

**Facility Readiness for Safe Operations and Occupancy**

**Report on**

**Technology and Engineering Development Facility (TEDF)**

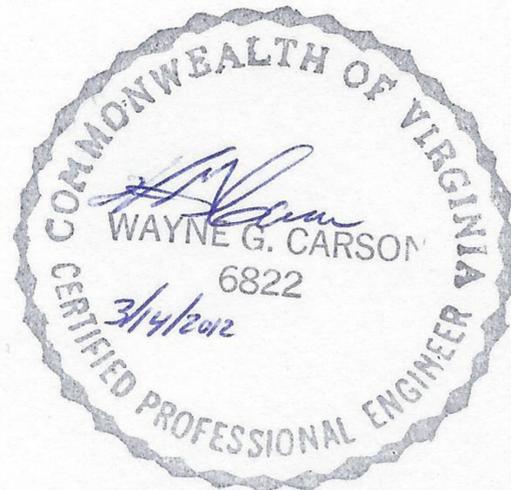
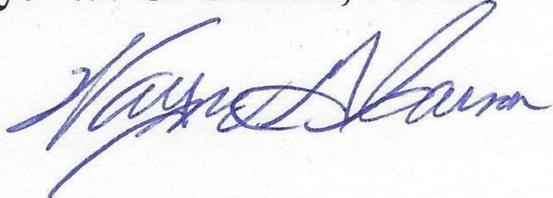
**Technology and Engineering Development Building (TED) Building 55**

**Test Lab Addition (TLA) Building 58**

**Fire / Life Safety Code Features and Functions**

March 14, 2012

Prepared by: W. G. Carson, F.P.E.



## 1. Introduction:

This readiness overview report is provided to summarize and document the survey of the Technology and Engineering Development Building (TED) and the Test Lab Addition (TLA) on Monday March 12, 2012. This review is based on the 2009 *Life Safety Code*, NFPA 101.

## 2. General Building Construction

**TED Building:** The new TED building is a two-story building of approximately 39,000 square feet per floor. The second floor is primarily offices. The first floor is light industrial with some offices. It is mixed use Group B and F-1 under the State Building Code. The uses are considered non-separated under both the Virginia Uniform Statewide Building Code (IBC 2006 with amendments) and the *Life Safety Code*, NFPA 101.

**TLA Building:** The new Test Lab Addition is a one-story building with a mechanical mezzanine. The building includes clean rooms and assembly areas (Group F-1) and a space for hazardous material that is Group H-4 under the State Building Code. It is important to note that the area designated for H-4 (acid room) does not become an H-4 until the acids are introduced. There are no acids in the building now, and reportedly will not be for several months.

The building construction for both buildings is Type IIB under the Building Code. That is, the structural frame is of non-combustible construction, but has no fire resistance. The Building Code and the *Life Safety Code* both permit this type of construction for these structures.

The following deficiencies were noted in the TED Building:

- a. Even though the floors are not required to have a fire resistance, they are required to be smoke-tight in accordance with the *Life Safety Code* section 8.6.1. There are several penetrations of data cables in the office area, ducts

in the mechanical room, and black drainage pipe penetrations just stuffed with mineral wool that are not sealed smoke tight.

Recommendation: Seal these penetrations with fire rated caulking to seal them smoke tight.

- b. The drawings show the wall around the second floor electrical room as one-hour rated. Several penetrations of the walls were not firestopped.

Recommendation: Firestop all penetrations of the walls around the electrical room.

- c. The first floor electrical room has a steel beam penetrating the wall near the double doors in the corridor. One side of this beam has not been filled in and provides an opening through the wall.. The wall around this electrical room is shown on the drawings as a one-hour wall.

Recommendation: Seal this opening beside the steel beam to maintain the one-hour fire resistance rating of the wall enclosing the electrical room.

### 3. Means of Egress

**TED Building:** The means of egress appears to be in compliance with the approved plans. There are two enclosed exit stairs from the second floor in accordance with Code. A third stair is open and not counted as an exit, but is available for use by occupants. Egress from the First floor is via doors directly to grade. Travel distances, deadends, and common path of travel distances appear well within Code requirements. Egress capacity is also well within Code requirements.

The exit stairs are enclosed in one-hour fire protection rated walls and the doors are one-hour fire protection rated as shown on the approved drawings.

The following deficiencies noted in the TED Building:

- a. Stair 6 (North Stair) has one plastic drainage pipe (rain leader) penetrating the stair at two locations at the second floor. There were also three conduits passing through the stair enclosure. No penetrations of

utilities are permitted to penetrate the exit stair enclosures that do not provide necessary services to the exit stair. *Life Safety Code* section 7.1.3.2.1(9) prohibits penetration of stair enclosures by drainage piping and conduit.

Recommendation: Although the penetration of the stair enclosure with utilities that do not directly serve the stair is prohibited by code, these penetrations are at the very top of the stair, the stair is only two stories, the penetrations are above the lay-in ceiling, and the building is protected with automatic sprinklers, the removal of these penetrating items will do little to improve life safety in the building. It is recommended that the penetrations be sealed well and left as is.

- b. The steel I-beam that supports the stair landing penetrates the wall enclosing the stair, which is a one-hour rated wall. The gap in the beam is filled with mineral wool insulation but is not sealed with fire rated caulking.

Recommendation: Seal the opening and the mineral wool with fire rated caulking to maintain the wall fire rating.

- c. There is no exit sign over this stair. A back box is installed in the wall immediately above the door, but it is labeled for ceiling installation only.

Recommendation: Remove the installed back box, install a standard 4” steel back-box, fill in the remaining opening with gypsum board, and install a wall mounted exit sign.

- d. The situation described in item #c above also occurs in the second floor mechanical room at both doors.

Recommendation: Same as item #c above.

**TLA Building:** The means of egress appears to be in compliance with the approved plans. Egress from the First floor is via doors directly to grade. Egress from the mechanical mezzanine is via an outside stair on the Southeast corner and a stair not yet constructed into the existing building at the Northeast corner. Travel

distances, deadends, and common path of travel distances appear well within Code requirements. Egress capacity is also well within Code requirements.

The “T” shaped area containing the hazardous material (acids) has three remote exits as required by code.

The following deficiency was noted:

- d. The South door did not have any hardware.

Recommendation: Provide hardware on the door.

#### **4. Fire Detection and Alarm System and Associated Interfaces**

A manual fire alarm system with voice evacuation is being installed throughout the buildings. The system will be an addressable multiplex system with mass notification capability throughout the TED Building, the TLA Building, and the to-be-renovated Building 58 Test Lab. Manual fire alarm boxes are provided at exits and some interior spaces. The distribution appears to comply with the Code. Audible/visible alarm notification appliances are being installed throughout the buildings. Smoke detection is provided in the HVAC system as required by Code. VESDA smoke detection is being installed in the HVAC units for the clean rooms.

**TED Building:** The fire alarm system for the TED building has been tested and accepted. The “Fire Alarm System Record of Completion” is attached. The annunciator panel at the entry is not installed, but that does not hamper the fire alarm system operation and is not considered detrimental for occupancy.

**TLA Building:** The fire alarm system installation is not complete. An acceptance test of the fire alarm system for the TLA building will be needed upon completion of the system installation.

#### **5. Fire Suppression System(s)**

**TED Building:** The building is protected throughout with a wet pipe automatic sprinkler system. The sprinkler piping is installed and reportedly has been

hydrostatically tested. The “Contractor’s Material and Test Certificate for Above Ground Piping” for the TED building is attached.

Most of the building sprinkler design is based on Ordinary Hazard Group I with a design density of 0.15 GPM/ft<sup>2</sup> over 1,500 ft<sup>2</sup>. The High Bay areas will be protected with sprinklers designed for Ordinary Hazard Group II with a density of 0.2 GPM/ft<sup>2</sup> over 1,500 ft<sup>2</sup>.

The following deficiencies were noted:

- a. All ceiling tiles are not in place. Absence of ceiling tiles will allow heat to pass the sprinklers and flow into the space above the ceilings, delaying activation of the sprinklers.

Recommendation: Install all ceiling tiles.

**TLA Building:** The building is protected throughout with a wet pipe automatic sprinkler system. The sprinkler piping is installed but not all sprinklers have been installed and the ceilings are not complete.

Most of the building sprinkler design is based on Ordinary Hazard Group I with a design density of 0.15 GPM/ft<sup>2</sup> over 1,500 ft<sup>2</sup>. The High Bay areas will be protected with sprinklers designed for Ordinary Hazard Group II with a density of 0.2 GPM/ft<sup>2</sup> over 1,500 ft<sup>2</sup>.

A final inspection of the sprinkler system will be needed.

**Water Supply and Distribution:** Multiple fire hydrants are located around the facility. Distribution appears adequate and in accordance with NFPA standards and DOE standard 1056.

## 6. Emergency Lighting

Emergency lighting is provided by having some lighting units powered from an emergency circuit via an emergency generator for the entire building complex.

The emergency generator was tested March 12, 2012 and reportedly operated in accordance with the standards.

## 7. Exit Signage

**TED Building:** Exit signs for the TED building are installed and appear adequate except as noted above under egress.

**TLA Building:** The conduit for the exit signs and the back boxes are installed. The placement of exit signs appears adequate. When finalized, an inspection will be needed to assure the signs are visible at the exits as one approaches the exit and any areas where the way to reach the exit is not readily apparent.

## 8. Fire/Smoke Barriers

**TED Building:** The open stair and hole in the floor is separated on the First Floor by a one-hour wall. This opening between floors was designed in accordance with the *Life Safety Code* section 8.6.8.1.

The high bay area is separated by a 1-hour wall.

The following deficiencies were noted:

- a. The double fire rated doors that separate B from C have concealed rods. The rods do not latch the door. Also, there are no keeps in the floor to accept the rods.

Recommendation: Repair the latching hardware so the doors latch at both the top and bottom as required by their listing.

- b. The one-hour wall that separates B and C has a few penetrations that are not firestopped.

Recommendation: Seal all penetrations of the wall with approved firestopping material to maintain the one-hour fire resistance rating.

**TLA Building:** The area containing hazardous materials is being separated by two-hour fire rated construction with 1-1/2 hr. fire protection rated doors. This separation complies with both the State Building Code and the *Life Safety Code*. Three remote means of egress are provided from this space. As noted above, this area does not become hazardous until hazardous materials are introduced.

**General:** The electrical rooms, elevator machine room, and mechanical pump rooms are enclosed in one-hour walls with 45 minute rated fire protection rated doors. All of these enclosures appear in compliance with Code. Final inspection will require all penetrations be sealed with approved through-penetration fire stop protection.

## **9. Portable Fire Extinguishers**

Fire extinguisher cabinets, partially recessed type, are provided throughout. Based on the design documents and field observations, the placement of fire extinguishers appears adequate.

## **10. Pre-Fire Planning by City of Newport News Fire Department**

Emergency services are provided to Jefferson Lab by the City of Newport News. A Baseline Needs Assessment (BNA) conducted in 2009 concluded the NNFD is capable of providing a broad spectrum of emergency services in a timely and effective manner. The NNFD was given a familiarization tour of the buildings on March 12, 2012. Additional tours are scheduled for March 13, and March 16 to permit all shifts from Station 6 to become familiar with this new structure.

## **11. Conclusion**

This survey documents that the TED Building is ready for occupancy except for the minor items noted above.

The TLA Building appears to be on track for occupancy in accordance with the *Life Safety Code*. Final inspection and testing of the fire alarm, sprinkler systems, fire barriers and fire doors, exit signs, and emergency lighting will be necessary.

The demolition and renovation of the TLR building will require some planning to assure life safety and fire protection are adequate for those areas of the building that must be occupied during this work. Interim Life Safety Measures were discussed briefly and appear to be reasonable, such as manual horns located at exits for periods when the fire alarm system will be taken out of service and battery operated emergency lights connected to temporary wiring or existing electrical outlets when ceilings and lighting is removed.

# Contractor's Material and Test Certificate for Aboveground Piping

## PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property name TEDE Jefferson Lumb Building Date 1-30-12

Property address Newport News VA

Plans  
 Accepted by approving authorities (names) Jefferson Lumb County or City of Newport News  
 Address Newport News  
 Installation conforms to accepted plans  Yes  No  
 Equipment used is approved  Yes  No  
 If no, explain deviations

Instructions  
 Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment?  Yes  No  
 If no, explain  
 Have copies of the following been left on the premises?  
 1. System components instructions  Yes  No  
 2. Care and maintenance instructions  Yes  No  
 3. NFPA 25  Yes  No

Location of system  
 Supplies buildings Entire TEDE Building 1st + 2nd Floor

Make	Model	Year of manufacture	Orifice size	Quantity	Temperature rating
Viking	VK 464	2011	17/32	328	155° <i>Concealed Wh-H</i>
Viking	VK 350	2011	17/32	267	155°
Viking	VK 606	2011	17/32	4	155° - 175°
Viking	VK 464	2011	17/32	12	155° <i>Brushed Chrome</i>
Viking	VK 570	2011	3/4	34	155°

Pipe and fittings  
 Type of pipe NFPA Approved steel piping black sch 10 + 40  
 Type of fittings NFPA Approved steel fittings + v. compatible fittings

Type	Alarm device		Maximum time to operate through test connection	
	Make	Model	Minutes	Seconds
Vicatula	Firelock	4		
Vicatula	Firelock	6		

Dry valve			Q. O. D.										
Make	Model	Serial no.	Make	Model	Serial no.								
Time to trip through test connection <sup>1,2</sup>	Water pressure	Air pressure	Trip point air pressure	Time water reached test outlet <sup>1,2</sup>		Alarm operated properly							
				Minutes	Seconds	psi	psi	psi	Minutes	Seconds	Yes	No	
Without Q.O.D.													
With Q.O.D.													

If no, explain

<sup>1</sup> Measured from time inspector's test connection is opened  
<sup>2</sup> NFPA 13 only requires the 60-second limitation in specific sections

Hydraulic data nameplate	Nameplate provided <input type="checkbox"/> Yes <input type="checkbox"/> No	If no, explain	
Remarks	Date left in service with all control valves open		
Will be left in service at later date			
Signatures	Name of sprinkler contractor Simplex Grinnell		
	Tests witnessed by		
	For property owner (signed) ★ DAVE KAUSCH	Title FIRE PROTECTION & MATH. HANDLING MGR.	Date 1-30-12
	For sprinkler contractor (signed) <i>[Signature]</i>	Title FOREMAN	Date 1-30-12
Additional explanations and notes			
Hydro - 1-26-12 on all piping sprinkler - <del>8</del>			

**FIRE ALARM SYSTEM RECORD OF COMPLETION**

*To be completed by the system installation contractor at the time of system acceptance and approval.*

**1. PROTECTED PROPERTY INFORMATION**

Name of property: JLAB Technical & Engineering Development (TED) Bldg  
 Address: Building 55  
 Description of property: DOE  
 Occupancy type: Mix  
 Name of property representative: Dave Kaush  
 Address: 628 Hofstadter Rd, Newport News, VA  
 Phone: 757-269-7674 Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 Authority having jurisdiction over this property: DOE  
 Phone: 757-269-7674 Fax: 757-269-5835 E-mail: \_\_\_\_\_

**2. FIRE ALARM SYSTEM INSTALLATION, SERVICE, AND TESTING INFORMATION**

Installation contractor for this equipment: Bay Electric  
 Address: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 Service organization for this equipment: Hiller Systems Inc.  
 Address: 1242 Executive Blvd, Chesapeake, VA  
 Phone: 757-549-9123 Fax: 757-549-1083 E-mail: \_\_\_\_\_  
 Location of as-built drawings: owner Location of historical test reports: owner  
 Location of system operation and maintenance manuals: owner  
 A contract for test and inspection in accordance with NFPA standards is in effect as of 2011-2012  
 Contracted testing company: Hiller Systems Inc.  
 Address: Same  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_  
 Contract expires: \_\_\_\_\_ Contract number: \_\_\_\_\_ Frequency of routine inspections: \_\_\_\_\_

**3. TYPE OF FIRE ALARM SYSTEM OR SERVICE**

NFPA 72 Chapter Reference of System Type: Local Siemens XLS  
 Name of organization receiving alarm signals with phone numbers (if applicable):  
 Alarm: JLAB Phone: \_\_\_\_\_  
 Supervisory: JLAB Phone: \_\_\_\_\_  
 Trouble: JLAB Phone: \_\_\_\_\_  
 Entity to which alarms are retransmitted: NCC Phone: \_\_\_\_\_  
 Method of retransmission of alarms to that organization or location: N/A

FIGURE 4.5.2.1 Record of Completion.

**3. TYPE OF FIRE ALARM SYSTEM OR SERVICE (continued)**

If Chapter 8, note the means of transmission from the protected premises to the central station:

Digital alarm communicator  McCulloh  Multiplex  2-way radio  1-way radio  N/A

If Chapter 9, note the type of connection:  Local energy  Shunt  N/A

**3.1 System Software**

Operating system (executive) software revision level: \_\_\_\_\_

Site-specific software revision date: \_\_\_\_\_ Revision completed by: Hiller Systems Inc

**4. SIGNALING LINE CIRCUITS**

Characteristics of signaling line circuits connected to this system (see NFPA 72, Table 6.6.1):

Quantity: 2 Style: 4 Class: B

**5. ALARM-INITIATING DEVICES AND CIRCUITS**

Characteristics of initiating device circuits connected to this system (see NFPA 72, Table 6.5):

Quantity: 14 Style: B Class: B

**5.1 Manual Initiating Devices**

**5.1.1 Manual Pull Stations** Number of manual pull stations: 23

Type of devices:  Addressable  Conventional  Coded  Transmitter  N/A

**5.2 Automatic Initiating Devices**

**5.2.1 Area Smoke Detectors** Number of smoke detectors: 9

Type of coverage:  Complete area  Partial area  Nonrequired partial area  N/A

Type of devices:  Addressable  Conventional  Coded  Transmitter  N/A

Type of smoke detector sensing technology:  Ionization  Photoelectric

**5.2.2 Duct Smoke Detectors** Number of duct smoke detectors: 7

Type of coverage: \_\_\_\_\_

Type of devices:  Addressable  Conventional  Coded  Transmitter  N/A

Type of smoke detector sensing technology:  Ionization  Photoelectric

**5.2.3 Heat Detectors** Number of heat detectors: 1

Type of coverage:  Complete area  Partial area  Nonrequired partial area  N/A

Type of devices:  Addressable  Conventional  Coded  Transmitter  N/A

**5.2.4 Sprinkler Waterflow Detectors** Number of waterflow detectors: 5

Type of devices:  Addressable  Conventional  Coded  Transmitter  N/A

**5.2.5 Alarm Verification** Number of devices subject to alarm verification: \_\_\_\_\_

Alarm verification on this system is:  Enabled  Disabled Set for \_\_\_\_\_ seconds

FIGURE 4.5.2.1 Continued

**6. SUPERVISORY SIGNAL-INITIATING DEVICES AND CIRCUITS**

**6.1 Sprinkler System**

Number of valve supervisory switches: 12

Type of devices: Addressable Conventional Coded Transmitter N/A

**6.2 Fire Pump**

Type of fire pump: Electric Diesel

Type of fire pump supervisory devices: Addressable Conventional Coded Transmitter N/A

**Fire Pump Functions Supervised**

Fire pump power Fire pump running Fire pump phase reversal Selector switch not in auto  
Engine or control panel trouble Low fuel

Other: \_\_\_\_\_

**6.3 Engine-Driven Generator**

Type of generator supervisory devices: Addressable Conventional Coded Transmitter N/A

Engine or control panel trouble Generator running Selector switch not in auto Low fuel

Other: \_\_\_\_\_

**7. ANNUNCIATORS**

**7.1 Annunciator 1** Local Remote

Type: Addressable Directory Graphic N/A Location: Bld 55 FACP Electrical Rm

**7.2 Annunciator 2** Local Remote

Type: Addressable Directory Graphic N/A Location: Entrance Bld 55

**7.3 Annunciator 3** Local Remote

Type: Addressable Directory Graphic N/A Location: \_\_\_\_\_

**8. ALARM NOTIFICATION DEVICES AND CIRCUITS**

**8.1 Emergency Voice Alarm Service**

Number of single voice alarm channels: 8 Number of multiple voice alarm channels: \_\_\_\_\_

Number of speakers: 119 Number of speaker zones: 2

**8.2 Telephone Jacks**

Number of telephone jacks installed: \_\_\_\_\_ Number of telephone handsets stored on site: \_\_\_\_\_

Type of telephone system installed: Electrically powered Sound powered N/A

**8.3 Nonvoice Audible System**

*Characteristics of notification device circuits connected to this system (see NFPA 72, Table 6.5):*

Quantity: \_\_\_\_\_ Style: \_\_\_\_\_ Class: \_\_\_\_\_

FIGURE 4.5.2.1 Continued

**8. ALARM NOTIFICATION DEVICES AND CIRCUITS (continued)****8.4 Types and Quantities of Nonvoice Notification Appliances Installed**

Bells: \_\_\_\_\_ With visual device: \_\_\_\_\_ Horns: \_\_\_\_\_ With visual device: \_\_\_\_\_  
 Chimes: \_\_\_\_\_ With visual device: \_\_\_\_\_ Bells: \_\_\_\_\_ With visual device: \_\_\_\_\_  
 Visual devices without audible devices: 92 Other (describe): 95 Blue Strobes (mass notification)

**9. EMERGENCY CONTROL FUNCTIONS ACTIVATED**

Hold-open door releasing devices  Smoke management or smoke control  
 Door unlocking  Elevator recall  Other \_\_\_\_\_

**10. SYSTEM POWER SUPPLY****10.1 Primary Power**

Nominal voltage 120 VAC Amps 12  
 Overcurrent protection: Type Breaker Amps \_\_\_\_\_  
 Location (of primary supply panelboard): \_\_\_\_\_  
 Disconnecting means location: \_\_\_\_\_

**10.2 Secondary Power**

Location: Panel or Battery Back Box Type: Lead Sealed Nominal voltage: 24 Current rating: \_\_\_\_\_  
 Number of standby batteries: 2 Amp hour rating: 100  
 Location of emergency generator: N/A  
 Location of fuel storage: N/A  
 Calculated capacity of secondary power to drive the system  
 In standby mode: 24 In alarm mode: 10 min

**11. RECORD OF SYSTEM INSTALLATION**

*Fill out after all installation is complete and wiring has been checked for opens, shorts, ground faults, and improper branching, but before conducting operational acceptance tests.*

The system has been installed in accordance with the following NFPA standards: (Note any or all that apply.)

NFPA 72  NFPA 70, *National Electrical Code*, Article 760  
 Manufacturer's published instructions  Other (please specify): Specifications  
 System deviations from referenced NFPA standards: None

Signed: \_\_\_\_\_ Printed name: Lou Esposito Date: 3/9/12  
 Organization: Hiller Systems Inc Title: Technician Phone: 757-549-9123

**12. RECORD OF SYSTEM OPERATION**

All operational features and functions of this system were tested by or in the presence of the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements of:

NFPA 72  NFPA 70, *National Electrical Code*, Article 760  
 Manufacturer's published instructions  Other (please specify): Specifications  
 Documentation in accordance with Inspection and Testing Form (Figure 10.6.2.3) is attached

Signed: \_\_\_\_\_ Printed name: Lou Esposito Date: 3/9/12  
 Organization: Hiller Systems Inc. Title: Technician Phone: 757-549-9123

FIGURE 4.5.2.1 *Continued*

13. CERTIFICATIONS AND APPROVALS

13.1 System Installation Contractor

This system as specified herein has been installed and tested according to all NFPA standards cited herein.

Signed: [Signature] Printed name: Jake Starff Date: 3/12/12  
Organization: Bay Electric Title: Supv Phone: 327-9757

13.2 System Service Contractor

This system as specified herein has been installed and tested according to all NFPA standards cited herein.

Signed: [Signature] Printed name: Lou Esposito Date: 3/9/12  
Organization: Hiller Systems Inc Title: Tech Phone: \_\_\_\_\_

13.3 Central Station

This system as specified herein will be monitored according to all NFPA standards cited herein.

Signed: \_\_\_\_\_ Printed name: \_\_\_\_\_ Date: \_\_\_\_\_  
Organization: N/A Title: \_\_\_\_\_ Phone: \_\_\_\_\_

13.4 Property Representative

I accept this system as having been installed and tested to its specifications and all NFPA standards cited herein.

Signed: [Signature] Printed name: Dave Kausch Date: 3/12/12  
Organization: JLAB Title: Fire Protection Manager Phone: 757-269-7674

13.5 Authority Having Jurisdiction

I have witnessed a satisfactory acceptance test of this system and find it to be installed and operating properly in accordance with its approved plans and specifications, its approved sequence of operations, and with all NFPA standards cited herein.

Signed: [Signature] Printed name: Dave Kausch Date: 3/12/12  
Organization: JLAB Title: Fire Protection Manager Phone: 757-269-7674

FIGURE 4.5.2.1 Continued