

3/1/89-00894

TECHNICAL REVIEW COMMITTEE MEETING
FOR
REMEDIAL INVESTIGATION INTERIM REPORT (DRAFT)
NAVAL WEAPONS STATION
YORKTOWN, VIRGINIA

DAMES & MOORE
MARCH 1, 1989

AGENDA
TECHNICAL REVIEW COMMITTEE (TRC) MEETING
FOR THE
INSTALLATION RESTORATION PROGRAM (IRP)
NAVAL WEAPONS STATION
YORKTOWN, VIRGINIA
MANAGEMENT INFORMATION CENTER
BUILDING 31-B
1 MARCH 1989
0900-1300

WELCOME.....CAPTAIN ROBERT L. MASTEN, COMMANDING OFFICER

COMMAND PRESENTATION.....MR. TOM BLACK, PUBLIC AFFAIRS OFFICER

HISTORY OF NAVY'S IRP AND PURPOSE
OF TRC IN THE REMEDIAL INVESTIGATION
(RI) PROCESS.....MS. CHRISTINE WALLACE,
NAVAL FACILITIES
ENGINEERING COMMAND,
ATLANTIC DIVISION

REVIEW OF REMEDIAL INVESTIGATION
INTERIM REPORT (DRAFT).....MS. GRACE WOOD
MR. BILL EATON
DAMES AND MOORE

B R E A K

REVIEW OF REMEDIAL INVESTIGATION
INTERIM REPORT (CONTINUED).....MS. WOOD/MR. EATON

PUBLIC PARTICIPATION REQUIREMENTS.....MR. BLACK

DISCUSSION OF IR SITE TOUR.....SAFETY DEPARTMENT

L U N C H
HALFWAY HOUSE

IR SITE TOUR.....SAFETY DEPARTMENT

SUMMARY.....SAFETY DEPARTMENT

ACTIVITY INVESTIGATIONS

- INITIAL ASSESSMENT STUDY (1984)
- CONFIRMATION STUDY STEP 1A (VERIFICATION), ROUND I (1986)
- CONFIRMATION STUDY STEP 1A (VERIFICATION), ROUND II (1988)
- HARM SITE RANKING (1988)

- - - - -

- DRAFT REMEDIAL INVESTIGATION INTERIM REPORT (FEB. 1989)
- FINAL REMEDIAL INVESTIGATION INTERIM REPORT (MAR. 1989)
- RI WORK PLANS (DRAFT, MAY, 1989)
- RI WORK PLANS (FINAL)

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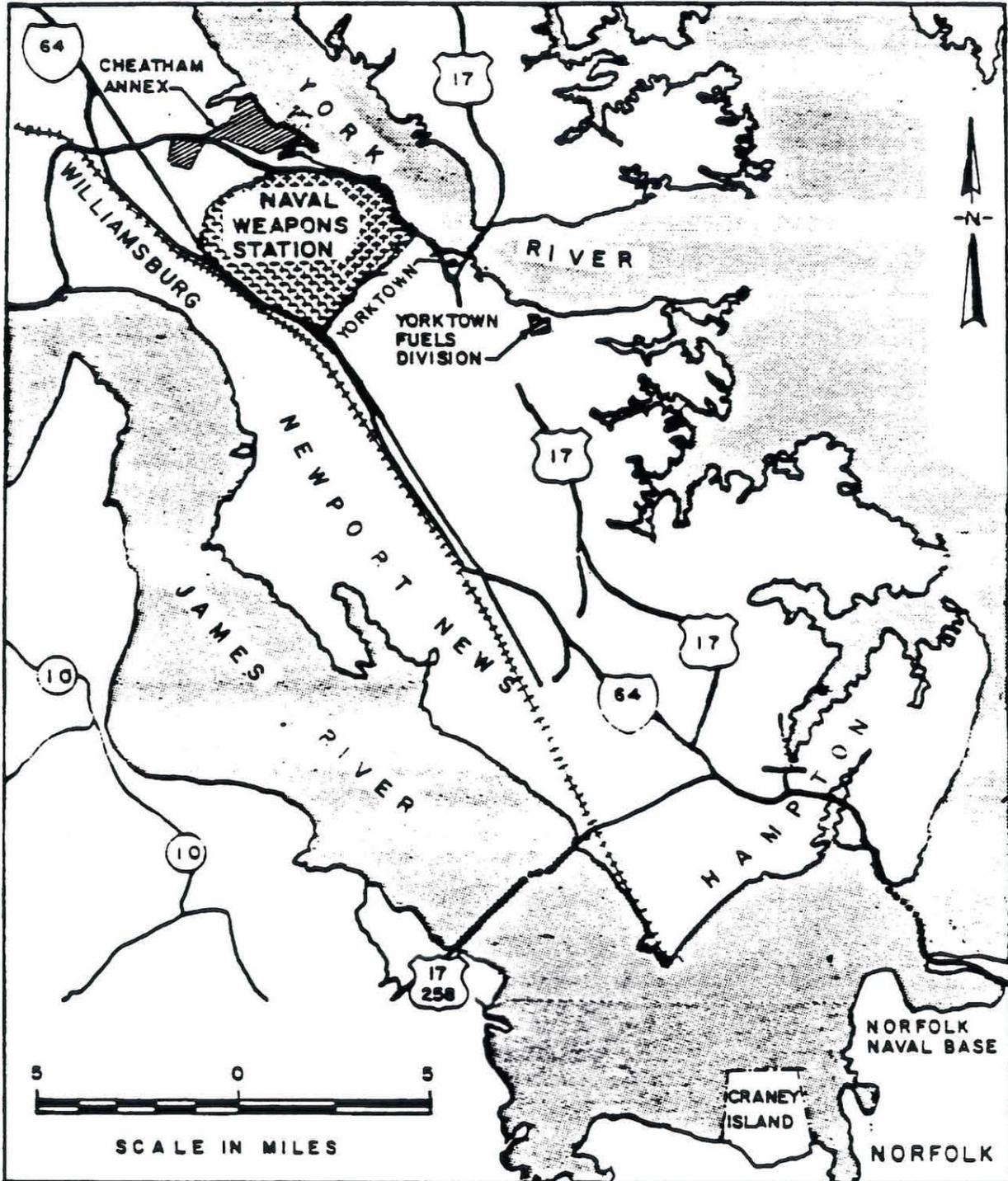
- * REMEDIAL INVESTIGATION REPORT
- * FEASIBILITY STUDY REPORT

RI INTERIM PROGRAM

- DATA REVIEW
- DEVELOPMENT OF WORK PLANS (ROUNDS ONE AND TWO)
- DRILLING/WELL INSTALLATION
- SOIL BORING/SAMPLING PROGRAM
- SAMPLING/ANALYTICAL PROGRAM
- SITE EVALUATION/CONTAMINATION ASSESSMENT
- RECOMMENDATIONS FOR FUTURE EFFORTS
 - NO FURTHER ACTION
 - PERFORM RISK ASSESSMENT
 - COLLECT ADDITIONAL RI DATA AND PERFORM RISK ASSESSMENT
- RI INTERIM REPORT

PHYSICAL SETTING

- LOCATION
- TOPOGRAPHY
- GEOLOGIC UNITS
 - WINDSOR FORMATION
 - YORKTOWN FORMATION
- GROUNDWATER PATTERNS
- SURFACE WATER DRAINAGE BASINS



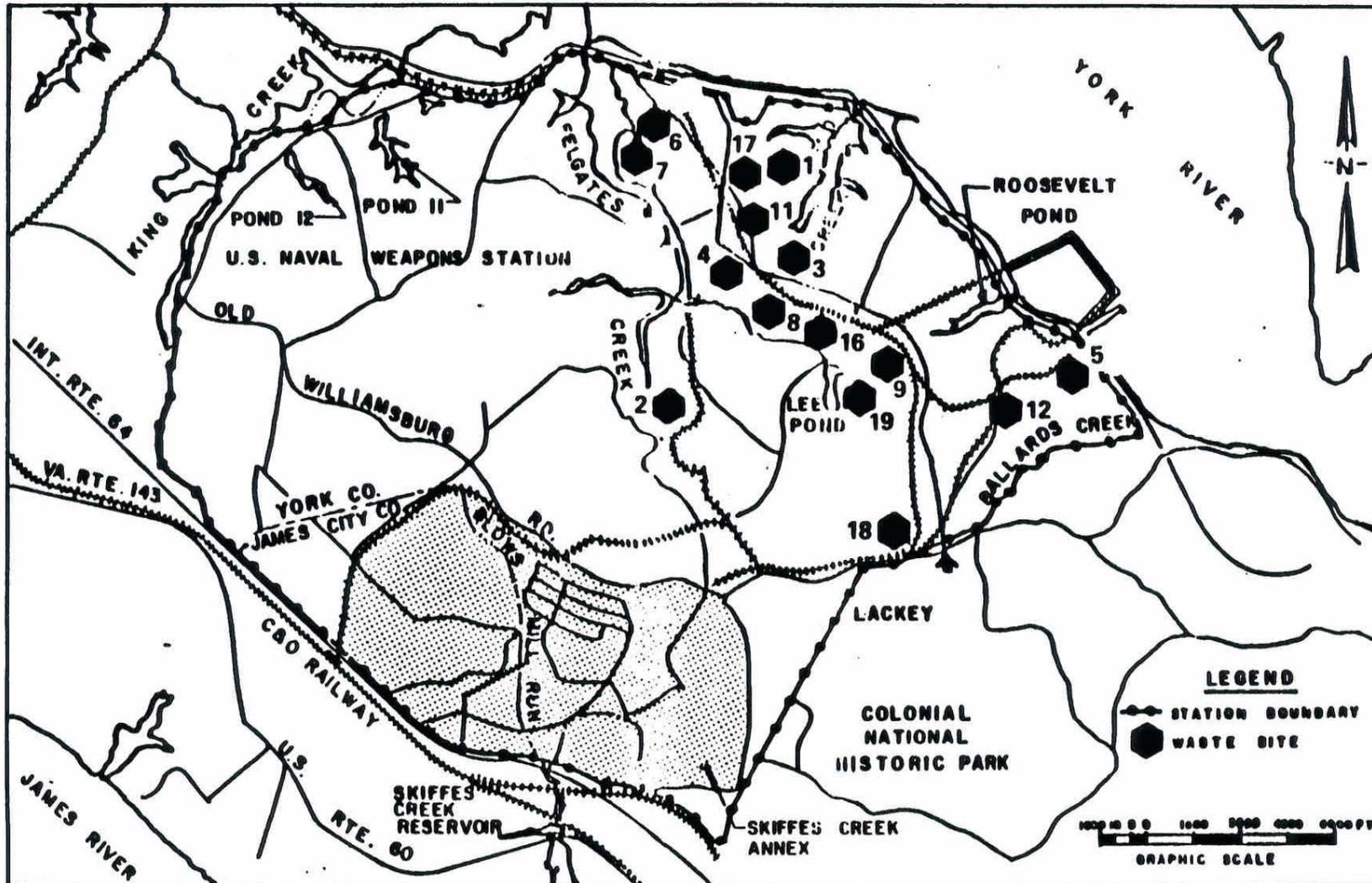
VICINITY MAP
 NAVAL WEAPONS STATION
 YORKTOWN, VIRGINIA



INITIAL ASSESSMENT STUDY
 NAVAL WEAPONS STATION
 YORKTOWN, VIRGINIA

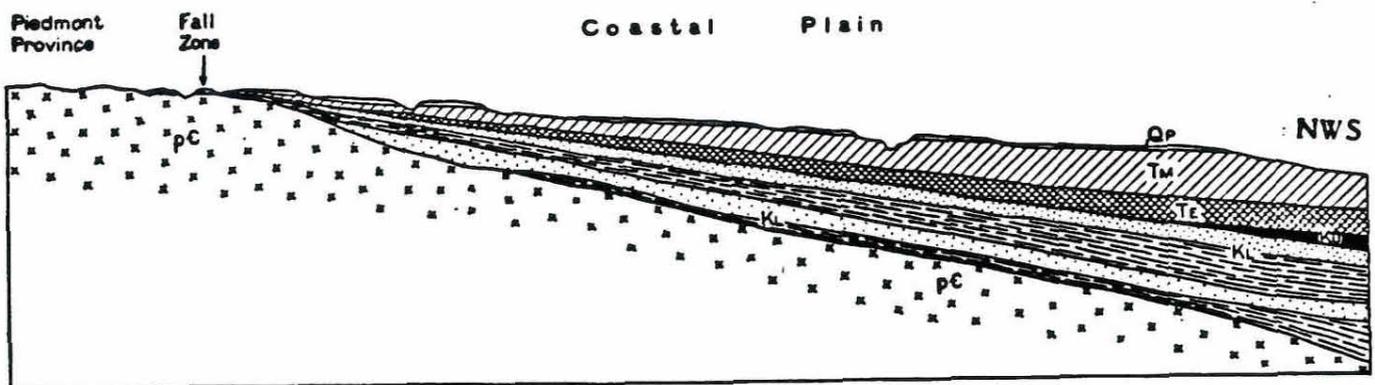
SOURCE: NEESA, 1984.

Location of Sites for Remedial Investigation Naval Weapons Station, Yorktown, Virginia



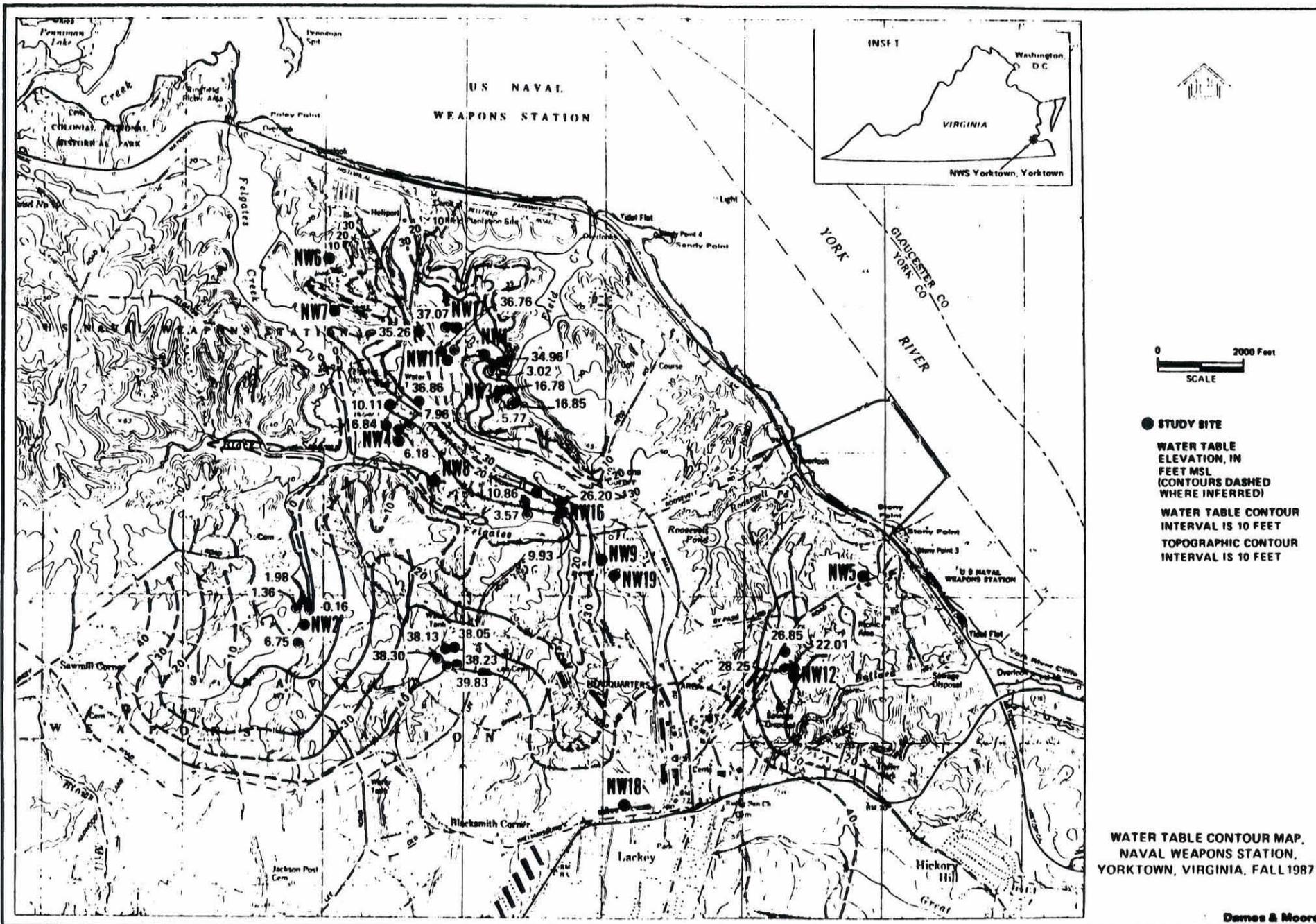
HYDROGEOLOGIC SETTING

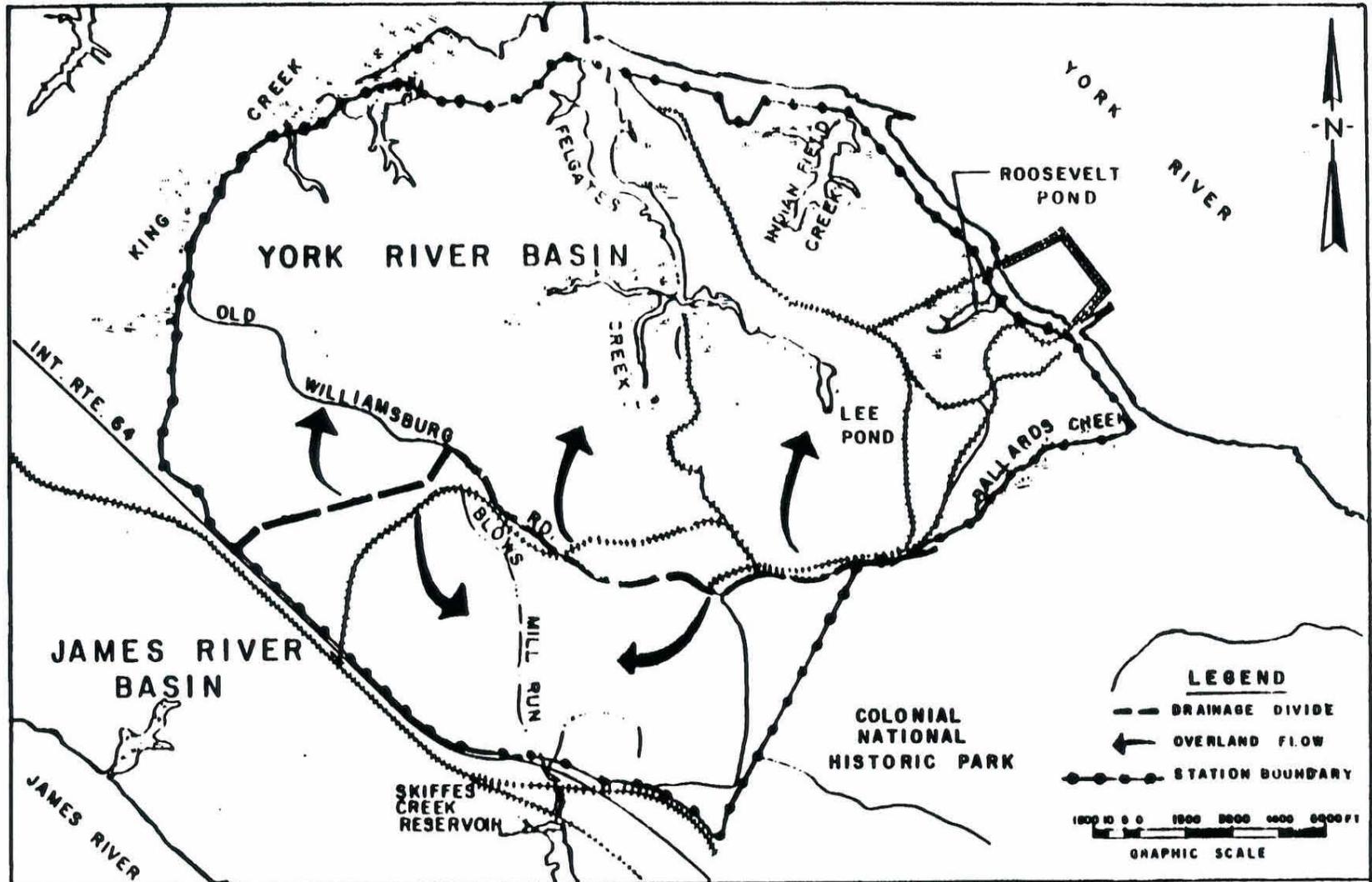
- COASTAL PLAIN PHYSIOGRAPHIC PROVINCE
- WINDSOR AND YORKTOWN FORMATIONS
 - WINDSOR--MARINE AND ESTUARINE SILT AND SAND
 - YORKTOWN--MARINE SILT, SAND, AND SHELL
- MOST HIGH YIELD WELLS COMPLETED IN POTOMAC GROUP (200 FEET DEEP AND DEEPER)
- SOME SHALLOW LOW YIELD WELLS
- SHALLOW GROUNDWATER FLOW DIRECTION FOLLOWS TOPOGRAPHY
- SHALLOW WATER TABLE IS 4 TO 8 FEET BELOW GROUND AT MOST SITES



- Qp = Pleistocene terrace Formation
- Tm = Miocene marl
- Te = Eocene glauconitic sand and marl
- Ku = Upper Cretaceous sands and clays
- Kl = Lower Cretaceous sands and clays
- pC = Crystalline basement rock, chiefly pre-Cambrian

**GENERALIZED GEOLOGIC CROSS-SECTION
OF THE ATLANTIC COASTAL PLAIN IN VIRGINIA**





MAJOR SURFACE WATER DRAINAGE BASINS
NEAR THE NAVAL WEAPONS STATION, YORKTOWN



INITIAL ASSESSMENT STUDY
NAVAL WEAPONS STATION
YORKTOWN, VIRGINIA

SOURCE: NEESA, 1984.

Dames & Moore

NAVAL WEAPONS STATION, YORKTOWN

- 1 DUDLEY ROAD LANDFILL
- 3 GROUP 16 MAGAZINE LANDFILL
- 11 ABANDONED EXPLOSIVES BURNING PITS
- 17 HOLM ROAD LANDFILL

- 2 TURKEY ROAD LANDFILL

- 4 BURNING PAD RESIDUE LANDFILL

- 5 SURPLUS TRANSFORMER STORAGE AREA

- 6 EXPLOSIVE CONTAMINATED WASTEWATER IMPOUNDMENT

- 7 PLANT 3, EXPLOSIVE CONTAMINATED WASTEWATER DISCHARGE AREA

- 8 NEEDED EXPLOSIVE CONTAMINATED WASTEWATER DISCHARGE AREA

- 9 PLANT 1 EXPLOSIVE CONTAMINATED WASTEWATER DISCHARGE AREA
- 19 CONVEYOR BELT SOILS AT BLDG. 10

- 12 BARRACKS ROAD LANDFILL

- 16 WEST ROAD LANDFILL

- 18 BLDG. 476 DISCHARGES

FIELD INVESTIGATION PROGRAM
 (ROUNDS ONE AND TWO)
 NAVAL WEAPONS STATION YORKTOWN, VIRGINIA

<u>SITE NO.</u>	<u>WELLS INSTALLED</u>	<u>GROUNDWATER SAMPLES</u>	<u>SURFACE WATER SAMPLES</u>	<u>BOTTOM SEDIMENT SAMPLES</u>	<u>SOIL SAMPLES</u>
1,3,11,17	9	18	6	6	--
2	4	8	6	6	--
4	5	10	4	4	--
5	--	--	--	--	10
6	--	--	6	10	4
7	--	--	4	4	5
8	--	--	4	4	2
9, 19	--	--	4	4	16
12	3	6	8	8	--
16	5	10	2	4	--
18	--	--	3	3	4
TOTAL NO. OF SAMPLES	26	52	47	53	41

APPLICABLE STANDARDS/CRITERIA FOR
DECISION MAKING

GROUNDWATER - MCL, MCLG, SMCL, AND VGS

SURFACE WATER - FAWQC, VAWQC, AND ASWL (EXPLOSIVES)

SEDIMENT/SOIL - BACKGROUND, TYPICAL RANGE FOR SOILS IN EASTERN
REGION OF U.S. AND VIRGINIA

MCL - MAXIMUM CONTAMINANT LEVEL
MCLG - MAXIMUM CONTAMINANT LEVEL GOAL
SMCL - SECONDARY MAXIMUM CONTAMINANT LEVEL
VGS - VIRGINIA GROUNDWATER STANDARDS
FAWQC - USEPA AMBIENT WATER QUALITY CRITERIA
VAWQC - VIRGINIA CRITERIA FOR PROTECTION OF AQUATIC LIFE
ASWL - AQUATIC SAFETY-RELATED WATER LIMIT

SITE 1, DUDLEY ROAD LANDFILL
 SITE 3, GROUP 16 MAG. LANDFILL
 SITE 11, ABANDONED EXPLOSIVES BURNING PITS
 SITE 17, HOLM ROAD LANDFILL

HISTORY

	SITE 1 -----	SITE 3 -----	SITE 11 -----	SITE 17 -----
● OPERATION:	1965 - 1984	1940 - 1970	1930 - 1950	1950 - 1960'S
● SIZE:	10 ACRES	2 ACRES	0.5 ACRES	5 ACRES
● TYPE OF WASTES:	ASBESTOS, SOLVENTS, O&G, WASTE OIL, PAINT WASTE	SOLVENTS, SLUDGE, O&G, TANK SKIMMINGS	EXPLOSIVE RESIDUES	HYDRAULIC FLUIDS, BATTERIES, DRUMS, SCRAP METAL

FINDINGS

● ANALYTICAL RESULTS

PARAMETER -----	MEDIA -----	CONCENTRATION, UG/L (LOCATION) -----	CRITERIA UG/L (SOURCE) -----
TRICHLOROETHYLENE	CW	30 (3GW07), 37 (3GW08), 30 (11GW09)	5.0 (MCL)
TOTAL PHENOLS	CW	2.0 (1GW04), 4.0 (1GW05), 8.0 (3GW07)	1.0 (VGS)
ZINC	CW	140 (17GW02), 68 (17GW03), 65 (1GW05), 51 (11GW09)	50 (VGS)
LEAD	SW	25.6 (1SW01), 82.0 (1SW02), 7.2 (1SW03)	5.6 (FAWQC)
SILVER	SW	11.8 (1SW01), 18.2 (1SW02), 7.3 (1SW03), 3.9 (1SW04)	0.023 (VAWQC)

- SOURCE OF CONTAMINANTS NOT WELL DEFINED DUE TO PROXIMITY OF FOUR SITES.
- ZINC, LEAD, AND SILVER CONCENTRATIONS COULD BE REPRESENTATIVE OF AMBIENT CONDITIONS.
- GROUNDWATER FLOWS TO SURFACE WATER

RECOMMENDATIONS

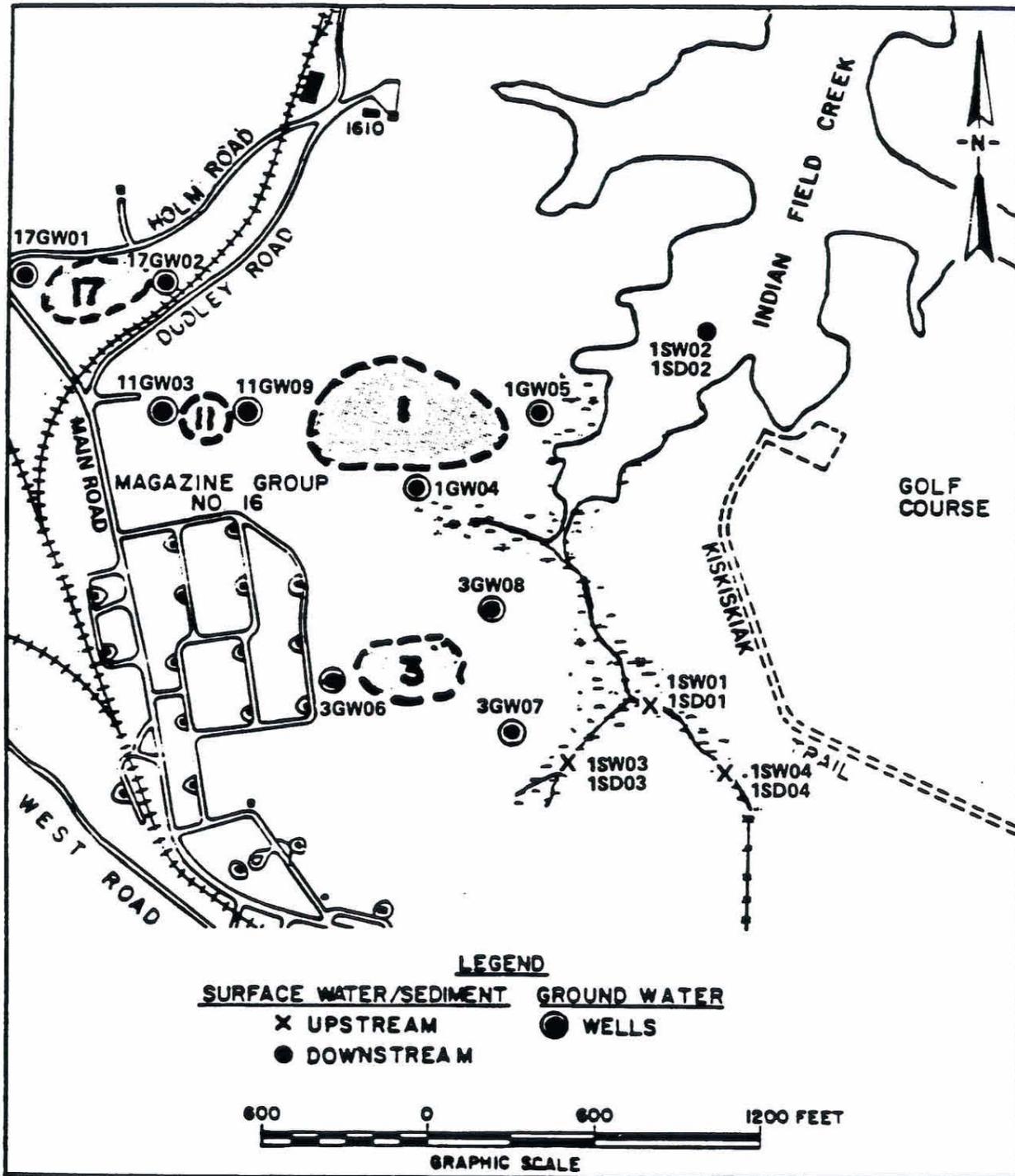
- PERFORM GEOPHYSICAL SURVEY
- COLLECT ADDITIONAL SAMPLES FOR CHEMICAL ANALYSIS
- PERFORM BIOTA SAMLING IN INDIAN FIELD CREEK
- PERFORM RISK ASSESSMENT

Site 1- Dudley Road Landfill

Site 3- Group 16 Magazines Landfill

Site 11- Abandoned Explosives Burning Pits

Site 17- Holm Road Landfill



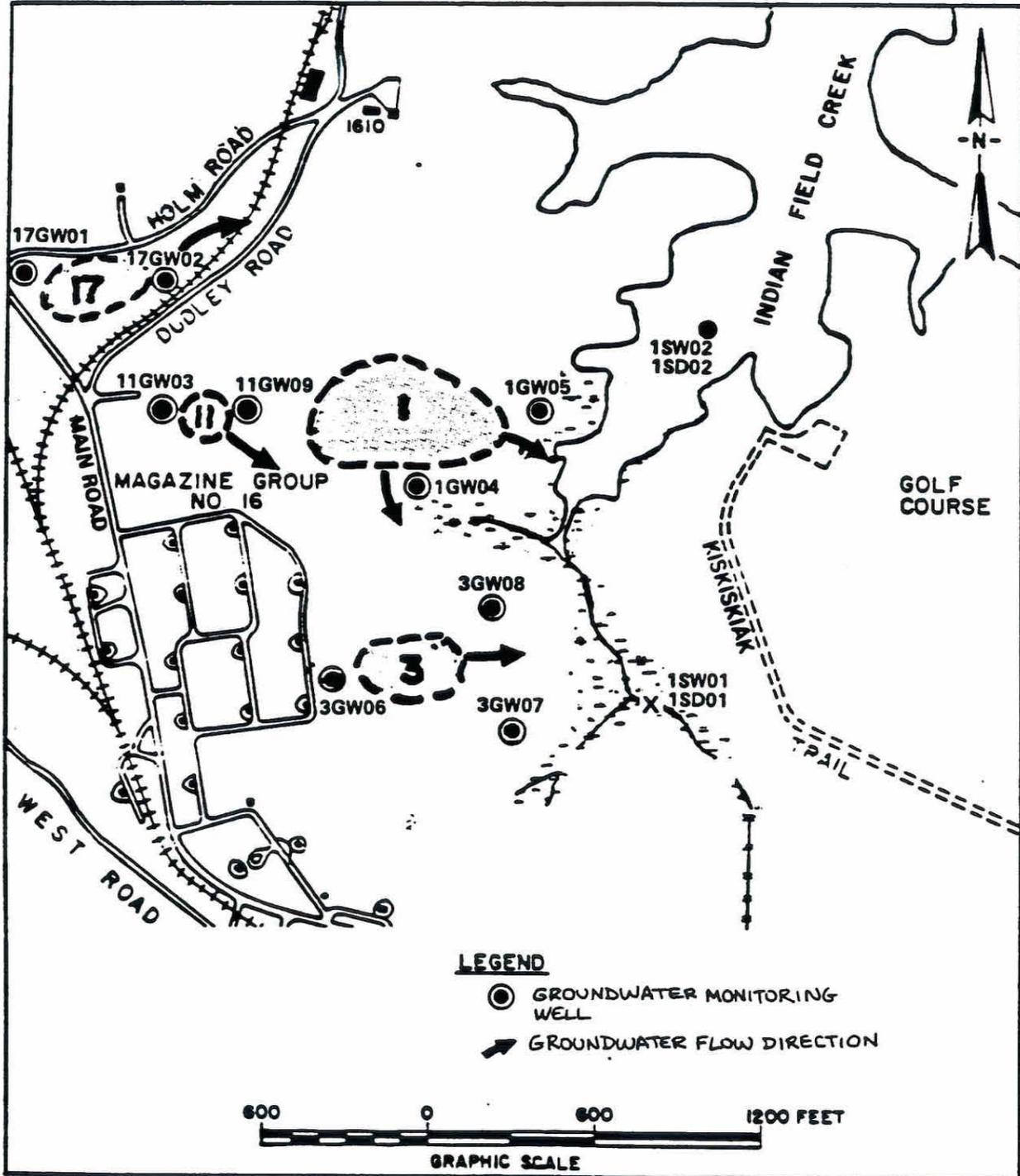
Groundwater Flow Map

Site 1- Dudley Road Landfill

Site 3- Group 16 Magazines Landfill

Site 11- Abandoned Explosives Burning Pits

Site 17- Holm Road Landfill



SITE 2, TURKEY ROAD LANDFILL

HISTORY

- OPERATION: 1940'S TO 1981
- SIZE: 5 ACRES
- TYPE OF WASTES: MERCURY AND ZINC CARBON BATTERIES, TREE STUMPS AND LIMBS, CONSTRUCTION DEBRIS, MISSILE HARDWARE, ELECTRICAL DEVICES, IDENTIFIED DRUMS OR TANKS
- CREATED BY FILLING LOW-LYING AREA ON EDGE OF MARSHY AREA
- BURIED DEBRIS EVIDENT AT SITE

FINDINGS

- ANALYTICAL RESULTS

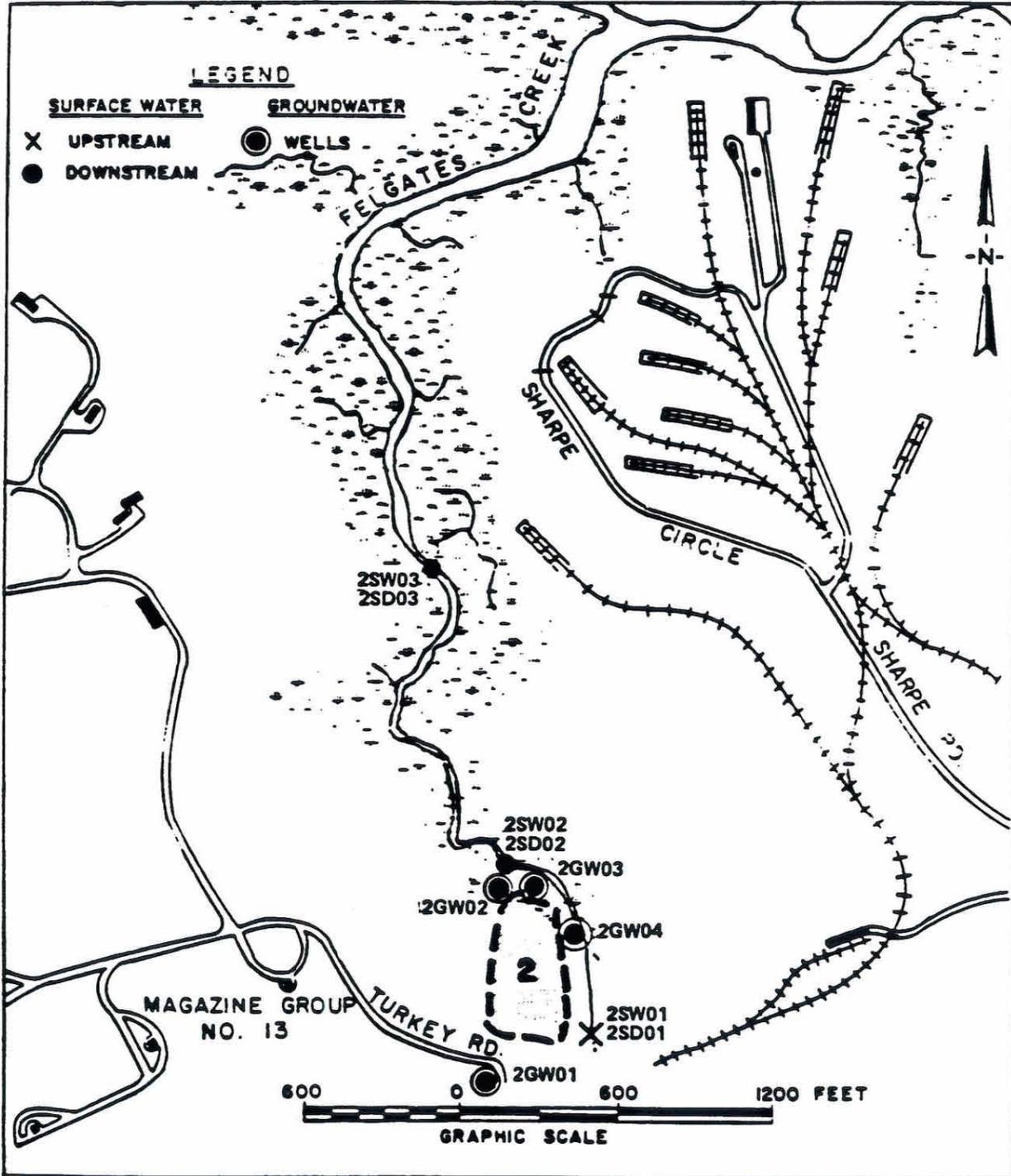
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION, UG/L (LOCATION)</u>	<u>CRITERIA (UG/L)</u>
ZINC	GW	68 (2GW02), 79 (2GW04)	50 (VGS)
TOTAL PHENOLS	GW	5 (2GW02), 77 (2GW03), 2 (2GW04)	1.0 (VGS)
ARSENIC	GW	83 (2GW04)	50 (VGS)
ZINC	SW	48 (2SW01), 49 (2SW02), 50 (2SW03)	48 (VAWQC)
TOTAL PHENOLS	SW	4 (2SW02)	1.0 (VAWQC)
COPPER	SW	13 (2SW03)	2.0 (VAWQC)
SILVER	SW	1.6 (2SW03)	.023 (VAWQC)

- GROUNDWATER DISCHARGES TO FELGATES CREEK

RECOMMENDATIONS

- PERFORM BIOTA SAMPLING IN FELGATES CREEK
- PERFORM A RISK ASSESSMENT

Site 2-Turkey Road Landfill



SITE 4, BURNING PAD RESIDUE LANDFILL

HISTORY

- OPERATION: 1940 TO 1975
- SIZE: 4 ACRES
- TYPE OF WASTES: BATTERIES FROM WEAPONS, BURNING PAD EXPLOSIVE RESIDUES, TREE STUMPS, FLY ASH, MINE CASINGS, ELECTRICAL EQUIPMENT, AND TRANSFORMERS

FINDINGS

- ANALYTICAL RESULTS

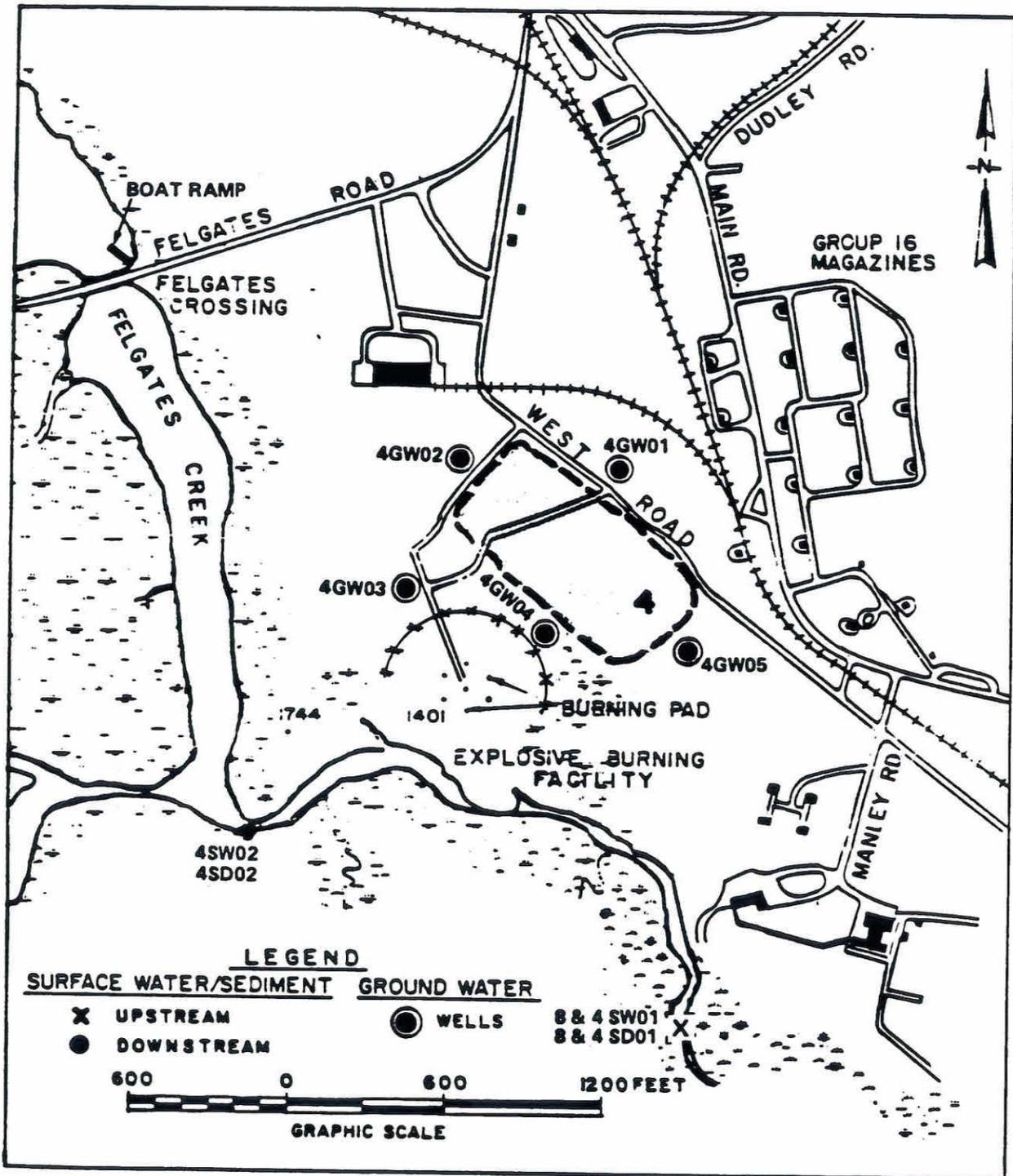
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION, UG/L (LOCATION)</u>	<u>CRITERIA (UG/L)</u>
ZINC	GW	54 (4GW05)	50 (VGS)
TCE	GW	8 (4GW03), 40 (4GW04), 28 (4GW05)	5 (MCL)
1,1-DCE	GW	13 (4GW03)	7 (MCL)
1,2-TRANS DCE	GW	23 (4GW04), 12 (4GW05)	10 (MCLG)
TOTAL PHENOLS	GW	4 (4GW02), 4.6 (4GW04), 16 (4GW05)	1.0 (VGS)
RDX	GW	1.1 - 9.0 (4GW02 - 4GW05)	NA
HMX	GW	0.7 (4GW05)	NA
LEAD	SW	85.3 (4SW02)	5.6 (FAWQC)
SILVER	SW	3.6 (4SW01), 9.4 (4SW02)	.023 (VAWQC)
ZINC	SW	73 (4SW02)	48 (VAWQC)
TOTAL PHENOLS	SW	4 (4SW01)	1.0 (VAWQC)

- ZINC AND LEAD CONCENTRATIONS IN GROUNDWATER COULD REPRESENT NATURAL VARIABILITY
- LEAD, SILVER, AND ZINC CONCENTRATIONS IN SURFACE WATER COULD REPRESENT NATURAL CONDITIONS
- GROUNDWATER AND SURFACE WATER FLOW TO FELGATES CREEK

RECOMMENDATIONS

- PERFORM GEOPHYSICAL SURVEY
- PERFORM BIOTA SAMPLING IN FELGATES CREEK
- PERFORM RISK ASSESSMENT

Site 4-Burning Pad Residue Landfill



SITE 5, SURPLUS TRANSFORMER STORAGE AREA

HISTORY

- OPERATION: 1940 TO 1981
- SIZE: 1,000 FT²
- TYPE OF WASTE: TRANSFORMER OIL CONTAINING PCBs
- REPORTED LEAKAGE OF TRANSFORMERS
- CLEANUP OF CONTAMINATED SOILS IN 1982

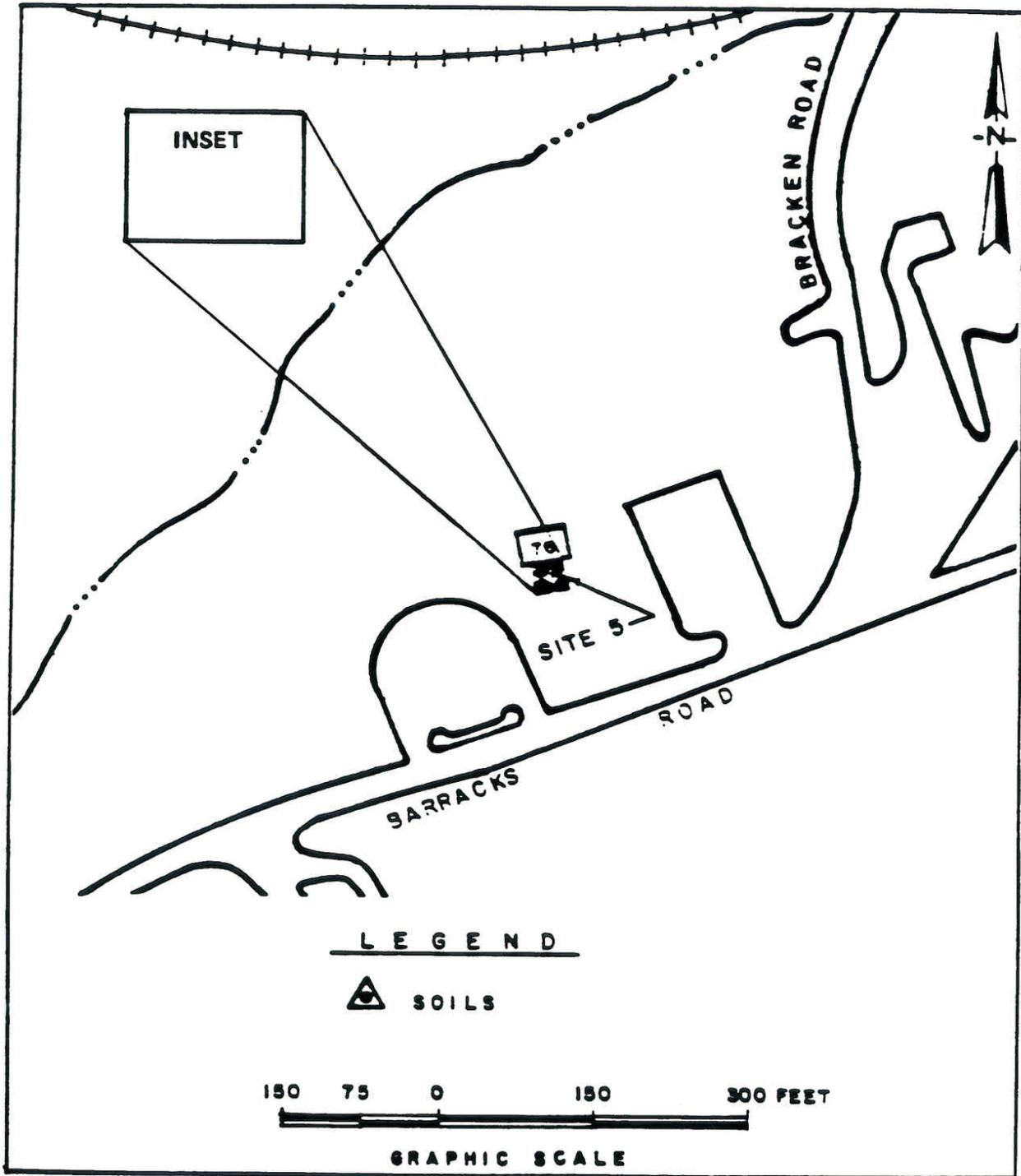
FINDINGS

- AROCHLOR 1260 CONCENTRATIONS IN SOIL RANGED FROM 242 TO 1920 UG/KG
- CONCENTRATIONS WERE BELOW CLEANUP LEVELS UNDER TOSCA
- SITE APPEARS TO POSE NO THREAT TO HUMAN HEALTH OR THE ENVIRONMENT

RECOMMENDATIONS

- NO FURTHER ACTION

Site 5-Surplus Transformer Storage Area



SITE 6, EXPLOSIVES CONTAMINATED
WASTEWATER IMPOUNDMENT

HISTORY

- SURFACE IMPOUNDMENT THAT RECEIVED EXPLOSIVE CONTAMINATED WASTEWATERS
- OPERATION: 1942 TO 1975
- SIZE: 3 ACRES
- TYPE OF WASTES: WASTEWATERS CONTAINING TNT, RDX, TCE, TCA, AND CYCLOHEXANONE

FINDINGS

- ANALYTICAL RESULTS

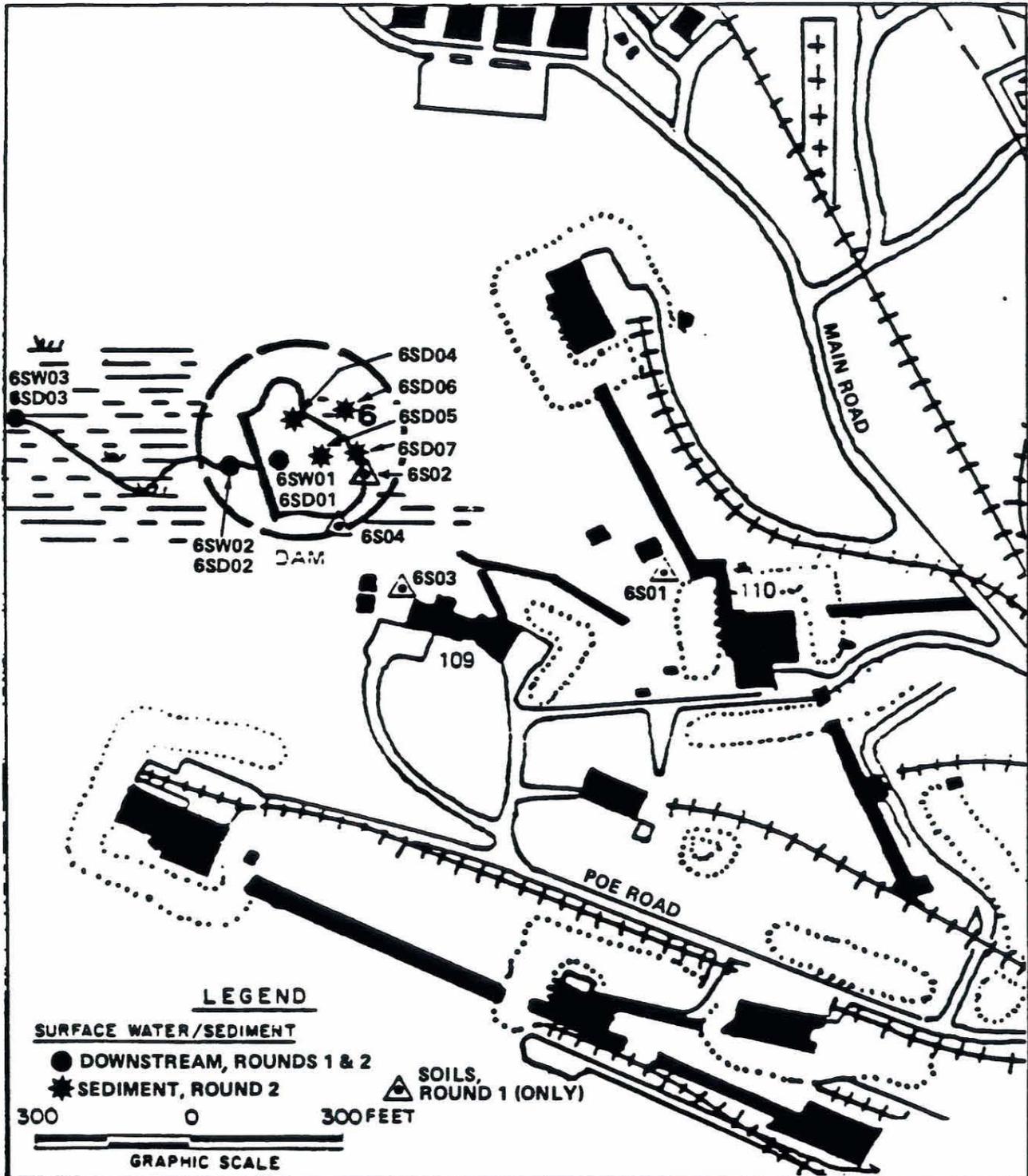
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION</u> <u>UG/KG OR UG/L (LOCATION)</u>	<u>CRITERIA</u> <u>(UG/L)</u>
TCA	SO	11 (6SO4)	NA
TCE	SO	35 (6SO2)	NA
1,2-TRANS DCE	SO	9 (6SO2), 14 (6SO4)	NA
FLUORANTHENE	SO	90 (6SO3)	NA
PHENANTHRENE	SO	70 (6SO3)	NA
TNT	SO	127000 (6SO2), 727000 (6SO4)	NA
4-A, 4,6-DNT	SO	55800 (6SO2), 222000 (6SO4)	NA
1,2-TRANS DCE	SW	3.0 (6SW01)	NA
TOLUENE	SD	2.0 (6SD01), 1.0 (6SD02)	NA
TCA	SD	11-14 (6SD01 - 6SD03)	NA
TNT	SD	2440 - 124000 (6SD01 - 6SD05)	NA
2,4-DNT	SD	17000 (6SD05)	NA
HMX	SD	44300 (6SD02), 34000 (6SD05)	NA
4-A,2,5-DNT	SD	543,000 (6SD05)	NA

- SOIL CONTAMINATION EXISTS ALONG EDGE OF IMPOUNDMENT
- CONTAMINANT CONCENTRATIONS DECREASE IN DOWNGRAIENT DIRECTION
- SURFACE WATER RUNOFF IS INTO FELGATES CREEK

RECOMMENDATIONS

- COLLECT ADDITIONAL SAMPLES FOR CHEMICAL ANALYSIS
- PERFORM BIOTA SAMPLING IN FELGATES CREEK
- PERFORM RISK ASSESSMENT

Site 6-Explosive Contaminated Waste Water Impoundment



SITE 7, PLANT 3 EXPLOSIVES-CONTAMINATED
WASTEWATER DISCHARGE AREA

HISTORY

- EXPLOSIVE-CONTAMINATED WASTEWATER DISCHARGED FROM PLANT 3
- OPERATION: 1945 TO 1975
- SIZE: <1 ACRE
- TYPE OF WASTE: WASTEWATER CONTAINING TNT, RDX, TCE, AND CYCLOHEXANE

FINDINGS

- ANALYTICAL RESULTS

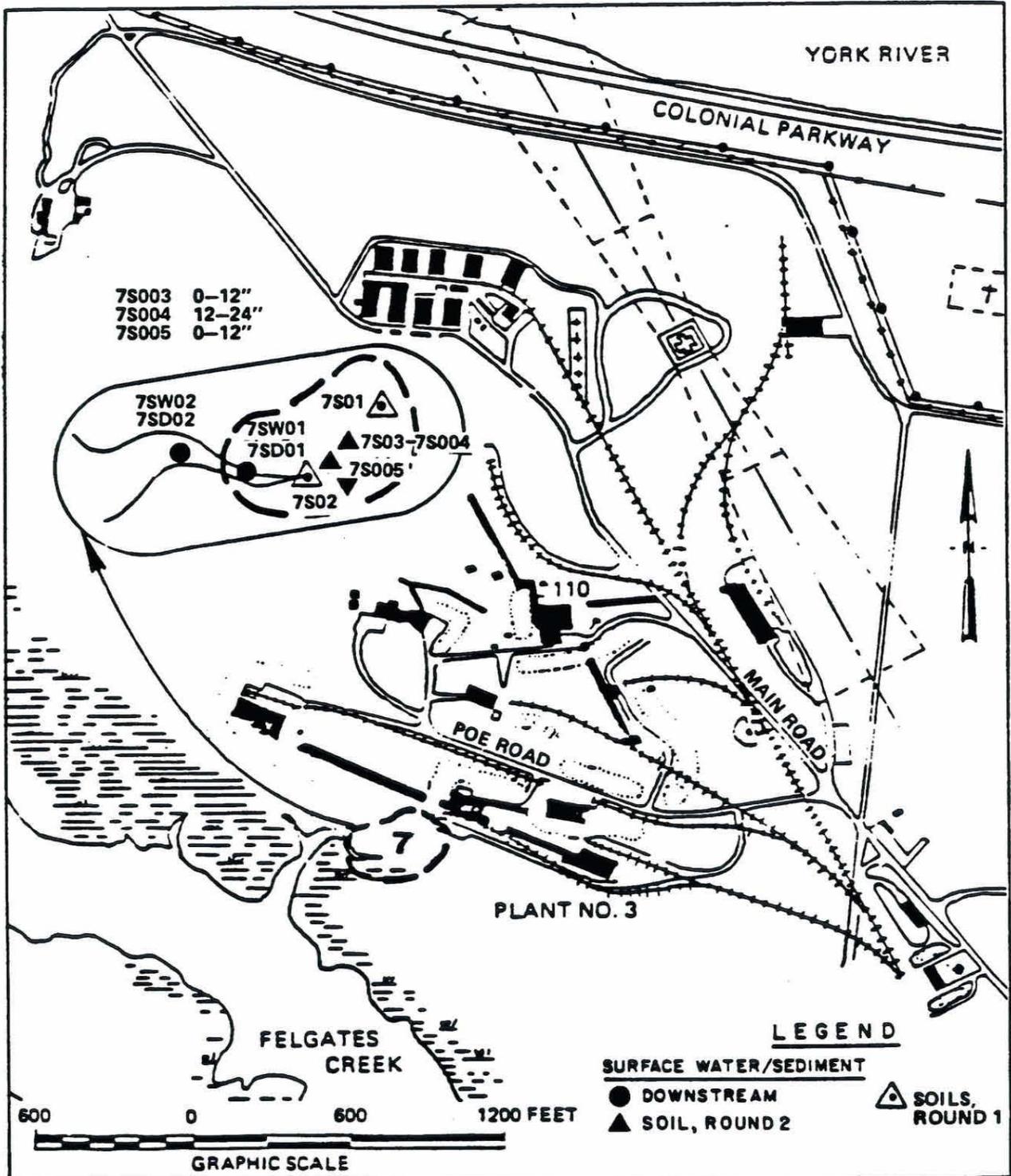
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION, UG/L (LOCATION)</u>	<u>CRITERIA (UG/L)</u>
TOLUENE	SO	2 (7S02)	NA
PYRENE	SO	185 (7S02)	NA
PHENANTHRENE	SO	169 (7S02), 1870 (7S03)	NA
OTHER PAHs	SO	792 - 2299 (7S03)	NA
EXPLOSIVES (TNT, RDX, HMX, ETC.)	SO	1030 - 3379000 (7S01 - 7S05)	NA
2,4D-6NT	SD	412 (7SD02)	NA

- EXPLOSIVES DETECTED IN SURFACE WATER AT CONCENTRATIONS BELOW CRITERIA
- NEAR-SURFACE SOIL SAMPLES ARE CONTAMINATED WITH EXPLOSIVES AND BNAs
- CONTAMINANT CONCENTRATIONS DECREASE IN THE DOWNGRAIDENT DIRECTION
- RUNOFF DISCHARGES ARE TO FELGATES CREEK

RECOMMENDATIONS

- PERFORM BIOTA SAMPLING IN FELGATES CREEK
- PERFORM RISK ASSESSMENT

Site 7-Plant 3 Explosive Contaminated Waste Water Discharge Area



SITE 8, NEDED EXPLOSIVES-CONTAMINATED
WASTEWATER DISCHARGE AREA

HISTORY

- WASTEWATER DISCHARGES FROM NEDED COMPLEX
- OPERATION: 1940 TO 1975
- SIZE: 2 ACRES
- TYPE OF WASTE: WASTEWATER CONTAINING SOLVENTS, SPENT/NEUTRALIZED ACIDS, EXPLOSIVE RESIDUES, TCE, ACETONE, AND CYCLOHEXANE

FINDINGS

- ANALYTICAL RESULTS

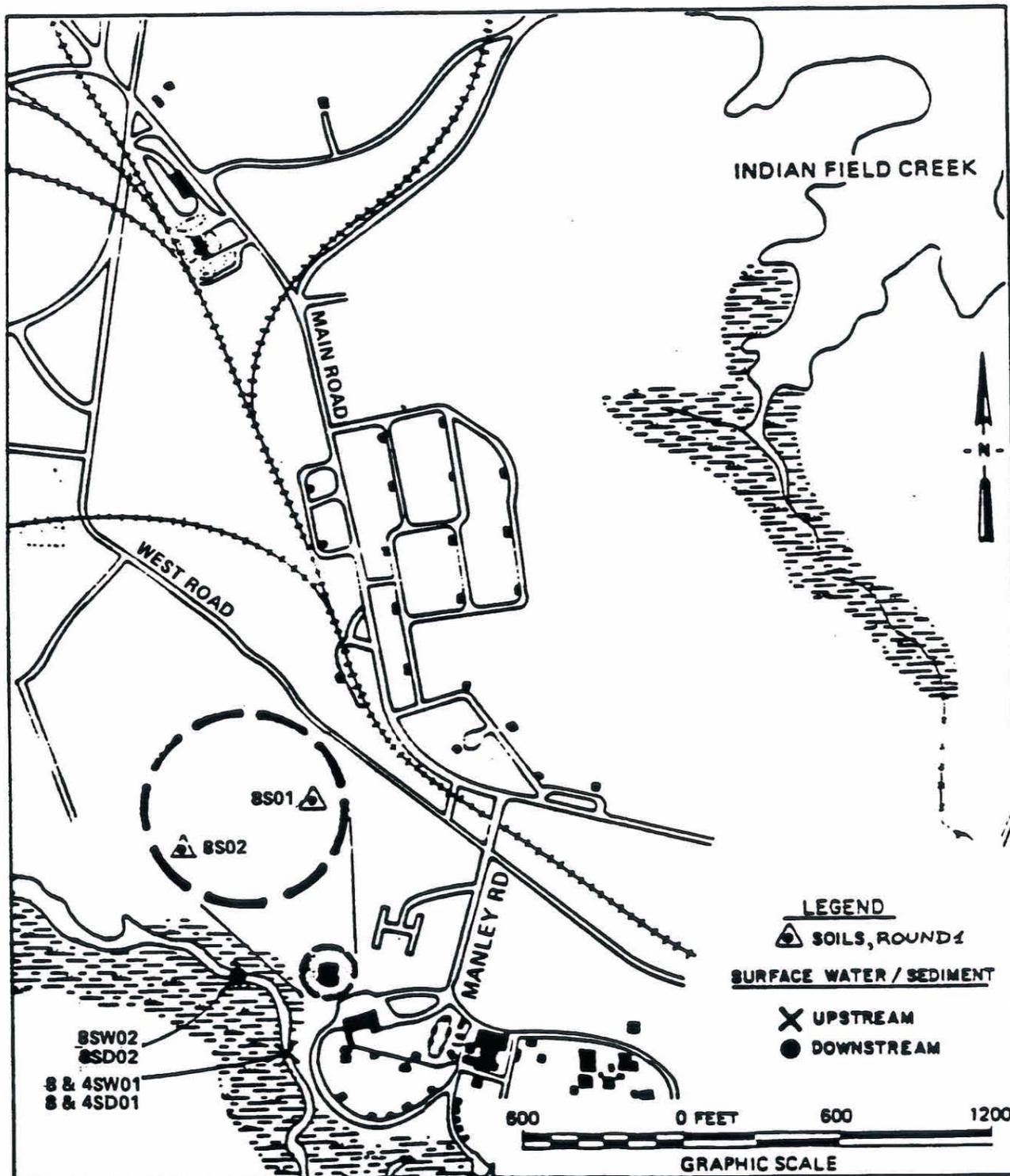
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION, UG/L (LOCATION)</u>	<u>CRITERIA (UG/L)</u>
TOLUENE	SO	.9 (8S01 - 8S02)	NA
ETHYL	SO	1.0 (8S01), 0.5 (8S02)	NA
BENZENE			
1,1-DCA	SO	2.0 (8S02)	NA
1,2-TRANS	SO	5.0 (8S02)	NA
DCE			
TOTAL XYLENE	SO	7 (8S01), 5 (8S02)	NA
TOTAL	SW	22 (8SW02)	1.0 (VAWQC)
PHENOLS			

- EXPLOSIVES WERE NOT DETECTED IN SOILS
- SITE 8 IS A SOURCE OF ORGANIC AND BNA CONTAMINANTS
- CONTAMINANTS DISCHARGE TO FELGATES CREEK
- UPGRAIDENT SOURCES MAY BE IMPACTING SURFACE WATER IN VICINITY OF SITE

RECOMMENDATIONS

- PERFORM BIOTA SAMPLING IN FELGATES CREEK
- COLLECT ADDITIONAL SAMPLES FOR CHEMICAL ANALYSIS
- PERFORM RISK ASSESSMENT

Site 8-NEDED Explosive Contaminated Waste Water Discharge Area



SITE 9, PLANT 1 EXPLOSIVES-CONTAMINATED WASTEWATER DISCHARGE AREA
 SITE 19, CONVEYOR BELT SOILS AT BUILDING 10

HISTORY

	SITE 9 -----	SITE 19 -----
	DISCHARGE AREA FOR EXPLOSIVES-CONTAMINATED WASTEWATER	EXPLOSIVE-CONTAMINATED SOILS BY SPILLAGE FROM CONVEYOR BELT
● OPERATION:	1930'S TO 1975	
● SIZE:	<1 ACRE	<1 ACRE
● TYPE OF WASTE:	WASTEWATER CONTAMINATED WITH EXPLOSIVES AND ORGANIC SOLVENTS	SURFACE SOILS CONTAMINATED WITH EXPLOSIVES

FINDINGS

● ANALYTICAL RESULTS

PARAMETER -----	MEDIA -----	CONCENTRATION (LOCATION) -----	CRITERIA -----
TCA	SO (UG/KG)	9 (9SO2)	NA
1,1-DCA	SO	14 (9SO2)	NA
TCE	SO	43 (9SO1)	NA
4-METHYL-2-PENTANONE	SO	100 (19SO14), 30 (19SO16)	NA
PAHs	SO	72 - 6083 (9SO1 - 9SO16)	NA
EXPLOSIVES (TNT, RDX, HMX, ETC.)	SO	600 - 1430000 (9SO1 - 9SO16)	NA
TCA	SD (UG/KG)	17 (9SD01), 14 (9SD02)	NA
PAHs	SD	346 - 1605 (9SD02)	NA
TCA	SW	13 (9SW01)	NA
1,1-DCA	SW (UG/L)	3 (9SW01)	NA
TCE	SW	15 (9SW01)	NA
1,2-TRANS-DCE	SW	2 (9SW01)	NA
EXPLOSIVES	SW	.06 - 18.8 (9SW01 - 9SW02)	NA

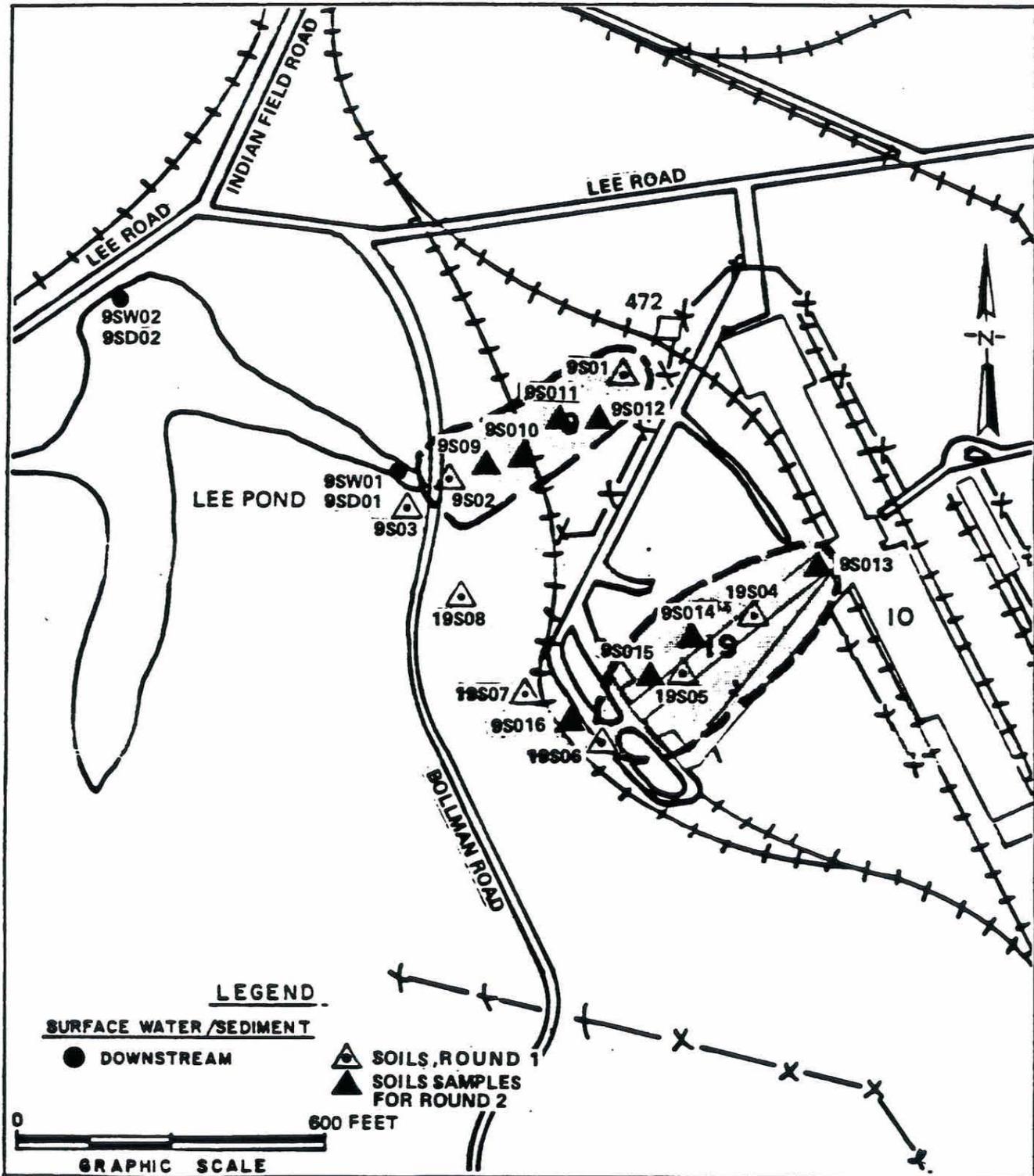
- EXPLOSIVES, ORGANICS, AND PAHs ARE CONTAMINANTS ASSOCIATED WITH SITES 9 AND 19
- OFFSITE CONTAMINATION HAS BEEN CONFIRMED
- CONTAMINANTS HAVE MIGRATED INTO LEE POND

RECOMMENDATIONS

- PERFORM BIOTA SAMPLING IN LEE POND
- COLLECT ADDITIONAL RI SAMPLES FOR CHEMICAL ANALYSIS
- PERFORM RISK ASSESSMENT

Site 9-Plant 1 Explosive Contaminated Waste Water Discharge Drainage Area

Site 19-Conveyor Belt Soils at Building 10



SITE 12, BARRACKS ROAD LANDFILL

HISTORY

- LANDFILL CREATED BY FILLING RAVINE
- OPERATION: 1925 TO MID-1960'S
- SIZE: 2-3 ACRES
- TYPE OF WASTES: GARBAGE, REFUSE, SCRAP WOOD, EXPLOSIVE-CONTAMINATED PACKAGING, AND SOLVENTS

FINDINGS

- ANALYTICAL RESULTS

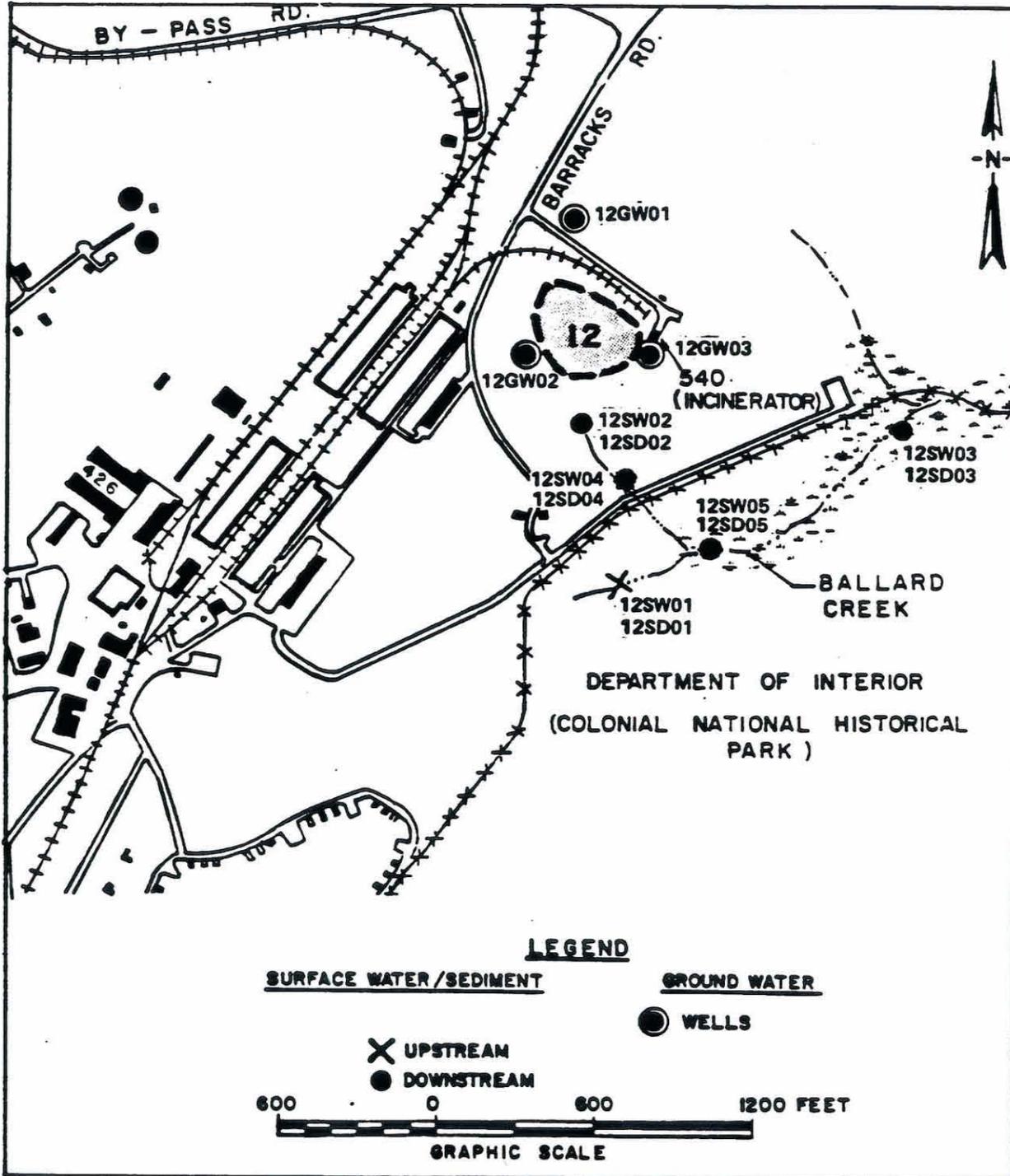
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION, UG/L (LOCATION)</u>	<u>CRITERIA (UG/L)</u>
TCE	GW	86 (12GW01), 19 (12GW02)	5 (MCL)
TOTAL PHENOLS	GW	12 (12GW03)	1.0 (VGS)
TNT	GW	0.5 (12GW03)	NA
RDX	GW	0.01 (12GW03)	NA
4-A-2, 6DNT	GW	0.6 (12GW03)	NA
2-A-4, 6-DNT	GW	1.8 (12GW03)	NA
TCE	SW	2.0 (12SW01), 4.0 (12SW02)	NA
TOTAL PHENOLS	SW	7 (12SW04)	1.0 (VAWQC)
COPPER	SW	6 (12SW03)	2.0 (VAWQC)
NICKEL	SW	15 (12SW03)	8.3 (FAWQC)
ZINC	SW	67 (12SW01), 61 (12SW02), 112 (12SW03)	50 (VGS)
1,2-DCA	SD	35 (12SD03)	NA
TCE	SD	2.0 (12SD02)	NA
VINYL ACETATE	SD	730 (12SD02)	NA
PAHs	SD	67 - 4619 (12SD01 - 12SD03)	NA
CHLORDANE	SD	196 (12SD01), 2776 (12SD02)	NA
TNT	SD	2690 (12SD02)	NA
OIL AND GREASE	SD	152100 - 16970000 (12SD01 - 12SD03)	NA

- GROUNDWATER FROM THE SITE APPEARS TO EMANATE FROM THE LANDFILL EMBANKMENT
- GROUNDWATER FLOW IS INTO BALLARDS CREEK
- CONTAMINANT MIGRATION IS OCCURRING INTO SURFACE WATER

RECOMMENDATIONS

- PERFORM GEOPHYSICAL SURVEY
- INSTALL ADDITIONAL MONITORING WELLS
- PERFORM BIOTA SAMPLING IN BALLARDS CREEK
- COLLECT ADDITIONAL SAMPLES FOR CHEMICAL ANALYSIS
- PERFORM RISK ASSESSMENT

Site 12-Barracks Road Landfill



SITE 16, WEST ROAD LANDFILL

HISTORY

- OPERATION: 1950'S TO EARLY 1960'S
- SIZE: 8 ACRES
- TYPES OF WASTES: DRY CARBON BATTERIES, HANDLING MATERIALS, PRESSURE TRANSMITTING FLUID, UNKNOWN CHEMICALS, AND 55-GALLON DRUMS
- MOSTLY WOODED; BOUNDARIES NOT EVIDENT

FINDINGS

- ANALYTICAL RESULTS

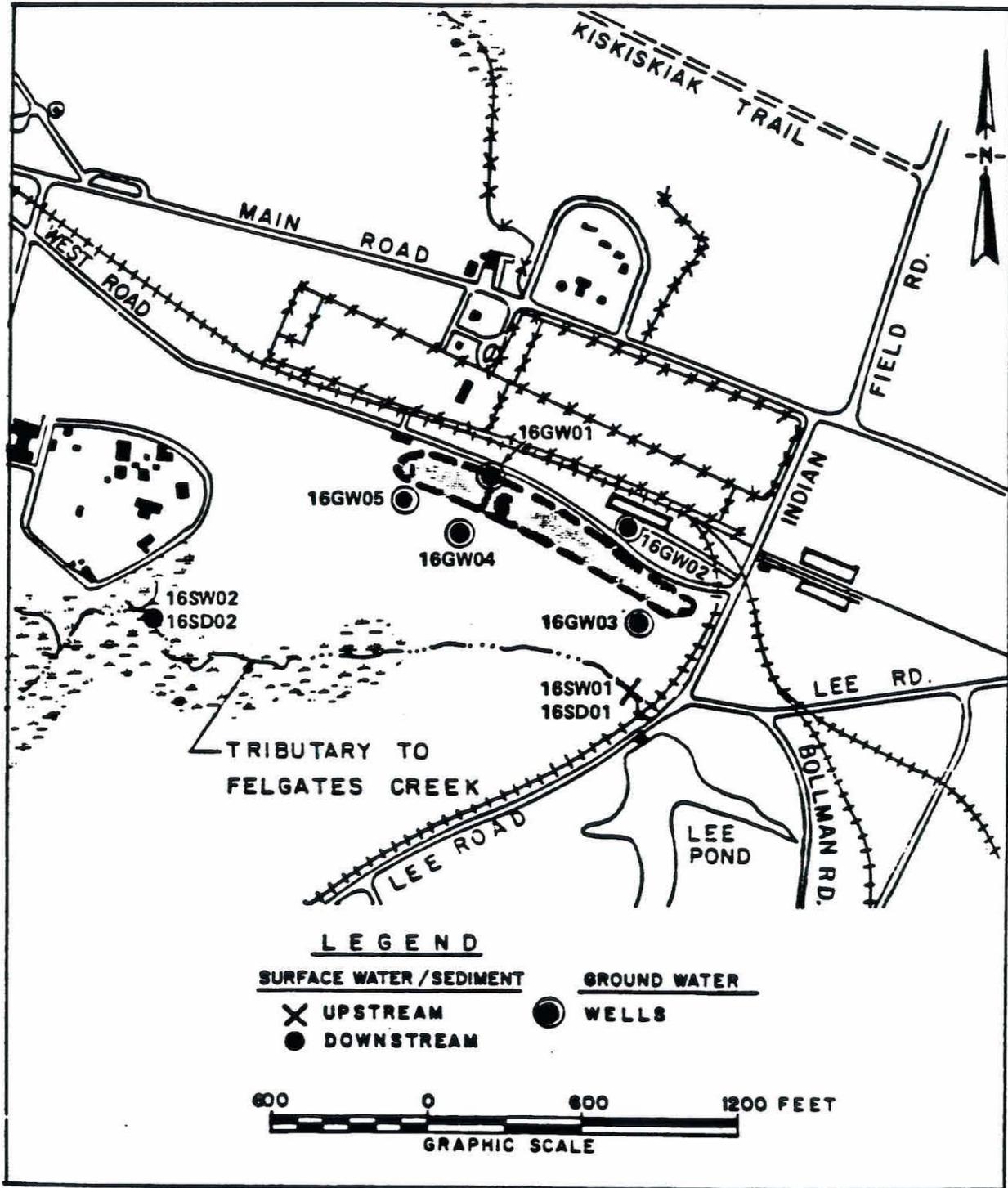
<u>PARAMETER</u>	<u>MEDIA</u>	<u>CONCENTRATION, UG/L (LOCATION)</u>	<u>CRITERIA (UG/L)</u>
ZINC	GW	72 (16GW01), 51 (16GW05)	50 (VGS)
TOTAL PHENOLS	GW	2 (16GW01), 3.4 (16GW02), 3.3 (16GW05)	1.0 (VGS)
1,1-DCA	GW	6 (16GW04)	NA
1,1-DCE	GW	10 (16GW04)	7 (MCL)
HEPTACHLOR	GW	0.024 (16GW01)	.001 (FAWQC)
TCE	SW	5.0 (16SW02)	NA
TOTAL PHENOLS	SW	6 (16SW02)	1.0 (FAWQC)
COPPER	SW	4 (16SW02)	2.0 (VAWQC)
EXPLOSIVES	SW	.58 - 2.3 (16SW01 - 16SW02)	NA
2-HEXANONE	SD	17 (16SD01), 22 (16SD02)	NA
PAHs	SD	172 - 1151 (1SD01)	NA
OIL AND GREASE	SD	225000 - 53000 (16SD01 - 16SD02)	NA

- PHENOL AND ZINC CONCENTRATIONS EXCEED CRITERIA IN UPGRADIENT AND DOWNGRAIDENT WELLS
- CONSTITUENTS OF CONCERN IN SURFACE WATER AND SEDIMENT DO NOT APPEAR TO BE SITE RELATED
- GROUNDWATER FLOW IS INTO FELGATES CREEK

RECOMMENDATIONS

- PERFORM GEOPHYSICAL SURVEY
- COLLECT ADDITIONAL SAMPLES FOR CHEMICAL ANALYSIS
- PERFORM BIOTA SAMPLING IN FELGATES CREEK
- PERFORM RISK ASSESSMENT

Site 16-West Road Landfill



SITE 18, BUILDING 476 DISCHARGES

HISTORY

- BATTERY ACID DISCHARGES TO UNLINED DITCH
- OPERATION: 1940'S THROUGH 1960'S
- TYPE OF WASTE: SPENT BATTERY ACIDS CONTAINING MERCURY, NICKEL, CADMIUM, AND LEAD

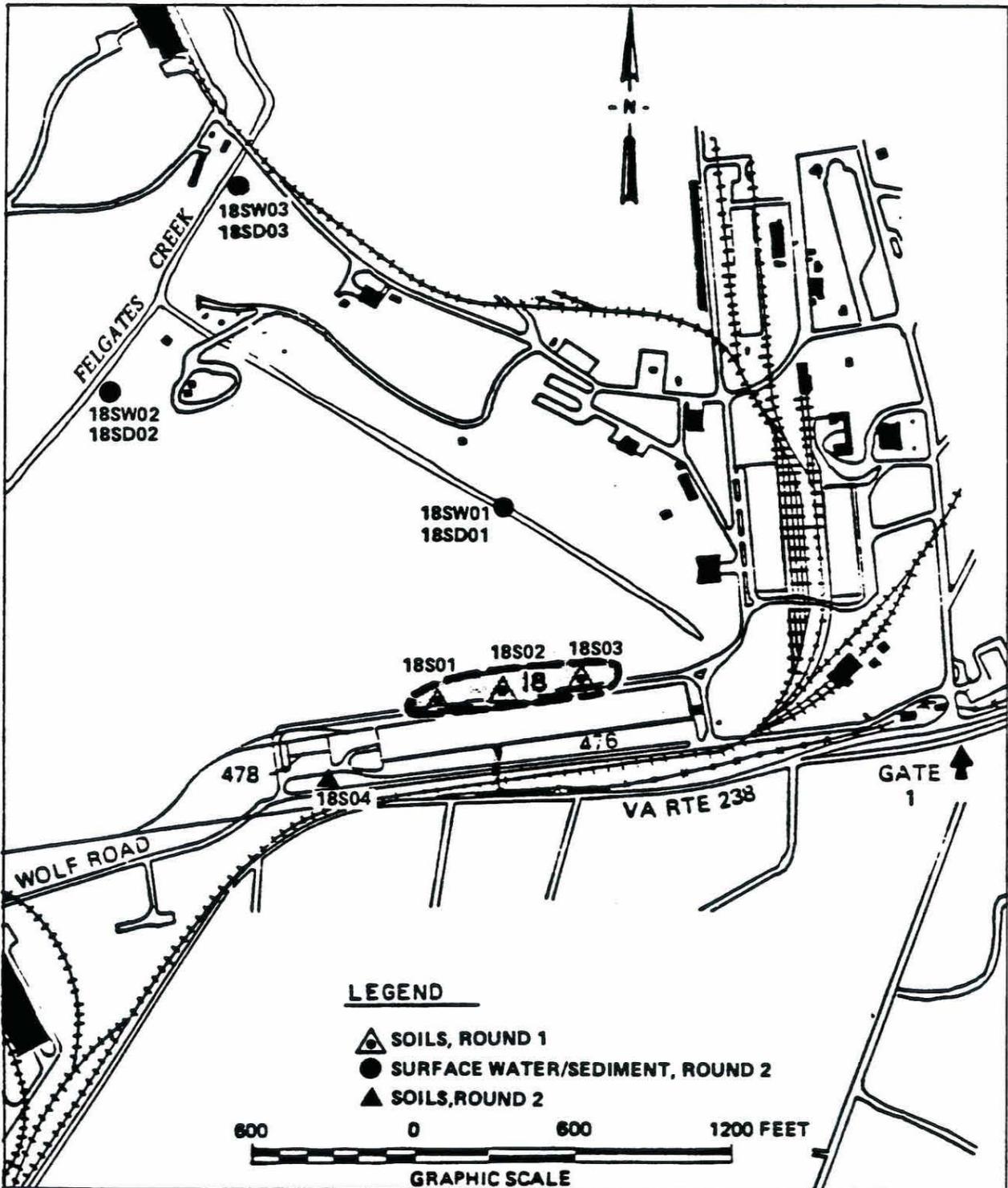
FINDINGS

- METALS CONCENTRATIONS ARE WITHIN NATURAL RANGES
- SITE APPEARS TO POSE NO THREAT TO HUMAN HEALTH OR THE ENVIRONMENT

RECOMMENDATIONS

- NO FURTHER ACTION

Site 18-Building 476 Discharges



Summary of Proposed Additional RI Efforts
 Naval Weapons Station, Yorktown, Virginia

Site No.	Geophysical Survey	Periodic Water Level Monitoring	Wells Installed	Sampling					Analytes
				GW	SW	SD	Soil	Biota	
1, 3, 11, 17	X	X	5	14	--	--	--	X	VOCs (a), BNAs (b), Phenols, Silver, Lead
2	X	--	--	--	--	--	--	X	--
4	X	--	--	--	--	--	--	X	--
5	--	--	--	--	--	--	--	--	--
6	--	--	--	--	6	10	--	X	VOCs, Explosives
7	--	--	--	--	--	--	--	X	--
8	--	--	--	--	--	--	4	X	VOCs, PCBs, Explosives
9, 19	--	--	--	--	4	4	--	--	VOCs
12	X	--	2	5	4	4	--	X	HSL, Explosives, Phenols, O&G
16	X	--	--	5	2	2	--	X	SW, SD--VOCs, BNAs, Pesticides, Explosives, Phenols GW--VOCs, BNAs, Pesticides, Explosives
18	--	--	--	--	--	--	--	--	--
Background	--	--	--	--	15	15	12	X	SW--HSL Metals, Phenols SO, SD--EP Metals, Phenols

-
- (a) All VOC and BNA analyses will be performed using HSL.
 - (b) BNA analyses will be performed for only 5 new well samples.

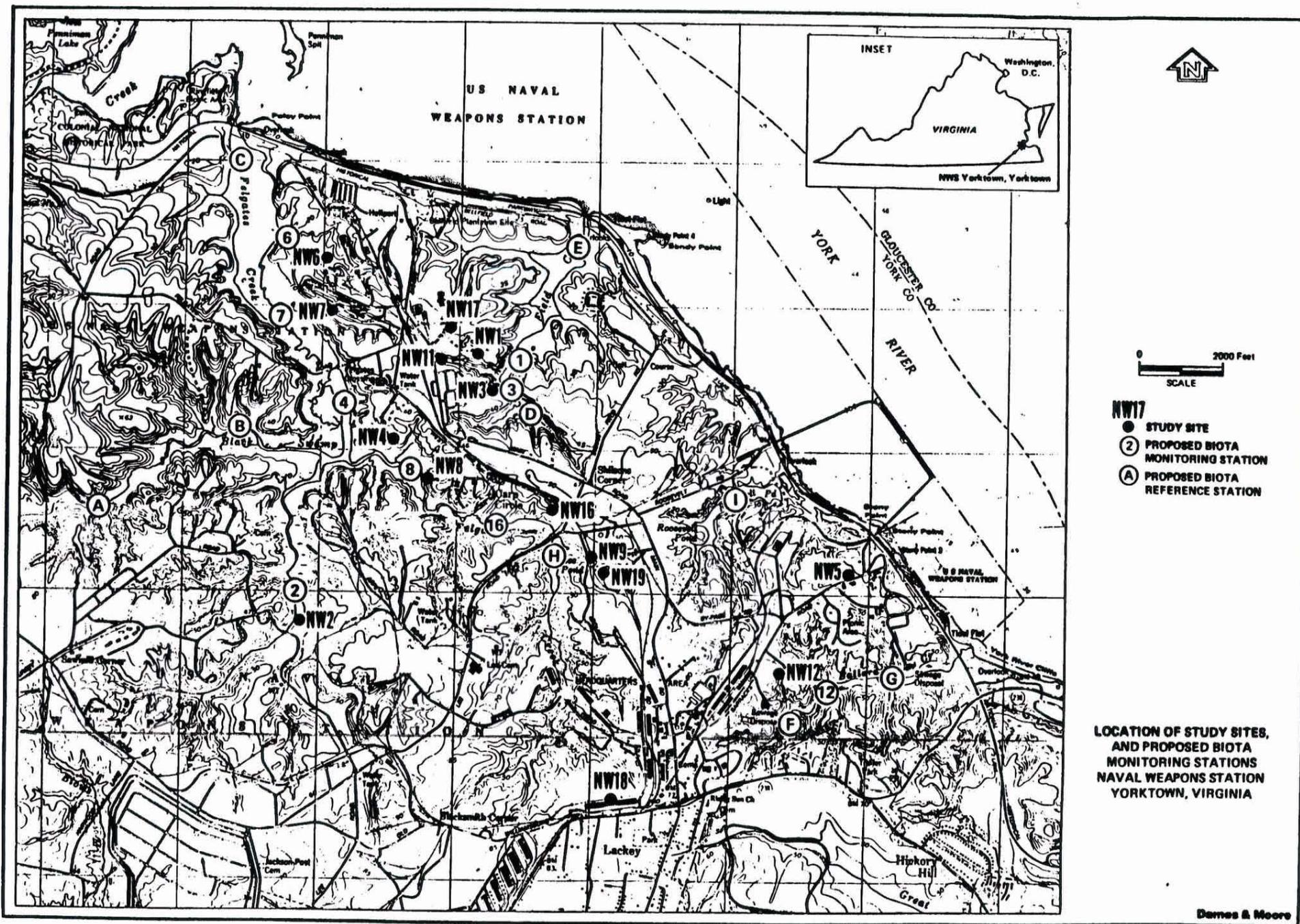
Summary of Recommended Biota Sampling Program
 Naval Weapons Station, Yorktown, Virginia

Sampling (a) Station	Chemical Analytes (b)	Biological Analysis		Chemical Analysis
		Benthic Invertebrate Study	Fish Species (c) Study	Fish Bioconcentration (c) Study
Felgates Creek:				
A (upstream reference)	VOCs, MEK, MIBK, Pest., Explosives, Metals	X	X	X
B (intermediate reference)	VOCs, MEK, MIBK, Pest., Explosives, Metals	X	X	X
C (downstream reference)	VOCs, MEK, MIBK, Pest., Explosives, Metals	X	X	X
2	VOCs, MEK, Pest., Copper, Silver	X	X	X
4	VOCs, MEK, MIBK, Pest., Metals	X	X	X
6	VOCs, Explosives	X	X	X
7	Explosives	X	X	X
8	VOCs, PCBs, Explosives	X	X	X
16	VOCs, BNAs, Pest., Explosives	X	X	X
Indian Field Creek:				
D (upstream reference)	VOCs, MEK, Phenols, Pest., Silver, Lead	X	X	X
E (downstream reference)	VOCs, MEK, Phenols, Pest., Silver, Lead	X	X	X
1	VOCs, MEK, Phenols, Pest., Silver, Lead	X	X	X
3	VOCs, MEK, Phenols, Pest., Silver, Lead	X	X	X
Ballards Creek:				
F (upstream reference)	TCL, Explosives, Phenols, Oil and Grease	X	X	X
G (downstream reference)	TCL, Explosives, Phenols, Oil and Grease	X	X	X
12	TCL, Explosives, Phenols, Oil and Grease	X	X	X
Lee Pond:				
H	VOCs, Explosives	X	X	X
Roosevelt Pond:				
I (Lee Pond reference)	VOCs, Explosives	X	X	X

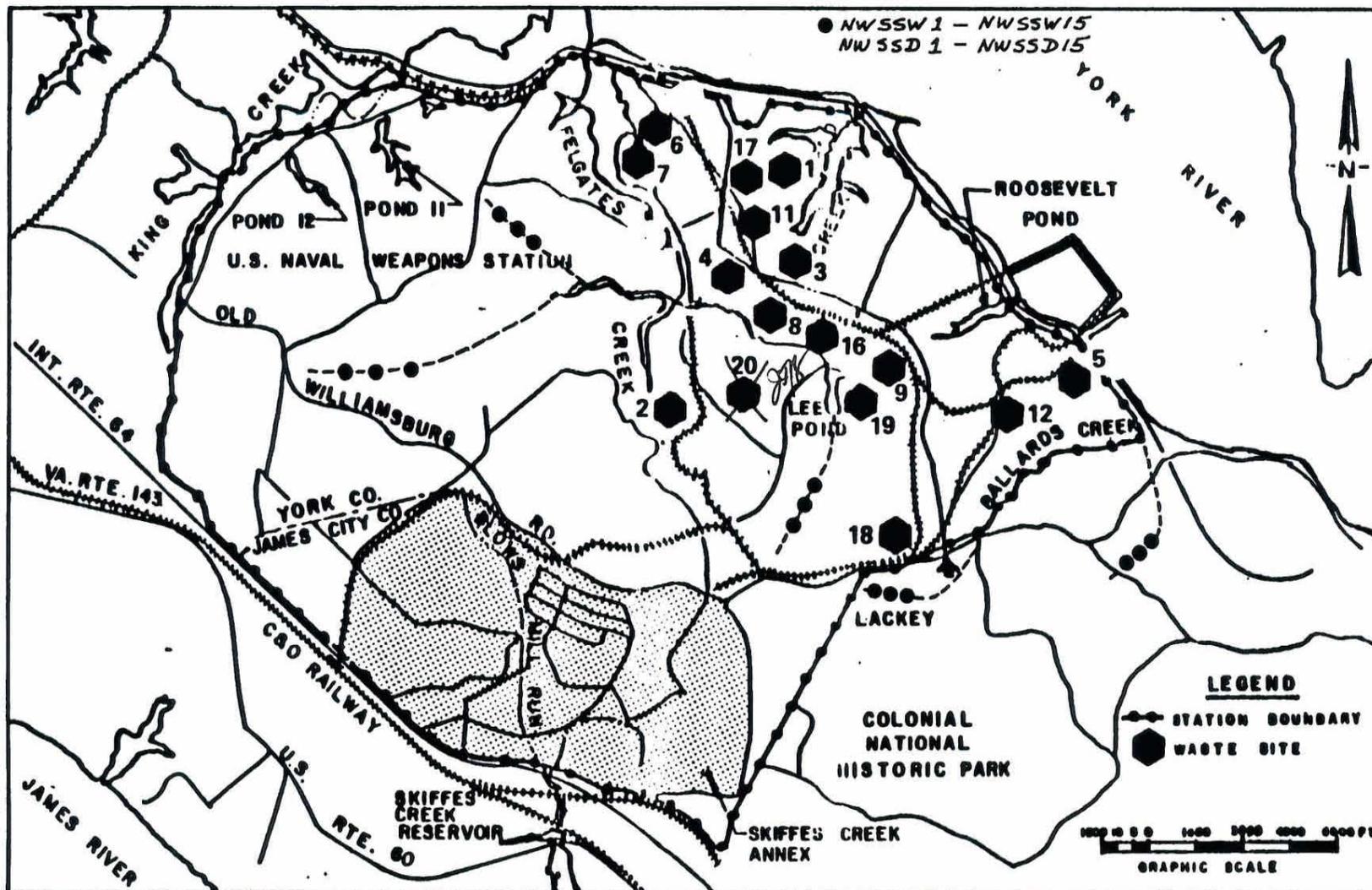
(a) See Figure 5-1 for location.

(b) Applicable to surface water, sediment, and fish.

(c) Performance dependent on availability of fish at time of sampling; will include identification of age, class, and length.



Location of Background Sampling Naval Weapons Station, Yorktown, Virginia



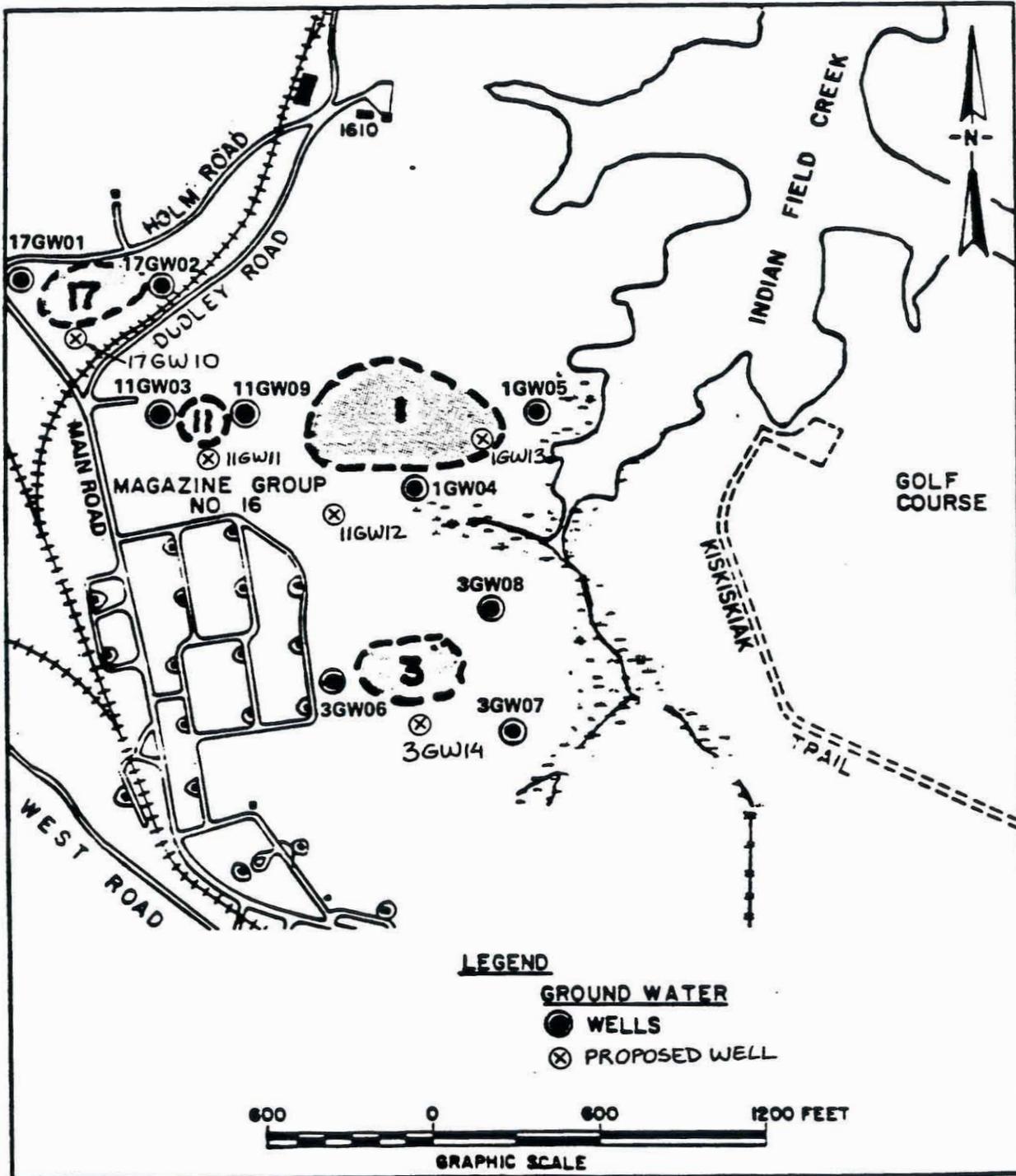
Sampling Locations for:

Site 1- Dudley Road Landfill

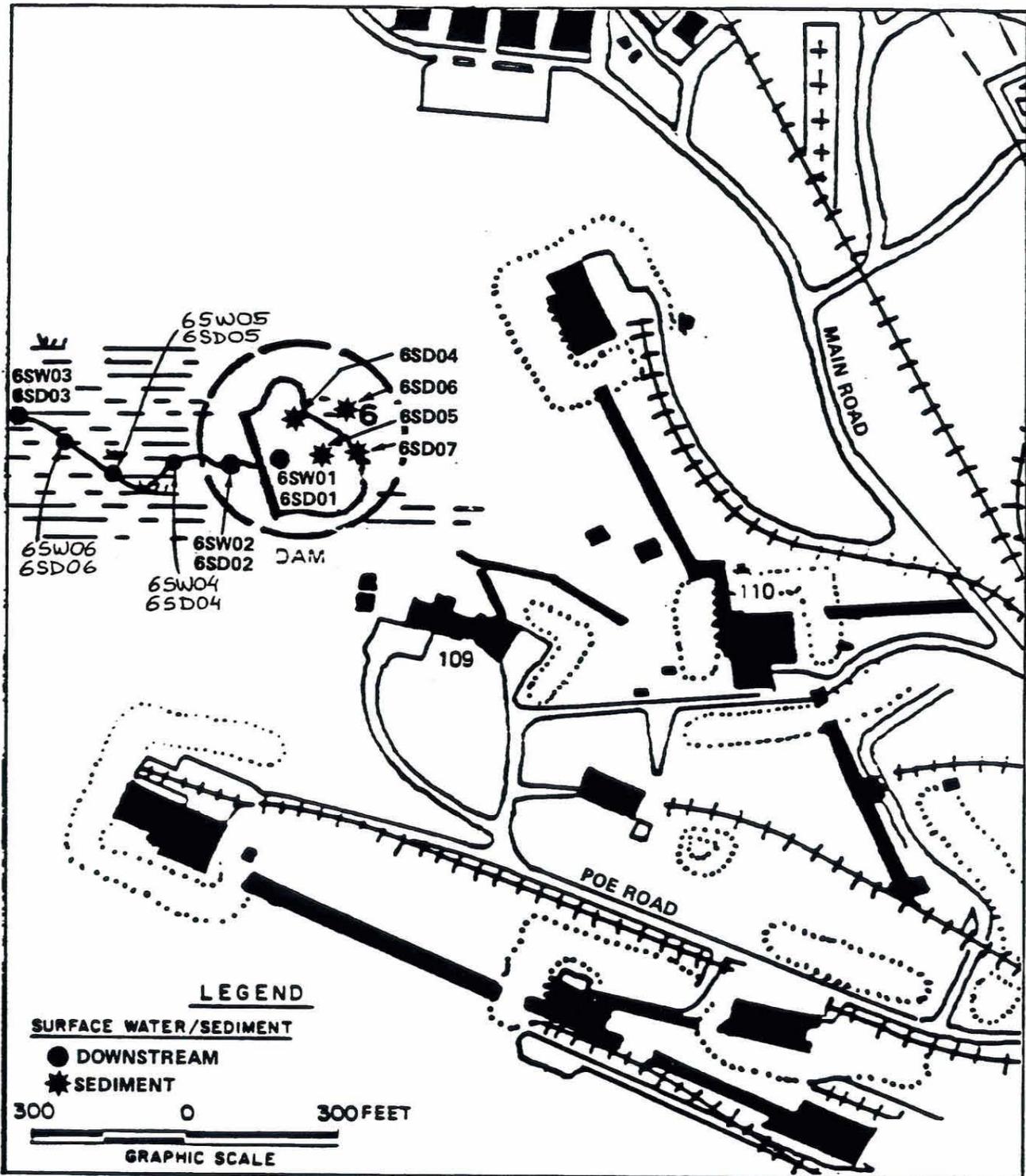
Site 3- Group 16 Magazines Landfill

Site 11- Abandoned Explosives Burning Pits

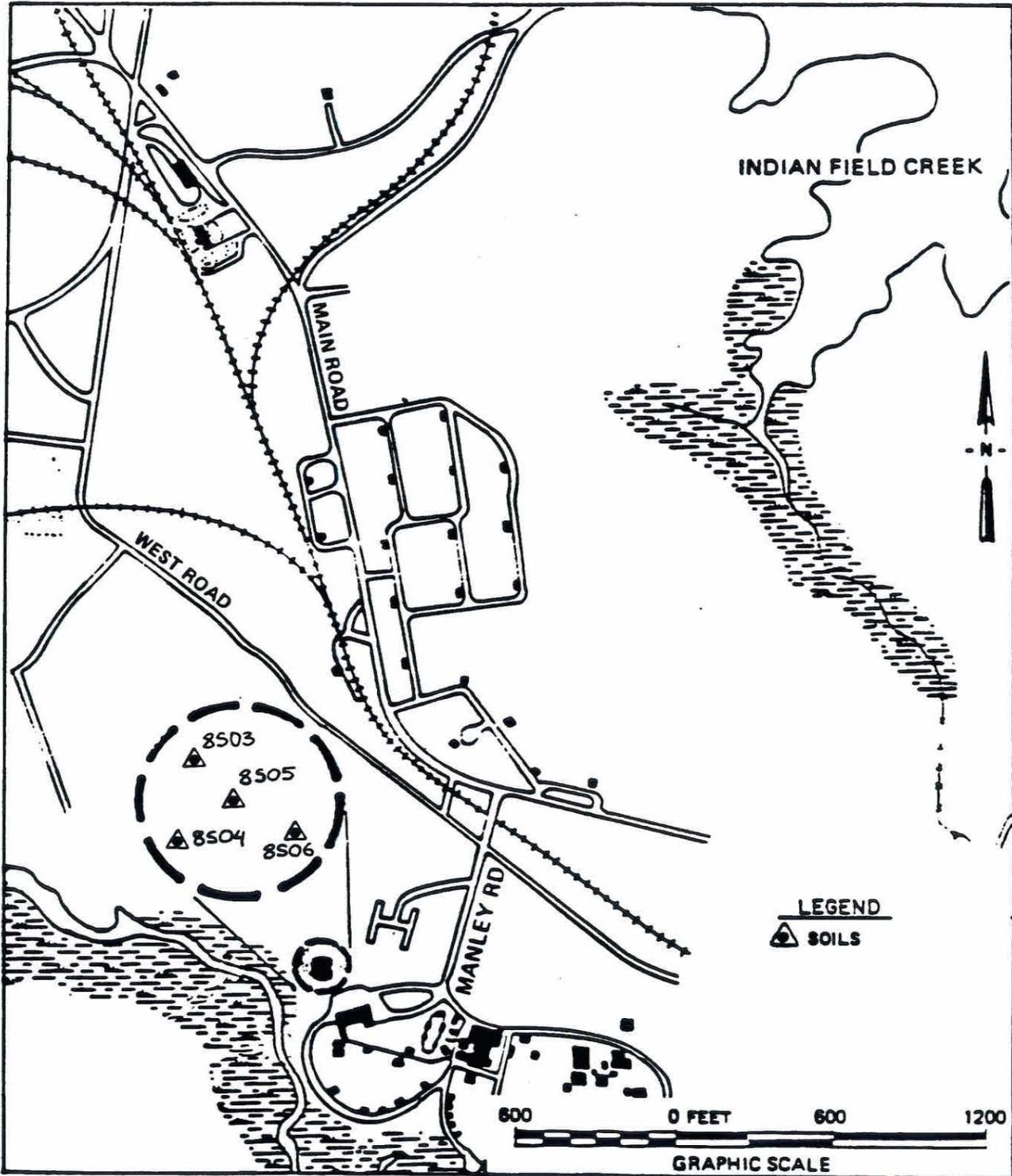
Site 17- Holm Road Landfill



Site 6-Explosive Contaminated Waste Water Impoundment Sampling Locations

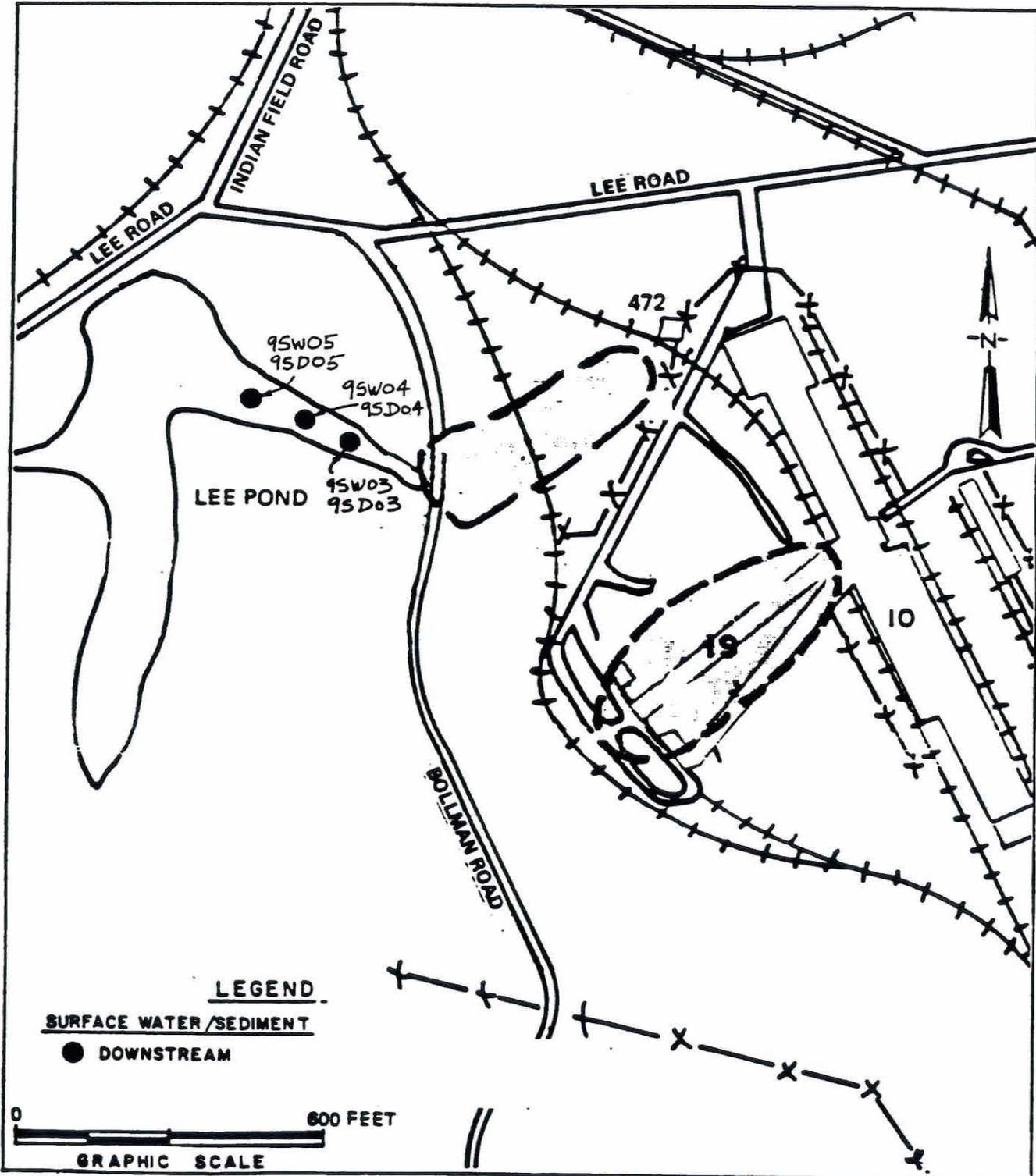


Site 8-NEDED Explosive Contaminated Waste Water Discharge Area Sampling Locations

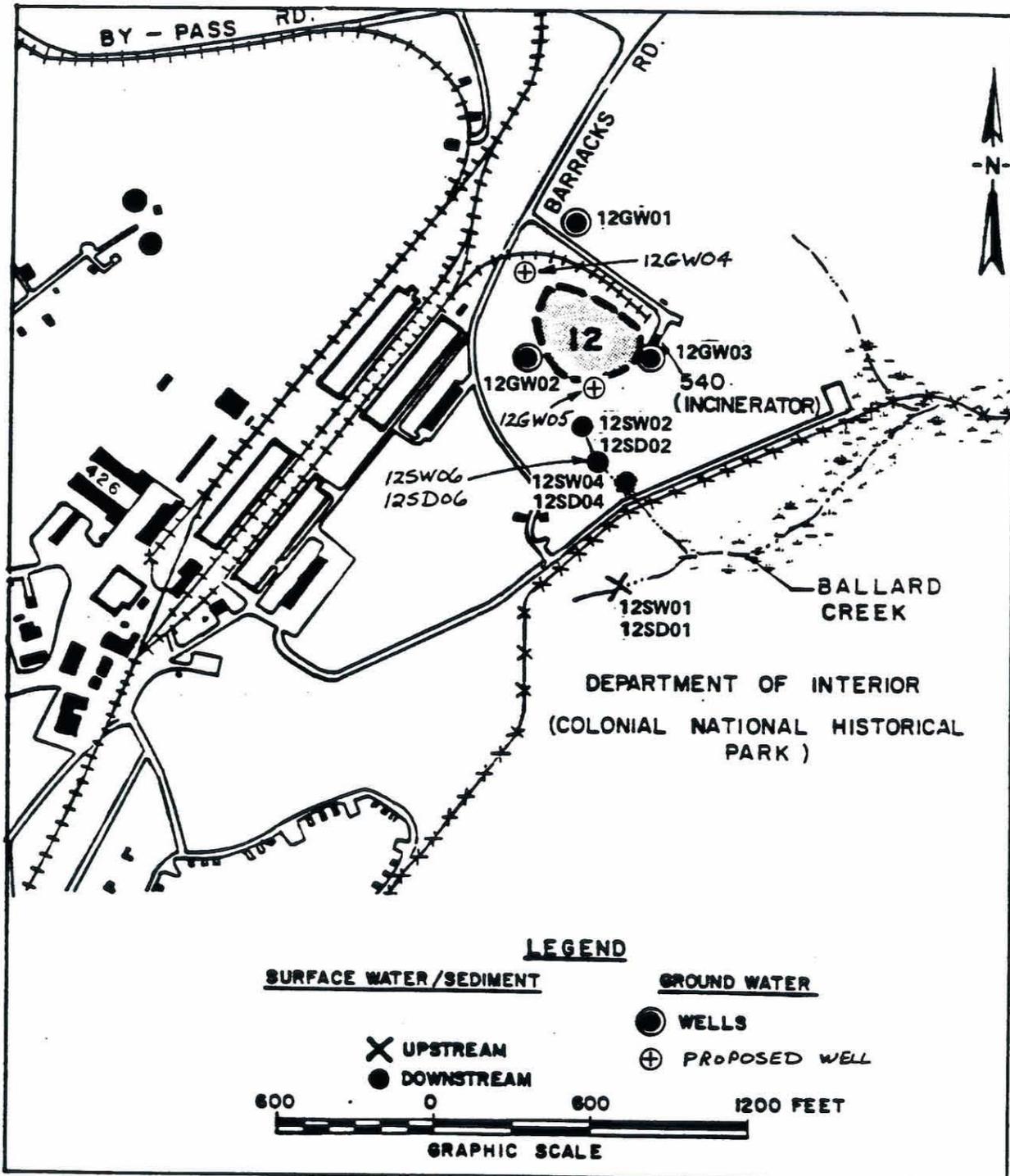


Site 9-Plant 1 Explosive Contaminated Waste Water Discharge Drainage Area

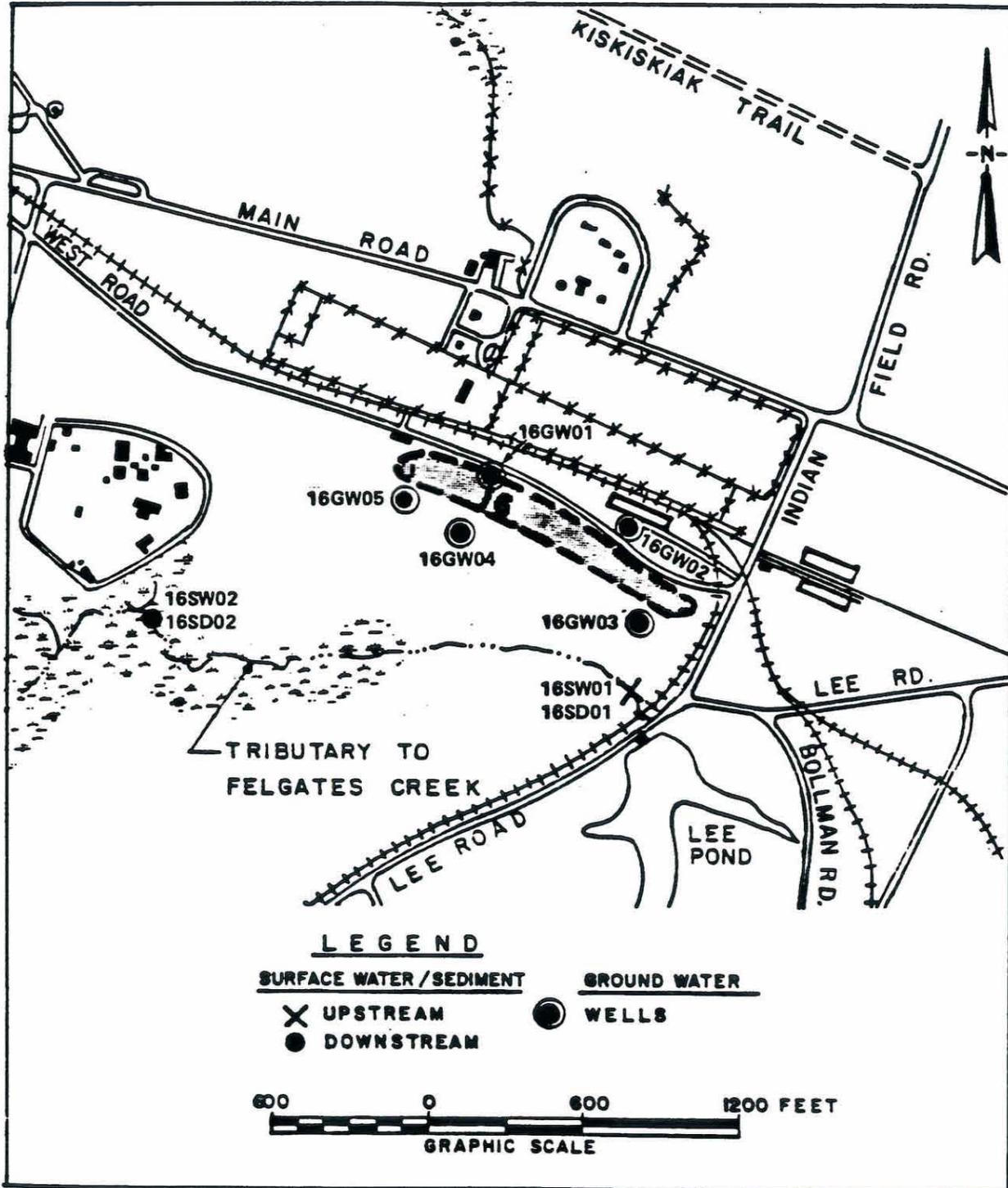
Site 19-Conveyor Belt Soils at Building 10 Sampling Locations



Site 12-Barracks Road Landfill Sampling Locations



Site 16-West Road Landfill Sampling Locations



Summary of Environmental Conditions at Sites Investigated
Naval Weapons Station, Yorktown, Virginia

Site No.	Site Name	Hydrogeologic Environment	Groundwater Flow Direction	Surface Water Receiving Body	Confirmed Site Contamination	Confirmed Offsite Migration	Potential for Offbase Migration	Distance Installation from Boundary (feet)
1	Dudley Road Landfill	windsor/Yorktown	Northeast	Indian Field Creek	X (a)	X (b)	M (c)	4,300
3	Group 16 Magazines Landfill	windsor/Yorktown	Northeast	Indian Field Creek	X	X	M	4,700 (d)
11	Abandoned Explosives Burning Pits	windsor/Yorktown	Northeast	Indian Field Creek	X	X	L	5,500
17	Holm Road Landfill	windsor/Yorktown	Northeast	Indian Field Creek	X	X	L	5,200
2	Turkey Road Landfill	windsor/Yorktown	North	Felgates Creek	X	X	L	8,800
4	Burning Pad Residue Landfill	windsor/Yorktown	Southwest	Felgates Creek	X	X	M	8,100
5	Surplus Transformer Storage Area	windsor/Yorktown			X	--	L	900
6	Explosives Contaminated Wastewater Impoundment	windsor/Yorktown	West-Northwest	Tributary to Felgates Creek	X	X	L	2,700
7	Plant 3 Explosives Contaminated Wastewater Discharge Area	windsor/Yorktown	Southwest	Felgates Creek	X	X	L	4,900
8	NEDED Explosives Contaminated Wastewater Discharge Area	windsor/Yorktown	Southwest	Felgates Creek	X	X	L	10,200
9	Plant 1 Explosives Contaminated Wastewater Discharge Drainage Area	windsor/Yorktown	West	Lee Pond	X	X	L	14,900
19	Conveyor Belt Soils at B10	windsor/Yorktown	Northwest	Lee Pond	X	--	L	15,500
12	Barracks Road Landfill	windsor/Yorktown	Southeast	Ballards Creek	X	X	L	1,100
16	West Road Landfill	windsor/Yorktown	South-Southwest	Tributary to Felgates Creek	X	X	L	12,400
18	Building 476 Discharges	windsor/Yorktown	North	Felgates Creek	--	--	L	20,200

(a) X = Contaminants detected in site media.

(b) "--" = not confirmed.

(c) M = medium; L = low.

(d) All distances are referenced to the installation boundary in the downgradient direction.

Summary of Proposed Recommendations
 Naval Weapons Station, Yorktown, Virginia

SITE NO. -----	SITE NAME -----	NO ACTION -----	PERFORM RISK ASSESSMENT -----	PERFORM RA AND COLLECT ADDITIONAL RI DATA -----
1, 3, 11, 17	DUDLEY ROAD LANDFILL, GROUP 16 MAG LANDFILL, ABANDONED EXPLOSIVES BURNING PITS, HOLM ROAD LANDFILL			X
2	TURKEY ROAD LANDFILL			X
4	BURNING PAD RESIDUE LANDFILL			X
5	SURPLUS TRANSFORMER STORAGE AREA	X		
6	EXPLOSIVE CONTAMINATED WASTEWATER IMPOUNDMENT			X
7	PLANT 3 EXPLOSIVE CONTAMINATED WASTEWATER DISCHARGE AREA			X
8	NEDED EXPLOSIVE CONTAMINATED WASTEWATER DISCHARGE AREA			X
9, 19	PLANT 1 EXPLOSIVE CONTAMINATED WASTEWATER DISCHARGE AREA, CONVEYOR BELT SOILS AT BLDG. 10			X
12	BARRACKS ROAD LANDFILL			X
16	WEST ROAD LANDFILL			X
18	BLDG. 476 DISCHARGES	X		