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LLNL-TR-704317

Emergency Response Capability Baseline Needs Assessment - Compliance Assessment

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October 4, 2016

Disclaimer

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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Emergency Response Capability Baseline Needs Assessment - Compliance Assessment

National Nuclear Security Administration

Lawrence Livermore National Laboratory

Emergency Management Department

Revision 9.0
September 2016

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Auspices Statement

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1.0 Introduction and Executive Summary

1.1 Introduction

This document was prepared by John A. Sharry, LLNL Fire Marshal and Division Leader for Fire Protection and was reviewed by LLNL Emergency Management Department Head, James Colson. This document is the second of a two-part analysis on Emergency Response Capabilities of Lawrence Livermore National Laboratory. The first part, 2016 Baseline Needs Assessment Requirements Document established the minimum performance criteria necessary to meet mandatory requirements. This second part analyses the performance of Lawrence Livermore Laboratory Emergency Management Department to the contents of the Requirements Document.

The document was prepared based on an extensive review of information contained in the 2016 BNA, a review of Emergency Planning Hazards Assessments, a review of building construction, occupancy, fire protection features, dispatch records, LLNL alarm system records, fire department training records, and fire department policies and procedures. The 2013 BNA was approved by NNSA's Livermore Field Office on January 22, 2014.

On October 1, 2007 LLNL contracted with the Alameda County Fire Department (ACFD) to provide emergency response services. The emergency response services contract was again awarded to ACFD in 2011 with a start date of July 1, 2012.

1.2 Executive Summary – Performance Assessment

1.2.1 Performance Status – Manual Firefighting LLNL Site 200

Table 1.2.1 Performance Summary Manual Firefighting Site 200

Type Incident	Responder	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Criterion Met or Not Met
Fire Sprinklered Bldg	1st Unit 1st Alarm	3 5	426 666	90 %	Met (92.2%) Met*
Fire Non-sprinklered Bldg	1st Unit 1st Alarm	3 11	426 666	90 %	Met (92.2%) Met*
Wildland Fire	Fire Attack First Alarm	4 5	486 726	90%	Met*
* Insufficient data to evaluate; however, data from incidents outside of evaluation period were within the performance criterion.					

1.2.1.1 Observations – Manual Firefighting LLNL Site 200

None

1.2.2 Performance Status Manual Firefighting – Site 300

Table 1.2.2 Performance Summary – Fire Response S-300

Type Incident	Responder	Minimum Staffing	Response Time	Performance Criteria	Performance Criterion
GSA Area Fire Sprinklered Bldg	1st Unit 1st Alarm	4 6	426 sec. 1086 sec.	90 %	Met (100%) Met*
GSA Area Fire Non-sprinklered Bldg	1st Unit 1st Alarm	4 17	426 sec. 1086 sec.	90 %	Met (100%) Met*
Non GSA Area Fire Sprinklered Bldg	1st Unit 1st Alarm	4 6	1146 sec. 2046 sec.	90 %	Met (100%) Met*
Non GSA Area Fire Non-sprinklered Bldg	1st Unit 1st Alarm	4 17	1146 sec. 2046 sec.	90 %	Met (100%) Met*
Wildland Fire	Fire Attack 1st Alarm	4 5	1206 sec. 2106 sec.	90%	Met (100%) Met*
* Insufficient data to evaluate, however data from incidents outside of evaluation period were within the performance criterion.					

1.2.2.1 Observations – Manual Firefighting Site 300

None

1.2.3 Performance Status – Emergency Medical Service

Table 1.2.3 Performance Summary – EMS

Type Incident	Responders	Minimum Staffing (persons)	Response Time	Performance Criterion	Performance Criterion
All EMS Except Outside Site 300 GSA Area	1st Responder	1 ALS 2 BLS	420 sec.	90%	Met (94.3%)
	Transport Unit	1 ALS 1 BLS	1020 sec.	90%	Met (94.3%)
EMS Site 300 Outside GSA	1st Responder	1 ALS 1 BLS	1140 sec.	90%	Met*
	Transport Unit	1 ALS 2 BLS	1980 sec.	90%	Met*
* There were no EMS incidents outside of the GSA area during the evaluation period. Based on the 1st Unit response times for fire events outside of the GSA area, it is expected the criterion will be met.					

1.2.3.1 Observations – Emergency Medical Service

None

1.2.4 Performance Status – Hazardous Materials

Table 1.2.4 Performance Summary – HAZMAT

Staffing	Training Level	Performance Criterion	Performance Criterion Met or Not Met
Investigation Level Incident			
4	Trained Personnel 426 sec. Response time	90%	Met (90.9%)
Level I Incident			
12	Trained Personnel		Met
Level II Incident			
17	Trained Personnel		Met

1.2.4.1 Observations – Hazardous Materials

None

1.2.5 Performance Status – Technical Rescue

Table 1.2.5 Performance Summary – Technical Rescue

Location	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Performance Criterion Met or Not Met
S-200 GSA Area S-300	Awareness Level	4	426 sec.	90 %	Met (90.1%)
Non GSA Area S-300	Awareness Level	4	1146 sec.	90 %	Met*
S-200 GSA Area S-300	Operations Level	6	1086 sec.	90 %	Met*
Non GSA Area S-300	Operations Level	6	2046 sec.	90 %	Met*
*There were no events of this type during the evaluation period; however, response times for fire incidents indicate the criterion will be met.					

1.2.5.1 Observations – Technical Rescue

None

1.2.6 Performance Status – Second Incident

Table 1.2.6 Performance Summary – Second Incident

Type Incident	Responders	Total Response Time	Performance Criteria	Criterion Met or Not Met
Second Incident	1 Company	1332 seconds	90 %	Met

1.2.6.1 Observations – Second Incident

None.

1.2.7 Performance Status – Emergency Communications

Table 1.2.7 Performance Summary – Emergency Communications

Event	Time Criteria	Performance	Criterion Met or Not Met
Dispatcher training	N/A	NFPA 1061	Met
Answer 911 phone	15 seconds 40 seconds	95% 99%	Met Met
Acknowledge alarm	15 seconds 40 seconds	95% 99%	Not Met (72%) Not Met (85.8%)
Dispatch Emergency	64 seconds 106 seconds	80% 95%	Met (92.5%) Met (97.6%)
Dispatch EMS Emergency	90 seconds 120 seconds	90% 99%	Met (95.1%) Met (97.5%)
Lab Alarms transmit alarms to ACRECC	45 seconds	95%	Met
ACRECC and/or Lab Alarms Notify Appropriate Party of Supervisory or Trouble Alarm	600 seconds	95%	Met

1.2.7.1 Observations – Emergency Communications

1. ACRECC could improve performance on alarm acknowledgement times. While Alarm acknowledgement times slightly less than the standard, dispatch performance exceeds the criterion.

1.2.8 Performance Status – Training and Certification

Table 1.2.8 Performance Summary – Training

Personnel	Performance Measure	Performance Criterion Met or Not Met
Entry level	Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.	Met
Entry level	There is an established training criterion for minimum performance of entry-level personnel.	Met
Incumbents	There is an established on-going training criterion for training incumbents.	Met
Officers	There is a minimum training criteria established for fire officers or supervisors of emergency responder.	Met
Special Operations	There is a minimum training criteria. Established for special operations such as hazardous materials and technical rescue.	Met
Drills and Exercises	There is an established program of drills and exercises at various facilities on LLNL site.	Met
All	Documented training records exist for each individual.	Met

1.2.8.1 Observations – Training and Certification

None

1.2.9 Performance Status – Pre-Fire Plans

Table 1.2.9 Performance Summary – Pre-Fire Plans

Performance Measure	Frequency	Performance Criterion Met or Not Met
Provide updates for pre-fire plans for all buildings	Annual	Met
Provide written standard operating procedures for response to occupancies with hazardous materials or other unique hazards	Annual	Met

1.2.9.1 Observations – Pre-Fire Plans

1. Emergency Call-Out Lists and Special Information Sheets should be improved by the change in responsibility for the information from the ES&H Teams to Facility Management.
2. LLNL should reactive updating Key Plans to permit emergency responders to have the most current building plans.

1.2.10 Performance Status – Emergency Response Apparatus

Table 1.2.10 Performance Summary Required First Line & Reserve Apparatus

Type Apparatus	Number	Comment	Criterion Met or Not Met
Engine	3	Livermore Site – 2, S-300 – 1	Met
Aerial Ladder	1	Livermore Site	Met
Ambulance	2	Livermore Site – 1, S-300 – 1	Met
Type 3 Engine	1	S-300	Met
Type 4 Engine	2	Livermore Site – 1, S-300 – 1	Met
Hazardous Materials	1	Responds both sites	Met
Command	1	Battalion Chief	Provided by ACFD
Reserve Type 1 Engine	1	1 Reserve per 5 in front-line service	Not Met
Reserve Ambulance	1	1 Reserve per 5 in front-line service	Met
Reserve Type 3 Engine	1	1 Reserve per 5 in front-line service	Met
Reserve Type 4 Engine	1	1 Reserve per 5 in front-line service	Met
Apparatus Plan		Written 5 year Plan	Met
Apparatus Maintenance		Per NFPA and GSA Fleet Requirements	Met

1.2.10.1 Observations – Emergency Apparatus

1. LLNL should provide a reserve Type 1 engine to assure proper coverage in case of a Type 1 engine breakdown or unavailability for extended maintenance.

2.0 Purpose

The purpose of this document is to compare the actual response capabilities of Lawrence Livermore National Laboratory to the minimum performance criteria established in the 2012 Baseline Needs Assessment Requirements Document.

3.0 Scope

This compliance assessment covers the following items as developed by the Baseline Needs Assessment Requirements Document:

- Response to fire emergencies
- Response to medical emergencies
- Response to hazardous materials emergencies
- Response to situations requiring technical rescue
- Response to a second incident
- Fire fighter collateral duties
- Emergency communications and dispatch requirements
- Training requirements for emergency responders
- Pre-fire plan requirements including Emergency Planning Hazard Assessments
- Emergency response apparatus
- Other fire protection program components (typically, those requiring fire protection engineering support) are not included

4.0 Assumptions

This Compliance Assessment is prepared based on the 2016 Baseline Needs Assessment Requirements Document. The Requirements Document identifies the emergency response requirements taken from applicable regulatory documents (primarily NFPA Codes and Standards) and modified as needed for application at the LLNL sites. The Requirements Document defines the criteria used to evaluate compliance of the emergency response capability.

5.0 Emergency Response Organization

5.1 Alameda County Fire Department

The Alameda County Fire Department (ACFD) is a full time fire department that was formed on July 1, 1993 as a dependent special district with the Alameda County Board of Supervisors as its governing body. This consolidation brought together into a single jurisdiction the Castro Valley Fire Department, the Eden Fire Department, and County Fire Patrol (each a dependent special district under the Board of Supervisors). The department provides all risk service to those unincorporated areas of Alameda County and provides services under contract to the Cities of Dublin, Emeryville, Newark, San Leandro, Union City, as well as Lawrence Berkeley National Laboratory.

Effective October 1, 2007, ACFD was awarded a contract to provide emergency response services for Lawrence Livermore National Laboratory including LLNL's Site 300 and Sandia/CA. In January 2008, ACFD also assumed responsibility for running the Alameda County Regional Emergency Communications Center (ACRECC) and became responsible for monitoring the LLNL Fire and Emergency Voice Alarm System, which included monitoring fire alarms for LLNL, Sandia/CA, Lawrence Berkeley National Laboratory, and Parks Reserve Training Center. The Emergency Response Contract was again awarded to ACFD in 2011 with a start date of July 1, 2012.

5.1.1 ACFD Stations and Staffing

ACFD operates 30 fire stations covering approximately 508 square miles in the communities it serves. The LLNL fire stations are numbers 20 and 21 in the county system. Overall, ACFD has over 400 personnel providing 24/7 coverage which includes

4 Battalions, 26 engine companies, 7 truck companies and specialized equipment such as an Air/Light/Support Unit, a Heavy Rescue Vehicle, a Hazardous Materials Response Vehicle, a 2,500 gallon Water Tender, and a dozer.

ACFD provides three companies at LLNL. At Site 200, each company has a minimum staffing of a Captain and two fire fighters. At Site 300, the company has minimum staffing of a Captain and three firefighters. At Station 20, which serves LLNL Site 200 campus, there are two companies dedicated to LLNL. ACFD has co-located Engine 8 at Station 20 giving LLNL access to a third, three person company when that company is not otherwise committed. In addition to fire fighter qualifications, all company members are Emergency Medical Technicians with one being a Paramedic. Station 20 companies are required to be HazMat Companies, meaning that all members of these companies are required to have Hazardous Materials Technician qualifications with the Captain having Hazardous Materials Specialist qualifications.

All fire fighters permanently assigned to LLNL possess a DOE security clearance and, in addition, approximately 130 ACFD members in other fire stations have security clearances and qualifications to work at LLNL.

Before being able to work at either of the LLNL fire stations an ACFD employee must take a minimum level LLNL site-specific training. After working 14 shifts at LLNL an ACFD member has to take the remaining LLNL specific training. Personnel not assigned to LLNL on a permanent basis are only permitted to fill one of the four positions on any company. In that way, staff temporarily assigned to LLNL, are supported by personnel who are fully LLNL qualified.

LLNL shares the cost of a Battalion chief assigned to the eastern section of Alameda County, an area known as Battalion 3. This Battalion Chief is housed and operates from Station 20 on the LLNL campus. In addition to the Battalion Chiefs, ACFD provides a Division Chief to serve as liaison to LLNL. This Division Chief operates from an office in Station 20 and is an emergency responder.

5.2 Mutual and Automatic Aid

LLNL, as an entity, is still signatory to several mutual and automatic aid agreements. LLNL meets its obligations to these agreements through its subcontractor, the Alameda County Fire Department. The agreements are as follows:

- Automatic Aid Agreement with the Livermore-Pleasanton Fire Department
- Alameda County Mutual Aid Agreement
- Mutual Threat Zone MOU with California Division of Forestry (provides automatic aid for wildland fires at S-300)
- Mutual Fire Protection Resources Agreement with City of Livermore

5.3 Alarm Monitoring and Emergency Dispatch

From its inception in early 2001, the organization that became the Alameda County Emergency Communications Center (ACRECC) was operated by the LLNL Emergency Management Division and later the Emergency Management Department. Beginning in January 2008, operation of ACRECC was turned over to ACFD and certain alarm

monitoring and emergency activities became part of the contract between ACFD and LLNL. Included in those services are monitoring the LLNL fire alarm system, which includes alarms being received from Sandia/CA, Lawrence Berkeley National Laboratory (LBNL), and Parks Army Training Center. In addition, ACRECC is responsible for the following functions and operations:

- Answering emergency (911) telephone calls
- Tracking emergency and LLNL non-emergency response resources via radio and telephone
- Providing emergency pager notification for deaf employees
- Making Emergency Alert System announcements for Site 200 and 300
- Participating in facility, site drills, and exercises as required by DOE Order 151.1.C
- Coordinating emergency response with LLNL and Sandia National Laboratory Protective Force personnel

6.0 Analysis of Services Provided

6.1 Manual Fire Suppression – LLNL Site 200

6.1.1 Minimum Performance Measure – LLNL S-200

Sprinklered Buildings

Respond to reported fires from buildings with sprinkler protection with an alarm assignment of two engine companies and a Battalion Chief in a manner to provide for arrival of the first engine company within a Total Response Time of 426 seconds 90% of the time and the arrival of the remainder of the alarm assignment within a Total Response Time of 666 seconds 90% of the time.

Unsprinklered Buildings

Respond to reported fires from buildings without sprinkler protection with an alarm assignment of three engine companies, a truck company and a Battalion Chief in a manner to provide for arrival of the first engine company within a Total Response Time of 426 seconds 90% of the time and the arrival of the remainder of the alarm assignment within a Total Response Time of 666 seconds 90% of the time.

Wildland Fire

Respond to a reported wildland fire within a Total Response Time for a two-flank wildland fire attack of 486 seconds 90% of the time and provide for the arrival of a Battalion Chief within a Total Response Time of 726 seconds 90% of the time.

6.1.2 Requirement Summary – Manual Fire Fighting LLNL Site 200

Table 6.1.2 Requirement Summary – Manual Fire Fighting Site 200

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria
Fire Sprinklered Bldg	1st Unit 1St Alarm	3 6	426 666	90%
Fire Unsprinklered Bldg	1st Unit 1st Alarm	3 17	426 666	90%
Wildland Fire	Fire Attack 1st Alarm	4 5	486 726	90%

6.1.3 Services Provided – Manual Fire Fighting LLNL Site 200

ACFD provides LLNL with minimum on-duty staffing at Fire Station 20 (LLNL Site 200) of seven persons (2 Captains, 4 Fire Fighters, and 1 Battalion Chief). In addition, ACFD has stationed Engine 8 at LLNL which gives LLNL access to 3 additional personnel most of the time (approx. 87% of the time). Having Engine 8 stationed at LLNL has also reduced the number of off-site emergency responses by LLNL companies by more than 80%. This staffing is sufficient to provide the minimum response to buildings protected by automatic sprinklers.

For fires in unprotected structures, which represent about 40% of the structures on LLNL property, but only 10% of the building area, the Fire Department at LLNL does not have sufficient resources to meet the minimum initial attack criteria and relies on mutual and automatic aid.

The ACFD standard response schedule for a structure fire calls for the response of three engines, one truck, and a Battalion Chief.

To determine compliance with the Total Response Time criterion, dispatch records for 36 months (September 2013 through August 2016) were examined. Disallowing any incident with incomplete or inconsistent information, 425 incidents were evaluated for response time. Response times for first unit exceeded minimums by meeting the time criterion 92.2% of the time. During the time period examined there was insufficient data on first alarm response times to draw any conclusions on meeting the requirement metric, however, the most recent instance where a full first alarm was required (04-20-13, B-322), the criterion was met. There were no wildland responses on Site 200, but are evaluated as having met the response criterion based on structure fire response times. The LLNL Wildland Management Plan[i] describes the various methods used to control wildland fires at LLNL.

Station 20 meets the fire attack requirement by the initial dispatch of two 3 persons companies and Battalion Chief to a response to a sprinklered building. This provides the necessary 5 persons to initiate fire attack. Responses to reported fires in all buildings, sprinklered or unsprinklered, receive a response of five 3-person engine companies, a 3-person truck company, and a Battalion Chief. This provides a total of 19 responders more than necessary to meet the first alarm response requirements for an unsprinklered

building. The assignment is normally filled by three companies from Station 20 (E-20, T20, E-8), an Engine from Livermore Pleasanton Station 98, and ACFD Engines 16 and 18. When Engine 8 is on another assignment, the fifth engine is assigned by ACRECC based on the nearest available unit as determined by the computer aided dispatch (CAD) system.

When Station 20 resources are reduced to one company, ACFD "moves-up" a company from another station to ensure there is a fire attack capability at Station 20. This could be due to an emergency off the LLNL campus or because of nonemergency assignments for an LLNL company, such as medical physicals or training. ACFD has agreed to conduct some of the training involving ACFD companies in the local area at facilities on the LLNL campus, specifically T-6575, to avoid taking companies off LLNL property. The same situations occur at Station 21. ACFD provides coverage at Station 21 by moving-up a company from Station 20 and then back filling the vacancy at Station 20 with a "move-up" from another ACFD station, typically Station 18. Because all fire stations in eastern Alameda County are dispatched by ACRECC, this is done seamlessly. Nonemergency "move-up" companies are from other ACFD stations to ensure that personnel have LLNL security clearances. ACFD has endeavored to provide security clearances to personnel at the two fire stations closest to LLNL to permit this seamless "move-up" capability. Emergency "move-ups" are from the closest stations available regardless of agency and can involve the Livermore Pleasanton Fire Department, who are escorted to locations on the Livermore site.

Firefighters at LLNL have the following corollary duties: hose testing, hydrant flow testing and lubrication, and incidental issuance of hot work permits (when fire inspectors are not on duty). Station 20 personnel have scheduled tours of specific facilities that involve hazardous materials or that have special hazards. Examples are all facilities having Emergency Preparedness Hazards Assessments. None of these assignments has been found to impede emergency response.

6.1.4 Performance Status – Manual Firefighting LLNL Site 200

Table 6.1.4 Performance Status Summary – Manual Firefighting Site 200

Type Incident	Responder	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Criterion Met or Not Met
Fire Sprinklered Bldg	1st Unit 1st Alarm	3 6	426 666	90 %	Met (92.2%) Met*
Fire Non-sprinklered Bldg	1st Unit 1st Alarm	3 17	426 666	90 %	Met (92.2%) Met*
Wildland Fire	Fire Attack 1st Alarm	4 5	486 726	90%	Met*
* Insufficient data to evaluate, however data from incidents outside of evaluation period were within the performance criterion.					

6.1.5 Observations – Manual Firefighting Site 200

None

6.2 Manual Fire Suppression – Site 300

6.2.1 Minimum Performance Measure – Site 300

GSA Sprinklered Buildings –

Respond to alarms in buildings with sprinkler protection within the General Services Area of Site 300 with an alarm assignment of one engine company (minimum staff of 4) to provide for arrival within a Total Response Time of 380 seconds 90% of the time and provide for the arrival of a Battalion Chief within a Total Response Time of 1800 seconds 90% of the time.

GSA Non-Sprinklered Buildings

Respond to alarms in buildings without sprinkler protection within the General Services Area of Site 300 with alarm assignment of three engine companies (each with a staff of 4) and a Battalion Chief in a manner to provide for arrival of the first engine company within a Total Response Time of 380 seconds 90% of the time and the arrival of the remainder of the alarm assignment within a Total Response Time of 1800 seconds 90% of the time.

Outside of GSA Sprinklered Buildings

Respond to fire incidents outside of the general services area with an alarm assignment of one engine company to provide for arrival within a Total Response Time of 960 seconds 90% of the time and provide for the arrival of a Battalion Chief within a Total Response Time of 2760 seconds 90% of the time.

Outside of GSA Non-Sprinklered Buildings

Respond to alarms in buildings without sprinkler protection outside of the General Services Area of Site 300 with alarm assignment of three engine companies and a Battalion Chief in a manner to provide for arrival of the first engine company within a Total Response Time of 960 seconds 90% of the time and the arrival of the remainder of the alarm assignment within a Total Response Time of 2760 seconds 90% of the time.

Wildland Fires

Respond to a reported wildland fire at Site 300 within a Total Response Time for a two-flank wildland fire attack of 1020 seconds 90% of the time and provide for the arrival of a Battalion Chief within a Total Response Time of 2760 seconds 90% of the time.

6.2.2 Requirement Summary – Manual Firefighting Site 300

Table 6.2.2 Requirement Summary – Manual Firefighting S-300

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria
GSA Area Fire Sprinklered Bldg	1st Unit 1st Alarm	4 6	426 sec. 1086 sec.	90 %
GSA Area Fire Non-sprinklered Bldg	1st Unit 1st Alarm	4 17	426 sec. 1086 sec.	90 %
Non GSA Area Fire Sprinklered Bldg	1st Unit 1st Alarm	4 6	1146 sec. 2046 sec.	90 %
Non GSA Area Fire Non-sprinklered Bldg	1st Unit 1st Alarm	4 17	1146 sec. 2046 sec.	90 %
Wildland Fire	Fire Attack 1st Alarm	4 5	1206 sec. 2106 sec.	90%

6.2.3 Services Provided – Manual Fire Fighting Site 300

ACFD has minimum on-duty staffing at Fire Station 21 (Site 300) of four persons (1 Captain, 3 Fire Fighters). An engine company and chief officer are dispatched from the Livermore Site on every fire response, but with an extended arrival time due to travel distance.

The rural nature of Site 300 dictates specialized tactics for structure fires in order to meet provisions of the various requirement documents concerning the 2In/2Out fire fighter safety requirement. If an interior structural fire as defined within the OSHA regulation and NFPA 1500 is encountered, the first arriving engine company will perform other functions such as, rescue, treatment of the injured, establishment of a water supply, stretch hose lines in preparation for fire attack, and protect exposures until the arrival of the second engine company. In concert with the OSHA rule and NFPA 1500 requirements, a rescue attempt can be made before the arrival of the second engine company if an imminent life-threatening situation is encountered.

Considering the remote location of Site 300, and considering that many of the buildings at Site 300 are outside of the GSA area will require a 30-minute cooling off period prior to any entry, the fire incident response plan and tactical plan is appropriate, meets the intent of the requirement documents, and meets the minimum response criteria established in the Baseline Needs Assessment.

Wildland fire control at Site 300 is a hazard that is mitigated significantly by the annual prescribed burn. The prescribed burn confines a potential fire to the property boundaries of Site 300, eliminates the fuel in high fire probability areas (high explosive test areas), and generally breaks the fuel path, thereby limiting the size of potential fires in other areas. The Fire Department has been successfully conducting prescribed burns at Site 300 for over 48 years. Three documents describe and regulate the prescribed burns; the *Prescribed Burning/Smoke Management Plan*[ii], *Site 300 Explosive Test Facility Prescribed Burn/Smoke Management Plan*[iii], and EMD Procedure 1606, *Tactical Plan-Command Procedures: Controlled Burns at Site 300*.[iv]

Because of the prescribed burn process, fire fighters assigned to Station 21 are well trained and experienced with "back-fire" techniques and use that technique extensively as a fire control measure when responding to wildland fires at Site 300. Staffing at Station 21 allows a standard two-flank attack. LLNL fire fighters have a history of aggressive wildland fire attack at Site 300 and control most fires with the initial response. As with all fire incidents, additional equipment is dispatched from the Livermore Site, but with an extended arrival time. Wildland fires beyond the capabilities of the initial fire attack are usually held in check by the prescribed burn boundaries, but LLNL's Mutual Threat Zone Agreement with the CAL Fire allows for specialized resources such as firefighting helicopters and tankers in addition to normal wildland mutual aid.

Response statistics for the past 36 months indicate continued low number of responses at Site 300. A total of 43 responses were evaluated, 39 fire responses and 4 wildland fire responses. Full first alarm responses were too few to evaluate, however, a full alarm assignment for a chemical accident in a other than GSA Area revealed the full alarm assignment was on scene in 1690 seconds (03-26-13 B-827D), well within the metric criterion.

The Fire Department also supports the community surrounding Site 300 by providing fire response to the areas immediately adjacent to Site 300 property, an area with no recognized fire department. During the past 36 months, off-site responses average 89 per year, the overwhelming number of these were EMS responses to the Carnegie State Vehicular Recreational Area (Carnegie SVRA).

The LLNL Wildland Management Plan[v] describes the various methods used to control wildland fires at LLNL. The ACFD wildland fire incident response plan and tactical plan is appropriate and meets the minimum response criteria established in this assessment.

6.2.4 Performance Status – Manual Firefighting Site 300

Table 6.2.4 Performance Status Summary – Fire Response Site 300

Type Incident	Responder	Minimum Staffing	Response Time	Performance Criteria	Performance Criterion
GSA Area Fire Sprinklered Bldg	1st Unit 1st Alarm	4 6	426 sec. 1086 sec.	90 %	Met (100%) Met*
GSA Area Fire Non-sprinklered Bldg	1st Unit 1st Alarm	4 17	426 sec. 1086 sec.	90 %	Met (100%) Met*
Non GSA Area Fire Sprinklered Bldg	1st Unit 1st Alarm	4 6	1146 sec. 2046 sec.	90 %	Met (100%) Met*
Non GSA Area Fire Non-sprinklered Bldg	1st Unit 1st Alarm	4 17	1146 sec. 2046 sec.	90 %	Met (100%) Met*
Wildland Fire	Fire Attack 1st Alarm	4 5	1206 sec. 2106 sec.	90%	Met (100%) Met*

* Insufficient data to evaluate, however data from incidents outside of evaluation period were within the performance criterion.

6.2.5 Observations – Manual Firefighting Site 300

None

6.3 Emergency Medical Service

6.3.1 Minimum Requirement – EMS

Site 200, GSA Area of S-300

Arrive on scene of an EMS incident at Site 200 and the GSA Area of S-300 with first responder with ALS capability of one ALS and two BLS qualified responders within a Total Response Time of 420 seconds 90% of the time and provide for the arrival of an ALS transport unit within a Total Response Time of 1020 seconds.

Outside of GSA Area of S-300

Arrive on the scene of an EMS incident Outside of the GSA Area of Site 300 with first responder/transport ALS capability of one ALS and two BLS qualified responders within a Total Response Time of 1140 seconds 90% of the time and provide for arrival of an ALS transport unit within a Total Response Time of 1980 seconds.

6.3.2 Requirement Summary – EMS

Table 6.3.2 Requirement Summary – EMS

Type Incident	Responders	Minimum Staffing (persons)	Response Time	Performance Criterion
All EMS Except Outside GSA Site 300	1st Responder	1 ALS 2 BLS	420 sec.	90%
	Transport Unit	1 ALS 1 BLS	1020 sec.	90%
EMS Outside GSA Site 300	1st Responder	1 ALS 1 BLS	1140 sec.	90%
	Transport	1 ALS 2 BLS	1980 sec.	90%

6.3.3 Services Provided – EMS

ACFD staffs every company with one ALS qualified fire fighter (paramedic). All fire fighters are BLS qualified as Emergency Medical Technician 1 with the transport or ambulance training module.

All LLNL ambulances are ALS qualified. LLNL responds each engine company as a first responder ALS unit; thus, each engine is equipped with the necessary ALS equipment and drugs.

Fire Station 20 houses a first line ambulance and the reserve ambulance. The reserve ambulance is equipped and maintained as a first response unit and can immediately be used for a second or simultaneous ambulance response. As with fire responses, a unit is dispatched from Station 20 as a "move-up" to cover any response at Site 300. In this case, an engine company will be the "move-up" unit. The "move-up" unit will assist the Station 21 units and, if necessary, "cover-in" at Station 21. If a second EMS incident occurs during the "cover-in", the engine, which is equipped and staffed as an ALS engine, will respond and treat the patient and request transport from an outside agency, most likely San Joaquin County EMS.

In evaluating 36 months of data for EMS responses, which totals 226 incidents, the performance met the criterion with 94.3% metric. There were insufficient responses outside the GSA area at S-300 to evaluate but based on fire responses to the same area it is expected that the EMS criterion will be met.

6.3.4 Performance Summary – EMS

Table 6.3.4 Performance Summary – EMS

Type Incident	Responders	Minimum Staffing (persons)	Response Time	Performance Criterion	Performance Criterion
All EMS Except Outside Site 300 GSA Area	1st Responder	1 ALS 2 BLS	420 sec.	90%	Met (94.3%)
	Transport Unit	1 ALS 1 BLS	1020 sec.	90%	Met (94.3%)
EMS Site 300 Outside GSA	1st Responder	1 ALS 1 BLS	1140 sec.	90%	Met*
	Transport Unit	1 ALS 2 BLS	1980 sec.	90%	Met*
* There were no EMS incidents outside of the GSA area during the evaluation period. Based on the 1st Unit response times for fire events outside of the GSA area, it is expected the criterion will be met.					

6.3.5 Observations – Emergency Medical Service

None

6.4 Hazardous Materials

6.4.1 Minimum Performance Measure – HazMat

Initial response to a hazardous materials incident at Site 200, Sandia/CA, and the Site 300 General Services Areas will arrive within a Total Response Time of 426 seconds 90% of the time.

Provide sufficient personnel trained to the proper level for a Level I or Level II hazardous materials incident prior to beginning any operations activities.

6.4.2 Performance Summary – HAZMAT

Table 6.4.2 Performance Summary – HAZMAT

Task	Staffing	Training Level
Investigation Level Incident		
Incident Commander	1	Hazmat IC & Technician
HazMat Group	3	Awareness
Total	4	426 sec. 90% of the time
Level I Incident		
Incident Commander	1	Hazmat IC & Specialist
Safety and Tech Reference	2	HM Safety and Technician
HazMat Group	7	Technician
Medical Group	2	Operations & EMT
Total	12	
Level II Incident		
Incident Commander	1	Hazmat IC & Specialist
Safety and Tech Reference	3	Specialists & Technicians
HazMat Group	9	Technician & Operations
Time Recorder & Access Control	2	Operations
Medical Group	2	Operations and EMT
Total	17	

6.4.3 Services Provided – HazMat

The contract with ACFD provides that Station 20 is a HazMat station and all fire fighters assigned to that station are certified Hazardous Materials Technicians and all Officers be certified Hazardous Materials Specialists. Station 21 does not require that constant level of staffing because of the general lack of hazardous materials.

Station 20 can handle an Investigation Level and most Level 1 incidents with on-duty stuffing. Full-blown hazardous materials incidents require significant equipment and staffing resources. The Fire Department on-duty staffing at LLNL, like most local agencies, does not have the capability to respond to a large hazardous materials incident without mutual aid assistance. LLNL and ACFD have developed a regional approach to hazardous materials response utilizing the County Mutual Aid Plan response to large hazardous materials incidents.

While the LLNL is able to maintain the equipment it has, it does not have the funds to update and upgrade to the newest technology equipment. That situation is improved with ACFD committing to provide new advanced diagnostic equipment to bring the LLNL Hazardous Materials Unit up to the standards of a Type 1 Hazardous Materials unit. During the past 36 months, Station 20 has responded to 88 HazMat responses and met the Investigations Level criterion 90.9% of the time. One Level II HazMat incident occurred during the evaluation period (01-20-16, B-254) with ACFD responding sufficient equipment and staffing to meet requirements for a Level II incident. During the time of this incident, another ACFD company was moved-up to “cover-in” at Station 20.

The LLNL Fire Department can meet the minimum response criteria contained in the Baseline Needs Assessment by a combination of on duty staffing and use of mutual aid.

6.4.4 Performance Status Summary – HazMat

Table 6.4.4 Performance Status Summary – HAZMAT

Staffing	Training Level	Performance Criterion	Performance Criterion Met or Not Met
Investigation Level Incident			
4	Trained Personnel 426 sec. Response time	90%	Met (90.9%)
Level I Incident			
12	Trained Personnel		Met
Level II Incident			
17	Trained Personnel		Met

6.4.5 Observations – HazMat

None

6.5 Technical Rescue

6.5.1 Performance Requirements – Technical Rescue

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents at Site 200 and the GSA Area of Site 300 within a total response time of 426 seconds for an Awareness Level Incident 90% of the time.

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents outside of the GSA Area of Site 300 within a total response time of 1146 seconds for an Awareness Level Incident 90% of the time.

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents at Site 200 and in the GSA Area of Site 300 within a total response time of 1086 seconds for an Operations Level Incident 90% of the time.

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents outside the GSA Area of Site 300 within a total response time of 2046 seconds for an Operations Level Incident 90% of the time.

6.5.2 Performance Summary – Technical Rescue

Table 6.5.2 Requirement Summary – Technical Rescue

Location	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria
S-200 GSA Area S-300	Awareness Level	4	426 sec.	90 %
Non GSA Area S-300	Awareness Level	4	1146 sec.	90 %
S-200 GSA Area S-300	Operations Level	6	1086 sec.	90 %
Non GSA Area S-300	Operations Level	6	2046 sec.	90 %

6.5.3 Services Provided – Technical Rescue

The LLNL Fire Department responds to all technical rescue incidents on LLNL and Sandia property.

An Engine Company responds to known technical rescue incidents. The engine company is provided with a hydraulic rescue tool (often called the "jaws of life" by the media), cribbing, and air rescue bags (heavy duty air inflatable bags used to lift or move heavy objects). If the incident were identified as a confined space incident, the HazMat vehicle would also respond, since it carries the specialized confined space rescue equipment.

The normal staffing for Station 20 can provide the staffing necessary for both Awareness and Operations Level responses to minor structural collapse, rope rescue, confined space rescue, vehicle and machinery rescue, and wilderness rescue. Responses to major structural collapse incidents or trench and excavation rescue incidents will require additional resources, including specialized equipment. The nearest heavy rescue vehicle is at ACFD Station 24 in San Leandro. Responses to those incidents are beyond the initial response capability being evaluated here.

There were no confined space technical rescue incidents in the data for the past 36 months, however response times to elevator emergencies and traffic collisions, which qualify as Awareness Level incidents, show that Awareness Level criterion can be met, while response times for other for fire incidents indicate that criterion will be met.

6.5.4 Performance Status Summary – Technical Rescue

Table 6.5.2 Performance Summary – Technical Rescue

Location	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Performance Criterion Met or Not Met
S-200 GSA Area S-300	Awareness Level	4	426 sec.	90 %	Met (90.1%)
Non GSA Area S-300	Awareness Level	4	1146 sec.	90 %	Met
S-200 GSA Area S-300	Operations Level	6	1086 sec.	90 %	Met
Non GSA Area S-300	Operations Level	6	2046 sec.	90 %	Met

6.5.5 Observations – Technical Rescue

None

6.6 Response to a Second Incident

6.6.1 Minimum Performance Requirements

Respond to a second simultaneous incident of any type with a single engine company within a Total Response Time of 1240 seconds 90 percent of the time.

6.6.2 Performance Summary – Second Incident

Table 6.6.2 Performance Summary – Second Incident

Type Incident	Responders	Total Response Time	Performance Criteria
Second Incident	1 Company	1332 seconds	90 %

6.6.3 Services Provided – Second Incident

Resources for a simultaneous second incident are expected to come from mutual or automatic aid. On a large incident usually one of the units that is part of the first alarm assignment will be diverted to the second incident. If all first alarm units are already "on scene" and committed, another engine will be dispatched. With all fire department in the Livermore Valley being dispatched by ACRECC, this is a seamless operation with the next closest engine being dispatch automatically. On a working full first alarm incident, dispatch will start to move companies from farther away to fill-in those stations vacated by the initial response. This makes the response time considerably better than would normally be expected. A recent example of this occurred on April 20, 2013 when all first alarm units were committed to a fire in B-322. An engine was moved-up to cover Station 20's responses during the B-322 event.

Simultaneous events do occur and the ACRECC dispatch system provides for automatic response to additional incidents and provides for "move-ups" to Lab fire stations when the normal units are committed to incidents.

6.6.4 Performance Status – Second Incident

Table 6.6.4 Performance Status – Second Incident

Type Incident	Responders	Total Response Time	Performance Criteria	Criterion Met or Not Met
Second Incident	1 Company	1332 seconds	90 %	Met

6.6.5 Observations – Second Incident

None.

6.7 Emergency Communications

6.7.1 Minimum Performance Requirements

ACRECC shall provide evidence that their dispatch staff is trained to meet the qualifications of NFPA 1061 and is capable of meeting the provisions of Section 7.2 of NFPA 1221.

Lab Alarms shall provide evidence that alarms are transmitted to ACRECC for dispatch within 45 seconds of receipt by 95% of the time.

ACRECC shall provide evidence that alarms received, via telephone or alarms from LLNL's site-wide alarm system, are answered or in the case of signals from the alarm system, acknowledged, within 15 seconds 95 % of the time and within 40 seconds 99% of the time.

ACRECC shall provide evidence that LLNL alarms are dispatched within 64 seconds 90% of the time and within 106 seconds 95% of the time.

ACRECC shall provide evidence that LLNL EMS incidents are dispatched within 90 seconds 90% of the time and within 120 seconds 99% of the time.

ACRECC and/ Lab Alarms will notify the appropriate party within 10 minutes of a supervisory or trouble alarm 95% of the time to allow for response of appropriate personnel.

6.7.2 Requirement Summary – Emergency Communications

Table 6.7.2 Requirement Summary – Emergency Communications

Event	Time Criterion	Performance
Dispatcher training	N/A	NFPA 1061
ACRECC Answer or Acknowledge Alarm	15 seconds 40 seconds	95% 99%
ACRECC Dispatch Emergency	64 seconds 106 seconds	90% 95%
ACRECC Dispatch EMS Emergency	90 seconds 120 seconds	90% 99%
Lab Alarms transmit alarms to ACRECC	45 seconds	95%
ACRECC and/or Lab Alarms Notify Appropriate Party of Supervisory or Trouble Alarm	600 seconds	95%

6.7.3 Services Provided – Emergency Communications

LLNL monitors its fire alarm system through the LLNL Fire and Emergency Voice (FEVA) system. Alarms are transmitted via supervised telephone lines to the central processor where the alarms are processed and passed on to the Alameda County Regional Emergency Communications Center (ACRECC) for dispatch. During normal working hours (Monday through Friday 6:00 AM until 4:30 PM) the LLNL Lab Alarms desk screens alarms, with active alarms passed onto to ACRECC for dispatching. During off hours, ACRECC performs the monitoring function.

ACRECC dispatched over 90,000 incidents for consortium members during the last year. Staffing varies somewhat by season with a minimum of 7 dispatchers and a supervisor on duty at all times with additional dispatchers added during wildland season. Dispatchers receive 3 weeks of classroom training and approximately 4 months of one-on-one on the job training. All dispatchers received 48 hours of continuing training annually. This training is equal to the training provisions of NFPA 1061, *Standard for Professional Qualifications for Public Safety Telecommunicator*. ACRECC has been chosen as an Accredited Center of Excellence (ACE) by the National/International Academies of Emergency Dispatch.

The dispatch center records all telephone and radio communications and retains those recordings for 100 days. Instant payback recorders are provided at each dispatch console. Fire alarm data is recorded by LLNL as part of their alarm system. Dispatch records are computerized and all information retained in electronic format. Fire apparatus in the ACRECC system use vehicle mounted laptops to communicate with the dispatch center for recording enroute times, on-scene times, and when available. Alarms are acknowledged by electronics means from each station. The center is provided with redundant emergency generators and has dispatch equipment on redundant

Uninterruptable Power Supplies. ALCO Fire uses the East Bay Regional Communications System (EBRCS) trunked radio system, but responses at LLNL are operated on a federal government 400 MHz trunked system. All fire departments in Alameda County operate on the EBRCS trunked system allowing for seamless communications during large emergencies. LLNL emergency vehicles are equipped with radios on both the EBRCS and LLNL systems. Both systems have redundant capability in the dispatch center.

ACRECC has a comprehensive set of operating procedures, including several that are unique to dispatching and handling of alarms.

The dispatch center is operated in accordance with the operational chapters of NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications System,* including the performance requirements for call handling. A review of 36 months of dispatch data for LLNL incidents indicates the following performance to the performance criteria of NFPA 1221:

92.5% of LLNL alarms are dispatched within 64 seconds

97.6% of LLNL alarms are dispatched with 106 seconds

95.1% of LLNL EMS incidents were dispatched within 90 seconds

97.5% of LLNL EMS incidents were dispatched within 120 seconds

A review of alarm data from the LLNL Alarm System records indicates that answering or acknowledgement times were 44.2% within 15 seconds, 85.8% within 40 seconds, and 100% within 60 seconds. This performance is judged as marginally acceptable and it is noted that this is a decrease in performance from three years ago, when the percentages were: 89.8% within 15 seconds, 98.2% within 40 seconds, and 99.4% within 60 seconds. While this acknowledgement time is deficient, it does not seem to affect the dispatch times, which are within the performance metric. This level of performance could be significantly improved by having alarms received by the alarm system "Fire" screen automatically dump into the CAD system creating a "waiting call" to be dispatched.

Trouble and Supervisory Alarms are to be reported to the "on-call" Alarm Technician who is required to respond to the Lab in 1 hour. Trouble or Supervisory Alarms that cannot be resolved within 4 hours are referred to the "on-call" Fire Protection Division representative for resolution or an authorized impairment. Responding to and making notifications of Trouble and Supervisory alarms is generally within the criterion, although there have been some glaring omissions with trouble alarms being unacknowledged for several hours. Those instances are considered anomalies and the result of dispatchers being involved in higher priority activities. There is a concern, however, that as ACRECC becomes busier, the response to the non-emergency needs of LLNL will deteriorate.

6.7.4 Performance Status – Emergency Communications

Table 6.7.4 Performance Status Summary – Emergency Communications

Event	Time Criteria	Performance	Criterion Met or Not Met
Dispatcher training	N/A	NFPA 1061	Met
Answer 911 phone	15 seconds 40 seconds	95% 99%	Met Met
Acknowledge alarm	15 seconds 40 seconds	95% 99%	Not Met (72%) Not Met (85.8%)
Dispatch Emergency	64 seconds 106 seconds	90% 95%	Met (92.5%) Met (97.6%)
Dispatch EMS Emergency	90 seconds 120 seconds	90% 99%	Met (95.1%) Not Met (97.5%)
Lab Alarms transmit alarms to ACRECC	45 seconds	95%	Met
ACRECC and/or Lab Alarms Notify Appropriate Party of Supervisory or Trouble Alarm	600 seconds	95%	Met

6.7.5 Observations – Emergency Communications

1. ACRECC could improve performance on alarm acknowledgement times. While Alarm acknowledgement times are slightly less than the standard, dispatch performance exceeds the criterion.

6.8 Training and Certification

6.8.1 Minimum Performance Requirements – Training

Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.

There is an established training criterion for minimum performance of entry level personnel.

There is an established on-going training criterion for training for incumbents.

There is a minimum training criteria established for fire officers or supervisors of emergency responder.

There is a minimum training criteria established for special operations such as hazardous materials and technical rescue.

There is an established program of drills and exercises at various facilities on LLNL site.

There are documented training records for each individual.

6.8.2 Performance Summary – Training

Table 6.8.2 Performance Summary – Training

Personnel	Performance Measure
Entry level	Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.
Entry level	There is an established training criterion for minimum performance of entry-level personnel.
Incumbents	There is an established on-going training criterion for training for incumbents.
Officers	There is a minimum training criteria established for fire officers or supervisors of emergency responder.
Special Operations	There is a minimum training criteria established for special operations such as hazardous materials and technical rescue.
Drills and Exercises	There is an established program of drills and exercises at various facilities on LLNL site.
All	Documented training records exist for each individual.

6.8.3 Services Provided – Training

ACFD has multiple training policies and standards, which are generally included in the 50.000 series of Official Action Guides (OAGs). As part of the ACFD Fire Recruit Academy, there is a minimum set of standards for entry level firefighter which includes two year probation. These standards are documented in the ACFD OAGs.

There are also standards for wildland firefighting, which are part of the "red card" program. It is reported that the training includes ICS 100, S-130 (Firefighter Training), S-190 (Introduction to Fire Wildland Behavior), L-180 (Potential Hazards and Human Factors on the Fire line) and S-131 (Advanced Firefighter Training). These are all part of the Recruit Academy. These standards are documented in the ALCO OAGs.

A recurring training program provides a minimum of 20 hours of refresher training and an assessment tool for all ACFD fire stations. A copy of OAG 50.009 and the 2014 and 2015 Training Plans were reviewed as evidence of a recurring training plan. The training plans are comprehensive with study guides, performance evaluations, and monthly training assignments.

Minimum qualifications for company officers include being a member of ACFD for 5 years, completion of a Task Book for Captain, completion of Command 1, Instructor 1A from the State Fire Marshal's Office, and completion of ICS 300. There is an Officer Academy and a 1-year probationary period.

There is a training program for hazardous materials and technical rescue training for those personnel in stations requiring that training. This training is documented in the ACFD OAGs.

Most of the ACFD training is done on LLNL property in the fire stations, in LLNL classroom facilities, or on LLNL roadways and parking lots. Certain evolutions require the use of a fire department drill grounds having a drill tower and/or structure fire building. ACFD uses both their own training center in San Leandro and has access to the Livermore-Pleasanton Fire Department Training Center in Pleasanton for those training evolutions. Those facilities generally meet the recommendations of the NFPA Guide to Building Fire Service Training Centers, NFPA 1402. ACFD has agreed to conduct some of the on-going training involving ACFD companies in battalion 3 at facilities on the LLNL campus, specifically T-6575, to avoid taking companies off LLNL property.

Drills and exercises at LLNL facilities is an important part of the emergency management program. There are extensive drills and exercises of various types are scheduled throughout the year by the Emergency Programs Division of the Emergency Management Department. During the past 3 years ACFD was involved in 24 Emergency Program's drills or exercises. In addition, the Fire Marshal has conducted a select number of specialty drills, i.e. response to High Voltage facilities. The Emergency Programs Division drills and exercises are developed to expose the firefighters to realistic scenarios that include firefighting activities, hazardous materials activities, and emergency medical activities. The drills are scheduled on a rotating basis to emphasize hazardous materials and security events every other year. Firefighting evolutions such as laying hose, pulling hose, throwing ladders, and extending hose lines have all been part of past drills and exercises.

Special facility familiarization tours are conducted annually for all nuclear facilities and those tours are tracked in LTRAIN as Facility Briefings. These Facility Briefings are tracked in LTRAIN and ACFD monitors attendance. Any special firefighting techniques for these facilities are discussed during the briefing.

ACFD Training is tracked for each individual via a computer program that is part of the ALCO records management system. Sample of individual training records were examined. Each record contained the module completed, number of hours, and date. The Training Office does certification tracking. LLNL site specific training is tracked in LTRAIN. In addition, the Fire Marshal is provided with a daily report of personnel working at Stations 20 and 21which lists their qualifications. This is used as a spot check on training and qualifications of on duty personnel.

6.8.4 Performance Status – Training

Table 6.8.4 Performance Status Summary – Training

Personnel	Performance Measure	Performance Criterion Met or Not Met
Entry level	Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.	Met
Entry level	There is an established training criterion for minimum performance of entry-level personnel.	Met
Incumbents	There is an established on-going training criterion for training for incumbents.	Met
Officers	Criteria established a minimum training for fire officers or supervisors of emergency responder.	Met
Special Operations	Criteria established a minimum training for special operations such as hazardous materials and technical rescue.	Met
Drills and Exercises	There is an established program of drills and exercises at various facilities on LLNL site.	Met
All	Documented training records exist for each individual.	Met

6.8.5 Observations – Training

None

6.9 Pre-Fire Plans

6.9.1 Minimum Requirement – Pre-Fire Plans

Provide updates to pre-fire plans for all LLNL and Sandia/CA buildings meeting ACFD OAG 30-103 with a quarterly review frequency to ensure that they are current and accurate.

Provide and maintain written standard operating procedures for emergency response to occupancies with hazardous materials or other unique hazards.

6.9.2 Performance Summary – Pre-Fire Plans

Table 6.9.2 Requirement Summary – Pre-Fire Plans

Performance Measure	Frequency
Provide updates for pre-fire plans for all buildings	Annually
Provide written standard operating procedures for response to occupancies with hazardous materials or other unique hazards	Annually

6.9.3 Services Provided – Pre-Fire Plans

ACFD provides Pre-Fire Plans based on ACFD Policy, Policy 30-103 which was created to meet the LLNL Run Card needs.

LLNL Run Cards consist of hanging folders that contain building plans, alarm and sprinkler zone plans, exposure maps, an emergency call out list, and a Special Information Sheet. This provides a detailed description of the contents of the building, ways to approach it, and the layout of the building and alarm zones. The "run cards" are filed in building number order in a filing cabinet in the apparatus room. Mutual and automatic aid companies have been shown the location of the run cards in case they are responding to a building without one of the "resident" companies.

The Special Information Sheets and the Emergency Call-Out Lists are now maintained by facility management and updated annually. Information is loaded onto a server and downloaded by the Emergency Management Department Secretary, who then passes it to the Battalion Chiefs for insertion into the Run Cards.

Several audits over the past year have found areas for improvement of the run cards. Structural issues have been resolved, however timely updating of the Emergency Call Out lists and Special Information Sheet information is a continuing challenge. During the past year the responsibility for updating this information has been transferred from the ES&H Teams to Facility Management, this was done in conjunction with changing of the review function from quarterly to annually. At this time the transition has occurred and appears to be functioning.

Discrepancies in the run cards usually involve the floor plans and symbols used on the plans. Discrepancies are correct immediately where possible, however the run card floor plans are based on the Lab's Key Plan system. Funding for Key Plans was reduced several years ago causing Key Plans to be out of date. This has caused the fire department run cards to not reflect the actual building layout.

6.9.4 Performance Status – Pre-Fire Plans

Table 6.9.4 Performance Status Summary – Pre-Fire Plans

Performance Measure	Frequency	Performance Criterion Met or Not Met
Provide updates to pre-fire plans for all buildings	Annually	Met
Provide written standard operating procedures for response to occupancies with hazardous materials or other unique hazards	Annually	Met

6.9.5 Observations – Pre-Fire Plans

1. Emergency Call-Out Lists and Special Information Sheets should be improved by the change in responsibility for the information from the ES&H Teams to Facility Management.
2. LLNL should restore full funding for updating Key Plans. Current Key Plans are needed to permit emergency responders to have the most current building plans.

6.10 Emergency Response Apparatus

6.10.1 Minimum Requirements – Emergency Apparatus

Apparatus and equipment must meet NFPA Standards for design, minimum equipment, and maintenance.

Provide a written replacement schedule for all emergency apparatus to allow timely replacement.

6.10.2 Performance Summary – Emergency Apparatus

Table 6.10.2 Requirement Summary – Emergency Apparatus

Type Apparatus	*Number*	*Comment*
Engine	*3*	*Livermore Site – 2, S-300 – 1*
Aerial Ladder	*1*	*Available via Automatic Aid*
Ambulance ALS Configuration	*2*	*Livermore Site – 1, S-300 – 1*
Type 3 Engine	*1*	*S-300*
Type 4 Engine	*2*	*Livermore Site – 1, S-300 – 1*
Hazardous Materials	*1*	*Responds both sites*
Command	*1*	*Battalion Chief*
Reserve Type 1Engine	*1*	*1 Reserve per 5 in front-line service*
Reserve Ambulance	*1*	*1 Reserve per 5 in front-line service*
Reserve Type 3 Engine	*1*	*1 Reserve per 5 in front-line service*
Reserve Type 4 Engine	*1*	*1 Reserve per 5 in front-line service*

6.10.3 Services Provided – Emergency Apparatus

As part of the contract with ACFD, LLNL remains responsible for providing emergency apparatus and equipment. Under the ACFD concept of operations each contract agency

is responsible for the deployment and maintenance of their fleet of vehicles, including providing reserve apparatus. ACFD is responsible for replacement of expendables. The LLNL emergency apparatus fleet is modern, well designed, complying with NFPA standards and has been maintained per the GSA maintenance schedule. Recently, LLNL has closed its own vehicle maintenance facility, leaving DOE owned vehicle maintenance up to the users. In response to this LLNL has contracted with the ACFD Maintenance Division for routine maintenance and is sending all vehicles to their facility for repairs by training Emergency Vehicle Technicians. The following table summarizes the LLNL emergency response fleet.

Table 6.10.3 Current LLNL Fire Department Fleet

Year	Chassis Make	Type and Kind	Station	Scheduled Replace	Comments Replacement Cost
2010	Ford	Ambulance	20	2020	Reserve
2014	Chevrolet	Ambulance	20	2024	Lease
2014	Chevrolet	Ambulance	21	2024	Lease
2005	Pierce	Hazmat	20	2025	$500K
1998	American LaFrance	Aerial Ladder	20	2018	$950K
2000	American LaFrance	Type 1 Engine	21	2015	$650K
2006	Pierce	Type I Engine	20	2021	$650K
2007	Pierce	Type I Engine	20	2022	$650K
2003	International	Type 3 Engine	20	2018	$350K
2004	International	Type 3 Engine	21	2019	$350K
2014	Ford	Type 6 Engine	20	2024	Lease
2015	Ford	Type 6 Engine	20	2024	Lease
2005	Ford	Type 6 Engine	21	2015	Reserve/Lease

The design of the fleet is such that the oldest engine is being used as the first line Type 1 Engine for Station 21 where the call volume is small. There is no reserve Type 1 engine. The need for two Type 3 Engines is based upon the prescribed burn of Site 300. From a fleet management standpoint, two Type 3 engines are sufficient with one being the reserve for the other. The Type 6 engines (formerly classified as Type 4 engines) are GSA lease vehicles with skid loaded firefighting modules. Their modest cost allows maintenance of both front line and reserve vehicles. Two of the three Type 6 engines were replaced in 2015.

LLNL's fire vehicle fleet has sufficient depth to provide coverage with reserve vehicles for all critical needs except Type 1 engines. ACFD has been able to provide coverage for an engine out of service due to repairs or maintenance, an advantage of contracting for service with a large regional agency, however, this service is not required and is only available when the ACFD reserves are not being used elsewhere for ACF's own vehicle coverage. ACFD's position has always been that contract agencies are responsible for their own fleet deployment and capability. A Type 1 or Type 2 engine is necessary for structural fire protection because of the ability to provide pump capacity to deploy sufficient hose lines for fire attack. Sustained attack requires flows of 1,000 gpm or more, flows that can only be reliably provided by Type 1 or 2 engines. If a Type 1

engine was out of service and no replacement could be provided by ACFD, Site 300 could be protected by the resident Type 3 engine (PTO pump capacity 500 gpm).

The need for a replacement aerial ladder was considered questionable in the last BNA. It was thought that the limited need at LLNL could easily be met by units from mutual or automatic aid rather than continued purchase and maintenance of an LLNL owned unit. That option is now not considered viable because of the distant location of aerials and extended response time. A more viable option is to purchase a Quint[1] type vehicle that can serve as both an aerial ladder and an engine. This allows purchasing one vehicle and serves two purposes. This option will be explored prior to replacement of the existing ladder, which is expected to cost nearly $1M.

The ambulance situation is very stable with Sandia providing what is essentially the reserve ambulance via a GSA lease. Two of the ambulances were replaced in 2015 through the GSA lease process.

There is a five-year apparatus replacement plan that is updated annually.

NFPA standards require testing of ladders, vehicle pumps, and fire hose on an annual basis. LLNL provides ladder testing via an outside contractor, typically Underwriters Laboratory, to inspect and test all ground ladders and the aerial ladder. Vehicle pumps are tested by the ACFD maintenance shop, and fire hose is test by the fire crews.

[1] Quint refers to the ability of the vehicle to provide 5 services (pump, hose, water, aerial ladder, ground ladders) which is the combination of the services of an engine and a truck.

6.10.4 Performance Status – Emergency Apparatus

Table 6.10.4 Performance Status First Line & Reserve Apparatus

Type Apparatus	Number	Comment	Criterion Met or Not Met
Engine	3	Livermore Site – 2, S-300 – 1	Met
Aerial Ladder	1	Livermore Site	Met
Ambulance	2	Livermore Site – 1, S-300 – 1	Met
Type 3 Engine	1	S-300	Met
Type 4 Engine	2	Livermore Site – 1, S-300 – 1	Met
Hazardous Materials	1	Responds both sites	Met
Command	1	Battalion Chief	Provided by ACFD
Reserve Type 1Engine	1	1 Reserve per 5 in front-line service	Not Met
Reserve Ambulance	1	1 Reserve per 5 in front-line service	Met
Reserve Type 3 Engine	1	1 Reserve per 5 in front-line service	Met
Reserve Type 4 Engine	1	1 Reserve per 5 in front-line service	Met
Apparatus Plan		Written 5 year Plan	Met
Apparatus Maintenance		Per NFPA and GSA Fleet Requirements	Met

6.10.5 Observations – Emergency Apparatus

1. LLNL should provide a reserve Type 1 engine to assure proper coverage in case of a Type 1 engine breakdown or is unavailable for an extended period of maintenance.

7.0 Status of Observations from 2013 BNA

7.1 Observations – Fire Preplans

ITS Item: 37029.1

Emergency Call-Out Lists and Special Information Sheets could be improved by proper quarterly review by ACFD and LLNL Fire Protection Division to ensure quarterly updates are placed in the Run Cards in a timely manner.

ACTION: The Fire Protection Division began monitoring the Run Card updates. Audits were conducted and the item was considered resolved with a memo dated 08-13-14.

7.2 Observations – Pre-Fire Plans

ITS Item: 37029.2

LLNL should provide a reserve Type 1 engine to assure proper coverage in case of a Type1 engine breakdown or unavailability for extended maintenance.

ACTION: To maintain the ability to respond to emergencies a fire department must be supplied with a fleet of vehicles that are reliable, meet safety standards, and provide the necessary services. Although we contract for emergency response services with the Alameda County Fire Department (ACFD), LLNL is responsible for providing and maintaining the fleet of emergency response vehicles. The LLNL emergency apparatus fleet is modern, well designed, maintained per NFPA and GSA standards and complies with national standards, but is not without shortcomings.

One shortcoming is the needs for a reserve firefighting vehicle, known as an "engine" (a vehicle with hose, pump and water). National standards of good practice propose that critical response apparatus have readily available back-ups to allow for breakdowns and routine maintenance. Our most recent Emergency Response Capability Baseline Needs Assessment (BNA) determined that the LLNL emergency vehicle fleet is lacking a reserve engine. The finding from the BNA was entered into ITS as item # 37029.2.1. The purchase of a new "engine" would allow placing our oldest engine in reserve status satisfying the need for a reserve engine. Cost $650K.

Our aerial ladder vehicle, known as a "truck" in fire department parlance, is 17 years old with normal replacement scheduled in 2018. It is proposed that instead of procuring two vehicles with a total cost of $1,550K, that one dual purpose vehicle be purchased instead. The dual purpose vehicle, known as a Quit because it possesses 5 functions (pump, hose, water tank, aerial ladder, and ground ladders) would replace the existing aerial and allow placing our oldest engine in reserve status meeting our need for a reserve engine. Cost $950K. Purchase of the dual purpose vehicle saves $650K overall.

There are a plethora of requirements that dictate the need for a both engines and trucks to have a functioning fire department. We cannot rely on mutual aid to meet this requirement because of the distance to the nearest reliably available truck. The replacement of the aerial ladder vehicle would be slightly ahead of the normal replacement schedule; however, recent repairs during the past two years indicate early replacement would be appropriate.

Funding for a replacement truck has been placed on the GPP List, and funds have been requested from end of year money FY14 and FY15. Further, a request was made for over target funds for the FY16 budget.

[i] Lawrence Livermore National Laboratory, *Wildland Fire Management Plan*, LLNL-AR-691997, May 2016.
[ii] Lawrence Livermore National Laboratory, *Prescribed Burning/Smoke Management Plan*, UCRL-AR-154173-REV-13, March 2016.
[iii] Lawrence Livermore National Laboratory, Site 300 Explosive Test Facility *Prescribed Burn/Smoke Management Plan*, UCRL-AR-154174-REV-13, March 2016.
[iv] Alameda County Fire Department, *Controlled Burns at Site 300 Procedure,* March 2008.
[v] Lawrence Livermore National Laboratory, *Wildland Fire Management Plan*, LLNL-AR-691997, May 2016.