Integrated Assessment Report- Combined Preliminary Assessment Site Inspection

for

Town Run

Marysville, Union County, Ohio

EPA I.D. No. : OHN000508114

September 30, 2002

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Executive Summary

Town Run, a tributary to Mill Creek, is an urban stream that is located in Marysville, Union County, Ohio. It receives storm water runoff from city streets, and has been partially culverted and channelized to control its flow and reduce erosion. Sampling conducted by Ohio EPA for the Mill Creek Geographic Initiative (GI) in 1995, 1997 and 1998, indicated that the sediments in Town Run were contaminated with heavy metals (copper, lead, and zinc) from the former Eljer Plumbingware (Eljer) plant, and polynuclear aromatic hydrocarbons (PAHs) from urban storm water runoff.

Eljer manufactured brass plumbing fixtures from 1915 until it closed in 1987. Waste foundry sand had been left on site in piles at various locations, in a 3.5 acre landfill, and as fill material around the plant buildings. In 1993, the Ohio EPA, Division of Hazardous Waste Management (DHWM) issued a Director's Final Findings and Orders (DFFOs) to Eljer requiring a RCRA Closure Plan to address the waste foundry sand and hazardous waste piles. In 1997, Industrial Recovery Capitol Co. (IRCC) purchased the Eljer site. They completed the RCRA closure activities at the site in 1998, which included removal of the hazardous waste pile and waste foundry sand adjacent to the factory building, consolidation of the remaining scattered waste foundry sand piles onto the existing landfill on the southern portion of Eljer, construction of a protective soil cap over this consolidated waste foundry sand, and the excavation of sediment from Town Run. After completing the closure activities, IRCC renovated the site into a municipal park, which is currently owned by the City of Marysville.

Because the effectiveness of the sediment removal in Town Run for the RCRA closure by IRCC could not be determined based on available data, the decision was made to conduct an Integrated Assessment at the site under the U.S. EPA Superfund Consolidated Cooperative Agreement. In March 6, 2002, the Ohio EPA, Division of Surface (DSW) collected sediment and surface water samples from Town Run as part of the Integrated Assessment. These samples confirmed that the levels of heavy metals in the sediment of Town Run had been reduced and did not exceed the Probable Effect Concentrations (PEC) for copper, lead and zinc. It appears that the RCRA closure by IRCC at the former Eljer site has addressed the heavy metal sediment contamination in Town Run.

Site Description and History

Town Run, a tributary to Mill Creek, is an urban stream that receives storm water runoff discharges from city streets and discharges from septic tanks. It is partially culverted through the downtown area of Marysville (Longitude: W83° 21' 54", Latitude: N40° 13' 51") and has been heavily channelized to control its flow and reduce erosion with numerous bricks and cement materials placed in the stream bed and along the banks. Near the head waters of the stream is the former Eljer plant site. From its head waters, Town Run flows approximately one mile to the north into Mill Creek (**Figure 1** in **Appendix B**), approximately ½ mile downstream of the Marysville's Water Treatment Plant surface water intake location.

Ohio EPA conducted a sampling event in April 1995 to identify and investigate possible sources of potential contamination in the Mill Creek watershed area. The sampling results and conclusions were summarized in Ohio EPA's January 1996 report titled "Mill Creek Mini-Remedial Action Plan Findings." This report detailed the numerous heavy metals (cadmium, chromium, copper, lead, nickel, and zinc) and PAHs that were found at elevated concentrations in the stream's sediment. Ohio EPA's January 1996 report also reported elevated concentrations of copper, zinc, nickel and several volatile organic compounds (VOCs) in Town Run's surface water samples. The report asserted that the former Eljer site appeared to be the major source of the elevated heavy metals contamination detected in Town Run, but that the PAHs appear to be from urban non-point source storm water runoff.

Ohio EPA conducted another sampling event in August 1997 to identify other possible sources of contamination in the Mill Creek watershed area. The sampling results and conclusions were summarized in Ohio EPA's September 1998 report titled "Mill Creek Geographic Initiative (GI) Phase I." This report detailed the numerous heavy metals (cadmium, chromium, copper, lead, nickel, and zinc) and PAHs found at elevated levels in Town Run's sediment. The report also described other possible sources of contaminants into the stream, including the Penn Oil Co. (former Marysville Light and Water Co. power plant site), the former Judson Lumber Yard, the former Eljer site, the former Scotts Company Seed Plant, and the Eighth Street storm sewer catch basin as shown in **Figure 2.** The GI Phase I report also stated that Eljer appeared to be the major source of the elevated heavy metals contamination detected in Town Run. It also noted that the Ohio EPA's DHWM was currently involved in the oversight of the RCRA closure activities at the former Eljer site.

Ohio EPA conducted the GI's Phase II sampling event in June 1998 to focus on other possible point sources of contaminants and to better define the profile of contamination in Town Run. Soil samples were collected by Ohio EPA near the bulk oil distribution center, and at the former lumberyard and the former seed plant. Additional sediment samples were collected throughout Town Run, and two more sediment samples were collected in Mill Creek downstream from the confluence of Town Run. These sampling results were summarized in Ohio EPA's January 1999 report titled "Mill Creek Geographic Initiative Phase II." This report found the historical source of the metal contaminants in Town Run was the former Eljer facility, but the late 1997 and early 1998 remedial activities at Eljer had reduced metals concentrations in the sediment near the plant site.

The former Eljer site was also known as Fisher Brass, H.G. Salter Manufacturing, Wallace Murray and U.S. Brass. Eljer manufactured brass plumbing fixtures at this plant from 1915 until closing in 1987. Waste foundry sand from the manufacturing processes were initially disposed on-site in a 3.5 acre landfill, then in other piles at various locations on-site, and used as fill materials around the plant's buildings. These wastes contained lead and selenium in concentrations exceeding the Extraction Procedure (E.P.) toxicity limits, in addition to elevated levels of chromium, copper and zinc.

The Ohio EPA DHWM finalized consensual DFFOs with Eljer on May 21, 1993, requiring Eljer to submit a revised RCRA Closure Plan addressing the waste foundry sand, the drainage ditch, the container storage area, the wheel-a-brator baghouse area, the existing landfill, and the hazardous waste pile. The majority of the waste foundry sand was located at the southern part of the site with the western border adjacent to Town Run, covering approximately six acres (including the 3.5 acre landfill) with approximately 9,000 cubic yards of chromium and lead contaminated sand up to eight feet deep in places. Before 1951, Eljer also used their waste foundry sand as fill material for their building expansion on the northern part of their property on approximately 2.5 acres as shown in **Figure 3**.

In early 1997, Zurn Inc. (Zurn) purchased the site from Eljer and assumed the obligation to comply with the terms of the 1993 consensual DFFOs. However, on July 22, 1997, IRCC met with Ohio EPA to state their intention to purchase the former Eljer site from Zurn, and to discuss IRCC's proposed remediation plans for the site. IRCC proposed closure/removal of the foundry sand waste pile and the hazardous waste container storage area adjacent to the main factory building, and the performance of a RCRA Corrective Action for the remaining areas of concern at the site. Ohio EPA was informed by IRCC that they had purchased the former Eljer facility from Zurn on October 10, 1997.

In late fall of 1997, IRCC began site stabilization activities including the construction of a storm water retention pond, bank stabilization for Town Run, and other on-site drainage improvements. During these activities, IRCC excavated an unknown amount of sediments in Town Run, from the site's outfall down to Walnut Street. No details were provided to the Ohio EPA DHWM by IRCC about this sediment excavation or any cleanup verification sampling results for the stream sediment. On January 19, 1998, IRCC's contractors began the demolition and removal of the site's main building.

DHWM public noticed the RCRA Corrective Action Plan proposed by IRCC for the former Eljer site on April 15, 1998. In June 1998, IRCC began the corrective action with the removal of the hazardous waste pile (2,000 tons); the remediation of the container storage and the wheel-a-brator baghouse areas; and the removal of the waste foundry sand pile adjacent to the plant buildings. Over 200 soil borings were collected at the former Eljer site to determine the location and extent of the waste foundry sand. All of the waste foundry sand located in the southern half of the former Eljer site was consolidated into a central location and covered with a protective cap. This cap consisted of two feet of compacted soil placed directly over the waste foundry sand, then a geosynthetic lining was placed over the compacted soil, and finally, 36 inches of additional soil was placed over the liner.

Using the recently purchased eight acres of nearby Retterer land, IRCC began in late 1998 to transform the entire site's total area of twenty-two acres into a municipal park with the construction of a 1.1 mile paved walking trail that surrounds the entire area. Three different children play areas and two shelter houses were also constructed in the park. In addition, the park area includes two softball fields, two basketball courts, two tennis courts, 160 car parking lot, and restroom facilities. The entire park area was landscaped with trees, shrubs, flowers and seeded with grass.

After completion of the RCRA closure activities at the former Eljer site, IRCC obtained approval for closure from DHWM. The City of Marysville held the public dedication for the opening of this new municipal park, named Eljer Park, on June 19, 1999. IRCC also transferred ownership of their entire property area (22 acres) to Marysville.

Reconnaissance Activities

Ohio EPA's Division of Surface Water (DSW) collected six sediment and five surface water samples from different locations in Town Run on March 6, 2002. During this sampling event, no visible waste or cap erosion effects were noted at the stream edge adjacent to the Eljer Park area. The water and sediment samples were collected upstream, adjacent to, and downstream of the former Eljer site. The March 2002 sampling event was conducted to evaluate current conditions in Town Run by identifying the levels of inorganic contaminants in the sediment and surface water, comparing Town Run's current conditions to Ohio EPA's previous investigation results, and assessing the effectiveness of the IRCC's RCRA closure action (completed in March 1999) at the former Eljer site. However, the concentration of PAHs in the surface water and sediment were not evaluated during this sampling event.

DSW summarized the March 6, 2002 sampling event results and findings in the attached report in **Appendix B** titled "Water and Sediment Quality Study, Town Run, May 31, 2002". The surface water samples collected in March 2002 did not exceed Ohio EPA's water quality criteria for target analyte list (TAL) parameters. However, Ohio EPA's 1995 surface water samples, prior to Eljer's RCRA closure action by IRCC, showed numerous exceedances for copper, lead and zinc. The sediment samples collected in March 2002 had generally lower metals concentrations than the sediment samples gathered in 1995. The March 2002 sediment samples collected in the vicinity of Eljer were less than the Probable Effect Concentrations (PEC) for copper, lead and zinc. Downstream samples, collected below Eljer Park, from river mile 0.64 and 0.17, still exceeded the PEC for copper and lead in the sediment.

Pathway Analysis

Potential migration pathways prior to the RCRA closure actions at the former Eljer site included leaching to ground water, overland flow to drainage ditches and Town Run, soil erosion and soil particulates, and non-point source urban storm water runoff. The protective soil cap construction over the site's consolidated waste foundry sand pile, and sediment removal from Town Run as part of the construction process for the municipal park, has eliminated all of these potential migration pathways except for ground water because it was not characterized, and the non-point source urban storm water runoff. The ground water to surface water pathway is also possible.

The City of Marysville uses both ground water and surface water for it public water supply. The public water supply serves 15,940 residents (Jones & Henry 1998). According to Year 2000 census data (**Appendix C**), the estimated residential population is 4,680 within a one mile radius and 17,376 within a four mile radius of the approximate mid-point of Town Run.

Ground Water Pathway

Town Run is located on the Powell glacial-drift plain, the result of the glacial recessional end moraine consisting of alternating layers of glacial till ranging in thickness from fifty to two hundred feet. The glacial till with interbedded sand and gravel deposits fills in the buried valley formed by the ancient preglacial Teays River (ODNR 1981). The uppermost aquifer consists of discontinuous sand and gravel lenses between clayey layers found in the glacial till, but is seldom used as a water source because of the ground water's high concentrations of dissolved solids, iron, and hardness. However, the principal source of ground water used in the Marysville area is the aquifer system found within the limestone bedrock underlying the glacial deposits (Schmidt 1978). This bedrock under the glacial till is the Monroe Limestone of the Upper Silurian and Lower Devonian age.

The well field for Marysville's public water supply is located approximately one mile northwest of Town Run. Four private water wells were identified within ½ mile of the site, shown in **Figure 5** as W-26, W-27, W-76 and W-161. These four wells were installed in the early 1950s and it is not known if the wells are still in existence or are being used because the City of Marysville requires connection to the public water supply within the city's limits. Two of the municipal wellfield system's wells are located about 800 feet (PW-1) to 1,500 feet (PW-2) northwest (upstream) of the Town Run and Mill Creek confluence. The construction date for Water Well PW-1 is unknown, but it was rehabilitated in 1989 with a 16-inch casing and screen installed to a depth of 75 feet. Water Well PW-2 was constructed in 1975 with a total depth of 206 feet, into the limestone bedrock.

The ground water exposure pathway is minimal because of the clayey layers in the glacial moraine will prohibit the spread of contamination in the ground water, and the lack of operating residential water wells within the City of Marysville.

Surface Water Pathway

Town Run is a small surface stream that flows from the south side of the City of Marysville to the north/northeast where it empties into Mill Creek. Mill Creek is a major perennial stream in Central Ohio, and is part of the Scioto River drainage basin. According to the USGS 2001 observations, Mill Creek has an annual average flow rate of 126 cubic feet per second. It is classified as a warm water habitat, and its use designation is primary contact recreation, public water supply, industrial water supply, and agricultural water supply. Marysville's Water Treatment Plant surface water intake, used for the plant's main water source, is located in Mill Creek approximately ½ mile upstream of the Town Run and Mill Creek confluence.

Town Run begins at the far south side of the city of Marysville, flows northward through the city's downtown area where it is culverted, and then empties into Mill Creek on the north side of the city. The stream has been heavily channelized and modified to control its flow and reduce bank erosion. The head waters of Town Run receives septic tank discharges and storm water runoff from the Eljer site while the lower half of the stream receives storm water runoff from the city's streets and buildings.

Urban residential housing is found at the southern part (the head waters) of Town Run, changing from a residential to commercial/office mixture through the downtown area back to residential/light commercial on the north side.

Earlier Ohio EPA investigations (1996, 1998, and 1999) identified six possible sources of contaminants into Town Run. These potential sources were the Penn Oil Co. (former Marysville Light and Water Co. power plant site), the former Judson Lumber Yard, the former Eljer site, the former Scotts Company Seed Plant, and the Eighth Street storm sewer catch basin as shown in **Figure 2.** However, these Ohio EPA's investigations identified only two sources of contamination into Town Run; the heavy metal contaminants from the former Eljer site, and the PAHs from the non-point urban source storm water runoff. The RCRA closure at the former Eljer site, which included sediment removal from Town Run and the construction of a protective cap over the consolidated waste foundry sand by IRCC, has addressed the heavy metal contamination.

There are no surface water intakes downstream from the site (Marysville's water plant intake is approximately ½ mile upstream); therefore, potential human target populations are limited to the food chain pathway and to direct contact with surface water and/or sediment. No identified sensitive environments can be found in or adjacent to Town Run. No state or federal endangered species have been found in Town Run Creek in recent years, the nearest endangered species is located 5.4 miles from Town Run. Therefore, the only potential environmental targets are local aquatic organisms and food chain organisms.

References

Jones & Henry, 1998. *Delineation of Wellhead Protection, City of Marysville.* By Jones & Henry Engineers, Ltd., January 5, 1998.

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Ohio EPA, 1989. *Preliminary Assessment for the Eljer Plumbingware Site,* December 3, 1989.

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Ohio EPA, 2002. *Water and Sediment Quality Study Town Run*, May 31, 2002.

Ohio EPA, 2002. Information on file at the Central District Office of the Ohio EPA.

Ohio EPA, 2002. Geographical Information System Data which used the U.S, Year 2000 census data.

Schmidt, 1978. James J. Schmidt, Ground-Water Resources of Union County, issued by ODNR in 1978.

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APPENDIX A

FIGURES

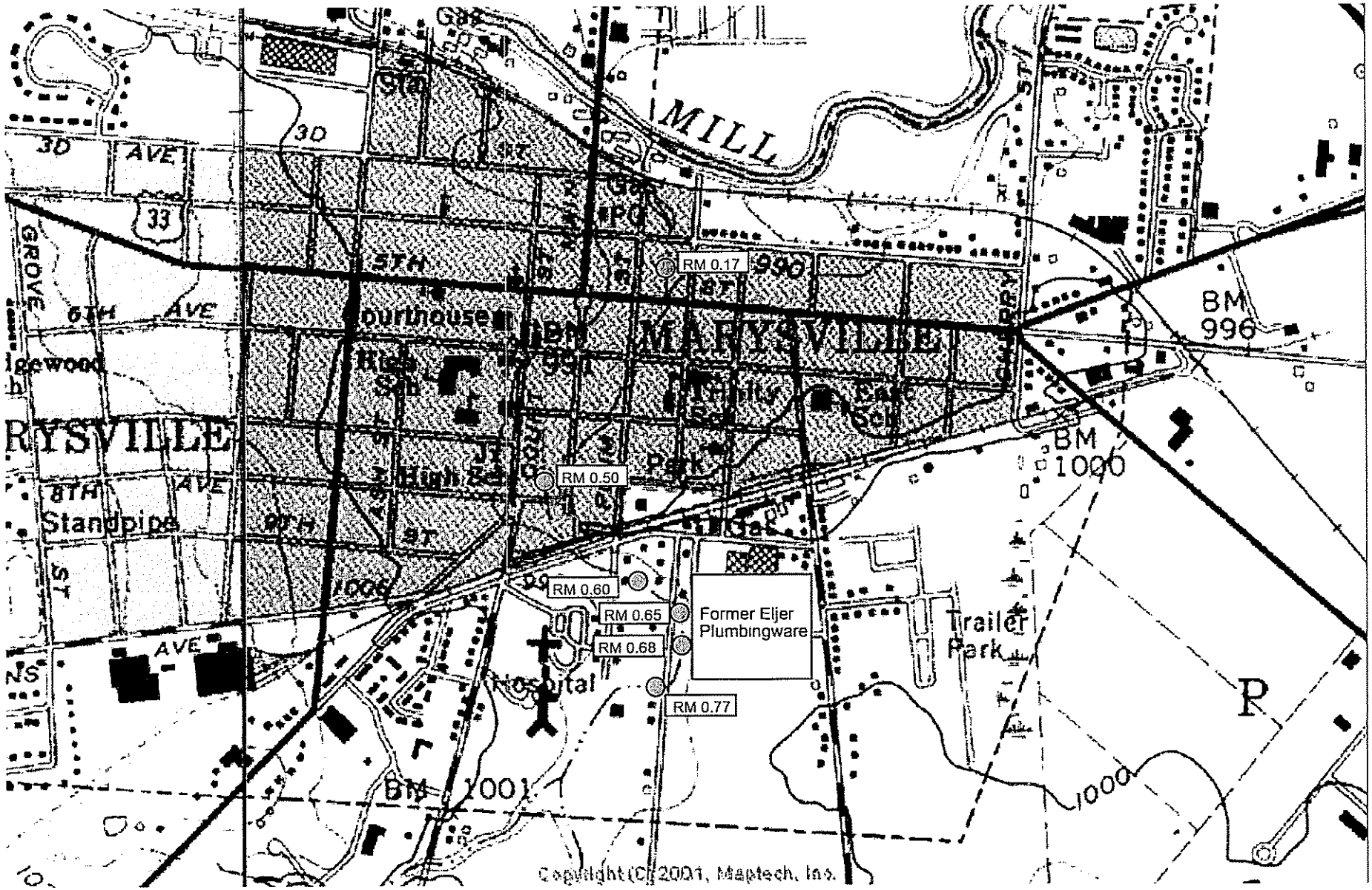


Figure 1. Map of sediment/surface water sampling locations in Town Run.

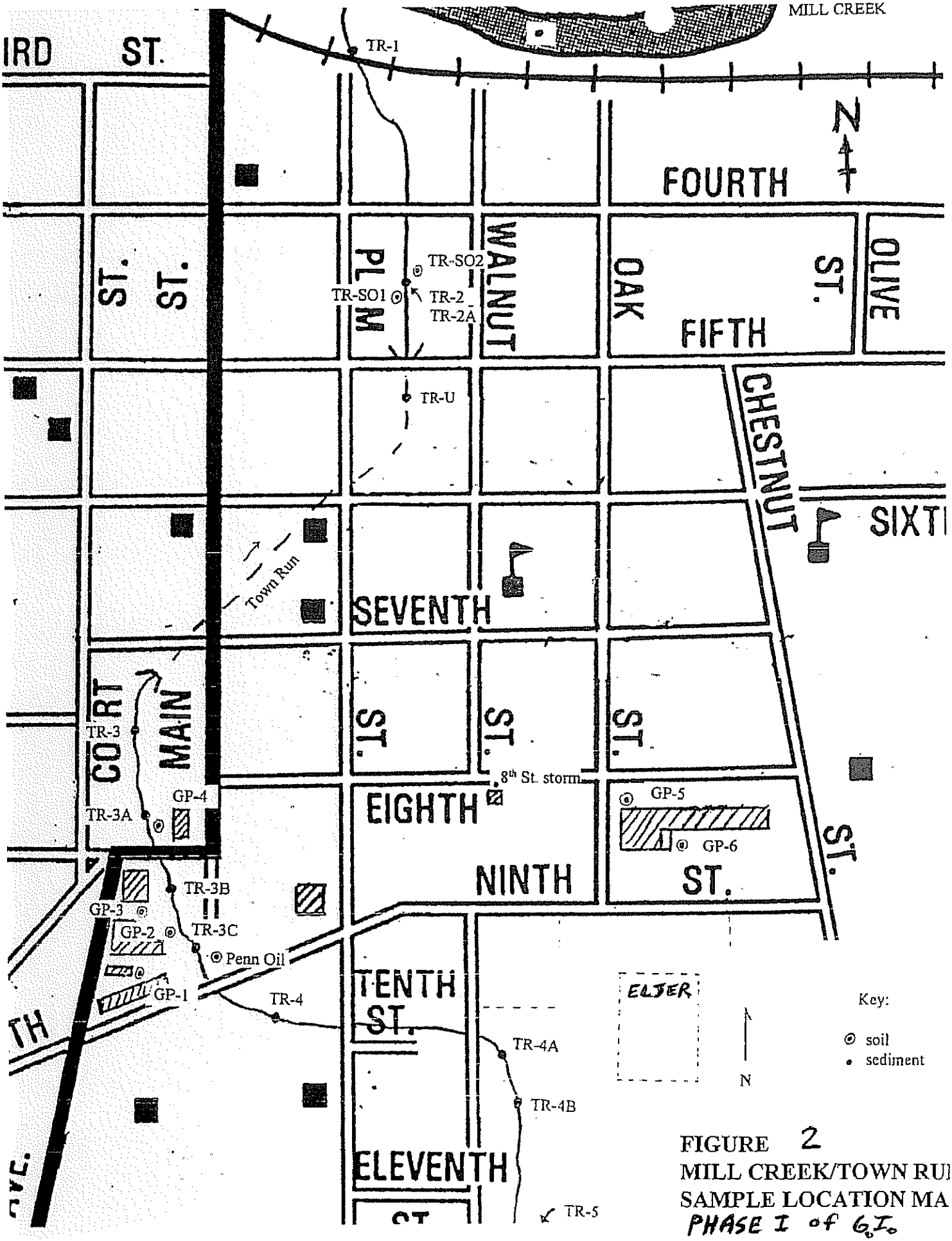


FIGURE 2
MILL CREEK/TOWN RU
SAMPLE LOCATION MA
PHASE I of G.I.

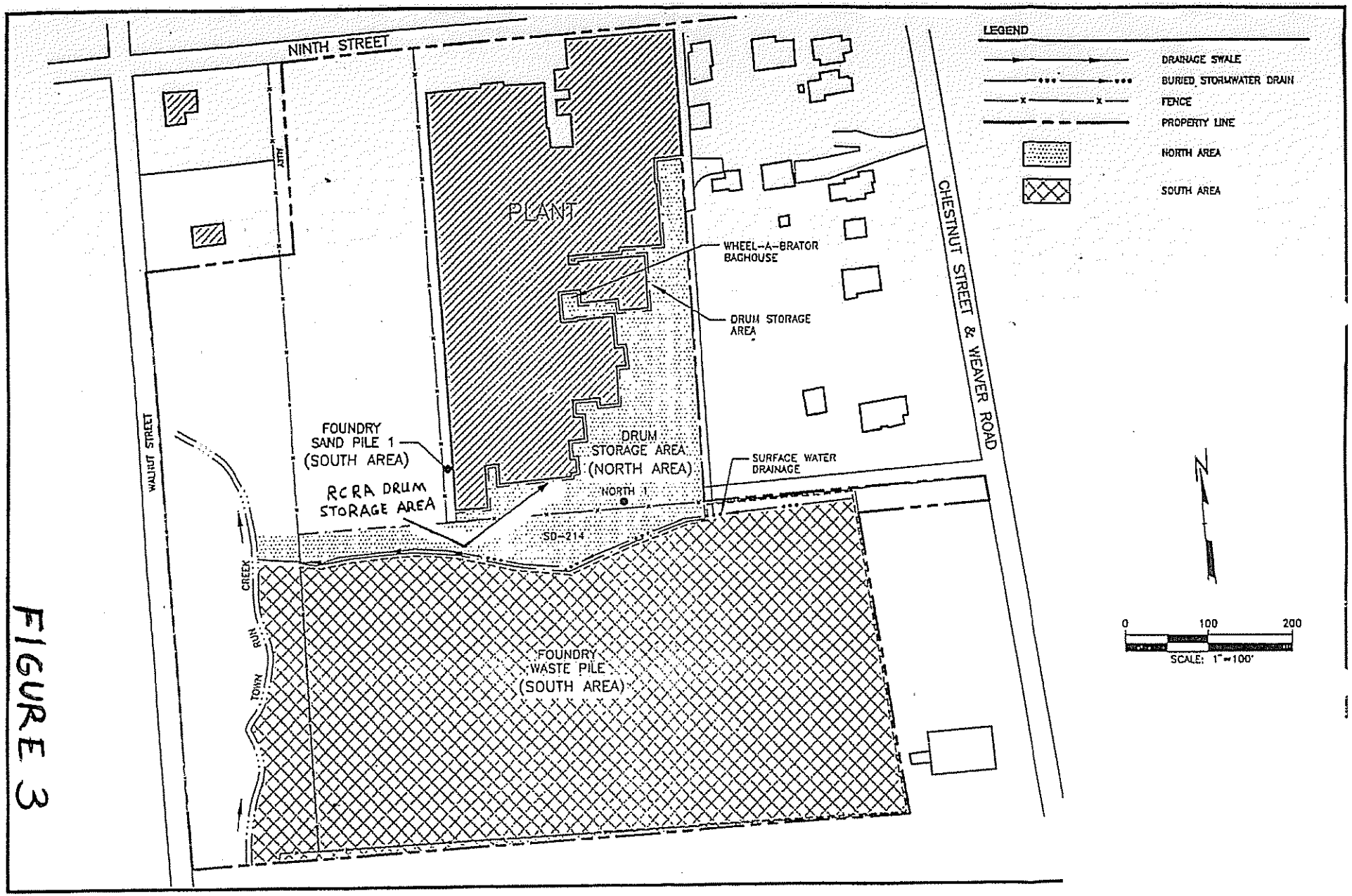

NINTH STREET
ALLEY
PLANT
WHEEL-A-BRATOR BAGHOUSE
DRUM STORAGE AREA
CHESTNUT STREET & WEAVER ROAD
WALNUT STREET
FOUNDRY SAND PILE 1 (SOUTH AREA)
RCRA DRUM STORAGE AREA
DRUM STORAGE AREA (NORTH AREA)
SURFACE WATER DRAINAGE
NORTH 1
SD-214
TOWN RUN CREEK
FOUNDRY WASTE PILE (SOUTH AREA)
LEGEND
DRAINAGE SWALE
BURIED STORMWATER DRAIN
FENCE
PROPERTY LINE
NORTH AREA
SOUTH AREA
N
0
100
200
SCALE: 1"=100'

FIGURE 3

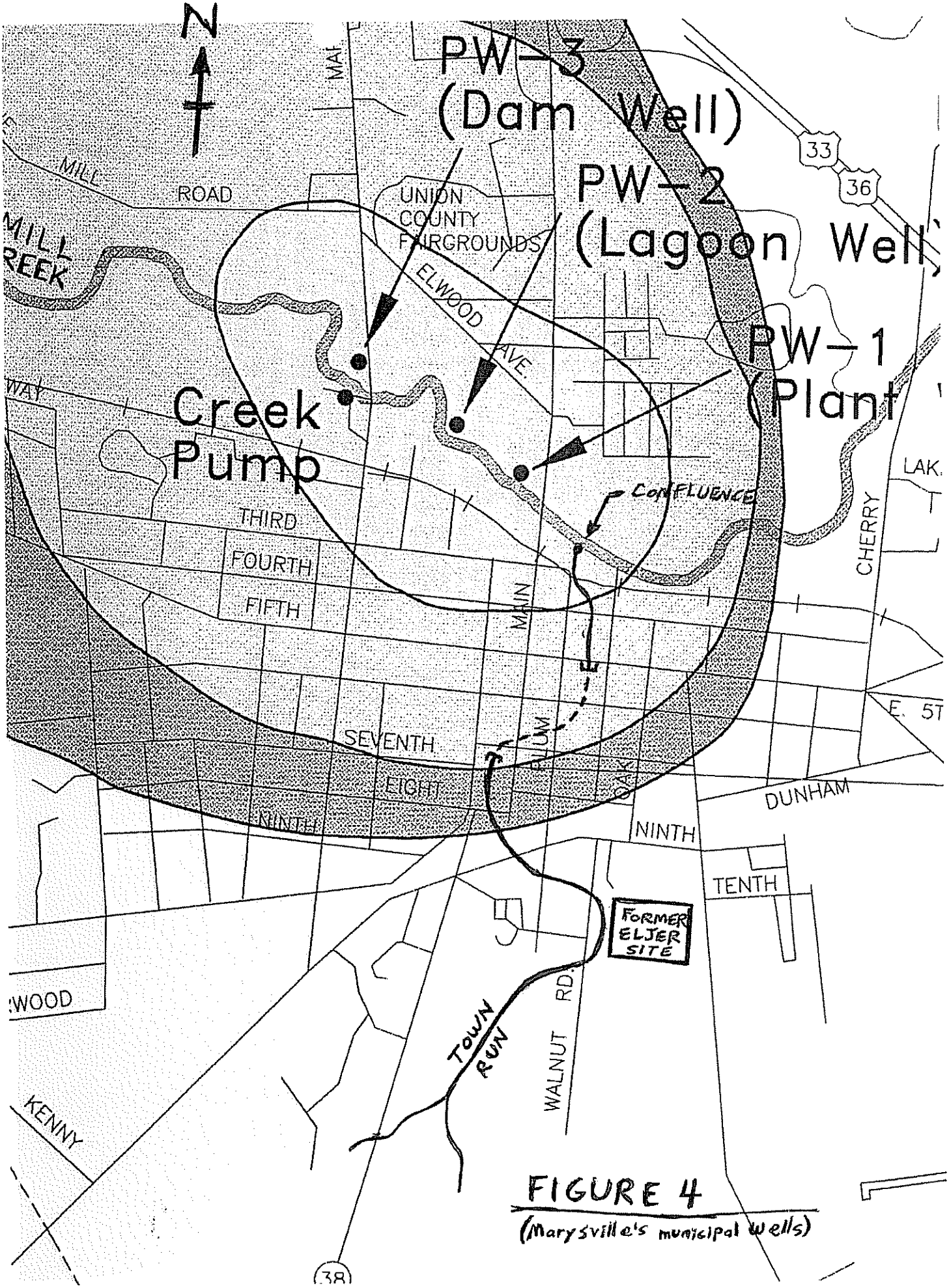
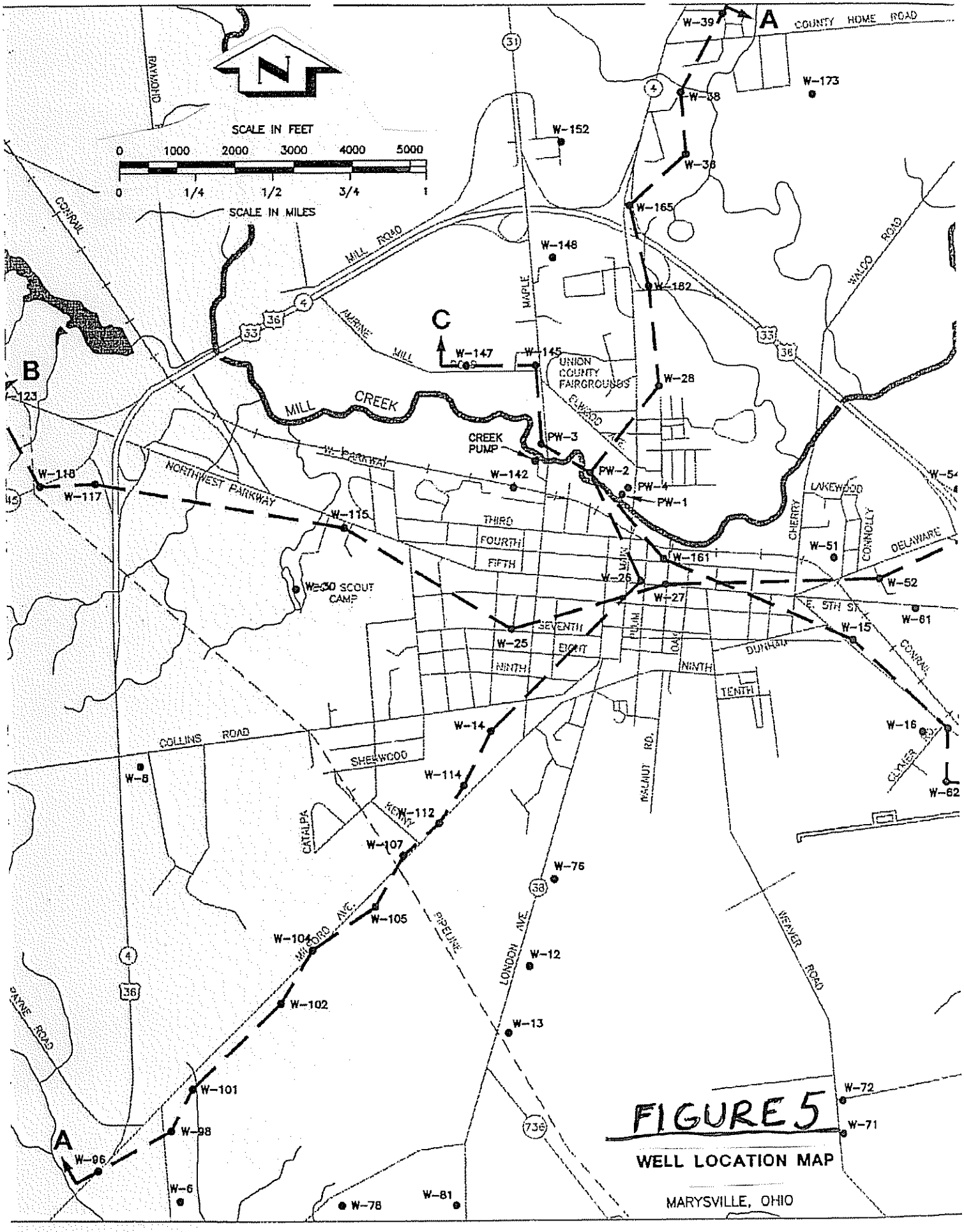


FIGURE 4

(Marysville's municipal wells)


N
SCALE IN FEET
0 1000 2000 3000 4000 5000
0 1/4 1/2 3/4 1
SCALE IN MILES
COUNTY HOME ROAD
MILL ROAD
MILL CREEK
MAPLE
WALCO ROAD
UNION COUNTY FAIRGROUNDS
CREEK PUMP
NORTHWEST PARKWAY
THIRD
FOURTH
FIFTH
SEVENTH
EIGHT
NINTH
TENTH
LAKEWOOD
CHERRY
CONNOLLY
DELAWARE
E. 5TH ST.
DUNHAM
COLLINS ROAD
SHELWOOD
CATALPA
WALNUT RD.
LONDON AVE.
WEAVER ROAD
DAYNE ROAD
CONRAIL
W-39
W-173
W-38
W-152
W-165
W-148
W-182
W-147
W-145
W-28
PW-3
PW-2
PW-4
PW-1
W-142
W-118
W-117
W-115
W-161
W-51
W-52
W-26
W-27
W-61
W-25
W-15
W-14
W-16
W-62
W-114
W-112
W-8
W-107
W-76
W-105
W-104
W-12
W-102
W-13
W-101
W-72
W-98
W-71
W-96
W-6
W-78
W-81
A
B
C
FIGURE 5
WELL LOCATION MAP
MARYSVILLE, OHIO

APPENDIX B

WATER and SEDIMENT QUALITY STUDY

TOWN RUN

May 31, 2002

Water and Sediment Quality Study
Town Run

2002

Union County, Ohio

May 31, 2002

OEPA Report EAS/2002-5-3

prepared for

State of Ohio Environmental Protection Agency
Division of Emergency and Remedial Response
Central District Office

prepared by

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INTRODUCTION

On March 6, 2002, staff from the Division of Surface Water collected surface water and sediment samples from Town Run upstream, adjacent to, and downstream from the former Eljer Plumbingware site. Sediment from six Town Run sites was analyzed for total analyte list (TAL) metals. Surface water from five sites was analyzed for TAL metals. The sampling locations are listed in Table 1.

Specific objectives of this evaluation were to:

1) Identify the level of inorganic contaminants in Town Run sediments and surface water

2) Compare current sediment and surface water conditions to results from previous investigations

3) Assess the effectiveness of sediment remediation at Eljer Plumingware completed in 11/98 and 3/99.

Table 1.List of sampling locations (sediment - S, surface water - W) in Town Run.

Stream River Mile	Sampling Media	Location	Purpose
Town Run			
0.88	S, W	Ust.Eljer property,Walnut Street	Background for project, (TR-5)
0.78	S	Adj. former Eljer property upst. new stormwater retention pond	Near sediment removal section (TR-4B)
0.75	S, W	Adj. former Eljer property, 15 meters ust. Walnut St. bridge	Area of sediment removal (TR-4A)
0.64	S, W	Between 9th and Plum Streets	Near field conditions (TR-4)
0.50	S, W	Immediately north of Eighth St.	High levels of metals (TR-3A)
0.17	S, W	Between 4th and 5th Streets	Far field conditions (TR-2)

SUMMARY

Surface water samples collected on March 6, 2002, from five locations produced no exceedences of Ohio water quality criteria for any TAL metals parameters. Surface water samples collected in 1995, prior to remediation, indicated numerous exceedences of copper, lead and zinc criteria. Sediment samples were collected at six locations from Town Run on March 6, 2002. Metals concentrations in the 2002 sediment samples were generally lower than results from sampling prior to remediation. Samples in the vicinity of the Eljer Plumbingware facility were less than the PEC for copper, lead, and zinc. Downstream samples from river mile 0.64 and 0.17 still exceeded the PEC for copper and lead in 2002..

METHODS

All chemical, field, laboratory, data processing, and data analysis methodologies and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio Environmental Protection Agency 1991) and Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2001).

Fine grain sediment samples were collected in the upper 4 inches of bottom material at each location using decontaminated stainless steel scoops. Decontamination of sediment sampling equipment followed the procedures outlined in the Ohio EPA Sediment Sampling Guide and Methodologies manual (Ohio EPA, 2001). Sediment grab samples were homogenized in stainless steel pans, transferred into glass jars with teflon lined lids, placed on ice (to maintain 4°C) in a cooler, and shipped to an Ohio EPA contract lab. Sediment data is reported on a dry weight basis. Surface water samples were collected directly into appropriate containers, preserved and delivered to an Ohio EPA contract lab. Surface water samples were evaluated using comparisons to Ohio Water Quality Standards criteria. Sediment evaluations were conducted using consensus based Probable Effect Concentrations(PEC) established in MacDonald *et al.* (2000).

RESULTS

Surface Water Quality

Chemical analyses were conducted on surface water samples collected on March 6, 2002 from five locations in Town Run. Surface water samples were analyzed for TAL metals. No violations of surface water quality criterias were noted at any of the sample locations and the results are presented in Appendix Table 1. On September 28, 2000 the Division of Surface Water collected surface water samples from Town Run at river mile (RM) 0.84, 0.51, and 0.01. Strontium was the only parameter for which exceedences of water quality criteria was noted. The criteria for aquatic life outside mixing zone average (OMZA) is 770. ug/l. At the three sampling locations , RM 0.84, RM 0.51 and

RM 0.01, strontium values of 976, 1900, and 1490 ug/l, respectively were noted. In 1995, as part of a basin wide assessment of Mill Creek, the Division of Surface Water collected surface water samples from Town Run at RM 0.8, 0.6 and 0.1 on six different sampling dates. Numerous exceedences of water quality criteria for copper, lead and zinc were noted (Ohio EPA, 1997).

Scatter plots for copper, lead, and zinc raw data for all sampling dates and locations in relation to the water quality criteria is presented in Figures 1,2, and 3. None of the figures show any violations of water quality criteria since remediation of contaminated sediments in Town Run. While this may be the result of sediment removal and capping it is also possibly the result of limited sampling conditions. If sampling is only done under low flow conditions, low stream velocity reduces scour of sediments and the introduction of sediment into the water column.

Sediment Chemistry

Sediment samples were collected at six locations in Town Run by the Ohio EPA on March 6, 2002 and analyzed for TAL metals. The raw data is presented in Appendix Table 2. Sediment data was evaluated using probable effect concentrations (PEC) from MacDonald *et al.*(2000). The probable effects concentration for copper in sediments of 149 mg/kg was exceeded in Town Run at river miles 0.64 and 0.17 with concentrations of 201, and 219 mg/kg, respectively. The probable effects concentration for lead of 128 mg/kg was exceeded at river mile 0.64 with a value of 160 mg/kg and at river mile 0.17 with a value of 225 mg/kg.

Previously, sediment samples were collected in Town Run in 1995 by the Division of Surface Water (DSW) and the Division of Emergency and Remedial Response (DERR), in 1997 by DERR, and in 1998 by DERR. The 1995 DSW sampling results from river mile 0.1, summarized in OEPA (1997), reported extremely elevated levels of lead, zinc and dieldrin based on criteria of Kelly and Hite 1984. Two compounds (benzo [g,h,i] perylene and Indo (1,2,3-cd) pyrene) exceeded the severe effect level (SEL) (Persaud *et al.*, 1993). The 1995 DERR sampling results reported in OEPA, (1996), indicated that Town Run sediment samples exceeded the lowest effect level (LEL) (Persaud et al., 1993) for cadmium, chromium, copper, lead, nickel, zinc, PAHs, and aldrin.

DERR sediment sampling from 1997 reported in OEPA (1998), listed exceedences of the LEL for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc. Copper and lead exceeded the SEL. Exceeding the LEL were the organic compounds: fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(k)fluoranthene, benzo(a)pyrene, indo(1,2,3 cd)pyrene, benzo(g,h,i)-perylene and total PAH. Pesticides exceeding the LEL were: aldrin, heptaclor epoxide, dieldrin, 4,4-DDE, endrin, 4,4-DDD, 4,4-DDT, a-chlordane, and g-chlordane. Two compounds, 4,4-DDT and 4,4-DDD, exceeded the SEL.

In 1998, DERR collected additional sediment and surface water samples from Town Run to reconfirm PAH and pesticide results from past samples in addition to sampling near potential sources. Results confirmed that copper, lead and zinc were contaminants of concern with numerous Town Run sites exceeding the LEL for these metals (Ohio EPA, 1999). All Town Run sediment samples exceeded the LEL for total PAH. For pesticides, chlordane sediment concentrations exceeded the LEL.

Sediment sampling data for copper, lead, and zinc are shown in Figures 4, 5 and 6. Scatter plots of

the raw data for all sampling dates and locations are shown in relation to the probable effect concentrations (PEC). The PEC is the level of a contaminant above which adverse effects are expected to occur more often than not (MacDonald *et al.*, 2000). The PEC levels were consensus based from a review of the sediment quality guideline literature. Data from 2002 shows a reduction, below PEC levels, in copper, lead and zinc sediment concentrations in the vicinity of the Eljer Plumbingware facility following remediation efforts in late 1998 and early 1999 (Figure 4,5, and 6). The remediation efforts consisted of sediment removal from 220 feet of stream bed between the Eljer facility and Walnut Street. The 2002 sampling results indicate that sediment samples from river mile 0.64 and 0.17 still exceed the PEC for copper and lead.

Figure 1. Town Run surface water sampling results for copper in relation to water quality criteria.

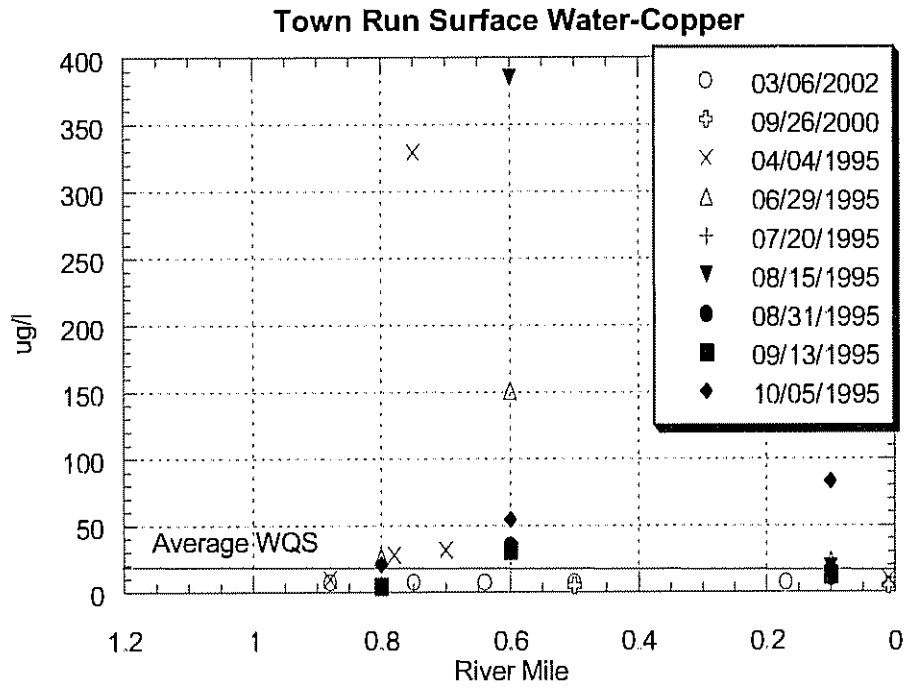


Figure 2. Town Run surface water sampling results for lead in relation to water quality criteria.

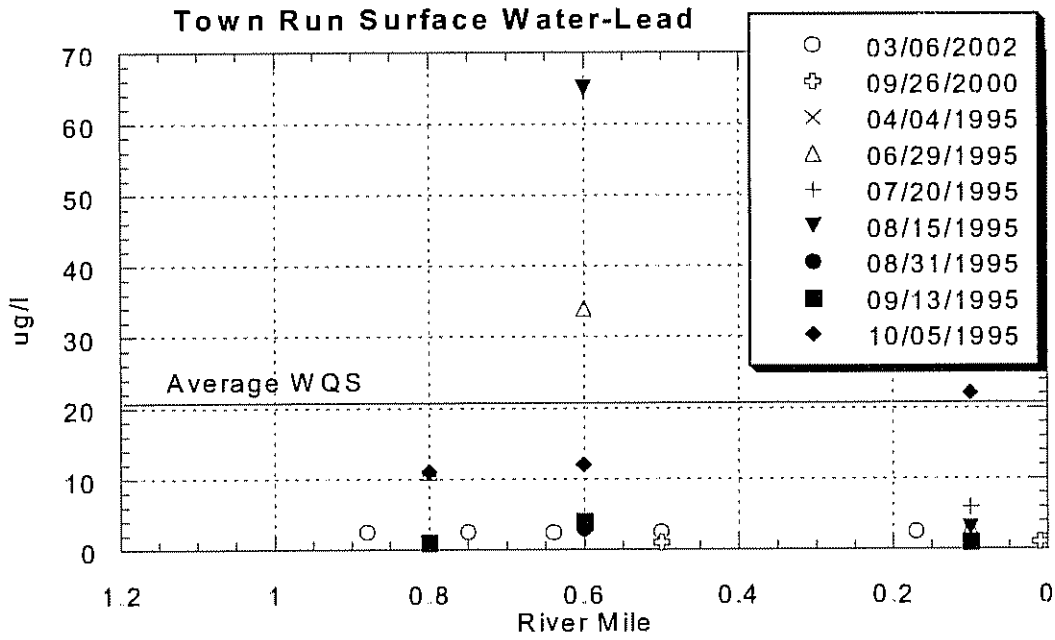


Figure 3. Town Run surface water sampling results for zinc in relation to water quality criteria.

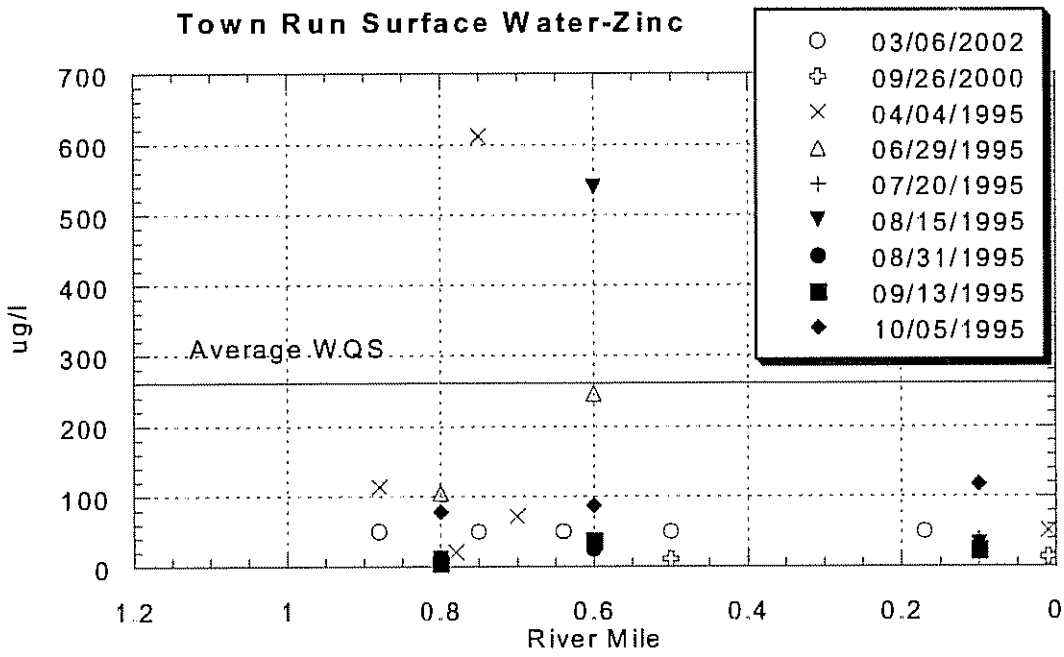


Figure 4. Town Run sediment sampling results for copper in relation to PEC.

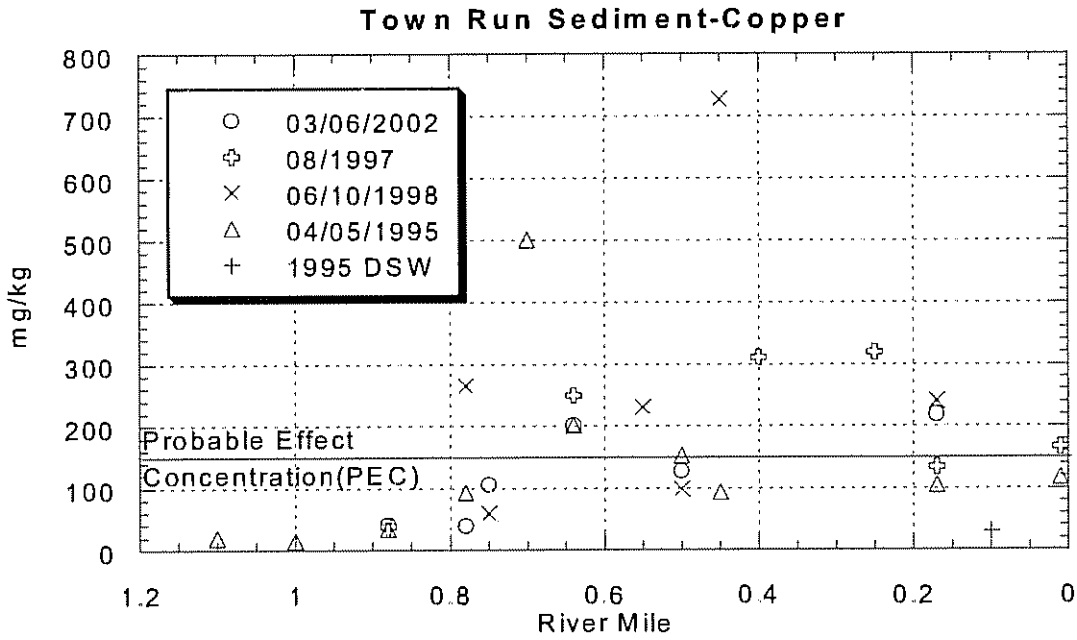


Figure 5. Town Run sediment sampling results for lead in relation to PEC.

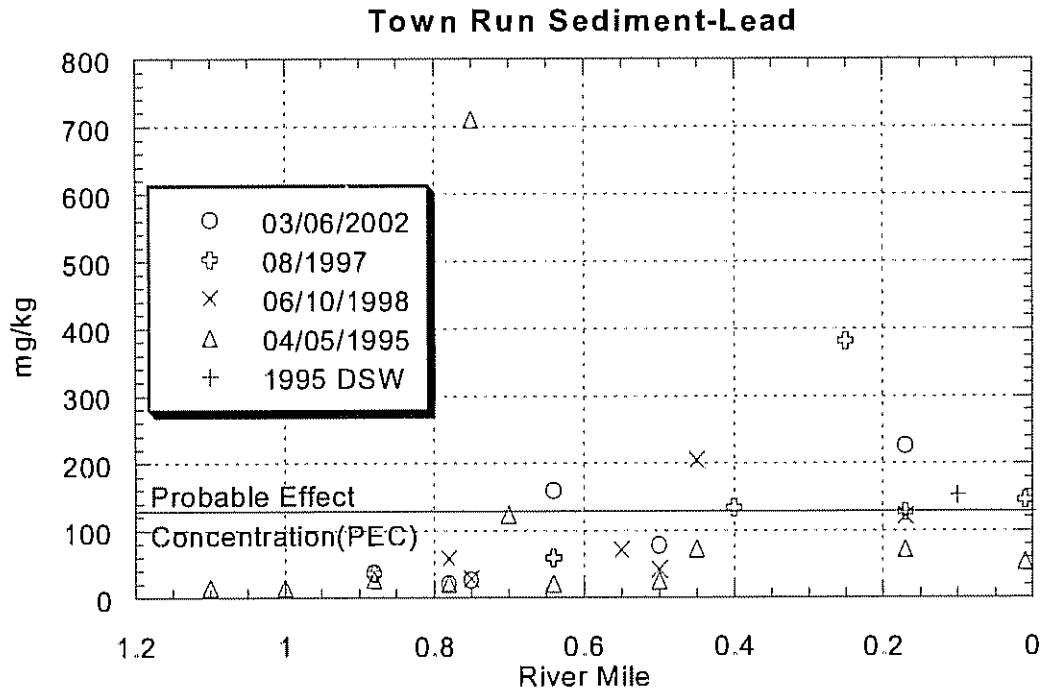
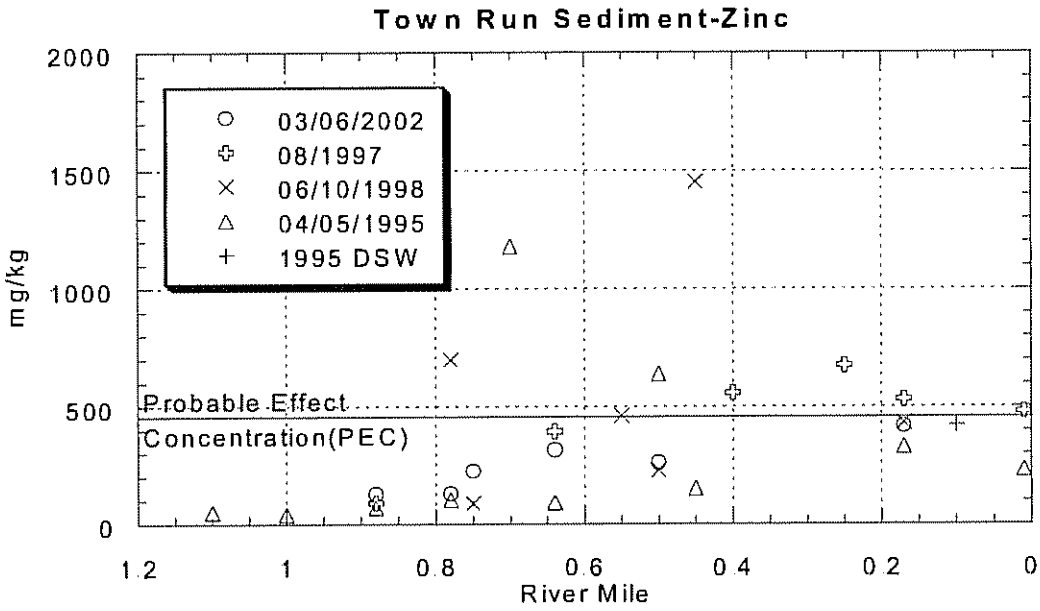


Figure 6. Town Run sediment sampling results for zinc in relation to PEC.



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Appendices

Appendix Table A-1. Town Run surface water data.

Sample Location	RM 0.88	RM 0.75	RM 0.64	RM 0.50	RM 0.50	RM 0.17
Sample Number	TR5	TR4A	TR4	TR3A	TR8	TR2
Date Sampled	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002
Time Sampled	12:10 PM	11:50 AM	11:40 AM	11:20 AM	11:20 AM	11:00 AM
					DUPLICATE	
Sample Location	RM 0.88	RM 0.75	RM 0.64	RM 0.50	RM 0.50	RM 0.17
Sample Number	TR5	TR4A	TR4	TR3A	TR8	TR2
Date Sampled	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002
Time Sampled	12:10 PM	11:50 AM	11:40 AM	11:20 AM	11:20 AM	11:00 AM
					DUPLICATE	
Inorganic Analytes	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	331	273	ND (<200)	ND (<200)	ND (<200)	ND (<200)
Antimony	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)
Arsenic	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)
Barium	ND (<50.0)	ND (<50.0)	ND (<50.0)	ND (<50.0)	ND (<50.0)	ND (<50.0)
Beryllium	ND (<1.00)	ND (<1.00)	ND (<1.00)	ND (<1.00)	ND (<1.00)	ND (<1.00)
Cadmium	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)
Calcium	96,900	96,300	98,200	100,000	96,400	98,800
Chromium	ND (<15.0)	ND (<15.0)	ND (<15.0)	ND (<15.0)	ND (<15.0)	ND (<15.0)
Cobalt	ND (<10.0)	ND (<10.0)	ND (<10.0)	ND (<10.0)	ND (<10.0)	ND (<10.0)
Copper	ND (<15.0)	ND (<15.0)	ND (<15.0)	ND (<15.0)	ND (<15.0)	ND (<15.0)
Iron	531	376	258	299	316	245
Lead	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)
Magnesium	33,400	30,100	30,200	31,500	30,000	31,500
Manganese	49.9	60.8	56.9	56.6	53.6	46.9
Mercury	ND (<0.200)	ND (<0.200)	ND (<0.200)	ND (<0.200)	ND (<0.200)	ND (<0.200)
Nickel	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)
Potassium	4580	3840	3620	4150	3950	4440
Selenium	ND (<5.00)	21	30.5	ND (<5.00)	28.5	ND (<5.00)
Silver	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)
Sodium	57,200	39,600	40,600	48,600	46,000	54,400
Thallium	ND (<1.50)	ND (<1.50)	ND (<1.50)	ND (<1.50)	ND (<1.50)	ND (<1.50)
Vanadium	ND (<50.0)	ND (<50.0)	ND (<50.0)	ND (<50.0)	ND (<50.0)	ND (<50.0)
Zinc	ND (<100)	ND (<100)	ND (<100)	ND (<100)	ND (<100)	ND (<100)

Appendix Table A-2. Town Run Sediment Data.

			Town Run				
Sample Location	RM 0.88	RM 0.78	RM 0.75	RM 0.64	RM 0.50	RM 0.50	RM 0.17
Sample Number	TR5	TR4B	TR4A	TR4	TR3A	TR8	TR2
Date Sampled	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002	06-March-2002
Time Sampled	12:15 PM	12:00 PM	11:55 AM	11:45 AM	11:25 AM	11:25 AM	11:05 AM
% Solids	49	44	40	56	42	42	45
						DUPLICATE	
Inorganic Analytes	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7940	4850	6180	4000	5780	5390	5240
Antimony	ND (<1.02)	ND (<1.14)	ND (<1.25)	ND (<0.888)	ND (<1.14)	ND (<1.17)	ND (<1.07)
Arsenic	7.07	5.03	5.11	4.82	5.28	4.74	6.88
Barium	88.1	58.9	70.9	55.4	71.4	68.7	78.5
Beryllium	ND (<5.05)	ND (<5.63)	ND (<6.25)	ND (<4.46)	ND (<5.95)	ND (<5.78)	nd (<5.53)
Cadmium	ND (<1.02)	ND (<1.14)	ND (<1.25)	ND (<0.888)	ND (<1.14)	ND (<1.17)	1.22
Calcium	33,200	41,300	43,300	47,300	64,200	60,700	52,000
Chromium	16	12.7	14.6	12.5	25.7	23.7	29.8
Cobalt	13.8	8.88	10.1	8.73	6.9	5.81	7
Copper	42.2	39.3	106	201	125	128	219
Iron	24,600	15,500	18,900	18,400	15,300	14,600	16,200
Lead	37.2	20.5	26.4	160	84.4	70.7	225
Magnesium	10,100	7810	10,200	11,800	17,700	16,500	16,100
Manganese	732	283	292	358	249	237	422
Mercury	0.089	ND (<0.073)	ND (<0.083)	0.061	0.119	ND (<0.077)	0.206
Nickel	29.7	17.9	24.7	22.7	23.2	21.2	23.4
Potassium	1020	646	788	601	810	761	848
Selenium	ND (<1.02)	ND (<1.14)	ND (<1.25)	ND (<0.888)	1.83	ND (<1.17)	1.5
Silver	ND (<5.05)	ND (<5.63)	ND (<6.25)	ND (<4.46)	ND (<5.95)	ND (<5.78)	ND (<5.53)
Sodium	187	196	212	228	219	222	198
Thallium	ND (<1.02)	ND (<1.14)	ND (<1.25)	ND (<0.888)	ND (<1.14)	ND (<1.17)	ND (<1.07)
Vanadium	23.5	13.9	18.3	14.8	15.3	13.9	15
Zinc	128	130	227	315	265	257	419

ND- Not detected

APPENDIX C

U.S. 2000 CENSUS DATA

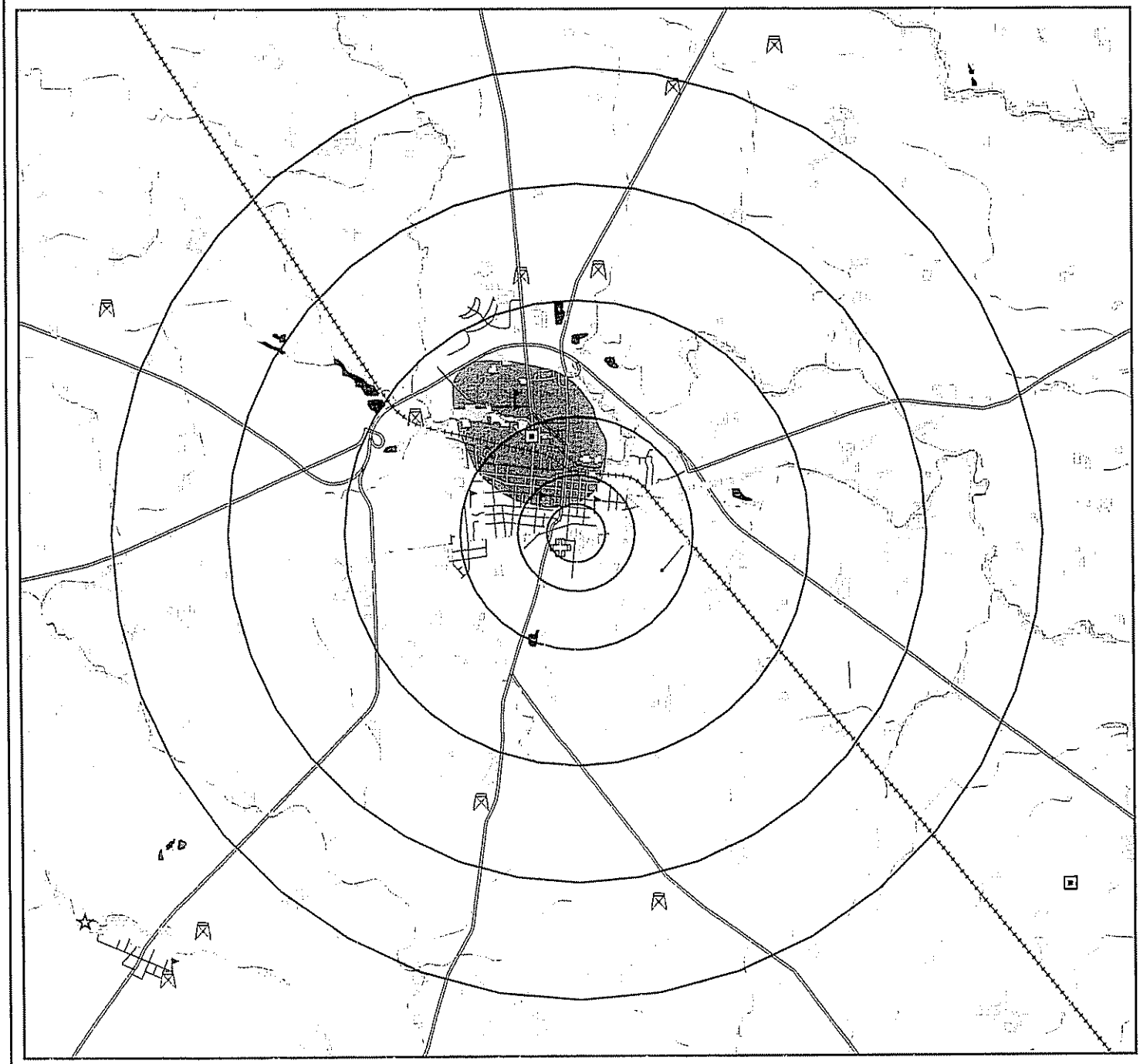
Maps and Tables

Ohio EPA

Division of Emergency & Remedial Response

GEOGRAPHIC INFORMATION SYSTEM 4-MILE RADIUS MAP

Union County
Town Run



Site
School
Hospital
Public Surface Water Systems
Public Ground Water Systems
US Endangered/Threatened Species
Ohio Endangered/Threatened Species

Wetland Area
Lakes & Ponds
Wellhead Protection Area
Limit of Radius From Site
County Boundaries

Rivers & Streams
Railroad
State and Federal Highways
Local Roads
Municipal Roads

N

2 0 2 Miles

RADIUS	TOTAL	WHITE	BLACK	INDIAN	ASIAN	HAWAII_PA(	OTHER	HOUSING
3.00 - 4.00	2426	2350	19	5	18	0	33	867
2.00 - 3.00	2832	2717	43	5	23	0	43	1069
1.00 - 2.00	7438	6515	751	12	65	2	92	2363
0.50 - 1.00	3544	3320	154	6	22	0	41	1299
0.25 - 0.50	983	955	11	2	4	0	11	392
0.00 - 0.25	153	149	1	0	1	0	2	66
TOTALS	17376	16006	979	30	133	2	222	6056

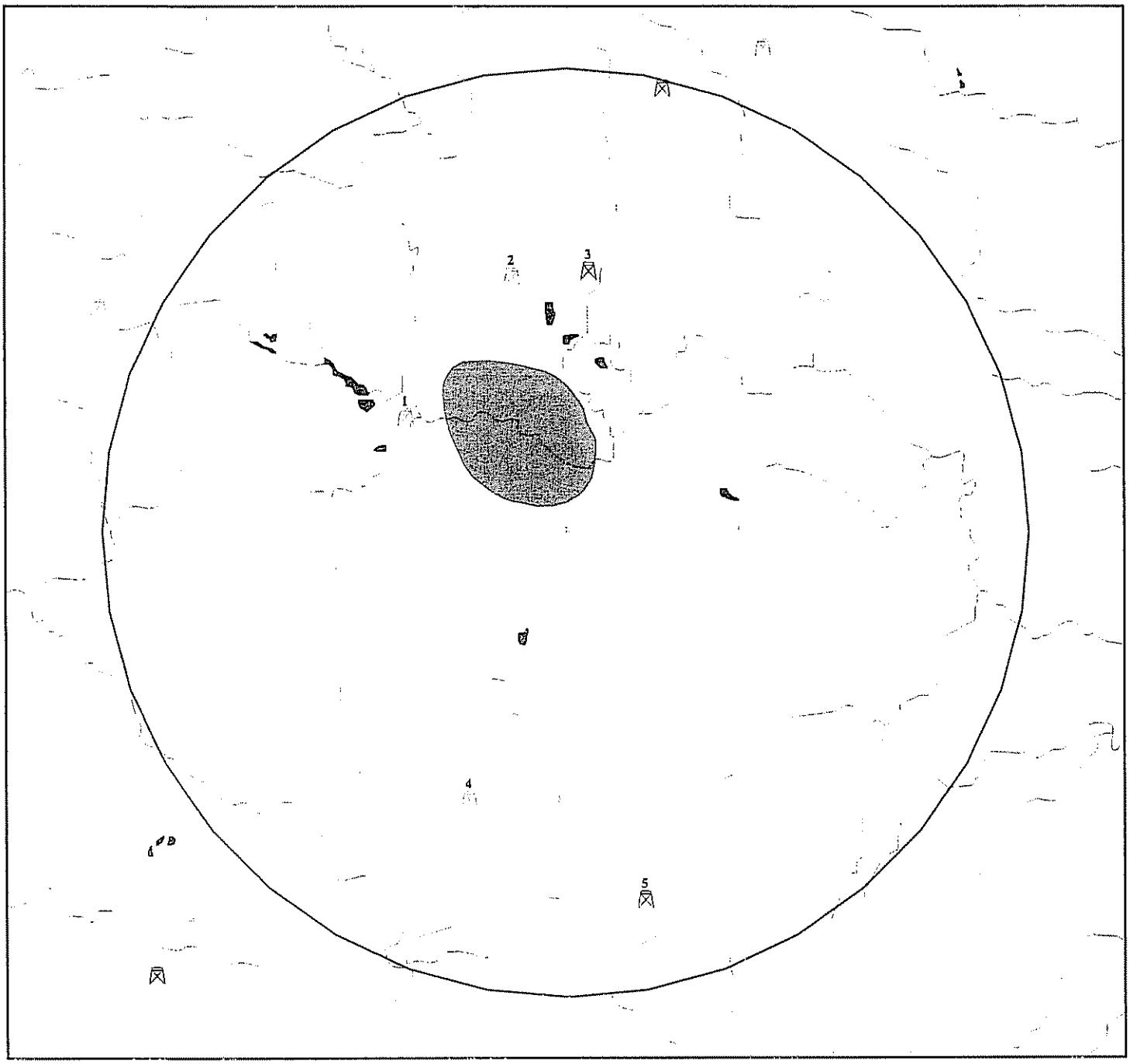
OhioEPA

Division of Emergency & Remedial Response

GEOGRAPHIC INFORMATION SYSTEM 4-MILE RADIUS MAP

PUBLIC GROUND WATER SYSTEMS

Town Run



Site

Public Ground Water Systems
- Community
- Non-Community/Transient
- Non-Community/Non-Transient

Rivers & Streams
Wellhead Protection Area
Lakes & Ponds
Limit of Radius From Site
County Boundaries

1 0 1 Miles

N

ID_	PWS_ID	SYS_SOURCE	SYS_TYPE	NAME	ADDRESS	DISTANCE	POPULATION
1	8000314	Surface Water	Community	MARYSVILLE, CITY OF	125 EAST SIXTH STREET	0.9087	11500
2	8000603	Purchased Surface Water	Community	NEW CALIF. WATER SUBDIST	233 WEST SIXTH STREET	5.1956	470

ID_	PWS_ID	SYS_TYPE	NAME	ADDRESS	CITY	DISTANCE	POPULATION
1	8031712	Non-Community/Transient	FOURSQUARE GOSPEL CHURCH	654 RAYMOND ROAD	MARYSVILLE	1.7020	100
2	8037212	Non-Community/Transient	MARYSVILLE JEHOVAHS WITN	15530 MYERS ROAD	MARYSVILLE	2.2580	80
3	8000512	Community	UNION MANOR NURSING CENT	18000 S.R.4	MARYSVILLE	2.2708	155
4	8032512	Non-Community/Transient	FLAGSTONE GOLF CLUB	P O BOX 325	MARYSVILLE	2.4577	175
5	8034312	Non-Community/Non-Transient	ST.JOHNS LUTHERAN SCHOOL	12809 ST RT 736	MARYSVILLE	3.2390	218
6	8036412	Non-Community/Non-Transient	UNITED ROTARY BRUSH CO I	20078 STATE ROUTE 4	MARYSVILLE	3.9202	62

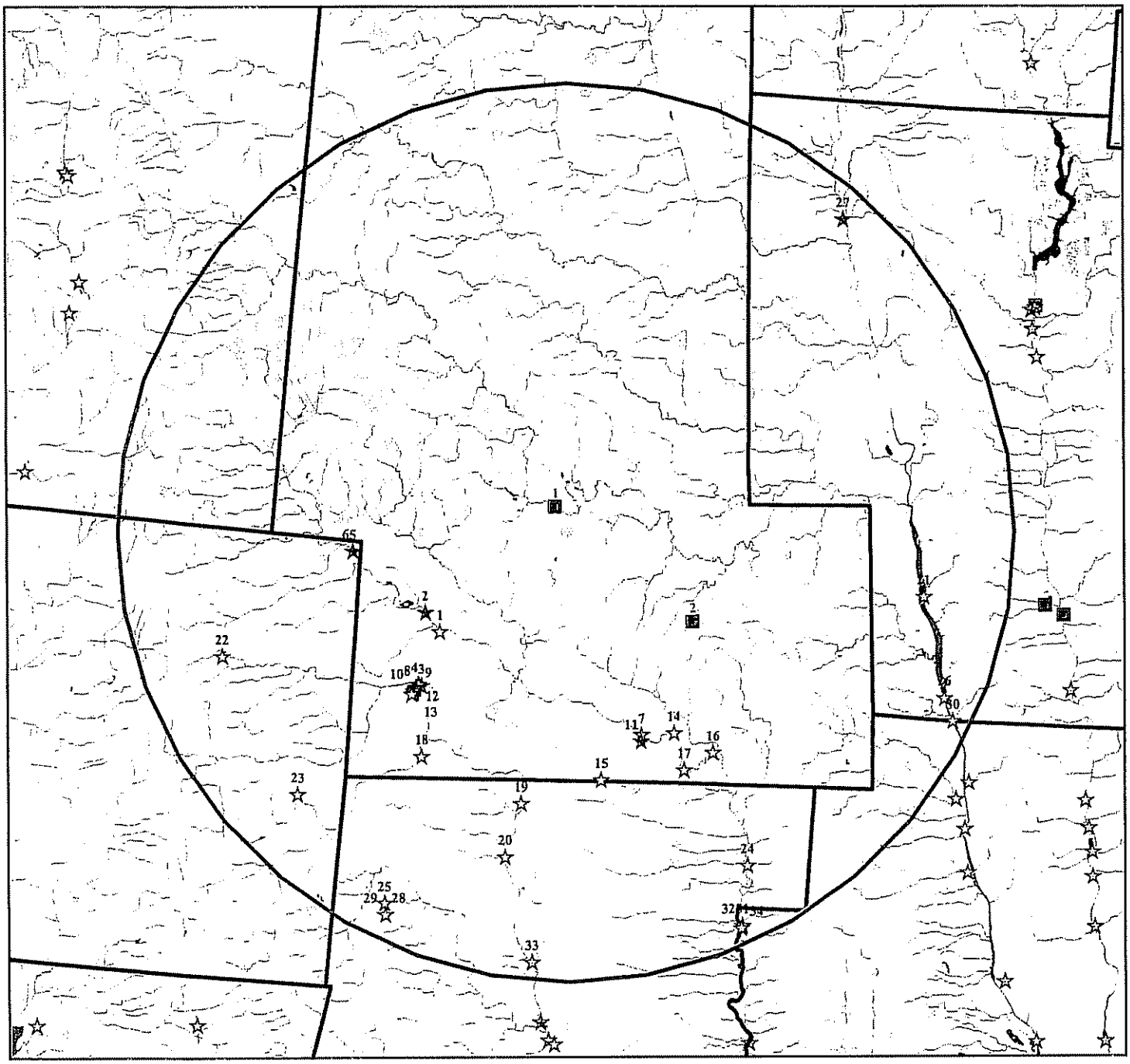
OhioEPA

Division of Emergency & Remedial Response

GEOGRAPHIC INFORMATION SYSTEM 15-MILE RADIUS MAP

NATURAL HERITAGE DATA

Town Run



Site
- ★ US Endangered/Threatened Species
- ☆ Ohio Endangered/Threatened Species

Public Surface Water Systems
- Community
- Non-Community/Transient
- Non-Community/Non-Transient

Rivers & Streams
- Wetland Area
- Lakes & Ponds
- Limit of Radius From Site
- County Boundaries

N

4 0 4 8 Miles

ID_	STATUS	DISTANCE	SCI_NAME	COM_NAME
1	State Endangered	5.3848	EPIOBLASMA TRIQUETRA	SNUFFBOX
2	Federally Endangered	5.4418	PLEUROBEMA CLAVA	CLUBSHELL
3	Federally Endangered	7.0648	PLEUROBEMA CLAVA	CLUBSHELL
4	State Threatened	7.1079	ROSA BLANDA	SMOOTH ROSE
5	State Endangered	7.1697	VILLOSA FABALIS	RAYED BEAN
6	Federally Endangered	7.1697	PLEUROBEMA CLAVA	CLUBSHELL
7	State Endangered	7.2272	VILLOSA FABALIS	RAYED BEAN
8	State Threatened	7.2382	CUSCUTA GLOMERATA	GLOMERATE DODDER
9	State Endangered	7.3000	MELICA NITENS	THREE-FLOWERED MELIC
10	State Threatened	7.3720	GENTIANA ALBA	YELLOWISH GENTIAN
11	Federally Endangered	7.4198	PLEUROBEMA CLAVA	CLUBSHELL
12	State Threatened	7.4277	ROSA BLANDA	SMOOTH ROSE
13	State Endangered	7.4959	LATHYRUS VENOSUS	WILD PEA
14	State Endangered	7.6109	EPIOBLASMA TRIQUETRA	SNUFFBOX
15	State Endangered	8.3655	LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE
16	State Endangered	8.8564	QUADRULA CYLINDRICA CYLINDRICA	RABBITSFOOT
17	State Endangered	8.8787	MYRIOPHYLLUM HETEROPHYLLUM	TWO-LEAVED WATER-MILFOIL
18	State Endangered	8.9401	EPIOBLASMA TRIQUETRA	SNUFFBOX
19	State Endangered	9.2003	EPIOBLASMA TRIQUETRA	SNUFFBOX
20	State Endangered	11.0469	VILLOSA FABALIS	RAYED BEAN
21	State Threatened	12.1740	UNIOMERUS TETRALASMUS	PONDHORN
22	State Threatened	12.2310	ERIMYZON SUCETTA	LAKE CHUBSUCKER
23	State Threatened	12.5760	ERIMYZON SUCETTA	LAKE CHUBSUCKER
24	State Endangered	12.6790	EPIOBLASMA TRIQUETRA	SNUFFBOX
25	State Endangered	13.8202	LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE
26	State Endangered	13.8273	NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON
27	Federally Endangered	14.0156	PLEUROBEMA CLAVA	CLUBSHELL
28	State Threatened	14.1537	CAREX BICKNELLII	BICKNELL'S SEDGE
29	State Threatened	14.1537	SPOROBOLUS HETEROLEPIS	PRAIRIE DROPSEED
30	State Threatened	14.3998	ETHEOSTOMA CAMURUM	BLUEBREAST DARTER
31	Federally Endangered	14.4054	PLEUROBEMA CLAVA	CLUBSHELL
32	State Endangered	14.4054	QUADRULA CYLINDRICA CYLINDRICA	RABBITSFOOT
33	State Endangered	14.4131	QUADRULA CYLINDRICA CYLINDRICA	RABBITSFOOT
34	State Endangered	14.4630	EPIOBLASMA RANGIANA	NORTHERN RIFFLESHELL