Technical Support Document

State of Minnesota Recommendation for an Area in Eagan to be Designated Non-Attainment with the Revised Lead NAAQS

Demonstration to EPA Region V
October 2009

The State of Minnesota provides this information to EPA V to support the recommendation of boundaries for the nonattainment area in the City of Eagan, Dakota County. The data constitute measured air monitoring values of lead concentrations, estimated concentrations based on emissions data with air dispersion modeling, and measured soil lead concentrations in the area of Gopher Resources Corp. In addition we provide information in two reports prepared by Gopher Resources. The first pertains to a significant emission reduction initiative that includes additional ventilation and filtration to prevent fugitive emissions. The second records the recent history of efforts to address fugitive dust from exposed soils at Gopher Resources.

This recommendation for a nonattainment boundary is written with reference to EPA guidance provided in the final rule promulgation (73 FR 66964). Section VI. B. "Lead Nonattainment Area Boundaries" presents both a list of "factors" and of "techniques" that might be used for the determination. "A demonstration supporting the designation of boundaries that are less than the full county would be required to show both that violation(s) are not occurring in the excluded portions of the county and that the excluded portions are not source areas that contribute to the observed violations." Of the eight factors, three are especially applicable to the area of Gopher Resources:

-'Emissions in areas potentially included versus excluded from the nonattainment area' There are no other known lead sources in the area based on the emissions inventory.

-'Air quality in potentially included versus excluded areas' As detailed in this document, there are no other air monitors that measure lead within miles of this area.

-'Level of control of emission sources' The source of lead emissions is GRC. The measures taken to reduce these emissions is discussed below and detailed in a report provided as an attachment.

These factors are again mentioned in the memo "Area Designations for the 2008 Revised Lead National Ambient Air Quality Standards" by William Harnett, Director Air Quality Policy Division, EPA RTP dated August 21, 2009.

The FR notice also presents three "techniques" that might be used by the state. "The state may, in addition to submitting recommendations for boundaries based on the factor analysis, also choose to recommend lead nonattainment boundaries using any one, or a combination of the following techniques… 1) qualitative analysis, 2) spatial interpolation of air quality monitoring data, or 3) air quality simulation by dispersion modeling…. We believe that we have applied both the factors and the techniques to this demonstration.

Outline

A. Air Monitoring Data and Dispersion Modeling for Gopher Resources (GRC)

   A1) Pb TSP-FRM Gopher Resources Corp (GRC) 460 cf GRC 465

   A2) Pb TSP-FRM Flint Hills Resources (FHR) 423 cf GRC 465

   A3) GRS-1 and GRS-2 (GRC TSP monitoring for Pb with Pace Lab)

B. Emission Controls of Fugitive Pb particles by Gopher Resources Corp

C. Soil Pb Concentrations and Fugitive Dust and Soil Controls

D. Recommended Nonattainment Designation Area

Attachments

1) aerial photograph of Gopher Resources Corp (2006)
2) diagram of physical GRC facility
3) GRC report "Emission Reduction Project" 10/07/09
4) GRC diagram of ventilation/filtration systems (with report above)
5) GRC report "Summary of Remediation Work 2007 and 2008" 10/08/09
6) Dakota County Office of Planning map of soil Pb data in area of GRC (1994)
7) recommended area of nonattainment in Eagan, Dakota County

Acknowledgements

These staff assisted in the preparation of this report:

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Gopher Resources Corp (GRC) began operation in 1946 as a lead-acid battery recycling facility (Attachments No. 1 & 2). Today GRC takes in 40-50,000 batteries a day, processing and recycling more than 10 million lead-acid batteries each year from Chicago to the Rocky Mts and into central Canada. It ships 130,000 tons of lead each year, much of it going to new battery production. In 1993, it began to recycle the plastic from lead-acid battery casings, shipping more than 18 million pounds of polypropylene pellets to plastic manufacturers.

A. Air Monitoring Data and Dispersion Modeling for Gopher Resources (GRC)

Because of the historical low density of TSP monitors in Dakota County or in the vicinity of GRC, we need to examine the monitoring records of available datasets of distant TSP monitors and of non-FRM TSP monitors to address the question of concentrations of lead (Pb) in the ambient air. There has been a single TSP monitor at GRC and it would be difficult to support a boundary determination that defines a two-dimensional area around the facility based on this single set of monitoring data. We believe that credible data that is available should also be used to provide a recommendation for a nonattainment area.

As reported below, it is fortunate for this designation that the MPCA has two datasets from this monitor because it was moved from a more distant site (420) to the current location (465) in December 2005. In addition, non-FRM data is useful for this purpose if it can be validated first by comparison to FRM data. GRS-1 is a monitor operated by GRC collocated with the MPCA TSP-FRM monitors to the SE of the facility property. GRS-2 is a second GRC monitor sited at the NNW of the property. These data are addressed below.

The issue for non-attainment boundaries is the gradient of concentration with distance in all directions from the facility. The line includes the area that may not attain and excludes the area that does attain the NAAQS. The boundary acts as a threshold of the level and form of the standard. If the non-FRM monitoring data can be correlated with the FRM data, then both sets of air monitoring values can be compared to the modeling projections. If the monitoring data generally corroborate the modeling isopleths, the modeling can be used to approximate the concentrations of Pb in the ambient air. A reasoned judgment can then be made about the distance from the GRC facility at which the ambient standard is met. Without the non-FRM data (and the soil lead data), only the dispersion modeling can provide estimates of air concentration in different directions from the facility. Further, the use of these datasets can serve to validate the modeling if they provide comparable values. The boundary recommendation is based on a body of evidence that includes more than one medium and with the datasets supporting and validating each other.

A1) Pb TSP-FRM Gopher Resources Corp (GRC) 460 compared to GRC 465

Gopher Resources has been monitored by a single TSP monitor since January 1, 1983. The original monitor (460) was situated east of Dodd Road and south of Yankee Doodle Road approximately 242 meters southeast of the SE corner of the Gopher facility (see Figure 1). The monitor was moved in December 2005 and began operation again on January 1, 2006. The present site (465) is at the NE corner of the intersection of Dodd Rd and Yankee Doodle Rd approximately 103 meters east of the property line of the facility. The locations of the two monitors and the lines used to determine the distance between monitors and the distance of each monitor from GR property are depicted in the Google map below. As stated, monitor site 460 was sited about 140 meters further from GR than site 465 (approx 2.35 times the distance). An important benefit of this move is that it provides a means of calculating the decrement of lead in the air with distance from the facility.

distance of site 465 to GRC facility: approx 103 m
distance of site 460 to GRC facility: approx 242 m
distance between site 460 and site 465: approx 222 m

Figure 1: Distance of Pb Monitor Sites 460 & 465 to Gopher Resources

note: The monitor "pin" between the two site text boxes is in error. Site 460 was sited at the end of the green line.

Table 1: Three-year average of monthly lead concentrations (ug/m^3) at MPCA operated monitors at Gopher Resources.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
460-1 (2003-2005)	0.144	0.090	0.067	0.141	0.055	0.060	0.039	0.053	0.057	0.040	0.138	0.047
465-1 (2006-2008)	0.229	0.226	0.436	0.154	0.394	0.394	0.285	0.278	0.413	0.308	0.273	0.168

Note: Monitoring data is not available from May 2003 – December 2003 at 460-1.

The monthly Pb monitoring data for the most recent three year interval for 460 (2003-2005) were compared with the three year record (2006-2008) for 465. The monthly averages were compared to see if there is any seasonal differences related to meteorology that might be apparent. Monitor 465 recorded higher Pb values than 460 for every monthly average in these contiguous time intervals. The range in difference is from a factor of 1.09 (April) to 7.7 (Oct). This is a significant difference that can be attributed to distance. Because the data are not derived from the same time intervals, distance is not the only variable that differentiates these two datasets. Potential differences in local sources and fugitive lead emissions during the sampling periods may have a role. For example, 465 is very near a major intersection (Dodd Rd & Yankee Doodle Rd) and would be more subject to reentrained fugitive Pb particles. Windrose analysis was not conducted for these monitors for these sampling periods. But wind direction on the sampling day is critical for dispersion and measured concentrations. The line graph (Figure 2) indicates that meteorology associated with the months does not shape the lines.

Figure 2: Three-year average of monthly lead concentrations at GRC 460-1 (2003-2005), 465-1 (2006-2008)

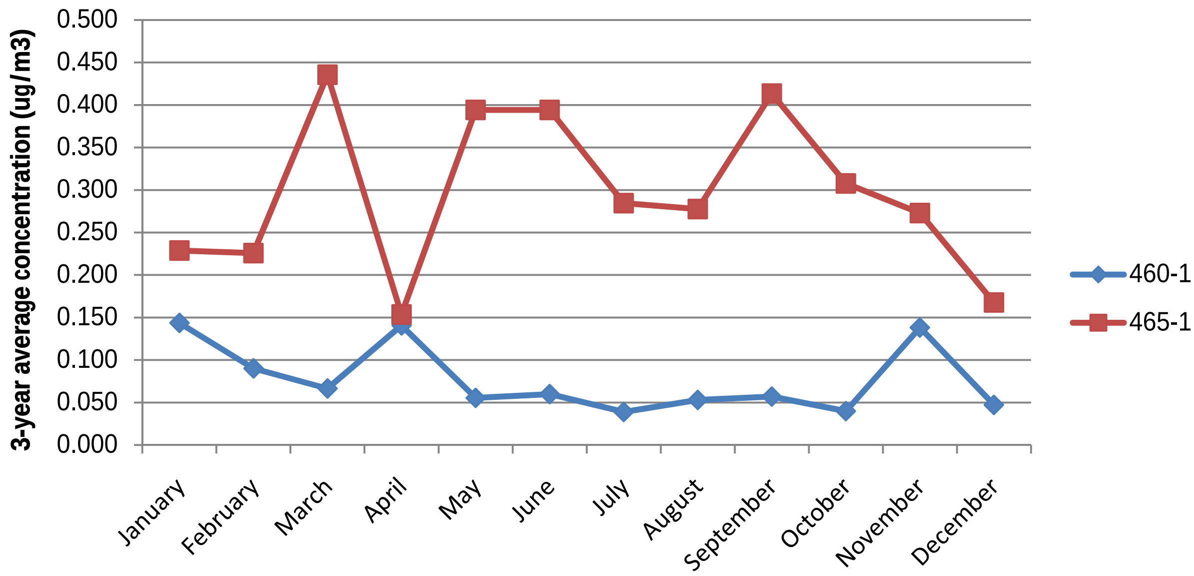
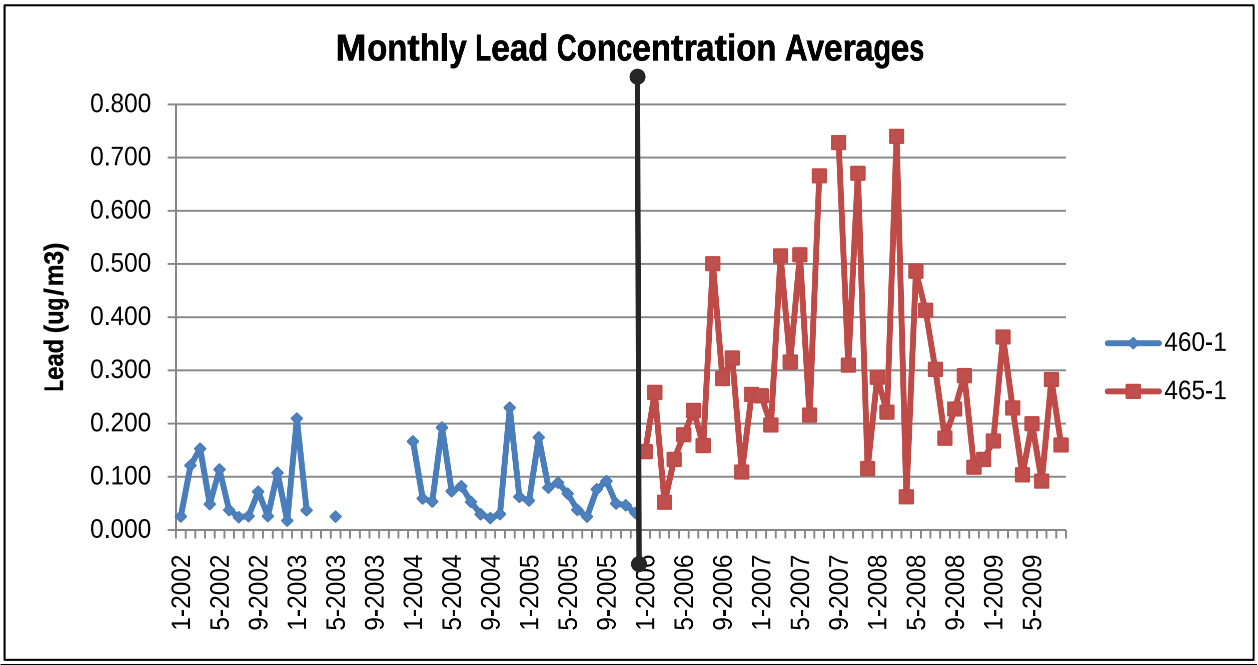
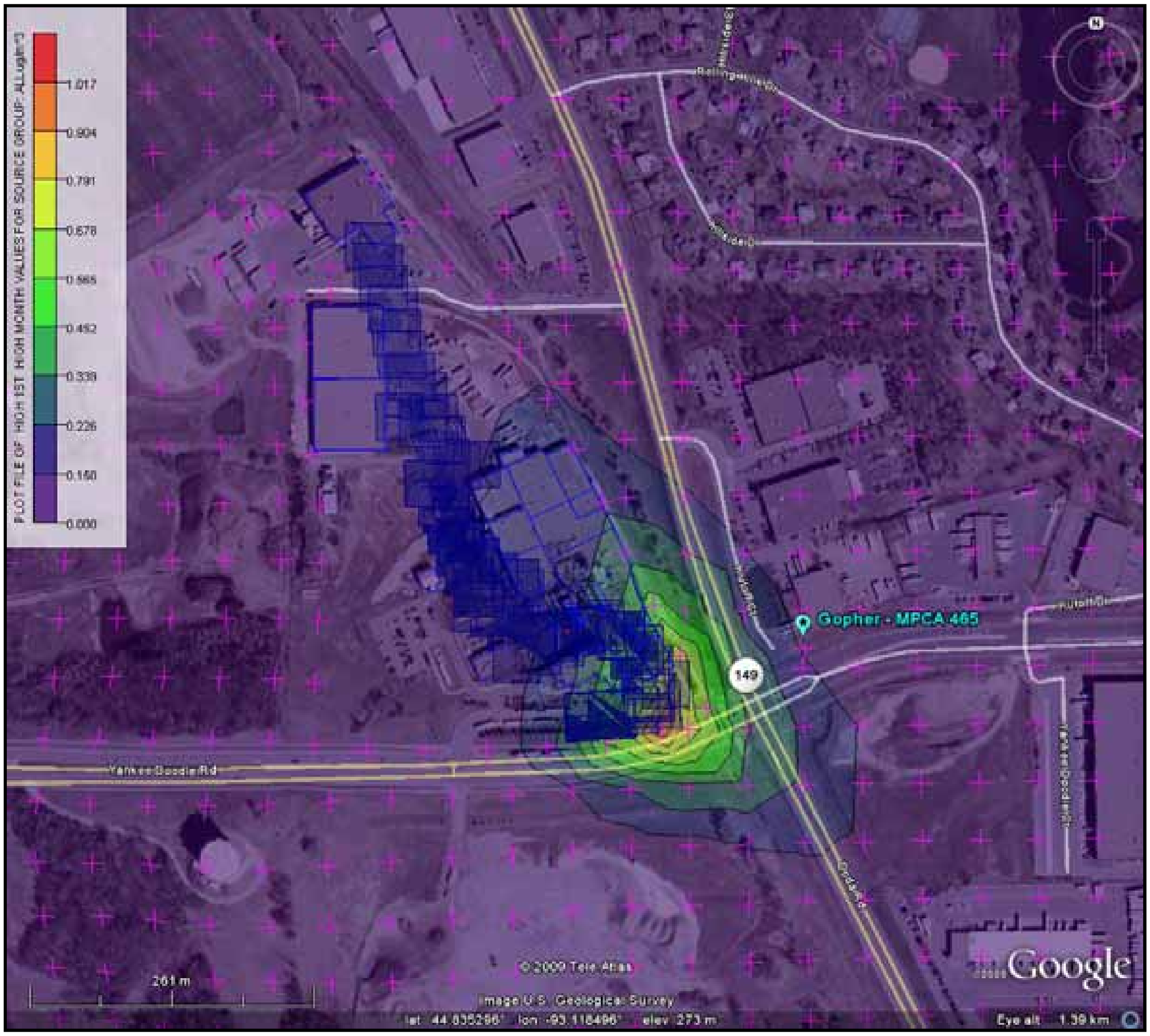


Figure 3: Monthly average lead concentrations (µg/m^3) at monitors near Gopher Resources over time, January 2002 – September 2009.



Nevertheless, concentrations of fugitive emissions near the ground are inversely related to distance from an area source and, in general, modeling of stack emissions also estimates a lower level of pollutants with distance. These monitor data demonstrate a large effect on air concentrations even at a difference in distance less than 150 meters. The high density of Pb would act to confine the dispersal of particles over large distances. This comports with the dispersion modeling done for the other Pb sources in Minnesota as part of Pb NAAQS implementation. It is characterized by relatively steep gradients of the higher concentrations and relatively small areas of impact overall. The dispersion modeling for GRC included both fugitive and stack emissions (see modeling map Figure 4). The soil Pb study done in 1992 by Dakota County in the vicinity of GRC seems to demonstrate this also for deposition of Pb particles from the facility (see discussion below and map Attachment No. 6).

Figure 4: Modeled Maximum Monthly Average Lead Concentration Contours for GRC (2009)



When comparing the modeled isopleths to the air monitoring data, it is important to note that the MPCA modeling was based on projected emissions *after* the emissions reduction project completed at GRC in August 2009. The following is a description excerpted from the modeling for GRC that MPCA submitted to EPA V: "Gopher Resources' emissions were based on actual and estimated actual emissions. These were provided by Gopher and their consultants at ENVIRON, and were approved by MPCA staff. A total of 125 sources of lead were modeled from Gopher Resources. There are 14 point sources and 111 volume sources. The point sources consisted of the main stack, torit stack, scrubber stack, nine refinery stacks and two exhaust fans on the plastic recycling building on the northern side of the facility. The volume sources are traffic-related dust emissions, furnace fugitives and afterburner gaps, and slag bins emissions. Hour-of-day emission scalars were applied to all but two of the volume sources of which the excluded sources were BFRNFUG1 (blast furnace fugitives) and BURNGAP1 (afterburner gaps). The modeling assumed that emissions from volume sources (except the two excluded sources) were emitted between 7am and 11pm, with no emissions occurring between 11pm and 7am. All other sources were assumed to be emitting lead 8,760 hours a year." In this both the “blast furnace” and the “after-burner gap” fugitive emissions were “zeroed out”. These were two key elements addressed by the installation of two additional ventilation and filtration systems at GRC (see Attachment No. 3-Report from GRC “Emission Reduction Project” 10/07/09).

A2) Pb TSP-FRM Flint Hills Resources (FHR) 423 compared to GRC 465

As stated above, there is a low density of TSP monitors in Dakota County. The next nearest TSP monitor to GRC is FHR423 located 4.83 miles (7,770 m) southeast of Gopher Resources. As shown in this table, the Pb concentrations at this monitor appear to represent background levels of Pb. This data supports the modeled isopleths for GRC.

Table 2: Monthly lead concentrations (ug/m^3) at Flint Hills Resources (FHR) 423

Monthly Average Concentration (ug/m3)

	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec
2005											0.002	0.002
2006	0.010	0.002	0.003	0.005	0.004	0.003	0.002	0.004	0.003	0.004	0.007	0.003
2007	0.002	0.003	0.003	0.003	0.003	0.003	0.005	0.005	0.002	0.001	0.007	0.004
2008	0.004	0.004	0.005	0.003	0.002	0.005	0.004	0.003	0.003	0.002	0.005	0.003
2009	0.003	0.003	0.004	0.002	0.003	0.003	0.004	0.003				

3 Month Rolling Average Concentration (ug/m3)

	Nov-Jan	Dec-Feb	Jan-Mar	Feb-Apr	Mar-May	Apr-Jun	May-Jul	Jun-Aug	Jul-Sep	Aug-Oct	Sept-Nov	Oct-Dec
2006	0.004	0.004	0.005	0.003	0.004	0.004	0.003	0.003	0.003	0.004	0.005	0.005
2007	0.004	0.002	0.002	0.003	0.003	0.003	0.004	0.004	0.004	0.003	0.004	0.004
2008	0.005	0.004	0.004	0.004	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.003
2009	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003				

Design Value 2006-2008	0.005

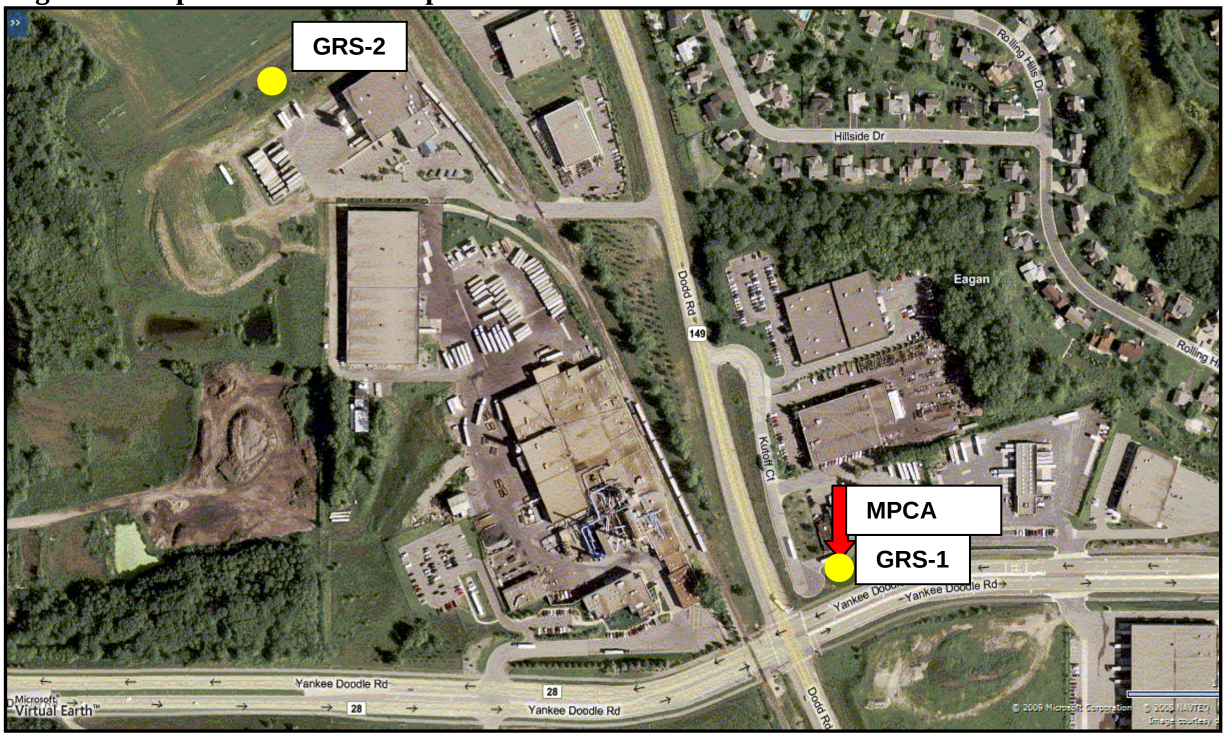
A3**) GRS-1 and GRS-2 (Gopher Resources TSP monitoring for Pb with Pace Lab)**

As stated earlier, it would not be possible to recommend the perimeter of an area that does not meet the level and form of the new NAAQS, based on the dataset of the one TSP FRM monitor alone. The modeling is meant to provide estimated values for the purpose of determining a monitoring requirement and of indicating the area of highest concentration of Pb in the ambient air. Fortunately, as with the monitoring data from the previous site 460, there is additional information that can be used to supplement the basis of the recommendation.

GRC operates two TSP monitors on its property. These are not FMR monitors, but they apply the same sampling day schedule (with some exceptions). GRS-1 is sited in the NE quadrant of the intersection of Dodd Rd and Yankee Doodle Rd, collocated with the two FRM monitors 465-1 and 465-2 (collocated).

GRS-2, the second monitor operated by GRC, is at the north end of the property in a NNW direction from the smelting/refining operations. (Note: GRC refers to these monitors as GRC-1 and GRC-2; MPCA refers to them as GRS-1 and GRS-2.) (see Figure 5)

Figure 5: Gopher Resources Corp monitor sites GRS-1 and GRS-2



In order to first validate the GRS data, the data from FRM 465-1 is compared to 465-2, the collocated FRM. The R^2 can then be compared to the R^2 for GRS-1 compared to 465-1 (Figures 6 & 7 below).

Figure 6. Correlation between MPCA operated monitors collocated at Gopher Resources (2006-2009): MPCA 465-1, MPCA 465-2.

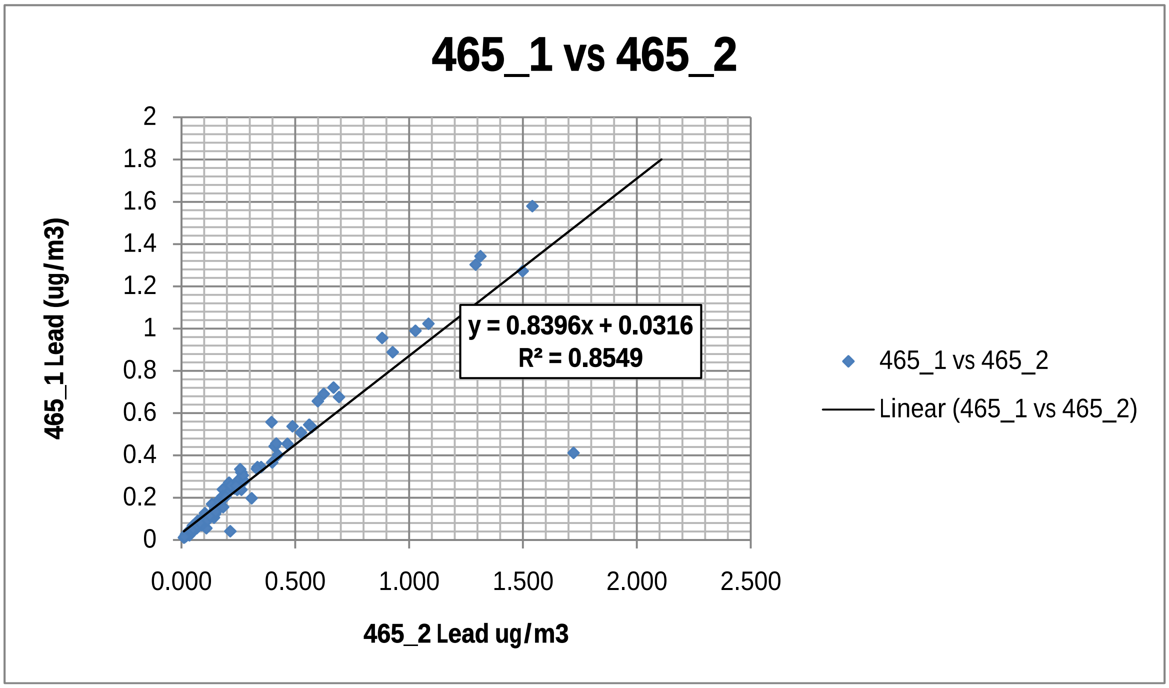
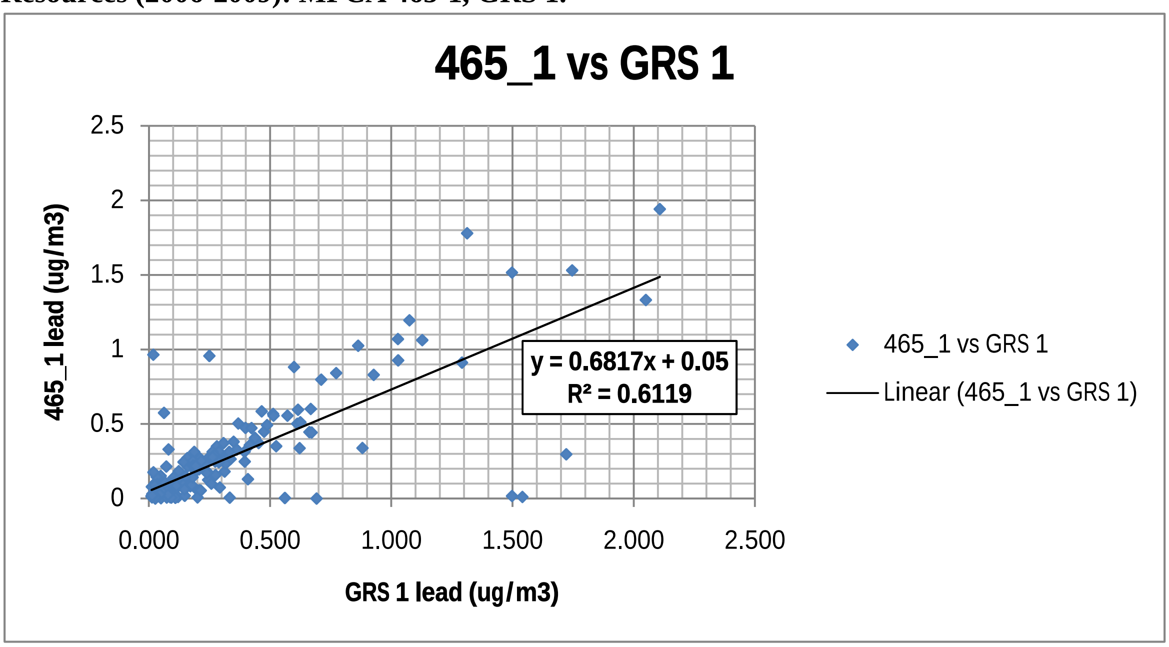


Figure 7. Correlation between MPCA and PACE Analytic operated monitors collocated at Gopher Resources (2006-2009): MPCA 465-1, GRS 1.



The R^2 for the collocated FRMs is clearly better than the correlation between the 465-1 and the GRS-1 monitors. The difference could be partly attributed to the different extraction and analytical methods used on the two filters. In addition, the GRS monitors may not strictly adhere to the prescribed 1-in-6 day sample schedule (not being FRM monitors) and the points on the chart may not represent the same days of air sampling if there were errors in date recording. There is a very large effect of wind direction in the monitored concentrations of lead. This is apparent from windrose analysis done previously by MPCA staff. This means if wind conditions are different, a relatively few days of the 60 sample days per year could result in poor correlation. There are at least six days that appear to be clearly due to asynchronous sampling. These record a value of 0 ug/m3 for 465-1 and values as high as 1.5 ug/m3 and greater for GRS-1. However, 'zero' is not the default for a non-sample day. In this instance, one monitor recorded very small values and the other a large positive value. This might account for much of the "scatter" apparent in the plot. Additional analysis would be necessary to identify and remove any unmatched days from the four years of data.

The positive correlation does provide some assurance in comparing the values of the two monitors (465-1 and GRS-1) operating on the same day. The value of the GRS-2 dataset is that it is provides information about the concentrations of Pb in the air at the opposite side of the property. Regardless of the exact dates of sample days, the monitor provides an independent record of levels of lead in the air near the property boundary. **Tables 3a** and **3c** (below) provide the monthly averages for GRS-1 and GRS-2 for four complete years (2005 through 2009 (2005 and 2009 are partial years.)) **Tables 3b** and **3d** provide the 3-month rolling averages in the form of the standard.

GRS-2 has lower Pb values overall. It is more distant from the smelting/refining operations at the facility. It is also less impacted by north or west winds. These are common wind vectors for the region and west wind would affect GRS-1. GRS-2 should measure higher Pb concentrations with winds from due south. Looking at the 3-month rolling averages for GRS-2 in **Table 3d**, all averages since August-October of 2007 meet the NAAQS form and standard (0.15 ug/m3). These values are in boldface. By contrast, only three averages for GRS-1 in **Table 3b** meet the new NAAQS for 2006, two averages for 2008, and one for 2009 (in boldface).

Monitoring data (collected after the retrofit project) can be compared to the isopleths produced by the MPCA modeling for GRC. There are two reference points. One is the 465 TSP site with collocated FRM and collocated GRS-1 monitor in the NE quadrant of the intersection of Dodd Rd and Yankee Doodle Rd. The second is the location of GRS-2, the second monitor operated by GRC, at the north end of the property in a NNW direction from the smelting/refining operations. The modeling map indicates that the first location is very near the isopleth indicating the breakpoint for the ambient standard of 0.15 ug/m3. The second monitor site is about 100 meters to the outside of the attainment isopleths, which means that 3-month rolling average values would be less than the NAAQS. It is important to note that the modeling calculated and plotted concentrations as "monthly maximum averages". With the three month rolling average form of the standard, the average of each month is part of three different 3-month calculated averages. Because of averaging, the highest monthly average will always be greater than the 3-month average.

Table 3a: Monthly average lead concentrations (µg/m³) at GRS 1 (2005-2009)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005									0.519	0.199	0.142	0.176
2006	0.158	0.196	0.115	0.077	0.093	0.216	0.143	0.541	0.265	0.269	0.457	0.164
2007	0.253	0.160	0.422	0.284	0.458	0.171	0.528	0.162	0.452	0.368	0.866	0.152
2008	0.183	0.191	1.034	0.032	0.051	0.019	0.306	0.198	0.359	0.241	0.068	0.157
2009	0.155	0.390	0.277	0.088	0.241	0.058	0.273	0.150	0.023			

Table 3b: Three-month rolling average lead concentrations (µg/m³) at GRS 1 (2006-2009)

	Nov-Jan	Dec-Feb	Jan-Mar	Feb-Apr	Mar-May	Apr-Jun	May-Jul	Jun-Aug	Jul-Sep	Aug-Oct	Sep-Nov	Oct-Dec
2006	0.158	0.176	0.156	**0.129**	**0.095**	**0.129**	0.151	0.300	0.316	0.358	0.331	0.297
2007	0.291	0.192	0.278	0.289	0.388	0.304	0.386	0.287	0.380	0.327	0.562	0.462
2008	0.401	0.176	0.469	0.419	0.372	**0.034**	**0.125**	0.174	0.288	0.266	0.223	0.155
2009	0.126	0.234	0.274	0.251	0.202	**0.129**	0.190	0.160				

Table 3c: Monthly average lead concentrations (µg/m³) at GRS 2 (2005-2009)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	0.140	0.069	0.403	0.423	0.284	0.185	0.109	0.301	0.117	0.136	0.133	0.104
2006	0.140	0.103	0.125	0.259	0.197	0.320	0.136	0.192	0.323	0.151	0.236	0.064
2007	0.106	0.112	0.421	0.132	0.697	0.333	0.153	0.246	0.115	0.032	0.046	0.095
2008	0.088	0.092	0.075	0.015	0.078	0.037	0.158	0.143	0.095	0.083	0.056	0.097
2009	0.014	0.204	0.121	0.025	0.094	0.136	0.028	0.033	0.204			

Table 3d: Three-month rolling average lead concentrations (µg/m³) at GRS 2 (2006-2009)

	Nov-Jan	Dec-Feb	Jan-Mar	Feb-Apr	Mar-May	Apr-Jun	May-Jul	Jun-Aug	Jul-Sep	Aug-Oct	Sep-Nov	Oct-Dec
2006	0.126	0.116	0.123	0.162	0.194	0.259	0.218	0.216	0.217	0.222	0.237	0.150
2007	0.135	0.094	0.213	0.221	0.416	0.387	0.395	0.244	0.172	**0.131**	**0.064**	**0.058**
2008	**0.076**	**0.091**	**0.085**	**0.060**	**0.056**	**0.043**	**0.091**	**0.113**	**0.132**	**0.107**	**0.078**	**0.079**
2009	**0.056**	**0.105**	**0.113**	**0.117**	**0.080**	**0.085**	**0.086**	**0.066**				

B. Emission controls of fugitive Pb particles by Gopher Resources Corp

In 1993, GRC installed three ventilation/filtration systems to implement part of the old nonattainment area (NAA) SIP. These are indicated on the diagram with the "air emissions reduction" report as Torit No.'s 1, 2, & 3 (see Attachment no. 4). After promulgation of the new Pb NAAQS on Oct. 15, 2008, GRC contracted a study of fugitive Pb emissions escaping leaks, vents and ports, and also the deposition of Pb particles on hard surfaces. AMEC recommended installation of additional ventilation and filtration systems, as well as improved engineering controls and cleaning of surface deposition. GRC undertook this work to try to meet the new NAAQS standard. Two new ventilation/filtration units were installed and work was completed August 28, 2009. This project added another 150,000 cfm of negative pressure ventilation to the existing 165,000 cfm. A report of this initiative prepared by GRC is attached (Attachments No. 3 & 4). The total cost of the emission control project is $2,250,000.

The emissions reduction project at GRC was completed on August 28, 2009. September was the first month with the additional pollution control in place. There is not enough monitoring data from either the FRM-TSP or the GRC monitors to show reduced emissions or to predict compliance with the NAAQS. The preliminary data from the collocated GRC monitor (GRS-1) appears to support the dispersion modeling results. For the FMR data, very little quality-assured data is yet available since the end of August. These data will be most important in determining compliance with the NAAQS. They will also be used to measure the effect of the recent emissions control effort of Gopher Resources. To collect more samples with which to measure the effect of the added pollution control, GRC adopted a 1-in-3 day schedule of sampling for the two monitors beginning on September 2, 2009.

C. Soil Pb Concentrations and Fugitive Dust/Soil Controls

In 1992, Dakota County conducted a soil lead study that was centered on Gopher Resources Corp. The soil data from the area around GRC is provided by a copy of the center part of a map produced by the county (Attachment No. 6). (GS&R on the map indicates the former business name Gopher Smelting and Refining. Page 2 of the attachment describes the map.) The study also included surface water samples. Documentation provided by the county reports that samples were of bare surface soils to a depth of two centimeters. Soil analysis was by ICP. The map indicates the locations of sampling and the concentrations of Pb in ppm. The scale is 1: 6000 and 1 inch = 500 ft.

Three concentric rings of samples were collected around the facility with additional sampling in transects within a radius of approximately one mile (5000+ ft) from the center of the facility. Some 70 to 80 soil samples were taken. At the time of the study, nearly all soil values beyond 1500 feet of the center of the facility were below 300 ppm (EPA standard for residential soils). The exception is one point 1500 ft due east of the center of GRC (830 ppm) and two points to the southeast of the center point that are in the 300 ppm range. If the property line of GRC were used as the reference, these values would be measured between 1000 and 1500 ft from the facility.

GRC has also conducted soils remediation since this time. Of special concern for the NAAQS is bare and unvegetated surface soils where Pb particles may be reentrained by the wind. Particles deposited or redeposited on the streets (Dodd Rd and Yankee Doodle Rd) could also be reentrained by traffic. This would present a public health hazard to residents in the vicinity. These particles could also be collected by the filter in the Pb TSP monitor. GRC has prepared a report that includes a diagram of the facility with a legend and dates of remediation. The report describes the more recent efforts to prevent fugitive dust from surficial soils on their property and these areas are identified on the map (Attachment No. 5).

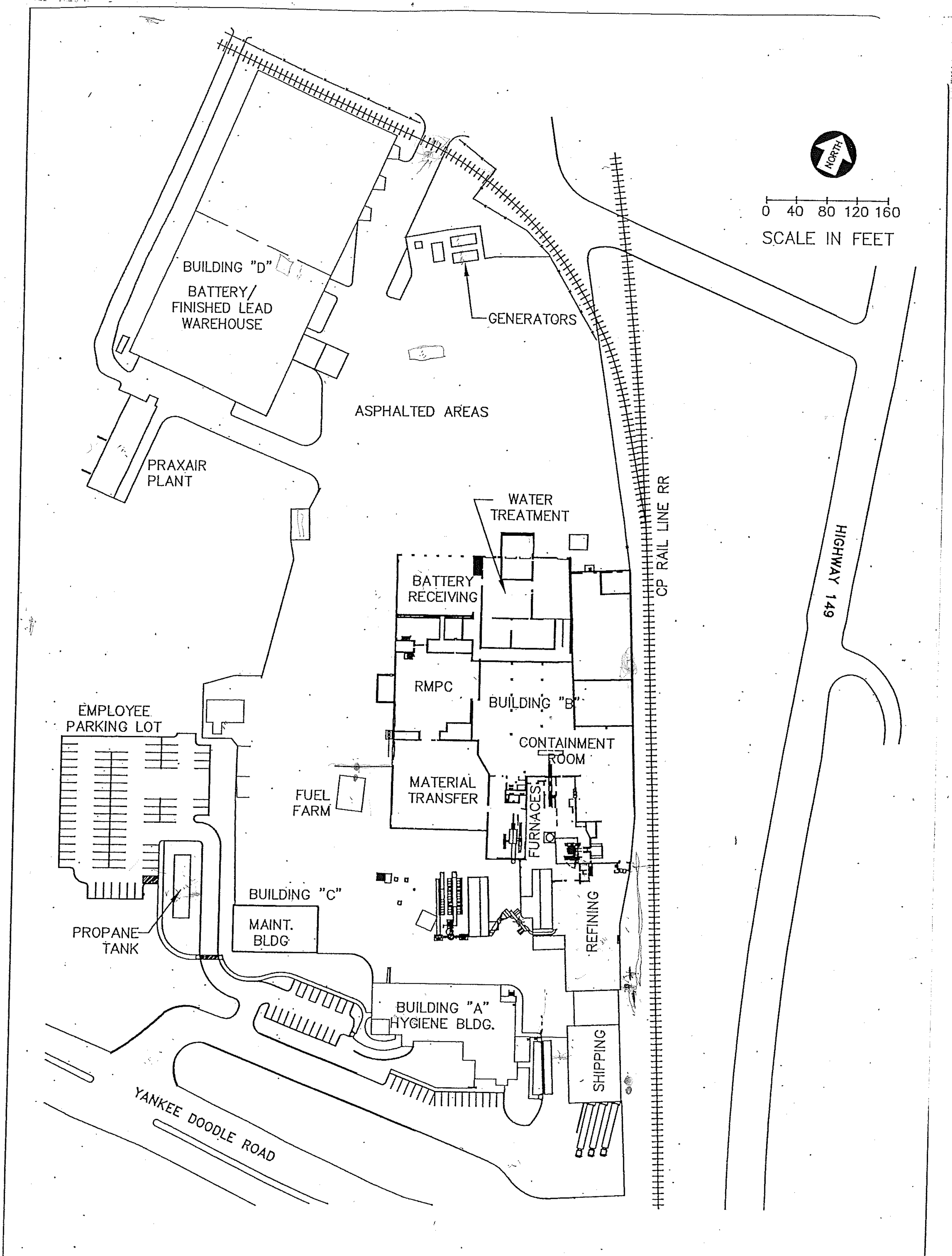
The modeling done for GRC for the 2008 Pb standard indicates predicted concentrations of Pb in the air that are relatively localized with strong gradients. In general, this corresponds to the relatively concentrated area of soil contamination documented in 1993.

D. Map of recommended nonattainment designation area

Finally, we recommend the NAA outlined on Attachment No. 7. This is the same area designated nonattainment by EPA in 1991 and described in the FR on October 18, 1994. "On November 6, 1991, USEPA, in accordance with the Clean Air Act (CAA), title I, section 107(d)(3), designated an area in Dakota County, Minnesota as nonattainment for the primary and secondary ..(NAAQS) for lead... The nonattainment area is bounded by Lone Oak Road (County Road 26) to the north, County Road 63 to the east, Westcott Road to the south, and Lexington Avenue (County Road 43) to the west." (59FR 52431). This is the existing maintenance area under the previous Pb NAAQS. These boundaries are included as an inset at the bottom of the attachment.

We believe that these are very conservative boundaries that will protect the public health from exposure to airborne Pb particles in the ambient air at concentrations of the level and form of the NAAQS. We base this statement on the information provided by air monitoring data, soil lead data, and air dispersion modeling data. We believe that this information does not disagree, but rather together indicates that the Pb emissions to the air that originate from GRC do not disperse at significant concentrations to these boundaries. Furthermore, we believe that the emissions of Pb to the air will be reduced due to the preemptive efforts of the company to attain the new standard with installation of additional ventilation and filtration to remove Pb particles. Ongoing efforts to improve control of, and to remediate, surface deposits of Pb contamination will also reduce airborne concentrations and dispersal from the facility.

Gordon Andersson
MPCA/EAO
October 13, 2009



GOPHER RESOURCE CORPORATION

GOPHER RESOURCE
CORPORATION

EMISSION REDUCTION PROJECT

CHRONOLOGY OF EVENTS RE. MEETING THE LOWERED NAAQS FOR LEAD AT GRC.

Oct. 16, 2008: EPA dropped the NAAQS level from 1.5 ug/M^3 to 0.15 ug/M^3.

In late October of 2008, GRC contracted with AMEC, Inc. to evaluate lead emission sources from the site and provide recommendations on how to insure compliance with the new standard.

Area sampling was conducted during the months of Oct/Nov/Dec 2008 using industrial hygiene sampling pumps. Areas sampled included inside the buildings, near overhead doors (that were opened and closed), near roadways, near process operations located outside and on the roof of the buildings. The goal was to identify potential lead emission sources. A second goal was to understand if fugitive lead emissions could be migrating from inside the building through openings such as doors left open to the outdoors. A TSI direct-reading aerosol monitor was used to characterize emissions inside and outside of the main processing building. The results from the perimeter ambient monitors and weather data were also reviewed.

In January, 2009, AMEC provided a "Lead Source Evaluations and Recommendations" report which detailed the source of the fugitives and prioritized them from highest contributor to lowest.

The list from highest priority to lowest is provided below:

1. Blast furnace penthouse enclosure
2. Material Transfer Room or MTR (where incoming scrap/outgoing blast slag are staged)
3. Afterburner tower
4. Refining kettle combustion vents
5. RMPC (battery receiving)
6. Roadways
7. Warehouse & Plastic Buildings
8. Maintenance shop
9. Miscellaneous

Items 1, 2, 3 & 5:

The three top priorities (the blast furnace penthouse enclosure, the MTR, and the afterburner tower) and item #5 (the RMPC dock area) were focused on since these sources were all located in the main processing building which was conducive to placing under additional negative pressure and were the highest sources of outside fugitives. AMEC provided recommendations on additional air flow requirements to address these lead sources.

extruder to produce plastic pellets that are sold to battery case manufacturers. The operation is all indoors and lead monitoring indicates this area has a very low potential for fugitives.

We are in the process of collecting some samples around the outside of both the warehouse and the plastics building in an attempt to further quantify what these fugitive levels may be. If the monitoring data were to show that one or both of these buildings is a potential issue, then we would examine options to address the sources.

Item #8 (Maintenance Shop):

The maintenance shop is a stand-alone building containing a wash bay, a mobile equipment repair room, a main shop area for equipment repair, and a room for parts storage. The main shop area has a Donaldson snorkel type ventilation unit for welding operations or if they need to melt lead off a mixer shaft, lead pumps, etc.. All equipment brought out of the lead processing building has to be deconned in that building (pressure washer) prior to driving outside and up to the shop. Since the equipment is washed prior to maintenance, we didn't feel this area required attention at this time.

We are in the process of collecting some samples around the outside of the maintenance shop in an attempt to quantify what these levels may be. As mentioned in Item #7, if the monitoring data were to show that the shop is a potential issue, then we would examine options to address the sources. We have met with Donaldson reps and visited their showroom to look at some of their HEPA control equipment designed for welding rooms and this would be the most likely option if there is an issue.

Item #9 (Miscellaneous):

AMEC had indicated elevated lead dust levels inside the processing building where the baghouse dust is augered into a slurry tank. The torit project did include installation of a hood over these augers since they are immediately adjacent to an outside mandoor and overhead door. This will be completed by the end of October when the afterburner tower enclosure is installed.

There was also a recommendation to inspect and tightly seal any gaps on the screw conveyor covers and to clean up spills and dust accumulations frequently. This is an on-going maintenance/housekeeping project and has included adding additional vacuum drops in areas where there weren't any previously.

Completed on October 7, 2009 by:

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An internal group at Gopher along with an AMEC team worked on the fast-tracking of an expansion of GRC's existing negative pressure units which pulls approximately 165,000 cfm of air out of the furnace, refinery, and containment rooms using three Donaldson cartridge filtration banks (Torit is the specific brand name). These three cartridge banks (labeled Torits #1, #2 , & #3) were installed in 1993 as part of a SIP agreement with the MPCA. AMEC recommended adding an additional two Donaldson cartridge banks which would pull another 150,000 cfm from the building.

This project included installing hoods in the roof of the Material Transfer Room (MTR), the battery receiving dock area (RMPC), on the top of the afterburner tower and increasing the pull (and modifying the hooding) on top of the blast enclosure (see attached diagram for the location of the cartridge units and the ductwork layout). The two new cartridge units (labeled #4 & #5) would also require the installation of a new stack located between them. The discharge ductwork, blowers and motors are located on the north side of the two new units.

The enclosure on top of the afterburner tower is yet to be installed (late October timeframe to get a crane in). This enclosure on top of the afterburner insures capture of any fugitives that may escape a small access hatch which needs to be opened periodically to allow rodding (using sections of rebar to break loose sections of build-up inside the ductwork) of the exhaust ductwork interior when buildup occurs in the pipe. There would also be an increased potential for fugitives when only four of the baghouse cells are on-line (if one cell is down for cleaning/repairs and a second is down for its shake cycle).

We also constructed a small room around an outside slide gate in the ductwork that carries the hot exhaust gases from the blast furnace down to the afterburner. When there was low pull at the top of the afterburner tower (as described in the paragraph above), there was a potential for fugitives from the slide gate assembly. This room has louvre's at the bottom and has an opening at the top which runs into the blast furnace enclosure area to provide continual draft.

The cost to date on this project is approximately $2,250,000 and does include the afterburner enclosure and baghouse dust auger hooding to be installed in late October.

THE FOLLOWING ITEMS RECEIVED A LOWER PRIORITY. THE ITEMS ARE DESCRIBED BELOW ALONG WITH A DESCRIPTION OF WHAT HAS BEEN DONE AND WHAT IS ON-GOING AT THIS TIME.

Item #4 (Refining Kettle Combustion Vents):

The nine 100-ton refining kettles are indirectly heated using natural gas burners. The non-contact heat is vented up through the refinery roof to the environment. AMEC was concerned that if a kettle were to spring a leak, it would be possible for lead to enter the chamber and fume off and release lead until the leak became larger (and apparent). While this potential exists, GRC did not feel it was a high priority since the kettles are pulled and rotated on a regular basis to extend the life of the kettles which also allows for inspections.

GRC applied for a matching grant in July 2009 with the Department of Energy which would capture these hot gases and run them thru a heat exchanger unit to recover the heat for use elsewhere in the process (the feed dryer or the office building in-floor hot water heating system have both been discussed). This system, if installed, would reduce gas usage at the facility and would eliminate this potential lead source since the gases would be discharged into one of the existing pollution control units after discharge from the heat exchanger. The DOE is expected to award this grant money in early 2010.

Item # 6 (Roadways):

GRC has implemented improvements to our outdoor sweeping program (increased use of wet suppression methods on our outdoor sweeper and increased sweeper coverage) and are currently running the industrial hygiene monitoring pumps at the same locations that were sampled last fall by AMEC in an attempt to quantify improvements in fugitive lead capture.

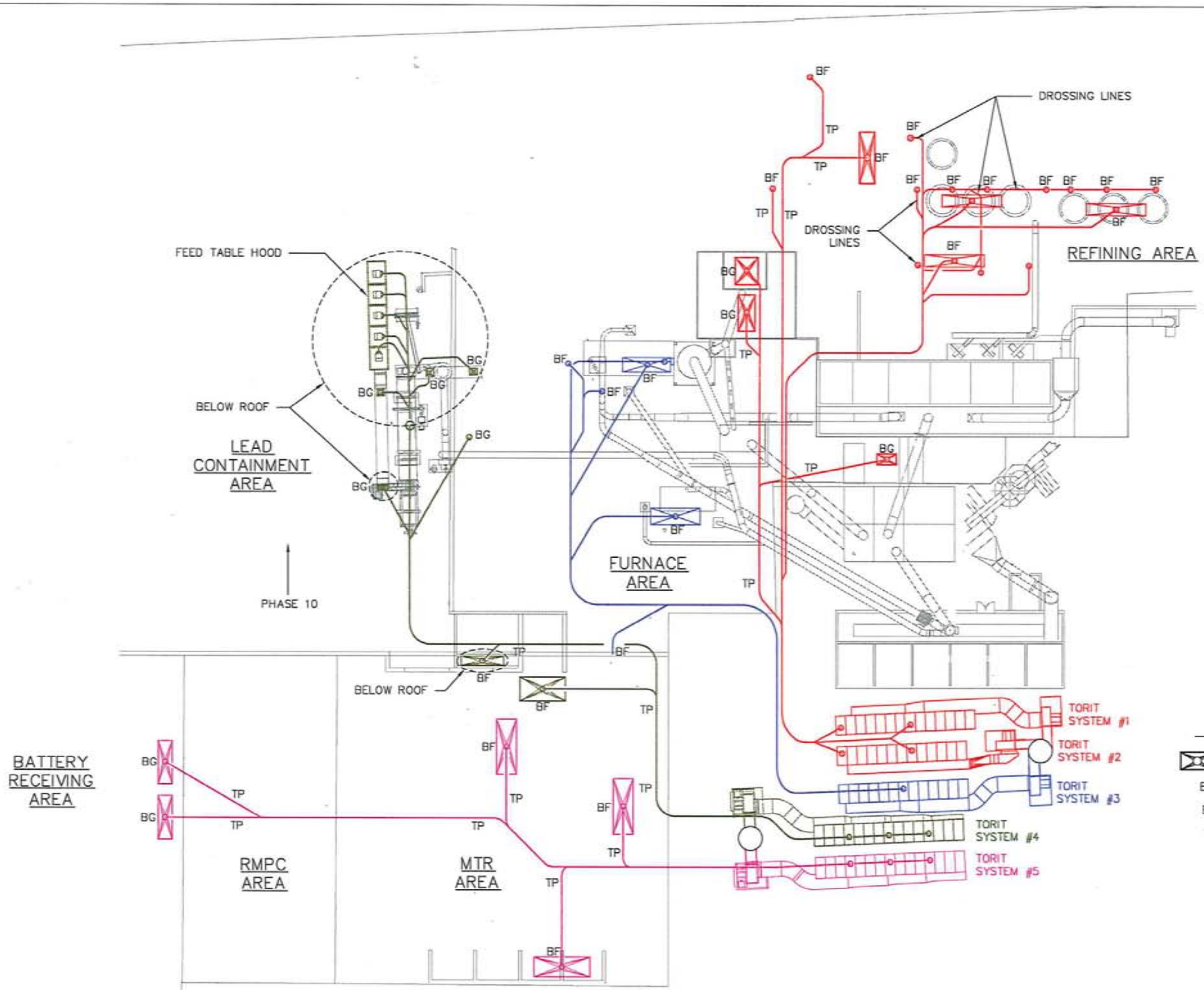
Employee's were also retrained on the importance of pressure washing mobile equipment before driving outside since track-out is probably the largest source of pavement lead deposition. By improving the cleaning of the equipment prior to exiting the building, this potential source is decreased.

Item # 7 (Warehouse & Plastics Buildings):

The warehouse and our adjacent plastics processing building were listed as low potential sources of fugitives. The on-site warehouse is used for stockpiling batteries as well as finished product and refinery chemicals. While there are trace levels of lead inside the warehouse from mobile equipment movement, we did not feel it warranted attention at this time. To provide perspective, the lead levels present in the warehouse do not warrant respirator usage for our employees. We do maintain a one-door open maximum policy for the warehouse to minimize potential wind issues.

The maintenance shop is a stand-alone building containing a wash bay, a mobile equipment repair room, a main shop area for equipment repair, and a room for parts storage. The main shop area has a Donaldson snorkel type ventilation unit for welding operations. All equipment brought out of the lead processing building has to be deconned in that building (pressure washer) prior to driving outside and up to the shop. Since the equipment is washed prior to maintenance, we didn't feel this area required attention at this time.

The plastics division is a building located to the north of the smelter operation. The battery plastic is separated in the RMPC area and rinsed a number of times and then blown into a trailer staged inside the building. These trailers are then backed up to the plastics building and unloaded with a small front-end loader. The plastic goes thru a couple more water baths, a mill, and a densifier before entering a heated



LEGEND:

- —o – ROOF PENETRATION/VERTICAL DUCT
- ⊠ – HOOD ON ROOF
- BG – BLAST-GATE DAMPER
- BF – BUTTERFLY DAMPER
- TP – TEST PORT LOCATION

Gopher Resource Corporation

FRIDAY OCTOBER 2, 2009

GOPHER RESOURCE CORPORATION

Summary of Remediation Work 2007 & 2008
Gopher Resource Corporation
Eagan, Minnesota

The unremediated outside areas around Gopher Resource Corporation identified in this report that were not capped with asphalt were a source of soil lead deposition. The surface lead dust could then become airborne from wind or other disturbances. Prior to remediation activities these areas may have had limited vegetative cover (bare soil) with sufficient surface lead concentrations that may have become airborne and affected the perimeter ambient air monitors. Soil remediation of these areas consisted of taking lead contaminated soil from the surface until concentration levels reached 500 mg/kg. These areas were then back filled with clean soil to the original grade. After reaching the cleanup goals, the areas were then covered with vegetation or in some cases asphalt.

Following is a summary of soil remediation work that was completed in 2007 and 2008 as well as from previous years. Portions of this summary have been taken from the 2007 and 2008 Corrective Measures Implementation (CMI) Reports. (For more detailed information please refer to the 2007 and 2008 CMI reports prepared by Landmark Environmental). These areas are also shown on the attached site facility soil remediation map.

Area along East Side of building B (2007 Phase VI-B2 West Middle area)

Prior to remediation most of this area was soil and gravel with limited vegetation and elevated lead surface contamination. Excavation work began on April 9, 2007 and was primarily completed by May 10, 2007. The West Middle Area of Phase VI-B2 includes the area along the western portion of the railroad tracks in between the main building and the railroad tracks. This was a 17 foot wide area on the north up to a 42 foot wide path on the south. The length of remediation extended approximately 600 feet and connected on the north with the work completed in 2004 and connected on the south with removal of soil excavated in 2005 for replacement of a transformer. The excavation area connected on the east with the soil previously excavated for the railroad track.

3385 SOUTH HWY. 149 • EAGAN, MINNESOTA 55121 • 651.454.3310 • FAX 651.454.7926 • 800.354.7451

The soil and/or concrete was removed and properly disposed at SKB Landfill after any stabilization as necessary. Clean soil was backfilled and part of the area was seeded and a portion was asphalted.

Area along East Side of Building B (2007 Phase VI-B2 Southwest Spur Area)

Prior to remediation most of this area was soil and gravel with limited vegetation and elevated lead surface contamination. A 20 foot wide path extending 120 feet, approximately 3 to 4 feet deep was excavated in August of 2007 for the south spur track located south of the west middle work. The soil and/or concrete was removed and properly disposed at SKB Landfill after any stabilization as necessary. Clean soil was backfilled and area was seeded.

North and South Storm water Ditches-2007

Prior to remediation most of this area was vegetated soil with elevated lead surface contamination. As part of the Highway 149 construction work, several areas within highway easements and construction areas were excavated and properly managed. These included an east and west storm water ditch at the southwest corner of the intersection of Highway 149 and Yankee Doodle Road and the northwest corner of the intersection which included a bike trail and ditch.

The ditch areas remediated included 1) two ditches located south of the GRC facility at the southwest corner of the intersection of Highway 149 and Yankee Doodle Road (ditches located on either side of the railroad track were excavated and disposed), 2) ditch and sidewalk area north of Yankee Doodle Road were excavated and disposed. The cleanup of the ditch areas met the cleanup goal of 300 mg/kg. Clean soil was backfilled and areas were seeded.

Temporary Road along Railroad Tracks at Southwest Area of Phase VI-B2-2008

Prior to remediation most of this area was soil and gravel with limited vegetation and elevated lead surface contamination. A temporary soil road was placed along the west side of the railroad tracks during construction of the East Wall of the Main Building and completion of the West Middle and South Spur Track of the Phase VI-B2 area completed in 2007. The temporary road was excavated to place ballast next to the railroad tracks to promote sloping and drainage. An area of approximately 5 to 6 feet wide by 260 feet in length next to the railroad tracks was excavated approximately 8 to 10 inches in depth and stockpiled. This area was either previously remediated in the area of the south spur track or will be remediated as part of the Southwest Area of Phase VI-B2. The area was backfilled with RR ballast and clean landscaping soil.

Summary of Previous remediation (Located on Map)

The RCRA corrective action program for GRC was divided into six phases. Phase I included the area along Highway 149 and was completed during October and November 1994. Phase II included the storm water/surface water runoff abatement activities which were completed in 1995. Phase III included the area between the trailer parking lot and the rail track and was completed in September through November 1996. Phase IV included the area north and west of the trailer parking lot and was completed in 2004. Phase V included the areas under asphalt and have been deferred as long as there is a protective cover which is monitored annually. Portions of Phase V have been removed as part of utility work.

Phase VI included the area between the east side of the GRC Main Building and the berm on the east side of the railroad tracks and extends north to approximately the southern boundary of the new RP facility. Prior to remediation most of the phase VI area was soil and gravel with limited vegetation and elevated lead surface contamination. Phase VI is divided into three phases: (1) Phase VI-A – railroad crossing area and (2) Phase VI-B1– railroad tracks and ballast along the railroad right-of-way other than the railroad crossing and (3) Phase VI-B2 – remaining area without the railroad tracks. Phase VI-B was divided into two phases because CP Railroad replaced the ballast material under the railroad tracks in this area in August 1997. Contaminated soil and ballast material under the tracks were removed at that time. Phase VI-B2: The entire east side of the railroad tracks of Phase VI-B2 was remediated in 2001 and 2002. Approximately 280 feet of the southeastern portion of the railroad tracks was excavated in 2001. Approximately 930 feet of the northeastern portion of the railroad tracks was excavation in 2002.

Phase VII was a newly identified SWMU as of July 1997 located south of the GRC facility (south of Yankee Doodle Road). Phase VII was divided into two phases – Phase VII-A and Phase VII-B. Phase VII-A included the soil pile south of the GRC facility (south of Yankee Doodle Road) that was stabilized and transported to a RCRA Subtitle D landfill in October 1997. Phase VII-B includes the buried battery chips area that was investigated in June and July 1998 and in August 1999. Prior to remediation most of this area was soil and gravel with limited vegetation containing buried battery chips with minimal lead surface contamination. The Property has been used in recent years by Max Steineger, an excavation contractor until October 2006 and several large piles of recycled materials were located on the Property. The piles included crushed concrete and bituminous products that were crushed, stockpiled and then removed from the Property. American Engineering and Testing performed geotechnical borings across the Property in 1996, 2005 and 2006 to delineate the buried battery chips area (area located on map). After Max Steineger vacated in October 2006 the area was graded and seeded.

Work completed in 2004 included three areas: 1) remediation of Phase IV including the unpaved area north of the main building, trailer storage, northeast of Warehouse D and south of the Resource Plastics recycling facility, 2) new construction of the Praxair Oxygen Plant , and 3) the northwest portion of the Phase VI-B2 area. Prior to remediation most of this area was soil and gravel with vegetation and elevated lead surface contamination. These areas were backfilled with clean soil and vegetative cover/asphalt.

Work completed in 2005 included three areas: 1) the Praxair oxygen line constructed through the storm water outfall area, 2) the Warehouse D expansion to the north and the new spur track leading to the north end of the Warehouse D expansion, 4) a parking lot expansion to the west of the Resource Plastics Building. Prior to remediation most of this area was vegetated soil and elevated lead surface contamination. These areas were backfilled with clean soil and vegetative cover/asphalt.

Other portions of the Property have been remediated as necessary for addition of buildings or replacement of infrastructure (See attached map for remediated areas).

Completed on October 8, 2009 by:

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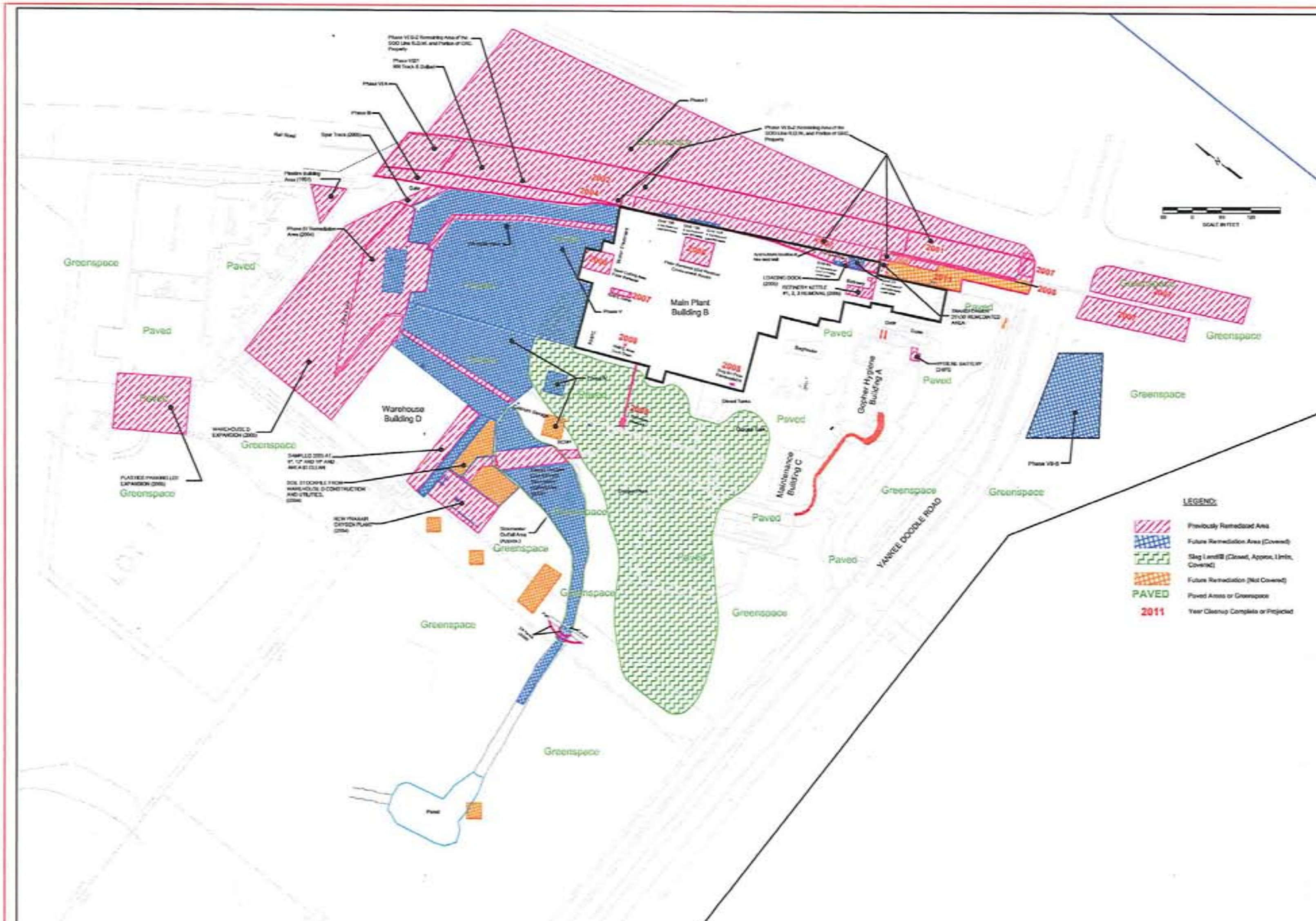
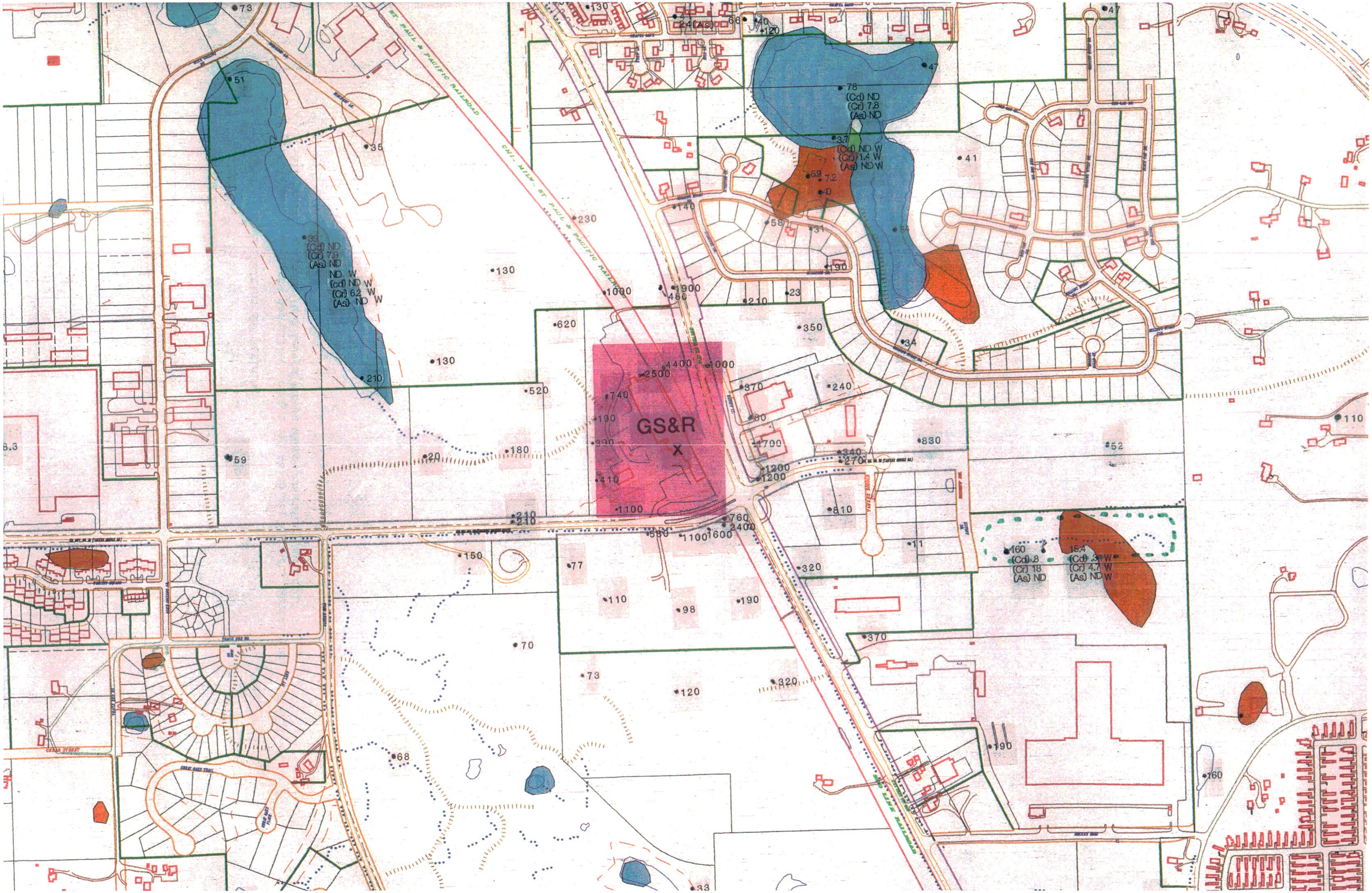


LANDMARK ENVIRONMENTAL, LLC
2042 W. 98th Street
Bloomington, MN 55431

CORRECTIVE MEASURES IMPLEMENTATION
COMPLETED & REMAINING WORK
Gopher Resource Corporation
Eagan, Minnesota

Landmark Project Number: GRC-01-001	
Drawn: CJB	Checked: SKV
Designed: SKV	
Scale: -	Date: 10-02-09
Revision: __	
Drawing Number: GRC/GRC2009CLEANUPCOMPLETE10209	Sheet 1 of Sheets 1



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11

Dakota County Soil Lead Sampling, April 1992

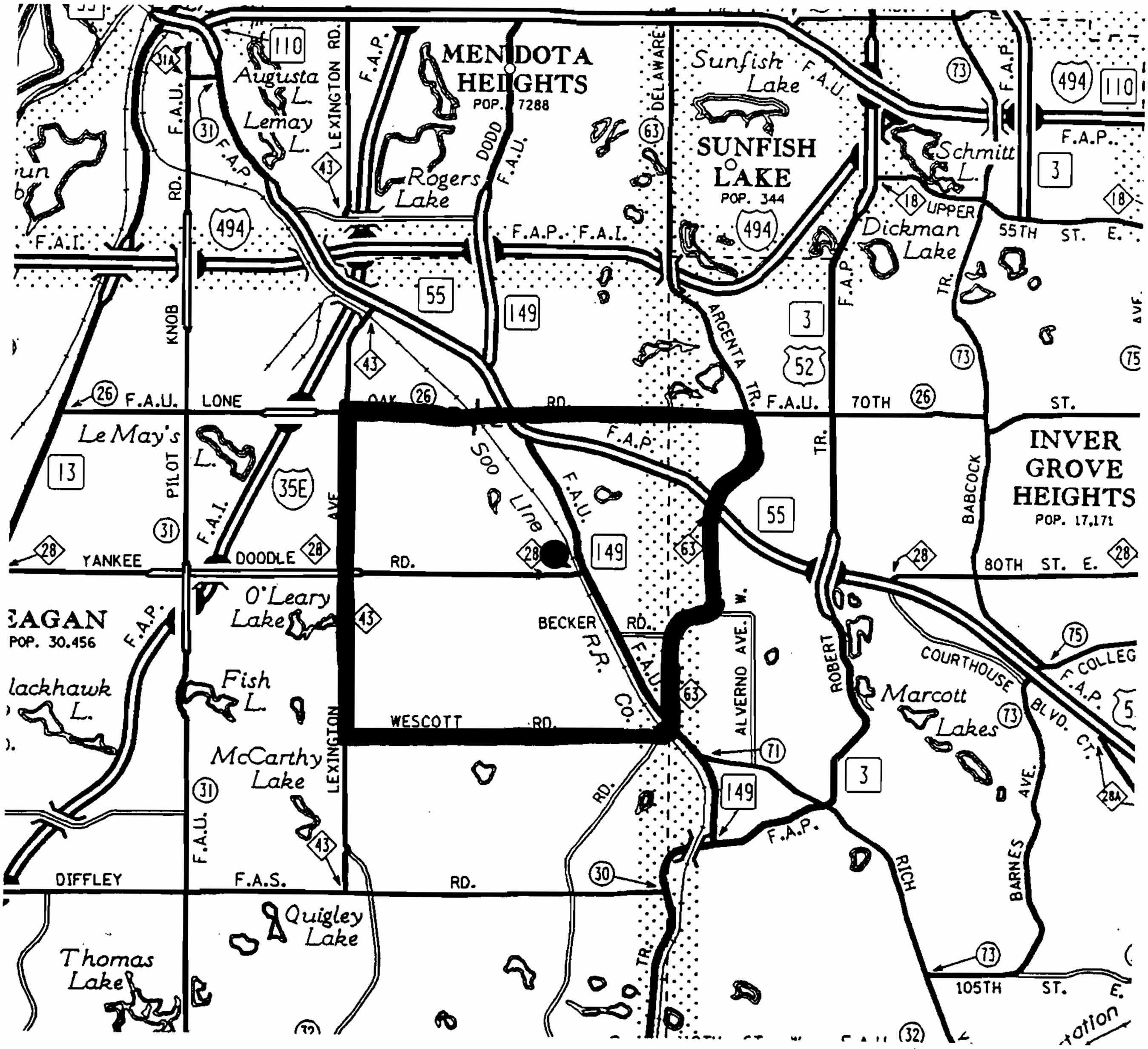
Prepared by : Dakota County Office of Planning, 1994

scale 1 : 6000
1 inch = 500 ft

GS&R - Gopher Smelting and Refining

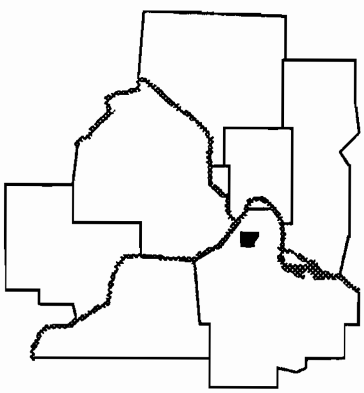
All results in parts per million except (W) which are in parts per billion.
All results indicate lead levels except where otherwise indicated.

Lead Nonattainment Area



KEY -

● - Gopher Smelting & Refining



January 1993

- A portion of the city of Eagan bounded by Lone Oak Road (County Road 26) to the north, County Road 63 to the east, Westcott Road to the south, and Lexington Avenue (County Road 43) to the west.