

# Lake County Department of Utilities

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**Title:** Confined Space Program

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**PURPOSE:**

This program establishes guidelines to help ensure that employees follow proper working procedures whenever they enter a confined space. It is the established policy of Lake County Department of Utilities to ensure that safe practices are followed when entrance into a confined space is required for any purpose (i.e. repairs, cleaning inspection, etc.). This program complies with all elements of OSHA's Permit-required Confined Space Program regulations (CFR 1910.146).

**SCOPE:**

This program addresses the initial classification and evaluation of confined spaces and covers all participants in the permit space entry procedure. The program includes the practices and procedures for preparation and safe entry into all Department confined spaces.

**RESPONSIBILITIES:**

The Safety Manager for Lake County Department of Utilities is designated as the confined space coordinator. The Department Safety Manager shall maintain an accurate inventory of all confined spaces, the hazards present in each space, the classification of the spaces (permit-required (see appendix A) or non-permit (see Appendix B)) and coordinate training of qualified personnel.

There are three basic roles in confined space operations: Entrant, Attendant and Entry Supervisor. The responsibility of each role is as follows:

Entrant

1. Know the hazards and consequences of exposure.

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2. Know how to select the proper equipment for hazards in the space and how to use it.
3. Ensure communication requirements are met.
4. Know the general duties of attendants and entry supervisors.
5. Alert the attendant when hazards, warning signs or symptoms appear.
6. Know the proper exit methods from the space.

## Attendant

1. Know the hazards faced during entry and consequences of exposure.
2. Maintain a count of workers in the space and insure only authorized persons enter the space.
3. Calls designated rescue facility to verify availability prior to entry.
4. Maintain watch outside of the space until all entrants have exited or until properly relieved of duty.
5. Maintain constant communication with the entrant, using visual, radio or other sufficient means.
6. Evacuate entrants from the space if a problem or emergency occurs.
7. Know how to properly use the required equipment.
8. Perform a non-entry rescue, if necessary.
9. Summon rescue and emergency services, if necessary.
10. Remain outside of the permit space during entry operations until relieved by another attendant.
11. The attendant is NEVER permitted to enter the permit space.

## Entry Supervisor

1. Know the potential hazards and signs of exposure during entry.
2. Ensure, before entry, that all information on the permit is correct and all conditions required on the permit are met.
3. Enforce permit requirements throughout the evolution of the work done in the space and ensure that all entrants and attendants know their responsibilities and entry procedures.
4. Remove any unauthorized personnel from the work space.
5. Terminate the entry permit when the job is complete or if hazardous conditions become apparent.

Superintendents are responsible for each site's entry and authorization into confined spaces. The superintendent of the site or system is to inform all contractors who enter permit-required spaces of all known hazards associated with each space. The contractor shall, at minimum, be shown the confined space inventory (Appendices A & B). Superintendents are responsible for maintaining the identification of each confined space on their site. Permit-required confined spaces must be labeled with a sign that states, "Danger, Permit-Required Confined Space, Do Not Enter." All non-permit

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confined spaces must be labeled, “Danger, Non-Permit Confined Space.” The superintendent is responsible for the maintenance of permit recordkeeping.

Supervisors shall ensure through coordination and survey of the permit space that work activities of one employer do not endanger the employees of another when multiple employer work in one area is performed.

## **DEFINITIONS:**

- 1.1 Acceptable Entry Conditions – The conditions that must exist in a permit space to allow and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
- 1.2 Attendant – The individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant’s duties described in this program.
- 1.3 Authorized Entrant – An employee who is authorized to enter a permit space.
- 1.4 Blanking or Blinding – The absolute closure of a pipe, line, or duct by fastening a solid plate that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.
- 1.5 Confined Space – means a space that:
  - A. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
  - B. Has limited or restricted means of entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, manholes, vaults, pits, pipes); and
  - C. Is not designed for continuous human occupancy.
- 1.6 Permit Space – Permit space, permit-required space and permit-required confined space all refer to the same type of space. It has one or more of the following characteristics:
  - D. Contains or has the potential to contain a hazardous atmosphere; or
  - E. Contains a material that has the potential for engulfing an entrant; or
  - F. 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; or
  - G. Contains any other recognized serious safety or health hazards.
- 1.7 Confined Space Program Coordinator – The person assigned and responsible for coordinating the implementation of the confined space entry program. Duties may include an annual review of the program, and specification or development of confined space entry training.
- 1.8 Non-Permit Confined Space – A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.
- 1.9 Entry – The action by which a person passes through an opening into a permit space. Entry includes ensuing work activities within that space and is considered to have occurred as soon as any part of the entrant’s body breaks the plain of the opening into the space.

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- 1.10 Entry Permit – The written or printed document that is provided by Lake County Department of Utilities to certify and control safe entry into a permit space (see Appendix C).
- 1.11 Entry Supervisor – The person determining if acceptable entry conditions are present in a space where entry is planned, authorizing entry operations, overseeing entry operations and terminating entry.
- 1.12 Hazardous Atmosphere – An atmosphere that may expose employees to a risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from one or more of the following causes:
  - H. A flammable gas, vapor or mist in excess of 10 percent of its lower flammable limit (LFL);
  - I. An airborne combustible dust, such as starch, at a concentration that meets or exceeds its lower flammable limit. This concentration may be approximated when dust obscures visibility at a distance of 5 feet;
  - J. Atmospheric concentrations that could result in an exposure exceeding the OSHA permissible exposure limit (PEL). In the absence of a PEL, the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLV) or Material Safety Data Sheet (MSDS) information shall be used;
  - K. Any other atmospheric condition recognized as immediately dangerous to life or health (IDLH). This provision may apply when no published exposure standard has been developed but health or safety professionals recognize a serious hazard potential. Refer to the manufacturer’s MSDS for published information.
- 1.13 Isolation – The process by which a permit space is removed from service and completely protected against the release of energy and materials into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes or ducts; double block and bleed system; lockout/tagout of all energy sources; or blocking or disconnecting all mechanical linkages.
- 1.14 Rescue Services – Lake County Department of Utilities has identified and provided for rescue services in the event of an incident within a space. Each site superintendent is responsible for maintaining the documentation of these agreements. It is the policy of the Department that no space shall be entered until verification of the availability of a rescue service has been achieved and documented on the permit.
- 1.15 Retrieval System – The equipment (including retrieval line, full-body harness, tripod and/or anchor point) used for non-entry rescue of persons from permit spaces. A retrieval system must be used for all vertical type permit spaces more than 5 feet deep.

## **PROCEDURE:**

- II. General Rules for Entering a Confined Space
  - A. All permit-required confined spaces, except manholes, will be labeled with a danger sign that has the following information:

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1. Danger
  2. Permit-Required Confined Space
  3. Do Not Enter
- B. The configuration and location of some confined spaces does not readily allow for a sign (example: manholes in the collection system).
1. Employees must not solely rely on a danger sign.
  2. If a space is encountered that does not have a sign posted and is suspected to be a permit-required confined space, contact the confined space program coordinator (Department Safety Manager).
    - a) Employees must not enter these spaces until a determination is made.
- C. If a fixed ladder is not present in a confined space that is over 4 feet deep, a proper ladder must be used.
1. All ladders shall be visually inspected prior to entry.
  2. Ladders shall be tied off at the top and at the bottom, if possible.
  3. Ladders must never be removed while workers are in the confined space.
- D. If a fall hazard exists in a permit-required confined space, or if the space is over 5 feet deep, or if there is an engulfment hazard, the entrant must wear a full recovery harness with a D-ring located on the upper back, between the shoulder blades, and be attached to a safety line and to a mechanical drop / retrieval system.
1. All fall protection and recovery systems must be inspected prior to use.
- E. If hot work (i.e. welding, cutting, burning, brazing, grinding) is to be conducted in a confined space, a hot work permit must be obtained and completed.
- III. Preparing and Entering a Permit-Required Confined Space
- A. When preparing to enter a permit-required confined space, entrants and attendants must:
1. Obtain an entry permit
  2. Isolate all mechanical and/or electrical hazards in the space by following lockout/tagout procedures.
  3. Test the atmosphere from outside of the space.
    - a) Air monitoring equipment shall be calibrated as instructed by the manufacturer.
      - (1) A calibration log will be maintained along with pertinent information and be kept on file for the life of the instrument, plus one year.
    - b) The atmosphere must be tested at the bottom, middle and top of all confined spaces and must be continuously monitored while work is being conducted in the space.
      - (1) Testing must be documented on the permit (Appendix C) every 15 minutes, at minimum.

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- c) If the confined space is left for any reason, the atmosphere must be re-tested before anyone is allowed to re-enter the space.
  - d) If the space is filled with water, the water must be completely pumped out and the space uncovered and ventilated by forced air ventilation prior to testing.
  - e) Oxygen content must be greater than 19.5% and less than 23.5 %.
  - f) Flammable gas must be less than 10% of the lower explosive limit.
  - g) Toxic gases and vapors must not exceed the permissible exposure limit (refer to a current MSDS for chemicals not listed below).
    - (1) Carbon monoxide – 35 parts per million (ppm), action level 17 ppm
    - (2) Hydrogen Sulfide – 10 ppm
    - (3) Carbon Dioxide – 5000 ppm, action level 2500 ppm
    - (4) Chlorine – 1 ppm
  - h) An atmosphere which contains a measurable contaminate(s) must, prior to entry:
    - (1) Be ventilated with forced air until contaminants are completely purged.
    - (2) Have appropriate continuous ventilation and monitoring strategies put into effect and annotated on the entry permit.
  - i) **NOTE: If the atmospheric conditions in the confined space cannot be controlled or eliminated with forced air ventilation DO NOT ENTER.**
    - (1) Lake County Department of Utilities employees are not trained or authorized to enter any confined space that warrants respiratory protection.
    - (2) Stop all work, cancel the permit and close the space.
4. Obtain any necessary equipment to complete the job.
  5. Each individual entrant must wear a retrieval system to facilitate non-entry rescue.
    - a) If the retrieval system would increase the overall risk of entry, or would hinder the rescue of the entrant, other methods may be considered.
  6. Obtain and complete a hot work permit, if necessary.
  7. Place any necessary signs or barriers around the space to prevent unauthorized entry and to control hazards created by opening the space.

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8. Brief all assigned workers on their roles, the work to be done, communication requirements, potential hazards and emergency procedures.
  - a) This must be completed prior to anyone entering the space.
9. Complete the entry permit
  - a) Items that must be documented on the permit include:
    - (1) Date and time of issue
    - (2) Equipment ID
    - (3) Equipment location
    - (4) Permit expiration time
    - (5) Detail of work to be conducted in the space
    - (6) Entrant name(s)
    - (7) Attendant name
    - (8) Phone number of rescue service and verification of availability
    - (9) Supervisor's signature

## B. Working Within A Confined Space

1. Entrant duties:
  - a) Perform only the work specified on the entry permit.
    - (1) If additional conditions arise that require additional work to be performed, exit the space and brief all employees involved in the work.
  - b) Maintain contact with the attendant through visual, radio or other means.
  - c) Entrants shall be equipped with an atmospheric monitor which sounds an audible alarm whenever there is a hazardous atmosphere.
    - (1) Where several entrants are working together in the same immediate location, one atmospheric monitor is acceptable.
  - d) Remain alert to any hazardous changes in the atmospheric conditions of the space.
  - e) Be aware of physical senses, headache, fatigue, etc.

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(1) Exit the space immediately if an employee experiences any of these conditions.

2. Attendant duties:
  - a) Maintain constant contact with the entrant.
  - b) Stop the work and evacuate all entrants from the space if there is a change in atmospheric conditions.
  - c) Monitor the entrant's behavior and watch for signs of fatigue, dizziness, etc.
  - d) Evacuate entrants and call for emergency rescue if an emergency occurs.
  - e) Attempt a non-entry rescue if an entrant is injured or unconscious.

**(1) If a non-entry rescue is not possible, wait for emergency rescue help to arrive. DO NOT ENTER!**

## C. Completing Work in a Confined Space:

1. The permit must be canceled when any one of the following conditions are met:
  - a) The work is completed.
  - b) A condition arises that creates a hazardous condition in the space.
  - c) The space is left unattended for a long period of time, creating the potential for a change in entry conditions.
2. All entrants must exit the space and the space must be closed. All covers, barricades, signs, etc. must be replaced.
3. Any problems encountered during an entry operation must be noted on the permit so that appropriate revisions to the Confined Space Program can be made.
4. The canceled permit must be sent to the site superintendent or superintendent's designee and maintained for one year.

## D. Ventilation of a confined space

1. Some permit required confined spaces contain an actual or potential atmospheric hazard that could present a safety or health risk to an entrant. To maintain a safe atmosphere during entry, it may be necessary to purge or flush the space or to use continuous forced air ventilation.
  - a) NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards; it is only a control measure.
2. Continuous forced air ventilation shall be used as follows.
  - a) Ventilation equipment shall consist of a blower and duct work designed for air ventilation in confined spaces.
  - b) Where possible, mechanical ventilation shall be set to 100% outside air.
  - c) Open additional manholes or openings, if possible, to increase air circulation.

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- d) An employee may not enter a space until forced air ventilation has eliminated any hazardous atmosphere.
- e) The forced air ventilation shall be directed to ventilate the immediate areas within the space where an entrant will work and shall continue until all entrants have left the space.
- f) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
- g) Spaces shall be continuously ventilated when tasks producing fumes, vapors, or mists are being performed, such as welding, cutting, removing sludge and painting.

#### IV. Contractors

- A. The permit space programs and entry procedures of all contractors and subcontractors must be consistent with Lake County Department of Utilities Confined Space Program.
- B. All contractors performing work for the Department shall have their own site supervision. No Department employee shall supervise the work of contractor confined space entry.
- C. All contractors shall be informed of hazards in permit spaces.
- D. All contractors must supply and use their own entry, retrieval, rescue and atmospheric testing equipment.
  - 1. Contractors must inspect their equipment prior to entry.
- E. Contractors shall coordinate entry operations with other contractors when workers from one or more employer enter permit spaces to reduce the potential of workers from one employer endangering the workers of another employer.
- F. Contractors shall be debriefed at the conclusion of entry operations to identify any problems in the confined space program.
  - 1. Confirmation of the debriefing shall be noted on the permit, along with any comments on issues found.
- G. Completed and closed entry permits must be returned to the project coordinator or designee for recordkeeping.

#### V. Training

- A. All employees who will be required to work in confined spaces will receive the following training:
  - 1. Regulations for permit-required confined space operations.
  - 2. Basic definitions and purpose of the permit system.
  - 3. Evaluation of potential hazards involved with confined space work, including self-assessment and recognition of exposure signs.
  - 4. Control of potential or existing hazards through ventilation, personal protective equipment (PPE) and control of hazardous energy.
  - 5. Selection and use of proper PPE.
  - 6. Selection and use of proper equipment specific to the needs of the confined space environment, including communication, personal protection, ventilation, lighting, barriers, shields, ladders, rescue,

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emergency and other equipment necessary for safe entry into and rescue from permit spaces.

7. Recognition of conditions and signs which require evacuation of a space.
8. Emergency response and rescue.
9. Duties of the entry supervisor, authorized entrant and attendant.
10. Review of the Department's written Confined Space Program.

## VI. Rescue and Emergency Information

A. The Lake County Department of Utilities has written agreements with the following fire departments (non-emergency numbers listed below) to serve as the primary rescue team in the event of a confined space emergency:

1. Fairport Harbor Fire Department – 352-3620
2. Madison Township Fire Department - 428-2114
3. Mentor Fire Department – 974-5768
4. Painesville Township Fire Department – 352-6996
5. Willoughby Fire Department – 953-4352

B. General rules and equipment for emergency use:

1. When entering a confined space with existing or potential hazards, authorized entrants must wear a retrieval system to facilitate non-entry rescues.
  - a) A retrieval system shall consist of a full body harness with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head.
2. If the space is more than 5 feet deep, the retrieval line shall be attached to a mechanical device outside of the space to aid in rescue.

C. If an entrant becomes disabled or hurt while in a confined space, the attendant must perform the following *non-entry* rescue procedures.

1. Call, or have someone else call, 911.
2. Attempt a non-entry rescue if feasible, by using the retrieval line, body harness and tripod.
3. If the attendant is able to remove the victim by non-entry rescue procedures, the attendant may administer first aid within the limits of his/her training until further help arrives.
4. If the attendant is unable to remove the victim using non-entry means, the attendant must wait for emergency help to arrive.
  - a) **NOTE: The attendant is not to enter the confined space to attempt a rescue.**

## VII. Sewer Manholes

A. All storm and sanitary sewers are considered permit-required confined spaces.

B. Sewer manhole entry differs from other permit entries in the following ways:

1. There is rarely any way to completely isolate the space being entered.
2. Because isolation is not complete, the atmosphere may suddenly and unpredictably become hazardous from causes beyond the control of the entrant or the entry supervisor.

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- C. Because of these additional hazards, extra precautions shall be used for entry into sewer manholes.
  - 1. All pumps and lines which may cause contaminants to flow into the space shall be effectively isolated to prevent development of dangerous air contamination or engulfment.
  - 2. Not all laterals to sewers or storm drains require blocking however, where experience or knowledge of industrial use indicates there is a reasonable potential for contamination of air or engulfment into an occupied sewer, all affected laterals shall be blocked.
  - 3. Portable blowers shall be used to augment natural circulation, if needed.
  - 4. Additional manholes shall be opened to increase air circulation.
- D. Entry into storm and sanitary sewer manholes shall not begin until testing has demonstrated that the hazardous atmosphere has been eliminated.

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## APPENDIX A

### PERMIT REQUIRED CONFINED SPACES:

- ALL DISTRIBUTION AND COLLECTION SYSTEM MANHOLES, WATER VAULTS, WET WELLS AND BELOW GROUND RESERVOIRS UNLESS OTHERWISE IDENTIFIED IN APPENDIX B
  - *KNOWN HAZARDS:*
    - CARBON MONOXIDE, OXYGEN DEFICIENCY, METHANE, HYDROGEN SULFIDE
  - *CONSEQUENCE OF EXPOSURE:*
    - DIZZINESS, NAUSEA, LOSS OF COORDINATION, ASPHYXIATION, EXPLOSION

#### *Madison Wastewater Treatment Plant*

<b>Permit Space</b>	<b>Known Hazard(s):</b>	<b>Consequence of Exposure:</b>
Vault for Ashtabula County Meter	Methane, Hydrogen Sulfide, Oxygen Deficiency	Asphyxiation, Explosion
Influent Wet Well	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Asphyxiation, Explosion
Filter Well	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Asphyxiation, Explosion, Dizziness, Nausea, Loss of Coordination
Recarb Basin	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Drowning, Asphyxiation, Explosion, Dizziness, Nausea, Loss of Coordination
Basement Sump Well	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Asphyxiation, Explosion, Dizziness, Nausea, Loss of Coordination
Digester Valve Pit East 1	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Dizziness, Nausea, Loss of Coordination, Asphyxiation
Digester Valve Pit East 2	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Dizziness, Nausea, Loss of Coordination, Asphyxiation
Digester Valve Pit West 1	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon	Dizziness, Nausea, Loss of Coordination,

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	Monoxide	Asphyxiation
Digester Valve Pit West 2	Methane, Hydrogen Sulfide, Oxygen Deficiency, Carbon Monoxide	Dizziness, Nausea, Loss of Coordination, Asphyxiation
Decant Pit East	Inward Converging Walls	Fall, Trapped
Decant Pit West	Inward Converging Walls	Fall, Trapped

### *Aquarius Water Treatment Plant*

<b>Permit Space</b>	<b>Known Hazard(s):</b>	<b>Consequence of Exposure:</b>
Clear Well East	Engulfment	Drowning
Clear Well West	Engulfment	Drowning
Intake Inspection Vault	Engulfment	Drowning
Carbon Storage Tank East	Oxygen Deficiency, Engulfment	Dizziness, Nausea, Loss of Coordination, Drowning, Asphyxiation
Carbon Storage Tank West	Oxygen Deficiency, Engulfment	Dizziness, Nausea, Loss of Coordination, Drowning, Asphyxiation
Caustic Storage Tank North	Exposure to Caustic	Skin, Eye, Throat and Lung Irritation or Blistering
Caustic Storage Tank South	Exposure to Caustic	Skin, Eye, Throat and Lung Irritation or Blistering
Raw Well Screen Well East	Engulfment	Drowning
Raw Well Screen Well West	Engulfment	Drowning
Rapid Mix Tank East	Engulfment	Drowning
Rapid Mix Tank West	Engulfment	Drowning
Fluoride Storage North	Engulfment	Drowning
Fluoride Storage South	Engulfment	Drowning
Sludge Thickener East	Converging Walls, Engulfment	Fall, Trapped, Drowning
Sludge Thickener West	Converging Walls, Engulfment	Fall, Trapped, Drowning
Electrical Vaults (3)	Electric Energy	Shock, Electrocution
Sanitary Manholes (3)	Methane	Asphyxiation, Explosion
Washwater Recovery Tank	Engulfment	Drowning
Supernate Well	Engulfment	Drowning
Flocculator 1	Engulfment	Drowning
Flocculator 2	Engulfment	Drowning
Flocculator 3	Engulfment	Drowning
Flocculator 4	Engulfment	Drowning
Flocculator 5	Engulfment	Drowning
Flocculator 6	Engulfment	Drowning

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Basin 1	Engulfment	Drowning
Basin 2	Engulfment	Drowning
Basin 3	Engulfment	Drowning
Basin 4	Engulfment	Drowning

### *Bacon Road Water Plant*

<b>Permit Space</b>	<b>Known Hazard(s):</b>	<b>Consequence of Exposure:</b>
Raw Screen Well	Engulfment	Drowning
Raw Well East	Engulfment	Drowning
Raw Well West	Engulfment	Drowning
Loading Dock Sewer Vault	Methane	Asphyxiation, Explosion
Rapid Mix Tank North	Engulfment	Drowning
Rapid Mix Tank South	Engulfment	Drowning
Zinc Orthophosphate Storage Tank	Engulfment	Drowning
Clear Well East	Engulfment	Drowning
Clear Well West	Engulfment	Drowning
High Service Pump Well	Engulfment	Drowning
High Service Meter Pit	Limited Access to Working and Walking Surface	Slip, Fall
Sewer Vault East	Methane	Asphyxiation, Explosion
Sewer Vault South	Methane	Asphyxiation, Explosion
Sewer Vault West	Methane	Asphyxiation, Explosion
Flocculator North	Engulfment	Drowning
Flocculator South	Engulfment	Drowning
Settling Basin North	Engulfment	Drowning
Settling Basin South	Engulfment	Drowning
Filter Box 1	Engulfment	Drowning
Filter Box 2	Engulfment	Drowning
Filter Box 3	Engulfment	Drowning
Filter Box 4	Engulfment	Drowning

### *Gary L. Kron Water Reclamation Facility*

<b>Permit Space</b>	<b>Known Hazard(s):</b>	<b>Consequence of Exposure:</b>
BFP Tank	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Fall Hazard, Sloped Floor	Injury or Death
WAS Tank East	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Fall Hazard, Sloped Floor	Injury or Death

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WAS Tank West	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Fall Hazard, Sloped Floor	Injury or Death
Blended Sludge Tank	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Fall Hazard, Sloped Floor	Injury or Death
Primary Digester 1	Engulfment, Bio Hazard, Oxygen deficiency, H2S, Flammable or Explosive Atmosphere, Sloped Floor, Fall Hazard. NOTE: Isolate Methane Valves Required	Injury or Death
Primary Digester 2	Engulfment, Bio Hazard, Oxygen deficiency, H2S, Flammable or Explosive Atmosphere, Sloped Floor, Fall Hazard. NOTE: Isolate Methane Valves Required	Injury or Death
Primary Digester 3	Engulfment, Bio Hazard, Oxygen deficiency, H2S, Flammable or Explosive Atmosphere, Sloped Floor, Fall Hazard. NOTE: Isolate Methane Valves Required	Injury or Death
Secondary Digester 1	Engulfment, Bio Hazard, Oxygen deficiency, H2S, Flammable or Explosive Atmosphere, Sloped Floor, Fall Hazard. NOTE: Isolate Methane Valves Required	Injury or Death
Secondary Digester 2	Engulfment, Bio Hazard, Oxygen deficiency, H2S, Flammable or Explosive Atmosphere, Sloped Floor, Fall Hazard. NOTE: Isolate Methane Valves Required	Injury or Death
Alum Tank	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Fall Hazard, Sloped Floor	
Septage Tank	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen	Injury or Death

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	Deficiency, H2S, Fall Hazard, Sloped Floor, Lockout Septage Receiving Pump	
Polymer Tank East	Oxygen Deficiency, Extreme Slip Hazard	Injury or Death
Polymer Tank West	Oxygen Deficiency, Extreme, Slip Hazard	Injury or Death
Gravity Thickener	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Mechanical Hazard, Fall Hazard, Sloped Floor	Injury or Death
Standby Influent Pump Wet Well North	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Fall Hazard, Sloped Floor	Injury or Death
Standby Influent Pump Wet Well South	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Fall Hazard, Sloped Floor	Injury or Death
Influent Pump Wet Well North	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Electrical or Mechanical Hazard, Fall Hazard, Sloped Floor	Injury or Death
Influent Pump Wet Well South	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Electrical or Mechanical Hazard, Fall Hazard, Sloped Floor	Injury or death
Bypass to EQ Channel	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Fall	Injury or death

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	Hazard, Sloped Floor	
Grit Tank East	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Fall Hazard, Sloped Floor	Injury or death
Grit Tank West	Engulfment, Mechanical Mixer, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Fall Hazard, Sloped Floor	Injury or death
Primary Bypass Overflow Channel	Engulfment, Bio Hazard, H2S, Flammable or Explosive Atmosphere	Injury or death
Chlorine Contact Tank 1	Engulfment, Biohazard, Fall Hazard.	Injury or death
Chlorine Contact Tank 2	Engulfment, Biohazard, Fall Hazard	Injury or death
Scum Well Northwest	Engulfment, Bio Hazard, Fall Hazard, Oxygen Deficiency, H2S	Injury or death
Scum Well Southwest	Engulfment, Bio Hazard, Fall Hazard, Oxygen Deficiency, H2S, NOTE: Must lockout sweep arms on South Clarifiers	Injury or death
EQ Flow Meter Vault	Electrical, Oxygen Deficiency, Fall Hazard	Injury or Death, Shock or electrocution
Old Madison Well	Engulfment, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, Fall Hazard	Injury or Death
Ferrous Chloride Tank North	Chemical, fall hazard, engulfment, extremely restricted entry, oxygen deficiency	Burns, injury, death. Potential health effects: inhalation, ingestion, skin/eye contact
Ferrous Chloride Tank South	Chemical, Fall Hazard, Engulfment, Extremely restricted entry, oxygen deficiency	Burns, injury, death, potential health effects, inhalation, ingestion, skin/eye contact
Sodium Bisulfite Tank North	Chemical, fall hazard, engulfment, extremely	Burns, injury, death. Potential health effects,

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	restricted entry, oxygen deficiency.	inhalation, ingestion, skin/eye contact
Sodium Bisulfite Tank South	Chemical, fall hazard, engulfment, oxygen deficiency	Burns, injury, death, potential health effects, inhalation, ingestion, skin/eye contact
Sodium Hypochlorite Tank East	Chemical, fall hazard, engulfment, oxygen deficiency	Reaction to acid, corrosive, Burns, injury, death, potential health effects, inhalation, ingestion, skin/eye contact
Sodium Hypochlorite Tank West	Chemical, fall hazard, engulfment, oxygen deficiency	Reactive to acid, corrosive, Burns, injury, death, potential health effects, inhalation, ingestion, skin/eye contact
Intermediate Wet Well North	Fall hazard, bio hazard, engulfment	Injury or death
Intermediate wet Well South	Fall hazard, bio hazard, engulfment	Injury or death
Sludge Well	Fall hazard, bio hazard, engulfment, mechanical hazard, sloped floor, electrical, H <sub>2</sub> S, oxygen deficiency, explosive or flammable atmosphere	Injury or death. Shock or electrocution
Polymer Tank	Oxygen deficiency, extreme slip hazard	Injury or death
Primary Clarifier Tank 1	Sloped floor, fall hazard, mechanical	Injury or death
Primary Clarifier Tank 2	Sloped floor, fall hazard, mechanical	Injury or death
Primary Clarifier Tank 3	Sloped floor, fall hazard, mechanical	Injury or death
Primary Clarifier Tank 4	Sloped floor, fall hazard, mechanical	Injury or death
Primary Clarifier Tank 5	Sloped floor, fall hazard, mechanical	Injury or death
Primary Clarifier Tank 6	Sloped floor, fall hazard, mechanical	Injury or death
Final Settling Tank 1	Sloped floor, fall hazard, mechanical, bio hazard	Injury or death
Final Settling Tank 2	Sloped floor, fall hazard, mechanical, bio hazard	Injury or death

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Final Settling Tank 3	Sloped floor, fall hazard, mechanical, bio hazard	Injury or death
Final Settling Tank 4	Sloped floor, fall hazard, mechanical, bio hazard	Injury or death
Trickling Filter Valve Pit 1	Fall hazard, Electrical hazard	Injury or death. Shock or electrocution
Trickling Filter Valve Pit 2	Fall hazard, electrical hazard	Injury or death. Fall or electrocution
Tanker Truck 57 U	Engulfment, Bio hazard, oxygen deficiency, H2S, flammable or explosive atmosphere, sloped floor, fall hazard, CO	Injury or death
Tanker Truck 103 U	Engulfment, Bio hazard, oxygen deficiency, H2S, flammable or explosive atmosphere, sloped floor, fall hazard, CO	Injury or death
Tanker Truck 111 U	Engulfment, Bio hazard, oxygen deficiency, H2S, flammable or explosive atmosphere, sloped floor, fall hazard, CO	Injury or death
Methane Scrubber 1	Inhalation Hazard	Injury or death
Methane Scrubber 2	Inhalation Hazard	Injury or death
Methane Scrubber 3	Inhalation Hazard	Injury or death

### *Sewer Collection System*

<b>Permit Space</b>	<b>Known Hazard(s):</b>	<b>Consequence of Exposure:</b>
All Manholes	Engulfment, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, sloped floor, fall hazard, CO	Injury or death
All Pop-Off Valves	Engulfment, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, sloped floor, fall hazard, CO	Injury or death
All Grinder Pumps	Engulfment, Bio Hazard, Oxygen Deficiency, H2S,	Injury or death

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	Flammable or Explosive Atmosphere, sloped floor, fall hazard, CO	
All Grinder Control Pits	Engulfment, Bio Hazard, Oxygen Deficiency, H2S, Flammable or Explosive Atmosphere, sloped floor, fall hazard, CO	Injury or death

*East End Service Center*

1. No Confined Spaces Identified On-Site

*West End Service Center*

1. No Confined Spaces Identified On-Site

*Solid Waste Facility*

<b>Permit Space</b>	<b>Known Hazard(s):</b>	<b>Consequence of Exposure:</b>
Storm Basins by Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
East Storm Basin by Baler	Conditions Can Change At Any Point In Time	Injury, Illness or Death
West Storm Basin by Baler	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin East of Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin West of Old Scale Gate	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin South of Old Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Old Scale Manholes	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin North of Old Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin Southeast of Old Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basins Northeast of Baler (North and South)	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin East of Baler	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin at End of Drive East	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin at End of Drive West	Conditions Can Change At Any Point In Time	Injury, Illness or Death

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Round Storm at End of Drive	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Collection Manhole Back of Maintenance Building	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm in Center of Maintenance Drive	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Sanitary Sewer in Maintenance Drive	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Meter Vault on Backside of Maintenance Building	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Concrete Manhole Northeast of Baler Building	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin East of Picnic Table	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin West of Picnic Table	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin North End of Drive, West Side of New Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin North End of Drive, East Side of New Scale	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin Alt. North Drive, West Side	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Basin Alt. North Drive, East Side	Conditions Can Change At Any Point In Time	Injury, Illness or Death
All Leachate System Lids	Conditions Can Change At Any Point In Time	Injury, Illness or Death
All Pump Stations Force Manholes	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Strom Manhole on Northwest Corner of the Landfill	Conditions Can Change At Any Point In Time	Injury, Illness or Death
Storm Inlets (2)	Conditions Can Change At Any Point In Time	Injury, Illness or Death

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## APPENDIX B

### NON-PERMIT CONFINED SPACES:

- ALL WATER TOWER BOWLS

#### *Madison Wastewater Treatment Plant*

1. Aeration Tank East
2. Aeration Tank West
3. Chemical Tank Draw-Off Pit
4. Chemical Tank East
5. Chemical Tank West
6. Clarifier 1
7. Clarifier 2
8. Contact Chamber
9. East Digester 1
10. East Digester 2
11. West Digester 1
12. West Digester 2
13. Electric Junction Yard Well
14. Scum Well East
15. Scum Well West

#### *Aquarius Water Treatment Plant*

1. All spaces at the Aquarius Water Treatment Plant are permit-required.

#### *Bacon Road Water Plant*

1. Coagulant Storage Tank East
2. Coagulant Storage Tank West
3. Fluoride Storage Tank
4. Sludge Lagoon Effluent Chamber East
5. Sludge Lagoon Effluent Chamber West
6. Sludge Lagoon Cleanout Vault
7. Sludge Thickener Tank
8. Washwater Recover Tank
9. Washwater Standpipe
10. Zinc Orthophosphate Storage Tank

#### *Gary L. Kron Water Reclamation Facility*

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1. Non-Potable Wet Well
2. Submersible Effluent Pumps and Valve Pit
3. Effluent Meter Vault
4. Aeration Tank 1
5. Aeration Tank 2
6. Aeration Tank 3
7. Aeration Tank 4
8. Aeration Tank 5
9. Aeration Tank 6
10. Aeration Tank 7
11. Aeration Tank 8
12. Aeration Tank 9
13. Water Meter Vault
14. Primary EQ Tank 1
15. Primary EQ Tank 2
16. Primary EQ Tank 3
17. Primary EQ Tank 4
18. Chlorine Contact Tank 2

## *Sewer Collection System*

1. All Dry Wells

## *Water Distribution System*

1. Middle Ridge Water Tower Pump Pit

## *East End Service Center*

1. No Confined Spaces Identified On-Site

## *West End Service Center*

1. No Confined Spaces Identified On-Site

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## APPENDIX C Confined Space Entry Permit

Today's Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Time Issued: \_\_\_\_\_ AM PM    Time Expires: \_\_\_\_\_ AM PM

Job Site / Space ID: \_\_\_\_\_

Equipment to Be Worked On / Task to Be Performed:

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Job Supervisor (print): \_\_\_\_\_

Source Isolation:	Zero Energy State	Yes	No	N/A
	Pumps or Lines Blinded			
	Disconnected or Blocked	Yes	No	N/A

Atmospheric Checks:    Time: \_\_\_\_\_ AM PM  
Oxygen: \_\_\_\_\_ %  
Explosive: \_\_\_\_\_ % L.F.L.  
H<sub>2</sub>S: \_\_\_\_\_  
CO: \_\_\_\_\_

Tester's Name (sign): \_\_\_\_\_

Ventilation Modification:	Mechanical Forced Air	Yes	No	N/A
	Natural Ventilation Only	Yes	No	N/A

Atmospheric Check (after ventilation):

Time: \_\_\_\_\_ AM PM  
Oxygen: \_\_\_\_\_ %  
Explosive: \_\_\_\_\_ % L.F.L.  
H<sub>2</sub>S: \_\_\_\_\_

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CO: \_\_\_\_\_

Tester's Name (sign): \_\_\_\_\_

Communication Procedure(s):

\_\_\_\_\_  
\_\_\_\_\_

Rescue Procedure(s):

\_\_\_\_\_  
\_\_\_\_\_

Fire Department Phone Number: (    )                      -                      Availability Confirmed: \_\_\_\_\_

Equipment:

Atmospheric Monitoring Equipment Tested                      Yes                      No

Safety Harness and Lifelines in Place                      Yes                      No

Hoisting Equipment                      Yes                      No

Method of Communication in Place                      Yes                      No

Protective Clothing                      Yes                      No

Sufficient Number of Employees to Safely Work                      Yes                      No

Periodic Atmospheric Testing:

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

Time : \_\_\_\_\_ Oxygen \_\_\_\_\_% Explosive \_\_\_\_\_% H<sub>2</sub>S \_\_\_\_\_ CO \_\_\_\_\_

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any items are marked "No." The permit is not valid unless all appropriate items are completed.

Permit Prepared by (sign): \_\_\_\_\_

# Lake County Department of Utilities

Attendant (sign): \_\_\_\_\_

Entrant(s) (sign): \_\_\_\_\_

Approved by Supervisor (sign): \_\_\_\_\_

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