APPENDIX C:
AIR QUALITY ANALYSIS

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APPENDIX C-1:
AIR QUALITY MODELING ANALYSIS

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AIR QUALITY MODELING ANALYSIS
US GYPSUM COMPANY - SOUTHWEST PLANT

PLASTER CITY, IMPERIAL COUNTY, CALIFORNIA

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September 2, 1999

Project 991401.0053

List of Tables

US Gypsum Company (USG) has submitted an Authority to Construct application to the Imperial County Air Pollution Control District (ICAPCD) for the installation and operation of a new plaster board line at its existing Southwest Plant, located in the town of Plaster City, California. As part of this Authority to Construct application, an air dispersion modeling analysis is required to demonstrate that emissions from the proposed sources will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or California Ambient Air Quality Standards (CAAQS). This report summarizes the methodology and results of the air quality dispersion modeling analysis performed for the Authority to Construct application.

All analyses presented in this report conform to current United States Environmental Protection Agency (U.S. EPA) and ICAPCD modeling guidelines.[1]

1.1 FACILITY LOCATION

The Southwest Plant is located in the town of Plaster City on County Highway S80. Plaster City is situated in Imperial County, approximately 12 miles north of the California-Mexico border and approximately 20 miles west of El Centro. The Southwest Plant property is divided by Highway S80 into two parts: the southern portion of the property contains most of the manufacturing facility and buildings while the northern portion contains the main office, covered rock storage, and five rock storage silos. Public access to the southern portion of the property is blocked by a fence. No such barrier exists for the northern portion of the property.

Sections 3 and 4 of this document contain a facility plot plan showing the locations of the existing line #2 sources that will be removed and the proposed sources. An area map consisting of the Southwest Plant fenceline boundary overlaid onto a detailed map of the area. The area map shows terrain contours and the facility property relative to predominant geographical features such as highways, roads, and streams, as well as significant landmarks such as buildings and water towers.

1.2 UTM COORDINATE SYSTEM

In all modeling analysis input and output data files, the location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. The U.S. EPA requires that coordinates for permits and air dispersion modeling analyses be represented in the UTM system. The UTM grid was originally created by the Defense Mapping Agency of the United States as a special grid for military use throughout the world.[2] In this grid, the world is divided into 60 north-south zones, each covering a strip 6° wide in longitude. The Plaster City area of South Central California is located in UTM Zone 11. In each UTM Zone, coordinates are measured north and east in

[1] Appendix W, Code of Federal Regulations, Title 40—Protection of Environment, Part 51, July 1, 1997.

[2] U.S. Department of the Interior and the U.S. Geological Survey Earth Science Information Center (ESIC), The Universal Transverse Mercator (UTM) Grid Factsheet, May 1993.

meters. The northing values are measured continuously from zero at the Equator, in a northerly direction. A central meridian through the middle of each 6° zone is assigned an easting value of 500,000 meters. Grid values to the east of this central meridian, as in the case of the Southwest Plant, are greater than 500,000. The center of the Southwest Plant is located near UTM coordinates 607.240 kilometers (km) East and 3,628.440 km North.

All emission point, building, and fenceline locations digitized from USG plot plans are converted to equivalent UTM coordinates.

2.1 PROCESS DESCRIPTION

The equipment being installed at the Southwest Plant is used to manufacture gypsum wallboard and other gypsum products. The equipment being installed for this manufacturing process can be found in Table 3-1.

In order to produce gypsum wallboard, gypsum ($CaSO_4 \bullet 2H_2O$), a white or gray naturally-occurring mineral, is partially dehydrated or calcined to produce calcium sulfate hemihydrate ($CaSO_4 \bullet 0.5H_2O$) (commonly referred to as stucco). This material is then converted to wallboard by crushing and stockpiling gypsum ore. The stockpiled ore is further crushed and screened to about 50 millimeters (2 inches) in diameter as needed. The mined ore is then dried in a heated roller mill and conveyed to a second roller mill, where it is ground such that 90% of it is less 149 micrometers (μm). This material is then fed to kettle calciners, where it is heated to remove 75% of the chemically-bound water to form stucco. In kettle calciners, the gypsum is indirectly heated by hot combustion gas passing through flues in the kettle, and the stucco product is discharged into a "hot pit" located below the kettle.

The stucco product is first mixed with dry additives and then mixed with water, soap foam, accelerators and shredded paper, or pulpwood in a pin mixer at the head of the board forming line. The slurry is then spread between two paper sheets that serve as a mold (the edges of the paper are board). As the wet board travels the length of the conveying line, the calcium sulfate hemihydrate combines with the water in the slurry to form solid calcium sulfate dihydrate, or gypsum, resulting in a rigid board. The board is rough-cut to length, and it enters a multideck kiln dryer, where it is dried by direct contact with hot combustion gases. The dried board is conveyed to the board end sawing area, where it is trimmed and bundled for shipment.

2.2 TYPE OF PERMIT REVIEW

Imperial County, in which the Southwest Plant is located, has been designated by the U.S. EPA as moderate nonattainment for particulate matter of 10 microns in size or less (PM_{10}) and transitional nonattainment for ozone.[3] Imperial County has been categorized as in attainment or unclassifiable for all other criteria pollutants. The Southwest Plant is a gypsum processing facility, which is not one of the 28 named Prevention of Significant Deterioration (PSD) stationary source categories with 100 ton per year (tpy) major source thresholds. Since facility-wide emissions of each criteria pollutant are less than 250 tpy, the Southwest Plant is considered to be a minor source with respect to the federal PSD program.

[3] Code of Federal Regulations, Title 40-Protection of the Environment, Parts 81-85, §81.305, July 1, 1998.

2.3 POLLUTANTS EVALUATED

Emissions associated with the gypsum manufacturing process include PM_{10}, nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and volatile organic compounds (VOC). The pollutants that are significantly increasing as a result of the proposed modification are NO_2 and CO; thus, this modeling analysis is conducted to demonstrate that the corresponding impacts of these pollutants will not exceed applicable modeling levels (e.g. CAAQS and NAAQS).

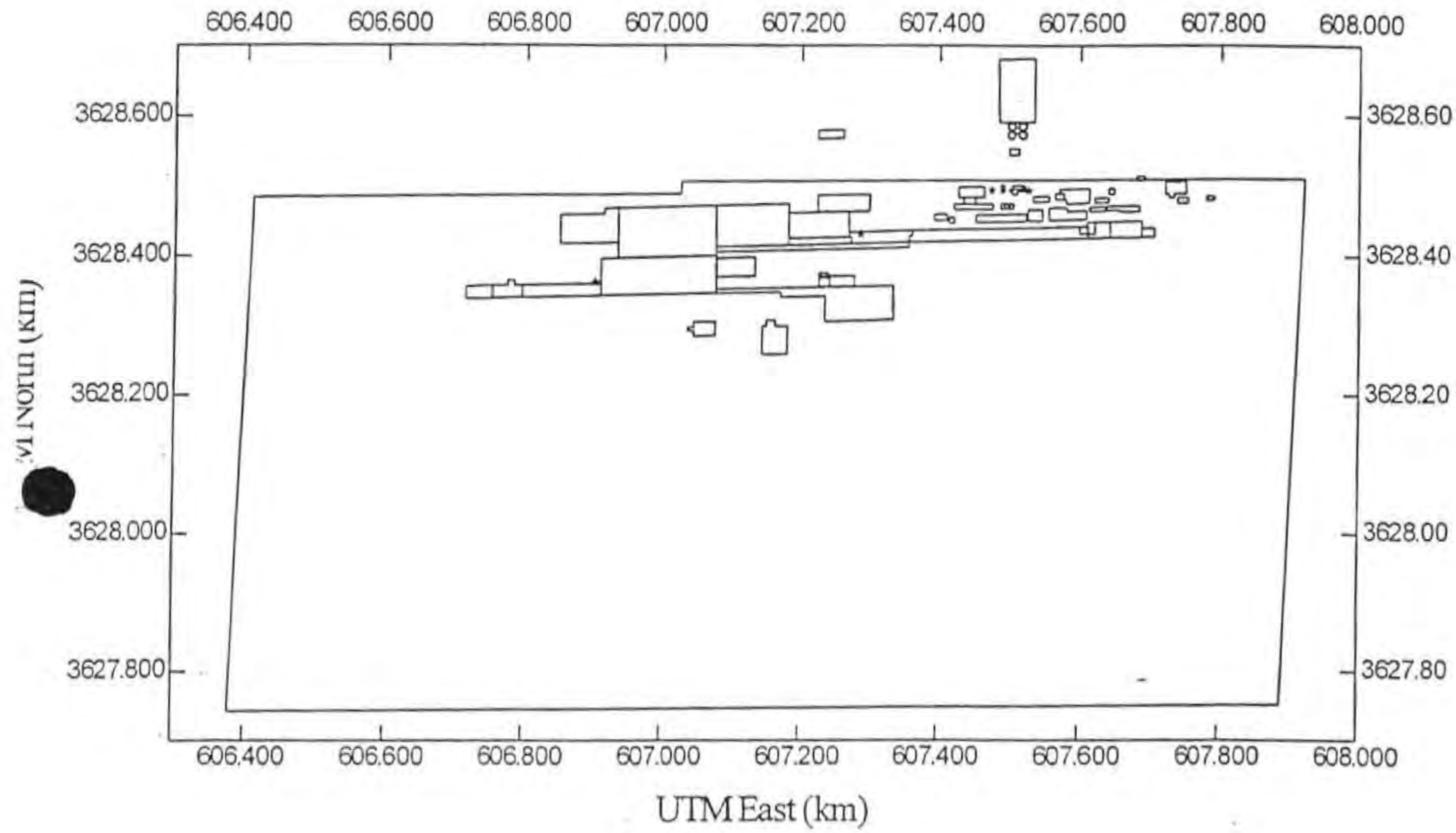
The maximum modeled off-property, ground-level concentrations of post-modification, plant-wide emissions of NO_2 and CO are compared to the corresponding CAAQS and NAAQS levels for each pollutant and averaging period.

A plot plan of the Southwest Plant and associated fenceline is shown in Figure 3-1. Figures 3-2A-C displays close-up views of the main manufacturing buildings. The sources depicted in Figures 3-2A-C are described below in Table 3-1. Please note that only those sources at the facility that emit the pollutants being modeled in this analysis (NO_2 and CO) are highlighted in the plots and tables.

TABLE 3-1. LINE #2 AND PROPOSED SOURCES AT THE SOUTHWEST PLANT.

Source Status	ID	Description
Existing (will be removed)	K	Line #2 Gypsum Board Drying Kiln
Proposed	LP_AIR	L.P. Air Heater
Proposed	CP_AIR	C.P. Air Heater
Proposed	N29	Kiln Exhaust

FIGURE 3-1. SOUTHWEST PLANT PLOT PLAN.



★- Indicates source location

FIGURE 3-2A. LOCATION OF SOURCES AT THE SOUTHWEST PLANT.

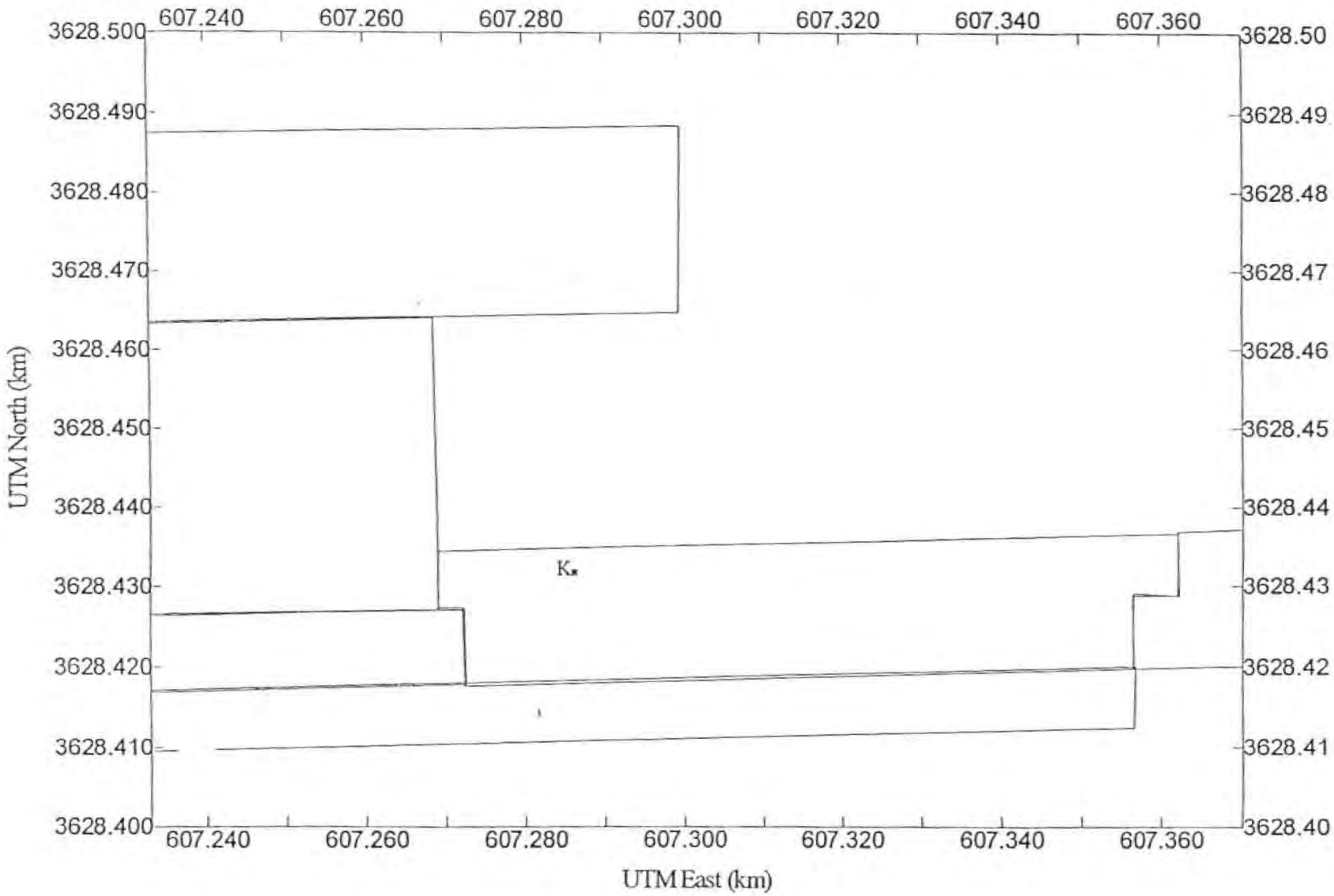


FIGURE 3-2B. LOCATION OF SOURCES AT THE SOUTHWEST PLANT.

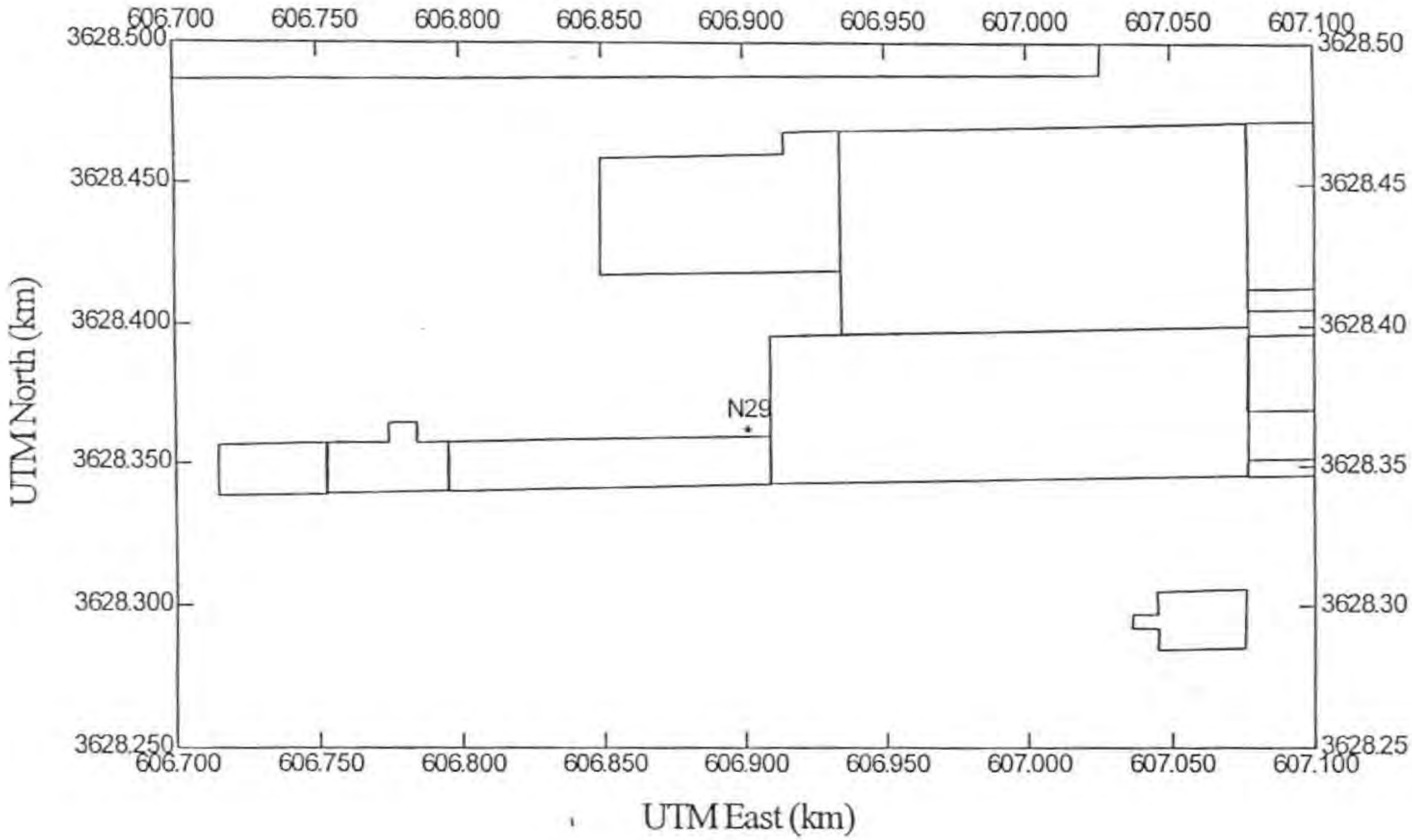
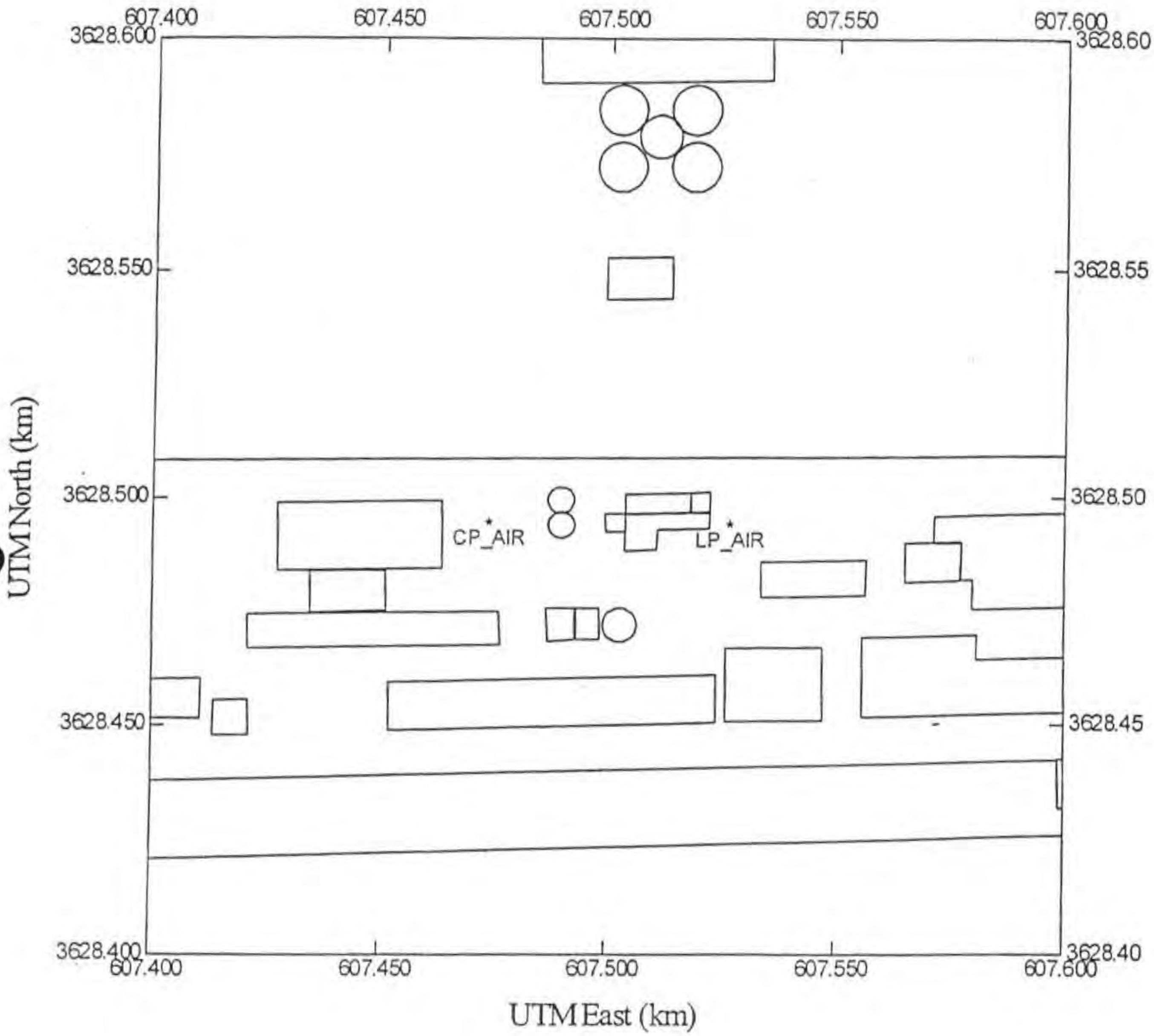
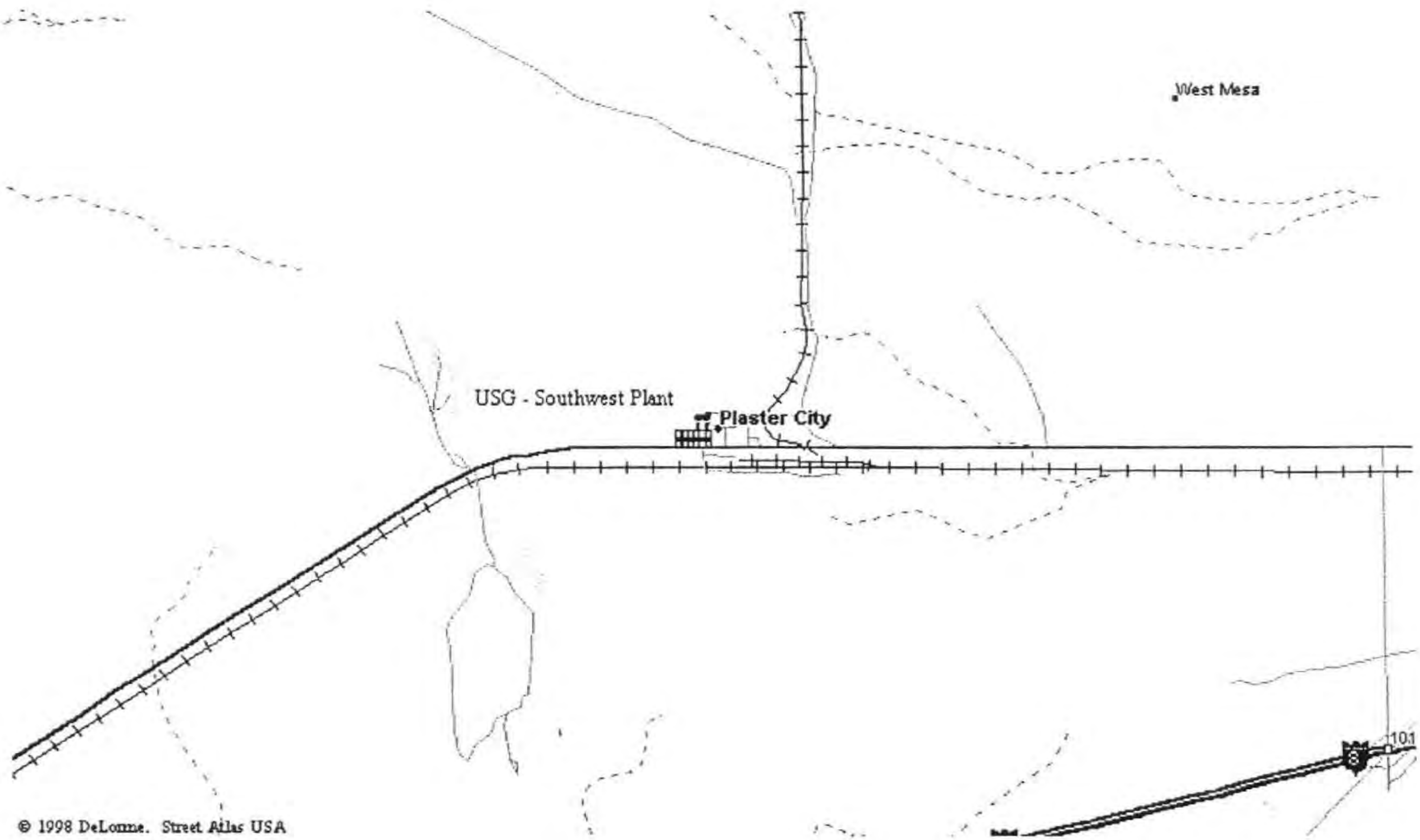


FIGURE 3-2C. LOCATION OF SOURCES AT THE SOUTHWEST PLANT.



4. AREA MAP

FIGURE 4-1. SOUTHWEST PLANT AREA MAP.



5.1 PROPOSED SOURCES

This section provides a brief discussion of stack parameters and emission rates for the proposed sources at the Southwest Plant.

Table 5-1 summarizes the stack parameters for the proposed sources in English units. Emission rates for the proposed sources are included in Table 5-3 at the end of this section. Descriptions of the proposed sources can be found in Table 3-1.

TABLE 5-1. STACK PARAMETERS FOR PROPOSED SOUTHWEST PLANT SOURCES.

Source ID	UTM East (km)	UTM North (km)	Height (ft)	Diameter (ft)	Velocity (ft/s)	Temperature (°F)
LP_AIR	607.527	3628.494	25.0	0.67	178.4	200
CP_AIR	607.474	3628.495	90.0	6.00	30.4	322
N29	606.901	3628.363	17.0	8.52	50.0	203

5.2 Removal of Existing Line #2 Sources

As stated in Section 2.3, USG is modeling post-modification emissions of the criteria pollutants CO and NO_2 to assess compliance with the CAAQS and NAAQS. There are four existing line #2 sources at the Southwest Plant that will be removed once the proposed line is installed. These sources are the #2 End Saw (31), the #2 Kerf (32), the #2 Glip Saw (33), and the #2 Board Drying Kiln (K). Source K is the only line #2 source that emits one or more of the pollutants modeled in this analysis. Table 5-2 summarizes the stack parameters for this additional source in English units. Emission rates for the additional modeled source are included in Table 5-3 at the end of this section. A description of this existing line #2 source can be found in Table 3-1.

Table 5-2. Stack parameters for existing line #2 Southwest Plant source.

Source ID	UTM East (km)	UTM North (km)	Height (ft)	Diameter (ft)	Velocity (ft/s)	Temperature (°F)
K	607.286	3628.432	26	5.42	27.7	203.5

TABLE 5-3. SUMMARY OF EMISSION RATES MODELED.

Stack #	NO_X Emission Rate tpy	NO_X Emission Rate lb/hr	NO_X Emission Rate g/sec	CO Emission Rate tpy	CO Emission Rate lb/hr	CO Emission Rate g/sec
LP_AIR	0.160	0.037	0.0046026	0.370	0.084	0.0106436
CP_AIR	18.830	4.299	0.5416730	7.530	1.719	0.2166117
N29	36.450	8.322	1.0485385	85.976	19.629	2.4732277
[illegible]	-27.010	-6.167	-0.7769829	-48.730	-11.126	-1.4017910
Totals	**28.430**	**6.491**	**0.818**	**45.146**	**10.307**	**1.299**

6. MODELING METHODOLOGY

This section discusses the modeling methodology that is used to demonstrate compliance with the applicable standards. The techniques used in the air dispersion modeling analysis are consistent with current U.S. EPA and ICAPCD modeling procedures.[4]

6.1 IMPACT ANALYSIS

An impact analysis is conducted for NO_2 and CO in order to determine whether the impacts associated with the post-modification Southwest Plant emissions comply with applicable NAAQS and CAAQS. In the impact analysis, the maximum off-property, ground-level concentrations of NO_2 and CO are calculated for comparison to the corresponding NAAQS and CAAQS levels.

6.2 DISPERSION MODEL SELECTION

Two levels of air quality dispersion model sophistication exist: screening and refined dispersion modeling. Screening models may be used to eliminate more extensive modeling; however, the results must demonstrate to the satisfaction of the permitting agency that all applicable air quality analysis requirements are adhered to. Screening models produce conservative estimates of ambient impacts in order to reasonably ensure that maximum ambient concentrations will not be underestimated. If the resulting estimates from a screening model indicate a violation of or a threat to the applicable standards, the applicant must use a refined model and/or refined emissions assumptions to re-estimate ambient concentrations. A refined dispersion model provides more accurate estimates of a source's impact and consequently requires more detailed and precise input data than does a screening model.

Based on the likelihood that a screening model would result in unacceptable impacts, a refined dispersion model is used in the air dispersion modeling analysis in support of the Authority to Construct application.

6.2.1 INDUSTRIAL SOURCE COMPLEX MODEL

The latest version (dated 99155) of the Industrial Source Complex Short Term Version 3 (ISCST3) model is used to estimate maximum off-property, ground-level concentrations due to emissions from the sources at the Southwest Plant. ISCST3 is the U.S. EPA's latest release of the Industrial Source Complex model. This model is used extensively in regulatory driven air quality modeling studies and is the workhorse of U.S. EPA regulatory models. Version 3 was first made available to the public in final form in early August 1995.

In this analysis, modeling with ISCST3 is performed using the regulatory default option, which includes stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. Ground-level concentrations occurring during "calm" wind conditions are calculated by the model using the calm processing feature. Regulatory default values for

[4] Appendix W, Code of Federal Regulations, Title 40–Protection of Environment, Part 51, July 1, 1998.

wind profile exponents and vertical potential temperature gradients are used since no representative on-site meteorological data are available. As per U.S. EPA requirements, direction-specific building dimensions are used for both the Schulman-Scire and the Huber-Snyder downwash algorithms.

7. LAND-USE ANALYSIS

An analysis must be performed to determine if the area surrounding the Southwest Plant should be classified as urban or rural for air dispersion modeling purposes. The vast majority (> 90%) of the land surrounding the Southwest Plant is desert shrubland (rural) and cannot be classified as residential, commercial, or industrial. Since the majority of the area around the Southwest Plant is considered to be rural, rural dispersion coefficients are utilized in the modeling analysis.

8. TERRAIN

The town of Plaster City is situated on a relatively flat plain approximately 20 miles west of the El Centro. As a general rule, terrain elevations slowly increase from east to west across the area. As shown on the 7.5 minute USGS map for Plaster City Quadrangle, the base elevation in the vicinity of the Southwest Plant is approximately 97 feet above mean sea level. Terrain elevations are all below the minimum facility stack heights within one mile of the facility; therefore, all sources, buildings, and receptors are modeled as flat terrain.

The emissions units at the Southwest Plant have been evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building were absent. The current version of the ISCST3 dispersion model provides for a revised treatment of building wake effects which, for certain emissions units, uses wind direction-specific building dimensions following the algorithms developed by Schulman and Hanna.[5] The minimum stack height not subject to the effects of downwash is defined by the formula:[6]

$$G = H + 1.5L$$

Where: G = Minimum Good Engineering Practice (GEP) stack height
H = Height of the structure
L = Lesser dimension (height or projected width of structure)

This equation is limited to stacks located within 5L of the structure. Stacks located at distances greater than 5L are not subject to the wake effects of the structure. If there is more than one stack at a given facility, the above equation must be successively applied to each stack. If more than one structure is involved, the equations must also be successively applied to each structure.

Direction-specific building dimensions and the dominant downwash structure parameters used as input to the dispersion models were determined using the *BREEZE-WAKE/BPIP* software, developed by Trinity Consultants, Inc. This software incorporates the algorithms of the U.S. EPA sanctioned Building Profile Input Program (BPIP), version 95086.[7] BPIP is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

The output from the BPIP downwash analysis lists the names and dimensions of the structures, and the emissions unit locations and heights. In addition, the output contains a summary of the dominant structure for each emissions unit (considering all wind directions) and the actual building height and projected widths for all wind directions. This information is then incorporated into the data files for the ISCST3 model. Table 9-1 summarizes the names and heights of the structures that are included in the downwash analysis. Figure 9-1 shows a close-up of the buildings at the plant and the corresponding building numbers for reference. Appendix A includes a hardcopy of the downwash output file.

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[5] L.L. Schulman, S.R. Hanna, Evaluation of Downwash Modifications to the Industrial Source Complex Model, *JAPCA* 36:258-264, 1986.

[6] U.S. EPA, Office of Air Quality Planning and Standards, *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised)*, Research Triangle Park, North Carolina, EPA 450/4-80-023R, June, 1985.

[7] United States Environmental Protection Agency, *User's Guide to the Building Profile Input Program*, Research Triangle Park, NC, EPA-454/R-93-038.

TABLE 9-1. SUMMARY OF BUILDINGS INCLUDED IN DOWNWASH ANALYSIS.

Building Number	Building/Tier Name	Height (ft)	Building Number	Building/Tier Name	Height (ft)
N1	Waste Building - Tier #1	26.5	18	Calciner Feed - Tier #1	29.5
N2	Waste Building - Tier #2	32.5	19	Calciner Feed - Tier #2	48.0
N3	Kiln Building	51.5	20	Existing Warehouse #2	14.0
N4	Warehouse - Tier #1	34.0	21	Storeroom	14.0
N5	Warehouse - Tier #2	34.0	22	Crusher Building - Tier #1	10.0
N6	Truck Tarping	32.0	23	Crusher Building - Tier #2	46.0
N7	Train Canopy	32.0	24	Crusher Building - Tier #3	57.0
N8	Paper Storage	25.0	25	Crusher Building - Tier #4	37.0
N9	Waste Reclaim	25.0	26	Mill Office	12.5
N10	High Mill - Tier #1	82.0	27	Packing House	46.0
N11	High Mill - Tier #2	56.0	28	East Mill - Tier #1	11.0
N12	High Mill - Tier #3	82.0	29	East Mill - Tier #2	51.0
N13	Covered Rock Storage	82.0	30	Storage Building #1	13.0
N14	Substation	12.0	31	Storage Building #2	10.0
1	Existing Warehouse - Tier #1	35.1	32	Storage Building #3	13.0
2	# 1 Line Building	34.1	33	Main Shop	28.0
3	Existing Warehouse - Tier #2	29.0	34	Plant Engineering	12.0
4	Existing Warehouse - Tier #3	32.0	35	Electric Shop	16.0
5	Center Beam Loading	31.0	36	MMD Crusher	13.0
6	Existing Warehouse - Tier #4	16.4	37	Tube Mill	47.0
7	Board Plant - Tier #1	12.3	38	#6 Kettle Building	70.0
8	Board Plant - Tier #2	23.0	T1	Tank - Green Giant	80.0
9	Board Plant - Tier #3	62.5	T2	Tank - Calciner Feed Tank	50.0
10	Board Plant - Tier #4	23.4	S1	Crusher Silo #1	50.0
11	Board Plant - Tier #5	41.3	S2	Crusher Silo #2	50.0
12	Board Plant - Tier #6	24.0	S3	Rock Storage Silo #1	40.0
13	Main Office	10.0	S4	Rock Storage Silo #2	40.0
14	Quality Building	15.0	S5	Rock Storage Silo #3	40.0
15	Control Building	15.0	S6	Rock Storage Silo #4	40.0
16	Raymond Mills - Tier #1	50.0	S7	Rock Storage Silo #5	40.0
17	Raymond Mills - Tier #2	80.0			

FIGURE 9-1A. LOCATION OF BUILDINGS AT THE SOUTHWEST PLANT.

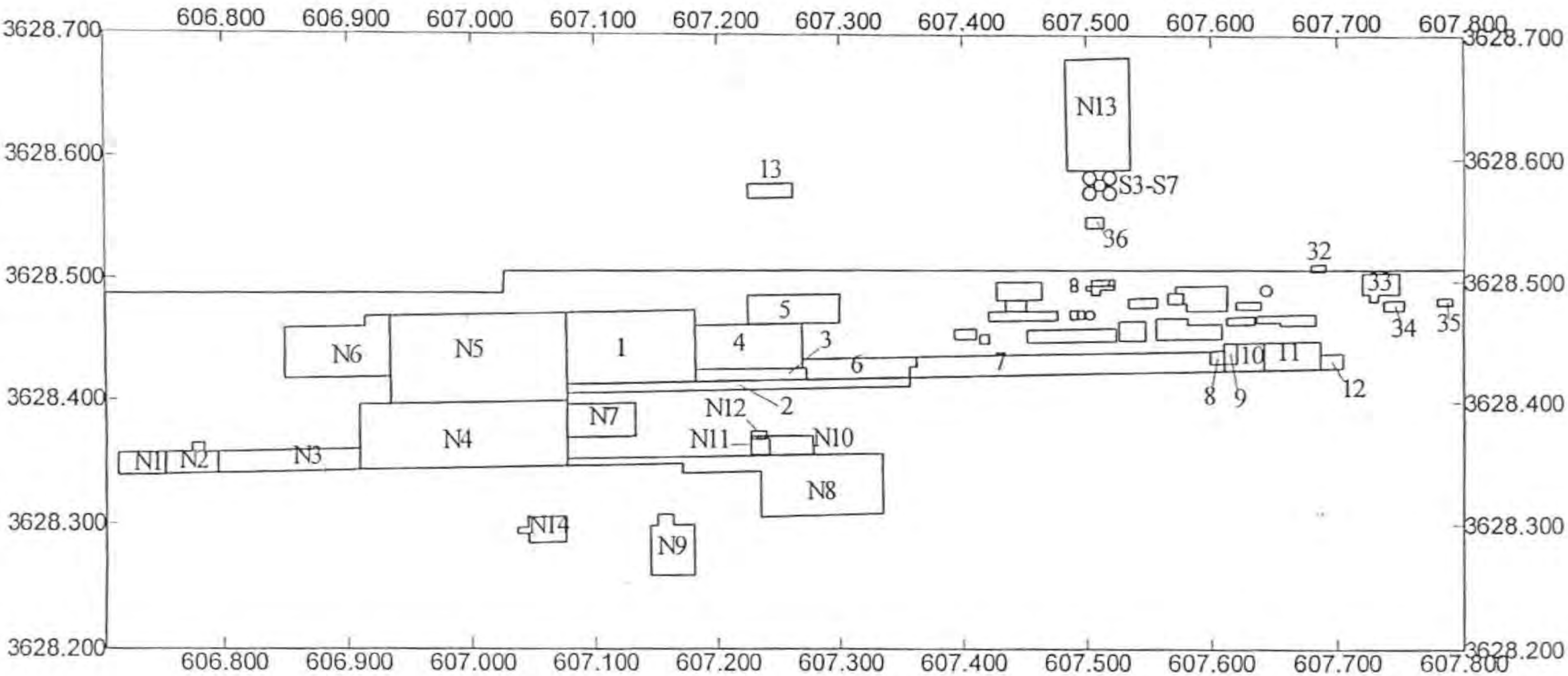
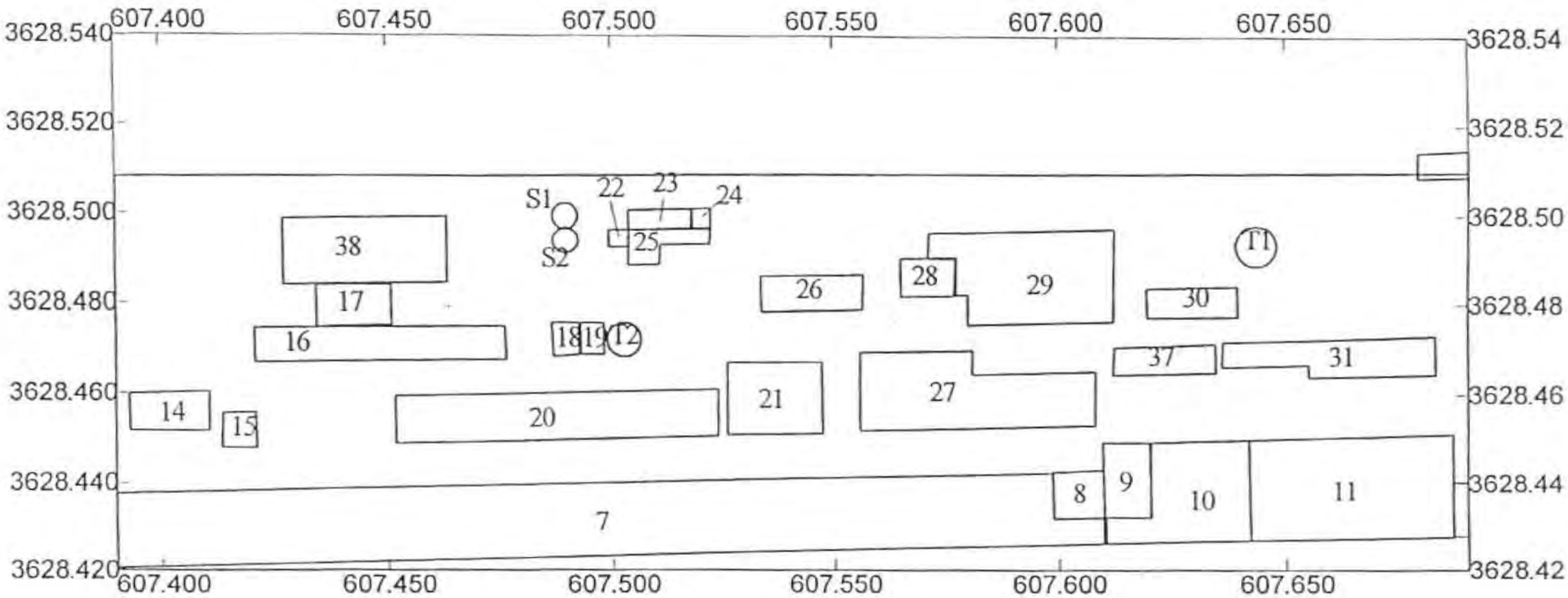


FIGURE 9-1B. LOCATION OF BUILDINGS AT THE SOUTHWEST PLANT (CONTINUED).



10. Receptor Grids

In the air dispersion modeling analysis, ground-level concentrations are calculated within four Cartesian receptor grids. These four grids cover a region extending 10 km from all edges of the Southwest Plant fenceline. Initially, a "coarse grid" that contains 1-km spaced receptors extending 10 km from the fenceline is employed to isolate a localized area of maximum concentrations. Since maximum concentrations are found to be on or very near the facility fenceline, the remaining grids are defined as follows: 1) a "fenceline" grid containing 100-meter spaced receptors extending along the fenceline of the facility, 2) a "fine grid" containing 100-meter spaced receptors extending 1.0 km from the fenceline exclusive of receptors on the fenceline grid and receptors within the fenceline, and 3) a "medium" grid containing 500 meter spaced receptors extending 5 km from the fenceline. Figures 10-1 through 10-4 show the receptor locations for the fenceline, fine, medium, and coarse Cartesian receptor grids, respectively.

FIGURE 10-1. RECEPTOR LOCATIONS FOR THE FENCELINE GRID.

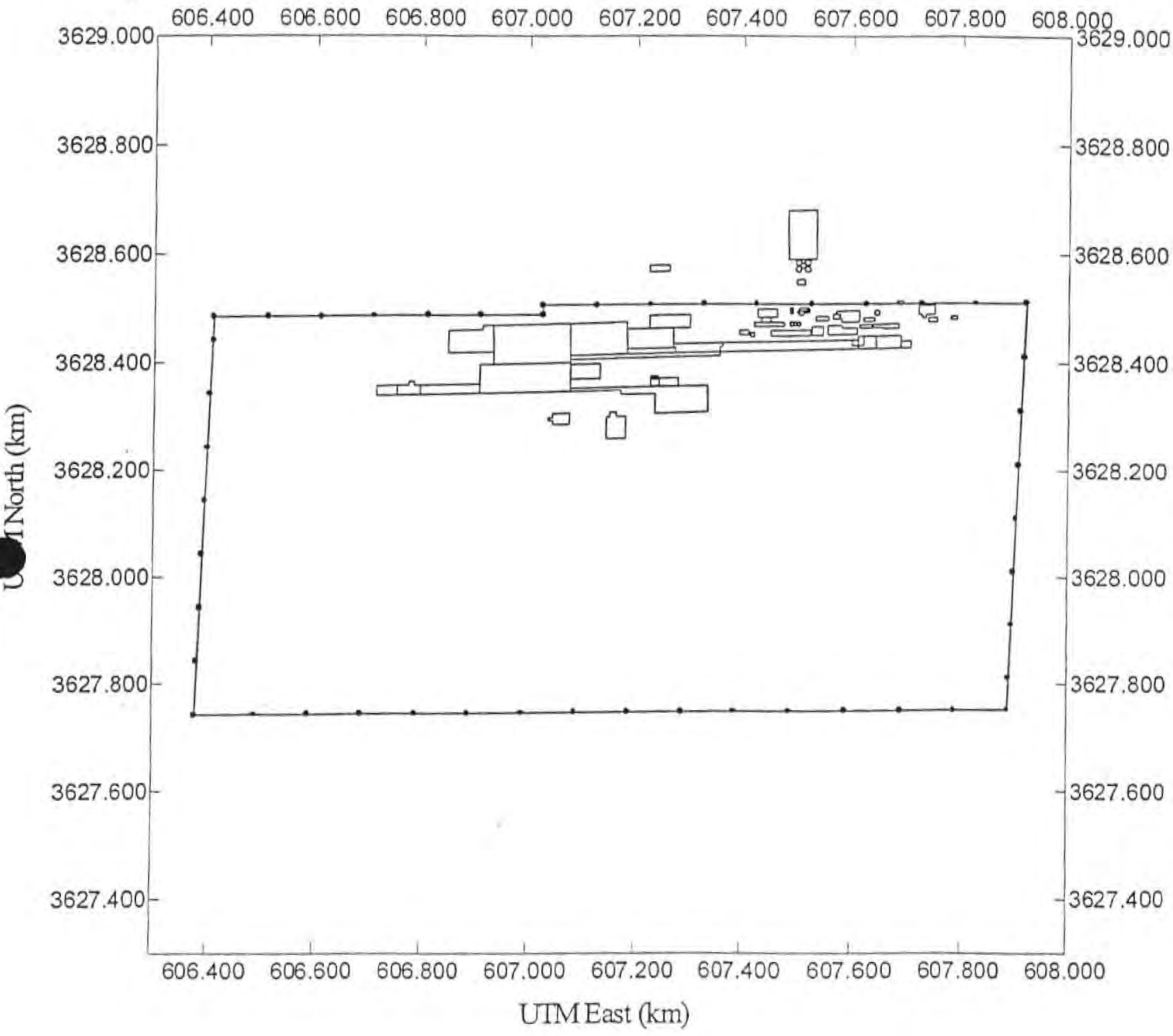


FIGURE 10-2. RECEPTOR LOCATIONS FOR THE FINE GRID.

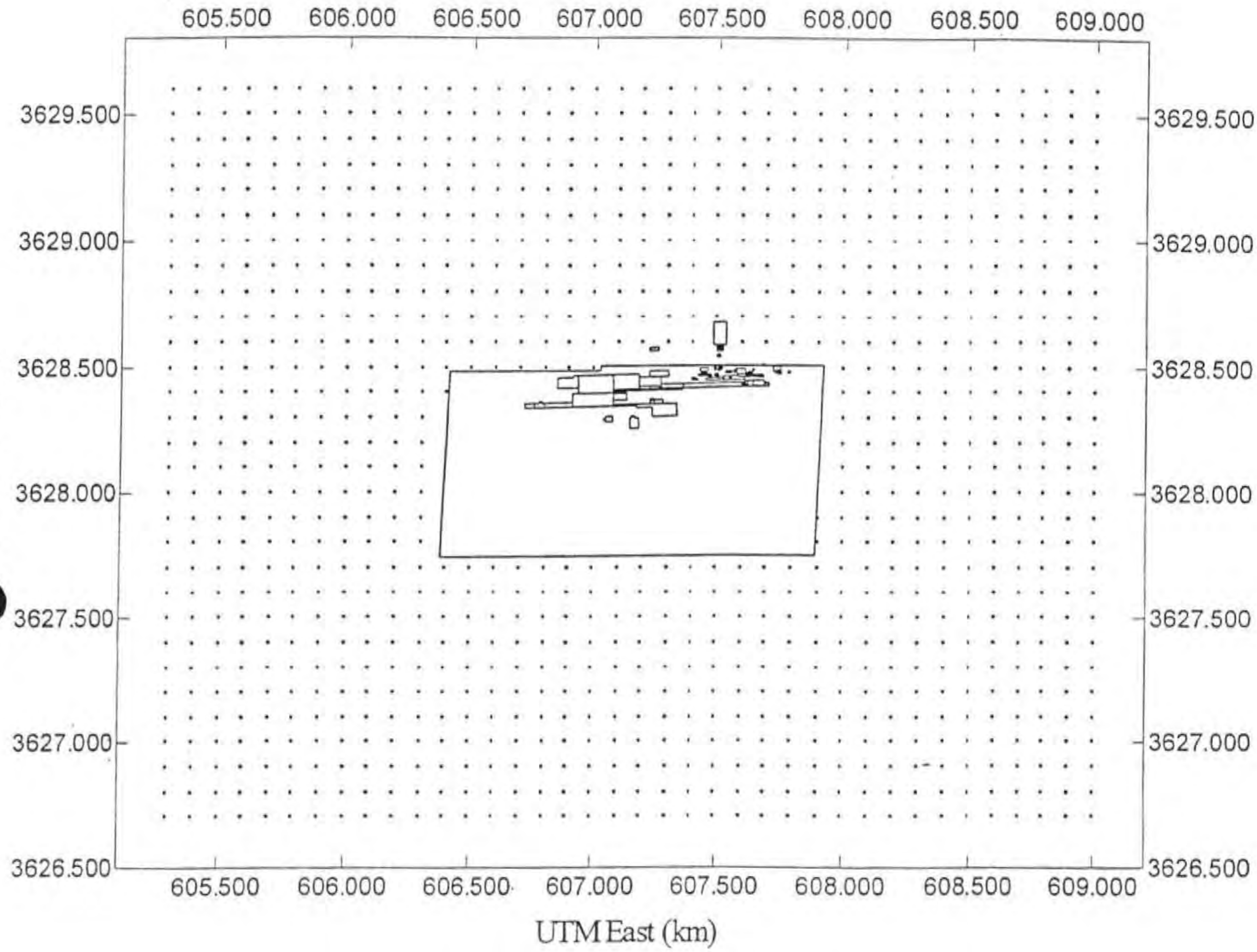


FIGURE 10-3. RECEPTOR LOCATIONS FOR THE MEDIUM GRID.

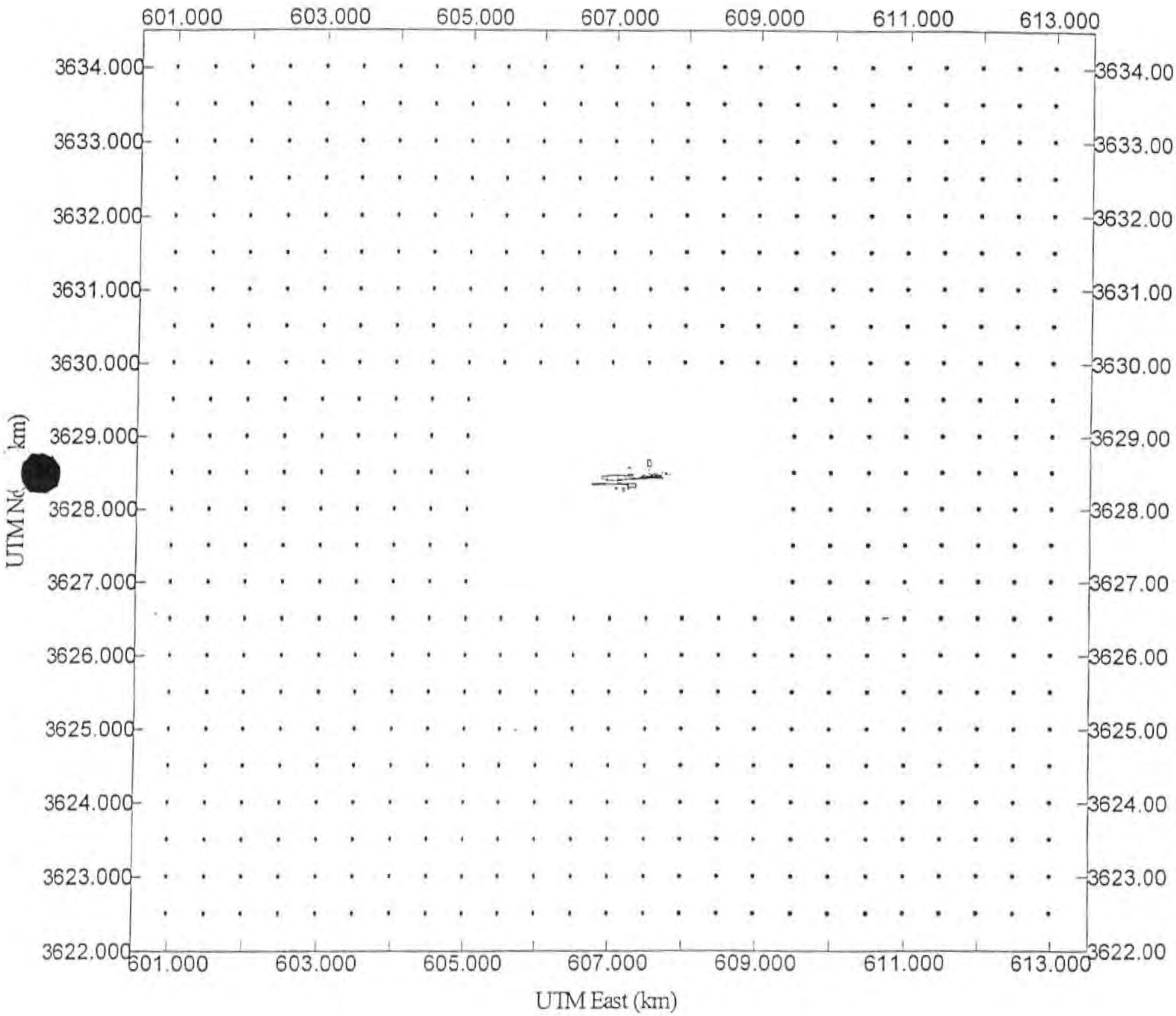
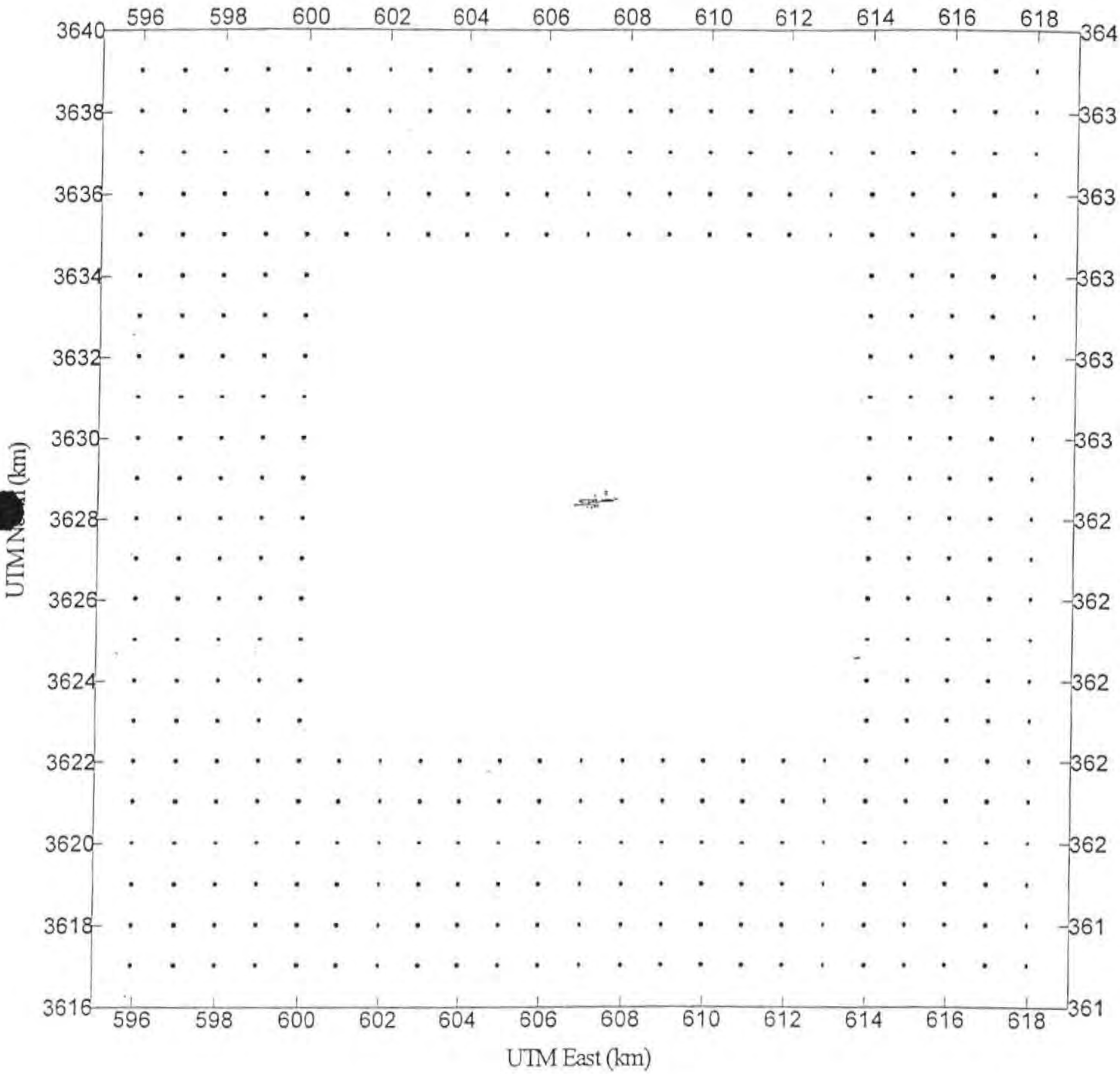


FIGURE 10-4. RECEPTOR LOCATIONS FOR THE COARSE GRID.



The U.S. EPA typically recommends a single year of meteorological data for effects evaluation or non-PSD modeling. In this case, the dispersion modeling analysis is performed using 1956 meteorological data based on surface observations taken from the El Centro Naval Auxiliary Air Station (National Weather Service Station [NWS] station number 23199) and upper air measurements from Yuma, Arizona (NWS station number 3145). This station combination has been recommended for modeling in Imperial County by the ICAPCD.

The anemometer height at the El Centro NWS station during the period of interest (1956) is assumed to be 10 feet above ground level.

12.1 IMPACT ANALYSIS

Table 12-2 lists the maximum off-property, ground-level concentrations of the pollutants modeled in the impact analysis (NO_2 and CO) for the fenceline, fine, medium, and coarse receptor grids. These impacts occur as a result of emissions from post-modification, proposed and removal of existing line #2 sources from the Southwest Plant. All concentrations are compared against the corresponding modeling impact levels (CAAQS and NAAQS).

Please note that a NO_X-to-NO_2 conversion ratio of 100% is conservatively assumed in the impact analysis.

Table 12-1 shows that all maximum modeled concentrations of criteria pollutants (NO_2 and CO) are below the corresponding modeling levels; therefore, no adverse impacts from these emissions are expected to occur and no further modeling is required to demonstrate compliance with the CAAQS and NAAQS. Concentration plots showing the maximum concentrations for each criteria pollutant and averaging period are provided for reference in Appendix B.

TABLE 12-1. MAXIMUM MODELED CONCENTRATIONS AS DETERMINED IN THE IMPACT ANALYSIS.

Pollutant	Averaging Period	Receptor Grid	UTM East (km)	UTM North (km)	Maximum Modeled Concentration ($\mu g/m^3$)	Maximum Modeled Concentration w/Background ($\mu g/m^3$)	Modeling Level CAAQS ($\mu g/m^3$)	Modeling Level NAAQS ($\mu g/m^3$)
NO_2	1-Hour	Fenceline	606.910	3,628.488	268.222	**341.522**	470	--
		Fine	607.000	3,628.500	212.635	**285.935**	470	--
		Medium	606.000	3,630.500	13.727	**87.027**	470	--
		Coarse	606.000	3,622.000	6.025	**79.325**	470	--
NO_2	Annual	Fenceline	606.810	3,628.487	1.580	**7.180**	--	100
		Fine	606.800	3,628.500	1.220	**6.820**	--	100
		Medium	609.500	3,628.000	0.059	**5.659**	--	100
		Coarse	615.000	3,627.000	0.037	**5.637**	--	100
CO	1-Hour	Fenceline	606.910	3,628.488	632.663	**632.663**	23,000	40,000
		Fine	607.000	3,628.500	501.547	**501.547**	23,000	40,000
		Medium	606.000	3,630.500	32.377	**32.377**	23,000	40,000
		Coarse	606.000	3,622.000	14.688	**14.688**	23,000	40,000
CO	8-Hour	Fenceline	606.910	3,628.488	164.644	**164.644**	10,000	10,000
		Fine	606.800	3,628.500	104.035	**104.035**	10,000	10,000
		Medium	608.000	3,626.500	9.547	**9.547**	10,000	10,000
		Coarse	602.000	3,635.000	2.295	**2.295**	10,000	10,000

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APPENDIX C-2:
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Table AQ1 (January 2019)
USG Quarry Proposed Operations
Onsite Quarry Mobile Equipment Emissions (Typical)

				Equation Variables		Emissions							
Operation		Emission Factor	Units	1	2	PM-10 lbs/day	PM-2.5 lbs/day	ROC lbs/day	CO lbs/day	NOx lbs/day	SOx lbs/day	CO2 lbs/day	CH4 lbs/day
Equipment Exhaust Emissions				Equipment #	Operating Hrs								
PM-10	Bulldozer -Cat D10-766 hp-T	0.020	lbs/hr	1	8	0.16	0.15						
PM-2.5	Loader-Cat 988 530hp-T4	0.006	lbs/hr	2	16	0.19	0.18						
	Loaders-Cat988-700hp-T3	0.010	lbs/hr	1	16	0.16	0.15						
	Water & Vac trks (Compos)	0.036	lbs/hr	2	4	0.29	0.26						
	Grader-Cat 12M (186 HP)- T4	0.003	lbs/hr	1	1	0.00	0.00						
	Trucks-Hit EH1100-760hp-T2	0.100	lbs/hr	1	14	1.40	1.29						
	Trucks Kom605-760hp-T4	0.008	lbs/hr	3	14	0.34	0.31						
	Drill Rig - HP 450- T3	0.080	lbs/hr	1	10	0.80	0.74						
	Excav-KOM 390-271hp- T4i	0.003	lbs/mi	1	14	0.04	0.04						
ROG	Bulldozer -Cat D10-766 hp-T	0.090	lbs/hr	1	8			0.72					
	Loader-Cat 988 530hp-T4	0.025	lbs/hr	2	16			0.80					
	Loaders-Cat988-700hp-T3	0.070	lbs/hr	1	16			1.12					
	Water & Vac trks (Compos)	0.161	lbs/hr	2	4			1.29					
	Grader-Cat 12M (186 HP)- T4	0.024	lbs/hr	1	1			0.02					
	Trucks-Hit EH1100-760hp-T2	0.040	lbs/hr	1	14			0.56					
	Trucks Kom605-760hp-T4	0.030	lbs/hr	3	14			1.26					
	Drill Rig - HP 450- T3	0.060	lbs/hr	1	10			0.60					
	Excav-KOM 390-271hp- T4i	0.030	lbs/mi	1	14			0.42					
CO	Bulldozer -Cat D10-766 hp-T	1.750	lbs/hr	1	8				14.00				
	Loader-Cat 988 530hp-T4	1.090	lbs/hr	2	16				34.88				
	Loaders-Cat988-700hp-T3	1.680	lbs/hr	1	16				26.88				
	Water & Vac trks (Compos)	0.563	lbs/hr	2	4				4.50				
	Grader-Cat 12M (186 HP)- T4	0.050	lbs/hr	1	1				0.05				
	Trucks-Hit EH1100-760hp-T2	3.070	lbs/hr	1	14				42.98				
	Trucks Kom605-760hp-T4	1.330	lbs/hr	3	14				55.86				
	Drill Rig - HP 450- T3	1.500	lbs/hr	1	10				15.00				
	Excav-KOM 390-271hp- T4i	0.350	lbs/mi	1	14				4.90				
NOX	Bulldozer -Cat D10-766 hp-T	1.750	lbs/hr	1	8					14.00			
	Loader-Cat 988 530hp-T4	0.140	lbs/hr	2	16					4.48			
	Loaders-Cat988-700hp-T4	1.460	lbs/hr	1	16					23.36			
	Water & Vac trks (Compos)	1.053	lbs/hr	2	4					8.42			
	Grader-Cat 12M (186 HP)- T4	0.370	lbs/hr	1	1					0.37			
	Trucks-Hit EH1100-760hp-T2	1.660	lbs/hr	1	14					23.24			
	Trucks Kom605-760hp-T4	0.150	lbs/hr	3	14					6.30			
	Drill Rig - HP 450- T3	1.300	lbs/hr	1	10					13.00			
	Excav-KOM 390-271hp- T4i	0.600	lbs/mi	1	14					8.40			
SOX	Bulldozer -Cat D10-766 hp-T	0.005	lbs/hr	1	8						0.04		
	Loader-Cat 988 530hp-T4	0.002	lbs/hr	2	16						0.07		
	Loaders-Cat988-700hp-T4	0.005	lbs/hr	1	16						0.08		
	Water & Vac trks (Compos)	0.003	lbs/hr	2	4						0.02		
	Grader-Cat 12M (186 HP)- T4	0.001	lbs/hr	1	1						0.00		
	Trucks-Hit EH1100-760hp-T2	0.004	lbs/hr	1	14						0.06		
	Trucks Kom605-760hp-T4	0.004	lbs/hr	3	14						0.17		
	Drill Rig - HP 450- T3	0.003	lbs/hr	1	10						0.03		
	Excav-KOM 390-271hp- T4i	0.002	lbs/mi	1	14						0.03		
CO2	Bulldozer -Cat D10-766 hp-T	465.0	lbs/hr	1	8							3,720.0	
	Loader-Cat 988 530hp-T4	237.0	lbs/hr	2	16							7,584.0	
	Loaders-Cat988-700hp-T4	460.0	lbs/hr	1	16							7,360.0	
	Water & Vac trks (Compos)	260.0	lbs/hr	2	4							2,080.0	
	Grader-Cat 12M (186 HP)- T4	442.0	lbs/hr	1	1							442.0	
	Trucks-Hit EH1100-760hp-T2	442.0	lbs/hr	1	14							6,188.0	
	Trucks Kom605-760hp-T4	442.0	lbs/hr	3	14							18,564.0	
	Drill Rig - HP 450- T3	188.0	lbs/hr	1	10							1,880.0	
	Excav-KOM 390-271hp- T4i	159.0	lbs/mi	1	14							2,226.0	
CH4	Bulldozer -Cat D10-766 hp-T	0.032	lbs/hr	1	8								0.254
	Loader-Cat 988 530hp-T4	0.013	lbs/hr	2	16								0.416
	Loaders-Cat988-700hp-T4	0.026	lbs/hr	1	16								0.416
	Water & Vac trks (Compos)	0.015	lbs/hr	2	4								0.117
	Grader-Cat 12M (186 HP)- T4	0.024	lbs/hr	1	1								0.024
	Trucks-Hit EH1100-760hp-T2	0.024	lbs/hr	1	14								0.336
	Trucks Kom605-760hp-T4	0.024	lbs/hr	3	14								1.008
	Drill Rig - HP 450- T3	0.005	lbs/hr	1	10								0.049
	Excav-KOM 390-271hp- T4i	0.008	lbs/mi	1	14								0.118
					Total Daily	3.38	3.11	6.79	199.05	101.57	0.50	50,044	2.74
					Tons&GHG Annual (MTCO2e)	0.62	0.57	1.24	36.33	18.54	0.09	8,303	9.54

Operations 365 days/year.
Equipment List from USG list submitted for DOORS program.

PM2.5 fraction of PM10 Exhaust is 0.92 (CEIDARS List)
Emission Sources: Off-Road Diesel Tier Emission Factors; SCAQMD Offroad Mobile Source Emissions' Factors.
MTCO2e = metric tons of CO2 equivalent

Table AQ2 (January 2019)
USG Pipeline Construction Activities
Onsite Mobile Construction Equipment Emissions (Typical)

	Operation	Emission Factor	Units	Equation Variables 1	Equation Variables 2	Emissions PM-10 lbs/day	PM-2.5 lbs/day	ROC lbs/day	CO lbs/day	NOx lbs/day	SOx lbs/day	CO2 lbs/day	CH4 lbs/day
Equipment Exhaust Emissions				Equipment #	Operating Hrs								
PM-10	Bulldozer	0.046	lbs/hr	1	9	0.41	0.38						
PM-2.5	Backhoes	0.007	lbs/hr	2	9	0.13	0.12						
	Water Truck	0.058	lbs/hr	1	2	0.12	0.11						
	Grader	0.036	lbs/hr	1	4	0.14	0.13						
	Trucks	0.058	lbs/hr	5	4	1.16	1.07						
	Excavator/trencher	0.025	lbs/hr	1	9	0.22	0.21						
			lbs/hr			0.00	0.00						
			lbs/hr			0.00	0.00						
			lbs/mi			0.00	0.00						
ROG	Bulldozer	0.119	lbs/hr	1	9			1.07					
	Backhoes	0.025	lbs/hr	2	9			0.46					
	Water Truck	0.163	lbs/hr	2	4			1.30					
	Grader	0.105	lbs/hr	1	4			0.42					
	Trucks	0.016	lbs/hr	5	4			0.33					
	Excavator/trencher	0.085	lbs/hr	1	9			0.76					
			lbs/hr					0.00					
			lbs/hr					0.00					
			lbs/mi					0.00					
CO	Bulldozer	0.539	lbs/hr	1	9				4.85				
	Backhoes	0.215	lbs/hr	2	9				3.86				
	Water Truck	0.676	lbs/hr	2	4				5.41				
	Grader	0.581	lbs/hr	1	4				2.32				
	Trucks	0.676	lbs/hr	5	4				13.52				
	Excavator/trencher	0.516	lbs/hr	1	9				4.64				
			lbs/hr						0.00				
			lbs/hr						0.00				
			lbs/mi						0.00				
NOX	Bulldozer	0.796	lbs/hr	1	9					7.16			
	Backhoes	0.180	lbs/hr	2	9					3.24			
	Water Truck	1.229	lbs/hr	2	4					9.83			
	Grader	0.722	lbs/hr	1	4					2.89			
	Trucks	1.229	lbs/hr	5	4					24.59			
	Excavator/trencher	0.518	lbs/hr	1	9					4.66			
			lbs/hr							0.00			
			lbs/hr							0.00			
			lbs/mi							0.00			
SOX	Bulldozer	0.001	lbs/hr	1	9						0.01		
	Backhoes	0.000	lbs/hr	2	8						0.01		
	Water Truck		lbs/hr	2	4						0.00		
	Grader	0.002	lbs/hr	1	4						0.01		
	Trucks		lbs/hr	5	4						0.00		
	Excavator/trencher	0.001	lbs/hr	1	9						0.01		
			lbs/hr								0.00		
			lbs/hr								0.00		
			lbs/mi								0.00		
CO2	Bulldozer	114.0	lbs/hr	1	9							1,026.0	
	Backhoes	30.0	lbs/hr	2	9							540.0	
	Water Truck	151.0	lbs/hr	2	4							1,208.0	
	Grader	133.0	lbs/hr	1	4							532.0	
	Trucks	151.0	lbs/hr	2	4							1,208.0	
	Excavator/trencher	120.0	lbs/hr	1	9							1,080.0	
			lbs/hr									0.0	
			lbs/hr									0.0	
			lbs/mi									0.0	
CH4	Bulldozer	0.011	lbs/hr	1	9								0.096
	Backhoes	0.002	lbs/hr	2	9								0.041
	Water Truck	0.015	lbs/hr	1	2								0.029
	Grader	0.010	lbs/hr	1	4								0.038
	Trucks	0.015	lbs/hr	2	4								0.117
	Excavator/trencher	0.008	lbs/hr	1	9								0.069
			lbs/hr										0.000
			lbs/mi										0.000
					Total Daily lbs	2.18	2.01	4.34	34.62	52.37	0.04	5,594	0.39
	Annual Tons - 50 days of construction (Quarry Line- 3 miles)					0.05	0.05	0.11	0.87	1.31	0.00	127	0.19
	Annual Tons - 75 days of construction (IID water supply line-5.5 miles)					0.08	0.08	0.16	1.30	1.96	0.00	191	0.28
	Annual Tons - 200 days of construction (Ocotillo to Plant line - 8.5 mi; remove/replace)					0.22	0.20	0.43	3.46	5.24	0.00	509	0.75

Fugitive Dust (from Table 3.6-8 (2006 EIR/EIS)

PM10 (tons/year)	PM2.5 (tons/year)
1.64	0.34
2.46	0.51
6.56	0.68

Operations - Days vary per pipeline project alternatives.
50 days of construction (Quarry Line- 3 miles)
75 days of construction (IID water supply line-5.5 miles)
200 days of construction (Ocotillo to Plant line - 8.5 miles; remove and replace)
PM2.5 fraction of PM10 Exhaust is 0.92 (CEIDARS List)
Emission Sources: Off-Road Diesel Tier Emission Factors; SCAQMD Offroad Mobile Source Emissions' Factors.
MTCO2e = metric tons of CO2 equivalent

Sources: USG, 2003; SCAQMD 2018 Off-road Mobile Source Emission Factors; Composite emission rates for 2018
http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/off-road-mobile-source-emission-factors

APPENDIX C-3: ESTIMATED AIR QUALITY EMISSIONS—VIKING RANCH

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Viking Ranch Restoration Summary Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Viking Ranch Restoration
Lead Agency	Imperial County
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	3.00
Precipitation (days)	6.20
Location	33.32733291356948, -116.35758498754706
County	San Diego
City	Unincorporated
Air District	San Diego County APCD
Air Basin	San Diego
TAZ	6100
EDFZ	12
Electric Utility	San Diego Gas & Electric
Gas Utility	San Diego Gas & Electric

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Recreational	1.00	User Defined Unit	207	0.00	207	—	—	open space

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	NOx	CO	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—
Unmit.	4.49	36.0	35.4	9.41	5.45	7,781
Daily, Winter (Max)	—	—	—	—	—	—
Unmit.	4.49	36.0	35.3	9.41	5.45	7,767
Average Daily (Max)	—	—	—	—	—	—
Unmit.	3.15	24.1	24.7	5.25	3.03	5,318
Annual (Max)	—	—	—	—	—	—
Unmit.	0.57	4.39	4.50	0.96	0.55	880
Exceeds (Daily Max)	—	—	—	—	—	—
Threshold	—	—	—	—	—	—
Unmit.	Yes	Yes	Yes	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—
Threshold	—	—	—	—	—	—
Unmit.	Yes	Yes	Yes	—	—	—
Exceeds (Annual)	—	—	—	—	—	—
Threshold	25.0	25.0	100	27.0	100	—
Unmit.	No	No	No	No	No	—

6. Climate Risk Detailed Report

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	2	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	0	0	0	N/A
Drought	0	0	0	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	2	1	1	3
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	1	1	1	2
Drought	1	1	1	2
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

7. Health and Equity Details

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	33.0
Healthy Places Index Score for Project Location (b)	33.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

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