

WP 10-WC.01
Revision 4

Cross-Connection Control Program

Cognizant Section: Surface Operations and Maintenance

Approved By: Leroy Bostick



**Cross-Connection Control Program
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CHANGE HISTORY SUMMARY

| REVISION NUMBER | DATE ISSUED | DESCRIPTION OF CHANGES |
|------------------------|--------------------|---|
| 4 | 11/15/10 | <p>Changed title in Responsibilities from Surface Operations and Maintenance to Maintenance Operations</p> <p>Deleted qualified testers from third bullet under Step 3.1</p> <p>Deleted fourth bullet under Step 3.1</p> <p>Changed Balance of Plant and Design Engineering Manager to Integrated Waste Handling Engineering Manager</p> <p>Added wording certified or qualified to Step 3.3</p> <p>Added bullet to Step 3.3 on technical approval of maintenance processes related to cross-connection control program</p> <p>Changed Surface Operations and Maintenance to Operations Maintenance</p> <p>Deleted Steps 4.5 to 4.5.2A(4)</p> <p>Deleted Step 4.6.5</p> <p>Attachment 1, definition Cross Connect Control Technician, deleted need to pass cross-connect technician examination requirement</p> |

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1.0 INTRODUCTION

The Waste Isolation Pilot Plant (WIPP) shall ensure the safety of both site water and supplier water by implementing a Cross-Connection Control Program (CCCP). As a water purveyor, WIPP is required to prevent backflow contamination or pollution of the site potable water system. As a water user, WIPP also is required to prevent contamination or pollution of its water supplier, the city of Carlsbad, New Mexico.

The CCCP isolates within the site internal distribution system all contaminants or pollutants that could backflow into the potable water system.

The program eliminates or controls existing cross-connections, actual or potential, between the WIPP site potable water system and nonpotable water systems, plumbing fixtures, and industrial fluids systems.

The CCCP also maintains backflow prevention devices that will systematically and effectively eliminate contamination or pollution of the potable water system.

2.0 REGULATIONS

2.1 Federal Regulations

2.1.1 Public Law 99-339 - Safe Drinking Water Act Amendments of 1986

This law establishes regulations and responsibilities that require a cross-connection control program. The primary responsibility is for the quality of water to the last free-flowing tap, or to the point where the supplier loses control over water quality within the system. This responsibility includes preventing water from unapproved sources from entering a potable water system within the user's premises. The U.S. Environmental Protection Agency (EPA) is responsible for safe drinking water as a direct result of the Safe Drinking Water Act of 1974. The EPA established standards for drinking water and responsibilities for enforcement of these standards. Each state has the responsibility for enforcing these standards for drinking water.

2.1.2 Occupational Safety and Health Administration Safety and Health Standards Code of Federal Regulations (Title 29 Code of Federal Regulations Part 1910)

This federal regulation establishes that construction of a nonpotable water system shall **NOT** allow back pressure or back siphonage into a potable water system.

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2.1.3 Safe Drinking Water Act, Title 40 Code of Federal Regulations, Parts 141 and 142

Domestic water conveyed within distribution systems that serve U.S. Department of Energy (DOE) facilities shall comply with the applicable Safe Drinking Water Act, Title 40 *Code of Federal Regulations* (CFR) Parts 141 and 142 requirements, and all other state, regional, and local requirements. Quality of domestic water within such distribution systems shall be protected from degradation by installation of backflow prevention assemblies, as necessary, to preclude backflow of contaminants or pollutants into the system.

2.2 State of New Mexico Regulations

2.2.1 New Mexico Codes Annotated, Title 20, Environmental Protection; Chapter 7, Waste Water and Water Supply Facilities; Part 10, Drinking Water

The state of New Mexico's Water Supply Regulations establish cross-connection control requirements. These include responsibilities and program requirements for suppliers and users. A cross-connection control program shall be established as a direct result of the Water Supply Regulations and the Safe Drinking Water Act.

The New Mexico Environment Department (NMED) has responsibility for enforcing EPA safe drinking water standards. The NMED has established Water Supply Regulations that provide responsibilities for both users and suppliers of safe drinking water. The supplier is responsible for the supply of potable water. The user is responsible for preventing cross-connections at point of delivery and ensuring safe drinking water within user boundary.

2.3 National Codes and Standards

2.3.1 Uniform Plumbing Code (1995 Edition)

This standard establishes guidelines for cross-connection control for construction of water, chemical, and waste treating equipment or mechanisms. The standard states guidelines for use and approval of backflow prevention devices.

2.3.2 American Water Works Association, 1984

This association recognized the need for cross-connection control and provided standards and guidelines for backflow preventing devices. They actively develop criteria for selection, installation, testing, and inspection of cross-connection control devices.

2.3.3 American Society of Sanitary Engineers

The standard states guidelines for use and approval of backflow prevention devices.

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3.0 RESPONSIBILITIES

3.1 Operations Department

The Operations Manager is the administrator of the CCCP.

The Maintenance Operations Manager has oversight responsibility for the CCCP.

Maintenance Operations, under general direction of Operations Manager, is responsible for:

- Administration, testing, and maintenance of the CCCP
- Prevention of pollution and contamination of both WIPP site potable water supply and supplier water supply at point of delivery
- Providing maintenance personnel to repair, maintain, and inspect cross-connection devices

Facility Operations is responsible for shutdown of potable water supply in event of possible contamination or pollution.

3.2 Safety and Health Department

The Safety and Health Department (S&H) Manager is responsible for notifications to health departments during any contamination or pollution of potable water supply.

S&H is responsible for remaining knowledgeable of new and current legislation and governmental regulations pertaining to safe drinking water regulations and cross-connection regulations.

3.3 Engineering

The Integrated Waste Handling Engineering Manager, is responsible for providing certified or qualified technical support for design, testing, repair, and inspection of cross-connection control devices.

Engineering is responsible for:

- Technical support
- Designs, plans, and plumbing installations to prevent uncontrolled cross-connections in WIPP site water distribution system
- Approval of changes in design or new applications of cross-connection devices

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- Ensuring that new or modified water distribution installations are **NOT** released for use prior to S&H approval
- Maintaining device documentation and locations
- Technical approval of maintenance processes related to Cross-Connection Control Program.

3.4 Supervisors

Supervisors, and any other person who immediately directs job efforts of a working unit, are responsible and accountable to ensure that cross-connection pollution or contamination does **NOT** occur. Accountability will be documented by initiation of an Action Request (AR) in accordance with WP 10-WC3011.

3.5 Employees

Employees are responsible for complying with CCCP to prevent any cross-connections that could make the water supply unsafe.

Employees involved in repair, maintenance, testing, and inspection of cross-connection devices are responsible for **NOT** performing work without proper instructions and authorization.

4.0 CROSS-CONNECTION CONTROL PROGRAM

4.1 Program Guidelines/Requirements

4.1.1 New Installations

- A. Perform on-site evaluation and/or review of plans to determine criteria for any required cross-connection control devices.
- B. Perform/request any necessary testing and inspection prior to returning system to service.

4.1.2 Cross-Connections

- A. Cross-connections shall **NOT** be allowed unless protected by approved cross-connection control device installed, and tested as required to ensure satisfactory operation.
- B. Installation of a by-pass around any backflow prevention device shall **NOT** be allowed unless by-pass contains an "equal" backflow prevention device.

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4.1.3 Unsafe Connections

- A. Discontinue water service immediately if S&H determines an unsafe potable water supply exists.
- B. DO NOT return affected water system to service until unsafe condition is corrected.

4.1.4 Backflow Prevention

- A. Install backflow prevention devices as required.
 - 1. Install only Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California approved backflow prevention devices in containment installations in accordance with 20.7.10 NMAC.
 - 2. Install Uniform Plumbing Code, American Society of Sanitary Engineers, or Cross-Connection and Hydraulic Research approved backflow prevention devices for isolation installations.
- B. Backflow devices that have provisions for testing (isolation valves and test ports) shall be tested annually.
- C. Test unscheduled maintenance or repairs prior to returning system to service.
- D. Correct any malfunction of a backflow prevention device that occurs during operation, or as revealed by periodic testing.

4.2 Maintenance

4.2.1 Operations Maintenance

- A. Maintain backflow prevention devices installed at WIPP in accordance with manufacturer's recommendations.
- B. If repairs are performed on backflow prevention device, test device prior to return to service.
- C. Retain copy of maintenance record and test results for each device maintained or repaired.

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4.3 Testing

4.3.1 Operations Maintenance

- A. Annually test all backflow prevention devices on site in accordance with approved WIPP procedures.
- B. Initially test all new backflow prevention devices prior to putting them into service (test devices annually thereafter).
- C. Ensure all annual and initial test data and results are documented.

4.4 Equipment and Calibration

4.4.1 Tool and Equipment Control

- A. Calibrate and mark equipment gauges in accordance with WP 10-AD3028.
- B. Maintain records for calibrated test equipment.

4.5 Record Keeping

4.5.1 General

Retain all records in accordance with WP 15-RM3002.

4.5.2 Operations Maintenance

- A. Maintain and update program.
- B. Retain maintenance, testing, and inspection records.

4.5.3 Tool and Equipment Control

Retain test equipment calibration records.

4.5.4 Engineering

Retain all backflow prevention device technical records. Technical records include equipment lists and locations of backflow prevention devices.

5.0 REFERENCES

40 CFR Parts 141 and 142, Safe Drinking Water Act

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New Mexico Codes Annotated (NMAC), Title 20, Environmental Protection, Chapter 7, Waste Water and Water Supply Facilities, Part 10, Drinking Water

Cross-Connection Control Manual, Third Edition, Environmental Protection Agency, 1989

Manual of Cross-Connection Control, Ninth Edition, Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, 1993

Recommended Practice for Backflow Prevention and Cross-Connection Control, Second Edition, American Water Works Association, 1992

WP 10-AD3028, Calibration and Control of Measurement and Test Equipment

WP 10-WC3011, Maintenance Process

WP 15-RM3002, Records Filing, Inventorying, Scheduling, and Dispositioning

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Attachment 1 - Definitions

Administrator - The WIPP management and operating contractor has the responsibility to protect both site potable water supply and supplier water supply at point of delivery. In event of contamination or pollution of site potable water supply, WIPP has authority to protect health of persons and may take action as deemed necessary to protect those persons. Administrator shall consult with Environment, Safety and Health to confirm correctness of information and to ascertain the action which must be taken.

Air Gap - Unobstructed vertical distance through free atmosphere between the lowest opening from any pipe or faucet conveying water or waste to a tank, plumbing fixture, receptor, or other assembly, and the flood level rim of the receptacle. These vertical, physical separations must be at least twice the diameter of the water supply outlet, but not less than 1 inch (25 mm).

Approved - Accepted by water purveyor (WIPP) as meeting applicable specification or procedures as stated in this program.

Approved Backflow Prevention Device - Device used to prevent backflow of contaminants or pollutants into potable water system. The approval and listing agency is the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California for containment applications, and the International Association of Plumbing and Mechanical Officials (Uniform Plumbing Code), or American Society of Sanitary Engineers for isolation applications.

Atmospheric Vacuum Breaker (AVB) - The AVB consists of a float check, a check seat, and an air inlet port. Shutoff valve immediately upstream may be an integral part of assembly. The AVB is designed to allow air to enter downstream water line to prevent back siphonage. Unit may **NEVER** be subjected to a back pressure condition, have a downstream shutoff valve, or be installed where it will be in continuous operation for more than 12 hours.

Back Pressure - Pressure, higher than supply pressure, which may cause backflow. Back pressure can be caused by pump, elevated tank, boiler, air/steam pressure, or other means.

Back Siphonage - Backflow caused by negative or reduced pressure in supply piping.

Backflow - Undesirable reversal of flow in potable water distribution system as a result of a cross-connection.

Backflow Prevention Device - Assembly or means that prohibits backflow of water into potable water supply.

Backflow Prevention Assembly Tester - Person qualified by approving authority (WIPP) to test, repair, and maintain backflow prevention assemblies.

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Check Valve - Self-closing device designed to permit flow of fluids in one direction. Single check valve is NOT an approved backflow prevention device.

Containment - Protection by containment shall mean installation of an approved backflow prevention device, or method, on water service line(s) serving any premises, location, facility, or area. Protection by containment shall be used when potable water system may be contaminated or polluted by substances used or stored within building or premise.

Contamination - Impairment of potable water quality by sewage, industrial fluids, or waste liquids, compounds, or other materials, to a degree which creates an actual hazard to public health through poisoning or through spread of disease.

Critical Level - Reference line representing the check valve seat level within a back siphonage control unit. It is used to establish the height of the unit above the highest outlet or flood level rim.

Cross-connection - Any actual or potential connection between public water supply and source of contamination or pollution.

Cross-connection, Controlled - Connection made between potable water system and non-potable water system using an approved backflow prevention device, properly installed and tested in accordance with this program, that will continuously afford protection commensurate with the degree of hazard.

Cross-Connection Control Technician - Person who has shown competency and shall be familiar with appropriate laws, rules, and regulations which address cross-connection control. Person shall be able to make competent tests and repairs on all approved backflow prevention devices, and stay abreast of all pertinent new products and information.

Double Check Valve Assembly (DC or DCVA) - Assembly of two independently operating approved check valves between two tightly closing (resilient seated, and fully ported) shutoff valves, plus four properly located test cocks (resilient seated, and fully ported with blowout-proof stems) for testing of each check valve. Entire assembly shall be an approved backflow prevention device and must be installed in accordance with approved methods.

Effective Opening - Minimum cross-sectional area at point of water supply discharge, measured or expressed in terms of diameter of a circle, or if the opening is not circular, diameter of a circle of equivalent cross-sectional area.

Flood Level Rim - Edge of receptacle from which liquid overflows.

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Hazard, Degree of - Term derived from evaluation of potential risk to public health and adverse effect of hazard upon potable water system.

Hazard, Health - Any condition, device, or practice in water supply system and its operation which could create, or in the judgment of the water purveyor or Environment, Safety and Health, may create a danger to health and well-being of water consumer. An example of a health hazard is a structural defect, including cross-connections, in water supply system, or direct connection of potable water supply line to sanitary sewer.

Hazard, Plumbing - Plumbing type cross-connection in potable water system that has not been properly protected by air gap separation or approved backflow prevention device. Unprotected plumbing type cross-connections are considered to be health hazards.

Hazard, System - Actual or potential threat of severe damage to physical properties of potable water system or consumer's potable water system, or of a pollution or contamination which would have a prolonged effect on quality of potable water in system caused by a cross-connection.

Industrial Fluids System - Any system containing fluid or solution which may chemically, biologically, radiologically, or otherwise contaminate or pollute in a form or concentration such as would constitute a health, system, pollution, or plumbing hazard if introduced into approved water supply.

Internal Isolation - Fixture isolation and/or isolation of area or zone. Isolation at fixture means installing approved backflow prevention device at source of potential contamination. Area or zone isolation is confining potential source of contamination within specific area.

Point of Delivery or Service Connection - The terminal end of a service connection from the public potable water system, that is, where the water purveyor may lose jurisdiction and sanitary control of the water at its point of delivery to the consumer's water system. If a water meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the water meter.

Pollution - Presence of any foreign substance in water that tends to degrade its quality so as to constitute a non-health hazard or impair usefulness of the water.

Potable Water - Water safe for human consumption as described by public health authority having jurisdiction.

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Pressure Vacuum Breaker Assembly (PVB) - Assembly consisting of independently operating internally loaded check valve, independently operating loaded air inlet valve located on discharge side of the check valve, with properly located test cocks (resilient seated, and fully ported with blowout-proof stems) and tightly closing shutoff valves (resilient seated, and fully ported) attached at each end of assembly designed to operate under pressure for prolonged periods of time to prevent back siphonage. Pressure vacuum breaker may not be subjected to any back pressure. Must be installed in accordance with approved methods.

Supplier - The city of Carlsbad provides potable water to WIPP site as a result of an agreement with the DOE. Potable water is supplied from the Double Eagle Pipeline.

Water Purveyor - Any person or group owning and/or operating public potable water system (also referred to as "Water Supplier"). WIPP is considered the water purveyor within confines of the perimeter fence.