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CONTINGENCY PLAN FOR THE LAWRENCE LIVERMORE NATIONAL LABORATORY'S HAZARDOUS WASTE OPERATIONS

MASTER

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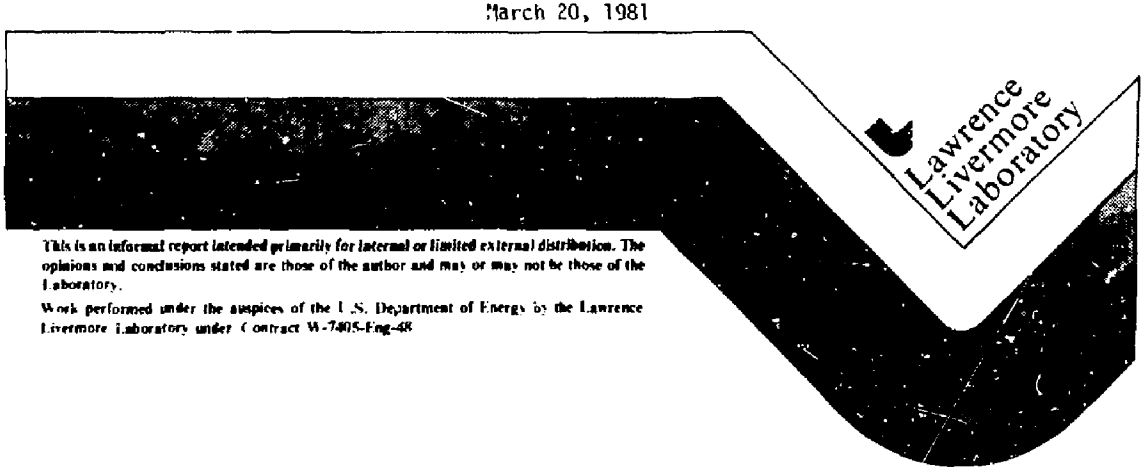

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ABSTRACT

The Lawrence Livermore National Laboratory has the necessary equipment and trained personnel to respond to a large number of hazardous material spills and fires or other emergencies resulting from these spills including injured personnel. This response capability is further expanded by the agreements that LLNL has with a number of outside response agencies. The Hazards Control Department at LLNL functions as the central point for coordinating the response of the equipment and personnel. Emergencies involving hazardous waste are also coordinated through the Hazards Control Department but the equipment and personnel in the Toxic Waste Control Group would be activated for large volume waste pumpouts. Descriptions of response equipment, hazardous waste locations, communication systems and procedures for personnel involved in the emergency are provided.

I. INTRODUCTION

A contingency plan which specifically addresses actions to be taken by personnel in response to a hazardous waste emergency is difficult if not impossible to isolate. The Lawrence Livermore National Laboratory (LLNL) does not recognize hazardous waste as unique or different from the other hazardous materials routinely handled. It is well known that hazardous wastes often behave differently than virgin hazardous materials. However, the response in emergency situations to hazardous wastes are typically very similar, if not identical, to their virgin counterparts. Therefore, this report will address the overall Emergency Response Operations for hazardous spills, releases and consequences with an emphasis on particular aspects unique to hazardous waste operations.

The Lawrence Livermore National Laboratory is equipped to respond to and control a large number of emergency situations that our industrial counterparts are unable to match either because of a lack of expertise or equipment. The Hazards Control Department at LLNL is chartered with the responsibility of providing safety guidance and support to all Laboratory programs involved in handling hazardous materials or performing potentially hazardous operations. As part of this support effort, the Department operates two fire stations: one at the Livermore Site and one at Site 300, a ten square mile area located 15 miles east of the main Livermore Laboratory. Both stations are equipped with emergency response vehicles, spill cleanup equipment, firefighting tools, ambulances, etc. In addition to this capability, the Toxic Waste Control Group maintains equipment specifically for hazardous waste emergency situations. This equipment consists of large semi trailer tanks, an assortment of pumps and hoses, an emergency response vehicle, personnel safety equipment, etc. Both the Hazards Control Equipment and the Toxic Waste Control response capabilities will be discussed later.

The basic Disaster Control Plan is outlined in the LLNL publication listed in Reference 3. In addition to this basic plan, a number of supplements are published and available which provide a more detailed plan for systems and emergency situations specific to the incident or accident. These plans range from a Hazardous Materials Spill Plan to off-site sampling. It is not the purpose of this report to reinstate what has already been described and published in these Plans, but rather to adapt our present emergency capabilities and response procedures to accidents or spills involving hazardous waste and related materials.

II. EMERGENCY CONTROL PLAN

The emergency control organization is comprised of competent personnel with specialized training to provide prompt and effective action in any conceivable situation including emergencies. These individuals are backed by trained professional people whose expertise is in Industrial Hygiene, Industrial Safety, Explosive Safety, Radiation Safety and Fire Safety. In addition, the Toxic Waste Control personnel are available to provide consultation or actual response to emergencies. The relationships and responsibilities of Laboratory groups for controlling emergencies are outlined in Fig. 1.

The Emergency Control Plan is outlined in chronological order of action items and is offered as a general guide that employees must follow in any emergency. The designated person or group performs the stated functions but the available personnel must use their judgment in fitting the given emergency into the control plan and performing any additional functions as required.

1. Emergency Actions

Actions to be taken in any given emergency will vary according to the nature of the emergency, location, number of people involved or affected, etc. The following are the responsibilities of employees not involved in the emergency, supervisors' responsibilities and the employees directly involved.

a. Employees Not Directly Involved in the Emergency

Employees are to stay away from the scene of the emergency and follow instructions issued over the PA system or given by emergency control personnel. The sounding of a steady klaxon horn means the immediate evacuation by the nearest exit. Employees are not to re-enter the area evacuated until notification by their supervisor is given.

b. Supervisor's Responsibility

The supervisor is to:

- Direct his personnel to perform actions required by the nature of the emergency. This action is largely a judgmental one. The first priority is life-saving if this attempt does not endanger other employees. Secondly, all attempts should be made to prevent off-site consequences which would adversely affect the community. The third priority is to protect LLNL property. Action such as spill containment by closing valves, diverting releases, etc. are acceptable until control is taken by the emergency response team or the fire protection personnel.

- Provide any information needed by the emergency response team regarding hazards in his area.

- Provide any assistance that his personnel can offer to the emergency response team.

- o Prevent his employees from re-entering the evacuated area until notification by the Hazards Control Safety Team Leader or the Emergency Control Coordinator is given that the area is safe for normal operations to resume.

c. Employees Directly Involved in the Emergency

Any emergency (including hazardous waste) that an employee has knowledge of or becomes involved in is expected to take the following action.

- o Immediately report the emergency to the dispatcher by phone (Livermore Site extension 2-7333; Site 300 extension 333). In clear concise language state what happened, the specific location, whether anyone was injured, your name and the phone number you are calling from.

- o If any question exists as to the magnitude of the emergency and whether or not it should be called in, call for help without waiting for a resolution.

- o If there is a threat of further injury from hazardous materials, the employee shall remove the injured person(s) and leave the immediate vicinity. If no threat of further injury is present, the injured person(s) should be left where they are. Do not call the Medical Department since this is done automatically through the emergency call-in.

- o Proceed with first aid if you know it or attempt to confine and control the incident if familiar with the operations and/or materials.

- o When response personnel arrive on the scene, show the Senior Fire Officer where the incident occurred, inform him of the hazards in the area and provide any other information needed

for the emergency response personnel to avoid injury. If the Emergency Control Coordinator or Deputy Disaster Control Director assumes control of the emergency, stand by to provide the information requested.

d. Notification of Emergency Response Team

Once notified, the emergency dispatcher relays the call-in promptly over dedicated telephone lines to the response groups that may need to respond immediately. After this is completed, the dispatcher uses the best available method for notifying other personnel that are requested. This will normally be accomplished using a radio paging system that key individuals wear 24-hours a day. During off-shift hours, the required personnel are notified by phone or radio page. The Security Office performs similar functions at Site 300.

e. Action Taken by the Emergency Response Team

At the time an emergency is phoned in to the dispatcher, the notified individuals will evaluate the severity of the emergency and the response required for the situation.

In all cases, fire protection personnel and equipment will respond to the scene within two minutes from the time of notification. The Senior Fire Officer will assume control of the activities after concurrence with the Hazards Control Safety Support Leader. The Laboratory's Security will provide traffic control or other support functions as required. Upon arriving at the scene, the Emergency Control Coordinator will take charge and assess the magnitude of the emergency. He will direct the control actions needed or request additional personnel as required. If the emergency is classified as a disaster according to criteria delineated in Reference 3, the Deputy Disaster Control Director assumes control and notifies the Disaster Control Director who assumes control of all related activities (see Fig. 1).

III. EMERGENCY CONTROL/RESPONSE EQUIPMENT

LLNL and Site 300 are equipped with a number of response vehicles and equipment to handle incidents as minor as a chemical spill in a laboratory to a major disaster such as an earthquake. The central point for most of this equipment is the Fire Department. Fire Station No. 1 is located at LLNL and Fire Station No. 2 is at Site 300. Station No. 1 is comprised of a fleet of 15 vehicles (including two ambulances) plus seven on duty fire fighting personnel. All of these vehicles are dispatched through the Emergency Dispatch Center (EDC). Fire Station No. 2 vehicles are dispatched through the Security Department at Site 300.

1. Emergency Dispatch Center (EDC)/Communication Systems

The EDC is continuously manned by at least one dispatcher and by additional EDC personnel during certain emergencies. It is located in Fire Station No. 1 and handles approximately 10-15 emergency and non-emergency activities per day. These activities are inclusive for LLNL's mutual aid activities for Twin Valley Fire Department, Tassajara Fire District and Alameda County. Communication with the fire fighting services of various communities and agencies are maintained which frequently involves LLNL in mutual aid assistance.

a. Equipment

- o Alarm system

  When a fire detector senses an alarm, a signal is sent to a zone panel which alarms at a building panel. The alarms on the building panel are sent to the EDC via telephone lines. This system is operated as a Class B proprietary alarm system. A central alarm panel located in the EDC is used to monitor the building panels' status. Approximately one-half of the buildings are of sufficiently low value that they do not require monitoring.

- Radio System

  LLNL fire and police communications are transmitted over two principle radio channels. There are four additional channels used in routine communications and a fifth one which is used in the emergency paging system. Channel "A" is a 2-frequency simplex half-duplex network operating through a repeater on Mount Diablo and is used for long range communication. All other channels are single frequency simplex networks. On-site communication between the Security Department and the Fire Station normally use Channel "B". The Channel "C" network is used for routine operational and administrative communication. This network comprise the other four channels available. A seventh channel exists which connects the emergency paging system into the Diablo repeater. Except for the taxi service (VHF low band) and the emergency page line (UHF) system, all radio channels are operated in the VHF high band.

  In addition to these communication channels, LLNL uses the Public Service Bands; and has agreements with the following agencies: Twin Valley Mutual Aid, California State Mutual Aid, City of Tracy/Alameda County, MEDNET, OES Radio and the Tassajara Fire Department. The LLNL Fire Station (EDC) also uses the local and state fire service mutual aid channels for off-site operations. In the event of a severe on-site emergency involving hazardous materials or wastes, these channels would be used for communicating with outside response personnel.

- Mobile/Portable Radios

  The mobile command post vehicle contains two 2-channel mobile transceivers covering Channels A and B, and the local and mutual aid frequencies. A 10-watt Channel B transceiver and a 10-watt transceiver for local mutual aid are also in the vehicle.

- Telephone System

  Intrasite telephone communications is through a Centrex system with access by a five digit local number. The Centrex system is capable of servicing approximately 10,000 phones. LLNL also has the dimension system which is referred to as the Emergency Communications Telephone System (ECTS). The ECTS units are located throughout the Laboratory in working areas of emergency personnel. This system guards against the Centrex overload.

  A local alert telephone system is provided between the Emergency Dispatch Center (EDC) and the Medical Department, Hazards Control, Maintenance and Plant Operations, and Fire Station.

  A dedicated line is used during emergencies and runs from the EDC to Plant Operations.

- Evacuation Paging System

  The Emergency Dispatch Center (EDC) can transmit to LLNL personnel any instructions needed over the building's evacuation paging (PA) system. The PA system is located in every building and is normally used for routine intrabuilding announcements. These building PA systems are integrated into a site-wide system operated from either the EDC or the police station. There are annunciator panels at these two locations which contain key selector switches for each building and a switch for transmitting to all buildings simultaneously. If any of these switches are activated a priority matrix is established which disconnects the building microphones and increases the audio output 10db. Unless a special laboratory announcement is made, this system is restricted to labwide emergencies.

- o Disaster Warning Systems

  The North American Warning Alert System (NAWAS) and the State Civil Defense warning and communication system are connected into LLNL. The police dispatcher processes all messages and warnings and can activate the air raid sirens.

- o Intercoms

  The Emergency Dispatch Center (EDC) uses a number of intercom systems to communicate with Site 300, Livermore Municipal Police and Fire Departments, Sandia National Laboratory's Security forces and surrounding work areas on site. An additional intercom system allows the EDC to transmit and receive messages from the Livermore Police/Fire Communication Center and the Livermore Fire Department Stations 1, 2, 3, and 4. This dedicated system provides a dispatching link between LLNL and municipal fire services.

2. Emergency Response Equipment

   a. Vehicles (general response)

   - o Foxtrot 1 is a fire department pumper equipped with a 1250 gpm pump, a 500 gallon water tank, an assortment of fire-fighting tools such as hoses, ladders, self-contained breathing apparatus, a 2500-watt portable electric generator, a number of gas and radiation instruments, air samplers and two transceivers.

   - o Foxtrot 3 is a truck that has a pumper-elevating platform combination whose chief function is to provide the equipment needed in firefighting or rescue operations. The primary capability of this vehicle is in the 50 ft. platform extension. The snorkel on the platform can pump 1,000 gpm. The truck also has a large assortment of ladders, hoses and other firefighting tools including two transceivers.

- Foxtrot 6 is the command vehicle equipped with a 5-ton winch and 4-wheel drive. It is equipped with two transceivers, one that operates on LLNL channels and the other on Twin Valley Mutual Aid frequencies.

- Foxtrot 7 is a modified 1-ton pickup truck carrying a portable pump and other equipment. During the winter months the vehicle is equipped with a 150 lb. dry chemical unit. There are two transceivers in this truck.

- Foxtrot 5A is a reserve ambulance that meets most of the State of California's recommendations for an ambulance and is equipped accordingly.

- Foxtrot 5 is a lifeguard intensive care unit that meets all the State of California requirements. It is equipped with a ECG monitor and is usually accompanied by a physician.

- Foxtrot 74 is a "crash truck" equipped with a 400 gallon water tank, a booster pump and a 300 lb. dry chemical fire extinguisher.

- Foxtrot 20 is a two-wheeled trailer equipped to minimize damage due to water floods on the Laboratory's property. It is equipped with water vacuums, salvage covers, absorbant materials, etc.

- Foxtrot 10 is a high expansion firefighting foam generator that has a 15,000 cfm capability.

- Foxtrot 18 is a 8.4 kV light and power generator mounted on wheels. This unit provides flood lights and supply power during emergencies.

- Foxtrot 71 is a firefighting vehicle located at Site 300. It is equipped with a 1,000 gpm pump capable of pulling water from static or open sources, a 1,000 gallon water tank, self-contained breathing apparatus, a 2,500 watt electric generator, radiation meters, air samplers, combustible gas indicators and an assortment of ladders and hoses. Two transceivers are also in this vehicle; one that operates LLNL Channels A and B and the other operates on Twin Valley Mutual Aid frequencies.

- Foxtrot 73 is a fire truck equipped with a 10-ton winch and has a 400 gallon water tank, a booster pump and a 300 lb. dry chemical fire extinguisher along with an assortment of hoses and ladders. This vehicle is located at Site 300.

- Foxtrot 75 is a carry-all ambulance containing respirators, protective and resuscitator equipment. It has a transceiver that operates on the LLNL Channels A and B. This vehicle is located at Site 300.

b. Hazardous Waste Response Equipment

- The Toxic Waste Control (TWC) Group operates a 1-ton pickup truck modified to respond to hazardous waste calls and emergencies. It is equipped with a flashing amber light and signs mounted stating "Dangerous Cargo". Equipment such as portable pumps, hoses, absorbant, etc., can quickly be loaded onto it. This response vehicle is also equipped with a first aid kit.

- The TWC Group has three 5,000 gallon tankers that can respond to large pump-outs of hazardous waste. One tanker is available for emergency responses, while two are used in operations.

- o A hazardous waste spill kit is available from the TWC Group. This kit is portable and is equipped with 100 lbs. of absorbant, 5 gallons of contamifix (prevent airborne contamination), disposable coveralls, bags, respirators, surgical gloves, etc.

- o Four 1,000 gallon portable tanks are always available for emergency response. They are capable of receiving hazardous waste having a pH range of 1 to 13.

- o An assortment of electrical and gasoline driven pumps are available for emergency response. These pumps have capacities up to 120 gpm and can pump corrosive liquids and sludges.

- o Two complete sets of chrome leather suits are maintained for responding to reactive or shock sensitive wastes such as old ethers, peroxide or super oxide formers. In addition, two blast shields constructed out of 1/4" steel are maintained and can be mounted on a flat bed truck for safety during transportation.

c. Other Related Equipment

- o Atmospheric Release Advisory Capability (ARAC)

This system is designed to estimate the effects and atmospheric dispersion of hazardous material releases. The core of this system is a PDP-11 computer with a CRT readout to graphically display the concentration of spills on site, within the immediate area surrounding the spill or within Northern California. The meteorological tower located on site supplies the necessary information such as wind speeds, temperature gradients, atmospheric pressure, etc., for these computations. Some computations are performed by the PDp-11 but if more involved numerical modeling is required, the ARAC

central facility is activated. This facility is equipped to perform detailed atmospheric dispersion calculations allowing a more accurate tracking of hazardous material dispersion.

The capability of this system allows the various response teams to have instantaneous information on any hazardous material concentrations resulting from a spill or an accidental release.

- Sewer Monitor

  The most probable discharge of a hazardous waste to the environment is in the sewer effluent. In response to this potential, LLNL has developed a system to monitor its sewer effluent on a continuous basis.

  A representative sample of the effluent leaving LLNL is continuously monitored for metals, radiation and pH. The equipment consists of an x-ray fluorescence unit, sodium iodide radiation detectors and an industrial probe for pH monitoring. An Intel 8008 microprocessor reduces and analyzes the data collected to determine if established environmental limits are being approached. If a preset pH or radiation level is exceeded, a sample of the suspect sewage is automatically collected for detailed analysis with the alarm transmitted to the Emergency Dispatch Center (EDC).

  It requires about two hours before LLNL sewage effluent reaches the Municipal Livermore Water Reclamation Plant where it is treated. This allows sufficient time to notify emergency personnel, evaluate the situation and if necessary, to arrange a diversion of this effluent to emergency holding basins located at the municipal treatment plant.

The radiation detection system is set at a level that corresponds to less than 2% of the allowable monthly discharge limit for Sr-90 or less than 0.5% of the limit for Pu-239 on a continuous release basis. The pH limits are established at pH of 3 and 11. If the pH drops below 3 or exceeds 11 for 15 minutes within a "floating" 20 minute block of time, the alarm is activated and sent to the EDC.

The X-Ray Fluorescence Analyzer (XRFA) has a dual register system for data output interfaced with a LSI-11 microprocessor. This allows a rapid response to high metal concentrations (operated at 500 second count) or a more sensitive measurement to low concentrations released over a longer period of time (operated at 5,000 second count). Table I shows the minimum advisory and alarm levels for monitored metals. Table II is a comparison of the LLNL accepted discharge limits on metals to that of the limit of sensitivity achieved by the XRFA.

IV. GENERAL RESPONSE PROCEDURES

All emergencies that occur at the Laboratory are received by the dispatcher at the Fire Station. This station maintains two sets of building data books (run cards) which contain procedures and special operations for each facility at LLNL. Other pertinent information such as emergency call-out lists, operational safety procedures, etc., are maintained in these dispatch records.

When the dispatcher receives an emergency call, a copy of the building book is pulled, while the responding personnel (firefighters) pull another copy of the book. In this manner, the dispatcher can follow the procedures and communicate effectively with the firefighters. The following information is contained in these books.

- Hazard Identification Cards: This card is located in a backside pocket of the front cover and provides a list of hazardous materials and their physical location within the building and surrounding area.

- Emergency Call List: This is a list of names and telephone numbers of individuals responsible in that building who can be contacted 24 hours a day. These are people who are knowledgable about the work and hazards associated with the area.

- Building Plan: A plot plan of the building and surrounding area is available. Information such as room numbers, location of shut-off valves, fire alarm panels, etc., is also contained here.

- Operational Safety Procedures: Buildings that contain hazardous materials or do work which may be hazardous have a set of safety procedures that must be followed by the building personnel. The information contained here describes the general functions of the building location of emergency equipment, safety requirements for hazardous operations, etc.

- CFIRS Information: General information is also provided on things such as number of stories, construction type of interior and exterior walls, floors and roofs, etc.

- There is also a SPECIAL EMERGENCY CALL LIST BOOK which is not used during the more common or "normal" emergencies. This special emergency book is reserved for emergencies that are more extensive and which could result in damage to life or property or have broader consequences than the immediate area. Primarily, the procedures contained in this document consist of telephoning a list of people or centers that should be notified of the emergency.

The special emergency plans contained in this document are the following:

- o Radiological Assistance Plan
- o Alameda County Emergency Plan
- o Civil Defense and Disaster Plan
- o National Warning Systems (CD)
- o Oil and Chemical Spill Information
- o Sheriff's Department, Alameda County SOPs
- o Alameda County Medical Alert Plan
- o Helecopter Rescue - U. S. Coast Guard
- o Emergency Conditions and Security Alerts
- o U. S. DOE - Emergency Radio System SOP
- o U. S. Coast Guard Pollution Control
- o Alameda County Pipelines Book

In the event that such an emergency of this magnitude occurs, the organization shown in Fig. 1 would be activated entirely. The Emergency call-out of responsible individuals is listed in Appendix A.

V. HAZARDOUS WASTE SPILLS

It is difficult to imagine an emergency situation developing with hazardous waste that would require an evacuation of LLNL. Hazardous wastes generated and processed at LLNL range from corrosive acids and caustics to highly radioactive wastes. Included are explosives, carcinogenic, reactive, pyrophoric, poisonous, flammable and combustible wastes. All of these wastes are generated throughout the Laboratory by programs which produce this waste during the course of their research. The wastes are packaged and identified by the generator and placed in staging areas clearly marked as such. Guidance on packagings and waste compatibilities is provided to the programs by the Toxic Waste Control Group. Retention tank systems (usually larger than 500 gallons but as high as 7,000 gallons) are located throughtout LLNL and are used to collect building wastes such as plating rinse water, etching rinse water, dip tank solutions, etc. The physical location of these wastes are shown in Figs. 2 through 6.

Any emergency which may develop in these field locations are usually of minor consequences because the largest container is of a 55 gallon capacity which meets DOT specifications for the waste type. Consequently, it is unlikely that a spill at one of these locations could result in a discharge greater than 50 gallons. While the buildings' retention tanks have a larger capacity, they are located away from easy access with barriers to prevent damage by vehicles.

The Toxic Waste Control (TWC) Group coordinates the routine pickups of these wastes with the LLNL Transportation group. Safety personnel assigned to the various programs phone the TWC Group on Wednesday to schedule the routine waste pickup on Thursday. The call-ins are logged in and the waste is transported to the Solid Waste Handling Facility to record and process for disposal or recycling. Containerized liquid waste (less than 110 gallons) is later transported to the Liquid Waste Handling Facility for processing. Building retention tanks are scheduled for pump-outs on an as-needed basis with arrangements made directly at the Liquid Waste Facility.

A TWC technician always accompanies the Thursday waste run with the Spill Kit (see Section III b.) accompanying the tractor/trailer. The technician inspects each container before it is loaded to insure that it is properly labeled and marked as to its identity and is in good condition for safe transportation. If the integrity of the container is suspect or if the hazardous waste is not properly identified, the load is refused. Once the hazardous waste is loaded onto the trailer it is secured with tie-downs by the Transportation driver. The spill kit is available to respond immediately to any leakage of the containers that may threaten personnel safety or the environment. The TWC technician monitors the loaded waste to ensure that shifting or spills do not occur during transportation. If a spill occurs with a magnitude beyond the capabilities of the TWC technician and the spill kit, the Fire Station can be crashed out over the radio in the tractor.

If a large volume of hazardous liquid waste begins leaking from a retention tank, the 5,000 gallon tanker can respond for cleanup. In conjunction with the four 1,000 gallon tanks, the capacity that is available for spill response exceeds the largest capacity of any retention tank at LLNL. The Liquid Waste Handling Facility also maintains a tank having a 25,000 gallon capacity which is reserved for large volume hazardous waste. The tank is completely empty about 95% of the time and is used only when a large unexpected volume of waste is generated. This tank allows the TWC Group an adequate buffer for the processing operations.

The TWC emergency response vehicle is available for situations in which a hazardous waste presents a threat to property or personnel safety such as a leaking toxic gas cylinder, reactive or shock sensitive wastes, etc. Blast shields and chrome leather outfits are available for responding to these hazardous waste types.

The most probable area at LLNL for a major hazardous waste spill would be the Liquid Waste Handling Facility shown in Fig. 5. Both bulk and containerized hazardous liquid waste are stored here before processing. The bulk wastes are located in the six treatment tanks (1,500 gallon capacity each) or the 25,000 gallon surge tank. The six treatment tanks are located in an area surrounded by a concrete berm having a capacity of 2,500 gallons. It is very unlikely that more than one tank would rupture at any given time and therefore this head room is judged to be adequate. No more than five of the six tanks are full at any given time; therefore, the maximum overflow would be 5,000 gallons which would be collected in the concrete yard area sump. One 5,000 gallon tanker is available for such a cleanup operation. The 25,000 gallon tank is also surrounded by a berm having a 10,000 gallon capacity. The berm offers considerable room for spill containment and also prevents damage to the tank by a vehicle inadvertently driving into it. The low usage factor of this tank coupled with the berm capacity is considered to be adequate. In addition the

tank and mountings are designed for the following conditions:

1. Tank is full of a liquid with a specific gravity of 1.2.

2. Earthquake occurs with a gravitational acceleration of 0.5 g horizontal and 0.3 vertical.

3. An 80 mile/hour wind is present.

4. Under these simultaneous conditions a 10:1 safety factor is present.

In addition to the bulk hazardous waste systems, the Liquid Waste Handling Facility also stores containerized wastes before processing. The storage areas are located along the south and the east fences defining the boundary of the facility (but not the Laboratory). These wastes are presently stored on asphalt with no containment berm or shelter. The areas are inspected daily for leaks. However, funds have been approved for construction of a 3,000 $ft.^2$ containment area. The containment structure will have a capacity of 7,500 gallons and a shelter to prevent rain water from entering the storage area.

VI. SUMMARY

The research work being done at the Lawrence Livermore National Laboratory is such that virtually every type of hazardous waste imaginable is generated. These wastes include corrosive, toxic, reactive, poisonous, pysophoric, flammable, high explosives, carcinogenic and radioactive. The system which provides the best operational flexibility and safest environment is one that allows the programs to generate, identify and store their waste in a staging area close to their work environment before scheduling a pick-up. The staging areas are clearly marked as to their purpose and contents and are isolated as much as possible from regular vehicular traffic. The Toxic Waste Control (TWC) Group is responsible for the management of the hazardous waste and

is equipped to respond completely to minor spills and participate with the Hazards Control Department on larger emergencies. The key response to any emergency involving hazardous waste is the fire stations operated through this department. The fire stations are well equipped, both with communication systems and emergency response equipment, to respond and control virtually any emergency imaginable. Our participation in the Mutual Aid Program expands LLNL emergency response capabilities considerably. The emergency response personnel are highly trained and experienced professionals dedicated in their profession which reflects in their response efficiency.

The hazardous waste areas and systems have been designed in such a manner as to prevent any damage or impact on lives and the environment. Containment structures and barriers along with diversion systems are seen throughout the Laboratory.

TABLE I

Minimum Advisory and Alarm Levels
For the XRFA Monitor

	500 Second		5,000 Second	
Element	Advisory ppm	Alarm, ppm	Advisory, ppm	Alarm, ppm
Cr	36	119	11	37
Mn	23	78	7	25
Fe	15	50	5	16
Co	10	33	3	10
Ni	6	21	2	7
Cu	5	16	2	5
Zn	4	14	1	4
As	2	7	1	2
Se	2	7	1	2
Hg	5	17	2	5
Pb	4	12	1	4

TABLE II

Comparison of LLNL Maximum Permissible Metal Discharge Limits and XRFA Alarm Limits

Single Metal	LLNL Limit, ppm	XRFA Alarm Limit	
		500 Sec, ppm	5,000 Sec, ppm
Cr	100	119	37
Cu	10	16	5
Zn	50	14	4
Ni	10	21	7

Combinations: Total concentrations to be less than 100 ppm.

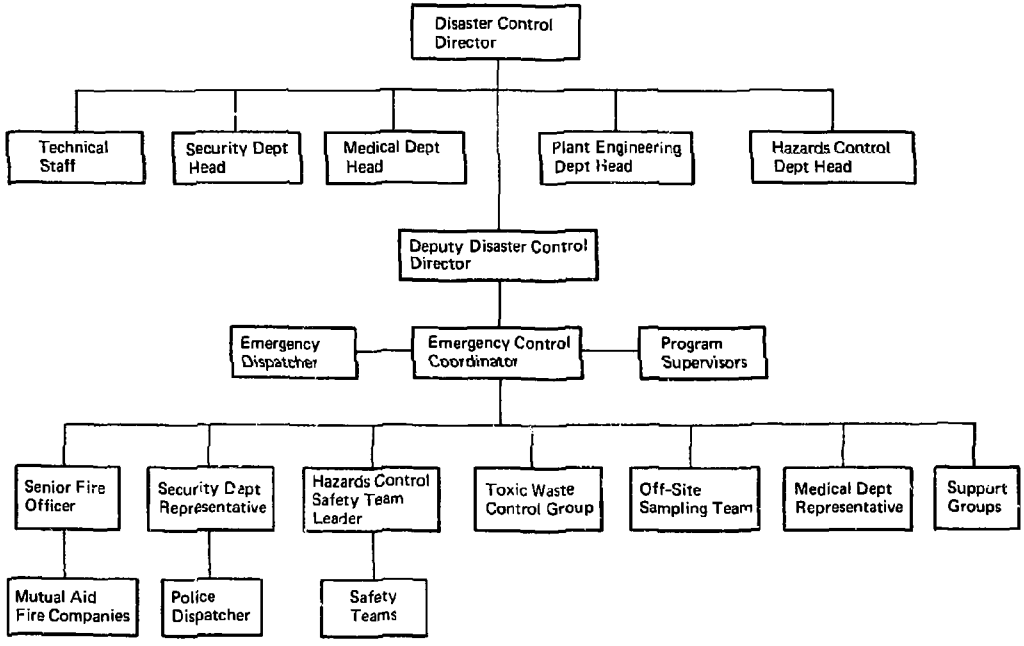


Figure 1. Hazardous Waste Energy Response Organization

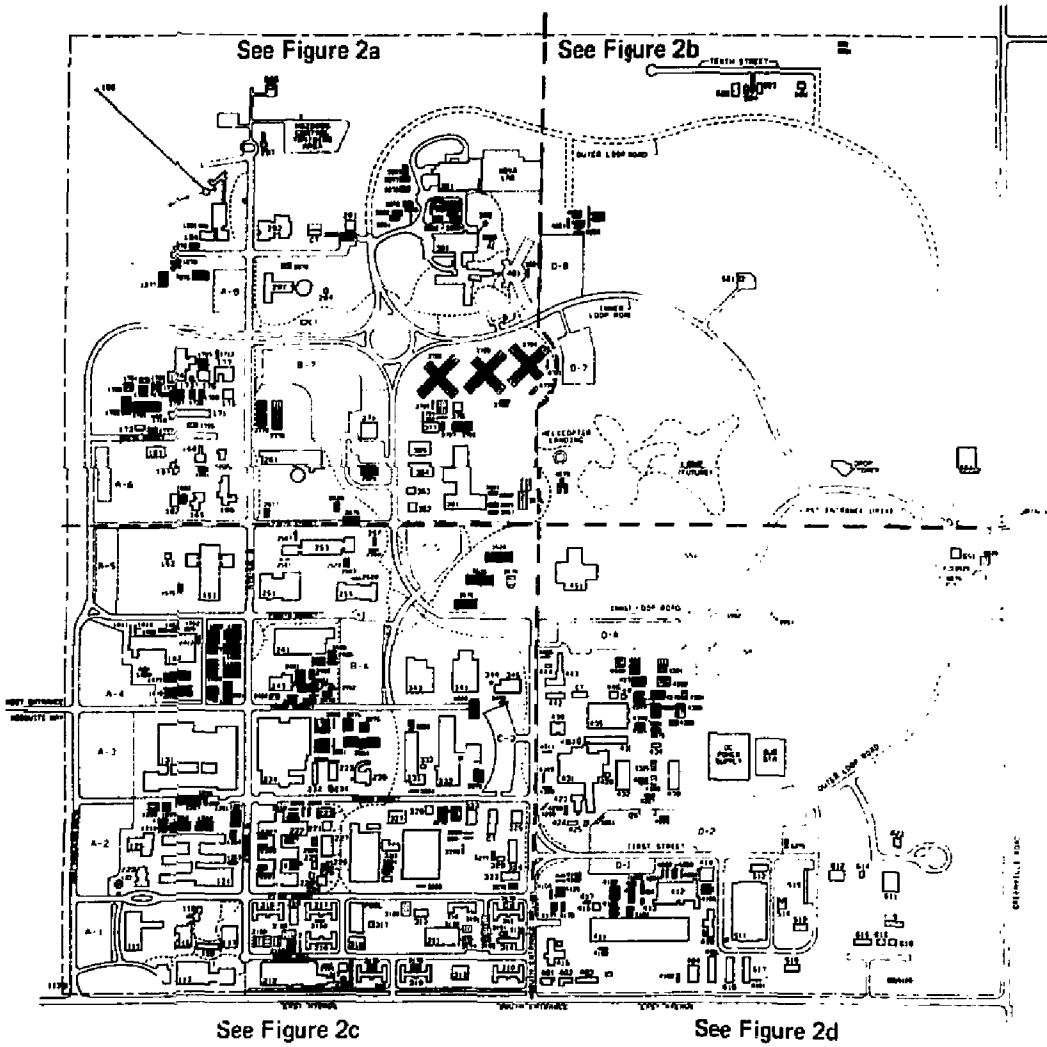
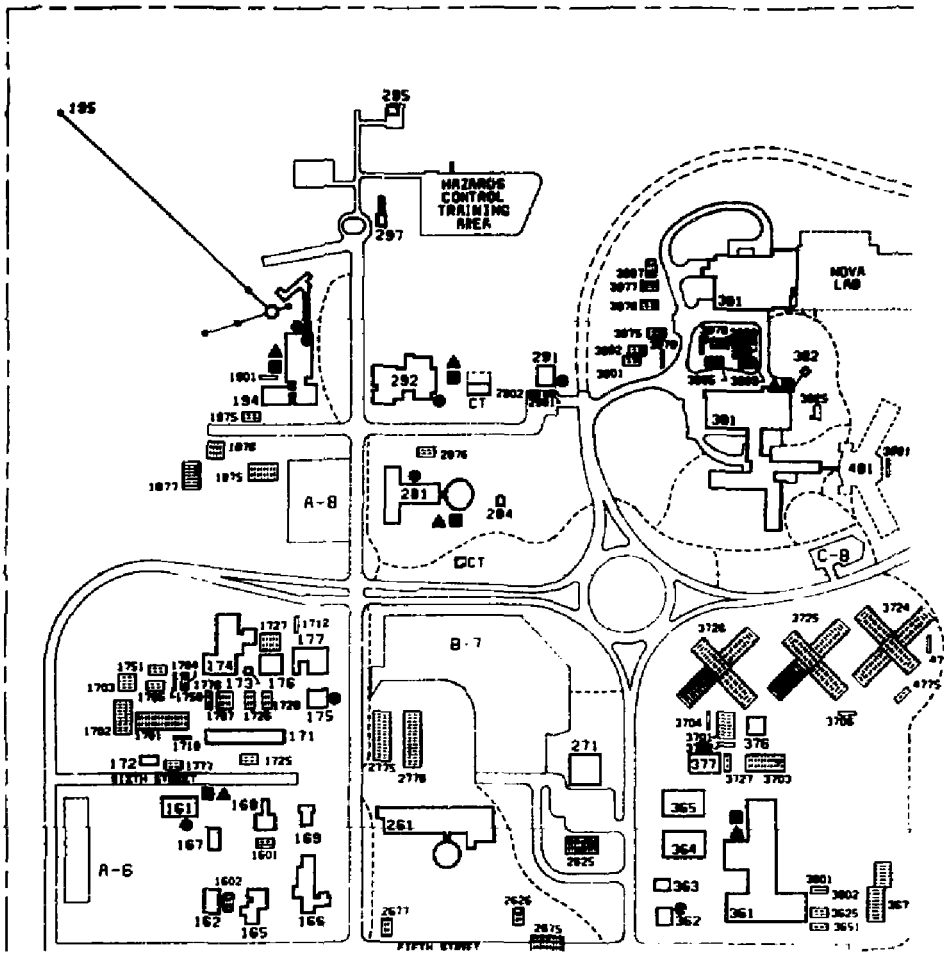


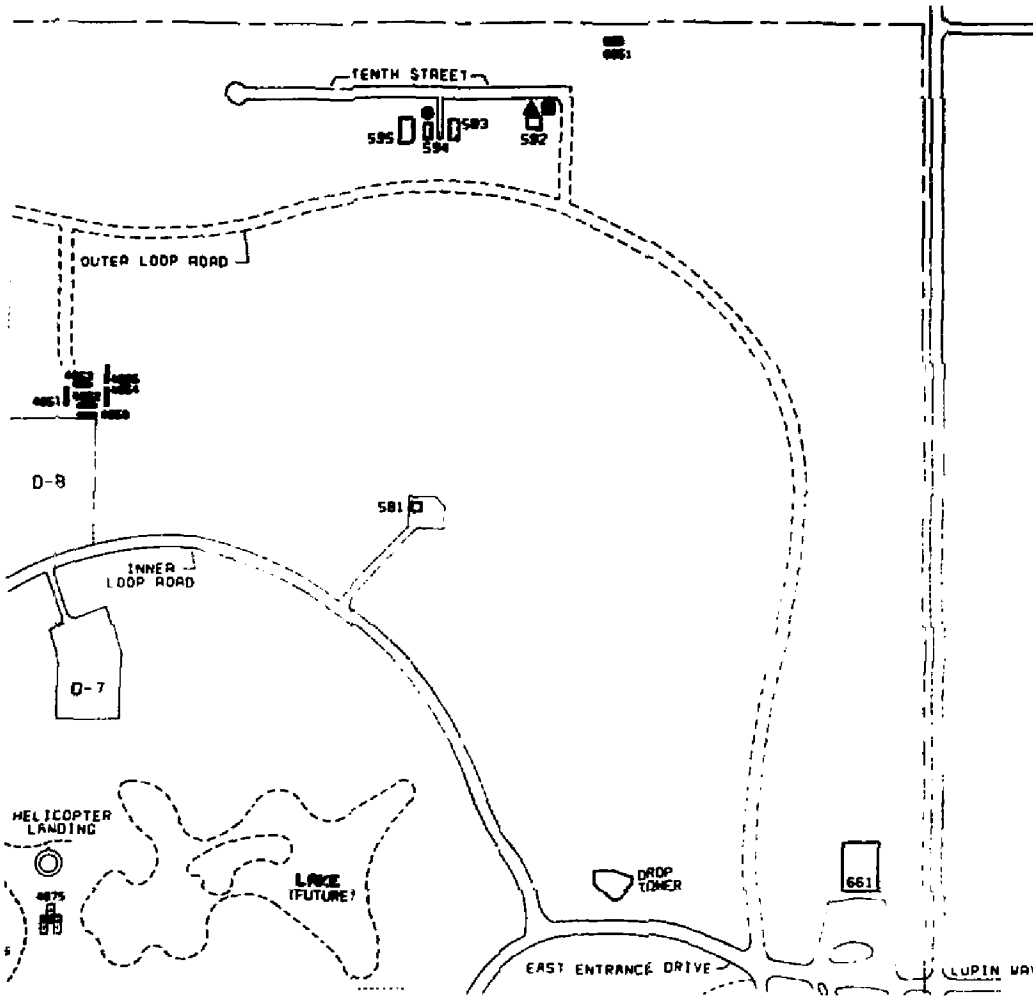
Figure 2



Legend

- ▲ Solid hazardous waste storage
- ■ Liquid hazardous waste storage
- ● Retention tank system(s)

Figure 2a



Legend

- ▲ Solid hazardous waste storage
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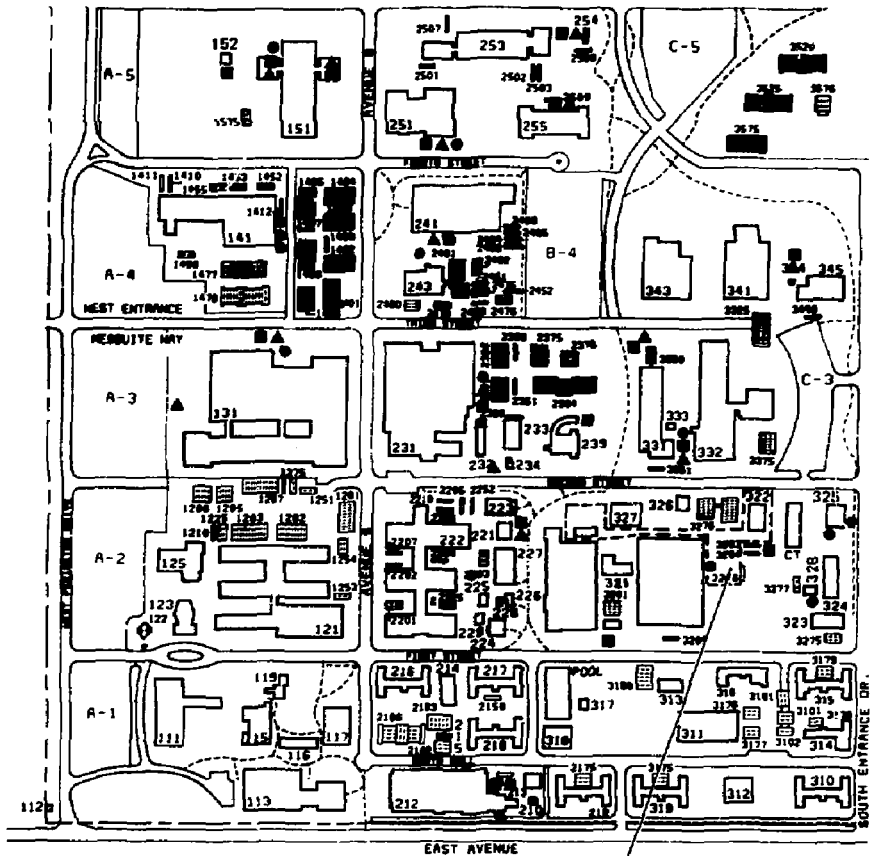
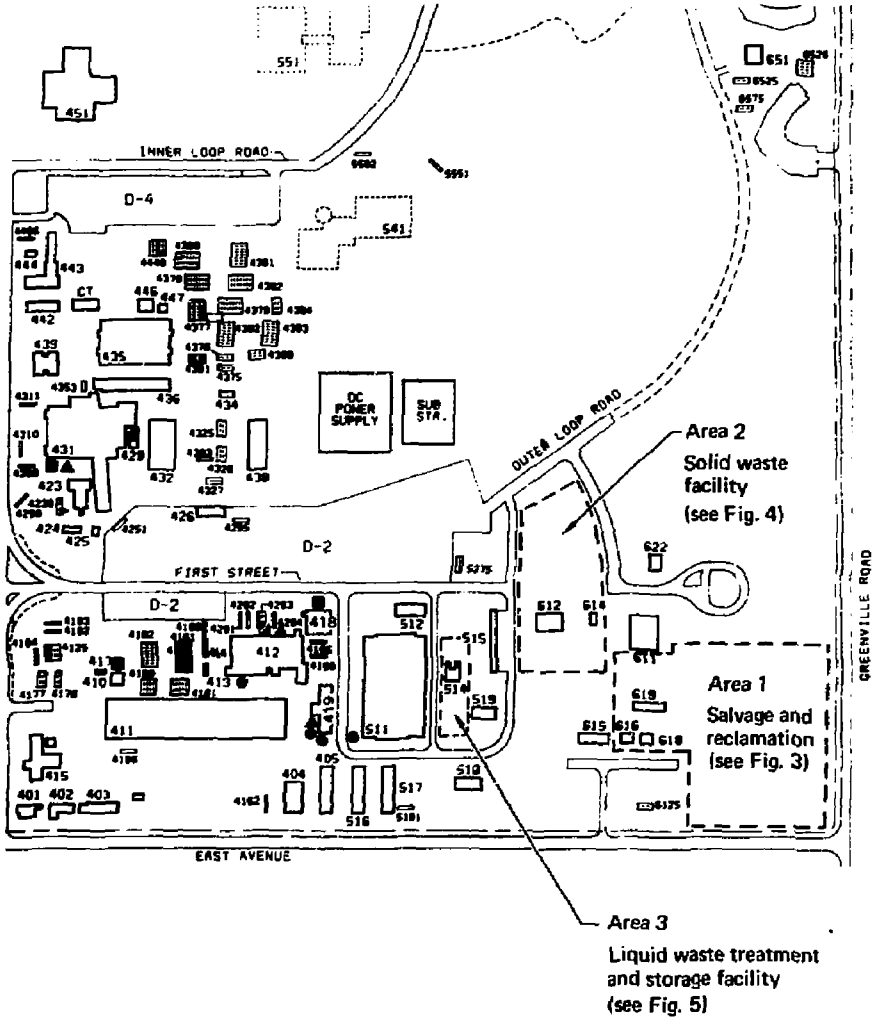
Figure 2b



Legend

- ▲ Solid hazardous waste storage
- ■ Liquid hazardous waste storage
- ● Retention tank system(s)

Figure 2c



Legend

- ▲ Solid hazardous waste storage
- ■ Liquid hazardous waste storage
- ● Retention tank system(s)

Figure 2d

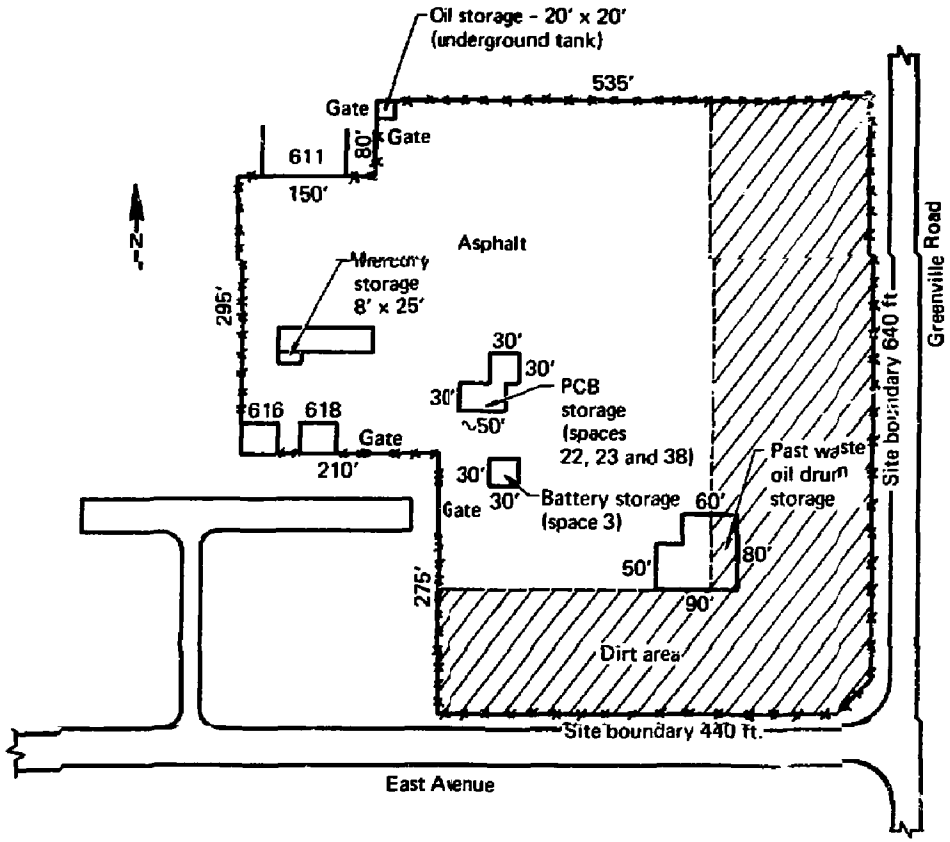


Figure 1
Corporation storage area
(Salvage)

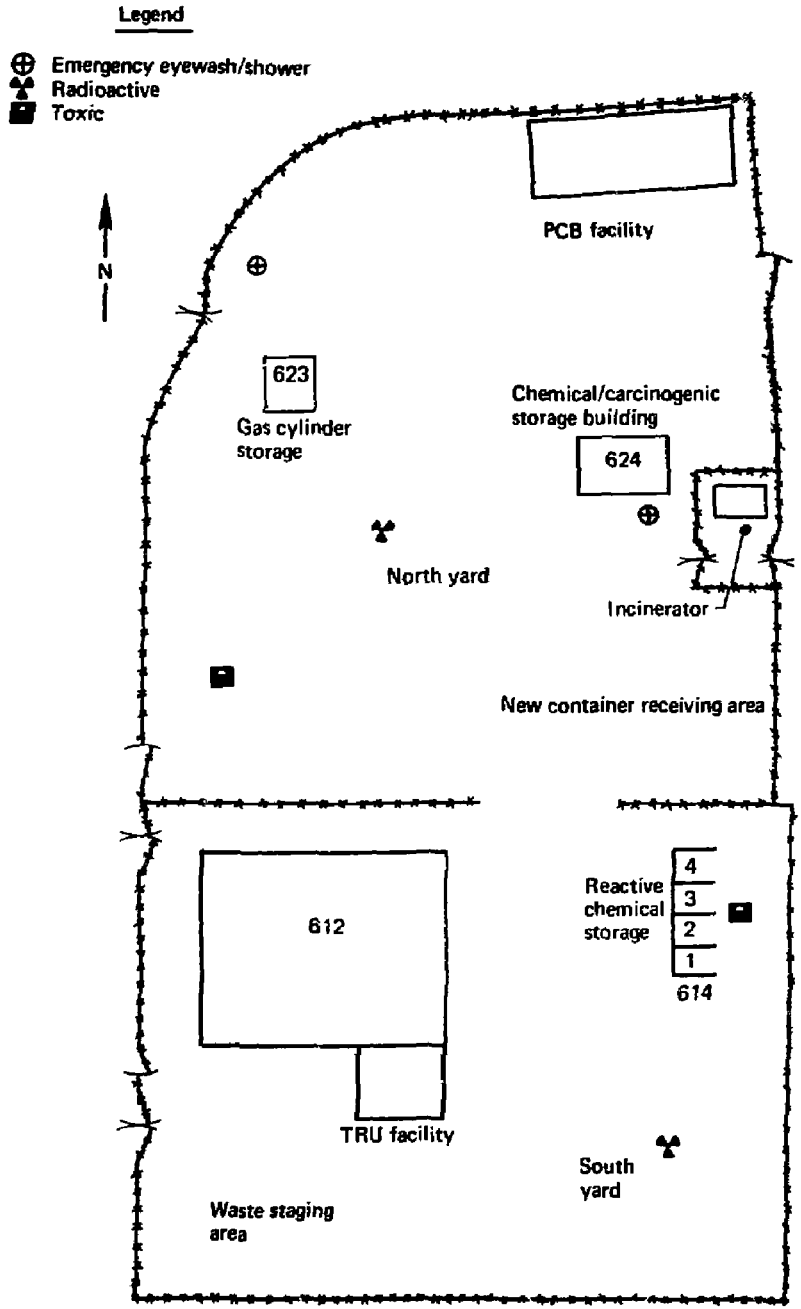


Figure 4
Building 612-614 area
Solid waste treatment facility

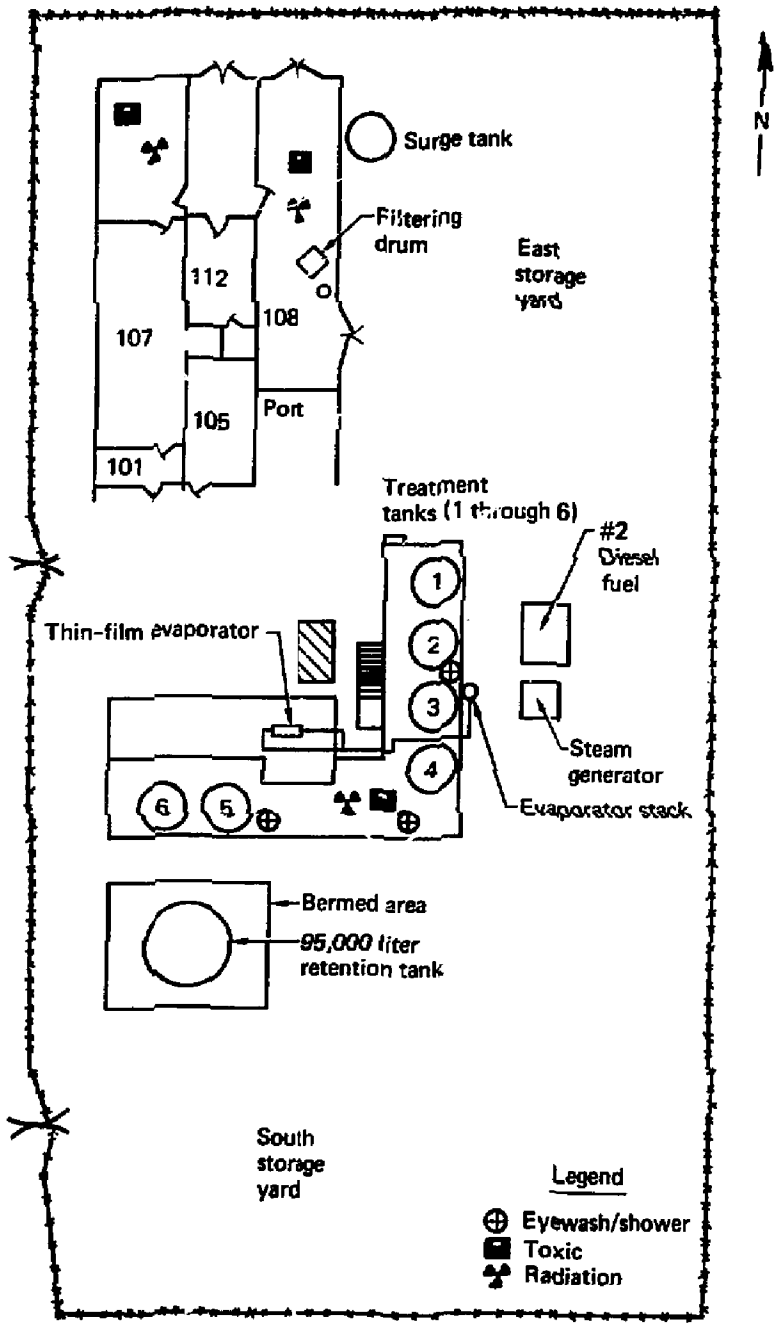
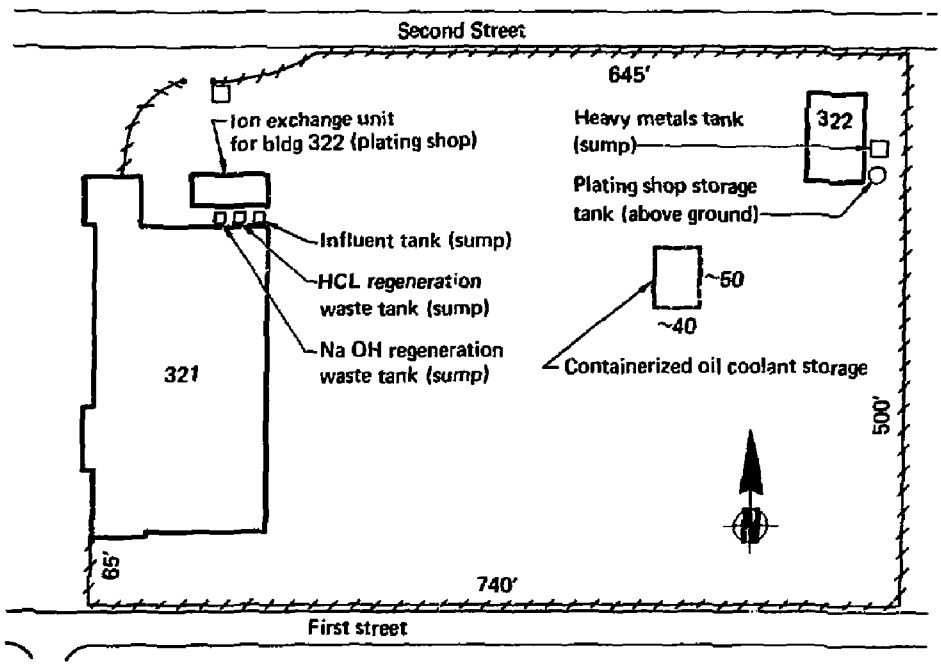


Figure 5
Building 514 yard area
Liquid waste treatment facility



ION EXCHANGE PLANT AND OIL COOLANT STORAGE

Figure 6

APPENDIX A
Emergency Call List

Disaster Control	Name	Home Phone	LLNL Ext.
Director	J. L. OLSEN	837-6056	2-4867
First Alternate	R. C. Becker	447-3867	2-4865
Second Alternate	D. E. Nielson	447-6420	2-4611
Third Alternate	J. E. Carothers	447-0117	2-7010
Deputy Disaster Control Director Site 300	R. K. MULLINS	447-1916	112-216
First Alternate	E. N. Thompson	(209) 478-6651	112-217
Second Alternate	W. C. Conner	(209) 835-5443	112-236
Third Alternate	H. J. Mize	(209) 835-5896	112-398
Deputy Disaster Control Director Livermore Site	H. W. PATTERSON	482-0105	2-5129
First Alternate	J. S. Dittig	447-2701	2-5129
Second Alternate	R. G. Purington	447-8921	2-5241
Third Alternate	G. Mackanic	447-5384	2-9039
Emergency Control Coordinator	R. G. PURINGTON	447-8921	2-5141
First Alternate	L. A. Chandler	443-3385	2-1279
Second Alternate	M. W. Magee	443-7913	2-5149
Hazardous Waste Coordinator	R. S. Roberts	443-2480	2-1925
First Alternate	L. K. Kerns	(209) 823-7054	2-9767

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1. Barter, R. H.; Baird, T. D.; Functional Requirements for Lawrence Livermore National Laboratory Emergency Communication Center Upgrade, December 1980.

2. Auyong, M.; Cate, J. L., Jr.; Rueppel, D. W.; On-Line Monitoring of Toxic Materials in Sewage at the Lawrence Livermore Laboratory, February 1980.

3. Disaster Control Plan M-014, Rev. 2, February 1980.

4. Disaster Control Plan Supplement No. 18, Hazardous Materials Spill Plan, July 1977.

5. Disaster Control Plan Supplement No. 13, Fire Department and Protective Services Division Equipment and Facilities, March 1977.

6. Disaster Control Plan Supplement No. 7, Off-Site Sampling, February 1979.

7. Health and Safety Manual M-010, Nov. 1977.

8. EPA, Office of Water & Waste Management, "Development of an Emergency Response Program for Transportation of Hazardous Waste", March 1979.