Copy #1

(4)

PHASE I

PROPOSED HYDROGEOLOGICAL FIELD WORK

AND

TESTING

DEALING WITH

MERCURY CONTAMINATION

TAYLOR INSTRUMENT CO.

DIVISION OF SYBRON CORPORATION

ROCHESTER, NEW YORK 14601

NOVEMBER 1982

LOZIER

ARCHITECTS/ENGINEERS

TABLE OF CONTENTS

LIST OF FIGURES

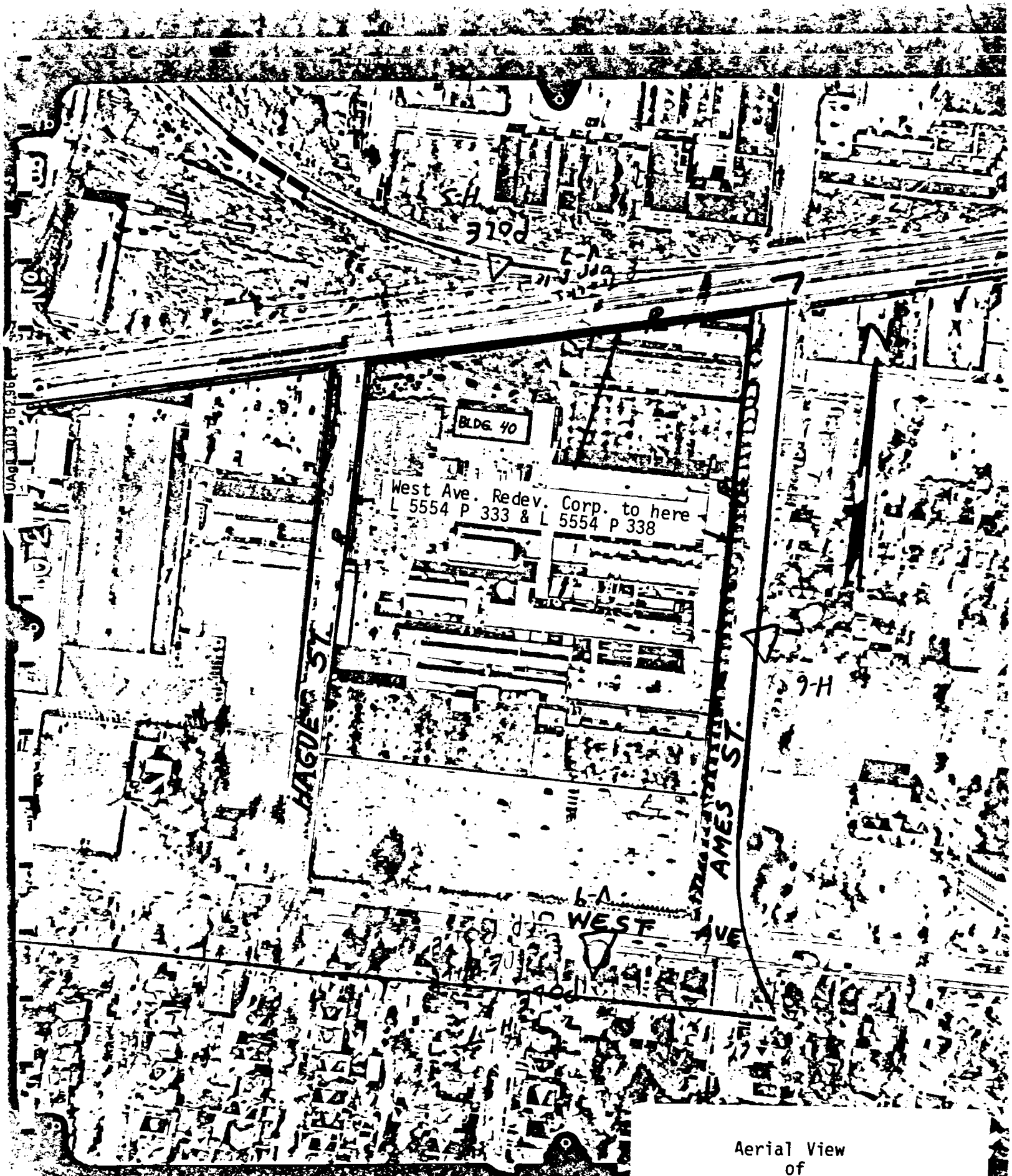
APPENDICES

INTRODUCTION

I. INTRODUCTION

This is the third Lozier Architects/Engineers ("Lozier") Engineering Report dealing with the mercury contamination of a portion of the Taylor Instrument Company ("Taylor") Ames Street site. Taylor is a division of Sybron Corporation and has a manufacturing facility located in Rochester, New York at 95 Ames Street. The history of the discovery of mercury contamination at the Ames Street site has been dealt with in the two (2) preceeding Engineering Reports. This report will discuss the proposed hydrogeological field work and bench scale testing associated with the first phase of the proposed remedial action plan to be implemented at the Taylor site. This report is the next step in the schedule presented in Chapter IV (Program Implementation and Scheduling) of the March 1982 Lozier Engineering report.

At present only a portion of the grounds at the Ames Street facility is known to be contaminated with elemental (or metallic) mercury. That contaminated area is shown in yellow on Figure 1. The principal goal for Phase I is to assess the magnitude of mercury contamination within the affected area, and also to generally assess the potential for and the extent of any contaminant migration in the site area. Consequently, the general thrust of this report will deal with the proposed methodology for assembling soil and water data from the Ames Street site to establish the extent and concentration of any mercury contamination within the groundwater and soil matrix.



Aerial View
of
Taylor Instrument Co.
(October, 1979)

Figure 1

The original hydrogeological field work performed in the fall of 1981 consisted of drilling four (4) P.V.C. monitoring wells and sixteen (16) split spoon soil boring holes. The results of that work and the associated laboratory tests were presented in the two (2) previous Lozier Engineering Reports. A graphic presentation of the location and orientation of that field work within the area of known contamination at the Ames Street site is contained in Appendix A of this report.

Appendix A of this report gives a detailed discussion of the hydrogeological field work proposed during Phase I of this project. In that Appendix the overall program is discussed and the reasons for the various elements of the program are explained. Prior to implementing the hydrogeological field work described in Appendix A, the New York State Department of Environmental Conservation (NYSDEC) will visit the Taylor Ames Street site.

The work proposed in this first phase of the remedial action plan follows the approval by the New York State Department of Environmental Conservation (NYSDEC) of the treatment concept outlined in the March 1982 Lozier Engineering Report. This approval can be found in the April 26, 1982 letter from Paul F. Schmied, P.E. to Mr. G. Robert Witmer, Jr. of Nixon, Hargrave, Devans and Doyle.

SECTION II

The Taylor Instrument manufacturing site is bounded by Ames Street on the east, Hague Street on the west, West Avenue on the south and property owned by the C.S.X. Corporation ("Chessie") on the north.

Vitrified clay pipe combined sewers are buried under the aforementioned adjacent streets. These sewers carry sanitary and storm drainage away from Taylor and the surrounding area. This drainage flows to the Maple Street trunk sewer and on to the Frank E. VanLare Sewage Treatment Plant for treatment and eventual discharge into Lake Ontario. The inverts (bottom) of the sewers in the bordering streets vary from elevation 530 feet to 498 feet above sea level.

Ground surface elevations across the Taylor Site range from 538 to 529 feet above sea level. Taylor's site comprises some 589,000 square feet. Of that total square footage, only 15 percent, or approximately 89,665 square feet is unsurfaced area. For the purpose of this report unsurfaced shall mean grasses or exposed ground surfaces. Of the aforementioned 15 percent, the one-half acre of mercury contaminated area at the north end of the site comprises approximately 28 percent.

Rain in the Rochester area has an average pH which is significantly below 6.0. Rainfall with a pH at that level tends to solubilize any organic mercury present in the soil matrix. Low pH conditions enhance the microbial methylation of mercury.

Methylated mercury is more mobile than elemental and inorganic Hg, making it much more capable of entering the groundwater.

With 85 percent of the Taylor site already shielded from direct surface contact by environmental agents, such as rain and snow, the chances of any buried mercury contacting low pH water and undergoing methylation is slight. Any further paving of the remaining unsurfaced sections of the site would tend to decrease mercury methylation action within the soil matrix even further. Asphalt paving of the one-half acre of mercury contaminated soil would essentially render this area largely imprevious in conformance with existing conditions across most of the site.

Chemical fixation was recommended in the March 1982 Lozier report as the remedial method which would not only "fix" the mercury contamination at the Taylor site, but which would also minimize the environmental concerns associated with any future activities at that site including soil removal. While this approach, if verified in a laboratory, would probably sequester the mercury in place, the technique is relatively new and extensive bench-scale testing would be necessary before any attempt at actual site remediation could be made. In contrast to this, simple capping of the contaminated area with a material such as asphalt would eliminate further mercury solubilization by preventing percolation of any surface precipitation through the soil matrix. This may provide adequate isolation of the mercury given its location and quantity and the projected land and subsurface water use. All

existing information to date indicates that there are no known users of the area's ground water.

Taylor Instrument proposes, with concurrence from N.Y.S.D.E.C., to gather up the visible glass shards on the surface in the 1/2 acre contaminated area, and then pave the site prior to winter. The glass shards will be properly disposed of in a secure landfill. Immediate capping of the 1/2 acre area will preclude the further introduction of water through the surface. Thus the aggressive action of low pH water on the soil matrix will be abated. Although additional remedial measures may be necessary at a later date these preceeding steps are good initial actions.

In order to collect information on groundwater and the extent of mercury contamination throughout the entire site, the proposed scope of hydrogeological field work (Appendix "A") is such that overall site information on the soil and groundwater will be gathered. The wells and other instrumentation are thus located so as to yield additional specific information on the one-half acre contaminated area. Additionally, new wells W-4 and W-5, in conjunction with the four (4) original wells (D-0°, 0-0°, C-135° and E-180°) will serve as perimeter monitoring locations for future sampling. All of the installations will be maintained so that future samples withdrawal is possible. The location of all the piezometers, lysimeters and wells to be installed during the Phase I field work are shown on Figure No. 1 in Appendix "A".

SECTION III

Once Phase I work is completed, a report will be prepared and submitted to NYSDEC for approval. That report will analyze the results of the Phase I field work and laboratory tests and recommend any necessary remedial work. If mercury groundwater levels fall within the State's groundwater limits then asphalt surfacing of the known one-half acre contaminated area might serve as the only action necessary to shield the ground surface, and thus abate mercury transport.

APPENDIX "A"

THOMSEN ASSOCIATES

PROPOSED

TAYLOR SITE INVESTIGATION

PHASE 1

HYDROGEOLOGICAL INVESTIGATIONS

1.0 OBJECTIVES

1.1 To determine the overall presence, extent and concentration of mercury contamination within the soil matrix of the Taylor Instrument Company ("Taylor") Ames Street site.

1.2 To determine the overall presence, extent and concentration of mercury contamination within the groundwater at the Taylor site.

1.3 To assist geotechnically and to evaluate the geotechnical merits of any proposed site remediation alternative.

2.0 SCOPE OF WORK

2.1 General -

The general scope of geotechnical field work as proposed by Thomsen Associates ("Thomsen") was outlined in Lozier Architects/Engineers ("Lozier") Engineering Report dated March, 1982. Since that time, an additional site inspection by Lozier and Thomsen personnel in addition to other information which has been obtained by the parties associated with the project has led to some adjustments in the originally proposed hydrogeological program. Consequently, the field program has been revised accordingly.

2.2 Basic Site Conditions and Assumptions

2.2.1 Initial site investigations indicated contamination to be confined to a narrow band of hot spots along the northern portion of the property between Building No. 40 and the railroad tracks. The originally proposed Phase 1 hydrogeological investigations were intended to focus the majority of the field work on that area.

2.2.2 The revised program is designed to address the entire Taylor site. The intent is to spread the sampling and monitoring program across most of the site.

2.2.3 The technical assumptions underlying Phase I of the field work are based on the limited information to date. The following assumptions will either be substantiated or refuted during Phase I.

a) An estimated depth to bedrock of 20 to 30 feet.

b) A possible perched groundwater condition on top of dense glacial till.

2.3 General Phase 1 Description

Phase 1 consists of the following major elements (to be discussed in detail later in this proposal):

a) Six (6) soil borings terminated above bedrock, converted to monitoring wells.

b) One (1) combined piezometer/lysimeter cluster.

c) One (1) separate lysimeter cluster.

The Phase I field work will yield a total of twelve (12) water sampling locations and eleven (11) soil sampling locations (See Figure 1). Those portions of Phase I work which call for continuous soil sampling shall be understood to mean soil samples drawn approximately every two and one half (2 1/2) feet.

There were an additional four (4) P.V.C. monitoring wells and sixteen (16) split spoon soil sample holes installed in the known contaminated area of the Taylor site in the fall of 1981 (See Figures 2 and 3 and 4 in this Appendix).

2.4 Detailed Discussions

2.4.1 General

The general intent of the hydrogeological portion of the field investigation program of Phase 1 is to determine the extent of any groundwater contamination by mercury and to determine the rate and direction of groundwater flow and correlative concentrations of contaminant. This analysis requires establishment of both vertical

and horizontal groundwater gradients and the associated soil permeabilities. Preliminary investigations indicate that the most severe vertical migration of contaminants appears to be in the vicinity of boring positions 0-0 and E-180, (see Figure 4). Thus, further investigations into the potential for vertical migration will be concentrated in that general area.

2.4.2 Vertical Groundwater and Contaminant Migration

a) The potential for vertical groundwater and contaminant migration will be evaluated by the installation of a piezometer/lysimeter cluster installed adjacent to existing monitor E-180. First, an initial continuously sampled soil boring will be advanced to bedrock. Then the bottom of the hole will be sealed with bentonite. Next, a porous-tube piezometer will be installed and packed with sand above the base seal. After placing sand around the piezometer, a bentonite seal will be placed above the sand from a depth of around 18 feet to 13 feet. Above this bentonite seal a second piezometer will be installed and packed with sand. Above the sand pack another bentonite seal will be placed, then the remainder of the bore hole sealed using a cement/bentonite grout. The piezometer installation will be completed with a lockable protective casing and capped.

b) Two (2) auger boring holes will then be drilled within a 5 ft. radius of the piezometer cluster. A pressure-suction lysimeter will be installed in each of these holes. The depths of these pressure-suction lysimeters will be approximately 4 and 6-1/2 feet below ground surface. Each of these will be sealed off within the vadose zone and completed in a manner similar to the piezometer clusters.

(c) A second lysimeter cluster will be installed adjacent to well 0-0. Two auger boring holes will be advanced to depth of approximately four and six and one-half feet and pressure-suction lysimeters installed in the holes. Each of these will be sealed off in a manner similar to the piezometer clusters.

(d) These piezometer/lysimeter clusters will provide a basis for measuring any changes in vertical hydraulic reading as well as providing for vertical water quality sampling points. Soil

samples obtained from the deep piezometer holes may also be analyzed for chemical analysis.

2.4.3 Horizontal Groundwater and Contaminant Movement

a) Six (6) 2-inch diameter PVC monitors will be installed at various locations indicated on the site plan. Due to the low permeability of the glacial till, larger diameter monitors would make accurate water level readings, sampling, and purging difficult.

b) The location of these six (6) new monitoring points, in conjunction with the existing four (4) wells, will establish overall horizontal hydraulic gradients and general groundwater flow vectors across the site. It is anticipated that building foundation footings and utility trenches may result in localized variations in the upper groundwater flow patterns. Additional monitors may be necessary during possible future phases.

c) The six (6) new monitors will be installed by auger boring methods with continuous split-spoon sampling in order to provide for soil analysis and general stratigraphic correlation across the site. Selected soil samples will also be available for chemical analysis. Five (5) of the monitors will consist of a sandpacked five-foot slotted PVC screen, while one monitor will have a sandpacked two-foot slotted PVC screen (W-6). All wells will have a bentonite seal above the sand to prevent cross-contamination. Each monitor will be completed with lockable protective pipe and cap, grouted in at the ground surface.

d) After the water level within the monitors has stabilized, slug tests will be performed within each monitor to establish horizontal permeabilities within the zone of saturation.

2.4.4 Extent of Soil Contamination

a) Broad Site Analysis - All the soil samples obtained from the monitoring wells and piezometer/lysimeter cluster installations will be logged and retained. These soil samples will be tested for organic mercury and the various forms of mercury. It is possible that a Phase II soil sampling grid may be necessary, depending on the results of the anaylsis performed on the soil for these sampling points.

3.0 SAFETY PRECAUTIONS AND METHODOLOGY

3.1 Cross-Contamination

3.1.1 All monitors, lysimeters, piezometers, and bore holes will be backfilled with a bentonite cement slurry to prevent future cross comtamination.

3.1.2 All equipment shall be steam cleaned throughout the course of the site work to prevent cross-contamination.

3.2 Soil Sample Contamination

3.2.1 All equipment will be steam cleaned before it is used on the site and before it leaves the site.

3.2.2 Sampling devices and equipment will be cleaned between each sample utilizing a pressurized water spray.

3.2.3 All soil samples will be placed in plastic jars. All procedures for sample collection, identification and storage shall be the same as those used during the site work of Fall 1981.

3.3 Personnel Safety

3.3.1 All field personnel will be provided with protective clothing (boots, gloves, and overalls) and breathing masks as required. The need for breathing masks will be determined after ambient air measurements are performed in the field using mercury test equipment supplied by Taylor.

3.3.2 All field work will be under the full-time direction of a geologist or geotechnical engineer.

3.4 Procedures and Regulations

Applicable regulations of the United States Environmental Protection Agency (U.S.E.P.A.) and the New York State Department of Environmental Conservation (N.Y.S.D.E.C.) shall be followed. Specifically the following standards and methods will be employed during the Phase I field work.

A. Piezometers, lysimeters and monitoring wells will be installed in conformance to the EPA guidelines contained in the "Procedures Manual for Groundwater

Monitoring at Solid Waste Disposal Sites", (E.P.A. Manual SW-611 December 1980).

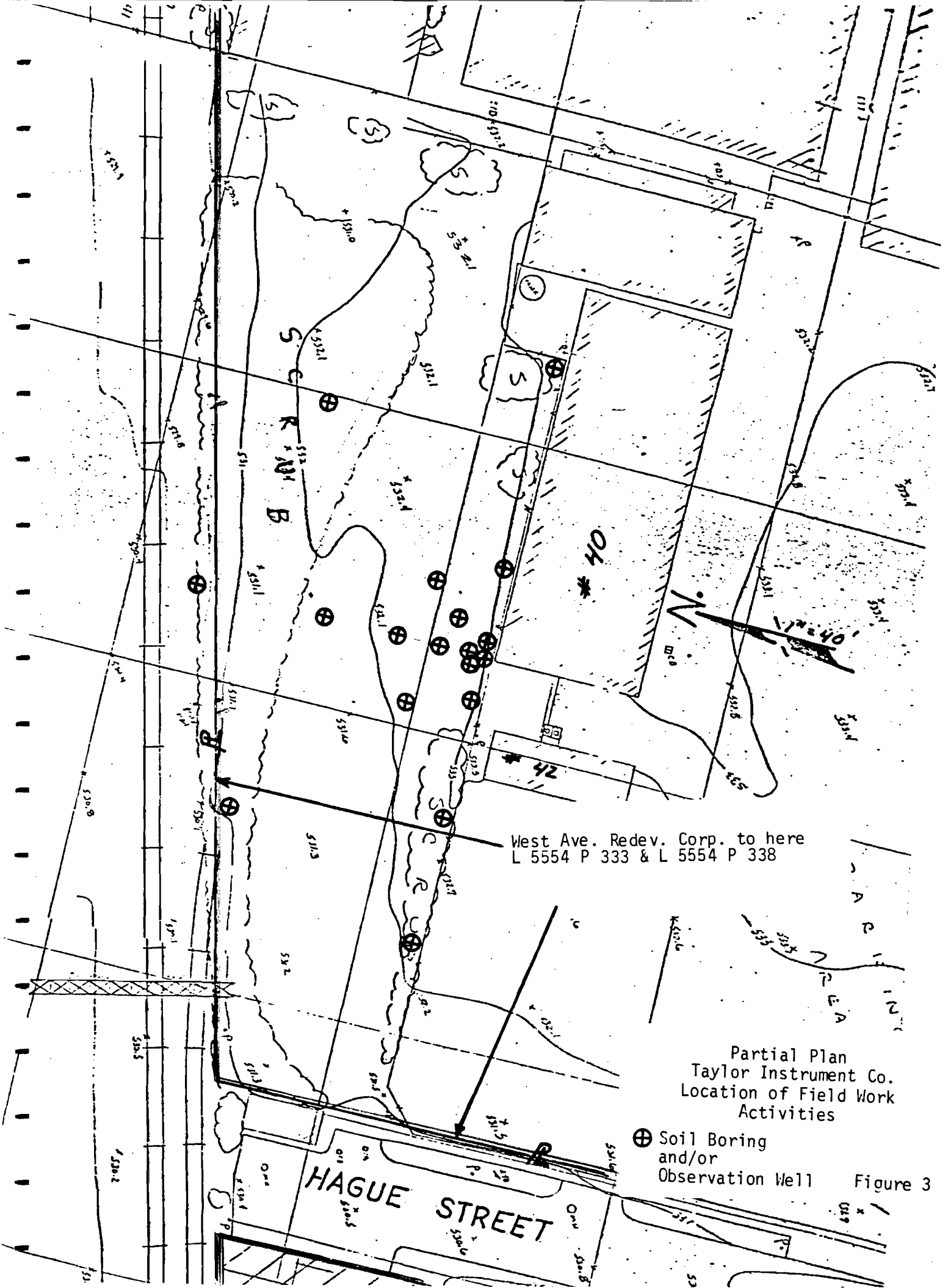
B. Laboratory analyses to determine the soil characteristics of all soil samples will follow A.S.T.M. methods D421 and D422.

C. Soil samples taken from all the augered holes shall be withdrawn using A.S.T.M. method D1586.

Beyond this, all methods and procedures proposed herein are designed to

A. Provide optimum results while minimizing the risks of cross-contamination, and

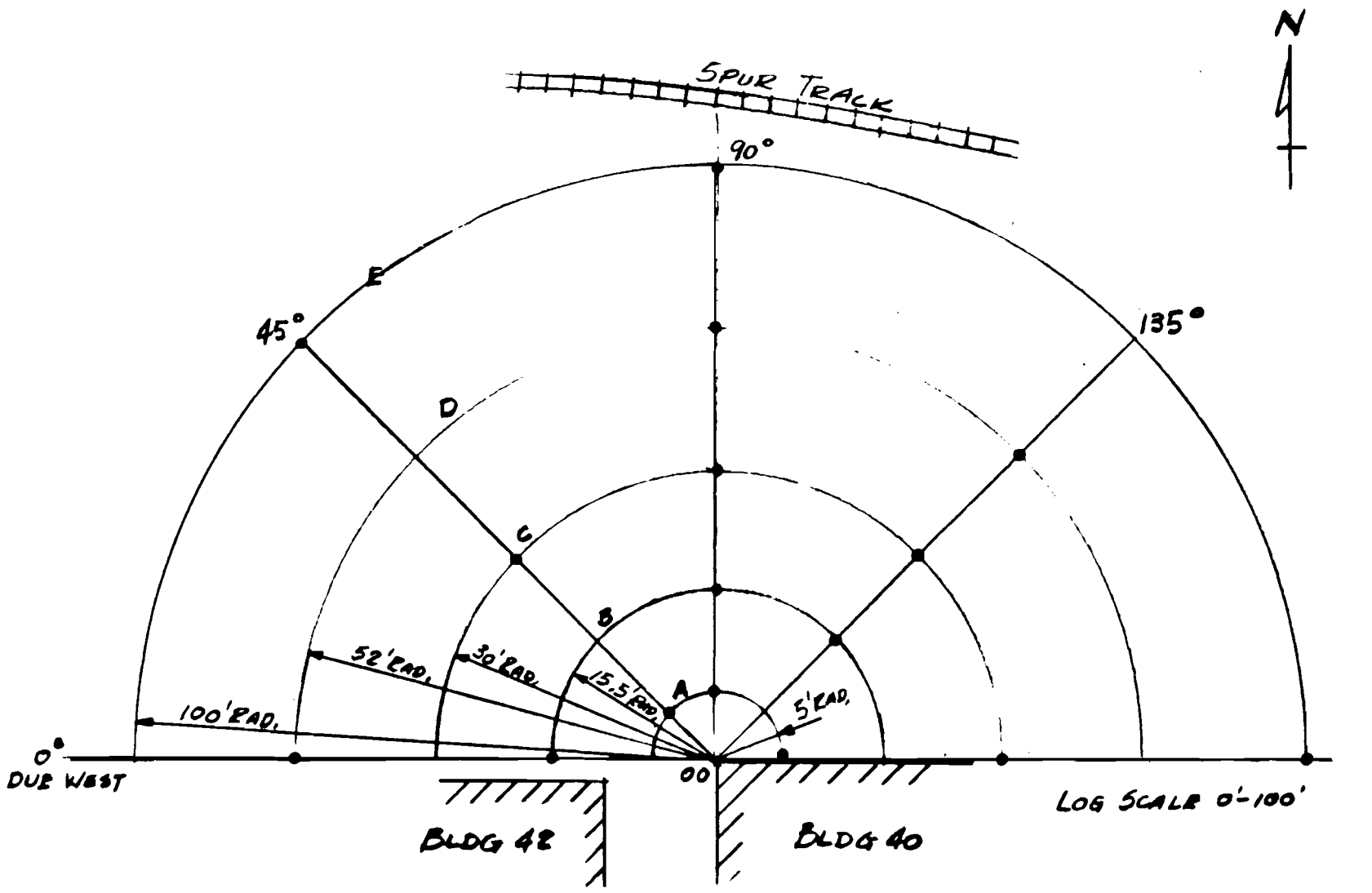
B. Provide the most up to date and accurate means of acquiring geotechnically sound data.



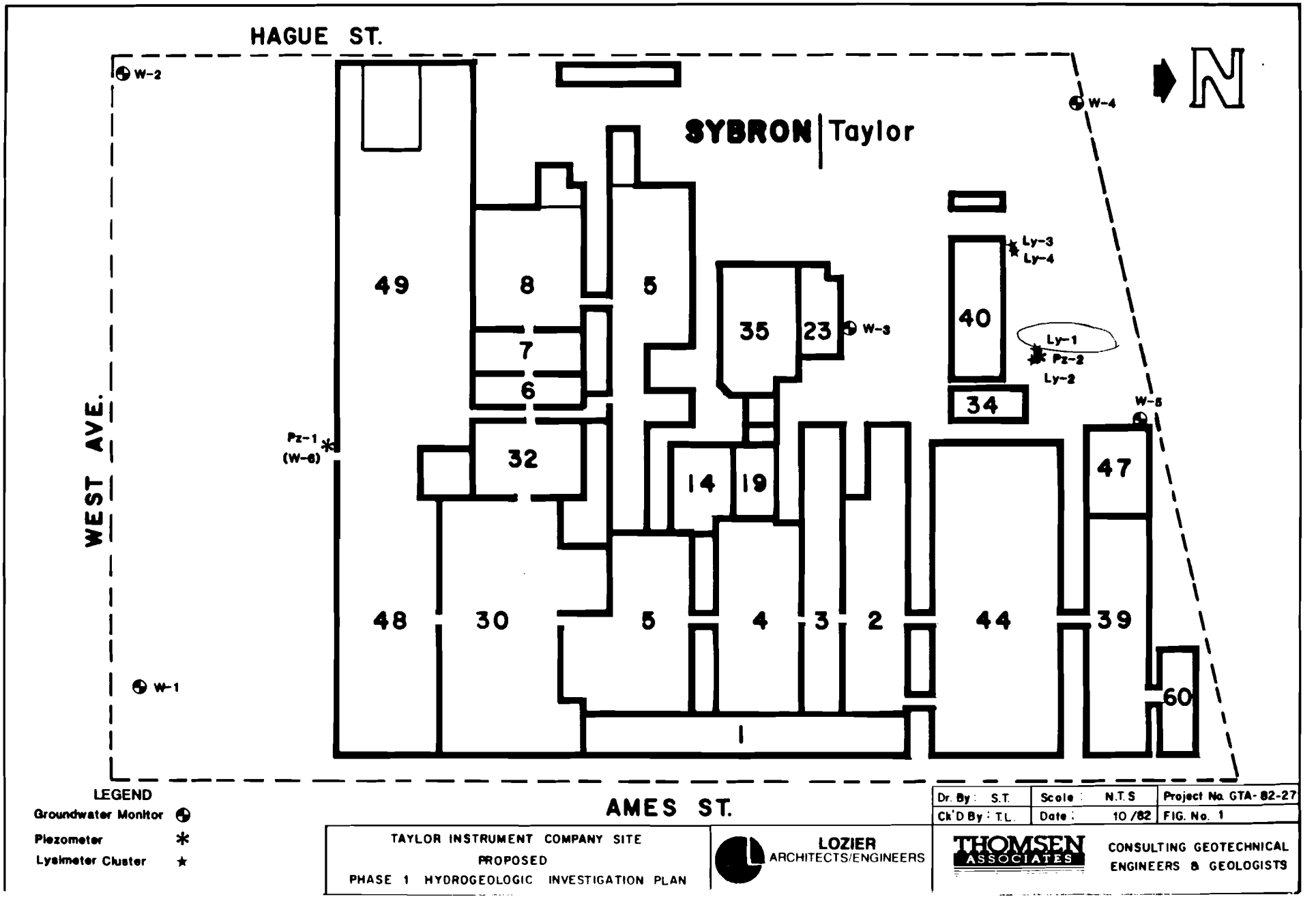
Partial Plan
Taylor Instrument Co.
Location of Field Work Activities

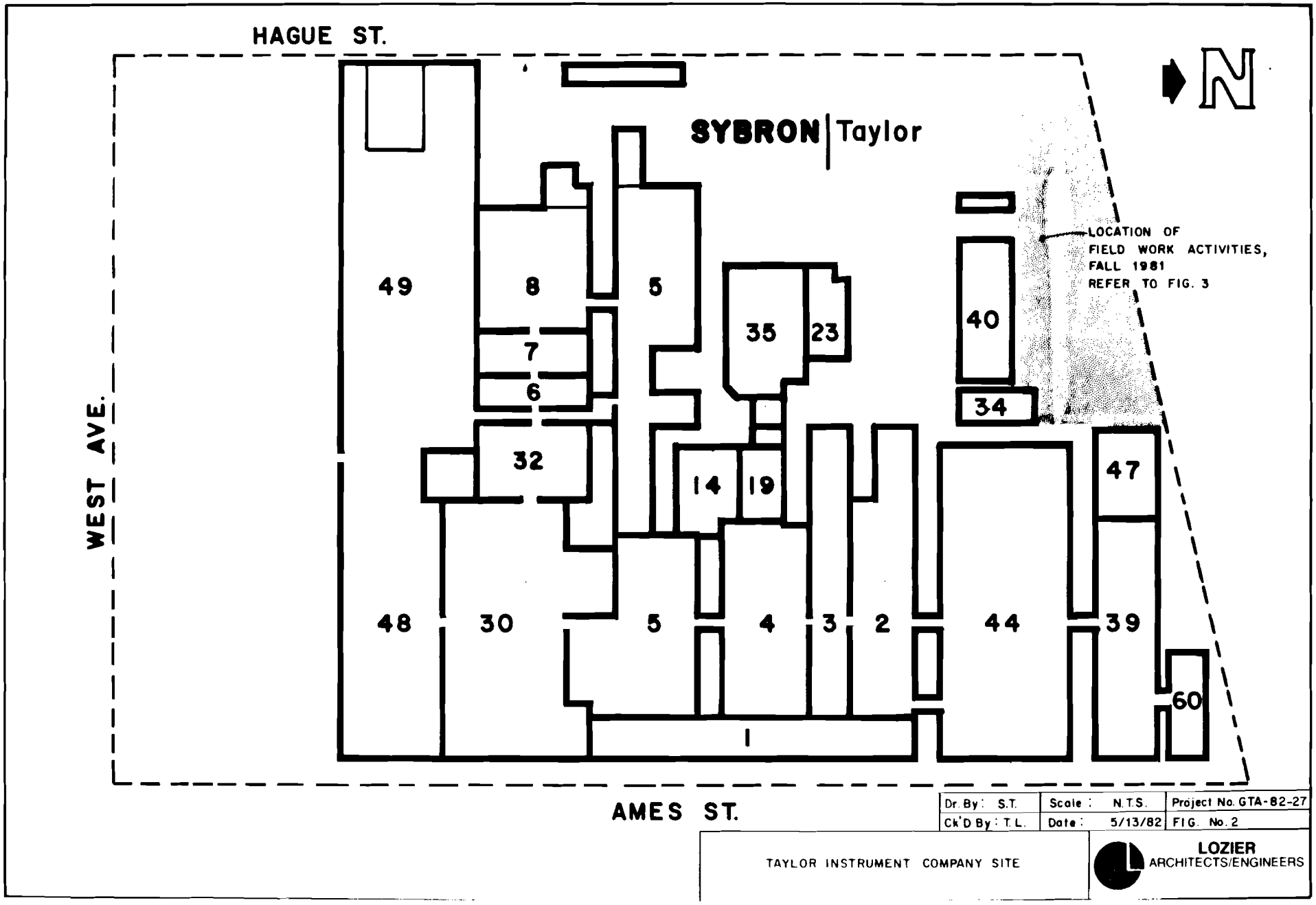
⊕ Soil Boring and/or Observation Well

Figure 3



TAYLOR INSTRUMENT CO.
SAMPLING GRID PATTERN
FIGURE # 4


HAGUE ST.
WEST AVE.
AMES ST.
N
SYBRON | Taylor
W-1
W-2
W-3
W-4
W-5
Pz-1
(W-6)
Pz-2
Ly-1
Ly-2
Ly-3
Ly-4
49
8
5
35
23
40
7
6
34
32
14
19
47
48
30
5
4
3
2
44
39
60
1
LEGEND
Groundwater Monitor
Piezometer
Lysimeter Cluster
TAYLOR INSTRUMENT COMPANY SITE
PROPOSED
PHASE 1 HYDROGEOLOGIC INVESTIGATION PLAN
LOZIER
ARCHITECTS/ENGINEERS
THOMSEN ASSOCIATES
CONSULTING GEOTECHNICAL ENGINEERS & GEOLOGISTS
Dr. By : S.T.
Ck'D By : T.L.
Scale : N.T.S
Date : 10/82
Project No. GTA-82-27
FIG. No. 1



Dr. By : S.T.	Scale : N.T.S.	Project No. GTA-82-27
Ck'D By : T.L.	Date : 5/13/82	FIG. No. 2

TAYLOR INSTRUMENT COMPANY SITE

LOZIER
ARCHITECTS/ENGINEERS

APPENDIX "B"

LOZIER CAMO LABORATORIES

23 N. MAIN STREET • FAIRPORT, NEW YORK 14450 • 716-425-2210

ON-SITE CHEMICAL FIXATION OF MERCURY CONTAMINATED SOIL

BENCH SCALE STUDY

TAYLOR INSTRUMENT CO.

A Division of Sybron Corp.

Rochester, New York 14601

DATE: September 29. 1982

Affiliated with:
LOZIER ARCHITECTS/ENGINEERS • 600 PERINTON HILLS • FAIRPORT, NEW YORK 14450 • 716-223-7610
CAMO LABORATORIES • 367 VIOLET AVENUE • POUGHKEEPSIE, NEW YORK 12601 • 914-473-9200

TAYLOR INSTRUMENT CO.
LABORATORY ANALYSIS

September 29, 1982

TABLE OF CONTENTS

I. PURPOSE OF THE STUDY

The engineering and analytical program for remedial work at the Taylor Instrument Company will be based on the results of the laboratory analysis of the soil and water samples obained during Phase I. Such analysis will determine the presence and concentration of any mercury throughout the site. Water analysis will not only determine the presence and concentration of any mercury within the groundwater on site, but if it is present and the aquifer is active, the extent of the plume migration if it exists.

The laboratory analysis required during Phase I will consist of two steps. The first step involves a visual inspection of the Taylor site. The second step includes hydrogeological field tests and associated laboratory analysis. The object of these tests is to characterize the soil and groundwater.

II. SAMPLES ANALYSIS

A. Soil Analysis. All soil samples resulting from the hydrogeological field work be analysed for total mercury, and organic mercury. These analyses will establish base data points. The difference in mercury concentration between total mercury and the organic mercury analysis will indicate the concentration of mercury that is inorganic. Those parameters for which the results of the ground analysis were positive will also be tested for during the analysis of the soil samples.

B. Groundwater Analysis. The groundwater will be characterized with respect to the presence of total mercury. In addition the groundwater will be characterized with respect to organic and inorganic constituents to determine the background quality of the groundwater. These analyses will include: pH, cadmium, cyanide, nitrate (as N), chloride, iron, hexavalent chromium, nickel, sulfate, copper, mercury, zinc, trichloroethylene, and methyl

chloroform.

III. QUALITY CONTROL

A. Analytical Equipment. The atomic absorption spectrophotomer used for the total mercury will be a Perkin-Elmer 460 with a Perkin-Elmer merury analyzer kit (cold vapor technique). The organic mercury analysis will utilize a Perkin-Elmer Sigma One gas chromatograph with a flame ionization detector in concert with a Perkin-Elmer Sigma 10 Data Station. Calibration of both instruments will be separately documented and will consist of a 3-5 point calibration curve. The calibration will be performed each day of the analysis.

B) Precision and Accuracy Data. All E.P. Toxicity analyses will be analyzed in duplicate due to the heterogeneous nature of the soil samples. Control blanks and method blanks will be used during the total mercury analysis.

C. Report. All Quality Control data will be reported.

IV. RESULTS AND DISCUSSION

The initial characterization of the soil for organic and inorganic mercury will be the first evaluation point. Originally the source of contamination was elemental mercury, and it is believed that a great majority of the total mercury now present in the soil is inorganic Hg^{0} or Hg^{+2}.

The exact course of action to be implemented during the remedial action portion of this project will be predicated on the extent, location and concentration of any mercury located on the Taylor Instrument site. Solutions may range from simple capping of the half acre affected area to chemical fixation of the mercury present within the soil matrix.