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March 29, 2018

VIA EMAIL AND U.S. MAIL

Ashley Smith
Planning and Development Services
County of San Diego
5510 Overland Avenue, Suite 310
San Diego, CA 92123

Re: Newland Sierra (Log No. PDS2015-ER-15-08-001; SCH No. 2015021036, Project Numbers: PDS2015-GPA-15-001, PDS2015-SP-15-001, PDS2015-REZ-15-001, PDS2015-TM-5597, PDSXXXX-HLP-XXX) – Transmittal of Report by Camille Sears Discussing Flaws in the Air Quality Analysis for the Newland Sierra Project

Dear Ms. Smith:

As you know, we represent Golden Door Properties, LLC ("Golden Door"), a world-class resort and agricultural operation in rural Twin Oaks Valley. The Golden Door has restored farming and beekeeping on its property, including the replanting of many new trees on the property—sharing its bounty at a community Farm Stand and through retail operations. The Golden Door has raised many concerns with the County about the proposed Newland Sierra Project and the impacts of adding urban density the size of the City of Del Mar in our rural community.

We write today with particular respect to the Project's air quality and health impacts. Newland proposes ten years of construction that would involve at least 10,700,000 cubic yards of cut and fill. Air emissions are a significant concern for nearby residents and businesses. Attached is a report from Camille Sears—an expert air quality consultant and modeler with over 35 years of experience—which describes significant flaws in the air quality analysis and health risk assessment for the Newland Sierra Project's Draft Environmental Impact Report ("DEIR").

Ms. Sears' report concludes that the Newland Sierra DEIR improperly omits modeling analysis of significant construction emissions, underestimates constructions emissions, fails to include wind erosion in its analysis, fails to disclose the crystalline silica content of on-site soil, and incorrectly models construction and operational emissions of diesel particulate matter. Her report describes flaws in methodology and significant impacts that were not previously

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identified. Ms. Sears' modeling runs show significant impacts to several residences and businesses in the area, including the Golden Door and the Deer Springs Oaks Mobile Home Park. The report demonstrates substantially worse impacts than what were identified in the DEIR.

These omissions and flawed analyses are significant legal errors that must be fixed. The County must provide adequate analysis of air emissions before the public and decisionmakers can understand the project's impacts. In this case, the DEIR must be recirculated for an additional comment period before publication of the final EIR so that the public has a chance to propose potential mitigation or alternatives for these impacts. (See *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 95 [recirculation required when important information omitted]; see also *Laurel Heights Improvement Assn. v. Regents of University of California* (1993) 6 Cal.4th 1112, 1120; *Save Our Peninsula Committee v. Monterey Cty. Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 130.)

Ms. Sears report is based on her review of the DEIR, including technical documents that were just recently provided to the Golden Door for review and analysis. In July 2017, during the public comment period for the Newland Sierra DEIR, Golden Door requested technical reports on air quality and greenhouse gas emissions under the Public Records Act. These technical reports provided the basis for the County's consultants' analysis in the DEIR; however, the files were not provided to the public as part of the DEIR. The County refused to provide the requested files. After several rounds of communications, the Golden Door was forced to file a lawsuit under the Public Records Act to obtain the documents, which the County eventually provided as part of a settlement agreement. Because the County did not provide these technical files as part of the DEIR, Ms. Sears' report is provided now at the earliest time possible and should be made part of the record in this matter and considered as part of the County's responses on the DEIR.

Thank you for your time and attention to our comments. Please do not hesitate to contact us should you have any questions or comments.

Best regards,

Andrew D. Yancey

Andrew D. Yancey
of LATHAM & WATKINS LLP

cc: Kathy Van Ness, Golden Door
County Board of Supervisors
County Planning Commission
Darin Neufeld, County Planning and Development Services
Mark Slovick, County Planning and Development Services
William W. Witt, Office of County Counsel
Claudia Silva, Office of County Counsel

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Dan Silver, Endangered Habitats League
George Courser, Sierra Club
Duncan McFetridge, Cleveland National Forest Foundation
Stephanie Saathoff, Clay Co.
Denise Price, Clay Co.
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Attachment

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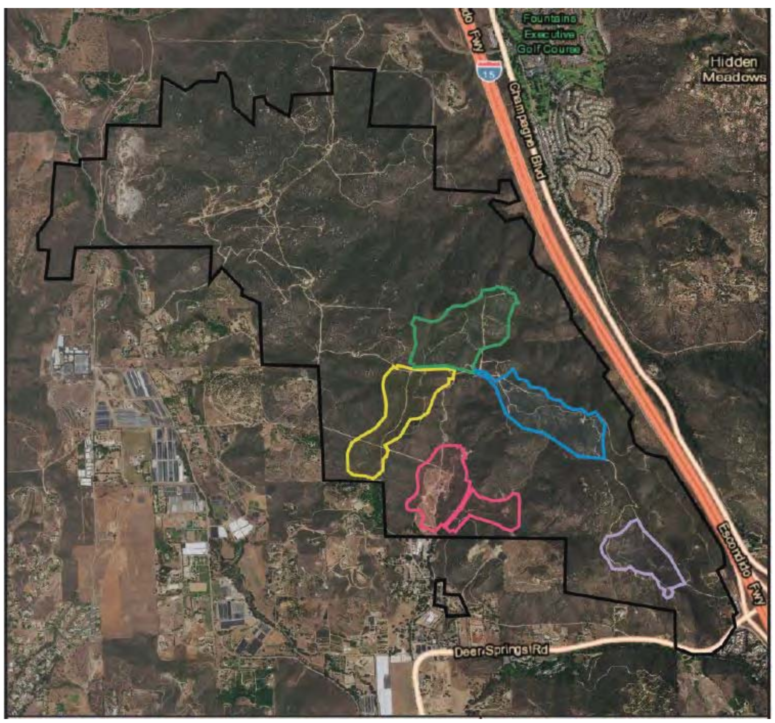
Air Quality Comments
on the
Draft Environmental Impact Report
for the
Newland Sierra Project



Prepared by:

Camille Sears

February 28, 2018

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1. Introduction

I reviewed the air quality and health risk assessment sections of the June 2017 Draft Environmental Impact Report (DEIR) for the proposed Newland Sierra Project (NSP), near Escondido, California. NSP is a planned community of residential, commercial, educational, and other uses on 1,985 acres (DEIR, p. S.0-1). In conjunction with the DEIR, I reviewed electronic CALEEMOD and Excel emission calculation files prepared by the DEIR-preparer, Dudek. I also reviewed AERMOD and HARP2 risk assessment input and output files prepared by Dudek.

The NSP DEIR addresses two general air quality aspects of the proposed project: construction activities and vehicle traffic occurring adjacent to the project site. The DEIR refers to the offsite vehicular traffic component as "operational emissions."

The DEIR is tasked with determining whether NSP will cause significant environmental impacts, including effects on ambient air quality and health risks due to exposure of toxic air contaminants. The DEIR concludes that mitigated PM10 and PM2.5 emissions during construction activities will greatly exceed the significance thresholds established by the San Diego County Air Pollution Control District (SDAPCD) for these pollutants (DEIR, Air Quality Technical Appendix, p. 80). The DEIR also acknowledges that these significant PM10 and PM2.5 emissions will require air dispersion modeling to determine the magnitude and extent of air concentrations caused by these emissions:

> In the event that emissions exceed these thresholds, modeling would be required to demonstrate that the project's total air quality impacts result in ground-level concentrations that are below the CAAQS and NAAQS, including appropriate background levels (DEIR, Air Quality Technical Appendix, p. 56).

The DEIR, however, fails to include any modeling analysis of these significant emissions. As such, the DEIR failed to prepare any ambient air quality modeling to determine whether NSP's construction emissions would violate National Ambient Air Quality Standard (NAAQS) or California Air Quality Standard (CAAQS). Moreover, the DEIR incorrectly calculates construction fugitive PM10 and PM2.5 emissions, under-estimating the likely daily quantities of these pollutants.

The NSP DEIR is extremely limited in its scope of air quality impact and health risk assessment. The DEIR includes only two air dispersion modeling analyses and subsequent health risk assessment: an assessment of health risks from construction diesel particulate matter (DPM) emissions, and an analysis of vehicle traffic DPM exposures to future residents of the NSP.

The construction DPM health risk assessment is limited to a small portion of the proposed project site, and includes only a fraction of the total construction DPM emissions. Furthermore, the health risk analysis is limited to assessing exposures in a relatively small area near the intersection of I-15 and Deer Springs Road.

The operational DPM health risk assessment focuses on future vehicle traffic emissions and the health risks to NSP residents. From the DEIR:

> The purpose of this health risk assessment (HRA) is to determine the impact to the future residents and the school site of the proposed project due to toxic air contaminant (TAC) emissions resulting from diesel and gasoline vehicle traffic along I-15 and Deer Springs Road as well as from a nearby gas station (DEIR, Air Quality Technical Appendix, Appendix C, p. iii).

The DEIR does not assess operational excess cancer risks to areas outside the NSP site.

My analyses and comments address a number of shortcomings and omissions in the NSP DEIR. In summary, my comments address the following DEIR deficiencies:

- The DEIR incorrectly calculates fugitive dust PM10 and PM2.5 emissions from construction activities. I corrected these emissions using USEPA's AP-42 emission factors with appropriate inputs.
- The DEIR fails to assess fugitive dust PM10 and PM2.5 emissions from wind erosion. I calculated wind erosion emissions for the NSP site.
- The DEIR fails to include any air dispersion modeling of construction emissions for verifying compliance with the PM10 CAAQS and the PM2.5 NAAQS. I prepared air dispersion modeling of construction PM10 and PM2.5 emissions, including a modeling analysis of wind erosion emissions.
- The DEIR incorrectly models construction DPM emissions, which only covers a small portion of the project site. I prepared an air dispersion modeling analysis of construction DPM emissions for the entire project site, including a 9-year exposure DPM health risk assessment.
- The DEIR incorrectly models operational DPM emissions, which only assesses future exposures to areas within the project site. I prepared an air dispersion modeling analysis of operational DPM emissions for a grid of receptors covering areas within the project site, extending to adjacent offsite residential areas. I prepared a DPM health risk assessment for 9-year exposures at these receptors.

When construction fugitive dust emissions are corrected, NSP is projected to cause or contribute to exceedances of the 24-hour PM2.5 NAAQS and the 24-hour PM10 CAAQS. In addition, a proper assessment of construction and operational DPM emissions from NSP reveals significant excess cancer risks to areas not identified in the DEIR. Many of my assumptions took a non-conservative approach, resulting in likely under-reporting of emissions. Impacts are likely even more significant than shown in my analysis. The DEIR is clearly deficient and inadequate, and should be revised to address emission rate, air dispersion modeling, and health risk assessment shortcomings.

2. Corrected NSP Construction Fugitive Dust Emissions

As discussed above, the NSP DEIR includes PM10 and PM2.5 emission calculations from construction activities, but neglects to prepare any air dispersion modeling analyses of these emissions. My analyses address two deficiencies in the NSP DEIR: correcting the inappropriately-low PM10 and PM2.5 construction emissions presented in the DEIR and the complete lack of any air quality impact analyses of these emissions.

This section focuses on Phase 1 construction emissions for year 2018, which includes two broad categories, termed in the DEIR as site preparation and grading activities. The DEIR and appendices are silent on the detailed construction schedule by location within the NSP. For example, the DEIR includes construction scheduling for Phase 1 and Phase 2 activities, but provides no information on whether construction for all residential areas will occur at the same time (in parallel), or whether the construction of residential areas will occur sequentially.

Since the DEIR lacks any detailed information on the sequence of residential area construction, I had little choice but to distribute the daily construction emissions evenly over the entire Phase 1 construction area (See DEIR, Figure 1-32, Phasing Plan). This is a non-conservative approach (likely to under-predict air quality impacts), since the daily emissions are diluted over the maximum possible area of Phase 1 construction activities. The area of Phase 1 construction activities used in my air dispersion modeling analysis is shown in Exhibit A.

2.1 CalEEMod is Inappropriate for Calculating NSP's Construction Emissions

The DEIR relies on the CalEEMod program to calculate the majority of NSP's construction and operational emission rates. CalEEMod is a database program distributed by the California Air Pollution Control Officer's Association (CAPCOA) for use in preparing many emission inventory types. CalEEMod, however, is not reliable for calculating fugitive dust emissions from NSP's construction activities.

First, CalEEMod is in many ways a "black box," where the actual emission calculations and coding are not available to the user or reviewer. As used in the NSP DEIR, CalEEMod does not display individual calculations from construction fugitive dust activities, but rather groups the output by site location, activity, and year.

Second, CalEEMod does not include the correct emission calculation methodologies for many of the most significant construction activities. This is evidenced in the DEIR, where the DEIR-preparer relied on AP-42 emission factors to calculate rock crushing and blasting emissions (DEIR, Air Quality Technical Appendix, Appendix D). CalEEMod also lacks the ability to calculate fugitive dust emissions from wind erosion.

Furthermore, and more importantly, CalEEMod uses an inappropriate unpaved road emission factor in calculating fugitive dust emissions from onsite hauling activities, which are the most significant source of PM10 and PM2.5 emissions during NSP's construction activities. CalEEMod uses the AP-

42 emission factor for unpaved public roads when calculating construction fugitive dust emissions.[1] As specified in the AP-42 emission factor for unpaved roads, there are two emission calculation equations: one for industrial roads, and another for public roads. The unpaved public road emission factor is limited to vehicles weighing between 1.5 and 3.0 tons.[2] NSPs' haul truck weigh approximately 35 tons, on average, as detailed below. The industrial unpaved emission factor in AP-42, which is designed for vehicles weighing from 2 to 290 tons, is the appropriate equation to use in calculating NSP's haul truck trips on unpaved roads. Using the inappropriate unpaved road emission factor in the NSP DEIR results in substantial under-predictions of fugitive PM10 and PM2.5 emissions from NSP's haul trucks.

2.2 Summary of Corrected Emissions

Table 1 shows the DEIR-calculated peak daily mitigated construction fugitive dust emissions. The DEIR uses CalEEMod for calculating construction activity emissions, and USEPA AP-42 factors for calculating emissions from blasting and rock crushing.

Table 1: DEIR-calculated construction fugitive PM emissions

Activity	PM10 (lb/day)	PM2.5 (lb/day)
Construction Activities (Phase 1)	385.31	43.03
Blasting (Phase 1)	55.89	3.22
Rock Crushing (Phase 1)	71.03	12.70
Total maximum daily emissions:	512.23	58.95

Table 2 shows corrected mitigated construction fugitive dust emissions, using USEPA AP-42 factors for calculating emissions haul trucks on unpaved roads, grading, and rock crushing. I did not revise the DEIR's blasting emission rate calculations, because the DEIR did not provide sufficient information for me to verify the blasting schedule.

Table 2: Corrected AP-42 construction fugitive PM emissions

Activity	PM10 (lb/day)	PM2.5 (lb/day)
Construction Activities (Phase 1)	786.53	95.89
Blasting (Phase 1)	55.89	3.22
Rock Crushing (Phase 1)	138.41	19.74
Maximum daily emissions:	980.84	118.85

The corrected emission rates shown in Table 2 do not include combustion DPM sources, or fugitive dust from wind erosion. A complete listing of PM10 and PM2.5 emissions I included in air

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[1] CAPCOA, CalEEMod User's Guide, Appendix A: Calculation Details for CalEEMod, October 2017, p. 30). Available at: http://www.aqmd.gov/docs/default-source/caleemod/02_appendix-a2016-3-2.pdf

[2] EPA, AP-42, Section 13.2.2 – Unpaved Roads, November 2006, Table 13.2.2-3. Available at: http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf

dispersion modeling analyses are shown in Exhibit B, and it should be noted that I did not amend the DEIR's DPM emission rate calculations. The following sections discuss the corrected fugitive dust emission rate calculations I performed for unpaved haul roads, dozing, grading, rock crushing, and wind erosion.

2.3 Unpaved Road Fugitive Dust Emissions

NSP's haul truck activities will generate fugitive PM2.5 and PM10 emissions when traveling on unpaved roads within the project site. As discussed above, the industrial unpaved road emission factor is the most appropriate equation for the weight and use of NSP's haul trucks. The emissions generated from this activity are mitigated by limiting the truck travel speed to 15 miles per hour (DEIR CalEEMod input and output files).

The equation used to calculate particulate matter (PM, or fugitive dust) emissions from NSP's haul truck traffic is obtained from EPA's air pollution emission factor equation for industrial unpaved roads.[3] This equation is as follows:

$$E = [k(s/12)^a * (W/3)^b] * [(365-P)/365]$$

Where: E = emission factor in the same units as k

k = particle size multiplier:
0.15 lb/vehicle mile traveled (VMT) for PM2.5
1.50 lb/VMT for PM10 [4]

s = road surface silt percentage (%)
W = average weight of vehicles (tons)
a = constant (0.9 for both PM2.5 and PM10)
b = constant (0.45 for both PM2.5 and PM10)
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period

The values used for any of the variables in the above equation, s, W, and P, will have an impact on the final result, *i.e.*, the calculated particulate matter emission rates. Each of these inputs are discussed below.

Silt content (s)
Silt content is the fraction of silt in the unpaved road surface materials, with silt being defined as particles smaller than 75 micrometers in diameter.[5] USEPA provides typical silt percentage values for unpaved roads at industrial facilities. My analysis uses an unpaved road silt fraction of 8.5%, which is the average silt fraction for construction sites listed by the USEPA.[6] The DEIR also uses

[3] *Id.*, p. 13.2.2-4.
[4] *Id.*, Table 13.2.2-2.
[5] *Id.*, p.13.2.2-1
[6] *Id.*, Table 13.2.2-1.

8.5% silt for its calculations of unpaved road fugitive dust, but again, the DEIR uses the inappropriate public road unpaved road emission factor.

Truck weight (W)
Vehicle weights are the other main component of the AP-42 emission factor for calculating PM2.5 and PM10 emission rates from unpaved roads. It is the average vehicle weight that is used for the emission calculation (usually the average of loaded and unloaded truck weights).[7]

The DEIR does not provide information on truck weights, with the CalEEMod emission calculation output files provided for my review list the Phase 1 construction haul trucks as being HHDT class.[8] For my emission rate analysis, I calculated a mean truck weight of 34.6 tons, as follows:

- Unloaded truck weight: 16.5 tons (33,000 lbs)[9]
- Haul truck load: 16 cubic yards (DEIR, Air Quality Technical Report, Appendix A)
- Material density: 2.26 tons/cubic yard (Rock Crushing Emissions spreadsheet used in DEIR emissions calculations)
- Haul truck material weight: 16 yd^3 * 2.26 tons/yd^3 = 36.16 tons
- Loaded truck weight: = 16.5 tons + 36.16 tons = 52.66 tons
- Average unloaded/loaded haul truck weight: (16.5 tons + 52.66 tons)/2 = 34.6 tons.

For comparison, the USEPA, in developing AP-42 Section 13.2.1, identifies an average vehicle weight of 35 tons for heavy duty diesel trucks.[10] Heavier trucks result in higher fugitive dust emissions; as the weight of the trucks increase, so do the emissions.

Rainfall correction (P)
Short-term PM2.5 and PM10 emission rates should not be calculated using a rainfall correction, as there are many consecutive days in San Diego County when there is no rainfall. Accordingly, my unpaved road fugitive dust emission rate calculations did not apply a rainfall correction to 24-hour PM2.5 and PM10 emission rates.

Unpaved haul road PM2.5 and PM10 emission rates, using the above-described methods, are calculated and presented in Exhibit B. Table 3 lists a summary of these daily emission rates.

Table 3: AP-42 Unpaved Road Fugitive PM Emissions

AP-42 Unpaved Road Emissions	PM10 (lb/day)	PM2.5 (lb/day)
Phase 1 Site Preparation	15.35	1.53
Phase 1 Grading Activities	430.77	43.08
Total:	446.12	44.61

[7] *Id.*, p.13.2.2-6.
[8] See CalEEMod Excel spreadsheet: Construction_Winter_OUTPUT.xls
[9] https://www.afdc.energy.gov/data/10380
[10] USEPA, Emission Factor Documentation for AP-42, Section 13.2.1, January 2011, p. 4-37; http://www.epa.gov/ttn/chief/ap42/ch13/bgdocs/b13s0201.pdf.

2.4 Fugitive Dust Emissions from Bulldozer/ Crawler Tractors

Equations used to calculate particulate matter (fugitive dust) emissions from the NSP's bulldozing and crawler tractors are obtained from EPA's air pollution emission factor equations for Western Surface Coal Mining, overburden material.[11] The bulldozing of overburden equations are as follows:

$$PM10\ E = k * [(1.0) * (s)^{1.5}] / (M)^{1.4} * (1\text{-}CE)$$

$$PM2.5\ E = k * [(5.7) * (s)^{1.2}] / (M)^{1.3} * (1\text{-}CE)$$

Where: E = emission factor in lb/hr

k = scaling factor:
0.75 scaling factor for PM10
0.022 scaling factor for PM2.5 [12]

s = material silt percentage (%)
Increasing silt content will increase fugitive dust emissions
M = material moisture content (%)
Increasing moisture content will decrease fugitive dust emissions
CE = wet suppression control efficiency
Increasing control efficiency will decrease fugitive dust emissions

It should be noted that the DEIR and the CalEEMod inputs often contain discrepancies. For example, for Phase 1 site preparation, the DEIR lists four crawler tractors (DEIR, p.2.3-69), while the CalEEMod input and output files assume three wheeled dozers. For my calculations, I applied the CalEEMod input values, since these are the basis for Dudek's technical analysis.

I used the same material silt and moisture percentages as the DEIR, but I included both bulldozers and crawler/tractors in these bulldozing emission calculations. A crawler tractor is essentially a bulldozer propelled on tracks (like a military tank), while the DEIR specifies bulldozers as being wheeled.

The DEIR assumes a 61% fugitive dust control efficiency by applying water at specific intervals. The 61% control efficiency apparently comes from the South Coast Air Quality Management District (SCAQMD) CEQA Handbook Fugitive Dust Mitigation Tables, but the DEIR does not provide an actual reference.[13]

Bulldozing and crawler tractor PM2.5 and PM10 emission rates, using the above-described methods, are calculated and presented in Exhibit B. Table 4 lists a summary of these daily emission rates.

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[11] EPA, AP-42, Section 11.9 – Western Surface Coal Mining, October 1998, Table 11.9-1. Available at: https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
[12] *Id.*
[13] http://www.aqmd.gov/ceqa/handbook/mitigation/fugitive/MM_fugitive.html

Table 4: AP-42 Bulldozing and Crawler Tractor Fugitive PM Emissions

AP-42 Bulldozing/ Crawler Tractor Emissions	PM10 (lb/day)	PM2.5 (lb/day)
Phase 1 Site Preparation	7.05	3.87
Phase 1 Grading Activities	25.83	14.20
Total:	32.88	18.07

2.5 Fugitive Dust Emissions from Grading Equipment

Equations used to calculate particulate matter (fugitive dust) emissions from the NSP's graders and scrapers are obtained from EPA's air pollution emission factor equations for Western Surface Coal Mining, overburden material.[14] The grading of overburden equations are as follows:

$$PM10\ E = k * [(0.051) * (s)^{2.0}] * (1-CE)$$

$$PM2.5\ E = k * [(0.040) * (s)^{2.5}] * (1-CE)$$

Where: E = emission factor in lb/VMT

k = scaling factor:
0.60 scaling factor for PM10
0.031 scaling factor for PM2.5 [15]

s = material silt percentage (%)
Increasing silt content will increase fugitive dust emissions

CE = wet suppression control efficiency
Increasing control efficiency will decrease fugitive dust emissions
The DEIR assumes a 61% fugitive dust control efficiency by applying water at specific intervals

CalEEMod does not include emission calculations for scrapers, thus the DEIR substantially under-estimates this fugitive dust emission component. I used the same material silt percentage as the DEIR, but I included both graders and scrapers in these grading emission calculations as both types of equipment generate fugitive dust emissions. A scraper is a large mechanical device that excavates and then stores the material it excavates, while a grader consists of only a blade to move and shape material.[16] In terms of fugitive dust potential, a scraper can cause much more emissions than a grader, due to the mechanical rasping and excavation activities of the scraper.

I applied the same USEPA AP-42 emission factors for both scrapers and graders, which will almost certainly under-estimate emissions from scrapers. USEPA AP-42 Section 13.2.3 (Heavy Construction Operations) indicates fugitive emissions from scrapers are much greater than from

[14] EPA, AP-42, Section 11.9 – Western Surface Coal Mining, October 1998, Table 11.9-1. Available at: https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf
[15] *Id.*
[16] Images of construction equipment can be found at: https://www.slideshare.net/isnindian/scraper-rippergraderdozer

graders. USEPA's scraper particulate matter emission factor is approximately 20 lb/VMT PM, which is roughly four time greater than the emission factor for scrapers. I chose to use USEPA's scraper emission factor for graders due to the lower emission factor rating for scrapers.[17] This is a non-conservative approach that likely result in under-reporting emissions.

Grader and Scraper PM2.5 and PM10 emission rates, using the above-described methods, are calculated and presented in Exhibit B. Table 5 lists a summary of these daily emission rates. The DEIR did not assume any graders or scrapers for Phase 1 site preparation.

Table 5: AP-42 Grader and Scraper Tractor Fugitive PM Emissions

AP-42 Grader/ Scraper Emissions	PM10 (lb/day)	PM2.5 (lb/day)
Phase 1 Site Preparation		
Phase 1 Grading Activities	307.53	33.21
Total:	307.53	33.21

2.6 Fugitive Dust Emissions from Rock Crushing

Equations used to calculate particulate matter (fugitive dust) emissions from the rock crushing emissions are obtained from USEPA's air pollution emission factor equations for Crushed Stone Processing (AP-42 Section 11.9.2) and Aggregate Handling and Storage Piles (AP-42 Section 13.2.4). I did not revise the DEIR stone crushing emissions, but the DEIR used an anomalously low wind speed for calculating fugitive dust emissions during crushed stone drops and transfers.

The material handling equation is as follows:

$$E = k * [(0.0032) * (U/5)^{1.3}] / (M/2)^{1.4} * (1-CE)$$

Where: E = emission factor in lb/hr

k = scaling factor:
0.35 scaling factor for PM10
0.053 scaling factor for PM2.5 [18]

U = mean wind speed during emission period (mph)
Increasing wind speed will increase fugitive dust emissions

M = material moisture content (%)
Increasing moisture content will decrease fugitive dust emissions

CE = wet suppression control efficiency
Increasing control efficiency will decrease fugitive dust emissions

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[17] EPA, AP-42, Section 13.2.3 – Heavy Construction Operations, January 1995, Table 13.2.3-1. Available at: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s02-3.pdf

[18] EPA, AP-42, Section 13.2.4 – Aggregate Handling and Storage Piles, November 2006, p. 13.2.2-4. Available at: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.pdf

The DEIR analysis assumed a mean wind speed of 2.98 mph, obtained as the average of all wind speeds included in the 2010-2012 Escondido meteorological data used in the DEIR DPM health risk assessment. Because the appropriate analysis for an EIR relies on peak daily emissions, the DEIR's approach will under-estimate fugitive dust from rock crushing material handling. Construction emissions are limited to hours 0700 through 1600 (DEIR DPM Health Risk Assessment Modeling Inputs), so peak wind speeds during this period should be used in the material handling fugitive dust emission rate calculations. I calculated the peak average wind speed during hours 0700 – 1600 to be 11.6 mph, again using the 2010-2012 Escondido meteorological data.

The DEIR assumes a 3% moisture content for material handling and did not apply any control (mitigation) measures to this activity. As these values seem reasonable given the project material and activities, I did not revise these DEIR assumptions.

Rock crushing and subsequent material handling PM2.5 and PM10 emission rates, using the above-described methods, are calculated and presented in Exhibit B. Table 6 lists a summary of these daily emission rates.

Table 6: AP-42 Rock Crushing and Handling Fugitive PM Emissions

AP-42 Rock Crushing and Material Handling Emissions	PM10 (lb/day)	PM2.5 (lb/day)
Phase 1 Site Preparation		
Phase 1 Grading Activities	138.41	19.74
Total:	138.41	19.74

2.7 Fugitive Dust Emissions from Wind Erosion

As discussed above, the DEIR failed to consider wind erosion emissions in verifying compliance with emissions significance criteria or ambient air quality standards. Furthermore, CalEEMod does not have the ability to address wind erosion emissions. From the CalEEMod User's Guide:

> Wind-blown fugitive dust is not calculated in CalEEMod because of the number of input parameters required such as soil type, moisture content, wind speed, etc. This limitation could result in underestimated fugitive dust emissions if high wind and loose soil are substantial characteristics for a given land use/construction scenario. [19]

Fugitive dust emissions from wind erosion activities are typically calculated using USEPA's emission factors for industrial wind erosion.[20] USEPA's industrial wind erosion equation is as follows:

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[19] CAPCOA, CalEEMod User's Guide, Technical Paper, July 2011, p. 4). Available at: http://www.aqmd.gov/docs/default-source/caleemod/techpaper.pdf

[20] EPA, AP-42, Section 13.2.5 – Industrial Wind Erosion, November 2006. Available at: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0205.pdf

$$P = 58*(u^* - u_t^*)^2 + 25*(u^* - u_t^*)$$
$$P = 0 \text{ for } u^* \leq u_t^*$$

Where:
u^* = friction velocity (m/s)
u_t^* = threshold friction velocity (m/s)
$u^* = 0.053 * u_{10}^+$
u_{10}^+ = fastest mile of reference anemometer for period between disturbances (m/s)
The fastest two-minute wind speed of 30 mph or greater equals a fastest mile

The 2010 – 2012 Escondido meteorological data do not include the fastest two-minute wind speed information necessary for calculating wind erosion emissions. To overcome this deficiency, I processed five years of meteorological data (2013 – 2017) from the McClellan – Palomar Airport (KCRQ), which is a National Weather Service ASOS site that measures two-minute wind speed data.[21] KCRQ is roughly 15 kilometers west of the NSP site, while the Escondido data were measured about 11 kilometers south of the NSP site.

To illustrate the potential for wind erosion fugitive dust emissions (as PM10) in the NSP area, I assessed one wind event comprising peak easterly Santa Ana winds exceeding two-minute wind speeds of approximately 30 mph. This event occurred on May 13, 2014, and was a dry easterly wind event (wind blowing from the east towards the coast). I also assessed potential wind erosion emissions from this event using the Pacific Northwest National Laboratory (PNNL) DUSTRAN model, which was validated by comparing DUSTRAN-calculated dust concentrations with observations of wind erosion on the US Department of Energy's Hanford Site in southeastern Washington.[22] A summary of the fugitive dust emissions (as PM10) calculated by USEPA AP-42 Section 13.2.5 and DUSTRAN are shown in Table 7.

Table 7: Wind Erosion Fugitive PM10 Emission Rate Calculations

Wind Erosion PM 10 Emission Calculations for May 13, 2014	AP42, 13.2.5	DUSTRAN
Threshold friction velocity (m/s):	0.62	0.42
Total particulate emissions (g/m^2):	1.98	11.05
Maximum particulate emissions (g/m^2):	1.69	4.36
Area or subarea (m^2):	1,109,040	1,109,040
Total particulate emissions (tons/day):	2.43	13.50
Total particulate emissions (pounds/day):	4,851	27,006

As can be seen from Table 7, extremely large quantities of fugitive PM10 emissions are possible during wind erosion events at the NSP site, greatly exceeding the quantities identified in the DEIR from mechanically-induced fugitive dust sources. This is particularly true for the DUSTRAN

[21] ASOS is an acronym for Automated Surface Observing Systems; see: http://www.nws.noaa.gov/ost/asostech.html
[22] Shaw, William J., et al. at PNNL, An evaluation of the wind erosion module in DUSTRAN, Atmospheric Environment, 42 (2008), pp. 1907–1921.

emission rate calculations. The area of wind erosion emissions (1,109,040 square-meters), is the Phase 1 construction area of the Hillside, Knoll, Mesa, Terraces, and Valley residential area developments.

Wind erosion PM10 emission rates, using the above-described methods, are calculated and presented in Exhibit B. For purposes of air dispersion modeling described below, I limited my analysis to the USEPA industrial wind erosion (AP-42 Section 13.2.5) calculations, which are significantly lower than those calculated by DUSTRAN.

3. Air Dispersion Modeling Analysis of Corrected NSP Construction Fugitive Dust Emissions

I prepared air dispersion modeling of 24-hour PM10 and PM2.5 impacts from NSP's construction emissions, using USEPA's AERMOD model, version 16216r. This is the latest version of the model. For this analysis, the pollutants of concern are the 24-hour PM2.5 NAAQS and the 24-hour PM10 CAAQS. The 24-hour PM10 CAAQS is 50 $\mu g/m^3$, represented as the absolute highest 24-hour value. The 24-hour PM2.5 NAAQS is 35 $\mu g/m^3$, represented as the 8^{th}-highest 24-hour value averaged over three years.

I modeled the construction fugitive dust emissions using AREAPOLY sources covering the areas of Phase 1 construction activities. These areas are shown in Exhibit A, and total 1,109,040 square-meters. As described earlier, I evenly-distributed the calculated emissions throughout these areas, which is likely to under-estimate modeled impacts.

AREAPOLY sources require the following AERMOD inputs:

- A source identifier number or name;
- Source Location X (Easting) coordinate (UTM Zone 11, NAD83);
- Source Location Y (Northing) coordinate (UTM Zone 11, NAD83);
- Source base elevation (meters above sea level);
- Emission flux of PM10 and PM2.5 ($g/(s\text{-}m^2)$);
- Release height of the area source (meters);
- Number of polygon vertices;
- X and Y coordinates for each polygon vertex (UTM Zone 11, NAD83);
- Initial vertical dispersion of the area source plume (SZ_0, in meters).

I assessed release heights equal to 5.0 meters and initial vertical dispersion (SZ_0) of 2.33 meters (5 meters/ 2.15) for each AREAPOLY source modeled. With the exception of wind erosion emissions, I modeled all emission sources using a unit emission rate (since each source is modeled separately). For AREAPOLY PM10 sources (other than wind erosion), I used a unit emission rate of 1.00E-05 $g/(s\text{-}m^2)$. For AREAPOLY PM2.5 sources (other than wind erosion), I used a unit emission rate of 1.00E-06 $g/(s\text{-}m^2)$. This is a standard air quality modeling practice known as "chi-over-Q," which allows efficient post-processing of modeled results using the actual emission rate of each pollutant for each source. This method is particularly useful for modeling sources with many pollutants, or scenarios with multiple or changing emission rates, since the source only needs to be modeled once.

The unit emission rate output can be post-processed with the actual emission rate of each pollutant without having to re-run the model each time. I used the actual calculated hourly PM10 emission rates when modeling wind erosion impacts.

Modeled source and receptor locations also require terrain elevation data, in meters above sea level. I obtained the terrain elevation data for these locations using the National Elevation Dataset (NED) GeoTiff file for the area, which includes the NSP site and the surrounding locations. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. I extracted terrain elevations from 1/3rd arc-second (10-meter resolution) NED files using USEPA's AERMAP program, v. 11103. AERMAP is included in the regulatory-approved AERMOD modeling system.

3.1 Meteorological Data and Background Air Quality

I used 2010 – 2012 Escondido meteorological data for modeling fugitive dust emissions and assessing compliance with the 24-hour PM10 CAAQS and 24-hour PM2.5 NAAQS. This is the same meteorological data set used in DEIR for preparing their DPM health risk assessment. For wind erosion emissions, I used KCRQ 2013 – 2017 meteorological data, as this data set has wind measurements necessary for calculating wind erosion emissions. Wind roses of the 2010-2012 Escondido meteorological data and the 2013 – 2017 KCRQ data are shown in Exhibit C.

Air quality data are used to determine whether an area is attaining state and national ambient air quality standards. These data are also used to develop background air quality levels, which are then added to project-incremental impacts to determine compliance with the applicable CAAQS and NAAQS.

Background PM2.5 and PM10 air quality data are available from the SDAPCD site in Escondido, which was closed in 2015. Although the site is no longer operating, it is applicable for background particulate matter levels as it is in relatively close-proximity to NSP. For 2015, PM10 was not measured for a complete year at Escondido. The maximum 24-hour PM10 concentration measured at Escondido in 2015 was 30 $\mu g/m^3$. For years 2013 – 2015, the 24-hour PM2.5 design concentration (in the form of the PM2.5 NAAQS) was 26.8 $\mu g/m^3$.[23]

3.2 NSP PM10 Impacts Exceed the 24-Hour PM10 CAAQS

I performed air dispersion modeling to calculate the highest 24-hour PM10 concentrations attributable to NSP's construction activities, modeled with three-years of Escondido meteorological data. The modeling shows significant violations of the 24-hour PM10 CAAQS (50 $\mu g/m^3$), extending well beyond the NSP site. Importantly, the modeled 24-hour PM10 impacts exceed the CAAQS without the addition of background levels. A map showing the locations of 24-hour PM10 impacts from NSP's construction emissions, overlaid onto aerial imagery, are shown in Exhibit D. This map includes two 24-hour PM10 isopleths: 100% of the CAAQS (50 $\mu g/m^3$) and 200% of the CAAQS (100 $\mu g/m^3$). These isopleth maps do not include the background PM10 concentrations

[23] SDAPCD, Annual Air Quality Monitoring Network Plan: 2015, July 2016.

discussed in Section 3.1.

3.3 NSP PM2.5 Impacts Exceed the 24-Hour PM2.5 NAAQS

I also performed air dispersion modeling to calculate eighth-highest 24-hour PM2.5 concentrations attributable to NSP, averaged over three-years of modeled Escondido meteorological data. The modeling shows violations of the 24-hour PM2.5 NAAQS (35 $\mu g/m^3$) when including background PM2.5 data measured at Escondido. Maps showing the locations of 24-hour PM2.5 impacts from NSP's construction emissions, overlaid onto aerial imagery, are shown in Exhibit D. These isopleth maps are presented two ways: without and with the background PM2.5 concentrations discussed in Section 3.1. The map showing 24-hour PM2.5 impacts without background values includes isopleths of 10 and 15 $\mu g/m^3$, which are levels chosen to depict modeled concentrations near the NSP site boundary. The map showing 24-hour PM2.5 impacts with background values includes a 35 $\mu g/m^3$ isopleth, which is the 24-hour PM2.5 NAAQS.

3.4 NSP Wind Erosion Fugitive Dust Impacts

I modeled NSP wind erosion emissions using May 13, 2014 meteorological data from the KCRQ ASOS site. As discussed above, I only assessed the wind erosion emissions calculated using USEPA's industrial wind erosion equations, which are much smaller than those calculated by PNNL's DUSTRAN program.

Since wind erosion is limited to two hours during the wind conditions of May 13, 2014, I assessed both one-hour and 24-hour PM10 impacts. One-hour PM10 impacts from wind erosion exceed 200 $\mu g/m^3$ well-beyond the NSP site boundary, while 24-hour PM10 impacts are roughly 20 $\mu g/m^3$ at the NSP boundary. The 24-hour wind erosion PM10 impacts will exacerbate the already significant 24-hour PM10 CAAQS violations that are modeled to occur from NSP's mechanical construction activities. While there are no one-hour CAAQS or NAAQS levels established for PM10, the one-hour PM10 impacts may contribute to acute adverse health effects, including asthma.[24] Maps showing the locations of one-hour and 24-hour PM10 impacts from NSP wind erosion emissions, overlaid onto aerial imagery, are shown in Exhibit D.

4. Health Risk Assessment of NSP Diesel Particulate Matter Emissions

Diesel engine exhaust is classified by the State of California as a toxic air contaminant (TAC) and as a chemical known to cause cancer in humans.[25] Diesel engine exhaust is also a Proposition 65 listed carcinogen, which requires notification to individuals when the exposure exceeds the No Significant Risk Level (NSRL) of 10 per million excess cancer risk.[26]

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[24] Delfino, Ralph J., et. al., Association of Asthma Symptoms with Peak Particulate Air Pollution and Effect Modification by Anti-inflammatory Medication Use, Environmental Health Perspectives, 110, 10, 2002, pp. A607 – A617.

[25] California Office of Environmental Health Hazard Assessment, Health Risk Assessment for Diesel Exhaust, May 1998.

[26] California Office of Environmental Health Hazard Assessment, Safe Drinking Water and Toxic Enforcement Act of 1986, Chemicals Known to the State to Cause Cancer or Reproductive Toxicity, June 19, 2015.

Although there are many toxic constituents in diesel exhaust, e.g. benzene, aldehydes, and metals, it is diesel particulate matter (DPM) that is used to assess excess cancer risks from diesel engine exhaust. The California Air Resources Board (CARB) and the California Office of Environmental Hazard Assessment (OEHHA) developed a DPM inhalation cancer potency factor which is used to assess diesel engine exhaust excess cancer risks. From OEHHA and CARB:

> The inhalation cancer potency factor was derived from whole diesel exhaust and should be used only for impacts from the inhalation pathway (based on diesel PM measurements). The inhalation impacts from speciated emissions from diesel-fueled engines are already accounted for in the inhalation cancer potency factor.[27]

The DPM inhalation cancer potency factor, with units of inverse air concentration ($(\mu g/m^3)^{-1}$), is used to convert DPM air concentrations to a unitless value of excess cancer risk. For DPM, OEHHA and CARB have identified an inhalation cancer potency factor of 3.00E-04 $(\mu g/m^3)^{-1}$, and an oral potency slope of 1.1 $(mg/(kg\text{-}day))^{-1}$ for dose calculations.[28]

Using OEHHA's 2015 Health Risk Assessment Guidelines, I calculated the excess cancer risk from exposure to 1.0 $\mu g/m^3$ of DPM for the first nine years of a child's life, from birth onwards. This is the most sensitive 9-year period of life, and OEHHA has developed age sensitivity factors and age-specific breathing rates for children which greatly increase the excess cancer risk compared to the same exposure for adults.[29] Applying OEHHA's guidelines, I calculate an excess cancer risk of 6.27E-04 (627 per million) for exposure to 1.0 $\mu g/m^3$ of DPM for the first nine years of a child's life. This value, which is calculated and shown in Exhibit E, is applied during post-processing of the modeled DPM air concentrations.

As discussed above, the DEIR incorrectly models construction DPM emissions, only covering a small portion of the project site and assessing only a fraction of the total construction DPM emissions. I prepared an air dispersion modeling analysis and health risk assessment (HRA) of construction DPM emissions for the entire project site, including a 9-year exposure DPM HRA.

The construction DPM emissions I modeled in this HRA are presented in Exhibit E. Consistent with the 24-hour PM10 and PM2.5 modeling analyses, I distributed these DPM emissions evenly over the entire Phase 1 construction area. This approach is likely to underestimate DPM air concentrations and associated health risks, but is necessitated by the lack of construction sequence information in the DEIR.

The DEIR also incorrectly models operational DPM emissions, and only assesses future exposures to areas within the NSP site. I prepared an air dispersion modeling analysis of operational DPM emissions for a wide-area of receptors, which forms the basis for a 9-year exposure DPM HRA. For

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[27] Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, Updated February 23, 2017, p. 15.
[28] Id., p.7.
[29] California Office of Environmental Health Assessment, Air Toxics Hot Spots Program Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015.

the operational DPM HRA, I used the same source and DPM emission rate information assessed in the DEIR, but added additional receptors to assess off-site and additional on-site exposures.

I limited the operational DPM HRA to the off-site vehicle emissions assessed in the DEIR, omitting the gas station since fueling operations do not directly emit DPM. These off-site vehicle activities are modeled as adjacent AERMOD volume sources, which require the following inputs:

- A source identifier number or name;
- Source Location X (Easting) coordinate (UTM Zone 11, NAD83);
- Source Location Y (Northing) coordinate (UTM Zone 11, NAD83);
- Source base elevation (meters above sea level);
- Emission rate of DPM (g/s);
- Center height of the volume source (meters);
- Initial horizontal dispersion of the area source plume (SYINIT – meters).
- Initial vertical dispersion of the area source plume (SZINIT – meters).

Consistent with the DEIR, I applied a series of adjacent volume sources, using the following parameters:

- Release height = 1.6 meters for I-15, Mesa Rock Rd. to I-15, and Mesa Rock Rd. to I-15 segments;
- SYINIT = road width/2.15 = 13.58 meters for I-15;
- SYINIT = road width/2.15 = 6.53 meters for Mesa Rock Rd. to I-15;
- SYINIT = road width/2.15 = 6.77 meters for Deer Springs Rd.;
- SZINIT = 1.6/2.15 = 0.74 meters for I-15, Mesa Rock Rd. and Deer Springs Rd. segments.[30]

I modeled all DPM sources for NSP's operational HRA with a unit emission rate of 1.0 g/s. This will facilitate post-processing using actual DPM emission rates by source, and the calculated excess cancer risk associated with 1.0 $\mu g/m^3$ of DPM exposure.

For both construction and operational emissions, modeled unit emission rate DPM concentrations are post-processed with both actual emission rates and 9-year excess cancer risk health risk multipliers. Modeled construction and operational DPM emission rates, including excess cancer risk post-processing inputs, are shown in Exhibit E.

4.1 Excess Cancer Risks from Construction DPM Emissions

I performed air dispersion modeling to calculate period average construction DPM concentrations, modeled with three-years of Escondido meteorological data. These DPM air concentrations are converted to excess cancer risk values using the construction emissions and risk calculation information provided in Exhibit E. Maps showing the locations of 5 and 10 per million excess cancer risks from NSP's construction DPM emissions, overlaid onto aerial imagery, are shown in

[30] USEPA, Haul Road Workgroup Final Report Submission to EPA-OAQPS, March 2, 2012, pp. 4-6.

Exhibit F. The 10 per million risk isopleth represents DPM exposures at the SDAPCD excess cancer risk significance level; the 5 per million risk isopleth is one-half the significance level ((DEIR, Air Quality Technical Appendix, Appendix C, p. iv).

4.2 Excess Cancer Risks from Operational DPM Emissions

I performed air dispersion modeling to calculate period average operational DPM concentrations, modeled with three-years of Escondido meteorological data. These DPM air concentrations are converted to excess cancer risk values using the operational emissions and risk calculation information provided in Exhibit E. Maps showing the locations of 5 and 10 per million excess cancer risks from NSP's construction DPM emissions, overlaid onto aerial imagery, are shown in Exhibit F. The 10 per million risk isopleth represents DPM exposures at the SDAPCD excess cancer risk significance level; the 5 per million risk isopleth is one-half the significance level.

5. Crystalline Silica

The DEIR obliquely addresses crystalline silica emissions, but fails to identify the crystalline silica content of the NSP site soils and subsequent fugitive dust emissions. This is a relatively simple measurement, but the DEIR has not performed this task. Given the magnitude of the fugitive dust emissions, and resulting ambient air concentrations of PM10 and PM2.5, this is a significant omission in the DEIR.

California has established a chronic reference exposure level of 3.0 $\mu g/m^3$ for crystalline silica.[31] The DEIR should obtain site-specific crystalline silica content data of the NSP site soils, and apply these mass-fraction levels to annual-average modeled PM10 emissions caused by construction activities.

6. Concluding Remarks

Corrected construction fugitive dust emissions will cause modeled impacts above the 24-hour PM10 CAAQS (50 $\mu g/m^3$) and 24-hour PM2.5 NAAQS (35 $\mu g/m^3$). Wind erosion events can add significantly to the air quality impacts caused by NSP's construction activities. In addition, construction and operational DPM emissions result in excess cancer risks greater than the 10 per million significance threshold. The NSP DEIR failed to identify these significant findings.

The DEIR assesses construction emissions (although incorrectly) within the project site, but fails to quantify PM10 and PM2.5 emissions that will be associated with off-site road widening and construction. This is particularly important for residential and other uses along Deer Springs Road, including the Golden Door Resort, which will be exposed to impacts from both NSP's on-site and off-site construction emissions.

The DEIR modeling uses actual terrain data for its limited modeling analyses. My re-analyses of the DEIR shortcomings also use actual terrain elevations (obtained using AERMAP). This, however, is

[31] Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, Updated February 23, 2017, p. 11.

not necessarily a complete analysis of possible air quality impacts. The USEPA acknowledges potential concerns regarding modeled impacts in areas of terrain that are both lower and higher than the emission source.[32] In essence, and most importantly for the NSP site location, AERMOD does not account for downslope flow that can occur during stable conditions, thus under-estimating modeled impacts in areas downslope of the emission sources. Furthermore, AERMOD may not adequately calculate air impacts in areas upslope from emission sources. The area surrounding the NSP site includes areas of terrain that are both lower and higher than the emission source terrain elevations, depending on the plume travel direction.

To address this concern, the DEIR air dispersion modeling should be assessed with both actual and flat terrain for sources and receptors, as is currently required by the South Coast Air Quality Management District (SCAQMD).[33] In other words, the DEIR should assess ambient air impacts in two ways: using the AERMOD default method of using actual terrain and the non-default method of applying flat terrain. The maximum ambient air impacts from these two methods is to be used for assessing compliance with the NAAQS, CAAQS, or other standards. From the SCAQMD:

> If some receptors are lower and some receptors are higher than the base elevation of the source, AERMOD should be run twice – once using the default option and the second time using the non-default option. The maximum ground-level concentration from both runs should be reported.

The NSP DEIR should be revised and recirculated to address the emission rate, air dispersion modeling, and health risk assessment shortcomings discussed above.

Thank you for the opportunity to provide comments on the NSP DEIR. My CV is attached as Exhibit G.

In summary, I hold B.S. (1978) and M.S. (1980) degrees in Atmospheric Science from the University of California at Davis. I specialize in atmospheric dispersion modeling, which uses regulatory-approved computer programs to estimate chemical concentrations in the air. I have prepared well over 1,000 air dispersion modeling analyses requiring on-site or site-specific meteorological data. I have extensive experience with many different air dispersion programs, including the ISC, AERMOD, OCD, MPTER, COMPLEX-I, CRSTER, and other plume models, as well as the MESOPUFF, MESOPUFF II, INPUFF, and CALMET/CALPUFF puff models. In addition, I have prepared hundreds of health risk assessments of major air toxics sources in California and the United States.

I also have extensive experience calculating air pollution emissions, including fugitive dust sources from scores of complex projects. In 2010, I provided detailed comments to USEPA regarding revision of AP-42 Section 13.2.1, Paved Roads. I have been qualified to calculate fugitive dust emissions in United States District Court proceedings.

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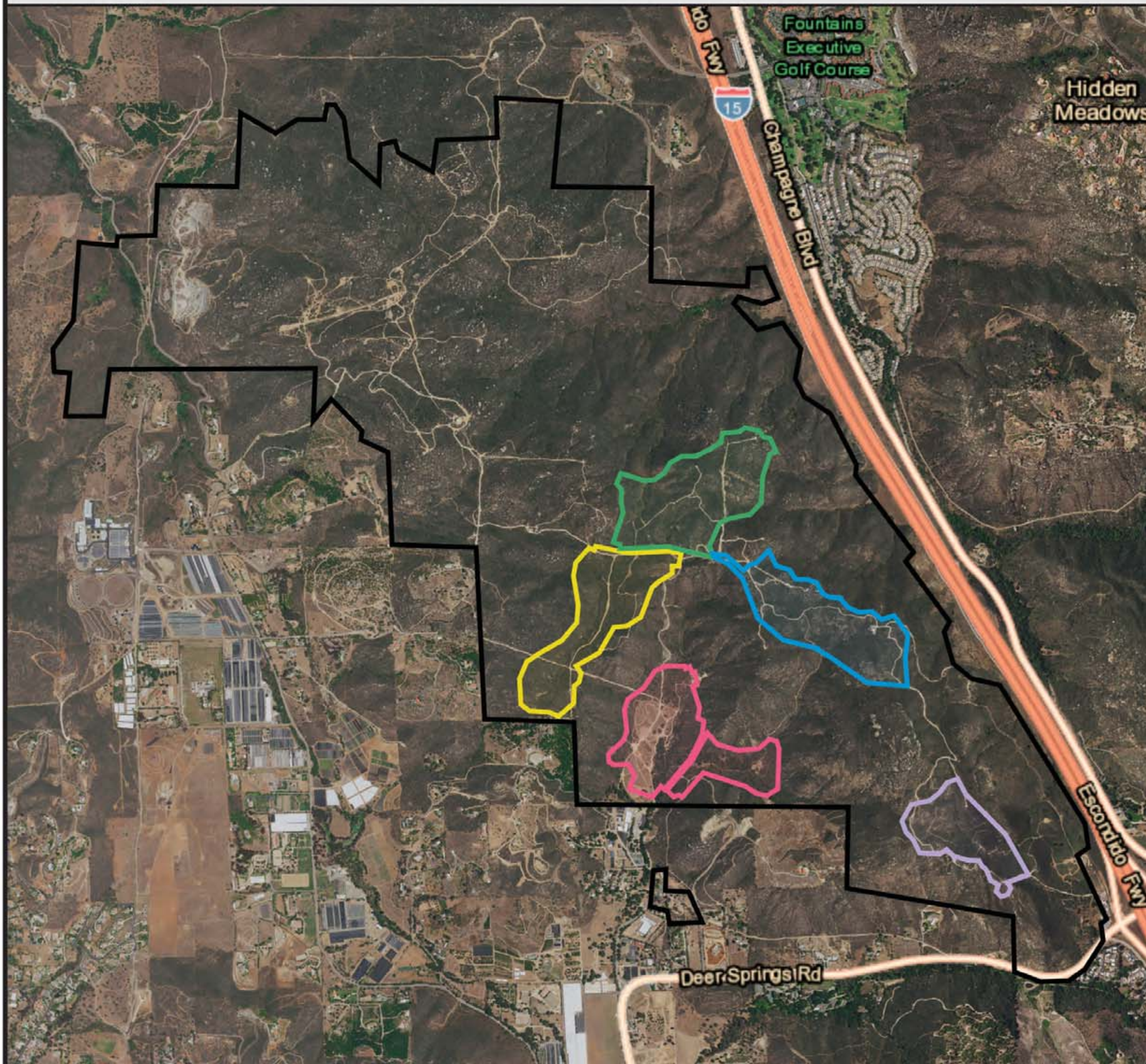
[32] https://www3.epa.gov/ttn/scram/7thconf/aermod/aermod_implmtn_guide_3August2015.pdf, p. 9.
[33] http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance.

Exhibit A:

Project Location and Emission Source Maps

Newland Sierra Project

Phase 1 Construction Activities



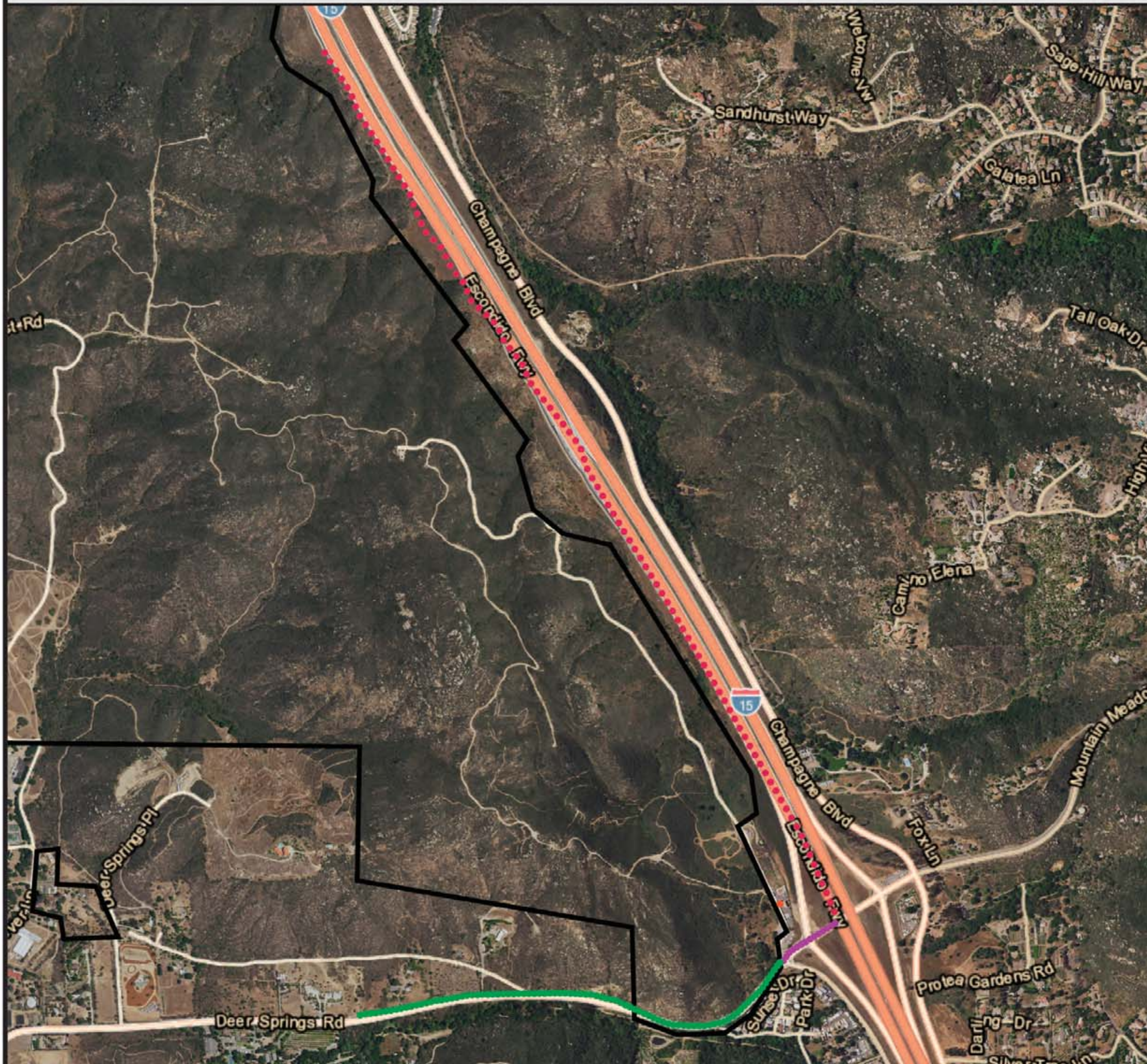
Knoll
Mesa
Hillside
Valley
Terraces
Project Boundary

0 1 Km

N

Newland Sierra Project

DEIR Modeled Operational Sources



Deer Springs 1

Deer Springs 2

I15

Gas Station

Project Boundary

0 0.5 Km

N

Exhibit B:

Phase 1 Construction
Fugitive Dust PM10 and PM2.5 Emission Calculations

Calculation of Unpaved Roadway Emissions
AP-42 Program Emission Factors
Equation from AP-42 Chapter 13.2.2, November 2006, Equations 1a, 2

Newland Sierra Phase 1 Construction: Site Preparation

$E_{(lb\ PM/VMT)} = [k(s/12)^a * (W/3)^b] * [(365-P)/365]$

value of a		
PM2.5	PM10	PM30
0.9	0.9	0.7

Input Variables

Description	Variable	Value	
Particle size multiplier for PM2.5 (lb/VMT)	k	0.15	
Particle size multiplier for PM10 (lb/VMT)	k	1.5	
Particle size multiplier for PM30 (lb/VMT)	k	4.9	
Road surface silt percentage (%)	s	8.500	
Constant for PM2.5, PM10, PM30	b	0.45	
Number of days in the averaging period	N (days)	---	
Operating hrs/day	(hrs)		
Number of days with at least 0.254 mm (0.01 in) of precipitation during the averaging period.	P (days)	0	Number of wet days set to 0 for 24-hr qcalcs
Control Efficiency	CE	0%	(No rain during 24-hour period)

Vehicle Weight and VMT

Vehicle Type	Empty Weight (tons)	Loaded Weight (tons)	Average Vehicle Weight (tons)	VMT/day	Days/Yr	VMT/Yr
Size group 1	16.5	52.7	34.6	4.65		1,753.10

Qcalcs

Paved Roadway Emissions		$E_{(lb/VMT)}$	(lb/day)	(g/s)	
Size group 1	PM2.5	0.33	1.5349		
	PM10	3.30	15.3487		
	PM30	11.56	53.72		

VMT/day:	4.6452	360	haul trips
		31	days
		0.4	One-way distance (mi)
		1	trip multiplier

Calculation of Unpaved Roadway Emissions
AP-42 Program Emission Factors
Equation from AP-42 Chapter 13.2.2, November 2006, Equations 1a, 2

Newland Sierra Phase 1 Construction: Grading

$E_{(lb\ PM/VMT)} = [k(s/12)^a * (W/3)^b] * [(365-P)/365]$

value of a		
PM2.5	PM10	PM30
0.9	0.9	0.7

Input Variables

Description	Variable	Value	
Particle size multiplier for PM2.5 (lb/VMT)	k	0.15	
Particle size multiplier for PM10 (lb/VMT)	k	1.5	
Particle size multiplier for PM30 (lb/VMT)	k	4.9	
Road surface silt percentage (%)	s	8.500	
Constant for PM2.5, PM10, PM30	b	0.45	
Number of days in the averaging period	N (days)	---	
Operating hrs/day	(hrs)		
Number of days with at least 0.254 mm (0.01 in) of precipitation during the averaging period.	P (days)	0	Number of wet days set to 0 for 24-hr qcalcs
Control Efficiency	CE	0%	(No rain during 24-hour period)

Vehicle Weight and VMT

Vehicle Type	Empty Weight (tons)	Loaded Weight (tons)	Average Vehicle Weight (tons)	VMT/day	Days/Yr	VMT/Yr
Size group 1	16.5	52.7	34.6	130.37		1,753.10

Qcalcs

Paved Roadway Emissions		$E_{(lb/VMT)}$	(lb/day)	(g/s)	
Size group 1	PM2.5	0.33	43.0771		
	PM10	3.30	430.7707		
	PM30	11.56	1507.66		

VMT/day:	130.3690	290071	haul trips
		890	days
		0.4	One-way distance (mi)
		1	trip multiplier

Newland Sierra: Phase 1 Site Preparation PM10
Bulldozing of Overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM15 E = [(1.0) * (s)^1.5] / (M)^1.4 (from AP-42, Table 11.9-1; bulldozing overburden)

Where,

E = Emission rate for PM15 (lb/hr)
s = Material silt content (%)
M = Material Moisture Content (%)
EXP1 = 1.5
EXP2 = 1.4

Material Silt Content =	6.90	%
Material Moisture Content =	7.90	%
Scaling Factor =	0.75	
Control Efficiency (Wet Suppression) =	61	%
Hours/Day of Bulldozing =	8.00	Hrs/Day
E =	0.39	lb/hr PM15
E =	0.29	lb/hr PM10
E =	2.35	lb/day PM10
Number of dozers:	3.00	
Total emissions:	7.04584	lb/day PM10

Newland Sierra: Phase 1 Site Preparation PM2.5
Bulldozing of Overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM30 E = [(5.7) * (s)^1.2] / (M)^1.3 (from AP-42, Table 11.9-1; bulldozing overburden)

Where,

E =	Emission rate for PM30 (lb/hr)
s =	Material silt content (%)
M =	Material Moisture Content (%)
EXP1 =	1.2
EXP2 =	1.3

Material Silt Content =	6.90	%
Material Moisture Content =	7.90	%
Scaling Factor =	0.105	
Control Efficiency (Wet Suppression) =	61	%
Hours/Day of Bulldozing =	8.00	Hrs/Day
E =	1.54	lb/hr PM30
E =	0.16	lb/hr PM2.5
E =	1.29	lb/day PM2.5
Number of dozers:	3.00	
Total emissions:	3.8730	lb/day PM2.5

Newland Sierra: Phase 1 Grading PM10
Bulldozing of Overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM15 E = [(1.0) * (s)^1.5] / (M)^1.4 (from AP-42, Table 11.9-1; bulldozing overburden)

Where,
E = Emission rate for PM15 (lb/hr)
s = Material silt content (%)
M = Material Moisture Content (%)
EXP1 = 1.5
EXP2 = 1.4

Material Silt Content =	6.90	%
Material Moisture Content =	7.90	%
Scaling Factor =	0.75	
Control Efficiency (Wet Suppression) =	61	%
Hours/Day of Bulldozing =	8.00	Hrs/Day
E =	0.39	lb/hr PM15
E =	0.29	lb/hr PM10
E =	2.35	lb/day PM10
Number of dozers:	11.00	
Total emissions:	25.8347	lb/day PM10

Newland Sierra: Phase 1 Grading PM2.5
Bulldozing of Overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM30 E = [(5.7) * (s)^1.2] / (M)^1.3 (from AP-42, Table 11.9-1; bulldozing overburden)

Where,
E = Emission rate for PM30 (lb/hr)
s = Material silt content (%)
M = Material Moisture Content (%)
EXP1 = 1.2
EXP2 = 1.3

Material Silt Content =	6.90	%
Material Moisture Content =	7.90	%
Scaling Factor =	0.105	
Control Efficiency (Wet Suppression) =	61	%
Hours/Day of Bulldozing =	8.00	Hrs/Day
E =	1.54	lb/hr PM30
E =	0.16	lb/hr PM2.5
E =	1.29	lb/day PM2.5
Number of dozers:	11.00	
Total emissions:	14.2009	lb/day PM2.5

Newland Sierra: Phase 1 Site Preparation PM10
Grading of overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM10 E = k*0.051 * (s)^2.0 (from AP-42, Table 11.9-1; grading)

Where,

E = Emission rate for PM10 (lb/VMT)

s = Grader speed (mph)

EXP1 = 2.0

Mean grader speed =	7.10	mph	(from AP-42, Table 11.9-3; grading)
k scaling Factor =	0.60		adjust from PM15 to PM10
Control Efficiency (Wet Suppression) =	61	%	
Hours/Day of grading =	8.00	Hrs/Day	
Number of graders/scrapers =			
VMT/day of grading =	12.53	VMT/day	
E =	1.00	lb/VMT PM15	
E =	0.60	lb/VMT PM10	
E =	7.5381	lb/day PM10	

AP-42 Section 13.2.3 (Heavy Construction Operations) indicates fugitive emissions from scrapers are much greater than from graders. Scraper EF is approx. 20 lb/VMT PM, with EF rating of E.

Acres	Blade width (ft)	VMT	days	VMT/day
565	12	388.4375	31	12.53024

Newland Sierra: Phase 1 Site Preparation PM2.5
Grading of overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM2.5 E = k*0.040 * (s)^2.5 (from AP-42, Table 11.9-1; grading)

Where,

E = Emission rate for PM2.5 (lb/VMT)

s = Grader speed (mph)

EXP1 = 2.5

Mean grader speed =	7.10	mph	(from AP-42, Table 11.9-3; grading)
k scaling Factor =	0.031		adjust from PM30 to PM2.5
Control Efficiency (Wet Suppression) =	61	%	
Hours/Day of grading =	8.00	Hrs/Day	
Number of graders/scrapers =			
VMT/day of grading =	12.53	VMT/day	
E =	2.10	lb/VMT PM30	
E =	0.06	lb/VMT PM2.5	
E =	0.8139	lb/day PM2.5	

AP-42 Section 13.2.3 (Heavy Construction Operations) indicates fugitive emissions from scrapers are much greater than from graders. Scraper EF is approx. 20 lb/VMT PM, with EF rating of E.

Acres	Blade width (ft)	VMT	days	VMT/day
565	12	388.4375	31	12.53024

Newland Sierra: Phase 1 Grading PM10
Grading of overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM10 E = k*0.051 * (s)^2.0 (from AP-42, Table 11.9-1; grading)

Where,

E = Emission rate for PM10 (lb/VMT)

s = Grader speed (mph)

EXP1 = 2.0

Mean grader speed =	7.10	mph	(from AP-42, Table 11.9-3; grading)
k scaling Factor =	0.60		adjust from PM15 to PM10
Control Efficiency (Wet Suppression) =	61	%	
Hours/Day of grading =	8.00	Hrs/Day	
Number of graders/scrapers =	9.00		
VMT/day of grading =	511.20	VMT/day	
E =	1.00	lb/VMT PM15	
E =	0.60	lb/VMT PM10	
E =	307.5343	lb/day PM10	

AP-42 Section 13.2.3 (Heavy Construction Operations) indicates fugitive emissions from scrapers are much greater than from graders. Scraper EF is approx. 20 lb/VMT PM, with EF rating of E.

Newland Sierra: Phase 1 Grading PM2.5
Grading of overburden
From AP-42, Chapter 11.9 - Western Surface Coal Mining

PM2.5 E =	k*0.040 * (s)^2.5		(from AP-42, Table 11.9-1; grading)
Where,			
E =	Emission rate for PM2.5 (lb/VMT)		
s =	Grader speed (mph)		
EXP1 =	2.5		

Mean grader speed =	7.10	mph	(from AP-42, Table 11.9-3; grading)
k scaling Factor =	0.031		adjust from PM30 to PM2.5
Control Efficiency (Wet Suppression) =	61	%	
Hours/Day of grading =	8.00	Hrs/Day	
Number of graders/scrapers =	9.00		
VMT/day of grading =	511.20	VMT/day	
E =	2.10	lb/VMT PM30	
E =	0.06	lb/VMT PM2.5	
E =	33.2065	lb/day PM2.5	

AP-42 Section 13.2.3 (Heavy Construction Operations) indicates fugitive emissions from scrapers are much greater than from graders. Scraper EF is approx. 20 lb/VMT PM, with EF rating of E.

Newland Sierra
Rock Crusher Emissions
Per Crushing Facility

Production Rate Information

2,500	cu yd/day
2.26	tons/cu yd
5,650	ton/day

Drop Operations Formula

$EF(PM) = (k*0.0032)*(U/5)^{1.3}/(M/2)^{1.4}$

k (PM_{10}) =	0.35
k ($PM_{2.5}$) =	0.053
U =	11.60 mph
M =	3 %

Equipment Type	Throughput Tons/day	PM_{10} Emission Factor (lb/ton)	PM_{10} Daily (lb/day)	$PM_{2.5}$ Emission Factor (lb/ton)	$PM_{2.5}$ Daily (lb/day)
Hopper Loading	5,650	0.001896	10.71	0.000287	1.622
Primary Crusher	5,650	0.00054	3.05	0.0001	0.565
Conveyor Transfer	5,650	0.000046	0.26	0.000013	0.073
Screen 1	5,650	0.00074	4.18	0.00005	0.283
Conveyor Transfer	1,695	0.000046	0.08	0.000013	0.022
Conveyor Transfer to Pile	1,695	0.001896	3.21	0.000287	0.487
Conveyor Transfer	3,955	0.000046	0.18	0.000013	0.051
Secondary Crusher	3,955	0.00054	2.14	0.000100	0.396
Conveyor Transfer	3,955	0.000046	0.18	0.000013	0.051
Screen 2	3,955	0.00074	2.93	0.00005	0.198
Conveyor Transfer	3,955	0.000046	0.18	0.000013	0.051
Conveyor Transfer to Pile	3,955	0.001896	7.50	0.000287	1.135
Total Rock Crushing			***34.60***		***4.93***

Notes:
1. Emission Factors from AP-42, Section 11.19.2 (Crushed Stone Processing), Table 11.19.2-2 (controlled factors).
2. Emission Factor for drop operation (conveyor to product pile) from AP-42, Section 13.2.4 (Aggregate Handling and Storage Piles), Equation 1. Wind speed is obtained from peak mean value of Escondido 2010-12 met data, hours 0700-1600. Moisture content is assumed to be 3%.

Phase 1

No. of Rock Crushing Facilities 4

	PM_{10}	$PM_{2.5}$
Total Rock Crushing	138.4114	19.7388

Mitigated Construction PM10 and PM2.5 Emissions (lb/day)

P1 Site Preparation	Location	Fugitive PM10 (lb/day)	Exhaust PM10 (lb/day)	Fugitive PM2.5 (lb/day)	Exhaust PM2.5 (lb/day)
Fugitive Dust	Onsite	7.0458		3.8730	
Off-road	Onsite		0.0660		0.0660
Hauling	Onsite	15.3487	0.0016	1.5349	0.0016
P1 Grading	Location				
Dozers/crawler tractors	Onsite	25.8347		14.2009	
Graders/scrapers	Onsite	307.5343		33.2065	
Off-road	Onsite		0.6395		0.6395
Hauling	Onsite	430.7707	0.0458	43.0771	0.0438
Rock Crushing Fugitives	Onsite	138.4114		19.7388	
Rock Crushing Generator	Onsite	3.9400		3.9400	
Blasting	Onsite	55.8919		3.2245	
	Sum:	984.7776	0.7529	122.7957	0.7509
	Sum with blasting:	985.5305	lb/day	123.5466	lb/day
	Area (m^2):	1109040		1109040	
	MODHRS:	9	0700-1600	9	0700-1600
Daily MODHR average:	Q (g/s-m^2):	1.2441E-05		1.5596E-06	
Annual average:	Q (g/s-m^2):	1.0634E-05		1.3331E-06	

Q Hrs: 2808

Mod Hrs: 3285

Summary of Wind Erosion Emissions
Calculated by AP-42 Section 13.2.5 and DUSTRAN

Wind Erosion PM 10 Emission Calculations for May 13, 2014	AP42, 13.2.5	DUSTRAN
Threshold friction velocity (m/s):	0.62	0.42
Total particulate emissions (g/m^2):	1.98	11.05
Maximum particulate emissions (g/m^2):	1.69	4.36
Area or subarea (m^2):	1,109,040	1,109,040
Total particulate emissions (tons/day):	2.43	13.50
Total particulate emissions (pounds/day):	4,851	27,006

Summary of Wind Erosion Emission Calculation Inputs
AP-42 Section 13.2.5 and DUSTRAN

Particle size multiplier (K):	0.5	PM10	(AP-42, Section 13.2.5, Table 13.2.5-1)
ANHT:	7.92	meters	
Surface threshold ustar:	0.62	m/s	(AP-42, Section 13.2.5, Table 13.2.5-2)
Surface area:	1,109,040	m^2	
Site-specific roughness length:	0.005	m	

DUSTRAN inputs (User's Manual, Section 2.5.2):

Threshold friction velocity for dry soil:	0.2	m/s
Gillette & Passi Factor C:	1.00E-02	$g/(m^{-6}s^{3})$

Soil Texture Class	Fraction (β)	Uplift availability (γ)	Dust productivity factor (δ)	δ (Normalized)
Clay (<2 μm)	0.34	0.08	0.027	0.045
Small Silt (2-20 μm)	0.28	1.00	0.280	0.467
Large Silt (20-50 μm)	0.28	1.00	0.280	0.467
Sand (50-100 μm)	0.10	0.12	0.012	0.020
Sum:	1.00			1.00

Maximum water adsorption (*w'*):	7.4	%
Dust flux adj. for sand particles(*G'*):	1.02	
Vegetation mask (α):	1.00	(1.00 = no vegetation; 0.00 = complete vegetation coverage)
Gravimetric soil moisture content (*w*):	12.0	%
Soil wetness factor (f_w):	2.10	
Threshold friction velocity for moist soil:	0.42	m/s

Exhibit C:

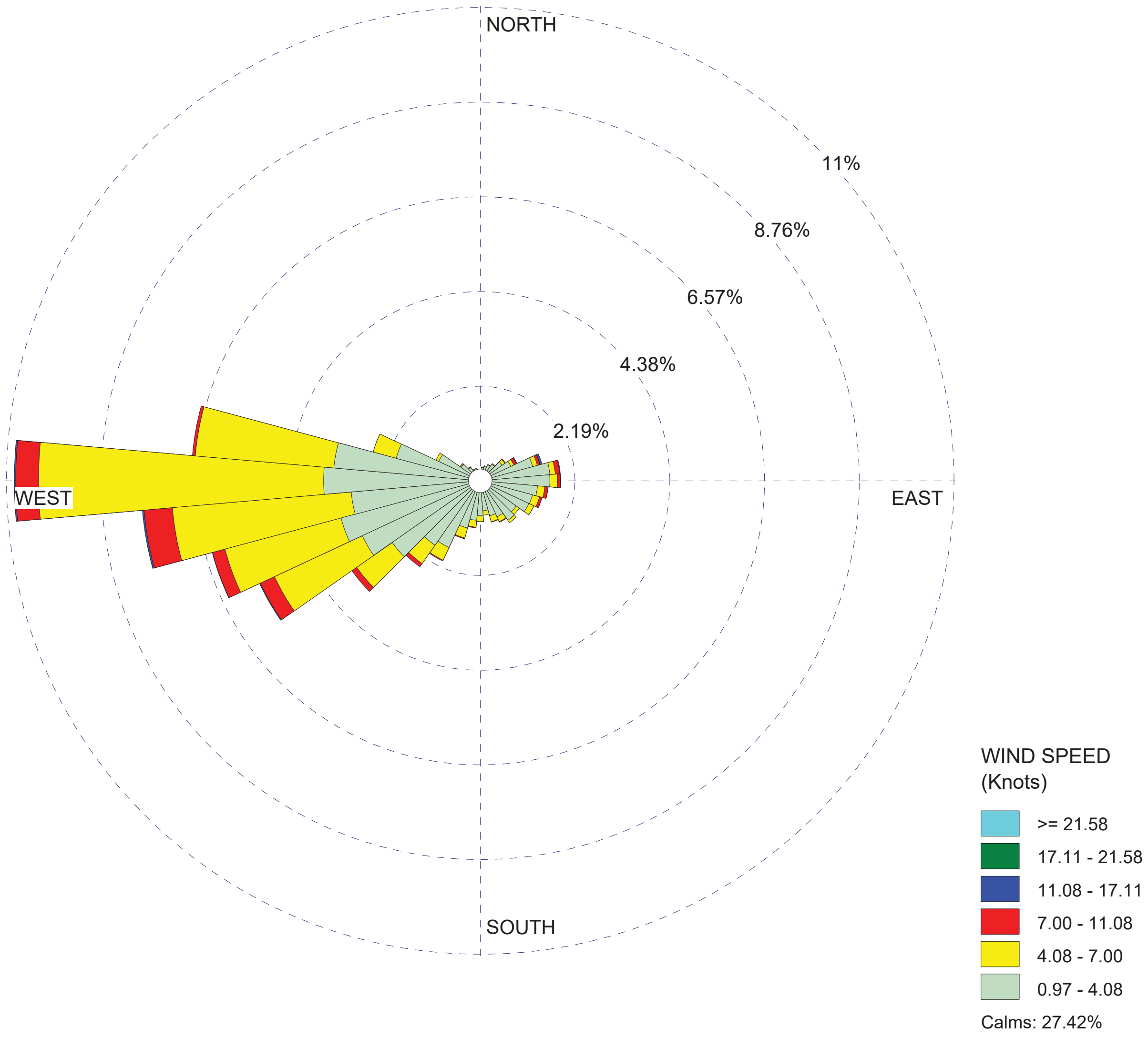
Escondido and KCRQ Meteorological Data
Wind Roses

WIND ROSE PLOT:

Escondido 2010-2012
AERMET 14134 with SA

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2010 - 00:00
End Date: 12/31/2012 - 23:59

COMPANY NAME:

MODELER:

CALM WINDS:

27.42%

TOTAL COUNT:

26289 hrs.

AVG. WIND SPEED:

2.59 Knots

DATE:

2/5/2018

PROJECT NO.:

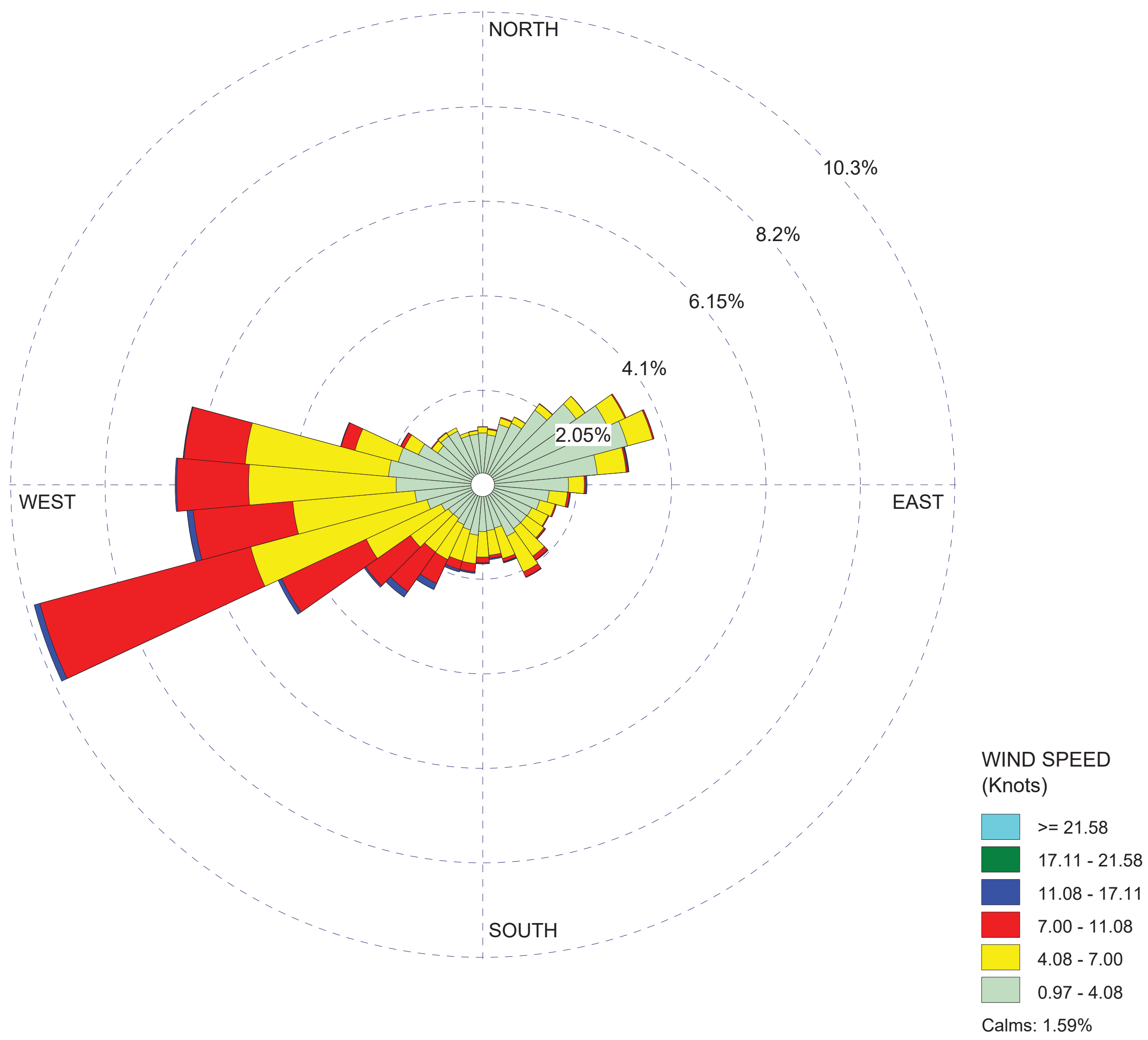
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

KCRQ; KNKX: 2013-2017
AERMET 16216, no ADJ_U*

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 1/1/2013 - 00:00** **End Date: 12/31/2017 - 23:59**	COMPANY NAME:
		MODELER:
	CALM WINDS: **1.59%**	TOTAL COUNT: **43660 hrs.**
	AVG. WIND SPEED: **4.47 Knots**	DATE: **2/10/2018**
		PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Precipitation Conditions for Determining Seasonal Bowen Ratios
(Based on 1981 through 2010 Precipitation Data from Oceanside Marina (USC00046377))

Year	Winter Dec-Feb	Spring Mar-May	Summer Jun-Aug	Fall Sep-Nov	Year Jan-Dec	Winter Dec-Feb	Spring Mar-May	Summer Jun-Aug	Fall Sep-Nov	Year Jan-Dec
1981	3.35	2.91	0.04	2.00	8.30	Dry	Average	Dry	Average	Average
1982	5.56	7.75	0.18	2.20	15.69	Average	Wet	Average	Wet	Wet
1983	7.35	8.45	0.31	4.50	20.62	Wet	Wet	Wet	Wet	Wet
1984	4.41	0.91	0.09	1.60	7.01	Average	Dry	Dry	Average	Dry
1985	2.91	0.58	0.00	3.85	7.34	Dry	Dry	Dry	Wet	Dry
1986	5.18	3.23	0.01	2.04	10.46	Average	Average	Dry	Average	Average
1987	6.33	0.79	0.00	3.35	10.48	Average	Dry	Dry	Wet	Average
1988	5.80	3.59	0.27	1.28	10.94	Average	Wet	Wet	Average	Average
1989	1.16	1.32	0.03	0.63	3.15	Dry	Dry	Dry	Dry	Dry
1990	3.68	1.57	0.74	0.54	6.54	Dry	Dry	Wet	Dry	Dry
1991	4.82	5.31	0.00	0.25	10.39	Average	Wet	Dry	Dry	Average
1992	8.84	3.24	0.22	0.18	12.48	Wet	Average	Wet	Dry	Average
1993	12.42	1.33	1.16	0.64	15.55	Wet	Dry	Wet	Dry	Wet
1994	3.50	3.48	0.00	0.06	7.04	Dry	Wet	Dry	Dry	Dry
1995	9.34	6.59	0.50	0.10	16.54	Wet	Wet	Wet	Dry	Wet
1996	6.42	1.20	0.04	3.28	10.94	Average	Dry	Dry	Wet	Average
1997	5.80	0.91	0.00	2.82	9.53	Average	Dry	Dry	Wet	Average
1998	11.13	5.51	0.00	1.45	18.09	Wet	Wet	Dry	Average	Wet
1999	2.21	2.12	0.00	0.00	4.33	Dry	Average	Dry	Dry	Dry
2000	3.97	1.76	0.00	2.37	8.10	Dry	Dry	Dry	Wet	Average
2001	7.75	1.57	0.01	1.09	10.42	Wet	Dry	Dry	Dry	Average
2002	2.80	0.95	0.00	1.59	5.34	Dry	Dry	Dry	Average	Dry
2003	4.02	3.91	0.36	0.77	9.06	Dry	Wet	Wet	Dry	Average
2004	6.54	0.72	0.00	5.48	12.73	Average	Dry	Dry	Wet	Average
2005	11.31	2.09	0.00	1.77	15.17	Wet	Average	Dry	Average	Wet
2006	1.82	2.69	0.19	0.22	4.91	Dry	Average	Wet	Dry	Dry
2007	3.37	0.80	0.24	0.44	4.86	Dry	Dry	Wet	Dry	Dry
2008	6.25	0.13	0.00	1.90	8.28	Average	Dry	Dry	Average	Average
2009	3.91	0.08	0.00	0.32	4.31	Dry	Dry	Dry	Dry	Dry
2010	14.36	2.29	0.01	4.24	20.90	Wet	Average	Dry	Wet	Wet
2011	4.24	3.06	0.19	3.03	10.52	Dry	Average	Wet	Wet	Average
2012	4.09	2.19	0.00	1.20	7.48	Dry	Average	Dry	Dry	Dry
2013	1.72	2.05	0.00	1.59	5.36	Dry	Average	Dry	Average	Dry
2014	5.40	0.87	0.09	0.80	7.16	Average	Dry	Dry	Dry	Dry
2015	1.13	2.10	0.91	1.77	5.91	Dry	Average	Wet	Average	Dry
2016	5.26	2.28	0.00	1.49	9.03	Average	Average	Dry	Average	Average
2017	10.43	1.55	0.03	0.28	12.29	Wet	Dry	Dry	Dry	Average
Averages:	5.88	2.59	0.15	1.70	10.32					

Precipitation units: inches

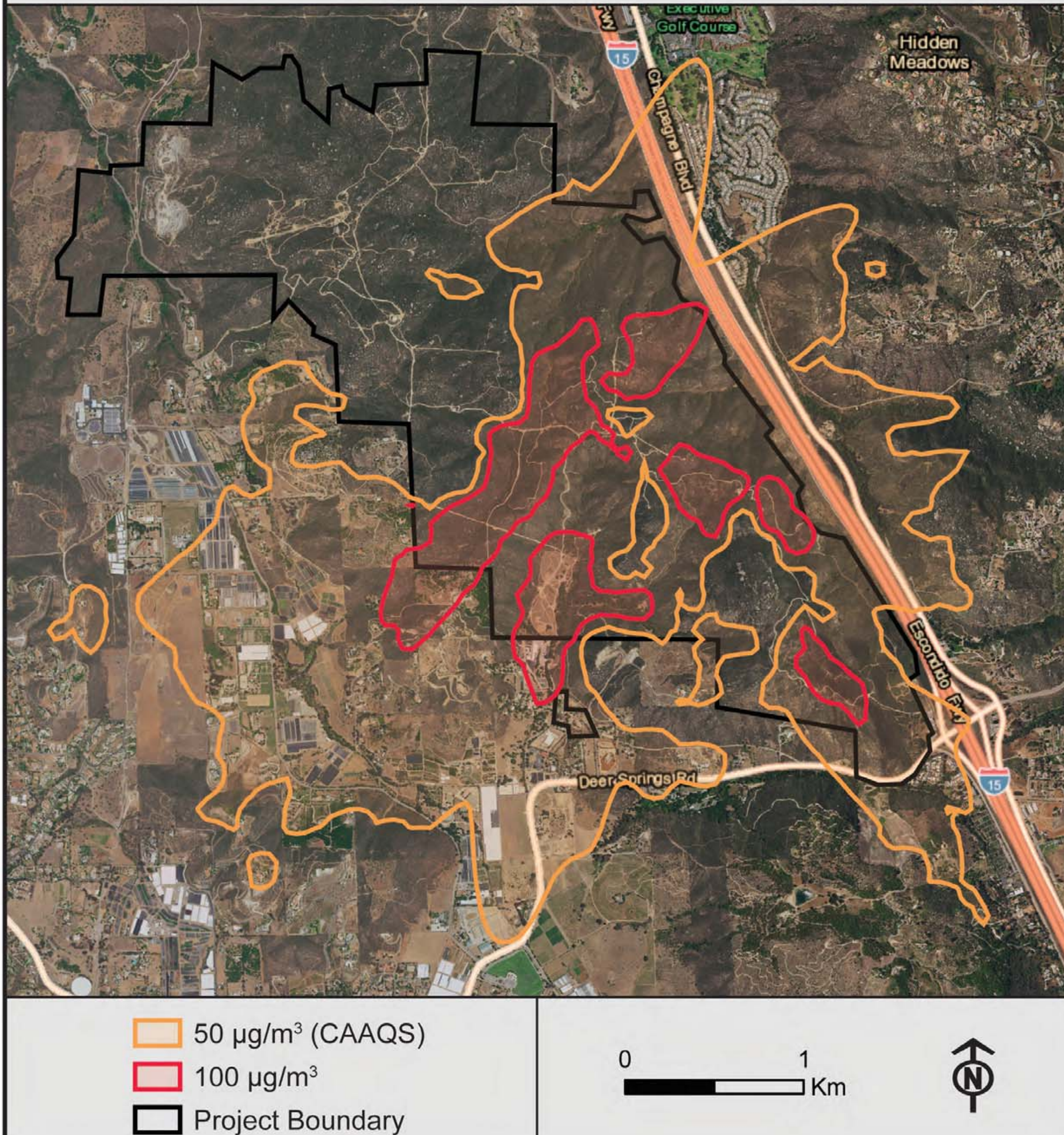
Average precipitation based on 1981 -- 2010 data

Exhibit D:

Air Concentration Maps
Phase 1 Construction PM10 and PM2.5

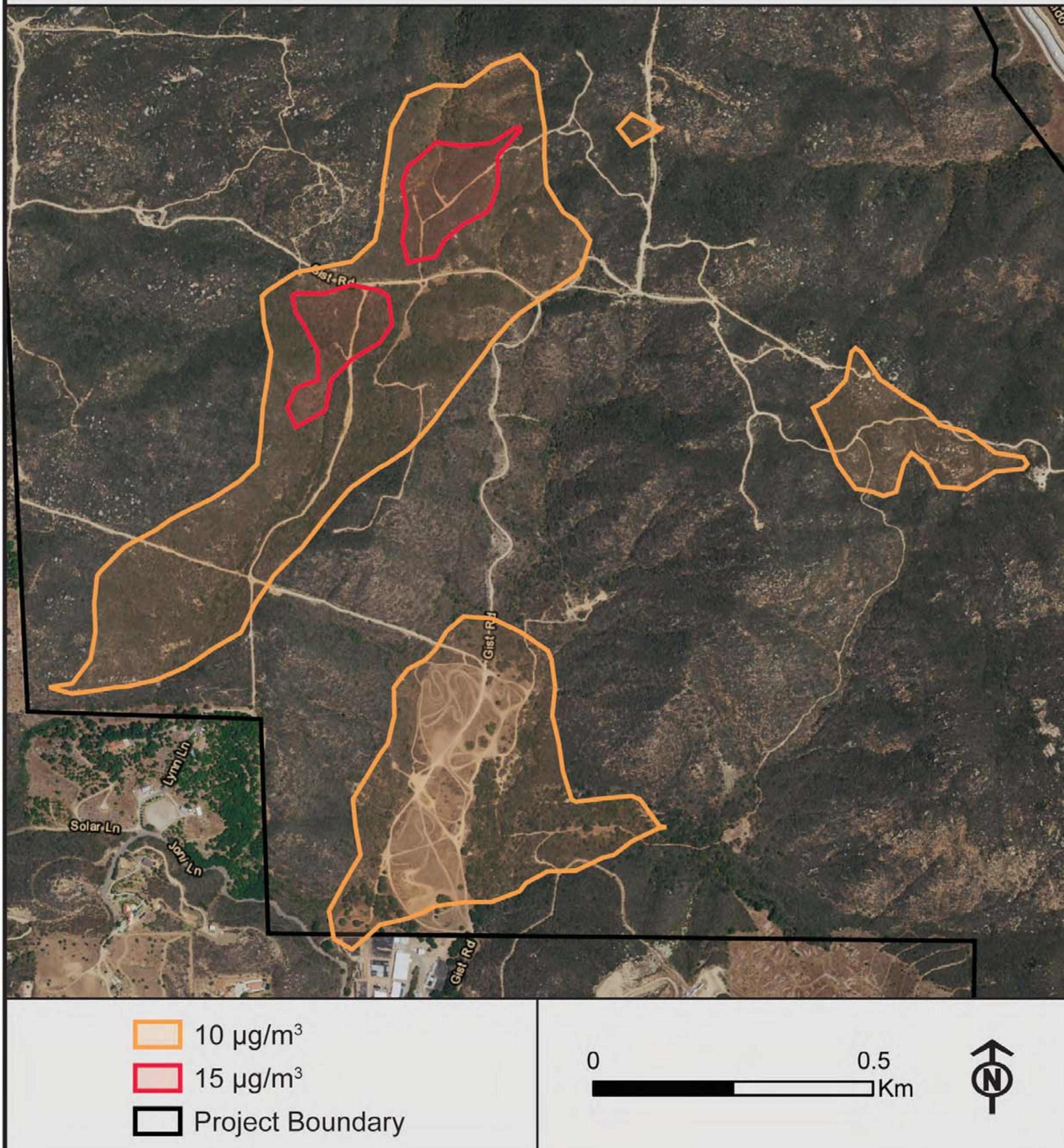
Newland Sierra Project Phase 1 Construction Emissions

24-Hour PM10 Concentrations without Background Levels
Modeled with AERMOD 16216r, 2010-12 Escondido Meteorological Data

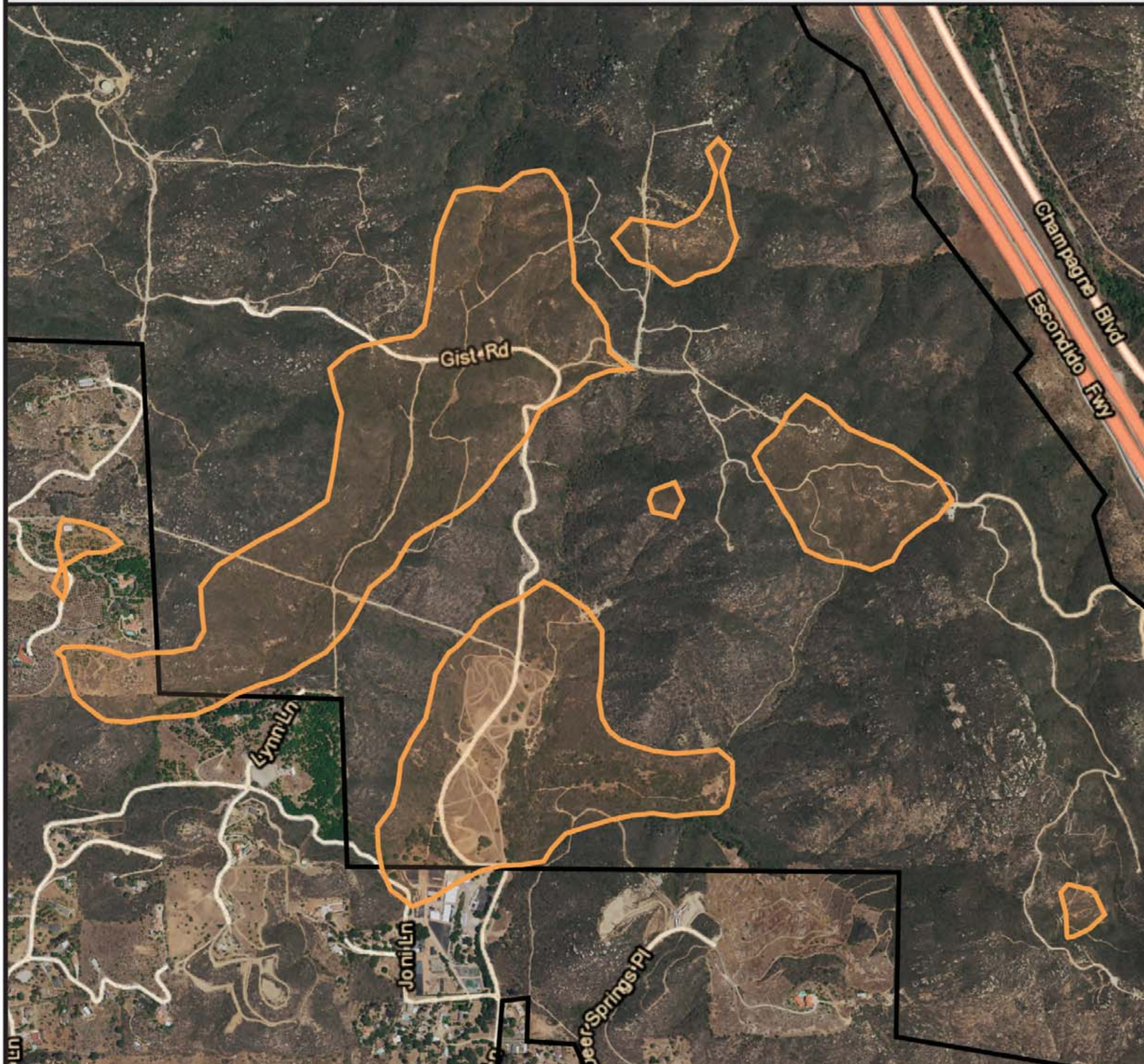


Newland Sierra Project Phase 1 Construction Emissions

24-Hour PM2.5 Concentrations without Background Levels
Modeled with AERMOD 16216r, 2010-12 Escondido Meteorological Data



Newland Sierra Project Phase 1 Construction Emissions
24-Hour PM2.5 Concentrations Including 26.8 μg/m³ Background Level
Modeled with AERMOD 16216r, 2010-12 Escondido Meteorological Data



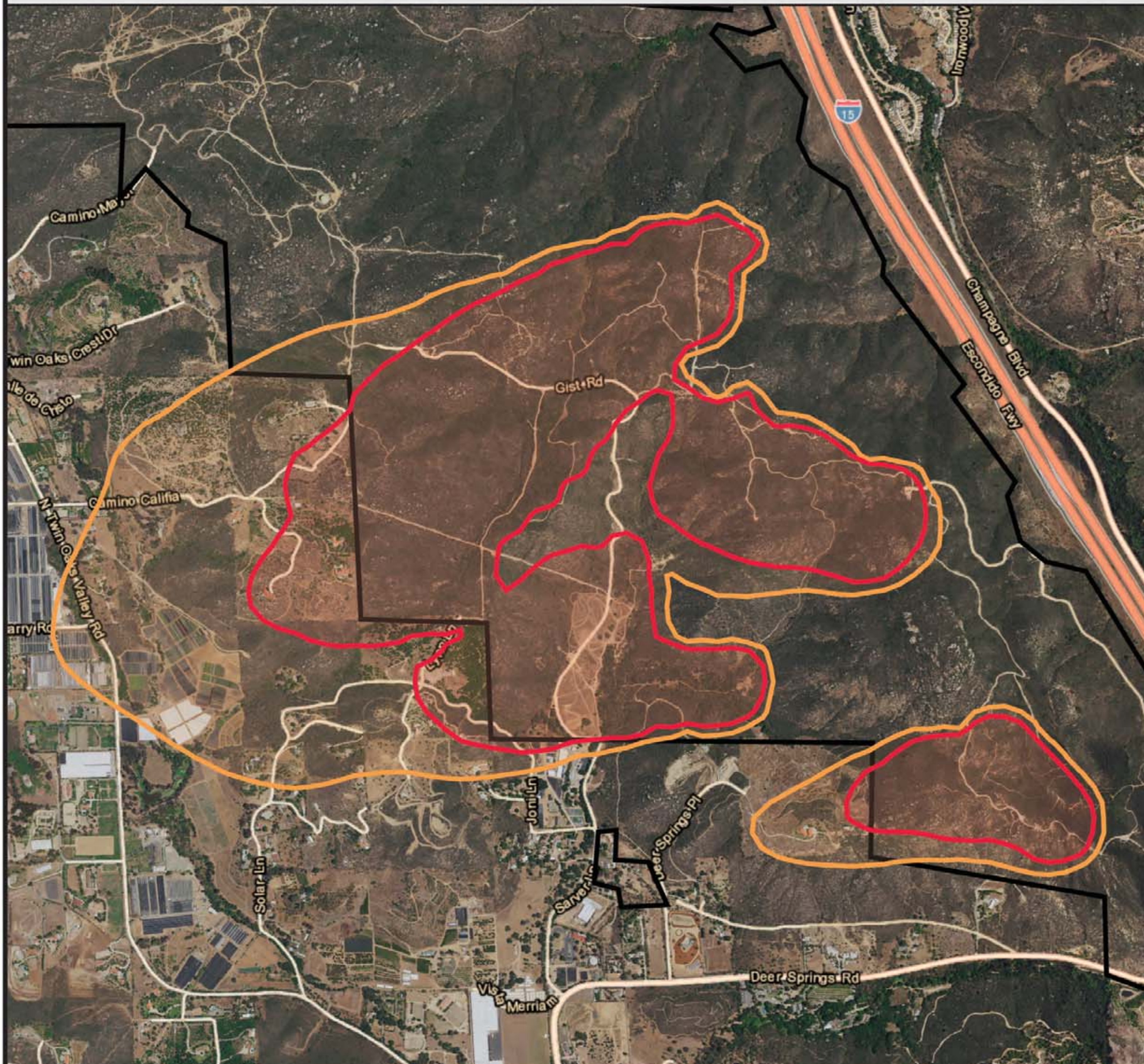
35 μg/m³ (NAAQS)

Project Boundary

0 0.5 Km

N

Newland Sierra Project Phase 1 Construction
1-Hour PM10 Concentrations from Wind Erosion Emissions
Modeled with AERMOD 16216r, 5/13/2014 KCRQ Meteorological Data



100 µg/m³

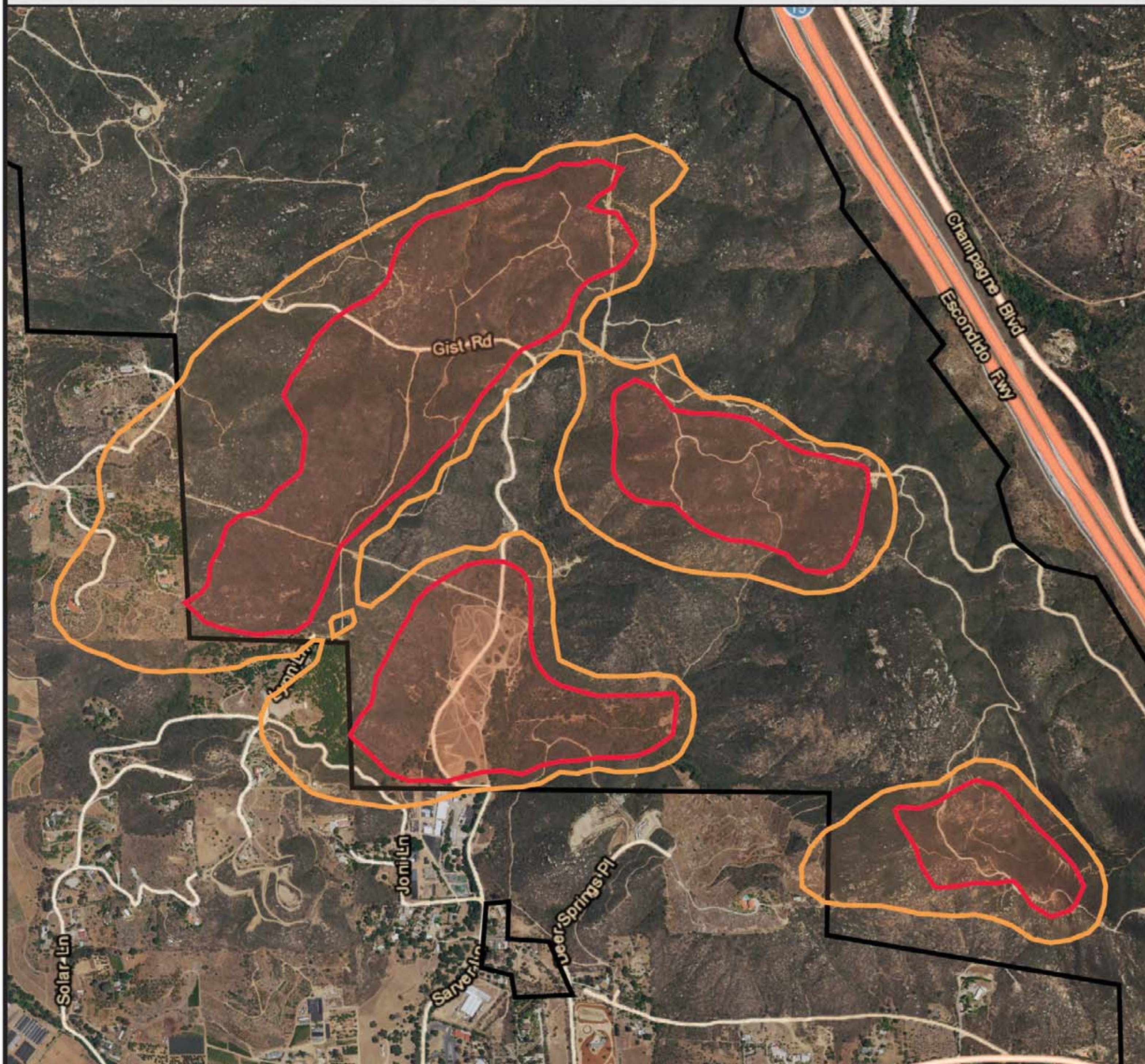
200 µg/m³

Project Site

0 1 Km

N

Newland Sierra Project Phase 1 Construction
24-Hour PM10 Concentrations from Wind Erosion Emissions
Modeled with AERMOD 16216r, 5/13/2014 KCRQ Meteorological Data



10 µg/m³
20 µg/m³
Project Boundary

0 0.5 Km

N

Exhibit E:

Diesel Particulate Matter Health Risk Assessment
Emission Rate Inputs and Risk Calculations

9-Year Excess Cancer Risk

From Exposure to 1.0 ug/m^3 DPM

First 9-Years of Life

DPM	3rd Trimester	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years	
Mean inh (m^3/kg-day)	0.225	0.658	0.535	0.452	0.210	0.185	
95% inh (m^3/kg-day)	0.361	1.090	0.861	0.745	0.335	0.290	
Age Sensitivity Factor	10.0	10.0	3.0	3.0	1.0	1.0	
Duration (years)	0.25	2.0	7.0	14.0	14.0	54.0	
FAH (% at home)	1.00	1.00	1.00	1.00	0.73	0.73	
CPF ((mg/(kg-day))$^{-1}$	1.1						
URV (µg/m^3)$^{-1}$	3.00E-04						
chi (µg/m^3)	1.00E+00						
ECR	3.00E-04						

95% tile inh	3rd Trimester	0<2 years	2<9 years	2<16 years	16<30 years	16<70 years	ECR
Dose-air (mg/(kg-day))	3.61E-04	1.09E-03	8.61E-04	7.45E-04	2.45E-04	2.12E-04	
ECR - AB2588 9-yr	1.42E-05	3.43E-04	2.84E-04				6.41E-04
ECR - AB2588 30-yr	1.42E-05	3.43E-04		4.92E-04	5.38E-05		9.02E-04
ECR - AB2588 70-yr	1.42E-05	3.43E-04		4.92E-04		1.80E-04	1.03E-03
Adult ECR - no ASF	8.32E-07	6.65E-06		4.66E-05		1.80E-04	2.34E-04

Year	ECR for year
1	1.71E-04
2	1.71E-04
3	4.06E-05
4	4.06E-05
5	4.06E-05
6	4.06E-05
7	4.06E-05
8	4.06E-05
9	4.06E-05
9-yr total:	6.27E-04

Construction DPM Emissions
and Excess Cancer Risk Post-Processing Inputs

Year	CALEEMOD DPM (lb/yr)	Generator DPM (lb/yr)	Construction DPM (lb/yr)	MODHRS/yr	DPM (g/s-m^2)	Mult for Post-Processing PM10	ECR for year from 1.0 µg/m^3 DPM	Total yearly multiplier for per million ECR Output
2018	240.80	810.67	1051.47	3285	3.6365E-08	3.6365E-03	1.71E-04	6.2288E-01
2019	349.00	810.67	1159.67	3285	4.0107E-08	4.0107E-03	1.71E-04	6.8698E-01
2020	422.20	810.67	1232.87	3294	4.2522E-08	4.2522E-03	4.06E-05	1.7260E-01
2021	307.80	296.90	604.70	3285	2.0914E-08	2.0914E-03	4.06E-05	8.4888E-02
2022	294.60	296.90	591.50	3285	2.0457E-08	2.0457E-03	4.06E-05	8.3035E-02
2023	171.60		171.60	3285	5.9348E-09	5.9348E-04	4.06E-05	2.4089E-02
2024	141.80		141.80	3294	4.8908E-09	4.8908E-04	4.06E-05	1.9852E-02
2025	99.40		99.40	3285	3.4378E-09	3.4378E-04	4.06E-05	1.3954E-02
2026	105.60		105.60	3285	3.6522E-09	3.6522E-04	4.06E-05	1.4824E-02
2027	95.80		95.80	3285	3.3132E-09	3.3132E-04		
				First 9-yr average:			First 9-yr risk sum multiplier:	1.7231E+00

AREAPOLY sum: 1,109,040 m^2

9-yr risk sum from 1 µg/m^3 DPM: 6.27E-04

ECR for year does not include 3rd trimester risk
Risk calcs begin at birth

Operation DPM Emissions
and Excess Cancer Risk Post-Processing Inputs

SRCGRP	SRCRNG	NVOL	DPM (lb/yr)	DPM (g/s) per source	9-yr risk sum from 1.0 µg/m^3 DPM:	Total multiplier for 9-yr per million ECR Output
I5	L0000001-L0000098	98	105.146	1.54324E-05	6.27E-04	9.68E-03
MESA	L0004838-L0004851	14	1.232	1.26575E-06	6.27E-04	7.94E-04
DEER	L0004852-L0004940	93	11.553	1.78681E-06	6.27E-04	1.12E-03

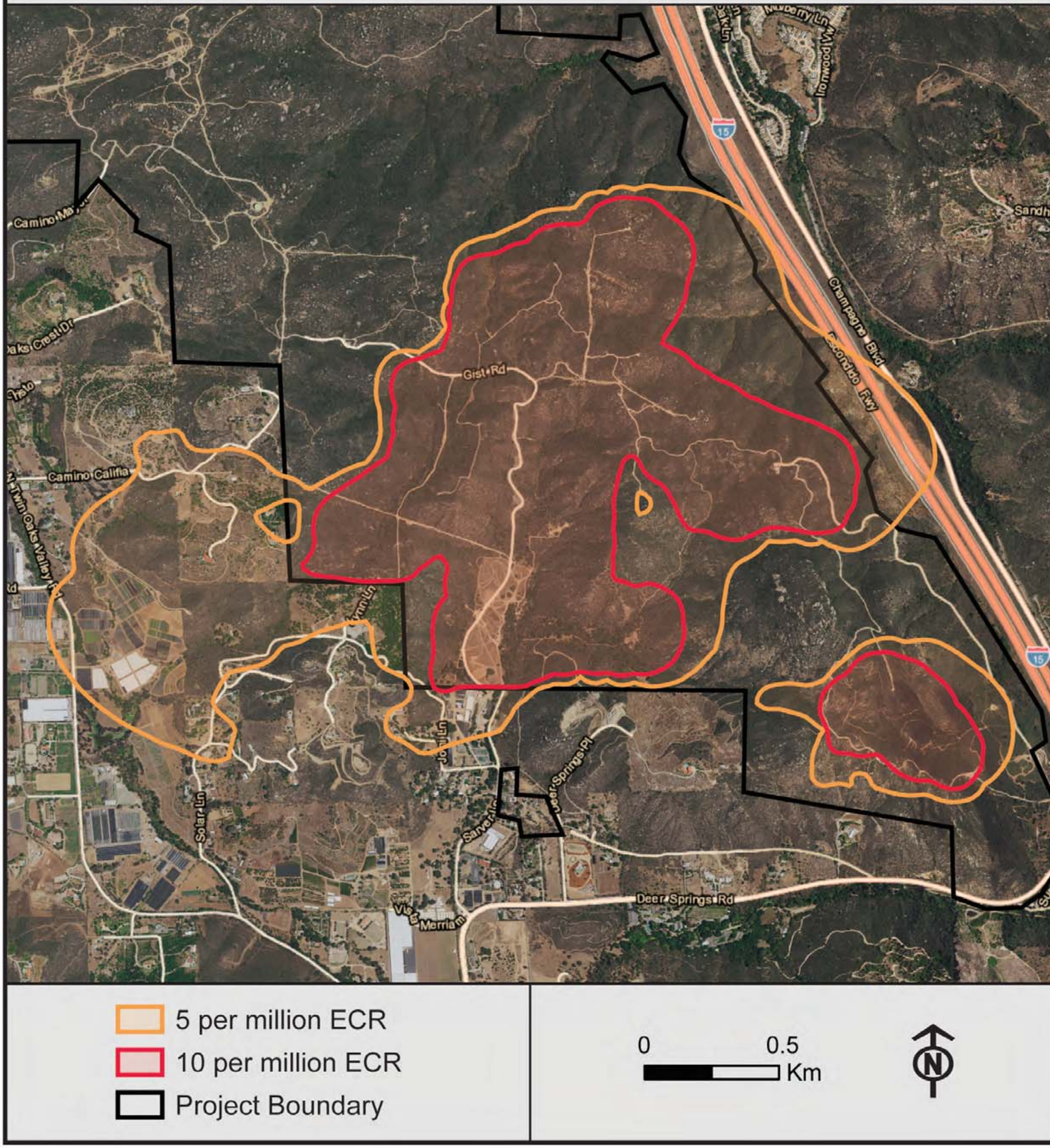
Exhibit F:

Diesel Particulate Matter Health Risk Assessment
DPM Excess Cancer Risk Maps

Newland Sierra Project Phase 1 Construction DPM Emissions

9-Year Excess Cancer Risks from Diesel Particulate Matter

Modeled with AERMOD 16216r, 2010-12 Escondido Meteorological Data



Newland Sierra Project Phase DEIR Operation DPM Emissions

9-Year Excess Cancer Risks from Diesel Particulate Matter
Modeled with AERMOD 16216r, 2010-12 Escondido Meteorological Data

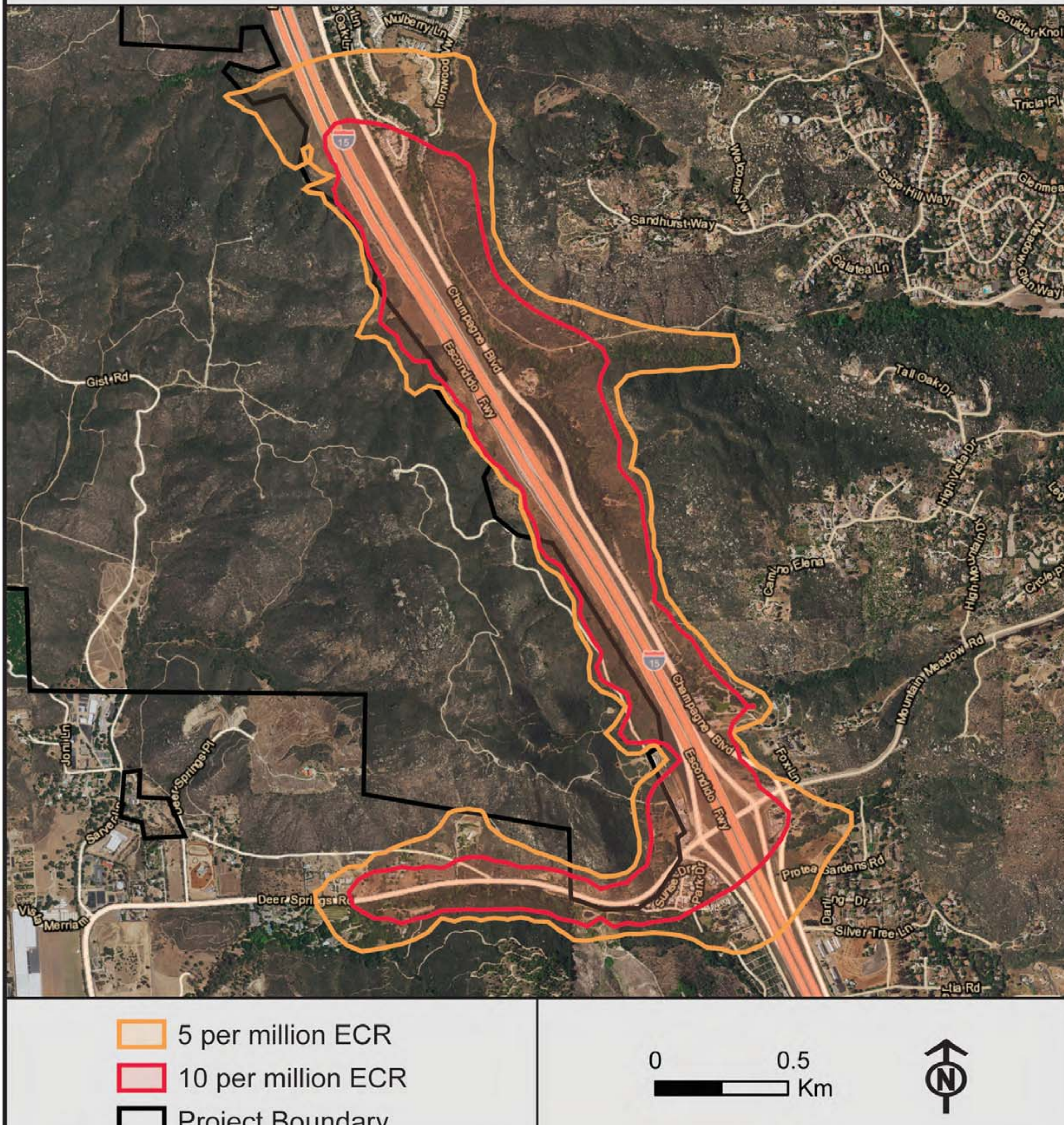


Exhibit G:

Curriculum Vitae

Camille Marie Sears

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Summary

I have over 35 years of regulatory and private-sector experience in air quality impact analyses, health risk assessments, meteorological monitoring, and geographic information systems. I specialize in litigation support; I have successfully provided testimony in numerous cases, both as an individual consultant and as part of a team of experts.

Education

- M.S., Atmospheric Science, University of California, Davis, 1980.
- B.S., Atmospheric Science, University of California, Davis, 1978.

Air Dispersion Modeling

- I am experienced in applying many different air dispersion models, including programs still in the development phase. I have prepared well over 1,000 air dispersion modeling analyses requiring the use of on-site or site-specific meteorological data. These runs were made with the USEPA ISC, OCD, MESOPUFF, INPUFF, CALPUFF, ISC-PRIME, AERMOD, COMPLEX-I, MPTER, and other air dispersion models.
- I prepared and submitted technical comments to the USEPA on beta-testing versions of AERMOD; these comments are being addressed and will be incorporated into the model and instructions when it is ready for regulatory application.
- I am experienced in performing air dispersion modeling for virtually every emission source type imaginable. I have modeled:
  Refineries and associated activities;
  Mobile sources, including cars, trains, airplanes, trucks, and ships;
  Power plants, including natural gas and coal-fired;
  Smelting operations;
  Area sources, such as housing tracts, biocides from agricultural operations, landfills, highways, fugitive dust sources, airports, oil and gas seeps, and ponds;
  Volume sources, including fugitive emissions from buildings and diesel construction combustion emissions;
  Small sources, including dry cleaners, gas stations, surface coating operations, plating facilities, medical device manufacturers, coffee roasters, ethylene oxide sterilizers, degreasing operations, foundries, and printing companies;
  Cooling towers and gas compressors;
  Diatomaceous earth, rock and gravel plants, and other mining operations;
  Offshore oil platforms, drilling rigs, and processing activities;
  Onshore oil and gas exploration, storage, processing, and transport facilities;
  Fugitive dust emissions from roads, wind erosion, and farming activities;
  Radionuclide emissions from actual and potential releases.
- I have extensive experience in modeling plume depletion and deposition from air releases of particulate emissions.
- As a senior scientist, I developed the Santa Barbara County Air Pollution Control District (SBAPCD) protocol on air quality modeling. I developed extensive modeling capabilities for the SBAPCD on VAX 8600 and Intel I-860 computer systems; I acted as systems analyst for the SBAPCD air quality modeling system; I served as director of air quality analyses for numerous major energy projects; I performed air quality impact analyses using inert and photochemical models, including EPA, ARB and private-sector models; I performed technical review and evaluating air quality and wind field models; I developed software to prepare model inputs consistent with the SBAPCD protocol on air quality modeling for OCD, OCDCPM, MPTER, COMPLEX-I/II and ISC.
- I provided detailed review and comments on the development of the Minerals Management Service OCD model. I developed the technical requirements for and

supervised the development of the OCDCPM model, a hybrid of the OCD, COMPLEX-I and MPTER models.

- I prepared the "Modeling Exposures of Hazardous Materials Released During Transportation Incidents" report for the California Office of Environmental Health Hazard Assessment (OEHHA). This report examines and rates the ADAM, ALOHA, ARCHIE, CASRAM, DEGADIS, HGSYSTEM, SLAB, and TSCREEN models for transportation accident consequence analyses of a priority list of 50 chemicals chosen by OEHHA. The report includes a model selection guide for adequacy of assessing priority chemicals, averaging time capabilities, isopleth generating capabilities, model limitations and concerns, and model advantages.
- I am experienced in assessing uncertainty in emission rate calculations, source release, and dispersion modeling. I have developed numerous probability distributions for input to Monte Carlo simulations, and I was a member of the External Advisory Group for the California EPA *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part IV, Technical Support Document for Exposure Assessment and Stochastic Analysis*.

Health Risk Assessment

- I have prepared more than 300 health risk assessments of major air toxics sources. These assessments were prepared for AB 2588 (the Air Toxics "Hot Spots" Information and Assessment Act of 1987), Proposition 65, and other exposure analysis activities. More than 150 of these exposure assessments were prepared for Proposition 65 compliance verification in a litigation support setting.
- I reviewed approximately 300 other health risk assessments of toxic air pollution sources in California. The regulatory programs in this review include AB 2588, Proposition 65, the California Environmental Quality Act, and other exposure analysis activities. My clients include the California Attorney General's Office, the Los Angeles County District Attorney's Office, the SBAPCD, the South Coast Air Quality Management District, numerous environmental and community groups, and several plaintiff law firms.
- I am experienced in assessing public health risk from continuous, intermittent, and accidental releases of toxic emissions. I am experienced in generating graphical presentations of risk results, and characterizing risks from carcinogenic and acute and chronic noncarcinogenic pollutants.
- I am experienced in communicating adverse health risks discovered through the Proposition 65 and AB 2588 processes. I have presented risk assessment results in many public settings -- to industry, media, and the affected public.
- For four years, I was the Air Toxics Program Coordinator for the SBAPCD. My duties included: developing and managing the District air toxics program; supervising District staff assigned to the air toxics program; developing District air toxics rules, regulations, policies and procedures; management of all District air toxics efforts, including AB 2588, Proposition 65, and federal activities; developing and tracking the SBAPCD air toxics budget.
- I have prepared numerous calculations of exposures from indoor air pollutants. A few examples include: diesel PM_{10} inside school buses, formaldehyde inside temporary school buildings, lead from disturbed paint, phenyl mercuric acetate from water-based paints and drywall mud, and tetrachloroethene from recently dry-cleaned clothes.

Litigation Support

- I have prepared numerous analyses in support of litigation, both in Federal and State Courts. I am experienced in preparing F.R.C.P. Rule 26(a)(2) expert reports and providing deposition and trial testimony (I have prepared eight Rule 26 reports). Much of my work is focused on human dose and risk reconstruction resulting from multiple air emission sources (lifetime and specific events).

- I am experienced in preparing declarations (many dozens) and providing expert testimony in depositions and trials (see my testimony history).
- I am experienced in providing support for legal staff. I have assisted in preparing numerous interrogatories, questions for depositions, deposition reviews, various briefs and motions, and general consulting.
- Recent examples of my work include:
  DTSC v. Interstate Non-Ferrous; United States District Court, Eastern District of California (2002).
  In this case I performed air dispersion modeling, downwind soil deposition calculations, and resultant soil concentrations of dioxins (TCDD TEQ) from historical fires at a smelting facility. I prepared several Rule 26 Reports in my role of assisting the California Attorney General's Office in trying this matter.
  Akee v. Dow et al.; United States District Court, District of Hawaii (2003-2004).
  In this case I performed air dispersion modeling used to quantify air concentrations and reconstruct intake, dose, excess cancer risk, and noncancer chronic hazard indices resulting from soil fumigation activities on the island of Oahu, Hawaii. I modeled 319 separate AREAPOLY pineapple fields for the following chemicals: DBCP, EDB, 1,3-trichloropropene, 1,2-dichloropropane, and epichlorohydrin. I calculated chemical flux rates and modeled the emissions from these fumigants for years 1946 through 2001 (56 years) for 34 test plaintiffs and 97 distinct home, school, and work addresses. I prepared a Rule 26 Expert Report, successfully defended against Daubert challenges, and testified in trial.
  Lawrence O'Connor v. Boeing North America, Inc., United States District Court, Central District of California, Western Division (2004-2005).
  In this case I performed air dispersion modeling, quantified air concentrations, and reconstructed individual intake, dose, and excess cancer risks resulting from approximately 150 air toxics sources in Los Angeles and Ventura Counties, California. I prepared these analyses for years 1950 through 2000 (51 years) for 173 plaintiffs and 741 distinct home, school, and work addresses. I prepared several Rule 26 Reports, and the case settled on the eve of trial in September, 2005. Defendants did not attempt a Daubert challenge of my work.
- I have prepared scores of individual and region-wide health risk assessments in support of litigation. These analyses include specific sub-tasks, including: calculating emission rates, choosing proper meteorological data inputs, performing air dispersion modeling, and quantifying intake, dose, excess cancer risk, and acute/chronic noncancer health effects.
- I have prepared over 150 exposure assessments for Proposition 65 litigation support. In these analyses, my tasks include: reviewing AB 2588 risk assessments and other documents to assist in verifying compliance with Proposition 65; preparing exposure assessments consistent with Proposition 65 Regulations for carcinogens and reproductive toxicants; using a geographic information system (Atlas GIS) to prepare exposure maps that display areas of required warnings; calculating the number of residents and workers exposed to levels of risk requiring warnings (using the GIS); preparing declarations, providing staff support, and other expert services as required. I have also reviewed scores of other assessments for verifying compliance with Proposition 65. My proposition 65 litigation clients include the California Attorney General's Office, the Los Angeles County District Attorney's Office, As You Sow, California Community Health Advocates, Center for Environmental Health, California Earth Corps, Communities for a Better Environment, Environmental Defense Fund, Environmental Law Foundation, and People United for a Better Oakland.

Geographic Information Systems

- ArcGIS: I am experienced in preparing presentation and testimony maps using ArcView versions 3 through 9.3. I developed methods to convert AutoCAD DXF files to ArcView polygon theme shape files for use in map overlays.

- I have created many presentation maps with ArcView using MrSID DOQQ and other aerial photos as a base and then overlaying exposure regions. This provides a detailed view (down to the house level) of where air concentrations and health risks are projected to occur.
- Using ArcView, I have created numerous presentations using USGS Topographic maps (as TIFF files) as the base on to which exposure regions are overlaid.
- MapInfo for Windows: I prepared numerous presentation maps including exposure isopleths, streets and highways, and sensitive receptors, labels. I developed procedures for importing Surfer isopleths in AutoCAD DXF format as a layer into MapInfo.
- Atlas GIS: I am experienced in preparing presentation maps with both the Windows and DOS versions of Atlas GIS. In addition to preparing maps, I use Atlas GIS to aggregate census data (at the block group level) within exposure isopleths to determine the number of individuals living and working within exposure zones. I am also experienced in geocoding large numbers of addresses and performing statistical analyses of exposed populations.
- I am experienced in preparing large-scale graphical displays, both in hard-copy and for PowerPoint presentations. These displays are used in trial testimony, public meetings, and other litigation support.
- I developed a Fortran program to modify AutoCAD DXF files, including batch-mode coordinate shifting for aligning overlays to different base maps.

Ozone and Long-Range Transport

- I developed emission reduction strategies and identified appropriate offset sources to mitigate project emissions liability. For VOC offsets, I developed and implemented procedures to account for reactivity of organic compound species for ozone impact mitigation. I wrote Fortran programs and developed a chemical database to calculate ozone formation potential using hydroxyl radical rate constants and an alkane/non-alkane reactive organic compound method.
- I provided technical support to the Joint Interagency Modeling Study and South Central Coast Cooperative Aerometric Monitoring Program. With the SBAPCD, I provided technical comments on analyses performed with the EKMA, AIRSHED, and PARIS models. I was responsible for developing emissions inventory for input into regional air quality planning models.
- I was the CEQA project manager for the Santa Barbara County Air Quality Attainment Plan Environmental Impact Report (EIR). My duties included: preparing initial study; preparation and release of the EIR Notice of Preparation; conducting public scoping hearings to obtain comments on the initial study; managing contractor efforts to prepare the draft EIR.
- I modified, tested, and compiled the Fortran code to the MESOPUFF model (the precursor to CALPUFF) to incorporate critical dividing streamline height algorithms. The model was then applied as part of a PSD analysis for a large copper-smelting facility.
- I am experienced in developing and analyzing wind fields for use in long-range transport and dispersion modeling.
- I have run CALPUFF numerous times. I use CALPUFF to assess visibility effects and both near-field and mesoscale air concentrations from various emission sources, including power plants.

Emission Rate Calculations

- I developed methods to estimate and verify source emission rates using air pollution measurements collected downwind of the emitting facility, local meteorological data, and dispersion models. This technique is useful in determining whether reported source emission rates are reasonable, and based on monitored and modeled air concentrations, revised emission rates can be created.

- I am experienced in developing emission inventories of hundreds of criteria and toxic air pollutant sources. I developed procedures and programs for quantifying emissions from many air emission sources, including: landfills, diesel exhaust sources, natural gas combustion activities, fugitive hydrocarbons from oil and gas facilities, dry cleaners, auto body shops, and ethylene oxide sterilizers.
- I have calculated flux rates (and modeled air concentrations) from hundreds of biocide applications to agricultural fields. Emission sources include aerial spraying, boom applications, and soil injection of fumigants.
- I am experienced in calculating emission rates using emission factors, source-test results, mass-balance equations, and other emission estimating techniques.
- I have been qualified in Federal court to provide opinions on calculating emission rates from fugitive sources of particulate matter.

Software Development

- I am skilled in computer operation and programming, with an emphasis on Fortran 95.
- I am experienced with numerous USEPA dispersion models, modifying them for system-specific input and output, and compiling the code for personal use and distribution. I own and am experienced in using the following Fortran compilers: Lahey Fortran 95, Lahey Fortran 90 DOS-Extended; Lahey F77L-EM32 DOS-Extended; Microsoft PowerStation 32-bit DOS-Extended; and Microsoft 16-bit.
- I configured and operated an Intel I-860 based workstation for the SBAPCD toxics program. I created control files and recoded programs to run dispersion models and risk assessments in the 64-bit I-860 environment (using Portland Group Fortran).
- Using Microsoft Fortran PowerStation, I wrote programs to extract terrain elevations from both 10-meter and 30-meter USGS DEM files. Using a file of discrete x,y coordinates, these programs extract elevations within a user-chosen distance for each x,y pair. The code I wrote can be run in steps or batch mode, allowing numerous DEM files to be processed at once.
- I have written many hundreds of utilities to facilitate data processing, entry, and quality assurance. These utility programs are a “tool chest” from which I can draw upon to expedite my work.
- While at the SBAPCD, I designed the ACE2588 model - the first public domain multi-source, multi-pathway, multi-pollutant risk assessment model. I co-developed the structure of the ACE2588 input and output files, supervised the coding of the model, tested the model for quality assurance, and for over 10 years I provided technical support to about 200 users of the model. I was responsible for updating the model each year and ensuring that it is consistent with California Air Pollution Control Officer’s Association (CAPCOA) Risk Assessment Guidelines.
- I developed and coded the ISC2ACE and ACE2 programs for distribution by CAPCOA. These programs were widely used in California for preparing AB 2588 and other program health risk assessments. ISC2ACE and ACE2 contain "compression" algorithms to reduce the hard drive and RAM requirements compared to ISCST2/ACE2588. I also developed ISC3ACE/ACE3 to incorporate the revised ISCST3 dispersion model requirements.
- I developed and coded the "HotSpot" system - a series of Fortran programs to expedite the review of air toxics emissions data, to prepare air quality modeling and risk assessment inputs, and to prepare graphical risk presentations.
- I customized ACE2588 and developed a mapping system for the SBAPCD. I modified the ACE2588 Fortran code to run on an Intel I-860 RISC workstation; I updated programs that allow SBAPCD staff to continue to use the "HotSpot" system – a series of programs that streamline preparing AB 2588 risk assessments; I developed a risk assessment mapping system based on MapInfo for Windows which linked the MapInfo mapping package to the "HotSpot" system.
- I developed software for electronic submittal of all AB 2588 reporting requirements for the SBAPCD. As an update to the "HotSpot" system software, I created software that

allows facilities to submit all AB 2588 reporting data, including that needed for risk prioritization, exposure assessment, and presentation mapping. The data submitted by the facility is then reformatted to both ATDIF and ATEDS formats for transmittal to the California Air Resources Board.

- I developed and coded Fortran programs for AB 2588 risk prioritization; both batch and interactive versions of the program were created. These programs were used by several air pollution control districts in California.

Air Quality and Meteorological Monitoring

- I was responsible for the design, review, and evaluation of an offshore source tracer gas study. This project used both inert tracer gas and a visible release to track the onshore trajectory and terrain impaction of offshore-released buoyant plumes.
- I developed the technical requirements for the Santa Barbara County Air Quality/Meteorological Monitoring Protocol. I developed and implemented the protocol for siting pre- and post-construction air quality and meteorological PSD monitoring systems. I determined the instrumentation requirements, and designed and sited over 30 such PSD monitoring systems. Meteorological parameters measured included ambient temperature, wind speed, wind direction, sigma-theta (standard deviation of horizontal wind direction fluctuations), sigma-phi (standard deviation of vertical wind direction fluctuations), sigma-v (standard deviation of horizontal wind speed fluctuations), and sigma-w (standard deviation of vertical wind speed fluctuations). Air pollutants measured included PM_{10}, SO_2, NO, NO_x, NO_2, CO, O_3, and H_2S.
- I was responsible for data acquisition and quality assurance for an offshore meteorological monitoring station. Parameters measured included ambient temperature (and delta-T), wind speed, wind direction, and sigma-theta.
- In coordination with consultants performing air monitoring for verifying compliance with Proposition 65 and other regulatory programs, I wrote software to convert raw meteorological data to hourly-averaged values formatted for dispersion modeling input.
- Assisting the Ventura Unified School District, I collected air, soil, and surface samples and had them analyzed for chlorpyrifos contamination (caused by spray drift from a nearby citrus orchard). I also coordinated the analysis of the samples, and presented the results in a public meeting.
- Using summa canisters, I collected numerous VOC samples to characterize background and initial conditions for use in Santa Barbara County ozone attainment modeling. I also collected samples of air toxics (such as xylenes downwind of a medical device manufacturer) to assist in enforcement actions.
- For the California Attorney General's Office, I purchased, calibrated, and operated a carbon monoxide monitoring system. I measured and reported CO air concentrations resulting from numerous types of candles, gas appliances, and charcoal briquettes.

Support, Training, and Instruction

- For 10 years, I provided ACE2588 risk assessment model support for CAPCOA. My tasks included: updating the ACE2588 risk assessment model Fortran code to increase user efficiency and to maintain consistency with the CAPCOA Risk Assessment Guidelines; modifying the Fortran code to the EPA ISC model to interface with ACE2588; writing utility programs to assist ACE2588 users; updating toxicity data files to maintain consistency with the CAPCOA Risk Assessment Guidelines; developing the distribution and installation package for ACE2588 and associated programs; providing technical support for all users of ACE2588.
- I instructed approximately 20 University Professors through the National Science Foundation Faculty Enhancement Program. Instruction topics included: dispersion modeling, meteorological data, environmental fate analysis, toxicology of air pollutants, and air toxics risk assessment; professors were also trained on the use of the ISC2ACE dispersion model and the ACE2 exposure assessment model.

- I was the instructor of the Air Pollution and Toxic Chemicals course for the University of California, Santa Barbara, Extension certificate program in Hazardous Materials Management. Topics covered in this course include: detailed review of criteria and noncriteria air pollutants; air toxics legislation and regulations; quantifying toxic air contaminant emissions; criteria and noncriteria pollutant monitoring; air quality modeling; health risk assessment procedures; health risk management; control/mitigating air pollutants; characteristics and modeling of spills and other short-term releases of air pollutants; acid deposition, precipitation and fog; indoor/occupational air pollution; the effect of chlorofluorocarbons on the stratospheric ozone layer. I taught this course for five years.
- I have trained numerous regulatory staff on the mechanics of dispersion modeling, health risk assessments, emission rate calculations, and presentation mapping. I provided detailed training to SBAPCD staff in using the HARP program, and in comparing and contrasting ACE2588 analyses to HARP.
- Through UCSB Extension, I taught a three-day course on dispersion modeling, preparing health risk assessments, and presentation mapping with Atlas GIS and MapInfo.
- I hold a lifetime California Community College Instructor Credential (Certificate No. 14571); Subject Matter Area: Physics.
- I have presented numerous guest lectures – at universities, public libraries, farm groups, and business organizations.

Indoor Air Quality

- I prepared mercury exposure assessments caused by applying indoor latex paints containing phenylmercuric acetate as a biocide.
- Using a carbon monoxide monitor, I examined CO concentrations inside rooms of varying sizes and with a range of ventilation rates. Indoor sources of CO emissions included gas appliances and candles. I also examined CO concentrations within parking garages.
- I calculated air concentrations of tetrachloroethene inside homes and cars from offgassing dry-cleaned clothes.
- I examined air concentrations of formaldehyde inside manufactured homes and school buildings. I also calculated formaldehyde exposures from carpet emissions within homes.
- I assessed lead air exposures and surface deposition from deteriorating lead-based paint applications within apartments. I also calculated lead air concentrations and associated exposures resulting from milling of brass pipes and fittings.
- While employed by the SBAPCD, I assisted with exposure assessment and awareness activities for Santa Barbara County high-exposure radon areas.
- I calculated BTEX air concentrations and health risks inside homes from leaking underground fuel tanks and resultant contaminated soil plumes. I also assessed indoor VOC exposures and remediation options with the AERIS model.
- I have assessed indoor air concentrations from numerous volatile organic compound sources, including printing operations, microprocessor manufacturing, and solvent degreasing activities.
- I calculated indoor emission flux rates and air concentrations of elemental mercury for plaintiff litigation support purposes. This analysis included an exposure reconstruction (home, school, workplace, outside, and other locations) for 16 plaintiffs who had collected spilled mercury in their village. The study required room volume calculations, air exchange rates, exposure history reconstruction, mercury quantity and droplet size estimation, elemental mercury flux rate calculations (including decay with time), and resultant air concentration calculations. I calculated both peak acute (two-hour) and 24-hour average concentrations.
- I calculated emission rates of lead from disturbed paint surfaces. I then calculated indoor air concentrations of lead for plaintiff litigation support purposes.

Publications

- To establish a legal record and to assist in environmental review, I prepared and submitted dozens of detailed comment letters to regulatory and decision-making bodies.
- I have contributed to over 100 Environmental Impact Statements/Reports and other technical documents required for regulatory decision-making.
- I prepared two software review columns for the *Journal of the Air and Waste Management Association*.
- Correlations of total, diffuse, and direct solar radiation with the percentage of possible sunshine for Davis, California. Solar Energy, 27(4):357-360 (1981).

Employment History

- Self-Employed Air Quality Consultant — 1992 to 2018
- Santa Barbara County APCD, Senior Scientist — 1988 to 1992
- URS Consultants, Senior Scientist — 1987 to 1988
- Santa Barbara County APCD, Air Quality Engineer — 1983 to 1987
- Dames and Moore, Meteorologist — 1982 to 1983
- UC Davis, Research Associate — 1980 to 1981

Testimony History

- People of the State of California v. McGhan Medical, Inc.
  Deposition: Two dates: June - July 1990
- People of the State of California v. Santa Maria Chili
  Deposition: Two dates: August 1990
- California Earth Corps v. Johnson Controls, Inc.
  Deposition: October 26, 1995
- Larry Dale Anderson v. Pacific Gas & Electric
  Deposition: January 4, 1996
  Arbitration: January 17, 1996
- Adams v. Shell Oil Company
  Deposition: July 3, 1996
  Trial: August 21, 1996
  Trial: August 22, 1996
- California Earth Corps v. Teledyne Battery Products
  Deposition: January 17, 1997
- Marlene Hook v. Lockheed Martin Corporation
  Deposition: December 15, 1997
- Lawrence O'Connor v. Boeing North America, Inc.
  Deposition: May 8, 1998
- Bristow v. Tri Cal
  Deposition: June 15, 1998
- Abeyta v. Pacific Refining Co.
  Deposition: January 16, 1999
  Arbitration: January 25, 1999
- Danny Aguayo v. Betz Laboratories, Inc.
  Deposition: July 10, 2000
  Deposition: July 11, 2000
- Marlene Hook v. Lockheed Martin Corporation
  Deposition: September 18, 2000
  Deposition: September 19, 2000
- Tressa Haddad v. Texaco
  Deposition: March 9, 2001

- California DTSC v. Interstate Non-Ferrous
  United States District Court, Eastern District of California,
  Case No. CV-F-97 50160 OWW LJO
  Deposition: April 18, 2002
- Akee v. Dow et al.
  United States District Court, District of Hawaii,
  Case No. CV 00 00382 BMK
  Deposition: April 16, 2003
  Deposition: April 17, 2003
  Deposition: January 7, 2004
  Trial: January 17, 2004
  Trial: January 20, 2004
- Center for Environmental Health v. Virginia Cleaners
  Superior Court of the State of California
  County of Alameda, Case No. 2002 07 6091
  Deposition: March 4, 2004
- Application for Certification for Small Power Plant Exemption – Riverside Energy Resource Center. Docket No. 04-SPPE-01.
  Evidentiary Hearing Testimony before the California Energy Resource Conservation And Development Commission: August 31, 2004
- Lawrence O'Connor v. Boeing North America, Inc.
  United States District Court, Central District of California,
  Western Division. Case No. CV 97-1554 DT (RCx)
  Deposition: March 1, 2005
  Deposition: March 2, 2005
  Deposition: March 3, 2005
  Deposition: March 15, 2005
  Deposition: April 25, 2005
- Clemente Alvarez, et al, v. Western Farm Service, Inc.
  Superior Court of the State of California
  County of Kern, Metropolitan Division. Case No. 250 621 AEW
  Deposition: April 11, 2005
- Gary June et al. v. Union Carbide Corporation & UMETCO Minerals Corporation
  United States District Court, District of Colorado,
  Case No. 04-CV-00123 MSK-MJW
  Deposition: January 9, 2007
- Alberto Achas Castillo, et al. v. Newmont Mining Corporation, et al.
  District Court, Denver County, Colorado,
  Case No. 01-CV-4453
  Deposition: February 19, 2007
  Deposition: February 20, 2007
  Arbitration: March 6, 2007
  Arbitration: March 7, 2007
- Jacobs Farm/Del Cabo Inc. v. Western Farm Service, Inc.
  Superior Court of the State of California
  County of Santa Cruz, Case No. CV 157041
  Deposition: May 8, 2008
  Deposition: August 26, 2008
  Trial: September 18, 2008
  Trial: September 24, 2008

- Environmental Law Foundation et al. v. Laidlaw Transit Inc. et al.
  Superior Court of the State of California
  County of San Francisco, Case No. CGC-06-451832
  Deposition: July 8, 2008
- Application of NRG Texas Power, LLC for State Air Quality Permit No. 79188
  and Prevention of Significant Deterioration Air Quality Permit PSD-TX-1072.
  State Office of Administrative Hearings Docket No. 582-08-0861;
  TCEQ Docket No. 2007-1820-AIR.
  Deposition: February 12, 2009
  Hearing: February 24, 2009
- Application of IPA Coleto Creek, LLC for State Air Quality Permit No. 83778
  and Prevention of Significant Deterioration Air Quality Permit PSD-TX-1118 and for Hazardous Air Pollutant Major Source [FCAA § 112(G)] Permit HAP-14.
  State Office of Administrative Hearings Docket No. 582-09-2045;
  TCEQ Docket No. 2009-0032-AIR.
  Deposition: September 21, 2009
  Hearing: October 16, 2009
- Application of Las Brisas Energy Center, LLC for State Air Quality Permit No. 85013
  and Prevention of Significant Deterioration Air Quality Permit PSD-TX-1138 and for Hazardous Air Pollutant Major Source [FCAA § 112(G)] Permit HAP-48 and Plantwide Applicability Permit PAL41.
  State Office of Administrative Hearings Docket No. 582-09-2005;
  TCEQ Docket No. 2009-0033-AIR.
  Deposition: October 9, 2009
  Hearing: November 5, 2009
  Hearing: November 6, 2009
- Abarca, Raul Valencia, et al. v. Merck & Co., Inc., et al.
  United States District Court, Eastern District of California,
  Case No. 1:07-CV-00388-OWW-DLB
  Phase 1 Deposition: April 13, 2010
  Daubert Hearing: October 7, 2010
  Daubert Hearing: October 13, 2010
  Daubert Hearing: October 14, 2010
  Rule 706 Expert Hearing: December 2, 2010
  Phase 1 Trial: February 10, 2011
  Phase 2 Deposition: September 19, 2012
- Commonwealth of Kentucky, Energy and Environment Cabinet, File No. DAQ-41109-048. Sierra Club, Kentucky Environmental Foundation, and Kentuckians for the Commonwealth v. Energy and Environment Cabinet, Division for Air Quality, and East Kentucky Power Cooperative, Inc.
  Deposition: August 31, 2010
- Dorsey, Michael J., et al. v. Mid-Pacific Country Club
  First District Court, State of Hawaii
  Case No. 12-1-0158-01
  Deposition: November 17, 2013
- Global Community Monitor, et al. v. Lumber Liquidators, Inc. et al.
  Superior Court of the State of California
  County of Alameda. Case No. RG14733979
  Deposition: January 8, 2016
  Deposition: March 1, 2016

- Scott D. McClurg, et al. v. Mallinckrodt, Inc., et al.
  United States District Court, Eastern District of Missouri, Eastern Division
  Case No. 4:12-CV-00361-AGF
    Deposition: July 12, 2017
    Deposition: July 13, 2017
    Deposition: September 27, 2017