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Familiarization Tour, OJT 55260

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Handout

Los Alamos County Fire Department

LAFD: TA-55 PF-4 Facility Familiarization Tour

OJT 55260

Revision 0.3 draft

**LA-UR- #-####
(formerly LA-UR-13-27672)**

TITLE PAGE

Course Title	LAFD: TA-55 PF-4 Facility Familiarization Tour
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Training Setting	Facility Tour
Target Audience	All Los Alamos Fire Department Response Personnel
Optimum Training Location	Onsite

Introduction

Los Alamos National Laboratory (LANL) will conduct familiarization tours for Los Alamos County Fire Department (LAFD) personnel at the Plutonium Facility (PF-4) at Technical Area (TA)-55. These familiarization tours are official LANL business; the purpose of these tours is to orient the firefighters to the facility so that they can respond efficiently and quickly to a variety of emergency situations. This orientation includes the ingress and egress of the area and buildings, layout and organization of the facility, evacuation procedures and assembly points, and areas of concern within the various buildings at the facility. LAFD firefighters have the skills and abilities to perform firefighting operations and other emergency response tasks that cannot be provided by other LANL personnel who have the required clearance level.

This handout provides details of the information, along with maps and diagrams, to be presented during the familiarization tours. The handout will be distributed to the trainees at the time of the tour. A corresponding checklist will also be used as guidance during the familiarization tours to ensure that all required information is presented to LAFD personnel.

Prerequisites

Access to the facility for tours can be time consuming; however, the following conditions are required for access:

- All Fire Department personnel must have access paperwork filed at least 5 working days before the tour begins. Deployed emergency management (EM) will be responsible for providing the paperwork needed. The employee's Z number and badge number (located on the back of the badge case) are needed to complete the paperwork.
- All participants must have a Q clearance.
- The tour participant-to-escort ratio must not exceed 4:1.
- No more than eight participants per tour are allowed.
- To make entrance to PF-4 as simple as possible, follow this guidance:
 - Shoes with steel toes and metal shanks must be removed during entrance into PF-4.
 - Other metal objects, such as watches, belts, and jewelry items, should be limited.
 - Radios that are allowed to enter the area must be limited to one per tour.
 - Pre-existing open sores or wounds (including cuts, scabs, or rashes) must be evaluated and covered with occluding bandages by Occupational Health.

Note: The response time will be restricted because of egress requirements; arrangements must be made for other units to cover for the tour group.

Personal protective equipment (PPE) is required to enter PF-4. The following items also are required and will be provided by the facility:

- Lab coats
- Booties
- Safety glasses (clear)
- Earplugs

LAFD Familiarization Escorts and Training Coordinators

The escorts and training coordinators (trainers) for the LAFD familiarization tours of the TA-55 General Facility may include subject matter experts from Security & Emergency Operations, Emergency Preparedness (SEO-EP). The contact information for trainers of COURSE 55260 is

- Andrea Romero, 500-2360, adromero@lanl.gov
- Chuck Tesch, 665-5602, tesch@lanl.gov
- Stuart McKernan, 667-7501, mckernan@lanl.gov
- Russell Lum, 667-7857, lum_r@lanl.gov

Elements of the Familiarization Tour

Introduction in Entry Control Facility

The following restrictions apply:

- No eating, drinking, chewing gum, smoking, or chewing tobacco.
- No lipstick, lip balms, or cosmetic application.
- Long hair should be tied back.
- No high heels, sandals, shorts, skirts, dresses, baseball caps/hats, or nylon stockings.
- Do not touch any item(s) without permission, including walls, doors, and windows.
- Do not set down hand-carried items inside PF-4.
- Items taken into PF-4 (jewelry, watches, hand-carried items, etc.) may be confiscated if they become contaminated. Lockers are available at the Access Control Office (ACO) or by the lab coat area, if needed.
- If you have any open or partially healed wounds or sores, they must be protected. It may be determined that it is not safe for you to enter PF-4.
- Inform your escort at least 3 days in advance of the tours if you have recently received any radioisotope treatments or have metal implants.
- You will be informed by your host/sponsor/escort of any chemical, radiological, or other hazards in the areas you are to visit.
- You may see chemical or nuclear material movements inside PF-4; your host/sponsor/escort will ensure that you are aware of these.
- If you are pregnant, you may decide not to enter PF-4 because of hazards in the area of your visit.
- Remain in sight of the host/sponsor/escorts at all times, and enter only those areas for which you have been approved.
- Do not access, view, or obtain classified matter for which you do not have a need to know.
- Failure to comply with established procedures may result in a security infraction.
- In an emergency, follow the instructions of your host/sponsor/escort to ensure your safety.
- If you must evacuate PF-4, listen to announcements, and do not commingle.

Fire Department personnel will meet at the TA-55 Entry Control Facility (ECF) with the trainer conducting the tour. Firefighters will sign the roster before the start of the tour. The firefighters will receive an access briefing. Firefighters must have a Q clearance, a thermoluminescent dosimeter (TLD), and a personal nuclear accident dosimeter (PNAD) before the start of the tour.

Prohibited articles are not permitted on LANL property, including parking lots, unless approved in advance by the Associate Directorate for Mission Assurance, Security, and Emergency

Response-Security Incidents & Occurrence Investigations (ADMASER-IP). If a prohibited article is found, LANL may treat it as a reportable incident.

Prohibited articles

- Dangerous weapons, explosives, or other dangerous instruments or materials likely to cause substantial injury or damage to persons or property
- Alcoholic beverages, including unopened bottles or cans
- Controlled substances (e.g., illegal drugs and associated paraphernalia, but not prescription medicines)
- Other items prohibited by law

Devices that are allowed in the parking area but not behind the fence**Portable Electronic Devices**

Portable electronic devices (PEDs) can potentially transmit or transport sensitive unclassified and classified information. The Department of Energy identifies two types of PEDs: portable electronic storage devices (PESDs) and controlled articles.

Portable Electronic Storage Devices

PESDs can store, read, or write nonvolatile information and be plugged into a computer. PESDs, unlike controlled articles, are not standalone devices. PESDs include

- CD/DVD write drives;
- external hard drives;
- flash memory (i.e., PC cards and SD memory cards); and
- USB memory devices (thumb drives, memory sticks, jump drives).

Controlled Articles

Controlled articles are standalone devices that can record and/or transmit data. Some examples of controlled articles are

- court-ordered devices (e.g., ankle-monitoring devices);
- cameras (e.g., cell phones or other multifunction devices, such as a Blackberry, with photographic capability);
- cell phones and personal digital assistants;
- copiers or scanners with hard drives;
- digital audio players (e.g., iPod);
- laptop or palmtop computers;
- some medical devices (e.g., heart monitors); and
- two-way pagers and radios (radios are allowed behind the fence as long as they have a LANL property tag).

Escorts will be provided for all personnel who are taking the facility tour. Escorting must meet the following criteria:

- The escort must have the appropriate level of security clearance, be aware of facility-specific escort procedures, and be trained in LANL escort procedures.

- No more than four escorted individuals per qualified escort are permitted at any given time.
- The escort must maintain control of the escorted individuals at all times.
- Escorted individuals must be logged in as visitors to TA-55.
- Escorted individuals will log out at the completion of the tour.

Safe Approach Route and Assembly Areas

When Fire Department personnel approach PF-4 in response to a fire, the location should always be approached from the upwind side if possible, because of the possibility of radioactive or hazardous materials (HAZMAT) in the plume. Before any attempt is made at fighting a facility fire, facility representatives will provide Fire Department personnel with a status report at the Facility Command (FC) and/or TA-55 Operations Center. The access road around the facility will allow Fire Department personnel to stage their equipment in an appropriate area to effectively fight a fire or respond to other emergencies.

Fire department connections (FDCs) are installed outside the west wall to allow the LAFD to augment flow and pressure to the PF-4 sprinkler and standpipe systems.

TA-55 has two assembly areas. One assembly area for personnel not wearing anti-C clothing is located on the south side of the facility between PF-1 and PF-2; for personnel wearing anti-C clothing, the assembly area is located between PF-1 and PF-39.

Facility Mission and Scope of Operation

Operations conducted in PF-4 involve the processing of plutonium in various forms, quantities, and types. Other operations include nuclear material research and development, reactor fuel element development and assembly, radioisotope heat-source development, nuclear waste process research, and various operations involving special nuclear material (SNM).

The principal nuclear materials used in operations within PF-4 include isotopes of plutonium (^{238}Pu , ^{239}Pu , ^{241}Pu , etc.) and isotopes of uranium (^{234}U , ^{235}U , ^{238}U , etc.) In addition, a variety of other radionuclides are also involved in operations. Metals, carbides, oxides, nitrides, and other compounds may be present in solid and aqueous solutions. Solids may exist as powders, buttons, billets, pellets, sintered compacts, and other forms of various sizes and shapes. The type, shape, size, form, and use of nuclear material make the safety of operations a paramount concern, which is the purpose of maintaining comprehensive and current hazards analyses for TA-55.

The PF-4 operations include

- nuclear material processing-related activities;
- nuclear material handling, movement, storage, and transportation activities;
- waste management operations for both chemical and radiological materials;
- facility utilities and activities to support all of the missions and operations; and
- preventive, corrective, and predictive maintenance activities.

General Facility Layout

TA-55 is located at Pajarito Road and Pecos Drive. This site comprises PF-4, offices, and other support buildings inside a security fence.

The PF-4 building is a two-story, reinforced concrete structure that is designed and constructed to remain functional following a design-basis earthquake and design-basis wind and tornado loads. The PF-4 structure also meets design-basis fire criteria.

Buildings and structures that are nearby and provide services for PF-4 include

- the TA-55 Operations Center,
- a waste storage pad,
- a containment vessel storage pad,
- support buildings,
- a utility building,
- a diesel generator building,
- an uninterrupted power supply (UPS) building,
- administrative buildings,
- guard stations,
- redundant electrical substations, and
- firewater pump houses with redundant pumps.

TA-55 has two fire protection water supply sources:

- Pumphouse TA-55-10, with an electric and diesel fire pump, taking suction from Tank TA-55-12 and discharging into the fire loop.
- Pumphouse TA-55-11, with an electric and diesel fire pump, taking suction from Tank TA-55-14 and discharging into the fire loop.

The loop has two check valves that in normal water supply configuration allow water to flow from east to west from the TA-55-10 pumphouse and prevent water from flowing east past PF-4 from the TA-55-11 pumphouse.

The sprinkler risers for TA-55-4 and TA-55-8/-18 are supplied from the fire loop west of the check valves. The sprinkler risers for TA-55-1, -2, -3, -5, 6, -28, -39, -114, -42 and -114 are supplied from the fire loop east of the check valves.

The intent of this configuration is to isolate TA-55-4 from the balance of the buildings on the fire loop should there be a failure of the water supply or structures to the east of TA-55-4 (e.g., resulting from a severe seismic event).

The TA-55 fire loop has (normally closed) bypass valves around the two check valves that allow the TA-55-11 fire pumphouse to supply the east portion of the fire loop if the TA-55-10 fire pumphouse is impaired. In this configuration, the vulnerability exists that a seismic event could compromise the water supply to TA-55-4 because of a failed structure (not seismically qualified to the same level as TA-55-4) and damaged fire lines. In this situation, it may be necessary for TA-55 operations and/or emergency responders to close post-indicator valves (PIVs) to sprinkler systems within damaged buildings to preserve the fire protection water supply for TA-55-4.

Upon response to TA-55 following a severe seismic event, it is possible that the LAFD may be instructed as part of the incident command structure to close PIVs to (damaged) sprinkler systems, thus protecting other structures to preserve the available firefighting water for TA-55-4.

The layout of PF-4 includes two equal halves that are isolated by fire barriers. A central corridor running through each half provides access to the laboratory and processing areas on both sides of the corridor. Each half contains its own ventilation system and electrical substation. The basement contains ventilation equipment, electrical equipment, and space for support functions.

The PF-4 ventilation system provides airflow from areas of low probability for radioactive material contamination to areas of higher probability of contamination (that is, from corridors through laboratories to glove boxes). The exhaust airflow passes through multiple banks of high-efficiency particulate air (HEPA) filtration before being released to the environment.

Significant external interfaces for PF-4 include the electrical supply system, the firewater and potable water supply systems, and the sanitary and process waste systems. Support services, which are provided onsite, include emergency response, training, radiation protection, and safety. These services are provided on a continuing basis.

TA-55 is bounded by Pecos Drive on the east and Pajarito Road on the south. The Entry Control Facility, PF-370, is located on the east side of the facility between the facility and Pecos Drive. Normal vehicle access will be from the west via Gamma Ray Drive and TA-48 through the west vehicle access (WVA) TA-55-442. TA-55 is a secured area; normal access is controlled by security personnel. In the event of an emergency causing a power outage, the onsite protective force personnel follow a current procedure, TA55-AERI-00, which is in place to manually open the access gates.

Facility Command (FC)

The primary FC is located in the Radiological Laboratory Utility Office Building (RLUOB). The FC is manned during an emergency and provides real-time data from a variety of sources that would be pertinent to emergency response personnel during the event. An alternate FC location is at PF-39.

Located throughout TA-55 are emergency medical cabinets and automated external defibrillators (AEDs), which are stored in separate cabinets. TA-55 has a medical response team (MRT), which comprises facility volunteers who are trained to the first-responder level. In case of an emergency, the MRT will respond and provide initial medical care until other emergency responders arrive on the scene.

Note: Depending on the time it takes for LAFD to respond to TA-55, the MRT may have injured personnel at an appropriate location ready for transport to the appropriate medical facility when the Fire Department arrives on the scene.

TA-55 Operations Center

The TA-55 Operations Center for PF-4 is considered to be part of PF-4; however, it is accessed from PF-3. The TA-55 Operations Center has its own standalone ventilation system so that in case of a release or a fire in PF-4, the Operations Center can remain in operation. The Operations Center provides real-time information regarding system status in PF-4, which will be extremely useful to emergency responders.

PF-4 General Facility Operations

This building opened in 1978 to consolidate operations from TA-21. The building is essentially considered two buildings—a north building and a south building—divided by what is referred to as an H-wall.

PF-4 Main Floor

Combustible materials in PF-4 are managed and controlled to minimize the size and consequences of a fire.

The transient combustible control inspection procedure and the control of flammable and combustible liquids and laboratory waste are intended to manage the accumulation of these materials.

Operations at LANL involve the use of many actinides, with some present in sufficient amounts to pose a criticality accident hazard. The LANL Nuclear Criticality Safety Division (NCS) functions to provide day-to-day guidance on criticality safety to operating groups and organizations that work with significant quantities of fissile material. The nuclear criticality safety program at PF-4 performs work in accordance with established limits and controls to ensure criticality safety during all operations.

General criticality safety design limits, their bases, and the design criteria used to ensure subcritical configurations under all normal, abnormal, and accident conditions (to ensure that criticality limits are not exceeded) are established for all operations involving fissile material where a potential exists for an inadvertent nuclear criticality. The parameters used for the prevention and control of criticality and the methods for the application and validation of these parameters are developed as part of the criticality safety evaluation for these operations. In each case, application of the double-contingency principle in criticality safety is implemented in the evaluation and identification of criticality controls.

The two general types of criticality controls are engineered and administrative. Limits to ensure criticality safety are based on identifying credible abnormal conditions for each process. The influences of neighboring operations are also considered. An important aspect of the criticality safety program is the extensive communication between the NCS and TA-55 operations personnel. This communication includes determining the range and credibility of potential abnormal conditions or credible upsets. These abnormal conditions are associated with parameters that influence criticality safety: mass, volume, concentration/density, moderation, reflection, poisons, enrichment, interaction (spacing), and geometry (shape). Criticality safety limits are developed jointly by operations personnel, including management as appropriate and NCS staff. Criticality safety controls include training, procedures, postings (limits, spacing, etc.), and the fissile material accountability program.

Facility egress is located on the east and west side of the building; normal egress is available through the secured access area on the east side.

Movement between the north and south sides of the building is through a passageway on the east side and through the office area on the west side.

The laboratories are housed on the main level, and the equipment used to support their operation is contained in the basement. A corridor equipped with a set of fire doors provides

access between the two halves of the first floor. Each half of the first floor is in turn divided into two processing areas by a corridor running the length of the building.

If protective actions are necessary, personnel can be moved from affected rooms to the corridor, to an interconnecting room, or to the opposite half of the building. These areas are considered to be safe havens.

Discuss orderly exits, and discuss the normal operations for entering the facility.

Discuss the facility alarms and required responses, including the drop box fire alarm.

TA-55 Emergency Alarms			
Alarm	Sound	Activated by	Affected area
Fire alarm	Double slow whoop	Glove-box heat detectors, smoke detectors, manual pull box, drop box, pressure, and/or water flow switch on the sprinkler systems	Affected area or building
Drop-box fire alarm	Steady and high pitched, followed by area fire alarm	Glove-box operator pushing the red button on the glove-box drop box	Affected room, followed quickly by the affected area
Evacuation alarm	Sonar-like sound	Criticality or manual activation by an Operations Center operator	All areas
Ventilation alarm	Slow chime	Loss of negative pressure in a glove box or PF-4 room	PF-4 (can be heard in the PF-3 hallway, but affects only PF-4)
CAM ^a alarm	Rapid, intermittent beeping	Airborne alpha contamination	PF-4 room/area where the CAM is located
Chlorine alarm	Siren (low volume)	3 ppm of chlorine	Affected area or building

^aCAM = continuous air monitor.

LAFD emergency equipment cabinets are located in the facility. These cabinets contain, for example:

- White boards
- Knives (for cutting gloves)
- Kevlar gloves
- A Sked® stretcher
- Light sticks

Medical equipment located in the facility includes

- A gurney (main floor and basement)
- Medical response team cabinets
- A long board
- Self-contained breathing apparatus (SCBA) bottles (not compatible with the Fire Department's equipment)

If water is to be used to fight a fire and the facility standpipe hose stations are to be used, the LAFD must bring hoses (stinger packs) to connect at the hose stations. If firefighting operations are conducted in a glove box, those operations should be conducted in accordance with previous Fire Department training and in conjunction with information supplied by a facility representative.

The facility has many assets that the Fire Department will be able to use to assist in any emergency response at TA-55-PF-4. The FC, located at the RLUOB, or the TA-55 Operations Center (or both) is the source of command and control information. Initial decisions regarding necessary protective actions will be issued from the FC.

The FC will provide the Fire Department with the necessary liaison from facility representatives so that firefighters have all pertinent information during the emergency response.

The facility has an MRT that is trained to New Mexico first-responder levels. The strategy is to move patients out of PF-4 before the Fire Department arrives to minimize the time needed to transport injured personnel.

The facility also has a spill team that is trained to first-responder operations levels. These individuals are NOT HAZMAT technicians but may be used to supplement the LANL and LAFD HAZMAT teams.

Locate the mezzanine entry points, and describe the difficulties that are presented for a rescue in the mezzanine.

Glove Boxes

A glove box is a sealed, unibody enclosure fabricated from stainless steel, with glove ports welded into the shell. All inside corners have a smooth radius, and all welds are ground down to provide a smooth finish, with no cracks or crevices. A large window is positioned above a pair of glove ports, and a small window is positioned between the glove ports.

In processes in which hydrochloric acid is used, boxes are lined with Kynar or a similar material to minimize corrosion. Each box is equipped with standard connector rings on the end to provide flexibility and versatility for adding and removing boxes to and from a glove-box line with minimum spread of contamination.

Glove boxes are standardized in design as much as possible, but some glove boxes have special design features required to support specific processes and equipment. Specific glove boxes maintain an air or a controlled inert gas atmosphere at a slight negative pressure with respect to ambient pressure in the room. Glove boxes are equipped with photohelics, magnehelics, and heat detectors to provide a means of monitoring differential pressures and temperature changes inside the glove box. Glove boxes may also include a water-cooling system of some type.

Utilities and services are provided through glove-box walls by the use of hermetically sealed penetrations. Mechanical-rotary or linear-motion sealed penetrations may be used in approved configurations. Butyl, Hypalon, or neoprene gloves are used, some with lead lining for radiation shielding. Glove-box windows are laminated safety glass with neoprene seals.

PF-4 Basement

Discuss the square columns in the basement and why a square vs round configuration is used.

Locate the north-side access to the basement.

Locate the fire doors, and describe how to override them.

Locate and discuss confined spaces in the basement.

The facility ventilation system is designed to prevent the release of HAZMAT to the environment, including the release of radioactive contamination. Air enters through the west side and enters the basement. Air is cleaned on the intake side through HEPA filter plenums. The intakes to the plenums are equipped with fire screens to minimize potential spark and flame propagation. Airflow in the building is always to the most negative or to the most likely to be contaminated.

Corridor → Room → Glove Box

The tunnel that at one time connected the basement of PF-4 to the basement of PF-41 (now demolished) has been annexed to PF-4. The tunnel has been incorporated into the PF-4 confinement boundary and is used to support interim radiography operations (IROs); it houses a linear accelerator (LINAC) and is used to perform nondestructive examinations of materials in support of weapons production, weapons surveillance, material disposition, and other programs to support the Laboratory. A Kirk key is required to gain access, and the tunnel can be used as an alternate emergency egress. The area is a high-radiation field, and no loitering is allowed in the area.

Relative Risks**Chemical Hazards**

The primary chemical hazards at TA-55 are from acids, caustics, and other volatile chemicals used in various processes conducted at TA-55.

Pressurized Gas Cylinders

Pressurized gas cylinders used at the facility represent a hazard because of the release of gas that is potentially hazardous and from improper storage that might result in damage to a cylinder, which could present a missile hazard because of the pressure in the cylinder.

Radiological Hazards

The radiological hazards at TA-55 are primarily due to plutonium, which emits alpha radiation, and some gamma radiation. Plutonium is a fissile isotope; therefore, there is a remote possibility for a nuclear criticality, which produces large amounts of neutron and gamma radiation.

Facility Alarms

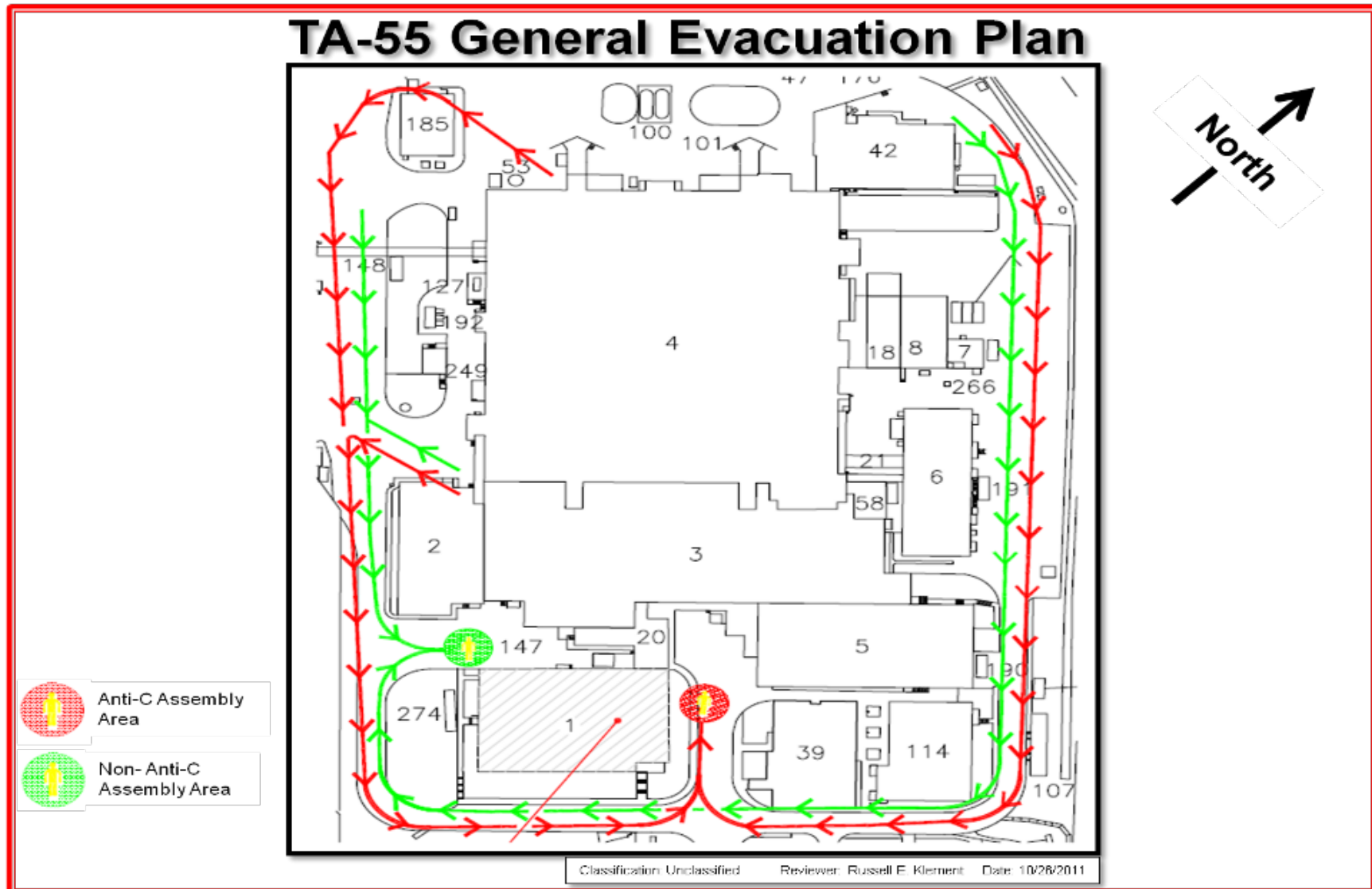
The facility is equipped with the following alarms:

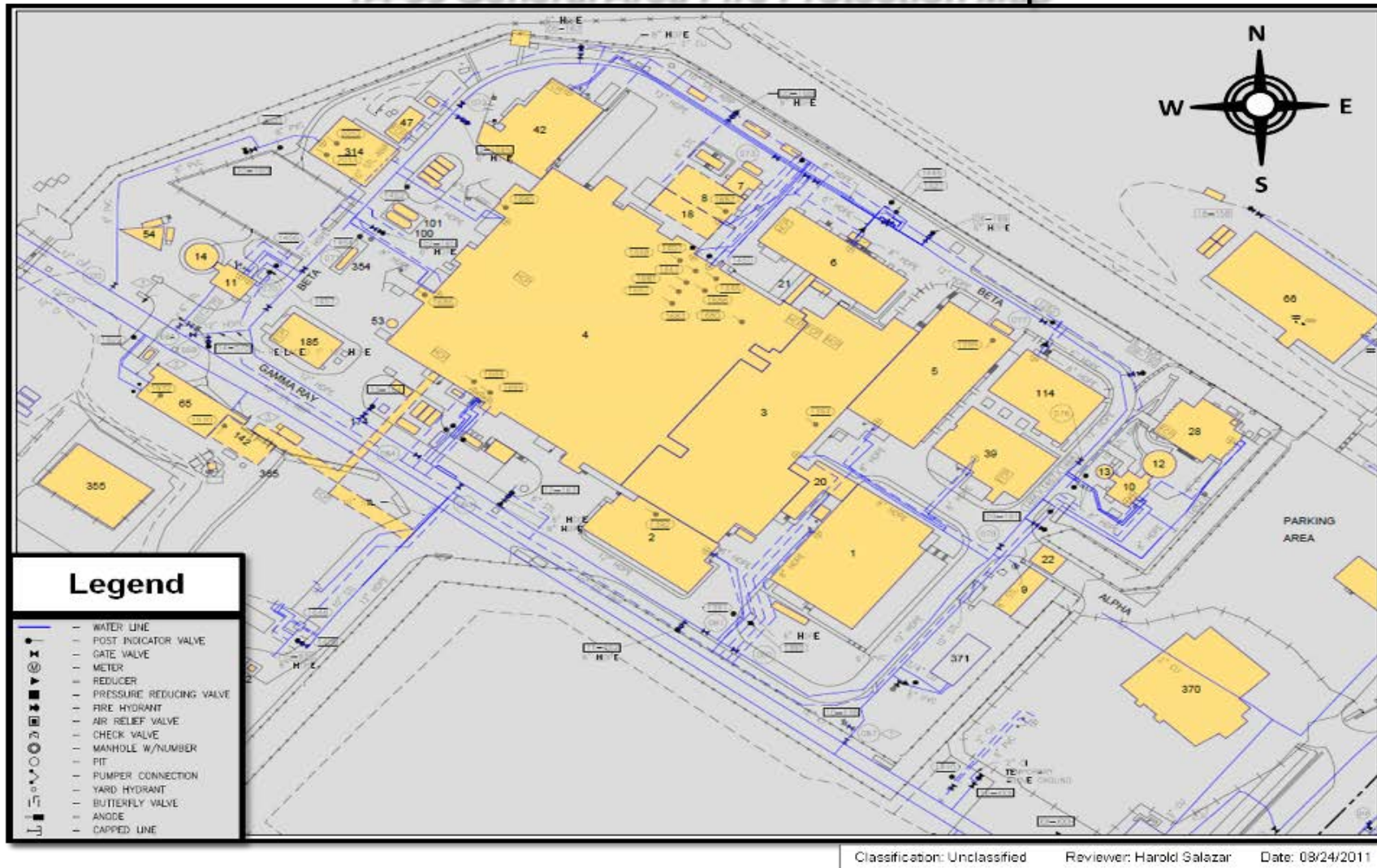
- Fire
- Ventilation
- Chlorine
- CAM
- General Evacuation
- Drop Box Fire

Controls

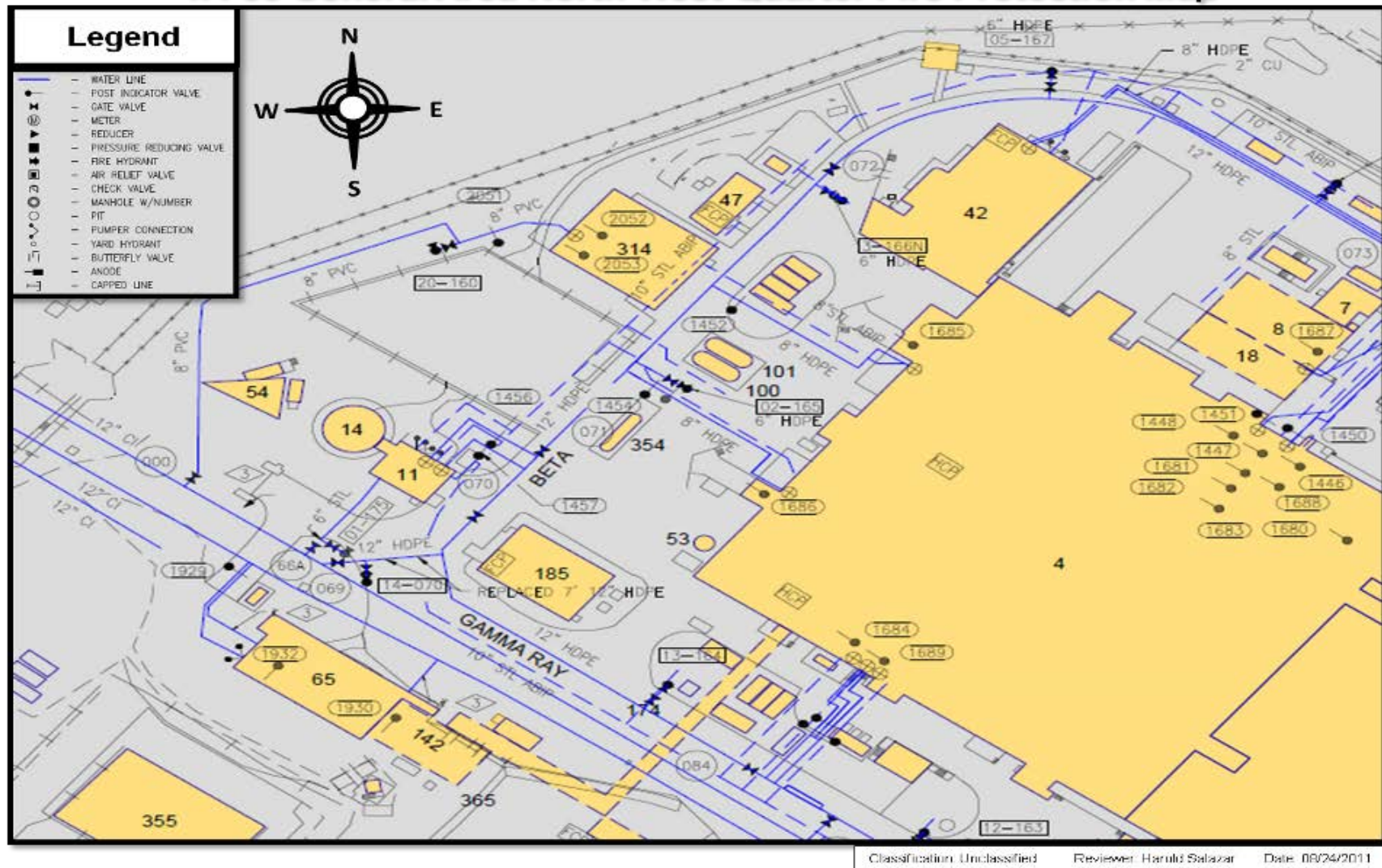
The following controls are in place to reduce the risk of accidents that would cause personnel or responders to be exposed to facility hazards. In addition, numerous engineered and administrative controls in the processing systems prevent accidents or limit the consequences should an accident occur:

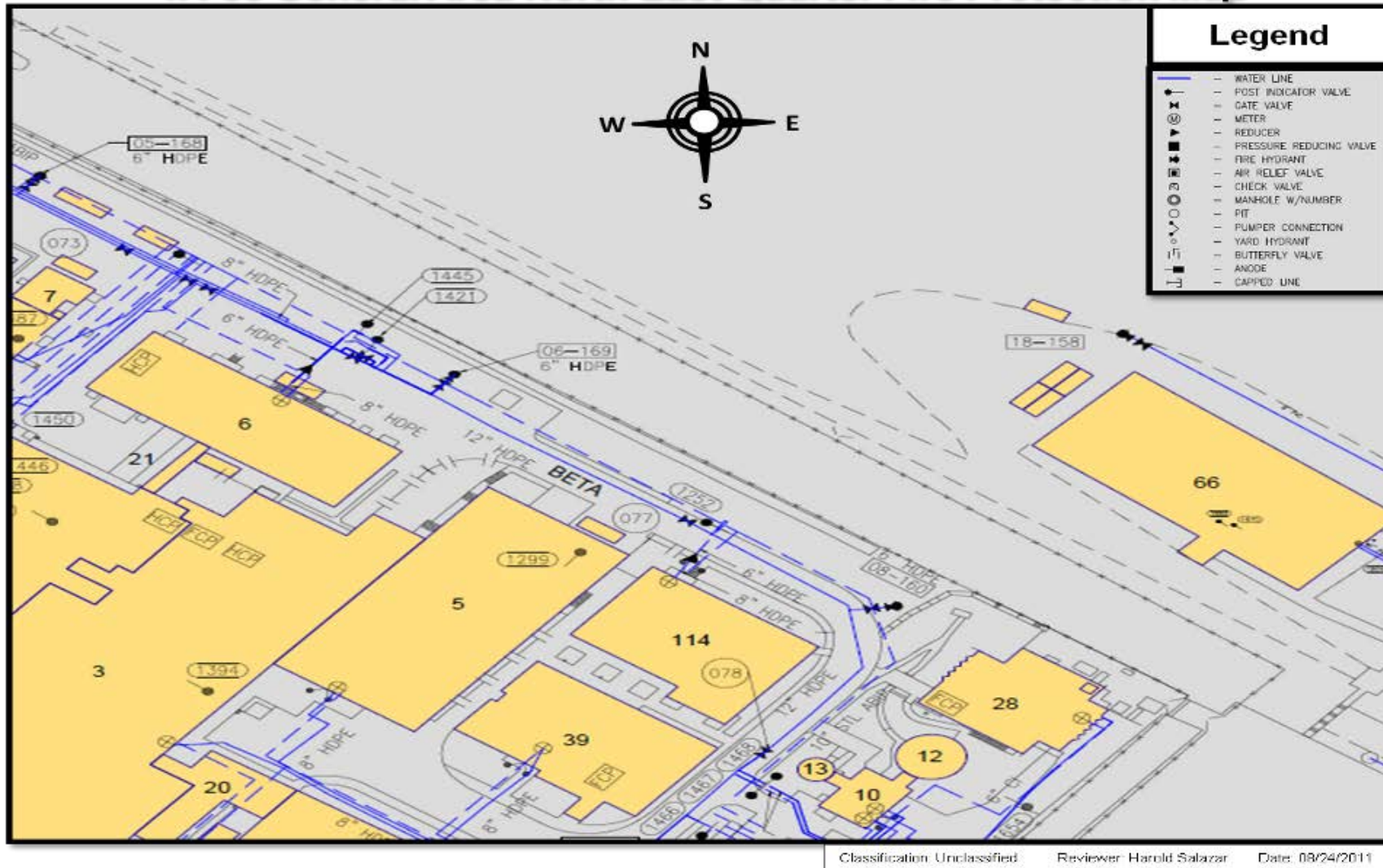
- *Combustible Loading:* The facility operates with levels of combustible materials that minimize fire risk. The combustible loading in the facility is consistent with the ordinary hazard occupancy category of the *Standard for the Installation of Sprinkler Systems* [National Fire Protection Association (NFPA) 13].
- *Facility Structure–Firewalls:* The facility structure outer walls are of substantial construction and are firewalls that prevent the spread of the fire within the facility.
- *Pressure Safety Program:* This program mitigates specific hazards that pressure presents (e.g., explosions, release of contents, and mechanical injury).
- *Radioactive Inventory Control Program:* This program limits the amount of radioactive material in the facility.
- *Quality Management Program–Training and Qualification Program:* Workers are trained and qualified on security, safety, containment, and sample transfer requirements for working with radiological, chemical, and biological materials.
- *Fire Suppression System:* This system minimizes the spread of fires and lowers temperatures.
- *Gas Cylinder Safety Program:* This program includes procedures for handling cylinders and the requirement to restrain gas cylinders used in the facility.
- *Postings:* Postings are as usual for LANL operating areas.
- *PPE:* This equipment is required as the last line of defense to further protect workers from hazards. In the spirit of the Occupational Safety and Health Administration (OSHA) Regulation 1910.132, *General Requirements for PPE*, guidelines for PPE will be determined during the Integrated Work Management process.
- *Integrated Work Management:* An integrated work document (IWD) is required for all moderate- or high-hazard work.

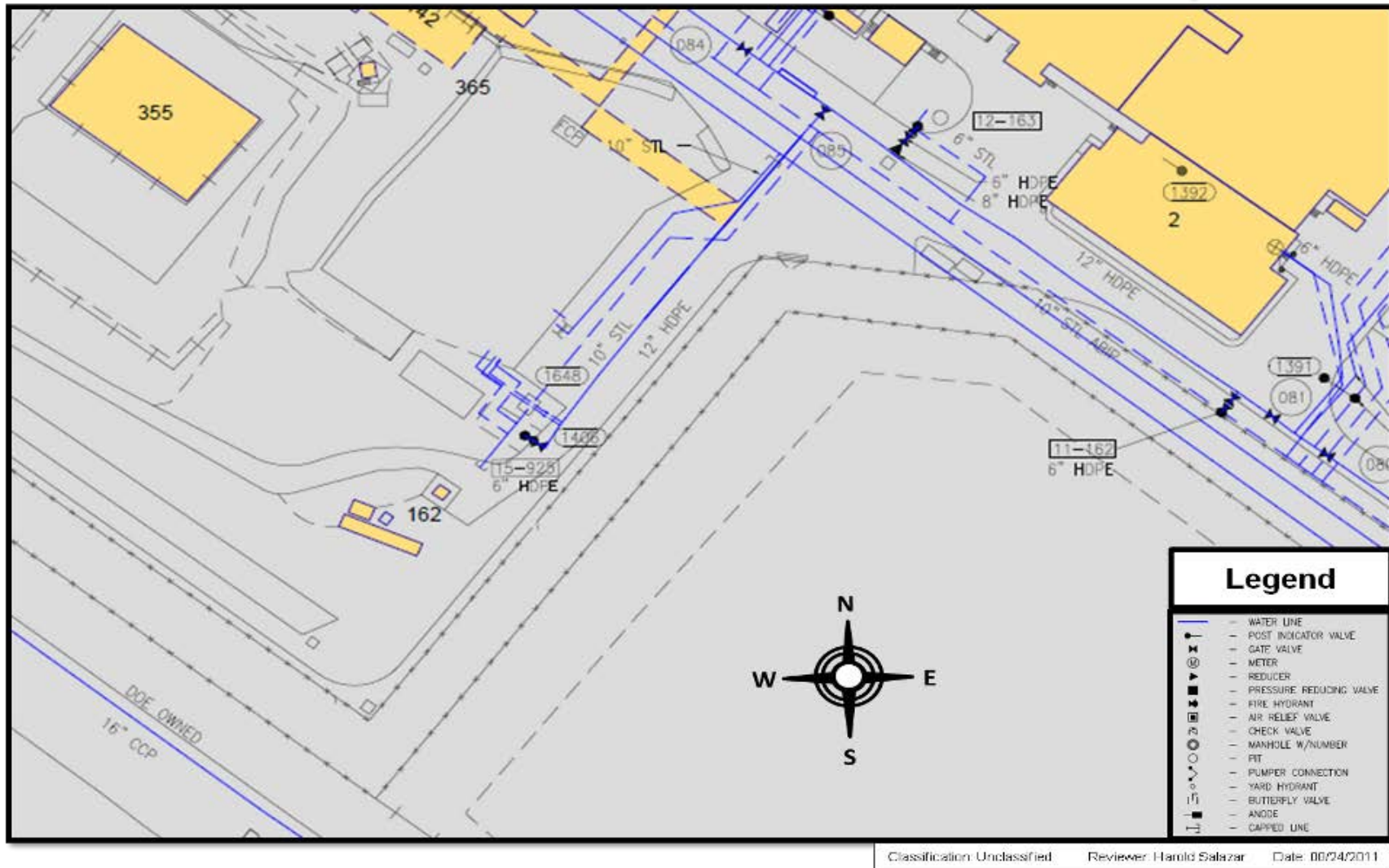


TA-55 General Area Fire Protection Map

TA-55 General Area North West Quarter Fire Protection Map



TA-55 General Area North East Quarter Fire Protection Map

TA-55 General Area South West Quarter Fire Protection Map

TA-55 General Area South East Quarter Fire Protection Map

