STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
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FRANKFORT, KY 40601
TELEPHONE: 502-564-3350
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October 5, 2009

Mr. A. Stanley Meiburg
Acting Regional Administrator
U.S. EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303

Re: Lead designation recommendations

Dear Mr. Meiburg:

In accordance with Section 107 (d)(1)(A) of the Clean Air Act (CAA), the governor or the governor's designee of each state is to submit to U.S. EPA, within one year following promulgation of a new or revised National Ambient Air Quality Standard (NAAQS), a list of all areas in the state, recommending designations for each as attainment, nonattainment, or unclassifiable with respect to a new or revised standard for a pollutant.

In a letter dated September 15, 2009, my office was notified that proposed boundary designations are due October 15, 2009, for the new lead primary standard, which reduced the standard from 1.5 micrograms per cubic meter (ug/m^3) established in 1978 to 0.15 ug/m^3.

To assist in this review, U.S. EPA provided a guidance attachment in its August 21, 2009, "Area Designations for the 2008 Revised Lead National Ambient Air Quality Standard" memorandum. The attachment provided a timeline of important dates in the designation process for the revised 2008 lead NAAQS designation process. The memorandum also referenced several factors in the lead NAAQS final rulemaking (73 FR 66964; November 12, 2008) that U.S. EPA recommended as a framework for area-specific analyses to support nonattainment area boundary recommendations and final boundary determinations. Analyses of these factors were used to evaluate whether an area should be designated as attainment (meeting the standard), nonattainment (not meeting the standard), or unclassifiable (area cannot be classified as meeting or not meeting the standard on the basis of available information). If states wish to differ from U.S. EPA's presumptive, then those nine criteria must be addressed to provide arguments for exclusion, or inclusion.

At this time, Kentucky does not have sufficient data to perform this analysis or to make a determination, and further notes that the final rule (73 FR 67032; November 12, 2008) advises State and Tribal officials to identify such areas as "unclassifiable".

In order to comply with those provisions in Section 107 of the CAA, the following designation recommendations for Kentucky counties are being submitted under the revised 2008 lead NAAQS standard.

County	Current Status	Projected Status with Revised Standard
All Kentucky counties	Attainment	Unclassifiable/Attainment

Three lead sources in Kentucky emitting 1.0 tons or greater did not qualify for modeling waivers under Section 4.5(a)(ii) of appendix D to 40 CFR part 58. As a result, Kentucky is expanding the ambient network to collect the required ambient data for these three sources (see attached modeling data).

Kentucky wishes to comply with the CAA and cooperate with U.S. EPA to improve and preserve air quality for the citizens of the Commonwealth. However, these recommendations are dependent on data that is currently unavailable. Under section 107(d)(1)(B) of the Act, EPA has discretion to extend the deadline for up to one year for issuing designations if there is insufficient information. These areas, using information from the expanded lead monitoring network which will be deployed on January 1, 2010, will be designated no later than October 15, 2010.

If you have any questions or comments concerning this matter, please contact John S. Lyons of the Division for Air Quality at (502) 564-3999.

Sincerely Yours,

Leonard K. Peters
Secretary

Enclosures: modeling data
c: Beverly Banister
Dick Schutt

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

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AUG 28 2009
TECHNICAL SERVICES BRANCH
DIVISION FOR AIR QUALITY

AUG 20 2009

Ms. Stephanie B. McCarthy
Manager
Technical Services Branch
Kentucky Division for Air Quality
200 Fair Oaks Lane
Frankfort, Kentucky 40601

Dear Ms. McCarthy:

This is in response to your letter dated June 30, 2009, requesting that the U.S. Environmental Protection Agency (EPA) Region 4 grant a waiver of source-oriented lead (Pb) monitoring requirements for several sources. Ambient air monitoring network design criteria for Pb are found at Section 4.5 of appendix D to 40 CFR part 58. This section requires that, at a minimum, there must be one source-oriented State or Local Air Monitoring Station (SLAMS) located to measure the maximum Pb concentration in ambient air resulting from each Pb source which emits 1.0 or more tons per year. Section 4.5(a)(ii) of appendix D to 40 CFR part 58, however, provides the following provisions for a waiver of these requirements:

> "(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the [National Ambient Air Quality Standards (NAAQS)] (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under 58.10(d)."

The Kentucky Division for Air Quality (KDAQ) has submitted air modeling indicating that the following sources will not contribute to a maximum Pb concentration in the ambient air in excess of 50% the NAAQS:

American Electric Power
Big Sandy Generating Plant
US 23 6 Miles N
Louisa, Kentucky 41230

NewPage Wickliffe Mill
1724 Fort Jefferson Hill Road
Wickliffe, Kentucky 42087

Tennessee Valley Authority
Shawnee Fossil Plant
7900 Metropolis Lake Road
Paducah, Kentucky 42002

North American Stainless
6870 US Highway 42 East
Ghent, Kentucky 41045

EPA has reviewed this information and concurs that the Pb emissions from each of these sources will not contribute to a maximum Pb concentration in the ambient air in excess of 50% the NAAQS. Therefore, EPA is granting a waiver of the source-oriented ambient air monitoring requirements at these sources. The waivers must be renewed once every 5 years as part of the network assessment required under 40 CFR §58.10(d).

EPA also concurs with KDAQ's modeling submitted with the June 30, 2009, letter which indicates that the following sources do not qualify for a waiver of the monitoring requirements.

Enersys
761 Eastern Bypass
Richmond, Kentucky 40475

Superior Battery
2515 Highway 910
Russell Springs, Kentucky 42642

Calgon Carbon
15024 US Route 23
Catlettsburg, Kentucky 41129

KDAQ will be required to conduct ambient air monitoring at these sources under Section 4.5 of appendix D to 40 CFR part 58. Should you have any questions, please feel free to contact Doug Neeley at (404) 562-9097 or Daniel Garver of the EPA Region 4 staff at (404) 562-9839 or via e-mail at Garver.Daniel@epa.gov.

Sincerely,

A. Stanley Meiburg
Acting Regional Administrator

cc: Dick Schutt, EPA R4

Steven L. Beshear
Governor

Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
200 Fair Oaks Lane, 1st Floor
Frankfort, Kentucky 40601-1403
www.air.ky.gov

Leonard K. Peters
Secretary

June 30, 2009

Mr. Doug Neeley, Chief
Air Toxics and Monitoring Branch
Air, Pesticides and Toxics Management Division
U.S. Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303-8960

Dear Mr. Neeley:

The Kentucky Division for Air Quality (DAQ) respectfully submits to you the final 2009 ambient air monitoring network plan. As required by 40 CFR 58.10, the Division made the annual monitoring network plan available for public inspection from May 29, 2009, through June 28, 2009. A public notice detailing the comment process, the location of the network plan, and recommended changes to the network was distributed to 75 individuals on the Division's regulatory notification list and mailed electronically to 290 interested individuals. The annual network plan was also available for inspection on the Division's website at http://www.air.ky.gov. Comments were received from three citizen groups and addressed accordingly.

In November 2008, the EPA revised the national ambient air quality standards (NAAQS) for lead. Pursuant to 40 CFR 58.10(a)(4), a plan for establishing source-oriented lead monitoring sites shall be submitted to the EPA as part of the 2009 annual network plan. Hence, the Division's proposal to address source-oriented lead monitoring within the Commonwealth is included here.

Seven facilities have been identified in Kentucky that potentially emit 1.0 ton per year (tpy) or more of lead. Section 4.5(ii) of Appendix D to 40 CFR 58 allows that some sources may be eligible to receive waivers, if the state agency can demonstrate that the lead source will not contribute to a maximum lead concentration in ambient air in excess of 50% of the NAAQS. With that in mind, the Division has completed extensive modeling of these seven sources.

Recent emissions inventory data, combined with modeling data, indicate that four of the seven lead sources emit significantly less than 1.0 tpy. Consequently, the Division respectfully requests that waivers be granted for these four sources. The enclosed document, *AERMOD Modeling Analysis in Support of the Lead NAAQS Waiver Requests for the State of Kentucky*, and accompanying data files on compact discs, are provided for your consideration.

The proposed or completed modifications to the monitors and monitoring sites operated by DAQ are detailed below, which include those locations where emissions data indicate source-oriented lead monitoring should be established. Information related to monitors operated by Louisville Metro Air Pollution Control District and the National Park Service is not provided in this letter; however, modifications to those monitors and networks are detailed in the enclosed plan. The Division's monitoring network modifications are categorized by MSA, if applicable.

Huntington-Ashland WV-KY-OH, Metropolitan Statistical Area:
Lockwood (21-019-0016)
Emissions inventory data, combined with the Division's modeling analysis, demonstrate that the Calgon Carbon facility emits more than 1.0 tpy lead into the ambient air. Hence, the Division intends to re-establish the Lockwood monitoring station in Catlettsburg. This location meets the siting criteria for lead monitoring; the instrument will be designated as a SLAMS monitor. More detailed information regarding this location is included in the enclosed plan.

Evansville IN-KY, Metropolitan Statistical Area:
Baskett (21-101-0014)
Currently, the Baskett air monitoring station serves as one of the Division's required collocated sites for $PM_{2.5}$. Pursuant to 40 CFR 58, Appendix A, Section 3.2.5.2, eighty percent of collocated $PM_{2.5}$ monitoring sites are to be deployed at locations within ±20% of the NAAQS; the remainder of the sites should be located at sites designated as high value. Upon review of the DAQ $PM_{2.5}$ network, the Division has determined that the Baskett site is not a high value site for $PM_{2.5}$, as compared to the other sites within the network. Hence, the Division proposes removing the collocated $PM_{2.5}$ sampler at Baskett and transferring it to another monitoring station in the network that is a high value site (i.e., Elizabethtown, see below). The Division anticipates completing this modification to the network by October 1, 2009, upon your approval.

Additionally, upon the removal of the collocated $PM_{2.5}$ sampler at Baskett, the Division plans to install a PM_{10} sampler at the site. This instrument will be designated as a SLAMS monitor. The installation of this PM_{10} sampler will satisfy the requirement for a PM_{10} sampler in the Evansville, IN-KY MSA and, subsequently, a Memorandum of Agreement with the State of Indiana will not be necessary.

In regards to the minimum number of ozone monitors required in this MSA, the 2008 projected census estimates that the population is greater than 350,000. The Division expects the 2010 United States Census to confirm this estimate. Therefore, the Division is making plans to establish an additional ozone monitoring station within this MSA, the location of which has yet to be determined, with the intent of having the site operational by March 1, 2011.

Elizabethtown, KY Metropolitan Statistical Area:
Elizabethtown (21-093-0006)
As previously mentioned, the Division plans to install an additional $PM_{2.5}$ FRM sampler at the Elizabethtown site, with a tentative installation date set for October 1, 2009. This sampler will be designated as a SLAMS monitor. The Elizabethtown site will then serve as a collocated site for $PM_{2.5}$ in the DAQ network. This modification will not impact the number of collocated sites in the DAQ network; fifteen percent of the $PM_{2.5}$ FRM monitors will remain collocated, as required.

Cincinnati-Middletown, OH-KY-IN Metropolitan Statistical Area:
Northern Kentucky University (21-037-3002)
The Division recently purchased two Met One BAM 1020 monitors for field deployment; the instruments are designated as a Federal Equivalent Method (FEM) for $PM_{2.5}$. Pursuant to 40 CFR 58, Appendix A, Section 3.2.5., fifteen percent the total number of $PM_{2.5}$ FEM samplers must be collocated. Additionally, for each $PM_{2.5}$ FEM model, 50% of the monitors designated for collocation shall be collocated with an FRM audit monitor. To meet these requirements, DAQ plans to install one Met One BAM monitor at the Northern Kentucky University site. The existing TEOM continuous $PM_{2.5}$ monitor will be removed & replaced with the BAM. The site will then satisfy the collocation requirements, since there is an existing $PM_{2.5}$ FRM in place. The BAM monitor will be designated as a Special Purpose Monitor (SPM).

Somerset, Micropolitan Statistical Area:
Somerset (21-199-0003)
The Division plans to install the second Met One BAM 1020 $PM_{2.5}$ monitor at the Somerset air monitoring station. It will be designated as a SPM. Historically, this site has been utilized for ozone and PM_{10} monitoring only. Considering the growing population in the Somerset area, and because of the lack of historical $PM_{2.5}$ data in this area, the Division believes a continuous $PM_{2.5}$ monitor at Somerset will be beneficial.

Richmond, Micropolitan Statistical Area:
Richmond (21-151-0003)
Emissions inventory data, combined with the Division's modeling analysis, demonstrates that the Enersys facility in Richmond emits more than 1.0 tpy lead into the ambient air. The Division proposes to install lead monitors at the existing $PM_{2.5}$ air monitoring station located at the Mayfield School. This site will also serve as the network's collocated lead site. Both lead samplers will be designated as SLAMS monitors.

Monitoring changes in areas not included in a MSA:
Salem Elementary (Site ID to be determined)
Emissions inventory data, combined with the Division's modeling analysis, demonstrates that Superior Battery in Russell Springs emits more than 1.0 tpy lead into the ambient air. The Division proposes to install a lead monitor at the neighboring Salem Elementary School. The lead sampler will be designated as a SLAMS monitor.

Pikeville (21-195-0002)
In 2008, DAQ requested a temporary reduction in sampling frequency for the Pikeville primary and collocated FRM $PM_{2.5}$ samplers, due to a lack of available staff. The sampling frequency was reduced to 24 hours every sixth day for the primary FRM $PM_{2.5}$ sampler and 24 hours every twelfth day for the collocated sampler. A new site operator was hired in December 2008 and has since been trained. Thus, the Division requests the sampling frequency return to its original schedule: 24 hours every third day for the primary FRM $PM_{2.5}$ sampler and 24 hours every sixth day for the collocated sampler. The proposed modifications to the Pikeville site will be implemented July 1, 2009.

Grayson Lake (21-043-0500)
The two PM_{10} samplers at Grayson Lake were originally on a 24 hours every sixth day sampling schedule for the primary and a 24 hours every twelfth day sampling schedule for the collocated sampler. The collocated Grayson Lake PM_{10} sampler was the only instrument on such a schedule in the DAQ network. For ease in sample preparation in the Division's PM_{10} weigh lab, the Division increased the sampling frequency of the Grayson Lake collocated sampler to a 24 hours every sixth day sampling schedule, effective January 1, 2009.

Thank you for your consideration regarding the enclosed lead waiver request, as well as your suggestions and comments regarding our 2009 network plan. If you have any questions or comments, please contact Andrea Keatley or me at (502) 564-3999.

Sincerely,

Stephanie B. McCarthy

Stephanie B. McCarthy, Manager
Technical Services Branch

SBM/bs

Enclosures (4)

AERMOD Modeling Analysis in Support of the Lead NAAQS Waiver Requests for the State of Kentucky

Introduction

On November 12, 2008, the United States Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standard (NAAQS) for lead. The revised standard is now set at 0.15 μg/m^3 for the primary (health-based) and secondary (welfare-based) standards. In conjunction with the revision of the lead NAAQS, the EPA promulgated new network design criteria, which can be found in 40 CFR Part 58, Appendix D, paragraph 4.5. Source-oriented monitoring is required for those facilities which emit 1.0 ton per year (tpy) or more of lead in the air.

The Kentucky Division for Air Quality (Division) received formal notification from EPA Region 4 in April 2009 of the sources within the Commonwealth that were subject to lead monitoring per the revised regulations. Those seven facilities are listed in this document as ***Appendix A: Kentucky Facilities with Lead Emissions over 1.0 TPY***. The facilities include: American Electric Power – Big Sandy Plant (Big Sandy), in Louisa, KY; Calgon Carbon in Catlettsburg, KY; Enersys in Richmond, KY; Newpage in Wickliffe, KY; North American Stainless (NAS) in Ghent, KY; Superior Battery in Russell Springs, KY; and Tennessee Valley Authority (TVA) Shawnee Fossil Plant in West Paducah, KY.

Section 4.5(ii) of Appendix D to 40 CFR 58 contains waiver provision for source-oriented lead monitoring, if a state or local agency can demonstrate that the lead source will not contribute to a maximum lead concentration in ambient air in excess of one-half of the Pb NAAQS (i.e., 0.075 μg/m^3). Consequently, the Division has modeled the facilities to determine whether or not to pursue waivers. Additionally, recent Kentucky Emissions Inventory data has been reviewed for this purpose.

Emissions Inventory Data

The Division's Emissions Inventory Section (EIS) has compiled calculations for 2006-2008 data for those seven facilities listed in the aforementioned ***Appendix A: Kentucky Facilities with Lead Emissions over 1.0 TPY.***

Emissions Inventory Reports for all seven facilities are included with this document on a compact disc (CD) for review. The CD (labeled KY DAQ EIS Data) also contains Kentucky Emissions Inventory data files for 2006, 2007, and 2008, as well as permits for the facilities in question. Table 1 shows the results of the recent EIS calculations.

Table 1. Kentucky Emissions Inventory Data

Facility Name	Location	2006 Actual Emissions (tpy)	2007 Actual Emissions (tpy)	2008 Actual Emissions (tpy)
Big Sandy	Louisa	2.37	0.61	Not complete
Calgon Carbon	Catlettsburg	6.01	6.06	6.29
Enersys	Richmond	0.11	2.16	1.45
Newpage	Wickliffe	7.39	6.28	Not complete
North American Stainless	Ghent	0.98	0.59	0.65
Superior Battery	Russell Springs	1.35	0.67	0.61
TVA Shawnee	West Paducah	8.33	8.42	8.57

Selection Criteria for the Modeled Facilities

Pursuant to 40 CFR Part 58, Appendix D, paragraph 4.5(a), monitoring agencies must use the most recent National Emissions Inventory (NEI) or other scientifically justifiable data to determine if a facility emits more than 1 tpy of lead. The Division, at the direction of EPA Region 4, chose to use both state emissions inventory data and Toxic Release Inventory (TRI) data from 2006 and 2007. 40 CFR Part 58 Appendix D 4.5 (ii) states: "The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near lead (Pb) sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air *in excess of* 50% of the NAAQS (based on historical monitoring data, modeling, or other means)." The lead NAAQS is based on a 3-month rolling average.

Model Parameters

Urban versus Rural Determination

The facilities modeled in this analysis were all modeled as rural. The rural setting was chosen based on the population density procedure as stated in Section 7.2.3(d) of 40 CFR 51, Appendix W. In addition, none of the facilities modeled fall into a highly industrialized category as mentioned subsequently in Section 7.2.3(e) of Appendix W.

Meteorological Data

In compliance with the EPA air quality modeling guideline found in Section 8.3 of 40 CFR Part 51, Appendix W, the modeling performed for each facility relied on five years of consecutive meteorological data taken from the most representative surface and upper air meteorological stations. A summary of general meteorological modeling data can be found in Table 2. The meteorological data years were chosen in part due to their availability and the completeness of the data. Unfortunately, the funding for more recent data for this particular project, which is in excess of $3,150, was not available. Therefore, the facilities were modeled with meteorological data ranging from 1988 to 1992, or 1989 to 1993, which is free to the public. Data sets deemed complete for the respective five years were chosen.

Table 2. Meteorological Modeling Data

Facility	Met Years	Surface Air Station	Upper Air Station
Big Sandy	1988-1992	Huntington/Tri-State Airport	Huntington/Tri-State Airport
Calgon Carbon	1988-1992	Huntington/Tri-State Airport	Huntington/Tri-State Airport
Enersys	1988-1992	Lexington/Blue-grass Field	Huntington/Tri-State Airport
Newpage	1989-1993	Paducah/WSO Airport	Paducah/WSO Airport
North American Stainless	1988-1992	Covington/ Greater Cincinnati	Dayton/Wright Patterson AFB
Superior Battery	1988-1992	Lexington/Blue-grass Field	Nashville/Int'l Airport
TVA Shawnee Fossil Plant	1989-1993	Paducah/WSO Airport	Paducah/WSO Airport

Representativeness/Surface Characteristics

According to the AERMOD Implementation Modeling Guidelines, the meteorological stations should be representative of the facility. The National Weather Service (NWS) meteorological stations chosen for each facility depended on the facility's location, topography, land use, and surface characteristics in reference to each facility. The surface roughness values at each facility were compared against the surface roughness values of the respective meteorological surface station and modeled separately to determine the difference in surface characteristics between them. In the interest of being conservative towards human health, the surface characteristics which yielded the highest monthly concentration were used in calculating the 3-month rolling average. The surface roughness data (albedo, bowen ratio, and surface roughness values) for each of these facilities and meteorological stations can be found in ***Appendix B: AERSURFACE Tables***. Surface roughness parameters are tabulated in Table 3. In AERSURFACE, the default 1 km radius was chosen, temporal resolution was set to "monthly", 12-30° averaged sectors were used throughout the analysis, and the application site coordinates were set to the facility.

Table 3. AERSURFACE defaults for the Meteorological Stations/Sites Used

Facility	Surface Roughness Radius (km)	Surface Moisture	Temporal Resolution	Number of 30° Sectors
Big Sandy	1.0	Average	Monthly	12
Calgon Carbon	1.0	Average	Monthly	12
Enersys	1.0	Average	Monthly	12
Newpage	1.0	Average	Monthly	12
NAS	1.0	Average	Monthly	12
Superior Battery	1.0	Average	Monthly	12
TVA Shawnee	1.0	Average	Monthly	12

The land use was classified based on the 1992 National Land Cover Data (NLCD 92) which is available from the USGS. The NLCD 92 contains a 21-category land cover classification, which is based on Landsat imagery.

Pollutant Averaging

The pollutant averaging time was set to 1-month. The 1-month average was converted to a 3-month rolling average using the lead post processor, which is available from EPA at http://www.epa.gov/ttn/amtic/pb-monitoring.html.

Building Downwash

Building downwash was not deemed necessary for facilities with very tall stacks, such as those found at coal-fired power plants. The stack heights for both AEP Big Sandy and TVA Shawnee exceed the Good Engineering Practices (GEP) stack heights. In addition, any facility significantly over or under the 0.075 $\mu g/m^3$ lead concentration on a 3-month rolling average did not have the building downwash (BPIP) algorithm applied in the model. Therefore, building downwash was only applied to the modeling for Superior Battery based on preliminary modeling showing a 3-month rolling average concentration at one-half the lead NAAQS.

Lead Emission Sources

The lead sources for each facility are tabulated in ***Appendix C*** of this document. The emission sources are based on the emissions data of the year that triggered the analysis as found in Appendix A.

AEP Big Sandy and TVA Shawnee are both electric utilities. AEP Big Sandy uses 2 pulverized coal (pc) combustors. In the case of TVA Shawnee, 9 pc's and 1 bubbling fluidized bed combustor are used. In addition, both facilities have smaller auxiliary units. Hence, their lead emissions primarily stem from the combustion of coal. Enersys and Superior Battery are both battery manufacturers. Their lead emissions are related to battery plating and manufacture. Calgon Carbon produces activated carbon and carbon-based media. Their primary feedstock is bituminous coal, which is also the source material for their lead emissions. Newpage is a paper producer whose primary lead emission point is their combination boiler. North American Stainless produces stainless steel and their primary lead emissions are from a furnace.

Receptors/Terrain

As stated in Section 8.2.2 of Appendix A to Appendix W of 40 CFR 51, "Receptor sites for refined modeling should be utilized in sufficient detail to estimate the highest concentration and possible violations of a NAAQS or PSD increment. In designing a receptor network, the emphasis should be placed on receptor resolution and location, not total number of receptors. The selection of receptor sites should be a case-by-case determination taking into consideration the topography, the climatology, monitor sites, and the results of the initial screening procedure."

The receptor grid parameters (spacing and number of receptors) were chosen in a way to encompass a majority of the plume as well as the significant impact area (SIA) in which the maximum impact occurs. The receptor grids are optimized to have the maximum concentration occur within a 100x100 meter grid. This is achieved by either expanding a tiered receptor grid or including a separate (uniform Cartesian) grid to cover the maximum impact area.

Digital Elevation Maps (DEM) or National Elevation Data (NED) maps available from the USGS were used for the AERMAP processor for each facility.

Table 4 provides a summary of parameters used in AERMOD, which includes the number and distance between receptors, whether building downwash was used, whether plant boundaries were defined, and what type of terrain data was chosen for the facilities.

Table 4. AERMOD General Summary

Facility	Model	Total Receptors	Receptor Grid Parameters	Building Downwash	Plant Boundaries	Terrain DEM or NED Data
Big Sandy	Airport Model	1604	Distance from Center/Tier Spacing 1000m/100m 5000m/500m 10000m/1000m Plus uniform Cartesian grid 100m x 100m to encompass SIA	No	Yes	NED
	Site Model	1163	Distance from Center/Tier Spacing 1000m/100m 5000m/500m 10000m/1000m	No	Yes	NED
Calgon Carbon	Airport Model	1507	Distance from Center/Tier Spacing 1500m/100m 3500m/500m 8000m/1000m	No	No	NED

	Site Model	1507	Distance from Center/Tier Spacing 1500m/100m 3500m/500m 8000m/1000m	No	No	NED
Enersys	Airport Model	1039	Distance from Center/Tier Spacing 100m/100m 3000m/500m	No	Yes	NED
	Site Model	1039	Distance from Center/Tier Spacing 100m/100m 3000m/500m	No	Yes	NED
NAS	Airport Model	3281	Distance from Center/Tier Spacing 2000m/100m 10000m/500m 15000m/1000m	No	Yes	NED
	Site Model	3281	Distance from Center/Tier Spacing 2000m/100m 10000m/500m 15000m/1000m	No	Yes	NED
NewPage	Airport Model	1594	Distance from Center/Tier Spacing 1000m/100m 5000m/500m 15000m/1000m Plus uniform Cartesian grid 100m x 100m to encompass SIA	No	Yes	NED
	Site Model	1602	Distance from Center/Tier Spacing 1000m/100m 5000m/500m 15000m/1000m Plus uniform Cartesian grid 100m x 100m to encompass SIA	No	Yes	NED
Superior Battery	Airport Model	1410	Distance from Center/Tier Spacing 1500m/100m 3500m/500m 8000m/1000m	Yes	No	NED
	Site Model	1410	Distance from Center/Tier Spacing 1500m/100m 3500m/500m 8000m/1000m	Yes	No	NED
TVA Shawnee	Airport Model	2949	3000m x 3000m Plus uniform Cartesian grid 100m x 100m to encompass SIA	No	Yes	DEM

	Site Model	3556	3000m x 3000m Plus three uniform Cartesian grids: 100m x 100m to encompass SIA 750m x 500m 500m x 1000m	No	Yes	DEM

Non-Default Parameters

The Division used a non-default option in the control pathway. The toxics non-default option was chosen to access the total deposition output. In the source pathway, particulate was selected for gas and particle deposition. Method 2 was selected for handling particle deposition by total particulate mass. Particle inputs for Method 2 consisted of the fine particle fraction equaling 0.75 and the mass mean particle diameter equaling 0.5 microns. These values were selected from Appendix B of the AERMOD Deposition Algorithms - Science Document (Revised Draft) found on EPA's Support Center for Regulatory Air Models (SCRAM) website at http://www.epa.gov/scram001/7thconf/aermod/aer_scid.pdf.

Results

Using the parameters given in this document, the models were run. The results for each facility are tabulated Table 5.

Table 5. 3-Month Rolling Average Concentrations

Facility	Surface Characteristics	One-half Lead NAAQS (μg/m^3)	3-Month Rolling Average Concentration (μg/m^3)
Big Sandy Plant	Airport	0.075	0.034
	Site	0.075	0.050
Calgon Carbon	Airport	0.075	0.289
	Site	0.075	0.286
Enersys	Airport	0.075	0.244
	Site	0.075	0.407
Newpage	Airport	0.075	0.004
	Site	0.075	0.015
North American Stainless	Airport	0.075	0.001
	Site	0.075	0.001
Superior Battery	Airport	0.075	0.982
	Site	0.075	1.341
TVA Shawnee Fossil Plant	Airport	0.075	0.001
	Site	0.075	0.000

Upon review, the output concentrations from the models show that Calgon Carbon, Enersys, and Superior Battery substantially surpass the modeled ambient concentration required to receive a waiver and indicate a modeled exceedance of the new lead NAAQS. Data in Table 5 also illustrate that the 3-month rolling averages for AEP Big Sandy, Newpage, TVA Shawnee, and North American Stainless are substantially below one-half the lead NAAQS.

Modeled Plots

Plots of the modeled high 1st high monthly impacts for the facilities can be found in ***Appendix D*** of this document. These figures are contour plots of the ambient lead concentrations as modeled. Please note, the concentration shown in the figures do not represent a 3-month rolling average but instead represent the highest monthly impact for the meteorological years chosen. Receptors are not placed within plant boundaries for the facilities that have defined fence lines. Air within the plant boundary of these facilities are represented as white areas. The facilities without defined physical barriers delineating the property line have receptors within their plant boundaries in accordance with the definition of ambient air found in 40 CFR 50.1(e). These facilities boundaries are depicted as red boundary lines.

Conclusion

As mentioned previously, modeling has demonstrated that a waiver for monitoring lead at AEP Big Sandy, Newpage, TVA Shawnee, and North American Stainless can be requested based upon a maximum 3-month rolling average at or below one-half the lead NAAQS. The Calgon Carbon, Enersys, and Superior Battery facilities emissions have been modeled and shown to exceed one-half the lead NAAQS. Therefore, Calgon Carbon, Enersys, and Superior Battery should be monitored in accordance with 40 CFR Part 58, Appendix D, paragraph 4.5(a).

Additional Information

Data has been complied for each facility and is available on the attached compact disc (CD) labeled *KY DAQ Lead Modeling Data: AERMOD*. Each facility has a designated folder which contains files specific the airport and site models. Each model has three folders: the Post Processor folder, the AERMET folder, and the AERMOD folder. The Post Processor folder contains the 3-Month Processor Output File (.out), Plot File (.plt), and a Post File (.pos). The AERMET folder contains the Profile File (.pfl) for Upper Air, Surface File (.sfc), AERMET Log File (.log), and the AERMET Output File (.out). The AERMOD folder contains the AERMOD Input File (.adi) and the AERMOD Output File (.ado).

Appendix A. Kentucky Facilities with Lead Emissions over 1.0 TPY

Facility	City	State	Lead Emissions (tpy)	Data Source
AMERICAN ELECTRIC POWER - BIG SANDY PLANT	LOUISA	KY	**2.37**	2006 S/L Data
CALGON CARBON	CATLETTSBURG	KY	**6.06**	2007 S/L Data
ENERSYS	RICHMOND	KY	**2.16**	2007 S/L Data
NEWPAGE	WICKLIFFE	KY	**6.28**	2007 S/L Data
NORTH AMERICAN STAINLESS	GHENT	KY	**1.14**	2007 TRI
SUPERIOR BATTERY	RUSSELL SPRINGS	KY	**1.35**	2006 S/L Data
TVA SHAWNEE FOSSIL PLANT	WEST PADUCAH	KY	**8.42**	2007 S/L Data

Appendix B. AERSURFACE Tables

Superior Battery Airport					Superior Battery Site				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length	Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length
1	1	0.17	0.79	0.067	1	1	0.17	0.79	0.065
1	2	0.17	0.79	0.035	1	2	0.17	0.79	0.079
1	3	0.17	0.79	0.034	1	3	0.17	0.79	0.051
1	4	0.17	0.79	0.036	1	4	0.17	0.79	0.041
1	5	0.17	0.79	0.062	1	5	0.17	0.79	0.05
1	6	0.17	0.79	0.043	1	6	0.17	0.79	0.052
1	7	0.17	0.79	0.042	1	7	0.17	0.79	0.068
1	8	0.17	0.79	0.038	1	8	0.17	0.79	0.103
1	9	0.17	0.79	0.076	1	9	0.17	0.79	0.095
1	10	0.17	0.79	0.08	1	10	0.17	0.79	0.034
1	11	0.17	0.79	0.057	1	11	0.17	0.79	0.073
1	12	0.17	0.79	0.045	1	12	0.17	0.79	0.055
2	1	0.17	0.79	0.067	2	1	0.17	0.79	0.065
2	2	0.17	0.79	0.035	2	2	0.17	0.79	0.079
2	3	0.17	0.79	0.034	2	3	0.17	0.79	0.051
2	4	0.17	0.79	0.036	2	4	0.17	0.79	0.041
2	5	0.17	0.79	0.062	2	5	0.17	0.79	0.05
2	6	0.17	0.79	0.043	2	6	0.17	0.79	0.052
2	7	0.17	0.79	0.042	2	7	0.17	0.79	0.068
2	8	0.17	0.79	0.038	2	8	0.17	0.79	0.103
2	9	0.17	0.79	0.076	2	9	0.17	0.79	0.095
2	10	0.17	0.79	0.08	2	10	0.17	0.79	0.034
2	11	0.17	0.79	0.057	2	11	0.17	0.79	0.073
2	12	0.17	0.79	0.045	2	12	0.17	0.79	0.055
3	1	0.15	0.41	0.075	3	1	0.15	0.43	0.096

3	2	0.15	0.41	0.046	3	2	0.15	0.43	0.116
3	3	0.15	0.41	0.047	3	3	0.15	0.43	0.076
3	4	0.15	0.41	0.05	3	4	0.15	0.43	0.061
3	5	0.15	0.41	0.089	3	5	0.15	0.43	0.074
3	6	0.15	0.41	0.06	3	6	0.15	0.43	0.073
3	7	0.15	0.41	0.057	3	7	0.15	0.43	0.101
3	8	0.15	0.41	0.048	3	8	0.15	0.43	0.154
3	9	0.15	0.41	0.097	3	9	0.15	0.43	0.144
3	10	0.15	0.41	0.1	3	10	0.15	0.43	0.05
3	11	0.15	0.41	0.068	3	11	0.15	0.43	0.102
3	12	0.15	0.41	0.051	3	12	0.15	0.43	0.084
4	1	0.15	0.41	0.075	4	1	0.15	0.43	0.096
4	2	0.15	0.41	0.046	4	2	0.15	0.43	0.116
4	3	0.15	0.41	0.047	4	3	0.15	0.43	0.076
4	4	0.15	0.41	0.05	4	4	0.15	0.43	0.061
4	5	0.15	0.41	0.089	4	5	0.15	0.43	0.074
4	6	0.15	0.41	0.06	4	6	0.15	0.43	0.073
4	7	0.15	0.41	0.057	4	7	0.15	0.43	0.101
4	8	0.15	0.41	0.048	4	8	0.15	0.43	0.154
4	9	0.15	0.41	0.097	4	9	0.15	0.43	0.144
4	10	0.15	0.41	0.1	4	10	0.15	0.43	0.05
4	11	0.15	0.41	0.068	4	11	0.15	0.43	0.102
4	12	0.15	0.41	0.051	4	12	0.15	0.43	0.084
5	1	0.15	0.41	0.075	5	1	0.15	0.43	0.096
5	2	0.15	0.41	0.046	5	2	0.15	0.43	0.116
5	3	0.15	0.41	0.047	5	3	0.15	0.43	0.076
5	4	0.15	0.41	0.05	5	4	0.15	0.43	0.061
5	5	0.15	0.41	0.089	5	5	0.15	0.43	0.074
5	6	0.15	0.41	0.06	5	6	0.15	0.43	0.073
5	7	0.15	0.41	0.057	5	7	0.15	0.43	0.101
5	8	0.15	0.41	0.048	5	8	0.15	0.43	0.154

5	9	0.15	0.41	0.097	5	9	0.15	0.43	0.144
5	10	0.15	0.41	0.1	5	10	0.15	0.43	0.05
5	11	0.15	0.41	0.068	5	11	0.15	0.43	0.102
5	12	0.15	0.41	0.051	5	12	0.15	0.43	0.084
6	1	0.18	0.5	0.094	6	1	0.18	0.4	0.302
6	2	0.18	0.5	0.117	6	2	0.18	0.4	0.341
6	3	0.18	0.5	0.138	6	3	0.18	0.4	0.269
6	4	0.18	0.5	0.16	6	4	0.18	0.4	0.238
6	5	0.18	0.5	0.242	6	5	0.18	0.4	0.257
6	6	0.18	0.5	0.193	6	6	0.18	0.4	0.257
6	7	0.18	0.5	0.107	6	7	0.18	0.4	0.327
6	8	0.18	0.5	0.077	6	8	0.18	0.4	0.411
6	9	0.18	0.5	0.152	6	9	0.18	0.4	0.403
6	10	0.18	0.5	0.127	6	10	0.18	0.4	0.203
6	11	0.18	0.5	0.076	6	11	0.18	0.4	0.31
6	12	0.18	0.5	0.06	6	12	0.18	0.4	0.288
7	1	0.18	0.5	0.094	7	1	0.18	0.4	0.302
7	2	0.18	0.5	0.117	7	2	0.18	0.4	0.341
7	3	0.18	0.5	0.138	7	3	0.18	0.4	0.269
7	4	0.18	0.5	0.16	7	4	0.18	0.4	0.238
7	5	0.18	0.5	0.242	7	5	0.18	0.4	0.257
7	6	0.18	0.5	0.193	7	6	0.18	0.4	0.257
7	7	0.18	0.5	0.107	7	7	0.18	0.4	0.327
7	8	0.18	0.5	0.077	7	8	0.18	0.4	0.411
7	9	0.18	0.5	0.152	7	9	0.18	0.4	0.403
7	10	0.18	0.5	0.127	7	10	0.18	0.4	0.203
7	11	0.18	0.5	0.076	7	11	0.18	0.4	0.31
7	12	0.18	0.5	0.06	7	12	0.18	0.4	0.288
8	1	0.18	0.5	0.094	8	1	0.18	0.4	0.302
8	2	0.18	0.5	0.117	8	2	0.18	0.4	0.341
8	3	0.18	0.5	0.138	8	3	0.18	0.4	0.269

8	4	0.18	0.5	0.16	8	4	0.18	0.4	0.238
8	5	0.18	0.5	0.242	8	5	0.18	0.4	0.257
8	6	0.18	0.5	0.193	8	6	0.18	0.4	0.257
8	7	0.18	0.5	0.107	8	7	0.18	0.4	0.327
8	8	0.18	0.5	0.077	8	8	0.18	0.4	0.411
8	9	0.18	0.5	0.152	8	9	0.18	0.4	0.403
8	10	0.18	0.5	0.127	8	10	0.18	0.4	0.203
8	11	0.18	0.5	0.076	8	11	0.18	0.4	0.31
8	12	0.18	0.5	0.06	8	12	0.18	0.4	0.288
9	1	0.18	0.79	0.091	9	1	0.18	0.79	0.302
9	2	0.18	0.79	0.114	9	2	0.18	0.79	0.341
9	3	0.18	0.79	0.134	9	3	0.18	0.79	0.269
9	4	0.18	0.79	0.158	9	4	0.18	0.79	0.238
9	5	0.18	0.79	0.239	9	5	0.18	0.79	0.257
9	6	0.18	0.79	0.188	9	6	0.18	0.79	0.257
9	7	0.18	0.79	0.097	9	7	0.18	0.79	0.327
9	8	0.18	0.79	0.069	9	8	0.18	0.79	0.411
9	9	0.18	0.79	0.144	9	9	0.18	0.79	0.403
9	10	0.18	0.79	0.118	9	10	0.18	0.79	0.203
9	11	0.18	0.79	0.071	9	11	0.18	0.79	0.31
9	12	0.18	0.79	0.055	9	12	0.18	0.79	0.288
10	1	0.18	0.79	0.091	10	1	0.18	0.79	0.302
10	2	0.18	0.79	0.114	10	2	0.18	0.79	0.341
10	3	0.18	0.79	0.134	10	3	0.18	0.79	0.269
10	4	0.18	0.79	0.158	10	4	0.18	0.79	0.238
10	5	0.18	0.79	0.239	10	5	0.18	0.79	0.257
10	6	0.18	0.79	0.188	10	6	0.18	0.79	0.257
10	7	0.18	0.79	0.097	10	7	0.18	0.79	0.327
10	8	0.18	0.79	0.069	10	8	0.18	0.79	0.411
10	9	0.18	0.79	0.144	10	9	0.18	0.79	0.403
10	10	0.18	0.79	0.118	10	10	0.18	0.79	0.203

10	11	0.18	0.79	0.071	10	11	0.18	0.79	0.31
10	12	0.18	0.79	0.055	10	12	0.18	0.79	0.288
11	1	0.18	0.79	0.091	11	1	0.18	0.79	0.302
11	2	0.18	0.79	0.114	11	2	0.18	0.79	0.341
11	3	0.18	0.79	0.134	11	3	0.18	0.79	0.269
11	4	0.18	0.79	0.158	11	4	0.18	0.79	0.238
11	5	0.18	0.79	0.239	11	5	0.18	0.79	0.257
11	6	0.18	0.79	0.188	11	6	0.18	0.79	0.257
11	7	0.18	0.79	0.097	11	7	0.18	0.79	0.327
11	8	0.18	0.79	0.069	11	8	0.18	0.79	0.411
11	9	0.18	0.79	0.144	11	9	0.18	0.79	0.403
11	10	0.18	0.79	0.118	11	10	0.18	0.79	0.203
11	11	0.18	0.79	0.071	11	11	0.18	0.79	0.31
11	12	0.18	0.79	0.055	11	12	0.18	0.79	0.288
12	1	0.17	0.79	0.067	12	1	0.17	0.79	0.065
12	2	0.17	0.79	0.035	12	2	0.17	0.79	0.079
12	3	0.17	0.79	0.034	12	3	0.17	0.79	0.051
12	4	0.17	0.79	0.036	12	4	0.17	0.79	0.041
12	5	0.17	0.79	0.062	12	5	0.17	0.79	0.05
12	6	0.17	0.79	0.043	12	6	0.17	0.79	0.052
12	7	0.17	0.79	0.042	12	7	0.17	0.79	0.068
12	8	0.17	0.79	0.038	12	8	0.17	0.79	0.103
12	9	0.17	0.79	0.076	12	9	0.17	0.79	0.095
12	10	0.17	0.79	0.08	12	10	0.17	0.79	0.034
12	11	0.17	0.79	0.057	12	11	0.17	0.79	0.073
12	12	0.17	0.79	0.045	12	12	0.17	0.79	0.055

Enersys Airport					Enersys Site				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length	Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length

1	1	0.17	0.79	0.067	1	1	0.17	0.78	0.18
1	2	0.17	0.79	0.035	1	2	0.17	0.78	0.056
1	3	0.17	0.79	0.034	1	3	0.17	0.78	0.143
1	4	0.17	0.79	0.036	1	4	0.17	0.78	0.062
1	5	0.17	0.79	0.062	1	5	0.17	0.78	0.096
1	6	0.17	0.79	0.043	1	6	0.17	0.78	0.149
1	7	0.17	0.79	0.042	1	7	0.17	0.78	0.314
1	8	0.17	0.79	0.038	1	8	0.17	0.78	0.29
1	9	0.17	0.79	0.076	1	9	0.17	0.78	0.519
1	10	0.17	0.79	0.08	1	10	0.17	0.78	0.379
1	11	0.17	0.79	0.057	1	11	0.17	0.78	0.41
1	12	0.17	0.79	0.045	1	12	0.17	0.78	0.24
2	1	0.17	0.79	0.067	2	1	0.17	0.78	0.18
2	2	0.17	0.79	0.035	2	2	0.17	0.78	0.056
2	3	0.17	0.79	0.034	2	3	0.17	0.78	0.143
2	4	0.17	0.79	0.036	2	4	0.17	0.78	0.062
2	5	0.17	0.79	0.062	2	5	0.17	0.78	0.096
2	6	0.17	0.79	0.043	2	6	0.17	0.78	0.149
2	7	0.17	0.79	0.042	2	7	0.17	0.78	0.314
2	8	0.17	0.79	0.038	2	8	0.17	0.78	0.29
2	9	0.17	0.79	0.076	2	9	0.17	0.78	0.519
2	10	0.17	0.79	0.08	2	10	0.17	0.78	0.379
2	11	0.17	0.79	0.057	2	11	0.17	0.78	0.41
2	12	0.17	0.79	0.045	2	12	0.17	0.78	0.24
3	1	0.15	0.41	0.075	3	1	0.14	0.42	0.228
3	2	0.15	0.41	0.046	3	2	0.14	0.42	0.075
3	3	0.15	0.41	0.047	3	3	0.14	0.42	0.181
3	4	0.15	0.41	0.05	3	4	0.14	0.42	0.083
3	5	0.15	0.41	0.089	3	5	0.14	0.42	0.121
3	6	0.15	0.41	0.06	3	6	0.14	0.42	0.183
3	7	0.15	0.41	0.057	3	7	0.14	0.42	0.355

3	8	0.15	0.41	0.048	3	8	0.14	0.42	0.334
3	9	0.15	0.41	0.097	3	9	0.14	0.42	0.56
3	10	0.15	0.41	0.1	3	10	0.14	0.42	0.43
3	11	0.15	0.41	0.068	3	11	0.14	0.42	0.472
3	12	0.15	0.41	0.051	3	12	0.14	0.42	0.284
4	1	0.15	0.41	0.075	4	1	0.14	0.42	0.228
4	2	0.15	0.41	0.046	4	2	0.14	0.42	0.075
4	3	0.15	0.41	0.047	4	3	0.14	0.42	0.181
4	4	0.15	0.41	0.05	4	4	0.14	0.42	0.083
4	5	0.15	0.41	0.089	4	5	0.14	0.42	0.121
4	6	0.15	0.41	0.06	4	6	0.14	0.42	0.183
4	7	0.15	0.41	0.057	4	7	0.14	0.42	0.355
4	8	0.15	0.41	0.048	4	8	0.14	0.42	0.334
4	9	0.15	0.41	0.097	4	9	0.14	0.42	0.56
4	10	0.15	0.41	0.1	4	10	0.14	0.42	0.43
4	11	0.15	0.41	0.068	4	11	0.14	0.42	0.472
4	12	0.15	0.41	0.051	4	12	0.14	0.42	0.284
5	1	0.15	0.41	0.075	5	1	0.14	0.42	0.228
5	2	0.15	0.41	0.046	5	2	0.14	0.42	0.075
5	3	0.15	0.41	0.047	5	3	0.14	0.42	0.181
5	4	0.15	0.41	0.05	5	4	0.14	0.42	0.083
5	5	0.15	0.41	0.089	5	5	0.14	0.42	0.121
5	6	0.15	0.41	0.06	5	6	0.14	0.42	0.183
5	7	0.15	0.41	0.057	5	7	0.14	0.42	0.355
5	8	0.15	0.41	0.048	5	8	0.14	0.42	0.334
5	9	0.15	0.41	0.097	5	9	0.14	0.42	0.56
5	10	0.15	0.41	0.1	5	10	0.14	0.42	0.43
5	11	0.15	0.41	0.068	5	11	0.14	0.42	0.472
5	12	0.15	0.41	0.051	5	12	0.14	0.42	0.284
6	1	0.18	0.5	0.094	6	1	0.18	0.47	0.276
6	2	0.18	0.5	0.117	6	2	0.18	0.47	0.112

6	3	0.18	0.5	0.138	6	3	0.18	0.47	0.373
6	4	0.18	0.5	0.16	6	4	0.18	0.47	0.237
6	5	0.18	0.5	0.242	6	5	0.18	0.47	0.239
6	6	0.18	0.5	0.193	6	6	0.18	0.47	0.356
6	7	0.18	0.5	0.107	6	7	0.18	0.47	0.41
6	8	0.18	0.5	0.077	6	8	0.18	0.47	0.386
6	9	0.18	0.5	0.152	6	9	0.18	0.47	0.59
6	10	0.18	0.5	0.127	6	10	0.18	0.47	0.469
6	11	0.18	0.5	0.076	6	11	0.18	0.47	0.528
6	12	0.18	0.5	0.06	6	12	0.18	0.47	0.325
7	1	0.18	0.5	0.094	7	1	0.18	0.47	0.276
7	2	0.18	0.5	0.117	7	2	0.18	0.47	0.112
7	3	0.18	0.5	0.138	7	3	0.18	0.47	0.373
7	4	0.18	0.5	0.16	7	4	0.18	0.47	0.237
7	5	0.18	0.5	0.242	7	5	0.18	0.47	0.239
7	6	0.18	0.5	0.193	7	6	0.18	0.47	0.356
7	7	0.18	0.5	0.107	7	7	0.18	0.47	0.41
7	8	0.18	0.5	0.077	7	8	0.18	0.47	0.386
7	9	0.18	0.5	0.152	7	9	0.18	0.47	0.59
7	10	0.18	0.5	0.127	7	10	0.18	0.47	0.469
7	11	0.18	0.5	0.076	7	11	0.18	0.47	0.528
7	12	0.18	0.5	0.06	7	12	0.18	0.47	0.325
8	1	0.18	0.5	0.094	8	1	0.18	0.47	0.276
8	2	0.18	0.5	0.117	8	2	0.18	0.47	0.112
8	3	0.18	0.5	0.138	8	3	0.18	0.47	0.373
8	4	0.18	0.5	0.16	8	4	0.18	0.47	0.237
8	5	0.18	0.5	0.242	8	5	0.18	0.47	0.239
8	6	0.18	0.5	0.193	8	6	0.18	0.47	0.356
8	7	0.18	0.5	0.107	8	7	0.18	0.47	0.41
8	8	0.18	0.5	0.077	8	8	0.18	0.47	0.386
8	9	0.18	0.5	0.152	8	9	0.18	0.47	0.59

8	10	0.18	0.5	0.127	8	10	0.18	0.47	0.469
8	11	0.18	0.5	0.076	8	11	0.18	0.47	0.528
8	12	0.18	0.5	0.06	8	12	0.18	0.47	0.325
9	1	0.18	0.79	0.091	9	1	0.18	0.78	0.254
9	2	0.18	0.79	0.114	9	2	0.18	0.78	0.098
9	3	0.18	0.79	0.134	9	3	0.18	0.78	0.367
9	4	0.18	0.79	0.158	9	4	0.18	0.78	0.233
9	5	0.18	0.79	0.239	9	5	0.18	0.78	0.228
9	6	0.18	0.79	0.188	9	6	0.18	0.78	0.348
9	7	0.18	0.79	0.097	9	7	0.18	0.78	0.39
9	8	0.18	0.79	0.069	9	8	0.18	0.78	0.364
9	9	0.18	0.79	0.144	9	9	0.18	0.78	0.574
9	10	0.18	0.79	0.118	9	10	0.18	0.78	0.449
9	11	0.18	0.79	0.071	9	11	0.18	0.78	0.511
9	12	0.18	0.79	0.055	9	12	0.18	0.78	0.304
10	1	0.18	0.79	0.091	10	1	0.18	0.78	0.254
10	2	0.18	0.79	0.114	10	2	0.18	0.78	0.098
10	3	0.18	0.79	0.134	10	3	0.18	0.78	0.367
10	4	0.18	0.79	0.158	10	4	0.18	0.78	0.233
10	5	0.18	0.79	0.239	10	5	0.18	0.78	0.228
10	6	0.18	0.79	0.188	10	6	0.18	0.78	0.348
10	7	0.18	0.79	0.097	10	7	0.18	0.78	0.39
10	8	0.18	0.79	0.069	10	8	0.18	0.78	0.364
10	9	0.18	0.79	0.144	10	9	0.18	0.78	0.574
10	10	0.18	0.79	0.118	10	10	0.18	0.78	0.449
10	11	0.18	0.79	0.071	10	11	0.18	0.78	0.511
10	12	0.18	0.79	0.055	10	12	0.18	0.78	0.304
11	1	0.18	0.79	0.091	11	1	0.18	0.78	0.254
11	2	0.18	0.79	0.114	11	2	0.18	0.78	0.098
11	3	0.18	0.79	0.134	11	3	0.18	0.78	0.367
11	4	0.18	0.79	0.158	11	4	0.18	0.78	0.233

11	5	0.18	0.79	0.239	11	5	0.18	0.78	0.228
11	6	0.18	0.79	0.188	11	6	0.18	0.78	0.348
11	7	0.18	0.79	0.097	11	7	0.18	0.78	0.39
11	8	0.18	0.79	0.069	11	8	0.18	0.78	0.364
11	9	0.18	0.79	0.144	11	9	0.18	0.78	0.574
11	10	0.18	0.79	0.118	11	10	0.18	0.78	0.449
11	11	0.18	0.79	0.071	11	11	0.18	0.78	0.511
11	12	0.18	0.79	0.055	11	12	0.18	0.78	0.304
12	1	0.17	0.79	0.067	12	1	0.17	0.78	0.18
12	2	0.17	0.79	0.035	12	2	0.17	0.78	0.056
12	3	0.17	0.79	0.034	12	3	0.17	0.78	0.143
12	4	0.17	0.79	0.036	12	4	0.17	0.78	0.062
12	5	0.17	0.79	0.062	12	5	0.17	0.78	0.096
12	6	0.17	0.79	0.043	12	6	0.17	0.78	0.149
12	7	0.17	0.79	0.042	12	7	0.17	0.78	0.314
12	8	0.17	0.79	0.038	12	8	0.17	0.78	0.29
12	9	0.17	0.79	0.076	12	9	0.17	0.78	0.519
12	10	0.17	0.79	0.08	12	10	0.17	0.78	0.379
12	11	0.17	0.79	0.057	12	11	0.17	0.78	0.41
12	12	0.17	0.79	0.045	12	12	0.17	0.78	0.24

Big Sandy Airport					Big Sandy Site				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length	Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length
1	1	0.16	0.82	0.232	1	1	0.17	0.93	0.133
1	2	0.16	0.82	0.206	1	2	0.17	0.93	0.028
1	3	0.16	0.82	0.299	1	3	0.17	0.93	0.037
1	4	0.16	0.82	0.488	1	4	0.17	0.93	0.119
1	5	0.16	0.82	0.372	1	5	0.17	0.93	0.106
1	6	0.16	0.82	0.199	1	6	0.17	0.93	0.185

1	7	0.16	0.82	0.192	1	7	0.17	0.93	0.283
1	8	0.16	0.82	0.044	1	8	0.17	0.93	0.272
1	9	0.16	0.82	0.04	1	9	0.17	0.93	0.165
1	10	0.16	0.82	0.06	1	10	0.17	0.93	0.274
1	11	0.16	0.82	0.383	1	11	0.17	0.93	0.402
1	12	0.16	0.82	0.303	1	12	0.17	0.93	0.292
2	1	0.16	0.82	0.232	2	1	0.17	0.93	0.133
2	2	0.16	0.82	0.206	2	2	0.17	0.93	0.028
2	3	0.16	0.82	0.299	2	3	0.17	0.93	0.037
2	4	0.16	0.82	0.488	2	4	0.17	0.93	0.119
2	5	0.16	0.82	0.372	2	5	0.17	0.93	0.106
2	6	0.16	0.82	0.199	2	6	0.17	0.93	0.185
2	7	0.16	0.82	0.192	2	7	0.17	0.93	0.283
2	8	0.16	0.82	0.044	2	8	0.17	0.93	0.272
2	9	0.16	0.82	0.04	2	9	0.17	0.93	0.165
2	10	0.16	0.82	0.06	2	10	0.17	0.93	0.274
2	11	0.16	0.82	0.383	2	11	0.17	0.93	0.402
2	12	0.16	0.82	0.303	2	12	0.17	0.93	0.292
3	1	0.15	0.56	0.356	3	1	0.16	0.64	0.182
3	2	0.15	0.56	0.311	3	2	0.16	0.64	0.035
3	3	0.15	0.56	0.463	3	3	0.16	0.64	0.048
3	4	0.15	0.56	0.772	3	4	0.16	0.64	0.168
3	5	0.15	0.56	0.574	3	5	0.16	0.64	0.152
3	6	0.15	0.56	0.279	3	6	0.16	0.64	0.262
3	7	0.15	0.56	0.28	3	7	0.16	0.64	0.394
3	8	0.15	0.56	0.062	3	8	0.16	0.64	0.351
3	9	0.15	0.56	0.055	3	9	0.16	0.64	0.181
3	10	0.15	0.56	0.079	3	10	0.16	0.64	0.322
3	11	0.15	0.56	0.566	3	11	0.16	0.64	0.626
3	12	0.15	0.56	0.451	3	12	0.16	0.64	0.44
4	1	0.15	0.56	0.356	4	1	0.16	0.64	0.182

4	2	0.15	0.56	0.311	4	2	0.16	0.64	0.035
4	3	0.15	0.56	0.463	4	3	0.16	0.64	0.048
4	4	0.15	0.56	0.772	4	4	0.16	0.64	0.168
4	5	0.15	0.56	0.574	4	5	0.16	0.64	0.152
4	6	0.15	0.56	0.279	4	6	0.16	0.64	0.262
4	7	0.15	0.56	0.28	4	7	0.16	0.64	0.394
4	8	0.15	0.56	0.062	4	8	0.16	0.64	0.351
4	9	0.15	0.56	0.055	4	9	0.16	0.64	0.181
4	10	0.15	0.56	0.079	4	10	0.16	0.64	0.322
4	11	0.15	0.56	0.566	4	11	0.16	0.64	0.626
4	12	0.15	0.56	0.451	4	12	0.16	0.64	0.44
5	1	0.15	0.56	0.356	5	1	0.16	0.64	0.182
5	2	0.15	0.56	0.311	5	2	0.16	0.64	0.035
5	3	0.15	0.56	0.463	5	3	0.16	0.64	0.048
5	4	0.15	0.56	0.772	5	4	0.16	0.64	0.168
5	5	0.15	0.56	0.574	5	5	0.16	0.64	0.152
5	6	0.15	0.56	0.279	5	6	0.16	0.64	0.262
5	7	0.15	0.56	0.28	5	7	0.16	0.64	0.394
5	8	0.15	0.56	0.062	5	8	0.16	0.64	0.351
5	9	0.15	0.56	0.055	5	9	0.16	0.64	0.181
5	10	0.15	0.56	0.079	5	10	0.16	0.64	0.322
5	11	0.15	0.56	0.566	5	11	0.16	0.64	0.626
5	12	0.15	0.56	0.451	5	12	0.16	0.64	0.44
6	1	0.16	0.39	0.684	6	1	0.16	0.32	0.222
6	2	0.16	0.39	0.642	6	2	0.16	0.32	0.039
6	3	0.16	0.39	0.803	6	3	0.16	0.32	0.055
6	4	0.16	0.39	1.096	6	4	0.16	0.32	0.201
6	5	0.16	0.39	0.86	6	5	0.16	0.32	0.201
6	6	0.16	0.39	0.447	6	6	0.16	0.32	0.331
6	7	0.16	0.39	0.434	6	7	0.16	0.32	0.527
6	8	0.16	0.39	0.12	6	8	0.16	0.32	0.416

6	9	0.16	0.39	0.115	6	9	0.16	0.32	0.192
6	10	0.16	0.39	0.123	6	10	0.16	0.32	0.378
6	11	0.16	0.39	0.742	6	11	0.16	0.32	0.834
6	12	0.16	0.39	0.714	6	12	0.16	0.32	0.575
7	1	0.16	0.39	0.684	7	1	0.16	0.32	0.222
7	2	0.16	0.39	0.642	7	2	0.16	0.32	0.039
7	3	0.16	0.39	0.803	7	3	0.16	0.32	0.055
7	4	0.16	0.39	1.096	7	4	0.16	0.32	0.201
7	5	0.16	0.39	0.86	7	5	0.16	0.32	0.201
7	6	0.16	0.39	0.447	7	6	0.16	0.32	0.331
7	7	0.16	0.39	0.434	7	7	0.16	0.32	0.527
7	8	0.16	0.39	0.12	7	8	0.16	0.32	0.416
7	9	0.16	0.39	0.115	7	9	0.16	0.32	0.192
7	10	0.16	0.39	0.123	7	10	0.16	0.32	0.378
7	11	0.16	0.39	0.742	7	11	0.16	0.32	0.834
7	12	0.16	0.39	0.714	7	12	0.16	0.32	0.575
8	1	0.16	0.39	0.684	8	1	0.16	0.32	0.222
8	2	0.16	0.39	0.642	8	2	0.16	0.32	0.039
8	3	0.16	0.39	0.803	8	3	0.16	0.32	0.055
8	4	0.16	0.39	1.096	8	4	0.16	0.32	0.201
8	5	0.16	0.39	0.86	8	5	0.16	0.32	0.201
8	6	0.16	0.39	0.447	8	6	0.16	0.32	0.331
8	7	0.16	0.39	0.434	8	7	0.16	0.32	0.527
8	8	0.16	0.39	0.12	8	8	0.16	0.32	0.416
8	9	0.16	0.39	0.115	8	9	0.16	0.32	0.192
8	10	0.16	0.39	0.123	8	10	0.16	0.32	0.378
8	11	0.16	0.39	0.742	8	11	0.16	0.32	0.834
8	12	0.16	0.39	0.714	8	12	0.16	0.32	0.575
9	1	0.16	0.82	0.684	9	1	0.16	0.93	0.221
9	2	0.16	0.82	0.642	9	2	0.16	0.93	0.039
9	3	0.16	0.82	0.803	9	3	0.16	0.93	0.055

9	4	0.16	0.82	1.096	9	4	0.16	0.93	0.201
9	5	0.16	0.82	0.86	9	5	0.16	0.93	0.201
9	6	0.16	0.82	0.443	9	6	0.16	0.93	0.331
9	7	0.16	0.82	0.42	9	7	0.16	0.93	0.527
9	8	0.16	0.82	0.111	9	8	0.16	0.93	0.415
9	9	0.16	0.82	0.107	9	9	0.16	0.93	0.191
9	10	0.16	0.82	0.115	9	10	0.16	0.93	0.378
9	11	0.16	0.82	0.735	9	11	0.16	0.93	0.834
9	12	0.16	0.82	0.714	9	12	0.16	0.93	0.569
10	1	0.16	0.82	0.684	10	1	0.16	0.93	0.221
10	2	0.16	0.82	0.642	10	2	0.16	0.93	0.039
10	3	0.16	0.82	0.803	10	3	0.16	0.93	0.055
10	4	0.16	0.82	1.096	10	4	0.16	0.93	0.201
10	5	0.16	0.82	0.86	10	5	0.16	0.93	0.201
10	6	0.16	0.82	0.443	10	6	0.16	0.93	0.331
10	7	0.16	0.82	0.42	10	7	0.16	0.93	0.527
10	8	0.16	0.82	0.111	10	8	0.16	0.93	0.415
10	9	0.16	0.82	0.107	10	9	0.16	0.93	0.191
10	10	0.16	0.82	0.115	10	10	0.16	0.93	0.378
10	11	0.16	0.82	0.735	10	11	0.16	0.93	0.834
10	12	0.16	0.82	0.714	10	12	0.16	0.93	0.569
11	1	0.16	0.82	0.684	11	1	0.16	0.93	0.221
11	2	0.16	0.82	0.642	11	2	0.16	0.93	0.039
11	3	0.16	0.82	0.803	11	3	0.16	0.93	0.055
11	4	0.16	0.82	1.096	11	4	0.16	0.93	0.201
11	5	0.16	0.82	0.86	11	5	0.16	0.93	0.201
11	6	0.16	0.82	0.443	11	6	0.16	0.93	0.331
11	7	0.16	0.82	0.42	11	7	0.16	0.93	0.527
11	8	0.16	0.82	0.111	11	8	0.16	0.93	0.415
11	9	0.16	0.82	0.107	11	9	0.16	0.93	0.191
11	10	0.16	0.82	0.115	11	10	0.16	0.93	0.378

11	11	0.16	0.82	0.735	11	11	0.16	0.93	0.834
11	12	0.16	0.82	0.714	11	12	0.16	0.93	0.569
12	1	0.16	0.82	0.232	12	1	0.17	0.93	0.133
12	2	0.16	0.82	0.206	12	2	0.17	0.93	0.028
12	3	0.16	0.82	0.299	12	3	0.17	0.93	0.037
12	4	0.16	0.82	0.488	12	4	0.17	0.93	0.119
12	5	0.16	0.82	0.372	12	5	0.17	0.93	0.106
12	6	0.16	0.82	0.199	12	6	0.17	0.93	0.185
12	7	0.16	0.82	0.192	12	7	0.17	0.93	0.283
12	8	0.16	0.82	0.044	12	8	0.17	0.93	0.272
12	9	0.16	0.82	0.04	12	9	0.17	0.93	0.165
12	10	0.16	0.82	0.06	12	10	0.17	0.93	0.274
12	11	0.16	0.82	0.383	12	11	0.17	0.93	0.402
12	12	0.16	0.82	0.303	12	12	0.17	0.93	0.292

Calgon Carbon Airport					Calgon Carbon Surface				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length	Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length
1	1	0.16	0.82	0.23	1	1	0.17	0.91	0.166
1	2	0.16	0.82	0.208	1	2	0.17	0.91	0.189
1	3	0.16	0.82	0.293	1	3	0.17	0.91	0.097
1	4	0.16	0.82	0.488	1	4	0.17	0.91	0.017
1	5	0.16	0.82	0.373	1	5	0.17	0.91	0.058
1	6	0.16	0.82	0.198	1	6	0.17	0.91	0.689
1	7	0.16	0.82	0.195	1	7	0.17	0.91	0.204
1	8	0.16	0.82	0.041	1	8	0.17	0.91	0.557
1	9	0.16	0.82	0.043	1	9	0.17	0.91	0.279
1	10	0.16	0.82	0.055	1	10	0.17	0.91	0.489
1	11	0.16	0.82	0.383	1	11	0.17	0.91	0.048
1	12	0.16	0.82	0.294	1	12	0.17	0.91	0.146

2	1	0.16	0.82	0.23	2	1	0.17	0.91	0.166
2	2	0.16	0.82	0.208	2	2	0.17	0.91	0.189
2	3	0.16	0.82	0.293	2	3	0.17	0.91	0.097
2	4	0.16	0.82	0.488	2	4	0.17	0.91	0.017
2	5	0.16	0.82	0.373	2	5	0.17	0.91	0.058
2	6	0.16	0.82	0.198	2	6	0.17	0.91	0.689
2	7	0.16	0.82	0.195	2	7	0.17	0.91	0.204
2	8	0.16	0.82	0.041	2	8	0.17	0.91	0.557
2	9	0.16	0.82	0.043	2	9	0.17	0.91	0.279
2	10	0.16	0.82	0.055	2	10	0.17	0.91	0.489
2	11	0.16	0.82	0.383	2	11	0.17	0.91	0.048
2	12	0.16	0.82	0.294	2	12	0.17	0.91	0.146
3	1	0.15	0.56	0.352	3	1	0.15	0.61	0.216
3	2	0.15	0.56	0.317	3	2	0.15	0.61	0.262
3	3	0.15	0.56	0.452	3	3	0.15	0.61	0.126
3	4	0.15	0.56	0.773	3	4	0.15	0.61	0.019
3	5	0.15	0.56	0.575	3	5	0.15	0.61	0.062
3	6	0.15	0.56	0.278	3	6	0.15	0.61	0.877
3	7	0.15	0.56	0.284	3	7	0.15	0.61	0.276
3	8	0.15	0.56	0.058	3	8	0.15	0.61	0.855
3	9	0.15	0.56	0.06	3	9	0.15	0.61	0.407
3	10	0.15	0.56	0.071	3	10	0.15	0.61	0.736
3	11	0.15	0.56	0.565	3	11	0.15	0.61	0.063
3	12	0.15	0.56	0.436	3	12	0.15	0.61	0.178
4	1	0.15	0.56	0.352	4	1	0.15	0.61	0.216
4	2	0.15	0.56	0.317	4	2	0.15	0.61	0.262
4	3	0.15	0.56	0.452	4	3	0.15	0.61	0.126
4	4	0.15	0.56	0.773	4	4	0.15	0.61	0.019
4	5	0.15	0.56	0.575	4	5	0.15	0.61	0.062
4	6	0.15	0.56	0.278	4	6	0.15	0.61	0.877
4	7	0.15	0.56	0.284	4	7	0.15	0.61	0.276

4	8	0.15	0.56	0.058	4	8	0.15	0.61	0.855
4	9	0.15	0.56	0.06	4	9	0.15	0.61	0.407
4	10	0.15	0.56	0.071	4	10	0.15	0.61	0.736
4	11	0.15	0.56	0.565	4	11	0.15	0.61	0.063
4	12	0.15	0.56	0.436	4	12	0.15	0.61	0.178
5	1	0.15	0.56	0.352	5	1	0.15	0.61	0.216
5	2	0.15	0.56	0.317	5	2	0.15	0.61	0.262
5	3	0.15	0.56	0.452	5	3	0.15	0.61	0.126
5	4	0.15	0.56	0.773	5	4	0.15	0.61	0.019
5	5	0.15	0.56	0.575	5	5	0.15	0.61	0.062
5	6	0.15	0.56	0.278	5	6	0.15	0.61	0.877
5	7	0.15	0.56	0.284	5	7	0.15	0.61	0.276
5	8	0.15	0.56	0.058	5	8	0.15	0.61	0.855
5	9	0.15	0.56	0.06	5	9	0.15	0.61	0.407
5	10	0.15	0.56	0.071	5	10	0.15	0.61	0.736
5	11	0.15	0.56	0.565	5	11	0.15	0.61	0.063
5	12	0.15	0.56	0.436	5	12	0.15	0.61	0.178
6	1	0.16	0.39	0.68	6	1	0.16	0.35	0.261
6	2	0.16	0.39	0.65	6	2	0.16	0.35	0.312
6	3	0.16	0.39	0.791	6	3	0.16	0.35	0.159
6	4	0.16	0.39	1.096	6	4	0.16	0.35	0.023
6	5	0.16	0.39	0.857	6	5	0.16	0.35	0.065
6	6	0.16	0.39	0.447	6	6	0.16	0.35	1.003
6	7	0.16	0.39	0.44	6	7	0.16	0.35	0.327
6	8	0.16	0.39	0.116	6	8	0.16	0.35	1.123
6	9	0.16	0.39	0.12	6	9	0.16	0.35	0.618
6	10	0.16	0.39	0.115	6	10	0.16	0.35	1.042
6	11	0.16	0.39	0.738	6	11	0.16	0.35	0.076
6	12	0.16	0.39	0.695	6	12	0.16	0.35	0.247
7	1	0.16	0.39	0.68	7	1	0.16	0.35	0.261
7	2	0.16	0.39	0.65	7	2	0.16	0.35	0.312

7	3	0.16	0.39	0.791	7	3	0.16	0.35	0.159
7	4	0.16	0.39	1.096	7	4	0.16	0.35	0.023
7	5	0.16	0.39	0.857	7	5	0.16	0.35	0.065
7	6	0.16	0.39	0.447	7	6	0.16	0.35	1.003
7	7	0.16	0.39	0.44	7	7	0.16	0.35	0.327
7	8	0.16	0.39	0.116	7	8	0.16	0.35	1.123
7	9	0.16	0.39	0.12	7	9	0.16	0.35	0.618
7	10	0.16	0.39	0.115	7	10	0.16	0.35	1.042
7	11	0.16	0.39	0.738	7	11	0.16	0.35	0.076
7	12	0.16	0.39	0.695	7	12	0.16	0.35	0.247
8	1	0.16	0.39	0.68	8	1	0.16	0.35	0.261
8	2	0.16	0.39	0.65	8	2	0.16	0.35	0.312
8	3	0.16	0.39	0.791	8	3	0.16	0.35	0.159
8	4	0.16	0.39	1.096	8	4	0.16	0.35	0.023
8	5	0.16	0.39	0.857	8	5	0.16	0.35	0.065
8	6	0.16	0.39	0.447	8	6	0.16	0.35	1.003
8	7	0.16	0.39	0.44	8	7	0.16	0.35	0.327
8	8	0.16	0.39	0.116	8	8	0.16	0.35	1.123
8	9	0.16	0.39	0.12	8	9	0.16	0.35	0.618
8	10	0.16	0.39	0.115	8	10	0.16	0.35	1.042
8	11	0.16	0.39	0.738	8	11	0.16	0.35	0.076
8	12	0.16	0.39	0.695	8	12	0.16	0.35	0.247
9	1	0.16	0.82	0.68	9	1	0.16	0.91	0.261
9	2	0.16	0.82	0.65	9	2	0.16	0.91	0.312
9	3	0.16	0.82	0.791	9	3	0.16	0.91	0.159
9	4	0.16	0.82	1.096	9	4	0.16	0.91	0.023
9	5	0.16	0.82	0.857	9	5	0.16	0.91	0.065
9	6	0.16	0.82	0.443	9	6	0.16	0.91	1.003
9	7	0.16	0.82	0.427	9	7	0.16	0.91	0.327
9	8	0.16	0.82	0.107	9	8	0.16	0.91	1.123
9	9	0.16	0.82	0.112	9	9	0.16	0.91	0.618

9	10	0.16	0.82	0.107	9	10	0.16	0.91	1.042
9	11	0.16	0.82	0.731	9	11	0.16	0.91	0.076
9	12	0.16	0.82	0.695	9	12	0.16	0.91	0.247
10	1	0.16	0.82	0.68	10	1	0.16	0.91	0.261
10	2	0.16	0.82	0.65	10	2	0.16	0.91	0.312
10	3	0.16	0.82	0.791	10	3	0.16	0.91	0.159
10	4	0.16	0.82	1.096	10	4	0.16	0.91	0.023
10	5	0.16	0.82	0.857	10	5	0.16	0.91	0.065
10	6	0.16	0.82	0.443	10	6	0.16	0.91	1.003
10	7	0.16	0.82	0.427	10	7	0.16	0.91	0.327
10	8	0.16	0.82	0.107	10	8	0.16	0.91	1.123
10	9	0.16	0.82	0.112	10	9	0.16	0.91	0.618
10	10	0.16	0.82	0.107	10	10	0.16	0.91	1.042
10	11	0.16	0.82	0.731	10	11	0.16	0.91	0.076
10	12	0.16	0.82	0.695	10	12	0.16	0.91	0.247
11	1	0.16	0.82	0.68	11	1	0.16	0.91	0.261
11	2	0.16	0.82	0.65	11	2	0.16	0.91	0.312
11	3	0.16	0.82	0.791	11	3	0.16	0.91	0.159
11	4	0.16	0.82	1.096	11	4	0.16	0.91	0.023
11	5	0.16	0.82	0.857	11	5	0.16	0.91	0.065
11	6	0.16	0.82	0.443	11	6	0.16	0.91	1.003
11	7	0.16	0.82	0.427	11	7	0.16	0.91	0.327
11	8	0.16	0.82	0.107	11	8	0.16	0.91	1.123
11	9	0.16	0.82	0.112	11	9	0.16	0.91	0.618
11	10	0.16	0.82	0.107	11	10	0.16	0.91	1.042
11	11	0.16	0.82	0.731	11	11	0.16	0.91	0.076
11	12	0.16	0.82	0.695	11	12	0.16	0.91	0.247
12	1	0.16	0.82	0.23	12	1	0.17	0.91	0.166
12	2	0.16	0.82	0.208	12	2	0.17	0.91	0.189
12	3	0.16	0.82	0.293	12	3	0.17	0.91	0.097
12	4	0.16	0.82	0.488	12	4	0.17	0.91	0.017

12	5	0.16	0.82	0.373	12	5	0.17	0.91	0.058
12	6	0.16	0.82	0.198	12	6	0.17	0.91	0.689
12	7	0.16	0.82	0.195	12	7	0.17	0.91	0.204
12	8	0.16	0.82	0.041	12	8	0.17	0.91	0.557
12	9	0.16	0.82	0.043	12	9	0.17	0.91	0.279
12	10	0.16	0.82	0.055	12	10	0.17	0.91	0.489
12	11	0.16	0.82	0.383	12	11	0.17	0.91	0.048
12	12	0.16	0.82	0.294	12	12	0.17	0.91	0.146

Newpage Airport					Newpage Site				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length	Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length
1	1	0.17	0.72	0.04	1	1	0.16	0.49	0.492
1	2	0.17	0.72	0.054	1	2	0.16	0.49	0.507
1	3	0.17	0.72	0.037	1	3	0.16	0.49	0.624
1	4	0.17	0.72	0.026	1	4	0.16	0.49	0.422
1	5	0.17	0.72	0.022	1	5	0.16	0.49	0.211
1	6	0.17	0.72	0.022	1	6	0.16	0.49	0.342
1	7	0.17	0.72	0.02	1	7	0.16	0.49	0.385
1	8	0.17	0.72	0.014	1	8	0.16	0.49	0.115
1	9	0.17	0.72	0.017	1	9	0.16	0.49	0.285
1	10	0.17	0.72	0.021	1	10	0.16	0.49	0.536
1	11	0.17	0.72	0.024	1	11	0.16	0.49	0.475
1	12	0.17	0.72	0.028	1	12	0.16	0.49	0.354
2	1	0.17	0.72	0.04	2	1	0.16	0.49	0.492
2	2	0.17	0.72	0.054	2	2	0.16	0.49	0.507
2	3	0.17	0.72	0.037	2	3	0.16	0.49	0.624
2	4	0.17	0.72	0.026	2	4	0.16	0.49	0.422
2	5	0.17	0.72	0.022	2	5	0.16	0.49	0.211

2	6	0.17	0.72	0.022	2	6	0.16	0.49	0.342
2	7	0.17	0.72	0.02	2	7	0.16	0.49	0.385
2	8	0.17	0.72	0.014	2	8	0.16	0.49	0.115
2	9	0.17	0.72	0.017	2	9	0.16	0.49	0.285
2	10	0.17	0.72	0.021	2	10	0.16	0.49	0.536
2	11	0.17	0.72	0.024	2	11	0.16	0.49	0.475
2	12	0.17	0.72	0.028	2	12	0.16	0.49	0.354
3	1	0.14	0.36	0.057	3	1	0.14	0.29	0.684
3	2	0.14	0.36	0.076	3	2	0.14	0.29	0.691
3	3	0.14	0.36	0.053	3	3	0.14	0.29	0.791
3	4	0.14	0.36	0.038	3	4	0.14	0.29	0.446
3	5	0.14	0.36	0.032	3	5	0.14	0.29	0.255
3	6	0.14	0.36	0.03	3	6	0.14	0.29	0.403
3	7	0.14	0.36	0.027	3	7	0.14	0.29	0.442
3	8	0.14	0.36	0.021	3	8	0.14	0.29	0.141
3	9	0.14	0.36	0.025	3	9	0.14	0.29	0.322
3	10	0.14	0.36	0.031	3	10	0.14	0.29	0.62
3	11	0.14	0.36	0.036	3	11	0.14	0.29	0.622
3	12	0.14	0.36	0.042	3	12	0.14	0.29	0.471
4	1	0.14	0.36	0.057	4	1	0.14	0.29	0.684
4	2	0.14	0.36	0.076	4	2	0.14	0.29	0.691
4	3	0.14	0.36	0.053	4	3	0.14	0.29	0.791
4	4	0.14	0.36	0.038	4	4	0.14	0.29	0.446
4	5	0.14	0.36	0.032	4	5	0.14	0.29	0.255
4	6	0.14	0.36	0.03	4	6	0.14	0.29	0.403
4	7	0.14	0.36	0.027	4	7	0.14	0.29	0.442
4	8	0.14	0.36	0.021	4	8	0.14	0.29	0.141
4	9	0.14	0.36	0.025	4	9	0.14	0.29	0.322
4	10	0.14	0.36	0.031	4	10	0.14	0.29	0.62
4	11	0.14	0.36	0.036	4	11	0.14	0.29	0.622
4	12	0.14	0.36	0.042	4	12	0.14	0.29	0.471

5	1	0.14	0.36	0.057	5	1	0.14	0.29	0.684
5	2	0.14	0.36	0.076	5	2	0.14	0.29	0.691
5	3	0.14	0.36	0.053	5	3	0.14	0.29	0.791
5	4	0.14	0.36	0.038	5	4	0.14	0.29	0.446
5	5	0.14	0.36	0.032	5	5	0.14	0.29	0.255
5	6	0.14	0.36	0.03	5	6	0.14	0.29	0.403
5	7	0.14	0.36	0.027	5	7	0.14	0.29	0.442
5	8	0.14	0.36	0.021	5	8	0.14	0.29	0.141
5	9	0.14	0.36	0.025	5	9	0.14	0.29	0.322
5	10	0.14	0.36	0.031	5	10	0.14	0.29	0.62
5	11	0.14	0.36	0.036	5	11	0.14	0.29	0.622
5	12	0.14	0.36	0.042	5	12	0.14	0.29	0.471
6	1	0.19	0.45	0.239	6	1	0.17	0.32	0.929
6	2	0.19	0.45	0.234	6	2	0.17	0.32	0.923
6	3	0.19	0.45	0.189	6	3	0.17	0.32	0.925
6	4	0.19	0.45	0.168	6	4	0.17	0.32	0.475
6	5	0.19	0.45	0.118	6	5	0.17	0.32	0.448
6	6	0.19	0.45	0.059	6	6	0.17	0.32	0.572
6	7	0.19	0.45	0.033	6	7	0.17	0.32	0.574
6	8	0.19	0.45	0.028	6	8	0.17	0.32	0.221
6	9	0.19	0.45	0.041	6	9	0.17	0.32	0.5
6	10	0.19	0.45	0.098	6	10	0.17	0.32	0.739
6	11	0.19	0.45	0.18	6	11	0.17	0.32	0.836
6	12	0.19	0.45	0.163	6	12	0.17	0.32	0.734
7	1	0.19	0.45	0.239	7	1	0.17	0.32	0.929
7	2	0.19	0.45	0.234	7	2	0.17	0.32	0.923
7	3	0.19	0.45	0.189	7	3	0.17	0.32	0.925
7	4	0.19	0.45	0.168	7	4	0.17	0.32	0.475
7	5	0.19	0.45	0.118	7	5	0.17	0.32	0.448
7	6	0.19	0.45	0.059	7	6	0.17	0.32	0.572
7	7	0.19	0.45	0.033	7	7	0.17	0.32	0.574

7	8	0.19	0.45	0.028	7	8	0.17	0.32	0.221
7	9	0.19	0.45	0.041	7	9	0.17	0.32	0.5
7	10	0.19	0.45	0.098	7	10	0.17	0.32	0.739
7	11	0.19	0.45	0.18	7	11	0.17	0.32	0.836
7	12	0.19	0.45	0.163	7	12	0.17	0.32	0.734
8	1	0.19	0.45	0.239	8	1	0.17	0.32	0.929
8	2	0.19	0.45	0.234	8	2	0.17	0.32	0.923
8	3	0.19	0.45	0.189	8	3	0.17	0.32	0.925
8	4	0.19	0.45	0.168	8	4	0.17	0.32	0.475
8	5	0.19	0.45	0.118	8	5	0.17	0.32	0.448
8	6	0.19	0.45	0.059	8	6	0.17	0.32	0.572
8	7	0.19	0.45	0.033	8	7	0.17	0.32	0.574
8	8	0.19	0.45	0.028	8	8	0.17	0.32	0.221
8	9	0.19	0.45	0.041	8	9	0.17	0.32	0.5
8	10	0.19	0.45	0.098	8	10	0.17	0.32	0.739
8	11	0.19	0.45	0.18	8	11	0.17	0.32	0.836
8	12	0.19	0.45	0.163	8	12	0.17	0.32	0.734
9	1	0.19	0.71	0.239	9	1	0.17	0.46	0.929
9	2	0.19	0.71	0.231	9	2	0.17	0.46	0.923
9	3	0.19	0.71	0.187	9	3	0.17	0.46	0.925
9	4	0.19	0.71	0.166	9	4	0.17	0.46	0.475
9	5	0.19	0.71	0.111	9	5	0.17	0.46	0.448
9	6	0.19	0.71	0.052	9	6	0.17	0.46	0.572
9	7	0.19	0.71	0.027	9	7	0.17	0.46	0.57
9	8	0.19	0.71	0.022	9	8	0.17	0.46	0.211
9	9	0.19	0.71	0.034	9	9	0.17	0.46	0.494
9	10	0.19	0.71	0.091	9	10	0.17	0.46	0.738
9	11	0.19	0.71	0.18	9	11	0.17	0.46	0.836
9	12	0.19	0.71	0.157	9	12	0.17	0.46	0.734
10	1	0.19	0.71	0.239	10	1	0.17	0.46	0.929
10	2	0.19	0.71	0.231	10	2	0.17	0.46	0.923

10	3	0.19	0.71	0.187	10	3	0.17	0.46	0.925
10	4	0.19	0.71	0.166	10	4	0.17	0.46	0.475
10	5	0.19	0.71	0.111	10	5	0.17	0.46	0.448
10	6	0.19	0.71	0.052	10	6	0.17	0.46	0.572
10	7	0.19	0.71	0.027	10	7	0.17	0.46	0.57
10	8	0.19	0.71	0.022	10	8	0.17	0.46	0.211
10	9	0.19	0.71	0.034	10	9	0.17	0.46	0.494
10	10	0.19	0.71	0.091	10	10	0.17	0.46	0.738
10	11	0.19	0.71	0.18	10	11	0.17	0.46	0.836
10	12	0.19	0.71	0.157	10	12	0.17	0.46	0.734
11	1	0.19	0.71	0.239	11	1	0.17	0.46	0.929
11	2	0.19	0.71	0.231	11	2	0.17	0.46	0.923
11	3	0.19	0.71	0.187	11	3	0.17	0.46	0.925
11	4	0.19	0.71	0.166	11	4	0.17	0.46	0.475
11	5	0.19	0.71	0.111	11	5	0.17	0.46	0.448
11	6	0.19	0.71	0.052	11	6	0.17	0.46	0.572
11	7	0.19	0.71	0.027	11	7	0.17	0.46	0.57
11	8	0.19	0.71	0.022	11	8	0.17	0.46	0.211
11	9	0.19	0.71	0.034	11	9	0.17	0.46	0.494
11	10	0.19	0.71	0.091	11	10	0.17	0.46	0.738
11	11	0.19	0.71	0.18	11	11	0.17	0.46	0.836
11	12	0.19	0.71	0.157	11	12	0.17	0.46	0.734
12	1	0.17	0.72	0.04	12	1	0.16	0.49	0.492
12	2	0.17	0.72	0.054	12	2	0.16	0.49	0.507
12	3	0.17	0.72	0.037	12	3	0.16	0.49	0.624
12	4	0.17	0.72	0.026	12	4	0.16	0.49	0.422
12	5	0.17	0.72	0.022	12	5	0.16	0.49	0.211
12	6	0.17	0.72	0.022	12	6	0.16	0.49	0.342
12	7	0.17	0.72	0.02	12	7	0.16	0.49	0.385
12	8	0.17	0.72	0.014	12	8	0.16	0.49	0.115
12	9	0.17	0.72	0.017	12	9	0.16	0.49	0.285

12	10	0.17	0.72	0.021	12	10	0.16	0.49	0.536
12	11	0.17	0.72	0.024	12	11	0.16	0.49	0.475
12	12	0.17	0.72	0.028	12	12	0.16	0.49	0.354

TVA Shawnee Airport					TVA Shawnee Site				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length	Month	Sector	Albedo	Bowen Ratio	Surface Roughness Length
1	1	0.17	0.72	0.04	1	1	0.16	0.53	0.048
1	2	0.17	0.72	0.054	1	2	0.16	0.53	0.009
1	3	0.17	0.72	0.037	1	3	0.16	0.53	0.036
1	4	0.17	0.72	0.026	1	4	0.16	0.53	0.109
1	5	0.17	0.72	0.022	1	5	0.16	0.53	0.18
1	6	0.17	0.72	0.022	1	6	0.16	0.53	0.123
1	7	0.17	0.72	0.02	1	7	0.16	0.53	0.18
1	8	0.17	0.72	0.014	1	8	0.16	0.53	0.16
1	9	0.17	0.72	0.017	1	9	0.16	0.53	0.045
1	10	0.17	0.72	0.021	1	10	0.16	0.53	0.009
1	11	0.17	0.72	0.024	1	11	0.16	0.53	0.054
1	12	0.17	0.72	0.028	1	12	0.16	0.53	0.085
2	1	0.17	0.72	0.04	2	1	0.16	0.53	0.048
2	2	0.17	0.72	0.054	2	2	0.16	0.53	0.009
2	3	0.17	0.72	0.037	2	3	0.16	0.53	0.036
2	4	0.17	0.72	0.026	2	4	0.16	0.53	0.109
2	5	0.17	0.72	0.022	2	5	0.16	0.53	0.18
2	6	0.17	0.72	0.022	2	6	0.16	0.53	0.123
2	7	0.17	0.72	0.02	2	7	0.16	0.53	0.18
2	8	0.17	0.72	0.014	2	8	0.16	0.53	0.16
2	9	0.17	0.72	0.017	2	9	0.16	0.53	0.045
2	10	0.17	0.72	0.021	2	10	0.16	0.53	0.009
2	11	0.17	0.72	0.024	2	11	0.16	0.53	0.054
2	12	0.17	0.72	0.028	2	12	0.16	0.53	0.085

3	1	0.14	0.36	0.057	3	1	0.14	0.31	0.056
3	2	0.14	0.36	0.076	3	2	0.14	0.31	0.01
3	3	0.14	0.36	0.053	3	3	0.14	0.31	0.041
3	4	0.14	0.36	0.038	3	4	0.14	0.31	0.129
3	5	0.14	0.36	0.032	3	5	0.14	0.31	0.242
3	6	0.14	0.36	0.03	3	6	0.14	0.31	0.148
3	7	0.14	0.36	0.027	3	7	0.14	0.31	0.199
3	8	0.14	0.36	0.021	3	8	0.14	0.31	0.186
3	9	0.14	0.36	0.025	3	9	0.14	0.31	0.048
3	10	0.14	0.36	0.031	3	10	0.14	0.31	0.009
3	11	0.14	0.36	0.036	3	11	0.14	0.31	0.059
3	12	0.14	0.36	0.042	3	12	0.14	0.31	0.097
4	1	0.14	0.36	0.057	4	1	0.14	0.31	0.056
4	2	0.14	0.36	0.076	4	2	0.14	0.31	0.01
4	3	0.14	0.36	0.053	4	3	0.14	0.31	0.041
4	4	0.14	0.36	0.038	4	4	0.14	0.31	0.129
4	5	0.14	0.36	0.032	4	5	0.14	0.31	0.242
4	6	0.14	0.36	0.03	4	6	0.14	0.31	0.148
4	7	0.14	0.36	0.027	4	7	0.14	0.31	0.199
4	8	0.14	0.36	0.021	4	8	0.14	0.31	0.186
4	9	0.14	0.36	0.025	4	9	0.14	0.31	0.048
4	10	0.14	0.36	0.031	4	10	0.14	0.31	0.009
4	11	0.14	0.36	0.036	4	11	0.14	0.31	0.059
4	12	0.14	0.36	0.042	4	12	0.14	0.31	0.097
5	1	0.14	0.36	0.057	5	1	0.14	0.31	0.056
5	2	0.14	0.36	0.076	5	2	0.14	0.31	0.01
5	3	0.14	0.36	0.053	5	3	0.14	0.31	0.041
5	4	0.14	0.36	0.038	5	4	0.14	0.31	0.129
5	5	0.14	0.36	0.032	5	5	0.14	0.31	0.242
5	6	0.14	0.36	0.03	5	6	0.14	0.31	0.148
5	7	0.14	0.36	0.027	5	7	0.14	0.31	0.199

5	8	0.14	0.36	0.021	5	8	0.14	0.31	0.186
5	9	0.14	0.36	0.025	5	9	0.14	0.31	0.048
5	10	0.14	0.36	0.031	5	10	0.14	0.31	0.009
5	11	0.14	0.36	0.036	5	11	0.14	0.31	0.059
5	12	0.14	0.36	0.042	5	12	0.14	0.31	0.097
6	1	0.19	0.45	0.239	6	1	0.17	0.35	0.062
6	2	0.19	0.45	0.234	6	2	0.17	0.35	0.011
6	3	0.19	0.45	0.189	6	3	0.17	0.35	0.054
6	4	0.19	0.45	0.168	6	4	0.17	0.35	0.172
6	5	0.19	0.45	0.118	6	5	0.17	0.35	0.382
6	6	0.19	0.45	0.059	6	6	0.17	0.35	0.275
6	7	0.19	0.45	0.033	6	7	0.17	0.35	0.281
6	8	0.19	0.45	0.028	6	8	0.17	0.35	0.277
6	9	0.19	0.45	0.041	6	9	0.17	0.35	0.059
6	10	0.19	0.45	0.098	6	10	0.17	0.35	0.009
6	11	0.19	0.45	0.18	6	11	0.17	0.35	0.069
6	12	0.19	0.45	0.163	6	12	0.17	0.35	0.108
7	1	0.19	0.45	0.239	7	1	0.17	0.35	0.062
7	2	0.19	0.45	0.234	7	2	0.17	0.35	0.011
7	3	0.19	0.45	0.189	7	3	0.17	0.35	0.054
7	4	0.19	0.45	0.168	7	4	0.17	0.35	0.172
7	5	0.19	0.45	0.118	7	5	0.17	0.35	0.382
7	6	0.19	0.45	0.059	7	6	0.17	0.35	0.275
7	7	0.19	0.45	0.033	7	7	0.17	0.35	0.281
7	8	0.19	0.45	0.028	7	8	0.17	0.35	0.277
7	9	0.19	0.45	0.041	7	9	0.17	0.35	0.059
7	10	0.19	0.45	0.098	7	10	0.17	0.35	0.009
7	11	0.19	0.45	0.18	7	11	0.17	0.35	0.069
7	12	0.19	0.45	0.163	7	12	0.17	0.35	0.108
8	1	0.19	0.45	0.239	8	1	0.17	0.35	0.062
8	2	0.19	0.45	0.234	8	2	0.17	0.35	0.011

8	3	0.19	0.45	0.189	8	3	0.17	0.35	0.054
8	4	0.19	0.45	0.168	8	4	0.17	0.35	0.172
8	5	0.19	0.45	0.118	8	5	0.17	0.35	0.382
8	6	0.19	0.45	0.059	8	6	0.17	0.35	0.275
8	7	0.19	0.45	0.033	8	7	0.17	0.35	0.281
8	8	0.19	0.45	0.028	8	8	0.17	0.35	0.277
8	9	0.19	0.45	0.041	8	9	0.17	0.35	0.059
8	10	0.19	0.45	0.098	8	10	0.17	0.35	0.009
8	11	0.19	0.45	0.18	8	11	0.17	0.35	0.069
8	12	0.19	0.45	0.163	8	12	0.17	0.35	0.108
9	1	0.19	0.71	0.239	9	1	0.17	0.52	0.062
9	2	0.19	0.71	0.231	9	2	0.17	0.52	0.011
9	3	0.19	0.71	0.187	9	3	0.17	0.52	0.054
9	4	0.19	0.71	0.166	9	4	0.17	0.52	0.172
9	5	0.19	0.71	0.111	9	5	0.17	0.52	0.376
9	6	0.19	0.71	0.052	9	6	0.17	0.52	0.269
9	7	0.19	0.71	0.027	9	7	0.17	0.52	0.278
9	8	0.19	0.71	0.022	9	8	0.17	0.52	0.271
9	9	0.19	0.71	0.034	9	9	0.17	0.52	0.059
9	10	0.19	0.71	0.091	9	10	0.17	0.52	0.009
9	11	0.19	0.71	0.18	9	11	0.17	0.52	0.069
9	12	0.19	0.71	0.157	9	12	0.17	0.52	0.108
10	1	0.19	0.71	0.239	10	1	0.17	0.52	0.062
10	2	0.19	0.71	0.231	10	2	0.17	0.52	0.011
10	3	0.19	0.71	0.187	10	3	0.17	0.52	0.054
10	4	0.19	0.71	0.166	10	4	0.17	0.52	0.172
10	5	0.19	0.71	0.111	10	5	0.17	0.52	0.376
10	6	0.19	0.71	0.052	10	6	0.17	0.52	0.269
10	7	0.19	0.71	0.027	10	7	0.17	0.52	0.278
10	8	0.19	0.71	0.022	10	8	0.17	0.52	0.271
10	9	0.19	0.71	0.034	10	9	0.17	0.52	0.059

10	10	0.19	0.71	0.091	10	10	0.17	0.52	0.009
10	11	0.19	0.71	0.18	10	11	0.17	0.52	0.069
10	12	0.19	0.71	0.157	10	12	0.17	0.52	0.108
11	1	0.19	0.71	0.239	11	1	0.17	0.52	0.062
11	2	0.19	0.71	0.231	11	2	0.17	0.52	0.011
11	3	0.19	0.71	0.187	11	3	0.17	0.52	0.054
11	4	0.19	0.71	0.166	11	4	0.17	0.52	0.172
11	5	0.19	0.71	0.111	11	5	0.17	0.52	0.376
11	6	0.19	0.71	0.052	11	6	0.17	0.52	0.269
11	7	0.19	0.71	0.027	11	7	0.17	0.52	0.278
11	8	0.19	0.71	0.022	11	8	0.17	0.52	0.271
11	9	0.19	0.71	0.034	11	9	0.17	0.52	0.059
11	10	0.19	0.71	0.091	11	10	0.17	0.52	0.009
11	11	0.19	0.71	0.18	11	11	0.17	0.52	0.069
11	12	0.19	0.71	0.157	11	12	0.17	0.52	0.108
12	1	0.17	0.72	0.04	12	1	0.16	0.53	0.048
12	2	0.17	0.72	0.054	12	2	0.16	0.53	0.009
12	3	0.17	0.72	0.037	12	3	0.16	0.53	0.036
12	4	0.17	0.72	0.026	12	4	0.16	0.53	0.109
12	5	0.17	0.72	0.022	12	5	0.16	0.53	0.18
12	6	0.17	0.72	0.022	12	6	0.16	0.53	0.123
12	7	0.17	0.72	0.02	12	7	0.16	0.53	0.18
12	8	0.17	0.72	0.014	12	8	0.16	0.53	0.16
12	9	0.17	0.72	0.017	12	9	0.16	0.53	0.045
12	10	0.17	0.72	0.021	12	10	0.16	0.53	0.009
12	11	0.17	0.72	0.024	12	11	0.16	0.53	0.054
12	12	0.17	0.72	0.028	12	12	0.16	0.53	0.085

North American Stainless Airport					North American Stainless Site				
Month	Sector	Albedo	Bowen Ratio	Surface Roughness	Month	Sector	Albedo	Bowen	Surface Roughness

				Length				Ratio	Length
1	1	0.17	0.79	0.047	1	1	0.16	0.75	0.036
1	2	0.17	0.79	0.061	1	2	0.16	0.75	0.023
1	3	0.17	0.79	0.05	1	3	0.16	0.75	0.05
1	4	0.17	0.79	0.044	1	4	0.16	0.75	0.15
1	5	0.17	0.79	0.053	1	5	0.16	0.75	0.209
1	6	0.17	0.79	0.06	1	6	0.16	0.75	0.167
1	7	0.17	0.79	0.056	1	7	0.16	0.75	0.051
1	8	0.17	0.79	0.034	1	8	0.16	0.75	0.023
1	9	0.17	0.79	0.019	1	9	0.16	0.75	0.026
1	10	0.17	0.79	0.055	1	10	0.16	0.75	0.036
1	11	0.17	0.79	0.04	1	11	0.16	0.75	0.017
1	12	0.17	0.79	0.035	1	12	0.16	0.75	0.022
2	1	0.17	0.79	0.047	2	1	0.16	0.75	0.036
2	2	0.17	0.79	0.061	2	2	0.16	0.75	0.023
2	3	0.17	0.79	0.05	2	3	0.16	0.75	0.05
2	4	0.17	0.79	0.044	2	4	0.16	0.75	0.15
2	5	0.17	0.79	0.053	2	5	0.16	0.75	0.209
2	6	0.17	0.79	0.06	2	6	0.16	0.75	0.167
2	7	0.17	0.79	0.056	2	7	0.16	0.75	0.051
2	8	0.17	0.79	0.034	2	8	0.16	0.75	0.023
2	9	0.17	0.79	0.019	2	9	0.16	0.75	0.026
2	10	0.17	0.79	0.055	2	10	0.16	0.75	0.036
2	11	0.17	0.79	0.04	2	11	0.16	0.75	0.017
2	12	0.17	0.79	0.035	2	12	0.16	0.75	0.022
3	1	0.15	0.49	0.055	3	1	0.15	0.48	0.051
3	2	0.15	0.49	0.067	3	2	0.15	0.48	0.034
3	3	0.15	0.49	0.056	3	3	0.15	0.48	0.076
3	4	0.15	0.49	0.051	3	4	0.15	0.48	0.235
3	5	0.15	0.49	0.062	3	5	0.15	0.48	0.316
3	6	0.15	0.49	0.069	3	6	0.15	0.48	0.265
3	7	0.15	0.49	0.067	3	7	0.15	0.48	0.078

3	8	0.15	0.49	0.043	3	8	0.15	0.48	0.035
3	9	0.15	0.49	0.027	3	9	0.15	0.48	0.039
3	10	0.15	0.49	0.077	3	10	0.15	0.48	0.053
3	11	0.15	0.49	0.052	3	11	0.15	0.48	0.023
3	12	0.15	0.49	0.045	3	12	0.15	0.48	0.029
4	1	0.15	0.49	0.055	4	1	0.15	0.48	0.051
4	2	0.15	0.49	0.067	4	2	0.15	0.48	0.034
4	3	0.15	0.49	0.056	4	3	0.15	0.48	0.076
4	4	0.15	0.49	0.051	4	4	0.15	0.48	0.235
4	5	0.15	0.49	0.062	4	5	0.15	0.48	0.316
4	6	0.15	0.49	0.069	4	6	0.15	0.48	0.265
4	7	0.15	0.49	0.067	4	7	0.15	0.48	0.078
4	8	0.15	0.49	0.043	4	8	0.15	0.48	0.035
4	9	0.15	0.49	0.027	4	9	0.15	0.48	0.039
4	10	0.15	0.49	0.077	4	10	0.15	0.48	0.053
4	11	0.15	0.49	0.052	4	11	0.15	0.48	0.023
4	12	0.15	0.49	0.045	4	12	0.15	0.48	0.029
5	1	0.15	0.49	0.055	5	1	0.15	0.48	0.051
5	2	0.15	0.49	0.067	5	2	0.15	0.48	0.034
5	3	0.15	0.49	0.056	5	3	0.15	0.48	0.076
5	4	0.15	0.49	0.051	5	4	0.15	0.48	0.235
5	5	0.15	0.49	0.062	5	5	0.15	0.48	0.316
5	6	0.15	0.49	0.069	5	6	0.15	0.48	0.265
5	7	0.15	0.49	0.067	5	7	0.15	0.48	0.078
5	8	0.15	0.49	0.043	5	8	0.15	0.48	0.035
5	9	0.15	0.49	0.027	5	9	0.15	0.48	0.039
5	10	0.15	0.49	0.077	5	10	0.15	0.48	0.053
5	11	0.15	0.49	0.052	5	11	0.15	0.48	0.023
5	12	0.15	0.49	0.045	5	12	0.15	0.48	0.029
6	1	0.17	0.44	0.061	6	1	0.16	0.34	0.231
6	2	0.17	0.44	0.071	6	2	0.16	0.34	0.212
6	3	0.17	0.44	0.062	6	3	0.16	0.34	0.325

6	4	0.17	0.44	0.057	6	4	0.16	0.34	0.595
6	5	0.17	0.44	0.069	6	5	0.16	0.34	0.69
6	6	0.17	0.44	0.075	6	6	0.16	0.34	0.638
6	7	0.17	0.44	0.076	6	7	0.16	0.34	0.33
6	8	0.17	0.44	0.051	6	8	0.16	0.34	0.217
6	9	0.17	0.44	0.034	6	9	0.16	0.34	0.226
6	10	0.17	0.44	0.109	6	10	0.16	0.34	0.217
6	11	0.17	0.44	0.079	6	11	0.16	0.34	0.07
6	12	0.17	0.44	0.053	6	12	0.16	0.34	0.09
7	1	0.17	0.44	0.061	7	1	0.16	0.34	0.231
7	2	0.17	0.44	0.071	7	2	0.16	0.34	0.212
7	3	0.17	0.44	0.062	7	3	0.16	0.34	0.325
7	4	0.17	0.44	0.057	7	4	0.16	0.34	0.595
7	5	0.17	0.44	0.069	7	5	0.16	0.34	0.69
7	6	0.17	0.44	0.075	7	6	0.16	0.34	0.638
7	7	0.17	0.44	0.076	7	7	0.16	0.34	0.33
7	8	0.17	0.44	0.051	7	8	0.16	0.34	0.217
7	9	0.17	0.44	0.034	7	9	0.16	0.34	0.226
7	10	0.17	0.44	0.109	7	10	0.16	0.34	0.217
7	11	0.17	0.44	0.079	7	11	0.16	0.34	0.07
7	12	0.17	0.44	0.053	7	12	0.16	0.34	0.09
8	1	0.17	0.44	0.061	8	1	0.16	0.34	0.231
8	2	0.17	0.44	0.071	8	2	0.16	0.34	0.212
8	3	0.17	0.44	0.062	8	3	0.16	0.34	0.325
8	4	0.17	0.44	0.057	8	4	0.16	0.34	0.595
8	5	0.17	0.44	0.069	8	5	0.16	0.34	0.69
8	6	0.17	0.44	0.075	8	6	0.16	0.34	0.638
8	7	0.17	0.44	0.076	8	7	0.16	0.34	0.33
8	8	0.17	0.44	0.051	8	8	0.16	0.34	0.217
8	9	0.17	0.44	0.034	8	9	0.16	0.34	0.226
8	10	0.17	0.44	0.109	8	10	0.16	0.34	0.217
8	11	0.17	0.44	0.079	8	11	0.16	0.34	0.07

8	12	0.17	0.44	0.053	8	12	0.16	0.34	0.09
9	1	0.17	0.78	0.055	9	1	0.16	0.75	0.231
9	2	0.17	0.78	0.067	9	2	0.16	0.75	0.212
9	3	0.17	0.78	0.057	9	3	0.16	0.75	0.325
9	4	0.17	0.78	0.051	9	4	0.16	0.75	0.595
9	5	0.17	0.78	0.063	9	5	0.16	0.75	0.69
9	6	0.17	0.78	0.07	9	6	0.16	0.75	0.638
9	7	0.17	0.78	0.069	9	7	0.16	0.75	0.33
9	8	0.17	0.78	0.044	9	8	0.16	0.75	0.217
9	9	0.17	0.78	0.027	9	9	0.16	0.75	0.226
9	10	0.17	0.78	0.096	9	10	0.16	0.75	0.217
9	11	0.17	0.78	0.07	9	11	0.16	0.75	0.07
9	12	0.17	0.78	0.045	9	12	0.16	0.75	0.09
10	1	0.17	0.78	0.055	10	1	0.16	0.75	0.231
10	2	0.17	0.78	0.067	10	2	0.16	0.75	0.212
10	3	0.17	0.78	0.057	10	3	0.16	0.75	0.325
10	4	0.17	0.78	0.051	10	4	0.16	0.75	0.595
10	5	0.17	0.78	0.063	10	5	0.16	0.75	0.69
10	6	0.17	0.78	0.07	10	6	0.16	0.75	0.638
10	7	0.17	0.78	0.069	10	7	0.16	0.75	0.33
10	8	0.17	0.78	0.044	10	8	0.16	0.75	0.217
10	9	0.17	0.78	0.027	10	9	0.16	0.75	0.226
10	10	0.17	0.78	0.096	10	10	0.16	0.75	0.217
10	11	0.17	0.78	0.07	10	11	0.16	0.75	0.07
10	12	0.17	0.78	0.045	10	12	0.16	0.75	0.09
11	1	0.17	0.78	0.055	11	1	0.16	0.75	0.231
11	2	0.17	0.78	0.067	11	2	0.16	0.75	0.212
11	3	0.17	0.78	0.057	11	3	0.16	0.75	0.325
11	4	0.17	0.78	0.051	11	4	0.16	0.75	0.595
11	5	0.17	0.78	0.063	11	5	0.16	0.75	0.69
11	6	0.17	0.78	0.07	11	6	0.16	0.75	0.638
11	7	0.17	0.78	0.069	11	7	0.16	0.75	0.33

11	8	0.17	0.78	0.044	11	8	0.16	0.75	0.217
11	9	0.17	0.78	0.027	11	9	0.16	0.75	0.226
11	10	0.17	0.78	0.096	11	10	0.16	0.75	0.217
11	11	0.17	0.78	0.07	11	11	0.16	0.75	0.07
11	12	0.17	0.78	0.045	11	12	0.16	0.75	0.09
12	1	0.17	0.79	0.047	12	1	0.16	0.75	0.036
12	2	0.17	0.79	0.061	12	2	0.16	0.75	0.023
12	3	0.17	0.79	0.05	12	3	0.16	0.75	0.05
12	4	0.17	0.79	0.044	12	4	0.16	0.75	0.15
12	5	0.17	0.79	0.053	12	5	0.16	0.75	0.209
12	6	0.17	0.79	0.06	12	6	0.16	0.75	0.167
12	7	0.17	0.79	0.056	12	7	0.16	0.75	0.051
12	8	0.17	0.79	0.034	12	8	0.16	0.75	0.023
12	9	0.17	0.79	0.019	12	9	0.16	0.75	0.026
12	10	0.17	0.79	0.055	12	10	0.16	0.75	0.036
12	11	0.17	0.79	0.04	12	11	0.16	0.75	0.017
12	12	0.17	0.79	0.035	12	12	0.16	0.75	0.022

Appendix C. Lead Emission Sources

Facility	Source ID	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Gas Exit Temperature [K]	Gas Exit Velocity [m/s]	Inside Diameter [m]	Description
Big Sandy	COMB01	358314.98	4226074.65	1.75E+02	250.85	0.126	429.82	29.87	8.595	Unit 1Boiler- Coal Use
	COMB02	358314.98	4226074.28	1.75E+02	250.85	0.126	429.82	29.87	8.595	Unit 2 Boiler-Coal Use
	COMB04	358357.69	4226142.21	1.75E+02	31.09	0.126	659.26	17.983	2.103	Aux. Unit 2 Boiler
Calgon Carbon	045	361167.00	4244297.94	168.08	29.87	0.1744	435.93	18.288	0.853	Reactivation Furnance
Enersys	001	738518	4179618	302.04	17.07	8.97E-05	322.04	17.678	1.524	Grid Casting baghouse (4 total)
	002	738627	4179511	300.6	13.41	0.0001945	299.82	20.726	1.524	Assembly Baghouse (4 total)
	003	738632	4179534	305.25	13.41	0.0001207	299.82	21.031	1.067	Plate Finishing Baghouse (2 total)
	004	738543	4179577	302.16	15.85	0.001701	299.82	25.908	0.61	Iron Clad Filling Baghouse
	005	738545	4179581	302.28	15.85	0.001189	299.82	19.507	0.61	Iron Clad Filling Baghouse
	006	738542	4179573	302.08	15.85	0.01298	299.82	19.507	0.701	Iron Clad Filling Baghouse
	011	738532	4179615	302.32	18.29	9.65E-05	355.37	11.582	0.366	Lead Oxide Mill #1 Baghouse
	021	738538	4179614	302.48	18.29	0.04423	355.37	14.326	0.366	Lead Oxide Mill #2 Baghouse
	024	738636	4179538	306.19	12.19	1.74E-05	299.82	23.774	1.006	Assembly Baghouse
	025	738508	4179616	301.75	12.19	5.54E-05	299.82	17.678	1.433	Pasting Baghouse
	031	738535	4179614	302.39	18.29	3.97E-05	355.37	26.822	0.366	Lead Oxide Mill #3 Baghouse
North American Stainless	S1	666748.47	4287588.65	147.5	64.92	1.40E-09	313.15	21.92	1.219	Natural Gas - Boiler
	S2	666776.71	4287551	147.46	64.92	0.0328	408.15	19.48	4.572	Natural Gas Boiler/Furnace
	S3	667246.62	4287783.1	148.98	29.87	9.75E-06	477.59	10.24	0.914	Furnace
	S4	667027.48	4287593.63	149.29	49.99	3.02E-06	477.59	4.02	1.999	Furnace
Newpage	COMB5009	314777.41	4090785.83	105.78	71.32	1.75E-01	449.82	17.556	2.713	Bark/Combination Boiler
	008	314893.44	4090844.76	109.01	24.38	5.75E-03	349.82	9.144	1.753	Lime Kiln

Superior Battery	PBO1	678882.78	4104156.63	309.88	15.54	6.33E-06	407.04	7.925	0.381	Oxide Mill 1
	PBO2	678888.02	4104159.91	309.75	15.54	6.12E-06	379.82	7.925	0.381	Oxide Mill 2
	C1	678849.23	4104100.07	310.38	13.41	0.0007216	317.04	14.021	1.219	Grid Casting Operation
	P1	678840.57	4104179.77	313.03	13.41	0.0001385	338.71	9.754	1.524	Pasting Operation
	3P_AB	678797	4104154	314.49	13.11	0.002087	310.93	7.01	1.829	3 Process Operation a&b Lines
	3P_C	678839.45	4104378.74	313.99	12.19	0.03577	310.93	10.668	1.067	3 Process Operation c Lines
	SP_1	678835.72	4104354.56	314.41	7.62	4.32E-08	310.93	14.021	2.53	Smalls Parts Casting
	SP_2	678851.22	4104354.37	314.47	6.1	5.75E-10	310.93	14.021	0.253	Battery Cable Manufacturing
TVA Shawnee	STCK1	342436.92	4113016.64	94.71	243.84	0.1211	429.82	29.428	8.534	Units 1-5
	STCK2	342087.82	4113168.96	95.89	243.84	0.1211	422.04	29.632	8.53	Units 6-10

Appendix D

Figure 1. Big Sandy-Airport, High 1st High Monthly Average Concentration, Entire Domain

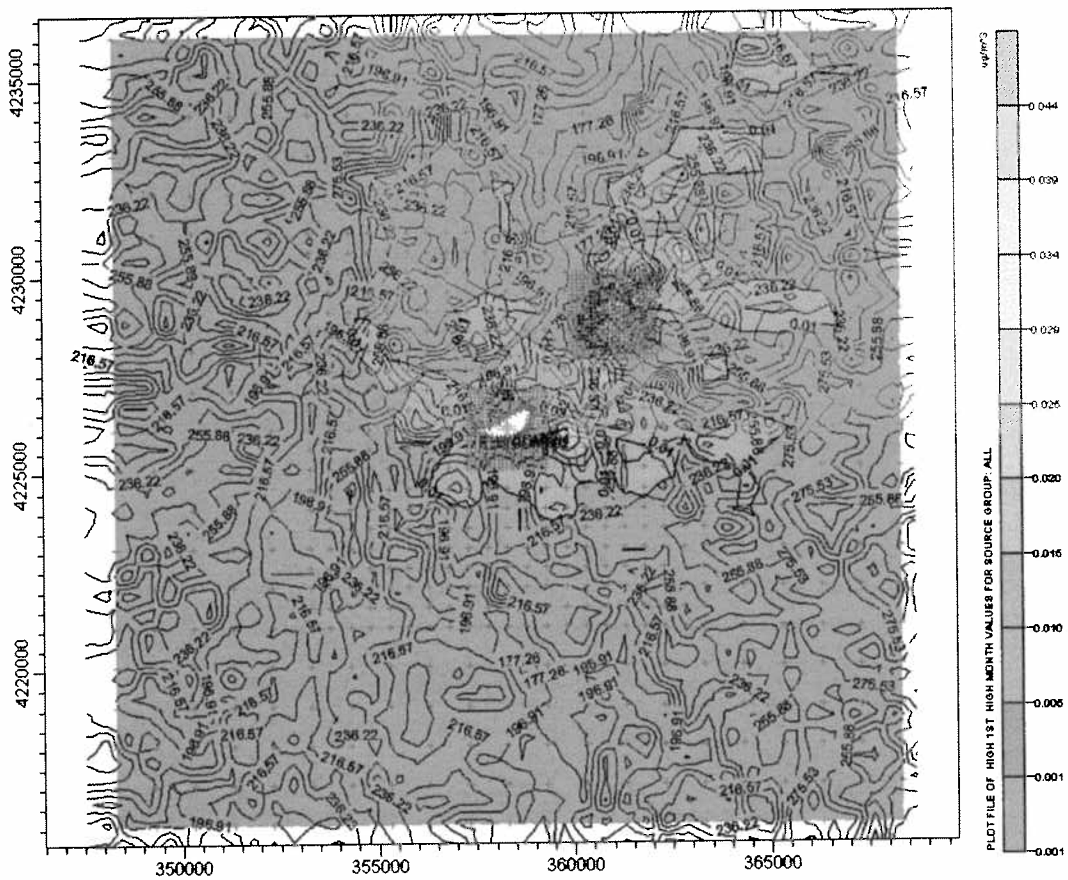

Figure 1.1 Big Sandy-Airport, High 1st High Monthly Average Concentration, Controlling Concentration

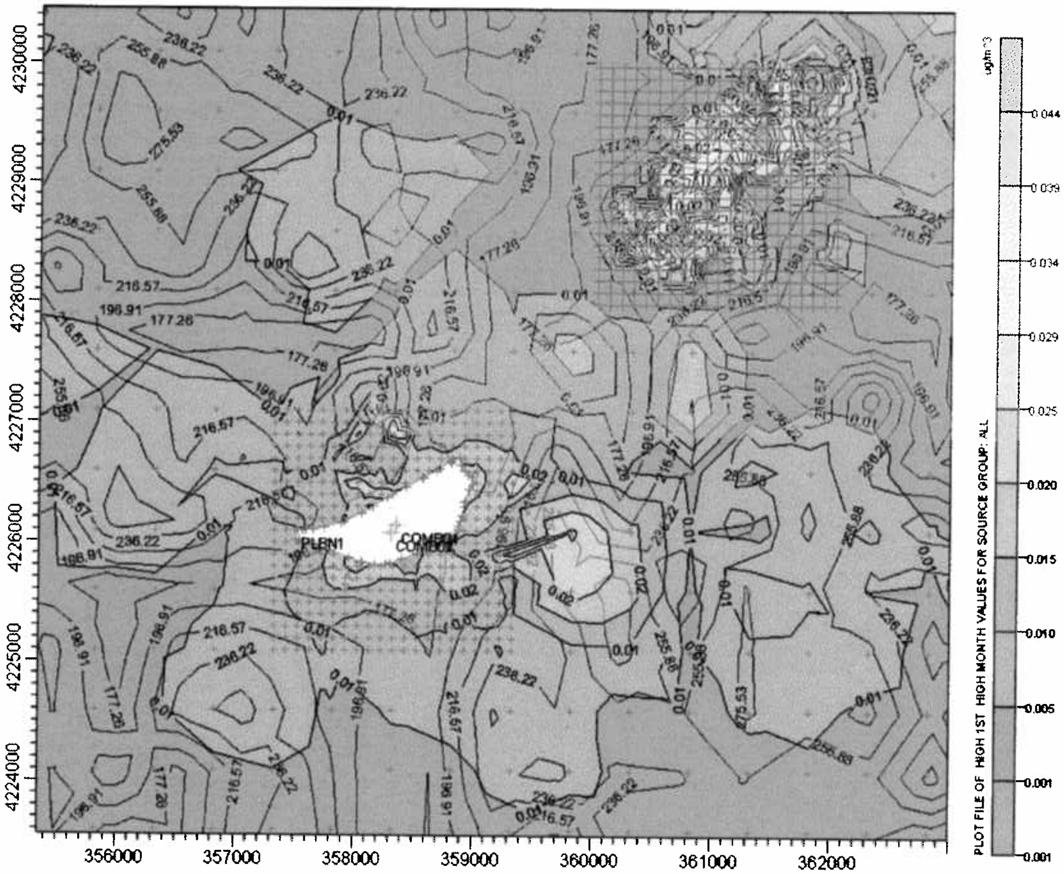

Figure 2. Big Sandy-Site, High 1st High Monthly Average Concentration, Entire Domain

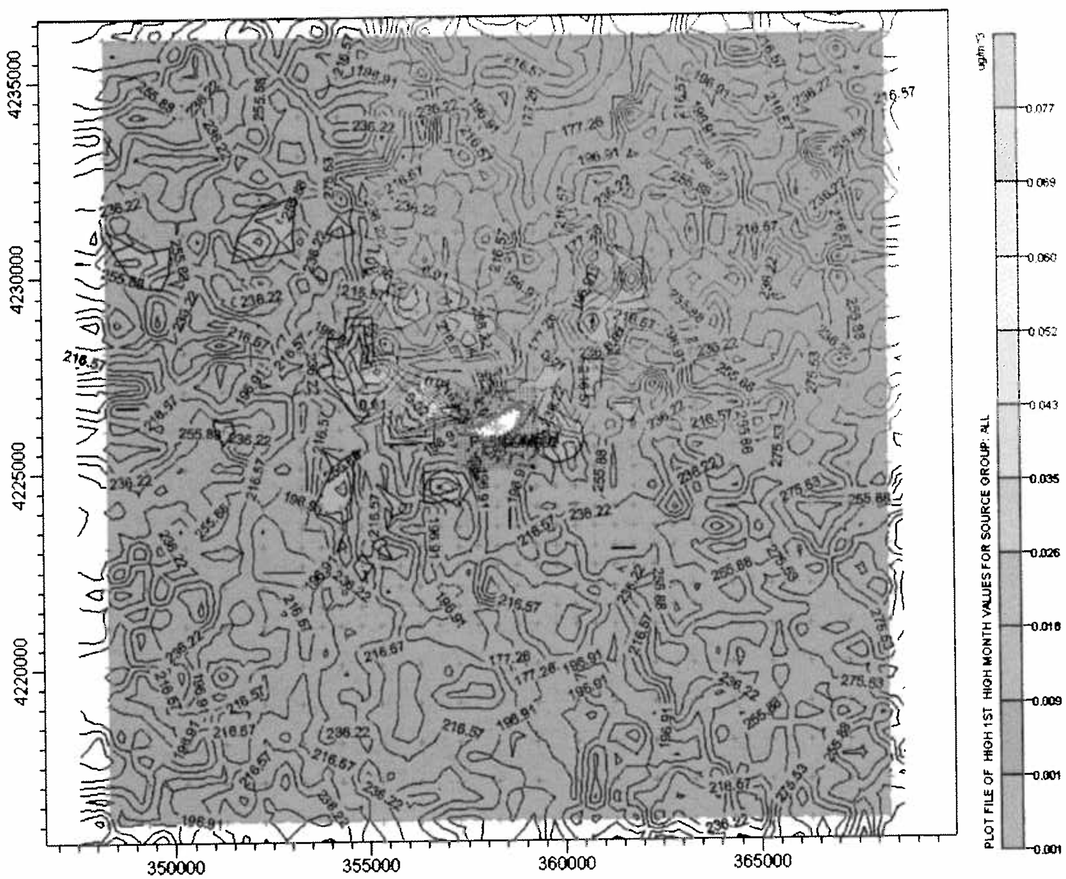

Figure 2.1 Big Sandy-Site, High 1st High Monthly Average Concentration, Controlling Concentration

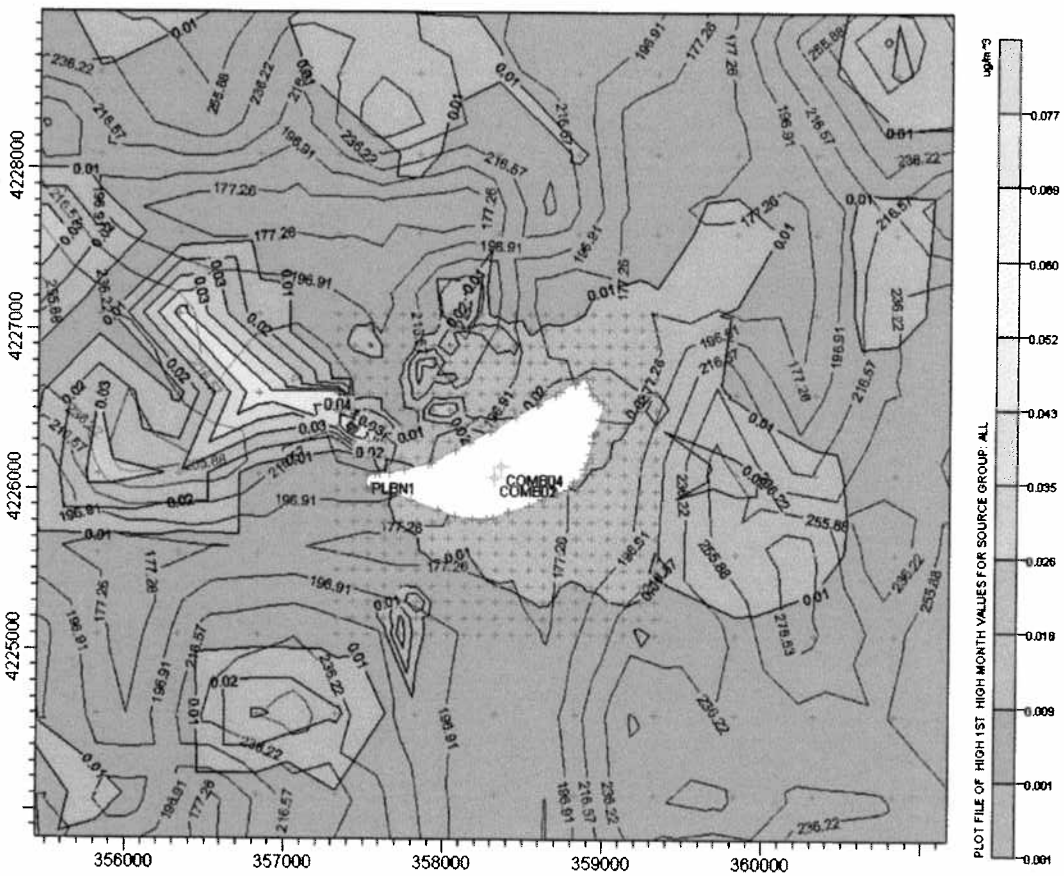

Figure 3. Calgon Carbon-Airport, High 1st High Monthly Average Concentration, Entire Domain

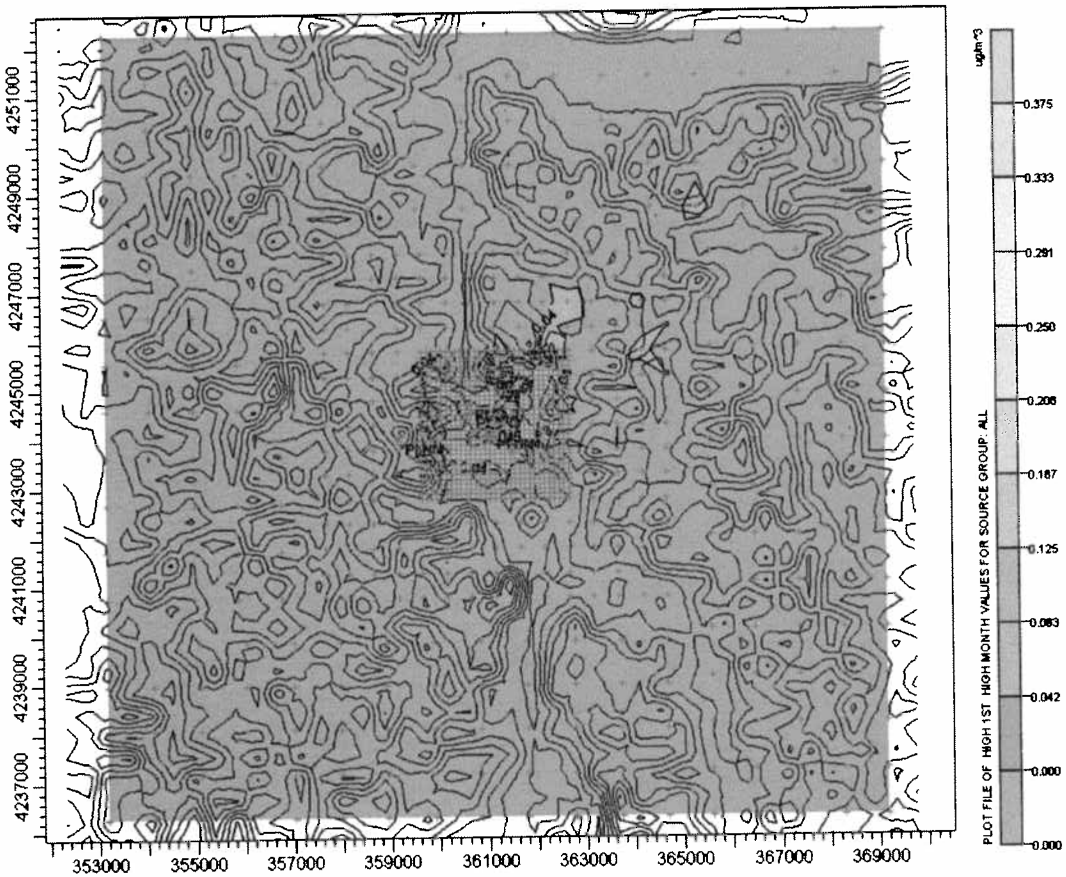

Figure 3.1 Calgon Carbon-Airport, High 1st High Monthly Average Concentration, Controlling Concentration

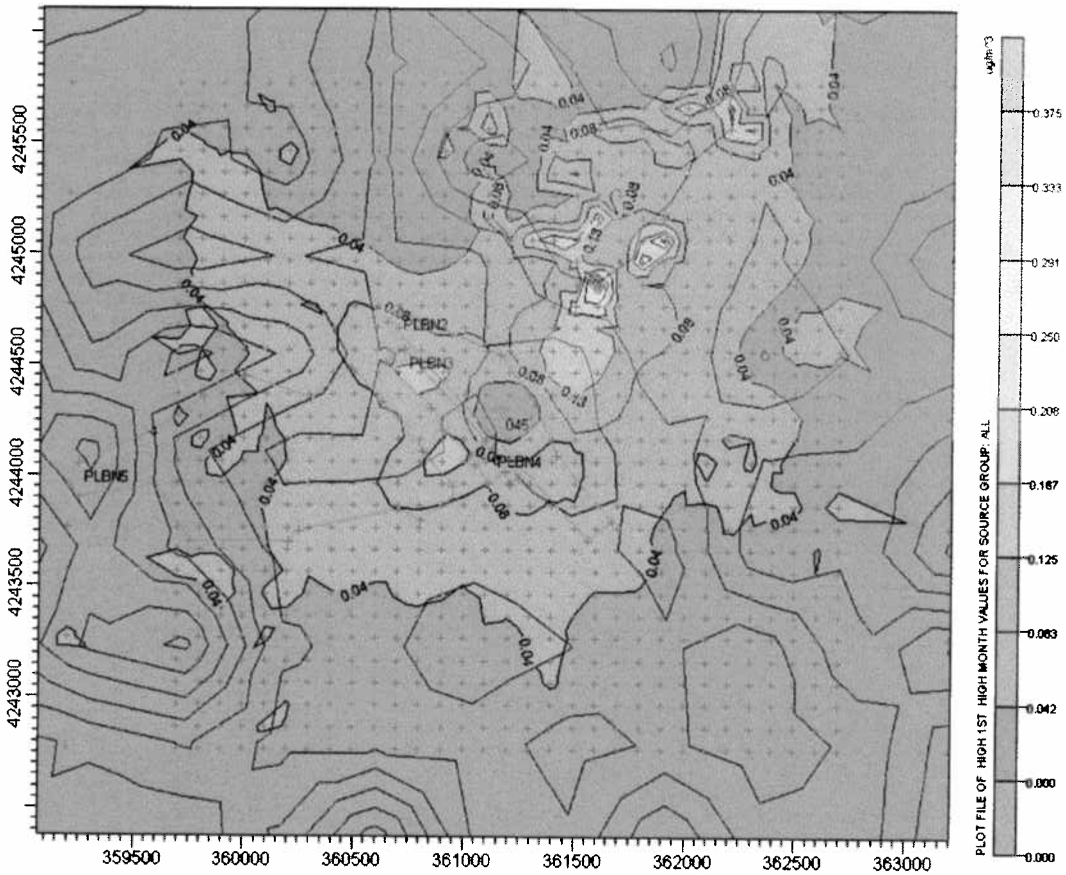

Figure 4. Calgon Carbon-Site, High 1st High Monthly Average Concentration, Entire Domain

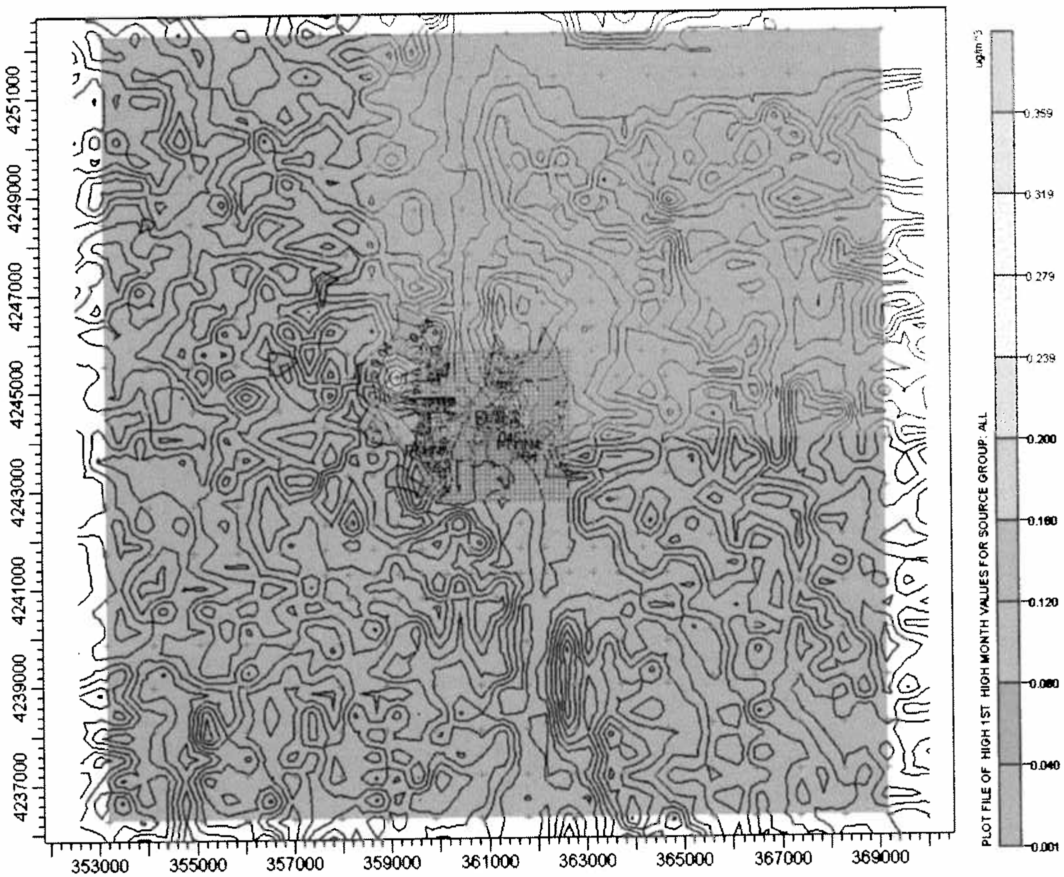

Figure 4.1 Calgon Carbon-Site, High 1st High Monthly Average Concentration, Controlling Concentration

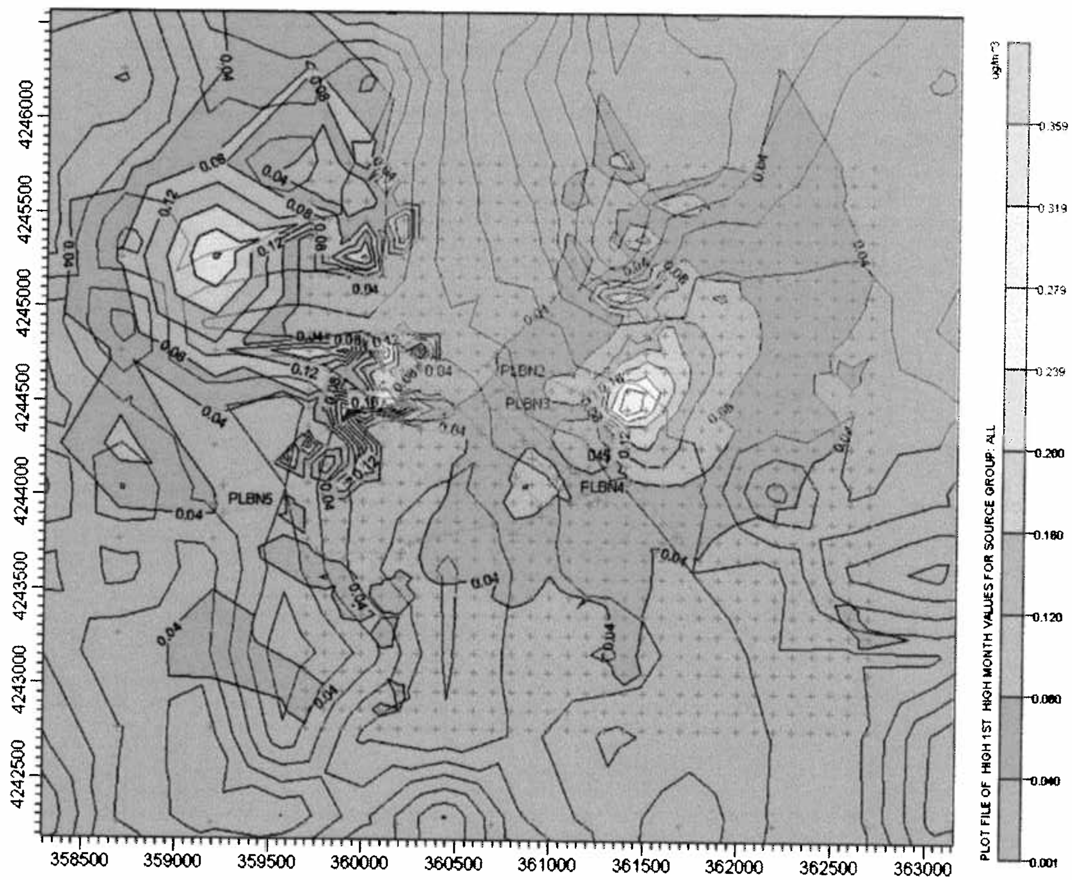

Figure 5. Enersys-Airport, High 1st High Monthly Average Concentration, Entire Domain

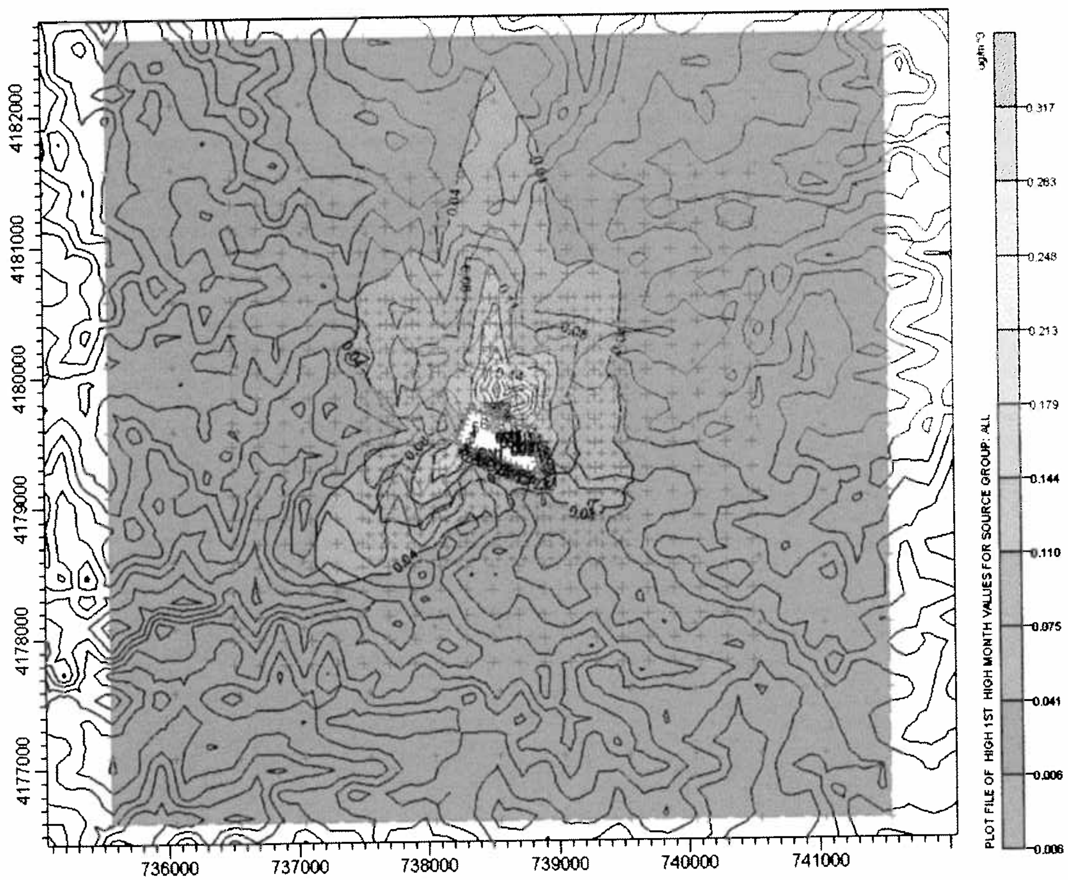

Figure 5.1 Enersys-Airport, High 1st High Monthly Average Concentration, Controlling Concentration

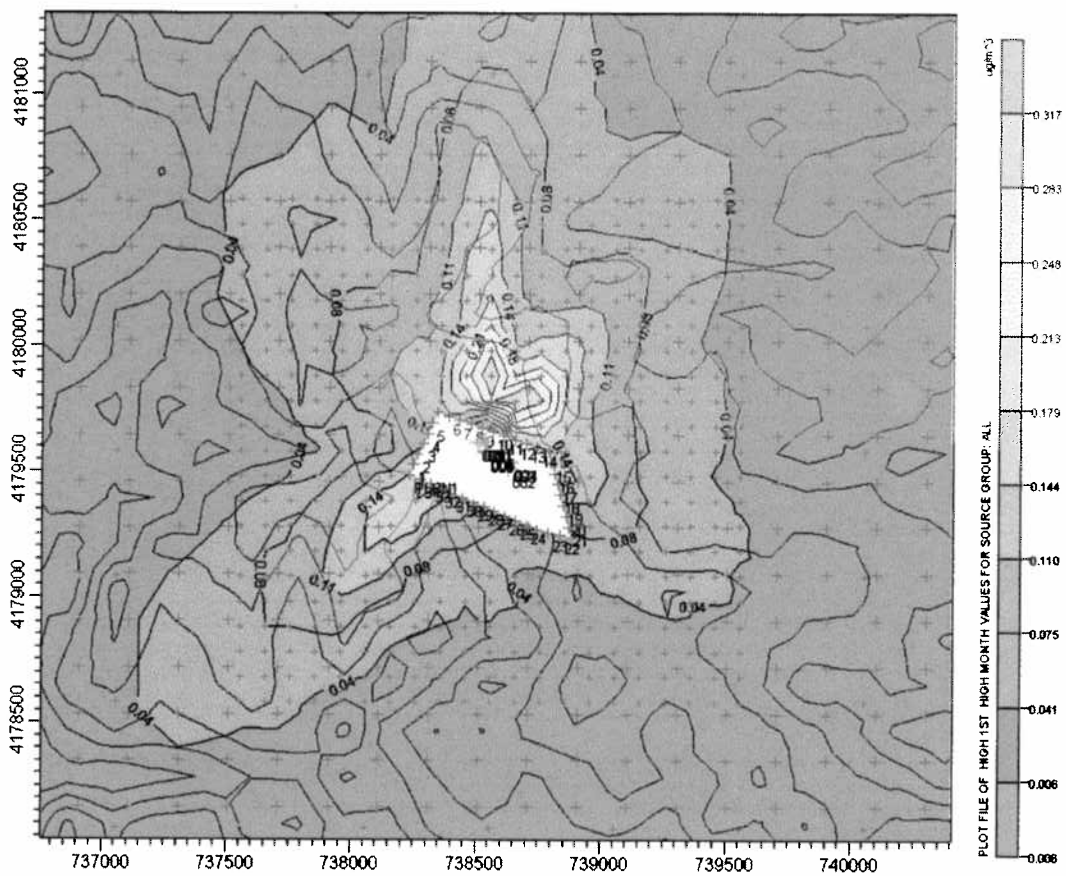

Figure 6. Enersys -Site, High 1st High Monthly Average Concentration, Entire Domain

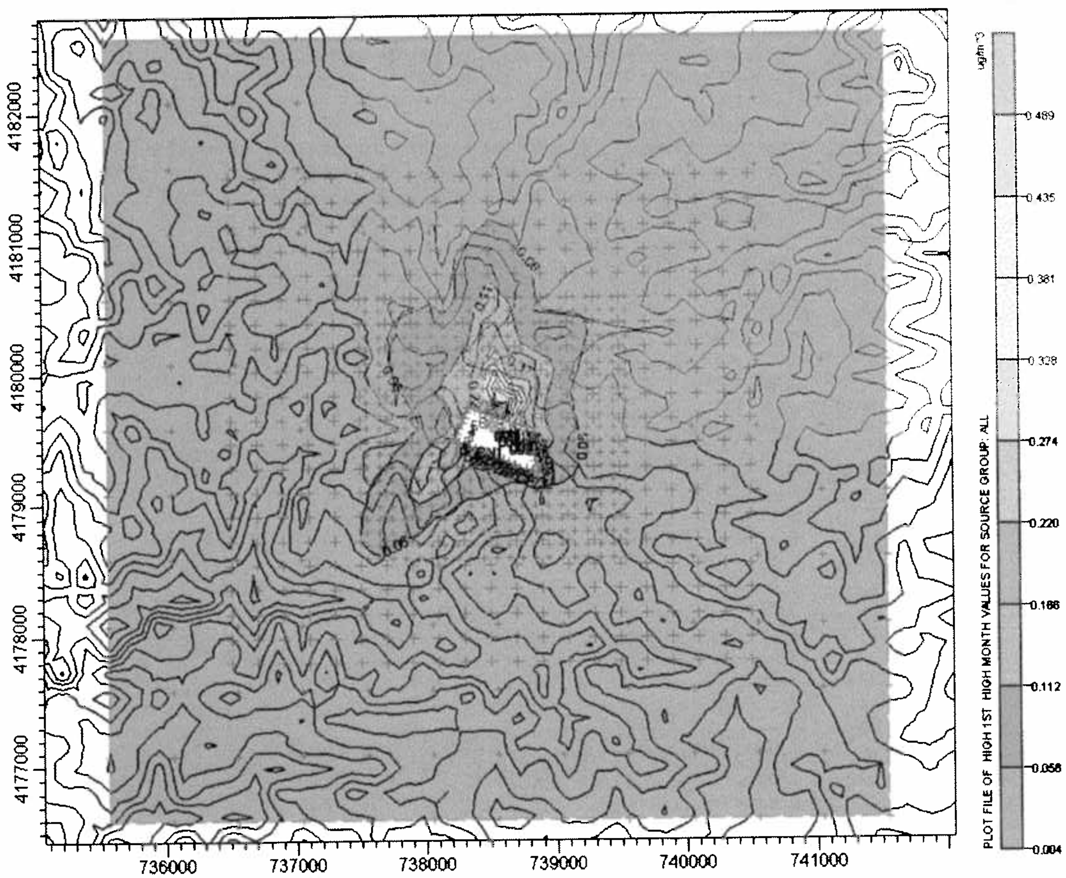

Figure 6.1 Enersys -Site, High 1st High Monthly Average Concentration, Controlling Concentration

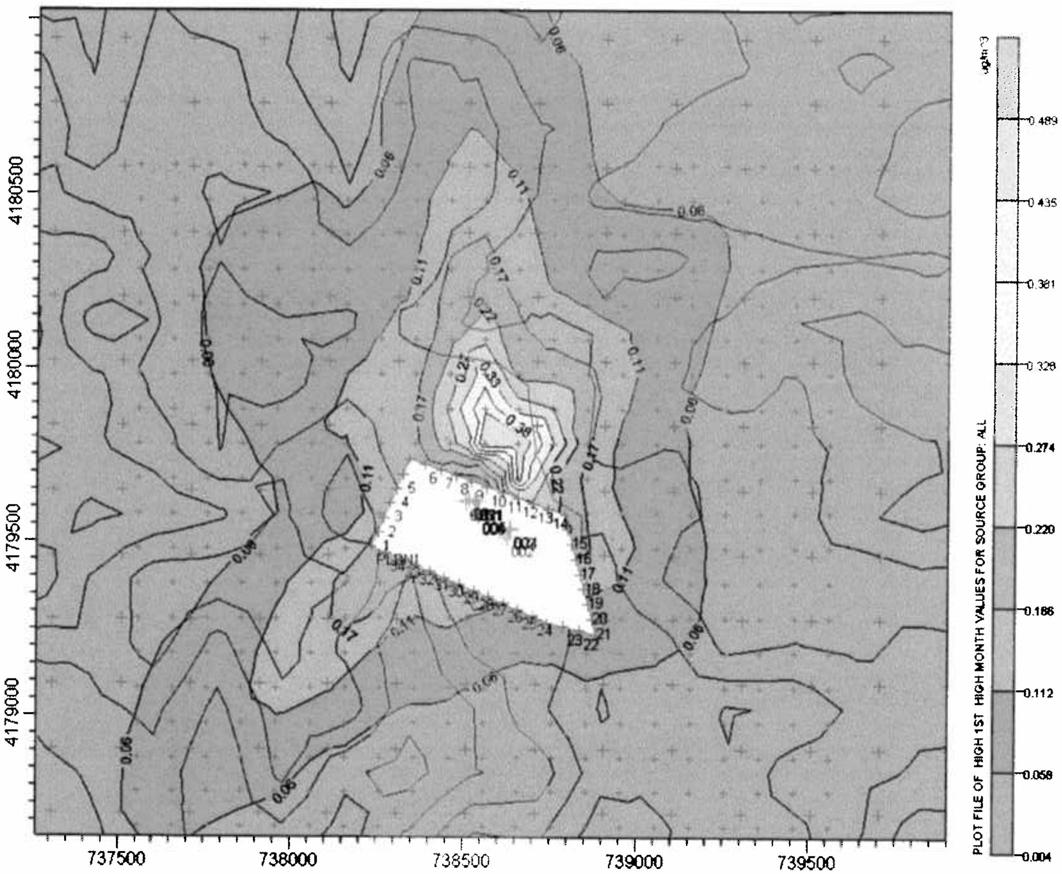

Figure 7. North American Stainless-Airport, High 1st High Monthly Average Concentration, Entire Domain

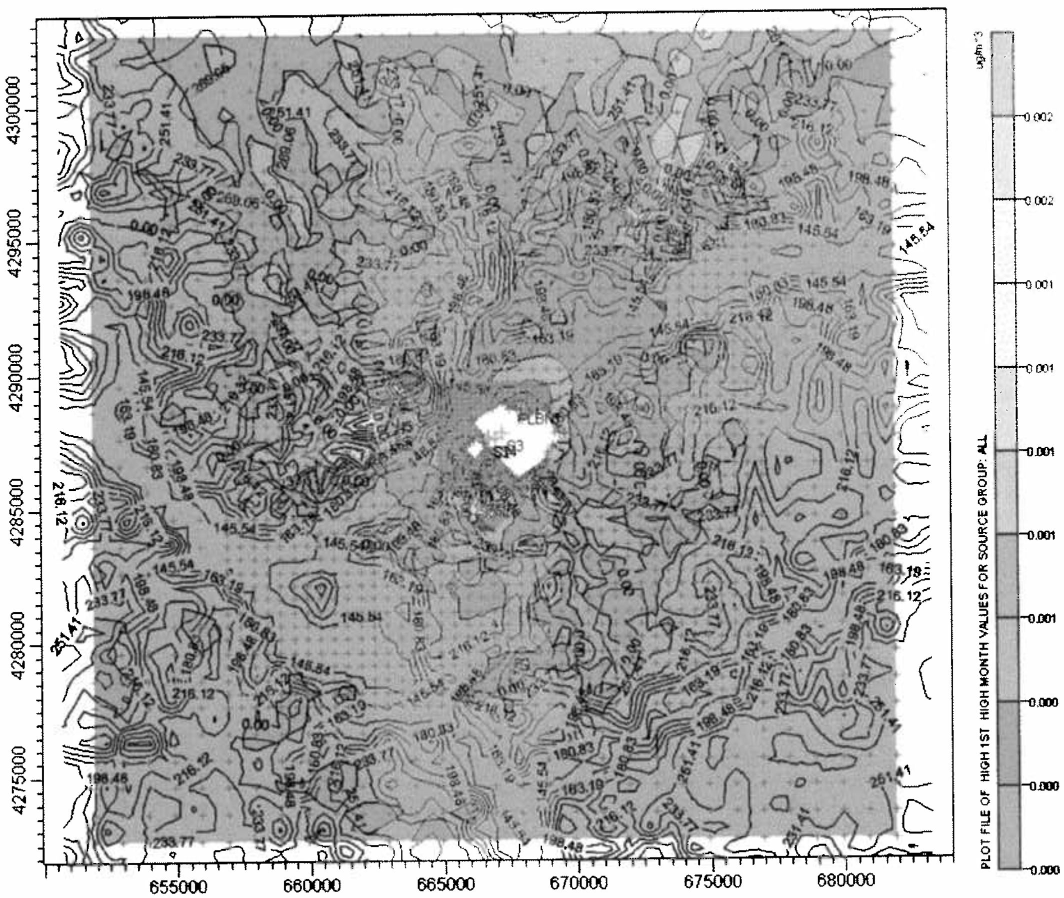

Figure 7.1 North American Stainless -Airport, High 1st High Monthly Average Concentration, Controlling Concentration

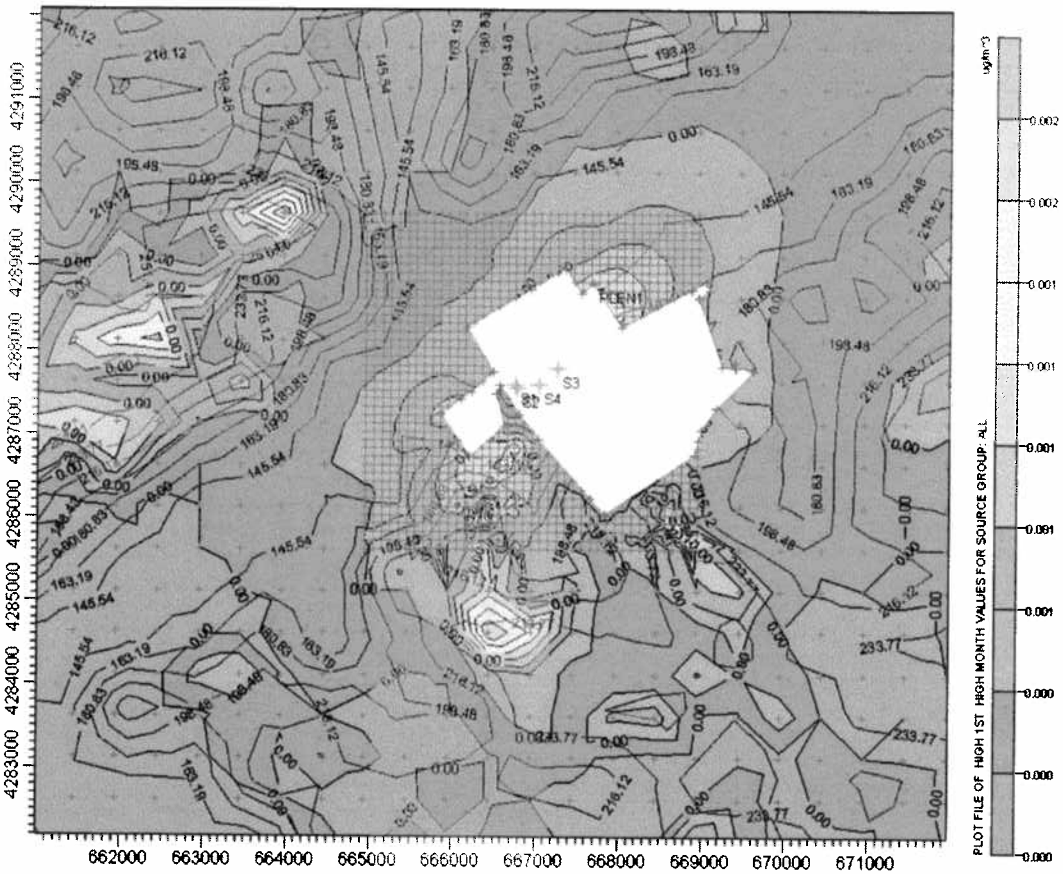

Figure 8. North American Stainless -Site, High 1st High Monthly Average Concentration, Entire Domain

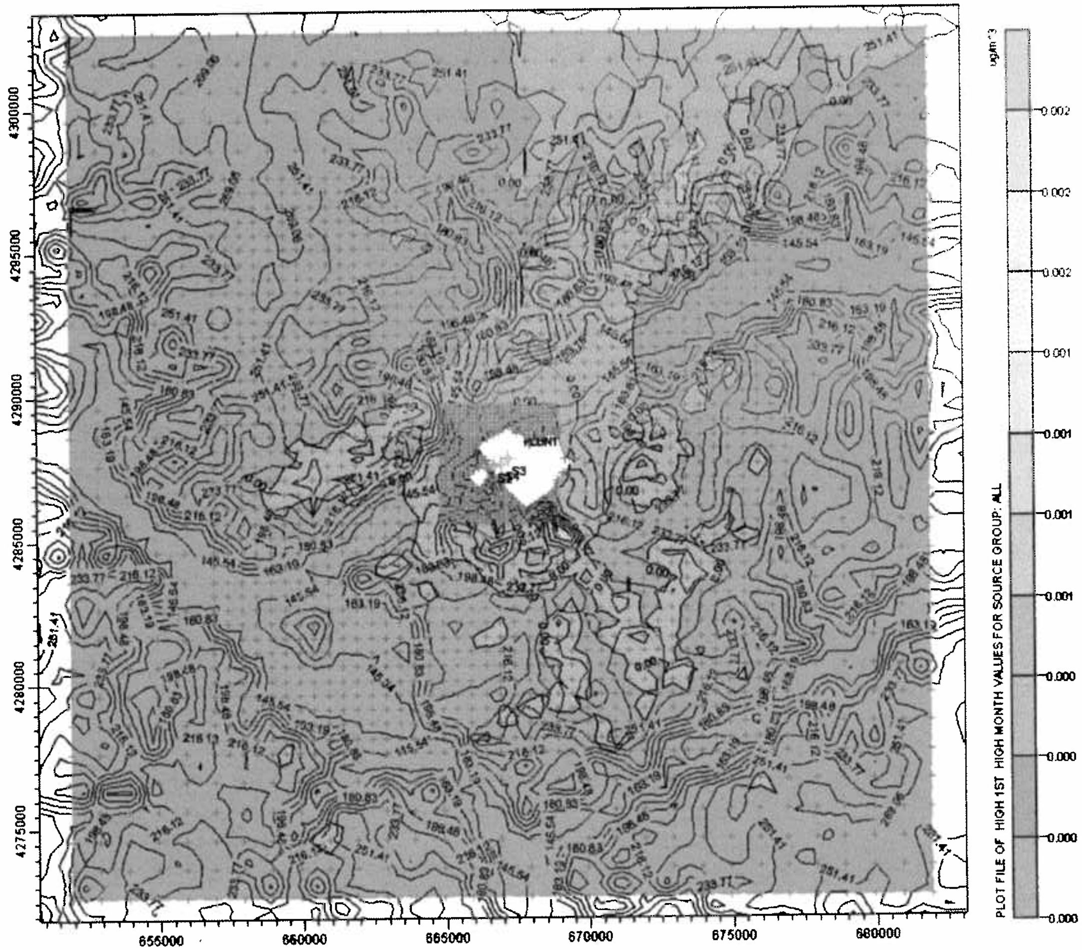

Figure 8.1 North American Stainless -Site, High 1st High Monthly Average Concentration, Controlling Concentration

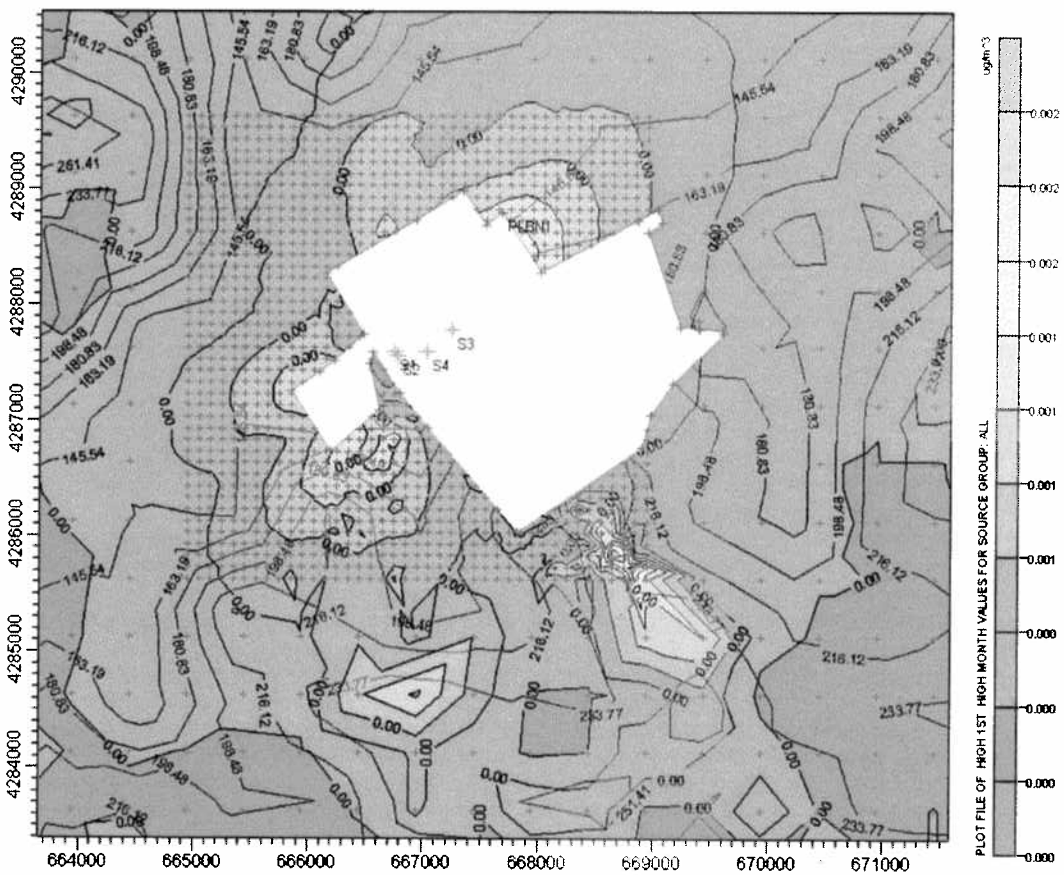

Figure 9. Newpage-Airport, High 1st High Monthly Average Concentration, Entire Domain

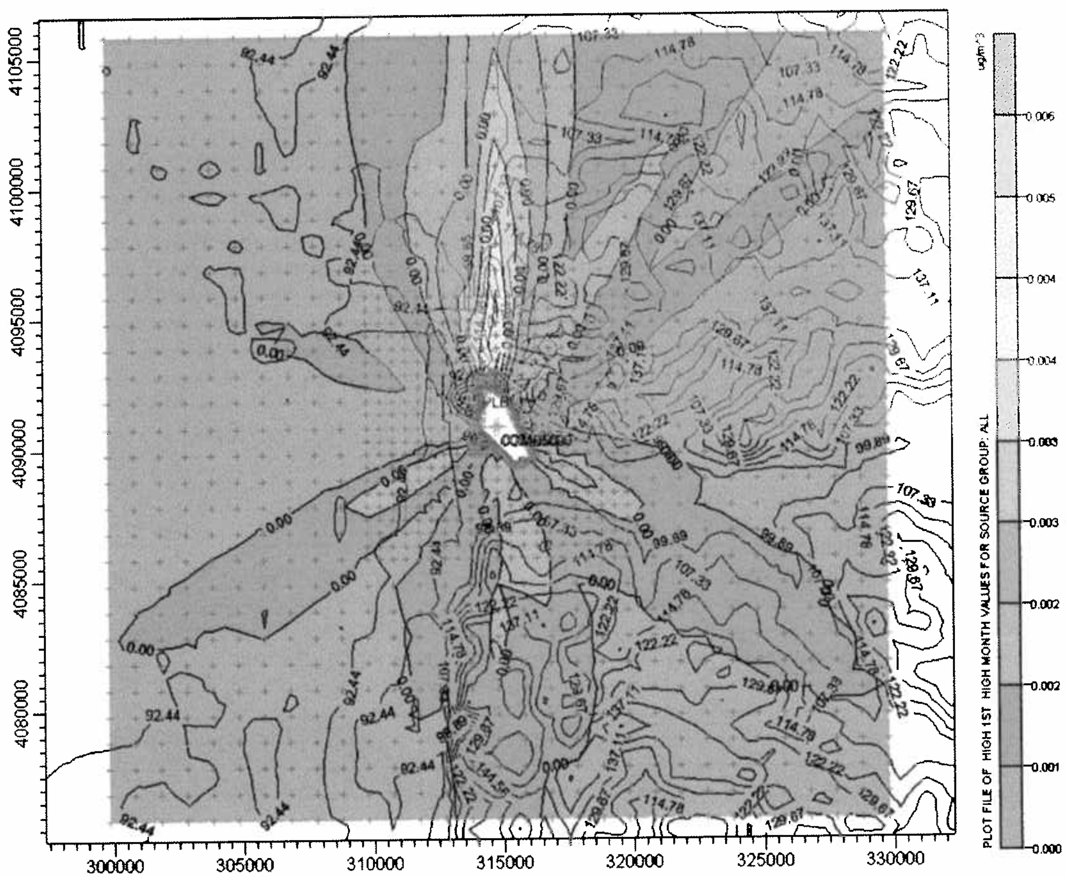

Figure 9.1 Newpage-Airport, High 1st High Monthly Average Concentration, Controlling Concentration

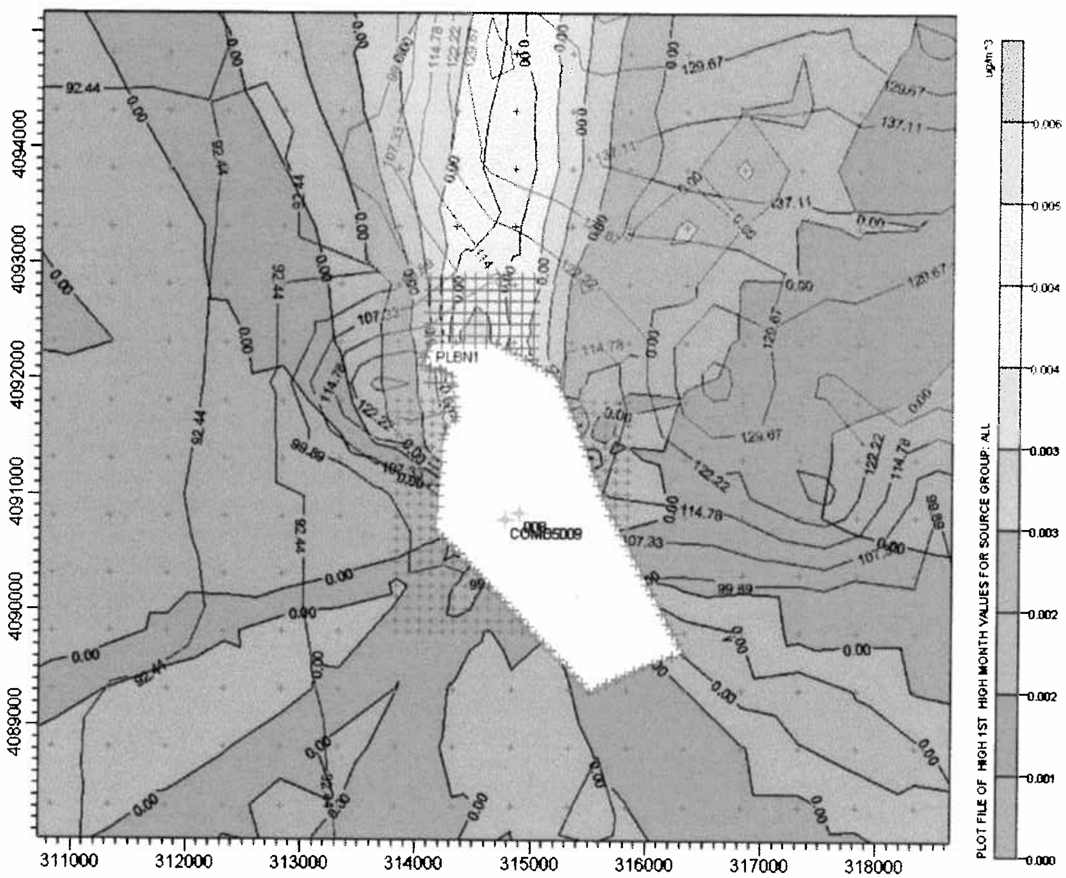

Figure 10. Newpage -Site, High 1st High Monthly Average Concentration, Entire Domain

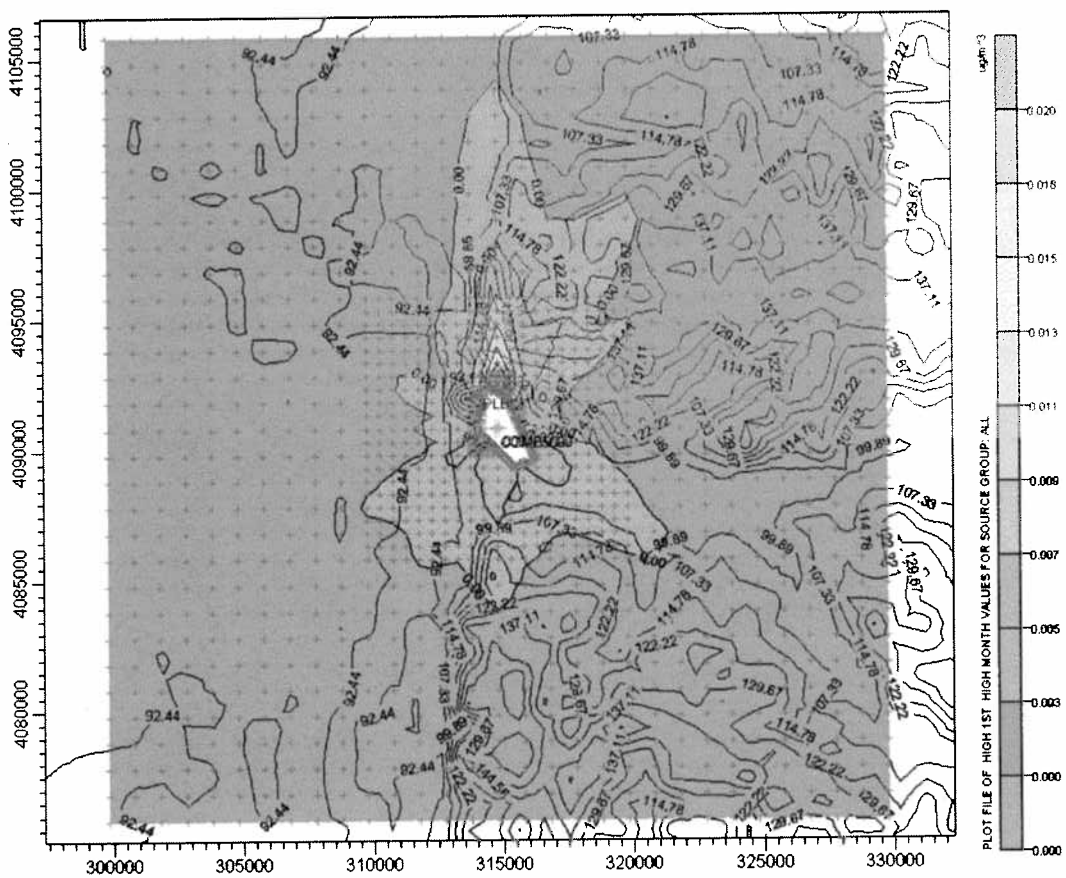

Figure 10.1 Newpage -Site, High 1st High Monthly Average Concentration, Controlling Concentration

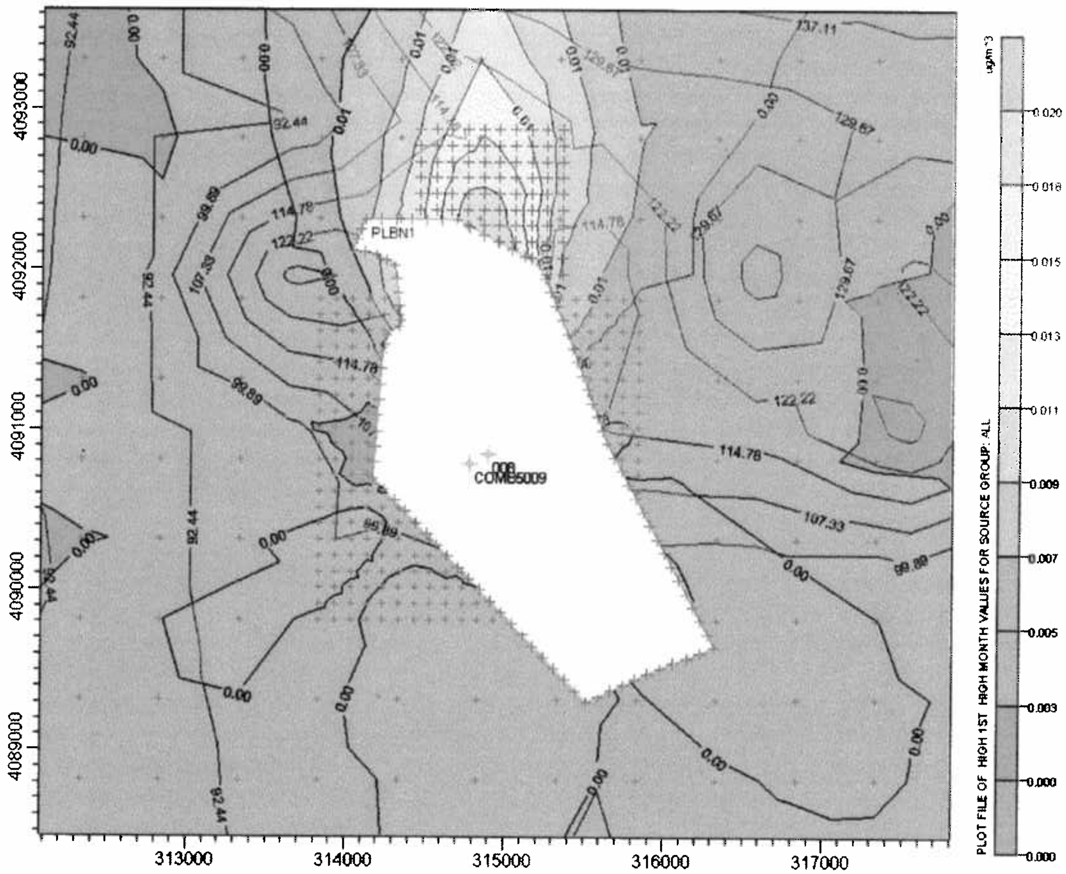

Figure 11. Superior Battery-Airport, High 1st High Monthly Average Concentration, Entire Domain

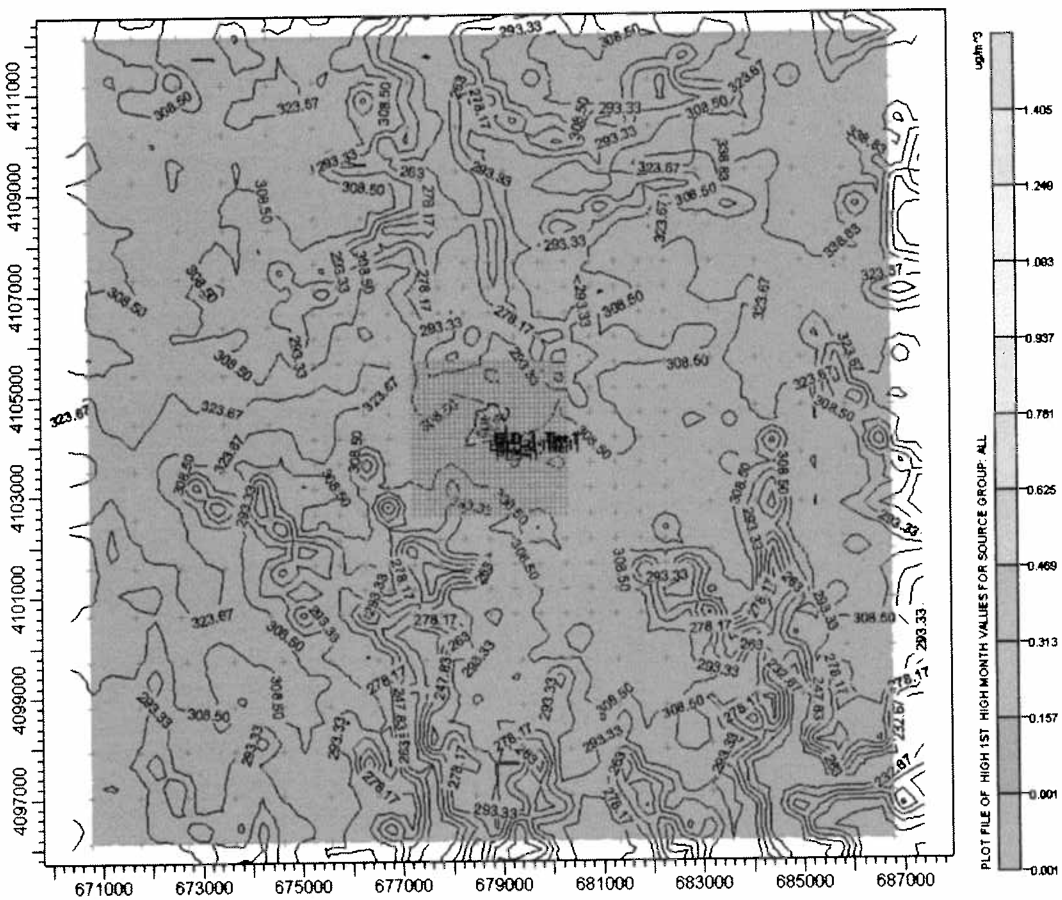

Figure 11.1 Superior Battery-Airport, High 1st High Monthly Average Concentration, Controlling Concentration

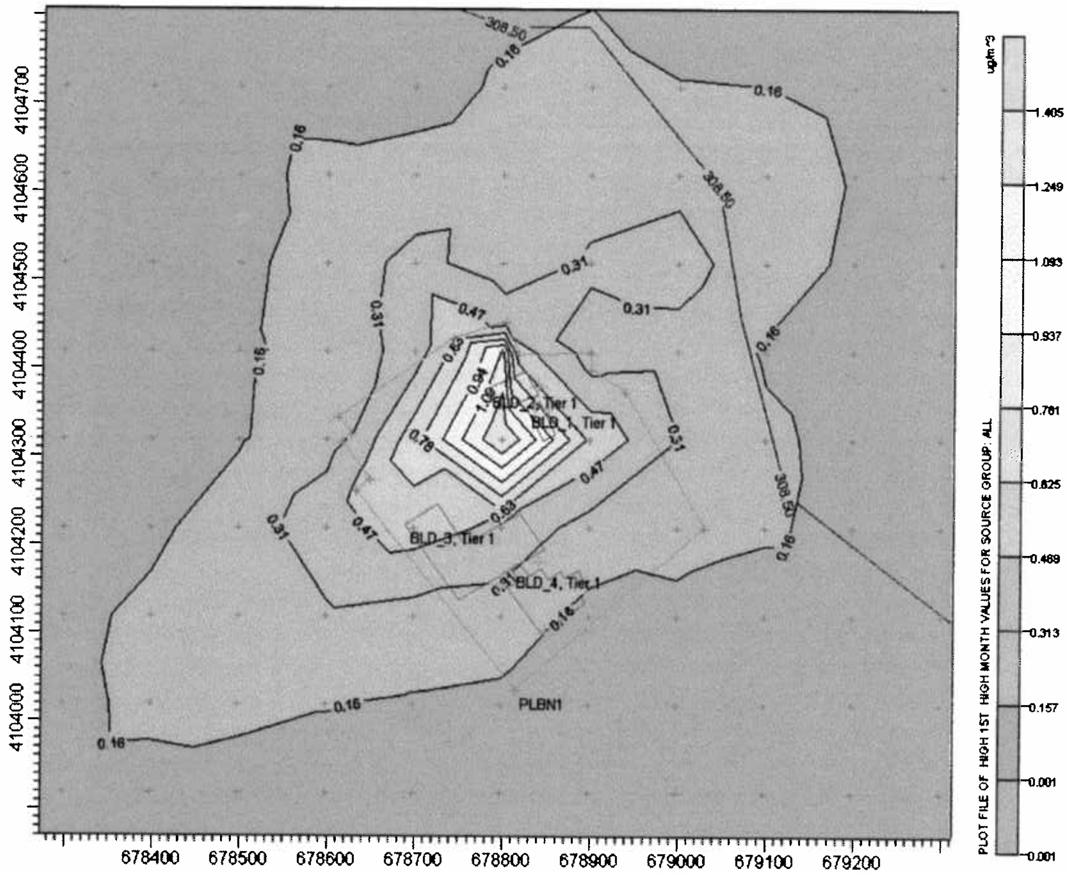

Figure 12. Superior Battery-Site, High 1st High Monthly Average Concentration, Entire Domain

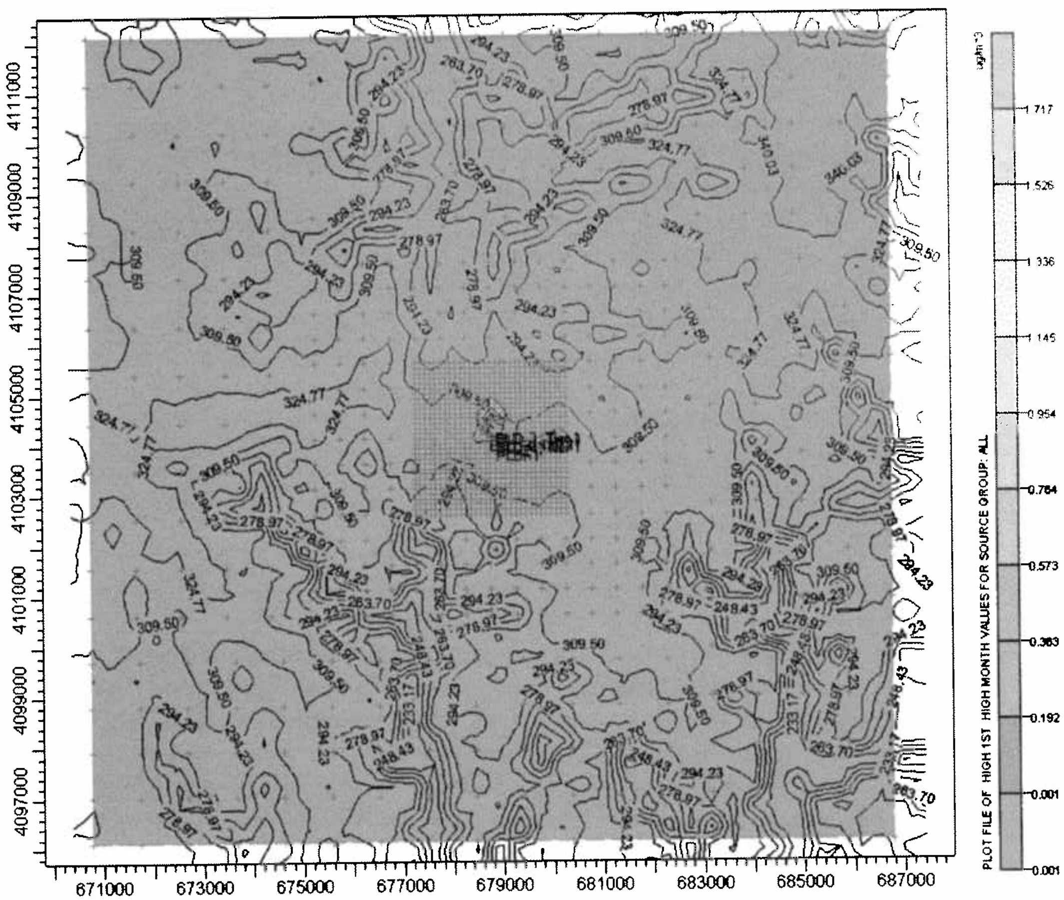

Figure 12.1 Superior Battery-Site, High 1st High Monthly Average Concentration, Controlling Concentration

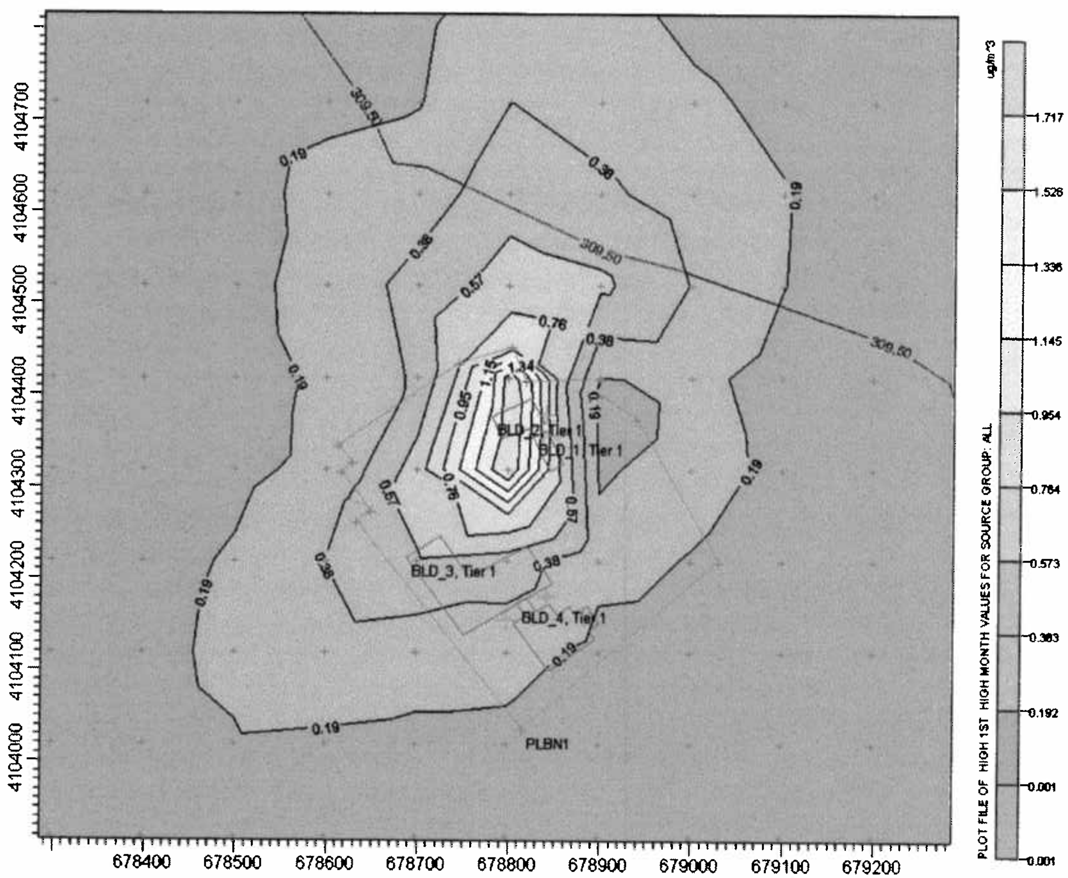

Figure 13. TVA-Airport, High 1st High Monthly Average Concentration, Entire Domain

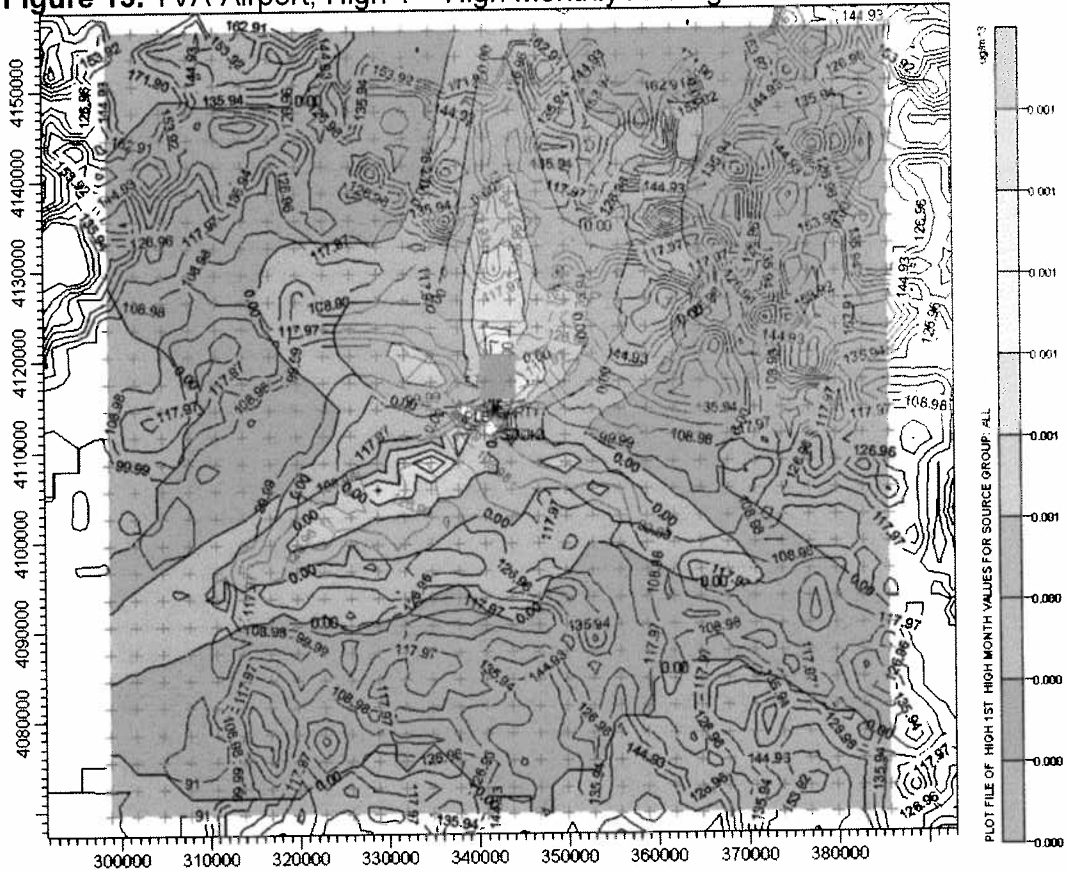

Figure 13.1 TVA-Airport, High 1st High Monthly Average Concentration, Controlling Concentration

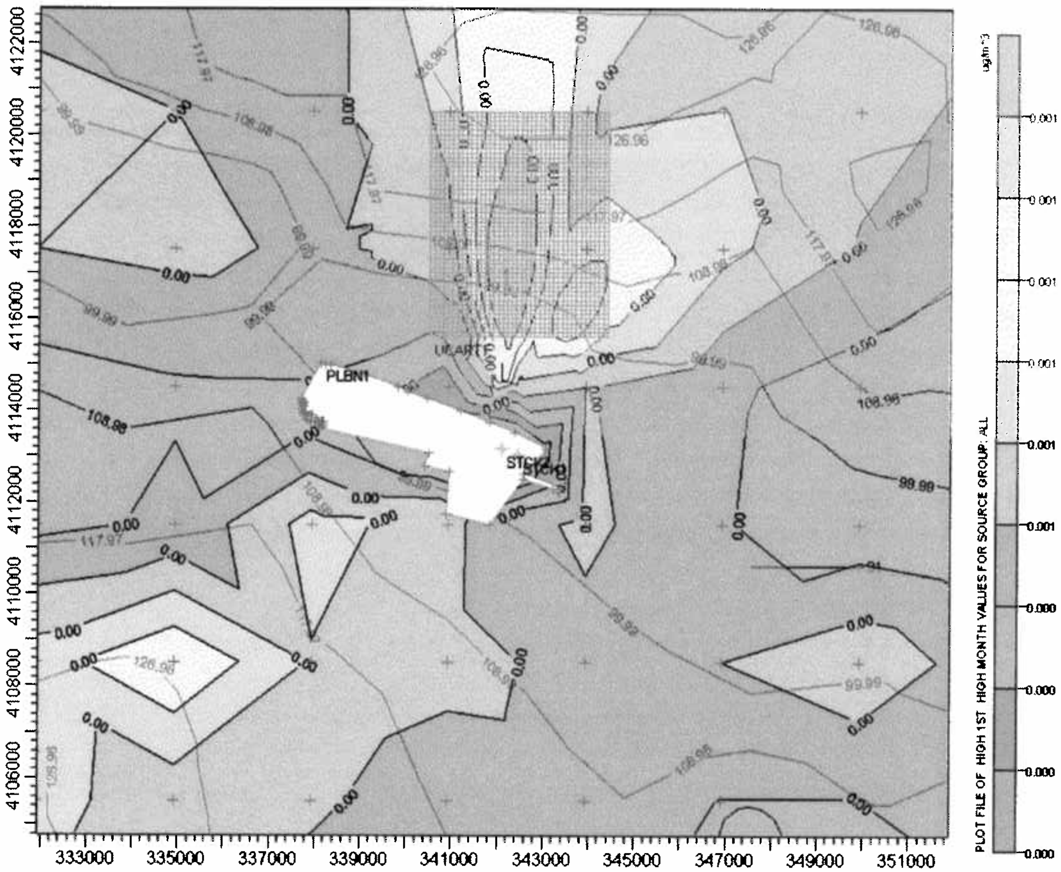

Figure 14. TVA-Site, High 1st High Monthly Average Concentration, Entire Domain

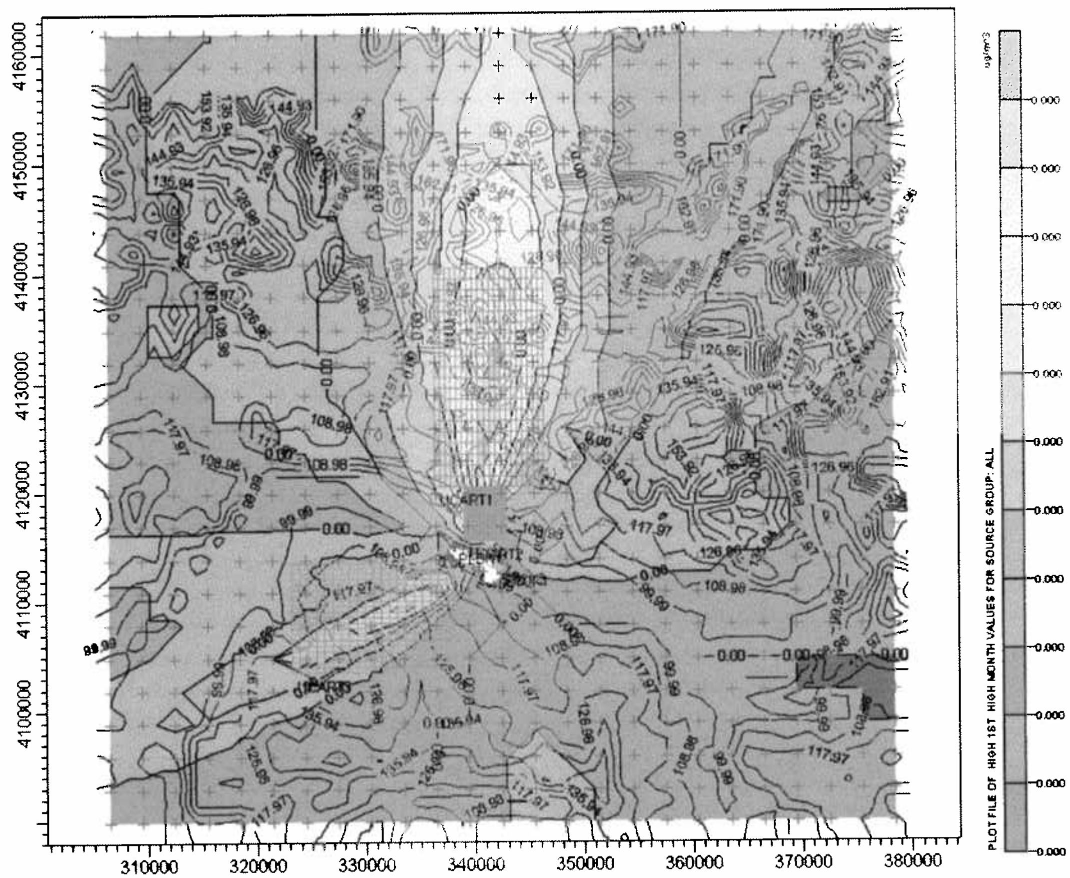

Figure 14.1 TVA-Site, High 1st High Monthly Average Concentration, Controlling Concentration