REPORT DOCUMENTATION PAGE

Form Approved OMB No. 074-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	1995	Technical Report, September 18, 1995

4. TITLE AND SUBTITLE
Preliminary Results of Field Activities, Joliet Army Ammunition Plant Field Demonstration, Milestone Report

5. FUNDING NUMBERS
N/A

6. AUTHOR(S)
Bujewski, Grace

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Environmental Restoration Technologies
Department
Sandia National Laboratories
Albuquerque, NM

8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
SERDP
901 North Stuart St. Suite 303
Arlington, VA 22203

10. SPONSORING / MONITORING AGENCY REPORT NUMBER
N/A

11. SUPPLEMENTARY NOTES
Milestone Report, September 18, 1995. This work was supported in part by SERDP.

12a. DISTRIBUTION / AVAILABILITY STATEMENT	12b. DISTRIBUTION CODE
Approved for public release: distribution is unlimited	A

13. ABSTRACT ***(Maximum 200 Words)***
The field demonstration at the Joliet Army Ammunition Plant (JAAP) took place from July 10 through August 3, 1995. the demonstration was conducted in partnership with the Army Environmental Center (AEC) Installation Restoration Program (IRP) and AEC's Technology Development Program (TDP). AEC's TDP supported researchers from Tufts University who demonstrated innovative field analytical techniques for the analysis of soil samples for TNT and tetryl. OHM, Inc., was the contractor to AEC's IRP for the JAAP project and was responsible for implementing the adaptive sampling program at selected JAAP sites. The problem of soils contaminated with explosives is extremely important from the Army's perspective. The Army has 28 ordnance manufacturing facilities with soil contamination problems very similar to those found at JAAP. Any enhancement in the characterization and restoration process at these facilities could result in significant time and cost savings.

14. SUBJECT TERMS	15. NUMBER OF PAGES	16. PRICE CODE
SERDP, IRP, JAAP, TDP, AEC	11	N/A

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
unclass	unclass	unclass	UL

(33-1995)

PRELIMINARY RESULTS OF FIELD ACTIVITIES
JOLIET ARMY AMMUNITION PLANT FIELD DEMONSTRATION
Milestone Report

Submitted by
Grace Bujewski
Environmental Restoration Technologies Department
Sandia National Laboratories

September 18,1995

PRELIMINARY RESULTS OF FIELD ACTIVITIES
JOLIET ARMY AMMUNITION PLANT FIELD DEMONSTRATION
Milestone Report

Submitted by
Grace Bujewski
Environmental Restoration Technologies Department
Sandia National Laboratories

Introduction

The field demonstration at the Joliet Army Ammunition Plant (JAAP) (Figure 1) took place from July 10 through August 3, 1995. The demonstration was conducted in partnership with the Army Environmental Center (AEC) Installation Restoration Program (IRP) and AEC's Technology Development Program (TDP). AEC's TDP supported researchers from Tufts University who demonstrated innovative field analytical techniques for the analysis of soil samples for TNT and tetryl. OHM, Inc., was the contractor to AEC's IRP for the JAAP project and was responsible for implementing the adaptive sampling program at selected JAAP sites. The problem of soils contaminated with explosives is extremely important from the Army's perspective. The Army has 28 ordnance manufacturing facilities with soil contamination problems very similar to those found at JAAP. Any enhancement in the characterization and restoration process at these facilities could result in significant time and cost savings.

Objectives

Contained within the general purpose of showing how decision support tools can be used to facilitate the design and implementation of an adaptive sampling program, the SERDP-funded work at JAAP included three objectives. The first objective was to successfully demonstrate several specific capabilities. These included (1) the ability to fuse soft data with any existing hard data into an initial conceptual model that would initially guide the course of the sampling program; (2) the ability to provide graphics in "real time" that synthesize the available characterization data; (3) the ability to provide sampling recommendations on the fly to field sampling crews; and (4) the ability to develop quantitative estimates of the area affected by contamination. The second objective was to include this demonstration in an actual characterization activity that would demonstrate its acceptability to the regulatory community. The third objective for the work was to identify technical or logistical issues that require resolution for adaptive sampling programs to work.

Standard Work Plan

The demonstration work funded by SERDP was designed both to demonstrate enhancements to the proposed OHM work plan and to complement OHM's planned activities in the areas of decision support. JAAP, an Army ordnance depot located 10 miles south of Joliet, Illinois, has two separate areas, the Manufacturing area and the Load, Assembly, and Packaging Area (Figure 2). Within the Manufacturing Area, there are several production lines that were associated with the production of TNT. Preliminary sampling indicated that there was TNT contamination in surface soils and groundwater. Based on these results, AEC's IRP proposed a more detailed and intensive sampling effort to determine the nature and extent of explosives contamination in the surface soils. The conclusions drawn from the sampling program would support the design of a remedial action for the TNT production area.

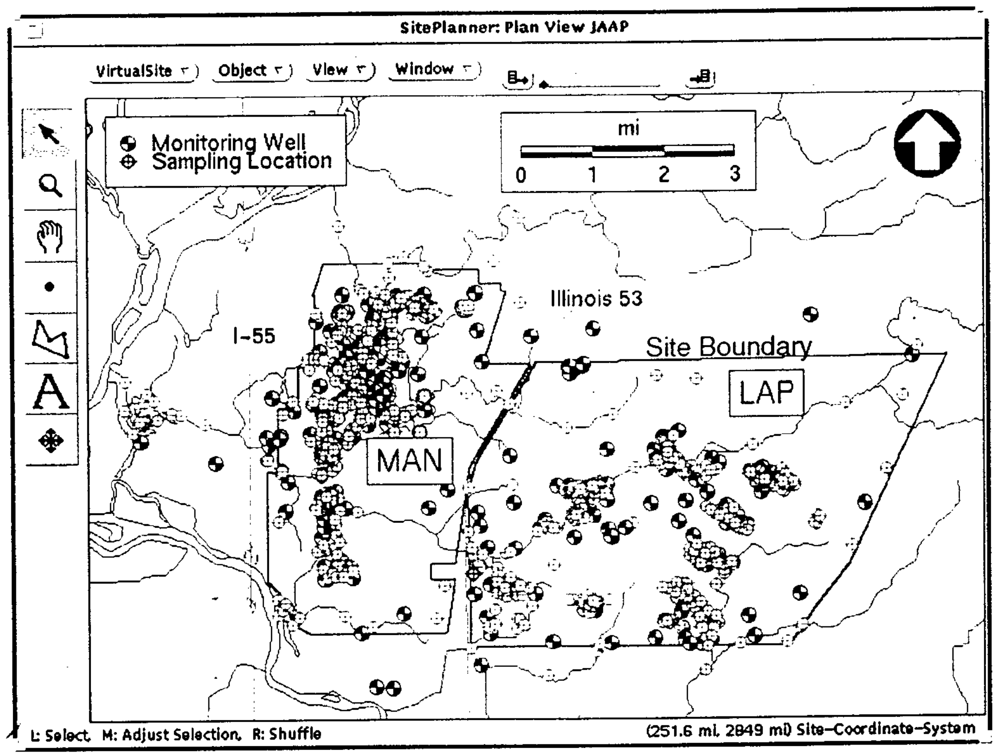

Figure 1 Joliet Army Ammunition Plant

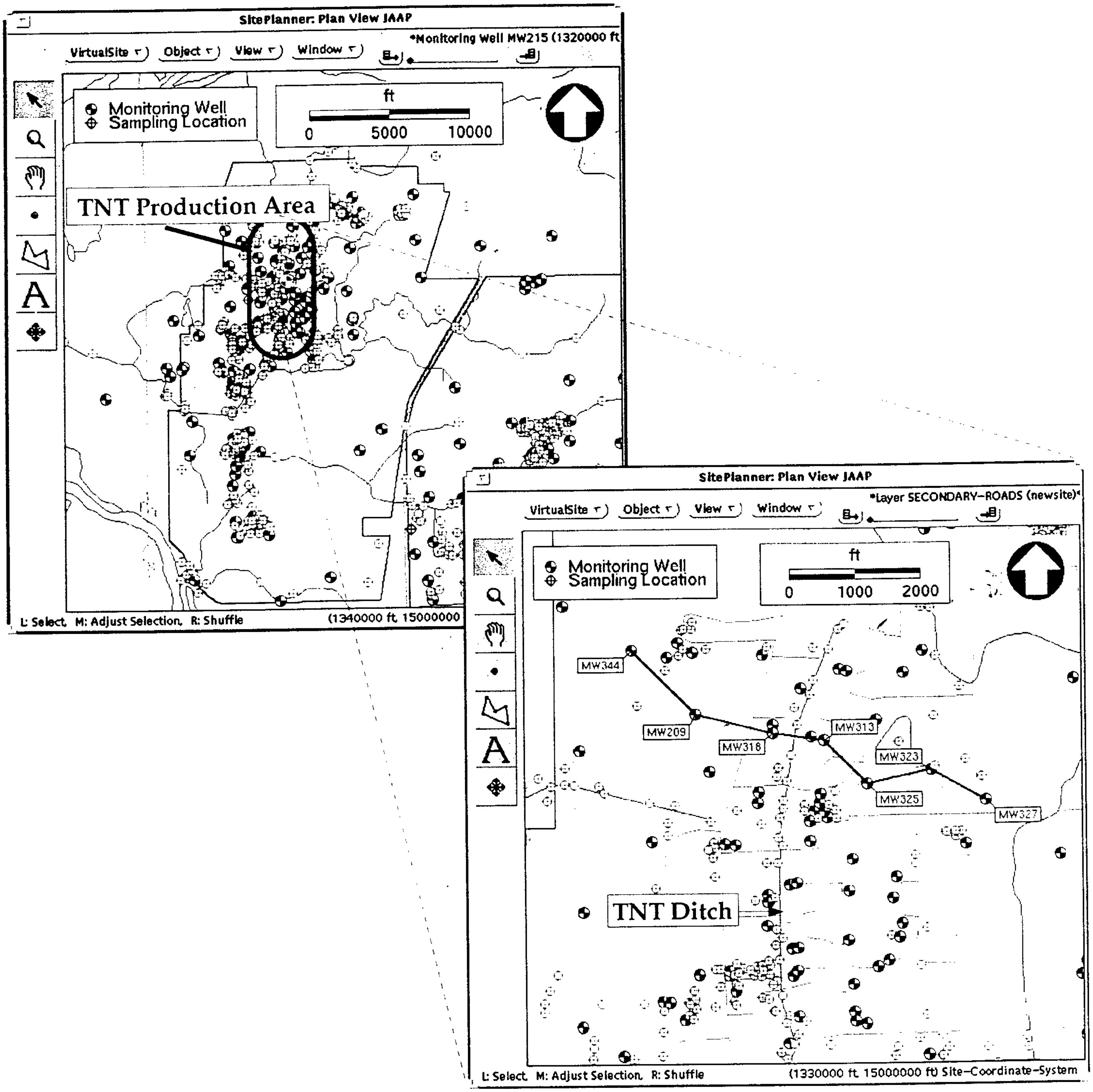

Figure 2 The TNT Production Area

The original OHM scope of work for the characterization of the TNT production area called for a combination of gridded and adaptive sampling, with field analysis performed using D-Tech explosives test kits, a gross field screening technique for TNT based on immunoassay technologies. Approximately 750 samples were to be collected at 375 sampling locations and two discrete depths. The gridded samples in the TNT production area were assigned to a very coarse grid (500 foot spacing between sampling locations). The adaptive samples were to be placed based on visual inspection of the TNT production line area.

Methodology

Two production lines (#2 and #5) from the TNT production area (Figure 3) were chosen for this demonstration. A detailed conceptual model was developed for these two lines (Figures 4 and 5). The conceptual model for each area attempted to delineate areas of high and low contamination probability, based on the information available for each line. Sampling began with these lines, with approximately 90 locations allocated per line. These 90 sampling locations were broken into three sequential groups. The first 30 were placed to verify that areas that were thought to be contaminated actually were. After the first 30 had been sampled, a second set of 30 was selected to delineate the extent of contamination where it was found. The final 30 sampling locations, selected after the second set of 30 had been sampled, were used both to finalize the delineation of contamination and to verify that areas where contamination was thought unlikely were indeed clean.

During the sampling period, the SERDP funded team selected, flagged, and surveyed locations to be sampled in the production line areas. OHM sampling crews sampled these locations and split the samples. One set of splits went to the OHM field chemists who analyzed the samples with D-Tech kits. The second set of the split went to field chemists from Tufts University who primarily used fast GC/MS technology to provide a more detailed analysis of the samples. Based on these sample results, the SERDP team picked the next set of sampling locations.

Results

The results of the integration of SitePlanner and Plume into the JAAP sampling program are indicated in Figures 6 – 8). The demonstration was a success from the standpoint of the technologies and methodologies brought to the project with SERDP funding. There were three objectives for the SERDP work.

The first objective was to demonstrate four decision-support technical capabilities important to the success of an adaptive sampling program. The first was the capability to produce graphics in "real time" that synthesized sampling program data. Graphics from SitePlanner were generated as data from the field became available. These graphics assisted in the selection of new sampling locations, served as field maps for survey crews required to locate the new sampling points in the field, and ultimately became the basis for periodic discussions with AEC staff, IEPA and US EPA regulators, and OHM field staff about the results and their significance.

The second capability was the capability to quantitatively incorporate soft information into the sampling program. Detailed conceptual models based on production line surveys were developed for two TNT production lines. These initial conceptual models were the basis for the initial set of sampling locations that were selected. These initial conceptual models successfully located the bulk of surficial soil contamination. This, in turn, dramatically changed the emphasis of additional sampling from determining the extent of contamination to confirming what had already been deduced from soft information.

The third was the capability to provide on-the-fly additional sampling locations based on previous sampling results. While this depended to a great extent on the

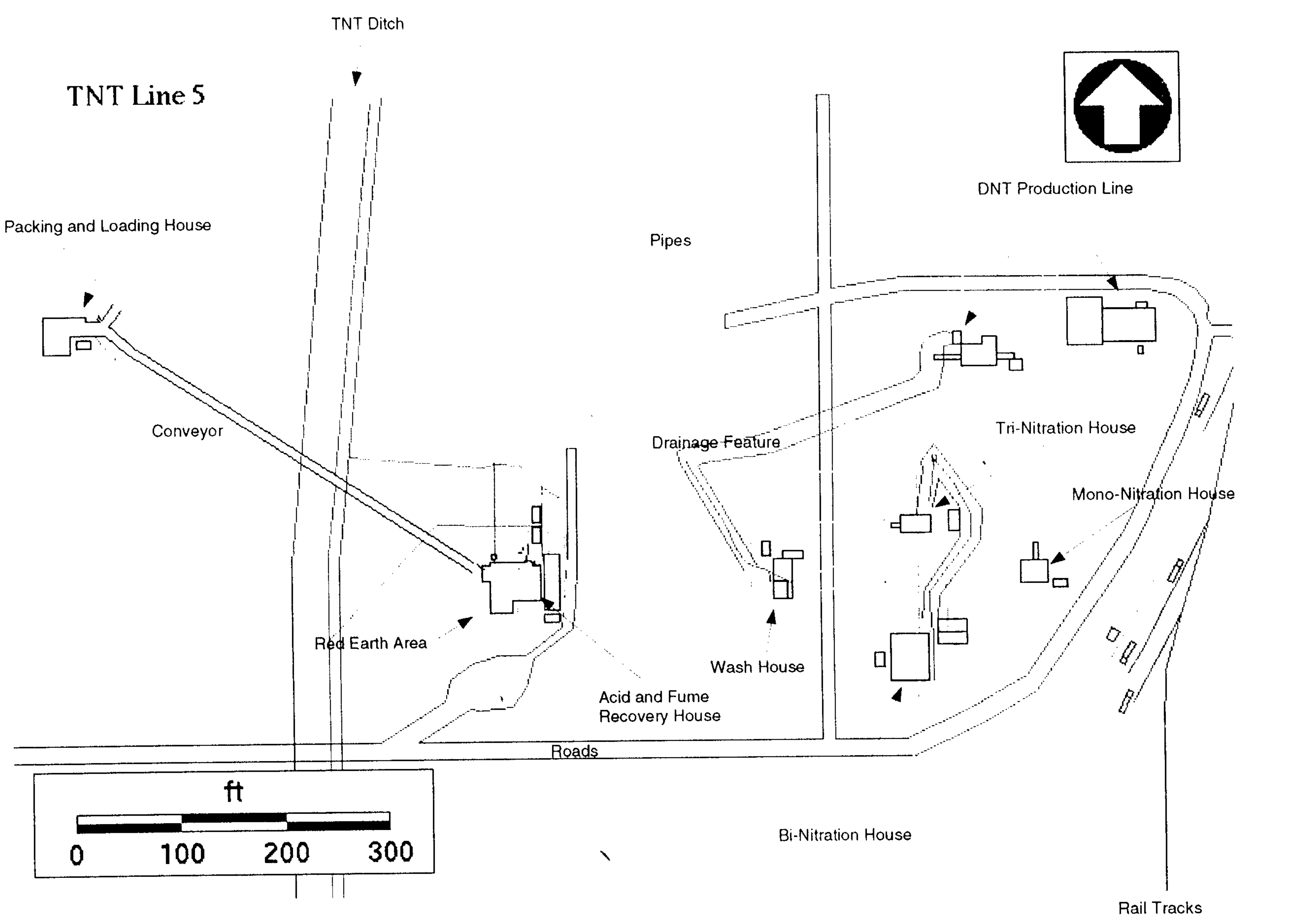

Figure 3 TNT Production Line # 5

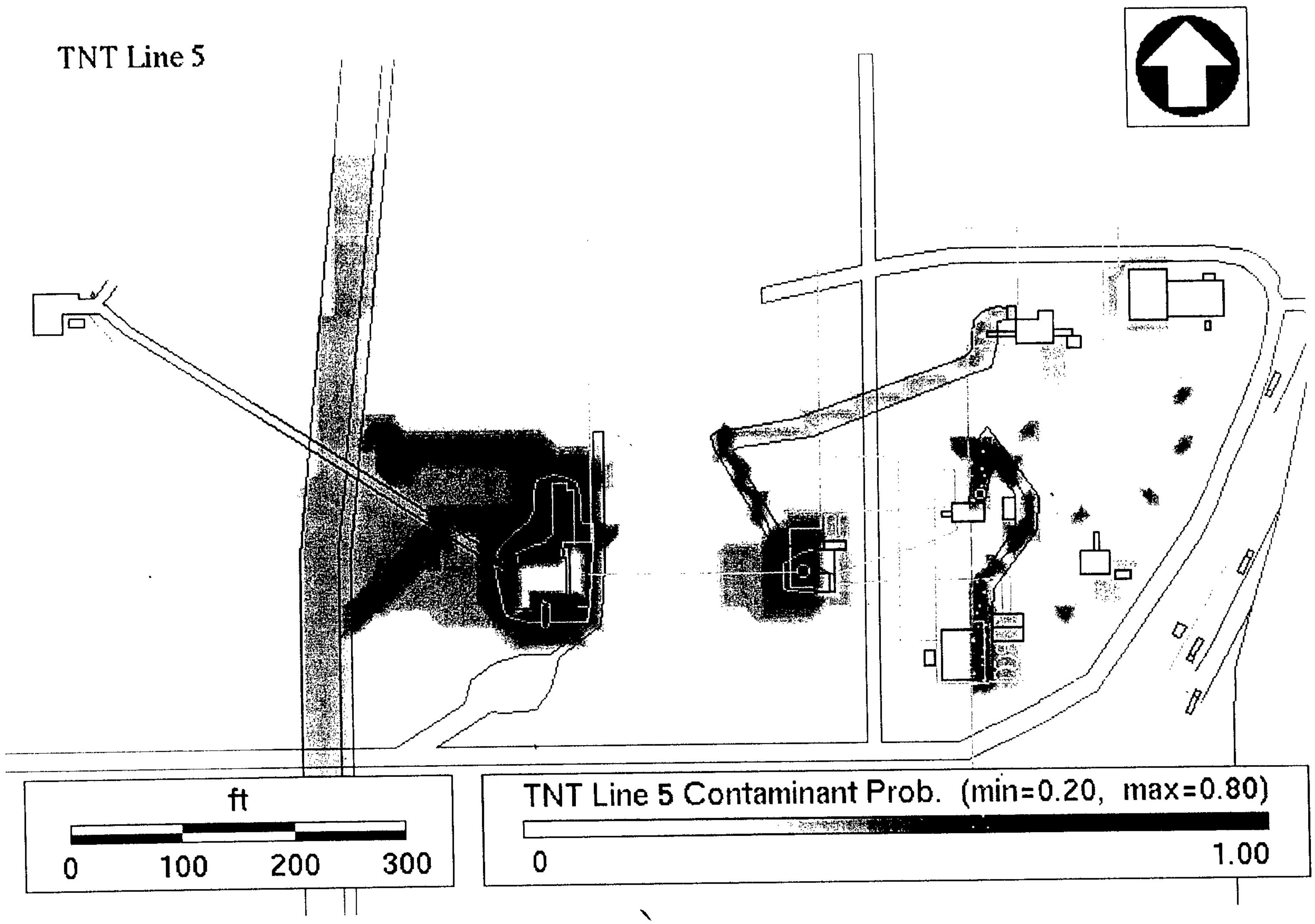

Figure 4 Initial Conceptual Model for TNT Production Line #5

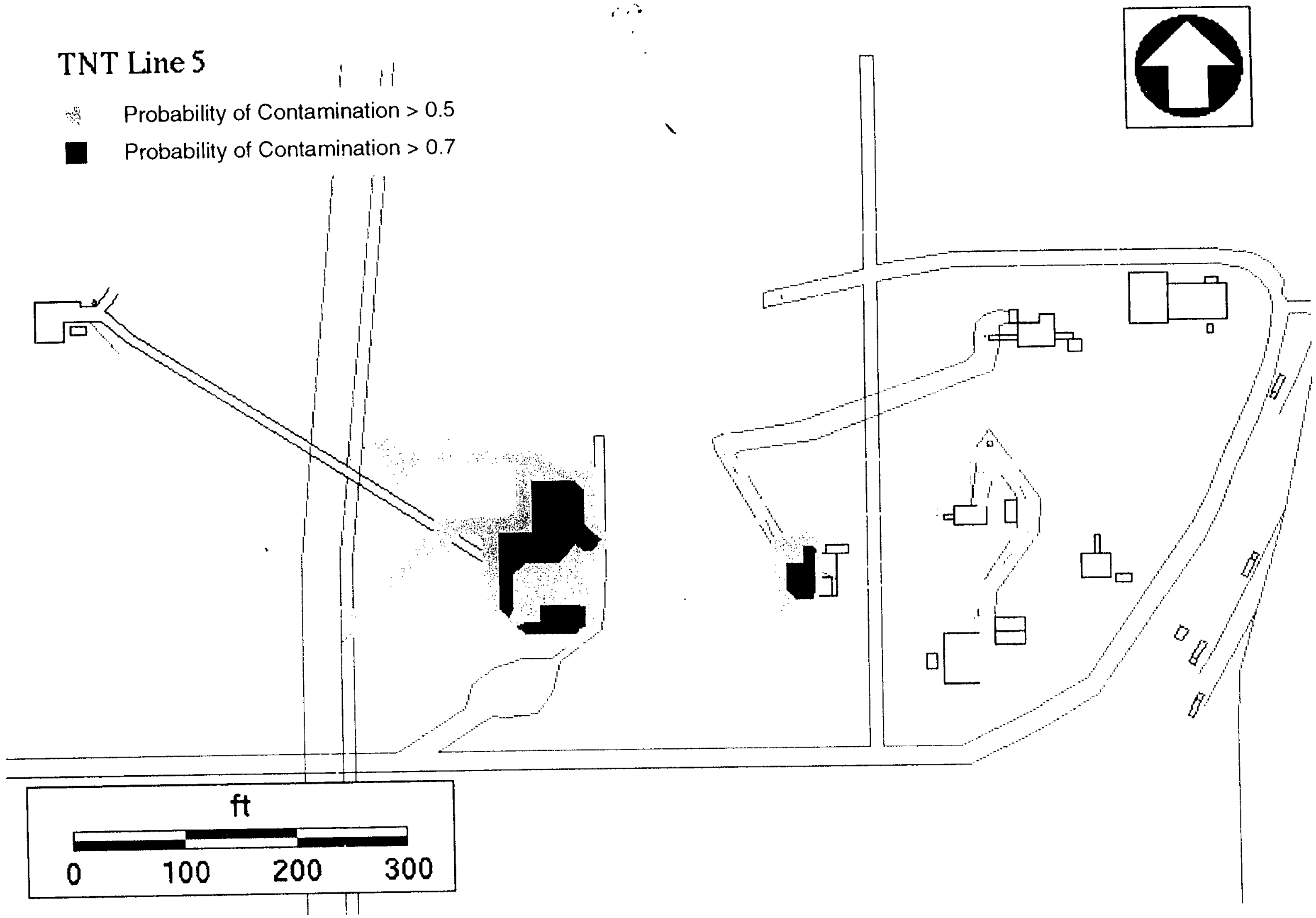

Figure 5 Presumed Contamination Extent