Poison Loophole

A Report on the Toxic Air Pollution Exemption For Combustion Sources in North Carolina

November 20, 2008

Louis A. Zeller, Science Director

Blue Ridge Environmental Defense League

www.BREDL.org PO Box 88 Glendale Springs, North Carolina 28629 BREDL@skybest.com (336) 982-2691

Table of Contents

Introduction

We the people have a growing understanding of the dangers of deregulation—irresponsible, negligent deregulation. But the North Carolina Division of Air Quality has proposed to deregulate more than 1,400 air pollution sources. And they are using a flawed technical study to mask the harm. This report will detail the potential harm to human health caused by the exemption of these industrial sources of toxic air pollution.

The deregulation proposal would remove the requirement that industrial boilers limit air poisons at the property boundary. These boilers include coal-fired power plants, asphalt plants, paper mills and more. The poisons include arsenic, benzene, formaldehyde, hydrogen sulfide, dioxin and more than a hundred others.

The Division of Air Quality has attempted to justify this industrial boiler exemption with a study which measures health impacts from direct inhalation only. This is a fatal flaw. The Division's Human Exposure Model estimates respiratory consequences but cannot capture the health risks posed by, for example, formaldehyde, which is water soluble. Further, the HEM under-reports the health impacts of dioxin—the world's most dangerous poison. The DAQ's methodology is at odds with the normal procedures employed by the NC Science Advisory Board which for twenty years has conducted detailed analyses of air poisons to create the state's existing toxic air pollutant limits. Unlike the DAQ, the Board sets specific limits for each toxin based on human exposure through every pollution pathway: water, soil and ingestion as well as inhalation. Toxic compounds deposited on soil, plants and water are metabolized by microorganisms and ingested by fish, other animals and humans. Fat-soluble bio-accumulative substances concentrate in dairy products. The DAQ's study tells only a piece of the truth, the effect of which is a lie. The lie is that these industrial boilers are safe.

The question is: Why would anyone propose this exemption at all? The answer: Coal plants, asphalt plants, paper mills and others cannot now meet the pollution limits. The principal finding of this report is that if operators of industrial facilities cannot meet the state's health-protective standards, they must add new pollution controls.

Cost-benefit analyses and economic hardship loopholes for industrial sources of pollution fail to take into account emergency room visits, missed work and school, health insurance, medicines and equipment, and chronic conditions. The enforcement of North Carolina's toxic air pollutant limits is a bulwark between industrial boiler smokestack pollution and our neighborhoods. We urge the NC Environmental Management Commission to exercise its authority and eliminate these dangerous loopholes.

Janet Marsh
Executive Director

Background

In 1998 the NC Environmental Management Commission created a combustion source exemption in the state air toxics control program. The exemption included all coal-fired electric power plants and every other type of industrial boiler and process heaters which burned unadulterated fossil fuel: coal, oil or natural gas. The rationale for the exemption when it was enacted was that a federal rule was pending; so, to avoid duplicate rules, North Carolina approved a temporary exemption. But the Environmental Protection Agency has never promulgated its rule.

In 1997 the Air Toxics Working Group[1] had recommended a series of changes in the state's air toxics program. Their report stated:

> The purpose of the Air Toxics Working Group recommendation on making boilers invisible until the federal MACT is promulgated is to accelerate the schedule for bringing facilities under air toxics review and thereby increase the effectiveness and efficiency of the program by avoiding an influx of almost all toxics applications at one following its promulgation.[2]

The recommendation meant that for a short period combustion sources burning unadulterated fossil fuel would neither trigger an air toxics review nor be included in an air toxics evaluation. The rule incorporating this recommendation is 15A NCAC 2Q .0702 (a)(18).

However, the Air Toxics Working Group recommendation was not to permanently exempt boilers. The ultimate end point of the group's plan included no combustion source exemption, the specification of pollution control equipment and compliance deadlines for the reduction of toxic air pollutant emissions.[3]

A member of the Air Toxics Working Group who testified at the EMC public hearing before the exemption was approved said:

> [T]he Working Group never discussed a proposal to completely exempt boilers plus other combustion sources from air toxics compliance and that the Group certainly would not have reached consensus on any proposal to exempt such sources from review altogether. [He] stated that the exemption for boilers stated in 2Q .0702(a)(18) should be deleted…[4]

Contrary to the original intent of the legislative committee which made the original recommendation, the rule now being proposed by the North Carolina Environmental

---

[1] The Environmental Review Commission established the Air Toxics Working Group in response to the passage of House Bill 898 in 1996.
[2] *Report of Proceedings of Public Hearing on Proposed Amendments to Rules 15A NCAC 2D, 2H and 2Q, Air Toxics Rules*, Raleigh, November 18, 1997
[3] *Id.*
[4] *Id.*, Testimony of Donnell Van Noppen, Esq., Southern Environmental Law Center

Management Commission would make the exemption permanent. The NC Environmental Management Commission's proposed changes to 2Q .0700 Toxic Air Pollutant Procedures would create a permanent exemption in the state's health-based toxic air pollution limits.

The Human Exposure Model

The NC Division of Air Quality did a study of the proposed exemption using the US Environmental Protection Agency's Human Exposure Model. But the DAQ's study did not account for important factors such as persistent bioacummulative toxins and multiple pollution pathways.

Human exposure to air pollutants occurs in many ways: water, soil and ingestion as well as inhalation. Toxic compounds deposited on soil, plants and water may be metabolized by microorganisms and ingested by fish and other animals. Fat-soluble bio-accumulative substances concentrate in dairy products. The US EPA states:

> Toxic air pollutants, like mercury or polychlorinated biphenyls, deposited onto soil or into lakes and streams persist and bioaccumulate in the environment. They can affect living systems and food chains, and eventually affect people when they eat contaminated food… Some of the PBTs that move through the air are deposited into water bodies and are concentrate up through the food chain, harming fish-eating animals and people. Small fish may consume plants that live in water contaminated by PBTs, which are absorbed into plant tissues. Big fish eat smaller fish and as the PBTs pass up the food chain, their levels go up. So a large fish consumed by people may have a much higher concentration of PBTs in its tissues than the simple plant first absorbing the PBTs. PBTs can concentrate in big fish to levels thousands of times the levels found in the contaminated water. Over 2000 U.S. water bodies are covered by fish consumption advisories, warning people not to eat the fish because of contamination with chemicals, usually PBTs. Those compounds have been linked to illnesses such as cancer, birth defects, and nervous system disorders.[5]

At the November 2007 meeting of the NC Environmental Management Commission's Air Quality Committee, the Toxics Protection Branch of the NC Division of Air Quality presented information on the Boiler Combustion Source Exemption Study. In his presentation, Mr. Steve Schliesser discussed the agency's application of the EPA's Human Exposure Model to assess the health risks of air toxics from industrial boilers. However, the Human Exposure Model estimates risk only from inhalation. The US EPA Office of Air Quality Planning and Standards (OAQPS) provides the following assessment of the HEM:[6]

---

[5] The Plain English Guide to the Clean Air Act, Reducing Toxic Air Pollutants, Persistent Bioaccumulative Toxics, available at http://www.epa.gov/air/caa/peg/toxics.html

[6] "Human Exposure Modeling-General Information," Technology Transfer Network, http://www.epa.gov/ttn/fera/human_gen.html

> Human exposure to pollutants can result from contact with contaminated air, water, soils, and food, as well as with drugs and consumer products….The models currently being used by OAQPS for estimating human exposure to criteria air pollutants and hazardous air pollutants (e.g., APEX/TRIM.Expo$_{inhalation}$, HAPEM4, HEM, and pNEM) do not include multimedia exposures.

There are models which take into account multiple exposure pathways. For example, the EPA's Indirect Exposure Model (IEM) was developed for dioxin exposure assessment and later adapted to mercury studies. The Total Risk Integrated Methodology computer modeling system was developed by EPA and uses a mass balance approach to assess multiple pathway pollution exposure. But the DAQ did not employ these models; the state study—the basis for the proposed exemption—fails to fully assess multiple pathway risks.

It has long been the responsibility of the NC Science Advisory Board to account for multiple risk factors from toxic air pollutants and recommend state standards to protect public health. SAB investigations of toxic chemicals are deliberate and sound; the panel studies the relevant literature and makes recommendations to the EMC. And, unlike the DAQ's HEM-based study, potential exposure from the deposition of airborne compounds onto soil or water is considered by the SAB when data indicate it leads to significant human health impacts.

The Division of Air Quality's limiting of toxic air pollutant risk to inhalation exposure is problematic. In fact, in a report to the EMC, the study's authors reported that "EPA's threshold levels for exposure and the State's Acceptable Ambient Levels (AAL) may differ such that the [human exposure] model cannot predict risk relevant to state criteria."[7] Plainly, the HEM model has been misapplied by the DAQ in its justification of the proposed rule. Moreover, the DAQ's incomplete study gives the mistaken impression that North Carolina's industrial boilers pose little threat from air toxics.

Exemption Allows Industrial Plants to Exceed Toxic Pollution Limits

The "combustion sources" exempted from toxic air pollution limits are defined as: boilers, space heaters, process heaters, internal combustion engines, and combustion turbines, which burn only unadulterated wood or unadulterated fossil fuel.[8] This report highlights the following representative examples.

Jackson Paper Manufacturing Company-Sylva

The Jackson Paper Manufacturing Company power boiler is permitted to burn wood, coal, tire-derived fuel, paper mill sludge and/or waste oil at a maximum heat input rate of 145.1 mmBTU from wood and 99.1 mmBTU from non-wood fuel to produce 70,000 pounds of steam per hour. The Jackson Paper mill appears to exceed state toxics limits

[7] NC EMC Air Quality Committee Meeting Minutes, Agenda Item 2, September 13, 2006
[8] 15 A NCAC 2Q .0703(6)

(AALs) one-fifth of a mile from the plant by up to 62% for benzene while burning wood fuel and by 15% for chromium VI and 117% for arsenic while burning coal. See map below.

Satellite photo of Jackson Paper Company in Sylva

. "Insignificant activities"[9] listed in the permit include burning of boiler additives as long as potential HAP emissions do not exceed 1,000 pounds per year. One ton of wood can produce from 9 million to 17 million Btu of heat. Wood residue including hogged wood, scraps and sawdust have a heat value of 4500 to 8000 Btu per pound.[10] Using a value of 9 mmBtu/ton,[11] the wood fuel use at Jackson Paper would be 16 tons per hour and 141,230 tons per year

Maymead Materials, Inc., Pineola

The second largest smokestack pollution source from an asphalt plant is the cement heater. Large tanks each holding from 10,000 to 35,000 gallons of liquid asphalt cement

[9] **15A NCAC 02Q .0503 DEFINITIONS**
For the purposes of this Section, the definitions in G.S. 143-212 and 143-213 and the following definitions apply: (8) "Insignificant activities because of size or production rate" means any activity whose emissions would not violate any applicable emissions standard and whose potential emission of particulate, sulfur dioxide, nitrogen oxides, volatile organic compounds, and carbon monoxide before air pollution control devices, i.e., potential uncontrolled emissions, are each no more than five tons per year and whose potential emissions of hazardous air pollutants before air pollution control devices, are each below 1000 pounds per year.

[10] US EPA AP-42 Fifth Edition, Volume I, Chapter 1: External Combustion Sources, 1.6 Wood Residue Combustion in Boilers

[11] Trigen-Biopower's calculations also assumed an average heat value of 4500 Btu/pound (9 million Btu/ton) for wood fuel used at the Forest City plant.

heated to about 300 degrees-F are located on the plant site near the asphalt drum mixer. These tanks supply asphalt cement which is mixed with gravel in the drum mixer to make road paving asphalt. The tank heaters typically operate 24 hours/day and often 365 days /year because the asphalt cement becomes solid when it cools. These tanks emit toxic air pollutants, similar to the main stack of the drum mixer.

North Carolina air pollution permits for asphalt plants list fuel-oil fired asphalt tank heaters as "Activities Exempted from Permitting." The asphalt tank heater is a source of both toxic air pollutants and criteria pollutants. A typical Division of Air Quality permit allows an asphalt plant to emit the following air pollutants annually:[12]

Chronic toxicants	**pounds**
carbon disulfide	682
methyl ethyl ketone	13,650
Toluene	17,150
Xylene	9,975
Acute system toxicant	
Formaldehyde	617
Styrene	3,780
Carcinogens	
Benzene	64
trichloroethylene (TCE)	4,000
Perchloroethylene (PCE)	13,000

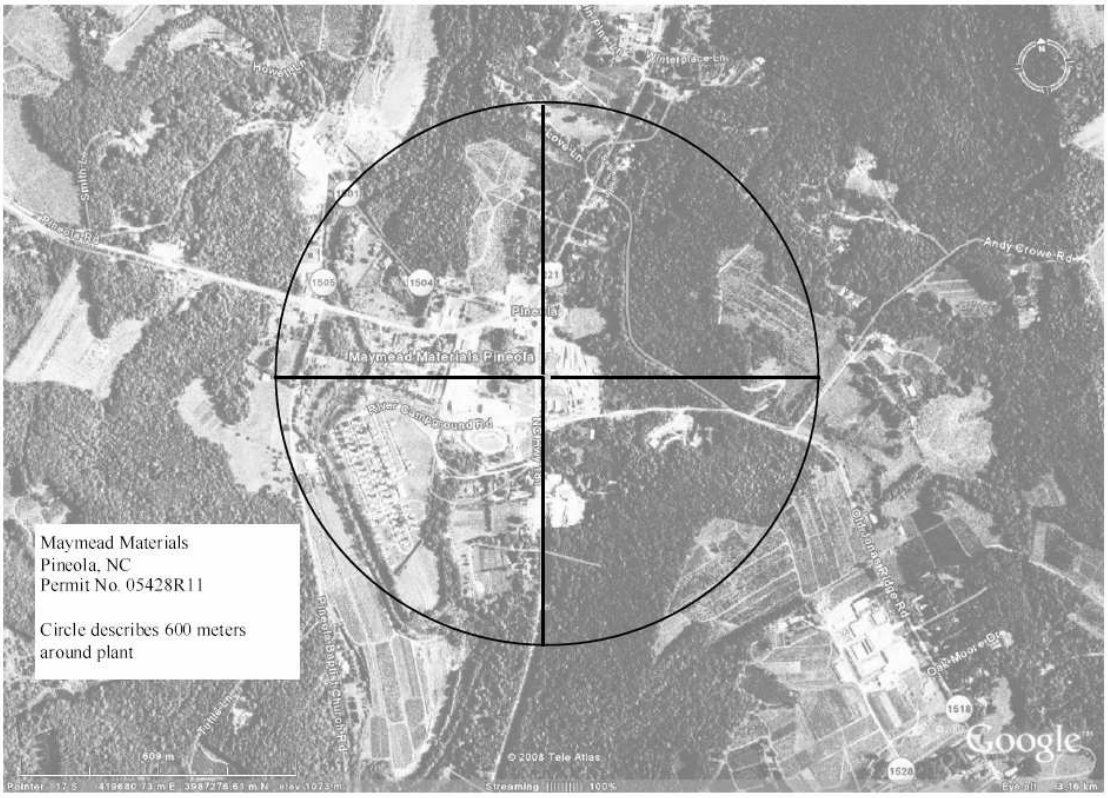
In addition to these pollutants, an important pollution source is exempted by 2Q .0702 (a)(18): the Asphalt Tank Heater burning No. 2 fuel oil. The Maymead Pineola asphalt tank cement heater burns up to 24,900 gallons of fuel oil per year. Asphalt cement heaters are known sources of toxic air pollution but are exempted by state statute; that is, they are listed in the permit but not included in the air pollution limits. Higher pollution levels are the result.

The Maymead plant in Pineola is permitted to manufacture 325 tons/hour and 650,000 tons/year of asphalt. According to our analysis, toxic formaldehyde levels, above state acceptable ambient limits, are indicated at 600 meters from the plant. This area extends well into commercial areas including a campground and residential areas. Residents living near this plant have lodged numerous complaints over the last twelve years but the plant continues to be permitted by the Division of Air Quality. The complaints include nausea, asthma and other health problems which residents associate with the operation of the plant.

The aerial photo on the next page indicates the extent of the formaldehyde contamination.

[12] Permit No. 09808R00, Young & McQueen Grading Co. Inc.—Spruce Pine Plant. Annual totals are based on production rate of 160 tons per hour for 1,406 hours per year or 175 days at 8 hours per day to produce 225,000 tons of asphalt.

Satellite photo of Maymead Materials in Pineola



Trigen-Biopower, Inc., Forest City

The power plant burns a combination of fuels including wood and fuel oil. Tests performed by the company for hydrogen chloride, formaldehyde and acetaldehyde indicate it is a minor source for hazardous air pollutants. The stack tests were conducted for Trigen by a consulting firm and submitted to the NC Division of Air Quality as part of a request by the company to avoid Clean Air Act maximum achievable control technology standards (MACT). According to the Title V permit for this facility, national emission standards for hazardous air pollutants and maximum achievable control technology, federal standards known as NESHAP and MACT (and codified in North Carolina at 15A NCAC 02D .1111[13]), are not applicable for boilers WCES-1, FCES-1 and FCES-2. The data provided by the company did demonstrate that the plant was below MACT thresholds.[14] Volatile organic compounds emissions were 5.7 tons per year (12 month rolling average, April, May and June 2006). Also, according to the DAQ,[15]

[13] 15A NCAC 02D .1111 MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY
[S]ources subject to national emission standards for hazardous air pollutants for source categories promulgated in 40 CFR Part 63

[14] Clean Air Act Title III Section 112 hazardous air pollutant (HAP) thresholds are 10 tons per year of any single pollutant or 25 tons per year of all HAPs combined.

[15] Comprehensive Action Report for 8100177.06A, 07/21/2006

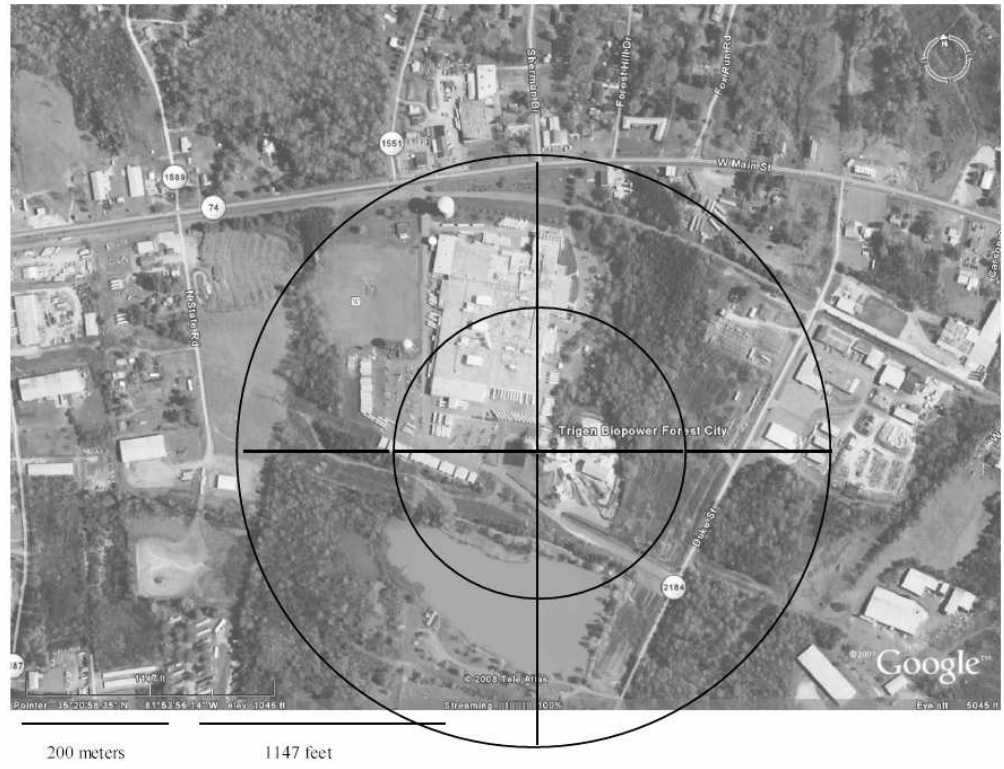
NC air toxics do not apply. So, according to DAQ, neither federal NESHAP nor NC toxic air pollutant limits apply to emissions from this plant.

Our analysis of Trigen-Biopower's emissions indicates the plant exceeded state AALs for acrolein, manganese, benzene and dioxin outside the facility fenceline. The modeling results using the EPA worst case model are in the table below. These data are based on stack tests compiled by the EPA on other facilities burning either fuel oil, wood or a combination.

Trigen-Biopower Permitted Toxic Air Pollutants

Pollutant	Tons/year[16]	Grams/second	Molecular weight	AAL mg/m3	Distance of excess-meters
Hydrochloric acid	6.494	0.187	36.47	0.7	--
Formaldehyde	1.059	0.030	30.03	0.15	--
Acetaldehyde	0.247	0.0071	44.05	27	--
Acrolein	3.006	0.0288	56.06	0.08	400
Benzene	3.175	0.0913	78.11	1.2xE-4	10000
Manganese	1.208	0.0348	54.94	0.031	800
Styrene	1.408	0.0410	104.2	10.6	--
Dioxin	6.5E-9	1.87E-8	184.2	3.0E-9	2700

Satellite photo of Trigen-Biopower in Forest City



[16] Annual emissions data from MACT Applicability Potential HAP Emission Calculations, July 8, 2006, Trigen-Biopower Inc.-Forest City, NC

Circumvention of Section 112 and MACT requirements in this case makes the North Carolina Toxic Air Pollutant program the principal means of protecting the public from hazardous air pollutants. As demonstrated above, if the state limits were applied to Trigen the result would be a significant reduction in toxic air emissions. Additional pollution controls would allow the plant to continue to operate at current levels while reducing negative health impacts on the residents of Forest City.

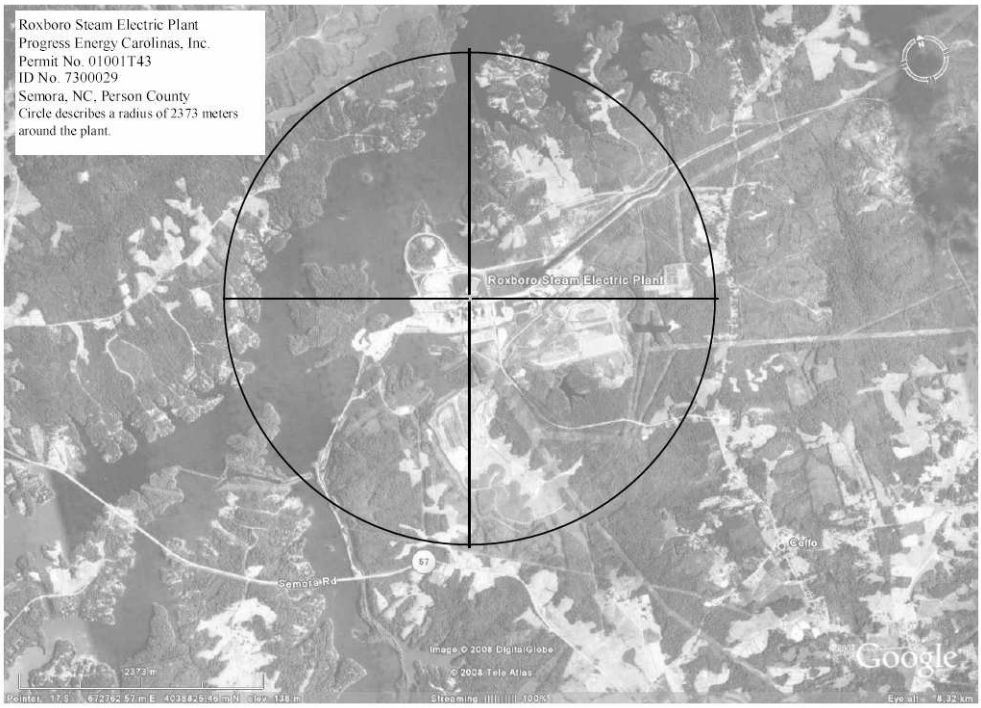
Coal-fired Electric Generating Power Plants

Despite the EMC hearing report statement that "The exemption does not apply to Utility boilers,"[17] coal-fired electric generating units were exempted by the final rule which went into effect in July 1998. A 42-page listing of combustion sources[18] published by the DAQ in 1997states that 1,249 sources could be exempted. The list includes the Weatherspoon, Sutton, Lee, Allen, Buck, Cliffside, Marshall and Riverbend plants; all are major coal-fired electric generating units.

Roxboro Steam Electric Plant-Person County

Progress Energy's Roxboro plant is the second largest fossil fuel electric generating facility in North Carolina with four coal-fired boilers and one fuel oil-fired combustion turbine.

Satellite photo of Roxboro



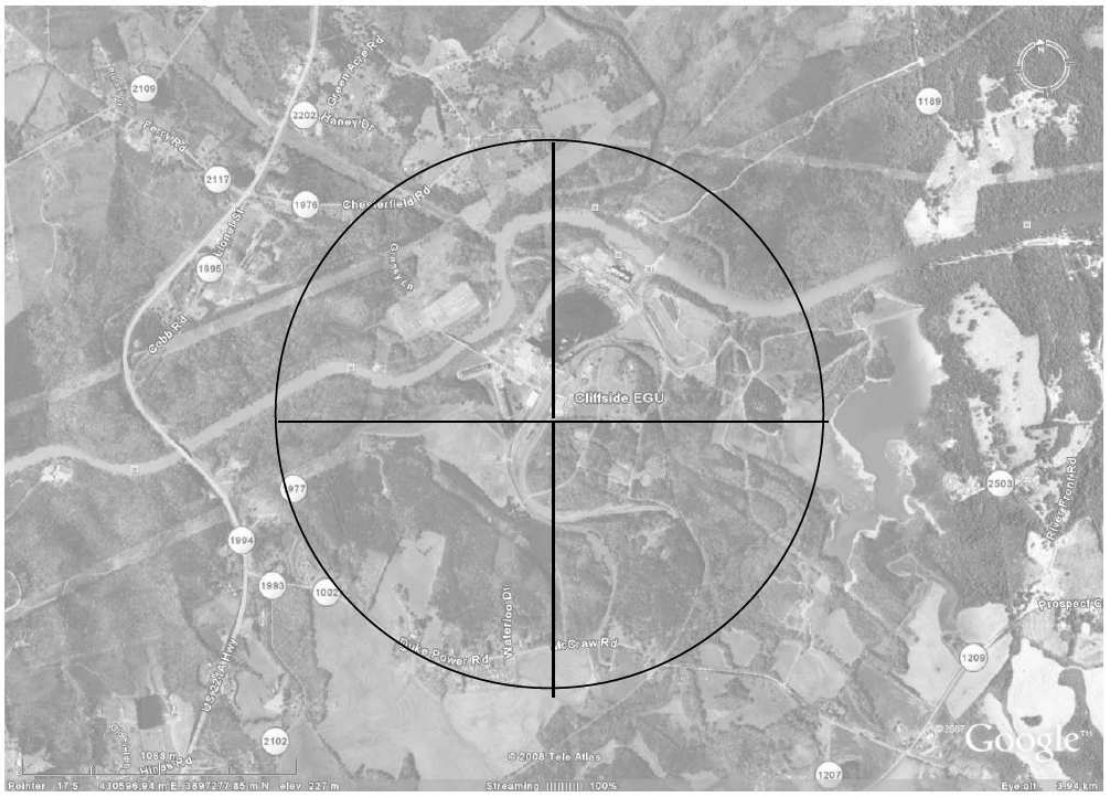
[17] *Ibid*, Conclusion, page I-154
[18] *Fuel Combustion Exemption*, Possible Exempt Combustion Sources, December 4, 1997

Our modeling the Roxboro Unit 1 emissions using SCREEN3 found that the offsite levels of arsenic exceeded state acceptable ambient levels (AALs) by a factor of 16.5 times and chromium-VI by a factor of 9 times. The excess levels extended into populated areas 2300 meters, nearly a mile and a half from the plant. The map on page 10 indicates the impact area of these toxic metals

Cliffside Steam Station Unit 6

The Cliffside Steam Station contains five coal-fired boilers, four of which are slated for closure and replacement by Unit 6. Duke Power claims that Unit 6 will be below major source thresholds that trigger case-by-case MACT determinations under the federal Clean Air Act.[19] No permit has been issued, but the air permit application submitted to DAQ includes a toxics analysis which lists just two compounds: ammonia and sulfuric acid, products of the pollution control devices.[20] These two compounds were modeled by Duke Power in the permit application. However, many other air toxics are emitted.

Satellite photo of Cliffside



[19] Letter from Duke Power President and CEO James L. Turner to DAQ Director Keith Overcash, October 14, 2008

[20] PSD Permit Application for the Cliffside Steam Station Units 6&7-Volume 1, Duke Power, December 16, 2005, Section 10.5 North Carolina Toxic Pollutants Analysis, page 10-19

To determine whether the proposed Cliffside coal-fired utility boiler would meet North Carolina toxic air pollutant limits, the Blue Ridge Environmental Defense League performed an independent analysis based on a permit application submitted to the Division of Air Quality. The computer modeling data is included in Appendix B of this report. We found that the emissions from the stack of Cliffside Unit 6 exceeded NC's acceptable levels (AALs) by significant amounts for two toxic compounds regulated by North Carolina: chromium and arsenic (see table below).

Arsenic is listed as a presumed carcinogenic substance based on the increased prevalence of lung and skin cancer observed in human populations with multiple exposures.[21] Chromium III and VI are released into the environment by burning coal. Chromium VI causes respiratory problems, weakened immune systems, kidney and liver damage, alteration of genetic material and lung cancer.[22]

Pollutant	Emission rate Pounds/hour	Generic modeled concentration μ g/m3/lb/hr	Conversion factor	Actual concentration μ g/m3	AAL μ g/m3
Chromium	0.11	0.1085	.08	0.0009548	0.000083
Arsenic	0.17	0.1085	.08	0.0014756	0.00023

Arsenic and Chromium emissions a kilometer from the Cliffside plant would be approximately 6 and 11 times higher than the respective AALs. These data would be for a single new stack at the Cliffside plant. The older plants are no doubt contributing many times this level. For this reason alone, we recommend that the toxic air pollution program be implemented at all utility boilers and other unadulterated fossil fuel combustion units.

The Changes Proposed by Toxic Air Pollution Procedures

15A NCAC 2Q 0701 Applicability

The new rule states "The Division shall assess risks from combustion sources using the latest risk assessment methodologies and information every five years starting March 1, 2014."

Apparently, the "latest risk assessment methodologies" would include the methodology which is being used to justify the permanent exemption now under discussion. The HEM model itself is not the problem; rather, the model was misapplied by the DAQ's in its recently completed study. The apparent elevation of DAQ's flawed methodology—that

[21] Arsenic Toxcity, E-Medicine, Marcus, August 2006
[22] ATSDR Public Health Statement, 2000

is, utilization of the HEM Model to assess health risk—into state regulations will undercut the Science Advisory Board which has developed superior procedures and practices during the last two decades. Procedures which include…..

Further, eliminated by the new rule is language which attaches North Carolina's combustion source assessment to federal regulations. The proposed rule change strikes the following text from existing law:

> Within one year after promulgation of MACT standards…the Division shall assess such MACT standards to determine whether additional measures are necessary with respect to toxic air pollutant emissions from combustion sources.

This change in the law, combined with changes in the following section .0702, would remove the requirement to assess the impact of the federal requirement with respect to the state's toxic air pollutant rules.

15A NCAC 2Q 0702 Exemptions

The new rule would make permanent the current exemption for thousands of combustion sources[23] now in operation plus all new and modified sources permitted before March 1, 2009. The definition of exempt combustion sources now applies to all permitted sources until federal regulations are promulgated. The proposed rule states:

> A permit to emit toxic air pollutants shall not be required under this section for: (18) combustion sources as defined in 15A NCAC 02Q .0703 except new or modified combustion sources permitted on or after March 1, 2009; ~~until 18 months after promulgation of the MACT or GACT~~…. (Underlined text is to be added, struck text is to be eliminated by the proposed rule)

If the rule change is approved by the Commission, toxic air pollution permits will never be required for existing combustion sources: boilers, space heaters, process heaters, internal combustion engines, and combustion turbines. Further, the stricken text puts North Carolina combustion sources outside of the reach of federal standards; i.e., MACT and GACT. According to the DAQ's Fiscal Note, for sources permitted before March 1, 2009, "[T]he exemption remains without regard to promulgation of the MACT or GACT standard for combustion sources."[24] So, even if the US EPA were to enact a standard stricter than North Carolina's, it would not apply to combustion sources permitted before March 2009. This language is contrary to federal law because it would be an impermissible setting of a state standard below the MACT floor.

---

[23] Combustion sources in North Carolina are defined by 15 A NCAC 2Q .0703(6) as follows: "Combustion sources" means boilers, space heaters, process heaters, internal combustion engines, and combustion turbines, which burn only unadulterated wood or unadulterated fossil fuel. It does not include incinerators, waste combustors, kilns, dryers, or direct heat exchange industrial processes.

[24] "Economic Analysis: Address Combustion Source Exemption in North Carolina Air Toxics Rules," DAQ File No. 472, September 4, 2008

The "MACT floor" is the average level of toxic air pollution control achieved by the top 12% of currently operating sources of the same type. It is a minimum national standard for all industrial sources of air pollution. Further, the 1990 Clean Air Act Amendments allow the US EPA to establish stricter standards if necessary to protect the environment and public health. North Carolina is an agreement state; it cannot eliminate a federal standard with a wave of the rulemaking wand.

The new rule eliminates the Environmental Management Commission's prerogative to remove the exemption upon finalization of the EPA's MACT. The proposed rule change strikes the following phrase from the combustion source exemption: "[T]he Commission shall decide whether to keep or remove the combustion source exemption."[25] Although this text follows the also stricken 18-month-after-MACT-promulgation text, it nevertheless reduces the Commission's ability to act; specifically, it would prevent the EMC from rectifying any sub-MACT combustion source standards permitted by the NC DAQ.

15A NCAC 2Q 0706 Modifications

The proposed change to this section effectively eliminates the combustion source exemption for sources constructed or modified[26] after March 1, 2009.

15A NCAC 2Q 0709 Demonstrations

The proposed rule would extend to 1,400 existing combustion sources eligibility to claim technical or economic reasons for not complying with state toxic air pollution limits. The proposed regulation states:

> The owner or operator of any…combustion source…permitted before March 1, 2009, who cannot supply a demonstration described in Paragraph (a) of this Rule shall: (1) demonstrate…that complying with the guidelines…is technically infeasible…; or (2) demonstrate…that complying with the guidelines…would result in serious economic hardship."[27] (new text underlined)

The demonstration referred to in paragraph (a) is compliance with health-based ambient standards for toxic air pollutants. The present rule restricts the ability to demonstrate technical infeasibility and economic hardship to facilities constructed before May 1990 and dry-cleaning facilities. The proposed rule is a sweeping change because it would allow thousands of facilities to claim technical infeasibility and economic hardship nearly

[25] 15 A NCAC 2Q .0702 (18)
[26] Modifications in North Carolina are defined in 15A NCAC 2Q .0703 Definitions as follows: (14) "Modification" means any physical changes or changes in the methods of operation that result in a net increase in emissions or ambient concentration of any pollutant listed in Rule .0711 of this Section or that result in the emission of any pollutant listed in Rule .0711 of this Section not previously emitted.
[27] 15A NCAC 2Q .0709(b)

two decades after the toxic air pollutant program was enacted.[28] In fact, the current exemption which the proposed rule is supposed to be replacing was only enacted in 1997.[29] Extending the ability to claim hardship back to 1990 has no basis in law, has no technical rationale and defies comprehension.

Conclusion

The proposed rule, if adopted, would exempt from North Carolina's Toxic Air Pollutant control program all existing combustion sources permitted before March 1, 2009. In addition to grandfathering an exemption for all permits issued before March 2009, the proposed amendments of the state TAP rules would make the exemption permanent. Finally, the exemption would remain even after modification of the plant if the permittee can demonstrate technical infeasibility or economic hardship.

The proposed change in North Carolina's Toxic Air Pollutant Program is an ill-considered and ill-advised attempt to fix a problem which the Commission itself created. It is the wrong answer for a question that should never have been asked. The EMC has an obligation to protect the health from all sources of toxic air pollution, regardless of whether the source is unadulterated fuel or not. The straightforward solution would be for the EMC to strike paragraph 18 from 15A NCAC 2Q .0702 and simply eliminate the combustion source exemption.

Louis A. Zeller
November 20, 2008

[28] The EMC adopted the current air toxics rules in 1990.
[29] Report of Proceedings of Public Hearing on Proposed Amendments to Rules 15A NCAC 2D, 2H, and 2Q Air Toxic Rules, Nov. 18, 1997

Appendix A: Toxics caused by the burning of unadulterated fossil fuel

Arsenic
Arsenic is listed as a presumed carcinogenic substance based on the increased prevalence of lung and skin cancer observed in human populations with multiple exposures (primarily through industrial inhalation). *Arsenic Toxcity, E-Medicine, Marcus, August 2006*

Chromium
Chromium III and VI are released into the environment by burning coal. Chromium VI causes respiratory problems, weakened immune systems, kidney and liver damage, alteration of genetic material and lung cancer. *ATSDR Public Health Statement, 2000*

Cadmium
Cadmium and cadmium compounds are known to be human carcinogens. Cadmium exposure and renal dysfunction were associated among the men and women in areas without any known environmental cadmium pollution. *RoC, NTP, DHHS, 2005* and *Health effects of cadmium exposure in the general environment, Uno, Kobayashi et al*

Mercury
Mercury is a neurotoxin, affecting the central nervous system. Airborne mercury deposited on land and water bodies becomes methyl mercury and is taken up in fish. Consumption of mercury-tainted fish can cause blurred vision and affect mental ability. Unborn children are three-times as sensitive to methyl mercury, leading to mental retardation, cerebral palsy, deafness, blindness. *Risks of Methylmercury Toxicity, Williams, NCDHHS*

Hydrogen Chloride
Hydrogen chloride forms corrosive hydrochloric acid on contact with body tissue. Inhalation of can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract. *Agency for Toxic Substances and Disease Registry, ATSDR*

Dioxins
A human carcinogen, dioxin persists in the environment and accumulates in the food chain, especially meat, fish and dairy products. Learning disabilities and attention deficit disorder have been linked to dioxin. *Health Risks from TCDD, other dioxins, and dioxin like compounds, USEPA* and *Environmental Science & Technology Online News*

Formaldehyde
Toxic and allergenic. The 11th Report on Carcinogens classifies it as "reasonably anticipated to be a human carcinogen"

Acetaldehyde
Toxic when applied externally for prolonged periods, an irritant, and a probable carcinogen.[13] In addition, acetaldehyde is damaging to both DNA [14] and causes abnormal muscle development as it binds to proteins [15]

Acrolein
A severe pulmonary irritant. It has been used as a chemical weapon during World War I. Acrolein concentrations of 2 ppm are immediately harmful. Acrolein is not a suspected human carcinogen; no studies have been conducted on the carcinogenic effects of acrolein on humans, but studies on rats have shown an increase in cancerous tumors from ingestion, but not from inhalation. [5] In October 2006, researchers found connections between acrolein in the smoke from tobacco cigarettes and the risk of lung cancer wikipedia

Appendix B
Computerized air modeling data used in this report

SCREEN3, as the name suggests, is a screening tool for the estimation of ambient concentrations of air pollutants and has been the basis for many permit limits in North Carolina. It remains useful for determining aerial dispersion from a single emission source and can provide estimated concentrations for distances less than 100 meters from the source. The Blue Ridge Environmental Defense League ran a SCREEN3 air pollution dispersion Model 95250 three facilities for which we could obtain stack parameter input data. SCREEN is based on the Industrial Source Complex (ISC) dispersion model developed by EPA. SCREEN3 has been supplanted in some quarters by AERMOD which is also based on the ISC model's architecture but uses newer algorithms which, among other things, simplify calculation of ambient concentrations in simple and complex terrain—elevations below and above the emission source—and from multiple sources. All are Gaussian dispersion models. The tables below contain data compiled from the NC Division of Air Quality's files on each facility modeled for this report.

Following accepted practice, we used an emission rate input of 0.126 grams per second which is equal to 1 pound per hour. This emission value simplifies the calculation for finding ambient concentrations in the atmosphere for many pollutants by generating a generic concentration. To get the actual pollutant concentration, one simply multiplies the generic concentration results from the SCREEN3 by the emissions of a particular pollutant in pounds per hour to get the actual hourly concentration. The US Environmental Protection Agency publishes emission factors for nearly every industrial source for hundreds of pollutants in AP-42. These data are typically given in pounds per hour or pounds per million-British thermal units (MMBTU).

The model output data for this report are reproduced on the following pages.

Roxboro Steam Electric Plant-Person County, Progress Energy Carolinas
Permit No. 01001T43 effective September 8, 2008—August 31, 2013
Facility ID No. 7300029

Emission rate	0.126 grams/second
Stack height	121.92 meters
Stack inside diameter	6.71 meters
Stack gas exit velocity	14.22 meters per second
Stack gas exit temperature	325.4 degrees Kelvin
Stack base elevation	131 meters amsl
Ambient temperature	293 degrees Kelvin (default)
Receptor height above ground	2 meters
Urban/rural option	Rural

```
******  SCREEN3 MODEL  ******
 **** VERSION DATED 95250 ****

ENTER TITLE FOR THIS RUN (UP TO 79 CHARACTERS):
ROXBORO EGU

ENTER SOURCE TYPE: P    FOR POINT
                   F    FOR FLARE
                   A    FOR AREA
                   V    FOR VOLUME
P
ENTER EMISSION RATE (G/S):
0.126
ENTER STACK HEIGHT (M):
121.92
ENTER STACK INSIDE DIAMETER (M):
6.71
ENTER STACK GAS EXIT VELOCITY OR FLOW RATE:
OPTION 1 : EXIT VELOCITY (M/S):
 DEFAULT - ENTER NUMBER ONLY
OPTION 2 : VOLUME FLOW RATE (M**3/S):
         EXAMPLE "VM=20.00"
OPTION 3 : VOLUME FLOW RATE (ACFM):
         EXAMPLE "VF=1000.00"
14.22
ENTER STACK GAS EXIT TEMPERATURE (K):
325.4
ENTER AMBIENT AIR TEMPERATURE (USE 293 FOR DEFAULT) (K):
293
ENTER RECEPTOR HEIGHT ABOVE GROUND (FOR FLAGPOLE RECEPTOR)
(M):
2
ENTER URBAN/RURAL OPTION (U=URBAN, R=RURAL):
R
CONSIDER BUILDING DOWNWASH IN CALCS?  ENTER Y OR N:
N
USE COMPLEX TERRAIN SCREEN FOR TERRAIN ABOVE STACK HEIGHT?
ENTER Y OR N:
N
USE SIMPLE TERRAIN SCREEN WITH TERRAIN ABOVE STACK BASE?
ENTER Y OR N:
Y
ENTER CHOICE OF METEOROLOGY;
1 - FULL METEOROLOGY (ALL STABILITIES & WIND SPEEDS)
2 - INPUT SINGLE STABILITY CLASS
```

3 - INPUT SINGLE STABILITY CLASS AND WIND SPEED
1
USE AUTOMATED DISTANCE ARRAY? ENTER Y OR N:
Y
ENTER TERRAIN HEIGHT ABOVE STACK BASE (M):
39
ENTER MIN AND MAX DISTANCES TO USE (M):
1000
3000

****
*** SCREEN AUTOMATED DISTANCES ***
****

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1400.	.1711	1	1.5	1.8	532.7	531.72	308.54	933.98	NO
1500.	.1627	1	1.5	1.8	532.7	531.72	324.56	1078.25	NO
1600.	.1550	1	1.5	1.8	532.7	531.72	340.58	1233.99	NO
1700.	.1481	1	1.5	1.8	532.7	531.72	356.60	1401.22	NO
1800.	.1417	1	1.5	1.8	532.7	531.72	372.59	1580.00	NO
1900.	.1359	1	1.5	1.8	532.7	531.72	388.55	1770.37	NO
2000.	.1305	1	1.5	1.8	532.7	531.72	404.48	1972.39	NO
2100.	.1256	1	1.5	1.8	532.7	531.72	420.37	2186.10	NO
2200.	.1214	1	1.0	1.2	757.1	756.12	459.17	2415.82	NO
2300.	.1175	1	1.0	1.2	757.1	756.12	474.20	2652.71	NO
2400.	.1139	1	1.0	1.2	757.1	756.12	489.24	2901.51	NO
2500.	.1105	1	1.0	1.2	757.1	756.12	504.27	3162.26	NO
2600.	.1073	1	1.0	1.2	757.1	756.12	519.30	3435.00	NO
2700.	.1043	1	1.0	1.2	757.1	756.12	534.31	3719.79	NO
2800.	.1034	2	1.5	1.8	532.7	531.72	405.81	361.71	NO
2900.	.1044	2	1.5	1.8	532.7	531.72	417.33	374.15	NO
3000.	.1049	2	1.5	1.8	532.7	531.72	428.84	386.69	NO

ITERATING TO FIND MAXIMUM CONCENTRATION . . .

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1000. M:

1003.	.2066	1	1.5	1.8	532.7	531.72	245.26	473.47	NO

CONTINUE SIMPLE TERRAIN AUTOMATED CALCS WITH NEW TERRAIN HEIGHT?
ENTER Y OR N:
N

```
USE DISCRETE DISTANCES?  ENTER Y OR N:
N
    ***************************************
    *** SUMMARY OF SCREEN MODEL RESULTS ***
    ***************************************

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND  1000. M:
  DIST    CONC          U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)  (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
------- ---------- ---- ----- ----- ------ ------ ------ ------ ------ -----
  1003.   .2066       1    1.5    1.8   532.7  531.72  245.26  473.47    NO

**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************

DO YOU WANT TO PRINT A HARDCOPY OF THE RESULTS?  ENTER Y OR N:
N
THE RESULTS OF THIS RUN ARE IN FILE, "SCREEN.OUT  ".
Stop - Program terminated.
```

Cliffside Steam Station Unit 6 Point Source Inputs[30]
Permit No. 04044T22

Emission rate	0.126 grams/second
Stack height	175 meters
Stack inside diameter	9.1 meters
Stack gas exit velocity	18.3 meters per second
Stack gas exit temperature	322 degrees Kelvin
Stack base elevation	231 meters amsl
Ambient temperature	degrees Kelvin (default)
Receptor height above ground	2 meters
Urban/rural option	Rural

[30] Cliffside Unit 6&7 Project, Duke Power, Dispersion Modeling Protocol, ENSR Document No. 02355-134-2230, September 2005

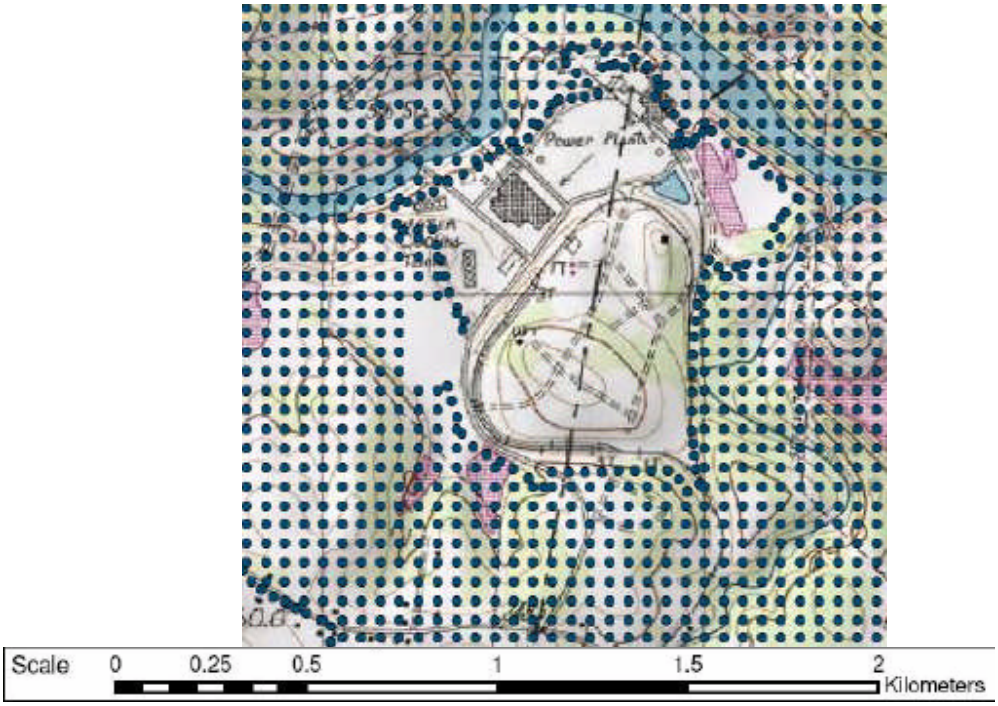


Figure 6-5, Near-Field Receptor Grid for SIL AERMOD Modeling Analysis (Application page 6-18)

****** SCREEN3 MODEL ******
**** VERSION DATED 95250 ****

ENTER TITLE FOR THIS RUN (UP TO 79 CHARACTERS):
CLIFFSIDE CSS6_1

ENTER SOURCE TYPE: P FOR POINT
F FOR FLARE
A FOR AREA
V FOR VOLUME
P
ENTER EMISSION RATE (G/S):
0.126
ENTER STACK HEIGHT (M):
175
ENTER STACK INSIDE DIAMETER (M):
9.1
ENTER STACK GAS EXIT VELOCITY OR FLOW RATE:
OPTION 1 : EXIT VELOCITY (M/S):
DEFAULT - ENTER NUMBER ONLY
OPTION 2 : VOLUME FLOW RATE (M**3/S):
EXAMPLE "VM=20.00"
OPTION 3 : VOLUME FLOW RATE (ACFM):

```
        EXAMPLE "VF=1000.00"
18.3
ENTER STACK GAS EXIT TEMPERATURE (K):
322
ENTER AMBIENT AIR TEMPERATURE (USE 293 FOR DEFAULT) (K):
293
ENTER RECEPTOR HEIGHT ABOVE GROUND (FOR FLAGPOLE RECEPTOR)
(M):
2
ENTER URBAN/RURAL OPTION (U=URBAN, R=RURAL):
R
CONSIDER BUILDING DOWNWASH IN CALCS?  ENTER Y OR N:
N
USE COMPLEX TERRAIN SCREEN FOR TERRAIN ABOVE STACK HEIGHT?
ENTER Y OR N:
N
USE SIMPLE TERRAIN SCREEN WITH TERRAIN ABOVE STACK BASE?
ENTER Y OR N:
Y
ENTER CHOICE OF METEOROLOGY;
1 - FULL METEOROLOGY (ALL STABILITIES & WIND SPEEDS)
2 - INPUT SINGLE STABILITY CLASS
3 - INPUT SINGLE STABILITY CLASS AND WIND SPEED
1
USE AUTOMATED DISTANCE ARRAY? ENTER Y OR N:
Y
ENTER TERRAIN HEIGHT ABOVE STACK BASE (M):
21
ENTER MIN AND MAX DISTANCES TO USE (M):
100
3000
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -----  -----  ------  ------  ------  ------  -----
  100.   .0000        1    1.0    1.2  1191.4 1190.38   62.96   58.63    NO
  200.   .6659E-11    5    1.0    2.7 10000.0  301.76   41.52   40.34    NO
  300.   .1801E-09    5    1.0    2.7 10000.0  301.76   45.47   43.10    NO
  400.   .4445E-07    1    3.0    3.7   960.0  499.46  103.95   85.29    NO
  500.   .9549E-04    1    3.0    3.7   960.0  499.46  125.51  118.01    NO
  600.   .4826E-02    1    3.0    3.7   960.0  499.46  146.46  165.80    NO
  700.   .2436E-01    1    3.0    3.7   960.0  499.46  166.90  223.98    NO
  800.   .4663E-01    1    3.0    3.7   960.0  499.46  186.93  292.67    NO
  900.   .8102E-01    1    2.0    2.4   673.2  672.19  225.45  382.78    NO
 1000.   .1024        1    2.0    2.4   673.2  672.19  245.81  472.07    NO
 1100.   .1084        1    2.0    2.4   673.2  672.19  265.85  572.28    NO
 1200.   .1057        1    2.0    2.4   673.2  672.19  285.59  683.51    NO
```

```
 1300.  .1011      1    2.0    2.4   673.2  672.19  301.75  804.57    NO
 1400.  .9629E-01  1    2.0    2.4   673.2  672.19  317.29  936.91    NO
 1500.  .9179E-01  1    2.0    2.4   673.2  672.19  332.89 1080.79    NO
 1600.  .8767E-01  1    2.0    2.4   673.2  672.19  348.53 1236.20    NO
 1700.  .8390E-01  1    2.0    2.4   673.2  672.19  364.19 1403.17    NO
 1800.  .8072E-01  1    1.5    1.8   845.9  844.92  401.68 1587.11    NO
 1900.  .7784E-01  1    1.5    1.8   845.9  844.92  416.53 1776.72    NO
 2000.  .7515E-01  1    1.5    1.8   845.9  844.92  431.43 1978.09    NO
 2100.  .7264E-01  1    1.5    1.8   845.9  844.92  446.36 2191.25    NO
 2200.  .7028E-01  1    1.5    1.8   845.9  844.92  461.31 2416.23    NO
 2300.  .6807E-01  1    1.5    1.8   845.9  844.92  476.28 2653.08    NO
 2400.  .6600E-01  1    1.5    1.8   845.9  844.92  491.25 2901.85    NO
 2500.  .6405E-01  1    1.5    1.8   845.9  844.92  506.23 3162.57    NO
 2600.  .6221E-01  1    1.5    1.8   845.9  844.92  521.20 3435.29    NO
 2700.  .6047E-01  1    1.5    1.8   845.9  844.92  536.15 3720.05    NO
 2800.  .5883E-01  1    1.5    1.8   845.9  844.92  551.10 4016.91    NO
 2900.  .5728E-01  1    1.5    1.8   845.9  844.92  566.03 4325.90    NO
 3000.  .5581E-01  1    1.5    1.8   845.9  844.92  580.94 4647.07    NO
ITERATING TO FIND MAXIMUM CONCENTRATION . . .

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND   100. M:
 1105.  .1085      1    2.0    2.4   673.2  672.19  266.65  576.52    NO

CONTINUE SIMPLE TERRAIN AUTOMATED CALCS WITH NEW TERRAIN
HEIGHT?
ENTER Y OR N:
N
USE DISCRETE DISTANCES?  ENTER Y OR N:
N

DO YOU WISH TO MAKE A FUMIGATION CALCULATION? ENTER Y OR N:
N

   ****************************************
   *** SUMMARY OF SCREEN MODEL RESULTS ***
   ****************************************

 CALCULATION      MAX CONC   DIST TO  TERRAIN
  PROCEDURE      (UG/M**3)   MAX (M)   HT (M)
-------------  -----------  -------  -------
SIMPLE TERRAIN    .1085       1105.     21.

**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

DO YOU WANT TO PRINT A HARDCOPY OF THE RESULTS? ENTER Y OR N:
THE RESULTS OF THIS RUN ARE IN FILE, "SCREEN.OUT ".
Stop - Program terminated.

Jackson Paper Manufacturing Company-Sylva
Permit No. 04665T11 effective September 7, 2004—March 31, 2006
Facility ID No. 5000119

Emission rate	0.126 grams/second
Stack height	36.6 meters
Stack inside diameter	2 meters
Stack gas exit velocity	10.5 meters per second
Stack gas exit temperature	472.6 degrees Kelvin
Ambient temperature	293 degrees Kelvin (default)
Receptor height above ground	2 meters
Urban/rural option	Rural

****** SCREEN3 MODEL ******
**** VERSION DATED 95250 ****

ENTER TITLE FOR THIS RUN (UP TO 79 CHARACTERS):
JACKSON PAPER

ENTER SOURCE TYPE: P FOR POINT
F FOR FLARE
A FOR AREA
V FOR VOLUME
P
ENTER EMISSION RATE (G/S):
0.126
ENTER STACK HEIGHT (M):
36.6
ENTER STACK INSIDE DIAMETER (M):
2
ENTER STACK GAS EXIT VELOCITY OR FLOW RATE:
OPTION 1 : EXIT VELOCITY (M/S):
DEFAULT - ENTER NUMBER ONLY
OPTION 2 : VOLUME FLOW RATE (M**3/S):
EXAMPLE "VM=20.00"
OPTION 3 : VOLUME FLOW RATE (ACFM):
EXAMPLE "VF=1000.00"
10.5

ENTER STACK GAS EXIT TEMPERATURE (K):
472.6
ENTER AMBIENT AIR TEMPERATURE (USE 293 FOR DEFAULT) (K):
293
ENTER RECEPTOR HEIGHT ABOVE GROUND (FOR FLAGPOLE RECEPTOR) (M):
2
ENTER URBAN/RURAL OPTION (U=URBAN, R=RURAL):
R
CONSIDER BUILDING DOWNWASH IN CALCS? ENTER Y OR N:
N
USE COMPLEX TERRAIN SCREEN FOR TERRAIN ABOVE STACK HEIGHT? ENTER Y OR N:
Y

FINAL STABLE PLUME HEIGHT (M) = 98.3
DISTANCE TO FINAL RISE (M) = 151.3

MAXIMUM CONCENTRATIONS ARE EXPECTED TO OCCUR DUE TO PLUME IMPACTION.
THEREFORE ENTER MINIMUM DISTANCES AND TERRAIN HEIGHTS FOR WHICH
IMPACTION IS LIKELY, TAKING INTO ACCOUNT TERRAIN CLOSER THAN THE DISTANCE TO FINAL RISE.
FOR TERRAIN BELOW PLUME HEIGHT, SIMPLE TERRAIN AND VALLEY 24-HR
CALCULATIONS ARE BOTH MADE AND THE MAXIMUM SELECTED.

ENTER TERRAIN HEIGHT ABOVE STACK BASE (M),
AND DISTANCE TO TERRAIN (M) (ZEROES TO EXIT):
100
300

		VALLEY 24-HR CALCS		**SIMPLE TERRAIN 24-HR CALCS**			
TERR HT (M)	MAX 24-HR DIST (M)	CONC (UG/M**3)	PLUME HT CONC (UG/M**3)	ABOVE STK BASE (M)	CONC (UG/M**3)	PLUME HT ABOVE STK HGT (M)	U10M SC	USTK (M/S)
100.	300.	3.986	3.986	98.3	.0000	.0	0 .0	.0

ENTER TERRAIN HEIGHT ABOVE STACK BASE (M),
AND DISTANCE TO TERRAIN (M) (ZEROES TO EXIT):
180
600

180.	600.	1.875	1.875	98.3	.0000	.0	0 .0	.0

ENTER TERRAIN HEIGHT ABOVE STACK BASE (M),
AND DISTANCE TO TERRAIN (M) (ZEROES TO EXIT):
0
0

COMPLEX TERRAIN CALCULATIONS DONE.
CONTINUE WITH SIMPLE TERRAIN CALCULATIONS? ENTER Y OR N:
Y
USE SIMPLE TERRAIN SCREEN WITH TERRAIN ABOVE STACK BASE?
ENTER Y OR N:
Y
ENTER CHOICE OF METEOROLOGY;
1 - FULL METEOROLOGY (ALL STABILITIES & WIND SPEEDS)
2 - INPUT SINGLE STABILITY CLASS
3 - INPUT SINGLE STABILITY CLASS AND WIND SPEED
1
USE AUTOMATED DISTANCE ARRAY? ENTER Y OR N:
Y
ENTER TERRAIN HEIGHT ABOVE STACK BASE (M):
30
ENTER MIN AND MAX DISTANCES TO USE (M):
150
600

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 30. M ABOVE STACK BASE USED FOR
FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
150.	1.500	4	20.0	24.3	6400.0	16.12	12.07	6.86	NO
200.	2.348	4	20.0	24.3	6400.0	16.12	15.72	8.78	NO
300.	2.534	4	20.0	24.3	6400.0	16.12	22.79	12.43	NO
400.	2.093	4	20.0	24.3	6400.0	16.12	29.66	15.66	NO
500.	1.695	4	15.0	18.2	4800.0	21.30	36.53	19.04	NO
600.	1.455	4	15.0	18.2	4800.0	21.30	43.04	21.85	NO

ITERATING TO FIND MAXIMUM CONCENTRATION . . .

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 150. M:

258.	2.609	4	20.0	24.3	6400.0	16.12	19.92	10.95	NO

CONTINUE SIMPLE TERRAIN AUTOMATED CALCS WITH NEW TERRAIN HEIGHT?
ENTER Y OR N:

FOR TERRAIN ABOVE STACK HEIGHT.
ENTER MIN AND MAX DISTANCES TO USE (M):
800
1000

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 37. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
800.	1.408	4	10.0	12.1	3200.0	25.05	56.13	27.92	NO
900.	1.238	4	10.0	12.1	3200.0	25.05	62.38	30.50	NO
1000.	1.108	4	8.0	9.7	2560.0	32.81	68.84	33.57	NO

ITERATING TO FIND MAXIMUM CONCENTRATION . . .

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 800. M:

800.	1.408	4	10.0	12.1	3200.0	25.05	56.13	27.92	NO

CONTINUE SIMPLE TERRAIN AUTOMATED CALCS WITH NEW TERRAIN HEIGHT?
ENTER Y OR N:
N

USE DISCRETE DISTANCES? ENTER Y OR N:
Y
TO CEASE, ENTER A DISTANCE OF ZERO (0).

****
*** SCREEN DISCRETE DISTANCES ***
****

ENTER TERRAIN HEIGHT ABOVE STACK BASE (M):
30

*** TERRAIN HEIGHT OF 30. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
ENTER DISTANCE (M) (0 TO EXIT):									
150									
150.	1.500	4	20.0	24.3	6400.0	16.12	12.07	6.86	NO
ENTER DISTANCE (M) (0 TO EXIT):									
300									
300.	2.534	4	20.0	24.3	6400.0	16.12	22.79	12.43	NO
ENTER DISTANCE (M) (0 TO EXIT):									
450									
450.	1.871	4	20.0	24.3	6400.0	16.12	33.03	17.21	NO
ENTER DISTANCE (M) (0 TO EXIT):									
600									
600.	1.455	4	15.0	18.2	4800.0	21.30	43.04	21.85	NO
ENTER DISTANCE (M) (0 TO EXIT):									
750									
750.	1.156	4	10.0	12.1	3200.0	31.65	52.98	26.61	NO
ENTER DISTANCE (M) (0 TO EXIT):									
900									
900.	1.013	4	10.0	12.1	3200.0	31.65	62.38	30.50	NO
ENTER DISTANCE (M) (0 TO EXIT):									
1050									
1050.	.8782	4	10.0	12.1	3200.0	31.65	71.66	34.04	NO
ENTER DISTANCE (M) (0 TO EXIT):									
1200									

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1200.	.7816	4	8.0	9.7	2560.0	39.41	81.04	37.41	NO
ENTER DISTANCE (M) (0 TO EXIT):									
0									
ENTER Y OR N:									
N									

DO YOU WISH TO MAKE A FUMIGATION CALCULATION? ENTER Y OR N:
N

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	2.609	258.	30.
COMPLEX TERRAIN	3.986	300.	100. (24-HR CONC)

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

DO YOU WANT TO PRINT A HARDCOPY OF THE RESULTS? ENTER Y OR N:
N
THE RESULTS OF THIS RUN ARE IN FILE, "SCREEN.OUT ".
Stop - Program terminated.

Appendix C
U.S. Environmental Protection Agency Worst-Source Spreadsheets

Another screening tool developed by the EPA to quantify air pollution risk is the "worst source" spreadsheet. This spreadsheet is based on computer modeling and allows an assessment to be made when there is incomplete information about an air pollution source; for example, the precise location and height of the smokestack. If the emission rate is entered in grams per second (g/s), the spreadsheet will make the downwind calculations for each of the source types: point, area and volume. If the concern level (acceptable ambient level, AAL) is entered in parts per million (ppm) the spreadsheet will make a comparison of the values. The following pages detail our findings using this method.

Maymead Materials, Inc.
Permit No. 05428R11 effective February 23, 2004—January 31, 2009
Facility ID No. 0600046

FORMALDEHYDE **MAYMEAD-Pineola**
Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**0.098**	**g/s**	**3.414**	**tons/yr**
MW=	**30.03**			
Concern level	**0.122**	**ppm**	**149.8**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	1.26E+03	1.69E+04	1.68E+03	**1.69E+04**	reduce emissions
100	7.24E+01	2.32E+03	7.57E+02	**2.32E+03**	reduce emissions
200	3.95E+01	9.19E+02	4.20E+02	**9.19E+02**	reduce emissions
300	2.72E+01	4.98E+02	2.71E+02	**4.98E+02**	reduce emissions
400	2.09E+01	3.16E+02	1.91E+02	**3.16E+02**	reduce emissions
500	1.70E+01	2.20E+02	1.42E+02	**2.20E+02**	reduce emissions
600	1.44E+01	1.63E+02	1.14E+02	**1.63E+02**	reduce emissions
700	1.22E+01	1.26E+02	9.26E+01	**1.26E+02**	its OK
800	1.06E+01	1.03E+02	7.70E+01	**1.03E+02**	its OK
900	1.06E+01	8.52E+01	6.60E+01	**8.52E+01**	its OK
1000	1.07E+01	7.22E+01	5.70E+01	**7.22E+01**	its OK
1100	1.05E+01	6.24E+01	4.99E+01	**6.24E+01**	its OK
1200	1.05E+01	5.47E+01	4.41E+01	**5.47E+01**	its OK
1300	1.05E+01	4.84E+01	3.93E+01	**4.84E+01**	its OK
1400	1.04E+01	4.32E+01	3.54E+01	**4.32E+01**	its OK
1500	1.03E+01	3.89E+01	3.20E+01	**3.89E+01**	its OK
1600	1.01E+01	3.52E+01	2.92E+01	**3.52E+01**	its OK
1700	9.89E+00	3.21E+01	2.67E+01	**3.21E+01**	its OK
1800	9.67E+00	2.94E+01	2.46E+01	**2.94E+01**	its OK
1900	9.43E+00	2.71E+01	2.27E+01	**2.71E+01**	its OK
2000	9.19E+00	2.50E+01	2.14E+01	**2.50E+01**	its OK

Trigen-Biopower, Inc., Forest City
Permit No. 06066T10 effective June 19, 2006—May 31, 2011
Facility ID No. 8100177

benzene **TRIGEN**
Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**0.091**	**g/s**	**3.171**	**tons/yr**
MW=	**78.11**			
Concern level	**0.0000376**	**ppm**	**0.12**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	1.17E+03	1.57E+04	1.56E+03	**1.57E+04**	reduce emissions
100	6.73E+01	2.16E+03	7.03E+02	**2.16E+03**	reduce emissions
200	3.67E+01	8.53E+02	3.90E+02	**8.53E+02**	reduce emissions
300	2.53E+01	4.63E+02	2.51E+02	**4.63E+02**	reduce emissions
400	1.94E+01	2.93E+02	1.77E+02	**2.93E+02**	reduce emissions
500	1.58E+01	2.04E+02	1.32E+02	**2.04E+02**	reduce emissions
600	1.33E+01	1.52E+02	1.06E+02	**1.52E+02**	reduce emissions
700	1.13E+01	1.17E+02	8.60E+01	**1.17E+02**	reduce emissions
800	9.84E+00	9.52E+01	7.15E+01	**9.52E+01**	reduce emissions
900	9.88E+00	7.91E+01	6.13E+01	**7.91E+01**	reduce emissions
1000	9.91E+00	6.71E+01	5.29E+01	**6.71E+01**	reduce emissions
1100	9.76E+00	5.80E+01	4.63E+01	**5.80E+01**	reduce emissions
1200	9.77E+00	5.08E+01	4.10E+01	**5.08E+01**	reduce emissions
1300	9.75E+00	4.49E+01	3.65E+01	**4.49E+01**	reduce emissions
1400	9.67E+00	4.01E+01	3.29E+01	**4.01E+01**	reduce emissions
1500	9.54E+00	3.61E+01	2.98E+01	**3.61E+01**	reduce emissions
1600	9.38E+00	3.27E+01	2.71E+01	**3.27E+01**	reduce emissions
1700	9.18E+00	2.98E+01	2.48E+01	**2.98E+01**	reduce emissions
1800	8.98E+00	2.73E+01	2.29E+01	**2.73E+01**	reduce emissions
1900	8.76E+00	2.51E+01	2.11E+01	**2.51E+01**	reduce emissions
2000	8.53E+00	2.32E+01	1.98E+01	**2.32E+01**	reduce emissions
2100	8.29E+00	2.17E+01	1.85E+01	**2.17E+01**	reduce emissions
2200	8.05E+00	2.03E+01	1.74E+01	**2.03E+01**	reduce emissions
2300	7.81E+00	1.90E+01	1.63E+01	**1.90E+01**	reduce emissions
2400	7.59E+00	1.79E+01	1.54E+01	**1.79E+01**	reduce emissions
2500	7.37E+00	1.68E+01	1.45E+01	**1.68E+01**	reduce emissions
2600	7.16E+00	1.59E+01	1.37E+01	**1.59E+01**	reduce emissions
2700	6.95E+00	1.51E+01	1.30E+01	**1.51E+01**	reduce emissions
2800	6.75E+00	1.43E+01	1.24E+01	**1.43E+01**	reduce emissions
2900	6.57E+00	1.36E+01	1.18E+01	**1.36E+01**	reduce emissions
3000	6.38E+00	1.29E+01	1.13E+01	**1.29E+01**	reduce emissions
3500	5.58E+00	1.05E+01	9.20E+00	**1.05E+01**	reduce emissions

4000	4.92E+00	8.74E+00	7.70E+00	**8.74E+00**	reduce emissions
4500	4.39E+00	7.44E+00	6.57E+00	**7.44E+00**	reduce emissions
5000	3.95E+00	6.45E+00	5.71E+00	**6.45E+00**	reduce emissions
5500	3.58E+00	5.66E+00	5.02E+00	**5.66E+00**	reduce emissions
6000	3.27E+00	5.03E+00	4.47E+00	**5.03E+00**	reduce emissions
6500	3.00E+00	4.51E+00	4.01E+00	**4.51E+00**	reduce emissions
7000	2.76E+00	4.08E+00	3.63E+00	**4.08E+00**	reduce emissions
7500	2.56E+00	3.73E+00	3.32E+00	**3.73E+00**	reduce emissions
8000	2.39E+00	3.43E+00	3.06E+00	**3.43E+00**	reduce emissions
8500	2.23E+00	3.17E+00	2.83E+00	**3.17E+00**	reduce emissions
9000	2.10E+00	2.94E+00	2.62E+00	**2.94E+00**	reduce emissions
9500	1.97E+00	2.74E+00	2.45E+00	**2.74E+00**	reduce emissions
10000	1.86E+00	2.56E+00	2.29E+00	**2.56E+00**	reduce emissions

hydrogen chloride **TRIGEN**

Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**0.187**	**g/s**	**6.495**	**tons/yr**
MW=	**36.47**			
Concern level	**0.469**	**ppm**	**699.6**	**ug/m3**

Distance (M)	**Point**	**Area**	**Volume**	**Worst**	**Recommendation**
10	2.40E+03	3.21E+04	3.20E+03	**3.21E+04**	reduce emissions
100	1.38E+02	4.42E+03	1.44E+03	**4.42E+03**	reduce emissions
200	7.52E+01	1.75E+03	7.99E+02	**1.75E+03**	reduce emissions
300	5.18E+01	9.48E+02	5.15E+02	**9.48E+02**	reduce emissions
400	3.98E+01	6.01E+02	3.62E+02	**6.01E+02**	its OK
500	3.23E+01	4.19E+02	2.71E+02	**4.19E+02**	its OK
600	2.73E+01	3.10E+02	2.17E+02	**3.10E+02**	its OK
700	2.31E+01	2.40E+02	1.76E+02	**2.40E+02**	its OK
800	2.02E+01	1.95E+02	1.47E+02	**1.95E+02**	its OK
900	2.02E+01	1.62E+02	1.26E+02	**1.62E+02**	its OK
1000	2.03E+01	1.37E+02	1.08E+02	**1.37E+02**	its OK
1100	2.00E+01	1.19E+02	9.49E+01	**1.19E+02**	its OK
1200	2.00E+01	1.04E+02	8.39E+01	**1.04E+02**	its OK
1300	2.00E+01	9.20E+01	7.49E+01	**9.20E+01**	its OK
1400	1.98E+01	8.21E+01	6.73E+01	**8.21E+01**	its OK
1500	1.95E+01	7.39E+01	6.10E+01	**7.39E+01**	its OK
1600	1.92E+01	6.70E+01	5.55E+01	**6.70E+01**	its OK
1700	1.88E+01	6.10E+01	5.09E+01	**6.10E+01**	its OK
1800	1.84E+01	5.59E+01	4.68E+01	**5.59E+01**	its OK
1900	1.79E+01	5.15E+01	4.33E+01	**5.15E+01**	its OK
2000	1.75E+01	4.76E+01	4.06E+01	**4.76E+01**	its OK

manganese **TRIGEN**

Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**0.035**	**g/s**	**1.209**	**tons/yr**
MW=	**54.94**			
Concern level	**0.0138**	**ppm**	**31.01**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	4.46E+02	5.98E+03	5.95E+02	**5.98E+03**	reduce emissions
100	2.56E+01	8.22E+02	2.68E+02	**8.22E+02**	reduce emissions
200	1.40E+01	3.25E+02	1.49E+02	**3.25E+02**	reduce emissions
300	9.63E+00	1.76E+02	9.58E+01	**1.76E+02**	reduce emissions
400	7.40E+00	1.12E+02	6.74E+01	**1.12E+02**	reduce emissions
500	6.01E+00	7.79E+01	5.04E+01	**7.79E+01**	reduce emissions
600	5.09E+00	5.78E+01	4.04E+01	**5.78E+01**	reduce emissions
700	4.30E+00	4.48E+01	3.28E+01	**4.48E+01**	reduce emissions
800	3.75E+00	3.63E+01	2.73E+01	**3.63E+01**	reduce emissions
900	3.77E+00	3.02E+01	2.34E+01	**3.02E+01**	its OK
1000	3.78E+00	2.56E+01	2.02E+01	**2.56E+01**	its OK
1100	3.72E+00	2.21E+01	1.77E+01	**2.21E+01**	its OK
1200	3.72E+00	1.93E+01	1.56E+01	**1.93E+01**	its OK
1300	3.72E+00	1.71E+01	1.39E+01	**1.71E+01**	its OK
1400	3.69E+00	1.53E+01	1.25E+01	**1.53E+01**	its OK
1500	3.64E+00	1.38E+01	1.13E+01	**1.38E+01**	its OK
1600	3.57E+00	1.25E+01	1.03E+01	**1.25E+01**	its OK
1700	3.50E+00	1.14E+01	9.47E+00	**1.14E+01**	its OK
1800	3.42E+00	1.04E+01	8.71E+00	**1.04E+01**	its OK
1900	3.34E+00	9.58E+00	8.05E+00	**9.58E+00**	its OK
2000	3.25E+00	8.86E+00	7.56E+00	**8.86E+00**	its OK

formaldehyde **TRIGEN**

Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**0.03**	**g/s**	**1.042**	**tons/yr**
MW=	**30.03**			
Concern level	**0.122**	**ppm**	**149.8**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	3.85E+02	5.15E+03	5.13E+02	**5.15E+03**	reduce emissions

100	2.21E+01	7.08E+02	2.31E+02	**7.08E+02**	reduce emissions
200	1.21E+01	2.80E+02	1.28E+02	**2.80E+02**	reduce emissions
300	8.30E+00	1.52E+02	8.26E+01	**1.52E+02**	reduce emissions
400	6.38E+00	9.64E+01	5.81E+01	**9.64E+01**	its OK
500	5.18E+00	6.72E+01	4.34E+01	**6.72E+01**	its OK
600	4.39E+00	4.98E+01	3.48E+01	**4.98E+01**	its OK
700	3.71E+00	3.86E+01	2.83E+01	**3.86E+01**	its OK
800	3.23E+00	3.13E+01	2.35E+01	**3.13E+01**	its OK
900	3.25E+00	2.60E+01	2.01E+01	**2.60E+01**	its OK
1000	3.26E+00	2.20E+01	1.74E+01	**2.20E+01**	its OK

dioxin **TRIGEN**

Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**1.87E-08**	**g/s**	**6E-07**	**tons/yr**
MW=	**184.2**			
Concern level	**3.98E-10**	**ppm**	**3E-06**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	2.40E-04	3.21E-03	3.20E-04	**3.21E-03**	reduce emissions
100	1.38E-05	4.42E-04	1.44E-04	**4.42E-04**	reduce emissions
200	7.52E-06	1.75E-04	7.99E-05	**1.75E-04**	reduce emissions
300	5.18E-06	9.48E-05	5.15E-05	**9.48E-05**	reduce emissions
400	3.98E-06	6.01E-05	3.62E-05	**6.01E-05**	reduce emissions
500	3.23E-06	4.19E-05	2.71E-05	**4.19E-05**	reduce emissions
600	2.73E-06	3.10E-05	2.17E-05	**3.10E-05**	reduce emissions
700	2.31E-06	2.40E-05	1.76E-05	**2.40E-05**	reduce emissions
800	2.02E-06	1.95E-05	1.47E-05	**1.95E-05**	reduce emissions
900	2.02E-06	1.62E-05	1.26E-05	**1.62E-05**	reduce emissions
1000	2.03E-06	1.37E-05	1.08E-05	**1.37E-05**	reduce emissions
1100	2.00E-06	1.19E-05	9.49E-06	**1.19E-05**	reduce emissions
1200	2.00E-06	1.04E-05	8.39E-06	**1.04E-05**	reduce emissions
1300	2.00E-06	9.20E-06	7.49E-06	**9.20E-06**	reduce emissions
1400	1.98E-06	8.21E-06	6.73E-06	**8.21E-06**	reduce emissions
1500	1.95E-06	7.39E-06	6.10E-06	**7.39E-06**	reduce emissions
1600	1.92E-06	6.70E-06	5.55E-06	**6.70E-06**	reduce emissions
1700	1.88E-06	6.10E-06	5.09E-06	**6.10E-06**	reduce emissions
1800	1.84E-06	5.59E-06	4.68E-06	**5.59E-06**	reduce emissions
1900	1.79E-06	5.15E-06	4.33E-06	**5.15E-06**	reduce emissions
2000	1.75E-06	4.76E-06	4.06E-06	**4.76E-06**	reduce emissions
2100	1.70E-06	4.44E-06	3.80E-06	**4.44E-06**	reduce emissions
2200	1.65E-06	4.15E-06	3.56E-06	**4.15E-06**	reduce emissions

2300	1.60E-06	3.89E-06	3.35E-06	**3.89E-06**	reduce emissions
2400	1.55E-06	3.66E-06	3.15E-06	**3.66E-06**	reduce emissions
2500	1.51E-06	3.45E-06	2.98E-06	**3.45E-06**	reduce emissions
2600	1.47E-06	3.26E-06	2.82E-06	**3.26E-06**	reduce emissions
2700	1.42E-06	3.09E-06	2.67E-06	**3.09E-06**	reduce emissions
2800	1.38E-06	2.93E-06	2.54E-06	**2.93E-06**	its OK
2900	1.34E-06	2.78E-06	2.42E-06	**2.78E-06**	its OK
3000	1.31E-06	2.65E-06	2.32E-06	**2.65E-06**	its OK
3500	1.14E-06	2.15E-06	1.88E-06	**2.15E-06**	its OK
4000	1.01E-06	1.79E-06	1.58E-06	**1.79E-06**	its OK

acrolein **TRIGEN**

Enter the peak emission rate of the contaminent of concern

Peak (30 min) Emission Rate =	**0.029**	**g/s**	**1**	**tons/yr**
MW=	**56.06**			
Concern level	**0.0349**	**ppm**	**80.02**	**ug/m3**

Distance (M)	**Point**	**Area**	**Volume**	**Worst**	**Recommendation**
10	3.70E+02	4.95E+03	4.92E+02	**4.95E+03**	reduce emissions
100	2.12E+01	6.80E+02	2.22E+02	**6.80E+02**	reduce emissions
200	1.16E+01	2.69E+02	1.23E+02	**2.69E+02**	reduce emissions
300	7.97E+00	1.46E+02	7.93E+01	**1.46E+02**	reduce emissions
400	6.12E+00	9.26E+01	5.58E+01	**9.26E+01**	reduce emissions
500	4.98E+00	6.45E+01	4.17E+01	**6.45E+01**	its OK
600	4.21E+00	4.78E+01	3.34E+01	**4.78E+01**	its OK
700	3.56E+00	3.70E+01	2.71E+01	**3.70E+01**	its OK
800	3.10E+00	3.00E+01	2.26E+01	**3.00E+01**	its OK
900	3.12E+00	2.50E+01	1.93E+01	**2.50E+01**	its OK
1000	3.12E+00	2.12E+01	1.67E+01	**2.12E+01**	its OK