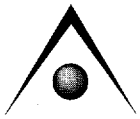

AMES LABORATORY

IS-5118
UC-20e

Ames Laboratory

Site Environmental Report

Calendar Year 1994

Ames Laboratory

Iowa State University

Ames, Iowa 50011-3020

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1.0 EXECUTIVE SUMMARY

Ames Laboratory is located on the campus of Iowa State University (ISU) and occupies twelve buildings owned by the Department of Energy (DOE). The Laboratory also leases space in ISU owned buildings. Laboratory activities involve less than ten percent of the total chemical use and one percent of the radioisotope use on the ISU campus.

The Laboratory accumulates and disposes of wastes under EPA issued generator numbers. The waste operations were inspected by EPA in April, 1994. There have been two EPA follow-up visits since the inspection. Ames Laboratory submitted a Proposed Site Treatment Plan to EPA on schedule in March 1995. This plan complies with the Federal Facilities Compliance Act (FFCA).

Pollution awareness and waste minimization programs implemented in 1990 were updated in 1994 and are continuing to date. Included in these efforts are a waste white paper and a green computer paper recycling program. Ames Laboratory also continues to recycle salvage metal and used oil. Most of the chemical and radiological "legacy" wastes have been properly disposed of. Discharges from laundry water holding tanks are analyzed before release to the sewer system.

Ames is responsible for a small chemical burial site, located on ISU property near the Applied Sciences Complex. The site was used from 1958 through 1966 for the disposal of waste chemicals and metal slags. The materials were buried according to standard practice at the time. The first phase of the remedial investigation (RI) of the site shows evidence of small scale migration of contaminated groundwater into the ravine directly east of the site. The Phase I RI included evaluation of surface soil samples, deep soil sample corings near the burial pits, shallow soil sample corings at various other points within the site area, groundwater samples from monitoring wells and surface water samples from adjacent ravines and Squaw Creek. The buried materials were removed and shipped to a disposal facility in Utah in the fall and winter of 1994-95. A Phase II RI is in progress at the site. It includes groundwater monitoring wells and ecological sampling.

The Laboratory is responsible for a soil plume that was contaminated by diesel fuel that leaked from an underground storage tank (UST) in 1971. The tank and backfill were replaced that year but the diesel contaminated soil was not removed. Soil borings and groundwater samples collected between November 1993 and May 1994 indicate that the soil contamination is confined to a small plume in a layer 7-15 feet below the surface and extending under the Computer Services Building. No volatiles were detected in the groundwater samples. The Iowa Department of Natural Resources is not requiring a site cleanup, nor a standard monitoring program at this site, due to the limited, naturally attenuating soil contamination.

Ames Laboratory investigated nine small areas of concern around Ames beginning in 1993. Some of these areas were locations of research or waste storage during the 1940s and 1950s. The others are areas where municipal sewage sludge containing small amounts of thorium progeny (radium, actinium, etc.) may have been used as fertilizer. An independent contractor collected samples in July 1993 and analyzed them to confirm that the sites are not contaminated. The results were reviewed by the Iowa Department of Public Health. Eight of the sites are

considered suitable for unrestricted use. The Health Department required additional sampling at one of the sites, the old Ames sewage plant, in 1994. That site was released for unrestricted use February 17, 1995.

Plans are in place for routine environmental monitoring of Ames Laboratory facilities areas. Implementation of these plans is resource limited. Only baseline monitoring of groundwater was accomplished in 1994.

2.0 INTRODUCTION

2.1 Site Description

Ames Laboratory is a U. S. DOE facility located on the campus of Iowa State University at Ames, Iowa (Figures 2-1 through 2-5). Ames is a government owned, contractor operated (GOCO) facility. ISU is the contractor. The Technical and Administrative Support Facility (TASF) contains most of the Laboratory management personnel. The buildings owned by the DOE are:

Building	Gross Square Feet
Spedding Hall	106,885
Metals Development Building	97,594
Wilhelm Hall	61,929
TASF (Figure 2-5)	44,020
Campus Warehouse Building	16,594
Mechanical Maintenance Building	8,540
Maintenance Shops Building	7,503
Paint and Air Conditioning Shops Building	4,998
Construction Storage Shed	4,320
Storage Shed	2,100
Computer Services Building	1,672
Storage Shed	500

In addition to the buildings owned by the DOE, Ames Laboratory rents a net total of 33,096 square feet of space from ISU. In 1987 the DOE transferred ownership of the buildings it owned at the Applied Sciences Complex (ASC) site to ISU. This site is located one mile northwest of the ISU campus (Figure 2-6). The buildings included were the Applied Sciences Complex building, ASC Annex, Radioactive Waste Disposal, and Test Cell. Ames Laboratory retains beneficial use of the Radioactive Waste Disposal building through the year 2060. This building also houses the Alpha Facility, a Laboratory facility which will use small amounts of radionuclides in the future.

The ISU campus is surrounded by the City of Ames, Iowa (Figures 2-2 and 2-3), population 48,000. An estimated 54,000 people live within a 5-mile radius of the campus. The student population of ISU is about 25,000.

The climate is temperate, continental, and subject to wide temperature and precipitation ranges throughout the year. Mean monthly temperature varies from a low of 19 degrees Fahrenheit in January to a high of 75 degrees Fahrenheit in July. Average rainfall equivalent precipitation varies from less than 1.0 inches in January to over 5.5 inches in June. A 500 year flood occurred in Ames in 1993. No Laboratory facilities were flooded.

The region is gently rolling with a slight pitch to the southeast. The shallow soils are glacial drift with a depth of about 65 feet. This material is underlaid by predominantly limestone bedrock. In the campus area, depth to ground water is about 10 feet. At the ASC site this

Ames Laboratory

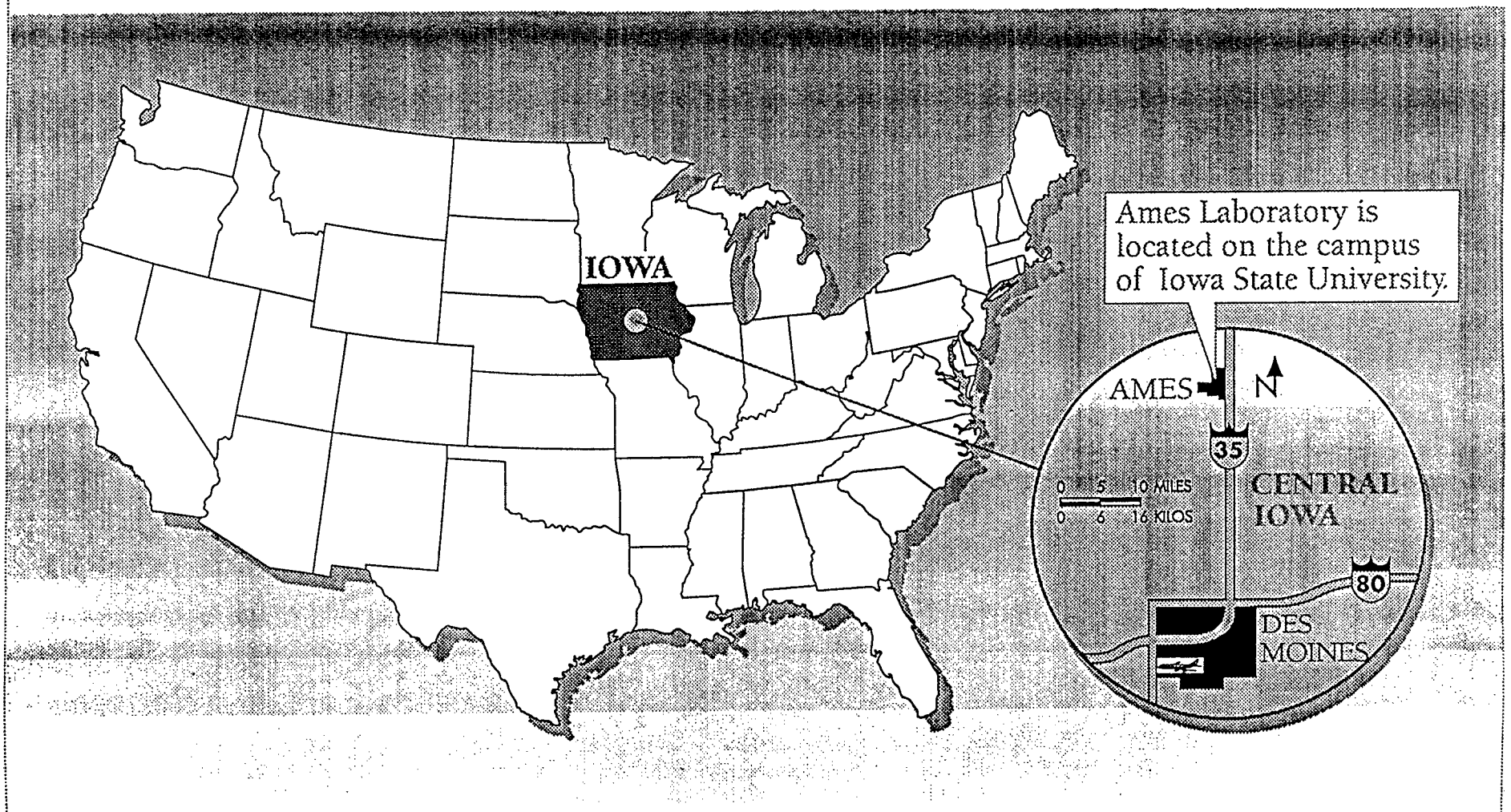


Figure 2-1, Location of Ames Laboratory in the State of Iowa

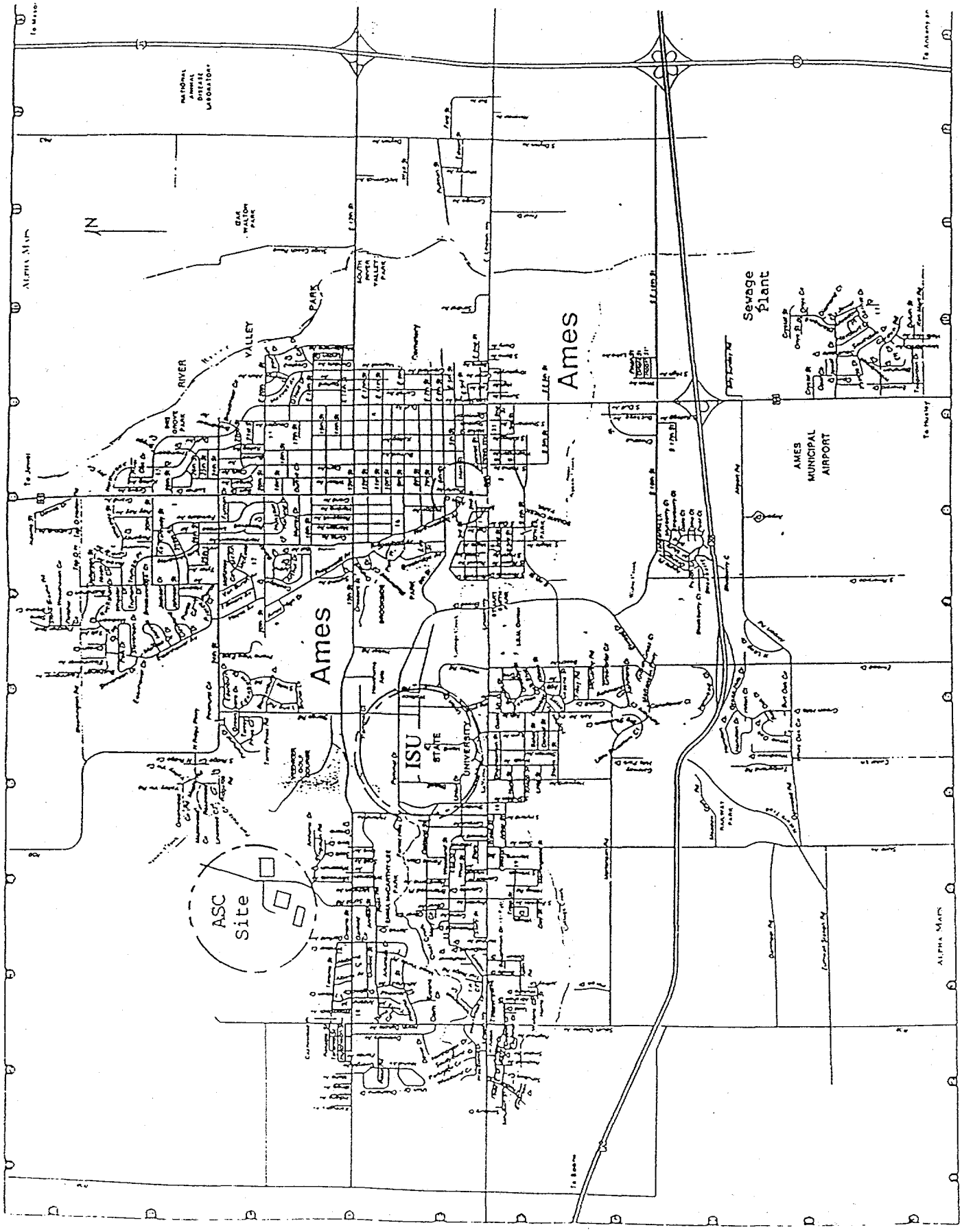


Figure 2-2, City of Ames, Iowa

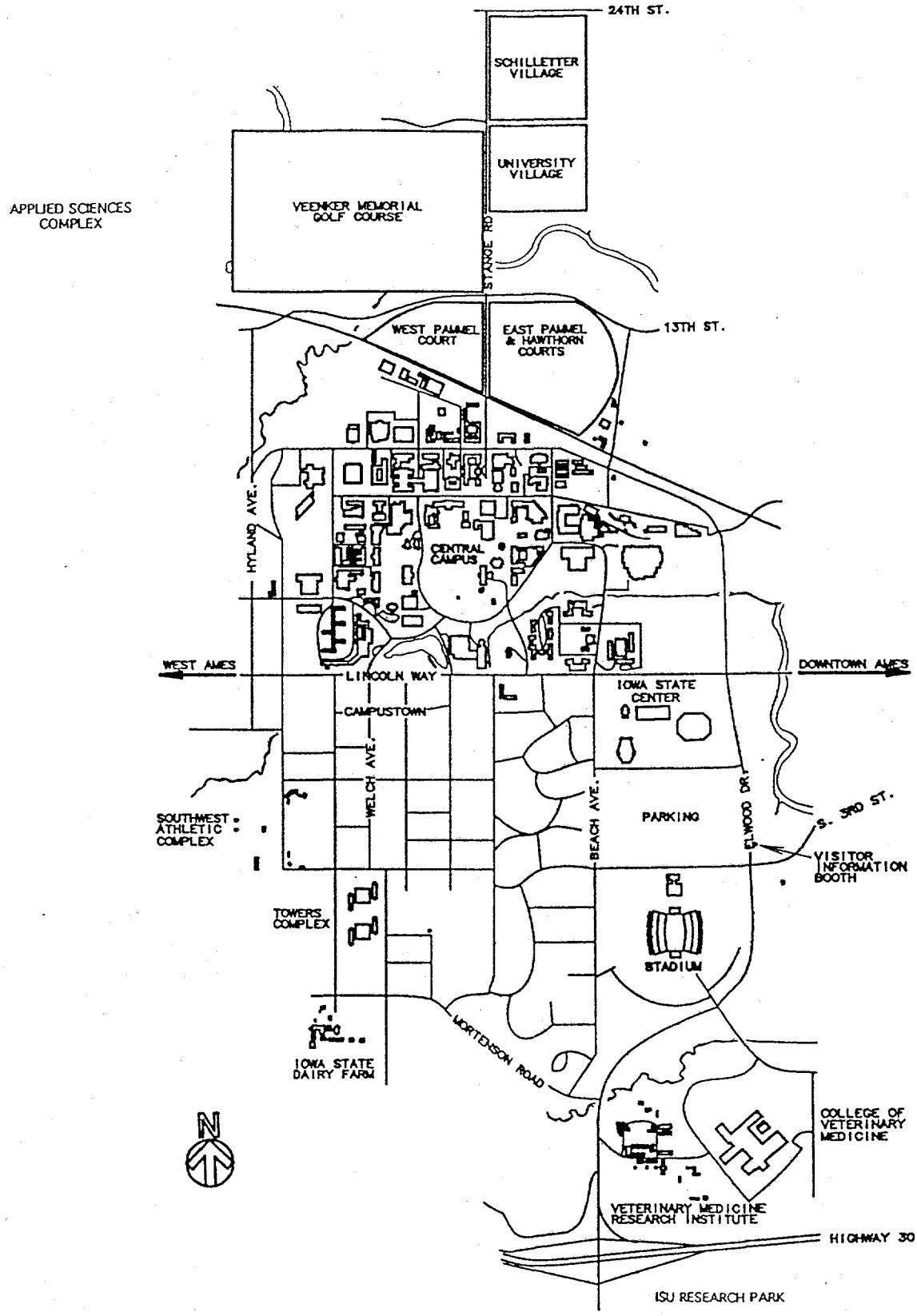


Figure 2-3, ISU Campus in Ames

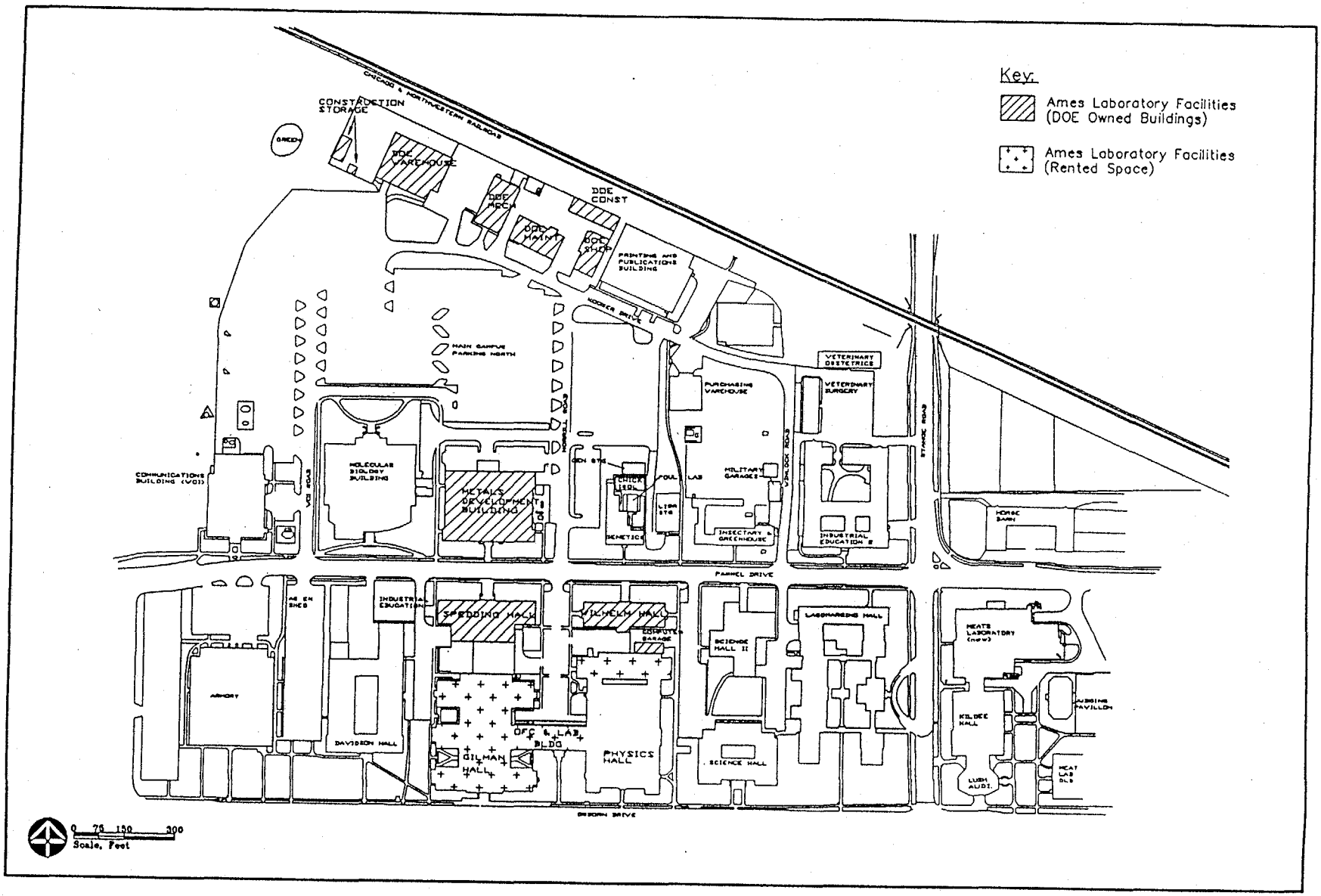


Figure 2-4, Ames Laboratory Facilities on ISU Campus

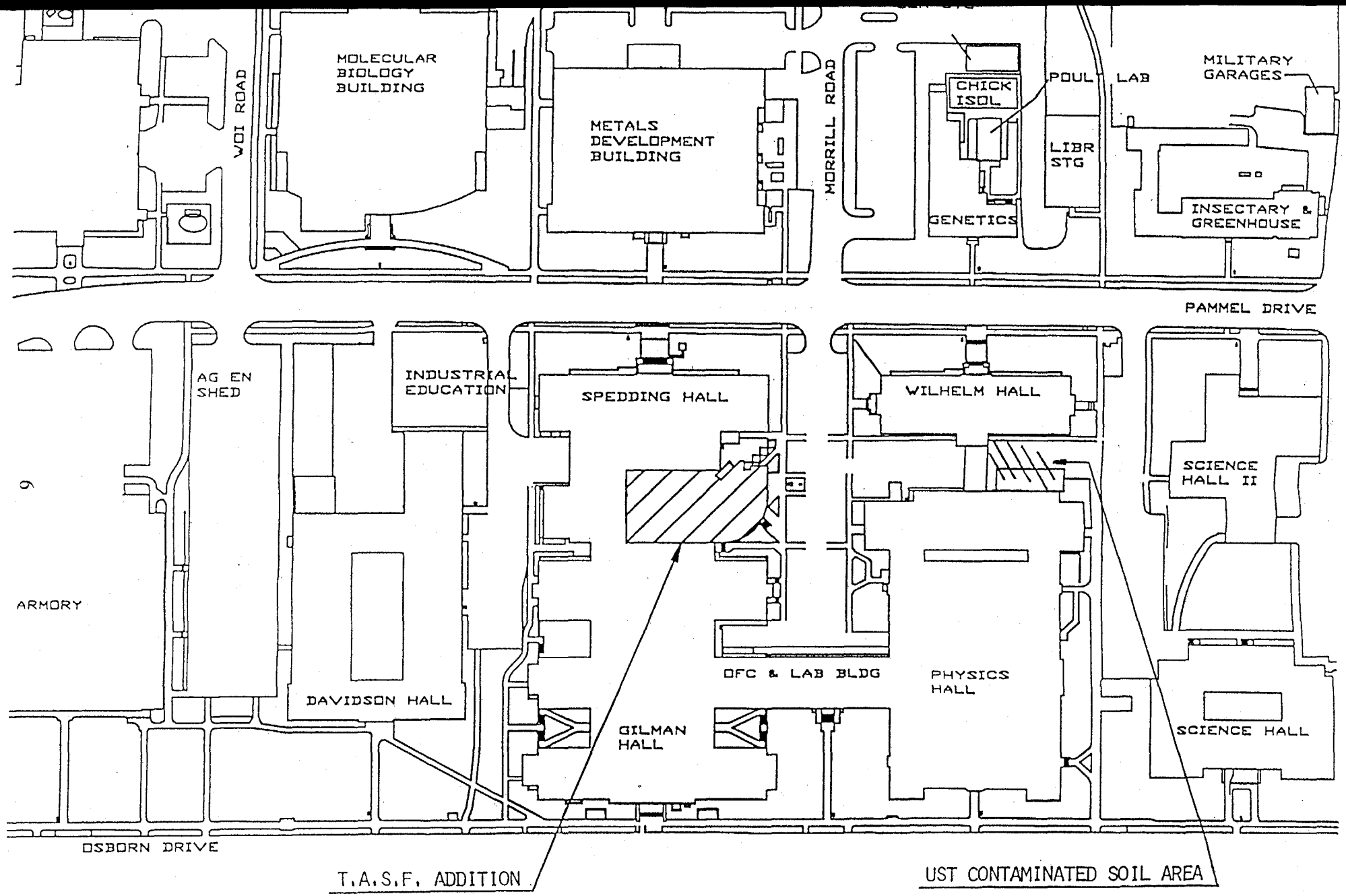


Figure 2–5, Technical and Administrative Support Facility

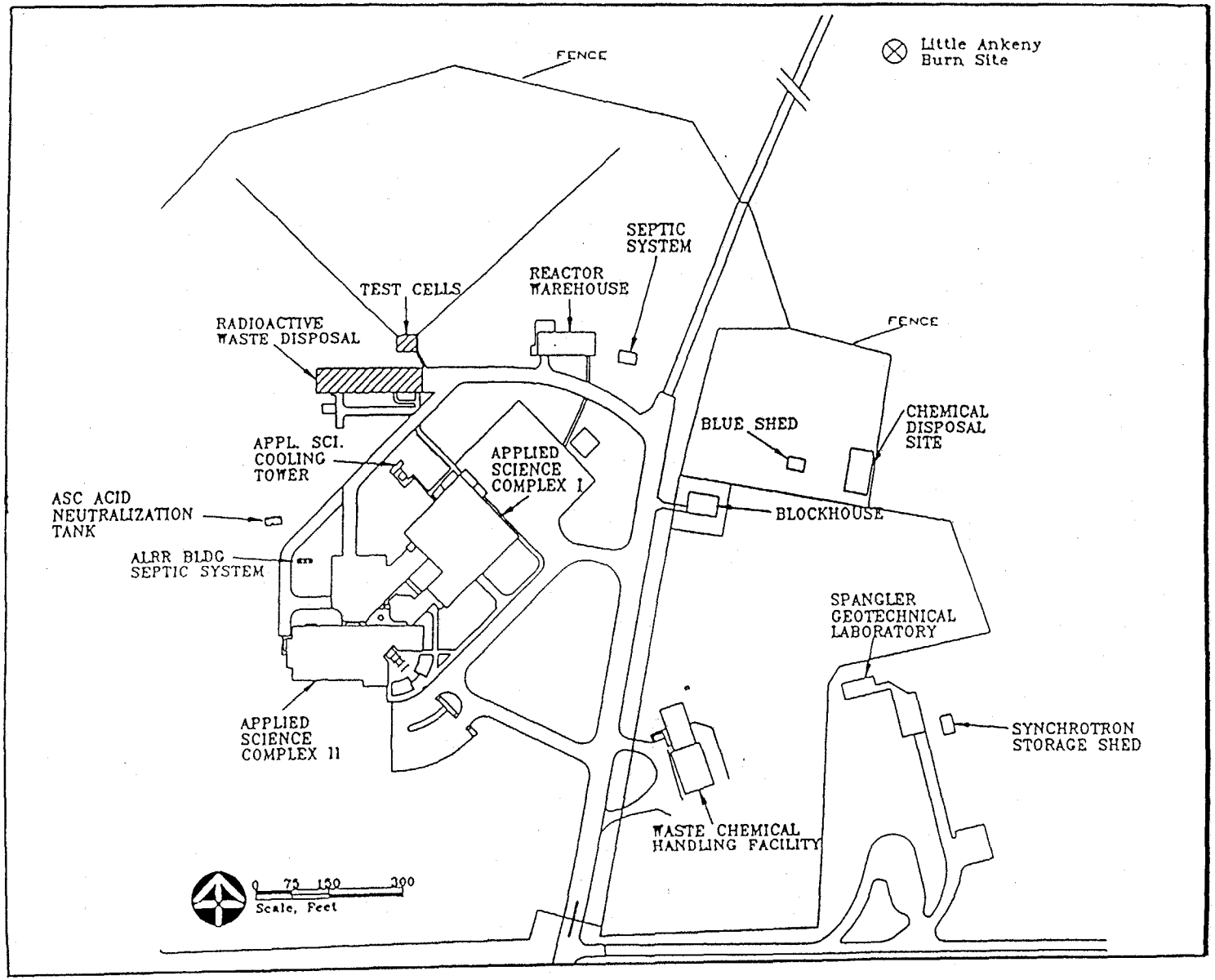


Figure 2–6, ISU Applied Science Complex Buildings

depth is about 20 feet. Surface run-off from both areas goes to Squaw Creek, a tributary of the South Skunk River. The streams have a combined average daily flow of 170 million gallons.

2.2 Organization and Administration

Ames Laboratory is operated by Iowa State University under Contract No. W-7405-Eng-82 with the U. S. DOE. The DOE's Chicago Operations Office oversees operation of the Laboratory. Ames is a member of the Institute for Physical Research and Technology (IPRT), an ISU association of research laboratories.

2.3 Mission

The Ames Laboratory conducts fundamental research in the physical, chemical, materials, and mathematical sciences and engineering which underlie energy generating, conversion, transmission and storage technologies, environmental improvement, and other technical areas essential to national needs. These efforts will be maintained so as to contribute to the achievement of the vision of DOE and, more specifically, to increase the general levels of knowledge and technical capabilities, to prepare engineering and physical sciences students for the future, both academia and industry, and to develop new technologies and practical applications from our basic scientific programs that will contribute to a strengthening of the US economy. The Laboratory approachs all its operations with the safety and health of all workers as a constant objective and with genuine concern for the environment. The Laboratory relies upon its strengths in materials synthesis and processing, materials reliability, chemical analysis, chemical sciences, photosynthesis, materials sciences, metallurgy, high-temperature superconductivity, and applied mathematical sciences to conduct the long term basic and intermediate range applied research needed to solve the complex problems encountered in energy production and utilization as well as environmental restoration and waste management. Ames Laboratory will continue to maintain a very significant and highly beneficial pre-college math and science education program which currently serves both teachers and students at the middle school and high school levels. Our technology transfer program is aided by joint efforts with ISU's technology development and commercialization enterprise and will sustain concerted efforts to implement Cooperative Research and Development Agreements, industrially sponsored Work for Others projects, and scientific personnel exchanges with our various customers.

2.4 Purpose of Site Environmental Report

The primary purpose of this report is to characterize the performance of Ames Laboratory's environmental programs, present highlights of significant environmental activities, and confirm compliance with environmental requirements. The summarized data and conclusions from Ames Laboratory environmental monitoring during calendar year 1994 are presented in this annual Site Environmental Report. Significant events from the first quarter of 1995 are also included. This report is a working requirement of Department of Energy (DOE) Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements" and Order 5400.1, "General Environmental Protection Program."

3.0 COMPLIANCE SUMMARY

3.1 CALENDAR YEAR 1994 COMPLIANCE STATUS

Ames Laboratory was not in compliance with all applicable environmental regulations that were in force during 1994. The regulatory non-compliance was in the area of hazardous waste storage and identification. This was identified during the April 1994 EPA inspection. See Section 3.1.2. Non-compliances with DOE orders were identified in the Laboratory's Self Assessment completed in December of 1991, by a Tiger Team assessment in 1992, by a DOE-CH 1993 appraisal, and by a DOE-HQ Environmental Audit in September 1994. The 1994 DOE related non-compliances were in the areas of air and groundwater monitoring, environmental training, and self-assessment and oversight. See Section 3.1.15.

3.1.1 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

In accordance with the Code of Iowa Section 455B.426, Registry of Hazardous Waste or Hazardous Substance Disposal Sites, a chemical disposal site (CDS) used by Ames Laboratory from 1958 through 1966 was classified by the director of the Iowa Department of Natural Resources (DNR) as "c...not a significant threat to the public health or environment---action may be deferred." Remedial Investigation and Feasibility Study (RI/FS) plans were approved for this site by DOE and Iowa DNR in February 1993. In September 1993, the draft RI and draft EE/CA were submitted to DOE-CH/HQ and the Laboratory. A source removal (interim remedial action) was performed from September 1994 through February 1995. DOE signed an interagency agreement with the Army Corps of Engineers to implement the source removal. DOE entered into a license agreement with ISU to perform the source removal on ISU property. Phase II Remedial Investigation work plans have been approved, and the RI is in progress. All draft documents were initially submitted to DOE and Ames Laboratory. After revision, documents were released to DNR, IDPH and EPA. After regulatory review, documents are released for public review.

A subcontractor characterized nine small areas of concern to confirm they are free of residual contamination. The areas are sites that were, or could have been, contaminated by Ames Laboratory or ISU activities. The work plans were approved by Ames Laboratory and CH, and a CX NEPA determination was made. The Investigative Report was finished in October. It concluded that eight areas were suitable for unrestricted use without further investigative activities. These are the Ames Municipal Airport, Ames Municipal Cemetery, Annex I, Annex II, Little Ankeny Debris Site, Blockhouse Site, Grand Avenue Underpass, and the Old Sewage Treatment Plant. The Report recommended resampling of the drain field monitoring well at the Applied Sciences Complex (ASC) due to gross alpha and gross beta activity above background. Resampling in December 1993 showed alpha and beta activity levels were within background. A second followup sample in February 1994 showed gross alpha and gross beta activity levels in the low end of the background range. After regulatory review of the Investigative Report, follow-up sampling was done at the Old Sewage Treatment Plant in October 1994. Samples were collected by Oak Ridge Institute for Science and Education (ORISE), under direction of the Iowa Department of Public Health (IDPH). Thirteen samples were slightly elevated over background and soil was removed. The follow-up samples were within background level

activity. IDPH released the site for unrestricted use February 17, 1995. An Investigative Summary Report, concerning all nine sites, was produced in December 1994. After reviews and revisions, the final report was released in February 1995.

On April 21, May 19, June 27, and November 30, 1994, DOE conducted public information meetings in Ames. A community advisory group (CAG) was formed between the first and second meetings. The CAG assists in directing site restoration activities.

3.1.2 Resource Conservation and Recovery Act (RCRA)

Ames Laboratory is a GOCO facility. Therefore, all wastes generated are DOE wastes. In 1994, DOE had four RCRA waste generator identification numbers from the Environmental Protection Agency (EPA) Region VII. Activities associated with the campus facility number are those of a large quantity generator, #IA6890008950. In calendar year 1994, 6870 kg of hazardous waste were properly disposed. All reporting requirements were met. The second EPA number is for a conditionally exempt small quantity generator for the radiological waste disposal building at the ASC, #IAD984617605. This waste disposal building stages radiological, hazardous and mixed wastes. The third generator number is for CDS source removal wastes only, #IA0000365973, conditionally exempt small quantity. The fourth number is conditionally exempt small quantity generator #IAD098715881 for the Technology Integration Program (TIP).

Ames Laboratory is currently storing three mixed waste streams with a total volume of 100 liters. One of the mixed waste streams is technology development waste. The other two mixed waste streams are legacy wastes. All mixed waste streams currently being stored at the Laboratory have been included in the Interim Mixed Waste Inventory Report.

The Laboratory received one notice of non-compliance (NON) from the State of Tennessee on March 3, 1994 concerning a shipment to Scientific Ecology Group (SEG). Tennessee did not recognize waste from a Government Owned Contractor Operated facility as DOE waste. The NON alleged a violation of SRPAR 1200-2-10-.32(4), in that Ames Laboratory shipped radioactive waste to Scientific Ecology Group in September of last year, without first obtaining a shipper's license. The NON was resolved April 8, 1994. Based upon the exemption in SRPAR 1200-2-10-.06, Ames Laboratory was, as a matter of law, not subject to the requirement cited in the NON. If DOE prime contractors are exempt from requirements relating to the transportation of sources of radiation to or from government-owned sites, technically the shipment by Ames Laboratory without the authorization of a Tennessee license for delivery is not in violation of SRPAR requirements.

The Laboratory was not in compliance with all applicable requirements of 40 CFR 262 for all of 1994. A surprise inspection from EPA Region VII on April 12-14, 1994, resulted in a notice of violation (NOV) concerning waste storage. An initial response to the NOV was made April 22, 1994. The response consisted of corrective actions taken and a brief plan for preventing future non-compliances. Additional information was sent to EPA in October. EPA indicated verbally that a response would be sent to the Laboratory in June 1995.

Ames completed and implemented the Waste Management Program Manual (WMPM) in 1994. Implementation of the WMPM includes personnel training. The EPA Biennial Report for calendar year 1993 was completed and submitted on time. It is a record of wastes removed from the facility. The EPA Biennial Report is required of all large quantity generators. Ames Laboratory was a large quantity generator in 1993, #IA6890908950. The next report is due in 1995.

Ames Laboratory has adopted a conservative waste disposal policy in which materials that are not regulated by RCRA, yet which might pose or be perceived to pose any kind of a potential hazard, are handled and sent for disposal as though they were RCRA regulated wastes. The Laboratory disposes its waste at an out of state EPA permitted facility under the two generator numbers. Hazardous wastes are shipped out quarterly and radioactive wastes are shipped out yearly, except contaminated lead. It is shipped biennially. No radioactive wastes were disposed in calendar year 1994. It is the Laboratory's practice to have these RCRA regulated wastes incinerated rather than put in a landfill. Incineration ensures the complete destruction of the hazardous constituents and eliminates any potential for members of the public being exposed in the future.

A subcontractor was selected to investigate diesel contaminated soil which resulted from a leaking underground storage tank (UST) replaced in 1971. From November 1993 through May 1994, soil and groundwater were sampled. The investigation results were submitted to DNR in October 1994. DNR issued an official ruling on December 2, 1994. The site does not require remediation or continuous monitoring. Any further remediation activities will comply with state regulations governing USTs and the Iowa DNR will be informed of all UST developments.

3.1.3 Federal Facilities Compliance Act (FFCA)

The Conceptual Site Treatment Plan was written in 1994 as a first step in compliance with the Federal Facilities Compliance Act (FFCA). It was expanded into a Draft Site Treatment Plan which received regulatory and public comments. In 1995, the draft plan was revised into a proposed plan. See Section 3.2.2. The DOE-CH Waste Management Office is assisting the Laboratory with FFCA issues. In addition, all mixed waste streams currently being stored at the Laboratory have been included in the Interim Mixed Waste Inventory Report.

3.1.4 National Environmental Policy Act (NEPA)

On April 18, 1994, the Laboratory received a categorical exclusion determination for the source removal at the CDS. Several other environmental evaluations were completed during 1994 for several minor building modification projects having no significant environmental impact. All project submittals resulted in CX determinations.

3.1.5 Clean Air Act (CAA) and National Emissions Standards for Hazardous Air Pollutants (NESHAP)

U.S. EPA Region VII has delegated CAA authority to the State of Iowa Department of Natural Resources. Iowa DNR does not require permits for laboratory fume hoods. DNR issued an official ruling for the Laboratory on July 18, 1994 stating that no permitting and no monitoring are required. There are no federal or local permits or compliance agreements in force, nor are any anticipated.

The Laboratory uses only small quantities of chemicals and radionuclides on a lab scale for its research and development activities. Any air emissions generated by Ames Laboratory activities are sporadic and in very small quantities. Ames Laboratory does not have a power plant, but obtains its utilities from ISU. The Laboratory is in compliance with all CAA requirements including the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations for radionuclide emissions from DOE facilities. In 1994, there was no use of radionuclides, and therefore no airborne waste or emissions to the environment. See Table 5-1. Historically any use of radionuclides is inside glove boxes and/or fume hoods. These hoods and boxes are HEPA filtered. Using the CAP88 model, calculated emissions have always been a minute fraction of the 10 mrem per year limit, typically 10^{-8} to 10^{-11} mrem/year.

3.1.6 Clean Water Act (CWA)

The Ames Laboratory does not have any regulated point source discharges. Neither Ames Laboratory nor ISU need any National Pollutant Discharge Elimination System (NPDES) permits. The Laboratory discharged approximately 60,000 gallons of wastewater per day to the ISU sanitary sewer system in 1994. This was 4% of the total discharged from ISU. The University discharges its wastewater to the City of Ames sewer system. Ames Laboratory discharges are approximately 0.7% of the total wastewater processed per day by the City of Ames wastewater treatment facility. The City of Ames has an NPDES permit. The City of Ames has an agreement for wastewater pre-treatment with ISU, which includes Ames Laboratory wastewater. Both the City of Ames and the University sampled ISU wastewater effluent in 1994 as part of this agreement. The Laboratory notifies the city directly, and ISU, of all discharges from the wash water storage tanks at the waste disposal building. There were no such discharges in 1994.

No stormwater permits are necessary for current Laboratory operations. The Laboratory's new office building, the Technical and Administrative Support Facility (TASF) was completed in 1994. The TASF is a DOE building on ISU land. The construction site was covered by a stormwater permit held by ISU.

3.1.7 Safe Drinking Water Act (SDWA)

Drinking water for the Laboratory is supplied by the University which obtains its water from the City of Ames public water system. Ames Laboratory's drinking fountain in Spedding Hall is regularly tested for lead and copper by ISU. The Ames public water system is tested by the city

to meet the standards of the SDWA. Additionally, the Laboratory sampled drinking fountains in six DOE buildings in 1994. The results are summarized in Table 3-1. All samples were within regulatory limits for lead and copper.

3.1.8 Superfund Amendments and Reauthorization Act (SARA) Title III and Iowa Administrative Code, Section 567, Chapter 131, Spill Reporting

The Laboratory is subject to the emergency reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) in Title III, Sections 302-304, 311 and 312. A facility representative and a listing of all hazardous chemicals on site have been reported to the local emergency planning committee, in this case the City of Ames Fire Department. The Laboratory does not store any chemicals in excess of threshold planning quantities (TPQ). Spills are reported to the Iowa Department of Natural Resources. There were no spills in 1994 or early 1995.

3.1.9 Toxic Substances Control Act (TSCA)

Approximately 2.3 metric tons of asbestos and asbestos containing material were properly removed and disposed in 1994. Ames Laboratory asbestos is disposed in the Ames-Story Environmental Landfill, DNR permit number 85-SDP-13-91P. The Laboratory complies with the State of Iowa Solid Waste Disposal Rule #102.14 and 40 CFR 61, Subpart M (asbestos NESHAP). The Chicago Appraisal Team (November, 1993) cited a noteworthy practice for small scale, short duration asbestos removal.

All Ames equipment has been declassified for PCB's. An arc generator transformer was removed on September 12, 1994 and an extrusion press was removed on November 22, 1994. PCB oil from these projects and other minor sources was properly disposed. A total of approximately 4.3 metric tons of PCB contaminated oil were properly disposed in 1994 through a contracted waste hauler. All Laboratory PCB's are incinerated at the Aptus Facilities near Coffeyville, KS and Aragonite, UT.

3.1.10 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Not Applicable. Ames Laboratory does not use pesticides regulated by FIFRA.

3.1.11 Endangered Species Act (ESA)

Not Applicable. No endangered species have been identified near Ames Laboratory facilities or Laboratory controlled areas.

Table 3-1

Ames Laboratory Drinking Fountain Analyses

Results in mg/l

BUILDING, LOCATION	SAMPLE DATE	LEAD	COPPER
Warehouse, main area	07-12-94	<0.002	0.03
Shop, main area	07-12-94	<0.002	0.03
Metals Development, 2nd floor	07-12-94	<0.002	0.13
Computer Building, main hall	07-12-94	<0.002	0.01
Wilhelm Hall, 3rd floor	07-12-94	<0.002	0.02
Spedding Hall, 1st floor west	09-02-94	<0.002	<0.01
Wilhelm Hall, 3rd floor east	09-02-94	<0.002	<0.01
Metals Development, room 158	09-02-94	<0.002	0.03

3.1.12 National Historic Preservation Act (NHPA)

Not Applicable. No historic resources have been identified near any of the Ames Laboratory facilities or Laboratory controlled areas. No archeological resources have been identified near the facilities or controlled areas.

3.1.13 Executive Order 11988, "Floodplain Management"

Not Applicable. All Laboratory facilities are outside the 100 year flood line as mapped by the USGS and Iowa GSB. Iowa experienced a 500 year flood the summer of 1993. Ames Laboratory facilities and Laboratory controlled areas were not affected.

3.1.14 Executive Order 11990, "Protection of Wetlands"

Not Applicable. No wetlands are affected by any Ames Laboratory activities.

3.1.15 Other Major Environmental Issues and Actions

The 1992 DOE Tiger Team made numerous findings concerning hazardous waste management, inactive waste sites, and environmental monitoring. The Laboratory wrote a Corrective Action Plan to address all Tiger Team findings. The hazardous waste management and inactive waste site action plans are completed, or show significant progress.

The Laboratory's Tiger Team Corrective Action Plan required a lab air monitoring program to be developed and implemented, in accordance with DOE Orders 5400.1, 5400.4 and 5400.5. The plan was completed in December 1994. The State of Iowa does not require permits for laboratory fume hoods. Ames Laboratory received written confirmation from Iowa DNR, dated July 18, 1994, of no permitting and no monitoring. There are no federal or local permits or compliance agreements in force, nor are any anticipated. The Tiger Team Corrective Action Plan also required a Groundwater Protection Management Plan to be developed and implemented by the Laboratory, in accordance with DOE Order 5400.1. Existing monitoring wells will be used in the network. The plan was completed in February 1995.

In November 1993, a DOE-Chicago ES&H Appraisal Team and DOE-HQ Tiger Team Milestone Compliance Team evaluated the overall environmental program and compliance with the Tiger Team Milestones. There were three findings by the DOE-CH Appraisal Team: hazardous waste storage, hazardous waste identification, and UST record keeping. Only one action plan from the appraisal still has open milestones. It is AAP005, MSDS database. The corrective action plan will be completed after necessary equipment and software arrive. The 1993 Appraisal Team cited two noteworthy practices. One was for the Public Affairs Office community relations program. The other was for small scale, short duration asbestos removal.

In September 1994, the DOE Office of Environmental Audit conducted a routine environmental audit of the Laboratory. The team from DOE-HQ and Arthur D. Little Company cited

deficiencies in routine environmental monitoring, hazardous waste storage and identification, environmental training, and self-assessment and oversight. The audit team's report was never officially approved or officially released. The deficiencies noted have either been corrected or corrections are in progress. Beginning in 1993, the Laboratory implemented walk-through inspections and self-assessments of programs and departments, and has refined the research project readiness review process. In 1994, OAA performed self assessments of the hoisting and rigging and the electrical safety programs. The Environment, Safety and Health Group does topical appraisals. The audit team noted three Laboratory "strengths". The strengths were in external communications, ES&H risk management and the hazardous waste management training program.

A general environmental monitoring plan and an environmental monitoring quality assurance plan were produced in March 1995. These plans are in review. Ames participates in two DOE environmental monitoring quality assurance programs. One is the Environmental Measurements Laboratory's Quality Assessment Program (QAP). The other is Environmental Management's (EM) Mixed Analyte Performance Evaluation Program (MAPEP).

3.1.16 Summary of Permits

Ames Laboratory currently needs no environmental discharge, storage, treatment or disposal permits for gaseous, liquid or solid effluents. See Sections 3.1.2, 3.1.5, 3.1.6, 3.1.7, 3.1.9, and 3.1.15. DOE currently holds four waste generator identification numbers associated with Ames Laboratory.

DOE RCRA Generator Identification Numbers

RCRA Generator ID#	Type	Ames Laboratory Facility/Area	Expiration
IA6890008950	LQG	Ames Laboratory Main Campus	None
IAD984617605	SQG	ASC #1 Waste Disposal Building	None
IAD000365973	SQG	ASC #2 CDS Source Removal Wastes	None
IAD098715881	SQG	Technology Integration Program	None

3.2 FIRST QUARTER 1995

3.2.1 Compliance Status and Permit Summary

The compliance status of the Laboratory with regard to environmental statutes and permitting has been under review as a result of various inspections beginning with the Tiger Team assessment of the Laboratory in February 1992 through the DOE-HQ Environmental Audit of September 1994. Ames Laboratory's Corrective Action Plans address needed corrections and additions.

All regulatory non-compliances found on inspections have been corrected. No air or water permits are required by federal, state or local regulators. No NOV's or NON's have been issued in 1995. Quarterly Action Plan Progress Reports are submitted to DOE. In 1995, the Office of Assurance and Assessment (OAA) initiated an independent walk-through that includes a member of the Ames Laboratory Executive Council.

3.2.2 Current Activities

One new NEPA determination request was submitted the first quarter of 1995. It was for building space renovations. A CX for the project was received February 13, 1995. A CX for a revision of the same project was received April 25, 1995.

Shipment of wastes from the CDS source removal was completed in March 1995. DOE entered into an interagency agreement (IAG) with the U.S. Army Corps of Engineers (COE) to oversee the source removal. DOE entered into a license agreement with ISU allowing DOE and its contractors to perform the source removal on ISU property. DOE conducted a public meeting in the Ames City Council chambers on March 23, 1995. The topic was the Phase II Remedial Investigation at the CDS. IDPH is reviewing the Investigative Summary Report for the nine small inactive waste sites. DOE Chicago Operations Office, Environmental Management staff are consulting with the Iowa DPH and ISU about the old Iowa State College dump and the old Iowa State College sewage treatment facility. Ames Laboratory has provided information to DOE-CH and ISU concerning these possible inactive waste sites.

The Proposed Site Treatment Plan was submitted to EPA in March 1995 in compliance with FFCA. The number of mixed waste streams was reduced from an original five down to three. The transuranic (TRU) waste stream was eliminated because it is not generated yet. Contaminated lead was rejected as a mixed waste stream because it does not meet the criteria.

A piece of equipment that contains oil with <50 ppm PCB was declassified in late 1994. It will be removed by the end of 1995. See Section 3.1.9. Ten liters of mixed waste were properly disposed in April 1995. The waste was disposed at Diversified Industries (DSSI) at Knoxville, TN. All wastes met DSSI Waste Acceptance Criteria.

There are currently eight potential sources of radionuclide emissions to the environment at Ames Laboratory. However, these sources are small scale activities and the radionuclide use in these sources is conducted so that no environmental hazard will be introduced. The hoods and glove boxes used for these activities are HEPA filtered. The CAP88 air model will be used to produce the 1994 NESHAP report for these potential sources.

A combined Groundwater Protection Management and Groundwater Monitoring Plan was completed in February 1995. It is in the signature cycle. A general Environmental Monitoring Plan and an Environmental Monitoring Quality Assurance Plan were drafted in March 1995. These plans are in review.

4.0 ENVIRONMENTAL PROGRAM

4.1 Monitoring and Surveillance

Inactive Waste Sites (IWS):
Soil and/or groundwater sampling was done at nine areas of concern in June 1993. The Investigative Report was finished in October. Based on sample analyses it was concluded that no significant residual radioactive material is likely present at seven of the sites. Resampling of groundwater at an eighth site, an old ASC well, occurred in December 1993 and again in February 1994. Both samples showed alpha and beta activity levels were within background. The ninth site, the old Ames Water Pollution Control Plant (sewage treatment), required resampling, a minor soil removal and follow-up sampling. ORISE conducted the resampling, supervised by the Iowa Department of Public Health (IDPH). OHM Corporation removed the soil. IDPH conducted follow-up sampling. The site was released for unrestricted use February 17, 1995. See section 5.4.

Chemical Disposal Site (CDS):
An electro-magnetic survey was conducted, surface soil samples were collected, and hand auger samples were collected at the CDS December 1992 through September 1993. Seven soil borings were drilled and six new monitoring wells were installed, for a total of 9 wells on site in 1993. A source removal was done during the fall and winter of 1994-95. The nine wells were abandoned during the source removal. A Phase II RI is currently in progress. A system of 15 monitoring wells is under construction. See section 5.5.

Underground Storage Tank (UST):
In 1993 and 1994 soil samples were taken from nine new borings, and two new monitoring wells were installed near the underground storage tank. The current emergency generator diesel fuel tank will be removed not later than 1998, and replaced by an above-ground tank. Diesel contaminated soil that resulted from the previous tank, replaced in 1970, does not have to be excavated. No routine monitoring is required by DNR. See section 7.0.

Effluents:
No liquid effluent releases are made directly to the environment. Ames Laboratory routinely analyzes wastewater from the Waste Disposal Building, that may contain radioactive contamination, before it is released to the sanitary sewer. Liquid wastes discharged to the ISU sanitary sewer system, which discharges into the City of Ames sewer system, are periodically analyzed by the University in accordance with ISU's pretreatment agreement with the City of Ames. See sections 6.1 and 7.0.

In accordance with the Laboratory's waste minimization program, good general lab practices, and the Radiation Control Manual, airborne releases from Ames Laboratory are small concentration to not quantifiable. During 1994, very little work with plutonium, uranium, or thorium isotopes was conducted. The potential dose equivalent to the public due to estimated radionuclide emissions are calculated annually for the NESHAP report. See section 5.1.

4.2 Pollution Awareness and Waste Minimization Program

A waste minimization plan and program, was originally implemented in 1990, and updated in 1994. As required by DOE Order 5400.1, elements of the plan include:

- A statement of management support and commitment.
- A waste minimization policy for the Laboratory.
- Objectives and numerical goals.
- Methods of tracking waste production.
- Employee awareness, training and incentive programs.
- Program performance, evaluation and quality assurance.

The Laboratory has been engaged in many waste minimization activities and procedures. The procedures have reduced the quantities of non-hazardous and hazardous wastes generated by the Laboratory's research efforts. Examples include:

- The project Readiness Review Procedure.
- Review of Purchase Orders to prevent duplication or over-supply.
- Collection of surplus mercury for resale.
- White paper and computer paper are separated and recycled.

All other non-hazardous waste generated by the Laboratory, e.g., paper, garbage, trash et cetera, is collected and transported to the City of Ames' Waste Recycling Plant where it is processed. Combustible waste is used as fuel in the city's electrical utility power plant. Scrap metal is sold for re-use. Used oil is recycled for re-use.

5.0 ENVIRONMENTAL RADIOLOGICAL PROGRAM

5.1 Radiation Emissions and Doses

As a policy, airborne releases from the Ames Laboratory complex are minimized or eliminated by experiment design or source limitation. Historically, radioactive materials handled at Ames Laboratory have included radiation instrument calibration sealed sources and standards, lab quantities of normal and depleted uranium, thorium metals, plutonium, and uranium-235. There was no use of other than sealed sources in 1994.

Research activities using less than 0.5 g quantities of several isotopes of plutonium and gram quantities of uranium-235, will be conducted in the future in a single glovebox facility designed

for inductive coupled plasma (ICP) spectroscopy research. This glove box is located at the Alpha Facility at the Applied Sciences Complex. During 1994, no work with these radionuclides was conducted. Typical work with uranium and thorium has consisted of arc melting the solid metal into alloys or electro-transport purification of small batches of 75 grams or less. All this work is done either under vacuum or in inert gas sealed atmospheres. No venting of the process is done until the chambers are opened on the solidified material.

The National Emission Standards for Hazardous Air Pollutants; Radionuclides, under Subpart H of 40 CFR Part 61 (8), requires that an Air Emission Annual Report be submitted by each DOE facility emitting any radionuclides (other than radon) into the air. Using the guidance found in 40 CFR 61.94, an annual report for 1994 will be prepared in June as required. According to the guidance and based on the isotope inventory in Curies per year used at the Laboratory, air emissions are not required to be monitored at the Laboratory. Iowa DNR and IDPH do not require permits for Laboratory fume hoods. However, Appendix D to 40 CFR Part 61 does provide a method for estimating the radionuclide emissions for a year for reporting purposes, based on the amount of radionuclides in Curies used at the facility. This information and other required parameters are used to calculate potential dose equivalent to the public due to estimated radionuclide emissions from the Laboratory. The effective dose equivalent values are calculated using the EPA-approved computer model CAP88-PC v. 1.0. The dose estimates are reported in Table 5-1.

No radioactive liquid effluent was released directly to the environment. Ames Laboratory routinely monitors wastewater containing radioactive contamination from the Waste Disposal Building, before release to the City of Ames sanitary sewer.

5.2 Unplanned Releases

There were no unplanned or accidental radiological releases from Ames Laboratory during 1994.

5.3 Environmental Monitoring

Liquid aqueous wastes, when generated at the Laboratory's Radioactive Waste Disposal Facility (Figure 2-6), are analyzed for radioactivity before release to the sanitary sewer as required by DOE Order 5480.1 (1). They are analyzed for radioactive content using gamma ray spectroscopy, gas proportional counting for gross beta and gross alpha activity, and a liquid scintillation technique. No releases of liquid aqueous waste were made during 1994. The level of radioactivity released in the past has always been below 10 CFR 20.303 and DOE Order 5400.5 (Chapters II and III) limits. When wastewater is generated, results of the sample analyses and water quantities released are reported to the City of Ames, Iowa, the DOE Chicago Operations Office and the DOE Idaho Operations Office. Baseline sampling of storm and sanitary sewer water, and groundwater was accomplished in 1994. See section 7.0.

Table 5-1
Ames Laboratory Air Dose Compliance
Calendar Year 1994

Summary of Input Parameters

Isotope	Ci/yr	Adjustment Factors (Appendix D to Part 61)	Adjusted Source Term, Ci/yr
		Iowa State University Campus Site	
Uranium (depleted)	0.0E0	1.0E-6 (solid)	0.0E0
Thorium-232	0.0E0	1.0E-6 (solid)	0.0E0

Sources were not used or opened in 1994

Alpha Facility Site

No radionuclides used
at this site during
calendar year 1994.

Compliance Assessment

Ames Laboratory-Iowa State University Site.

Effective Dose Equivalent:

For dep. Uranium, 0.00

For U-234, 0.00

Doses are calculated in accordance with DOE 5400.5 and 5400.1. The standard for air emissions found in 40 CFR 61.92 states that emissions of radionuclides to ambient air from a DOE facility "shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr" (0.1 mSv/yr). The Laboratory is in compliance with the stated standard.

5.4 Areas of Concern

Areas of concern include inactive waste sites, spill sites and other areas that had the potential to be contaminated as a result of Ames Laboratory activities. The term does not include any UST sites nor the inactive chemical disposal site. Nine areas of concern were investigated by a subcontractor in 1993. A radiological survey was performed at seven of the areas and soil and/or groundwater sampling was performed at all nine areas. An Investigative Report was completed in October 1993. The areas are sites where potential contamination may have occurred as a result of activities associated with Ames Laboratory in the 1940's and 1950's, and reactor operations which occurred in the 1960s and 1970s. Groundwater at one of the sites, at the ASC, was resampled in December 1993 and February 1994. Four of the sites were characterized due to an accidental release of thorium progeny to the sanitary sewer in 1953. Sites where contaminated sludge was stored or may have been spread include the Old Sewage Treatment Plant, Ames Airport, Grand Avenue Underpass, and Ames Municipal Cemetery. In 1994, eight of the sites were determined to be no risk to the public. On February 17, 1995, the Old Sewage Treatment Plant was determined to be no risk to the public.

5.4.1 ASC Well

Based on the results of the elevated gross alpha and gross beta activity in a sample from an old monitoring well, resampling the groundwater was suggested. Followup samples were collected in December 1993 and February 1994. The December sample showed gross alpha and gross beta activity levels were within background. The February samples were in the low end of the background range. See Table 5-2.

5.4.2 Old Sewage Treatment Plant

The radiological survey performed at this site did indicate radiation slightly elevated above background values. Soil samples did not, however, suggest significant elevation. The elevation noted during the survey may have been due to the concentration of inorganics in the municipal sludge and not the release from Ames Laboratory. Elevated radiological activity is commonly observed in municipal sludge (as comparable to soils) due to the concentrating of metals in the sewage treatment process.

Soil samples were collected at 24 locations and were analyzed for thorium-228, -230, and -232. See Figure 5-1 and Table 5-3. The concentrations of thorium-230 and -232 were well below the generic guideline of 5pCi/g (DOE Order 5400.5) for surface soil; there is no generic guideline for thorium-228.

Two groundwater samples were also collected at this site. Thorium concentrations were less than four percent of the derived concentration guide (DCG) values listed in DOE Order 5400.5. The four percent value is used for comparison with the DOE drinking water system criterion of 4 mrem/yr, and are below the concentration levels of radionuclides permitted in water above natural background radiation in Iowa Administrative Code (IAC) Chapter 40. See Table 5-3.

Table 5-2

Applied Science Complex Groundwater Samples

SAMPLE DESIGNATION	**Date**	**Sample pH**	**Gamma Spectral Analysis**	**Gross alpha** pCi/liter	**Gross beta** pCi/liter
Monitoring Well	07-07-93	7.58	<0.1	34	163
Monitoring Well	12-09-93		NA	2.1	8.0
Monitoring Well	02-01-94		NA	0.9	6.5

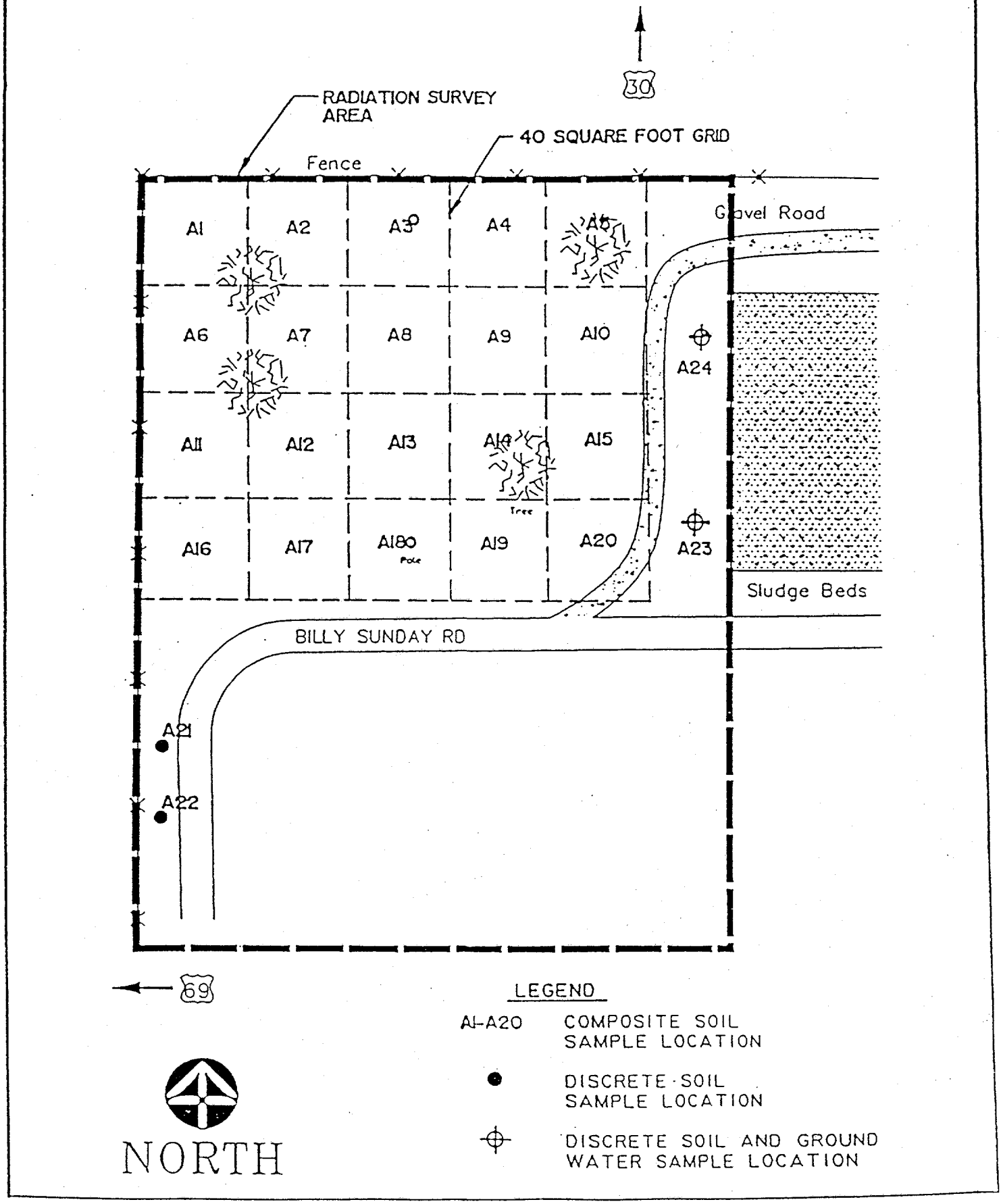


Figure 5-1, Old Sewage Treatment Plant

Table 5-3

Ames Laboratory Nine Areas of Concern
Old Sewage Treatment Plant Soil Samples

SAMPLE DESIGNATION	Thorium-228 pCi/gram	Thorium-230 pCi/gram	Thorium-232 pCi/gram
A-1	0.10	0.07	0.52
A-2	ND	ND	ND
A-3	0.06	0.07	0.10
A-4	ND	ND	ND
A-5	ND	ND	ND
A-6	ND	ND	ND
A-7	0.34	ND	0.11
A-8	0.79	0.16	0.39
A-9	ND	ND	ND
A-10	ND	ND	ND
A-11	0.05	ND	ND
A-12	0.25	0.06	0.19
A-13	ND	ND	ND
A-14	ND	ND	ND
A-15	ND	ND	ND
A-16	ND	0.05	0.26
A-17	ND	ND	ND
A-18	ND	ND	ND
A-19	ND	ND	ND
A-20	0.54	0.45	0.55
A-21-10	ND	ND	ND
A-21-20	ND	ND	ND
A-22-10	ND	ND	ND
A-22-20	0.27	0.11	0.15
A-23-10	ND	ND	ND
A-23-20	ND	ND	ND
A-23-40	ND	ND	ND
A-23-WT	0.13	0.14	0.08
A-23-Groundwater**	0.6	ND	0.9
A-24-10	0.28	0.21	0.21
A-24-20	0.09	0.09	0.56
A-24-40	ND	ND	ND
A-24-WT	ND	ND	ND
A-24-Groundwater**	0.7	ND	1.1

**pCi/Liter
Detection limit for soil samples is 0.05 pCi/gram
Detection limit for groundwater samples is 0.1 pCi/Liter

After reviewing the data, the Iowa Department of Public Health decided further investigation was warranted. The ORISE performed the investigation. A thorough exposure rate survey was done, over a wider area than the original survey, using hand held instruments. Surface and subsurface soil, surface water, groundwater, sludge, and sediment samples were collected. See Figures 5-2 through 5-7. The sample results for soils for all radionuclides analyzed ranged from lows of 0.2 to 0.3 pCi/g through highs of 3.6 to 32.1 pCi/g. The results are in Table 5-4 (9 pages). The thirteen sampled points with the highest radioactivity were selected for soil removal.

Soil was removed within a one meter radius of each selected point. Individual excavation depths were determined by hand held survey instruments. Clean fill was brought in and the area was graded. Resampling demonstrated that all areas were within background range. The confirmatory samples results are in Tables 5-5 through 5-7.

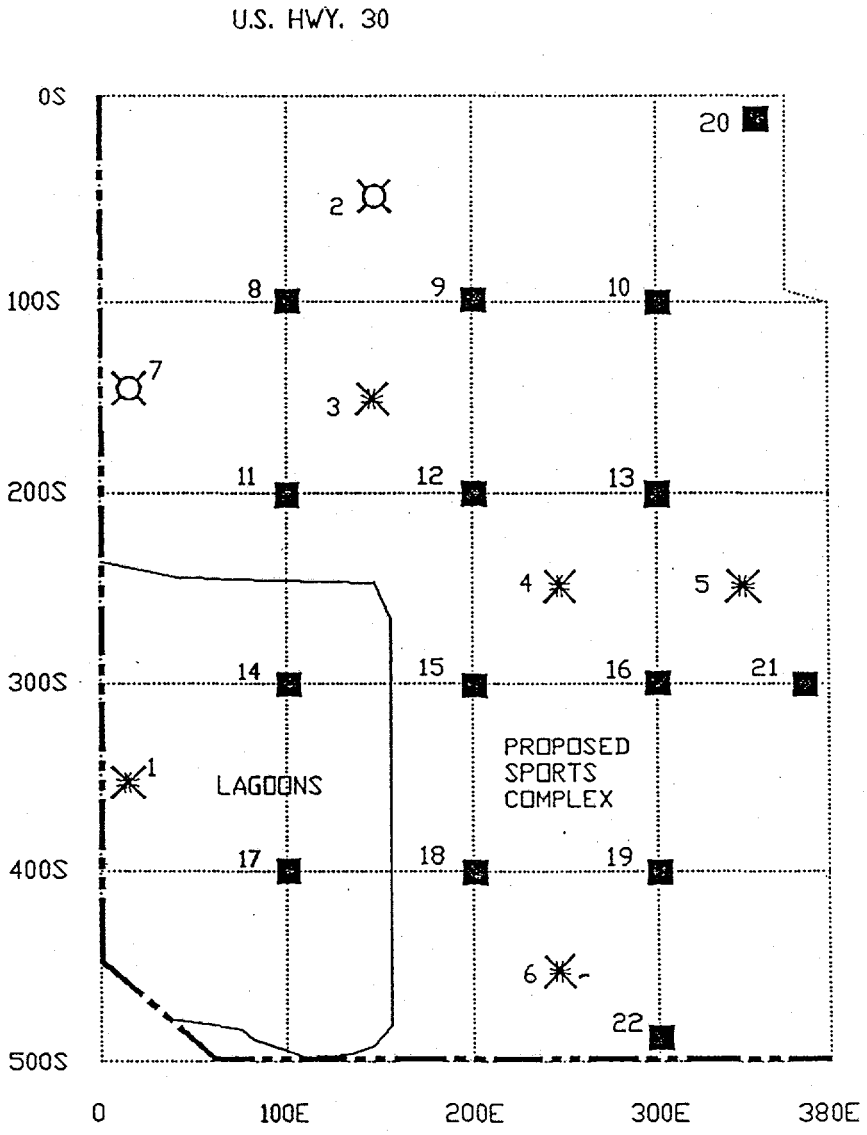
5.5 Chemical Disposal Site (CDS)

Ames Laboratory is responsible for a small chemical burial site, located on ISU property, which was used from 1958-1966 for disposal of hazardous wastes and wastes from yttrium, thorium and uranium production. Survey instrument monitoring was performed at the site in 1980 and 1987. Contaminated surface soil was removed and properly disposed both times at the DOE Hanford Facility at Richland, Washington. Test wells and a reference well were installed at the site in 1989. Testing of the wells and water from upstream and downstream sites on the nearby Squaw Creek was reaccomplished in 1990 through 1992. The creek sampling points were the same ones used the reactor operation years (Figure 5-8). In 1993, an electro-magnetic survey was conducted, surface soil samples were collected, and hand auger samples were collected. Seven soil borings were done and six new monitoring wells were installed, for a total of 9 wells on site in 1993 (Figure 5-9).

Refer to the site work plans and investigation reports for detailed information concerning the CDS. Documents produced to date (May 1995) include:

- A Phase I Remedial Investigation (RI) site work plan
- A Phase I site work health and safety plan, HASP
- A Phase I field sampling plan, FSP
- A Phase I sampling and analysis quality assurance plan, QA
- A risk assessment plan
- A Phase I RI report
- A groundwater resampling report
- A source removal engineering evaluation and cost analysis (EE/CA)
- A draft feasibility study (FS)
- A source removal action plan
- A Phase II RI work plan, including HASP, QA and FSP, monitoring well network and ecological sampling components
- The Corps of Engineers Souce Removal Report (draft)

Figure 5-2, ORISE Sewage Plant Samples - East



MEASUREMENT/SAMPLING LOCATIONS

■ SURFACE SOIL

✳ BOREHOLE, SOIL AND WATER

✳ BOREHOLE, SOIL ONLY

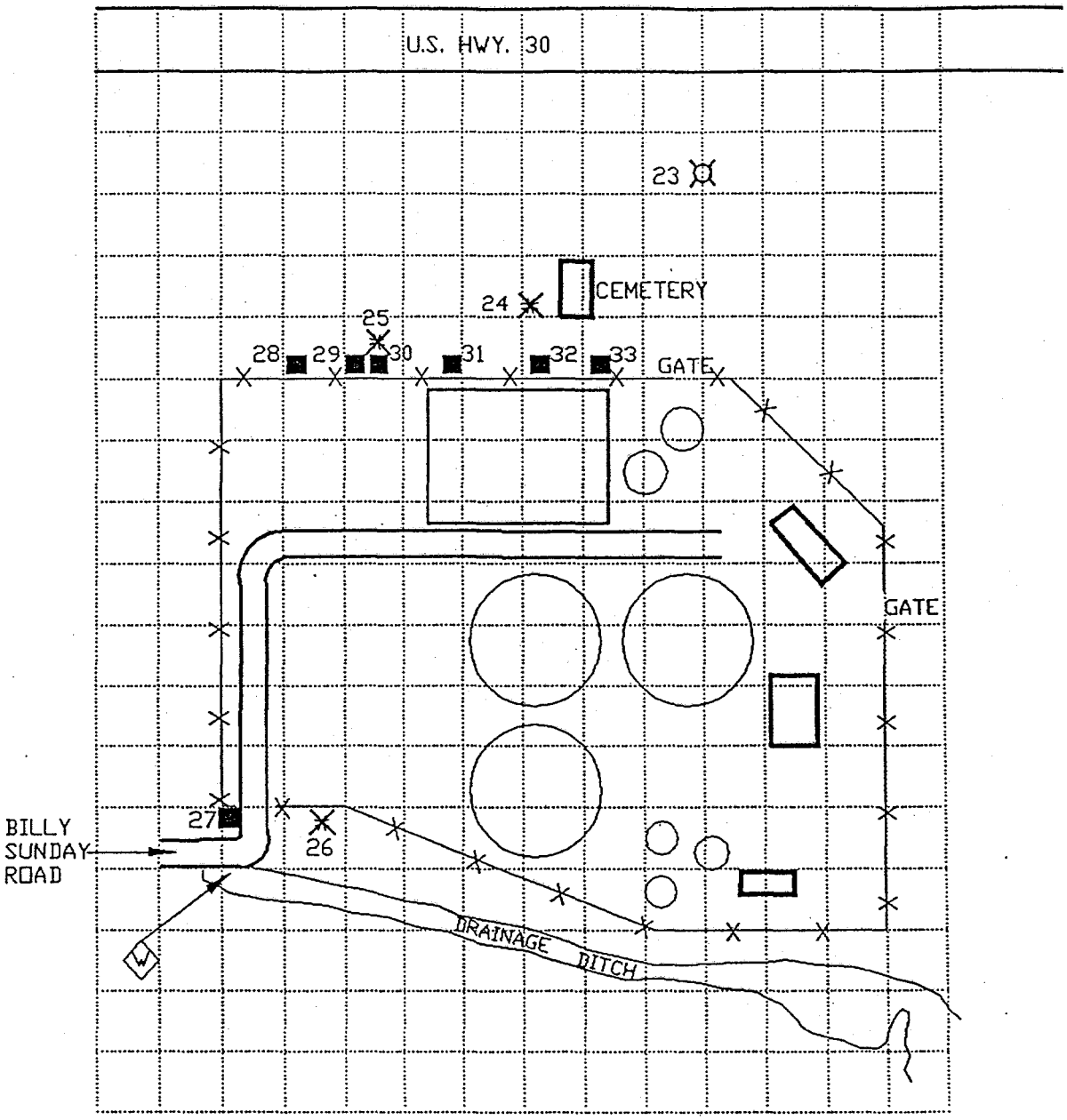
SURVEY BOUNDARY

N

FEET 0 300

METERS 0 100

Figure 5-3, ORISE Sewage Plant Samples - North & South



MEASUREMENT/SAMPLING LOCATIONS

- # ■ SURFACE SOIL
- # ✕ BOREHOLE, SOIL AND WATER
- # ⊠ BOREHOLE, SOIL ONLY
- ◇ SURFACE WATER

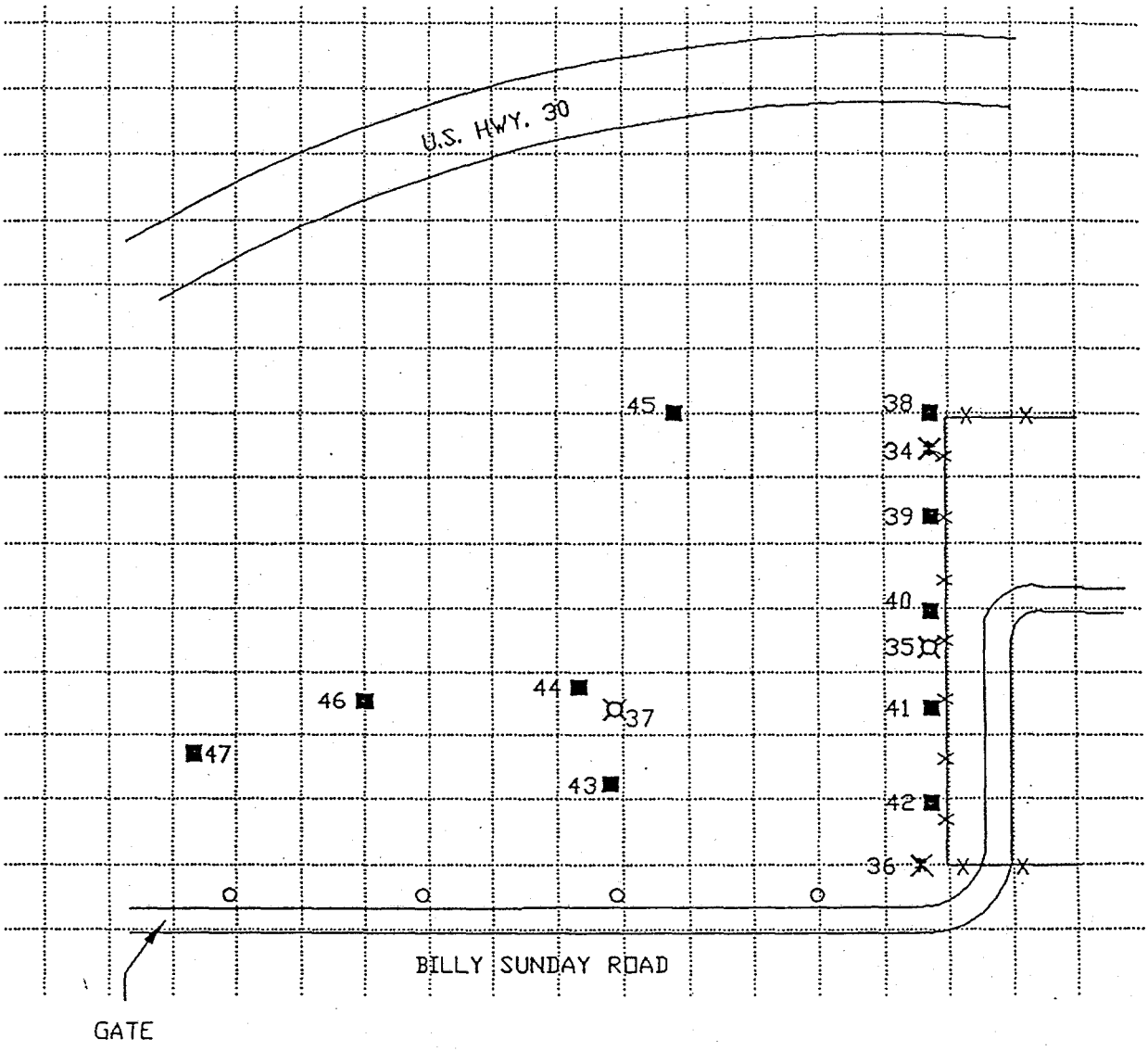
✕——✕——✕ FENCE

N

0 FEET 120

0 METERS 40

Figure 5-4, ORISE Sewage Plant Samples - West



MEASUREMENT/SAMPLING LOCATIONS

■ SURFACE SOIL

⊠ BOREHOLE, SOIL AND WATER

⊠ BOREHOLE, SOIL ONLY

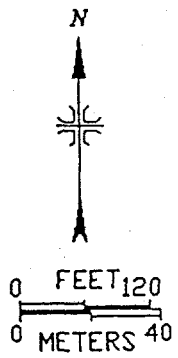


Figure 5-5, ORISE Sewage Plant Samples - Inside Fence

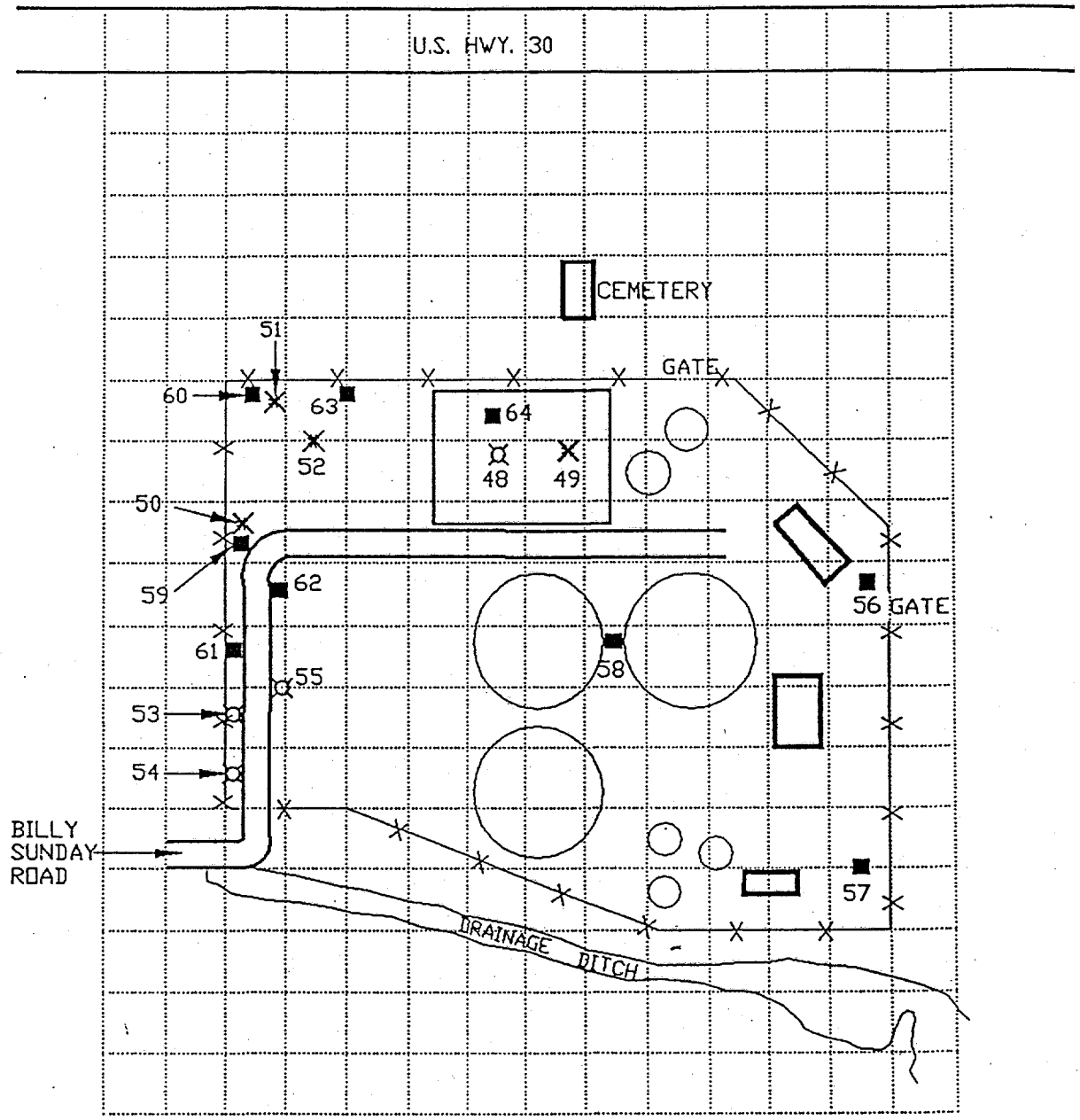
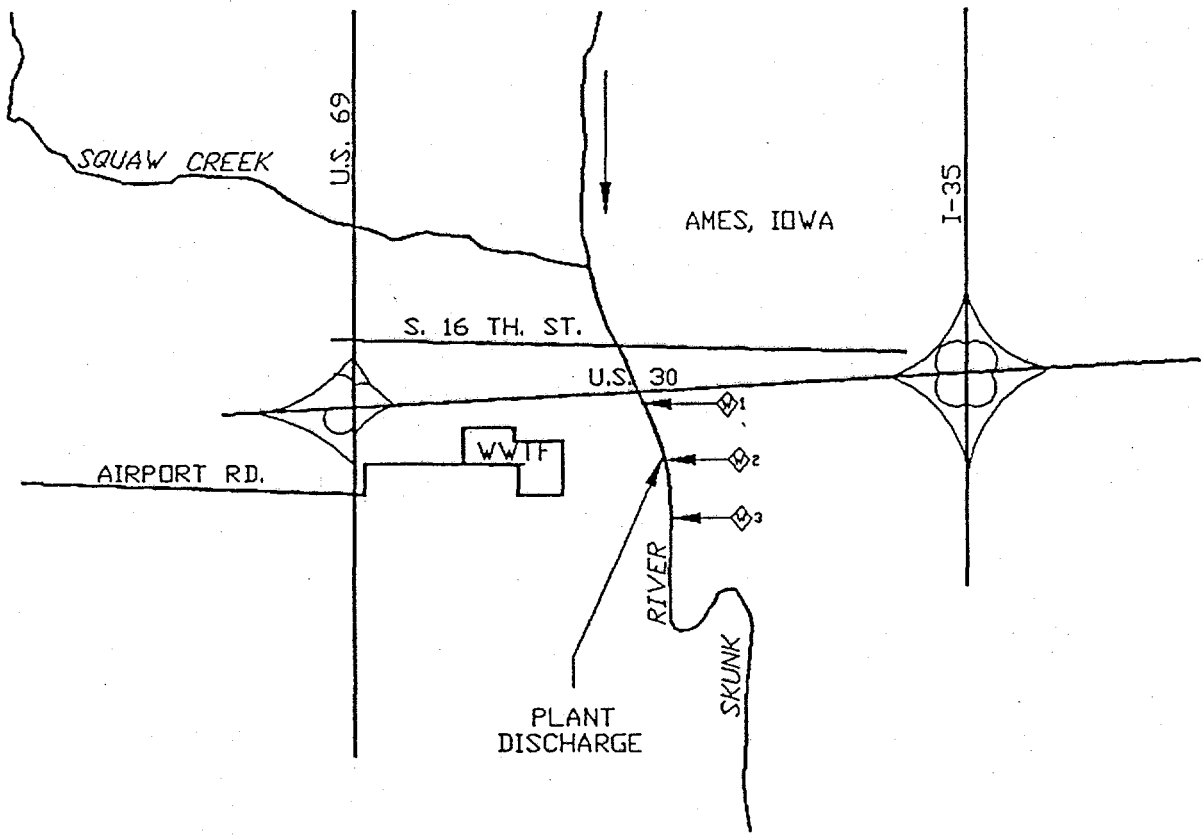


Figure 5-6, ORISE Skunk River Samples



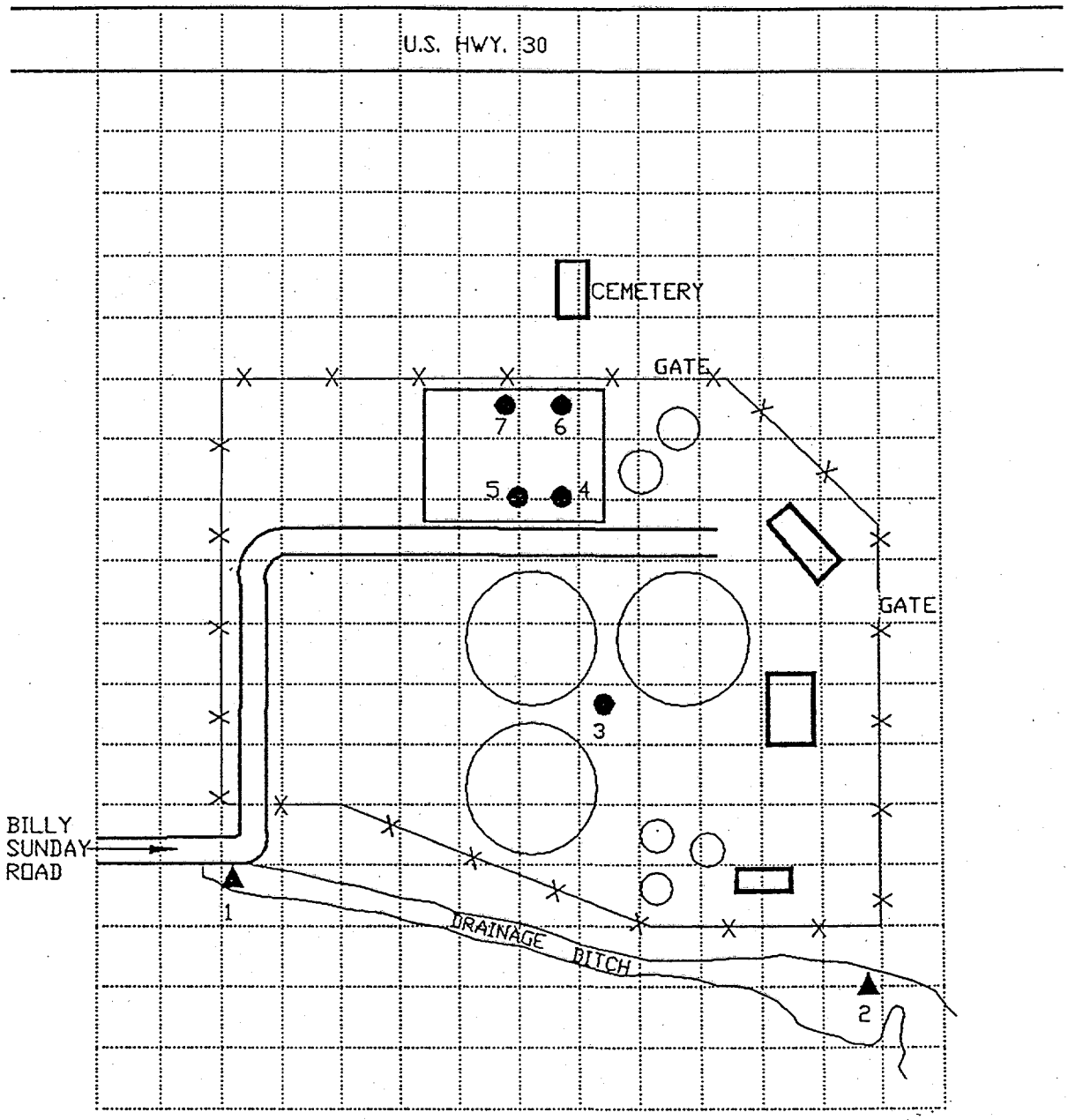
SAMPLING LOCATIONS

◇W# SURFACE WATER

N

NOT TO SCALE

Figure 5-7, ORISE Miscellaneous Samples



SAMPLING LOCATIONS

● SLUDGE

▲ SEDIMENT

FENCE

N

0 FEET 120

0 METERS 40

Table 5-4, ORISE Sample Results

Location/depth		Radionuclide Concentrations (pCi/g)			
		Ac-228[a]	Tl-208[b]	U-238	Ra-226
East Field[c]					
Location 1	0-15 cm	1.9 ± 0.2[d]	0.6 ± 0.1	1.2 ± 0.8	0.6 ± 0.1
	45-60 cm	1.3 ± 0.5	0.5 ± 0.1	2.2 ± 1.6	0.4 ± 0.2
Location 2	0-15 cm	1.1 ± 0.2	0.3 ± 0.1	0.9 ± 0.7	0.7 ± 0.1
	2 m	1.1 ± 0.2	0.3 ± 0.1	0.8 ± 0.6	0.6 ± 0.1
Location 3	0-15 cm	1.0 ± 0.2	0.4 ± 0.1	1.3 ± 0.7	0.6 ± 0.1
	2 m	1.0 ± 0.2	0.3 ± 0.1	1.2 ± 0.6	0.6 ± 0.1
Location 4	0-15 cm	1.0 ± 0.3	0.3 ± 0.1	0.4 ± 0.6	0.6 ± 0.1
	2 m	0.9 ± 0.2	0.2 ± 0.1	0.7 ± 0.6	0.4 ± 0.1
Location 5	0-15 cm	1.1 ± 0.2	0.4 ± 0.1	1.8 ± 0.6	0.5 ± 0.1
	2 m	0.4 ± 0.1	0.1 ± 0.1	0.5 ± 0.4	0.3 ± 0.1
Location 6	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	1.6 ± 0.8	0.6 ± 0.1
	2 m	1.1 ± 0.2	0.4 ± 0.1	1.7 ± 0.7	0.6 ± 0.1
Location 7	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	0.6 ± 0.6	0.6 ± 0.1
	2 m	0.4 ± 0.1	0.2 ± 0.1	0.7 ± 0.4	0.3 ± 0.1
Location 8	0-15 cm	1.0 ± 0.2	0.3 ± 0.1	0.7 ± 0.6	0.5 ± 0.1
Location 9	0-15 cm	1.3 ± 0.2	0.4 ± 0.1	1.2 ± 0.7	0.6 ± 0.1
Location 10	0-15 cm	1.1 ± 0.2	0.4 ± 0.1	0.9 ± 0.7	0.6 ± 0.1
Location 11	0-15 cm	1.0 ± 0.2	0.3 ± 0.1	0.8 ± 0.6	0.6 ± 0.1
Location 12	0-15 cm	1.1 ± 0.2	0.3 ± 0.1	0.8 ± 0.6	0.9 ± 0.1
Location 13	0-15 cm	1.2 ± 0.2	0.4 ± 0.1	1.6 ± 0.8	0.7 ± 0.1
Location 14	0-15 cm	0.8 ± 0.2	0.2 ± 0.1	0.8 ± 0.6	0.5 ± 0.1
Location 15	0-15 cm	0.8 ± 0.2	0.4 ± 0.1	1.1 ± 0.7	0.7 ± 0.1

Table 5-4, ORISE Sample Results

Location/depth		Radionuclide Concentrations (pCi/g)			
		Ac-228[a]	Tl-208[b]	U-238	Ra-226
East Field[c] (Continued)					
Location 16	0-15 cm	1.2 ± 0.2	0.4 ± 0.1	1.2 ± 0.8	0.8 ± 0.1
Location 17	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	1.1 ± 0.8	0.6 ± 0.1
Location 18	0-15 cm	1.0 ± 0.2	0.4 ± 0.1	0.6 ± 0.6	0.7 ± 0.1
Location 19	0-15 cm	1.2 ± 0.2	0.5 ± 0.1	1.4 ± 0.8	0.8 ± 0.1
Location 20	0-15 cm	0.5 ± 0.1	0.2 ± 0.1	0.4 ± 0.5	0.3 ± 0.1
Location 21	0-15 cm	1.3 ± 0.2	0.4 ± 0.1	1.7 ± 0.8	0.8 ± 0.1
Location 22	0-15 cm	1.3 ± 0.2	0.4 ± 0.1	1.4 ± 0.7	0.7 ± 0.1
North and South Fields[e]					
Location 23	0-15 cm	0.9 ± 0.3	0.2 ± 0.1	1.3 ± 1.0	0.4 ± 0.1
	2 m	0.5 ± 0.1	0.1 ± 0.1	0.5 ± 0.4	0.2 ± 0.1
Location 24	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	1.2 ± 0.7	0.5 ± 0.1
	2 m	0.3 ± 0.1	0.1 ± 0.1	0.5 ± 0.4	0.2 ± 0.1
Location 25	0-15 cm	1.0 ± 0.2	0.3 ± 0.1	0.4 ± 0.6	0.5 ± 0.1
	2 m	0.2 ± 0.1	0.1 ± 0.1	0.1 ± 0.3	0.2 ± 0.1
Location 26	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	0.8 ± 0.7	0.4 ± 0.1
	2 m	1.0 ± 0.2	0.3 ± 0.1	1.1 ± 0.8	0.7 ± 0.1
Location 27	0-15 cm	1.7 ± 0.3	0.5 ± 0.1	1.2 ± 0.8	0.5 ± 0.1
Location 28	0-15 cm	1.0 ± 0.2	0.3 ± 0.1	1.1 ± 0.6	0.6 ± 0.1
Location 29	0-15 cm	8.4 ± 0.5	3.1 ± 0.2	1.9 ± 1.5	0.8 ± 0.1
Location 30	0-15 cm	5.0 ± 0.4	1.8 ± 0.1	1.4 ± 1.0	0.5 ± 0.1
Location 31	0-15 cm	1.0 ± 0.2	0.3 ± 0.1	0.4 ± 0.8	0.5 ± 0.1
Location 32	0-15 cm	0.8 ± 0.2	0.2 ± 0.1	0.7 ± 0.8	0.4 ± 0.1
Location 33	0-15 cm	0.8 ± 0.2	0.3 ± 0.1	0.8 ± 0.6	0.5 ± 0.1

Table 5-4, ORISE Sample Results

Location/depth		Radionuclide Concentrations (pCi/g)			
		Ac-228[a]	Tl-208[b]	U-238	Ra-226
West Field[f]					
Location 34	0-15 cm	0.7 ± 0.2	0.3 ± 0.1	1.1 ± 0.6	0.5 ± 0.1
	2 m	0.5 ± 0.1	0.2 ± 0.1	0.7 ± 0.5	0.3 ± 0.1
Location 35	0-15 cm	0.7 ± 0.3	0.2 ± 0.1	0.8 ± 0.7	0.4 ± 0.1
	2 m	0.6 ± 0.2	0.2 ± 0.1	1.0 ± 0.6	0.4 ± 0.1
Location 36	0-15 cm	0.8 ± 0.2	0.2 ± 0.1	0.9 ± 0.5	0.6 ± 0.1
	2 m	0.7 ± 0.2	0.2 ± 0.1	0.3 ± 0.3	0.4 ± 0.1
Location 37	0-15 cm	0.5 ± 0.1	0.2 ± 0.1	0.6 ± 0.4	0.4 ± 0.1
	2 m	0.4 ± 0.1	0.1 ± 0.1	0.5 ± 0.5	0.4 ± 0.1
Location 38	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	1.1 ± 0.8	0.7 ± 0.1
Location 39	0-15 cm	1.0 ± 0.2	0.3 ± 0.1	0.8 ± 0.7	0.5 ± 0.1
Location 40	0-15 cm	1.8 ± 0.3	0.6 ± 0.1	0.8 ± 0.8	0.5 ± 0.1
Location 41	0-15 cm	0.8 ± 0.1	0.2 ± 0.1	0.6 ± 0.6	0.4 ± 0.1
Location 42	0-15 cm	0.7 ± 0.2	0.2 ± 0.1	0.5 ± 0.8	0.4 ± 0.1
Location 43	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	0.7 ± 0.8	0.6 ± 0.1
Location 44	0-15 cm	0.6 ± 0.1	0.2 ± 0.1	1.0 ± 0.6	0.4 ± 0.1
Location 45	0-15 cm	0.6 ± 0.2	0.2 ± 0.1	1.5 ± 0.6	0.3 ± 0.1
Location 46	0-15 cm	1.0 ± 0.2	0.2 ± 0.1	0.8 ± 0.5	0.5 ± 0.1
Location 47	0-15 cm	0.4 ± 0.3	0.2 ± 0.1	2.0 ± 1.8	0.5 ± 0.3
Inside Fence[g]					
Location 48	0-15 cm	0.8 ± 0.2	0.2 ± 0.1	1.1 ± 0.6	0.4 ± 0.1
	2 m	0.5 ± 0.1	0.2 ± 0.1	0.5 ± 0.6	0.4 ± 0.1
Location 49	0-15 cm	1.0 ± 0.3	0.4 ± 0.1	1.5 ± 0.9	1.3 ± 0.2
	2 m	0.3 ± 0.1	0.1 ± 0.1	0.3 ± 3.0	0.2 ± 0.1

Table 5-4, ORISE Sample Results

Location/depth		Radionuclide Concentrations (pCi/g)			
		Ac-228[a]	Tl-208[b]	U-238	Ra-226
Inside Fence[g] (Continued)					
Location 50	0-15 cm	5.7 ± 0.3	2.1 ± 0.1	0.7 ± 1.0	0.5 ± 0.1
	2 m	0.7 ± 0.1	0.2 ± 0.1	0.7 ± 0.6	0.3 ± 0.1
Location 51	0-15 cm	8.4 ± 0.4	2.9 ± 0.1	2.7 ± 1.1	0.5 ± 0.1
	15-30 cm	2.1 ± 0.2	0.7 ± 0.1	1.0 ± 0.8	0.6 ± 0.1
	90-105 cm	1.2 ± 0.2	0.4 ± 0.1	1.5 ± 0.8	0.6 ± 0.1
	2 m	0.6 ± 0.3	0.2 ± 0.1	1.0 ± 1.1	0.4 ± 0.1
Location 52	0-15 cm	6.1 ± 0.4	2.2 ± 0.1	1.1 ± 1.1	0.8 ± 0.1
	30-45 cm	1.2 ± 0.4	0.3 ± 0.1	1.0 ± 1.3	0.7 ± 0.1
	2 m	2.4 ± 0.2	0.9 ± 0.1	0.2 ± 0.7	0.4 ± 0.1
Location 53	0-15 cm	8.7 ± 0.4	3.0 ± 0.1	2.7 ± 1.4	0.7 ± 0.1
	15-30 cm	1.2 ± 0.4	0.4 ± 0.1	1.0 ± 1.4	0.5 ± 0.1
	2 m	0.7 ± 0.1	0.2 ± 0.1	0.8 ± 0.4	0.4 ± 0.1
Location 54	0-15 cm	19.9 ± 0.6	7.3 ± 0.2	2.8 ± 1.6	0.8 ± 0.1
	15-30 cm	5.0 ± 0.3	1.9 ± 0.1	1.1 ± 1.0	0.6 ± 0.1
	2 m	1.1 ± 0.2	0.3 ± 0.1	0.3 ± 0.5	0.4 ± 0.1
Location 55	0-15 cm	7.0 ± 0.4	2.6 ± 0.1	1.7 ± 1.1	0.8 ± 0.1
	45-60 cm	15.3 ± 0.5	5.4 ± 0.1	1.2 ± 1.1	0.9 ± 0.1
	2 m	0.6 ± 0.1	0.2 ± 0.1	0.3 ± 0.4	0.3 ± 0.1
Location 56	0-15 cm	0.5 ± 0.1	0.2 ± 0.1	0.7 ± 0.5	0.6 ± 0.1
Location 57	0-15 cm	0.6 ± 0.4	0.3 ± 0.1	1.9 ± 2.0	0.5 ± 0.2
Location 58	0-15 cm	1.0 ± 0.4	0.3 ± 0.1	1.6 ± 1.5	0.4 ± 0.2
Location 59	0-15 cm	7.4 ± 0.6	2.7 ± 0.2	2.3 ± 1.6	0.8 ± 0.2
Location 60	0-15 cm	9.1 ± 0.4	3.4 ± 0.1	1.3 ± 1.1	0.7 ± 0.1

Table 5-4, ORISE Sample Results

Location/depth		Radionuclide Concentrations (pCi/g)			
		Ac-228[a]	Tl-208[b]	U-238	Ra-226
Inside Fence[g] (Continued)					
Location 61	0-15 cm	7.8 ± 0.7	2.9 ± 0.2	1.1 ± 2.5	0.6 ± 0.2
Location 62	0-15 cm	8.2 ± 0.4	3.0 ± 0.1	1.6 ± 1.1	0.5 ± 0.1
Location 63	0-15 cm	4.8 ± 0.3	1.8 ± 0.1	1.2 ± 1.0	0.3 ± 0.1
Location 64	0-15 cm	0.9 ± 0.2	0.3 ± 0.1	1.3 ± 0.8	0.7 ± 0.1

[a]Values in this column represent the concentrations of Ra-228 (mesothorium).
[b]Values in this column represent 36% of Th-228 concentrations.
[c]Refer to Figure 8.
[d]Uncertainties represent the 95% confidence level, based only on counting statistics.
[e]Refer to Figure 9.
[f]Refer to Figure 10.
[g]Refer to Figure 11.

Table 5-4, ORISE Sample Results

Location[a]	Thorium Concentrations (pCi/g)			Th-232/Th-228 Ratio
	Th-228	Th-230	Th-232	
North Field Location 29	8.4 ± 0.4[b]	1.3 ± 0.2	6.6 ± 0.4	0.79
Inside Fence Location 51	9.9 ± 0.5	1.5 ± 0.2	6.9 ± 0.4	0.70
Inside Fence Location 60	9.6 ± 0.5	1.7 ± 0.2	6.8 ± 0.4	0.71
Inside Fence Location 54	32.1 ± 1.1	3.7 ± 0.4	23.0 ± 0.9	0.72
Inside Fence Location 55	15.8 ± 0.6	2.1 ± 0.2	11.3 ± 0.5	0.72

[a]Refer to Figures 9 and 11.
[b]Uncertainties represent the 95% confidence levels, based on counting statistics.

Table 5-4, ORISE Sample Results

Location/Depth		Gross Alpha and Gross Beta Activity pCi/l	
		Alpha Activity	Beta Activity
Background[a]			
City Well #22	N/A	<4.6	10.8 ± 3.0
Lime Sludge Lagoon	3 m	<3.4	<3.6
East Field[b]			
Location #1	2 m	<8.1	20.0 ± 5.6
Location #3	3.2 m	<4.0	<4.0
Location #4	3.2 m	5.2 ± 3.0	<4.5
Location #5	2.5 m	8.3 ± 2.8	<4.0
Location #6	3 m	<6.0	<6.3
North and South Fields[c]			
Location #24	2 m	<5.7	<5.6
Location #25	2 m	<8.8	<8.5
Location #26	2 m	<1.6	<2.0
Drainage Way Surface		<2.9	<3.5
West Field[d]			
Location #34	1.6 m	<9.0	<9.3
Location #36	2 m	<4.6	<4.8
Inside Fence[e]			
Location #49	2 m	<12	<13
Location #50	2 m	<2.0	2.6 ± 1.5
Location #51	2 m	<9.2	<10
Location #52	2 m	<10	<11

Table 5-4, ORISE Sample Results

Location/Depth		Gross Alpha and Gross Beta Activity pCi/l	
		Alpha Activity	Beta Activity
Skunk River[f]			
Location #1	Surface	2.4 ± 1.4	<2.9
Location #2	Surface	2.9 ± 1.4	2.9 ± 1.5
Location #3	Surface	2.0 ± 1.5	<2.9

[a]Refer to Figure 3.
[b]Refer to Figure 8.
[c]Refer to Figure 9.
[d]Refer to Figure 10.
[e]Refer to Figure 11.
[f]Refer to Figure 12.

Table 5-4, ORISE Sample Results

Location	Radionuclide Concentrations (pCi/g)			
	Ac-228	Tl-208	U-238	Ra-226
Sediment, Location 1[a]	0.9 ± 0.4[b]	0.3 ± 0.1	0.8 ± 0.9	0.6 ± 0.2
Sediment, Location 2	0.4. ± 0.1	0.1 ± 0.1	0.5 ± 0.4	0.3 ± 0.1
Lime Sludge, Location 3	0.6 ± 0.2	0.2 ± 0.1	0.5 ± 0.4	0.5 ± 0.1
Dry Sludge, Location 4	0.9 ± 0.4	0.3 ± 0.1	2.0 ± 2.5	1.1 ± 0.3
Dry Sludge, Location 5	1.2 ± 0.4	0.3 ± 0.1	2.1 ± 1.1	1.1 ± 0.2
Dry Sludge, Location 6	1.2 ± 0.4	0.6 ± 0.1	3.7 ± 1.9	1.3 ± 0.3
Dry Sludge, Location 7	1.6 ± 0.3	0.6 ± 0.1	2.8 ± 1.1	2.1 ± 0.2
WPC[c] 2nd Digestor[d], Sample 1	4.9 ± 0.4	0.6 ± 0.1	4.3 ± 1.3	3.6 ± 0.2
WPC 2nd Digestor, Sample 2	5.4 ± 1.0	0.6 ± 0.2	2.4 ± 3.1	2.5 ± 0.5
WPC 2nd Digestor, Sample 3	3.0 ± 0.6	0.3 ± 0.2	2.1 ± 2.3	1.3 ± 0.3
WPC 2nd Digestor, Sample 4	2.1 ± 0.3	0.2 ± 0.1	2.0 ± 0.8	0.9 ± 0.1

[a]Refer to Figure 13.
[b]Uncertainties represent the 95% confidence level based only on counting statistics.
[c]City of Ames Water and Pollution Control.
[d]Samples are from the city of Ames new water treatment plant.

Table 5-5, UHL Sewage Plant Confirmatory Samples

Activity = pCi/gm

Sample ID	UHL Lab #	Ac-228[a]	Tl-208[b]	U-238	Ra-226
1A	9410330	1.2 ± 0.2[c]	0.4 ± 0.3	0.6 ± 0.3	0.4 ± 0.3
2A	9410331	2.1 ± 0.2	0.8 ± 0.4	0.7 ± 0.4	0.4 ± 0.2
3A	9410332	2.5 ± 0.3	0.9 ± 0.4	0.9 ± 0.5	0.5 ± 0.3
4A	9410333	5.1 ± 0.4	1.9 ± 0.5	1.0 ± 0.4	0.4 ± 0.3
5A	9410334	3.9 ± 0.3	1.5 ± 0.3	< 0.8	0.4 ± 0.3
6A	9410335	0.7 ± 0.2	0.3 ± 0.3	0.5 ± 0.3	0.2 ± 0.2
7A	9410336	3.2 ± 0.3	1.0 ± 0.4	1.1 ± 0.5	0.4 ± 0.3
8A	9410337	5.8 ± 0.4	2.1 ± 0.6	0.8 ± 0.5	0.4 ± 0.3
9A	9410338	1.2 ± 0.2	0.4 ± 0.3	0.9 ± 0.4	0.3 ± 0.3
10A	9410339	2.4 ± 0.3	0.8 ± 0.4	0.6 ± 0.5	0.3 ± 0.3
11A	9410340	1.6 ± 0.3	0.6 ± 0.3	1.1 ± 0.5	0.5 ± 0.3
12A	9410341	2.0 ± 0.2	0.8 ± 0.3	0.8 ± 0.4	0. 3 ± 0.3
13A	9410342	1.8 ± 0.3	0.7 ± 0.3	0.6 ± 0.5	0.2 ± 0.3
14A	9410343	0.8 ± 0.2	0.2 ± 0.3	< 0.6	0.3 ± 0.3
15A	9410344	4.5 ± 0.4	1.5 ± 0.4	1.0 ± 0.3	0.4 ± 0.3
16A	9410345	0.7 ± 0.2	0.2 ± 0.3	0.3 ± 0.4	0.2 ± 0.3
17A	9410346	1.0 ± 0.2	0.3 ± 0.3	0.7 ± 0.5	0.3 ± 0.3
18A	9410347	3.3 ± 0.4	1.3 ± 0.5	< 0.7	0.4 ± 0.3
19A	9410348	0.9 ± 0.2	0.3 ± 0.2	0.8 ± 0.4	0.3 ± 0.3
20A	9410349	2.1 ± 0.3	0.7 ± 0.3	0.6 ± 0.5	0.5 ± 0.3
21A	9410350	1.6 ± 0.2	0.6 ± 0.3	1.0 ± 0.3	< 0.1
22A	9410351	1.1 ± 0.2	0.4 ± 0.2	0.8 ± 0.3	0.1± 0.2

Table 5-5, UHL Sewage Plant Confirmatory Samples

23A	9410352	1.1 ± 0.2	0.4 ± 0.3	0.8 ± 0.4	0.4 ± 0.3
24A	9410353	0.9 ± 0.2	0.3 ± 0.3	0.4 ± 0.2	0.2 ± 0.3
25A	9410354	0.9 ± 0.2	0.3 ± 0.3	0.5 ± 0.4	0.3 ± 0.3
26A	9410355	0.7 ± 0.2	0.3 ± 0.3	< 0.5	0.3 ± 0.3
UHL soil bkgd		0.7 ± 0.2	0.2 ± 0.2	0.5 ± 0.3	0.4 ± 0.2

[a] Values in this column represent the concentrations of Ra-228 (mesothorium).
[b] Values in this column represent 36% of Th-228 concentrations.
[c] Uncertainties represent the 95% confidence level based only on counting statistics.

Table 5-6, EPA Sewage Plant Confirmatory Summary

Activity=pCi/g

SAMPLE ID	GAMMA	GROSS ALPHA	GROSS BETA
E-651	214Pb 0.61±0.04 226Ra 1.95±0.36 212Pb 2.89±0.05 214Bi 0.50±0.04 228Ra 2.68±0.08 234Th 1.13±0.35 208Tl 0.92±0.03 137Cs 0.37±0.03 212Bi 1.66±0.17	30.2±10.9 MDC 10.9	21.1±4.0 MDC 4.4
E-759	214Pb 0.64±0.03 226Ra 1.70±0.29 212Pb 2.95±0.04 214Bi 0.53±0.03 228Ra 2.77±0.06 234Th 0.66±0.26 208Tl 0.95±0.02 137Cs 0.49±0.02 212Bi 1.67±0.10	28.2±9.9 MDC 9.6	24.3±4.1 MDC 4.3
E-766	214Pb 0.50±0.02 226Ra 1.43±0.24 212Pb 1.00±0.03 214Bi 0.42±0.03 228Ra 0.90±0.04 234Th 0.90±0.26 208Tl 0.31±0.02 137Cs 0.14±0.01 212Bi 0.57±0.09	19.4±8.7 MDC 9.5	13.6±3.5 MDC 4.2
E-775	214Pb 0.42±0.02 226Ra 1.10±0.23 212Pb 0.67±0.03 214Bi 0.35±0.03 235U 0.07±0.01 228Ra 0.61±0.03 234Th 0.69±0.21 208Tl 0.21±0.01 137Cs 0.45±0.02 212Bi 0.41±0.07	11.5±7.3 MDC 9.7	14.0±3.3 MDC 3.9

MDC = Minimum Detectable Concentration

Table 5-6, EPA Sewage Plant Confirmatory Summary

Activity = pCi/g

SAMPLE ID	GAMMA	GROSS ALPHA	GROSS BETA
E-805	214Pb 0.64±0.03 226Ra 1.76±0.37 212Pb 3.70±0.05 214Bi 0.51±0.03 235U 0.11±0.02 228Ra 3.44±0.06 234Th 1.43±0.35 208Tl 1.22±0.03 137Cs 0.39±0.02 212Bi 2.18±0.12	44.9±12.1 MDC 9.8	26.7±4.3 MDC 4.3
E-807	214Pb 0.58±0.03 226Ra 1.68±0.29 212Pb 1.05±0.03 214Bi 0.51±0.03 228Ra 1.08±0.05 234Th 0.73±0.25 208Tl 0.35±0.02 137Cs 0.29±0.02 212Bi 0.57±0.11	13.0±7.4 MDC 9.1	14.8±3.4 MDC 3.9
E-812	214Pb 0.80±0.06 226Ra 3.10±0.69 212Pb 1.57±0.07 214Bi 0.62±0.06 228Ra 1.35±0.10 234Th 0.64±0.43 208Tl 0.50±0.03 137Cs 0.29±0.03 212Bi 0.96±0.19	13.2±7.4 MDC 9.1	14.3±3.4 MDC 4.0
E-813	214Pb 0.69±0.03 226Ra 1.86±0.33 212Pb 1.43±0.04 214Bi 0.57±0.03 228Ra 1.37±0.06 208Tl 0.45±0.02 137Cs 0.31±0.02 212Bi 0.73±0.10	21.8±9.7 MDC 10.9	21.0±4.0 MDC 4.3

MDC = Minimum Detectable Concentration

Table 5-6, EPA Sewage Plant Confirmatory Summary

Activity=pCi/g

SAMPLE ID	GAMMA	GROSS ALPHA	GROSS BETA
E-825	214Pb 0.51±0.03 226Ra 1.20±0.30 212Pb 1.36±0.03 214Bi 0.44±0.03 235U 0.07±0.02 228Ra 1.29±0.05 234Th 0.90±0.37 208Tl 0.44±0.02 137Cs 0.19±0.01 212Bi 0.82±0.09	6.3±5.9 MDC 8.9	11.3±3.2 MDC 4.1
E-826	214Pb 0.58±0.03 226Ra 1.50±0.28 212Pb 3.38±0.04 214Bi 0.48±0.02 235U 0.09±0.02 228Ra 3.08±0.06 234Th 0.53±0.25 208Tl 1.08±0.02 137Cs 0.25±0.01 212Bi 1.98±0.10	30.9±10.6 MDC 10.0	20.4±4.0 MDC 4.3
E-766 QA	214Pb 0.51±0.02 226Ra 1.31±0.21 212Pb 0.99±0.02 214Bi 0.43±0.02 228Ra 0.92±0.03 234Th 0.53±0.18 208Tl 0.31±0.01 137Cs 0.16±0.01 212Bi 0.58±0.06	15.6±7.7 MDC 8.9	16.9±3.6 MDC 4.1

MDC = Minimum Detectable Concentration

Table 5-7, Ames Laboratory Sewage Plant Confirmatory Summary

Sample ID#	Dry Weight (g)	Ac-228	% CG	Tl-208	% CG	Ra-226	% CG	Bi-214	% CG	Cs-137	% CG
#E747, 22C	503.7	7.61E-07	15.23	2.69E-07	5.38	1.52E-06	30.51	3.22E-07	6.44	1.89E-07	6.31
#E785, 19C	713.6	9.04E-07	18.09	3.15E-07	6.31	9.46E-07	18.93	3.39E-07	6.79	1.38E-07	4.60
#E796, 16C	675.6	4.83E-07	9.66	1.53E-07	3.06	9.80E-07	19.61	2.71E-07	5.43	3.44E-07	11.48
#E800, 1C	590.2	8.38E-07	16.77	2.98E-07	5.97	1.23E-06	24.69	4.33E-07	8.66	2.19E-07	7.31
#E802, 7C	516.4	2.15E-06	43.04	7.85E-07	15.70	1.33E-06	26.68	4.20E-07	8.40	3.48E-07	11.60
#E808, 5C	590.2	2.62E-06	52.52	1.00E-06	20.04	1.50E-06	30.07	3.92E-07	7.84	2.94E-07	9.82
#E818, 15C	606.8	2.51E-06	50.23	9.71E-07	19.42	1.24E-06	24.89	4.18E-07	8.37	3.26E-07	10.88
#E819, 9C	535.6	8.03E-07	16.06	2.93E-07	5.87	1.60E-06	32.15	4.30E-07	8.61	2.13E-07	7.11
#E821, 17C	666.8	6.33E-07	12.67	2.10E-07	4.21	1.17E-06	23.44	3.25E-07	6.51	9.82E-08	3.27
#E823, 18C	726.2	2.01E-06	40.25	7.59E-07	15.19	1.25E-06	25.17	3.88E-07	7.77	1.70E-07	5.67

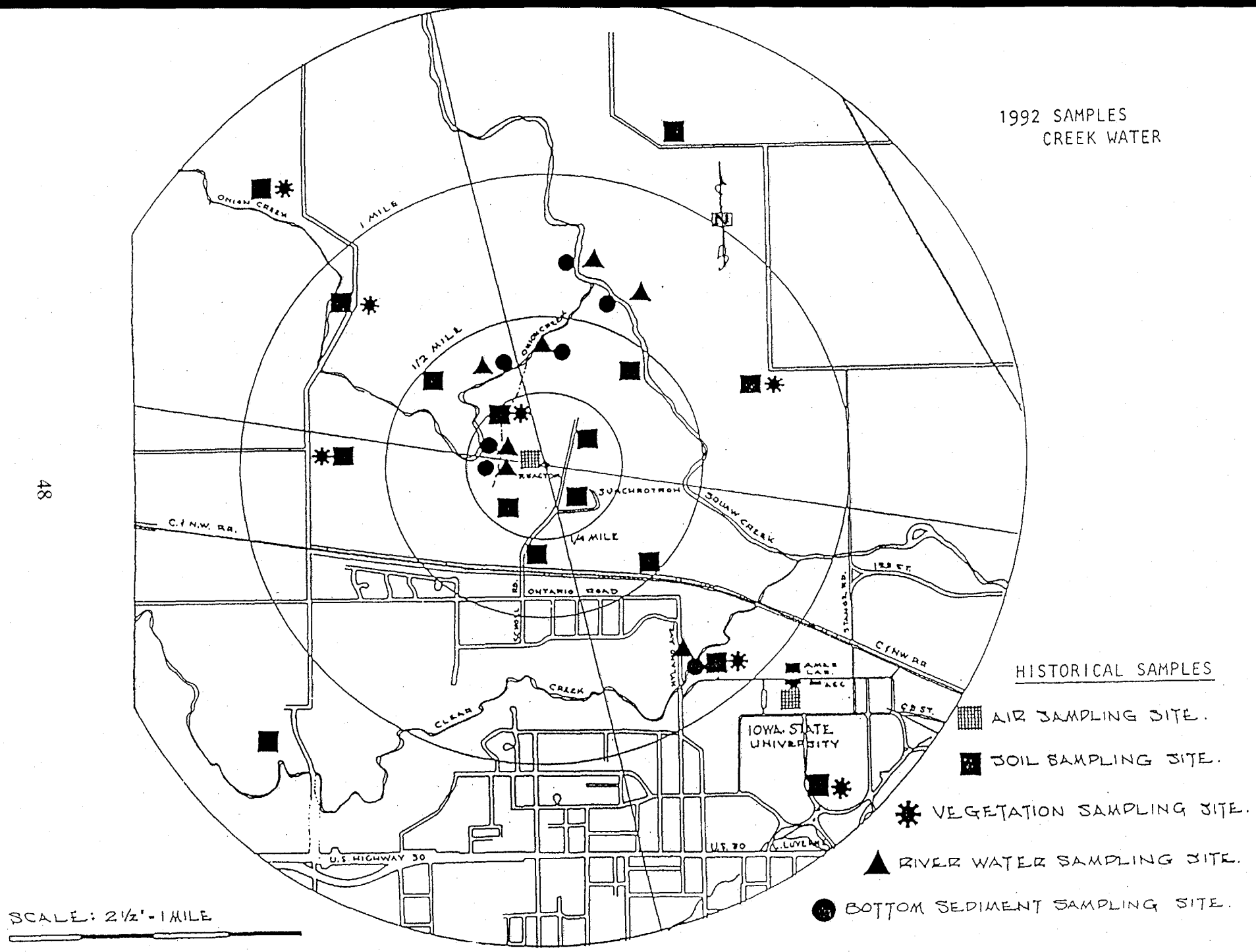


Figure 5-8, Closed Chemical Disposal Site Vicinity

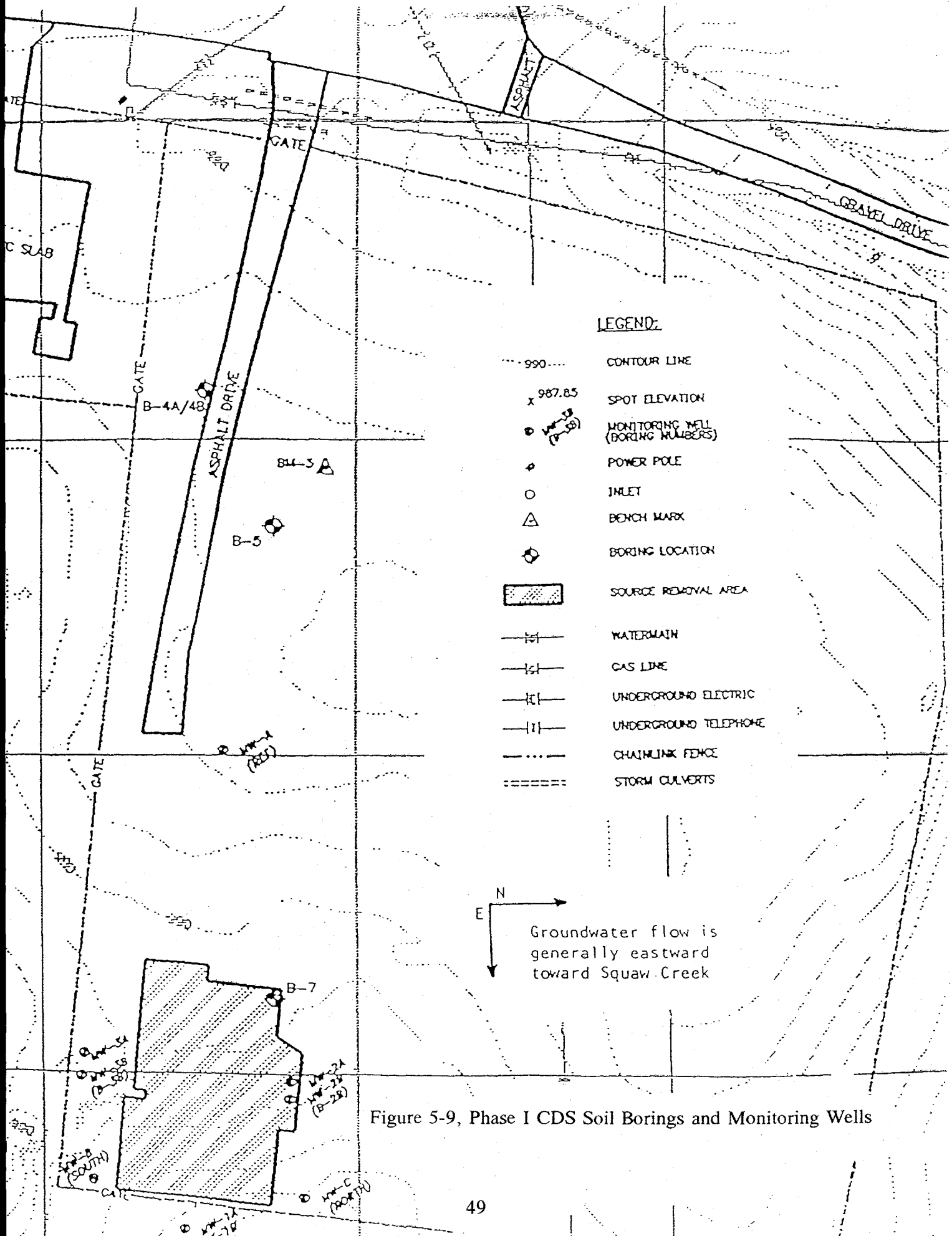


Figure 5-9, Phase I CDS Soil Borings and Monitoring Wells

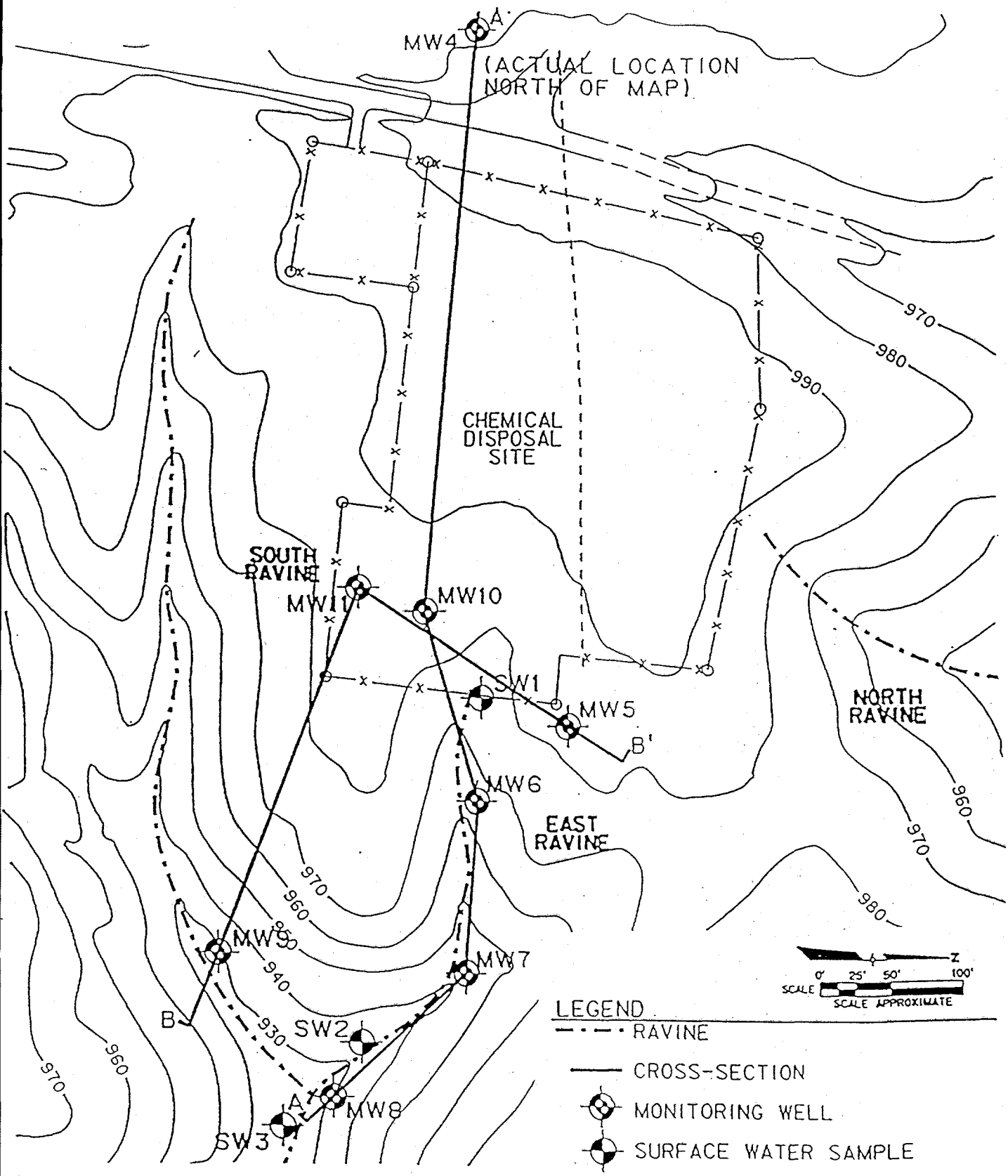


Figure 5-10, Ames Laboratory Chemical Disposal Site, Phase II

The Phase I RI report, EE/CA, source removal action plan, and Phase II RI workplans are in the Ames Laboratory public repository at the Ames Public Library. The nine Phase I monitoring wells were abandoned during the source removal. A new monitoring well network is part of the Phase II RI. Thirteen new wells have been installed in seven locations thus far. See Figure 5-10.

6.0 ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM

6.1 National Pollutant Discharge Elimination System (NPDES) Data

Ames Laboratory does not have or need any NPDES permits since there are no direct discharges or surface runoff to the environment. The Laboratory discharges all liquid wastes to the ISU sanitary sewer system, which discharges into the City of Ames sewer system. The Laboratory is included in the University's discharge contract with the City of Ames. The contract between ISU and the City of Ames for wastewater from the ASC was renewed on April 1, 1995 for five years. The contract requires the University to analyze its waste discharges periodically. This discharge includes the contribution by Ames Laboratory. The Laboratory contributes an estimated 4% of the total ISU sanitary waste. ISU wastewater comprises 10-20% of the sanitary wastes received by the Ames Water Pollution Control Facility. Since the DOE buildings are on ISU land, ISU holds any necessary storm water permits.

6.2 Other Emissions Monitoring

Employee fire extinguisher training sessions involving open burning of flammable liquids and solids are permitted by State of Iowa open burning statutes. The local fire department is notified as required.

It is the general policy of Iowa DNR to exempt laboratory fume hoods from permitting. Ames Laboratory described its system to DNR. DNR issued a ruling for no permitting or monitoring at Ames on July 18, 1994. Since that time DNR has requested more information on the Laboratory's paint booth and its sand blaster. The permitting status of these two sources has not been determined by DNR yet.

6.3 Continuous Release Reporting

Ames Laboratory has no continuous release sources.

6.4 Environmental Occurrences

There were no reportable spills or releases at Ames Laboratory in 1994 or early 1995.

6.5 SARA Title III Reporting Requirements

There were no chemicals stocked at Ames Laboratory at or above the threshold planning quantity (TPQ) in 1994 or early 1995. There is one cylinder for hydrogen fluoride, HF, whose total capacity matches the TPQ of 100 pounds. However this cylinder was never full in 1994. The research program using HF has implemented administrative controls to limit the total quantity on site to a maximum of 80 lbs.

7.0 GROUNDWATER

The inactive chemical disposal site (CDS) is monitored by a system of onsite monitoring wells. Two of these are upgradient wells. See Figure 5-10.

During the 1993-1994 investigation of the nine areas of concern, several borings to groundwater were made. The groundwater was sampled and various samples were analyzed for uranium, thorium, gross alpha activity, gross beta activity, and hexavalent chromium as appropriate.

A combined Groundwater Protection Management Plan and Groundwater Monitoring Plan are in place at the Laboratory. The combined groundwater plan addresses sitewide groundwater protection. The plan is required by DOE Order 5400.1. Suitable downgradient monitoring sites for the Laboratory's main complex have been located among existing wells. Shallow wells in the system belong to Ames Laboratory and the deep wells belong to ISU. Groundwater flow is generally southeastward. A new upgradient (background) well was installed in April 1994 at the golf course west of the WOI television building. The CDS monitoring well system is part of this program.

The current groundwater monitoring network at the main campus consists of 6 wells. See Figure 7-1. Two of the wells belong to ISU and exceed 100 feet in depth. One well is upgradient, for background data. Five wells are downgradient (east-southeast) of the Laboratory's main campus facilities. The deeper ISU wells are screened into the Ames Aquifer. The combination of shallow and deep wells is to detect both floating and sinking contaminants.

The baseline monitoring effort used all the monitoring wells, plus the storm and sanitary sewers adjacent to the Laboratory's main campus facilities. Results of the baseline monitoring indicated no areas of concern on the main campus. See Table 7-1. If resources allow, the system will be sampled semi-annually in the spring and fall, except for the CDS. The CDS area will be monitored as prescribed by the Iowa DNR, IDPH, and EPA until the regulatory agenices release the site. It will then be monitored on the same schedule in effect for the main campus, if required.

Ames Laboratory has an emergency generator underground storage tank (UST) which is located between Wilhelm Hall and the Physics Addition on the ISU campus. See Figure 2-5 and Figure 7-2. In 1971, a leaking UST in the same location was replaced by the tank currently in use. The diesel contaminated soil was not completely remediated at that time. The current emergency generator diesel fuel tank will be removed no later than 1998. It will be replaced by an above-ground tank. A program for monitoring the tank for diesel fuel leakage was conducted by the

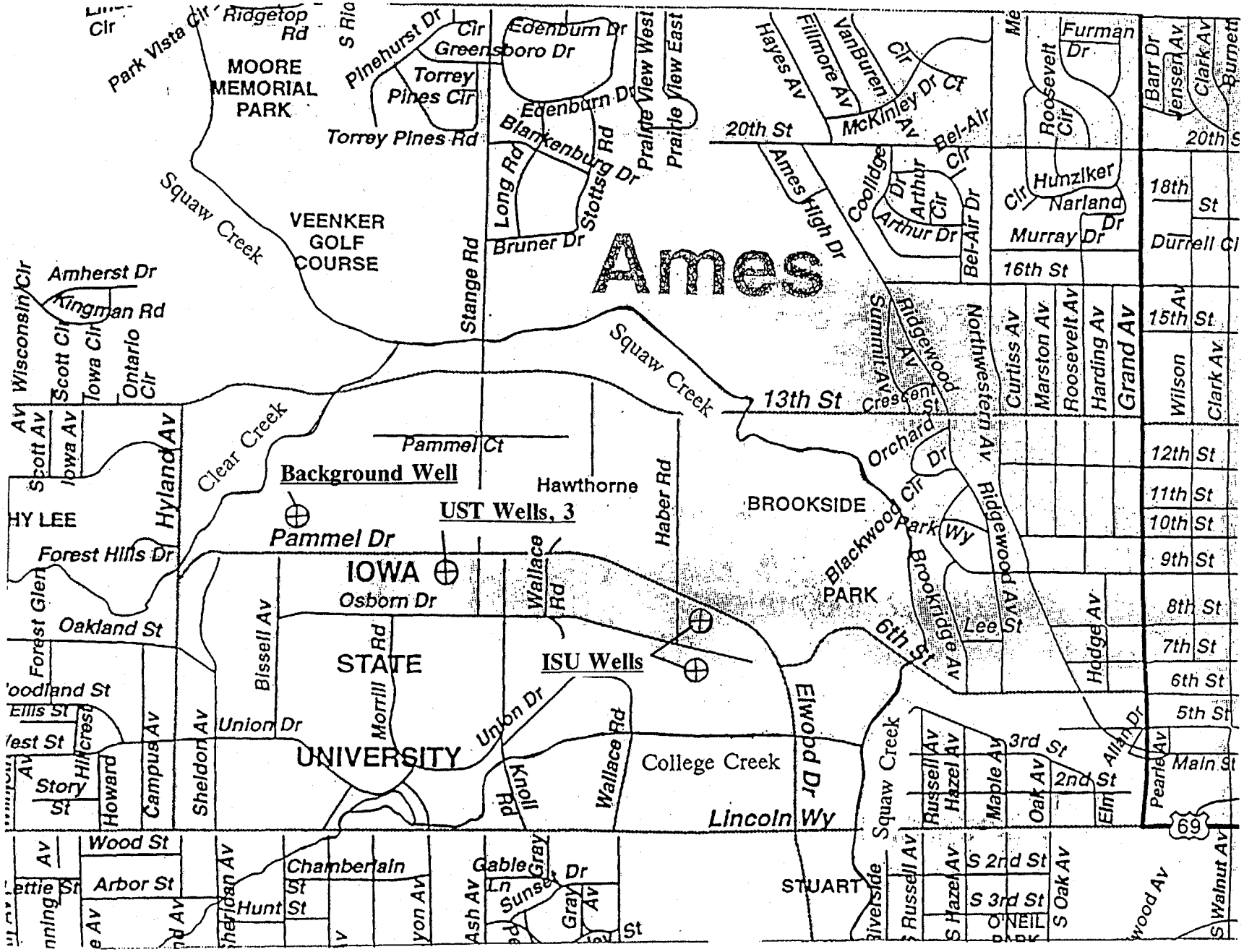


Figure 7-1, Main Campus Monitoring Well Network

Table 7-1, Baseline Samples Summary

(14 total samples analyzed with 2 QA blanks)

ANALYTE	UNITS	ANALYSIS RESULT
Vinyl Chloride	ug/l	Not Detected (ND)
1,1-Dichloroethylene	ug/l	Not Detected
2-Butanone (MEK)	ug/l	ND to 8.9
Chloroform	ug/l	ND to 5.5
Carbon Tetrachloride	ug/l	ND to 1.4
Benzene	ug/l	ND to 49.2
1,2-Dichloroethane	ug/l	Not Detected
Trichloroethylene	ug/l	ND to 1.5
Tetracholoroethylene	ug/l	ND to 123.0
Chlorobenzene	ug/l	Not Detected
Arsenic, dissolved	mg/l	ND to 0.234
Barium, dissolved	mg/l	ND to 0.546
Cadmium, dissolved	mg/l	Not Detected
Chromium, dissolved	mg/l	Not Detected
Lead, dissolved	mg/l	ND to 0.009
Mercury, dissolved	mg/l	ND to 0.005
Selenium, dissolved	mg/l	Not Detected
Silver, dissolved	mg/l	Not Detected

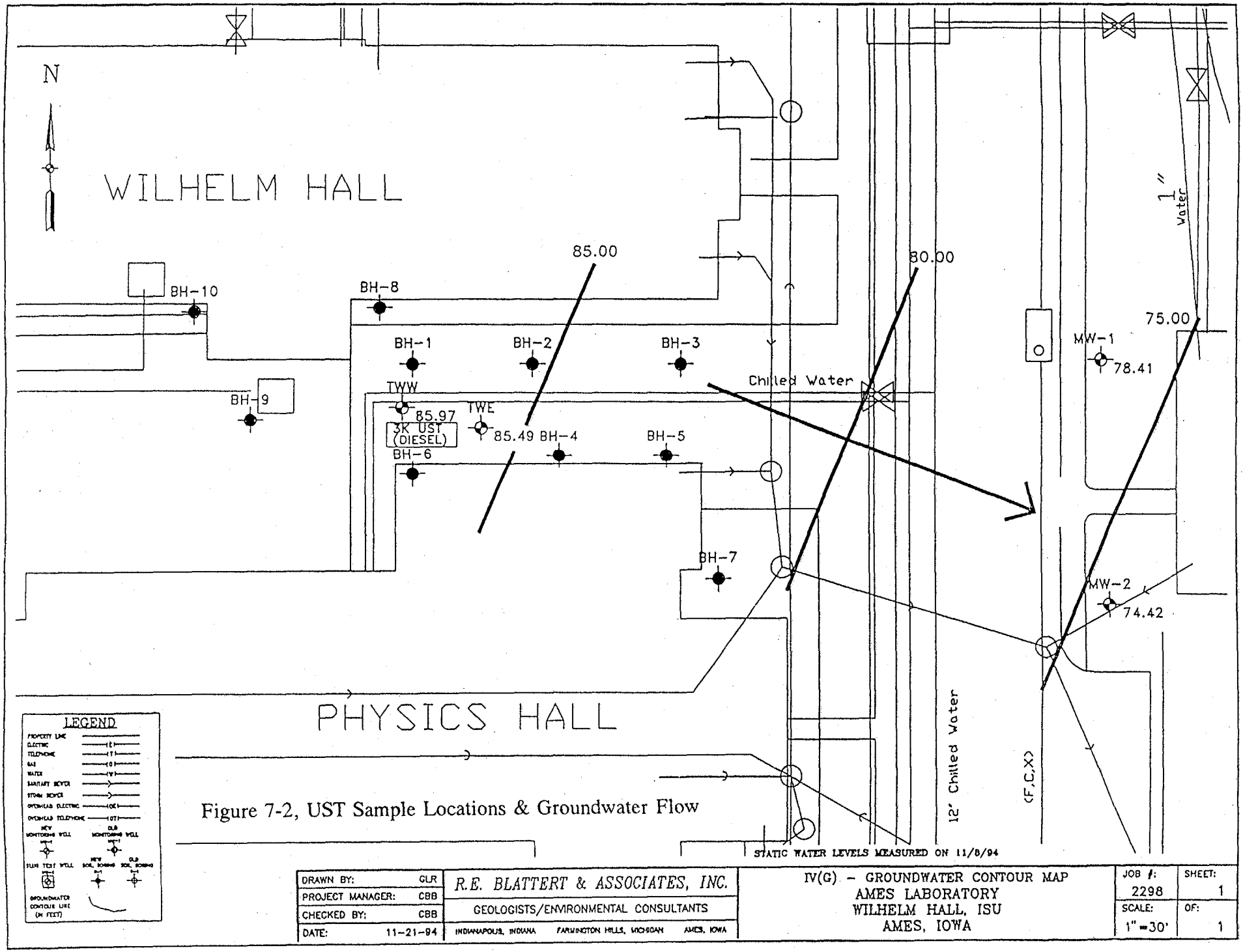


Figure 7-2, UST Sample Locations & Groundwater Flow

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DATE:	11-21-94

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IV(G) - GROUNDWATER CONTOUR MAP
AMES LABORATORY
WILHELM HALL, ISU
AMES, IOWA

JOB #: 2298	SHEET: 1
SCALE: 1" = 30'	OF: 1

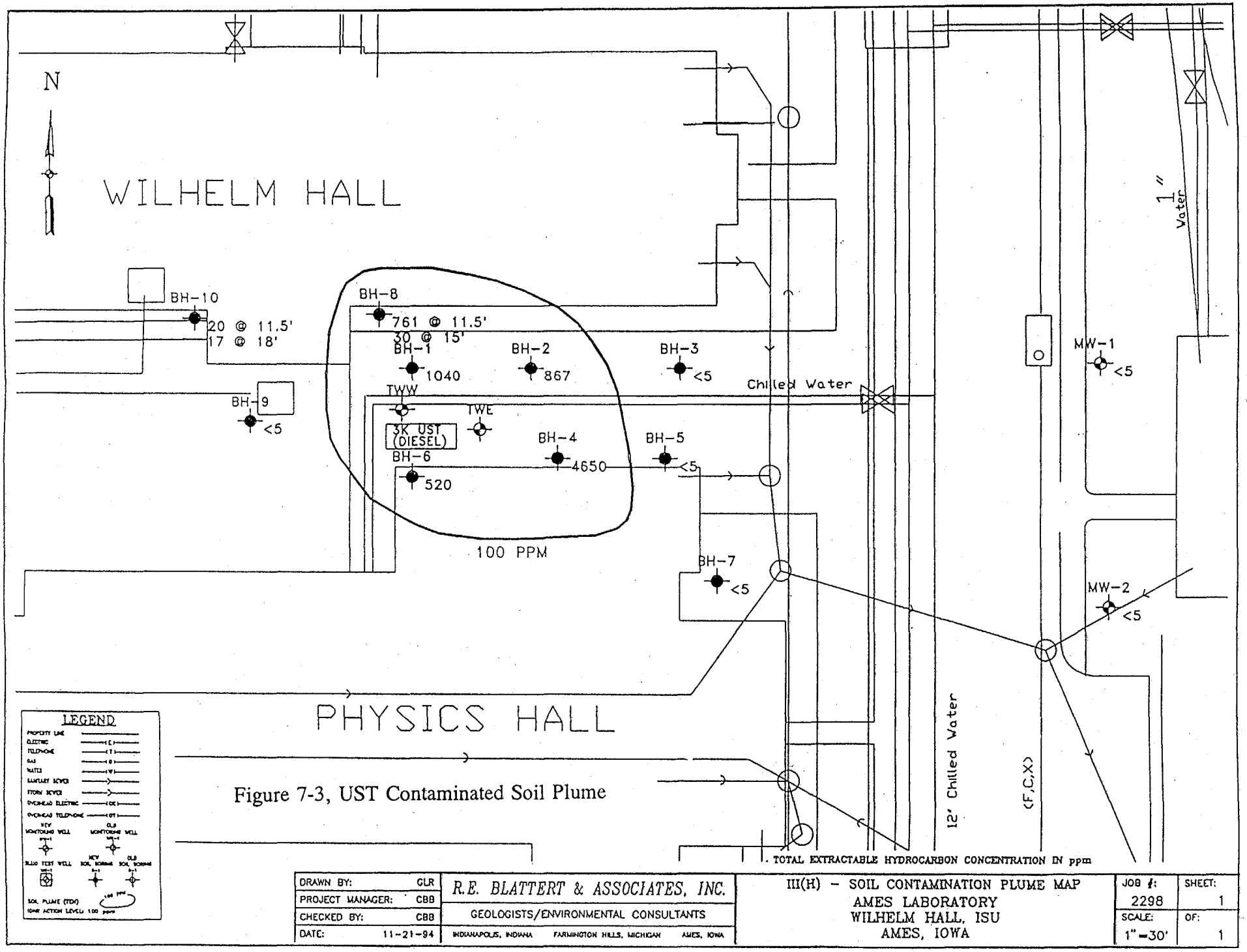

Figure 7-3, UST Contaminated Soil Plume

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III(H) - SOIL CONTAMINATION PLUME MAP
AMES LABORATORY
WILHELM HALL, ISU
AMES, IOWA

JOB #:	2298
SHEET:	1
SCALE:	1"=30'
OF:	1

Laboratory as required by the Iowa Administrative Code, Chapter 135. The program consists of measuring the tank contents level monthly and periodic checking of groundwater from four monitoring wells at the tank site. Water samples are examined for the presence of diesel fuel using a vapor detection method (odor) and visually. No sheens were detected from 1992 on.

In September 1993, R.E. Blattert was awarded the project subcontract for remediation of the UST. In November 1993 through February 1994, soil samples were taken from seven new borings. New monitoring wells were installed in the two most downgradient borings. The old monitoring well nearest the tank was sampled in December as required by DNR. Three soil borings were contaminated at the 7' to 15' interval. No volatiles were detected in the groundwater samples. Based on the results, a new boring site was located inside the Computer Services Building. Laboratory analysis of this soil sample detected contamination. Another boring southeast of the Computer Services Building was collected in April 1994. This sample was not contaminated. Another sample was collected as near as possible to the junction of Wilhelm Hall and the loading dock in May. That sample was contaminated. In June 1994, two more borings were done on the west side of the loading dock. They were not contaminated. See Figure 7-3. At the Laboratory's request, Blattert petitioned Iowa DNR for "Low Risk" status for the UST site. DNR ruled that the site is "Low Risk." DNR's letter stated that no excavation or standard monitoring are necessary.

8.0 QUALITY ASSURANCE

The Ames Laboratory has a quality assurance program. The Laboratory also participates in two DOE quality assurance programs designed to test the quality of the environmental measurements being reported to the DOE. One is the Environmental Measurements Laboratory's Quality Assessment Program (QAP), and the other is EM's Mixed Analyte Performance Evaluation Program (MAPEP). The programs include testing of water, soil, vegetation and air filter samples. Elements of the program which involve measurement of radioactivity are the responsibility of the Environment, Safety and Health Group. Radioactive sources and solutions that are used for calibration of radiation detection instrumentation are obtained with quantitative calibration that is directly traceable to the National Institute of Standards and Technology.

Ames Laboratory quality assurance relies on established U.S. EPA, Iowa DNR, Iowa DPH, and DOE regulations, standards and methods. This applies to both radioactive and non-radioactive environmental sampling and analyses. See the Ames Environmental Monitoring Plan, the Groundwater Protection Management Plan, the Environmental Protection Implementation Plan, the Environmental Monitoring Quality Assurance Plan, and the Site Environmental Report. Ames Laboratory already practices the QA measures described in this report and the referenced plans.

The Ames Laboratory Air Emissions Program Policy (AEPP) ensures that Laboratory activities will not degrade local air quality in violation of the CAA. This is accomplished through control of emissions and rapid remediation of any air quality problems. All applicable DOE Orders, federal, state, and local regulations will be complied with. The primary regulatory authority is the Iowa DNR. This policy relies on the use of standard EPA protocols and methods.

Ames Laboratory's air quality assurance procedure consists of maintaining an exhaust hood inventory, radiological material balance, and chemicals tracking waste management. These measures will determine if we have a source that needs monitoring or permitting, in accordance with Iowa DNR guidance. The Laboratory uses the CAP88 modeling program to produce an annual NESHAP report.

There are no air sampling procedures in place because Iowa DNR is not requiring any sampling, monitoring or source permitting by the Laboratory. Ames Laboratory has had numerous discussions with Iowa DNR concerning air emissions. The Iowa DNR responded on July 18, 1994, that both the chemical fume hoods and associated exhaust points are exempt from both air construction permits and Title V permitting provisions.

The Safe Drinking Water Act (SDWA) establishes drinking water quality standards, well head protection requirements, monitoring requirements, treatment standards, and the regulation of underground injection activities. Drinking water for Ames Laboratory is supplied by ISU which obtains its water from the city of Ames public water system.

The Laboratory has a Policy for Monitoring Lead in Potable Water. Potable water at Ames facilities is monitored in accordance with the SDWA to ensure that the lead content in drinking water does not exceed action levels. Samples are drawn and tested on a periodic basis. The frequency of the testing is annually, but may be adjusted based on a history of the results. Analyses are done at an independent contracted laboratory. EPA protocols and methodologies are used in samples collection and analyses.

The procedure for Monitoring Lead in Potable Water consists of sampling and analysis of drinking water in accordance with SDWA. Corrective measures are taken as necessary. Water samples are collected in Metals Development Building, Wilhelm Hall, and Spedding Hall. Samples are collected from a drinking fountain in each building. The same drinking fountain is used each time. If the test site is removed or unavailable, another drinking fountain is selected as the test site. Samples are collected on an annual basis. If the action levels have not been exceeded for three consecutive years (3 sample periods), the sample frequency may be reduced to every three years. The latest sample results are in Table 3-1.

Analyses are done by an independent testing laboratory. Ames currently uses Minnesota Valley Testing Labs in Nevada, IA. The contracted laboratory analyzes every sample using test procedures approved by the regulatory agencies.

Ames Laboratory does not have any regulated point source discharges. Neither the Laboratory nor ISU have any National Pollutant Discharge Elimination System (NPDES) permits. The City of Ames has an NPDES permit. The City of Ames has an agreement for wastewater pre-treatment with ISU, which includes Ames Laboratory wastewater. Both the City of Ames and the University sample ISU wastewater effluent using EPA standards and methods. The sampling schedule and permit for ASC wastewater was renewed April 1, 1995, for five years. The Laboratory notifies the city directly, and ISU, of all discharges from the wash water storage tanks at the waste disposal building. ISU has a storm water permit for construction activities. Since the existing DOE buildings are on land leased from ISU, Ames Laboratory activities are covered by the ISU storm water permit.

The Ames Laboratory groundwater protection policy ensures groundwater quality through pollution prevention and rapid remediation. All applicable DOE Orders, federal, state, and local regulations are complied with. This policy number depends on the use of standard EPA protocols and methods that are analyte specific. Sampling methodologies, containerization, and analyses will comply with EPA standards. Sample shipments and handling will comply with U.S. Department of Transportation standards.

The Laboratory has a Groundwater Monitoring Procedure. The strategy for groundwater protection is to actively clean up and/or monitor all contaminated sites, and to perform routine monitoring of wells at the main campus and ASC locations. The UST site is being remediated in accordance with the Iowa Administrative Code, Chapter 135. This emergency generator diesel fuel tank will be removed and replaced by an above ground tank by 1998. During the investigation of inactive waste sites, several borings to groundwater were made. Groundwater samples were collected and analyzed. On the main campus, a combination of shallow and deep wells between the Laboratory and Squaw Creek will continue to be sampled as resources permit. Inactive waste sites will be sampled as necessary.

The Office of Assurance and Assessment has developed an Ames Laboratory Calibration Policy. The instrument calibration policy is to ensure the accuracy of measurements made at the Laboratory. Equipment enrolled in the calibration program is marked by stickers. Some equipment is calibrated by the manufacturers, and some is calibrated in-house. The Office of Assurance and Assessment oversees the calibration program.

The Laboratory has a Readiness Review Procedure for new or significantly modified research activities. This procedure is for risk identification, categorization, and ES&HG readiness review of activities. It has been developed to ensure that an appropriate level of rigor, commensurate to the risk associated with an activity's hazards, is applied to the activity's ES&HG review of the project. One purpose of the Readiness Review Procedure is to prevent and/or control releases of hazardous materials to the environment.

9.0 REFERENCES

1. Ames Laboratory Site Environmental Report, 1993.

2. DOE Order #5400.1, "General Environmental Protection Program."

3. DOE Order #5400.5, "Radiation Protection of the Public and the Environment."

4. DOE Order #5480.14, "Comprehensive Environmental Response, Compensation, and Liability Act Program."

5. DOE Order #5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."

6. DOE Order #5900.2A, "Use of the Metric System of Measurement."

7. Investigative Report, Ames Laboratory Inactive Waste Sites, Rust Environment and Infrastructure, October 1993.

8. Investigative Summary Report, Ames Laboratory Inactive Waste Sites, Rust Environment and Infrastructure, February 1995.

9. Iowa Administrative Code, Chapter 22, "Controlling Pollution."

10. Iowa Administrative Code, Chapter 23, "Emission Standards for Contaminants."

11. Iowa Administrative Code, Chapter 61, "Water Quality Standards."

12. Iowa Administrative Code, Chapter 62, "Effluent Standards."

13. Iowa Administrative Code, Chapter 131, "Notification of Hazardous Conditions."

14. Iowa Administrative Code, Chapter 133, "Rules for Cleanup Actions and Responsible Parties."

15. Iowa Administrative Code, Chapter 135, "Underground Storage Tanks."

16. Phase II Remedial Investigation Work Plan, Ames Laboratory Chemical Disposal Site, Rust Environment and Infrastructure, March 1995.

17. Remedial Investigative Report, Ames Laboratory Chemical Disposal Site, Rust Environment and Infrastructure, February 1994.

18. 40 CFR, "Clean Air Act and Amendments."

19. 40 CFR, "Clean Water Act."

9.0 REFERENCES (continued)

20. 40 CFR, "Comprehensive Environmental Response, Compensation and Liability Act."

21. 40 CFR, "Resource Conservation and Recovery Act."

10.0 DISTRIBUTION

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