Annual
Site Environmental Report
Calendar Year 1996

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Ames Laboratory
Iowa State University
Ames, Iowa 50011-3400

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1.0 EXECUTIVE SUMMARY

This report summarizes the environmental status of Ames Laboratory for calendar year 1996. It includes descriptions of the Laboratory site, its mission, the status of its compliance with applicable environmental regulations, its planning and activities to maintain compliance, and a comprehensive review of its environmental protection, surveillance and monitoring programs.

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 approximately one percent of the radioisotope use on the ISU campus. In 1996, the Office of Assurance and Assessment merged with the Environment, Safety and Health Group forming the Environment, Safety, Health and Assurance (ESH&A) office.

In 1996, the Laboratory accumulated and disposed of wastes under U.S. Environmental Protection Agency (EPA) issued generator numbers. Ames Laboratory submitted a Proposed Site Treatment Plan to EPA in December 1995. This plan complied with the Federal Facilities Compliance Act (FFCA). It was approved by EPA in January 1996. The consent agreement/consent order was issued in February 1996.

Pollution awareness, waste minimization and recycling programs, implemented in 1990 and updated in 1994, continued through 1996. Included in these efforts were a waste white paper and green computer paper recycling program. Ames Laboratory also continued to recycle salvageable metal and used oil, and it recovered freon for recycling. All of the chemical and nearly all of the radiological "legacy" wastes were properly disposed by the end of 1996. Additional radiological legacy waste will be properly disposed during 1997.

In 1996, Ames was still responsible for a small former chemical disposal site (CDS), located on ISU property near the Applied Sciences Complex (ASC). The site was used from 1957 through 1966 for burying waste chemicals and metal slags. The materials were buried according to standard practice at the time. In 1993-94, the first phase of the site remedial investigation (RI) was completed. The buried materials were removed and shipped to the Envirocare disposal facility in Utah in the fall and winter of 1994-95. A Phase II RI was in progress at the site throughout 1996. Fifteen groundwater monitoring wells were in place in 1996. Groundwater samples were collected and analyzed in August and October of 1995, and in January and April of 1996. Uranium and volatiles contamination was detected in the wells closest to the excavated area, within the security fence. A Phase II RI draft report, and a draft Focussed Feasibility Study/Proposed Plan, were written in 1996. The final reports will issue in 1997.

In a letter dated January 11, 1996, the Iowa Department of Public Health (IDPH) approved five of nine areas of concern for unrestricted use, and approved three more for their current uses. The former City of Ames Water Pollution Control Plant (sewage plant) was the ninth site. It was approved for unrestricted use by IDPH on February 17, 1995. The nine sites were areas of concern that Ames Laboratory investigated in 1993 through 1995. Some of these areas were locations of research or waste storage during the 1940's and 1950's. The others were areas

where municipal sewage sludge from the old sewage plant containing small amounts of thorium progeny (radium-228, actinium, etc.) may have been used as fertilizer.

The Work Smart Standards (WSS) process for Ames was initiated in May 1996. It was completed in December 1996. One category of activities reviewed was Environmental Protection and Transportation.

In calendar year 1996, Ames Laboratory was not required to report to DOE through the Performance Indicator Database System (PIDS) on any environmental performance indicators or measures. Plans for routine air and groundwater monitoring of Ames Laboratory facilities and areas were revised to comply with existing DOE Orders and the pending 10 CFR 834. Implementation of these plans is resource limited. It is anticipated that funding to comply with 10 CFR 834 will be available when needed.

The following page contains the 1996 Ames Laboratory Site Environmental Report Feedback Form. The comment form is provided to solicit public input on the development and improvement of future SER's. Public input is encouraged.

(remove and copy as needed; attach additional pages as needed)

1. What prompted your interest in environmental activities at Ames Laboratory?

2. In what ways can this report document and/or format be improved?

3. Do you have any questions on specific items or issues in this report?

4. Do you have any other comments?

2.0 INTRODUCTION

2.1 Site Description

Ames Laboratory is a U. S. DOE facility located on the campus of Iowa State University (ISU) at Ames, Iowa. See Figures 2-1 through 2-4. Ames is a government owned, contractor operated (GOCO) facility. ISU is the contractor. The Technical and Administrative Support Facility (TASF) houses most of the Laboratory management offices. The TASF is located at latitude 42° 01' 30" north by longitude 93° 39' 00" west. The buildings owned by the Department of Energy (DOE) are listed below. See Figure 2-3.

<u>Building</u>	<u>Gross Square Feet</u>
Spedding Hall	107,630
Metals Development Building	69,663
Wilhelm Hall	56,541
TASF	46,991
Campus Warehouse Building	16,506
Mechanical Maintenance Building	8,540
Maintenance Shops Building	7,503
Paint and Air Conditioning Shops Building	4,998
Construction Storage Shed	4,441
Storage Shed	2,100
Records Storage Building	1,689
Storage Shed	500
-----	-----
Total DOE Owned	327,102

In addition to the buildings owned by the DOE, Ames Laboratory rented a net total of 13,654 square feet of space from ISU in 1996. In 1987 the DOE transferred ownership of the buildings it owned at the Applied Sciences Complex (ASC) site to ISU. The ASC is located one mile northwest of the ISU main campus. See Figures 2-2 and 2-4. At the ASC, Ames Laboratory retains beneficial use of the Waste Handling Facility and the High Pressure Test Cell through February 28, 2060. The Waste Handling Facility houses the Alpha Facility, a laboratory which was designed to use small amounts of radionuclides. No work was done in the Alpha Facility in 1996.

The ISU main campus is surrounded by the City of Ames, Iowa. See Figure 2-2. The 1996 approximate population of Ames was 48,800. An estimated 56,000 people lived within an eight kilometer (five mile) radius of the campus. The student population of ISU was approximately 24,890 during the spring and fall semesters, but less in the summer. The amount of overlap between the permanent resident and student populations varies.

The climate is temperate continental, and subject to wide temperature and precipitation ranges throughout the year. Mean monthly temperatures vary from a low of negative 7.5 degrees

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

Figure 2-2, ISU Campus in the City of Ames

Figure 2-3, Ames Laboratory Facilities on ISU Campus

Figure 2-4, ISU Applied Sciences Complex Buildings

Celsius (18.5° F) in January to a high of 23.8 degrees Celsius (74.8° F) in July. Average rainfall equivalent precipitation varies from 1.8 centimeters (0.7 inches) in January to 13.7 centimeters (5.4 inches) in June.

The region is gently rolling with a slight overall gradient to the southeast. Under the shallow topsoil, the soils are glacial till with a depth of approximately 19.8 meters (65 feet). This material is underlaid by predominantly limestone bedrock. In the central campus area, the depth to first groundwater is approximately 3.0 meters (10 feet). At the ASC site depth to groundwater averages approximately 5.5 meters (18 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 approximately 644 million liters (170 million gallons).

2.2 Organization and Administration

Ames Laboratory is operated by Iowa State University under Contract Number 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. In 1996, the Laboratory employed 600 persons totaling 458 full time equivalents. See the organizational chart for the end of 1996, Figure 2-5.

2.3 Mission

The Ames Laboratory conducts fundamental research which underlies energy resources, environmental technology development and other technical areas essential to national needs. These efforts are maintained to contribute to the achievement of the vision of DOE, to increase the general levels of knowledge and technical capabilities, to prepare engineering and physical sciences students for the future, to develop new technologies and to transfer technology to industry that will contribute to the industrial competitiveness and economic strength of the United States. All operations are conducted in ways that maintain the health and safety of all workers and visitors, and that protect the environment from pollution. In 1996, the Laboratory's research projects fell within the following 10 program areas.

Physical and Biological Chemistry	Materials Chemistry
Nondestructive Evaluation	Safeguards and Securities
Condensed Matter Physics	Molecular Processes
Environmental Technology Development (including Fossil Energy Section)	
Metallurgy and Ceramics (including Materials Preparation Center)	
Applied Mathematical Sciences and Computational Sciences	
Informatics and Mathematics/Computer Education	

In 1996, the Laboratory approached all its operations with the safety and health of all workers as a constant objective and with genuine concern for the natural environment. The Laboratory

July 1996

Figure 2-5, Ames Laboratory 1996 Organizational Chart

relied 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. Our technology transfer and industrial outreach program is aided by joint efforts with ISU's technology development and commercialization enterprise and sustains concerted efforts to implement "Cooperative Research and Development Agreements", industrially sponsored "Work for Others" projects, and scientific collaborations with industrial partners from both large and small businesses. Ames Laboratory continues to maintain a very significant and highly beneficial pre-college math and science education program currently serving both teachers and students at the middle school and high school levels.

2.4 Purpose of Site Environmental Report

The primary purpose of this report is to summarize the performance of Ames Laboratory's environmental programs, present highlights of significant environmental activities, and confirm compliance with environmental regulations and requirements. The summarized data and conclusions from Ames Laboratory environmental monitoring during calendar year 1996 are presented in this annual Site Environmental Report. This report is a working requirement of Department of Energy Order 231.1, "Environment, Safety, and Health Reporting".

3.0 COMPLIANCE SUMMARY

3.1 CALENDAR YEAR 1996 COMPLIANCE STATUS

Ames Laboratory was in compliance with all applicable environmental regulations that were in force during 1996. In 1996, the Laboratory addressed the few remaining non-compliances with DOE orders which were identified by a DOE-HQ Environmental Audit conducted 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 3.16.

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

Closed chemical disposal site (CDS) Phase II Remedial Investigation work plans were approved in March 1995, and the Phase II RI was in progress through 1996. As part of the Phase II RI, an ecology study was conducted in August 1995. Groundwater samples were collected for the Phase II RI in August and October 1995, and in January and April 1996. Uranium and volatiles contamination has been detected in the wells closest to the excavated area. See section 5.4.1. A Phase II RI report was written in 1996. A Focussed Feasibility Study and Proposed Plan were also produced in 1996. The final versions of these documents, plus DOE's Record of Decision, will issue in final form in 1997. The CDS hydrological tracer study continued throughout 1996.

The proper public comment periods have been observed for specified documents associated with the CDS site restoration. The community advisory group (CAG), formed in May 1994, was the primary vehicle for public input to Ames site restoration activities in 1996. The CAG met with the Ames Laboratory Director and other interested parties on an as needed basis. The CAG met with Ames Laboratory and ISU representatives in the Laboratory Director's conference room on March 25, 1996, to discuss the EM-30/40 priority list. The site cleanups being the second priority on the list was acceptable to the CAG and ISU. DOE conducted a public meeting in the Ames Municipal Library on August 20, 1996. The primary topic was the CDS Phase II Remedial Investigation, Focussed Feasibility Study and Proposed Plan.

A small area located at 13th Street and Stange Road in Ames was sampled in August, 1995 under IDPH supervision. This area was known as the old Iowa State College dump. Uranium and thorium activities were at background levels. Discussions between DOE, ISU and IDPH concerning this site continued through February 1996, but no decisions concerning any further actions were reached. See section 5.4.3.

3.3 Resource Conservation and Recovery Act (RCRA)

Ames Laboratory is a GOCO facility. Therefore, all wastes generated are DOE wastes. In 1996, DOE had four RCRA waste generator identification numbers from the Environmental Protection Agency (EPA) Region VII. See the summary table in section 3.17. Activities associated with the main campus facility number were those of a large quantity generator. In calendar year 1996, 3919 kg of hazardous waste were properly disposed. All reporting requirements were met. Another EPA generator number was for a conditionally exempt small quantity generator for the Waste Handling Facility at the ASC. This waste handling building stages radiological, hazardous and mixed wastes. The last active generator number was for CDS source removal wastes only, a conditionally exempt small quantity generator. This activity was completed in 1995, but the site has not been released by the regulators. The fourth number was a conditionally exempt small quantity generator for the Technology Integration Program (TIP). This program became inactive after 1995, and the generator number expired February 15, 1996. See section 3.17.

The Laboratory was in compliance with all applicable requirements of 40 CFR 262 for all of 1996. A surprise inspection from EPA Region VII on April 12-14, 1994, resulted in findings concerning waste storage. The local EPA inspector forwarded the findings to EPA Region VII. Through all of 1995 and 1996, EPA did not decide if a formal notice of violation (NOV) will be issued. EPA indicated verbally in 1995 that a response would be sent to the Laboratory after completion of activities associated with the Federal Facilities Compliance Act (FFCA). No further actions were taken on the findings through 1995 and 1996.

The Laboratory uses the Idaho National Engineering Lab (INEL) Waste Tracking System. The EPA Biennial Report for calendar year 1995 was completed and submitted on time in January 1996. The report is required of all large quantity generators and is a record of wastes removed from the facility.

Ames Laboratory maintained its 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 are RCRA regulated wastes. See section 3.4. The Laboratory disposed wastes at an out of state EPA permitted facility under two generator numbers. It remained the Laboratory's practice to have these RCRA regulated wastes incinerated rather than put into a permitted landfill. Incineration ensured the complete destruction of the hazardous constituents and eliminated any potential for members of the public being exposed in the future. Hazardous wastes were shipped out quarterly, and radioactive wastes were shipped out annually, except radioactively contaminated lead. It is shipped biennially. In 1996, 3919 kg of hazardous and 3191 kg of radioactive wastes were properly disposed.

The Laboratory had no underground storage tanks (UST's) in 1996. The last UST (emergency generator diesel fuel) was removed in August 1995. It was replaced by an above-ground, double walled diesel tank with interstitial leak detection. The tank did not experience any problems in 1996.

3.4 Federal Facilities Compliance Act (FFCA)

The FFCA is part of 42 USC 6901 and amends a part of RCRA. FFCA requires the preparation of site treatment plans for the handling of mixed wastes. Ames' Conceptual Site Treatment Plan (STP) 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 and submitted to EPA December 20, 1995. The STP was approved by EPA in January 1996. The FFCA prescribes that EPA issue an order requiring compliance with the approved Site Treatment Plan.

DOE-CH received the complaint, compliance order and notice of opportunity for hearing from EPA on March 4, 1996, and the consent agreement and consent order (CA/CO) on March 13, 1996. The CA/CO stated that within one year of the CA/CO issue date of 02-27-96, Ames Laboratory must provide EPA a report on the completed treatability study. Once the treatability study report is approved, EPA is to provide Ames Laboratory with a notice of termination, indicating all actions have been fully performed in accordance with the CA.

All mixed wastes not in compliance with land disposal restriction (LDR) requirements were removed from the facility by September 1995. The transuranic (TRU) waste stream was eliminated from the STP because it had not been generated yet. Contaminated lead was eliminated as a mixed waste stream because it did not meet the criteria. All mixed waste streams generated at the Laboratory were included in the Mixed Waste Inventory Report and were managed in accordance with the Site Treatment Plan. Ames properly incinerated 1.5 kg of mixed waste in 1996 at Diversified Scientific Services, Inc. (DSSI).

3.5 National Environmental Policy Act (NEPA)

NEPA requires actions proposed by federal agencies to be evaluated for their potential environmental impacts, and for alternatives to the proposed actions. These evaluations are documented in either Environmental Assessments (EA's) or Environmental Impact Statements (EIS's). Categorical Exclusions (CX's) are classes of actions that the evaluating federal agency has determined do (will) not individually or cumulatively have a significant impact on the environment. CX's require less extensive documentation than EA's or EIS's. On March 6 and December 11, 1996, the Laboratory received a total of four categorical exclusion (CX) determinations. All four were for repairs to existing facilities, room renovations and modifications having no significant environmental impact.

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

U.S. EPA Region VII delegated CAA authority to the State of Iowa Department of Natural Resources (IDNR). IDNR does not require either construction or operating permits for laboratory fume hoods. In December 1996, IDNR issued construction permits for two existing sources of air emissions at Ames Laboratory. One is a paint booth and the other is a sand blaster. A construction permit application was submitted by ISU Environmental Health and Safety on September 11, 1996 for an Ames Laboratory source, a graphics paint hood. ISU wrote to IDNR on December 10 to change the point of contact for that application from ISU to Ames Laboratory. No response was received from IDNR concerning this application in 1996.

The Laboratory used only small quantities of chemicals and radionuclides, lab bench quantities, for its research and development activities in 1996. Any air emissions generated by Ames Laboratory research activities were sporadic and in very small quantities. Ames Laboratory does not have a power plant, but obtains its electricity from the City of Ames. The Laboratory was in compliance with all CAA requirements including the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations for radionuclide emissions from DOE facilities. In 1996, the work involving radionuclides did not produce small enough particles in sufficient quantities to become airborne contaminants or radioactive 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 high efficiency particulate air (HEPA) filtered. Using the CAP88 model, calculated emissions for 1996 were a small fraction of the 0.1 mSv (10 mrem) per year limit, typically 10^{-10} to 10^{-13} mSv (10^{-8} to 10^{-11} mrem) per year.

There were eight potential sources of radionuclide emissions to the environment at Ames Laboratory in 1996. However, these emission sources were small scale activities and the radionuclide use in these sources was conducted so that no environmental hazard was introduced. The hoods and glove boxes used for these activities were HEPA filtered. The CAP88 air model was used to produce the 1996 NESHAP report for these potential sources.

3.7 Clean Water Act (CWA)

Ames Laboratory does not have any regulated point source effluents. Neither Ames Laboratory nor ISU have any National Pollutant Discharge Elimination System (NPDES) permits. The Laboratory discharged approximately 87,501,300 liters (23,117,900 gallons) of wastewater to the ISU sanitary sewer system in 1996. This was 9.1% of the total discharged from ISU's central campus. The University central campus discharged 960,383,200 liters (253,734,000 gallons) of wastewater to the City of Ames sewer system. Central campus does not include the dormitory complex or the ASC. Ames Laboratory discharges were approximately one percent of the total wastewater processed 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 1996 as part of this agreement. No stormwater permits were necessary for 1996 Laboratory operations. DOE construction activities on ISU land were covered by a stormwater permit held by ISU.

3.8 Safe Drinking Water Act (SDWA)

Drinking water for the Laboratory is supplied by the City of Ames public water system through the University's water mains. The Ames public water system is tested by the city to verify the SDWA standards are being met. The Laboratory used 97,223,800 liters (25,686,600 gallons) of potable water in 1996, or 7.9% of the 1,230,855,600 liters (325,193,000 gallons) used by the ISU central campus.

No Ames Laboratory drinking fountains were sampled for lead and copper in 1996, but three fountains are scheduled to be sampled in January 1997. Beginning in September 1994, Ames Laboratory Facilities Services monitored fountains in Wilhelm Hall, Metals Development and Spedding Hall in accordance with the Laboratory's Policy for Monitoring Lead in Potable Water. Samples were drawn and tested annually, but the frequency was subject to be adjusted based on a history of the results. Analyses were done by an independent laboratory. All samples were within regulatory limits for lead and copper. The results are summarized in Table 3-1. During the Work Smart Standards process in 1996, SDWA compliance was identified as a responsibility of the City of Ames. The Laboratory is no longer required to sample fountains.

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

In 1996, the Laboratory was subject to the emergency reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) in Title III the Emergency Planning and Community Right to Know Act (EPCRA), Sections 302-304, 311 and 312. Data reported to EPA are available to the public through the National Library of Medicine's "TOXNET" database

BUILDING, LOCATION	1994 LEAD / COPPER mg/l	1995 LEAD / COPPER mg/l
Warehouse, shipping & receiving Office	<0.002 / 0.03	
Mechanical Maintenance Shop, main area	<0.002 / 0.03	
Metals Development, 2nd floor hallway	<0.002 / 0.13	
Computer Building (now Records Storage), hallway	<0.002 / 0.01	
Spedding Hall, 1st floor west hallway	<0.002 / <0.01	<0.002 / 0.03
Spedding Hall, ground floor east hallway		
Wilhelm Hall, 3rd floor west hallway	<0.002 / 0.02	
Wilhelm Hall, 3rd floor east hallway	<0.002 / <0.01	0.003 / 0.02
Metals Development, room 158	<0.002 / 0.03 <0.002 / 0.03	<0.002 / 0.06

The regulatory limits are 0.015 mg/l lead and 1.3 mg/l copper.

Table 3-1, Ames Laboratory Drinking Fountain Analyses

and under the DOE Office of Environmental Compliance, EH-41, internet home page. The Laboratory was in compliance with Executive Order 12856, Federal Compliance with Right to Know Laws and Pollution Prevention Requirements, during 1996. The name of a facility representative and a listing of all hazardous chemicals on site have been reported to the State Emergency Response Commission, the Story County Emergency Planning Committee and the City of Ames Fire Department. The Laboratory did not store any chemicals in excess of threshold planning quantities (TPQ) in 1996. If a chemical is found to exceed the TPQ, the Laboratory will submit a Tier II report to the agencies named above.

Spills to the environment are reported to the Iowa Department of Natural Resources in accordance with the Iowa Administrative Code, Rule 567, Chapter 131. Spills are cleaned up in accordance with the Iowa Administrative Code, Rule 567, Chapter 133. There is no minimum reportable quantity under Chapter 131. There was one reportable release at Ames Laboratory during 1996. An accidental release of hydrogen sulfide gas occurred on March 13, 1996, at approximately 9:15 a.m. An IDNR representative was on hand coordinating with the Des Moines Hazmat Team. Less than two pounds of gas was actually released. See section 6.4 for details.

3.10 Toxic Substances Control Act (TSCA)

Approximately 4772 kg of asbestos and asbestos containing material were properly removed and disposed in 1996. Ames Laboratory asbestos was disposed in the Ames-Story Environmental Landfill, DNR permit number 85-SDP-13-91P. The Laboratory complied with the State of Iowa Solid Waste Disposal Rule #102.14 and 40 CFR 61, Subpart M (asbestos NESHAP).

All Ames equipment has been declassified for polychlorinated biphenols (PCB's). All Laboratory PCB's were incinerated at the Aptus facilities near Coffeyville, KS and Aragonite, UT. In 1996, 396 kg of PCB's were incinerated for Ames.

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

Not Applicable. Ames Laboratory does not purchase or use pesticides regulated by FIFRA. During the Work Smart Standards process in 1996, FIFRA compliance was identified as not applicable to Ames.

3.12 Endangered Species Act (ESA)

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

3.13 National Historic Preservation Act (NHPA)

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

3.14 Executive Order 11988, "Floodplain Management"

Not Applicable. All Laboratory facilities are well outside the 100 year flood line as mapped by the U.S. Geological Survey (USGS) and the Iowa Geological Survey Bureau (GSB).

3.15 Executive Order 11990, "Protection of Wetlands"

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

3.16 Other Major Environmental Issues and Actions

Low level radioactive wastes were properly disposed in calendar year 1996. During maintenance activities, very small quantities of low level wastes were generated. This is Class A material under 10 CFR 61.55 and 61.56. The total annual accumulation was less than 0.010 Curies per cubic meter.

Ames' combined EM-30 and EM-40 projects risk assessment priority list was submitted to stakeholders for review on March 1, 1996. The proposed priorities were 1) EM-30 continuity of operations (hazardous waste management), 2) through 4) all EM-40 activities, and 5) through 11) the remaining EM-30 activities. The CAG met with Ames Laboratory and ISU representatives in the Laboratory Director's conference room on March 25 to discuss the priority list. U.S. EPA Region VII, ISU and the CAG approved of the priorities in the list. No other stakeholders commented.

The Laboratory's walk-through topical appraisals and self assessments begun in 1993 continued through 1996. The walk-throughs noted a few significant electrical safety findings that were corrected within 24 hours or one work day. Other moderate and minor general lab safety discrepancies, such as use of extension cords and partial obstructions to corridors, were corrected as soon as is practical.

The Work Smart Standards (WSS) process for Ames was initiated in May 1996. It was completed in December 1996. One category of activities reviewed was Environmental Protection and Transportation. The selected standards were categorized as Legally Binding Requirements and External or Internal Standards.

3.17 Summary of Permits

In 1996, Ames Laboratory had two air emission source construction permits, but no environmental discharge, operational, storage, treatment or disposal permits for gaseous, liquid or solid effluents. See Sections 3.3, 3.6, 3.7, 3.8, 3.10, and 3.16. DOE held four waste generator identification numbers associated with Ames Laboratory in 1996. One was a conditionally exempt small quantity generator for the Technology Integration Program. This program became inactive after 1995, and the generator number expired February 15, 1996. Though the buried waste was removed from the CDS in 1994-1995, the generator number cannot be closed until the regulatory agencies are satisfied with the entire site cleanup. DOE can request that the generator status be changed from a small quantity to a conditionally exempt small quantity generator. This change would remove the 180 day time requirement for waste shipment.

DOE Air Emissions Source Construction Permit Numbers

Permit Number	Type	Ames Laboratory Facility/Area	Expiration
96-A-1282	Air	Ames Lab Paint Booth	None
96-A-1283	Air	Ames Lab Sand Blaster	None

DOE RCRA Generator Identification Numbers

RCRA Generator ID#	Type	Ames Laboratory Facility/Area	Expiration
IA6890008950	LQG	Ames Lab #3-DOE (main campus)	None
IAD984617605	CESQG	Ames Lab #1-DOE (Waste Handling Facility)	None
IA0000365973	SQG	Ames Lab #2-Chemical Disposal Site-DOE/ISU	None
IAD098715881	CESQG	Technology Integration Program	02/15/96

4.0 ENVIRONMENTAL PROGRAM

4.1 Monitoring and Surveillance

In 1996, Ames Laboratory obtained meteorological data from the National Weather Service in Des Moines, the ISU Geological and Atmospheric Sciences Department and a small weather station on top of Spedding Hall. The Laboratory's main uses of weather data were related to site restoration work, and to preparedness for spills and accidental releases. The Ames 30-year average and 1996 climatic data are in Table 4-1.

1961-1990 Average		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
	Max Temp °F	27.7	33.2	46.0	62.0	73.6	82.1	85.3	82.9	75.8	64.4	46.9	31.6
	Mean Temp °F	18.2	23.6	36.1	50.1	61.5	70.4	74.2	71.5	63.9	52.5	37.5	23.0
	Min Temp °F	8.8	14.0	26.2	38.2	49.5	58.7	63.1	60.0	51.9	40.6	28.0	14.3
	Precip in Inches	.69	.84	2.09	3.38	4.27	5.24	3.73	3.93	3.48	2.63	1.59	1.07
	Wind in MPH	11.5	11.4	12.7	12.7	11.1	10.2	8.9	8.6	9.4	10.3	11.3	11.2
	Wind Direction	NW	NW	NW	NW	SE	S	S	S	S	S	NW	NW
Calendar Year 1996	Max Temp °F	24.3	34.8	45.9	57.3	67.9	80.2	84.0	85.7	74.0	62.9	40.7	31.5
	Mean Temp °F	17.7	26.1	37.5	46.2	58.0	70.4	73.5	76.1	61.5	52.1	30.9	24.7
	Min Temp °F	11.1	17.3	29.0	35.0	48.1	60.5	63.0	66.4	48.9	41.2	21.1	17.8
	Precip in Inches	1.78	0.17	1.46	1.29	7.64	5.20	4.11	4.90	3.18	2.81	4.19	0.86
	Wind in MPH	11.5	11.8	12.2	12.7	10.2	8.6	8.0	6.9	7.9	11.6	10.2	10.7
	Wind Direction	NW	W	N	W	E	S	W	S	S	W	NW	NW

Note: Wind data are from Des Moines Airport.

Table 4-1, Ames Climatic Data

In accordance with 10 CFR 835 and the Ames Laboratory Radiological Protection Plan (RPP), airborne releases from the Laboratory are always minimized. During 1996, the work with uranium, and thorium isotopes did not produce any particles sufficiently small to become airborne. The potential dose equivalent to the public due to estimated radionuclide emissions were calculated for the annual NESHAP report. See section 5.1.

4.2 Pollution Awareness, Waste Minimization and Recycling Programs

A waste minimization plan and program, was originally implemented in 1990, updated in 1994, and continued through 1996. The plan conforms to Executive Order 12873, Section 701. 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.
 - Affirmative procurement program.

The Laboratory was engaged in many waste minimization activities and procedures in 1996. The procedures reduced the quantities of non-hazardous and hazardous wastes generated by the Laboratory's research efforts. Examples include:

- Work Authorization System (WAS) reviews.
- 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, was collected and transported to the City of Ames' Waste Recycling Plant where it was processed. Combustible waste is used as fuel in the city's electrical utility power plant. Some scrap metal was sold for re-use. Used oil was recycled for re-use. Ames recovered R-12

refrigerants, except from vehicles, and R-22 refrigerants with one recovery unit, but could not recycle them. The Laboratory recovered blended refrigerants with a second recovery unit, but could not recycle them. Onsite contractual recovery and recycling with Iowa State University (ISU) was used as needed for all listed ozone depleting substances (ODS's). ISU and Ames Laboratory have separate Facilities Services and ES&H units, but ISU is the management and operating contractor for DOE. Therefore, the ODS's did not change owners. There are one or more performance measures being developed that will address waste minimization and recycling efforts. See section 4.3.

For affirmative procurement in 1996, 77% of Ames' non-GSA paper products purchased were recycled material. Ames did not purchase \$10,000 or more of GSA paper products, tires, lubricating oils, cement, building insulation, carpet or floor tile.

4.3 Performance Measures

In calendar year 1996, Ames Laboratory was not required to report to DOE through the Performance Indicator Database System (PIDS) on any environmental performance indicators or measures. There were no specific environmental performance measures written into the Ames Laboratory contract, that expired December 31, 1996.

The current contract requires PIDS reporting. The Laboratory tracked data in 1996 to report against draft ES&H performance measures, in the new contract, in the following areas.

1. Acknowledge and promptly resolve employees' ES&H concerns.
2. Strive to minimize the number of work related injuries and illnesses.
3. Maintain an effective environmental protection program by minimizing impacts to the public and the environment.

The Laboratory complied with applicable federal, state and local rules and regulations and DOE orders. See section 3.0.

5.0 ENVIRONMENTAL RADIOLOGICAL PROGRAM

5.1 Radiation Emissions and Doses

In 1996, airborne releases from the Ames Laboratory complex were minimized or eliminated by experiment design and/or source limitations. Historically, radioactive materials handled at Ames Laboratory have included radiation instrument calibration sealed sources and standards, lab bench experiment quantities of normal and depleted uranium, uranium-235, thorium and plutonium. There was very little use of other than sealed sources in 1996. Work activities involving radioisotopes did not generate airborne contaminants. The 1996 work consisted of electrotransport purification of thorium. No venting of the process was necessary and no airborne radioactivity was generated by the process.

Research activities using less than 0.5 g quantities of several isotopes of plutonium and gram quantities of uranium-235, may be conducted in the future in a single glovebox facility designed for inductive coupled plasma (ICP) spectroscopy research. This glovebox is located in the Alpha Facility at the Applied Sciences Complex. The Alpha Facility did not operate in 1996.

Using the guidance found in 40 CFR 61.94, the annual radionuclide NESHAPS report was prepared in June 1996 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. IDNR and IDPH do not require permits or monitoring 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. The required parameters were used to calculate potential dose equivalent to the public due to estimated radionuclide emissions from the Laboratory. The effective dose equivalent values were calculated using the EPA-approved computer model CAP88-PC v. 1.0. The dose estimates are reported in Table 5-1.

No liquid effluent releases were made directly to the environment. Ames Laboratory routinely analyzes laundry machine wastewater from the Waste Handling Facility before it is released to the sanitary sewer. ISU and the City of Ames are notified directly of the sample results before any discharge. There were no such discharges in 1996. CDS well development water is handled in the same manner. Normal wastewater flow through the ISU sanitary sewer system, which discharges into the City of Ames sewer system, is periodically analyzed by the University in accordance with ISU's pretreatment agreements with the City of Ames. See sections 6.1 and 7.0.

5.2 Unplanned Releases

There were no unplanned or accidental radiological releases from Ames Laboratory during 1996.

5.3 Environmental Monitoring

Liquid aqueous wastes (laundry machine water), when generated at the Waste Handling Facility (Figure 2-4), are analyzed for radioactivity as required by DOE Order 5480.1 (1) before release to the sanitary sewer. The wastewater is analyzed for radioactive content using gamma ray spectroscopy, gas proportional counting for gross beta and gross alpha activity, and liquid scintillation for tritium. No releases of liquid aqueous wastes were made during 1996. The level of radioactivity released in the past has always been below 10 CFR 20.2003 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, ISU, the DOE Chicago Operations Office and the DOE Idaho Operations Office. No sampling of storm and sanitary sewer water was accomplished in 1996. CDS groundwater was sampled, and a sump in Wilhelm Hall was sampled. The water in the sump was well below the Part 20 action level. Sections 5.4 and 7.0 discuss groundwater.

Table 5-1
Ames Laboratory Air Dose Compliance
Calendar Year 1996

Summary of Input Parameters

<u>Isotope</u>	<u>Ci(Bq)/yr</u>	<u>Adjustment Factors</u> (Appendix D to Part 61)	<u>Adjusted Source</u> <u>Term, Ci(Bq)/yr</u>
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Iowa State University Campus Site

Thorium-232	0.0E0 (0)	1.0E-6 (solid)	0.0E0 (0)
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In 1996, activities involving very small quantities of thorium, < 10 grams, did not result in airborne particulates.

Alpha Facility Site

No radionuclides used at this site during calendar year 1996.

Compliance Assessment

Ames Laboratory-Iowa State University Site.

Effective Dose Equivalent:

For dep. Uranium, 0.00

For U-234, 0.00

For Th-232, 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 are small local areas in or near the City of Ames that were, or could have been, contaminated by Ames Laboratory or ISU Manhattan Project activities. Areas of concern include inactive waste sites, spill sites and other areas that had a potential to be contaminated. The tables and figure for this section are at the end of the section to minimize text fragmentation.

5.4.1 Chemical Disposal Site (CDS)

The CDS is a small former chemical burial site, located on ISU property, which was used from 1957-1966 for disposal of hazardous wastes and wastes from yttrium, thorium and uranium production. A Phase I RI was conducted at the CDS in 1992-1993. A source removal was done during the fall of 1994, with final waste shipments completed in March 1995. The nine Phase I RI wells were abandoned during the source removal.

The Phase II RI field work was done in 1995 and 1996, including an ecological study. The 1996 network of 15 monitoring wells was installed in April 1995. See Figure 5-1. Groundwater samples were collected for the Phase II RI in August and October 1995, and in January and April 1996. The samples were analyzed for twenty three different parameters. Uranium and volatiles contamination was detected in the wells closest to the excavated area. A summary of selected analytical results are in Table 5-2. The table contains the results from all four events for the five contaminants detected at concentrations greater than their drinking water MCL's in any well during any single event. The CDS east ravine hydrological study continued through 1996.

A Phase II RI final draft report was issued July 24, 1996. A draft Focussed Feasibility Study and a draft Proposed Plan were issued concurrently with the RI report. A public meeting was held August 20 to discuss the documents and future plans for the site. The public comment period was extended from 30 days to 60. The documents generated numerous comments. To address these comments, a draft Responsiveness Summary was issued December 5, 1996. Final groundwater cleanup concentrations were not established for the site in 1996. Refer to the site work plans and investigation reports for detailed information concerning the CDS. A list of documents produced through 1996 follows. Copies of all final reports were placed in the Ames Laboratory Public Repository at the Ames Public Library.

- A Phase I Remedial Investigation (RI) site work plan, a Phase I RI health and safety plan (HASP), a field sampling plan (FSP), a sampling and analysis quality assurance plan (QA), a risk assessment plan
- A Phase I RI report
- A Phase I RI groundwater resampling report
- A source removal engineering evaluation and cost analysis (EE/CA)
- A preliminary feasibility study (FS) draft
- A source removal action plan

- An OHM Corporation/Corps of Engineers Source Removal Report
- A Phase II RI work plan, including HASP, QA and FSP, monitoring well network and ecological sampling components
- An ecological study preliminary report
- Four Phase II RI groundwater sampling event reports
- A Phase II RI Report (draft)
- A Focussed Feasibility Study (draft)
- A Proposed Plan (draft)
- A Responsiveness Summary (draft)

5.4.2 Inactive Waste Sites (IWS)

Regulatory release of eight IWS's was obtained January 11, 1996. Nine areas of concern were investigated for potential radiological contamination. Field work was completed in 1993-1994. After some follow-up work, the old Ames Water Pollution Control (sewage treatment) Plant, was released for unrestricted use February 17, 1995. See the Ames Laboratory 1993-1995 Site Environmental Reports for details. The status of the sites released follows.

Site	Release Status
Old Sewage Plant	Unrestricted (1995)
Grand Avenue Underpass	Unrestricted
Ames Municipal Cemetery	Unrestricted
Applied Sciences Complex	Unrestricted
Block House	Unrestricted
Little Ankeny Debris	Unrestricted
Annex I	Approved for current use
Annex II	Approved for current use
Ames Municipal Airport	Approved for current use

In response to a letter from an Ames resident, the Iowa Attorney General sent an investigator to tour the Block House and Little Ankeny Debris sites. Richard Heathcote from the IAG's office toured the sites September 9, 1996. Mr. Heathcote did not issue a report on his Ames trip in 1996.

5.4.3 Old Iowa State College Dump

Another area of concern was discussed in 1996. It is a five acre tract at 13th Street and Stange Road in Ames, known as the old Iowa State College dump. See Figure 2-2. Some Manhattan Project and Ames Laboratory wastes were disposed there in the early 1940's. In 1946, 250 tons of uranium extraction wastes were removed from the site for reprocessing.

In response to a public meeting comment, it was determined the radiological waste portion of the site would be sampled to determine if it posed a threat to human health or the environment.

Sampling was conducted in August 1995. The samples were below action levels for thorium, uranium and their decay products, indicating no threat to human health or the environment. DOE sent the results to IDPH in September 1995, indicating that DOE considers the radiological investigation closed. IDPH did not formally respond to the sampling report, but forwarded it to ISU. The November 2, 1995 cover letter stated that IDPH is waiting for ISU as the "licensee" to review the data and issue to IDPH a written synopsis of ISU's conclusion. IDPH will then issue a written determination of the status of the site. Discussions between DOE, ISU and IDPH concerning this site continued during 1996, but no decisions concerning any further actions were reached.

5.4.4 Fire Service Institute Training Area

Discussions between DOE, ISU and IDPH concerning ISU's Fire Service Institute training area continued in 1996. The site is on campus, under ISU control and responsibility. It is on the northeast corner of the intersection of Haber Road and the Chicago Northwestern Railroad. See Figure 2-2. ISU made a radiological survey of the site in April 1995 and found seven small areas of activity above background. The University fenced those areas to minimize human contact. Soil samples collected in July and October 1995 detected some thorium contamination. The samples ranged from 14.9 to 662.9 Pci/g Th-232. There was also limited non-radiological sampling done by ISU, but these samples were not split with regulators like the radiological samples were. The samples were analyzed for TCLP metals, volatiles and pesticides. The results were within regulatory limits. Due to the possibility of some of the thorium contamination being linked to former Atomic Energy Commission activities at Ames Laboratory, DOE is implicated as one of the potentially responsible parties. ISU issued a summary of their site sampling activities on November 22, 1996.

A few years ago, the University removed underground storage tanks near this area, and it has a 33 well monitoring network in place. The east end of the area continued to be used for coal storage in 1996. As site owner, ISU has lead responsibility in any further site investigation.

5.4.5 Drainage Area North of Applied Sciences Complex

On February 14, 1996, ISU workers discovered five drums under some rubble in a drainage ditch at the north end of the Applied Sciences Complex. Ames Laboratory and ISU EH&S personnel responded. The drums were identified as specially constructed shipping containers used during the Ames reactor decommissioning. All the drums were empty and had not been used. Both ISU and Ames personnel confirmed there was no radiation above background. ISU disposed of the drums as normal solid waste.

Figure 5-1, Closed Chemical Disposal Site

Well number	Uranium ug/l	Benzene ug/l	Trichloroethene ug/l	Gross alpha pCi/l	Gross beta pCi/l	Uranium-238 pCi/l
4A	2.2	0.84				1.0
4B	3.6	0.22				1.7
5A		1.8				
5B	1.7	2.6				
6A	-----	-----	-----	DRY WELL	-----	-----
7A	46	2.5		25		21.9
7B						
8A	4.9					1.6
8B	4.5	0.35				2.0
9A	4.6					1.8
9B		1.5				
10A	5600		34	2000	1600	3140
10B	2900	12	14	1300	900	1500
11A	1500	0.59		500	320	568
11B	4.4	0.35				2.3

Note: No groundwater cleanup concentrations had been established for this site through 1996.

Table 5-2, CDS Phase II RI Groundwater Samples Summary (first quarter, collected August 1995)

Well number	Uranium ug/l	Benzene ug/l	Trichloroethene ug/l	Gross alpha pCi/l	Gross beta pCi/l	Uranium-238 pCi/l
4A	1.4					
4B	4.3					2.0
5A	-----	-----	-----	DRY WELL	-----	-----
5B	2.2					
6A	-----	-----	-----	DRY WELL	-----	-----
7A	41			32		18
7B	3.2					1.7
8A	8.2				4.5	2.9
8B	4.0			3.7		2.9
9A	3.8					1.9
9B	0.2				6.2	1.7
10A	7500		32	2400	1700	2490
10B	2600	4.0	13	1300	920	1080
11A	-----	-----	-----	DRY WELL	-----	-----
11B	160					3.2

Note: No groundwater cleanup concentrations had been established for this site through 1996.

Table 5-2, CDS Phase II RI Groundwater Samples Summary, continued (second quarter, collected October 1995)

Well number	Uranium ug/l	Benzene ug/l	Trichloroethene ug/l	Gross alpha pCi/l	Gross beta pCi/l	Uranium-238 pCi/l
4A	1.1					0.7
4B	2.8			7.9	23	1.4
5A	-----	-----	-----	DRY WELL	-----	-----
5B	1.0				2.7	1.4
6A	-----	-----	-----	DRY WELL	-----	-----
7A	26			22		16.5
7B	1.1					0.8
8A	4.0					2.1
8B	2.6				8.7	1.5
9A	2.9					1.6
9B						
10A	6900	0.20	29	4100	1600	2350
10B	1600	5.5	16	850	420	757
11A	-----	-----	-----	DRY WELL	-----	-----
11B	2.7					1.6

Note: No groundwater cleanup concentrations had been established for this site through 1996.

Table 5-2, CDS Phase II RI Groundwater Samples Summary, continued (third quarter, collected January 1996)

Well number	Uranium ug/l	Benzene ug/l	Trichloroethene ug/l	Gross alpha pCi/l	Gross beta pCi/l	Uranium-238 pCi/l
4A	1.5			1.5		0.66
4B	9.2			6.3	3.2	3.11
5A	-----	-----	-----	DRY WELL	-----	-----
5B	1.8				3.8	0.60
6A	-----	-----	-----	DRY WELL	-----	-----
7A	43			9.9	3.7	14.3
7B	0.59					0.37
8A	2.7					0.95
8B	1.9				12	1.0
9A	3.7			3.6	4.6	1.15
9B	0.31				3.8	
10A	7200	0.20	10	650	850	2390
10B	2000	5.0	11	49	160	745
11A	-----	-----	-----	DRY WELL	-----	-----
11B	9.8			2.1	4.0	1.48

Note: No groundwater cleanup concentrations had been established for this site through 1996.

Table 5-2, CDS Phase II RI Groundwater Samples Summary, continued (fourth quarter, collected April 1996)

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 sanitary 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 sanitary sewer system. The Laboratory's wastewater is included in the University's pretreatment agreement with the City of Ames. The Laboratory contributes an estimated 9.1% of the ISU central campus sanitary waste. ISU central campus wastewater comprises 12-15% of the sanitary wastes received in the summer, and 15-20% of the wastewater received during the academic year, by the Ames Water Pollution Control Plant. Since the DOE buildings are on ISU land, ISU holds any necessary storm water permits. See section 3.7.

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 regulations. In 1996, DNR and the local fire department were notified in advance as required.

It is the policy of Iowa DNR to exempt laboratory fume hoods from permitting and monitoring. Ames Laboratory described its system to DNR. DNR issued an official ruling for the Laboratory on July 18, 1994 stating that no permitting and no monitoring are required for the 144 fume hoods and 34 associated exhausts. DNR issued construction permits for the Laboratory's paint booth and sand blaster December 17, 1996. A construction permit application for a graphics paint hood was submitted in 1996 by ISU. The permitting status of this source has not been determined by DNR in 1996. There were no federal or local permits or compliance agreements for emissions or effluents in force in 1996.

6.3 Continuous Release Reporting

Ames Laboratory had no continuous release sources in 1996.

6.4 Environmental Occurrences

There was one reportable release at Ames Laboratory in 1996. It occurred inside Wilhelm Hall. An accidental release of hydrogen sulfide gas occurred on March 13, 1996, at approximately 9:15 a.m. The incident exposed two postdoctoral research personnel, one graduate student and one ISU Department of Public Safety officer to the toxic gas. The four personnel exposed to the gas were transported to a local hospital where three were treated and released. One of the postdoctoral researchers was kept overnight for observation and released the next morning.

One of the researchers prepared an experiment to pass hydrogen sulfide gas over a heated metal compound to produce a metal sulfide. This experiment used a 22 pounds capacity cylinder of hydrogen sulfide gas that was connected to the apparatus through a pressure regulator. The metal compound was heated in a tube furnace located inside a walk-in fume hood. The gas cylinder was on a cart located just outside the front of the hood, and was connected to the heated reaction tube in the furnace by tygon tubing.

One of the researchers opened the main cylinder valve slightly to start the gas flow. As he turned away to a laboratory bench, he heard a hissing noise and smelled the gas. He closed the main cylinder valve, but the gas flow continued. He lifted the cylinder and cart into the fume hood, but was overcome by the gas before he could get the hood sash closed. The other researcher dragged him from the room into the hallway, closed the room door, and went to a secretary in an adjacent room for assistance. The secretary called the Ames Laboratory emergency number. The secretary and researcher provided respiratory aid to the fallen researcher.

A graduate student and a public safety officer, responding to the emergency call, helped get the impaired researcher on his feet and to a rest room. Then they all exited the building. Ames Laboratory ESH&A personnel activated the building evacuation alarms as the affected parties were exiting. The two closest buildings downwind were temporarily evacuated as a precaution. Other responding personnel arrived at the scene, including the Ames Fire Department and an ambulance. The ambulance took the researchers to the hospital and the public safety officer went later. The Des Moines Fire Department (DMFD) Hazardous Materials Team and an IDNR representative arrived. The DMFD Hazmat Team entered the building, secured the experiment, and determined there was no residual gas. Ames ESH&A detected no gas outdoors beyond the Wilhelm Hall building exhausts. When the building was reoccupied, the accident scene was secured by ESH&A personnel until an investigation was initiated. Less than two pounds of gas had escaped the cylinder. Three of the affected personnel were treated and released. One was kept overnight for observation and released the next morning.

The direct cause of the accident was failure of a defective pressure regulator. Disassembly of the pressure regulator revealed internal corrosion on the needle valve and a cracked regulating needle valve spring. The cracked valve spring allowed the pressurized gas to pass through without proper regulation and open the pressure relief valve on the secondary side of the regulator. The gas escaped through the relief valve. See the "Draft Final Report, Accident Investigation of the March 13, 1996, Hydrogen Sulfide Gas Release" for details.

6.5 SARA Title III Reporting Requirements

There were no chemicals stocked at Ames Laboratory at or above the threshold planning quantity (TPQ) in 1996. The Laboratory was in compliance with Executive Order 12856 (Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements) in 1996. Reporting requirements are summarized at the end of this section. The name of a facility representative and a listing of all hazardous chemicals on site were reported to the State

Emergency Response Commission, the Story County Emergency Planning Committee and the City of Ames Fire Department. There is no volumetric information in the report because the Laboratory does not meet the TPQ for any EPCRA chemicals. If a chemical is found to exceed the TPQ, the Laboratory will submit a Tier II report to the agencies named above.

There was one release at Ames Laboratory reported to Iowa DNR, and other appropriate agencies, during 1996. An accidental release of hydrogen sulfide gas occurred on March 13, 1996, at approximately 9:15 a.m. An IDNR representative was on hand coordinating with the Des Moines Hazmat Team. Less than two pounds of gas was released. See section 6.4 for details.

EPCRA 302-303: Planning Notification	Yes (X) No () Not Required ()
EPCRA 304: EHS Release Notification	Yes () No () Not Required (X)
EPCRA 311-312: MSDS Chemical Inventory	Yes (X) No () Not Required ()
EPCRA 313: TRI Reporting	Yes () No () Not Required (X)

7.0 GROUNDWATER MONITORING AND PROTECTION PROGRAM

A revised combined Groundwater Protection Management Plan and Groundwater Monitoring Plan have been in place at the Laboratory since May 1995. The combined groundwater plan addresses sitewide groundwater protection. The plan is required by DOE Order 5400.1.

Ames Laboratory had a 20 well system for monitoring groundwater during 1996. The inactive chemical disposal site (CDS) was monitored by a system of 15 monitoring wells. Thirteen were downgradient of the source removal area and two were off site, upgradient wells. See Figure 5-1. On the main campus, the groundwater monitoring network consisted of five wells. See Figure 7-1. One well was upgradient, for background data. Four wells were downgradient (east-southeast) of the Laboratory's main campus facilities. Two of the downgradient wells belonged to ISU. The ISU wells were farther downgradient than the DOE owned wells, and they are screened into a deeper aquifer. The combination of shallow and deep wells is an attempt to detect both floating and sinking contaminants.

The CDS area will be monitored as prescribed by the IDNR, IDPH, and U.S. EPA until the regulatory agencies release the site. It will then be monitored on the same schedule in effect for the main campus, when 10 CFR 834 becomes effective. Only the CDS wells were sampled in 1996. CDS groundwater was collected for the Phase II RI in August and October 1995, and in January and April 1996. The samples were analyzed for twenty three different parameters. Uranium and volatiles contamination has been detected in the wells closest to the excavated area, plus trace detections in a well in the east ravine. The results for the five parameters detected at concentrations greater than their drinking water MCL's in any well at any time are in Table 5-2. No final groundwater cleanup concentrations have been established for the site through 1996.

8.0 QUALITY ASSURANCE PROGRAMS

Ames Laboratory used its existing Environmental Monitoring Quality Assurance Program Plan in 1996. The plan complies with DOE Orders 5400.1, CH5700.6B and 5700.6C. 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 relied on established U.S. EPA, IDNR, IDPH, and DOE regulations, standards and methods. This applied 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 previous Site Environmental Reports. Ames Laboratory practiced the QA measures described in this report and the referenced plans and reports in 1996.

The Laboratory also participated in the DOE Environmental Measurements Laboratory's Quality Assessment Program (QAP). The program included testing of water, pulverized soil, pulverized vegetation and air filter samples. Elements of the program involving measurement of radioactivity were the responsibility of the Environment, Safety, Health and Assurance office.

The Ames Laboratory Air Emissions Program Plan (Policy and Procedure) ensured that Laboratory activities did not degrade local air quality in violation of the CAA. This was accomplished through control of emissions and rapid remediation of any air quality problems. All applicable DOE Orders, federal, state, and local regulations were complied with. The primary regulatory authority is the IDNR. The IDPH and EPA Region VII also play significant roles. Ames' air plan relies on the use of standard EPA protocols and methods.

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

The Safe Drinking Water Act 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 was 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 was not monitored in calendar year 1996. Samples are scheduled to be drawn and tested in January 1997. SDWA monitoring was identified as a City of Ames responsibility during the Work Smart Standards process.

Ames Laboratory did not have any regulated point source discharges in 1996. Neither the Laboratory nor ISU had an NPDES wastewater permit. The City of Ames has an NPDES permit. The City of Ames had an agreement for wastewater pre-treatment with ISU, which included Ames Laboratory wastewater. Both the City of Ames and the University sampled ISU wastewater effluent using EPA protocols and methods. The Laboratory notifies the City of

Ames and ISU directly, before any discharge, of all discharges of analyzed wash water from the storage tanks at the Waste Handling Facility. ISU had a storm water permit for construction activities. Since the existing DOE buildings are on land leased from ISU, Ames Laboratory activities were covered by the ISU storm water permit.

The Ames Laboratory Combined Groundwater Protection Management Plan and Groundwater Monitoring Plan ensured groundwater quality through pollution prevention and rapid remediation. All applicable DOE Orders, federal, state, and local regulations were complied with. This policy depends on the use of standard EPA protocols and methods that are analyte specific. Sampling methodologies, containerization, and analyses complied with EPA standards. Sample shipments and handling complied with standards of the U.S. Department of Transportation and the International Air Transporters Association. The strategy for groundwater protection was to actively clean up and/or monitor all contaminated sites, and to perform routine monitoring of wells at the main campus and ASC locations. On the main campus, a combination of shallow and deep wells between the Laboratory facilities and Squaw Creek were available for sampling as resources permit. The CDS was monitored as prescribed by the regulators. Inactive waste sites were sampled as necessary or as directed by regulatory agencies.

Ames Laboratory ESH&A developed an instrument calibration policy in 1993 to ensure the accuracy of measurements made at the Laboratory. This policy was followed in 1996. Equipment enrolled in the calibration program was and is marked by stickers. A direct charge system pays for calibration work. Some equipment was calibrated by the manufacturers, and some was calibrated in-house in 1996.

In 1996, the Laboratory followed its Readiness Review Procedure for new or significantly modified research activities. This procedure is for risk identification, categorization, and ESH&A readiness review of activities. Another purpose of the Readiness Review Procedure is to prevent and/or control releases of hazardous materials to the environment. It was 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&H review. Twenty three readiness reviews were closed in 1996.

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10.0 LIST OF ACRONYMS

ASC: Applied Sciences Complex of Iowa State University

Bq: Becquerel, one disintegration per second

CAA: Clean Air Act and Amendments

CAG: Community Advisory Group for Ames Laboratory environmental activities

CDS: closed chemical disposal site at the ASC

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act

CESQG: conditionally exempt small quantity generator

CFR: Code of Federal Regulations

CG: concentration guide, DOE derived

CH: Chicago Operations Office of the U.S. Department of Energy

Ci: Curie, 3.7×10^{10} disintegrations per second

COE: U.S. Army Corps of Engineers

CWA: Clean Water Act

CX: categorical exclusion, a class of activities determined to have no environmental impact

DOE: U.S. Department of Energy

DSSI: Diversified Scientific Services, Incorporated

EA: environmental assessment

EE/CA: engineering evaluation/cost analysis

EIS: environmental impact statement

EPA: U.S. Environmental Protection Agency

EPCRA: Emergency Planning and Community Right to Know Act

ESA: Endangered Species Act

ESH&A: Environment, Safety, Health and Assurance Group of Ames Laboratory

FFCA: Federal Facilities Compliance Act

FIFRA: Federal Insecticide, Fungicide and Rodenticide Act

FS: feasibility study

FSP: field sampling plan

g: gram, of mass

GOCO: a government (DOE) owned, contractor operated facility

GSB: Geological Survey Bureau of the Iowa DNR

HASP: health and safety plan

HEPA: high efficiency particulate air, a filter element or filtration system.

HQ: Headquarters of U.S. Department of Energy

IAC: Iowa Administrative Code

ICP: inductively coupled plasma

IDNR: Iowa Department of Natural Resources

IDPH: Iowa Department of Public Health

INEL: Idaho National Engineering Laboratory, U.S. DOE

IPRT: Institute for Physical Research and Technology, ISU

ISU: Iowa State University

IWS: inactive waste site

LDR: land disposal restriction

LQG: large quantity generator

MCL: maximum contaminant level

mg/L: milligrams per liter; equivalent to ppm or PPM

mrem: millirem

mSv: millisievert, 10^{-3} Sieverts

NEPA: National Environmental Policy Act

NESHAP: National Emission Standards for Hazardous Air Pollutants

NHPA: National Historic Preservation Act

NOV: notice of violation

NPDES: National Pollutant Discharge Elimination System

NRC: Nuclear Regulatory Commission

ODS: ozone depleting substance

ORISE: Oak Ridge Institute for Science and Education

PCB: polychlorinated biphenols

pCi: picocurie, 10^{-12} Curies

PIDS: performance indicator database system

QA: quality assurance

QAP: Quality Assessment Program, DOE

RCRA: Resource Conservation and Recovery Act

rem: Roentgen equivalent man, radiation dose

RESRAD: residual radiation model for sites

RI: remedial investigation

RPP: Radiological Protection Plan, for Ames Laboratory

SARA: Superfund Amendments and Reauthorization Act

SDWA: Safe Drinking Water Act

SEG: Scientific Ecology Group

SER: annual Site Environmental Report, for Ames Laboratory

SQG: small quantity generator

STP: Site Treatment Plan, for Ames Laboratory

Sv: Sievert, 100 rem

TASF: Technical and Administrative Support Facility, the Ames Laboratory office building

TIP: Technology Integration Program of Ames Laboratory

TPQ: threshold planning quantity

TRU: transuranic waste

TSCA: Toxic Substances Control Act

uCi: microcurie, 10^{-6} Curies

ug/L: micrograms per liter

UHL: University (of Iowa) Hygienic Laboratory, provides analytical services for DNR

USGS: United States Geological Survey

UST: underground storage tank

WAS: work authorization system of Ames Laboratory

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