Health Consultation

Groundwater Evaluation

HIGHWAY 71/72 REFINERY SITE
BOSSIER PARISH, LOUISIANA

EPA FACILITY ID: LAD981054075

Prepared by
Louisiana Department of Health and Hospitals

JANUARY 13, 2012

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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List of Acronyms

ATSDR	Agency for Toxic Substances and Disease Registry
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CREG	Cancer Risk Evaluation Guide
CSC	Cities Services Company
CVs	Health Based Comparison Values
DPE	Dual Phase Extraction
EMEG	Environmental Media Evaluation Guide
EPA	Environmental Protection Agency
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LNAPL	Light Non-Aqueous Phase Liquid
MRL	Minimal Risk Level
OPH	Office of Public Health
PDB	Passive Diffusion Bag Sampler
PCMI	Post Corrective Measure Inspection Program
ppb	Parts per Billion
ROD	Record of Decision
SEET	Section of Environmental Epidemiology and Toxicology
µg/L	Micrograms per Liter

Summary and Statement of Issues

INTRODUCTION

In December 2010, U.S. Environmental Protection Agency (EPA) contractors collected groundwater samples from 20 monitoring wells at the Highway 71/72 Refinery site, located in Bossier Parish, Louisiana. The Highway 71/72 Refinery site is currently undergoing remedial action, with bi-annual groundwater monitoring.

In cooperation with EPA, Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) evaluated the most recent groundwater data available for the Highway 71/72 site to determine whether the Highway 71/72 site poses potential harm to public health through contact with contaminated groundwater.

CONCLUSION

After assessing the potential for the public to be exposed to these contaminants, SEET concludes that contact with the groundwater does not occur and will not harm people's health. However, there is a concern that contaminant vapors from the groundwater may migrate up through the soil and into people's homes.

BASIS FOR DECISION

The aquifer beneath the site is not used for drinking water or irrigation. Drinking water is sourced from the Red River. The Bossier City ordinance requires connection to the city water supply for all property owners. Therefore, we do not expect any exposures to groundwater to occur. However, Light Non-Aqueous Phase Liquid (LNAPL) in groundwater and possible high soil gas concentrations may be an underlying source of potential indoor air contamination. SEET cannot currently conclude whether vapor intrusion within the Highway 71/72 site borders could harm people's health. SEET recommends that additional indoor and outdoor air sampling be conducted by EPA at all properties within the Highway 71/72 site borders.

NEXT STEPS

SEET will be available to assess any additional samples collected from the Highway 71/72 site or to reassess the current data following any changes in usage of or access to the site.

The information produced within this health consultation will be made available to the community members and stakeholders in Bossier Parish, LA.

FOR MORE INFORMATION

If you have further concerns about the site, you can call SEET at 1-888-293-7020 or ATSDR at 1-800-CDC-INFO and ask for information about the Highway 71/72 site.

Background

Site Description and History

The 215-acre Highway 71/72 Refinery site is located in Bossier City, Louisiana near the intersections of Louisiana State Highways 71 and 72 in Bossier Parish. The site is approximately 2 miles east of downtown Shreveport and 1,500 feet north of the Red River. It was operated by Arkansas Fuel Oil for the production of home heating and fuel oils from 1923 to 1946. The refinery included processing areas, bulk storage and distribution areas and a railroad tank car repair yard. Following World War II, the processing area of the refinery was dismantled, and the facility was then used as a petroleum storage and distribution center during the 1950s. Petroleum was stored at the site and included leaded gasoline. By 1955, a significant portion of the refinery process equipment had been dismantled, and most of the tanks and bulk storage were leased to third parties. Between 1955 and 1967, various refinery operations were removed and sold. By 1966, an interstate highway corridor (I-20) was under construction through the site. The interstate highway was completed by the late 1960s [1].

In November 1966, the refinery property owner, Cities Services Company (CSC) announced plans for the demolition of the remaining refinery structures and cleanup of the property. A land use plan was subsequently approved by the Bossier City Council and the Bossier City-Parish Metropolitan Planning Commission. In 1966 and 1967, CSC undertook site clearing, which is reported to have included: filling in all remaining ponds and bayous (with soil) with the exception of the two canals on the north half of the property; leveling all dikes, spoils banks, and mounds; clearing structures, foundations, and piping in planned residential areas to a depth of two feet; removing oil, product and gas lines regardless of depth, and burning or removing all asphaltic refinery waste from the site [1].

Investigations and response actions conducted at the site found evidence that the site was not thoroughly cleaned in the 1960s as had been reported. Sludge deposits were buried under thin layers of fill material or simply graded into a level surface without any attempt at removal. High concentrations of lead were found in surface soil (addressed through the 1996 Soil Removal Action). Numerous abandoned pipelines, foundation remnants, concrete rubble, railroad tracks and ties, coke material, and tar material were also encountered in the surface soil during response actions conducted at the site [1].

Currently the refinery is gone, and the site is fully developed with single-family homes, apartments and businesses. The northwest corner of the site contains a single-family residential development, apartment complexes and commercial establishments. The northeastern portion of the site contains commercial establishments and a plot of undeveloped land. The southern part of the site is covered by several large apartment complexes, other residential areas and several commercial establishments including two hotels. The site has historically been divided into northern and southern halves by the present day Old Minden Road. Approximately 52 percent of the site is covered by pavement or buildings. Additionally, approximately 10 percent of the site has limited accessibility (e.g., fenced I-20 right-of-way). Land use in the area surrounding the site is similar to on-site use; residential, commercial and light industrial [2].

EPA signed the Record of Decision (ROD) on September 26, 2000 [2]. At the time of signing, physical and documentary evidence showed significant quantities of refinery waste remained at the Highway 71/72 Refinery site. The site is currently in remedial action status. Cleanup of

groundwater contamination consists of dual-phase extraction (DPE) of the light non-aqueous phase liquid (LNAPL) on the groundwater. LNAPL is a group of petroleum chemicals (mainly benzene, ethylbenzene, toluene and xylene) that tend to spread across the surface of the water table and form a layer on top of the water table. Emissions generated from the DPE process flow through a carbon filtration system in the vacuum pump discharge unit; influent and effluent stream air samples are collected during regularly scheduled groundwater monitoring events. The remedial action for groundwater was separated into two installation phases. Phase I addressed groundwater contamination on a 5-acre vacant lot bounded by John Wesley Boulevard and Bobbie Street. The Phase II area encompassed Days Inn, Motel 6 and other commercial properties. Well drilling was completed in August 2009. Installation of Phase II piping started May 3, 2010 and was completed mid-June 2010. Final testing of the DPE system took place in June 2010. The system was determined to be fully operational on July 14, 2010. System optimization is ongoing; evaluation of Phase II wells is also on-going [1]. This remedy requires periodic groundwater monitoring to ensure that LNAPL is not migrating to non-contaminated areas and to evaluate that the DPE system is recovering LNAPL as planned.

Another component of the remedial action includes sampling of soil and indoor air at the request of on-site residents, workers, business or property owners. LNAPL in groundwater and areas of high soil gas concentrations may be an underlying source area of potential indoor air contamination. As requested, all soil sampling and cleanup and indoor air sampling and mitigation will be conducted with EPA oversight at no cost to the requesting party [1] The on-site community is notified of the availability of sampling via community meetings and bi-annual mail-outs that are sent to all addresses within the site boundaries and to known individuals owning or managing properties within the site boundaries.

Demographics

The Highway 71/72 Refinery site is located in Bossier Parish, Louisiana. Census 2010 data record a parish population of 116,979. The largest ethnic group in that parish at that time was Caucasian (72.2%), followed by African American (20.9%). 87% of the population 25 years of age and above had earned at least a high school diploma. The median household income was $49,053 with 14.3% of persons living below poverty level [3].

The population of onsite residents is estimated at 3,500and includes approximately 370 children six years of age and younger [1].

Discussion

Environmental Data

The most recent bi-annual groundwater samples were collected in December 2010 from 20 monitoring wells [4]. Samples were analyzed for benzene, ethylbenzene, toluene and total xylene (BTEX). Benzene was detected above the ATSDR Cancer Risk Evaluation Guide (CREG) of 0.6 micrograms per liter (ug/L) at seven of the 20 monitoring well locations (Appendix A, table 1). Health based comparison values and their usage in the screening process are explained

further in appendix A. The benzene CREG was below the laboratory detection limit at 13 monitoring well locations.The LNAPL recovery plan continues to monitor the measured thickness of the LNAPL plumes. Thickness measurements shown from April 2010 and January 2011 show that a continued reduction in the plume size is being achieved [4]..

Previously collected bi-annual groundwater samples from June 2010 were analyzed for BTEX. With the exception of benzene, all contaminants were below laboratory analytical limits or health based comparison values. Benzene was detected above the CREG at the same seven wells as the December 2010 sampling. Two of the wells (B-2R, B-4) are located in Area C in the northeastern portion of the site, which contains commercial properties and undeveloped land parcels; one well is located in Area B (MW-66), and four wells (MW-59, MW-60, MW-63, MW-114) are located in Area D which are mixed residential/commercial (Appendix B, figure 1). The benzene CREG was below the laboratory detection limit at 13 monitoring well locations; SEET was unable to evaluate these locations . SEET contacted the EPA Highway 71/72 site manager to confirm that all monitoring wells are effectively capturing the LNAPL at the site. Per EPA, all monitoring wells are gauged prior to sampling with passive diffusion bag (PDB) samplers. The pre-gauging effectively detects all LNAPL in the monitoring wells [5].

Exposure Pathways

SEET evaluated the environmental and human components that lead to exposure in order to determine whether a child or adult would be exposed to contaminants detected in sampled media from the Highway 71/72 site. A completed exposure pathway contains the following five elements: a source of contamination, transport through some kind of environmental medium, a point of exposure, a route of exposure, and a receptor population. Completed pathways require that the five elements exist and indicate that exposure to a contaminant has occurred in the past, is presently occurring, or will occur in the future. Potential pathways, however, indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

EPA Groundwater Protection Strategy classification guidelines were used to classify the aquifer beneath the site. The groundwater beneath the site is classified as a Class IIB aquifer. A Class IIB aquifer is one that is not currently used but could be used in the future for drinking water, agriculture or other beneficial uses. Currently, the groundwater from this aquifer is not used for any of these purposes. Drinking water for on-site residents comes from treated water from the Red River which provides an abundant source of water. A well survey conducted in 1995 showed that only one private residential? well was located on-site. This well is not being used. The site aquifer is not expected to be used for drinking water or irrigation in the future because of the availability of an abundant water supply, because of the high total dissolved solids in the aquifer and because of a Bossier City ordinance which requires connection to the City water supply for all property owners (Appendix B) [2]. Therefore, no completed exposure pathways with respect to groundwater ingestion or direct contact currently exist at this site.

It is noted by EPA in the remedial action plan that LNAPL in groundwater and areas of high soil gas concentrations may be an underlying source area of potential indoor air contamination. As such, regularly scheduled inspections are conducted twice yearly at historically affected

businesses and residences on the Highway 71/72 site [6]. The Post Corrective Measure Inspection (PCMI) Program provisions include unit inspections, utility sealing at wall and floor entry locations, floor sealing where required and mechanical changes to continuously vent the unit or provision of a fresh air intake to constantly exchange air within the unit [6]. As further noted in the remedial action plan, residents, workers, business or property owners may request soil and/or indoor air sampling at no cost. The most recent request came from a resident at the Alexis Park apartments who complained of an occasional odor in the apartment. The Louisiana Department of Environmental Quality (LDEQ) and EPA contractors conducted an inspection of the unit on October 18, 2010 and did not encounter any petroleum odors or elevated readings with a photoionization detector (PID) [7]. Two gasoline storage cans and two large aboveground petroleum storage tanks were observed behind the building. PCMI measures were previously conducted in the apartment but some of the wall penetrations were not sealed due to subsequent remodeling work. Contractors resealed the wall penetrations during the inspection. On November 4, 2010, LDEQ and EPA contractors conducted air monitoring and sampling at the location. No odors or elevated PID readings were detected. One summa canister collected air for eight hours in the den/dining room area of the apartment and one canister collected ambient air for eight hours outside the apartment on the front porch. Both samples were submitted for benzene analysis using EPA method TO-15. The benzene concentration in indoor air at the apartment was within the performance standards set forth in the Consent Decree for the site [6]. SEET evaluated the results using ATSDR's minimal risk level (MRL) (3 parts per billion (ppb)) and cancer risk evaluation guide (CREG) (0.04 ppb) for benzene in air. Both samples exceeded the CREG, however, it would be imprudent to compare one 8-hour summa canister sample to the CREG which assumes a 70-year exposure period. SEET cannot conclude that the detected levels in both samples will not harm people's health (Appendix A, Table 2).

A potential exposure pathway exists in the past, present and future with respect to indoor air vapor intrusion at the Highway 71/72 site. SEET cannot currently conclude whether vapor intrusion at other properties within the site borders could harm people's health. Sampling conducted at the request of residents, workers and property owners does not adequately identify the potential exposure risk to all occupants. SEET recommends that additional indoor and outdoor air sampling be conducted by EPA at all properties within the Highway 71/72 site borders.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their

children's health. SEET found no harm pertaining to groundwater for children living near the Highway 71/72 Refinery site.
SEET further finds that there is a potential for exposure to BTEX in indoor air due to vapor intrusion from LNAPL in groundwater. This is based on the PCMI provisions and the most recent indoor air data collected at one of the historically affected properties located on the Highway 71/72 site.

Conclusions

Evaluation of the groundwater sampled by EPA contractors suggests that there is no harm related to exposures to groundwater from the Highway 71/72 Refinery site since there is no exposure pathway between the site related groundwater and the local population.

However, LNAPL in groundwater and possible high soil gas concentrations may be an underlying source of potential indoor air contamination. SEET cannot currently conclude whether vapor intrusion at all properties within the site borders could harm people's health. Sampling conducted at the request of residents, workers and property owners does not adequately identify the potential exposure risk to all occupants.

Recommendations

SEET recommends that, due to the potential for indoor air contamination from LNAPL in groundwater plumes and/or soil gas, additional indoor and outdoor air sampling be conducted by EPA at all properties within the Highway 71/72 site borders.

SEET further recommends that EPA continue to conduct post corrective measure inspections twice yearly to identify areas in need of maintenance or repair; and to continue to provide indoor air and soil sampling, cleanup and mitigation as necessary based on inspection findings.

The benzene CREG was below the laboratory detection limit at 13 monitoring well locations; SEET was unable to evaluate these locations. When future sampling is conducted to determine the hazard potential of contaminants, detection levels should be modified accordingly.

Public Health Action Plan

SEET will review future soil, groundwater and air data to monitor contaminant concentrations and to ensure that exposures are not occurring at levels of health concern.

The information produced within this health consultation will be disseminated by SEET to the public repositories, community members and stakeholders within Bossier Parish, Louisiana.

REPORT PREPARATION

This Health Consultation for the Highway 71/72 Refinery Site was prepared by the Louisiana Department of Health and Hospitals, Office of Public Health, Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved agency methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this health consultation and concurs with its findings based on the information presented in this report. ATSDR's approval of this document has been captured in an electronic database, and the approving reviewers are listed below.

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References

1. Environmental Protection Agency Region 6. Fact Sheet for the Highway 71/72 Refinery Site, Bossier Parish, Louisiana. Accessed 19 May 2011 at URL: http://www.epa.gov/superfund/sites/npl/la.htm

2. Environmental Protection Agency Region 6, Superfund Division. Record of Decision for the Highway 71/72 Refinery Site, Bossier Parish, Louisiana. September 2000.

3. U.S. Census Bureau, Bossier City, Louisiana Population Finder- American Fact Finder. Generated by Darcie Olexia. Accessed 1 Nov 2011 at URL: http://factfinder.census.gov/

4. CRA. Annual Remedial Action Report for Highway 71/72 Former Refinery Site, Bossier City, Louisiana. May 2011.

5. Email coorespondence with EPA site manager dated 18 Aug 2001.

6. CRA. Indoor Air Removal Action, Post Corrective Measure Inspection (PCMI) Program, Highway 71/72 Former Refinery Site, Bossier City, Louisiana. January 1998.

7. CRA. Community Requested Indoor Air Sampling Results, 2201 Loreco Street, Alexis Park Apartments, Unit 501, Highway 71/72 Former Refinery Site, Bossier City, Louisiana. March 4, 2011.

Appendices

Appendix A: Screening Process

Health based comparison values (CVs) were used to determine which samples needed further evaluation. CVs are not used to predict health effects or to set clean-up levels. Contaminants with media concentrations above a health based comparison value do not necessarily represent a health threat, but are selected for further evaluation. Contaminants with media concentrations below a health based comparison value are unlikely to be associated with illness and are not evaluated further.

The Agency for Toxic Substances and Disease Registry's (ATSDR) Environmental Media Evaluation Guide (EMEG) and Cancer Risk Evaluation Guide (CREG) were used as CVs in this evaluation. EMEGs are estimated contaminant concentrations that are unlikely to cause adverse non-carcinogenic health effects. EMEGs are calculated by using ATSDR's Minimal Risk Level (MRL), which is also an estimate of daily exposure to contaminants that are unlikely to cause adverse non-cancer health effects. CREGs are media-specific comparison values that are used to identify concentrations of cancer-causing substances that are unlikely to result in an increase of cancer rates in an exposed population.

Table 1: Benzene in micrograms per liter (ug/L) Detected in Groundwater Monitoring Wells above the Cancer Risk Evaluation Guide (CREG), Highway 71/72 Refinery Site. December 2010.

B-2R	B-4	MW-59	MW-60	MW-60 duplicate	MW-63	MW-66	MW-114
June 2010:							
66.4	7.5	419	432	422	2010	2020	3.8
December 2010:							
12.4	6.4	338	930	---	4310	1690	3.9

**Benzene groundwater CREG = 0.6 ug/L

Table 2: Benzene in parts per billion (ppb) detected in indoor and ambient air at the Alexis Park Apartments, Unit 501, Highway 71/72 Refinery Site. November 2010.

Indoor Air	Ambient Air
0.19 ppb	0.51 ppb

Benzene air CREG = 0.04 ppb **Appendix C: Bossier City Groundwater Ordinance**

The following Ordinance offered and adopted:

ORDINANCE 109 OF 2000

AN ORDINANCE PROHIBITING THE INSTALLATION OF GROUNDWATER WELLS WITHIN THE HIGHWAY 71/72 REFINERY SITE IN BOSSIER CITY

WHEREAS, the City has no feasible process to determine the contents, quality, or safety of underground sources of water; and

WHEREAS, the City has sufficient water to meet current residential and commercial water needs of the city from existing water treatment plant resources.

NOW, THEREFORE, BE IT ORDAINED, that the City Council of Bossier City, Louisiana, in regular session convened, hereby prohibits the installation of any new groundwater wells on the Highway 71/72 Refinery Site.

BE IT FURTHER ORDAINED, water from the existing well on that site, or any other that may be discovered on that site, shall not be used for any purpose.

The above and foregoing Ordinance, was read in full at open and legal session convened, on motion of MR. DARBY, seconded by MRS. RAWLS, and adopted on the 17 day of OCTOBER, 2000, by the following vote:

AYES: MRS. COOPER, MR. DEPRANG, MRS. RAWLS, MR. DARBY, MR. WILLIAMS, DR. ROGERS
NAYS: NONE
ABSENT: MR. JONES
ABSTAIN: NONE

Coy Cooper

COY COOPER
VICE-PRESIDENT

Helen Thornton

HELEN THORNTON, CITY CLERK
NOVEMBER 2, 2000
BOSSIER PRESS TRIBUNE

I, Helen Thornton, City Clerk of the City Council of Bossier City, Louisiana, do hereby certify that the above is a true and correct copy of Ordinance #109 of 2000 as adopted at the City Council Regular meeting held on the 17 day of October, 2000

Helen Thornton

Helen Thornton, City Clerk

Figure 1: Highway 71/72 Refinery Site

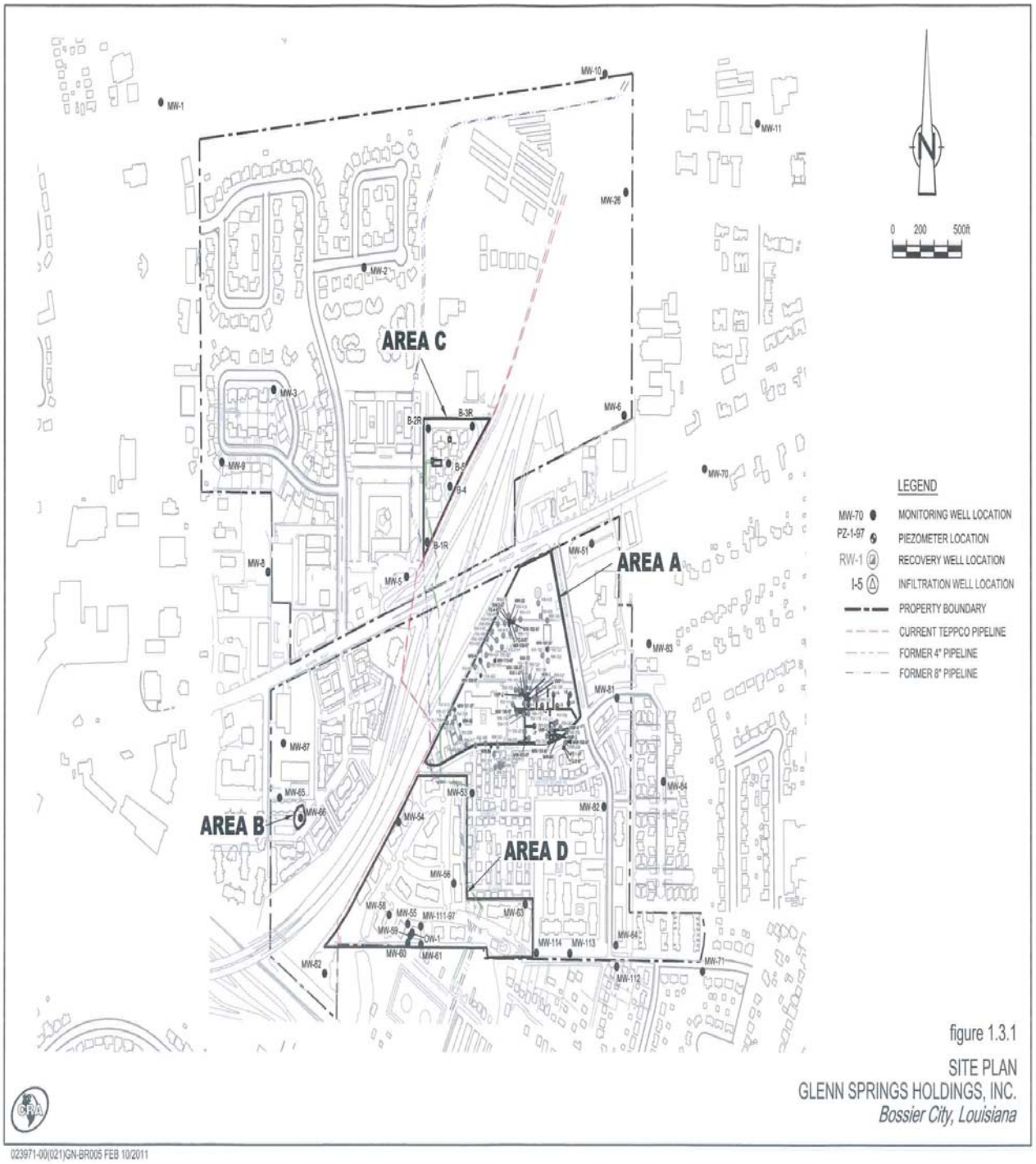

Figure 2: Current Land Use and Former Refinery Features