NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

APPLICATION FOR VARIANCE FROM 6 NYCRR 360

SEE APPLICATION INSTRUCTIONS ON REVERSE SIDE

FOR STATE USE ONLY

PROJECT NO.	DATE RECEIVED
DEPARTMENT ACTION ☐ Approved ☐ Disapproved	DATE

1. OWNER'S NAME City of Auburn	2. ADDRESS (Street, City, State, Zip Code) 24 South St. Auburn, NY 13021	3. Telephone No. (315)255-4123
4. OPERATOR'S NAME City of Auburn	5. ADDRESS (Street, City, State, Zip Code) 24 South St. Auburn, NY 13021	6. Telephone No. (315)255-4123
7. ENGINEER'S NAME Stearns & Wheler	8. ADDRESS (Street, City, State, Zip Code) 1 Remington Park Dr. Cazenovia, NY 13035	9. Telephone No. (315)655-8161

10. PROJECT/FACILITY NAME
City of Auburn Solid Waste Management Center - Landfill No. 1

11. PROJECT STATUS XX Public ☐ Private ☐ Proposed ☐ Existing	12. COUNTY IN WHICH FACILITY IS LOCATED Cayuga	13. ENVIRONMENTAL CONSERVATION REGION Region 7

14. DESCRIBE SPECIFIC LOCATION OF FACILITY

West of Intersection of North Division St. and York St., Northwest Portion of City of Auburn, New York

15. TYPE OF PROJECT FACILITIES: ☐ Composting ☐ Transfer ☐ Shredding ☐ Baling XX Sanitary Landfill ☐ Incineration ☐ Pyrolysis ☐ Resource Recovery-Energy ☐ Resource Recovery-Materials ☐ Other

16. BRIEFLY DESCRIBE THE PROJECT INCLUDING THE BASIC PROCESS AND MAJOR COMPONENTS

Post-Closure Environmental Monitoring - Quarterly Sampling and Analysis of Groundwater from Landfill No. 1 Monitoring Wells

17. SPECIFIC PROVISION OF 6 NYCRR 360 FROM WHICH A VARIANCE IS REQUESTED: Section 360-2.15 | Paragraph (1)(4) | Variance Request No. 1

18. BRIEFLY DESCRIBE PROPOSED VARIANCE

Reduction in Sampling Frequency for Landfill No. 1 from Quarterly (1 Baseline, 3 Routine) to Annually (1 Baseline).
Landfill No. 1 Monitoring Wells include: MW3, MW4AA, MW4B, MW4C, MW5AA, MW5B, MW7AA, MW7BB, MW18AA, MW18CC, MW19AA, MW19CC, MW20AA, MW20C, MW21A, MW21C, MW22A, MW22C, MW23AA, MW23C, MW24A, MW24C, MW25A, MW25C, MW26A, MW26C

19. IMPACTS OF VARIANCE APPROVAL OR DISAPPROVAL:

a. Environmental Impact:

No Adverse Impact (See Enclosed Report)

b. Economic Impact:

Reduction in Sampling Frequency Will Save the City an Estimated $20,000 Each Year in Analytical Expenses.

20. CERTIFICATION:

I hereby affirm under penalty of perjury that information provided on this form and attached statements and exhibits is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law.

4-18-96
Date

Alfred D. Emmi
Signature and Title City Manager

5/77

CENTRAL OFFICE COPY

POST-CLOSURE MONITORING REDUCTIONS FOR LANDFILL NO. 1

CITY OF AUBURN SOLID WASTE MANAGEMENT CENTER

CAYUGA COUNTY, NEW YORK

Prepared for

CITY OF AUBURN, NEW YORK

Prepared by

STEARNS & WHELER, LLC
Environmental Engineers & Scientists
One Remington Park Drive
Cazenovia, NY 13035

April 1996

Project No. 42629ZA

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POST-CLOSURE MONITORING REDUCTIONS FOR LANDFILL NO. 1
CITY OF AUBURN SOLID WASTE MANAGEMENT CENTER
CAYUGA COUNTY, NEW YORK

SECTION 1 - INTRODUCTION

1.1 BACKGROUND

Stearns & Wheler was retained by the City of Auburn in 1993 to evaluate water quality data from the City's Solid Waste Management Center (SWMC) for the purpose of developing a hydrogeochemical model that explains water quality characteristics at the site. A Hydrogeochemical Evaluation Report was prepared that described site groundwater flow hydraulics, stratigraphy, and geochemical reaction mechanisms that govern site water quality. The report provided a basis for differentiating leachate and leachate-impacted groundwater from natural groundwater quality (Stearns & Wheler, April 1994). Based on the findings of the report, the following conclusions were reached:

1. Data from past sampling events have been compared with historical data from Upgradient Wells 8A, 8C, 17AA, and 17C to determine the likelihood of leachate impacts. These four wells were selected as background wells because they are known to be upgradient of the landfill and unaffected by leachate. However, statistical and geochemical evidence indicate that several other wells may also be considered as background wells, and hence, the background water quality database should be expanded to include those wells. Furthermore, there appear to be several downgradient wells that also monitor natural groundwater. Although there are differences in water quality between upgradient and downgradient, it appears that those differences are due to natural chemical changes and not due to leachate.

2. Leachate quality is most strongly influenced by elevated total organic carbon (TOC), alkalinity, ammonia, chloride, and low sulfate. By using these parameters, leachate impacts can be identified. Well 22A is the only monitoring well that has exhibited significant leachate impacts. It is concluded, therefore, that leachate affects a confined area near Well 22A. The upward (artesian) flow of groundwater along the downgradient portion of Landfill No. 1 restricts leachate migration. Monitoring wells around Landfill No. 2 do not show signs of leachate impacts.

From the above finding, it was concluded that reductions in the level of monitoring could be implemented without compromising monitoring objectives. Specifically, reductions in the number of wells sampled, the list of analytical parameters, and/or sampling frequency should be possible. A meeting was held on April 25, 1995 in which representatives from the City of Auburn, Region 7 NYSDEC, and Stearns & Wheler discussed the findings of the Hydrogeochemical Evaluation Report. It was agreed from that meeting that a subsequent report would be prepared to cite specific recommendations for revising the facility's monitoring strategy. That report presented relevant findings of the previous Hydrogeochemical Evaluation Report and made specific recommendations for reducing monitoring requirements at the City of Auburn SWMC (Alternative Environmental Monitoring Strategy, City of Auburn Solid Waste Management Center, November 1995).

This report draws upon the discussion and conclusions cited in the above previous reports, but is tailored more specifically towards acquiring a post-closure monitoring variance for Landfill No. 1. This report is being provided to demonstrate that Landfill No. 1 at the City of Auburn SWMC is eligible for a reduction in monitoring requirements, and as a supporting document for the City's formal request for variance.

1.2 BASIS FOR REVISED MONITORING STRATEGY

Regulations that govern how solid waste management facilities are designed, constructed, operated, and monitored are provided in 6 NYCRR Part 360. These regulations are reviewed and revised on a periodic basis, which can necessitate changing the way in which active sites are monitored.

The SWMC contains two distinct landfills that are subject to monitoring requirements. Landfill No. 1 is the older and larger of the two and covers a majority of the southern portion of the site (Figure 1-2). Landfill No. 1 is currently closed and has received a final geomembrane cap. Landfill No. 2 is a smaller, active landfill located northwest of Landfill No. 1. Landfill No. 2 began accepting wastes in September 1992 shortly after the construction of the geomembrane cap began for Landfill No. 1. A third small section of the landfill comprises the former city dump and has not received waste for decades. This section is located close to North Division Street, east of Landfill No. 1 and the intermittent stream, and received a final soil cover decades ago. The older former City dump was targeted for special monitoring following completion of the Closure Investigation Report (CIR) for Landfill No. 1. Three well clusters were installed to monitor the downgradient edge of the former dump: Clusters MW-28, MW-29, and MW-30. The special monitoring of these wells over the past several monitoring events does not indicate any significant impacts to groundwater quality resulting from the former dump.

Landfill Nos. 1 and 2 are surrounded by their own respective monitoring well networks. Monitoring wells were installed several phases since 1985, the most recent of which were north of the decades old former city landfill. The wells were installed as shallow ("A" and "AA" series), intermediate ("B" and "BB" series), and deep ("C" and "CC" series) to monitor groundwater flow and chemical characteristics at specific depths.

The former City dump will not be subject to the monitoring requirements of the SWMC's monitoring program. Because the former City dump was closed long before the enactment of post-closure monitoring requirements, and because sampling of special monitoring wells indicates that no groundwater impacts resulting from the former dump have taken place, it is appropriate that the monitoring program at the SWMC target Landfill No. 1 and Landfill No. 2, but not the former City dump.

As described in a letter dated March 21, 1996 from NYSDEC Region 7 to the City of Auburn, the NYSDEC Division of Solid and Hazardous Waste has reviewed the post-closure groundwater monitoring requirements for solid waste landfills closed pursuant to the December 31, 1988 6 NYCRR Part 360 regulations (Attachment 1). Landfill No. 1 at the City's SWMC was closed under these requirements and is in a post-operational monitoring phase. It was concluded by NYSDEC that in the absence of significant environmental concerns, landfills that stopped accepting waste before October 9, 1993 will be considered for a variance under Part 360-17(c). A reduction in post-closure groundwater monitoring frequency can be granted providing that the following criteria are met:

1. The landfill is not located over or in close proximity to a sole source of primary aquifer.

2. Groundwater velocity should not be excessive.

3. An approved groundwater network musts be in place and a minimum of the rounds of representative post-closure groundwater chemistry data must be available for the facility.

4. The groundwater monitoring array must have detected contamination.

5. An acceptable water supply survey has been completed, identifying potentially impacted water supplies and necessary remedial measures implemented.

6. The landfill should be properly capped or making acceptable progress towards capping and determined to be in substantial compliance with the Part 360 regulations or the Order on Consent.

A database of water quality characteristics has been developed over the years based on analysis of surface water, groundwater, and leachate samples from the site. This geochemical data, as well as site stratigraphy information and a variety of hydrogeologic investigation and quarterly monitoring reports, have been reviewed by Stearns & Wheler in order to demonstrate that the above criteria are met for Landfill No. 1.

The EMP/SAP that was recently completed as part of the permit renewal process specified that the monitoring strategy contained therein would be subject to revision, as appropriate, and subject to NYSDEC approval. This document specifies the revisions that are being sought for Landfill No. 1 in support of a formal request for variance.

SECTION 2 - FINDINGS OF PREVIOUS INVESTIGATION

The following is a summary of information regarding site conditions that are relevant to the request for monitoring variance for Landfill No. 1. The information has been compiled over the course of numerous site investigations and monitoring events that have taken place at the site.

2.1 SITE SETTING

A. **Topography and Drainage.** The Auburn SWMC is situated in an area that has been modified by glaciation in the geologic past. Drumlins, which are mounds of glacial drift, are a common regional feature. One such drumlin is situated on the western edge of the SWMC and forms a drainage divide separating the SWMC (specifically the Landfill No. 1 part of the SWMC) from areas to the west.

Locally, natural elevations at the SWMC range from roughly 635 feet at the top of the western drumlin to a low elevation of roughly 535 feet along an intermittent stream east of the landfill. Both landfill mounds are thus situated between the drumlin and stream.

Surface water drains towards the north and east off of the Landfill No. 1 mound. The design for Landfill No. 2 results in the same pattern. The drumlin west of the mound and constructed ditches prevent the westward migration of surface runoff from the landfills themselves, although a tiny portion of the SWMC (unimproved) continues to drain westward. Surface water drainage from both landfills discharges to the intermittent stream, which flows northward, eventually reaching the Owasco Lake Outlet. The outlet flows northward into the Seneca River, eventually reaching Lake Ontario.

Numerous wetland areas north, east, and south of the landfill site are evidence of groundwater discharge in those areas, as well as the generally poor drainage characteristics of area tills.

B. **Surficial Geology.** The surficial overburden geology at the SWMC is complex and consists of a mixture of glacial tills and glaciolacustrine clays (C&S Engineers, 1991). The tills are generally dense and presumably underlay the SWMC landfill site, although the lack of exploratory borings within the footprint of Landfill No. 1 prevents verification of the actual extent. The softer glaciolacustrine clay is present across most of the south and eastern portions of the site, and presumably pinches out towards the higher grounds to the west. The clay separates the till into two distinct units where it occurs.

A fence diagram was prepared as part of the Closure Investigation Report (CIR) for Landfill No. 1 (C&S Engineers, 1991). This diagram has been reproduced as Figure 2-1 and depicts the site stratigraphy based on information obtained from site well borings.

Figure 2-2 illustrates the extent of the soft glaciolacustrine silts and clays, also based on the findings of the CIR. These soft sediments were deposited in a glacial meltwater lake environment. The limits of the lacustrine setting apparently coincides with the rise in elevation associated with the drumlin to the west.

The upper till, overlaying the glaciolacustrine clay, is predominately reddish-brown, stiff to hard clayey silt with embedded angular rock fragments. This upper till is thickest towards the southern portion of Landfill No. 1 and gives way to a predominantly grey lower till towards the north and west portions of the site. In the absence of glaciolacustrine clays, the upper and lower tills are generally in direct contact in the north and west, except for areas where a transitional zone of sands and clayey silts were identified in the northwest and southwest corners of the site (C&S Engineers, 1991).

C. **Bedrock Geology.** As stated in the Hydrogeologic Assessment Report (O'Brien & Gere, November 1989), the City of Auburn is underlain primarily by the Devonian Manlius Formation. However, the Auburn SWMC site, located northwest of the City, is underlain by the Bertie Formation (Figure 2-3).

Bedrock cores were collected in the vicinity of the Auburn landfill to identify the bedrock stratigraphy underlying Landfill Nos. 1 and 2. Examination of cores from the surrounding landfill property indicates that site bedrock consists of gypsum and dolostone from the Bertie Formation, namely from the gypsiferous Forge Hollow member and the dolomitic Fiddlers Green member (CS Consulting Engineers, April 1991). Bedrock exposed southeast of the landfill consists of fossiliferous limestone found in the overlying Manlius Formation. Bedrock of the Manlius Formation occurs at elevations well above the Auburn landfill bedrock, and is therefore not present at the Auburn SWMC site.

The geologic contact between the Manlius Formation and the Bertie Formation, as indicated on the geologic map of New York State Finger Lakes Sheet (Rickard & Fisher, 1970) was superimposed on the USGS topographic map of the Auburn area (Figure 2-3). The geologic contact falls approximately along the 600-foot topographic contour line. The 600-foot contour line corresponds with a southwest-northeast trending escarpment present throughout the area. This escarpment is the northernmost extension of the Devonian Manlius Formation, which further provides evidence to support that the bedrock beneath the Auburn landfill (north of the escarpment) is the Bertie Formation.

The surface of the bedrock at the landfill site has been weathered. This weathered zone varies from 2 to 6 feet in thickness. The bedrock surface has localized high and lows, which reflect changes in resistance to weathering; formations rich in rock gypsum have apparently weathered down to lower elevations than did formations more resistant to weathering. The result is an east-west trending trough between Landfill Nos. 1 and 2. Figure 2-4 illustrates the elevation contours of site bedrock. Based on data from previous investigations, the depth to bedrock ranges from 37 to 89 feet below ground surface (C&S Engineers, 1991).

D. **Hydrogeology.** Previous investigations have indicated that the glacial tills and glaciolacustrine clays over which the landfills are situated are of low permeability. Hydraulic conductivity tests have been performed in monitoring wells screened within the glacial till, as well as the bedrock. Overall, hydraulic conductivity values ranged from 1.79×10^{-4} cm/sec to 2.42×10^{-6} cm/sec (Table 2-1). For overburden wells, the range of values was from 1.79×10^{-4} cm/sec to 7×10^{-6} cm/sec, while for bedrock, values ranged from 3.42×10^{-4} cm/sec to 2.42×10^{-6} cm/sec.

Seepage velocities were estimated from the hydraulic conductivity values by the relationship $v = Ki/n$, where v is the seepage velocity of groundwater, K is the calculated hydraulic conductivity, I is the hydraulic gradient, and n is the effective porosity. The hydraulic gradient was conservatively estimated for the overburden and bedrock groundwater zones, based on the steepest portion of gradient typically observed for each zone. Estimated values for I were 0.10 and 0.01 for overburden and bedrock, respectively. Values for porosity (n) were estimated to be 0.20 for the overburden till, and 0.10 for the shale bedrock. Seepage velocity calculations are included on Table 2-1. The average seepage velocity for the overburden groundwater zone is estimated to be approximately 50 feet per year, and for bedrock it is roughly 80 feet per year.

Groundwater elevations have been used to determine the direction of groundwater flow in both the overburden and bedrock zones. Shallow groundwater flow is driven by high hydraulic head from the drumlin west of the site. The prevailing direction of shallow groundwater flow across the landfills is towards the east and north as presented in Figure 2-5.

Bedrock groundwater follows a slightly different flow pattern, flowing generally northward across Landfill No. 1 and becoming more westward across Landfill No. 2 (Figure 2-6).

The shallow groundwater gradient is quite steep moving eastward from the top of the drumlin and becomes more gradual across Landfill Nos. 1 and 2. It is believed that the intermittent stream acts as a local groundwater discharge area (C&S Engineers, 1991). This interpretation is consistent with the location of the landfill site in what appears to be a groundwater discharge area, as evidenced by topographic and surface water features.

Artesian conditions are known to exist along the north and east boundaries of Landfill No. 1. The hydraulic head exceeds the ground surface elevation for wells installed in that area. Groundwater flows freely from such wells. Artesian conditions have been observed for both shallow and bedrock wells installed along the northeast landfill perimeter. Specifically, Wells 5A, 5B, 18CC, 19CC, 20C, 21A, 21C, 22A, 22C, 29A, 29B, 30A, and 30B have exhibited artesian flow. The wells with consistent artesian flow include 5A, 18CC, 20C, 21A, 21C, 22A, and 22C. As previously stated, these wells are located north and east of Landfill No. 1 and are also in close proximity to the intermittent stream which flows northward across the site. It therefore appears that site groundwater discharges to this stream. Artesian flow is driven by hydraulic head in the deeper bedrock which exceeds the hydraulic head in the shallower overburden.

E. **Existing Monitoring Facilities.** The site consists of a closed portion (Landfill No. 1) that has received a final cap and no longer receives waste, and an active portion (Landfill No. 2) that currently accepts waste. Two distinct monitoring well networks have been installed at the site for Landfill No. 1 and No. 2, respectively. Table 2-2 lists the wells for each of the two landfills and well construction data for each well. Wells listed for Landfill No. 1 on the table will be subject to the monitoring variance requested herein.

F. **Area Water Resources.** To be approved for a post-closure monitoring variance, potentially at-risk water supplies must be identified and necessary remedial measures must be implemented. For the City's SWMC, there are no known at-risk surface water or groundwater supplies associated with site operations. Area groundwater and surface water are not utilized as a source and are unlikely to be used as a resource in the future. The Finger Lakes Sheet of the Map of Unconsolidated Aquifers in New York State (Miller, 1987) indicates that there are no primary or sole source aquifers underlying the site or its general vicinity. Although there are some isolated sand and gravel deposits across the area, the most substantial soil types are clayey tills and sand, silt, and clay lacustrine deposits. Modest yields and undesirable natural water quality characteristics restrict the potential for area development of groundwater as a resource.

2.2 HYDROGEOCHEMISTRY

Piper diagrams were used in the Hydrogeochemical Evaluation Report (Stearns & Wheler, 1994) to demonstrate the chemical distinctions between water quality types at the SWMC. In this report, they are used to clearly show that leachate contamination in groundwater is easily identified, distinct from background and confined to a specific area. This demonstration supports the criterion that the groundwater monitoring well array must have detected contamination.

Piper diagrams are a means of depicting the water quality characteristics of samples according to the relative abundance of the major ions, calcium, magnesium, potassium, sodium, bicarbonate (or alkalinity), chloride, and sulfate. Since these seven ions account for the vast majority of all dissolved species, their proportions in a sample can reveal distinct sources of groundwater and also can determine if mixing is taking place between different water types. Different water types are represented on a piper diagram in different areas on the figure. Figure 2-7 illustrates some common groundwater types on an idealized piper diagram. From Figure 2-7, it can be seen how a groundwater derived from a limestone aquifer can be readily differentiated from groundwater that is affected by, for instance, gypsum. Water quality characteristics for groundwater at the SWMC can be evaluated in the same way. In general, three water quality types were identified:

1. Shallow (overburden) upgradient groundwater that is typified by relatively moderate TDS (500 to 1,000 ppm) and containing calcium, magnesium, and bicarbonate as the primary dissolved species. This water quality is naturally derived from dolomitic tills in the area. Natural hardness is elevated, limiting the value of shallow groundwater as a resource.

2. Deep (bedrock) groundwater that has a high TDS (1,000 to 3,000 ppm) and contains primarily calcium and sulfate derived from gypsum within area shales and dolostones. The elevated TDS results in poor quality in regard to possible use as a resource.

3. Leachate, with a high TDS (~2,000 to 5,000 ppm), and influenced primarily by sodium, bicarbonate, and chloride.

Piper diagrams for site monitoring wells effectively demonstrate which areas are affected by leachate and which are influenced by natural water quality. The artesian conditions along the downgradient perimeter of Landfill No. 1 are reflected in the natural bedrock calcium sulfate signature of groundwater from shallow wells (18AA, 19AA, 20AA, and 21A). Groundwater from the bedrock flowing upward into the overburden aquifer is imparting a bedrock chemistry to the shallow wells (Figures 2-8 and 2-9). In contrast, shallow wells upgradient of the landfills that are not affected by artesian conditions have a dolomite-type chemistry (Figure 2-10). Leachate quality has its own distinct signature (Figure 2-11). It is also obvious that leachate is not affecting Well 22C due to the upward groundwater flow, but leachate is affecting well 22A (Figure 2-12). The hydrogeochemical evaluation thus ties together stratigraphic, hydraulic, and chemical data to provide a comprehensive site model.

The results of the evaluation indicate that leachate impacts are confined to well 22A and also explain how site groundwater hydraulics confine impacts to the area near that particular well.

Additional Piper diagrams were included in previous reports (Stearns & Wheler, April 1994, November 1995). From those reports, it is apparent that the majority of wells are unaffected by leachate characteristics, and hence reflect natural groundwater quality. Leachate impacts are easily differentiated from natural groundwater quality.

2.3 STATISTICAL EVALUATION

Statistical methods were applied to the data set to help verify or refute the conclusions drawn from the hydrogeochemical evaluation. The statistical evaluation answered the basic question of whether upgradient groundwater quality is significantly different from downgradient groundwater and leachate, and if so, what specific analytes reflect those differences. The goal of the statistical approach was to find specific analytes that can be used to clearly differentiate water quality types. Used in conjunction with geochemical reasoning, differences in water quality due to leachate and those due to natural groundwater evolution can be defined.

The findings of the statistical evaluation are presented in detail in previous reports (Stearns & Wheler, April 1994 and November 1995). In summary, the statistical evaluation verified that there is a chemical distinction between natural upgradient groundwater chemistry and natural downgradient groundwater chemistry. There is also a clear distinction between leachate impacts (represented by data from Well 22A) and natural downgradient groundwater. Overall, the independent statistical evaluation supported the hydrogeochemical model described above.

SECTION 3 - SUMMARY AND CONCLUSIONS

To support a request for variance for Landfill No. 1 post-closure monitoring, the following criteria need to be satisfied:

1. The landfill must not be located over or in close proximity to a sole source or primary aquifer.

2. Groundwater velocity should not be excessive.

3. An approved groundwater network must be in place, and a minimum of 10 rounds of representative post-closure data must be available.

4. The groundwater monitoring well array must have detected contamination.

5. An acceptable water supply survey must be completed, identifying potentially impacted water supplies and necessary remedial measures.

6. The landfill should be properly capped or making acceptable progress towards capping, and determined to be in substantial compliance with the Part 360 regulations or the Order on Consent.

The findings of previous investigations indicate that each of the above criteria are satisfied. Landfill No. 1 is not located over a sole source or primary aquifer. Groundwater velocity is modest, estimated at less than 100 feet per year. The existing groundwater monitoring network provides adequate detection capabilities, and the required number of post-closure sampling rounds have been completed. The results of previous geochemical and statistical evaluation clearly show where leachate impacts have occurred, and provide a means for easily identifying future impacts if they occur. There are no known drinking water supplies that are potentially impacted by site activities, and Landfill No. 1 has been properly capped.

SECTION 4 - RECOMMENDATIONS

We are recommending, based on satisfaction of the above criteria, that the post-closure groundwater monitoring program for Landfill No. 1 be reduced to an annual baseline analysis for the Landfill No. 1 monitoring wells listed on Table 2-2. It is understood that the Department may, in the future, require additional information and monitoring beyond the annual baseline round in this request for variance should future concerns require that it is necessary.

REFERENCES

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O'Brien & Gere, Interim Closure Measures Plan (ICMP), Sanitary Landfill No. I, City of Auburn, Cayuga County, New York, September 1989.

6 NYCRR Part 360, Solid Waste Management Facilities, Title 6 of the Official Compilation of Codes, Rules, and Regulations, effective October 1993.

Stearns & Wheler, 1993 First Quarterly Monitoring Report, City of Auburn Landfills No. I and II, October 1993.

Stearns & Wheler, 1993 Second Quarterly Monitoring Report, City of Auburn Landfills No. I and II, November 1993.

Stearns & Wheler, Hydrogeochemical Evaluation, City of Auburn Landfills No. 1 and 2, April 1994.

Stearns & Wheler, Alternative Environmental Monitoring Strategy, City of Auburn Solid Waste Management Center, Cayuga County, NY, November 1995.

ATTACHMENT 1

New York State Department of Environmental Conservation
Region 7 Division of Solid and Hazardous Materials
615 Erie Blvd. W., Syracuse, NY 13204-2400
(315) 426-7419

Michael D. Zagata
Commissioner

March 21, 1996

Al Emmi, City Manager
City of Auburn
Memorial City Hall
24 South Street
Auburn, NY 13021

RE: NOTICE OF AVAILABILITY OF REDUCTION IN POST-CLOSURE ENVIRONMENTAL MONITORING BY GENERAL PART 360 VARIANCE

Dear Mr. Emmi:

The Division of Solid and Hazardous Waste has reviewed the post-closure groundwater monitoring requirements for solid waste landfills closed pursuant to the December 31, 1988 6NYCRR Part 360 regulations.

Based upon this review, we have concluded these groundwater monitoring requirements may, in certain instances, be reduced prior to collecting a full five years' worth of post-closure monitoring data from a facility while still providing effective groundwater monitoring. Specifically, reduction in post-closure groundwater monitoring may be considered for facilities which are currently known to be contaminating groundwater and for which frequent monitoring will not aid in better understanding the problem.

Therefore, in the absence of significant environmental concerns, landfills that stopped accepting waste before October 9, 1993 or, for those landfills that conform to the October 1, 1993, 40 CFR Part 258 Extension Criteria before April 8, 1994 will be considered for a variance under Part 360-1.7(c) for a reduction in post-closure groundwater monitoring frequency in accordance with criteria described below.

Any requests for variances for this reduction in monitoring should include sufficient information to demonstrate that the following criteria are met:

1. The landfill is not located over or in close proximity to a sole source or primary aquifer.

2. Groundwater velocity should not be excessive.

3. An approved groundwater network must be in place, and a minimum of ten rounds of representative post-closure groundwater chemistry data must be available for the facility.

4. The groundwater monitoring well array must have detected contamination.

5. An acceptable water supply survey has been completed, identifying potentially impacted water supplies and necessary remedial measures implemented.

6. The landfill should be properly capped or making acceptable progress towards capping and determined to be in substantial compliance with the Part 360 regulations or the Order on Consent.

If, upon evaluation, a landfill qualifies for a post-closure groundwater monitoring reduction, this reduced monitoring should consist of a minimum of an annual baseline analysis at each of the monitoring wells, leachate, and surface water sampling locations.

The Department may, based on site-specific or other concerns, require additional information and/or additional monitoring beyond the minimum identified in this letter. The Department may also at any time increase the monitoring frequency if warranted by subsequent analytical results or other site-specific conditions.

This request for variance in post-closure environmental monitoring does not preclude the facility owner from other post-closure inspection and monitoring requirements (see Section 360-2.15 and variance responsibilities described in "Guidance on Landfill Closure Regulatory Relief, February 1993").

One yearly report will be required summarizing the year's events; however, if incidences of monitoring well failure or destruction occur, or leachate or gas migration is detected, or cover or slope failure occur, the facility owner must notify the Department in writing within ten days of detection and propose a plan to correct the problem as soon as possible. Failure to do so may result in the Department taking enforcement action.

If the facility owner wishes to request this variance, and the Department grants this variance, the facility owner will also be required to submit a revised Post-Closure Operations and Maintenance Manual which will reflect the changes described in the general post-closure monitoring variance.

Submittal to the Department for the above described variance must be made with the attached form which must also include documentation satisfying the variance criteria referenced above.

If you have any questions concerning this procedure, please contact Anita Grikstas for Onondaga, Cayuga, Madison, Oswego and Cortland County facilities at (315) 426-7419, or Frank Trent for Tompkins, Tioga, Broome and Chenango Counties at (607) 775-2545.

Sincerely,

Larry Gross, P.E.
Regional Solid & Hazardous
Materials Engineer

CC: A. Grikstas
F. Trent
R. Baldwin
D. Stoner, Stearns & Wheler

TABLES

Table 2-1
Hydraulic Conductivity Test Results
City of Auburn Solid Waste Management Center
Alternative Monitoring Strategy

Well Number	Formation Monitored	Test Number	Test Type	Hydraulic Conductivity	Seepage Velocity cm/sec Overburden	Seepage Velocity cm/sec Bedrock	Seepage Velocity ft/yr Overburden	Seepage Velocity ft/yr Bedrock
18A	Till	1	Slug	9.09E-05	4.55E-05		47.03	
		2	Slug	1.58E-04	7.90E-05		81.75	
18C	Bedrock	1	Bail	7.52E-05		3.76E-05		38.91
		2	Bail	6.64E-05		3.32E-05		34.35
19A	Till	1	na	1.35E-04	6.75E-05		69.85	
		2	na	1.22E-04	6.10E-05		63.12	
19C	Bedrock	1	Bail	3.42E-04		1.71E-04		176.95
		2	Bail	2.74E-04		1.37E-04		141.76
		3	Bail	2.74E-04		1.37E-04		141.76
20A	Till	1	Bail	1.79E-04	8.95E-05		92.61	
		2	Bail	1.30E-04	6.50E-05		67.26	
20C	Bedrock	1	Bail	5.14E-05		2.57E-05		26.59
		2	Bail	5.14E-05		2.57E-05		26.59
21A	Till	1	Bail	7.00E-06	3.50E-06		3.62	
21C	Bedrock	1	Bail	3.40E-04		1.70E-04		175.91
		2	Bail	3.40E-04		1.70E-04		175.91
22A	Till	1	Bail	8.02E-05	4.01E-05		41.49	
		2	Bail	7.33E-05	3.67E-05		37.92	
22C	Bedrock	1	Bail	1.13E-04		5.65E-05		58.46
		2	Bail	1.10E-04		5.50E-05		56.91
23A	Till	1	Bail	5.72E-05	2.86E-05		29.59	
23C	Bedrock	1	Slug	1.68E-05		8.40E-06		8.69
24A	Till	1	Bail	1.52E-04	7.60E-05		78.64	
24C	Bedrock	1	Slug	9.44E-05		4.72E-05		48.84
25A	Till	1	Bail	9.98E-05	4.99E-05		51.64	
		2	Bail	6.62E-05	3.31E-05		34.25	
25C	Bedrock	1	Slug	2.42E-06		1.21E-06		1.25
26A	Till	1	Bail	6.62E-05	3.31E-05		34.25	
		2	Bail	4.68E-05	2.34E-05		24.21	
		3	Bail	4.35E-05	2.18E-05		22.51	
					Average seepage vel.		**48.73**	**79.49**

Conductivities reported in cm/sec

na- not available

Velocity = Ki/n

where: K = conductivity, i = hydraulic gradient, and n = effective porosity.

"i" is estimated based on the steepest gradient typically observed for the overburden and bedrock groundwater zones, based on site groundwater elevation data (i = 0.1 for overburden and 0.01 for bedrock)

"n" is estimated to be 0.20 for overburden and 0.10 for bedrock.

Table 2-2
Groundwater Monitoring Wells
City of Auburn Solid Waste Management Center

LANDFILL NO. 1 (6NYCRR Part 360, Dec. 1988)			
Well Number	Well Depth	Well Elevation	Ground Elevation
MW 3	34	545.77	544.68
MW 4AA	14.5	618.88	616.62
MW 4B	32.1	618.95	616.62
MW 4C	67.3	620.25	618.38
MW 5AA	15	550.78	548.45
MW 5B	29.6	550.66	548.8
MW 7AA	15	560.68	558.51
MW 7BB	34	560.74	558.78
MW 18AA	23	555.17	552.72
MW 18CC	65.5	555.49	552.59
MW 19AA	36	556.83	555.58
MW 19CC	61	557.68	555.98
MW 20AA	23.5	559.84	557.66
MW 20C	54	550.51	548.11
MW 21A	24	543.75	541.35
MW 21C	43.1	543.56	541.16
MW 22A	22.7	545.7	543.2
MW 22C	46.2	545.52	543.02
MW 23AA	21.5	574.43	572.03
MW 23C	46	574.3	571.8
MW 24A	21.5	600.62	598.12
MW 24C	94	600.53	598.54
MW 25A	19.5	591.11	588.71
MW 25C	75	591.56	589.06
MW 26A	17.5	574.25	571.75
MW 26C	44.5	575.06	572.66
MW 28A	24		
MW 28B	42		
MW 29A	27.25		
MW 29B	62		
MW 30A	26		
MW 30B	55.7		

LANDFILL NO. 2 (6NYCRR Part 360, Oct. 1993)			
Well Number	Well Depth	Well Elevation	Ground Elevation
MW 8A	15	584.1	580.82
MW 8C	95	581.1	578.77
MW 9AA	15	550.7	548.38
MW 9C	63	550.02	548.14
MW 10AA	16	546.12	544.72
MW 10C	52	545.66	544.58
MW 12AA	17	554.74	552.44
MW 12B	28	554.52	553.07
MW 12C	48	555.14	552.81
MW 13A	18	550.97	549.1
MW 13C	65	551.01	549.19
MW 14A	18	547.6	545.49
MW 14C	43	547.81	545.52
MW 15A	26	557.62	555.55
MW 15C	48	557.4	555.57
MW 16AA	17	548.69	546.74
MW 16C	58	547.99	546.73
MW 17AA	17	583.05	580.99
MW 17C	90	582.93	581.23

Sources: CS Consulting Engineers, "Closure Investigation Report for Landfill No. 1", May 1991.
Upstate Laboratories, Inc., "Analysis Report #051793002-Quarterly Landfill 1" May 1993
C&S Consulting Engineers, Inc., Environmental Monitoring Program Quarterly Reports

Wells to be included in environmental monitoring program. The above list may be subject to change, based on appropriate data and as regulations permit, subject to NYSDEC approval.
Elevation data for well clusters 28, 29 and 30 scheduled to be revised in future survey.
Landfill No. 1 monitoring wells to be sampled annually for baseline parameters
Landfill No. 2 monitoring wells to be sampled quarterly (3 routine, 1 baseline)

Stearns & Wheler
Job No 2629
Apr-96

FIGURES

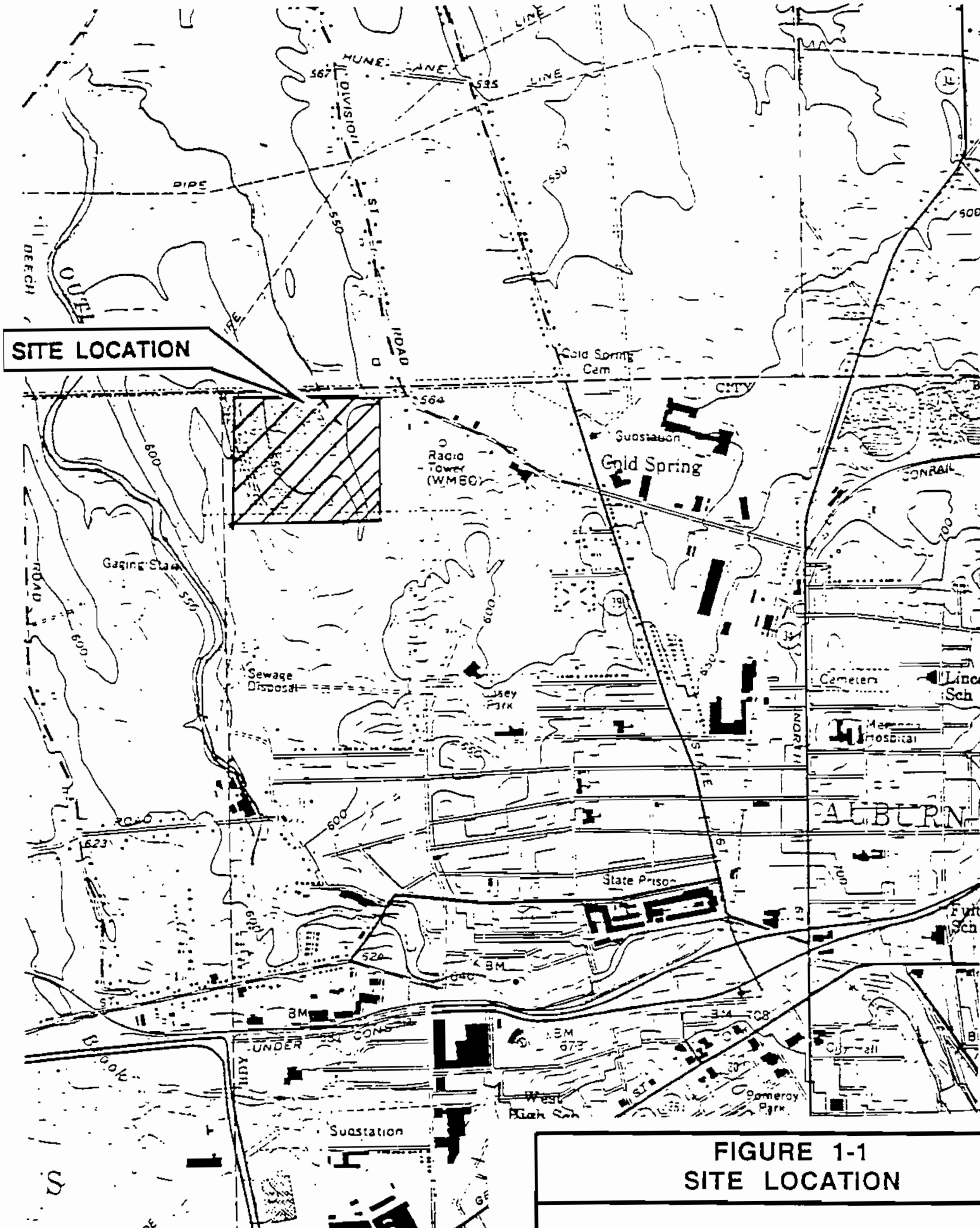

FIGURE 1-1
SITE LOCATION

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
MONITORING PROGRAM

JOB NO. 2629 DATE: SEPTEMBER 1995

Stearns & Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

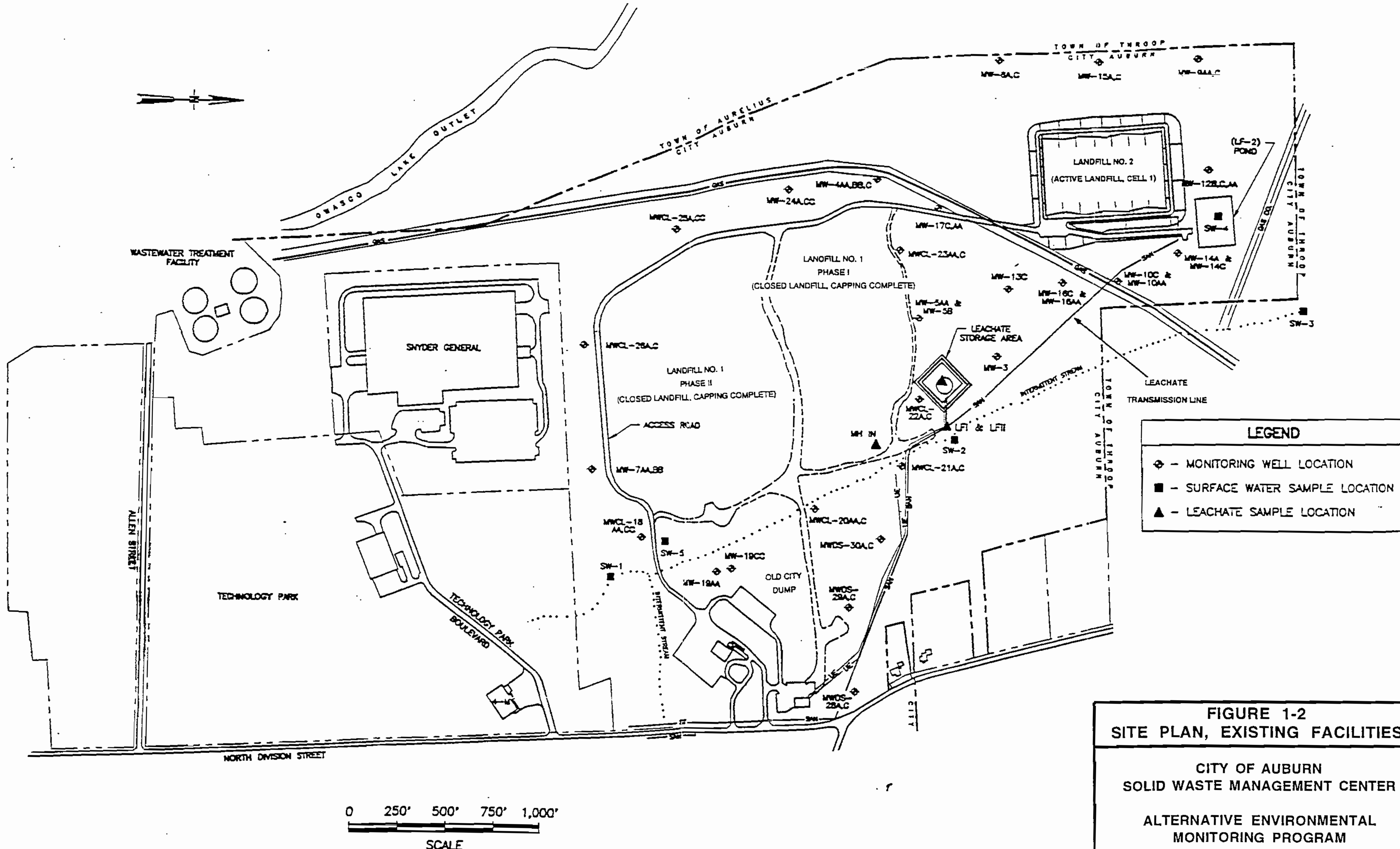

FIGURE 1-2
SITE PLAN, EXISTING FACILITIES

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
MONITORING PROGRAM

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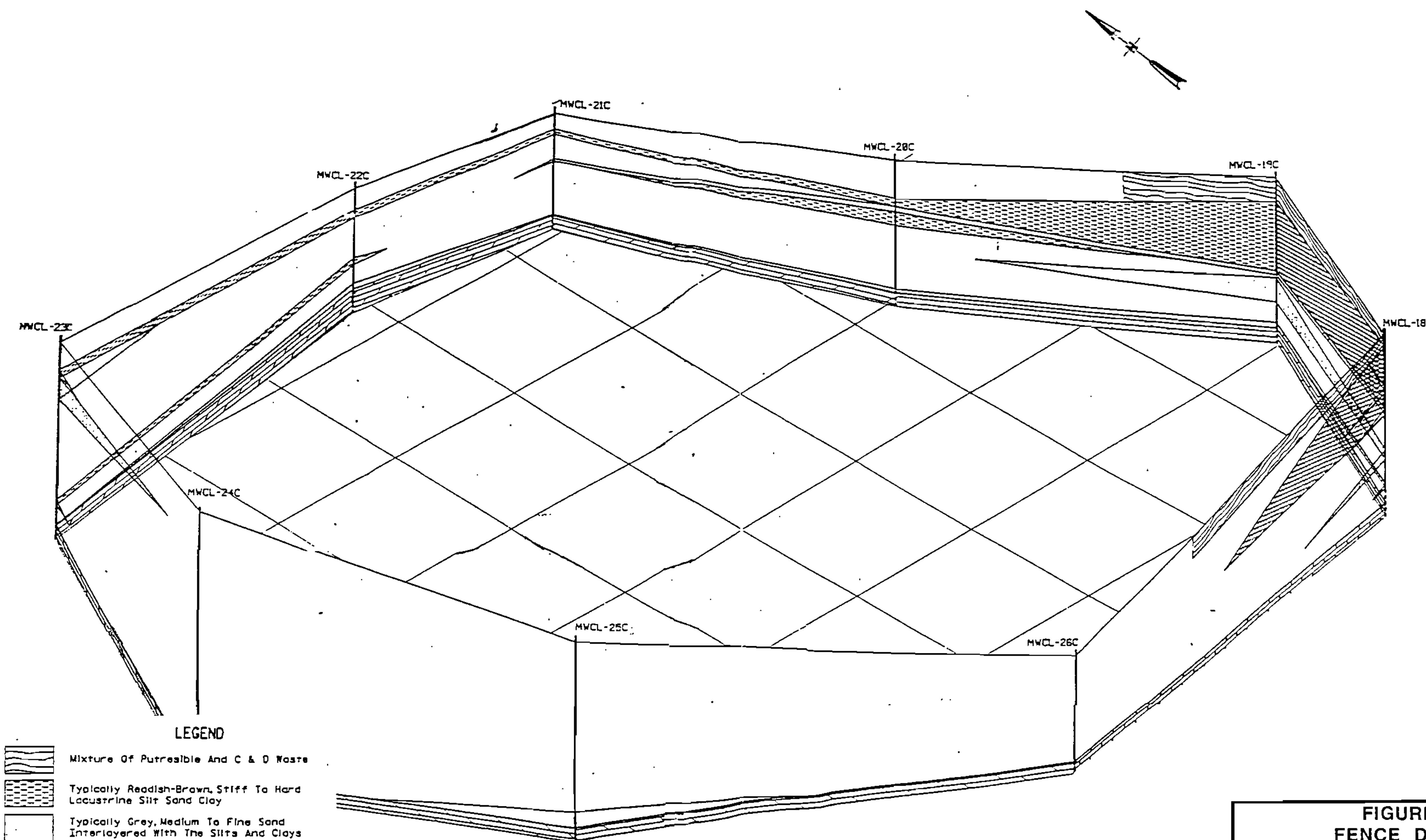


LEGEND

TRASH	Mixture Of Putresible And C & D Waste
SILT/CLAY	Typically Reddish-Brown, Stiff To Hard Lacustrine Silt Sand Clay
SAND	Typically Grey, Medium To Fine Sand Interlayered With The Silts And Clays
TILL	Typically Dark Grey, Silt With Angular Rock Fragments Interlayed With Grey Silt
BEDROCK	Bertie Group Consisting Of Dolostone And Rock Gypsum Of The Fiddlers Green And Forge Hollow Formations

NOTE: The Upper Till Layers Are Similar In Appearance To The Lacustrine Silts And Clays. Typically Reddish-Brown In Color, Consisting Of A Mixture Of Fine To Coarse Gravel And Reworked Lacustrine Silts And Clays.

REPRODUCED FROM C&S ENGINEERS, 1991

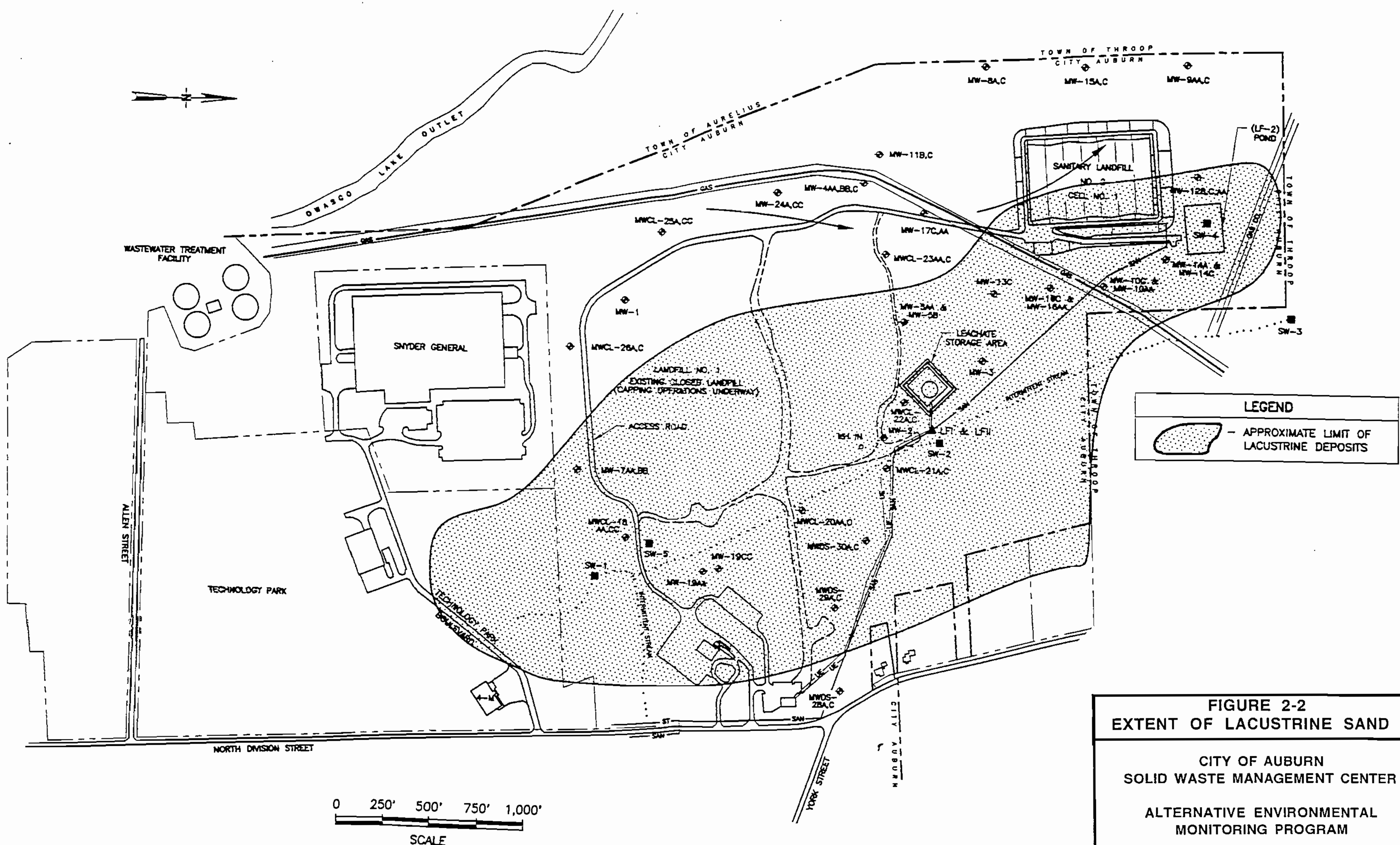
FIGURE 2-1
FENCE DIAGRAM

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
MONITORING PROGRAM

Stearns & Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

JOB NO. 2629 DATE: SEPTEMBER 1995



LEGEND

- APPROXIMATE LIMIT OF LACUSTRINE DEPOSITS

FIGURE 2-2
EXTENT OF LACUSTRINE SAND

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
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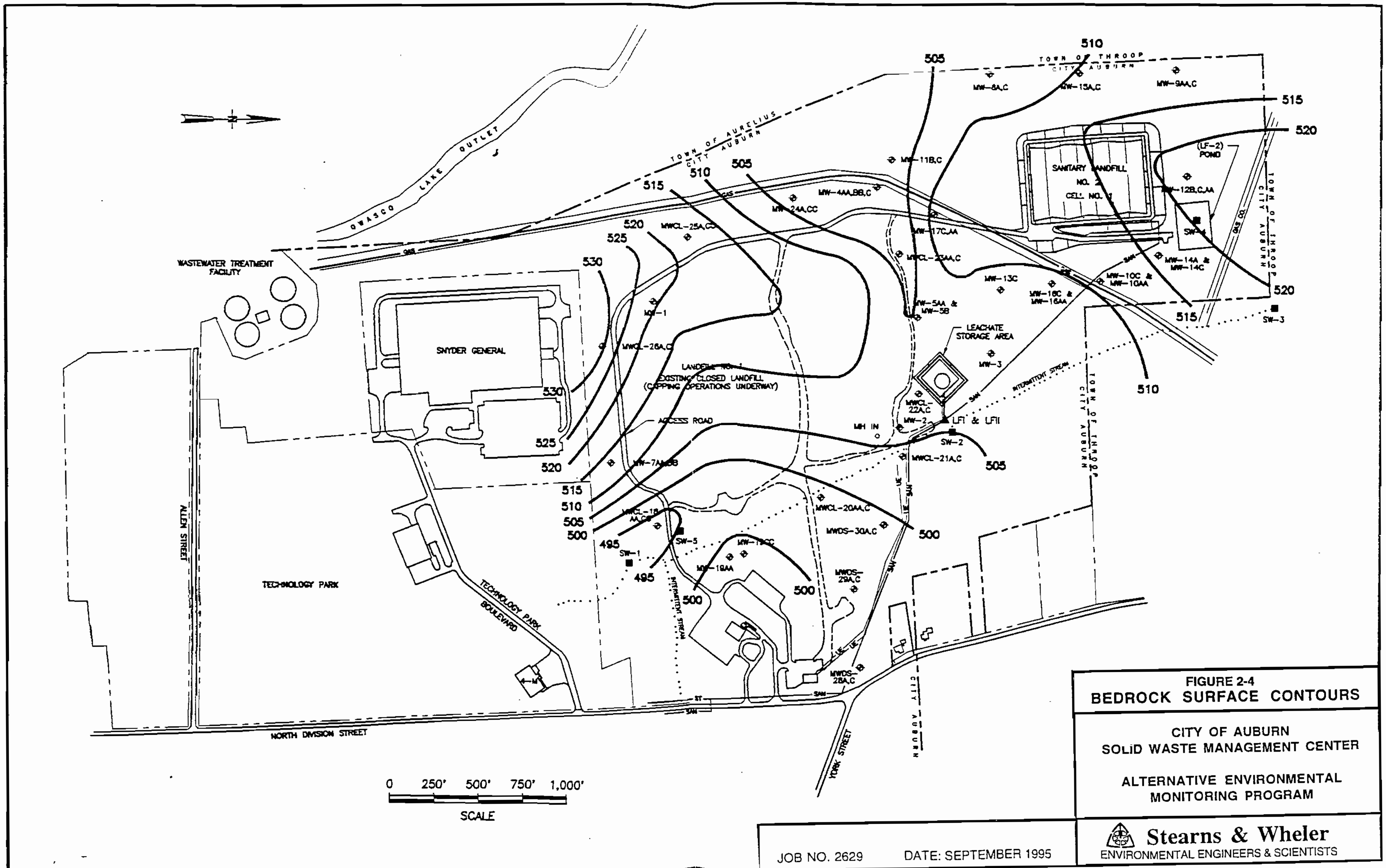

FIGURE 2-4
BEDROCK SURFACE CONTOURS

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
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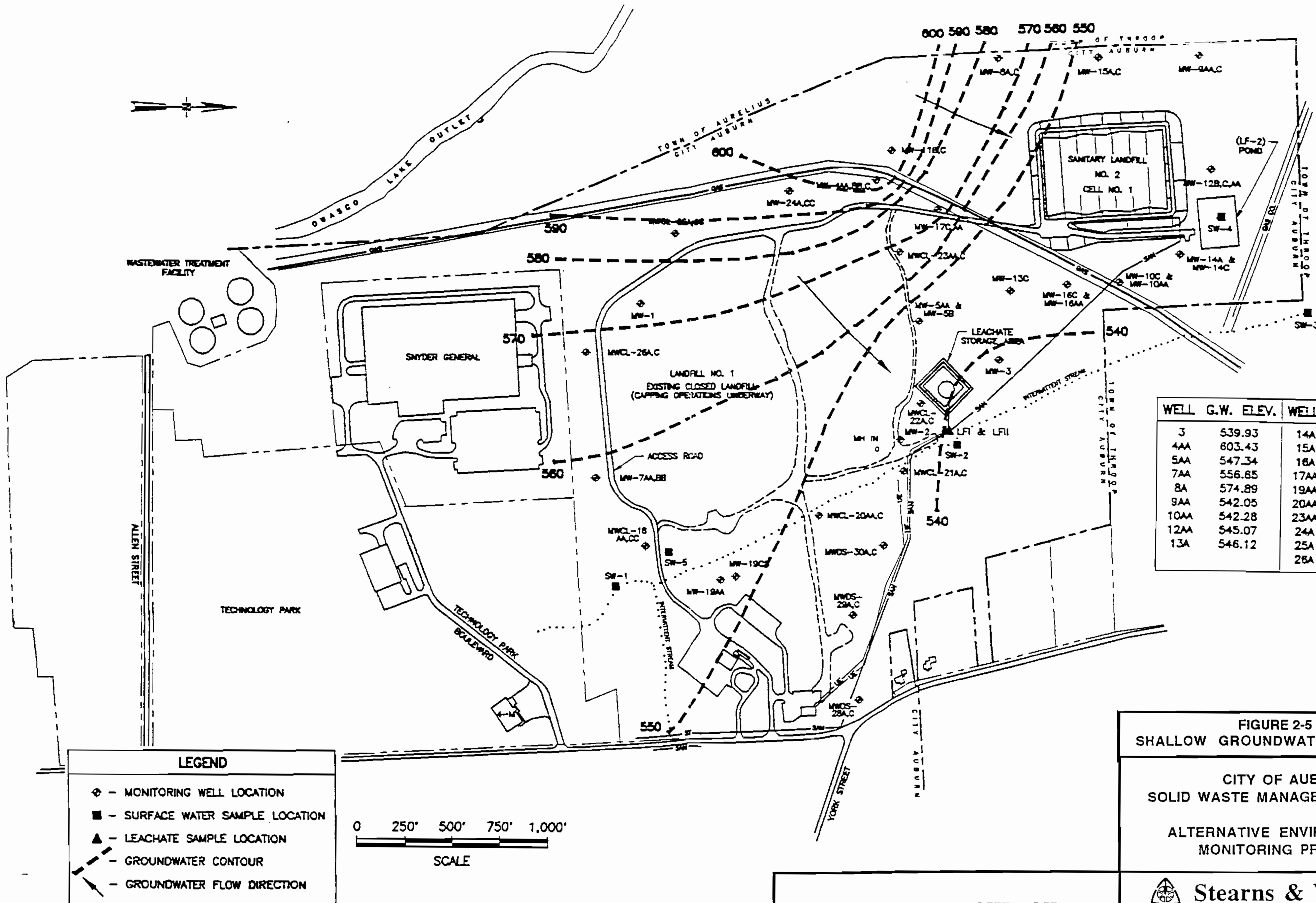

WELL	G.W. ELEV.	WELL	G.W. ELEV.
3	539.93	14A	542.13
4AA	603.43	15A	545.03
5AA	547.34	16A	541.64
7AA	556.85	17AA	577.59
8A	574.89	19AA	554.01
9AA	542.05	20AA	556.14
10AA	542.28	23AA	565.20
12AA	545.07	24A	594.50
13A	546.12	25A	589.30
		26A	567.82

LEGEND

- MONITORING WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- LEACHATE SAMPLE LOCATION
- GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION

0 250' 500' 750' 1,000'

SCALE

FIGURE 2-5
SHALLOW GROUNDWATER CONTOURS

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
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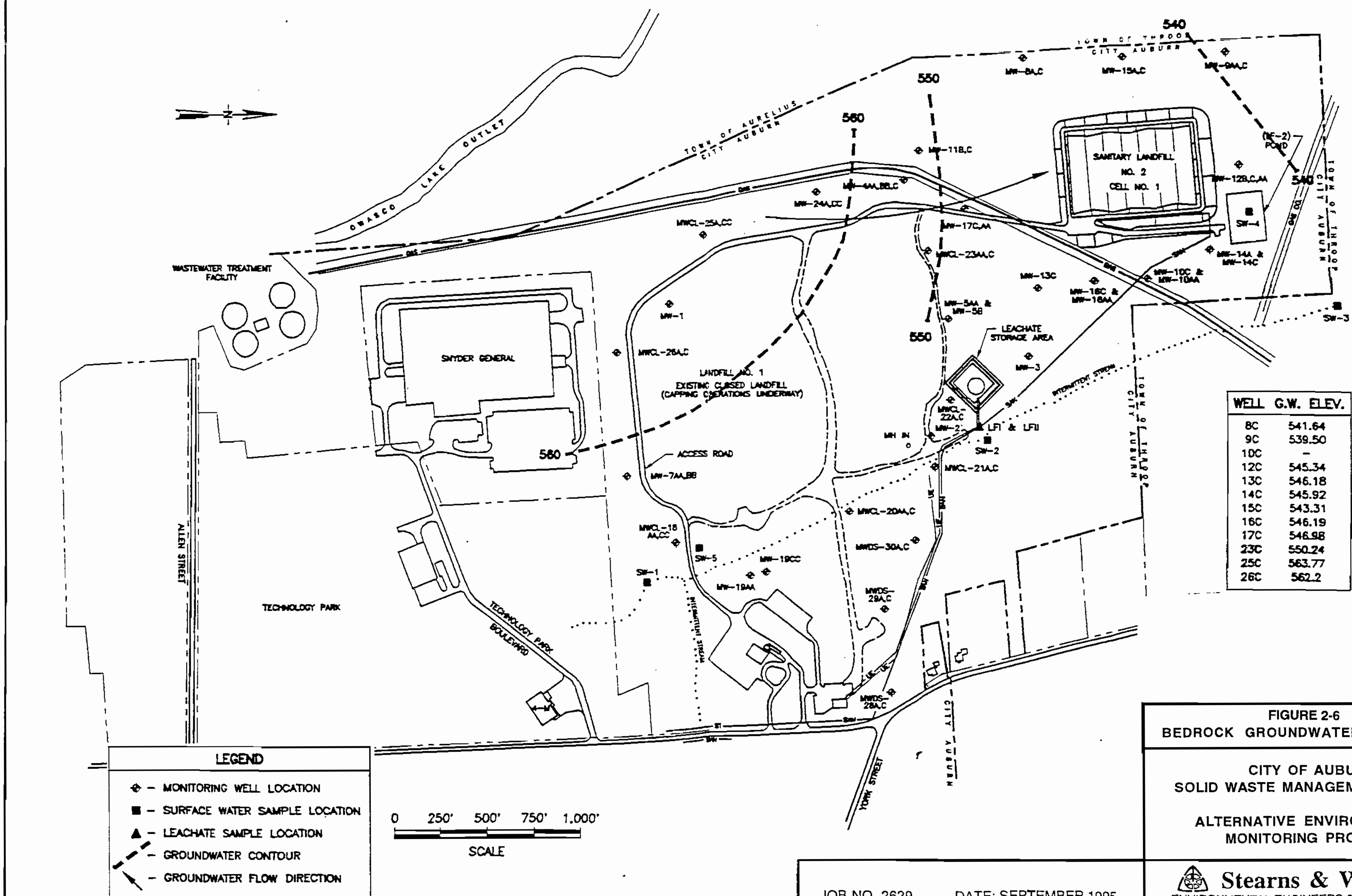
JOB NO. 2629 DATE: SEPTEMBER 1995



WELL	G.W. ELEV.
8C	541.64
9C	539.50
10C	–
12C	545.34
13C	546.18
14C	545.92
15C	543.31
16C	546.19
17C	546.98
23C	550.24
25C	563.77
26C	562.2

FIGURE 2-6
BEDROCK GROUNDWATER CONTOURS

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL
MONITORING PROGRAM

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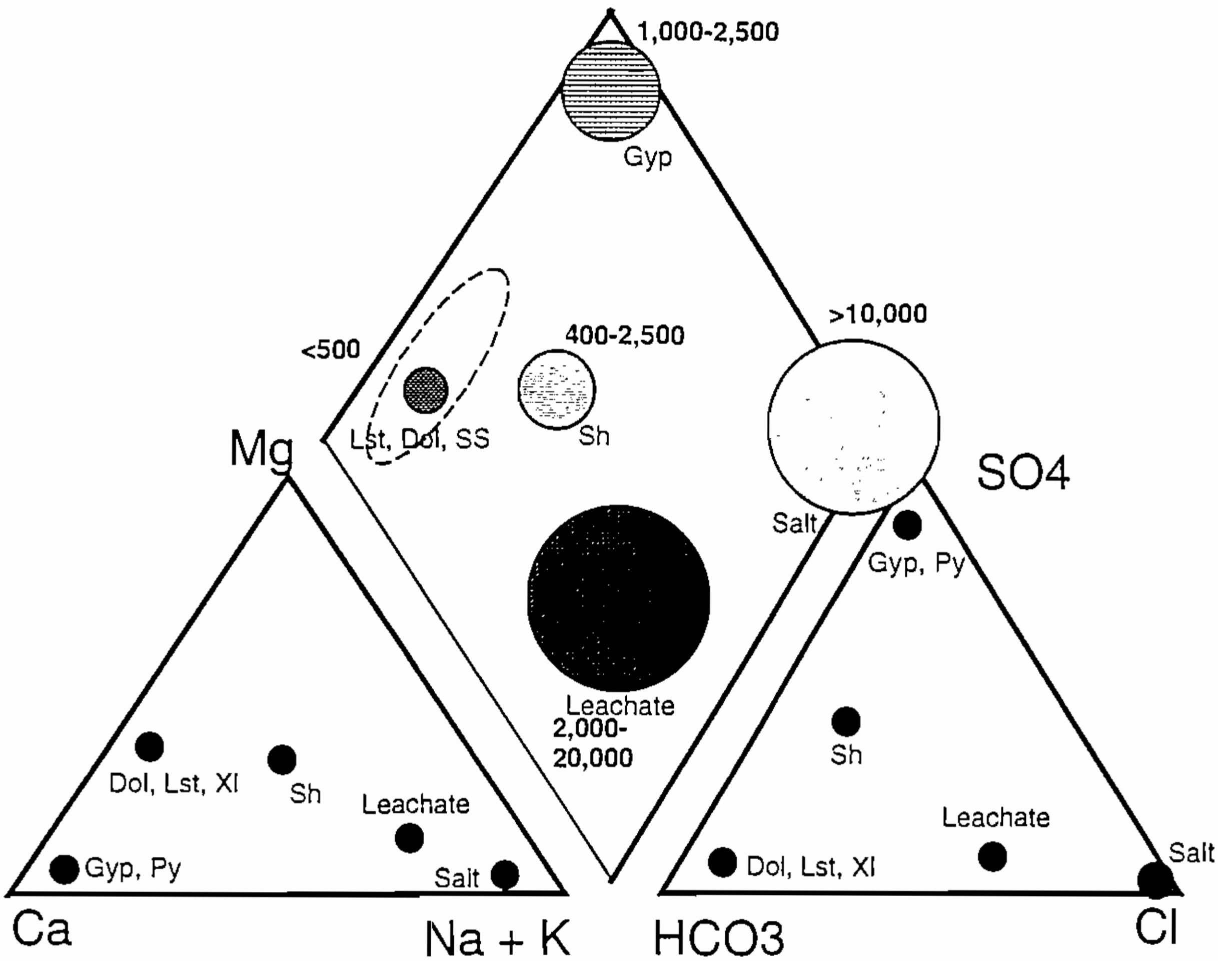

Dol = dolostone
Lst = limestone
Gyp = gypsum
SS = sandstone

Sh = shale
Xl = crystalline rock
Py = pyrite

Numbers indicate approximate parts per million range for each water type.

FIGURE 2-7
IDEAL PIPER DIAGRAM

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER

ALTERNATIVE ENVIRONMENTAL MONITORING PROGRAM

JOB NO. 2629 DATE: SEPTEMBER 1995

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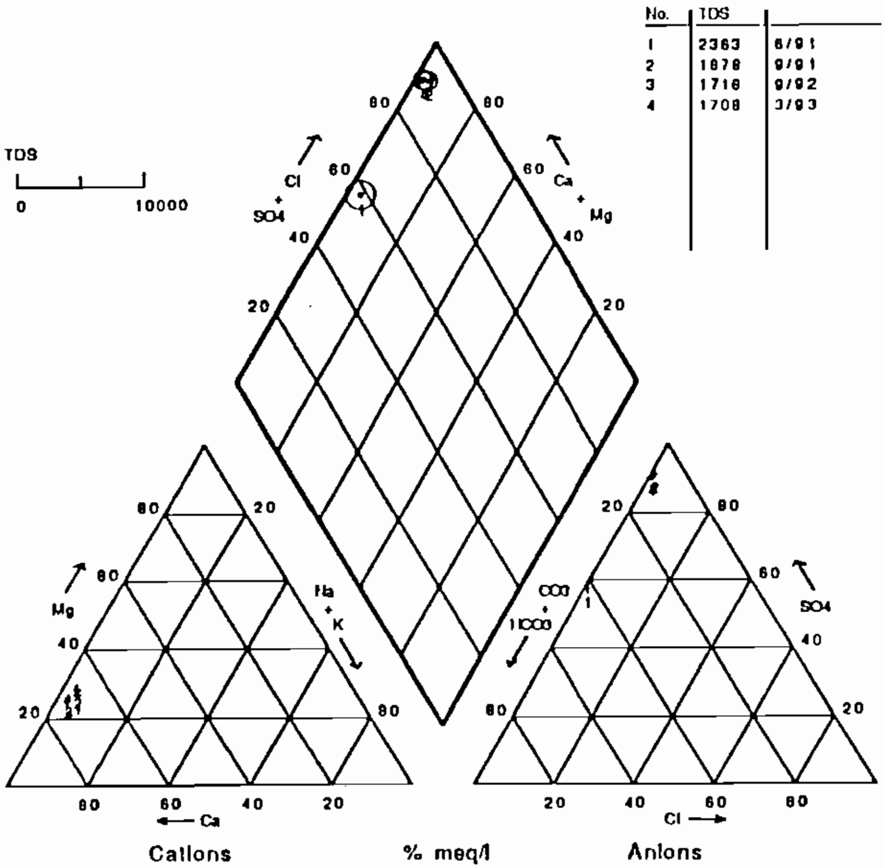
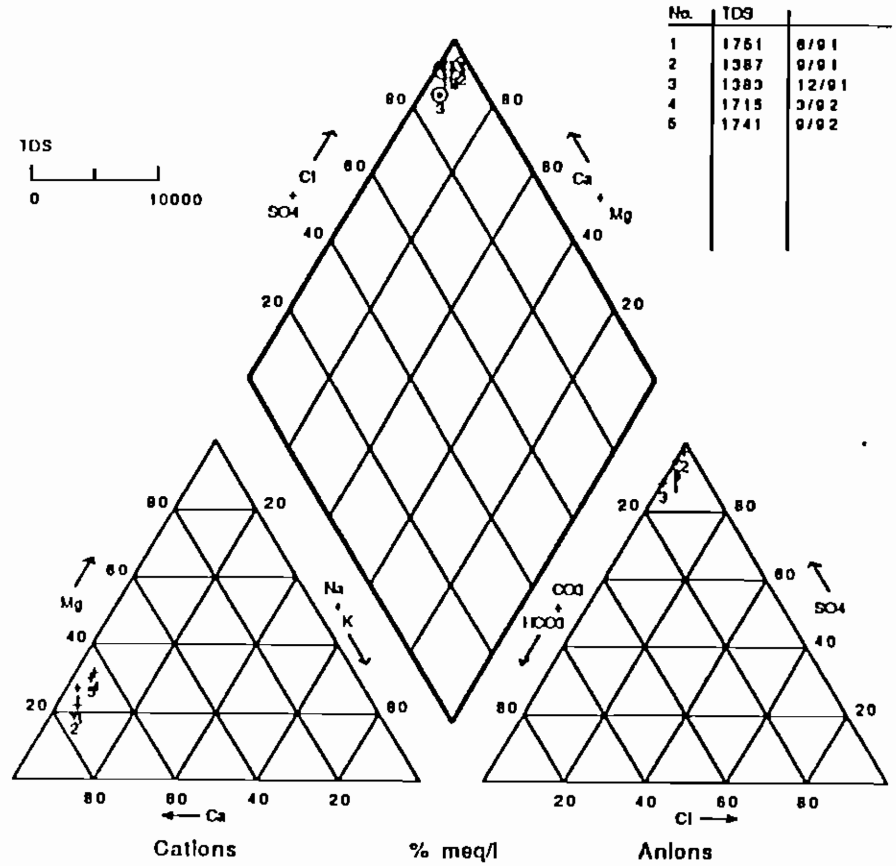


18AA



19AA

FIGURE 2-8

PIPER DIAGRAMS, WELLS18AA & 19AA

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER
ALTERNATIVE ENVIRONMENTAL
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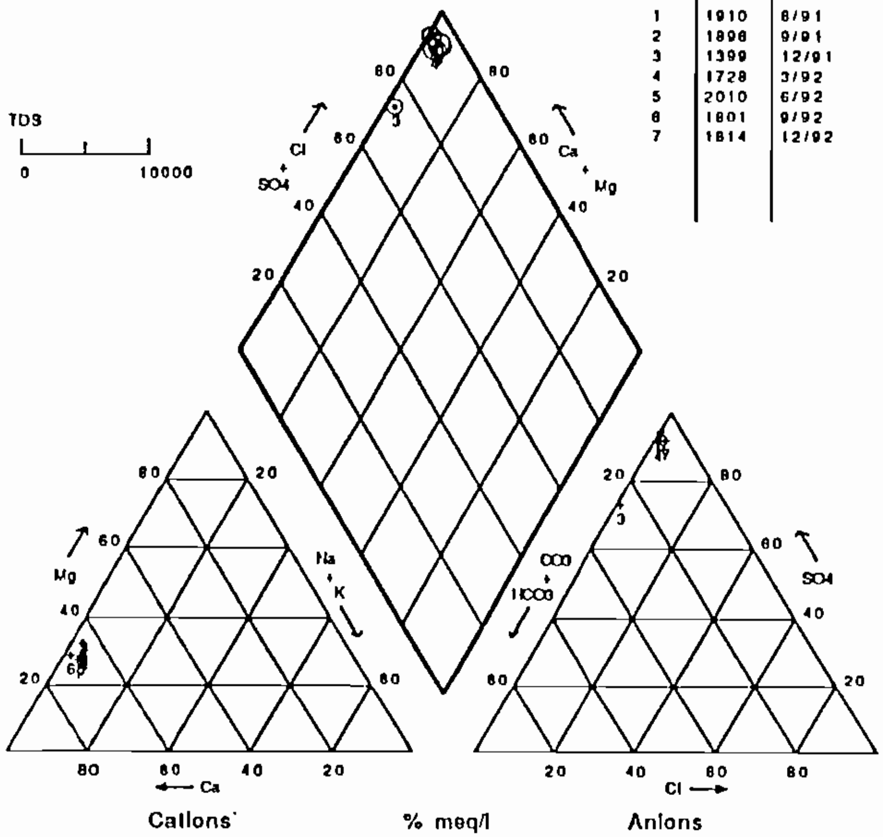
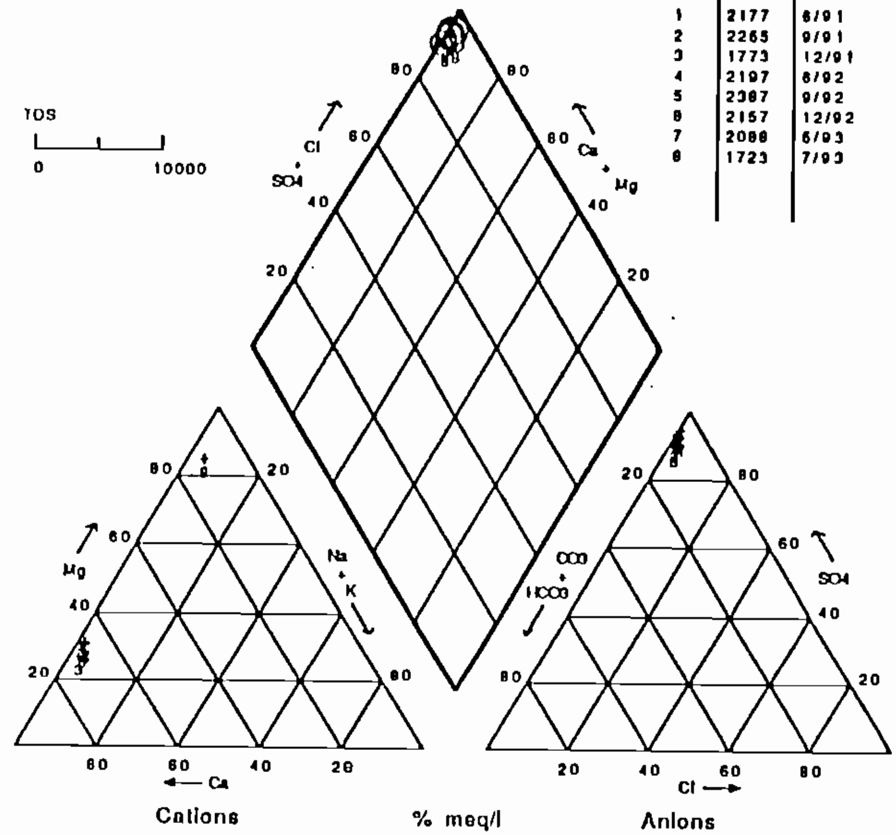


20AA

No.	TDS	
1	1910	6/91
2	1896	9/91
3	1399	12/91
4	1728	3/92
5	2010	6/92
6	1801	9/92
7	1814	12/92



21A

No.	TDS	
1	2177	6/91
2	2265	9/91
3	1773	12/91
4	2197	6/92
5	2387	9/92
6	2157	12/92
7	2088	6/93
8	1723	7/93

FIGURE 2-9

PIPER DIAGRAMS, WELLS 20AA & 21A

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER
ALTERNATIVE ENVIRONMENTAL
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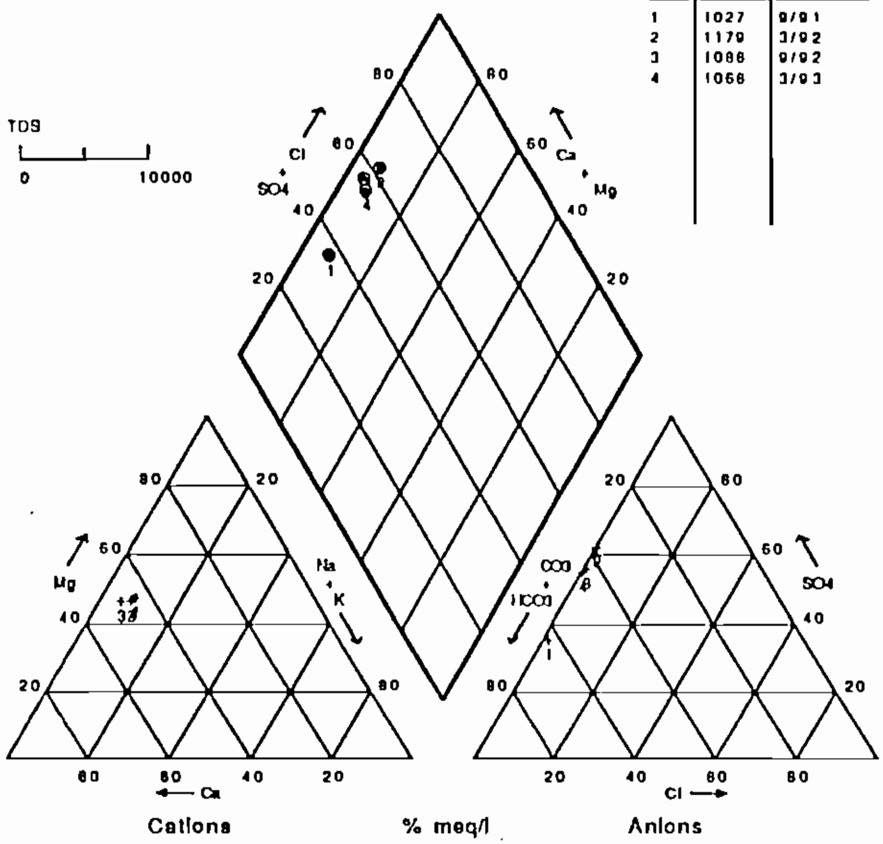
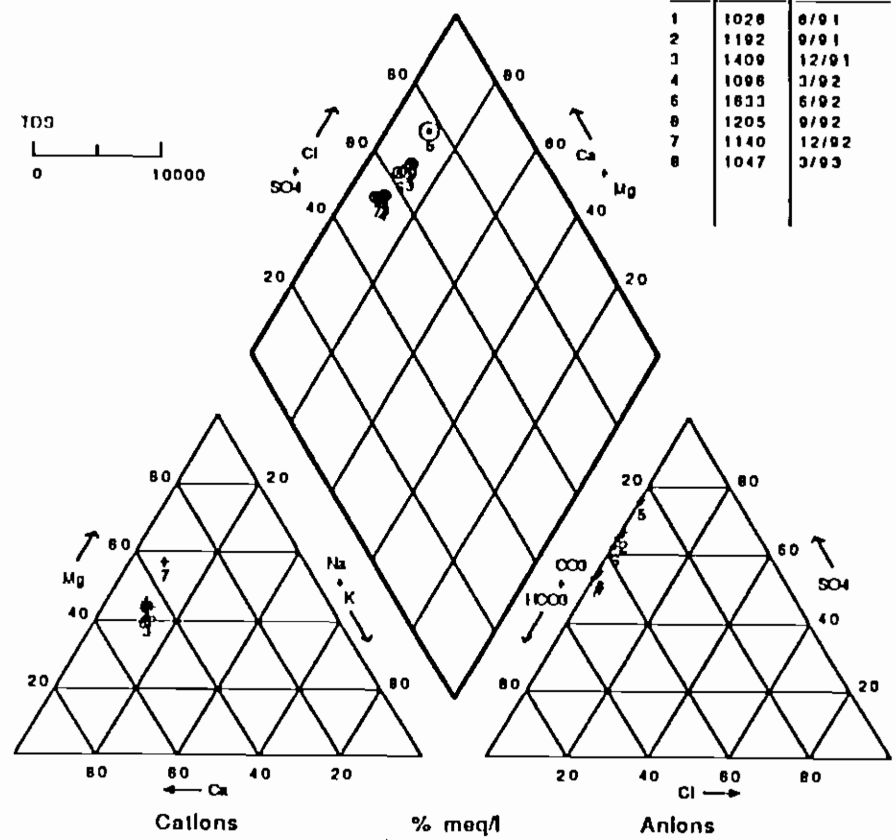


No.	TDS	
1	1027	9/91
2	1179	3/92
3	1086	9/92
4	1056	3/93

24A



No.	TDS	
1	1026	6/91
2	1192	9/91
3	1409	12/91
4	1096	3/92
5	1633	6/92
6	1205	9/92
7	1140	12/92
8	1047	3/93

25A

FIGURE 2-10

PIPER DIAGRAMS, SHALLOW UPGRADIENT

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER
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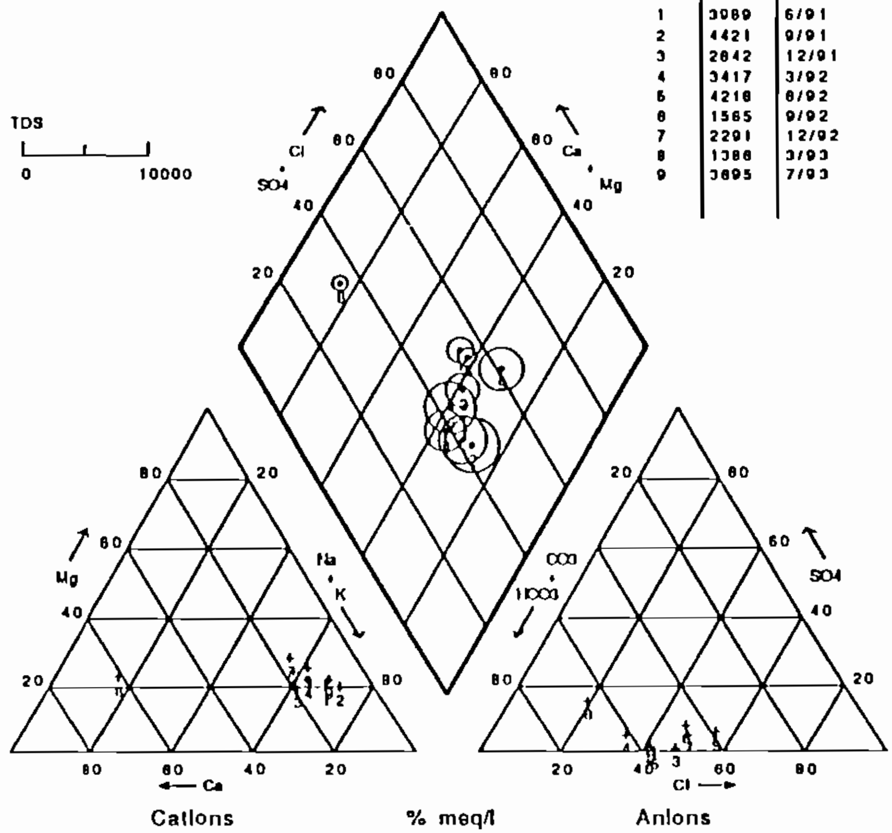
JOB NO. 2629 DATE: SEPTEMBER 1995



No	TDS	
1	3989	6/91
2	4421	9/91
3	2842	12/91
4	3417	3/92
5	4218	6/92
6	1565	9/92
7	2201	12/92
8	1388	3/93
9	3895	7/93

LEACHATE

FIGURE 2-11
PIPER DIAGRAM, LEACHATE

CITY OF AUBURN
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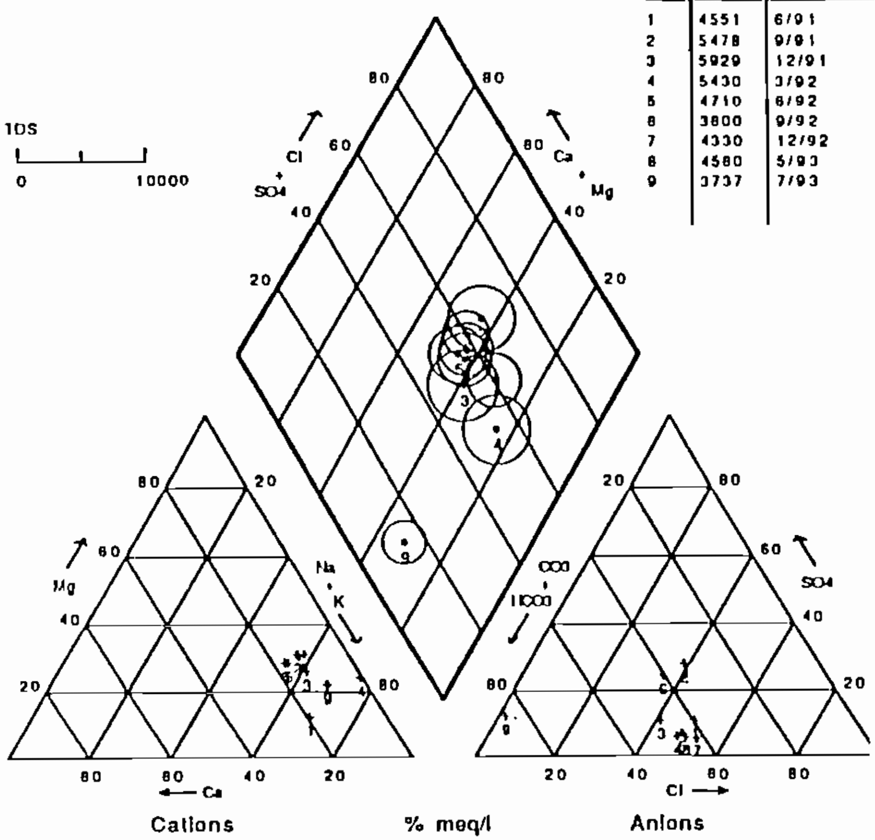
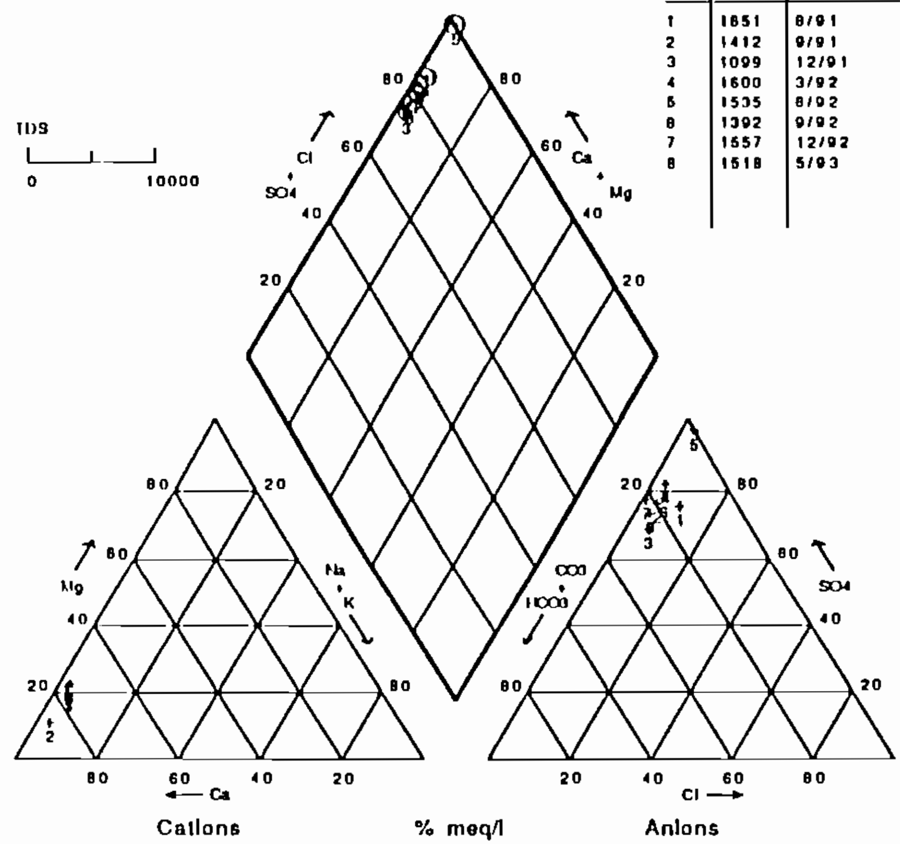


No	TDS	
1	4551	6/91
2	5478	9/91
3	5929	12/91
4	5430	3/92
5	4710	6/92
6	3800	9/92
7	4330	12/92
8	4580	5/93
9	3737	7/93

22A



No.	TDS	
1	1851	6/91
2	1412	9/91
3	1099	12/91
4	1600	3/92
5	1535	6/92
6	1392	9/92
7	1557	12/92
8	1518	5/93

22C

FIGURE 2-12
PIPER DIAGRAMS, WELLS 22A & 22C

CITY OF AUBURN
SOLID WASTE MANAGEMENT CENTER
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JOB NO. 2629

DATE: SEPTEMBER 1995