SOM-18 TITLE: **CONFINED SPACE PROCEDURES** **20 APR 04**

1. **PURPOSE:** To describe the procedures to be followed by Riverside County Flood Control and Water Conservation District (RCFC) employees for entry into confined spaces or permit required confined spaces.

2. **SCOPE:** RCFC has the following contractual relationships for Flood Control Projects where RCFC employees may require entry into project confined spaces:
   - **A. – District Contract/Developer Agreement:** The contractor/developer is responsible to maintain a compliant confined space entry program.
   - **B. – No Contract or Developer Agreement:** In this situation RCFC is totally responsible for confined space entry.

3. **REGULATIONS:**
   - **A.** Title 8, Article 108, Confined Spaces

4. **DEFINITIONS:**
   - **A. Confined Space**
     - (1) Is large enough and so configured that an employee can enter and perform work.
     - (2) Has limited or restricted means of entry and exit.
     - (3) Is not designed for continuous employee occupancy.
   - **B. Permit Required Confined Space**
     - (1) Contains or has potential to contain a hazardous atmosphere.
     - (2) Contains material that has potential for engulfing occupant (water, sand, granite).
     - (3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section.
     - (4) Contains any other safety or health hazard.
   - **C. Non-Permit Required Confined Space**
     - (1) 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.
   - **D. Entry** – The activity of passing through an opening into a Permit-Required Confined Space. This means when any part of the person's body breaks the plane of the opening.
   - **E. Entry Permit** – See Appendix C. This permit is required prior to entry into a permit required confined space.
   - **F. Hazardous Atmosphere** – An atmosphere that may expose employee to risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from one of the following:
     - (1) Flammable gas, mist or vapor greater than 10% of LFL (lower flammable limit).
     - (2) Airborne combustible dust greater than or equal to LFL.
     - (3) Oxygen concentration below 19.5% or above 23.5%.

ORIGINATOR:		AUTHORIZED BY:	
STEVE THOMAS		WARREN D. WILLIAMS	
Steve Thomas	5/3/04		5-3-04
SIGNATURE	DATE	SIGNATURE	DATE

(4) Exposure in excess of Dose or PEL for Radiation or Radioactivity (Title 8, Group 14) or Airborne Contaminants (Title 8, Section 5155).

G. Rescue Service – The personnel designated to rescue employees from permit spaces.

5. PROCEDURE:

A. Introduction: There are two basic procedures required by RCFC employees to follow prior to entering a confined space. The first and most often used procedure is where RCFC inspectors rely on a contractor or developer to have an adequate confined space program and the RCFC inspectors will verify adequacy of the program prior to entry. Procedures to be followed for this condition are described in 5B below. The second procedure is infrequent and is where the total responsibility for confined space entry is with RCFC. The second procedure applies to Maintenance and Surveys personnel and is described in 5C below.

B. Contractor/Developer Confined Space Entry Procedure:

(1) Contractor Construction

(a) Prior to the Pre-Construction Meeting, the contractor shall submit a confined space procedure acceptable to the District. The procedure shall address how the contractor will comply with California Code of Regulations, Title 8, Section 5158, Other Confined Space Operations. The District's safety consultant shall review the procedure to assure actions and controls are defined to protect District inspectors during confined space entry.

(b) Historically, the contractor projects are a series of underground pipes that carry floodwaters. There are no obvious sources of air contaminants for new construction projects other than what could be inserted into the various inlets. Natural ventilation has generally been adequate, although on long runs mechanical ventilation has been used to increase airflow. By assuring adequate ventilation, the contractor has classified the confined space as a non-permit confined space. Records justifying this classification must be maintained by the contractor so that entry by the District inspector may be based on a history of acceptable atmosphere. The history shall include the following data available at the job site:

1 Daily calibration data of a direct reading confined space meter by qualified personnel.

2 Daily monitoring and recording of the confined space atmosphere throughout the confined space with a calibrated direct reading confined space meter.

3 The records shall indicate if the readings are for natural or mechanically enhanced ventilation.

Note: *Appendix A contains sample wording for use in Contracts to require confined space programs for construction projects.*

(c) Prior to confined space entry, the District inspector shall:

1 Tour the job site with the contractor/developer to assure the inlets to the confined space are free of obstruction or substances that might affect the ventilation or atmosphere of the confined space.

2 Review the records of confined space meter calibrations and confined space monitoring since the last entry by the inspector.

3 Complete confined space checklist, Appendix B. A copy of the checklist should be provided to the District's safety consultant after entry is completed.

(d) The contractor shall provide the District inspector with a direct reading confined space meter that has been calibrated on the same day as the entry. The inspector shall carry the confined space meter while in the confined space and return it to the contractor when the inspection is completed.

Note: *The District inspector shall not enter the confined space unless records indicate a history of acceptable atmosphere, and he has a calibrated confined space meter with him at all times. The inspector shall exit the confined space immediately if the meter shows an inadequate atmosphere or alarm goes off. Call the District safety consultant if this occurs and do not reenter the confined space without authorization from the District Safety Program Manager.*

(2) Developer Projects

(a) Prior to the Notice to Proceed, the developer shall submit a confined space procedure acceptable to the District. The procedure shall address how the developer will comply with California Code of Regulations, Title 8, Section 5158, Other Confined Space Operations, during the active construction phase. The procedure shall also address how the developer will comply with Section 5157, Permit Required Confined Space, during entry into a functioning flood control system. The District's safety consultant shall review the procedure to assure actions and controls are defined to protect District and developer employees.

(b) During the construction phase of the project, the developer shall implement the confined space procedure described in paragraphs B(1)(b)-(d). The developer shall maintain the records and provide the services and support delineated in paragraphs B(1)(b)-(d). The District inspector shall perform the functions of paragraphs B(1) (c)-(d) and not enter unless the records indicate a history of acceptable atmosphere and he has a calibrated direct reading confined space meter with him at all times. The inspector shall exit the confined space immediately if the meter shows an inadequate atmosphere or the alarm sounds. Contact the District safety consultant if this occurs and do not reenter the confined space without authorization from the District Safety Program Manager.

(c) The developer shall take additional actions to protect entrants into functioning flood control projects. These actions are addressed in his confined space procedure and include: review of project drawings to determine if the project configuration contains extreme slopes, depressions, or other health of safety hazards that would make entry permit required. For standard project configurations, the District shall consider the plan to be adequate if the developer performs the following functions on the day of confined space entry:

1 Calibrate a direct reading confined space meter and record the calibration.
2 Test the atmosphere through each manhole along the confined space. Readings are to be taken at various levels and recorded.
3 If the readings indicate the confined space atmosphere is outside acceptable limits, the confined space will be treated as a permit required confined space. The developer must implement steps contained in paragraph 5C(2). Otherwise, continue with the following.
4 Remove all manhole covers and install protectors around the manhole openings.
5 Set up surveillance of open manholes and inlets to the storm drain.
6 Inspect inlets to the confined space to assure they are free of obstruction or substances that might affect the ventilation or atmosphere of the confined space.

Note: *Appendix A contains sample addendum wording for use in Developer Agreements.*

Prior to confined space entry, the District inspector shall:

1 Observe the calibration of the direct reading confined space meter on the day of entry.
2 Tour the job site with the developer to assure confined space inlets are free of obstruction or substances and surveillance is in place.
3 Observe the monitoring of confined space atmosphere through each manhole.
4 Assure a direct reading calibrated (on the day of entry) confined space meter is available for use during entry.
5 Complete confined space checklist, Appendix C, and provide a copy to the District safety consultant after completion of inspection.

Note: *If the atmosphere is below acceptable limits for any portion of the monitoring conducted through the manholes, the confined space will be treated as a permit required confined space, and the inspector should immediately inform the District safety consultant. The District safety consultant shall review the situation with the inspector and monitor developer actions to implement permit required confined space operations in accordance with paragraph 5.(C)(2).*

C. RCFC Confined Space Entry Procedure: Prior to entry of a confined space (as in 5.B.2(c), Maintenance and Surveys employees will review drawings of the confined space to be entered to determine if there are any extreme slopes, depressions, or other unusual configurations that may make entry and egress difficult or constitute other potential hazards. If such configurations exist, follow the steps in C(2) below. If the drawings do not indicate any unusual configuration or other safety and health hazard, the employee should take the following actions:

(1) Not Permit Required or Alternate Entry Method
   (a) Review confined space entry plans with the supervisor. Supervisor to determine required actions prior to entry and complete Appendix D. If mechanical ventilation is required, employee to contact fence crew lead and coordinate entry date.

(b) Checkout and calibrate a direct reading confined space meter. Record calibration data on Appendix E. Surveys will store the meter and maintain its usage schedule. Surveys will also maintain calibration gases.

(c) Checkout an Escape Breathing Apparatus from Surveys if work requires stepping into a confined space.

(d) Tour the site and inspect inlets to the confined space to assure they are free of obstruction or substances that might affect ventilation on atmosphere of the confined space.

(e) Test the atmosphere through each manhole along the route of confined space travel. Test at the top, mid-point, and bottom of the space. Always test through one additional manhole on either end of the route of travel.

(f) Remove all manhole covers along the route of travel and place protectors around each opening.

(g) Complete the confined space checklist, Appendix C and submit a copy to the District safety consultant after completion of the work. If the readings indicate the confined space atmosphere is outside acceptable limits, the employee will follow the steps in C(2) below. If the readings are within acceptable limits, the employee should assure there is surveillance above the site to safeguard the open manholes and assure no changes take place that may affect the atmosphere of the confined space.

(h) On entering the confined space, the employee must carry a calibrated direct reading confined space meter and an emergency air supply capable of providing at least 5 minutes of air for emergency escape.

(i) If the confined space meter alarm sounds or shows unacceptable atmosphere readings, or the employee experiences any situation that could potentially constitute a hazard, he is to don and activate the Escape Breathing Apparatus, exit the confined space immediately, and follow the steps in C(2) before reentry.

(2) Permit Required Confined Space Entry Procedures

(a) All permit-required confined spaces must be identified as permit required confined spaces and have warning signs posted as well as barricades, as appropriate.

(b) Appendix D, RCFC Confined Space Entry Permits must be prepared and approved prior to entry.

(c) All supplemental pre-approved entry procedures and equipment must be identified on the permit.

(d) Lock-Out/Block-Out and other isolation procedures must be documented on the permit and implemented prior to entry.

(e) All ventilation, purging or other procedures to control a hazard must be documented, implemented and measured for effectiveness prior to entry. Measurement of atmosphere prior to entry must be accomplished in the following order:

- Measure Oxygen first
- Measure Flammability next
- Measure Toxic Gasses last.

(f) Duties for Permit-Required Team

- Entrant
  - Know hazards and signs of exposure.
  - Properly use equipment during entry.
  - Maintain continuous communication with attendant.
  - Alert attendant when warning signs or prohibited conditions exist.
  - Exit quickly when ordered to by attendant or supervisor or when warning/danger signs are recognized or an evacuation alarm is activated.
- Entry Supervisor
  - Know Hazard – modes, signs, symptoms and consequences of exposure.
  - Verify permit complete and all procedures and equipment is at the site.
  - Terminate and cancel permit when a problem is noted or the entry is completed.
  - Verify rescue service and equipment is available at the point of entry.
  - Remove unauthorized individuals from the site.
  - Verify all entry operations and procedures are fully complied with.
- Attendant
  - Know Hazards – modes, signs, symptoms and consequences of exposure.
  - Be aware of possible behavioral effects of hazard on entrants.
  - Continuously maintain an accurate identification and accounting of authorized entrants.
  - Remain outside permit space during entry operations until relieved by another attendant.
  - Maintain continuous communication with entrant.
  - Monitor activities and conditions inside and outside the permit space and order evacuation of the space when:
    - A prohibited conditions exists
    - Entrant's behavior indicates effects of hazard
    - A situation outside of space could endanger entrant
    - If attendant is unable to perform all duties required.
  - Initiate rescue conditions when entrants may need assistance. Summon additional rescue services if required.
  - Keep unauthorized persons away from the space. Notify entrant and supervisor of unauthorized persons.
  - Perform non-entry rescue.
  - Perform no duties that might interfere with the primary duty of protecting the entrant.

D. Training

(1) RCFC employees, who are to enter a non-permit confined space or participate as a member of a permit-required confined space entry, and their supervisors must attend and pass with a satisfactory grade a confined space entry training class. Refresher training will occur annually. Inspector training will cover this procedure and bump-

testing a confined space meter. Training for Maintenance and Survey personnel will also cover confined space monitoring and the use of the Escape Breathing Apparatus. Exception: RCFC employees who need to enter a new-construction, non-permit confined space one-time-only may do so without formal training if:

- Accompanied at all times by a trained RCFC employee familiar with the confined space, and
- Prior to entry the employees receive a confined space indoctrination on egress points and how to react to a confined space meter alarm or other emergencies.

There is No Exception to the training requirement for any other confined space entry.

(2) Permit Required Training

- All employees participating as part of permit required confined space operation must have the understanding, knowledge and skills to effectively perform duties under this procedure
- Training is to be provided before being assigned duties, before a change in duties and whenever a change in operations presents a new hazard or requires new procedures.
- Training must establish proficiency of employees in performing their duties.
- The training will be certified by the Section Leader as being accomplished. Records of date, employee, and trainer shall be maintained and available to employees.
- Specific training required for rescuers include:
  - Practice permit space rescues each 12 months.
  - First Aid/CPR/Bloodborne Pathogens (current certification required)
  - Rescue equipment and procedures.

E. Responsibilities

(1) Supervisors (Maintenance, Contract Administration, Surveys)

- Identify employees who are authorized to enter confined spaces or participate in a permit-required confined space entry.
- Assure employees are trained and comply with this procedure.
- Maintenance and Survey Supervisors review plans for confined space entry with entry personnel. Complete and sign Appendices D or E as appropriate.
- Review plans for permit-required confined space entry to assure preparations are complete.

(2) District Safety Consultant

- Provide/coordinate confined space training.
- Review contractor/developer confined space procedures and recommend acceptable or modifications
- Review and approve confined space entry permits.

(3) Administrative Services

(4) Assure confined space provisions are included in appropriate contracts and agreements. Confined Space Entrants

- Comply with all required steps for planning and performing confined space entry.
- Document confined space entry preparation on appropriate Appendices.

- Exit confined space immediately if confined space meter alarms or other hazards appear.

APPENDIX A

CONTRACT/AGREEMENT PROVISIONS FOR CONFINED SPACE COMPLIANCE

A. SAMPLE CONTRACT CONFINED SPACE PROVISIONS

CONFINED SPACE PROVISIONS

The contractor shall comply with all Cal/OSHA safety regulations including regulations concerning confined space and for maintaining a safe working environment for contractor and District employees on the site. The contractor shall develop and maintain a confined space procedure specific to this contract that complies with the requirements contained in California Code of Regulations, Title 8, Section 5158, Other Confined Space Operations and District Confined Space Procedure, SOM-18.

Within five days after the award of the contract, the contractor shall submit three (3) copies of the procedure to the Engineer for review and approval. The contractor shall allow five (5) working days for the Engineer to review the procedure. If revisions are required as determined by the Engineer, the contractor shall revise and resubmit the procedure within three (3) working days of receipt of the Engineer's comments and shall allow four (4) working days for the Engineer to review the revisions. The contractor shall submit three (3) copies of the approved procedure to the Engineer prior to pre-construction meeting. **The contractor must have an approved procedure prior to the Pre-Construction meeting.**

B. SAMPLE DEVELOPER AGREEMENTS CONFINED SPACE PROVISIONS

CONFINED SPACE PROVISIONS

Developer shall:

Comply with all Cal/OSHA safety regulations including regulations concerning confined space and shall maintain a safe working environment for DEVELOPER and DISTRICT employees on the site.

Furnish DISTRICT, at time of providing written notice to DISTRICT of the start of construction as set forth in Section ____ herein, a confined space procedure specific to the PROJECT. The procedure shall comply with requirements contained in California Code of Regulations, Title 8, Section 5158, Other Confined Space Operations, Section 5157, Permit Required Confined Space and DISTRICT Confined Space Procedures, SOM-18. The procedure shall be reviewed and approved by the DISTRICT prior to the issuance of a Notice to Proceed.

APPENDIX B

RCFC INSPECTOR CHECKLIST FOR ENTRY INTO CONTRACTOR/DEVELOPER NEW CONSTRUCTION CONFINED SPACE

1. This checklist is required to be completed by the inspector prior to entering any contractor/developer (C/D) new construction confined space. Any No answer will require further action by the contractor/developer prior to entry.

ITEM	ACTION REQUIRED	YES	NO
1	The C/D has current and adequate data to support that the confined space to be entered has been tested daily since the last entry by a District inspector and the data supports that no hazard exists.		
2	The C/D has calibration records to support the continued space atmosphere monitoring was performed with calibrated meters.		
3	The inlets are free of obstruction or substances which might affect ventilation of atmosphere of the confined space.		
4	The C/D provides the inspector with a currently calibrated direct reading instrument to measure the following and to provide for continuous monitoring during entry: • Oxygen content • Flammable Gases & Vapors • Potential Toxic Air Contaminants		

2. Description of space to be entered _____

_____

_____

3. Inspector _____
Signature

Date _____

Copy to be forwarded to RCFC Safety Coordinator.

APPENDIX C

RCFC EMPLOYEE CHECKLIST FOR ENTRY INTO STORM DRAINS IN USE

1. This checklist is required to be completed by the employee before entry into any storm drain in use. Any No answer will notification of the District's Safety Consultant or Safety Manager before entry.

ITEM	ACTION REQUIRED	YES	NO
1	Calibration of direct reading confined space meter has been performed or observed and recorded?		
2	Job site has been toured and inlets are free of obstacles or substances which might affect confined space atmosphere?		
3	Confined space monitoring performed at each manhole; atmosphere is acceptable, manhole covers removed and protected and surveillance in place? Readings have been recorded?		
4	Calibrated direct reading confined space meter is available for use to measure: • Oxygen content • Flammable Gases & Vapors • Potential Toxic Air Contaminants		
5	Mechanical ventilation is in place, if required.		

2. Description of space to be entered _____

_____

3. Employee: _____
Signature

Date _____

APPENDIX D

RCFC CHECKLIST FOR ENTRY INTO OPERATIONAL CONFINED SPACES

1. This checklist must be completed by the supervisor and employee before entry into any confined space in an operational state. Employees may not enter unless all required actions are performed.

ITEM	ACTION REQUIRED	YES/NO SUPERVISOR INITIALS	PERFORMED BY
1	Calibration of direct reading confined space meter has been performed or observed and recorded?		
2	Job site has been toured and inlets are free of obstacles or substances which might affect confined space atmosphere?		
3	Confined space monitoring performed at each manhole; atmosphere is acceptable, manhole covers removed and protected and surveillance in place? Readings have been recorded?		
4	Calibrated direct reading confined space meter is available for use to measure: • Oxygen content • Flammable Gases & Vapors • Potential Toxic Air Contaminants		
5	Escape Breathing apparatus is available, if required.		
6	Mechanical ventilation is in place, if required.		

2. Description of space to be entered, Employees authorized to enter, and date of entry: _____

_____

3. Supervisor: _____ Date _____
Signature

APPENDIX E

RCFC CONFINED SPACE ENTRY PERMIT

Space to be Entered: _____

Drawing or description showing material and energy inputs attached? YES or NO

Nature of Task: _____

_____ Hot Work? _____

Is there potential for:

Physical Injury?	_____	Vehicular Traffic?	_____	Toxic Gases or Vapors?	_____
Explosive Gases?	_____	Oxygen Deficiency?	_____	Exposure to Microbes?	_____
Heat Stress?	_____	Cold Stress?	_____	Engulfment?	_____

Duration of Permit: From: _____ To: _____

Entry Supervisor _____

Authorized Entrants: _____

Rescuers: _____

Attendants: _____

Means of Communication with Entrants: _____

Safety Equipment Outside the Space:

Needed?	In Place?	(To be initialed by Entry Supervisor)
_____	_____	Traffic cones or barriers in place
_____	_____	Ventilation system in operation
_____	_____	Rescue and retrieval equipment in place.
_____	_____	SCBA inspected and ready (topside) for emergency use.
_____	_____	Valves locked out or made inoperable (N/A if not applicable).
_____	_____	Electrical equipment disconnected and locked out (or N/A).
YES	_____	Rescue service is currently available.
_____	_____	Radio, phone, or portable phone reaches rescue team.
_____	_____	Ignition sources eliminated/isolated.

Safety Equipment in the Space:

Needed?	In Place?		Needed?	In Place?	
_____	_____	SCBA or Airline respirator	_____	_____	5-min. escape pack
_____	_____	Air filtering respirator	_____	_____	Ladder for entry
_____	_____	Steel-toe safety shoes	_____	_____	Rubber over boots
_____	_____	Surgical inner gloves	_____	_____	Rubber outer gloves
_____	_____	Leather or cloth gloves	_____	_____	Cloth coveralls

Needed?	In Place?		Needed?	In Place?	
_____	_____	Tyvek or Saranex coveralls	_____	_____	PVC rain Suit
_____	_____	Safety goggles	_____	_____	Face Shield
_____	_____	Safety harness & lifeline	_____	_____	Hardhat
_____	_____	Fire extinguisher (topside)	_____	_____	Flashlight or lamp

Atmospheric Testing and Conditioning:

Calibrate instruments per manufacturer's instructions. Perform field calibration just prior to entry. Measure gases just inside the space and at locations workers will occupy.

Needed?		Readings			
_____	Time of Day	_____	_____	_____	_____
_____	Oxygen deficiency (>19.5% and <21.5%)	_____	_____	_____	_____
_____	Flammable gases (less than 10% LEL)	_____	_____	_____	_____
_____	Toxics (<PEL). Specify: _____	_____	_____	_____	_____
Yes	Initials of Attendant	_____	_____	_____	_____

Emergency Service	**Provider**	**Telephone Number**
24-Hour Emergency		
Safety Coordinator		
Section Manager		
Space Entry Supervisor		
Fire Department		
Police Department		
Health Department		
Poison Control Center		
Hospital Address		
Contact at Hospital		
24-Hour Ambulance		

Route to Hospital (instructions or map):

Special Instructions: _____

PERMIT APPROVED: _____ _____
Safety Coordinator *Date*

ENTRY APPROVED: _____ _____
Entry Supervisor *Date*

APPENDIX F

AUTO CALIBRATION AND ATMOSPHERIC TEST RECORD

Model RKI GX-2001 **Serial # of meter** 358020243

Name of Employee(s) performing Calibration/Monitoring _____/_____

Expiration date of gas(es) used for auto calibration _____

Current date _____

Atmospheric Test

Standards	Combustibles 10% LEL	Oxygen 19.5%23.5%	CO 25 PPM	H2S 10 PPM
Monitoring				
Sites				
A _____	_____	_____	_____	_____
B _____	_____	_____	_____	_____
C _____	_____	_____	_____	_____
D _____	_____	_____	_____	_____
E _____	_____	_____	_____	_____
F _____	_____	_____	_____	_____
G _____	_____	_____	_____	_____

AUTO CALIBRATION _____ OK _____ FAIL

Diagram route of Entry Egress in Confined Space. Label Monitoring Sites A, B, etc.

Example: