# City of Albuquerque

**Environmental Health Department**

**Timothy M. Keller, Mayor**

## Interoffice Memorandum

**February 21, 2018**

**To:** **Regan Eyerman, Senior Environmental Health Scientist**

**From:** **Jeff Stonesifer, Senior Environmental Health Scientist** JS

**Subject:** **Review of model for Albuquerque Asphalt, Inc.**

**Permit #** **3291-M1, 1955, 1838**

**Site Location**

5028 Broadway Blvd SE
Easting: 349,700m Northing: 3,874,950m Zone:13

**Overview of Facilities**

With permit #3291-1AR-R1, Albuquerque Asphalt (AAI) bought the permit that originally belonged to Mountain States and relocated the Hot Mix Asphalt (HMA) plant and Recycled Asphalt Products (RAP) plant to the east side of Broadway Blvd. The new location will include Albuquerque Asphalt's Cold Recycling Mixing Plant (KMA), permit #1955, as well as the concrete batch plant (CBP), formerly known as Complete Concrete, and permitted as #1838. The CBP is already on site. This modeling also establishes conditions under which AAI's KMA plant can operate on this site simultaneously with the HMA, RAP, and CBP. Permit #3291 is also being modified so the crusher plant can handle both RAP and concrete.

**Conclusions of Dispersion Modeling**

Modeling was performed for TSP, $PM_{10}$, $PM_{2.5}$, and CO using AERMOD. Compliance was demonstrated for NAAQS and NMAAQS.

**Process and Records**

Modeling conducted in-house demonstrates compliance with applicable regulatory requirements. Modeling files are archived, are part of the public record for this permit application, and are available for printing. A modeling protocol was submitted and reviewed. After some questions were answered, the protocol was approved on 16Nov2017.

**Assumptions used in the modeling review**

1. Operating hours:
    a. AAI HMA…24/7
    b. AAI RAP
        i. Dec, Jan, Feb…8 AM to 5 PM
        ii. Mar, Apr, May…7 AM to 5 PM
        iii. Jun, Jul, Aug…7 AM to 7 PM
        iv. Sep, Oct, Nov…7 AM to 5 PM
    c. AAI KMA
        i. Dec, Jan, Feb…8 AM to 5 PM
        ii. Mar…3 AM to 9 PM
        iii. Apr through Sep…24/7
        iv. Oct, Nov…3 AM to 9 PM
    d. CC may operate any day of the year between the hours of 3 AM to 5 PM.
2. Throughput limits
    a. AAI HMA
        i. 400 tons per hour
        ii. Jan, Feb, Mar…2800 tons per day
        iii. Apr, May…3600 tons per day
        iv. Jun, Jul, Aug…4000 tons per day
        v. Sep, Oct…3600 tons per day
        vi. Nov, Dec…2400 tons per day
        vii. 900,000 tons per year (source of the 0.747 factor used in annual PM models)
    b. AAI RAP
        i. 200 tons per hour
    c. AAI KMA
        i. 200 tons per hour
    d. CC
        i. 100 cubic yards per hour of concrete production
        ii. 1000 cubic yards/day of concrete production
        iii. 265,000 cubic yards/year of concrete production
3. A fence or some other barrier restricts access to the property
4. The southern access road is paved from Broadway into the facility and maintained to mitigate fugitive dust emissions.
5. The following haul roads are paved. Refer to Figure 1 for visualization of haul road layout.
    a. PVI, PAS, PAG, and PVO
    b. COM…Concrete batch plant road

**Modeling Parameters**

- Rural dispersion coefficients
- Gravitational settling for TSP
- Hourly emissions factors
- Structural downwash
- Backgrounds included in cumulative models

Emission rates used in the review can be seen below in **Tables 1 - 8**.

**Table 1: Particulate Emission Rates for sources for HMA plant (3291-M1)**

| Source ID | Unit # | Emission Unit Description | TSP (lbs/hr) | PM10 (lbs/hr) | PM2.5 (lbs/hr) |
|---|---|---|---|---|---|
| HMASTK | 15 | Baghouse Stack | 13.200 | 9.200 | 9.200 |
| HMAHEAT | 20 | Asphalt Cement Heater | 0.039 | 0.039 | 0.039 |
| HMAFILL | 14 | Loading of Mineral Filler Silo | 0.180 | 0.115 | 0.009 |
| DRUMUNL | 16 | Loading of Asphalt Silo | 0.234 | 0.234 | 0.234 |
| HMASILO | 17 | Unloading of Asphalt Silo | 0.209 | 0.209 | 0.209 |
| HMAPILE1 | 1 | Storage Pile Handling 1 | 0.436 | 0.207 | 0.031 |
| HMAPILE2 | 1 | Storage Pile Handling 2 | 0.436 | 0.207 | 0.031 |
| HMAPILE3 | 1 | Storage Pile Handling 3 | 0.436 | 0.207 | 0.031 |
| HMAPILE4 | 1 | Storage Pile Handling 4 | 0.436 | 0.207 | 0.031 |
| HMABIN | 2 | Bin Loading | 1.086 | 0.513 | 0.078 |
| HMATP1 | 3 | Bin Unloading | 0.032 | 0.011 | 0.003 |
| HMASCR | 4 | Scalping Screen | 0.506 | 0.170 | 0.012 |
| HMATP2 | 5 | Scalping Screen Unloading | 0.032 | 0.011 | 0.003 |
| HMAPUG | 6 | Pug Mill | 0.033 | 0.011 | 0.003 |
| HMATP3 | 7 | Pug Mill Unloading | 0.033 | 0.011 | 0.003 |
| HMATP4 | 8 | Conveyor Transfer to Drum Conveyor | 0.033 | 0.011 | 0.003 |
| RAPBIN | 9 | RAP Bin Loading | 0.198 | 0.094 | 0.014 |
| RAPTP1 | 10 | RAP Bin Unloading | 0.020 | 0.006 | 0.002 |
| RAPSCR | 11a | RAP Screen | 0.308 | 0.104 | 0.007 |
| RAPTP2 | 11b | RAP Screen Unloading | 0.020 | 0.006 | 0.002 |
| RAPTP3 | 12 | RAP Transfer Point | 0.020 | 0.006 | 0.002 |
| RAPTP4 | 13 | RAP Transfer Point | 0.020 | 0.006 | 0.002 |
| PVI_1-17 | 22 | Paved Haul Road, Ingress | 0.794 | 0.159 | 0.039 |
| PAS_1-9 | 22 | Paved Haul Road, Asphalt | 0.228 | 0.046 | 0.011 |
| PAG_1-19 | 22 | Paved Haul Road, Aggregate | 0.274 | 0.055 | 0.014 |
| PVO_1-16 | 22 | Paved Haul Road, Egress | 0.750 | 0.150 | 0.038 |
| UPA_1-22 | 22 | Unpaved Haul Road, Aggregate | 1.144 | 0.292 | 0.029 |
| UPS_1-8 | 22 | Unpaved Haul Road, Asphalt | 0.624 | 0.159 | 0.016 |
| | | **Totals** | **21.761** | **12.446** | **10.096** |

**Table 2: Particulate Emission Rates for sources for RAP plant (3291-M1)**

| Source ID | Unit # | Emission Unit Description | TSP (lbs/hr) | PM10 (lbs/hr) | PM2.5 (lbs/hr) |
|---|---|---|---|---|---|
| RAW | 24 | Raw Material Pile | 0.944 | 0.447 | 0.068 |
| FEEDER | 25 | Feeder | 0.944 | 0.447 | 0.068 |
| PCRUSH | 26 | Primary Crusher | 0.240 | 0.108 | 0.020 |
| TP1 | 27 | Transfer Point | 0.028 | 0.009 | 0.003 |
| TP2 | 28 | Transfer Point | 0.028 | 0.009 | 0.003 |
| TP3 | 29 | Transfer Point | 0.017 | 0.006 | 0.002 |
| SCRN | 30 | Screen | 0.704 | 0.237 | 0.016 |
| SCRUSH | 31 | Secondary Crusher | 0.144 | 0.065 | 0.012 |
| TP4 | 32 | Transfer Point | 0.017 | 0.006 | 0.002 |
| TP5 | 33 | Transfer Point | 0.017 | 0.006 | 0.002 |
| TP6 | 34 | Transfer Point | 0.028 | 0.009 | 0.003 |
| TP7 | 35 | Transfer Point | 0.028 | 0.009 | 0.003 |
| TP8 | 36 | Transfer Point | 0.028 | 0.009 | 0.003 |
| PPILE | 37 | Stacker Drop to Finish Storage Pile | 0.567 | 0.268 | 0.041 |
| GEN | 38 | Generator | 0.850 | 0.850 | 0.850 |
| RAP_1-74 | 22 | RAP Road, Paved & Unpaved | 1.670 | 0.387 | 0.059 |
| | | **Totals** | **6.254** | **2.872** | **1.155** |

**Table 3: Total Particulate Emission Rates for sources for HMA/RAP (permit #3291-M1)**

| Facility | TSP (lbs/hr) | PM10 (lbs/hr) | PM2.5 (lbs/hr) |
|---|---|---|---|
| HMA | 21.761 | 12.446 | 10.096 |
| RAP | 6.254 | 2.872 | 1.155 |
| **Totals** | **28.02** | **15.32** | **11.25** |

**Table 4: Carbon Monoxide Emission Rates for HMA/RAP (permit #3291-M1)**

| Source ID | Source Description | CO (lbs/hr) |
|---|---|---|
| HMASTK | Baghouse Stack | 52.00 |
| HMAHEAT | Asphalt Cement Heater | 0.20 |
| GEN | RAP Plant Generator | 2.20 |
| DRUMUNL | Asphalt Silo Loading | 0.47 |
| HMASILO | Asphalt Silo Unloading | 0.54 |
| PAS_1-9 | Paved Haul Road, Asphalt | 0.04 |
| PVO_1-16 | Paved Haul Road, Egress | 0.08 |
| UPS_4-8 | Unpaved Haul Road, Asphalt | 0.02 |
| | **Total** | **55.55** |

**Table 5: Particulate Emission Rates for sources for KMA plant (permit #1955)**

| Source ID | Unit # | Emission Unit Description | TSP (lbs/hr) | PM10 (lbs/hr) | PM2.5 (lbs/hr) |
|---|---|---|---|---|---|
| KMAGEN1 | 7 | Generator | 0.02 | 0.02 | 0.02 |
| KMAGEN2 | 8 | Generator | 0.07 | 0.07 | 0.07 |
| KMASILO | 4 | Cement Silo | 0.18 | 0.12 | 0.04 |
| KMA | 1-3 | Hopper/Screen/Pugmill/Conveyor | 1.16 | 0.55 | 0.08 |
| KMAPILE | 5 | Raw Material Pile | 0.11 | 0.05 | 0.008 |
| KMAFPILE | 6 | Finish Pile | 0.04 | 0.02 | 0.003 |
| KMA_1-74 | 9 | KMA Haul Road | 0.37 | 0.10 | 0.010 |
| | | **Totals** | **1.95** | **0.93** | **0.23** |

**Table 6: Carbon Monoxide Emission Rates for KMA (1955)**

| Source ID | Source Description | CO (lbs/hr) |
|---|---|---|
| KMAGEN1 | Generator | 0.29 |
| KMAGEN2 | Generator | 0.81 |
| | **Totals** | **1.10** |

**Table 7: Particulate Emission Rates for sources for the Concrete Batch Plant (1838)**

| Source ID | Emission Unit Description | TSP (lbs/hr) | PM10 (lbs/hr) | PM2.5 (lbs/hr) |
|---|---|---|---|---|
| COM1 | Cement silo | 0.202 | 0.129 | 0.045 |
| COM2 | Flyash silo | 0.220 | 0.077 | 0.027 |
| COM3 | Raw material piles | 0.044 | 0.021 | 0.003 |
| COM3A | Feed hopper | 0.033 | 0.016 | 0.002 |
| COM4 | Concrete batch plant | 0.458 | 0.136 | 0.044 |
| COM5 | Water heater | 0.006 | 0.006 | 0.006 |
| COM_1-12 | Haul road | 0.193 | 0.052 | 0.005 |
| | **Totals** | **1.156** | **0.437** | **0.132** |

**Table 8: Carbon Monoxide Emission Rate for the Concrete Batch Plant (1838)**

| Source ID | Source Description | CO (lbs/hr) |
|---|---|---|
| COM5 | Water Heater | 0.015 |

**Receptor Grid**

Receptor spacing was less than 50 meters along the fenceline. Beyond the fence, receptor spacing was 50 meters out approximately 1 kilometer beyond the fenceline.

For the review of the modeling for fine and coarse particulate models, the receptor field was reduced based on professional judgement. The primary consideration in reducing the receptor field was the low-level, fugitive release for the majority of particulate sources. Also, the baghouse stack emits the greatest amount of particulates by a couple of orders of magnitude and its exit temperature as well as exit velocity are modest. One would expect the maximum impact to be along or near the fenceline.

The receptor field was further reduced for the TSP model. In addition to the reasons for reducing the receptor field for the fine particulate modeling, the gravitational settling in the TSP models further ensures that the maximum impact is along the fenceline.

**Meteorological Data**

National Weather Service, KABQ, processed with AERMET v16216 and AERMINUTE v15272
One year of data for TSP modeling; five years data for modeling of criteria pollutants

**Nearby Sources**

PG Enterprises, permit #1246-M1-RV1
Blackrock Services, permits #3306 and #1694-M3

**Terrain Used**

USGS NED files

## Modeling Results

**Table 9: Impact of emissions vs. Ambient Air Quality Standards**

| Pollutant | Averaging Time | Modeled Impact (µg/m³) | Background (µg/m³) | Model + Background (µg/m³) | Most stringent Standard (µg/m³) | Pass/Fail |
|---|---|---|---|---|---|---|
| CO | 1-hour | 521 | Modeled impacts below significance levels | | 15007 | P |
| CO | 8-hour | 234 | | | 9967 | P |
| TSP | 24-hour | * | * | 146.8 | 150 | P |
| TSP | Annual | 25.0 | 31.0 | 56.0 | 60 | P |
| $PM_{10}$ | 24-hour | 78.6 | 31.0 | 109.6 | 150 | P |
| $PM_{2.5}$ | 24-hour | 15.6 | 18.0 | 33.6 | 35 | P |
| $PM_{2.5}$ | Annual | 4.1 | 7.1 | 11.2 | 12 | P |

*See discussion (*Rarely noticed feature of AERMOD...*) for explanation of the 24-hour TSP result.

## Discussion

The modeling in support of permit #3291-1AR-R1 demonstrated compliance for the $NO_2$ and $SO_2$ standards at this site. With this permit modification, none of the emissions rates for $NO_2$ and $SO_2$, as well as stack parameters or site location will change. Another demonstration of compliance is not required for the $NO_2$ and $SO_2$ standards.

The modeling had to be revised to include appropriate particle size distributions for the cement and flyash silos. The revision also corrected operational hours for the CBP truck traffic emissions. There are some differences in Table 9 versus results reported by Class One Technical Services (Class One), especially for TSP modeling.

Blackrock Services was included in fine and coarse particulate modeling for Albuquerque Asphalt due to the recent changes in Blackrock's permits. Specifically, Blackrock is now permitted to operate their Hot Mix Asphalt (HMA) plant at night and has a permit to operate a Recycled Asphalt Products (RAP) plant on the same property.

The fine and coarse particulate matter backgrounds were calculated from data measured at the South Valley monitor. Background was not required for the CO modeling because modeled impacts were below significance levels.

**Particulate Emissions Modeling**

TSP modeling used only one year of meteorological data which is acceptable because TSP is not a criteria pollutant. In other words, the guidance in Appendix W does not apply to modeling of TSP. When five years of meteorological data are used with TSP modeling and compliance with the 24-hour TSP standard is successfully demonstrated, then $PM_{10}$ does not need to be modeled because the 24-hour TSP standard is more restrictive of $PM_{10}$ than the $PM_{10}$ standard itself. However, when only one year of meteorological data is used with TSP modeling, then the 24-hour $PM_{10}$ standard has to be modeled with five years of meteorological data.

Both 24-hour and annual TSP modeling results included two exceedances of the TSP standard within the PG Enterprises property for each scenario modeled. However PG's contributions to these exceedances cannot be counted inside the PG property because the impacts from a facility's emissions only matter in ambient air. Upon removing PG's contributions, both exceedances within the PG property disappear for each scenario modeled. Those exceedances are not included for TSP results in Table 9.

**Rarely noticed feature of AERMOD affects TSP modeling results**

Scenarios with changing hours of operation for the HMA were used with 24-hour TSP modeling. The results showed the highest ambient impact in scenario #9 which includes peak season hours of 4 PM to 2 AM for the HMA. One would expect the highest results with operations starting at Midnight or later and lasting though sunrise or mid-morning. The late night and early morning hours typically have the greatest atmospheric stability. Due to a quirk in AERMOD, however, the highest results were with an evening scenario.

The user group ALLNB (all sources, no background) showed a highest, 1st high of 124.4 $\mu g/m^3$. Adding the background of 31 $\mu g/m^3$ would result in an exceedance. However, the results for user group ALL (all sources plus background) showed a highest, 1st high of 146.8 $\mu g/m^3$ instead of the expected 155.4 $\mu g/m^3$. This is important because 155.4 $\mu g/m^3$ would be an exceedance and reason to reject the modeling. AERMOD did not use the background of 31 $\mu g/m^3$ for that day. Rather, AERMOD modified the background per the following excerpt from the AERMOD User's Guide:

> *Background concentrations specified with the BACKGRND keyword are combined with source impacts on a temporally-paired basis to estimate cumulative ambient impacts. However, since modeled concentrations are not calculated for hours with calm or missing meteorological data, background concentrations are also omitted for those hours. This may result in the background contribution being lower than expected for short-term averages of 3-hours up to 24-hours for periods when the denominator used to calculate the multi-hour average is adjusted in accordance with EPA's calms policy (see Section 8.3.4.2 of Appendix W), which is implemented within the AERMOD model. For example, if 12 hours out of a 24-hour period are calm or missing, the calms policy dictates that the 24-hour average concentration would be based on the sum of the 12 noncalm/non-missing hours divided by 18. The contribution from background concentrations would also be based on the sum of background values for the 12 non-calm/non-missing hours, divided by 18. If background was specified as uniform during that 24-hour period, then the contribution from background would appear to be 33.3% lower than expected (i.e., 12/18).*

**Throughput limits**

The modeling report submitted by Class One requests a permit limit of 900,000 tons per year throughput for the HMA plant. In the 24-hour averaging model, the HMA was operated 3014 hours per year at 400 tons per hour which equates to an annual throughput of 1,205,600 tons per year. The hourly factor of 0.747 used in annual models for the HMA plant was calculated by dividing the permit limit of 900,000 tons per year by 1,205,600 TPY figure.

For this modification, there was no limit on the annual throughput of the RAP plant other than that naturally imposed by the limited hours of operation and the limit on hourly throughput. This is a change from previous models for this facility which used factors in the annual average modeling that resulted in a permit limit on annual throughput for the RAP plant.

The KMA also has no limit on annual throughput other the limit that naturally results from the limited hours of operation and the hourly throughput limit.

The modeling report submitted by Class One requests a permit production limit of 265,000 tons per year for the CBP. In the 24-hour averaging model, CBP was run 3650 hours at a production rate of 100 tons per hour which equates to an annual production of 365,000 tons per year. The hourly factor of 0.726 used in the annual models for the CBP was calculated by dividing the permit limit of 265,000 TPY by the 365,000 TPY figure.

**Secondary particulate formation analysis**

Page 27 of the modeling report submitted by Class One stated that a Tier 3 secondary analysis was required because "$NO_X$ emissions at the relocation site are greater than 40 TPY." The EPA guidance[1] confirms this is a Case 3 situation. Table 10 shows that controlled $NO_X$ emissions are greater than 40 TPY:

**Table 10: Controlled $NO_X$ and $SO_2$ emissions for MS RAP/HMA**

| Source | $NO_X$ (TPY) | $SO_2$ (TPY) |
|---|---|---|
| HMASTK | 25 | 26 |
| HMAHEAT | 1.7 | 0.61 |
| GEN | 26 | 0.52 |
| **Totals** | **52.7** | **27.1** |

A qualitative Tier 3 analysis sufficiently demonstrates that secondary impacts will not result in an exceedance of the $PM_{2.5}$ NAAQS. Two observations regarding the $PM_{2.5}$ modeling results are revealing and pertinent in light of the EPA guidance.

First, the maximum design value impacts are along the fence for both the 24-hour and annual modeling of direct $PM_{2.5}$ emissions. The EPA guidance says on page D-3, "Formation of secondary sulfate and nitrate particulate is a fairly slow process with conversion rates taking many hours to days." Thus, in the context of the example in the EPA guidance where the highest primary emissions impacts occur on the project border, "the peak secondary impacts are expected to occur well downwind of the peak primary impacts."

Genuinely calm winds are very rare. There is usually at least some movement in the air. It is even rarer yet that winds would remain calm for "many hours to days." If secondary particulate formation takes "many hours to days" and the peak primary impact is along the fence, even a wind speed under 1 MPH will result in a lack of spatial pairing between peak secondary impacts and peak primary impacts.

Second, the highest primary impacts, in both the 24-hour and annual modeling of fine particulates, occur with nighttime operations scenarios for the HMA. The lack of photochemistry at nighttime further ensures the peak secondary impacts will not coincide with peak direct emissions impacts.

**Blocks of time modeling technique and implications**

The modeling included blocks of time for the Albuquerque Asphalt HMA for the purposes of operational flexibility. For example, one modeling file would have HMA operations from Midnight through 7 AM for January through March; then another scenario runs the HMA from 2 AM to 9 AM for those same months; a third scenario runs the HMA from 4 AM to 11 AM for those same months, and so on, until the entire 24-hour period is covered. This is done when a company needs the flexibility to operate any time of day, but a model with maximum hourly throughout for 24 hours won't pass.

The blocks of time technique gives a company the flexibility to operate during any of the blocks of time covered by modeling. For example, in the case of the AAI HMA, the facility would have the flexibility to operate any 7 hours of the day during January. However, this technique gives the company even more flexibility. The worst time for dispersion of emissions is the late night and early morning hours because that is when the atmosphere is most stable. Concentrating emissions into blocks of time that include those hours ensures the worst-case scenario has been modeled. With the worst-case covered, the facility can spread its emissions out over time. In other words, if AAI wants to operate the HMA more than 7 hours per day in January, we can be confident that the ambient air quality standards will not be exceeded as long as the hourly and daily throughput limits are obeyed.

On the other hand, the AAI RAP plant was modeled as operating at the same time regardless of which hours the HMA was modeled as operating. That means the RAP does not have the flexibility to operate at any time of day and reduced throughput operations cannot be spread over longer hours than what was modeled.

[1] Guidance for PM2.5 Permit Modeling, EPA, 20May2014, page viii, Table ES-1

**Aspects of the AAI modeling that were more protective of public health than required:**

- Receptor field had a higher resolution than required
- PG Enterprises did not need to be included in the TSP models
- Overestimated the $PM_{2.5}$ emissions from the baghouse stack
- KMA Cement Silo modeled as emitting 24/7

**Conclusion**

The Modeling Section recommends accepting this model for permitting actions.

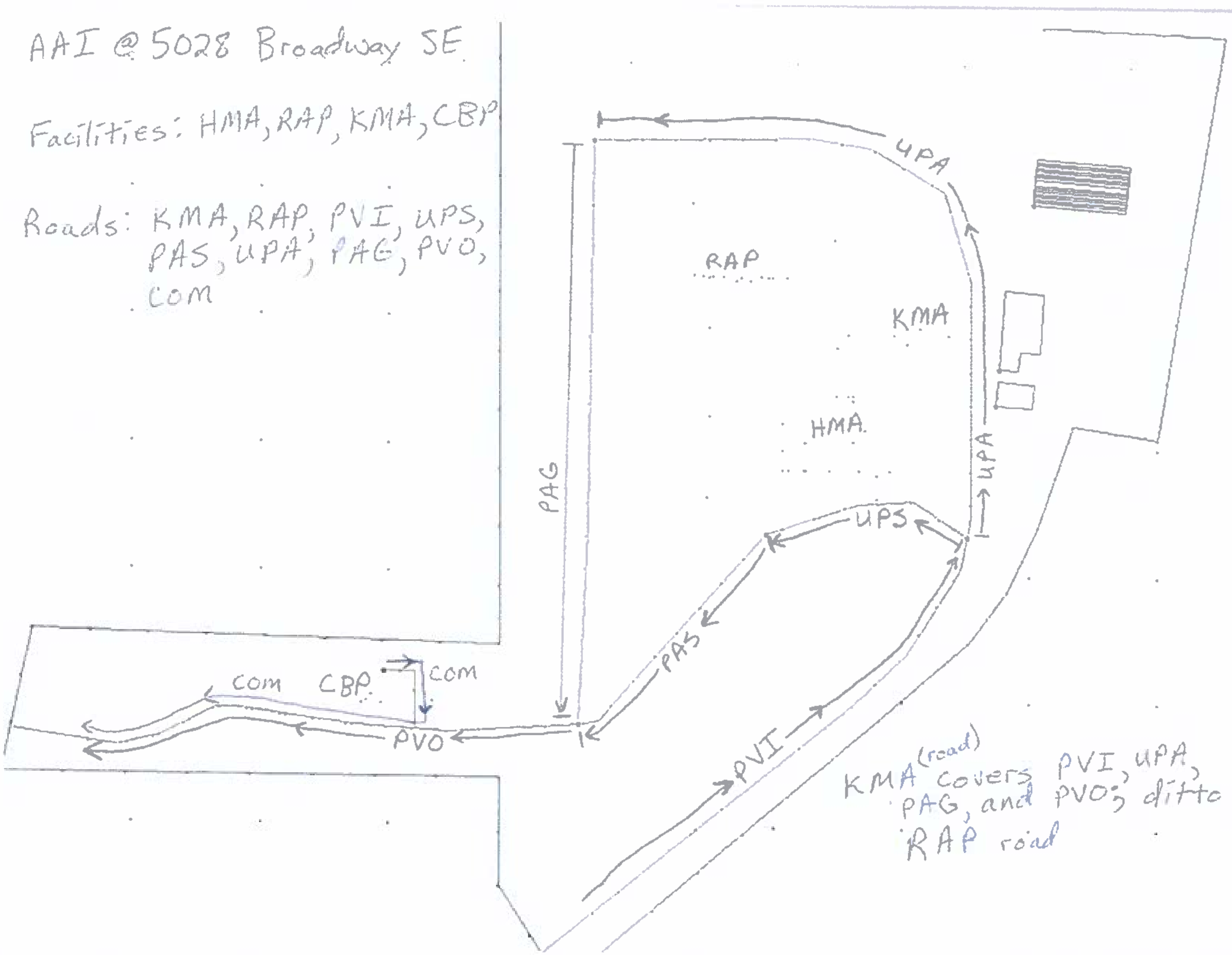


Figure 1: Planned layout of facilities and roads

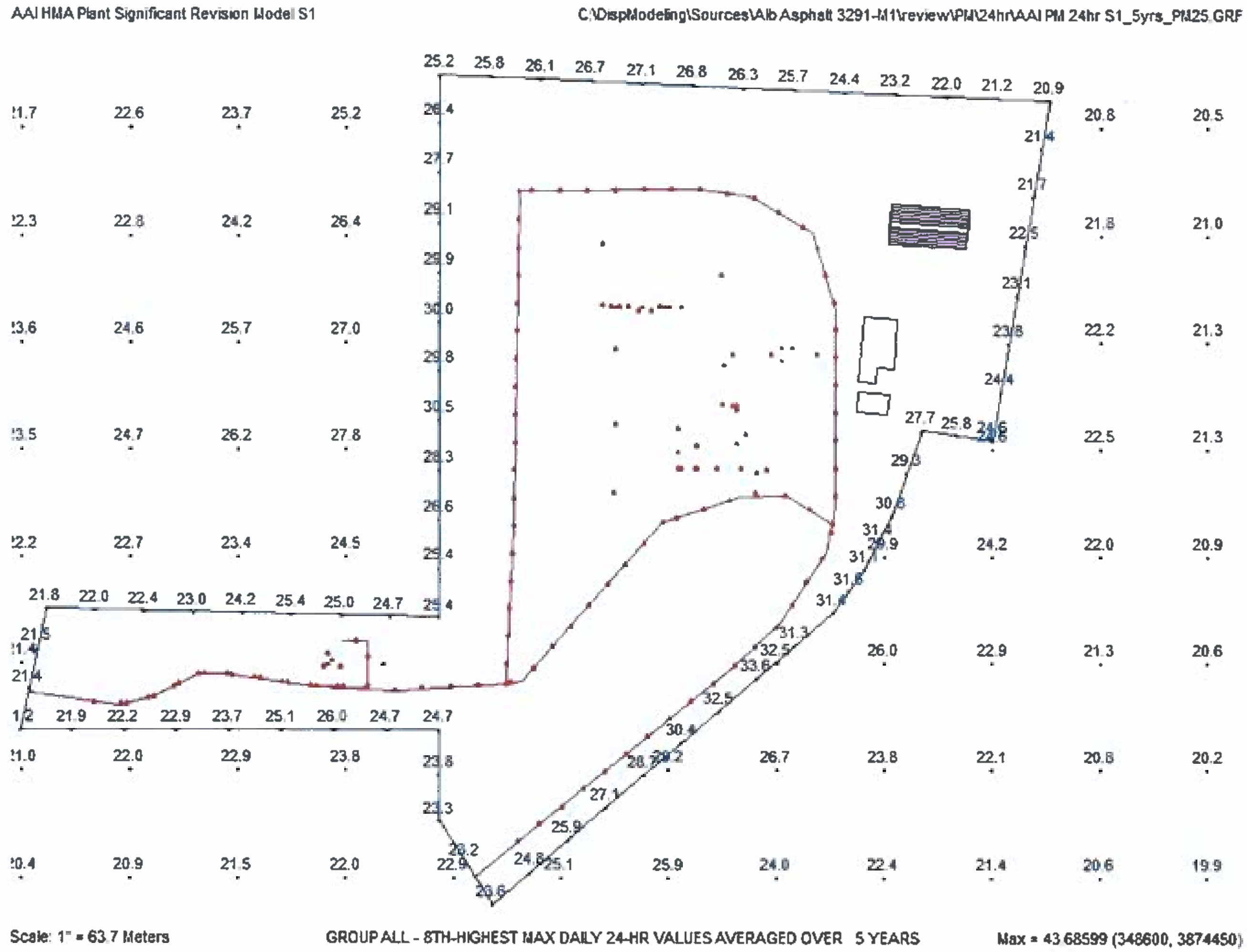


**Figure 2: $PM_{2.5}$ 24-hour results for Scenario #1**

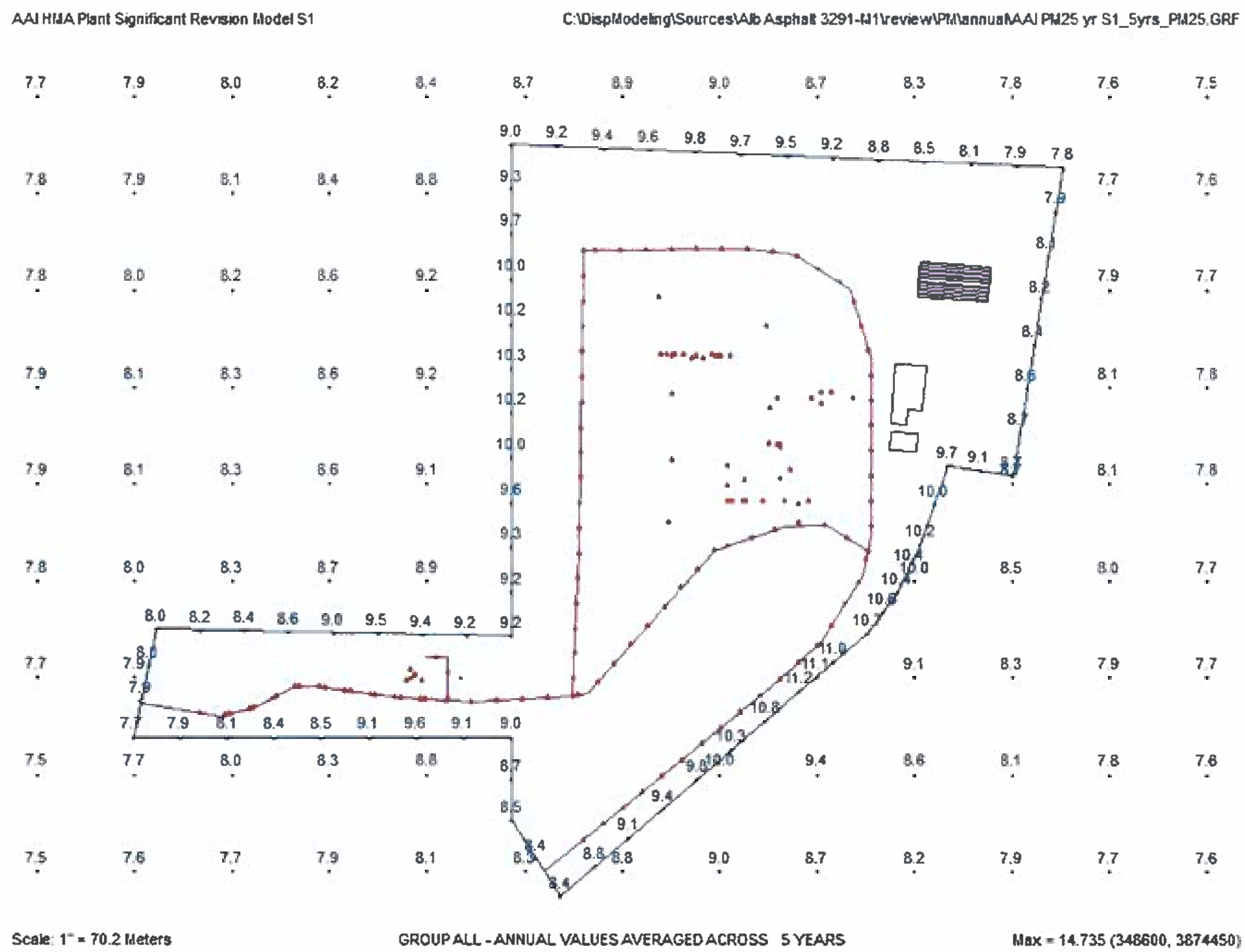


**Figure 3: $PM_{2.5}$ Annual results for Scenario #1**