DOE/EA-0845

Environmental Assessment

Expansion of the Idaho National Engineering Laboratory Research Center

March 1994

U.S. Department of Energy
DOE Idaho Operations Office
Idaho Falls, Idaho

[6450-01]

U.S. DEPARTMENT OF ENERGY

FINDING OF NO SIGNIFICANT IMPACT FOR EXPANSION OF THE IDAHO NATIONAL ENGINEERING LABORATORY RESEARCH CENTER

AGENCY: Department of Energy

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA-0845, for expansion and upgrade of facilities at the Idaho National Engineering Laboratory (INEL) Research Center (IRC) in Idaho Falls, Idaho. Construction and operation of proposed facilities would not cause significant environmental impacts. Based on the analyses in the EA, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321, et. seq. Therefore, an environmental impact statement (EIS) is not required.

PUBLIC AVAILABILITY: Single copies of the EA and FONSI are available from:

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BACKGROUND: IRC facilities are located on a partially developed 14.3 hectare (35.5-acre) plot located in an area zoned for commercial development on the north side of Idaho Falls, Idaho. Existing structures include office and laboratory buildings. The original and largest building at the IRC consists of an office building interconnected by an enclosed walkway with the laboratory building.

The laboratory/office building is used as an experimental research facility and contains 63 laboratories. Individual laboratories are dedicated to a wide range of research areas, including industrial microbiology, geochemistry, materials characterization, welding, ceramics, thermal fluids behavior, materials testing, nondestructive evaluation methodologies, analytical and environmental chemistry, and biotechnology. Other activities at the IRC include routine sample analysis, such as bioassays, and other INEL support functions. The IRC supports nuclear and other energy-related programs at the INEL and provides independent research and development activities in cooperation with other government agencies, private companies, universities, and non-profit organizations.

PROPOSED ACTION: DOE Idaho Operations Office proposes to expand and upgrade facilities at the Idaho National Engineering Laboratory (INEL) Research Center (IRC) located in Idaho Falls, Idaho. Expansions and upgrades would include constructing a research laboratory addition on the northeast corner of existing laboratory building; upgrading the fume hood system in the existing laboratory building; and constructing a hazardous waste handling facility and a chemical storage building. The DOE also proposes to expand the capabilities of biotechnology research programs by increasing use of radiolabelled compounds to levels in excess of current facility limits for three radionuclides (carbon-14, sulfur-35, and phosphorus-32).

The proposed facilities and facility upgrades and modifications would accommodate program consolidations and increase operational efficiency. The proposed research laboratory wing would be located on the northeast corner of the existing laboratory building. The addition would be a steel frame structure similar to the existing facility, and accommodate 12 to 16 research scientists in 12 modular laboratory work stations. The floor plan would consist of an open laboratory configuration with a modular laboratory design, three chemical storage rooms for materials being used in the laboratories, an extension of an existing hallway, and a storage/receiving area. Fume hoods would discharge through a dedicated stack or series of stacks, not tied to the existing ventilation system in the IRC laboratory building.

The proposed upgrade of the fume hood system would increase the capacity of the exhaust air system in the existing laboratory building, enabling all hoods in that building to operate simultaneously.

The hazardous waste handling and chemical storage facilities would be single story buildings. The hazardous waste handling building would provide a safe and secure area for short term accumulation of hazardous wastes prior to shipment. The chemical storage facility would enhance safety by providing areas for storage and physical isolation of different classes of bulk chemicals.

The biotechnology research program at the IRC proposes to increase the use of radiolabelled compounds as tracers in experiments studying metabolic pathways and reaction rates. The use of radiotracers would ensure that the biotechnology program maintains its state-of-the-art technological position. The maximum proposed inventory of radionuclides at the IRC (in addition to 10 CFR 20 Appendix C quantities and sealed sources) would be 30 mCi, comprised of 10 mCi each of carbon-14 (^{14}C), sulfur-35 (^{35}S), and phosphorus-32 (^{32}P). Radioactively labelled amino acids, sugars, nucleotides, sulfates, phosphates, and other organic substrates would be used in research programs investigating and enhancing desirable biochemical processes. All radiotracer studies would be carried out in an existing IRC laboratory equipped for handling radiolabelled materials.

ENVIRONMENTAL IMPACTS: The proposed action would have minimal impact on the existing environment. The proposed facilities would be located within the boundaries of the existing 14.3-hectare (35.5-acre) IRC site. No endangered species, critical habitats, or significant biological, archaeological, or cultural resources would be affected by the proposed action. Soil and vegetation at this location were extensively disturbed by agricultural pursuits for many years prior to construction of the existing facilities. No significant impacts to human health or the environment are expected to result from construction and operation of the proposed facilities.

Water Resources: The proposed research laboratory wing would add a maximum of 10% additional volume to sewer effluents from the facility which constitute less than 0.2 % of the wastewater treated at the City of Idaho Falls Wastewater Treatment Plant. This minor increase in wastewater volume would not adversely impact the treatment capabilities of the City of Idaho Falls Wastewater Treatment Plant.

Because the storage areas of the chemical storage facility would not be connected to the Idaho Falls sewer system, the research laboratory addition and hazardous waste handling facility would be the only proposed facilities from which chemicals might be released to wastewater treated at the City of Idaho Falls Wastewater Treatment Plant. Releases from the research laboratory addition would be similar in nature to those from the existing IRC laboratories. Under normal operating conditions, no biohazardous materials would be discharged to the sewer from these laboratories. Liquid effluents from the hazardous waste management operations are currently released from the existing research laboratory building. IRC hazardous waste management operations, including activities resulting in liquid effluents, would be relocated to the new hazardous waste handling facility. All wastewater would comply with City of Idaho Falls Sewer Regulations. To ensure ongoing compliance with applicable laws and regulations, effluents from laboratory sinks would be incorporated into the existing IRC monitoring program. This monitoring program continuously monitors the pH of liquid effluent having the potential to exceed limits indicated in the Idaho Falls Sewer Regulations. Effluent would be detained in a 5,400 gallon holding tank in the event of a pH excursion or inadvertent release of a prohibited material. Monthly samples from liquid waste streams leaving INEL facilities, including the IRC, are also collected and analyzed to provide verification of compliance with discharge requirements.

Air Quality and Health and Safety Risks: Nonradiological atmospheric pollutants would be released from the proposed research laboratory addition, the hazardous waste handling facility, and the chemical storage facility. These emissions would be produced from chemical evaporation and combustion of natural gas for heating. These emissions would not result in a significant increase in ambient concentrations of volatile organic compounds or ozone. A permit-to-construct would be submitted to the Idaho Air Quality Bureau for each new building that would release atmospheric pollutants and construction would not commence without state approval.

Radiolabelled compounds would be used in biotechnology research and experimentation carried out in the existing laboratory building. The quantities of radionuclides used in these experiments would be measured in microcurie (mCi). Under normal operational conditions, no radionuclides would be released to the environment. The maximum inventory of radiolabelled compounds related to the proposed expansion would be limited to 30 mCi, comprised of 10 mCi each of ^{14}C, ^{35}S, and ^{32}P. As low as reasonably achievable (ALARA) goals for workers at the IRC would not change under the proposed action. Fewer than 50 workers are anticipated to be associated with biotechnology programs using radiolabelled compounds. No adverse health effects are anticipated in workers as a result of use of radiolabelled compounds as metabolic tracers in biotechnology experiments.

ALTERNATIVES: Two alternatives to the proposed action were considered in the EA.

No Action Alternative: The no action alternative is continued operation of the existing facilities. Under the no-action alternative, some research projects would need to be eliminated or delayed due to lack of space. Research in existing laboratories would continue, but the efficiency of these activities would not improve without upgrading the fume hoods. State-of-the-art techniques in biotechnology research would not be available to IRC researchers. Operational safety at the IRC would not be increased if hazardous waste operations and bulk chemical storage were not moved to self-contained facilities. Under the no-action alternative, the efficiency and safety of existing IRC operations would not be improved.

Develop the Facilities at an Alternate Location: Several sites for in-town facilities were studied in detail at the time of construction of the existing facilities. The location of the IRC was selected because it complies with the Idaho Falls zoning requirements and offers convenient proximity to other INEL installations, sufficient room for expansion, and minimal site development impacts. Developing the proposed facilities at a different location while leaving the remaining land at the IRC undeveloped would not be an optimum use of land resources in the area. No environmental advantage would be gained by developing and operating the proposed facilities at an alternate site.

DETERMINATION: Based on the analyses in the EA, the DOE has determined that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment, within the meaning of the NEPA. Therefore, an EIS is not required.

Issued at Washington, D. C., this 18th day of March, 1994.

for Tara J. O'Toole, M.D., M.P.H.
Assistant Secretary
Environment, Safety and Health

EXECUTIVE SUMMARY

This environmental assessment evaluates potential environmental impacts associated with a Department of Energy proposal to expand and upgrade facilities at the Idaho National Engineering Laboratory (INEL) Research Center (IRC), located in Idaho Falls, Idaho. The IRC consists of a partially developed 14.3-hectare (35.5-acre) site. The IRC is affiliated with the INEL but is located within the city limits of Idaho Falls and not on the INEL site. Existing facilities at the IRC are office buildings, laboratory buildings, and associated support structures. The proposed action involves constructing new IRC facilities, modifying existing facilities, and expanding research capabilities, including the following:

- Constructing a chemistry and biotechnology research laboratory addition on the principal laboratory building
- Upgrading the fume hood system in the main laboratory building
- Constructing a hazardous waste handling building
- Constructing a chemical storage facility
- Raising the allowable quantities of three radioisotopes (carbon-14, sulfur-35, and phosphorus-32) used in biotechnology research to levels in excess of 10 CFR 20 Appendix C limits.

The proposed facilities, upgrades, and modifications to existing research programs would accommodate consolidation of programs, increase efficiency, and enable biotechnology programs to use state-of-the-art techniques not available without the use of radiotracers.

Impacts from construction of new facilities would be similar to those from any small construction project. Construction would produce temporary local increases in noise and dust levels. Gaseous emissions from construction equipment would be similar to those of routine construction jobs. Construction activities would use standard earth moving machinery and carpentry, mechanical, and electrical equipment. There would be no unusual worker hazards associated with construction of facilities. The IRC site was extensively disturbed by agricultural activity before the existing facilities were constructed and new construction would have no impact on biological or cultural resources. No threatened or endangered species would be affected, and no wetlands are located on the site. The IRC site is not located within a floodplain.

The research laboratory addition, hazardous waste handling facility, and chemical storage facility would increase the quantity of air pollutants and liquid effluents released by IRC facilities. Atmospheric emissions from existing and proposed facilities would include particulates (0.4 ton/yr), SO_2 (0.05 ton/yr), NO_x (10.4 tons/yr), CO (2.6 tons/yr), and volatile organic compounds (VOCs) (2.6 tons/yr). The proposed research laboratory wing would add up to 10% additional volume to sewer effluents from the facility. All wastewater would comply with City of Idaho Falls Sewer Regulations. Effluents from laboratory sinks would be incorporated in the existing monitoring program. Increases in wastewater volume due to the proposed action would have little impact on treatment capabilities of the City of Idaho Falls Wastewater Treatment Plant.

Biotechnology research at the IRC generally involves benign, nonpathogenic (to animals or plants) organisms. In many instances, the organisms have been enriched from environmental samples for specific physiological characteristics atypical of human or animal pathogens. Experimentation using organisms requiring containment exceeding Biohazard Safety Level 2 (BL-2) is not anticipated at this time. However, a containment room meeting the requirements of BL-3 is available in the

existing biotechnology wing of the IRC laboratory building. National Institute of Health Guidelines for recombinant deoxyribonucleic acid (DNA) research activities have been adopted at the IRC. Research activities requiring containments and safeguards above BL-2 would not be conducted in the new wing. Under normal operations, releases of biohazardous materials from laboratory operations are not anticipated.

Unsealed forms of radionuclides in the IRC laboratories are presently limited to quantities defined in 10 Code of Federal Regulations (CFR) 20 Appendix C. This appendix identifies administrative levels of radionuclides sufficiently small that materials containing less activity do not need to be labelled as radioactive. In order to use state-of-the-art research techniques, biotechnology research programs propose to use quantities of some radionuclides in excess of the 10 CFR 20 Appendix C limits. The proposed facility limit is 30 mCi, consisting of up to 10 mCi each of carbon-14, sulfur-35, and phosphorus-32. The conservatively calculated maximum committed effective dose equivalent (CEDE) from the proposed operations involving radioisotopes to a hypothetical maximally exposed member of the public was determined to be 2.9×10^{-2} mrem/yr. Assuming an exposure for 70 yrs, conservatively estimated operational releases from the IRC would produce an excess fatal and nonfatal cancer risk of 1.5×10^{-6}. The CEDE resulting from an accident that released radionuclides used in existing and proposed operations to a hypothetical maximally exposed individual was determined to be 9.7 mrem. The conservatively estimated accidental dose would result in an excess cancer risk of 7.1×10^{-6}.

This environmental assessment identifies the need for the new facilities, describes the proposed projects and environmental setting, and evaluates the potential environmental effects. Impacts associated with current operations are discussed and established as a baseline. Impacts associated with the proposed action and cumulative impacts are described against this background. Alternatives to the proposed action (No action; Locating proposed facilities at a different site) are discussed and a list of applicable regulations is provided. The no action alternative is continuation of existing operations at existing levels as described in Section 4 of this EA. Proposed facilities could be constructed at a different location, but these facilities would not be useful or practical since they are needed to provide a support function for IRC operations. Further, the potential environmental impacts would not be reduced if a different site was selected.

CONTENTS

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

AIHA	American Industrial Hygiene Association
ALARA	as low as reasonable achievable
Btu	British thermal units
CEDE	committed effective dose equivalent
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DNA	deoxyribonucleic acid
EPA	Environmental Protection Agency
ERPG	Emergency Response Planning Guidelines
FEMA	Federal Emergency Management Agency
FR	Federal Register
HEPA	High Efficiency Particulate Air
INEL	Idaho National Engineering Laboratory
IRC	INEL Research Center
LC_{LO}	Threshold Lethal Concentration
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Agency
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PM	particulate matter
PM-10	particulate matter with a diameter less than 10 microns
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
STEL	short-term exposure limit
TLV	threshold limit value
TPQ	Threshold Planning Quantities
TWA	time-weighted average
VOC	volatile organic compound
μm	micrometer (1×10^{-6} meter)

Draft Environmental Assessment For the Expansion of the Idaho National Engineering Laboratory Research Center

1. INTRODUCTION

The U.S. Department of Energy (DOE) proposes to expand and upgrade facilities at the Idaho National Engineering Laboratory (INEL) Research Center (IRC) by constructing a research laboratory addition on the northeast corner of existing laboratory building; upgrading the fume hood system in the existing laboratory building; and constructing a hazardous waste handling facility and a chemical storage building. The DOE also proposes to expand the capabilities of biotechnology research programs by increasing use of radiolabelled compounds to levels in excess of current facility limits for three radionuclides (carbon-14, sulfur-35, and phosphorus-32).

IRC facilities are located on a partially developed 14.3-hectare (35.5-acre) plot on the north side of the City of Idaho Falls. Though programs and operations at the IRC are affiliated with the INEL, the IRC is located within the city limits of Idaho Falls and not on the INEL site, which is located approximately 80 km (50 mi) west of Idaho Falls.

Existing facilities at the IRC include office, laboratory, and technical support buildings (Figure 1). The largest is a 3-story office building connected by an enclosed walkway to a one-story laboratory building containing 66 laboratories. Other buildings at the IRC include the Research Office Building, Physics Building, Government Motor Pool/Electric Vehicle Building, and Systems Analysis Facility. Utilities are supplied through a central corridor.

The laboratory/office building is principally an experimental research facility dedicated to a wide range of research areas, including industrial microbiology; geochemistry; materials characterization; welding; ceramics; thermal fluids behavior; materials testing; nondestructive evaluation of materials using a standard industrial x-ray device, x-ray diffusion, and x-ray fluorescence; analytical and environmental chemistry; and biotechnology, including genetic research and modification of organisms to enhance desirable traits. Sample analysis, including assay of biological samples for radioactive contamination, and other INEL support functions are also conducted at IRC facilities.

The IRC supports nuclear and other energy-related programs at the INEL and provides the capability to conduct independent research and development activities in cooperation with other government agencies, private companies, universities, and nonprofit organizations.

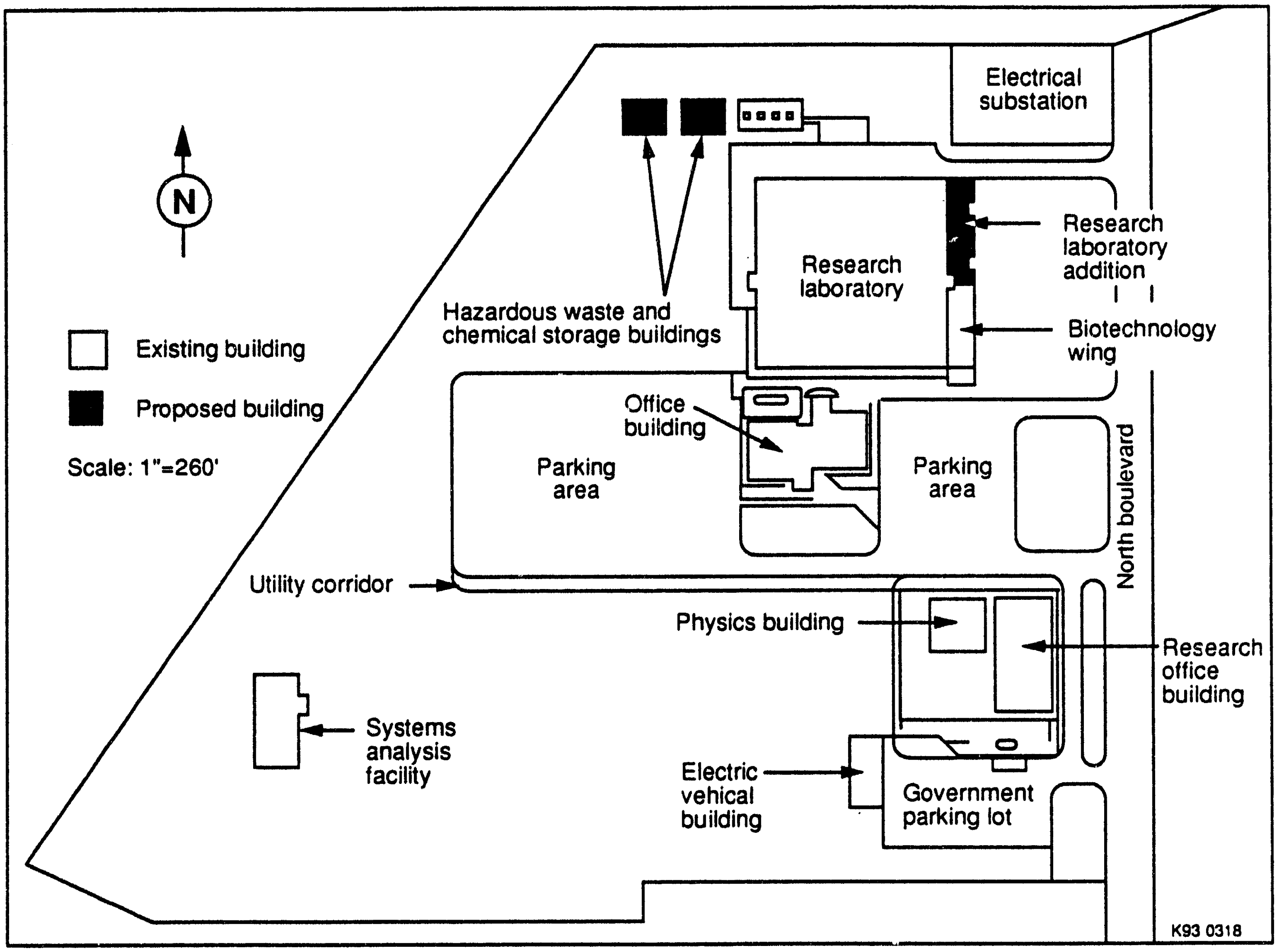

Figure 1. Plot plan of the IRC facilities.

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This environmental assessment has been prepared in accordance with provisions of the National Environmental Policy Act (NEPA) of 1969, as amended; Council on Environmental Quality regulations for implementing the procedural provisions of NEPA [Code of Federal Regulations (CFR) 40 CFR 1500-1508]; and DOE NEPA regulations (10 CFR 1021). The environmental assessment describes proposed facilities and operations, addresses impacts that could be associated with the proposed action, and discusses cumulative impacts associated with continued growth of facilities and operations at the IRC. Finally, the environmental assessment includes a discussion of alternatives and list of relevant environmental regulations.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 Purpose and Need for Actions

The purposes of the actions are to enhance the efficiency and safety of existing IRC operations. Additional laboratory space is needed to support the current range of research activities at the IRC, and the existing IRC fume hood system needs to be improved. Self-contained hazardous waste operations and bulk chemical storage are needed to facilitate storage and handling capabilities in support of the IRC. Finally, biotechnology research requires the use of radiolabelled compounds to conduct routine analytical procedures currently not available at the IRC.

2.2 Descriptions of the Proposed Actions

The proposed action involves several separate activities, including constructing a research laboratory addition devoted to chemistry and biotechnology on the existing laboratory building; constructing a hazardous waste handling facility and chemical storage facility; upgrading the fume hood system in the existing laboratory building; and increasing biotechnology research capabilities at the facility through increased use of radiolabelled materials.

2.2.1 Research Laboratory Addition

Biotechnology and chemistry laboratories are among the most highly used facilities at the IRC. Construction of a research laboratory addition on the IRC laboratory building (Figure 1) would provide additional space for chemistry and biotechnology research in support of energy-related and environmental restoration programs.

The proposed research laboratory addition would be located on the northeast corner of the existing laboratory building. The addition would be a steel frame structure similar to the existing facility and would provide approximately 540 m^2 (5,800 ft^2) of floorspace. The addition would accommodate 12 to 16 research scientists in 12 modular laboratory work stations. The floor plan would consist of an open laboratory configuration with a modular laboratory design, three chemical storage rooms for materials being used in the laboratories, an extension of an existing hallway, and a storage/receiving area. Fume hoods would be located on the outside walls, and large sinks and eyewash stations would be located on the inside aisles at alternating stations. Fume hoods in the addition would discharge through a dedicated stack or series of stacks and would not be tied to the existing ventilation system in the IRC laboratory building.

Chemistry and biotechnology research conducted in the new addition would be similar to existing activities at the IRC. Research activities requiring containments and safeguards above Biohazard Safety Level 2 (BL-2) would not be conducted in the new addition.

2.2.2 IRC Hazardous Waste Handling Facility

The proposed hazardous waste handling facility would accommodate waste handling operations currently carried out in a small storage and handling area in the laboratory building. The facility would be constructed and operated in accordance with all regulatory requirements, including National Fire Protection Association (NFPA), Resource Conservation and Recovery Act (RCRA), and Occupational Safety and Health Administration (OSHA) requirements. The proposed facility would provide a safe and secure area for short term accumulation of hazardous wastes prior to shipment. The hazardous waste handling facility would also enhance safety by removing the material from the laboratory building. In the event of an accident or spill, the material would be contained within the hazardous waste handling facility and would not affect operations in the laboratory/office building.

The proposed hazardous waste handling facility would be a 420-m^2 (4,500-ft^2), single-story, slab-on-grade building. The facility would have direct access to a loading area sufficiently large to handle a tractor trailer. The storage area would be designed to accommodate storage of eight classes of wastes (Table 1) and would be designed to accommodate large influxes of any two classes at one time. Each storage space would have a containment system for retaining accidental spills.

Table 1. Design basis chemical loads for the hazardous waste storage building.

	Quantity	
Chemical Class	Kilograms	Number of 55 Gallon Drums
Flammables	335	8
Acids/heavy metals	735	20
Bases/poisons	100	3
Oxidizers	30	2
ORM (pesticides, solvents, mixed organics, etc.)	10	1
Reactives	100	3
Nonregulated	440	10
Open lab packs	variable	6

The proposed new facility would provide a larger area for storage of hazardous wastes generated at the IRC in order to provide separate rooms for receipt of wastes and physical isolation of incompatible materials to enhance safety of hazardous waste management operations at the IRC. Explosion-proof containers would be used as necessary within the facility.

2.2.3 IRC Chemical Storage Facility

Centralized chemical storage is not presently available at the IRC. Chemicals used by different programs are stored in laboratories assigned to those programs. Centralized purchasing, receiving, and storage of chemicals is in the process of implementation through a Chemical Inventory and Management Control System in order to enhance safety and economize purchases. A dedicated chemical storage facility would accommodate implementation and operation of this Chemical Inventory and Management Control System. Once implemented, this system would limit quantities of specific materials that could be stored at or shipped to the IRC by tracking quantities of chemicals present at the facility. Individual laboratories would only store chemicals in use; bulk supplies [up to 208-L (55-gal.) containers] would be maintained in the proposed chemical storage facility.

The chemical storage facility would be similar in design to the hazardous waste handling facility. The facility would provide areas for storage and physical isolation of different classes of chemicals that would be incompatible if accidentally mixed. Each area would provide sufficient containment to control at least a 208-L (55-gal.) spill. The proposed facility would be a 420-m^2 (4,500-ft^2), single-story, slab-on-grade building. Chemicals stored in the building would include salts, acids, bases, and organics. The facility would be constructed and operated in accordance with all regulatory requirements, including NFPA and OSHA requirements.

2.2.4 IRC Fume Hood Upgrade

Insufficient capacity in the heating and ventilation system makes it impossible to operate all fume hoods in the existing laboratory building simultaneously. The proposed system upgrade would increase the capacity of the exhaust air system in the existing research laboratory building, enabling all hoods in that building to operate simultaneously. The exhaust may be discharged through a stack or a series of stacks or use the existing system of horizontal louvers. Some ducts would also be modified to improve air circulation throughout the laboratory building. Modification of the fume hood system would not involve existing perchloric acid hoods or hoods in the biotechnology wing; these hoods discharge through dedicated ductwork and stacks. Similarly, fume hoods in the proposed research laboratory addition would be independent of the existing exhaust air system and would not be affected by the upgrade to the fume hood system in the existing research laboratory building.

2.2.5 Use of Radiolabelled Compounds in Biotechnology Research

Biotechnology research programs at the IRC propose to increase use of radiolabelled compounds as tracers in experiments studying metabolic pathways and reaction rates. Presently, radionuclide use in IRC facilities, with the exception of sealed sources, is limited to quantities defined in 10 CFR 20 Appendix C. 10 CFR 20 Appendix C defines the minimum quantity of material that needs to be labelled and treated as radioactive (quantities less than this are not treated as radioactive) (10 CFR 20.203). 10 CFR 20 Appendix C (1980) was used to establish conservative administrative controls for radioactive materials at the IRC. Biotechnology research programs require quantities of some radionuclides in excess of the 10 CFR 20 Appendix C limits. Ongoing research programs that would use radiolabelled compounds include studies of biomining, desulfurization of fossil fuels, bioremediation, and bioconversion of alternate feedstocks to produce commodity organic chemicals.

The proposed use of radiolabelled compounds would be similar to radionuclide use in any other facility devoted to biotechnology research, such as a university or private laboratory facility. Under this proposal, the maximum inventory of radionuclides at the IRC (in addition to 10 CFR 20 Appendix C quantities and sealed sources) would be 30 mCi, comprised of 10 mCi each of carbon-14 (^{14}C), sulfur-35 (^{35}S), and phosphorus-32 (^{32}P) (current inventories do not exceed current limits for the IRC of 0.1 mCi of ^{14}C, 0.1 mCi of ^{35}S, and 0.01 mCi of ^{32}P). Radioactively labelled amino acids, sugars, nucleotides, sulfates, phosphates, and other organic substrates would be used in research programs investigating and enhancing desirable biochemical processes. All radiotracer studies would be carried out in an existing IRC laboratory equipped for handling radiolabelled materials. Radiation exposure to Biotechnology personnel is maintained at levels that are as low as reasonably achievable (ALARA). Changes in the organizational ALARA goal of 33 mrem/yr would not be necessary if the proposed action is adopted. No increases in exposure are anticipated as a result of the proposed action and IRC research scientists would not be expected to incur any health effects as a result of occupational exposure to radiation.

Experiments investigating the metabolic fate of radiolabelled compounds in microbial cultures would be designed to prevent the release of gaseous radioactive metabolites (such as $^{14}CO_2$) to the atmosphere. For example, $^{14}CO_2$ can routinely be trapped in specially designed flasks as $NaH^{14}CO_3$. Trapped materials can then be quantified by liquid scintillation spectrometry. Other potential radioactive gases would be captured with suitable absorptive media (such as activated carbon).

Liquid radioactive culture effluents remaining after the completion of experiments would be solidified with an appropriate agent (such as diatomaceous earth) and shipped to the INEL Radioactive Waste Management Complex (RWMC) for disposal as low-level waste. A waste certification program plan would be prepared to ensure all radioactive wastes from biotechnology experiments would meet the Waste Acceptance Criteria of the RWMC.

2.3 Alternatives to the Proposed Action

2.3.1 No Action

No action would allow existing IRC facilities to continue operation at current levels of activity. If adopted, the no action alternative would not meet the purpose and need of the proposed action in that the safety and efficiency of existing IRC operations would not be improved. The impacts associated with "no action" would be identical to those described in Section 4 on existing operations.

2.3.2 Locate the Facilities at Different Locations

The proposed facilities could be developed at a different location in the City of Idaho Falls or on the INEL site. The proposed facilities are needed to support existing IRC operations. Therefore, the facilities would not be useful or practical if constructed at an alternate location. Construction of the support facilities at alternate locations was not evaluated in detail because the alternative did not meet the purpose and need of the proposed action. Potential environmental impacts from the construction and operation of the proposed facilities would not be reduced if a different location were selected (See Section 7.2).

3. AFFECTED ENVIRONMENT

The City of Idaho Falls (Bonneville County) is located in southeastern Idaho on the southeastern margin of the Snake River Plain. The IRC is located on the northern edge of Idaho Falls in an area designated for industrial development in the Comprehensive Land Use Plan developed by the Bonneville Council of Governments. The area is zoned for industrial and manufacturing development. Prior to the construction of existing IRC facilities, the 14.3-hectare (35.5-acre) site was used as irrigated pasture.

Biological or cultural resources that may have been present at the IRC were extensively disturbed by many years of cultivation. Native vegetation was removed from the area in the interest of agriculture. No threatened or endangered species are known to occupy or use undeveloped areas at the IRC. The IRC site is somewhat higher than much of the surrounding area and no wetlands are located on the IRC site. No cultural resources were identified at the IRC during an archaeological survey conducted in 1979 before construction of existing facilities.[a]

The Snake River is located approximately 1.1 km (0.7 mi) west of the IRC. The IRC site is 10 m (33 ft) above the level of the river and the facilities are not located in a floodplain. The catastrophic failure of the Teton Dam in 1976 resulted in the second largest recorded river flow north and west of Idaho Falls and caused extensive flooding in the city. The IRC site was not flooded during this event. The IRC site is identified by the Federal Emergency Management Agency (FEMA) as a Zone C Area, meaning that the site is not considered a potential floodplain (FEMA, 1981). Runoff from impervious areas at the IRC is channelled into a landscaped swale and existing ditch that drains into Willow Creek and, ultimately, the Snake River.

The Snake River Plain Aquifer underlies much of the Snake River Plain. The aquifer is the primary source of drinking water in the region and the Environmental Protection Agency has designated the Eastern Snake River Plain aquifer as a sole-source aquifer. Non-thermal groundwater beneath the Eastern Snake River Plain is generally of naturally high quality relative to drinking water standards. Dissolved solids range from 260 to 280 mg/L with calcium accounting for 50% of the cations and bicarbonate accounting for 80% of the anions (Yee and Souza, 1987). Depth to the water table at the IRC is approximately 61 m (200 ft). The City of Idaho Falls operates 16 water production wells, including a well located approximately 0.8 km (0.5 mi) northwest of the IRC. Water samples from these wells are routinely analyzed for the presence of regulated materials, including metals and other contaminants.

The regional climate has been extensively studied and meteorological information is summarized in Clawson et al. (1989). The area in which the IRC is located is designated an

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a. Letter from B. Robert Butler, Society of Professional Archaeologists, to EG&G Idaho, Inc., "Report on an Archaeological Clearance Survey of a Proposed Construction Site, Vicinity of Idaho Falls, Idaho," November 5, 1979.

attainment area with respect to the National Ambient Air Quality Standards (NAAQS). This means that ambient concentrations of all criteria pollutants in the area are below the NAAQS and that air quality in the region is generally good. The requirements of the Prevention of Significant Deterioration (PSD) regulations ensure that new sources do not contribute to the degradation of local air quality or cause ambient concentrations of criteria pollutants to exceed the NAAQS. The IRC and the surrounding area is in a PSD Class II air quality area, which is defined as an area that requires reasonably or moderately good air quality protection while still allowing moderate industrial growth.

Background radiation in the vicinity of Idaho Falls consists of natural radiation from cosmic, terrestrial, and internal body sources; nuclear weapons test fallout; and radiation from consumer and industrial products and building materials. These sources result in an estimated total effective dose equivalent (EDE) to an average member of the public residing in Idaho Falls of 350 mrem/yr.

4. ENVIRONMENTAL IMPACTS OF EXISTING OPERATIONS

This section describes impacts resulting from existing operations at the IRC to establish a baseline of impacts from current operations.

4.1 Emissions of Nonradiological Atmospheric Pollutants

Airborne effluents associated with the laboratory building are produced by combustion of natural gas for heating and evaporation of volatile chemicals used in laboratory research activities. The IRC was granted a conditional exemption, and no state air permit was required at the time of construction in 1983. Other existing buildings do not release atmospheric pollutants.

Fume hoods located in the original laboratory facility discharge effluent through a series of horizontal louvers. Special hoods designed for use of perchloric acid have separate ductwork and discharge through dedicated stacks. To enhance safety, effluent from perchloric acid hoods discharges directly to the environment and the hoods are equipped with wash down systems to prevent the buildup of perchlorates. Effluent from hoods in the biotechnology wing is discharged through dedicated stacks. Effluent from hoods used with potentially biohazardous agents passes through a high efficiency particulate air (HEPA) filter before discharge to the environment. Additionally, one IRC fume hood is equipped with an acid vapor chemical scrubber.

Emissions of volatile organic compounds (VOCs) from the existing laboratory fume hood and ventilation systems occur from the evaporation of organic solvents used in laboratory research. VOC emissions are based on a conservatively estimated maximum annual usage of 2,650 gal./yr (1.27 gal./hr on average) and peak usage of 5 gal./hr. Research personnel have conservatively estimated 50% of these chemicals may be used under fume hoods where 10% may evaporate. The remaining 50% of the chemicals in the IRC are used in process or disposed of as hazardous waste and do not evaporate. VOC emissions are greatest during periods when all laboratories are being used. Such activities normally occur 8 hrs/day, 5 days/wk, and 52 wks/yr (2,080 hr/yr). Emissions of VOCs from chemical evaporation average 0.60 lb/hr (based on 2,080 hrs of operation). Peak emissions from laboratory operation were estimated to be 2.4 lb/hr.

Natural gas-fired heat combustion sources at the IRC produce airborne emissions of particulate matter (PM) (0.31 ton/yr), sulfur dioxide (SO_2) (0.038 ton/yr), nitrogen oxides (NO_x) (8.8 ton/yr), carbon monoxide (CO) (2.2 ton/yr), and VOCs (0.36 ton/yr). The basis for emission calculations from these combustion sources can be found in the Environmental Protection Agency's (EPA's) *Compilation of Air Pollutant Emission Factors Volume I: Stationary Point and Area Sources* (1985). The total heat input of all natural gas-fired boilers, hot water generators, and space heaters is approximately 15 million Btu/hr. Combustion sources are assumed to operate 24 hrs/day, 365 days/yr (8,760 hr/yr). Total estimated pollutant emissions for the existing IRC complex are presented in Table 2.

Table 2. Total emission rates of pollutants from existing IRC sources.

	Pollutant				
Emission Rate	PM-10[a]	SO_2	NO_x	CO	VOC_b
g/sec	0.01	0.001	0.25	0.06	0.3[C]
lb/hr	0.07	0.009	2.0	0.5	2.4[c]
ton/yr	0.3	0.04	8.8	2.2	1.0[d]

a. Particulate matter with a diameter of 10 μm or less (PM-10). All particulate is assumed to be PM-10.

b. VOC emissions account for combustion sources and evaporation of organic solvents.

c. Evaporative emissions in this value assume peak usage of 5 gal./hr (average emission over 2,080 hrs of operation are 0.60 lb/hr).

d. Based on the average emission rate for 2,080 hrs of laboratory operation (0.62 ton/yr) and 8,760 hrs of combustion (0.36 ton/yr).

4.2 Wastewater

Wastewater from the IRC is treated at the publicly-owned wastewater treatment facility operated by the City of Idaho Falls. The Idaho Falls Sewage Treatment Department has issued an industrial discharge permit with no special restrictions for IRC facilities. Acceptable discharges are defined in Chapter 7 of the City Sewer Regulations.

The maximum volume of wastewater produced by existing IRC facilities is estimated to be 8.86×10^4 L/day (2.34×10^4 gal./day), or 2.16×10^7 L/yr (5.56×10^6 gal./yr). Wastewater released from IRC facilities accounts for less than 0.2% of the wastewater processed at the City of Idaho Falls Wastewater Treatment Plant.

The pH of the liquid effluent leaving the IRC is continuously monitored. The monitor is installed at the point where laboratory sink effluent leaves the building. The monitoring station is upstream from the point where lavatory effluent enters the stream and prior to discharge to the city sewer. An alarm is triggered if the pH is higher than 9 or lower than 5. If the alarm sounds, the effluent is temporarily detained and neutralized. A 20,400 L (5,400 gal.) holding tank contains the effluent in the event of a pH excursion or inadvertent release of a prohibited material (identified via administrative controls).

Monthly samples from liquid waste streams leaving INEL facilities, including the IRC, are collected and analyzed to provide verification of compliance with discharge requirements. The effluent stream from the IRC is analyzed for metals, anions, cyanide, hexavalent chromium, total organic carbon, VOCs, total dissolved solids, and total suspended solids. Effluent concentrations are compared to RCRA guidelines and City of Idaho Falls Sewer Code limits. Additionally, effluent concentrations are compared to statistical confidence levels derived from historical sample data to detect trends or changes in the effluent composition. Statistical confidence Level 1 is the upper 95% confidence limit on individual measurements. Consequently, an individual measurement has one chance in 20 of exceeding Level 1 due to random fluctuations in the effluent concentration of the constituent. Statistical confidence Level 2 is the upper 99% confidence limit. Values exceeding this limit are interpreted to be indicative of a deviation from normal stream characteristics. Excursions above Level 2 do not imply regulatory standards have been exceeded, but do indicate a situation that should be investigated to identify potential problems at a stage where corrective action is possible. During the past 5 years of monitoring (sampling once a month), no constituent concentrations in excess of the City of Idaho Falls Sewer limits have been detected.

4.3 Hazardous Materials

4.3.1 Chemical Inventories and Storage

Hazardous and flammable chemicals are used and stored in the laboratory building. An inventory of hazardous materials in each laboratory is maintained and updated every 6 months. Storage cabinets for flammable materials are located throughout the laboratory building. Laboratories are limited to 242 L (64 gal.) of flammable materials including wastes and chemicals. Incompatible liquids are stored in separate cabinets. The laboratory building is equipped with explosion proof refrigerators, which can be used for cold storage of flammable liquids. Under this system, chemicals to be shipped to or stored at the IRC are evaluated with respect to potential risks to the public in the event of an accidental release. A Chemical Inventory and Management System is being developed in order to minimize potential risks by placing limits on the maximum allowable quantity for each specific chemical through centralized purchasing and inventory tracking.

4.3.2 Hazardous Wastes

Hazardous wastes, consisting of materials regulated under the RCRA, are accumulated in the laboratory building for disposal by a permitted private contractor. Each laboratory or group of laboratories includes a specific hazardous waste accumulation area, known as a satellite accumulation area. Full waste bottles are transferred to the temporary accumulation area before shipment. The temporary accumulation area is located on the south wall of the mechanical area in the northeast corner of the laboratory building and is in compliance with RCRA regulations (40 CFR 262.34). The area is fenced and access is limited. A 15- x 15-cm (6- x 6-in.) concrete berm surrounds the area to contain any potential spills of hazardous materials. Compatibility testing and mixing is carried out in a wet chemistry laboratory adjacent to the temporary accumulation area. The IRC is a small quantity generator of hazardous wastes but is not permitted as a treatment, storage, or disposal facility.

Hazardous wastes generated at the IRC are transported to licensed, commercial treatment, storage, and disposal facilities. Transportation to the treatment, storage, and disposal facility is provided by a contractor. Hazardous waste shipments from the IRC typically consist of 20 to 70 containers with the maximum volume of any individual container being 208 L (55 gal.). Under present operations, hazardous wastes are shipped from the IRC up to six times per year.

4.3.3 Fuels

Three underground fuel storage tanks are located at the IRC. These tanks are used to store and supply fuel to emergency generators and vehicles in the government motor pool. The tanks comply with current regulations for underground storage tanks and are equipped with leak detection monitors.

4.3.4 Potentially Biohazardous Materials

Biotechnology research at the IRC generally involves benign, nonpathogenic (to animals or plants) organisms. In many instances, the organisms have been enriched from environmental samples for specific physiological characteristics atypical of human or animal pathogens. Recombinant deoxyribonucleic acid (DNA) research is performed with nucleic acids derived from similar organisms but also employs standard strains of *Escherichia coli* for cloning experiments. At present, a number of plant pathogenic bacteria and two plant viruses are being studied. Appropriate permits have been obtained from the U.S. Department of Agriculture. These permits typically require submittal of experimental protocols (including disposal plans) before permit approval. Other exceptions to the criterion of pathogenicity are naturally occurring opportunistic soil bacteria, such as *Pseudomonas*, which can be pathogenic if the exposure is sufficiently great. Experimentation using organisms requiring containment exceeding Biohazard Safety Level 2 (BL-2) is not anticipated at this time. A containment room meeting the requirements of BL-3 is available in the existing biotechnology wing of the IRC laboratory building and any proposal to use organisms requiring this level of containment would require further NEPA review.

Recombinant DNA researchers at the IRC have voluntarily adopted the National Institute of Health Guidelines for Research Involving Recombinant DNA Molecules [51 FR 16958 (1986), with amendments of 52 FR 31848 (1987), 53 FR 28819 (1988), 53 FR 43410 (1988), 54 FR 10508 (1989), 55 FR 7438 (1990), and 55 FR 37565 (1990)]. A standard practice invoking a minimum set of good microbiological practices has been established. This standard practice addresses destruction of organisms by autoclaving or chemical means (such as bleach) before disposal and adherence to the National Institute of Health guidelines for experiments involving recombinant research.

The standard practice for disposing microbially contaminated materials, including culture fluids, petri dishes, plastic ware, personal protective equipment, or spill containment materials, requires routine decontamination of those materials by autoclaving or chemical means (culture materials containing hazardous chemicals are generally not autoclaved). Research scientists are responsible for demonstrating that the decontamination method is appropriate to the organism(s) under study and verifying media containing live microorganisms are not disposed in solid waste receptacles or discharged via the sanitary sewer. Large scale experiments (> 10-L liquid media) are considered and evaluated by the Institutional Biosafety Committee on an individual basis. Research scientists are required to demonstrate that no potential pathogens will be generated in the culture or that a suitable means of disinfecting the effluents will be implemented before disposal. Under normal conditions, no releases of potentially biohazardous material from biotechnology operations occur at the IRC.

4.4 Use of Radionuclides in Existing IRC Laboratory Facilities

With the exception of sealed sources, quantities of radionuclides presently allowed in IRC facilities are limited to amounts defined in 10 CFR 20 Appendix C, as discussed in Section 2.1.5. The 10 CFR 20 Appendix C limits are substantially lower than quantities of radionuclides used in a typical hospital or university laboratory. One-third of the defined quantities of radioactive materials that could be present at the IRC (from 10 CFR 20 Appendix C) is held as an administrative reserve to ensure that allowable facility limits are not exceeded, effectively limiting actual quantities that could be present at the IRC to two-thirds of 10 CFR 20 Appendix C quantities.

4.4.1 Sealed Sources

Sealed sources containing quantities of radionuclides in excess of 10 CFR 20 Appendix C limits are allowed at the IRC if they are required as equipment necessary for IRC operations and approved by DOE. These sources consist of calibration and check sources and are used to calibrate equipment and in development and testing of detection systems. Under all foreseeable operating conditions, there is no possibility of a radiological release from these sources. An inventory of these sources is maintained and updated every 6 months. All sources are checked for radiation leakage every 6 months.

4.4.2 Other Radioactive Substances

Radionuclides may be present in environmental samples or other materials analyzed in IRC laboratories. Administrative controls, including experiment reviews and operational limits, are in place to ensure that 10 CFR 20 Appendix C quantities are not exceeded. In general, these controls limit the number of samples present in the facility.

The principal radionuclides present in environmental samples and other materials at the IRC are americium-241 (^{241}Am), ^{14}C, chromium-51 (^{51}Cr), cesium-137 (^{137}Cs), tritium (^{3}H), iodine-131 (^{131}I), ^{32}P, plutonium-239 (^{239}Pu), strontium-90 (^{90}Sr), uranium-235 (^{235}U), and natural U (Underwood et al., 1984). The computer code RSAC IV was used to determine the maximum possible committed effective dose equivalent (CEDE) that could be received by a member of the public exposed to a hypothetical maximum accident. Operational releases are substantially smaller than the release used in this hypothetical accident scenario. The dose was calculated using conservative exposure assumptions, worst case atmospheric conditions, and simultaneous release of the entire allowable (10 CFR 20 Appendix C) inventory of these radionuclides. The maximum possible radiological dose from existing IRC operations that could be received by a member of the public was determined to be 0.46 mrem. Using a conversion factor of 7.3×10^{-4} excess cancers (fatal and nonfatal)/rem (ICRP, 1991), this dose rate can be converted to excess cancer risk. Existing operations at the IRC could produce a bounding-case excess cancer risk of 3.4×10^{-7}. No adverse health effects would be expected to occur as a result of this exposure.

4.4.3 Worker Exposure to Radiation

Worker exposure to radiation under normal operations would be controlled under established procedures requiring doses be kept as low as reasonably achievable (ALARA) and limiting the radiological dose received by any individual to less than 5 rem/yr. Based on historical exposures to radiation during IRC operations, DOE anticipates doses will be well below this limit. The maximum organizational ALARA goal for workers at the IRC is 100 mrem/yr. Thermoluminescent dosimeters have been placed in various laboratories in the IRC to monitor worker exposure to radiation. The greatest deviation from background detected in the IRC is less than 80 mR/yr. Workers exposed for 2,080 hrs/yr in this laboratory would receive a dose less than 19 mrem/yr. Workers at the IRC would not be expected to incur any harmful health effects from radiation exposures received during normal operations.

4.5 Waste Minimization

As required under RCRA and the Hazardous and Solid Waste Amendments of 1984, programs aimed at reducing volume, reactivity, and toxicity of hazardous wastes are being developed and implemented at the IRC. Source reduction is the primary aim of these programs. A study of waste streams in the laboratory building (Boehmer et al., 1989) identified methods that could reduce hazardous waste generation by more than 50%. Waste reduction methodologies that have been determined to be economically feasible have been implemented at the IRC, including silver recovery, elementary neutralization, and chemical recycling.

Recycling programs aimed at reducing the volume of solid wastes for disposal have been implemented at IRC facilities. Areas are provided for collection of recyclable materials such as aluminum cans and paper.

4.6 Hazards at the IRC

4.6.1 Natural Phenomena

Idaho Falls is located in an earthquake Zone 3 and there are no known faults in the area. IRC buildings are designed to withstand a constant wind loading of 122 kg/m^2 (25 lb/ft^2). Idaho Falls is not prone to tornadoes. Flooding at the IRC could only occur as a result of failure of a dam upstream on the Snake River. The catastrophic failure of the Teton Dam in 1976 produced extensive flooding in Idaho Falls but did not flood the IRC site.

4.6.2 Chemical Spills

The chemical spill analysis was based on a release of the maximum allowable quantities of individual toxic and highly toxic chemicals. Chemicals listed in 40 CFR 355 and identified as present in the IRC were evaluated. The maximum allowable quantity of a chemical was assumed to be the lesser (more restrictive) of either UBC/NFPA45 limits or 40 CFR 355 Appendix A Threshold Planning Quantities (TPQ). A handling accident releasing the maximum allowable quantity was determined to be a conservative scenario for releases of chemicals during an accident condition. Handling accidents resulting in a total release of a spilled material have an estimated likelihood of 1×10^{-5} accidents per handling occasion (FEMA, 1989). The frequency of handling the maximum allowable inventory of a particular material has been assumed to be no greater than 0.1 per year. Furthermore, the likelihood of involvement of the maximum allowable quantity of a particular material (i.e. involvement of multiple containers) is assumed to be no greater than 0.1 per accident. Consequently, the probability of a handling accident involving release of the maximum allowable inventory of a chemical at the IRC is estimated to be 10^{-6} to 10^{-8} per year.

In practice, inventories in IRC laboratories usually include small fractions of allowable quantities. The IRC chemical inventory is dynamic and quantities of chemicals present fluctuate. Chemical quantities identified in IRC facilities during a walkover were considered representative of inventories likely to be present and were evaluated using identical assumptions as the bounding release scenario in order to provide perspective.

Release fractions were postulated based on the physical properties of the chemical. One percent of solid materials, 100% of gaseous chemicals, 10% of semi-volatile liquids, and 100% for volatile liquids were assumed to be released during the accident (Elder, 1986). The bounding release scenario for cyanogen bromide and cyanide salts was assumed to be evolution of hydrogen cyanide gas by a chemical reaction. Chemicals were assumed to be released from the northeast corner of the IRC Laboratory building (the location used for deliveries) and dispersed by air transport. Materials were assumed to be released at ground level with neutral buoyancy and deposition velocities of 0.001 m/sec for solids and liquids and 0 m/sec for gases. Conservative meteorological conditions consisting of 0.5 m/s wind velocity (wind speeds at the IRC are normally greater than 0.5 m/s), air stability class F (very stable), an air inversion layer at an elevation of 400 m were used in modeling. For certain chemicals, the computer code EPI-Code was allowed to compensate for saturation conditions. Receptor locations of interest were determined to be 100 m (approximate site boundary), 183 m (U.S. Highway 20 closest approach), 536 m (DOE Operations Office), and 677 m (A.H. Bush Elementary School).

EPI-Code Version 5.0 was used to calculate the air concentration of chemicals at downwind receptor locations. Calculated concentrations were compared to American Industrial Hygiene Association Emergency Response Planning Guideline (ERPG) threshold concentrations. These concentrations were developed for use in emergency planning and are intended to provide estimates of concentration ranges above which adverse health effects or other physiological responses, such as odor thresholds, would be observed in most people. ERPG-1 represents the maximum airborne concentration to which nearly all individuals could be exposed for up to 1 hr without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor. ERPG-2 is the maximum airborne concentration to which nearly all individuals could be exposed for up to 1 hr without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action. ERPG-3 is the maximum airborne concentration to which nearly all individuals could be exposed for up to 1 hr without experiencing or developing life-threatening health effects.

Table 3 summarizes concentrations at the selected receptor sites of selected chemicals released at the IRC at bounding inventory quantities. Air concentrations at 100 m for 22 of the 26 chemicals evaluated for a release of maximum allowable inventory quantities would exceed the ERPG-3 threshold.

Table 4 summarizes the consequence of releases for the same chemicals at representative IRC inventory quantities. Air concentrations at 100 m for 6 of 27 chemicals evaluated would exceed the ERPG-3 threshold for a release scenario involving representative inventory quantities. Serious health effects would result in individuals exposed for 1 hr or more at this location.

Five candidate chemicals were chosen for further comparison against the ERPG guidelines. Bromine, chlorine, hydrogen sulfide, nitric oxide, and sulfur dioxide were selected for further evaluation because of their large inventory or bounding regulatory limit quantity and the resulting ERPG-3 values calculated for their release.

Releases of any of these toxic chemicals at maximum allowable or representative inventory quantities would produce an air concentration in excess of ERPG-2 or ERPG-3 guidelines at 100 m. Current inventories of chlorine, hydrogen sulfide, nitric oxide, and sulfur dioxide would produce air concentrations exceeding ERPG-3 levels at 100 m. A release of the inventory of sulfur dioxide would produce levels exceeding ERPG-3 up to 600 m from the point of release.

Table 3. Calculated air concentrations at various receptor locations for chemicals released at maximum allowable quantities.

Chemical	ACUTE/CHRONIC EXPOSURE ERPG-3*	Response****	Air Concentration 100 m	Air Concentration 183 m	Air Concentration 536 m	Air Concentration 677 m
Acrylamide	N/A	Neurological, C	105 mg/m3	30 mg/m3	3 mg/m3	2 mg/m3
Aldrin	100 mg/m3	Liver Tox, C	1 mg/m3	0.36 mg/m3	0.04 mg/m3	0.03 mg/m3
Allyl Alcohol	150 ppm	Pulmonary Edema	4,350 ppm	1,250 ppm	145 ppm	95 ppm
Aniline	100 ppm	Cyanosis, C,M	270 ppm	80 ppm	9 ppm	6 ppm
Boron Trifluoride	100 ppm	Lung Irritant	1,250 ppm	385 ppm	50 ppm	33 ppm
Bromine	5 ppm	Lung Irritant	1,000 ppm	305 ppm	40 ppm	26 ppm
Cadmium Oxide	9 mg/m3	Pulmonary Edema, C	10.5 mg/m3	3.0 mg/m3	0.3 mg/m3	0.2 mg/m3
Carbon Disulfide	500 ppm	Neurological, M	12,500 ppm	3,650 ppm	420 ppm	270 ppm
Chlorine	20 ppm	Lung Irritant	450 ppm	140 ppm	18 ppm	12 ppm
Chloroform	1,000 ppm	CNS Depressant, C	12,500 ppm	3,650 ppm	425 ppm	270 ppm
Cyanogen Bromide**	50 ppm	Chem. Asphyxiation	70 ppm	22 ppm	3 ppm	2 ppm
Dimethyl Sulfate	10 ppm	Lung Irritant, C,M,T	100 ppm	29 ppm	3 ppm	2 ppm
Endrin	2,000 mg/m3	Pulmonary Edema, C	1.25 mg/m3	0.36 mg/m3	0.04 mg/m3	0.03 mg/m3
Ethylene Oxide	800 ppm	Pulmonary Edema	1,250 ppm	385 ppm	50 ppm	33 ppm
Ethylenediamine	4,916 mg/m3	Neurological, C	7,900 mg/m3	2,300 mg/m3	270 mg/m3	170 mg/m3
Fluorine	25 ppm	Chem. Asphyxiant	1,250 ppm	385 ppm	50 ppm	33 ppm
Hydrazine	10 ppm	Neurological, C	95 ppm	28 ppm	3 ppm	2 ppm
Hydrogen Sulfide	100 ppm	Chem. Asphyxiant	1,250 ppm	385 ppm	50 ppm	33 ppm
Lindane	1,000 mg/m3	Neurological	105 mg/m3	30 mg/m3	3 mg/m3	2 mg/m3
Mercury Salts***	10 mg/m3	Neurological	155 mg/m3	45 mg/m3	5 mg/m3	3 mg/m3
Nitric Acid (FUM)	30 ppm	Pulmonary Edema	400 ppm	115 ppm	14 ppm	9 ppm
Nitric Oxide	30 ppm	Lung Irritant	1,050 ppm	325 ppm	43 ppm	28 ppm
Nitrobenzene	200 ppm	Liver/Kidney Toxin	1,250 ppm	355 ppm	41 ppm	26 ppm
Phenol	200 ppm	Liver/Kidney Toxin	130 ppm	39 ppm	4 ppm	3 ppm
Cyanide Salts*****	50 ppm	Chem. Asphyxiant	70 ppm	22 ppm	3 ppm	2 ppm
Sulfur Dioxide	15 ppm	Lung Irritant	1,250 ppm	385 ppm	50 ppm	33 ppm
Sulfuric Acid	30 mg/m3	Lung Irritant	1,050 mg/m3	300 mg/m3	35 mg/m3	22 mm/m3

* ERPG-3 (AIHA, 1989); (DOE, 1992); IDLH (NIOSH, 1990) used when no ERPG-3 values established.
** Cyanogen bromide converted to hydrogen cyanide as gas equivalent.
*** Combined mercury acetate, chloride, and oxide forms.
****C: suspected carcinogen; M: suspected mutagen; T: suspected teratogen. From NIOSH, 1986 and NIOSH, 1990.
***** Potassium and sodium cyanide converted to hydrogen cyanide equivalent.

Table 4. Calculated air concentrations at various receptor locations for chemicals released at representative inventory quantities.

Chemical	ACUTE/CHRONIC EXPOSURE ERPG-3*	TERATOGEN****	Air Concentration 100 m	Air Concentration 183 m	Air Concentration 536 m	Air Concentration 677 m
Acrylamide	N/A	Neurological, C	0.46 mg/m3	0.13 mg/m3	0.02 mg/m3	0.01 mg/m3
Aldrin	100 mg/m3	Liver Tox, C	0.00 mg/m3	0.00 mg/m3	0.00 mg/m3	0.00 ppm
Allyl Alcohol	150 ppm	Pulmonary Edema	0.95 ppm	0.28 ppm	0.03 ppm	0.02 ppm
Aniline	100 ppm	Cyanosis, C,M	3.55 ppm	1.05 ppm	0.12 ppm	0.08 ppm
Boron Trifluoride	100 ppm	Lung Irritant	2.05 ppm	0.65 ppm	0.08 ppm	0.06 ppm
Bromine	5 ppm	Lung Irritant	3.50 ppm	1.10 ppm	0.14 ppm	0.09 ppm
Cadmium Oxide	9 mg/m3	Pulmonary Edema, C	0.12 mg/m3	0.03 mg/m3	0.00 mg/m3	0.00 mg/m3
Carbon Disulfide	500 ppm	Neurological, M	14.50 ppm	4.20 ppm	0.50 ppm	0.31 ppm
Chlorine	20 ppm	Lung Irritant	70.00 ppm	21.00 ppm	2.75 ppm	1.80 ppm
Chloroform	1,000 ppm	CNS Depressant, C	30.00 ppm	8.50 ppm	1.00 ppm	0.65 ppm
Cyanogen Bromide**	50 ppm	Chem. Asphyxiation	3.90 ppm	1.20 ppm	0.16 ppm	0.10 ppm
Dimethyl Sulfate	10 ppm	Lung Irritant, C,M,T	0.90 ppm	0.27 ppm	0.03 ppm	0.02 ppm
Endrin	2,000 mg/m3	Pulmonary Edema, C	0.00 mg/m3	0.00 mg/m3	0.00 mg/m3	0.00 mg/m3
Ethylene Oxide	800 ppm	Pulmonary Edema	3.95 ppm	1.20 ppm	0.16 ppm	0.11 ppm
Ethylenediamine	4,916 mg/m3	Neurological, C	110.00 mg/m3	33.00 mg/m3	3.80 mg/m3	2.40 mg/m3
Fluorine	25 ppm	Chem. Asphyxiant	0.46 ppm	0.14 ppm	0.02 ppm	0.01 ppm
Hydrazine	10 ppm	Neurological, C	20.50 ppm	6.00 ppm	0.70 ppm	0.45 ppm
Hydrogen Sulfide	100 ppm	Chem. Asphyxiant	210.00 ppm	65.00 ppm	8.50 ppm	5.50 ppm
Lindane	1,000 mg/m3	Neurological	0.00 mg/m3	0.00 mg/m3	0.00 mg/m3	0.00 mg/m3
Mercury Salts***	10 mg/m3	Neurological	0.50 mg/m3	0.15 mg/m3	0.02 mg/m3	0.01 mg/m3
Nitric Acid (FUM)	30 ppm	Pulmonary Edema	2.65 ppm	0.75 ppm	0.09 ppm	0.06 ppm
Nitric Oxide	30 ppm	Lung Irritant	105.00 ppm	32.00 ppm	4.20 ppm	2.75 ppm
Nitrobenzene	200 ppm	Liver/Kidney Toxin	0.27 ppm	0.08 ppm	0.01 ppm	0.01 ppm
Phenol	200 ppm	Liver/Kidney Toxin	4.81 ppm	1.43 ppm	0.16 ppm	0.10 ppm
Cyanide Salts*****	50 ppm	Chem. Asphyxiant	55.00 ppm	16.50 ppm	2.20 ppm	1.40 ppm
Sulfur Dioxide	15 ppm	Lung Irritant	420.00 ppm	130.00 ppm	17.00 ppm	11.00 ppm
Sulfuric Acid	30 mg/m3	Lung Irritant	1.15 mg/m3	0.33 mg/m3	0.04 mg/m3	0.02 mg/m3

* ERPG-3 (AIHA, 1989); (DOE, 1992); IDLH (NIOSH, 1990) used when no ERPG-3 values established.
** Cyanogen bromide converted to hydrogen cyanide as gas equivalent.
*** Combined mercury acetate, chloride, and oxide forms.
****C: suspected carcinogen; M: suspected mutagen; T: suspected teratogen. From NIOSH, 1986 and NIOSH, 1990.
***** Potassium and sodium cyanide converted to hydrogen cyanide equivalent.

Bounding consequences of postulated accidental releases would result from a release of the maximum inventory quantity of bromine or sulfur dioxide. Concentrations of bromine exceeding ERPG-3 would occur as far away as 2 km (1.2 mi) from the release point and ERPG-2 would be exceeded as far away as 6 km (3.7 mi). Concentrations of sulfur dioxide exceeding ERPG-3 would be seen as far away as 1.5 km (1 mi) from the release point and ERPG-2 would be exceeded as far away as 3 km (1.8 mi). Predominant winds at the IRC would transport the plume into relatively unpopulated areas. Potential health effects would be less severe if the wind speed was greater than 0.5 m/sec (1.5 ft/sec). Assuming that the plume moved into the most highly populated sector and that no mitigative measures, such as evacuation, were undertaken, severe or life-threatening health effects would be experienced by as many as 3000 people. In this unmitigated scenario, fatalities would be concentrated within 300 m (1000 ft) of the IRC as discussed below.

Threshold lethal concentrations (LC_{LO}) from human toxicology data for selected chemicals were compared to air concentrations for release of maximum allowable and current inventory quantities of IRC chemicals (Table 5). The LC_{LO} is the lowest reported concentration which was lethal for 1 person. For each chemical evaluated, release of the maximum allowable quantities of material would produce an air concentration within 100-300 m (330-1000 ft) from the release point that could be fatal to individuals exposed to the plume for a sufficient period of time. The number of individuals exposed to the plume would be limited because the area within the plume includes the IRC complex and other adjacent businesses. Workers at these locations are usually inside of the buildings

Table 5. Comparison of human toxicological data for selected chemicals with calculated 100 m air concentrations.[a]

Chemical	Maximum[b] (ppm)	Inventory[c] (ppm)	LC_{LO}[d] (ppm)	Exposure Time (min)
Allyl Alcohol	4,350	0.95	1,000	60
Bromine	1,000	3.5	1,000	—
Chlorine	450	70	843	30
Chloroform	12,500	30	5,100	5
Cyanogen Bromide (as HCN)	70	3.9	110	60
Hydrogen Sulfide	1,250	210	200	30
Cyanide Salts (as HCN)	70	55	110	60
Sulfur Dioxide	1,250	420	1,000	10

a. Exposure times at 100 m would be approximately 60 min because model calculations assume the release occurs over 60 min.

b. Air concentrations calculated from release of maximum facility inventory (based on NFPA or 40 CFR 355).

c. Air concentrations calculated from release of current inventory quantities.

d. From NIOSH, 1990.

where they work and air concentrations of chemicals within these buildings would likely be lower than air concentrations outside. The time of exposure for these individuals would also likely be short as these people would be outside only when moving between buildings or leaving the area. Implementation of spill control measures would, in most circumstances, reduce the duration of the release and the associated exposure time. The maximum population exposed to plume concentrations in excess of the LC_{LO}, including workers at the IRC and adjacent businesses, is estimated to be approximately 600. If all of these people were exposed to the plume for a sufficient time and if 2.5 people in 100 are assumed to have a fatal reaction to exposure to the LC_{LO}[b], then as many as 15 fatalities could result from an accidental spill. Mitigating factors such as work location and time of exposure would likely reduce the number of fatalities to 1 or fewer.

Spills would be rare events and no spills have occurred outside IRC buildings in the past. With the exception of chemicals used by only one program, quantities of specific chemicals received at the IRC are generally smaller than the quantity identified as the representative facility inventory for that chemical. Packaging of chemicals delivered to the IRC provides secondary containment and greatly reduces the possibility of a spill occurring. Worst-case atmospheric conditions assumed in modeling rarely occur and wind speeds at the IRC are generally greater the 0.5 m/s. These factors further reduce the probability of occurrence for the bounding accident. The Chemical Inventory and Management Control System will limit quantities of specific materials shipped to or stored at the IRC in order to minimize potential risks to the public.

In the event that a spill occurred, spill cleanup and containment activities would be initiated and local emergency response agencies would be notified through the Warning Communications Center in accordance with the Emergency Action Plan for the IRC. Mitigative actions that might be necessary, such as evacuation, would be initiated by these agencies.

4.6.3 Fire Safety

Flammable chemicals are widely used in the laboratories at the IRC. Administrative controls are in place to reduce the risk of fire starting inside the facility. Those controls include limiting the volume of flammable material in each laboratory and reducing ignition sources wherever possible.

IRC buildings meet Uniform Building Code and NFPA requirements for classification as noncombustible. Fire detection systems in the facility include the automatic sprinkler heads (heat activated) and smoke detectors in the heating, ventilation, and air conditioning system and chemical

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b. The percentage of the population that would have a fatal reaction if exposed to the LC_{LO} for a chemical was estimated by assuming that the population response to the exposure would follow a normal distribution. A typical response to exposure to LC_{LO} concentrations of a chemical was assumed to be recovery after a temporary illness. If 95% of the population showed this typical response, then 2.5% of the population would be expected to have a less severe response and 2.5% would be expected to have a more severe response. The more severe response was assumed to be death.

storage areas. Fire suppression systems include the sprinkler system, standpipe hose stations, and hand extinguishers. The fire suppression system in the laboratory building would limit any fire that did occur to an individual laboratory or group of laboratories. No halon systems are used at the IRC.

5. ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTIONS

5.1 Impacts From Construction

Construction activities would lead to temporary atmospheric pollution, noise, and generation of various wastestreams. All construction activity generates temporary atmospheric pollution by dust and vehicular emissions. Dust suspension would be reduced whenever possible by applying water and approved soil fixatives. Paving activities using asphalt are likely to produce temporary noxious odors, which would subside upon completion of the project. Construction activities would also generate some temporary additional noise. Construction debris would be deposited in the Bonneville County Sanitary Landfill.

Construction of the proposed facilities and support areas would involve development of approximately 1% of the IRC site [0.15 ha (0.4 acre)] and would increase the amount of paved surface and building coverage at the site by approximately 2.5%. This increased impervious area would proportionately increase runoff. Existing measures for controlling runoff including depressions and ditches are adequate and no modifications would be required as a result of the proposed action.

Blasting might be necessary to remove basalt before construction of the Chemical Storage Facility and the Hazardous Waste Handling Facility. Blasting is likely to produce noise, vibration, dust, and possibly projectiles. All DOE, State of Idaho, and City of Idaho Falls blasting permits would be obtained and all agency requirements would be complied with before blasting was conducted on the site. Blasting would not be necessary for construction of the Research Laboratory Addition because the site was prepared when the existing laboratory facility was erected.

No impacts to biological or cultural resources are anticipated at the IRC. All construction activities would occur within the boundaries of the IRC property, where native vegetation was removed long ago. Topsoil from construction sites would be retained for restoration of the disturbed sites. If any unusual materials (i.e. bones, obsidian flakes, darkly stained soil horizons, "arrowheads," etc.) were encountered during excavation, construction activities in the area would cease immediately, resuming only after consultation with a certified professional and completion of any necessary mitigative action.

There would be no unusual worker hazards associated with construction activities at the IRC. Construction activities would use standard earth moving machinery and carpentry, mechanical, and electrical equipment. Construction projects would rely on the local labor pool, and for these small, short duration projects (less than one construction season of April through October), peak employment would be less than 20.

5.2 Operational Impacts

5.2.1 Emissions of Nonradiological Atmospheric Pollutants

Nonradiological atmospheric pollutants would be released from the proposed research laboratory addition, the hazardous waste handling facility, and the chemical storage facility (Table 6). These emissions would be produced from chemical evaporation and combustion of natural gas for heating. The basis for emission calculations from these combustion sources can be found in the EPA's *Compilation of Air Pollutant Emission Factors Volume I: Stationary Point and Area Sources* (1985).

Table 6. Emission rates (tons/yr) of pollutants from proposed IRC sources.

	Pollutant				
Proposed Facility	PM-10	SO_2	NO_x	CO	VOC[a]
Research laboratory addition	0.05	0.006	1.4	0.35	0.18
Hazardous waste facility	0.003	0.0004	0.09	0.02	1.4
Chemical storage facility	0.003	0.0004	0.09	0.02	0.013
Total (tons/yr)	0.06	0.007	1.6	0.39	1.6
Total (mg/sec)	1.52	0.14	45.4	11.34	183.1

a. VOC emissions account for combustion sources and evaporation of organic solvents. Calculations assume an average density of 1.1 kg/L (9.42 lb/gal.) for VOCs that could evaporate and average release rates for 2,080 hrs of operation annually. Calculations for combustion assume sources operate 24 hrs/day, 365 days/yr, for a total of 8.760 hrs/yr. VOC emissions from the research laboratory addition include 0.12 ton/yr from evaporation of chemicals and 0.06 ton/yr from combustion.

Chemical emissions from the research laboratory addition would be discharged through a dedicated stack associated with the fume hood ventilation system. Emissions would consist of VOCs released through evaporation. Maximum usage volumes are estimated to be 1,900 L/yr (500 gal./yr) with 5% of the total lost to evaporation. Average VOC emissions, based on an operational schedule of 2,080 hr/yr, would be 0.01 g/sec (0.11 lb/hr). The maximum hourly release rate from the proposed research laboratory addition would be 0.18 g/sec (1.4 lb/hr). Evaporation of chemicals used in the proposed research laboratory addition would increase annual VOC emissions by 109 kg/yr (0.12 ton/yr).

The proposed research laboratory addition would be heated by natural gas duct heaters with a maximum heat output of 2.4 x 10^6 Btu/hr. Heaters are assumed to operate 24 hrs/day, 365 days/yr (8,760 hr/yr) and would increase pollutant emissions due to combustion sources at the IRC by approximately 16% (including 0.06 ton/yr of VOCs). A discussion of total emissions from existing and proposed IRC facilities can be found in Section 6.

The air concentration of each regulated pollutant at 100 m (330 ft) (approximate site boundary) was estimated using SCREEN, an atmospheric dispersion model used for screening pollutant concentration and for determining if additional modelling is required. Air concentrations of NO_x and VOCs would be 1.2% and 22% of the relevant National Ambient Air Quality Standard (NAAQS) (40 CFR 50), respectively. Maximum air concentrations of other pollutants that could result from IRC emissions were determined to be much less than 1% of the NAAQS. The estimate for VOCs is conservative because the maximum estimated hourly emission rate was assumed in the calculation.

Emissions of VOCs from the proposed hazardous waste handling facility would result from evaporation during mixing and compatibility testing. Based on annual usage of 11,950 L (3,150 gal.) of VOCs in IRC facilities, with 90% of the total discarded as waste and 10% of the total waste evaporating during mixing and bulking, the average VOC emission from the hazardous waste handling facility would be 0.038 g/sec (1.28 lb/hr). Annually, 1,200 kg (1.34 tons) of VOCs would be released from the facility. Most evaporation would occur during bulking and a conservative estimate of the maximum was calculated based on bulking of 417 L (110 gal.) in 1 hr, with 10% evaporative loss. This maximum emission rate would be 13 g/sec (104 lb/hr). Evaporation rates have not been included in the emission rates of pollutants from the proposed chemical storage facility as all sources would be sealed.

The hazardous waste handling facility and chemical storage facility would be heated by combustion of natural gas. Both facilities would be equipped with heaters with outputs of 1.5 x 10^5 Btu/hr. Heaters are assumed to operate 24 hrs/day, 365 days/yr (8,760 hr/yr). Total estimated pollutant emissions from the proposed chemistry wing are presented in Table 6.

A permit-to-construct application would be submitted to the Idaho Air Quality Bureau for each new building that would release atmospheric pollutants. Construction would not commence without state approval.

5.2.2 Liquid Effluents

The new facilities would add up to 10% additional volume to sewer effluents from the facility. Increases in wastewater volume due to the proposed action would have little impact on treatment capabilities of the City of Idaho Falls Wastewater Treatment Plant. The plant treats approximately 1.14 x 10^{10} L/yr (3 x 10^9 gal./yr) and has the capacity to treat 2.28 x 10^{10} L/yr (6 x 10^9 gal./yr). Doubling the conservatively estimated volume of wastewater released from IRC facilities would maximally increase the IRC contribution to the wastewater treatment plant from 0.2 to 0.4% of the current volume treated.

The research laboratory addition and hazardous waste handling facility would be the only proposed facilities from which chemicals might be released. Releases from the research laboratory addition would be similar in nature to those from the existing laboratories at the IRC and would consist of materials that adhered to glassware and were released during cleaning. Under normal operating conditions, no biohazardous materials would be discharged to the sewer from these laboratories. Liquid effluents released by hazardous waste management operations are currently released from the existing research laboratory building. IRC hazardous waste management operations, including activities resulting in liquid effluents, would be relocated to the dedicated facility. All wastewater would comply with City of Idaho Falls Sewer Regulations. Effluents from laboratory sinks would be incorporated into the existing monitoring program.

5.2.3 Radiological Releases and Worker and Public Exposure

Radiolabelled compounds would be used in biotechnology research and experimentation carried out in the laboratory building. The quantities of radionuclides that would be used in these experiments would be on the order of microcurie amounts. Under normal operational conditions, no radionuclides would be released to the environment. The maximum inventory of radiolabelled compounds (in excess of 10 CFR 20 Appendix C limits and sealed sources) would be limited to 30 mCi, comprised of 10 mCi each of ^{14}C, ^{35}S, and ^{32}P. ALARA goals for workers at the IRC would not change under the proposed action. Fewer than 50 workers are anticipated to be associated with biotechnology programs using radiolabelled compounds. No adverse health effects are anticipated in workers as a result of use of radiolabelled compounds as metabolic tracers in biotechnology experiments.

A National Emission Standards for Hazardous Air Pollutants (NESHAPs) permit application addressing the use of these radiolabelled compounds has been prepared, and the conservatively estimated dose to a hypothetical maximally exposed member of the public was determined to be below regulatory concern. The NESHAPs application, and associated risk assessment, conservatively estimated releases would occur through the heat recovery fan exhaust vents. This assumption represented the most direct route of release and maximized the resulting dose to a hypothetical member of the public. The maximum possible radiological dose a person could receive was calculated to be 2.9×10^{-2} mrem/yr, which is approximately 0.3% of the EPA limit for the radiological dose resulting from atmospheric releases from DOE facilities. Using a conversion factor of 7.3×10^{-4} (ICRP, 1991) and assuming an individual was exposed to this dose rate for 70 yrs, conservatively estimated operational releases from the IRC would produce an excess cancer (fatal and nonfatal) risk of 1.5×10^{-6}.

An application for a permit to construct regarding the use of radiolabelled compounds in biotechnology research was submitted to the State of Idaho in February 1990. The Idaho Air Quality Bureau notified DOE, on April 5, 1990, that radionuclide emissions from radiotracer use would not trigger a review for prevention of significant deterioration and the source was specifically exempted from obtaining a permit to construct under Idaho Administrative Procedures Act 16.01.1012,02.f ("Rules and Regulations for the Control of Air Pollution in Idaho"), which addresses laboratory equipment used exclusively for chemical and physical analyses.

A small quantity of the radioactive material could be released to the sanitary sewer system through inadvertent drips or through adhering to glassware. Conservatively estimated operational releases into sanitary sewers could lead to a maximum radiological dose of 5.1×10^{-4} mrem/yr to an individual who drank 2 L/day (0.5 gal./day) of the discharge water at the point where the effluent from the IRC enters the sanitary sewer system. Exposure to this radiological dose for 70 yrs would result in an excess risk of cancer (fatal and nonfatal) of 2.6×10^{-8}. The calculated dose and excess cancer risk is extremely conservative because the water is not available, nor fit, for consumption. The calculated operational releases via the sanitary sewer are more than 100,000 times smaller than the derived concentration guides for ingested water (DOE Order 5400.5) and nearly 8,000 times smaller than the Safe Drinking Water Act standard of 4 mrem/yr (40 CFR 141.16).

For perspective, maximum radiation doses that could result from the proposed action as described above can be compared to the 5×10^{-2} to 1×10^{-1} mrem/yr received by the average television viewer and to the 7×10^{-1} mrem dose received by passengers on an average 5-hour jet flight.

5.2.4 Utilities

The existing utility corridor at the IRC is owned by the City of Idaho Falls. The corridor is maintained by the City, and the City is obligated to upgrade the capacity if necessary. The City of Idaho Falls Engineering Department would be consulted during the planning phases of each proposed modification or new facility. The City does not anticipate upgrades to the corridor would be necessary to accommodate the proposed facilities.

The existing lateral connection to the City of Idaho Falls water main is adequately sized to accommodate expansion at the IRC.

5.2.5 Land Use

The IRC is located in an area zoned for industrial development. Expansion of IRC facilities is consistent with the current development plan for the area. Light industrial facilities surround the IRC, with the exception of the land immediately to the east, which is presently used as pasture.

5.2.6 Waste Management

Wastestreams in proposed facilities would be incorporated into existing waste programs. The research laboratory wing would add up to 10% to the existing hazardous wastestream. This increase in the quantity of hazardous waste generated would not change the small quantity generator status of the IRC.

5.3 Impacts from Nonroutine Operations

The proposed facilities would not change the nature or impact of potential accidents at the IRC as described in Section 4.6. Increasing the volume of chemicals used at the IRC would slightly increase the possibility of a spill. Environmental impacts from such a spill would not be changed.

Accidental atmospheric releases of ^{14}C labelled compounds would be bounded by the maximum quantity contained in one ampoule (5 mCi). Most or all of a highly volatile material might evaporate before cleanup could be attempted. Compounds labelled with ^{32}P or ^{35}S are not volatile, but a small laboratory fire might lead to a release of up to 5×10^{-4} mCi. The CEDE from this accident that could be received by a hypothetical maximally exposed member of the general public was determined to be 5×10^{-3} mrem. This dose would result in an excess cancer risk of 3.7×10^{-9}. No adverse health effects would be expected to occur in the exposed population as a result of this exposure.

An accidental release to the sanitary sewer could involve the entire contents of one vial of a radionuclide (5 mCi). For purposes of calculation, it was assumed the release was diluted by the volume of water exiting the IRC in one hour [7,950 L (2,000 gal.)]. The receptor was assumed to be an individual who drank 2 L (0.5 gal.) of the contaminated water. The maximum possible dose would occur if the vial contained ^{32}P. This hypothetical scenario could result in a CEDE of 9.7 mrem and an excess cancer risk of 7.1×10^{-6}. This acute dose would not produce any noticeable health effects in the exposed individual.

6. CUMULATIVE IMPACTS

Expansion of IRC facilities would have little or no adverse impact on the local environment. No significant biological impacts would occur as a result of the new construction. Natural vegetation was eliminated long ago, and no endangered or threatened species inhabit the site.

The research laboratory addition, hazardous waste handling facility, and chemical storage facility would increase the quantity of air pollutants released by IRC facilities. Air concentrations of pollutants at 100 m (approximate site boundary) were modeled and average hourly emissions from the IRC were compared to applicable NAAQS (Table 7)[c]. Based on average hourly emissions and with the exception of NO_x and VOCs, 100-m (330-ft) air concentrations of pollutants would be less than 1% of the applicable NAAQS. Air concentrations of NO_x and VOCs would be approximately 9% of the applicable NAAQS. These conservatively estimated emissions would not produce a noticeable decline in air quality in the region and would not be expected to impact human health.

Sanitary wastewater volumes would increase proportional to the number of new employees located at the IRC. The increase in wastewater volume would have little impact on the City of Idaho Falls Wastewater Treatment Plant.

Table 7. Average hourly air concentrations of atmospheric pollutants 100 m resulting from existing and proposed IRC sources as compared to NAAQS.

Source[a]	Pollutant concentration at 100 m ($\mu g/m^3$)				
	PM-10	SO_2	NO_x	CO	VOC
Existing	1.2	0.14	7.5	18.7	8.5
Proposed	0.2	0.02	1.4	3.4	13.6
Total	1.4	0.16	8.9	22.1	22.1
NAAQS[b]	150	365	100	40,000	235

a. IRC emission rates include existing releases and increases in emissions due to heating and increased use of VOCs.

b. NAAQS are 24-hour standards for PM-10 and SO_2, annual for NO_x, and 1-hour for CO and VOC (ozone).

c. Letter from W.J. Berry (MSE, Inc.) to S.K. Gray (EG&G Idaho, Inc.) *Conversion of pollutant emission rates to air concentrations at 100 m for emissions from the IRC.* Dated 9 August 1993.

7. ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

7.1 No Action

Environmental impacts of the no-action alternative would be identical to the impacts of the existing facility addressed in Section 4.0. Under the no-action alternative, research activities would need to be prioritized, and some projects would need to be eliminated or delayed due to lack of space. Research in existing laboratories would continue, but the efficiency of these activities would not improve without upgrading the fume hoods. State-of-the-art techniques in biotechnology research require the use of radiolabelled compounds, and these procedures would not be available to IRC researchers if the no-action alternative is adopted. Operational safety at the IRC would not be increased if hazardous waste operations and bulk chemical storage were not moved to self-contained facilities. Although the no-action alternative would produce no new environmental impacts, the efficiency and safety of existing IRC operations would not be improved.

7.2 Locate the Facilities at Another Site

Several sites for in-town facilities were studied in detail at the time of construction of the existing facilities. The location of the IRC was selected because it complies with the Idaho Falls zoning requirements and offers convenient proximity to other INEL installations, sufficient room for expansion, and impacts that would result from development of the site were determined to be minimal. Developing the facilities proposed in this environmental assessment at a different location while leaving the remaining land at the IRC undeveloped would not be an optimum use of land resources in the area.

Environmental impacts associated with developing and operating the proposed facilities at an alternate site would not be reduced. Furthermore, those impacts could be increased if, for example, the alternate site involved a sensitive habitat or required a greater amount of development.

The research laboratory addition is not sufficiently large to operate as a stand-alone facility, and other proposed facilities, such as the hazardous waste handling and chemical storage buildings, which would provide a support function for the IRC, would not be useful if constructed at another location. Construction of these support facilities at an alternate location would also increase the number of transportation events associated with chemical and hazardous waste handling, increasing the likelihood of an accident. Furthermore, the existing waste accumulation area in the laboratory building would need to be maintained for collection of materials prior to shipment across town

The proposed laboratory facilities could be erected at a location on the INEL site, located 80 km (50 mi.) west of Idaho Falls. Releases to the environment would not be reduced, and development could require upgrades to INEL utility systems. Environmental impacts would be minimal if the facilities were developed on the INEL site. The proposed laboratory would need to be constructed in association with an existing laboratory facility and continuity of programs could be disrupted if related operations were separated, some occurring in Idaho Falls and others on the INEL site.

8. ENVIRONMENTAL REGULATIONS AND STANDARDS

A variety of statutes, regulations, and standards intended to preserve the environment apply to the expansion and modification of IRC facilities. DOE exercises its responsibility for protection of public health and welfare through the issuance of departmental orders incumbent on all DOE activities. DOE Order 5400.1, "General Environmental Protection Program," establishes programmatic requirements, authorities, and responsibilities for DOE programs that ensure environmental compliance is maintained.

8.1 Regulations

The following list identifies federal regulations and NIH guidelines that apply to the proposed IRC facilities:

- The NEPA of 1969 (Public Law 91-190, as amended), with Council on Environmental Quality regulations for implementation of NEPA (40 CFR 1500-1508) and DOE regulations for implementation of NEPA (10 CFR 1021)

- The Clean Air Act of 1970 (Public Law 91-604, as amended), established NESHAPs, and 40 CFR 61, Subpart H ("National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities"). Radionuclide emissions from IRC facilities and from the proposed action were evaluated and determined to be below regulatory concern.

- State of Idaho Air Quality Bureau, *Rules and Regulations for the Control Pollution in Idaho Manual*, Title 1, Chapter 1, require a permit to construct application be submitted to the State of Idaho and no construction would begin without state approval.

- RCRA of 1986 (Public Law 94-580, as amended) authorizes EPA and states to regulate solid and hazardous wastes.

- A National Pollution Discharge Elimination System permit (40 CFR 403) establishes standards for the City of Idaho Falls Wastewater Treatment Plant. Discharges into the sewer system are regulated under Title 8 of the City of Idaho Falls Municipal Code, which is the Health Sanitation Code. Sewer use is regulated under Chapter 7 of Title 8. Wastewater from the IRC is discharged into the sewer system and the IRC operates within Chapter 7 effluent concentration limits.

- Limits to quantities of radionuclides at the IRC, except as proposed are identified in 10 CFR 20 Appendix C.

- National Institute of Health Guidelines for Research Involving Recombinant DNA Molecules

[51 FR 16958 (1986), with amendments of 52 FR 31848 (1987), 53 FR 28819 (1988), 53 FR 43410 (1988), 54 FR 10508 (1989), 55 FR 7438 (1990), and 55 FR 37565 (1990)], have been adopted as a standard practice all recombinant DNA research conducted at the IRC.

8.2 Operational Standards

The following list identifies DOE orders that effectively promote environmental compliance and safety at the IRC:

- DOE Order 5440.1E, "National Environmental Policy Act," establishes DOE's responsibilities under NEPA.

- DOE Order 5400.5, "Radiation Protection of the Public and the Environment," establishes standards with respect to protection of members of the public and the environment from undue risk from radiation exposure.

- DOE Order 5480.11, "Radiation Protection for Operational Workers."

- DOE Order 5480.3, "Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes."

- DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards."

- DOE Order 5820.2A, "Radioactive Waste Management."

- DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements," Chapter III, "Effluents and Environmental Monitoring Program Requirements."

- DOE Order 6430.1A, "General Design Criteria Manual."

9. CONSULTATION AND COORDINATION

Applications associated with air quality permits for construction and operation of the proposed expansion and upgrade of IRC have been submitted to EPA and the State of Idaho. The EPA determined that no permission is required for the proposed modifications with respect to the radionuclide NESHAP regulations[d]. The State of Idaho determined that the radionuclide emissions from radiotracer use do not trigger Prevention of Significant Deterioration (PSD) review and are exempted from obtaining a permit to construct[e]. The proposed modifications and use of chemicals regulated as toxic air pollutants at the hazardous waste storage/staging facility and the research laboratory addition are also exempt from Permit to Construct requirements by the State[f]. A Permit to Construct determination for the proposed hazardous waste storage/staging facility has been applied for and determined by the State to be exempt from obtaining a Permit to Construct[g]. If additional environmental permit applications for proposed facilities are identified, they will be prepared and submitted for approval as required.

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d. Letter from Jerry Leitch, Radiation Program Manager, EPA, to Chris Anderson, DOE-ID, March 23, 1990.

e. Letter from Orville D. Green, Manager, Planning and Permits, Air Quality Bureau, "Permit Applicability Determination -- DOE-INEL (Idaho Falls) -- P-900204 (radiotracer use at the IRC)," April 5, 1990.

f. Letter from Orville D. Green, Assistant Administrator, Permits and Enforcement, Division of Environmental Quality, to R. S. Rothman, DOE-ID, "INEL -- P-910503 (INEL Research Center Chemistry Laboratory Addition)," March 16, 1992

g. Letter from Martin Bauer, Acting Bureau Chief, Construction Permits Bureau, Permits and Enforcement, to R. S. Rothman, DOE-ID, "DOE/INEL (IRC) Idaho Falls -- P-920504 (Hazardous Waste Storage/Staging Facility and Chemistry Laboratory Addition)," July 27, 1992.

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APPENDIX A

RESPONSES TO THE SHOSHONE-BANNOCK TRIBE COMMENTS

APPENDIX A

RESPONSE TO THE SHOSHONE-BANNOCK TRIBES COMMENTS

In accordance with the Department of Energy, Idaho Operations Office, the draft Environmental Assessment for the expansion of the Idaho National Engineering Laboratory Research Center was provided to the State of Idaho and the Shoshone and Bannock Tribes during December 1993, for preapproval review. This appendix contains a copy of the Shoshone-Bannock Tribes comments letter and the Department of Energy responses to the comments. The State of Idaho determined they had no significant issues related to the action requiring discussion in the EA.

The SHOSHONE-BANNOCK TRIBES

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December 30, 1993

Ms. Theresa L. Perkins
NEPA Compliance Officer
Department of Energy
Idaho Field Office
785 DOE Place MS 1146
Idaho Falls, ID 83401-1562

Dear Theresa,

On December 29th, I received a **Draft EA for the Expansion of the INEL Research Center** from Washington, D.C., Mr. Daniel A. Dreyfus, Acting Director, Office of Nuclear Energy. The following are comments addressing, Pg. 24, Part 5 Environmental Impacts to the Proposed Action, Sec. 5.1 Impacts From Construction, paragraph 3 and 4.

Blasting activity will produce direct and indirect impact in and around the proposed project area. Serious consideration of the consequences to the immediate and surrounding area; the species, endangered and/or threatened; unique geological features; the aesthetic quality of this area; the season for sensitive reproduction of the inhabitant species, direct and indirect to the area; and noise interference with biological production must be taken into account. Consequently, blasting will also affect the subsurface species and cultural resources not yet located.

The next paragraph beginning with, "No impacts to biological or cultural resources are anticipated at the IRC.", suggests construction and human activity during this project will not affect biological or cultural properties at IRC. This statement assumes such properties do not exist subsurface although has yet to be established. I would suggest the statement be changed to "No significant impacts are anticipated to biological or cultural resources." Further, I would suggest the term "unusual material" be changed to "cultural material", also the i.e. statement remain in the sentence. Additionally, a statement of intent for compliance with the environmental checklist with the Cultural Resource Department at DOE be included in this paragraph.

The submitted comments are in compliance with the objectives Tribes agreement with DOE regarding the preservation and protection of environmental and cultural resources located on the INEL.

Any questions please feel free to contact me at 238-3706.

Respectfully submitted,

Diana K. Yupe,
Tribal Anthropologist

cc: R. King, Project Manager
C. Marler, EG&G Cultural Resource Dept.
B. Hayball, Project Director
D/file

RESPONSE TO THE SHOSHONE-BANNOCK TRIBES COMMENTS

The following comments address page 24, Section 5.1 "Impacts from Construction"

Comment: Blasting activity will produce direct and indirect impact in and around the proposed project area. Serious consideration of the consequences to the immediate and surrounding area; the species, endangered and/or threatened; unique geological features; the aesthetic quality of this area; the season for sensitive reproduction of the inhabitant species, direct and indirect to the area; and noise interference with biological production must be taken into account. Consequently, blasting will also affect the subsurface species and cultural resources not yet located.

Response: During the development of this environmental assessment, serious consideration was given to the consequences of construction (e.g., blasting) and operation of the proposed expansion of the IRC on those resources identified by this comment. It was determined that there would be no adverse impacts to these resources.

The proposed site of this activity is in the city limits of Idaho Falls in an area zoned for industrial and manufacturing development. While it is not known at this time if blasting will be required to remove basalt (bedrock) during construction, the possible need for blasting was identified for consideration in this environmental assessment. As identified in Section 3 "Affected Environment", the immediate and surrounding area is primarily light industrial facilities with the exception of the land to the east. Consultation with the appropriate state and federal authorities has indicated that there are no threatened or endangered species known to occupy or use the undeveloped lands at the IRC; consequently we do not anticipate adverse impact to any such species. Similarly, no known unique geological features that have been identified on or adjacent to the site that would be adversely impacted by the proposed action. The proposed construction would have minimal impact on the aesthetic quality of this area since the area is already developed. In addition, the buildings proposed to be constructed are similar in type and size to those already occupying the IRC and will be constructed according to applicable building codes and zoning regulations. Consultation with the State Historic Preservation Officer has failed to identify any cultural resources in the project area. If construction activities unearth cultural resources, procedures would be in place to protect any such resources.

Comment: The next paragraph beginning with, "No impacts to biological or cultural resources are anticipated at the IRC.", suggest construction and human activity during this project will not affect biological or cultural properties at IRC. This statement assumes such properties do not exist subsurface although has yet to be established. I would suggest the statement be changed to "No significant impacts are anticipated to biological or cultural resources."

Response: During the preparation of an environmental assessment, the use of the term "significant" is discouraged. Conclusions of overall insignificance or significance will be made in a finding of no significant impact or a determination to prepare an EIS. Therefore, there has been no change is wording.

The statement does not assume that cultural resources do not exist on the subsurface. Rather, the statement identifies that no impacts to biological or cultural resources would be anticipated by the project. This is based upon the analysis of information contained in the 1979 archaeological survey and information identified in section 3 "Affected Environment."

Comment: Change the term "unusual material" to "cultural material", also the i.e. statement remain in the sentence.

Response: The term "unusual material" has been used to provide a broader scope of definition (coverage) that would give an added measure of safety for protection of cultural resources. During construction activity, personnel are instructed to look for "unusual material" and stop construction immediately upon any discovery of this material. A certified professional would then be called in to assess whether the "unusual material" is "cultural material". Due to the need to provide for broader coverage to ensure the protection of cultural resources, this term has not been revised.

Comment: A statement of intent for compliance with the environmental checklist with the Cultural Resource Department at DOE should be included in this paragraph.

Response: For clarification, this comment is regarding compliance with the draft "*Idaho National Engineering Laboratory Management Plan for Cultural Resources*." The project has budgeted funds for project oversight by Cultural Resource Management personnel to ensure ongoing compliance with the cultural resource requirements stated in this environmental assessment and those contained in the above referenced plan. As this is one of numerous administrative actions that will be conducted as part of the project's management and oversight, wording to this effect has not been included in this environmental assessment.

DATE FILMED

8/24/94

END