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NSY PORTSMOUTH
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MINUTES OF MEETING

SUBJECT: Technical Review Committee (TRC) Meeting
Portsmouth Naval Shipyard (PNS)
RCRA Facility Investigation/Corrective Measures Program

PURPOSE: The TRC meeting was called by the Navy to update the TRC members on Phase IV of field work.

LOCATION: Portsmouth Naval Shipyard
Kittery, Maine

DATE: February 5, 1992

PREPARED BY: Stephen J. Myers, Managing Principal
Project Director
McLaren/Hart Environmental Engineering Corporation
28 Madison Ave. Ext.
Albany, NY 12203
(518) 869-6192

February 7, 1992

ATTENDEES:

Community/Public Representatives

Chris Mitchell, Town of Kittery
Phil McCarthy, Town of Kittery
Maria Barth, Town of Kittery
Jeffrey Clifford, Town of Kittery
John Nelson, New Hampshire Fish and Game

USEPA Region I

Ernest Waterman, Project Manager

Maine DEP

Pamela Parker, Environmental Specialist

US Navy- PNS

Kenneth Plaisted, Head, Environmental Affairs Department
Jim Tayon, Environmental Engineer
CDR. Paul Chamberlin, PNS-Public Works Officer

Off-shore Program Representatives

Bob Johnston, NOSC
Heidi Hoven, University of New Hampshire

US Navy- Northern Division, Philadelphia

Linda Dietz, Remedial Project Manager
Jim Szykman, Technical Manager

McLaren/Hart Environmental Engineering Corporation

Stephen J. Myers, Project Director, Albany, NY
Stephen Urschel, Project Manager, Albany, NY
Robert Farrell, Sr. Assoc. Geoscientist, Albany, NY

BACKGROUND

The subject TRC meeting was held at Building 156 at the Portsmouth Naval Shipyard, Kittery, Maine to update committee members on the latest phase of field work performed in late 1991. Phase IV is the final major phase of field work performed prior to the issuance of the RCRA Facility Investigation (RFI) Report scheduled to meet the RCRA permit condition of July 1992. Minor field work is being performed presently as well as the wrap up of the air quality and off shore programs in anticipation of the completion of the RFI effort.

DISCUSSION

The meeting was opened by Linda Dietz followed by Jim Tayon introducing new members of the TRC. Each attendee introduced him/herself.

The subject Phase IV presentation was provided by Messrs. Urschel and Farrell of McLaren/Hart Environmental Engineering, consultants to the US Navy. All attendees were provided with a comprehensive handbook of Phase IV information that was presented. The meeting agenda was contained in the handbook.

Since the handbook provided the core information of the presentation, these minutes will not repeat the presented information but will supplement the handbook by representing comments and questions raised during discussions.

Introduction

Steve Urschel provided a brief introduction by summarizing the past three phases of field work. Steve indicated that the presentation of Phase IV work would be organized by solid waste management unit (SWMU) similar to past presentations. Steve stated that Rob Farrell would be discussing the water level monitoring and hydraulic conductivity programs performed during Phase IV.

JILF (Jamaica Island Landfill)

- Steve discussed past findings at the JILF and identified the data gaps that would be the subject of Phase IV efforts.

- Data gaps included subsurface conditions, bedrock conditions, groundwater/surface water interaction, surface soils and air data.

- Areas of investigation included the former gas station location and the child development center.

- Findings included:

  - Low concentrations of heavy metals in surface soils
  - Metals, volatiles, PCB's and semi-volatiles in subsurface soils
  - No drums discovered
  - Petroleum constituents noted in seep samples
  - Minor volatiles and heavy metals noted in groundwater
  - No major contamination or plume found
  - Found the lower mercury burial cells intact
  - Located USTs at former gas station location by GPR and magnetometry
  - Additional soil samples at child development center indicated low levels of contamination, however, not considered high enough to alter conclusions of interim risk assessment

- Bob Johnston asked the depth of surface samples and if any areas were covered with grass.

  Response- 0"-12" composites and some areas were grass covered.

- Bob Johnston asked for the identification of "TIC".

  Response- Tentatively identified compound.

- Pam Parker asked the present status of the USTs near the former gas station.

  Response- Jim Tayon indicated that the tanks are empty of product and abandoned in place. Whether the tanks are filled with sand is unknown. Linda Dietz indicated that the UST's would be handled under the Navy's abandoned tanks program. Ernest Waterman clarified that the tanks will be properly handled under a separate RCRA program governing tanks rather than the subject RCRA corrective action program for the identified SWMU's. Linda also indicated that the tanks were not under the building as previously thought.

- Pam Parker asked if the petroleum seen in the seeps could be coming from the former waste oil tanks (SWMU #11).

  Response- The possibility existed, however, no visual evidence existed and the source has not been quantified. Circumstantial evidence indicates a pathway from the landfill.

- Pam Parker asked if Appendix IX compounds were run on wells JW-16 and -16B.

  Response- No, TCL and TAL compounds run.

- Ernest Waterman asked what metals were found in the surface samples from the JILF. Beryllium?

  Response- Similar to those found in subsurface. Yes, beryllium was found.

- Ernest then asked if this could be indicative of disposal of sand blast grit and paint chips with additives.

  Response- Jim Tayon indicated he had no idea. Bob Johnston indicated that beryllium is a common compound found almost everywhere.

- Pam Parker asked if the soil gas survey done in the area of the former gas station identified the source as the USTs.

  Response- No real relationship found. We believe the source of the BTEX is the contaminated soil in the area.

DRMO (scrap yard)

- Steve discussed findings of the previous phases of work at the DRMO and the data gaps that would be the subject of Phase IV.

- Data gaps included surface soil data within the DRMO, subsurface samples near quarters S and N and an investigation of a fill area at the eastern edge of the DRMO.

- Findings included:

  - Heavy metals, PCB's, semi-volatiles and PCB's found in surface soils
  - Heavy metals found in soil near quarters S and N decreasing with depth
  - Similar compounds found at eastern fill area as rest of DRMO
  - Groundwater found to contain heavy metals, PCB's, pesticides and some petroleum constituents

- Pam Parker asked if air sampling was conducted at the DRMO.

  Response- Yes, eleven day survey, will be in air quality report that will be issued next week.

- Ernest Waterman asked what metals were found at the DRMO.

  Response- As expected, such metals as lead, cadmium, zinc and copper.

Groundwater Flow Characteristics

- Rob Farrell gave a presentation on the methodology employed and the findings of the water level monitoring and hydraulic conductivity programs. The programs were conducted at the JILF and the DRMO. The purpose of the programs was to determine the impact of the tides on groundwater elevation in the individual wells and the groundwater flow direction and velocities across the JILF and the DRMO.

JILF

- At the JILF 24 monitoring wells were studied over 3 days. Hydrographs were generated for each well. Three wells went dry at low tide during the test.

- John Nelson asked what the depths were of surrounding wells in relationship to those that went dry.

  Response- The exact depths were not readily available, however they were probably deeper. The designation of S- shallow overburden, D- deep overburden and B- bedrock was noted for all attendees.

- Rob described the tidal influence in various wells referring to the hydrographs in the handbook. Some were influenced by the tides and some were not. The clay barrier on the landfill did act to reduce tidal influence inside the landfill.

- Hydraulic conductivity estimates at the JILF conclude that the overburden is fairly permeable while the bedrock is less permeable.

- 72 hour average groundwater elevations corrected to remove tidal influence show the highest elevation on Jamaica Island (JW-3). A relatively high elevation was also noted at JW-7. Additional information is needed inside the landfill. Additional wells to be installed.

- Chris Mitchell asked if the overburden wells were screened across first water.

  Response- yes and they confirmed the permeability of the overburden. Slot size- 10 slot.

DRMO

- At the DRMO 14 wells were studied. No specific tide data was gathered due to facility difficulties.

- Chris Mitchell asked if regional tide data could be used and adjusted.

  Response- Yes, we will look into it. John Nelson stated that UNH may have usable data.

- Rob indicated that as expected all wells at the DRMO were influenced by the tides.

- Bob Johnston asked if there was wind influence.

  Response- Unsure at this point. Once the air quality study is complete more information will be available.

- Average groundwater flow is south toward the river.

- Hydraulic conductivity estimates conclude that at the DRMO the overburden is permeable with the bedrock less permeable. Results are similar to the JILF.

Fuel Oil Pipeline

- Steve discussed previous work at the fuel oil pipeline area and data gaps that would be the subject of Phase IV.

- Data gaps included the source and extent of the contamination and the impact on groundwater.

- Additional wells were installed, outfalls sampled, and soils sampled in the tank farm area.

- Phase IV indicates petroleum contaminants in soils in tank farm area, however, contamination at berth #6 not considered to have come from the tank farm area.

Freshwater Ponds

- Sediment samples from the ponds were taken to determine if contaminants were finding their way into the ponds.

- Heavy metals were found in the pond sediments along with the minor presence of petroleum contaminants.

Tank-Related SWMU's

- Steve discussed previous work performed at these SWMU's and data gaps to be the subject of Phase IV.

- Data gaps included subsurface sampling from the battery acid tank and SWMU's 13, 16, 21, and 23 not previously addressed.

- Soil borings in the area of the battery acid tank indicated the presence of semi-volatiles, heavy metals and fill material.

- Ken Plaisted asked if lead was found.

  Response- Yes. Ken indicated that would be expected because they were lead-acid batteries.

- Sampling of tank contents indicated all non-hazardous except SWMU 23 (Cd). SWMU 21 had a structural failure. All tanks (SWMU 13,16,21,23) removed.

- Pam Parker asked for the meaning of "visual evidence".

  Response- There was an oily appearance and the presence of semi-volatiles at SWMU 21.

Background Sampling

- Steve discussed the rationale for background sampling with samples taken from "native" areas and "fill" areas. In addition, background salt and fresh water samples were taken.

- In the soil samples detectable levels of volatiles, semi-volatiles, PCB's and metals found along with a suggested presence of petroleum.

- In the fresh groundwater sample only suggested presence of petroleum. In the river salt water sample no concentrations of concern.

- John Nelson began a discussion of the definition of "background" and the difficulty of finding true "background", i.e. untouched areas. Steve explained that the meaning of background in the context of RCRA Corrective Action is a comparative point within an industrial setting that has not been affected by the SWMU/release being evaluated. Ernest Waterman concurred that the points chosen are not considered a remote untouched location but are "realistically background" that are free from the affects of the areas being investigated. Therefore, they form the basis of more realistic cleanup levels.

  John Nelson indicated that its important that this use of background be defined for the public.

  Phil McCarthy concurred that it is imperative that the public be made aware of how the term background is used in context so that they don't assume the "natural background".

  Pam Parker suggested the term "facility background" be used.

Additional Work Required

- Steve described the additional work to be performed prior to the issuance of the RFI Report and the initiation of the next phase of work, the Corrective Measures Study.

General Comment and Question Period

- John Nelson indicated that it appears that a lot of headway has been made and asked if there is enough information to determine groundwater flow at the JILF.

Response- Steve indicated that some additional information is needed and that two more wells are being installed in coming weeks. Findings to date do not indicate the presence of a plume that can be defined and tracked. Concentrations are relatively low, so some "net flow " path will probably be developed.

- John Nelson asked if the tides are directly contributing to removal of material over time.

  Response- Ernest indicated that the off-shore program should shed more light on this issue. John indicated that it is important for the public to understand groundwater movement.

- Commander Chamberlin indicated that the "clean fill sample locations" can be defined as to when the fill was placed to better define the situation for the public. He asked if petroleum contamination off berth #6 correlated with previous dredging.

  Response- Steve indicated that samples were not directly off the berth since there was no sediment at these locations due to scouring. Samples were 100-150 feet from shore.

- Linda Dietz closed the meeting thanking all attendees for attending the meeting. Linda tentatively scheduled a site visit/refresher meeting for new members on March 11, 1992 at 10:30 AM and the next regular TRC meeting on April 7, 1992 at 1:30 PM at the Portsmouth Naval Shipyard to discuss the air quality study.

ADMINISTRATIVE
RECORD

TECHNICAL REVIEW COMMITTEE MEETING FEBRUARY 5, 1992

ENVIRONMENTAL AFFAIRS

PORTSMOUTH NAVAL SHIPYARD

AGENDA FOR TRC MEETING

- REVIEW OF PREVIOUS PHASES

- PHASE IV - SCOPE OF WORK BY SWMU

  1. JILF, MERCURY BURIAL, CHILD DEVELOPMENT CENTER

  2. DRMO

  3. FUEL OIL PIPELINE, TANK FARM, FRESH WATER PONDS

  4. TANK RELATED SWMUs

  5. BACKGROUND SAMPLING LOCATIONS

- DATA GAPS IDENTIFIED/ADDITIONAL WORK REQUIRED

- POTENTIAL CORRECTIVE MEASURES

TRC MEETING SLIDES

Slide

1. INTRODUCTION
2. SITE MAP
3. JILF & MERCURY BURIAL FINDINGS
4. JILF & MERCURY BURIAL DATA GAPS
5. JILF SURFACE SOIL SAMPLE MAP
6. JILF MONITORING WELL MAP
7. JILF CROSS-SECTION LOCATIONS
8. JILF CROSS-SECTION E-E'
9. JILF SOIL RESULTS MAP
10. JILF SEISMIC LINE & EXCAVATION MAP
11. GAS STATION SOIL GAS SURVEY
12. GPR COVERAGE MAP
13. MAGNETIC ANOMALY MAP
14. CDC SURFACE SOIL SAMPLING LOCATIONS
15. JILF, MERCURY BURIAL AND CDC PHASE IV FINDINGS

16. DRMO PREVIOUS FINDINGS
17. DRMO DATA GAPS
18. DRMO SURFACE SOIL LOCATIONS
19. DRMO SURFACE SOIL RESULTS
20. QUARTERS "S" AND "N" SAMPLING LOCATIONS
21. DRMO PHASE IV MONITORING WELLS
22. DRMO CROSS-SECTION LOCATION MAP
23. DRMO CROSS-SECTION A-A'
24. DRMO PHASE IV FINDINGS

TRC MEETING SLIDES
(CONTINUED)

Slide

25. JILF DATALOGGER/TRANSDUCER LAYOUT
26. JW-13 HYDROGRAPH
27. JW-14 HYDROGRAPH
28. JW-5 HYDROGRAPH
29. JW-9 HYDROGRAPH
30. MW-4 HYDROGRAPH
31. JILF AVERAGE GROUNDWATER ELEVATIONS
32. JW-7 SLUG TEST RECOVERY CURVES
33. JW-7B SLUG TEST RECOVERY CURVES
34. JW-12B SLUG TEST RECOVERY CURVES
35. JILF HYDRAULIC CONDUCTIVITY ESTIMATES

36. DRMO DATALOGGER/TRANSDUCER LAYOUT
37. DW-7 HYDROGRAPH
38. DW-8 HYDROGRAPH
39. DW-4 HYDROGRAPH
40. DRMO AVERAGE GROUNDWATER ELEVATIONS
41. DW-7B SLUG TEST RECOVERY CURVES
42. DW-9 SLUG TEST RECOVERY CURVES
43. DRMO HYDRAULIC CONDUCTIVITYESTIMATES

TRC MEETING SLIDES
(CONTINUED)

Slide

44. FUEL OIL PIPELINE PREVIOUS FINDINGS
45. FUEL OIL PIPELINE DATA GAPS
46. FUEL OIL MONITORING WELL LOCATION MAP
47. TANK FARM SOIL SAMPLING LOCATIONS
48. FRESH WATER POND SEDIMENT SAMPLING
49. FUEL OIL, TANK FARM, POND FINDINGS

50. PREVIOUS WORK REGARDING TANK SWMUs
51. TANK DATA GAPS
52. BATTERY ACID TANK BORING LOCATION MAP
53. BATTERY ACID TANK FINDINGS
54. OTHER TANK RELATED SWMU FINDINGS

55. PURPOSE OF BACKGROUND SAMPLES
56. BACKGROUND SAMPLING LOCATIONS
57. BACKGROUND SAMPLE FINDINGS
58. ADDITIONAL DATA NEEDS

ACRONYMS/ABBREVIATIONS

As	Arsenic	Alloying Additive for Metals, Especially Lead and Copper (Battery Grids, Cable Sheaths, Boiler Tubes; Paint Pigments; Herbicides; and Rodenticide; Wood Preservative)
Be	Beryllium	Moderator and Reflector in Nuclear Reactors; in Gyroscopes, Computer Parts, Inertial Guidance Systems; Spot-welding Electrodes
Cr	Chromium	Constituent of Inorganic Paint Pigments; Stainless Steel; Alloying and Plating Element on Metal
Pb	Lead	Storage Batteries, Tetraethyl Lead (Gasoline Additive); Radiation Shielding Corrosion Inhibiting Pigments
Hg	Mercury	Anti-fouling Paints; Thermometers; Barometers; Mercury Vapor Lamps
TCE	Trichloro-ethylene	Metal Degreaser; Dry Cleaning; Dilutent in Paints; Cleaning and Drying of Electronic Parts
TPH	Total Petroleum Hydrocarbons	The Sum of All Hydrocarbons That Are Derived From Petroleum Products
Aromatic	Hydrocarbons	A Major Group of Compounds Containing One or More Benzene Rings in Them. The Name is Due to the Strong and Not Unpleasant Odor Characteristic of These Compounds

ACRONYMS/ABBREVIATIONS (CONTINUED)

Heavy Metals		A Metal of Atomic Weight Greater Than Sodium (22.9) That Forms Soaps on Reaction With Fatty Acids (e.g., Chromium, Cadmium, Lead)
PCE (Perc)	Tetrachloro-ethylene (Perchloro-ethylene)	Dry Cleaning Solvent; Vapor Degreasing Solvent
MEK	Methyl Ethyl Ketone (2-Butanone)	Solvent in Nitrocellulose and Vinyl Coatings; Paint Removers and Thinners
Methylene Chloride	(Dichloro-methane)	Paint Removers; Solvent Degreasing; Propellant for Aerosol Sprays; Laboratory Extraction Solvent
Toluene		Solvent for Paints; Component of Gasoline (higher Levels in Super Grades of Unleaded Gas)
BTEX	Benzene-Toluene-Ethyl Benzene-Xylene	Major Aromatic Constituents of Gasoline
VOCs	Volatile Organic Compounds	Class of Compounds Which Tend to Easily (i.e., at Ambient Temperatures) Go Into the Vapor State

ACRONYMS/ABBREVIATIONS (CONTINUED)

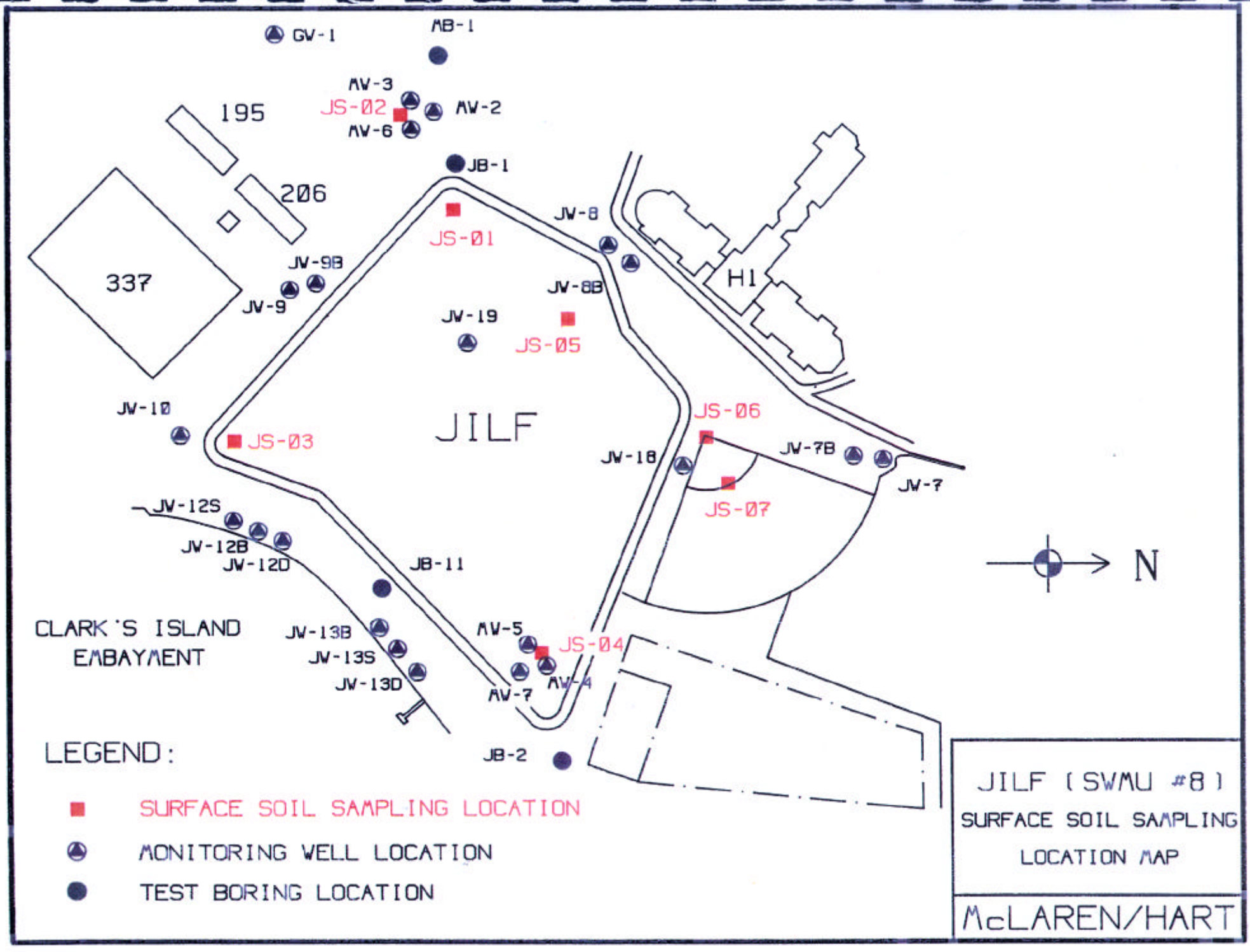
H	Equilibrium Water Level	
H_o	Perturbed Water Level At Time $t = o$	
H_t	Water Level At Time t	
T_o	Basic Time Lag	Time Required To Reduce The Head Difference To 37% Of Its Original Value

JAMAICA ISLAND LANDFILL
FINDINGS OF PREVIOUS PHASES

- WIDESPREAD SUBSURFACE SOIL AND GROUNDWATER CONTAMINATION
- CONTAMINANT CONCENTRATIONS OFTEN EXCEEDED BUT WERE GENERALLY LOW COMPARED TO NPDWR AND NEW JERSEY ECRA GUIDANCE VALUES
- PRIMARILY HEAVY METALS; SECONDARILY PETROLEUM, PESTICIDES, SOLVENTS
- COMPLEX GROUNDWATER FLOW PATTERNS ANTICIPATED

JAMAICA ISLAND LANDFILL
DATA GAPS

- SUBSURFACE CONDITIONS WITHIN LANDFILL LARGELY UNEVALUATED
- GROUNDWATER/SURFACE WATER INTERACTION, GROUNDWATER FLOW AND AQUIFER CHARACTERISTICS UNTESTED
- EVALUATION OF BEDROCK AQUIFER NOT COMPLETE
- SURFACE SOIL AT JILF AND CHILD DEVELOPMENT CENTER (CDC) NOT FULLY CHARACTERIZED
- AIR PATHWAY NOT EVALUATED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MW-2
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JS-03
JILF
JS-06
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JS-07
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CLARK'S ISLAND
EMBAYMENT
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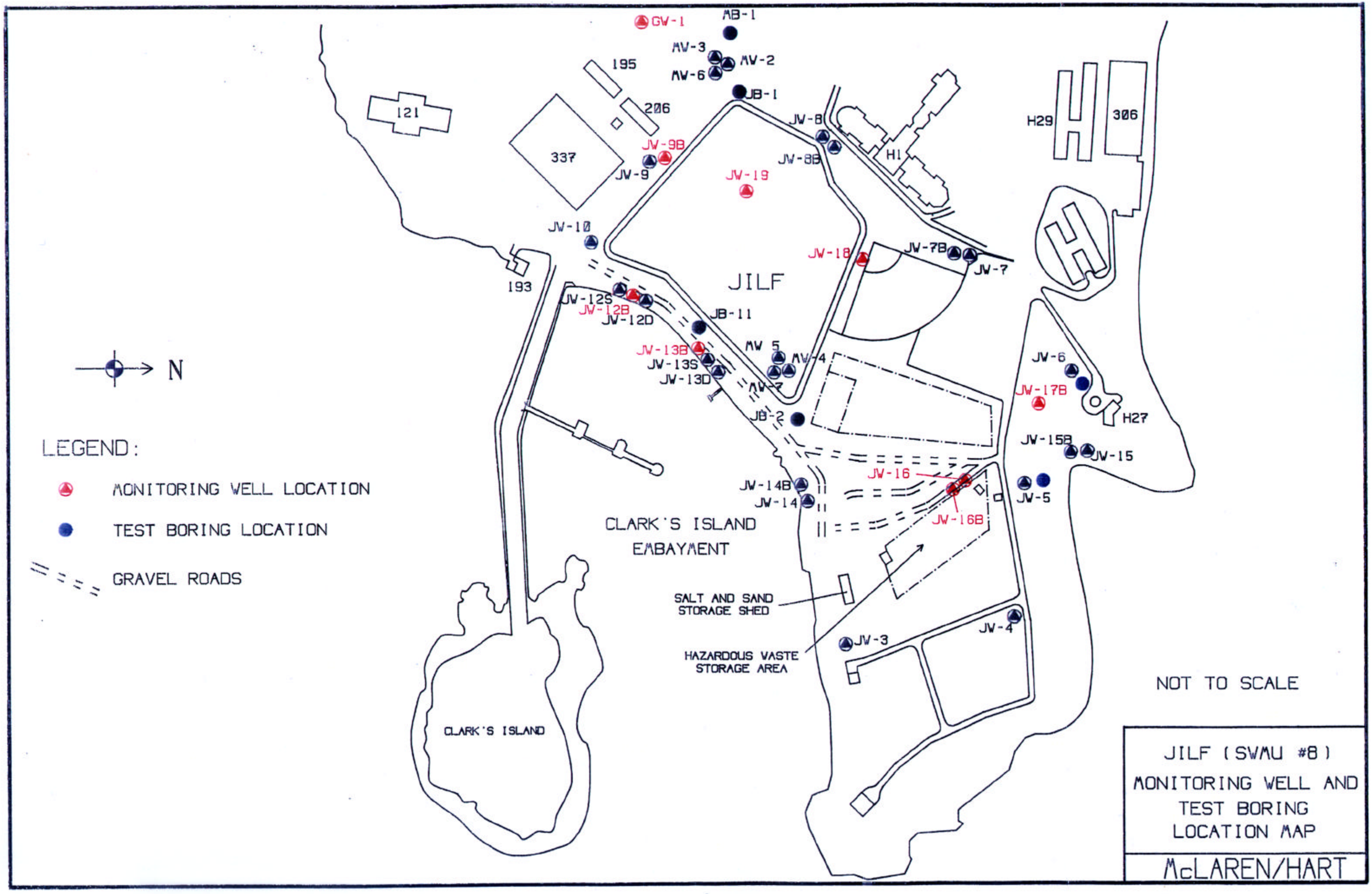
JB-2
LEGEND:
SURFACE SOIL SAMPLING LOCATION
MONITORING WELL LOCATION
TEST BORING LOCATION
JILF (SWMU #8)
SURFACE SOIL SAMPLING
LOCATION MAP
McLAREN/HART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CLARK'S ISLAND
EMBAYMENT
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CLARK'S ISLAND
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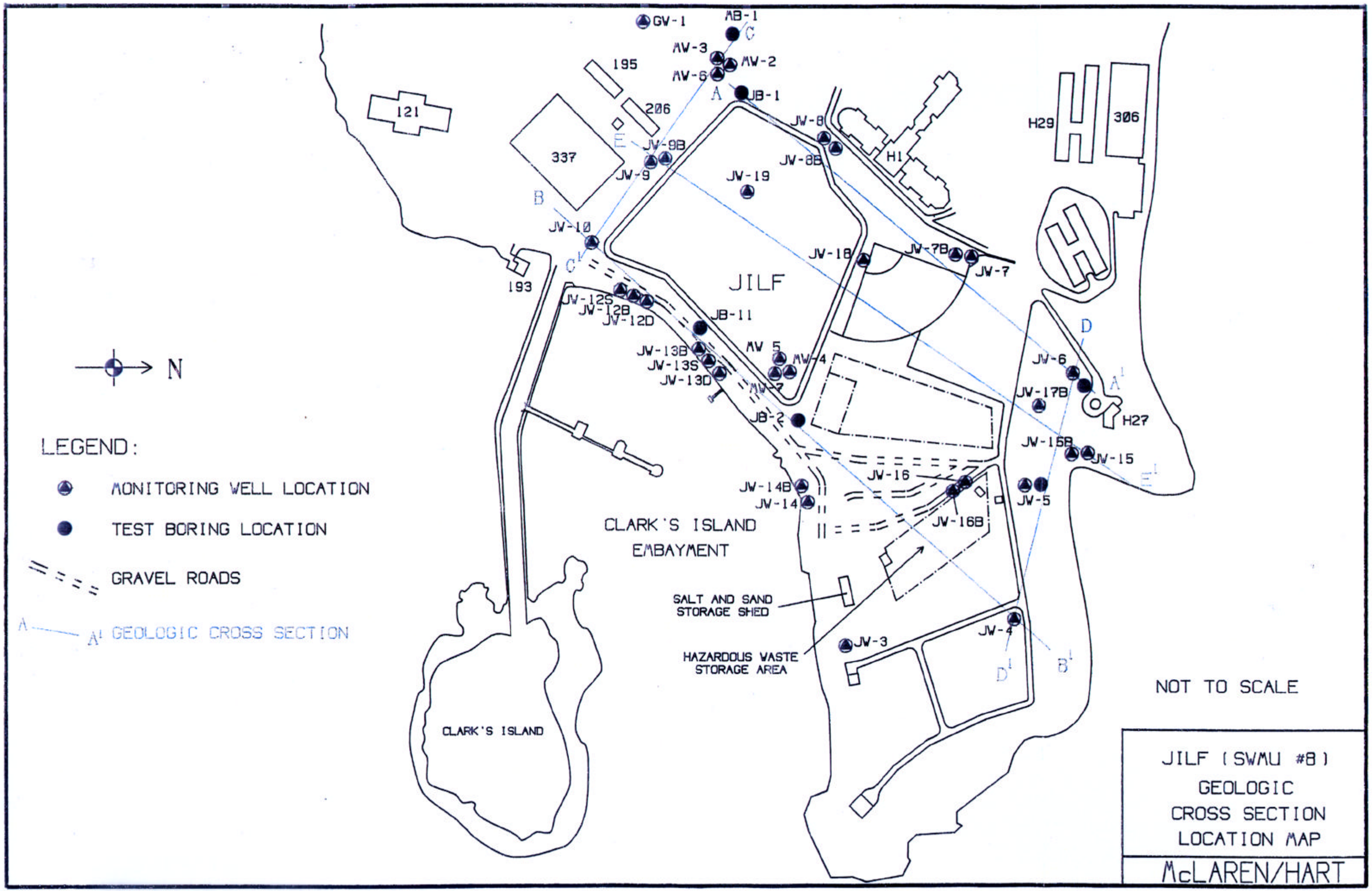
LEGEND:
MONITORING WELL LOCATION
TEST BORING LOCATION
GRAVEL ROADS
NOT TO SCALE
JILF (SWMU #8)
MONITORING WELL AND
TEST BORING
LOCATION MAP
McLAREN/HART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LEGEND:
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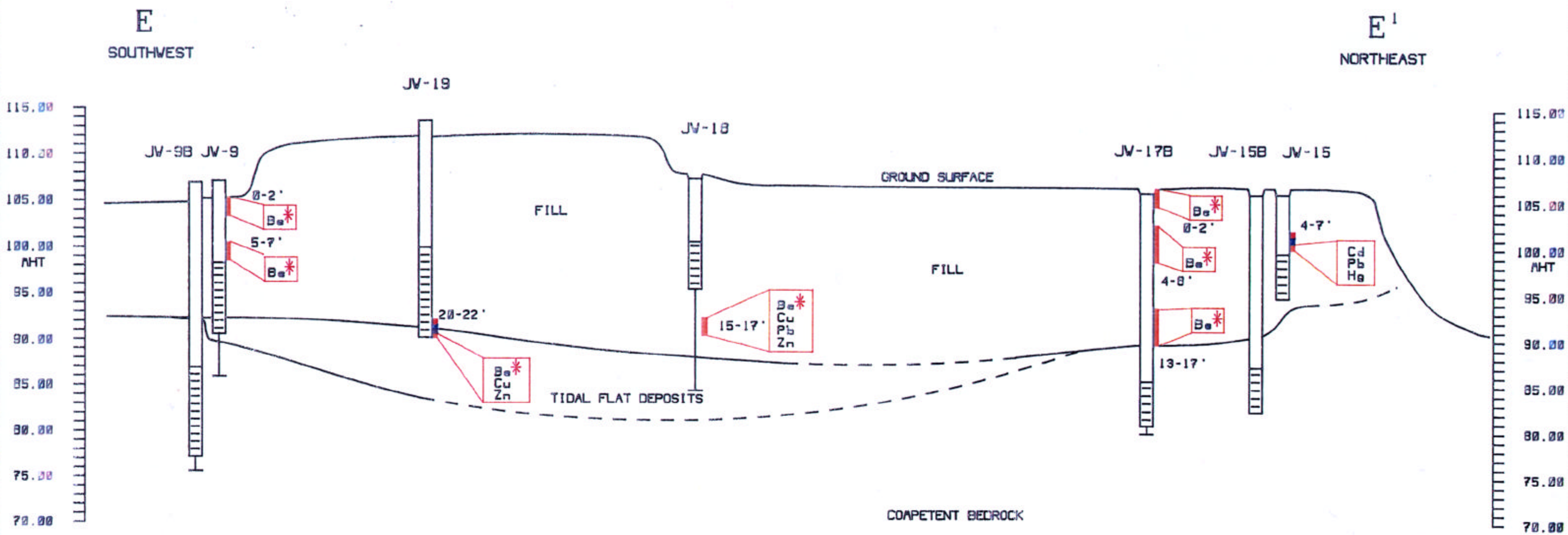
TEST BORING LOCATION
GRAVEL ROADS
A A' GEOLOGIC CROSS SECTION
NOT TO SCALE
JILF (SWMU #8)
GEOLOGIC
CROSS SECTION
LOCATION MAP
McLAREN/HART



LEGEND:

PHASE I, III AND IV SOIL SAMPLE INTERVALS WITH RESULT CONCENTRATIONS EXCEEDING NEW JERSEY ECRA OR PROPOSED FEDERAL ACTION LEVELS

- RED - VOLATILES
- BLUE - SEMI-VOLATILES
- PURPLE - PCBs
- ORANGE - METALS

* CONCENTRATION EXCEEDS PROPOSED FEDERAL ACTION LEVELS ONLY

SCREENED INTERVAL

DEPTH OF BORING

5 0 50

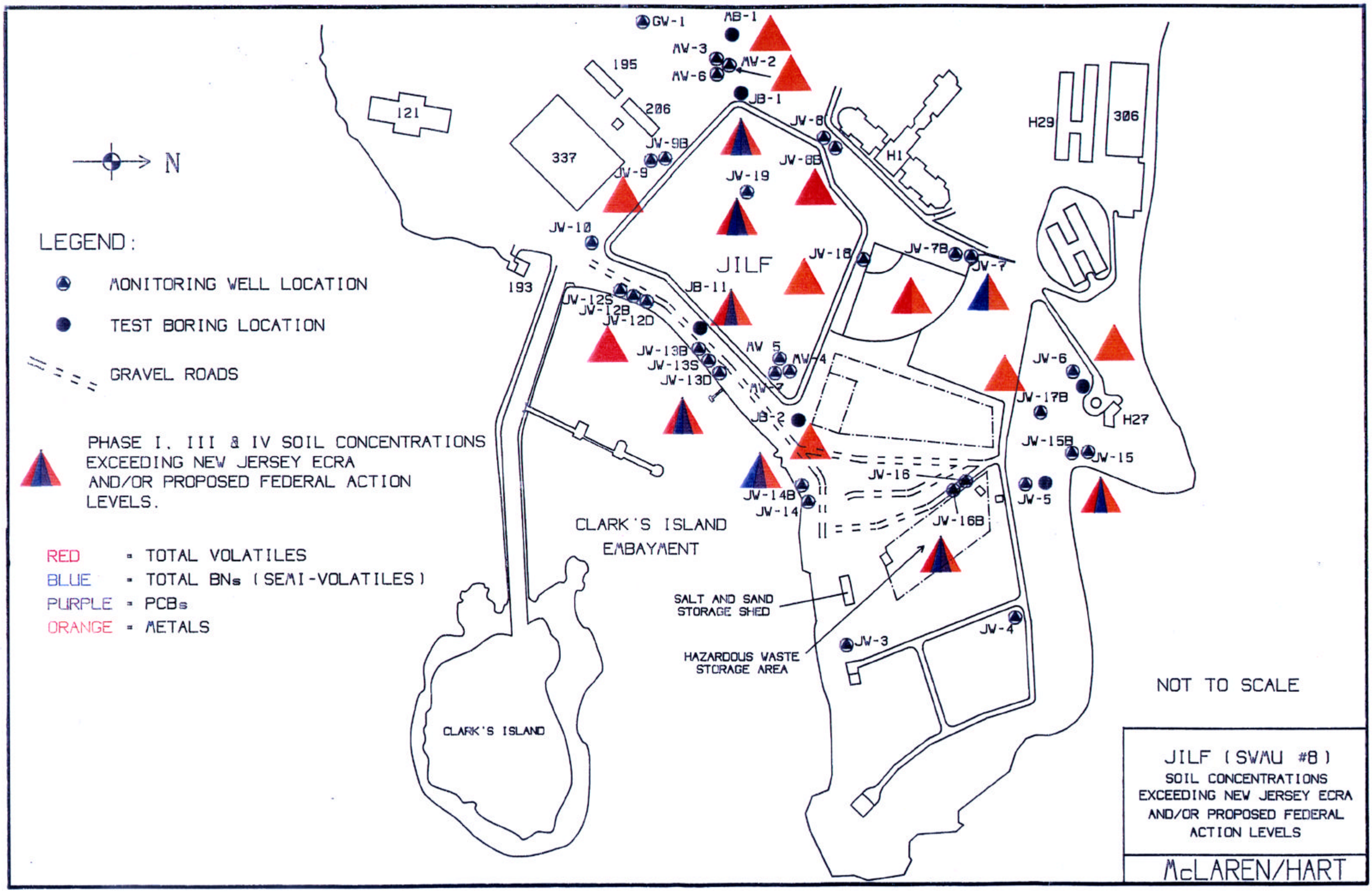
SCALE IN FEET

VERTICAL EXAGGERATION - 10x

NOTE: ELEVATION 100.00' MEAN HIGH TIDE, PORTSMOUTH NAVAL SHIPYARD SYSTEM IS EQUAL TO 3.804' USGS SYSTEM

JILF (SWMU #8)
GEOLOGIC CROSS SECTION E-E'

McLAREN/HART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LEGEND:
MONITORING WELL LOCATION
TEST BORING LOCATION
GRAVEL ROADS
PHASE I, III & IV SOIL CONCENTRATIONS EXCEEDING NEW JERSEY ECRA AND/OR PROPOSED FEDERAL ACTION LEVELS.
RED = TOTAL VOLATILES
BLUE = TOTAL BNs (SEMI-VOLATILES)
PURPLE = PCBs
ORANGE = METALS
GW-1
MB-1
MW-3
MW-2
MW-6
JB-1
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121
337
JW-9B
JW-9
JW-8
JW-8B
H1
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JILF
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JW-13S
JW-13D
MW 5
MW-4
MW-7
JB-2
JW-6
JW-17B
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JW-15
JW-16
JW-14B
JW-14
JW-5
JW-16B
CLARK'S ISLAND EMBAYMENT
SALT AND SAND STORAGE SHED
HAZARDOUS WASTE STORAGE AREA
JW-3
JW-4
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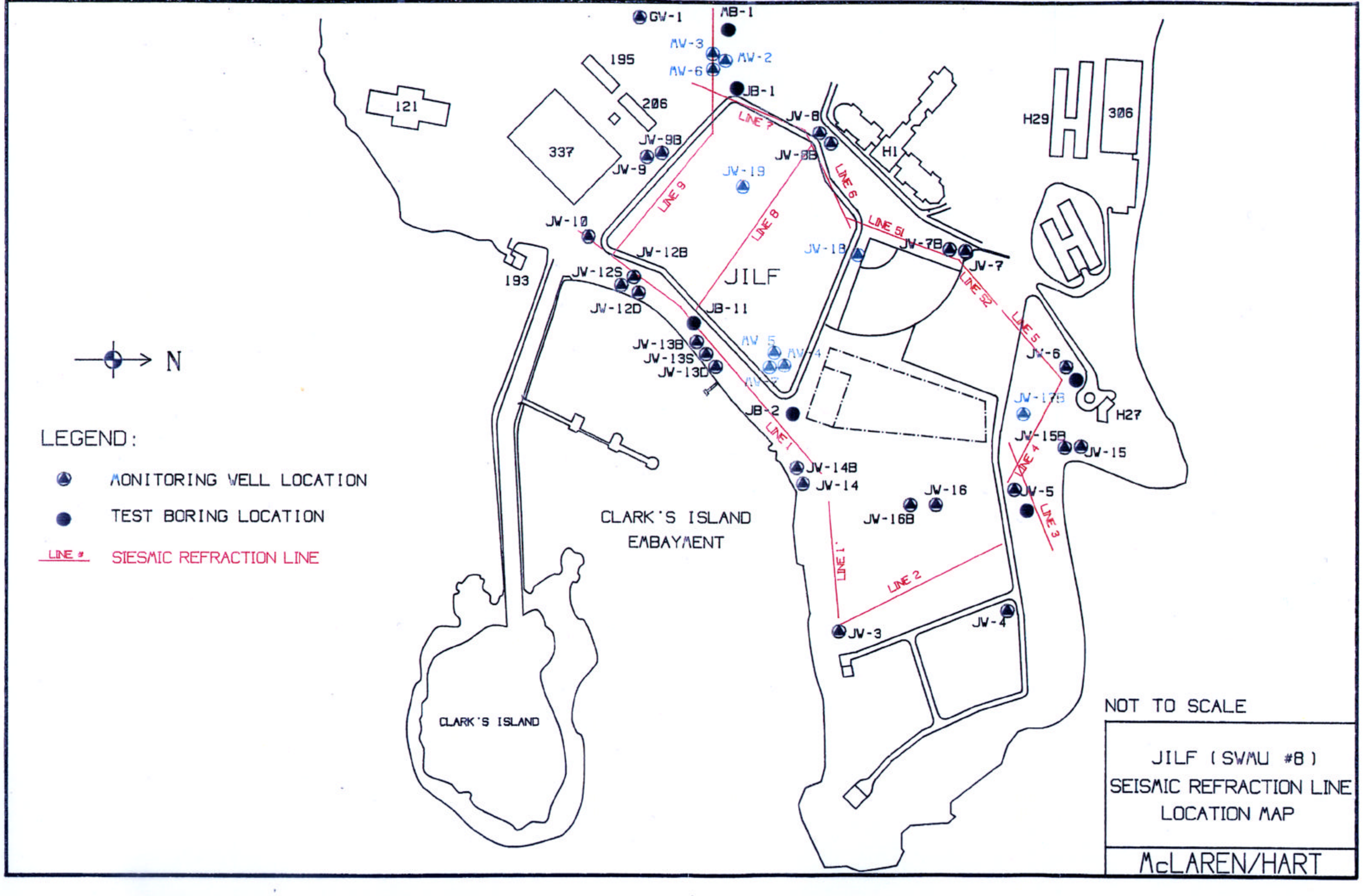
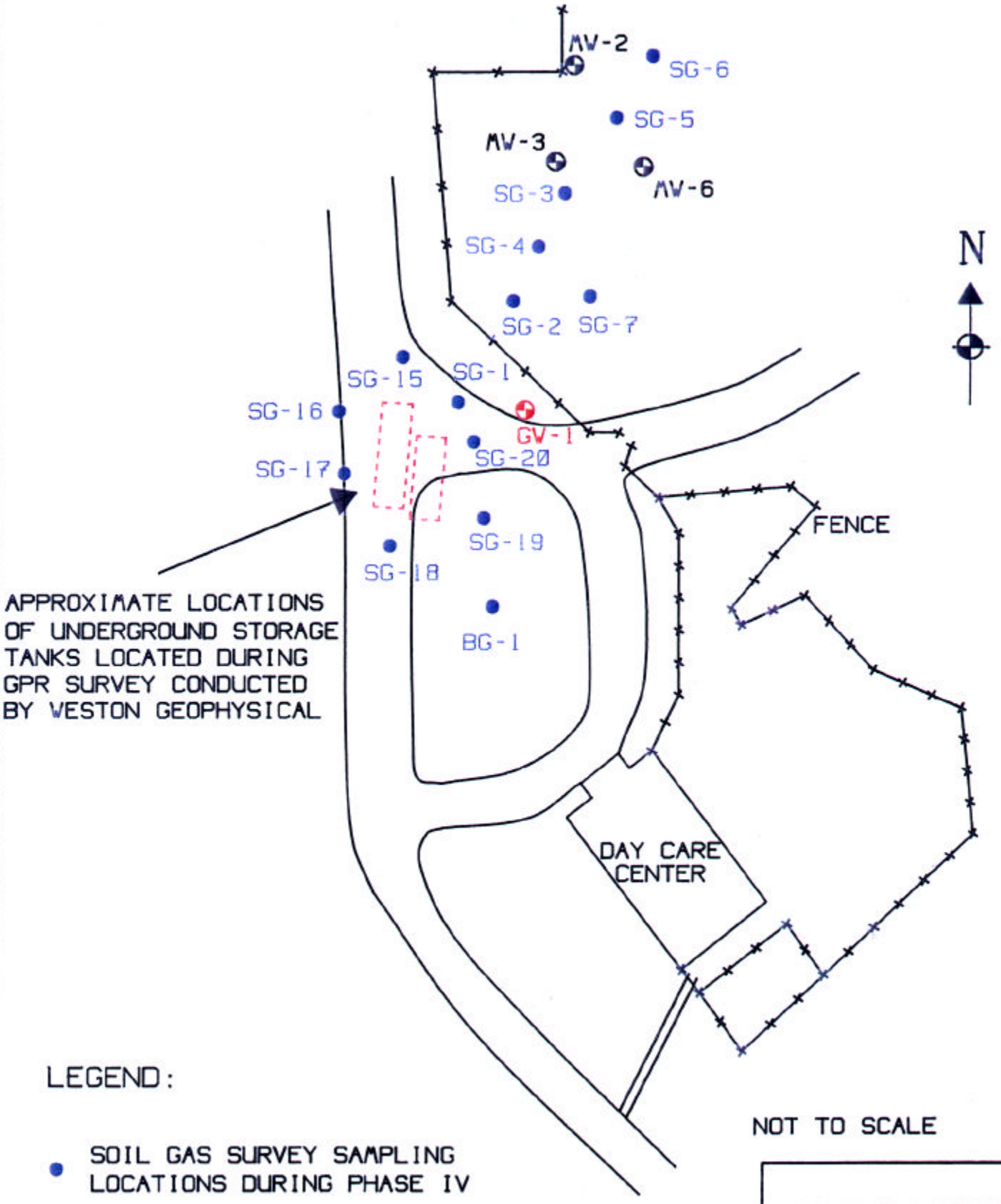
NOT TO SCALE
JILF (SWMU #8)
SOIL CONCENTRATIONS EXCEEDING NEW JERSEY ECRA AND/OR PROPOSED FEDERAL ACTION LEVELS
McLAREN/HART



NOT TO SCALE

JILF (SWMU #8)
SEISMIC REFRACTION LINE
LOCATION MAP

McLAREN/HART



LEGEND:

- SOIL GAS SURVEY SAMPLING LOCATIONS DURING PHASE IV
- GROUNDWATER MONITORING WELL LOCATIONS

FORMER GAS STATION
SOIL GAS SURVEY
SAMPLING LOCATIONS

McLAREN/HART

EXPLANATION

- Fill location
- GPR survey line location
- Point target indicative of utility or other point target and approximate depth in feet
- Inferred utility location
- Anomaly indicative of concrete or other reflective horizon
- Possible excavation
- Anomaly indicative of underground tank
- Approximate tank location and depth

0 20 50

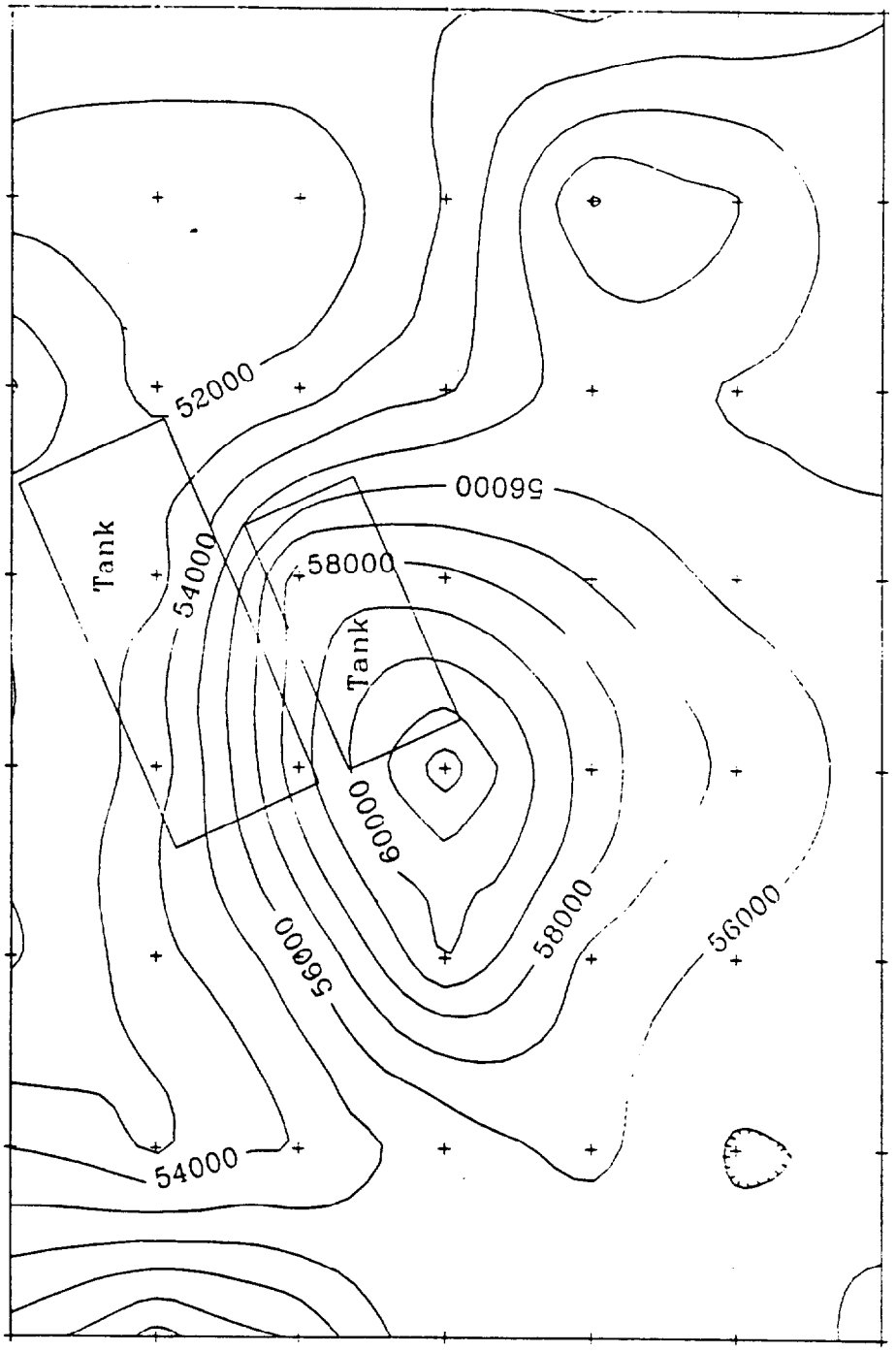
Scale in Feet

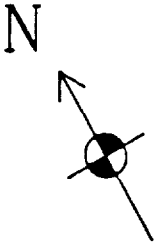
FROM: Weston Geophysical GPR Survey prepared for McLaren/Hart 8/6/91

FORMER GAS STATION

GPR COVERAGE AND ANOMALY MAP

McLAREN/HART





LEGEND:

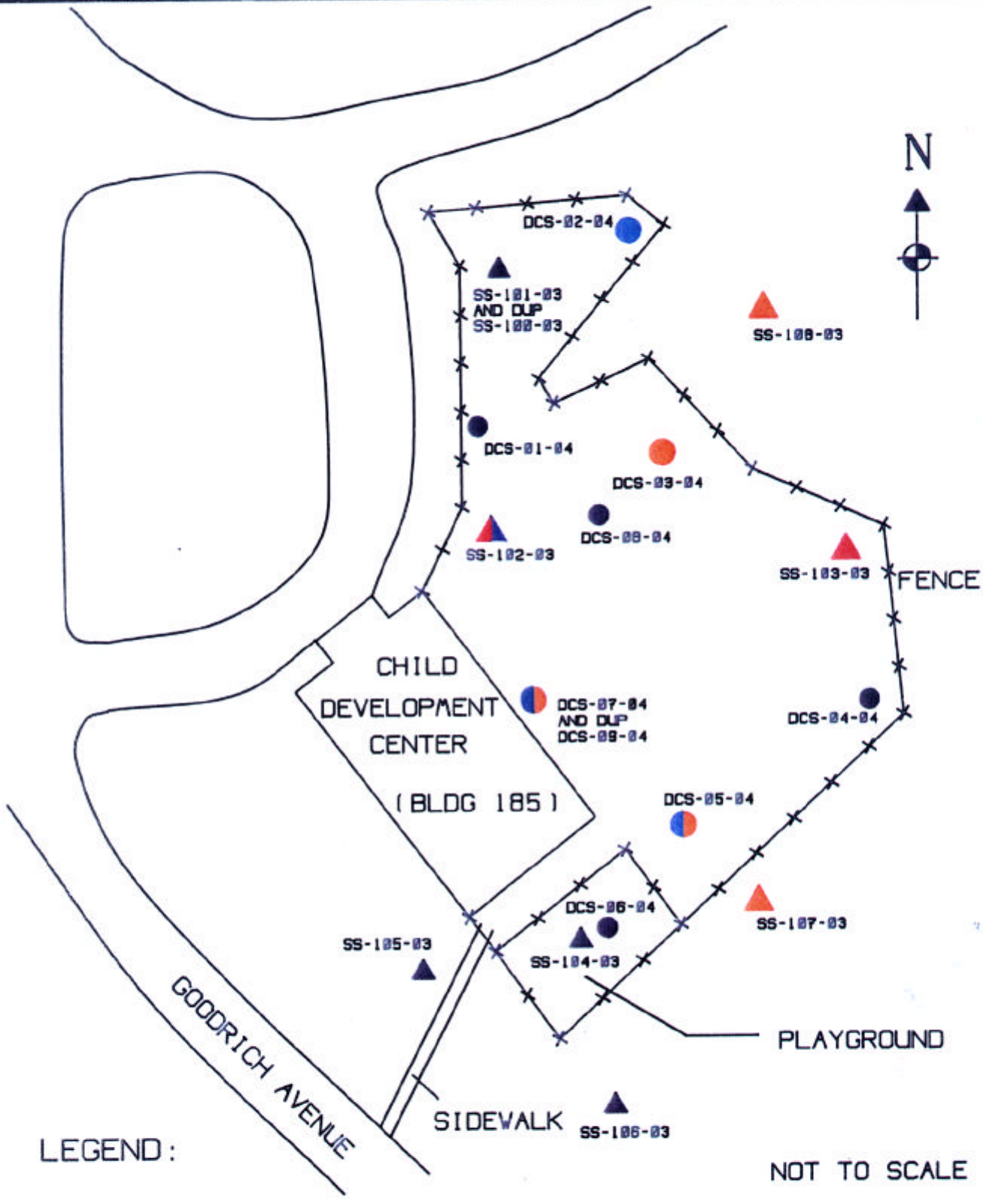
+ MAGNETOMETER SURVEY MEASUREMENT POINT

54000 MAGNETOMETER SURVEY CONTOUR LINE WITH CONTOUR INTERVAL IN GAMMAS

NOT TO SCALE

FORMER GAS STATION MAGNETOMETER SURVEY ANOMALY MAP

McLAREN/HART



LEGEND:

- ● SURFACE SOIL SAMPLING LOCATION DURING PHASE IV
- ▲ SURFACE SOIL SAMPLING LOCATION DURING PHASE III

TOTAL VOLATILES
TOTAL BASE NEUTRALS
PESTICIDES
METALS

SOIL CONCENTRATIONS EXCEEDING PROPOSED FEDERAL ACTION LEVELS AND/OR NEW JERSEY ECRA GUIDANCE VALUES

CHILD DEVELOPMENT CENTER
SURFACE SOIL SAMPLING RESULTS

McLAREN/HART

JAMAICA ISLAND LANDFILL
PHASE IV FINDINGS

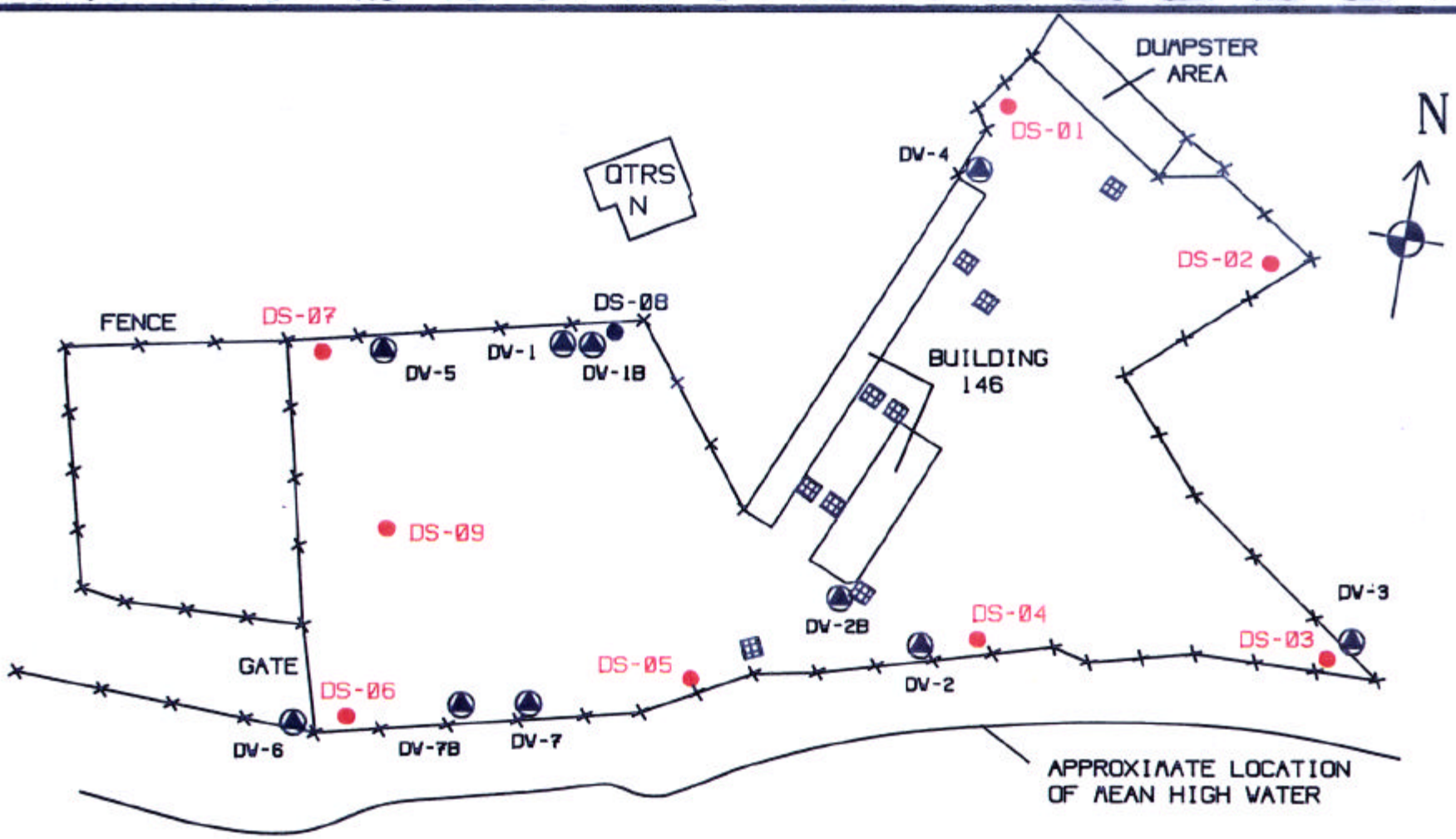
- SURFACE SOIL
  - LOW CONCENTRATION OF HEAVY METALS
- SEEPS & OUTFALLS
  - PETROLEUM (TIC) AND PESTICIDE (DIELDRIN)
  - SALINITIES VARY WITH LOCATION
- SUBSURFACE SOILS
  - NO DRUMS DISCOVERED
  - HEAVY METALS
  - MINOR PCBs, VOLATILES, SEMI-VOLATILES
  - MERCURY SIMILAR TO BACKGROUND AT BURIAL SITES
- GROUNDWATER
  - MINOR VOLATILE CONTAMINATION (JW-16, JW-13B, MERCURY BURIAL)
  - PESTICIDES (JW-19)
  - HEAVY METALS (TOTAL) ALL WELLS
  - SELENIUM (JW-13S), ANTIMONY (5 WELLS) (FILTERED)
- AIR
  - RESULTS NOT YET AVAILABLE
- MERCURY BURIAL CONTAINERS INTACT (SITE I)

DRMO
FINDINGS OF PREVIOUS PHASES

- HIGH HEAVY METALS CONCENTRATIONS IN SUBSURFACE SOIL
- PETROLEUM HYDROCARBONS, PCBs, AND LIMITED PESTICIDE CONTAMINATION IN SURFACE AND SUBSURFACE SOILS
- COARSE SUBSURFACE SOILS WITH HIGH PERMEABILITY
- HEAVY METALS NEAR QUARTERS "S" AND "N" NOT AN IMMEDIATE HEALTH THREAT
- MONITORING WELLS IN HYDRAULIC COMMUNICATION WITH ESTUARY

DRMO
DATA GAPS

- SURFACE SOIL SAMPLES NOT OBTAINED WITHIN DRMO
- SUBSURFACE SOIL SAMPLES NOT OBTAINED NEAR QUARTERS
- EASTERN FILL AREA NOT INVESTIGATED



SCALE (FT)

0 10 20 50 90 140

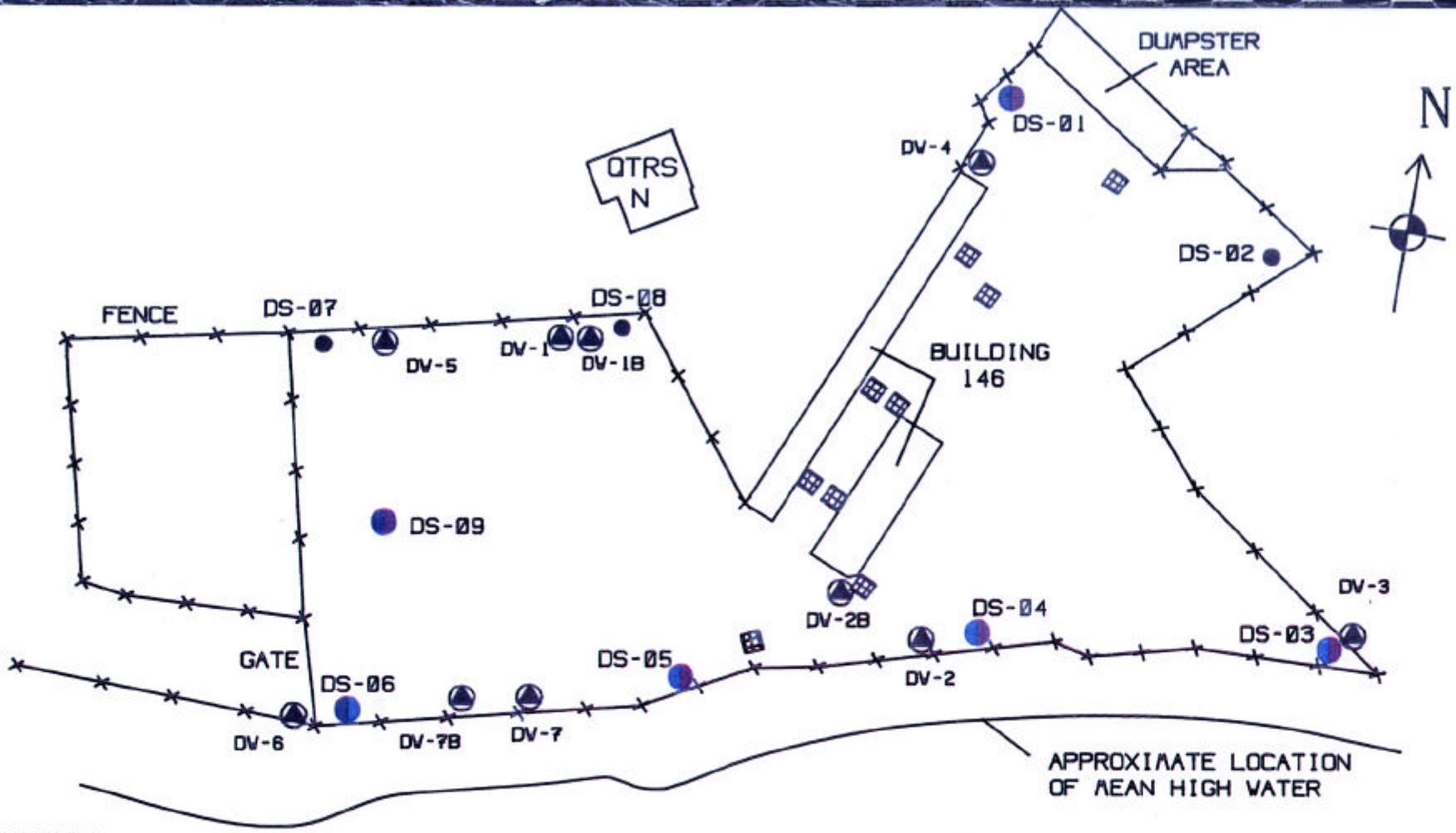
LEGEND:

- SURFACE SOIL SAMPLE LOCATION
- CATCH BASIN LOCATION
- TEST BORING/MONITORING WELL LOCATIONS

DRMO (SWMU #6)

SURFACE SOIL SAMPLE LOCATION MAP

McLAREN/HART



LEGEND:

PISCATAQUA RIVER

SCALE (FT)

0 10 20 50 90 140

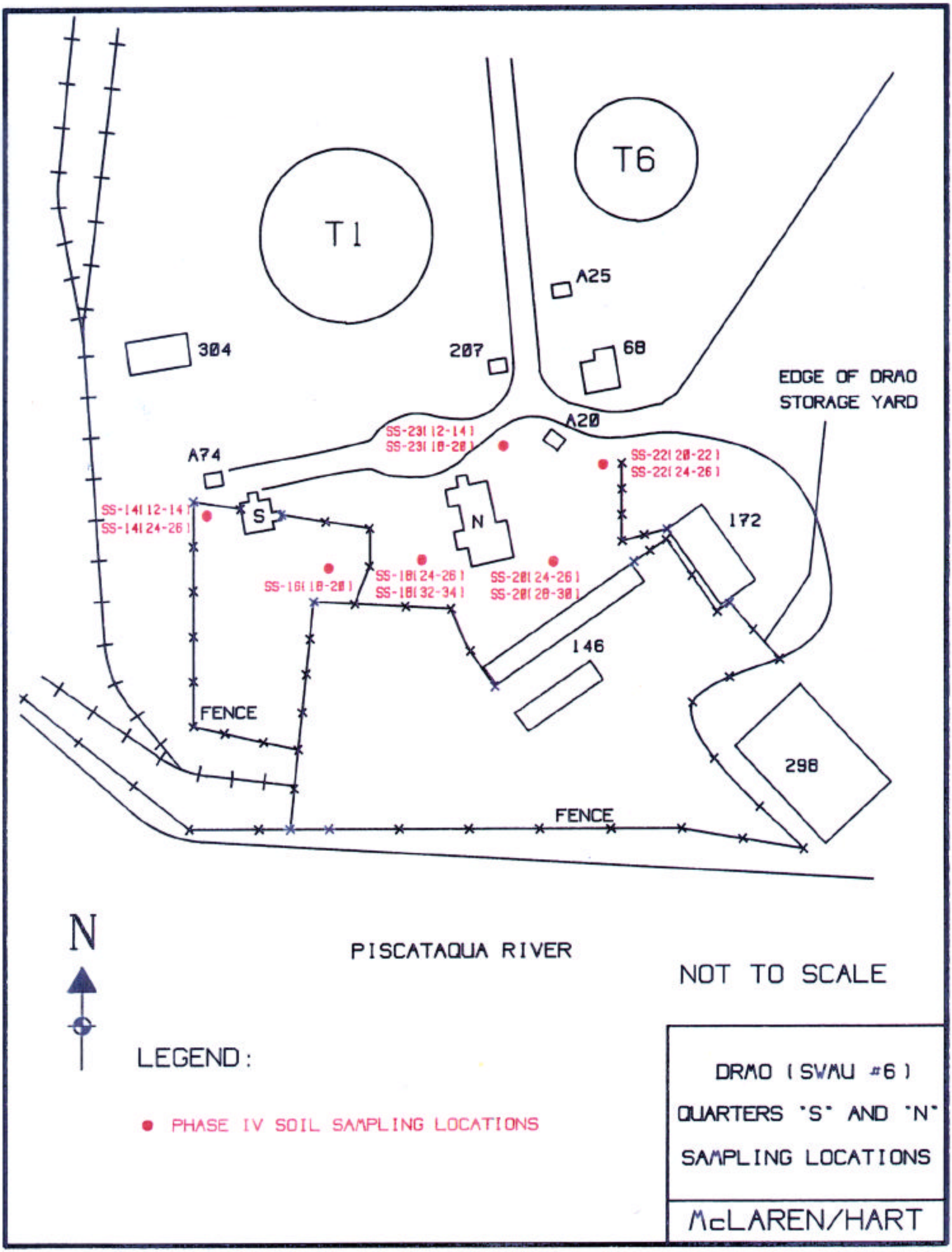
- SURFACE SOIL SAMPLE LOCATION
  - TOTAL BASE NEUTRALS
  - PESTICIDES
  - PCBs

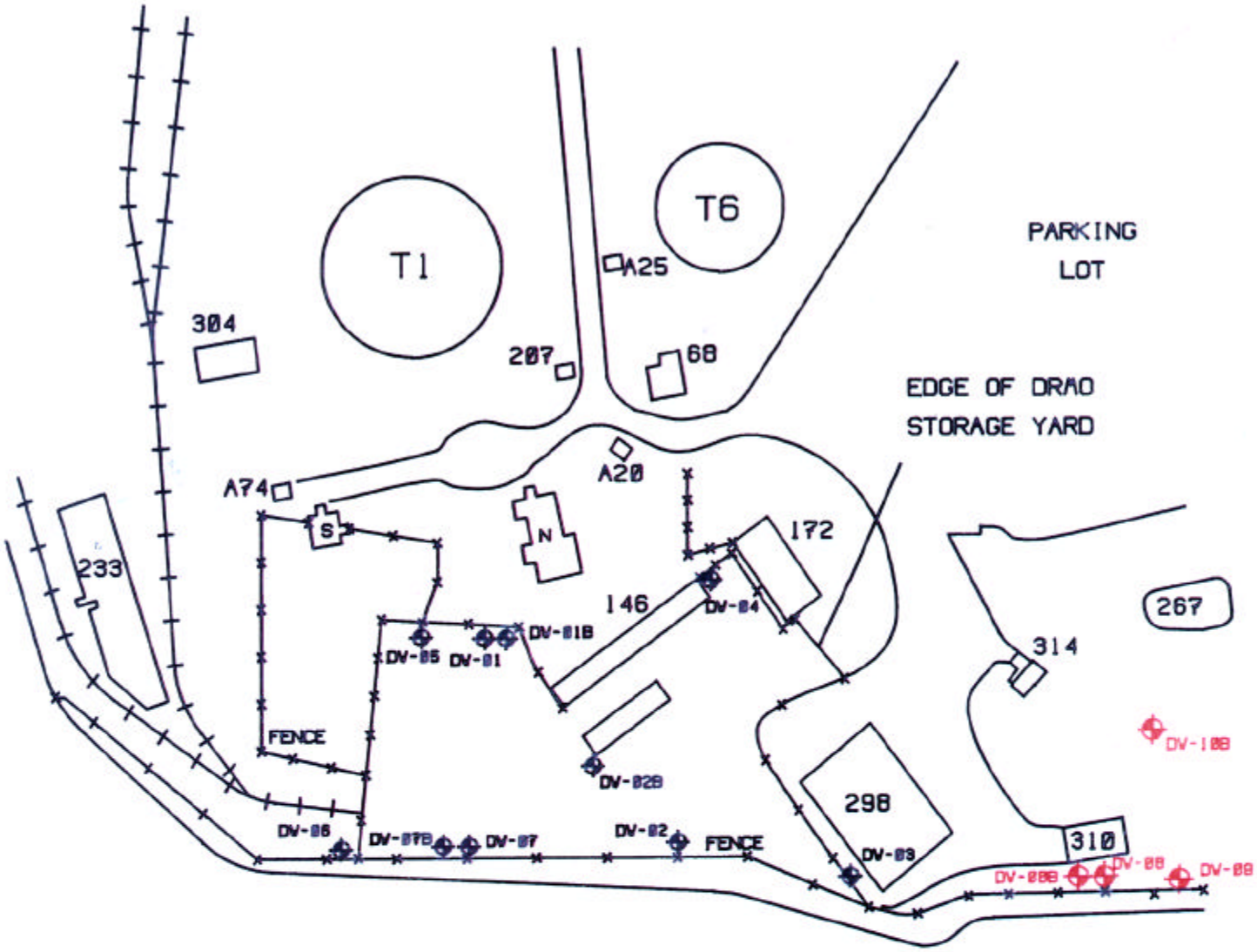
  SOIL CONCENTRATIONS EXCEEDING PROPOSED FEDERAL ACTION LEVELS AND/OR NEW JERSEY ECRA GUIDANCE VALUES
- OTHER PHASE IV SURFACE SOIL SAMPLING LOCATIONS
- CATCH BASIN LOCATION
- TEST BORING/MONITORING WELL LOCATIONS

DRMO (SWMU #6)

SURFACE SOIL SAMPLING RESULTS

McLAREN/HART


T1
T6
A25
304
207
68
EDGE OF DRAO
STORAGE YARD
A20
SS-23(12-14)
SS-23(18-20)
A74
SS-22(20-22)
SS-22(24-26)
SS-14(12-14)
SS-14(24-26)
S
N
172
SS-16(18-20)
SS-18(24-26)
SS-18(32-34)
SS-20(24-26)
SS-20(28-30)
146
FENCE
298
FENCE
N
PISCATAQUA RIVER
NOT TO SCALE
LEGEND:
PHASE IV SOIL SAMPLING LOCATIONS
DRAO (SWMU #6)
QUARTERS "S" AND "N"
SAMPLING LOCATIONS
McLAREN/HART



PISCATAQUA RIVER

NOT TO SCALE

LEGEND:

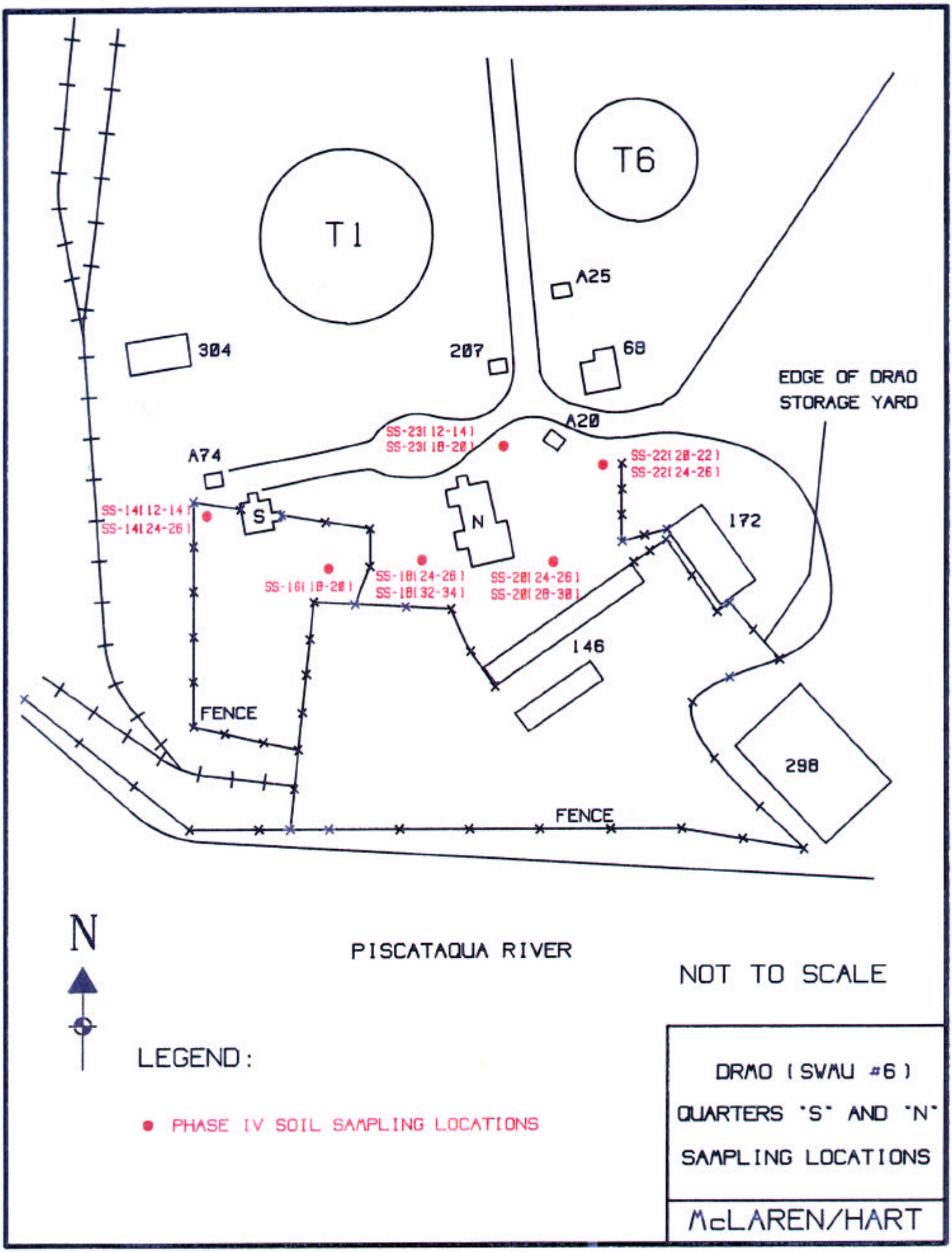
PHASE IV GROUNDWATER MONITORING WELL LOCATIONS

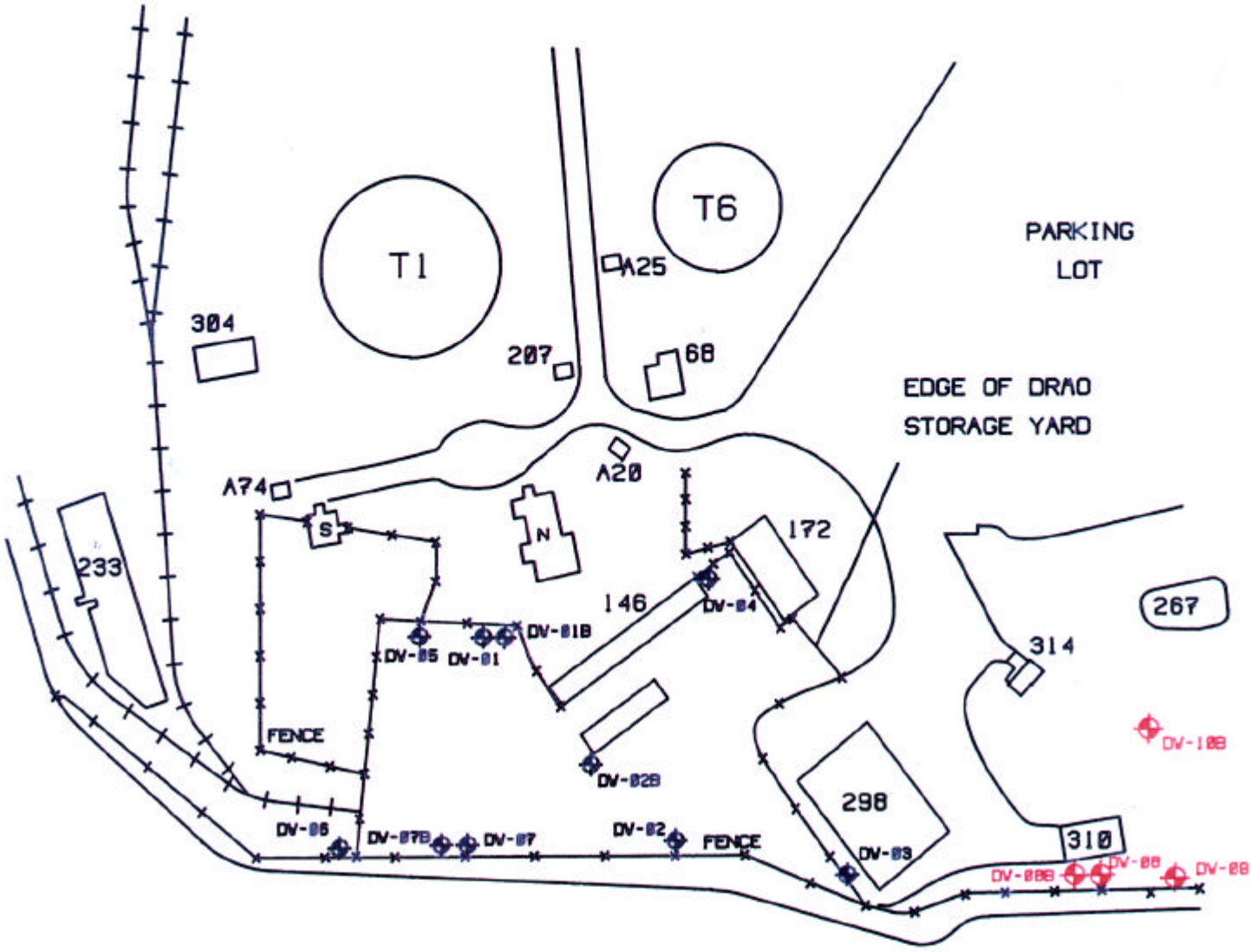
PREVIOUSLY INSTALLED GROUNDWATER MONITORING WELL LOCATIONS

N

DRMO (SWMU #6)
PHASE IV GROUNDWATER
MONITORING WELL
LOCATIONS MAP

McLAREN/HART


T1
T6
A25
304
207
68
EDGE OF DRAO
STORAGE YARD
A20
SS-23(12-14)
SS-23(18-20)
A74
SS-22(20-22)
SS-22(24-26)
SS-14(12-14)
SS-14(24-26)
S
N
172
SS-16(18-20)
SS-18(24-26)
SS-18(32-34)
SS-20(24-26)
SS-20(28-30)
146
FENCE
298
FENCE
N
PISCATAQUA RIVER
NOT TO SCALE
LEGEND:
PHASE IV SOIL SAMPLING LOCATIONS
DRAO (SWMU #6)
QUARTERS "S" AND "N"
SAMPLING LOCATIONS
McLAREN/HART



NOT TO SCALE

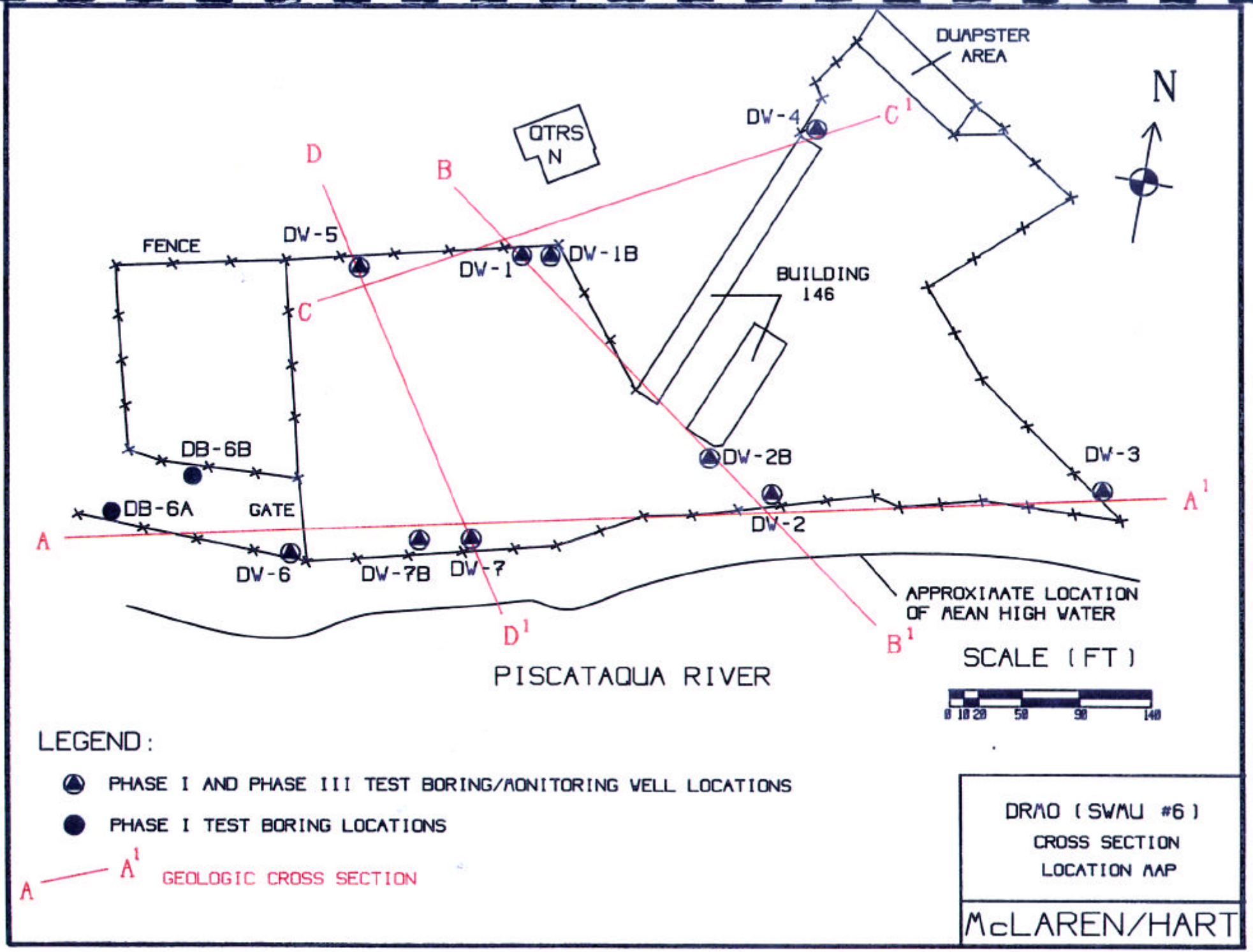
LEGEND:

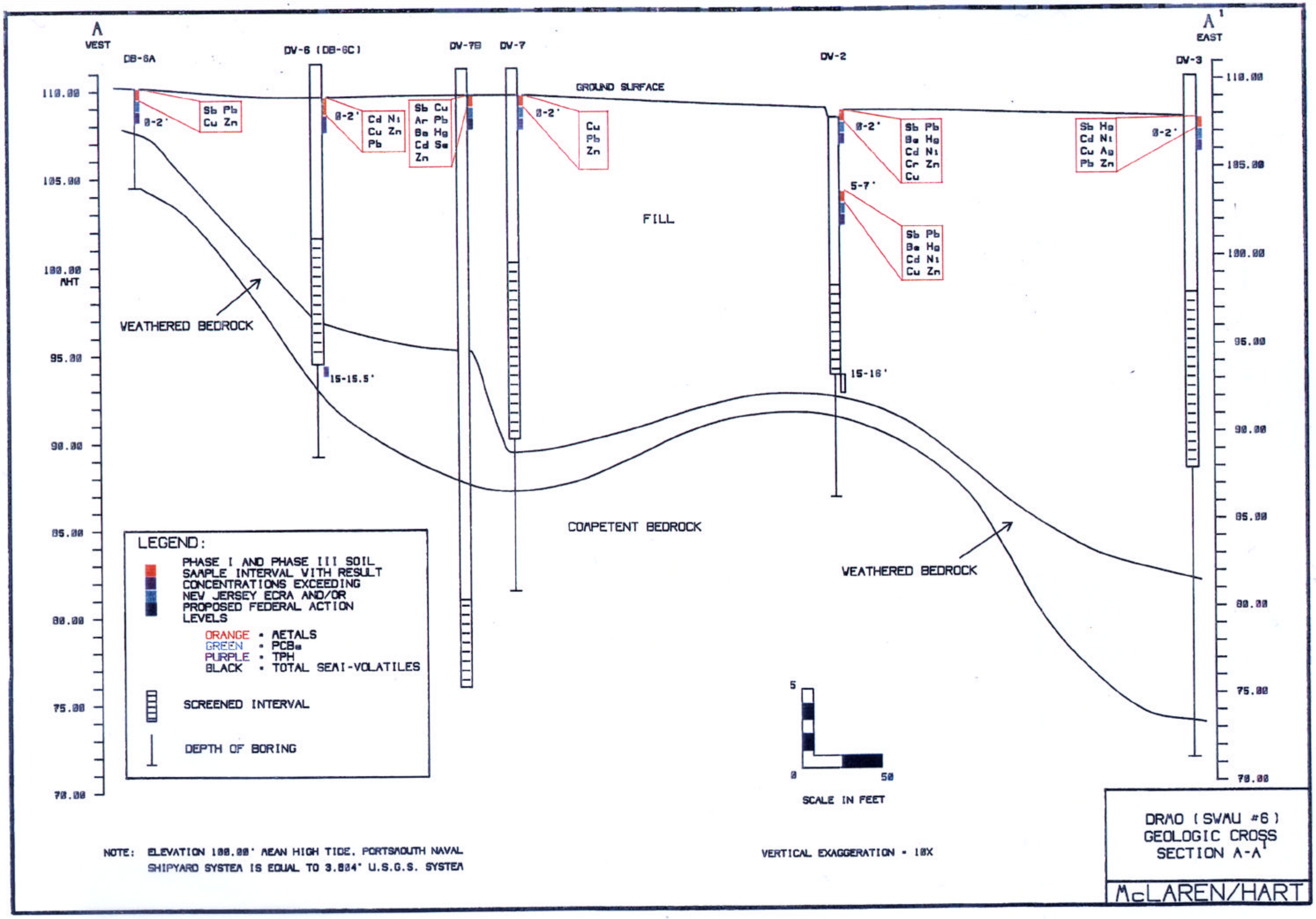
- PHASE IV GROUNDWATER MONITORING WELL LOCATIONS
- PREVIOUSLY INSTALLED GROUNDWATER MONITORING WELL LOCATIONS

N

DRMO (SWMU #6)
PHASE IV GROUNDWATER
MONITORING WELL
LOCATIONS MAP

McLAREN/HART

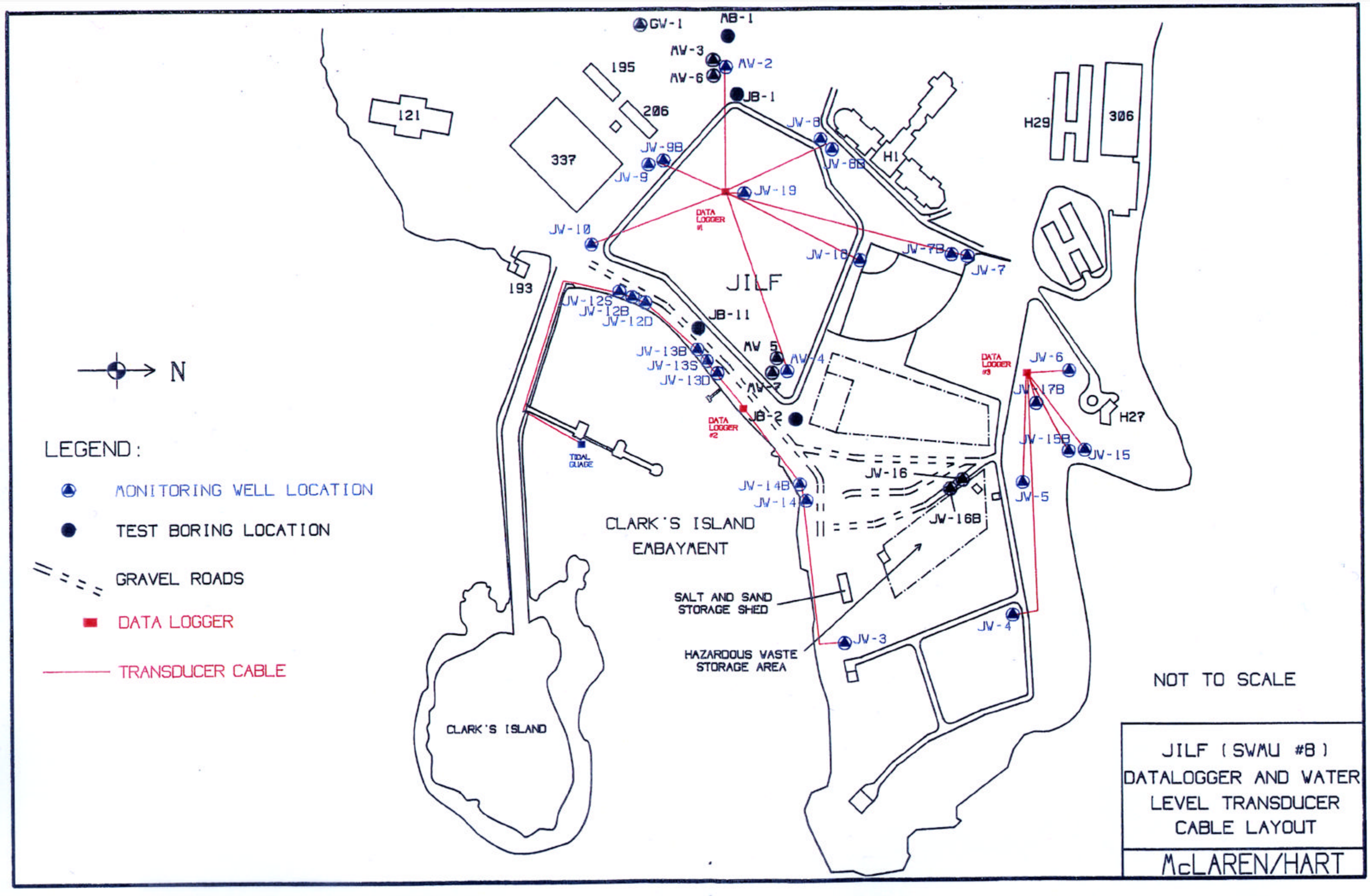

DUMPSTER AREA
N
QTRS N
DW-4
C1
D
B
FENCE
DW-5
DW-1
DW-1B
BUILDING 146
C
DB-6B
DW-2B
DW-3
DB-6A
GATE
A1
A
DW-2
DW-6
DW-7B
DW-7
APPROXIMATE LOCATION OF MEAN HIGH WATER
D1
B1
PISCATAQUA RIVER
SCALE (FT)
0 10 20 50 90 140
LEGEND:
PHASE I AND PHASE III TEST BORING/MONITORING WELL LOCATIONS
PHASE I TEST BORING LOCATIONS
A A1 GEOLOGIC CROSS SECTION
DRMO (SWMU #6)
CROSS SECTION
LOCATION MAP
McLAREN/HART

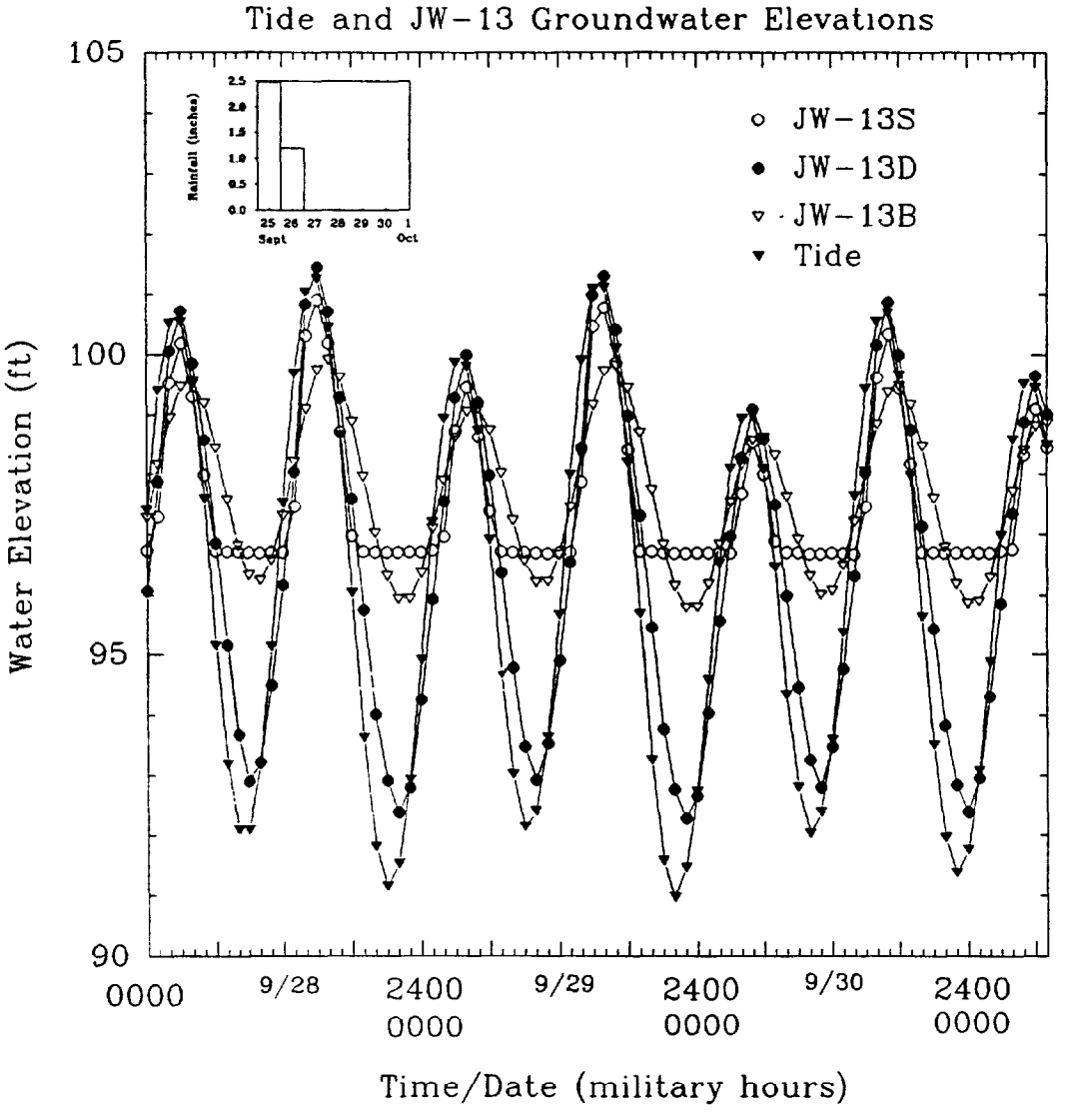


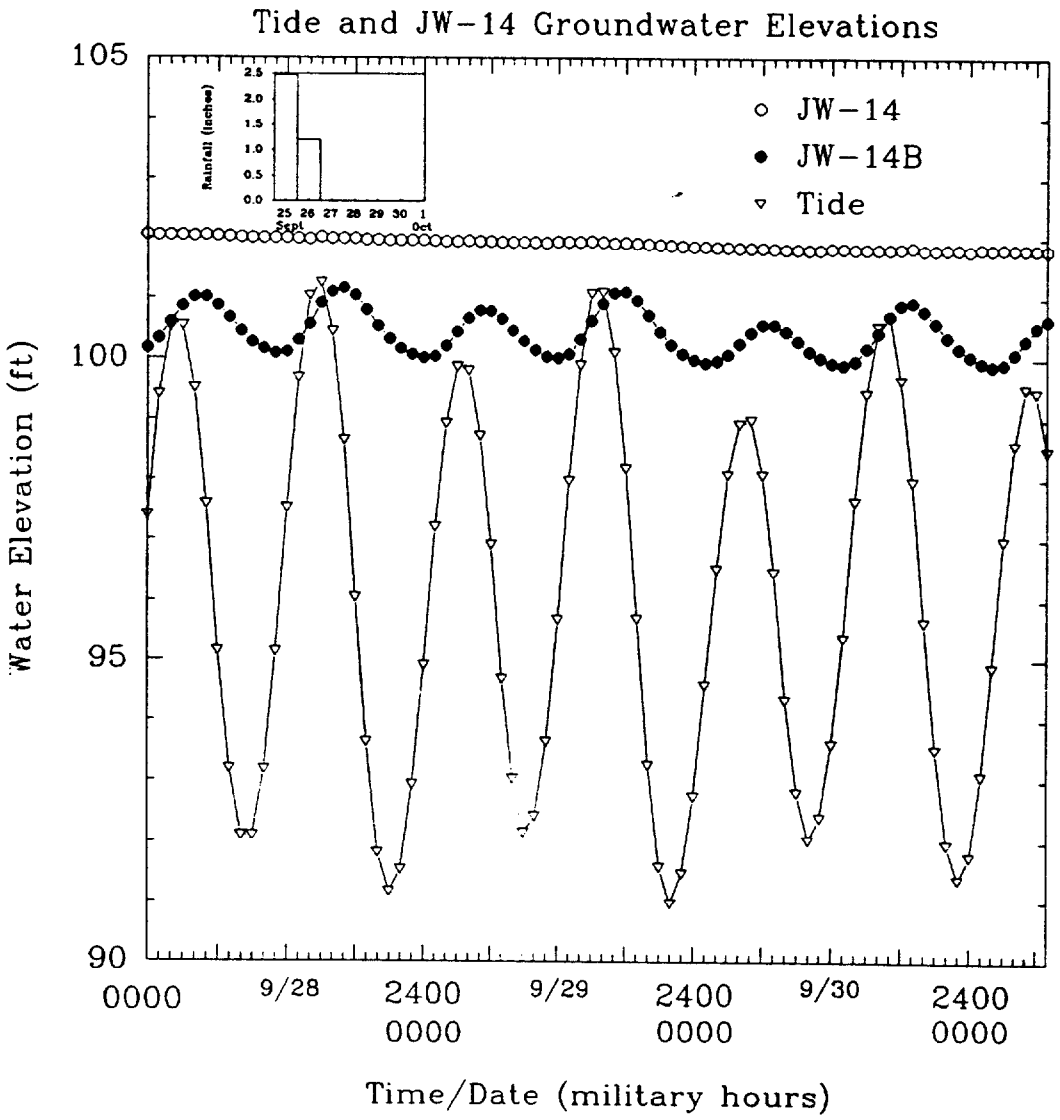
NOTE: ELEVATION 100.00' MEAN HIGH TIDE, PORTSMOUTH NAVAL SHIPYARD SYSTEM IS EQUAL TO 3.804' U.S.G.S. SYSTEM

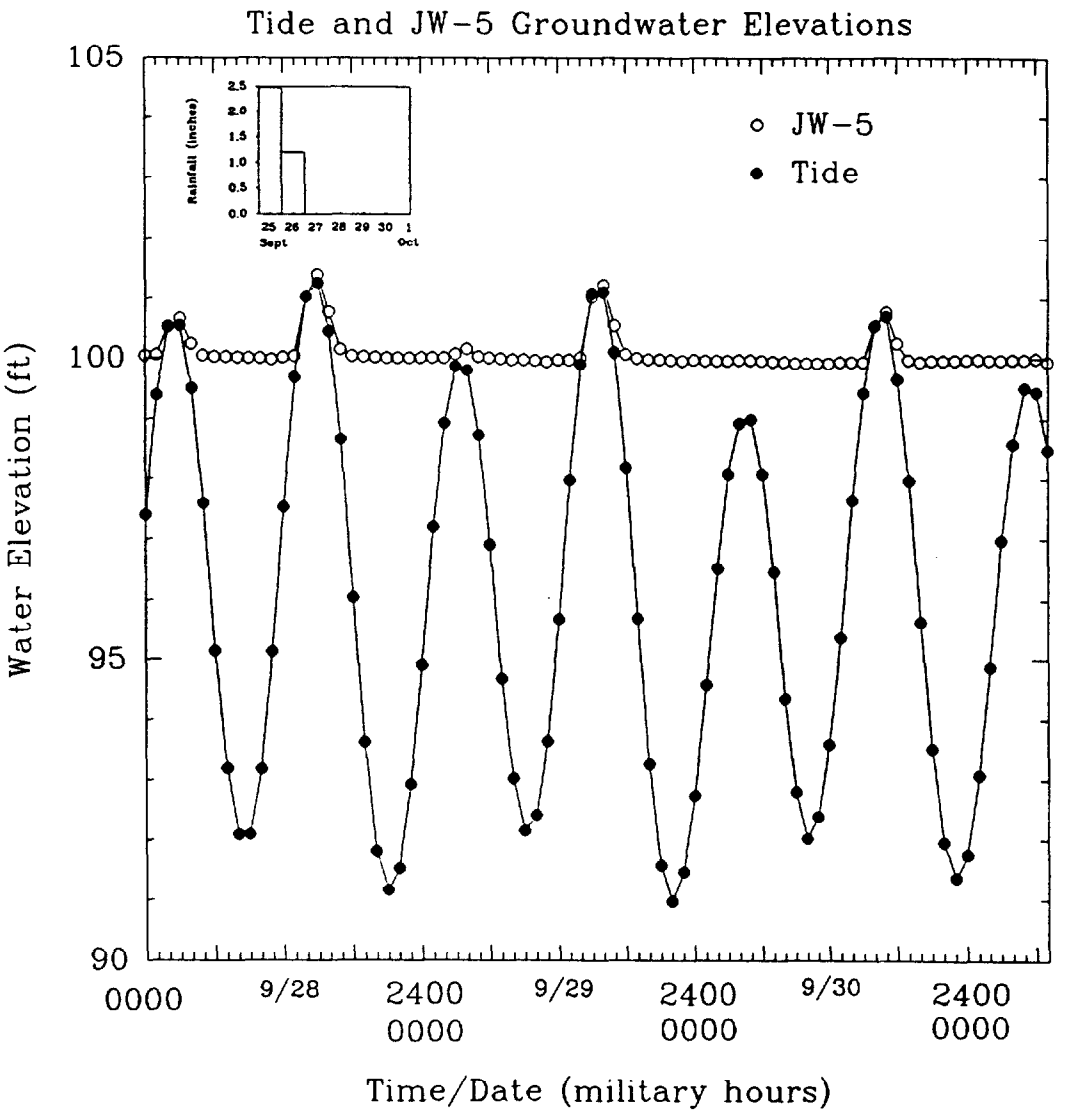
DRMO
PHASE IV FINDINGS

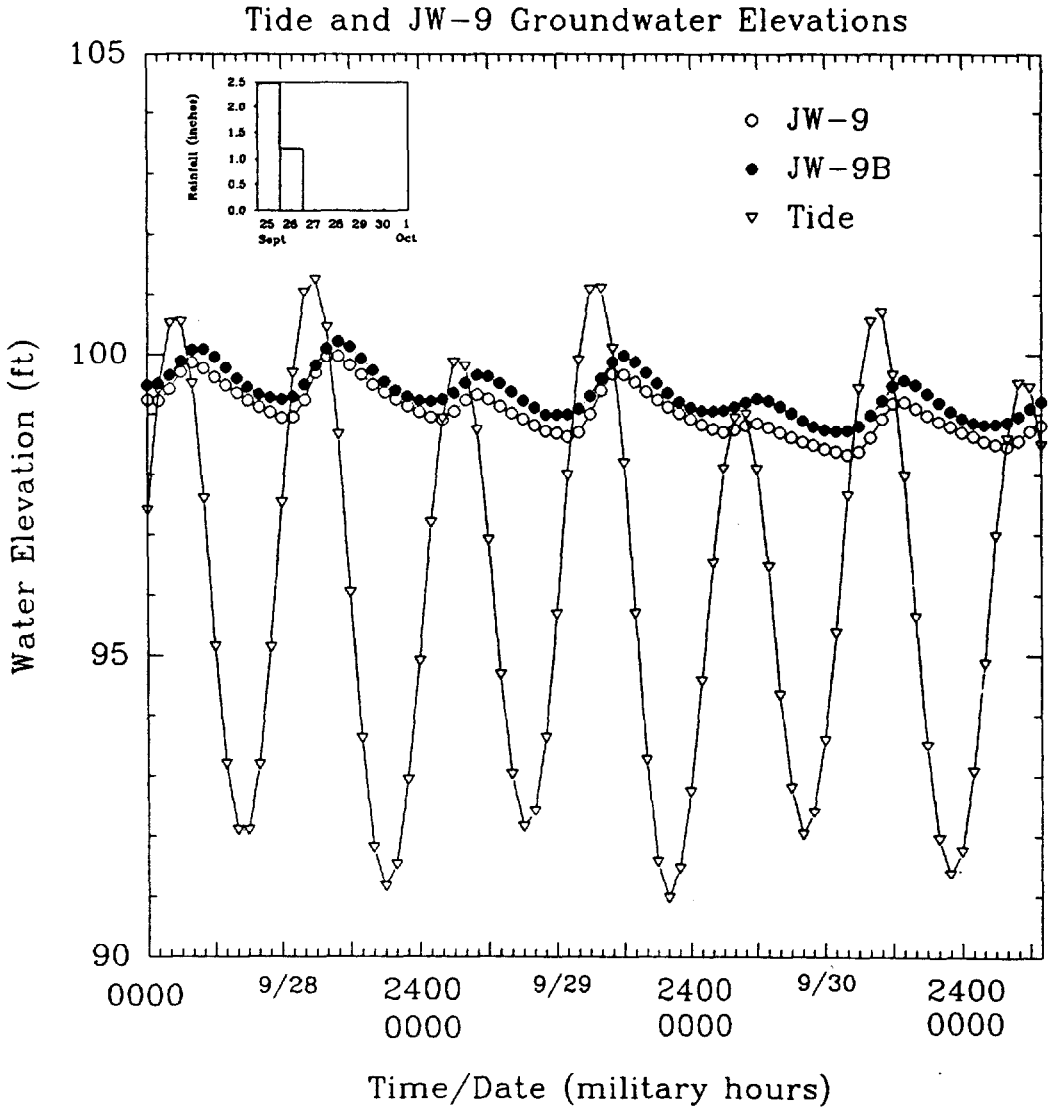
- SURFACE SOIL
  - CONTAINED HEAVY METALS, PCBs, PESTICIDES AND VARIETY OF SEMI-VOLATILE COMPOUNDS
- "S" AND "N" SOIL
  - CONTAINED HEAVY METALS
  - CONCENTRATIONS DECREASED WITH DEPTH
- SUBSURFACE SOILS (EAST END)
  - CONTAINED HEAVY METALS, PCBs AND SEMI-VOLATILE COMPOUNDS
- GROUNDWATER
  - CONTAINED HEAVY METALS, PCBs, PESTICIDES, AND PHTHALATE

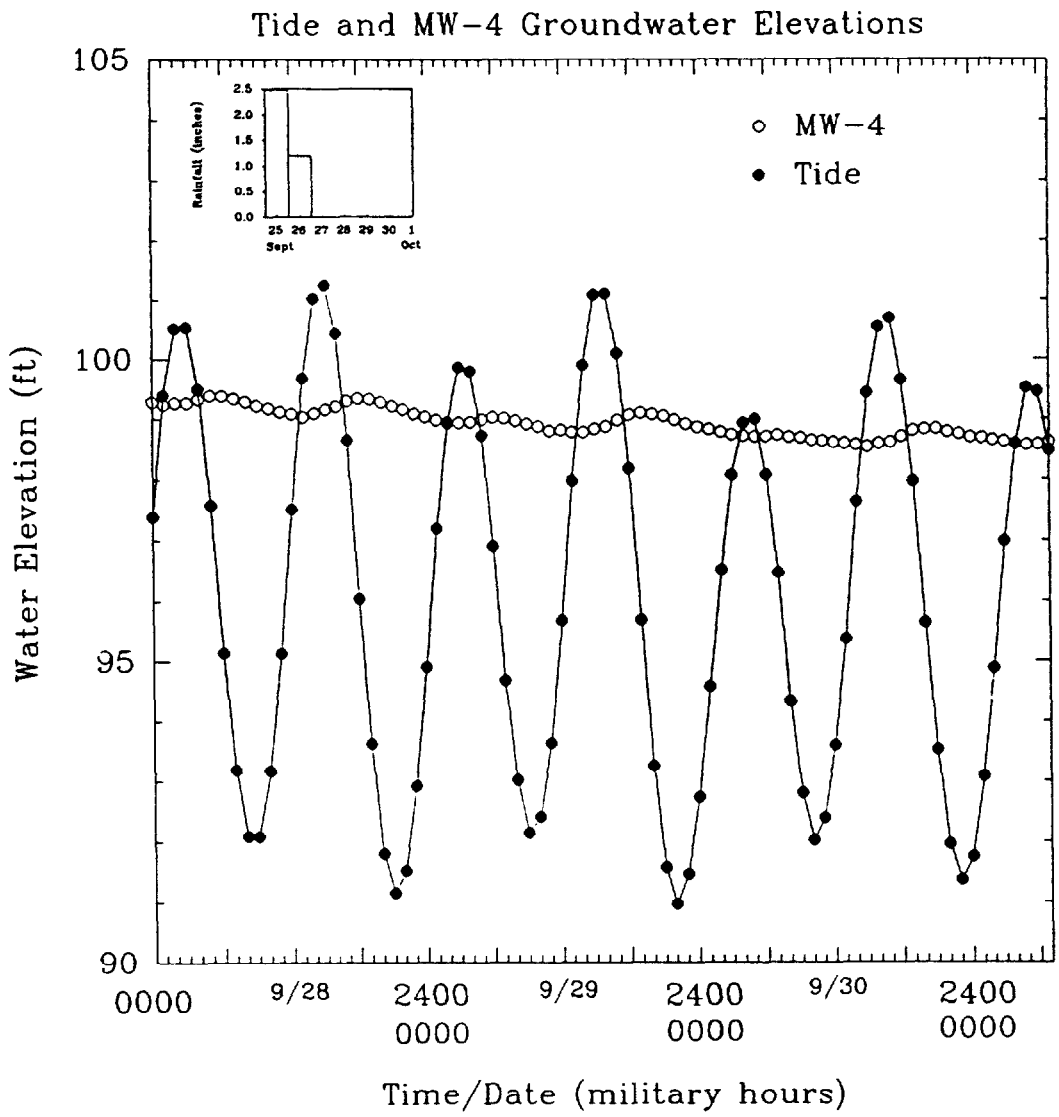

GW-1
MB-1
MW-3
MW-2
MW-6
JB-1
195
206
121
337
JW-9B
JW-9
JW-8
JW-8B
H1
H29
306
JW-19
DATA LOGGER #1
JW-10
JW-18
JW-7B
JW-7
193
JILF
JW-12S
JW-12B
JW-12D
JB-11
MW 5
MW-4
JW-13B
JW-13S
JW-13D
MW-7
JB-2
DATA LOGGER #2
TIDAL GUAGE
DATA LOGGER #3
JW-6
JW-17B
H27
JW-15B
JW-15
JW-16
JW-14B
JW-14
JW-16B
JW-5
CLARK'S ISLAND EMBAYMENT
SALT AND SAND STORAGE SHED
HAZARDOUS WASTE STORAGE AREA
JW-3
JW-4
CLARK'S ISLAND
N
LEGEND:
MONITORING WELL LOCATION
TEST BORING LOCATION
GRAVEL ROADS
DATA LOGGER
TRANSDUCER CABLE
NOT TO SCALE
JILF (SWMU #8)
DATALOGGER AND WATER LEVEL TRANSDUCER CABLE LAYOUT
McLAREN/HART

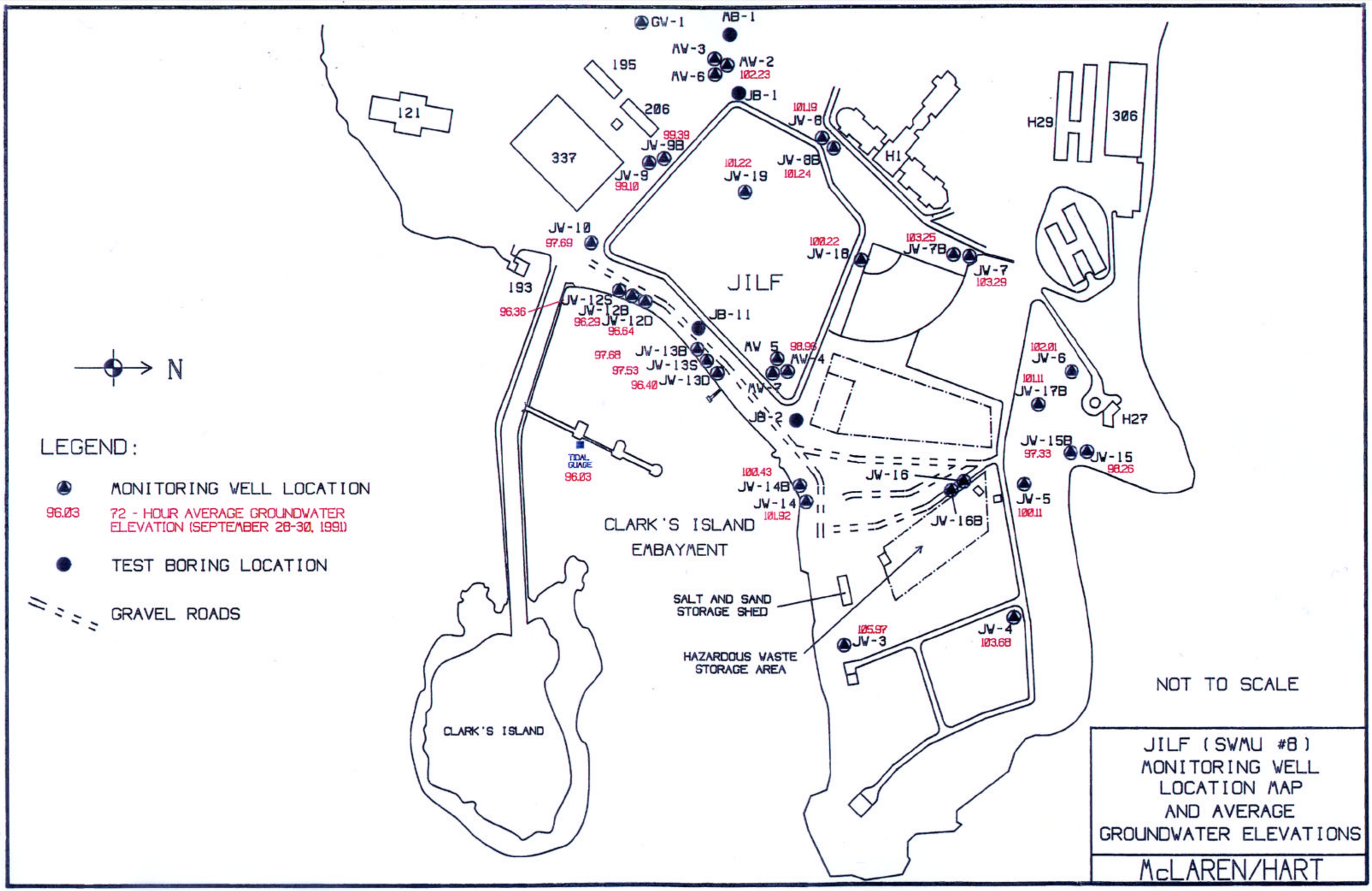

Tide and JW-13 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
0000
9/28
2400
0000
9/29
2400
0000
9/30
2400
0000
Time/Date (military hours)
JW-13S
JW-13D
JW-13B
Tide
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
25 26 27 28 29 30 1
Sept
Oct


Tide and JW-14 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
0000
9/28
2400
0000
9/29
2400
0000
9/30
2400
0000
Time/Date (military hours)
JW-14
JW-14B
Tide
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
25 26 27 28 29 30 1
Sept
Oct

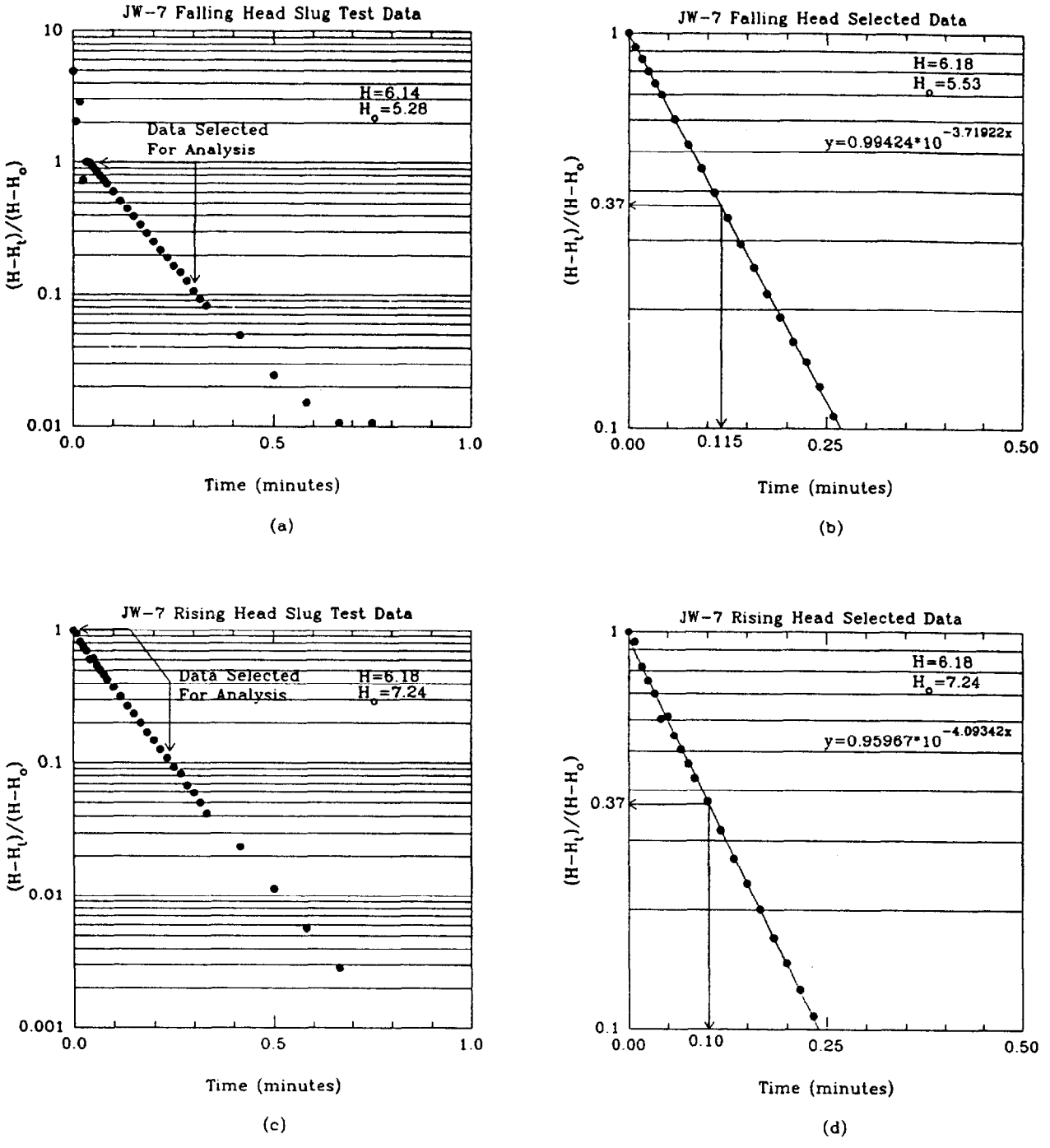

Tide and JW-5 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
JW-5
Tide
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
25 26 27 28 29 30 1
Sept
Oct
0000
9/28
2400
0000
9/29
2400
0000
9/30
2400
0000
Time/Date (military hours)


Tide and JW-9 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
0000
9/28
2400
0000
9/29
2400
0000
9/30
2400
0000
Time/Date (military hours)
JW-9
JW-9B
Tide
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
25 26 27 28 29 30 1
Sept
Oct

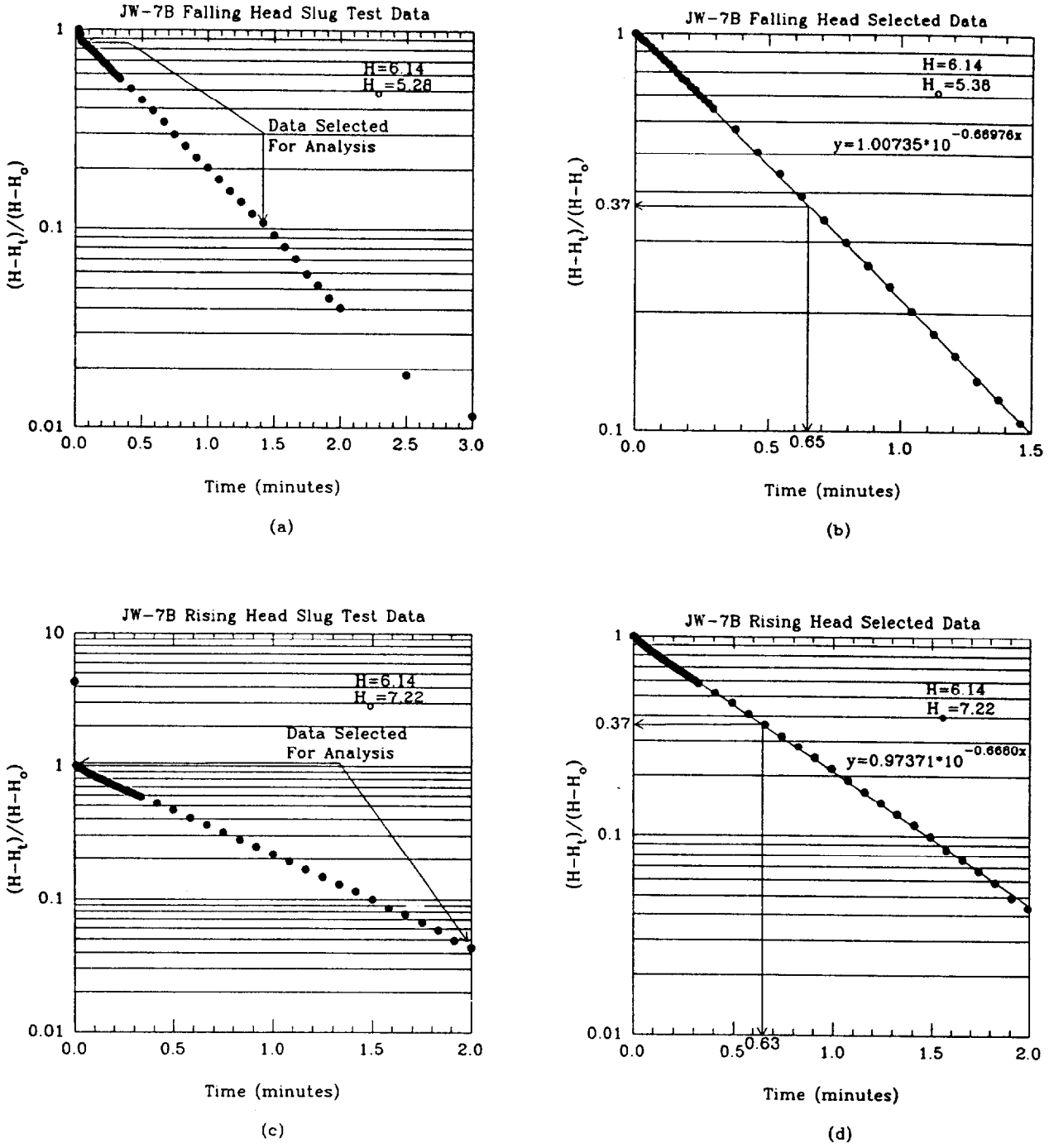

Tide and MW-4 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
MW-4
Tide
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
25 26 27 28 29 30 1
Sept
Oct
0000
9/28
2400
0000
9/29
2400
0000
9/30
2400
0000
Time/Date (military hours)



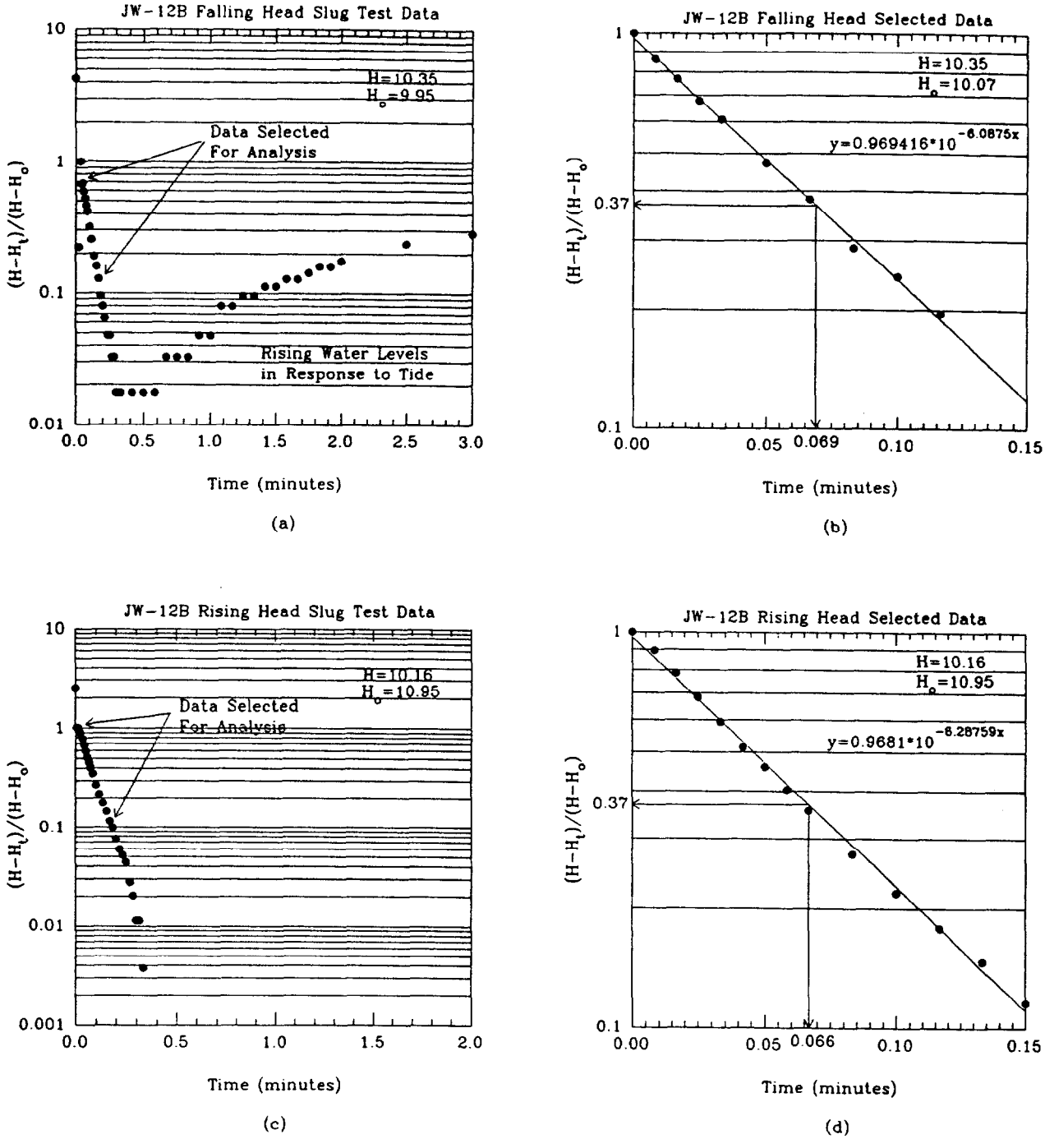
GW-1
MB-1
MW-3
MW-2
102.23
MW-6
JB-1
195
206
121
337
99.39
JW-9B
JW-9
99.10
101.19
JW-8
JW-8B
101.24
101.22
JW-19
H1
H29
306
JW-10
97.69
100.22
JW-18
103.25
JW-7B
JW-7
103.29
193
JILF
JW-12S
96.36
JW-12B
96.29
JW-12D
96.64
JB-11
97.68
JW-13B
JW-13S
97.53
96.40
JW-13D
MW 5
98.96
MW-4
MW-7
JB-2
102.01
JW-6
101.11
JW-17B
H27
JW-15B
97.33
JW-15
98.26
TIDAL GUAGE
96.03
100.43
JW-14B
JW-14
101.92
JW-16
JW-16B
JW-5
100.11
CLARK'S ISLAND EMBAYMENT
SALT AND SAND STORAGE SHED
HAZARDOUS WASTE STORAGE AREA
105.97
JW-3
JW-4
103.68
CLARK'S ISLAND
N
LEGEND:
MONITORING WELL LOCATION
96.03
72 - HOUR AVERAGE GROUNDWATER ELEVATION (SEPTEMBER 28-30, 1991)
TEST BORING LOCATION
GRAVEL ROADS
NOT TO SCALE
JILF (SWMU #8)
MONITORING WELL
LOCATION MAP
AND AVERAGE
GROUNDWATER ELEVATIONS
McLAREN/HART



Plots of water level recovery data for falling (a) and rising (c) head slug tests and selected data plots with regression lines (b) and (d). Points indicated on x-axes of (b) and (d) correspond to T_o of the Hvorslev method for computing hydraulic conductivity.



Plots of water level recovery data for falling (a) and rising (c) head slug tests and selected data plots with regression lines (b) and (d). Points indicated on x-axes of (b) and (d) correspond to T_o of the Hvorslev method for computing hydraulic conductivity.



Plots of water level recovery data for falling (a) and rising (c) head slug tests and selected data plots with regression lines (b) and (d). Points indicated on x-axes of (b) and (d) correspond to T_o of the Hvorslev method for computing hydraulic conductivity.

JAMAICA ISLAND LANDFILL
HYDRAULIC CONDUCTIVITY ESTIMATES

OVERBURDEN

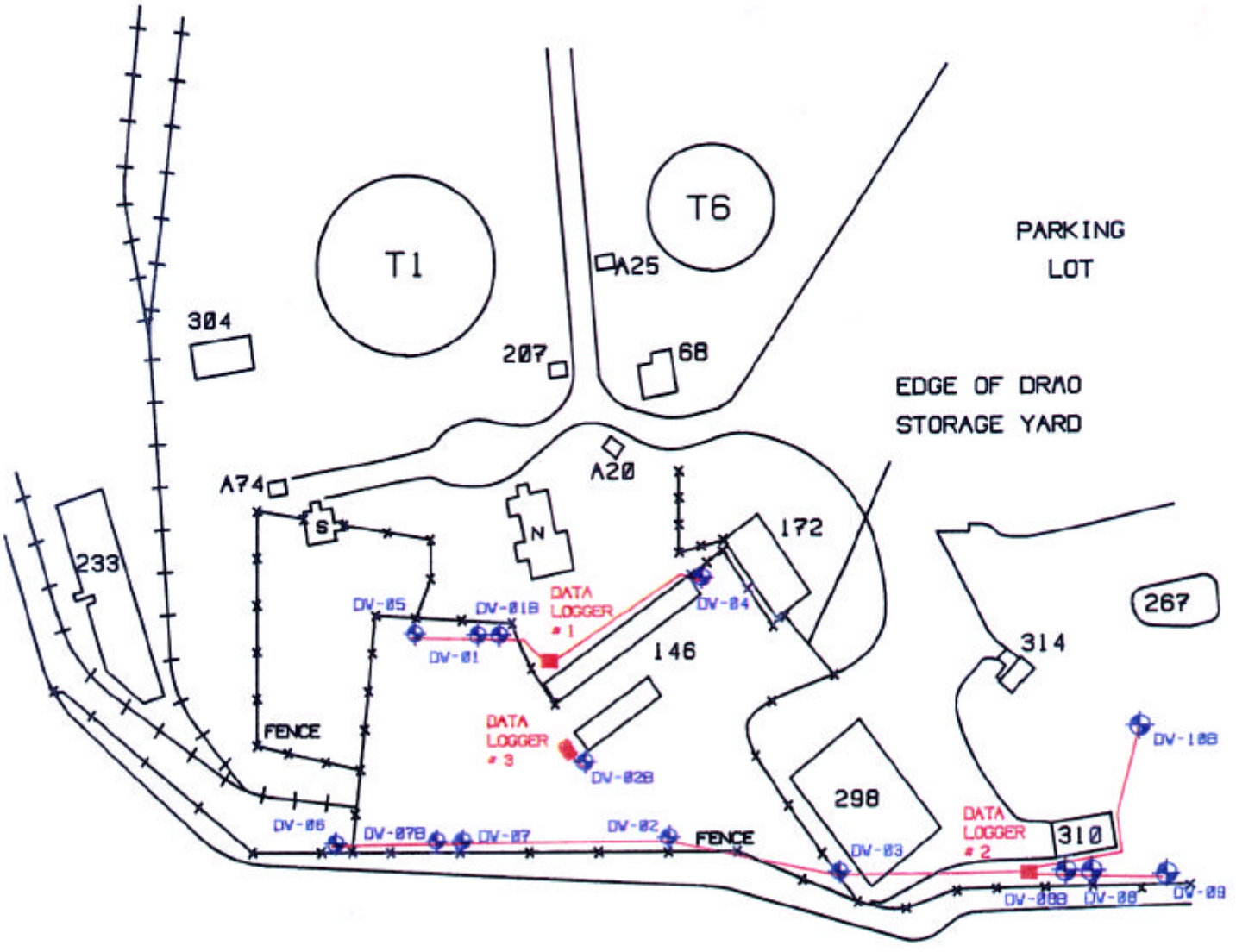
RANGE: 1.65×10^{-3} cm/sec to 1.26×10^{-1} cm/sec

TYPICAL: 10^{-3} to 10^{-2} cm/sec

BEDROCK

RANGE: 4.99×10^{-5} cm/sec to 8.76×10^{-2} cm/sec

TYPICAL: with JW-12B, 13B: 10^{-2} cm/sec
without JW-12B, 13B: 10^{-4} cm/sec



NOT TO SCALE

LEGEND:

GROUNDWATER MONITORING WELL LOCATIONS

DATA LOGGER

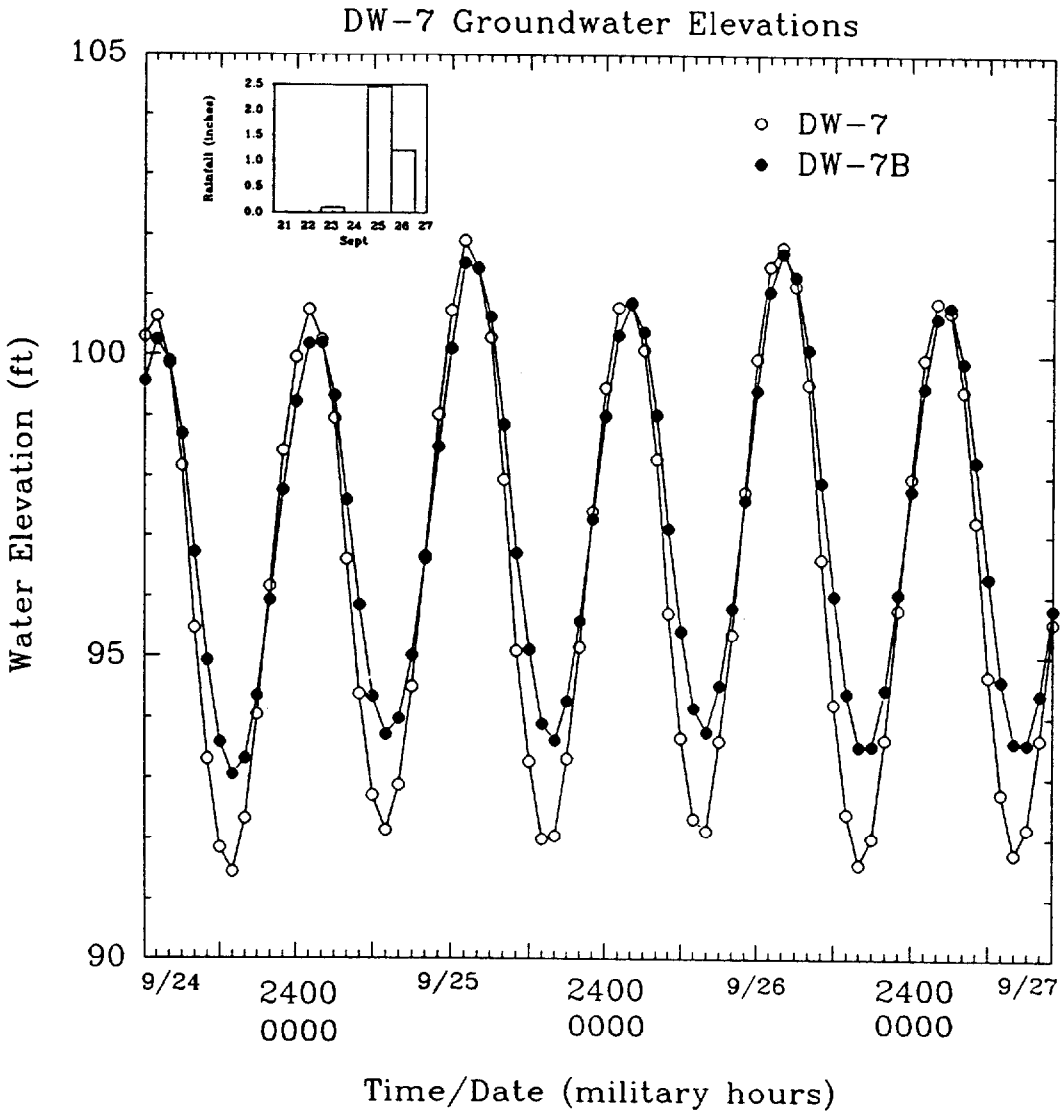
TRANSDUCER CABLE

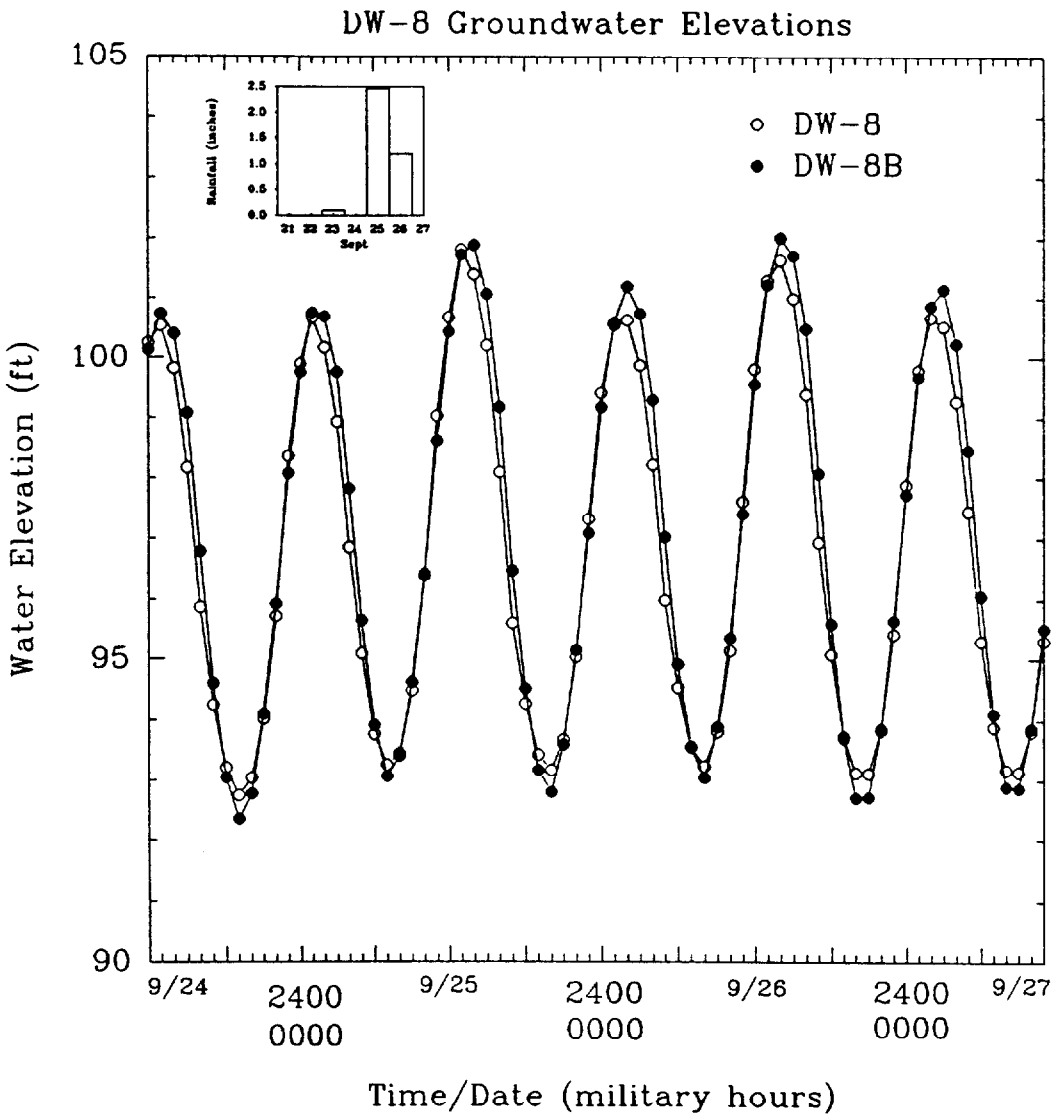
N

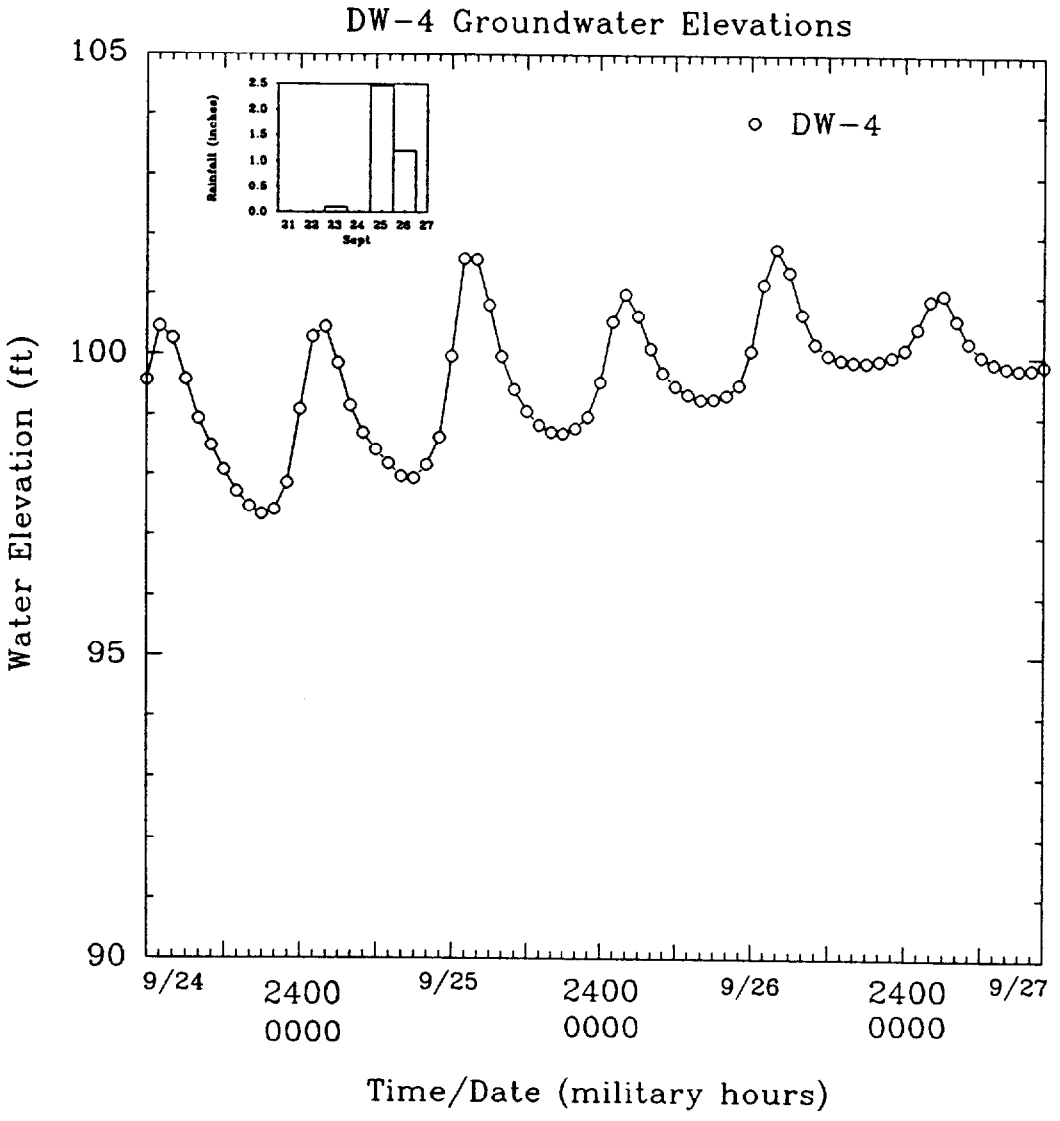
DRMO (SWMU #6)

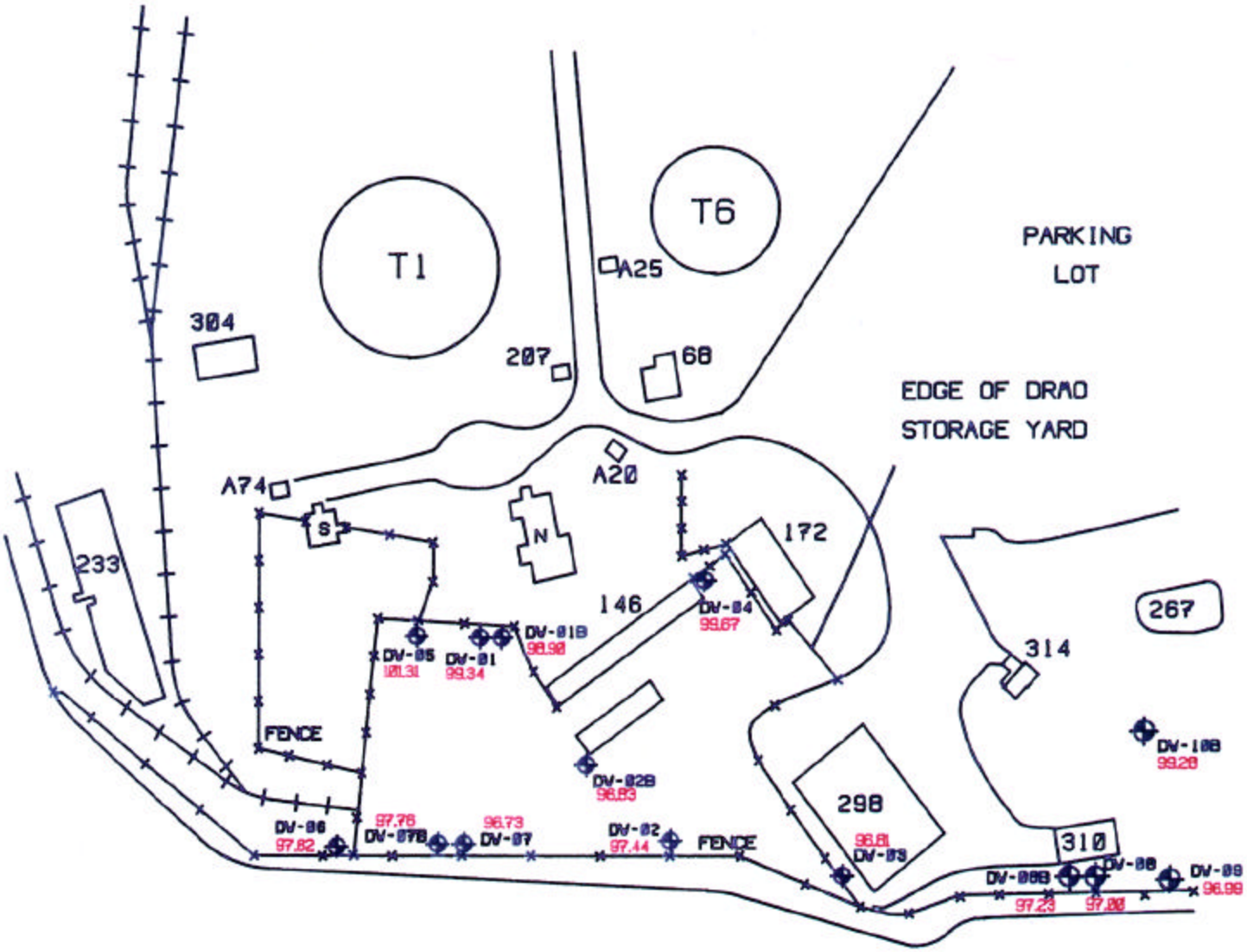
DATALOGGER AND WATER LEVEL TRANSDUCER CABLE LAYOUT

McLAREN/HART


DW-7 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
DW-7
DW-7B
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
21 22 23 24 25 26 27
Sept
9/24
2400
0000
9/25
2400
0000
9/26
2400
0000
9/27
Time/Date (military hours)


DW-8 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
DW-8
DW-8B
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
21 22 23 24 25 26 27
Sept
9/24
2400
0000
9/25
2400
0000
9/26
2400
0000
9/27
Time/Date (military hours)


DW-4 Groundwater Elevations
105
100
95
90
Water Elevation (ft)
DW-4
Rainfall (inches)
2.5
2.0
1.5
1.0
0.5
0.0
21 22 23 24 25 26 27
Sept
9/24
2400
0000
9/25
2400
0000
9/26
2400
0000
9/27
Time/Date (military hours)



NOT TO SCALE

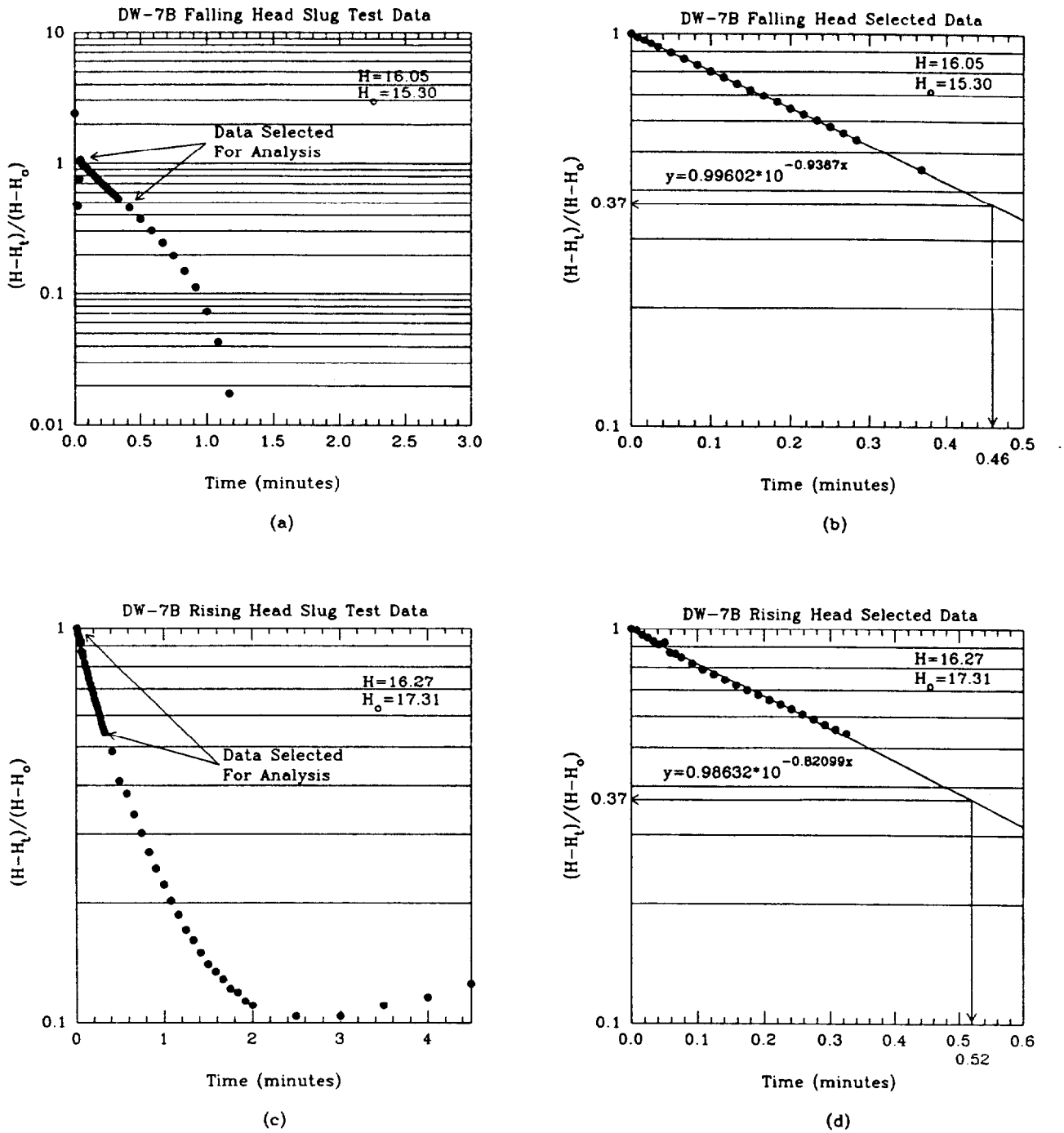
LEGEND:

- MONITORING WELL LOCATIONS
- 101.31 72 - HOUR AVERAGE GROUNDWATER ELEVATIONS (SEPTEMBER 24-27,1991)
- PREVIOUSLY INSTALLED GROUNDWATER MONITORING WELL LOCATIONS

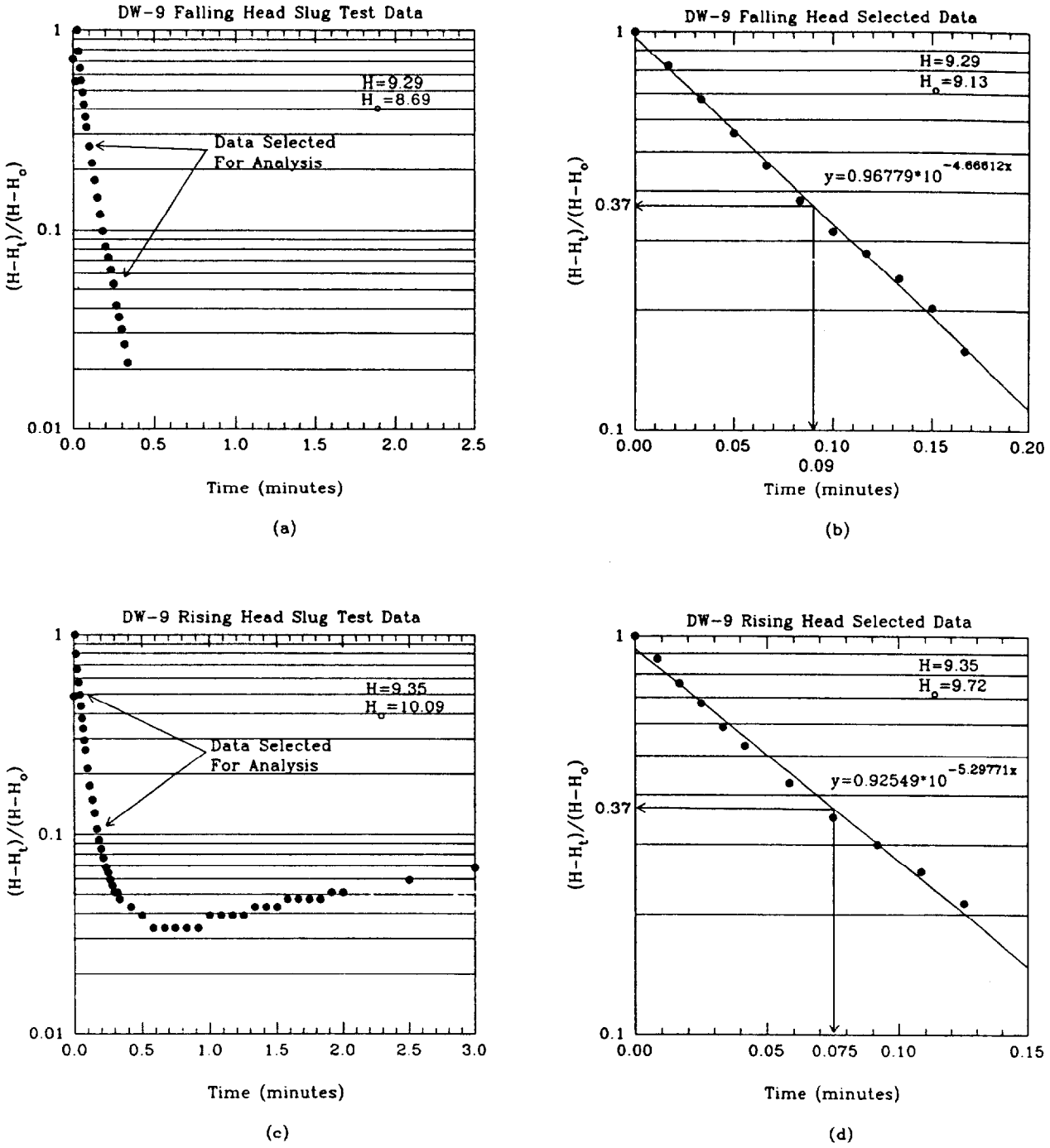
N

DRMO (SWMU #6)
MONITORING WELL
LOCATION MAP
AND AVERAGE
GROUNDWATER ELEVATIONS

McLAREN/HART



Plots of water level recovery data for falling (a) and rising (c) head slug tests and selected data plots with regression lines (b) and (d). Points indicated on x-axes of (b) and (d) correspond to T_o of the Hvorslev method for computing hydraulic conductivity.



Plots of water level recovery data for falling (a) and rising (c) head slug tests and selected data plots with regression lines (b) and (d). Points indicated on x-axes of (b) and (d) correspond to T_o of the Hvorslev method for computing hydraulic conductivity.

DRMO
HYDRAULIC CONDUCTIVITY ESTIMATES

OVERBURDEN

RANGE: 6.57×10^{-3} cm/sec to 1.03×10^{-1} cm/sec

TYPICAL: 10^{-2} cm/sec

BEDROCK

RANGE: 9.66×10^{-5} cm/sec to 6.5×10^{-2} cm/sec

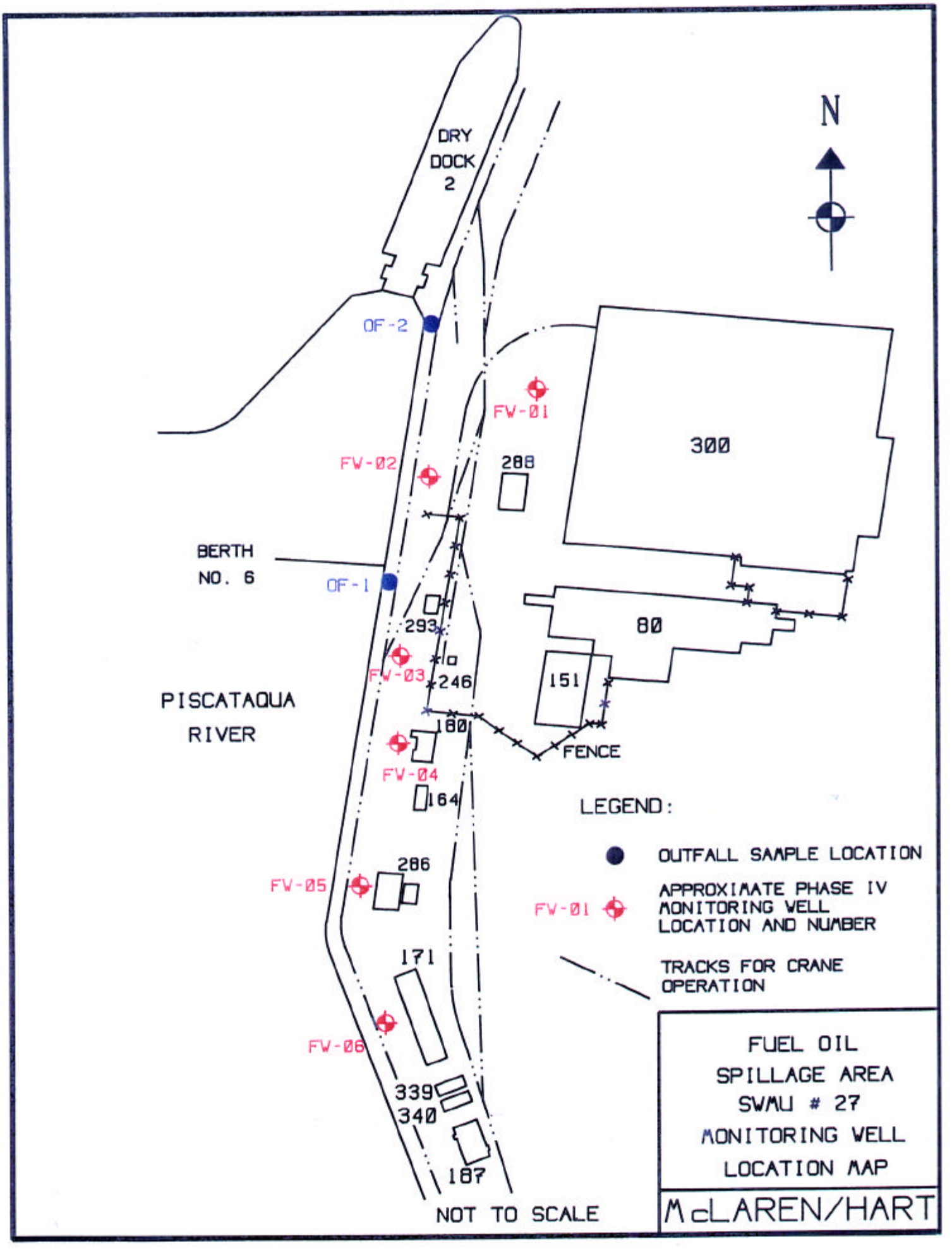
TYPICAL: with DW-10B: 10^{-2} cm/sec
without DW-10B: 10^{-3} cm/sec

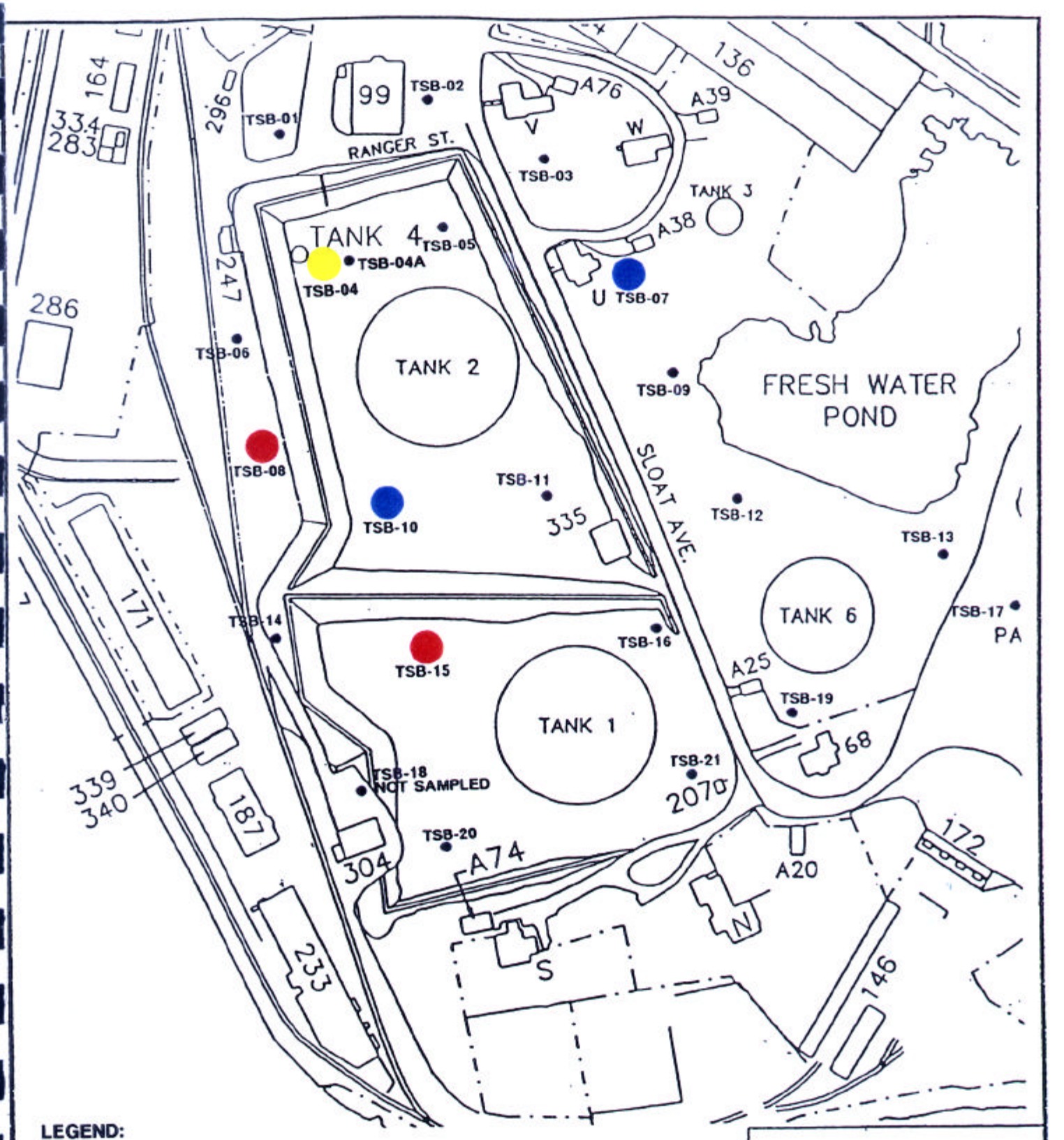
FUEL OIL PIPELINE
FINDINGS OF PREVIOUS PHASES

- COARSE FILL MATERIAL IN SUBSURFACE
- PETROLEUM CONTAMINATION FOUND IN SUBSURFACE SOILS
- PETROLEUM PRODUCT EVIDENT IN SEDIMENT OFF-SHORE

FUEL OIL PIPELINE
DATA GAPS

- SOURCE AND EXTENT OF CONTAMINATION NOT WELL DEFINED
- IMPACT ON GROUNDWATER NOT ASSESSED


N
DRY
DOCK
2
OF-2
FW-01
300
FW-02
288
BERTH
NO. 6
OF-1
293
80
FW-03
246
151
PISCATAQUA
RIVER
160
FENCE
FW-04
164
LEGEND:
OUTFALL SAMPLE LOCATION
286
FW-05
FW-01
APPROXIMATE PHASE IV
MONITORING WELL
LOCATION AND NUMBER
171
TRACKS FOR CRANE
OPERATION
FW-06
339
340
187
NOT TO SCALE
FUEL OIL
SPILLAGE AREA
SWMU # 27
MONITORING WELL
LOCATION MAP
McLAREN/HART



LEGEND:

- TRANSMISSION FLUID
- DIESEL OIL (#2 FUEL OIL)
- BUNKER OIL (#6 FUEL OIL)
- OTHER SOIL SAMPLING LOCATIONS

100 50 25 0 100 200

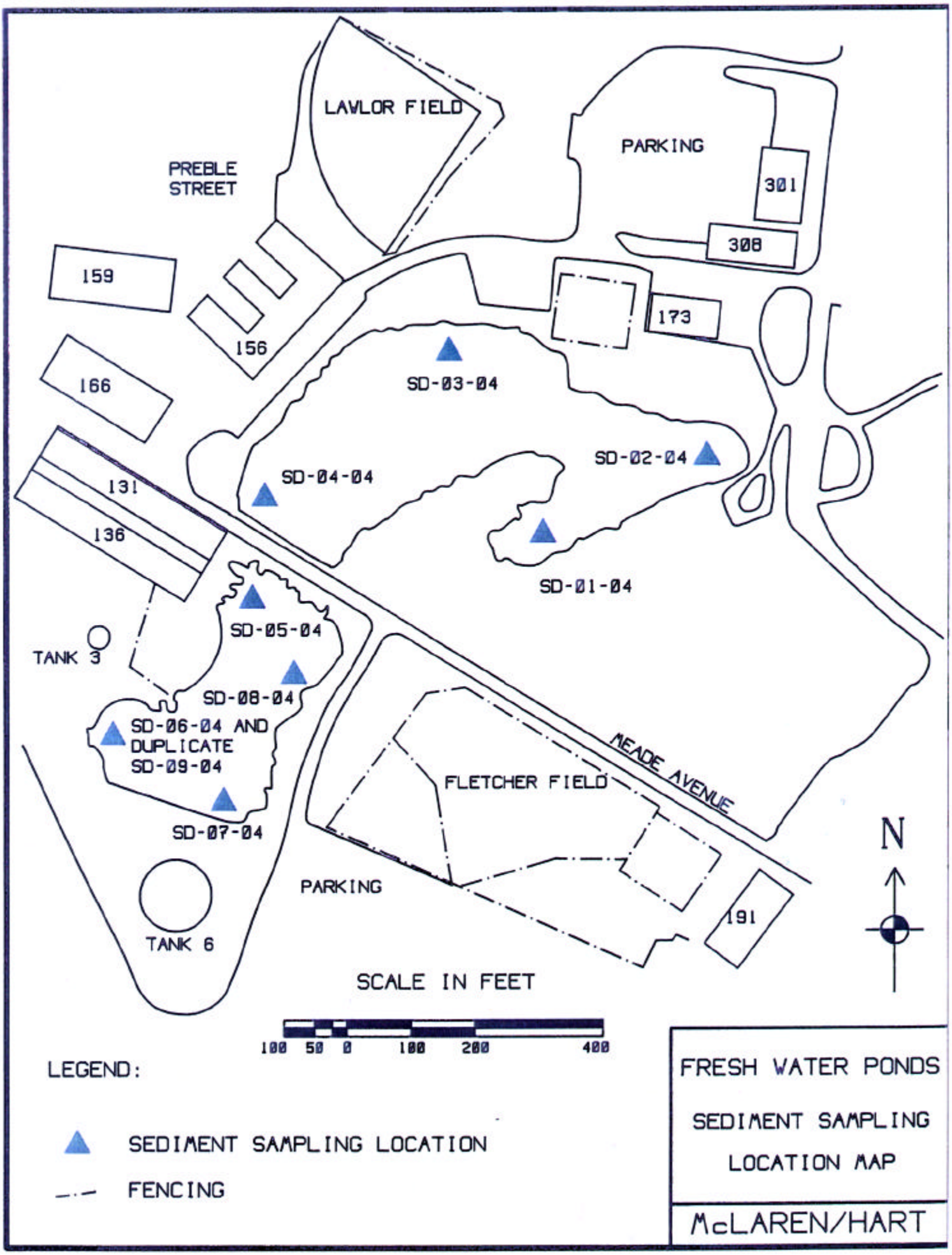
SCALE IN FEET

N

TANK FARM

PETROLEUM IDENTIFICATION ANALYSIS RESULTS

McLAREN/HART


LAWLOR FIELD
PARKING
PREBLE STREET
301
308
159
173
156
166
SD-03-04
SD-02-04
SD-04-04
131
136
SD-01-04
SD-05-04
TANK 3
SD-08-04
SD-06-04 AND DUPLICATE SD-09-04
MEADE AVENUE
FLETCHER FIELD
SD-07-04
N
PARKING
191
TANK 6
SCALE IN FEET
100 50 0 100 200 400
LEGEND:
SEDIMENT SAMPLING LOCATION
FENCING
FRESH WATER PONDS
SEDIMENT SAMPLING
LOCATION MAP
McLAREN/HART

FUEL OIL PIPELINE, TANK FARM, POND FINDINGS

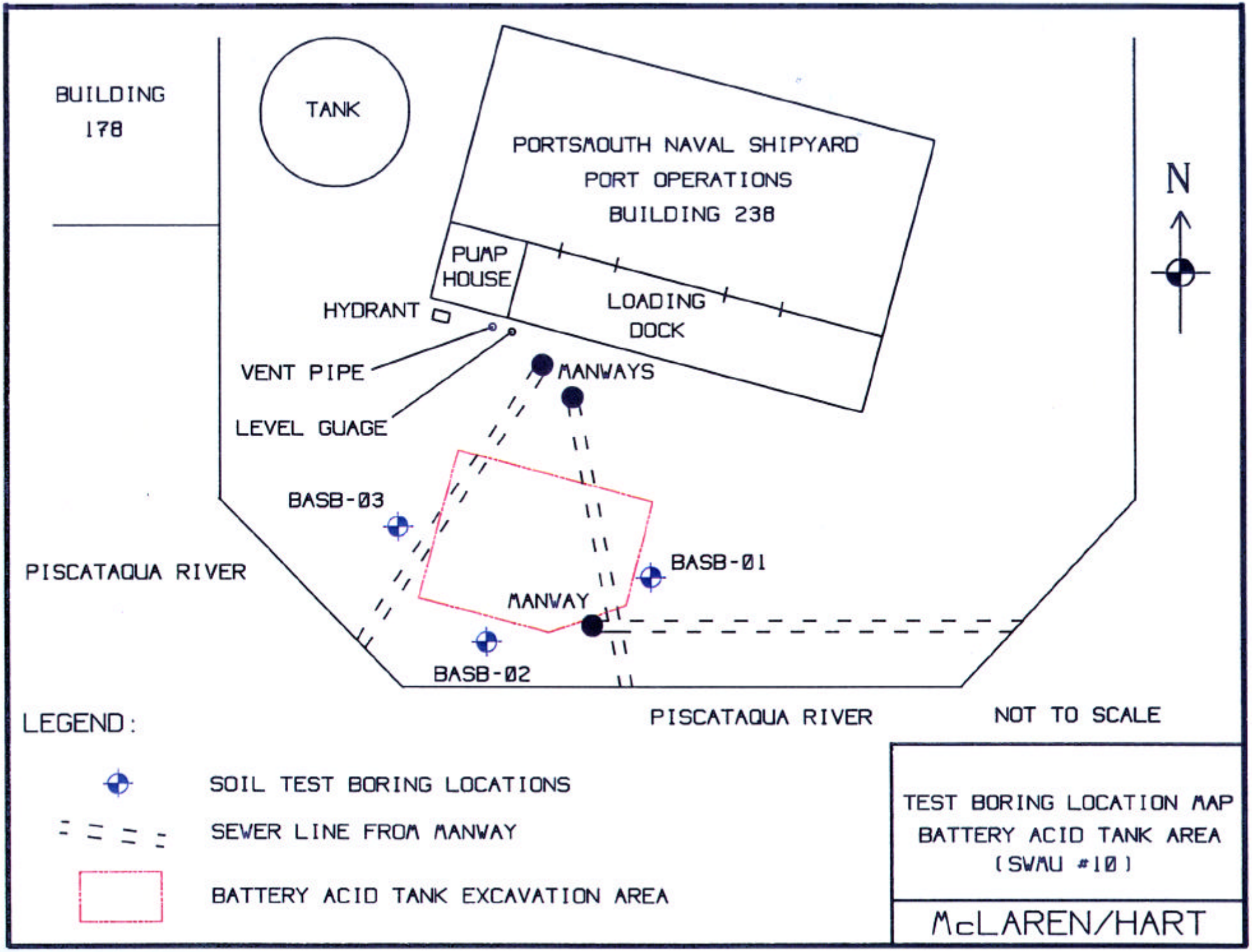
- NUMEROUS RELEASES FROM PIPELINE
- SURFACE SOILS AT TANK FARM SHOW LIMITED PETROLEUM CONTAMINATION (#2 FUEL OIL, #6 FUEL OIL, TRANSMISSION OIL)
- SOILS ALONG BERTH CONTAIN HEAVY METALS, ONE AREA SHOWED VARIOUS SEMI-VOLATILE COMPOUNDS
- GROUNDWATER CONTAINED HEAVY METALS, SELENIUM ABOVE NPDWR AFTER FILTERING
- CHROMATOGRAMS SUGGEST PRESENCE OF PETROLEUM PRODUCT IN SOILS FROM THREE LOCATIONS
- CHROMATOGRAMS SUGGEST PRESENCE OF PETROLEUM PRODUCT IN FW-06 ONLY
- NO CONTAMINANTS FOUND IN OUTFALLS WHICH EXCEEDED GUIDANCE VALUES OR PROPOSED ACTION LEVELS
- HEAVY METALS FOUND IN POND SEDIMENT SAMPLES
- CHROMATOGRAMS SUGGEST PRESENCE OF PETROLEUM IN SEVEN OF EIGHT SEDIMENT SAMPLES

TANK RELATED SWMUs
PREVIOUS WORK

- OFF-SHORE SEDIMENT SAMPLES COLLECTED NEAR FORMER BATTERY ACID TANK LOCATION
- SWMUs 13, 16, 21 AND 23 NOT PREVIOUSLY ADDRESSED

TANK RELATED SWMUs
DATA GAPS

- SUBSURFACE SOILS AT FORMER BATTERY ACID TANK LOCATION NEVER SAMPLED
- NO INVESTIGATIONS OF REMAINING TANK SWMUs WERE CONDUCTED


BUILDING
178
TANK
PORTSMOUTH NAVAL SHIPYARD
PORT OPERATIONS
BUILDING 238
PUMP
HOUSE
LOADING
DOCK
HYDRANT
VENT PIPE
LEVEL GUAGE
MANWAYS
BASB-03
BASB-01
MANWAY
BASB-02
PISCATAQUA RIVER
PISCATAQUA RIVER
N
NOT TO SCALE
LEGEND:
SOIL TEST BORING LOCATIONS
SEWER LINE FROM MANWAY
BATTERY ACID TANK EXCAVATION AREA
TEST BORING LOCATION MAP
BATTERY ACID TANK AREA
(SWMU #10)
McLAREN/HART

BATTERY ACID TANK
FINDINGS

- SEMI-VOLATILE CONCENTRATIONS WERE MEASURED IN ALL SOIL BORINGS AT THE FORMER BATTERY ACID TANK LOCATION
- CHROMATOGRAMS (TIC) SUGGESTED THE PRESENCE OF PETROLEUM IN THE SOILS
- HEAVY METALS WERE PRESENT IN CONCENTRATIONS ABOVE GUIDANCE VALUES USED FOR COMPARISON
- SUBSURFACE SOIL CONSISTED OF A BLACK COLORED SAND AND GRAVEL FILL MATERIAL

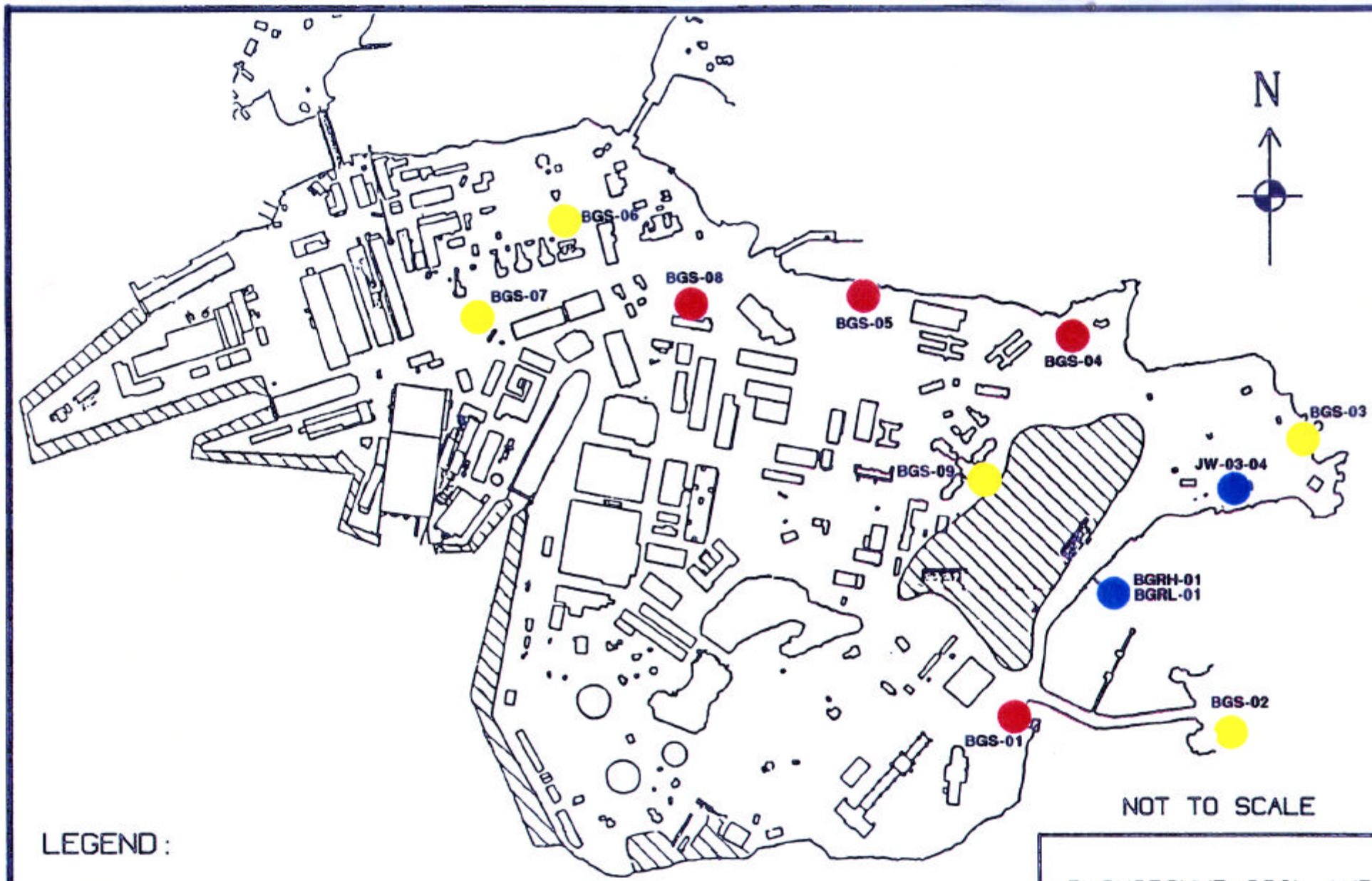
OTHER TANK RELATED SWMUs FINDINGS

Tank Identification	Tank Contents	Tank Condition	Soil Contaminants
SWMU #13	Non-Hazardous	Minor Corrosion	Semi-Volatiles, Metals
SWMU #16	Non-Hazardous	Minor Corrosion	Semi-Volatiles
SWMU #21	Non-Hazardous	Structural Failure	Semi-Volatiles, Metals
SWMU #23	Hazardous(Cd)	Good, No Corrosion	Semi-Volatiles

- ALL FOUR TANKS WERE REMOVED
- VISUAL EVIDENCE OF SOIL AND BEDROCK CONTAMINATION AT SWMU #21
- GROUNDWATER ENCOUNTERED IN EXCAVATION FOR SWMU #23 AT SEVEN FEET BELOW GRADE

BACKGROUND SAMPLES
PURPOSE

TO OBTAIN SOIL, GROUNDWATER AND RIVER SAMPLES FROM AREAS BELIEVED TO BE UNAFFECTED BY PNS ACTIVITIES FOR COMPARISON TO SWMU RELATED INVESTIGATORY SAMPLES



NOT TO SCALE

LEGEND:

- NATIVE SOIL SAMPLING LOCATION
- CLEAN FILL SAMPLE LOCATION
- WATER SAMPLE LOCATION

BACKGROUND SOIL AND GROUNDWATER/RIVER WATER SAMPLING LOCATIONS

McLAREN/HART

BACKGROUND SAMPLES
FINDINGS

SOILS

- DETECTABLE CONCENTRATIONS OF VOLATILES, SEMI-VOLATILES, PCBs AND METALS WERE FOUND IN ALL SOILS
- CHROMATOGRAMS (TIC) SUGGEST THE PRESENCE OF PETROLEUM IN MOST SOILS
- ONLY HEAVY METALS CONCENTRATIONS EXCEEDED GUIDANCE VALUES USED FOR COMPARISON

GROUNDWATER

- NO CONCENTRATIONS EXCEEDING GUIDANCE VALUES
- CHROMATOGRAMS (TIC) SUGGEST PRESENCE OF PETROLEUM

RIVER

- NO CONCENTRATIONS EXCEEDING GUIDANCE VALUES

ADDITIONAL WORK REQUIRED

- COMPLETION OF PHASE IV FIELD ACTIVITIES
- COMPLETION OF AIR MONITORING REPORT
- FURTHER IDENTIFICATION OF SOURCE AND EXTENT OF PETROLEUM CONTAMINATION AT FUEL OIL PIPELINE (SWMU #27)
- EVALUATION OF INTERIM CORRECTIVE MEASURES FOR DRMO
- COMPLETION OF ON-SHORE ECOLOGICAL ASSESSMENT
- PREPARATION OF PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION (PHERE)
- EVALUATION AND RECOMMENDATION OF MEDIA PROTECTION STANDARDS (MPS)
- REVIEW, INTERPRETATION AND PRESENTATION OF RFI REPORT
- INITIATION OF CORRECTIVE MEASURE STUDY