

SITE INVESTIGATION OF ACID AREAS FORMER PLUM BROOK ORDNANCE WORKS

Presented to

RAB

September 9, 1998



Purpose and Objectives

- Determine if hazardous substances are present in site soils in a manner that constitute unacceptable risk
- Define physical site features and characteristics (background)



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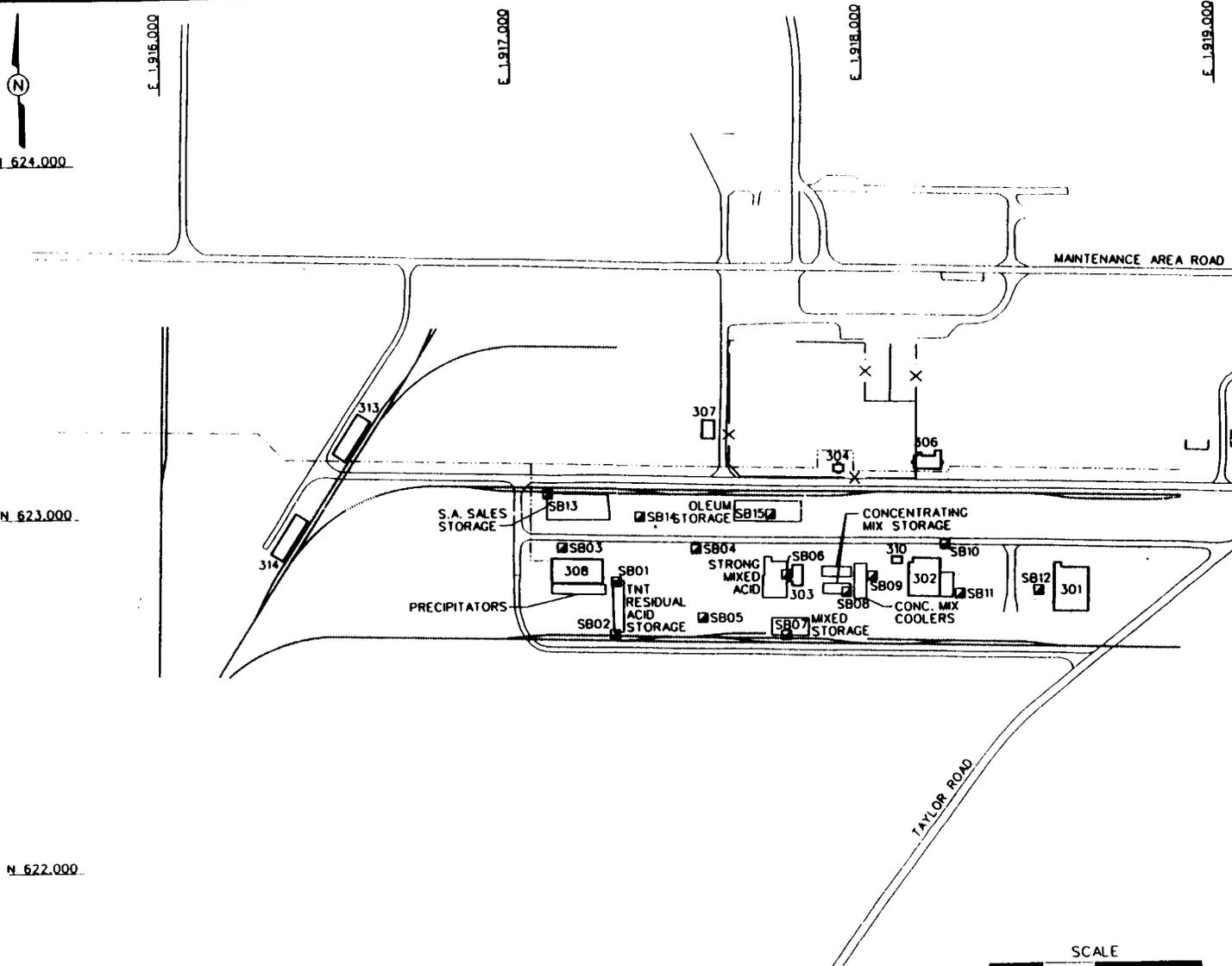
Scope of the Site Investigation

- Acid Areas 1 through 3
 - 30 soil samples each (15 borings) for chemical analysis
 - 4 soil samples each (2 borings) for geotechnical testing
- Maintenance Shop Area & Power Substation Area (Acid Area 3)
 - 6 soil samples (3 borings) for chemical analysis from MSA
 - 2 surface soil samples for chemical analysis from PSB
- Background Soil Sampling
 - 12 soil samples (6 borings) for chemical analysis



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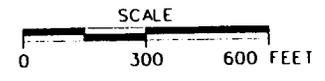
STARTING DATE 7/16/98 DATE LAST RE. 11/14/98
 DRAWN BY C-HALL DRAWN BY C-HALL
 DRAFT CHECK BY C-TUMMINI INITIATOR M. SPANGBERG DWG NO. 11-11-11
 ENGR CHECK BY GEORGE YU PROJ MGR SPANGBERG PROJ NO. 771320E

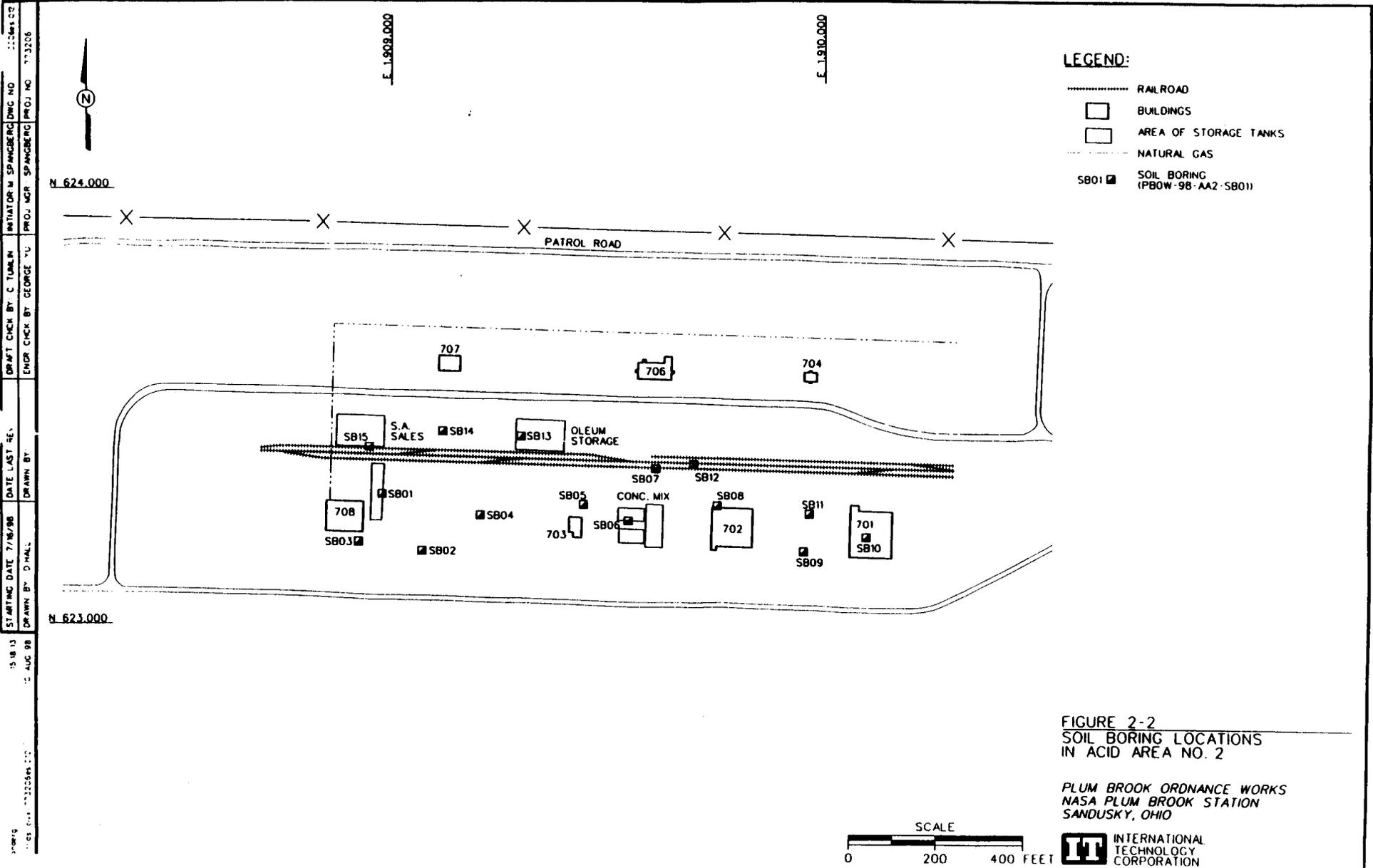


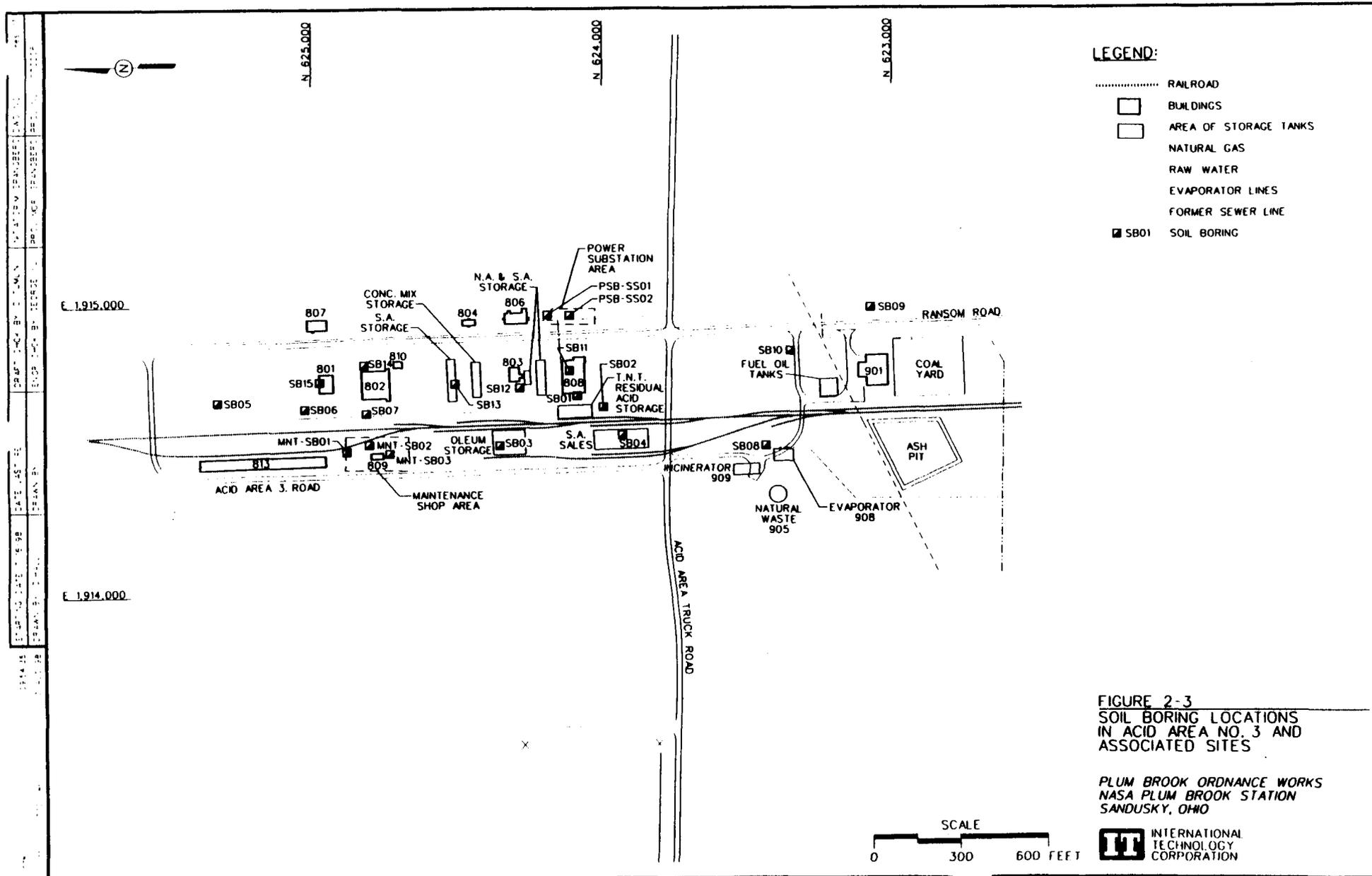
- LEGEND:**
- RAILROAD
 - BUILDINGS
 - ▭ AREAS OF STORAGE TANKS
 - - - - NATURAL GAS
 - SB01 SOIL BORING (PBOW-98-AA1-SB01)

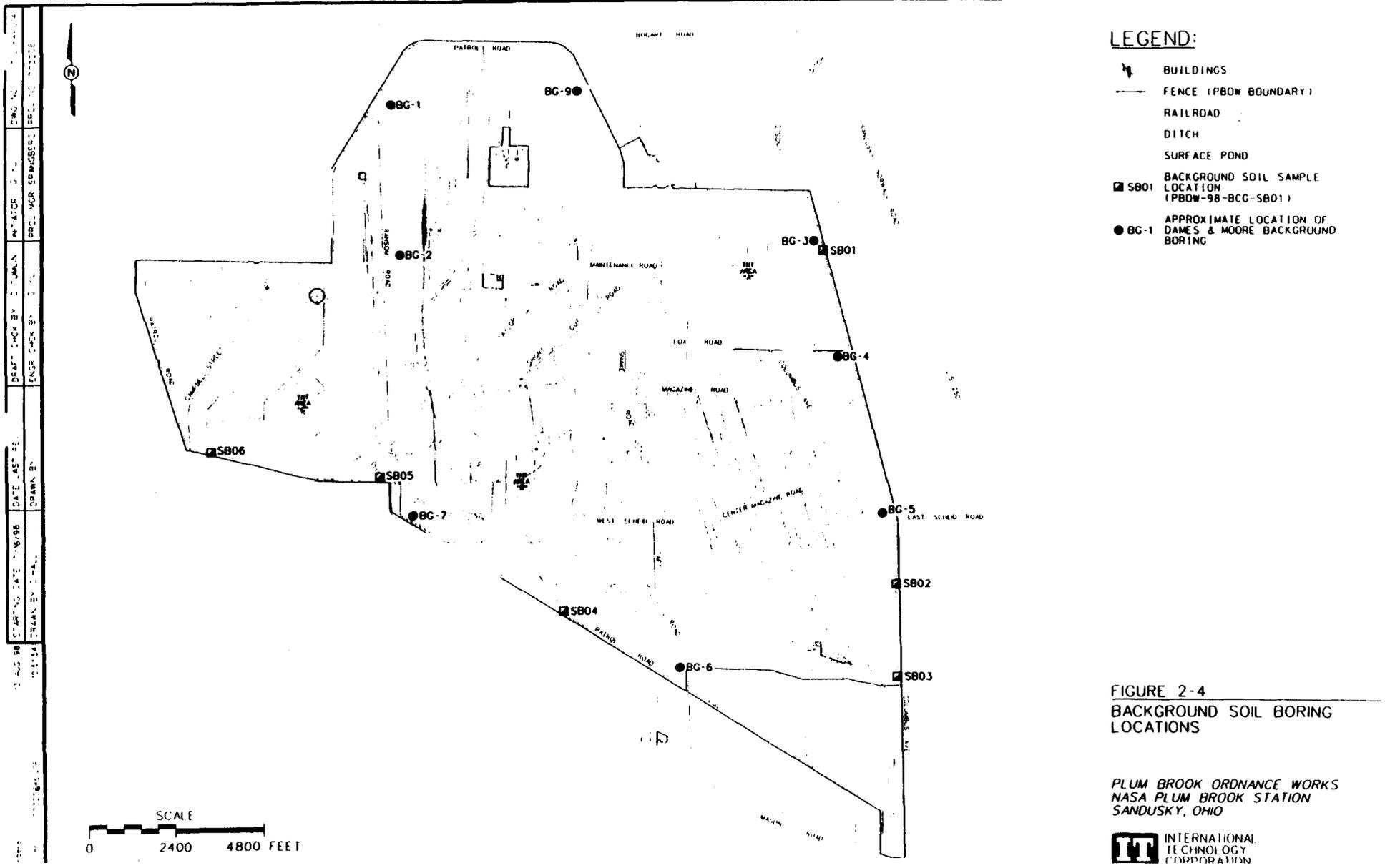
FIGURE 2-1
SOIL BORING LOCATIONS
IN ACID AREA NO. 1

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Risk-Based Screening Concentrations (RBC)

- RBCs are a screening tool
 - Determine need for additional investigation or remedial action
 - Reduce number of constituents carried to risk assessment
- PBOW RBCs adapted from published EPA Region 3 RBCs using lifetime excess cancer risk of 10^{-6} and hazard index (HI) of 0.1 (published RBCs use cancer risk of 10^{-6} and HI of 1.0)
 - EPA considers lifetime cancer risk of 10^{-4} to 10^{-6} "acceptable"
 - HI of 0.1 address concern of exposure to multiple non-carcinogenic contaminants
- RBCs do not replace human health or ecological risk assessments



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Analytical Results from Acid Area 1

- Surface Soils (0.5 to 1.5 feet)
 - All 15 samples analyzed for VOCs, SVOCs, PCBs, and metals
 - 2 samples (SB01 and SB02) analyzed for explosives
 - 3 VOCs and 12 SVOCs detected; concentrations below RBCs
 - 4 explosive compounds detected in SB02; 4-amino-2,6-DNT exceeded RBCs
 - PCB (Aroclor 1260) detected in 9 of 15 samples; exceeded RBC in SB01, SB06, SB08, SB11, SB12, SB14, and SB15
 - 5 metals (aluminum, arsenic, beryllium, iron, and manganese) exceeded RBCs but were below background concentrations



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Analytical Results from Acid Area 1 (continued)

- **Subsurface Soils (2.0 to 10.0 feet)**
 - All 15 samples analyzed for VOCs, SVOCs, and metals
 - 2 samples (SB01 and SB02) analyzed for explosives
 - 11 VOCs and 1 SVOC detected; concentrations below RBCs
 - Explosive compounds were not detected
 - 5 metals (aluminum, arsenic, beryllium, iron, and manganese) exceeded RBCs but were below background concentrations.



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Analytical Results from Acid Area 2

- **Surface Soils (0.5 to 1.5 feet)**
 - All 15 samples analyzed for VOCs, SVOCs, PCBs, and metals
 - 2 samples (SB06 and SB07) analyzed for explosives
 - 3 VOCs detected at concentrations below RBCs
 - 22 SVOCs detected of which 5 exceeded RBCs
 - Explosive compounds were not detected
 - PCB (Aroclor 1260) detected in 9 of 15 samples; exceeded RBC in SB01, SB02, SB03, SB06, SB10, SB11, and SB13
 - 5 metals (aluminum, arsenic, beryllium, iron, and manganese) exceeded RBCs but were below background concentrations



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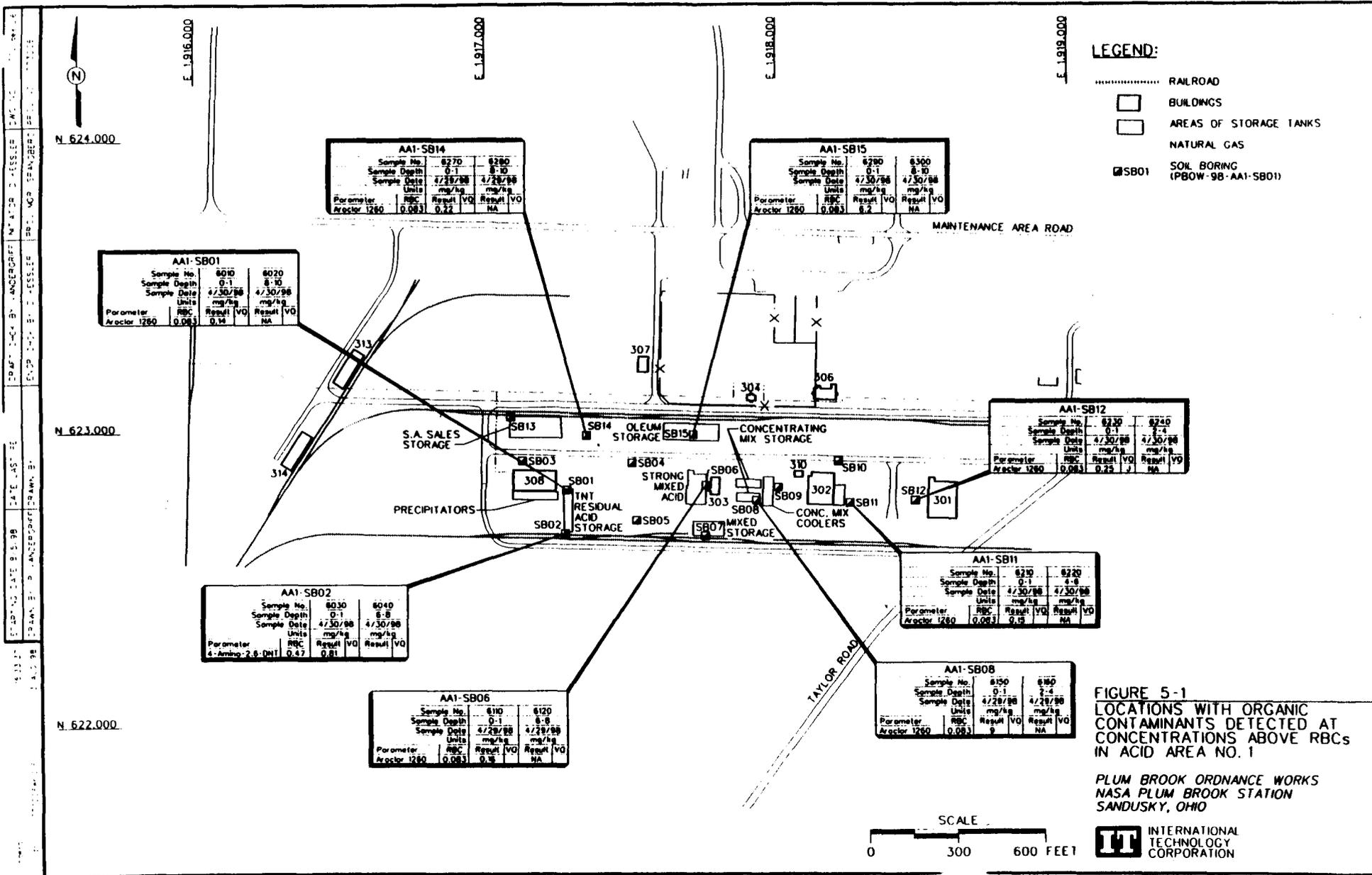
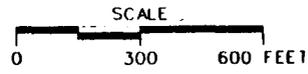
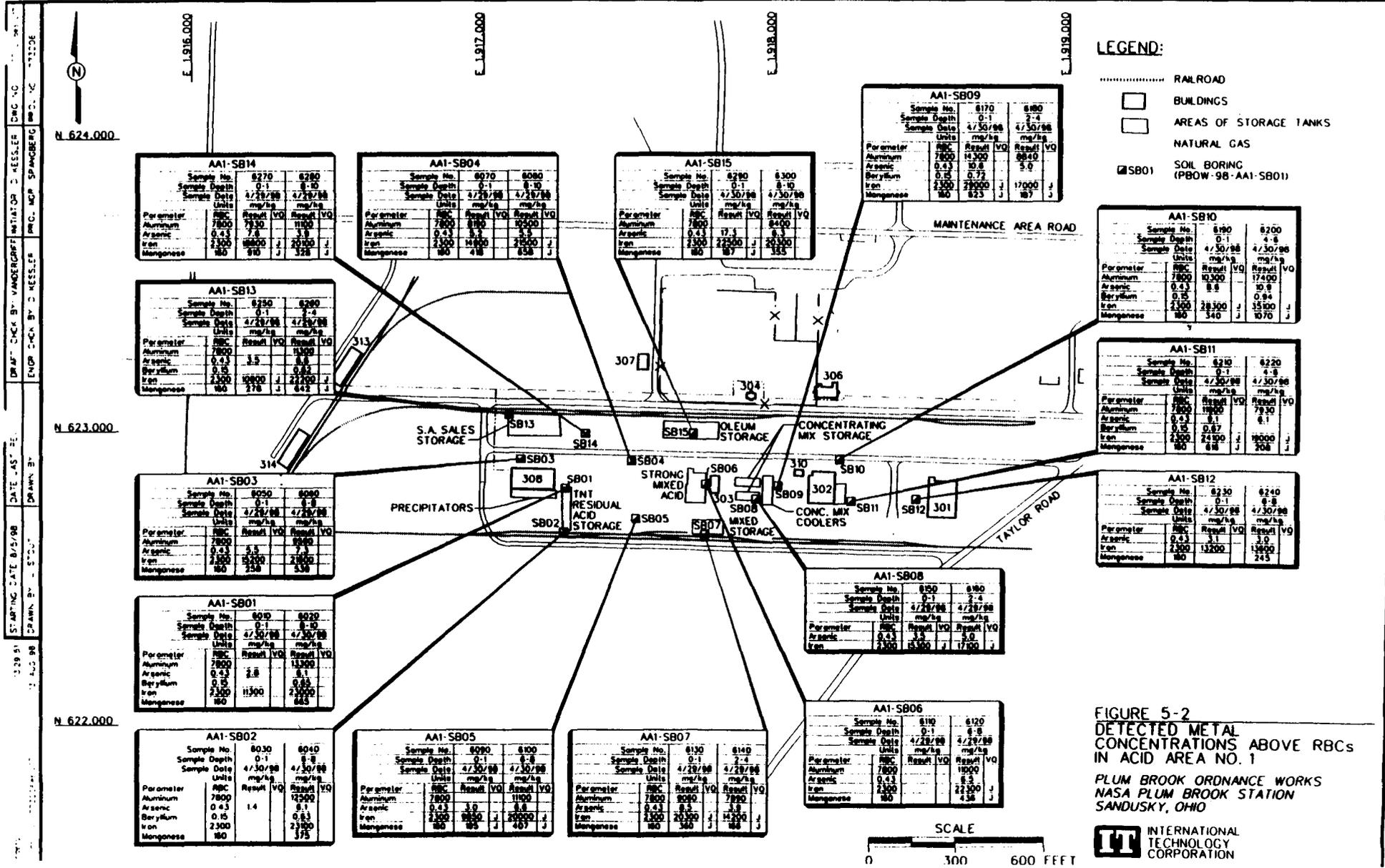


FIGURE 5-1
 LOCATIONS WITH ORGANIC
 CONTAMINANTS DETECTED AT
 CONCENTRATIONS ABOVE RBCs
 IN ACID AREA NO. 1

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LEGEND:

- RAILROAD
- BUILDINGS
- AREAS OF STORAGE TANKS
- NATURAL GAS
- ⊠ (SB01) SOIL BORING (PBOW-98-AA1-SB01)

AA1-SB10

Sample No.	6190	6200			
Sample Depth	0-1	4-8			
Sample Date	4/30/98	4/30/98			
Parameter	RBC	Result	VG	Result	VG
Aluminum	7800	10300		17400	
Arsenic	0.43	8.8		30.8	
Beryllium	0.15	0.94		0.94	
Iron	2300	28300	J	45100	J
Manganese	80	340	J	1070	J

AA1-SB11

Sample No.	6210	6220			
Sample Depth	0-1	4-8			
Sample Date	4/30/98	4/30/98			
Parameter	RBC	Result	VG	Result	VG
Aluminum	7800	10300		17400	
Arsenic	0.43	8.8		30.8	
Beryllium	0.15	0.67		0.67	
Iron	2300	24300	J	19000	J
Manganese	80	68	J	208	J

AA1-SB12

Sample No.	6230	6240			
Sample Depth	0-1	4-8			
Sample Date	4/30/98	4/30/98			
Parameter	RBC	Result	VG	Result	VG
Arsenic	0.43	3.1		3.0	
Iron	2300	13200	J	13900	J
Manganese	80	358	J	245	J

AA1-SB08

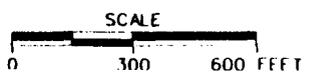
Sample No.	6150	6160			
Sample Depth	0-1	2-4			
Sample Date	4/28/98	4/28/98			
Parameter	RBC	Result	VG	Result	VG
Arsenic	0.43	3.6		3.6	
Iron	2300	15300	J	1700	J

AA1-SB06

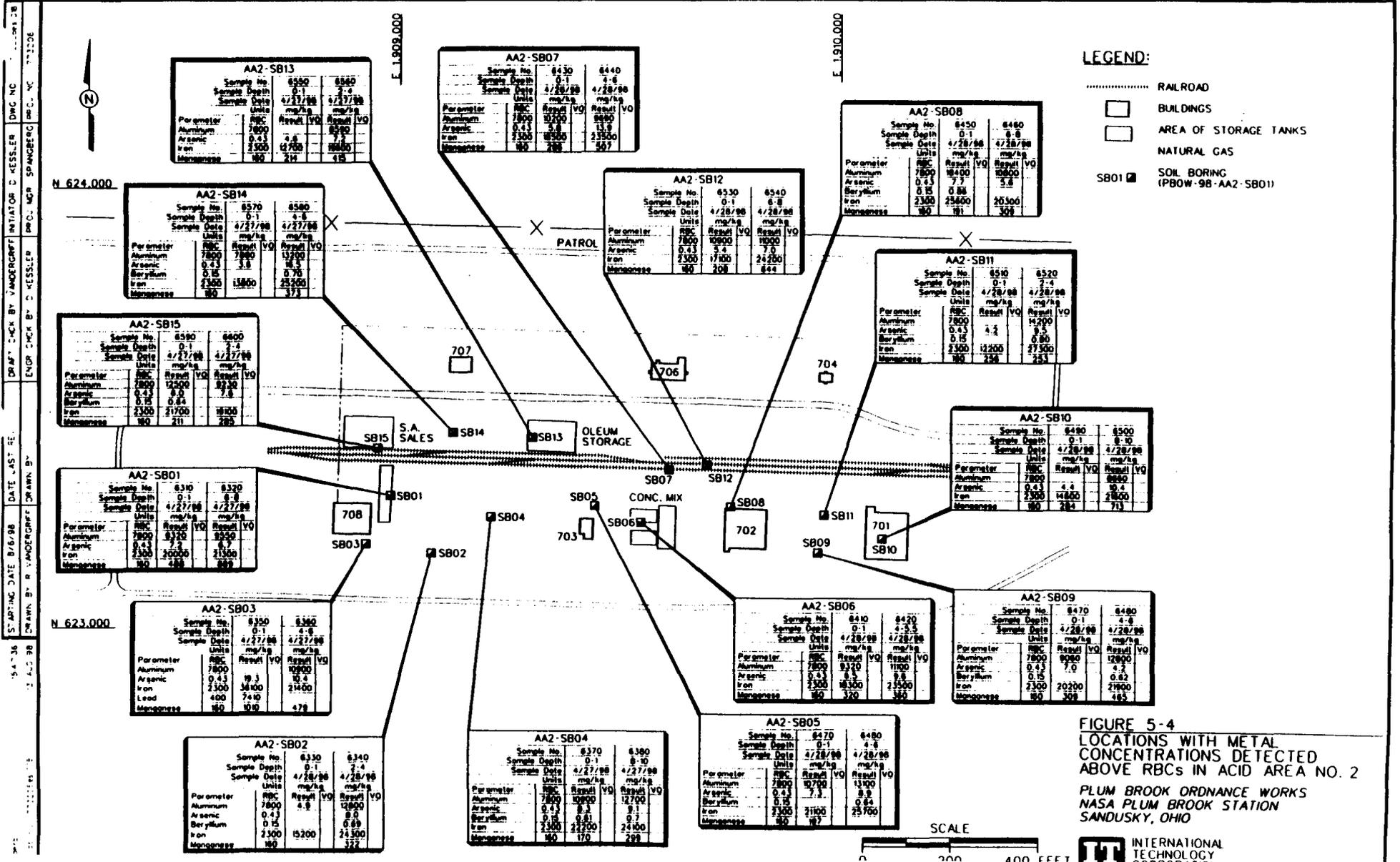
Sample No.	6110	6120			
Sample Depth	0-1	6-8			
Sample Date	4/28/98	4/28/98			
Parameter	RBC	Result	VG	Result	VG
Aluminum	7800	8090		19000	
Arsenic	0.43	8.5		6.3	
Iron	2300	20300	J	14300	J
Manganese	80	360	J	438	J

FIGURE 5-2
DETECTED METAL CONCENTRATIONS ABOVE RBCs IN ACID AREA NO. 1

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STARTING DATE: 8/15/98 DATE: 10/1/98
 DRAWN BY: SDC
 CHECK BY: VANDERGRIFT/ATOR 3, HESSLER DWG NO. 10000000
 EMP. NO. SPANBERG 100, 100



Analytical Results from Acid Area 2 (continued)

- **Subsurface Soils (2.0 to 10.0 feet)**
 - All 15 samples analyzed for VOCs, SVOCs, and metals
 - 2 samples (SB06 and SB07) analyzed for explosives
 - 4 VOCs and 13 SVOCs detected; only benzo(a)pyrene (SVOC) exceeded RBCs
 - Explosive compounds were not detected
 - 5 metals (aluminum, arsenic, beryllium, iron, and manganese) exceeded RBCs but were below background concentrations.



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Analytical Results from Acid Area 3

- **Surface Soils (0.5 to 1.5 feet)**
 - All 15 samples analyzed for VOCs, SVOCs, PCBs, and metals
 - 2 samples (SB01 and SB02) analyzed for explosives
 - 2 VOCs detected at concentrations below RBCs
 - 22 SVOCs detected of which 5 exceeded RBCs
 - 1 explosive compound (2,4-DNT) detected in SB01 below RBC
 - PCB (Aroclor 1260) detected in 5 of 15 samples; exceeded RBC in each (SB01, SB02, SB04, SB08, and SB14)
 - 4 metals (aluminum, arsenic, iron, and manganese) exceeded RBCs but were below background concentrations



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Analytical Results from Acid Area 3 (continued)

- **Subsurface Soils (2.0 to 10.0 feet)**
 - All 15 samples analyzed for VOCs, SVOCs, and metals
 - 2 samples (SB01 and SB02) analyzed for explosives
 - 6 VOCs and 20 SVOCs detected; only benzo(a)pyrene (SVOC) exceeded RBCs
 - 1 explosive compound (2,4-DNT) detected in SB01 below RBC
 - 6 metals (aluminum, arsenic, antimony, beryllium, iron, and manganese) exceeded RBCs; all but antimony below background concentrations.



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Analytical Results from Maintenance Shop (AA3)

- **Surface Soils (0.5 to 1.5 feet)**
 - All 6 samples analyzed for VOCs, SVOCs, PCBs, and metals
 - VOCs and SVOCs were not detected
 - PCB (Aroclor 1260) detected in 1 sample but below RBC
 - 4 metals exceeded RBCs; below background concentrations
- **Subsurface Soils (2.0 to 10.0 feet)**
 - All 6 samples analyzed for VOCs, SVOCs, and metals
 - 2 VOCs and 1 SVOC detected but below RBCs
 - 5 metals exceeded RBCs; below background concentrations.



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Analytical Results from Power Substation (AA3)

- **Surface Soils (0.5 to 1.5 feet)**
 - 2 samples analyzed for VOCs, SVOCs, PCBs, and metals
 - VOCs and SVOCs detected; only benzo(a)pyrene exceeded RBCs
 - PCB (Aroclor 1260) detected in both samples above RBC
 - 4 metals exceeded RBCs; below background concentrations
- **Subsurface Soils (2.0 to 10.0 feet)**
 - Not sampled.



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Acid Area 1 Conclusions

- **Contaminants of potential concern (COPC) (above RBCs) in surface soils include SVOCs, PCBs, and explosives**
- **Subsurface soils exhibit low levels of organics (below RBCs)**
- **Metals attributable to background conditions**



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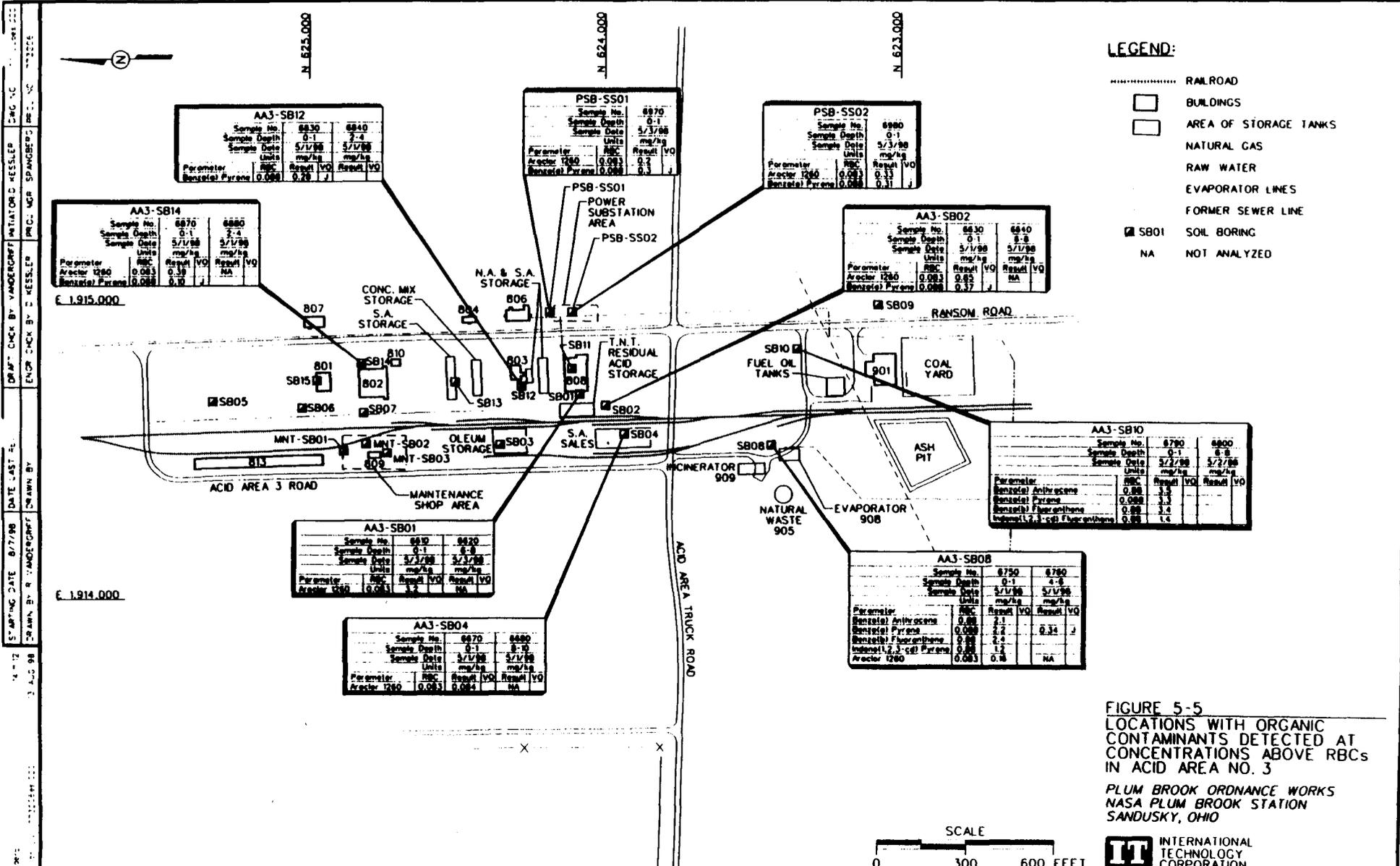
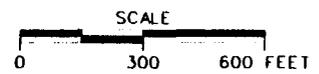
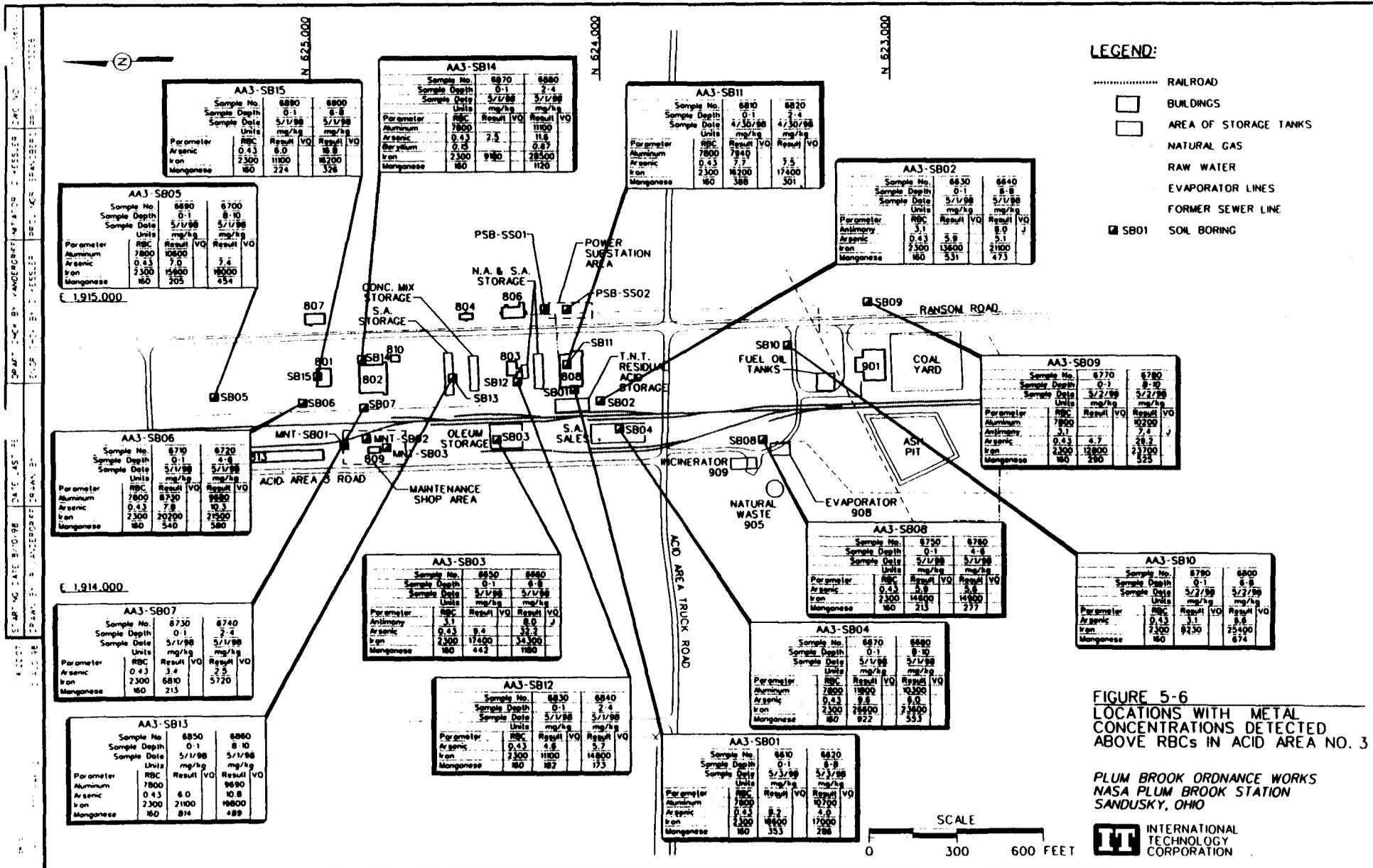


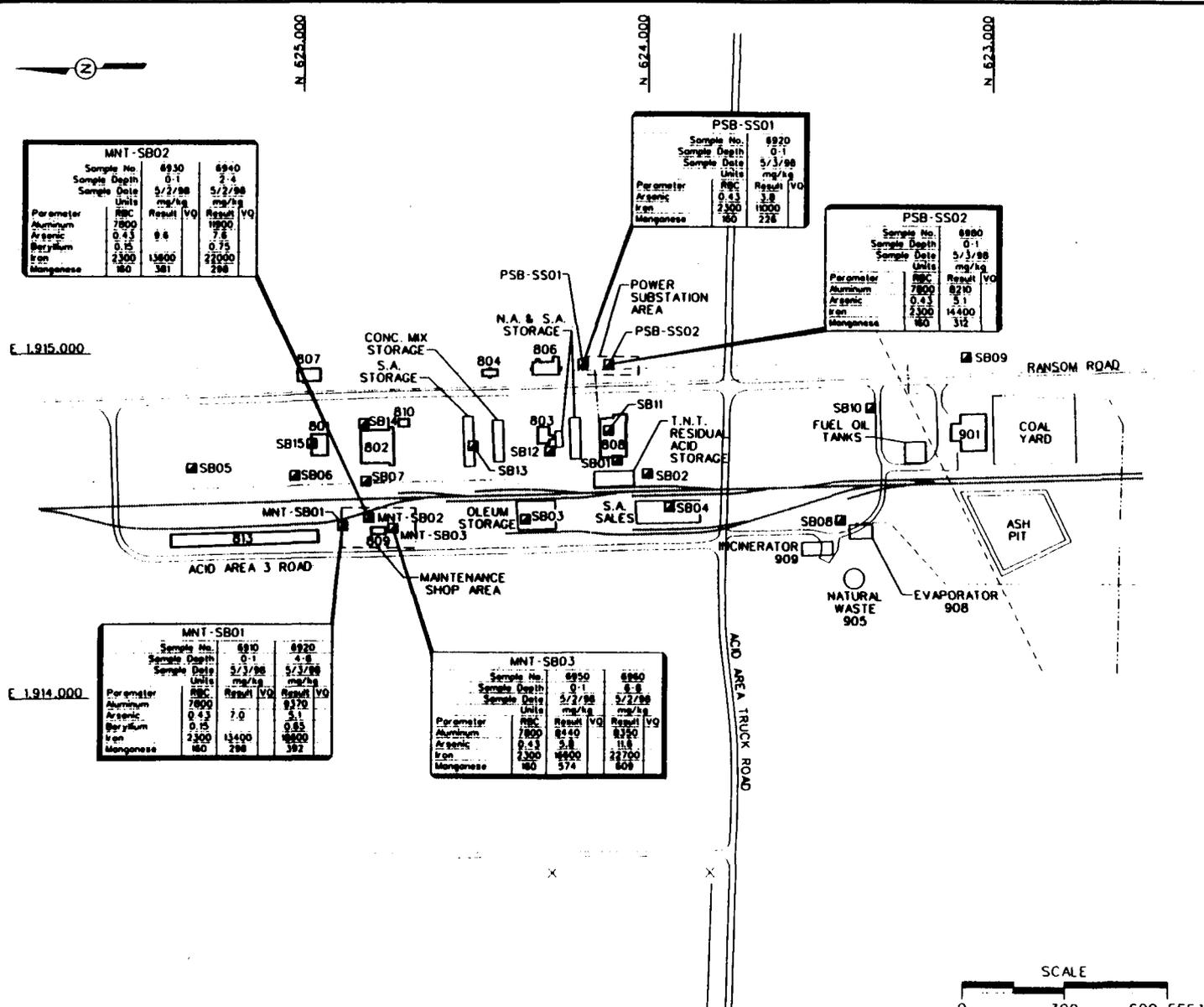
FIGURE 5-5
 LOCATIONS WITH ORGANIC
 CONTAMINANTS DETECTED AT
 CONCENTRATIONS ABOVE RBCs
 IN ACID AREA NO. 3
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DRAWN BY: R. WANDERGRIFT DATE: 8/7/98
 CHECKED BY: D. KESSLER DATE: 8/11/98
 PROJECT: MGR. SPANDEBEE
 DRAWING NO.: 2022E



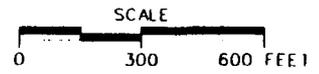
54926 DATE 8/10/98 DATE AS'D BY: DRAM' CHECK BY: VANDERGRFF INITIATOR C HESSLER DMC NO. 1111111111
 DRAWN BY: VANDERGRFF DRAWN BY: ENGR. CHK. BY: HESSLER PROJ. MGR. SPANBERG PROJ. NO. 1111111111



- LEGEND:**
- RAILROAD
 - BUILDINGS
 - AREA OF STORAGE TANKS
 - NATURAL GAS
 - RAW WATER
 - EVAPORATOR LINES
 - FORMER SEWER LINE
 - SB01 SOIL BORING

FIGURE 5-7
 LOCATIONS WITH METAL CONCENTRATIONS DETECTED ABOVE RBCs IN MNT AND PSB AREAS

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Acid Area 2 Conclusions

- COPCs in surface soils include SVOCs and PCBs
- COPCs in subsurface soils limited to benzo(a)pyrene (SVOC)
- Metals attributable to background conditions



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Acid Area 3 Conclusions

- COPCs in AA3 surface soils include SVOCs and PCBs
- COPCs in PSB surface soils include benzo(a)pyrene (SVOC) and PCBs
- COPCs in AA3 subsurface soils limited to benzo(a)pyrene (SVOC)
- Metals, including antimony, attributable to background conditions
 - Antimony detected @ 8 mg/kg
 - 95% UCL background is 7.88 mg/kg, maximum detected background is 9.3 mg/kg



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Recommendations

- **Subsurface soil sampling should be conducted in Acid Areas to determine if PCBs present in subsurface as well as surface soils**
- **Site-specific human health and ecological risk assessments should be performed to determine risk associated with COPCs**
 - **Aroclor 1260 (PCB) frequently detected in surface soils at concentrations above RBCs; maximum detection 20 mg/kg**
 - **SVOCs infrequently detected at concentrations above RBCs**
- **Additional surface soil sampling and/or evaluation if deemed appropriate by human health and/or ecological risk assessments**

