



City of Albuquerque

Environmental Health Department

Tim Keller, Mayor

Interoffice Memorandum

December 29, 2020

To: Regan Eyerman, Environmental Health Scientist

From: Kyle Tumpane, Environmental Health Scientist *KT*

Subject: Review of model for Lovelace Biomedical Research Institute – South Facility

Permit # 0917-M6

Site Location

Building 9217, Area Y, Kirtland AFB – East
Easting: 363,058m Northing: 3,868,527m Zone:13

Overview of Facilities

The facility performs biomedical research.

Conclusions of Dispersion Modeling

Modeling was performed for PM_{2.5}, NO₂, and SO₂ using AERMOD. Compliance was demonstrated for NAAQS and NMAAQs.

Assumptions used in the modeling review

1. Operating hours: 24 hours/day, 7 days/week
2. A fence or some other barrier restricts access to the property, with the exception of the northeast boundary. The edge of the building near the main entrance was used as the fence line.

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 as part of a denied application for an emergency permit. The same parameters described in that protocol, except for requested changes, were used in this modeling.

Modeling Parameters

Rural dispersion coefficients
ARM2 for 1-hour NO₂ model

Emission rates used in the review can be seen below in **Table 1**.

Table 1: Combustion Gas Emission Rates

Source ID	Source Description	NO _x (lbs/hr)	SO ₂ (lbs/hr)	PM _{2.5} (lbs/hr)
BS004	Boiler	0.16	0.024	0.012
BS007	Boiler	0.90	0.32	0.090
BS009	Boiler	0.72	0.26	0.072
TO	Thermal Oxidizer	0.20	0.029	0.015
Totals		1.98	0.633	0.189

Receptor Grid

Receptor spacing was 50 meters or less along the fence line. Beyond the fence, spacing was 100 meters out to approximately 300 meters, 250 meters out to approximately 1300 meters, 500 meters out to approximately 2,800 meters and 1,000 meters out to approximately 4,500 meters. The receptor field was not reduced for cumulative modeling.

Meteorological Data

Albuquerque Sunport (KABQ) 2014-2018 processed with AERMET v.19191 and AERMINUTE v.15272.

Adjacent Sources

For NO₂ modeling:

KAFB – permit #3331

For NO₂, SO₂ and PM_{2.5} modeling:

KAFB – permit #3366

Terrain Used

USGS DEM files

Modeling Results**Table 2: Impact of Emissions vs. Ambient Air Quality Standards**

Pollutant	Averaging Time	Modeled Impact (µg/m ³)	Background (µg/m ³)	Model + Background (µg/m ³)	Most stringent Standard (µg/m ³)	Pass/Fail
NO ₂	1-hour	69.2	84.6	153.8	188	P
NO ₂	Annual	Modeling waived			94	P
CO	1-hour				15007	P
CO	8-hour				9967	P
SO ₂	1-hour	27.9	13.1	41.0	196.4	P
PM ₁₀	24-hour	Modeling waived			150	P
PM _{2.5}	24-hour	1.3	20.0	21.3	35	P
PM _{2.5}	Annual	0.4	7.8	8.2	12	P

Discussion

Lovelace Biomedical Research Institute (LBRI) proposes to replace two existing boilers (Units BS-005 and BS-006) with one new boiler (BS-009). Modeling was required because this facility had not previously demonstrated compliance with the 1-hour NO₂, the 1-hour SO₂ or the updated PM_{2.5} standards. Modeling was waived for the 1-hour CO, 8-hour CO, annual NO₂ and 24-hour PM₁₀ standards due to low emission rates and the fact that these standards have not had recent changes/decreases like the standards for which modeling was required. Also, since all emissions are combustion emissions and PM₁₀ and PM_{2.5} emission rates are the same, passing the more restrictive PM_{2.5} 24-hour standard was determined to be sufficient to demonstrate compliance with the PM₁₀ 24-hour standard. Units BS-007 and BS-009 are dual-fuel boilers that can use either natural gas or diesel. The modeled emission rates were worst case.

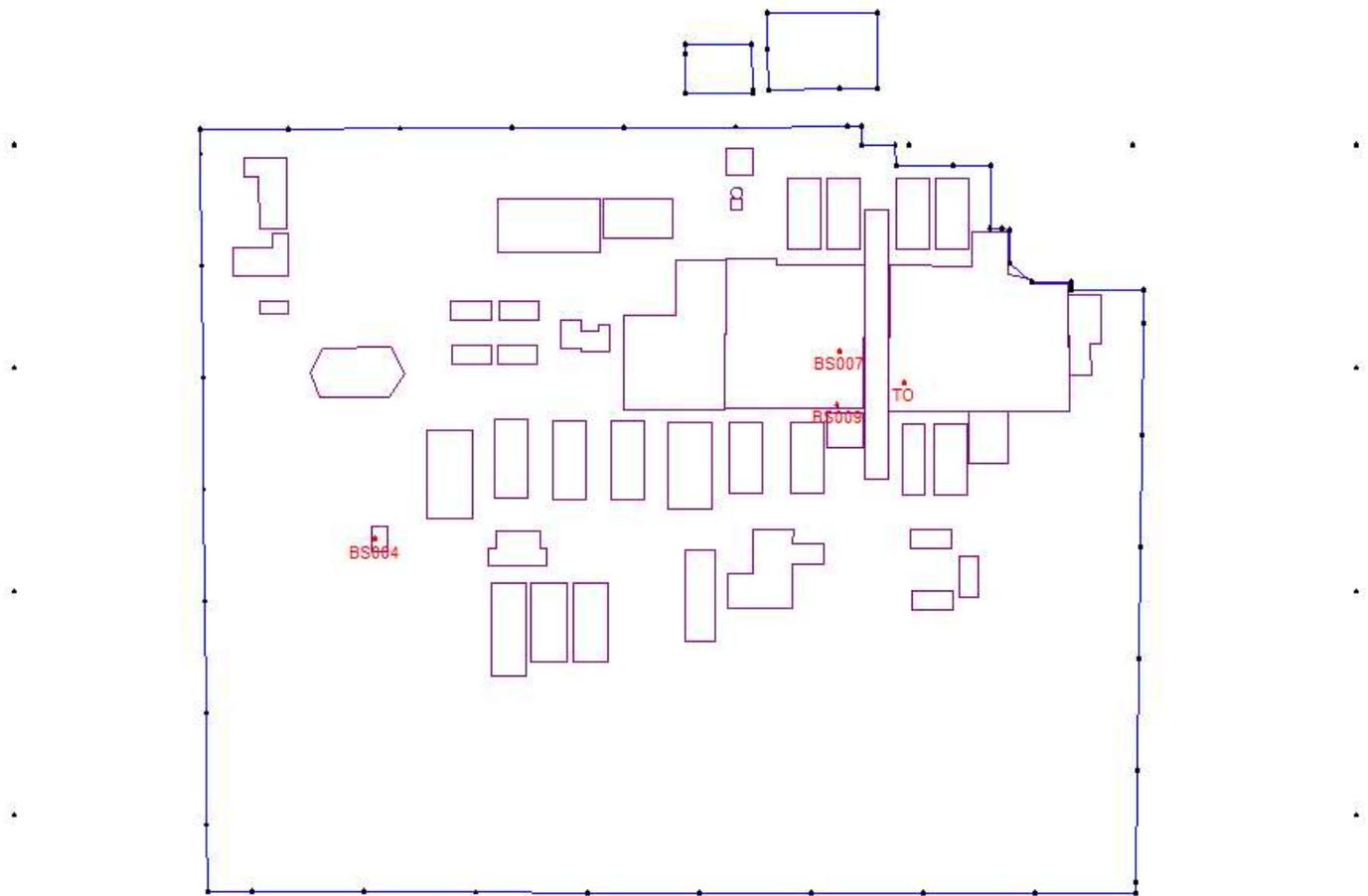
Minor differences between EHD and LBRI's consultant's cumulative model results were due to several factors. The cumulative models were all run in Breeze as well as in BEEST. There were slight differences in the number of buildings and the building locations between the building input files provided by LBRI's consultant for the SIL and the cumulative models for some reason and this led to slightly different modeled results in tests. The models in BEEST were run with the newer SIL building input file for the given pollutant because it is a more accurate representation of the buildings and the models in Breeze, which also display the newer building input file, were run after re-running BPIP-Prime. EHD used the modeled results based on the newer SIL building input file to compare to the standards because this is a more accurate building representation. The differences between results was 1.05 µg/m³ or less for each pollutant and averaging period. EHD's modeled results were higher in all models except 24-hour PM_{2.5}. The modeled results reported by LBRI's consultant matched the EHD test modeled results with BEEST using the cumulative model building input file provided by the consultant. This appears to indicate that LBRI's consultant did not re-run BPIP-Prime in Breeze after updating the building input file.

Another minor source of difference in modeled results is the inaccurate base elevation for the meteorology surface station used by LBRI's consultant. In all the cumulative models the base elevation is listed as 5250 meters (17,224.41 feet). This was corrected by EHD to 1619 meters. A test was quickly run to determine the amount of difference this caused and it led to modeled results only slightly higher (0.01 µg/m³) in the model version with the incorrect base elevation. Based on this, it appears that the corrected building input file and building downwash calculations are the main source of difference in the modeled results between EHD and LBRI's consultant.

The receptor grid spacing does not fully match what is requested in the AQP October 2019 Modeling Guidelines but the modeled results decline rapidly and smoothly with increasing distance from the facility fence line. The spacing of the receptor grid also does not match exactly what LBRI's consultant listed. The reason for this appears to be that the Breeze software generates variable density receptor grids based off one point, which Trinity placed in the center of the facility, so the grids do extend 500 m from that point, 1500 m from that point, etc. But when measured from the fence line the grids extend approximately 300 m, 1300 m, etc. This does not have an effect on the modeled impact because the highest impacts are right on the LBRI fence.

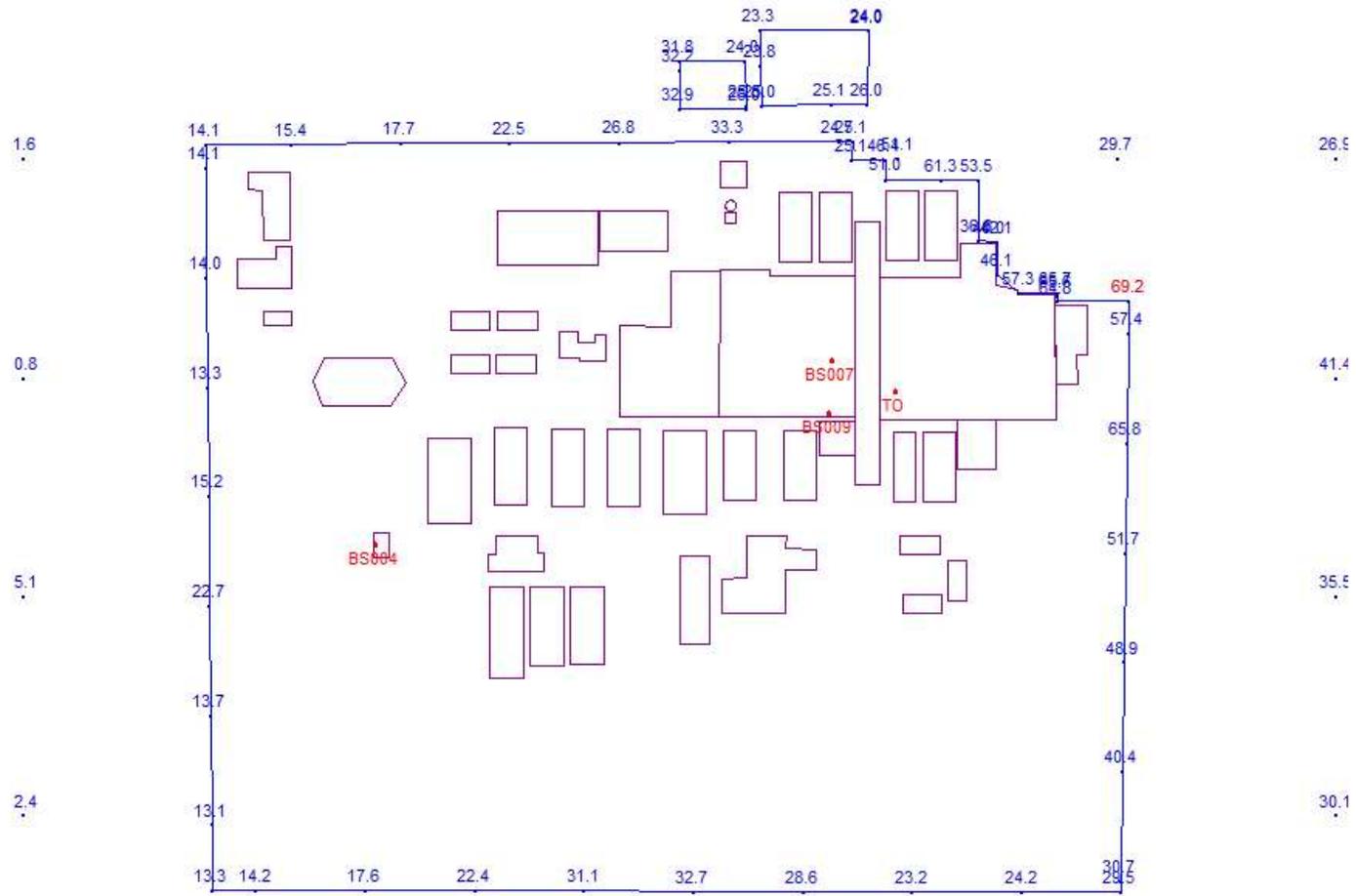
The two closest sources are located on Kirtland Air Force Base and were included in the cumulative modeling in addition to the monitored background. These two sources are relatively small and had minimal impact on the modeled results.

The Technical Analysis Section recommends accepting this model.



Scale: 1" = 67.6 Meters

Figure 1. Source layout

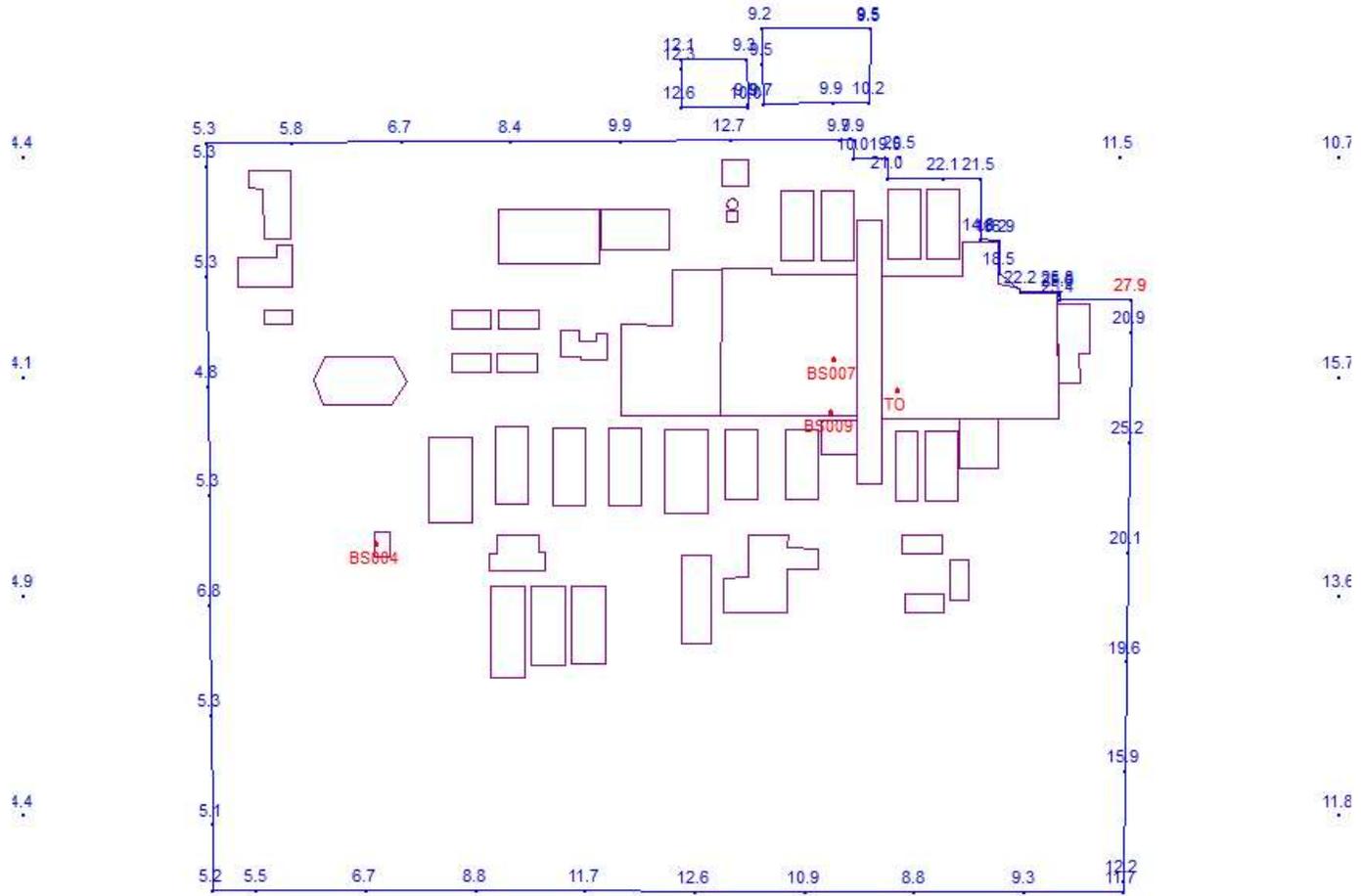


Scale: 1" = 67.9 Meters

GROUP ALL - 8TH-HIGHEST MAX DAILY 1-HR VALUES AVERAGED OVER 5 YEARS

Max = 69.22104 (363243.1, 3868566)

Figure 2. 1-hour NO₂ model results

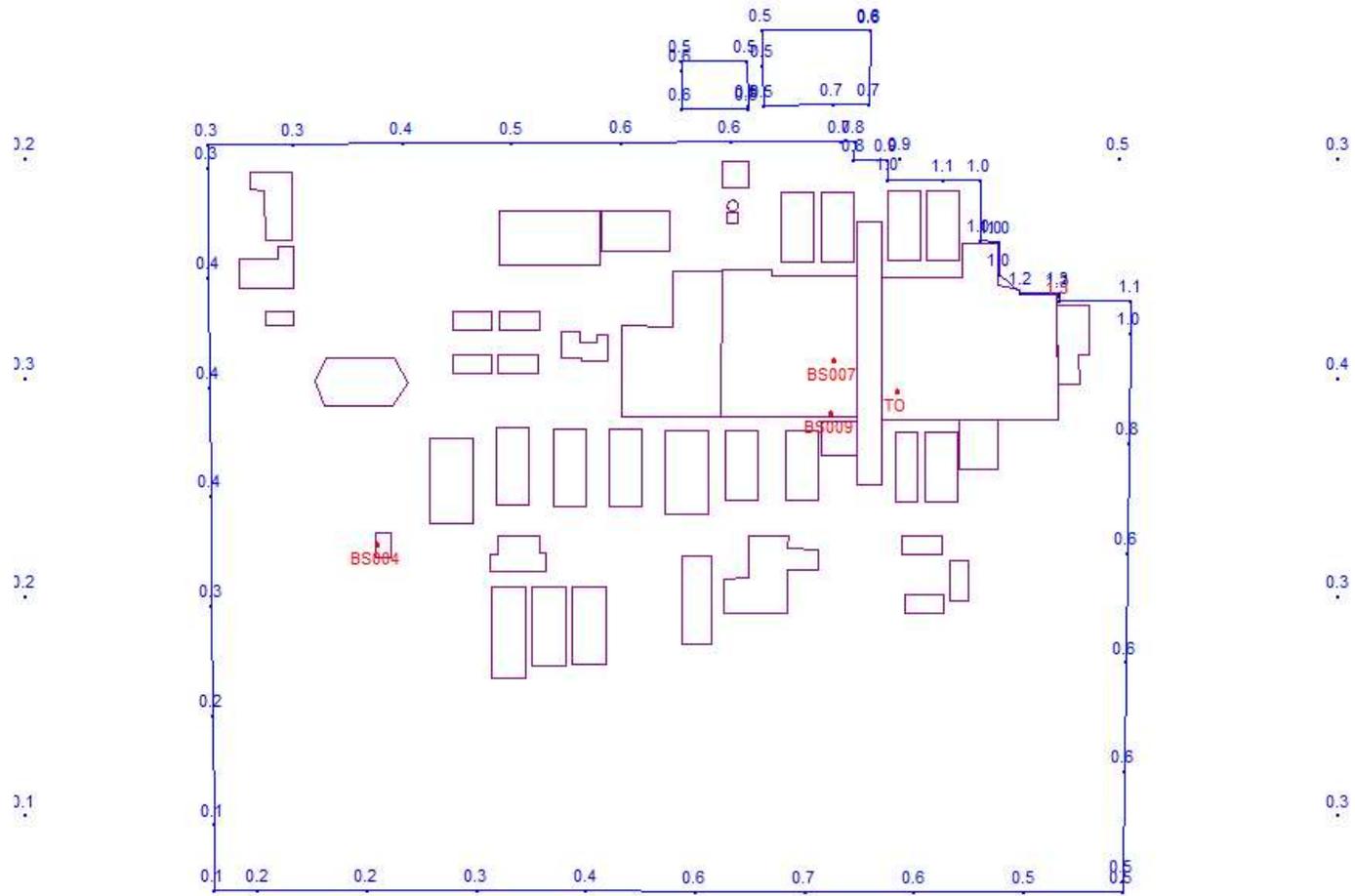


Scale: 1" = 67.9 Meters

GROUP ALL - 4TH-HIGHEST MAX DAILY 1-HR VALUES AVERAGED OVER 5 YEARS

Max = 27.87784 (363243.1, 3868566)

Figure 3. 1-hour SO₂ model results



Scale: 1" = 67.9 Meters

GROUP ALL - 8TH-HIGHEST MAX DAILY 24-HR VALUES AVERAGED OVER 5 YEARS

Max = 1.29126 (363210.4, 3868565)

Figure 4. 24-hour PM_{2.5} model results