City of Albuquerque

Environmental Health Department

Tim Keller, Mayor

Interoffice Memorandum

March 16, 2021

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

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

Subject: **Review of model for Albuquerque Asphalt's Hot Mix Asphalt plant**

Permit # **3291-M2**

Site Location

5012 Broadway Blvd SE and 5040 Broadway Blvd SE
Easting: 349,700m Northing: 3,874,930m Zone:13

Overview of Facilities

Albuquerque Asphalt (AAI) seeks to increase the daily permitted production capacity at its South Broadway hot mix asphalt (HMA) plant for all months of the year. A recycled asphalt products (RAP) plant also operates at this site and under this permit. A cold mix asphalt (KMA) plant was included in the modeling as well. The KMA is not part of permit #3291. However, if AAI decides to relocate the KMA to this site later on, the modeling for that relocation will already have been completed.

Conclusions of Dispersion Modeling

Modeling was performed for PM_{10} and $PM_{2.5}$ using AERMOD. Compliance was demonstrated for the particulate matter NAAQS.

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 approved 04Aug2020.

Assumptions used in the modeling review for the HMA plant and RAP plant

1. Operating hours:
    a. HMA (units 1,2,3,4,5,6,7,8,9,10,11a,11b,12,13,14,15,16,17, part of 22)
        i. January…7:00 AM to 5:30 PM
        ii. February through November…24/7
        iii. December…7:00 AM to 5:00 PM
    b. HMA heater (unit 20)…24/7
    c. RAP (units 24,25,26,27,28,29,30,31,32,33,34,35,36,37,38, part of 22)
        i. December, January, February…8:00 AM to 5:00 PM
        ii. March, April, May…7:00 AM to 5:00 PM
        iii. June, July, August…7:00 AM to 7:00 PM
        iv. September, October, November…7:00 AM to 5:00 PM
2. Throughput limits
    a. HMA plant
        i. Hourly…400 tons per hour
        ii. Daily
            1. January…4000 tons per day
            2. February, March…4400 tons per day
            3. April, May…5600 tons per day
            4. June, July, August…7200 tons per day
            5. September, October…4400 tons per day
            6. November, December…4000 tons per day
        iii. Annual…900,000 tons per year
    b. RAP plant…200 tons per hour
3. A fence restricts access to the property
4. All roads at this facility are paved.
5. Working piles (aka stockpiles) must be kept at least 40 feet from the fence along the property boundary.
6. The RAP plant generator must have
    a. a stack height of least 15 feet above ground level,
    b. an exit temperature of at least 892 ºF,
    c. an exit velocity of at least 220 feet per second,
    d. a stack diameter no more than 8 inches, and
    e. a stack with a vertical release.
7. Both the HMA plant baghouse stack and the RAP plant generator must be at least 250 feet from the property boundary fence in every direction.
8. The concrete batch plant in permit 1838-RV3 was not included as a co-located source in this modeling. The documents submitted in support of this application state that Albuquerque Asphalt seeks to withdraw permit 1838-RV3.

Modeling Parameters

- Rural dispersion coefficients
- Hourly emissions factors
- Structural downwash
- Backgrounds included in cumulative models

Emission rates used in the review can be seen below in **Tables 1 through 4**.

Table 1: Particulate Emission Rates for HMA plant sources

Source ID	Emission Unit Description	PM_{10} (lbs/hr)	$PM_{2.5}$ (lbs/hr)
HMASTK	Baghouse Stack/Unit 15	9.20	9.20
HMAHEAT	Asphalt Cement Heater/Unit 20	0.039	0.039
HMAFILL	Mineral Filler Silo Loading/Unit 14	0.115	0.009
DRUMUNL	Asphalt Silo Loading/Unit 16	0.094	0.094
HMASILO	Asphalt Silo Unloading/Unit 17	0.116	0.116
HMAPILE1-8	Storage Pile Handling (8 volume srcs)/Unit 1	0.826	0.125
HMABIN	Bin Loading/Unit 2	0.513	0.078
HMATP1	Bin Unloading/Unit 3	0.011	0.003
HMASCR	Scalping Screen/Unit 4	0.170	0.012
HMATP2	Scalping Screen Unloading/Unit 5	0.011	0.003
HMAPUG	Pug Mill/Unit 6	0.011	0.003
HMATP3	Pug Mill Unloading/Unit 7	0.011	0.003
HMATP4	Conveyor Transfer to Drum Conveyor/Unit 8	0.011	0.003
RAPBIN	RAP Bin Loading/Unit 9	0.094	0.014
RAPTP1	RAP Bin Unloading/Unit 10	0.006	0.002
RAPSCR	RAP Screen/Unit 11a	0.104	0.007
RAPTP2	RAP Screen Unloading/Unit 11b	0.006	0.002
RAPTP3	RAP Transfer Point/Unit 12	0.006	0.002
RAPTP4	RAP Transfer Point/Unit 13	0.006	0.002
PAG, PAS	HMA Truck Traffic/Unit 22	0.588	0.144
	Totals	**11.94**	**9.86**

Table 2: Particulate Emission Rates for RAP plant sources

Source ID	Emission Unit Description	PM_{10} (lbs/hr)	$PM_{2.5}$ (lbs/hr)
GEN	Generator/Unit 38	0.85	0.85
RRAW	Raw Material Pile/Unit 24	0.447	0.068
FEEDER	Feeder/Unit 25	0.447	0.068
PCRUSH	Primary Crusher/Unit 26	0.108	0.020
TP1	Transfer Point/Unit 27	0.009	0.0026
TP2	Transfer Point/Unit 28	0.009	0.0026
TP3	Transfer Point/Unit 29	0.006	0.0016
SCRN	Screen/Unit 30	0.237	0.016
SCRUSH	Secondary Crusher/Unit 31	0.065	0.012
TP4	Transfer Point/Unit 32	0.006	0.0016
TP5	Transfer Point/Unit 33	0.006	0.0016
TP6	Transfer Point/Unit 34	0.009	0.0026
TP7	Transfer Point/Unit 35	0.009	0.0026
TP8	Transfer Point/Unit 36	0.009	0.0026
PPILE	Stacker Drop to Finish Storage Pile/Unit 37	0.268	0.0406
RAP_####	RAP truck traffic/Unit 22	0.154	0.0382
	Totals	**2.64**	**1.13**

Table 3: Total truck traffic emission rates for HMA and RAP plants

Plant	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)
HMA truck traffic/Unit 22	0.588	0.144
RAP truck traffic/Unit 22	0.154	0.038
Totals	**0.742**	**0.182**

Table 4: Particulate emissions totals for both RAP and HMA plants

Plant	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)
HMA	11.94	9.86
RAP	2.64	1.13
Totals for application 3291-M2	**14.58**	**10.99**

Receptor Grid
In the significance modeling submitted, receptor spacing was less than 50 meters along the modeled fence. Beyond the fence, receptor spacing was 50 meters out to at least 500 meters beyond the modeled fence. Further receptors were spaced at 100 meters apart out to at least 1 kilometer beyond the modeled fence. For the cumulative modeling that was submitted, the receptor field was reduced based on significant impacts in the significance modeling.

For the review completed by the Air Quality Program (AQP), 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 fences.

Meteorological Data
National Weather Service, KABQ, years 2014 to 2018, processed with AERMET v19191 and AERMINUTE v15272

Adjacent Sources
Albuquerque Asphalt's aggregate plant, permit 3391

Terrain Used
USGS NED files

Modeling Results

Table 5: Impact of Emissions vs. Ambient Air Quality Standards

Ambient Standard	Modeled Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Secondary Impacts ($\mu g/m^3$)	Model + Secondary + Background ($\mu g/m^3$)	Most stringent Standard ($\mu g/m^3$)	Pass/Fail
PM_{10} 24-hour	95.8	35	n/a	130.8	150	P
$PM_{2.5}$ 24-hour	14.2	20	0.2	34.4	35	P
$PM_{2.5}$ Annual	3.1	7.8	<0.01	10.9	12	P

Discussion

Summary of modeling and sought after permit modifications

AAI's South Broadway HMA facility currently operates both a HMA plant and a RAP plant. The modeling submitted for the current application includes emissions for a Cold Mix Asphalt plant (KMA) in addition to the HMA and the RAP. Figure 1 illustrates the locations of the three operations in the models. The KMA is not part of permit 3291; rather, the KMA is covered by permit 1955. However, by including the KMA in the model, AAI can use the modeling for this application to demonstrate NAAQS compliance for a relocation of the KMA/permit 1955 to its South Broadway facility.

With this application, Albuquerque Asphalt seeks to modify permit 3291 to cover anticipated changes in operation at its South Broadway HMA/RAP facility. The modification would grant an increase in the daily production limit for the HMA plant for all 12 months without changing the hourly or annual production limits. The modification would limit hours of operation for the HMA plant during December and January to daylight hours. For the rest of the year, AAI wants to keep 24 hours a day, 7 days a week flexibility for HMA plant operation. No changes are sought for RAP plant throughput or hours of operation.

Other changes to the facility reflected in the modeling include the paving of all roads at the facility. The haul truck traffic routes for the three operations are depicted in Figures 2 and 3. The RAP and KMA truck routes are the same as the PAG (aggregate, lime, asphalt cement) route which is shown in Figure 2. The PAS (asphalt) truck route is shown in Figure 3. The addition of control equipment for both asphalt silo loading and the exit of the drum mixer is reflected in decreased emissions for sources DRUMUNL (unit 16) and HMASILO (unit 17).

The modeling in support of permits #3291-1AR-R1 and #3291-M1 demonstrated compliance for the CO, NO_2, and SO_2 standards at this site. With this permit modification, none of the emissions rates for CO, NO_2, and SO_2, as well as stack parameters or site location will change. A waiver from modeling those standards was granted on 04Aug2020. Another demonstration of compliance with the CO, NO_2, and SO_2 standards was not required with this application.

Terrain data and mapping issues

Modeling files submitted in October 2020 had locations for sources that did not match up with aerial imagery when the modeling file was projected to Google Earth. Montrose stated that the modeling was based on a professional survey conducted for AAI. The October 2020 modeling files were used despite the differences from aerial imagery because initially the AQP was not sure whether the survey was correct or Google Earth was correct. AQP's plan was to have the consultant submit additional modeling that did match up with Google Earth and run both sets of models. That way, regardless of whether the survey was correct about the location of sources or whether Google Earth was correct, the AQP would have defensible modeling to back up this permit modification.

Due to difficulties downloading and using NED files in the previous 12 months, the AQP initially used 10 meter DEM files downloaded from the University of New Mexico's RGIS website with the survey-based modeling files that were submitted in October 2020. The AQP obtained higher results using the DEM data than Montrose had obtained with old NED data. The results the AQP obtained failed in comparison to ambient air quality standards. That led to research regarding which terrain data, NED or DEM, the EPA prefers. The AERMAP User's Guide states that EPA prefers NED data over DEM data. Montrose used NED data, but it was several years old. EHD downloaded the latest NED data from a USGS website.

On 02Dec2020, Montrose revealed the survey only covered the HMA plant, i.e. the main plant, not the storage piles. That revelation changed the AQP plan regarding the use of two sets of models, i.e. the survey-based models and the models fixed to match Google Earth aerial imagery. Henceforth, only the results from the models fixed to match aerial imagery would be compared to ambient air quality standards.

What if the survey was correct about the location of the HMA plant equipment? Moving the HMA storage piles eastward in the model reduces impacts at the closest fence. On the other hand, the change in impacts at other fences would be negligible. All the results in Table 5 occurred along the fence closest to the HMA storage piles. If the HMA plant equipment remained in the same place while the HMA storage piles and the adjacent truck traffic shifted eastward, then a reduction in modeled impacts would be the result.

The Montrose modeling reports submitted 12Feb2021 and 23Feb2021 show two sets of results in Tables 13, 14, and 16. In those tables, the results labeled under "Original Facility Layout" came from the survey-based models and before the correction to secondary impacts. Those tables also include results labeled as "Revised Facility Layout" which came from the third submission of models that matched up to Google Earth. The third modeling report was submitted 12Feb2021 whereas the third set of modeling files were submitted in November 2020. That explains why the third modeling report includes correct secondary impacts in Tables 13 and 14 under "Revised Facility Layout" even though the third set of modeling files were submitted months before the error in secondary impacts calculation was discovered (see Secondary particulate formation analysis, later in discussion).

The results for the "Original Facility Layout" cannot be compared to the NAAQS because of the incorrect coordinates for so many of the sources. However, the "Original Facility Layout" results demonstrate two important points:

1. The maximum impacts occur with nighttime operations scenarios. This is due to greater atmospheric stability during the night. That would not change with a change in coordinates of sources and this is why it was not necessary to fix scenarios 2 through 7 to match up with Google Earth aerial imagery.
2. Revising coordinates of sources to match Google Earth aerial imagery reduced modeled impacts. Even accounting for the slight increase in secondary PM formation due to using correct total NO_X and SO_2 emissions, cumulative impacts still decreased overall due to the alignment of sources with Google Earth aerial imagery.

Changing source coordinates to match Google Earth aerial imagery resulted in the same or lower concentrations than the survey-based models, all else being equal (i.e. same scenario, same terrain files). Graphical output of ambient impacts from models adjusted to match aerial imagery for 24-hour $PM_{2.5}$, annual $PM_{2.5}$, and 24-hour PM_{10} are shown in Figures 4, 5, and 6 respectively.

Throughput limits

The 23Feb2021 modeling report submitted by Montrose requests a permit production limit of 900,000 tons per year for AAI's hot mix asphalt plant. In any individual scenario, the HMA was operated 4750 hours per year at 400 tons per hour which equates to an annual throughput of 1,900,000 tons per year. The hourly factor of 0.474 used in annual models for the HMA plant was calculated by dividing the annual production limit of 900,000 tons per year by 1,900,000 TPY figure.

No annual or daily production limits are needed for the RAP plant because those limits would be the same as the hourly limit multiplied by the potential operating hours. In other words, the limit on operating hours together with the hourly limit will control the daily and annual limits on throughput for the RAP plant.

Blocks of time modeling technique and implications

Blocks of time were used to model the Albuquerque Asphalt HMA plant for the purposes of operational flexibility. For example, one modeling file would have HMA operations from Midnight to 2 PM for April and May, then another modeling file would have the HMA plant operating from 2 AM to 4 PM for April and May, then a third file would have the HMA plant operating from 4 AM to 6 PM for April and May, and so on until the entire 24 hour period was covered. This is done when a company needs the flexibility to operate any time of day, but a model with maximum hourly throughput for 24 hours won't pass.

The blocks of time technique obviously gives a company the flexibility to operate during any of the blocks of time covered by modeling. For example, in the case of the Albuquerque Asphalt HMA, the facility would have the flexibility to operate at 400 TPH over any 18 hours of the day during June, July, and August. However, the blocks of time technique gives the company even more flexibility. The worst time for dispersion of emissions is nighttime because that's when the atmosphere is most stable. Concentrating the emissions into blocks of time that include nighttime hours ensures that the worst-case scenario is covered. With the worst-case covered, the company can spread their emissions out over time. In other words, if Albuquerque Asphalt wants to operate 24 hours at a reduced throughput, 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 Albuquerque Apshalt RAP plant was modeled as operating at the same time in all the modeling files. That means the AAI RAP plant does not have the flexibility to operate at any time of day and reduced throughput operations cannot be spread out over longer hours than what was modeled.

Secondary particulate formation analysis
Page 23 of the second modeling report submitted on 12Oct2020 by Montrose Environmental calculated secondary fine particulate matter impacts. However, the emission rates used in those calculations left out the RAP plant generator and the KMA generators. NO_X and SO_2 emissions for MERPs calculations were corrected and secondary particulate impacts recalculated in the third modeling report submitted on 12Feb2021.

Table 6: Controlled NO_X and SO_2 emissions for AAI RAP/HMA/KMA

Source	NO_X (TPY)	SO_2 (TPY)
HMASTK	25	26
HMAHEAT	1.7	0.6
GEN	26	0.5
KMAGEN1	4.9	1.6
KMAGEN2	3.3	0.9
Totals	**60.9**	**29.6**

The NMED modeling guidelines, section 2.6.6, suggest the use of equations from the U.S. EPA's MERP guidance to evaluate the secondary formation of $PM_{2.5}$. Montrose's third modeling report (submitted 12Feb2021) correctly calculates these numbers for both the annual and 24-hour $PM_{2.5}$ averaging times. Table 5 shows the addition of secondary PM formation values to background and modeled design values. The resulting cumulative impacts are within the $PM_{2.5}$ NAAQS.

Although the NMED guidance regarding secondary particulate formation was followed using a Tier 1 analysis, it should be made clear that the values calculated are overestimates of secondary particulate formation for the fence of Albuquerque Asphalt. The modeled impacts shown in Table 5 are along the fence for both the 24-hour and annual modeling of direct $PM_{2.5}$ emissions. EPA guidance[1] from May 2014 states, "Formation of secondary sulfate and nitrate particulate is a fairly slow process with conversion rates taking many hours to days." As with 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."

Background and nearby sources in cumulative modeling
The particulate backgrounds were calculated using data from the South Valley air quality monitoring station which samples industrial emissions in the South Valley of Albuquerque. Because the South Valley particulate monitors already sample PM_{10} and $PM_{2.5}$ emissions from industry, including industrial emissions beyond adjacent properties would be double-counting the impacts of industrial emissions. Thus, only the adjacent source, Albuquerque Asphalt's aggregate plant was included in the cumulative model.

[1] Guidance for PM2.5 Permit Modeling, EPA-454/B-14-001, May2014, page D-3

Receptors were included inside the property where Albuquerque Asphalt's aggregate plant (permit #3391) is permitted to operate. The purpose was to study whether emissions from the HMA and RAP facility were causing or contributing to a violation of the NAAQS inside the adjacent source property. The inside of the aggregate plant property is not ambient air in regards to the emissions of the aggregate plant. In other words, the air quality impacts created by the aggregate plant emissions cannot be counted inside the aggregate plant property.

The values circled in Figures 4, 5, and 6 are the modeled impacts plus background values as shown in Table 5. However, each figure shows a higher maximum value in the lower right corner. Those higher maximum values would be violations of the PM NAAQS except that they occurred inside the property of the aggregate plant. The AQP analyzed each of these ostensible violations of the NAAQS. When the impacts of the aggregate plant itself were removed, the seeming violations vanished inside the aggregate plant property.

Co-location of KMA (construction permit 1955) to facilitate future relocations

Should AAI later use this modeling to demonstrate compliance with standards for the relocation of the KMA plant to 5012 Broadway Blvd SE, the following assumptions which were used in the modeling of the KMA will need to be reflected in the relocation permit/letter.

1. Hours of Operation
    a. December, January, February…8 AM to 5 PM
    b. March, October, November…3 AM to 9 PM
    c. April through September…24/7
2. The maximum emission rates listed in permit 1955 were used to model the KMA. In other words, the emission rates on page 6 of permit 1955 were included in this modeling.
3. Existing roads that serve the HMA and RAP plants will also serve the KMA.
4. All KMA equipment must be kept at least 200 feet from the property boundary fence.

Gap in fence must be closed off permanently

During the review, aerial imagery from 2020 revealed a gap in the fencing that separates Albuquerque Asphalt from 5100 Broadway Blvd SE. Albuquerque Asphalt, per a lease agreement, was using part of 5100 Broadway Blvd SE for parking trucks and storing other equipment. The modeling for this application did not have such a gap in the fencing and there were no receptors on the Albuquerque Asphalt property. The AQP decided that a gate would not be sufficient. The fence had to be solid and continuous so that neither pedestrians nor vehicles could cross from one property to the other.

Recommendation

The Modeling Section recommends accepting this model for permitting purposes.

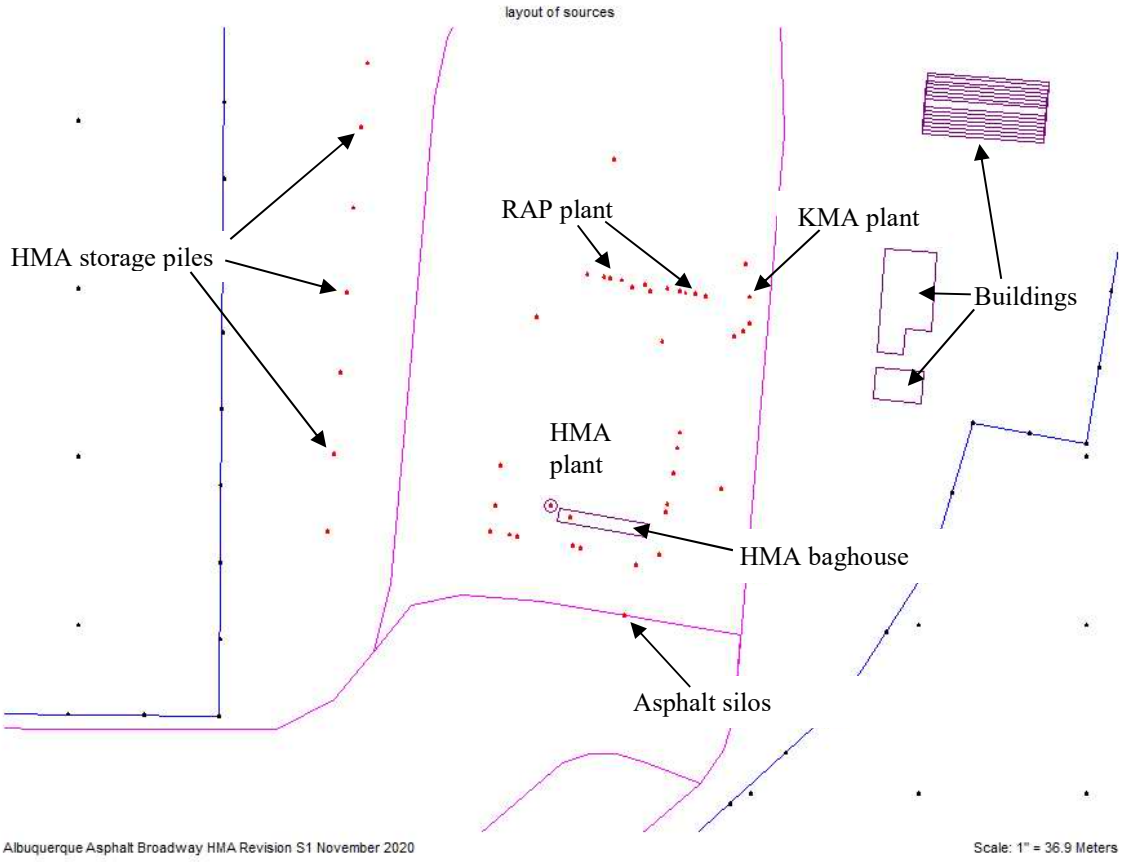

Figure 1: Location of HMA, RAP, & KMA plants on the property

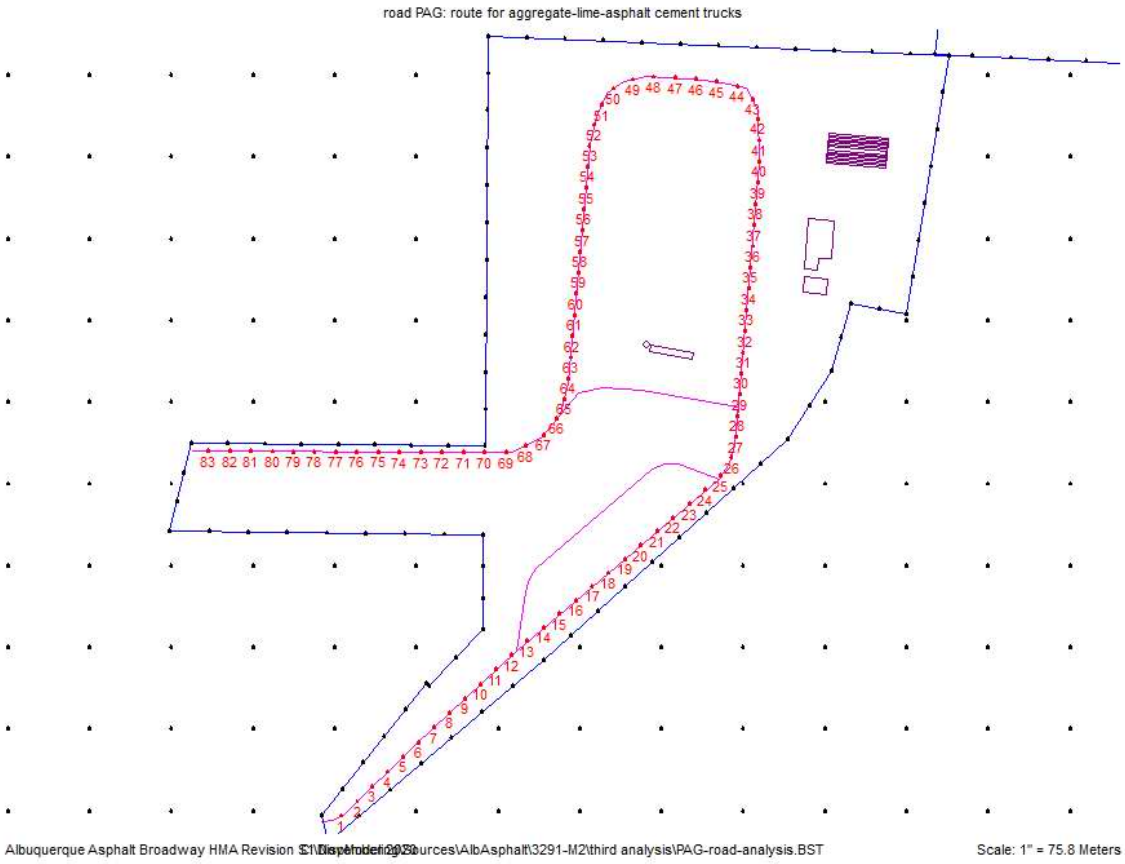

Figure 2: PAG haul truck route; KMA & RAP routes are identical to PAG

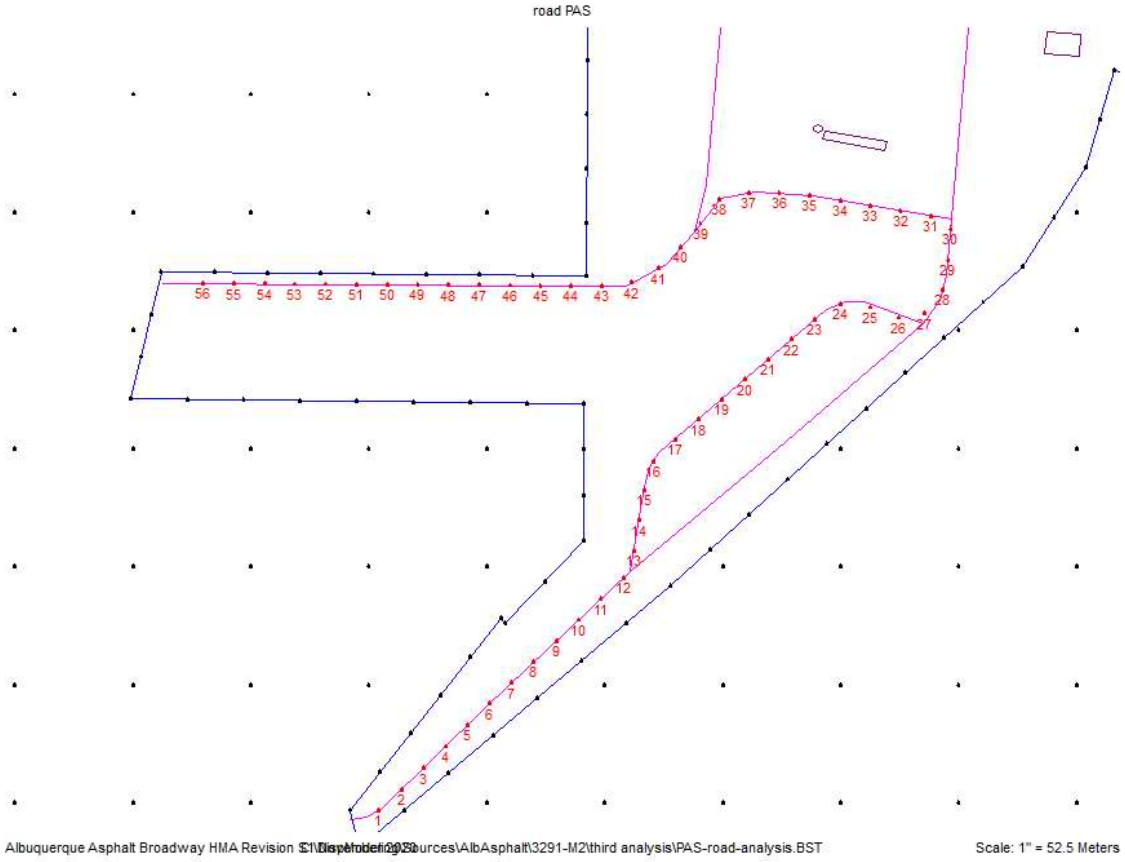

Figure 3: Asphalt haul truck route (PAS sources in the models)

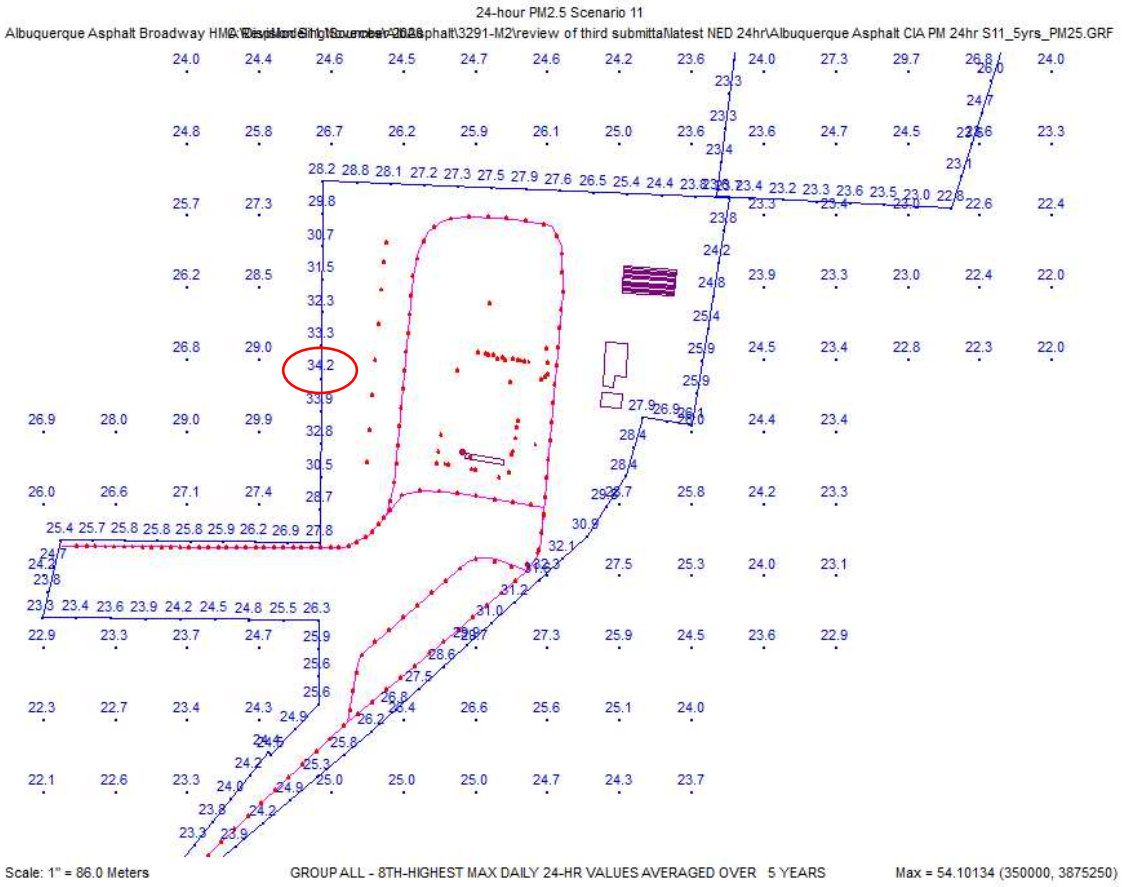

Figure 4: 24hour $PM_{2.5}$ results including background, but not secondary formation

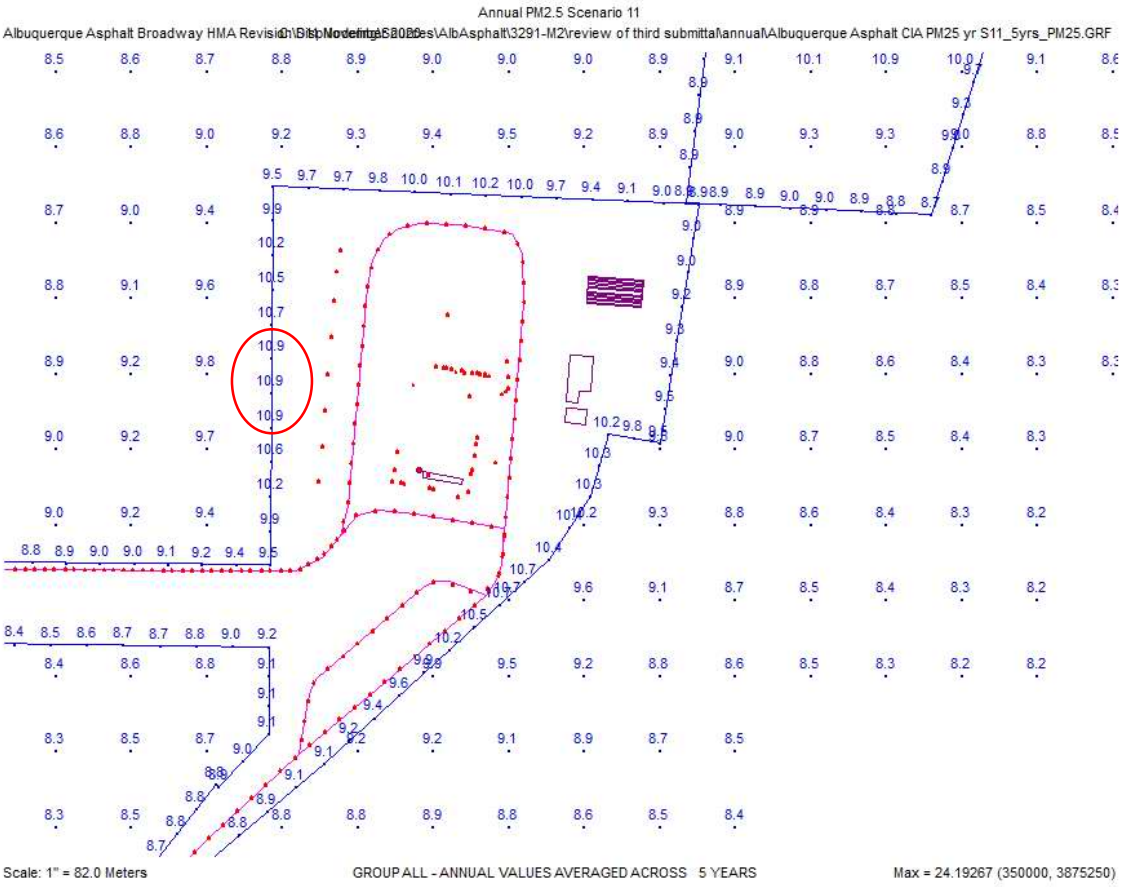

Figure 5: Annual $PM_{2.5}$ results including background, but not secondary formation

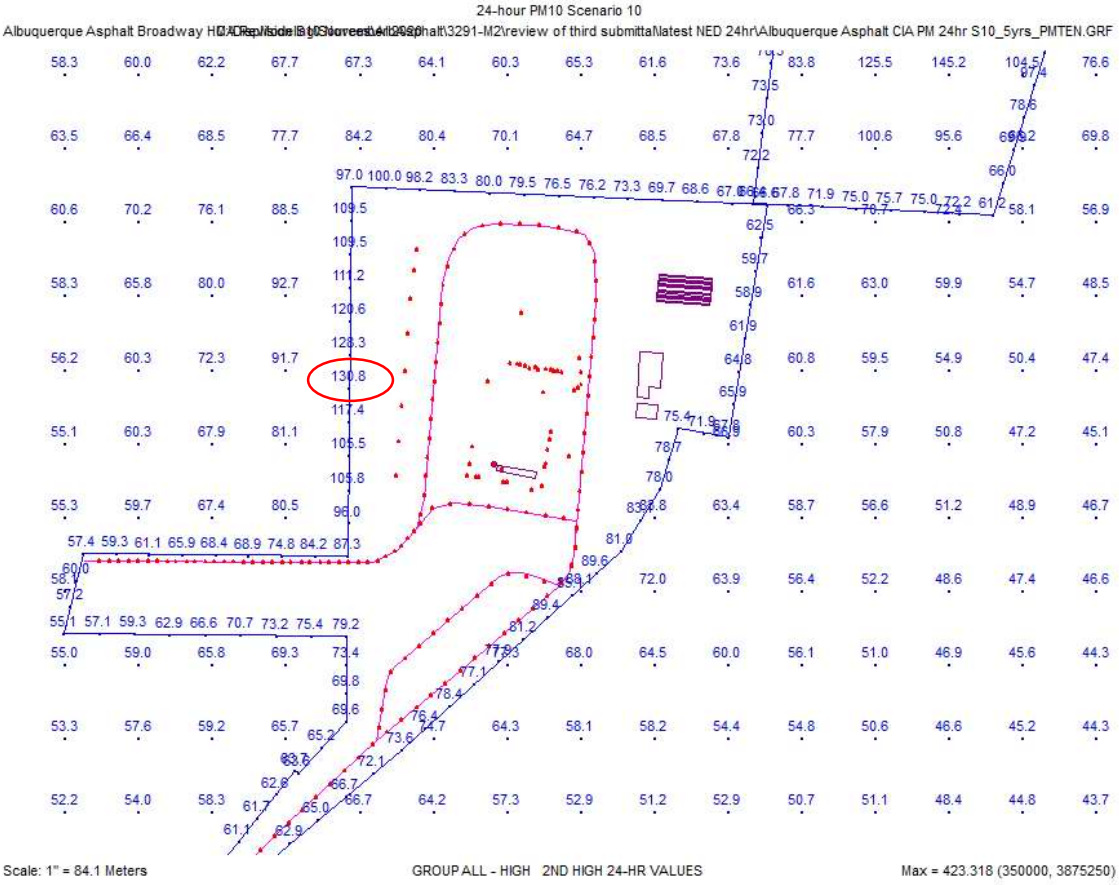

Figure 6: 24-hour PM_{10} modeled impacts including background