Five-Year Review Report

Third Combined Five-Year Review Report

for

Double Eagle and Fourth Street Refinery Sites
Oklahoma City
Oklahoma County, Oklahoma
OKD007188717 and OKD980696470

April 2012

PREPARED BY:

U.S. Environmental Protection Agency
Region 6
Dallas, Texas

and

Oklahoma Department of Environmental Quality
Oklahoma City, Oklahoma

THIRD COMBINED FIVE-YEAR REVIEW FOR
DOUBLE EAGLE AND FOURTH STREET REFINERY SITES
OKLAHOMA CITY, OKLAHOMA

This memorandum documents approval of the third combined Five-Year Review Report for the Double Eagle and Fourth Street Superfund Sites by the U.S. Environmental Protection Agency (EPA).

Summary of Five-Year Review Findings

The selected remedy for soils at the Double Eagle and Fourth Street sites was solidification and stabilization, then off-site disposal. The combined remedy for the contaminated ground water beneath both sites included: institutional controls; notification prior to drilling; filing deed notices; establishing a monitoring program; and additional evaluation of the ground water following removal of the contaminant sources.

Progress since last combined Five-Year Review

As documented in the Explanation of Significant Differences approved on January 19, 2006, the combined remedy for contaminated ground water beneath both sites was modified after the actions described above were implemented. Further ground water monitoring was discontinued after three years. Additional investigations have shown that contaminant level reduction is taking place, and the potential receptors or targets of contamination, the North Canadian River and deeper usable portions of the Garber-Wellington aquifer are not at risk at this time.

The remedy appears to be performing as intended and is currently protective of human health and the environment. No issues of concern were identified during this review.

Determination

The remedies for the Double Eagle and Fourth Street Refinery sites are performing as intended and are protective of human health and the environment.

U.S. Environmental Protection Agency

By: _____ Date: 5/15/12

Pam Phillips
Acting Division Director
Superfund Division
U.S. Environmental Protection Agency, Region 6

CONCURRENCE PAGE FOR THE
THIRD COMBINED FIVE-YEAR REVIEW FOR
DOUBLE EAGLE AND FOURTH STREET REFINERY SITES

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List of Acronyms

ARARs	Applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 also known as Superfund, Amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA)
CFR	Code of Federal Regulations
COC	Chemical of Concern
DEQ	Oklahoma Department of Environmental Quality
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FCOR	Final Close Out Report
FS	Feasibility Study
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PPM	Parts Per Million
RA	Remedial Action
RAG	Remedial Action Goal
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986 (See CERCLA)
TDS	Total Dissolved Solids
USGS	United States Geological Survey

Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act ("CERCLA" or "Superfund"), 42 United States Code (USC) §9621(c), the third combined five-year review of the remedy in place has been completed for the Double Eagle Refinery Company and Fourth Street Abandoned Refinery Sites ("sites" or "Double Eagle and Fourth Street sites"), located in Oklahoma County, Oklahoma. This review covers both sites since the Double Eagle and Fourth Street sites had similar Source Control Operable Units (OU) and share a single Ground Water OU. The results of the five-year review indicate that the remedy is protective of human health and the environment. No deficiencies were noted that currently impact the protectiveness of the remedy.

Under the statutory requirements of Section 121(c) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), P.L. 99-499, and the subordinate provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) 300.430(f)(4)(ii), performance of five-year reviews are required for sites where hazardous substances remain on-site above levels that allow for unlimited use and unrestricted exposure. This situation applies to the Double Eagle and Fourth Street sites. The U.S. Environmental Protection Agency (EPA) and Oklahoma Department of Environmental Quality completed the second combined five-year review at the sites on May 15, 2007.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Double Eagle Refinery Company and Fourth Street Abandoned Refinery		
EPA ID: OKD007188717 and OKD980696470		
Region: 6	**State:** OK	**City/County:** Oklahoma City/Oklahoma County

SITE STATUS	
NPL Status: Deleted	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: State **If "Other Federal Agency" was selected above, enter Agency name:** Click here to enter text.
Author name (Federal or State Project Manager): Amber Brawdy
Author affiliation: Oklahoma Department of Environmental Quality
Review period: August 2011 – May 2012
Date of site inspection: September 27, 2011
Type of review: Statutory
Review number: 3
Triggering action date: May 15, 2007
Due date *(five years after triggering action date)*: May 15, 2012

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Double Eagle Source Control and Ground Water OUs

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Fourth Street Source Control OU and Ground Water OU	**Issue Category: Changed Site Conditions**			
	Issue: In July 2011, EPA Region 6 discovered asbestos contamination in soil on the 4th Street Site during a removal action at a nearby facility (Henley's Sealant). Some removal work was conducted in June and July 2011. Future removal is planned.			
	Recommendation: Continue to monitor future removal actions at the 4th Street Site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	EPA	EPA	On-going

Protectiveness Statement(s)
Because the remedial actions at all operable units are protective, the sites are protective of human health and the environment.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Double Eagle Source Control OU	Protective	Click here to enter date.
Protectiveness Statement: Because the remedial actions at all operable units are protective, the site is protective of human health and the environment.		

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Double Eagle Ground Water OU	Protective	Click here to enter date.
Protectiveness Statement: Because the remedial actions at all operable units are protective, the site is protective of human health and the environment.		

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Fourth Street Source Control OU	Protective	Click here to enter date.
Protectiveness Statement: Because the remedial actions at all operable units are protective, the site is protective of human health and the environment.		

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Fourth Street Ground Water OU	Protective	Click here to enter date.
Protectiveness Statement: Because the remedial actions at all operable units are protective, the site is protective of human health and the environment.		

Sitewide Protectiveness Statement (if applicable)	
Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: *Because the remedial actions at all operable units are protective, the sites are protective of human health and the environment.*	

Third Combined Five-Year Review Report
Double Eagle and Fourth Street Refinery Sites

The United States Environmental Protection Agency (EPA) Region 6 and the Oklahoma Department of Environmental Quality (DEQ) conducted the third combined five-year review of the remedial action implemented at the Double Eagle Refinery Company and Fourth Street Abandoned Refinery Sites ("sites" or "Double Eagle and Fourth Street sites"), located in Oklahoma County, Oklahoma for the period between May 2007 (when the second five-year review was completed) and May 2012. This review covers both sites since the Double Eagle and Fourth Street sites had similar Source Control Operable Units (OU) and share a single Ground Water OU. The purpose of a five-year review is to determine whether the remedy at a site remains protective of human health and the environment, and to document the methods, findings, and conclusions of the five-year review in a report. Five-year Review reports identify issues found during the review, if any, and make recommendations to address the issues. This third combined five-year review report documents the results of the review for the Double Eagle and Fourth Street Refinery Superfund Sites, conducted in accordance with EPA guidance on five-year reviews.

EPA guidance on conducting five-year reviews is provided by the Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P, *Comprehensive Five-Year Review Guidance*. EPA and DEQ personnel followed the guidance provided in this OSWER directive in conducting the five year review performed for the Double Eagle and Fourth Street sites.

1. Introduction

The purpose of a five-year review is to determine whether the remedy at the Double Eagle and Fourth Street Sites is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and identify recommendations to address them. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA § 121 (c), as amended, states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such review, and any actions taken as a result of such reviews.*

The NCP states at 40 CFR 300.430(f)(4)(ii):

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The Oklahoma Department of Environmental Quality (DEQ) conducted the third combined five-year review of the remedy implemented at the Double Eagle and Fourth Street Superfund Sites in Oklahoma City, Oklahoma. This review was conducted by the DEQ Project Manager for the sites. This report documents the results of the review.

This is the third combined five-year review for the Double Eagle and Fourth Street Superfund sites. The triggering action for this statutory review is the initiation of the remedial action on July 17, 1997, to clean up the ground water operable unit and the date of the first combined five-year review which was July 29, 2002. In accordance with the EPA five-year review guidance, the five-year review for the Double Eagle and Fourth Street sites is being conducted because the implemented remedial action resulted in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. The third combined review for the Double Eagle and Fourth Street Superfund Sites must be completed on or before May 15, 2012.

2. Site Chronology

Table 1: Chronology of Site Events at Fourth Street Refinery

Fourth Street Refinery		
Event	Operable Unit	Actual Completion
Discovery	Sitewide	July 1, 1980
Preliminary Assessment	Sitewide	May 1, 1985
Proposal for NPL	Sitewide	June 24,1988
Final Listing on NPL	Sitewide	March 31,1989
Removal	Sitewide	September 27, 1989
RI/FS Negotiations	Sitewide	October 6, 1989
Administrative Records	Sitewide	September 28, 1992
Combined RI/FS	Source Control OU	September 28, 1992
Record of Decision	Source Control OU	September 28, 1992
Treatability Study	Source Control OU	September 28, 1992
Combined RI/FS	Ground Water OU	September 30, 1993
Record of Decision	Ground Water OU	September 30, 1993
Remedial Design	Source Control OU	August 10, 1994
Remedial Design	Ground Water OU	March 17, 1995
Remedial Action	Source Control OU	April 30, 1996
Quarterly Ground Water Sampling Event	Ground Water OU	December 1996
Remedial Action	Ground Water OU	February 20, 1997
Quarterly Ground Water Sampling Event	Ground Water OU	March 1997
Quarterly Ground Water Sampling Event	Ground Water OU	June 1997
Quarterly Ground Water Sampling Event	Ground Water OU	September 1997
Quarterly Ground Water Sampling Event	Ground Water OU	December 1997
Quarterly Ground Water Sampling Event	Ground Water OU	March 1998
Quarterly Ground Water Sampling Event	Ground Water OU	July 1998
Quarterly Ground Water Sampling Event	Ground Water OU	September 1998

Quarterly Ground Water Sampling Event	Ground Water OU	June 1999
Community Involvement	Sitewide	September 1, 1999
Quarterly Ground Water Sampling Event	Ground Water OU	October 1999
Community Involvement	Source Control OU	December 1, 1999
Quarterly Ground Water Sampling Event	Ground Water OU	December 1999
Quarterly Ground Water Sampling Event	Ground Water OU	April 2000
Semiannual Ground Water Sampling Event	Ground Water OU	September 2000
Five-Year Remedy Assessment	Sitewide	October 18, 2000 and July 29, 2002
Semiannual Ground Water Sampling Event	Ground Water OU	March 2001
Semiannual Ground Water Sampling Event	Ground Water OU	February 2002
Natural Attenuation Sampling Event	Ground Water OU	April 2002
Semiannual Ground Water Sampling Event	Ground Water OU	December 2002
Semiannual Ground Water Sampling Event	Ground Water OU	April 2003
Semiannual Ground Water Sampling Event	Ground Water OU	September 2003
Off-site Source of Contamination Study	Ground Water OU	January 2005
Plugging of all site wells	Ground Water OU	October 2005
Explanation of Significant Differences	Ground Water OU	January 2006
Final Close Out Report	Sitewide	January 2006
Beginning of Site O&M Period	Sitewide	March 2006
O&M Well Completion Search	Sitewide	April 2006
O&M Well Completion Search	Sitewide	October 2006
O&M Well Completion Search	Sitewide	April 2007
O&M Well Completion Search	Sitewide	October 2007
O&M Well Completion Search	Sitewide	April 2008
Explanation of Significant Differences	Source Control OU	May 2008
NPL Deletion	Sitewide	August 2008

O&M Well Completion Search	Sitewide	October 2008
O&M Well Completion Search	Sitewide	April 2009
O&M Well Completion Search	Sitewide	December 2009
O&M Well Completion Search	Sitewide	June 2010
O&M Well Completion Search	Sitewide	December 2010
O&M Well Completion Search	Sitewide	April 2011
Henley's Sealant & 4th Street Asbestos Removal Action	Henley's Sealant & parts of 4th Street Site	June 2011 & July 2011
O&M Well Completion Search	Sitewide	November 2011

Table 2: Chronology of Site Events at Double Eagle Refinery

Double Eagle Refinery		
Event	Operable Unit	Actual Completion
Preliminary Assessment	Sitewide	May 1, 1980
Discovery	Sitewide	June 1, 1980
Proposal for NPL	Sitewide	June 24, 1988
Admin Order on Consent	Sitewide	December 7, 1988
Final Listing on NPL	Sitewide	March 31, 1989
RI/FS Negotiations	Sitewide	November 29, 1989
Administrative Records	Sitewide	September 28, 1992
Combined RI/FS	Source Control OU	September 28, 1992
Record of Decision	Source Control OU	September 28, 1992
Treatability Study	Source Control OU	September 28, 1992
Combined RI/FS	Ground Water OU	July 28, 1993
Removal	Sitewide	April 3, 1994
Record of Decision	Ground Water OU	April 19, 1994
Remedial Design	Ground Water OU	March 17, 1995
Quarterly Ground Water Sampling Event	Ground Water OU	December 1996
Remedial Action	Ground Water OU	February 20, 1997
Quarterly Ground Water Sampling Event	Ground Water OU	March 1997
Remedial Design	Source Control OU	April 30, 1997
Quarterly Ground Water Sampling Event	Ground Water OU	June 1997
Quarterly Ground Water Sampling Event	Ground Water OU	September 1997
Quarterly Ground Water Sampling Event	Ground Water OU	December 1997
Quarterly Ground Water Sampling Event	Ground Water OU	March 1998

Quarterly Ground Water Sampling Event	Ground Water OU	July 1998
Quarterly Ground Water Sampling Event	Ground Water OU	September 1998
Quarterly Ground Water Sampling Event	Ground Water OU	June 1999
Community Involvement	Sitewide	September 1, 1999
Quarterly Ground Water Sampling Event	Ground Water OU	October 1999
Community Involvement	Source Control OU	December 21, 1999
Quarterly Ground Water Sampling Event	Ground Water OU	December 1999
Remedial Action	Source Control OU	March 29, 2000
Quarterly Ground Water Sampling Event	Ground Water OU	April 2000
Semiannual Ground Water Sampling Event	Ground Water OU	September 2000
Semiannual Ground Water Sampling Event	Ground Water OU	March 2001
Semiannual Ground Water Sampling Event	Ground Water OU	February 2002
Natural Attenuation Sampling Event	Ground Water OU	April 2002
Five-Year Remedy Assessment	Sitewide	July 29, 2002
Semiannual Ground Water Sampling Event	Ground Water OU	December 2002
Semiannual Ground Water Sampling Event	Ground Water OU	April 2003
Semiannual Ground Water Sampling Event	Ground Water OU	September 2003
Off-site Source of Contamination Study	Ground Water OU	January 2005
Plugging of all site wells	Ground Water OU	October 2005
Explanation of Significant Differences	Ground Water OU	January 2006
Final Close Out Report	Sitewide	January 2006
Beginning of Site O&M Period	Sitewide	March 2006
O&M Well Completion Search	Sitewide	April 2006
O&M Well Completion Search	Sitewide	October 2006
O&M Well Completion Search	Sitewide	April 2007
O&M Well Completion Search	Sitewide	October 2007

O&M Well Completion Search	Sitewide	April 2008
Explanation of Significant Differences	Source Control OU	May 2008
NPL Deletion	Sitewide	August 2008
O&M Well Completion Search	Sitewide	October 2008
O&M Well Completion Search	Sitewide	April 2009
O&M Well Completion Search	Sitewide	December 2009
O&M Well Completion Search	Sitewide	June 2010
O&M Well Completion Search	Sitewide	December 2010
O&M Well Completion Search	Sitewide	April 2011
O&M Well Completion Search	Sitewide	November 2011

3. Background

Physical Characteristics

The Double Eagle Superfund Site occupies the Southeast Quarter (SE 1/4) of Section 35, Township 12 North, Range 3 West, Indian Meridian, Oklahoma County, Oklahoma City, Oklahoma. Located at 301 N Rhode Island (generally South of NE 4th Street and West of Martin Luther King Boulevard), the site extends over approximately 12 acres and is bounded to the north by the Union Pacific Railroad tracks and to the east and west by vacant lots zoned for industrial land use. A "Truck Stop" is operating to the south. Martin Luther King Boulevard lies on the east side of the site as an overpass to the railroad tracks.

Prior to the remedial action, the following features were located within the Double Eagle site: a sludge lagoon, six smaller earthen impoundments, 13 steel buildings, one fire tube boiler, two pipe heat exchangers, five vacuum precoat/scrapper filters, two concrete settling cells, and approximately 100 steel tanks of varying dimensions. The tanks contained residual sludge and most equipment was contaminated to various degrees. One of the concrete cells contained residual waste material mixed with rainwater.

The Fourth Street Superfund Site occupies the Southwest Quarter (SW 1/4) of Section 36, Township 12 North, Range 3 West, Indian Meridian, Oklahoma County, Oklahoma City, Oklahoma. Located at 2200 Block NE 4th Street (South of NE 4th Street and East of Martin Luther King Boulevard), the site is bounded to the south by the Union Pacific Railroad tracks, to the north by Northeast Fourth Street, and to the east by Interstate 35. Martin Luther King Boulevard lies on the west side of the site as an overpass to the railroad tracks. Active industrial facilities (which have not been associated with past site operations) also lie adjacent to the mid-northern portion of the site, just south of NE 4th Street.

The Fourth Street site extends over three contiguous tracts of land totaling approximately 27 acres. An active industrial facility is currently operating on the westernmost tract, which is part of the original refinery property, but is now owned and operated by a

separate individual. This tract is referred to as the Pipe Storage Yard, consistent with the active facility's current operations.

The Pipe Storage Yard contained buried sludge material beneath the site. The middle tract of the site contained the majority of contaminated material, a large tar mat area and surface ponds. This tract is referred to as the Main Site Area, consistent with the fact that most of the contaminated material and scattered debris were found on this tract. The eastern tract of land contained only surficial contamination carried from the Main Site Area via surface drainage. This tract is referred to as the Eastern Drainage Area.

The Pipe Storage Yard and the Main Site Area were once the former operations area, as evidenced by historical aerials and the extensive piping network discovered during investigations at the site. The gravel/sand cover in the Pipe Storage Yard was ineffective in covering buried contaminated sludges; consequently, surface seeps were apparent. The Main Site Area contained several discrete areas of concern: a tar mat area, two smaller earthen impoundments, one small concrete sump, and numerous pieces of abandoned refinery equipment and debris from past uncontrolled dumping. Remnants of the dismantled refinery in the Main Site Area included a warehouse foundation, three horizontal tank stands and foundations, an oil well derrick, and an abandoned concrete oil well derrick foundation.

The Double Eagle site contributed to off-site contamination in an area just south of the site, known as the "Radio Tower Area." The contamination at the Radio Tower Area consisted of a surficial tar matrix, which covered approximately 0.25 acre.

Both the Fourth Street site and the Double Eagle site contributed to the contamination of an off-site area called Parcel H. The contamination at the Parcel H Area, which was attributable to past site operations, included two surficial ponds, comprising approximately 0.5 acre. Approximately half of the Parcel H contaminated area was addressed under the Fourth Street cleanup activities and the other half was addressed as part of the Double Eagle remedial action.

Land and Resource Use

Although industrial areas surround the sites, the land use within a 1-mile radius of both sites is mixed industrial and residential. A small neighborhood is located about ¼ mile to the northwest of the Martin Luther King Boulevard and Northeast Fourth Street intersection. Four schools (Douglas High School, Dunbar School, Bath School, and Edwards School) and two recreational facilities are located within a 1-mile radius of the sites.

Recreational areas close to the sites include the Douglas Community Center, Douglas Community Park, and Washington Park. A Pipe Storage Yard sits on the west side of the Fourth Street site. There are two large truck stops to the south of the sites.

Within a 1-mile radius of the sites are many commercial and small industrial facilities. Part of the Fourth Street site is currently being used as a pipe storage yard. The rest of the

Fourth Street site and all of the Double Eagle site are not being re-used at this time. Both sites are owned by private land owners.

Both of the Records of Decision (RODs) identified the upper ground water zone non-usable (Class III aquifer) due to the presence of high total dissolved solids (TDS). Ground water sampling and monitoring activities have confirmed this fact. Ground water sampling has shown that a reduction in contaminant levels is taking place, and the potential receptors or targets of contamination, the North Canadian River and the deeper usable portions of the Garber-Wellington aquifer, are not at risk at this time. No users of the aquifer have been identified. Since there are not any buildings located on either of the sites and there are not any buildings located within a horizontal or vertical separation of 100 ft of these sites, vapor intrusion is not an issue at this time. Both sites have been historically used for industrial purposes. There could be a possibility of future development at the sites. This development could result in a vapor intrusion pathway. Measures will be taken in construction of any future buildings to prevent any exposure to vapor intrusion in the future.

History of Contamination

The Double Eagle site collected, stored, and re-refined used oils and distributed the recycled product. The refinery was active as early as 1929 with historical aerial photographs available as early as 1941. Generally, early refining was conducted on the western portion of the site and expanded toward the eastern portion as the operations increased.

The Double Eagle site recycled approximately 500,000 to 600,000 gallons of used motor oil per month into finished lubricating oil. The recycling process consisted of the addition of sulfuric acid, settling, and filtration with bleaching clays via a filter press. This process generated approximately 80,000 gallons of oily sludge per month. Sludges were initially sent to an off-site disposal facility, now the Hardage-Criner Superfund Site located in Criner, Oklahoma. Later, sludges were disposed of in on-site impoundments and a sludge lagoon until the late 1960's to early 1970's. Double Eagle continued to accept waste oil for storage in on-site storage tanks until 1980.

On-site and off-site visual inspections by the EPA Field Investigations Team in May of 1985 indicated that a preliminary sampling inspection should be conducted. Off-site sampling in the southwestern drainage area and at the Radio Tower area during January of 1986 revealed elevated levels of target compounds that were also found in the waste impoundments on-site.

The Fourth Street site collected, stored, and re-refined used oils and distributed the recycled product. Refinery operations at the Fourth Street site apparently recycled used

oils by the use of sulfuric acid in clarification of the used oils. Sludges generated by the reclamation process were disposed in on-site impoundments.

The refinery was active in the early 1940's and was noted on historical aerial photographs available as early as 1941. Refining operations were conducted on land owned by the Chicago, Rock Island and Pacific Railway Company.

Planet Oil and Refining Company participated in the waste oil reclamation business during the early part of the 1940's through the early 1960's. Elliot Refining Company conducted waste oil reclamation activities during the late 1940's through the 1960's.

Salyer Refining Company performed waste oil reclamation operations from the late 1940's through the 1960's. Operations ceased in the late 1960's or early 1970's.

Exposed underground pipes at many locations indicated that an extensive piping network was utilized during operations.

Both sites were found to be contaminated with metals and organic contaminants in the soil and ground water. Also both sites contained acidic sludges found in on-site lagoons or pits.

Initial Response Action

After reviewing the data, EPA determined that the contaminants posed a potential health threat at both sites. The Regional Administrator authorized a removal action in 1989 for the Fourth Street site. The removal action consisted of constructing a fence and posting warning signs around areas of contamination thus mitigating the potential threat to the public of direct contact with the hazardous materials found on-site. In December 1988 the EPA issued an administrative order to the Double Eagle Refining Company to install a fence and warning signs around the site. In April 1989 under EPA oversight the fence was installed and warning signs posted.

The Double Eagle and Fourth Street sites were both proposed for the National Priorities List (NPL) on June 24, 1988, and placed on the NPL on March 31, 1989.

Basis for Taking Action

The purpose of the response actions conducted at the sites was to protect public health and welfare and the environment from releases or threatened releases of hazardous substances from the sites.

A Remedial Investigation/Feasibility Study (RI/FS) for both the Double Eagle and Fourth Street sites was conducted in 1992 for the Source Control Operable Unit (OU). The RIs determined the types and amounts of contaminants present at the sites and discovered the extent of contamination.

The RIs indicated that chemicals of concern (COCs) attributable to site activities included polycyclic aromatic hydrocarbons, chlorinated hydrocarbons and polychlorinated biphenyls, alkyl benzenes, ketones, lead, arsenic, and antimony.

Lead was considered the primary COC given the widespread occurrence in all media and the extremely high concentrations (approximately 15,000 parts per million (ppm) for the Fourth Street site and up to 20,000 ppm for the Double Eagle site) in sludge and contaminated soils and sediments.

An RI/FS was conducted at both sites in 1993 for the Ground Water OU. The RIs found that the ground water under the sites was contaminated with similar COCs to the Source Control OU for the sites. The shallow alluvial and shallow Garber Sandstone Formation were found to be contaminated with COCs above MCLs. No wells were drilled into the deeper Garber-Wellington Aquifer and it was assumed that this deeper aquifer was a potential drinking water source.

Human Health and Environmental Impacts

The purpose of the human health risk characterization is to estimate and characterize the potential human cancer risks and non-cancer adverse health effects associated with exposure to contaminants released from each site. The risk characterization performed on the Source Control OUs indicated that future on-site workers would be exposed to unacceptable levels for both carcinogenic and non-carcinogenic effects of the site COCs. Results of the risk calculations from the Ground Water OUs indicated that adults and children are at risk from exposure to contamination in the ground water for potential carcinogenic and toxic effects.

The environmental risks showed that environmental receptors, in particular migratory fowl, could be adversely affected by site related contaminants. Toxicity tests indicated that there was potential for toxic effects to aquatic life from the water in the Parcel H impoundment.

The RODs stated that actual or threatened releases of hazardous substances from these sites, if not addressed, could pose an imminent and substantial endangerment to public health, welfare, or the environment.

Feasibility Study

The Feasibility Studies (FS) developed and evaluated a range of alternatives to remediate contamination in the Source Control OU and Ground Water OU. The Source Control remedial alternatives for both sites were No Action, Limited Action, On-site Stabilization and Capping, On-site Stabilization and Disposal in an On-site Landfill, On-site Stabilization and Disposal in an Off-site Landfill, Excavation, On-site Incineration, and On-site Capping of Ash, and Excavation, Off-site Incineration and Disposal of Ash. The Ground Water remedial alternatives for both sites were No Action, Limited Action, and Inorganic Precipitation and Activated Carbon Treatment of Organic Contaminants.

4. Remedial Actions

Remedial Action Objectives

The remedial action objectives (RAOs) for the Double Eagle and Fourth Street Source Control OUs are to minimize potential exposure by direct contact or inhalation and to reduce the potential for migration of contaminants into the surface waters and ground water. The two RAOs for the Double Eagle Ground Water OU are to ensure that future potential users of the lower Garber-Wellington aquifer are not exposed to contaminants from the site and to ensure that the North Canadian River is not impacted by contaminants from the site.

Remedy Selection

The EPA Regional Administrator for Region 6 signed the RODs for the Double Eagle and Fourth Street Source Control OUs on September 28, 1992. In the RODs, EPA selected Alternative 5 – Neutralization, Excavation, On-site Stabilization, and Off-site Landfill Disposal, as the remedy.

The major components of the Double Eagle Source Control OU Selected Remedy included:

- Excavation of the contaminated material in the Radio Tower area (approximately 1,500 cubic yards) and Parcel "H" (approximately 1,200 cubic yards)
- Consolidation of this material with the contaminated material on the Double Eagle property
- Demolition of on-site structures and disposal of the asbestos insulation, as necessary
- Use of the surface water in the impoundments in the stabilization process
- On-site stabilization of 42,000 cubic yards of the consolidated material to immobilize and address the hazardous characteristics of the contaminants
- Disposal of the stabilized material in a fully permitted off-site landfill
- Maintenance of the landfill and ground water monitoring around the perimeter of the landfill

The major components of the Fourth Street Source Control OU Selected Remedy included:

- Excavation of the contaminated material on Parcel "H" (approximately 1,200 cubic yards)
- Consolidation of this material with the contaminated material on the Fourth Street property
- Demolition of on-site structures and disposal of the asbestos insulation, as necessary
- Use of the surface water in the impoundments in the stabilization process
- On-site stabilization of 42,000 cubic yards of the consolidated material to immobilize and address the hazardous characteristics of the contaminants
- Dispose of the stabilized material in a fully permitted off-site landfill

The EPA Regional Administrator for Region 6 signed the ROD for the Fourth Street Ground Water OU on September 30, 1993, and signed the ROD for the Double Eagle Ground Water OU on April 19, 1994. In the RODs, EPA selected Alternative 2 – Limited Action as the remedy.

The major components of the Double Eagle and Fourth Street Ground Water OU Selected Remedies included:

- Installation of warning signs to require notification prior to drilling in the area.
- A deed notice filed to notify land owners of the hazards associated with the contaminated ground water in the area of the site.
- Installation of additional deeper monitoring wells further down-gradient to ensure that contaminants do not migrate deeper, or to a receptor point off-site, and determine if an off-site source of contamination exists.
- Establishment of a routine (quarterly sampling for the first two years, then semi-annually for the following three years (in the Double Eagle ROD)) monitoring and maintenance program for ground water sampling and modeling to evaluate contaminant level reductions following removal of the contaminant source.
- Routine inspections to ensure that public use of the upper zone of the Garber-Wellington Aquifer does not occur prior to attainment of the remedial action objectives.
- Five-Year review of the site to determine if further actions need to be taken with regard to the ground water. As part of the 5-year review, data analysis and ground water modeling are included to assess the adequacy of the monitoring and maintenance plan.
- Contingency measures (which include active treatment) that can be implemented if the ground water monitoring indicates an increase in contaminant concentrations (either vertically or horizontally).

Remedy Implementation

The Remedial Design (RD) for the Fourth Street Source Control OU was performed between June 1993 and August 1994 by Fluor Daniel. The Remedial Action (RA) for the Source Control OU at the Fourth Street site was performed between March 1995 and April 1996 by Fluor Daniel. The RA consisted of on-site neutralization and stabilization of wastes containing lead and/or acid exceeding the numerical remedial action goals (RAGs). Hydrated lime and cement kiln dust were mixed with waste materials to neutralize the sulfuric acid and stabilize the lead. 91,200 tons of the treated waste materials were transported and disposed of off-site at the East Oak Landfill in Oklahoma City, Oklahoma. The Source Control OU RA also included the restoration of areas affected by remedial activities and the cleaning and disposing of contaminated equipment and structures. Future source control operation and maintenance activities are not required since all source material above RAGs was removed from the site.

The RD for the Double Eagle Source Control OU was performed between June 1993 and April 1997 by Fluor Daniel. The Remedial Action (RA) for the Double Eagle Source Control OU was performed between August 1997 and March 2000 by Tetra Tech EM, Inc. The initial steps of the RA involved asbestos abatement and demolition of existing structures at the Double Eagle site, which consisted of nine buildings and 59 tanks. Treatment reagents and the treatment method for the Double Eagle Source Control OU were first addressed in the Draft Bench Scale Treatability Study by Fluor Daniel in 1992. The final remedy, which involved adding cement kiln dust and lime to the waste, was included in the Double Eagle ROD and was described in detail in Fluor Daniel's RD.

During the Pilot Waste Treatment Demonstration, conducted during the RA, problems were encountered with stabilizing leachable lead and generating sulfur dioxide. As a result, additional reagents were evaluated and tested. Eventually, Portland cement and Class C fly ash were utilized as the treatment reagents for most of the contaminated waste material. Cement kiln dust was used to a lesser extent.

These reagents were mixed with the acid sludges to (1) solidify the contaminated waste material into a workable material, (2) neutralize the sulfuric acid in the contaminated waste material, and (3) stabilize the leachable lead in the contaminated waste material. A total of 44,186 cubic yards of both the treated waste and the contaminated waste material exceeding the RAGs were transported and disposed of off-site at the East Oak Landfill in Oklahoma City, Oklahoma, which was permitted to accept these wastes. Future source control operation and maintenance activities are not required since all source material above RAGs was removed from the site.

The RD for the Fourth Street Ground Water OU was performed between March 1994 and March 1995. The RD for the Double Eagle Ground Water OU was performed between June 1993 and April 1997. The Ground Water OU RA for the two sites was combined since they share one ground water contaminant plume. Fluor Daniel implemented the RA in two phases.

During Phase I of the RA, the following activities were performed:

- Five speed borings were advanced and geophysically logged to a depth of 200 feet.
- Nineteen piezometers were installed to a depth approximately 5 feet into the ground water. The piezometers were developed and water levels were measured weekly for a month.
- The 938-foot deep production well that existed on the Double Eagle property was plugged and abandoned to eliminate the possibility of downward migration of site-related contaminants.

After the completion of Phase I activities, the data were analyzed and the locations and depths of the Phase II monitoring wells were determined.

The Phase II monitoring wells included two upper monitoring wells installed 10 feet into the top of the bedrock (approximately 60 feet below ground surface) and six deep monitoring wells installed to a depth just above the significant shale layer detected during the speed borings (approximately 150 to 175 feet below ground surface).

The shallower monitoring wells were identified as "upper" monitoring wells, and the deeper monitoring wells were identified as "deep" monitoring wells. In order to be consistent, this terminology is used for the discussion of the five-year review data. Phase I data was used to establish a monitoring well network for the RA. The RA monitoring well network consisted of a total of thirteen wells: five upper monitoring wells (BMW-1 through BMW-5); and the eight Phase II monitoring wells (upper monitoring wells BMW-6A and BMW-7 and deep monitoring wells BMWD-1 through BMWD-6A).

The 22 existing alluvial wells, BMW-6, and the 19 piezometers were abandoned during the Phase II activities. Also during Phase II warning signs were installed.

The DEQ conducted quarterly ground water monitoring of the 13 Garber-Wellington monitoring wells between December 1996 and April 2000. Semi-annual sampling occurred between September 2000 and September 2003.

Results indicated that the concentrations of site contaminants are decreasing except in some wells where there may be off-site sources of contamination. Time graphs of the concentration results of the monitoring events are attached in Appendix 9. In December 2004 and January 2005 the DEQ drilled additional wells off-site near wells BMW-6A and BMWD-1. The results of the additional well study concluded that there are off-site sources of contamination to the North of the sites.

The United States Geological Survey (USGS) performed an evaluation of reduction of levels of contaminant concentrations in 2002. The USGS report verified that a reduction in the levels of contaminant concentrations was occurring (Appendix 10).

The investigations that were performed at the site have shown that contaminant level reduction is taking place, and that the potential receptors or targets of contamination, the North Canadian River and deeper usable portions of the Garber-Wellington aquifer, are not at risk at this time. Hence, in 2005, the DEQ and EPA determined that further monitoring of the ground water of the sites was not warranted. The decision to discontinue ground water monitoring was also based on the fact that the remedial action objectives for the sites were met because the ground water in the vicinity of the sites is not used as water supply, the DEQ is monitoring semi-annually to ensure that the public does not use contaminated ground water in the area, the extremely high concentrations of total dissolved solids make the ground water undesirable as a water supply source, and the North Canadian River is not threatened by site contaminants.

The DEQ plugged all existing on-site wells in October 2005. The EPA issued an Explanation of Significant Differences (ESD) for both sites in January 2006.

The bases for the ESDs were the results of the quarterly and semi-annual monitoring performed by the DEQ between 1996 and 2003, the results of the additional well study performed by the DEQ in 2004 and 2005, the study conducted by the USGS in 2002 which verified that contaminant level reduction was occurring, and that the ground water in the vicinity of the sites is not being used as a water supply. The ESDs documented a final decision to discontinue further semi-annual monitoring. At that time studies indicated that no further action was necessary in regards to the ground water.

The remedial action objectives for the Source Control OUs, to minimize potential exposure by direct contact or inhalation and to reduce the potential for migration of contaminants into the surface waters and ground water, have been accomplished by the remedial actions at the sites. A Remedial Action Report for the Fourth Street Source Control OU was completed in 1996 and the Remedial Action Report for the Double Eagle Source Control OU was completed in 2000.

The remedial action objectives for the Ground Water OUs, to ensure that future potential users of the lower Garber-Wellington aquifer are not exposed to contaminants from the site and to ensure that the North Canadian River is not impacted by contaminants from the site, have also been met by the remedial actions at the sites. Therefore, the EPA issued a Final Close Out Report (FCOR) for both sites in March 2006. The FCORs document that construction activities for the Source Control OU and Ground Water OU have been completed.

Operation and Maintenance

DEQ assumed Operation and Maintenance (O&M) of the sites in March 2006. O&M consists of maintaining the institutional controls on the site and semi-annual search of well drilling records to insure that no one drills drinking water wells on or near the sites. DEQ performed the well drilling record search starting April 2006 through November 2011. Total O&M costs from April 2006 through September 2011 are shown in the table below.

Table 3: Annual System Operations/O&M Costs

Dates		Total Cost rounded to nearest $1,000
From	To	
April 2006	September 2011	$1,000.00

5. Progress Since the Last Five-Year Review

There were no recommendations or follow-up actions listed in the second combined five year review. Since the second combined five-year review was conducted in November 2006, O&M has been conducted, ESDs were issued to clarify that the source control remedial action implemented is based in clean up objectives appropriate for the current and anticipated land uses and to document the need for institutional controls and five year reviews of both sites, and the sites were deleted from the NPL in 2008.

A removal action was conducted at a facility called Henley's Sealant which is located nearby the Fourth Street Site. During this removal it was discovered that the asbestos contamination at Henley's Sealant extended to parts of the Fourth Street Site.

Some asbestos removal was conducted by EPA in June and July of 2011 at the Fourth Street Site [?]. Removal actions included the excavation of asbestos-contaminated soil to a depth of 2 feet below ground surface. EPA is planning future asbestos removal at the Fourth Street Site.

6. Five-Year Review Process

Administrative Components

The five-year review team consisted of Amber Brawdy and Dennis Datin of the DEQ. The review was conducted from September 2011 to May 2012. The tasks for the five-year review included:

1. Develop a project schedule.
2. Review of existing site data.
3. Inspection of the sites on September 27, 2011.
4. Inspection of the site repository on December 19, 2011.
5. Publish a public notice stating that a five-year review was underway, and
6. Prepare the five-year review report.

Community Involvement

The community was notified in the Daily Oklahoman on October 18, 2011 and in the Black Chronicle on October 13, 2011 that a five-year review was being conducted. A copy of the Press Release issued by the DEQ is provided as an attachment to this report in Appendix 6. [We need to attach a copy as actually published, not just the DEQ Press Release without any proof of publication.]

Upon signature, the Third Combined Five-Year Review Report will be placed in the information repositories for each site, both local and at the EPA Region 6 office in Dallas, Texas. A notice will then be published in the local newspaper to summarize the findings of the review and announce the availability of the report at the information repositories.

Document Review

The following documents were reviewed to complete this five-year review:

- The second combined 5-year review, 2002
- The Record of Decision documents, 1992-1994
- The Final Close Out Reports, 2006
- The Explanation of Significant Differences, 2006 & 2008
- USGS Report, 2004
- Plugging of Monitoring Well Memo 2006
- 2006-2011 Operation and Maintenance Well Search Memos
- Direct Final Notice of Deletion of Double Eagle Refinery Co. Superfund Site from NPL (Federal Register: June 13, 2008 Volume 73, Number 115)
- Direct Final Notice of Deletion of 4th Street Abandoned Refinery Superfund Site from NPL (Federal Register: June 13, 2008 Volume 73, Number 115)
- Henley's Sealant Pollution Report 1 (2010) & Pollution Report 2 (2011)

Data Review

Operation and Maintenance Well Completion Searches identified no new wells have been drilled.

Site Inspection

Amber Brawdy and Amy Brittain of the DEQ conducted a site inspection on September 27, 2011. The visual inspection revealed that the sites looked to be in good condition. There was no evidence of drilling or digging on the sites. It was observed that the front gate to the Double Eagle site was open.

Interviews

On September 26, 2011, Bart Canellas with the EPA was interviewed. He is the remedial project manager for both sites for EPA. He had no problems with the sites.

On September 26, 2011, Dennis Datin with the DEQ was interviewed. He is the project manager for the Source Control OU for the DEQ. He had no problems with the sites.

On October 5, 2011, Mike McAteer with EPA Region 6 was interviewed. In July of 2011, he worked on a removal action at a nearby site (Henley's Sealant) during which asbestos-contaminated soil was found at the 4th Street Site. He did not have any problems with the current remedy for the sites.

On October 13, 2011, Chris Varga with the City of Oklahoma City Planning Department was interviewed. He had no problems with the sites.

7. Technical Assessment

An overall assessment of the remedy implemented at the sites was conducted to confirm that the selected remedy is operating according to the ROD expectations and remains protective of human health and the environment. The assessment was used primarily to answer the following questions:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents?

The decision documents for the Double Eagle and Fourth Street sites are the two Source Control OU RODs and the two Ground Water OU RODs. All activities at the sites were consistent with the RODs, and with the RD and RA statements of work.

All contaminated soil above the site RAOs was excavated, treated and disposed of off-site at a permitted solid waste landfill. No O&M activities are necessary for the Source Control OU because the site soil was cleaned-up to commercial/industrial levels.

The ground water sampling under the Ground Water OU RA demonstrated that contaminant level reduction was taking place, that off-site sources of contamination exist, that potential users of the lower Garber-Wellington aquifer are not exposed to contaminants from the site, and that the North Canadian River is not impacted by contaminants from the site. The 2006 ESD determined that further ground water monitoring is not necessary at the sites. The wells were plugged by the DEQ.

DEQ's O&M activities for the Ground Water OU include: a search of well drilling records to insure that no drinking water wells are installed in the area of the sites; and routine inspections to insure that the future reuse of the sites is consistent with clean-up activities that were performed on the sites. DEQ filed deed notices in the Oklahoma County Courthouse to notify landowners of the clean-up activities that have taken place.

On September 26, 2011, the DEQ went to the County Courthouse, looked through the deed records, and found both deed notices readily available to the public (see Appendix 7).

On October 3, 2011 the DEQ searched the City of Oklahoma City Online Zoning locator to ensure that the land use at the sites has not changed since the last combined five year review (see Appendix 8).

There were no issues raised in the last five year review. The remedy is functioning adequately for both sites. There have been no changes in the land use of the surrounding areas since the remedy began.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

The baseline risk assessments conducted during the 1992 and 1993 RI/FSs were based on an exposure scenario for future workers and ingestion of ground water.

Current and future land use are expected to remain commercial/industrial on-site and mixed use off-site and the state is ensuring through O&M activities that no one drinks the ground water.

The sites are in the Reno redevelopment corridor and the City of Oklahoma City Planning Department is actively working on the redevelopment of these sites and the surrounding areas. Changes in risk assessment methodologies since the time of the RODs do not call into question the protectiveness of the remedy. There have been no changes in regulations that would change any of the risk-based RAGs that were set for the sites.

The remedial action complies with all applicable or relevant and appropriate requirements (ARARs). These include the EPA and DEQ rules and regulations cited in the RODs and ESDs. Because all surface contamination has been removed from the sites and institutional controls are in place to insure that no people drink the ground water, no risk recalculation/assessment is necessary for these sites.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.

Technical Assessment Summary

The technical assessment, based on the data review, site inspection, and technical evaluation indicates that the remedial actions selected for the sites continue to be implemented as intended by the decision documents.

8. Issues

Table 4: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
In July 2011, EPA Region 6 discovered asbestos contamination in soil on the 4th Street Site during a removal action at a nearby facility (Henley's Sealant). Some removal work was conducted in June and July 2011. Future removal is planned.	N	N

9. Recommendations and Follow-up Actions

Table 5: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Asbestos contamination in soil	Continue to monitor future removal actions at the 4th Street Site.	(possibly) PRP	EPA Region 6 & ODEQ	N/A	N	N

10. Protectiveness Statement

Because the remedial actions at all operable units are protective, the sites are protective of human health and the environment.

11. Next Review

The next combined five-year review, the fourth for the sites, will be due within five years from the date of this report.

Appendix 1

Double Eagle Superfund Site

Legend

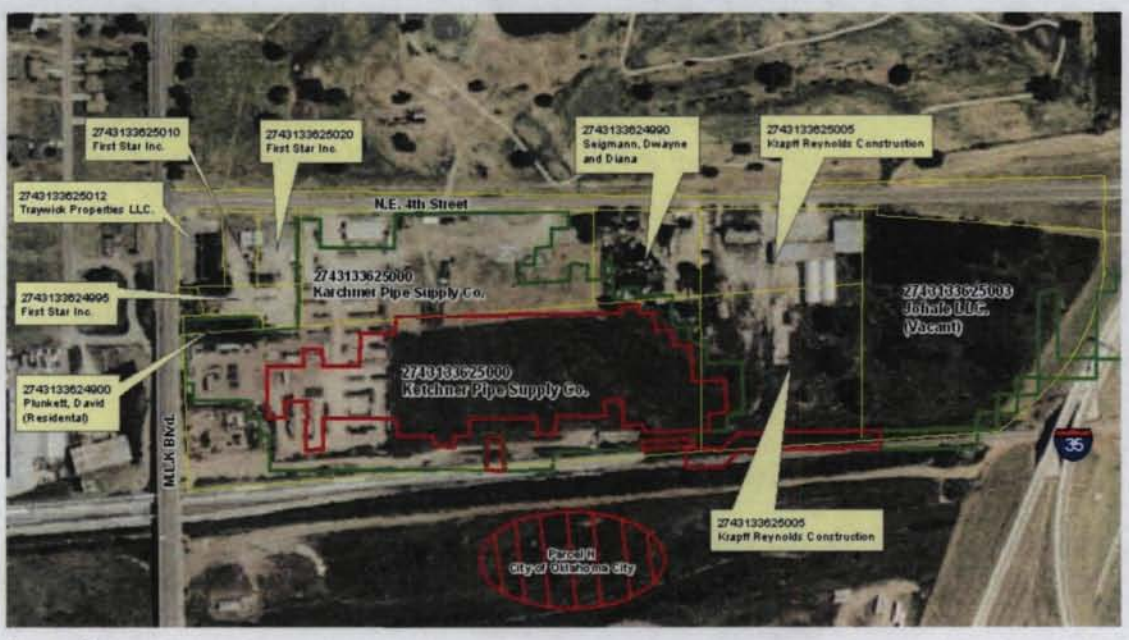
- Areas Sampled and Remediated
- Radio Tower Area - Sampled and Remediated
- Property Boundary
- Railroad

(Property Boundary Data: Oklahoma County Assessor)

N

0 305 610 1,220 Feet

4th Street Abandoned Refinery



Legend

- Areas Sampled and Remediated
- Area Sampled
- Property Line (w/Parcel ID)

N

0 0.05 0.1 0.2 Miles

Sampling data from 1995 Property Line Data Source: Oklahoma County Assessor

Date Created: 10/07/2005

Appendix 2

List of Documents Reviewed

U.S. Environmental Protection Agency, Comprehensive Five-Year Review Guidance, (OSWER No. 9355.7-03B-P or EPA 540-R-01-007), June 2001.

U.S. Environmental Protection Agency, Double Eagle Refinery Co., Explanation of Significant Differences, January 2006.

U.S. Environmental Protection Agency, Double Eagle Refinery Co., Explanation of Significant Differences, May 2008.

U.S. Environmental Protection Agency, Double Eagle Refinery Co., Final Close Out Report, March 2006.

U.S. Environmental Protection Agency, Double Eagle Refinery Site Record of Decision Ground Water OU, April 1994.

U.S. Environmental Protection Agency, Double Eagle Refinery Site Record of Decision Source Control OU, September 1992.

U.S. Environmental Protection Agency, First Combined Five-Year Review Report for the Double Eagle and Fourth Street Refinery Sites, July 2002.

U.S. Environmental Protection Agency, Fourth Street Abandoned Refinery, Explanation of Significant Differences, January 2006.

U.S. Environmental Protection Agency, Fourth Street Abandoned Refinery, Explanation of Significant Differences, May 2008.

U.S. Environmental Protection Agency, Fourth Street Abandoned Refinery, Final Close Out Report, March 2006.

U.S. Environmental Protection Agency, Fourth Street Refinery Site Record of Decision Ground Water OU, September 1993.

U.S. Environmental Protection Agency, Fourth Street Refinery Site Record of Decision Source Control OU, September 1992.

Oklahoma Department of Environmental Quality, Memorandum: Plugging of all monitoring wells at the Double Eagle and 4th Street sites, January 2006.

U.S. Geological Survey, Reductive Dechlorination of Chlorinated Ethenes Under Oxidation-Reduction Conditions and Potentiometric Surfaces in Two Trichloroethene-Contaminated Zones at the Double Eagle and Fourth Street Sites in Oklahoma City, Oklahoma, 2004.

U.S. Environmental Protection Agency, Direct Final Notice of Deletion of Double Eagle Refinery Co. Superfund Site from NPL (Federal Register: June 13, 2008 Volume 73, Number 115)

U.S. Environmental Protection Agency, Direct Final Notice of Deletion of 4th Street Abandoned Refinery Superfund Site from NPL (Federal Register: June 13, 2008 Volume 73, Number 115)

U.S. Environmental Protection Agency, Henley's Sealant Pollution Report 1 (2010) & Pollution Report 2 (2011)

Appendix 3

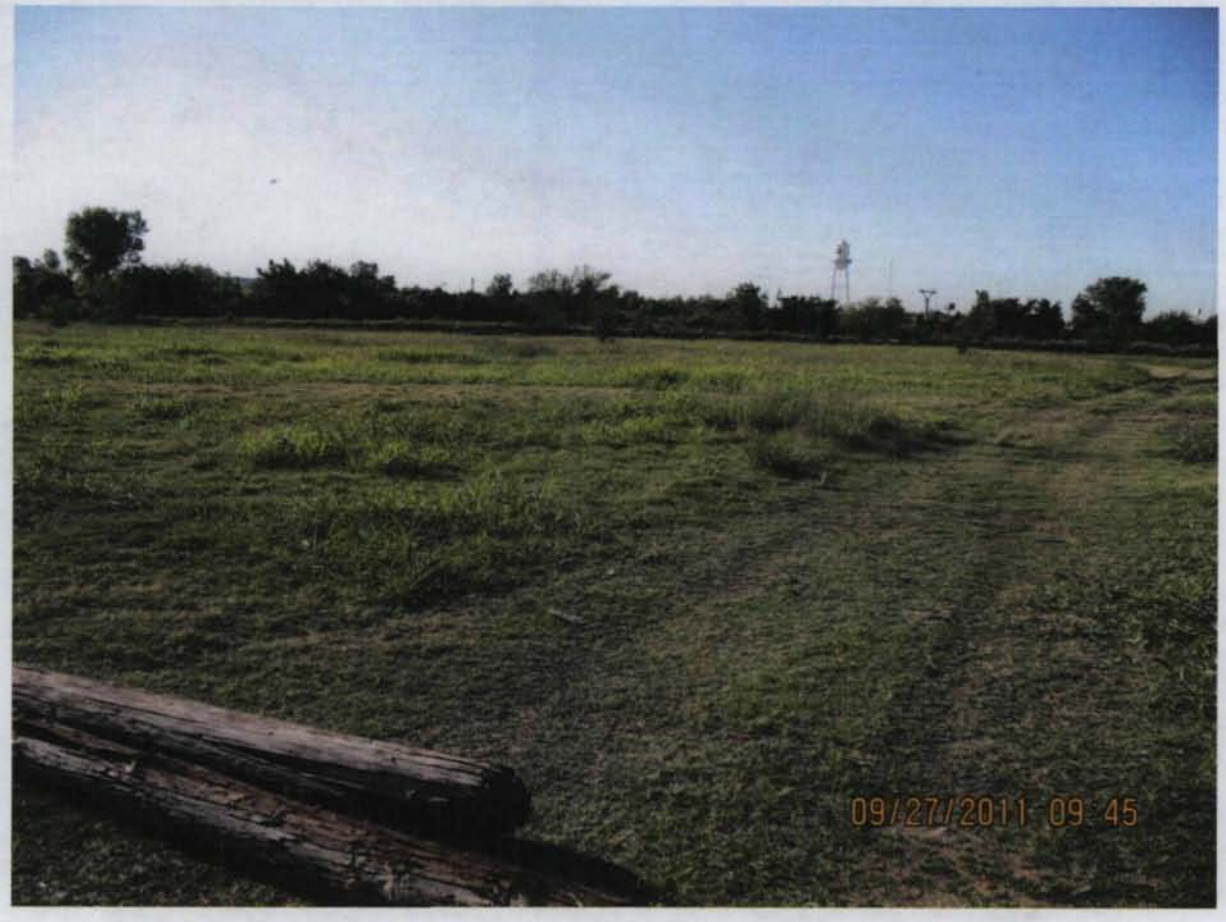


Photo # 1
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Overview of the 4th Street Superfund Site looking southeast

Photo # 2
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Overview of the 4th Street Superfund Site looking southwest

Photo # 3
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Double Eagle Superfund Site- Trash on gravel road on south side of site

Photo # 4
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Overview of the Double Eagle Superfund Site looking northeast

Photo # 5
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Overview of the Double Eagle Superfund Site looking northwest

Photo # 6
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Double Eagle Superfund Site-Trash on gravel road on south side of site

Photo # 7
Photographer: Amber Brawdy
Witness: Amy Brittain
Date: September 27, 2011
Subject: Sign on the front gate of the Double Eagle Superfund Site

Appendix 4

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Double Eagle/4th Street Refinery	**Date of inspection:** 9/27/11
Location and Region: Oklahoma City Region 6	**EPA ID:** OKD007188717 and OKD980696470
Agency, office, or company leading the five-year review: ODEQ	**Weather/temperature:** sunny 66°

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other _____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency OK Dept of Env. Quality
Contact Dennis Datin — Engineer — 9/26/11 — 405-702-5125
Name — Title — Date — Phone no.
Problems; suggestions; ■ Report attached _____

Agency US EPA Region 6
Contact Bart Canellas — Remedial Project Manager — 9/26/11 — (214) 665-6662
Name — Title — Date — Phone no.
Problems; suggestions; ■ Report attached _____

Agency City of Oklahoma City
Contact Chris Vargo — Brownfields Coordinator — 10/13/11 — (405) 297-1639
Name — Title — Date — Phone no.
Problems; suggestions; ■ Report attached _____

Agency US EPA Region 6
Contact Mike McAfee — On Scene Coordinator — 10/5/11 — (214) 354-9371
Name — Title — Date — Phone no.
Problems; suggestions; ■ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual — ☐ Readily available — ☐ Up to date — ■ N/A
   - ☐ As-built drawings — ☐ Readily available — ☐ Up to date — ■ N/A
   - ☐ Maintenance logs — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** — ■ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

3. **O&M and OSHA Training Records** — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ■ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ■ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ■ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks _____

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

7. **Groundwater Monitoring Records** — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ■ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ■ N/A

   Remarks _____

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ■ N/A

    Remarks _____

IV. O&M COSTS

1. **O&M Organization**
   - ■ State in-house
   - ☐ Contractor for State
   - ☐ PRP in-house
   - ☐ Contractor for PRP
   - ☐ Federal Facility in-house
   - ☐ Contractor for Federal Facility
   - ☐ Other _____

2. **O&M Cost Records**
   - ■ Readily available ☐ Up to date
   - ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate _____ ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ (Date) To _____ (Date) _____ (Total cost) ☐ Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) ☐ Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) ☐ Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) ☐ Breakdown attached
   From _____ (Date) To _____ (Date) _____ (Total cost) ☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A
   Remarks _____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ■ N/A
   Remarks _____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) OWRB Drilling Record Search

Frequency two times per year

Responsible party/agency ODEQ

Contact Amber Brawley (Name) Env. Programs Specialist (Title) 4/26/11 (Date) 405-702-5133 (Phone no.)

Reporting is up-to-date ■ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ■ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident

Remarks

2. **Land use changes on site** ☐ N/A

Remarks

3. **Land use changes off site** ☐ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks trash is being dumped on gravel road which runs on the south side of the site

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks _____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks _____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks _____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks _____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks _____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ■ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ■ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ■ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ■ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ■ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ■ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy is operating as planned

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The O&M activity appears to be adequate.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. No significant issues noted during the site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. No opportunities for optimization were noted during the site inspection.

Appendix 5

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Chris Varga	Brownfields Coordinator	City of Oklahoma City	10/13/11
Name	Title/Position	Organization	Date
Dennis Datin	Engineer	DEQ	9/26/11
Name	Title/Position	Organization	Date
Bart Canellas	Remedial Project Manager	EPA Region 6	9/26/11
Name	Title/Position	Organization	Date
Mike McAteer	On Scene Coordinator	EPA Region 6	10/5/11
Name	Title/Position	Organization	Date

INTERVIEW RECORD

Site Name: Double Eagle and Fourth Street Superfund Sites		**EPA ID No.:** OKD980696470 and OKD007188717
Subject: : Five Year Review		**Time:** 9:57 am **Date:** 10/13/11
Type: Telephone Visit Other **Location of Visit:** email		Incoming Outgoing

Contact Made By:

Name: Amber Brawdy	**Title:** Env. Programs Specialist	**Organization:** DEQ

Individual Contacted:

Name: : Chris Varga	**Title:** Brownfields Coordinator	**Organization:** City of Oklahoma City, Urban Redevelopment
Telephone No: 405-297-1639 **Fax No:** **E-Mail Address:** chris.varga@okc.gov		**Street Address:** 420 West Main Street, 9th Floor **City, State, Zip:** OKC, OK 73102

Summary Of Conversation

1. What is your overall impression of the project? Project was successful in minimizing risk; getting the sites back into productive reuse will continue to be challenging.

2. How has the City of Oklahoma City been involved with the sites in the last 5-years? ? Minimally. We occasionally get a call or inquiry on the status of the site. We also have held meetings with several developers with interest in the property around and potentially including Double Eagle; however, none of the development projects materialized.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. Nothing I am aware of.

4. Do you feel well informed about the site's activities and progress? I am not aware there are any on-going activities or progress on the site.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? No.

6. Have there been any changes in the actual or projected land use for these sites? No.

INTERVIEW RECORD

Site Name: Double Eagle and Fourth Street Superfund Sites		**EPA ID No.:** OKD980696470 and OKD007188717
Subject: Five Year Review		**Time:** 1:53 pm **Date:** 9/26/11
Type: Telephone Visit Other **Location of Visit:** email		Incoming Outgoing

Contact Made By:

Name: Amber Brawdy	**Title:** Env. Programs Specialist	**Organization:** DEQ

Individual Contacted:

Name: Dennis Datin	**Title:** Engineer	**Organization:** DEQ
Telephone No: 405-702-5215 **Fax No:** 405-702-5101 **E-Mail Address:** dennis.datin@deq.ok.gov	**Street Address:** 707 N Robinson **City, State, Zip:** OKC, OK 73101	

Summary Of Conversation

1. What is your overall impression of the project? It went good.

2. Are you aware of any communication problems with the City of Oklahoma City, the surrounding community or the public? No.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. None that I know of.

4. Do you feel well informed about the site's activities and progress? Yes.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? No.

6. Have there been any changes in the actual or projected land use for these sites that you are aware? Not that I am aware of.

INTERVIEW RECORD

Site Name: Double Eagle and Fourth Street Superfund Sites		**EPA ID No.:** OKD980696470 and OKD007188717
Subject: Five Year Review		**Time:** 10:51 am **Date:** 9/26/11
Type: Telephone Visit Other **Location of Visit:** email		Incoming Outgoing

Contact Made By:

Name: Amber Brawdy	**Title:** Env. Programs Specialist	**Organization:** DEQ

Individual Contacted:

Name: Bart Canellas	**Title:** EPA Remedial Project Manager	**Organization:** EPA, Region VI
Telephone No: 214-665-6662 **Fax No:** 214-665-6660 **E-Mail Address:** canellas.bart@epamail.gov		**Street Address:** 1445 Ross Avenue **City, State, Zip:** Dallas, TX 75202

Summary Of Conversation

1. What is your overall impression of the Double Eagle project? Remediation of the Double Eagle Refinery Co. site and the nearby Fourth Street Abandoned Refinery sites was completed successfully.
2. How has your organization been involved with the Double Eagle site in the last 5-years? The above sites were placed in the EPA National Priorities List (NPL) and they were remediated under the oversight of the EPA and the State Oklahoma Department of Environmental Quality ODEQ.
3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. There have been no complaints or questions related to the implemented actions at these sites.
4. Do you feel well informed about the site's activities and progress? The EPA is kept informed through periodic quarterly reports from the ODEQ. The EPA also keeps a site summary in their Internet website that is updated every month.
5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? None at this time.
6. Have there been any changes in the actual or projected land use for the Double Eagle site (something other than commercial/industrial)? Note that I am aware. The sites are available for future re-use according to redevelopment plans by the City of Oklahoma City. Anticipated uses and current zoning is for industrial / commercial uses. The EPA supports the future re-use of these properties.

INTERVIEW RECORD

Site Name: Double Eagle and Fourth Street Superfund Sites		**EPA ID No.:** OKD980696470 and OKD007188717
Subject: Five Year Review		**Time:** **Date:** 10/5/11
Type: Telephone Visit Other **Location of Visit:** email		Incoming Outgoing

Contact Made By:

Name: Amber Brawdy	**Title:** Env. Programs Specialist	**Organization:** DEQ

Individual Contacted:

Name: Mike McAteer	**Title:** On Scene Coordinator	**Organization:** EPA Region 6
Telephone No: 214-354-9371 **Fax No:** **E-Mail Address:**	**Street Address:** 1445 Ross Ave **City, State, Zip:** Dallas, TX 75202	

Summary Of Conversation

1. What is your overall impression of the project? My impression is that the goals of the original remedial action have been met and that the risks from the original refinery wastes have been eliminated.

2. How have you been involved with the sites in the last five years? I have been involved with this site only because EPA is conducting a removal action nearby (Henley's Sealant Site) that expanded over the last year to include sampling on the former Fourth Street Refinery. We discovered asbestos contamination in soil on the Fourth Street site this past July. We have conducted some removal work on the south side of the former refinery site but, we are planning to conduct further removal work on the site within the next year.

3. Have there been any complaints, violations, or other incidents related to the sites requiring a response by your office? Because we have discovered asbestos contamination in soils on the Fourth Street Site, we conducted some removal work on the property in June and July of 2011. Additional removal work will need to be conducted on the site to address the risks posed by the elevated asbestos levels. We are working with the responsible party now to conduct this work hopefully within the next year. Approximately 20,000 cubic yards of asbestos contaminated soil from the former Fourth Street site needs to be removed.

4. Do you have any comments, suggestions, or recommendations regarding the management or operation of the sites? I highly recommend that anyone entering the property be made aware of the asbestos contamination. Proper PPE needs to be worn when working on the property.

Appendix 6

Five-Year Review for the Double Eagle and
4th Street Superfund Sites
The Oklahoma Department of Environmental Quality
(DEQ) and the U.S. Environmental Protection
Agency (EPA) are beginning the five-year review of
the Double Eagle and Fourth Street Superfund Sites
in September 2011. The purpose of this review is to
determine whether the site remedy remains protective of human health and the environment and to
document the methods, findings, and conclusions of
the five-year review in a report. The report will be
available to the public in May 2012. This will be the
third combined Five-Year Review for these sites.
The Double Eagle and Fourth Street Superfund Sites
are adjoining properties in Oklahoma City, Oklahoma, near the intersection of Martin Luther King
Avenue and NE 4th Street. These two sites share
similar past operations, contaminants, a common
ground water operable unit, and similar Records of
Decision. Both facilities operated as used oil re-refiners over many years. Historical operations resulted in wide-spread disposal of residual waste,
mostly in pits, on both sites. These pits were generally acidic tar sludges with high lead concentrations. On both sites, the acidic sludges were neutralized, stabilized and transported offsite for disposal in a landfill. The excavated areas were filled
with clean soil and vegetated. The cleanup was
completed in 1999.
The ground water in the alluvial and shallow Garber-Wellington aquifers under the sites is contaminated
with chlorinated solvents, hydrocarbons and metals
from the refining operations. The selected remedy
for ground water was natural attenuation and routine monitoring. In 2006 EPA issued an Explanation
of Significant Difference for both sites that documents EPA's final decision to discontinue further
groundwater monitoring after confirming this is a
Class III (non usable water aquifer due to high total
dissolved solids content of the water), conditions
are adequate to support natural reduction of the
contaminants, and potential receptors (surface waters and usable ground water supplies) are not
likely to be affected. In 2008 EPA deleted these
sites from the National Priorities List. DEQ continues to check the sites and the surrounding area to
assure that no drinking water wells are placed near
the sites.
If you have any questions or need further information about the five-year review please contact Amber Brawdy, DEQ, Environmental Programs Specialist, Land Protection Division, Site Remediation Section (405) 702-5133. Information about these sites
is also available on EPA's website at
www.epa.gov/earth1r6/6sf/6sf-ok.htm.
www.epa.gov/earth1r6/6sf/6sf-ok.htm

STATE OF OKLAHOMA,
COUNTY OF OKLAHOMA } SS.

Affidavit of Publication

Carol Davis, of lawful age, being first duly sworn, upon oath deposes and says that she/he is the Classified Legal Notice Admin of The Oklahoma Publishing Company, a corporation, which is the publisher of *The Oklahoman* which is a daily newspaper of general circulation in the State of Oklahoma, and which is a daily newspaper published in Oklahoma County and having paid general circulation therein; that said newspaper has been continuously and uninterruptedly published in said county and state for a period of more than one hundred and four consecutive weeks next prior to the first publication of the notice attached hereto, and that said notice was published in the following issues of said newspaper, namely:

Dept Of Environmental Quality
10885028 - Metro
Published on 10/18/2011

Carol Davis

Subscribed and sworn to before me this Oct. 18, 2011

Diannah Featherston
Notary Public

My commission expires April 1, 2013

DIANNAH FEATHERSTON NOTARY # 01004284 EXP. 04/01/13 PUBLIC STATE OF OKLAHOMA

ODEQ

THE BLACK CHRONICLE

PROOF OF PUBLICATION

In the _____ Court of _____ Oklahoma

STATE OF OKLAHOMA

STATE OF OKLAHOMA, _____)

COUNTY OF **OKLAHOMA**)

RUSSELL M. PERRY, of lawful age, being duly sworn upon oath, deposes and says: That he is the **PUBLISHER** of the ***The Black Chronicle***, weekly newspaper printed and published in the city of Oklahoma City, County of Oklahoma, State of Oklahoma, and has personal knowledge of the facts hereinafter stated.

That a printed notice, copy of which is here to attached, was published in the regular and entire issue of said newspaper, and not in any supplement thereof, for One consecutive Week, the first publication thereof being made on Thursday the 13th day of October, '11 and the last publication on the 13th day of October, '11.

That said newspaper had been continuously and uninterruptedly published in said county during a period of more than one hundred and four (104) weeks consecutively and immediately prior to the first publication of the attached notice or advertisement; that it has entrance into the United States mails in the city and county where published; that said newspaper comes within all of the prescriptions and requirements of Title 25 Oklahoma Statutes of 1941, Section 102, and meets all other requirements of the laws of the State of Oklahoma with reference to legal publications.

Russell Perry

Subscribed and sworn to before me this 14th day of October, '11

Laurel A Talley

Notary Public

My Commission Expires:

NOTARY SEAL PUBLIC

LAUREL A. TALLEY
Notary Public
State of Oklahoma
Commission # 03006267 Expires 04/27/15

Publication fee $ 200

Dated this 5th day of October, 2011.

Signature of application(s): If partnership, all partners must sign. If corporation, an officer of the corporation must sign. If limited liability company a manager must sign. S/:Keith Brown, County of Oklahoma, State of Oklahoma

Before me, the undersigned notary public, personally appeared: Keith Brown to me known to be the person(s) described in and who executed the foregoing application and acknowledge the they executed the same as their free act and deed. S/Laurel Talley, Commission Expires 4-27-2015

RECEIVED
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WATER PROTECTION DIVISION
DEPARTMENT OF ENVIRONMENTAL QUALITY

Advertise Today!

Five-Year Review for the Double Eagle and 4th Street Superfund Sites

The Oklahoma Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) are beginning the five-year review of the Double Eagle and Fourth Street Superfund Sites in September 2011. The purpose of this review is to determine whether the site remedy remains protective of human health and the environment and to document the methods, findings, and conclusions of the five-year review in a report. The report will be available to the public in May 2012. This will be the third combined Five-Year Review for these sites.

The Double Eagle and Fourth Street Superfund Sites are adjoining properties in Oklahoma City, Oklahoma, near the intersection of Martin Luther King Avenue and NE 4th Street. These two sites share similar past operations, contaminants, a common ground water operable unit, and similar Records of Decision. Both facilities operated as used oil re-refiners over many years. Historical operations resulted in wide-spread disposal of residual waste, mostly in pits, on both sites. These pits were generally acidic tar sludges with high lead concentrations. On both sites, the acidic sludges were neutralized, stabilized and transported offsite for disposal in a landfill. The excavated areas were filled with clean soil and vegetated. The cleanup was completed in 1999.

The ground water in the alluvial and shallow Garber-Wellington aquifers under the sites is contaminated with chlorinated solvents, hydrocarbons and metals from the refining operations. The selected remedy for ground water was natural attenuation and routine monitoring. In 2006 EPA issued an Explanation of Significant Difference for both sites that documents EPA's final decision to discontinue further groundwater monitoring after confirming this is a Class III (non usable water aquifer due to high total dissolved solids content of the water), conditions are adequate to support natural reduction of the contaminants, and potential receptors (surface waters and useable ground water supplies) are not likely to be affected. In 2008 EPA deleted these sites from the National Priorities List. DEQ continues to check the sites and the surrounding area to assure that no drinking water wells are placed near the sites.

If you have any questions or need further information about the five-year review please contact Amber Brawdy, DEQ, Environmental Programs Specialist, Land Protection Division, Site Remediation Section (405) 702-5133. Information about these sites is also available on EPA's website at www.epa.gov/earth1r6/6sf/6sf-ok.htm.

Appendix 7

Memorandum

Date: September 26, 2011

To: Double Eagle and Fourth Street File

From: Amber Brawdy, Environmental Programs Specialist IV

Re: Deed Notice Search for the Double Eagle and Fourth Street Superfund Sites

On September 26, 2011, Amber Brawdy from the DEQ went to the County Clerk, Registrar of the Deeds Office at the Oklahoma County Court House in Oklahoma City to search the records to see if the deed notices filed by the DEQ for both the Double Eagle and the Fourth Street Superfund sites could be found easily by the public. By searching the county's records on computer workstations in the Registrar of Deeds Office anyone can find both deed notices with only the legal descriptions of the properties. County records can also be searched using any computer with internet access to the County Clerk's website http://clerkpi.oklahomacounty.org . The deed information is provided in the tables below:

Double Eagle	
Legal Description	Unplated SE ¼ S35 T12N R3W
Date Filed:	6/22/2001
Document Number:	2001084662
Book:	8127
Page:	1769
Number of Pages:	3

Fourth Street	
Legal Description	Unplated SW ¼ S36 T12N R3W
Date Filed:	6/22/2001
Document Number:	2001084663
Book:	8127
Page:	1772
Number of Pages:	3

FOURTH STREET ABANDONED
OKD980696470
0665
23.03

MARK COLEMAN
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

FRANK KEATING
Governor

June 19, 2001

Mr. Bart Canellas (6SF-LP)
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Re: Notice of Remedial Action
Ground Water Operable Unit (GWOU)
Fourth Street/Double Eagle Superfund Sites

Dear Mr. Canellas:

Attached are copies of the Notices of Remedial Action filed with the Oklahoma County Clerk's Office for the Double Eagle and Fourth Street Superfund sites. These sites are located in Oklahoma County, Oklahoma. Notices were required to be filed under the provisions of the Oklahoma Statutes, Title 27A (2000 Supp.), Section 2-7-123(B), and in accordance with the Record of Decision (ROD) approved October 1993, for the Double Eagle/Fourth Street Ground Water Operable Unit.

If you have any questions, please feel free to contact me at (405) 702-5121.

Sincerely,

Kathleen Buckley

Kathleen Buckley
Voluntary Cleanup and Brownfields Section
DEQ Land Protection Division

enclosures

901316

902355

NOTICE OF

REMEDIATION & GROUNDWATER CONTAMINATION

DOUBLE EAGLE REFINERY SUPERFUND SITE

This Notice is made pursuant to Oklahoma Statutes, Title 27A (2000 Supp.), Section 2-7-123(B), concerning the former Double Eagle Refinery site. It is also noticed that groundwater contamination exists at this site in the upper alluvial aquifer and the upper Garber Wellington, approximately 50'-150' below ground surface level. Attempts to use groundwater for human consumption is not advised.

SITE DESCRIPTIONS: THE DOUBLE EAGLE REFINERY (DER) SITE is located at 1900 Northeast First Street, in Oklahoma City, Oklahoma. The aerial extent of the site is approximately 12 acres and occupies the southeast Quarter (SE1/4) of Section 35, Township 12 North, Range 3 West, Oklahoma County, Oklahoma. It is bounded on the north by ATSF Railroad (Union Pacific) tracks and on the east by Martin Luther King Blvd.

DOUBLE EAGLE REFINERY recycled used motor oil into finished lubricating oil. The refinery was active as early as 1929, and is known to have accepted waste oil for storage until 1980. The recycling process included the use of sulfuric acid (H_2SO_4) and bleaching clays. Crude oil or waste oil was steam heated in tanks. Acid and bleaching clay were added to clarify and separate the desired oil product from the heavy tars. Waste consisted primarily of acidic tar material mixed with clay. Site wastes contained a number of metals and organic contaminants. These wastes were considered hazardous because they were found to be corrosive and toxic. Clean up levels were based on risk based levels established for industrial waste sites.

REMEDIATION ACTION: Remediation took place under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Administrative Record for the Double Eagle Refinery site is available for review at the following locations in Oklahoma City: Ralph Ellison Library and Oklahoma Department of Environmental Quality.

Remediation activities (RA) were completed under two operable units:

Surface Contamination Operable Unit (SCOU): Work was performed for EPA under Work Assignment No. 013-RA-RA-06B1 of Response Action No. 68-W6-0037 in accordance with specifications of the remedial design prepared as a result of the September 1992 Record of Decision (ROD). The DER Site refers to the contaminated area above the water table where the former used oil refinery was located west of parcel H and North of the Radio Tower.

Remedial Activities included: Asbestos abatement, and the excavation, treatment, and removal for off site disposal of 44,186 yd^3 of contaminated waste materials containing lead and acid. Waste material was excavated down to the water table. Excavated areas were backfilled, regraded, and revegetated to prevent erosion. The remedial action was completed in June 29, 1999.

Ground Water Contamination Operable Unit (GWOU): Work was performed for EPA under Work Assignment No. 57-6NE5 and 58-6NB1 in accordance with specifications of the remedial design prepared as a result of the October 1993 Record of Decision (ROD). Contaminants found in the ground water are similar to those found in the on-site sludges. Contaminants of Concern include lead, arsenic, and organic chemicals such as chlorinated hydrocarbons and benzene compounds. The intent of the RA was to prevent migration of contaminants from the shallow aquifer to the deeper aquifer, and to prevent migration of contaminants to the North Canadian River. The selected remedy for the site is natural attenuation. Remediation activities were performed in two phases. Phase One: the installation of piezometers and speed borings, geophysical logging and removal of the DER Deep Well. Phase Two: installation of ground water monitor wells to monitor the upper alluvial aquifer (approx. 50'-60' bgs) and upper portion of the Garber-Wellington (140'-150' bgs), abandonment of alluvial wells and piezometers, and installation of warning signs. Ground water monitoring of the upper alluvial aquifer and upper portion of the Garber-Wellington aquifer continues.

Appropriate Land Uses: The site is considered appropriate for activities associated with industrial/commercial uses. Cleanup levels met during remediation are not conducive for residential uses.

Dated this 19th day of June, 2001.

Mark Coleman

Mark S. Coleman, Executive Director
Department of Environmental Quality

ACKNOWLEDGMENT

STATE OF OKLAHOMA)
) SS:
COUNTY OF OKLAHOMA)

Before me, the undersigned, a Notary Public in and for said County and State on this 19th day of June, 2021 personally appeared _____ to me known to be the identical person who executed the within and foregoing instrument and acknowledged to me that he executed the same as his free and voluntary act and deed for the uses and purposes therein set forth.

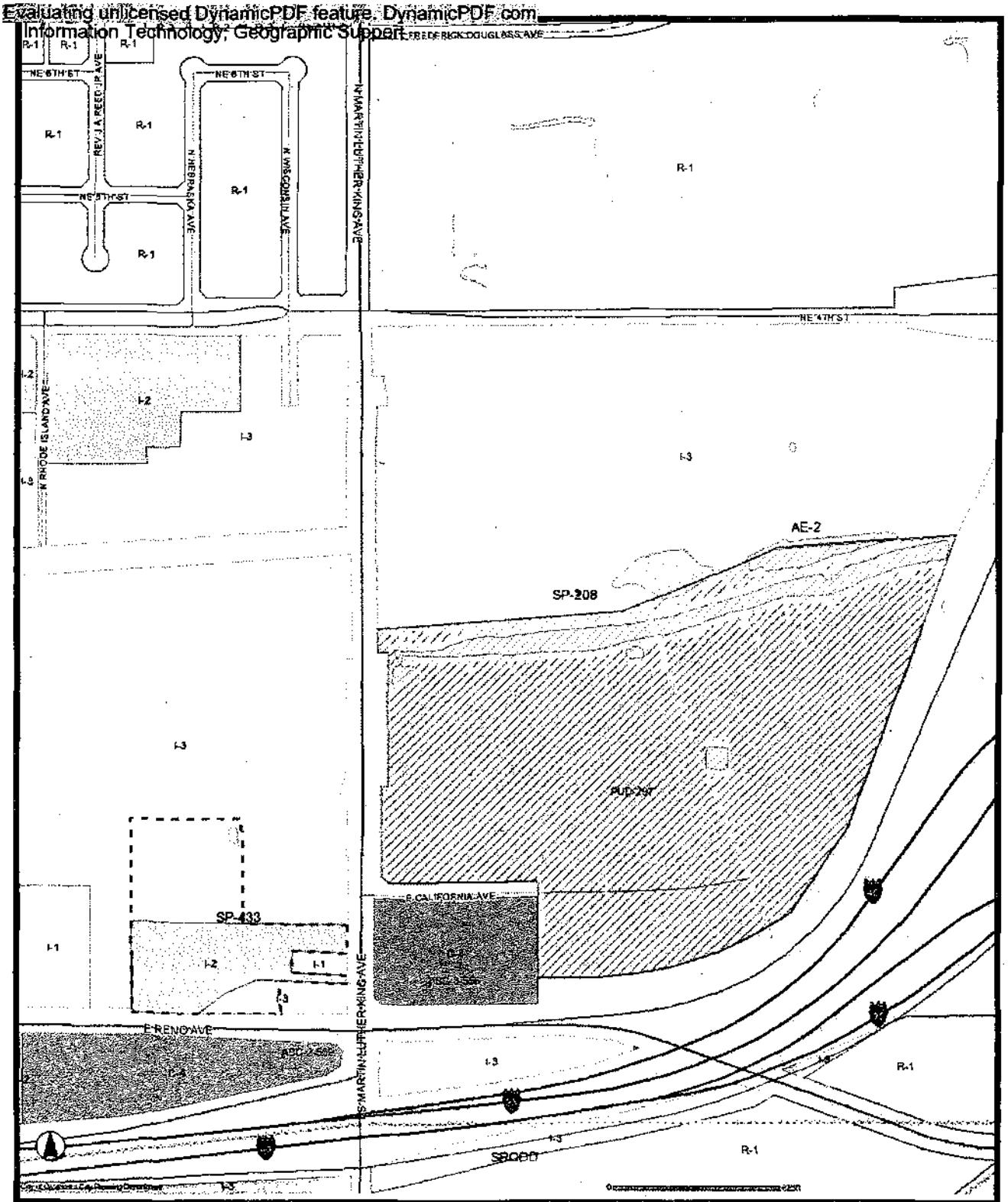
Given under my hand and seal the day and year last above written.

Linda Lee

My Commission expires 2-18-25.

Appendix 8

Evaluating unlicensed DynamicPDF feature. DynamicPDF.com



City of Oklahoma City
ZONING DISTRICT CATEGORIES AND DEFINITIONS

Zoning District Categories

Agricultural and Residential Districts

AA	Agricultural
RA2	Single-Family Two-Acre Rural Residential
RA	Single-Family One-Acre Rural Residential
R-1	Single-Family Residential
R-1ZL	Single-Family Residential Zero Lot Line
R-2	Medium-Low Density Residential
R-3	Medium Density Residential
R-3M	Medium Density Multiple-Family Residential
R-4M	Medium-High Density Multiple-Family Residential
R-4	General Residential
R-MH-1	Manufactured (Mobile) Home Subdivision
R-MH-2	Manufactured (Mobile) Home Park

Office and Commercial Districts

O-1	Limited Office
O-2	General Office
RC	Rural Commercial
NB	Neighborhood Business
C-1	Neighborhood Commercial
C-2	Shopping Center
C-3	Community Commercial
C-4	General Commercial
C-CBD	Central Business
C-HC	Highway Commercial

Industrial Districts

TP	Technology Park
I-1	Light Industrial
I-2	Moderate Industrial
I-3	Heavy Industrial

Special Purpose Districts

BC	Bricktown Core Development
DBD	Downtown Business
DTD-1	Downtown Transitional, Limited
DTD-2	Downtown Transitional, General
HP	Historic Preservation
NC	Neighborhood Conservation
SYD	Stockyards City Development

Zoning Overlay Districts

AE-1	Airport Environs Zone One
AE-2	Airport Environs Zone Two
ABC-1	Alcoholic Beverage Consumption, Restaurant-With-Limited-Alcohol
ABC-2	Alcoholic Beverage Consumption, Restaurant-With-Alcohol

ABC-3	Alcoholic Beverage Consumption, Club-With-Alcohol
CBO	Classen Boulevard Overlay
HL	Historic Landmark Overlay
MH	Manufactured Home Overlay
DP	Downtown Parking Overlay
FP	Fringe Parking Overlay
SRO	Scenic River Overlay
SRODD	Scenic River Overlay Design
SYT	Stockyards City Transitional Development Overlay
TT	Twenty-Third Street Uptown Corridor Overlay
UCD	Urban Conservation
UD	Urban Design Overlay

Zoning District Definitions

AGRICULTURAL AND RESIDENTIAL DISTRICTS

AA ***Agricultural District.*** The AA District creates and preserves areas intended primarily for agricultural purposes. It permits low intensity residential development along with certain essential commercial and institutional uses. It is not intended to provide a lower standard of development than in other districts. The types of uses, area and intensity of use regulations are designed to encourage and protect agricultural uses on a permanent basis, or until such time as urbanization takes place and an appropriate change in district classification is made.

RA2 ***Single-Family Two-Acre Rural Residential District.*** The RA2 District provides single-family residential housing with rural amenities in the rural development areas of the City at densities from 0.35 to 0.45 dwelling units per acre. Special attention should be given to overall design and location of lots within this district to assure adequate provision of light, air and open space, and to protect the area from being subject to intensified zoning once the district has been established and developed.

RA ***Single-Family One-Acre Rural Residential District.*** The RA District provides single-family residential housing with rural amenities in the rural development areas of the City at densities from 0.70 to 1.00 dwelling units per acre. Special attention should be given to overall design and location of lots within this district to

assure adequate provision of light, air and open space, and to protect the area from being subject to intensified zoning once the district has been established and developed.

R-1 ***Single-Family Residential District.*** The R-1 District is the most restrictive residential district. The principal use is single-family residential with provisions for related recreational, religious and educational facilities that are normally required to provide the basic elements of a balanced and attractive residential area. Internal stability, attractiveness, order and efficiency are encouraged by providing adequate light, air and open space for dwellings and related facilities, and through consideration of the proper functional relationships of each element.

R-1ZL ***Single-Family Residential Zero Lot Line District.*** The R-1ZL District is a restrictive residential district whose principal use is the single-family detached home with a zero side yard setback. Provisions are made for related recreational, religious and educational facilities that are normally required to provide the basic elements of a balanced and attractive residential area. Internal stability, attractiveness, order and efficiency are encouraged by providing adequate light, air and open space for dwellings and related facilities, and through consideration of the proper functional relationship of each element. The R-1ZL District provides for a unique housing environment regarding such elements as side yard building setbacks, usable side yard areas, intensity of use and typical building orientation, which is unlike the R-1 District.

R-2 ***Medium-Low Density Residential District.*** The R-2 District is a residential district with restrictions similar to the R-1 District. The purpose of this district is to create and preserve residential areas with a broad range of housing types and densities in proximity to essential support services. The regulations provide incentives for infill housing development consistent with the existing character and density of an area. Provisions are also made for non-residential uses that support residential development.

R-3 ***Medium Density Residential District.*** The R-3 District creates and preserves residential areas with a broad range of housing types and densities, which are close to essential support services. The regulations provide incentives for infill housing development consistent with the existing character and density of an area. Provisions are also made for non-residential uses that support residential development.

R-3M ***Medium Density Multiple-Family Residential District.*** The R-3M District is a medium density residential district that encourages multi-family developments representing a broad variety of housing types. The regulations are designed to facilitate medium-density infill residential development, compatible with other nearby residential uses. Provisions are made for conditional approval of those uses that support and service the development in a manner that will not have a harmful effect on the character of existing neighborhoods and will reduce dependence upon automobile transportation by encouraging population densities that support mass transportation.

R-4M ***Medium-High Density Multiple-Family Residential District.*** The R-4M District is a medium to high density residential district that encourages multi-family developments representing a broad variety of housing types. The regulations are designed to facilitate medium-density infill residential development, compatible with other nearby residential uses. Provisions are made for conditional approval of those uses that support and service the development in a manner that will not have a harmful effect on the character of existing neighborhoods and will reduce dependence upon automobile transportation by encouraging population densities that support mass transportation.

R-4 ***General Residential District.*** The R-4 District is a higher density residential district which encourages multiple-family and group residential developments, and represents a broad variety of housing types and densities. The regulations are designed to facilitate infill residential development and development close to non-residential uses. Provision is made for conditional approval of those uses that support and service the development in a manner that will not have a harmful effect on the character of existing neighborhoods, and will reduce dependence upon automobile transportation by encouraging population densities that will support mass transportation.

R-MH-1 ***Manufactured (Mobile) Home Subdivision District.*** The R-MH-1 District is a restrictive residential district. The principal use within this district is a freestanding manufactured (mobile) home used as a single residence. The purpose of this district is to provide a grouping of home sites, within the setting of a residential subdivision, for manufactured (mobile) homes, which are not compatible with conventional housing and are normally permitted only in manufactured (mobile) home parks or rural areas, and conventional single-family homes. This district provides for individual lots which allow the manufactured (mobile) home owner

to own the property on which his/her home is situated. Provision is made for related recreational, religious and educational facilities normally required to provide the basic elements of a balanced and attractive residential area. Internal stability, attractiveness, order and efficiency are encouraged by providing adequate light, air and open space for manufactured (mobile) homes, conventional residences and related facilities, and through consideration of the proper functional relationship of each element. A minimum subdivision size is established to assure that sufficiency of compatible housing types can be established to create a desirable environment, and provide separation from conventional housing areas that may be nearby.

R-MH-2 ***Manufactured (Mobile) Home Park District.*** The R-MH-2 District permits locations for manufactured (mobile) home parks which, while providing a residential environment, are not generally compatible with normal residential developments. These parks are under a single ownership and provide leased or rented manufactured (mobile) home spaces. This district should provide for an orderly arrangement of home sites in manufactured (mobile) home parks, which have been located and designed in a manner that will promote and protect the health, safety and general welfare of the residents.

OFFICE AND COMMERCIAL DISTRICTS

O-1 ***Limited Office District.*** The O-1 District is intended to provide a location for those administrative and professional offices that can occupy smaller structures in a landscaped setting. This type of development can serve as a buffer between more intense retail and office commercial uses, and established residential neighborhoods. Emphasis is placed on smaller, individual freestanding buildings, landscaping, setbacks, sign control and restricted building height in order to promote protection for nearby residences.

O-2 ***General Office District.*** The O-2 District is intended to provide a place for those office and institutional activities that require separate buildings, or building groups, and whose employees and clientele may come from a wide geographic area. Land, space and aesthetic requirements of these uses make either a central location or a location on large sites between more intense retail commercial areas and established residential neighborhoods desirable, so as to act as a buffer. ***C-1 Neighborhood Commercial District.*** The C-1 District is intended to provide a location for a limited number of retail commercial goods and personal services that serve the day-to-day needs of residents of surrounding neighborhoods. Because

these shops and offices are lower intensity uses, they may be designed to be located at, or near, arterial street intersections, in close proximity to housing areas, or as limited service facilities in larger planned high density housing areas. This district is limited to the types of uses that will not create increased traffic, noise or other incompatible factors caused by uses serving a larger part of the City and, therefore, would have a negative impact on surrounding neighborhoods.

C-2 ***Shopping Center District.*** The C-2 District is intended to provide for a unified grouping, in one or more buildings, of retail shops, stores and offices, which are planned and developed as a single operating unit, and under single or multiple ownership. A development will typically contain such features as shared parking, driveways and common facilities, adequate setbacks and landscaping, and sufficient on-site parking for customers and employees.

C-3 ***Community Commercial District.*** The C-3 District is intended for business activity that is located at the edge of residential areas but serves a larger trade area than the immediately surrounding residential neighborhoods. Business uses will most often be found in a wide variety of commercial structures, normally on individual sites with separate ingress, egress and parking. Because of the varied uses permitted, it is important to separate them as much as possible, both visually and physically, from any nearby residential areas and to limit the harmful effects of increased traffic, noise and general non-residential activity generated.

C-4 ***General Commercial District.*** The C-4 District is intended for the conduct of wholesale, retail and office business activities that serve the needs of citizens from anywhere in the metropolitan area, rather than being oriented only to surrounding residential areas. Because the permitted uses may serve and employ a large number of people from a large part of the metropolitan area, the activities conducted, and the traffic generated, make this district very much incompatible with residential development. The Comprehensive Plan policy does not support further expansion of the C-4 District.

C-CBD ***Central Business District.*** The C-CBD District is intended for the conduct of all forms of business activity within the central area of the City. Because of extensive private and public development controls already in existence, via covenants and urban renewal activities, development regulations in this district are kept to a minimum and reflect previously established regulations only. C-CBD zoning shall only be granted as an extension of an existing C-CBD District. To be eligible for rezoning to this district, a parcel

shall abut, or be directly across a street or alley from, an existing C-CBD District.

C-HC ***Highway Commercial District.*** The C-HC District is intended to provide commercial facilities for the traveling public along freeways in those areas where surrounding urban development does not exist and normal urban services are not available. Commercial uses permitted are limited to those types which directly serve automobile and truck needs, and provide basic convenience goods for cross country travelers. Because these areas will be located in low density agricultural areas, their location should be limited to freeway or highway intersections. They should be relatively small in size, and care should be taken in the location and development of structures to minimize their impact on surrounding land uses.

NB ***Neighborhood Business District.*** The NB District is intended to promote a mix of commercial, office and residential uses which serve the day-to-day needs of residents and the residents of surrounding neighborhoods. It is particularly applicable to older areas of Oklahoma City developed prior to the off-street parking requirements typically mandated in today's commercial zoning districts.

RC ***Rural Commercial District.*** The RC District is intended to provide locations for commercial and service uses which primarily serve outlying agricultural areas and/or businesses.

INDUSTRIAL DISTRICTS

TP ***Technology Park District.*** The TP District is intended to provide locations for office, research, and limited technology and industrial uses that do not have adverse impacts on surrounding properties or the environment, and are typically located in a campus or industrial park setting.

I-1 ***Light Industrial District.*** The I-1 District is intended to accommodate low impact industrial development and supporting commercial or public uses, in areas where little or no nuisance effects are generated. These industrial uses may require good accessibility to air, mail or street transportation routes, but the size and volume of the raw materials and finished products should not be as great as that produced by uses in the moderate and heavy industrial districts. No manufacturing, assembly, repair, work activity or storage, other than outside sales and display as permitted by this chapter, shall take place outside the confines of an enclosed building.

I-2 ***Moderate Industrial District.*** The I-2 District is intended primarily for the conduct of light manufacturing, assembly and fabrication, and for warehousing, wholesale and service uses, which may generate relatively low levels of noise, odor, smoke, dust or intense light. Industrial uses permitted may require good accessibility to air, rail or street transportation routes, but do not depend heavily on frequent personal visits of customers or clients. Provision is also made for outdoor operation and storage.

I-3 ***Heavy Industrial District.*** The I-3 District is intended to provide locations for those industrial uses that may generate relatively high levels of noise, vibrations, smoke, dust, odor or light. These industrial uses are incompatible with residential uses. For this reason it is desirable that they be located downwind, and as far away as possible, from residential and most commercial uses.

SPECIAL PURPOSE DISTRICTS

BC ***Bricktown Core Development District.*** This mixed-use district allows for a wide range of commercial, residential, office, warehouse and limited industrial uses. It is intended for the central part of the City, to facilitate the adaptation of warehouse districts to a more vital mixture of uses, while conserving the exterior architectural quality of an area of historic significance.

DBD ***Downtown Business District.*** The DBD District is intended for the conduct of all forms of business activity, including mixed-uses in a single building, within the central area of the City. Development regulations are intended to promote the development and redevelopment of the downtown area in a manner consistent with the unique and diverse design elements of downtown, ensure that uses are compatible with the commercial, cultural, historical and governmental significance of downtown, promote the downtown as a vital mixed-use area, create a network of pleasant public spaces and pedestrian amenities, enhance existing structures and circulation patterns, and preserve and restore historic features.

DTD-1 ***Downtown Transitional District, Limited.*** The DTD-1 District is intended to promote a high quality mix of commercial, office, and residential uses, including mixed-uses in a single building, for areas adjacent to the DBD District. Development regulations are intended to promote the development and redevelopment of areas adjacent to the DBD District in a manner consistent with the unique and diverse design elements of the area, ensure compatible commercial

and residential uses, create a network of pleasant public spaces and pedestrian amenities, enhance existing structures and circulation patterns, preserve and restore historic features, preserve the cultural significance of the central City, and promote the areas adjacent to the downtown business district as dense, urban and mixed-use neighborhoods.

DTD-2 ***Downtown Transitional District, General.*** The DTD-2 District is intended to promote a high quality mix of commercial, office, residential, and industrial uses, including mixed-uses in a single building, for areas adjacent the DBD District. Development regulations in this district are intended to promote the development and redevelopment of areas adjacent to the DBD District in a manner consistent with the unique and diverse design elements of the area, ensure that areas adjacent to the DBD District contain land uses compatible with commercial, residential, and cultural significance of the central City, create a network of pleasant public spaces and pedestrian amenities, enhance existing structures and circulation patterns, preserve and restore historic features, preserve the cultural significance of the central City, and promote the areas adjacent to the downtown business district as dense, urban and mixed-use neighborhoods.

HP ***Historic Preservation District.*** All property within the City previously designated as Historic Preservation District (HP District) as of October 21, 1980, and all property subsequently included within this District, shall be subject to and comply with the regulations and restrictions of this section. All provisions of the Historic Preservation Ordinance, including the definitions contained therein, shall be applicable to the HP District. The HP District is intended as a basic zoning district and is not intended as an overlay zoning district.

NC ***Neighborhood Conservation District.*** The purpose of this district is to encourage, promote and facilitate the conservation and/or revitalization of older areas.

SYD ***Stockyards City Development District.*** The Stockyards City Development District (SYD District) is a mixed-use commercial district intended for the conduct of commercial, office and limited industrial uses, while conserving the exterior architectural quality of an area of historic significance. The business activity is of a retail and commercial service nature that serves a larger trade area than the immediate surrounding residential neighborhoods.

ZONING OVERLAY DISTRICTS

AE-1 ***Airport Environs Zone One.*** This is an area established on an official airport zoning map, which is exposed to a projected annual average noise level in excess of 65 decibels as measured by weighted day-night sound level (Ldn) methodology. **Single-family or two-family residential uses and institutional uses such as schools, community centers, churches, etc., are prohibited in this overlay zone.** Uses within this zone shall meet or exceed building requirements for a minimum noise level reduction of thirty (30) decibels, inside the structure as set forth in Division 4, of Article II of Chapter 12 of the Oklahoma City Municipal Code. **All uses allowed within this zone shall grant an aviations easement right to the Oklahoma City Airport Trust.**

AE-2 ***Airport Environs Zone Two.*** This is an area established on an official airport zoning map, which is exposed to a projected annual average noise level in excess of 60 decibels as measured by weighted day-night sound level (Ldn) methodology. Uses within this zone shall meet or exceed building requirements for a minimum noise level reduction of twenty-five (25) decibels, inside the structure as set forth in Division 4, of Article II of Chapter 12 of the Oklahoma City Municipal Code. **All uses allowed within this zone shall grant an aviations easement right to the Oklahoma City Airport Trust.**

ABC-1 ***Alcoholic Beverage Consumption, Restaurant-With-Limited-Alcohol.*** This overlay district allows for restaurants which serve beverages containing less than fourteen percent (14%) alcohol by volume. This district allows for the serving of beer and wine in a restaurant setting. The overlay district provides for uses in such a way that compatibility with adjacent uses is enhanced.

ABC-2 ***Alcoholic Beverage Consumption, Restaurant-With-Alcohol.*** This overlay district allows for the serving of all types of beer and alcohol in a restaurant setting. The overlay district provides for uses in such a way that compatibility with adjacent uses is enhanced.

ABC-3 ***Alcoholic Beverage Consumption, Club-With-Alcohol District*** This overlay district allows for the serving of all types of beer and alcohol in a club setting where the sale of food is an accessory activity. The overlay district provides for uses in such a way that compatibility with adjacent uses is enhanced.

CBO ***Classen Boulevard Overlay.*** This is an overlay zoning district designed to conserve the resources and encourage the orderly

development, the materials use on the façade of buildings and off-street parking south of NW 36th Street. The underlying zoning on the property, designated by the regular zoning district regulations of this code shall continue to regulate the use and development of land, unless expressly modified by the overlay regulations.

HL ***Historic Landmark Overlay.*** This is an overlay zoning district intended to promote the preservation of historic districts and landmarks for the educational, cultural, economic, and general welfare of the public through the preservation of historical structures, buildings, or monuments that represent facets of history in the locality. The regulations imposed by such district shall be in addition to the regulations of the underlying zoning district applicable to the subject parcel. All provisions of the Historic Preservation Ordinance, including the definitions contained therein, but not including the regulations of the HP District, shall be applicable to this district.

MH ***Manufactured Home Overlay.*** This overlay district is designed to help meet the need for affordable housing by allowing manufactured homes, built in compliance with the Federal Manufactured Housing Construction & Safety Standards (a.k.a. HUD codes), to be used as infill housing units. It also encourages conservation of natural resources and makes better use of existing infrastructure.

DP ***Downtown Parking Overlay.*** Subject to other applicable sections of Chapter 59, property located in the Downtown Parking Overlay District may have off-site off-street parking. Provided certain conditions located in section 59-13400.1.B of the code are met.

FP ***Fringe Parking Overlay.*** The erection, expansion or use of any principal building or secondary structure located in the Fringe Parking Overlay District shall not be required to provide minimum off-street parking.

SRO ***Scenic River Overlay.*** The Scenic River Overlay District is intended to promote the health, safety, economic, cultural and general welfare of the public by encouraging the conservation and enhancement of the urban environment specifically in the area of Oklahoma City in the vicinity of the North Canadian River. The underlying zoning on the property, designated by the regular zoning district regulations of this code shall continue to regulate the use and development of land, unless expressly modified by the overlay regulations.

SRODD ***Scenic River Overlay Design.*** Oklahoma City has made a tremendous investment in infrastructure along the North Canadian River (a portion of which has been renamed the Oklahoma River) in recent years to set the stage for future infill and redevelopment. The implementation of these development regulations and guidelines will protect the City's investment as well as the investments of property owners, project developers and other interests that invest within the Scenic River Overlay Design District (SRODD) in the future. These development regulations and guidelines will serve as the primary tool for the implementation of the North Canadian River Strategic Action and Development Plan, which defines the City's vision for the SRODD. They are intended to assist property owners, project developers, and City agencies and staff to achieve this vision and to be used as a supplement to the City's development code. **The district includes the sub-districts of Meridian Gateway, Stockyards River, Farmers Market, Western Gateway, Regatta, and American Indian Cultural Center.**

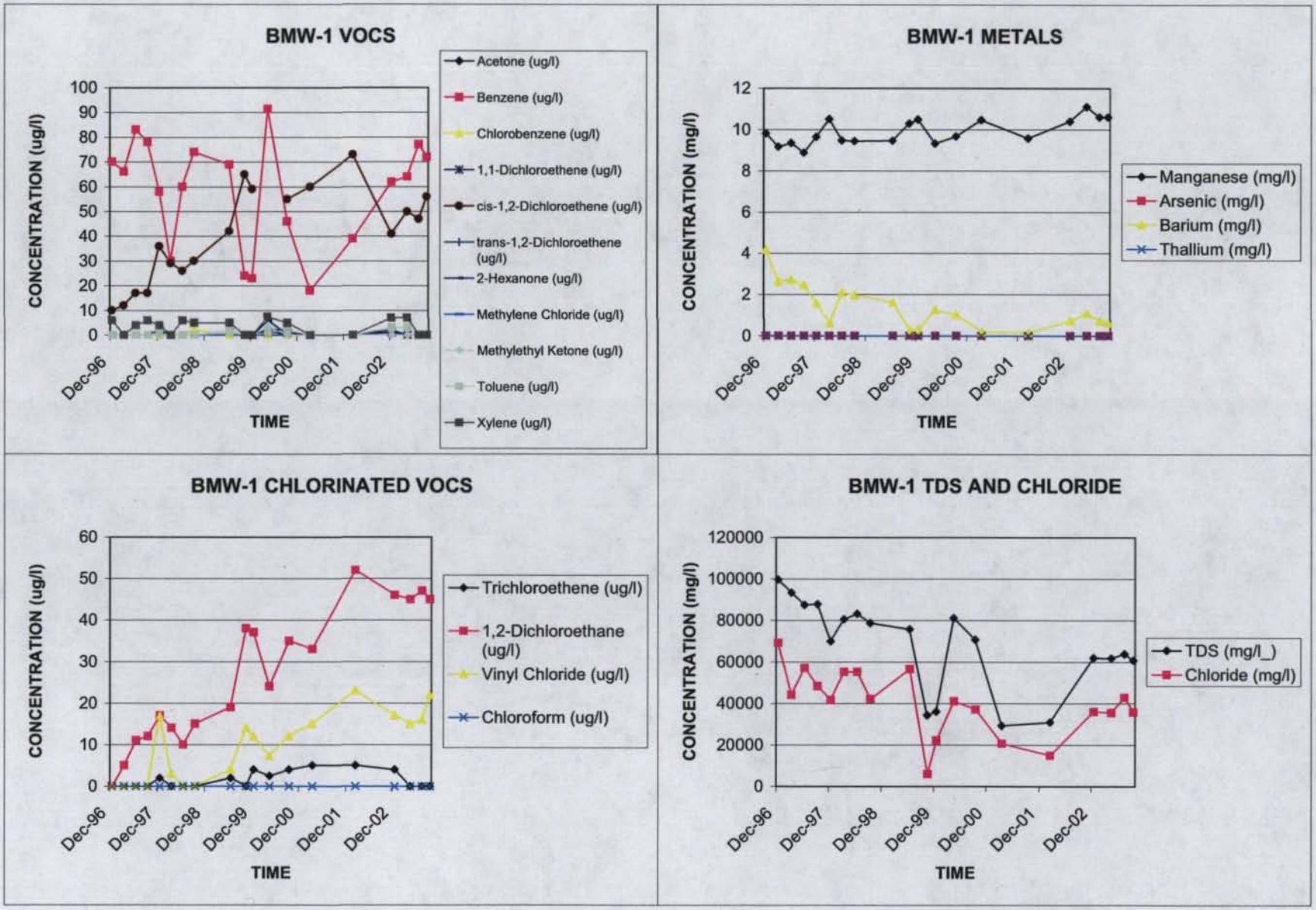
SYT ***Stockyards City Transitional Development Overlay.*** This is an overlay zoning district which allows for most of the uses permitted in the underlying zoning districts in the Stockyards City Area. This district is intended to encourage efforts to enhance the appearance of the Stockyards City area through preservation of historic buildings and features, by encouraging architectural innovation in new construction and the rehabilitation of existing buildings, and by effective use of landscaping and streetscaping techniques to enhance the urban environment.

TT ***Twenty-Third Street Uptown Corridor Overlay.*** This district is to encourage neighborhood-oriented commercial development in support of the stabilization of the adjacent residential areas. More-intense commercial uses, particularly those engaging in outside sales, would be discouraged. Automobile repair would have to occur within a building.

UCD ***Urban Conservation.*** The Urban Conservation Districts (UC Districts) are intended to promote the health, safety, economic, cultural, and general welfare of the public by encouraging the conservation and enhancement of the urban environment. The underlying zoning on the property designated by the regular zoning district regulations of this chapter shall continue to regulate the use and development of land unless expressly modified by the overlay regulations. **Included in the Urban Conservation Districts are Linwood Place, Northeast Gateway, Cleveland, Silver Lake, Hilldale, Mesta Park, Heritage Hills East, Jefferson Park, Wilde Oaks, Gatewood, and Mayfair Heights.**

UD ***Urban Design Overlay District.*** The Urban Design Overlay District (UD Overlay District) is intended to promote the health, safety, economic, cultural and general welfare of the public by encouraging the revitalization and enhancement of the urban environment. The underlying zoning on the property designated by the regular zoning district regulations continue to regulate the use and development of land unless expressly modified by the Urban Design District regulations. A Certificate of Approval from the Urban Design Commission is required for any new construction, exterior changes to existing buildings, or demolition of existing buildings

Appendix 9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50
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30
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10
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Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Acetone (ug/l)
Benzene (ug/l)
Chlorobenzene (ug/l)
1,1-Dichloroethene (ug/l)
cis-1,2-Dichloroethene (ug/l)
trans-1,2-Dichloroethene (ug/l)
2-Hexanone (ug/l)
Methylene Chloride (ug/l)
Methylethyl Ketone (ug/l)
Toluene (ug/l)
Xylene (ug/l)
BMW-1 METALS
CONCENTRATION (mg/l)
12
10
8
6
4
2
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Manganese (mg/l)
Arsenic (mg/l)
Barium (mg/l)
Thallium (mg/l)
BMW-1 CHLORINATED VOCS
CONCENTRATION (ug/l)
60
50
40
30
20
10
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Trichloroethene (ug/l)
1,2-Dichloroethane (ug/l)
Vinyl Chloride (ug/l)
Chloroform (ug/l)
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80000
60000
40000
20000
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TIME
TDS (mg/l_)
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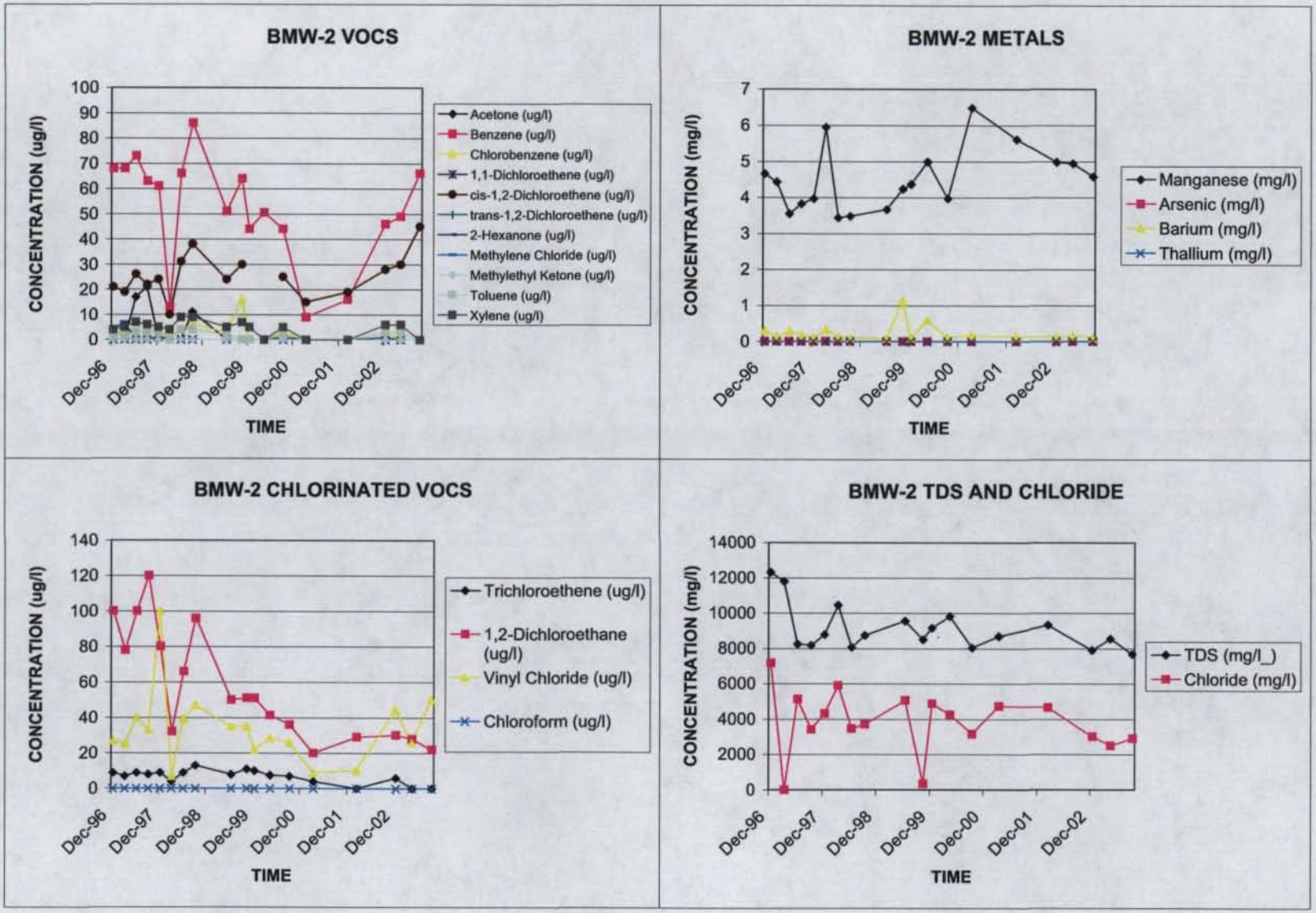
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CONCENTRATION (ug/l)
100
90
80
70
60
50
40
30
20
10
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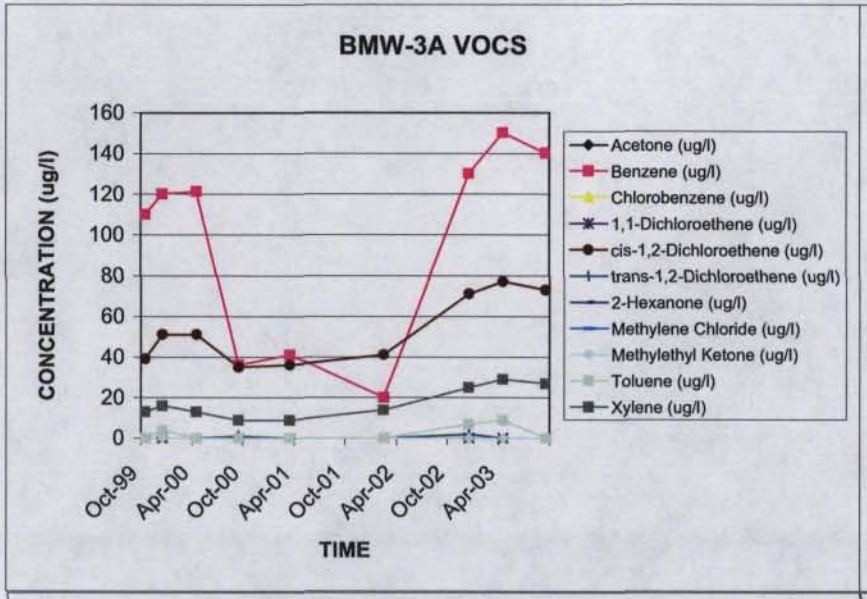
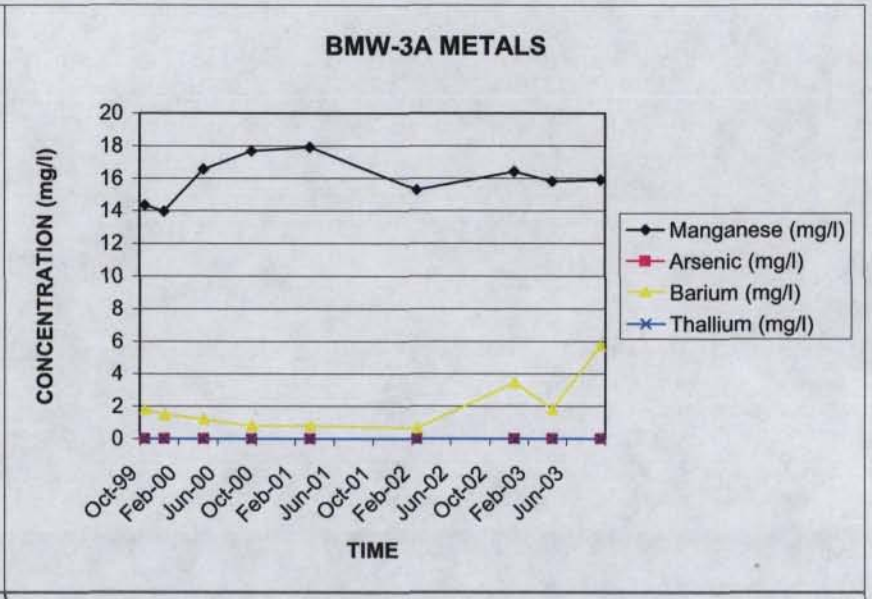
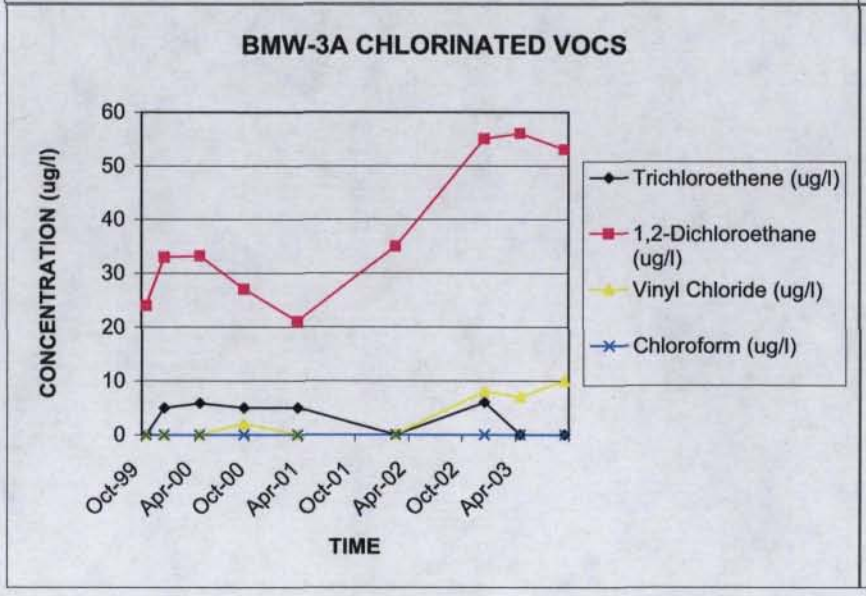
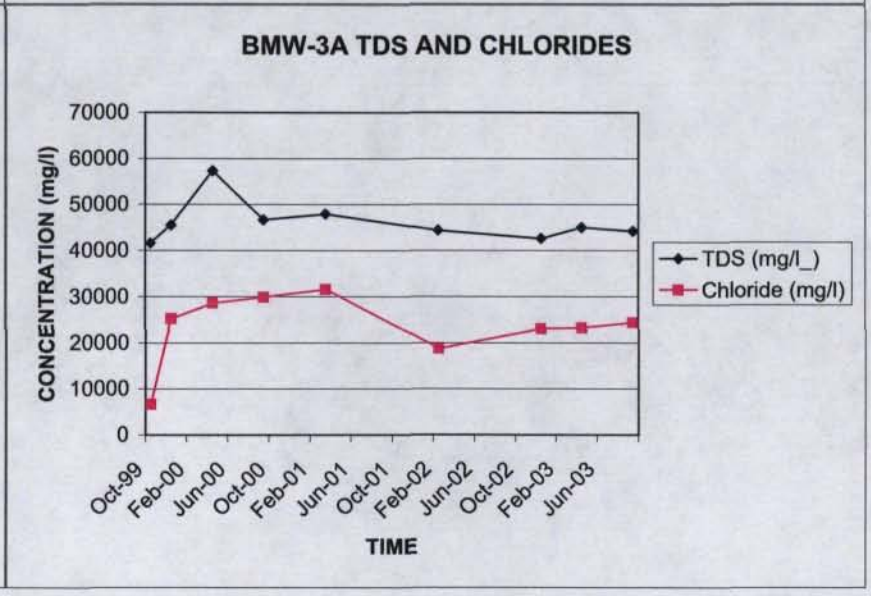
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Acetone (ug/l)
Benzene (ug/l)
Chlorobenzene (ug/l)
1,1-Dichloroethene (ug/l)
cis-1,2-Dichloroethene (ug/l)
trans-1,2-Dichloroethene (ug/l)
2-Hexanone (ug/l)
Methylene Chloride (ug/l)
Methylethyl Ketone (ug/l)
Toluene (ug/l)
Xylene (ug/l)
BMW-2 METALS
CONCENTRATION (mg/l)
7
6
5
4
3
2
1
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Manganese (mg/l)
Arsenic (mg/l)
Barium (mg/l)
Thallium (mg/l)
BMW-2 CHLORINATED VOCS
CONCENTRATION (ug/l)
140
120
100
80
60
40
20
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Trichloroethene (ug/l)
1,2-Dichloroethane (ug/l)
Vinyl Chloride (ug/l)
Chloroform (ug/l)
BMW-2 TDS AND CHLORIDE
CONCENTRATION (mg/l)
14000
12000
10000
8000
6000
4000
2000
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
TDS (mg/l_)
Chloride (mg/l)

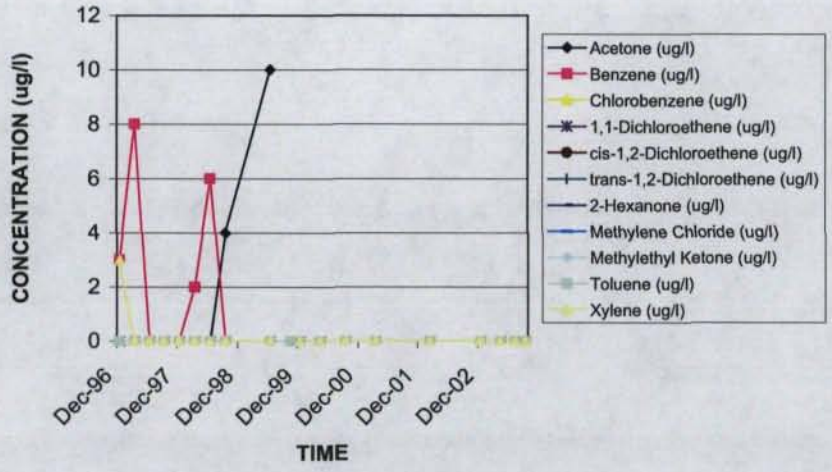

BMW-3A VOCS
CONCENTRATION (ug/l)
160
140
120
100
80
60
40
20
0
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
TIME
Acetone (ug/l)
Benzene (ug/l)
Chlorobenzene (ug/l)
1,1-Dichloroethene (ug/l)
cis-1,2-Dichloroethene (ug/l)
trans-1,2-Dichloroethene (ug/l)
2-Hexanone (ug/l)
Methylene Chloride (ug/l)
Methylethyl Ketone (ug/l)
Toluene (ug/l)
Xylene (ug/l)


BMW-3A METALS
CONCENTRATION (mg/l)
20
18
16
14
12
10
8
6
4
2
0
Oct-99
Feb-00
Jun-00
Oct-00
Feb-01
Jun-01
Oct-01
Feb-02
Jun-02
Oct-02
Feb-03
Jun-03
TIME
Manganese (mg/l)
Arsenic (mg/l)
Barium (mg/l)
Thallium (mg/l)

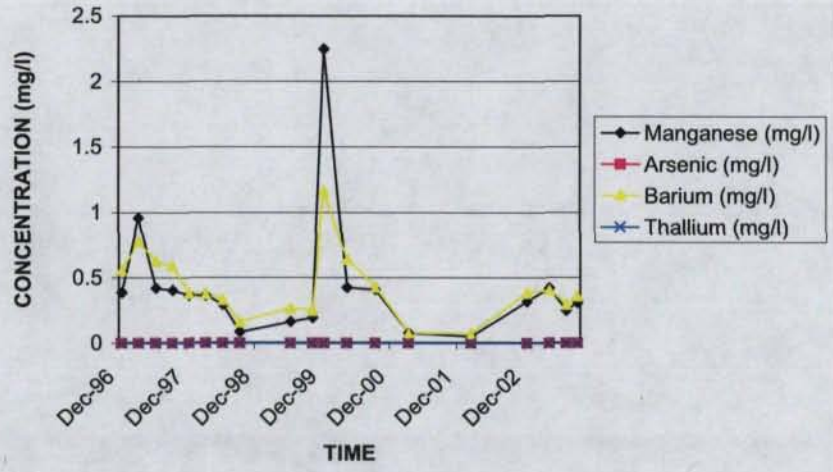

BMW-3A CHLORINATED VOCS
CONCENTRATION (ug/l)
60
50
40
30
20
10
0
Oct-99
Apr-00
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
TIME
Trichloroethene (ug/l)
1,2-Dichloroethane (ug/l)
Vinyl Chloride (ug/l)
Chloroform (ug/l)


BMW-3A TDS AND CHLORIDES
CONCENTRATION (mg/l)
70000
60000
50000
40000
30000
20000
10000
0
Oct-99
Feb-00
Jun-00
Oct-00
Feb-01
Jun-01
Oct-01
Feb-02
Jun-02
Oct-02
Feb-03
Jun-03
TIME
TDS (mg/l_)
Chloride (mg/l)

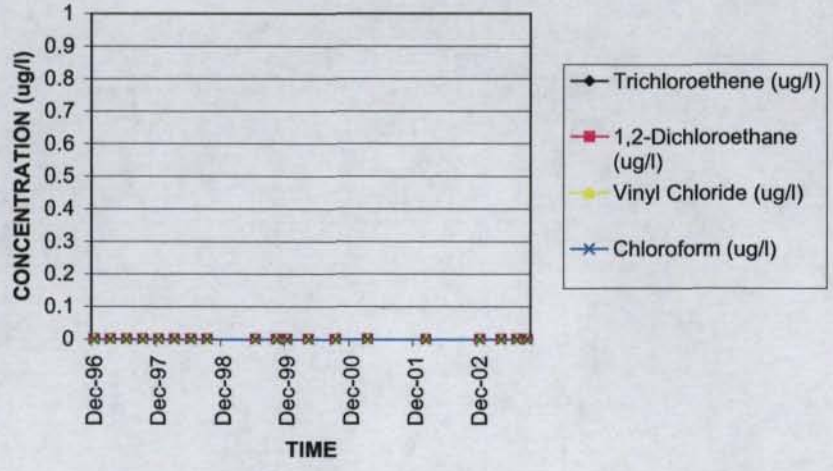
BMW-4 VOCS



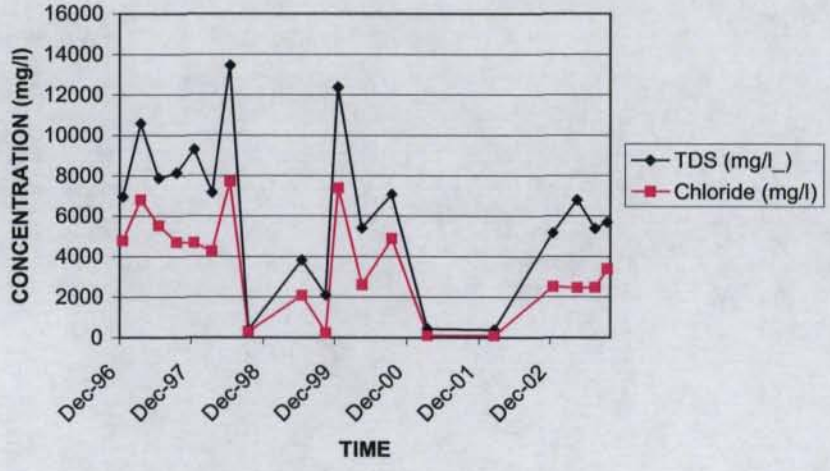
BMW-4 METALS



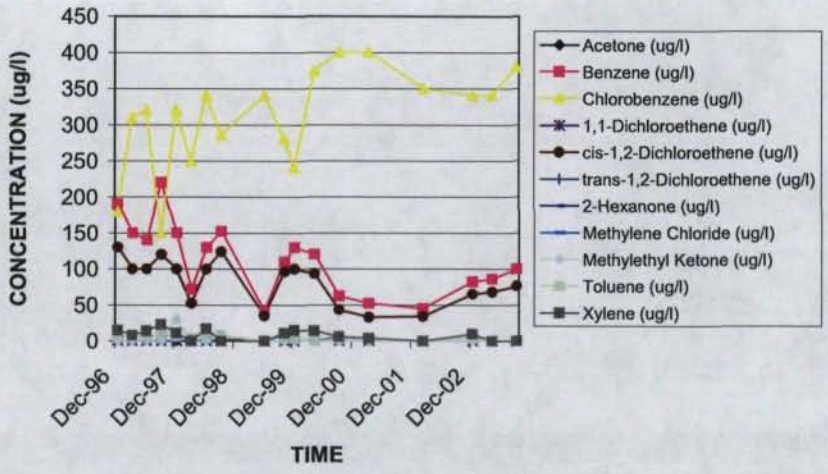
BMW-4 CHLORINATED VOCS



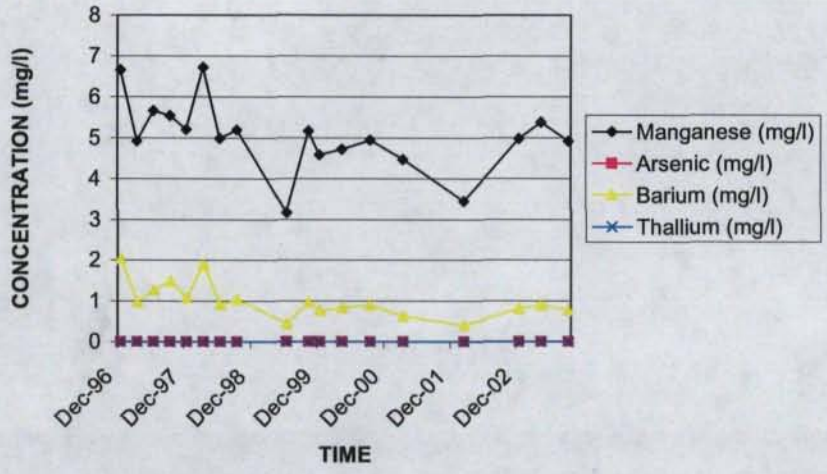
BMW-4 TDS AND CHLORIDE



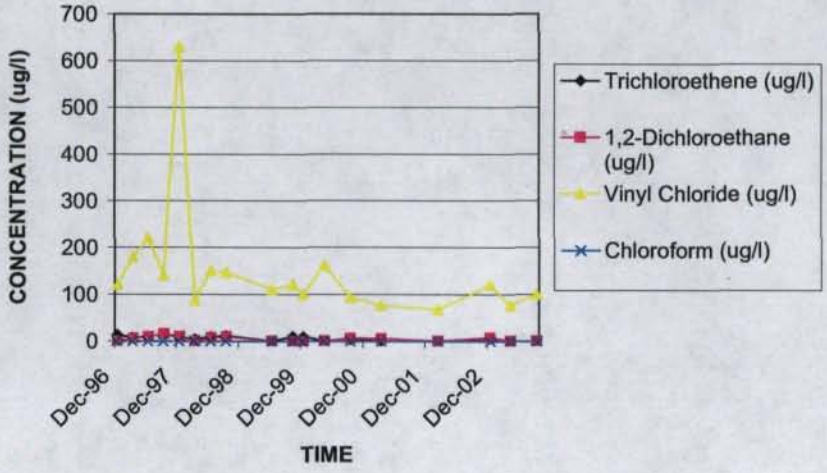
BMW-5 VOCS



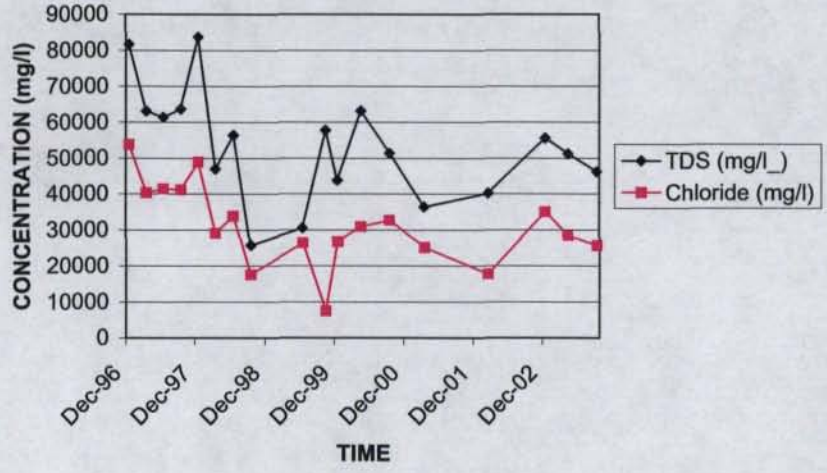
BMW-5 METALS



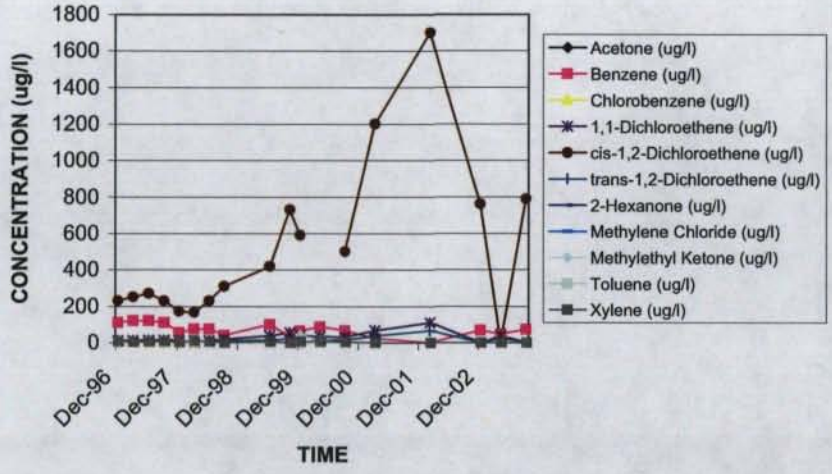
BMW-5 CHLORINATED VOCS



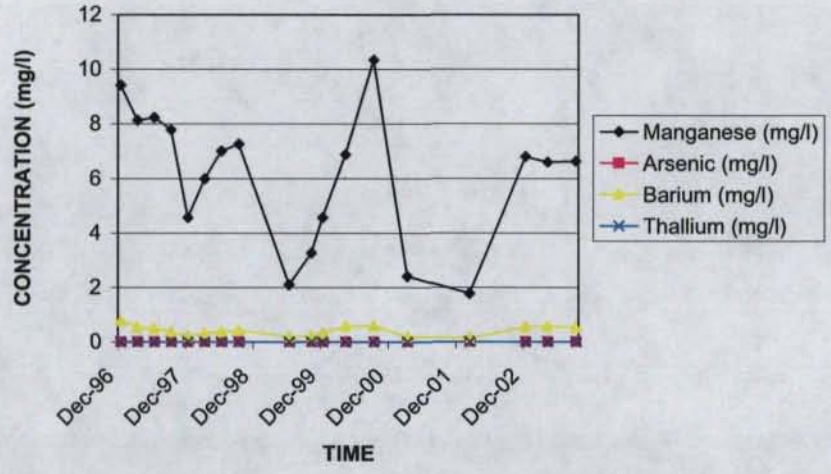
BMW-5 TDS AND CHLORIDE



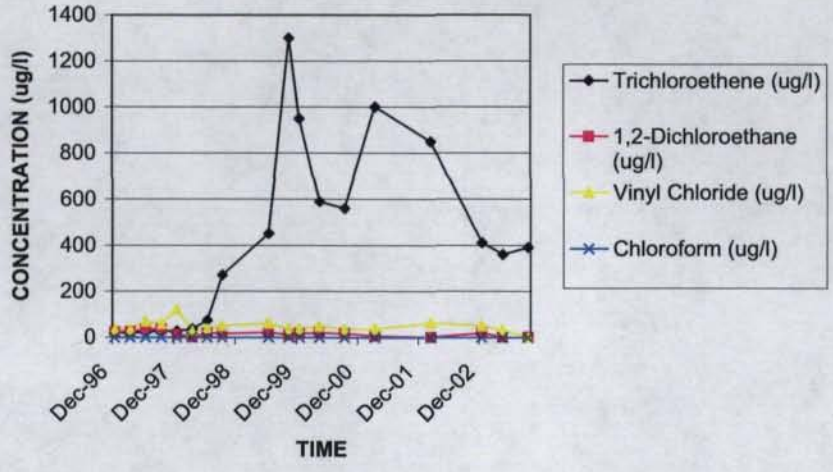
BMW-6A VOCS



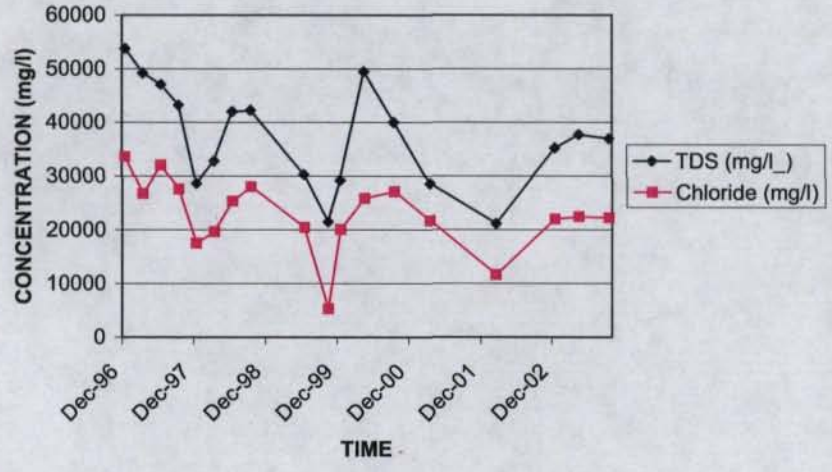
BMW-6A METALS

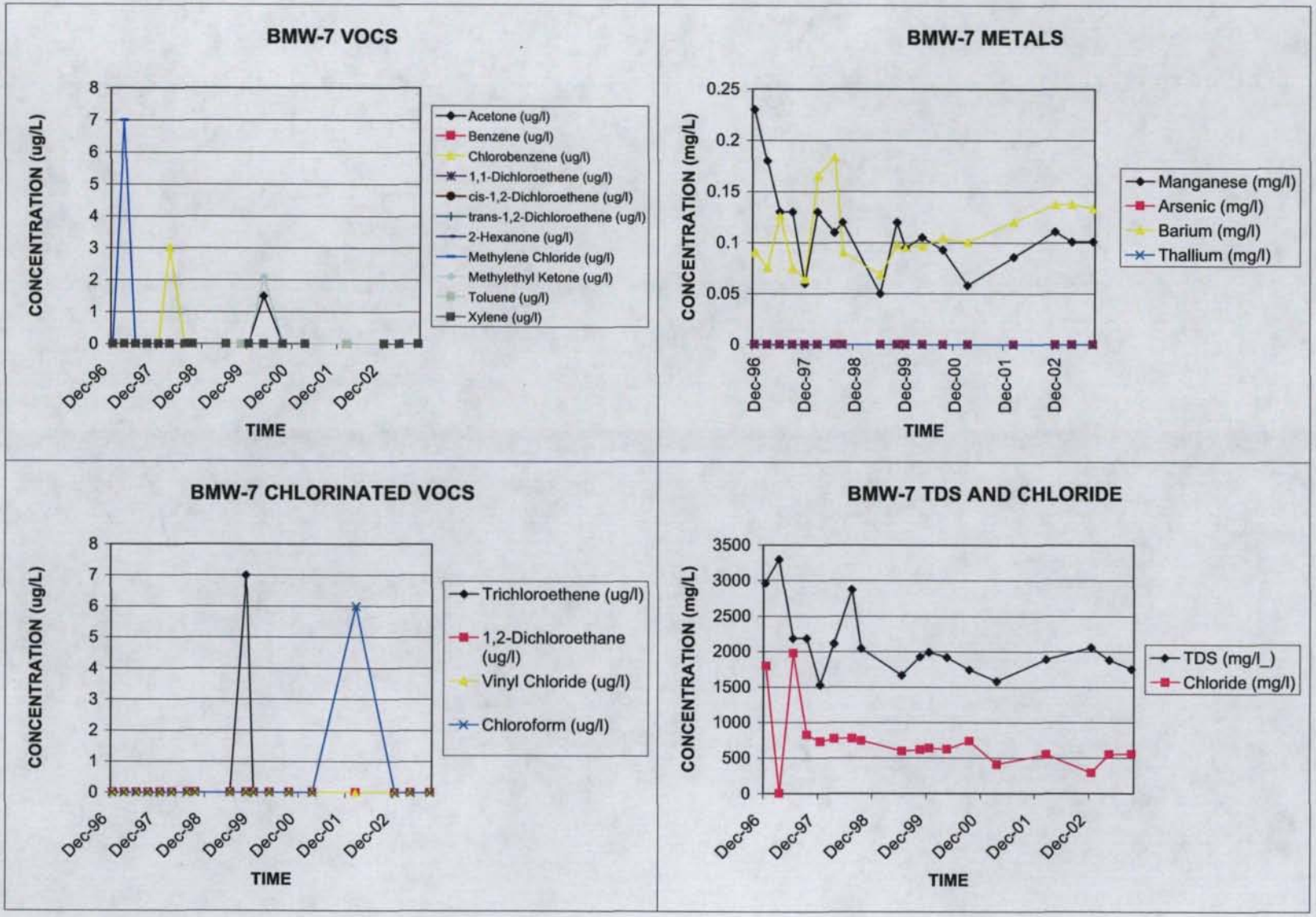


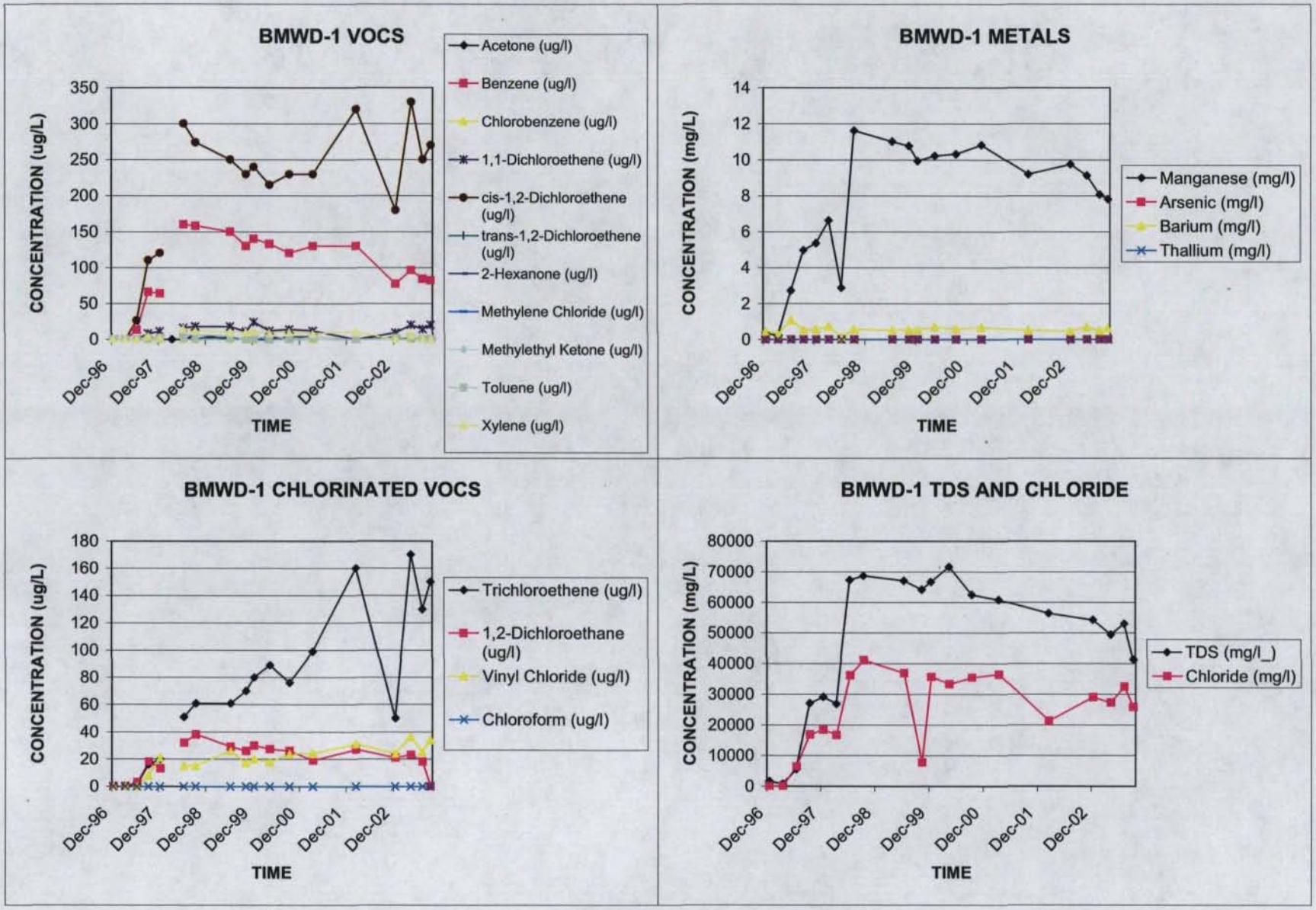
BMW-6A CHLORINATED VOCS



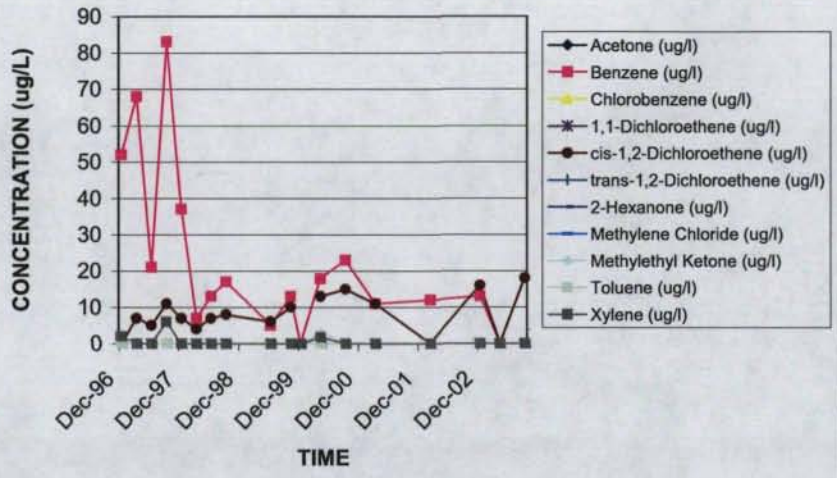
BMW-6A TDS AND CHLORIDE



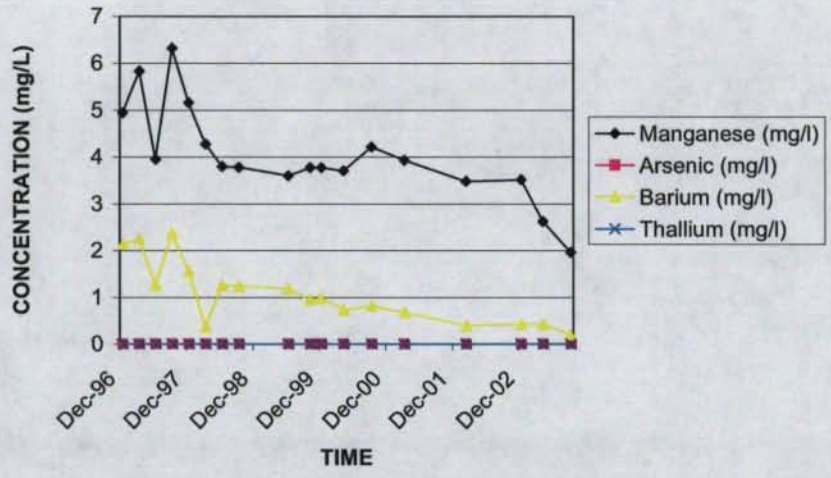

BMW-7 VOCS
CONCENTRATION (ug/L)
TIME
Acetone (ug/l)
Benzene (ug/l)
Chlorobenzene (ug/l)
1,1-Dichloroethene (ug/l)
cis-1,2-Dichloroethene (ug/l)
trans-1,2-Dichloroethene (ug/l)
2-Hexanone (ug/l)
Methylene Chloride (ug/l)
Methylethyl Ketone (ug/l)
Toluene (ug/l)
Xylene (ug/l)
BMW-7 METALS
CONCENTRATION (mg/L)
TIME
Manganese (mg/l)
Arsenic (mg/l)
Barium (mg/l)
Thallium (mg/l)
BMW-7 CHLORINATED VOCS
CONCENTRATION (ug/L)
TIME
Trichloroethene (ug/l)
1,2-Dichloroethane (ug/l)
Vinyl Chloride (ug/l)
Chloroform (ug/l)
BMW-7 TDS AND CHLORIDE
CONCENTRATION (mg/L)
TIME
TDS (mg/l_)
Chloride (mg/l)


BMWD-1 VOCS
CONCENTRATION (ug/L)
350
300
250
200
150
100
50
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Acetone (ug/l)
Benzene (ug/l)
Chlorobenzene (ug/l)
1,1-Dichloroethene (ug/l)
cis-1,2-Dichloroethene (ug/l)
trans-1,2-Dichloroethene (ug/l)
2-Hexanone (ug/l)
Methylene Chloride (ug/l)
Methylethyl Ketone (ug/l)
Toluene (ug/l)
Xylene (ug/l)
BMWD-1 METALS
CONCENTRATION (mg/L)
14
12
10
8
6
4
2
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Manganese (mg/l)
Arsenic (mg/l)
Barium (mg/l)
Thallium (mg/l)
BMWD-1 CHLORINATED VOCS
CONCENTRATION (ug/L)
180
160
140
120
100
80
60
40
20
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Trichloroethene (ug/l)
1,2-Dichloroethane (ug/l)
Vinyl Chloride (ug/l)
Chloroform (ug/l)
BMWD-1 TDS AND CHLORIDE
CONCENTRATION (mg/L)
80000
70000
60000
50000
40000
30000
20000
10000
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
TDS (mg/l_)
Chloride (mg/l)

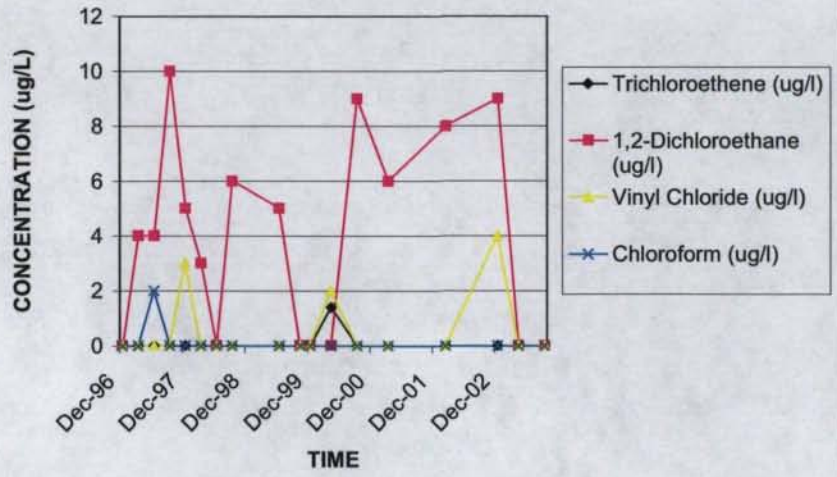
BMWD-2 VOCS



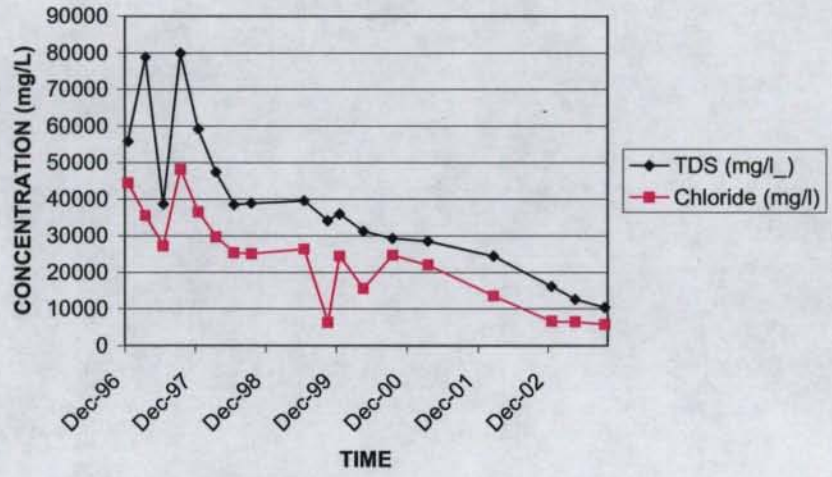
BMWD-2 METALS

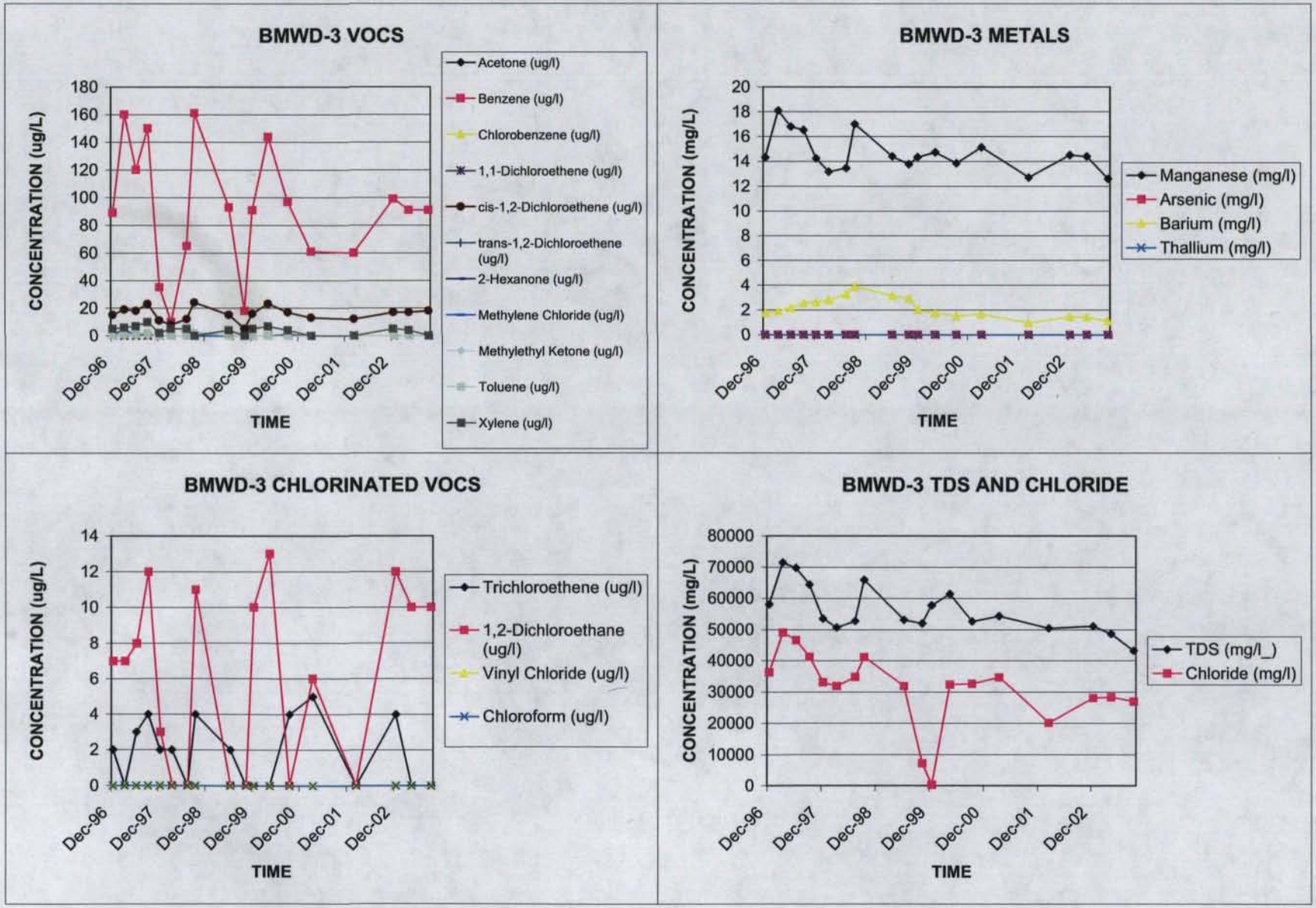


BMWD-2 CHLORINATED VOCS



BMWD-2 TDS AND CHLORIDE




BMWD-3 VOCS
CONCENTRATION (ug/L)
180
160
140
120
100
80
60
40
20
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Acetone (ug/l)
Benzene (ug/l)
Chlorobenzene (ug/l)
1,1-Dichloroethene (ug/l)
cis-1,2-Dichloroethene (ug/l)
trans-1,2-Dichloroethene (ug/l)
2-Hexanone (ug/l)
Methylene Chloride (ug/l)
Methylethyl Ketone (ug/l)
Toluene (ug/l)
Xylene (ug/l)
BMWD-3 METALS
CONCENTRATION (mg/L)
20
18
16
14
12
10
8
6
4
2
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Manganese (mg/l)
Arsenic (mg/l)
Barium (mg/l)
Thallium (mg/l)
BMWD-3 CHLORINATED VOCS
CONCENTRATION (ug/L)
14
12
10
8
6
4
2
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
Trichloroethene (ug/l)
1,2-Dichloroethane (ug/l)
Vinyl Chloride (ug/l)
Chloroform (ug/l)
BMWD-3 TDS AND CHLORIDE
CONCENTRATION (mg/L)
80000
70000
60000
50000
40000
30000
20000
10000
0
Dec-96
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
TIME
TDS (mg/l_)
Chloride (mg/l)