Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

May 16, 2012

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Chris Hoidal
Director, Western Region
US Department of Transportation
Pipeline and Hazardous Materials Safety Administration
12300 W. Dakota Ave., Suite 110
Lakewood, CO 80228

Subject: Hawaiian Electric Company, Inc.
Response to Notice of Amendment
CPF 5-2012-6013M

Dear Mr. Hoidal:

On March 24-25, 2011, Mr. Gerald Davis of the Pipeline and Hazardous Materials Safety Administration (PHMSA) Western Region inspected the Hawaiian Electric Company (HECO) Iwilei pipeline facilities in Honolulu, Hawaii. On April 24, 2012, as a result of the inspection, HECO received a Notice of Amendment, dated April 19, 2012. The NOA letter identified two items in HECO's Operation and Maintenance procedures to be amended.

HECO takes pride in its pipeline system and strives for continuous improvement. HECO acknowledges that improvements to its Operation and Maintenance program are essential to the success of the program. To that end, HECO has amended its procedures, as described below.

NOA Item 1: "HECO's ROW and crossing inspection procedures did not contain a process for documenting potential safety concerns or concerns discovered during the inspections. HECO must amend their O&M procedures to include a process for documenting surface conditions, particularly those that need to be addressed in order to provide safety, following the inspections required by Part §195.412(a)."

HECO Response to NOA Item 1: HECO will amend its procedure to further address the requirements of Part §195.412(a). The O&M manual will be amended to include the following (revisions are shown in bold face type):

> "Items to look for during this inspection shall include, but **are** not limited to, **construction activity within the ROW, safety concerns along the surface of the ROW,** any visual signs of oil released from the pipeline, significant amounts of water within the expansion box vaults, excavation operations in the vicinity of the pipeline, and any other abnormal conditions. **If a condition is observed during the ROW inspection that requires further investigation or is a safety concern that needs to be addressed, a notation shall be made on the ROW inspection form to indicate that this condition is to be checked by a supervisor who will determine what follow-up action is to be performed.**"

In addition, the ROW inspection form has been modified to add a space for the person performing the ROW inspection to note any abnormal conditions discovered during the ROW inspection, and how the condition will be handled. The amended ROW inspection form is enclosed as Attachment A.

NOA Item 2: "At the time of the inspection, HECO's Operation and Maintenance manual did not address all of the requirements pertaining to §195.402(c)(11). HECO's O&M procedure 13.3, with respect to prevention of accidental ignition, did not include the hot work permitting process. Following the inspection, HECO submitted a letter dated April 8, 2011 to my staff stating that HECO had completed a written procedure for hot work permitting process. Unfortunately, it appears that the process did not include the requirement for testing the vapors or hazardous atmosphere prior to the initiation of the permitted activity. An operator's procedure for hot work permitting must include a method to test the vapors or hazardous atmosphere. Therefore, HECO must amend their procedures to include the test method for vapors or hazardous atmosphere as required by Part §195.402(c)(11)."

HECO Response to NOA Item 2: In the referenced April 8, 2011 letter, HECO submitted its Hot Work Permit Form, but did not include the Hot Work Procedure. The procedure describes the testing for vapors or hazardous atmosphere that is to be performed prior to being allowed to perform hot work as follows:

> "Test to ensure a non-flammable atmosphere if the area once contained or has the potential to contain an explosive atmosphere. The Supervisor or designee will inspect the area and determine the potential for explosive gases in the work area. If there is a potential of explosive gases, initial and

continuous air monitoring shall be conducted. All work must stop if air tests for the LEL reach or exceed 10%."

In addition, the Hot Work Permit Form has been amended to specifically note that the area must be "Gas free to < 10% of LEL where flammable vapors may be present." (Item 5 on the permit form.)

A copy of the Hot Work Procedure is enclosed as Attachment B, and the amended permit form is enclosed as Attachment C.

HECO is committed to improving its pipeline operations and maintenance processes to ensure the safe operation of its pipeline. We trust that the actions and amendments taken by HECO resolve these two items.

If you have any questions, please call me at (808) 543-7571.

Sincerely,

Jon M. Arakaki
Director, Fuels Infrastructure Division

JMA
Attachments

cc (w/out attach):
R. Cox
E. Nowak
F. Shiroma

Attachment A

Amended Right-of-Way Inspection Form

IWILEI PIPELINE RIGHT-OF-WAY and EXPANSION JOINT VAULT INSPECTION REPORT

Inspected by: Date:

Location No.	Station No.	Description	Oil visible?	Remarks
1	0 + 85	Across Iwilei On Traffic Island		Vault removed.
2	91 + 91	Koala Moa huli-huli chicken		
3	94 + 87	80 yds West of Pacific St		
4	97 + 36	Nimitz / Pacific St		Vault removed.
5	101 + 73	Sam Choys		
6	104+ 83	550 N. Nimitz		
7	107 + 79	Across K-Mart		
8	110 + 60	Nimitz / Sumner St. Upstream of 90 bend		
9	0 + 44	Nimitz / Sumner St. Downstream of 90 bend		
10	4 + 68	Flora Dec		
11	7 + 25	Awa St. On Traffic Island		Verify that isolation valve is locked in the open position.
12	122 + 50	Nimitz / River St.		
13	125 + 28	East of Kekaulike St.		
14	128 + 11	Maunakea St.		
15	131 + 18	Pier 13		
16	133 + 66	Bethel St.		
17	136 + 08	Queen St.		
18	0 + 98.5	State Harbors Bldg.		
19	1 + 95	West of Fort St.		
20	4 + 16	East of Fort St.		
21	6 + 62	Bishop St.		

Comments: (Describe any abnormal conditions along pipeline right-of-way.)

Disposition: (Identify the follow up action that was taken.)

Attachment B

Hot Work Procedure

HECO GENERATION DEPARTMENT HOT WORK PROCEDURE

1.0 Objective

This program establishes procedures to prevent injury and fire resulting from temporary operations involving an open flame or that, which produces heat, sparks, or hot slag. This includes but is not limited to welding, brazing, cutting, grinding, soldering, chipping, and torch applied roofing.

2.0 Purpose and Scope

This procedure applies to Hawaiian Electric Company (HECO) Generation employees and contractors who supervise or perform hot work activities. Contractors will not be permitted to perform hot work activities unless all provisions of HECO's Hot Work Permit Procedures are agreed upon and followed. Contractors shall provide all equipment and materials necessary to conform to the HECO Hot Work Procedure. Good work practices, employee training, following company hot work procedures, and issuing the hot work permit, if applicable, shall be implemented to control the hazards associated with hot work activities.

3.0 Definitions

Combustible material: Liquid or gas that has a flash point between 100 degrees and 200 degrees Fahrenheit; or solid that can ignite from friction (like a match), or can catch fire easily (like wood, paper products, oil soaked insulation, and vegetation). Combustible solids have a burn rate of 22 mm (0.087 inches) per second when tested in accordance with UN Manual of Tests and Criteria.

Combustible liquid: Any liquid having a flashpoint at or above 100 deg. F. where the total of which make up 99 percent or more of the total volume of the mixture.

Combustible solid:
1) Are solids which may cause a fire through friction, such as matches;
2) Show a burning rate faster than 2.2 mm (0.087 inches) per second when tested in accordance with UN Manual of Tests and Criteria; or
3) Any metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less, when tested in accordance with UN Manual of Tests and Criteria.

Designated welding area: Permanent location approved for hot work operations to be performed regularly. Welding and cutting should preferably be done in these areas which have been designed and constructed to minimize fire risk.

Flammable liquid: Any liquid having a flashpoint below 100 deg. F. where the total of which make up 99 percent or more of the total volume of the mixture.

Flammable material: Material (gas, liquid, or solid) that has a flash point at or below 100 degrees Fahrenheit.

Hot Work: Any work involving burning, welding, or similar operations that is capable of initiating fires or explosions. This may include, but is not limited to, welding, torch cutting, plasma cutting, brazing, soldering, grinding, and the use of flares or other incendiary devices.

Inert: Introducing carbon dioxide, nitrogen or other inert gas into the space in sufficient volume to maintain the oxygen content of the atmosphere of the enclosed space at or below 8%.

Temporary designated welding shop: Temporary location approved for hot work operations to be performed regularly. Welding and cutting should preferably be done in these areas which have been designed and constructed to minimize fire risk.

4.0 Responsibilities

a) Supervisors/Foremen/Working Foremen

i) Ensure that all employees involved with the hot work are familiar with and are following safe hot work procedures.

ii) Oversee hot work activities, and issues a Hot Work Permit if required by this procedure.

iii) Ensure that all cutting, welding or other hot work equipment is in satisfactory condition and in good repair.

iv) Ensure that employees are suitably trained in the operation of the equipment and safe use of the process.

v) Ensure fire extinguisher equipment is available and that employees are familiar with the equipment and emergency procedures.

vi) Engineering controls, work practices and proper personal protective equipment is used to protect workers and surrounding crafts from exposure.

vii) Evaluate work area, and ensure proper protection and monitoring (if there is a potential for a flammable or combustible atmosphere) is implemented.

b) Employees

i) Follow and use hot work procedures

ii) Obtain a Hot Work Permit, if required by this procedure.

iii) Ensure that all cutting, welding or other hot work equipment is in satisfactory condition and in good repair.

iv) Attend and actively participate in training sessions.

v) Ensure fire extinguisher equipment is available and be familiar with use of equipment and emergency procedures.

vi) Utilize engineering controls, work practices, and proper personal protective equipment to protect yourself and other crafts from exposure.

vii) Protect nearby personnel and people passing by work area against heat, sparks, eye hazards, etc. (especially when working in public areas). Conduct air monitoring if there is a potential for flammable or combustible atmosphere.

5.0 Work Area

a. Hot work is only allowed in areas that have been made fire safe. Welding and cutting shall be performed in designated or temporary designated welding shops unless the job cannot be moved to one.

   i) If the object in which the hot work is to be performed on cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place. Where practicable, all combustibles shall be relocated at least 35 feet (10.7 m) from the work site.

   ii) If the object in which the hot work is to be performed cannot readily be moved **AND** if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards. Where relocation is impracticable, combustibles shall be protected with flameproofed covers or otherwise shielded with metal or asbestos guards or curtains.

   iii) If the requirements stated in paragraphs (i) and (ii) of this section cannot be followed then hot work shall not be performed.

b. When the nature of the work to be performed falls within the scope of paragraph (a)(ii) of this section certain additional precautions may be necessary:

   i) Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily flammable or combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

   ii) Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the flammable or combustible material exposed.

   iii) Fire watchers shall be required whenever hot work is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

      1) Appreciable flammable or combustible material, in building construction or contents, closer than 35 feet (10.7 m) to the point of operation.

      2) Appreciable flammable or combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks.

3) Wall or floor openings within a 35-foot (10.7 m) radius expose flammable or combustible material in adjacent areas including concealed spaces in walls or floors.

4) Flammable or combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

5) Fire watchers shall have fire extinguishing equipment readily available and be trained in its use. They shall be familiar with facilities for sounding an alarm in the event of a fire. They shall watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch shall be maintained for at least a half hour after completion of the hot work to detect and extinguish possible smoldering fires.

6.0 Authorization

a) Before the hot work is permitted, the area shall be inspected by the individual performing the hot work operations. He shall identify fire hazards and designate precautions to be followed in the form of a written Hot Work Permit (Attachment 2), which may be completed himself or their Supervisor/Foreman/Working Forman. The Shift Supervisor of Operations will be notified of such work. Employees shall conduct a daily inspection of their area prior to the start of any hot work and after any breaks longer than one half hour in duration. This inspection does not need to be documented.

b) A Hot Work Permit will be created for each job requiring a permit and is good for the entire duration of the job. Supervisor/Foreman/Working Forman must ensure that the permit is closed when the job is completed and the Shift Supervisor of Operations is informed.

c) The Hot Work Permit number system will be tied to the W/O number.

d) A copy of the permit will be placed as close to the worksite as possible. The original copy shall be stored in a binder located near the Plant Clearance Logs. Closed permits shall be returned and attached to the original.

7.0 Prohibited areas

Hot work shall not be permitted in the following situations:

a) In areas not authorized by management.

b) In sprinklered buildings while such protection is impaired. Hot work on sprinklered systems may be performed provided that all other precautions required in this procedure have been taken.

c) In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton.

d) In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside uncleaned

or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts.

i. Test to ensure a non-flammable atmosphere if the area once contained or has the potential to contain an explosive atmosphere. The Supervisor or designee will inspect the area and determine the potential for explosive gases in the work area. If there is a potential of explosive gases, initial and continuous air monitoring shall be conducted. All work must stop if air tests for the LEL reaches or exceeds 10%.

ii. When the LEL reaches or exceeds 10%, the supervisor must determine the source of the flammable vapors and implement actions to remove the flammable vapors through ventilation or other safe means.

e) Floors. Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet (10.7 m). Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

Hot work near hydrogen sources:

a) All hot work shall be at least 35 feet away from any hydrogen source. Any closer will require a thorough job safety analysis to be conducted prior to commencing. **Unless mission critical, hot work situations such as these should be deferred to a maintenance outage or planned outage when the hydrogen lines can be purged.**

i. Each person conducting hot work shall have a hydrogen meter as close as practical to the hot work. Continuous air monitoring for hydrogen is required during all hot-work in the area. All work shall stop when meter is in alarm and an investigation shall be undertaken to determine what triggered the alarm. Alarm set point is typically set at 2% hydrogen in air. Hydrogen is flammable at 4% in air.

ii. Force air ventilation towards the hydrogen source will be required.

8.0 Special Areas

a) Ducts. Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

b) Combustible walls. Where hot work is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition.

c) Noncombustible walls. If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided.

d) Combustible cover. Welding shall not be attempted on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.

e) Pipes. Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

f) Welding or cutting containers.

i. Used containers. No welding, cutting, or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which when subjected to heat, might produce flammable or toxic vapors. Any pipe lines or connections to the drum or vessel shall be disconnected or blanked.

g) Venting and purging. All hollow spaces, cavities or containers shall be vented to permit the escape of air or gases before preheating, cutting or welding. Purging with inert gas is recommended.

9.0 Confined Spaces

General. As used herein confined space is intended to mean a relatively small or restricted space such as a tank, boiler, pressure vessel, or small compartment of a ship.

a) Torch valve. In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the gas supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose shall also be removed from the confined space.

b) Ventilation. Adequate ventilation is a prerequisite to work in confined spaces.

c) Securing cylinders and machinery. When welding or cutting is being performed in any confined spaces the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.

d) Lifelines. Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose they shall be so attached to the welder's body that his body cannot be jammed in a small exit opening. An attendant, separate from fire watch, with a preplanned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect. A space requiring an attendant and rescue equipment will be considered a permit required confined space.

e) Electrode removal. When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine disconnected from the power source.

f) Gas cylinder shutoff. In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable the torch and hose shall also be removed from the confined space.

g) Warning sign. After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

10.0 Protection of personnel

a) General

ii. Railing. A welder or helper working on platforms, scaffolds, or runways shall be protected against falling. This may be accomplished by the use of railings, safety belts, lifelines, or some other equally effective safeguards.

iii. Welding cable. Welders shall place welding cable and other equipment so that it is clear of passageways, ladders, and stairways.

b. Eye protection.

i. Selection.

1. Helmets or hand shields shall be used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants shall be provided with proper eye protection.

2. Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations. Spectacles without side shields, with suitable filter lenses are permitted for use during gas welding operations on light work, for torch brazing or for inspection.

3. All operators and attendants of resistance welding or resistance brazing equipment shall use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required.

4. Eye protection in the form of suitable goggles shall be provided where needed for brazing.

c. Specifications for protectors.

i. Helmets and hand shields shall be made of a material which is an insulator for heat and electricity. Helmets, shields and goggles shall be not readily flammable and shall be capable of withstanding sterilization.

ii. Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.

iii. Helmets shall be provided with filter plates and cover plates designed for easy removal.

iv. All parts shall be constructed of a material which will not readily corrode or discolor the skin.

v. Goggles shall be ventilated to prevent fogging of the lenses as much as practicable.

vi. All glass for lenses shall be tempered, substantially free from striae, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and windows shall be smooth and parallel.

vii. Lenses shall bear some permanent distinctive marking by which the source and shade may be readily identified.

viii. All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1-1968 - American National Standard Practice for Occupational and Educational Eye and Face Protection, which is incorporated by reference as specified in Sec. 1910.6.

ix. Protection from arc welding rays. Where the work permits, the welder should be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide (an important factor for absorbing ultraviolet radiations) and lamp black, or shall be enclosed with noncombustible screens similarly painted. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles.

d. Protective clothing - General requirements. Employees exposed to the hazards created by welding, cutting, or brazing operations shall be protected by personal protective equipment in accordance with the requirements of 1910.132. Appropriate protective clothing required for any welding operation will vary with the size, nature and location of the work to be performed.

e. Health protection and ventilation.

General.

i. Contamination. The requirements in this paragraph have been established on the basis of the following three factors in arc and gas welding which govern the amount of contamination to which welders may be exposed:

1. Dimensions of space in which welding is to be done (with special regard to height of ceiling).

2. Number of welders.

3. Possible evolution of hazardous fumes, gases, or dust according to the metals involved.

ii. Screens. When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet (0.61 m) above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

iii. Maximum allowable concentration. Local exhaust or general ventilating systems shall be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration as specified in 29 CFR 1910.1000.

iv. Ventilation for general welding and cutting.

1. General. Mechanical ventilation shall be provided when welding or cutting in the following situations:

    a. In a space of less than 10,000 cubic feet (284 m^3) per welder.

    b. In a room having a ceiling height of less than 16 feet (5 m).

    c. In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation.

    d. Minimum rate. Such ventilation shall be at the minimum rate of 2,000 cubic feet (57 m^3) per minute per welder.

v. Local exhaust hoods and booths. Mechanical local exhaust ventilation may be by means of either of the following:

1. Hoods. Freely movable hoods intended to be placed by the welder as near as practicable to the work being welded and provided with a rate of air-flow sufficient to maintain a velocity in the direction of the hood of 100 linear feet (30 m) per minute in the zone of welding when the hood is at its most remote distance from the point of welding.

2. Fixed enclosure. A fixed enclosure with a top and not less than two sides which surround the welding or cutting operations and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

vi. Ventilation in confined spaces.

1. Air replacement. All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. All air replacing that is withdrawn shall be clean and respirable.

2. Airline respirators. In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR part 84 must be used.

3. Self-contained units. In areas immediately hazardous to life, a full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-facepiece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH under 42 CFR part 84 must be used.

4. Outside helper. Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health, a worker shall be stationed on the outside of such confined spaces to insure the safety of those working within.

5. Oxygen for ventilation. Oxygen shall never be used for ventilation.

vii. Fluorine compounds.

1. General. In confined spaces, welding or cutting involving fluxes, coverings, or other materials which contain fluorine compounds shall be done in accordance with paragraph f)(*vi*) of this section. A fluorine compound is one that contains fluorine, as an element in chemical combination, not as a free gas.

2. Maximum allowable concentration. The need for local exhaust ventilation or airline respirators for welding or cutting in other than confined spaces will depend upon the individual circumstances. However, experience has shown such protection to be desirable for fixed-location production welding and for all production welding on stainless steels. Where air samples taken at the welding location indicate that the fluorides liberated are below the maximum allowable concentration, such protection is not necessary.

viii. Zinc.

1. Confined spaces. In confined spaces, welding or cutting involving zinc-bearing base or filler metals or metals coated with zinc-bearing materials shall be done in accordance with paragraph f)(*vi*) of this section.

2. Indoors. Indoors, welding or cutting involving zinc-bearing base or filler metals coated with zinc-bearing materials shall be done in accordance with paragraph f)(*iv*)(*i*) of this section.

ix. Lead.

1. Confined spaces. In confined spaces, welding involving lead-base metals (erroneously called lead-burning) shall be done in accordance with paragraph f)(*vi*) of this section.

2. Indoors. Indoors, welding involving lead-base metals shall be done in accordance with paragraph f)(*iv*)(*i*) of this section.

3. Local ventilation. In confined spaces or indoors, welding or cutting operations involving metals containing lead, other than as an impurity, or metals coated with lead-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84. In all cases, workers in the immediate vicinity of the cutting operation must be protected by local exhaust ventilation or airline respirators.

x. Beryllium.

1. Welding or cutting indoors, outdoors, or in confined spaces involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations defined by 29 CFR 1910.1000 In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

xi. Cadmium.

1. General. In confined spaces or indoors, welding or cutting operations involving cadmium-bearing or cadmium-coated base metals must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators, such as fume respirators, approved for this purpose by NIOSH under 42 CFR part 84.

2. Confined space. Welding (brazing) involving cadmium-bearing filler metals shall be done using ventilation as prescribed in paragraph f)(*iv*)(*i*) or f)(*vi*) of this section if the work is to be done in a confined space.

xii. Mercury.

1. In confined spaces or indoors, welding or cutting operations involving metals coated with mercury-bearing materials, including paint, must be done using local exhaust ventilation or airline

respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84.

xiii. Cleaning compounds.

1. Manufacturer's instructions. In the use of cleaning materials, because of their possible toxicity or flammability, appropriate precautions such as manufacturers instructions shall be followed.

2. Degreasing. Degreasing and other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichloroethylene and perchlorethylene should be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

xiv. Cutting of stainless steels. Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated.

1. First-aid equipment. First-aid equipment shall be available at all times. All injuries shall be reported as soon as possible for medical attention. First aid should be rendered until medical attention can be provided.

2. Electric shock. When arc welding is performed in wet conditions, or under conditions of high humidity, special protection against electric shock shall be supplied.

3. Pressure testing. In pressure testing of pipelines, the workers and the public shall be protected against injury by the blowing out of closures or other pressure restraining devices. Also, protection shall be provided against expulsion of loose dirt that may have become trapped in the pipe.

4. Construction standards. The welded construction of transmission pipelines shall be conducted in accordance with the Standard for Welding Pipe Lines and Related Facilities, API Std. 1104-1968.

5. Flammable substance lines. The connection, by welding, of branches to pipelines carrying flammable substances shall be performed in accordance with Welding or Hot Tapping on Equipment Containing Flammables, API Std. PSD No. 2201-1963.

6. X-ray inspection. The use of X-rays and radioactive isotopes for the inspection of welded pipeline joints shall be carried out in conformance with the American National Standard Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources, ANSI Z54.1-1963.

Reference

- HiOSH:..... 12-126
- OSHA: ..... 29 CFR 1910.252 & 1926 Subpart J
- UFC:..... Article 49
- ANSI:..... Z49.1
- NFPA: 51B

Attachments

Attachment 1: Cutting and Welding Eye Protection Reference Guide
Attachment 2: Hot Work Checklist
Attachment 3: Hot Work Permit Log

ATTACHMENT 1

Cutting and Welding Eye Protection Reference Guide

1.0 OBJECTIVE

This section supplements and serves a "quick reference guide" to the hot work procedure. This section provides guidance in the prevention of eye injury from electric arc welding rays and the high yellow light produced when oxyfuel gas welding or cutting.

2.0 PROTECTION OF PERSONNEL

UNDER NO CIRCUMSTANCES SHALL A WELDER OR CUTTER PROCEED WITH THE WORK WITHOUT THE PROTECTION REQUIRED BELOW.

a. Eye Protection

1. Welders utilizing shielded metal, gas tungsten, Gas metallic, flux core, carbon, and plasma arc processes shall use an appropriate* filter lens and welding hood/helmet.

2. Pipefitters or personnel assisting a welder tack-welding an assembly shall use an appropriate* filter lens and a welding hood/helmet.

3. Personnel watching ("spotting") a weld root pass being executed through the opening of the weld joint shall use an appropriate* filter lens and welding hood/ helmet.

4. Personnel using an oxyfuel gas torch for cutting or welding shall use an appropriate* pair of goggles with filter lens protection.

*Refer to attached lens selection chart, Tables 1 and 2.

b. Specifications for protectors

f) Helmets and hand shields shall be made of a material which is an insulator for heat and electricity. Helmets, shields and goggles shall be not readily flammable and shall be capable of withstanding sterilization.

g) Auto darkening welding helmets have lenses that automatically darken when an arc is struck, and returns to a light state when welding ceases, it allows the wearer to continue work with both hands free. The lens shade can also be adjusted to suit the task.

h) Leather "sock" type welding hoods can help to allow head access into areas too small for rigid welding helmets.

i) Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.

j) Helmets shall be provided with filter plates and cover plates designed for easy removal.

k) Lenses shall bear some permanent distinctive marking by which the source and shade may be readily identified.

l) All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1-1968 - American National Standard Practice for Occupational and Educational Eye and Face Protection, which is incorporated by reference as specified in Sec. 1910.6.

m) Protection from arc welding rays. Where the work permits, the welder shall be enclosed with noncombustible screens. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles.

n) Welding hoods and goggles shall comply with Page 15 of 20, American National Standards Inst. (ANSI) Z87.1.

EYE PROTECTION REFERENCE TABLE
(from AWS F2.2, Lens Shade Selector)

Table 1
Guide for Cutting Shade Numbers

Operation		Plate Thickness (Inches)	Plate Thickness (millimeters)	Minimum Protective Shade
Gas Welding	Light	Under 1/8	Under 3.2	4 or 5
	Medium	1/8 to 1/2	3.2 to 12.7	5 or 6
	Heavy	Over ½	Over 12.7	6 or 8

Operation		Plate Thickness (inches)	Plate Thickness (millimeters)	Minimum Protective Shade
Oxygen Cutting	Light	Under 1	Under 25	3 or 4
	Medium	1 to 6	25 to 150	4 or 5
	Heavy	Over 6	Over 150	5 or 6

Table 2
Filter Lenses for Protection Against Radiant Energy

Operations	Electrode Size 1/32 in	Arc Current (A)	Minimum Protective Shade	Suggested* Protective Shade(Comfort)
Shielding metal arc welding	Less than 3	Less than 50	7	--
	3 - 5	60 – 160	8	10
	5 – 8	160 – 250	10	12
	More than 8	250 – 550	11	14
Gas metal arc welding and flux cored arc welding		Less than 60	7	--
		60 – 160	10	11
		160 – 250	10	12
		250 – 550	10	14
Air carbon	(Light)	Less than 500	10	14
Air cutting	(Heavy)	500 – 1000	11	14
Plasma arc welding		Less than 20	6	8
		20 – 100	8	10
		100 - 400	10	12
		400 – 800	11	14
Plasma arc cutting	(Light)	Less than 300	8	9
	(Medium)	300 – 400	9	12
	(Heavy)	400 - 800	10	14
Torch blazing				3 – 4
Carbon arc welding				14

As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade that gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

Hot Work Permit Log

W/O No.	Location	Desc. of Work	Date Open	Date Close

Attachment C

Amended Hot Work Procedure Form

ATTACHMENT 2

HECO Generation Department Hot Work Permit

W/O No:	Date/Time:
Est. Comp. Date:	Location of Work:
Description of Work to Be Done:	
Special Precautions Required:	
Emergency Communications Protocol: (Gaitronics/Radio/Cell Phone)	

The undersigned states that an inspection of the welding and cutting work area has been conducted and the necessary precautions have been taken to prevent fire and explosion. Please initial or write N/A in the appropriate boxes. Any "blank" responses require corrective action before hot work can begin.
Hot Work Initiator (HWI) = person performing hot work or Supervisor/Foreman/Working Foreman/Crew Leader or equivalent

Inspection Item	**HWI**
1. Has a job briefing been conducted?	
2. Equipment is tagged out, if necessary, prior to start work. Ensure line has been relieved of any pressure and fluids. (except for hot taps)	
3. Will welding/cutting be performed in a confined space? If yes, is there compliance w/section 9.0 .	
4. All hot work equipment in good repair?	
5. Work area clear of fire hazards and combustibles within 35' spherical radius or combustibles are covered and made nonflammable? **Gas free to < 10% of LEL where flammable vapors may be present.**	
6. Are noncombustible guards used to protect immovable fire hazards?	
7. Will adequate ventilation be provided?	
8. Will appropriate PPE (including welding screens) be used?	
9. Machinery, equipment, and other critical areas subject to damage by sparks protected?	
10. Is a fully charged fire extinguisher and source(s) of water available to Fire Watch?	
11. Has the nearest first aid station been identified? LOCATION:_____	
12. If hot work is done above a walkway or other work area, the area below must be barricaded, flame retardant shield erected, or warning signs stating "Caution – Welding Overhead" or similar shall be posted at all immediate entrances.	
13. Has the Shift Supervisor been notified and **concurs** with the level of precautions taken? (**Shift Supervisor to also initial**)	
14. Fire sprinklers, where provided, need to be operational and not taken out of service. (See item 7.b. of procedure)	

Print Name:	Sign Name:
Employee_____ Contractor_____ _____ (Check appropriate box. Note contracting company)	
Work Started-Date/Time:	Work Completed- Date/Time:

Fire watches shall continuously monitor the hot work, ensure there are no deviations of the permit, and be prepared to handle incipient stage fires. Fire watches shall conduct the final inspection 30 minutes after the hot work has been completed. Fire watchers shall be required whenever hot work is performed in locations where other than a minor fire might develop, or any of the following conditions: **1)** Appreciable flammable or combustible material, in building construction or contents, closer than 35 feet to the point of operation. **2)** Appreciable flammable or combustibles are more than 35 feet away but are easily ignited by sparks. **3)** Wall or floor openings within a 35-foot (10.7 m) radius expose flammable or combustible material in adjacent areas including concealed spaces in walls or floors.

Fire Watch Required: YES _____ NO_____

Required for Entire Duration of Permit: YES _____ NO _____(Termination Date_____)

Fire Watch Sign-in date/time:_____ Sign-out date/time:_____

Comments: _____

_____

Daily Check (Initial and Date Each Box for Duration of Permit) Inspections must also be conducted after breaks longer than one hour in duration		
Print Name/Initial	Date/Time	Discrepancy Notes