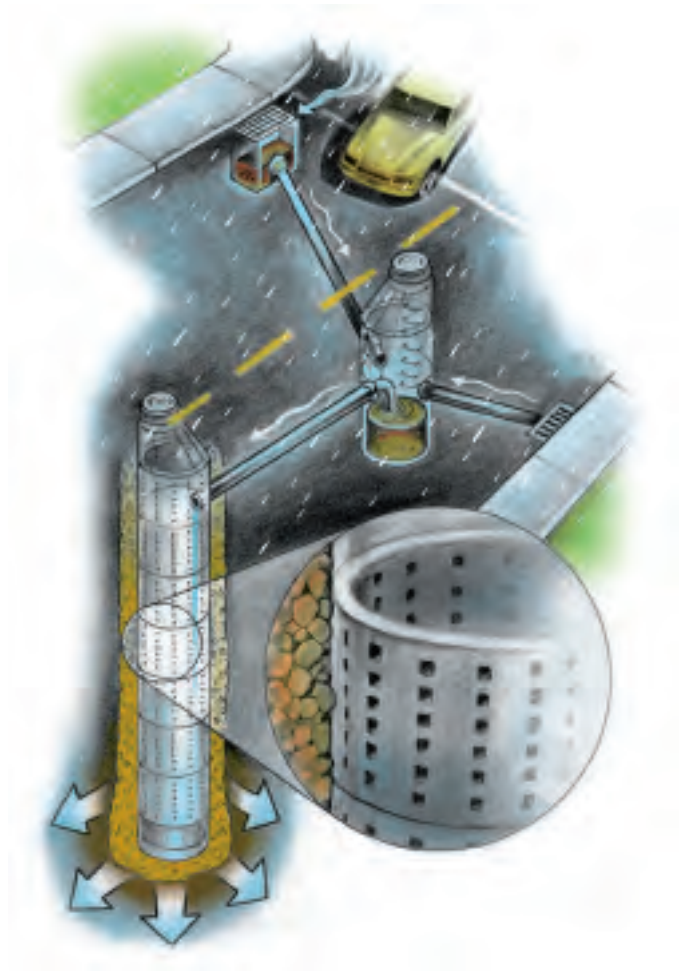


Corrective Action Plan

Water Pollution
Control
Facilities (WPCF)
Permit

Class V Stormwater
Underground
Injection Control
Systems

DEQ Permit
Number
102830



Prepared by



ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

July 2006

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City of Portland, Oregon

**Water Pollution Control Facilities (WPCF) Permit For
Class V Stormwater Underground Injection Control Systems**

Permit Number: 102830

CORRECTIVE ACTION PLAN
Underground Injection Control Systems (UICs)

Version 1

July 2006

Prepared By:
City of Portland, Bureau of Environmental Services

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1 Introduction and Organization

1.1 Introduction

This Corrective Action Plan (CAP) provides the process that Bureau of Environmental Services (BES) staff will use to identify, evaluate, select, implement, and document corrective actions for non-compliant public underground injection control systems (UICs) in the City of Portland. The CAP is a requirement of the Water Pollution Control Facility (WPCF) permit issued to the City of Portland (City) by the Oregon Department of Environmental Quality (DEQ) in June 2005.

The City currently has an estimated 9,000 UICs that collect stormwater from public rights-of-way and discharge it to the subsurface. For many areas located east of the Willamette River, UICs are the only available form of stormwater disposal. UICs are also an essential element of a comprehensive watershed strategy to use stormwater as a resource by infiltrating it back into the ground. UICs quickly and efficiently reintroduce stormwater into subsurface soils, which filter and cool the runoff before it finds its way to groundwater and, eventually, helps recharge streams.

As used in this document, **UIC** means any Class V underground injection control system owned or operated by the City of Portland.

In the Portland area, groundwater serves as a backup drinking water supply to the Bull Run reservoirs. The WPCF permit establishes the UIC construction, operation, and maintenance requirements the City must implement to protect groundwater for use as a drinking water resource. The permit is designed to protect groundwater by implementing a comprehensive stormwater management strategy to prevent, minimize, and control pollutants at the surface before stormwater is discharged to the ground.

The WPCF permit requires the City to implement corrective actions for any UICs that do not comply with permit requirements (see Section 1.3). For the purpose of this CAP, corrective action includes a range of responses, technologies, or best management practices (BMPs) constructed or implemented to address or resolve non-compliant conditions. Corrective action includes defining the nature and extent of the potential adverse impact; evaluating site or regional characteristics; and identifying, developing, and implementing appropriate measures to prevent adverse impacts to the beneficial uses of groundwater (e.g., drinking water) and the environment.

1.2 Regulatory Background

Congress enacted UIC rules in 1974 under the federal Safe Drinking Water Act (SDWA) and modified the rules in 1999. The U.S. Environmental Protection Agency (EPA) administers these rules under Title 40 of the Code of Federal Regulations (CFR) Parts 144 -148. In Oregon, EPA has delegated the regulation of UICs to DEQ. Oregon Administrative Rules (OAR) 340-044 regulate all groundwater as a potential source of drinking water and require municipalities with

more than 50 UICs to operate under a permit. DEQ issued a WPCF permit to the City of Portland on June 1, 2005 (DEQ Permit Number 102830).

1.3 Permit Requirements

The WPCF permit contains specific criteria that all UICs must meet. In general, a UIC is non-compliant under any of the following conditions:

- It is within 500 feet of a domestic or irrigation well and does not meet the water quality limits established in the permit.
- It is within 500 feet or the two year time-of-trave of a public water system and the water quality of the discharge does not meet the water quality limits established in the permit.
- It does not meet the water quality discharge limits at the end-of-pipe discharge point into the UIC.
- It has insufficient separation distance between the bottom of the injection well and groundwater to protect the natural water quality.
- It is constructed into groundwater.
- It does not meet other general permit conditions.

The permit requires the City to implement corrective actions for non-compliant UICs throughout the life of the permit (10 years or permit term). Non-compliant UICs must be corrected within three full Capital Improvement Program (CIP) cycles after the UIC is determined to be non-compliant. If a corrective action may take more than three full CIP cycles to complete after the UIC has been identified as non-compliant, the City can request in writing an extension of up to one full year beyond the initially required completion date without a permit modification (WPCF permit, Schedule C12g, h, i).

If a regional corrective action is necessary or the nature of the corrective action requires more than three full CIP cycles to complete, the City may also apply for a permit modification under OAR 340-045-0055 to address regional corrective actions, or DEQ may issue a Department Order for that purpose. Any regional corrective action under a permit modification must be completed within the original permit duration period. If a regional corrective action cannot be completed within the permit duration period, the City may:

- Apply for a new permit to incorporate the regional corrective action and update the permit expiration date, or
- Request DEQ to issue a Department Order as a separate corrective action from this permit.

The permit classifies non-compliant UICs into the following four categories:

- **Category 1:** UICs known to be non-compliant upon the date of permit issuance (June 1, 2005). ([LINK¹](#))
- **Category 2:** UICs discovered as non-compliant during the Systemwide Assessment (by July 15, 2006).
- **Category 3:** UICs discovered as non-compliant after completion of the Systemwide Assessment (after July 15, 2006).
- **Category 4:** UICs that become non-compliant by failing to meet the annual mean maximum allowable discharge limits (MADLs) within one wet season after the exceedance or failing to satisfy any groundwater protection conditions of Schedule A of the permit.

Corrective actions for **Category 1** UICs have already been approved and initiated by the City, in accordance with the Corrective Actions for Category 1 UICs document (City of Portland, July 2005) and the Decommissioning Procedure for UICs (City of Portland, October 2005).

The City must prioritize the **Category 2** UICs from the greatest to the least potential risk of endangerment to the environment and develop an implementation schedule to correct the system deficiencies. The permit requires the City to submit a prioritized and ranked list of Category 2 UICs to DEQ by July 15, 2006. DEQ has agreed to extend this date (Oregon Department of Environmental Quality, Approval to submit Category 2 UICs December 1, 2006. *Response to BES letter dated June 2, 2006, Schedule Classification, Underground Injection Control System, City of Portland WPCF Permit No. 102830*—June 20, 2006), and the City will submit the Category 2 list by December 1, 2006, along with the UIC Management Plan (UICMP). ([LINK](#)) This revised submittal date will allow the City to:

- Complete the Systemwide Assessment (to be submitted to DEQ by July 15, 2005).
- Develop procedures needed to evaluate, prioritize, and rank non-compliant UICs. These procedures (as described in Sections 4 and 5 of this CAP) will be included in the UICMP that is due to DEQ by December 1, 2006.
- Develop a work plan for addressing Category 2 UICs. The work plan will be part of the UICMP and will use BMPs, processes, and procedures established in the UICMP.

Category 3 and **Category 4** UICs will be identified in years 2 through 10 of the permit (June 2006 through June 2015).

Category 2, 3 and 4 corrective actions will be implemented in accordance with this CAP.

¹ Electronic links to references cited are being developed and will be included in the future.

1.4 CAP Organization

The CAP is organized as follows:

Section 1.0: Introduction and Organization,

provides a brief description and purpose of the CAP. It also summarizes relevant regulatory

background information and permit requirements, describes the CAP's relationship to other plans required by the permit, and describes when and how the CAP may be modified.

Section 2.0: BES Staff Roles and Responsibilities, identifies the various staff positions involved in the corrective action program and summarizes their responsibilities.

Section 3.0: Goals and Objectives, describes goals and objectives for the CAP, as well as the City's overall watershed goals.

Section 4.0: Identification and Prioritization of Non-Compliant UICs, describes the process that will be used to identify and prioritize UICs that are non-compliant and require corrective action. This process relies on procedural components that are included in the UICMP ([LINK](#)) and other UIC Program activities.

Section 5.0: Ranking, Scheduling, and Funding of Corrective Actions, describes the process that will be used to initiate corrective actions, rank and schedule corrective actions, and fund corrective action projects to resolve non-compliant UICs.

Section 6.0: Development and Selection of Corrective Actions, describes the process that will be used to identify, screen, develop, and select appropriate corrective actions to resolve known non-compliant UICs.

Section 7.0: Design and Implementation of Selected Corrective Actions, describes the existing BES procedures that will be used to design and implement corrective action projects.

Section 8.0: Performance Verification of Corrective Actions provides the follow-up verification process/performance evaluation that will be conducted to demonstrate that implemented corrective actions adequately resolve the non-compliant condition.

Section 9.0: Data Management and Reporting, describes how BES will document, track, and report corrective actions.

Appendix A: Forms, presents examples of forms that will be used as part of the Corrective Action Plan process.

Overview of CAP Process

Figure 1-1 presents an overview of the primary steps described in Sections 4 through 9. It also cites references to relevant procedures, forms, and CAP sections.

1.5 Other UIC Plans

The WPCF permit requires the City to prepare a variety of plans that together describe the programmatic actions and management practices the City will implement to protect groundwater and meet permit requirements. In addition to the CAP, the following plans and documents are required:

- Corrective Actions: Category 1 Underground Injection Control Systems (submitted July 2005) ([LINK](#))
- UIC Registration Database (submitted September 1, 2005) ([LINK](#))
- Decommissioning Procedure (Draft) for Underground Injection Control Systems (UICs) (submitted October 2005) ([LINK](#))
- Stormwater Discharge Monitoring Plan (SDMP) (submitted February 2006) ([LINK](#))
- Groundwater Monitoring Plan (if necessary)
- Systemwide Assessment (to be submitted by July 15, 2006) ([LINK](#))
- UIC Management Plan (UICMP) (to be submitted by December 1, 2006) ([LINK](#))
 - Operations and Maintenance (O&M) Plan ([LINK](#))
 - Best Management Practices (BMPs) Monitoring Program ([LINK](#))
 - Employee Training and Public Education Plan ([LINK](#))
 - Spill Prevention and Pollution Control Plan (SPPCP) ([LINK](#))

The UICMP will describe the relationship between the various plans in the overall context of the UIC program.

1.6 CAP Modifications

Potential modifications to the CAP may be identified during the selection, design, or implementation of corrective actions or during review or evaluation of the technologies or best management practices. Plan modifications will be implemented by either revising the CAP or preparing addenda to the CAP. The revised CAP or addenda will also describe the need for the modifications.

Proposed modifications to the DEQ-approved CAP will be submitted to DEQ for review and approval in accordance with the permit modification requirements (OAR 340-045-0055). The City will:

- Submit any proposed modification to DEQ for approval within 30 days of the modification.
- Have DEQ approval before implementing a modification, unless the modification is directed by DEQ.
- Include a summary of any modifications in the Annual UICMP Report.

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Procedures and Forms

Procedure
UIC Compliance Determination Work Sheet

Procedure
Scoresheet for Prioritizing Public UICs

UIC Form
UIC Corrective Action Request Form

UIC Form
Ranking of Non-Compliant UICs

BES Form
CIP Project Request Form

BES Engineering Services Guidance
Implementation Procedures for Capital Projects
 (Rev 1., June 2003)

Identification of Non-compliant UICs

Underground Injection Control (UIC) program staff identifies and verifies non-compliant UIC(s) and the need for corrective action

UIC Prioritization

UIC staff prioritize non-compliant UICs based on potential threats to groundwater quality

Initiation of Corrective Actions

UIC staff completes Corrective Action Request (CAR) form. CAR identifies non-compliant condition, the initial project objective(s), permit-required compliance date, and preliminary identification of general response action.

Ranking and Initial Scheduling of Corrective Actions

UIC staff develops initial project ranking and schedule. CAR submitted to UIC Corrective Action Review Team (CART) for review. CART will set target completion date to meet permit compliance schedule.

Corrective Action Funding

UIC staff and/or Engineering Services staff will obtain project funds, following BES processes. Corrective action projects utilizing structural/engineering controls will be funded following BES's Capital Improvement Project (CIP) process; nonstructural/institutional controls will be funded through the BES' operating fund.

Define Corrective Action Objectives

UIC and Engineering Services staff develop project-specific corrective action objectives.

Identify General Response Actions

UIC staff identifies and screens potentially applicable general response action(s) and/or applicable technologies to resolve the non-compliant condition.

Develop and Select Corrective Actions

UIC and Engineering Services staff develop a range of potential corrective action alternatives from list of potentially applicable general response actions.

UIC and/or Engineering Services staff recommend corrective action based on comparative analyses of alternatives meeting corrective action standards and decision criteria.

Select and Approve Corrective Action

CART reviews, selects, and approves recommended or most appropriate corrective action for design and construction.

Design and Implementation of Selected Corrective Actions

Engineering Services staff prepare and finalize design of approved corrective action alternative with structural/engineering technologies. BES Chief Engineer approves and stamps final engineered design.

Approved corrective action design for structural/engineering projects are implemented by Engineering Services in accordance with BES capital project implementation procedures.

UIC Program staff implement non-structural/institutional controls using existing BES and UIC Program plans, policies, and programs.

Performance Verification of Corrective Actions

BES demonstrates corrective action objectives are met through inspection and monitoring, as appropriate.

Data Management and Reporting

BES documents, tracks, and reports corrective actions.

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Corrective Action Plan Section

Sections 4.2 and 4.3

Section 4.4

Section 5.2

Section 5.3

Section 5.4

Section 6.2 Step 2

Section 6.2 Steps 3 & 4

Section 6.2 Step 4

Section 6.2 Step 5

Section 6.2 Step 6

Section 7.0

Section 8

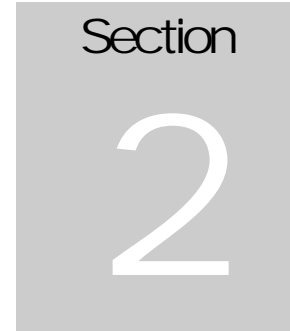
Section 9

Figure 1-1

UIC Corrective Action Step-by-Step Procedure

Figure 1 – Back

2 BES Staff Roles and Responsibilities



2.1 Introduction

This section describes the roles and responsibilities assigned to key BES staff who oversee or participate in implementing corrective actions for City UICs. These roles and responsibilities are clearly defined and communicated to ensure effective management of corrective actions.

The permit designates BES as the bureau responsible for implementing the permit and for identifying and managing the regulatory and technical components of the UIC Program citywide and across bureaus. BES has ultimate responsibility for meeting the permit conditions; overseeing the implementation of UIC management plans, programs, and procedures by other bureaus; and arranging the management, resources, and supervision required to meet regulatory requirements. The overall program responsibilities of BES and other bureaus will be further discussed in the UICMP (to be submitted to DEQ by December 1, 2006).

2.2 Corrective Action Review Team

BES has established a Corrective Action Review Team (CART) that comprises staff from the BES UIC Program, Engineering Services, Watershed Services, and other specialists as required, depending on the issue or project. CART members will have the appropriate knowledge and experience to review and approve corrective action alternatives and projects.

The goals of the CART are to:

- Ensure clear communication and interaction between the UIC Program and other parts of the bureau or City when implementing corrective actions.
- Streamline the corrective action processes.
- Optimize corrective action selection, design, and implementation.
- Maximize the efficiency of City resources.
- Ensure permit compliance.

The CART will be responsible for the following activities:

- Review and adjust the ranking of non-compliant UICs, as needed.
- Recommend Capital Improvement Program (CIP) funding priorities relative to UICs.
- Review and approve corrective action alternatives in accordance with the criteria and procedures defined in Section 6.
- Recommend and approve methods and strategies to verify effectiveness of corrective actions.

- Ensure corrective actions are completed in accordance with WPCF permit requirements and schedules.
- Recommend changes to BMPs to improve the City's UIC infrastructure and associated operations.

The CART will meet on an as-needed basis to review and rank non-compliant UICs, identify priorities for corrective actions, and select appropriate corrective actions.

2.3 Summary of Roles and Responsibilities

Table 2-1 summarizes the roles and responsibilities for the UIC corrective action program by staff position. Table 2-2 summarizes key components of the corrective action program and the corresponding staff members responsible for those components.

**Table 2-1
Roles and Responsibilities for UIC Corrective Actions**

Position Title	Area of Responsibility and Authority
Bureau Director	Approve UIC policy and program relative to bureau needs and direction. Provide citywide coordination and implementation of program elements. Ensure adequate program resources.
Watershed Services Group Manager	Approve UIC Program policies and plans. Assist Bureau Director and UIC Program Manager with citywide coordination and implementation of program elements. Allocate group resources to meet program goals and requirements.
Division Manager	Provide technical support and direction for UIC Program. Assist in development of UIC policy and program. Approve UIC plans and documents; ensure adequate resources are allocated to UIC Program. Participate on the UIC Corrective Action Review Team (CART) as required.
UIC Program Manager	Develop, recommend, and oversee implementation of UIC Program, budget, and policies with assistance from the Division and Group Managers. Ensure UIC Program management and regulatory requirements are identified, implemented, and maintained in accordance with BES policy and the DEQ WPCF permit. Ensure that UIC Program personnel have the appropriate qualifications, knowledge, and experience. Report to BES management on the performance of the UIC Program. Liaison with DEQ and other interested parties regarding the UIC Program. Provide citywide coordination of UIC Program requirements. Review and approve UIC plans and documents; ensure adequate resources are allocated to the UIC Program. Participate on the CART as required.
UIC Hydrogeologist	Develop and implement policies, procedures, and actions to meet permit and protect groundwater. Coordinate and communicate UIC Program and WPCF permit needs (stormwater event sampling, source investigations, or response actions) with applicable BES UIC personnel. Conduct data evaluation; develop sampling and analysis plans for decommissioning and corrective actions and preparation of Annual UICMP Reports. Participate on the CART as required.
UIC Corrective Action Plan Project Manager	Develop UIC corrective action priorities, strategies, procedures, and plans. Develop scope, schedule, and budget for UIC corrective action projects. Prepare Project Request Forms and information to secure CIP funding for UIC corrective action projects. Develop UIC decommissioning process and procedures. Assist in acquisition of required CIP project funding for UIC corrective actions. Assist in the preparation of annual reports and plans as required. Assist with UIC Program budget needs.
UIC Systemwide Assessment Project Manager	Implement UIC Systemwide Assessment process and UIC Registration Database. Prepare annual reports and plans as required. Assist in the preparation of corrective action strategies and priorities. Assist hydrogeologist with the development of sampling and analysis plans for UICs and corrective action requirements.
Watershed Services and Sustainable Stormwater Staff	Assist UIC Program staff with development of appropriate corrective action alternatives, strategies, and technologies for non-compliant UICs. Participate on the CART as required to review corrective action alternatives.
Corrective Action Review Team (CART)	Review and adjust the ranking of non-compliant UICs, as needed. Review and approve corrective action alternatives in accordance with the criteria and procedures defined in Section 6.0. Recommend and approve corrective action verification methods and strategies. Recommend changes to BMPs to improve the City's UIC infrastructure and associated operations. Ensure corrective actions are completed in accordance with WPCF permit requirements and schedules.
BES Engineering Services	Participate on the CART as required for evaluation and selection of UIC BMPs and corrective action technologies. Develop predesign and design for the selected corrective action alternatives. Prepare the scope, schedule, and budget for corrective action CIP projects as required. Work with the UIC CAP Project Manager to implement corrective actions.

**Table 2-2
Key Components and Staff Responsibilities
for UIC Corrective Action Program**

Key Component	Staff Responsibility
Approve UIC policy and programs relative to bureau policy needs and direction. Provide citywide coordination and implementation of program elements.	Bureau Director Watershed Services Group Manager Division Manager UIC Program Manager City Attorney as required
Ensure that adequate resources are available for development, implementation, and maintenance of UIC corrective actions.	Bureau Director Watershed Services Group Manager Division Manager UIC Program Manager
Assist in the development of UIC policy and program. Provide technical support and direction for the UIC Program.	Division Manager
Ensure that all UIC permit and legislative requirements are met.	UIC Program Manager
Ensure that personnel responsible for identifying non-compliant UICs and implementing corrective actions have the appropriate qualifications, knowledge, and experience.	UIC Program Manager
Ensure that good public relations are maintained with DEQ, the community, and interested stakeholders.	All BES Staff
Identify and prioritize corrective actions.	UIC Program Staff
Initiate corrective actions.	UIC Program Staff
Fill out and submit Corrective Action Request (CAR) forms.	UIC Program Staff
Rank and prepare initial schedule of corrective actions.	UIC Program Staff prepare initial ranking. CART reviews and adjusts ranking.
Select and recommend general response actions.	UIC Program Staff and Manager CART
Request funding (BES Project Request Forms) for corrective actions.	UIC Program Staff
Provide funding for corrective actions.	BES Capital Improvement Program (CIP) Project Team
Develop objectives and performance indicators for corrective action projects.	UIC Program Staff Engineering Services/Design Engineer CART
Develop and evaluate structural and nonstructural corrective action alternatives.	Engineering Services/Design Engineer Engineering Services/System Analyses CART UIC Program Staff
Review and approve corrective action alternatives.	CART
Prepare formal design of corrective actions.	Engineering Services/Design Engineer
Approve final design of corrective actions.	BES Chief Engineer

Table 2-2 (continued)

Key Component	Staff Responsibility
Implement corrective actions.	Engineering Services/Design Engineer, in accordance with Engineering Services CIP project implementation procedures
Verify and evaluate corrective actions.	Engineering Services/Design Engineer UIC Program Staff
Prepare closeout report for corrective actions.	Engineering Services/Design Engineer UIC Program Staff
Document and track corrective actions.	Engineering Services/Design Engineer UIC Program Staff
Prepare UIC plans and reports.	UIC Program Staff Engineering Services

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3 Goals and Objectives

3.1 Introduction

The mission of the Bureau of Environmental Services is to:

- Protect the quality of surface and groundwater and conduct activities that promote healthy ecosystems in our watersheds, and
- Provide sewage and stormwater collection and treatment services to accommodate Portland's current and future needs.

For many areas located east of the Willamette River, UICs are the only form of stormwater disposal available. UICs are also an essential element of a comprehensive watershed strategy to use stormwater as a resource by infiltrating it back into the ground. This section discusses the role the CAP will play in ensuring that UICs continue to play an integral role in carrying out the bureau's mission.

3.2 CAP Goals

The CAP presents a process for making corrective action decisions for known non-compliant UICs. The primary goals of the CAP are to:

1. Ensure that non-compliant UICs are operated, modified, and/or decommissioned in a manner that brings them into compliance.
2. Ensure that City infrastructure is operated in a manner that protects groundwater quality for long-term use as a drinking water resource, and source of baseflow in area streams.
3. Emphasize solutions that will contribute to achieving watershed goals, objectives, and targets established in the Portland Watershed Management Plan (City of Portland, March 2006) and the 2004 City of Portland Framework for Integrated Management of Watershed Health (City of Portland, December 2005). The following watershed goals from those documents are directly supported by properly managed recharge of groundwater:

- **Hydrology:** *Move toward normative flow conditions to protect and improve watershed and stream health, channel functions, and public health and safety.*

UICs help mimic the natural hydrologic cycle by infiltrating stormwater from impervious areas back into the ground and providing recharge of summer base flow volumes in streams.

- **Physical Habitat:** *Protect, enhance, and restore aquatic and terrestrial habitat conditions to support key ecological functions and improved productivity, diversity, capacity, and distribution of native fish and wildlife populations and biological communities.*

UICs help prevent damage to riparian areas caused by increased stormwater discharges during rain events.

- **Water Quality:** *Protect and improve surface water and groundwater quality to protect public health and support native fish and wildlife populations and biological communities.*

Maximum allowable discharge limits (MADLs) for stormwater ensure that UICs are operated in a manner that is protective of groundwater quality. UICs also benefit surface water quality by treating stormwater prior to discharge and by providing cool base flow to surface waters in the summer months.

- **Biological Communities:** *Protect, enhance, manage and restore native aquatic and terrestrial species and biological communities to improve and maintain biodiversity in Portland's watersheds.*

UICs contribute to healthy biological communities by helping restore a more natural hydrologic cycle, providing cool base flow in the summer months, reducing damage to physical habitat created by peak stormwater flows, and controlling and treating pollutants carried in stormwater before it is discharged to the ground.

3.3 CAP Objectives

The overall objective of the CAP process is to implement corrective actions to bring non-compliant UICs into conformance with the permit requirements and to protect the beneficial uses of groundwater. Additionally, the approach outlined in this CAP will improve the overall health of the watershed. Specifically, corrective actions will be selected and designed to satisfy the following objectives:

- 1. Protect groundwater as a drinking water resource by ensuring that stormwater meets the MADLs established in Table 1 of the permit.**

The most efficient and straightforward way to ensure that UICs will not damage groundwater over time is to meet the MADLs established in the permit. DEQ and the City have determined the MADLs to be appropriate for groundwater protection until it is demonstrated that groundwater or watershed health would be better served by different standards. Compliance with MADLs is based on a statistically valid compliance monitoring program outlined in the Stormwater Discharge Monitoring Plan (City of Portland, February 2006). ([LINK](#)) The UIC Management Plan (UICMP) and the CAP will be used to determine an appropriate course of action to evaluate and correct UICs that do not meet MADLs.

- 2. Protect groundwater quality by ensuring that UICs have adequate separation distance between the bottom of the UIC and groundwater.**

The WPCF permit requires adequate separation distance as the primary mechanism to remove bacteria from stormwater before it reaches groundwater. The permit requires all UICs five feet deep or less to have a minimum separation distance of five feet.

UICs five feet deep or greater must have a minimum separation distance of 10 feet. The Systemwide Assessment process (City of Portland, July 2006) will identify UICs in areas of high groundwater that may have inadequate separation distance. The UICMP and the CAP will be used to determine an appropriate course of action to evaluate and correct UICs with inadequate separation distance.

3. Select corrective actions that are cost effective, practicable, and represent the “highest and best” solution available to resolve a non-compliance.

The permit requires the use of highest and best solutions to prevent the movement of pollutants to groundwater, in accordance with OAR 340-040-0020(11). The determination of the highest and best solution considers available technologies, cost effectiveness, site characteristics, pollutant toxicity and persistence, and state and federal regulations. The evaluation criteria established in the CAP (see Section 6.6) are designed to result in the selection of highest and best method to remedy a non-compliant UIC.

In addition, the City’s Stormwater Management Manual (City of Portland, September 2004) establishes a hierarchy for the design of appropriate stormwater management and disposal methods. This hierarchy emphasizes vegetated, multi-objective stormwater management techniques. DEQ has approved application of the stormwater hierarchy and the Stormwater Management Manual as one of the primary tools to design stormwater facilities in a way that meets the intent of Oregon’s Groundwater Protection Rules for highest and best. Corrective actions implemented through the CAP will be designed in accordance with the current version of the Stormwater Management Manual.

4. Select corrective actions that have multiple watershed benefits.

The evaluation criteria established in Section 6.2 of the CAP are designed to result in stormwater management solutions that provide multiple watershed benefits. In addition, corrective actions implemented through the CAP will be designed in accordance with the current version of the City’s Stormwater Management Manual and hierarchy, which emphasize vegetated, multi-objective stormwater management techniques.

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4 Identification and Prioritization of Non-Compliant UICs

4.1 Introduction

This section describes the process BES will use to identify and prioritize UICs that are non-compliant (Category 2 through 4) and require corrective action. These activities will occur as part of other UIC Program elements, including the Systemwide Assessment, stormwater discharge monitoring, and the UICMP.

4.2 Data Sources for Identification of Potentially Non-Compliant UICs

Two UIC Program activities will provide the primary data needed to identify UICs that may be non-compliant with permit requirements: the Systemwide Assessment and stormwater discharge monitoring. These two methods of data collection will be undertaken during permit years 1 through 10 (June 1, 2005 through June 1, 2015).

4.2.1 UIC Systemwide Assessment

The purpose of the Systemwide Assessment ([LINK](#)) is to identify the spatial and physical characteristics of existing and new UICs and assess drainage to each UIC for potential impacts to groundwater. An initial comprehensive Systemwide Assessment will be submitted to DEQ on July 15, 2006, and will include lists of UICs with any of the following characteristics:

1. Receive drainage from motor vehicle maintenance floor drains, indoor parking facilities, and fire station bay drains.
2. Receive drainage from SARA Title III facilities.
3. Receive drainage from commercial/industrial properties that have site activities that may result in a violation of maximum allowable discharge limits (MADLs) in stormwater entering City-owned UICs.
4. Are in areas of high groundwater and potentially have inadequate separation distance between the bottom of the UIC and groundwater.
5. Are within 500 feet of a domestic or public supply well or within the 2-year time of travel of a delineated two-year time of travel for a public supply well.

The general procedures developed during the Systemwide Assessment will continue to be used throughout the permit period to investigate and characterize UICs.

4.2.2 Stormwater Discharge Monitoring

The Stormwater Discharge Monitoring Plan ([LINK](#)) describes procedures for monitoring the quality of stormwater discharged to UICs and analyzing the results. The monitoring results will be submitted to DEQ each July in the Stormwater Discharge Monitoring Report and summarized in the Annual UICMP Report. These reports will list UICs that exceed the MADLs during an individual storm event and UICs with an annual mean concentration, as defined by the permit, that exceeds a given MADL. UICs that exceed the MADL for two consecutive monitoring seasons will be identified as Category 4 non-compliant UICs through the compliance determination process (discussed in Section 4.3 of this CAP) and prioritized and ranked appropriately.

4.3 Compliance Determination

A compliance determination procedure, to be included in the UICMP, will establish criteria for determining UIC compliance status. A [UIC Compliance Determination Work Sheet \(LINK\)](#) will use these criteria, along with data collected during the Systemwide Assessment, stormwater discharge monitoring, and/or subsequent best available information, to evaluate and document UIC compliance status. The work sheet procedure will separate UICs into three categories:

1. **Compliant:** The UIC meets WPCF permit conditions.
2. **Non-Compliant:** The UIC is non-compliant, based on verified data.
3. **No Determination - Further Evaluation Required:** Additional data or evaluation is needed to make a conclusive determination about compliance status. In this case, the UIC will be evaluated through the Evaluation and Response process ([LINK](#)) defined in the UICMP ([LINK](#)).

In most cases, corrective actions will be initiated only for those UICs determined to be non-compliant, based on verified data (item number 2 above).

An initial list of Category 2 UICs will be submitted to DEQ in December 2006; a list of non-compliant UICs will then be included in the Annual UICMP Report submitted to DEQ in December of each permit year.

4.4 UIC Prioritization

UICs determined to be non-compliant will be prioritized to reflect their potential to adversely impact groundwater and to determine their initial priority for corrective action. The prioritization process will categorize UICs based on a systematic evaluation of each UIC's construction and environmental setting. The prioritization procedure is intended to provide a qualitative measure of the reasonable likelihood of a UIC to impact groundwater quality at levels that may adversely affect the highest beneficial use(s) of groundwater. The prioritization process is based on the DEQ Cleanup Program's site assessment priority system (<http://www.deq.state.or.us/wmc/cleanup/sa-fact.htm>).

The prioritization process will use data from the Systemwide Assessment, stormwater discharge monitoring, and other sources, including site inspections, regulatory databases, U.S. Geological Survey (USGS) and Oregon Department of Water Resource well logs, and professional knowledge and experience. It will result in a numeric score, which will be used to assign a low, medium, or high priority for corrective action to each non-compliant UIC.

The process and [Score Sheet for Prioritizing Public UICs](#) (LINK) will be included in the UICMP.

Results of the UIC prioritization will be used to:

- Identify initial priorities that will be considered in ranking non-compliant UICs for corrective action (see Section 5).
- Prioritize UICs that require further evaluation (as part of the Evaluation and Response process defined in the UICMP). ([LINK](#))
- Provide information needed to support Capital Improvement Program (CIP) funding (see Section 5).
- Help schedule UIC operations and maintenance activities.

The prioritization score sheets will be maintained in the BES UIC files, and the results will be reported to DEQ in the Annual UICMP Report each December of the permit term.

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5 Ranking, Scheduling, and Funding of Corrective Actions

5.1 Introduction

This section describes the process BES will use to initiate, rank, schedule, and fund corrective actions for non-compliant UICs. These steps occur after non-compliant UICs have been identified and prioritized based on potential adverse impacts to groundwater, as described in Section 4.

5.2 Initiation of Corrective Actions

After a UIC is determined to be non-compliant, UIC staff will initiate a corrective action by filling out the appropriate sections of a Corrective Action Request (CAR) form (see draft form in Appendix A). ([LINK](#)). The purpose of the CAR form² is to provide basic project information regarding the non-compliant UIC in order to formally initiate a corrective action project. As the project proceeds, additional sections of the CAR form will be filled out as more required information becomes available.

At this stage of a corrective action project, Section 1 of the CAR form is filled out.

The form will be used to:

- Initiate documentation and tracking of required corrective actions.
- Identify the permit-required compliance date and determine initial schedules to complete corrective actions.
- Inform the Corrective Action Review Team (CART) (see Section 2.2) of the non-compliant condition, likely cause of the non-compliance, permit compliance date, and preliminary corrective action objective(s).
- Prompt the CART to review and advise UIC Program staff on the initial ranking, initial scheduling, and funding priorities of the required corrective action.
- Notify BES Engineering Services and UIC Program staff of the need for corrective action at a given UIC for short- and long-term planning of staff and funding resources.

5.3 Ranking and Initial Scheduling of Corrective Actions

UIC Program staff and BES Engineering Services will rank and schedule corrective action projects for non-compliant UICs, based on the initial priority (see Section 4.4) and using a Ranking of Non-Compliant UICs form (see draft form in Appendix A). Ranking is an ongoing, dynamic process used to generate an ordered list of non-compliant UICs for the initiation and implementation of corrective actions. The process is iterative in order to allow the addition of newly identified non-compliant UIC systems, ensure permit compliance, and provide

² The CAR form may also be used to schedule, track, and document completion of corrective actions. The CAR forms will be maintained in the UIC Program files and will be available for review upon request.

5.4 Corrective Action Funding

After UIC corrective action projects are ranked and initial schedules are developed, UIC Program staff will review the projects to identify how the corrective actions will be funded and implemented. As projects are selected, they will be funded through either the CIP process (for structural corrective actions)³ or the UIC Program's approved annual and five-year operating budgeting process (for non-structural/institutional corrective actions), as summarized below.

5.4.1 Capital Improvement Project Funding

Corrective action projects that require structural design and construction will be directed to BES's Engineering Services Group and funded through the bureau's CIP program. The CIP program uses a multi-step process to identify, develop, review, score, and rank BES projects for funding and scheduling priority. This process will ensure that the core identified needs of the UIC Program and UIC corrective actions are funded and scheduled to meet permit requirements and consider the context of overall BES priorities. CIP projects are funded on an annual basis (July 1-June 30) and five-year forecast cycles.

The WPCF permit compliance schedule (Table 3 of the permit) is based on the City's CIP program fiscal year. It requires UIC corrective actions to be completed within three full CIP cycles after a UIC has been identified as non-compliant.

A BES stakeholder review team scores and ranks all CIP projects in accordance with CIP project criteria. In order for a recommended corrective action project to receive CIP funds, it must provide benefits under one or more of the CIP criteria⁴ described below. UIC corrective actions required because of non-compliant conditions easily meet several of these criteria.

1. Protection of the environment

All corrective actions must meet this criterion because the WPCF permit requires corrective actions to be protective of beneficial uses of groundwater—specifically as a drinking water resource—and protective of the environment.

2. Protection of existing capital investment and system reliability

UICs must be operated and maintained in compliance with the WPCF permit. If compliance cannot be attained within the period set by the permit, the non-compliant UIC must be decommissioned and an alternative stormwater management system constructed. Permit compliance is essential for protecting existing UIC capital investments and maintaining UIC system reliability.

³ Section 6.2, Step 3, describes structural and non-structural/institutional corrective actions.

⁴ City of Portland, BES, Engineering Services Group, Implementation Procedures for Capital Projects, 2003) ([LINK](#))

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³ Section 6.2, Step 3, describes structural and non-structural/institutional corrective actions.

⁴ City of Portland, BES, Engineering Services Group, Implementation Procedures for Capital Projects, 2003) ([LINK](#))

3. Regulatory or contractually driven improvements

UICs must meet the requirements and standards of the WPCF permit.

4. Improvements that enhance the environment

All corrective actions must meet this criterion. The WPCF permit requires corrective actions to be protective of beneficial uses of groundwater and protective of the environment. In addition, the permit and the CAP advance City goals and objectives for improvement of watershed health.

5. Improvements that accommodate growth and economic development

Permit compliance and continued UIC operation are essential to the continued growth and economic development of east Portland, where most of the existing UICs are located and an alternative stormwater management system does not exist.

6. Improvements that reduce long-term bureau costs

Corrective actions will be selected considering capital costs and long-term operations and maintenance costs.

CIP funding also considers project added value, such as good neighbor projects, significant desire of City Council to undertake a project, projects that meet special needs of a segment of the City's population due to environmental equity conditions, and projects that are funded partially or significantly from grants or other funding sources through partnering agreements with citizens, businesses, and/or other agencies and jurisdictions.

5.4.2 UIC Program Operating Budget

Institutional or non-structural corrective actions and preventative actions will be funded and implemented through the UIC Program operating budget and other City or bureau operating budgets. Criteria similar to those of the CIP are used to evaluate and program the expenditure of operating funds for the coming five-year period.

5.4.3 Prioritization of Project Funds

The CART will meet at least annually in spring or summer to discuss UIC corrective action requirements and funding priorities. The ranked UIC list, initial project schedules, and CAR forms will be used to complete CIP Project Request Forms and to document the need for CIP funds (for structural corrective actions) and obtain required operating funds (for institutional/non-structural corrective actions).

Structural projects that are funded through the CIP Process will move into the Engineering Services Group for pre-design, design, and construction. UIC Program staff or other appropriate City staff will initiate institutional/non-structural projects.

Updates on Corrective Action timelines will be provided to DEQ in the annual UICMP report. If significant rescheduling is required within the permit year, a list will be provided to DEQ to identify the revised project schedules and schedule extensions will be requested if appropriate.

6 Development and Selection of Corrective Actions

6.1 Introduction

This section outlines the process BES will use to identify general response actions for non-compliant UICs, screen corrective action technologies and BMPs, assemble and develop corrective action alternatives, and select appropriate corrective actions to resolve a non-compliant condition. This process is intended to address first those UICs with the highest likelihood of adversely impacting groundwater, based on the process described in section 4.4.

The process is designed to be flexible and to address both simple non-compliance issues (e.g., single UICs) and those that are more complex (e.g., regionally based corrective actions). The scope of developing and selecting corrective actions will reflect site-specific conditions and resolve the specific compliance problem. For example, for simple UICs it may be appropriate to evaluate a single BMP or corrective action technology, using BES staff's knowledge and professional judgment. For complex non-compliant UICs, it may be appropriate to evaluate several corrective action alternatives.

6.2 Process Steps

The steps for selecting a corrective action are described below.

Step 1: Review CAR Form and UIC Ranking Documentation

The Corrective Action Project Manager will review the following information to clarify the known non-compliant condition and likely cause of the condition:

- UIC Systemwide Assessment and UIC Registration Database information ([LINK](#))
- UIC stormwater monitoring data
- Facility maps
- UIC Compliance Determination Work Sheet ([LINK](#))
- Score Sheet for Prioritizing Public UICs ([LINK](#))
- Ranking of Non-Compliant UICs Worksheet ([LINK](#))
- UIC Corrective Action Request (CAR) form ([LINK](#))

Summary of Steps for Selecting a Corrective Action

- Step 1:** Review the CAR form and UIC ranking documentation.
- Step 2:** Define corrective action objectives.
- Step 3:** Identify general response actions.
- Step 4:** Assemble corrective action alternatives.
- Step 5:** Evaluate and compare corrective action alternatives relative to corrective action standards and decision criteria (Tables 6-2 and 6-3).
- Step 6:** Select and approve corrective action.

These steps are generally consistent with DEQ's *Final Guidance for Conducting Feasibility Studies* (DEQ, 1998); however, the process has been modified to fit the requirements of the WPCF permit.

If the specific cause or source of a stormwater quality (MADL) exceedance is unknown, BES will conduct an inspection or further investigation, including a review of appropriate databases and maps, to address data gaps. The Evaluation and Response process in the UICMP will describe the types of investigations that may be conducted to evaluate the source of the non-compliance. ([LINK](#))

Step 2: Define Corrective Action Objectives

Corrective action objectives (CAOs) will be developed for each project to address the specific non-compliant condition and to achieve the overall goals and objectives of the Corrective Action Plan (see Section 3). CAOs provide the framework for evaluating the effectiveness of corrective action alternatives and ensuring that permit requirements are met. They will also be used to define appropriate performance measures or key performance indicators to evaluate or demonstrate the effectiveness of individual corrective action projects (see Section 8.2). In addition, CAOs will help BES obtain CIP funds and meet BES watershed goals and objectives (see Section 3.2).

Example Language for Corrective Action Objectives

- Obtain adequate separation distance from the bottom of the UIC to estimated seasonal high groundwater.
- Eliminate use of the UIC in order to protect groundwater for beneficial use.
- Prevent migration of pollutants above MADLs into the UIC by controlling or eliminating the source of pollutants prior to discharge.
- Achieve permit MADLs by using pretreatment.

CAOs may be refined as more information becomes available during the corrective action selection process.

In summary, CAOs will:

- Be specific to the known non-compliance issue.
- Be developed to achieve permit compliance, ensure groundwater protection, and achieve the overall goals and objectives of the CAP.
- Be developed to meet CIP project funding requirements.
- Advance BES watershed priorities and goals.

Step 3: Identify General Response Actions

Once CAOs are defined, a general response action(s) will be selected from the five categories described below and shown on Table 6-1. A general response action(s) is a broad category of actions, which includes a range of strategies or technologies. The most appropriate general response action(s) will be selected based on the potential to satisfy the corrective action objectives and address the non-compliant condition. UIC Program staff will recommend the general response action when the corrective action process is initiated (see Section 5.2).

General Response Action Categories

- **Protectiveness Demonstration:** This category entails a demonstration that a non-compliant condition will not adversely affect groundwater and that “no further action” (NFA) is an appropriate corrective action response. A DEQ-approved risk assessment, fate and transport model, additional monitoring, or monitored natural attenuation⁵ may be used to demonstrate that the discharge of stormwater into the UIC does not result in adverse impacts to beneficial groundwater uses or watershed health.
- **Pretreatment:** Pretreatment measures include treatment facilities or other structural measures (berms, plugs, etc.) that remove pollutants from stormwater. Treatment facilities include a wide variety of stormwater technologies, including swales, planters, sedimentation manholes, or filtration-based technologies.
- **Increased Vertical Separation Distance of UIC to Estimated Seasonal High Groundwater:** Physically increasing the vertical separation distance between a UIC and seasonal high groundwater is a permanent structural control that can be accomplished by several actions, depending on the estimated separation distance. Increasing the separation distance will allow for adequate filtration of stormwater before mixing directly with groundwater. Separation can be accomplished by backfilling UICs to an appropriate depth with an approved filtration media (sand, charcoal, etc.) or a consolidated low strength fill material (CLFM) or slurry approved by DEQ. Other means of meeting adequate separation distance include replacing existing UICs with shallow sumps or horizontal UICs. Selection of an appropriate action will depend on site-specific and subsurface conditions.
- **Non-Structural and Institutional Controls:** Nonstructural controls include actions that prevent, reduce, or minimize pollutants entering stormwater. Examples include education and training, spill response, operations and maintenance, UIC cleaning, and street sweeping. Institutional controls are legal or administrative measures or actions that reduce the potential release of or exposure to pollutants. Examples include deed restrictions or revisions to City code, administrative rules, ordinances, and zoning.
- **UIC Decommissioning/Closure:** Decommissioning is defined as permanent closure of a UIC, rendering the facility non-functional and unable to act as a direct subsurface conduit for stormwater to surrounding soils or groundwater. ([LINK](#))

General response actions will be eliminated from further consideration if they:

- Are clearly not applicable
- Do not meet permit requirements or project objectives
- Are infeasible to implement given the type of non-compliance, pollutant, or site-specific conditions
- Are cost prohibitive

⁵ As described in Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, US EPA OSWER Directive 9200.4-17, November 1997

Step 4: Assemble Corrective Action Alternatives

After an appropriate category of general response actions is identified, a range of potential technologies that fall within the category (see Table 6-1) will be combined to develop corrective action alternatives.

Innovative stormwater treatment technologies will be considered, especially in situations where a limited number of corrective action technologies are applicable. Innovative corrective actions may require extra initial effort to gather information, analyze options, and adapt the technology to site-specific situations. However, they may be cost effective and have multiple benefits.

Technologies used to develop corrective action alternatives will be selected and designed based on information presented in, but not limited to, the following resources:

- The UICMP, which contains additional information on best management practices (BMPs), a BMP Effectiveness Monitoring Program ([LINK](#)), a UIC Operation and Maintenance (O&M) Plan ([LINK](#)), a Public Education and Training Plan ([LINK](#)), and other potential response actions that may be considered during development of corrective action alternatives.
- The City of Portland Stormwater Management Manual (City of Portland 2004). ([LINK](#))
- The Oregon ACWA Underground Injection Wells for Stormwater—Best Management Practices (Oregon Association of Clean Water Agencies 2003). ([LINK](#))

Step 5: Evaluate and Compare Corrective Action Alternatives

In this step, each corrective action alternative developed in Step 4 will be evaluated. If there is more than one alternative, a comparative analysis of the various alternatives will be performed.

Table 6-2 shows the corrective action standards that will be used to evaluate each of the corrective action alternatives being considered. The corrective action standards are:

- Meets WPCF permit compliance requirements
- Complies with any other local, state, and federal regulations and standards
- Advances BES watershed goals and objectives

An alternative must meet these three standards before being evaluated against the five corrective action decision criteria shown in Table 6-3. Each individual alternative that meets the corrective action standards will be evaluated relative to the following decision criteria:

- Cost
- Effectiveness
- Reliability, sustainability, and permanence
- Implementability

Comparing alternative(s) to the decision criteria will allow BES to select the alternative that best satisfies multiple objectives, while balancing cost and other factors.

Step 6: Select and Approve Corrective Action

Based on the evaluation and comparison described in Step 5, UIC Program staff will recommend a preferred corrective action to the CART for review and approval.

The corrective action recommendation will include a brief description and the supporting justification that is consistent with the project objectives and corrective action decision criteria. In general, preference will be given to the least costly alternative that is both reliable and meets project objectives, unless the additional cost of a more expensive alternative is justified by proportionately greater benefits to the environment.

Documentation of the corrective action selection will be maintained in BES files and will be available for review upon request. A summary of corrective action project status will be submitted to DEQ in the Annual UICMP Report in December of each permit year.

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Table 6-1 Potential General Response Actions and Corrective Action Technologies for Non-Compliant UICs

General Response	Corrective Action Technologies	Effectiveness ^c		Ease to Implement ^c	Relative Cost ^c		Comments
		MADL Exceeded	Separation Distance		Initial Cost	O and M	
Protectiveness Demonstration							
	Risk Assessment and Modeling	X	X	H	L	NA	Demonstrates no adverse impacts
	Additional Monitoring	X	X	H	L	NA	Demonstrates no adverse impacts
	Natural Attenuation	X	X	H	L	NA	Removes adverse impacts over time
Pretreatment							
	Sedimentation Manhole	X		H	M	M	Sedimentation, oil/water separation, debris removal
	Catch Basin/CB Inserts	X		H	L	M	
	Spill Control Manhole	X		H	NA	NA	Oil removal only—must be used in conjunction with other pollution reduction devices
	Porous Pavement	X	XX	M	H	M	Water filtration, increased groundwater infiltration, aerobic decomposition, adsorption
	Infiltration Planter	XX		H	L	M	Sedimentation, filtration, uptake/biological processes, debris removal
	Vegetated Swales	XX		M	L	M	Sedimentation, filtration, uptake/biological processes, debris removal
	Street Swales	XX		M	M	M	Sedimentation, filtration, uptake/biological processes, debris removal
	Vegetated Infiltration Basin	XX		M	M	M	Sedimentation, filtration, uptake/biological processes, debris removal
	Sand Filter	XX		M	H	H	Sedimentation, filtration, uptake/biological processes, debris removal
	Wet/Dry Detention Pond	XX		M	H	M	Sedimentation, filtration, uptake/biological processes, debris removal
	Divert or Separate	XX	XX	M	M/H	L	Bypasses and removes stormwater from facility, reduces pollutant load or concentration
	Storm Water Vaults	XX		M	M	M	Sedimentation, filtration, debris removal, specific pollutant removal dependent on filter medium
	Manufactured Technologies	XX		SD	M/H	M/H	
	Innovative Technologies	XX	X	SD	SD	SD	Depends on specific problem and corrective action required
Increased Separation Distance to Groundwater							
	Partial UIC backfill	XX	XX	H	L	L	Allows additional filtration and meets separation distance requirement
	Horizontal UIC	XX	XX	H	L	L	Allows additional filtration and meets separation distance requirement
	Shallow UIC	XX	XX	H	L	SD	Allows additional filtration and meets separation distance requirement
Institutional and Non-Structural Controls							
	O & M	X		M	L	L	Removes or manages pollution source, restores effectiveness of UIC or pretreatment system
	Source Evaluation and Control	XX		M/L	SD	SD	Removes or manages pollution source
	Education and Training ^b	XX		H	L	L	Reduces source of contaminants-instills BMPs
	Pollution Prevention	XX		M	L		Removes or manages pollution source, reduces source of contaminants-instills BMPs
	Land use restrictions	XX		L/M	L/H	NA	Reduces exposure pathways; reduces or manages pollution source
	Permit Modifications	XX	XX	M	L	NA	
	Policy and Regulations	XX		L/H	L/H	NA	Reduces exposure pathways; reduces or manages pollution source
Decommission/Close UIC							
	Decommission	XX	XX	H/M	L		Permanently removes potential impacts from UIC

XX The action or technology can likely be effective or prevent the noncompliance.

X The action or technology can potentially be effective or prevent the noncompliance—depending on design.

a Technologies selected from City of Portland Storm Water Management Manual and ACWA UIC BMP Manual (2004)

b UIC Program element or BMP (To be submitted as part of UICMP December 2006)

c ACWA Best Management Practices Manual for UICs January 2003

L=Low

M=Medium

H=High

NA=Not Applicable

SD=Site Dependent. Dependent on facility specific issues and site specific conditions

Table 6-2: Corrective Action Standards

For a corrective action alternative to be considered, it must meet the standards presented in this table to the extent applicable and practicable. Bullets under each standard are provided as guidance to help project managers determine if a specific alternative meets the standard. The standards are not necessarily in priority order.

Meets WPCF Permit Compliance Requirements

Resolves non-compliant permit condition: Demonstrates protectiveness; meets MADL criteria; meets separation distance; meets general permit requirements.

Protective of human health and the environment. Prevents exposure to a contaminated drinking water supply.

Complies with UIC rules (OAR 340-044).

Protects beneficial uses of groundwater (OAR 340-040) .

Uses "highest and best" technologies or practical methods {OAR 340-040-0020 (11)}.

Clearly meets general requirements of the WPCF permit.

Advances BES Watershed Goals and Objectives

Prevents, minimizes, and controls stormwater at the ground surface before it is discharged to the UIC.

Improves surface and groundwater hydrology by increasing infiltration and using vegetated solutions where applicable and appropriate.

Is consistent with the BES Stormwater Management Manual.

Complies with any other Local, State and Federal Regulations and Standards

: Meets City of Portland design and construction procedures, specifications and standards.

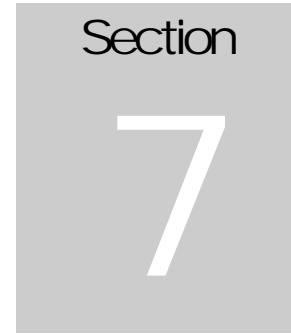
: Meets City of Portland code, policies and administrative rules.

: Complies with any other applicable local, state and federal regulatory requirements.

Table 6-3: Corrective Action Decision Criteria

The City will select the corrective action alternative that best meets the corrective action standards in Table 6-2 and balances cost and the other factors listed in this table. The decision criteria are provided as guidance to help Project Managers compare possible corrective action alternatives and select the alternative that provides the greatest benefit at the least cost. They are not necessarily in priority order.

Effectiveness	Reliability, Sustainability & Permanence	Cost
<p>Directly resolves UIC noncompliant condition. Reduces pollutant concentrations, mobility, and/or volume of discharge, if appropriate and applicable.(i.e., meets the MADL standard; meets separation distance to groundwater standard)</p>	<p>Provides reliable and permanent solution, as needed to ensure long-term effectiveness of the corrective action.</p>	<p>Total cost of alternative, including: design and construction (if needed), sampling and analysis, operations and maintenance, waste disposal (if required), permitting, site cleanup and restoration, monitoring and health and safety measures.</p>
<p>Reduces length of time required to resolve noncompliance and achieve permit compliance .</p>	<p>Reduces requirements (e.g, frequency and complexity) for long-term maintenance or monitoring to the extent practicable.</p>	<p>Reduces potential cost uncertainty and mitigates future cost risk.</p>
<p>Meets or exceeds project specific short-term and long-term corrective action objectives.</p>	<p>Reduces long-term demand on city resources (e.g., staff and equipment) to meet long-term O&M requirements.</p>	<p>Minimizes total present cost worth.</p>
	<p>Contains flexibility and reliability to deal with uncontrollable changes at the site (e.g., heavy rain storms, spills, etc) to the extent practicable.</p>	<p>Minimizes future maintenance obligations.</p>
Implementability	Stakeholder Input	
<p>Technology is readily available and proven for the specific application and noncompliant condition of UIC.</p>	<p>Considers issues and/or concerns that other bureaus, DEQ, or the community may have regarding the corrective action alternatives.</p>	
<p>Actions or technology can be constructed and/or implemented given the existing non-compliant condition and site-specific conditions.</p>	<p>Coordinates with other City projects and supports other bureaus or agencies goals.</p>	
<p>Uses known construction methods that are reliable and/or easy to implement (e.g., necessary equipment and specialists are available).</p>		
<p>Action can be implemented immediately (e.g., ability to obtain permits, right-of-way access, etc).</p>		
<p>Protects residents and workers during construction and minimizes impacts to the environment during construction.</p>		



7 Design and Implementation of Selected Corrective Actions

7.1 Introduction

This section describes the existing BES procedures that will be used to design and implement corrective actions. After the CART has selected and approved a corrective action project (Section 6.2, Step 6), the project ranking and scheduling information will be updated as needed.

Design and implementation schedules will be generated during this stage of the corrective action process. Implementation of all corrective actions will be directly tied to the permit compliance schedules and the CIP funding cycle.

All corrective action projects will be tracked, documented, and reported in the Annual UICMP Report, including schedules and design and implementation information.

7.2 Non-Structural/Institutional Corrective Actions

Corrective actions that rely on non-structural or institutional controls will be implemented using existing BES and UIC Program plans, policies, and programs. These corrective actions may include public education and training, land use restrictions, code or policy change, and other strategies and BMPs. The process for implementing these actions will vary, depending upon the action required.

7.3 Structural Corrective Actions

Corrective actions that require structural or engineering controls will be designed and implemented by BES's Engineering Services Group. Engineering Services has developed detailed procedures that describe each phase associated with implementation of a capital project.⁶ These procedures include descriptions of:

- Engineering roles and responsibilities
- General requirements
- Project initiation and work plans
- Predesign
- Final design
- Contract procurement
- Construction

The Chief Engineer will approve final design activities. Final designs will be maintained in the Engineering Services Group files.

⁶ City of Portland, BES, Engineering Services Group, Implementation Procedures for Capital Projects, Rev. 1.0, Adopted June 30, 2003

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8 Performance Verification of Corrective Actions

8.1 Introduction

BES has an established UIC Program and specific procedures to routinely monitor and measure UIC operations and performance. These include:

- City of Portland Stormwater Discharge Monitoring Plan (February 2006) ([LINK](#))
- Sampling and Analysis Plan (February 2006) ([LINK](#))
- Quality Assurance Project Plan (February 2006) ([LINK](#))
- BMP Monitoring Program (due December 2006) ([LINK](#))
- City of Portland Source Control Program ([LINK](#))

The UIC Program and stormwater discharge monitoring activities will collect information to document that UICs are constructed, operated, and maintained in accordance with the WPCF permit.

8.2 Performance Evaluation

Following completion of a corrective action, a performance evaluation will be conducted to demonstrate that the corrective action adequately resolves the non-compliant condition.

Corrective action objectives (see Section 6.2, Step 2) will be used to define appropriate performance measures or key performance indicators to evaluate and demonstrate the effectiveness of individual corrective action projects. These performance measures or indicators will be developed in more detail during design and implementation of the corrective action.

To the extent practicable, BES will use data gathered from the Stormwater Discharge Monitoring Plan and the BMP Monitoring Program as one element of the compliance demonstration for UICs where site-specific conditions are considered representative of the UIC system. However, some structural/engineering controls may require specific sampling and analyses to document their effectiveness or performance. If site-specific data are needed, the data will be collected and analyzed to the extent required, consistent with the BMP Monitoring Program ([LINK](#)) and the Stormwater Discharge Monitoring Plan

Corrective actions that involve non-structural/institutional controls will be evaluated by documenting compliance with specific corrective action goals, objectives, or requirements. The type of performance demonstration will depend on the specific corrective action that is implemented. Examples of how performance may be documented and assessed include, but are not limited to:

- Documenting that a pollutant source has been terminated.

- Documenting the content of and number of attendees at public education events.
- Collecting feedback on the effectiveness of education or training (e.g., through surveys).
- Providing copies of public outreach materials.
- Documenting the content of in-house City training, the number of people trained, the learning objectives, etc.
- Providing copies of applicable land use restrictions, code, or policy changes.

Performance data and/or sampling results collected to demonstrate the effectiveness of a corrective action will be reported to DEQ in the Annual UICMP Report submitted in December of each year.

Performance data, records, and reports will be maintained in the UIC Program files and will be available for review upon request.

9 Data Management and Reporting

9.1 Introduction

BES is responsible for ensuring that corrective action decisions are in compliance with the WPCF permit and are properly documented, tracked, and reported.

9.2 Data Management

BES has established data management, validation, and storage procedures that are presented in the Quality Assurance Project Plan (City of Portland, February 2006). These procedures will be followed for corrective action records and files, as applicable. The UIC records will be stored and maintained so they are readily retrievable to demonstrate conformance with WPCF permit requirements. The following types of records or files may be maintained specifically for the corrective action program:

- UIC Compliance Determination Work Sheets
- Score Sheets for Prioritizing Public UICs
- Corrective Action Request forms
- Ranking of Non-Compliant UICs forms
- Corrective action selection documentation
- Corrective action designs
- Budget information (e.g., CIP forms, contracts, invoices)
- UIC education and training records
- UIC inspections and audits
- Response action data (e.g., requested operations and maintenance activities)
- Monitoring data (sampling records and analytical results)
- Details of corrective actions

These records or files will be available for review upon request.

9.3 UIC Corrective Action Completion Report

Upon completion of a corrective action, BES staff will prepare a UIC corrective action project completion report. The report will include the following information, as appropriate:

- Summary of the UIC non-compliant condition.
- Summary of the development, screening, and selection of the final corrective action.
- Description of the corrective action⁷ taken to ensure the UIC compliance. (Applicable design documents or as-built drawings will be included.)
- Data and information relevant to demonstrating the effectiveness of the corrective action, as applicable.
- Documentation demonstrating implementation of non-structural actions.
- Diagram and photograph of the UIC system or area.
- Pertinent documentation of the UIC (maps, photographs, waste disposal permits if required, transportation manifests, analytical data, etc.).
- Basis for determination that a given corrective action is protective and in compliance with permit conditions.

Corrective action completion reports will be maintained in BES files in accordance with the permit requirements. These documents will be available for review upon request.

9.4 Annual Reporting

BES will prepare, maintain, and annually update a table that summarizes the status of corrective actions. The types of information that may be provided include, but are not limited to:

- UIC node number
- Street address
- Non-compliance category (1 through 4)
- Date of non-compliance determination
- Permit-required compliance date
- Description of non-compliance
- UIC priority

⁷ If the UIC was decommissioned for the corrective action, see the City of Portland Decommissioning Procedure for UICs ([LINK](#)) for any additional requirements.

- Scope of corrective action
- Project phase (e.g., selection, design, implementation, completion)
- Corrective action completion date
- Other remarks or outstanding issues (e.g., monitoring, maintenance, institutional controls)

Corrective action tracking tables will be maintained in BES files for a period of at least 10 years and will be available for review upon request. BES will provide corrective action documentation and tracking information to DEQ in the Annual UICMP Report due each December of the permit period.

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References

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- City of Portland, Oregon, Bureau of Environmental Services. *Annual UICMP Report*. To be submitted to Oregon Department of Environmental Quality in December of each permit year.
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- City of Portland, Oregon, Bureau of Environmental Services. *UIC Registration Database*. Submitted to Oregon Department of Environmental Quality, September 1, 2005.
- City of Portland, Oregon, Bureau of Environmental Services. *Underground Injection Control Management Plan (UICMP)*. (Includes *Operations and Maintenance Plan; Best Management Practices Monitoring Program; Employee Training and Public Education Plan; Spill Prevention and Pollution Control Plan*.) To be submitted to Oregon Department of Environmental Quality by December 1, 2006).

City of Portland, Oregon, Bureau of Environmental Services, Engineering Services Group. *Implementation Procedures for Capital Projects*. 2003.

Code of Federal Regulations (CFR). *Title 40: Protection of Environment, Parts 144-148*.

Oregon Administrative Rules (OAR). *Chapter 340, Division 44: Construction and Use of Waste Disposal Wells or Other Underground Injection Activities (Underground Injection Control)*.

Oregon Association of Clean Water Agencies. *Underground Injection Wells for Stormwater—Best Management Practices Manual*. January 2003.

Oregon Department of Environmental Quality, *Waste Management and Cleanup Division*. *Final Guidance for Conducting Feasibility Studies*. July 1, 1998.

Oregon Department of Environmental Quality. *Water Pollution Control Facilities Permit for Class V Stormwater Underground Injection Control Systems*. DEQ Permit Number 102830, issued to the City of Portland, Oregon. June 1, 2005.

Oregon Department of Environmental Quality Approval to submit Category 2 UICs December 1, 2006. *Response to BES letter dated June 2, 2006, Schedule Classification, Underground Injection Control System, City of Portland WPCF Permit No. 102830—June 20, 2006*

U.S. Environmental Protection Agency. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*. US EPA OSWER Directive 9200.4-17. November 1997.

Appendix A: Forms

- UIC Corrective Action Request Form
- Ranking of Non-Compliant UICs

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Ranking of Non-compliant UICs

UIC Node	UIC Address	Compliance Issue	Prioritization Score ^a	Assigned Priority ^a	Priority Ranking Factor	Implementability of Corrective Action	Implementability Ranking Factor	Estimated Cost	Cost Ranking Factor	Initial Permit Compliance Deadline	Schedule Ranking Factor	Ranking Weighting Factor ^b	Comments	Total Ranking Factor Score ^c	Rank

^a Numeric prioritization score from *Scoresheet for Prioritizing Public UICs* (See *Guidance for Worksheet for Prioritizing Public Underground Injection Control Systems*)

^b Use the Ranking Weighting factor to adjust the overall rank of a project or to modify the value of an individual ranking factor. The use of this factor is subjective and the basis for its use should be documented in the Comments column. The use of this factor should be based on the best professional judgement of the UIC program staff and approved by the Corrective Action Review Team.

^c Total Ranking Factor Score = Priority Ranking Factor + Complexity Ranking Factor + Cost Ranking Factor + Schedule Ranking Factor + Ranking Weighting Factor

Compliance Issue

- NC1 Within 500 feet of a domestic or irrigation well and exceeds MADL
- NC2 Within 500 feet of a public water and does not have a groundwater time-of-travel (TOT) delineation and exceeds MAI
- NC3 Within 2-year TOT delineated for a public water well and exceeds MADL
- NC4 Exceeds MADL at the end-of-pipe discharge point into the public UIC
- NC5 Insufficient separation distance between the bottom of the injection well and groundwater
- NC6 Constructed into groundwater
- NC7 Does not meet permit conditions

Assigned Priority

- High
- Medium
- Low

Priority Ranking Factor

- 3
- 2
- 1

Definition (Select most applicable factor from defined list, use the Ranking Weighting Factor to adjust the score if needed)

See GUIDANCE WORKSHEET FOR PRIORITIZING PUBLIC UNDERGROUND INJECTION CONTROL SYSTEMS (UICs)

Implementability of Corrective Action

- Simple
- Moderate
- Complex

Complexity Ranking Factor

- 3
- 2
- 1

Readily implementable / limited engineering design / standard construction
 Moderate constructability / engineering design / standard construction
 Difficult to construct / conflicts with other projects or priorities / specialized contracting

Estimated Cost

- Low
- Moderate
- High

Cost Ranking Factor

- 3
- 2
- 1

Low capital costs (e.g. construction, equipment) and indirect capital costs (e.g., engineering, permitting)
 Moderate capital costs (e.g. construction, equipment) and indirect capital costs (e.g., engineering, permitting)
 High capital costs (e.g. construction, equipment) and indirect capital costs (e.g., engineering, permitting)

Permit Compliance Deadline

- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014

Schedule Ranking Factor

- 4
- 3
- 2
- 1
- 0
- 0
- 0
- 0

Corrective action must be completed by July 15, 2007
 Corrective action must be completed by July 15, 2008
 Corrective action must be completed by July 15, 2009
 Corrective action must be completed by July 15, 2010
 Corrective action must be completed by July 15, 2011
 Corrective action must be completed by July 15, 2012
 Corrective action must be completed by July 15, 2013
 Corrective action must be completed by July 15, 2014

Ranking Weighting Factor^b

- 10
- x
- 1
- 0
- 1
- x
- 10

Examples (provide basis in comment column)

Project accelerated based on groundwater threat or stormwater improvements (mitigate local flooding) or project opportunity, etc.
 Provide basis for "x" value in comment field
 Ranking factor adjustment
 No adjustment necessary
 Ranking factor adjustment
 Provide basis for "- x" value in comment field
 Project delayed due to planned or ongoing "protectiveness demonstration" or project will completed in conjunction with planned BES Capital project or project will be grouped with similar projects and completed, etc.

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RANK _____

DRAFT: UIC CORRECTIVE ACTION REQUEST FORM

(**Requirement** of the DEQ UIC Water Pollution Control Facility (WPCF) Permit No. 102830 and UIC Corrective Action Plan July 2006)

SECTION 1 A. Location and Description of UIC(s): (Provide map and additional information if required)	
UIC BES Node No(s): _____	
Date of Request: _____ Bureau: _____ Responsible Person: _____	UIC Priority: Priority: High__ Medium__ Low__ UIC Category: (1, 2, 3 or 4) _____
B. Description of Non-compliance and the Likely Cause: (Attach additional information if required)	C. Objectives of this Corrective Action Project (Attach additional information if required):
Applicable Schedule/Section of DEQ Permit: _____ NC Code: e.g. Separation Distance, MADL Exceedance, etc	Objectives to be Measured by: _____
SECTION 2 D. Recommended Corrective or Preventative Action to Resolve Non-conformance.	
Responsible Person(s) to Implement Corrective Action: _____	
E. Estimated Cost of Corrective Action	
F. Required Date of Completion (see DEQ Permit Schedule C--Table C):	
a) Required Permit Completion Date: _____ b) Project Start Date: _____ c) Project Completion Date: _____ (Attach schedule if required): _____	

<p>G. Circle the CIP Criteria(s) the Project Meets (Attach paperwork if more space is required).</p> <ul style="list-style-type: none"> a) Protection of human health and the environment b) Protection of existing capital investment/system reliability c) Regulatory or contractually driven improvement d) Improvement that enhances the environment e) Improvement that accommodates growth and economic development f) Improvement that reduces long-term bureau costs g) Added value—describe in writing 	
<p>H. Approved Plan or Regulatory Requirement Identifying the Need for this Project</p>	
<p><u>SECTION 3</u> I. Corrective Action Request Form Reviewed by:</p> <p>Date of Review:</p>	
<p>J. City/BES Procedures, Plans, or Work Methods Required to be Modified:</p>	
<p>K. Corrective Action Closeout or Verification</p> <p>Date:</p> <p>Approved by:</p> <p>Signed:</p> <p>Date:</p>	<p>Comments:</p>

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