Public Health Assessment

Final Release

Site Update and Review

BROOKLYN PARK DUMP

BROOKLYN PARK, HENNEPIN COUNTY, MINNESOTA

USEPA FACILITY ID: MND985671874

Prepared by:

The Minnesota Department of Health
Environmental Health Division

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Agency for Toxic Substances and Disease Registry
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This document has not been reviewed and cleared by ATSDR.

FOREWORD

This document summarizes public health concerns related to an industrial facility in Minnesota. It is based on a formal site evaluation prepared by the Minnesota Department of Health (MDH). For a formal site evaluation, a number of steps are necessary:

- *Evaluating exposure:* MDH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is found on the site, and how people might be exposed to it. Usually, MDH does not collect its own environmental sampling data. Rather, MDH relies on information provided by the Minnesota Pollution Control Agency (MPCA), the U.S. Environmental Protection Agency (USEPA), and other government agencies, private businesses, and the general public.

- *Evaluating health effects:* If there is evidence that people are being exposed—or could be exposed—to hazardous substances, MDH scientists will take steps to determine whether that exposure could be harmful to human health. MDH's report focuses on public health; that is, the health impact on the community as a whole. The report is based on existing scientific information.

- *Developing recommendations:* In the evaluation report, MDH outlines its conclusions regarding any potential health threat posed by a site and offers recommendations for reducing or eliminating human exposure to pollutants. The role of MDH is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies—including USEPA and MPCA. If, however, an immediate health threat exists, MDH will issue a public health advisory to warn people of the danger and will work to resolve the problem.

- *Soliciting community input*: The evaluation process is interactive. MDH starts by soliciting and evaluating information from various government agencies, the individuals or organizations responsible for the site, and community members living near the site. Any conclusions about the site are shared with the individuals, groups, and organizations that provided the information. Once an evaluation report has been prepared, MDH seeks feedback from the public. *If you have questions or comments about this report, we encourage you to contact us.*

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On the web:	http://www.health.state.mn.us/divs/eh/hazardous/index.html

TABLE OF CONTENTS

Appendices

Tables

Figures

List of Acronyms

ATSDR: Agency for Toxic Substances and Disease Registry
BaP: benzo(a)pyrene
BaPE: benzo(a)pyrene equivalents
BDCM: bromodichloromethane
BCAA: bromochloroacetic acid
CDBM: chlorodibromomethane
cPAH: carcinogenic polycyclic aromatic hydrocarbons
CRA: Conestoga-Rovers & Associates
DBAA: dibromoacetic acid
DCAA: dichloroacetic acid
DCB: dichlorobenzene
DCE: dichloroethene
GW_{ISV}: Groundwater Vapor Intrusion Screening Value
HRL: Health Risk Limit
MDH: Minnesota Department of Health
MEK: methyl ethyl ketone
MIBK: methyl isobutyl ketone
ND: non-detect
MCSS: Minnesota Cancer Surveillance System
MPCA: Minnesota Pollution Control Agency
PAH: polycyclic aromatic hydrocarbons
PERC: perchloroethylene (also known as tetrachloroethylene)
PCB: polychlorinated biphenyls
ppb: parts per billion
ppm: parts per million
ppt: parts per trillion
RAP: response action plan
SDWA: Safe Drinking Water Act
SVOC: semi-volatile organic compound
TCA: trichloroethane
TCAA: trichloroacetic acid
TCDD: tetrachlorodibenzodioxin
TCDF: tetrachlorodibenzofuran
TCE: trichloroethylene
VOC: volatile organic compound
USEPA: United States Environmental Protection Agency

I. Executive Summary

This Public Health Assessment (PHA) provides a review of the available information regarding the Brooklyn Park Dump, evaluates the likelihood of public exposure (past, current, and future) to site-related contaminants, and evaluates the potential health implications of any exposures that may have occurred. The Minnesota Department of Health (MDH) completed this PHA at the request of the Minnesota Pollution Control Agency (MPCA) after that agency had been contacted by Brooklyn Park residents regarding health concerns possibly related to the site.

The Brooklyn Park Dump was located between 85th and 83rd Avenues and between Regent and France Avenues (Figure 1). It operated from 1954 to 1966 and covered approximately 21 acres of former agricultural land and wetlands in Brooklyn Park. The land where the dump was located is now used for a city maintenance facility, city park, and commercial businesses.

While no records exist of the volume and specific types of wastes disposed at the site, it is known that commercial, industrial and residential wastes were buried in excavated trenches that intersected the shallow water table. Soils at the site were contaminated with polychlorinated biphenyls (PCBs), dioxins, polynuclear aromatic hydrocarbons (PAHs) and other chemicals typical of landfills, such as heavy metals, volatile organic compounds (VOCs), petroleum compounds, and chlorinated solvents. Some of these compounds exceeded levels of health concern in surficial soils at the site and actions were taken to prevent public exposure to these soils. It is documented that people were in contact with soil contaminants in Central Park in 1988-1989. It is likely that some exposure to PCBs, dioxins, lead, and other contaminants occurred before and after those years until 2005 when the most recent remedial work began. Exposures could have increased the risk of illness but were very unlikely to have been high enough to cause any specific illness. Generally low levels of VOCs, chlorinated solvents, PAHs, and metals were detected in the shallow groundwater at the site. These contaminants have not been detected in private drinking water wells or city water supply wells near the site.

Surface soils in Central Park adjacent to areas that have been remediated should be analyzed for contaminants to confirm Central Park is free of contamination. Other recommendations include additional groundwater sampling near the southwest corner of the site; consideration of a vapor investigation at structures built on top of waste debris; and additional investigation when land use changes at adjacent businesses and if additional evidence of dump materials is uncovered.

This document had a public comment period, which is an opportunity for the public to comment on the information, conclusions, and recommendations contained in the draft document. Public comments received, MDH responses to comments, and changes made to the document are noted in Appendix A.

II. Introduction

The Minnesota Department of Health (MDH) was asked by the Minnesota Pollution Control Agency (MPCA) to review the Brooklyn Park Dump site (hereafter the "site") in response to citizen health concerns. The site was placed on the state Superfund list (Permanent List of Priorities; PLP) in 1989 after black, tar-like material that surfaced in Central Park was found to be hazardous. MDH previously reviewed the site in 1994 (MDH, 1994a) after two United States Environmental Protection Agency (USEPA) response actions in the early 1990s, when approximately 2,900 tons of soil containing high levels of polychlorinated biphenyls (PCBs) were excavated and removed from Central Park. Since that time, additional cleanup activities have occurred at the site and portions of the site (referred to as Areas 1 and 2) have been taken off of the state Superfund list, although some contamination remains on privately owned land (in what is referred to as Area 3). The purpose of this Public Health Assessment (PHA) is to review the available information regarding the site, evaluate the likelihood of public exposure (past, current, and future) to site-related contaminants, and evaluate the potential health implications of any exposures that may have occurred.

III. Background and Site History

A. Site History Until Discovery and Addition to the State Superfund List

The Brooklyn Park Dump operated from 1954 to 1966 and covered approximately 21 acres of former agricultural land and wetlands in Brooklyn Park (Figure 1) (CRA, 2005). There are no records of the volume and types of materials placed in the dump but it accepted many commercial and industrial wastes. Residents of Brooklyn Park dropped off their refuse and contents of burn barrels at the dump. The dump operators excavated trenches where the waste was deposited. Due to the high water table in this area, the trenches contained water (MPCA, 1992). Fires were common in the dump, both from intentionally burning wastes and inadvertent fires that required a response from the fire department. By 1964 the city limited burning to between 7 a.m. and noon, due to citizen complaints of the smoke. The dump was closed in 1966 due to resident complaints and failure of the operators to maintain it properly (MPCA, undated).

The westernmost part of the dump became Central Park in 1968. In 1971, Noble Avenue N. was extended from 83rd to 85th Avenue N., forming the eastern boundary of Central Park. Material that was excavated for the road construction was piled up in the park and became known as the sledding hill. This waste was found to be largely typical refuse, such as tires, paper, trees, cans, and bottles. The City of Brooklyn Park (hereafter the "City") purchased additional former dump property in various parcels in the 1970s to the early 1980s and developed the property east of Noble Avenue N. which currently includes the City Operations and Maintenance Facility and associated buildings. Miscellaneous fill materials including sand, bricks, asphalt, and wires were found at depths of 6 to 15 feet during the construction of the City buildings (MDH, 1994a).

The first documentation of any problem associated with the former dump was in 1981 when a City employee notified the MPCA of a black, tar-like substance in the surface soil of the park. At that time, it wasn't thought to be hazardous. By 1988-1989, more complaints of a black substance oozing up out of the soil in the park led to the material being tested. The material contained high levels of PCBs, dioxins, chlorinated solvents, petroleum products, heavy metals, and it was very acidic (pH of 1) (MDH, 1994a; USEPA, 1994). The area was fenced in June 1989. In December 1989, the site was added to the State of Minnesota's Superfund list (MPCA, 1994).

B. Geology and Hydrogeology

The site is located above an east-west trending buried valley that was eroded down through the bedrock. This valley is filled with deposits of glacial sand, sand and gravel, and loamy sand. Soil borings drilled at the site encountered interbedded sand and gravel layers with occasional localized areas of peat; discontinuous clay layers were encountered between 40-90 feet below ground level (CRA, 2005).

Groundwater is present at approximately15-20 feet below ground level. Water levels measured in monitoring wells at the site indicate that shallow groundwater in the area of the site generally flows from the southwest to the northeast (MPCA, 1995; CRA, 2005), while regional groundwater, particularly in bedrock aquifers, flows generally from the west-northwest to the east-southeast (Barr, 2003; CRA, 2005). Water levels measured within the glacial deposits beneath the site indicate no significant downward component to the groundwater flow (CRA, 2005).

Several early site documents referred to drain tiles having been used at the site to lower the water table. The use of drain tiles could potentially re-direct groundwater from the site to an intermittent stream/drainage channel that ultimately discharges to Shingle Creek (MDH, 1994b; MPCA, 1995). Review of historic aerial photographs and Light Detection and Ranging (LIDAR) remote imagery did not indicate the presence or construction of a drain tile system, nor does the City have any record of drain tiles having been installed on the city park or maintenance building properties. Finally, no drain tiles have ever been encountered during any of the drilling, trenching, excavation, or construction activities at the site. A former drainage ditch once bounded the western limit and portions of the northwest and north edges of the dumpsite, but this ditch did not drain to Shingle Creek. Historic aerial photos indicate the portion of this ditch within the Central Park property was filled sometime between 1967 and 1971. Based on this information, there does not appear to have been any link between the site and Shingle Creek.

C. Site Investigations and Clean-up Activities

The land over the former dump was later divided into three areas: Area 1 – Central Park; Area 2 – City Operations and Maintenance Facility; and Area 3 – privately owned commercial properties along Noble, 83rd, and 85th Avenues (CRA, 2005). The sections below describe the data, remedial actions, and current status of the three areas (see Figure 2).

Area 1 - Central Park - Remedial investigation and removals

A removal action was conducted by USEPA in November-December of 1990 to excavate the tar sludge and contaminated soils in Central Park. Over 2,500 tons of PCB-contaminated material was removed and sent to a disposal facility in Idaho. In April 1991, the City identified residual contamination in the Park near the area of the removal action. The USEPA suspected that tar was dropped from the heavy equipment used in the removal action, covered by snow and overlooked. The City removed the residual contamination found at the surface, placed it in eight drums and stored them in the city maintenance garage. USEPA took the drums for disposal in February 1992. By August 1992, additional tar sludge surfaced in the Park south of the area that was excavated in 1990. USEPA excavated an additional 170 tons of contaminated material in October 1992 and sent it to Utah for disposal. It was clear at that time that a lot more contamination remained; however, USEPA did not have funding to remove additional soil. USEPA erected a fence around where they thought the contamination remained.

USEPA collected soil samples in May of 1993; concentrations of up to 300 parts per million (ppm) PCBs were detected in surface soils near the excavated areas (USEPA, 1993). It is unclear if the contaminated samples were collected inside or outside of the fenced area. The USEPA determined that additional emergency response actions were not warranted and transferred the site to the MPCA for further investigation. Although never on the federal Superfund list, USEPA used money from the federal Superfund for the removal actions. The USEPA sued to recover the costs of the cleanup. Gopher Oil, Cowles Media, Northern States Power, the City, and the dump owners eventually paid a portion of the cleanup costs.

The MPCA conducted additional sampling in 1993 and found significant PCB contamination remaining in surface soils north of the fenced area in Central Park (up to 680 ppm). In addition to the elevated PCBs, the analytical results showed that lead was found in the surface soils up to 6,720 ppm, as well as elevated levels of other inorganics - iron, copper, and antimony. One sample also contained elevated levels of 1,2,4-trichlorobenzene and 1,4-dichlorobenzene. Trace levels of a number of other compounds were also detected.

A previous Health Consultation written by MDH in 1994 recommended that fencing at Central Park be extended to prevent access to any contaminated soils (MDH, 1994a). However, the original fence was never extended and the public had access for a number of years to a limited area of surface soils in the park that contained elevated PCBs, lead, and other contaminants (MPCA, 1994).

The City received a grant from Hennepin County in 2002 to conduct a site investigation and create a Response Action Plan (RAP) for all three areas of the dump site and to implement a RAP for Central Park. The City of Brooklyn Park hired a consultant, Conestoga-Rovers & Associates (CRA) to conduct the investigation and create the RAP. CRA conducted a site investigation in 2003 and completed a site investigation report in 2005 that describes their investigation which includes additional groundwater sampling, delineation of the waste boundaries, delineation and characterization of the waste oil sludge, and methane monitoring.

At the sledding hill, 13 test pits were dug into the soil to depths between one and six feet and a visual assessment was conducted for the presence of waste (CRA, 2005). One soil boring was advanced to a depth of 32 feet through the entire thickness of the sledding hill. One sample collected at a depth of 20 feet contained 43 ppm PCBs. The sledding hill was found to contain a mix of typical refuse and soil throughout the entire hill and there was at least six inches of soil cover on top of the buried waste. No safety hazards were identified during the investigation, but it was determined that a thicker soil cover would prevent any objects from emerging and creating a physical hazard. In 2004, a minimum of two feet of soil cover was placed over the existing waste (CRA, 2007). No waste was excavated during the construction.

CRA completed subsurface sampling to locate the tar sludge that was remaining in the eastern edge of Central Park. Twenty test pits were dug to various depths and a visual assessment of the type of soil or contents in the soil was completed. In addition to the test pits, one-inch diameter soil borings were conducted on a 50-foot grid pattern over the area that was known or suspected to contain tar sludge (CRA, 2005). A visual assessment was also completed on 65 soil borings. According to these investigation results, all trash debris or tar sludge found in Central Park was at least 6 inches below the soil surface - with the exception of areas that were within the fenced portion of Central Park (CRA, 2005). Eleven samples at depths between two and eight feet were collected for PCB and pH analyses. These samples were chosen based on the appearance of the sludge material. Results ranged from non-detectable to 12,000 ppm PCBs and a pH of 0.2 to 8.4. The soil sludge sample from a depth of 3-5 feet that contained 12,000 ppm PCBs was also analyzed for dioxins. The total 2,3,7,8-tetrachlorodibenzodioxin (TCDD) equivalents measured was 11.7 parts per billion (ppb; see section IV. B. below).

Soil or oil sludge in Central Park was sampled and analyzed four times between 1989 and 2003. Much of the sampling was done at depth to define the extent of oil sludge below the surface. Some of the sludge samples had a very low pH, measured as low as 0.2. Acid sludge is a by-product of petroleum refinery operations, possibly containing sulfuric acid. Table 1 lists the pH and concentrations of significance for PCBs, lead, and other contaminants in the soil from sampling events in 1989, 1993, and 2003. Table 2 provides soil screening levels from the MPCA, the Agency for Toxic Substances and Disease Registry (ATSDR), and USEPA for both residential and industrial soil exposure scenarios. PCBs, lead, and dioxin were all found at levels much greater than screening values. Figure 3 shows the locations of the soil samples in Table 1 and the samples that exceed screening values at the surface.

No surface soil samples were taken during the 2003 investigation so the extent of contamination at the surface in the Park at that time is unknown.

In the summer of 2005, construction began on the capping of the east area of Central Park. Geotextile fabric was laid over the areas to be capped, followed by at least two feet of clean soil cover. Also in 2005, during construction of a storm sewer, buried waste was encountered along the southern edge of the site and relocated within the Park to a parking lot area and covered with two feet of soil and asphalt (CRA, 2006). By September 2006, the installation of the bituminous cap (for the Park skating rinks) was finished (CRA, 2007). Land use restrictions were put into place to prevent future excavations in the areas where buried waste is known to exist.

The areas in Central Park where contaminated surface soil was detected (from the sledding hill east to Noble Avenue), were capped with soil or pavement. However, on the areas where capping was not deemed necessary, no surface soil confirmation sampling was done to ensure that all surface soils in the park are free of contamination.

In 2007 the Central Park portion of the Brooklyn Park Dump site was delisted from the state Superfund list.

Area 2 – City Operation and Maintenance Facility
The City of Brooklyn Park has built a number of structures and bituminous surfaces on or adjacent to the former dump since their purchase of the property. The City began the development of their Operations and Maintenance Facility in the NE corner of 83rd and Noble Avenue in the early to mid-70s (CRA, 2005). As previously mentioned, fill materials were encountered during excavations during building construction. An MPCA document regarding the history of the site noted that "previous reports indicate that unknown tar-like substances have been present at the city garage" (MPCA, 1992).

In 1987, as part of the parking lot construction at the city garage (Area 2), the City removed approximately 12,230 cubic yards of waste and soil (STS, 1990). Smaller excavation activities have occurred over the years as the City constructed new buildings and/or parking lots in Area 1 and 2. Soils from these activities were either disposed in off-site landfills or buried on-site with a thick soil cover (Braun, 1991; STS, 2000; CRA, 2006).

In 1992, four underground storage tanks were removed from city garage parking lot on 83rd Ave. and Noble Ave. (MDH, 1994a). There had been a release of unknown volume of both leaded and unleaded gasoline from two of the 10,000 gallon tanks. About 172 cubic yards of contaminated soil was excavated at the time of the tank removal. Results from the soil and groundwater testing done after the removal indicated that no petroleum contamination remained in the area (MDH, 1994a).

In 1998, the City initiated an investigation to explore the subsurface in order to build a salt shed. Construction was started in April of 2000 and resulted in a stockpile of waste materials on-site. In May, MPCA observed the waste/soil stockpile and took two samples – one of black oily material found dripping down the pile and a composite soil sample; the two samples contained elevated lead (510, 570 ppm), PCBs (18.5, 9.7 ppm), and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) (1.5, 3.6 ppm benzo(a)pyrene equivalents; BaPE), respectively (see section IV. D. below). The material was properly disposed in a landfill.

In 2003, an investigation to define the boundaries and depth of the buried waste was completed (CRA, 2005). Much of the City property over the former dump in this area was already covered with pavement or buildings in 2003. The investigation first started with soil borings intended to determine the boundaries of the waste. A total of forty-nine borings were advanced in Area 2 and Area 3, the locations determined by approximations of the dump boundaries from historic aerial photographs. Six test pits were dug in Area 2. Two were found not to be within the dump boundaries, and in the other four the waste was found less than six inches to one foot from the surface. In addition, twelve soil borings (TB1-TB12) were advanced on the City property. The soil cover over waste varied from one to five feet in those borings. Oily sludge was only found in one boring at the City property. PCBs measured 1.3 ppm at a depth of 6-8 feet where the sludge was found. Based on the investigation results, the boundaries of the waste and sludge waste in Area 2 were approximated as shown in Figure 2. The City proposed to maintain the asphalt currently in place over the buried waste and to add additional buildings and impervious surfaces in the future (CRA, 2005).

Also in 2003, CRA took soil gas samples to check for combustible gases. Buried wastes can generate methane which can accumulate in buildings located near or on top of the wastes. CRA used a hand-held combustible gas meter to measure for the presence of methane at utility access points (manholes and catch basins) through much of Areas 2 and 3. No methane was detected. A second method which collected soil vapor up to six feet below the surface found low levels of methane in the soil outside of the City Operations and Maintenance Facility Building B (up to 2.8% methane by volume), and outside of the Waste Technology and Excel Warehouse buildings (up to 5% methane by volume). According to the CRA report, no methane was detected in Building B or the Waste Technology basement.

In 2010, the City acquired a portion of the L.J. Fischer property (in Area 3, see below) to the north of their Operations and Maintenance Facility in order to expand their parking capacity (CRA, 2011). They also expanded their stormwater retention pond. Waste profile sampling was conducted on materials excavated during this work to determine options for disposal; all concentrations were below regulatory criteria for hazardous waste. Over 12,000 tons of material was excavated from the parking lot area and over 2,000 tons excavated from the pond expansion and disposed as non-hazardous waste at the Vonco II, LLC landfill in Becker Minnesota (CRA, 2011). Two feet of clean soil was placed under the pavement, and four feet of clean soil on unpaved areas (CRA, 2011).

This City-owned part of the Brooklyn Park Dump site (Area 2 and the City-owned portion of Area 3, the parking lot expansion) was delisted from the state Superfund list in November 2011. The City cannot excavate or disturb the soil in the future without notifying the MPCA.

In July 2012 the MPCA approved excavation for construction of a 1,000 square foot addition to Building C of the Operations and Maintenance Facility. Two soil samples collected from the geotechnical borings for this construction did not detect hazardous substances at concentrations of concern. PCBs were detected in one of the samples at 0.041 ppm.

Currently the City has multiple buildings on the property including the maintenance office facility, garages, a paint booth, and a salt shed.

Area 3 – Privately-owned commercial properties along Noble, 83rd, and 85th Avenues

Several additional buildings have been built (either whole or in part) within the former dump boundaries (see Figure 4). These businesses and the years they were built include Cardinal Towing (1974), Waste Technology Inc. (1975), Premier Electric/Metro Building Systems (1976), Builders Insulation (1976), and Brooklyn Park Mini-Storage (1979). A vacant lot, the L.J. Fischer property, is also located within the dump boundaries. There are several additional businesses adjacent to the dump but not directly on top of it. Cardinal Towing, Waste Technology, Inc., and Metro Building Systems all have unpaved gravel lots behind their front entrances. There is also some green space near the buildings.

In 1993, the USEPA conducted limited sampling at Cardinal Towing and the former Twin City Garage (currently Excel Warehouse and Waste Technology Property) and found up to 46 ppm PCBs in surface soils at Cardinal Towing (see Table 3 and Figure 3) (Liesch, 1997; USEPA, 1993). USEPA sent a letter to Cardinal Towing in 1993 stating that emergency response actions are not warranted at the property; however, "ATSDR has indicated that disturbance of surface soils may render fugitive dust that contains PCBs at air levels that may pose a public health threat." The

MPCA analyzed a composite tar sample from the USEPA sample collection for total organics and inorganics from the back lot of Cardinal Towing (MPCA, 1994). Lead was detected at 1200 ppm, as well as very low levels of tetrachloroethylene (or perchloroethylene, PERC), 4,4-DDE (a pesticide), and petroleum compounds. In October 1993, the MPCA conducted additional sampling, including two samples from Cardinal Towing at a depth of 0-2 feet. One sample had elevated PCBs at 32 ppm and the other had elevated lead at 1350 ppm (MPCA, 1994). The MPCA investigation report notes workers may be exposed to contaminated soils in areas that have not been paved. The report also notes that in hot weather an area behind Cardinal Towing had occasional seeping of a black tar-like substance up through the surface soil (MPCA, 1994). Figure 3 also locates PCBs and lead in surface samples above screening levels in Area 3.

2003 Area 3 investigation

The extent of buried waste and oil sludge in Area 3 was investigated in 2003 (CRA, 2005). In addition to the 49 soil borings previously mentioned that were placed throughout Area 2 and 3 to further define the waste boundaries, 22 test pits were excavated and an additional 17 soil borings were advanced (CRA, 2005).

At Cardinal Towing, sludge or roofing tar was found at a depth of six inches in two test pits. Trash and sludge were found at various depths in the nine soil borings, but neither trash nor sludge were found in all of the borings. Trash was found between the surface and four feet; sludge was found between 1 and 4 feet. A petroleum odor was noted in two of the borings.

At the Waste Technology Inc. property, sludge was found in only one of the six borings at 3.5 feet, but trash was found in five of the borings between the surface and four feet. In the test pits, trash was found between 1-1.5 feet and a trace amount of oily sand was found in one pit at 1 foot, but blocks of oils, and soaked compressed sand was found starting at a depth of 1.5 feet in the other test pit.

In the two borings on the Fischer property, sludge was found at 3.5-4 feet and trash between the surface and 3.5 feet. No oily sludge was found in four test pits on the Fischer property, but trash was present in all pits between depths of 0.5 and 4 feet.

The oil sludge is primarily below Cardinal Towing, Waste Technology, Inc. and the southern part of the former Fischer property (currently owned by the City). The range of soil cover over the oil sludge mixture was found to be from six inches to four feet. Results from analytical sampling in this area found PCBs up to 180 ppm at a depth of four feet (see Table 3). One sample of the sludge on the Cardinal Towing property was analyzed for 2,3,7,8-TCDD equivalents which was detected at 942 parts per trillion (ppt). An oily substance different in composition and appearance than the oil sludge was found in a soil boring at 4-6 feet on the Waste Technology property. It was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Lead (1620 ppm), mercury (3.2 ppm), and several petroleum compounds were detected. PCBs were not measured in this sample. Sampling results are reported in Table 4.

It was determined in the Response Action Plan that because the future use of the properties was unknown, it was premature to propose specific response actions (CRA, 2005). The investigation did not address the current risk of surface soil contaminants to site owners and employees.

Fischer Property investigation and remediation

A 1995 investigation of the vacant 5.5 acre Fischer property confirmed a portion of the dump exists on the parcel, but did not detect groundwater contamination at that time (Liesch, 1995). Additional investigation completed in 1997 further delineated the extent of the dump, identified soil impacts from the waste disposal and identified limited groundwater impacts (Liesch, 1997). A similar investigation was completed concurrently in 1997 on the adjacent developed 2.25 acre parcel.

In 2008, additional investigation was carried out to facilitate redevelopment of the site (Barr, 2009). The boundary of the former dump was adjusted slightly because waste material doesn't extend as far north as previously thought. It was discovered that sludge was present in the southwest corner of the property. Soil samples at depth found elevated levels of lead (1200-6600 ppm), arsenic (25-32 ppm), and antimony (660 ppm). Total petroleum hydrocarbons as fuel oil were detected in nearly all of the samples. cPAHs were also present in the soil. Soil gas screening for VOCs detected elevated trichloroethylene (TCE), PERC, and petroleum compounds. Because VOCs easily evaporate, they can move from contaminated soil towards the ground surface. If these vapors come to a basement as they travel to the surface, they may enter through cracks in the foundation, spaces around pipes, or through a drain system. Vapor intrusion is the process of pollution moving from soil or groundwater to indoor air. The soil gas levels found would be a concern for vapor intrusion if buildings existed on the site (Barr, 2009). See Table 5 for soil gas data.

The Fischer property was later divided into southern and northern parcels. As noted above, the southern parcel was sold to the City and a new parking lot was completed in early 2011. The northern portion was investigated further in 2010-2011 (Barr, 2011). Approximately 14,700 tons of dump material was excavated and properly disposed at Veolia Environmental Services' landfill in Buffalo, Minnesota; approximately 16,500 tons of clean soil was used to backfill the excavation. Soil gas sampling was completed and 1,3-butadiene was found elevated but not above industrial soil gas screening levels. Barr hypothesized that the 1,3-butadiene could be from past burning of rubber tires. They recommended additional soil gas sampling prior to redevelopment and, if needed, a vapor barrier be installed as part of building construction (Barr, 2011).

Residential areas - 4001/05 83rd Avenue and surrounding parcels

In September of 2009, the City demolished a vacant duplex on City-owned property at 4001-4005 83rd Avenue North, located southeast of what was thought to be the southeastern edge of the dump (see Figure 2). Buried waste was found during the demolition. In October, CRA dug two test pits on either side of the former duplex basement to collect samples of the soil/waste material. Waste, including glass and metal fragments, was found from 4-7.5 feet in the east test pit, and from 3.5-9 feet in the west test pit. The east test pit contained a 1.5 foot layer of whitish ash found at a depth of 6 feet. In the west test pit, a 5.5 foot layer of rusted metal debris was encountered. Field screening of the soil with a photoionization detector did not detect volatile organic compounds or other gases. Soil samples collected from each test pit were tested for PCBs and both were estimated to contain 0.024 ppm PCBs. Toxicity characteristic leaching procedure (TCLP) tests were done to screen for VOCs, SVOCs, metals, pesticides and herbicides, and no contaminants were detected. A geotextile was placed over the disturbed soil and six inches of top soil placed over the fabric. The City plans to maintain the cover on the property until there is interest in developing the property. Future development would have to appropriately address management of the waste. A letter was sent to residential property owners in the surrounding area in February 2010 informing them that buried non-hazardous waste was found during demolition of the duplex and that the extent of the buried waste beyond that property is not known.

Brookdale Park investigation

While reviewing City records, CRA discovered that 5,000 cubic yards of waste material was excavated during a project at the City Operations and Maintenance Facility in 1987 and relocated elsewhere. City workers indicated the waste was transported to Brookdale Park (Brookdale Park is approximately one mile southeast of Central Park, see Figure 1). In 2003 an investigation was carried out at Brookdale Park to determine the extent of the waste and whether any of it was hazardous (CRA, 2004). Eight test pits in the northeast parking lot and three test pits in the sledding hill were excavated to look for waste. No waste was found in the sledding hill area. Some waste was found in the parking lot area, but the samples were estimated to contain less than 1 percent debris. Most of the area had at least six inches of soil cover above any debris that was present. Waste that was found included plastic, construction debris, wood and tree waste, metals, glass, and concrete. No oil sludge waste or other hazardous waste was found based on a visual inspection. CRA recommended that a foot of clean topsoil be placed on the fill area surrounding the parking lot to prevent contact with glass and metal fragments that were present at the surface. According to the City, the area was covered with topsoil in 2004 (Greg Hoag, Park Maintenance Superintendent, personal communication, 1/2/13). Based on this investigation, no evidence of hazardous waste was found at Brookdale Park.

Groundwater Investigation

On-Site Groundwater Monitoring

Twenty-two monitoring wells were installed at the site between 1988 and 2003 (Figure 5) and have been tested, at various times, for VOCs, SVOCs, PCBs, PAHs, pesticides, dioxin, and metals. The available sampling results are shown in Table 6. It should be noted that this table shows only those compounds that have been detected at least once in a monitoring well and does not reflect the entire list of chemicals analyzed.

Low levels of fifteen VOCs, one SVOC, nine PAHs, and six heavy metals were detected. Of these, only four VOCs [benzene, PERC, TCE, and vinyl chloride], two PAHs [benzo(a)anthracene and benzo(b, j, k)fluoranthene] and four metals [arsenic, cadmium, lead, and manganese] exceeded the Minnesota Health Risk Limits (HRLs) for drinking water. A HRL is a concentration of a chemical in drinking water that is likely to pose little or no health risk to humans, including vulnerable subpopulations. PCBs, pesticides, and dioxin were not detected in any of the monitoring wells.

Of the contaminants detected in the groundwater at the site, only vinyl chloride, the two PAHs, and one metal (manganese) exceeded the HRLs by any significant amount. Except for manganese, the areas of contaminated groundwater appear to be localized near the southeast corner (VOCs in well MW-13) and north-central portion of Area 3 (PAHs in wells M-2 and M-3). The VOCs detected in MW-13 may be related to waste disposal at the site, but as this area has been used for a variety of light industrial businesses; at this time the actual source of the VOCs is not known. Manganese is a naturally occurring mineral in Minnesota groundwater, but the normal concentration in quaternary aquifers in the Twin Cities metropolitan area ranges from <0.9 to 1200 ppb (MPCA, 1999). The manganese concentrations detected in groundwater beneath the site (up to 13,400 ppb) were 10 to 100 times greater than the HRL and well above the natural range in Minnesota groundwater. Elevated manganese is often found at unlined landfills and dumps because the water that leaches through the waste becomes acidic and allows mineralized manganese to become soluble (Kerfoot, et al., 2004).

Three temporary monitoring wells (MW-101, 102 and 103) were installed in 1991 as part of an underground storage tank removal and environmental investigation at the City Operations and Maintenance Facility (Area 2). MDH was unable to locate any sample results for these wells, but a report by the City's consultant states: "…groundwater samples collected during the investigation did not indicate the presence of significant contamination from the fuel storage area." The MPCA closed the file for the tank site December 30, 1994.

Following delisting of Areas 1 and 2, all of the monitoring wells at the site were sealed in accordance with the Minnesota state well code.

Off-Site Groundwater Monitoring

As noted above, during the construction of a parking lot in Area 2, approximately 5,000 cubic yards of soil and waste was excavated and placed on a portion of Brookdale Park (Figure 1). To determine if the soil or waste had impacted groundwater at that park, four temporary monitoring wells were installed (CRA, 2004). The wells were sampled for VOCs, metals, and general chemistry parameters (see last two pages of Table 6). Low levels of four VOCs (cis-1,2-DCE, PERC, 1,1,1-trichlorethane and TCE) were detected in two of the wells; none exceeded their HRLs. Manganese concentrations in all four wells exceeded the drinking water criteria and were somewhat higher than the naturally occurring range of manganese detected in metropolitan area groundwater. In one well (MW-4), an estimated concentration of thallium (which was detected below the laboratory reporting limit) exceeded its drinking water criteria, but this was not confirmed by a duplicate sample from that well.

Drinking Water Sampling: Municipal Water Supply

Brooklyn Park currently has eighteen water supply wells that provide drinking water to nearly all residential and commercial properties in the City (Figure 6); four additional wells (city wells 4, 5, 6 and 9) were sealed between 1993 and 2002. In compliance with the Safe Drinking Water Act, the City routinely monitors water quality from all of their wells. Brooklyn Park drinking water consistently meets or exceeds federal drinking water standards.

Ten of the existing city wells are located in a main well field northwest of the site (city wells 10, 13, 14, and 16 – 22). Before the water from the main well field enters the city water distribution system, it passes through a treatment plant, where the mineral content is reduced and disinfection chemicals are added to prevent bacteria. The wells in the main well field are completed in the quaternary sands and gravels filling the bedrock valley (described in section II. B.) or the underlying bedrock (Franconia-Ironton-Galesville formation), at depths of 190 feet or more below the ground surface. The area of the aquifers from which these wells draw water (or their "capture zone") may extend into the western end of the site (Figure 6; Barr, 2003). However, the city well field is located upgradient of the site and, as discussed below, there is no evidence that contaminated groundwater at the site is being drawn towards the city wells.

MDH has reviewed all available City water sampling data for the Brooklyn Park municipal water supply wells, treatment plant effluent, and water distribution system (Table 7) and found the following:

- In accordance with the federal Safe Drinking Water Act (SDWA), the city water is routinely tested for bacteria, metals, and nitrate and less frequently for VOCs, SVOCs, and pesticides. Since 1963, ten VOCs have been detected in six of the city wells (wells 7, 8, 9, 10, 11, and 15; well 9 has since been sealed). Well 10 is the only one of these located in the main well field near the site and had only one trace detection of cis-1,2-dichloroethene (0.49 ppb) in 1985. This is far below both the federal Maximum Contaminant Level (MCL) for cis-1,2-dichloroethene of 70 ppb and the state Health Risk Limit (HRL) of 50 ppb.

- The majority of VOCs detected were in sealed well 9, on the west edge of the city, several miles upgradient of the site. There is no hydrogeologic connection between well 9 and the groundwater beneath the site.

- One VOC, xylene (0.2 ppb) was detected in the main well field treatment effluent in 1999 (but never in any of the main well field wells). This concentration is well below both the state HRL and federal MCL. The treatment plant effluent also frequently contains small amounts of chloroform, bromoform, bromodichloromethane (BDCM), and chlorodibromomethane (CDBM), which are the by-products of the drinking water disinfection process, not groundwater contaminants. Although BDCM occasionally slightly exceeds its HRL of 6 ppb, the combined concentrations of disinfection by-products do not exceed the federal MCL of 80 ppb, which is the applicable regulatory standard for public drinking water systems.

- Trace levels of phenols (SVOCs) were detected in five of the city wells, but at concentrations far below the HRL.

- Five pesticides have been detected in seven of the city wells, none of which are located in the main well field. Two pesticides, dalapon and DCPA di-acid degradate, have been infrequently detected at low levels in the main well field treatment plant effluent. None of the pesticides detected in the wells or treatment plant effluent exceeded the MCLs.

- Sampling of the city water distribution system since 1963 has detected only four VOCs other than disinfection by-products [TCE, 1,1,2-trichlorotrifluoroethane (also called Freon 113), benzene, and xylenes]. None exceeded either the HRLs or MCLs.

- In 1989, the City's consultant sampled city wells 2, 3, 10, 13, and 14 for PCBs. No PCBs were detected (STS, 1989).

- Metals, nitrate, radionuclides, and general chemistry measurements were within normal ranges for Minnesota groundwater (MPCA, 1999); only manganese exceeded the HRL (there is no MCL for this metal). The manganese detected in the city wells appears to be naturally occurring and unrelated to the site. It would be removed by the treatment plant and although it is not analyzed for in the effluent, if it were present it would cause unpleasant odors and staining at concentrations below levels of health concern, triggering a response by the City. Some slight exceedences of federal drinking water standards were detected for copper and lead within the distribution system, but these detections are related to metal plumbing materials, not groundwater contamination (see Table 7 for more details).

It should be noted that the main well field treatment plant became the primary sample location for the main well field after it was constructed in 1993. The SDWA requires drinking water systems be sampled at the point of entry of the water into the distribution system. This is why, since the early 1990s, the individual wells in the main well field (10, 11, 13, 14, and 16 – 22) have not been sampled as frequently or for all of the chemicals listed above.

Drinking Water Sampling: Residential, Business, and City Park Wells
Between 1988 and 1996, MDH and MPCA sampled three residential, eight business, two golf course, and three city park wells (including the well at Central Park) for dump-related contaminants (Figure 7; Table 8; MDH, 1999). Well logs are available for eleven of these wells; all but one (Norwood Park) are completed in the Quaternary sand and gravel aquifer and most are more than 105 feet deep. Samples collected included VOCs, PCBs, metals, and general water quality parameters such as chloride, nitrate and nitrite, ammonia, sulfate, pH, and specific conductivity. PCBs were not detected in any of the wells tested and all of the general chemistry parameters were within normal background levels for Minnesota.

Only one business well had low level detections of three VOCs (chloroform, BDCM, and CDBM) that did not exceed the HRLs. These VOCs are not site-related contaminants and are typical byproducts of well disinfection; it is possible this well had recently been treated for bacteria. Two wells downgradient of the site had elevated manganese at concentrations above the HRL. These elevated manganese levels may be associated with the elevated levels observed at the site, which are likely the result of the increased acidity typically found in groundwater beneath unlined dumps and landfills. Three of the wells initially had elevated sulfate and specific conductivity relative to the other Brooklyn Park wells sampled, but subsequent sampling did not confirm these results. None of the three wells was located in or downgradient of the dump area and the initial elevated levels may simply have been the result of normal variability in the groundwater.

IV. Chemicals of Interest

A. Polychlorinated Biphenyls (PCBs)

PCBs are oily liquids or solids that were widely used as coolants and lubricants in transformers, capacitors, and other electrical equipment. The term PCB actually refers to a class of 209 compounds with a range of physical and toxicological characteristics. Each PCB compound is called a congener. Commercially, PCBs were sold as mixtures of congeners graded by the percent of chlorine in their total mass. Aroclor is the industrial trade name for the PCB mixtures that were produced by Monsanto from 1930 to 1977. For example, Aroclor 1260 and Aroclor 1254, identified at the site, are mixtures of PCBs containing 60 percent and 54 percent chlorine, respectively (an exception is Aroclor 1216, which has 42 percent chlorine).

The Agency for Toxic Substances and Disease Registry (ATSDR, 2000) and the USEPA have published extensive reviews of PCBs and their behavior and fate in the environment. PCBs always appear in the environment as mixtures. The manufacture of PCBs in the United States was banned in 1977 because they are persistent, accumulate in the environment, and are toxic to humans and other animals. Low levels of PCBs are found throughout the environment because of long-range atmospheric transport from sources such as waste incinerators. Although PCBs are widespread and very persistent in the environment, once they are deposited they are not particularly mobile. They readily adsorb onto soil and sediment, particularly if it has high organic carbon content (as would be expected in wetland deposits like those beneath the Brooklyn Park Dump). As a result, even at sites with high concentrations of PCBs in the soil, these contaminants are typically not found in groundwater, and therefore drinking water is not a common route of exposure.

PCBs are very persistent chemicals. Degradation half-lives for PCBs are typically determined to be two to ten years in soil (ATSDR, 2000). PCBs evaporate easily from water, but vaporization is greatly reduced when PCBs are adsorbed onto soil or sediment. Volatility increases dramatically with increases in temperature. Typically, higher chlorination of PCBs equates with greater toxicity, lower vapor pressure (and therefore less rapid evaporation), and slower degradation. The composition of a mixture of PCBs in the environment will therefore change over time, not only because of selective decomposition of PCB congeners but also because of different evaporation rates. Therefore, as an exposed PCB source ages, the ratio of highly chlorinated congeners to congeners with lesser chlorination may increase.

When PCBs are heated, some are changed into other compounds known as polychlorinated dibenzofurans (PCDFs; also known simply as furans). In the presence of chlorobenzenes, polychlorinated dibenzodioxins (PCDDs; also known simply as dioxins) can also be formed. These reactions can occur as a result of the overheating of electrical transformers or from fires. Typically, only a small percentage of PCBs are converted to PCDFs or PCDDs. PCDFs are also known to be contaminants of commercial PCBs, especially those manufactured before 1970 (ATSDR, 2000). While the percentage of PCDFs and PCDDs present in PCBs is likely to be small, they are of concern because some PCDFs and PCDDs are significantly more toxic than PCBs.

The USEPA Integrated Risk Information System lists PCBs as a probable human carcinogen based on the results of animal studies (USEPA, 1997). Furthermore, PCBs may be associated with adverse effects other than cancer, such as immunological or developmental effects. Studies of people who worked directly with PCBs suggest that exposure at high concentrations could cause irritation of the skin, nose, and lungs, gastrointestinal discomfort, and changes in blood and liver (ATSDR, 2000).

PCBs are lipid (fat) soluble chemicals and are therefore directly absorbable by inhalation, ingestion, and through the skin of animals, including humans. The affinity for lipids and hydrophobic organic molecules allows PCBs to be stored in the fat of animals, including humans, and causes them to bind preferentially to the organic fraction of soil and sediment. The half-life for PCBs in animals is very long (about 7 ½ years in humans), and accumulation of PCBs can continue over an entire lifetime. PCBs can also be found in fish. The MDH fish consumption advisory contains strict advice on eating fish from the Mississippi River due to developmental effects on the children of women who consumed large amounts of PCB-contaminated fish.

PCBs are thought to be found in all people throughout the United States and other developed countries, without any specific exposure. The background PCBs body burden is primarily from contamination of the food supply (mainly fish, meat, and dairy products) (Carpenter, 2006). PCBs can bioaccumulate over time, therefore PCB concentrations usually increase with age. Studies of health effects of PCBs have often been focused on looking at children of mothers who were exposed to PCBs (occupationally or through eating large amounts of contaminated fish). Low birth weight, changes in the immune system, and behavioral/developmental effects, have been linked to higher than typical levels of PCBs in infants (ATSDR, 2000).

B. Dioxins

Dioxins are a family of chemicals (including PCDDs, PCDFs, and some PCBs) that share a similar chemical structure and common mechanism of toxic action (USEPA, 2011), but each PCDD, PCDF, and PCB in this class of chemicals has a different degree of toxicity, or potency. Like PCBs, dioxins almost always occur in mixtures; to account for the different potencies of the individual congeners in the mixture, analytical results are often reported as a single "total dioxin" concentration presented in terms of "toxic equivalency" to the most toxic dioxin compound, 2,3,7,8-tetrachlorodibenzodioxin (or 2,3,7,8-TCDD). Dioxins occur as contaminants in the manufacture of certain organic chemicals or as unintentional byproducts of combustion. Exposure to dioxins occurs mainly from our food supply, but dioxins are widely distributed throughout the environment in low concentrations. Like PCBs, dioxins are readily adsorbed onto soil and sediment, particularly if it has high organic carbon content. As a result, they are typically not found in groundwater and drinking water is not a common route of exposure.

Dioxins are persistent and bioaccumulative. They have been characterized by USEPA as likely to be human carcinogens and are anticipated to increase the risk of cancer at even background levels of exposure. Animal studies have shown that exposure to dioxins at high enough levels may cause a number of other adverse effects, including changes in hormone systems, alterations in fetal development, reduced reproductive capacity, and immunosuppression (USEPA, 2011).

Sampling for dioxins was conducted at the site in 1989 and 2003. In 1989 one sample of a surface deposit of oil sludge was tested for 2,3,7,8-TCDD which was detected at 89 parts per billion (ppb) (MDH, 1994a). Subsequently, one additional sample was taken and no 2,3,7,8-TCDD was detected. At the time it was suggested that the first result was a false positive due to the high concentrations of PCBs in the sample. Additional sampling for dioxins and furans was conducted in 1989. Five samples of soils and five samples of water were analyzed for TCDD and seven samples of oil sludge for TCDD and TCDF (tetrachlorodibenzofuran). No TCDD or TCDF was identified in any of the samples (MDH, 1994a). As noted above, in 2003 two samples of the oil sludge were analyzed for 2,3,7,8-TCDD equivalents and the results were 11.7 ppb and 942 ppt.

The dioxins measured in the oil sludge at the site were very high. Dioxins are formed during the burning of PCBs, chlorinated solvents, and even other municipal waste. The site accepted burn barrel remains from residents. It is probable that beyond the soil sludge there are pockets of dioxin contamination within the dump due in part to the intentional burning of waste material as well as the unintentional dump fires.

C. Lead

Lead, a naturally occurring metal, can be found in concentrations of approximately 15-20 ppm in the Earth's crust (ATSDR, 2007). It continues to be used in the production of lead batteries, mainly for automobiles. Lead is a very common contaminant due to its previous use as an additive in gasoline and paints, as well as in a wide variety of industrial uses. Lead-arsenic compounds were also used as pesticides. Lead does not degrade and is not mobile in soil.

No safe level of lead has been identified. Subtle neurobehavioral effects in children can occur at very low blood lead levels. New Centers for Disease Control and Prevention guidance in 2012 has changed from identifying a blood lead level of concern at 10 µg/dL to identifying a reference level for elevated lead in the population at 5 µg/dL. Children are often most at risk for lead poisoning during their hand-to-mouth behavior phase. The vast majority of elevated lead levels in children are known to be from leaded paint peeling from older housing; however, lead in soil, especially at very high levels, can also be an exposure pathway leading to childhood lead poisoning.

Although the most sensitive target for lead toxicity is the developing nervous system in children, the nervous system of adults is also a main target of lead. Lead can affect almost every organ and system in the body, with other sensitive targets being the blood and cardiovascular systems, and the kidneys (ATSDR, 2007). Very high exposure levels to pregnant women may cause miscarriage.

Lead is a common contaminant at dump sites, likely due to the widespread disposal of lead-acid batteries. Very high levels (up to 6,720 ppm) were found in the surface soil in Central Park. Lead adsorbs readily to soil and sediment and, typically, is not found dissolved in groundwater except under acidic conditions such as those found in landfills and dumps. Unfiltered groundwater samples from monitoring wells may detect lead which is actually adsorbed onto soil particles in the water, rather than actual dissolved lead. This may account for some of the lead detections at the site.

D. Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are produced by the incomplete combustion of organic materials such as coal, oil, wood, tobacco, and cooked food, and as a result are very common in the environment (ATSDR 1995). They are also found in petroleum products such as asphalt, coal tar, creosote, and roofing tar. Hundreds of PAHs are known to exist, and they are usually found in the environment as mixtures. PAHs generally fall into two groups based on their potential health effects: those that are carcinogenic (cancer causing, known as cPAHs), and those that are not (non-carcinogenic PAHs, or nPAHs). While short-term dermal exposures to PAHs can irritate the skin, the health outcome of primary concern for people exposed to PAHs is cancer.

Carcinogenic PAHs, measured in benzo(a)pyrene equivalents or BaPE, are found at low levels in the soil at the site. Because cancer potency data is not available for most PAH mixtures, toxicity is often measured as BaPE, which is the sum of the concentrations of cPAHs multiplied by their potency factors relative to the toxicity of benzo(a)pyrene (BaP).

PAHs were also found at elevated levels in the groundwater at the site, but not in drinking water near the site. Like PCBs and dioxins, PAHs tend to adsorb onto soil and sediment particles rather than dissolve into the groundwater, limiting their mobility in the environment. Exposure to these compounds from the site is expected to be minimal.

E. Volatile Organic Compounds (VOCs)

VOCs are a concern because they can volatilize (evaporate) from soil and groundwater and move up through the soil, where the gases can collect under or near structures. The vapors can then enter buildings and be inhaled by building occupants. Health effects from a variety of VOCs can range from eye and respiratory irritation to an increase in cancer risk to developmental or other health endpoints. Vinyl chloride, TCE, and 1,3-butadiene, contaminants found at the site, are compounds that are considered carcinogenic to humans. PERC, also found at the site, is considered to be likely carcinogenic to humans and can cause adverse effects to the nervous system. TCE is also a potential human health hazard for toxicity to the immune system, kidney, and developing fetus.

Vinyl chloride was detected in well MW-13 at concentrations up to 3.7 ppb, which exceeds the MPCA's Tier 1 initial groundwater vapor intrusion screening value (GW_{ISV}) of 1 ppb (MPCA, 2008). GW_{ISV}'s are screening values that, when exceeded, indicate that further investigation is needed to determine if there is a possibility that vapors may enter buildings from contamination in the groundwater. TCE, PERC, and 1,3-butadiene were also found at elevated levels in the soil gas at the Fischer property prior to remediation.

TCE and PERC, and petroleum compounds, such as benzene and xylenes have been found in the groundwater near the site. While in some samples these compounds exceeded state HRLs, they were not detected in drinking water wells near the site. VOCs were also found in some of the Central Park soil samples. Although VOCs are generally more readily dissolved into groundwater than PCBs, PAHs, and dioxins, and thus are more mobile in the environment, they are also degraded to some degree by naturally occurring bacteria, which tends to limit the distances they will travel away from a source area.

V. Potential Exposures to Site Contaminants

Former dump operations

As previously noted, fires were common in the dump, and citizens made frequent complaints regarding smoke. Smoke from open burning of municipal solid waste contains many toxins. It is unknown how much, if any, of oil sludge waste or other hazardous wastes was burned. Residents nearby were likely exposed to contaminants during the dump operation from the burning of wastes.

Former drainage ditch

It is possible, during wetter periods, that anyone coming into direct contact with the former drainage ditch that bordered the west, northwest, and northern edges of the dump may have encountered standing water, but it is unlikely to have constituted a significant route of exposure. Access by any one person would likely have been infrequent and of limited duration. While no information is available regarding water quality in the former ditch, the low levels of contamination in the monitoring wells at the site suggests that any contamination that may have entered the ditch water also likely would have been relatively low. Moreover, the highest levels of groundwater contamination (MW-13) were detected in the portion of the dump furthest from the ditch. The primary contaminants of concern at the site (PCBs, PAHs, dioxins, and lead) tend to have relatively low mobility in the environment and are more likely to adsorb onto soil and organic carbon than to dissolve into water. This also may have limited the levels of contamination in water in the ditch. The more mobile VOCs detected above drinking water criteria in the groundwater (benzene, PERC, TCE, and vinyl chloride) are quite volatile and would rapidly evaporate from surface water. The drainage ditch was filled sometime between 1967 and 1971, before this portion of Central Park became a city park. This may have also helped to limit the number of people who could have come in contact with the ditch.

Central Park (Area 1)
The waste oil sludge was first discovered in Central Park in the surface soil in 1981. Residents began reporting the substance in the park in 1988 and 1989 and there are reports of children getting the sludge on their shoes (Mintpress, 2012; unknown, 1989). MPCA noted in their files that they received citizen calls about previous encounters (usually child encounters) with the substance. Exposure to people walking through the park lessened after the USEPA's removal actions. But in 1993, MPCA soil testing found PCBs and lead at levels of concern in a small area north of the fenced area (MPCA, 1994). Dioxin was measured in the oil sludge but it is unknown if dioxins were commonly present in the surface soils. Despite the recognized need for the fence to be extended, the soil remained open to the public until 2005 when construction for the hockey rinks began.

It is unknown how common it was for people to walk or spend time in the particular area of the park where soil contamination was present on the surface. The land north of the fenced area became overgrown with trees and brush over the years, which may have reduced exposure to the surface soil. It is likely that direct contact with the sludge did not occur very frequently. Incidental ingestion or direct contact with contaminated soil (not the sludge itself) is more likely. Exposure to the contaminants may have occurred from contaminated soil attaching to shoes or bike tires and subsequently being tracked into homes and yards. Infrequent walking through contaminated soil should not lead to significant contamination in homes. Repeated tracking of soil into the home is more of a concern; however exposure potential depends on the floor surface, activity patterns, and frequency and effectiveness of cleaning patterns (Hunt et al. 2006). Once in homes, dust can be resuspended and inhaled. Crawling infants with repeated hand contact on the floor may be the most at risk for exposure through their frequent hand-to-mouth activity that may lead to contaminant ingestion.

It is unknown what the ambient air concentrations of PCBs were when the contamination was near or at the ground surface in Central Park. PCBs can enter the air by evaporation from soil, and knowledge of the importance of airborne PCBs as a route of exposure is increasing (Robertson and Ludewig, 2011). There is research to show higher than average air concentrations at PCB contaminated waste sites (ATSDR, 2000; Chiarenzelli, et al 2000; Hermanson et al., 2003). Elevated air concentrations were found at a former PCB manufacturing facility in 1997 (the facility stopped production in 1971) from near-site landfills that had a soil cover of unknown depth (Hermanson et al., 2003). It is likely there were measurable level of PCBs in ambient air in Central Park from the volatilization of PCBs in the sludge at the ground surface or even buried under a layer of soil, and therefore some exposure to PCBs from inhalation in Central Park. Contaminants in the soil surface may also have been inhaled if the soil was disturbed and the conditions were right to create dust. These exposures likely would have been infrequent and of limited duration, but given the persistence of PCBs in the body would have added some small amount to a person's overall body burden of PCBs.

A number of studies have assessed exposure or health effects from living near a PCB contaminated site (Choi et al., 2006; Orloff et al., 2003; Hermanson et al., 2003). In 2001 ATSDR responded to citizens' concerns regarding exposure to environmental PCB contamination from a PCB production plant that dumped waste adjacent to the plant (Orloff et al., 2003). PCB-contaminated soil was present in nearby residential yards and in soil and sediment on other properties prior to remediation. Eighteen families who lived within a half mile of the chemical plant participated in an investigation that measured PCBs in participant's blood, soil, and dust from their homes. Blood serum samples were taken from 37 children and 43 adults. Nine adults were determined to have elevated PCBs in their blood. The authors concluded that "analyses of environmental data failed to show a correlation between *current* environmental concentrations and blood PCB concentrations" (Orloff et al., 2003). However, it is thought that the older, long-term residents likely had past exposures to PCBs from the site that could be responsible for the elevated levels in their blood. Six of the nine participants with elevated levels ate clay (a cultural or social tradition) from the neighborhood. It is likely that at this site participants were exposed to PCBs indirectly from locally caught fish and locally raised animals, and directly through contact with soil, sediment, surface water, and air. Potential exposures from Central Park would be much lower in comparison to this example.

Another study conducted in the mid-1990s attempted to answer the question if living near a Superfund site contributes to higher PCB exposure. The researchers looked at cord blood PCB concentrations in newborns born to mothers living near a Superfund site that contained PCB contaminated sediments (Choi, et al., 2006). The authors found no evidence that living closer to the Superfund site was associated with increased cord serum PCB levels. However, infants born before or during dredging of PCB contaminated sediments at the site had higher levels than infants born after the dredging. This indicates exposure to volatile PCBs from the ambient air. In addition, maternal consumption of local dairy products was associated with higher cord blood PCB levels, which may have been site related. Older maternal age was the greatest predictor of elevated cord serum PCB levels, which is a well-established risk factor.

A study in Germany looked at the influence of PCBs in blood in school children from a school known to be contaminated by PCB building materials. Although the exposure from the indoor air in the school caused an increase in blood concentration of the lower chlorinated congeners, the levels attributable to the school exposure were low in comparison to background levels caused by dietary intake (Liebl et al., 2004).

Lead was also present in surface soils in Central Park. It is likely that some exposure to lead occurred through direct contact with surface soils, especially if children ever dug in the contaminated areas. The extent of dioxins that were present at the surface is unclear. There was only one surface sample detection in 1989 that was considered at the time to be a false positive.

In conclusion, it is known that exposures to PCBs (and likely to a lesser extent lead and dioxins) did occur in Central Park. It is possible that a person could have elevated PCBs in their blood from past exposure. However, based on exposure studies from other PCB-contaminated sites, past exposure to contaminants at Central Park to the typical park visitor is likely to be relatively low, but could result in small increases in health risk. The majority of lifetime exposure to PCBs and dioxins are from the diet. People are typically exposed to lead through a variety of media including paint chips, air, water, food, dust, and soil.

City property and other private businesses (Areas 2 and 3)
Soil gas data from the Fischer property sampled in 2008 prior to remediation revealed high levels of PERC, TCE, and 1,3-butadiene that could be problematic if present under or near structures at the site because these contaminants may accumulate inside buildings. Structures on the site have not been tested for the potential for VOCs to impact the indoor air. Vapor intrusion from soil gases from waste materials may be a concern.

There are areas within Area 3 that likely still contain contaminants at the ground surface of unpaved parking lots at Cardinal Towing and Waste Technology. Contaminants may be inhaled in these areas, from contaminants volatilizing into the air. Or, they may be inhaled or ingested as particulates in the air from dusty conditions or vehicle traffic. Contaminants at the surface could also be tracked into buildings and homes.

Residential properties
Most of the existing residential properties near the site were built after dump operations ceased and would not have been affected by those operations. While site investigation work indicates most of the dump was located within the boundaries of Areas 1, 2, and 3, some waste was found buried at a residential property located southeast of Area 3 and outside the delineated area of the dump. It is unclear whether the waste on that property was related to the dump and whether similar waste is present beneath other residential properties south of 83rd Avenue. Several VOCs were detected in monitoring well MW-13, near the southeast corner of Area 3, including vinyl chloride above the Tier 1 initial groundwater screening value (GW_{ISV}) of 1 ppb. This well was located approximately 95–100 feet from the nearest commercial building and approximately 130 feet from the nearest residence. The screening value for possible vapor intrusion at these distances would be ten times the GW_{ISV}, or 10 ppb. However, the source, magnitude and extent of VOC contamination in this area has not been defined so it is unknown if concentrations of vinyl chloride higher than those detected in MW-13 are present or if the VOC contamination extends beyond the site boundaries. Additional groundwater investigation is warranted to ensure that VOCs are not present at concentrations high enough in the groundwater beneath the adjacent residential neighborhood to pose a potential vapor intrusion risk.

VI. Disease and Environmental Contamination

MDH learned about public concern over environmental contaminants in this area through several articles in an online news source (MintPress, 2012) and through a Facebook page dedicated to discussing and tracking diseases in Brooklyn Park. The largest concerns voiced by the public were regarding a variety of serious illnesses in people between 35-45 years old, many of whom graduated from Park Center Senior High School. People suspected Central Park and Shingle Creek have something to do with the amount of illness in people in this area. Autoimmune diseases, such as lupus, multiple sclerosis, and amyotrophic lateral sclerosis, as well as neurological disorders and cancer are among the illnesses mentioned as a concern.

Disease clusters have been defined as a greater than expected number of cases of the same disease that occurs within a group of people in a geographic area over a period of time (CDC, 2012). There are a number of examples of the epidemiologic evaluation of clusters that have led to the discovery of environmental risk factors for a disease. Mesothelioma and workplace asbestos exposures, angiosarcoma in vinyl chloride workers, and birth deformities and consumption of thalidomide are all historic examples of breakthroughs resulting in the evaluation of clusters of cases (CDC, 2012; ATSDR, 2002). However, most suspected clusters are due to chance or may be an assortment of unrelated diseases (ATSDR, 2002). The first step in evaluating a suspected cluster is to determine whether an unexpected increased incidence of disease really exists, which unfortunately can be very difficult to ascertain. Disease registries or active public health surveillance do not occur for most chronic diseases. Therefore it is largely unknown if there are elevated rates of specific diseases in Brooklyn Park.

Exposure investigations look for evidence of a shared exposure to a chemical that is capable of causing a disease of concern. The exposure would also have to be at a level that health effects might be expected to occur. However, except in occupational settings where very high level exposures can occur, true disease clusters are very hard to identify. Most suspected clusters are individuals with similar diseases that happened to have occurred by chance in one particular place but have independent causes (ATSDR, 2002). Statisically, it is expected that in large enough populations the occurrence of several people in a small area having the same illness but with unrelated causes will occur frequently. It appears unlikely that intermittent exposures to contaminants from the former dump site have occurred at levels sufficient to cause evident health effects in individuals. However, it is possible that exposures may have resulted in increased risk of disease, most of which have multiple causes and long latencies (time between exposure and disease).

Minnesota Cancer Surveillance

The Minnesota Department of Health systematically collects demographic and diagnostic information on all Minnesota residents with newly-diagnosed cancers as part of the Minnesota Cancer Surveillance System (MCSS). As a result of a citizen inquiry, staff from MCSS collected cancer incidence data from three zip codes (55443, 55444, 55445) in Brooklyn Park from 2000-2009 for all types of cancers. This data was then compared against the State average cancer incidence. There is no statistically significant difference in cancer in Brooklyn Park compared to the rest of the State; most cancer types are slightly lower in Brooklyn Park than the State average and some types are slightly higher. Total observed cancers for Brooklyn Park was 1,870, while the expected amount based on the state average is 1,919. For ages 30-49 only, the observed cancers in Brooklyn Park was 207, while the expected amount is 218. A graph of the data is shown in Figure 8.

VII. Conclusions

- No Brooklyn Park Dump site-related contaminants have been detected in private or city drinking water wells.

- There is no hydrogeological connection between the city well field and the site.

- Low levels of some organic chemicals have been infrequently detected in some of the Brooklyn Park city wells, treatment plant effluent, and city water distribution system. These chemicals are not related to the Brooklyn Park Dump site and the concentrations detected do not pose a health risk for current or past users.

- It is documented that people were in contact with contaminants in Central Park in 1988-1989. It is likely that some exposure to PCBs, dioxins, lead, and other contaminants occurred before and after those years until 2005, when the most recent remedial work began.

- Exposures to dump contaminants mostly in Central Park were likely intermittent; these exposures may have increased risk of disease but were very unlikely to have been high enough to cause any specific illness. Because these exposures mostly occurred decades ago, it is impossible to quantify the amount of exposure and health risk.

- PCBs in ambient air in at the site were likely greater than background levels in air from the volatilization of PCB contaminants in soils.

- It is unknown if Central Park is free of contamination because no surface soil samples from areas not capped during the remedial action have been analyzed.

- Workers at Cardinal Towing and Waste Technology may have been exposed to contaminants in the surface soil in the past and/or may be currently exposed to contaminants in the surface soil. However, workers are likely occupationally exposed to some amount of contaminants and it may be hard to differentiate soil contamination from the dump versus potential current site releases.

- Several VOCs were detected above the HRLs in MW-13, near the southeast corner of the site. The source, magnitude and extent of VOC contamination in this area have not been defined. There do not appear to be any drinking water receptors in the area likely to be affected by these VOCs, but they may pose a vapor intrusion risk (see next conclusion).

- Soil gas screening from the Fischer property in 2008 and the presence of vinyl chloride in MW-13 above its groundwater screening value indicates the potential for a vapor intrusion risk on other areas of the site. It is unknown whether there is any exposure from soil gas contaminants in the buildings on the City property or other businesses on the site although the likelihood may be low.

- It is unknown whether there are homes that have been built over dump materials.

VIII. Recommendations

- Surface soils in Central Park adjacent to the park remedial activity in 2005-2006 should be analyzed for PCBs, dioxin, and lead to ensure the surface soil in Central Park is free of contamination.

- Remediation of soil at Cardinal Towing and Waste Technology Inc. should be considered. If land use changes, then further investigation and remediation will be needed.

- Additional groundwater sampling should be conducted near the southeast corner of the site to define the extent and magnitude of the VOC contamination detected in MW-13 and to ensure nearby commercial and residential buildings are not at risk for vapor intrusion.

- If additional evidence of dump materials in residential areas is uncovered it should be investigated.

- Soil gas levels at the Fischer property prior to remediation indicate some potential for vapor intrusion at other buildings over the former dump. A vapor investigation should be considered at structures that are built on top of waste debris.

IX. Public Health Action Plan

- MDH with work with the MPCA to support the implementation of recommendations in this report.
- If additional environmental data becomes available, MDH will evaluate the data and provide recommendations as needed.
- MDH will communicate with the community regarding health risk as needed.

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CERTIFICATION

This Brooklyn Park Dump Public Health Assessment was prepared by the Minnesota Department of Health (MDH) with support from the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health assessment was begun. This document has not been reviewed and cleared by ATSDR. Editorial review was completed by additional programs of MDH.

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Appendices

Appendix A: Responses to Public Comments Received

Table 1: Soil Data in Central Park

Table 2: Soil Screening Levels from MPCA, ATSDR, and EPA

Table 3: PCBs in Area 3

Table 4: Additional Contaminants Detected in Area 3

Table 5: 2008 Fischer Property Soil Gas Samples

Table 6: Monitoring Well Sample Data – Detected Chemicals

Table 7: City Water Sample Data – Detected Chemicals

Table 8: Residential, Business, and Park Drinking Water Wells

Figure 1: Site Location Map

Figure 2: Site Map and Defined Extent of Dump

Figure 3: Soil Sample Locations

Figure 4: Business Properties in Area 3

Figure 5: Monitoring Well Sample Locations

Figure 6: Location of Brooklyn Park City Wells

Figure 7: Location of Residential, Business and Park Well Samples

Figure 8: Cancer incidence comparing the average for Minnesota and Brooklyn Park from 2000-2009

Appendix A
Responses to Public Comments Received

Minnesota Pollution Control Agency Comments on the Public Health Assessment for the Brooklyn Park Dump prepared by the Minnesota Department of Health dated March 1, 2013

Conclusions

- No Brooklyn Park Dump Site-related contaminants have been detected in private or city wells.

  No comment

- There is no hydrogeological connection between the city well field and the site.

  No comment

- Low levels of some organic chemicals that have been infrequently detected in some of the Brooklyn Park City wells, treatment plant effluent, and city water distribution system. These chemicals are not related to the Brooklyn Park Dump site and do not pose a health risk for current or past users.

  No comment

- It is documented that people were in contact with contaminants in Central Park in 1988-1989.
  It is likely that some exposure to PCBs, dioxins, lead, and other contaminants occurred before and after those years until 2005 when the remedial work began.

  Comment: It is important to better define the conclusion regarding exposures occurring until 2005. The Minnesota Pollution Control Agency (MPCA) Site Assessment staff that investigated the seeps of contamination report that the small seeps were found in heavy brush that would have limited exposure to people.

  Response: The amount of exposure to the contamination is unknown. It is unclear at what point in time the brush become heavy north of the fenced area. Brush on the site at one point in time may have been an attractive place for children to play, or conversely, it may have limited exposure. The brush would not have prevented access to contact with the contaminants. The PHA notes that the brush may have reduced exposure to surface soil.

- Exposures to dump contaminants mostly in Central Park were likely intermittent; these exposures may have increased risk of disease but were very unlikely to have been high enough to cause any specific illness. Because these exposure mostly occurred decades ago, it is impossible to quantify the amount of exposure and health risk.

Comment: Statements linking levels of dump contaminants to disease would benefit from additional objective data and quantification for better context, for instance - what levels of exposure could be expected to cause specific illnesses compared to the situation encountered at this Site. Statements associating contaminants to disease - even those intended to provide reassurance - may be more effective with additional context.

Response: The frequency and duration of exposures to contaminants at the site is largely unknown and therefore impossible to quantify or compare with exposures that may cause specific illnesses. Exposures to PCBs, dioxins, and lead from the site, although likely low, could have added to a person's overall body burden of those contaminants from other sources.

- PCBs in ambient air in at the Site were likely greater than background levels in air from the volatilization of PCB contaminants in soils.

Comment: This statement is not clear in terms of the conditions assumed to exist at the site and the risk implications. Supporting evidence may be required to better illustrate this risk.

Response: PCB contaminated material was present in or near the surface soil for a number of years. PCBs are known to volatilize from contaminated sites and impact the ambient air. Additional supporting citations have been added to document. Because the past levels of PCBs in ambient air is unknown and cannot be quantified, the PHA acknowledges the inhalation exposure pathway and notes it would have added some small amount to a person's overall body burden of PCBs.

- It is unknown if Central Park is free of contamination because no surface soil samples from areas not capped during the remedial action have been analyzed.

Comment: An investigation was conducted by Conestoga-Rovers & Associates (CRA) to define areas of contamination. Soil borings and test pits were advanced in areas of suspected contamination and soil samples were collected for analysis in those areas. Figure 3.5 in the Site Investigation Report and Response Action Plan, prepared by CRA and dated July 2003, shows the layout of the grid sampling plan consisting of soil borings with additional trench excavations on the east side of Central Park.

Boring logs and excavation logs showing the stratigraphy of the soils are presented in Tables 1 and 2 of Appendix F of the above referenced report. Selected soil samples were analyzed for PCBs. These samples were generally collected from locations showing visual, odor, or elevated PID evidence of soil contamination. PCB contamination was generally only found in the visible oil sludge material. The data presented in Figure 3.5 shows the depth that the waste material was encountered. The hockey rink was constructed and additional fill was placed over the area of shallow oil sludge contamination, and fill was placed over the sledding hill. To the north, outside of the area where the hockey rinks and additional soil cover was placed; the waste material was at a depth that would be considered non-accessible. It would appear therefore that Central Park has been adequately investigated and remediated such that no risk to human health and the environment exists**.**

Response: We agree with MPCA that there should not be any oily sludge material found in the surface soil. However, the eastern portion of the park was a dump site. Waste material was moved around the site on numerous occasions – first to build Noble Avenue, second through potential tracking of contaminated soil from people who reported contact with the materials, third through the EPA removal actions, fourth through additional potential contact, and fifth through the redevelopment. Understandably, the focus has been on removing or covering the sludge material that contains high levels of PCB oil. However, it is reasonable that the surface soil of a public park should have confirmation sampling conducted to ensure that contaminants from the former dump site are not present, even if the likelihood of finding high levels of contamination is thought to be low.

- Workers at Cardinal Towing and Waste Technology may have been exposed to contaminants in the surface soil in the past and/or may be currently exposed to contaminants in the surface soil. However, workers are likely occupationally exposed to some amount of contaminants and it may be hard to differentiate soil contamination from the dump versus potential current site releases.

  Comment: The recently completed MPCA Factsheet states that this property would not be delisted till further investigation is complete. Both businesses are active facilities whose operations could contribute to any contamination present at the Site. The area in the case of Cardinal Towing has been used to store vehicles damaged in accidents. Fluids from damaged cars may have leaked on the surfaces and it some vehicles appear to have been stored for an extended period. The Waste Technology Site has been used to store dumpsters and containers. When redevelopment of the properties occurs, the properties will be remediated to fit the proposed use. In the interim, the MPCA will request Minnesota Department of Health (MDH) assistance to determine any risks to the workers on-site from residual contamination.

  Response: MDH agrees that the property should not be delisted and that further investigation in the event of redevelopment is needed.

- Several VOCs were detected above the HRLs in MW-13, near the southeast corner of the site. The source, magnitude, and extent of VOC contamination in this area has not been defined.

  Comment: Groundwater sample were collected on two occasions in 2003 from MW-13 and MW-13L, located in the southeast corner of the site. Low concentrations of several cVOCs were detected in the groundwater. The concentration of benzene was slightly above the HRL during the first sampling event and the concentration decreased to below the HRL in the second sampling event. PCE and TCE were less than 2 x HRL during both sampling events. Cis-1,2-DCE and trans-1,2-DCE were detected at concentrations below their HRLs.

While the vinyl chloride (VC) concentration was approximately 15 x HRL and decreasing. The compounds were generally below or near the detection limits and none of the contaminants were detected at concentrations above the action limit in the samples collected from MW-13L, a well screened at a deeper level. VC, along with cis-1,2-DCE and trans-1,2-DCE are daughter products that are breakdown components of PCE and TCE. The data suggest that natural degradation may be occurring at the site, and the elevated VC is a temporary result. Concentrations of PCE and VC were decreasing during the two sampling events; however that is not enough data to establish a trend. The data also suggests that the plume is not migrating downward from MW-13 to MW-13L.

Because: 1) the concentrations were only slightly above the HRLS; 2) degradation of the contaminants appears to be occurring at the site; 3) only the shallow groundwater appears to be impacted and the contamination is not migrating deeper; 4) the direction of groundwater flow is to the northeast (away from the residential property); and 5) there are no identified receptors to the shallow groundwater, the risk associated with groundwater contamination appears to be very low.

Response: MDH agrees that there does not appear to be a drinking water risk associated with groundwater contamination and has clarified this in the text of the conclusion; however, the VOCs may pose a vapor intrusion risk and because the source, magnitude, and extent of VOC contamination in this area has not been defined, this cannot be ruled out as a potential concern.

- Soil gas screening from the Fischer property in 2008 and the presence of vinyl chloride in MW-13 above its groundwater screening value indicates the potential for a vapor intrusion risk on other areas of the Site. It is unknown whether there is any exposure from soil gas contaminants in the buildings on the city property or other businesses although the likelihood may be low.

Comment: Soil gas concentrations on the LJ Fisher Site indicated possible impacts of 1,3-butadiene on the north parcel and tetrachloroethene on the south parcel. Tires, a possible source of the
1,3-butadiene were removed during the response action on the north parcel, and an institutional control on the north parcel requires a MPCA approved vapor barrier below any buildings constructed on the north parcel to mitigate the risk. Soil gas analysis suggests that although the PCE concentration was almost 100 times the Intrusion Screening Value (ISV), the horizontal extent of the PCE contamination was limited. Also, the city constructed a parking lot on the property, which will limit potential exposure. One well out of the 18 monitoring wells constructed on the Site had a VOC concentration above the current groundwater ISV. The groundwater ISVs are a screening to evaluate the potential risk associated with vapor intrusion. One compound, vinyl chloride, exceeded the groundwater ISV. However since the concentration was less than ten times the groundwater ISV there does not appear to be a significant risk of vapor intrusion at the Site.

Response: MDH agrees that there does not appear to be a significant risk of vapor intrusion; however, without defining the magnitude and extent of the groundwater *contamination near MW-13 and without any data of soil gas levels beneath structures built upon buried waste at the site, health risk from vapor intrusion cannot be ruled out.*

- It is unknown whether there are homes that have been built over dump materials.

  Comment: The material found on the lot at 4005 83rd Avenue was analyzed for PCBs, VOCs, Semi Volatile Organics (SVOC), Metals, Pesticides and the Toxicity Characteristic Leaching Procedure test. No VOCs, SVOCs, or Pesticides were detected in the soil samples. VOC contamination does not appear to be present in that area in the soils. The metal and PCB concentrations detected in the soil samples were below the regulatory limits.

  However, the MPCA staff agrees that the investigation was limited to a single property and the horizontal extent of the dump material in the residential area southeast of the Site is not known.

  Response: MDH's understanding from the data report is that the toxicity characteristic leaching procedure test (TCLP) was done to screen for VOCs, SVOCs, metals, pesticides, and herbicides; however, this test may not be appropriate for these compounds and is not the same laboratory quality as the analysis for PCBs. Regardless, we agree with MPCA's comment that the horizontal extent of the dump material in the residential area southeast of the site in not known.

I. **Recommendations**

- Surface soil north of the skating rinks in Central Park and other areas adjacent to the park remedial activity in 2005-2006 should be analyzed for PCBs, dioxin, and lead to ensure the surface soil in Central Park is free of contamination.

  Comment: Historical data suggest the horizontal extent of the dump on the west side was the former drainage ditch. Dump material excavated during construction of Noble Avenue was later used to build the sledding hill. The grid sampling presented in Figures 3.5 and 4.1 of the July 2003 Investigation Report and Response Action Plan suggests that the extent of the waste material was defined, and waste material was absent north, west and south of the area where the future skating rink was constructed and additional cover was placed. Waste material was also absent in the perimeter samples surrounding the sledding hill. There was generally about 0.5 foot of cover over the waste at the sledding hill prior to completing the response actions. The January 2007 Construction Completion Report indicated that two feet of additional cover was placed over the sledding hill. The report also indicates that a geomembrane and either bituminous pavement or two feet of clean soil cover was placed over the waste material on the west side of Noble Avenue. The extent of the geomembrane was not show on the drawings, but the Grading Plan on Figure 4.1 of the January 2007, Construction Completion Report, prepared by CRA, shows the thickness of the additional clean cover, which extends east to the existing berm along the west side of Noble Avenue. The additional cover does not appear to extend over the oil/sludge area on the north part of the work limit, near test pit TPSD-6, but the test pit excavation log, presented in Appendix F of the July 2003 Investigation Report, indicates that the soils in the 0 to 6 foot interval below ground surface (bgs) were a sandy clay silt fill and the soils in the 6 to 6.5 foot bgs interval were sand mixed with sludge and organic matter.

Response: We agree with MPCA that there should not be any oily sludge material found in the surface soil. However, the eastern portion of the park was a dump site. Waste material was moved around the site on numerous occasions – first to build Noble Avenue, second through potential tracking of contaminated soil from people who reported contact with the materials, third through the EPA removal actions, fourth through additional potential contact, and fifth through the redevelopment. Understandably, the focus has been on removing or covering the sludge material that contains high levels of PCB oil. However, it is completely reasonable that the surface soil of a public park should have confirmation sampling conducted to ensure that contaminants from the former dump site are not present, even if the likelihood of finding high levels of contamination is thought to be low.

- Remediation of soil at Cardinal Towing and Waste Technology Inc. should be considered. If land use changes, then further investigation and remediation will be needed.

  Comment: Cardinal Towing is an active facility where damaged cars are towed to and stored temporarily. The Site is currently a potential source for ongoing releases. The MPCA agrees that additional investigation and possibly additional response actions need to be completed on these properties in the future when changes in use of the properties raise the issue of additional exposures. As stated in the MPCA Fact Sheet, the properties will not be delisted until the use changes, the Sites are investigated and response actions are implemented that will mitigate the potential for exposure to potential contamination. In the interim, the MPCA can work with the MDH and other Agencies to examine current exposure at the Cardinal Towing Facility and the Waste Technology Facility.

  Response: MDH agrees that the property should not be delisted and that further investigation in the event of redevelopment is needed.

- Additional groundwater sampling should be conducted near the southeast corner of the site to define the extent and magnitude of the VOC contamination detected in MW-13 and to ensure nearby commercial and residential buildings are not at risk for vapor intrusion.

  Comment: Groundwater sample were collected on two occasions in 2003 from MW-13 and MW-13L, located in the southeast corner of the site. Low concentrations of several cVOCs were detected in the groundwater. The concentration of Benzene was slightly above the HRL during the first sampling event and the concentration decreased to below the HRL in the second sampling event. PCE and TCE were less than 2 x HRL during both sampling events. Cis-1,2-DCE and trans-1,2-DCE were detected at concentrations below their HRLs. While the vinyl chloride (VC) concentration was approximately 15 x HRL and decreasing. The compounds were generally below or near the detection limits and none of the contaminants were detected at concentrations above the action limit in the samples collected from MW-13L, a well screened at a deeper level. VC, along with cis-1,2-DCE and trans-1,2-DCE are daughter products that are breakdown components of PCE and TCE. The data suggest that natural degradation may be occurring at the site, and the elevated VC is a temporary result. Concentrations of PCE and VC were decreasing during the two sampling events; however that is not enough data to establish a trend. The data also suggests that the plume is not migrating downward from MW-13 to MW-13L.

Because: 1) the concentrations were only slightly above the HRLS; 2) degradation of the contaminants appears to be occurring at the site; 3) only the shallow groundwater appears to be impacted and the contamination is not migrating deeper; 4) the direction of groundwater flow is to the northeast (away from the residential property); and 5) there are no identified receptors to the shallow groundwater, the risk associated with groundwater contamination appears to be very low. Verification samples could be collected from the southeast corner of the site to confirm this conclusion. The risk associated with vapor intrusion is discussed below.

Response: Comments noted. MDH agrees that verification samples should be collected, but should not be confined to just the southeast corner of the site. The goal should be to define the extent of the VOC contamination, which may extend off-site, and verify that it does not exceed vapor intrusion screening values on- or off-site.

- If additional evidence of dump materials in residential areas is uncovered it should be investigated.

  Comment: Across the majority of the Site, the horizontal extent of the dump material has been determined. However, at the southeast corner additional dump material was discovered below former location of a twin home at 4005 83rd Avenue. Two test pits excavated on either side of the lot confirmed that dump material consisting primarily of metal fragments, glass, and ash were present. Soil samples were analyzed for VOCs, SVOCs, pesticides/herbicides, metals, and PCBs. No VOCs, SVOCs, or pesticides/herbicides were detected.

  The metal and PCB concentrations detected in the soil samples were below the regulatory limits. The January 4, 2010 Waste Sampling Results report states that the debris was generally at depths greater than three feet below ground surface. Furthermore the chemical analysis of the soil samples suggest that there is a low risk of exposure to contamination as the material was tested and found to be non-hazardous. The horizontal extent of the dump debris in this area has not been determined; however the city of Brooklyn Park contacted the nearby homes in writing about the material found on the lot by the dump. The MPCA has not received any inquires in regards to this issue.

  Response: Comment noted, however the comment does not address the statement that if additional evidence of dump materials in residential areas are uncovered, it should be investigated.

- Soil gas levels at the Fischer property prior to remediation indicate potential for vapor intrusion at other buildings over the former dump. A vapor investigation should be considered at structures that are built on top of waste debris.

  Comment: The majority of the investigation at the Site was completed prior to the development of vapor intrusion policies. However, the VOC contaminant concentrations detected in the groundwater samples from the monitoring wells constructed at the Site can be compared with the current Groundwater Intrusion Screening Values (GW ISVs) to evaluate the risk of vapor intrusion at the Site. Eighteen monitoring wells were sampled up to eight times between 1988 through 2003, and analyzed for VOCs. Most of the groundwater samples were either below the detection limit or well below the GW ISV concentrations. The only well that had contaminant concentrations above the GW ISV was monitoring well MW-13, in the southeast corner of the Site. At MW-13, the vinyl chloride concentration was 3.7 ug/l and 3.2 ug/l, during the two times the well was sampled in 2003. The GW ISV for vinyl chloride is 1ug/l. The "Risk Based Guidance for Vapor Intrusion Pathway" suggests when contaminant concentrations are above 10x the GW ISV, additional vapor monitoring is generally required. Therefore at the Brooklyn Park Dump Superfund Site, since all the groundwater concentrations are below 10 x GW ISV, no additional vapor monitoring appears to be required.

  During the investigation of the LJ Fischer Property soil gas samples were collected on the north and south parcels. Three compounds were detected at concentrations above 10x ISV. These were 1,3-butadiene on the north parcel and PCE and Trichloroethylene (TCE) on the south parcel. 1,3-butadiene is generally associated with rubber and latex products. The source may be associated with tires that were removed from the excavation. To mitigate any future risk associated with potential 1,3-butadiene vapors, an institutional control on the property requires a vapor barrier below any buildings constructed on the Site. The PCE and TCE concentrations were less than the ISV in all soil gas samples collected on the north parcel. PCE was detected at elevated concentrations in three soil samples collected on the south parcel. In two of the samples the concentration was less than 10x ISVs, and in the third sample the concentration was slightly less than 100x ISV. TCE was either less than 10x ISVs or non-detect. The data suggests that the horizontal extent of the PCE and TCE contamination is limited. Since a parking lot was constructed over the south parcel, there should be no receptors to the PCE and TCE vapors.

  Response: MDH agrees that the soil gas data from the LJ Fischer Property does not indicate a current risk from vapor intrusion at that property and institutional controls should address vapor concerns in the future. However, the soil gas data from the LJ Fischer property was used as an example of the potential for elevated soil gas levels at other areas of the site where buildings exist. Without any data of soil gas levels beneath structures built upon buried waste at the site, health risk from vapor intrusion cannot be ruled out.

City of Brooklyn Park comments to the Public Health Assessment (Public Comment Draft) for the Brooklyn Park Dump Site in Brooklyn Park, Minnesota.

1. Recommendation to Conduct Soil Sampling in Central Park

MDH contends in the report that there are areas to the north of the hockey rinks in Central Park where polychlorinated biphenyls (PCBs) are present which were neither sampled nor remediated. In particular, sample points SB-1, SB-2, and SB-9 are reportedly located off the northwestern corner of the hockey rink area and had previously been identified with PCBs. MDH recommends that surface sampling be completed to confirm that surface soils do not contain PCBs.

The locations of these sampling points, as depicted on Figure 3 of the report, are within the area of the Site that was redeveloped in 2008 as part of the Central Park upgrades. This previously wooded, low area received a substantial amount of fill for development of the recreational skating rink and trail system. The soil surface elevation that existed in 1993 has been raised through placement of several feet of clean, imported fill material. The previous surface soils sampled in 1993 are now several feet below grade. Surface sampling in this area is, thus, unnecessary as the sampling would be conducted of soil imported to the Site in 2006, not the surficial soils present in 1993 when the original sampling was conducted. What surficial soil impacts may have been present in 1993 have been remediated at the Site through containment.

Response: MDH is concerned that waste material was moved around the eastern portion of Central Park on numerous occasions over many years. It is reasonable that the surface soil of a public park should have confirmation sampling conducted to ensure that contaminants from the former dump site are not present, even if the likelihood of finding high levels of contamination is thought to be low. However, MDH is unaware of any Central Park upgrades in 2008 that brought in additional clean fill to the site. Documentation of Central Park redevelopment should be considered when selecting appropriate surface sampling locations.

2. Report Figures

The limits of the buried wastes are misrepresented on Figures 2, 3, 4, 5, and 7 of the report. These figures depict that buried waste is present beneath Noble Avenue. As the report correctly states, the buried waste was excavated for the road right-of-way during construction of Noble Avenue in the early 1970's, and placed within Central Park, forming the present-day sledding hill.

Response: The figures were intended to show the footprint of the former dumpsite. However, the comment is noted and the figures adjusted to represent the current known limits of the buried waste.

Appendix:

Tables Section

Table 1: Soil Data in Central Park

Source/Date	Sample ID	Depth	Total Polychlorinated Biphenyls (PCBs) (mg/kg or ppm)	Other elevated contaminant results (mg/kg or ppm) or pH results
USEPA 1989			25,000	2,3,7,8-TCDD - 87,400 ppt metals, VOCs, pH -1
STS 1989	S1	Surface	ND	
STS 1989	S3	Surface	ND	
STS 1989	S5	Surface	ND	
STS 1989	S6	Surface	ND	
STS 1989	S7	Surface	ND	
USEPA 1993	S-5	Surface	300	
USEPA 1993	CPS-13	4-5', 7'	ND	
USEPA 1993	CPS-14	4-5', 7'	ND	
USEPA 1993	CPS-15	4-5' (ND at 7')	0.091	
MPCA 1993	SB-1	0-2'	4.4	
MPCA 1993	SB-1	2-6'	0.32	
MPCA 1993	SB-2	0-2'	200	
MPCA 1993	SB-3	0-2'	490	1,4-Dichlorobenzene - 49 1,2,4-Trichlorobenzene - 160
MPCA 1993	SB-4	0-2'	1.4	
MPCA 1993	SB-4	Surface 0-3"	340	Lead - 1,010
MPCA 1993	SB-5	0-2'	6.8	
MPCA 1993	SB-5	Surface 0-3"	89	Lead - 4,520
MPCA 1993	SB-6	Surface 0-3"	45	
MPCA 1993	SB-7	0-2'	2.3	
MPCA 1993	SB-7	Surface 0-3"	200	Lead - 688
MPCA 1993	SB-8	0-2'	1.2	
MPCA 1993	SB-8	Surface 0-3"	680	Lead - 6,720
MPCA 1993	SB-9	Surface 0-3"	8.7	
MPCA 1993	SB-10	0-2'	0.038	
MPCA 1993	SB-10	Surface 0-3"	0.051	
MPCA 1993	SB-11	0-2'	0.058	
MPCA 1993	SB-11	2-7'	0.16	
CRA 2003	GP-A4	4-6'	ND	pH - 7.8
CRA 2003	GP-A5	4-6'	ND	pH - 8.3
CRA 2003	GP-A12	4-6'	ND	pH - 7.7
CRA 2003	GP-B6	4-6'	0.15	pH - 8.4
CRA 2003	GP-C3	2-4'	230	pH - 6
CRA 2003	GP-C4	6-8'	220	pH - 6.8
CRA 2003	GP-C6	6-8'	2.5	pH - 7.2
CRA 2003	GP-D10	4-6'	0.036	pH - 7.7
CRA 2003	SH-1	20-21'	43	pH - 7.6
CRA 2003	TPSD-4	6'	1,800	pH - 0.2
CRA 2003	TPSD-5	3-5'	12,000	2,3,7,8-TCDD equivalents- 11,700 ppt; pH - 3.2
CRA 2003	TPSD-6	6-6.5'	1,200	pH - 1

ppm = parts per million, ppt = parts per trillion, ND = not detected

2,3,7,8-TCDD = 2,3,7,8-Tetrachlorodibenzodioxin

Table 2: Soil screening levels from MPCA, ATSDR, and EPA

	MPCA Soil Reference Value[1] (ppm)		ATSDR Residential Comparison Value[2] (ppm)			USEPA Regional Screening Level[3] (ppm)	
	Residential	Industrial	Child	Adult	Cancer	Residential	Industrial
PCBs	1.2	8	--	--	0.35	0.22	0.74
Lead	300	700	--	--	--	400	800
2,3,7,8- TCDD (dioxin)	20 ppt	35 ppt	50 ppt	700 ppt	--	4.5 ppt/50 ppt[B]	18 ppt/664 ppt[B]
1,2,4-Trichlorobenzene	200	985	200[A]	70,000	--	22	99
1,4-Dichlorobenzene	30	50	140[A]	49,000	--	2.4	12
carcinogenic PAHs	2	3	--	--	0.096	0.015	0.21

[1]Minnesota Pollution Control Agency Soil Reference Values - June 2009

[2]Agency for Toxic Substances and Disease Registry Comparison Values - August 2012

[3]United States Environmental Protection Agency Regional Screening Levels - November 2012

[A] Pica child scenario

[B] The EPA screening levels for dioxin per Superfund policy (USEPA, 2012)

Soil screening values that are calculated by state and federal agencies may use slightly different exposure assumptions, toxicity values, and cancer risk levels to arrive at different values.
Sites in Minnesota generally use the MPCA SRVs as screening and/or cleanup levels.

Table 3: PCBs in Area 3

Source/Date	Location	Sample ID	Depth	Total PCBs (ppm)
USEPA/May 1993	Cardinal Towing	CS-06A	0.5-0.67 ft	37
USEPA/May 1993	Cardinal Towing	CS-06B	4.5 ft	1.8
USEPA/May 1993	Cardinal Towing	CS-07A	0-0.33 ft	40
USEPA/May 1993	Cardinal Towing	CS-09	0.5-0.67 ft	46
USEPA/May 1993	Twin City Garage	TCS-16A	4-5 ft	28
USEPA/May 1993	Twin City Garage	TCS-17A	4-5 ft	12
MPCA/October 1993	Cardinal Towing	SB-12	0-2 ft	32
MPCA/October 1993	Cardinal Towing	SB-13	0-2 ft	0.051
CRA/2003	Cardinal Towing	TB-15	4-6 ft	180
CRA/2003	Cardinal Towing	TB-16	4-6 ft	7.6
CRA/2003	Cardinal Towing	TB-17	4-6 ft	23
CRA/2003	Cardinal Towing	TB-20	unk	0.027
CRA/2003	Cardinal Towing	TB-21	2-4 ft	120
CRA/2003	Waste Technology Inc.	TB-23	unk	0.3
CRA/2003	Waste Technology Inc.	TB-25	unk	0.23
CRA/2003	Waste Technology Inc.	TB-27	unk	0.45
CRA/2003	Fischer Property	TB-28	4-6 ft	16
CRA/2003	Fischer Property	TB-29	6-8 ft	6.6
CRA/2003	Fischer Property	TPSD-18	8 ft	0.043
CRA/2003	Fischer Property	TPSD-19	9 ft	ND
CRA/2003	Fischer Property	TPSD-20	5.5 ft	ND
CRA/2003	Fischer Property	TPSD-21	7.5 ft	0.41
CRA/2003	Cardinal Towing	TPSD-22	6 ft	0.56
CRA/2003	Waste Technology Inc.	TPSD-23	6 ft	2.7
CRA/2003	Waste Technology Inc.	TPSD-24	6 ft	0.74
CRA/2003	Waste Technology Inc.	TPSD-25	3 ft	0.077

If laboratory duplicates existed, the highest concentration of the two is listed in the table and the extra sample omitted.

Additional soil samples with PCBs not detected have been omitted from the table.

ND: not detected

unk: unknown

Table 4: Additional Contaminants Detected in Area 3

Source/Date	Location	Sample ID	Depth	Contaminant	Concentration
MPCA/October 1993	Cardinal Towing	SB-13	0-2 ft	Lead	1350 ppm
CRA/2003	Cardinal Towing	TB-21	2-4 ft	2,3,7,8,-TCDD Equivalents	942 ppt
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Lead	1620 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Mercury	3.2 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Ethylbenzene	100 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Isopropylbenzene	4.5 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Methylene chloride	2.9 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Xylenes, total	1100 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	2-Methylnaphthalene	18 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Biphenyl	1.5 ppm
CRA/2003	Waste Technology Inc.	TB-24	2-4 ft	Naphthalene	19 ppm

Table 5: 2008 Fischer Property Soil Gas Samples

Sample results in µg/m3 from a depth of four feet (Barr, 2009)

	10X IND ISV*	SG-1	SG-2	SG-3	SG-4	SG-5	SG-6	SG-7
1,2,4-Trimethylbenzene	200	11	14	13	19	25	13	18
1,3,5-Trimethylbenzene	200	3	3.7	3.5	6	6.4	3.5	4.7
1,3-Butadiene	10	**28**	10	7.4	6.9	2.8	0.84	2.4
Benzene	130	11	12	7.4	6.3	7.5	2	8.3
Naphthalene	300	31	21	18	84	7.3	5	4.7
Tetrachloroethylene (PERC)	600	4.4	2.9	3.4	15	71	38	**1900**
Trichloroethylene (TCE)	80	ND	1.3	1.3	0.62	11	ND	**95**

*10X IND ISV: 10 times the Industrial Intrusion Screening Value, which is an appropriate screening level for soil gas

Bold indicates a level that is at or above screening values

ND: not detected

Table 6: Monitoring Well Sample Data - Detected Chemicals

		VOCs											
Drinking Wtr Criteria		Benzene	Chloroform	1,3-DCB	1,4-DCB	1,1-DCE	cis-1,2-DCE	trans-1,2 DCE	Methylene chloride	MEK	MIBK	PERC	Toluene
	HRL (ppb)	2	30	NE	10	200	50	40	NE	4,000	300	5	200
	MCL (ppb)	5	NE	NE	75	7	70	100	NE	NE	NE	5	1,000
Well	**Date**												
MW-1	8/18/1988	<1	<1	<1	<1	<1	<1	<1	**2.5**[a]	NA	NA	<1	<1
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	**0.6**[a]	NA	NA	<0.11	<0.2
	7/18/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	<0.53	NA	NA	<0.11	<0.2
	10/18/1993[b]	<10	NA	NA	NA	<10	<10	<10	<10	NA	NA	<10	**9**
	6/27/1994	<1	<1.5	<1.5	<0.2	<1	<0.2	<0.2	<5	<5	<5	<1	<1
	3/8/2000	<0.2	<0.1	NL	NL	NL	NL	NL	NL	NL	NL	<0.2	<0.2
	1/14/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-2	8/18/1988	<1	<1	<1	<1	<1	<1	<1	**2.9**[a]	NA	NA	<1	<1
	6/28/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	<0.53	NA	NA	<0.11	<0.2
	1/14/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-3	8/18/1988	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	<1	<1
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	<0.53	NA	NA	**1.1**	<0.2
	3/8/2000	<0.2	<0.1	**0.3**	<0.2	<0.5	<0.2	<0.1	<0.5	<10	<5	**0.7**	<0.2
	1/14/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	**3.3**	<1
MW-4	8/18/1988	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	<1	<1
	6/30/1989	<1	<1	<1	<1	<1	<0.5	NA	<1	NA	NA	NA	NA
	2/14/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	<0.53	NA	NA	<0.11	<0.2
	7/18/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	**1.1**[a]	NA	NA	<0.11	<0.2
	1/14/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
	6/27/1994	<1	<1.5	<1.5	<0.2	<1	<0.2	<0.2	<5	<5	<5	<1	<1

[a] Compound also detected in a field, trip, or method blank - suspected to be a laboratory contaminant rather than an actual groundwater contaminant

[b] MW-1 had 23 compounds tentatively ID'd as: "aliphatic coumpound" (up to 2,800 ppb); "aliphatic hydrocarbon" (up to 5 ppb); and "unknown" (up to 770 ppb)

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

Drinking Wtr Criteria		VOCs: 1,2,4-TCB	VOCs: 1,1,1-TCA	VOCs: TCE	VOCs: Vinyl chloride	VOCs: Xylenes	SVOCs: bis(2-EH) phthalate	PAHs: Benzo[a] anthracene	PAHs: Benzo[b] anthrenene	PAHs: Benzo[b,j,k] fluoranthene	PAHs: Benzo[g,h,i] perylene	PAHs: Benzo[a] pyrene
HRL (ppb)		4	9,000	5	0.2	300	NE	0.6[c]	0.6[c]	0.6[c]	NE	0.06
MCL (ppb)		70	200	5	2	10,000	6	2[c]	2[c]	2[c]	NE	0.2
Well	**Date**											
MW-1	8/18/1988	NA	<1	<1	<1.8	<1	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	10/18/1993	NA	<10	<10	<10	<10	**6**	<10	NA	<10	<10	<10
	6/27/1994	<1	<1	<0.5	<1	<1	NA	<10	NA	<10	<10	<10
	3/8/2000	NL	<0.2	<0.1	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/14/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-2	8/18/1988	NA	<1	<1	<1.8	<1	NA	NA	NA	NA	NA	NA
	6/28/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	1/14/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-3	8/18/1988	NA	<1	<1	<1.8	<1	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.17	<0.32	**0.24**	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	3/8/2000	<0.5	<1	**0.7**	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/14/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-4	8/18/1988	NA	<1	<1	<1.8	<1	NA	NA	NA	NA	NA	NA
	6/30/1989	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	1/14/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
	6/27/1994	<1	<1	<0.5	<1	<1	NA	<10	NA	<10	<10	<10

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		PAHs								Metals		
Drinking Wtr Criteria		Benzo[e] pyrene	Dibenzo (a,h) anthracene	Chrysene	Fluor-anthene	Indeno [1,2,3-c,d] pyrene	Phen-anthrene	Pyrene	Total cPAHs	As	Cd	Cr
HRL (ppb)		NE	0.6[c]	6[c]	300	0.6[c]	NE	200	0.06	10	4	100
MCL (ppb)		NE	2[c]	20[c]	NE	2[c]	NE	NE	0.2	10	5	100
Well	**Date**											
MW-1	8/18/1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/18/1993	NA	<10	<10	<10	<10	<10	<10	<10	<2.1	<1.3	<2.1
	6/27/1994	<10	<10	<10	<10	<10	<10	<10	<10	<2	<0.2	**0.8**
	3/8/2000	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA
	1/14/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-2	8/18/1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/28/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/14/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-3	8/18/1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/8/2000	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA
	1/14/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-4	8/18/1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/14/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
	6/27/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<0.2	**1**

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		Metals		
Drinking Wtr Criteria		Pb	Mn	Ag
	HRL (ppb)	15	100	30
	MCL (ppb)	15[d]	NE	NE
Well	**Date**			
MW-1	8/18/1988	NA	NA	NA
	6/30/1989	NA	NA	NA
	2/14/1990	NA	NA	NA
	7/18/1990	NA	NA	NA
	10/18/1993	<2.9	**1,330**	<2.6
	6/27/1994	<2	**890**	NA
	3/8/2000	NA	NA	NA
	1/14/2003	<3	**2,400**	<10
MW-2	8/18/1988	NA	NA	NA
	6/28/1989	NA	NA	NA
	7/18/1990	NA	NA	NA
	1/14/2003	<3	**73**	<10
MW-3	8/18/1988	NA	NA	NA
	6/30/1989	NA	NA	NA
	7/18/1990	NA	NA	NA
	3/8/2000	NA	NA	NA
	1/14/2003	<3	**2,000**	<10
MW-4	8/18/1988	NA	NA	NA
	6/30/1989	NA	NA	NA
	2/14/1990	NA	NA	NA
	7/18/1990	NA	NA	NA
	1/14/2003	<3	**2,100**	<10
	6/27/1994	<2	**2,300**	NA

[d] This drinking water criterion is a federal "Action Level", not an MCL

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

Drinking Wtr Criteria		Benzene	Chloroform	1,3-DCB	1,4-DCB	1,1-DCE	cis-1,2-DCE	trans-1,2 DCE	Methylene chloride	MEK	MIBK	PERC	Toluene
		VOCs											
HRL (ppb)		2	30	NE	10	200	50	40	NE	4,000	300	5	200
MCL (ppb)		5	NE	NE	75	7	70	100	NE	NE	NE	5	1,000
Well	**Date**												
MW-5	8/18/1988	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	<1	<1
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	<0.53	NA	NA	<0.11	<0.2
	7/18/1990	<0.34	<0.08	<0.19	<0.11	<0.1	<0.14	<0.18	<0.53	NA	NA	<0.11	<0.2
	5/9/1995	<0.3	<0.2	<0.5	<0.6	<0.2	<0.2	<0.6	<5	<5	<1	<0.4	<0.2
	11/12/1996	<0.3	<0.3	<0.2	<0.2	<0.2	<0.3	<0.3	<5	<5	<5	<0.4	<0.3
	12/6/1996	<0.3	<0.3	<0.2	<0.2	<0.2	<0.3	<0.3	<5	<5	<5	<0.4	<0.3
	3/8/2000	<0.2	<0.1	<0.2	<0.2	<0.5	<0.2	<0.1	<0.5	<10	<5	<0.2	<0.2
	1/15/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-6	10/18/1993	<10	NA	NA	NA	<10	<10	<10	<10	NA	NA	<10	<10
	6/27/1994	<1	<1.5	<1.5	<0.2	<1	**0.5**	<0.2	<5	<5	<5	<1	<1
	3/8/2000	<0.2	<0.1	<0.2	<0.2	<0.5	**0.2**	<0.1	<0.5	<10	<5	<0.2	<0.2
	1/15/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-7	10/18/1993	<10	NA	NA	NA	<10	<10	<10	<10	NA	NA	<10	<10
	6/27/1994	<1	<1.5	<1.5	<0.2	<1	<0.2	<0.2	<5	<5	<5	<1	<1
	3/8/2000	<0.2	<0.1	<0.2	<0.2	<0.5	<0.2	<0.1	<0.5	<10	<5	<0.2	<0.2
	1/15/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-8	10/18/1993	<10	NA	NA	NA	<10	<10	<10	<10	NA	NA	<10	<10
	10/18/1993D	<10	NA	NA	NA	<10	<10	<10	<10	NA	NA	<10	<10
	6/27/1994	<1	<1.5	<1.5	<0.2	<1	<0.2	<0.2	<5	<5	<5	<1	<1
	6/27/1994D	<1	<1.5	<1.5	<0.2	<1	<0.2	<0.2	<5	<5	<5	<1	<1
	3/8/2000	<0.2	<0.1	**0.8**	**0.4**	<0.5	<0.2	<0.1	<0.5	<10	<5	<0.2	<0.2
	1/14/2003	<1	<1	**0.44 J**	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-10	1/16/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		VOCs					SVOCs	PAHs				
Drinking Wtr Criteria		1,2,4-TCB	1,1,1-TCA	TCE	Vinyl chloride	Xylenes	bis(2-EH) phthalate	Benzo[a] anthracene	Benzo[b] anthrenene	Benzo[b,j,k] fluoranthene	Benzo[g,h,i] perylene	Benzo[a] pyrene
	HRL (ppb)	4	9,000	5	0.2	300	NE	0.6[c]	0.6[c]	0.6[c]	NE	0.06
	MCL (ppb)	70	200	5	2	10,000	6	2[c]	2[c]	2[c]	NE	0.2
Well	**Date**											
MW-5	8/18/1988	NA	<1	<1	<1.8	<1	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	7/18/1990	<0.17	<0.32	<0.18	<0.27	<0.47	NA	NA	NA	NA	NA	NA
	5/9/1995	<1	<0.2	<0.4	<1	<0.9	NA	NA	NA	NA	NA	NA
	11/7/1996	<0.5	<0.25	<0.3	<1	<1.2	NA	**0.03**	<0.018	<0.017	**0.14**	**0.05**
	12/6/1996	<0.5	<0.25	<0.3	<1	<1.2	NA	<0.013	<0.018	<0.017	<0.074	<0.023
	3/8/2000	<0.5	<0.2	<0.1	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/15/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-6	10/18/1993	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10
	6/27/1994	<1	<1	<0.5	<1	<1	NA	<10	NA	<10	<10	<10
	3/8/2000	<0.5	<0.2	**0.2**	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/15/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-7	10/18/1993	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10
	6/27/1994	<1	<1	<0.5	<1	<1	NA	<10	NA	<10	<10	<10
	3/8/2000	<0.5	<0.2	<0.1	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/15/2003	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-8	10/18/1993	NA	<10	<10	<10	<10	**3**	<10	NA	<10	<10	<10
	10/18/1993D	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10
	6/27/1994	<1	<1	<0.5	<1	<1	NA	<10	NA	<10	<10	<10
	6/27/1994D	<1	<1	<0.5	<1	<1	NA	<10	NA	<10	<10	<10
	3/8/2000	<0.5	<0.2	<0.1	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/14/2003	**0.7 J**	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10
MW-10	1/16/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		PAHs								Metals		
Drinking Wtr Criteria		Benzo[e] pyrene	Dibenzo (a,h) anthracene	Chrysene	Fluor-anthene	Indeno [1,2,3-c,d] pyrene	Phen-anthrene	Pyrene	Total cPAHs	As	Cd	Cr
	HRL (ppb)	NE	0.6[c]	6[c]	300	0.6[c]	NE	200	0.06	10	4	100
	MCL (ppb)	NE	2[c]	20[c]	NE	2[c]	NE	NE	0.2	10	5	100
Well	**Date**											
MW-5	8/18/1988	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/30/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/14/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/1990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/9/1995	NA	NA	NA	NA	NA	NA	NA	NA	<10	**6**	<25
	11/7/1996	NA	<0.03	<0.15	<0.21	<0.043	<0.64	<0.27	**0.08**	<20	<10	<50
	12/6/1996	NA	<0.03	<0.15	<0.21	<0.043	<0.64	<0.27	BDL	<20	<10	<50
	3/8/2000	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA
	1/15/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-6	10/18/1993	NA	<10	<10	<10	<10	<10	<10	<10	**11.1 J**	<1.3	<2.1
	6/27/1994	<10	<10	<10	<10	<10	<10	<10	<10	<2	<0.2	**1**
	3/8/2000	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA
	1/15/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-7	10/18/1993	NA	<10	<10	<10	<10	<10	<10	<10	**8.5 J**	<1.3	<2.1
	6/27/1994	<10	<10	<10	<10	<10	<10	<10	<10	<2	<0.2	**1.1**
	3/8/2000	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA
	1/15/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-8	10/18/1993	NA	<10	<10	<10	<10	<10	<10	<10	**15.7**	<1.3	<2.1
	10/18/1993D	NA	<10	<10	<10	<10	<10	<10	<10	**18.7**	<1.3	<2.1
	6/27/1994	<10	<10	<10	<10	<10	<10	<10	<10	<2	<0.2	**1**
	6/27/1994D	<10	<10	<10	<10	<10	<10	<10	<10	<2	<0.2	**1.1**
	3/8/2000	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA
	1/14/2003	NA	<10	<10	<10	<10	<10	<10	<10	**3.1 J**	<5	<10
MW-10	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		Metals		
Drinking Wtr Criteria		Pb	Mn	Ag
	HRL (ppb)	15	100	30
	MCL (ppb)	15[d]	NE	NE
Well	**Date**			
MW-5	8/18/1988	NA	NA	NA
	6/30/1989	NA	NA	NA
	2/14/1990	NA	NA	NA
	7/18/1990	NA	NA	NA
	5/9/1995	<10	NA	<25
	11/7/1996	<5	NA	<10
	12/6/1996	<5	NA	<10
	3/8/2000	NA	NA	NA
	1/15/2003	<3	**1,900**	<10
MW-6	10/18/1993	<2.9	**10,900**	<2.6
	6/27/1994	<2	**8,100**	NA
	3/8/2000	NA	NA	NA
	1/15/2003	<3	**6,500**	<10
MW-7	10/18/1993	<2.9	**4,810**	<2.6
	6/27/1994	<2	**5,400**	NA
	3/8/2000	NA	NA	NA
	1/15/2003	<3	**2,900**	<10
MW-8	10/18/1993	<2.9	**7,170**	<2.6
	10/18/1993D	<2.9	**7,290**	<2.6
	6/27/1994	<2	**9,800**	NA
	6/27/1994D	<2	**8,500**	NA
	3/8/2000	NA	NA	NA
	1/14/2003	**1.6 J**	**12,500**	<10
MW-10	1/16/2003	<3	**3,800**	<10

[d] This drinking water criterion is a federal "Action Level", not an MCL

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		VOCs											
Drinking Wtr Criteria		Benzene	Chloroform	1,3-DCB	1,4-DCB	1,1-DCE	cis-1,2-DCE	trans-1,2 DCE	Methylene chloride	MEK	MIBK	PERC	Toluene
	HRL (ppb)	2	30	NE	10	200	50	40	NE	4,000	300	5	200
	MCL (ppb)	5	NE	NE	75	7	70	100	NE	NE	NE	5	1,000
Well	**Date**												
MW-10L	1/16/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-11	1/16/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-11L	1/16/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-12	1/16/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
MW-12L	1/16/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	**2 J**	**0.58 J**	<1	**0.41 J**
MW-13	1/16/2003	**3**	<1	<1	<1	**0.43 J**	**9.9**	**1.2**	<1	<10	**0.5 J**	**11**	<1
	4/1/2003	**1.8**	<1	<1	<1	**0.53 J**	**12**	**1.5**	<1	<10	<10	**9.2**	<1
	4/1/2003D	**1.9**	<1	<1	<1	**0.58 J**	**13**	**1.6**	<1	<10	<10	**9.9**	<1
MW-13L	1/16/2003	**0.49 J**	<1	<1	<1	<1	**0.38 J**	<0.5	<1	<10	<10	<1	<1
	4/1/2003	**0.75 J**	<1	<1	<1	<1	**0.94**	<0.5	<1	<10	<10	<1	<1
M-1	5/9/1995	<0.3	<0.2	<0.5	<0.6	<0.2	<0.2	<0.6	<5	<5	<1	<0.4	<0.2
	11/7/1996	<0.3	<0.3	<0.2	<0.2	<0.2	<0.3	<0.3	<5	<5	<5	<0.4	<0.3
	12/6/1996	<0.3	<0.3	<0.2	<0.2	<0.2	<0.3	<0.3	<5	<5	<5	<0.4	<0.3
	3/8/2000	<0.2	<0.1	<0.2	<0.2	<0.5	**0.4**	<0.1	<0.5	<10	<5	<0.2	<0.2
	1/15/2003	<1	<1	<1	<1	<1	**0.84**	<0.5	<1	<10	<10	<1	<1
M-2	5/9/1995	<0.3	<0.2	<0.5	<0.6	<0.2	<0.2	<0.6	<5	<5	<1	<0.4	<0.2
	3/8/2000	<0.2	**0.6**	<0.2	<0.2	<0.5	<0.2	<0.1	<0.5	<10	<5	**0.2**	<0.2
	3/8/2000D	<0.2	**0.7**	<0.2	<0.2	<0.5	<0.2	<0.1	<0.5	<10	<5	**0.2**	<0.2
	1/15/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
	1/15/2003D	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1
M-3	11/7/1996	<0.3	<0.3	<0.2	<0.2	<0.2	**0.73**	<0.3	<5	<5	<5	<0.4	<0.3
	12/6/1996	<0.3	<0.3	<0.2	<0.2	<0.2	**0.039**	<0.3	<5	<5	<5	<0.4	<0.3
	3/8/2000	<0.2	<0.1	<0.2	<0.2	<0.5	<0.2	<0.1	<0.5	<10	<5	**0.2**	<0.2
	1/15/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<10	<10	<1	<1

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		VOCs					SVOCs	PAHs				
Drinking Wtr Criteria		1,2,4-TCB	1,1,1-TCA	TCE	Vinyl chloride	Xylenes	bis(2-EH) phthalate	Benzo[a] anthracene	Benzo[b] anthrenene	Benzo[b,j,k] fluoranthene	Benzo[g,h,i] perylene	Benzo[a] pyrene
	HRL (ppb)	4	9,000	5	0.2	300	NE	0.6[c]	0.6[c]	0.6[c]	NE	0.06[c]
	MCL (ppb)	70	200	5	2	10,000	6	2[c]	2[c]	2[c]	NE	0.2[c]
Well	**Date**											
MW-10L	1/16/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
MW-11	1/16/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
MW-11L	1/16/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
MW-12	1/16/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
MW-12L	1/16/2003	<1	<1	<1	<1	**0.54 J**	<44	<10	NA	<10	<10	<10
MW-13	1/16/2003	<1	<1	**4.5**	**3.7**	<1	<10	<10	NA	<10	<10	<10
	4/1/2003	<1	<1	**5.3**	**3.2**	<1	NA	NA	NA	NA	NA	NA
	4/1/2003D	<1	<1	**5.8**	**3.4**	<1	NA	NA	NA	NA	NA	NA
MW-13L	1/16/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
	4/1/2003	<1	<1	<1	<1	<1	NA	NA	NA	NA	NA	NA
M-1	5/9/1995	<1	<0.2	<0.4	<1	<0.9	NA	NA	NA	NA	NA	NA
	11/7/1996	<0.5	<0.25	<0.3	<1	<1.2	NA	<0.013	<0.018	**0.05**	<0.074	<0.023
	12/6/1996	<0.5	<0.25	<0.3	<1	<1.2	NA	<0.013	**0.051**	**0.055**	<0.074	<0.023
	3/8/2000	<0.5	<0.2	**0.2**	<0.5	<0.2	NA	<10	NA	<10	<10	<10
	1/15/2003	<1	<1	**0.52 J**	<1	<1	<10	<10	NA	<10	<10	<10
M-2	5/9/1995	<1	<0.2	<0.4	<1	<0.9	NA	NA	NA	NA	NA	NA
	3/8/2000	<0.5	<0.2	<0.1	<0.5	<0.2	NA	**14**	NA	**26**	**10**	<10
	3/8/2000D	<0.5	<0.2	<0.1	<0.5	<0.2	NA	<10	NA	**13**	<10	<10
	1/15/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
	1/15/2003D	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10
M-3	11/7/1996	<0.5	<0.25	<0.3	<1	<1.2	NA	**0.73**	<0.018	**0.08**	**0.26**	**0.12**
	12/6/1996	<0.5	<0.25	<0.3	<1	<1.2	NA	**0.039**	<0.018	**0.038**	<0.074	**0.069**
	3/8/2000	<0.5	<0.2	<0.1	<0.5	<0.2	NA	**11**	NA	**19**	<10	<10
	1/15/2003	<1	<1	<1	<1	<1	<10	<10	NA	<10	<10	<10

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

		PAHs								Metals		
Drinking Wtr Criteria		Benzo[e] pyrene	Dibenzo (a,h) anthracene	Chrysene	Fluor-anthene	Indeno [1,2,3-c,d] pyrene	Phen-anthrene	Pyrene	Total cPAHs	As	Cd	Cr
HRL (ppb)		NE	6[c]	6[c]	300	NE	NE	200	0.06	10	4	100
MCL (ppb)		NE	20[c]	20[c]	NE	NE	NE	NE	0.2	10	5	100
Well	**Date**											
MW-10L	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-11	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	**3.6 J**	**0.3 J**	**7 J**
MW-11L	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
MW-12	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	**4 J**	<5	**2 J**
MW-12L	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	**4.1 J**	<5	**10**
MW-13	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	**4 J**	**0.3 J**	**19**
	4/1/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/1/2003D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-13L	1/16/2003	NA	<10	<10	<10	<10	<10	<10	<10	**3.9 J**	<5	<10
	4/1/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M-1	5/9/1995	NA	NA	NA	NA	NA	NA	NA	NA	<10	**8**	<25
	11/7/1996	NA	<0.03	<0.15	<0.21	<0.043	<0.64	<0.27	BDL	<20	<10	**62**
	12/6/1996	NA	<0.03	<0.15	**0.27**	<0.043	<0.64	<0.27	**0.051**	<20	<10	<50
	3/8/2000	<10	<10	<10	<10	<10	<10	**10**	<10	NA	NA	NA
	1/15/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10
M-2	5/9/1995	NA	NA	NA	NA	NA	NA	NA	NA	<10	**6**	**44**
	3/8/2000	**15**	<10	**12**	**24**	**PP (<10)**	**14**	**25**	**4**	NA	NA	NA
	3/8/2000D	**PP (<10)**	<10	<10	**PP (<10)**	<10	<10	**12**	**1.3**	NA	NA	NA
	1/15/2003	NA	<10	<10	<10	<10	<10	<10	<10	**5.5 J**	<5	<10
	1/15/2003D	NA	<10	<10	<10	<10	<10	<10	<10	**6.2 J**	<5	<10
M-3	11/7/1996	NA	**0.078**	<0.15	<0.21	**0.078**	<0.64	<0.27	**1.006**	<20	<10	<50
	12/6/1996	NA	<0.03	<0.15	**0.49**	<0.043	<0.64	<0.27	**0.108**	<20	<10	<50
	3/8/2000	<10	<10	**PP (<10)**	**21**	<10	**PP (<10)**	**17**	**3**	NA	NA	NA
	1/15/2003	NA	<10	<10	<10	<10	<10	<10	<10	<10	<5	<10

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

Drinking Wtr Criteria		Metals		
		Pb	Mn	Ag
	HRL (ppb)	15	100	30
	MCL (ppb)	15[d]	NE	NE
Well	**Date**			
MW-10L	1/16/2003	<3	**3,100**	<10
MW-11	1/16/2003	**2.9 J**	**13,400**	<10
MW-11L	1/16/2003	<3	**8,200**	<10
MW-12	1/16/2003	<3	**11,300**	<10
MW-12L	1/16/2003	<3	**1,300**	<10
MW-13	1/16/2003	**3.7 J**	**6,700**	<10
	4/1/2003	NA	NA	NA
	4/1/2003D	NA	NA	NA
MW-13L	1/16/2003	<3	**3,700**	<10
	4/1/2003	NA	NA	NA
M-1	5/9/1995	**23**	NA	<25
	11/7/1996	<5	NA	**51**
	12/6/1996	<5	NA	<10
	3/8/2000	NA	NA	NA
	1/15/2003	<3	**6,100**	<10
M-2	5/9/1995	<10	NA	<25
	3/8/2000	NA	NA	NA
	3/8/2000D	NA	NA	NA
	1/15/2003	<3	**2,900**	<10
	1/15/2003D	<3	**2,900**	<10
M-3	11/7/1996	<5	NA	**48**
	12/6/1996	<5	NA	<10
	3/8/2000	NA	NA	NA
	1/15/2003	<3	**1,300**	<10

[d] This drinking water criterion is a federal "Action Level", not an MCL

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

Brookdale Park Monitoring Wells

		VOCs											
Drinking Wtr Criteria		Benzene	Chloroform	1,3-DCB	1,4-DCB	1,1-DCE	cis-1,2-DCE	trans-1,2 DCE	Methylene chloride	MEK	MIBK	PERC	Toluene
	HRL (ppb)	2	30	NE	10	200	50	40	NE	4,000	300	5	200
	MCL (ppb)	5	NE	NE	75	7	70	100	NE	NE	NE	5	1,000
Well	**Date**												
MW-1	12/19/2003	<1	<1	<1	<1	<1	<0.5	<0.5	<1	NA	NA	<1	<1
MW-2	12/19/2003	<1	<1	<1	<1	<1	**0.45 J**	<0.5	<1	NA	NA	**2.7**	<1
MW-3	12/19/2003	<1	<1	<1	<1	<1	**1.4**	<0.5	<1	NA	NA	**1.4**	<1
MW-4	12/19/2003	<1	<1	<1	<1	<1	**0.5**	<0.5	<1	NA	NA	<1	<1
	12/19/2003D	<1	<1	<1	<1	<1	**0.5**	<0.5	<1	NA	NA	<1	<1

		VOCs					SVOCs	PAHs				
Drinking Wtr Criteria		1,2,4-TCB	1,1,1-TCA	TCE	Vinyl chloride	Xylenes	Bis(2-EH) phthalate	Benzo[a] anthracene	Benzo[b,j,k] fluoranthene	Benzo[g,h,i] perylene	Benzo[e] pyrene	Chrysene
	HRL (ppb)	4	9,000	5	0.2	300	NE	0.6[c]	0.6[c]	NE	NE	6[c]
	MCL (ppb)	70	200	5	2	10,000	6	2[c]	2[c]	NE	NE	20[c]
Well	**Date**											
MW-1	12/19/2003	<1	<1	<1	<1	<1	NA	NA	NA	NA	NA	NA
MW-2	12/19/2003	<1	**1.2**	<1	<1	<1	NA	NA	NA	NA	NA	NA
MW-3	12/19/2003	<1	**1.3**	**0.61 J**	<1	<1	NA	NA	NA	NA	NA	NA
MW-4	12/19/2003	<1	<1	<1	<1	<1	NA	NA	NA	NA	NA	NA
	12/19/2003D	<1	<1	<1	<1	<1	NA	NA	NA	NA	NA	NA

[c] These drinking water criteria are based on toxic equivalency with benzo(a)pyrene

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

Brookdale Park Monitoring Wells (continued)

		PAHs					Metals						
Drinking Wtr Criteria		Fluor-anthene	Indeno [1,2,3-c,d] pyrene	Phen-anthrene	Pyrene	Total cPAHs	As	Cd	Cr	Pb	Mn	Ag	Th
	HRL (ppb)	300	NE	NE	200	0.06	10	4	100	15	100	30	0.6
	MCL (ppb)	NE	NE	NE	NE	0.2	10	5	100	15[d]	NE	NE	2
Well	**Date**												
MW-1	12/19/2003	NA	NA	NA	NA	NA	**5.7 J**	<5	<10	**3.2**	**3,100**	<10	<10
MW-2	12/19/2003	NA	NA	NA	NA	NA	**5.2 J**	<5	<10	**2.3**	**2,500**	<10	<10
MW-3	12/19/2003	NA	NA	NA	NA	NA	**6.7 J**	<5	<10	**0.98**	**1,900**	<10	<10
MW-4	12/19/2003	NA	NA	NA	NA	NA	<10	<5	<10	**1.4**	**2,100**	<10	**8.4 J**
	12/19/2003D	NA	NA	NA	NA	NA	<10	<5	<10	**1.5**	**2,200**	<10	<10

[d] This drinking water criterion is a federal "Action Level", not an MCL

[See "Notes" at end of table]

Table 6: Monitoring Well Sample Data - Detected Chemicals

NOTES:	**CHEMICAL ABBREVIATIONS:**
This table shows only those compounds detected at least once in a site monitoring well	Bis(2-EH)phthalate = bis(2-ethylhexyl)phthalate
Detected chemicals are shown in "bold" typeface	DCB = dichlorobenzene
concentration exceeds state or federal drinking water criteria	DCE = dichloroehtene
ppb = parts per billion	MEK = methyl ethyl ketone
< = "less than", indicates compound not detected at or above the reporting limit	MIBK = methyl isobutyl ketone
J = estimated value; compound detected at a concentration below the reporting limit	PERC = tetrachloroethene (or perchlorethene)
BDL = below detection limit	TCB = trichlorobenzene
ND = not detected (detection limit not provided)	TCA = trichloroethane
NE = none established	TCE = trichloroethene
NA = not analyzed	As = arsenic
NL = results not located (file copy of report not complete)	Cd = cadmium
PP = "peak present", compound detected below reporting limit, but not quantified	Cr = chromium
DW = Drinking Water	Pb = lead
A "D" after the sample date indicates the sample is a duplicate	Mn = manganese
	Ag = silver
	Th = thallium

DATA SOURCES: CRA (2004, 2005); STS (1988); Serco (1990a, 1990b); Liesch (1995, 1997); MPCA files - reviewed 11/9/12

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #1	10/5/1961	NA	NA	NA	NA	NA	NA	NA	NA	<50	NA	NA
	June 1968	NA	NA	NA	NA	NA	NA	NA	NA	**180**	NA	NA
	1/22/1969	NA	NA	NA	NA	NA	NA	NA	NA	<20	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	**40**	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	**40**	NA	<10
	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	**20**	NA	NA
	3/9/1976	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/7/1984	<0.5	<0.2	<1	<0.2	<0.2	<0.5	<0.2	<0.5	NA	NA	NA
	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	**1.1**	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.2**	NA
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/22/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/5/2003	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	11/20/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.76**	NA
Well #2	6/20/1968	NA	NA	NA	NA	NA	NA	NA	NA	**20**	NA	NA
	January 1969	NA	NA	NA	NA	NA	NA	NA	NA	**180**	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	<20	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	**30**	NA	NA
	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	**27**	NA	**11**
	1/28/1974	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/16/1977	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #1	10/5/1961	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	June 1968	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/22/1969	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/1973	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	3/9/1976	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/7/1984	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	2/8/1984	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	12/21/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/22/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/5/2003	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	11/20/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #2	6/20/1968	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	January 1969	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/1973	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	1/28/1974	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	11/16/1977	NA	NA	NA	NA	**6.7**	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #2 (continued)	3/29/1979	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/7/1984	<0.5	<0.2	<1	<0.2	<0.2	<0.5	<0.2	<0.5	NA	NA	NA
	7/6/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/11/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/22/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	NA
	5/23/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/6/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/18/2003	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	5/5/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #2 (continued)	3/29/1979	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	2/7/1984	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	7/6/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	7/11/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	5/18/1995	<0.1	<0.2	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	12/21/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/22/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/23/2002	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA
	7/24/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/6/2002	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/18/2003	<0.1	<0.2	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.1	<0.2	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	5/5/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #3	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	**370**	NA	<10
	1/28/1974	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/7/1984	<0.5	<0.2	<1	<0.2	<0.2	<0.5	<0.2	<0.5	NA	NA	NA
	2/8/1984	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/6/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/11/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/22/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/18/2003	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	5/5/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
Well #4	6/20/1968	NA	NA	NA	NA	NA	NA	NA	NA	**20**	NA	NA
	June 1968	NA	NA	NA	NA	NA	NA	NA	NA	**20**	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	<20	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	**20**	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #3	12/10/1973	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	1/28/1974	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/7/1984	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	2/8/1984	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/6/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	7/11/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	12/21/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/22/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/18/2003	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	5/5/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #4	6/20/1968	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	June 1968	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #4	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	<10	NA	<10
(continued)	6/13/1985	<0.5	<0.2	<1	<2	<0.2	<0.2	<0.2	<0.5	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
[sealed -2002]	8/29/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
Well #5	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	**320**	NA	NA
	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	**240**	NA	<10
	1/28/1974	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/9/1976	NA	NA	NA	NA	NA	NA	NA	NA	**960**	NA	NA
	11/16/1977	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/29/1979	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/13/1985	<0.5	<0.2	<1	<2	<0.2	<0.2	<0.2	<0.5	NA	NA	NA
	8/29/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.4**	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[sealed - 2001]	8/16/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Well #6	6/20/1968	NA	NA	NA	NA	NA	NA	NA	NA	**30**	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	<20	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	**120**	NA	NA
	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	**26**	NA	<10
[sealed - 1993]	2/7/1984	<0.5	<0.2	<1	<0.2	<0.2	<0.5	<0.2	<0.5	NA	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #4	12/10/1973	NA	NA	NA	NA	**47**	NA	NA	NA	NA	NA	NA
(continued)	6/13/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
[sealed -2002]	8/29/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #5	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/1973	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	1/28/1974	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	3/9/1976	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/16/1977	NA	NA	NA	NA	**6.3**	NA	NA	NA	NA	NA	NA
	3/29/1979	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	**4**	NA	NA	NA	NA	NA	NA
	6/13/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	8/29/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[sealed - 2001]	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
Well #6	6/20/1968	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/7/1969	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/13/1970	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/1973	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
[sealed - 1993]	2/7/1984	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #7	12/10/1973	NA	NA	NA	NA	NA	NA	NA	NA	**260**	NA	<10
	5/8/1980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	**0.2**	<0.2	**5.8**	<0.2	<0.2	<0.2	<0.1	**1.3**	NA	NA	NA
	8/29/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.5**	NA
	11/1/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	6/18/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/1996	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	12/21/1998	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	1.5	NA
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.6**	NA
Well #8	3/9/1976	NA	NA	NA	NA	NA	NA	NA	NA	**160**	NA	NA
	3/30/1979	NA	NA	NA	NA	NA	NA	NA	NA	**160**	<50	<50
	5/8/1980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/28/1987	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**0.2**	<0.2	NA	NA	NA
	2/18/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/17/1993	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	8/11/1993	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	11/22/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
	12/9/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #7	12/10/1973	NA	NA	NA	NA	**6**	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/29/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/1/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	6/18/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/1996	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	<0.1	<0.2	<0.2	<0.2	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	12/21/1998	<0.1	<0.2	<0.2	<0.2	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #8	3/9/1976	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/30/1979	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	5/28/1987	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	2/18/1993	NA	NA	NA	NA	NA	NA	**8.26**	**0.12**	**0.4**	**0.11**	<1
	5/17/1993	<0.1	<0.2	<0.2	<0.2	NA	NA	<0.5	**0.15**	<0.5	<0.5	<1
	8/11/1993	<0.1	<0.2	<0.2	<0.2	NA	NA	<0.5	**0.48**	**0.21**	<0.5	**0.04**
	11/22/1993	NA	NA	NA	NA	NA	NA	<0.5	**0.1**	<0.5	<0.5	<1
	12/9/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #8 (continued)	5/26/1994	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	12/30/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #9	3/30/1979	NA	NA	NA	NA	NA	NA	NA	NA	**540**	<50	<50
	5/8/1980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/13/1985	<0.5	<0.2	<1	<2	<0.2	<0.2	**0.25**	<0.5	NA	NA	NA
	10/2/1985	<0.5	<0.2	<1	<2	<0.2	**0.53**	**0.38**	<0.5	NA	NA	NA
	9/18/1986	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/28/1987	<0.5	<0.2	<1	<2	<0.2	<0.2	**1.1**	<0.5	NA	NA	NA
	3/12/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/17/1993	<0.2	<0.2	<5	<0.2	**0.5**	<0.2	**1.2**	<0.2	NA	NA	NA
	8/11/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/13/1993	<0.2	<0.2	<5	<0.2	**0.3**	<0.2	**1.3**	<0.2	NA	NA	NA
	11/22/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
	12/13/1993	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**1.1**	<0.2	NA	NA	NA
	3/14/1994	<0.2	<0.2	<5	<0.2	**0.4**	<0.2	**1.4**	<0.2	NA	NA	NA
	5/26/1994	<0.2	<0.2	<5	<0.2	**0.3**	<0.2	**1.4**	<0.2	NA	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #8 (continued)	5/26/1994	<0.1	<0.2	<5	<0.2	NA	NA	NA	NA	NA	NA	NA
	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	12/21/1998	<0.1	<0.2	<0.2	<0.2	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	<0.1	<0.2	<0.2	<0.2	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	12/30/1999	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
Well #9	3/30/1979	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/8/1980	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	6/13/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	10/2/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	9/18/1986	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/28/1987	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	3/12/1993	NA	NA	NA	NA	NA	NA	<1.3	**1.08**	<0.13	<0.06	<0.04
	5/17/1993	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	**1.17**	**0.18**	<0.06	<0.04
	8/11/1993	NA	NA	NA	NA	NA	NA	<1.3	**1.03**	<0.13	**0.08**	<0.04
	9/13/1993	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	11/22/1993	NA	NA	NA	NA	NA	NA	<1.3	**0.92**	<0.13	<0.06	<0.04
	12/13/1993	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	3/14/1994	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	5/26/1994	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #9	8/22/1994	<0.2	<0.2	<5	<0.2	**0.4**	<0.2	**1.7**	<0.2	NA	NA	NA
(continued)	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/21/1994	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**0.9**	<0.2	NA	NA	NA
	2/27/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**1.2**	<0.2	NA	NA	NA
	8/16/1995	<0.2	<0.2	<5	<0.2	**1**	<0.2	**1.6**	<0.2	NA	NA	NA
	11/1/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**1**	<0.2	NA	NA	NA
	6/18/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/1996	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**1.1**	<0.2	NA	NA	NA
	6/25/1997	<0.2	<0.2	<5	**1.5**	<0.2	<0.2	**2.7**	<0.2	NA	NA	NA
[sealed - 2000]	8/26/1997	<0.2	**0.5**	<5	<0.2	<0.2	<0.2	**3.1**	<0.2	NA	NA	NA
Well #10	8/4/1981	<2.2	<0.4	NA	NA	NA	NA	NA	NA	**990**	<5	<10
	6/13/1985	<0.5	<0.2	<1	<2	<0.2	<0.2	<0.2	<0.5	NA	NA	NA
	10/2/1985	<0.5	**0.49**	<1	<2	<0.2	<0.2	<0.2	<0.5	NA	NA	NA
	7/6/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/11/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/30/1990	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Well #11	8/4/1981	NA	NA	NA	NA	NA	NA	NA	NA	**180**	<5	**35**
	6/13/1985	<0.5	<0.2	<1	<2	**PP (<0.2)**	<0.2	<0.2	<0.5	NA	NA	NA
	10/2/1985	<0.5	<0.2	<1	<2	<0.2	<0.2	<0.2	<0.5	NA	NA	NA
	5/28/1987	<0.5	<0.2	<1	<2	<0.2	<0.2	<0.2	<0.5	NA	NA	NA
	2/18/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/17/1993	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #9 (continued)	8/22/1994	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/21/1994	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	2/27/1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	11/1/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	6/18/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/1996	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	6/25/1997	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
[sealed - 2000]	8/26/1997	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
Well #10	8/4/1981	NA	NA	NA	NA	<2	NA	NA	NA	NA	NA	NA
	6/13/1985	<0.2	<0.5	<1	<2	NA	NA	NA	NA	NA	NA	NA
	10/2/1985	<0.2	<0.5	<1	<2	NA	NA	NA	NA	NA	NA	NA
	7/6/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	7/11/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	8/30/1990	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
Well #11	8/4/1981	NA	NA	NA	NA	**9.9**	NA	NA	NA	NA	NA	NA
	6/13/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	10/2/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	5/28/1987	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	2/18/1993	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	**0.04**
	5/17/1993	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

Drinking Wtr Criteria		VOCs								Metals		
		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #11 (continued)	8/11/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/22/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
	12/9/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/1994	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	12/30/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/11/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/2001	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	9/5/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/22/2004	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	8/10/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/17/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/22/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	5/5/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/8/2010	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA

[a] This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #11 (continued)	8/11/1993	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	**0.2**
	11/22/1993	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	12/9/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/1994	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	5/6/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	12/30/1999	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	7/11/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/2001	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	9/5/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2001	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	4/22/2004	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	8/10/2004	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	8/17/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/22/2007	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	5/5/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	7/8/2010	**0.47**	**0.56**	**0.56**	**0.56**	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #11 (continued)	5/9/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/11/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/21/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #12	6/13/1985	<0.5	<0.2	<1	<2	<0.2	<0.2	<0.2	<0.5	**380**	<5	<5
	9/18/1986	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/21/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA
	4/22/2004	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Well #13	7/6/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/5/2005	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Well #14	7/6/1989	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #15	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	**1.2**	<0.2	NA	NA	NA
	8/16/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	11/1/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	6/18/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/1996	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	6/25/1997	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	9/29/1998	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	12/21/1998	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	4/22/2004	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
Well #16	5/5/2005	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA

a This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides				
Drinking Wtr Criteria		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #11 (continued)	5/9/2012	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	7/11/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/21/2012	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
Well #12	6/13/1985	<0.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
	9/18/1986	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	5/18/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/10/1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	12/21/1998	NA	NA	NA	NA	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	4/22/2004	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	4/26/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
Well #13	7/6/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
	5/5/2005	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
Well #14	7/6/1989	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
Well #15	5/18/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	8/16/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	11/1/1995	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	6/18/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/24/1996	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	6/25/1997	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA
	9/29/1998	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	12/21/1998	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
	4/22/2004	<0.1	<0.2	<0.2	<0.2	NA	NA	<1.3	<0.02	<0.13	<0.06	<0.04
Well #16	5/5/2005	<0.1	<0.2	<0.2	<0.2	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOCs								Metals		
Drinking Wtr Criteria		Ethyl-benzene	cis-1,2-DCE	MIBK	PERC	1,1,1-TCA	1,1,2-TCA	TCE	Xylenes	Mn	As	Pb
	HRL (ppb)	50	50	300	5	9,000	3	5	300	100	10	15
	MCL (ppb)	700	70	NE	5	200	5	5	10,000	NE	10	15[a]
Location	Sample Date											
Well #17	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #18	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #19	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #20	4/20/2005	<0.5	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Well #21	4/20/2005	<0.5	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Well #22	7/23/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/5/2005	<0.5	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
Treatment Plant	2/18/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/17/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/11/1993	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/22/1993	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	<1	NA
	5/26/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.2	<0.2	<5	<0.2	<0.2	<0.2	<0.1	<0.2	NA	NA	NA
	2/6/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/1996	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/29/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/23/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/23/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/6/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/18/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	NA
	10/30/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/22/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	6/19/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/21/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA

a This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

Drinking Wtr Criteria		VOC: Disinfection By-products				SVOCs	PCBs	Pesticides[d]				
		Chloroform	BDCM	CDBM	Bromoform	Phenols		Dalapon	DCPA di-acid degr.	4-nitro phenol	3,5-DCB acid	5-HDC
	HRL (ppb)	30	6	NE	40	4,000	0.04	NE	NE	NE	NE	NE
	MCL (ppb)	NE[b]	NE[b]	NE[b]	NE[b]	NE	0.5	200	70[c]	NE	NE	NE
Location	Sample Date											
Well #17	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #18	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #19	10/4/1994	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Well #20	4/20/2005	<0.1	<0.2	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
Well #21	4/20/2005	<0.1	<0.2	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
Well #22	7/23/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/5/2005	<0.1	<0.2	<0.5	<0.5	NA	NA	NA	NA	NA	NA	NA
Treatment Plant	2/18/1993	NA	NA	NA	NA	NA	NA	**1.66**	**0.95**	<0.13	<0.06	<0.04
	5/17/1993	NA	NA	NA	NA	NA	NA	<1.3	**2.03**	<0.13	<0.06	<0.04
	8/11/1993	NA	NA	NA	NA	NA	NA	<1.3	**1.37**	<0.13	<0.06	<0.04
	11/22/1993	NA	NA	NA	NA	NA	NA	<1.3	**0.94**	<0.13	<0.06	<0.04
	5/26/1994	**2.4**	**4**	**4.3**	**1.2**	NA	NA	NA	NA	NA	NA	NA
	5/18/1995	**1.2**	**1.4**	**1.4**	<0.5	NA	NA	NA	NA	NA	NA	NA
	2/6/1996	**1.4**	**1.9**	**2.3**	**1.1**	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	4/19/1996	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	3/29/1999	**0.5**	**0.4**	<0.5	<0.5	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	6/23/1999	NA	NA	NA	NA	NA	NA	<0.5	<0.5	<0.5	<0.5	<1
	5/23/2002	NA	NA	NA	NA	NA	NA	NA	**1.37**	NA	NA	NA
	11/6/2002	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA
	9/18/2003	**1.9**	**3**	**2.4**	**0.8**	NA	NA	<0.5	NA	<0.5	<0.5	<1
	10/30/2003	NA	NA	NA	NA	NA	NA	<0.5	NA	<0.5	<0.5	<1
	3/22/2007	**3**	**4.4**	**3.7**	**1**	NA	NA	<0.5	NA	NA	NA	NA
	6/19/2007	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA	NA
	5/21/2010	**2.5**	**2.7**	**NA**	**0.8**	NA	NA	**0.6**	ND	NA	NA	NA
	8/21/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[b] The federal MCL for disinfection by-products, is for total trihalomethanes (THMs) of 80 ppb; chloroform, bromoform, CDBM and BDCM are all THMs

[c] This is a federal "Health Risk Limit", a non-regulatory comparison value

[d] Also tested for pesticides in 2009 (not those listed above) - none detected

Table 7: City Water Sample Data - Detected Chemicals

		VOCs				SVOCs	PCBs	Pesticides	Metals		
Drinking Wtr Criteria		Benzene	TCE	Freon 113	Xylenes	Phenols			Mn	As	Pb
	HRL (ppb)	2	5	200,000	300	4,000	0.04	varies	100	10	15
	MCL (ppb)	5	5	NE	10,000	NE	0.5	varies	NE	10	15[a]
Location	**Sample Date**										
Distribution System	11/16/1977	NA	NA	NA	NA	NA	NA	NA	NA	<50	<50
	8/4/1981	NA	NA	NA	NA	NA	NA	NA	NA	<5	<10
	11/8/1982	NA	<0.2	<0.5	NA	NA	NA	NA	NA	NA	NA
	6/13/1985	NA	<0.2	<0.5	NA	NA	NA	NA	NA	<5	<5
	9/18/1986	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5
	11/25/1986	NA	**1.1**	**22**	NA	NA	NA	NA	NA	NA	NA
	5/26/1994	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	5/18/1995	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	2/6/1996	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	6/25/1997	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	1/15/1998	**0.3**	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	11/5/1998	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	1/29/1999	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	1/21/2000	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	1/25/2001	<0.2	<0.1	<0.2	**0.2**	NA	NA	NA	NA	NA	NA
	4/11/2002	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	1/21/2003	<0.2	<0.1	<0.2	<0.2	NA	NA	NA	NA	NA	NA
	4/16/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/20/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/27/2005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/30/2007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/28/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/29/2009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	8/11/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

a This is a federal action level, not an MCL

[See "Notes" at end of table]

Table 7: City Water Sample Data - Detected Chemicals

		VOC: Disinfection By-products							
Drinking Wtr Criteria		DCAA	DBAA	TCAA	BCAA	Chloroform	Bromoform	BDCM	CDBM
	HRL (ppb)	NE	NE	NE	NE	30	40	6	NE
	MCL (ppb)	NE[e]	NE[e]	NE[e]	NE[e]	NE[b]	NE[b]	NE[b]	NE[b]
Location	Sample Date								
Distribution System	11/16/1977	NA	NA	NA	NA	NA	NA	NA	NA
	8/4/1981	NA	NA	NA	NA	NA	NA	NA	NA
	11/8/1982	NA	NA	NA	NA	**8.9**	**3.9**	**13**	**12**
	6/13/1985	NA	NA	NA	NA	**23**	**1.3**	**11**	**5.9**
	9/18/1986	NA	NA	NA	NA	NA	NA	NA	NA
	11/25/1986	NA	NA	NA	NA	**1.3**	**16**	**4.7**	**7.7**
	5/26/1994	NA	NA	NA	NA	**3.8**	**2**	<0.5	**6.2**
	5/18/1995	NA	NA	NA	NA	**1.6**	**0.7**	**1.7**	**1.8**
	2/6/1996	NA	NA	NA	NA	**1.6**	**0.7**	**1.8**	**1.9**
	6/25/1997	NA	NA	NA	NA	**2.8**	**2.4**	**3.4**	**4.8**
	1/15/1998	NA	NA	NA	NA	**5.4**	**2.2**	**5.9**	**7.3**
	11/5/1998	NA	NA	NA	NA	**3.3**	**1.4**	**5.9**	**5.6**
	1/29/1999	NA	NA	NA	NA	**3.5**	**2.1**	**6.1**	**7.4**
	1/21/2000	NA	NA	NA	NA	**11**	**1.4**	**10**	**8**
	1/25/2001	NA	NA	NA	NA	**4.1**	**1.2**	**5.8**	**5.4**
	4/11/2002	NA	NA	NA	NA	**1.7**	**0.8**	**2.4**	**2.4**
	1/21/2003	**1.6**	**1.9**	**1.1**	**2.4**	**4.1**	**0.9**	**4.3**	**2.8**
	4/16/2003	<1.5	**2.2**	**1**	**2.5**	**3.3**	**1.7**	**5.4**	**5.7**
	7/9/2003	**2.7**	**2**	**1.7**	**2.4**	**9.2**	**0.9**	**8.7**	**4.8**
	11/20/2003	**2.9**	**2.5**	**1.8**	NA	**9.8**	**0.9**	**3.6**	**3.8**
	7/27/2005	<1.5	**1.8**	**0.6**	**1.5**	**2.9**	**4.6**	**4.4**	**6.6**
	7/25/2006	<1.5	**1.1**	**1**	NA	**4.4**	**2.8**	**6.4**	**6.8**
	10/30/2007	**1.8**	**1.2**	**1.9**	NA	**13**	**2.1**	**13**	**8.8**
	7/28/2008	**2.5**	**1.3**	**1.5**	NA	**10**	**1.9**	**11**	**7.1**
	9/29/2009	**2.4**	**1.6**	**1.9**	NA	**12**	**1.7**	**8.6**	**7**
	7/12/2010	**2.2**	**1.7**	**1.8**	NA	**12**	**2.1**	**11**	**8.2**

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[e] The federal MCL for these disinfection by-products, is 60 ppb for total haloacetic acids (HAAs); DCAA, DBAA, TCAA and BCAA are all HAAs

Table 7: City Water Sample Data - Detected Chemicals

		VOCs				SVOCs	PCBs	Pesticides	Metals		
Drinking Wtr Criteria		Benzene	TCE	Freon 113	Xylenes	Phenols			Mn	As	Pb
	HRL (ppb)	2	5	200,000	300	4,000	0.04	varies	100	10	15
	MCL (ppb)	5	5	NE	10,000	NE	0.5	varies	NE	10	15[a]
Location	Sample Date										
Distribution System (continued)	8/31/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1/23/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

a This is a federal action level, not an MCL

		VOC: Disinfection By-products							
Drinking Wtr Criteria		DCAA	DBAA	TCAA	BCAA	Chloro-form	BDCM	CDBM	Bromoform
	HRL (ppb)	NE	NE	NE	NE	30	6	NE	40
	MCL (ppb)	NE[e]	NE[e]	NE[e]	NE[e]	NE[b]	NE[b]	NE[b]	NE[b]
Location	Sample Date								
Distribution System (continued)	8/31/2011	**2.9**	**1.7**	**2.2**	NA	**17**	**14**	**8.9**	**2.1**
	1/23/2012	**2.5 - 4.6**	**1.9 - 2.6**	**1.7 - 2.3**	NA	**7.9 - 14**	**7.9 - 9.8**	**6.7 - 7.6**	**1.6 - 1.9**
	4/18/2012	**2.8 - 4.8**	**2.1 - 2.6**	**1.6 - 2.1**	NA	**6.0 - 20.0**	**6.6 - 9**	**4.7 - 6.6**	**1.6 - 12.6**
	7/18/2012	**3.3 - 5.5**	**2.4 - 2.5**	**2.2 - 2.6**	NA	**6.7 - 15.0**	**6.2 - 7.2**	**5.3 - 6.1**	**1.0 - 1.2**

[b] The federal MCL for these disinfection by-products is 80 ppb for total trihalomethanes (THMs); chloroform, bromoform, CDBM and BDCM are all THMs

[e] The federal MCL for these disinfection by-products, is 60 ppb for total haloacetic acids (HAAs); DCAA, DBAA, TCAA and BCAA are all HAAs

<u>Distribution system also sampled for</u>:

Bacteria (40-50 samples per quarter); detected in 2000, 2001, 2009, 2012 at single sample locations - re-sampled 2-7 days later and not detected

Nitrate (1963, 1970, 1984; city wells all sampled annually) - not detected (<2 mg/L)

Fluoride (1992 - 2012) - all below federal guidelines (<4 mg/L)

Radionuclides (1993, 1996, 1999, 2002) - all below federal guidelines (<5 picocuries per liter, or piC/L radium and <15 piC/L gross alpha)

Copper (1992-1995, 1998, 2001, 2004, 2007, 2010 - multiple times and locations per year) - only five minor exceedences (1,330 - 1,800 ppb) of federal standard (1,300 ppb)

Lead (1992-1995, 1998, 2001, 2004, 2007, 2010 - multiple times and locations per year) - only one minor exceedence (19 ppb) of federal standard (15 ppb)

Table 7: City Water Sample Data - Detected Chemicals

NOTES:

This table shows only those compounds that have been detected at least once in the city water (wells, treatment plant, or distribution system)
Values shown in "bold" text indicate detections
concentration exceeds a state or federal drinking water criteria
ppb = parts per billion
< = "less than", indicates compound not detected at or above reporting limit
ND = not detected (detection limit not provided)
NA = not analyzed
NE = no drinking water criteria established
PP = "peak present", compound detected below reporting limit, but not quantified (reporting limit shown in parantheses)

CHEMICAL ABBREVIATIONS:

DCE = dichloroethene
3,5-DCB acid = 3,5-dichlorobenzoic acid
5-HDC = 5-hydroxydicamba
MIBK = methyl isobutyl ketone
PERC = tetrachloroethene (or perchlorethene)
TCA = trichloroethane
TCE = trichloroethene
Freon 113 = 1,1,2-trichlorotrifluoroethane
BDCM = bromodichloromethane
CDBM = chlorodibromomethane
DCAA = dichloroacetic acid
DBAA = dibromoacetic acid
TCAA = trichloroacetic acid
BCAA = bromochloroacetic acid
As = arsenic
Pb = lead
Mn = manganese

SOURCES: MNDWIS (2012) and MDH microfiche records of city water samples (as accessed 10/25/2012)

Table 8: Residential, Business, and Park Drinking Water Wells

Address[a]	Unique Well No.	6/15-20/1988		6/15/1989			8/4/1989		6/27/1990	8/30/1990	
		VOCs	Gen'l Chem	VOCs	Pesticides	Gen'l Chem	VOCs	Gen'l Chem	VOCs	VOCs	Gen'l Chem
4816 85th Ave N	180928	ND	Elevated?	NS	NS	NS	NS	NS	NS	NS	NS
4808 85th Ave N	203014	ND	Normal	NS	NS	NS	NS	NS	NS	NS	NS
4800 85th Ave N	W20038	NS	NS	NS	NS	NS	ND	Elevated	NS	NS	NS
4601 85th Ave[b]	203020	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4401 85th Ave N[b]	?	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4309 85th Ave[b]	?	ND	NA	NS	NS	NS	NS	NS	NS	NS	NS
4120 85th Ave N[b]	203012	ND	Normal	NS	NS	NS	NS	NS	ND	NS	NS
4000 85th Ave N[b]	207176	NS	NS	NS	NS	NS	NS	NS	ND	NS	NS
3901 85th Ave N[b]	169545	ND	Normal	NS	NS	NS	NS	NS	NS	ND	Normal
3900 85th Ave N (?)[b]	?	NS	NS	NS	NS	NS	NS	NS	ND	NS	NS
4025 85th Ave N[b]	166058	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Central Park	203015	ND	Elevated?	ND	ND	Normal	NS	NS	NS	NS	NS
Brookland Exec. Nine	203019	ND	Normal	NS	NS	NS	NS	NS	NS	ND	Normal
Brookland Golf Course	W20037	ND	Elevated?	NS	NS	NS	NS	NS	NS	NS	NS
Hamilton Park	203016	ND	Normal	NS	NS	NS	NS	NS	NS	NS	NS
Norwood Park	203024	ND	Normal	NS	NS	NS	NS	NS	NS	NS	NS

NOTES:

All results in parts per billion (ppb)

[a] property locations shown on figures 1 and 3

[b] well is located on or downgradient of Brooklyn Park Dump

PCB samples speciated for aroclors 1242, 1254, 1260

General chemistry samples included: total iron, chloride, conductivity, nitrate+nitrite, ammonia as N, total sulfate, pH

Pesticide samples tested for: alachlor, atrazine, butylate, chlorpyrifos, cyanazine, dicamba, diallate, EPTC, fonofos, linuron, MCPA, methyl parathion, metolachlor, metribuzin, phorate, propachlor, simazine, 2,4-D, silvex, 2,4,5-T, picloram, and trifluralin

ND = not detected

NS = well not sampled

NA = result not available

Table 8: Residential, Business, and Park Drinking Water Wells

Address	Unique Well No.	12/12/1990			6/27/1994				5/29/1996	
		VOCs	metals	Gen'l Chem	VOCs	PAHs	PCBs	Metals	VOCs	Gen'l Chem
4816 85th Ave N	180928	ND	Normal	Normal	NS	NS	NS	NS	NS	NS
4808 85th Ave N	203014	NS	NS	NS	NS	NS	NS	NS	ND	Normal
4800 85th Ave N	W20038	ND	ND	Normal	NS	NS	NS	NS	NS	NS
4601 85th Ave[b]	203020	NS	NS	NS	ND	ND	ND	Mn = 1,100 Cr = 0.6	NS	NS
4401 85th Ave N[b]	?	NS	NS	NS	ND	ND	ND	Mn = 2,100 Cr = 0.6	NS	NS
4309 85th Ave[b]	?	NS	NS	NS	NS	NS	NS	NS	NS	NS
4120 85th Ave N[b]	203012	NS	NS	NS	NS	NS	NS	NS	NS	NS
4000 85th Ave N[b]	207176	NS	NS	NS	NS	NS	NS	NS	NS	NS
3901 85th Ave N[b]	169545	NS	NS	NS	NS	NS	NS	NS	ND	Normal
3900 85th Ave N (?)[b]	?	NS	NS	NS	NS	NS	NS	NS	NS	NS
4025 85th Ave N[b]	166058	NS	NS	NS	BDCM = 3.8 CDBM = 3.5 chloroform = 2.7	ND	ND	Mn = 13 Cr = 0.5	NS	NS
Central Park	203015	NS	NS	NS	NS	NS	NS	NS	NS	NS
Brookland Exec. Nine	203019	NS	NS	NS	NS	NS	NS	NS	ND	Normal
Brookland Golf Course	W20037	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hamilton Park	203016	NS	NS	NS	NS	NS	NS	NS	NS	NS
Norwood Park	203024	NS	NS	NS	NS	NS	NS	NS	ND	Normal

NOTES:

All results in parts per billion (ppb)

[a] property locations shown on figures 1 and 3

[b] well is located on or downgradient of Brooklyn Park Dump

ND = not detected

NS = well not sampled

NA = result not available

Federal MCL for total trihalomethane disinfection by-products (ie. chloroform, BDCM, CDBM) = 80 ppb

General chemistry samples included: total iron, chloride, conductivity, nitrate+nitrite, ammonia as N, total sulfate, pH

HRL = state Health Risk Limit for drinking water

BDCM = bromodichloromethane (HRL = 6 ppb)

CDBM = chlorodibromomethane (no HRL established)

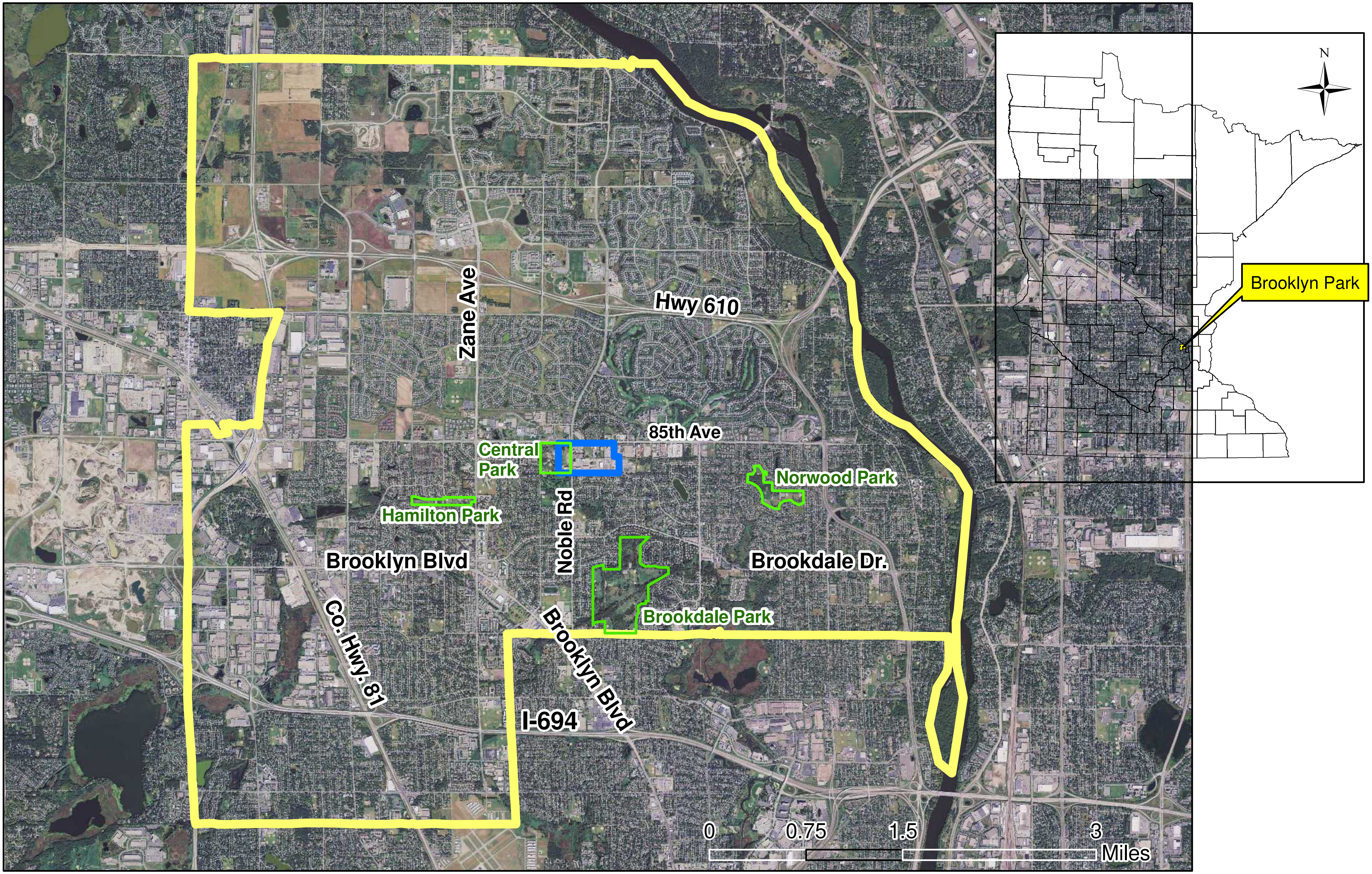
Chloroform (HRL = 30 ppb)

Mn = manganese (HRL = 100 ppb)

Cr = Chromium (HRL = 100 ppb)

Appendix:

Figures Section



MDH, 12/14/2012

Figure 1: Site Location Map

LEGEND

City of Brooklyn Park

Brooklyn Park Dump Site

City parks

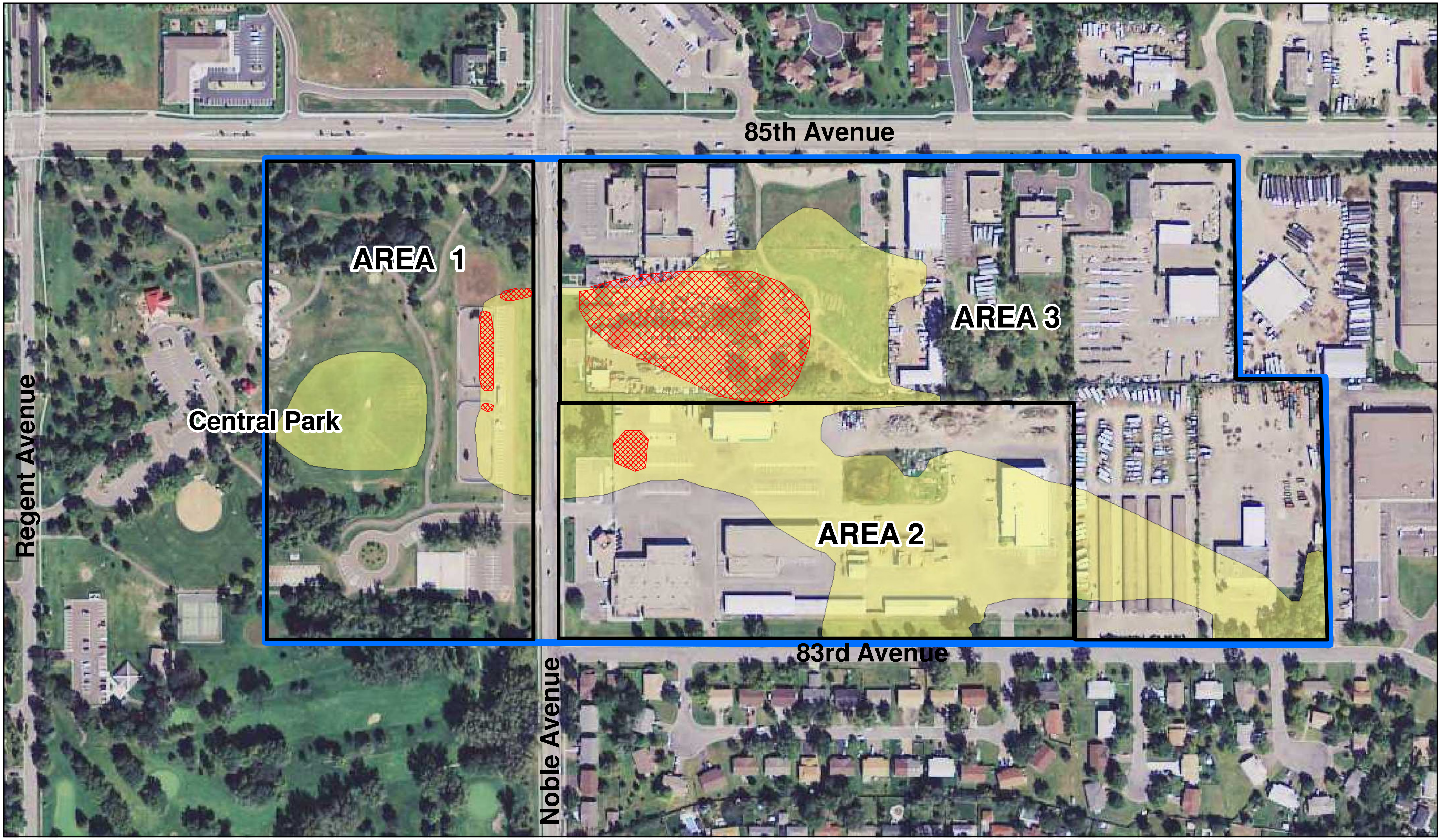


Figure 2: Site Map and Defined Extent of Dump Waste

N

LEGEND

Brooklyn Park Dump site boundary

Areas where black tar-like material was encountered

Current known extent of dump waste

0 0.05 0.1 0.2 Miles

MDH, 5/3/2013

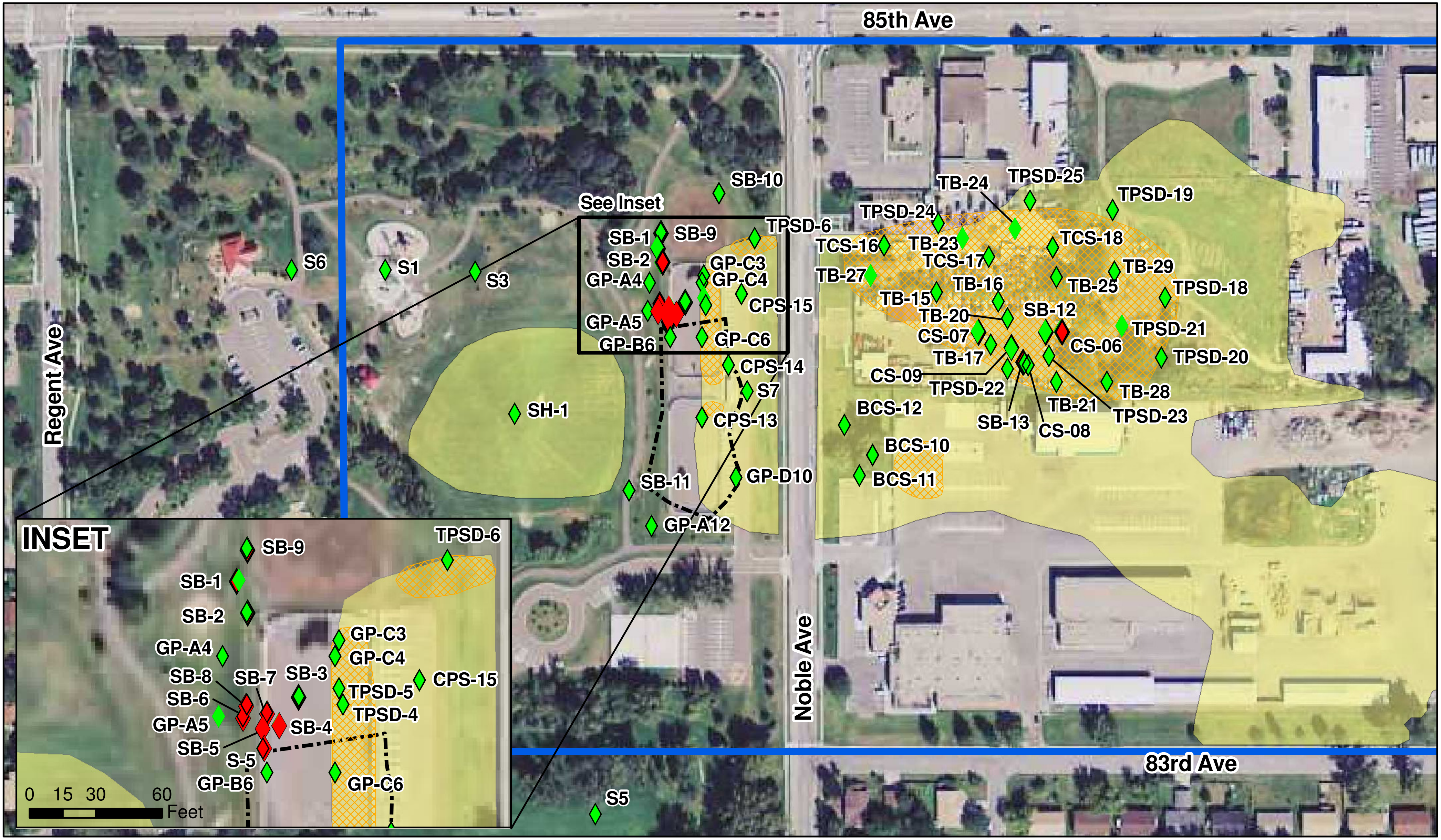
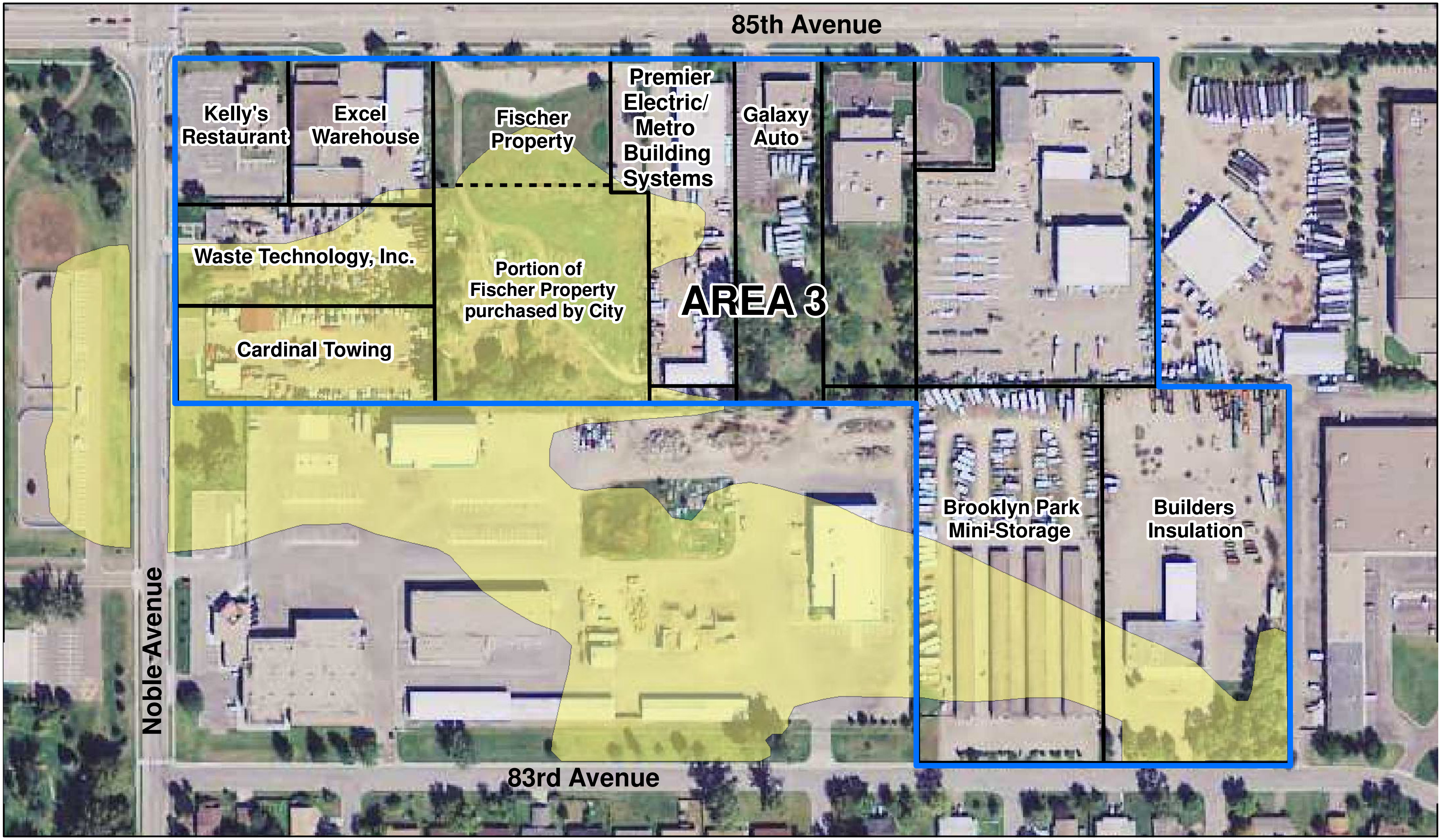


Figure 3 - Soil Sample Locations

Legend

- Brooklyn Park Dump Site boundary
- Brooklyn Park Dump footprint
- Black tarry material
- Fenced area
- Soil Sample
- Surface sample exceeds soil screening value

MDH, 5/3/2013



MDH, 5/3/2013

Figure 4: Business Properties in Area 3

LEGEND

Area 3 boundary

Property boundary

Current known extent of dump waste

N

0 0.05 0.1 0.2 Miles

Note: property names from CRA (2003, Fig. 2.4)

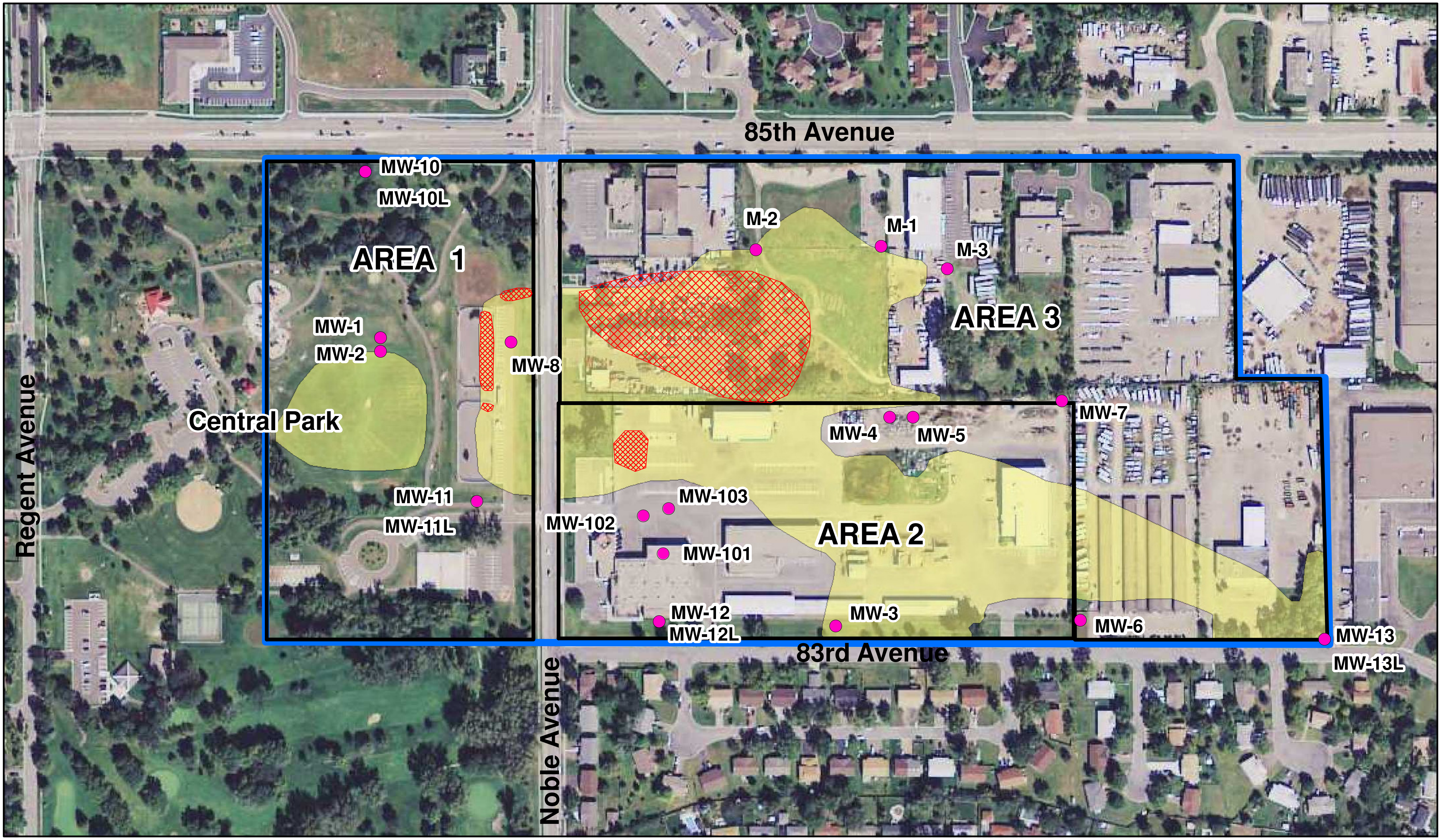
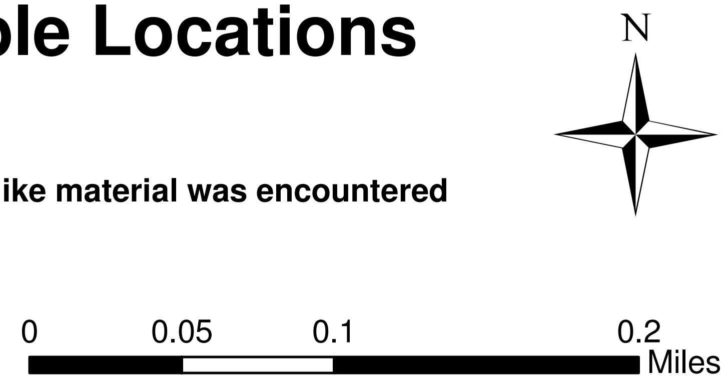


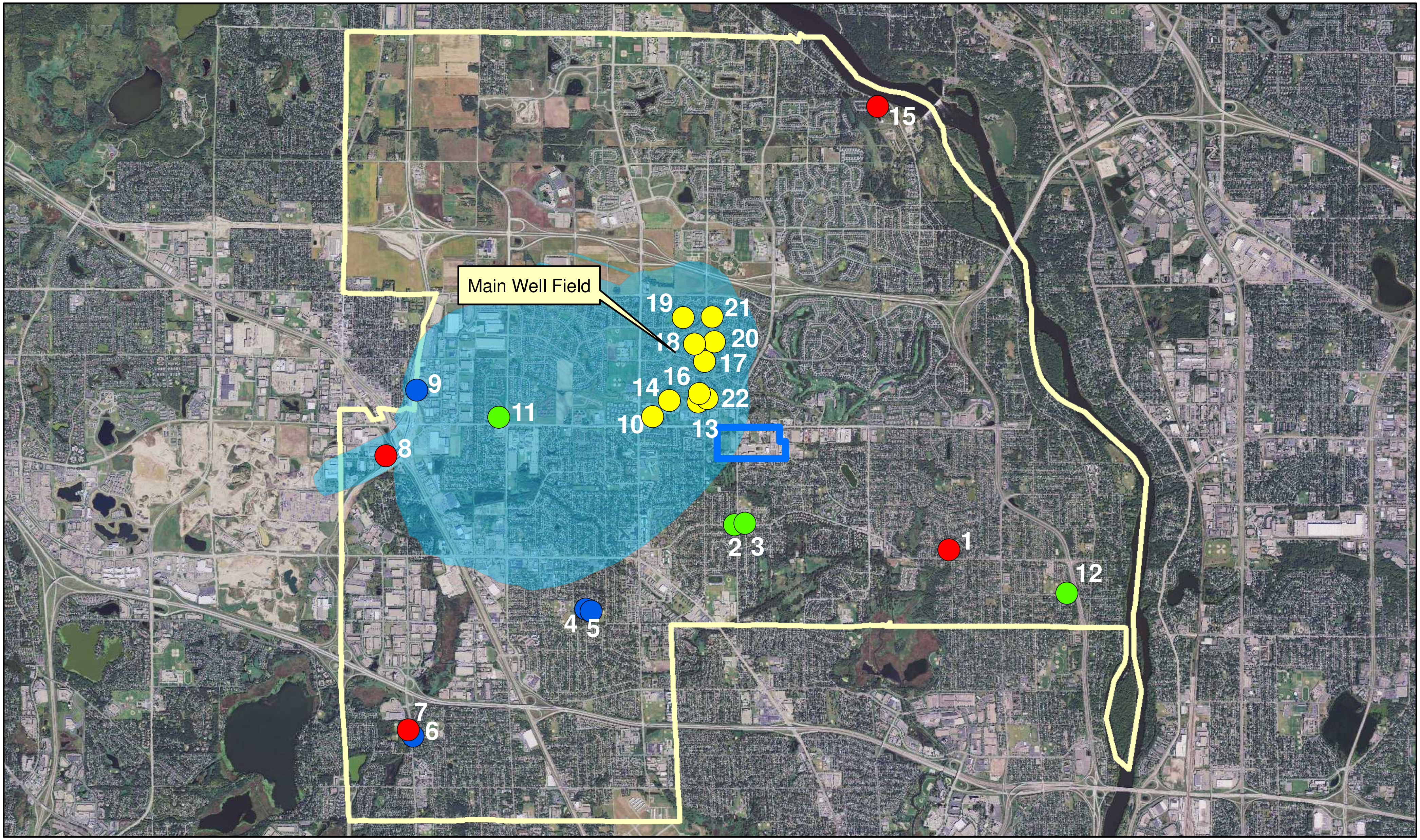
Figure 5: Monitoring Well Sample Locations



LEGEND

- Brooklyn Park Dump site boundary
- Current known extent of dump waste
- Areas where black tar-like material was encountered
- Monitoring well

MDH, 5/3/2013



MDH, 11/15/2012

Figure 6: Location of Brooklyn Park City Wells

LEGEND

City of Brooklyn Park

Brooklyn Park Dump Site Boundaries

Main wellfield capture zone

Primary well

Seasonal backup well

Emergency well

Sealed well

N

0 0.75 1.5 3 Miles

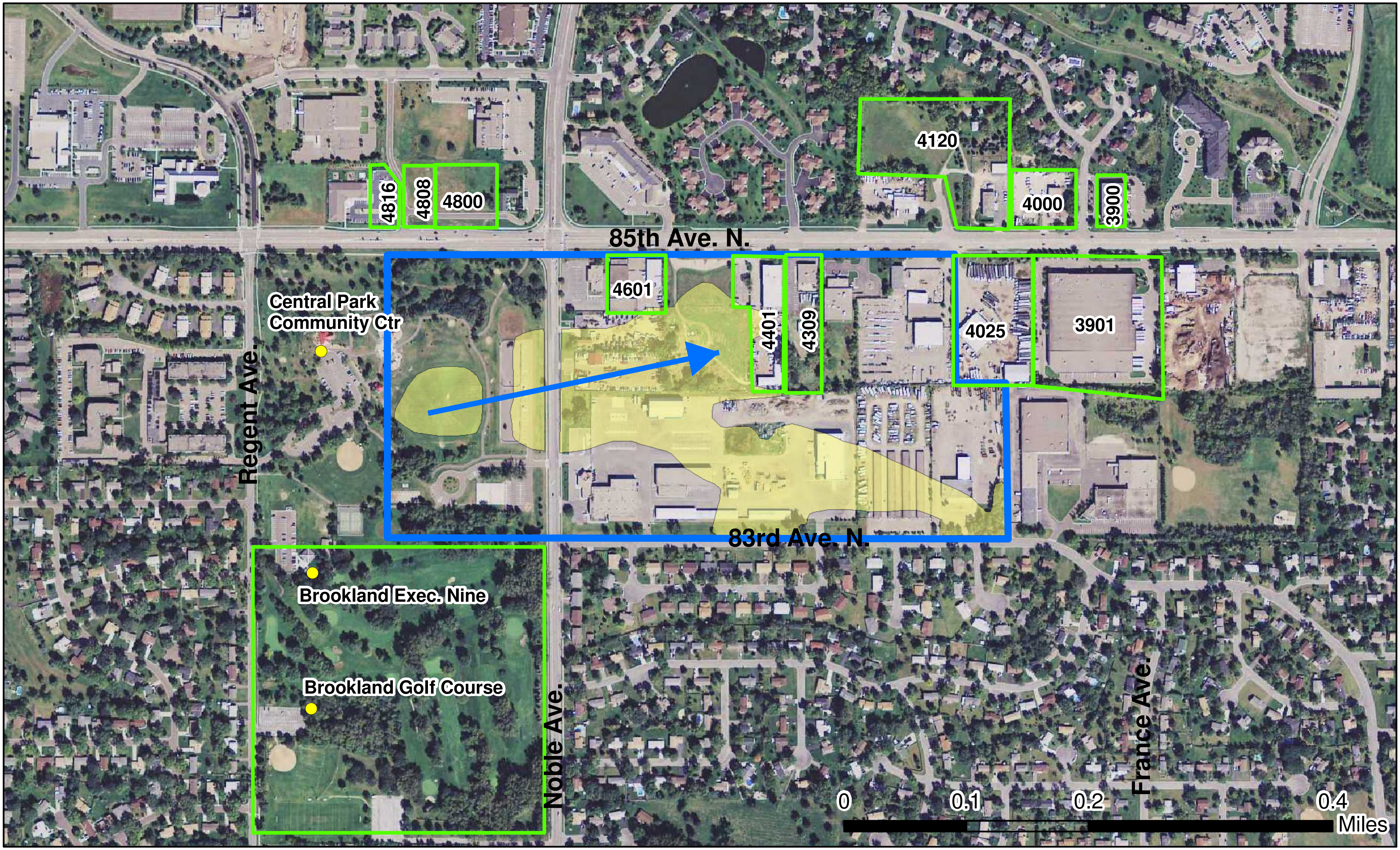


Figure 7: Location of Residential, Business and Park Well Samples

LEGEND

Brooklyn Park Dump Site Boundary

Current known extent of dump waste

Property where well sample was collected

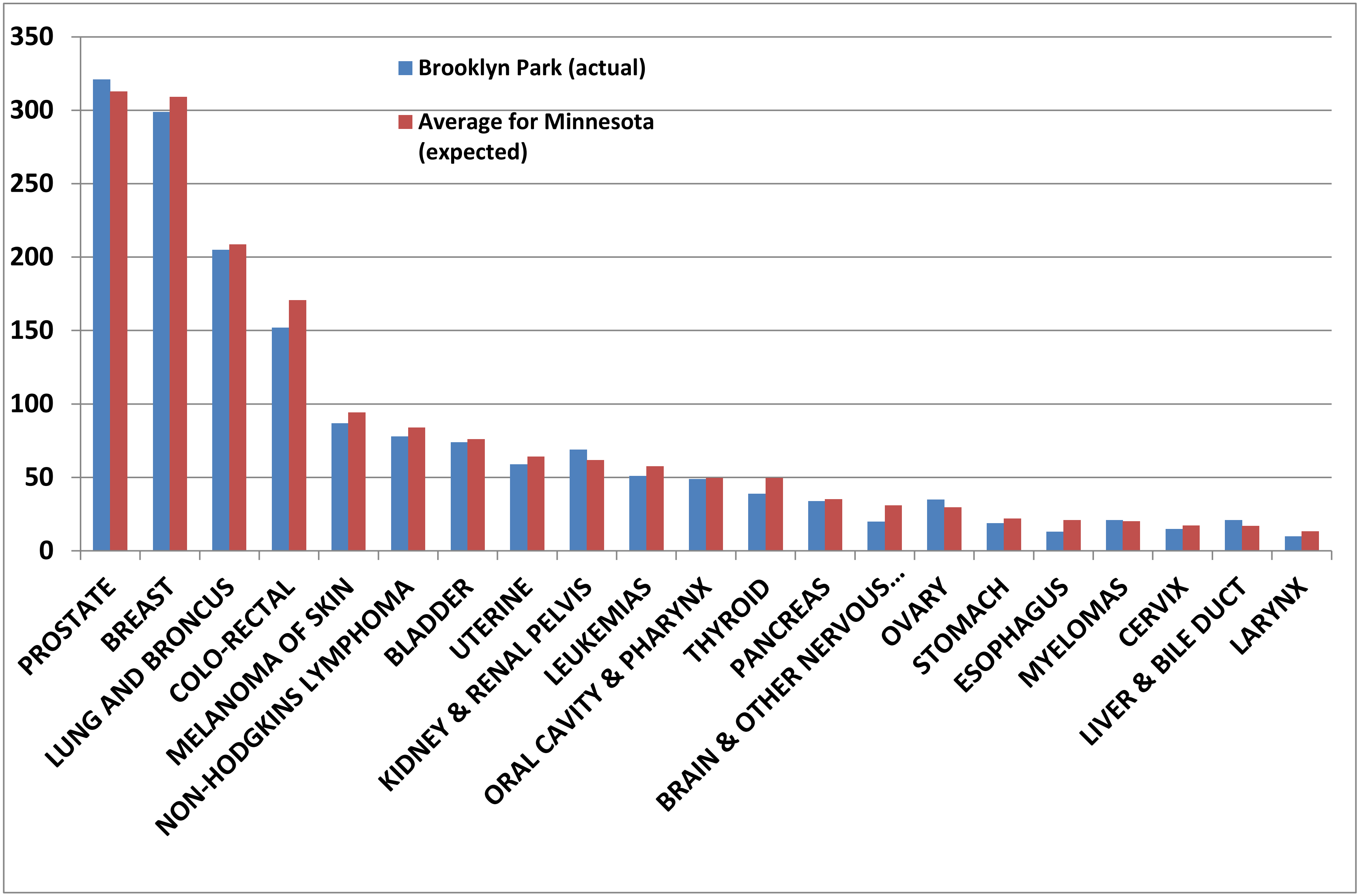
General groundwater flow direction

N

NOTE: Norwood and Hamilton Parks shown on Fig. 1

MDH, 5/3/2013

Figure 8: Cancer incidence comparing the average for Minnesota and Brooklyn Park from 2000-2009*



*Data source: Minnesota Cancer Surveillance System; Brooklyn Park includes zip codes 55443, 55444, and 55445