Blue Ridge Environmental Defense League

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Testimony of Louis A. Zeller
Science Director, Blue Ridge Environmental Defense League

Before the Onslow County Board of Adjustment, Jacksonville, North Carolina
Members: Homer Hobgood, Jerry Bunting, Jerome Shaw, Alex Wood and John Napper
Alternates: Marie Farmer and Carol McIntyre

Date: February 23, 2010

Re: Special Use Permit, Tax Parcel ID# 349-6

This is a report on the potential impacts of an asphalt proposed by Morton Trucking, Inc which seeks a Special Use Permit on US Highway 17 in the Kellum and Pumpkin Center communities.

As you know, the Onslow County Zoning Ordinances prohibit approval of a Special Use unless the Board can determine *inter alia* that the proposed use meets the following criteria:

- The use will not materially endanger the public health or safety;
- The use will not substantially injure the value of adjoining property;
- The use is a public necessity;
- The use is in harmony with the surrounding area.

Upon review of the available information, it is clear that the proposed asphalt plant would not meet these criteria.

The site plan in support an application for a special use must allow the Zoning Administrator to reasonably understand the proposed development and may include "any additional information required by the Zoning Administrator to assess the merits of the application." However, until an air permit application is submitted to the state and the NC Division of Air Quality issues a permit, the Board cannot be certain how large an operation Morton Trucking would build, what type of fuel it would use and what type of pollution controls will be employed. These are critical factors which would determine the plant's impact on public health and property values, the need for such a facility and its conformity with adjacent land uses. For this reason, I recommend that the Onslow County Board of Adjustment defer its zoning decision until after an air permit application is submitted. Further, I recommend that the Board place a moratorium on all asphalt plant special use permitting until a specific county-wide protective ordinance for all such facilities can be put in place.

Overview

Hot mix asphalt contains gravel and sand mixed with asphalt cement. Large volumes of hydrocarbons are released into the air as the hot asphalt is mixed, loaded into trucks and hauled from the plant site. These include volatile organic compounds, polycyclic aromatic hydrocarbons, and condensed particulates. Condensation of particulates occurs

at ambient temperatures of 70 degrees F. These condensed particles carry a variety of compounds which are a danger to public health.

Air Pollution Impacts

For this analysis I have used the data provided by Morton Trucking, Inc to the Onslow County Planning and Development Dept in an application dated October 8, 2009.

Project Name: Morton Trucking, Inc. Asphalt Plant
Property address: 123 Garnet Lane, Jacksonville, North Carolina 28546
Township: Jacksonville TWP
Tax Parcel ID# 349-6
Zoning District: HB

In order to prepare this report, we have, according to information and belief, assumed the company is considering a 200 ton per hour hot-mix asphalt batch plant.[1] The US Environmental Protection Agency has compiled data on the types and quantities of asphalt plant emissions based on tests conducted at a variety of facilities. Below is an excerpt from the EPA database which details the air pollution from the type of asphalt manufacturing contemplated for the Morton property: a batch mix plant:

> As with most facilities in the mineral products industry, batch mix HMA plants have two major categories of emissions: ducted sources (those vented to the atmosphere through some type of stack, vent, or pipe), and fugitive sources (those not confined to ducts and vents but emitted directly from the source to the ambient air). Ducted emissions are usually collected and transported by an industrial ventilation system having one or more fans or air movers, eventually to be emitted to the atmosphere through some type of stack. Fugitive emissions result from process and open sources and consist of a combination of gaseous pollutants and PM.
>
> The most significant ducted source of emissions of most pollutants from batch mix HMA plants is the rotary drum dryer. The dryer emissions consist of water (as steam evaporated from the aggregate); PM; products of combustion (carbon dioxide [CO2], nitrogen oxides [NOx], and sulfur oxides [SOx]); carbon monoxide (CO); and small amounts of organic compounds of various species (including volatile organic compounds [VOC], methane [CH4], and hazardous air pollutants [HAP]). The CO and organic compound emissions result from incomplete combustion of the fuel. It is estimated that between 70 and 90 percent of the energy used at HMA plants is from the combustion of natural gas.
>
> Other potential process sources include the hot-side conveying, classifying, and mixing equipment, which are vented either to the primary dust collector (along with the dryer gas) or to a separate dust collection system. The vents and enclosures that collect emissions from these sources are commonly called “fugitive air” or “scavenger” systems. The scavenger system may or may not have its own separate air mover device, depending on the particular facility. The emissions captured and transported by the

[1] The Onslow County Staff Report and Special Use Permit Application for Morton Trucking, Inc. dated October 8, 2009 states “proposed asphalt batch plant” on page 10.

> scavenger system are mostly aggregate dust, but they may also contain gaseous organic compounds and a fine aerosol of condensed organic particles. This organic aerosol is created by the condensation of vapor into particles during cooling of organic vapors volatilized from the asphalt cement in the mixer (pug mill). The amount of organic aerosol produced depends to a large extent on the temperature of the asphalt cement and aggregate entering the pug mill. Organic vapor and its associated aerosol also are emitted directly to the atmosphere as process fugitives during truck load-out, from the bed of the truck itself during transport to the job site, and from the asphalt storage tank. Both the low molecular weight organic compounds and the higher weight organic aerosol contain small amounts of HAP. The ducted emissions from the heated asphalt storage tanks include gaseous and aerosol organic compounds and combustion products from the tank heater.[2]

A medium-sized plant, producing 200,000 tons of asphalt per year and using fabric filter pollution control, will, according to the EPA's Emission Factors, emit the amounts of air pollution listed in Table A.

Table A. Annual Emissions With Pollution Controls

Pollutant	**Annual emissions in pounds**	**Reference notes**
PM [a]	5,000	Filterable
PM-10 [a]	1,960	Filterable
Inorganic PM [a]	2,600	Condensable
Organic PM [a]	820	Condensable
PM-2.5 [a]	1,660	
Carbon monoxide (CO) [b]	80,000	
Carbon dioxide (CO_2) [b]	7,400,000	
Nitrogen oxides (NO_x) [b]	5,000	Natural gas
Nitrogen oxides (NO_x) [b]	24,000	Fuel oil #2
Sulfur dioxide (SO_2) [b]	920	Natural gas
Sulfur dioxide (SO_2) [b]	17,600	Fuel oil #2
Total Organics (TOC) [c]	3,000	Hydrocarbons +formaldehyde
Methane (CH4) [c]	1,480	
Volatile organics (VOC) [c]	1,640	
Benzene [d]	56	
Formaldehyde [d]	148	
Toluene [d]	200	
Xylene [d]	540	
Total HAP [d]	1,520	Hazardous air pollutants

a. AP-42 Table 11.1-2
b. AP-42 Table 11.1-5
c. AP-42 Table 11.1-6
d. AP-42 Table 11.1-9

[2] AP 42 Section 11.1.2.1 Batch Mix Plants, Hot Mix Asphalt Reports, 3/04 Mineral Products Industry, page 11.1-7, available at http://www.epa.gov/ttn/chief/ap42/ch11/related/c11s01.html

All pollution totals listed above are actual emissions to the atmosphere *after* any reductions by the pollution control device.

Asphalt plants are large sources of air pollution. The main smoke stack carries emissions from the aggregate dryer through the baghouse filter. But in addition to the dryer stack, asphalt plants have many sources of fugitive emissions; i.e., releases from other stacks, conveyor belts, flanges, hoppers and other equipment close to ground level. (Appendix A of this report has a flow diagram of an asphalt plant with emission points.) Because fugitive emissions occur close to ground level, wind velocity is reduced and air pollution is not subject to the dispersion which occurs at smokestack levels. Stagnant air conditions and inversions increase the level of exposure to the local community. Figure 1 is a photo of an operating asphalt plant in North Carolina showing the cloud of ground-level fugitive emissions.

Figure 1. Asphalt Plant Fugitive Emissions

Toxic Air Pollutant Levels

The NC Division of Air Quality uses a US EPA computer model called SCREEN3 to derive its pollution estimates. In my analysis, I have employed a spreadsheet developed by EPA based on SCREEN3 which calculates all emission modeling modes: point source, area source, and volume source.

Arsenic

Using the most conservative calculations, the model predicts that pollution levels for arsenic would not meet NC standards for toxic air pollution within 10,000 meters of the proposed plant site. The arsenic readout is included in Appendix B. The International Agency for Research on Cancer has classified arsenic as a Group 1 human carcinogen. Inhaled arsenic is linked to respiratory cancer. Chronic inhalation exposure to inorganic arsenic in humans is associated with irritation of the skin and mucous membranes, while chronic oral exposure has resulted in gastrointestinal effects, anemia, peripheral neuropathy, skin lesions, and liver or kidney damage (U.S. EPA, 1994a).

Benzene

In addition, the model predicts that benzene levels would not meet NC standards for toxic air pollution within 10,000 meters of the proposed plant site. The benzene readout is included in Appendix C. Benzene is a known human carcinogen. Benzene damages the bone marrow causing anemia and depresses the immune system, increasing the chance of infection. Benzene causes leukemia and is associated with other cancers of the blood. Benzene affects the liver, kidney, lung, heart and the brain and can damage human DNA.

Formaldehyde

Finally, the model predicts that formaldehyde levels would not fall below NC standards for toxic air pollution within 300 meters of the proposed plant site. The formaldehyde readout is included in Appendix D. Chronic exposure is associated with respiratory symptoms and eye, nose, and throat irritation (U.S. EPA, 1994a). The U.S. EPA has classified formaldehyde in Group B1, probable human carcinogen.

Map circles in Figure 2 are drawn at approximately 980 meters (six-tenths miles), 1960 meters (one and two-tenths miles) and 2940 meters (one and eight-tenths miles). Ten thousand meters distance from the proposed plant site would extend over six miles, encompassing much of the City of Jacksonville.

Figure 2. Proposed Asphalt Plant Site

Conclusion

According to the modeling, pollution levels above state toxics limits for both arsenic and benzene could extend over six miles from the proposed plant site. The results of my analysis indicate that the proposed Morton Trucking, Inc. asphalt plant would have an undesirable effect on adjoining properties, would endanger residential areas, and does not meet Onslow County special use permit criteria.

To protect public health, industrial pollution sources must meet North Carolina toxic air pollutant limits. I find that at least two pollutants, benzene and arsenic, may exceed the

maximum allowable level in residential and commercial areas of Onslow County and the City of Jacksonville.

Respectfully submitted,

Louis A. Zeller

Appendix A: Flow diagram of an asphalt plant with emission points

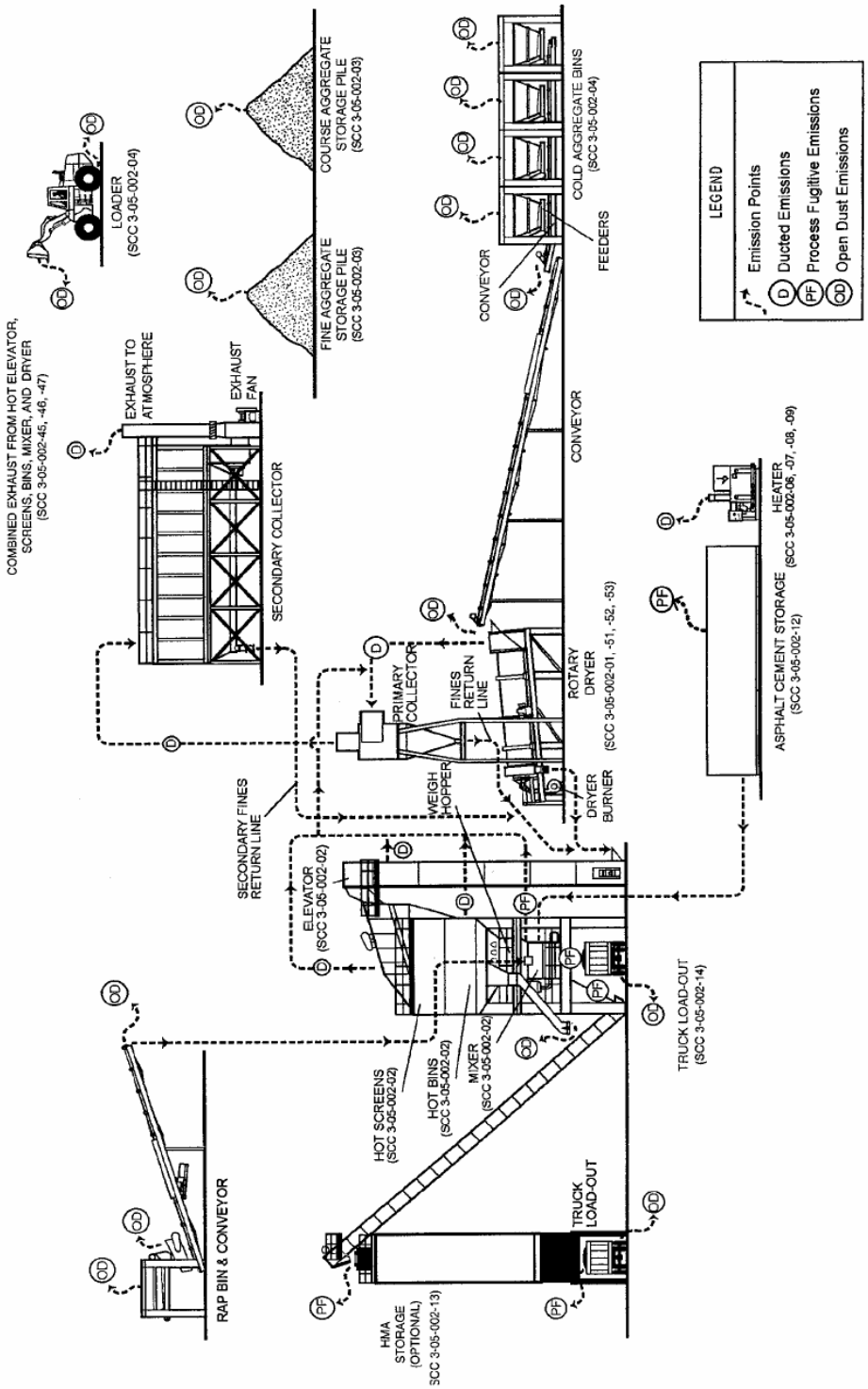

Figure 11.1-1. General process flow diagram for batch mix asphalt plants (source classification codes in parentheses).[3]

Appendix B

Enter the peak emission rate of the contaminent of concern
ARSENIC

Peak (30 min) Emission Rate =	**0.0000116**	**g/s**	**4E-04**	**tons/yr**
MW=	**72.9216**			
Concern level	**0.000000075**	**ppm**	**2E-04**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	1.49E-01	1.99E+00	1.98E-01	**1.99E+00**	reduce emissions
100	8.55E-03	2.74E-01	8.93E-02	**2.74E-01**	reduce emissions
200	4.66E-03	1.08E-01	4.96E-02	**1.08E-01**	reduce emissions
300	3.21E-03	5.88E-02	3.19E-02	**5.88E-02**	reduce emissions
400	2.47E-03	3.73E-02	2.25E-02	**3.73E-02**	reduce emissions
500	2.00E-03	2.60E-02	1.68E-02	**2.60E-02**	reduce emissions
600	1.70E-03	1.93E-02	1.35E-02	**1.93E-02**	reduce emissions
700	1.43E-03	1.49E-02	1.09E-02	**1.49E-02**	reduce emissions
800	1.25E-03	1.21E-02	9.09E-03	**1.21E-02**	reduce emissions
900	1.26E-03	1.01E-02	7.79E-03	**1.01E-02**	reduce emissions
1000	1.26E-03	8.52E-03	6.73E-03	**8.52E-03**	reduce emissions
1100	1.24E-03	7.37E-03	5.88E-03	**7.37E-03**	reduce emissions
1200	1.24E-03	6.45E-03	5.20E-03	**6.45E-03**	reduce emissions
1300	1.24E-03	5.71E-03	4.64E-03	**5.71E-03**	reduce emissions
1400	1.23E-03	5.10E-03	4.18E-03	**5.10E-03**	reduce emissions
1500	1.21E-03	4.59E-03	3.78E-03	**4.59E-03**	reduce emissions
1600	1.19E-03	4.15E-03	3.45E-03	**4.15E-03**	reduce emissions
1700	1.17E-03	3.79E-03	3.16E-03	**3.79E-03**	reduce emissions
1800	1.14E-03	3.47E-03	2.90E-03	**3.47E-03**	reduce emissions
1900	1.11E-03	3.19E-03	2.68E-03	**3.19E-03**	reduce emissions
2000	1.08E-03	2.95E-03	2.52E-03	**2.95E-03**	reduce emissions
2100	1.05E-03	2.75E-03	2.36E-03	**2.75E-03**	reduce emissions
2200	1.02E-03	2.57E-03	2.21E-03	**2.57E-03**	reduce emissions
2300	9.93E-04	2.41E-03	2.08E-03	**2.41E-03**	reduce emissions
2400	9.64E-04	2.27E-03	1.95E-03	**2.27E-03**	reduce emissions
2500	9.36E-04	2.14E-03	1.85E-03	**2.14E-03**	reduce emissions
2600	9.09E-04	2.02E-03	1.75E-03	**2.02E-03**	reduce emissions
2700	8.83E-04	1.91E-03	1.66E-03	**1.91E-03**	reduce emissions
2800	8.58E-04	1.82E-03	1.58E-03	**1.82E-03**	reduce emissions
2900	8.34E-04	1.73E-03	1.50E-03	**1.73E-03**	reduce emissions
3000	8.11E-04	1.64E-03	1.44E-03	**1.64E-03**	reduce emissions
3500	7.08E-04	1.33E-03	1.17E-03	**1.33E-03**	reduce emissions
4000	6.26E-04	1.11E-03	9.78E-04	**1.11E-03**	reduce emissions
4500	5.58E-04	9.46E-04	8.35E-04	**9.46E-04**	reduce emissions
5000	5.02E-04	8.19E-04	7.25E-04	**8.19E-04**	reduce emissions
5500	4.55E-04	7.20E-04	6.38E-04	**7.20E-04**	reduce emissions
6000	4.15E-04	6.39E-04	5.68E-04	**6.39E-04**	reduce emissions
6500	3.81E-04	5.73E-04	5.10E-04	**5.73E-04**	reduce emissions

7000	3.51E-04	5.19E-04	4.62E-04	**5.19E-04**	reduce emissions
7500	3.26E-04	4.74E-04	4.22E-04	**4.74E-04**	reduce emissions
8000	3.04E-04	4.35E-04	3.88E-04	**4.35E-04**	reduce emissions
8500	2.84E-04	4.02E-04	3.59E-04	**4.02E-04**	reduce emissions
9000	2.66E-04	3.73E-04	3.33E-04	**3.73E-04**	reduce emissions
9500	2.51E-04	3.48E-04	3.11E-04	**3.48E-04**	reduce emissions
10000	2.37E-04	3.25E-04	2.91E-04	**3.25E-04**	reduce emissions

Appendix C

Enter the peak emission rate of the contaminent of concern
BENZENE

Peak (30 min) Emission Rate =	**0.00706**	**g/s**	**0.245**	**tons/yr**
MW=	**78.1124**			
Concern level	**0.000038**	**ppm**	**0.121**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	9.06E+01	1.21E+03	1.21E+02	**1.21E+03**	reduce emissions
100	5.20E+00	1.67E+02	5.43E+01	**1.67E+02**	reduce emissions
200	2.84E+00	6.60E+01	3.02E+01	**6.60E+01**	reduce emissions
300	1.95E+00	3.58E+01	1.94E+01	**3.58E+01**	reduce emissions
400	1.50E+00	2.27E+01	1.37E+01	**2.27E+01**	reduce emissions
500	1.22E+00	1.58E+01	1.02E+01	**1.58E+01**	reduce emissions
600	1.03E+00	1.17E+01	8.20E+00	**1.17E+01**	reduce emissions
700	8.73E-01	9.08E+00	6.65E+00	**9.08E+00**	reduce emissions
800	7.61E-01	7.36E+00	5.53E+00	**7.36E+00**	reduce emissions
900	7.64E-01	6.12E+00	4.74E+00	**6.12E+00**	reduce emissions
1000	7.66E-01	5.18E+00	4.09E+00	**5.18E+00**	reduce emissions
1100	7.55E-01	4.48E+00	3.58E+00	**4.48E+00**	reduce emissions
1200	7.55E-01	3.93E+00	3.17E+00	**3.93E+00**	reduce emissions
1300	7.54E-01	3.47E+00	2.83E+00	**3.47E+00**	reduce emissions
1400	7.48E-01	3.10E+00	2.54E+00	**3.10E+00**	reduce emissions
1500	7.38E-01	2.79E+00	2.30E+00	**2.79E+00**	reduce emissions
1600	7.25E-01	2.53E+00	2.10E+00	**2.53E+00**	reduce emissions
1700	7.10E-01	2.30E+00	1.92E+00	**2.30E+00**	reduce emissions
1800	6.94E-01	2.11E+00	1.77E+00	**2.11E+00**	reduce emissions
1900	6.77E-01	1.94E+00	1.63E+00	**1.94E+00**	reduce emissions
2000	6.60E-01	1.80E+00	1.53E+00	**1.80E+00**	reduce emissions
2100	6.41E-01	1.67E+00	1.43E+00	**1.67E+00**	reduce emissions
2200	6.22E-01	1.57E+00	1.34E+00	**1.57E+00**	reduce emissions
2300	6.04E-01	1.47E+00	1.26E+00	**1.47E+00**	reduce emissions
2400	5.87E-01	1.38E+00	1.19E+00	**1.38E+00**	reduce emissions
2500	5.70E-01	1.30E+00	1.12E+00	**1.30E+00**	reduce emissions
2600	5.53E-01	1.23E+00	1.06E+00	**1.23E+00**	reduce emissions
2700	5.38E-01	1.16E+00	1.01E+00	**1.16E+00**	reduce emissions
2800	5.22E-01	1.10E+00	9.59E-01	**1.10E+00**	reduce emissions
2900	5.08E-01	1.05E+00	9.12E-01	**1.05E+00**	reduce emissions
3000	4.94E-01	1.00E+00	8.75E-01	**1.00E+00**	reduce emissions
3500	4.31E-01	8.10E-01	7.12E-01	**8.10E-01**	reduce emissions
4000	3.81E-01	6.76E-01	5.95E-01	**6.76E-01**	reduce emissions
4500	3.40E-01	5.75E-01	5.08E-01	**5.75E-01**	reduce emissions
5000	3.06E-01	4.99E-01	4.41E-01	**4.99E-01**	reduce emissions
5500	2.77E-01	4.38E-01	3.88E-01	**4.38E-01**	reduce emissions
6000	2.53E-01	3.89E-01	3.46E-01	**3.89E-01**	reduce emissions
6500	2.32E-01	3.49E-01	3.10E-01	**3.49E-01**	reduce emissions

7000	2.14E-01	3.16E-01	2.81E-01	**3.16E-01**	reduce emissions
7500	1.98E-01	2.88E-01	2.57E-01	**2.88E-01**	reduce emissions
8000	1.85E-01	2.65E-01	2.36E-01	**2.65E-01**	reduce emissions
8500	1.73E-01	2.45E-01	2.19E-01	**2.45E-01**	reduce emissions
9000	1.62E-01	2.27E-01	2.03E-01	**2.27E-01**	reduce emissions
9500	1.53E-01	2.12E-01	1.89E-01	**2.12E-01**	reduce emissions
10000	1.44E-01	1.98E-01	1.77E-01	**1.98E-01**	reduce emissions

Appendix D

Enter the peak emission rate of the contaminent of concern
FORMALDEHYDE

Peak (30 min) Emission Rate =	**0.0186**	**g/s**	**0.646**	**tons/yr**
MW=	**30.0216**			
Concern level	**0.122**	**ppm**	**149.8**	**ug/m3**

Distance (M)	Point	Area	Volume	Worst	Recommendation
10	2.39E+02	3.20E+03	3.18E+02	**3.20E+03**	reduce emissions
100	1.37E+01	4.39E+02	1.43E+02	**4.39E+02**	reduce emissions
200	7.48E+00	1.74E+02	7.95E+01	**1.74E+02**	reduce emissions
300	5.15E+00	9.43E+01	5.12E+01	**9.43E+01**	its OK
400	3.95E+00	5.98E+01	3.60E+01	**5.98E+01**	its OK
500	3.21E+00	4.16E+01	2.69E+01	**4.16E+01**	its OK
600	2.72E+00	3.09E+01	2.16E+01	**3.09E+01**	its OK
700	2.30E+00	2.39E+01	1.75E+01	**2.39E+01**	its OK
800	2.01E+00	1.94E+01	1.46E+01	**1.94E+01**	its OK
900	2.01E+00	1.61E+01	1.25E+01	**1.61E+01**	its OK
1000	2.02E+00	1.37E+01	1.08E+01	**1.37E+01**	its OK