City of Des Moines, Engineering Department

Master Construction Safety Packet
2006 (Revised to eliminate Aviation Dept.)

This packet is to assist you in evaluating the hazards of the worksite in relationship to the job you have contracted to do. It is divided into three sections. The first is a section entitled, "City Construction Safety Packet" and contains the permit-required confined space entry program that is used by the Public Works Department to enter the sewer collection system. Separately in the Public Works Safety Section you will find the lockout/tagout policy. Together, these two programs will provide you with the concepts that the City uses to apply these two important OSHA safety standards.

The other safety sections are Public Works and Wastewater Reclamation Facility (WRF). Here you will find the permit-required confined space entry programs and the lockout/tagout policies in use at each. In addition you will receive a process management safety briefing at WRF. These are the safety procedures in use at each department/division. You may use them to evaluate the hazards in your work area in relationship with the work you have contracted to perform.

If you have any questions concerning the City or WRF safety procedures contact the Public Works/Wastewater Reclamation Authority Safety Consultant Matthew Van Dyke at 515-323-8009 (office) or 515-720-9351 (cell). If you have any questions concerning OSHA standards contact IOSHA Consultation at

Iowa OSHA Consultation and Education
1000 East Grand
Des Moines, Iowa 50319
Telephone: 515-281-7629
Fax: 515-281-5522
www.iowaworkforce.org/labor/josh/consultation/

For additional guidance be sure to read the following:

Section 1070 2.02 of the SUDAS Standard Specifications
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SECTION 1070 — Contractual Provisions, 2.02 — Convenience and Safety of the SUDAS Standard Specifications current Edition, and as further modified by any supplemental specifications or special provision in the contract documents.

2.02 CONVENIENCE AND SAFETY

A. Use of Streets: The Contractor is granted the privilege of using Jurisdictional roads, streets, or highways, as shown on the plans, for the purpose of doing work specified in the contract, but is not granted exclusive use of such roads, streets, or highways.

B. Protection of Workers and the Public: The Contractor shall erect and maintain good and sufficient guards, barricades, and signals at or near the work according to the MUTCD and all applicable laws, regulations, and specifications. The Contractor shall, in all cases, maintain safe passageways at all road crossings, crosswalks, and street intersections and shall do all other things necessary to prevent an accident or loss of any kind. After November 24, 2008, all personnel shall wear ANSI 107 Class 2 apparel at all times when exposed to traffic or construction equipment in the right-of-way.

C. Convenience and Access: The Contractor shall handle the work in a manner that will cause the least inconvenience and annoyance to the general public and to the property owners abutting the work area. The Contractor shall also provide access to the abutting property to the greatest extent practicable.

D. Worker Safety: The Contractor shall comply with all current and future federal and state OSHA requirements. Nothing in this contract or any action by the Jurisdiction shall be interpreted or construed as a waiver of OSHA requirements. It is the Contractor’s obligation to follow OSHA requirements and standards at all times.

E. Project Area or Work Site Safety:

1. In accordance with Section 1070, 1.06, until the work is accepted by the Jurisdiction, the work shall be in the custody of and under the charge, care, and control of the
Contractor. The Contractor is also responsible for the project area or work site. The Contractor is solely responsible for the safety of everyone on its work site.

2. The Contractor should have a safety program; however, the Contractor need not submit a safety program to the Jurisdiction, and the Jurisdiction will not review or approve the Contractor’s safety program. The Jurisdiction assumes that the Contractor will maintain a safe worksite; however, the Jurisdiction’s staff will not intrude in the Contractor’s responsibility for safety issues.

3. The Engineer may assign some or all of the duties and responsibilities of the Engineer to an authorized representative for a given project. Nothing contained in this section or in the contract documents shall be construed as requiring or permitting the Engineer to direct the means, methods, sequences, or procedures, including safety measures, of performing any work under the contract or contract documents, except to assure that the quality of work conforms to these specifications and other provisions of the contract documents and that the contract will be completed as scheduled.

4. The Engineer may appoint an authorized representative on the work site to monitor the materials used and the work done by the Contractor. The Engineer’s authorized representative is not a safety inspector and is not responsible for monitoring, directing, or otherwise ensuring the safety of the Contractor, its subcontractors, its suppliers, or any others that may be on the work site.

5. Construction of the work included in the contract is by its nature dangerous work; and the Contractor is hereby notified that it is the Contractor’s sole responsibility to provide as safe a working site as possible given the nature of the work. It is the Contractor’s responsibility to notify and advise its employees, subcontractors, suppliers, and everyone on the worksite of the dangers associated with the work, and provide them with appropriate safety information to protect them from those dangers.
OBJECTIVES

1. To outline a procedure for safe entry into a confined space.
2. To outline procedures for rescue in the event of an emergency.

DEFINITIONS

1. "Attendant" - An employee stationed outside the confined space who monitors the authorized entrant(s) and who performs all assigned attendant's duties. May also be referred to as "First Attendant"

2. "Second Attendant" -- An employee assigned job duties of an "Attendant" who also physically enters a confined space during special entries, such as a "horizontal" entry or "Hat" entry. This employee regularly performs these duties and is familiar with all sewer entry operations (i.e. Sewer Maintenance Worker, TV Crew Tech, etc.).

3. "Authorized Entrant" -- An employee who is authorized by the City of Des Moines to enter a confined space.

4. "Confined Space" -- Confined spaces are normally considered enclosures having limited means of access and egress such as, but not limited to, septic tanks, sewers, manholes, wet wells, arid pipes. In addition, a confined space is large enough and so configured that an employee can bodily enter, but is not designed for continuous employee occupancy.

5. "Entry" -- The action by which a person passes through an opening into a permit-required confined space. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

6. "Entry Supervisor" -- The employee (Senior Civil Engineer, Section Chief Crew Chief, Sewer Cleaning Equipment Operator) responsible for determining if acceptable entry conditions are present at a confined space where entry is planned, for authorizing entry, overseeing entry operations, and for terminating entry as required.

7. "Hazardous Energy" -- The unexpected release of energy, including "stored" energy, upon machines or equipment which could cause injury to employees, including any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, hazardous flow, etc.

8. "Shall, Must, Will" - - Denotes a mandatory requirement.

DUTIES

1. Authorized Entrants Shall:
   1. Know the hazards of entry, including signs/symptoms, and consequences of exposure to hazardous atmospheres.
2. Know how to properly use testing, monitoring, ventilating, and other equipment required onsite.
3. Communicate with attendant, as necessary.
4. Exit the space immediately when warning signs/ symptoms are evident.
5. Exit the space when ordered by the attendant.
6. Exit the space when atmospheric monitor detects an alarm condition.

II. Attendants (First and Second) Shall:

1. Know the hazards of entry, including signs/ symptoms, and consequences of exposure.
2. Be aware of behavioral effects of hazardous exposure.
3. Maintain an accurate count of authorized entrants (i.e. using entry permit).
4. Remain outside the permit space until relieved by another qualified attendant, unless acting as a second attendant.
5. Communicate with the entrant, monitoring the entrant’s status.
6. Monitor activities inside and outside the space.
7. Order entrants to evacuate the confined space if
   a. behavioral effects of exposure are obvious
   b. a situation outside the space could endanger entrants
   c. The attendant must leave his/her post
8. Summon rescue/emergency services as conditions warrant.
9. Warn unauthorized personnel to stay away and advise them to exit the space, if they have entered.
10. Perform no other duties that would interfere with the primary duty of monitoring and protecting the entrants.

Entry Supervisors Shall:

1. Know the hazards of entry, including signs/symptoms, and consequences of exposure.
2. Verify that entries have been made appropriately and according to the permit.
3. Authorize the entry by signing the permit and terminate the entry by signing the permit.
4. Verify that communication equipment is working properly.
5. Remove unauthorized individuals from working in or near the confined space.
6. Verify that entry operations remain consistent with the terms of the permit.
7. Retain all entry permits and submit them to the Wastewater Systems Supervisor for one year retention.

CONFINED SPACE ENTRY

PROCEDURE

I. Job Site Preparation

1. Whenever maintenance or construction work is taking place, the job site must be protected from adjacent hazards.
2. All loose objects shall be moved at least two feet from the manhole. Take necessary measures to protect employees and public from accidental injury.
3. The following safety equipment must be at the site: gas detection meters for O₂, combustible gas, H₂S, CO; manlift; full-body safety harness with lifeline; ventilation equipment; necessary communication equipment to summon rescue services (i.e. cellular phone); hard hat; and traffic barricades, as necessary.
4. Entry supervisor completes and signs the entry permit.
5. Post the entry permit at the confined space.

II. Pre-entry procedures:

Prior to entering any confined space, the following steps shall be taken:

1. Test the environment for oxygen deficiency, combustible gas, hydrogen sulfide, and carbon, monoxide, where available, record the results and the time tested.
2. Identify, eliminate, and/or minimize potential hazardous energy sources (i.e. electrical contact, engulfment, mechanical movement, etc.) when it exists and where it can be controlled, prior to entering the confined space.
3. If any of the atmospheric tests are positive, ventilate for at least five minutes by mechanical means and re-test. Continue ventilation for the duration of the entry.

   If the confined space will not test negative (without alarms) and/or hazardous energy cannot be controlled, entry is prohibited, canceling the entry permit. Contact your supervisor for additional instructions.

4. Continuous testing of confined space atmospheres shall be conducted while the space is occupied.

NOTE: Recommend sampling of all excavations over 4 feet in depth, as deemed necessary by a competent person.
III. Physical Hazard Lockout
A. Prior to entering a confined space where "hazardous energy" has the capability of causing employee injury, the following steps must be taken:
   1. Identify sources of hazardous energy
   2. Effectively "lockout" sources
   3. Release any "stored" energy
B. Effective communication is the key to safe-guarding employee exposure to hazardous energy.
   If a public utility service energy source needs to be controlled and is not controlled by Public Works:
   1. Contact the appropriate organization (WRF, Parks, MidAmerican Energy, Water Works, Century Link, AT&T).
   2. Inform them of the worksite location and necessary work to be performed.
   3. Ask that they perform a standard "lockout" on the energy source presenting the hazard.
   4. Wait for confirmation of "lockout" and obvious dissipation of hazardous energy before proceeding.
   5. Following completion of work, inform the utility service provider.

IV. Entering a Confined Space
A. Vertical Entry
   1. Follow the directives/guidelines of the entry permit. DO NOT ENTER a confined space unless all tests are negative.
   2. A manlift or mechanical winch must be available for immediate use at all entry sites and arranged over the confined space to provide necessary emergency/rescue retrieval.
   3. All authorized entrants entering the confined space must wear a harness, with lifeline attached to the manlift.
   4. The authorized entrant(s) and at least one attendant shall be on-site before the confined space is entered.
   5. The attendant must remain on top, in voice or visual contact with the authorized entrant in the confined space, at all times.
   6. A third party must be available at the site or by radio contact to summon rescue and other emergency services, as determined by the attendant.
B. Horizontal Entry
   1. An entry permit shall not be issued until a pre-entry conference is completed with the entry supervisor, entrant(s) and attendant(s).
   2. DO NOT ENTER a confined space unless all tests are negative.
   3. In addition to the access hole, two other fresh-air accesses (manhole, intake, etc.) immediately above and below the access hole must be opened, if possible.
   4. Continuous mechanical ventilation shall be used on every horizontal entry.
   5. A manlift or mechanical winch shall be available for immediate use at all entry sites. It shall be set up at the confined space.
   6. The horizontal space shall be tested continuously.
7. At least three persons must be at the site before a horizontal entry is made.
   a. The authorized entrant shall be equipped with the following items:
      i. Personal protective equipment
      ii. Escape pack (5 MINUTE minimum rating)
      iii. Harness with lifeline attached to rescue device.
      iv. Gas detection instrument
   
   b. A Second Attendant must remain in the vertical hole and is to be equipped with the following items;
      i. Personal protective equipment
      ii. One self-contained breathing apparatus (pack must be on and ready for use) with a 60-minute minimum rating.
      iii. Harness with attached lifeline.
      iv. Gas detection instrument. This person is the rescuer in case of emergency.
   
   c. The First Attendant must remain on top, in voice or visual contact with the person in the vertical space, at all times. This attendant is the top-side rescuer and is to be equipped as follows:
      i. Mechanical winch
      ii. Radio contact with the dispatcher who can summon emergency rescue services, or cellular phone.
C. "Hat" Entry - is an entry into a vertical structure in which an existing manhole lid is removed and a new manhole is placed directly over the old access to raise the elevation. A "lip" is therefore created between the new access and the actual sewer line, which can create an additional hazard in the event of a confined space rescue.

1. Monitor to Point
2. Monitor to Point 2
3. Return monitor to Point 1
4. If atmosphere checks OK:
   a. Second Attendant enters to Point 1, equipped with harness, safety line, Emergency Escape Pack, and GasTech.
   b. Safety line attached to chain ladder or other fixed point.
   c. "Entrant" enters per established procedure.
5. Second Attendant remains on "hat" during "entrant's" entry, in voice/visual contact with "entrant" and First Attendant.
6. In the event of an emergency or atmospheric hazard, Second attendant dons respirator and assists "entrant" in evacuation. If the "entrant" is injured or rendered unconscious, second attendant assists entrant evacuation by guiding "entrant" through "hat", ensuring that the "entrant" is not hung up on the hat lip.
7. Second attendant exits space only after entrant has safely evacuated.

V. EMERGENCY RESCUE:

In the event an employee is down in a confined space, the following emergency rescue procedure should be used:

A. Two-man rescue
   1. Second Attendant begins rescue with retrieval equipment.
   2. First Attendant calls dispatcher or 911.
B. One-Man Rescue with Manlift:
   1. Call dispatcher or 911, if phone is immediately available, giving exact location and nature of emergency.

   2. Lift victim out of hole and remove to fresh air. If, for any reason, a phone/radio is not available, remove victim first before leaving to summon rescue.

NOTE:
Smoking or open flames shall not be permitted in a confined space at any time, unless provisions for a HOT WORK PERMIT are followed.

NO DEVIATIONS FROM THIS PROCEDURE ARE ALLOWED WITHOUT THE PRIOR APPROVAL OF THE SAFETY ADMINISTRATOR.

VI. POST ENTRY

1. Note any conditions that occurred during the entry which were not permitted, caused problems or delays.

2. Entry supervisor cancels permit by signing off.

3. Retain permit for one year from initial entry.

4. Conduct post-entry conference for all entries performed within the last year.

5. Evaluate/review effectiveness of permit required for Confined Space Program, making corrective recommendations as necessary.
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     2. Lift victim out of hole and remove to fresh air. If, for any reason, a phone/radio is not available, remove victim first before leaving to summon rescue.

NOTE:
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NO DEVIATIONS FROM THIS PROCEDURE ARE ALLOWED WITHOUT THE PRIOR APPROVAL OF THE SAFETY ADMINISTRATOR.

VI. POST ENTRY

1. Note any conditions that occurred during the entry which were not permitted, caused problems or delays.

2. Entry supervisor cancels permit by signing off.

3. Retain permit for one year from initial entry.

4. Conduct post-entry conference for all entries performed within the last year.

5. Evaluate/review effectiveness of permit required for Confined Space Program, making corrective recommendations as necessary.
Control/Blocking Hazardous Energy
December 2005

Background:
Two percent of workplace deaths here in Iowa could be prevented by control/blocking hazardous energy. Energy, stored or residual, can maim or kill. A 37-year-old man was trying to clean the operating pedals of a skid-steer loader, which were frozen with snow and ice. Working in a cold, small garage with a low ceiling, which prevented use of the machine’s lift arm locks. The bucket was stuck in the 3/4-raised position. The victim had disabled the seatbelt safety interlock and the bucket came down on him when he loosened the pedals or linkage with a crowbar.

During 1995, an Iowan was killed while working under a 1973 grain truck changing a universal joint. The man parked the truck on a very slight slope, set the parking brake, put the transmission in neutral, and began to remove the U-joint located to the rear of the transmission. He was lying parallel with the truck with his head towards the front of the truck. No chocks were put under the wheels, only the parking brake was used. As the man removed the last bolt of the U-joint, the drive shaft spun out of his hands and hit him in the face. Once the joint was disconnected there was nothing to stop the truck from rolling down the incline. The truck stopped rolling with the front axle crushing the man's chest. He was found dead 30-40 minutes later. On this truck, the parking brake was connected to the transmission, and acted through the drive shaft, not the rear wheels. When the driveshaft was disconnected from the transmission the truck was free to roll down the incline. He obviously assumed the parking brake locked the rear wheels, as it does on most vehicles.

Purpose:
This policy requires that before servicing or maintenance is performed on machinery or equipment, that it must be turned off and disconnected (if appropriate) from the energy source and that an energy-isolating device must be locked or a personal work notice applied whenever someone is placed in harm's way. This policy is to prevent the accidental and unexpected startup of the equipment.

For most of our automotive fleet, this will require removing the ignition key and placing it in your pocket (or another location under your control) and hanging a
personal work notice on the steering wheel or other appropriate location indicating that the unit cannot be operated because work is being performed. It may require blocking components to prevent their movement.

Definitions:

**Affected employee** — is most likely the operator of the equipment. Generally, this will be the person bringing the unit in for repair but could also be the people working nearby.

**Authorized employee** — is the mechanic who will be performing the work.

**Blocking** — is placing a device that prevents movement due to gravity, springs, hydraulic or similar energy sources. Block include jack stands, wheel chocks, props, braces, and blocks.

**Energized** machines and equipment are energized when they are connected to an energy source or they contain residual or stored energy that is sufficient to cause injury. A number of components will be suspended and must be blocked to prevent their movement should hydraulic pressure fail and/or gravity cause a component to move or fall.

**Energy isolating device** — the ignition switch in most cases but also includes blocks, valves, jack stands, locks with only one key, and/or there may be a disconnect-switch or other device. Any suspended component shall be blocked. Hydraulic valves shall be locked.

**Energy sources** — the battery on the electrical system, hydraulics, gravity, compressed springs, and gasoline to power the engine are examples. Be aware that there are other sources of energy. Be watchful of chemicals, and stored mechanical energy. A number of units will have power take-offs and hydraulic power. All of these sources shall be brought to a zero energy state and lockout before working on them. Any suspended component shall have gravity blocked to prevent any movement.

**Equipment Work Notice** — is a notice that solely protects equipment from damage by preventing its operation. This device may be a notice stating the situation, or a locking device that may have other keys to allow the unit to be placed back into operation at the discretion of the managerial staff. Work may only be done under "personal work notice". The equipment work notice is bright orange and will be placed in a conspicuous location so it will be easily seen as the unit is approached and before it can be operated and cause damage. More than one equipment work notice may be used to meet this goal. The preferred method of attachment is by use of a plastic "zip strip". Indicate the problem with the unit and sign the equipment work notice.

**Personal Work Notice** — when placing a padlock, block or other energy-isolating device on the energy source and/or removing the ignition key to prevent its
operation or movement place, a personal work notice in a conspicuous location. This magnetic/hanging notice is bright green and stated that the equipment shall not be operated. More than one personal work notice may be used to insure that it will be easily seen as the unit is approached and before it can be operated, injuring the person working on the unit. Special instructions may be written on the notice. Make sure that the notice is signed.

**Program:**

This program is applicable when any servicing activity requires an authorized employee to:

- Remove or bypass machine guards or other safety devices, resulting in exposure to hazards at the point of operation or
- The employee is required to place any part of his/her body in contact with the point of operation of the operational machine or piece of equipment or
- The employee is required to place any part of his or her body into a danger zone associated with a machine operating cycle.

Some servicing procedures must be performed with the power on and/or the equipment operating. This includes measuring electrical current, making fine adjustments, or troubleshooting as allowed by the manufacturer. These operations are allowed, provided the appropriate PPE is worn and the proper precautions are taken. If this work is done with the help of another, establish clear channels of communication and procedures prior to the troubleshooting. The equipment must be returned to a lockout condition as soon as these operations are completed.

**Equipment brought in to the shop:**

1. Plan your work
2. If the operator is in the area, warn him what you are planning to do
3. Shutdown the equipment
4. Install all needed energy isolating devices (including blocks) and remove the ignition key and place it in your pocket
5. Hang a personal work notice on the steering wheel or other appropriate location
6. Dissipate all stored energy
7. Verify the isolation

**Equipment on a job site:**

1. Plan your work
2. Discuss your plan with the operator and anyone nearby
3. Shutdown the equipment
4. Install all needed energy isolating devices and remove the ignition key and place it in your pocket (or other location under your control)
5. Hang a personal work notice on the operating controls and/or steering wheel
6. Dissipate all stored energy
7. Verify the isolation

**Placing equipment back in service:**
1. Inspect the work area and make sure that all tools and parts have been removed
2. Inspect the area around the equipment and alert anyone nearby and make sure that they are safely positioned
3. Remove all your energy isolating devices and notices and/or replace the ignition switch key
4. Notify the operator if he/she is present; if they are not present and you are in the shop, you may move the unit to a designated place

**5. Only the authorized employee who placed the energy isolating devices and personal work notices may remove them**
6. If the unit is locked out and ready to be placed in service, but the authorized employee who placed the lockout has left, the Fleet Services Administrator, or his designee, may authorize the removal of the lock and/or work notice after he/she has verified that the person has left

**Protecting Equipment While Awaiting Parts/Service**
1. Place the unit in the east lot or other designated location.
2. Place an equipment work notice in a conspicuous location if repair/maintenance work has been delayed or halted and it is determined that continued operation of the equipment may cause considerable damage.
3. Contact Fleet Services' administration to place the equipment back into service and before removing the equipment work notice.

**Notes:**
1. Do not take ignition keys home; return them to their designated place
2. Your energy isolating devices and personal work notice may remain on the equipment when you are on break in the shop
3. If you are in the field and/or you have been pulled from the job, remove your energy isolating devices and personal work notice as outlined above or return the ignition key to either the operator or the unit and communicate the status of the equipment to the operator or others
4. Communications is a key and an important factor in keeping everyone safe
5. Padlocks used for lockouts shall be readily identifiable as a lockout and shall have only one key which remains in control of the person who has been assigned to the lock
6. If the work has not been completed by the end of shift or is placed in the down lot waiting on parts (or some other reason) for completion, an "equipment work notice"
may be installed to prevent damage to the equipment. See *Protecting Equipment While Awaiting Parts/Service*.

If you are in doubt on how to lockout the equipment, block energy sources or other safety precautions ask the operator or your supervisor. Planning is an important key in controlling hazardous energy. Refer to the owner's manual or the manufacture for additional information.

"Safety is the right attitude"

Approved by the Fleet Services Safety Committee on _____________________________

Matthew Van Dyke  
Consultant

Brian Bennett  
Manager
CITY OF DES MOINES
WASTEWATER RECLAMATION FACILITY

Confined Space Entry Policy

Objectives:

1. To outline a procedure for safe entry into a confined space.
2. To outline a procedure for rescue in the event of an emergency.

Definitions:

Attendant The individual stationed outside one or more permit spaces and who monitors the authorized entrants and performs all attendant's duties signed in the permit program.

Attendant's Log (Attachment Four) The daily log kept by the attendant to record the initial daily permit verification and the entrant's time into and out of the permit required confined space.

Authorized Entrant/Entrant The employee who is authorized by the entry supervisor to enter a permit space.

Confined Space A confined space is a space that is large enough and so configured that an employee can bodily enter and perform assigned work; has limited or restricted means for entry or exit; and is not designed for continuous employee occupancy.

Entry Entry has been made when any part of the body breaks the plane of the confined space.

Entry Permit (Attachment Two) The completed printed document that is provided by the City to allow and control entry into a permit space.

Entry Supervisor The WRF Manager, Senior Environmental Engineer, Treatment Manager, Solids Manager, Facilities Manager, Regulatory Compliance Manager, ACC1 and ACC2 Team Leader, Facilities Team Leader, Pumping Stations Team Leader, the Plant Field Services Team Leader, and the designated Team Leader in the Team Leaders absence. The Entry Supervisor shall be responsible for specifying acceptable entry conditions at a permit space where entry is planned; for authorizing entry; and specifying conditions for terminating the entry. These individuals shall be responsible for initiating the confined space entry process.
**Hazardous Atmosphere**

Has a flammable gas, vapor, or mist in excess of 10% of the lower flammable limit (LEL).

Airborne combustible dust at a concentration that meets or exceeds its LEL. (Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of five (5) feet or less.

Has an oxygen concentration that is less than 19.5% or greater than 23.5%.

Has any other atmospheric concentration of any substance recognized as immediately dangerous to life or health. A list of the substances are published in Subpart G to Z, 29CFR Part 1910.

**Hot Work Permit**

The written authorization to perform operations (riveting, welding, cutting, burning, and heating) capable of providing a source of ignition within a confined space.

**Permit Required Confined Space (Attachment One)**

A permit required confined space is a confined space that has either a hazardous atmosphere or the potential to develop a hazardous atmosphere; and/or contains a material that has the potential for engulfing an entrant; and/or has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; and/or contains any other recognized serious safety or health hazard. See "Attachment One - Permit Required Confined Space Listing" for the Des Moines Wastewater Reclamation Facility.

**Permit Spaces Re-Classified as Non-Permit Spaces (Attachment Three)**

For permit spaces to be re-classified non-permit spaces the following conditions must be met:

1. If entry must be made to gather data, then the initial entry must be made under the full permit system.

2. The only hazard posed by the permit space is an actual or potential hazardous atmosphere.

3. Ventilation alone will maintain the permit space safe for entry.
4. Monitoring and inspection data shows that ventilation will keep the atmosphere safe.

5. Any condition that makes it unsafe to remove an entrance cover must be eliminated prior to its removal.

6. Internal atmosphere must be tested with a calibrated, direct-reading instrument prior to entry. Monitoring should be continuous or if not possible then every 20 minutes.

7. All of the above must be documented and made available to the entrants.

8. Openings to permit spaces must be guarded by a barrier.

9. No one may be in the confined space if a hazardous atmosphere is present.

10. Continuous forced air ventilation must be used.

**Rescue Services**

Fire Rescue paramedics 9-911 OR 911.

**Training:**

Training shall be provided to all employees who will make confined space entries. This training may be conducted on the job by the entry supervisor. Training shall cover this policy, the hazards involved, any change in procedures and prior to the change, duties of the participants, the equipment that will be used, hazards that may be encountered, symptoms of contaminate exposure, and the consequences of exposure. Entrants trained shall be certified by name, the signature or initials of the trainer, and the dates of training. This certification shall be made available for inspection by the employees or their authorized representatives.

**Permit-Required Confined Space Entry:**

1. **Unauthorized entry is prohibited.** The entry supervisor shall take the steps necessary to prevent entry by use of barriers, barrier tape, etc. If the confined space entry worksite is abandoned for end of shift, breaks, etc.; barriers, barrier tape, etc. shall be erected, or the worksite closed, and unauthorized employees shall be instructed not to enter. **Note:** Outside contractors must agree to abide to all IOSHA rules and regulations and if joint City/contractor work is involved, the outside contractor must be included in the pre and post entry conferences.

2. Identify and evaluate the hazards of permit spaces before employees enter them.
3. The entry supervisor shall conduct a pre-entry conference with the WRF Manager or designee, the Operations Training Coordinator, any outside contractor, the assigned attendants and at least one assigned entrant to develop and implement the means, procedures, and practices necessary for safe permit space entry operations. Each shall sign the entry permit. The following are minimum entry requirements:

**Pre-entry:**

a. Obtain your entry supervisor's written permission to enter the confined space.

b. Atmospheric levels without respiratory protection
   - LEL less than 10%
   - Oxygen greater than 19.5% but less than 23.5%
   - Hydrogen Sulfide less than 10 ppm
   - Other limits as determined and that may be applicable

c. Isolate the permit space by following the Lockout/Tagout policy and procedures.

d. Purge, inert, flush or ventilate the permit space as necessary to eliminate or control atmospheric hazards.

e. Protect the site from adjacent hazards (example traffic). Remove all loose objects to a distance of at least two (2) feet from the entrance.

Test for oxygen, flammable gases and vapors, and hydrogen sulfide.

g. Gather all required safety equipment at the site. Including but not limited to atmospheric monitoring equipment, full body harness with lifeline, manlift and ventilation equipment. Provide all necessary personal protective equipment (PPE) such as but not limited to hard hats, eye protection, etc.

h. If ventilation is to be used, ventilate for at least five (5) minutes and re-test. Repeat this until all tests show acceptable atmospheric conditions. Ventilate for an additional 15 minutes and re-test atmosphere.

i. **If permit conditions are not established, then DO NOT ENTER until permit conditions are met or a new permit is issued and the new permit conditions are met.**
j. A trained attendant must be present outside the confined space whenever an entrant is in the confined space. The attendant must be in radio contact (or other suitable means of communication) with someone who is available to summon emergency aid. If radio contact is not possible, then a second attendant must be present to summon emergency aid. The second attendant must have transportation available whenever an entrant is in the confined space. See attendant's duties for additional information.

k. Post the entry supervisor’s written permission (entry permit) at the confined space.

**At entry:**

l. All persons entering the confined space must be properly fitted with safety harness and attached lifelines unless their use may endanger the entrant and specifically exempted by the entry permit.

m. If ventilation is used, ventilation shall be maintained continuously except to allow entry, the passing of tools and equipment, or to temporarily reduce noise to improve communication with the entrants.

n. Monitor the atmosphere continuously or if not possible, then monitor at least every twenty (20) minutes.

o. Provide all necessary personal protective equipment (PPE) such as but not limited to hard hats, eye protection, etc.

p. When work is completed, close the confined space by removing all tools, debris, works materials, etc. Exit the space and close it. Remove all barriers, tools, etc. from the worksite. Remove all lockouts and tags and inform the area operator. Return the permit required confined space to service.

**Post Entry:**

q. The entry supervisor shall conduct a post entry conference with the WRF Manager or his designee, the Operations Training Coordinator, any outside contractor involved in a joint entry, the attendant, and at least one entrant to evaluate the entry and develop any additional procedures for subsequent confined space entries. This post entry conference shall be conducted within five (5) working days of closure.

r. Submit the entry permit to the Operations Training Coordinator after closure.
Re-Classified Confined Space Entry Procedure

Note: Hot work shall not be performed under the re-classified confined space entry procedure.

Note: The entry supervisor shall approve the re-classification of a permit required confined space to non-permit required confined space provided that the only hazard posed by the permit space is an actual or potential hazardous atmosphere and that continuous powered ventilation will maintain the permit space safe for entry. All of the conditions listed under the definition of "Permit Spaces Re-Classified as Non-Permit Spaces must be met (page 3 of this policy). See attachment three.

1. Unauthorized entry is prohibited. The entry supervisor shall take the steps necessary to prevent entry by use of barriers, barrier tape, etc. If the confined space entry worksite is abandoned for end of shift, breaks, etc.; barriers, barrier tape, etc. shall be erected, or the worksite closed, and the next shift or area employees shall be instructed not to enter.

2. Identify and evaluate the hazards of permit spaces before employees enter them.

3. Complete the Re-Classified Confined Space Entry Checklist. The following are minimum entry requirements:
   a. Atmospheric
      LEL less than 10%
      Oxygen greater than 19.5% but less than 23.5%
      Hydrogen Sulfide less than 10 ppm
      Other limits as determined and that may be applicable
   b. Isolate the permit space by following the Lockout/Tagout policy and procedures.
   c. Purge, inert, flush or ventilate the permit space as necessary to eliminate or control atmospheric hazards.
   d. Protect the site from adjacent hazards (example traffic). Remove all loose objects to a distance of at least two (2) feet from the entrance.
   e. Test for oxygen, flammable gases and vapors, and hydrogen sulfide.
   f. Gather all required safety equipment at the site. Including but not limited to atmospheric monitoring equipment, full body harness with lifeline, manlift and ventilation equipment.
   g. Ventilate for at least five (5) minutes and re-test. Repeat this until all tests show acceptable atmospheric conditions.
If the confined space cannot be cleared of all toxic and explosive gases or an oxygen deficiency then DO NOT ENTER. Contact your Team Leader for additional instructions. Entry may be done only under the permit required entry procedures.

Ventilate for an additional 15 minutes.

A trained attendant must be present outside the confined space whenever an entrant is in the confined space. The attendant must be in radio contact (or other suitable means of communication) with someone who is available to summon emergency aid. If radio contact is not possible, then a second attendant must be present to summon emergency aid. The second attendant must have transportation available whenever an entrant is in the confined space. See attendant’s duties for additional information.

All persons entering the confined space must be properly fitted with safety harness and attached lifelines.

Ventilation shall be maintained continuously except to allow entry, the passing of tools and equipment, or to temporarily reduce noise to improve communication with the entrants.

Monitor the atmosphere continuously or if not possible, then monitor at least every twenty (20) minutes.

Provide all necessary personal protective equipment (PPE) such as but not limited to hard hats, eye protection, etc.

When work is completed, close the confined space by removing all tools, debris, works materials, etc. Exit the space and close it. Remove all barriers, tools, etc. from the worksite. Remove all lockouts and tags and inform the area operator. Return the re-classified confined space to service.

Submit the re-classified confined space entry checklist to the Operations Training Coordinator after closure.

Duties of Employees Involved in Permit Required or Re-Classified Confined Space Entries

Attendant’s Duties

The attendant shall know the hazards, the symptoms and consequences of the hazards associated with the confined space, and how to use the safety equipment. He shall monitor the confined space's atmosphere and the entrants, communicate with the entrants, and order the entrants to evacuate the confined space if he detects a prohibited condition. If the attendant detects the
behavioral effects of hazard exposure in an entrant, or if the attendant detects a situation outside the space that could endanger the entrant or if the attendant cannot effectively and safely perform all of his duties he shall order an evacuation. The attendant shall also summon rescue and other emergency aid, warn unauthorized persons to stay away, advise unauthorized entrants to exit, and inform the entry supervisor of unauthorized entrants. In a permit-required entry, the attendant shall keep a daily log in which he shall verify permit conditions and record the entrants in the permit required confined space. See attachment 4. He shall maintain an accurate count of all entrants at all times.

Note: The attendant may not enter the confined space unless relieved by another attendant. The attendant is to remain outside the confined space as long as an entrant is in the space.

Entry Supervisor's Duties
Know the hazards and their symptoms that may exist in the confined space. Verify that the confined space entry permit requirements have been met. Terminates the entry and cancels the permit if permit conditions no longer exists. Verifies that rescue services are available. Removes unauthorized entrants, and determines that whenever responsibility for a permit space entry operation is transferred that the entry operation remains consistent with the entry permit conditions.

Entrants' Duties
The entrant shall follow the direction of the Entry Supervisor and Attendant. The entrant shall not enter the confined space unless so directed. The entrant shall immediately vacate the confined space if so directed. The entrant shall immediately exit and report any permit violation, difficulty, hazard or unusual condition. The entrant shall adhere to the permit conditions and instructions at all times. The entrant shall know the hazards, symptoms and consequences of exposure to hazards, and proper use of equipment. The entrant shall sign the attendant's log and enter the time into or leaving the permit required confined space.

Rescue
Rescues shall be by use of a manlift or by fire rescue. To reach fire rescue, telephone 9-911, or contact the WWTP by radio.

Outside Construction Services
Any City employee who is authorized to contract, purchase, or arrange for outside services shall inform the service supplier that the Des Moines Wastewater Reclamation Facility has permit required confined spaces that have or may have hazards and/or hazardous atmospheres. All service suppliers shall contact the
WRF Manager or his designee for specific locations and hazards that may be encountered with their work.

The outside contractor must agree to abide by 29CFR1910.146. All joint entries must be coordinated.

**Deviations**

NO DEVIATIONS FROM THE CONFINED SPACE ENTRY POLICY ARE PERMITTED WITHOUT THE EXPRESSED APPROVAL OF THE WRF Manager or his designee.
Des Moines Metropolitan Wastewater Reclamation Facility

Permit Required Confined Space Listing - Contractors

November 2006
Attachment One

A confined space is a space that is large enough and so configured that an employee can bodily enter and perform assigned work; has limited or restricted means for entry or exit; and is not designed for continuous employee occupancy.

A permit required confined space is a confined space that has either a hazardous atmosphere or the potential to develop a hazardous atmosphere; and/or contains a material that has the potential for engulfing an entrant; and/or has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; and/or contains any other recognized serious safety or health hazard.

Entry has been made when any part of the body breaks the plane of the confined space.

IMPORTANT: You must have your supervisor's written permission to enter a permit required confined space.

<table>
<thead>
<tr>
<th>Permit required confined spaces include but are not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Structure 04 Raw wastewater diversion structure.</td>
</tr>
<tr>
<td>2. Building 05 Below elevation 6.50 in bar screen channels or wet wells.</td>
</tr>
<tr>
<td>3. Building 05 Room B 401 - Valve pit area below elevation -18.92.</td>
</tr>
<tr>
<td>4. Building 05 Bar Screens, upper and lower levels if power ventilation fails Seepage Vac Receiving Station if power ventilation fails and/or hydrogen sulfide monitory system fails</td>
</tr>
<tr>
<td>5. Structure 07 Seepage waste channels</td>
</tr>
<tr>
<td>6. Special waste influent vault</td>
</tr>
<tr>
<td>7. Special waste effluent vault</td>
</tr>
<tr>
<td>8. Channels for transporting wastewater, including the grit influent, grit channels, grit effluent and the east and west primary influent channels.</td>
</tr>
<tr>
<td>15. Building 14 Truck scale pit.</td>
</tr>
<tr>
<td>17. Structure 15 All primary clarifiers</td>
</tr>
</tbody>
</table>
19. Structure 15  All scum wells.
22. Structure 24  Wastewater channels.
26. Structure 40  Aeration basins
27. Structure 40  Polymer and caustic tanks.

29. Structure 55  All final clarifiers
   Contact tank, scum and dewatering pump station manhole at
   south side of Structure 65 and valve pit.
30. Structure 65  Blended sludge wet well.
31. Structure 70  Polymer tanks.
32. Structure 70  Digested sludge wet well.
33. Structure 70  Recycle flow wet well.
34. Structure 70  Waste to Digester Receiving Tank
35. Structure 85  Inside digesters.
37. Structure 95  East side junction chamber.
38. Structure 95  Gas sphere and pit below the sphere.
39. SW Basin  Bar screen, below floor level.
40. SW Basin  Valve control room.
41. SW Basin  All chambers.
42. Westside Basin  All chambers.
43. Westside Basin  Bar screen, below floor level.
44. All lift stations  All wet wells.
45. All locations  All manholes and sewer lines.
46. All locations  All levee gate wells.
47. All locations  All sump pump pits.
48. All locations  All valve pits with leaking valves.
49. All locations  All meter pits with leaking equipment.
50. All locations  All unventilated valve pits.
51. All locations  All unventilated meter pits.
52. All locations  All wet wells.

In addition care must be exercised in all tunnels, basements, ventilated valve pits and ventilated meter pits.

**If you have any doubt, contact your supervisor or proceed as if it were a confined space. If the ventilation fails in any normally ventilated confined space, immediately contact your supervisor.**
Instructions: This form is to be completed in ink and posted near the entry site prior to entry. Any mistakes must be crossed out by a single line and initialed by the entry supervisor.

No deviations are allowed. If entry conditions are not met, entrants must not enter. If entry conditions are not maintained, entrants must immediately exit the confined space and may not re-enter until acceptable conditions are re-established or a new permit issued.

Confined Space Entry Preparation:
1. Identify (be specific) the confined space to be entered: ____________________________________________________________

2. What is the purpose of the entry: ____________________________________________________________

3. [] Conduct the pre-entry conference with entrant, attendant, and contractor representatives (mandatory).

4. Identify the hazards or potential hazards that may be encountered with this entry:
   - [] Hydrogen sulfide
   - H Oxygen deficiency
   - [] Methane
   - n Carbon monoxide
   - H Falls
   - [] Slips
   - [] Entrapment
   - [] Engulfment
   - [] Biological hazards
   - [] Mechanical
   - Li Electrical
   - [] Traffic
   - [] Other (be specific): ____________________________________________________________

5. Outside contractors [] will [] will not be used in this confined space entry. Note: contractor representative must be present and participate in completing this entry permit.

6. Clear the area of the following adjacent hazards: ____________________________________________________________

7. The following employees will be assigned to this confined space entry:
   - Attendants:
   - Entrants:

8. Isolate the confined space as per the WRF Lockout/Tagout Policy by locking and tagging the following:

9. The following minimum atmospheric standards have been established for this entry (mandatory):

   | No respiratory protective equipment is required: | [] Air line respiratory protection is required: | [] SCBA required: |
   | Oxygen > 19.5% | Oxygen > 19.5% | Oxygen <= 19.5% |
   | LEL < 10% | H₂S >10 PPM and <300 PPM | 1 l/min > 300 PPM |
   | CO < 25 PPM | CO >25 PPM and < 1500 PPM | CO => 1500 PPM |
   | Other: | Other: | Other: |

10. The following safety equipment will be present at the entry site:
Confined Space Entry Procedure:

11. Erect barriers and prohibit unauthorized entry (mandatory).

12. Entrants will use the following safety equipment:
   - Full body harness, required
   - Ladder for entry
   - Appropriate respiratory equipment (item #9)
   - Life lines, required unless they would present a hazard to the entrant
   - Man lift, required for rescue

13. Ventilation:
   - Continuous (required if LEL, is detected)
   - Intermittent
   - None

   Note: If ventilation is used, it shall begin at least 15 minutes prior to any entry and until atmospheric standards have been established.

15. Hot work (welding, cutting, etc.) is not permitted.
16. Special consideration or instructions (make sure all identified hazards in item #4 have been addressed):

Approvals (mandatory):

17. Pre-entry conference procedures approved by:
   - Assigned Attendant: __________________________  Assigned Entrant: __________________________
   - Outside Contractor Representative: ______________________________________________________________

Permission to Enter (mandatory):

18. I have determined that the confined space described above meets minimum entry requirements and authorize the above named entrants to
   enter this confined space beginning on ________________ and ending ________________
   - Entry Supervisor's signature: _________________________________________________________________

19. Entry permit posted at entry site (mandatory). Entry may now begin.
20. Attendant is to record initial atmospheric readings on the log sheet.
21. Entrants log in and out of the confined space.

Closing the Confined Space (mandatory):

22. Date the confined space was closed: __________________________
23. Post entry conference conducted within 5 days of closure.
24. This permit submitted to the Operations Training Coordinator.
Re-Classified Permit Required Confined Space Entry Checklist

Attachment Three

Checklist to be completed each time a re-classified permit required confined space is entered. Deviations from the Confined Space Entry Procedure are not allowed without the prior approval of the WRF Manager or his designee.

JOB SITE PREPARATION - LOCATION ______________________ Date: ______________________

[ ] Site protected from adjacent hazards (example: traffic)
[ ] All loose objects are at least two (2) feet from the entrance.
[ ] All required safety equipment is at the site.

H atmospheric monitoring equipment
[ ] manlift

[ ] full body harness with lifeline
[ ] ventilation equipment

ENVIRONMENTAL TESTING

[ ] Tested confined space for explosive gases, toxic gases and oxygen deficiencies
[ ] confined space tested clear, no alarms

confined space tested, alarm condition:

[ ] H₂S [ ] combustibles H oxygen [ ] carbon monoxide

Ventilate five (5) minutes and then retest; repeat until all tests show no alarm condition.

If the confined space cannot be cleared of all toxic and explosive gases or an oxygen deficiency then DO NOT ENTER. Contact your supervisor immediately.

ENTRANCE INTO THE CONFINED SPACE

[ ] Confined space ventilated 15 minutes prior to entry
[ ] Two persons present at the site
[ ] All persons entering the confined space is properly fitted with safety harness and attached lifeline time entered: ________________
[ ] One person outside of the confined space, in visual or voice contact with person(s) in the space
[ ] Confined space atmosphere monitored
[ ] continuously; or
[ ] every 20 minutes
[ ] Ventilation of confined space maintained continuously

time exited: ______________________

COMMENTS (unusual conditions, alarms): ________________________________

_________________________________________

CREW MEMBERS:

_________________________________________

_________________________________________

Name of person completing checklist ______________________ Name of entry Supervisor reclassifying the confined space
**Wastewater Reclamation Facility**

**Permit Required Confined Space Attendant's Daily Log -**

Attachment Four

**Instructions:** This form is to be kept with the entry permit and is a part of the permit. A new log sheet is required each day; or shift, if the work extends beyond the shift. The atmosphere of the confined space must be tested prior to every entry and monitored continuously or every 20 minutes as per the permit. Attendants shall sign-in when they take over the entry. All authorized entrants must sign-in each time he enters the permit required confined space and note the time entered. All authorized entrants must sign-out each time he exits the permit required confined space and note the time exited. No deviations are allowed with the entry permit. *On the back, record atmospheric monitoring results, as indicated.*

1. Location: 

2. Check one: [ ] permit conditions verified and entry allowed. [ ] permit conditions not met, entry not allowed.

3. Date: 

<table>
<thead>
<tr>
<th>Log</th>
<th>Authorized Attendant’s Signature</th>
<th>Authorized Entrant’s Signature</th>
<th>Time Entered</th>
<th>Time Exitd</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Typical Atmospheric Monitoring Results

Readings prior to the initial permit required confined space entry:

<table>
<thead>
<tr>
<th>Time</th>
<th>LEL</th>
<th>Oxygen</th>
<th>Hydrogen Sulfide</th>
<th>Carbon Monoxide</th>
<th>Other (identify)</th>
</tr>
</thead>
</table>

Attendant's comments:

Second set of readings or two hours into the entry procedure:

<table>
<thead>
<tr>
<th>Time</th>
<th>LEL</th>
<th>Oxygen</th>
<th>Hydrogen Sulfide</th>
<th>Carbon Monoxide</th>
<th>Other (identify)</th>
</tr>
</thead>
</table>

Attendant's Comments:

Third set of readings or after meal break and prior to re-entry:

<table>
<thead>
<tr>
<th>Time</th>
<th>LEL</th>
<th>Oxygen</th>
<th>Hydrogen Sulfide</th>
<th>Carbon Monoxide</th>
<th>Other (identify)</th>
</tr>
</thead>
</table>

Attendant's comments:

Fourth set of readings or six hours into the entry:

<table>
<thead>
<tr>
<th>Time</th>
<th>LEL</th>
<th>Oxygen</th>
<th>Hydrogen Sulfide</th>
<th>Carbon Monoxide</th>
<th>Other (identify)</th>
</tr>
</thead>
</table>

Attendant's comments:
Lockout/Tagout Procedure

Purpose:

The potential for serious injury or fatalities exists for all employees working with or around powered equipment, including all mobile equipment. The proper use of Lockout/Tagout procedures eliminates the risk of accidental contact with direct or stored energy when maintaining this equipment.

The purpose of this policy is to define a process that will protect city employees from the hazards of potential contact with direct or stored energy.

Objective:

1. To establish the minimum requirements for the safe lockout or tagout of energy isolating devices.
2. To ensure that all employees are protected from potentially hazardous energy when performing service or maintenance activities.

Some common examples of energy sources and associated hazards include the following:

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Energy Magnitude</th>
<th>Hazard Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Power</td>
<td>120v-13800v</td>
<td>Shock burns, cardiac arrest, death</td>
</tr>
<tr>
<td>Hydraulic fluid under pressure</td>
<td></td>
<td>Mechanical movement — crushing injury</td>
</tr>
<tr>
<td>Compressed air</td>
<td>Over 30 psi</td>
<td>Puncture, severe eye injury</td>
</tr>
<tr>
<td>Energy stored in springs</td>
<td></td>
<td>Mechanical movement, crushing injury</td>
</tr>
<tr>
<td>Potential energy from suspended parts, etc.</td>
<td></td>
<td>Crushing injury</td>
</tr>
<tr>
<td>PTO, (i.e. Teragator) hydraulic attachments</td>
<td></td>
<td>Mechanical movement, crushing injury</td>
</tr>
<tr>
<td>Flow control gate/valve</td>
<td>Water, wastewater, etc. sludge, Crushing injury, drowning</td>
<td></td>
</tr>
</tbody>
</table>
Definitions:
1. "Hazardous energy" - the unexpected release of energy or "stored" energy upon machines or equipment which could cause injury to employees.
2. "Energy source" - any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
3. "Lockout" - the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
4. "Lockout device" - a device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safety position and prevent the energizing of a machine or equipment.
5. "Lockout Installer" - that employee who physically placed a lockout on the energy isolating equipment and is/was performing the intended work on that equipment.
6. "Tagout" - the placement of a tagout device on an energy isolating device, in accordance with an established procedure to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
7. "Tagout device" - a permanent warning device such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
   See attachment 2.
8. "Departmental lock" - a color coded padlock used for temporarily locking out defective equipment as a means of preventing further operation. Keys are available to supervisory and crew chief personnel. Departmental locks are prohibited as a sole means of protecting an energy isolation device.
9. "Safety lock" - a single keyed padlock used for ensuring lockout by the individual placing the lock. The sole key is kept in possession of that person placing the device and actually performing the intended work. This lockout is color coded black and its owner identified.
10. "Lock board" - a designated dry erase or chalk board used as a communication device for lockout processes, the board is numerically divided. When a lock is installed it is required that the information for that lock is filled in (Name, Date, Equipment/ Location) on the lock board. Failure to properly fill in this information is considered a breach of this policy.
12. "Zero Mechanical/Electrical State" - All energy sources, main as well as secondary, have been isolated from the machine/equipment, all stored energy has been released, and all potential energy has been restrained.
13. "Group Lockout or Tagout" - May be used when servicing and/or maintenance is performed by a crew, craft, department or other group.
14. "Group Lockout Device" - is a departmental lock or set of keyed alike locks used to isolate a process or structure.
15. "Group Lockout Device" - is a device which contains all the key(s) used in a group lockout procedure and which in turn is capable of receiving a lockout from each member of the crew.
16. "Team Leader" shall include crew chiefs for the purpose of this policy.
17. "Lockout/Tagout Book" is a booklet identifying power sources for equipment.
18. "Padlock Control Center" a box that contains departmental locks and keys, tags, and inventory control.

Responsibility

Team Managers shall:

1. Implement this lockout/tagout policy by:
   a. Requiring all Team Leaders to identify activities where lockout/tagout shall be used, and to identify employees who this may affect.
   b. Ensuring that all necessary equipment is available to comply with this policy.
2. To enforce strict compliance with this policy.

Team Leaders shall:

1. Identify those areas or equipment where lockout/tagout can be used, that is, potential areas or equipment which can accept a lockout device or tagout system.
2. Train their personnel in the location of the areas listed in #1, and the appropriate use of lockout/tagout equipment, or identify personnel capable of providing training for locking out highly specialized equipment (ex. vendor). Training must be provided for all types of lockout systems which may be encountered at the worksite. Each specific system need not require training, but identification of power sources and control source is required.
3. Provide necessary equipment to properly perform lockout/tagout.
4. Strictly enforce the lockout/tagout policy.
5. Be responsible for the placement of departmental locks used in a group lockout and the placement of all key(s) in the group lockout box.
7. Maintain the padlock control center if one is used.

Employees shall:

1. Strictly comply with the directives of this policy.
2. Alert Team Leaders to potential lockout/tagout equipment or areas.
4. Be responsible for individually issued safety lockouts. Loss of a personally issued safety lock, or the destruction of the personally issued safety lock due to its left in place and denying the WRF use of the equipment when the employee is not on duty, may result in disciplinary action as prescribed by standard City procedures.

Risk Management shall:

1. Assist each department in selecting the appropriate procedure of energy isolation if questions arise as to the proper means of control.
2. Train appropriate Team Leaders and assist in the training of employees in the City's lockout/tagout procedures.
3. Audit each Team's compliance with this policy.
LOCKOUT PROCEDURE

Preparation
A. Survey the work location and identify all isolating devices which apply to the equipment to be locked or tagged out. Trace equipment power back to highest source(s). Remember, more than one energy source (electrical, mechanical, or other) may be involved.

Some examples include:

Pressurized fluid lines (hydraulic, oil, etc.) - shut off to block pressure from the power source and reduce pressure on the machine side by venting to atmosphere, drain, or collector as necessary.

Accumulators, surge tanks, associated lines - reduce to atmospheric pressure at specific work location.

Pipes, tubing, hoses, valves - reduce the mechanical potential energy so that the opening or disconnection of any of the above will not produce a movement that could cause injury.

Electrical - identify all sources of power supply to the equipment, and accompanying energy isolating devices (switches, motor control, master switch, etc.) capable of reducing the equipment to a zero mechanical/electrical state. Other equipment power sources include remote and automatic control circuits which must be locked out.

B. Determine the appropriate technique for a lockout or a tagout system.

Procedure

A. 1. Obtain appropriate "equipment" or "safety" lock from the designated "lock board".
2. Fill in appropriate information on lock board following removal of lock for intended use.

B. Lockout Sequence
1. Shut down equipment by normal stopping procedures (depress stop button, open toggle switch, etc.)
2. De-energize all equipment power sources (shut down breaker panel switch, master control, etc.)
3. The most acceptable and preferred method of achieving lockout, in order of decreasing preference, is as follows:
   a. Where practical, all systems shall be both locked and tagged out to facilitate communication among employees.
   b. In the event an energy isolating device for obvious reasons (exposure to adverse weather, etc.) cannot accept a tagout system, a lockout alone is acceptable.
c. If a system is not physically capable of accepting a lockout device, the least acceptable form of energy isolation is by use of a tagout device.

NOTE: Any machine or equipment, new or being modified, must be capable of effectively accepting a lockout device to achieve the highest level of energy isolation.

4. Release stored energy or restrain moving parts (e.g. rotating flywheels, hydraulic systems, and air, gas, or water pressure, etc.) If for some reason stored energy cannot be released, all necessary and appropriate personal protective equipment shall be worn according to established policy.

5. Check lockout effectiveness by attempting to restart equipment using normal, alternate, local, and/or remote start-up procedures.

CAUTION: Return operating control(s) to "neutral" or "off" position after the test.

C. Restoring Equipment to Normal Operation
   1. Ensure all tools have been removed and guards have been reinstalled.
   2. Check the area around the equipment to ensure that no one is exposed.
   3. Remove lock from energy isolating device.
   4. Restore energy to equipment. NOTE: If more than one lockout is used, do not attempt to restart.

D. Lockout/Tagout Device Removal by Other Than Safety Lock Installer

No lockout/tagout device may be removed or cut by a person other than the one who originally installed the device, unless removal is authorized by the appropriate Team Leader. The appropriate Team Leader shall be the immediate Team Leader of the employee who placed the lock and performed or is performing the designated work. After approval, use normal removal procedure.

III. Energized Equipment Maintenance

For specific equipment, some manufacturers recommend making necessary adjustments and performing routine maintenance while equipment is energized (e.g., pump-packing adjustments). In this case, work shall only be performed by qualified personnel who have had specified training in making these adjustments. Two employees are required to perform this maintenance and maintain visual/audio contact. One employee shall be positioned at the nearest power isolation source for that equipment in order to deactivate the energy in the event of an emergency. In addition, all necessary personal protective equipment shall be worn (hard hat, goggles, etc.).

This policy requires all Electricians/Electronic Technicians, etc.; to have two people available at all times when testing any energized system rated above 480 volts nominal. All personnel testing such systems shall wear appropriate protective clothing, including hard hats, safety glasses, and dielectrically certified gloves.
Following is a list of possible employees affected by Lockout/Tagout requirements.

| Airport Field Worker                  | Park Maintenance Supervisor |
| Building and Grounds Crew Chief       | Park Operations Supervisor  |
| Building Attendant                   | Park Shop Chief              |
| Building Equipment Operator          | Park Superintendent         |
| Building Maintenance Supervisor      | Park Supervisor              |
| Building Services Superintendent     | Plant Equipment Lubricator   |
| Custodial Service Supervisor         | Plant Mechanic               |
| Electrical Inspector                 | Plant Mechanic Crew Chief    |
| Electrical Specialist                | Plant Operator               |
| Electrician                          | Plumber                      |
| Electronic Flow Meter Technician     | Plumbing Inspector           |
| Electronic Technician                | Plumbing Specialist          |
| Equipment Lubricator                 | Public Works Crew Chief      |
| Equipment Mechanic                   | Public Works Section Chief   |
| Equipment Service Worker             | Public Works Supervisor      |
| Fire Equipment Mechanic              | Pumping Station Crew Chief   |
| Fire Maintenance Superintendent      | Pumping Station Maintenance Worker |
| Maintenance Section Chief            | Senior Building Equipment Operator |
| Maintenance Supervisor               | Senior Electrical Inspector  |
| Maintenance Inspector                | Senior Equipment Mechanic    |
| Mechanical Specialist                | Senior Mechanical Inspector  |
| Operations Supervisor                | Senior Plumbing Inspector    |
| Park Maintenance Leader              | Utility Worker               |
| Park Maintenance Mechanic            | Welder                       |

Each new or transferred affected employee and other employees whose work operations are or may be in the area, shall be instructed in the purpose and use of the lockout or tagout procedures.
Metropolitan Wastewater Reclamation Facility

Process Safety Management

Prevention Program

Compliance with OSHA Process Safety Management (PSM) requirements makes up the Prevention Program of the RMP. The Process Safety Management consists of twelve elements designed to improve the system safety and decrease the likelihood of a release.

Employee Participation

Participation of the Des Moines Metropolitan Wastewater Facility employees in preparing the PSM program and RMP was critical to the program's successful implementation. Employee participation is valuable because it increases the safety awareness of the employees and it allows the employee's experience in operating and maintaining the processes to be incorporated into the plan.

Employees participated in the development of the Prevention Program through the Process Hazard Analysis, described below. All employees receive PSM and RMP awareness training instructing them as to how the requirements may impact their jobs. Employees who operate and maintain processes regulated under PSM and RMP were trained in how to safely maintain and operate the processes.

Process Safety Information

PSM and RMP regulations require that information concerning process chemicals, technology and equipment be compiled. Emergency response planners can use such information to develop training programs and procedures, or as a general resource. The information will be supplied to contractors who will work in the chlorine and digester gas process areas as part of the requirements outlined in the Contractors element. All the required process safety information was compiled as required by the regulations. The information meets and in many cases exceeds the minimum required by the regulations.

Process Hazard Analysis

A Process Hazard Analysis (PHA) was conducted systematically to evaluate potential causes and consequences of accidental releases. This information was used to reduce both the likelihood and severity of a release. Equipment, instrumentation, utilities, human actions and external factors that might affect the process were the focus of the PHAs performed for the chlorine and digester gas systems.

An interdisciplinary team familiar with the process operation, maintenance, plant management, and the PHA analysis methodology conducted the PHAs. The PHA was performed using a combination of HAZOP and What-If/Checklist methods. Based on the results of the PHA, recommendations for changes in operating, maintenance and other process safety management procedures were identified. The other improvements and process modifications suggested to reduce or eliminate potential hazards are scheduled to be implemented or incorporated.

Operating Procedures

Operating procedures for the chlorination and digester gas processes have been developed as part of the RMP and PSM program. Written operating procedures assure continuous, efficient and safe operation of the facility. The goal of the operating procedures is to provide clear instructions to safely operate the process. Operating procedures are also used to train new employees and to provide refresher training for existing employees.
Detailed operating procedures include startup, shutdown and emergency operating procedures. The procedures describe how the system should be operated in order to minimize the chances of an accidental release. The procedures also emphasize safety considerations during operation and address hazardous situations that can occur and how to correct them.

**Training**

An effective training program can significantly reduce the number and severity of accidental release incidences. Employees involved in operating or maintaining the chlorination or digester gas processes receive training that includes applicable operating and maintenance procedures and an overview of the process. Training emphasizes safety and health hazards and safe work practices.

Employees have received initial training on the operation and maintenance of the regulated processes, an overview of each of the plan elements, and the procedures that must be followed to comply with the process safety management requirements. In addition to RMP and PSM training, select personnel have been trained to respond to an accidental release. Refresher process operation training must be provided at least every 3 years. Refresher training for emergency response is conducted annually.

**Contractors**

The facility must ensure that contractors are aware of the known hazards of the chlorine and digester gas processes as they relate to the contractors' work. In addition, the facility must make contractors aware of the applicable elements of its emergency response plan. The facility should screen contractors to identify those that are competent to perform work on (or adjacent to) the chlorine and digester gas processes without compromising the safety and health of employees and the facility.

Before allowing a contractor to work on or adjacent to the chlorine or digester gas processes, the facility must obtain and evaluate information regarding the contractor's safety performance and programs. When a contract involving work on or adjacent to the chlorine or digester gas processes is to be bid, the bidding procedures must ensure that contractor safety management requirements are met. If a contractor is to work in or adjacent to any covered processes, a safety briefing covering RMP and PSM requirements must be conducted before work begins. Upon arriving at the plant for the first time to perform work, the contractor will be presented a Contractor Safety Management Briefing Form that must be read and signed. All contractors should receive a Chlorine Leak Response Protocol.

**Pre-Startup Safety Review**

A pre-startup safety review must be conducted for any new covered process or for significant modifications to the existing chlorine or digester gas processes that necessitate a change in the process safety information. No new or significantly modified process will start up and no acutely hazardous chemicals will be introduced into such a process prior to the pre-startup safety review. The purpose of the pre-startup safety review is to ensure that the facility is ready to operate new and modified regulated processes safely. To initiate the pre-startup safety review, all updated elements of the Process Safety Management Plan are assembled for review. This includes all process safety information, process hazard analysis, operating procedures, employee training and mechanical integrity. A pre-startup safety review team completes a pre-startup checklist. The pre-startup safety review team should complete a Pre-Startup Safety Review Form. This form documents the process, and helps ensure that the review has been properly performed. The Pre-Startup Safety Review Form must be authorized before startup.

**Mechanical Integrity**

An effective mechanical integrity program is one of the primary lines of defense against a release. The mechanical integrity program also addresses equipment testing and inspection, preventative maintenance
schedules, and personnel training. The intent is to ensure that equipment used to process, store or handle chlorine and digester gas is maintained and installed to minimize the risk of releases.

Maintenance employees use a computerized maintenance management system (CMMS) to store equipment information, generate and prioritize work orders, schedule preventative maintenance, provide safety procedures for work orders, and maintain an inventory of parts and materials. In addition to preventative maintenance, employees perform corrective maintenance in the event of equipment malfunction or breakdown. Work orders indicate what safety precautions must be followed including whether lockout/tagout or confined space entry provisions are applicable. Personnel that perform maintenance have all had RMP and PSM training.

**Hot Work Permits**

RMP and PSM regulations require employees and contractors to employ safe work practices when performing "hot work" in, on, or around the chlorine and digester gas processes. To ensure that hot work is performed safely, a Hot Work Permit Program has been developed that requires a permit to be issued before hot work is performed. Examples of hot work include welding, grinding, using a cutting torch, brazing, and other flame or spark-producing operations.

The process of completing the hot work permit makes it necessary to identify the hazard, recognize what safeguards are appropriate, and then initiate the safeguards necessary to ensure a fire-safe workplace.

**Management of Change**

A system for managing changes and modifications to equipment, procedures, chemicals and processing conditions is required under the regulations. Modifications to the chlorine or digester gas system will be reviewed before they are implemented to determine if the modification would compromise system safety. An effective management of change system will help minimize the chance for an accidental release.

If a modification in the chlorine or digester gas systems is made, the possible effects must be addressed, employees must be informed, and the written procedures must be updated. The intent is for all modifications to equipment, procedures and process conditions other than "replacement in-kind" are managed by identifying and reviewing before implementation. A Management of Change Committee will evaluate any modifications that are made in the chlorine or digester gas systems. The Management of Change Committee will complete a Management of Change Form that the Treatment Manager will review and authorize prior to initiation of the change.

**Incident Investigation**

Each incident that resulted in or could reasonably have resulted in a catastrophic release of chlorine or digester gas must be investigated. A process to identify the underlying causes of incidents and to implement procedures for preventing similar events has been developed. To investigate an incident, an investigation team will be established. As part of the investigation, an incident report will be prepared to recommend system changes.

The investigation team should ask questions such as what equipment failed, which behavior failed, and which material leaked, reacted or exploded? As part of the incident review, human actions that may have contributed to the incident will also be reviewed. A determination will be made as to whether it is necessary to institute additional training for the employees to prevent the incident from occurring in the future. On the incident report form, the Treatment Manager identifies which of the recommended system changes are approved for implementation. The incident investigation report and any changes resulting from the report
will be reviewed will all employees who operate and maintain the applicable system.

**Compliance Audit**

The facility is required to complete a compliance audit of the process safety management system for chlorine and digester gas every three years. The primary goals of the audit are to gather sufficient data to verify compliance with regulatory requirements, verify good process safety practices, identify process safety deficiencies, develop corrective actions, and increase safety awareness among plant employees.

A team that includes at least one person knowledgeable in the covered processes and an audit leader knowledgeable in RMP and PSM requirements and audit techniques will conduct the audits. The Treatment Manager and the audit team will promptly determine corrective actions for each deficiency identified during the audit and assign completion dates.

**Emergency Response Program**

The Emergency Response Program develops a plan for dealing with a release. PSM and RMP regulations require that an Accidental Release Emergency Response Plan be prepared. The plan must be prepared in accordance with the provisions of another overlapping OSHA regulation-Employee Emergency Plans (29 CFR 1910.38(a)). In addition, provisions of the OSHA hazardous waste and emergency response standard, 29 CFR 1910.120(q), must also be considered. The Emergency Planning and Response Plan described in this section complies with the requirements of 40 CFR 68.95, 29 CFR 1910.38(a), and 29 CFR 1910.120(q).

The Emergency Planning and Response Plan provide specific emergency response procedures for accidental releases of chlorine or digester gas. The emergency response procedures cover a release from the initial alarm stage through either leak stoppage or Hazmat assistance. As part of the emergency response procedures, there are plans for victim rescue, leak investigation, and communication with additional support agencies. In addition, critical plant operations are identified to ensure that, if possible, the critical processes remain operational. The Emergency Planning and Response plan also indicates the level of training needed to carry out the emergency response procedures.

Information regarding self-contained breathing apparatus is also provided in the Emergency Planning and Response Plan. It also addresses plant site communication, emergency response equipment, first aid and medical treatment, medical surveillance and consultation, and emergency response drills.