

# CCP-HSP-008

Revision 4

## CCP Health and Safety Plan for Flammable Gas

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APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	01/09/2004	Initial Revision
1	02/27/2004	Revised in response to findings from the LLNL Contractor ORR.
2	05/28/2004	Changes to Step 2.3, 3.3, 4.3, and 4.5.
3	02/23/2005	Revisions throughout document to reflect the change from Lawrence Livermore National Laboratory (LLNL) to general sites where headspace gas (HSG) sampling will be conducted. Editorial changes throughout document.
4	04/30/2007	Revised to update flammable gas operations.

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## 1.0 PURPOSE

This Health and Safety Plan (HSP) applies to the Flammable Gas process, which consists of a Gas Chromatograph with Mass Spectrometer and Thermal Conductivity Detector and a cylinder cart used for Flammable Gas Sampling and Analysis (FGA), provided by Washington TRU Solutions (WTS) and operated at various U.S. Department of Energy (DOE) sites. The purpose of this HSP is to describe and document operation and system-specific safety features of the Flammable Gas process.

### 1.1 Scope

This plan applies to all sites utilizing the Flammable Gas Analysis Unit for sampling and analysis for transportation purposes.

## 2.0 REQUIREMENTS

### 2.1 References

#### Baseline Documents

- DOE/WIPP-06-3345, *Waste Isolation Pilot Plant Flammable Gas Analysis*

#### Referenced Documents

- CCP-QP-002, *CCP Training and Qualification Plan*
- CCP-TP-082, *CCP Preparing and Handling Waste Drums for Headspace Gas Sampling*

### 2.2 Training Requirements

- 2.2.1 Personnel performing this procedure will be trained and qualified in accordance with CCP-QP-002, *CCP Training and Qualification Plan*, prior to performing this procedure.
- 2.2.2 All individuals operating this system shall have documented as part of his/her training record that he/she has read and understands this document.
- 2.2.3 Personnel associated with FGA will have completed Hazardous Waste and Emergency Response standard (HAZWOPER) training as required by the Host site.

2.2.4 Personnel associated with FGA will have completed the Rad Worker II and other training as required by the Host site.

2.2.5 Personnel associated with FGA will have completed Lockout/Tagout (LO/TO) training as required by the Host site.

2.3 Flammable Gas Sampling and Analysis Facility Requirements/General Information

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**NOTE**

All work performed in or on the FGA Unit shall be accomplished in accordance with an approved site-specific Radiological Work Plan (RWP) or equivalent.

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2.3.1 The FGA Unit shall reside in a location where ingress and egress by personnel is not obstructed.

2.3.2 Various levels of utility support include, at a minimum:

[A] One 120 VAC 20 amperes (amp) circuit; and

[B] Two 120 VAC 15 amp circuits

2.3.3 Additional Operational Requirements

[A] Flammable HSG Unit requires operating gases. Gases include helium, nitrogen, internal standard (IS), 1-Bromo-4-Fluorobenzene (BFB), and Volatile Organic Compounds (VOCs)/hydrogen/methane gas standards. These gases shall be supplied by the WTS Central Characterization Project (CCP) on an ongoing basis, as needed.

2.4 Site Utilities Requirements

2.4.1 Integrated Emergency alarm systems.

### 3.0 RESPONSIBILITIES

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#### **NOTE**

All personnel will comply with Host site procedures that manage and control the potential for heat and cold stress.

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#### 3.1 Flammable Gas Operator

3.1.1 Operates equipment in a safe manner required by WTS CCP and the Host site.

3.1.2 Documents as part of his/her permanent training record that he/she has read and understands this document.

#### 3.2 Flammable Gas Lead Operator (LO)

3.2.1 Provides guidance in the event of abnormal conditions.

#### 3.3 Radiological Control Technician (RCT)

3.3.1 Provides Host site Health Physics support for FGA operations.

3.3.2 Documents as part of his/her training record that he/she has read and understands this document.

#### 3.4 Vendor Project Manager (VPM)

3.4.1 Ensures that all work within the Scope and Purpose sections of this procedure is performed according to this HSP and the specified Host site-specific requirements.

3.4.2 Provides on-site management of field operations.

3.4.3 Approves changes in operations, as defined in the interface document that do not significantly affect safety or the environment. The VPM shall document the change. Any changes that become hazard or safety issues shall have prior approval of the VPM and the Host site's Subcontract Technical Representative (STR), and this HSP shall be revised, reviewed, and approved before implementing any changes that affect safety and/or environment.

3.5 Subcontract Technical Representative (STR)

3.5.1 A Host site-specific STR shall take responsibility for the safety of this operation and for assuring that all work is performed in accordance with this HSP and any related Host site-specific Health and Safety requirements are incorporated, reviewed, and approved in this HSP.

3.5.2 Documents as part of his/her training record that he/she has read and understands this document.

4.0 SAFETY SYSTEMS

**WARNING**

In the event of an abnormal occurrence while operating the FGA Unit, the following actions shall be taken unless otherwise directed by Supervisory personnel:

- STOP WORK
- Secure work area
- Notify Supervisor and Safety Personnel

**NOTE**

This HSP is not designed to include Host site radiological control or safety issues. See the Host site Radiological Control Manual(s) for proper radiological safety guidelines.

**CAUTION**

There is a possibility of a radioactive particle emission from a waste drum. Radioactive waste drums are typically sealed and vented through particle filters. Failure of the particle filter or the drum seal could result in radioactive particle emission. In this event, a health hazard may develop from radioactive particles from waste drums mixing with room air.

4.1 Radiation Monitoring Safety System

**NOTE**

Radioactive contamination poses the risk of ingestion and/or inhalation of radioactive material. Ingestion and/or inhalation of radioactive material may result in a source of neutron, gamma, beta, and/or alpha radiation entering the body.

4.1.1 Controls

**NOTE**

An alpha continuous air monitor (CAM) will be utilized for real-time air monitoring during FGA.

- [A] An alpha CAM alarm system will be utilized to alert individuals that immediate action is necessary in order to minimize or terminate inhalation exposure during FGA.

- [B] A hand and foot monitor or appropriate hand held instruments will be located in the FGA area to conduct appropriate whole body surveys prior to exit.
- [C] Direct and smear surveys are performed by RCTs on a regular basis on the drum surfaces and areas around the FGA Unit.
- [D] An RCT will be present and monitor the FGA operations.

## 4.2 Fire Safety Systems

### 4.2.1 Hazards

- [A] Transuranic (TRU) waste stored in drums have the potential to have flammable headspace from radioactive decay of the waste.
- [B] Fire hazards in the designated FGA area include combustibles such as paper, cloth, and some plastic.

### 4.2.2 Controls

- [A] The site-specific TRU Waste Acceptable Knowledge (AK) Summary Report MUST be read prior to FGA activities to flag potential combustibles present in drums.
- [B] Carlsbad Field Office (CBFO)-approved filters will be installed on all drums.
- [C] Sampling will only be done on CBFO-approved vented filters installed on drums.
- [D] Through personnel training and qualification, the CCP program will ensure that only trained/qualified personnel conduct the FGA operation.
- [E] Any activities that involve welding, grinding, cutting with open flames, and high heat sources are prohibited in or on the FGA Unit without specific authorization from the specific Host site STR and VPM.
- [F] Material Safety Data Sheets (MSDSs) are stored in immediate area.

- [G] Limited combustible materials are located near the FGA Unit. Combustibles brought into the characterization area are limited to incidental material necessary to conduct operations.
- [H] Personnel will comply with Host site-specific emergency response and evacuation procedures.
- [I] The exit door for the operator's work area shall be clearly marked and housekeeping inspection will ensure that the egresses are not obstructed.

#### 4.3 Heated Zones Safety Systems

##### 4.3.1 Hazards

- [A] The following areas may have hot spots that should be avoided:
  - [A.1] Gas Chromatography (GC) space oven
  - [A.2] Insulated enclosure
  - [A.3] Thermal Conductivity Detector

##### 4.3.2 Controls

- [A] Proper Personal Protective Equipment (PPE) will be worn in heated zones when appropriate.
- [B] When applicable, heated zones, when worked on, will be cooled to appropriate working temperatures.
- [C] Thermal hazards ( $\geq 125$  °Fahrenheit [F]) will be labeled as such.

#### 4.4 Electric Equipment Safety Systems

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##### **NOTE**

FGA Unit will fail in an electrically safe configuration.

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##### 4.4.1 Hazards

- [A] All electrical equipment that is installed and maintained on the FGA Unit is potentially an electrical hazard. Electrical shock can occur while working on energized equipment or equipment that is turned off but has stored energy.

[B] Some fire hazards may result from an electrical system short.

[C] Voltage spikes are a potential hazard.

#### 4.4.2 Controls

[A] Personnel will comply with Host site-specific LO/TO procedures when required.

[B] Proper use of recommended PPE will guard against electric shock or burns due to use of electrical equipment.

[C] Personnel will follow Host site-specific safety rules for electrical hot work.

[D] When possible, work/repairs shall be done on de-energized equipment. The work shall be performed by qualified personnel who have completed the appropriate safety training.

[D.1] If it is determined that work must be done on energized equipment, safety precautions and the appropriate Host site-specific requirements shall be followed.

[E] The FGA Unit plugs into grounded 120V circuits.

[F] Electrically energized components are not exposed.

[G] Fuse circuit breakers will provide additional protection from electrical hazard.

### 4.5 Pressurized Gas Cylinders Safety Systems

#### 4.5.1 Hazards

[A] Compressed gases have the potential for creating hazardous working environments. Mishandled cylinders may rupture violently, release their hazardous contents, or become dangerous projectiles.

#### 4.5.2 Controls

- [A] Flammable Gas Operators shall read the labels on the cylinders and MSDSs for safety information.
- [B] Pressure regulators will be installed on gas cylinders that are in service.
- [C] Personnel will ensure that safety caps are placed on all pressurized gas cylinders when not in service. This includes gas cylinders required for the operation of the FGA Unit that are empty or in storage.
- [D] Personnel will routinely inspect gas cylinders and replace them as needed.
- [E] All pressurized gas cylinders will be properly stored and secured with nylon straps or chains.
- [F] All cylinders will be properly labeled indicating contents. In addition, cylinders will be properly tagged when empty.
- [G] Pressure relief valves will be used with gas cylinders.
- [H] Emergency response will be in accordance with Host site-specific procedures.

#### 4.6 Drum Filter Removal and Replacement Safety Systems

##### 4.6.1 Hazards

- [A] A potential for a release of loose contamination can occur during drum filter removal and replacement process.

##### 4.6.2 Controls

- [A] CCP-TP-082, *CCP Preparing and Handling Waste Drums for Headspace Gas Sampling*, will be implemented to prevent exposure to radioactive material during vent filter removal and replacement.
- [B] A HEPA vacuum will support the drum filter removal or replacement process within the FGA area.

- [C] A Host site RCT will monitor the process of vent filter removal and replacement.
- [D] Personnel will comply with Host site-specific emergency response and evacuation procedures.

#### 4.7 Hazardous Material Safety Systems

##### 4.7.1 Hazards

- [A] The dry chemicals used in the extinguisher can cause eye, skin, and respiratory discomfort.
- [B] VOCs can emit from drums being sampled.
- [C] VOCs can emit from drums during filter change out.

##### 4.7.2 Controls

- [A] All chemicals, which are used and/or stored near the FGA Unit, shall have an MSDS.
- [B] Small quantities of chemicals allowed for storage are limited to those needed for routine operation of the FGA Unit.
- [C] All personnel shall be familiar with the MSDS for chemicals they are handling and prior to operating the fire extinguisher.
- [D] Unwanted or expired chemicals shall be disposed in accordance with Host site-specific requirements.
- [E] Chemicals will be stored in appropriate containers and freezers.
- [F] All personnel shall wear PPE when handling hazardous materials, when appropriate.

#### 4.8 Noise Monitoring Safety Systems

##### 4.8.1 Hazards

- [A] Noise from equipment around the FGA Unit may exceed noise level acceptance.

#### 4.8.2 Controls

- [A] Noise monitoring will be conducted by the Host site at the discretion of the Host site Industrial Hygienist.
- [B] Hearing protection will be worn if noise levels exceed 84 decibals (dBA) or as required by the Host site.

#### 4.9 Safety Awareness Associated with Material Handling

- 4.9.1 Spills will be handled in accordance with Host site-specific controls.
- 4.9.2 Material handling practices shall conform to the requirements of each Host site related to health and safety for both material handling and forklift safety.
- 4.9.3 Maintain personal awareness and your proximity in relation to forklift. Stay clear of load.
- 4.9.4 Use established/designated traffic lanes for container movement. Be aware of backup alarms and use a spotter for backing or in tight clearance areas.
- 4.9.5 Maintain awareness of surroundings (to include inclement weather conditions) and walk with caution around vehicles and on uneven surfaces to prevent slipping and tripping accidents.
- 4.9.6 Drums staged for FGA purposes should not obstruct ingress or egress paths.
- 4.9.7 Appropriate PPE will be worn as required by Host site-specific procedures.
- 4.9.8 Material handling aids (e.g., forklift, loader) shall be used whenever practicable and whenever the material or drum weight exceeds 50 pounds or 1/3 body weight, whichever is less.
- 4.9.9 A trained and qualified person shall perform all handling of drums requiring forklifts. Use Host site personnel to provide this forklift function when required. Refer to the Host site requirements.
- 4.9.10 Warning labels and striped warning tape will be utilized, when applicable.

#### 4.10 Maintenance, Inspections, and Quality Assurance

- 4.10.1 The RCT shall ensure all radiation monitoring equipment is functional and has current calibrations and that there is appropriate equipment stationed by the FGA Unit.
- 4.10.2 Primary heat/smoke detector shall have a functional check per Host site-specific procedures.
- 4.10.3 Emergency lighting shall have a functional check per Host site-specific procedures.
- 4.10.4 The FGA Lead Operator or FGA Operator or operators shall ensure all signs and warning lights are in place and functional before beginning any work.
- 4.10.5 All modifications or changes to the safety equipment shall be reviewed, approved, and documented by the VPM and STR.
- 4.10.6 Any equipment modification that could alter radiation protection shall be reviewed and approved by the VPM and Host site Health Physics. After the modifications are completed, a survey shall be conducted to ensure personnel ALARA is maintained.
- 4.10.7 Emergency response plans and procedures will be followed in accordance with Host site-specific procedures.
- 4.10.8 If an oxygen sensor is present then the oxygen sensor calibration shall be calibrated monthly and maintained in accordance with the manufacturer's recommendations.

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#### **NOTE**

Attachment 1 lists recommended PPE requirements for each activity performed based on CCP experience. Each Host Site may adopt the recommended requirements or specify additional requirements based on special hazards or programmatic needs.

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#### 4.11 Personnel Safety and Barrier/Boundaries

- 4.11.1 Emergency response will be in accordance with facility and Host site training.
- 4.11.2 The FGA Unit will be posted in compliance with DOE and Host site-specific requirements.
- 4.11.3 All personnel must be aware of radiological control zone barriers and postings.

4.11.4 Personnel operating the FGA Unit shall wear Thermoluminescent Dosimeter (TLD) badges and any additional dosimetry as required by Host site-specific procedures.

4.11.5 Personnel performing anything other than administrative work shall wear appropriate PPE as identified in the Host site requirements.

#### 4.12 Visitor Requirements

4.12.1 Visitors shall follow the Host site-specific visitor's rules and regulations.

4.12.2 An employee familiar with the FGA Unit and its operation shall escort visitors. The employee will have been authorized by the Host site to serve as an escort.

4.12.3 It is also the responsibility of the escort to provide the visitor with a briefing of the associated radiation and safety hazards of the FGA Unit.

4.12.4 Visitors are required to wear dosimeters and other PPE, as specified by the Host site.

#### 4.13 Unattended Operations

4.13.1 When leaving the FGA Unit overnight or for extended periods of time (weekends, weeks, or even months while temporarily unattended), all electronics may be left on if prior concurrence is received from the Host site STR.

4.13.2 Analysis of samples may occur while unattended.

5.0 RECORDS

5.1 No records are generated by this HSP.

Attachment 1 - Personal Protective Equipment Requirements

Procedure	Operation/Conditions	Respiratory Protection	Protective Clothing	Dosimetry
DOE/WIPP-06-3345	Flammable Gas Sampling	N/A	Nitrile gloves, safety glasses, steel toe shoes, and required PPE per Radiological Control Documentation.	Dosimetry requirements will be specified in the Radiological documents (e.g., RWP)
DOE/WIPP-06-3345	Flammable Gas Unit operations	N/A	PPE per Radiological Control Documentation.	Dosimetry requirements will be specified in the Radiological documents (e.g., RWP)
CCP-TP-082	Drum filter replacement	N/A	Leather gloves for drum handling and for sharps, nitrile gloves for handling Loctite, safety glasses, steel toe shoes, and required PPE per Radiological Control Documentation.	Dosimetry requirements will be specified in the Radiological documents (e.g., RWP)
CCP-HSP-008	Visitors (tours) to Flammable Gas Unit / non-operational	N/A	Safety glasses, and required PPE per Radiological Control Documentation.	Dosimetry requirements will be specified in the Radiological documents (e.g., RWP)