NRC FORM 313 (4-2004)
10 CFR 30, 32, 33, 34, 35, 36, 39, and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 10/31/2005

Estimated burden per response to comply with this mandatory collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MISSISSIPPI, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-4005

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [x] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include ZIP code)*

International Isotopes Inc.
4137 Commerce Circle
Idaho Falls, ID 83401

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

1359 Commerce Way
Idaho Falls, ID 83401

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

John J. Miller

TELEPHONE NUMBER

(208) 524-5300

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number; b. chemical and/or physical form; and c. maiximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. *INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR* TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES *(See 10 CFR 170 and Section 170.31)*

FEE CATEGORY 2A | AMOUNT ENCLOSED $

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTANED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Steve T. Laflin	Steve T. Laflin	4-18-05

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

5. RADIOACTIVE MATERIAL

Element and mass number	Chemical and/or physical form	Maximum amount which will be possessed at any one time
A. Depleted Uranium	Chemical Form: UF_4, U_3O_8, UO_2 Physical Form: Solid	5,000 kg
B. Depleted Uranium	Chemical Form: UF_4, U_3O_8, UO_2 Physical Form: Solid	1,000 kg

A Decommissioning Funding Plan pursuant to 10 CFR 40.36 has been developed, a copy of which included with this application. Consistent with § 40.36, financial assurance will be obtained after the application has been approved and the license issued but before the receipt of licensed material in quantities requiring financial assurance. A signed original of the financial instrument obtained to satisfy the financial assurance for decommissioning requirements will be submitted to the NRC prior to receipt of licensed material in quantities requiring financial assurance.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED

A. 5000 kg	Depleted uranium contained in Department of Transportation approved shipping containers staged as process feed material (UF_4), chemical catalyst product (U_3O_8) or waste (U_3O_8 /UO_2/ UF_4).
B. 1,000 kg	Depleted uranium in process as described below.

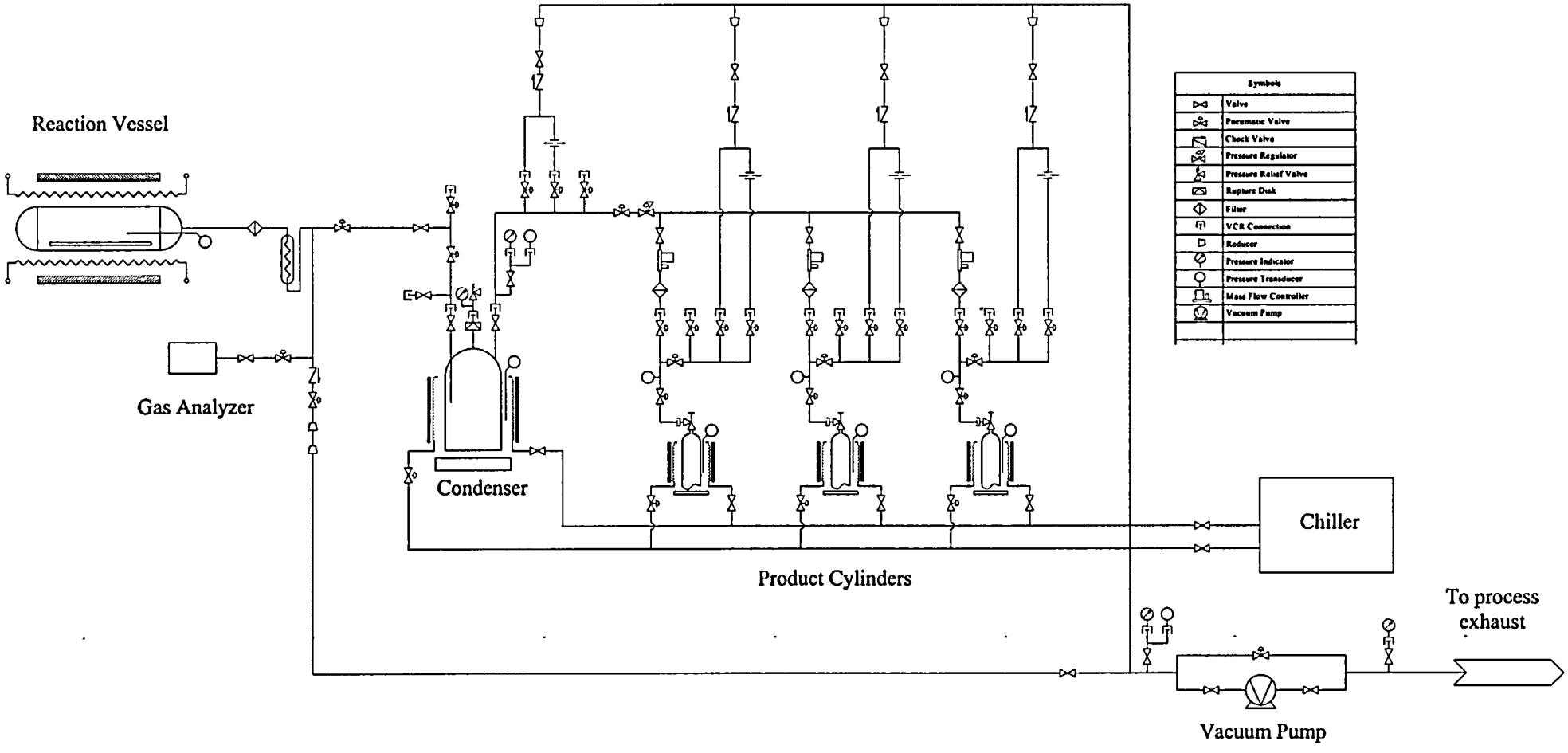
It is important to note that references made to uranium compounds in this application refer to compounds in a solid physical state in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present.

A description of the Germanium tetrafluoride (GeF_4) Production Process is provided below. Note that the processes associated with the research and development of the production of other fluorine gas compounds would be nearly identical with the exception of scale and starting oxide reactant, i.e. silicon oxide (SiO_2) or boron oxide (B_2O_3) to produce silicon tetrafluoride (SiF_4) or boron trifluoride (BF_3) gas respectively.

1. Germanium oxide (GeO_2) and uranium tetrafluoride (UF_4) powders are mixed in a reaction vessel of 0.0049 m^3. This mixing takes place within a contamination containment.
2. The sealed reaction vessel is transferred and installed into the fluorine gas process system.
3. The GeO_2/UF_4 mixture is heated to 400 °C, held for approximately four hours to drive off any residual moisture.
4. The GeO_2/UF_4 mixture is then heated to 700 °C, to begin the reaction. This temperature is held for four hours. During this period GeF_4 gas is collected is collected in the condenser as a liquid at -40 °C.
5. The condenser is warmed to ambient temperature, the GeF_4 changes phase resulting in a pressure increase which allows for the transfer of gas into collection cylinders.
6. The gas recovery system retains >95 % of the product. Fluoride emissions prior to emission controls are expected to be 0.0143 lb/hr, 8.56 % of the fluoride Emission Limit (EL) of 0.167 lb/hr. This potential to emit is less than the limit for Below Regulatory Concern (BRC) which is considered 10 % of the EL or, 0.0167 lb/hr. While uranium tetrafluoride is one of the reactants, it is retained in the reaction vessel as solid uranium oxide that is not available for release to the ambient environment. With no uranium carryover into the gas stream, there are no radionuclide emissions from this process.
7. The solid uranium oxide, either UO_2 or U_3O_8 and non-reacted UF_4 and GeO_2 is cooled to ambient temperature and transferred to the contamination containment for unloading.

Refer to the attached process diagram. A description of process equipment is provided in Block 9 of Form 313.

Simplified Process Diagram GeF_4



7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

Radiation Safety Officer:

The Radiation Safety Officer for International Isotopes, Inc Fluorine Production Division will be qualified through education and/or experience in the field of health physics. Certification through the American Academy of Health Physicists is considered sufficient qualification.

The Radiation Safety Officer has the authority to immediately stop any operations involving the use of byproduct and/or source material in which health and safety may be compromised or may result in non-compliance with NRC requirements.

Refer to Block 7 Attachment for further detail.

INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

Radiation Safety Officer:

Mr. John Miller is the Radiation Safety Officer for International Isotopes, Inc. Mr. Miller is a Certified Health Physicist and a Registered Radiation Protection Technologists. Mr. Miller possesses a Bachelor of Science Degree in Radiation Protection from Thomas Edison State College, a Master of Science Degree in Environmental Engineering from the University of Alabama and is currently pursuing a Doctorate degree in Nuclear Engineering and Science with research emphasis in health physics through Idaho State University.

As the radiation Safety Officer, Mr. Miller has the authority to immediately stop any operations involving the use of byproduct and/or source material in which health and safety may be compromised or may result in non-compliance with NRC requirements. Statement of authority and Mr. Miller's resume is attached.

Steve Laflin, President/CEO.

Mr. Laflin has a Bachelor of Science Degree in Health Physics from Idaho State University and over 25 years of experience in radiological engineering, Health Physics, and operation of numerous nuclear facilities. He is a member of the American Nuclear Society, and the Society of Nuclear Medicine. Mr. Laflin was responsible for the initial creation of the I^3 business and the first conversion of a government facility into commercial radioisotope production operation for medical and industrial applications.

Critical Operational Personnel:

Ed Kennedy, Fluorine Products Operations/Safety Manager.

Mr. Kennedy has a Bachelor of Science Degree in Chemical Engineering from the University of Michigan, Ann Arbor. Mr. Kennedy has experience in the design and construction of toxic gas facilities including a tungsten hexafluoride production facility.

Dr Bamidele Omotowa, Fluorine Products Senior Scientist.

Dr. Omotowa received his B.S., M.Sc and Ph.D. in Chemistry, University of Ilorin, Nigeria. He has held Post-doctorate positions at the Technical University of Berlin Germany, the University of Bath, U.K. and was the Senior Research Scientist, Fluorine Group, University of Idaho, Moscow Idaho.

Kirby Hanson, Fluorine Products System Engineer.

Mr. Hanson received has a Master's of Science degree from Idaho State University in Measurement & Control Systems and a bachelors of Science in General Engineering. He has over 11 years experience in systems engineering.

John J. Miller, CHP, RRPT

International Isotopes Inc.
Idaho Falls, ID 83401

Phone: 208.524.5300

email: jjmiller@intisoid.com

SUMMARY:

Approximately 16 years of radiological/nuclear safety experience in various capacities, currently as the Radiation Safety Officer for International Isotopes Inc operating under a broad scope Nuclear Regulatory Commission License, previously as a health physicist at various Department of Energy Sites and as Radiological Controls Supervisor with the United States Navy. Experience includes; radiation and industrial safety program development and administration, decontamination and decommissioning for unrestricted use, environmental remediation, self-assessment, nuclear power plant refueling and radioactive material transportation.

Educational and professional highlights include; Master's of Science Degree, Environmental Engineering, Bachelors of Science Degree, Applied Science and Technology Degree specializing in Radiation Protection, Certification through the American Board of Health Physics and Registration with the National Registry of Radiation Protection Technologists. Currently pursuing a Doctorate Degree through Idaho State University in Nuclear Science & Engineering with research emphasis in Health Physics.

EXPERIENCE:

Occupational and Radiation Safety Officer: June 2000 –Present
International Isotopes, Inc. (I^3), Idaho Falls ID

Developed and implemented the Safety & Health Program and the Radiation Safety Program for a small company operating under a Nuclear Regulatory License. Specific highlights include:

- Developed facility design and work control processes to incorporate engineering and administrative controls to reduce personnel dose and the potential for the spread of contamination during work activities.
- Authored the NRC License Application and Decommissioning Funding Plan to support a Broad Scope Type A NRC License.
- Company liaison for US Nuclear Regulatory Commission, Occupational Safety and Health Organization and State of Idaho Department of Environmental Quality.

Staff Engineer/Scientist: June 1999 –June 2000
Idaho National Engineering and Environmental Laboratory, Idaho Falls ID

Providing radiological engineering technical support for the Test Reactor Area (TRA) Hot Cell Facility. Specific Highlights included:

- Developed the facility specific technical basis document for the TRA Internal Dosimetry Program.
- Provide timely review of work orders and operating procedures involving radiological work ensuring requirements identified in the federal regulations, INEL Radiological Control Manual and Site Specific procedures are incorporated as necessary.

Principal Health Physicist: June 1994 – May 1999
Rocky Flats Environmental Technology Site, Golden CO

Provided radiological engineering technical support for several of the Site's facilities and projects associated with the closure of the DOE Rocky Flats Site, most specifically involving the deactivation and decommissioning of contaminated facilities and environmental remediation of waste burial sites.

- Implemented guidance provided in the Multi-Agency Radiation Survey and Site Investigation Manual to develop the Final Survey Plan for a deactivated radiochemistry and research laboratory. Developed the radiological work controls for the excavation of 20,000 kg of depleted uranium.
- Implemented an alpha spectroscopy program enabling technicians to discriminate between naturally occurring radioactivity and DOE radioactive material while in the field.

John J. Miller, CHP, RRPT

Phone: 208.524.5300

International Isotopes Inc.
Idaho Falls, ID 83401
email: jjmiller@intisoid.com

Radiological Controls Supervisor: September 1990 - May 1994
Naval Nuclear Propulsion Program, USS Enterprise

Provided radiological control technical assistance throughout the refueling, testing and operations of USS Enterprise's 8 reactor plants. Responsible for maintaining reactor and steam plant chemistry within prescribed specifications. Other responsibilities include:

- Supervisor of 24 radiological control technicians throughout refueling operations.
- Evaluating 130 technicians' ability to sample and analyze primary coolant, boiler water, feed water and pure water.

Reactor Laboratories Group Supervisor: June 1988 - September 1990
Naval Nuclear Propulsion Program, USS Theodore Roosevelt:

Supervised 12 technicians responsible for reactor/steam plant chemistry and radiological controls associated with the operation of a naval nuclear power plant.

- Awarded Commanding Officer's Letter of Commendation for 1989 Operation Reactor Safeguards Examination grade of "Excellent" in chemistry and radiological controls.
- Recognized by the Commanding Officer for outstanding performance in maintaining steam plant chemistry within specifications during a prolonged steam plant casualty.

Engineering Laboratory Technician: October 1987 to June 1988
Naval Nuclear Propulsion Program, S1G Prototype:

Performed routine radiological surveys and maintained primary and secondary chemistry for S1G nuclear power plant prototype.

EDUCATION:

Idaho State University, Pocatello, Idaho	Doctorate studies Nuclear Engineering & Science August 2001-Present
University of Alabama, Tuscaloosa, Alabama	Masters of Science in Environmental Engineering December 1999
Thomas Edison State College, Trenton, New Jersey	Bachelors of Science in Applied Science and Technology Specializing in Radiation Protection, March 1994

PROFESSIONAL DEVELOPMENT:

- Certification through the American Academy of Health Physics — November 1997 (Re-certified 2001)
- Registered with the NRRPT — December 1993

CLEARANCE:

Past: Department of Energy L and Q, Department of Defense Secret.

Current: None

International Isotopes Inc.
(Including International Isotopes Idaho Inc. subsidiary)

INTEROFFICE MEMO

TO: All Employees

FROM: Steve Laflin

DATE: January 7, 2005

SUBJECT: Delegation of Authority for Radiation Safety Officer- STL-01-05

John J. Miller has been assigned as the Radiation Safety Officer (RSO) at the International Isotopes Inc. 4137 Commerce Circle (NRC License 11-27680-01) and 1359 Commerce Way (NRC License pending) facilities. The RSO is responsible for ensuring the safe use of byproduct and source material, managing the radiation safety program; identifying radiation safety problems; initiating, recommending, or providing corrective actions; verifying implementation of corrective actions; and ensuring compliance with regulations for the use of byproduct material. The RSO is hereby delegated the authority necessary to meet these responsibilities.

The RSO has the authority to immediately stop any operations involving the use of byproduct material in which health and safety may be compromised or may result in non-compliance with NRC requirements.

Steve T. Laflin
President and CEO
International Isotopes, Inc.

cc: S. T. Laflin File
NRC Licensing File

STL- 2005- 01

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

Radiological and occupational safety-related training is coordinated by the Radiation Safety Officer and the Manager Fluorine Products. Training records are maintained in each individual's general file.

The following general topics in Radiation Safety will be utilized to develop or procure lesson plans or training videos.

I. Radiological Fundamentals:
   - A. Characteristics of Radiation
   - B. Units of Radiation Dose and Radioactivity
   - C. Significance of Radiation Dose
     1. Radiation Protection Standards
     2. Biological Effects of Radiation
     3. Prenatal Effects

II. Radiological Work Practices
   - A. Methods of Controlling Radiation Dose
     1. Time- Distance- Shielding
   - B. Radiological Postings
   - C. Radiological Work Permits
   - D. Personnel Protective Equipment
   - E. Internal Exposure Pathways

III. Radiation Detection Instrumentation
   - A. Use of Radiation Survey Instrumentation
     1. Operations and Limitations
   - B. Survey Techniques
   - C. Personnel Monitoring

IV. Emergency Procedures
   - A. Radiological Events and Proper Response

Continuing training is provided as necessary. For example employees will be required to read notices issued by the Nuclear Regulatory Commission which are pertinent to I^3 operations.

Hazardous materials operations training will meet the criteria established in Title 29 §1910.120 (e) *Training* and §1910.120 (q)(6) *Training* as applicable.

9. FACILITIES AND EQUIPMENT

Facility Description

The I^3 Facility is located in the St. Leon Business Park on the north side of Idaho Falls, Idaho. The building is constructed of expanded polymer block filled with approximately four inches of concrete. The St. Leon Business Park has a common well that supplies untreated water to the I^3 facility and several other businesses in the park. The facility is approximately 80 feet wide by 100 feet deep. There is approximately 2400 square feet of office space, which includes a conference room, two small restrooms, a break room and a small utility closet. The remainder of the facility space is devoted to material handling, storage, processing and gas collection. The facility is equipped with its own septic system that serves the restrooms and potentially once through cooling water and treated waste water. Floor drains are located in the restrooms and utility closet. Refer to the attached drawings.

The process floor is divided into depleted uranium handling area, depleted uranium storage, fluorine gas transfer and collection, and a laboratory. The fluorine gas transfer and collection and lab portion of the process is completely isolated from the depleted uranium handling and storage portions. This isolation is achieved through the chemical process itself and a gas-line particulate filter capable of removing 99.9999999% of all particles greater than 0.0003μm. Pilot scale production of fluorine gas compounds utilizing depleted uranium tetrafluoride as the fluorine source confirmed the fluorine gas product to be free of uranium compounds. This analysis is performed utilizing inductively coupled plasma – mass spectroscopy (ICP-MS) with detection levels for uranium in the parts per trillion region.

Process Steps

Initial Collection

The initial reactants will arrive in two forms (uranium tetrafluoride (UF_4) and germanium oxide (GeO_2)). The UF_4 will be received in 30 or 55 gallon drums. Material not being put into use immediately will be stored in Room 303, Drum Storage. A sample of UF_4 will be taken from each drum to verify the material meets specification. Sampling will be performed within the drum hood, located in Room 304, Powder Handling. Once the material is verified the stainless steel drum cone will be installed. The drum cone is fitted with a gate valve for complete isolation and a rotary valve for metering UF_4. The drum will be lifted and tipped, UF_4 will be transferred from the drum to a small metal can using the Drum hood to control airborne radioactivity. The can containing the UF_4 will be capped and transferred into the UF_4 glove box for further reactant preparation. GeO_2 will be supplied in small sealed containers.

Reactant Preparation

Each reactant will be loaded into the UF_4 glove box. A technician will then weigh each reactant with the scale inside the glove box. Then the reactants are moved into a mixing container where the ingredients are manually mixed. The mixed ingredients will be transferred to the reaction

tray. The reaction furnace will be coupled with the glove box and the tray will be slid into the furnace. The reactor will then be sealed, surveyed and transported to the GeF_4 process equipment.

GeF_4 Process

The reaction furnace will be connected to the process skid located in an exhausted enclosure. After passing a successful pressure test, the reactor will be heated to various levels to remove any absorbed water and to begin the chemical reaction to produce GeF_4. The GeF_4 and other reaction gases will pass through a particulate filter (99.9999999% removal > 0.003 μm) to eliminate any particles and then to a chilled collection vessel. The GeF_4 will condense in the collection vessel and all non-condensable gases (He, O_2, N_2, etc.) will be vented to the process abatement system. The reactor will then be isolated from the collection vessel via valving located after the filter and allowed to cool. The collection vessel will then be warmed up to room temperature as a part of the gas transfer process. The GeF_4 will then be transferred via differential pressure to the final product cylinders. To aid in this transfer the product cylinders will also be chilled. Prior to shipment, the product cylinders will be warmed to room temperature. A final QA will be performed to assure that product specifications will be met. This may include gas analysis and trace metals analysis. At least 95% of the GeF_4 produced by the reactor will be captured by this process. The remainder will be vented to the process exhaust system as a result of line purging and off specification material produced during the initial heating stage.

Ancillary Systems

Analytical Measurement Equipment

Monitoring of the reaction furnace effluent gas prior to collection will be performed continuously as a part of the process control. The instrument will be devoted to monitoring gaseous impurities only. However, a final QA on the product cylinders will be performed routinely to verify that both gaseous and metals impurities meet product specifications. An ICP-MS will be periodically used to validate that metal contamination, including uranium, is below product specifications. The specification for metal contamination is typically in the low ppt level.

Drum Cone and Tipper: A stainless-steel cone with a metering valve and gate valve will be used to transfer UF_4 from a 55 gallon drum into a smaller mixing container in 7 kg batches to be transferred into the UF_4 glove box. The drum hood described below will be utilized to provide local HEPA filtered ventilation during transfer activities.

UF_4 Glove Box : A glove box will be used to control contamination and airborne radioactivity levels during the mixing of UF_4 and GeO_2. This glove box will be located in Room 304, Powder Handling and is approximately 5 feet long by 2 feet deep and 2 feet tall. The glove box will be maintained at a negative pressure during operations utilizing a HEPA filtered air mover.

Drum Hood: A drum hood will be utilized to transfer the roasted depleted uranium, consisting primarily of U_3O_8 with a small amount of un-reacted UF_4 and metal oxide (GeO_2) into a 55 gallon drum. The drum hood will be sized to fit over two 55 gallon drums. One side will be used to house the U_3O_8 collection drum. The other side will be used to control the initial opening of the UF_4 drum. The drum hood will be located in Room 304, Powder Handling and is 72 inches long, 30 inches deep and extends 16 inches above the top of a standard 55 gallon drum.

Gas Production Fume Hood: A fume hood approximately, 12 ft wide by 6 ft deep and 9 feet in height will be used to house the fluorine gas extraction system. This fume hood is not expected to become contaminated during operations. This fume hood will be located in Room 301 Gas Production.

ICP-MS Fume Hood: A fume hood approximately, 12 ft wide by 6 ft deep and 9 feet in height will be used to house the Perkin Elmer ICP-MS system. This fume hood is not expected to become contaminated during operations. This fume hood will be located in Room 302 Analytical Laboratory.

Perkin Elmer ICP-MS: The Perkin Elmer ICP-MS is an automated trace element gas/liquid sampling system. The system is currently utilized to determine the impurity concentrations at the parts per trillion level of fluorine gas products. This unit is located in Room 302, Analytical Laboratory. Based on pilot scale tests, this unit is not expected to become contaminated during operations.

HEPA Filtered Vacuum Cleaner: A radiological grade HEPA vacuum is utilized for radiological work controls. The HEPA vacuum will be utilized during decommissioning and will be disposed of as radioactive waste or transferred to an authorized individual for reuse.

HEPA Filtered Air mover: A HEPA filtered air mover which provides at least 500 CFM of air flow will provide ventilation for the UF_4 glove box, the U_3O_8 Drum hood and the powder handling room.

Heavy Equipment

Heavy equipment similar to a Yale manufactured MPW-E motorized hand truck is required to move this material.

Backup Generator

A natural gas powered backup generator will provide a constant power source for crucial facility operations in the event of power outages. Natural gas is preferred to diesel or propane in that there are no storage requirements for the fuel source. The initial facility will require roughly 40 kW to run all the process and facility equipment.

Safety Systems

Anticipated safety concerns include handling of gases, working with depleted uranium, working at high temperatures, and maintenance on process equipment. In addition to the requirements of Title 10 Code of Federal Regulations, the facility will comply with requirements in Emergency Planning and Community Right-to-Know Act sections 301-304, 311-313 and Occupational Safety and Health Administration (OSHA) requirements in 29 CFR 1910.119 as appropriate.

Radioactivity Monitoring

Radioactive monitoring will follow the standard guidelines already established by I^3. Three primary areas of focus will be personnel, area and environmental monitoring. Further detail is provided in Block 10. Radiation Safety Program.

Dangerous Gas Monitoring

The purpose of dangerous gas monitoring is to detect fluorine containing gases. Fluorinated gases come in the form of GeF_4, the initial production gas, and HF, the reactant gas of UF_4 and H_2O. A detection system will continuously monitor HF concentrations around the facility and notify personnel about hazardous conditions.

General Employee

Standard practices will include mandatory training for hazardous materials, a central location for employee awareness materials, new material/safety meetings, and exposure testing. Employees routinely working with hazardous materials will be required to attend a 40-hour hazardous material industry technician class. The central safety location center will contain Material Safety Data Sheet (MSDS) information and other emergency response equipment. All employees will have access to MSDS information. Finally, employees working with hazardous materials will undergo annual physicals to monitor exposure to hazardous chemicals.

Local Hazardous Material Response Team

The Idaho Falls Fire Department (IFFD) Hazardous Material Response Team has toured the facility and has been provided information on the process operations and hazards.

Safety Equipment

Proper safety attire will be worn while working with GeF_4. Vapor-proof eye protection, respiratory protection, footwear, and hand protection are examples of protective equipment that will be specified.

Figure 1. International Isotope Inc. FEP First Floor

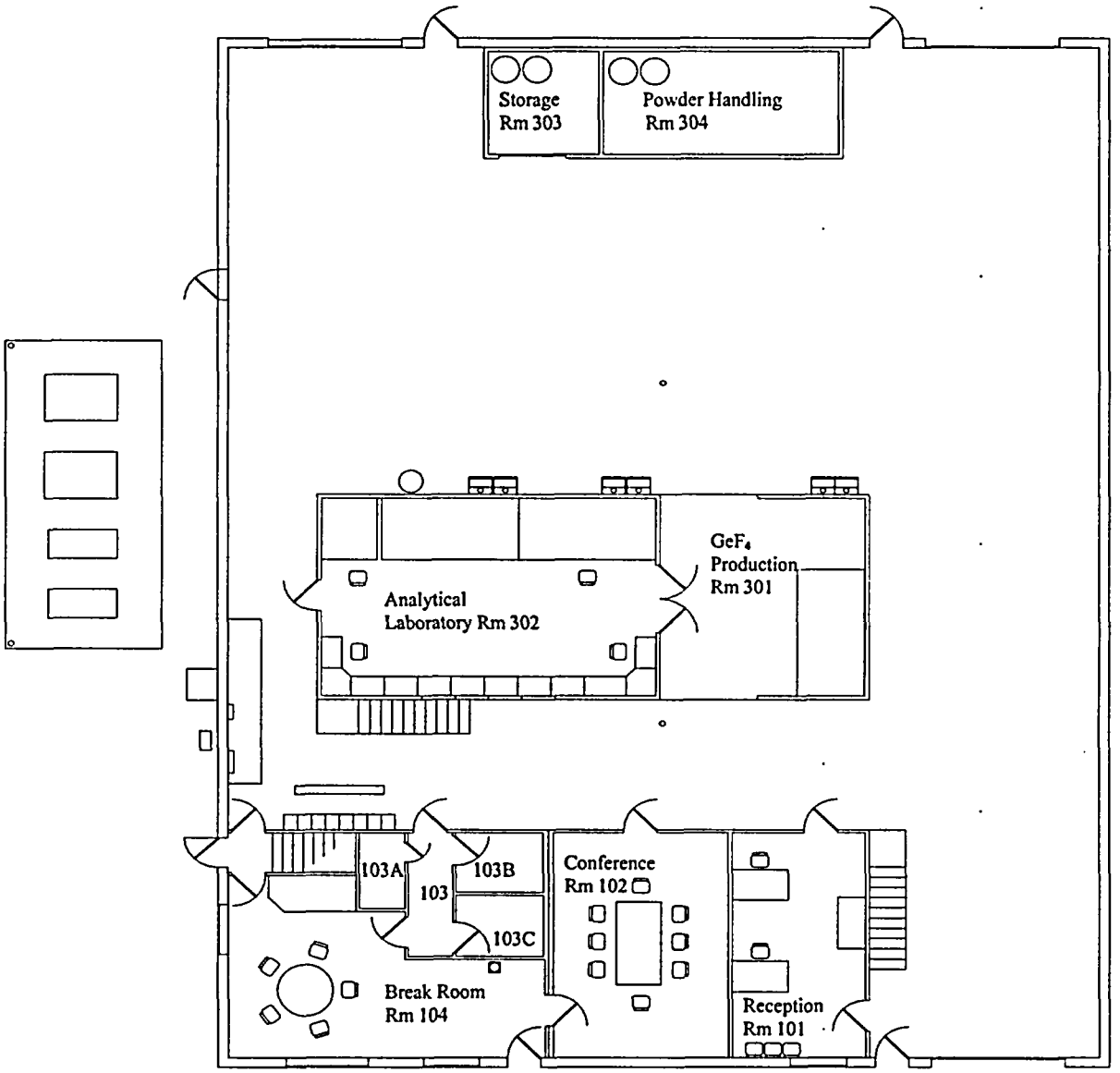
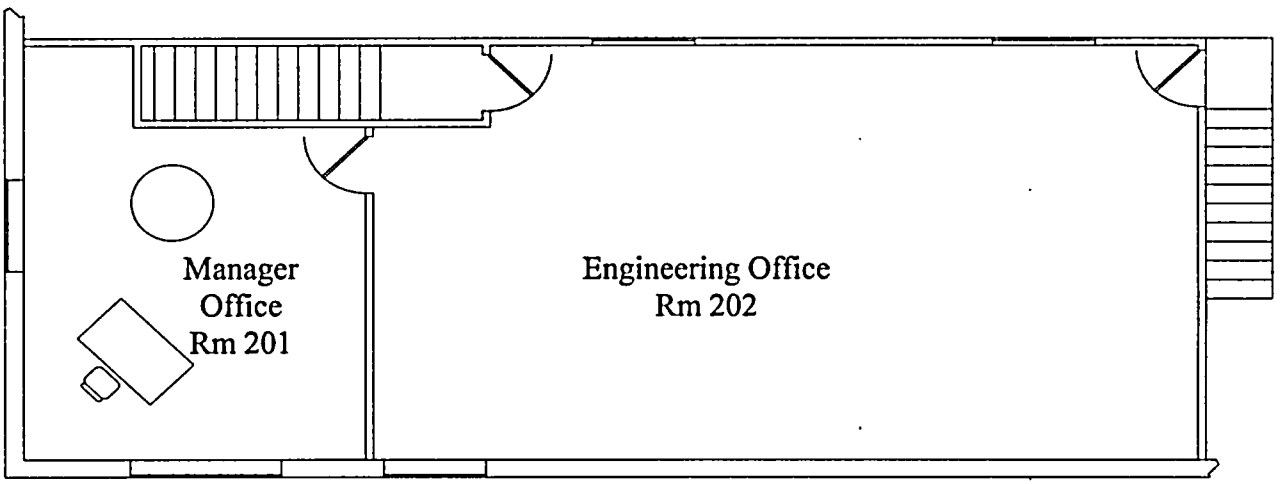


Figure 2. International Isotope Inc. FEP Second Floor



10. RADIATION SAFETY PROGRAM

Company Background

I^3 is committed to conducting business in a manner that protects the environment, the surrounding population and provides a safe work environment to its employees. From 1996 to 2001 I^3 operated and managed the Department of Energy's Test Reactor Area hot cell facility at the Idaho National Engineering and Environmental Laboratory. In September 2001 the Company began licensed operations at its Idaho Falls facility under NRC License No. 11-27680-01. During the last 4 years the Company's scope of radiological work has grown to its present day level, handling kilocurie quantities of radioactive materials. Development of the I^3 Radiation Safety Program has kept pace with the Company's growth so these commitments are continually realized. The I^3 ALARA/Safety Committee, chaired by the President/CEO meets at least quarterly to discuss the status of the Radiation and Industrial Safety Programs. Members of the committee include the Radiation Safety Officer, Project Management, Process Supervisors and Technicians.

Audit Program

The purpose of the Radiation Safety Audit Program is to assure, on a rotational basis, that each area of the facility is given an in-depth inspection annually by a member of the I^3 ALARA/Safety Committee or outside contractor with respect to radiological hazards.

The Radiation Safety Audit is conducted and documented in accordance with Company operating Procedure I4-OP-024, *Radiation Safety Audit Program.* A copy of this procedure is attached for reference.

Radiation Monitoring

Routine radiological monitoring of the I^3 Fluorine Production facility will be performed at frequencies and with instrumentation capable of determining radiation levels and concentrations of radioactive materials in the facility, to identify potential radiological hazards and to detect releases of radioactive material from the facility and process equipment. A list of instrumentation currently utilized by I^3 for radiological monitoring of the Fluorine Production facility is provided below. This list may change over time as new instruments become available. The Radiation Safety Officer must approve of any instrument substitution.

Contamination Monitoring Instrumentation:

Ludlum Model 3030 – Dual channel counter with shielded scintillation detector designed for simultaneous alpha and beta sample measurements. Primarily used for swipe survey and air filter analysis.

Ludlum Model 2360 with 43-93 Alpha/Beta Scintillator – Hand held scaler/ratemeter with 100 cm^2 detector used for personnel and area frisking.

Ortec SOLOIST – Single Chamber Alpha Spectroscopy System with 1200 mm^2 low background detector. This system will be utilized to complement gross alpha/beta counting systems.

Canberra Gamma Analyst – Automated gamma spectroscopy system utilizing high purity germanium (HPGe) detector. This system is located at I^3's 4137 Commerce Circle Facility and may be used for isotopic identification in support of the Fluorine Production process.

Radiation Monitoring Instrumentation:

Eberline-RO20 - An air filled ionization chamber designed for flat energy response in the X ray region with a 7mg/cm^2 beta window. Instrument response 30% of true mrad/hr field on uranium slab through beta window.

Bircon MicroRem - An air filled ionization chamber designed for flat energy response in the X ray region with a 7mg/cm^2 beta window. Instrument response 30% of true mrad/hr field on uranium slab through beta window.

Air Sampling Equipment:

GAST Model 1023/HI-Q MCV-260Flow regulator - This air sampler consists of a NIST traceable flow gauge and LCD timer utilized for air sampling in areas where uncontained depleted uranium is handled.

Eberline Alpha 7A Continuous Air Monitor – This continuous air monitor with radial entry head will continuously monitor the ambient air in areas where uncontained depleted uranium is handled.

It should be noted that continuous air monitoring of the fluorine gas stream is not performed. The fluorine gas stream would be the only gas stream that would be exhausted to the environment. Real time monitoring of the fluorine gas stream for radioactivity is not practicable due to the corrosive characteristics of the fluorine gas. Based on calculations and tests from pilot scale operations, uranium in concentrations that would exceed the values listed in Table 2, *Effluent Concentrations* of Appendix B of Title 10 Code of Federal Regulations Part 20 is not expected to be present in the fluorine gas stream. I^3 will sample the fluorine gas product using Inductively Coupled Plasma – Mass Spectroscopy (ICP-MS) to verify the absence of uranium.

Instrument Calibration: With the exception of the alpha spectroscopy instrument, radiological survey instrumentation will be calibrated by an outside calibration service. The alpha spectroscopy system will be calibrated at the I^3 facility at a frequency and with a method recommended by the manufacturer.

Material Receipt and Accountability:

I^3 will develop and maintain a database to track the receipt of UF_4 and subsequent disposal or transfer of U_3O_8/UO_2. Physical inventories of source material will be conducted on a quarterly basis. Inventories of sealed sources received and possessed under the license will be conducted at intervals not to exceed 6 months.

Occupational Dose

Whole-body Exposure: Whole body dose to individuals whose work function requires frequent access into the facility processing area will be monitored with film badges issued and processed by a National Voluntary Laboratory Accreditation Program (NVLAP) approved dosimetry service.

Extremity Monitoring: Extremity monitoring (finger rings) will be used to monitor the extremity dose to individuals whose work activity requires hands-on work with depleted uranium compounds.

Internal Monitoring: Internal monitoring will be conducted as necessary to determine the extent of internal exposure to uranium compounds in accordance with HPS N13.22-1995, *Bioassay Programs for Uranium*. At this time International Isotopes Inc. does not have the necessary procedures in place to perform this analysis and therefore will sub-contract this activity.

Based on the expected facility dose rates, administrative personnel requiring infrequent access to the process area are not expected to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20. Area dosimeters will be used to monitor both the process and administrative areas to provide area dose rate data for use in future evaluations and monitoring requirements.

Public Dose

I^3 will ensure through the use of fume hoods, glove boxes and HEPA filtered ventilation and administrative controls that licensed material will be handled, stored, transported and disposed of in such a way that members of the public will not receive a dose in excess of that allowed by 10 CFR 20.1301. Shielding will be utilized to ensure external dose rates in any unrestricted area within the boundaries of the facility and any area outside of the facility boundary will not result in a dose of 0.02 mSv (2 mrem) to a member of the public in any one hour, from licensed operations.

Safe Use of Uranium Compounds and Emergency Procedures

Processes involving the handling of unsealed or uncontained uranium compounds will be governed by procedures approved by the I^3 ALARA/Safety Committee and Radiological Work Permits. I^3 will adapt the Model Procedures for Handling Emergency as published in Appendix R, *General Topics for Safe Use of Radioisotopes and Model Emergency Procedures* in NUREG-

1556 Vol. 11, *Consolidated Guidance about Material Licenses: Program-Specific Guidance about Licenses of Broad Scope*, dated April 1999.

Unauthorized access to radioactive material areas is controlled via locks and with a building alarm system. Processing procedures require licensed material to be securely stored when not in use.

An Emergency Response Plan as described in §40.31(j)(3) is not being submitted because the proposed operations, under normal or worst case scenarios, will not meet the criteria identified in §40.31(j)(1), that being 50 kg of UF_6 in a single container or 1000 kg of UF_6 total. Fluorine gas (F_2) a necessary reactant in the $UF_4 + F_2 \rightarrow UF_6$ chemical conversion process is not available to react with the UF_4. Additionally the design of the GeF_4 production system would not support the UF_4 to UF_6 conversion process which is typically conducted utilizing a fluidized bed reactor. It is appropriate to conclude the inadvertent production of UF_6 is not credible and that an Emergency Response Plan as described in §40.31(j)(3) is not warranted.

The Company will, however maintain a written Safety and Health Program in accordance with Title 29 §1910.120 (b) *Safety and health program* and an Emergency Action Plan in accordance with Title 29 §1910.38(a) *Emergency action plan.* A copy of I4-EH&S-06, *Emergency Plan and Fire Prevention Program*, has been provided for NRC review. Modeling to support the development of this plan was performed using ALOHA® Version 5.3.1. Modeling results have been included for NRC review.

A meeting was held between the Company, Idaho Department of Environmental Quality and Idaho Falls Fire Department, Hazardous Material Team on April 8th, 2005 to discuss the radiological and non-radiological facility hazards and the Idaho Falls Fire Department Hazardous Material Team emergency response capability. It was agreed that in the event of an unintentional release of GeF_4 gas, the Idaho Falls Fire Department, Hazardous Materials Team would respond.

Surveys

Radiological surveys will be performed at frequencies based on the amount of activity being handled and the operation being performed. The Radiation Safety Officer will develop an area specific routine survey schedule. Work or process specific surveys will be indicated on the Radiological Work Permit as necessary. Surveys will be performed in accordance with Company Procedure I4-OP-011, *Facility Radiological Surveys*, attached for reference.

Sealed source leak tests will be performed at 6 month intervals or less as specified in the safety evaluation of the device. Sealed source leak checks will be performed in accordance with Company Procedure I4-OP-016, *Sealed Source Leak Test & Inventory Control*, attached for reference.

Transportation

Under currently licensed operations I^3 ships and receives radioactive materials on a daily basis. The Company has well established shipping and receiving procedures and properly trained individuals. The Company is committed to being in complete compliance with the US Department of Transportation (DOT) and NRC transportation regulations. The Company is

currently registered with the DOT as required by 49 CFR Part 107, Subpart G. Registration number 061103 552 007LN expires 06/30/2006 and will be renewed at that time. Although not required for the transportation of depleted uranium as UF_4, U_3O_8 or UO_2, I^3's Quality Assurance Program, in regards to radioactive material packages, has been approved by the NRC, Approval Number 0929 Revision 0, Docket number 71-0929.

Minimization of Contamination

Operations utilizing depleted uranium that may result in the spread of contamination will be performed within a glove box or fume hood with adequate HEPA filtered ventilation. Additional detail on these components are described in Block 9 of this application.

Physical Security

A Physical Security Plan was developed using guidance provided in Policy Guide-50, *Site Security Guidelines*, Compressed Gas Association, 1/13/2005. The Physical Security Plan was not submitted with this application and would be made available to the NRC for their review, upon their request.

11. WASTE MANAGEMENT

I^3 is located in the Northwest Low-Level Waste Compact region and therefore is authorized to dispose of low-level radioactive waste generated through licensed operations at American Ecology Corporation's, US Ecology Richland Washington Facility. I^3 may transfer LLW directly to this facility, or transfer LLW to an authorized recipient for disposal. LLW transfers will comply with 10 CFR 20 Appendix G, *Requirements for Transfer of Low-Level Radioactive Waste Intended for Disposal at Licensed Land Disposal Facilities and Manifests*. Collection, segregation and volume-reduction of radioactive wastes generated at the I^3 facility will be governed by approved procedures and when necessary controlled by a Radiological Work Permit approved by the RSO.

Waste Compaction:

I^3 will utilize a Model 55SC RAM Flat Compactor to volume reduce compactable low-level radioactive waste generated from licensed operations. Note this piece of equipment is currently in use at the I^3 4137 Commerce Circle Facility, NRC License 11-27680-01.

I^3 originally purchased the Model 55SC RAM Flat Compactor to volume reduce lab waste generated during the production of Co-57 Flood Sources. The RAM Flat Compactor is equally suitable to compact the low-level compactable waste generated during irradiated gemstone processing, byproduct sealed source production and UF_4 fluorine extraction. Typical waste includes disposable latex gloves, absorbent wipes, contaminated filter papers, plastic mixing beakers and miscellaneous plastic and paper lab consumables. Removable contamination levels on the waste are not expected to exceed 1000 dpm/100 cm^2. All waste placed in the compactor is contained in at least one PVC bag. The Compactor has been in operation for approximately 2 years, air sampling in the work area during compaction operations has never approached 0.01 DAC. Removable contamination levels performed on the interior of the compactor following compaction have never exceeded 1000 dpm (450 uuCi)/100cm^2.

The potential for an airborne release of radioactive material during Compactor operations is highly unlikely. The Model 55SC RAM Flat Compactor is specifically designed to compact hazardous wastes. The unit at the I^3 facility is connected to an NFS RPS SP-1600 HEPA Filtered air mover rated at 1720 cfm at 1" static pressure water gauge. During compaction operations the front door of the unit is closed, negative pressure resulting from the HEPA exhaust provides a tight seal on the door.

Air sampling is performed in the general work area during compaction operations using a high volume air sampler. Air samples are analyzed via gamma spectroscopy.
Removable contamination surveys are performed between each compaction when the compaction drum is filled and compacted multiple times and at the end of the compaction operation.

The manufacturer's operating procedure along with a Radiological Work Permit approved by the RSO governs Compactor operations. Protective clothing requirements during waste compaction operations are identified on the Radiological Work Permit. In most cases protective clothing is limited to disposable latex gloves and lab coat.

Should the Model 55SC RAM Flat Compactor require replacement I^3 may replace the compactor with the same or an equivalent model.

Evaporation:

The liquid radioactive waste generated from licensed operations is expected to be below the effluent release concentration limits for disposal in sanitary sewer system. However, since the I^3 facility is not connected to a municipal sewage system, all radioactively contaminated and potentially contaminated waste is collected in a 55 gallon stainless steel drum and evaporated utilizing a PSI Water Systems Inc. ENCON Drum Evaporator. Note this piece of equipment is currently in use at the I^3 4137 Commerce Circle Facility, NRC License 11-27680-01.

Should the PSI Water Systems Inc. ENCON Drum Evaporator require replacement I^3 may replace the compactor with the same or an equivalent model.

Decay-in-Storage:

Not applicable.

International Isotopes Inc
Attached Procedures

I4-OP-011, *Facility Radiological Surveys*
I4-OP-016, *Sealed Source Leak Test & Inventory Control*
I4-OP-024, *Radiation Safety Audit Program*
I4-ES&H-006, *Emergency Plan and Fire Prevention Program*

I4-OP-011, *Facility Radiological Surveys*

TITLE:	Number:	Effective Date:
Facility Radiological Surveys	I4-OP-11	12/30/04
PRI:	Page:	Superceded Date:
Steve Laflin	of 6	01/0?/01
PRI Signature and Date:	Document Control Signature and Date:	Quality Assurance Signature and Date:

1.0 PURPOSE

Radiological surveys are performed to:

A. Demonstrate compliance with Title10 Code of Federal Regulations Part 20.1501.
B. Document radiological conditions in the workplace.
C. Detect changes in radiological conditions.
D. Detect the gradual build-up of radioactivity in the workplace.
E. Verify the effectiveness of engineering and process controls in containing radioactive material and reducing radiation exposure.

2.0 POTENTIAL HAZARDS

The hazards associated with the implementation of this procedure include:

- Potential exposure to radiation and contamination.
- Industrial hazards such as strains, pinch points, trips, slips and falls.

3.0 APPLICABILITY AND LIMITATIONS

This procedure provides methods for performing and documenting radiation and contamination surveys. It covers routine surveys and job specific surveys.
This procedure does not cover: (1) personnel surveys or (2) airborne radioactivity sampling.

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO): Prepare a routine radiation and contamination survey schedule for the facility. Maintain Survey Records generated through the use of this procedure in accordance with 10 CFR 20.2103, Records of Survey.

5.2 Technician (TECH): Perform and document surveys as directed by the Radiation Safety Officer and the routine schedule.

6.0 EQUIPMENT AND MATERIALS

6.1 Radiation and Contamination survey instruments.

6.2 Form I4-33, Radiological Survey Report

7.0 PROCEDURE

7.1 RSO: Utilize the guidance provided in NUREG 1556 Volume 11 Appendix S to prepare a routine radiation and contamination survey schedule for the facility.

NOTE: *Work control surveys, such as those specified by a Radiological Work Permit may be documented in the Facility Log book in lieu of Form I4-33, Radiological Survey Report. Routine facility surveys, radioactive material receipt and shipment surveys and decay-in-storage release surveys must be recorded on Form I4-33.*

7.2 TECH: Perform and document surveys.

7.2.1 IF the survey is a follow-up survey after a decontamination process, THEN provide a cross reference to the original survey.

7.2.2 IF log entries lack sufficient detail to reconstruct the radiological survey/conditions, THEN prepare a map.

7.2.3 Prepare a Radiological Survey Report Form I4-33 (RSR).

7.2.4 Prepare maps on the RSR.

7.2.4.1 Include sufficient detail so reviewing individuals can understand and identify original survey and sampling locations and radiological conditions.

7.2.4.2 Indicate each survey point's location by entering a sequential reference number and appropriate symbol on the map in accordance with the legend on the RSR.

7.2.4.3 Enter necessary details regarding survey point locations on the Survey Data and Legend sheet on the RSR.

7.2.4.4 IF location details are not necessary, THEN enter "See Map" on the data sheet.

7.2.4.5 Include the following items on the map, if applicable:

a. smears
b. large area wipes
c. direct scans
d. dose rates
e. radiological boundaries
f. radiological postings
g. step-off pads
h. hot spots
i. physical conditions that might affect radiological control requirements (for example: leaks, water on the floor, ice).

7.2.5 Perform radiation surveys.

7.2.5.1 IF an open window reading exceeds a closed window reading on an instrument, THEN determine the corrected beta dose rate (in mrem/hr) and record the dose rate on the survey map.

7.2.5.2 Take general area dose rates at waist level, unless conditions warrant taking the readings at another level. If they are taken at other than waist level, indicate the height on the map.

7.2.5.3 Take Radiation Area or High Radiation Area dose rates at 30 cm (~ 1 foot) from the surface or the closest accessible point and indicate with an @ and distance (cm) on the map (such as, 20 @ 30 cm).

7.2.5.4 Take Very High Radiation Area dose rates at 100 cm (~ 3 feet).

7.2.5.5 Take contact dose rates at approximately ½ inch from the surface and indicate with an * on the map, (such as, *30).

7.2.6 Perform contamination surveys using one or more of the following methods: smears (smears, the required method for documenting loose surface contamination), large area wipes or direct scans. Document contamination survey results in units of μμCi. (1 dpm = 0.45 μμCi).

7.2.6.1 Perform large area wipe surveys when a qualitative indication of area contamination is desired.

7.2.6.2 Obtain a beta-gamma, beta-alpha or alpha only count rate on the wipe, as applicable.

7.2.6.3 IF the large area wipe activity is ≥ 450μμCi above background, THEN record results in μμCi and perform a smear survey of the area.

7.2.6.4 Perform smear surveys when quantitative measurements for loose surface contamination are desired.

7.2.6.4.1 Swipe an area of 100 cm^2.

7.2.6.4.2 Count smears on a beta-gamma or alpha-beta scaler, as applicable, using a count time of 1 minute unless a different count time is recorded on the survey record.

7.2.6.4.3 Record swipe results in μμCi/100 cm^2 . For surveys of small items, report results in units of μμCi /smear or per area of item smeared (cm^2).

7.2.6.5 Perform direct scan for beta-gamma or alpha-beta contamination, as applicable, when general area background radiation levels are less than 300 cpm.

7.3 RSO: Review RSR.

7.3.1 IF the RSR is complete and legible, THEN sign the RSR on the "Reviewed by" line.

7.3.2 Review survey data for changes in radiological conditions, the gradual buildup of radioactivity in the workplace, and to verify the effectiveness of engineering and process controls in containing radioactive contamination and reducing radiation exposure.

7.3.3 Ensure all required surveys have been performed and documented.

7.3.4 Compile and review survey data at least quarterly, note changes or trends, and assign corrective actions as necessary.

8.0 REFERENCES

8.1 Title 10 Code of Federal Regulations Part 20

8.2 NUREG-1556 Volume 11 Appendix S.

9.0 ATTACHMENTS

9.1 Attachment 1 – Form I4-33, Sample Radiological Survey Report

Attachment 1
Page 1 of 2

I4 Form-33 Rev. 2 Page of

I³ RADIOLOGICAL SURVEY REPORT

Contamination Survey Instrument Data

ID	Type	Serial #	Cal. Due	probe area (cm^2)	Eff.	Bkg count rate (cpm) Rb	Sample count time (minute) Ts	Bkg count time (minute) Tb	MDA ($\mu\mu Ci$)	Units
1										
2										
3										
4										

Radiation Survey Instrument Data

Type	Serial #	Cal. Due

$$MDA = \frac{3 + 3.29\sqrt{RbTs\left(1+\frac{Ts}{Tb}\right)}}{\text{efficiency} \times Ts \times \frac{\text{Probe Area } (cm^2)}{100}}$$

Survey No.	Type (D, S, L)	Inst. ID	Location or Item Description	Gross count rate (cpm)	Net count rate (cpm)	Activity ($\mu\mu Ci$)	Units

Survey Types
D = Direct Scan
S = Swipe
L = Large Area Wipe

NOTES
1. Conversion Factor: 1 dpm = 0.45 $\mu\mu Ci$
2. "Probe Area (cm^2)/100 cm^2" not used in MDA equation for Scalers.
3. A map is not required if sufficient detail can be included on this page.
4. Activity for direct (D) measurements corrected for probe area to 100 cm^2.
5. Swipes obtained over 100 cm^2 when the accessible surface area an item exceeds 100cm^2.
6. Notify RSO when contamination levels exceed 450 uuCi/100cm^2.

Survey Performed By:
Print name: _____
Signature: _____
Date: _____

Survey Reviewed By:
Print name: _____
Signature: _____
Date: _____

Form 14-33 Rev. 2
Page ___ of ___

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(Including International Isotopes Idaho Inc. subsidiary)

RADIOLOGICAL SURVEY REPORT

BLDG: _____ AREA/ROOM: _____ RWP#: _____ LOG #: _____ DATE: _____ TIME: _____	JOB DESCRIPTION ☐ ROUTINE ☐ NON-ROUTINE (SPECIFY) _____ ☐ FOLLOW UP _____ COMMENTS: _____

NOTES

Dose rates in mr hr unless otherwise noted

Radiological barriers indicated by: ----x----x----x----

ANNOTATION CONVENTIONS

Direct Scan annotated by: #

Swipe annotated by: O

Large Area Wipe Annotated by: ◊

Air Sample annotated by: Δ

On-contact radiation survey annotated by: X#

Distance from source annotated by: @ Y cm

General area dose rates depicted as a number only

I4-OP-016, *Sealed Source Leak Test & Inventory Control*

International Isotopes Inc.
(Including International Isotopes Idaho Inc. subsidiary)

TITLE:	Number:	Effective Date:
Sealed Source Leak Test & Inventory Control	I4-OP-016	12/30/04
PRI:	Page:	Superceded Date:
Steve Laflin	Page 1 of 4	09/01/00
PRI Signature and Date:	Document Control Signature and Date:	Quality Assurance Signature and Date:

1.0 PURPOSE

1.1. Maintain compliance with regulations governing the maintenance of sealed sources.

1.2. Ensure adequate safety and health of employees and the public.

2.0 POTENTIAL HAZARDS

2.1. Spill or leakage of radioactive material presents a hazard to both the environment and personnel.

3.0 APPLICABILITY AND LIMITATIONS

NOTE: *Sealed sources manufactured by I^3 are leak tested as part of the manufacturing process and are not subjected to this procedure. I^3 manufactured sealed sources that have passed all quality control checks are stored in QA Released Source Cabinets, an electronic inventory of these sources is maintained by Quality Control. Sealed sources disposed of as waste are not subjected to this procedure.*

3.1. All sealed sources are subjected to physical inventory at intervals not to exceed six months.

3.2. All sealed sources containing radioactive material shall not be opened or removed from their respective holders, if the source is used in its holder.

3.3. Sealed sources other than those specified below are subject to leak testing at six-month intervals.

3.4. Leak tests are not required for sealed sources that meet the following criteria:

3.4.1. Contain only radioactive material with a half-life less than 30 days.

3.4.2. Contain only radioactive material as a gas.

3.4.3. Contain 100 microcuries (3.7 MBq) or less of beta or photon emitting material or 10 microcuries (370KBq) or less of alpha emitting material.

3.4.4. Contain only ^3H.

3.4.5. Are stored, not being used and/or identified as "in storage".

4.0 DEFINITIONS

4.1. Sealed source refers to radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release of the radioactive constituents under the most severe conditions likely to be encountered during normal use and handling. Sources fabricated by individuals and organizations not registered and approved by the Sealed Source and Device Registry of the United States Nuclear Regulatory Commission are not

considered to be sealed sources. Sources meeting the criteria set forth in section 3.4 do not require a Sealed Source and Device registry.

5.0 RESPONSIBILITIES

5.1. Qualified I³ technicians will perform all leak testing.

5.2. The I³ Radiation Safety Officer (RSO) will approve procurement of all radioactive sources and designate storage locations for all radioactive sources.

6.0 EQUIPMENT AND MATERIALS

6.1. Detection equipment calibrated to National Institute of Standards and Technology traceable sources appropriate for detecting 0.005 microcuries (185 Bq) of the radiation of concern.

6.2. Smear element. (filter paper, cotton swabs, etc.)

7.0 PROCEDURE

7.1. Storage and Control

7.1.1. All sealed sources will be stored in a locked storage cabinet as directed by the RSO.

7.1.2. The RSO or a designated alternate will maintain control of the key to the sealed source cabinet.

7.1.3. An inventory of sealed sources will be posted on the outside of the source cabinet.

7.1.4. In the event that a source is lost or damaged, the I³ RSO shall be contacted as soon as possible.

7.1.5. The RSO will determine the recovery actions to be taken in the event of a lost or damaged source.

7.2. Sealed source inventory and leak testing.

7.2.1. Inventory sealed sources for proper location and availability. Record the results on the sealed source inventory log

7.2.2. Perform the leak test on the sealed source.

7.2.3. Sealed sources contained in devices shall be leak tested with the device in the "OFF" position.

7.2.4. The smear to test for leakage should be taken from the most accessible area (but not directly on surface of the source) of the holder/container most likely to accumulate contamination.

7.2.5. Use the smear element(s) to smear the sealed source. Perform the smear survey in accordance with I4-OP-11, Facility Radiological Surveys.

7.2.6. Verify that the counting equipment to be used for the analysis of the smears is appropriate as described in section 6.1 and that the calibration is current.

7.2.7. Analyze the smear and record the results in the sealed source log and an I³ Form 33, Radiological Survey Report.

7.2.8. Record the instrument used to analyze the smears and the MDA (Minimum Detectable Activity) for the counting instrument.

7.2.9. Record the smear count times and smear counts in microcuries or bequerels.

7.2.10. If leakage greater than 0.005 microcuries (185 Bq) of removable contamination is detected, take appropriate measures to prevent the spread of contamination and contact the I³ RSO.

8.0 REFERENCES

8.1. NUREG-1556, Vol. 11, *Program Specific Guidance About Licenses of Broad Scope*, dated April 1999

9.0 ATTACHMENTS

9.1. Leak Check Information and Results

TITLE:	Number:	Effective Date:
Sealed Source Leak Test & Inventory Control	14-OP-016	12/30/04
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Sealed Source ID #	Attachment 9.1 Leak Check Information and Results				
	Instrument Used for Leak Check Counting	Instrument MDA	Leak Check Count Results	Signature of Person Performing Leak Test	Date

I4-OP-024, *Radiation Safety Audit Program*

TITLE:	Number:	Effective Date:
Radiation Safety Audit Program	I4-OP-024	11/18/02
PRI:	Page:	Superceded Date:
Steve Laflin	1 of 5	12/7/00
PRI Signature and Date:	Document Control Signature and Date:	Quality Assurance Signature and Date:

1.0 PURPOSE

The purpose of the audit program is to provide a mechanism for I^3 to self-assess the adequacy of the licensed program, identify program weaknesses, and enable I^3 to take early corrective actions.

2.0 POTENTIAL HAZARDS

None.

3.0 APPLICABILITY AND LIMITATIONS

3.1 The Audit form is not intended to be all inclusive. During an audit, the auditor needs to keep in mind not only the requirements of NRC's regulations, but also the licensee's commitments in its applications and other correspondence with NRC. Also document areas where improvement can be implemented.

3.2 The auditor should also evaluate whether I^3 is maintaining exposures to workers and the general public as low as is reasonably achievable (ALARA) and, if not, make suggestions for improvement. References are included within the body of the Audit Checklist.

4.0 DEFINITIONS

None.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO):

5.1.1 Perform periodic audits of the radiation safety program to ensure that I^3 is complying with all applicable NRC regulations and the terms and conditions of the license.

5.1.2 Ensure that the results of audits, identification of deficiencies and recommendations for change are documented and maintained for a period of at least 3 years and provided for management for review.

5.1.3 Ensure that prompt action is taken to correct deficiencies.

5.1.4 Ensure that the audit results and corrective actions are communicated to all personnel who use licensed material.

5.2 I³ ALARA Committee:

5.2.1 Working with the senior management, shares responsibility with the RSO for conducting periodic audits of the radiation safety program.

5.2.2 Reviews audit findings and acts upon those findings.

5.2.3 Analyzes findings for possible trends, and provides suggestions for timely and corrective action should.

5.2.4 Assesses the effectiveness of corrective actions to help in deterring or eliminating future problems and violations.

5.3 I³ Senior Management: Provide necessary resources to support the radiation safety audits program.

6.0 EQUIPMENT AND MATERIALS

6.1 Appendix 1, Radiation Safety Audit Checklist

7.0 INSTRUCTIONS

7.1 Audit Radiation Safety Program

Note: *A complete audit of the radiation safety program must be performed at least annually. To comply with the annual audit requirement, individual aspects of the radiation safety program may be audited throughout the year in lieu of a single all encompassing annual audit.*

7.1.1 RSO or designated individual: Perform an audit of the following aspects of the radiation safety program utilizing Appendix 1, Radiation Safety Audit Checklist:

1. AUDIT HISTORY:

Date of last audit, findings, open action items.

2. MANAGEMENT OVERSIGHT:

Management support to radiation safety; I³ ALARA COMMITTEE; RSO; program audits, including annual reviews of program and ALARA reviews; appropriate follow up on events and previous audit/inspection findings.

3. AMENDMENTS AND PROGRAM CHANGES:

Amendments to the license were properly implemented; if applicable, program and procedural changes were approved and implemented in accordance with license condition.

4. **FACILITIES:**

Facilities as described in license; uses; control of access; engineering controls; calibration facilities; shielding; air flow.

5. **EQUIPMENT AND INSTRUMENTATION:**

Operable and calibrated survey equipment; procedures; 10 CFR Part 21

6. **AREA RADIATION SURVEYS AND CONTAMINATION CONTROL, AND HANDLING OF RADIOACTIVE MATERIAL:**

Radiological surveys; air sampling; leak tests; inventories; handling of radioactive materials; contamination controls; records; and public doses. Materials and uses authorized; security and control of licensed materials; and procedures for receipt and transfer of licensed material.

7. **TRAINING AND INSTRUCTIONS TO WORKERS:**

Training and retraining requirements and documentation; interviews and observations of routine work; staff knowledge of all routine activities; 10 CFR Parts 19 and 20 requirements; emergency situations.

8. **RADIATION PROTECTION:**

Radiation protection program with ALARA provisions; external and internal dosimetry; exposure evaluations; dose and survey records and reports; annual notifications to workers; bulletins and other generic communications.

9. **RADIOACTIVE WASTE MANAGEMENT:**

Disposal; effluent pathways and control; storage areas; transfer; packaging, control, and tracking procedures; equipment; hoods, vacuums, and evaporator; license conditions for special disposal method.

10. **DECOMMISSIONING:**

Records relevant to decommissioning; decommissioning plan/schedule; notification requirements; cost estimates; funding methods; financial assurance; and Timeliness Rule requirements; changes in radiological conditions since decommissioning plan was submitted.

11. **TRANSPORTATION:**

Quantities and types of licensed material shipped; packaging design requirements; shipping papers; hazardous materials (HAZMAT) communication procedures; return of sources; procedures for monitoring radiation and contamination levels of packages; HAZMAT training; and records and reports.

12. NOTIFICATIONS AND REPORTS:

Reporting and follow-up of theft, loss, incidents and overexposures. Notification of change in RSO. Radiation exposure reports provided to individuals.

13. POSTING AND LABELING:

Notices; license documents; regulations; bulletins and generic information; posting of radiation areas; and labeling of containers of licensed material.

14. INDEPENDENT AND CONFIRMATORY MEASUREMENTS:

Areas surveyed, both restricted and unrestricted, and measurements made; comparison of data with staff's results and regulations.

7.2 Document Audit

7.2.1 Auditor: Document the results of the audit utilizing Appendix 1.

7.3 Review Audit Results:

7.3.1 I^3 ALARA Committee: Review the results of the audit as soon as practicable after the audit is completed in a formal meeting of the Committee.

7.3.2 I^3 ALARA Committee: Identify possible trends and actions necessary to correct deficiencies.

7.3.3 Record corrective actions on Form I4-29 ALARA Committee Comment Form.

7.4 Communicate Audit Results

7.4.1 RSO/ALARA Committee: Communicate the results of the audit to Senior Management.

Note: *Audit results may be communicated to general employees via required reading or through a verbal briefing by the RSO. I either case, attendance or assigned reading is completed must be documented.*

7.4.2 RSO: Communicate the results of the audit to employees that handle and work with licensed material.

7.5 Maintain Audit Records

7.5.1 RSO: Maintain the following records pertaining to the audit for at least 3 years from the date of the audit:

a. Original Radiation Safety Audit Checklist.

b. ALARA Committee Comments Form.

c. A copy of the ALARA Committee Meeting Minutes relevant to the audit.

d. Briefing attendance rosters and/or required reading forms.

8.0 REFERENCES

8.1 Refer to Appendix 1.

9.0 ATTACHMENTS

9.1 Appendix 1, Radiation Safety Audit Checklist

International Isotopes Inc.
(Including International Isotopes Idaho Inc. subsidiary)

Radiation Safety Audit Program

Audit Report No. _____ License No. _____

Licensee's Name and Mailing Address: Amendment No. _____

International Isotopes Inc.
4137 Commerce Circle
Idaho Falls, ID 83401

Check Location of Audit Activities: ☐ Commerce Circle ☐ TRA Hot Cells

Point of Contact: _____ Telephone No. _____

Audit Date: _____

Summary of Findings and Actions:

☐ No Deficiencies
☐ Deficiencies
☐ Action on previous deficiencies

Recommendations (use additional sheets as necessary):

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Auditor: _____ _____
Signature Date

Radiation Safety Audit Program

1. AUDIT HISTORY
   A. Last audit of this location conducted: _____.
   B. Content and implementation of the radiation protection Program reviewed annually [20.1101(c)]: [ ] Yes [ ] No
   C. Deficiencies identified during last two audits or two years: [ ] Yes [ ] No
   D. Records maintained [§20.2102]: [ ] Yes [ ] No
   E. Record open deficiencies from previous audits in the remarks below:
   F. Remarks (use additional sheets as necessary):

_____

_____

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_____

2. MANAGEMENT OVERSIGHT
   A. Senior Management:
      i. Actively involved in the Radiation Safety Program: [ ] Yes [ ] No
      ii. Conducts audits and surveillances of operations: [ ] Yes [ ] No
   B. ALARA Committee:
      i. Functions as described by the ALARA Charter: [ ] Yes [ ] No
   C. Radiation Safety Officer:
      i. Authorized on License: [ ] Yes [ ] No
      ii. Sufficient time to perform his/her duties and is not too busy with other assignments: [ ] Yes [ ] No
      iii. Fulfils duties as RSO: [ ] Yes [ ] No

D. Licensee has sufficient staff: [ ] Yes [ ] No

E. Remarks (use additional sheets as necessary):

3. AMENDMENTS AND PROGRAM CHANGES:

   A. License amendments properly implemented: [ ] Yes [ ] No [ ] N/A

   B. Program and procedural changes were implemented in accordance with the license conditions: [ ] Yes [ ] No [ ] N/A

   C. Remarks (use additional sheets as necessary):

4. FACILITY:

   A. Use and lay-out as described in license: [ ] Yes [ ] No

   B. Method of controlling access in place: [ ] Yes [ ] No

   C. Engineering controls utilized to minimize; dose, spread of contamination and generation of airborne radioactivity: [ ] Yes [ ] No

   D. Shielding is used to maintain exposures ALARA: [ ] Yes [ ] No

E. Airflow directed from areas of lower to areas of higher contamination: [✓] Yes [ ] No [ ] N/A

F. Remarks (use additional sheets as necessary):

5. EQUIPMENT AND INSTRUMENTATION:

A. Use and operating procedures as described in license: [ ] Yes [ ] No

B. Remarks (use additional sheets as necessary):

6. AREA RADIOLOGICAL SURVEYS, CONTAMINATION CONTROL AND HANDLING OF RADIOACTIVE MATERIALS:

A. Radiological Surveys (Radiation, contamination and airborne radioactivity):

i. Instruments operable and in good repair: [ ] Yes [ ] No

ii. Instruments calibrated as required by §20.1501: [ ] Yes [ ] No

iii. Calibration records maintained §20.2103(a): [ ] Yes [ ] No

iv. Meet the requirements of §20.1501(a): [ ] Yes [ ] No

v. Performed at frequencies described by procedure: [ ] Yes [ ] No

Radiation Safety Audit Program

vi. Survey records maintained §20.2103: [ ] Yes [ ] No

vii. Protection of members of the public:

1. Adequate surveys made to demonstrate either: [ ] Yes [ ] No
   a. TEDE to the individual likely to receive the highest dose does not exceed 100 mrem/year.
   b. If an individual were continuously present in an unrestricted area, the external dose would not exceed 2 mrem in any hour and 50 mrem in a year [§20.1301(a)(1), §20.1302(b)]
2. Unrestricted area radiation levels do not exceed 2 mrem in any hour [§20.1301(a)(2)]: [ ] Yes [ ] No
3. Records maintained [§20.2103, §20.2107]: [ ] Yes [ ] No

viii. Remarks (use additional sheets as necessary):

B. Possession limits:

i. Isotopes, quantities and use as authorized on license: [ ] Yes [ ] No

ii. Remarks

C. Sealed Source Leak Tests and Inventories:

i. Performed as described in correspondence with NRC: [ ] Yes [ ] No

ii. Performed every 6 months (unless approved by NRC): [ ] Yes [ ] No

Radiation Safety Audit Program

iii. Records with appropriate information maintained: [ ] Yes [ ] No

iv. Remarks (use additional sheets as necessary):

D. Receipt and Transfer of Radioactive Material (includes waste disposal):

i.	Procedures describe how packages are received and by whom:	[ ] Yes	[ ] No
ii.	Written package opening procedures established and followed [§20.1906(e)]:	[ ] Yes	[ ] No
iii.	Packages monitored for contamination and radiation per procedures:	[ ] Yes	[ ] No
iv.	Monitoring performed within time specified by procedure [§20.1906(c)]:	[ ] Yes	[ ] No
v.	Transfer(s) between licensees (including disposal) performed per [§30.41]:	[ ] Yes	[ ] No
vi.	Records of receipt/transfer maintained [§20.2103(a), §30.41]:	[ ] Yes	[ ] No
vii.	Transfer(s) between licensees authorized users or locations performed per procedure:	[ ] Yes	[ ] No
viii.	Package receipt/distribution evaluated for Compliance with [§20.1301, §20.1302]:	[ ] Yes	[ ] No
ix.	Remarks (use additional sheets as necessary):		

UNCONTROLLED

E. Contamination Control:

i. Processes and equipment designed to minimize the potential for the spread of contamination: [ ] Yes [ ] No

ii. Work practices/procedures incorporate techniques that minimize the potential for the spread of contamination: [ ] Yes [ ] No

iii. Remarks (use additional sheets as necessary):

7. TRAINING AND INSTRUCTION TO WORKERS:

A. Instructions to workers per [§19.12]: [ ] Yes [ ] No

B. Training program required: [ ] Yes [ ] No

C. Training records maintained: [ ] Yes [ ] No

D. Evaluation of individuals' understanding of procedures and regulations based on interviews, observations of selected workers: [ ] Yes [ ] No

E. Workers cognizant of requirements for:

i. Radiation Safety Program: [ ] Yes [ ] No

ii. Annual dose limits [§20.1301, §20.1302]: [ ] Yes [ ] No

iii. 10% monitoring threshold[§20.502]: [ ] Yes [ ] No

iv. Dose limits to embryo/fetus and declared pregnant women [§20.1208]: [ ] Yes [ ] No

v. Procedures for opening radioactive packages [§20.1906]: [ ] Yes [ ] No

F. Remarks (use additional sheets as necessary):

8. RADIATION PROTECTION:

A. ALARA considerations are incorporated into the Radiation protection Program [§20.1101(b)]: [ ] Yes [ ] No

B. Adequate documentation of determination that unmonitored occupationally exposed individuals are not likely to exceed >10% of the allowable limit [§20.1502(a)] [ ] Yes [ ] No

C. External Dosimetry provided and required: [ ] Yes [ ] No

i. Supplier:_____ Frequency:_____

ii. NVLAP-approved [§20.1501(c)]: [ ] Yes [ ] No

iii. Exchanged at required frequency: [ ] Yes [ ] No

D. Occupational intake monitored and assessed [§20.1502(b)]: [ ] Yes [ ] No

E. Reports:

i. Auditor reviewed personnel monitoring records for period _____ to _____.

ii. Prior dose determined for individuals likely to receive doses [§202104]: [ ] Yes [ ] No

iii. Maximum exposures TEDE:_____ Other:_____

iv. NRC Forms or equivalent [§20.2104(d), §20.2106(c)]:

1. NRC Form 4, "Cumulative Occupational Exposure History" complete: [ ] Yes [ ] No [ ] N/A

2. NRC Form 5, "Occupational Exposure Record For a Monitoring Period" complete: [ ] Yes [ ] No

v. Worker declared her pregnancy in writing during inspection period (review records): [ ] Yes [ ] No [ ] N/A

1. If yes, compliant with [§20.1208(e)]: [ ] Yes [ ] No [ ] N/A
2. Records maintained [§20.2106(e)]: [ ] Yes [ ] No [ ] N/A

F. Records of exposures, surveys, monitoring, and evaluations maintained [§20.2102, §20.2103, §20.2106]: [ ] Yes [ ] No

G. Remarks (use additional sheets as necessary):

_____

_____

_____

_____

9. RADIOACTIVE WASTE MANAGEMENT:

A. Radioactive waste handled in accordance with procedures: [ ] Yes [ ] No

B. Methods used to minimize volume of waste: [ ] Yes [ ] No

C. Stored in accordance with procedures: [ ] Yes [ ] No

D. Remarks (use additional sheets as necessary):

_____

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10. DECOMMISSIONING:

A. Records relevant to decommissioning maintained until license termination: [ ] Yes [ ] No

B. Records include all information outlined in §30.35(g): [ ] Yes [ ] No

C. Changes in radiological conditions or licensed activities incorporated into decommissioning plans and schedules: [ ] Yes [ ] No

D. Funding methods, financial assurance and Timeliness Rule requirements meet: [ ] Yes [ ] No

E. Remarks (use additional sheets as necessary):

_____

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_____

11. TRANSPORTATION (10 CFR 71.5(a) and 49 CFR 170-189):

A. Licensee shipments are:	[ ] N/A		
i. Delivered by common carriers:	[ ] Yes	[ ] No	
ii. Transported in licensee's own private vehicle(s):	[ ] Yes	[ ] No	
B. Packages:	[ ] N/A		
i. Authorized packages used [§173.415, §173.416(b)]:	[ ] Yes	[ ] No	
ii. Closed and sealed during transport [§173.475(f)]:	[ ] Yes	[ ] No	
C. Shipping Papers:	[ ] N/A		
i. Prepared and used [§172.200(a)]:	[ ] Yes	[ ] No	
ii. Properly completed [§172.200-204]:	[ ] Yes	[ ] No	
iii. Readily accessible during transport [§177.718(e)]:	[ ] Yes	[ ] No	
D. Vehicles:	[ ] N/A		
i. Blocked and braced [§177.842(d)]:	[ ] Yes	[ ] No	
ii. Placarded as needed [§172.504]:	[ ] Yes	[ ] No	
iii. Proper overpacks, (shipping name UN Number, Labeled, statement indicating inner package Complies with specification package)[§173.25]:	[ ] Yes	[ ] No	
E. Incidents reported to DOT[§171.15, §171.16]:	[ ] Yes	[ ] No	[ ] N/A

F. Remarks (use additional sheets as necessary):

12. NOTIFICATIONS AND REPORTS: [§30.50]

A. Reporting and follow-up of theft/loss [§20.2201]: [ ] Yes [ ] No [ ] N/A

B. Reporting and follow-up of incidents [§20.2202]: [ ] Yes [ ] No [ ] N/A

C. Reporting and follow-up of overexposures [§20.2203]: [ ] Yes [ ] No [ ] N/A

D. Licensee aware of telephone number for NRC Emergency Operations Center [(303) 816-5100]: [ ] Yes [ ] No

13. POSTING AND LABELING:

E. NRC-Form 3 "Notice to Workers" is posted [§19.11]: [ ] Yes [ ] No

F. Parts 19, 20, 21 Section 206 of Energy Reorganization Act procedures adopted pursuant to Part 21, and license documents are posted, or a notice indicating where documents can be examined is posted [§19.11, §21.6]: [ ] Yes [ ] No

G. Other posting and labeling per [§20.1902, §20.1904] and the license is not exempted by [§20.1903, §20.1905]: [ ] Yes [ ] No

H. NRC Bulletins, Information Notices, etc.

i. Distributed, as appropriate to staff: [ ] Yes [ ] No

ii. Appropriate actions taken in response to such bulletins: [ ] Yes [ ] No

I. Remarks (use additional sheets as necessary):

Radiation Safety Audit Program

13. Independent and Confirmatory Measurements:

Survey Instrument: _____ S/N: _____ Cal. Due Date: _____

A. Auditor's measurements compare to licensee's: [ ] Yes [ ] No

B. Remarks (use additional sheets as necessary):

_____

_____

_____

_____

_____

_____

Radiation Safety Audit Program

PROBLEMS OR DEFICIENCIES NOTED; RECOMMENDATIONS:

Briefly state (1) the requirement and (2) how, and when violated. Provide recommendations for improvements. Use continuation sheets as necessary:

Requirement	How/When Violated	Recommendations

I4-ES&H-006, *Emergency Plan and Fire Prevention Program*

International Isotopes Inc.

(Including International Isotopes Idaho Inc. subsidiary)

Title:		Number:	Effective Date:
Emergency Plan & Fire Prevention Program		I4-EH&S-006	**April 21, 2005**
PRI:	Page:		Superceded Date:
Steve Laflin	Page 1 of 14		May 18, 2001
PRI Signature	Document Control Signature:		Signature of Quality Assurance:

1.0 Purpose

This procedure is intended to address comprehensively the issues of; evaluating and identifying potential fire and chemical hazards, providing proper exits, fire fighting equipment, emergency plans, written procedures, and communicating information concerning these hazards to employees.

2.0 Background

2.1 Regulatory Statute: OSHA - 29 CFR 1910.36, 29 CFR 1910.38, 29 CFR 1910.157, 29 CFR 1910.165.

2.2 Basis: Over 150 major fires occur in workplaces on an annual basis. Fire is the third leading cause of accidental deaths in the United States. The Occupational Safety and health Administration (OSHA) estimates that most of these accidents can be prevented if proper safety precautions at job sites are initiated. This poses a serious problem for exposed workers and their employer. The OSHA Fire Prevention Standards establish uniform requirements to ensure that fire hazards in U.S. workplaces are evaluated, safety procedures implemented, and that the proper fire prevention information is transmitted to all affected workers.

2.3 General: INIS will ensure that potential fire and chemical hazards within our facility(s) are evaluated. This procedure is intended to address comprehensively the issues of; evaluating and identifying potential fire hazards, providing proper exits, fire fighting equipment, emergency action plans, written procedures, and communicating information concerning these hazards to employees.

3.0 Responsibility

3.1 The Industrial and Radiation Safety Officer is responsible for the development and administration of this procedure. The Industrial and Radiation Safety Officer provides programmatic oversight including auditing and program evaluation.

3.2 Line supervision is responsible for the implementation of this procedure.

3.3 All employees are authorized to halt any operation of where there is danger of serious personal injury.

4.0 Emergency Plan & Fire Prevention Program

4.1 Program Contents

- Written Program
- Training
- Job titles of persons or departments to be contacted for further information or explanation of duties under the plan
- Alarm Systems
- Emergency Notification Procedures
- Facility Evacuation
- Critical Plant Shutdown
- Employee Rescue and Medical Duties
- Means of Egress
- Portable Fire Suppression Equipment
- INIS Fire Prevention Policy

4.2 Written program.

4.2.1 This procedure will be reviewed on an annual basis, when changes occur to 29 CFR 1910, or when facility operational changes occur that require revision.

4.2.2 This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of number of workers employed or the number of work shifts. It is designed to establish clear goals, and objectives.

4.3 Training.

4.3.1 Each employee will be apprised of the fire and toxicity hazards associated with the materials and processes to which they are exposed.

4.3.2 The Industrial and Radiation Safety Officer, or designee, will review with each employee upon initial assignment those parts of the Emergency Plan and Fire Prevention Program which the employee must know to protect the employee in the event of an emergency and whenever the plan is changed.

4.4 Job titles of persons or departments to be contacted for further information or explanation of duties under the plan.

4.4.1 President/CEO – 524-5300 Ext. 101

4.4.2 Industrial and Radiation Safety Officer – 524-5300 Ext. 106

4.4.3 Fluorine Extraction Project Manager – 524-1723 Ext. 100

4.5 Alarm Systems

4.5.1 The following alarm systems are utilized:

System	Location	Condition
Smoke Alarm(1)	Bldg. 4137, Room 112 Co-60 Hot Cell Room	Fire/Smoke – Room 112 only.
Radiation Area Monitors	Bldg. 4137, Room 112 Co-60 Hot Cell Room, Between Rooms 110 and 111.	Alert – 10 mrem/hr Alarm –100 mrem/hr
Fire/Panic Alarm	Bldg. 1359, gas cabinet, pull stations at egress doors	Fire/temperature rise or employee activated
Alpha CAM	Bldg. 1359 Room 304 Powder Handling	> 1.0 DAC uranium particulate
Toxic Gas	Bldg. 1359 Rooms 301, 302 GeF4 Production and Analytical Laboratory, building exhaust	GeF_4, NH3 gas release
Public Address	Both Facilities, production areas, office areas via telephone system	Any, employee initiated
Burglar Alarm(2)	Through out both facilities, "Panic" Alarm function.	Break-in after hours, employee initiated during business hours
(1) Smoke Alarm as part of NRC licensing condition.		
(2) Further detail available on "need-to-know" basis for personnel with security clearance.		

4.6 Emergency Notification Procedures.

4.6.1 Facility plans and operational information will be provided to the Idaho Falls Fire Department (IFFD), Bonneville County Sheriff's Office (BCSO) and Idaho State Police (ISP) on an annual basis or when changes to the facility layout or operations warrant such an update..

4.6.2 The following services/agencies will be requested/notified in the event of a fire that cannot be contained through the use of portable fire extinguishers or for situations requiring law enforcement.

Off-Site Fire and Emergency Services

Type of Service	Location	Phone Number
Fire/EMS/Medical	Idaho Falls Fire Department, Station 12	911
Local Law Enforcement	BCSO	911

4.6.3 The following services/agencies will be requested/notified in the event of an unintentional release of toxic gas that can not be contained through remote means or immediate operator action.

Off-Site Hazardous Material Response Services

Type of Service	Location	Phone Number
Hazardous Materials Team	Idaho Falls Fire Department	911

4.6.4 For non-emergencies, i.e. report of vandalism, contact the Idaho Falls E911 Telecommunications Center at 529-1200.

4.6.5 Notification/requests for assistance will normally be made by the Operations Supervisor, or the Industrial and Radiation Safety Officer. Any employee who cannot immediately contact the Operations Supervisors or the Industrial and Radiation Safety Officer should immediately request assistance. This person should begin word-of-mouth evacuation notification then immediately evacuate.

4.6.6 Notifications made as a result of an attempt to divert or steal radioactive material of concern is beyond the scope of this procedure.

4.7 Critical Plant Shutdown.

4.7.1 If the emergency is such that an operator may shutdown critical systems to limit the extent of the emergency, i.e. removal of fuel sources, isolation of toxic gases, without placing him or herself in danger then every attempt should be made to shutdown the process.

4.7.2 Remote shut down of critical systems should be performed to the greatest extent possible.

4.7.3 Update status boards or charts if possible.

4.7.4 Report system status to the person in charge of providing information to off-site emergency responders.

4.8 Employee Rescue and Medical Duties

4.8.1 To prevent an emergency situation from compounding, only employees trained and qualified to respond to specific emergencies are authorized to render any assistance to fellow employees.

CAUTION: THERE HAVE BEEN MANY INSTANCES WHEN WELL INTENTIONED EMPLOYEES WINDUP AS VICTIMS ATTEMPTING TO RESCUE FELLOW EMPLOYEES BY BLINDLY ENTERING A SPACE WITHOUT KNOWING THE FULL MAGNITUDE OF THE SITUATION. DO NOT ENTER A SPACE TO RESCUE A FELLOW EMPLOYEE UNLESS YOU ARE CERTAIN YOU CAN AID THE VICTIM WITHOUT JEOPARDIZING YOUR OWN WELL-BEING.

4.8.2 The following table summarized emergency situations and employee qualifications needed to render assistance to fellow employees.

Emergency Condition	Expected Action	Required Qualification
Simple first aid, cuts, burns, broken bone. Victim is conscious and responsive.	Render first aid, i.e. stop bleeding, keep victim calm until EMT arrives	Basic first aid skills
Person unconscious but breathing, no signs of trauma	Keep employee warm and comfortable until help arrives	Basic first aid skills
Person unconscious no breathing and/or pulse	Begin CPR continue until help arrives	Person qualified in CPR
Fire -person down.	Recover person if fire and smoke do not block escape.	General employee with facility knowledge and physically capable
Toxic gas release – person down.	Recover person if supplied breathing air and protective clothing are available.	Employee trained and medically qualified to use supplied breathing apparatus and protective clothing. Employee knowledge on the process and type of gas released.
Alpha Cam – person down	Recover person, do not delay recovery action to don respiratory protection	Employee qualified radiation worker and physically capable
Radiation Area Monitor Alarm – person down	Recovery person as rapidly as possible.	Employee qualified radiation worker and physically capable

4.9 Facility Evacuation.

4.9.1 Facility layouts with designated egress routes shall be posted in prominent places throughout the facility. These postings will be reviewed annually and updated when appropriate.

4.9.2 Facility evacuation will require the complete dispersal of all employees from the facility.

4.9.2.1 First Line Supervisors will be assigned to direct employees to the nearest unobstructed exit away from the emergency. In the event it is unclear whether Facility evacuation was ordered. Facility evacuation will be assumed and all personnel evacuated

4.9.2.2 Buddy system. All supervisors and fellow employees should be made aware of handicapped employees who may need extra assistance, such as using the buddy system, and of hazardous areas to be avoided during emergencies. Before leaving, Supervisors should check rooms and other enclosed spaces in the workplace for employees who may be trapped or otherwise unable to evacuate the area.

4.9.3 Procedures. In the event a facility evacuation, follow the below listed guidelines. Above all use your common sense.

- Panic kills, if you're calm it will help others.
- Move quickly in the opposite direction of known hazards towards the nearest unobstructed exit.
- Notify co-workers along the way, talk later.
- Once outside relocate to the evacuation relocation/rally point. These points will be in the front parking lot near the mail box. Be sure to stay away from the building and away from the entrances to the parking lots so as not to obstruct emergency services response.
- Report to your supervisor if he/she is present.
- Senior employees will begin roll call immediately.
- Notify senior management of missing or injured persons.
- Don't forget facility visitors.
- When all persons are accounted for report to the INIS facility not involved in the emergency. If both facilities happen to be involved in an emergency evacuation at the same time all INIS employees will gather at the empty lot north of the 4137 Commerce Circle facility.

4.10 Means of Egress.

4.10.1 The INIS Facilities will meet as a minimum the basic building codes required for safety and health. This section details general fundamental requirements essential to providing a safe means of egress from fire and like emergencies.

4.10.2 Fundamental requirements.

4.10.2.1 Basic egress premise: Every building or structure designed for human occupancy owned or leased by INIS will be provided with exits sufficient to permit the prompt escape of occupants in case of fire or other emergency. The design of exits and other safeguards will be such that reliance for safety or life in case of fire or other emergency will not depend solely on any single safeguard. Where required additional safeguards will be provided for life safety in case any single safeguard is ineffective due to some human or mechanical failure.

4.10.2.2 Design criteria: All buildings or structures will be so constructed, arranged, equipped, maintained, modified, and operated as to avoid undue danger to the lives and safety of our employees from fire, smoke, fumes, or resulting panic during the period of time reasonably necessary for escape from the building or structure in case of fire or other emergency.

4.10.2.3 Exit requirements: All buildings or structures will be provided with exits of kinds, numbers, location, and capacity appropriate to the individual building or structure, with due regard to the character of the occupancy, the number of persons exposed, the fire protection available, and the height and type of construction of the building or structure, to afford all occupants convenient facilities for escape.

4.10.2.4 All exits will be so arranged and maintained as to provide free and unobstructed egress from all parts of the building or structure at all times when it is occupied. It is understood that no lock or fastening device designed to prevent free escape from the inside of any building will be installed.

4.10.2.5 Egress marking: Every exit will be clearly visible or the route to reach it will be conspicuously indicated in such a manner that every occupant of every building or structure who is physically and mentally capable will readily know the direction of escape from any point, and each path of escape, in its entirety, will be so arranged or marked that the way to a place of safety outside is unmistakable. Any doorway or passageway not constituting an exit or way to reach an exit, but of such a character as to be subject to being mistaken for an exit, will be so arranged or marked as to minimize its possible confusion with an exit and the resultant danger of persons endeavoring to

escape from fire finding themselves trapped in a dead-end space, such as a cellar or storeroom, from which there is no other way out.

4.10.2.6 Illumination requirements. In every building or structure equipped for artificial illumination, adequate and reliable illumination will be provided for all exit locations. Exit signs will be installed at the point of exit from the building and will remain illuminated in the event of a power outage.

4.10.2.7 In every building or structure of such size, arrangement, or occupancy that a fire may not itself provide adequate warning to occupants, fire alarm facilities will be provided where necessary to warn occupants of the existence of fire so that they may escape, or to facilitate the orderly conduct of fire exit drills.

4.10.2.8 Every building or structure, section, or area thereof of such size, occupancy, and arrangement that the reasonable safety of numbers of occupants may be endangered by the blocking of any single means of egress due to fire or smoke, will have at least two means of egress remote from each other, so arranged as to minimize any possibility that both may be blocked by any one fire or other emergency conditions.

4.10.2.9 It is understood that compliance with these requirements will not be construed as eliminating or reducing the necessity for other provisions for safety of persons using a structure under normal occupancy conditions, or requiring or permitting any condition that may be hazardous under normal occupancy conditions.

4.10.3 Maintenance: All required exits, ways of approach thereto, and ways of travel from the exit into the street or open space, will be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency.

4.10.4 Discharge from exits.

4.10.4.1 All exits will discharge directly to the street, or to a yard, court, or other open space that gives safe access to a public way. The streets to which the exits discharge will be of width adequate to accommodate all persons leaving the building. Yards, courts, or other open spaces to which exits discharge will also be of adequate width and size to provide all persons leaving the building with ready access to the street.

4.10.4.2 Stairs and other exits will be so arranged as to make clear the direction of egress to the street. Exit stairs that continue beyond the floor of discharge will be interrupted at the floor of discharge by partitions, doors, or other effective means.

4.10.5 Headroom.

4.10.5.1 Means of egress will be so designed and maintained as to provide adequate headroom, but in no case will the ceiling height be less than 7 feet 6 inches nor any projection from the ceiling be less than 6 feet 8 inches from the floor.

4.10.6 Changes in elevation.

4.10.6.1 Where a means of egress is not substantially level, such differences in elevation will be negotiated by stairs or ramps.

4.10.7 Maintenance and workmanship.

4.10.7.1 Doors, stairs, ramps, passages, signs, and all other components of means of egress will be of substantial, reliable construction and will be built or installed in a workmanlike manner.

4.10.7.2 Means of egress will be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency.

4.10.7.3 Any device or alarm installed to restrict the improper use of an exit will be so designed and installed that it cannot, even in cases of failure, impede or prevent emergency use of such exit.

4.10.8 Furnishings and decorations.

4.10.8.1 No furnishings, decorations, or other objects will be so placed as to obstruct exits, access thereto, egress therefrom, or visibility thereof.

4.10.8.2 No furnishings or decorations of an explosive or highly flammable character will be used in any occupancy.

4.10.9 Exit marking.

4.10.9.1 Exits will be marked by a readily visible sign. Access to exits will be marked by readily visible signs in all cases where the exit or way to reach it is not immediately visible to the occupants.

4.10.9.2 Any door, passage, or stairway which is neither an exit nor a way of exit access, and which is so located or arranged as to be likely to be mistaken for an exit, will be identified by a sign reading "Not an Exit" or similar designation, or will be identified by a sign indicating its actual character, such as "To Basement," "Storeroom," "Linen Closet," or the like.

4.10.9.3 Every required sign designating an exit or way of exit access will be so located and of such size, color, and design as to be readily visible. No decorations, furnishings, or equipment which impair visibility of an exit sign will be permitted, nor will there be any brightly illuminated sign (for other

than exit purposes), display, or object in or near the line of vision to the required exit sign of such a character as to so detract attention from the exit sign that it may not be noticed.

4.10.9.4 Every exit sign will be distinctive in color and will provide contrast with decorations, interior finish, or other signs.

4.10.9.5 A sign reading "Exit", or similar designation, with an arrow indicating the directions, will be placed in every location where the direction of travel to reach the nearest exit is not immediately apparent.

4.10.9.6 Every exit sign will be suitably illuminated by a reliable light source.

4.10.9.7 Each internally illuminated exit sign will be provided in all occupancies where reduction of normal illumination is permitted.

4.10.9.8 Every exit sign will have the word "Exit" in plainly legible letters not less than 6 inches high, with the principal strokes of letters not less than three fourths of an inch wide.

4.11 Portable Fire Suppression Equipment

4.11.1 General requirements. Portable fire extinguishers shall be mounted, located and identified so that they are readily accessible to employees without subjecting the employees to possible injury.

4.11.2 Only approved portable fire extinguishers shall be used to meet the requirements of this section.

4.11.3 Portable fire extinguishers using carbon tetrachloride or chlorobromomethane extinguishing agents are prohibited at all INIS facilities.

4.11.4 Portable fire extinguishers shall be maintained in a fully charged and operable condition and kept in their designated places at all times except during use.

4.11.5 Selection and distribution. Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of hazard which would affect their use.

4.11.5.1 Class A fires. Class A fires are classed as ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber and some plastics. Portable fire extinguishers for use by employees on Class A fires will be distributed so that the travel distance for employees to any extinguisher is 75 feet (22.9 m) or less.

4.11.5.2 Class B fires. Class B fires are classed as flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane. Portable fire extinguishers for use by employees on Class B fires will be distributed so that the travel distance from the Class B hazard area to any extinguisher is 50 feet (15.2 m) or less.

4.11.5.3 Class C fires. Class C fires are classed as energized electrical equipment, such as appliances, switches, panel boxes and power tools. Portable fire extinguishers for use by employees on Class C fires will be distributed so that the travel distance from the Class C hazard area to any extinguishing agent is 50 feet (15.2 m) or less.

4.11.5.4 Class D fires. Class D fires are classed as certain combustible metals, such as magnesium, titanium, potassium, uranium metal and sodium. Portable fire extinguishers or other containers of Class D extinguishing agent used by employees will be distributed so that the travel distance from the combustible metal working area to any extinguishing agent is 75 feet (22.9 m) or less.

4.11.6 Inspection, Maintenance and Testing: All portable fire extinguishers used by INIS shall be inspected periodically and maintained at all times. Portable fire extinguishers not passing these tests will be removed from service and replaced.

4.11.6.1 Monthly inspections. Portable extinguishers will be visually inspected monthly and documented on the inspection tag affixed to the extinguisher.

4.11.6.2 Monthly inspection will include the following:

- Physical integrity
- Pressure and level satisfactory
- For dry chemical extinguishers, turning the extinguisher end over end to prevent caking of fire extinguishing chemical

4.11.7 Annual maintenance check. Portable fire extinguishers will be subjected to an annual maintenance check and documented. These tests may be performed by a subcontractor.

4.11.7.1 The annual maintenance date shall be recorded and records retained for one year after the last entry or the life of the shell, whichever is less.

4.11.7.2 Hydrostatic testing. Hydrostatic testing will be performed by trained persons with suitable testing equipment and facilities. Alternate equivalent protection will be provided when portable fire extinguishers are removed from service for maintenance and recharging.

4.11.7.2.1 Test records. Test records will include the date of the test, the signature of the person who performed the test and the serial number, or other identifier, of the fire extinguisher that was tested. Such records shall be kept until the extinguisher is hydrostatically tested or until the extinguisher is taken out of service.

4.11.7.3 Dry chemical extinguishers. All pressure dry chemical extinguishers that require a 12 year hydrostatic test must be emptied and subjected to applicable maintenance procedures every 6 years. Dry chemical extinguishers having non-refillable disposable containers are exempt from this requirement. When recharging or hydrostatic testing is performed, the 6 year requirement begins from that date.

4.11.7.4 In addition to an external visual examination, an internal examination of cylinders and shells will be made prior to being tested or subjected to hydrostatic tests.

4.11.7.5 Portable extinguishers will be hydrostatically tested at the intervals listed in the table below, and under any of the following conditions:

4.11.7.5.1 When the unit has been repaired by soldering, welding, brazing, or use of patching compounds.

4.11.7.5.2 When the cylinder or shell threads are damaged.

4.11.7.5.3 When there is corrosion that has caused pitting, including corrosion under removable name plate assemblies.

4.11.7.5.4 When the extinguisher has been burned in a fire.

Types of Portable Extinguishers Used at INIS	Test Interval (years)
Carbon dioxide	5
Dry chemical, cartridge or cylinder operated, with mild steel shells	12

4.11.8 Training and education. Where portable fire extinguishers for employee use are provided in the workplace, INIS will also provide training to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.

4.11.8.1 Using a Fire Extinguisher

The "PASS" is a method for operating most common fire extinguishers. It is a four step method.

"P" stands for **PULL** the pin. This will unlock the operating handle and allow you to discharge the extinguisher.

"A" stands for **AIM** at the base of the fire.

"S" stands for **SQUEEZE** the operating handle. This will discharge the fire fighting agent.

"S" stands for **SWEEP** from side to side. Move carefully in on the fire, aiming at the base, sweep back and forth.

4.11.8.2 Training intervals. INIS shall provide the training upon initial employment and at least annually thereafter.

4.12 INIS Fire Prevention Policy

4.12.1 Inspections of fire extinguishers shall be conducted on a monthly basis to identify and correct recognizable fire hazards.

4.12.2 Exit doors, approved hardware and lock devices, exit signs, passageways, and means of emergency exit shall be inspected on a semi-annual basis to ensure their working condition and unobstructed access. Padlocking of a designated fire exit door is prohibited.

4.12.3 Interior fire doors which are part of the building design to limit the spread of fire shall be inspected and tested on a semi-annual basis to insure their working condition. Holding fire doors open by use of chocks, door wedges, or similar means is prohibited.

4.12.4 Emergency lighting shall be inspected and tested on a semi-annual basis to assure good operating condition.

4.12.5 Procedures shall be established to control the receipt, storage, handling, and use of flammable liquids and gases. The use of safety cans for handling separate storage of flammables, minimizing concentrations, and proper identification of containers are typical procedures which shall be enforced.

4.12.6 The INIS facility will be maintained as a smoke free facility.

4.12.7 The training of selected personnel in the use of fire extinguishers shall be accomplished on a periodic schedule.

4.12.8 Access of emergency vehicles shall be considered in regard to facilities' layouts. Parking of cars or other obstructions shall be restricted as necessary.

4.12.9 Fire drills shall be carried out in accord with a regular yearly schedule.

4.12.10 Proposed changes in facility layout, materials, operations, and constructions shall be reviewed by the facility engineer as early in the planning stage as possible in order to establish the necessary fire prevention measures.

4.12.11 All personnel will:

4.12.11.1 Evacuate immediately when told to do so.

4.12.11.2 Take whatever immediate steps are necessary and feasible to minimize any hazard in leaving the work area unattended.

4.12.11.3 Assemble at evacuation relocation/rally points, a predetermined safe location for attendance check.

4.12.11.4 Not reenter building until the "all clear" signal sounds or similar verbal instructions are given by responsible authority.

4.12.12 Supervisors will:

4.12.12.1 Direct the evacuation of the area and account for personnel.

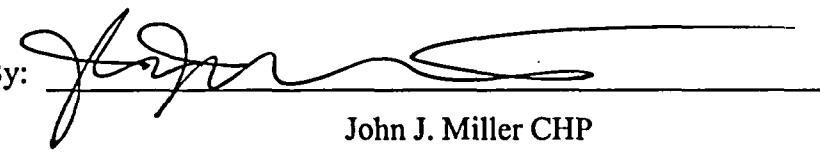
4.12.12.2 Advise the responding authority of the situation and warn of potentially hazardous conditions.

EMERGENCY ACTION PLANNING

INTERNATIONAL ISOTOPES INC

GERMANIUM TETRAFLUORIDE PRODUCTION RELEASE SCENARIOS

ALOHA® 5.3.1
MARPLOT® 3.3.1

Prepared By: 

John J. Miller CHP

3/24/05

Date

ALOHA 5.3.1 was utilized to model the dispersion of germanium tetrafluoride (GeF_4) gas during hypothetical accident scenarios developed for International Isotopes Inc.'s (INIS) Fluorine Extraction Process (FEP). In total twelve scenarios where analyzed. Because there are no published Acute Exposure Guideline Levels (AEGLs), Emergency Response Planning Guidelines (ERPGs), or Temporary Emergency Exposure Limits (TEELs) the sixteen scenarios where modeled using two Level of Concern (LOC) methodologies. Scenarios A through L where modeled using Red LOC = 35 ppm, Orange LOC = 3.75 ppm and Yellow LOC = 2.25 ppm. The most restrictive concentrations of those associated with BF_3 and SiF_4, similar heavy gas fluorine gas compounds. Scenarios A-HF through L-HF where modeled using Red LOC = 42.5 ppm, Orange LOC = 24 ppm and Yellow LOC = 0.25 ppm, derived by dividing the 10 minute AEGLs for hydrogen fluoride (HF).

These scenarios include three different source term quantities, (mass in grams of GeF_4):

1. 2,020 g – Quantity produce from a single batch.
2. 5,000 g – Quantity stored in five Type 3 or one Type 8 cylinders.
3. 10,000 g – Quantity stored in ten Type 3 or two Type 8 cylinders.

Two different release heights and durations:

1. 1 minute release duration at a height of 10 feet, "the explosion scenario".
2. 30 minute release duration at a height of 21 feet, "the system failure scenario".

The "system failure scenario" is considered the most probable. System redundancies and gas detection monitoring further reduce the likelihood of a system failure that would release significant quantities of untreated gas to the environment.

The "explosion scenario" would most likely result from an act of sabotage. Flammable materials are not utilized in the GeF_4 production process nor are significant quantities stored in the facility. Natural gas is used to heat the facility and to power the emergency electrical generator. Natural gas supplying the facility is not deemed a probable explosion source because the facility was constructed within the last five years in accordance with the National Building Code.

And two different wind conditions selected based on hourly data collected between 1/1/2004 00:00 and 12/31/02 24:00 from the NOAA/Air Resources Laboratory Field Resources Division IDA Station.

1. Wind direction of 209° at 9.9 MPH
2. Wind direction of 347° at 4.2 MPH.

Direction corresponds to the maximum occurring direction of the two predominate directional peaks. Speed corresponding to the Median speed measured in the two maximum directions. Graphs summarizing this data have been included for reference.

ALOHA 5.3.1 modeled plume footprints greater than 100 yards in length with corresponding LOC concentrations in ppm where overlaid on MARPLOT 3.3.1 map of the St. Leon Industrial Park. It should be noted that the long foot points associated with Scenarios A-HF through L-HF occur as a result of the low concentration of 0.25 ppm GeF_4 (1 ppm HF) used for the Yellow LOC. This concentration is considered conservative when compared against the National

Institute for Occupational Safety and Health (NIOSH) 15 minute TWA Recommended Exposure Level of 6 ppm HF (1.5 ppm GeF_4).

Germanium Tetrafluoride added to the ALOHA Chemical Library by INIS utilizing chemical data obtained from the Matheson Gas Data Book, 7th Edition, 2001.

Homes and business co-located in and near the St. Leon Industrial Park added to the Bonneville County MARPLOT Map by the INIS.

The results of these scenarios will aid in the development of a Site Emergency Response Plan as well as a Security Plan.

Scenario parameters are provided on the following page.

A map of Idaho Falls with the location of the facility shown as a red bull's eye is provided on the preceding page.

SITE DATA INFORMATION

Location:	1359 Commerce Way, Idaho Falls, ID
Building Type:	Unsheltered double storied
Default Air Exchanges Per Hour:	0.37

CHEMICAL INFORMATION

Chemical Name	GERMAINUM TETRAFLUORIDE					
Formula	GeF4					
CAS Number	7783-58-6					
Molecular Weight	148.6	g				
Melting Point @ 4 atm	258.15	K	-15	C	5	F
Boiling point @ 101.325 kPa (1 atm) (sublimes)	236.65	K	-36.5	C	-33.7	F
Critical Temperature	366.81	K	93.66	C	200.58	F
Critical Pressure	54.82	bar	54.1	atm	795.1	psi
Critical Volume	152.93	cm^3/mol				
Critical Density	0.9716	g/cm^3				
Critical Compressibility Factor	0.275					
Acentric Factor	0.351					
Density of Liquid @ 25°C	2.162	g/cm^3				
Coefficient of Thermal Expansion of Liquid @ 25°C	0.00333	l/°C				
Surface Tension @ 25°C	9.44	dynes/cm				
Density of Gas @ 1 atm and 70°F (21.1°C)	6.154	kg/m^3	0.3842	lb/ft^3		
Relative Density of gas @ 1 atm and 70°F (Air = 1)	5.131					
Heat Capacity of Gas @ 25°C, Constant Pressure (CP)	0.551	kJ/(kg-K)	0.132	BTU/(lb-R)		
Heat Capacity of Gas @ 25°C, Constant Volume (CV)	0.495	kJ/(kg-K)	0.118	BTU/(lb-R)		
Ratio of Heat Capacities for Gas, CP/CV	1.113					
Entropy of Gas @ 25°C	301.54	J/(mol-K)				
Liquid Volume	58.548	cm^3/mol				
Viscocity of Gas @ 25°C	172.31	micropoise				
Viscocity of Liquid @ 25°C	0.242	centipoise				
Thermal Conductivity of Gas @ 25°C	0.01164	watts/(m-K)				
Thermal Conductivity of Liquid @ 25°C	0.0666	watts/(m-K)				

ALOHA EXPOSURE LEVELS OF CONCERN

YELLOW LOC (TEEL-1):	2.25 ppm (Scenarios A-L) 0.25 ppm (Scenarios A-HF – L-HF)
ORANGE LOC (TEEL-2):	3.75 ppm (Scenarios A-L) 24 ppm (Scenarios A-HF – L-HF)
RED LOC (TEEL-3):	35 ppm (Scenarios A-L) 42.5 ppm (Scenarios A-HF – L-HF)

Levels of Concern (LOC) and Temporary Emergency Exposure Limits (TEEL) derived using most restrictive of those associated with BF_3 and SiF_4, similar heavy gas fluorine gas compounds and as ¼ the 10 min. AEGL for HF

ATMOSPHERIC INFORMATION

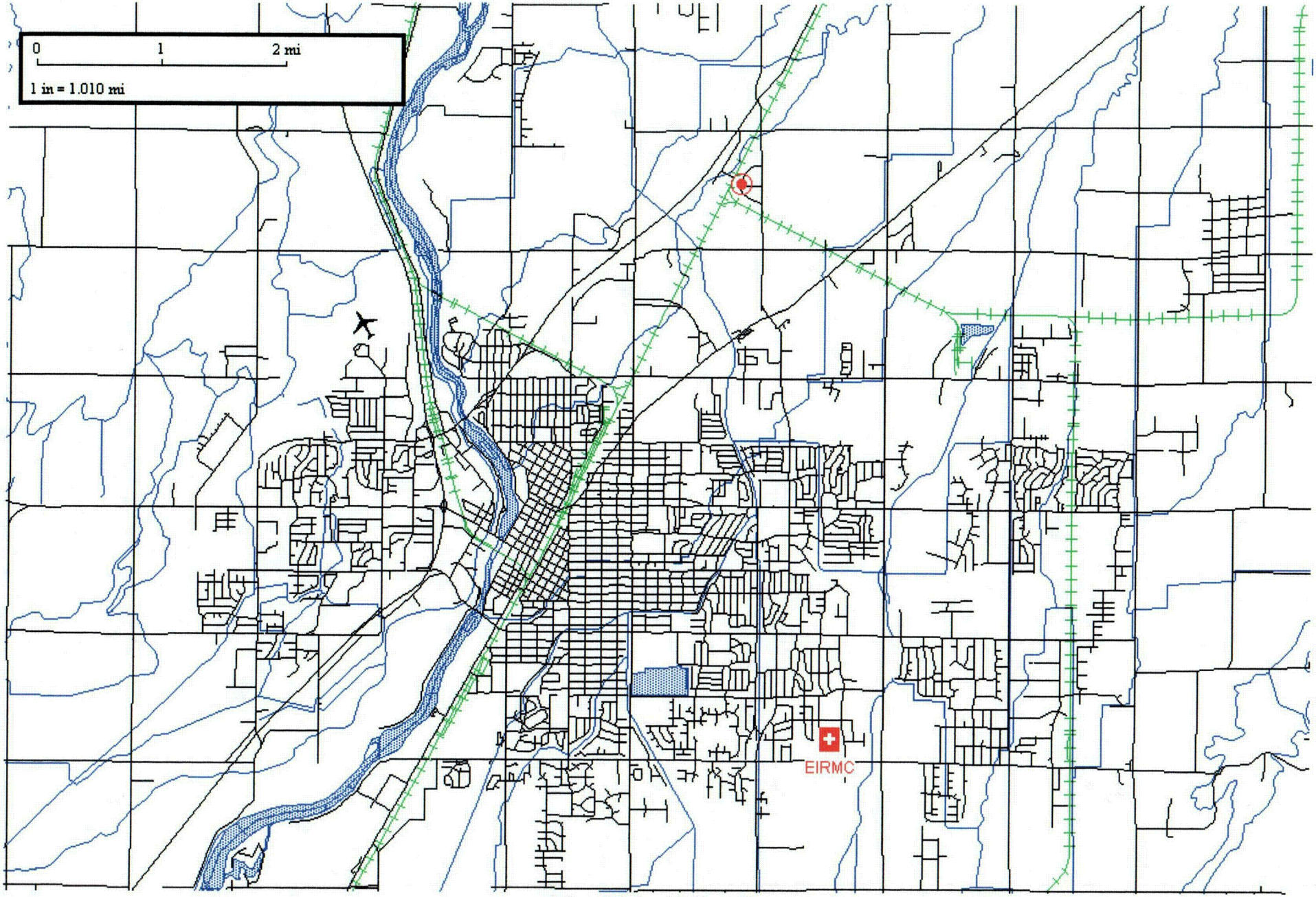
Wind Condition A:	9.9 mph from 209° true at 15 meters		
Wind Condition B:	4.2 mph from 347° true at 15 meters		
Ground Roughness:	urban or forest	Cloud Cover:	3 tenths
Air Temperature:	60° F	Relative Humidity:	15%
Stability Class:	B	No Inversion Height	

Wind condition data obtained from NOAA/Air Resources Laboratory Field Resources Division IDA Station. Graphs summarizing hourly wind measurements are included.

MARPLOT

MAP

Idaho Falls, ID



Map Idaho Falls, ID

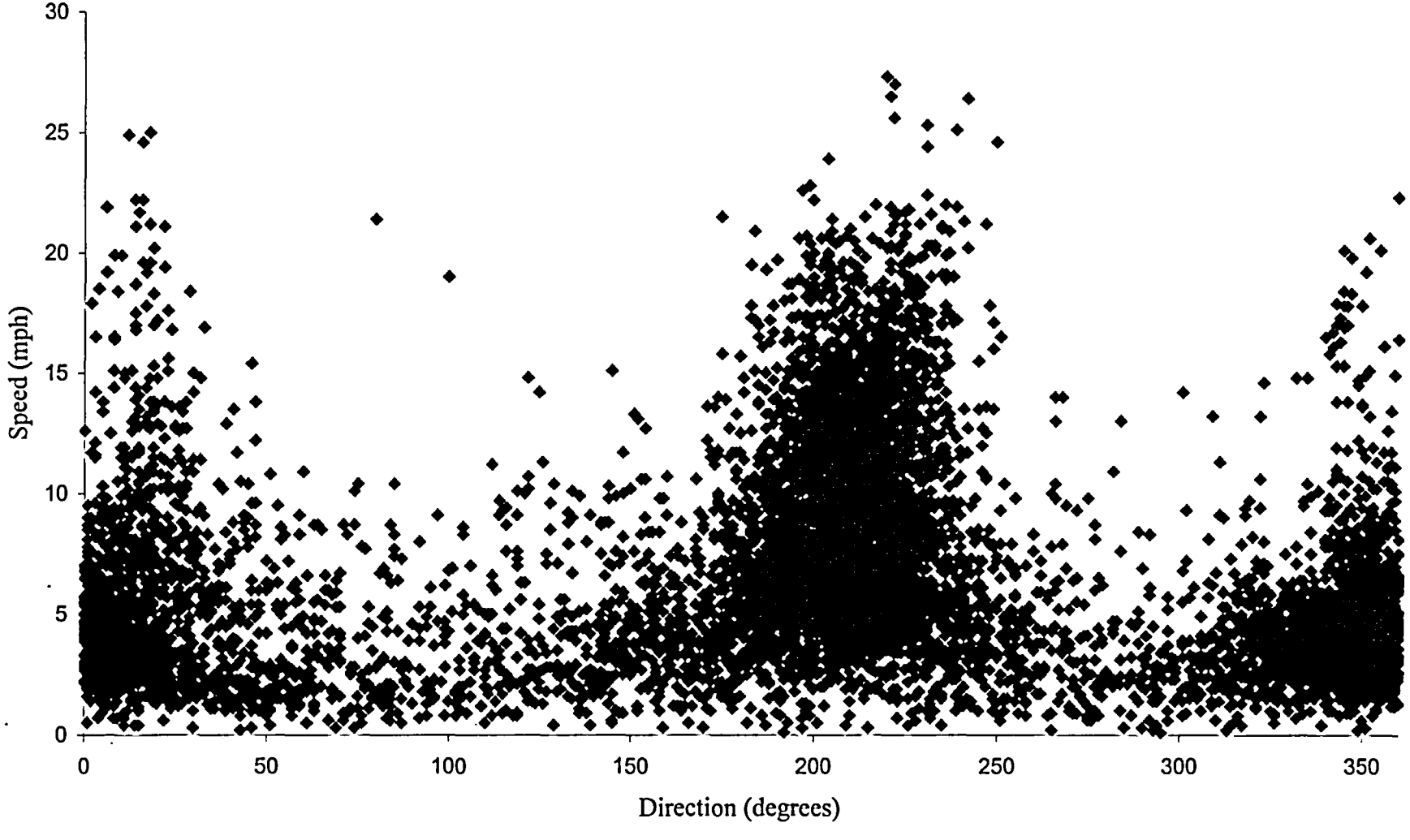
Summary Charts

15 m Hourly Wind Measurement

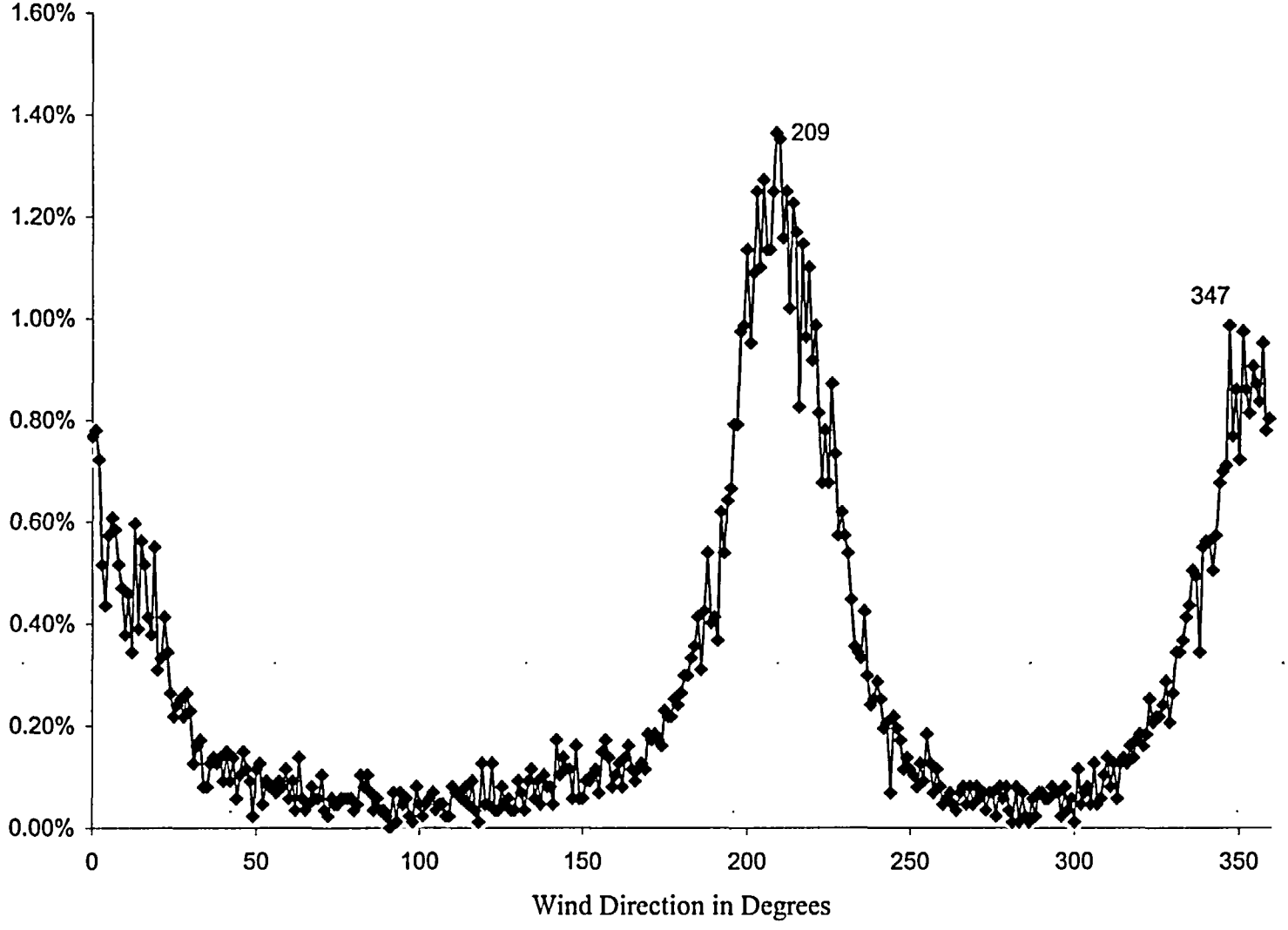
1/1/2004 00:00 - 12/31/02 24:00

NOAA/ARLFRD IDA Station

Hourly 15m Wind Speed and Direction
IDA NOAA Monitoring Station 1/1/2004-12/31/2004



15 m Hourly Percent Occurrence -Wind Direction
IDA NOAA Monitoring Station 1/1/2004-12/31/2004



SITE DATA INFORMATION

Location:	1359 Commerce Way, Idaho Falls, ID
Building Type:	Unsheltered double storied
Default Air Exchanges Per Hour:	0.37

CHEMICAL INFORMATION

Chemical Name	GERMAINUM TETRAFLUORIDE					
Formula	GeF4					
CAS Number	7783-58-6					
Molecular Weight	148.6	g				
Melting Point @ 4 atm	258.15	K	-15	C	5	F
Boiling point @ 101.325 kPa (1 atm) (sublimes)	236.65	K	-36.5	C	-33.7	F
Critical Temperature	366.81	K	93.66	C	200.58	F
Critical Pressure	54.82	bar	54.1	atm	795.1	psi
Critical Volume	152.93	cm^3/mol				
Critical Density	0.9716	g/cm^3				
Critical Compressibility Factor	0.275					
Acentric Factor	0.351					
Density of Liquid @ 25°C	2.162	g/cm^3				
Coefficient of Thermal Expansion of Liquid @ 25°C	0.00333	l/°C				
Surface Tension @ 25°C	9.44	dynes/cm				
Density of Gas @ 1 atm and 70°F (21.1°C)	6.154	kg/m^3	0.3842	lb/ft^3		
Relative Density of gas @ 1 atm and 70°F (Air = 1)	5.131					
Heat Capacity of Gas @ 25°C, Constant Pressure (CP)	0.551	kJ/(kg-K)	0.132	BTU/(lb-R)		
Heat Capacity of Gas @ 25°C, Constant Volume (CV)	0.495	kJ/(kg-K)	0.118	BTU/(lb-R)		
Ratio of Heat Capacities for Gas, CP/CV	1.113					
Entropy of Gas @ 25°C	301.54	J/(mol-K)				
Liquid Volume	58.548	cm^3/mol				
Viscocity of Gas @ 25°C	172.31	micropoise				
Viscocity of Liquid @ 25°C	0.242	centipoise				
Thermal Conductivity of Gas @ 25°C	0.01164	watts/(m-K)				
Thermal Conductivity of Liquid @ 25°C	0.0666	watts/(m-K)				

ALOHA EXPOSURE LEVELS OF CONCERN

YELLOW LOC (TEEL-1):	2.25 ppm (Scenarios A-P) 0.25 ppm (Scenarios A-HF – P-HF)
ORANGE LOC (TEEL-2):	3.75 ppm (Scenarios A-P) 24 ppm (Scenarios A-HF – P-HF)
RED LOC (TEEL-3):	35 ppm (Scenarios A-P) 42.5 ppm (Scenarios A-HF – P-HF)

Levels of Concern (LOC) and Temporary Emergency Exposure Limits (TEEL) derived using most restrictive of those associated with BF_3 and SiF_4, similar heavy gas fluorine gas compounds and as ¼ the 10 min. AEGL for HF

ATMOSPHERIC INFORMATION

Wind Condition A:	9.9 mph from 209° true at 15 meters		
Wind Condition B:	4.2 mph from 347° true at 15 meters		
Ground Roughness:	urban or forest	Cloud Cover:	3 tenths
Air Temperature:	60° F	Relative Humidity:	15%
Stability Class:	B	No Inversion Height	

Wind condition data obtained from NOAA/Air Resources Laboratory Field Resources Division IDA Station. Graphs summarizing hourly wind measurements are included.

Emergency Action Planning
Release Scenarios A-L

SCENARIO A (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	2020 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.0742 lbs/sec			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO A (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	51	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone:	163	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	213	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO B (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	5000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.184 lbs/sec			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO B (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	82	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone:	262	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	342	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO C (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	10000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.367 lbs/sec			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO C (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone:	117	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone:	376	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	490	yards

SCENARIO D (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	2020 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.0742 lbs/sec			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO D (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	77	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone:	248	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	315	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO E (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	5000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.184 lbs/sec			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO E (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone:	123	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone:	371	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	458	yards

SCENARIO F (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	10000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.367 lbs/sec			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO F (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone:	176	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone:	492	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	602	yards

SCENARIO G (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	67.33 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.148 lbs/min			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO G (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	13	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone*:	30	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone*:	37	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO H (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	166.7 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.368 lbs/min			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO H (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	13	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone*:	46	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone*:	60	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO I (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	333.34 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.735 lbs/min			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO I (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	21	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone*:	64	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone*:	83	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO J (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	67.33 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.148 lbs/min			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO J (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	13	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone*:	44	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone*:	57	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO K (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	166.7 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.368 lbs/min			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO K (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	21	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone*:	68	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone*:	89	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO L (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	333.34 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.735 lbs/min			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO L (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	35 ppm = TEEL-3	Max Threat Zone*:	29	yards
Orange LOC	3.75 ppm = TEEL-2	Max Threat Zone*:	97	yards
Yellow LOC	2.25 ppm = TEEL-1	Max Threat Zone:	129	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

ALOHA/MARPLOT

Plume Footprints

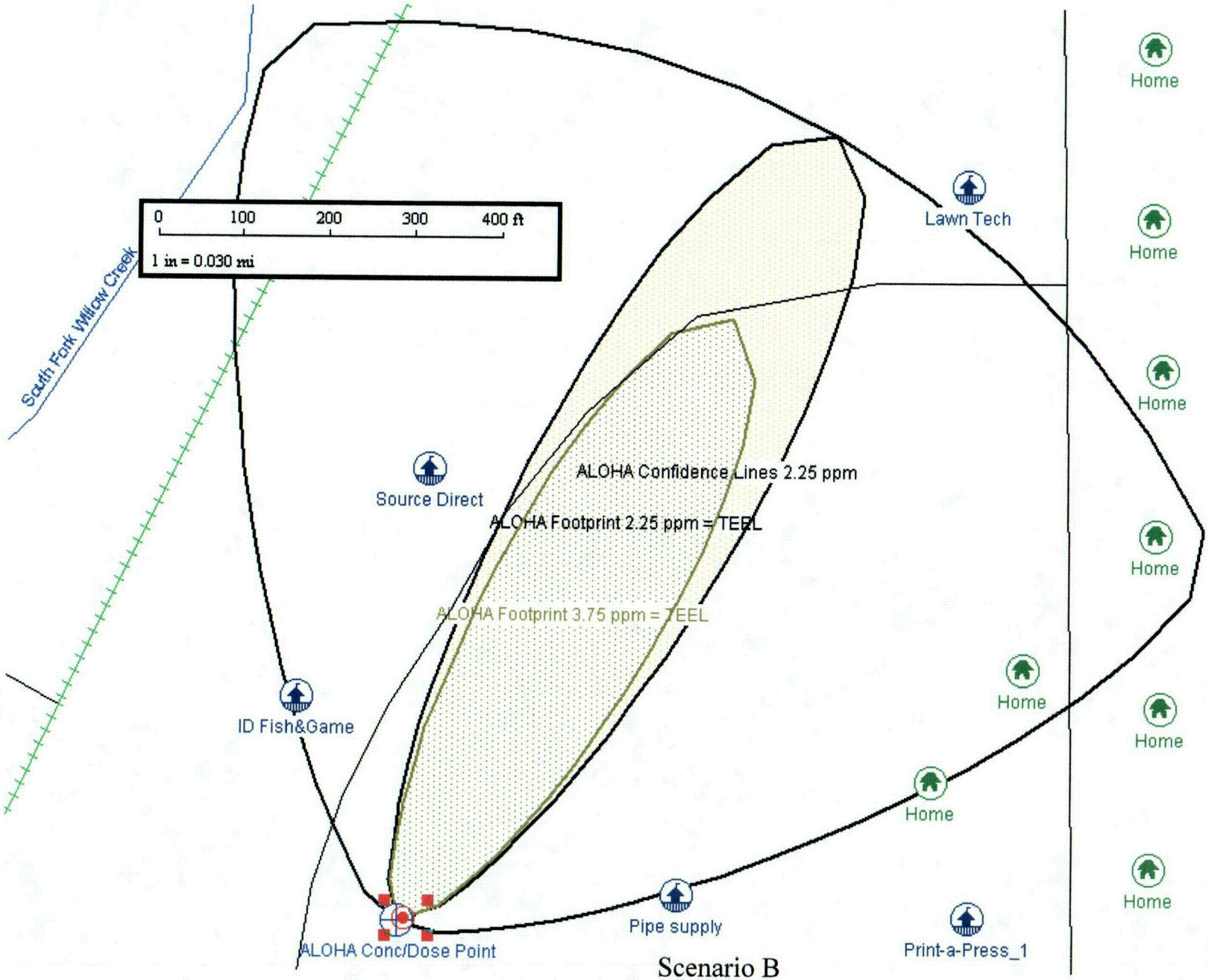
Scenarios A-L

St. Leon Industrial Park

Bonneville County, Idaho

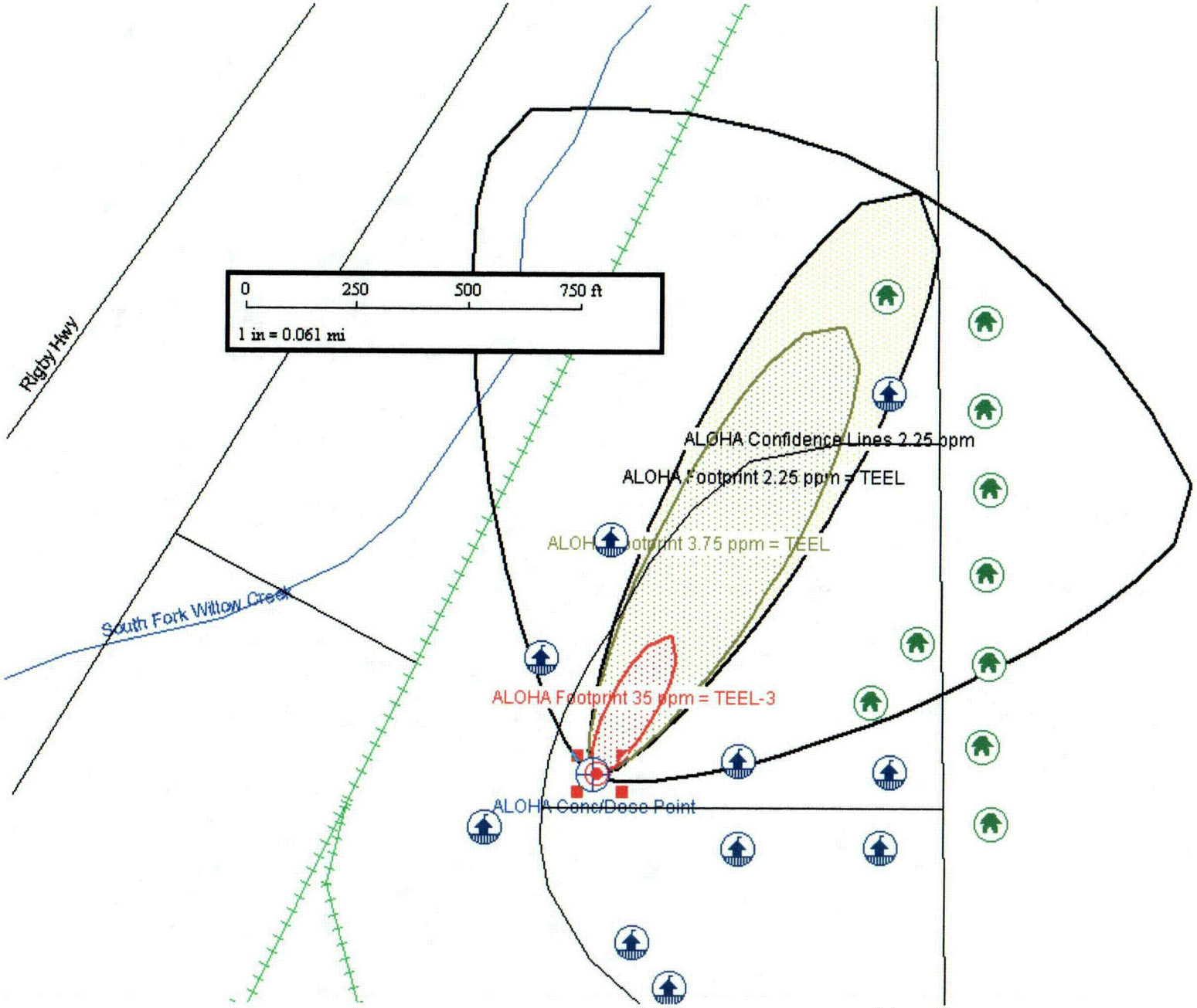
Scenario A

C02



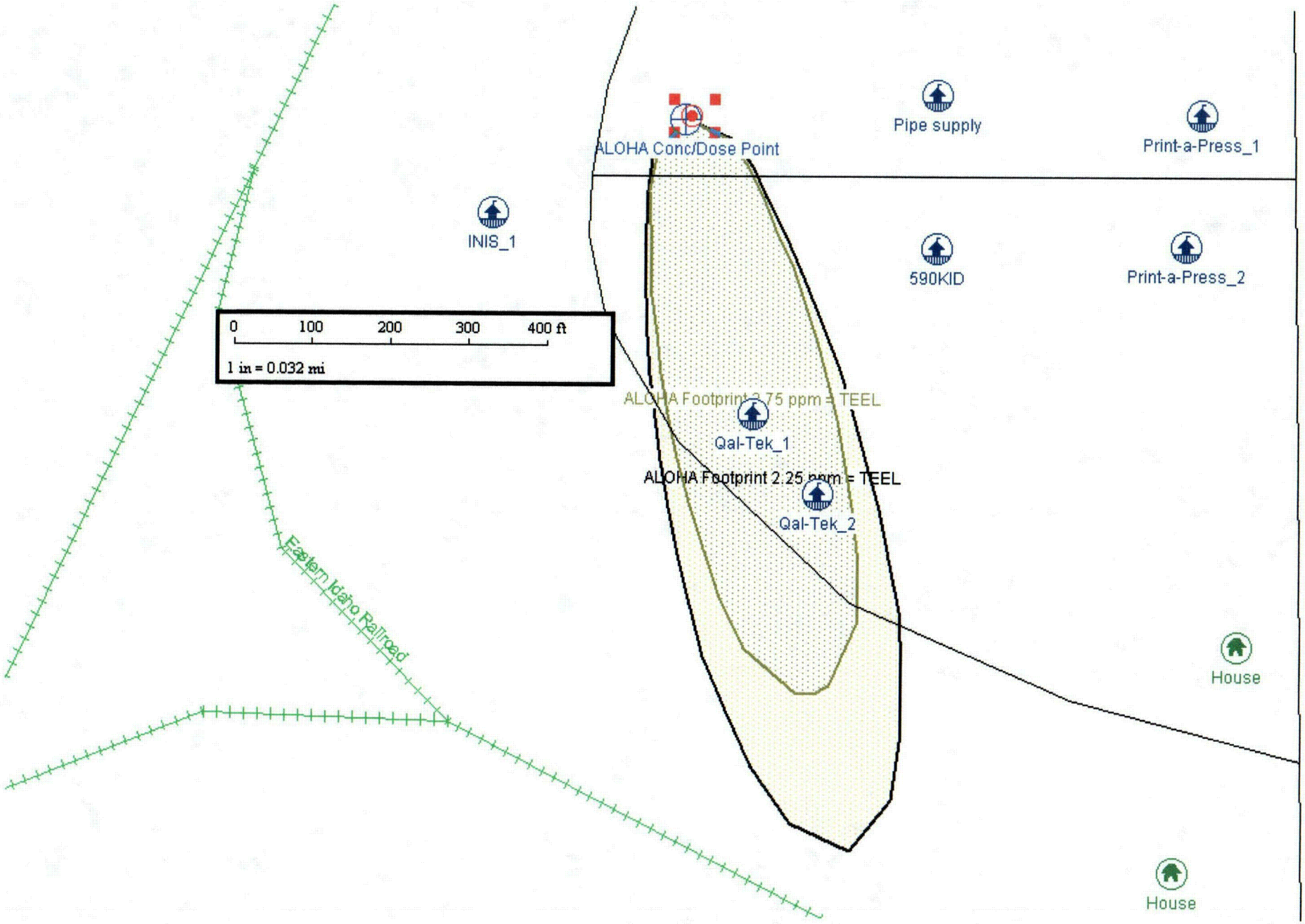
Scenario B

C03



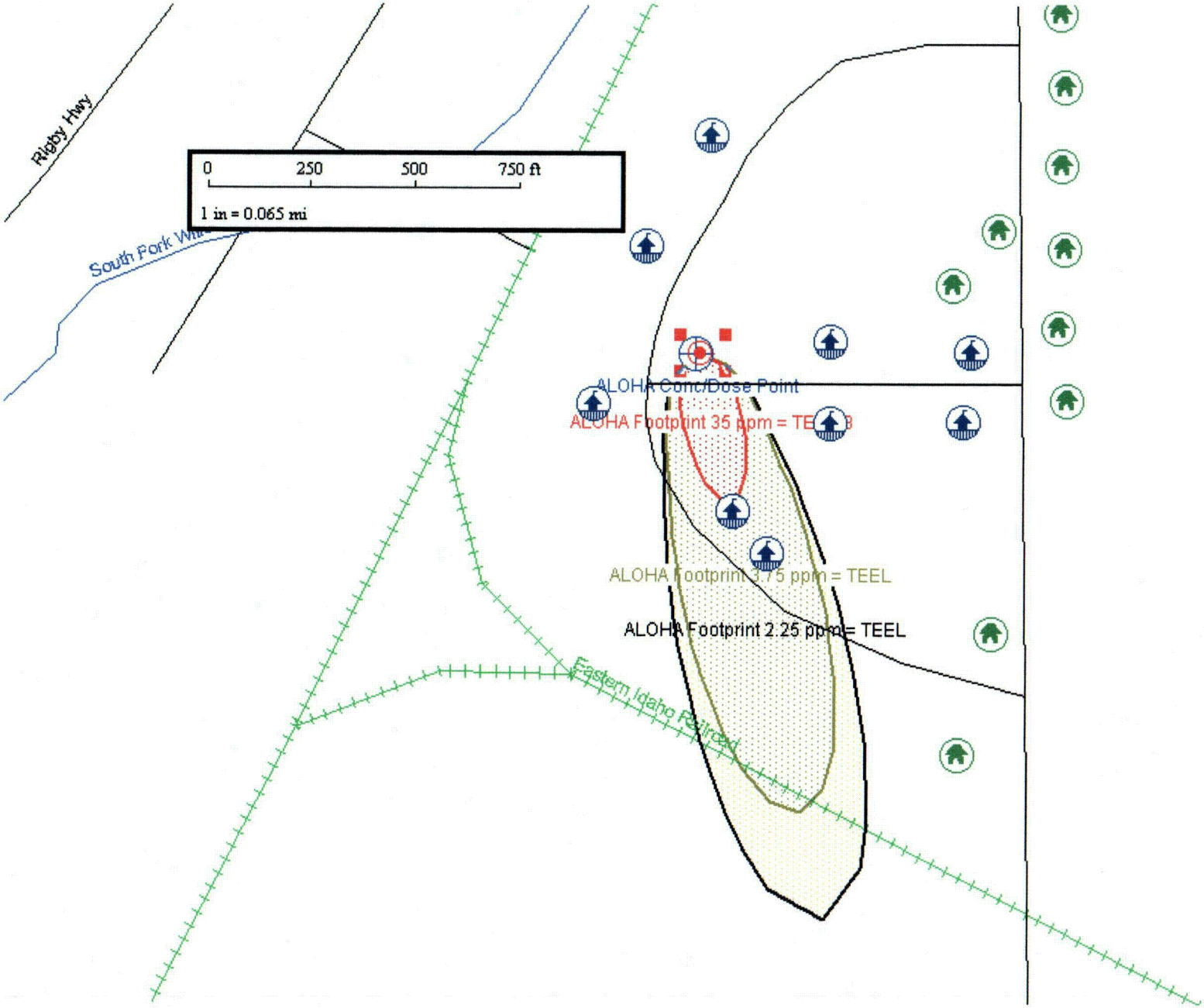
Scenario C

C04



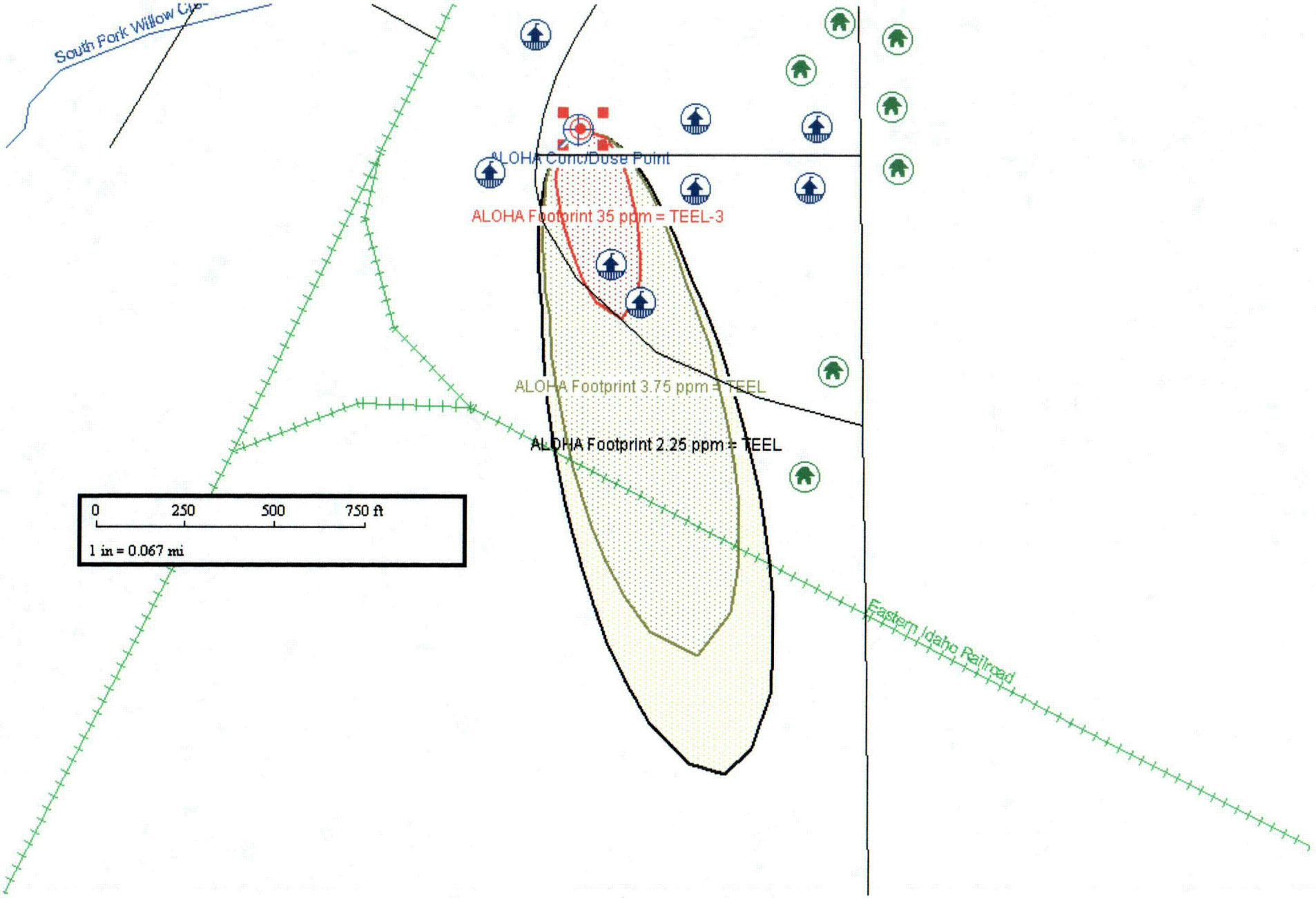
Scenario D

C05



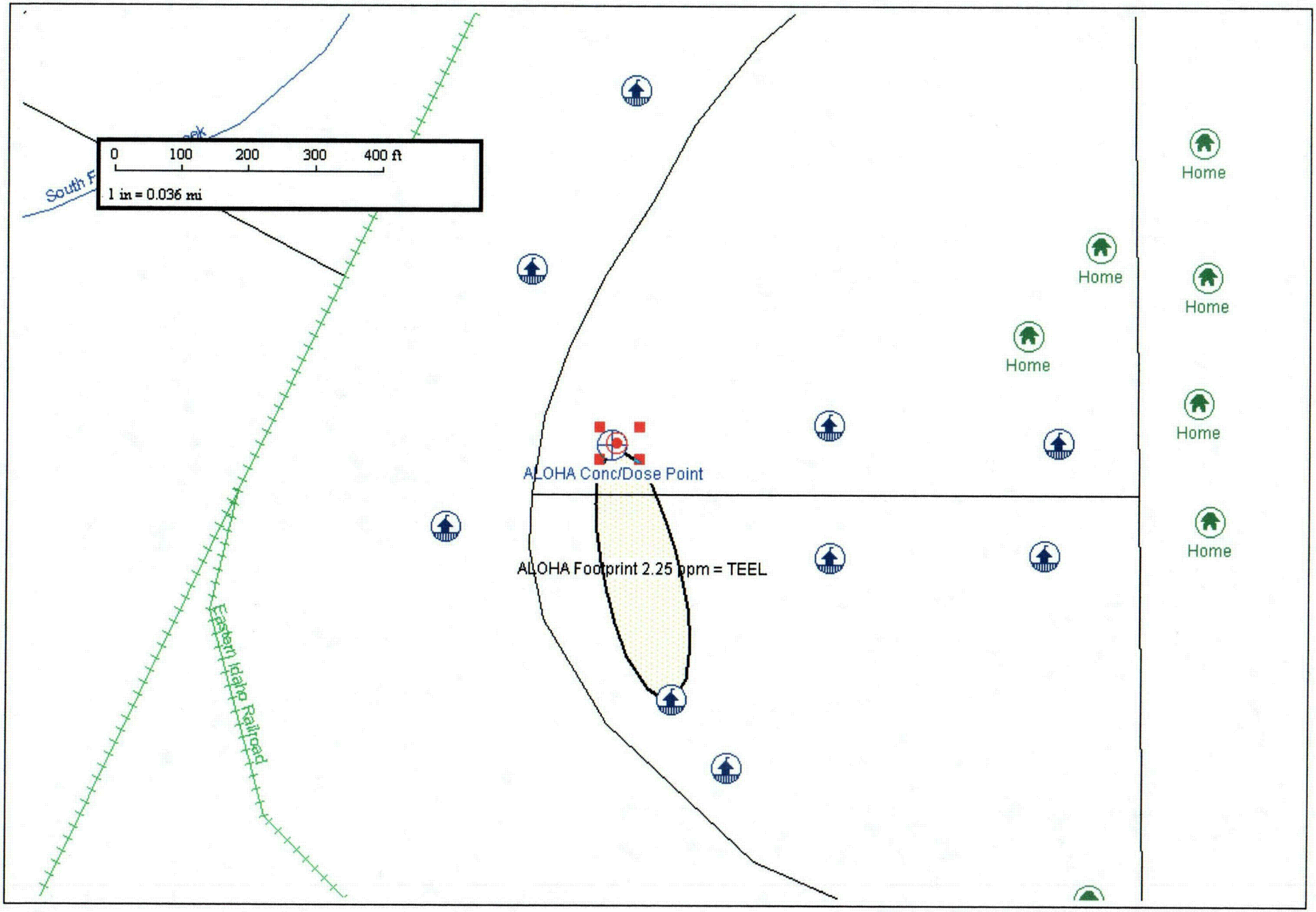
Scenario E

C06



Scenario F

C07


0 100 200 300 400 ft
1 in = 0.036 mi
South F
Eastern Idaho Railroad
ALOHA Conc/Dose Point
ALOHA Footprint 2.25 ppm = TEEL
Home
Home
Home
Home
Home
Home

Scenario L

Emergency Action Planning
Release Scenarios A-HF-L-HF

SCENARIO A-HF (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	2020 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.0742 lbs/sec			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO A-HF (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	47	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	62	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	666	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO B-HF (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	5000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.184 lbs/sec			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO B-HF (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	74	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	99	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	1016	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO C-HF (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	10000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.367 lbs/sec			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO C-HF (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone:	105	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone:	144	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	1341	yards

Emergency Action Planning
Release Scenarios A-HF-L-HF

SCENARIO D-HF (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	2020 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.0742 lbs/sec			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO D-HF (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	69	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	94	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	765	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO E-HF (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	5000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.184 lbs/sec			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO E-HF (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone:	110	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone:	150	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	1042	yards

SCENARIO F-HF (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	10000 g	Source Height:	10 ft	Release Duration:	1 min.
Release Rate:	0.367 lbs/sec			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO F-HF (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone:	159	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone:	214	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	1330	yards

Emergency Action Planning
Release Scenarios A-HF-L-HF

SCENARIO G-HF (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	67.33 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.148 lbs/min			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO G-HF (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	13	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	13	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	115	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO H-HF (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	166.7 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.368 lbs/min			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO H-HF (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	13	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	19	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	182	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO I-HF (Wind Condition A)
SOURCE STRENGTH INFORMATION

Direct Source:	333.34 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.735 lbs/min			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO I-HF (Wind Condition A)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	19	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	24	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	262	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

Emergency Action Planning
Release Scenarios A-HF-L-HF

SCENARIO J-HF (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	67.33 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.148 lbs/min			Total Amount Released:	4.45 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO J-HF (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	13	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	16	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	176	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO K-HF (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	166.7 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.368 lbs/min			Total Amount Released:	11.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO K-HF (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	19	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	25	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	284	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

SCENARIO L-HF (Wind Condition B)
SOURCE STRENGTH INFORMATION

Direct Source:	333.34 g/min	Source Height:	21 ft	Release Duration:	30 min.
Release Rate:	0.735 lbs/min			Total Amount Released:	22.0 lb

Note: This chemical may flash boil and/or result in two phase flow

SCENARIO L-HF (Wind Condition B)
FOOTPRINT INFORMATION

Model Run:	Heavy Gas			
Red LOC	42.5 ppm = TEEL-3	Max Threat Zone*:	25	yards
Orange LOC	24 ppm = TEEL-2	Max Threat Zone*:	36	yards
Yellow LOC	0.25 ppm = TEEL-1	Max Threat Zone:	408	yards

*Note: Footprint was not drawn because effects of near-field patchiness make dispersion predictions unreliable for short distances

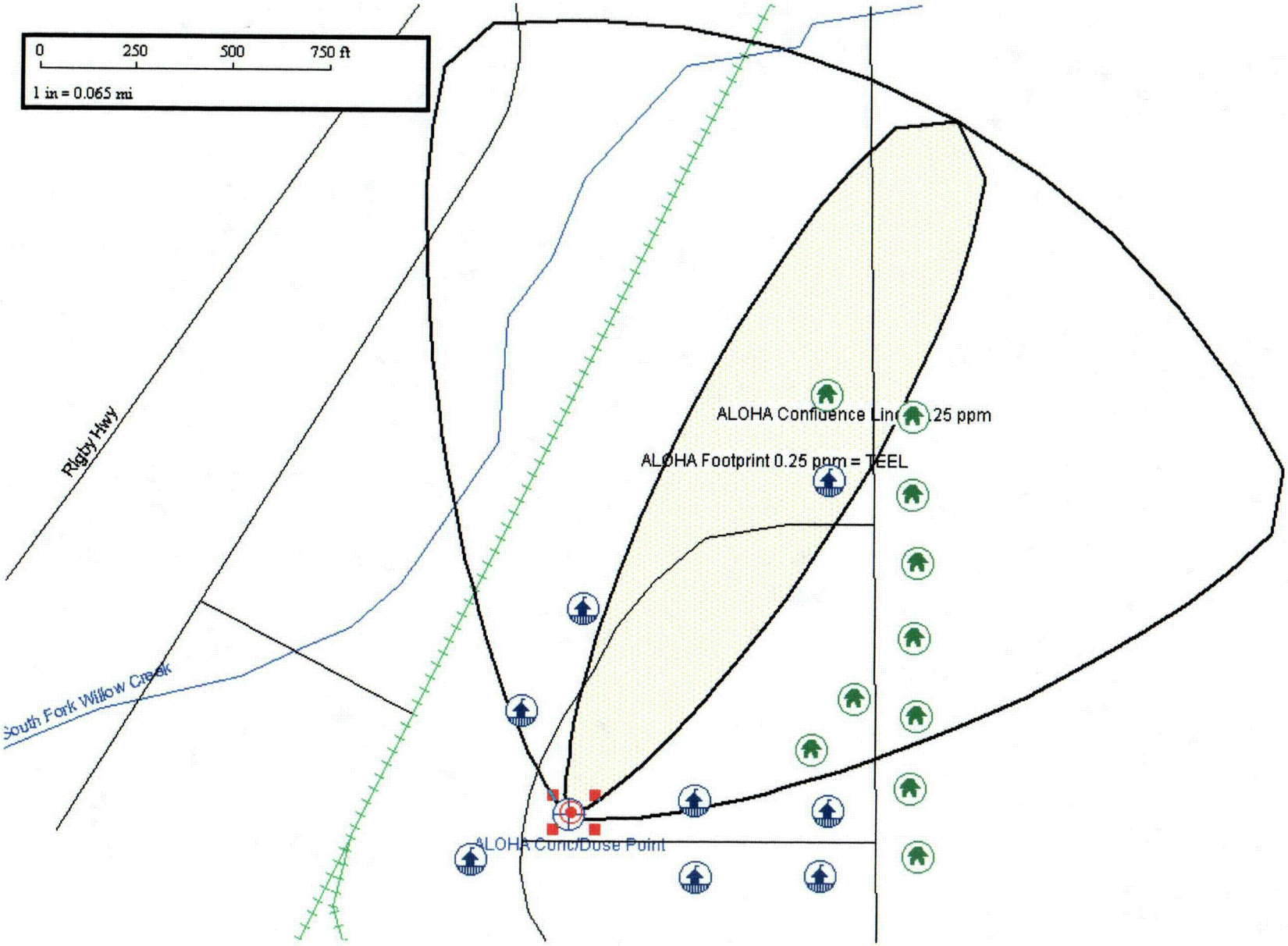
ALOHA/MARPLOT

Plume Footprint

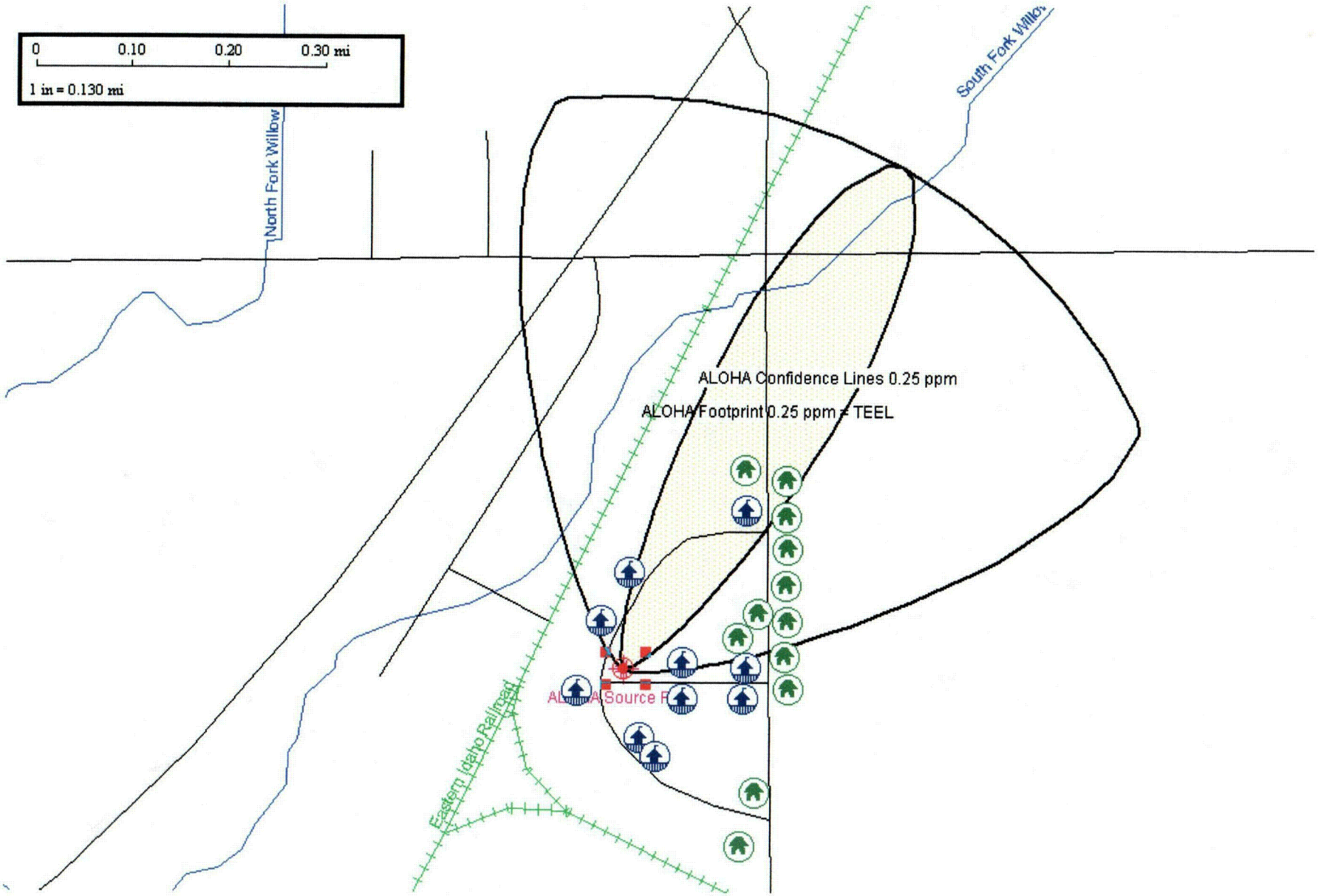
Scenarios AHF-LHF

St. Leon Industrial Park

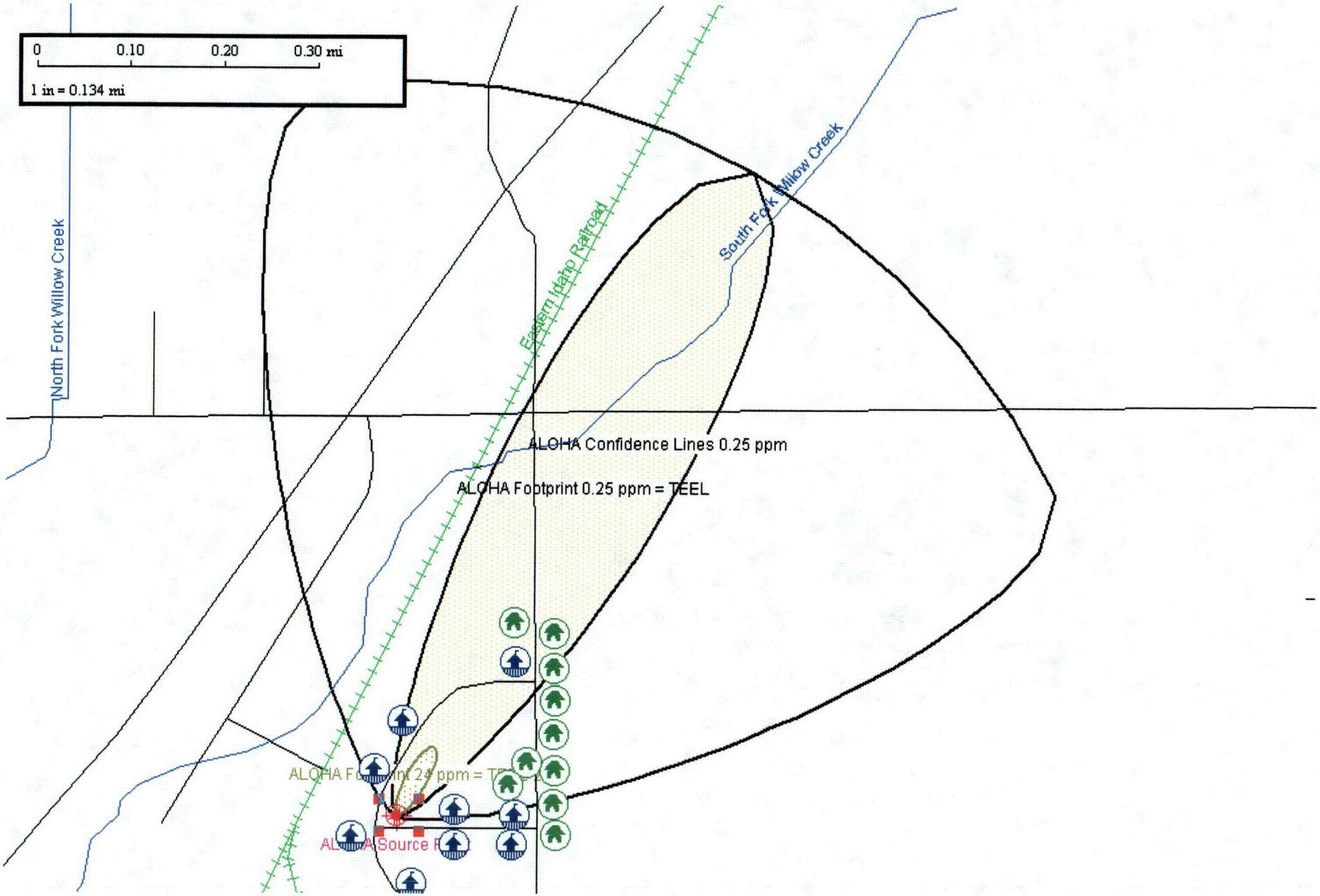
Bonneville County, Idaho



Scenario A-HF

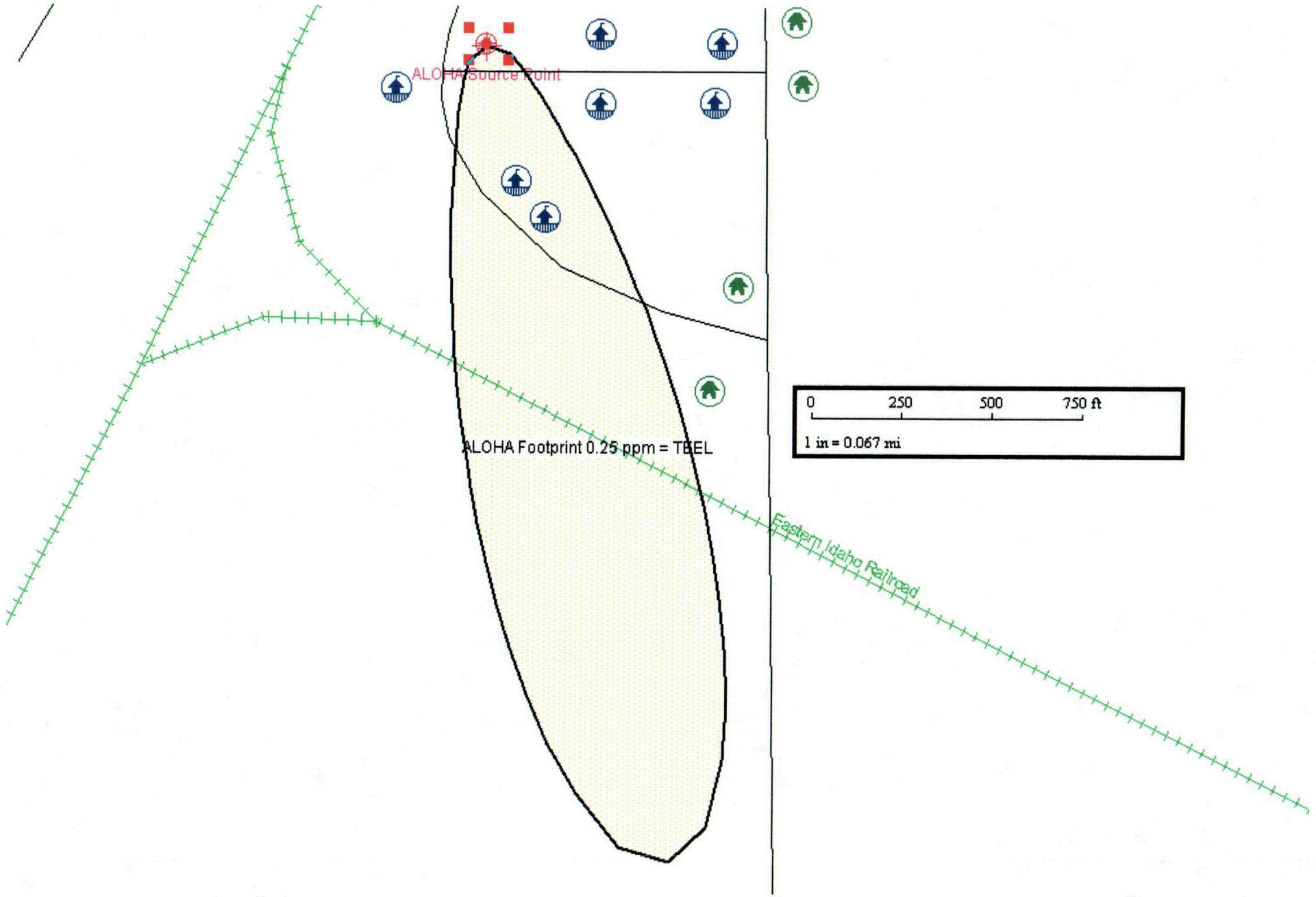


Scenario B-HF



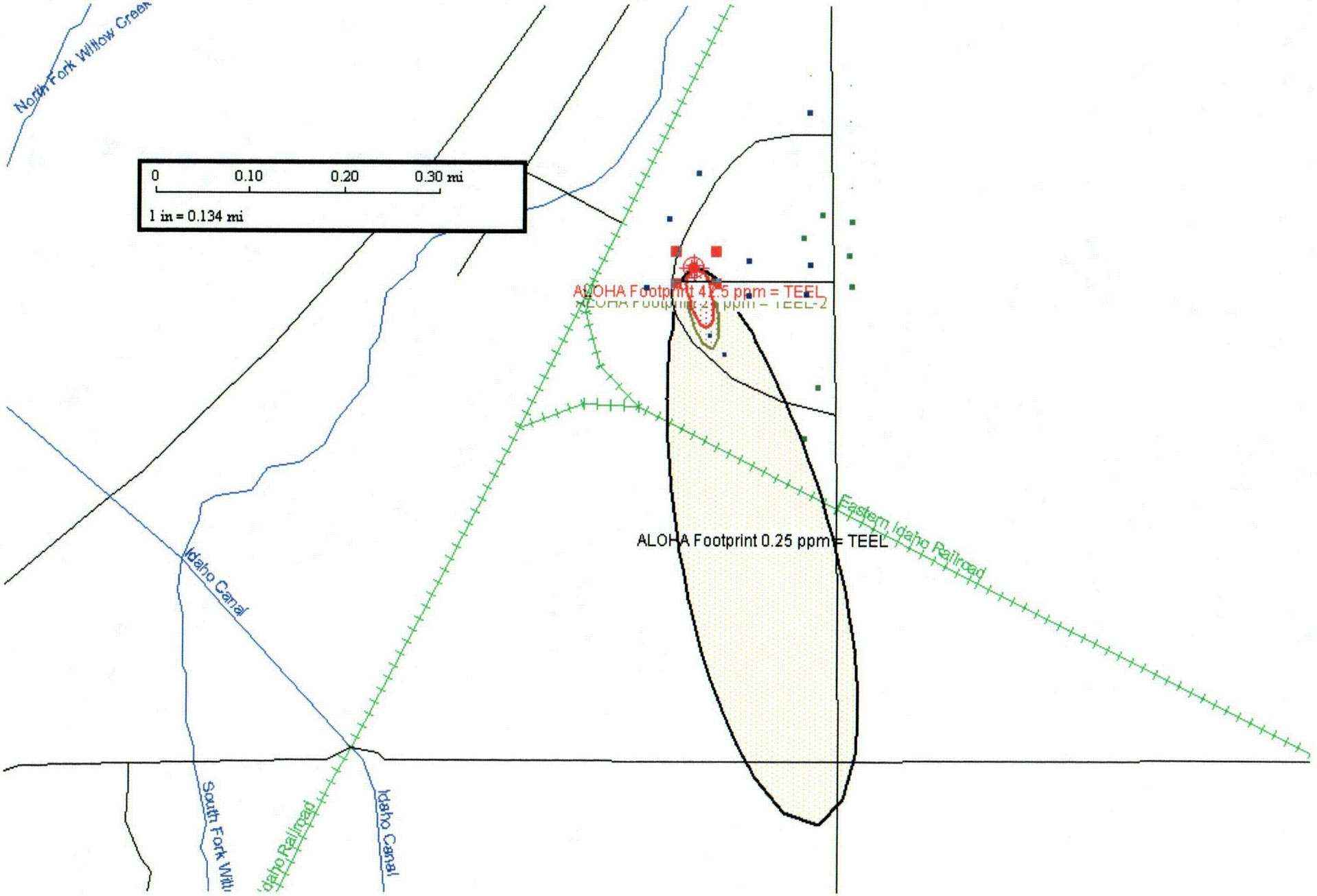
Scenario C-HF

C11



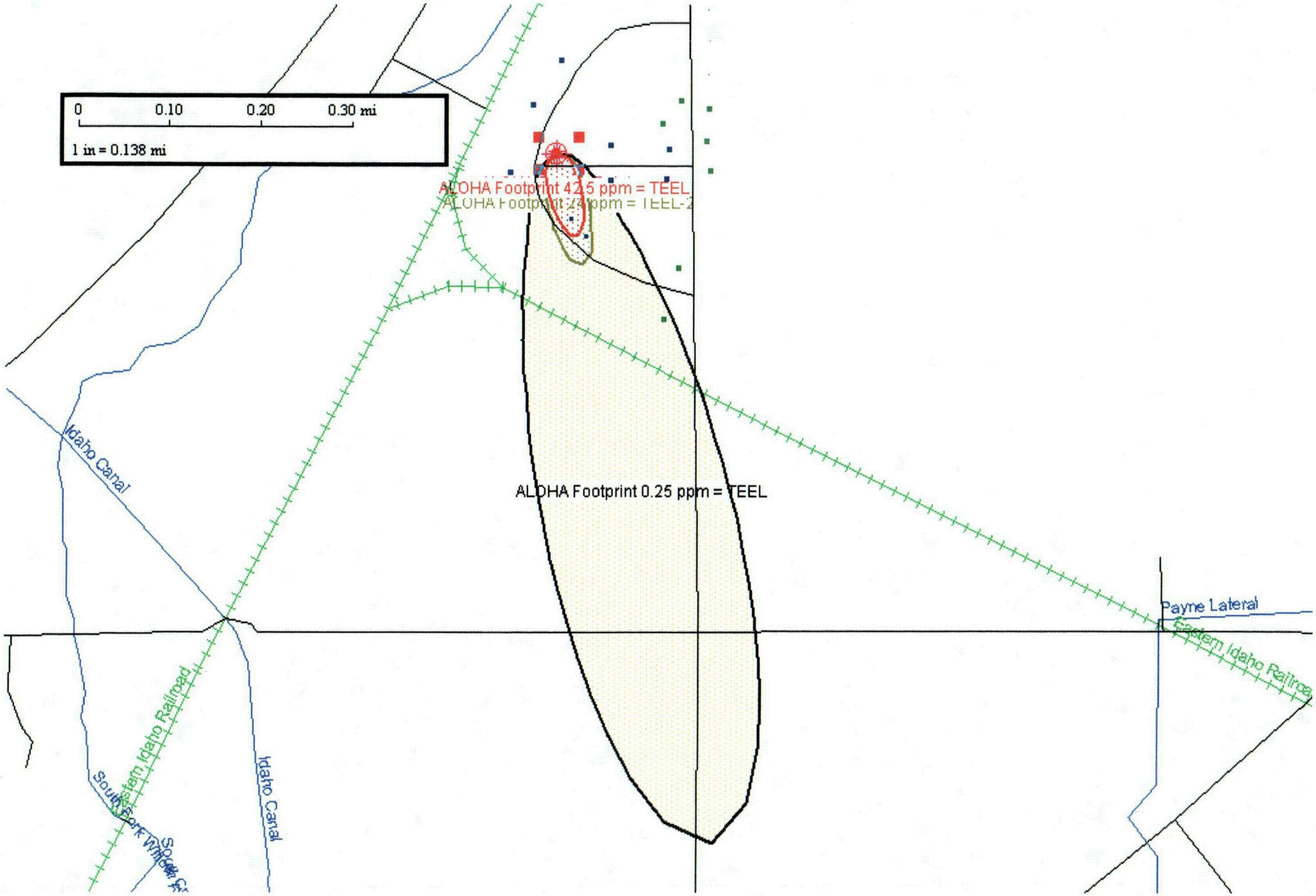
Scenario D-HF

C12



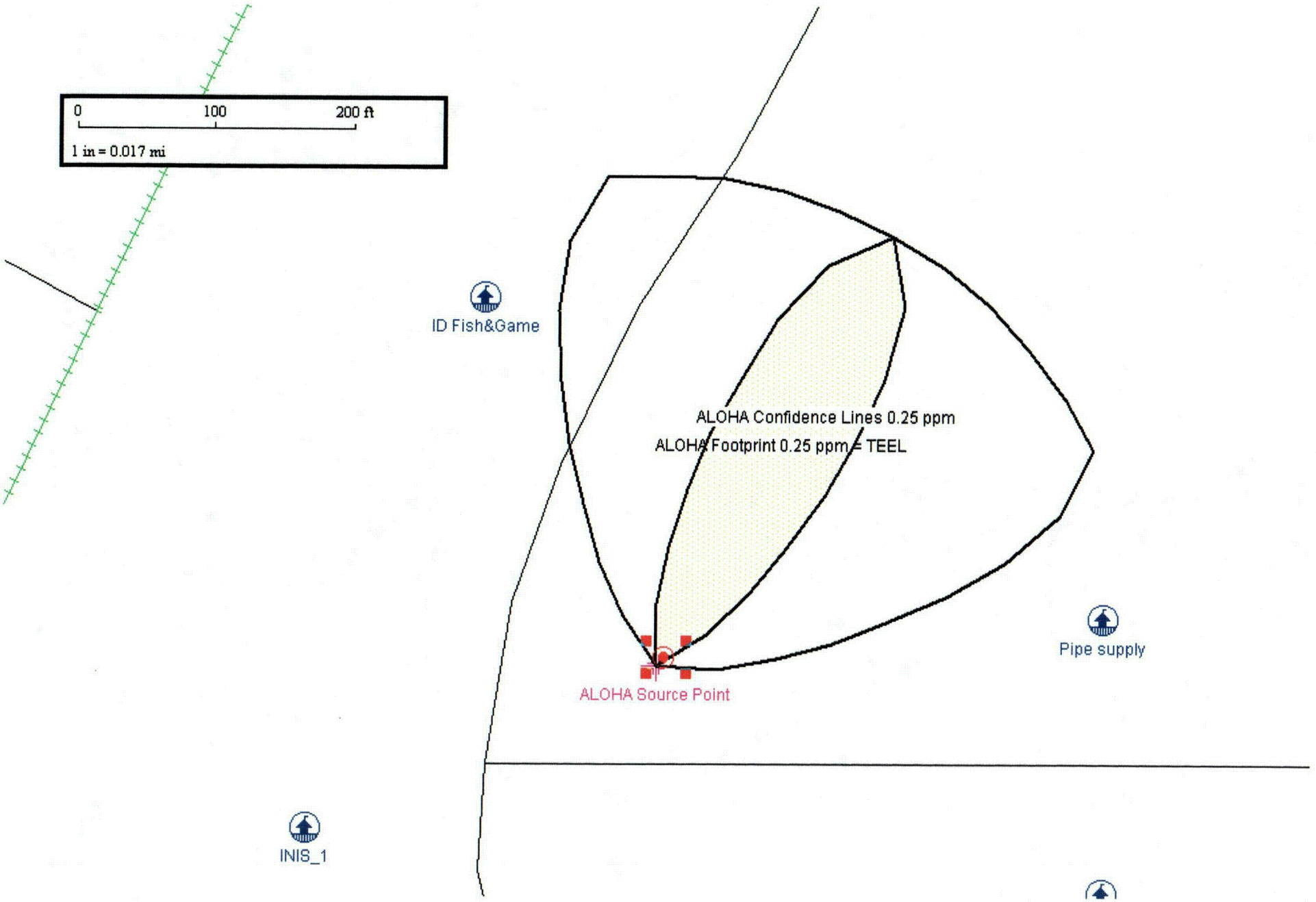
Scenario E-HF

C13

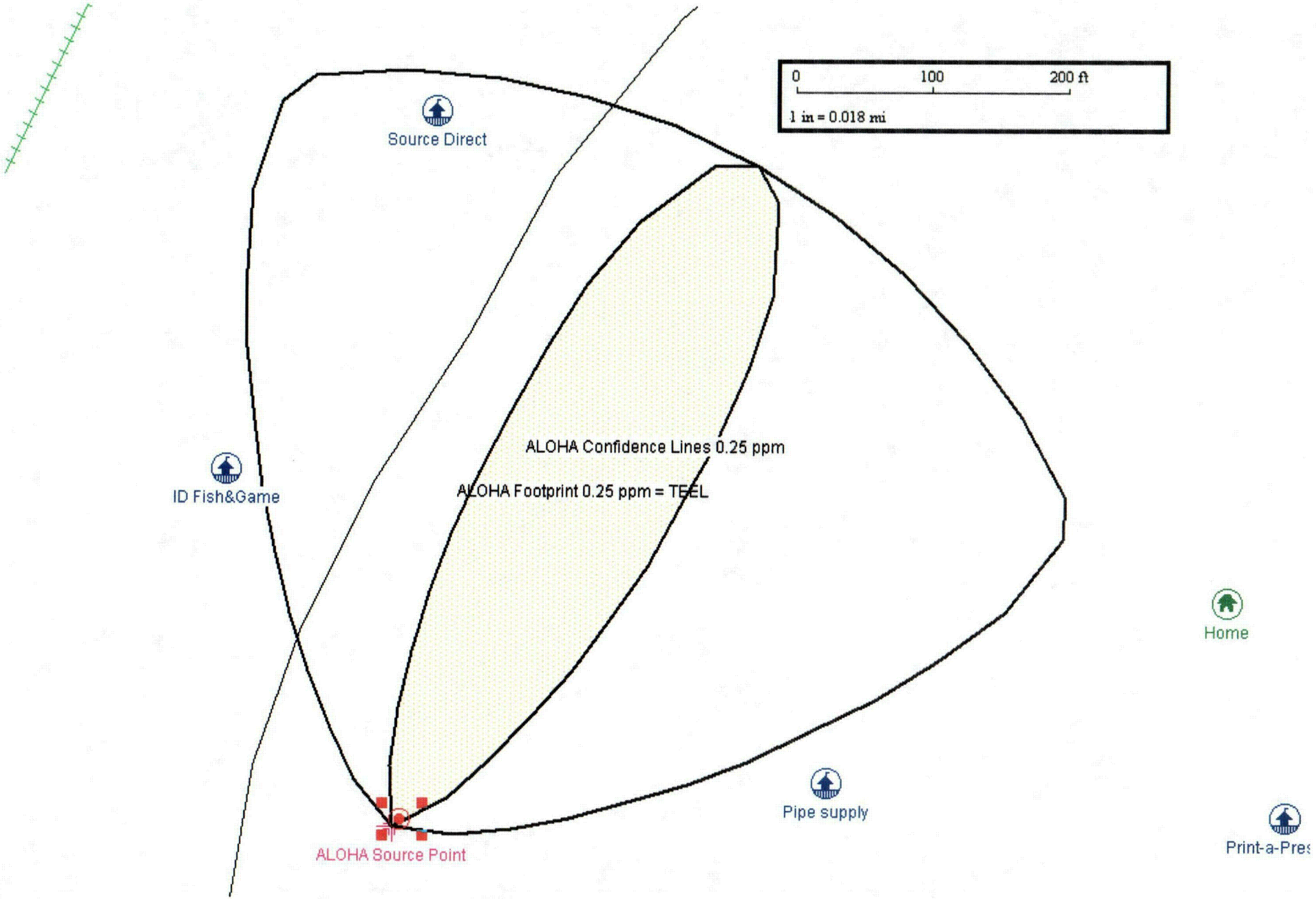


Scenario F-HF

C14

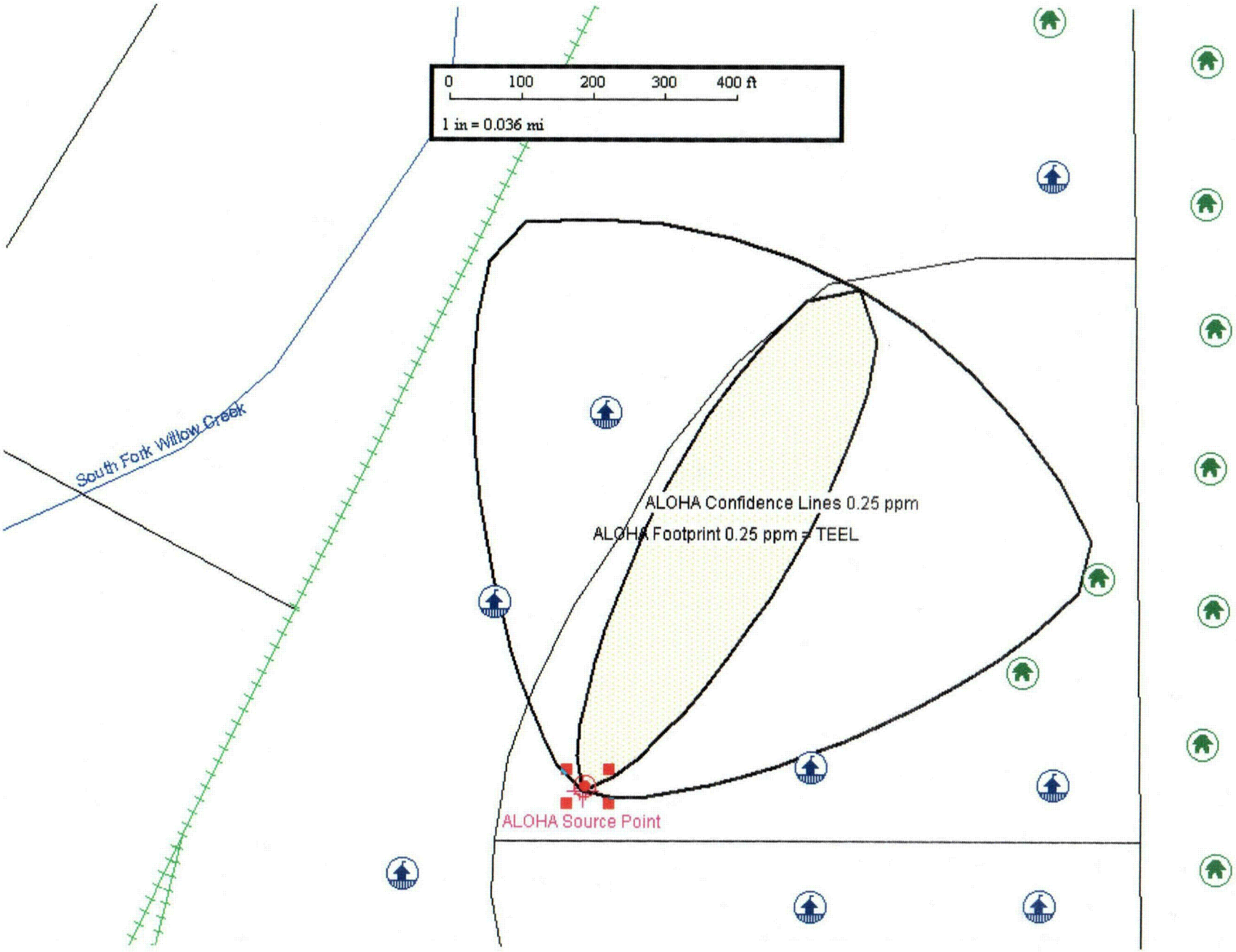


Scenario G-HF



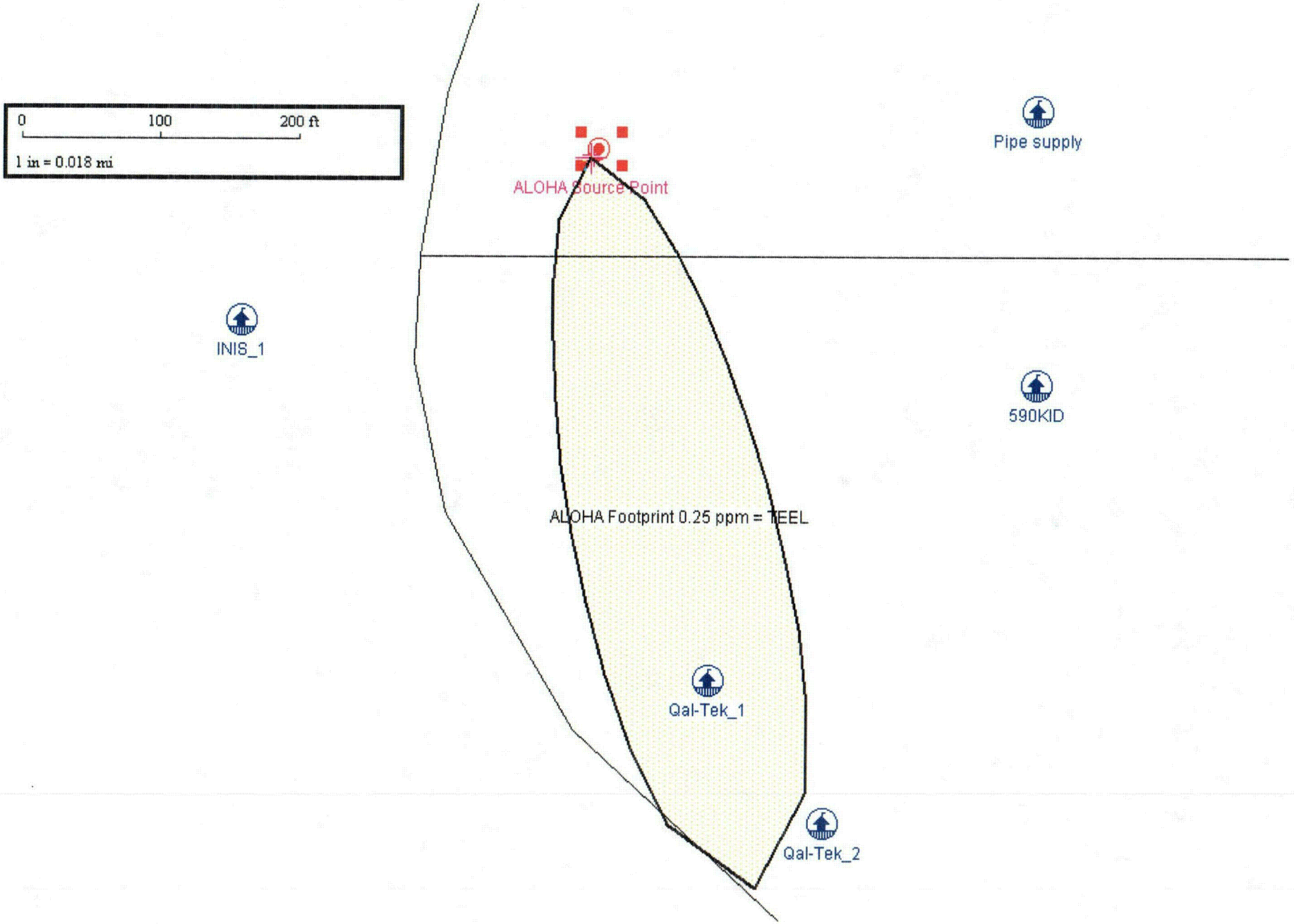
Scenario H-HF

C16



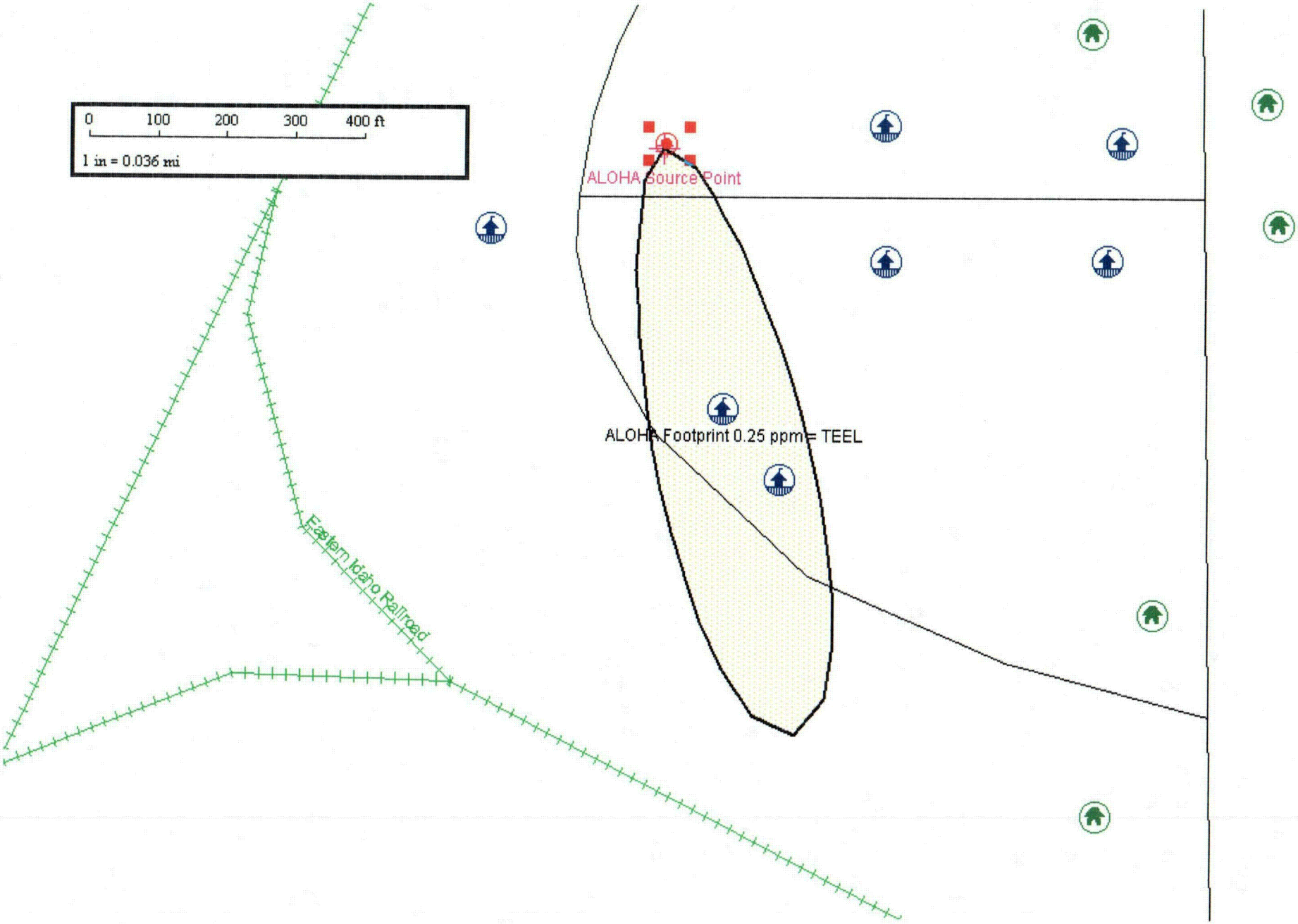
Scenario I-HF

C17

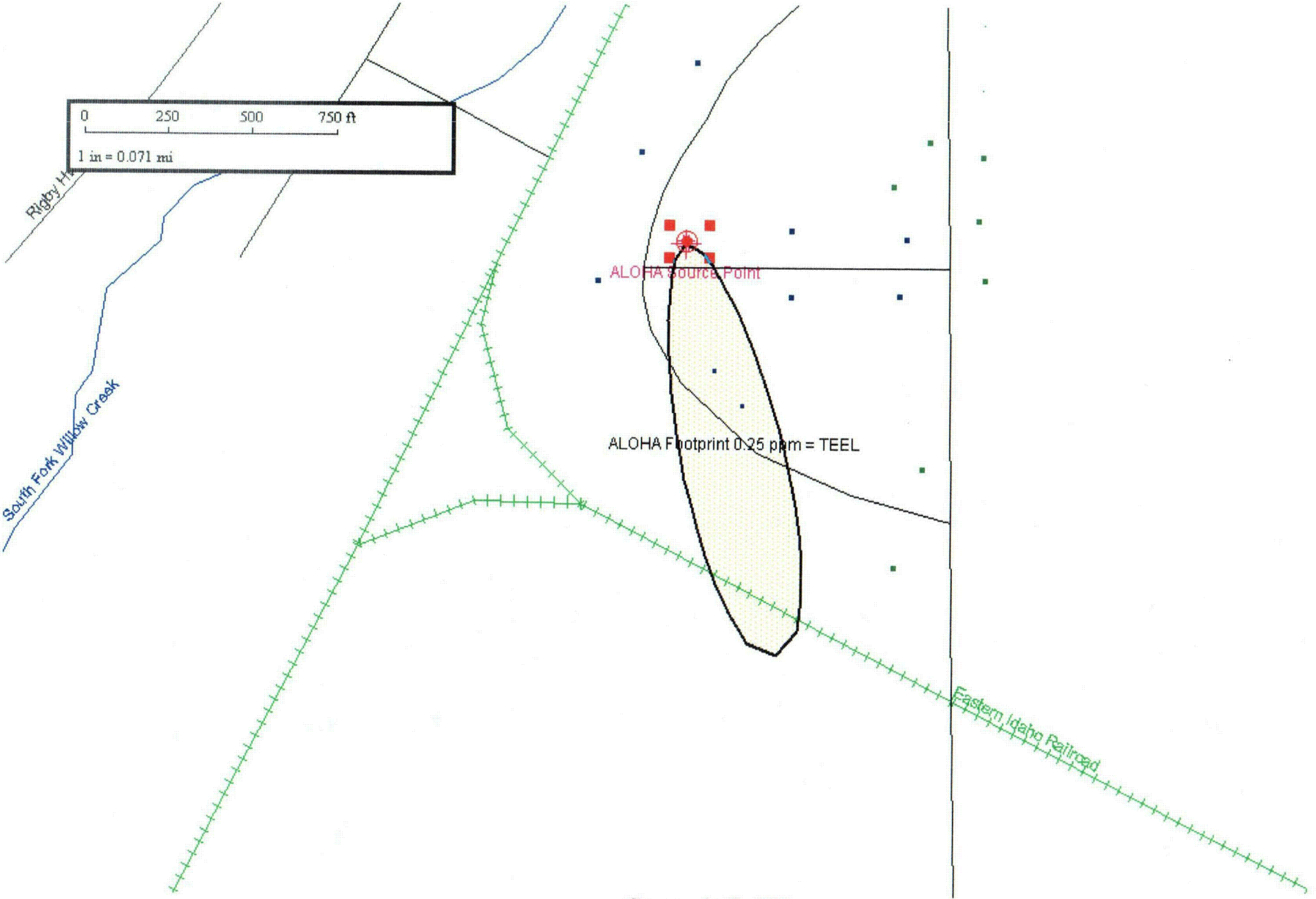


Scenario J-HF

C18



Scenario K-HF



Scenario L-HF

C20