Joyce Street

DOE/EA - 0619

ENVIRONMENTAL ASSESSMENT
FOR
RELOCATION
OF
NREL RESEARCH EXPERIMENTS

June 1992

U.S. Department of Energy
National Renewable Energy Laboratory

EXECUTIVE SUMMARY

In compliance with the National Environmental Policy Act (NEPA), the Department of Energy (DOE) has prepared this environmental assessment (DOE/EA-0619) to evaluate the environmental consequences associated with the conduct of ongoing research activities of its National Renewable Energy Laboratory (NREL) proposed to be relocated to leased commercial laboratory and warehouse space at 6800 Joyce Street, in Arvada, Colorado. NREL is currently leasing space in Golden, Colorado, for conduct of the research actions discussed in the EA. The research project proposed for relocation is the Amorphous Silicon Deposition Laboratory (ASDL). Additionally, it may be financially desireable to relocate the Scanning Hartman Optical Tester (SHOT) and the Whole Building Test Facility at a later date, therefore, the consequences of their operation at the proposed facility is evaluated in the EA to support such future decisions. The new location can also provide additional warehouse space required by NREL.

The proposed relocation is necessary to meet a short-term shortage of laboratory and warehouse space until new facilities at NREL's permanent site in Golden, CO, are built. A separate NEPA document is being prepared for the new facility.

Even though one project, the ASDL, uses small quantities of hazardous gases and solvents, the analyses in the EA demonstrate that neither normal operations nor accident conditions resulting from any of the proposed projects would cause any offsite effects and would have very limited potential for onsite effects. Because the facility is already constructed, potential impacts that may have occurred from construction are not part of this analysis. Only minor modifications, primarily door relocations, would be necessary to upgrade the facility for the proposed NREL experiments.

The NREL research may develop improved energy systems which ultimately could have a positive environmental effect if applied commercially.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ENVIRONMENTAL ASSESSMENT
FOR RELOCATION OF NREL RESEARCH EXPERIMENTS

1.0 INTRODUCTION

In 1974, Congress created the Solar Energy Research Institute (SERI) with a mission of being the nation's primary research laboratory for development of renewable energy technologies. Since its inception, SERI conducted basic and applied research in photovoltaics, wind, biomass, solar thermal and solar building energy technologies, and other areas of environmental/energy technology. SERI's experimental activities are primarily bench-scale basic and applied research and include limited field testing. SERI's mission was formalized as a national laboratory in September, 1991, with the establishment of the National Renewable Energy Laboratory (NREL).

This environmental assessment, DOE/EA-0619, addresses the environmental consequences of conducting ongoing NREL research activities proposed to be relocated to leased commercial laboratory and warehouse space at 6800 Joyce Street, in Arvada, Colorado (Figure 1). NREL is currently leasing space for these activities in Golden, Colorado. The research project to be relocated is the Amorphous Silicon Deposition Laboratory (ASDL). Additionally, because it may be finacially desireable to relocate the Scanning Hartman Optical Tester (SHOT) and the Whole Building Test Facility to this new facility at a later date, the consequences of their operations have also be evaluated in this EA. Expanded warehouse space is also required by NREL for the storage of long-lead procurement items for a proposed new NREL office and laboratory facility.

1.1 Purpose and Need for Action. The proposed relocation is necessary to meet a short-term (5 years) shortage of laboratory and warehouse space until new facilities at NREL's permanent site in Golden, CO are built and, therefore, the duration of this proposed

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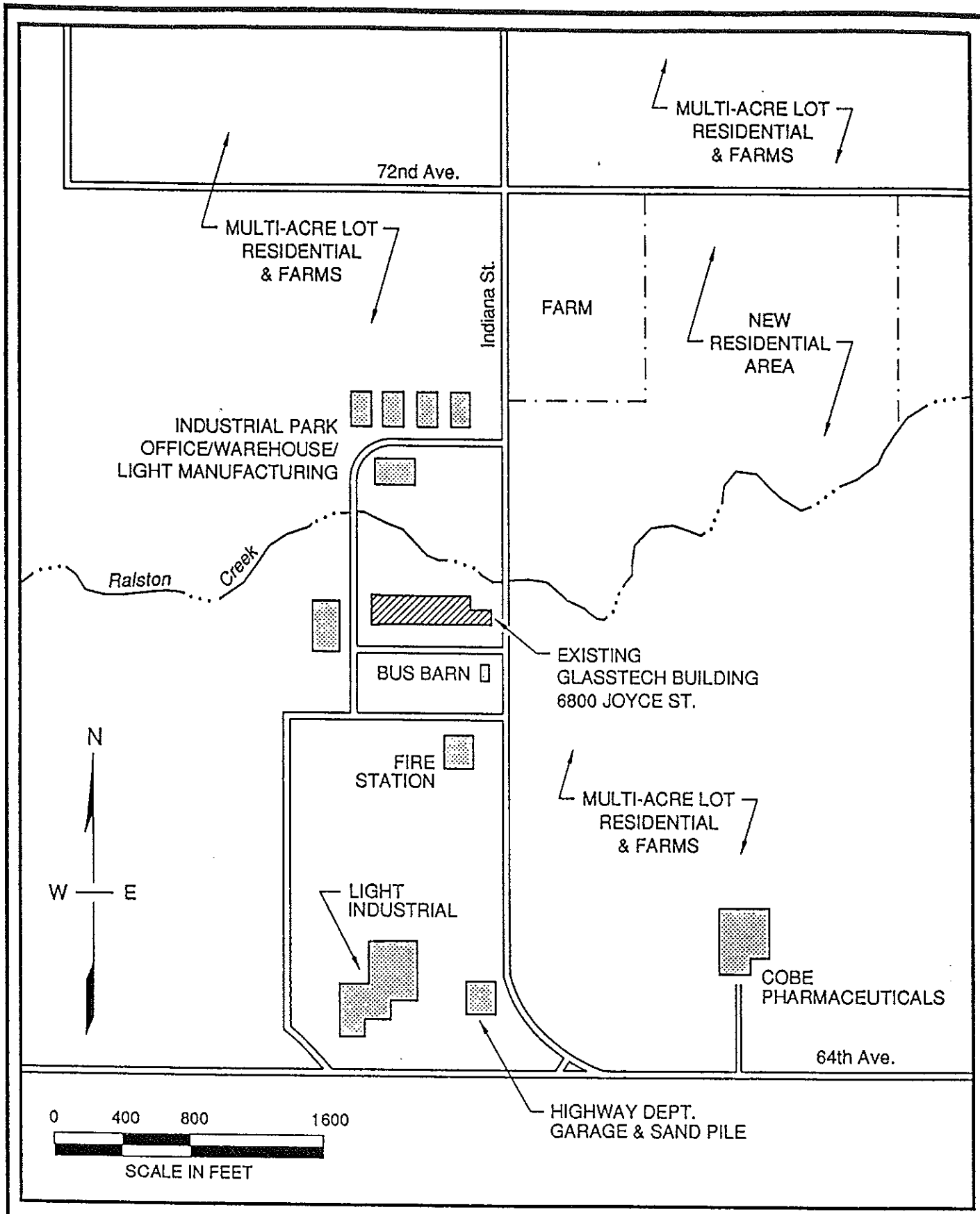

Figure 1
Vicinity Map

action would be limited to this interim period. A separate NEPA document is being prepared for the construction and operation of the proposed Solar Energy Research Facility (SERF), DOE/EA-0620.

The potential relocation of the listed projects would enhance operating conditions and provide more room, but these projects, with the exception of the ASDL experiments, would continue at their current location if additional space is not leased. The ASDL experiments, however, cannot continue at the current location because the building cannot be adequately modified to meet current Uniform Building Code (UBC) requirements, such as exterior gas storage for experiments which utilize concentrated silane, a pyrophoric gas.

The commercial laboratory space available in Arvada can be easily modified to meet all city building code requirements applicable to the proposed research projects and contains sufficient warehouse space for the storage of long-lead procurement items for the proposed new NREL facility. Modification needed to upgrade the proposed facility for NREL's proposed actions would be limited to the relocation of four to five doors and a 13 foot section of wall; the connection of experimental equipment to the existing through the roof exhaust system; and the construction of a concrete bunker in the existing parking lot. The bunker would be a reinforced concrete pad approximately 13ft. x 13ft. surrounded by fencing to prevent unauthorized access, with an 8 foot concrete blast wall separating the pyrophoric gas cylinders from the facility. The remodeling would not generate any hazardous wastes and the solid wastes (primarily dry-wall from the wall relocation) generated would be disposed in an existing commercial landfill.

1.2 Background. The research projects proposed for relocation to the Arvada facility have been ongoing for 3-5 years at various leased facilities in the Golden area. The relocation would allow research for these projects to continue while the SERF is constructed. The current planning schedule for SERF assumes issuance of the EA and FONSI spring 1992, construction summer 1992 through fall of 1993, and occupancy to be intiated in winter of 1994. The proposed temporary relocation would enhance the already demonstrated safe conduct of the laboratory research by providing expanded fire protection and better isolation

of hazardous materials. During the past 4 years of operations there have been no spills, fires, explosions, or other accidents involving ASDL activities. The proposed lease would also provide the option to consolidate activities currently ongoing in several leased facilities into a single, less expensive lease.

The facility which NREL proposes to lease and modify is an existing one-story laboratory/warehouse that was built in 1980 and operated until recently by GlassTech Solar Inc., for the commercial production of photovoltaic power panels. On a commercial scale the activities successfully conducted by GlassTech were very similar to the proposed laboratory scale ASDL research experiments. GlassTech was a small quantity generator under the Resource Conservation and Recovery Act (RCRA), 40 CFR 262.12, (Applied Environmental, 1991). The commercial venture was unsuccessful and the facility was recently purchased by a private investor from the bank. The bank and NREL conducted environmental audits of the facility which identify no significant environmental concerns with the property. Hazardous materials and all production equipment from GlassTech activities have been removed by commercial vendors.

NREL proposes to lease 60,000 ft^2 of the 100,000 square-foot building. The space would be multiple use, consisting of about 30,000 ft^2 of warehouse space, 7,000 ft^2 of office space, 20,000 ft^2 of general laboratory for SHOT and the Whole Building Test Facility and 2,000 ft^2 of specialty (Uniform Building Code Type H-6) laboratory space for the ASDL (Figure 2). The remaining area is currently leased as warehouse space by COBE Pharmaceutical as warehouse space for storage of non-hazardous feedstocks for their manufacturing process. The proposed NREL area is separated from this warehouse space by a fire wall which meets the City of Arvada Fire Code requirements.

1.3 Alternatives Including the Proposed Action. The proposed action is to relocate and conduct ongoing research projects in leased commercial laboratory and warehouse space modified to meet NREL's needs. The relocation would provide the ASDL project with

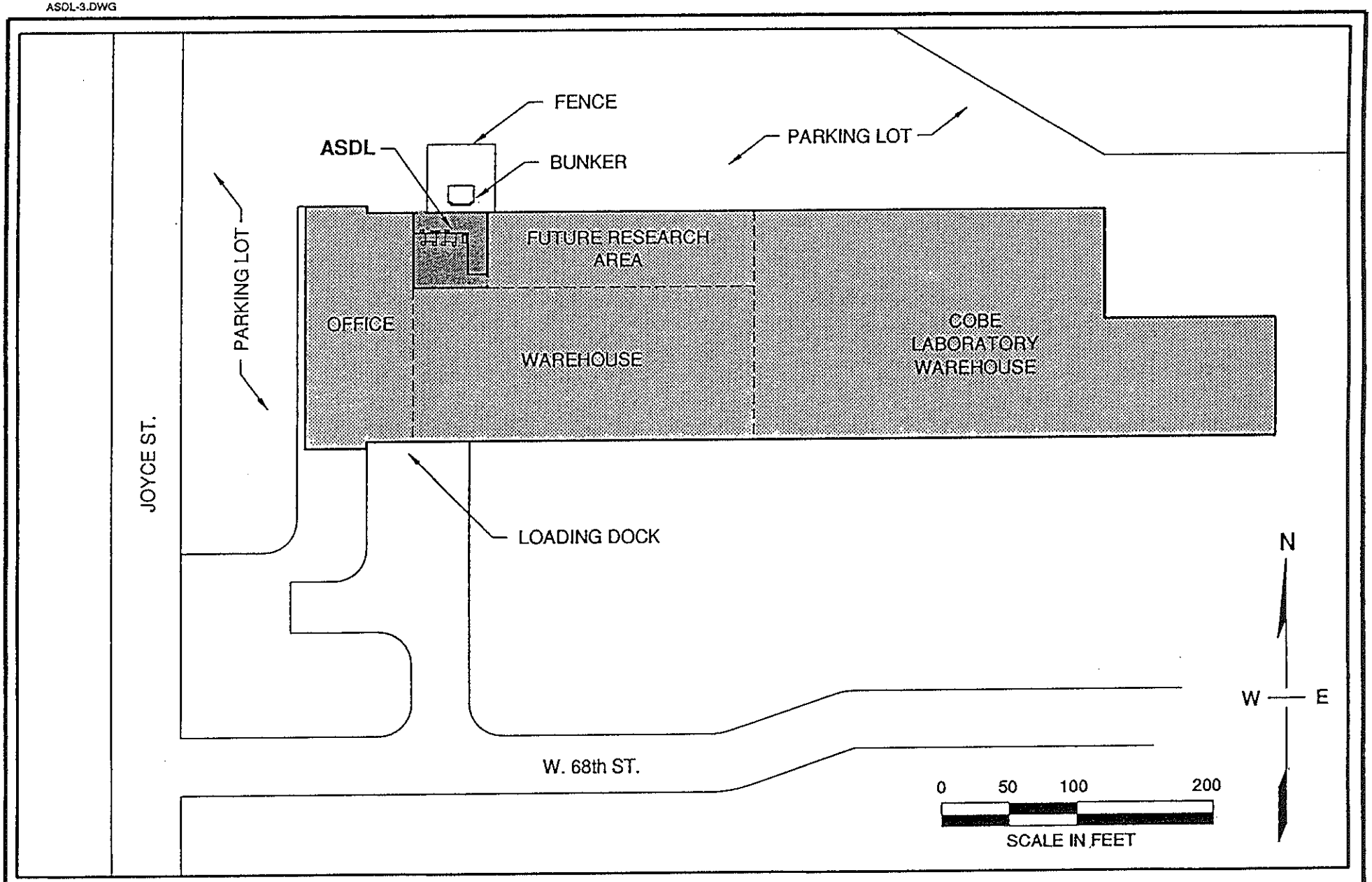

Figure 2
Proposed Use of GlassTech Facility

facilities with the requisite uniform building code (UBC) rating and would increase the available operating space for the SHOT and Whole Building Test Facility projects. Because the proposed relocation of ongoing research activities would be to existing facilities which were zoned by the City and constructed for activities similar to the proposed ASDL research project, the scope of this EA focuses on those issues relevant to the conduct of the proposed research projects at the new location. Issues that have no bearing on the environmental consequences of the relocation have been dismissed from further evaluation. The following subsections discuss the limitations placed on the scope of this EA.

1.3.1 No Action Alternative. This alternative would temporarily halt the ASDL research program for 3 - 5 years, until the new SERF facility is constructed and operational, because the building currently housing the project cannot be modified to meet current building code requirements (H-6) for the proposed research. This would obviously negatively affect this national program and eliminate the potential benifits that the research provides to the photovoltaic industry but would have no direct environmental impacts on biota, workers or the offsite public. Resumption of the ASDL research in the proposed SERF is addressed in DOE/EA-0620, prepared for the new construction and operation of the SERF facility. The remaining ongoing research activities proposed for relocation to the GlassTech facility would continue at their existing locations, the effects of which were addressed in the SERI Sitewide EA (DOE/EA-0101). Additional warehouse space would still be necessary to meet the current and near-term needs under the no action alternative, however, the environmental consequences of warehouse space usage would not differ from the proposed action.

1.3.2 Alternative Sites. No other available facilities exist in the area which meet NREL size requirements for office, laboratory and warehouse space. Additionally, no alternative sites within the area either have or can be easily modified to receive the requisite H-6 building rating and which provide the opportunity for NREL to consolodate actions currently ongoing at multiple locations. New facility construction would be required to create an alternative site comparable to the GlassTech facility. Such an action is addressed

in the SERF document, DOE/EA-0620. Additionally, based on the analyses in this EA, the consequences of the relocation would not be different at another site.

1.4 Limitations on Scope. Because the commercial facility proposed for this action is already constructed and this EA demonstrates that there will be no offsite impacts from normal operation or accidents, there is no potential for the relocation to affect wetlands, floodplains, threatened or endangered species, prime farmland, or cultural or historic sites. Modifications to the GlassTech building would be limited to the interior of the building and the existing asphalt parking lot immediately adjacent to the building. Therefore, the EA will not address these topics further.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The research project proposed for relocation to the GlassTech facility is the Amorphous Silicon Deposition Laboratory (ASDL). Additionally, the Scanning Hartman Optical Tester (SHOT) and the Whole Building Test Facility may be relocated at a later date. The relocation period is currently proposed to last approximately 5 years. At the end of 5 years, the projects will either be moved to the proposed new SERF facility or DOE may re-evaluate the continuation of the projects at the GlassTech facility.

2.1 Facility Description. The GlassTech facility was a combination office, manufacturing, and warehouse building, currently owned and managed by a private investor. Society Bank, the previous owners, and NREL have conducted environmental audits of the facility which did not identify any significant environmental concerns with the property (Fox, 1991a & 1991b, Applied Environmental, 1991). Hazardous materials and all production equipment have been removed by commercial vendors. No asbestos or other hazardous materials were found during the environmental audits and, therefore, the minor interior modifications required by NREL would pose no hazards to workers. As was described in Section 1.1, needed modification would be limited to the relocation of a few doors, one 13 foot wall, the connection of experimental equipment to the existing through the roof exhaust

system, and the construction of a concrete bunker in the existing parking lot. The remodeling would not generate any hazardous wastes and the solid wastes (primarily dry-wall from the wall relocation) generated would be disposed in an existing commercial landfill.

The proposed NREL activities would occupy the office space and use approximately 50% of the high bay area as laboratories and a warehouse. The ASDL experiments would utilize the existing 2000 ft^2 laboratory. The remainder of the building is leased by COBE laboratories for warehousing of plastic feed materials for their pharmaceutical manufacturing facility located approximately one mile south. The COBE warehouse space is isolated from the proposed NREL space by a floor-to-ceiling fire wall, (see Figure 2). The building contains a sprinkler system throughout and has standard industrial showers and eye wash stations. Extensive locker rooms would also be available for employee use.

The facility currently has a toxic gas monitoring system which may be utilized to meet NREL requirements and specification, such as sensitivity, sampling frequency, and 24 hour seven day a week operations. If the existing system cannot perform to NREL standards it would be replaced with a system similar to that which has been successfully used during the last four years of ASDL operations.

Heating is provided by the existing central fired gas heaters which require no operating permits. The system would be operated and maintained by NREL facilities managers. Water and sewer are provided by the city and electrical service from the local utility. No modifications of existing services would be required for NREL activities. Backup emergency power would be provided by a commercially manufactured uninterruptable power supply and consist of two wet-cell lead acid batteries rated at 80 kV and 15 kV. This capacity would exceed the National Fire Protection Association Code (NFPA) 6 hour emergency power standard. This same capacity was adequate to meet the commercial needs of GlassTech opertions. The batteries would be isolated from all laboratory operations, office activities and warehouse actions in the southeast corner of the facility.

The building is adjacent to Ralston Creek, a small drainage, but is above the 100-year floodplain. The Army Corps of Engineers has determined that no Department of the Army Permit would be required for the proposed action (see Appendix A). The building has asphalt parking areas on three sides and has several commercial loading docks capable of receiving deliveries for the proposed projects. Available parking could accommodate over a hundred employees.

2.2 Activity Description. With the exception of the ASDL research, all proposed actions are of the "dry lab" type (i.e., electronics, module testing, etc.) utilizing analytical equipment to conduct a variety of energy research projects. The hazards associated with these projects would be limited to physical hazards and would not include hazards from toxic materials.

Safe operating procedures (SOPs) required by NREL would establish the protocols by which research would be conducted and the safety standards and systems which must be applied. Ongoing programs proposed for relocation have been operating safely under approved SOPs. All SOPs would be updated and staff retrained to the revised SOPs prior to restart at the GlassTech facility.

During the five years of proposed operations, the number of NREL employees working at the facility is not expected to exceed 15 at any time. An average of 5 round trips per day, approximately 20 miles per trip, are estimated between the new facility and current facilities for research and support activities.

2.2.1 Amorphous Silicon Deposition Laboratory. NREL has safely operated the ASDL in its present location for over 4 years. However, the proposed relocation of ASDL is necessary to continue the use of concentrated silane, a pyrophoric material with explosive properties that requires storage external to the research laboratories. External bunker storage in the currently leased facilities cannot be accomodated and the addition of

full building sprinklers, an H-6 fire code requirement, is not acceptable to the landlord of the Golden facilities.

The proposed ASDL for the Glasstech facility consists of two single-chamber deposition systems to fabricate thin film amorphous semiconductors. These will be located in an existing 2000-ft^2 laboratory space isolated from the remaining office, laboratory, and warehouse areas. Between 3 and 5 ASDL researchers operate the equipment 8 hours daily, five days per week. Under NREL operating procedures no after-hours operations are permitted for projects utilizing hazardous materials. The deposition systems are contained in vented plexiglass housings which isolate them from the researchers during normal operations. Products from the deposition chambers will be used for a variety of scientific studies; however, the primary function of the ASDL is to investigate the deposition process and fabricate structures of amorphous silicon for the conversion of solar energy into electrical energy. Microscopic analysis of the products generated in the deposition systems will be conducted at the existing facilities in Golden. This analysis involves only microscopic examination and does not utilize any hazardous materials. The products are solid, not toxic, and present no risk to workers during transport or examination.

The sealed deposition systems, which are enclosed in plexiglass cabinets, will produce thin film amorphous semiconductors by creating reactive gas species using a radiofrequency (RF) plasma assisted glow discharge. These reactive gases then deposit onto the surfaces they contact, including the substrates used for samples. The principal material to be used in the fabrication of these films are gases which are toxic, flammable, and/or pyrophoric. During normal operations approximately 10 percent of the process gases would be deposited on the solid substrate, and the remaining 90 percent passed through the chamber into the scrubbers and then vented to outside air through the roof (Figure 3). System components between runs are cleaned within a fume hood using very small volumes of solvents, including a mixture of nitric, hydrofluoric, and acetic acids. An estimate of the total inventory of

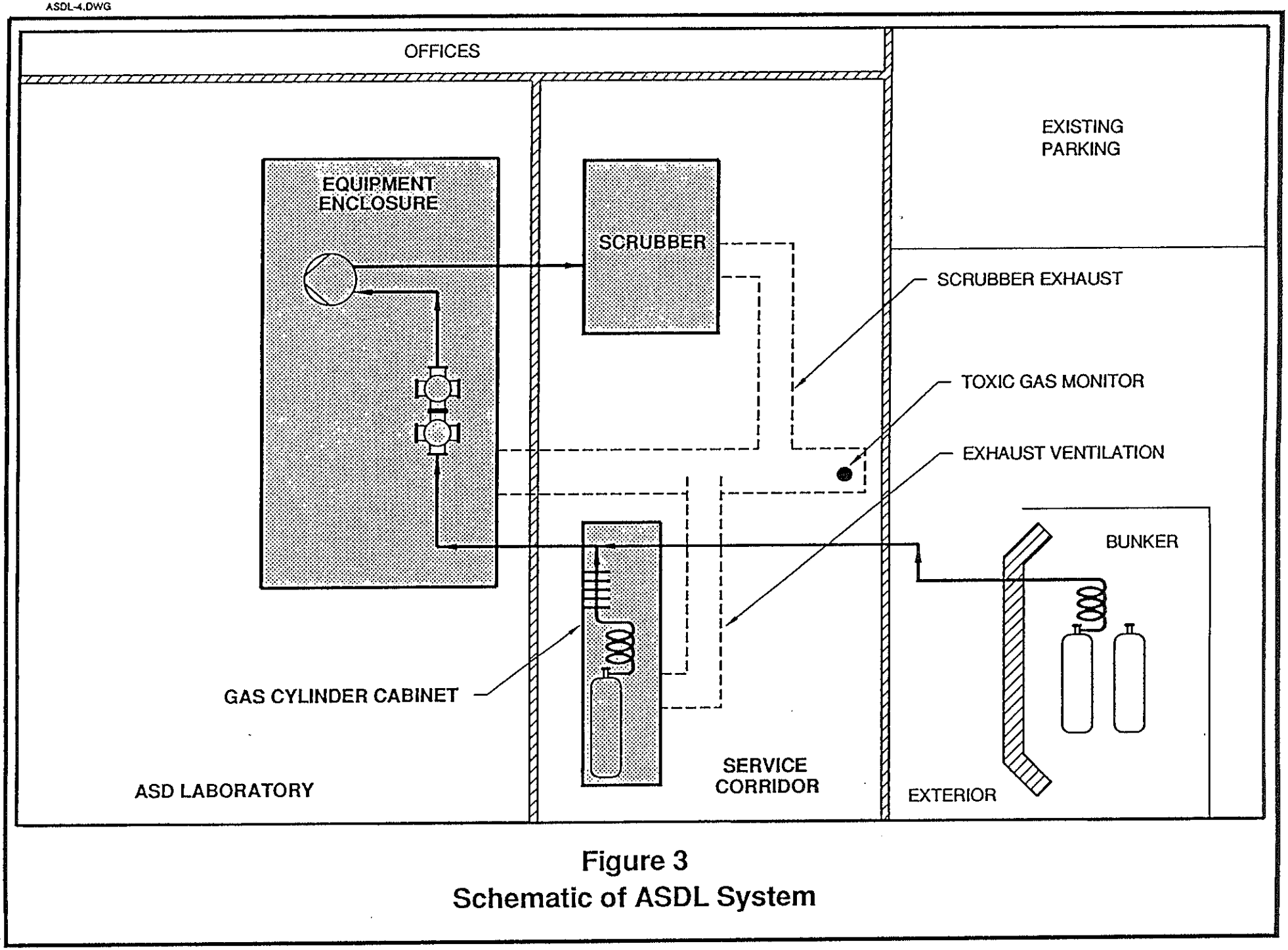

Figure 3
Schematic of ASDL System

gases and solvents required for the two systems for one year of operations is shown in Table 1. As the table demonstrates, the ASDL project uses very small quantities of hazardous chemicals. Table 2 lists the occupational exposure limits for each of the chemicals in the ASDL inventory.

The frequency of the RF generator is 13.56 MHz (megahertz) which is nonionizing; however, at power levels above ASDL operationg parameters, exposures could result in health effects. The threshold limit value (TLV) for RF radiation at 13.56 Mhz is 4.9 mW/cm^2 (milliwatts per square centimeter), however, the systems are typically run at less than one watt. At this power level a person would have to be within 7 cm to exceed the TLV, assuming there is no shielding. Even if the power were increased by a factor of 4, to 4 watts, the safe exposure distance would be only 14 cm. Because the unsafe zone (e.g., within 14 cm) is wholly contained within the system enclosure, it is impossible for a researcher to receive an exposure in excess of the TLV (SERI, 1988).

In addition to standard operating procedures which establish the protocols for safe operations by researchers, the deposition systems will have built-in safety features which assure system operations within safe limits for workers and the environment. Standard industrial safety interlock systems would be incorporated in the design of each deposition system to prevent off-normal operations. The current deposition systems have six individual components to their safety interlock systems: the 12-V direct current power supply, the exhaust ventilation alarm system, the scrubber alarm system, the gas detection high level alarm system, the control panel power boxes, and the individual control panels. Each of these systems are preset to initiate automatic system shutdown if abnormal operating parameters are detected (SERI, 1991).

Safety systems are also incorporated in the design of the proposed laboratory space. The planned layout of the laboratory is shown in Figure 4. The entire laboratory and service corridor would be operated at negative pressure relative to the remainder of the facility via a 5500 cfm exhaust system which would vent to the atmosphere through roof vents.

TABLE 1
PROPOSED CHEMICAL INVENTORY FOR ASDL

Material Type		Quantity On Site at Any Time	Quantity Used Per Year	Quantity Disposed as Waste Per Year	Quantity Exhaust or Evap. Per Year	Storage Location (c)
Name	Conc.					
Methane	100%	40 ft³	20 ft³		20 ft³	gas
Methane	100%	40 ft³	20 ft³		20 ft³	gas
Hydrogen	100%	30 ft³	30 ft³		30 ft³	gas
Hydrogen	100%	30 ft³	30 ft³		30 ft³	gas
Nitrogen	100%	1,530 ft³	51,000 ft³		51,000 ft³	various
Argon	100%	560 ft³	1,120 ft³		1,120 ft³	portable
Helium	100%	244 ft³	244 ft³		244 ft³	portable
Silane	100%	40.6 ft³	20.3 ft³		scrubbed	bunker
Diborane in Silane	2%/98%	13.5 ft³	13.5 ft³		scrubbed	bunker
Diborane in Silane	70 ppm	13.5 ft³	2 ft³		scrubbed	bunker
Phosphine in Helium	2%/98%	68 ft³	68 ft³		scrubbed	gas
Phosphine in Helium	2%/98%	68 ft³	68 ft³		scrubbed	gas
Germane in Helium	2%/98%	28 ft³	28 ft³		scrubbed	gas
Germane in Helium	2%/98%	28 ft³	28 ft³		scrubbed	gas
TMB in Helium	3%/97%	66 ft³	66 ft³		scrubbed	gas
Methanol	100%	1 gallon	4 gallons	0.25 gal.	3.75 gal.	fume
Acetone	100%	1 gallon	4 gallons	0.25 gal.	3.75 gal.	fume
Isopropyl Alcohol	100%	1 gallon	4 gallons	0.25 gal.	3.75 gal.	fume
De contam	100%	1 gallon	1 gallon		1 gallon	fume
Sodium Hydroxide	100%	5 gallons	5 gallons	(a)		fume
Acetic Acid	100%	1 gallon	see 3-1-2 acid	see 3-1-2 acid		fume
Nitric Acid	100%	1 gallon	see 3-1-2 acid	see 3-1-2 acid		fume
Hydrofluoric Acid	100%	2 pints	see 3-1-2 acid	see 3-1-2 acid		fume
3-1-2 Acid	(b)	2 gallons	6 gallons	6 gallons		fume
NaOH scrubber sol.	pH 13	40 gallons	40 gallons	40 gallons		scrubber
NaOH scrubber sol.	pH 13	40 gallons	40 gallons	40 gallons		scrubber

(a) Used in scrubber solution and disposed as part of that waste.
(b) 3-1-2 acid is 3 x nitric, 1 x hydrofluoric, and 2 x acetic.
(c) See Figure 4

TABLE 2
EXPOSURE LIMITS FOR ASDL CHEMICAL INVENTORY

Inventory	OSHA[a]		NIOSH
	TWA(ppm)[c]	STEL(ppm)[d]	IDLH (ppm)[e]
Acetone	750	1,000	20,000
Acetic Acid	10	[f]	1,000
Argon	[g]	[g]	[g]
Diborane	0.1	[f]	40
Germane	0.2	[f]	[f]
Helium	[g]	[g]	[g]
Hydrofluoric Acid	3	6	30
Hydrogen	[g]	[g]	[g]
Isopropyl/Alcohol	400	500	12,000
Methane	[g]	[g]	[g]
Methanol	200	250[g]	25,000
Nitric Acid	2	4	100
Nitrogen	[g]	[g]	[g]
Phosphine	0.3	1.0	200
Silane	5	[f]	[f]
Sodium Hydroxide	2 mg/m^3[h]	[f]	250 mg/m^3
Trimethylboron	[f]	[f]	[f]

[a] OSHA, Permissible Exposure Limit (PEL), 1989.
[b] NIOSH, 1990.
[c] Time Weighted Average, ppm = parts per million. The average airborne exposure in any 8 hr shift of a 40 hour week which shall not be exceeded.
[d] Short Term Exposure Limit. The 15-minute time-weighed average exposure which shall not be exceeded during a work day.
[e] Immediately Dangerous to Life or Health. The maximum concentration from which one could escape within 30 minutes without irreversible health effects.
[f] No limits established.
[g] Not considered toxic.
[h] No TWA established, recommended transitional ceiling limit.

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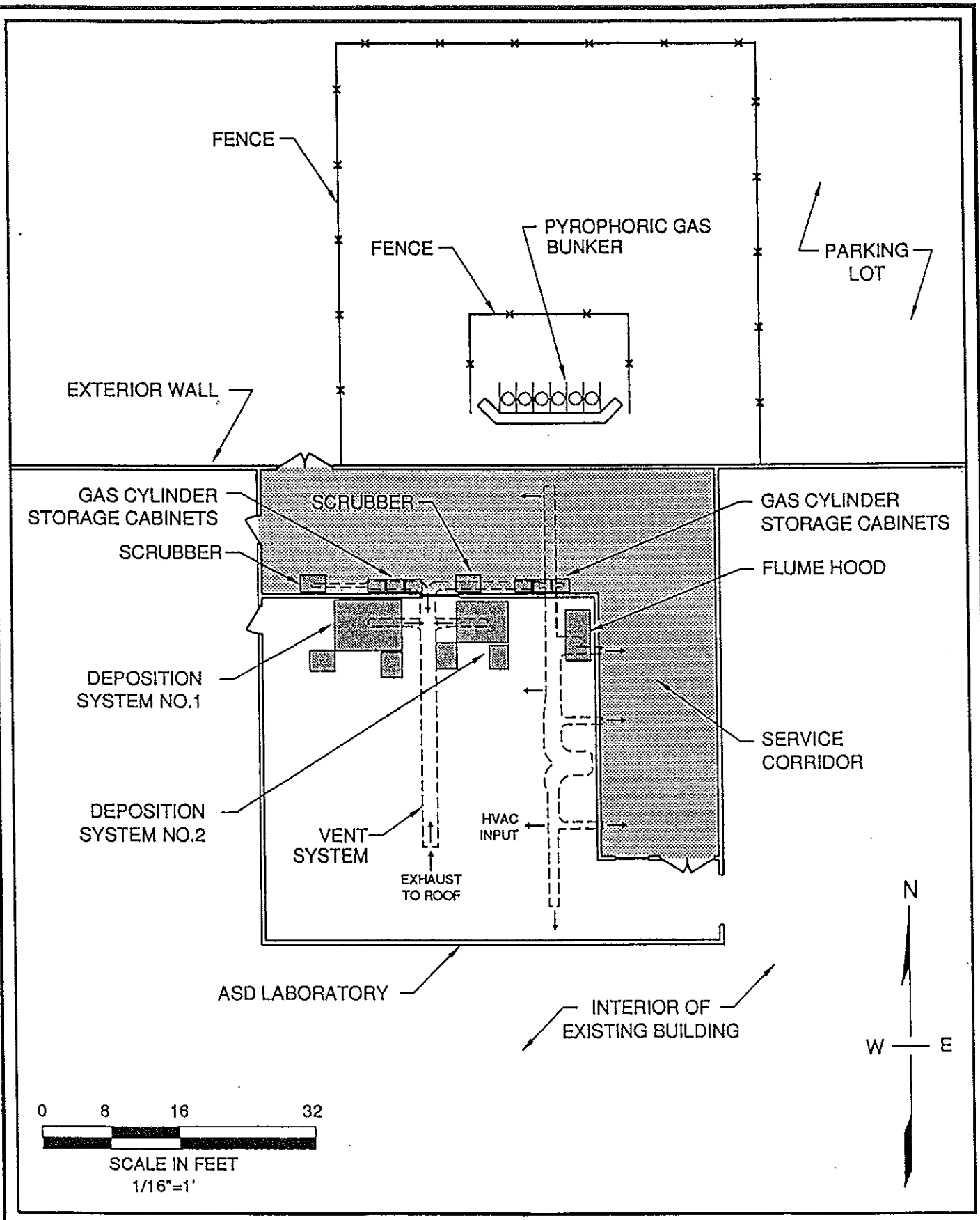

Figure 4
Amorphous Silicon Deposition Laboratory

Gas storage would be isolated from the laboratory space in either vented gas cabinets in the service corridor, for toxics and flammables, or outside in the bunker for pyrophorics. This arrangement would isolate the researchers from the gases not only during operations but also during pickup and delivery.

The emissions from the deposition systems would pass through commercial wet scrubbers, Airprotec model SD 101s, which utilize strong solutions of sodium hydroxide and sodium phosphate. At the flow rates used in normal operations, the scrubber efficiencies have been demonstrated to be greater than 99.99 percent at the existing laboratory (SERI, 1988).

Continuous toxic gas monitoring of this laboratory would be accomplished using either the existing system or a commercially supplied MDA PSM8e stationary monitor. Both units are multi-channel instruments using chemically treated tape which is exposed via sampling ports to the air flow being monitored. Monitoring points would include as a minimum the two deposition system vents, the fume hood, gas cabinet ducts, and the ambient laboratory air. The sample points would be programmed to activate low-level alarms at one TLV and the high-level alarm at 5 times the TLV for the target gases. Manual and automatic shutdown systems would be activated in the event of an alarm and the laboratory evacuated if necessary. NREL SOPs exist for the ASDL program at the Golden facilities and would be modified and the staff trained in the new procedures prior to resumption of operations at the GlassTech facility.

2.2.2 Scanning Hartman Optical Tester (SHOT). SHOT is a test method being developed by NREL to measure the precise surface contour of large solar concentrating mirrors. SHOT is an adaptation of the classical Hartman test for concave, spherical, and mildly aspherical surfaces. Because solar paraboloids are highly aspheric, the reflected grid from a normal Hartman test is too distorted for interpretation. The modification of the traditional Hartman test involves the projection of one light beam at a time across a scanning grid instead of the normal instantaneous measurement of the entire grid.

Lasers are used to calibrate the spot tracking system and to do the actual surface scanning. The infrared calibrating laser produces 3 to 5 mW of light at 780 nm, which is invisible, and the HeNe scanning laser produces 25 mW at 633 nm, which is a visible red. All systems are powered by standard 110V alternating current and do not present unique hazards. The photodetector used in the experiment is cooled with liquid nitrogen. No toxic or hazardous materials are used in this research.

2.2.3 Whole Building Test Facility. This program currently conducts thermal testing of manufactured buildings within an environmental enclosure under controlled and repeatable conditions of temperature, wind and radiation. This program assists the DOE National Low Income Weatherization Program to develop better and more cost effective weatherization techniques, assists Housing and Urban Development (HUD) in developing new energy standards, assists manufacturers in finding cost-reduction methods for meeting new energy codes, and facilitates the development of new field testing methods for buildings of all types.

NREL's current facility can accommodate buildings as large as 17x17x90 feet in a high bay area. The proposed GlassTech facility could accommodate manufactured buildings of this size and larger.

Thermal testing of the manufactured buildings might include the following:

- Coheating tests to determine the overall heat transmission coefficients of the buildings
- Tracer gas tests with sulfur hexafluoride (SF6) to determine infiltration rates
- Calorimetric determination of heating system efficiency
- Blower door tests to determine effective leakage area and leakage distribution
- Infrared identification of thermal anomalies

Other than the SF6, this research program will use no toxic or hazardous materials in testing. Analyses will be performed using commercially available analytical equipment.

2.3 Emissions. Of the proposed research experiments only the ASDL project will have routine emissions of small quantities of hazardous materials. As was described in section 2.2.1, process gases used in the deposition systems will be vented through commercial scrubbers which have been demonstrated by past operations to be 99.994 percent efficient for silane removal. At that efficiency the normal flow of silane at 60 standard cubic centimeters/minute will result in a scrubber discharge level of 4 ppm into the laboratory exhaust system. When diluted by the 5500 cfm exhaust system, the concentration upon release from the rooftop stack will be approximately 0.032 ppb (part per billion). To put these levels into perspective, the 8-hour PEL-TWA (permissable exposure limit - time weighted average) for silane is 5 ppm and there is no established immediately dangerous to life or health (IDLH) value. Therefore, even exposure to the undiluted 4 ppm scrubber emissions for an entire day would not exceed the OSHA standard. Flow rates for phosphine, diborane, germane, and trimethylboron, which are also released through the scrubbers, are less than half that of silane and the scrubber efficiency for these gases is only slightly less. This operational fact combined with the significantly lower concentrations of these gases as identified on Table 1, 100% silane vs. 2% for these gases, would also yield releases of these gases from the exhaust stack in the ppb range, which is below established PELs for any of the gases listed in Table 2. Even under the accidents discussed in section 4.2, released levels of these gases would be below established PELs.

Fume hood emissions would contain only small quantities of standard laboratory solvents such as methanol, acetone, and isopropyl alcohol. The Colorado Air Quality Control Commission Regulation No. 3, Section II.C.1.g. exempts experimental laboratory equipment from regulation for air emissions. Over an entire year only a few gallons of each of these solvents will be released (see Table 1).

2.4 Releases. Other than precipitation run-off, there would be no discharges to surface water bodies from the proposed action. The proposed research projects would produce no hazardous discharges to bodies of surface water or the Arvada sewers. There would be no discharge to the sewers of any laboratory solvents. Solvents would be disposed by commercial vendors. Additionally, to prevent accidental spills from entering the sewer system, there are no floor drains in laboratory areas. Since the floors are constructed of concrete, they would prevent migration of chemicals to the environment should a spill occur.

2.5 Waste Generation. Construction wastes from the minor remodeling described in Section 1.1 would only generate 1 - 2 loads of non-hazardous waste for removal by a commercial hauler to a landfill. Each deposition system would generate one 40-gallon waste drum of scrubber solution per year which would be picked up by commercial waste handlers and recycled or disposed according to all applicable regulations. The only other waste stream generated by the proposed action would be 6 gallons per year of an acid mixture containing nitric, hydrofluoric, and acetic acid. This mixture would also be recycled or disposed by a commercial vendor. The facility would have small quantity generator status under RCRA, 40 CFR 260.10. NREL would apply for a generator identification number from the Colorado Department of Health upon the signing of a lease, as required by the Colorado Hazardous Waste Regulations. Temporary waste storage would occur in an isolated containment area constructed and operated in accordance with all regulatory requirements.

2.6 Transportation. The proposed research projects would require some staff travel to the main NREL facilities in Golden and require the transport of non-hazardous products from the ASDL to NREL for microscopic evaluation. A total of 5 round trips per day, approximately 20 miles per trip, for such interactions is estimated. Supplies and gases will be delivered directly to the new facility by commercial carriers.

3.0 AFFECTED ENVIRONMENT

3.1 Land Use. The GlassTech facility is located within the city limits of Arvada. The building was constructed in 1980, on what was agricultural land until 1969. The facility is located in an industrial park across the street from the Arvada school bus barn and less than a half mile from an Arvada fire station. The city maintains a solid waste landfill immediately to the southwest of the facility. GlassTech was a registered small quantity generator (SQG) under RCRA and, as of March 1991, there were nine other SQGs within one mile. The immediate area is high density residential developments approximately 100 meters to the northeast, but multi-acre farms and residences to the west, north and south. Future development plans in the area call for potential expansion of the industrial park and possibly a municipal golf course to the west. Environmental audits performed for the bank and NREL identified 3 solid waste landfills within 1 mile of the site.

The U.S. Fish and Wildlife Service has determined that no known federally listed or candidate endangered species are expected to occur at the site and the State Historic Preservation Officer has determined that the proposed action would not affect historic properties (see Appendix A).

3.2 Meteorology. Analyses of meteorological conditions for Denver's Stapleton Airport and DOE's Rocky Flats Plant have determined that neutral stability conditions (5 meters/second) prevail about 50 percent of the time and stable conditions (1 meter/second) prevail approximately 35-40 percent of the time, with unstable conditions constituting the remaining 10-15 percent (DOE, 1980). For the purposes of the dispersion analyses in section 4.1.2 the following classes of stability were used: stability class D, neutral or representative wind speed of 5 meters/second; and a conservative stability class F, highly stable conditions of 1 meter/second. For the purposes of conservative impact assessment, wind direction was assumed to be toward the nearest residential area approximately 100 meters to the northeast.

3.3 Water Resources. The facility is served by the City of Arvada water and sewer system. Surface runoff from the site and adjacent areas drains into Ralston Creek located immediately north of the site. The creek is a very small intermittent drainage way. Other than normal precipitation runoff, there will be no discharges to Ralston Creek from the proposed NREL activities. A small area, less than 200 ft^2, of cattails has established itself between the north parking lot and Ralston Creek, probably as the result of increased runoff from the parking area into a depression which may have been created during construction in 1980. The area is not delineated as wetland by the State, City, or Fish and Wildlife Service. The State Division of Wildlife feels that the proposed action has little potential to negatively impact fish or wildlife (see Appendix A).

During test drilling performed at the site in March 1991, groundwater was found within 4 feet of the surface. The testing was performed to determine if contamination from a leaking underground storage tank (LUST) on the Arvada school bus lot, located approximately 200 ft south of the GlassTech site, had migrated onto the site. While toluene, total xylenes, and total recoverable petroleum hydrocarbons were detected in groundwater and/or soil samples, the levels were below action levels established by the State of Colorado and no further actions were required by the City or State (Fox, 1991b).

3.4 Population Distribution. The site is located in an industrial park on the northwestern edge of the residential suburb of Arvada (1988 population 91,238), approximately 7 miles from downtown Denver. As was shown in Figure 1, the immediate area is predominantly an industrial park bordered by residential high density housing approximately 100 meters to the northeast, and sparsely populated multi-acre residential and farms to the south, west and north.

3.5 Infrastructure. Arvada City services would provide all necessary municipal support services such as fire response, utilities, water, and sewer to the facility. Commercial vendors would supply hazardous and nonhazardous waste disposal. As the relocation would

involve NREL personnel already resident in the area, there would be no impact to city services from an influx of new residents.

4.0 ENVIRONMENTAL CONSEQUENCES

Of the proposed projects described in section 2.0, only the ASDL experiments utilize materials that, due to their toxic, flammable, and pyrophoric nature, may cause environmental impacts. Even under accident conditions the SHOT and the Whole Building Test Facility, would present no potential environmental risk. The following sections provide the analyses of the environmental consequences of the proposed actions.

4.1 Scanning Hartman Optical Tester (SHOT). The SHOT experiments would use lasers to calibrate the spot tracking system and to do the actual surface scanning. The infrared calibrating laser produces 3 to 5 mW of light at 780 nm, which is invisible, and the HeNe scanning laser produces 25 mW at 633 nm, which is a visible red. At these levels, both lasers pose a hazard to the eyes if viewed directly, but are not a hazard to the skin and do not produce a hazardous diffuse beam reflection. SOPs require protective eyewear for researchers.

All systems would be powered by standard 110V alternating current and would not present unique hazards. The photodetector used in the experiment would be cooled with liquid nitrogen. No toxic or hazardous materials would be used in this research and, therefore, there would be no source of hazardous emissions or releases. NREL SOPs exist for the SHOT program as it is currently conducted. These SOPs would be modified and the staff trained in the new procedures if operations are relocated to the GlassTech facility.

4.2 Whole Building Test Facility. Other than the sulfur hexafluoride, SF6, used as a tracer gas to determine infiltration rates, the Whole Building Test Facility research program would use no toxic or hazardous materials in testing. Analyses would be performed using commercially available analytical equipment.

Compressed SF6 used for the tracer tests is a colorless, odorless gas which is inert with respect to body chemistry. SF6 has a density 6 times that of air and can, at high concentrations, displace air making it a simple asphyxiant. SF6 has an OSHA PEL of 1000 ppm for an 8-hour TWA, (OSHA, 1989). The tracer gas test would require a concentration of 250 ppm and an exposure of less than 5 minutes in any 24-hour period. Therefore, there would be no opportunity to exceed the OSHA limits. Further precautions would be achieved through the use of two commercial monitors, Foxboro SF6 Specific Vapor Analyzers, that allow personnel to monitor concentrations in and around the experiment. Because the experimental levels of SF6 used in the laboratory would be well below the PEL and because additional dilution would occur upon venting, there would be no opportunity for external or offsite impacts from SF6 releases.

NREL SOPs exist for the Whole Building Test Facility program as it is currently conducted. These SOPs would be modified and the staff trained in the new procedures if operations are relocated to the GlassTech facility.

4.3 ASDL Experiments. Because the ASDL experiments utilize materials that, due to their toxic, flammable, and pyrophoric nature, may cause environmental impacts, more extensive analyses of this action have been conducted.

4.3.1 Normal Operations. The ASDL project is designed with multiple safety systems which will isolate the researchers from the hazardous materials and prevent impacts to staff within the facility. The plexiglass enclosures surrounding the deposition systems are designed to isolate the researcher from the gas and RF hazards. The scrubber systems reduce gas levels to concentrations below established exposure limits before further dilution in the laboratory exhaust. Gases are stored in vented cabinets in the service corridor (which is separated by a fire wall from the laboratory) or in a bunker outside the building. The staff uses self-contained breathing apparatus (SCBA) when changing cylinders. Flow-limiting valves and cylinder orifices maintain gas volumes in the deposition chambers at the minimums required for the experiments. NREL has successfully operated the deposition

chambers at Golden using these integrated safety measures. In four years of operations there has been no effect on employees.

As shown in section 2.3, the concentrations of toxic gases emitted from the ASDL during routine operations would be below the exposure limits identified in Table 2. There would be no emission sources for offsite exposure levels that exceed established exposure limits.

The liquid effluent discharges to the city sewer would contain no hazardous materials. The quantity of discharge from the 15 employees would be less than that previously discharged by GlassTech.

4.3.2 Accident Consequences. The redundant safety systems incorporated into the ASDL make accidents very unlikely and, because the research uses only small quantities of hazardous materials, the consequences of even extremely unlikely accidents would result in no serious effects on workers or the offsite public. For the purposes of analysis in this EA, the following three accident scenarios have been postulated:

- Scrubber failure resulting in direct discharge of gases through the ventilation system to the atmosphere

- Cylinder leak resulting in direct discharge through the ventilation system to the atmosphere

- Pyrophoric loss of all cylinders stored outside in the bunker and release of combustion byproducts to the atmosphere

4.3.2.1 Scrubber Failure. In the unlikely event of a scrubber failure both manual and automatic safety systems would be activated which would shut down the system and all gas flows. However, even if it is assumed that the safety systems fail, the

concentration of silane, which is stored outside in the bunker, at its maximum flow rate in the system of 100 cubic centimeters per minute would only be 0.64 ppm at the release point when diluted by the exhaust system. This level is approximately 1/8 of the 8-hour PEL-TWA of 5 ppm for silane. The concentrations and flow rates of the other gases used in the ASDL are less than that of silane and, therefore, their release concentrations in this scenario would be even lower. Conservatively considering only the concentration difference, 100% silane vs. 2% diborane, germane or phospine, and taking no credit for lower flow rates (less than 50 cc/m), the release concetration of these gases under this scenario would be less than 0.013 ppm, well below the PELs for these gases. Because this scenario would occur within the confines of the deposition system there would be no source of exposure to the researchers and because the concentrations at the roof would be well below the PEL, there would be no offsite consequences.

4.3.2.2 Cylinder Leak. If a cylinder leak occurred in the service corridor or in a gas cabinet resulting in the release in five minutes of the entire contents of a cylinder of phosphine or germane directly into the atmosphere (i.e., without passing through the scrubbers), it would not generate concentrations which would cause offsite effects. Moreover, exposure to researchers would be highly unlikely since a gas loss in the service corridor outside of a vented gas cabinet could occur only during cylinder changeout when self-contained breathing apparatuses (SCBA) are used to prevent exposure under just such an accident scenario.

For example, the loss of the contents of an entire cylinder of phosphine in helium over a five-minute period would generate a concentration of approximately 10 ppm upon release at the roof. This would equate to a 1.7 ppm exposure over a 30-minute average, which is significantly below the IDLH limit of 200 ppm. Such a release would generate an 8-hour average of 0.1 ppm, which is less than the PEL-TWA of 0.3 ppm. However, this release would generate the equivalent of a 15-minute average of 3.3 ppm which would exceed the 15-minute PEL-STEL of 1 ppm. This exposure could result in short term health effects to an individual at the stack on the roof at the time of the accident but would not be

expected to produce long-term health effects or fatalities. Using Gaussian dispersion modeling of this 5 minute release offsite results in exposure levels at 100 meters of approximately 4E-09 mg/m^3 (milligrams per cubic meter) for stability class D (5m/s), and 6E-32 mg/m^3 for stability class F (1m/s), concentrations well below all established exposure limits.

The same release scenario applied to germane would yield a 5-minute exposure of 10 ppm at the roof. Germane has no established IDLH or STEL but has an 8-hour PEL-TWA of 0.2 ppm. The 8-hour average for this exposure would be 0.1 ppm, or one half the applicable PEL.

4.3.2.3 Pyrophoric Explosion. The failure of all of the silane cylinders in the bunker would result in a pyrophoric release of amorphous silica which has a TLV of 6mg/m^3 (milligram per cubic meter), 8-hour time-weighted average. This is, however, an extremely unlikely event. The EPA estimates the probability of a single cylinder failure to be on the order of 10^{-6} (EPA 1987). A worker present within the bunker at the time of the accident could be killed by the explosion. Fencing around the bunker restricts unauthorized access to the bunker and to a buffer zone.

The offsite consequences of this accident scenario have been assessed using an extremely conservative Gaussian plume dispersion model. The analysis assumes the total loss of all five tanks in storage within 10 minutes. It does not take into account the response of the nearby fire department which would likely occur in less than 10 minutes and reduce the quantity of material released. The analysis also does not take credit for silica dispersion from the explosion; it assumes a straight line dispersion. The results of this conservative analysis yield an offsite concentration at 100 meters of 9.5 mg/m^3 for stability class D (representative wind of 5m/s), and 270 mg/m^3 for stability class F (unstable wind of 1 m/s). Since silica has no IDLH or STEL, for comparative purposes the postulated 10-minute accident exposure levels are converted to 8-hour averages. The resulting exposures would be 0.2 mg/m^3 for stability class D, well below the PEL, and 5.6 mg/m^3, for stability class F,

below but approaching the PEL. Because of the conservatism involved in this analysis, actual exposures would be even lower.

4.4 Effects on Short-Term and Long-Term Productivity. As demonstrated in the preceding analyses, neither normal operations nor accident conditions would result in any offsite effects and would have very limited potential for onsite effects. Because the facility is already constructed, potential effects that may have occurred to the net productivity of the agricultural lands in the area are independent of this proposed relocation. The 5-year duration of the proposed relocation and operation precludes any potential detrimental long-term effects. The NREL research may develop improved energy systems which ultimately could have a positive environmental effect if applied commercially.

4.5 Cumulative Impacts. The proposed research projects have been shown to have no effects individually. Collectively, because only the ASDL involves normal releases, they represent no greater potential for onsite or offsite effects other than those which were addressed in sections 4.1 and 4.2 and shown to be below levels of concern.

The addition of the proposed NREL actions to 6800 Joyce Avenue location would result in a net decrease in traffic flow compared to that which occurred during GlassTech's operations. The anticipated 5 round trips per day between the new facility and the current facility would slightly increase the overall risk of traffic accidents to NREL staff.

5.0 COORDINATION WITH OTHER AGENCIES

Federal, state, county, and city agencies were contacted for comments on the proposed action. A complete listing of agencies contacted is found in Appendix A with a sample of the letter which was sent to all agencies. No new issues were identified by agency responses. Written agency responses, some of which were cited in the EA, are also included in Appendix A.

6.0 REFERENCES

American Conference of Governmental Industrial Hygienists. *1990 - 1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.* ACGIH, Cincinnati, OH, 1990.

Applied Environmental. *Phase I Environmental Audit Report of Office/Warehouse Building Located in Arvada, CO.* Prepared for Solar Energy Research Institute, Golden CO, September, 1991.

Fox Consultants. *Environmental Risk Assessment Report for GlassTech Solar Inc.* Prepared for Society Bank and Trust, Toledo, OH, March, 1991a.

Fox Consultants. *Subsurface Soil and Ground Water Assessment, GlassTech Solar Inc.* Prepared for Society Bank and Trust, Toledo, OH, June, 1991b.

National Institute for Occupational Safety and Health. *NIOSH Pocket Guide to Chemical Hazards.* U.S. Department of Health and Human Services Publication No. 90-117, June, 1990.

Occupational Safety and Health Administration. *Air Contaminants - Permissible Exposure Limits.* Title 29 Code of Federal Regulations Part 1910.1000, 1989.

Solar Energy Research Institute. *Draft Safety Analysis Review for Hazardous Production Materials in Photovoltaic Applications at SERI.* Golden, CO. August 1991.

Solar Energy Research Institute. *Amorphous Silica Deposition Laboratory Safe Operating Procedure.* Golden, CO. 1988.

U.S. Department of Energy. *Final Environmental Impact Statement, Rocky Flats Plant Site.* DOE/EIS-0064. 1980.

U.S. EPA. *Prevention Reference Manual: Control Technologies, Volume 1.* EPA/600/8-87/039a. August, 1987.

U.S. Department of Energy. *Programmatic Assessment of the Solar Energy Research Facility.* DEO/EA-0101, 1980.

APPENDIX A
AGENCY CONTACTS

AGENCIES CONTACTED FOR COMMENT ON THE PROPOSED ACTION

CITY OF ARVADA
City Manager
Department of Parks and Recreation
Planning Department
Department of Water Quality and Environmental Services
Arvada Fire Protection District

JEFFERSON COUNTY
County Commissioners
Division of Emergency Preparedness
County Health Department
Open Space Department
Planning & Zoning Department
Planning Director

STATE OF COLORADO
Department of Public Safety
State Engineer
Division of Water Resources
Department of Natural Resources
Division of Wildlife
Director Soil Conservation Board
Public Utilities Commission
State Historical Society
State Archaeologist
Department of Highways
Department of Health
- Stationary Sources Section
- Hazardous Material and Waste Management Division
- Water Quality Control Division

FEDERAL
U.S. Forest Service
U.S. Department of the Interior
U.S. Army Corps of Engineers
U.S. Fish & Wildlife Service
Occupational Safety and Health Administration
U.S. EPA Region VIII
- Regional Administrator
- Water Management Division
- Waste Management Division
- Air and Toxics Division
- Environmental Services Division
- Industrial Assistance Coordinator

SAMPLE LETTER TO POTENTIALLY INTERESTED AGENCIES

Local, County, State and Federal Agency
Address

Subject: Preparation of an Environmental Assessment by DOE

To Whom It May Concern,

Dames & Moore has been selected to prepare an Environmental Assessment (EA) for the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL). NREL proposes to lease existing commercial office, laboratory, and warehouse space at 6800 Joyce Road, Arvada, Colorado, for the relocation of ongoing research activities from currently leased space in Golden, Colorado. The proposed action will allow NREL to accommodate current warehousing, office, and research space needs, and will involve about 15 full time persons. The Arvada facility was formerly used by GlassTech Solar Inc. for the manufacture of photovoltaic systems, but is now owned by Society Bank.

The research projects proposed for relocation are analyses of the energy efficiency of manufactured buildings, analysis of solar energy conversion equipment, and research on the process of silicon deposition used in the generation of photovoltaic cells. Only the silicon deposition experiments involve the use of small quantities of toxic, flammable and pyrophoric gases. Routine releases of hazardous production materials will be well below both levels of regulatory and/or health concern. Wastes generated will be collected on site under a Colorado Department of Health ID number.

As part of its compliance with the National Environmental Policy Act (NEPA), the DOE is soliciting the opinions of various Federal, State, and local agencies regarding issues which should be addressed in the EA. Your thoughts on the proposed action would be greatly appreciated.

Please send written responses to me by November 29, 1991 at the following address:

Dames & Moore
1125 17th Street, Suite 1200
Denver, CO 80202-2027

For further information I can be reached at (303) 299-7857. Thank you in advance for your responsiveness to this request.

Sincerely,

Thomas L. Anderson
Senior Environmental Compliance Specialist

COLORADO
HISTORICAL
SOCIETY

The Colorado History Museum 1300 Broadway Denver, Colorado 80203-2137

December 4, 1991

Thomas L. Anderson
Senior Environmental Compliance Specialist
Dames & Moore
1125 17th Street, Suite 1200
Denver, CO 80202-2027

Re: Facility at 6800 Joyce Road, Arvada

Dear Mr. Anderson:

Thank you for your November 15, 1991, correspondence concerning the proposed lease of the above facility by the Department of Energy's National Renewable Energy Laboratory (NREL).

We understand that this property was constructed in 1980. Consequently it is not eligible for inclusion in the National Register of Historic Places. In addition we find that the nature of the undertaking is such that there will be no effect on historic properties.

Sincerely,

James E. Hartmann
State Historic Preservation Officer

JEH/KKP

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
Colorado State Office
730 Simms Street, Suite 290
Golden, CO 80401

IN REPLY REFER TO:
FWE/CO: DOE
Mail Stop 65412
A:\ARVADAEA.WPF

NOV 27 1991

Mr. Thomas L. Anderson
Senior Environmental Compliance Specialist
Dames & Moore
1125 17th Street, Suite 1200
Denver, Colorado 80202-2027

Dear Mr. Anderson:

This letter responds to your request for comments letter of November 15, 1991, for the development of the Environmental Assessment (EA) that Dames & Moore is preparing for the proposed Department of Energy (DOE) National Renewable Energy Laboratory (NREL) to be relocated at 6800 Joyce Road, Arvada, Jefferson County, Colorado. The U.S. Fish and Wildlife Service (Service) offers the following comments under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.).

The only issues of environmental concern for the Service that should be addressed in the EA of this project deal with proper disposal of hazardous materials and the securing of the proper state and federal permits associated with a facility of this type. No known federally listed or candidate species are expected to occur at the site in question.

If the Service can be of further assistance, please contact Bernardo Garza of this office at (303) 231 - 5280.

Sincerely Yours,

LeRoy W. Carlson
Colorado State Supervisor

cc: FWS/FWE; SLC
Reading file
Project file

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
TRI-LAKES PROJECT OFFICE, 9307 STATE HWY 121
LITTLETON, COLORADO 80123-6901

REPLY TO
ATTENTION OF

November 25, 1991

Denver Regulatory Office

Mr. Thomas L. Anderson
Dames & Moore
1125 Seventeenth Street
Suite 1200
Denver, Colorado 80202-2027

Dear Mr. Anderson:

Reference is made to your proposal to prepare an Environmental Assessment for the Department of Energy's National Renewable Energy Laboratory. This project is located in Section 25, Township 3 South, Range 70 West, Jefferson County, Colorado.

This letter is to inform you that the proposed activity, assigned number 199177767, will not require a Department of the Army (DA) Permit.

Although a DA Permit will not be required for the project, this does not eliminate the requirement that other applicable federal, state, and local permits be obtained as required.

If there are any questions concerning this matter, please feel free to contact Mr. Terry McKee of this office at 303-979-4120 or 4121.

Sincerely,

TIMOTHY T. CAREY
Project Manager

STATE OF COLORADO
Roy Romer, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER
Perry D. Olson, Director
6060 Broadway
Denver, Colorado 80216
Telephone: (303) 297-1192

REFER TO

For Wildlife–
For People

November 20, 1991

Thomas Anderson
Dames & Moore
1125 17th Street Suite 1200
Denver, CO 80202

RE: EA for Moving NREL Facility

Dear Mr. Anderson:

Thanks for referring this proposal for our comment. In view of the fact that the NREL facility is moving into existing structures, there will apparantly be little potential for negative impacts to fish or wildlife.

Please let me know if you have any questions.

Sincerely,

Dave Weber
Habitat Biologist

12/6/91

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

Ref: 8HWM-HW

DEC 4 1991

Mr. Thomas L. Anderson
Dames & Moore
1125 17th Street Suite 1200
Denver, Colorado 80202-2027

Dear Mr. Anderson:

This letter is in response to your November 15, 1991 letter regarding the U.S. Department of Energy's National Renewable Energy Laboratory (NREL). In your letter, you requested EPA opinion regarding the proposed consolidation of various NREL research functions to a site at 6800 Joyce Road, in Arvada, Colorado. This request was made per the compliance requirements of the National Environmental Policy Act (NEPA).

At present, EPA has no concerns regarding the proposed NREL consolidation. However, because the newly consolidated NREL laboratory is expected to be a small quantity generator of hazardous waste, you should be sure to notify the Colorado Department of Health (CDH) of the proposed operations. In addition, you should consider an Environmental Audit of the property (if you have not already done so) in order to minimize potential future liability complications.

If you have any further questions regarding the proposed NREL site, please contact Mr. George Dancik of my staff at (303) 293-1506.

Sincerely,

Thomas G. Burns

Thomas G. Burns, Chief
Colorado/Montana RCRA Section

COLORADO
DEPARTMENT
OF HEALTH

4210 East 11th Avenue
Denver, Colorado 80220-3716
Phone (303) 320-8333

Telefax Numbers:
Main Building/Denver
(303) 322-9076

Ptarmigan Place/Denver
(303) 320-1529

First National Bank Building/Denver
(303) 355-6559

Grand Junction Office
(303) 248-7198

Pueblo Office
(719) 543-8441

ROY ROMER
Governor

JOEL KOHN
Interim Executive Director

November 25, 1991

Mr. Thomas L. Anderson
Senior Environmental Compliance Specialist
Dames and Moore
1125 Seventeenth Street
Suite 1200
Denver, CO 80202-2027

Re: DOE Environmental Assessment for NREL

Dear Mr. Anderson:

This letter is written in response to your letter dated November 15, 1991 concerning the NREL facility in Arvada, CO. Without more specific information as to the types and quantities of toxic compounds that will be used at this facility, the Division can not say at this time whether a permit for this facility would be required.

In general, if emissions of toxic compounds are less than one ton per year, then no permit is required. If emissions are less than one ton per year, but greater than one pound per day, an Air Pollutant Emissions Notice (APEN) must be filed.

In order for an emissions determination to be made, the source should file an application with the Division. If the Division then determines that no permit is required, a letter will be issued to the source stating that.

I am enclosing the necessary application forms with this letter. If you have any questions concerning this matter, please feel free to contact me at 331-8542.

Sincerely,

Dennis M. Myers
Public Health Engineer

RCVD. 12-4-91
TEA

JEFFERSON COUNTY DEPARTMENT of
Health & Environment

260 South Kipling Street, Lakewood, Colorado 80226
Telephone: 303/232-6301 FAX 303/239-7088

December 2, 1991

Dames & Moore
Attn: Thomas L. Anderson
1125 17th Street, Suite 1200
Denver, CO 80202-2027

Re: Relocation of the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) to 6800 Joyce Road, Arvada.

Dear Mr. Anderson:

I am writing in regards to the proposed lab relocation noted above. The existing light industrial building located at 6800 Joyce Road is served by the Arvada Water and Sanitation District.

A review was conducted of this Department's files regarding records of soil and/or groundwater contamination at this location. No records of hazardous materials spills, leaking underground storage tanks, old landfills or other major environmental problems were located that are specific to this site.

However, the following incidents were found in our files which occurred within two (2) blocks of the property at 6800 Joyce Road, Arvada:

1. The Colorado Department of Health requested an investigation of run-off from the practice burn buildings located at 6651 Indiana Street.
2. A leaking underground storage tank (LUST) investigation was requested for both 6701 and 6704 Indiana Street to determine the extent of contamination and environmental impacts to the area.
3. A petroleum product release occurred at 6751 Indiana Street. The Colorado Department of Health has requested that an investigation and site assessment be conducted at this location to determine the extent of environmental and/or public health impacts.

In addition to the above, there is an old landfill located just north of Sunstrand Fluid Handling at 64th Avenue, west of Indiana Street. No development has occurred at this location. From previous studies it is believed that there is not a significant potential for methane gas to migrate off this site.

As stated in your letter, the proposed lab will generate a small amount of hazardous wastes. Therefore, all applicable federal (RCRA) and Colorado Department of Health requirements must be complied with for this site.

It must be noted that this Department does not receive nor serve as a repository for records regarding underground storage tanks. For further information on tank records the Colorado Department of Health Waste Management Division can be contacted (Scott Winters at 331-4864).

The enclosed Environmental Records Review complied by the Jefferson County Department of Health and Environment concerning the real property located at 6800 Joyce Road is furnished pursuant to your request for input. This review is based upon records on file with this Department. In compiling and furnishing this report, the Department of Health and Environment and the Jefferson County Board of Health make no representations, nor do they extend any express or implied warranties that the records of this department are complete or comprehensive; that the real property which is the subject of this report is suitable for its present or proposed use; that the condition of the real property is in compliance with applicable statutes, ordinances, or regulations, including those pertaining to environmental protection; or that there are any additional known or unknown conditions on the real property or adjacent properties which would constitute violations of applicable statutes, ordinances, or regulations pertaining to environmental protection or otherwise.

This exclusion and disclaimer of liability pertains to all loss, cost, injury, or damage, including incidental and consequential damages, resulting directly or indirectly from the use or reliance upon this report.

Sincerely,

Mindi Arris

Mindi Arris
Environmental Health Division

MA/jt

Jefferson County Colorado
OPEN SPACE

BOARD OF COUNTY COMMISSIONERS
RICH FERDINANDSEN
District No. 1
MARJORIE E. CLEMENT
District No. 2
JOHN P. STONE
District No. 3

November 19, 1991

Thomas L. Anderson
Dames & Moore
1125 Seventeenth St. Suite 1200
Denver CO 80202-2027

Dear Mr. Anderson:

Thank you for your recent request for opinions from local agencies regarding proposed issues in your E.A. Unfortunately, the Open Space Department is not the Jefferson County representative that can best answer your inquiry.

I have forwarded your letter of request to Doyle James, Director of the Community Resources Division, so that he may assess who might best provide you with the information you seek.

Respectfully,

Ray Printz,
Director of Open Space

:slr

c: Doyle James
M.L. Tucker

City of Arvada
P. O. Box 8101
8101 Ralston Road
Arvada, Colorado 80001-8101
Fax: (303) 431-3085

Water Quality / Environmental Services Section
431-3042

November 29, 1991

Mr. Thomas L. Anderson
Senior Environmental Compliance Specialist
Dames & Moore
1125 Seventeenth Street, Suite 1200
Denver, Colorado 80202-2027

Attention: Mr. Thomas L. Anderson

Subject: Preparation of an Environmental Assessment by DOE

Dear Mr. Anderson:

This letter is to confirm our conversation this week regarding the Environmental Assessment (EA) for the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL). As discussed, the City's concern relative to the EA is that the wastewater discharge meets all applicable regulations.

The enclosed Industrial Waste Questionnaire will provide the information to determine what discharge standards apply. If the NREL has any process which is regulated under the Federal Pretreatment Regulations then "Categorical" standards promulgated by EPA will apply. If there is no Categorical process, then the City's wastewater discharge standards will apply. The City's standards are on page 8 of the enclosed Arvada Industrial Pretreatment Ordinance.

I would be pleased to meet with you to assist you in completing the EA and in the relocation of the NREL. If you have any questions, please call me at 431-3042.

Sincerely,

James McCarthy, Manager
Water Quality/Environmental Services

Enclosures

ww\dames.qst