1 - 1
Summary of Sediment and Soil Sample Analytical Results
NWS Earle, Site 20 (Grit Blast Disposal)

Site ID(s)	20-001-D001 Sediment Sample 20-01	20-002-D001 Sediment Sample 20-02	20-003-D001 Sediment Sample 20-03	20-004-D001 Sediment Sample 20-04	20-005-D001 Sediment Sample 20-05	20-005-D001 Replicate	20-005-D101 Sediment Sample 20-05(Dup)	20-005-D201 Sediment Sample 20-02(Bq, Blank)	20-005-D201 Replicate	20-005-S002 Soil Sample 20-05	20-005-S102 Soil Sample 20-05(Dup)	20-005-S202 Soil Sample 20-05(Bq, Blank)
Compounds												
Volatile Organics (µg/kg)												
Blanks (µg in µg/L)												
Methylene Chloride	NR	NR	NR	NR	NR	NR	NR	NR	NR	130 B	74 B	3 JB
Acetone	NR	NR	NR	NR	NR	NR	NR	NR	NR	78 B	60 B	86 B
Chloroform	NR	NR	NR	NR	NR	NR	NR	NR	NR	U 10	U 12	5
Semivolatile (µg/kg) Blanks (µg/L)												
Phenol	NR	NR	U 560	NR	U 780	NR	U 850	8 JB	NR	NR	NR	NR
1,4-Dichlorobenzene	NR	NR	U 560	NR	U 780	NR	U 850	4 JB	NR	NR	NR	NR
N-Nitroso-Di-n-propylamine	NR	NR	U 560	NR	U 780	NR	U 850	6 JB	NR	NR	NR	NR
1,2,4-Trichlorobenzene	NR	NR	U 560	NR	U 780	NR	U 850	5 JB	NR	NR	NR	NR
Acenaphthene	NR	NR	U 560	NR	U 780	NR	U 850	7 JB	NR	NR	NR	NR
2,1-Dinitrotoluene	NR	NR	U 560	NR	U 780	NR	U 850	6 JB	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	U 560	NR	U 780	NR	U 850	13 B	NR	NR	NR	NR
Pentachlorophenol	NR	NR	U 2800	NR	U 780	NR	U 850	6 JB	NR	NR	NR	NR
Phenanthrene	NR	NR	110 J	NR	910	NR	U 850	U 11	NR	NR	NR	NR
Anthracene	NR	NR	U 560	NR	200 J	NR	210 J	U 11	NR	NR	NR	NR
Di-n-Butylphthalate	NR	NR	78 J	NR	180 J	NR	200 J	U 11	NR	NR	NR	NR
Fluoranthene	NR	NR	260 J	NR	3300	NR	3400	U 11	NR	NR	NR	NR
Pyrene	NR	NR	260 J	NR	2600	NR	3900	10 JB	NR	NR	NR	NR
Butyl benzylphthalate	NR	NR	U 560	NR	U 940	NR	550 J	U 11	NR	NR	NR	NR
Benzo (a) anthracene	NR	NR	120 J	NR	1700	NR	1900	U 11	NR	NR	NR	NR
Chrysene	NR	NR	200 J	NR	2200	NR	2600	U 11	NR	NR	NR	NR
1,4-Diethylhexyl phthalate	NR	NR	450 J	NR	1900	NR	1200	U 11	NR	NR	NR	NR
Benzo (b) fluoranthene	NR	NR	230 J	NR	2400	NR	2800	U 11	NR	NR	NR	NR
Benzo (k) fluoranthene	NR	NR	170 J	NR	2000	NR	2600	U 11	NR	NR	NR	NR
Benzo (a) pyrene	NR	NR	150 J	NR	2300	NR	2700	U 11	NR	NR	NR	NR
Indeno (1,2,3-cd) pyrene	NR	NR	120 J	NR	1900	NR	2000	U 11	NR	NR	NR	NR
Dibenzo (a,h) anthracene	NR	NR	U 560	NR	710 J	NR	830 J	U 11	NR	NR	NR	NR
Benzo (g,h) perylene	NR	NR	160 J	NR	2700	NR	2400	U 11	NR	NR	NR	NR

Legend: U = Not detected
NR = Not Requested
J = Below Detection limit
(a) = Refer to June 90 QAAP
Replicate = Lab QA sample

(b) = Soil cleanup criteria (revised 3/8/93)
(c) = Residential/nonresidential soils

Table 1-2

Analytical Results for Soil Samples Collected in March 1986 -- Site 20,
NWS Earle, Colts Neck, NJ

Sample Number	Analyte				
	Petroleum Hydrocarbons (mg/kg)	EPTOX (mg/L)			
		Zn	Cr	Pb	Ti
20-A					
(0.5' - 1')	ND	ND	ND	ND	ND
(2.5' - 3')	ND	ND	ND	ND	ND
20-B					
(0.5' - 1')	65.7	ND	ND	ND	ND
(2.5' - 3')	ND	ND	ND	ND	ND
20-C					
(0.5' - 1')	2.20	ND	ND	1.64	ND
(2.5' - 3')	ND	ND	ND	ND	ND
20-D*					
(0.5' - 1')	ND	<0.05	<0.50	0.051	0.41
(2.5' - 3')	ND	<0.05	<0.50	0.05	0.039
20-E*					
(0.5' - 1')	ND	<0.05	<0.50	0.072	<0.003
(2.5' - 3')	ND	<0.05	<0.50	0.057	0.024
Detection Limits	0.50	0.50	0.50	0.50	
Regulatory Limits	100	350	100	100	NRC

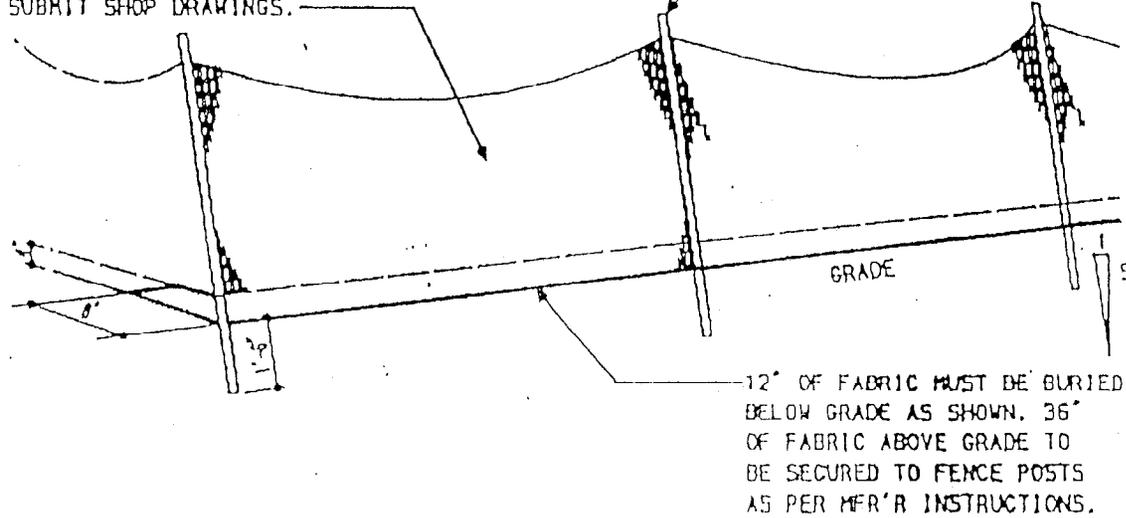
*Samples collected July 1986

ND - Not Detected

NRC - No specific regulatory concentration

SILT FENCE FABRIC TO BE AS MANUFACTURED BY "GEOFAB" OR APPROVED EQUAL. FABRIC TO BE 10 MILS THICK AND INSTALLED AS PER MANUFACTURER'S INSTRUCTIONS. SUBMIT SHOP DRAWINGS.

STEEL FENCE POSTS TO BE 5' LONG AND INSTALLED AT 8'-0" O/C (MAX), 1'-6" TO BE DRIVEN BELOW GRADE.



12" OF FABRIC MUST BE BURIED BELOW GRADE AS SHOWN. 36" OF FABRIC ABOVE GRADE TO BE SECURED TO FENCE POSTS AS PER MFR'S INSTRUCTIONS.

SILT FENCE DETAIL

NOT TO SCALE

FIGURE 2

