

FIRE DEPARTMENT • CITY OF NEW YORK



**STUDY MATERIAL FOR THE
CERTIFICATE OF FITNESS EXAMINATION**

L-19

SUPERVISION OF SANITARY LANDFILL METHANE RECOVERY FACILITIES

All applicants are required to apply and pay for an exam online before arriving at the FDNY. It can take about 30 minutes to complete.

Simplified instructions for online application and payment can be found here:

<http://www1.nyc.gov/assets/fdny/downloads/pdf/business/fdny-business-cof-individuals-short.pdf>

Create an Account and Log in to:

<http://fires.fdnyccloud.org/CitizenAccess>

This study material is provided to the public for free by the FDNY.

EXAM SPECIFIC INFORMATION FOR L-19 CERTIFICATE OF FITNESS

Save time and submit application online!

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REQUIREMENTS FOR CERTIFICATE OF FITNESS APPLICATION

General requirements:

Review the General Notice of Exam:

<https://www1.nyc.gov/assets/fdny/downloads/pdf/business/general-notice-of-exam-cof.pdf>

Special requirements for the L-19 Certificate of Fitness:

- L-19 C of F can cover S-95 C of F duties. L-19 C of F holder can purchase S-95 C of F with required recommendation letter.
- The L-19 applicant must have at least 6 months of satisfactory work experience under the supervision of L-19 Certificate of Fitness holder. Sample of the recommendation letter is provided in the following page and available in the following link:

<http://www1.nyc.gov/assets/fdny/downloads/pdf/business/cof-l19-samplerec-letter.pdf>

Application fee (Cash is NO LONGER ACCEPTED):

Pay the **\$25** application fee online or in person by one of the following methods:

- Credit card (*American Express, Discover, MasterCard, or Visa*)
- Debit card (*MasterCard or Visa*)
- In person: Personal or company check or money order (*made payable to the New York City Fire Department*)

A convenience fee of 2% will be applied to all credit card payments.

For fee waivers submit: ***(Only government employees who will use their COF for their work- related responsibilities are eligible for fee waivers.)***

- A letter requesting fee waiver on the Agency's official letterhead stating applicant full name, exam type and address of premises; **AND**
- Copy of identification card issued by the agency

--L-19 SAMPLE RECOMMENDATION LETTER--

COMPANY NAME
BUSINESS ADDRESS

Date: _____

Fire Department
Bureau of Fire Prevention
9 Metro Tech Center
Brooklyn, NY 11201-3857

To whom it may concern:

I am pleased to recommend (Applicant's name) to apply for the L-19 Certificate of Fitness for **SUPERVISION OF SANITARY LANDFILL METHANE RECOVERY FACILITIES.**

The applicant has been worked under the supervision of (name of a L-19 C of F holder) with the C of F number: (L-19 COF holder's COF number) in the sanitary landfill methane recover at (premises address) for (amount of time employed, must be more than 6 months)

After the applicant receives the L-19 C of F, the applicant will be working at (Address of building where certificate is to be used).

Applicant is of GOOD CHARACTER and is PHYSICALLY ABLE to perform the functions required by the holder of the Certificate of Fitness.

(Printed name of Employer) (Employer's title) (Signature of Employer)

NOTE: The recommendation letter should be on employer's letterhead. If not on employer's letterhead, signature must be notarized.

REQUIREMENTS FOR ALTERNATIVE ISSUANCE PROCEDURE (AIP)

No AIP available. This certificate of fitness can only be obtained by passing the computer exam at the FDNY Headquarters.

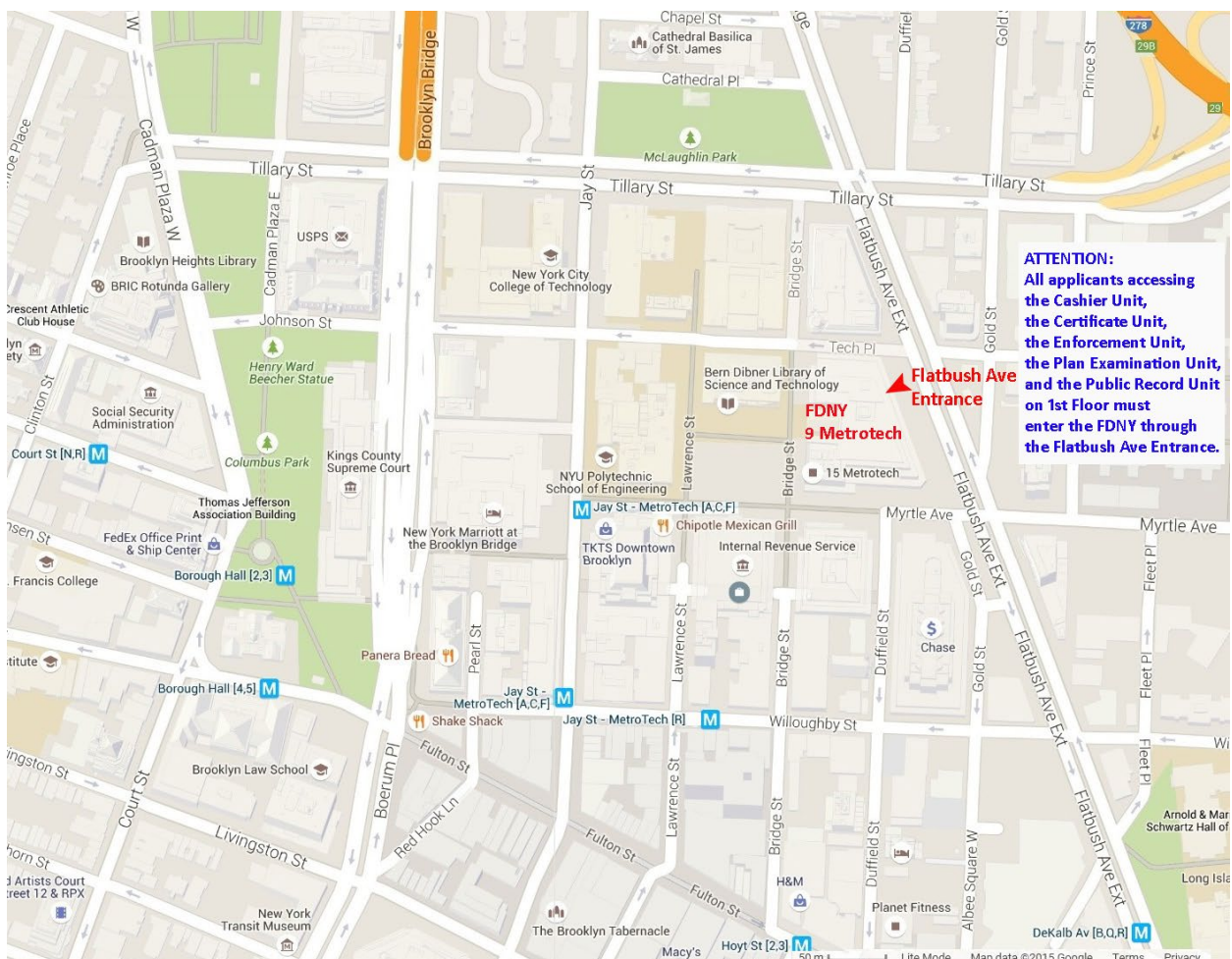
EXAM INFORMATION

The **L-19** exam will consist of **45** multiple-choice questions, administered on a “touch screen” computer monitor. It is a time-limit exam. Based on the amount of the questions, you will have 68 minutes to complete the test. A passing score of at least 70% is required in order to secure a Certificate of Fitness.

Please always check for the latest revised booklet at FDNY website before you take the exam.

<http://www1.nyc.gov/assets/fdny/downloads/pdf/business/cof-119-noe-study-materials.pdf>

Exam site: **FDNY Headquarters, 9 MetroTech Center, Brooklyn, NY.**
Enter through the Flatbush Avenue entrance (between Myrtle Avenue and Tech Place).



RENEWAL REQUIREMENTS

General renewal requirements:

Review the General Notice of Exam:

<https://www1.nyc.gov/assets/fdny/downloads/pdf/business/general-notice-of-exam-cof.pdf>

Special renewal requirements for L-19 COF: None

The FDNY strongly recommends the L-19 COF holders to renew the COF on-line. To learn the simplified on-line renewal:

<https://www1.nyc.gov/assets/fdny/downloads/pdf/business/cof-simplified-renewal-short.pdf>

QUESTIONS?

FDNY Business Support Team: For questions, call 311 and ask for the FDNY Customer Service Center or send an email to FDNY.BusinessSupport@fdny.nyc.gov

STUDY MATERIAL AND TEST DESCRIPTION

This study material contains the information you will need to prepare for the examination for the Certificate of Fitness to supervise SANITARY LANDFILL METHANE RECOVERY FACILITIES. The study material includes information taken from relevant sections of the Fire Prevention Code and the Building Code of New York.

Fire Department Certificates of Fitness are extremely important. A holder must secure and protect his or her Certificate of Fitness in much the same manner as one would a driver's license. It must be available upon demand by a duly authorized Fire Department representative. It is very important for you to review the information in the study guide very carefully. The study material does not contain all of the information you need to know in order to perform your duties. It is your responsibility to learn whatever else you need to know to do your job effectively, and in keeping with all Fire Department rules and regulations as well as all other pertinent laws.

All questions on the Certificate of Fitness examination provide a multiple choice selection of answers, with four alternative answers to each question. Only one answer is correct for each question. If you do not answer a question or if you mark more than one alternative your answer will be scored as incorrect. A score of 70% correct is required on the examination in order to qualify for the Certificate of Fitness. Read each question carefully before marking your answer. There is no penalty for guessing.

2022 FIRE CODE ENACTED

The amended New York City Fire Code, to be known as the 2022 Fire Code, takes effect on April 15, 2022. **It may not have been updated in this study material and the exam will be mainly based on this booklet, not the 2022 Fire Code. However, as the Certificate of Fitness holder, it is your responsibility to become familiar with the applicable sections of the new 2022 Fire Code.**

Design and installation provisions.

The design and installation provisions of the 2022 Fire Code shall apply to:

- Facilities established and conditions arising on or after 04/15/2022.
- Facilities and conditions not lawfully existing prior to 04/15/2022.

The facilities and conditions lawfully existing prior to the 04/15/2022 can be continued in compliance with the requirements of the former Fire Code/Fire Rule except as otherwise provided in the New Fire Code 102.5.

Operational and maintenance provisions.

The operational and maintenance provisions of the 2022 Fire Code, including permit and certification requirements, shall apply to all facilities, operations,

conditions, uses and occupancies, regardless of when they were established or arose.

Whenever this code is amended or a rule is promulgated to require a permit or certificate for a facility, operation, condition, use or occupancy, and no permit or certificate was previously required therefor pursuant to this code or the rules, such facility, operation, condition, use or occupancy may be continued without such permit or certificate until 04/15/2023, except as may otherwise be provided by such amendment or rule.

The 2022 Fire Code can be obtained via the following website:

<http://www1.nyc.gov/site/fdny/codes/fire-code/fire-code.page>

The 2014/2022 New York City Fire Code Cross-Reference Table can be referred to the following website:

<http://www1.nyc.gov/assets/fdny/downloads/pdf/codes/fire-code-cross-reference.pdf>

Sample Questions

The following questions represent the “format” of the exam questions, not the content of the real exam.

1. Which of the following are allowed to be used/displayed while taking a Certificate of Fitness examination at 9 Metro Tech Center?

- I. cellular phone**
- II. study material booklet**
- III. reference material provided by the FDNY**
- IV. mp3 player**

- A. III only
- B. I, II, and III
- C. II and IV
- D. I only

*Only reference material provided by the FDNY is allowed to be used during Certificate of Fitness examinations. Therefore, the correct answer would be **A**. You would touch “**A**” on the computer terminal screen.*

2. If you do not know the answer to a question while taking an examination, who should you ask for help?

- A. the person next to you
- B. the firefighters
- C. the examiner in the testing room
- D. you should not ask about test questions since FDNY staff cannot assist applicants

You should not ask about examination questions or answers since FDNY staff cannot assist applicants with their tests. Therefore, the correct answer would be D. You would touch "D" on the computer terminal screen.

3. If the screen on your computer terminal freezes during your examination, who should you ask for help?

- A. the person next to you
- B. the firefighters
- C. the examiner in the testing room
- D. the computer help desk

If you have a computer related question, you should ask the examiner in the testing room. Therefore, the correct answer would be C. You would touch "C" on the computer terminal screen.

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1. DEFINITIONS

Central Station / Central Monitoring Station – The hub that contacts NYC Fire Department in case of emergency.

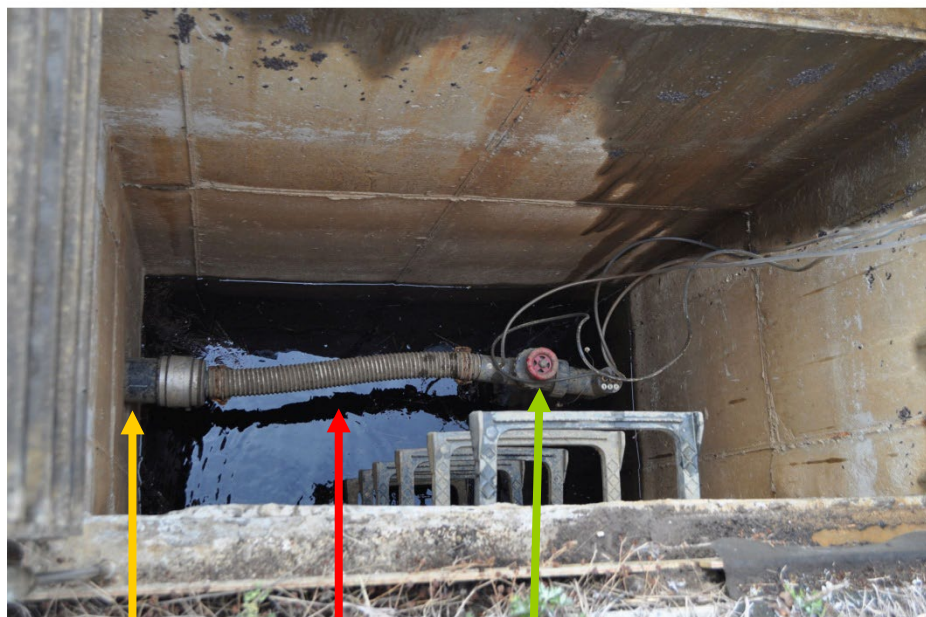
Compressor - A machine which compresses gas for the movement purposes into the piping distribution system.

Control Panel – Control Panel receives the signal from the sensors and transfers the signal to central monitoring station.



Extraction Well -

A gas well is an excavation or structure created in the ground by digging, driving, boring, or drilling to access ground in underground aquifers. Wells can vary greatly in depth (they can be anywhere from 30 feet to 80 feet deep), gas volume, and gas quality. Landfill penetrations are



Horizontal Pipe

Flexible Connection

Valve

made by pipes of different lengths.

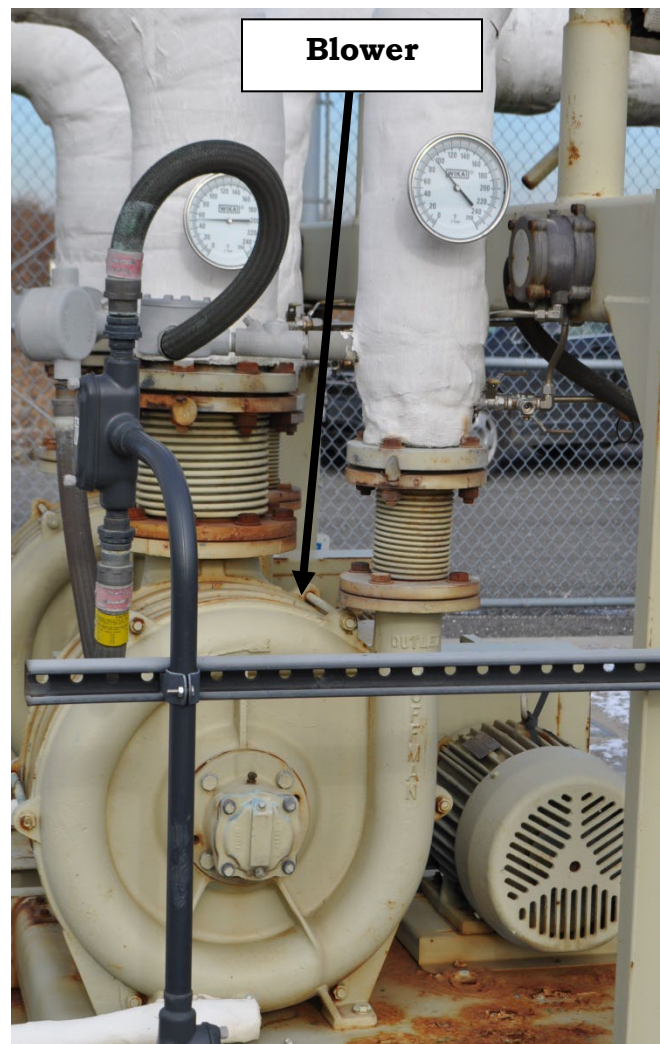
Fire Alarm Initiating Device – Fire Alarm Initiating Device is any of the following, or a combination of smoke detectors, heat detectors, UV detectors, IR sensors, pull station and duct detectors.

Fracking – Fracking is a relatively new drilling technology, which makes it possible to reach natural gas reserves. Hydraulic fracturing is the use of sand, water, and chemicals injected at high pressures to blast open shale rock and release the trapped gas inside.

Flare and Blower Station – Landfill gas is collected from decomposition of organic matter. The blowers collect the gas which is then burned in the flare station stack.

Gas Detector - A gas detector is a device which detects the presence of various gases within an area, usually as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. When activated, these methane detectors will emit audible and visible alarms in the control room.

Heat Sensors - A heat sensor is a fire alarm device designed to respond when the convected thermal energy of a fire increases the temperature of a heat sensitive element. Once the temperature reaches sensor rating the sensor will send a signal to the panel to sound the alarm.



LEL (Lower Explosiveness Limit) - The minimum concentration of a particular combustible gas or vapor necessary to support its combustion in air is defined as the Lower Explosive Limit (LEL) for that gas.

Methane Gas Detection System - A methane gas detection system that initiates audible and visible alarms in the control center

Odorant room – Methane gas is odorless, colorless and tasteless. Odorant room is an area where ethyl mercaptan (corrosive gas) is added for the purposes of detecting methane release.

Smoke detector - A listed device that senses visible or invisible particles of combustion.

UV Detector / IR Sensor – A UV detector is a device which uses photoelectric cells to detect the presence of UV rays. The Certificate of Fitness holder must ensure that UV detectors are properly operating. If the UV detectors are found to be malfunctioning the Certificate of Fitness holders must get in touch with company that services them and schedule a repair. IR sensors perform similar tasks; however they use different technologies. Infrared sensor is a device that detects an image using infrared radiation, similar to a common camera that forms an image using visible light. Instead of the 450–750 nanometer range of the visible light camera, infrared cameras operate in wavelengths as long as 14,000 nm.



2. INTRODUCTION

Landfills are the largest source of U.S. anthropogenic methane emissions. Landfill methane is produced when organic materials (such as yard waste,



household waste, food waste, and paper) are decomposed by bacteria under anaerobic conditions (in the absence of oxygen).

Methane (CH_4) is the important component of landfill gas. The amount of methane that is produced varies significantly based on composition of the waste. Most of the methane produced in the landfills is derived from food waste, composite paper, and corrugated cardboard. The rate of landfill gas production varies with the age of the landfill.

The rate of methane production varies greatly from landfill to landfill depending on site-specific characteristics such as waste in place, waste composition, moisture content, pressure created by the excess waste, landfill design and operating practices, and climate. Unless captured first by a gas recovery system, methane generated by the landfill is emitted when it migrates through the landfill cover. During this process, the soil oxidizes approximately 10 percent of the methane generated, and the remaining 90 percent is flared (burned).

Increased recycling and alternative waste disposal methods are contributing to a forecasted decline in landfill methane emissions, by slowing the rate of waste going into landfills. Primarily because of a rise in recycling, the percent of waste going to landfills has been declining, and this percentage decline has

offset the increase in total tons generated, roughly stabilizing the level of waste going into landfills.

Landfill gas utilization is a process of gathering, processing, and treating the methane gas emitted from decomposing garbage to produce electricity, heat, fuels, and various chemical compounds.

The recovery and use of methane from landfills can significantly reduce the overall emissions of greenhouse gases. Landfills are the largest anthropogenic source of methane in the U.S. There are a variety of ways that utilities can reduce overall emissions of methane from landfills. Landfill methane can be collected by gas recovery systems, and it can then be used to generate electricity, as a fuel for nearby industrial purposes, or enriched and sold to gas pipelines.

These projects are popular because they control energy costs and reduce greenhouse gas emissions. They collect the methane gas and treat it, so it can be used for electricity or upgraded to pipeline-grade gas. These projects power homes, buildings, and vehicles.

Capture and use of landfill methane as fuel for electricity generation is done through the development of well fields and collection systems at the landfill. Collected methane can be used for on-site power generation or pipelined to a nearby existing generating station. Where electric generation is impractical, flaring is preferred over direct venting to reduce emissions and fire hazards.

ALL THE METHANE RECOVERY LANDFILLS IN NEW YORK HAVE STOPPED ACCEPTING WASTE.

2.1 CERTIFICATE OF FITNESS RESPONSIBILITIES AND DUTIES

Facilities shall be under the continuous personal supervision (24 hour, seven-day-a-week) by at least one (1) person holding a L-19 Certificate of Fitness for Supervision of Sanitary Landfill Methane Recovery Facilities.

PLEASE NOTE: The L-19 Certificate of Fitness DOES NOT qualify the holder to PERFORM AND SUPERVISE FLAMMABLE GAS COMPRESSING (G-29), AND OPERATION OF A REFRIGERATING SYSTEM (Q-01) at a sanitary landfill methane recovery facility. Separate Certificates of Fitness are required for those job duties.

JOB RESPONSIBILITY	COF	RELATED COF TESTS
PERFORM AND SUPERVISE FLAMMABLE GAS COMPRESSING	G-29	Safe Use, Handling, Storage and Compression of Flammable Gases With Pressure Above 6 PSI
OPERATION OF A REFRIGERATING SYSTEM	Q-01	Refrigerating System Operating Engineer

CERTIFICATE OF FITNESS FOR SUPERVISION OF FIRE ALARM SYSTEMS AND OTHER RELATED SYSTEMS IS INCORPORATED INTO THIS STUDY MATERIAL (SEE SECTION 8) AND WILL BE INCLUDED IN THE CERTIFICATE OF FITNESS EXAM.

There are approximately 10 methane recovery landfill facilities in New York City. Some landfills are significantly different; however they all share similar type of mechanical and fire safety equipment.

The differences include variations in land methane content, size of plants, and employee work practices. Please use this study material with these facts in mind.

The L-19 Certificate of Fitness holders are RESPONSIBLE for ensuring that ALL New York City Fire Department regulations related to the safe use, handling and storage of methane gas are fully observed on the premises at all times.



The failure of L-19 COF holders to fulfill their duties can result in having their Certificate of Fitness revoked. Upon receiving their Certificates of Fitness, L-19 holders must maintain their Certificates of Fitness for their entire term of employment. If a L-19 COF holder changes his/her work location, the holder is

NOT required to take another Certificate of Fitness exam. However; since L-19 is a site specific Certificate of Fitness, holders must file with FDNY to get a new COF card with correct address. Individuals that do not have a L-19 Certificate of Fitness and are transferring to a new location must provide a recommendation letter on an employer's letterhead with the correct work address prior to taking the L-19 Certificate of Fitness exam. A Certificate of Fitness card should be provided to FDNY representatives upon request. When applying for a L-19 Certificate of Fitness an employee must provide the FDNY with the employer's recommendation letter attesting to employees work experience.

2.2 SPECIFIC CERTIFICATE OF FITNESS RESPONSIBILITIES

- Record operational data (such as run times) on all mechanical equipment comprising the groundwater collection system and the landfill gas collection and flare station. **(See an example of daily, weekly, and monthly logs in the pages 38-45 of this study material.)**
- Performing routine maintenance (e.g. lubrication) on mechanical equipment as required.
- Visually observing the performance of mechanical equipment, and associated controls and instrumentation.
- Visually inspecting the condition of the landfill cover system.
- Visual inspection of the fire protection equipment

2.3 ANTICIPATED HAZARDS ASSOCIATED WITH CERTIFICATE OF FITNESS RESPONSIBILITIES

- Potential for injury related to slip, trip and fall type accidents during the operator's walking tour of the site.
- Potential for injury/property damage related to the use of manual cranes/hoists when performing corrective maintenance on mechanical equipment.
- Potential for injury to workers' head, face, hands, feet and eyes, when inspecting and working on mechanical equipment, and when performing landscaping tasks.
- Potential for injury related to lock-out/tag-out (ex. Unwanted or unauthorized start-up of motorized equipment, electrocution, etc.), when performing as-needed corrective maintenance on mechanical equipment.
- Potential for exposure to various bio-hazards during the field sampling.

Some sanitary landfill methane recovery facilities may have more than one (1) Certificate of Fitness holder working at the same time, just in case one of them gets injured on the job. The other individual can then seek medical attention. In the case where only one (1) COF holder is on duty, he or she must have

specific instructions on whom to contact in case of injury or other emergency. It is best to ask the supervisor about the proper protocol, as each methane recovery facility has a different one.

2.4 RESPONSIBILITY OF THE FACILITY OWNER

It shall be the owner's representative/operators responsibility to maintain the sanitary landfill methane recovery facility and related systems. It is also the owner's responsibility to determine the individual qualifications needed for the Certificate of Fitness holder to perform duties that are related to inspection, testing and maintenance of the facility. It is also the owner's responsibility to maintain a valid FDNY permit.

Records of all system inspections, tests, servicing and other maintenance required by the NYC Fire Code and NYC Fire Rules shall be maintained on the premises for a minimum of 3 years and made available for inspection by any department representative.

The facility owner shall assign an operations and maintenance employee to comply with the requirements of this study guide. In the absence of a specific designee, the owner shall be considered the impairment coordinator.

2.5 FDNY PERMITS

2.5.1 Site-Specific Permit

Such permit authorizes the permit holder to recover methane from landfills and related processing, and to conduct an operation or maintain a facility at a specific premises or location, for which a permit is required by the NYC Fire Code.

A site-specific permit is valid for 12 months only. Every permit or renewal will require an inspection by the NYC Fire Department's Bulk Fuel Safety Unit and shall expire after 12 months.

Permits are not transferable and any change in occupancy, operation, tenancy or ownership must require that a new permit be issued. The Certificate of Fitness holder is responsible for ensuring that all fire safety regulations and procedures regarding the premises are fully observed. Permits and Certificates of Fitnesses shall be readily available and posted on the premises for inspection by Fire Department representatives.

FIRE DEPARTMENT, CITY OF NEW YORK				BUREAU OF FIRE PREVENTION		
ACCOUNT NUMBER 77777777	TYPE 10	A.P. P	D.O. 12	ADM. CO. E284	ISSUANCE DATE 01/28/10	PERMIT EXPIRES 01/11
PREMISES ADDRESS 1111 YORK ST STATEN ISLAND NY 11111				ACCOUNT NAME CARI & RENO		
ITEM CODE 338	SUB CODE 00	QTY 01	DESCRIPTION Methane Recovery Operations		FLOOR NO. 1	FEE PAID
PERMIT TYPE 1 1-REGULAR 2-SUPPLEMENTAL 3-DUPLICATE				ANNUAL FEE PAID		
CARI & RENO 1111 YORK ST STATEN ISLAND NY 11111						
 20 11012938				BY ORDER OF THE COMMISSIONER		

AN EXAMPLE OF FDNY PREMISES PERMIT

2.5.2 Hot Work Permit

- A Certificate of Fitness (G-60) is needed for conducting torch operations.
- A Certificate of Fitness (F-60) holder must be present to perform fire watch during hot work operations.
- A copy of an insurance policy is required as well for conducting hot work operations.
- FDNY temporary permits are required to conduct hot work:
 - (1) using oxygen and a flammable gas; or
 - (2) storing, using or handling any flammable gas in excess of 400 SCF.
- Hot work authorization (is NOT a FDNY permit) requirements:
 1. Hot work authorizations are to be issued daily and are required at all times for any welding, brazing/soldering, torch cutting, and spark production. A hot work authorization should be prepared by the responsible person for the subcontractor. The L-19 holder may serve as the responsible person or should ensure that such a person is designated to monitor the hot work operations. The L-19 Certificate of Fitness holder must have copies of all FDNY hot work permits and hot work authorizations secured on premises.

2. Hot work operations are limited to the area and time specified in the hot work authorization.
3. Subcontractors will identify responsible persons for hot work in Subcontractor Site Specific Safety Plans.
4. A copy of the FDNY hot work temporary permit and hot work authorization are to be kept by the fire guard. Copies of completed permits will be maintained in the project files.
5. Hot work authorization must be posted in the area where the work is taking place. It must be available for inspection by any representative of the FDNY during the performance of the work, and for 48 hours after the work is complete.
6. A pre-hot work check shall be conducted by the responsible person prior to work to ensure that all equipment is safe and hazards are recognized and protected. A report of the check shall be kept at the work site during the work and made available for inspection by any representative of the FDNY.
7. A hot work permit has to be obtained from CDA (Construction, Demolition and Abatements) Unit of FDNY.
8. A pre-hot work check shall be conducted at least once per day.

WELDING

(1) Welds of steel process piping shall be made by certified welders, and evidence of their certifications shall be filed with the FDNY. Piping welders shall be certified to the Department of Buildings by their employers after qualifying under the ASME Boiler and Pressure Vessel Code, or API Standard 1104-1999.

Additionally, welders using oxygen and a flammable gas during torch operations must have a G-60 Certificate of Fitness. Fire Guards holding a F-60 Certificate of Fitness issued by the FDNY shall also be present at the time of torch operations.

(2) Upon completion of the installation, the owner or operator of the facility shall arrange to have a FDNY representative witness a hydro-test of all process piping (if needed – is based on the installation).

3. DESIGN, INSTALLATION AND OPERATION OF METHANE GAS RECOVERY FACILITIES

Methane gas recovery facilities at sanitary landfills must be designed, installed, operated and maintained in compliance with the requirements of the NYC Fire Code, NYC Fire Rules, NYC Construction Codes and the NYC Electrical Code.

Design and installation documents for the facility, detailing the methane recovery process and fire protection systems, including a process flow diagram showing all vessels (also known as containers) and instrumentation, shall be filed with the NYC Department of Buildings and the FDNY's Bureau of Fire Prevention, together with supporting information and documentation.

3.1 DESIGN AND INSTALLATION REQUIREMENTS

Pressure Vessels (Containers) shall be designed to comply with the ASME Boiler and Pressure Vessel Code. Manufacturer ASME data sheets for pressure vessels as well as the results of pressure tests (if required) shall be maintained on the premises and made available for inspection by any Fire Department representative.

3.1.1 Electrical Equipment

(A) Electrical equipment within 25 feet of any process equipment shall be explosion-proof.

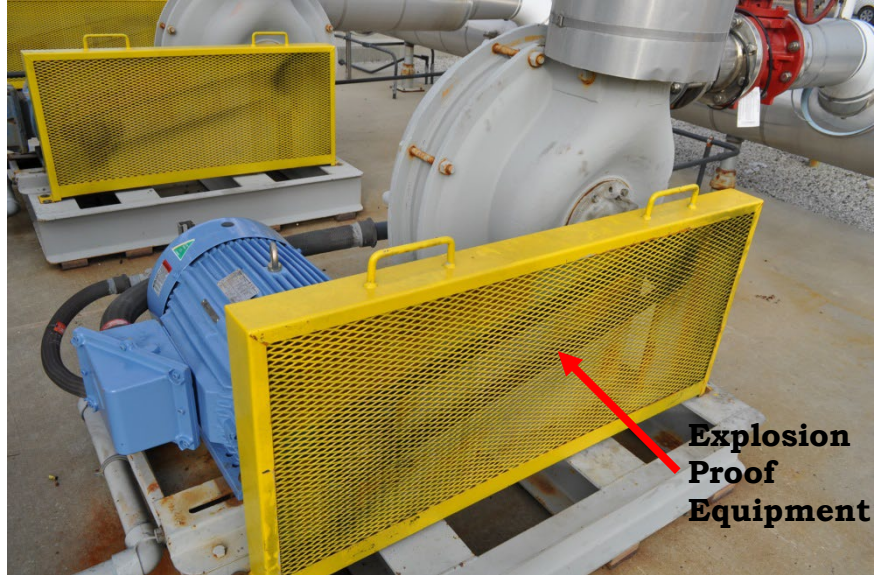
That includes the following:

- control center
- electric service
- overhead lights
- air handling equipment
- odorant room



(B) Electrical instrumentation shall be designed to provide for fail-safe operation.

- Instrumentation shall provide for fail safe design and operation.
- Refrigeration systems, if used, shall utilize a non-flammable refrigerant.
- The design and fabrication of the piping systems shall comply with ANSI B31.3-1980 “Chemical Plant and Petroleum Refinery Piping” except as modified by the Fire Department – City of New York.



3.2 GAS COLLECTION SYSTEMS

Landfill gas is gathered from landfills through extraction wells. A typical gas extraction well is shown here.

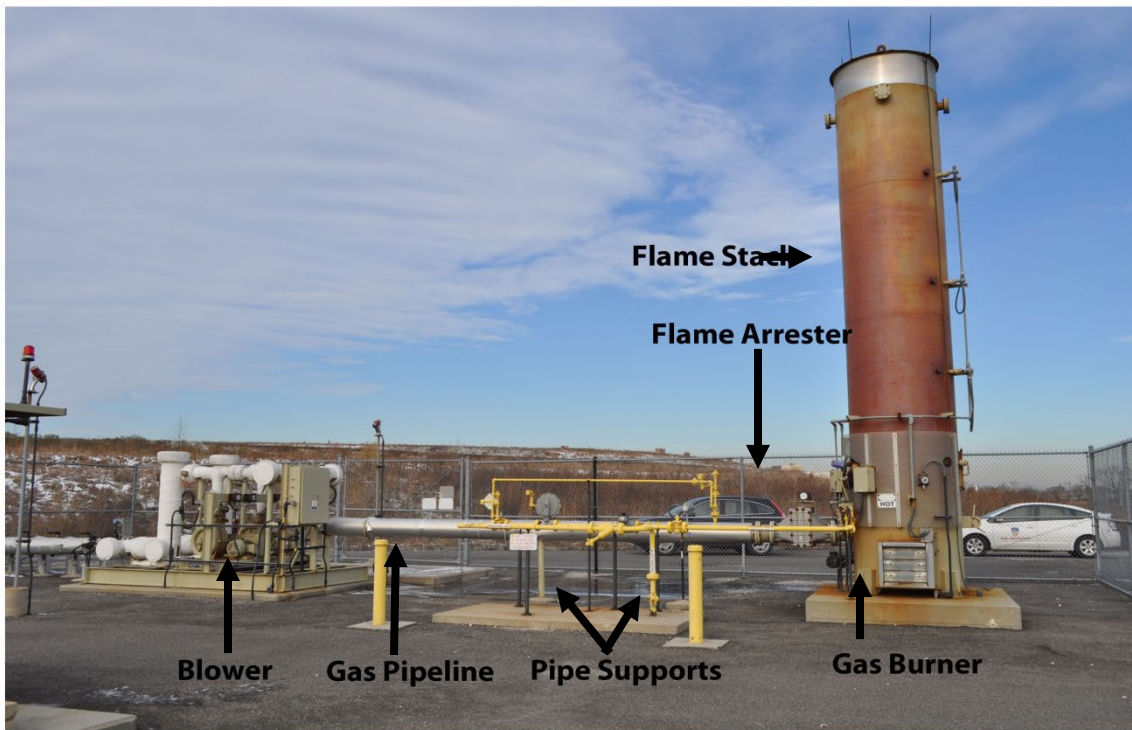
Landfill gas can also be extracted through horizontal trenches instead of vertical wells. Both systems are effective at collecting gas.

Landfill gas is extracted and piped to a main collection header, where it is then sent to be treated or flared. A blower is needed to pull the gas from the collection wells to the collection header and further downstream.



3.3 FLARE AND BLOWER STATION

If gas extraction rates do not warrant direct use or electricity generation, the gas can be flared off. One hundred m³/hr is a practical threshold for flaring. Flares are useful in all landfill gas systems, as they can help control excess gas extraction spikes and maintenance down periods. Flares can be either open or enclosed. Enclosed flares are typically more expensive, but they provide high combustion temperatures and specific residence times as well as limit noise and light pollution.



Landfill gas must be treated to remove impurities, condensate, and particulates. This process of purification is done at the flare and blower station.

The process and components of different flare stations do vary from facility to facility; however, common components usually include, extraction wells, headers, pipes, flaring station, sensors, control panels and so forth. Extraction wells and headers are connected with pipe to the flaring station. At the flaring station sensors measure the contents and amount of methane gas on each header.

Some flaring stations have a nitrogen or air operated shutdown valve. A modulating valve may also be present, as it is the valve that controls how much gas is taken from the landfill.

Blowers act as a vacuum that pull the gas from the landfill. A flame arrester, which is a honeycomb of metal, acts as a fail-safe mechanism. If the flame goes backwards, the flame arrester melts and an alarm will sound, and will simultaneously initiate a system shut-down. It is a preventive measure and may save lives.

The flaring station is always on, just in case there is gas that needs to be burned. If the gas is coming into a flare and blower station, it **MUST** be burned. If the flaring station is off and gas continues to be pulled in from extraction wells, it is then sent to the recovery system.

The flaring station has to be under constant maintenance. The lens/iris of the sensors has to be constantly cleaned, rates have to be recorded, and the control panel needs to be constantly checked and calibrated. These are just some of the many responsibilities the L-19 COF holder must perform. The flare has to be run at a minimum temperature; it is done by letting air in and out.

BELOW IS A BRIEF SUMMARY OF HOW THE FLARE AND BLOWER STATION FUNCTION.

The flare and blower process consists of turning on the blower. The blower then cleans the stack, after that the pilot gas gets released and pilot gets lit. Once the pilot gas gets lit and is at a certain temperature, the shutdown valve opens – lets the methane gas in. Blowers turn on automatically and start pulling in the methane gas. The pilot ignites it, and the flare is on.

The pathway of the gas in the FLARE and BLOWER STATION is:
HEADER → BLOWERS → FLAME ARRESTER → STACK

4. EMERGENCY SHUT DOWN OF THE FACILITY

In case of a fire emergency, the Certificate of Fitness holder shall comply with the following:

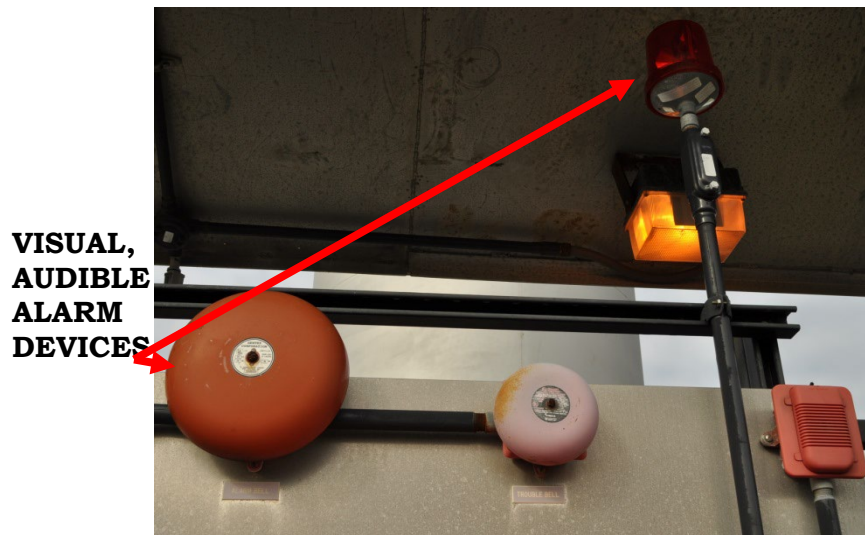
- 1) Initiate the emergency shutdown (ESD) of the landfill methane recovery facility
- 2) Call the Fire Department
- 3) Identify the source of the fire hazard
- 4) Direct firefighters to the hazard and assist as necessary

(A) The process equipment shall be provided with an emergency shut-down system capable of automatic and manual operation. The emergency shutdown system shall initiate upon the following activation:

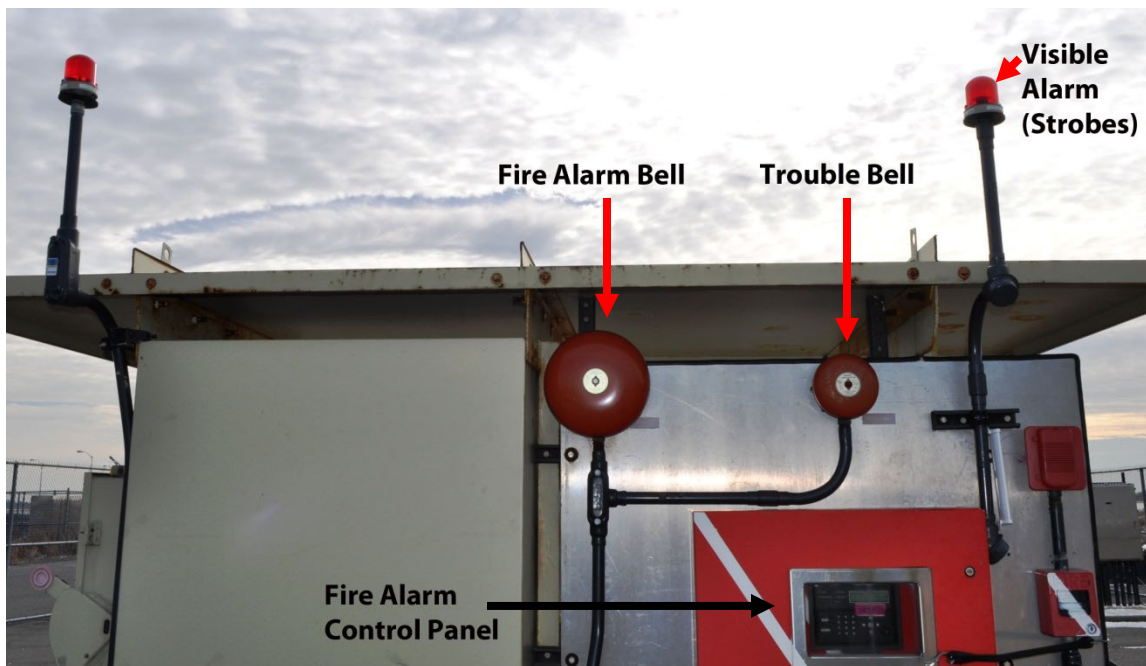
- Manual activation of the system at the process control center (such as a fire, process equipment failure, etc).
- Activation of the fire detection system detectors located in the feed gas engine compressors area, or in other areas as determined by the Fire Department.

(B) Activation of the emergency shut-down system shall initiate:

- AUDIBLE and VISIBLE ALARMS at the control center
- an AUDIBLE ALARM outside the control center



- a VISIBLE ALARM at the field alarm panel
- automatic shut down of process equipment within two (2) minutes,
- followed by depressurization of process piping to 100 psig or less with seven (7) minutes to 20 psig or less within twelve (12) minutes.



Instrument air compressors are not required to shut down upon activation of the emergency shut-down system.

(C) An EMERGENCY SHUT-DOWN can't be initiated by pulling the EMERGENCY SHUT-DOWN SWITCHES (Class 3 Box). The Certificate of Fitness holder MUST know where Emergency Shut-Down switches are located in their plant.

Should there be a need to release the gas from the system in case of emergency, the release shall only occur when all personnel are at a minimum distance from the system. System build-in timer usually allows 2 minutes for COF to investigate and to release the gas; personnel are required to abandon the facility to avoid breathing in the methane gas.

(D) One (1) or more emergency shut-down system abort switches, manual pull stations may be provided in the control center and/or in the field alarm panel. When activated within the first two (2) minutes it will not interrupt any required transmission of alarms to central station. Manual activation of the



emergency shut-down system shall override any abort switches. A manual pull station is connected to the Fire Alarm Panel and designed to shut-down the plant if necessary.



*Emergency shut-down is initiated with an initiating fire alarm device.

5. ALARM SYSTEMS

Alarm systems shall be designed and installed in compliance with NYC codes and regulations.

(A) A methane gas detection system that initiates audible and visible alarms in the control center at 25% LEL shall be provided throughout the landfill methane recovery facility.

Such a system shall have an audible alarm outside the control center and a visible alarm on the field alarm panel. The methane gas detection system may be interconnected with the emergency shut-down system, and is arranged to initiate such a shut down if gas detection reaches 50% of LEL. More on this in section 8 of this study material.



METHANE GAS DETECTOR

METHANE GAS DETECTORS SHALL BE PROVIDED IN THE FOLLOWING LOCATIONS:

- Feed gas compressor areas
- Feed gas intercool areas
- Vacuum compressor areas
- Vacuum module
- H.P. flash module
- Pretreatment module
- Solvent recovery system area
- Other area as determined by the FDNY.

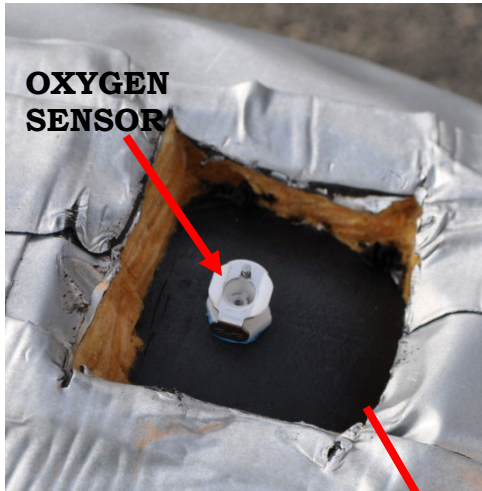
(B) An UV (Ultra-Violet) detectors and/or IR (Infra-Red) sensors shall be provided to protect the methane recovery and flaring plant area. The system shall initiate an audible and visible alarm at the control center, and an audible alarm on the field alarm panel. Activation of the fire detection system shall initiate the facility emergency shut-down system and shall transmit a fire alarm signal to a central monitoring station.

(C) At least one (1) manual fire alarm box (Class 3 box) shall be provided in the control center. At least one (1) additional manual fire alarm box shall be provided within the facility and near the facility entrance, which, if manually activated, shall transmit an alarm to a central monitoring station.

NOTE: The Class 3 Box will only send a signal to an FDNY approved monitoring station. IT WILL NOT INITIATE AN EMERGENCY SHUT-DOWN.

(D) Process alarms for abnormal operating conditions shall be installed and in working order.

(E) Some methane recovery stations have oxygen sensor for monitoring the oxygen levels in the landfill gas. Levels above 5% of oxygen by volume are an indication of a hazard and should initiate a recovery system shut-down.



6. YARD HYDRANT SYSTEM

A landfill methane recovery facility shall be provided with a yard hydrant system installed in conformance with the requirements of the construction codes, including the NYC Building Code and 2022 NYC Fire Code section 507.

The yard hydrant system shall be designed and installed in compliance with the following requirements:

(A) Hydrants shall be of a type complying with the requirements of the NYC Department of Environmental Protection and have Fire Department approved threads;

(B) The hydrant system piping shall be a minimum of eight (8) inches in diameter;

(C) Fire Department connections to the hydrant system piping shall be provided at one (1) or more approved locations;

(D) The system shall be supplied with water from a source capable of providing a minimum of 2,500 GPM (gallons per minute);

(E) A hydrant loop grid system shall be provided with block valves at one (1) or more approved locations for emergency and maintenance purposes;

(F) Hose reels and nozzles shall be provided at one (1) or more approved locations and shall be readily available for use; and



(G) Where required by the Fire Department, fire water monitors shall be provided at one (1) or more approved locations.

If a fire extinguishing system other than a sprinkler system is installed in an interior motor control room, it shall be of an approved type, and shall comply with NYC Fire Code Section 904 and the NYC Building Code.

6.1 HYDRANT TESTING

Hydrants shall be tested annually to ensure proper functioning. Each hydrant shall be opened fully and water flowed until all foreign material has cleared.

Flow shall be maintained for not less than 1 minute. After the operation, dry barrel and wall hydrants shall be observed for proper drainage from the barrel. Full drainage shall take no longer than 60 minutes. Where soil conditions or other factors are such that the hydrant barrel does not drain within 60 minutes, or where the groundwater level is above that of the hydrant drain, the hydrant drain shall be plugged and the water in the barrel shall be pumped out.



Dry barrel hydrants that are located in areas subject to freezing weather and that have plugged drains shall be identified clearly as requiring pumping after operation.

6.2 MAINTENANCE

Hydrants shall be lubricated annually to ensure that all stems, caps, plugs, and threads are in proper operating condition. Hydrants shall also be kept free of snow, ice, or other materials and protected against mechanical damage so that free access is ensured. After using a fire hydrant, a Certificate of Fitness holder should always secure the cap, roll and properly store the hoses, and check that the hydrant has drained properly.

6.3 HOSE CABINETS

Hose cabinets must be painted red and provided with a white strip and number. The cabinet must be accessible at all times. Hoses, nozzles and other fire protection tools are to be kept in the hose cabinet. Hose connections are located in the hose cabinet. These connections will allow fire fighters to connect directly into the yard system.



The Certificate of Fitness holder should ensure that the hose cabinets are in good working order. All equipment inside should be inspected. The standard hose length is 50 feet. The hose cabinet must be closed with specific type of lock. The lock should be of a type that is easily broken in the event the key is not available.



Cabinets and enclosed compartments used to house portable fire extinguishers shall be clearly marked with the words FIRE EXTINGUISHER in letters at least two (2) inches high. Cabinets and the compartments shall be readily accessible at all times.

The hose in the storage shall be kept out of direct sunlight and in a well-ventilated location. The

hose shall be stored only after it has been properly inspected, service-tested if required, cleaned, dried and rolled. The hose that is out-of-service for repair shall be properly tagged and kept separated from any hose that is in storage and ready for service. To maximize the life of the hose, it should be

stored in a ventilated area at temperatures between 32°F and 100°F. As per manufacturer's maintenance requirements, the hose should be wet-tested annually at a working pressure.

A HOSE NOZZLE is attached at the end of the hose. The nozzle is used to direct the stream of water from the hose. An example of a typical nozzle is shown in the picture below:



Water Nozzle

Nozzles at auxiliary hose stations shall be FDNY approved. Water spray nozzles shall be inspected and maintained by the L-19 COF holders to ensure that they are in place, continue to be aimed or pointed in the direction intended in the system design, and are free from external loading and corrosion. Where caps or plugs are required, the inspection shall confirm they are in place and free to operate as intended. Misaligned water spray nozzles shall be adjusted (aimed) by visual means, and the discharge patterns shall be checked at the next scheduled flow test.

6.4 MARKING/SIGN

Wall hydrants and fire pump test headers located on the exterior of buildings shall be conspicuously marked to indicate their function. FDNY connections shall be marked as follows:

1. FDNY connections serving a standpipe system shall be provided with caps painted red, and shall have the word "STANDPIPE" in letters 1 inch high and 1/8 inch deep cast in the body or on a non-ferrous metal plate secured to the connections. They may also be mounted on the wall in a visible location, except that caps of FDNY connections used for combination standpipe and sprinkler systems shall be painted yellow and the words shall read "COMBINATION STANDPIPE AND SPRINKLER SYSTEMS."
2. FDNY connections serving a sprinkler system protecting an entire building or structure shall be provided with caps painted green and shall have the word "SPRINKLER" in letters 1 inch high and 1/8 inch deep cast in the body or on a non-ferrous metal plate secured to the connections. They may also be mounted on the wall in a visible location, except that caps of fire department connections used for combination standpipe and sprinkler systems shall be painted yellow and the words shall read "COMBINATION STANDPIPE AND SPRINKLER SYSTEMS."
3. FDNY connections serving a non-automatic sprinkler system shall have the entire connection painted silver.

4. FDNY connections serving a sprinkler system protecting only a portion of a building or structure shall have durable metal signs securely fastened to, or above, the connection indicating the portion of the building or structure protected.

FIRE EXTINGUISHERS

7. PORTABLE FIRE EXTINGUISHERS

7.1 INSTALLATION AND PLACEMENT

Fire extinguishers must be located in conspicuous locations where they will be readily accessible and immediately available for use. These locations must be along normal paths of travel. Fire extinguishers having a gross weight 40 pounds or less must be installed so that the top of the extinguisher is not more than 5 ft above the floor. Hand-held fire extinguishers having a gross weight exceeding 40 pounds shall be installed so that their tops are not more than 3.5 feet above the floor. The clearance between the floor and the bottom of installed hand-held extinguishers shall not be less than 4 inches.

IN OTHER WORDS, NO FIRE EXTINGUISHER IS ALLOWED TO BE ON THE FLOOR.

7.2 CLASSES OF FIRES AND THE APPROPRIATE EXTINGUISHERS

Class A fires are caused by ordinary combustible materials (such as wood, paper, and cloth). A Class A fire extinguisher must use either the heat-absorbing effects of water or the coating effects of certain dry chemicals to extinguish a Class A fire.

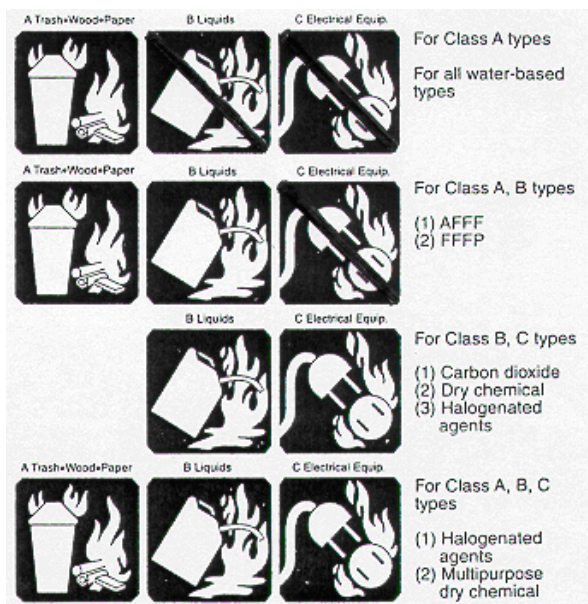
Class B fires are caused by flammable or combustible liquids and gases such as oil, gasoline, etc. A Class B fire extinguisher, using the blanketing-smothering effect of oxygen-excluding media such as CO₂, dry chemical or foam is most effective.

Class C fires involve live electrical equipment. These fires must be fought with Class C fire extinguishers that do not conduct electricity. Foam and water type extinguishers must not be used to extinguish electrical fires. After the power has been isolated from the electrical equipment, extinguishers for Class A or B fires may be used.

Class D fires are caused by ignitable metals, such as magnesium, titanium, and metallic sodium, or metals that are combustible under certain conditions, such as calcium, zinc, and aluminum. Generally, water should not be used to extinguish these fires.

A multi-purpose dry chemical fire extinguisher may be used to extinguish more than two (2) classes of fires. Examples of some fire extinguishers are shown on the next page.

Symbols may also be painted on the extinguisher. The symbols indicate what kind of fires the extinguisher may be used on. Examples of these symbols are shown on the next page. The symbol with the shaded background and the slash indicates when the extinguisher must NOT be used. The Certificate of Fitness holder must understand these symbols. All fire extinguishers should be kept in good working order at all times.



CLASSES OF FIRES	TYPES OF FIRES	PICTURE SYMBOL
A	Wood, paper, cloth, trash & other ordinary materials.	
B	Gasoline, oil, paint and other flammable liquids.	
C	May be used on fires involving live electrical equipment without danger to the operator.	
D	Combustible metals and combustible metal alloys.	

PORTABLE FIRE EXTINGUISHERS



OPERATION INSTRUCTIONS FOR FIRE EXTINGUISHERS

INSTRUCTIONS



7.3 FIRE EXTINGUISHER INSPECTIONS AND MAINTENANCE

MONTHLY

The portable fire extinguishers are required to be checked monthly. The owner of the business is responsible to select a person to do a monthly inspection. This monthly inspection is called a "quick check".

The **QUICK CHECK** should check if:

- (1) the fire extinguisher is fully charged;
- (2) it is in its designated place;
- (3) it has not been actuated or tampered with;
- (4) there is no obvious or physical damage or condition to prevent its operation.

The information of the monthly inspection record must include the date of the inspection, the name/initials of the person who did the inspection. This monthly quick check record must be kept on the back of the PFE tag or by an approved electronic method that provides a permanent record.

The information of the monthly inspection record must include:

- the date the inspection was performed;
- the person performing the inspection, and
- those portable fire extinguishers found to require corrective action.

Recordkeeping must be either attached to the extinguisher or on an inspection checklist maintained on file. Labels or markings indicating fire extinguisher use, or classification, or both shall be placed on the front of the fire extinguisher.

ANNUALLY

At least annually all Portable Fire Extinguishers must be checked by a W-96 Certificate of Fitness holder from FDNY approved company. After each annual inspection W-96 COF holder will replace the PFE tag. The information of the annual inspection record must be indicated on the new PFE tag.

Wheeled fire extinguishers must be periodically inspected to ensure that they are working properly. They should be tested according to the schedule recommended by the manufacturer. All inspections should be recorded on the tag attached to the fire extinguisher. These inspections must be conducted by an authorized representative of the manufacturer. The extinguisher must be inspected to ensure that all extinguishers are fully charged. Defective extinguishers must be repaired or replaced. The name of the person conducting the inspections and the date must be recorded on the tag attached to the fire extinguisher. The Certificate of Fitness holder may also record these inspections in his/her log. Depending upon the material from which the extinguishers are made, they are subject to periodic hydrostatic testing.

7.4 PORTABLE FIRE EXTINGUISHER TAGS

Installed portable fire extinguishers must have an FDNY standard PFE tag affixed. This tag will have important information about the extinguisher. By November 15, 2019, all portable fire extinguishers must have the new PFE tags. The FDNY will only recognize new PFE tags and will be issuing violations to business that have PFE installed without a proper tag.

The color of the fire extinguishers may be changed by the FDNY every few years. The FDNY recommends two ways to verify the tag's legitimacy:

1. Hologram:

A real hologram strip shown on the tag is 3 inches long by ¼ inch wide.

Counterfeit tags will NOT have a high quality silver hologram. The hologram on a counterfeit tag will NOT change color as it is moved against the light.

2. QR code

IF you scan the QR code, it should direct you to the updated FDNY approved fire extinguisher company list. You can use the company list to verify if the company printed on the list is currently approved by the FDNY.

If your PFE tags cannot be verified via these two methods, contact your supervisor. If you suspect your PFE is a counterfeit, contact FDNY immediately by e-mail: Tags.Decal@fdny.nyc.gov



PFE tag (This tag is released for 2021-2023)

If your PFE tags look different than the one pictured above, contact your supervisor. If you suspect your PFE is a counterfeit, contact FDNY immediately by e-mail: Tags.Decal@fdny.nyc.gov

7.5 FIRE EXTINGUISHER SIGNS

Portable fire extinguishers shall not be obstructed or obscured from view. In rooms or areas in which visual obstruction(s) cannot be completely avoided, signs or other markings shall be provided to indicate the locations of portable fire extinguishers.

8. HAZARD IDENTIFICATION SIGNS AND MARKINGS

Signs and markings required by Sections Hazard identification signs shall not be obscured or removed, shall be in English as a primary language or in symbols allowed by this code, shall be durable, and the size, color and lettering shall be acceptable to the commissioner.

EXAMPLES OF HAZARD MARKINGS



Unless otherwise exempted by the Fire Commissioner, hazard identification signs as set forth in NFPA 704 for the specific material contained shall be conspicuously affixed on stationary containers and aboveground tanks and at entrances to locations where hazardous materials are stored, handled or used, including dispensing, in quantities requiring a permit, including locations where such materials are dispensed, and at such other locations as may be designated by the Fire Commissioner.

Sources of ignition such as smoking, shall comply with the section below. It shall be unlawful to smoke in the following locations, and “No Smoking” signs shall be provided in English as a primary language.

It should be prohibited:

1. In rooms or areas where hazardous materials are stored or used in open systems in amounts requiring a permit.
2. Within 25 feet of outdoor hazardous material storage, handling and use areas, including dispensing areas.

3. In facilities or areas within facilities in which smoking has been entirely prohibited shall have “No Smoking” signs conspicuously placed at all entrances to the facility or area. Facilities or areas within facilities in which smoking is permitted in designated areas shall have signs indicating that smoking is permitted in designated areas only.
4. In rooms or areas where flammable or combustible hazardous materials are stored, handled or used.

Warning markings

Cabinets shall be clearly identified in an approved manner with red letters on a contrasting background to read: HAZARDOUS — KEEP FIRE AWAY.

Fire protection and other critical piping, as well as other processes, shall be identified in accordance with 2022 NYC Fire Code Chapters 9 and 50.

9. LIGHTNING PROTECTION, GROUNDING AND SECURITY

9.1 LIGHTNING PROTECTION, GROUNDING

Lightning protection and grounding is used for pre-caution. It is to prevent accidental fire.

(A) The highest structural steel, process vessels and columns shall be provided with lightning protection in accordance with the NYC *Electrical Code*.

(B) All process equipment and piping shall be electrically grounded.

Flammable and combustible liquids, in the gas recovery and treatment system, and in *stationary tanks*, shall be stored, *handled* and used in compliance with the requirements of NYC 2022 Fire Code Chapter 57 and the NYC Fire Rules. Solvents with low *flash points* and solvents used at a temperature above their *flash points* may be used only when *approved*.

Natural gas compressors shall be located outdoors, except that such compressors may be partially enclosed in light-weight noncombustible construction for protection against the weather, provided such enclosure is open at the top and bottom in an approved manner that provides for adequate ventilation and explosion venting.

The design and installation of any flaring system shall be *approved*.

9.2 SECURITY

A fence constructed of noncombustible material shall be provided around the perimeter of the *facility*, at least 25 feet away from any process equipment.

At least two (2) means of fire apparatus access shall be provided to the methane gas recovery facility.

SPACE HEATING SYSTEMS

Only hot water space heating systems may be installed within the facility. The location of any space heating plant shall be *approved*.

10. ODORANT ROOM

Odorant room is limited in the methane industry and is used for detecting quality of methane gas that is being sold to utility companies.

(A) A *sprinkler system or other approved non-water fire extinguishing system* designed and installed in accordance with NYC Fire Code Chapter 9 and the NYC *Building Code* shall be provided for protection of a gas odorant room.

(B) A fire detection system shall be provided in the odorant room. Activation of the fire detection system shall cause the gas valves to close gas valves and initiate audible and visible alarms locally and in the control center.

(C) A flammable gas detection system shall be provided in the odorant room. Activation of the flammable gas detection system shall initiate audible and visible alarms locally and in the control center.

(D) The odorant room shall be equipped with absorbing or neutralizing equipment to prevent escape of any odorant to the atmosphere.

Note: The Odorant Room is restricted to the utility company that works with the Methane Recovery Facility. COF holders are restricted from entering the Odorant Room.

11. SUPERVISION OF FIRE ALARM SYSTEMS

The 2008 NYC Fire Code (adopted July 2008) vastly changed the requirements for the supervision of all fire alarm systems. The old Fire Prevention code only required supervision for Interior Fire Alarm Systems. The 2008 NYC Fire Code affects thousands of fire alarm systems in facilities which previously did not require a Certificate of Fitness holder (COF).

Most landfill methane recovery facility may have one or more of the following:

1. Emergency voice/alarm communication system
2. Fire Department communication system
3. Carbon monoxide alarms and detectors
4. Automatic
5. Manual
6. Manual and automatic
7. Emergency alarm systems (gas detection system)
8. Smoke control systems

Ordinary a separate COF (S-95) would be required to supervise these systems. This L-19 COF will incorporate Fire Alarm related questions to eliminate the need for an additional certification.

All COF holders should ensure that their respective premises have fire alarm systems approved by the Fire Department City of New York.

11.1 FIRE ALARM SYSTEMS

The primary purpose of fire alarm systems within protected premises is to warn facility occupants and transmit signals indicating a fire condition to the Fire Department via an FDNY approved central station company.

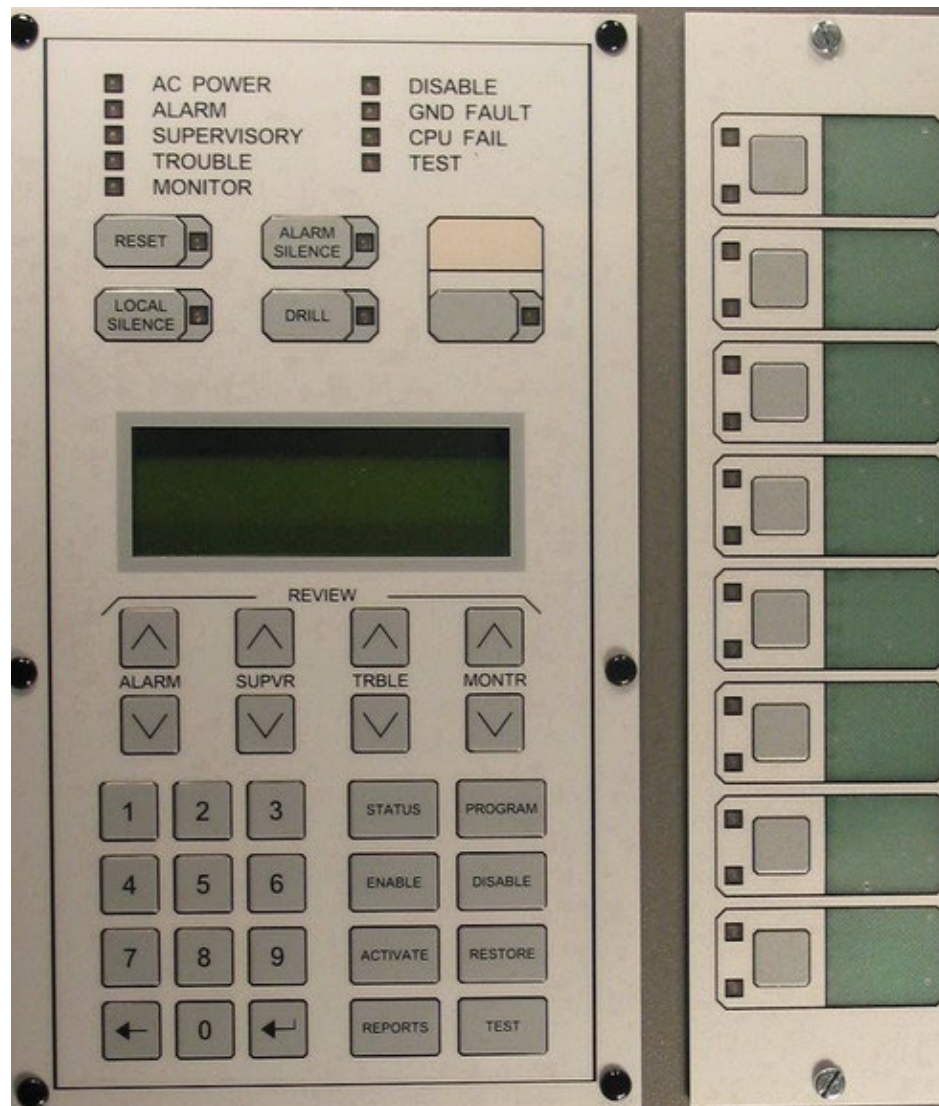
A Fire Alarm System is a system consisting of components and circuits arranged to monitor and annunciate the status of fire alarm and supervisory signal-initiating devices, and to initiate the appropriate response to these signals.

In general, a fire alarm system can be classified as automatic, manually activated, or both. If a fire condition occurs, the alarm system warns the occupants within the premises by actuating loud sirens, gongs, bells, speakers, horns and flashing lights (strobes).

11.2 FIRE ALARM SYSTEM COMPONENTS

11.2.1 Fire Alarm Control Panel (FACP)

The FACP monitors inputs and control output through various types of circuits. FACP processes all abnormal conditions (alarm, trouble & supervisory) and indicates appropriately based on action programmed for the respective device.



Fire Alarm Control Panel (FACP)

Three types of signals initiated by FACP:

- **Alarm Signal:** A signal initiated by a fire alarm initiating device such as a manual fire alarm pull station, automatic fire detector, water flow switch, or other device in which activation is indicative of the presence of a fire or fire signature. When a fire signal is generated, the FACP activates the facility audible and visual devices connected to the fire alarm (i.e. horn/strobes), sends a signal to an FDNY approved central station, and activates control of certain facility function which will be described later in this study booklet.
- **Supervisory Signals:** A supervisory signal indicates a system or device being monitored which has been compromised or is in an abnormal state. A supervisory signal will audibly annunciate at the FACP to indicate the supervisory condition which needs to be investigated and corrected. A visual message will appear on the screen but the strobe will not flash. The FACP will also send a supervisory signal to an FDNY approved central station. The central station must be notified not to dispatch the FDNY for a supervisory signal; however, the central station must notify the COF holder so that the situation can be corrected immediately. A supervisory signal can also be programmed to turn off a system or close a valve as needed to prevent a potentially unsafe condition. For example, a landfill gas flaring system can be set to shut off the main gas inlet valve in the event that the oxygen level inside of the piping reaches a predetermined set point and triggers a supervisory alarm signal. Since the threat of fire is eliminated once the system is shut down, there is no need for an FDNY response. The central station will notify the COF holder so that the situation can be corrected immediately.
- **Trouble Signals:** A signal initiated by the fire alarm system or device indicative of a fault in a monitored circuit or component. A trouble signal will audibly annunciate at the FACP to indicate that the trouble condition needs to be investigated and corrected. The trouble signal could be sent to the central station who would notify the operator but not the FDNY. Common trouble conditions monitored by the FACP would be battery condition, Alternative Current failure (electric), ground fault, open or short circuit on a wire, phone line failure, or internal component failure. The battery backup should take over in the event of a power outage.

11.2.2 Acknowledge switch or button

An acknowledge button, also abbreviated as (ACK) is used to acknowledge alarm, trouble or supervisory condition.

The sequence of operations may differ in various fire alarm systems; however, it is necessary for the L-19 COF to report to the FACP location whenever the alarm is activated.

11.2.3 Alarm silence switch or button

The alarm silence switch is used to silence the facility audible and visual devices after evacuation is complete while the source of an alarm is being investigated. Never reset the fire alarm system until the condition is verified. Depending on the configuration of the alarm system, this function will either silence the system's notification appliances completely, or will silence only the audible alarm, with strobe lights continuing to flash. The silence switch does not prevent a signal from being transmitted to a FDNY approved central station company. Audible silence allows for easier communication for facility personnel while responding to an alarm.

11.2.4 System reset switch or button

This switch is used to reset the fire alarm system after an alarm condition has been cleared. All initiating devices should return to normal condition after manually resetting.

If an initiating device is still in alarm after the system is reset, such as smoke detectors continuing to sense smoke, or a manual pull station is still in an activated position, another alarm will be generated.

A system reset is often required to clear supervisory conditions. A system reset does not clear trouble conditions. Most trouble conditions will clear automatically when conditions are returned to normal.

A FACP indicating an alarm signal cannot be reset to “normal” if the device or devices signaling the alarm to the FACP have not returned to “normal” from “alarm”.

11.2.5 Remote Annunciator panel

A remote annunciator panel when installed shall function for visual notification of alarm, supervisory or trouble conditions only.

Do not silence facility audible/visual devices or reset the fire alarm panel until the fire alarm condition is verified by authorized person.

TYPE OF DEVICE	ACTIVATED BY	TYPE OF SIGNAL	ACTION NORMALLY REQUIRED TO RETURN DEVICE TO “NORMAL” CONDITION
Manual pull station	Manually pulling handle	Fire Alarm	Return handle to normal position. A key or other method may be required to reset the station to a normal condition.
Smoke, beam, and duct detectors	Detection of particles of combustion *see note below	Fire Alarm	Smoke detectors will normally reset when the reset button is pressed at the FACP if the condition activating the detector has been cleared.
UV/IR detectors	UV or IR rays	Fire Alarm	After activation detectors will not self-restore and will require replacement/service by a qualified service technician. Once the detector is cleared, the COF holder will manually reset the panel switch responsible for that detector. Consideration should be given to false signals from the sun reflecting off of metallic objects. Trouble signals will be transmitted when the lens is obstructed by snow/ice/rain. The trouble alarm should be “non latching” so that the alarm will go away once the lens is clear. For most sensors, the heat from the detector is sufficient to clear any condensation on the lens. Lenses should be cleaned weekly to prevent buildup of dust and dirt.
Heat detectors	Abnormally high temperature (fixed temperature detector) or rapid temperature rise(rate of rise detector)	Fire Alarm	After activation most Fixed temperature heat detectors will not self restore and will require replacement by a qualified service technician. Rate of rise detectors will normally self-restore after activation.
Methane gas detectors	Methane level	Supervisory Signal	After activation most detectors will not self-restore and will require replacement by a qualified service technician. Detector has to be cleared, COF holder manually resets the panel.
Oxygen Detectors	Minimum allowable level of oxygen	Supervisory Signal	System automatically shuts off or yields a collection of methane.
NOTE: There are other circumstances which will cause a smoke detector to signal an alarm condition when there is none, creating false alarms and causing unnecessary Fire Department responses. Care must be taken at all times to protect all smoke detectors from the entrance of foreign particles which may be airborne. Smoke detectors which have not been properly cleaned and maintained will also create false alarms. Smoke detectors must be cleaned at least once every six month by the S-78 COF. holder. ALL ABNORMAL CONDITIONS MUST BE INVESTIGATED AND NOTED IN THE LOG BOOK.			

11.3 FIRE ALARM SYSTEM POWER SUPPLIES

11.3.1 Primary Power Supply

The main power supply for a fire alarm system shall be provided with a dedicated circuit from a local utility.

11.3.2 Secondary Power Supply

The fire alarm system shall have a secondary power supply which provides power to the alarm system within 10 seconds of failure of the primary power supply. Storage batteries dedicated to the fire alarm system or engine driven generators are acceptable as secondary power source for the system.

11.4 TYPES OF FIRE ALARM INITIATING DEVICES

11.4.1 Automatic Detection Devices

Automatic detection devices have sensors which detect heat, smoke in a fire alarm system. Note as follows:

11.4.2 Area Smoke Detector

A smoke detector is a device that detects visible or invisible particles of combustion. Smoke detectors have been shown to be very effective in reducing fire damage and loss of life.



Smoke Detector

11.4.3 Methane Gas Detector

Methane gas detector is part of a detection system. The methane gas detectors may be interconnected with the emergency shut-down system, and are arranged to initiate such a shut down if gas detection reaches 50% of LEL. When activated, these methane detectors will emit audible and visible alarms in the control room.



Methane Detector

11.4.4 Flame (UV, IR) Detector

A UV detector is a device which uses photoelectric cells to detect the presence of UV rays. IR sensors perform similar tasks; however, they use different technologies. An infrared sensor is a device that detects an image using infrared radiation, similar to a common camera that forms an image using visible light.

UV/IR Detector



11.4.5 Duct Smoke Detector

Is designed to sample air flow in a duct and detect the presence of particles of combustion.



**Duct Smoke
Detector**

11.4.6 Heat Detector

A sensor that detects abnormally high temperatures or rate of temperature rise. Heat detectors have been shown to be very effective in reducing fire damage. An illustration of a heat detector is shown below:



Heat Detectors

Heat detectors are available in two general types: **rate-of-rise and fixed temperature**. Heat detectors can only be tested by authorized fire alarm technicians. COF holders are responsible for ensuring that operational heat detectors are in place. They must notify fire alarm maintenance companies to make all necessary repairs.

The rate-of-rise heat detectors activate the alarm when the room or surrounding area temperature(s) increases at a rapid rate. This type of detector is more sensitive than the fixed temperature detector. The rate-of-rise heat detector does not have to be replaced after it has activated the fire alarm. All heat detectors require special attention. They must be carefully installed according to the manufacturer's instructions.



Rate-of-rise Heat Detector

Where subject to mechanical damage a heat detector shall be protected by an approved UL/FM mechanical guard as shown in the picture below.



Heat Detector with Protective Mechanical Guard

11.5 MANUAL OR PULL STATION DEVICES

A manually operated device used to initiate an alarm signal. Some fire alarm systems are activated automatically. When sensors detect heat or smoke and sound an alarm. Other fire alarm systems must be activated manually. A person who notices a fire emergency must activate the alarm by hand. Fire alarm systems that are manually activated use fire alarm pull stations. Fire alarm pull stations shall be located near the exits throughout the protected area so that they are conspicuous, unobstructed, and accessible. There must be at least one manual fire alarm station in a landfill methane recovery facility. Approved plastic covers are permitted to protect fire alarm manual pull stations and provide relief from false alarms.

11.5.1 Single Action Stations

Single action stations require only one step to activate the alarm. For example, the alarm might be activated by pulling down on a lever. An example of a single action station is shown below. This type of alarm station is often found indoors, e.g., in office buildings.

The cover on these alarm stations serves as a lever. When the cover is pulled down, it allows a switch inside to close. This sends the alarm signal.



11.5.2 Double Action Stations

Double action stations require two steps in order to activate the alarm. The user must first break a glass, open a door or lift a cover. The user can then gain access to a switch or lever which must then be operated to initiate the alarm. To activate this type of alarm the station the cover must be lifted before the lever is pulled. This kind of double action station is often found indoors. Another kind of double action break glass station requires someone to break a small pane of glass with a small metal mallet.

The Certificate of Fitness holder must know how to manually operate each manual pull station. Once activated, the fire alarm system can not be re-set at

the fire alarm manual pull station. The alarm must be re-set at a main FACP after the pull station is reset to its normal condition. The alarm may be turned off only by a Certificate of Fitness holder or by a Fire Department representative. Once activated, a key may be required to reset the manual pull station.

All fire alarm pull stations installed or relocated after April 1, 1984 should be installed so that the handle is approximately four feet from the adjusted level and it is located within (5 ft) of the exit egress. Manual stations should never be blocked or obstructed.

11.6 SUPERVISORY DEVICES

Supervisory devices are commonly installed as part of a landfill gas recovery facility. The supervisory devices monitor important parts of the system. A supervisory alarm such as a bell will be sounded when there is an off normal condition with a system or device being monitored. This type of signal is commonly called a supervisory signal. The signal is always transmitted to the main control panel. When a supervisory condition is indicated, the Certificate of Fitness holder must check the system in order to identify the part of the system that caused the signal. Then that part of the system should be identified and dealt with accordingly. The supervisory signal at this type of facility is not transmitted to a FDNY approved central station company.

Some control panels indicate the exact location of the trouble. Other panels only display a general supervisory signal. For example, a lighted panel might indicate only that there is a problem somewhere in the fire protection system. Each supervised device must then be inspected to determine which part is causing the signal.

Common supervised conditions include:

- 1) Oxygen Sensor
- 2) Heat Detectors



Tamper switch on a sprinkler valve



Temperature Supervisory Switch

11.7 SUB-SYSTEM

Sub-System is an activating (voluntary or required) system installed in a specific area or floor for a specific purpose in a facility that has a required (mandated) base facility fire alarm system.

All Sub-Systems including **Smoke Detection** shall be subject to Fire Department inspection and test for the issuance of a Letter of Approval for such Sub-System(s).

Thereafter, all such Sub-Systems shall be maintained in proper working order, and a person holding a COF shall be in charge of the supervision and maintenance of all such activating systems. A detailed record of such system shall be kept available for examination by the NYC Fire Department.

All Sub-Systems shall be interconnected to the base facility fire alarm system for alarm and trouble supervision and shall annunciate specific type and location of such sub-system(s).

Activation of the sub-system shall activate the base facility audible and visual appliances and notify the Fire Department via the base facility Central Station.

11.8 AUDIO AND VISUAL NOTIFICATION DEVICES

A fire alarm system component such as a bell, horn, speaker, light or text display that provides audible, tactile or visible out puts or any combination thereof.

11.8.1 Horns, Horn/Strobes



11.8.2 Combination Speaker / Strobe Appliances



Speaker



Speaker Strobe

Gongs Bells



11.9 ACTIVATION OF AUDIO/VISUAL NOTIFICATION DEVICES

There are two methods used to notify the occupants of a facility in case of a fire.

The **first** is the general alarm method. This method activates all audio/visual devices throughout the facility when a fire is detected.

The **second** is the selective method. The selective method activates the audio/visual devices only in the floor of alarm as well as the floor immediately above and the floor below.

After the fire alarm system for all methods has been activated it must be reset manually. When on the premises the Certificate of Fitness holder shall investigate. The fire alarm system must be reset at the control panel. The fire alarm must remain in operating condition at all times.

11.10 COMMUNICATION SYSTEM

A functioning communication system is required as part of the fire alarm system when it is applicable. There are one and two-way communication system.

The Certificate of Fitness holder must make sure that all communication units are working correctly.

A. One way communication entails use of a public address system. Some facilities also have a public address system installed which is not part of the approved fire alarm system. Although not approved, the public address system may be used to warn and instruct facility occupants in case of a fire emergency. All communication systems may be used to issue evacuation instructions in facility requiring two way communications.

B. The two way communication system uses warden phones. Warden phones must be placed at several locations in the facility. The warden phones are usually located near exit stairways in the facility. A warden phone must also be installed in the FACP. The FACP is used to issue instructions during a fire emergency. Portable two-way radios may also be used as a means of communication.

Two-way communication systems must be tested at least once every 6 months according to NFPA 72 (2002). If a telephone system is used, a signal should sound at the command center as soon as the receiver is lifted from the cradle. It should be noted that in some systems voice communication are not required.

11.11 CENTRAL STATION TRANSMITTER

A central station transmitter is a device that receives alarm signals from protected premises and retransmits those signals to the Fire Department's Bureau of Fire Communication thru an FDNY approved central station. A central station transmitter must have primary and secondary means of communication.

The COF holder must make sure that the central station transmitter is operable at all times. When transmitter malfunctions are discovered, the COF holder must report the malfunctions to the FDNY approved central station company, and they must be recorded into a log book. Authorized central station companies must be approved by FDNY. The central station company must arrange for any and all repairs as soon as possible.

COF holders are **prohibited** from performing any repairs on the central station transmitter. They are also prohibited from installing or modifying any component of the fire alarm system.

11.12 PERIODIC INSPECTION AND TESTING REQUIREMENTS FOR FIRE ALARM SYSTEMS

Fire alarm systems are required to be maintained in good working order. To ensure that fire alarm systems are maintained in such condition, the Fire Code and Rules provide minimum requirements for the periodic inspection, testing and other maintenance of such systems.

NFPA Standard 72 sets forth detailed requirements for the periodic inspection, testing and other maintenance of fire alarm systems.

11.12.1 Companies and individual certifications

It is the buildings owner's responsibility to ensure that the buildings fire alarm system is maintained in good working order and aware of the Fire Code and Rule requirements, including that the operations, inspection, tests and other maintenance of the system. Different Certificate of Fitness is permitted to carry different level of responsibilities in inspecting, testing and maintaining the fire alarm systems:

Fire Alarm System

Duties and responsibilities		May be performed by	
		S-95/T-89/F-89/F-53/L-19	S-97/S-98
1.	Daily visual inspections of fire alarm system	Yes	Yes
2.	Maintain the fire alarm log book	Yes	Yes
3.	Program, service, clean, test, repair and/or replace any fire alarm system components	No	Yes

Mandatory visual inspection frequency requirements for common equipment:

- (1) Control equipment:** fire alarm system UNMONITORED for alarm, supervisory, and trouble signals: weekly.
- (2) Control equipment:** fire alarm system MONITORED for alarm, supervisory, and trouble signals: annually.
- (3) Manual fire alarm boxes, heat detectors, smoke detectors:** semiannually.

(4) In-building fire emergency voice/alarm communications equipment:
semiannually

****Daily visual inspection of the Fire Alarm Control Panel has been the industrial practice and highly recommended by the Fire Department.** The purpose of the visual inspection is to detect defective components or abnormalities.

Any programming, servicing, testing, repairing and/or replacing of the fire alarm system components shall be conducted only by an S-97/S-98 Certificate of Fitness holder. The S-97/S-98 C of F holders could work citywide but must be employed by an approved FDNY Fire Alarm Company.

- The approved fire alarm company list:

<https://www1.nyc.gov/assets/fdny/downloads/pdf/business/approved-companies-fire-alarm-system-inspection-testing-service.pdf>

Smoke detector cleaning and testing

Duties and responsibilities		May be performed by		
		S-95/F-89/ T-89/L-19	S-78/F-78	S-97/ S-98
1.	Smoke detector visual inspection	Yes	Yes	Yes
2.	Smoke detector inspection, testing and cleaning	No	Yes	Yes
3.	Smoke detector maintenance	No	Yes	Yes
3.	Program, service, clean, test, repair and/or replace fire alarm components	No	No	Yes

Inspection, testing and cleaning guidelines of smoke detectors

- (A) All smoke detectors connected to a defined fire alarm system shall be visually inspected at least once every 6 months.
- (B) All smoke detectors connected to a defined fire alarm system shall be cleaned and tested in compliance with the procedures set forth in the manufacturer's recommended cleaning/specifications and in NFPA 72.
- (C) All smoke detectors connected to a defined fire alarm system shall be:
 - Cleaned not less than once every six (6) months, except for analog (intelligent) smoke detectors, which shall be cleaned no later than one (1) week from receipt of an indication of the need for cleaning.
 - Tested for smoke entry not less than once a year.
 - Tested for sensitivity not less than once a year, except for analog (intelligent) smoke detectors, which shall be tested for sensitivity no later than one (1) week from receipt of an indication of the need for such testing (FR).

The L-19 COF **DOES NOT** allow individual to perform the smoke detector cleaning. The smoke detectors are extremely sensitive and easily damaged. They should never be painted or altered in any way. Smoke detectors must be cleaned by a person holding S-78/W-78 (Certificate of Fitness to maintenance smoke detector) only. **The S-78 C of F holders could work citywide but must be employed by a FDNY Certified Company**, The F-78 C of F holders could be employed by the premises where possess the tools, instruments or other equipment necessary to clean and test the smoke detectors.

Companies that monitor fire alarm systems

A central station company shall be responsible for monitoring and retransmitting the fire alarm system signals. The central station company must be certified by the FDNY. The list of FDNY Certified Company could be found in the following website, the list is updated on a monthly basis.

- The approved central station monitoring company list:

<http://www1.nyc.gov/assets/fdny/downloads/pdf/business/approved-companies-central-station.pdf>

11.12.2 Fire Alarm Log Book

A Certificate of Fitness holder must supervise the operation and testing of the fire alarm system. A record of all tests, inspections, and other operations of the fire alarm system must be noted in the log book. Log books can be combined or separated depending upon your in house procedures.

The fire and life safety director, or in buildings not requiring a fire and life safety director, a person designated by the owner (such as an S-95/L-19 C of F holder) shall be responsible to make all log book entries required by the Fire Rule. Although an S-97/S-98 C of F holder may be allowed to make the entry when he/she services the fire alarm system; however, the Fire and Life Safety Director or the L-19 C of F holder is responsible to supervise the entries and the maintenance of the alarm log book. Any programing, servicing, testing, repairing and/or replacing the fire alarm system components shall be conducted only by an S-97/S-98 Certificate of Fitness holder.

An alarm log book shall be maintained on the premises, at the building's main fire alarm control panel and made available for inspection by any FDNY representatives.

A separate log book shall be kept for each calendar year. Alarm log books shall be retained for a period of three years from the date of the last entry.

Entries must include:

- Inspection of Fire Alarm system and actions taken if defective equipment or abnormal conditions are discovered.
- Tests conducted by COF holder (i.e. manual stations)
- Fire drill conducted
- Facility with fire safety directors shall follow high rise bulleting guide lines.
- Further log book requirements may be specified in the Rules of City of New York.

Information to be found at the beginning of the log book:

- Premise address
- Fire alarm system FDNY approval date – type of system/manufacturer
- FDNY approved central station information:
 1. account number
 2. company name
 3. telephone number
 4. supervisors name
- Fire alarm maintenance contractor:
 1. company name
 2. telephone number
 3. supervisors name

SUGGESTED FORMAT FOR LOG BOOK ENTRY

Date	Time	Name of COF holder	COF Number	Events/Test results	Disposition/Date (follow up)	Initials
1/06/09	1:00PM	Joe Doe	89924922	Conducted visual inspections fire alarm panel-system normal	System normal	JD
1/07/09	2:00PM	Jane Doe	89353423	Tested exit “A” pull station found pull station to function satisfactorily	System normal	JD
1/23/09	1:00PM	Steve Doe	89887789	Visual inspections discovered defective horn/strobe on 6 th floor and notified ABC Fire alarm Co. for service call.	ABC fire Alarm replaced the defective device 1/23/09	SD
1/27/09	1:00PM	Peter Pan	89345678	Test exit “B” pull station on 5 th Floor found to be defective & notified fire alarm co. for service (placed “ out of service ” sign over the pull station).	Repair made and sign removed. 1/28/09	PP

Any time a fire alarm system is to be activated during a test, inspection, or fire drill, ***it is mandatory to take the system “off line”. The FDNY approved central station company monitoring the fire alarm must be notified beforehand to prevent the unnecessary dispatching of the Fire Department.*** The telephone number for the FDNY approved central station should be readily available to the COF holder. The telephone number for the FDNY approved central station and the account number associated with the fire alarm system are required to be located on the FACP and central station transmitter.

The results of the test shall be recorded in the log book. Defective devices must be replaced immediately by qualified personnel. The manual stations may also be used to conduct fire drills.

11.13 OUT-OF-SERVICE SITUATIONS & THE IMPAIRMENT COORDINATOR

Out of service system: A fire protection system that is not fully functional; or whose operation is impaired or is otherwise not in good working order.

System off-line entries:

The date and time the alarm system was taken off-line, the reason for such action, the name and operator number of the person notified at the FDNY approved central station (or other evidence of notification satisfactory to the Department), and the date and time the system was restored to service, shall be entered in the alarm log book in every instance.

Out of service Signage:

The COF holders notify the appropriate supervisor and place a placard over the defective box indicating that a particular device is out of service.

Any impairment to a fire Alarm or related system poses safety risks to a facility and its occupants. The impairment coordinator shall be responsible to ensure appropriate posting of a fire guard detail, notifications to tenants, and posting out of service signage when appropriate.

12. EMERGENCY SITUATIONS

In case of any fire or non-fire emergency, the C of F holder must ensure 911 has been called and the notification has been made..

The notification should include:

- 1.** a brief description of condition.
- 2.** area affected.
- 3.** type of occupancy.
- 4.** estimated time until it becomes operational.
- 5.** name and Telephone number of Impairment Coordinator making the notification.

13. LITHIUM-ION BATTERY SAFETY

Lithium-ion safety

Lithium-ion batteries are rechargeable batteries found in electric bikes, scooters, cars, laptops, tablets, phones, and many other common household devices.

Lithium-ion battery fires have caused deaths, serious injuries, and devastating damage to property around the city. It's important to follow rules for safe storage, charging, and disposal for these types of batteries.

If you own a lithium-ion powered device or plan to buy one, the FDNY has important safety tips that you should follow. These tips apply to all devices powered by lithium-ion batteries, including phones, tablets, laptops, e-cigarettes, toys, high-tech luggage, and even robotic vacuum cleaners.

Immediately stop using or charging battery and call 911 if you notice:

- Fire or Smoke
- Overheating
- Change in color or shape
- Odd noises
- Leaking
- Strange smell

ALWAYS:

- purchase and use devices certified by a Nationally Recognized Testing Laboratory (NRTL). 
- follow the manufacturer's instructions for:
 - charging and storage.
 - correct battery, cord, and power adapter
- **keep exit path clear at all times.**
- plug directly into a wall electrical outlet for charging.
- keep batteries and devices at room temperature.
- store and/or charge batteries away from anything flammable.
- keep away from heat sources.
- bring batteries to a **NYC Battery Recycling Center**. Visit nyc.gov/batteries for more information.

NEVER:

- use aftermarket batteries or chargers.
- use damaged or altered batteries
- plug into a power strip or overload an outlet.
- overcharge or leave battery charging overnight.
- charge a battery or device under your pillow, on your bed, or near a couch.
- leave e-bikes or e-scooters unattended while charging.
- block your primary way in or out of a room/space with e-bikes, e-scooters, wheelchairs, etc.
- place batteries in Trash or Recycling bin. **It is ILLEGAL.** Visit nyc.gov/batteries for disposal locations and information.

**In the event of a Fire,
Leave and CLOSE the door.**

Call 911 once you are in a safe location.

This study material is provided to the public for free by the FDNY.



Charging Lithium Ion

Lithium-ion batteries do not have to be fully charged; partial charge is the most suitable.

When **charging more than five (5)** personal mobility devices or their removable batteries, it must be in a **dedicated room with ventilation** and a self-closing door.

For a total battery capacity of 20 kilowatt-hours (kWh), a 2-foot separation between charging batteries is required. For a total battery capacity up to 50 kWh, a 3-foot separation is needed.

Chargers must only be used with a compatible battery pack. The original equipment manufacturer (OEM) charger interplays with the battery pack using the battery management system (BMS). The wrong battery/charger combination may not work safely. For example, the 100% cutoff to prevent overcharging, which damages batteries, may not work which can easily create hazardous conditions such as fires, explosions and/or injuries.

Always check with the manufacturer or retailer of the personal mobility device, an authorized repair shop or a testing laboratory such as Underwrites Laboratories (UL) to see if replacement is recommended or listed and safe for use with that device. Using unauthorized parts, including batteries and/or chargers, may cause damage, fire and possibly void your warranty.

Extinguishing Lithium-ion

Water may not prevent a battery from burning and spreading. Battery cells are known to explode and quickly spread to another battery. It can spread to another devices.



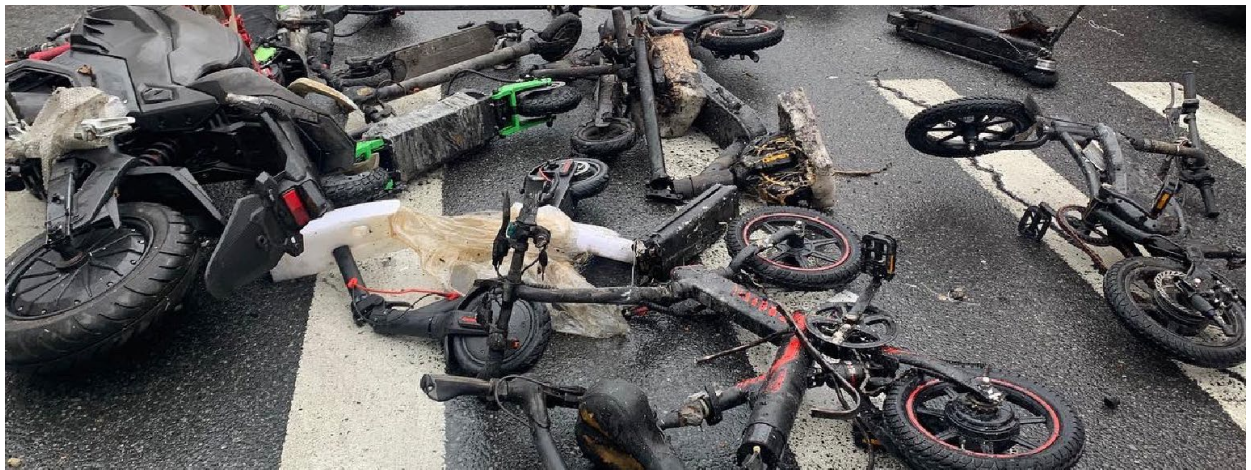
Fire Extinguishers
do not work
on lithium-ion batteries fires.

Unexpected Re-ignition.

Reignition is common. Lithium-Ion Batteries are known to unexpectedly re-ignite (without warning) minutes, hours and even days after all visible fire has been put out.

Lithium-ion batteries can enter an uncontrollable, self-heating state. This can result in the release of gas, cause fire and possible explosion.

These batteries may continue to generate heat even when there is no visible sign of fire. Once heat reaches a certain level fire may reignite on the battery and surrounding area.



APPENDIX

Daily Log (Example 1)

LANDFILL GAS MANAGEMENT SYSTEM DAILY INSPECTION LOG

Date			Time		
Technician			Wind Speed/Direction		
Ambient Temperature (°F)			Barometric Pressure (in Hg)		
Weather			GEM I.D.		

FLARE STATION			
Blower in Service (circle)			
Blower Inlet Temp. (°F)		Demister Inlet Valve Position (% Open)	
Blower Vacuum (in. WC)		Demister Delta Pressure (in WC)	
Blower Discharge Temp. (°F)		Nitrogen Regulator Press. (psi)	
Blower Discharge Pressure (in. WC)		Nitrogen Tank Pressure (psi)	
Blower Outlet Valve Position (% Open)		Propane Regulator Press. (psi)	
Vacuum Control Transmitter (Digital %)		Propane Tank Pressure (psi)	N/A
Vacuum Control Valve Position (% Open)		Flame Arrestor Delta Pressure (in WC)	N/A

	Header #1	Header #2	Header #3	Header #4	Header #5	Header #6	Flare Inlet
Pipe Diameter (in.)	8	12	12	12	12	8	16
Valve Position (% Open)							
Temperature (°F)							
Gauge Vacuum (in. WC)							
Methane (% Vol)							
Carbon Dioxide (% Vol)							
Oxygen (% Vol)							
Vacuum (in. WC)							

Note: Header readings are taken on the field side of the valve.

ANALOG DATA MENU			
Flow - Chart Recorder (SCFM)			Top Flare Temp. (°F)
Flow Rate (SCFM)			Middle Flare Temp. (°F)
Flow Totalizer (1000 SCF)			Bottom Flare Temp. (°F)
Landfill Vacuum (in. WC)			Pilot Temperature (°F)
Blower I/S Current (Amps)			Controlling Thermocouple
Blower X Running Hours			Control Temperature (SP)
Blower Y Running Hours			Control Mode
Blower Z Running Hours			Area #1 LEL (Next to Blowers)
LFG Oxygen (%)			Area #2 LEL (Next to Flare)
Flow/Temp Chart Change (circle)	Yes	No	Print Daily Condensate Tank Report (check)
Visible Smoke or emissions?	Yes	No	Flame Condition (Color and Stability)
			Good
			Bad

Comments:

KEY

°F = degrees Fahrenheit
% Vol = percent by volume
psi = pounds per square inch

in WC = inches water column
in Hg = inches Mercury
SP = Set Point

SCFM = standard cubic feet per minute
SCF = Standard Cubic Feet
NA = Not Available

Daily Log (Example 2)**LANDFILL GAS MANAGEMENT SYSTEM DAILY INSPECTION LOG**

Date		Time		Technician	
Weather		Ambient Temp. (°F)		Wind Speed/Direction	
				Barometric Press. (in Hg)	

HEADER DATA					
	Header A	Header B	Header C	Header D	Main Header
Methane (% Vol)					
Carbon Dioxide (% Vol)					
Oxygen (% Vol)					
Inlet Vacuum (in WC)					
Valve Setting (% Open)					Vac/Flow Valve
					Manual
					Auto

BLOWER STATION			FLARE STATION		
	% Open	inches WC	Temp (°F)	Flare Inlet Pressure (in WC)	
Demister			//////////	Flame Arrestor Diff. Pressure (in WC)	
Blower Inlet		-		Aux Fuel Press. (in WC) - Natural Gas	
Blower Discharge		+		Nitrogen Pressure (psi) - Regulator	
Blower in operation (circle)				Nitrogen Pressure (psi) - Tank	

ANALOG DATA MENU

Process Overview (YIC-1 From Main Menu Screen)		Flare Temperature	
Landfill Vacuum (in WC)		Top Flare Temp. (°F)	
Flow Rate (SCFM)		Middle Flare Temp. (°F)	
LFG Oxygen (%)		Bottom Flare Temp. (°F)	
Blower Current (Amps)		Controlling Thermocouple	
Flare Top Temp. (°F)		Louver Position (% Closed)	
Flare Middle Temp. (°F)		Control Temperature (SP)	
Flare Bottom Temp. (°F)		Control Mode	
Area LEL (%)			

Blower Data		Flow & Totalizer	
Blower 301 Current (Amps)		Current Flow (SCFM)	
Blower 301 Current (Hours)		Today's Total Flow (SCF)	
Blower 302 Current (Amps)		Total Flow (SCF)	
Blower 302 Current (Hours)			

7 Day Flow History		Resettable Flow	
Yesterday's Flow (SCF)		Resettable Total Flow (SCF)	
2 Days Ago Flow (SCF)		Reset Time	
3 Days Ago Flow (SCF)		Reset Date	
4 Days Ago Flow (SCF)			
5 Days Ago Flow (SCF)		Area LEL (Calibrated Detronics Methane Sensors)	
6 Days Ago Flow (SCF)		Area #1 LEL	
7 Days Ago Flow (SCF)		Area #2 LEL	

Date and Time	Date		Time	
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KEY

°F = degrees Fahrenheit
 % Vol = percent by volume
 psi = pounds per square inch

in WC = inches water column
 in Hg = inches Mercury
 SP = Set Point

SCFM = standard cubic feet per minute
 SCF = Standard Cubic Feet
 NA = Not Available

Weekly/Bi-weekly Log

WEEKLY / BI-WEEKLY INSPECTION		Date:					
		Time:					
		Technician:					
1. OPERATING BLOWER (Circle)		X	Y	X	Y		
1A	Noise or Vibration	OK	Bad	OK	Bad		
1B	Measurable or Odiferous Gas Leaks	No	Yes	No	Yes		
2. CONTROL PANEL – Motor Control							
2A	Blower Running Light (Circle)	Off	On	Off	On		
2B	Blower 1 or 2 Current Alarm	Off	On	Off	On		
2C	High Motor Current Alarm	Off	On	Off	On		
2D	Alarm Shutdown Reset Button						
3. CONTROL PANEL							
3A	Panel Power Switch	Off	On	Off	On		
3B	System	Test	Off	Auto	Test	Off	Auto
3C	Blower Operation	Test	Off	Auto	Test	Off	Auto
3D	Blower Run Green Light	Off	On	Off	On		
3E	Purge System	Test	Off	Auto	Test	Off	Auto
3F	Purge On Green Light	Off	On	Off	On		
3G	Flare Pilot	Test	Auto	Test	Auto		
3H	Flame On Green Light	Off	On	Off	On		
3I	Auxiliary Fuel (Natural Gas)	Hand	Off	Auto	Hand	Off	Auto
3J	Flare Shutdown Valve	Open	Closed	Auto	Open	Closed	Auto
3K	Shutdown Valve Open Green Light	Off	On	Off	On		
3L	Condensate Tank Overfill Alarm Amber Light	Off	On	Off	On		
3M	Condensate Tank High Alarm Light	Off	On	Off	On		
3N	Condensate Tank Leak Alarm Light	Off	On	Off	On		
3O	Condensate Tank Alarm Test	Yes	No	Yes	No		
3P	Condensate Tank Power Green Light	Off	On	Off	On		
3Q	Condensate Tank Warning Amber Light	Off	On	Off	On		
3R	Condensate Tank Alarm Red Light	Off	On	Off	On		
4. FLARE							
4A	Flame Condition (Color & Stability)	Good	Bad	Good	Bad		
4B	Abnormal Burner Hot Spots	Yes	No	Yes	No		
4C	Unusual Sounds or Odors	Yes	No	Yes	No		
4D	Damper Motor Running	Yes	No	Yes	No		
4E	Manual Damper Position – Left Lever	Up	Down	Up	Down		
4F	Manual Damper Position – Right Lever	Up	Down	Up	Down		
5. PIPING							
5A	Piping General Condition						
5B	Inlet Valve Position	% Open		% Open			
5C	Gauges Operational	Yes	No	Yes	No		
6. SITE CONDITIONS (Vandalism, Cleanliness)		Good	Bad	Good	Bad		
7. SUPPLEMENTAL NATURAL GAS VALVE		Open	Closed	Open	Closed		
8. NATURAL GAS METER READING (CUFT)		Temp compensated					
		Non-compensated					

Weekly/Bi-weekly Log (continued)

DATE: _____ Technician: _____

BI-WEEKLY INSPECTION GAS MANAGEMENT SYSTEM											
CONTROL PANEL – POWER & ALARM											
Power Toggle Lever	ON	OFF		Alarm Light	ON	OFF					
Power Key	ON	OFF		Reset Button							
Power Light	ON	OFF		Emergency Stop	IN	OUT					
CONTROL PANEL – INDICATOR LIGHTS (Outside Door)											
Green Lights				Red Lights							
Purge Blower	ON	OFF		Purge Failure	ON	OFF					
Ignition Sequence	ON	OFF		Flare High Temp	ON	OFF					
Flame Prove	ON	OFF		Flame Failure	ON	OFF					
Inlet # 1 Open	ON	OFF		Flare Temp Low	ON	OFF					
Automatic Blocking Valve On	ON	OFF		Automatic Blocking Valve Failure	ON	OFF					
Blower No. 1 (Running Light)	ON	OFF		Blower No. 1 Failure	ON	OFF					
Blower No. 2 (Running Light)	ON	OFF		Blower No. 2 Failure	ON	OFF					
Blower No. 3 (Running Light)	ON	OFF		Blower No. 3 Failure	ON	OFF					
				High Blower Pipe Pressure	ON	OFF					
CONTROL PANEL SWITCHES (Inside Door)											
MODE SELECTION				MANUAL CONTROLS							
Control Mode	MAN	OFF	AUTO	Purge Blower	OFF	ON					
Blower No. 1	MAN	OFF	AUTO	Pilot Gas	OFF	ON	IGNITE				
Blower No. 2	MAN	OFF	AUTO	Inlet No. 1	CLOSE	OPEN					
Blower No. 3	MAN	OFF	AUTO	Mod. Valve Bypass	OFF	ON					
CONDENSATE TANK											
Tank Lights	Good	Bad	Tank Alarm Test	Yes	No	Printer Paper Roll					
ALARMS (From PLC Screen)											
Active Alarms	Yes	No	Alarm History Check	Yes	No	Cond. Overfill Light	ON	OFF			
Alarm:											
VERBATIM AUTO-DIALER											
Armed	Disarmed		Check Status	Yes	No						
BURNER CONTROL											
Power	ON	OFF	Flame	ON	OFF	Alarm	ON	OFF	Reset	Yes	No
VIGILANTE (CHECK IF LIGHT IS ON)											
CH ₄ No. 1		CH ₄ No. 2		O ₂		O ₂ Sample Pump-not needed	Power		All Flashing		
Oxygen Sensor Operation:			Good		Bad		Calibration Date				
LEL Sensors Operation:			Good		Bad		Calibration Date				
FLARE											
Flame Condition (Color & Stability)		Good		Bad		Abnormal Burner Hot Spots		Yes		No	
Damper Motor Running		Yes		No		Unusual Sounds or Odors		Yes		No	
PIPING											
Piping General Condition		Good		Bad		Insulation Condition		Good		Bad	
Press. Gauges Operational		Yes		No		Temp. Gauges Operational		Yes		No	
SITE CONDITIONS (Vandalism, Cleanliness, Weeds)								Good		Bad	

Monthly Log (Example)

Month: _____, Year: _____

Monthly Facility Safety Inspection

Facility or Site:

Jobsite Address:

Reviewed by Supervisor Signature: _____

Inspected by: _____ Date: _____

Yes	No	Worksite General	Comments
☐	☐	Safety signs/warnings posted where appropriate?	
☐	☐	Emergency phone #'s posted where they can be found easily?	
☐	☐	First Aid Kit available and adequately stocked?	
☐	☐	All work areas clean and orderly?	
☐	☐	Combustibles, scrap, debris, and waste removed and stored away from work area?	
		Fire Protection	
☐	☐	Fire suppression equipment inspection current?	
☐	☐	Fire extinguishers provided in adequate #, type and location?	
		Exiting or Egress	
☐	☐	All Doors marked and illuminated by reliable light source?	
☐	☐	Doors, passageways, or stairway appropriately marked?	
☐	☐	"Exit" sign lettering at least 5 inches high and 1/2 inch wide?	
		Walkways	
☐	☐	Aisles and passageways kept clear and clean?	
☐	☐	Pits and floor openings covered or guarded?	
		Personal Protective Equipment (PPE)	
☐	☐	Protective goggles or face shield provided and worn where there is a danger of flying particles or corrosive materials?	
☐	☐	Approved respirators provided for regular and emergency use as needed?	
☐	☐	PPE maintained in a sanitary condition and ready for use?	
☐	☐	Eye wash and quick drench shower within work area where employees are exposed to injurious materials?	
☐	☐	Hearing protection required when noise levels are exceeded?	
		Self Contained Breathing Apparatus	
☐	☐	Face piece in sealed bag?	
☐	☐	Lenses clear and clean?	
☐	☐	Cylinder pressure full?	
☐	☐	Straps, buckles, hardware in good condition?	
		Ladders	
☐	☐	Ladders inspected and maintained in good condition?	

Monthly Log (Continued)

Month: _____, Year: _____

Yes	No	Rotating Equipment	Comments
☐	☐	Signs posted warning of automatic starting feature of the unit?	
☐	☐	Belt drive system totally enclosed?	
☐	☐	Coupling guards in place where needed?	
Compressed Gas Cylinders			
☐	☐	Cylinders legibly marked to clearly identify the gas contained?	
☐	☐	Compressed gas cylinders stored in areas which are protected from heat?	
☐	☐	Cylinders stored or transported in a manner to prevent them from creating a tripping, falling or rolling hazard?	
☐	☐	Valve protector caps always placed on cylinders when not in use?	
☐	☐	Bottles maintained with current hydro inspection dates?	
Lockout / Tagout Procedure			
☐	☐	LOTO equipment available and inventoried?	
Confined Spaces			
☐	☐	All permit required confined spaces properly identified and marked?	
Environmental Conditions			
☐	☐	Work areas properly illuminated?	
☐	☐	Caution labels and signs used to warn of hazardous conditions?	
Flammable and Combustible Materials			
☐	☐	Combustible materials stored in covered metal receptacles and removed from work area promptly?	
☐	☐	Approved containers and tanks used for storage and handling of flammable and combustible liquids?	
Hazardous Chemical Exposure			
☐	☐	Containers labeled?	
☐	☐	Piping system clearly marked as to their contents?	
☐	☐	PPE provided, used and maintained where needed?	
Hazardous Substance Communication			
☐	☐	MSDS readily available for each hazardous substance used?	
Electrical			
☐	☐	Extension cords in use have the grounding conductor?	
☐	☐	Disconnecting switches and circuit breakers labeled to indicate their use or equipment served?	
☐	☐	Sufficient work space and access provided around all electrical equipment to provide safe operation and maintenance?	
☐	☐	Unused openings in electrical enclosures and fittings protected with appropriate covers, plugs, or plates?	
☐	☐	Each Motor disconnecting switch or circuit breaker located within sight of the motor control device?	
☐	☐	Employees who regularly work on or around energized electrical equipment or lines instructed in CPR methods?	

Monthly Log (Continued)

Month: _____, Year: _____

Yes	No	Material Handling	Comments
☐	☐	Safe clearance for equipment through aisles and doorways?	
☐	☐	Aisles properly marked and clear?	
☐	☐	Motorized vehicles and mechanized equipment inspected daily or prior to use?	
☐	☐	Hooks and safety latches or other arrangements used when hoisting materials to prevent accidentally slip off?	
☐	☐	Securing chains, ropes, chokers, or slings adequate for the job?	
☐	☐	Shelves secure and constructed to withstand maximum designed storage weight?	
Hoist and Auxiliary Equipment			
☐	☐	Rated load of hoist legibly marked and visible to the operator?	
☐	☐	Controls of hoist plainly marked to indicate the direction of travel or motion?	
☐	☐	Hoist and load bearing structures load tested and certified?	
Industrial Trucks and Forklifts			
☐	☐	Industrial truck checklists in use and completed forms filed?	
Hand Tools and Equipment			
☐	☐	All tools maintained and in good condition?	
☐	☐	Appropriate safety glasses, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breakage?	
Power Tools and Equipment			
☐	☐	Grinders, saws and similar equipment provided with appropriate safety guards?	
☐	☐	Effective guards over belts, pulleys, and sprockets?	
Abrasive Wheel Grinders			
☐	☐	Work rest used and kept adjusted within 1/8 inch of the wheel?	
☐	☐	Adjustable tongue on the top side of the grinder used and kept adjusted to within 1/4 inch of the wheel?	
Bulk Storage			
☐	☐	Adequate secondary containment?	
☐	☐	Proper labeling?	
☐	☐	Fire Extinguishers available on fuel storage tanks?	
☐	☐	Visible signs of leaks?	