

Final Draft
Contingency Plan

Reduction, Coagulation, Filtration Chromium(VI) Removal Demonstration Facility

City of Glendale, California

**Contract Number
City of Glendale Line Nos.
AECOM Project No. 114116.01**

Submitted to:
City of Glendale
141 N Glendale Avenue
Glendale, CA 91206

Submitted by:

AECOM

300 Oceangate, Suite 700
Long Beach, California, 90802
(562) 951-2000

October 2009

CONTENTS

Acronyms and Abbreviations	v
1. Introduction	1
2. Background	1
3. Response Procedures	7
3.1 Process Failure	7
3.1.1 Triggering Events	7
3.1.2 Response	8
3.2 Damage Caused by External Forces (Fire, Earthquake, or Vandalism)	8
3.2.1 Triggering Events	8
3.2.2 Response	9
3.3 Chemical Release	9
3.3.1 Triggering Event	9
3.3.2 Response	9
3.4 Emergency Contacts	10
3.4.1 City of Glendale Personnel	10
3.4.2 Emergency Response Contacts	10
3.5 Reporting Requirements	10
4. Corrective Action/Operational Restoration	11
5. Preventive Action/Follow-up	11
6. Plan Updates and Annual Training	12
7. Definition of the Closure Point	12
8. Facility And Emergency Contact Information	13
9. References	17
Figures	
Figure 1: RCF Treatment System Process Flow Diagram	3
Figure 2: Treatment System Layout	5
Figure 3: Hospital Route Map from RCF Facility to Glendale Memorial Hospital	15
Tables	
Table 1: Categories of Triggering Events	7
Table 2: Facility and Emergency Contact Information	13

ACRONYMS AND ABBREVIATIONS

µg/L	microgram per liter
1,2,3-TCP	trichloropropane
CDPH	California Department of Public Health
City	City of Glendale, Water and Power
Cr	chromium
Cr(III)	trivalent chromium
Cr(VI)	hexavalent chromium
EMT	Emergency Medical Technician
Fe	iron
LARWQCB	Los Angeles Regional Water Quality Control Board
MCL	maximum contaminant level
mg/L	milligram per liter
O&M	operation and maintenance
PCE	perchloroethylene (tetra chloroethylene)
PLC	programmable logic controller
ppb	part per billion
ppm	part per million
RCF	Reduction, Coagulation, Filtration Chromium(VI) Removal Demonstration
SCADA	supervisory control and data acquisition
TCE	trichloroethylene

1. INTRODUCTION

This contingency plan describes the appropriate actions for emergency response, crisis mitigation, and restoration of operation following a treatment system failure at the Reduction, Coagulation, Filtration (RCF) Chromium (VI) Removal Demonstration (CRD) Facility (RCF) (the Site). Response procedures are outlined for various potential triggering events to ensure that the appropriate actions for emergency response and crisis mitigation will be implemented quickly. The objectives are to minimize impacts to human health and the environment, and to prevent damage to the system.

This contingency plan includes emergency response procedures to triggering events, a guide for corrective action and operational restoration, preventive action and follow-up plans, a plan for updates and annual training, and event closure. Additional information can be found in the health and safety plan (AECOM 2009a) and operation and maintenance manual (AECOM 2009b).

This contingency plan applies solely to the immediate battery limits of the RCF Facility and does not apply or include transmission pipelines into or out of the plant or the Glendale Water Treatment Plant.

2. BACKGROUND

The City of Glendale's groundwater supply in the San Fernando Valley has been contaminated with a wide variety of chemicals, including hexavalent chromium [Cr(VI)], trichloroethylene (TCE), perchloroethylene (PCE), 1,2,3-trichloropropane (1,2,3-TCP).

In Glendale and other cities such as Los Angeles and Burbank in the San Fernando Valley, public concern about Cr(VI) in the groundwater supply led the city to embark on a multi-phase study to identify and install Cr(VI) treatment in anticipation of a Cr(VI) MCL lower than the current total Cr MCL in California.

The Phase III Demonstration-scale study will finalize the treatment evaluation, residuals assessment, and cost estimate development through the implementation of two, Cr(VI)-removal technologies. For the demonstration facilities, the City selected the construction of the demonstration RCF Facility to treat water from Well GS-3 at a design capacity of 425 gpm and a 100-gpm, reduction with ferrous sulfate, coagulation, and filtration system adjacent to the existing Glendale Water Treatment Plant. Figure 1 shows a schematic of the RCF treatment process. A site layout is shown on Figure 2.

In the RCF process, Cr(VI) is first reduced to trivalent chromium [Cr(III)] with the addition of excess ferrous iron (Fe^{+2}), which is oxidized to ferric iron (Fe^{+3}) by the electron transfer during the reduction of Cr(VI) and by dissolved oxygen present in the water. Ferrous iron doses found to be acceptable in Phase II testing ranged from 1.5 to 2.5 mg/L for reducing 100 $\mu\text{g/L}$ of Cr(VI) to less than 5 $\mu\text{g/L}$. Cr(III) either precipitates, forms a co-precipitate with the ferric iron, or adsorbs onto the ferric floc. The ferric iron/Cr(III) particles form larger flocs during the aeration and coagulation (with the use of a polymer) stages. Particles are then removed by filtration through two, dual-media filters arranged in parallel for alternate operation. A backwash system is used to periodically send water upflow through the dual-media filter not in use to clean the filter media and remove the floc particles.

The purpose of this project is to demonstrate the effectiveness of the RCF process in removing Cr(VI) to low part-per-billion levels. The system will be operated for one year under the Proposition 50 grant and other available grants. Treated water will be put to beneficial use by serving Glendale's consumers.

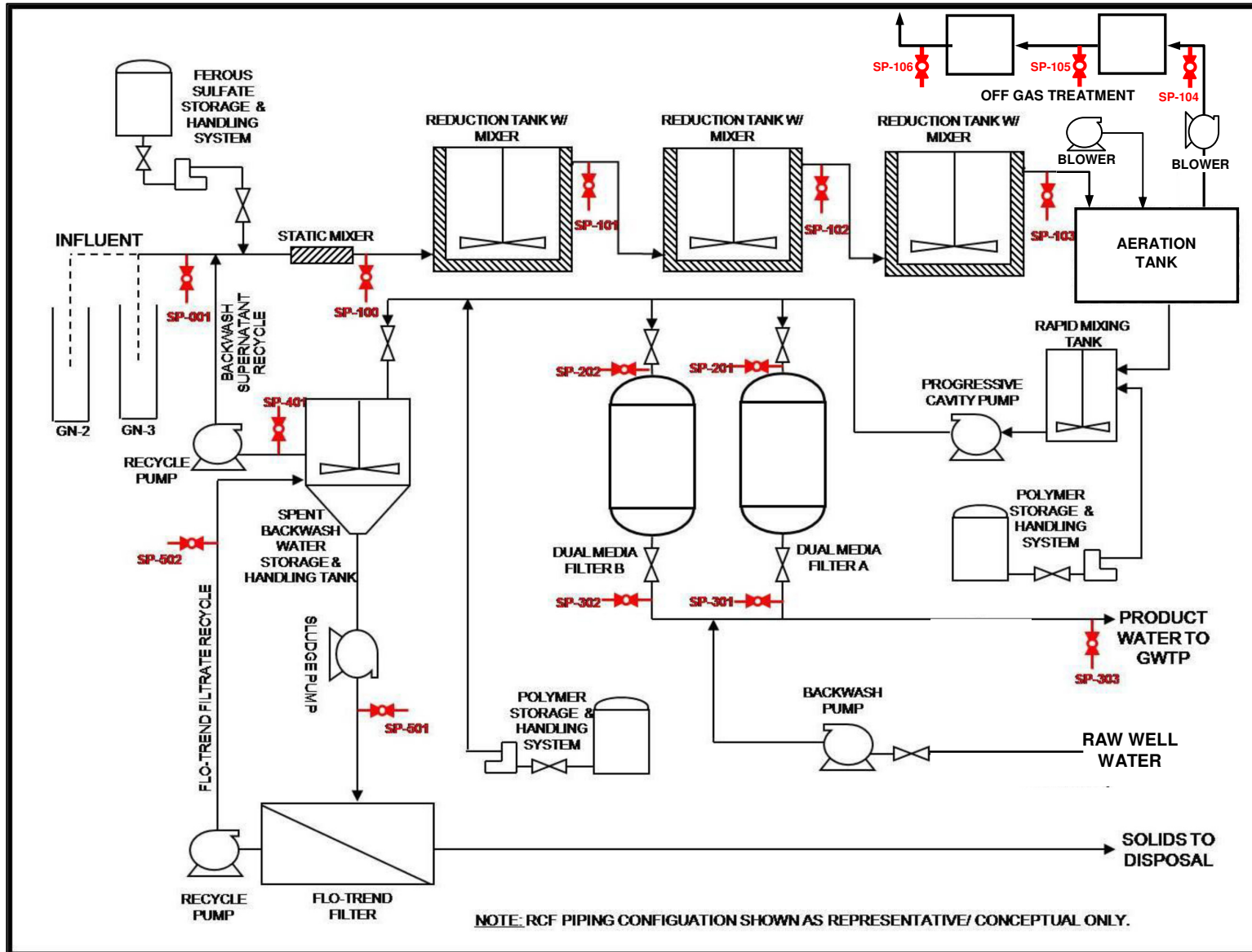


Figure 1: RCF Treatment System Process Flow Diagram

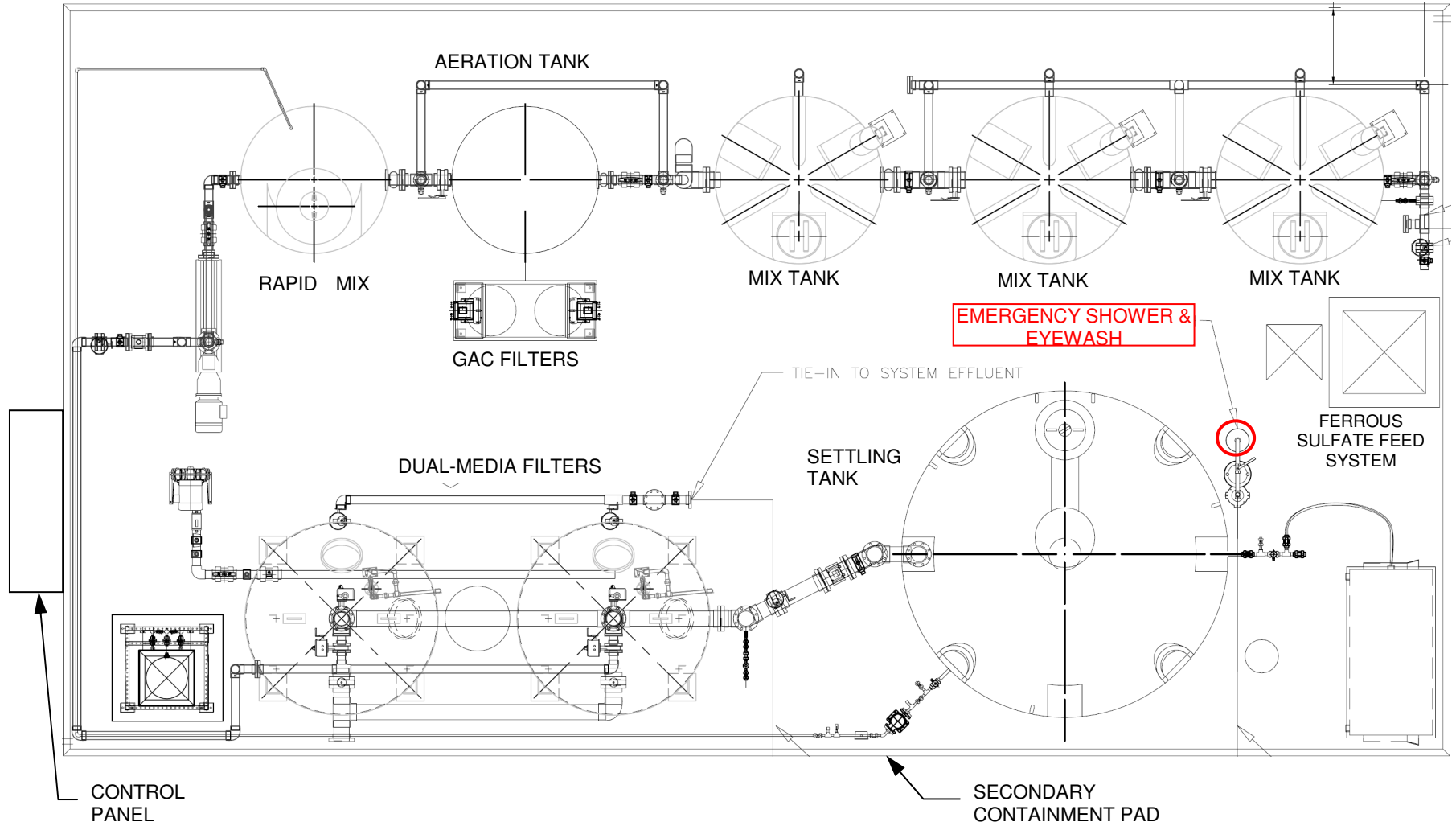


Figure 2: Treatment System Layout

3. RESPONSE PROCEDURES

There are two major components of the initial emergency response procedure.

1. The operator must assess the situation and take necessary actions to stabilize the situation.
 - a. The first priority is to minimize any potential threats to human health or the environment (a map to the nearest hospital is shown on Figure 3).
 - b. The secondary priority is to minimize damage to the treatment system.
2. During or immediately following the stabilization process, the appropriate parties must be contacted to coordinate the emergency response. The City of Glendale plant or operations managers shall be notified of any emergency situation, including, but not limited to, fire, earthquake, explosion, or human exposure to hazardous substances caused by the release of a hazardous substance. Any onsite personnel or potentially affected personnel at neighboring sites shall be warned of the type of emergency so that appropriate precautions can be taken. The preliminary draft health and safety plan for the demonstration facilities (AECOM 2009) has additional information concerning emergency response procedures.

Appropriate procedures are initiated in response to certain triggering events that can be classified into four categories as described in Table 1.

Facility and emergency contact information are provided in Table 2. A hospital route map is provided on Figure 3.

Table 1: Categories of Triggering Events

Category	Description	Example
Process Failure (Mechanical or Instrumentation)	Event in which equipment fails to operate as designed and the result of failure renders the plant inoperable for an extended period of time or has the potential of causing a release to the environment or to the distribution system.	Pump failure, process equipment rupture or leak, valve failure, control system failure
External Forces	Catastrophic event caused by manmade or natural conditions that cause significant damage to the plant and/or render the plant inoperable or unsuitable for human occupancy for an extended period of time	Fire, explosion, vandalism Earthquake, flood, lightning strike
Chemical Release	Event in which hazardous or toxic substances are released in an uncontrolled or controlled manner that may exceed regulatory limits and could potentially pose a threat to human health or the environment.	Leaks and spills that extend beyond the facility, gas emission violations

3.1 PROCESS FAILURE

3.1.1 Triggering Events

Process failures may result in shutdown of the facility, spills, or releases of hazardous substances. Triggering events may include the following:

1. Vessel rupture or leaks,
2. Piping rupture or leaks,
3. Instrumentation failure leading to leaks or spills,
4. Equipment or power failure leading to shutdown of the plant.

The following is a list of process fluids (and hazard class) that may spill from process equipment:

- Untreated water (non-hazardous)

- Ferrous sulfate solution (hazardous, corrosive)
- Polymer solution (non-hazardous)
- Water containing, ferrous sulfate and polymer (non-hazardous)
- Waste sludge (potentially California-hazardous for chromium)

3.1.2 Response

The secondary containment pad is designed to contain a certain volume of liquid. However, the system must be shut down to stem the source of flow to the system and minimize the potential for overflowing of the containment.

If a leak or spill does occur that does not reach beyond the confines of the treatment facility, the following procedures will be followed:

1. Evaluate the severity of the situation
2. Address the leak or spill;
 - a. Shut-off source of spill (shutdown plant and well),
 - b. Contain the spill, prevent spread to sanitary sewer or storm drain,
 - c. Obtain help if necessary.
3. Address other mechanical failures and minimize damage to the system
4. Notify stakeholders in the following order:
 - a. Chief Plant Operator
 - b. Plant Manager
 - c. Operations Manager for City of Glendale, Water and Power
5. Report a spill of hazardous material or waste in excess of 5 gallons to the regulatory agency (see Table 2).

If a mechanical failure occurs, the plant programmable logic controller (PLC) will generate an alarm condition on the control panel and to the supervisory control and data acquisition (SCADA) system and shut the plant down. The plant can also be shut down manually via the master power switch on the control panel.

In the event of a power failure, the treatment system will shut down automatically and no response is necessary. When the power is restored, the system must be restarted following appropriate start-up procedures outlined in the O&M manual by an operator.

3.2 DAMAGE CAUSED BY EXTERNAL FORCES (FIRE, EARTHQUAKE, OR VANDALISM)

3.2.1 Triggering Events

The emergency effects associated with external forces are difficult to define because the nature and extent of the damage will be variable. However, the results of such a failure will likely be some combination of the following:

- Discharge violations, spills, or emissions, which will generally result in a release of untreated water to the storm drain, the spill containment area, the surrounding ground surface or subsurface.
- System shutdown resulting from either a power outage
- Other mechanical failures that may not always result in system shutdown or failure. However, if these problems are not addressed appropriately the system could be damaged and the potential for failure exists.

3.2.2 Response

The damage caused by external effects can result in both injuries and damage to the system. If the system is damaged significantly, the potential for other types of failure such as discharge violations or spills and emissions exists; therefore, the appropriate response action must be determined based on an assessment of the situation, but will be prioritized as follows:

1. Evaluate the severity of the situation
2. Address injuries;
 - a. remove victim from the area,
 - b. administer first aid,
 - c. call for paramedics,
 - d. transport victim to hospital (see Figure 3).
3. Address discharge violations, spills, or emissions;
 - a. Shut-off source of spill (shutdown plant and well)
 - b. Contain the spill, prevent spread to sanitary sewer or storm drain,
 - c. Obtain help if necessary
4. Address other mechanical failures and minimize damage to the system
5. Notify stakeholders in the following order:
 - a. Chief Plant Operator
 - b. Plant Manager
 - c. Operations Manager for City of Glendale, Water and Power

In the event of a major earthquake that causes structural damage, a California-registered Structural Engineer or local building official will be consulted to determine whether the plant is suitable for occupancy and operation.

3.3 CHEMICAL RELEASE

3.3.1 Triggering Event

Triggering events that result in a release or discharge violation include:

1. A leak or spill of untreated water from Wells GN-2 or GN-3 or treatment chemicals that travels beyond the confines of the facility's secondary containment area and battery limits and enters the storm drain system that discharges to surface water bodies in violation of surface water discharge requirements (regulated by the Los Angeles Regional Water Quality Control Board [LARWQCB]).
2. A leak or spill of untreated water from Wells GN-2 or GN-3 or treatment chemicals that travels beyond the confines of the facility's secondary containment area and battery limits and enters the sanitary sewer system in violation of sewer discharge requirements (regulated by the City of Glendale).
3. A malfunction of the treatment system that results in a release of untreated or partially treated water to the municipal supply in violation of the operating permit (regulated by the California Department of Public Health [CDPH]).

3.3.2 Response

1. Evaluate the severity of the situation
2. Address discharge violations, spills, or emissions;
 - a. Shut-off source of spill (shutdown plant and well)
 - b. Contain the spill, prevent spread to sanitary sewer or storm drain,
 - c. Obtain help if necessary

3. Address other mechanical failures and minimize damage to the system
4. Notify stakeholders in the following order:
 - a. Chief Plant Operator
 - b. Plant Manager
 - c. Operations Manager for City of Glendale, Water and Power
5. Report the violation to the regulatory agency

Appropriate response procedures for each of these triggering mechanisms are on Table 1. The priority in response to these mechanical failures is to minimize damage to the system.

3.4 EMERGENCY CONTACTS

Table 2 presents a list of the emergency contacts, phone numbers, and addresses in case of an emergency.

3.4.1 City of Glendale Personnel

City of Glendale personnel shall be contacted if any of the triggering events occurs and the situation permits. The primary points of contact are Charles Cron, Chief Plant Operator and Peter Kavounas, Assistant Plant Manager.

3.4.2 Emergency Response Contacts

The additional contacts for emergency response will vary depending on the type of emergency situation.

- Generally, in the case of injury, explosion, fire, or significant damage due to vandalism the operator must dial 911.
- In the case of a spill or other emission of untreated water outside of the containment area, Spill Control should be contacted.
- In the case of a discharge violation, the LARWQCB must be informed immediately.

3.5 REPORTING REQUIREMENTS

CDPH must be contacted immediately in the event of a treatment permit violation (discharge of pollutants to the drinking water distribution system). A written notification must also be sent within 5 days of the violation and shall contain the following information:

1. nature of waste or pollutant discharged,
2. quantity discharged,
3. duration of the discharge,
4. cause of the discharge,
5. control and countermeasure plan in effect,
6. corrective measures that have been taken or are planned, and
7. persons or agencies notified.

Details of incident must also be included in the operations report and kept on file.

The LARWQCB must be contacted immediately in the event of a discharge violation (discharge to receiving waters via a storm drain). A written notification must also be sent within 5 days of the violation and shall contain the following information:

1. nature of waste or pollutant released,

2. quantity released,
3. duration of the release,
4. cause of the release,
5. spill prevention, control, and countermeasure plan in effect,
6. estimated size of the affected area,
7. nature of effects (i.e., fish kill, discoloration of receiving water, etc.),
8. corrective measures that have been taken or are planned, and
9. persons or agencies notified.

Details of incident must also be included in the operations report and kept on file.

4. CORRECTIVE ACTION/OPERATIONAL RESTORATION

The following steps will be followed if the plant is rendered inoperable after a triggering event:

- Assess the nature and extent of damage
- Develop a plan for repairs/improvements based on root cause analysis
- Generate schedule, scope and budget for repairs
- Inform stakeholders of findings
- Obtain approval to proceed with repairs/improvements
- Implement repairs/improvements

5. PREVENTIVE ACTION/FOLLOW-UP

Following restoration of operation, a review of lessons learned will help identify problems that materialized during the emergency response and corrective action phases. Performance metrics will be used to document what was done well, and what could have been done better. Analysis of this information should lead to effective solutions, which can be used to improve the emergency response plan by identifying mitigating actions that can be taken to lessen the impact of a failure.

The following preventative action/follow up steps will be followed after a triggering event:

- Perform a root-cause analysis
- Make recommendations for improvement
- Implement corrective action plan

After reviewing lessons learned, a vulnerability assessment should be performed. The purpose of the vulnerability assessment is to identify weaknesses in the system, so that improvements can be made to minimize the potential for damage to the system.

The objective is to identify any components which are aging or unreliable, and to determine if there are any flaws in the system design that might make it more susceptible to failure. Depending on the type of failure, one or more of the items listed below may need to be evaluated following a system failure:

- Fire hazards
- Seismic stability requirements
- Security measure to limit access to the site
- Condition of all hoses, tanks, and fittings on injection trailers
- Conveyance piping leak detection system
- Operation of all interlock switches
- Appropriate operation and maintenance procedures

6. PLAN UPDATES AND ANNUAL TRAINING

After reviewing lessons learned and performing a vulnerability assessment it may be necessary to update this contingency plan or other project documentation (training, policies and procedures, phone list etc.) to reflect any changes to the emergency response procedure. It may also be necessary to update the O&M manual if any changes to the system have occurred as a result of repairs or in addressing weaknesses identified during the vulnerability assessment.

Once a year, the City will perform an audit of the contingency plan and procedures. The audit will include a review of the most current failure modes as a result of changes in site operations and or equipment design in addition to a general review of the compliance with this plan. The results of the audit will be used to update the plan. The audit and plan update will be completed in advance of the annual training.

Annual training will be conducted every May following the audit and plan update. Training will include providing an overview of this plan, the location of the plans, changes to the plan, and plant tour if required.

7. DEFINITION OF THE CLOSURE POINT

If a system failure occurs, the closure point will be reached after all repairs have been made and City -trained personnel have confirmed that the system is properly configured, the system is restarted and functioning properly, and any necessary follow-up or preventative actions have been completed, including documentation updates and personnel training.

8. FACILITY AND EMERGENCY CONTACT INFORMATION

Table 2: Facility and Emergency Contact Information

Facility and Contact Information				
Facility Name:	Reduction-Coagulation-Filtration Chromium-VI Removal Demonstration Facility			
Address:	800 Flower Street, Glendale, California, 91201			
Facility Telephone Number:	818-550-5975			
Owner/Operator:	Glendale Water and Power			
Address:	Glendale, California			
Representative:	Peter Kavounas			
Title:	Assistant General Manager			
Telephone:	818 548-2137			
EPA Project Manager:	David Stensby			
Telephone:	415-972-3246			
CDM Project Manager:	Dan Hutton			
Telephone:	562-577-1212			
Chief Plant Operator	Charles Cron (CDM)			
Telephone:	818-550-5975	Mobile:	562-755-0905	Fax:
Waste Management Vendor::	.			
Contact:				
Telephone:		Mobile:		Fax:
Local Emergency Responder Contact Information				
Organization / Agency				Telephone
EMERGENCY	Police			911
	Fire Department			911
	Ambulance (EMT will determine appropriate hospital for treatment)			911
Hospital, Glendale Memorial (Use by site personnel is only for non-emergency cases)				818-502-1900
Poison Control Center (if a toxic substance has been ingested, inhaled, injected through or come in contact with the skin)				800-222-1222
City of Los Angeles, Department of Public Works (for Sewer Spill)				311 or 213-473-3231
Regional Water Quality Control Board, Los Angeles Region				213-576-6600
National Response Center (for toxic chemical and oil spills)				800-424-8802

Notes:
EMT = Emergency Medical Technician

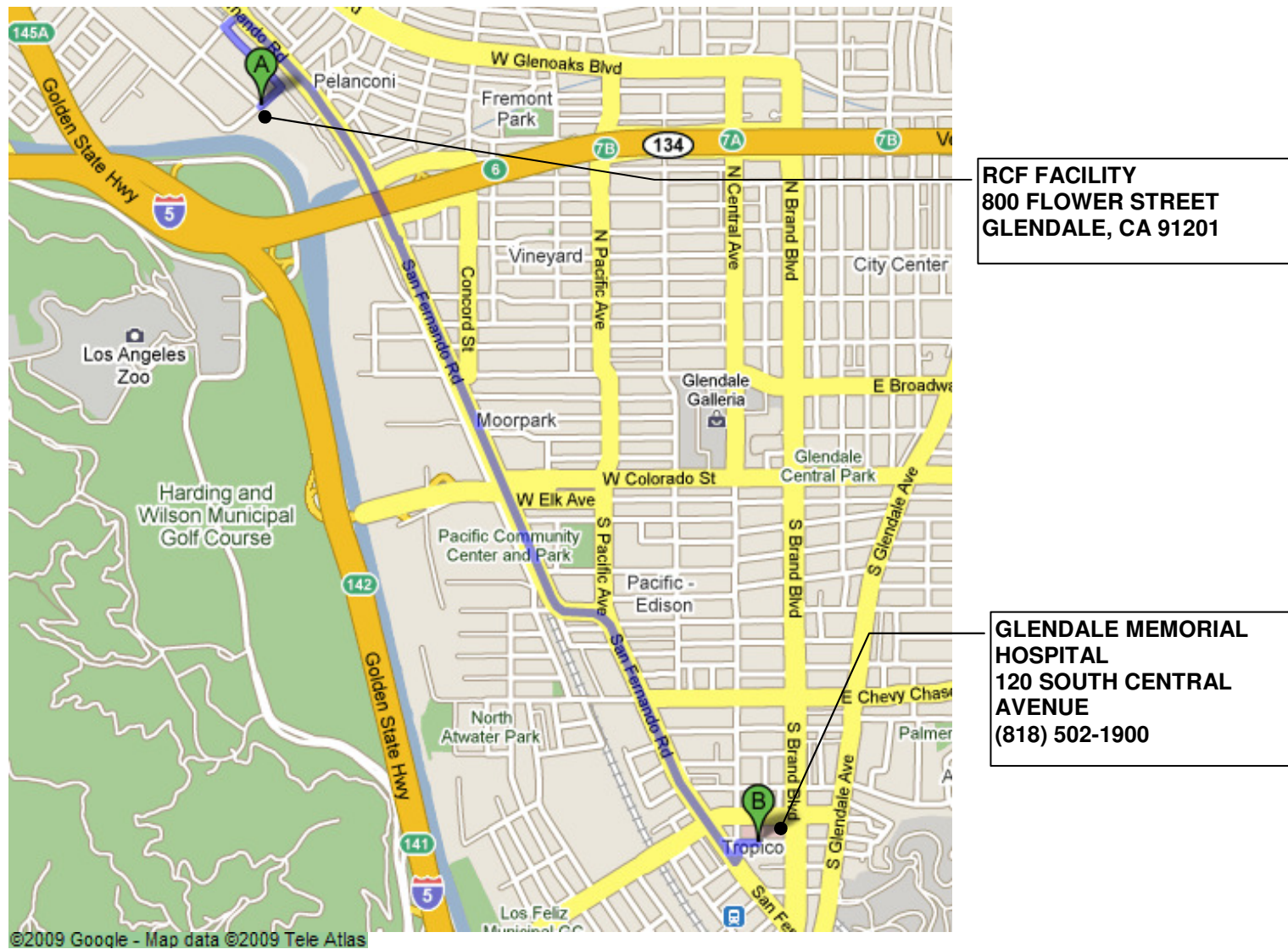


Figure 3: Hospital Route Map from RCF Facility to Glendale Memorial Hospital

9. REFERENCES

AECOM. 2009a. Draft Health and Safety Plan for Multi-Site Operation and Maintenance Activities Chromium-(VI) Removal Demonstration Facilities, City of Glendale, California. Long Beach, California. August.

AECOM. 2009b. Operation and Maintenance Manual Reduction-Coagulation-Filtration Chromium-(VI) Removal Demonstration Facility City of Glendale, California. Long Beach, California. August.