FACILITY DESCRIPTIONS

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Combustion Research Facility (CRF)

Function and Description:

The CRF (Buildings 905, 906, and 907) is used for broad-based research in combustion science and technology.

The CRF is a low-hazard nonnuclear complex that consists of an administrative building a separate laboratory building, and a mechanical building. The administrative and laboratory buildings are multistory, steel frame masonry structures totaling approximately 70,500 gross square feet (gsf). The mechanical building is a single-story structure with approximately 4,500 gsf. The following structures are located in the complex:

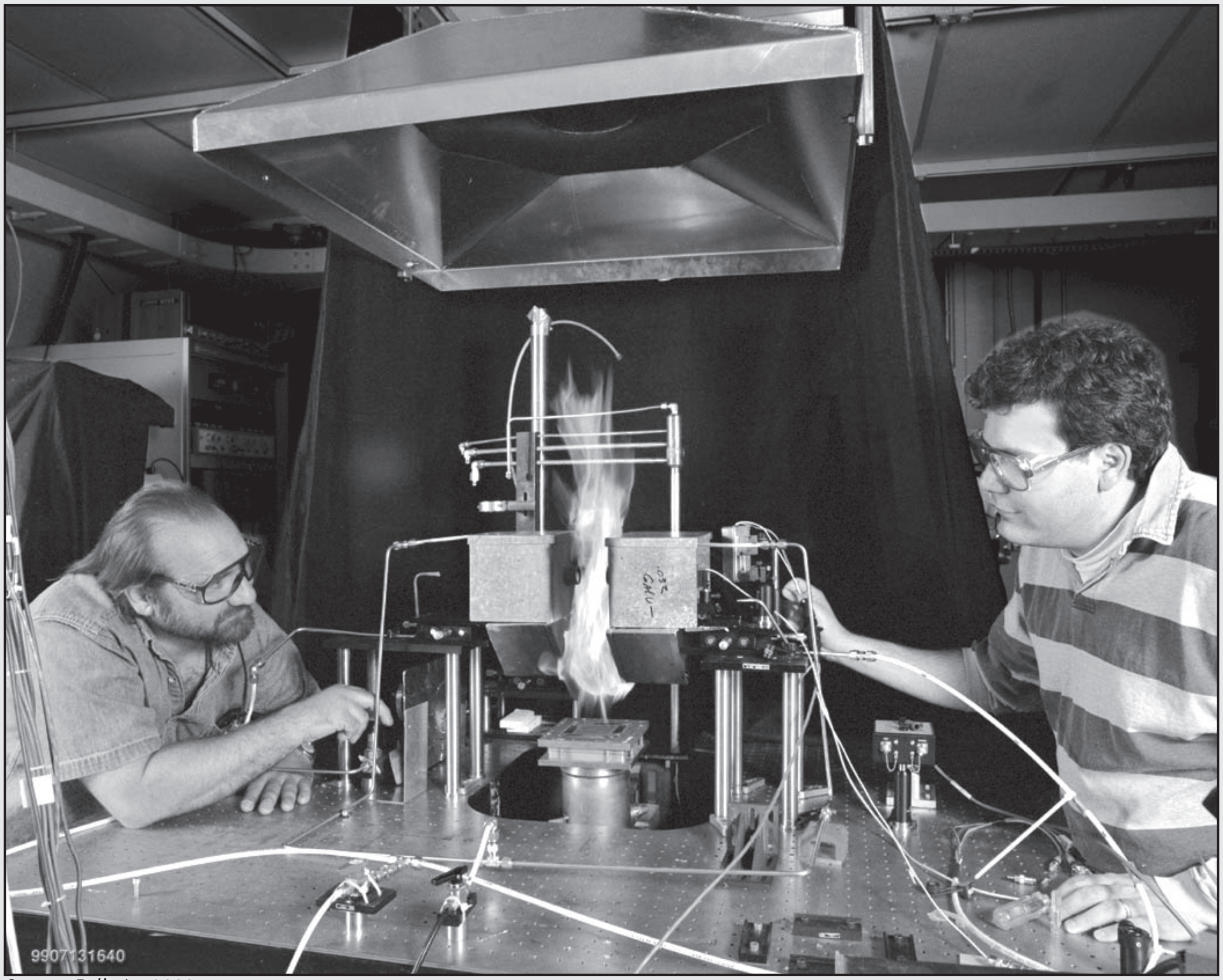
- 38,000 square feet (sq ft) building with lobby, conference rooms, and approximately 117 offices,
- 44,000 sq ft building with 50 primary research and development light labs,
- Loading dock (provides gas bottle storage area), and
- Large liquid nitrogen tank.

Specific Processes, Activities, and Capabilities:

Support activities include a wide variety of bench-scale research and development in areas of combustion engines and chambers, combustion chemistry, combustion reactions, industrial and combustion processes, and diagnostics and remote sensing.

Typical hazards include standard industrial and laboratory hazards including power supplies, custom electrical equipment, lasers, fuels, compressed gases, and combustible materials. Other hazards include the handling of chemical, reactive, toxic, thermal, and energetic materials. Chemical emissions are small and related to the small-scale chemical use at the facility.

Safety features within the building include barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at the Complex is maintained by using the following engineered features: insulated conductors, pressure relief valves, interlocks, ventilation hoods, secondary containment, access prevention barriers, warning devices, Liquid Effluent Control System (LECS), and shielding.



Source: Pelletier 2002

Figure FD-1. Combustion Research Facility (CRF)

Various combustible materials are tested at the CRF.

Building 910

Function and Description:

Building 910 is used to conduct weapons research and development (R&D) activities. The facility conducts science-based engineering and technology R&D in a wide variety of sciences including advanced electronics prototype and development, surface physics, neutron detector research, and telemetry systems.

Building 910 is a low-hazard non-nuclear facility that consists of offices and space for weapons test assembly work. It is a multistory steel frame masonry structure of approximately 89,000 gsf, of which 48,000 sq ft is laboratory and office space. The following spaces are located in the facility:

- Lobby,
- 128 offices,
- Loading dock (provides gas bottle storage area),
- Large liquid nitrogen tank, and
- 35 primary research and development light laboratories.

Specific Processes, Activities, and Capabilities:

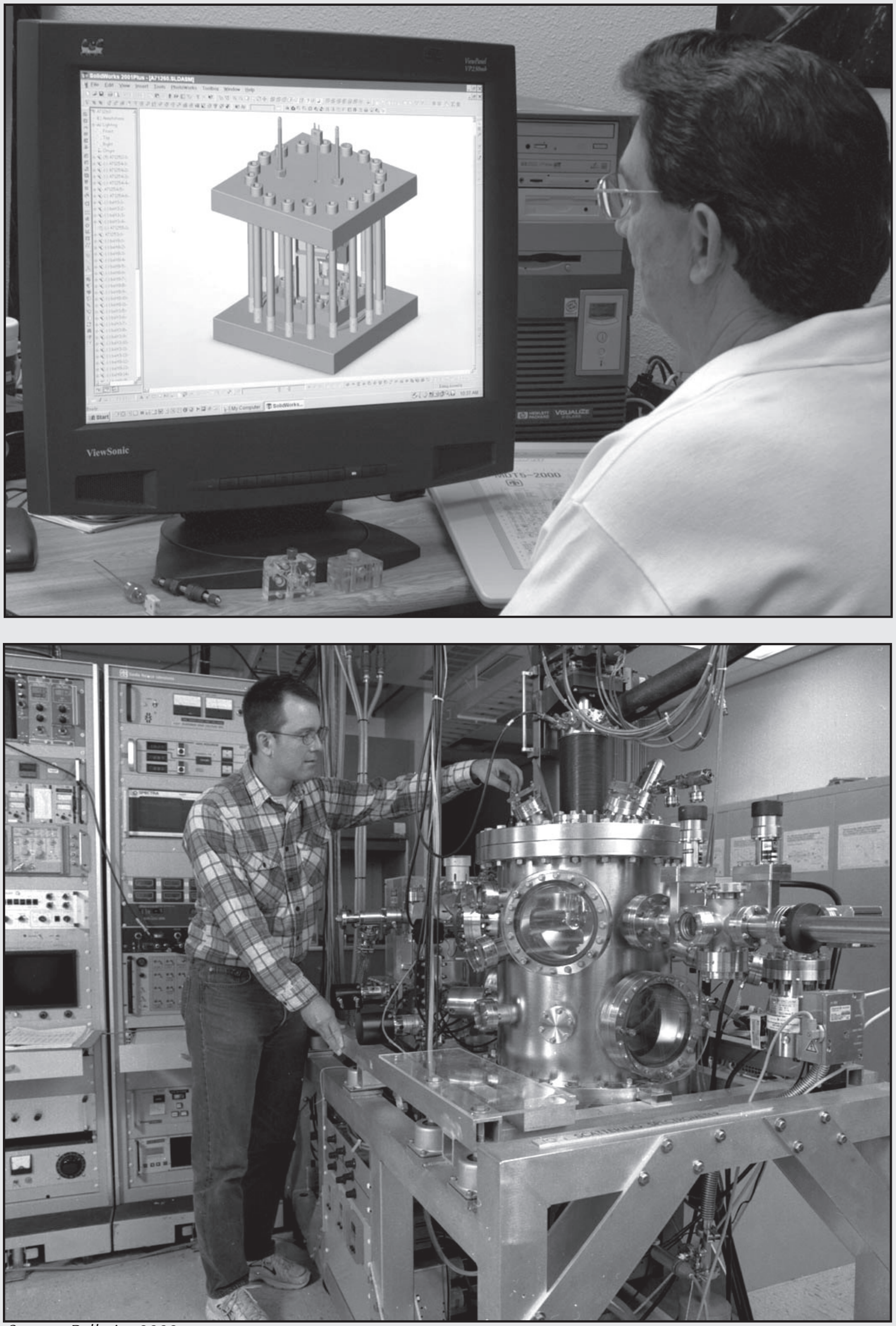
Generally, the activities are focused on electronics and microelectronics prototypes. Materials that are studied include ceramics, semiconductors, organic polymers, and metals. A wide variety of capabilities is employed in areas of weapon system instrumentation, remote sensing, surface analysis, energy sciences, electronics, and microsystems engineering.

Specific activities include

- Advanced electronics prototype and development,
- Surface physics,
- Neutron detector research, and
- Telemetry systems research and development.

Typical hazards include standard industrial and laboratory hazards including power supplies, custom electrical equipment, stored electrical energy, compressed gases, cryogenic materials, and energetic materials. Other hazards include the handling of radioactive, toxic, thermal and energetic materials. Chemical emissions are small and related to the small-scale chemical use at the facility.

Examples of safety features within the building include machining barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at Building 910 is maintained by using the following engineered features: insulated conductors, pressure relief valves, interlocks, ventilation hoods, access prevention barriers, secondary containment, LECS, warning devices, and shielding.



Source: Pelletier 2002

Figure FD-2. Building 910

Activities at Building 910 include development of advanced electronic prototypes.

Building 914

Function and Description:

Building 914 is used to conduct weapons test assembly and machine shop activities. The facility supports Sandia National Laboratories/California's (SNL/CA's) primary mission of ensuring that the United States (U.S.) nuclear weapons stockpile is safe, secure, and reliable.

Building 914 is a low-hazard non-nuclear facility that consists of offices and laboratory space for weapons test assembly work. It is a single-story, steel frame masonry structure of approximately 25,000 gsf, of which 19,000 sq ft is laboratory and office space. The following spaces are located in the facility:

- 17 offices,
- 4 electronic laboratories,
- 1 large machine shop,
- 1 high-bay test assembly, and
- Several small utility, vault, and storage rooms.

Specific Processes, Activities, and Capabilities:

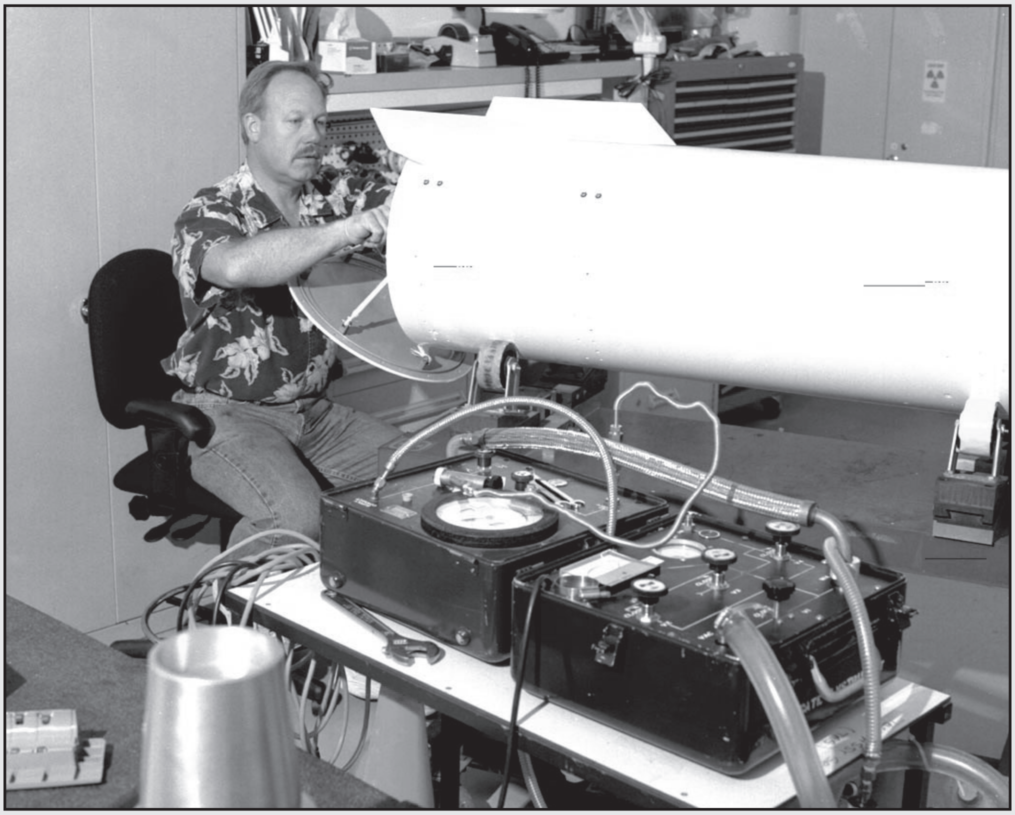
The operations conducted at Building 914 generally are focused on two distinct capabilities that support the mission of U.S. nuclear weapons stockpile maintenance: machine shop activities and test assembly operations.

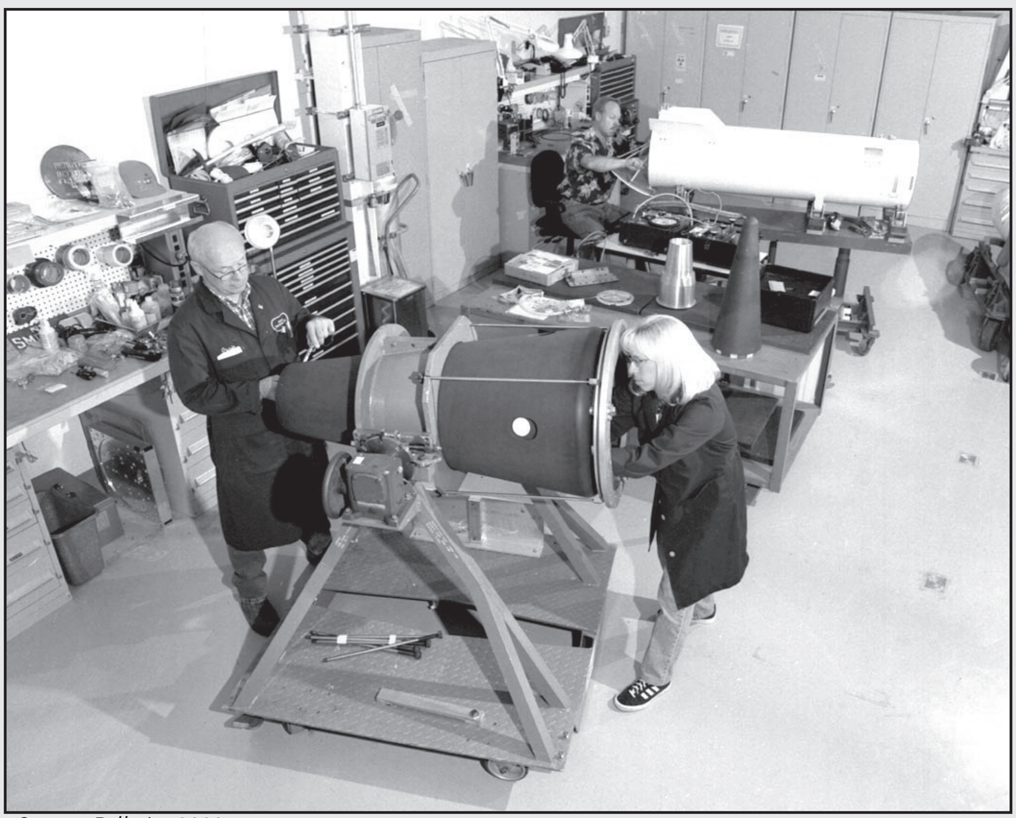
Specific activities include:

- Prototype machining and hardware generation,
- Mechanical inspection,
- Calibration,
- Assembly, testing, and modification of hardware for weapons subassemblies, and
- Electrical laboratory operations.

Typical hazards include those associated with machining and mechanical operations, such as the use of lathes, mills, forklifts, overhead cranes, and hoists, and use of flammable/combustible lubricants, solvents, and oils. Other hazards include the handling of radioactive, toxic, compressed, cryogenic, thermal and energetic materials from a variety of components associated with weapon subsystems. Chemical emissions are small and related to the small-scale work in the building.

Examples of safety features within the building include machining barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at Building 914 is maintained by using the following engineered features: insulated conductors, pressure relief valves, ventilation hoods, interlocks, access prevention barriers, secondary containment, magazette containment, grounding system, warning devices, and shielding.





Source: Pelletier 2002

Figure FD-3. Building 914

Operations conducted at Building 914 are generally focused on nuclear weapons stockpile maintenance. Here, these workers are performing test assembly activities.

Building 916

Function and Description:

Building 916 is used to conduct materials chemistry R&D activities. Areas of research include thin film interface science, mechanics, ion implantation, gases in metals, hydrogen storage, plasma, annealing, detectors, science-based modeling, extreme ultraviolet lithography, microsystems, and fluidics.

Building 916 is a low-hazard non-nuclear facility that consists of offices and laboratory space for primary research and development light labs. It is a single story building of approximately 42,000 gsf, of which 32,000 sq ft is laboratory and office space. The following spaces are located in the facility:

- Lobby,
- Conference room,
- 53 offices,
- Loading dock (provides gas bottle storage area),
- Large liquid nitrogen tank, and
- 22 primary research and development light laboratories.

Specific Processes, Activities, and Capabilities:

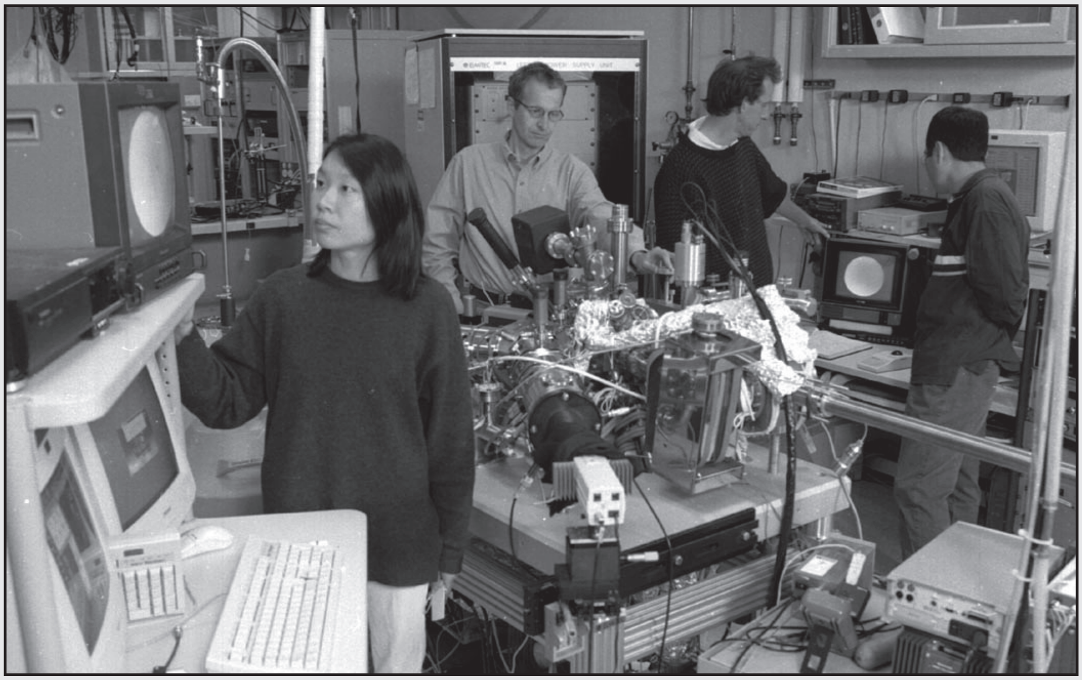
Generally, the activities are focused on materials studies including chemical and physical properties and characteristics (phases). Materials that are studied include ceramics, semiconductors, organic polymers, and metals. A wide variety of capabilities are employed in areas of material science, lithography, surface analysis, electronics, and microsystems engineering.

Research activities involve:

- Advanced metallic alloys,
- Chemical and radiation detection materials,
- Semiconductors,
- High-temperature superconductors,
- Ceramics
- Laser, optical, and dielectric materials, and
- Cryogenic vapor and liquid streams.

Routine hazards are associated with lasers, chemicals, microwave radiation, flames and furnaces, vacuum chambers, compressed gases, cryogenic materials, extreme ultraviolet radiation, ionizing radiation from accelerators, and organic, inorganic, and energetic materials. Other hazards include cutting, grinding, and etching, as well as the use of high voltages, power and hand tools, electronic test equipment, and power supplies. Chemical emissions are small and related to the small-scale work in the building.

Examples of safety features within the building include machining barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at Building 916 is maintained by using the following engineered features: insulated conductors, pressure relief valves, interlocks, access prevention barriers, ventilation hoods, LECS, magazette containment, warning devices, and shielding.



Source: Pelletier 2002

Figure FD-4. Building 916

Activities at Building 916 laboratories include research and development of advanced materials.

Building 927

Function and Description:

Building 927 is used to store nuclear and classified materials, assemble subsystems, conduct system verification, and store equipment. The Explosive Destruction System (EDS) subsystems are assembled in the facility. No testing with explosives or other hazardous materials is completed at this location.

Building 927 is a low-hazard non-nuclear facility. It consists of a single story warehouse of approximately 22,000 gsf. The building provides a safeguard storage facility for special materials.

Specific Processes, Activities, and Capabilities:

Building 927 has four operations:

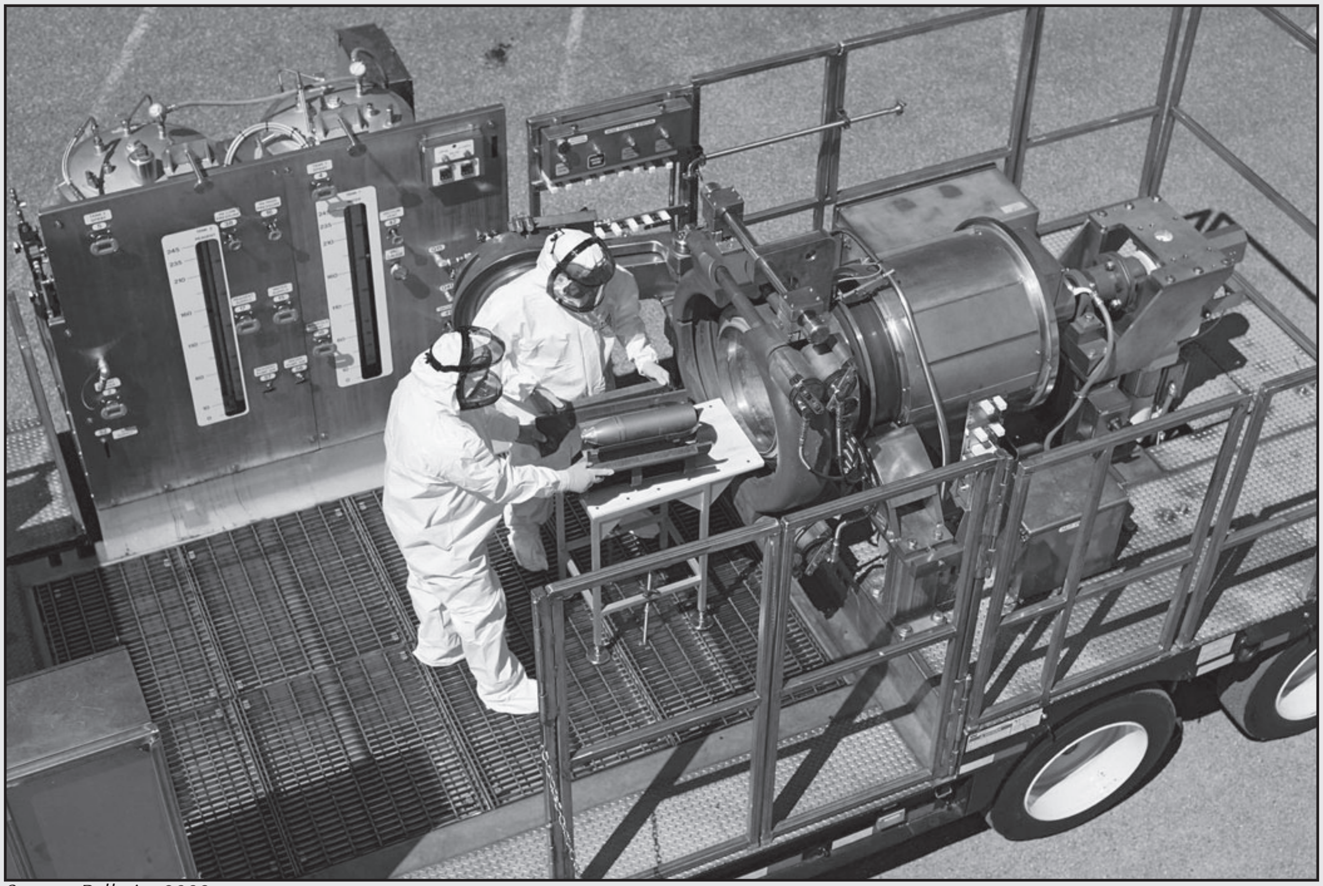
- Nuclear and Classified Material Control,
- Assembly test facility,
- Storage, and
- EDS assembly support.

The major hazards include radioactive materials, electrical sources, mechanical hazards, thermal hazards, high-pressure operations, miscellaneous hazards, and small amounts of hazardous waste.

A variety of hazards in this building include:

- Hoists,
- Cranes,
- Machine shop equipment,
- Welding,
- Parts fabrication tools, and
- Hydraulic equipment.

Hazard control at Building 927 is maintained by using the following engineered features: pressure relief valves and access prevention barriers.



Source: Pelletier 2002

Figure FD-5. Building 927 assembles the Explosive Destruction System (EDS)

The EDS is designated to destroy recovered World War I vintage chemical explosives.

Micro and NanoTechnologies Laboratory (MANTL)

Function and Description:

The mission of the MANTL (Buildings 940, 941, 942, and 943) is to develop and integrate manufacturing technology to produce micro- and nano-products.

MANTL is a low-hazard non-nuclear facility complex that consists of an administrative building and three separate laboratory buildings. All of the buildings are of steel-framed masonry construction, and total approximately 100,000 gsf. The following facilities are located in the complex:

- 22,778 sq ft administrative building including lobby, offices, and a small auditorium,
- 30,218 sq ft building with primary research and development light laboratories,
- 25,740 sq ft building with primary research and development light laboratories,
- 7,182 sq ft building with primary research and development light laboratories, and
- 10,000-gallon (gal) LECS.

Specific Processes, Activities, and Capabilities:

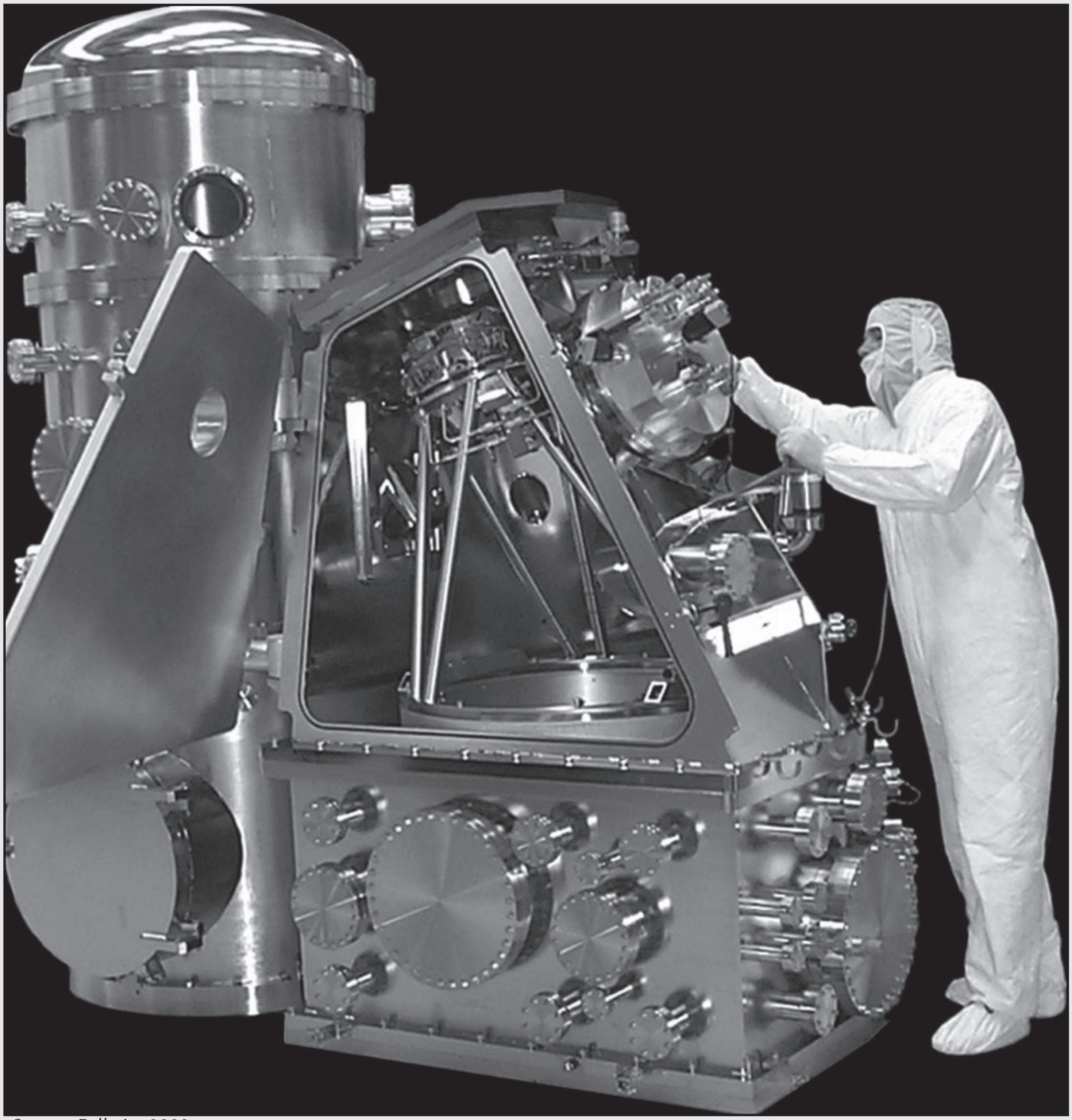
MANTL activities include a wide variety of operations micro-machining, miniature component fabrication, fuel cell research and development, sensors and signal processing, and extreme ultraviolet lithography. Areas of materials research and development include characterization, chemistry, composite and lightweight components, engineered materials (welding, brazing, and joining), science-based modeling, and radiography. Specific operations include materials evaluation laboratories, materials synthesis and processing laboratories, microsystems processing laboratories, and nanolithography equipment development.

MANTL has 11 areas of capabilities:

- Integrated Manufacturing,
- LIGA Microsystems,
- Fuel Cell Prototyping,
- Materials Characterization,
- Materials Chemistry,
- Lightweight Components,
- Engineered Materials,
- Science-Based Modeling,
- Sensors,
- Radiography, and
- Extreme Ultraviolet Lithography.

Routine hazards are associated with lasers, chemicals, microwave radiation, flames and furnaces, vacuum hambers, compressed gases, extreme ultraviolet radiation, ionizing radiation, and organic, inorganic, and toxic materials. Other hazards include high voltages, power and hand tools, and electronic test equipment.

Examples of safety features within the building include machining barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at the Complex is maintained by using the following engineered features: insulated conductors, pressure relief valves, interlocks, access prevention barriers, ventilation hoods, LECS, magazette containment, warning devices, and shielding.



Source: Pelletier 2002

Figure FD-6. Micro and Nano Technologies Laboratory (MANTL)

At the MANTL, materials research and development involves very small components and highly specialized equipment.

Chemical and Radiation Detection Laboratory (CRDL)

Function and Description:

The CRDL is used as a multi-purpose research and development facility. Generally, the facility supports research, development, and fabrication of chemical and radiation detection systems. Rooms within the CRDL operate as a Centers for Disease Control (CDC) registered Biosafety Level 2 laboratory.

CRDL is a low-hazard non-nuclear facility. The single story building totals approximately 16,000 gsf with 9,500 sq ft of laboratory and office space. The following spaces are located in the building:

- Lobby,
- Conference room,
- A clean room (Microstructures Laboratory)
- Approximately 22 research and development light laboratories, and
- Loading dock.

Specific Processes, Activities, and Capabilities:

CRDL activities involve development of biological/chemical species sensors that detect trace amounts of toxins, viruses, and biological species, and protein research. Areas of research and development would include microstructures (fabrication of semiconductors), radiation detectors, laser-based detectors, and sensor research (nerve agents, drugs, and explosives).

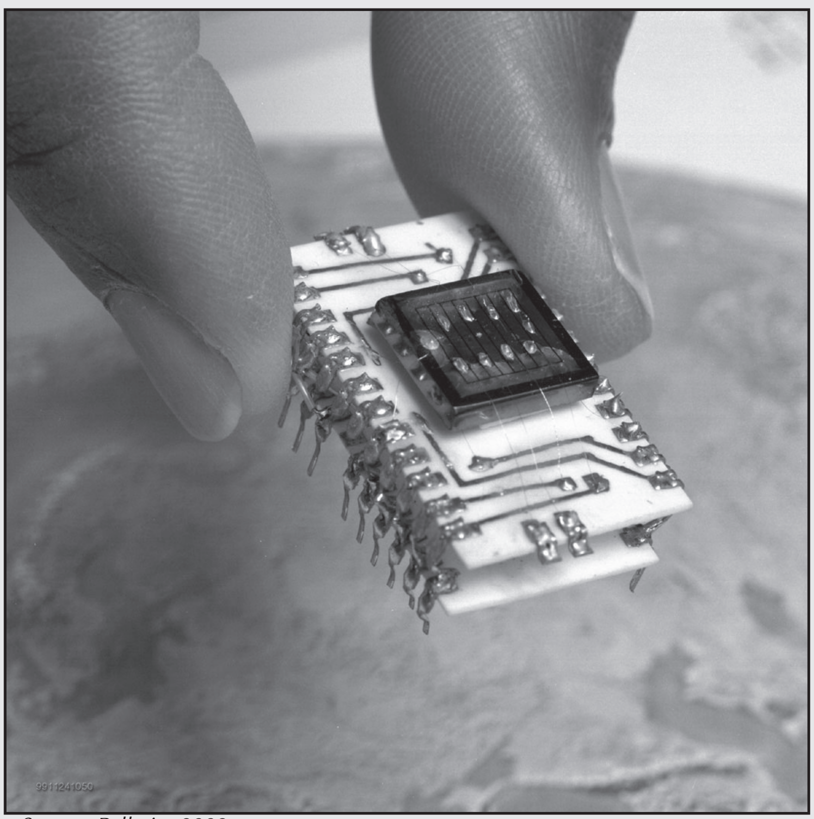
The Biosafety Level 2 laboratories provide standard chemical, biological, and analytical laboratory capabilities for conducting research in areas of advanced micro-separation technologies, laser-based detection, microelectronic biosensors, biological chemistry, and toxins handling. Work is limited to non-aerosol species.

CRDL has a wide variety of capabilities including:

- Development of chemical and bio-analytical methods for chemical analysis;
- Development, fabrication and testing of biochemical, chemical and radiation detectors;
- Culture of viral, microbial and mammalian cells to produce proteins for basic research;
- Development of membrane protein systems for environmental remediation and energy production;
- Refrigerators/freezers for storage of biological species; and
- Autoclaves are available for the destruction of biological species.

Routine hazards are associated with lasers, chemicals, microwave radiation, flames and furnaces, vacuum chambers, cryogenic materials, compressed gases, and organic, inorganic, and toxic materials (includes toxins, toxin fragments, and biohazardous materials). Other hazards include high voltages, hot and cold surfaces, and test equipment.

Examples of safety features within the building include machining barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at the building is maintained by using the following engineered features: autoclaves, access control, ventilation hoods, interlocks, LECS, warning devices, and shielding.



Source: Pelletier 2002

Figure FD-7. Chemical and Radiation Detection Laboratory (CRDL)

Activities at the CRDL involve advanced detection technologies including lasers and microsystems.

LIGA Technologies Facility (LTF)

Function and Description:

The LTF (Building 944) would provide R&D, and prototyping of LIGA and LIGA-like microdevices necessary to meet current and future Defense Program objectives.

The new facility would be a state-of-the-art, multi-story structure containing approximately 30,000 gsf; it would house offices, primary and secondary laboratories, and clean room areas. Laboratory space would be used for LIGA device test equipment, packaging, scanning, and device inspection.

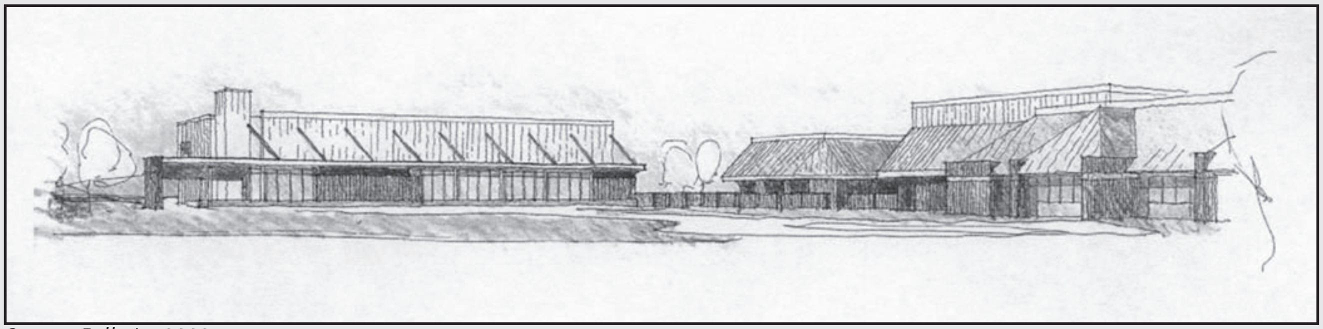
Specific Processes, Activities, and Capabilities:

A variety of processes are used to produce microelectronic and micromechanical devices that may vary according to the needs of a particular project. The LTF is to provide process-and process-support cleanrooms, functional areas, and laboratory environments to fabricate these devices. The high tolerance and high quality process requirements of the appropriate size and technical performance characteristics essential to LIGA and LIGA-like part and device microfabrication, assembly, aging, and testing would be provided in this facility

These processes can be grouped within the following four broad categories:

- Film molding—processes that chemically treat polymethyl methacrylate to create a mold;
- Plating—processes that electroplate metal or alloy in the mold to create a metal micropart;
- Microfabrication—processes that carve (lapped and polished) out the image created on the films; and
- Part finishing—processes dissolve the film and expose the finished product.

Hazards would involve standard laboratory hazards, acids and caustics, hazardous materials, and flammable gases. Engineering and administrative controls and personal protective equipment would be employed. Engineered controls will include interlocks, insulation, barriers, hoods, and alarms.



Source: Pelletier 2002

Figure FD-11. LIGA Technologies Facility (LTF)

The LTF is a proposed microdevices facility.

Distributed Information Systems Laboratory (DISL)

Function and Description:

The DISL (Building 915), which is currently under construction, would provide research and development in areas of distributed information systems.

The new facility would be a state-of-the-art, two-story structure containing approximately 70,400 gsf; it would house offices, computer laboratory space, research and development space, and collaborative group areas. The space would be divided into the following:

- 12,000 sq ft of computer laboratory space,
- 17,650 sq ft of research and development space,
- 4,730 sq ft for collaborative group areas,
- 8,220 sq ft for support areas,
- Ancillary laboratories, and
- Secure vault-type rooms.

Specific Processes, Activities, and Capabilities:

DISL operations would focus on the following technologies:

- Secure networking,
- High performance distributed computing,
- Visualization and collaboration technologies, and
- Design and manufacturing of productivity environments.

Laboratory activities would consist primarily of connecting off-the-shelf hardware components into multimedia and network systems, computer model development, testing and validation, and distributed computing.

Hazards would be minimal. No radioactive or chemical inventory is anticipated.

Source: Pelletier 2002

Figure FD-12. Distributed Information System Laboratory (DISL)

A new state-of-the-art research and development facility.

Area 8 Facilities

Function and Description:

The Area 8 facilities (Buildings 955, 956, 965, 966, 970, 974, 976, 977, 978, 979, and 983) are used as a multi-purpose R&D support facilities. Generally, the facilities support research, development, and testing throughout SNL/CA.

All the facilities in Area 8 are low-hazard non-nuclear facilities. The nine buildings, all steel and masonry, total approximately 23,000 gsf of laboratory and testing space. The following facilities are located in Area 8:

- 1,091 sq ft welding lab,
- 7,168 sq ft high pressure test facility,
- 2,011 sq ft welding lab,
- 682 sq ft storage facility,
- 2,451 sq ft hydrogen test facility,
- 2,882 sq ft test assembly facility,
- 4,380 sq ft radiation machining, engine lab, and
- 1,318 sq ft test assembly facility.

Specific Processes, Activities, and Capabilities:

Testing activities involve high-pressure hydrogen, mechanical, high explosives, vibration, climate, temperature, and high acceleration. Experiments and research are completed in areas of welding, hydrogen fueled engines, and special materials. Data collection activities support the above testing work.

Area 8 has a wide variety of capabilities including:

- High pressure hydrogen testing,
- Mechanical testing,
- High explosives component testing,
- EDS testing,
- Machining of special materials,
- Vibration testing, and
- High “g” testing.

Routine hazards are associated with lasers, chemicals, large centrifuge, weapon test units, overhead cranes, vibration tables, compressed gases, cryogenic materials, and organic, inorganic, and toxic materials. Other hazards include vacuum vessels, pressure vessels, and test equipment.

Examples of safety features within the Area 8 facilities include machining barriers and shields, safety shower and/or eyewash stations, and ventilation hoods. Hazard control at Area 8 is maintained by using the following engineered features: insulated conductors, pressure relief valves, interlocks, access prevention barriers, ventilation hoods, grounding system, warning devices, and shielding.

Explosive Storage Area

Function and Description:

The Explosive Storage Area performs safe handling, packaging, short-term storing, and shipping of all Department of Transportation (DOT)-regulated explosives. Total capacity is 234.2 kilograms (kg) of explosives.

The ESA is a low-hazard non-nuclear facility that consists of one permanent building, eight storage bunkers, and four magazettes.

Specific Processes, Activities, and Capabilities:

Personnel routinely handle energetic materials of various explosive classes. Personnel typically handle explosives on a day-to-day basis. Activities at the ESA include unpacking, sorting, repackaging, sampling, storing, staging, and preparing explosives for onsite shipment to approved users.

Hazard control at the ESA is maintained by using the following engineered features, as needed: material containers, lightning protection, structure design, static control, warning systems, access control, and seismic storage. Other controls include segregation of incompatible explosives, intrusion alarms, and signage.

Hazardous and Radioactive Waste Storage Facilities

Function and Description:

The Hazardous and Radioactive Waste Storage Facilities perform safe handling, packaging, short-term storing, and shipping (for recycling, treatment, or disposal) of all *Resource Conservation and Recovery Act* (RCRA)-regulated and other hazardous and toxic waste categories, including radioactive wastes. Total capacity of the waste facilities is 63 cubic meters (2,200 cubic feet).

The facilities are a low-hazard non-nuclear facilities. The following structures are located at the facility:

- The Hazardous Waste Storage Facility, a 625 sq ft steel-framed metal building for hazardous waste,
- The Radioactive Waste Storage Facility, a 3,778 sq ft, steel framed masonry building,

Specific Processes, Activities, and Capabilities:

Hazardous (RCRA, California toxic, and other hazardous) and radioactive waste (including low-level waste and low-level mixed waste), which are generated by SNL/CA operations described in the RCRA Part B Permit, are collected and transported to the facilities for packaging and short-term (less than 1 year) storage prior to offsite transportation for recycling, treatment, or disposal at a licensed facility. In the normal conduct of business, personnel use a variety of power equipment such as hydraulic drum handlers and empty drum compactors, forklifts, lift trucks, flatbed trucks, and hauling trucks.

Hazard control at the facilities are is maintained by using the following engineered features, as needed: waste containers, secondary containment, glove boxes, fume hood, air supply and exhaust systems, high efficiency particulate air filters, air monitoring systems, radiation area monitor system, breathing air supply, fire detection and notification system, fire suppression system, and backup electrical power generator.

Glass Furnace and Melting Laboratory

Function and Description:

Glass Furnace and Melting Laboratory would operate as a user facility for the study of glass manufacturing processes. Activities at the lab would assist in identifying methods to increase production efficiency, improve product quality, and maintain glass industry competitiveness.

The new laboratory and furnace would be built in the existing CRF. The laboratory would use a pilot scale glass melting tank furnace with a water tank (quench tank) to cool the molten glass. The furnace would be fired by a combination of natural gas combustion, with air or oxygen, and electrical power. The oxygen would be supplied through a 10,000 gal liquid oxygen tank. To maintain a comfortable work environment, the ventilation system would be upgraded.

The lab would be equipped with an exhaust system, control room, optical benches, a glass cooling tank, and glass storage area.

Specific Processes, Activities, and Capabilities:

The activities conducted in the lab would be typical laboratory and pilot-scale manufacturing operations involving raw materials (sand, limestone, sodium carbonate, sodium sulfate) and crushed recycled glass. The equipment used is commercial with custom-built laboratory and pilot-scale instrumentation. To prevent damage to equipment, the furnace would be kept hot at all times.

Research activities would include:

- Operation parameter measurements using laser-based techniques,
- Imaging of flames and gaseous species using lasers,
- Chemical and physical properties of molten glass,
- Testing of instrumentation and process controls,
- Testing burner performance, and
- Monitoring and measurement of refractory wear.

Equipment would include melting tank furnace, raw material mixer, raw material feeder, crane, gas analyzers, lasers, and an air preheater. The gas analyzers would be used to monitor oxygen, carbon dioxide, carbon monoxide, unburned hydrocarbons, sulfur dioxide, and nitrogen oxides. In addition, Class IV, argon ion, and dye lasers would be used.

Hazards would involve high temperature (2900 degrees Fahrenheit [F]) hazards, caustic raw materials, flammable gases, and high-energy sources. Engineering and administrative controls and personal protective equipment would be employed. Engineered controls will include interlocks, insulation, barriers, vents, and a moat around the furnace.

Weekly raw material use would be 16,800 pounds (lbs) of sand, 14,000 lbs crushed recycled glass, and 4,400 lbs of limestone. Approximately 600,000 lbs of glass would be produced annually. It is expected that all of the glass would be recycled as raw material onsite or recycled through an offsite facility.

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