Appendix B

Air Quality Impact Assessment

Updated Air Quality Impact Assessment, May 29, 2019

Air Quality Impact Assessment, January 2, 2019

Sespe Consulting, Inc.

SESPE
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May 29, 2019

Jane Farkas
Director of Land and Regulatory Affairs
Carbon California Company
270 Quail Ct., Suite B
Santa Paula, CA 93060

Re: Updated Air Quality Impact Assessment
Carbon California Company – Agnew Lease

Dear Ms. Farkas:

This Updated Air Quality Impact Assessment (AQIA) has been prepared to update a previous AQIA dated January 2, 2019 and prepared by Sespe Consulting, Inc. (Sespe) for the Agnew Lease (Facility) operations. The previous AQIA quantified and determined the significance of air quality impacts associated with the following Facility operations:

- The continued operation and production of the three (3) existing wells, including the proposed re-drill of one of the existing wells,
- The drilling (construction) and operation of three (3) new oil wells and associated production activities,
- The vehicle miles traveled (VMT) off-site and on-site for the transport of oil and wastewater,
- The vehicle miles traveled (VMT) off-site and on-site for the transport of drilling equipment during construction.

Since the preparation of the January 2, 2019 AQIA, the project applicant revised the proposed project description such that only two (2) new oil wells are proposed to be drilled and operated at the project site. This AQIA provides revised emissions estimates for the operation and associated production activities of two (2) new oil wells (Project).

1.0 SIGNIFICANCE THRESHOLDS

The VCAPCD's Ventura County Air Quality Assessment Guidelines (VCAPCD Guidelines) form the basis of this AQIA. Table 1 presents the criteria pollutant significance thresholds from the Guidelines. As the proposed project is located in the Ojai Planning Area, significance thresholds for that area were used.

Table 1 Ojai Planning Area Criteria Pollutant Significance Thresholds

Source	ROC (lbs/day)	NO_x (lbs/day)
Ojai Planning Area CEQA Threshold	5	5

2.0 EMISSIONS SUMMARY

Attachment A contains emissions calculations and assumptions used. Operational criteria pollutant emissions associated with the two new wells and associated activities/equipment were estimated. This includes:

- The additional 4 pounds/day in ROC emissions from the two new proposed oil wells.
- Emissions from the proposed gas flaring from the two new wells. Historic production records from the three existing wells was used to estimate oil and gas production for the new wells over the life of the CUP.
- Emissions from processing and storage of crude oil for new wells using the existing on-site equipment.
- Emissions from transport of oil and water from the new and existing wells.

Emissions for the proposed Project are shown in Table 2.

Table 2: Project-Related and Total Criteria Pollutant Emissions (lb./day)

PHASE	ROC (lb./day)	NOx (lb./day)	CO (lb./day)	PM10 (lb./day)	SOx (lb./day)
Project-Related Emissions:					
Flare	0.3460	0.4845	2.5609	0.0692	0.4845
Tanks	0.1896	--	--	--	--
Loading Facilities	0.0221	--	--	--	--
Oil Wells[1]	4.0000	--	--	--	--
Vehicle Miles (transport oil and wastewater)	0.0002	0.0083	0.0008	0.0000	0.0000
Project Total:	**4.5579**	**0.4928**	**2.5617**	**0.0692**	**0.4845**
Ojai Planning Area CEQA Threshold	**5**	**5**			

1 – Includes 2 lb./day ROC emissions for each new well

The revised Project results in less than significant impacts from operation phase criteria pollutant emissions.

3.0 HEALTH RISK IMPACTS

The previous AQIA evaluated the health risks of the previously proposed Project including the drilling of three new wells and the re-drilling of one existing oil well over the period of four years (one well drilled per year). The previous AQIA showed the project did not exceed the cancer risk significance threshold of 10 cancer cases per million exposed nor the chronic hazard index of 1.0. Since the new Project removes one of the proposed new oil wells, the cancer risk would be lower and the chronic hazard index would be either unchanged or lower. Because of this, health risk impacts were not re-evaluated in this AQIA.

Respectfully,

Rob Dal Farra, P.E.
Vice President
Sespe Consulting, Inc.

Attachments: Emissions Calculations and Assumptions

ATTACHMENT A

Emissions Calculations

Project - Emission Calculation Summary

Summary of Estimated Criteria Emissions

	Calculated Emissions (tons/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0632	0.0884	0.0126	0.0884	0.4673
Tanks	0.0346				
Loading Facilities	0.0040				
Oil Wells	0.7300				
VMT	0.0000	0.0009	0.0000	0.0000	0.0001
Diesel Engines (construction)	0.0657	1.3828	0.0363	0.0017	0.3565
TOTAL	**0.8975**	**1.4722**	**0.0489**	**0.0901**	**0.8240**

	Calculated Emissions (lbs/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	126.3079	176.8310	25.2616	176.8310	934.6784
Tanks	69.2020				
Loading Facilities	8.0746				
Oil Wells	1460.0000				
VMT	0.0485	1.8877	0.0095	0.0056	0.2058
Diesel Engines (construction)	131.3441	2765.6110	72.6022	3.3904	713.0758
TOTAL	**1794.9771**	**2944.3297**	**97.8733**	**180.2270**	**1647.9600**

	Calculated Emissions (lbs/hr)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0144	0.0202	0.0029	0.0202	0.1067
Tanks	0.0079				
Loading Facilities	0.0009				
Oil Wells	0.1667				
VMT	0.0004	0.0146	0.0001	0.0000	0.0017
Diesel Engines (construction)	0.9224	18.7828	0.5026	0.0241	5.0737
TOTAL	**1.1126**	**18.8175**	**0.5056**	**0.0443**	**5.1821**

	Calculated Emissions (lbs/day)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.3460	0.4845	0.0692	0.4845	2.5608
Tanks	0.1896				
Loading Facilities	0.0221				
Oil Wells	4.0000				
VMT	0.0002	0.0083	0.0000	0.0000	0.0008
TOTAL	**4.5580**	**0.4928**	**0.0693**	**0.4845**	**2.5616**

Project - Flares

Usage Data

Unit ID#		
[D] District Toxic Profile ID	9	
Operating Hours Per Day	24	hours/day
[A] Operating Days Per year	365	days/year
[E] Heating Value	861.9	BTU/scf
[A] Flare Max Hourly Throughput	0.8	MMBtu/hr
	800,000	Btu/hr
	928.18	scf/hr
Flare Production	2	Wells
	5.27	Historic ave. crude oil bbl/day/well
	10.53	Total project ave. crude bbl/day
	3,845	Crude oil bbl per year
	762	Historic average gas/oil ratio (scf/bbl)
	2,930,918	scf/year for all wells
	2.93	MMCF / year

[C] Criteria Emission Factors

Unit	ROC	NOx	PM	SOx	CO
lb/MMBTU	0.0500	0.0700	0.0100	0.0700	0.3700

Criteria Emissions

Unit	ROC	NOx	PM	SOx	CO
lb/MMcf	43.0950	60.3330	8.6190	60.3330	318.9030
lb/year	126.3079	176.8310	25.2616	176.8310	934.6784
tons/year	0.0632	0.0884	0.0126	0.0884	0.4673
lb/hr	0.0144	0.0202	0.0029	0.0202	0.1067
lb/day	0.3460	0.4845	0.0692	0.4845	2.5608

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

C) Criteria pollutant emission factors for a non-BACT flare from AP-42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 5: Industrial Flares.

D) Speciation for Natural Gas Flare External Combustion ROC emissions from the San Joaquin Valley APCD AB-2588 Hot Spots Air Toxics Profiles from table, "Natural Gas Fired External Combustion Equipment" in the May 2001 update of VCAPCD AB 2588 Combustion Emission Factors. Received from Ventura County APCD Manager, Kerby Zozula, on September 24, 2018.

E) Heatling value from Gas Analysis by Chromatography report on Agnew Oil Well No. 2 from Pacific Gas Technology (PGT), ASTM D 1945/D 3588, sampled and analyzed on September 25, 2018.

Project - Tanks

Usage Data

Unit ID #		
[A] Emission Control Factor	90.00%	(vapor recovery and flare)
[A] Operating Days Per Year	365	days/year
Operating Hours Per Day	24	hours/day
[A] Crude Oil Vapor Pressure	1.5	psi
Number of Wells	**2**	Wells
Oil Production		
Oil Production Per Well	5.27	bbl/day/well
Total Oil Production	10.5	bbl/day
Crude Oil Storage Tank (Oil Production Tank 1)	1,922	bbl/year
Wash Tank (Oil Production Tank 2)	1,922	bbl/year
[A] Crude Oil Storage Tank (Oil Production Tank 1)	500	bbl
[A] Wash Tank (Oil Production Tank 2)	500	bbl
Number of Oil Tanks	2	tanks
Water Production		
Water Production Per Well	2	bbl/day/well
Total Water Production	4	bbl/day
Produced Water Tank 1		bbl/year
Produced Water Tank 2		bbl/year
[A] Produced Water Tank 1 Capacity	250	bbl
[A] Produced Water Tank 2 Capacity	250	bbl
Number of PW Tanks	2	tanks

90% control used by APCD in permitting

[C] Criteria Emission Factors: Breathing and Working

	Breathing	Working
Unit Description	**Uncontrolled ROC EF[1] (lb/bbl-yr)**	**Uncontrolled ROC EF[1] (lb/Mbbl)**
Crude Oil Storage Tank (Oil Production Tank 1)	0.43	12.23
Wash Tank (Oil Production Tank 2)	0.43	12.23
[D] Produced Water Tank 1	0.43	
[D] Produced Water Tank 2	0.43	

Criteria Emissions: Breathing and Working

	Breathing		
Unit Description	**Controlled ROC (tons/year)**	**Controlled ROC (lbs/hr)**	**Controlled ROC (lbs/day)**
Crude Oil Storage Tank (Oil Production Tank 1)	0.0108	0.0025	0.0589
Wash Tank (Oil Production Tank 2)	0.0108	0.0025	0.0589
[D] Produced Water Tank 1	0.0054	0.0012	0.0295
[D] Produced Water Tank 2	0.0054	0.0012	0.0295
TOTAL	**0.0323**	**0.0074**	**0.1767**

	Working		
Unit Description	**Controlled ROC (tons/year)**	**Controlled ROC (lbs/hr)**	**Uncontrolled ROC (lbs/day)**
Crude Oil Storage Tank (Oil Production Tank 1)	0.0012	0.0003	0.0064
Wash Tank (Oil Production Tank 2)	0.0012	0.0003	0.0064
[D] Produced Water Tank 1			
[D] Produced Water Tank 2			
TOTAL	**0.0024**	**0.0005**	**0.0129**

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

C) Ventura County APCD criteria pollutant default emission factors.

D) In the Ventura County APCD, it is assumed that working emissions are not produced from process water tanks or diluent tanks, which is the reason for no emission factors or emission calculations.

Project - Loading Facilities

Usage Data

Unit ID#		
Number of Wells	**2**	Wells
Oil Production Per Well	5.27	bbl/day/well
Total Oil Production	10.5	bbl/day
Operating Days/year	365	days
[A] Control Efficiency	90%	
Operating Hours/day	24	hours
Total Fluid	3,845	bbl/year
[A] Rated Capacity	200	bbl/hr

90% control used by APCD in permitting

[C] Criteria Emission Factors

Unit	ROC
lbs/Mgal	2.7400

Criteria Emissions

Unit	ROC Emissions
lbs/day	0.0221
lbs/hour	0.0009
lbs/year	8.0746
Tons/year	0.00404

[E] True Vapor Pressure Calculation

True vapor pressure (psia) can also be assumed from AP42 Table 7.1-2

True Vapor Pressure = RVP $e^{[C_0(IRTEMP-ITEMP)]}$

RVP =	Reid Vapor Pressure =		0.45
Co=	Constant =		-6622.5
ITEMP =	Inverse of RVP temperature (559.69^{o}R) =		0.001786703
IRTEMP=	Inverse of holding temperature =		0.001667528
		TVP=	0.99

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

C) Ventura County APCD criteria pollutant default uncontrolled emission factors.

D) Criteria emission factors from AP-42, Section 5.2.

E) True Vapor Presure equation from SBCAPCD Rule 325.

Project - Oil Wells

Usage Data

1 barrell oil (bbl)	5.61	cubic feet
Number of wells	**2**	Wells
[A]Average operational Days Per Well	365	Days
[A]Average operational Hours Per Day	24	Hours
Number of Well Days Operated	730	Days
Oil Well Production Estimation Per Well	5.27	bbl/day/well
# Wells	**2**	wells
Oil Well Production Estimation	10.53	bbl/day
	59.092	scf/day
	2.462166667	scf/hr

[A] Criteria Emission Factors

Unit	[C]ROC
lb/well-day	2.0

Criteria Emissions

ROC (tons/year)	ROC (lbs/hr)	ROC (lb/year)	ROC (lb/day)
0.7300	0.1667	1460.0000	4.0000

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.
C) APCD emission factor.

Project - Construction-Specific VMTs (years 1-4)

Usage Data

Hours per trucking day	8	hours
Days per week	5	day/wk
Employees transporting oil and wastewater days per year	260.5	days
Additional construction employees days per year	10	days
Construction equipment transportation days per year	4	days
Weeks per year	52.1	weeks/yr

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification:	HHD Fleet Truck, Diesel, T7 Tractor	
[J]Total number of trucks	2	trucks
Trips/ week /truck	2	trips / wk / truck
Trips/week for all trucks	4	trips / wk
[B]On Site Road Length (One Way)	700	feet
On Site Road Length	0.1326	miles
VMT per week for all trucks	0.5303	VMT/week for all trucks
VMT per year for one truck	13.8144	VMT/year for one truck
VMT per year for all trucks	27.6288	VMT/ year for all trucks
VMT per day for all trucks	0.1061	VMT/day for all trucks
VMT per hour for all trucks	0.0133	VMT/ hour for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[C]Total number of trucks	2	trucks
Trips/ week /truck	2	trips / wk / truck
Trips/week for all trucks	4	trips / wk
[B]Off Site Road Length (One Way)	2500	feet
Off Site Road Length	0.4735	miles
VMT per week for all trucks	1.8939	VMT/week for all trucks
VMT per year for one truck	49.3371	VMT/year for one truck
VMT per year for all trucks	98.6743	VMT/ year for all trucks
VMT per day for all trucks	0.3788	VMT/day for all trucks
VMT per hour for all trucks	0.0473	VMT/ hour for all trucks

Additional Construction Employees

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification	LDT2, Gas	
[L] Total number of shifts per day	2	shifts / day
[L]Hours per shift	12	hours / shift
[L] Employees per shift	10	Employees / shift
[L]Trips per day per truck	2	Trips / day / truck
[L] Total days with additional employees	10	days/year
[K]Total number of trips all vehicles all days	400	trips/well drilled
[B]On Site Road Length (one-way)	700	feet/trip
On Site Road Length (one-way)	0.1326	miles/trip
VMT per year for one truck	5.3030	mile / yr / truck
VMT per year for all trucks	53.0303	miles/ year for all trucks
VMT per day for all trucks	0.2036	VMT/ day for all trucks
VMT per hour for all trucks	0.0254	VMT/ hour for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	LDT2, Gas	
[L] Total number of shifts per day	2	shifts / day
[L]Hours per shift	12	hours / shift
[L] Employees per shift	10	Employees / shift
[L]Trips per day per truck	2	Trips / day / truck
[L] Total days with additional employees	10	days
[K]Total number of trips all vehicles all days	400	trips/well drilled
[B]On Site Road Length (one-way)	2500	feet/trip
On Site Road Length (one-way)	0.4735	miles/trip
VMT per year for one truck	18.9394	mile / yr / truck
VMT per year for all trucks	189.3940	miles/ year for all trucks
VMT per day for all trucks	0.7270	VMT/ day for all trucks
VMT per hour for all trucks	0.0909	VMT/ hour for all trucks

Project - Construction-Specific VMTs (years 1-4)
Construction Equipment Transportation

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification:	HHD Fleet Truck, Diesel, T7 Tractor	
[C,J]Total number of trucks	8	trucks
Trips per day per truck	2	trips / day / truck
Trips per day for all trucks	16	trips / day / truck
Days needed to transport equipment	2	days/well
Total days for construction equp. Transport	4	days/year
Total number of trips all vehicles all days	64	trips/well
[B]On Site Road Length (one-way)	700	feet/trip
On Site Road Length (one-way)	0.1326	miles/trip
VMT per year for one truck	1.0606	miles/year for one truck
VMT per year for all trucks	8.4849	VMT/ year for all trucks
VMT per day for all trucks	2.1212	miles/day for all trucks
VMT per hour for all trucks	0.2652	VMT/ hour for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification:	HHD Fleet Truck, Diesel, T7 Tractor	
[C,J]Total number of trucks	8	trucks
Trips per day per truck	2	trips / day / truck
Trips per day for all trucks	16	trips / day / truck
Days needed to transport equipment	2	days/well
Total days for construction equp. Transport	4	days/year
Total number of trips all vehicles all days	32	trips/well
[B]On Site Road Length (one-way)	2500	feet/trip
On Site Road Length (one-way)	0.4735	miles/trip
VMT per year for one truck	1.8939	miles/year for one truck
VMT per year for all trucks	15.1515	VMT/ year for all trucks
VMT per day for all trucks	7.5758	miles/day for all trucks
VMT per hour for all trucks	0.9470	VMT/ hour for all trucks

VMT Totals

		On-Site	Off-Site
Gas and Diesel Engine Total (Employees Transporting Oil and Wastewater + Additional Construction Employees + Equipment Transportation):	VMT per day for all trucks	2.4308	8.6816
	VMT per hour for all trucks	0.3039	1.0852
	VMT per year for all trucks	89.1440	303.2198

Fugitive PM10 and PM2.5 Emission Factors and Total (Employees Transporting Oil and Wastewater + Additional Construction Employees + Equipment Transportation) Emissions

[D]Unpaved Road Emission Factors (On Site VMTs, On Road Truck, Unpaved Road):

	PM10	PM2.5
S = silt content (%)	4.8	
W_l = loaded truck wt (tons)	40	
W_u = unloaded truck wt (tons)	15	
W = avg truck weight	27.5	
Uncontrolled EF (lb/VMT)	1.7821	0.3778
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.3564	0.0756
Daily Emissions (lb/day)	0.8664	0.1837
Hourly Emissions (lb/hour)	0.1083	0.0230
Annual Emissions (lb/year)	225.7020	47.8488

EF (lb/VMT)= $4.9 * (S/12)^{0.7} * (W/3)^{0.45}$

Silt content based on mean Sand and Gravel Processing from AP-42 Table 13.2.2-1.

Control efficiency for unpaved roads in baseline is 80% for watering.

Control efficiency for unpaved roads in baseline is 80% for watering.

Project - Construction-Specific VMTs (years 1-4)

[E] Paved Road Emission Factors (Off Site VMTs, On Road Truck, Paved Road):

	PM10	PM2.5
k= particle size multiplier (lb/vmt)	0.0022	0.00054
sL = road surface silt loading (g/m^2)	0.2	0.2
W_l = loaded truck wt (tons)	40	40
W_u = unloaded truck wt (tons)	15	15
W = avge truck weight	27.50	27.50
Uncontrolled EF (lb/VMT)	0.0149	0.0037
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.0030	0.0007
Daily Emissions (lb/day)	0.0259	0.0064
Hourly Emissions (lb/hour)	0.0032	0.0008
Annual Emissions (lb/year)	6.7595	1.6592

EF (lb/VMT)= $k * (sL)^{0.91} * (W)^{1.02}$
Particle size multiplier based on AP-42 Table 13.2.1-1.
Silt Loading based on ADT of 500 - 5000 from AP-42 Table 13.1-2.
Control efficiency for unpaved roads in baseline is 80% for watering.

Particulate Matter Totals from On Site and Off Site, Unpaved and Paved Roads:

	Off-road Trucks		On-road Trucks	
	PM10	PM2.5	PM10	PM2.5
Hourly Emissions (lb/hour)			0.1115	0.0238
Annual Emissions (lb/year)			232.4615	49.5080

[I] Speciated Fugitive DUST PM10 Emission Factors and Total (Employees Transporting Oil and Wastewater + Equip. Transposport + Additional Construction Employees) Emissions (On and Off Site VMTs, On Road, Paved Road)

Pollutant Name	Emission factor (ppmw)	CAS #	Emissions (lbs/year)	Emissions (lbs/hour)
ARSENIC	20	7440382	4.65E-03	2.23E-06
BERYLLIUM	1	7440417	2.32E-04	1.12E-07
CADMIUM	1	7440439	2.32E-04	1.12E-07
CHROMIUM HEXAVALENT	0	18540299	0.00E+00	0.00E+00
CHROMIUM NONHEXAVALENT	50	7440473	1.16E-02	5.58E-06
COPPER	100	7440508	2.32E-02	1.12E-05
LEAD	50	1128	1.16E-02	5.58E-06
MANGANESE	500	7439965	1.16E-01	5.58E-05
MERCURY	0	7439976	0.00E+00	0.00E+00
NICKEL	20	7440020	4.65E-03	2.23E-06
SELENIUM	5	7782492	1.16E-03	5.58E-07
SILICA, CRYSTALLINE	100000	1175	2.32E+01	1.12E-02
ZINC	200	7440666	4.65E-02	2.23E-05

EMFAC2014 Emission Factors for Criteria Emissions

[F] EMFAC2014 Emission Rates for Gas Pick-Up Truck (LDT2, On Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.0213	0.9929	0.1148	0.0040	0.0017	0.0016	394.1230	413.8291

[G] EMFAC2014 Emission Rates for Diesel HHD Fleet Truck (T7 Tractor, Off Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.1321	0.5100	5.1846	0.0151	0.0260	0.0249	1579.2033	1658.1635

Project - Construction-Specific VMTs (years 1-4)

Criteria Emissions

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0012	0.0001	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0080	0.3155	0.0310	0.0016	0.0015	0.0009	0.0458

Off-Site, On-Road, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0001	0.0043	0.0004	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0005	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0287	1.1268	0.1108	0.0056	0.0054	0.0033	0.1635

Total of Off- and On- Site Employee Oil and Wastewater Transport Emissions

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0001	0.0055	0.0005	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0007	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0367	1.4424	0.1419	0.0072	0.0069	0.0042	0.2092

Additional Construction Employees

On-Site, On-Road Truck, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0001	0.0004	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0001	0.0005	0.0045	0.0000	0.0000	0.0000	0.0000

Project - Construction-Specific VMTs (years 1-4)

Off-Site, On-Road Truck, Paved

Daily Emissions (lb/day)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0000	0.0002	0.0016	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						**CO2e (MT/y)**
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0003	0.0018	0.0159	0.0000	0.0000	0.0001	0.0000

Total of Off- and On- Site Additional Construction Employee Transport Emissions

Daily Emissions (lb/day)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0000	0.0002	0.0020	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0000	0.0000	0.0003	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						**CO2e (MT/y)**
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0004	0.0024	0.0204	0.0000	0.0000	0.0001	0.0000

Construction Equipment Transportation

On-Site, On-Road Truck, Unpaved

Daily Emissions (lb/day)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0006	0.0242	0.0024	0.0001	0.0001	0.0001	
Hourly Emissions (lb/hour)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0001	0.0030	0.0003	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						**CO2e (MT/y)**
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0025	0.0969	0.0095	0.0005	0.0005	0.0003	0.0141

Off-Site, On-Road Truck, Paved

Daily Emissions (lb/day)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0022	0.0865	0.0085	0.0004	0.0004	0.0003	
Hourly Emissions (lb/hour)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0003	0.0108	0.0011	0.0001	0.0001	0.0000	
Annual Emissions (lb/year)						**CO2e (MT/y)**
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0088	0.3461	0.0340	0.0017	0.0017	0.0010	0.0251

Total of Off- and On- Site Construction Equipment Transport Emissions

Daily Emissions (lb/day)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0028	0.1107	0.0109	0.0006	0.0005	0.0003	
Hourly Emissions (lb/hour)						
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0004	0.0138	0.0014	0.0001	0.0001	0.0000	
Annual Emissions (lb/year)						**CO2e (MT/y)**
ROC	**NOx**	**CO**	**PM10**	**PM2.5**	**SOx**	
0.0113	0.4430	0.0436	0.0022	0.0021	0.0013	0.0392

Project - Construction-Specific VMTs (years 1-4)
Diesel Engine Total (Employees Transporting Oil and Wastewater + Equipment Transportation) Criteria Emissions

	ROC	CO	NOx	SOx	PM10 [M]	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.0004	0.0014	0.0145	0.0000	0.0001	0.0001	0.2484
Annual (lb/year)	0.0480	0.1854	1.8853	0.0055	9.45E-03	0.0090	

Diesel + Gas Engine Total (Employees Transporting Oil and Wastewater + Additional Construction Employees + Equipment Transportation) Criteria Emissions

	ROC	CO	NOx	SOx	PM10	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.0004	0.0017	0.0146	0.0000	0.0001	0.0001	0.2484
Annual (lb/year)	0.0485	0.2058	1.8877	0.0056	0.0095	0.0091	

Assumptions and Sources

A) Assume T7 Tractor vehicle classification used for the transport of Rig #4 and associated well drilling equipment and assume LDT2 vehicle classification used for the transport of additional well-drilling employees to and from the Agnew Oilfield.
B) Google Earth software was used to measure the VMTs on site and off site. The on-site VMT distance was assumed to include the 350 foot site unpaved driveway. The off-site VMT distance was assumed to extend from the bottom of the on-site driveway to the intersection of Koenigstein Road and California State Route 150.
C) Total number of truck trips per week estimate provided by Kenai Drilling Company representative, Carl Hathaway.
D) Unpaved Road emissions factor from AP42 Section 13.2.2.
E) Paved Road emissions factor from AP42 Section 13.2.1.
F) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: LDT2, Model Year: Aggregated, Speed: Aggregated, Fuel: Gas, Season: Annual, and Vehicle Category: EMFAC2011 Categories.
G) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: T7 Tractor, Model Year: Aggregated, Speed: Aggregated, Fuel: Diesel, Season: Annual, and Vehicle Category: EMFAC2011 Categories.
H) CO2e emissions factor determined by scaling CO2 factor up by 5%, per the methodologies found in the BAAQMD GHG Model (BGM). This accounts for emissions of CH4, N2O, and air conditioner evaporative loss.
I) San Diego County APCD, H01 - Haul Roads, General, Paved, & Unpaved, Default Trace Metal Composition.
J) Assume that the number of on-site truck trips is the same as the number of off-site truck trips.
K) Assume the same number of total days with additional well-drilling employees necessary for both on site and off site trucks.
L) Values used to account for the increase in well-drilling employee traffic volume to and from the Agnew Oilfield from page 4 of the Superior Court of the State of California, County of Ventura, Writ of Mandate court decision made by Judge Glen Reiser on September 1, 2017. The Mandate states, "The project would result in a traffic volume of 40 ADT during the drilling stage."
M) Assume PM10 emissions produced by diesel engines are equal to the amount of diesel engine exhaust produced. Diesel engines used here for the transport of oil and wastewater and for the transport of construction equipment.

Project - VMTs (years 5-30)

Usage Data

Hours per trucking day	8	hours
Days per week	5	day/wk
Trucking days per year	260.5	days
Weeks per year	52.1	weeks/yr

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[K J]Total number of trucks	3	trucks
Trips per week per truck	2	trips / wk / truck
Trips per week for all trucks	6	trips / wk
[B]On Site Road Length (One Way)	700	feet
On Site Road Length	0.1326	miles
VMT per week for all trucks	0.7955	VMT/week for all trucks
VMT per day for all trucks	0.1591	VMT/day for all trucks
VMT per hour for all trucks	0.0199	VMT/ hour for all trucks
VMT per year for all trucks	41.4432	VMT/ year for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[K C]Total number of trucks	3	trucks
Trips per week per truck	2	trips / wk / truck
Trips per week for all trucks	6	trips / wk
[B]Off Site Road Length (One Way)	2500	feet
Off Site Road Length	0.4735	miles
VMT per week for all trucks	2.8409	VMT/week for all trucks
VMT per day for all trucks	0.5682	VMT/day for all trucks
VMT per hour for all trucks	0.0710	VMT/ hour for all trucks
VMT per year for all trucks	148.0114	VMT/ year for all trucks

Fugitive PM10 and PM2.5 Emission Factors and Emissions

[D]Unpaved Road Emission Factor (On Site VMTs, On Road Truck, Unpaved Road):

	On-road Trucks	
	PM10	**PM2.5**
S = silt content (%)	4.8	
W_l = loaded truck wt (tons)	40	
W_u = unloaded truck wt (tons)	15	
W = avg truck weight	27.5	
Uncontrolled EF (lb/VMT)	1.7821	0.3778
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.3564	0.0756
Daily Emissions (lb/day)	0.0567	0.0120
Hourly Emissions (lb/hour)	0.0071	0.0015
Annual Emissions (lb/year)	14.7715	3.1316

EF (lb/VMT)= $4.9 * (S/12)^{0.7} * (W/3)^{0.45}$

Silt content based on mean Sand and Gravel Processing from AP-42 Table 13.2.2-1.

Control efficiency for unpaved roads in baseline is 80% for watering.

PM2.5 emissions are 21.2% of PM10 for unpaved roads (SCAQMD *Updated CEIDARS Table).*

Project - VMTs (years 5-30)

[E] Paved Road Emission Factors (Off Site VMTs, On Road Truck, Paved Road):

	On-road Trucks	
	PM10	PM2.5
k= particle size multiplier (lb/vmt)	0.0022	0.00054
sL = road surface silt loading (g/m^2)	0.2	0.2
W_l = loaded truck wt (tons)	40	40
W_u = unloaded truck wt (tons)	15	15
W = avge truck weight	27.50	27.50
Uncontrolled EF (lb/VMT)	0.0149	0.0037
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.0030	0.0007
Daily Emissions (lb/day)	0.0017	0.0004
Hourly Emissions (lb/hour)	0.0002	0.0001
Annual Emissions (lb/year)	0.4424	0.1086

$EF\ (lb/VMT) = k * (sL)^{0.91} * (W)^{1.02}$

Particle size multiplier based on AP-42 Table 13.2.1-1

Silt Loading based on ADT of 500 - 5000 from AP-42 Table 13.1-2

Control efficiency for unpaved roads in baseline is 80% for watering.

Particulate Matter Totals from On Site and Off Site, Unpaved and Paved Roads:

	Off-road Trucks		On-road Trucks	
	PM10	PM2.5	PM10	PM2.5
Hourly Emissions (lb/hour)			0.0073	0.0016
Annual Emissions (lb/year)			15.2139	3.2401

[I] Speciated Fugitive PM10 Emission Factors and Emissions (On and Off Site VMTs, On Road, Paved Road)

Pollutant Name	Emission factor (ppmw)	Emissions (lbs/year)	Emissions (lbs/hour)
ARSENIC	20	3.04E-04	1.46E-07
BERYLLIUM	1	1.52E-05	7.30E-09
CADMIUM	1	1.52E-05	7.30E-09
CHROMIUM HEXAVALENT	0	0.00E+00	0.00E+00
CHROMIUM NONHEXAVALENT	50	7.61E-04	3.65E-07
COPPER	100	1.52E-03	7.30E-07
LEAD	50	7.61E-04	3.65E-07
MANGANESE	500	7.61E-03	3.65E-06
MERCURY	0	0.00E+00	0.00E+00
NICKEL	20	3.04E-04	1.46E-07
SELENIUM	5	7.61E-05	3.65E-08
SILICA, CRYSTALLINE	100000	1.52E+00	7.30E-04
ZINC	200	3.04E-03	1.46E-06

EMFAC2014 Emission Factors for Criteria Emissions

[G] EMFAC2014 Emission Rates for Diesel T7 Tractor (Off Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.1321	0.5100	5.1846	0.0151	0.0260	0.0249	1579.2033	1658.1635

Project - VMTs (years 5-30)

Criteria Emissions

On-Site, On-Road, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0018	0.0002	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0121	0.4733	0.0466	0.0024	0.0023	0.0014	0.0687

Off-Site, On-Road, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0002	0.0065	0.0006	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0008	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0431	1.6903	0.1663	0.0085	0.0081	0.0049	0.2452

Total Criteria Emissions

	ROC	CO	NOx	SOx	[F] PM10	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.00003	0.0001	0.0010	0.0000	0.0000	0.0000	0.3139
Annual (lb/year)	0.0551	0.2128	2.1635	0.0063	0.0108	0.0104	

Project - VMTs (years 5-30)

Assumptions and Sources

A) Assume T7 Tractor EMFAC2014 vehicle category used for the transport of oil and wastewater on and off site.
B) Google Earth software was used to measure the VMTed on site and off site. The on site VMT distance was assumed to include the 350 foot site unpaved driveway. The off site VMT distance was assumed to extend from the bottom of the on site driveway to the intersection of Koenigstein Road and California State Route 150.
C) The baseline setting for overall heavy duty truck traffic reflects the maximum weekly fluid production established in 1989 - the CEQA baseline for traffic volume on Highway 150 is a weekly average of 6.6 to 11.8 one-way truck trips per week. Emissions calculated using 5 trucks to remain conservative.
D) Unpaved Road emissions factor from AP42 Section 13.2.2.
E) Paved Road emissions factor from AP42 Section 13.2.1.
F) Assume PM10 emissions produced by diesel engines are equal to the amount of diesel engine exhaust produced. Diesel engines used here for the transport of oil and wastewater.
G) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: T7 Tractor, Model Year: Aggregated, Speed: Aggregated, Fuel: Diesel, Season: Annual, and Vehicle Category: EMFAC2011 Categories.
H) CO2e emissions factor determined by scaling CO2 factor up by 5%, per the methodologies found in the BAAQMD GHG Model (BGM). This accounts for emissions of CH4, N2O, and air conditioner evaporative loss.
I) San Diego County APCD, H01 - Haul Roads, General, Paved, & Unpaved, Default Trace Metal Composition.
J) Assume that the number of on site truck trips is the same as the number of off site truck trips.
K) Assume no construction in years 5 through 30. The number of trucks used for the transport of oil and wastewater used to calculate the VMT emissions in years 5 to 30 was assumed to remain consistant with the number of trucks used for the transport of oil and wastewater in years 1 to 4.

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AIR QUALITY IMPACT ASSESSMENT

Carbon California Company
Agnew Oilfield Lease
270 Quail Ct., Suite B
Santa Paul, CA 93060

January 2, 2019

Prepared for: Carbon California Company
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AIR QUALITY IMPACT ASSESSMENT

Agnew Oilfield Lease
Carbon California Company

January 2, 2019

EXECUTIVE SUMMARY

This Air Quality Impact Assessment (AQIA) has been prepared to quantify and determine the significance of air quality impacts associated with the proposed drilling of three new oil wells at the Carbon California Company (Carbon) Agnew Lease (Facility) located north of Highway 150 between the City of Ojai and the City of Santa Paula in Ventura County, California. This AQIA follows methodologies and guidance presented in the Ventura County Air Pollution Control District's (VCAPCD) *Ventura County Air Quality Assessment Guidelines*.

All analyzed air quality impacts associated with this Project are less than significant. This AQIA has the following findings:

- The Project results in less than significant Construction phase emissions impacts, however, standard construction emission reduction measures recommended by the VCAPCD are identified.
- Less than significant impacts from operation phase criteria pollutant emissions;
- Less than significant GHG emission impacts.
- The Project results in less than significant localized health risk impacts.
- The Project is consistent with the Ventura County Air Quality Management Plan.

AIR QUALITY IMPACT ASSESSMENT

Agnew Oilfield Lease
Carbon California, LLC
January 2, 2019

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AIR QUALITY IMPACT ASSESSMENT

Carbon California Company
270 Quail Ct., Suite B
Santa Paula, CA 93060

January 2, 2019

1.0 INTRODUCTION

Carbon California Company (Carbon) is proposing to drill and operate three (3) new oil and gas wells and re-drill an existing oil and gas well at their Agnew Lease (Facility) located north of Highway 150 between the City of Ojai and the City of Santa Paula in Ventura County, California (see Figure 1). This Air Quality Impact Assessment (AQIA) has been prepared to quantify and determine the significance of air quality impacts associated with the Facility operations. Operations and sources of air emissions considered in this AQIA include:

- The continued operation and production of the three (3) existing wells, including the proposed re-drill of one of the existing wells,
- The drilling (construction) and operation of three (3) new oil wells and associated production activities,
- The vehicle miles traveled (VMT) off-site and on-site for the transport of oil and wastewater,
- The vehicle miles traveled (VMT) off-site and on-site for the transport of drilling equipment during construction,

Basis for this AQIA: Historically the Facility operated under Conditional Use Permit (CUP) 3543. In 2013, the operator at that time applied to the County of Ventura to renew the permit for an additional 25 years, including re-drilling one of the three existing wells, and for authorization to drill the remaining three wells authorized under the original permit. Since that time the CUP renewal has been approved and appealed numerous times resulting in a Subsequent Environmental Impact Report (SEIR) being prepared by the County of Ventura in March 2016 and ending finally in the Superior Court of California, County of Ventura. In a 2017 decision rendered by Judge Glen Reiser, the applicant (now Carbon) was ordered to conduct additional analysis to evaluate impacts from the proposed drilling of new wells, plus all production, storage, flaring and transport associated with those new wells and identify appropriate project mitigations.

This AQIA has been prepared in response to that court order and is limited in scope to address the requirements of that judgement.

This AQIA follows methodologies and guidance presented in the Ventura County Air Pollution Control District's (VCAPCD) October 2003 *Ventura County Air Quality Assessment Guidelines*. These Guidelines provide a framework and uniform methods for preparing air quality evaluations for environmental documents and recommend specific criteria and threshold levels for determining whether a proposed project may have a significant adverse air quality impact.

There are various principles within the Guidelines that are important to this AQIA:

- *The Guidelines are not applicable to equipment or operations required to have Ventura County APCD permits (Authority to Construct or Permit to Operate). APCD permits are generally required for stationary and portable (non-vehicular) equipment or operations that may emit air pollutants. This permit system is*

separate from CEQA and involves reviewing equipment design, followed by inspections, to ensure that the equipment will be built and operated in compliance with APCD regulations.

- *The emissions from equipment or operations requiring APCD permits are not counted towards the air quality significance thresholds. This is for two reasons. First, such equipment or processes are subject to the District's New Source Review permit system, which is designed to produce a net air quality improvement. Second, facilities are required to mitigate emissions from equipment or processes subject to APCD permit by using emission offsets and by installing Best Available Control Technology (BACT) on the process or equipment.*

- *Construction-related emissions (including portable engines and portable engine-driven equipment subject to the ARB's Statewide Portable Equipment Registration Program, and used for construction operations or repair and maintenance activities) of ROC and NOx are not counted towards the two significance thresholds, since these emissions are temporary. However, construction-related emissions should be mitigated if estimates of ROC and NOx emissions from the heavy-duty construction equipment anticipated to be used for a particular project exceed the 5 pounds per day threshold in the Ojai Planning Area, or the 25 pounds per day threshold in the remainder of the county.*

Based on these principles, the following table compares the proposed Carbon operations and their applicability to the VCAPCD's CEQA air quality significance thresholds (see Section 2.0 for project description details).

Table 1 Emissions Sources vs CEQA Significance

Emission Source	Emission Type	Requires APCD Permit?	Do APCD CEQA Significance Thresholds Apply?
Continued production of the 3 existing wells including flaring of produced gas	Long Term	Yes	No
Production of the 3 new wells including flaring of produced gas and additional 2 lb./day of ROC emissions per well	Long Term	Yes	No
Vehicle travel for the offsite transport of oil and wastewater (additional trips for new well oil production)	Long Term	No	**Yes**
Drilling 3 new wells	Short term construction	No	No
Re-drilling 1 well	Short term construction	No	No
Vehicle travel for the transport of drilling equipment	Short term construction	No	No
Vehicle travel for the transport of additional driller employees	Short term construction	No	No

It is evident based on the VCAPCD Guidelines that only the impact from additional truck trips due to offsite hauling of increased produced fluids (oil, water) would be counted towards the air quality significance thresholds. However, Judge Reiser's order required Carbon to evaluate impacts from the proposed drilling of new wells, plus all production, storage, flaring and transport associated with those new wells even though the majority of those emissions would fall under VCAPCD's permitting authority.

In order to follow the VCAPCD Guidelines and attempt to satisfy the requirements of Judge Reiser's order, the following scenarios were considered in this AQIA when evaluating impacts:

- **For Evaluation of Health Risk:**

    - *Analysis per VCAPCD's Guidelines:* This scenario includes emissions and associated health risk impacts from all vehicle travel for the offsite transport of oil and wastewater. All vehicle travel is being considered instead of considering only the incremental vehicle travel due to increased production from the 3 new wells for the following reasons:

        - The original CUP prohibited the use of Koenigstein Road by heavy trucks for Agnew operations. For the segment of Koenigstein Road proposed to be used, the baseline condition is assumed to be zero truck trips per week.
        - Evaluating impacts from all vehicle travel for the offsite transport of oil and wastewater would be considered the most impactful analysis.

    - *Existing + Proposed Project Analysis:* This scenario included emissions and associated health risk impacts from all sources including existing and Project proposed VCAPCD permitted sources, temporary construction, transportation, etc.

- **For Comparison to CEQA Significance Thresholds:**

    - *Analysis per VCAPCD's Guidelines:* Again, this scenario includes emissions from all vehicle travel for the offsite transport of oil and wastewater.

    - *Temporary Construction Emissions:* Although temporary construction-related emissions are not counted towards the VCAPCD's CEQA significance thresholds they still need to be compared to the thresholds to determine if construction mitigation measures should be identified to reduce such emissions.

2.0 PROJECT DESCRIPTION

The existing Facility contains three (3) wells that are used for oil and gas production. The Project includes continuing oil and gas exploration and production and associated truck trips to transport the oil and wastewater on and off site for the next 25 years. The project also includes the re-drilling of one (1) of the existing three (3) wells, as well as the drilling of three (3) new wells on the Agnew well pad. The construction of the three (3) additional wells will require the transport of drilling equipment to and from the site. Once constructed, the new oil wells will require the Facility to transport additional oil and wastewater to and from the site. Once construction is complete, a total of six (6) wells will be operational on the approximately 1.7-acre Agnew Lease.

2.1 Existing Setting/Baseline

The operation of existing oil and gas production facilities are considered to be baseline sources of emissions. There are currently three (3) operational oil wells located at the Agnew oilfield. Emissions associated with oil production operations from these wells were estimated using historical oil, water, and gas production data from the Division of Oil, Gas, and Geothermal Resources (DOGGR) well finder online data tool for Agnew Wells No. 1, 2, and 3. Existing on-site equipment that will continue to be used over the next 25 years includes:

- Three (3) oil wells (Agnew Wells No. 1, 2, and 3),
- One (1) 200-barrel crude oil storage tank,
- One (1) 500-barrel wash tank,
- Two (2) 250 barrel produced water tanks,

- One (1) oil loading facility, and
- One (1) 0.8 MMBTU/hour Agnew Lease Flare.

Also baseline employee vehicle trips to operate the wells were assumed at two visits per day (4 trips/day, 28 trips per week).

2.2 Project Operation Phase

Operational criteria and toxic air contaminant (TAC) emissions associated with the Project were calculated for new Project sources related to the three new wells and associated activities/equipment. This includes:

- The additional 6 pounds/day in ROC emissions from the three new proposed oil wells.
- Emissions from the proposed gas flaring from the new wells.
- Emissions from processing and storage of crude oil for new wells using the existing on-site equipment.
- Emissions from transport of oil and water from the new and existing wells. This analysis assumes all emissions related to offsite hauling of fluids is Project related. The Project includes a maximum of 8 tanker truck loads (16 one-way trips) per week for fluids transport, occurring during daylight hours Monday through Saturday, between 7:30 am and 6:30 pm.

Emissions from employee vehicle trips to operate the wells are not considered Project related as they are not expected to change with the addition of the 3 new wells.

2.3 Construction Phase

The activities required to drill the three new oil wells and re-drill one existing well were considered in calculating construction phase emissions for the Project. These activities include:

- Transportation of a diesel-powered drilling rig and support equipment to and from site.
- Drilling of new oil well(s). It was assumed that it would take 10 days to drill each new well.
- Traffic from temporary drilling personnel. The analysis assumed during drilling, two x 12 hour shifts with 10 employees each shift driving light duty gasoline powered trucks (pickups) for 10 days of drilling. Total of 40 trips per day, 400 trips per well drilled.

Based on direction from Carbon, it was assumed that one well per year would be drilled over 4 consecutive years (3 new wells, one re-drill). Other assumptions used in the construction phase emissions analysis included:

- Kenai Rig 4 would be used to drill the wells (rig used by Carbon to drill its most recent new oil well). A total of 16 heavy heavy-duty trucks, 8 trucks per day for 2 days would be required to bring the rig on-site during daylight hours (1 truck per hour). The same assumption would apply to taking the rig away.

- Kenai Rig 4 on average uses 400 gal/day of diesel fuel. To yield the most impactful analysis it was assumed this fuel was burned in the highest emitting engine for each pollutant emitted.

3.0 SIGNIFICANCE THRESHOLDS

The VCAPCD's Ventura County Air Quality Assessment Guidelines (VCAPCD Guidelines) form the basis of this AQIA. Table 2 presents the criteria pollutant significance thresholds from the Guidelines. As the proposed project is located in the Ojai Planning Area, significance thresholds for that area were used.

Table 2 Ojai Planning Area Criteria Pollutant Significance Thresholds

Source	ROC (lbs/day)	NO_x (lbs/day)
Sources Not Requiring Permit	5	5

The VCAPCD Guidelines only include thresholds for the ozone precursors oxides of nitrogen (NO_x) and reactive organic compounds (ROC). According to the VCAPCD Guidelines, these thresholds are only applied to unpermitted sources of emissions. Emissions from equipment requiring VCAPCD permits, specifically stationary equipment, are not counted towards these air quality significance thresholds. Significance thresholds are meant to be applied to the impacts associated with the Project only. However, emissions from stationary sources are still quantified within this AQIA for informational purposes.

Impacts from toxic air contaminant (TAC) emissions are estimated by conducting a health risk assessment (HRA). Table 3 presents the significance thresholds for health risk impacts, which are from the VCAPCD Guidelines.

Table 3 Health Risk Significance Thresholds

Source	Cancer Risk	Chronic Risk	Acute Risk
All Project Sources	10 cases in a million	1.0 hazard index	1.0 hazard index

The VCAPCD Guidelines have not yet been updated to include a threshold for greenhouse gasses (GHGs). The VCAPCD has historically utilized the South Coast Air Quality Management District's (SCAQMD) threshold for GHG impacts from industrial projects, as presented in Table 4.

Table 4 GHG Significance Thresholds

Source	CO_2e (MT/yr.)[1]
All Project Sources	10,000

1 – Metric tonnes per year of carbon dioxide equivalent emissions

This AQIA does not calculate GHG emissions from the proposed Project and instead relies upon a GHG emission evaluation conducted by the VCAPCD and presented by the County in their 2016 SEIR (see Appendix D).

In addition to the criteria pollutant, GHG, and TAC quantitative thresholds presented above, the VCAPCD Guidelines also requires that consistency with the Ventura County Air Quality Management Plan (AQMP) be evaluated. A project is consistent with the AQMP if it does not cause population growth beyond the population forecasts in the most recent AQMP.

4.0 CONSTRUCTION PHASE EMISSIONS

This section presents the results of the construction phase impact assessment. For construction emission calculations and additional detail regarding the calculation methodologies and assumptions, see Appendix A. Table 5 below presents the Project construction short-term emissions on a pounds per day basis and compares them to the OVPA threshold to determine if mitigation techniques should be implemented during construction activities.

Table 5 Maximum Day Construction Phase (Short-Term) Emissions

PHASE[1]	ROC (lb./day)	NOx (lb./day)	CO (lb./day)	PM10 (lb./day)	PM2.5 (lb./day)	SOx (lb./day)
Drilling	3.7897	112.4274	22.7381	2.1475	1.6093	0.1016
Vehicle Travel for the Transport of Additional Driller Employees	0.0000	0.0002	0.0020	0.0000	0.0000	0.0000
Total	**3.7897**	**112.4276**	**22.7402**	**2.1475**	**1.6093**	**0.1016**
Significance Threshold[2]	5	5	--	--	--	--
Emission Reduction Measures Recommended?	**No**	**Yes**	**--**	**--**	**--**	**--**

1 – Rig transport and drilling do not occur on the same day so emissions from vehicle travel for transport of drilling equipment is not included in the maximum day calculation. Max day emissions were during drilling days
2 – Significance thresholds from Section 3.3.1a, Ojai Planning Area ROC and NOx Criteria Pollutants, from the Ventura County Air Quality Assessment Guidelines.

5.0 OPERATION PHASE EMISSIONS

5.1 Criteria Pollutant Emissions

This section presents the results of the operation phase impact assessment. Significance of the impacts are determined by comparison to the appropriate significance threshold presented in Section 3. For operation emission calculations and additional detail regarding the calculation methodologies and assumptions, see Appendix B.

The following emission evaluations are presented:

- Baseline, Project-related and total criteria pollutant emissions for informational purposes.

- Emissions from all vehicle travel for the offsite transport of oil and wastewater for comparison to CEQA significance thresholds.

Table 6 Baseline, Project-Related and Total Criteria Pollutant Emissions (lb./day)

PHASE	ROC (lb./day)	NOx (lb./day)	CO (lb./day)	PM10 (lb./day)	SOx (lb./day)
Project-Related Emissions:					
Flare	1.2929	1.8100	9.5671	0.2586	0.0700
Tanks	0.2501	--	--	--	--
Loading Facilities	0.1260	--	--	--	--
Oil Wells[1]	6.0000	--	--	--	--
Vehicle Miles (transport oil and wastewater)	0.0002	0.0083	0.0008	0.0000	0.0000
Project Total:	**7.6692**	**1.8183**	**9.5679**	**0.2586**	**0.0700**
Baseline Emissions:					
Flare	0.0425	0.0595	0.3144	0.0085	0.0595
Tanks	0.1826	--	--	--	--
Loading Facilities	0.0101	--	--	--	--
Oil Wells	6.0000	--	--	--	--
Vehicle Miles (transport oil and wastewater)	0.0004	0.0138	0.0014	0.0001	0.0000
Employee vehicle trips to operate wells	0.0000	0.0000	0.0002	0.0000	0.0000
Baseline Total:	**6.2355**	**0.0733**	**0.3160**	**0.0086**	**0.0595**
Total (Project + Baseline):	**13.9046**	**1.8916**	**9.8839**	**0.2672**	**0.1296**

1 – Includes 2 lb./day ROC emissions for each new well

Table 7 CEQA Project-Related Criteria Pollutant Emissions vs Thresholds (lb./day)

PHASE	ROC (lb./day)	NOx (lb./day)	CO (lb./day)	PM10 (lb./day)	PM2.5 (lb./day)	SOx (lb./day)
Transport of oil and wastewater off of the site[1]	0.0006	0.0097	0.0147	0.0001	0.0001	0.0001
Significance Threshold[2]	5	5	--	--	--	--
Significant?	**No**	**No**	**--**	**--**	**--**	**--**

1 – Assumes 8 trucks per week (16 trips per week)
2 – Significance thresholds from Section 3.3.1a, Ojai Planning Area ROC and NOx Criteria Pollutants, from the Ventura County Air Quality Assessment Guidelines.

The Project results in less than significant impacts from criteria pollutant emissions

5.2 Greenhouse Gas Emissions

An evaluation of GHG emissions was conducted by the County of Ventura, Planning Division during their preparation of the March 2016 SEIR. Their evaluation utilized a 2015 VCAPCD evaluation of GHG emissions for another oilfield project that proposed drilling 19 new oil wells (see Appendix D). The County Planning evaluation determined:

- A project has a cumulatively considerable impact on global climate change if it would cause an increase in GHG emissions in excess of 10,000 metric tonnes of CO_{2e} ($MTCO_{2e}$) per year.
- This Project (Carbon) would result in annual direct and indirect GHG emissions of 1,196 $MTCO_{2e}$ per year which is well below the 10,000 metric tonnes of CO_{2e} per year threshold.

6.0 TOXIC AIR EMISSIONS AND HEALTH RISK IMPACTS

Toxic air contaminants (TACs) are pollutants that cause a health risk impact to exposed populations. TAC emissions from Project sources are calculated in Appendix C.

Air dispersion modeling is conducted to determine offsite concentrations of TAC emissions. For this Project, dispersion modeling was conducted using the Lakes AERMOD View implementation of the industry standard AERMOD dispersion model. After determining offsite TAC concentrations, health risk impacts were calculated using California Air Resources Board's (CARB) Hotspots Analysis and Reporting Program 2 (HARP 2). Residential cancer, chronic, and acute risk levels were calculated based on 30-year exposure (per HRA protocols) and the "OEHA Derived Method" intake rate percentile; worker risk levels were calculated based on 25-year exposure and the "OEHHA Derived Method" intake rate percentile; and cancer burden was calculated based on a 70 -year exposure, using the "OEHHA Derived Method" intake rate percentile. Additional information regarding the dispersion modeling parameters used is provided in Appendix C. Health risk modeling files are included in a link provided with this AQIA (https://bit.ly/2V3J51i).

The VCAPCD does not provide meteorological data in reasonable vicinity to the Project. Meteorological data was purchased from Lakes Environmental. Lakes generated prognostic meteorological data for the five-year period of 2013 through 2017 based on coordinates within the Project area.

The following scenarios were modeled in this AQIA when evaluating impacts for health risk:

- *Analysis per VCAPCD's Guidelines:* This scenario includes emissions and associated health risk impacts from all vehicle travel for the offsite transport of oil and wastewater, including:
    - Fugitive dust emissions from on-site and local off-site truck travel, and,
    - Diesel particulate matter from on-road truck engines during onsite travel and local off-site travel.

- *Existing + Proposed Project Analysis:* This scenario includes emissions and associated health risk impacts from all emission sources, including:
    - Existing and Project proposed VCAPCD permitted sources such as:
        - combustion products from oil well flaring, and
        - fugitive volatile emissions from wells, piping, flanges, tanks, and loading racks.
    - Temporary construction emissions from diesel engines associated with well drilling.
    - Transportation emissions associated with both existing Project processes and temporary construction processes, including:
        - fugitive dust emissions from on-site and local off-site truck travel, and,
        - diesel particulate matter from on-road truck engines during onsite travel and local off-site travel.

The Existing + Proposed Project Analysis is broken into two (2) periods. The first period modeled emissions for years 1 – 4, of the project, and assumes one new well will be drilled per year. The second period modeled emissions for years 5 – 30 of the project, and does not contain construction related emissions sources. Construction based emissions were calculated using information from Kenai drilling, assumed Kenai Rig 4 was utilized, and that the rig used 400 gallons of diesel fuel per day. For more information regarding the quantification of emissions, see Appendices B and C.

A total of 200 grid receptors, 77 fence-line receptors, and 13 discreet residential receptors were modeled. Modeled Receptors and sources are illustrated on Figures 1 and 2 respectively found in Appendix C. Health risk

results at local residential receptors, and at the Acute Hazard Point of Maximum Impact (PMI) are presented in Table 8 and Table 9 for the VCAPCD based Analysis and the Existing + Proposed Project Analysis respectively.

Table 8 Risk per VCAPCD Guidelines Analysis

Receptor ID	Receptor Type	UTM Location (m East)	UTM Location (m North)	Cancer Cases per Million Exposed	Chronic Hazard Index	Acute Hazard Index
201	Residential	305181	3813150	0.014	0.0010	0.000018
202	Residential	305175	3813184	0.011	0.00081	0.000011
203	Residential	304931	3812926	0.015	0.0011	0.000074
204	Residential	304812	3812740	0.006	0.00045	0.000035
205	Residential	304596	3812860	0.011	0.00083	0.000028
206	Residential	304653	3813041	0.019	0.0014	0.000030
207	Residential	304658	3813202	0.010	0.00076	0.000032
208	Residential	304641	3812566	0.0039	0.00028	0.000021
209	Residential	304590	3812613	0.0047	0.00034	0.000021
210	Residential	305548	3813385	0.00049	0.000036	0.0000016
211	Residential	304971	3813575	0.00032	0.000023	0.0000037
212	Residential	304670	3813774	0.00021	0.000015	0.0000034
213	Residential	304345	3813766	0.000077	0.0000056	0.0000026
224	Off-Site PMI	304899	3813053	N/A	N/A	0.00017
Sig. Threshold	N/A	N/A	N/A	10	1	1
Significant?	N/A	N/A	N/A	No	No	No

MEIR: Maximum Exposed Individual Receptor

Table 9 Risk per Existing + Proposed Project Analysis

Receptor ID	Receptor Type	UTM Location (m East)	UTM Location (m North)	Cancer Cases per Million Exposed	Chronic Hazard Index	Acute Hazard Index
201	Residential	305181	3813150	4.7	0.021	0.014
202	Residential	305175	3813184	4.1	0.017	0.0083
203	Residential	304931	3812926	2.2	0.020	0.0099
204	Residential	304812	3812740	1.1	0.0085	0.0068
205	Residential	304596	3812860	2.4	0.016	0.0071
206	Residential	304653	3813041	4.9	0.027	0.0087
207	Residential	304658	3813202	2.7	0.015	0.010
208	Residential	304641	3812566	0.8	0.0055	0.0050
209	Residential	304590	3812613	1.0	0.0066	0.0050
210	Residential	305548	3813385	0.15	0.00074	0.00057
211	Residential	304971	3813575	0.10	0.00048	0.0013
212	Residential	304670	3813774	0.06	0.00030	0.00090
213	Residential	304345	3813766	0.02	0.00011	0.00053
275	Off-Site PMI	304873	3813298	N/A	N/A	0.038
Sig. Threshold	N/A	N/A	N/A	10	1	1
Significant?	N/A	N/A	N/A	No	No	No

MEIR: Maximum Exposed Individual Receptor

To evaluate cancer burden, a 70-year cancer risk model was run and the geographical bounds of the 1 in one million cancer risk isopleth was determined. Based on modeling results, the isopleth was conservatively represented as a circle with a radius of 1 km, and the census receptor module of HARP2 was utilized to determine that the population within the bounds of the circle was 208. The cancer MEIR for the 70-year run demonstrated a risk level of 0.00000523, which was multiplied by the population of 208, resulting in a cancer burden result of 0.0011, well below the ARB Health Risk Assessment Guidelines threshold of 1.0

Worker health risk was also evaluated. In order to conservatively represent possible worker receptor locations, residential receptors were assumed to be possible locations for work to take place and were incorporated into the worker risk model, which also determined the facility posed less than significant health risk.

Cancer burden and Worker health risk modeling files and results can be found with the rest of the HRA modeling files at the link provided (https://bit.ly/2V3J51i).

7.0 CONSISTENCY WITH THE VENTURA COUNTY AIR QUALITY MANAGEMENT PLAN

In order to demonstrate consistency with the AQMP, a Project must demonstrate consistency with the population forecasts contained therein. Due to its industrial/commercial nature, this Project is not expected to cause an increase in population. Since this Project is not growth inducing, it is consistent with the AQMP population forecasts. Furthermore, the Project will remain consistent with the control strategies outlined in the AQMP by complying with stationary source regulations and BACT requirements.

8.0 CUMMULATIVE AIR QUALITY IMPACT ASSESSMENT

The Ventura County Air Quality Assessment Guidelines (2003) state:

> *"A project with emissions of two pounds per day or greater of ROC, or two pounds per day or greater of NOx that is found to be inconsistent with the AQMP will have a significant cumulative adverse air quality impact. A project with emissions below two pounds per day of ROC, and below two pounds per day of NOx, is not required to assess consistency with the AQMP. Inconsistent projects are usually those that cause the existing population to exceed the population forecasts contained in the most recently adopted AQMP."*

These thresholds would apply to the Project emissions under the "Analysis per VCAPCD's Guidelines" scenario (emissions associated with vehicle travel for the offsite transport of oil and wastewater). Since those Project emissions of NOx and ROC are well below 2 pounds per day and the Project is consistent with the AQMP the Project's cumulative impact would be less than significant.

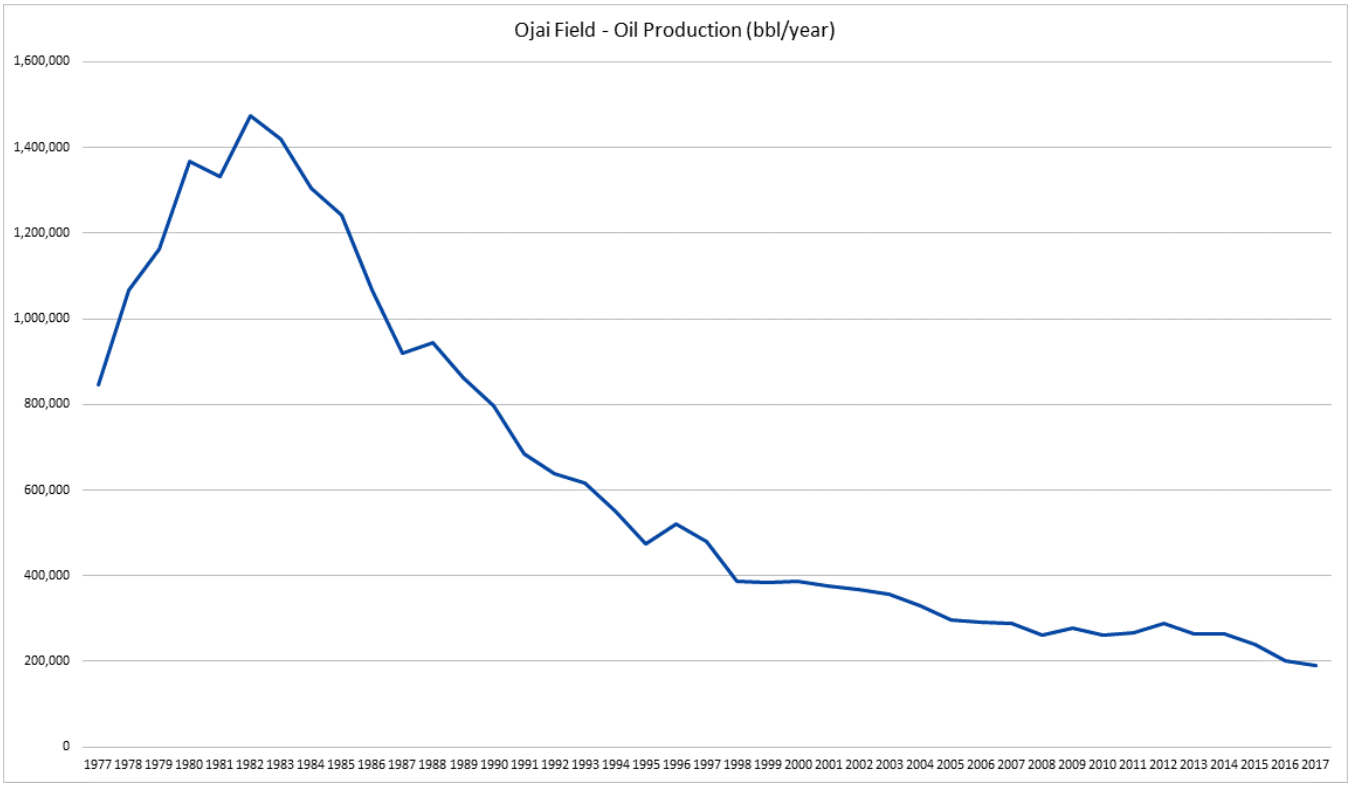
Also, Policy 1.1.2.1 of the Ojai Valley Area Plan establishes a 5 pound per day emissions Threshold of Significance for the Ojai Planning Area. Policy 1.1.2.1of the Ojai Valley Area Plan states:

> *Discretionary development in the Ojai Valley shall be found to have a significant adverse impact on the regional air quality if daily emissions would be greater than 5 pounds per day of Reactive Organic Compounds (ROC) and/or greater than 5 pounds per day of Nitrogen Oxides (NOx).*

The above policy of the Ojai Valley Area Plan does not address how the emissions of a project are to be evaluated or calculated. General Plan Policy 1.2.2.2 specifies that they are to be evaluated in accordance with the Ventura County Air Quality Assessment Guidelines. Thus, the 5 pounds per day Threshold of Significance listed in this Area Plan policy applies only to emissions from facilities or uses that are not required to have a permit from the VCAPCD. The majority of the facility emissions reviewed in the AQIA would operate under permits issued from the VCAPCD. Thus, the proposed project would not result in a significant impact on air quality pursuant to the County General Plan and adopted Air Quality Assessment Guidelines.

Judge Reiser's decision also suggested that the significant cumulative air quality impacts of CUP-3543 with other new oil and gas projects within the immediate airshed was not properly analyzed. Recent contact with County Planning reveals the Bentley Oil and Gas Project, Case No. PL15-0187 as the only new oil and gas project within the immediate airshed. In that project, the applicant is requesting a modification to allow full time flaring of all produced natural gas due to the loss of access to a gas sales pipeline. As with the Carbon Project, emissions from the Bentley project would require a permit from the VCAPCD and not count towards significance thresholds. As a result, the cumulative impact of the two projects would also be insignificant.

Lastly, the increased production of oil from the proposed three new wells will bring overall oil production in the Ojai Oil Field back to conditions that existed in the 2015-2016 timeframe which is at the Project's baseline year condition (baseline conditions are those that existed at the time the notice of preparation is published – in this case February 20, 2015). The following figure shows the Ojai Oil Field production from 1977 through 2017 based on DOGGR production records:



This AQIA assumed 20 barrels/day of oil production per well for new wells. This equals 2,190 barrels/year by the time all three wells are drilled and producing. In 2015 the Ojai Field produced 238,334 barrels of oil. By 2017 production was 190,154 barrels. Assuming field production levels remain steady after 2017, addition of the Project oil production will result in annual field oil production of 212,054 barrels which is below 2015 levels suggesting that addition of the new wells will not cause a significant increase in area production and the project's additional emissions would not result in a cumulatively considerable increase.

9.0 MITIGATIONS

9.1 Construction Phase Recommended Measures

As discussed in the VCAPCD Guidelines, ozone precursor emissions from mobile construction equipment are not counted against the significance thresholds (VCAPCD CEQA Guidelines, page 7-5). However, an effort should be made to reduce construction emissions if the emissions exceed the thresholds presented in Table 2 of this AQIA. Construction NOx (ozone precursor) emissions exceed the 5 lb./day Ojai Planning Area Criteria Pollutant Significance Threshold. Note that construction activities for this Project are expected to be relatively short in duration (i.e., two weeks per year over a period of approximately four years). It is recommended that the Project implement the following measures to reduce ozone precursors during construction to the extent possible:

AQ-1. Minimize equipment idling time.

AQ-2. Maintain equipment engines in good condition and in proper tune as per manufacturers' specifications.

AQ-3. Use alternatively fueled construction equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), or electric, if feasible.

Measures AQ-1, 2 and 3 are standard measures recommended by the VCAPCD Guidelines (Section 7.4.3, page 7-8).

A drilling rig equipped with newer Tier 4 diesel engines, if available at the time of drilling, should be considered to reduce emissions of NOx. Discussions with Kenai Drilling personnel indicated that rigs utilizing cleaner Tier 4 engines are currently not available. The use of a drilling rig equipped with newer Tier 4 diesel engines would also significantly reduce the emissions of diesel particulates which was the primary source of the potential cancer risk identified during health risk modeling.

9.2 Operation Phase Mitigations

All operation phase impacts are less than the applicable significance threshold without mitigation. Therefore, mitigation is not required.

10.0 CONCLUSION

All analyzed air quality impacts associated with this Project are less than significant without mitigation. This AQIA has the following findings:

- The Project results in less than significant Construction phase emissions impacts, however, standard construction emission reduction measures recommended by the VCAPCD are identified.
- Less than significant impacts from operation phase criteria pollutant emissions;
- Less than significant GHG emission impacts.
- The Project results in less than significant localized health risk impacts.
- The Project is consistent with the Ventura County Air Quality Management Plan.

Photo Date: 4/12/18

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SESPE CONSULTING, INC.

FIGURE 1	SITE LOCATION Carbon California Agnew Facility 11 S, 304915 m E, 3813190 m N Ventura County, CA		
PROJECT #:	CA19.18.05	DATE:	12/21/18
SCALE:		DRAWN BY:	RDF

APPENDIX A

Construction Phase Emissions

Project - Construction Engines

Engine Use	Engine Family	Registration #	HP	Load Factor	Equiptment Type Assumed	Year Used	[A] Emission Factors (g/kw-hr) TOG	ROG	CO	NOX	SO2	PM10	PM2.5	CO2	CH4	Operating Hrs Max Year
Drawworks	WDDXH12.7EGD	133815	370	0.74	Generator Sets	2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72
Drawworks	WDDXH12.7EGD	133815	370	0.74	Generator Sets	2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72
Mud Pump	8MDDL31.8XRR	145700	850	0.74	Generator Sets	2018	N/A	0.26	1.6	4.85	N/A	0.16	N/A	N/A	N/A	192
Mud Pump	3DDXL31.8XRE	120083	850	0.74	Generator Sets	2018	N/A	0.3	1.2	8.9	N/A	0.17	N/A	N/A	N/A	192
Marathon Genset	7PKXL06.6PJ1	141014	203	0.74	Generator Sets	2018	N/A	0.18	1.8	3.42	N/A	0.15	N/A	N/A	N/A	240
Marathon Genset	7PKXL06.6PJ1	141696	225	0.74	Generator Sets	2018	N/A	0.18	1.8	3.42	N/A	0.15	N/A	N/A	N/A	240

Engine Use	Engine Family	Registration #	HP	Load Factor	Equiptment Type	Year Used	Emissions g/hp-hr TOG	ROG	CO	NOX	SO2	PM10	PM2.5	CO2	CH4	[B] Operating Hrs Max Year
Drawworks	WDDXH12.7EGD	133815	370	0.74	Generator Sets	2018	18.52	0.211	1.028	2.31	0.005	0.069	0.069	568.3	0.019	120
Drawworks	WDDXH12.7EGD	133815	370	0.74	Generator Sets	2018	18.52	0.211	1.028	2.31	0.005	0.069	0.069	568.3	0.019	120
Mud Pump	8MDDL31.8XRR	145700	850	0.74	Generator Sets	2018	76.62	0.190	1.193	3.613	0.005	0.119	0.095	568.3	0.025	156
Mud Pump	3DDXL31.8XRE	120083	850	0.74	Generator Sets	2018	76.62	0.224	0.895	6.637	0.005	0.127	0.095	568.3	0.025	156
Marathon Genset	7PKXL06.6PJ1	141014	203	0.74	Generator Sets	2018	12.55	0.134	1.342	2.550	0.006	0.112	0.072	568.3	0.02	120
Marathon Genset	7PKXL06.6PJ1	141696	225	0.74	Generator Sets	2018	12.55	0.134	1.342	2.550	0.006	0.112	0.072	568.3	0.02	120

Load Factors based on CalEEMod Appendix D Table 3.3 factor for Generator Sets
Emissions Factors based on CalEEMod Appendix D Table 3.4 factor for Generator Sets
Shaded Cells Represent CalEEMod Emissions Factors
Un-shaded cells represent factors based on CARB certification
A) California Code of Regulations (13 CCR), Section 2423, exhaust certification standards (STD) and certification levels (CERT) per engine family (https://www.arb.ca.gov/msprog/offroad/cert/cert.php?eng_id=OFCI&year=2007)
B) Operating hours max year reduced to account for idling and working time while in operation. Working and idling specifications gathered from Kenai Drilling Company employee Carl Hathaway on November 19, 2018.
Combined emissions factors of NMCH+NOx are assumed to be 95% NOx and 5% NMHC based on Carl Moyer Program Guidelines

Fuel Based Construction EMS

Data Type/Units	Data	Source
BSFC (lbs fuel/hp-hr):	0.367	(based on offroad 2011)
Density of Diesel Fuel (lb/gal):	7.05	(based on AP-42 App A)
Daily Fuel Use (gal/day)	400	kenai drilling
Daily Fuel Use (lb/day)	2820	calculation
Daily HpHrs	7683.9	calculation
Annual Days of Operation	10.0	kenai drilling
PM10 emission rate (g/hphr)	0.126769176	Project Construction Engine Sheet
Daily grams PM10 Emissions	974.0846743	calculation
Daily lb PM10 Emissions	2.147489109	calculation
Annual lb PM10 Emissions	21.47489109	calculation
Conservative Hrs/Day Estimate	8	estimate
Hourly PM10 Emissions (lbs)	0.268436139	calculation
Conservative Hrs/Day Estimate	24	actual project
Hourly PM10 Emissions (lbs)	0.089478713	calculation

	Emissions								
	TOG	ROG	CO	NOX	SO2	PM10	PM2.5	CO2	CH4
Maximum Device Rate g/hp-hr	76.62	0.22	1.34	6.64	0.01	0.13	0.10	568.30	0.03
Maximum Daily Emissions (grams)	588,742.23	1,718.97	10,313.84	50,996.20	46.10	974.08	729.97	4,366,766.16	192.10
Maximum Annual Emission (grams)	5,887,422.34	17,189.73	103,138.38	509,961.98	461.04	9,740.85	7,299.73	43,667,661.58	1,920.98
Maximum Daily Emissions (lbs)	1,297.95	3.79	22.74	112.43	0.10	2.15	1.61	9,627.07	0.42
Maximum Annual Emissions (lbs)	12,979.54	37.90	227.38	1,124.27	1.02	21.47	16.09	96,270.71	4.24

APPENDIX B

Operational Phase Emissions

- Baseline
- Project
- Total

Baseline - Emission Calculation Summary

Summary of Estimated Criteria Emissions

	Calculated Emissions (tons/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0078	0.0109	0.0016	0.0109	0.0574
Tanks	0.0333				
Loading Facilities	0.0018				
Oil Wells	1.0950				
VMT	0.0000	0.0002	0.0018	0.0000	0.0000
Diesel Engines (construction)	0	0	0	0	0
TOTAL	**1.1380**	**0.0110**	**0.0034**	**0.0109**	**0.0574**

	Calculated Emissions (lbs/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	15.5095	21.7132	3.1019	21.7132	114.7700
Tanks	66.6390				
Loading Facilities	3.6733				
Oil Wells	2190.0000				
VMT	0.0919	0.3547	3.6059	0.0105	0.0181
Diesel Engines (construction)	0	0	0	0	0
TOTAL	**2275.9136**	**22.0679**	**6.7078**	**21.7237**	**114.7881**

	Calculated Emissions (lbs/hr)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0018	0.0025	0.0004	0.0025	0.0131
Tanks	0.0076				
Loading Facilities	0.0004				
Oil Wells	0.2500				
VMT	0.0000	0.0002	0.0017	0.0000	0.0000
Diesel Engines (construction)	0	0	0	0	0
TOTAL	**0.2598**	**0.0026**	**0.0021**	**0.0025**	**0.0131**

[A] Speciated ROC Emission Factors and Emissions

Sum of ROC fugitive emissions from wells, piping, flanges, tanks, and loading rack:	**0.2580**	lb/hour

Pollutant Name	**CAS#**	**Emission Factor (lbs/lb VOC)**	**Emissions (lbs/day)**	**Emissions (lbs/year)**	**Emissions (lbs/hour)**
Benzene	71432	0.0035	0.0217	7.9111	0.0009
Hydrogen sulfide	7783064	0.0143	0.0886	32.3225	0.0037
Toluene	108883	0.0034	0.0211	7.6851	0.0009
Xylenes (mixed)	1330207	0.0070	0.0433	15.8222	0.0018

Assumptions and Sources

A) Speciation for oilfield equipment fugitive ROC emissions from the San Joaquin Valley APCD AB-2588 Hot Spots Air Toxics Profiles for district approved toxic emission factors. District Policy based on Actual ST in the valley. District Toxic Profile ID #204. Received from Ventura County APCD Manager, Kerby Zozula, on September 24, 2018.

Baseline - Flares

Usage Data

Unit ID#		
[D] District Toxic Profile ID	9	
Operating Hours Per Day	24	hours/day
[A] Operating Days Per year	365	days/year
[E] Heating Value	861.9	BTU/scf
[A] Flare Max Hourly Throughput	0.8	MMBtu/hr
	800,000	Btu/hr
	928.18	scf/hr
	0.0411	MCF / hr
[B] Flare Production	0.9860	Mscf/day for all wells
	986.00	scf/day for all wells
	41.0959	scf/hr for all wells
	359,890.00	scf/year for all wells
	0.3599	MMCF / year

[C] Criteria Emission Factors

Unit	ROC	NOx	PM	SOx	CO
lb/MMBTU	0.0500	0.0700	0.0100	0.0700	0.3700

Criteria Emissions

Unit	ROC	NOx	PM	SOx	CO
lb/MMcf	43.0950	60.3330	8.6190	60.3330	318.9030
lb/year	15.5095	21.7132	3.1019	21.7132	114.7700
tons/year	0.0078	0.0109	0.0016	0.0109	0.0574
lb/hr	0.0018	0.0025	0.0004	0.0025	0.0131
lb/day	0.0425	0.0595	0.0085	0.0595	0.3144

[D] Speciated ROC Emission Factors and Emissions

Pollutant Name	CAS#	Emission Factor (lb/mmscf)	Emissions (lb/day)	Emissions (lb/year)	Emissions (lb/hr)
Acetaldehyde	75070	4.30E-02	4.24E-05	1.55E-02	1.77E-06
Acrolein	107028	1.00E-02	9.86E-06	3.60E-03	4.11E-07
Benzene	71432	1.59E-01	1.57E-04	5.72E-02	6.53E-06
Ethyl benzene	100414	1.44E+00	1.42E-03	5.18E-01	5.92E-05
Formaldehyde	50000	1.17E+00	1.15E-03	4.21E-01	4.81E-05
Hexane	110543	2.90E-02	2.86E-05	1.04E-02	1.19E-06
Naphthalene	91203	1.10E-02	1.08E-05	3.96E-03	4.52E-07
PAHs, total, w/o individ. components reported	1151	3.00E-03	2.96E-06	1.08E-03	1.23E-07
Propylene	115071	2.44E+00	2.41E-03	8.78E-01	1.00E-04
Toluene	108883	5.80E-02	5.72E-05	2.09E-02	2.38E-06
Xylenes (mixed)	1330207	2.90E-02	2.86E-05	1.04E-02	1.19E-06

Baseline - Flares

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

B) Historic Agnew Oil Well No. 1, 2, and 3 gas production data from the Department of Oil, Gas, and Geothermal Resources (DOGGR) Online Data webase. Production values based on the year 2015 because 2017 data was not produced each day of a 365 day year, and because 2016 DOGGR data displayed a gas production value of 0. Because of these reasons, oil, gas, and water baseline production values from 2015 were choosen to be most representative.

C) Criteria pollutant emission factors for a non-BACT flare from AP-42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 5: Industrial Flares.

D) Speciation for Natural Gas Flare External Combustion ROC emissions from the San Joaquin Valley APCD AB-2588 Hot Spots Air Toxics Profiles from table, "Natural Gas Fired External Combustion Equipment" in the May 2001 update of VCAPCD AB 2588 Combustion Emission Factors. Received from Ventura County APCD Manager, Kerby Zozula, on September 24, 2018.

E) Heatling value from Gas Analysis by Chromatography report on Agnew Oil Well No. 2 from Pacific Gas Technology (PGT), ASTM D 1945/D 3588, sampled and analyzed on September 25, 2018.

Baseline - Tanks

Usage Data

Unit ID #		
[A] Emission Control Factor	90.00%	(vapor recovery and flare)
[A] Operating Days Per Year	365	days/year
Operating Hours Per Day	24	hours/day
[A] Crude Oil Vapor Pressure	1.5	psi
Number of Wells	3	Wells

2015 Oil Production (Oil Production Tanks)

[B] Oil Production Per Well	1.5973	bbl/day/well
[B]Total Oil Production	4.7918	bbl/day
Crude Oil Storage Tank	875	bbl/year
Wash Tank	875	bbl/year
[A] Crude Oil Storage Tank Capacity	500	bbl
[A] Wash Tank Capacity	500	bbl
Number of Oil Tanks	2	tanks

2015 Water Production (Water Production Tanks)

	Well 1	Well 2	Well 3
Days Well Produced:	365	365	365
Water Produced (bbl/yr):	302	603	1013
Average Per Well (bbl/year/ well):	302	603	1013

Average Water Production Per Well	639	bbl/year/well
[B]Average Water Production Per Well:	1.7516	bbl/day/well
[B]Total Water Production	5.2548	bbl/day
Produced Water Tank 1		bbl/year
Produced Water Tank 2		bbl/year
[A] Produced Water Tank 1 Capacity	250	bbl
[A] Produced Water Tank 2 Capacity	250	bbl
Number of PW Tanks	2	tanks

[C] Criteria Emission Factors: Breathing and Working

	Breathing	Working
Unit Description	**Uncontrolled ROC EF[1] (lb/ bbl-yr)**	**Uncontrolled ROC EF[1] (lb/Mbbl)**
Crude Oil Storage Tank	0.43	12.23
Wash Tank	0.43	12.23
[D] Produced Water Tank 1	0.43	
[D] Produced Water Tank 2	0.43	

Baseline - Tanks

Criteria Emissions: Breathing and Working

Unit Description	Breathing		
	Controlled ROC (tons/year)	Controlled ROC (lbs/hr)	Controlled ROC (lbs/day)
Crude Oil Storage Tank (Oil Production Tank 1)	0.0108	0.0025	0.0589
Wash Tank (Oil Production Tank 2)	0.0108	0.0025	0.0589
[D] Produced Water Tank 1	0.0054	0.0012	0.0295
[D] Produced Water Tank 2	0.0054	0.0012	0.0295
TOTAL	**0.0323**	**0.0074**	**0.1767**

Unit Description	Working		
	Controlled ROC (tons/year)	Controlled ROC (lbs/hr)	Uncontrolled ROC (lbs/day)
Crude Oil Storage Tank (Oil Production Tank 1)	0.0005	0.0001	0.0029
Wash Tank (Oil Production Tank 2)	0.0005	0.0001	0.0029
[D] Produced Water Tank 1			
[D] Produced Water Tank 2			
TOTAL	**0.0011**	**0.0002**	**0.0059**

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29,

B) Historic Agnew Oil Well No. 1, 2, and 3 production data from the Department of Oil, Gas, and Geothermal Resources (DOGGR) Online Data webase. Production values based on the year 2015 because 2017 data was not produced each day of a 365 day year, and because 2016 DOGGR data displayed a gas production value of 0. Because of these reasons, oil, gas, and water baseline production values from 2015 were choosen to be most representative.

C) Ventura County APCD criteria pollutant default emission factors.

D) In the Ventura County APCD, it is assumed that working emissions are not produced from process water tanks or diluent tanks, which is the reason for no emission factors or emission calculations.

E) For year 2017, production was scaled-up to determine production over a 365 day year for all three (3) wells.

Baseline - Loading Facilities

Usage Data

Number of Wells	3	Wells
[B] Oil Production Per Well (2015)	1.5973	bbl/day/well
Total Oil Production	5	bbl/day
Operating Days/year	365	days
[A] Control Efficiency	90%	
Operating Hours/day	24	hours
Total Fluid	1,749	bbl/year
[A] Rated Capacity	200	bbl/hr

[C] Criteria Emission Factors

Unit	ROC
lbs/Mgal	2.7400

Criteria Emissions

Unit	ROC Emissions
lbs/day	0.0101
lbs/hour	0.0004
lbs/year	3.6733
Tons/year	0.00184

[E] True Vapor Pressure Calculation

True vapor pressure (psia) can also be assumed from AP42 Table 7.1-2

True Vapor Pressure = RVP $e^{[C_0(IRTEMP-ITEMP)]}$

RVP =	Reid Vapor Pressure =		0.45
Co=	Constant =		-6622.5
ITEMP =	Inverse of RVP temperature (559.69°R) =		0.001786703
IRTEMP=	Inverse of holding temperature =		0.001667528
		TVP=	0.99

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

B) Historic Agnew Oil Well No. 1, 2, and 3 production data from the Department of Oil, Gas, and Geothermal Resources (DOGGR) Online Data webase. Production values based on the year 2015 because 2017 data was not produced each day of a 365 day year, and because 2016 DOGGR data displayed a gas production value of 0. Because of these reasons, oil, gas, and water baseline production values from 2015 were choosen to be most representative.

C) Ventura County APCD criteria pollutant default uncontrolled emission factors.

D) Criteria emission factors from AP-42, Section 5.2.

E) True Vapor Presure equation from SBCAPCD Rule 325.

Baseline - Oil Wells

Usage Data

Number of wells	3	Wells
Average operational Days Per Well	365	Days
Average operational Hours Per Day	24	Hours
Number of Well Days Operated	1,095	Days
1 barrell oil (bbl) conversion	5.61	cubic feet

[B] 2015 Well Oil Production

	Well 1	Well 2	Well 3
Days Well Produced	365	365	365
Oil Produced (bbl/yr)	330	526	893
Average Per Well (bbl/year/ well)	330	526	893

Average Production of All 3 Wells:	583.0000	bbl/year/well
Average Production of All 3 Wells:	1.5973	bbl/day/well
Sum of All 3 Wells:	1,749.0000	bbl/ yr
	4.7918	bbl/ day
	360,000.0000	scf/ yr
	986.3014	scf/ day
	0.9863	Mscf/ day
	41.0959	scf/hr
	0.3600	MMCF / year
	4.11E-05	MMCF / hour
	4.11E-02	MCF / hour

[A] Criteria Emission Factors

Unit	[C]ROC
lb/well-day	2.0

Criteria Emissions

ROC (tons/year)	ROC (lbs/hr)	ROC (lb/year)	ROC (lb/day)
1.0950	0.2500	2190.0000	6.0000

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.
B) Historic Agnew Oil Well No. 1, 2, and 3 production data from the Department of Oil, Gas, and Geothermal Resources (DOGGR) Online Data webase. Production values based on the year 2015 because 2017 data was not produced each day of a 365 day year, and because 2016 DOGGR data displayed a gas production value of 0. Because of these reasons, oil, gas, and water baseline production values from 2015 were choosen to be most representative.
C) APCD emission factor.
D) For year 2017, production was scaled-up to determine production over a 365 day year for all three (3) wells.

Baseline - VMTs

Usage Data

Hours per trucking day	8	hours
Days per week	5	day/wk
Trucking days per year	260.5	days
Weeks per year	52.1	weeks/yr

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[J]Total number of trucks	5	trucks
Trips per week per truck	2	trips / wk / truck
Trips per week for all trucks	10	trips / wk
[B]On Site Road Length (One Way)	700	feet
On Site Road Length	0.1326	miles
VMT per week for all trucks	1.3258	VMT/week for all trucks
VMT per day for all trucks	0.2652	VMT/day for all trucks
VMT per hour for all trucks	0.0331	VMT/ hour for all trucks
VMT per year for all trucks	69.0720	VMT/ year for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[C]Total number of trucks	5	trucks
Trips per week per truck	2	trips / wk / truck
Trips per week for all trucks	10	trips / wk
[B]Off Site Road Length (One Way)	2500	feet
Off Site Road Length	0.4735	miles
VMT per week for all trucks	4.7349	VMT/week for all trucks
VMT per day for all trucks	0.9470	VMT/day for all trucks
VMT per hour for all trucks	0.1184	VMT/ hour for all trucks
VMT per year for all trucks	246.6857	VMT/ year for all trucks

Fugitive PM10 and PM2.5 Emission Factors and Emissions

[D]Unpaved Road Emission Factors (On Site VMTs, On Road Truck, Unpaved Road):

	On-road Trucks	
	PM10	**PM2.5**
S = silt content (%)	4.8	
W_l = loaded truck wt (tons)	40	
W_u = unloaded truck wt (tons)	15	
W = avg truck weight	27.5	
Uncontrolled EF (lb/VMT)	1.7821	0.3778
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.3564	0.0756
Daily Emissions (lb/day)	0.0945	0.0200
Hourly Emissions (lb/hour)	0.0118	0.0025
Annual Emissions (lb/year)	24.6191	5.2193

EF (lb/VMT)= $4.9 * (S/12)^{0.7} * (W/3)^{0.45}$

Silt content based on mean Sand and Gravel Processing from AP-42 Table 13.2.2-1.

Control efficiency for unpaved roads in baseline is 80% for watering.

PM2.5 emissions are 21.2% of PM10 for unpaved roads (SCAQMD *Updated CEIDARS Table)*.

Baseline - VMTs

[E]Paved Road Emission Factors (Off Site VMTs, On Road Truck, Paved Road):

	On-road Trucks	
	PM10	**PM2.5**
k= particle size multiplier (lb/vmt)	0.0022	0.00054
sL = road surface silt loading (g/m^2)	0.2	0.2
W_l = loaded truck wt (tons)	40	40
W_u = unloaded truck wt (tons)	15	15
W = avge truck weight	27.50	27.50
Uncontrolled EF (lb/VMT)	0.0149	0.0037
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.0030	0.0007
Daily Emissions (lb/day)	0.0028	0.0007
Hourly Emissions (lb/hour)	0.0004	0.0001
Annual Emissions (lb/year)	0.7373	0.1810

EF (lb/VMT)= $k * (sL)^{0.91} * (W)^{1.02}$

Particle size multiplier based on AP-42 Table 13.2.1-1

Silt Loading based on ADT of 500 - 5000 from AP-42 Table 13.1-2

Control efficiency for unpaved roads in baseline is 80% for watering.

Particulate Matter Totals from On Site and Off Site, Unpaved and Paved Roads:

	Off-road Trucks		On-road Trucks	
	PM10	**PM2.5**	**PM10**	**PM2.5**
Hourly Emissions (lb/hour)			0.0122	0.0026
Annual Emissions (lb/year)			25.3564	5.4002

[I]Speciated Fugitive PM10 Emission Factors and Emissions (On and Off Site VMTs, On Road, Paved Road)

Pollutant Name	Emission factor (ppmw)	Emissions (lbs/year)	Emissions (lbs/hour)
ARSENIC	20	5.07E-04	2.43E-07
BERYLLIUM	1	2.54E-05	1.22E-08
CADMIUM	1	2.54E-05	1.22E-08
CHROMIUM HEXAVALENT	0	0.00E+00	0.00E+00
CHROMIUM NONHEXAVALENT	50	1.27E-03	6.08E-07
COPPER	100	2.54E-03	1.22E-06
LEAD	50	1.27E-03	6.08E-07
MANGANESE	500	1.27E-02	6.08E-06
MERCURY	0	0.00E+00	0.00E+00
NICKEL	20	5.07E-04	2.43E-07
SELENIUM	5	1.27E-04	6.08E-08
SILICA, CRYSTALLINE	100000	2.54E+00	1.22E-03
ZINC	200	5.07E-03	2.43E-06

Baseline - VMTs

EMFAC2014 Emission Factors for Criteria Emissions

[G]EMFAC2014 Emission Rates for T7 Tractor (Off Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.1321	0.5100	5.1846	0.0151	0.0260	0.0249	1579.2033	1658.1635

Criteria Emissions

On-Site, On-Road, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0001	0.0030	0.0003	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0201	0.7888	0.0776	0.0040	0.0038	0.0023	0.1144

Off-Site, On-Road, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0003	0.0108	0.0011	0.0001	0.0001	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0014	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0718	2.8171	0.2771	0.0141	0.0135	0.0082	0.4087

Total Criteria Emissions

	ROC	CO	NOx	SOx	[F] PM10	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.0000	0.0002	0.0017	0.0000	0.0000	0.0000	0.5231
Annual (lb/year)	0.0919	0.3547	3.6059	0.0105	0.0181	0.0173	
Daily (lb/day)	0.0004	0.0014	0.0138	0.0000	0.0001	0.0001	

Baseline - VMTs

Assumptions and Sources

A) Assume T7 Tractor EMFAC2014 vehicle category used for the transport of oil and wastewater on and off site.
B) Google Earth software was used to measure the VMTed on site and off site. The on site VMT distance was assumed to include the 350 foot site unpaved driveway. The off site VMT distance was assumed to extend from the bottom of the on site driveway to the intersection of Koenigstein Road and California State Route 150.
C) The baseline setting for overall heavy duty truck traffic reflects the maximum weekly fluid production established in 1989 - the CEQA baseline for traffic volume on Highway 150 is a weekly average of 6.6 to 11.8 one-way truck trips per week. Emissions calculated using 5 trucks to remain conservative.
D) Unpaved Road emissions factor from AP42 Section 13.2.2.
E) Paved Road emissions factor from AP42 Section 13.2.1.
F) Assume PM10 emissions produced by diesel engines are equal to the amount of diesel engine exhaust produced. Diesel engines are used here for the transport of oil and wastewater.
G) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: T7 Tractor, Model Year: Aggregated, Speed: Aggregated, Fuel: Diesel, Season: Annual, and Vehicle Category: EMFAC2011 Categories.
H) CO_2e emissions factor determined by scaling CO_2 factor up by 5%, per the methodologies found in the BAAQMD GHG Model (BGM). This accounts for emissions of CH_4, N_2O, and air conditioner evaporative loss.
I) San Diego County APCD, H01 - Haul Roads, General, Paved, & Unpaved, Default Trace Metal Composition.
J) Assume that the number of on site truck trips is the same as the number of off site truck trips.

Project - Emission Calculation Summary

Summary of Estimated Criteria Emissions

	Calculated Emissions (tons/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.2359	0.3303	0.0472	0.3303	1.7460
Tanks	0.0456				
Loading Facilities	0.0230				
Oil Wells	1.0950				
VMT	0.0000	0.0013	0.0000	0.0000	0.0001
Diesel Engines (construction)	0.0657	1.3828	0.0363	0.0017	0.3565
TOTAL	**1.4653**	**1.7144**	**0.0835**	**0.3320**	**2.1027**

	Calculated Emissions (lbs/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	471.8903	660.6464	94.3781	660.6464	3491.9879
Tanks	91.2837				
Loading Facilities	45.9946				
Oil Wells	2190.0000				
VMT	0.0668	2.6088	0.0131	0.0077	0.2767
Diesel Engines (construction)	131.3441	2765.6110	72.6022	3.3904	713.0758
TOTAL	**2930.5795**	**3428.8662**	**166.9934**	**664.0444**	**4205.3404**

	Calculated Emissions (lbs/hr)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0539	0.0754	0.0108	0.0754	0.3986
Tanks	0.0104				
Loading Facilities	0.0053				
Oil Wells	0.2500				
VMT	0.0004	0.0149	0.0001	0.0000	0.0017
Diesel Engines (construction)	0.9224	18.7828	0.5026	0.0241	5.0737
TOTAL	**1.2423**	**18.8731**	**0.5135**	**0.0996**	**5.4740**

[A] Speciated ROC Emission Factors and Emissions

Sum of ROC fugitive emissions from wells, piping, flanges, tanks, and loading rack:	**0.2657**	lb/hour

Pollutant Name	**CAS#**	**Emission Factor (lbs/lb VOC)**	**Emissions (lbs/day)**	**Emissions (lbs/year)**	**Emissions (lbs/hour)**
Benzene	71432	0.0035	0.0223	8.1455	0.0009
Hydrogen sulfide	7783064	0.0143	0.0912	33.2801	0.0038
Toluene	108883	0.0034	0.0217	7.9127	0.0009
Xylenes (mixed)	1330207	0.0070	0.0446	16.2909	0.0019

Assumptions and Sources

A) Speciation for oilfield equipment fugitive ROC emissions from the San Joaquin Valley APCD AB-2588 Hot Spots Air Toxics Profiles for district approved toxic emission factors. District Policy based on Actual ST in the valley. District Toxic Profile ID #204. Received from Ventura County APCD Manager, Kerby Zozula, on September 24, 2018.

Project - Flares

Usage Data

Unit ID#		
[D] District Toxic Profile ID	9	
Operating Hours Per Day	24	hours/day
[A] Operating Days Per year	365	days/year
[E] Heating Value	861.9	BTU/scf
[A] Flare Max Hourly Throughput	0.8	MMBtu/hr
	800,000	Btu/hr
	928.18	scf/hr
	1.2500	MCF / hr
[B] Flare Production	7,008	MMBtu/yr
	10	Mscf gas/day/well
	3	Wells
	30	Mscf gas/day for all wells
	30,000	scf/day for all wells
	1,250	scf/hr for all wells
	10,950,000	scf/year for all wells
	10.95	MMCF / year

[C] Criteria Emission Factors

Unit	ROC	NOx	PM	SOx	CO
lb/MMBTU	0.0500	0.0700	0.0100	0.0700	0.3700

Criteria Emissions

Unit	ROC	NOx	PM	SOx	CO
lb/MMcf	43.0950	60.3330	8.6190	60.3330	318.9030
lb/year	471.8903	660.6464	94.3781	660.6464	3491.9879
tons/year	0.2359	0.3303	0.0472	0.3303	1.7460
lb/hr	0.0539	0.0754	0.0108	0.0754	0.3986
lb/day	1.2929	1.8100	0.2586	1.8100	9.5671

[D] Speciated ROC Emission Factors and Emissions

Pollutant Name	CAS#	Emission Factor (lb/mmscf)	Emissions (lb/day)	Emissions (lb/year)	Emissions (lb/hr)
Acetaldehyde	75070	4.30E-02	1.29E-03	4.71E-01	5.38E-05
Acrolein	107028	1.00E-02	3.00E-04	1.10E-01	1.25E-05
Benzene	71432	1.59E-01	4.77E-03	1.74E+00	1.99E-04
Ethyl benzene	100414	1.44E+00	4.32E-02	1.58E+01	1.80E-03
Formaldehyde	50000	1.17E+00	3.51E-02	1.28E+01	1.46E-03
Hexane	110543	2.90E-02	8.70E-04	3.18E-01	3.63E-05
Naphthalene	91203	1.10E-02	3.30E-04	1.20E-01	1.38E-05
PAHs, total, w/o individ. components reported	1151	3.00E-03	9.00E-05	3.29E-02	3.75E-06
Propylene	115071	2.44E+00	7.32E-02	2.67E+01	3.05E-03
Toluene	108883	5.80E-02	1.74E-03	6.35E-01	7.25E-05
Xylenes (mixed)	1330207	2.90E-02	8.70E-04	3.18E-01	3.63E-05

Project - Flares

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

B) Email response from Jane Farkas regarding answers to questions about the Agnew Oil Field Health Risk Assessment; received August 17, 2018.

C) Criteria pollutant emission factors for a non-BACT flare from AP-42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 5: Industrial Flares.

D) Speciation for Natural Gas Flare External Combustion ROC emissions from the San Joaquin Valley APCD AB-2588 Hot Spots Air Toxics Profiles from table, "Natural Gas Fired External Combustion Equipment" in the May 2001 update of VCAPCD AB 2588 Combustion Emission Factors. Received from Ventura County APCD Manager, Kerby Zozula, on September 24, 2018.

E) Heatling value from Gas Analysis by Chromatography report on Agnew Oil Well No. 2 from Pacific Gas Technology (PGT), ASTM D 1945/D 3588, sampled and analyzed on September 25, 2018.

Project - Tanks

Usage Data

Unit ID #		
[A] Emission Control Factor	90.00%	(vapor recovery and flare)
[A] Operating Days Per Year	365	days/year
Operating Hours Per Day	24	hours/day
[A] Crude Oil Vapor Pressure	1.5	psi
Number of Wells	3	Wells
Oil Production		
[B] Oil Production Per Well	20	bbl/day/well
Total Oil Production	60	bbl/day
Crude Oil Storage Tank (Oil Production Tank 1)	10,950	bbl/year
Wash Tank (Oil Production Tank 2)	10,950	bbl/year
[A] Crude Oil Storage Tank (Oil Production Tank 1)	500	bbl
[A] Wash Tank (Oil Production Tank 2)	500	bbl
Number of Oil Tanks	2	tanks
Water Production		
[B] Water Production Per Well	2	bbl/day/well
Total Water Production	6	bbl/day
Produced Water Tank 1		bbl/year
Produced Water Tank 2		bbl/year
[A] Produced Water Tank 1 Capacity	250	bbl
[A] Produced Water Tank 2 Capacity	250	bbl
Number of PW Tanks	2	tanks

[C] Criteria Emission Factors: Breathing and Working

	Breathing	Working
Unit Description	**Uncontrolled ROC EF[1] (lb/bbl-yr)**	**Uncontrolled ROC EF[1] (lb/Mbbl)**
Crude Oil Storage Tank (Oil Production Tank 1)	0.43	12.23
Wash Tank (Oil Production Tank 2)	0.43	12.23
[D] Produced Water Tank 1	0.43	
[D] Produced Water Tank 2	0.43	

Project - Tanks

Criteria Emissions: Breathing and Working

	Breathing		
Unit Description	**Controlled ROC (tons/year)**	**Controlled ROC (lbs/hr)**	**Uncontrolled ROC (lbs/day)**
Crude Oil Storage Tank (Oil Production Tank 1)	0.0108	0.0025	0.0589
Wash Tank (Oil Production Tank 2)	0.0108	0.0025	0.0589
[D] Produced Water Tank 1	0.0054	0.0012	0.0295
[D] Produced Water Tank 2	0.0054	0.0012	0.0295
TOTAL	**0.0323**	**0.0074**	**0.1767**

	Working		
Unit Description	**Controlled ROC (tons/year)**	**Controlled ROC (lbs/hr)**	**Uncontrolled ROC (lbs/day)**
Crude Oil Storage Tank (Oil Production Tank 1)	0.0067	0.0015	0.0367
Wash Tank (Oil Production Tank 2)	0.0067	0.0015	0.0367
[D] Produced Water Tank 1			
[D] Produced Water Tank 2			
TOTAL	**0.0134**	**0.0031**	**0.0734**

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.
B) Email response from Jane Farkas regarding answers to questions about the Agnew Oil Field Health Risk Assessment; received August 17, 2018.
C) Ventura County APCD criteria pollutant default emission factors.
D) In the Ventura County APCD, it is assumed that working emissions are not produced from process water tanks or diluent tanks, which is the reason for no emission factors or emission calculations.

Project - Loading Facilities

Usage Data

Unit ID#		
Number of Wells	3	Wells
[B] Oil Production Per Well	20	bbl/day/well
Total Oil Production	60	bbl/day
Operating Days/year	365	days
[A] Control Efficiency	90%	
Operating Hours/day	24	hours
Total Fluid	21,900	bbl/year
[A] Rated Capacity	200	bbl/hr

[C] Criteria Emission Factors

Unit	ROC
lbs/Mgal	2.7400

Criteria Emissions

Unit	ROC Emissions
lbs/day	0.1260
lbs/hour	0.0053
lbs/year	45.9946
Tons/year	0.02300

[E] True Vapor Pressure Calculation

True vapor pressure (psia) can also be assumed from AP42 Table 7.1-2

True Vapor Pressure = RVP $e^{[C_0(IRTEMP-ITEMP)]}$

RVP =	Reid Vapor Pressure =		0.45
Co=	Constant =		-6622.5
ITEMP =	Inverse of RVP temperature (559.69°R) =		0.001786703
IRTEMP=	Inverse of holding temperature =		0.001667528
		TVP=	0.99

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.

B) Email response from Jane Farkas regarding answers to questions about the Agnew Oil Field Health Risk Assessment; received August 17, 2018.

C) Ventura County APCD criteria pollutant default uncontrolled emission factors.

D) Criteria emission factors from AP-42, Section 5.2.

E) True Vapor Presure equation from SBCAPCD Rule 325.

Project - Oil Wells

Usage Data

1 barrell oil (bbl)	5.61	cubic feet
Number of wells	3	Wells
[A]Average operational Days Per Well	365	Days
[A]Average operational Hours Per Day	24	Hours
Number of Well Days Operated	1,095	Days
[B]Oil Well Production Estimation Per Well	20	bbl/day/well
# Wells	3	wells
Oil Well Production Estimation	60	bbl/day
	336.6	scf/day
	14.025	scf/hr

[A] Criteria Emission Factors

Unit	[C]ROC
lb/well-day	2.0

Criteria Emissions

ROC (tons/year)	ROC (lbs/hr)	ROC (lb/year)	ROC (lb/day)
1.0950	0.2500	2190.0000	6.0000

Assumptions and Sources

A) Information from Permit #00004 engineering file Public Record Request. Received from Ventura County APCD Manager, Kerby Zozula, on August 29, 2018.
B) Email response from Jane Farkas regarding answers to questions about the Agnew Oil Field Health Risk Assessment; received August 17, 2018.
C) APCD emission factor.

Project - Construction-Specific VMTs (years 1-4)

Usage Data

Hours per trucking day	8	hours
Days per week	5	day/wk
Employees transporting oil and wastewater days per year	260.5	days
Additional construction employees days per year	10	days
Construction equipment transportation days per year	4	days
Weeks per year	52.1	weeks/yr

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification:	HHD Fleet Truck, Diesel, T7 Tractor	
[J]Total number of trucks	3	trucks
Trips/ week /truck	2	trips / wk / truck
Trips/week for all trucks	6	trips / wk
[B]On Site Road Length (One Way)	700	feet
On Site Road Length	0.1326	miles
VMT per week for all trucks	0.7955	VMT/week for all trucks
VMT per year for one truck	13.8144	VMT/year for one truck
VMT per year for all trucks	41.4432	VMT/ year for all trucks
VMT per day for all trucks	0.1591	VMT/day for all trucks
VMT per hour for all trucks	0.0199	VMT/ hour for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[C]Total number of trucks	3	trucks
Trips/ week /truck	2	trips / wk / truck
Trips/week for all trucks	6	trips / wk
[B]Off Site Road Length (One Way)	2500	feet
Off Site Road Length	0.4735	miles
VMT per week for all trucks	2.8409	VMT/week for all trucks
VMT per year for one truck	49.3371	VMT/year for one truck
VMT per year for all trucks	148.0114	VMT/ year for all trucks
VMT per day for all trucks	0.5682	VMT/day for all trucks
VMT per hour for all trucks	0.0710	VMT/ hour for all trucks

Additional Construction Employees

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification	LDT2, Gas	
[L] Total number of shifts per day	2	shifts / day
[L]Hours per shift	12	hours / shift
[L] Employees per shift	10	Employees / shift
[L]Trips per day per truck	2	Trips / day / truck
[L] Total days with additional employees	10	days/year
[K]Total number of trips all vehicles all days	400	trips/well drilled
[B] On Site Road Length (one-way)	700	feet/trip
On Site Road Length (one-way)	0.1326	miles/trip
VMT per year for one truck	5.3030	mile / yr / truck
VMT per year for all trucks	53.0303	miles/ year for all trucks
VMT per day for all trucks	0.2036	VMT/ day for all trucks
VMT per hour for all trucks	0.0254	VMT/ hour for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	LDT2, Gas	
[L] Total number of shifts per day	2	shifts / day
[L]Hours per shift	12	hours / shift
[L] Employees per shift	10	Employees / shift
[L]Trips per day per truck	2	Trips / day / truck
[L] Total days with additional employees	10	days
[K]Total number of trips all vehicles all days	400	trips/well drilled
[B] On Site Road Length (one-way)	2500	feet/trip
On Site Road Length (one-way)	0.4735	miles/trip
VMT per year for one truck	18.9394	mile / yr / truck
VMT per year for all trucks	189.3940	miles/ year for all trucks
VMT per day for all trucks	0.7270	VMT/ day for all trucks
VMT per hour for all trucks	0.0909	VMT/ hour for all trucks

Project - Construction-Specific VMTs (years 1-4)
Construction Equipment Transportation

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification:	HHD Fleet Truck, Diesel, T7 Tractor	
[C,J]Total number of trucks	8	trucks
Trips per day per truck	2	trips / day / truck
Trips per day for all trucks	16	trips / day / truck
Days needed to transport equipment	2	days/well
Total days for construction equp. Transport	4	days/year
Total number of trips all vehicles all days	64	trips/well
[B] On Site Road Length (one-way)	700	feet/trip
On Site Road Length (one-way)	0.1326	miles/trip
VMT per year for one truck	1.0606	miles/year for one truck
VMT per year for all trucks	8.4849	VMT/ year for all trucks
VMT per day for all trucks	2.1212	miles/day for all trucks
VMT per hour for all trucks	0.2652	VMT/ hour for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification:	HHD Fleet Truck, Diesel, T7 Tractor	
[C,J]Total number of trucks	8	trucks
Trips per day per truck	2	trips / day / truck
Trips per day for all trucks	16	trips / day / truck
Days needed to transport equipment	2	days/well
Total days for construction equp. Transport	4	days/year
Total number of trips all vehicles all days	32	trips/well
[B] On Site Road Length (one-way)	2500	feet/trip
On Site Road Length (one-way)	0.4735	miles/trip
VMT per year for one truck	1.8939	miles/year for one truck
VMT per year for all trucks	15.1515	VMT/ year for all trucks
VMT per day for all trucks	7.5758	miles/day for all trucks
VMT per hour for all trucks	0.9470	VMT/ hour for all trucks

VMT Totals

		On-Site	Off-Site
Gas and Diesel Engine Total (Employees Transporting Oil and Wastewater + Additional Construction Employees + Equipment Transportation):	VMT per day for all trucks	2.4839	8.8710
	VMT per hour for all trucks	0.3105	1.1089
	VMT per year for all trucks	102.9584	352.5569

Fugitive PM10 and PM2.5 Emission Factors and Total (Employees Transporting Oil and Wastewater + Additional Construction Employees + Equipment Transportation) Emissions

[D]Unpaved Road Emission Factors (On Site VMTs, On Road Truck, Unpaved Road):

	PM10	PM2.5
S = silt content (%)	4.8	
W_l = loaded truck wt (tons)	40	
W_u = unloaded truck wt (tons)	15	
W = avg truck weight	27.5	
Uncontrolled EF (lb/VMT)	1.7821	0.3778
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.3564	0.0756
Daily Emissions (lb/day)	0.8853	0.1877
Hourly Emissions (lb/hour)	0.1107	0.0235
Annual Emissions (lb/year)	230.6258	48.8927

EF (lb/VMT)= $4.9 * (S/12)^{0.7} * (W/3)^{0.45}$

Silt content based on mean Sand and Gravel Processing from AP-42 Table 13.2.2-1.

Control efficiency for unpaved roads in baseline is 80% for watering.

Control efficiency for unpaved roads in baseline is 80% for watering.

Project - Construction-Specific VMTs (years 1-4)

[E] Paved Road Emission Factors (Off Site VMTs, On Road Truck, Paved Road):

	PM10	PM2.5
k= particle size multiplier (lb/vmt)	0.0022	0.00054
sL = road surface silt loading (g/m^2)	0.2	0.2
W_l = loaded truck wt (tons)	40	40
W_u = unloaded truck wt (tons)	15	15
W = avge truck weight	27.50	27.50
Uncontrolled EF (lb/VMT)	0.0149	0.0037
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.0030	0.0007
Daily Emissions (lb/day)	0.0265	0.0065
Hourly Emissions (lb/hour)	0.0033	0.0008
Annual Emissions (lb/year)	6.9070	1.6954

$EF\ (lb/VMT) = k * (sL)^{0.91} * (W)^{1.02}$

Particle size multiplier based on AP-42 Table 13.2.1-1.
Silt Loading based on ADT of 500 - 5000 from AP-42 Table 13.1-2.
Control efficiency for unpaved roads in baseline is 80% for watering.

Particulate Matter Totals from On Site and Off Site, Unpaved and Paved Roads:

	Off-road Trucks		On-road Trucks	
	PM10	PM2.5	PM10	PM2.5
Hourly Emissions (lb/hour)			0.1140	0.0243
Annual Emissions (lb/year)			237.5328	50.5880

[I] Speciated Fugitive DUST PM10 Emission Factors and Total (Employees Transporting Oil and Wastewater + Equip. Transposport + Additional Construction Employees) Emissions (On and Off Site VMTs, On Road, Paved Road)

Pollutant Name	Emission factor (ppmw)	CAS #	Emissions (lbs/year)	Emissions (lbs/hour)
ARSENIC	20	7440382	4.75E-03	2.28E-06
BERYLLIUM	1	7440417	2.38E-04	1.14E-07
CADMIUM	1	7440439	2.38E-04	1.14E-07
CHROMIUM HEXAVALENT	0	18540299	0.00E+00	0.00E+00
CHROMIUM NONHEXAVALENT	50	7440473	1.19E-02	5.70E-06
COPPER	100	7440508	2.38E-02	1.14E-05
LEAD	50	1128	1.19E-02	5.70E-06
MANGANESE	500	7439965	1.19E-01	5.70E-05
MERCURY	0	7439976	0.00E+00	0.00E+00
NICKEL	20	7440020	4.75E-03	2.28E-06
SELENIUM	5	7782492	1.19E-03	5.70E-07
SILICA, CRYSTALLINE	100000	1175	2.38E+01	1.14E-02
ZINC	200	7440666	4.75E-02	2.28E-05

EMFAC2014 Emission Factors for Criteria Emissions

[F] EMFAC2014 Emission Rates for Gas Pick-Up Truck (LDT2, On Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.0213	0.9929	0.1148	0.0040	0.0017	0.0016	394.1230	413.8291

[G] EMFAC2014 Emission Rates for Diesel HHD Fleet Truck (T7 Tractor, Off Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.1321	0.5100	5.1846	0.0151	0.0260	0.0249	1579.2033	1658.1635

Project - Construction-Specific VMTs (years 1-4)

Criteria Emissions

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0018	0.0002	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0121	0.4733	0.0466	0.0024	0.0023	0.0014	0.0687

Off-Site, On-Road, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0002	0.0065	0.0006	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0008	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0431	1.6903	0.1663	0.0085	0.0081	0.0049	0.2452

Total of Off- and On- Site Employee Oil and Wastewater Transport Emissions

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0002	0.0083	0.0008	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0010	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0551	2.1635	0.2128	0.0108	0.0104	0.0063	0.3139

Additional Construction Employees

On-Site, On-Road Truck, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0001	0.0004	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0001	0.0005	0.0045	0.0000	0.0000	0.0000	0.0000

Project - Construction-Specific VMTs (years 1-4)

Off-Site, On-Road Truck, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0002	0.0016	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0003	0.0018	0.0159	0.0000	0.0000	0.0001	0.0000

Total of Off- and On- Site Additional Construction Employee Transport Emissions

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0002	0.0020	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0000	0.0003	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0004	0.0024	0.0204	0.0000	0.0000	0.0001	0.0000

Construction Equipment Transportation

On-Site, On-Road Truck, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0006	0.0242	0.0024	0.0001	0.0001	0.0001	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0001	0.0030	0.0003	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0025	0.0969	0.0095	0.0005	0.0005	0.0003	0.0141

Off-Site, On-Road Truck, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0022	0.0865	0.0085	0.0004	0.0004	0.0003	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0003	0.0108	0.0011	0.0001	0.0001	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0088	0.3461	0.0340	0.0017	0.0017	0.0010	0.0251

Total of Off- and On- Site Construction Equipment Transport Emissions

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0028	0.1107	0.0109	0.0006	0.0005	0.0003	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0004	0.0138	0.0014	0.0001	0.0001	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0113	0.4430	0.0436	0.0022	0.0021	0.0013	0.0392

Project - Construction-Specific VMTs (years 1-4)

Diesel Engine Total (Employees Transporting Oil and Wastewater + Equipment Transportation) Criteria Emissions

	ROC	CO	NOx	SOx	PM10 [M]	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.0004	0.0015	0.0149	0.0000	0.0001	0.0001	0.3530
Annual (lb/year)	0.0664	0.2564	2.6065	0.0076	1.31E-02	0.0125	

Diesel + Gas Engine Total (Employees Transporting Oil and Wastewater + Additional Construction Employees + Equipment Transportation) Criteria Emissions

	ROC	CO	NOx	SOx	PM10	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.0004	0.0017	0.0149	0.0000	0.0001	0.0001	0.3530
Annual (lb/year)	0.0668	0.2767	2.6088	0.0077	0.0131	0.0125	

Assumptions and Sources

A) Assume T7 Tractor vehicle classification used for the transport of Rig #4 and associated well drilling equipment and assume LDT2 vehicle classification used for the transport of additional well-drilling employees to and from the Agnew Oilfield.

B) Google Earth software was used to measure the VMTs on site and off site. The on-site VMT distance was assumed to include the 350 foot site unpaved driveway. The off-site VMT distance was assumed to extend from the bottom of the on-site driveway to the intersection of Koenigstein Road and California State Route 150.

C) Total number of truck trips per week estimate provided by Kenai Drilling Company representative, Carl Hathaway.

D) Unpaved Road emissions factor from AP42 Section 13.2.2.

E) Paved Road emissions factor from AP42 Section 13.2.1.

F) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: LDT2, Model Year: Aggregated, Speed: Aggregated, Fuel: Gas, Season: Annual, and Vehicle Category: EMFAC2011 Categories.

G) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: T7 Tractor, Model Year: Aggregated, Speed: Aggregated, Fuel: Diesel, Season: Annual, and Vehicle Category: EMFAC2011 Categories.

H) CO2e emissions factor determined by scaling CO2 factor up by 5%, per the methodologies found in the BAAQMD GHG Model (BGM). This accounts for emissions of CH4, N2O, and air conditioner evaporative loss.

I) San Diego County APCD, H01 - Haul Roads, General, Paved, & Unpaved, Default Trace Metal Composition.

J) Assume that the number of on-site truck trips is the same as the number of off-site truck trips.

K) Assume the same number of total days with additional well-drilling employees necessary for both on site and off site trucks.

L) Values used to account for the increase in well-drilling employee traffic volume to and from the Agnew Oilfield from page 4 of the Superior Court of the State of California, County of Ventura, Writ of Mandate court decision made by Judge Glen Reiser on September 1, 2017. The Mandate states, "The project would result in a traffic volume of 40 ADT during the drilling stage."

M) Assume PM10 emissions produced by diesel engines are equal to the amount of diesel engine exhaust produced. Diesel engines used here for the transport of oil and wastewater and for the transport of construction equipment.

Project - VMTs (years 5-30)

Usage Data

Hours per trucking day	8	hours
Days per week	5	day/wk
Trucking days per year	260.5	days
Weeks per year	52.1	weeks/yr

Employees Transporting Oil and Wastewater

On-Site, On-Road Truck, Unpaved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[K J]Total number of trucks	3	trucks
Trips per week per truck	2	trips / wk / truck
Trips per week for all trucks	6	trips / wk
[B]On Site Road Length (One Way)	700	feet
On Site Road Length	0.1326	miles
VMT per week for all trucks	0.7955	VMT/week for all trucks
VMT per day for all trucks	0.1591	VMT/day for all trucks
VMT per hour for all trucks	0.0199	VMT/ hour for all trucks
VMT per year for all trucks	41.4432	VMT/ year for all trucks

Off-Site, On-Road Truck, Paved

[A]Vehicle Classification	HHD Fleet Truck, Diesel, T7 Tractor	
[K C]Total number of trucks	3	trucks
Trips per week per truck	2	trips / wk / truck
Trips per week for all trucks	6	trips / wk
[B]Off Site Road Length (One Way)	2500	feet
Off Site Road Length	0.4735	miles
VMT per week for all trucks	2.8409	VMT/week for all trucks
VMT per day for all trucks	0.5682	VMT/day for all trucks
VMT per hour for all trucks	0.0710	VMT/ hour for all trucks
VMT per year for all trucks	148.0114	VMT/ year for all trucks

Fugitive PM10 and PM2.5 Emission Factors and Emissions

[D]Unpaved Road Emission Factor (On Site VMTs, On Road Truck, Unpaved Road):

	On-road Trucks	
	PM10	**PM2.5**
S = silt content (%)	4.8	
W_l = loaded truck wt (tons)	40	
W_u = unloaded truck wt (tons)	15	
W = avg truck weight	27.5	
Uncontrolled EF (lb/VMT)	1.7821	0.3778
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.3564	0.0756
Daily Emissions (lb/day)	0.0567	0.0120
Hourly Emissions (lb/hour)	0.0071	0.0015
Annual Emissions (lb/year)	14.7715	3.1316

EF (lb/VMT)= $4.9 * (S/12)^{0.7} * (W/3)^{0.45}$

Silt content based on mean Sand and Gravel Processing from AP-42 Table 13.2.2-1.

Control efficiency for unpaved roads in baseline is 80% for watering.

PM2.5 emissions are 21.2% of PM10 for unpaved roads (SCAQMD *Updated CEIDARS Table)*.

Project - VMTs (years 5-30)

[E]Paved Road Emission Factors (Off Site VMTs, On Road Truck, Paved Road):

	On-road Trucks	
	PM10	PM2.5
k= particle size multiplier (lb/vmt)	0.0022	0.00054
sL = road surface silt loading (g/m^2)	0.2	0.2
W_l = loaded truck wt (tons)	40	40
W_u = unloaded truck wt (tons)	15	15
W = avge truck weight	27.50	27.50
Uncontrolled EF (lb/VMT)	0.0149	0.0037
Control Efficiency	80%	80%
Emission Factor (lb/VMT)	0.0030	0.0007
Daily Emissions (lb/day)	0.0017	0.0004
Hourly Emissions (lb/hour)	0.0002	0.0001
Annual Emissions (lb/year)	0.4424	0.1086

EF (lb/VMT)= $k * (sL)^{0.91} * (W)^{1.02}$

Particle size multiplier based on AP-42 Table 13.2.1-1

Silt Loading based on ADT of 500 - 5000 from AP-42 Table 13.1-2

Control efficiency for unpaved roads in baseline is 80% for watering.

Particulate Matter Totals from On Site and Off Site, Unpaved and Paved Roads:

	Off-road Trucks		On-road Trucks	
	PM10	PM2.5	PM10	PM2.5
Hourly Emissions (lb/hour)			0.0073	0.0016
Annual Emissions (lb/year)			15.2139	3.2401

[I]Speciated Fugitive PM10 Emission Factors and Emissions (On and Off Site VMTs, On Road, Paved Road)

Pollutant Name	Emission factor (ppmw)	Emissions (lbs/year)	Emissions (lbs/hour)
ARSENIC	20	3.04E-04	1.46E-07
BERYLLIUM	1	1.52E-05	7.30E-09
CADMIUM	1	1.52E-05	7.30E-09
CHROMIUM HEXAVALENT	0	0.00E+00	0.00E+00
CHROMIUM NONHEXAVALENT	50	7.61E-04	3.65E-07
COPPER	100	1.52E-03	7.30E-07
LEAD	50	7.61E-04	3.65E-07
MANGANESE	500	7.61E-03	3.65E-06
MERCURY	0	0.00E+00	0.00E+00
NICKEL	20	3.04E-04	1.46E-07
SELENIUM	5	7.61E-05	3.65E-08
SILICA, CRYSTALLINE	100000	1.52E+00	7.30E-04
ZINC	200	3.04E-03	1.46E-06

EMFAC2014 Emission Factors for Criteria Emissions

[G]EMFAC2014 Emission Rates for Diesel T7 Tractor (Off Site, On Road, Paved)

2018 Emission Factors (g/VMT)							
ROC	CO	NOx	SOx	PM10	PM2.5	CO2	[H] CO2e
0.1321	0.5100	5.1846	0.0151	0.0260	0.0249	1579.2033	1658.1635

Project - VMTs (years 5-30)

Criteria Emissions

On-Site, On-Road, Unpaved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0018	0.0002	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0121	0.4733	0.0466	0.0024	0.0023	0.0014	0.0687

Off-Site, On-Road, Paved

Daily Emissions (lb/day)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0002	0.0065	0.0006	0.0000	0.0000	0.0000	
Hourly Emissions (lb/hour)						
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0000	0.0008	0.0001	0.0000	0.0000	0.0000	
Annual Emissions (lb/year)						CO2e (MT/y)
ROC	NOx	CO	PM10	PM2.5	SOx	
0.0431	1.6903	0.1663	0.0085	0.0081	0.0049	0.2452

Total Criteria Emissions

	ROC	CO	NOx	SOx	[F] PM10	PM2.5	CO2e (MT/year)
Hourly (lb/hour)	0.0000	0.0001	0.0010	0.0000	0.0000	0.0000	0.3139
Annual (lb/year)	0.0551	0.2128	2.1635	0.0063	0.0108	0.0104	

Project - VMTs (years 5-30)

Assumptions and Sources

A) Assume T7 Tractor EMFAC2014 vehicle category used for the transport of oil and wastewater on and off site.
B) Google Earth software was used to measure the VMTed on site and off site. The on site VMT distance was assumed to include the 350 foot site unpaved driveway. The off site VMT distance was assumed to extend from the bottom of the on site driveway to the intersection of Koenigstein Road and California State Route 150.
C) The baseline setting for overall heavy duty truck traffic reflects the maximum weekly fluid production established in 1989 - the CEQA baseline for traffic volume on Highway 150 is a weekly average of 6.6 to 11.8 one-way truck trips per week. Emissions calculated using 5 trucks to remain conservative.
D) Unpaved Road emissions factor from AP42 Section 13.2.2.
E) Paved Road emissions factor from AP42 Section 13.2.1.
F) Assume PM10 emissions produced by diesel engines are equal to the amount of diesel engine exhaust produced. Diesel engines used here for the transport of oil and wastewater.
G) Emission Rates from California Air Resources Board EMFAC2014 (v1.0.7) Web Base, Source: https://www.arb.ca.gov/emfac/2014/. Rates based on the following parameters: Region Type: Air District, Region: Ventura County APCD, Calendar Year: 2018, Vehicle Class: T7 Tractor, Model Year: Aggregated, Speed: Aggregated, Fuel: Diesel, Season: Annual, and Vehicle Category: EMFAC2011 Categories.
H) CO_2e emissions factor determined by scaling CO_2 factor up by 5%, per the methodologies found in the BAAQMD GHG Model (BGM). This accounts for emissions of CH_4, N_2O, and air conditioner evaporative loss.
I) San Diego County APCD, H01 - Haul Roads, General, Paved, & Unpaved, Default Trace Metal Composition.
J) Assume that the number of on site truck trips is the same as the number of off site truck trips.
K) Assume no construction in years 5 through 30. The number of trucks used for the transport of oil and wastewater used to calculate the VMT emissions in years 5 to 30 was assumed to remain consistant with the number of trucks used for the transport of oil and wastewater in years 1 to 4.

Project PLUS Baseline Criteria and Speciated Emission Calculation Summary (Years 1-4)

Criteria Emissions

	Calculated Emissions (tons/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.2437	0.3412	0.0487	0.3412	1.8034
Tanks	0.0790				
Loading Facilities	0.0248				
Oil Wells	2.1900				
VMT	0.0001	0.0015	0.0018	0.0000	0.0001
Diesel Engines (construction)	0.0657	1.3828	0.0363	0.0017	0.3565
TOTAL	**2.6032**	**1.7255**	**0.0869**	**0.3429**	**2.1601**

	Calculated Emissions (lbs/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	487.3997	682.3596	97.4799	682.3596	3606.7579
Tanks	157.9227				
Loading Facilities	49.6679				
Oil Wells	4380.0000				
VMT	0.1587	2.9635	3.6190	0.0181	0.2948
Diesel Engines (construction)	131.3441	2765.6110	72.6022	3.3904	713.0758
TOTAL	**5206.4931**	**3450.9341**	**173.7012**	**685.7681**	**4320.1285**

	Calculated Emissions (lbs/hr)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0556	0.0779	0.0111	0.0779	0.4117
Tanks	0.0180				
Loading Facilities	0.0057				
Oil Wells	0.5000				
VMT	0.0004	0.0151	0.0018	0.0000	0.0017
Diesel Engines (construction)	0.9224	18.7828	0.5026	0.0241	5.0737
TOTAL	**1.5021**	**18.8757**	**0.5156**	**0.1020**	**5.4871**

Project PLUS Baseline Criteria and Speciated Emission Calculation Summary (Years 1-4)

Speciated Emissions

HARP Emission Inventory Identifier	Identifier Description	Pollutant Name	CAS#	Emissions (lbs/year)	Emissions (lbs/hour)
FUG	Fugitive ROC emissions from wells, piping, flanges, tanks, and loading rack. Includes construction diesel engine emissions. **DIESEL EMISSIONS CACULATED SEPARATELY BASED ON FUEL USE. SEE "Fuel Based Construction PM10" sheet.**	DieselExhPM	9901	2.15E+01	2.68E-01
		Benzene	71432	1.61E+01	1.83E-03
		Hydrogen sulfide	7783064	6.56E+01	7.49E-03
		Toluene	108883	1.56E+01	1.78E-03
		Xylenes (mixed)	1330207	3.21E+01	3.67E-03
FLARE	Fugitive ROC emissions from flare.	Acetaldehyde	75070	4.86E-01	5.55E-05
		Acrolein	107028	1.13E-01	1.29E-05
		Benzene	71432	1.80E+00	2.05E-04
		Ethyl benzene	100414	1.63E+01	1.86E-03
		Formaldehyde	50000	1.32E+01	1.51E-03
		Hexane	110543	3.28E-01	3.74E-05
		Naphthalene	91203	1.24E-01	1.42E-05
		PAHs, total, w/o individ. components reported	1151	3.39E-02	3.87E-06
		Propylene	115071	2.76E+01	3.15E-03
		Toluene	108883	6.56E-01	7.49E-05
		Xylenes (mixed)	1330207	3.28E-01	3.74E-05
ROAD	PM10 emissions from the diesel exhaust produced while driving on and off site.	DieselExhPM	9901	3.11E-02	1.49E-04
	Fugitive PM10 dust emissions from driving on and off site.	ARSENIC	7440382	0.0053	0.0000
		BERYLLIUM	7440417	2.63E-04	1.26E-07
		CADMIUM	7440439	2.63E-04	1.26E-07
		CHROMIUM HEXAVALENT	18540299	0.00E+00	0.00E+00
		CHROMIUM NONHEXAVALENT	7440473	1.31E-02	6.31E-06
		COPPER	7440508	2.63E-02	1.26E-05
		LEAD	1128	1.31E-02	6.31E-06
		MANGANESE	7439965	1.31E-01	6.31E-05
		MERCURY	7439976	0.00E+00	0.00E+00
		NICKEL	7440020	0.0053	0.0000
		SELENIUM	7782492	1.31E-03	6.31E-07
		SILICA, CRYSTALLINE	1175	2.63E+01	1.26E-02
		ZINC	7440666	5.26E-02	2.52E-05

Project PLUS Baseline Criteria and Speciated Emission Calculation Summary (Years 5-30)

Criteria Emissions

	Calculated Emissions (tons/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.2437	0.3412	0.0487	0.3412	1.8034
Tanks	0.0790				
Loading Facilities	0.0248				
Oil Wells	2.1900				
VMT	0.0000	0.0011	0.0000	0.0000	0.0001
TOTAL	**2.5375**	**0.3423**	**0.0487**	**0.3412**	**1.8035**

	Calculated Emissions (lbs/year)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	487.3997	682.3596	97.4799	682.3596	3606.7579
Tanks	157.9227				
Loading Facilities	49.6679				
Oil Wells	4380.0000				
VMT	0.0551	2.1635	0.0108	0.0063	0.2128
TOTAL	**5075.0454**	**684.5231**	**97.4908**	**682.3659**	**3606.9707**

	Calculated Emissions (lbs/hr)				
Source	**ROC**	**NOx**	**PM10**	**SOx**	**CO**
Flares	0.0556	0.0779	0.0111	0.0779	0.4117
Tanks	0.0180				
Loading Facilities	0.0057				
Oil Wells	0.5000				
VMT	0.0000	0.0010	0.0000	0.0000	0.0001
TOTAL	**0.5794**	**0.0789**	**0.0111**	**0.0779**	**0.4118**

Project PLUS Baseline Criteria and Speciated Emission Calculation Summary (Years 5-30)

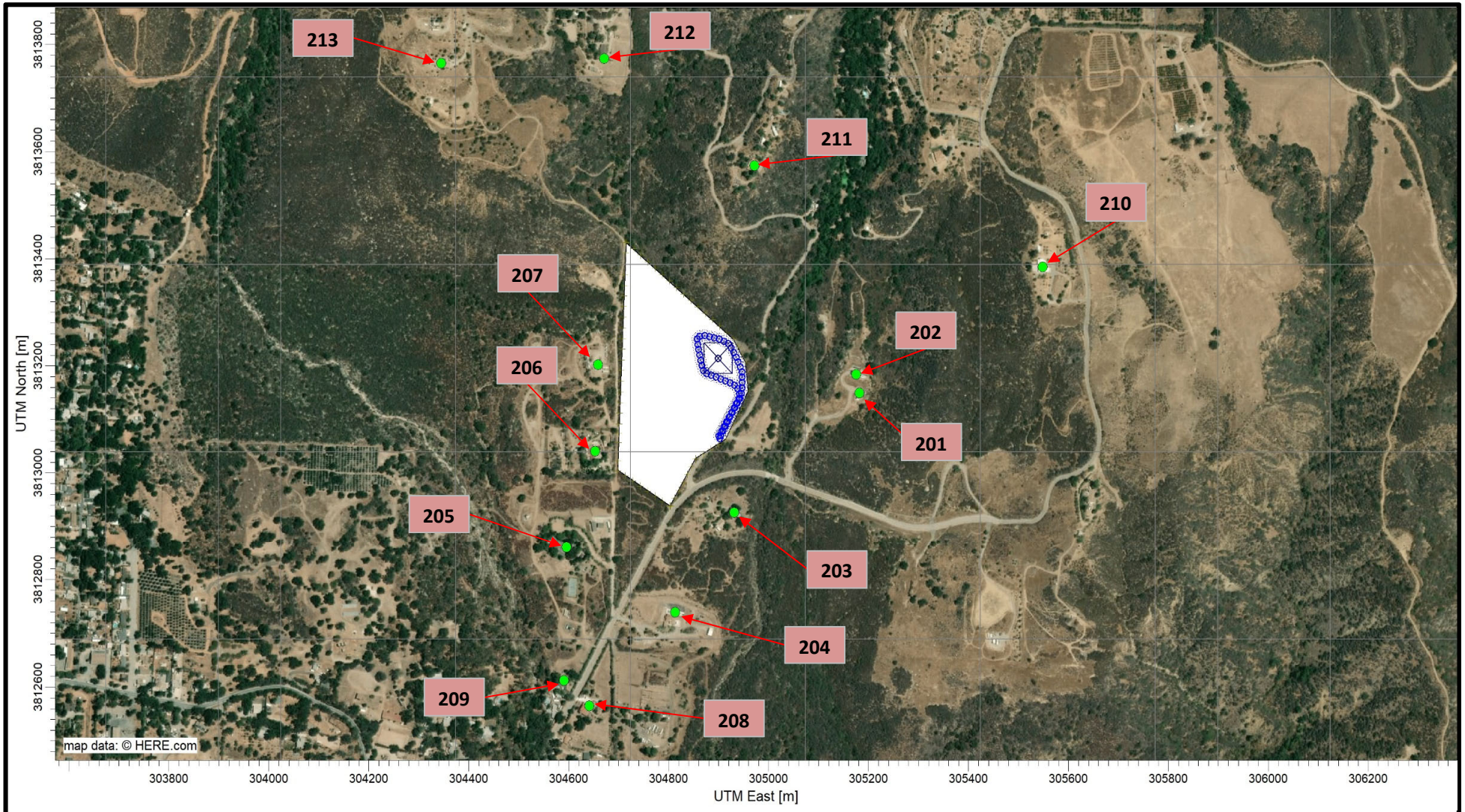
Speciated Emissions

HARP Emission Inventory Identifier	Identifier Description	Pollutant Name	CAS#	Emissions (lbs/year)	Emissions (lbs/hour)
FUG	Fugitive ROC emissions from wells, piping, flanges, tanks, and loading rack.	Benzene	71432	1.61E+01	1.83E-03
		Hydrogen sulfide	7783064	6.56E+01	7.49E-03
		Toluene	108883	1.56E+01	1.78E-03
		Xylenes (mixed)	1330207	3.21E+01	3.67E-03
FLARE	Fugitive ROC emissions from flare.	Acetaldehyde	75070	4.86E-01	5.55E-05
		Acrolein	107028	1.13E-01	1.29E-05
		Benzene	71432	1.80E+00	2.05E-04
		Ethyl benzene	100414	1.63E+01	1.86E-03
		Formaldehyde	50000	1.32E+01	1.51E-03
		Hexane	110543	3.28E-01	3.74E-05
		Naphthalene	91203	1.24E-01	1.42E-05
		PAHs, total, w/o individ. components reported	1151	3.39E-02	3.87E-06
		Propylene	115071	2.76E+01	3.15E-03
		Toluene	108883	6.56E-01	7.49E-05
		Xylenes (mixed)	1330207	3.28E-01	3.74E-05
ROAD	PM10 emissions from the diesel exhaust produced while driving on and off site.	DieselExhPM	9901	1.08E-02	5.21E-06
	Fugitive PM10 on site and off site VMT emissions.	ARSENIC	7440382	3.04E-04	1.46E-07
		BERYLLIUM	7440417	1.52E-05	7.30E-09
		CADMIUM	7440439	1.52E-05	7.30E-09
		CHROMIUM HEXAVALENT	18540299	0.00E+00	0.00E+00
		CHROMIUM NONHEXAVALENT	7440473	7.61E-04	3.65E-07
		COPPER	7440508	1.52E-03	7.30E-07
		LEAD	1128	7.61E-04	3.65E-07
		MANGANESE	7439965	7.61E-03	3.65E-06
		MERCURY	7439976	0.00E+00	0.00E+00
		NICKEL	7440020	3.04E-04	1.46E-07
		SELENIUM	7782492	7.61E-05	3.65E-08
		SILICA, CRYSTALLINE	1175	1.52E+00	7.30E-04
		ZINC	7440666	3.04E-03	1.46E-06

APPENDIX C

Health Risk Assessment

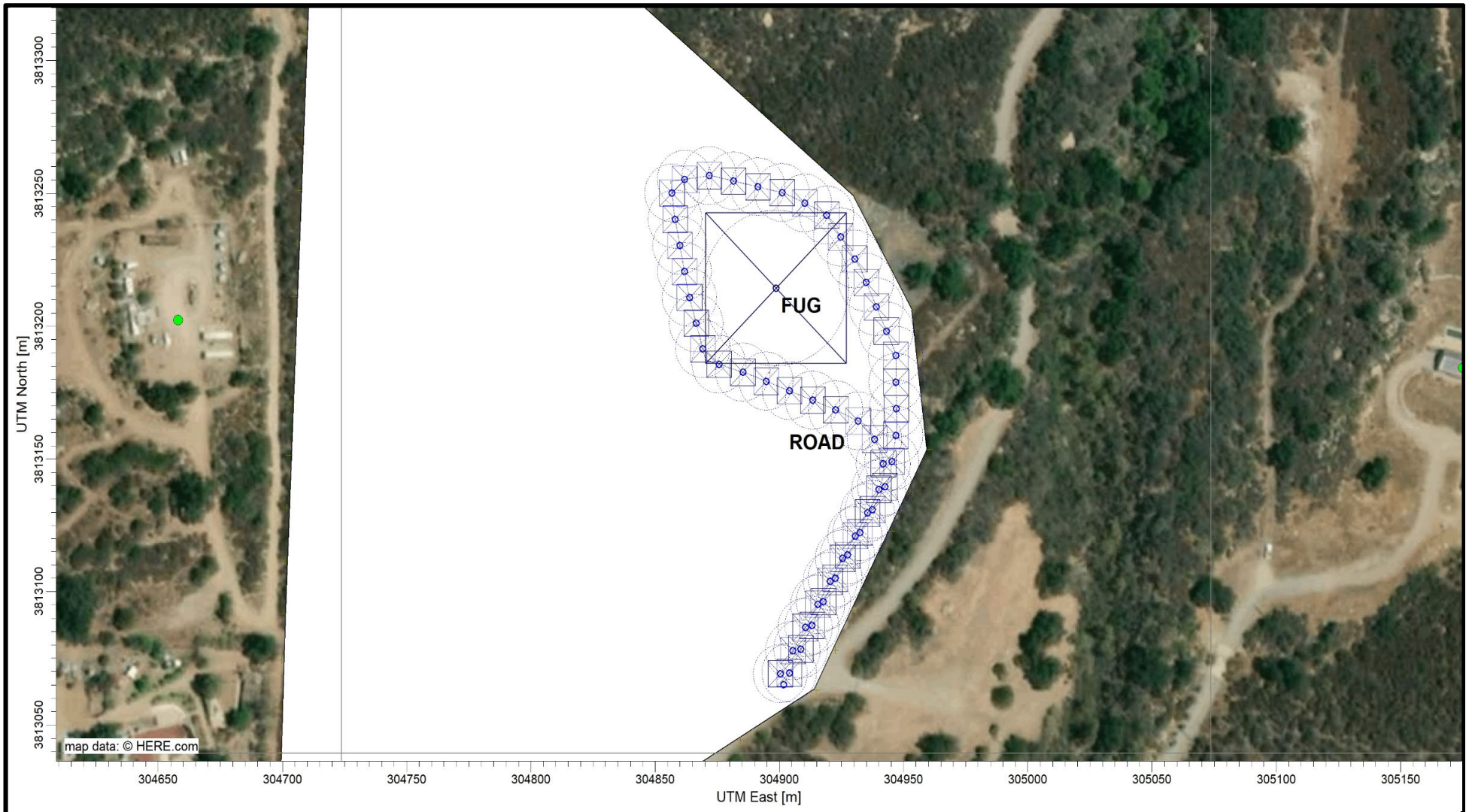
Figure 1 - Health Risk Assessment Receptor Map
Figure 2 - Health Risk Assessment Source Map
Link to modeling files: https://bit.ly/2V3J51i



Grey grid represents a subset of total cartesian grid receptors
Green circles represent individual residential receptors
Red boxes contain receptor number labels
White area represents facility boundries

SESPE CONSULTING, INC.

FIGURE 1	Health Risk Assesment Receptor Map Carbon California Agnew Facility 11 S, 304915 m E, 3813190 m N Ventura County, CA		
PROJECT #:	CA19.18.05	DATE:	12/21/18
SCALE:	AS SHOWN	DRAWN BY:	ADA



ROAD - Line Volume Source

FUG - Volume Source

SESPE CONSULTING, INC.

FIGURE 2	Health Risk Assesment Source Map Carbon California Agnew Facility 11 S, 304915 m E, 3813190 m N Ventura County, CA		
PROJECT #:	CA19.18.05	DATE:	12/21/18
SCALE:	AS SHOWN	DRAWN BY:	ADA

REC	NETID	X	Y	1_4f Cancer Risk Sum	5_30f Cancer Risk Sum	1_4f Max Chronic Hazard Index	5_30f Max Chronic Hazard Index	1_4f Max Acute Hazard Index	5_30f Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
1	UCART1	295898.7	3804214	1.02E-08	2.26E-09	6.88E-05	9.48E-06	0.00010676	0.00010096	1.24E-08	6.88E-05	0.000107
2	UCART1	297898.7	3804214	1.12E-08	2.49E-09	7.76E-05	1.05E-05	0.00012428	0.00011691	1.37E-08	7.76E-05	0.000124
3	UCART1	299898.7	3804214	9.83E-09	2.15E-09	6.67E-05	9.19E-06	0.00014559	0.00013688	1.20E-08	6.67E-05	0.000146
4	UCART1	301898.7	3804214	8.56E-09	1.86E-09	5.80E-05	8.01E-06	0.00016286	0.00015355	1.04E-08	5.80E-05	0.000163
5	UCART1	303898.7	3804214	7.33E-09	1.57E-09	4.97E-05	6.87E-06	0.00017615	0.00016649	8.90E-09	4.97E-05	0.000176
6	UCART1	305898.7	3804214	7.92E-09	1.73E-09	5.36E-05	7.40E-06	0.00020052	0.00018866	9.65E-09	5.36E-05	0.000201
7	UCART1	307898.7	3804214	6.49E-09	1.40E-09	4.40E-05	6.07E-06	0.00017546	0.00016537	7.88E-09	4.40E-05	0.000175
8	UCART1	309898.7	3804214	6.16E-09	1.34E-09	4.17E-05	5.76E-06	0.00015367	0.00014521	7.50E-09	4.17E-05	0.000154
9	UCART1	311898.7	3804214	5.25E-09	1.14E-09	3.52E-05	4.89E-06	0.00012455	0.00011773	6.39E-09	3.52E-05	0.000125
10	UCART1	313898.7	3804214	4.74E-09	1.03E-09	3.19E-05	4.43E-06	0.00010948	0.0001037	5.77E-09	3.19E-05	0.000109
11	UCART1	295898.7	3806214	1.22E-08	2.69E-09	8.27E-05	1.14E-05	0.00012067	0.00011376	1.49E-08	8.27E-05	0.000121
12	UCART1	297898.7	3806214	1.53E-08	3.40E-09	0.00010351	1.43E-05	0.0001571	0.00014851	1.87E-08	0.000104	0.000157
13	UCART1	299898.7	3806214	1.53E-08	3.34E-09	0.00010396	1.43E-05	0.00018024	0.00017006	1.86E-08	0.000104	0.00018
14	UCART1	301898.7	3806214	1.39E-08	3.06E-09	9.45E-05	1.30E-05	0.00023455	0.00022138	1.70E-08	9.45E-05	0.000235
15	UCART1	303898.7	3806214	1.14E-08	2.46E-09	7.79E-05	1.07E-05	0.00024954	0.00023523	1.39E-08	7.79E-05	0.00025
16	UCART1	305898.7	3806214	1.18E-08	2.62E-09	8.01E-05	1.11E-05	0.00026793	0.00025131	1.45E-08	8.01E-05	0.000268
17	UCART1	307898.7	3806214	9.59E-09	2.08E-09	6.52E-05	8.99E-06	0.00023631	0.00022243	1.17E-08	6.52E-05	0.000236
18	UCART1	309898.7	3806214	8.41E-09	1.82E-09	5.65E-05	7.85E-06	0.00020408	0.00019283	1.02E-08	5.65E-05	0.000204
19	UCART1	311898.7	3806214	7.23E-09	1.58E-09	4.90E-05	6.76E-06	0.00016139	0.00015281	8.80E-09	4.90E-05	0.000161
20	UCART1	313898.7	3806214	6.43E-09	1.39E-09	4.35E-05	6.01E-06	0.00013099	0.00012385	7.82E-09	4.35E-05	0.000131
21	UCART1	295898.7	3808214	1.34E-08	2.97E-09	9.08E-05	1.25E-05	0.00011462	0.0001086	1.64E-08	9.08E-05	0.000115
22	UCART1	297898.7	3808214	2.36E-08	5.37E-09	0.00015746	2.18E-05	0.00032272	0.00030104	2.89E-08	0.000157	0.000323
23	UCART1	299898.7	3808214	2.66E-08	5.95E-09	0.00018108	2.49E-05	0.00025878	0.00024452	3.25E-08	0.000181	0.000259
24	UCART1	301898.7	3808214	2.68E-08	5.96E-09	0.00018466	2.52E-05	0.00034362	0.00032353	3.28E-08	0.000185	0.000344
25	UCART1	303898.7	3808214	2.14E-08	4.75E-09	0.00014738	2.01E-05	0.00039915	0.00037574	2.61E-08	0.000147	0.000399
26	UCART1	305898.7	3808214	1.94E-08	4.22E-09	0.00013286	1.82E-05	0.00042886	0.00040427	2.36E-08	0.000133	0.000429
27	UCART1	307898.7	3808214	1.61E-08	3.56E-09	0.00010929	1.51E-05	0.00035581	0.00033515	1.97E-08	0.000109	0.000356
28	UCART1	309898.7	3808214	1.25E-08	2.74E-09	8.53E-05	1.18E-05	0.00026657	0.00025226	1.53E-08	8.53E-05	0.000267
29	UCART1	311898.7	3808214	1.31E-08	2.91E-09	9.18E-05	1.24E-05	0.00021135	0.00019783	1.60E-08	9.18E-05	0.000211
30	UCART1	313898.7	3808214	9.72E-09	2.13E-09	6.62E-05	9.11E-06	0.00014254	0.00013414	1.19E-08	6.62E-05	0.000143
31	UCART1	295898.7	3810214	1.56E-08	3.49E-09	0.00010569	1.46E-05	0.00024815	0.00023047	1.91E-08	0.000106	0.000248
32	UCART1	297898.7	3810214	1.92E-09	4.41E-10	1.28E-05	1.78E-06	3.81E-05	3.55E-05	2.36E-09	1.28E-05	3.81E-05
33	UCART1	299898.7	3810214	4.50E-09	1.04E-09	2.99E-05	4.16E-06	5.65E-05	5.23E-05	5.54E-09	2.99E-05	5.65E-05
34	UCART1	301898.7	3810214	6.10E-09	1.37E-09	4.16E-05	5.71E-06	7.24E-05	6.65E-05	7.47E-09	4.16E-05	7.24E-05
35	UCART1	303898.7	3810214	2.62E-09	5.61E-10	1.82E-05	2.47E-06	0.00013346	0.00012348	3.18E-09	1.82E-05	0.000133
36	UCART1	305898.7	3810214	5.18E-08	1.14E-08	0.00036485	4.91E-05	0.0010691	0.00099873	6.32E-08	0.000365	0.001069
37	UCART1	307898.7	3810214	2.91E-08	6.37E-09	0.0002002	2.74E-05	0.00055431	0.00052342	3.55E-08	0.0002	0.000554
38	UCART1	309898.7	3810214	3.01E-08	6.67E-09	0.00020832	2.83E-05	0.00042692	0.00040136	3.68E-08	0.000208	0.000427
39	UCART1	311898.7	3810214	2.31E-08	5.21E-09	0.00015692	2.16E-05	0.00040912	0.00038108	2.83E-08	0.000157	0.000409
40	UCART1	313898.7	3810214	3.23E-09	7.41E-10	2.23E-05	3.03E-06	3.40E-05	3.14E-05	3.97E-09	2.23E-05	3.40E-05
41	UCART1	295898.7	3812214	9.51E-09	2.09E-09	6.42E-05	8.87E-06	0.00018058	0.00016959	1.16E-08	6.42E-05	0.000181
42	UCART1	297898.7	3812214	1.21E-08	2.72E-09	8.25E-05	1.13E-05	0.00019338	0.00018187	1.49E-08	8.25E-05	0.000193
43	UCART1	299898.7	3812214	2.46E-08	5.54E-09	0.0001671	2.30E-05	0.00032004	0.00030268	3.01E-08	0.000167	0.00032
44	UCART1	301898.7	3812214	7.19E-08	1.62E-08	0.00048559	6.70E-05	0.00062334	0.00058835	8.81E-08	0.000486	0.000623
45	UCART1	303898.7	3812214	3.90E-07	9.33E-08	0.0029337	0.00037701	0.0022699	0.0021272	4.83E-07	0.002934	0.00227
46	UCART1	305898.7	3812214	1.77E-07	3.96E-08	0.0012998	0.00017038	0.0023661	0.0022209	2.17E-07	0.0013	0.002366
47	UCART1	307898.7	3812214	7.69E-08	1.71E-08	0.0005257	7.20E-05	0.00066593	0.00062824	9.40E-08	0.000526	0.000666
48	UCART1	309898.7	3812214	8.63E-09	1.97E-09	5.92E-05	8.08E-06	6.09E-05	5.65E-05	1.06E-08	5.92E-05	6.09E-05
49	UCART1	311898.7	3812214	2.66E-09	5.92E-10	1.84E-05	2.51E-06	4.71E-05	4.34E-05	3.26E-09	1.84E-05	4.71E-05
50	UCART1	313898.7	3812214	1.57E-09	3.51E-10	1.08E-05	1.47E-06	3.63E-05	3.37E-05	1.92E-09	1.08E-05	3.63E-05
51	UCART1	295898.7	3814214	4.91E-09	1.11E-09	3.39E-05	4.61E-06	0.0001273	0.00012061	6.01E-09	3.39E-05	0.000127
52	UCART1	297898.7	3814214	6.79E-09	1.53E-09	4.71E-05	6.39E-06	0.00018408	0.00017449	8.32E-09	4.71E-05	0.000184
53	UCART1	299898.7	3814214	1.04E-08	2.34E-09	7.26E-05	9.80E-06	0.00029543	0.00027974	1.27E-08	7.26E-05	0.000295
54	UCART1	301898.7	3814214	2.36E-08	5.68E-09	0.00017487	2.27E-05	0.00060032	0.0005649	2.93E-08	0.000175	0.0006
55	UCART1	303898.7	3814214	1.70E-08	4.14E-09	0.00010849	1.54E-05	0.00046236	0.00043284	2.11E-08	0.000108	0.000462
56	UCART1	305898.7	3814214	9.28E-09	2.05E-09	5.95E-05	8.50E-06	0.00015624	0.0001464	1.13E-08	5.95E-05	0.000156
57	UCART1	307898.7	3814214	5.95E-09	1.32E-09	3.95E-05	5.51E-06	7.17E-05	6.61E-05	7.27E-09	3.95E-05	7.17E-05
58	UCART1	309898.7	3814214	4.50E-09	1.01E-09	2.99E-05	4.17E-06	5.58E-05	5.19E-05	5.51E-09	2.99E-05	5.58E-05
59	UCART1	311898.7	3814214	3.04E-09	6.83E-10	2.05E-05	2.83E-06	4.20E-05	3.88E-05	3.72E-09	2.05E-05	4.20E-05
60	UCART1	313898.7	3814214	1.70E-09	3.80E-10	1.14E-05	1.58E-06	2.73E-05	2.53E-05	2.08E-09	1.14E-05	2.73E-05
61	UCART1	295898.7	3816214	3.75E-09	8.63E-10	2.66E-05	3.56E-06	0.00011184	0.00010588	4.62E-09	2.66E-05	0.000112
62	UCART1	297898.7	3816214	4.98E-09	1.13E-09	3.56E-05	4.74E-06	0.00015561	0.00014759	6.12E-09	3.56E-05	0.000156
63	UCART1	299898.7	3816214	8.95E-09	2.08E-09	6.46E-05	8.53E-06	0.00027491	0.00025971	1.10E-08	6.46E-05	0.000275
64	UCART1	301898.7	3816214	8.24E-10	1.84E-10	5.63E-06	7.72E-07	5.42E-05	5.00E-05	1.01E-09	5.63E-06	5.42E-05
65	UCART1	303898.7	3816214	9.53E-10	2.06E-10	6.48E-06	8.93E-07	5.68E-05	5.28E-05	1.16E-09	6.48E-06	5.68E-05
66	UCART1	305898.7	3816214	1.14E-09	2.59E-10	7.70E-06	1.06E-06	4.82E-05	4.46E-05	1.40E-09	7.70E-06	4.82E-05

REC	NETID	X	Y	1_4f Cancer Risk Sum	5_30f Cancer Risk Sum	1_4f Max Chronic Hazard Index	5_30f Max Chronic Hazard Index	1_4f Max Acute Hazard Index	5_30f Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
67	UCART1	307898.7	3816214	1.07E-09	2.43E-10	7.19E-06	9.95E-07	3.77E-05	3.49E-05	1.31E-09	7.19E-06	3.77E-05
68	UCART1	309898.7	3816214	1.38E-09	3.14E-10	9.30E-06	1.28E-06	2.84E-05	2.63E-05	1.69E-09	9.30E-06	2.84E-05
69	UCART1	311898.7	3816214	1.35E-09	3.07E-10	9.18E-06	1.26E-06	2.19E-05	2.03E-05	1.66E-09	9.18E-06	2.19E-05
70	UCART1	313898.7	3816214	8.66E-10	1.98E-10	5.89E-06	8.08E-07	2.48E-05	2.31E-05	1.06E-09	5.89E-06	2.48E-05
71	UCART1	295898.7	3818214	2.25E-10	5.04E-11	1.53E-06	2.10E-07	1.69E-05	1.57E-05	2.75E-10	1.53E-06	1.69E-05
72	UCART1	297898.7	3818214	3.66E-10	8.50E-11	2.47E-06	3.40E-07	1.96E-05	1.83E-05	4.51E-10	2.47E-06	1.96E-05
73	UCART1	299898.7	3818214	3.54E-10	7.92E-11	2.42E-06	3.32E-07	3.51E-05	3.24E-05	4.34E-10	2.42E-06	3.51E-05
74	UCART1	301898.7	3818214	3.77E-10	8.37E-11	2.57E-06	3.53E-07	2.10E-05	1.96E-05	4.61E-10	2.57E-06	2.10E-05
75	UCART1	303898.7	3818214	4.88E-10	1.14E-10	3.34E-06	4.55E-07	5.08E-05	4.72E-05	6.02E-10	3.34E-06	5.08E-05
76	UCART1	305898.7	3818214	5.87E-10	1.35E-10	3.98E-06	5.46E-07	2.58E-05	2.39E-05	7.22E-10	3.98E-06	2.58E-05
77	UCART1	307898.7	3818214	5.00E-10	1.12E-10	3.39E-06	4.67E-07	3.04E-05	2.81E-05	6.13E-10	3.39E-06	3.04E-05
78	UCART1	309898.7	3818214	5.37E-10	1.23E-10	3.64E-06	5.01E-07	2.54E-05	2.36E-05	6.60E-10	3.64E-06	2.54E-05
79	UCART1	311898.7	3818214	6.25E-10	1.40E-10	4.22E-06	5.82E-07	1.36E-05	1.27E-05	7.65E-10	4.22E-06	1.36E-05
80	UCART1	313898.7	3818214	6.10E-10	1.38E-10	4.18E-06	5.71E-07	1.40E-05	1.30E-05	7.49E-10	4.18E-06	1.40E-05
81	UCART1	295898.7	3820214	1.70E-10	3.88E-11	1.17E-06	1.60E-07	1.39E-05	1.29E-05	2.09E-10	1.17E-06	1.39E-05
82	UCART1	297898.7	3820214	2.24E-10	5.03E-11	1.53E-06	2.09E-07	2.67E-05	2.46E-05	2.74E-10	1.53E-06	2.67E-05
83	UCART1	299898.7	3820214	2.66E-10	6.11E-11	1.84E-06	2.49E-07	3.46E-05	3.24E-05	3.27E-10	1.84E-06	3.46E-05
84	UCART1	301898.7	3820214	2.54E-10	5.73E-11	1.74E-06	2.38E-07	1.68E-05	1.56E-05	3.12E-10	1.74E-06	1.68E-05
85	UCART1	303898.7	3820214	3.37E-10	7.68E-11	2.31E-06	3.16E-07	2.37E-05	2.21E-05	4.14E-10	2.31E-06	2.37E-05
86	UCART1	305898.7	3820214	3.78E-10	8.61E-11	2.59E-06	3.54E-07	2.01E-05	1.87E-05	4.65E-10	2.59E-06	2.01E-05
87	UCART1	307898.7	3820214	3.70E-10	8.55E-11	2.53E-06	3.45E-07	2.24E-05	2.07E-05	4.55E-10	2.53E-06	2.24E-05
88	UCART1	309898.7	3820214	3.60E-10	8.26E-11	2.45E-06	3.36E-07	2.27E-05	2.12E-05	4.42E-10	2.45E-06	2.27E-05
89	UCART1	311898.7	3820214	3.96E-10	9.06E-11	2.70E-06	3.70E-07	1.84E-05	1.71E-05	4.87E-10	2.70E-06	1.84E-05
90	UCART1	313898.7	3820214	4.16E-10	9.26E-11	2.82E-06	3.89E-07	7.51E-06	7.00E-06	5.09E-10	2.82E-06	7.51E-06
91	UCART1	295898.7	3822214	1.45E-10	3.32E-11	9.91E-07	1.36E-07	2.16E-05	1.99E-05	1.79E-10	9.91E-07	2.16E-05
92	UCART1	297898.7	3822214	2.02E-10	4.92E-11	1.40E-06	1.89E-07	3.66E-05	3.38E-05	2.52E-10	1.40E-06	3.66E-05
93	UCART1	299898.7	3822214	1.81E-10	4.05E-11	1.23E-06	1.69E-07	1.03E-05	9.55E-06	2.21E-10	1.23E-06	1.03E-05
94	UCART1	301898.7	3822214	2.16E-10	4.72E-11	1.49E-06	2.03E-07	1.88E-05	1.75E-05	2.63E-10	1.49E-06	1.88E-05
95	UCART1	303898.7	3822214	2.80E-10	6.27E-11	1.93E-06	2.63E-07	1.94E-05	1.81E-05	3.43E-10	1.93E-06	1.94E-05
96	UCART1	305898.7	3822214	2.88E-10	6.52E-11	1.98E-06	2.70E-07	2.15E-05	2.01E-05	3.53E-10	1.98E-06	2.15E-05
97	UCART1	307898.7	3822214	2.91E-10	6.64E-11	2.00E-06	2.72E-07	1.45E-05	1.35E-05	3.57E-10	2.00E-06	1.45E-05
98	UCART1	309898.7	3822214	2.69E-10	5.90E-11	1.83E-06	2.52E-07	1.62E-05	1.51E-05	3.28E-10	1.83E-06	1.62E-05
99	UCART1	311898.7	3822214	2.77E-10	6.35E-11	1.91E-06	2.60E-07	1.94E-05	1.80E-05	3.41E-10	1.91E-06	1.94E-05
100	UCART1	313898.7	3822214	2.96E-10	6.81E-11	2.02E-06	2.77E-07	1.45E-05	1.35E-05	3.64E-10	2.02E-06	1.45E-05
101	UCART2	303323.7	3811639	2.29E-07	5.30E-08	0.0015697	0.00021382	0.0020349	0.0019052	2.82E-07	0.00157	0.002035
102	UCART2	303673.7	3811639	2.28E-07	5.21E-08	0.0015781	0.00021413	0.0022092	0.0020679	2.80E-07	0.001578	0.002209
103	UCART2	304023.7	3811639	1.78E-07	4.12E-08	0.0011634	0.00016317	0.0018693	0.0017613	2.19E-07	0.001163	0.001869
104	UCART2	304373.7	3811639	7.92E-08	1.87E-08	0.00050239	7.18E-05	0.00090695	0.00085613	9.79E-08	0.000502	0.000907
105	UCART2	304723.7	3811639	1.47E-07	3.38E-08	0.00096476	0.00013543	0.0027828	0.0026097	1.81E-07	0.000965	0.002783
106	UCART2	305073.7	3811639	1.46E-07	3.46E-08	0.0011146	0.00014201	0.0021519	0.0020041	1.80E-07	0.001115	0.002152
107	UCART2	305423.7	3811639	1.15E-07	2.55E-08	0.00083244	0.00011012	0.0019396	0.0018143	1.40E-07	0.000832	0.00194
108	UCART2	305773.7	3811639	1.07E-07	2.39E-08	0.00075956	0.00010136	0.0017269	0.001619	1.30E-07	0.00076	0.001727
109	UCART2	306123.7	3811639	9.29E-08	2.05E-08	0.00065415	8.81E-05	0.0014784	0.0013899	1.13E-07	0.000654	0.001478
110	UCART2	306473.7	3811639	8.40E-08	1.86E-08	0.00059372	7.97E-05	0.0013303	0.0012522	1.03E-07	0.000594	0.00133
111	UCART2	303323.7	3811989	2.63E-07	6.12E-08	0.0019041	0.00025099	0.0015857	0.0014756	3.24E-07	0.001904	0.001586
112	UCART2	303673.7	3811989	3.16E-07	7.49E-08	0.0023343	0.00030329	0.0019172	0.0017885	3.90E-07	0.002334	0.001917
113	UCART2	304023.7	3811989	3.20E-07	7.50E-08	0.002464	0.00031293	0.0021387	0.0019875	3.95E-07	0.002464	0.002139
114	UCART2	304373.7	3811989	2.84E-07	6.68E-08	0.0022406	0.00028077	0.002571	0.0023873	3.51E-07	0.002241	0.002571
115	UCART2	304723.7	3811989	1.99E-07	4.44E-08	0.0014827	0.00019262	0.0026136	0.0024425	2.43E-07	0.001483	0.002614
116	UCART2	305073.7	3811989	1.98E-07	4.54E-08	0.0014549	0.00019014	0.0027933	0.0026151	2.43E-07	0.001455	0.002793
117	UCART2	305423.7	3811989	1.65E-07	3.73E-08	0.0012128	0.00015882	0.0025387	0.0023718	2.02E-07	0.001213	0.002539
118	UCART2	305773.7	3811989	1.47E-07	3.28E-08	0.0010496	0.00013973	0.0022209	0.0020846	1.79E-07	0.00105	0.002221
119	UCART2	306123.7	3811989	1.28E-07	2.85E-08	0.0009243	0.00012223	0.0018396	0.001729	1.56E-07	0.000924	0.00184
120	UCART2	306473.7	3811989	1.19E-07	2.66E-08	0.00087315	0.00011454	0.0015337	0.0014454	1.46E-07	0.000873	0.001534
121	UCART2	303323.7	3812339	2.47E-07	5.83E-08	0.001756	0.0002338	0.0013914	0.0013132	3.05E-07	0.001756	0.001391
122	UCART2	303673.7	3812339	3.55E-07	8.38E-08	0.0025848	0.0003389	0.0020878	0.0019624	4.38E-07	0.002585	0.002088
123	UCART2	304023.7	3812339	4.62E-07	1.10E-07	0.0034376	0.0004448	0.0026537	0.0024929	5.71E-07	0.003438	0.002654
124	UCART2	304373.7	3812339	4.61E-07	1.07E-07	0.0035683	0.00045249	0.0033207	0.0031131	5.68E-07	0.003568	0.003321
125	UCART2	304723.7	3812339	3.58E-07	8.21E-08	0.0027913	0.00035253	0.0037108	0.0034557	4.40E-07	0.002791	0.003711
126	UCART2	305073.7	3812339	3.25E-07	7.55E-08	0.0024997	0.000318	0.0040947	0.0038059	4.01E-07	0.0025	0.004095
127	UCART2	305423.7	3812339	2.69E-07	6.21E-08	0.0020151	0.00026023	0.0034944	0.0032615	3.31E-07	0.002015	0.003494
128	UCART2	305773.7	3812339	2.21E-07	4.99E-08	0.001656	0.00021424	0.0027784	0.0026053	2.71E-07	0.001656	0.002778
129	UCART2	306123.7	3812339	2.11E-07	4.88E-08	0.0014175	0.00019566	0.0027475	0.0025994	2.60E-07	0.001418	0.002748
130	UCART2	306473.7	3812339	7.02E-08	1.68E-08	0.0004903	6.59E-05	0.00056474	0.00052978	8.70E-08	0.00049	0.000565
131	UCART2	303323.7	3812689	2.12E-07	4.97E-08	0.0014602	0.00019826	0.0014741	0.0013889	2.62E-07	0.00146	0.001474
132	UCART2	303673.7	3812689	3.48E-07	8.31E-08	0.0024322	0.00032695	0.0020033	0.0018938	4.31E-07	0.002432	0.002003

REC	NETID	X	Y	1_4f Cancer Risk Sum	5_30f Cancer Risk Sum	1_4f Max Chronic Hazard Index	5_30f Max Chronic Hazard Index	1_4f Max Acute Hazard Index	5_30f Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
133	UCART2	304023.7	3812689	5.96E-07	1.42E-07	0.0041393	0.00055852	0.0030504	0.0028917	7.37E-07	0.004139	0.00305
134	UCART2	304373.7	3812689	9.94E-07	2.40E-07	0.0075513	0.00096404	0.0046675	0.0043794	1.23E-06	0.007551	0.004668
135	UCART2	304723.7	3812689	8.87E-07	2.11E-07	0.0078157	0.00091817	0.006197	0.005735	1.10E-06	0.007816	0.006197
136	UCART2	305073.7	3812689	6.55E-07	1.58E-07	0.0056257	0.0006696	0.0065349	0.0059979	8.13E-07	0.005626	0.006535
137	UCART2	305423.7	3812689	1.20E-07	3.04E-08	0.0009282	0.0001171	0.0014202	0.0013297	1.51E-07	0.000928	0.00142
138	UCART2	305773.7	3812689	4.36E-07	1.03E-07	0.0029532	0.00040481	0.004147	0.0039541	5.39E-07	0.002953	0.004147
139	UCART2	306123.7	3812689	3.36E-07	7.85E-08	0.0025179	0.00032497	0.0021749	0.0020453	4.14E-07	0.002518	0.002175
140	UCART2	306473.7	3812689	2.72E-07	6.33E-08	0.0019624	0.00025951	0.0017374	0.0016242	3.36E-07	0.001962	0.001737
141	UCART2	303323.7	3813039	1.33E-07	3.07E-08	0.00091952	0.00012483	0.001502	0.0014171	1.64E-07	0.00092	0.001502
142	UCART2	303673.7	3813039	2.22E-07	5.26E-08	0.0015312	0.00020763	0.002068	0.0019481	2.75E-07	0.001531	0.002068
143	UCART2	304023.7	3813039	4.21E-07	1.00E-07	0.0027851	0.00038726	0.0031999	0.0030349	5.21E-07	0.002785	0.0032
144	UCART2	304373.7	3813039	1.15E-06	2.87E-07	0.0073929	0.001039	0.0053068	0.0050265	1.43E-06	0.007393	0.005307
145	UCART2	304723.7	3813039	4.90E-06	1.44E-06	0.039303	0.0047781	0.009677	0.0090861	6.34E-06	0.039303	0.009677
146	UCART2	305073.7	3813039	3.17E-06	9.29E-07	0.040124	0.0038597	0.013618	0.012418	4.10E-06	0.040124	0.013618
147	UCART2	305423.7	3813039	7.10E-07	1.75E-07	0.0051837	0.0006765	0.0018926	0.0018033	8.86E-07	0.005184	0.001893
148	UCART2	305773.7	3813039	2.16E-07	5.02E-08	0.0014889	0.00020221	0.00066276	0.00062951	2.66E-07	0.001489	0.000663
149	UCART2	306123.7	3813039	4.59E-07	1.04E-07	0.0029759	0.00042066	0.0036514	0.003447	5.63E-07	0.002976	0.003651
150	UCART2	306473.7	3813039	1.12E-07	2.63E-08	0.00072693	0.00010227	0.00047602	0.00044647	1.38E-07	0.000727	0.000476
151	UCART2	303323.7	3813389	8.81E-08	2.12E-08	0.00063147	8.35E-05	0.0014937	0.0014053	1.09E-07	0.000631	0.001494
152	UCART2	303673.7	3813389	1.32E-07	3.20E-08	0.00095506	0.00012523	0.0021721	0.0020429	1.64E-07	0.000955	0.002172
153	UCART2	304023.7	3813389	1.99E-07	4.94E-08	0.0014904	0.00019172	0.0031403	0.0029489	2.49E-07	0.00149	0.00314
154	UCART2	304373.7	3813389	3.44E-07	8.84E-08	0.0025582	0.00032925	0.005166	0.0048838	4.33E-07	0.002558	0.005166
155	UCART2	304723.7	3813389	1.18E-06	3.70E-07	0.0091904	0.0011258	0.010812	0.0099538	1.55E-06	0.00919	0.010812
156	UCART2	305073.7	3813389	5.71E-07	1.43E-07	0.0033057	0.00049802	0.0036018	0.0034327	7.14E-07	0.003306	0.003602
157	UCART2	305423.7	3813389	2.02E-07	4.46E-08	0.0011627	0.00017794	0.00094839	0.00091033	2.47E-07	0.001163	0.000948
158	UCART2	305773.7	3813389	1.08E-07	2.38E-08	0.00064802	9.66E-05	0.0005487	0.00052115	1.32E-07	0.000648	0.000549
159	UCART2	306123.7	3813389	9.16E-08	2.08E-08	0.00056121	8.23E-05	0.00048385	0.00045576	1.12E-07	0.000561	0.000484
160	UCART2	306473.7	3813389	9.77E-08	2.21E-08	0.00059307	8.75E-05	0.0007102	0.00067326	1.20E-07	0.000593	0.00071
161	UCART2	303323.7	3813739	7.03E-08	1.71E-08	0.00051939	6.74E-05	0.0015564	0.0014652	8.74E-08	0.000519	0.001556
162	UCART2	303673.7	3813739	1.22E-08	2.93E-09	7.90E-05	1.11E-05	0.00042878	0.00040289	1.51E-08	7.90E-05	0.000429
163	UCART2	304023.7	3813739	5.42E-08	1.30E-08	0.0003192	4.78E-05	0.0015609	0.0014874	6.72E-08	0.000319	0.001561
164	UCART2	304373.7	3813739	1.90E-08	4.35E-09	0.00012776	1.76E-05	0.00056826	0.00052469	2.33E-08	0.000128	0.000568
165	UCART2	304723.7	3813739	6.18E-08	1.42E-08	0.00038661	5.58E-05	0.0010911	0.0010245	7.60E-08	0.000387	0.001091
166	UCART2	305073.7	3813739	3.70E-08	8.19E-09	0.00022896	3.34E-05	0.0007218	0.00068543	4.52E-08	0.000229	0.000722
167	UCART2	305423.7	3813739	3.30E-08	7.22E-09	0.00020228	2.97E-05	0.00046713	0.00043913	4.02E-08	0.000202	0.000467
168	UCART2	305773.7	3813739	3.33E-08	7.42E-09	0.00020368	2.99E-05	0.00031581	0.00029774	4.07E-08	0.000204	0.000316
169	UCART2	306123.7	3813739	2.80E-08	6.24E-09	0.00017672	2.55E-05	0.00024485	0.00023099	3.42E-08	0.000177	0.000245
170	UCART2	306473.7	3813739	2.33E-08	5.15E-09	0.00014735	2.12E-05	0.00020644	0.00019346	2.84E-08	0.000147	0.000206
171	UCART2	303323.7	3814089	6.59E-09	1.54E-09	4.30E-05	6.04E-06	0.00026322	0.00024663	8.12E-09	4.30E-05	0.000263
172	UCART2	303673.7	3814089	5.35E-09	1.24E-09	3.54E-05	4.93E-06	0.0002069	0.00019382	6.59E-09	3.54E-05	0.000207
173	UCART2	304023.7	3814089	1.28E-08	3.03E-09	8.37E-05	1.18E-05	0.00040098	0.00037291	1.59E-08	8.37E-05	0.000401
174	UCART2	304373.7	3814089	1.12E-08	2.53E-09	7.52E-05	1.04E-05	0.00032032	0.00029377	1.37E-08	7.52E-05	0.00032
175	UCART2	304723.7	3814089	1.85E-08	4.12E-09	0.00011653	1.68E-05	0.00049196	0.00046074	2.26E-08	0.000117	0.000492
176	UCART2	305073.7	3814089	1.46E-08	3.26E-09	9.33E-05	1.33E-05	0.00033415	0.00031268	1.78E-08	9.33E-05	0.000334
177	UCART2	305423.7	3814089	1.53E-08	3.36E-09	9.69E-05	1.39E-05	0.00034615	0.00032644	1.86E-08	9.69E-05	0.000346
178	UCART2	305773.7	3814089	1.27E-08	2.78E-09	8.04E-05	1.16E-05	0.00021313	0.00019964	1.54E-08	8.04E-05	0.000213
179	UCART2	306123.7	3814089	1.07E-08	2.36E-09	6.82E-05	9.75E-06	0.00013203	0.00012478	1.30E-08	6.82E-05	0.000132
180	UCART2	306473.7	3814089	9.37E-09	2.12E-09	6.07E-05	8.59E-06	0.00011406	0.00010656	1.15E-08	6.07E-05	0.000114
181	UCART2	303323.7	3814439	3.07E-09	6.96E-10	2.03E-05	2.84E-06	0.00013125	0.00012143	3.77E-09	2.03E-05	0.000131
182	UCART2	303673.7	3814439	6.51E-09	1.52E-09	4.33E-05	6.01E-06	0.00026348	0.00024375	8.03E-09	4.33E-05	0.000263
183	UCART2	304023.7	3814439	5.03E-09	1.19E-09	3.43E-05	4.68E-06	0.00022152	0.00020004	6.22E-09	3.43E-05	0.000222
184	UCART2	304373.7	3814439	6.52E-09	1.44E-09	4.27E-05	6.01E-06	0.00019027	0.00017707	7.97E-09	4.27E-05	0.00019
185	UCART2	304723.7	3814439	6.64E-09	1.44E-09	4.35E-05	6.14E-06	0.0002273	0.00021148	8.08E-09	4.35E-05	0.000227
186	UCART2	305073.7	3814439	6.54E-09	1.48E-09	4.30E-05	6.03E-06	0.00016266	0.00014954	8.02E-09	4.30E-05	0.000163
187	UCART2	305423.7	3814439	7.32E-09	1.63E-09	4.75E-05	6.73E-06	0.00018134	0.00016967	8.96E-09	4.75E-05	0.000181
188	UCART2	305773.7	3814439	5.74E-09	1.27E-09	3.74E-05	5.28E-06	0.00014489	0.00013421	7.01E-09	3.74E-05	0.000145
189	UCART2	306123.7	3814439	5.67E-09	1.26E-09	3.69E-05	5.21E-06	9.50E-05	8.88E-05	6.93E-09	3.69E-05	9.50E-05
190	UCART2	306473.7	3814439	4.87E-09	1.08E-09	3.18E-05	4.49E-06	6.71E-05	6.25E-05	5.95E-09	3.18E-05	6.71E-05
191	UCART2	303323.7	3814789	2.36E-09	5.25E-10	1.63E-05	2.22E-06	0.00011624	0.00010676	2.89E-09	1.63E-05	0.000116
192	UCART2	303673.7	3814789	3.88E-09	9.02E-10	2.64E-05	3.61E-06	0.00018732	0.00017103	4.78E-09	2.64E-05	0.000187
193	UCART2	304023.7	3814789	4.42E-09	9.84E-10	2.93E-05	4.09E-06	0.00014371	0.00013366	5.40E-09	2.93E-05	0.000144
194	UCART2	304373.7	3814789	3.71E-09	7.93E-10	2.47E-05	3.45E-06	0.00012727	0.00011821	4.50E-09	2.47E-05	0.000127
195	UCART2	304723.7	3814789	3.63E-09	8.10E-10	2.42E-05	3.37E-06	0.00015853	0.00014663	4.44E-09	2.42E-05	0.000159
196	UCART2	305073.7	3814789	3.17E-09	7.26E-10	2.12E-05	2.94E-06	0.00013502	0.00012363	3.90E-09	2.12E-05	0.000135
197	UCART2	305423.7	3814789	3.63E-09	8.16E-10	2.41E-05	3.36E-06	8.65E-05	8.07E-05	4.45E-09	2.41E-05	8.65E-05
198	UCART2	305773.7	3814789	4.32E-09	9.45E-10	2.85E-05	4.00E-06	0.00011185	0.00010465	5.26E-09	2.85E-05	0.000112

REC	NETID	X	Y	1_4f Cancer Risk Sum	5_30f Cancer Risk Sum	1_4f Max Chronic Hazard Index	5_30f Max Chronic Hazard Index	1_4f Max Acute Hazard Index	5_30f Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
199	UCART2	306123.7	3814789	3.85E-09	8.57E-10	2.54E-05	3.55E-06	9.96E-05	9.21E-05	4.70E-09	2.54E-05	9.96E-05
200	UCART2	306473.7	3814789	3.20E-09	7.19E-10	2.11E-05	2.96E-06	6.25E-05	5.81E-05	3.92E-09	2.11E-05	6.25E-05
201		305181.2	3813150	3.81E-06	8.91E-07	0.021191	0.0033012	0.013891	0.013602	4.70E-06	0.021191	0.013891
202		305175.1	3813184	3.36E-06	7.78E-07	0.017103	0.0028264	0.0083058	0.0081252	4.13E-06	0.017103	0.008306
203		304930.6	3812926	1.74E-06	4.86E-07	0.019825	0.0020147	0.0099171	0.008718	2.23E-06	0.019825	0.009917
204		304812.5	3812740	9.23E-07	2.23E-07	0.0084874	0.0009731	0.0068445	0.0062771	1.15E-06	0.008487	0.006844
205		304595.7	3812860	1.90E-06	4.78E-07	0.015984	0.0019181	0.0070783	0.0066211	2.38E-06	0.015984	0.007078
206		304652.6	3813041	3.79E-06	1.08E-06	0.026814	0.0035154	0.0087016	0.0082218	4.86E-06	0.026814	0.008702
207		304658.1	3813202	2.11E-06	5.96E-07	0.014827	0.0019563	0.0099643	0.0094428	2.71E-06	0.014827	0.009964
208		304641.4	3812566	6.62E-07	1.54E-07	0.0054696	0.00066746	0.0050321	0.0046902	8.16E-07	0.00547	0.005032
209		304590.2	3812613	7.96E-07	1.86E-07	0.0066117	0.00080392	0.0050193	0.004673	9.82E-07	0.006612	0.005019
210		305548.4	3813385	1.26E-07	2.73E-08	0.00074173	0.00011225	0.00056587	0.00053969	1.54E-07	0.000742	0.000566
211		304971.4	3813575	7.93E-08	1.78E-08	0.00047675	7.08E-05	0.0012629	0.0012022	9.70E-08	0.000477	0.001263
212		304670.5	3813774	4.87E-08	1.13E-08	0.00030462	4.39E-05	0.00089863	0.00084285	6.00E-08	0.000305	0.000899
213		304345	3813766	1.65E-08	3.76E-09	0.00011189	1.54E-05	0.00052721	0.00048418	2.03E-08	0.000112	0.000527
214		304954.2	3813207	2.60E-05	1.55E-05	0.1894	0.021646	0.025619	0.025619	4.16E-05	0.1894	0.025619
215		304956.3	3813189	2.30E-05	1.35E-05	0.17775	0.01975	0.027183	0.027183	3.65E-05	0.17775	0.027183
216		304958.3	3813171	1.66E-05	8.86E-06	0.23814	0.020334	0.026824	0.026824	2.55E-05	0.23814	0.026824
217		304960.3	3813154	1.20E-05	5.66E-06	0.25253	0.01915	0.024126	0.024126	1.76E-05	0.25253	0.024126
218		304952.7	3813138	9.49E-06	4.10E-06	0.24279	0.017543	0.02064	0.02064	1.36E-05	0.24279	0.02064
219		304945.1	3813123	8.20E-06	3.03E-06	0.27878	0.018955	0.01644	0.01644	1.12E-05	0.27878	0.01644
220		304937.6	3813108	7.13E-06	2.34E-06	0.26797	0.017922	0.016243	0.013918	9.47E-06	0.26797	0.016243
221		304930	3813093	6.47E-06	1.93E-06	0.25894	0.017157	0.016364	0.013834	8.41E-06	0.25894	0.016364
222		304922.5	3813078	5.89E-06	1.65E-06	0.23999	0.01588	0.016168	0.013605	7.55E-06	0.23999	0.016168
223		304914.9	3813063	5.03E-06	1.42E-06	0.17846	0.012166	0.015677	0.013126	6.44E-06	0.17846	0.015677
224		304899.4	3813053	4.56E-06	1.30E-06	0.13462	0.0095995	0.015353	0.012606	5.85E-06	0.13462	0.015353
225		304884.3	3813044	4.29E-06	1.20E-06	0.11108	0.0082256	0.014176	0.012035	5.49E-06	0.11108	0.014176
226		304869.2	3813035	4.11E-06	1.14E-06	0.091373	0.0070917	0.01325	0.011563	5.24E-06	0.091373	0.01325
227		304854.1	3813026	3.98E-06	1.10E-06	0.076402	0.006235	0.012431	0.010998	5.07E-06	0.076402	0.012431
228		304846	3813012	3.61E-06	9.84E-07	0.062096	0.0052814	0.011651	0.01035	4.59E-06	0.062096	0.011651
229		304837.5	3812997	3.29E-06	8.88E-07	0.051606	0.0045575	0.011016	0.0098277	4.18E-06	0.051606	0.011016
230		304829.1	3812982	3.02E-06	8.07E-07	0.043847	0.0040024	0.010428	0.0093268	3.83E-06	0.043847	0.010428
231		304820.7	3812968	2.79E-06	7.37E-07	0.037896	0.0035614	0.0099622	0.0089368	3.53E-06	0.037896	0.009962
232		304812.2	3812953	2.58E-06	6.76E-07	0.033199	0.0032014	0.0097015	0.0087445	3.26E-06	0.033199	0.009702
233		304803.8	3812938	2.40E-06	6.22E-07	0.029408	0.0029016	0.0094711	0.0085751	3.02E-06	0.029408	0.009471
234		304802.4	3812938	2.41E-06	6.23E-07	0.029368	0.0029016	0.0094582	0.0085691	3.03E-06	0.029368	0.009458
235		304787.5	3812948	2.65E-06	6.89E-07	0.032007	0.003179	0.0093177	0.0084786	3.34E-06	0.032007	0.009318
236		304772.6	3812957	2.91E-06	7.61E-07	0.034026	0.00343	0.0094446	0.0086304	3.67E-06	0.034026	0.009445
237		304757.6	3812966	3.17E-06	8.39E-07	0.03518	0.0036352	0.0095619	0.0087908	4.01E-06	0.03518	0.009562
238		304742.7	3812976	3.42E-06	9.16E-07	0.035426	0.0037828	0.0093696	0.0086467	4.34E-06	0.035426	0.00937
239		304727.8	3812985	3.63E-06	9.87E-07	0.034922	0.0038721	0.0093528	0.0086814	4.62E-06	0.034922	0.009353
240		304712.8	3812995	3.80E-06	1.05E-06	0.033897	0.0039075	0.009286	0.0086515	4.85E-06	0.033897	0.009286
241		304697.9	3813004	3.91E-06	1.09E-06	0.032509	0.0038877	0.0090096	0.0084204	5.00E-06	0.032509	0.00901
242		304698	3813022	4.24E-06	1.21E-06	0.03359	0.004122	0.0092848	0.0087227	5.45E-06	0.03359	0.009285
243		304698.6	3813040	4.55E-06	1.32E-06	0.03434	0.0043232	0.0093846	0.0088396	5.87E-06	0.03434	0.009385
244		304699.1	3813057	4.82E-06	1.43E-06	0.034716	0.0044841	0.0095012	0.0089641	6.25E-06	0.034716	0.009501
245		304699.7	3813074	5.03E-06	1.52E-06	0.034724	0.00459	0.0095697	0.0090328	6.54E-06	0.034724	0.00957
246		304700.2	3813092	5.13E-06	1.57E-06	0.034352	0.0046234	0.010082	0.0095453	6.71E-06	0.034352	0.010082
247		304701	3813112	5.12E-06	1.58E-06	0.033446	0.004562	0.010415	0.0098774	6.70E-06	0.033446	0.010415
248		304701.8	3813132	4.93E-06	1.53E-06	0.031893	0.0043764	0.010563	0.010009	6.47E-06	0.031893	0.010563
249		304702.7	3813152	4.55E-06	1.41E-06	0.029614	0.004049	0.010742	0.010173	5.97E-06	0.029614	0.010742
250		304703.5	3813171	3.98E-06	1.22E-06	0.026665	0.0035826	0.011054	0.010471	5.20E-06	0.026665	0.011054
251		304704.3	3813191	3.30E-06	1.00E-06	0.023301	0.0030406	0.011071	0.010479	4.30E-06	0.023301	0.011071
252		304705.1	3813211	2.68E-06	8.05E-07	0.019868	0.0025191	0.011108	0.010493	3.48E-06	0.019868	0.011108
253		304705.9	3813231	2.18E-06	6.57E-07	0.016733	0.0020815	0.01127	0.010624	2.84E-06	0.016733	0.01127
254		304706.7	3813251	1.82E-06	5.52E-07	0.014255	0.0017514	0.01116	0.010499	2.37E-06	0.014255	0.01116
255		304707.5	3813271	1.58E-06	4.81E-07	0.012452	0.0015192	0.011107	0.01042	2.06E-06	0.012452	0.011107
256		304708.3	3813291	1.41E-06	4.32E-07	0.011203	0.0013608	0.011039	0.010335	1.84E-06	0.011203	0.011039
257		304709.1	3813311	1.28E-06	3.92E-07	0.010289	0.0012443	0.010909	0.010217	1.67E-06	0.010289	0.010909
258		304709.9	3813331	1.19E-06	3.60E-07	0.0096347	0.001158	0.010779	0.010061	1.55E-06	0.009635	0.010779
259		304710.8	3813351	1.12E-06	3.41E-07	0.009177	0.0010977	0.010672	0.0099277	1.46E-06	0.009177	0.010672
260		304711.6	3813371	1.10E-06	3.42E-07	0.0089832	0.0010761	0.010378	0.0096038	1.45E-06	0.008983	0.010378
261		304712.4	3813390	1.11E-06	3.46E-07	0.0086779	0.0010652	0.010614	0.009792	1.46E-06	0.008678	0.010614
262		304713.2	3813410	1.13E-06	3.35E-07	0.0080088	0.001046	0.011702	0.010884	1.47E-06	0.008009	0.011702
263		304714	3813430	1.08E-06	3.09E-07	0.0070225	0.00097242	0.012508	0.011689	1.39E-06	0.007022	0.012508
264		304715.6	3813431	1.10E-06	3.12E-07	0.0071487	0.00099071	0.012518	0.011698	1.42E-06	0.007149	0.012518

REC	NETID	X	Y	1_4f Cancer Risk Sum	5_30f Cancer Risk Sum	1_4f Max Chronic Hazard Index	5_30f Max Chronic Hazard Index	1_4f Max Acute Hazard Index	5_30f Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
265		304729.9	3813419	1.15E-06	3.48E-07	0.0085152	0.0010771	0.010923	0.010077	1.49E-06	0.008515	0.010923
266		304744.3	3813407	1.23E-06	3.83E-07	0.0094842	0.0011699	0.010877	0.0099807	1.61E-06	0.009484	0.010877
267		304758.6	3813395	1.33E-06	4.21E-07	0.010525	0.0012763	0.011154	0.010215	1.75E-06	0.010525	0.011154
268		304772.9	3813383	1.54E-06	5.01E-07	0.012156	0.0014717	0.012123	0.011074	2.04E-06	0.012156	0.012123
269		304787.2	3813371	1.83E-06	6.08E-07	0.014119	0.0017313	0.013868	0.012711	2.44E-06	0.014119	0.013868
270		304801.5	3813359	2.07E-06	6.89E-07	0.013629	0.0018314	0.017112	0.015901	2.76E-06	0.013629	0.017112
271		304815.8	3813347	1.91E-06	5.84E-07	0.011511	0.0016567	0.02038	0.019492	2.50E-06	0.011511	0.02038
272		304830.1	3813335	1.80E-06	4.83E-07	0.0098302	0.0015277	0.026268	0.025757	2.28E-06	0.00983	0.026268
273		304844.4	3813322	1.84E-06	5.20E-07	0.010278	0.0015658	0.023167	0.022755	2.36E-06	0.010278	0.023167
274		304858.7	3813310	2.56E-06	7.20E-07	0.013743	0.0021515	0.034127	0.033626	3.28E-06	0.013743	0.034127
275		304873	3813298	4.06E-06	1.22E-06	0.022973	0.0034443	0.038779	0.03787	5.29E-06	0.022973	0.038779
276		304887.3	3813286	5.59E-06	2.26E-06	0.041431	0.0050554	0.018887	0.017474	7.85E-06	0.041431	0.018887
277		304901.6	3813274	7.56E-06	3.58E-06	0.068036	0.0072884	0.017408	0.017408	1.11E-05	0.068036	0.017408
278		304915.9	3813262	9.84E-06	5.17E-06	0.10491	0.010172	0.020886	0.019841	1.50E-05	0.10491	0.020886
279		304930.2	3813250	1.24E-05	7.00E-06	0.14154	0.013134	0.020159	0.020159	1.94E-05	0.14154	0.020159
280		304938.4	3813236	1.89E-05	1.15E-05	0.17911	0.017834	0.021398	0.021398	3.04E-05	0.17911	0.021398
281		304946.2	3813221	2.53E-05	1.55E-05	0.18927	0.021154	0.02292	0.02292	4.08E-05	0.18927	0.02292
282		304715	3813430	1.10E-06	3.12E-07	0.0071054	0.0009867	0.012527	0.011702	1.41E-06	0.007105	0.012527
283		304701.2	3813092	5.17E-06	1.58E-06	0.034586	0.0046529	0.010084	0.0095458	6.75E-06	0.034586	0.010084
284		304698.5	3813005	3.93E-06	1.10E-06	0.032646	0.0039055	0.0090169	0.0084277	5.02E-06	0.032646	0.009017
285		304802.9	3812939	2.42E-06	6.25E-07	0.029562	0.0029171	0.0094729	0.0085803	3.04E-06	0.029562	0.009473
286		304853.5	3813027	4.02E-06	1.11E-06	0.077203	0.0062985	0.012428	0.010999	5.12E-06	0.077203	0.012428
287		304914	3813063	5.11E-06	1.43E-06	0.18601	0.012613	0.015766	0.013164	6.54E-06	0.18601	0.015766
288		304959.3	3813154	1.20E-05	5.68E-06	0.25879	0.019512	0.024282	0.024282	1.77E-05	0.25879	0.024282
289		304953.2	3813207	2.67E-05	1.60E-05	0.19393	0.022168	0.026099	0.026099	4.28E-05	0.19393	0.026099
290		304929.6	3813249	1.29E-05	7.36E-06	0.14902	0.013741	0.020757	0.020757	2.03E-05	0.14902	0.020757

REC	NETID	X	Y	30yr_veh_only Cancer Risk Sum	30yr_veh_only Max Chronic Hazard Index	30yr_veh_only Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
1	UCART1	295898.7	3804214	4.70E-11	3.45E-06	3.57E-07	4.70E-11	3.45E-06	3.57E-07
2	UCART1	297898.7	3804214	5.33E-11	3.91E-06	4.53E-07	5.33E-11	3.91E-06	4.53E-07
3	UCART1	299898.7	3804214	4.56E-11	3.34E-06	5.35E-07	4.56E-11	3.34E-06	5.35E-07
4	UCART1	301898.7	3804214	3.96E-11	2.90E-06	5.73E-07	3.96E-11	2.90E-06	5.73E-07
5	UCART1	303898.7	3804214	3.40E-11	2.49E-06	5.94E-07	3.40E-11	2.49E-06	5.94E-07
6	UCART1	305898.7	3804214	3.66E-11	2.68E-06	7.29E-07	3.66E-11	2.68E-06	7.29E-07
7	UCART1	307898.7	3804214	3.00E-11	2.20E-06	6.21E-07	3.00E-11	2.20E-06	6.21E-07
8	UCART1	309898.7	3804214	2.85E-11	2.09E-06	5.20E-07	2.85E-11	2.09E-06	5.20E-07
9	UCART1	311898.7	3804214	2.40E-11	1.76E-06	4.20E-07	2.40E-11	1.76E-06	4.20E-07
10	UCART1	313898.7	3804214	2.18E-11	1.60E-06	3.56E-07	2.18E-11	1.60E-06	3.56E-07
11	UCART1	295898.7	3806214	5.66E-11	4.15E-06	4.25E-07	5.66E-11	4.15E-06	4.25E-07
12	UCART1	297898.7	3806214	7.08E-11	5.19E-06	5.28E-07	7.08E-11	5.19E-06	5.28E-07
13	UCART1	299898.7	3806214	7.11E-11	5.21E-06	6.26E-07	7.11E-11	5.21E-06	6.26E-07
14	UCART1	301898.7	3806214	6.46E-11	4.73E-06	8.10E-07	6.46E-11	4.73E-06	8.10E-07
15	UCART1	303898.7	3806214	5.33E-11	3.90E-06	8.80E-07	5.33E-11	3.90E-06	8.80E-07
16	UCART1	305898.7	3806214	5.48E-11	4.01E-06	1.02E-06	5.48E-11	4.01E-06	1.02E-06
17	UCART1	307898.7	3806214	4.46E-11	3.27E-06	8.54E-07	4.46E-11	3.27E-06	8.54E-07
18	UCART1	309898.7	3806214	3.85E-11	2.82E-06	6.92E-07	3.85E-11	2.82E-06	6.92E-07
19	UCART1	311898.7	3806214	3.35E-11	2.45E-06	5.28E-07	3.35E-11	2.45E-06	5.28E-07
20	UCART1	313898.7	3806214	2.97E-11	2.18E-06	4.39E-07	2.97E-11	2.18E-06	4.39E-07
21	UCART1	295898.7	3808214	6.20E-11	4.55E-06	3.70E-07	6.20E-11	4.55E-06	3.70E-07
22	UCART1	297898.7	3808214	1.08E-10	7.88E-06	1.33E-06	1.08E-10	7.88E-06	1.33E-06
23	UCART1	299898.7	3808214	1.24E-10	9.09E-06	8.77E-07	1.24E-10	9.09E-06	8.77E-07
24	UCART1	301898.7	3808214	1.27E-10	9.28E-06	1.24E-06	1.27E-10	9.28E-06	1.24E-06
25	UCART1	303898.7	3808214	1.01E-10	7.41E-06	1.44E-06	1.01E-10	7.41E-06	1.44E-06
26	UCART1	305898.7	3808214	9.09E-11	6.67E-06	1.51E-06	9.09E-11	6.67E-06	1.51E-06
27	UCART1	307898.7	3808214	7.47E-11	5.48E-06	1.27E-06	7.47E-11	5.48E-06	1.27E-06
28	UCART1	309898.7	3808214	5.83E-11	4.27E-06	8.81E-07	5.83E-11	4.27E-06	8.81E-07
29	UCART1	311898.7	3808214	6.31E-11	4.63E-06	8.32E-07	6.31E-11	4.63E-06	8.32E-07
30	UCART1	313898.7	3808214	4.53E-11	3.32E-06	5.16E-07	4.53E-11	3.32E-06	5.16E-07
31	UCART1	295898.7	3810214	7.23E-11	5.30E-06	1.09E-06	7.23E-11	5.30E-06	1.09E-06
32	UCART1	297898.7	3810214	8.71E-12	6.38E-07	1.63E-07	8.71E-12	6.38E-07	1.63E-07
33	UCART1	299898.7	3810214	2.04E-11	1.50E-06	2.54E-07	2.04E-11	1.50E-06	2.54E-07
34	UCART1	301898.7	3810214	2.85E-11	2.09E-06	3.62E-07	2.85E-11	2.09E-06	3.62E-07
35	UCART1	303898.7	3810214	1.25E-11	9.14E-07	6.14E-07	1.25E-11	9.14E-07	6.14E-07
36	UCART1	305898.7	3810214	2.51E-10	1.84E-05	4.33E-06	2.51E-10	1.84E-05	4.33E-06
37	UCART1	307898.7	3810214	1.37E-10	1.01E-05	1.90E-06	1.37E-10	1.01E-05	1.90E-06
38	UCART1	309898.7	3810214	1.43E-10	1.05E-05	1.57E-06	1.43E-10	1.05E-05	1.57E-06
39	UCART1	311898.7	3810214	1.07E-10	7.88E-06	1.72E-06	1.07E-10	7.88E-06	1.72E-06
40	UCART1	313898.7	3810214	1.53E-11	1.12E-06	1.60E-07	1.53E-11	1.12E-06	1.60E-07
41	UCART1	295898.7	3812214	4.39E-11	3.22E-06	6.76E-07	4.39E-11	3.22E-06	6.76E-07
42	UCART1	297898.7	3812214	5.64E-11	4.14E-06	7.08E-07	5.64E-11	4.14E-06	7.08E-07
43	UCART1	299898.7	3812214	1.14E-10	8.39E-06	1.07E-06	1.14E-10	8.39E-06	1.07E-06
44	UCART1	301898.7	3812214	3.32E-10	2.43E-05	2.15E-06	3.32E-10	2.43E-05	2.15E-06
45	UCART1	303898.7	3812214	2.05E-09	0.00014994	8.78E-06	2.05E-09	0.00015	8.78E-06
46	UCART1	305898.7	3812214	9.01E-10	6.60E-05	8.93E-06	9.01E-10	6.60E-05	8.93E-06
47	UCART1	307898.7	3812214	3.60E-10	2.64E-05	2.32E-06	3.60E-10	2.64E-05	2.32E-06
48	UCART1	309898.7	3812214	4.06E-11	2.98E-06	2.75E-07	4.06E-11	2.98E-06	2.75E-07
49	UCART1	311898.7	3812214	1.26E-11	9.26E-07	2.28E-07	1.26E-11	9.26E-07	2.28E-07
50	UCART1	313898.7	3812214	7.42E-12	5.44E-07	1.61E-07	7.42E-12	5.44E-07	1.61E-07
51	UCART1	295898.7	3814214	2.32E-11	1.70E-06	4.11E-07	2.32E-11	1.70E-06	4.11E-07
52	UCART1	297898.7	3814214	3.23E-11	2.37E-06	5.90E-07	3.23E-11	2.37E-06	5.90E-07
53	UCART1	299898.7	3814214	5.00E-11	3.66E-06	9.65E-07	5.00E-11	3.66E-06	9.65E-07

REC	NETID	X	Y	30yr_veh_only Cancer Risk Sum	30yr_veh_only Max Chronic Hazard Index	30yr_veh_only Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
54	UCART1	301898.7	3814214	1.22E-10	8.92E-06	2.18E-06	1.22E-10	8.92E-06	2.18E-06
55	UCART1	303898.7	3814214	7.38E-11	5.41E-06	1.82E-06	7.38E-11	5.41E-06	1.82E-06
56	UCART1	305898.7	3814214	4.03E-11	2.95E-06	6.05E-07	4.03E-11	2.95E-06	6.05E-07
57	UCART1	307898.7	3814214	2.69E-11	1.97E-06	3.46E-07	2.69E-11	1.97E-06	3.46E-07
58	UCART1	309898.7	3814214	2.04E-11	1.50E-06	2.42E-07	2.04E-11	1.50E-06	2.42E-07
59	UCART1	311898.7	3814214	1.40E-11	1.03E-06	1.93E-07	1.40E-11	1.03E-06	1.93E-07
60	UCART1	313898.7	3814214	7.82E-12	5.74E-07	1.20E-07	7.82E-12	5.74E-07	1.20E-07
61	UCART1	295898.7	3816214	1.84E-11	1.35E-06	3.66E-07	1.84E-11	1.35E-06	3.66E-07
62	UCART1	297898.7	3816214	2.45E-11	1.80E-06	4.93E-07	2.45E-11	1.80E-06	4.93E-07
63	UCART1	299898.7	3816214	4.47E-11	3.28E-06	9.34E-07	4.47E-11	3.28E-06	9.34E-07
64	UCART1	301898.7	3816214	3.85E-12	2.83E-07	2.60E-07	3.85E-12	2.83E-07	2.60E-07
65	UCART1	303898.7	3816214	4.43E-12	3.24E-07	2.45E-07	4.43E-12	3.24E-07	2.45E-07
66	UCART1	305898.7	3816214	5.27E-12	3.86E-07	2.21E-07	5.27E-12	3.86E-07	2.21E-07
67	UCART1	307898.7	3816214	4.91E-12	3.60E-07	1.68E-07	4.91E-12	3.60E-07	1.68E-07
68	UCART1	309898.7	3816214	6.37E-12	4.67E-07	1.32E-07	6.37E-12	4.67E-07	1.32E-07
69	UCART1	311898.7	3816214	6.29E-12	4.61E-07	9.95E-08	6.29E-12	4.61E-07	9.95E-08
70	UCART1	313898.7	3816214	4.04E-12	2.96E-07	1.10E-07	4.04E-12	2.96E-07	1.10E-07
71	UCART1	295898.7	3818214	1.05E-12	7.69E-08	7.33E-08	1.05E-12	7.69E-08	7.33E-08
72	UCART1	297898.7	3818214	1.69E-12	1.24E-07	7.89E-08	1.69E-12	1.24E-07	7.89E-08
73	UCART1	299898.7	3818214	1.66E-12	1.22E-07	1.63E-07	1.66E-12	1.22E-07	1.63E-07
74	UCART1	301898.7	3818214	1.76E-12	1.29E-07	8.66E-08	1.76E-12	1.29E-07	8.66E-08
75	UCART1	303898.7	3818214	2.29E-12	1.68E-07	2.21E-07	2.29E-12	1.68E-07	2.21E-07
76	UCART1	305898.7	3818214	2.73E-12	2.00E-07	1.15E-07	2.73E-12	2.00E-07	1.15E-07
77	UCART1	307898.7	3818214	2.32E-12	1.70E-07	1.39E-07	2.32E-12	1.70E-07	1.39E-07
78	UCART1	309898.7	3818214	2.49E-12	1.83E-07	1.12E-07	2.49E-12	1.83E-07	1.12E-07
79	UCART1	311898.7	3818214	2.88E-12	2.11E-07	5.09E-08	2.88E-12	2.11E-07	5.09E-08
80	UCART1	313898.7	3818214	2.86E-12	2.10E-07	6.19E-08	2.86E-12	2.10E-07	6.19E-08
81	UCART1	295898.7	3820214	8.06E-13	5.91E-08	6.54E-08	8.06E-13	5.91E-08	6.54E-08
82	UCART1	297898.7	3820214	1.05E-12	7.69E-08	1.24E-07	1.05E-12	7.69E-08	1.24E-07
83	UCART1	299898.7	3820214	1.26E-12	9.25E-08	1.36E-07	1.26E-12	9.25E-08	1.36E-07
84	UCART1	301898.7	3820214	1.19E-12	8.75E-08	7.19E-08	1.19E-12	8.75E-08	7.19E-08
85	UCART1	303898.7	3820214	1.58E-12	1.16E-07	9.89E-08	1.58E-12	1.16E-07	9.89E-08
86	UCART1	305898.7	3820214	1.78E-12	1.30E-07	8.12E-08	1.78E-12	1.30E-07	8.12E-08
87	UCART1	307898.7	3820214	1.74E-12	1.27E-07	1.03E-07	1.74E-12	1.27E-07	1.03E-07
88	UCART1	309898.7	3820214	1.68E-12	1.23E-07	9.32E-08	1.68E-12	1.23E-07	9.32E-08
89	UCART1	311898.7	3820214	1.85E-12	1.36E-07	8.07E-08	1.85E-12	1.36E-07	8.07E-08
90	UCART1	313898.7	3820214	1.93E-12	1.42E-07	3.12E-08	1.93E-12	1.42E-07	3.12E-08
91	UCART1	295898.7	3822214	6.79E-13	4.98E-08	1.02E-07	6.79E-13	4.98E-08	1.02E-07
92	UCART1	297898.7	3822214	9.61E-13	7.04E-08	1.75E-07	9.61E-13	7.04E-08	1.75E-07
93	UCART1	299898.7	3822214	8.45E-13	6.19E-08	4.46E-08	8.45E-13	6.19E-08	4.46E-08
94	UCART1	301898.7	3822214	1.02E-12	7.47E-08	7.72E-08	1.02E-12	7.47E-08	7.72E-08
95	UCART1	303898.7	3822214	1.32E-12	9.68E-08	7.83E-08	1.32E-12	9.68E-08	7.83E-08
96	UCART1	305898.7	3822214	1.36E-12	9.96E-08	8.62E-08	1.36E-12	9.96E-08	8.62E-08
97	UCART1	307898.7	3822214	1.37E-12	1.00E-07	6.39E-08	1.37E-12	1.00E-07	6.39E-08
98	UCART1	309898.7	3822214	1.25E-12	9.18E-08	6.51E-08	1.25E-12	9.18E-08	6.51E-08
99	UCART1	311898.7	3822214	1.31E-12	9.61E-08	8.77E-08	1.31E-12	9.61E-08	8.77E-08
100	UCART1	313898.7	3822214	1.39E-12	1.02E-07	6.34E-08	1.39E-12	1.02E-07	6.34E-08
101	UCART2	303323.7	3811639	1.08E-09	7.90E-05	7.97E-06	1.08E-09	7.90E-05	7.97E-06
102	UCART2	303673.7	3811639	1.08E-09	7.95E-05	8.69E-06	1.08E-09	7.95E-05	8.69E-06
103	UCART2	304023.7	3811639	7.93E-10	5.81E-05	6.64E-06	7.93E-10	5.81E-05	6.64E-06
104	UCART2	304373.7	3811639	3.41E-10	2.50E-05	3.13E-06	3.41E-10	2.50E-05	3.13E-06
105	UCART2	304723.7	3811639	6.57E-10	4.82E-05	1.06E-05	6.57E-10	4.82E-05	1.06E-05
106	UCART2	305073.7	3811639	7.79E-10	5.71E-05	9.09E-06	7.79E-10	5.71E-05	9.09E-06

REC	NETID	X	Y	30yr_veh_only Cancer Risk Sum	30yr_veh_only Max Chronic Hazard Index	30yr_veh_only Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
107	UCART2	305423.7	3811639	5.75E-10	4.22E-05	7.70E-06	5.75E-10	4.22E-05	7.70E-06
108	UCART2	305773.7	3811639	5.24E-10	3.84E-05	6.63E-06	5.24E-10	3.84E-05	6.63E-06
109	UCART2	306123.7	3811639	4.50E-10	3.30E-05	5.44E-06	4.50E-10	3.30E-05	5.44E-06
110	UCART2	306473.7	3811639	4.09E-10	3.00E-05	4.80E-06	4.09E-10	3.00E-05	4.80E-06
111	UCART2	303323.7	3811989	1.32E-09	9.67E-05	6.77E-06	1.32E-09	9.67E-05	6.77E-06
112	UCART2	303673.7	3811989	1.62E-09	0.00011897	7.92E-06	1.62E-09	0.000119	7.92E-06
113	UCART2	304023.7	3811989	1.72E-09	0.00012623	9.30E-06	1.72E-09	0.000126	9.30E-06
114	UCART2	304373.7	3811989	1.57E-09	0.00011516	1.13E-05	1.57E-09	0.000115	1.13E-05
115	UCART2	304723.7	3811989	1.03E-09	7.55E-05	1.05E-05	1.03E-09	7.55E-05	1.05E-05
116	UCART2	305073.7	3811989	1.01E-09	7.40E-05	1.10E-05	1.01E-09	7.40E-05	1.10E-05
117	UCART2	305423.7	3811989	8.41E-10	6.16E-05	1.03E-05	8.41E-10	6.16E-05	1.03E-05
118	UCART2	305773.7	3811989	7.24E-10	5.31E-05	8.38E-06	7.24E-10	5.31E-05	8.38E-06
119	UCART2	306123.7	3811989	6.39E-10	4.68E-05	6.80E-06	6.39E-10	4.68E-05	6.80E-06
120	UCART2	306473.7	3811989	6.05E-10	4.43E-05	5.43E-06	6.05E-10	4.43E-05	5.43E-06
121	UCART2	303323.7	3812339	1.21E-09	8.89E-05	4.81E-06	1.21E-09	8.89E-05	4.81E-06
122	UCART2	303673.7	3812339	1.79E-09	0.00013142	7.71E-06	1.79E-09	0.000131	7.71E-06
123	UCART2	304023.7	3812339	2.39E-09	0.00017538	9.89E-06	2.39E-09	0.000175	9.89E-06
124	UCART2	304373.7	3812339	2.49E-09	0.00018282	1.28E-05	2.49E-09	0.000183	1.28E-05
125	UCART2	304723.7	3812339	1.95E-09	0.00014313	1.57E-05	1.95E-09	0.000143	1.57E-05
126	UCART2	305073.7	3812339	1.75E-09	0.00012799	1.78E-05	1.75E-09	0.000128	1.78E-05
127	UCART2	305423.7	3812339	1.40E-09	0.00010279	1.43E-05	1.40E-09	0.000103	1.43E-05
128	UCART2	305773.7	3812339	1.15E-09	8.44E-05	1.06E-05	1.15E-09	8.44E-05	1.06E-05
129	UCART2	306123.7	3812339	9.70E-10	7.11E-05	9.11E-06	9.70E-10	7.11E-05	9.11E-06
130	UCART2	306473.7	3812339	3.38E-10	2.48E-05	2.15E-06	3.38E-10	2.48E-05	2.15E-06
131	UCART2	303323.7	3812689	1.00E-09	7.36E-05	5.23E-06	1.00E-09	7.36E-05	5.23E-06
132	UCART2	303673.7	3812689	1.68E-09	0.00012292	6.73E-06	1.68E-09	0.000123	6.73E-06
133	UCART2	304023.7	3812689	2.85E-09	0.00020897	9.76E-06	2.85E-09	0.000209	9.76E-06
134	UCART2	304373.7	3812689	5.27E-09	0.00038663	1.77E-05	5.27E-09	0.000387	1.77E-05
135	UCART2	304723.7	3812689	5.56E-09	0.00040765	2.84E-05	5.56E-09	0.000408	2.84E-05
136	UCART2	305073.7	3812689	3.99E-09	0.00029267	3.30E-05	3.99E-09	0.000293	3.30E-05
137	UCART2	305423.7	3812689	6.51E-10	4.77E-05	5.56E-06	6.51E-10	4.77E-05	5.56E-06
138	UCART2	305773.7	3812689	2.03E-09	0.00014847	1.19E-05	2.03E-09	0.000148	1.19E-05
139	UCART2	306123.7	3812689	1.75E-09	0.00012848	7.97E-06	1.75E-09	0.000128	7.97E-06
140	UCART2	306473.7	3812689	1.36E-09	9.95E-05	6.96E-06	1.36E-09	9.95E-05	6.96E-06
141	UCART2	303323.7	3813039	6.32E-10	4.63E-05	5.22E-06	6.32E-10	4.63E-05	5.22E-06
142	UCART2	303673.7	3813039	1.05E-09	7.72E-05	7.37E-06	1.05E-09	7.72E-05	7.37E-06
143	UCART2	304023.7	3813039	1.90E-09	0.00013952	1.02E-05	1.90E-09	0.00014	1.02E-05
144	UCART2	304373.7	3813039	5.04E-09	0.00036977	1.72E-05	5.04E-09	0.00037	1.72E-05
145	UCART2	304723.7	3813039	2.79E-08	0.0020441	3.63E-05	2.79E-08	0.002044	3.63E-05
146	UCART2	305073.7	3813039	2.97E-08	0.0021808	7.38E-05	2.97E-08	0.002181	7.38E-05
147	UCART2	305423.7	3813039	3.60E-09	0.00026413	5.49E-06	3.60E-09	0.000264	5.49E-06
148	UCART2	305773.7	3813039	1.02E-09	7.50E-05	2.04E-06	1.02E-09	7.50E-05	2.04E-06
149	UCART2	306123.7	3813039	2.02E-09	0.00014824	1.26E-05	2.02E-09	0.000148	1.26E-05
150	UCART2	306473.7	3813039	4.95E-10	3.63E-05	1.82E-06	4.95E-10	3.63E-05	1.82E-06
151	UCART2	303323.7	3813389	4.37E-10	3.21E-05	5.43E-06	4.37E-10	3.21E-05	5.43E-06
152	UCART2	303673.7	3813389	6.63E-10	4.86E-05	7.94E-06	6.63E-10	4.86E-05	7.94E-06
153	UCART2	304023.7	3813389	1.04E-09	7.62E-05	1.18E-05	1.04E-09	7.62E-05	1.18E-05
154	UCART2	304373.7	3813389	1.79E-09	0.00013091	1.74E-05	1.79E-09	0.000131	1.74E-05
155	UCART2	304723.7	3813389	6.52E-09	0.00047809	5.28E-05	6.52E-09	0.000478	5.28E-05
156	UCART2	305073.7	3813389	2.21E-09	0.00016216	1.04E-05	2.21E-09	0.000162	1.04E-05
157	UCART2	305423.7	3813389	7.72E-10	5.66E-05	2.34E-06	7.72E-10	5.66E-05	2.34E-06
158	UCART2	305773.7	3813389	4.33E-10	3.18E-05	1.69E-06	4.33E-10	3.18E-05	1.69E-06
159	UCART2	306123.7	3813389	3.77E-10	2.77E-05	1.73E-06	3.77E-10	2.77E-05	1.73E-06

REC	NETID	X	Y	30yr_veh_only Cancer Risk Sum	30yr_veh_only Max Chronic Hazard Index	30yr_veh_only Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
160	UCART2	306473.7	3813389	3.98E-10	2.92E-05	2.27E-06	3.98E-10	2.92E-05	2.27E-06
161	UCART2	303323.7	3813739	3.61E-10	2.65E-05	5.61E-06	3.61E-10	2.65E-05	5.61E-06
162	UCART2	303673.7	3813739	5.39E-11	3.95E-06	1.59E-06	5.39E-11	3.95E-06	1.59E-06
163	UCART2	304023.7	3813739	2.14E-10	1.57E-05	4.52E-06	2.14E-10	1.57E-05	4.52E-06
164	UCART2	304373.7	3813739	8.74E-11	6.41E-06	2.68E-06	8.74E-11	6.41E-06	2.68E-06
165	UCART2	304723.7	3813739	2.61E-10	1.92E-05	4.09E-06	2.61E-10	1.92E-05	4.09E-06
166	UCART2	305073.7	3813739	1.54E-10	1.13E-05	2.24E-06	1.54E-10	1.13E-05	2.24E-06
167	UCART2	305423.7	3813739	1.36E-10	9.96E-06	1.72E-06	1.36E-10	9.96E-06	1.72E-06
168	UCART2	305773.7	3813739	1.37E-10	1.00E-05	1.11E-06	1.37E-10	1.00E-05	1.11E-06
169	UCART2	306123.7	3813739	1.19E-10	8.75E-06	8.52E-07	1.19E-10	8.75E-06	8.52E-07
170	UCART2	306473.7	3813739	9.96E-11	7.30E-06	7.98E-07	9.96E-11	7.30E-06	7.98E-07
171	UCART2	303323.7	3814089	2.93E-11	2.15E-06	1.02E-06	2.93E-11	2.15E-06	1.02E-06
172	UCART2	303673.7	3814089	2.42E-11	1.77E-06	8.04E-07	2.42E-11	1.77E-06	8.04E-07
173	UCART2	304023.7	3814089	5.70E-11	4.18E-06	1.73E-06	5.70E-11	4.18E-06	1.73E-06
174	UCART2	304373.7	3814089	5.14E-11	3.77E-06	1.63E-06	5.14E-11	3.77E-06	1.63E-06
175	UCART2	304723.7	3814089	7.87E-11	5.77E-06	1.92E-06	7.87E-11	5.77E-06	1.92E-06
176	UCART2	305073.7	3814089	6.32E-11	4.63E-06	1.32E-06	6.32E-11	4.63E-06	1.32E-06
177	UCART2	305423.7	3814089	6.55E-11	4.80E-06	1.21E-06	6.55E-11	4.80E-06	1.21E-06
178	UCART2	305773.7	3814089	5.43E-11	3.98E-06	8.29E-07	5.43E-11	3.98E-06	8.29E-07
179	UCART2	306123.7	3814089	4.61E-11	3.38E-06	4.46E-07	4.61E-11	3.38E-06	4.46E-07
180	UCART2	306473.7	3814089	4.12E-11	3.02E-06	4.62E-07	4.12E-11	3.02E-06	4.62E-07
181	UCART2	303323.7	3814439	1.39E-11	1.02E-06	6.04E-07	1.39E-11	1.02E-06	6.04E-07
182	UCART2	303673.7	3814439	2.96E-11	2.17E-06	1.21E-06	2.96E-11	2.17E-06	1.21E-06
183	UCART2	304023.7	3814439	2.35E-11	1.72E-06	1.32E-06	2.35E-11	1.72E-06	1.32E-06
184	UCART2	304373.7	3814439	2.90E-11	2.13E-06	8.12E-07	2.90E-11	2.13E-06	8.12E-07
185	UCART2	304723.7	3814439	2.95E-11	2.17E-06	9.73E-07	2.95E-11	2.17E-06	9.73E-07
186	UCART2	305073.7	3814439	2.93E-11	2.15E-06	8.06E-07	2.93E-11	2.15E-06	8.06E-07
187	UCART2	305423.7	3814439	3.23E-11	2.37E-06	7.17E-07	3.23E-11	2.37E-06	7.17E-07
188	UCART2	305773.7	3814439	2.54E-11	1.86E-06	6.57E-07	2.54E-11	1.86E-06	6.57E-07
189	UCART2	306123.7	3814439	2.50E-11	1.84E-06	3.82E-07	2.50E-11	1.84E-06	3.82E-07
190	UCART2	306473.7	3814439	2.16E-11	1.59E-06	2.86E-07	2.16E-11	1.59E-06	2.86E-07
191	UCART2	303323.7	3814789	1.12E-11	8.20E-07	5.83E-07	1.12E-11	8.20E-07	5.83E-07
192	UCART2	303673.7	3814789	1.81E-11	1.33E-06	1.00E-06	1.81E-11	1.33E-06	1.00E-06
193	UCART2	304023.7	3814789	2.00E-11	1.47E-06	6.18E-07	2.00E-11	1.47E-06	6.18E-07
194	UCART2	304373.7	3814789	1.68E-11	1.23E-06	5.57E-07	1.68E-11	1.23E-06	5.57E-07
195	UCART2	304723.7	3814789	1.65E-11	1.21E-06	7.32E-07	1.65E-11	1.21E-06	7.32E-07
196	UCART2	305073.7	3814789	1.45E-11	1.06E-06	7.00E-07	1.45E-11	1.06E-06	7.00E-07
197	UCART2	305423.7	3814789	1.64E-11	1.20E-06	3.61E-07	1.64E-11	1.20E-06	3.61E-07
198	UCART2	305773.7	3814789	1.94E-11	1.42E-06	4.43E-07	1.94E-11	1.42E-06	4.43E-07
199	UCART2	306123.7	3814789	1.73E-11	1.27E-06	4.63E-07	1.73E-11	1.27E-06	4.63E-07
200	UCART2	306473.7	3814789	1.43E-11	1.05E-06	2.68E-07	1.43E-11	1.05E-06	2.68E-07
201		305181.2	3813150	1.40E-08	0.001027	1.78E-05	1.40E-08	0.001027	1.78E-05
202		305175.1	3813184	1.11E-08	0.00081307	1.11E-05	1.11E-08	0.000813	1.11E-05
203		304930.6	3812926	1.46E-08	0.0010667	7.37E-05	1.46E-08	0.001067	7.37E-05
204		304812.5	3812740	6.07E-09	0.00044511	3.49E-05	6.07E-09	0.000445	3.49E-05
205		304595.7	3812860	1.13E-08	0.00083074	2.81E-05	1.13E-08	0.000831	2.81E-05
206		304652.6	3813041	1.87E-08	0.0013698	2.95E-05	1.87E-08	0.00137	2.95E-05
207		304658.1	3813202	1.03E-08	0.00075609	3.21E-05	1.03E-08	0.000756	3.21E-05
208		304641.4	3812566	3.86E-09	0.00028278	2.10E-05	3.86E-09	0.000283	2.10E-05
209		304590.2	3812613	4.67E-09	0.00034214	2.13E-05	4.67E-09	0.000342	2.13E-05
210		305548.4	3813385	4.94E-10	3.62E-05	1.61E-06	4.94E-10	3.62E-05	1.61E-06
211		304971.4	3813575	3.19E-10	2.34E-05	3.74E-06	3.19E-10	2.34E-05	3.74E-06
212		304670.5	3813774	2.06E-10	1.51E-05	3.43E-06	2.06E-10	1.51E-05	3.43E-06

REC	NETID	X	Y	30yr_veh_only Cancer Risk Sum	30yr_veh_only Max Chronic Hazard Index	30yr_veh_only Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
213		304345	3813766	7.66E-11	5.62E-06	2.65E-06	7.66E-11	5.62E-06	2.65E-06
214		304954.2	3813207	1.40E-07	0.010264	0.00013774	1.40E-07	0.010264	0.000138
215		304956.3	3813189	1.32E-07	0.0096608	0.00014342	1.32E-07	0.009661	0.000143
216		304958.3	3813171	1.82E-07	0.013326	0.00015163	1.82E-07	0.013326	0.000152
217		304960.3	3813154	1.95E-07	0.014277	0.00013413	1.95E-07	0.014277	0.000134
218		304952.7	3813138	1.88E-07	0.01378	0.00015374	1.88E-07	0.01378	0.000154
219		304945.1	3813123	2.17E-07	0.0159	0.00016249	2.17E-07	0.0159	0.000162
220		304937.6	3813108	2.09E-07	0.015298	0.00015401	2.09E-07	0.015298	0.000154
221		304930	3813093	2.02E-07	0.014791	0.00015558	2.02E-07	0.014791	0.000156
222		304922.5	3813078	1.87E-07	0.013706	0.00015761	1.87E-07	0.013706	0.000158
223		304914.9	3813063	1.39E-07	0.010159	0.00015693	1.39E-07	0.010159	0.000157
224		304899.4	3813053	1.04E-07	0.0076247	0.00016888	1.04E-07	0.007625	0.000169
225		304884.3	3813044	8.54E-08	0.0062624	0.00013166	8.54E-08	0.006262	0.000132
226		304869.2	3813035	6.99E-08	0.0051205	0.00010374	6.99E-08	0.005121	0.000104
227		304854.1	3813026	5.80E-08	0.0042528	8.81E-05	5.80E-08	0.004253	8.81E-05
228		304846	3813012	4.69E-08	0.0034362	8.00E-05	4.69E-08	0.003436	8.00E-05
229		304837.5	3812997	3.87E-08	0.0028396	7.31E-05	3.87E-08	0.00284	7.31E-05
230		304829.1	3812982	3.27E-08	0.0024001	6.77E-05	3.27E-08	0.0024	6.77E-05
231		304820.7	3812968	2.82E-08	0.0020645	6.31E-05	2.82E-08	0.002065	6.31E-05
232		304812.2	3812953	2.46E-08	0.0018007	5.89E-05	2.46E-08	0.001801	5.89E-05
233		304803.8	3812938	2.17E-08	0.0015886	5.51E-05	2.17E-08	0.001589	5.51E-05
234		304802.4	3812938	2.16E-08	0.0015861	5.47E-05	2.16E-08	0.001586	5.47E-05
235		304787.5	3812948	2.36E-08	0.0017271	5.16E-05	2.36E-08	0.001727	5.16E-05
236		304772.6	3812957	2.50E-08	0.0018315	5.01E-05	2.50E-08	0.001832	5.01E-05
237		304757.6	3812966	2.57E-08	0.0018856	4.74E-05	2.57E-08	0.001886	4.74E-05
238		304742.7	3812976	2.58E-08	0.0018877	4.45E-05	2.58E-08	0.001888	4.45E-05
239		304727.8	3812985	2.52E-08	0.0018478	4.13E-05	2.52E-08	0.001848	4.13E-05
240		304712.8	3812995	2.43E-08	0.0017803	3.90E-05	2.43E-08	0.00178	3.90E-05
241		304697.9	3813004	2.31E-08	0.0016948	3.62E-05	2.31E-08	0.001695	3.62E-05
242		304698	3813022	2.38E-08	0.0017423	3.46E-05	2.38E-08	0.001742	3.46E-05
243		304698.6	3813040	2.42E-08	0.0017719	3.35E-05	2.42E-08	0.001772	3.35E-05
244		304699.1	3813057	2.43E-08	0.0017818	3.30E-05	2.43E-08	0.001782	3.30E-05
245		304699.7	3813074	2.42E-08	0.0017736	3.30E-05	2.42E-08	0.001774	3.30E-05
246		304700.2	3813092	2.38E-08	0.0017478	3.30E-05	2.38E-08	0.001748	3.30E-05
247		304701	3813112	2.31E-08	0.0016967	3.31E-05	2.31E-08	0.001697	3.31E-05
248		304701.8	3813132	2.20E-08	0.0016158	3.40E-05	2.20E-08	0.001616	3.40E-05
249		304702.7	3813152	2.05E-08	0.0015016	3.50E-05	2.05E-08	0.001502	3.50E-05
250		304703.5	3813171	1.85E-08	0.0013574	3.58E-05	1.85E-08	0.001357	3.58E-05
251		304704.3	3813191	1.63E-08	0.0011938	3.64E-05	1.63E-08	0.001194	3.64E-05
252		304705.1	3813211	1.40E-08	0.0010244	3.78E-05	1.40E-08	0.001024	3.78E-05
253		304705.9	3813231	1.18E-08	0.00086653	3.97E-05	1.18E-08	0.000867	3.97E-05
254		304706.7	3813251	1.01E-08	0.00074032	4.07E-05	1.01E-08	0.00074	4.07E-05
255		304707.5	3813271	8.84E-09	0.00064783	4.23E-05	8.84E-09	0.000648	4.23E-05
256		304708.3	3813291	7.96E-09	0.00058345	4.33E-05	7.96E-09	0.000583	4.33E-05
257		304709.1	3813311	7.32E-09	0.0005363	4.25E-05	7.32E-09	0.000536	4.25E-05
258		304709.9	3813331	6.86E-09	0.00050277	4.41E-05	6.86E-09	0.000503	4.41E-05
259		304710.8	3813351	6.54E-09	0.00047939	4.57E-05	6.54E-09	0.000479	4.57E-05
260		304711.6	3813371	6.40E-09	0.00046936	4.76E-05	6.40E-09	0.000469	4.76E-05
261		304712.4	3813390	6.15E-09	0.00045109	5.06E-05	6.15E-09	0.000451	5.06E-05
262		304713.2	3813410	5.59E-09	0.00040995	5.03E-05	5.59E-09	0.00041	5.03E-05
263		304714	3813430	4.83E-09	0.00035396	5.03E-05	4.83E-09	0.000354	5.03E-05
264		304715.6	3813431	4.91E-09	0.00036015	5.05E-05	4.91E-09	0.00036	5.05E-05
265		304729.9	3813419	5.99E-09	0.00043941	5.20E-05	5.99E-09	0.000439	5.20E-05

REC	NETID	X	Y	30yr_veh_only Cancer Risk Sum	30yr_veh_only Max Chronic Hazard Index	30yr_veh_only Max Acute Hazard Index	Total Cancer Risk Sum	Max Chronic Hazard	Max Acute Hazard
266		304744.3	3813407	6.72E-09	0.00049254	5.51E-05	6.72E-09	0.000493	5.51E-05
267		304758.6	3813395	7.49E-09	0.00054885	5.77E-05	7.49E-09	0.000549	5.77E-05
268		304772.9	3813383	8.66E-09	0.00063462	6.45E-05	8.66E-09	0.000635	6.45E-05
269		304787.2	3813371	1.00E-08	0.0007355	7.12E-05	1.00E-08	0.000736	7.12E-05
270		304801.5	3813359	9.49E-09	0.00069571	7.45E-05	9.49E-09	0.000696	7.45E-05
271		304815.8	3813347	7.85E-09	0.00057572	5.46E-05	7.85E-09	0.000576	5.46E-05
272		304830.1	3813335	6.53E-09	0.00047895	3.14E-05	6.53E-09	0.000479	3.14E-05
273		304844.4	3813322	6.88E-09	0.00050463	2.53E-05	6.88E-09	0.000505	2.53E-05
274		304858.7	3813310	9.13E-09	0.00066923	3.08E-05	9.13E-09	0.000669	3.08E-05
275		304873	3813298	1.55E-08	0.0011358	5.59E-05	1.55E-08	0.001136	5.59E-05
276		304887.3	3813286	2.97E-08	0.0021756	8.69E-05	2.97E-08	0.002176	8.69E-05
277		304901.6	3813274	5.02E-08	0.0036784	0.00010916	5.02E-08	0.003678	0.000109
278		304915.9	3813262	7.88E-08	0.0057769	0.00012259	7.88E-08	0.005777	0.000123
279		304930.2	3813250	1.07E-07	0.0078592	0.00012538	1.07E-07	0.007859	0.000125
280		304938.4	3813236	1.35E-07	0.0098937	0.00012852	1.35E-07	0.009894	0.000129
281		304946.2	3813221	1.41E-07	0.010309	0.00012885	1.41E-07	0.010309	0.000129
282		304715	3813430	4.88E-09	0.0003578	5.08E-05	4.88E-09	0.000358	5.08E-05
283		304701.2	3813092	2.40E-08	0.0017599	3.31E-05	2.40E-08	0.00176	3.31E-05
284		304698.5	3813005	2.32E-08	0.0017018	3.62E-05	2.32E-08	0.001702	3.62E-05
285		304802.9	3812939	2.18E-08	0.001597	5.49E-05	2.18E-08	0.001597	5.49E-05
286		304853.5	3813027	5.86E-08	0.0042976	8.79E-05	5.86E-08	0.004298	8.79E-05
287		304914	3813063	1.45E-07	0.010595	0.00016001	1.45E-07	0.010595	0.00016
288		304959.3	3813154	2.00E-07	0.01464	0.0001386	2.00E-07	0.01464	0.000139
289		304953.2	3813207	1.43E-07	0.010513	0.00014101	1.43E-07	0.010513	0.000141
290		304929.6	3813249	1.13E-07	0.0082842	0.00012856	1.13E-07	0.008284	0.000129

REC	NETID	X	Y	1_4f_W Cancer Risk Sum	5_25f_W Cancer Risk Sum	1_4f_W Max Chronic Hazard Index	5_25f_W Max Chronic Hazard Index	1_4f_W Max Acute Hazard Index	5_25f_W Max Acute Hazard Index	Total Cancer Risk Sum	Overall Max Chronic	Overall Max Acute
1	UCART1	295898.7	3804214	1.92E-10	1.41E-10	3.25E-05	7.38E-06	0.00010676	0.00010096	3.33E-10	3.25E-05	0.000107
2	UCART1	297898.7	3804214	2.11E-10	1.55E-10	3.65E-05	8.15E-06	0.00012428	0.00011691	3.66E-10	3.65E-05	0.000124
3	UCART1	299898.7	3804214	1.87E-10	1.35E-10	3.15E-05	7.16E-06	0.00014559	0.00013688	3.22E-10	3.15E-05	0.000146
4	UCART1	301898.7	3804214	1.64E-10	1.17E-10	2.75E-05	6.24E-06	0.00016286	0.00015355	2.80E-10	2.75E-05	0.000163
5	UCART1	303898.7	3804214	1.41E-10	9.91E-11	2.36E-05	5.35E-06	0.00017615	0.00016649	2.40E-10	2.36E-05	0.000176
6	UCART1	305898.7	3804214	1.51E-10	1.08E-10	2.54E-05	5.77E-06	0.00020052	0.00018866	2.59E-10	2.54E-05	0.000201
7	UCART1	307898.7	3804214	1.24E-10	8.79E-11	2.08E-05	4.74E-06	0.00017546	0.00016537	2.12E-10	2.08E-05	0.000175
8	UCART1	309898.7	3804214	1.18E-10	8.40E-11	1.97E-05	4.49E-06	0.00015367	0.00014521	2.02E-10	1.97E-05	0.000154
9	UCART1	311898.7	3804214	1.00E-10	7.14E-11	1.67E-05	3.82E-06	0.00012455	0.00011773	1.72E-10	1.67E-05	0.000125
10	UCART1	313898.7	3804214	9.06E-11	6.47E-11	1.51E-05	3.45E-06	0.00010948	0.0001037	1.55E-10	1.51E-05	0.000109
11	UCART1	295898.7	3806214	2.32E-10	1.68E-10	3.91E-05	8.89E-06	0.00012067	0.00011376	4.00E-10	3.91E-05	0.000121
12	UCART1	297898.7	3806214	2.89E-10	2.12E-10	4.89E-05	1.11E-05	0.0001571	0.00014851	5.01E-10	4.89E-05	0.000157
13	UCART1	299898.7	3806214	2.92E-10	2.09E-10	4.92E-05	1.12E-05	0.00018024	0.00017006	5.01E-10	4.92E-05	0.00018
14	UCART1	301898.7	3806214	2.65E-10	1.91E-10	4.47E-05	1.02E-05	0.00023455	0.00022138	4.57E-10	4.47E-05	0.000235
15	UCART1	303898.7	3806214	2.18E-10	1.55E-10	3.68E-05	8.34E-06	0.00024954	0.00023523	3.73E-10	3.68E-05	0.00025
16	UCART1	305898.7	3806214	2.25E-10	1.63E-10	3.79E-05	8.62E-06	0.00026793	0.00025131	3.88E-10	3.79E-05	0.000268
17	UCART1	307898.7	3806214	1.83E-10	1.31E-10	3.09E-05	7.00E-06	0.00023631	0.00022243	3.14E-10	3.09E-05	0.000236
18	UCART1	309898.7	3806214	1.61E-10	1.15E-10	2.68E-05	6.13E-06	0.00020408	0.00019283	2.75E-10	2.68E-05	0.000204
19	UCART1	311898.7	3806214	1.38E-10	9.88E-11	2.32E-05	5.27E-06	0.00016139	0.00015281	2.37E-10	2.32E-05	0.000161
20	UCART1	313898.7	3806214	1.23E-10	8.75E-11	2.06E-05	4.69E-06	0.00013099	0.00012385	2.10E-10	2.06E-05	0.000131
21	UCART1	295898.7	3808214	2.55E-10	1.85E-10	4.30E-05	9.78E-06	0.00011462	0.0001086	4.41E-10	4.30E-05	0.000115
22	UCART1	297898.7	3808214	4.42E-10	3.32E-10	7.46E-05	1.71E-05	0.00032272	0.00030104	7.74E-10	7.46E-05	0.000323
23	UCART1	299898.7	3808214	5.02E-10	3.69E-10	8.55E-05	1.93E-05	0.00025878	0.00024452	8.71E-10	8.55E-05	0.000259
24	UCART1	301898.7	3808214	5.08E-10	3.71E-10	8.71E-05	1.96E-05	0.00034362	0.00032353	8.79E-10	8.71E-05	0.000344
25	UCART1	303898.7	3808214	4.04E-10	2.96E-10	6.95E-05	1.56E-05	0.00039915	0.00037574	7.00E-10	6.95E-05	0.000399
26	UCART1	305898.7	3808214	3.70E-10	2.65E-10	6.28E-05	1.42E-05	0.00042886	0.00040427	6.34E-10	6.28E-05	0.000429
27	UCART1	307898.7	3808214	3.06E-10	2.22E-10	5.17E-05	1.17E-05	0.00035581	0.00033515	5.28E-10	5.17E-05	0.000356
28	UCART1	309898.7	3808214	2.39E-10	1.71E-10	4.04E-05	9.15E-06	0.00026657	0.00025226	4.11E-10	4.04E-05	0.000267
29	UCART1	311898.7	3808214	2.48E-10	1.81E-10	4.32E-05	9.59E-06	0.00021135	0.00019783	4.29E-10	4.32E-05	0.000211
30	UCART1	313898.7	3808214	1.85E-10	1.33E-10	3.13E-05	7.09E-06	0.00014254	0.00013414	3.18E-10	3.13E-05	0.000143
31	UCART1	295898.7	3810214	2.94E-10	2.17E-10	5.00E-05	1.13E-05	0.00024815	0.00023047	5.11E-10	5.00E-05	0.000248
32	UCART1	297898.7	3810214	3.60E-11	2.72E-11	6.05E-06	1.39E-06	3.81E-05	3.55E-05	6.31E-11	6.05E-06	3.81E-05
33	UCART1	299898.7	3810214	8.41E-11	6.39E-11	1.42E-05	3.25E-06	5.65E-05	5.23E-05	1.48E-10	1.42E-05	5.65E-05
34	UCART1	301898.7	3810214	1.15E-10	8.49E-11	1.96E-05	4.44E-06	7.24E-05	6.65E-05	2.00E-10	1.96E-05	7.24E-05
35	UCART1	303898.7	3810214	5.01E-11	3.54E-11	8.57E-06	1.92E-06	0.00013346	0.00012348	8.55E-11	8.57E-06	0.000133
36	UCART1	305898.7	3810214	9.83E-10	7.12E-10	0.00017141	3.80E-05	0.0010691	0.00099873	1.69E-09	0.000171	0.001069
37	UCART1	307898.7	3810214	5.54E-10	3.99E-10	9.45E-05	2.13E-05	0.00055431	0.00052342	9.53E-10	9.45E-05	0.000554
38	UCART1	309898.7	3810214	5.70E-10	4.16E-10	9.81E-05	2.20E-05	0.00042692	0.00040136	9.85E-10	9.81E-05	0.000427
39	UCART1	311898.7	3810214	4.35E-10	3.23E-10	7.41E-05	1.68E-05	0.00040912	0.00038108	7.57E-10	7.41E-05	0.000409
40	UCART1	313898.7	3810214	6.04E-11	4.56E-11	1.05E-05	2.35E-06	3.40E-05	3.14E-05	1.06E-10	1.05E-05	3.40E-05
41	UCART1	295898.7	3812214	1.81E-10	1.31E-10	3.04E-05	6.92E-06	0.00018058	0.00016959	3.11E-10	3.04E-05	0.000181
42	UCART1	297898.7	3812214	2.29E-10	1.69E-10	3.90E-05	8.83E-06	0.00019338	0.00018187	3.98E-10	3.90E-05	0.000193
43	UCART1	299898.7	3812214	4.63E-10	3.43E-10	7.89E-05	1.79E-05	0.00032004	0.00030268	8.06E-10	7.89E-05	0.00032
44	UCART1	301898.7	3812214	1.35E-09	1.00E-09	0.00022957	5.22E-05	0.00062334	0.00058835	2.36E-09	0.00023	0.000623
45	UCART1	303898.7	3812214	7.13E-09	5.65E-09	0.001357	0.00028589	0.0022699	0.0021272	1.28E-08	0.001357	0.00227
46	UCART1	305898.7	3812214	3.33E-09	2.46E-09	0.00060562	0.00013026	0.0023661	0.0022209	5.78E-09	0.000606	0.002366
47	UCART1	307898.7	3812214	1.45E-09	1.06E-09	0.00024816	5.60E-05	0.00066593	0.00062824	2.52E-09	0.000248	0.000666
48	UCART1	309898.7	3812214	1.62E-10	1.21E-10	2.79E-05	6.27E-06	6.09E-05	5.65E-05	2.83E-10	2.79E-05	6.09E-05
49	UCART1	311898.7	3812214	5.04E-11	3.68E-11	8.68E-06	1.94E-06	4.71E-05	4.34E-05	8.72E-11	8.68E-06	4.71E-05
50	UCART1	313898.7	3812214	2.96E-11	2.18E-11	5.09E-06	1.14E-06	3.63E-05	3.37E-05	5.14E-11	5.09E-06	3.63E-05
51	UCART1	295898.7	3814214	9.24E-11	6.84E-11	1.59E-05	3.57E-06	0.0001273	0.00012061	1.61E-10	1.59E-05	0.000127
52	UCART1	297898.7	3814214	1.28E-10	9.46E-11	2.21E-05	4.95E-06	0.00018408	0.00017449	2.22E-10	2.21E-05	0.000184
53	UCART1	299898.7	3814214	1.95E-10	1.45E-10	3.41E-05	7.57E-06	0.00029543	0.00027974	3.40E-10	3.41E-05	0.000295
54	UCART1	301898.7	3814214	4.31E-10	3.43E-10	8.11E-05	1.73E-05	0.00060032	0.0005649	7.75E-10	8.11E-05	0.0006
55	UCART1	303898.7	3814214	3.11E-10	2.50E-10	5.16E-05	1.21E-05	0.00046236	0.00043284	5.61E-10	5.16E-05	0.000462
56	UCART1	305898.7	3814214	1.77E-10	1.28E-10	2.84E-05	6.70E-06	0.00015624	0.0001464	3.05E-10	2.84E-05	0.000156
57	UCART1	307898.7	3814214	1.13E-10	8.22E-11	1.87E-05	4.31E-06	7.17E-05	6.61E-05	1.95E-10	1.87E-05	7.17E-05
58	UCART1	309898.7	3814214	8.49E-11	6.28E-11	1.42E-05	3.26E-06	5.58E-05	5.19E-05	1.48E-10	1.42E-05	5.58E-05
59	UCART1	311898.7	3814214	5.74E-11	4.23E-11	9.69E-06	2.21E-06	4.20E-05	3.88E-05	9.97E-11	9.69E-06	4.20E-05
60	UCART1	313898.7	3814214	3.20E-11	2.36E-11	5.41E-06	1.23E-06	2.73E-05	2.53E-05	5.56E-11	5.41E-06	2.73E-05
61	UCART1	295898.7	3816214	7.00E-11	5.30E-11	1.25E-05	2.74E-06	0.00011184	0.00010588	1.23E-10	1.25E-05	0.000112
62	UCART1	297898.7	3816214	9.33E-11	6.99E-11	1.66E-05	3.64E-06	0.00015561	0.00014759	1.63E-10	1.66E-05	0.000156
63	UCART1	299898.7	3816214	1.66E-10	1.27E-10	3.01E-05	6.54E-06	0.00027491	0.00025971	2.93E-10	3.01E-05	0.000275
64	UCART1	301898.7	3816214	1.56E-11	1.14E-11	2.66E-06	6.00E-07	5.42E-05	5.00E-05	2.70E-11	2.66E-06	5.42E-05
65	UCART1	303898.7	3816214	1.82E-11	1.30E-11	3.07E-06	6.96E-07	5.68E-05	5.28E-05	3.12E-11	3.07E-06	5.68E-05
66	UCART1	305898.7	3816214	2.14E-11	1.60E-11	3.64E-06	8.25E-07	4.82E-05	4.46E-05	3.73E-11	3.64E-06	4.82E-05
67	UCART1	307898.7	3816214	2.02E-11	1.50E-11	3.40E-06	7.76E-07	3.77E-05	3.49E-05	3.52E-11	3.40E-06	3.77E-05

REC	NETID	X	Y	1_4f_W Cancer Risk Sum	5_25f_W Cancer Risk Sum	1_4f_W Max Chronic Hazard Index	5_25f_W Max Chronic Hazard Index	1_4f_W Max Acute Hazard Index	5_25f_W Max Acute Hazard Index	Total Cancer Risk Sum	Overall Max Chronic	Overall Max Acute
68	UCART1	309898.7	3816214	2.58E-11	1.94E-11	4.40E-06	9.97E-07	2.84E-05	2.63E-05	4.52E-11	4.40E-06	2.84E-05
69	UCART1	311898.7	3816214	2.53E-11	1.90E-11	4.33E-06	9.79E-07	2.19E-05	2.03E-05	4.43E-11	4.33E-06	2.19E-05
70	UCART1	313898.7	3816214	1.62E-11	1.22E-11	2.78E-06	6.29E-07	2.48E-05	2.31E-05	2.84E-11	2.78E-06	2.48E-05
71	UCART1	295898.7	3818214	4.25E-12	3.13E-12	7.23E-07	1.64E-07	1.69E-05	1.57E-05	7.38E-12	7.23E-07	1.69E-05
72	UCART1	297898.7	3818214	6.82E-12	5.21E-12	1.17E-06	2.65E-07	1.96E-05	1.83E-05	1.20E-11	1.17E-06	1.96E-05
73	UCART1	299898.7	3818214	6.69E-12	4.92E-12	1.14E-06	2.58E-07	3.51E-05	3.24E-05	1.16E-11	1.14E-06	3.51E-05
74	UCART1	301898.7	3818214	7.14E-12	5.21E-12	1.21E-06	2.75E-07	2.10E-05	1.96E-05	1.24E-11	1.21E-06	2.10E-05
75	UCART1	303898.7	3818214	9.06E-12	6.97E-12	1.57E-06	3.53E-07	5.08E-05	4.72E-05	1.60E-11	1.57E-06	5.08E-05
76	UCART1	305898.7	3818214	1.10E-11	8.30E-12	1.88E-06	4.25E-07	2.58E-05	2.39E-05	1.93E-11	1.88E-06	2.58E-05
77	UCART1	307898.7	3818214	9.45E-12	6.96E-12	1.60E-06	3.64E-07	3.04E-05	2.81E-05	1.64E-11	1.60E-06	3.04E-05
78	UCART1	309898.7	3818214	1.01E-11	7.57E-12	1.72E-06	3.89E-07	2.54E-05	2.36E-05	1.76E-11	1.72E-06	2.54E-05
79	UCART1	311898.7	3818214	1.18E-11	8.70E-12	1.99E-06	4.53E-07	1.36E-05	1.27E-05	2.05E-11	1.99E-06	1.36E-05
80	UCART1	313898.7	3818214	1.15E-11	8.55E-12	1.97E-06	4.44E-07	1.40E-05	1.30E-05	2.00E-11	1.97E-06	1.40E-05
81	UCART1	295898.7	3820214	3.19E-12	2.39E-12	5.52E-07	1.24E-07	1.39E-05	1.29E-05	5.58E-12	5.52E-07	1.39E-05
82	UCART1	297898.7	3820214	4.21E-12	3.12E-12	7.22E-07	1.63E-07	2.67E-05	2.46E-05	7.33E-12	7.22E-07	2.67E-05
83	UCART1	299898.7	3820214	4.96E-12	3.75E-12	8.64E-07	1.93E-07	3.46E-05	3.24E-05	8.72E-12	8.64E-07	3.46E-05
84	UCART1	301898.7	3820214	4.79E-12	3.55E-12	8.21E-07	1.85E-07	1.68E-05	1.56E-05	8.34E-12	8.21E-07	1.68E-05
85	UCART1	303898.7	3820214	6.33E-12	4.74E-12	1.09E-06	2.45E-07	2.37E-05	2.21E-05	1.11E-11	1.09E-06	2.37E-05
86	UCART1	305898.7	3820214	7.10E-12	5.31E-12	1.22E-06	2.75E-07	2.01E-05	1.87E-05	1.24E-11	1.22E-06	2.01E-05
87	UCART1	307898.7	3820214	6.89E-12	5.25E-12	1.19E-06	2.68E-07	2.24E-05	2.07E-05	1.21E-11	1.19E-06	2.24E-05
88	UCART1	309898.7	3820214	6.73E-12	5.08E-12	1.16E-06	2.61E-07	2.27E-05	2.12E-05	1.18E-11	1.16E-06	2.27E-05
89	UCART1	311898.7	3820214	7.41E-12	5.58E-12	1.28E-06	2.87E-07	1.84E-05	1.71E-05	1.30E-11	1.28E-06	1.84E-05
90	UCART1	313898.7	3820214	7.87E-12	5.76E-12	1.33E-06	3.03E-07	7.51E-06	7.00E-06	1.36E-11	1.33E-06	7.51E-06
91	UCART1	295898.7	3822214	2.73E-12	2.05E-12	4.68E-07	1.06E-07	2.16E-05	1.99E-05	4.77E-12	4.68E-07	2.16E-05
92	UCART1	297898.7	3822214	3.70E-12	2.97E-12	6.55E-07	1.46E-07	3.66E-05	3.38E-05	6.66E-12	6.55E-07	3.66E-05
93	UCART1	299898.7	3822214	3.41E-12	2.51E-12	5.82E-07	1.31E-07	1.03E-05	9.55E-06	5.92E-12	5.82E-07	1.03E-05
94	UCART1	301898.7	3822214	4.11E-12	2.95E-12	7.02E-07	1.58E-07	1.88E-05	1.75E-05	7.07E-12	7.02E-07	1.88E-05
95	UCART1	303898.7	3822214	5.28E-12	3.89E-12	9.08E-07	2.04E-07	1.94E-05	1.81E-05	9.17E-12	9.08E-07	1.94E-05
96	UCART1	305898.7	3822214	5.41E-12	4.03E-12	9.33E-07	2.09E-07	2.15E-05	2.01E-05	9.44E-12	9.33E-07	2.15E-05
97	UCART1	307898.7	3822214	5.45E-12	4.09E-12	9.40E-07	2.11E-07	1.45E-05	1.35E-05	9.55E-12	9.40E-07	1.45E-05
98	UCART1	309898.7	3822214	5.11E-12	3.69E-12	8.65E-07	1.96E-07	1.62E-05	1.51E-05	8.79E-12	8.65E-07	1.62E-05
99	UCART1	311898.7	3822214	5.19E-12	3.91E-12	8.99E-07	2.01E-07	1.94E-05	1.80E-05	9.10E-12	8.99E-07	1.94E-05
100	UCART1	313898.7	3822214	5.54E-12	4.19E-12	9.54E-07	2.15E-07	1.45E-05	1.35E-05	9.72E-12	9.54E-07	1.45E-05
101	UCART2	303323.7	3811639	4.26E-09	3.25E-09	0.00073892	0.0001658	0.0020349	0.0019052	7.51E-09	0.000739	0.002035
102	UCART2	303673.7	3811639	4.27E-09	3.21E-09	0.0007423	0.00016583	0.0022092	0.0020679	7.48E-09	0.000742	0.002209
103	UCART2	304023.7	3811639	3.32E-09	2.53E-09	0.00055241	0.00012785	0.0018693	0.0017613	5.84E-09	0.000552	0.001869
104	UCART2	304373.7	3811639	1.47E-09	1.14E-09	0.00023974	5.66E-05	0.00090695	0.00085613	2.61E-09	0.00024	0.000907
105	UCART2	304723.7	3811639	2.76E-09	2.08E-09	0.00045832	0.00010616	0.0027828	0.0026097	4.84E-09	0.000458	0.002783
106	UCART2	305073.7	3811639	2.67E-09	2.10E-09	0.00051445	0.00010732	0.0021519	0.0020041	4.77E-09	0.000514	0.002152
107	UCART2	305423.7	3811639	2.17E-09	1.59E-09	0.00038895	8.45E-05	0.0019396	0.0018143	3.76E-09	0.000389	0.00194
108	UCART2	305773.7	3811639	2.00E-09	1.48E-09	0.00035571	7.80E-05	0.0017269	0.001619	3.49E-09	0.000356	0.001727
109	UCART2	306123.7	3811639	1.76E-09	1.28E-09	0.00030734	6.81E-05	0.0014784	0.0013899	3.04E-09	0.000307	0.001478
110	UCART2	306473.7	3811639	1.59E-09	1.16E-09	0.00027867	6.15E-05	0.0013303	0.0012522	2.75E-09	0.000279	0.00133
111	UCART2	303323.7	3811989	4.87E-09	3.75E-09	0.00088774	0.00019226	0.0015857	0.0014756	8.62E-09	0.000888	0.001586
112	UCART2	303673.7	3811989	5.80E-09	4.55E-09	0.0010833	0.00023099	0.0019172	0.0017885	1.03E-08	0.001083	0.001917
113	UCART2	304023.7	3811989	5.89E-09	4.57E-09	0.0011366	0.00023622	0.0021387	0.0019875	1.05E-08	0.001137	0.002139
114	UCART2	304373.7	3811989	5.23E-09	4.07E-09	0.0010297	0.00021079	0.002571	0.0023873	9.30E-09	0.00103	0.002571
115	UCART2	304723.7	3811989	3.74E-09	2.75E-09	0.00068911	0.00014676	0.0026136	0.0024425	6.49E-09	0.000689	0.002614
116	UCART2	305073.7	3811989	3.68E-09	2.79E-09	0.0006769	0.00014517	0.0027933	0.0026151	6.47E-09	0.000677	0.002793
117	UCART2	305423.7	3811989	3.09E-09	2.30E-09	0.00056481	0.00012138	0.0025387	0.0023718	5.40E-09	0.000565	0.002539
118	UCART2	305773.7	3811989	2.76E-09	2.03E-09	0.00049126	0.00010746	0.0022209	0.0020846	4.79E-09	0.000491	0.002221
119	UCART2	306123.7	3811989	2.40E-09	1.77E-09	0.00043178	9.38E-05	0.0018396	0.001729	4.17E-09	0.000432	0.00184
120	UCART2	306473.7	3811989	2.24E-09	1.65E-09	0.00040692	8.76E-05	0.0015337	0.0014454	3.89E-09	0.000407	0.001534
121	UCART2	303323.7	3812339	4.56E-09	3.55E-09	0.0008208	0.00017974	0.0013914	0.0013132	8.11E-09	0.000821	0.001391
122	UCART2	303673.7	3812339	6.53E-09	5.10E-09	0.0012028	0.00025903	0.0020878	0.0019624	1.16E-08	0.001203	0.002088
123	UCART2	304023.7	3812339	8.47E-09	6.66E-09	0.0015935	0.00033822	0.0026537	0.0024929	1.51E-08	0.001594	0.002654
124	UCART2	304373.7	3812339	8.54E-09	6.53E-09	0.0016459	0.00034138	0.0033207	0.0031131	1.51E-08	0.001646	0.003321
125	UCART2	304723.7	3812339	6.65E-09	5.04E-09	0.0012863	0.00026554	0.0037108	0.0034557	1.17E-08	0.001286	0.003711
126	UCART2	305073.7	3812339	6.01E-09	4.62E-09	0.0011539	0.00024022	0.0040947	0.0038059	1.06E-08	0.001154	0.004095
127	UCART2	305423.7	3812339	4.98E-09	3.81E-09	0.00093422	0.00019776	0.0034944	0.0032615	8.79E-09	0.000934	0.003494
128	UCART2	305773.7	3812339	4.13E-09	3.08E-09	0.00076855	0.00016295	0.0027784	0.0026053	7.21E-09	0.000769	0.002778
129	UCART2	306123.7	3812339	3.93E-09	3.00E-09	0.00066989	0.00015245	0.0027475	0.0025994	6.93E-09	0.00067	0.002748
130	UCART2	306473.7	3812339	1.29E-09	1.02E-09	0.00022974	5.09E-05	0.00056474	0.00052978	2.31E-09	0.00023	0.000565
131	UCART2	303323.7	3812689	3.93E-09	3.04E-09	0.00068648	0.00015355	0.0014741	0.0013889	6.96E-09	0.000686	0.001474
132	UCART2	303673.7	3812689	6.40E-09	5.04E-09	0.0011396	0.00025225	0.0020033	0.0018938	1.14E-08	0.00114	0.002003
133	UCART2	304023.7	3812689	1.10E-08	8.60E-09	0.0019418	0.00043152	0.0030504	0.0028917	1.96E-08	0.001942	0.00305
134	UCART2	304373.7	3812689	1.81E-08	1.45E-08	0.0034857	0.00072907	0.0046675	0.0043794	3.26E-08	0.003486	0.004668

REC	NETID	X	Y	1_4f_W Cancer Risk Sum	5_25f_W Cancer Risk Sum	1_4f_W Max Chronic Hazard Index	5_25f_W Max Chronic Hazard Index	1_4f_W Max Acute Hazard Index	5_25f_W Max Acute Hazard Index	Total Cancer Risk Sum	Overall Max Chronic	Overall Max Acute
135	UCART2	304723.7	3812689	1.61E-08	1.28E-08	0.0035291	0.00067042	0.006197	0.005735	2.89E-08	0.003529	0.006197
136	UCART2	305073.7	3812689	1.18E-08	9.51E-09	0.0025482	0.00049173	0.0065349	0.0059979	2.14E-08	0.002548	0.006535
137	UCART2	305423.7	3812689	2.15E-09	1.81E-09	0.00042657	8.81E-05	0.0014202	0.0013297	3.96E-09	0.000427	0.00142
138	UCART2	305773.7	3812689	8.05E-09	6.28E-09	0.0013919	0.00031458	0.004147	0.0039541	1.43E-08	0.001392	0.004147
139	UCART2	306123.7	3812689	6.20E-09	4.79E-09	0.0011668	0.00024689	0.0021749	0.0020453	1.10E-08	0.001167	0.002175
140	UCART2	306473.7	3812689	5.05E-09	3.88E-09	0.00091582	0.00019902	0.0017374	0.0016242	8.93E-09	0.000916	0.001737
141	UCART2	303323.7	3813039	2.48E-09	1.89E-09	0.00043246	9.67E-05	0.001502	0.0014171	4.37E-09	0.000432	0.001502
142	UCART2	303673.7	3813039	4.10E-09	3.20E-09	0.00071942	0.00016072	0.002068	0.0019481	7.30E-09	0.000719	0.002068
143	UCART2	304023.7	3813039	7.77E-09	6.10E-09	0.001318	0.00030247	0.0031999	0.0030349	1.39E-08	0.001318	0.0032
144	UCART2	304373.7	3813039	2.07E-08	1.71E-08	0.0035047	0.00081431	0.0053068	0.0050265	3.78E-08	0.003505	0.005307
145	UCART2	304723.7	3813039	8.09E-08	8.16E-08	0.017808	0.0035358	0.009677	0.0090861	1.62E-07	0.017808	0.009677
146	UCART2	305073.7	3813039	5.02E-08	5.23E-08	0.017192	0.0025343	0.013618	0.012418	1.02E-07	0.017192	0.013618
147	UCART2	305423.7	3813039	1.28E-08	1.05E-08	0.0024062	0.00051597	0.0018926	0.0018033	2.33E-08	0.002406	0.001893
148	UCART2	305773.7	3813039	4.02E-09	3.07E-09	0.00070021	0.00015663	0.00066276	0.00062951	7.09E-09	0.0007	0.000663
149	UCART2	306123.7	3813039	8.64E-09	6.44E-09	0.0014171	0.00033057	0.0036514	0.003447	1.51E-08	0.001417	0.003651
150	UCART2	306473.7	3813039	2.07E-09	1.61E-09	0.00034533	8.02E-05	0.00047602	0.00044647	3.68E-09	0.000345	0.000476
151	UCART2	303323.7	3813389	1.61E-09	1.28E-09	0.00029442	6.40E-05	0.0014937	0.0014053	2.89E-09	0.000294	0.001494
152	UCART2	303673.7	3813389	2.40E-09	1.93E-09	0.00044412	9.57E-05	0.0021721	0.0020429	4.32E-09	0.000444	0.002172
153	UCART2	304023.7	3813389	3.59E-09	2.96E-09	0.00068899	0.00014541	0.0031403	0.0029489	6.55E-09	0.000689	0.00314
154	UCART2	304373.7	3813389	6.11E-09	5.23E-09	0.0011817	0.0002497	0.005166	0.0048838	1.13E-08	0.001182	0.005166
155	UCART2	304723.7	3813389	1.87E-08	2.06E-08	0.0041631	0.00083521	0.010812	0.0099538	3.92E-08	0.004163	0.010812
156	UCART2	305073.7	3813389	1.04E-08	8.54E-09	0.0016005	0.00039947	0.0036018	0.0034327	1.89E-08	0.001601	0.003602
157	UCART2	305423.7	3813389	3.87E-09	2.79E-09	0.00056793	0.00014357	0.00094839	0.00091033	6.65E-09	0.000568	0.000948
158	UCART2	305773.7	3813389	2.07E-09	1.49E-09	0.00031395	7.73E-05	0.0005487	0.00052115	3.56E-09	0.000314	0.000549
159	UCART2	306123.7	3813389	1.73E-09	1.28E-09	0.00027029	6.55E-05	0.00048385	0.00045576	3.02E-09	0.00027	0.000484
160	UCART2	306473.7	3813389	1.85E-09	1.37E-09	0.00028616	6.98E-05	0.0007102	0.00067326	3.22E-09	0.000286	0.00071
161	UCART2	303323.7	3813739	1.28E-09	1.03E-09	0.00024079	5.13E-05	0.0015564	0.0014652	2.31E-09	0.000241	0.001556
162	UCART2	303673.7	3813739	2.24E-10	1.77E-10	3.75E-05	8.71E-06	0.00042878	0.00040289	4.02E-10	3.75E-05	0.000429
163	UCART2	304023.7	3813739	1.00E-09	7.89E-10	0.00015445	3.83E-05	0.0015609	0.0014874	1.79E-09	0.000154	0.001561
164	UCART2	304373.7	3813739	3.55E-10	2.68E-10	6.04E-05	1.37E-05	0.00056826	0.00052469	6.23E-10	6.04E-05	0.000568
165	UCART2	304723.7	3813739	1.16E-09	8.74E-10	0.00018524	4.42E-05	0.0010911	0.0010245	2.03E-09	0.000185	0.001091
166	UCART2	305073.7	3813739	7.06E-10	5.11E-10	0.00011021	2.66E-05	0.0007218	0.00068543	1.22E-09	0.00011	0.000722
167	UCART2	305423.7	3813739	6.32E-10	4.52E-10	9.76E-05	2.37E-05	0.00046713	0.00043913	1.08E-09	9.76E-05	0.000467
168	UCART2	305773.7	3813739	6.32E-10	4.62E-10	9.82E-05	2.38E-05	0.00031581	0.00029774	1.09E-09	9.82E-05	0.000316
169	UCART2	306123.7	3813739	5.32E-10	3.88E-10	8.47E-05	2.01E-05	0.00024485	0.00023099	9.20E-10	8.47E-05	0.000245
170	UCART2	306473.7	3813739	4.43E-10	3.21E-10	7.06E-05	1.68E-05	0.00020644	0.00019346	7.64E-10	7.06E-05	0.000206
171	UCART2	303323.7	3814089	1.23E-10	9.40E-11	2.04E-05	4.73E-06	0.00026322	0.00024663	2.17E-10	2.04E-05	0.000263
172	UCART2	303673.7	3814089	9.98E-11	7.60E-11	1.68E-05	3.86E-06	0.0002069	0.00019382	1.76E-10	1.68E-05	0.000207
173	UCART2	304023.7	3814089	2.38E-10	1.85E-10	3.97E-05	9.21E-06	0.00040098	0.00037291	4.23E-10	3.97E-05	0.000401
174	UCART2	304373.7	3814089	2.11E-10	1.57E-10	3.56E-05	8.11E-06	0.00032032	0.00029377	3.67E-10	3.56E-05	0.00032
175	UCART2	304723.7	3814089	3.52E-10	2.56E-10	5.59E-05	1.33E-05	0.00049196	0.00046074	6.08E-10	5.59E-05	0.000492
176	UCART2	305073.7	3814089	2.76E-10	2.03E-10	4.46E-05	1.05E-05	0.00033415	0.00031268	4.79E-10	4.46E-05	0.000334
177	UCART2	305423.7	3814089	2.92E-10	2.10E-10	4.64E-05	1.10E-05	0.00034615	0.00032644	5.02E-10	4.64E-05	0.000346
178	UCART2	305773.7	3814089	2.42E-10	1.74E-10	3.85E-05	9.13E-06	0.00021313	0.00019964	4.15E-10	3.85E-05	0.000213
179	UCART2	306123.7	3814089	2.03E-10	1.47E-10	3.26E-05	7.70E-06	0.00013203	0.00012478	3.50E-10	3.26E-05	0.000132
180	UCART2	306473.7	3814089	1.77E-10	1.31E-10	2.89E-05	6.75E-06	0.00011406	0.00010656	3.08E-10	2.89E-05	0.000114
181	UCART2	303323.7	3814439	5.79E-11	4.30E-11	9.65E-06	2.22E-06	0.00013125	0.00012143	1.01E-10	9.65E-06	0.000131
182	UCART2	303673.7	3814439	1.21E-10	9.30E-11	2.05E-05	4.69E-06	0.00026348	0.00024375	2.14E-10	2.05E-05	0.000263
183	UCART2	304023.7	3814439	9.29E-11	7.25E-11	1.61E-05	3.63E-06	0.00022152	0.00020004	1.65E-10	1.61E-05	0.000222
184	UCART2	304373.7	3814439	1.24E-10	9.01E-11	2.03E-05	4.72E-06	0.00019027	0.00017707	2.14E-10	2.03E-05	0.00019
185	UCART2	304723.7	3814439	1.27E-10	9.04E-11	2.07E-05	4.82E-06	0.0002273	0.00021148	2.18E-10	2.07E-05	0.000227
186	UCART2	305073.7	3814439	1.23E-10	9.17E-11	2.04E-05	4.72E-06	0.00016266	0.00014954	2.15E-10	2.04E-05	0.000163
187	UCART2	305423.7	3814439	1.39E-10	1.02E-10	2.27E-05	5.29E-06	0.00018134	0.00016967	2.40E-10	2.27E-05	0.000181
188	UCART2	305773.7	3814439	1.09E-10	7.93E-11	1.78E-05	4.15E-06	0.00014489	0.00013421	1.88E-10	1.78E-05	0.000145
189	UCART2	306123.7	3814439	1.07E-10	7.86E-11	1.76E-05	4.10E-06	9.50E-05	8.88E-05	1.86E-10	1.76E-05	9.50E-05
190	UCART2	306473.7	3814439	9.27E-11	6.71E-11	1.52E-05	3.53E-06	6.71E-05	6.25E-05	1.60E-10	1.52E-05	6.71E-05
191	UCART2	303323.7	3814789	4.48E-11	3.27E-11	7.69E-06	1.72E-06	0.00011624	0.00010676	7.74E-11	7.69E-06	0.000116
192	UCART2	303673.7	3814789	7.21E-11	5.53E-11	1.24E-05	2.81E-06	0.00018732	0.00017103	1.27E-10	1.24E-05	0.000187
193	UCART2	304023.7	3814789	8.37E-11	6.12E-11	1.39E-05	3.20E-06	0.00014371	0.00013366	1.45E-10	1.39E-05	0.000144
194	UCART2	304373.7	3814789	7.14E-11	5.01E-11	1.17E-05	2.70E-06	0.00012727	0.00011821	1.21E-10	1.17E-05	0.000127
195	UCART2	304723.7	3814789	6.88E-11	5.04E-11	1.15E-05	2.63E-06	0.00015853	0.00014663	1.19E-10	1.15E-05	0.000159
196	UCART2	305073.7	3814789	5.94E-11	4.47E-11	1.00E-05	2.29E-06	0.00013502	0.00012363	1.04E-10	1.00E-05	0.000135
197	UCART2	305423.7	3814789	6.86E-11	5.06E-11	1.14E-05	2.63E-06	8.65E-05	8.07E-05	1.19E-10	1.14E-05	8.65E-05
198	UCART2	305773.7	3814789	8.24E-11	5.92E-11	1.35E-05	3.13E-06	0.00011185	0.00010465	1.42E-10	1.35E-05	0.000112
199	UCART2	306123.7	3814789	7.28E-11	5.33E-11	1.21E-05	2.78E-06	9.96E-05	9.21E-05	1.26E-10	1.21E-05	9.96E-05
200	UCART2	306473.7	3814789	6.05E-11	4.46E-11	1.00E-05	2.32E-06	6.25E-05	5.81E-05	1.05E-10	1.00E-05	6.25E-05
201		305181.2	3813150	7.15E-08	5.46E-08	0.010392	0.002677	0.013891	0.013602	1.26E-07	0.010392	0.013891

REC	NETID	X	Y	1_4f_W Cancer Risk Sum	5_25f_W Cancer Risk Sum	1_4f_W Max Chronic Hazard Index	5_25f_W Max Chronic Hazard Index	1_4f_W Max Acute Hazard Index	5_25f_W Max Acute Hazard Index	Total Cancer Risk Sum	Overall Max Chronic	Overall Max Acute
202		305175.1	3813184	6.33E-08	4.79E-08	0.008553	0.0023323	0.0083058	0.0081252	1.11E-07	0.008553	0.008306
203		304930.6	3812926	2.88E-08	2.78E-08	0.0086089	0.0013665	0.0099171	0.008718	5.66E-08	0.008609	0.009917
204		304812.5	3812740	1.66E-08	1.34E-08	0.0038069	0.0007026	0.0068445	0.0062771	3.00E-08	0.003807	0.006844
205		304595.7	3812860	3.38E-08	2.84E-08	0.0072483	0.0014132	0.0070783	0.0066211	6.22E-08	0.007248	0.007078
206		304652.6	3813041	6.40E-08	6.18E-08	0.01241	0.0026829	0.0087016	0.0082218	1.26E-07	0.01241	0.008702
207		304658.1	3813202	3.59E-08	3.42E-08	0.0068764	0.0014968	0.0099643	0.0094428	7.02E-08	0.006876	0.009964
208		304641.4	3812566	1.22E-08	9.41E-09	0.002496	0.00049561	0.0050321	0.0046902	2.16E-08	0.002496	0.005032
209		304590.2	3812613	1.46E-08	1.13E-08	0.003014	0.00059599	0.0050193	0.004673	2.59E-08	0.003014	0.005019
210		305548.4	3813385	2.43E-09	1.72E-09	0.00036121	9.03E-05	0.00056587	0.00053969	4.15E-09	0.000361	0.000566
211		304971.4	3813575	1.50E-09	1.10E-09	0.00023055	5.66E-05	0.0012629	0.0012022	2.61E-09	0.000231	0.001263
212		304670.5	3813774	9.08E-10	6.95E-10	0.00014585	3.48E-05	0.00089863	0.00084285	1.60E-09	0.000146	0.000899
213		304345	3813766	3.09E-10	2.32E-10	5.28E-05	1.20E-05	0.00052721	0.00048418	5.41E-10	5.28E-05	0.000527
214		304954.2	3813207	1.81E-07	7.49E-07	0.081463	0.015408	0.025619	0.025619	9.29E-07	0.081463	0.025619
215		304956.3	3813189	1.66E-07	6.51E-07	0.076165	0.013879	0.027183	0.027183	8.17E-07	0.076165	0.027183
216		304958.3	3813171	1.33E-07	4.32E-07	0.098021	0.012235	0.026824	0.026824	5.65E-07	0.098021	0.026824
217		304960.3	3813154	1.07E-07	2.80E-07	0.1024	0.010473	0.024126	0.024126	3.88E-07	0.1024	0.024126
218		304952.7	3813138	9.12E-08	2.06E-07	0.097888	0.0091685	0.02064	0.02064	2.97E-07	0.097888	0.02064
219		304945.1	3813123	8.54E-08	1.55E-07	0.11158	0.0092924	0.01644	0.01644	2.41E-07	0.11158	0.01644
220		304937.6	3813108	7.99E-08	1.23E-07	0.1071	0.008625	0.016243	0.013918	2.02E-07	0.1071	0.016243
221		304930	3813093	7.63E-08	1.03E-07	0.10342	0.0081687	0.016364	0.013834	1.80E-07	0.10342	0.016364
222		304922.5	3813078	7.23E-08	8.97E-08	0.095866	0.0075504	0.016168	0.013605	1.62E-07	0.095866	0.016168
223		304914.9	3813063	6.52E-08	7.75E-08	0.071636	0.0059924	0.015677	0.013126	1.43E-07	0.071636	0.015677
224		304899.4	3813053	6.25E-08	7.15E-08	0.054446	0.0049657	0.015353	0.012606	1.34E-07	0.054446	0.015353
225		304884.3	3813044	6.18E-08	6.69E-08	0.045232	0.0044197	0.014176	0.012035	1.29E-07	0.045232	0.014176
226		304869.2	3813035	6.16E-08	6.40E-08	0.037529	0.0039798	0.01325	0.011563	1.26E-07	0.037529	0.01325
227		304854.1	3813026	6.16E-08	6.21E-08	0.031682	0.0036505	0.012431	0.010998	1.24E-07	0.031682	0.012431
228		304846	3813012	5.72E-08	5.61E-08	0.025964	0.0031931	0.011651	0.01035	1.13E-07	0.025964	0.011651
229		304837.5	3812997	5.32E-08	5.10E-08	0.021747	0.0028318	0.011016	0.0098277	1.04E-07	0.021747	0.011016
230		304829.1	3812982	4.97E-08	4.66E-08	0.018609	0.0025437	0.010428	0.0093268	9.62E-08	0.018609	0.010428
231		304820.7	3812968	4.64E-08	4.27E-08	0.016187	0.0023067	0.0099622	0.0089368	8.91E-08	0.016187	0.009962
232		304812.2	3812953	4.35E-08	3.94E-08	0.014264	0.0021071	0.0097015	0.0087445	8.28E-08	0.014264	0.009702
233		304803.8	3812938	4.08E-08	3.64E-08	0.012703	0.0019361	0.0094711	0.0085751	7.72E-08	0.012703	0.009471
234		304802.4	3812938	4.09E-08	3.64E-08	0.012689	0.0019377	0.0094582	0.0085691	7.73E-08	0.012689	0.009458
235		304787.5	3812948	4.51E-08	4.03E-08	0.013846	0.0021293	0.0093177	0.0084786	8.53E-08	0.013846	0.009318
236		304772.6	3812957	4.95E-08	4.44E-08	0.014767	0.002317	0.0094446	0.0086304	9.39E-08	0.014767	0.009445
237		304757.6	3812966	5.39E-08	4.88E-08	0.015353	0.0024893	0.0095619	0.0087908	1.03E-07	0.015353	0.009562
238		304742.7	3812976	5.81E-08	5.32E-08	0.015577	0.0026356	0.0093696	0.0086467	1.11E-07	0.015577	0.00937
239		304727.8	3812985	6.17E-08	5.71E-08	0.015491	0.0027491	0.0093528	0.0086814	1.19E-07	0.015491	0.009353
240		304712.8	3812995	6.44E-08	6.05E-08	0.015177	0.0028256	0.009286	0.0086515	1.25E-07	0.015177	0.009286
241		304697.9	3813004	6.60E-08	6.28E-08	0.014688	0.0028577	0.0090096	0.0084204	1.29E-07	0.014688	0.00901
242		304698	3813022	7.11E-08	6.92E-08	0.01527	0.0030632	0.0092848	0.0087227	1.40E-07	0.01527	0.009285
243		304698.6	3813040	7.56E-08	7.53E-08	0.015707	0.0032463	0.0093846	0.0088396	1.51E-07	0.015707	0.009385
244		304699.1	3813057	7.95E-08	8.09E-08	0.015979	0.0034012	0.0095012	0.0089641	1.60E-07	0.015979	0.009501
245		304699.7	3813074	8.23E-08	8.55E-08	0.016074	0.0035121	0.0095697	0.0090328	1.68E-07	0.016074	0.00957
246		304700.2	3813092	8.36E-08	8.82E-08	0.015974	0.0035613	0.010082	0.0095453	1.72E-07	0.015974	0.010082
247		304701	3813112	8.30E-08	8.86E-08	0.015605	0.0035309	0.010415	0.0098774	1.72E-07	0.015605	0.010415
248		304701.8	3813132	7.98E-08	8.57E-08	0.014902	0.0033944	0.010563	0.010009	1.65E-07	0.014902	0.010563
249		304702.7	3813152	7.36E-08	7.90E-08	0.013824	0.0031364	0.010742	0.010173	1.53E-07	0.013824	0.010742
250		304703.5	3813171	6.46E-08	6.85E-08	0.012391	0.0027576	0.011054	0.010471	1.33E-07	0.012391	0.011054
251		304704.3	3813191	5.39E-08	5.63E-08	0.010747	0.0023151	0.011071	0.010479	1.10E-07	0.010747	0.011071
252		304705.1	3813211	4.38E-08	4.54E-08	0.0090954	0.0018965	0.011108	0.010493	8.92E-08	0.009095	0.011108
253		304705.9	3813231	3.56E-08	3.70E-08	0.0076213	0.0015548	0.01127	0.010624	7.26E-08	0.007621	0.01127
254		304706.7	3813251	2.96E-08	3.10E-08	0.0064705	0.0013015	0.01116	0.010499	6.06E-08	0.006471	0.01116
255		304707.5	3813271	2.54E-08	2.69E-08	0.0056403	0.0011255	0.011107	0.01042	5.24E-08	0.00564	0.011107
256		304708.3	3813291	2.26E-08	2.42E-08	0.0050676	0.0010062	0.011039	0.010335	4.68E-08	0.005068	0.011039
257		304709.1	3813311	2.06E-08	2.20E-08	0.0046495	0.00091837	0.010909	0.010217	4.26E-08	0.00465	0.010909
258		304709.9	3813331	1.92E-08	2.02E-08	0.0043479	0.00085244	0.010779	0.010061	3.94E-08	0.004348	0.010779
259		304710.8	3813351	1.81E-08	1.91E-08	0.004136	0.00080637	0.010672	0.0099277	3.72E-08	0.004136	0.010672
260		304711.6	3813371	1.76E-08	1.91E-08	0.0040478	0.00079087	0.010378	0.0096038	3.67E-08	0.004048	0.010378
261		304712.4	3813390	1.78E-08	1.93E-08	0.0039345	0.00079101	0.010614	0.009792	3.71E-08	0.003935	0.010614
262		304713.2	3813410	1.87E-08	1.90E-08	0.003698	0.00079684	0.011702	0.010884	3.77E-08	0.003698	0.011702
263		304714	3813430	1.84E-08	1.77E-08	0.0033005	0.00075731	0.012508	0.011689	3.62E-08	0.003301	0.012508
264		304715.6	3813431	1.88E-08	1.79E-08	0.0033616	0.00077184	0.012518	0.011698	3.68E-08	0.003362	0.012518
265		304729.9	3813419	1.86E-08	1.95E-08	0.0038946	0.00081008	0.010923	0.010077	3.82E-08	0.003895	0.010923
266		304744.3	3813407	1.96E-08	2.14E-08	0.0043049	0.00087056	0.010877	0.0099807	4.09E-08	0.004305	0.010877
267		304758.6	3813395	2.09E-08	2.33E-08	0.0047538	0.00094277	0.011154	0.010215	4.42E-08	0.004754	0.011154
268		304772.9	3813383	2.38E-08	2.75E-08	0.0054831	0.001086	0.012123	0.011074	5.13E-08	0.005483	0.012123

REC	NETID	X	Y	1_4f_W Cancer Risk Sum	5_25f_W Cancer Risk Sum	1_4f_W Max Chronic Hazard Index	5_25f_W Max Chronic Hazard Index	1_4f_W Max Acute Hazard Index	5_25f_W Max Acute Hazard Index	Total Cancer Risk Sum	Overall Max Chronic	Overall Max Acute
269		304787.2	3813371	2.81E-08	3.33E-08	0.006385	0.0012843	0.013868	0.012711	6.14E-08	0.006385	0.013868
270		304801.5	3813359	3.19E-08	3.77E-08	0.0063132	0.0014086	0.017112	0.015901	6.96E-08	0.006313	0.017112
271		304815.8	3813347	3.14E-08	3.28E-08	0.0054568	0.0013068	0.02038	0.019492	6.43E-08	0.005457	0.02038
272		304830.1	3813335	3.18E-08	2.83E-08	0.0047939	0.0012366	0.026268	0.025757	6.00E-08	0.004794	0.026268
273		304844.4	3813322	3.16E-08	3.00E-08	0.0049715	0.0012591	0.023167	0.022755	6.16E-08	0.004972	0.023167
274		304858.7	3813310	4.43E-08	4.15E-08	0.0067057	0.0017448	0.034127	0.033626	8.58E-08	0.006706	0.034127
275		304873	3813298	6.74E-08	6.91E-08	0.011029	0.002754	0.038779	0.03787	1.36E-07	0.011029	0.038779
276		304887.3	3813286	7.29E-08	1.18E-07	0.018553	0.0037332	0.018887	0.017474	1.91E-07	0.018553	0.018887
277		304901.6	3813274	8.04E-08	1.80E-07	0.029356	0.0050529	0.017408	0.017408	2.60E-07	0.029356	0.017408
278		304915.9	3813262	8.62E-08	2.54E-07	0.044159	0.0066614	0.020886	0.019841	3.40E-07	0.044159	0.020886
279		304930.2	3813250	9.14E-08	3.39E-07	0.058893	0.0083573	0.020159	0.020159	4.30E-07	0.058893	0.020159
280		304938.4	3813236	1.20E-07	5.49E-07	0.075078	0.011821	0.021398	0.021398	6.69E-07	0.075078	0.021398
281		304946.2	3813221	1.61E-07	7.44E-07	0.080862	0.014888	0.02292	0.02292	9.06E-07	0.080862	0.02292
282		304715	3813430	1.88E-08	1.79E-08	0.003343	0.00076925	0.012527	0.011702	3.67E-08	0.003343	0.012527
283		304701.2	3813092	8.41E-08	8.88E-08	0.01608	0.0035834	0.010084	0.0095458	1.73E-07	0.01608	0.010084
284		304698.5	3813005	6.63E-08	6.31E-08	0.014751	0.0028712	0.0090169	0.0084277	1.29E-07	0.014751	0.009017
285		304802.9	3812939	4.10E-08	3.66E-08	0.01277	0.0019466	0.0094729	0.0085803	7.76E-08	0.01277	0.009473
286		304853.5	3813027	6.21E-08	6.27E-08	0.032012	0.0036867	0.012428	0.010999	1.25E-07	0.032012	0.012428
287		304914	3813063	6.60E-08	7.81E-08	0.074604	0.0061748	0.015766	0.013164	1.44E-07	0.074604	0.015766
288		304959.3	3813154	1.07E-07	2.81E-07	0.10484	0.010615	0.024282	0.024282	3.89E-07	0.10484	0.024282
289		304953.2	3813207	1.83E-07	7.71E-07	0.083383	0.015779	0.026099	0.026099	9.55E-07	0.083383	0.026099
290		304929.6	3813249	9.28E-08	3.56E-07	0.061913	0.0087059	0.020757	0.020757	4.49E-07	0.061913	0.020757

APPENDIX D

2016 SEIR GHG Analysis

4.4 Climate Change

The issue of climate change is not evaluated in the 1983 FEIR. The following discussion is provided to disclose the potential impacts of greenhouse gas emissions that would result from implementation of the proposed project. The estimate of project greenhouse gas emissions provided below is based on the analysis of greenhouse gas emissions included in the two October 19, 2015 memoranda prepared by the VCAPCD for the CRC Oil and Gas Project (PL13-0150). ~~Mitigated Negative Declaration Addendum for Mirada Petroleum Project (Case No. LU11-0041) adopted by the Planning Commission on May 30, 2013~~. Staff of the Ventura County Air Pollution Control District (Chuck Thomas, pers. comm., ~~March~~ October 2015) has reviewed and found adequate the analysis presented herein.

4.4.1 Project Impact Discussion:

Utilizing the updated methodology that was employed to assess the greenhouse gas emissions of the oil and gas wells prepared in response to the administrative appeals of the approval of the PL13-0150 application, the annual Reactive Organic Compound (ROC) emissions for one new oil well is 0.365 tons of ROC per year (0.331 metric tonnes per year). The current proposed project (PL15-0060) involves the re-activation of three existing wells. Thus, the project involves an estimated increase of ROC emissions of 0.993 metric tonnes/year. According to the VCAPCD, a worst case estimate is that 85 percent of oil field emissions are methane, a greenhouse gas (GHG), and 10 percent are carbon dioxide (CO_2), also a GHG. The remaining five percent of oil field emissions are ROC.

The ratio of methane emissions to ROC emissions is 17:1 and the ratio of CO_2 to ROC emissions is 2:1. Using these ratios, the estimated methane emissions from the proposed project would be 16.9 metric tonnes/year of methane (0.331 x 3 x 17 = 16.9). The estimated CO_2 emissions from the proposed project would be 2.0 metric tonnes/year. (0.662 x 3 = 2.0).

The global warming potential (GWP) of methane currently accepted for state and federal regulatory requirements (see Table A-1 of 40 CFR Part 98 Subpart A) is 25 times the GWP of carbon dioxide (CO_2). This means that one metric tonne of methane is equivalent to 25 metric tonnes of CO_2 equivalents ($MTCO_2e$), which is the standard unit for tracking GHG emissions. The direct, project-related GHG emissions are equivalent to 424 $MTCO_2e$ [(16.9 x 25) + 2.0 = 424]. (Refer to GHG emissions calculations in Appendix K.)

The project will cause indirect GHG emissions from generation of electricity to power the well pumps. Southern California Edison reported a GHG emission rate of 570 pounds CO_2e per megawatt-hour delivered in its 2014 Corporate Responsibility Report.

Using the worst-case assumptions of 150-horsepower motors for each pump and the maximum annual operating hours of 8,760 hours per year, the indirect greenhouse gas emissions were calculated. After unit conversions, this results in 762 $MTCO_2e$ per year indirect GHG emissions from electricity generation for this project. It should be noted that the indirect GHG emissions from electricity generation are covered under California's GHG Cap-and-Trade requirements so they are already mitigated under that program. In addition, the VCAPCD has estimated that fluid hauling motor vehicle operations would contribute approximately 10 metric tons per year of GHG (refer to CalEEMod calculation summary in Appendix K).

As explained in the following discussion of climate change, this total level of direct and indirect GHG emissions, including fluid hauling motor vehicle operations, of up to 1,196 $MTCO_2e$ per year, is below the applicable Threshold of Significance of 10,000 $MTCO_2e$ per year.

Impacts involving greenhouse gas emissions pertain to changes in global climate. This is a cumulative effect that would not involve project-specific or local impacts. As indicated above, the estimated GHG emissions would be less than the applicable threshold. Thus, the contribution of the project to the impact of global climate change is not cumulatively considerable.

~~Utilizing the same methodology that was employed to assess the greenhouse gas emissions of the oil and gas wells included in the previous and separate Mirada Petroleum Project (Case No. LU11-0041), the annual Reactive Organic Compound (ROC) emissions for one new oil well is 0.48 tons/year (0.53 metric tons /year). The current proposed project (PL13-0158) involves the installation of up to three new wells and the re-drilling of an existing well. Thus, the project involves an estimated increase of ROC emissions of 2.1 metric tons/year. According to the VCAPCD, a reasonable estimate is that 90 percent of oil field emissions are methane, a greenhouse gas (GHG), and 10 percent are ROC. With these parameters, the estimated GHG emissions from the proposed project would be 18.9 tons/year of methane (2.1 x 9 = 18.9). These methane emissions are equivalent to 397 metric tons/year of CO^2 (18.9 x 21 = 397). If all six existing plus proposed oil wells are considered, the total GHG emissions from the project site will be an estimated 596 metric tons per year of CO^2 (397 x 6/4 = 596). In addition, the VCAPCD has estimated that fluid hauling activities would contribute an estimated 34 metric tons per year of GHG (Chuck Thomas, VCAPCD, pers. commun.). As explained in the following discussion of climate change, this level (up to 630 metric tons per year) of greenhouse gas emissions is below the applicable Threshold of Significance of 10,000 metric tons/year of CO^2 equivalents.~~

~~Impacts involving greenhouse gas emissions pertain to changes in global climate. This is a cumulative effect that would not involve project-specific or local impacts. As indicated above, the estimated GHG emissions would be less than the applicable threshold. Thus, the contribution of the project to the impact of global climate change is not cumulatively considerable.~~

4.4.2 Background Information on Greenhouse Gas Emissions

Gases that trap heat in the atmosphere are known as greenhouse gases (GHGs). GHGs are emitted by natural processes and human activities. Examples of GHGs that are produced both by natural processes and industry include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHGs in the atmosphere regulate the temperature of the earth's atmosphere. Without these natural GHGs, the Earth's surface would be about 61°F cooler (AEP 2007). However, emissions from fossil fuel combustion by humans have elevated the concentration of GHGs in the atmosphere to above current natural levels. Scientific evidence indicates a correlation between increasing global temperatures/climate change over the past century and human induced levels of GHGs. According to the United Nations' Intergovernmental Panel on Climate Change (IPCC) "Fourth Assessment Report, Climate Change 2007," most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic concentrations of these three gases, collectively known as *Greenhouse Gases (GHG)*. The report states, "*Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now ~~activities since 1750~~ far exceed pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentration are primarily due to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture*" (IPCC 2007: Summary for Policymakers).

Some observed effects of climate change include shrinking glaciers, thawing permafrost, later freezing and earlier break-up of ice on rivers and lakes, a lengthened growing season, shifts in plant and animal ranges, and earlier flowering of trees (IPCC 2007). Other, longer term environmental impacts of global warming may include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a significant reduction in winter snow pack. These ~~GHG and other~~ induced environmental changes are predicted to have severe negative environmental, economic, and social consequences around the globe. For example, one study estimates that the Sierra Nevada Mountains as a whole could lose as much as 50 percent of its average April snowpack compared to current levels by the end of the 21st century (California Department of Water Resources 2006). Current data suggests that in the next 25 years, in every season of the year, California will experience unprecedented heat, longer and more extreme heat waves, greater intensity and frequency of heat waves, and longer dry periods. More specifically, the California Climate Change Center predicted that California could witness the following events (Fried, et al 2006):

- Temperature rises between 3-10.5°F;

- 6-20 inches or more of sea level rise;
- 2-4 times as many heat wave days in major urban centers;
- 2-6 times as many heat related deaths in major urban centers;
- 1-1.5 times more critically dry years; and
- 10-55 percent increase in the expected risk of wildfires.

GHGs have varying amounts of global warming potential or GWP. ~~(GWP).~~ The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO_2 is assigned a GWP of one. In comparison, CH4 (methane or natural gas) has a GWP of 25 ~~21~~, which means that it has a global warming effect 25 ~~21~~ times greater than CO_2 on an equal-mass basis. To account for their GWP, GHG emissions are often reported as a CO_2 equivalent or CO_2e. ~~(CO2e).~~ The CO_2e for a source is calculated by multiplying each GHG emission by its GWP, and adding the results together to produce a single, combined emission rate representing all GHGs.

To date, 12 states, including California, have set state GHG emission targets. Executive Order S-3-05 and the passage of AB 32, the California Global Warming Solutions Act of 2006, promulgated the California target to achieve 1990 GHG levels by the year 2020. This emissions reduction approach allows progress to be made in addressing climate change, and is a forerunner to the setting of emission limits. The Federal government and EPA have also begun regulating ~~the process to regulate~~ GHGs as pollutants (see discussion below).

4.4.3 Regulatory Setting

International Initiatives:

Over the past 15 years, various international, national, regional, state, and local initiatives have been adopted to address climate change. The foremost international climate change initiative is the United Nations Framework Convention on Climate Change (UNFCCC), commonly known as the Kyoto Protocol. Signed on March 21, 1994, the Kyoto Protocol calls for governments to gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change. There have been several international summits since Kyoto, most recently Copenhagen (December 2009), which seek to advance and cement climate change goals and programs, but no significant advances in this area have been accomplished since Kyoto.

Federal Initiatives and Regulations:

Although the U.S. has not ratified the Kyoto Protocol, it established a comprehensive policy to address climate change in 2002. The policy has three basic components: slowing the growth of GHG emissions; strengthening the science, technology, and institutions; and enhancing international cooperation. The federal government is implementing this policy through voluntary and incentive-based programs and has established major programs to advance climate technologies and improve climate science.

The U.S. government administers a wide array of public-private partnerships to reduce U.S. GHG intensity. These programs focus on energy efficiency, renewable energy, methane, and other non-carbon dioxide (non- CO_2) gases, agricultural practices and implementation of technologies to achieve GHG reductions. The United States Environmental Protection Agency (EPA) has the authority to regulate CO_2 or GHG emissions as an air pollutant under the federal Clean Air Act (42 U.S.C. § 7602(g)). The EPA also implements several voluntary programs that substantially contribute to the reduction of GHG emissions.

Final Mandatory Reporting of GHG Rule:

The EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule on October 30, 2009 (EPA 2009). The rule requires suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities with stationary sources that emit 25,000 metric tons or more per year of CO_2e emissions to collect emissions activity data and submit annual emissions reports to the EPA beginning with year 2010 operations. The rule does not apply to mobile sources of GHGs. This reporting system will provide a better understanding of GHG emission sources within the U.S. and it will guide the development of policies and programs to reduce GHG emissions. It was also intended to ~~also will~~ support implementation of the EPA Prevention of Significant Deterioration and Title V GHG Tailoring Rule. This rule has similarities to the California Regulation for the Mandatory Reporting of GHG Emissions, which also specifies a reporting threshold of 25,000 metric tons of CO_2e for stationary sources. Reporting of greenhouse gases by major sources in California is required ~~by~~ by AB 32.

Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailoring Rule:

On May 13, 2010, the EPA finalized the "GHG Tailoring Rule" to address GHG emissions from the largest stationary sources. The rule included ~~includes~~ a phased implementation schedule, where ~~when~~ Clean Air Act (CAA) permitting requirements for GHGs began ~~will begin~~ in January 2011 for large facilities that are already required to obtain PSD and Title V permits for other pollutants. However, on June 23, 2014, the Supreme Court of the United States (SCOTUS) vacated the GHG Tailoring Rule provisions which applied EPA permitting to sources solely due to their GHG emissions. ~~In July 2011, CAA permitting requirements expanded to cover all new facilities with GHG emissions of at least 100,000 TPY CO_2e and modifications at existing facilities~~

~~that would increase these emissions by at least 75,000 TPY.~~ The SCOTUS decision left intact the provisions applying PSD requirements to GHG emissions at sources subject to PSD due to increase in emissions of other PSD pollutants. These permits must demonstrate the use of best available control technologies (BACT) to minimize GHG emission increases when facilities are constructed or significantly modified.

California Initiatives and Regulations:

AB 32 - California Global Warming Solutions Act of 2006

The enactment of AB 32, "The California Global Warming Solutions Act of 2006" (Health & Safety Code § 38500 et seq), established a comprehensive program of regulatory and market mechanisms to achieve quantifiable reductions of GHGs within the state. The California Air Resources Board (ARB) is the primary state agency responsible for developing and maintaining a statewide inventory of GHG emissions and for formulating plans and action steps to reduce current GHG emissions statewide to 1990 GHG emission levels by the year 2020. AB 32 defines GHGs as CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride.

From 2007 to 2009, the ARB promulgated several discrete early action measures to reduce GHG emissions prior to the full and final adoption of a plan to reduce aggregate California GHG emissions. Specifically, these discrete early action measures include (1) Green Ports/Electrification, (2) SmartWays truck efficiency, (3) PFCs in semiconductor manufacturing, (4) landfill gas capture, (5) tire inflation program, and (6) vehicle owner refrigerant (HFC-134e) servicing.

The Act instructed the ARB to establish a mandatory GHG reporting and verification program by January 1, 2008. In April 2008, the ARB finalized a regulation for the mandatory reporting of greenhouse gas emissions from major sources (ARB 2008c). In December 2008, the ARB approved the final Climate Change Proposed Scoping Plan ("Scoping Plan") which outlines the State's strategy for achieving the 2020 GHG emissions limit outlined under the law. The Scoping Plan includes recommendations for reducing GHG emissions from most sectors of the California economy.

On June 30, 2009, California was granted a CAA waiver (42 U.S.C. §7543(a)) from EPA to regulate automotive tailpipe CO_2 emissions. The ARB originally approved regulations to reduce GHG emissions from passenger vehicles in September 2004 based upon 2002 legislation, AB 1493 (Pavley). These regulations are expected to reduce passenger vehicle GHG emissions by approximately 22 percent in 2012 and 30 percent in 2016, while improving fuel efficiency and reducing motorists' costs.

In December 2009, the ARB promulgated a low carbon fuel standards (LCFS) in order to reduce the carbon intensity of transportation fuels used in California (i.e., gasoline, compressed natural gas (CNG), ethanol, liquefied natural gas (LNG), hydrogen, diesel, biodiesel, and electricity). It is expected that the LCFS will reduce carbon intensity from

the use of such fuels by an average of 10 percent per year. Carbon intensity is a measure of the GHG emissions associated with the combination of all the steps in the "lifecycle" of a transportation fuel.

AB 32 requires the ARB to incorporate the standards and protocols developed by the California Climate Action Registry (CCAR) into the state's future GHG emissions reporting program, to the maximum extent feasible. The current GHG emission calculation methods used by CCAR are contained in *California Climate Action Registry—General Reporting Protocol,* Version 3.1, (CCAR 2009). This protocol categorizes GHG emission sources as either (1) direct (vehicles, on-site combustion, fugitive, and process emissions) or (2) indirect (from off-site electricity, steam, and co-generation).

Regulation for the Mandatory Reporting of Greenhouse Gas Emissions

As part of the AB 32 requirements, the ARB approved a mandatory GHG reporting regulation in December 2007, which became effective January 2009. The regulation requires operators of facilities in California that emit greater than 25,000 metric tons per year of CO_2 from stationary combustion sources in any calendar year after 2007 to report these emissions on an annual basis.

SB 97 – CEQA Guidelines for Greenhouse Gas Emissions

The Legislature also adopted Senate Bill 97 (SB 97) in 2007. As required by ~~Under~~ SB 97, the State Office of Planning and Research (OPR) developed ~~is required to develop~~ CEQA guidelines *"for the mitigation* of *greenhouse gas emissions or the effects* of *greenhouse gas emissions* as *required by this division."* (Pub. Res. Code § 21083.05(a)). According to the OPR website:

> Those CEQA Guidelines amendments clarified several points, including the following:
>
> - Lead agencies must analyze the greenhouse gas emissions of proposed projects, and must reach a conclusion regarding the significance of those emissions. (See CEQA Guidelines § 15064.4.)
> - When a project's greenhouse gas emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions. (See CEQA Guidelines § 15126.4(c).)
> - Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change. (See CEQA Guidelines § 15126.2(a).)
> - Lead agencies may significantly streamline the analysis of greenhouse gases on a project level by using a programmatic greenhouse gas emissions reduction plan meeting certain criteria. (See CEQA Guidelines § 15183.5(b).)

- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply, and ways to reduce energy demand, including through the use of efficient transportation alternatives. (See CEQA Guidelines, Appendix F.)

As part of the administrative rulemaking process, the Natural Resources Agency developed a Final Statement of Reasons explaining the legal and factual bases, intent, and purpose of the CEQA Guidelines amendments. Other rulemaking documents can be accessed on the Natural Resources Agency's rulemaking website. The amendments to the CEQA Guidelines implementing SB 97 became effective on March 18, 2010.

OPR Technical Advisory - CEQA Review of Greenhouse Gases

On June 19, 2008, OPR issued a Technical Advisory, "CEQA AND CLIMATE CHANGE: Addressing Climate Change through California Environmental Quality Act" *(CEQA) Review),* to guide agencies before the final regulations are issued. This Technical Advisory noted:

Lead agencies should determine whether greenhouse gases may be generated by a *proposed project, and if so, quantify or estimate the GHG emissions by type and source. Second, the lead agency must assess whether those emissions are individually or cumulatively significant. When assessing whether* a *project's effects on climate change are "cumulatively considerable" even though its GHG contribution may be individually limited, the lead agency must consider the impact* of *the project when viewed in connection with the effects* of *past, current, and probable future projects. Finally, if the lead agency determines that the GHG emissions from the project* as *proposed are potentially significant, it must investigate and implement ways to avoid, reduce, or otherwise mitigate the impacts* of *those emissions.*

The Technical Advisory also noted the scientific knowledge and understanding of how best to perform this analysis was still evolving. The OPR Technical Advisory also explained that:

We realize that perhaps the most difficult part of the climate change analysis will be the determination of significance. Although lead agencies typically rely on local or regional definitions of significance for most environmental issues, the global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions. To this end, OPR has asked ARB technical staff to recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. Until such time as state guidance is available on thresholds of significance for GHG emissions, we recommend the following approach to your CEQA analysis. Source: www.opr.ca.gov/download.php?dl=ceqa/pdfs/june08- ceqa.pdf.

California Natural Resources Agency (Resources Agency) Final Statement of Reasons for Regulatory Action; Amendments to State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97 (December 2009)

Following extensive public review and comment on the proposed amendments to the CEQA Guidelines to address environmental impact analysis and mitigation of GHG emissions, the Resources Agency adopted amendments to the CEQA Guidelines (Title 14, Cal. Code of Regs., § 15000 et seq.) to comply with the mandate set forth in Public Resources Code section 21083.05.

4.4.3 Thresholds of Significance

CEQA Guidelines:

Due to the global nature of the effects of GHG emissions, the primary CEQA concern with GHG emissions is the cumulative impact of a project's incremental GHG emissions when viewed in connection to past, current and probable future project GHG emissions.

According to GHG amendments to the CEQA Guidelines, each public agency that is a CEQA lead agency needs to develop its own approach to performing a climate change analysis for projects that generate GHG emissions. A consistent approach should be applied for the analysis of all such projects, and the analysis must be based on best available information. For these projects, compliance with CEQA entails three basic steps:

- identify and quantify the GHG emissions;
- assess the significance of the impact on climate change; and
- if the impact is found to be significant, identify alternatives and/or mitigation measures that will reduce the impact below significance.

To date, in California, only a few public agencies have published CEQA thresholds of significance for project specific or cumulative anthropogenic GHG emissions. Moreover, how to address greenhouse gases under CEQA is evolving and fluid because formulating significance thresholds for CEQA purposes is especially problematic for GHG emissions. Unlike other air pollutant emissions that create impacts in local and regional air basins (i.e., air pollution nonattainment areas or toxic air contaminant hotspots), anthropogenic GHG emissions are implicated as a cause for *global climate change* regardless of their emission source or location. In addition, simply estimating GHG emissions from a specific project is not an adequate way to gauge the degree to which those emissions would contribute to global warming or climate change. Substantial additional scientific research and regulatory guidance are needed to determine whether a project's incremental GHG emissions impacts on climate change would be significant, and whether and how cumulative GHG emissions will affect global climate change.

The CEQA Guideline amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in draft CEQA documents. They do not, however, establish a specific threshold of significance. Public agencies are not required to adopt significance thresholds for any environmental issue area. The amendments do identify a general methodology for assessing the significance of impacts from project GHG emissions. Specifically, CEQA Guideline Section 15064.4 states:

"(a) The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:

(1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or

(2) Rely on a qualitative analysis or performance based standards.

(b) A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project."

These CEQA Guidelines amendments were adopted and became effective on March 18, 2010.

Air Pollution Control Agency GHG Thresholds:

Since the State CEQA Guidelines amendments were never intended to establish a uniform, widely accepted and adopted standard for determining the CEQA significance of project-specific GHG emissions, the ARB and some local air pollution control districts, such as the South Coast Air Quality Management District (SCAQMD), have been working to develop interim thresholds for evaluating GHG emissions. Both the ARB and SCAQMD prepared draft interim thresholds that would employ a tiered approach to determining significance.

In 2008, the ARB proposed an interim screening threshold of 7,000 metric tons (MT) CO2e per year for industrial, non–transportation emissions, as well as a threshold that would evaluate compliance with "performance standards" for transportation and construction activities. The ARB has never adopted their interim thresholds. Also in 2008, the SCAQMD Governing Board adopted an interim GHG significance threshold for stationary air pollution sources, rules, and plans where the SCAQMD is the lead agency for CEQA purposes. The SCAQMD adopted a 5-tier approach for their interim threshold that includes consideration of direct, indirect, and, to the extent that information is available, life cycle emissions during project construction and operation. Construction emissions are amortized over the life of the project, defined as 30 years, and added to the operational emissions, which are then compared to the applicable interim GHG significance threshold tier. Tier 3 is a screening tier with a 10,000 $MTCO_2e/yr$ threshold. It is based on the District's policy objective of capturing 90 percent of GHG emissions from new industrial projects where the SCAQMD is the CEQA lead agency. The SCAQMD has not adopted GHG significance thresholds for projects where other agencies are the lead agency.

Both the Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD), the next two largest air pollution control districts in California following the SCAQMD, have also developed recommended thresholds of significance for land use projects.

On June 2, 2010, the BAAQMD's Board of Directors unanimously adopted new and updated thresholds of significance to assist in the review of projects under the CEQA. The new thresholds included three sets of thresholds for GHGs: one for projects where the BAAQMD is the lead agency and two for land use development projects where other public agencies are the CEQA lead agencies.

The threshold for projects where the BAAQMD is the CEQA lead agency is 10,000 MTCO2e/yr, the same as the SCAQMD's Tier 3 screening threshold. The GHG thresholds for projects where other agencies are the CEQA lead agencies include a project-level (*e.g.*, residential, commercial, industrial, and public land uses and facilities) threshold, and a plan-level (*e.g.*, general plans and specific plans) threshold.

The BAAQMD's project level threshold is compliance with a Qualified Climate Action Plan, or a numeric threshold of 1,100 MT CO2e/yr, or a per capita efficiency metric of

4.6 $MTCO_2e$/SP/yr. [Note: "SP" refers to service population, which includes project residents and any employees that will work on the project site.] ~~* (project residents + employees).~~ The threshold for plans is compliance with a qualified climate action plan (or similar criteria included in a general plan) or a per capita metric of 6.6 $MTCO_2e$/SP/yr. ~~(residents + employees).~~

However, on March 5, 2012 the Alameda County Superior Court issued a judgment finding that the BAAQMD had failed to comply with CEQA when it adopted its latest set CEQA thresholds for various air pollutants, including for GHG emissions. The court did not determine whether the thresholds were valid on their merits, but found that the adoption of the thresholds was a project under CEQA. The court thus issued a writ of mandate ordering the BAAQMD to set aside the thresholds and cease dissemination of them until the District had complied with CEQA.

In view of the court's order, the BAAQMD is no longer recommending its new and updated air pollutant thresholds, including its GHG thresholds, as generally applicable measures of a project's significant air quality impacts. Lead agencies within the BAAQMD's boundaries will need to determine their own appropriate air quality thresholds of significance based on substantial evidence in the record. They may, however, continue to use the BAAQMD's 1999 set of thresholds as they find applicable. However, those thresholds are only for criteria air pollutants and do not include thresholds for GHG emissions.

SJVAPCD has chosen a slightly different approach to the CEQA significance threshold for GHG emissions. On December 17, 2009, the District adopted the guidance document: "Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA," and the accompanying policy document: "District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency." The guidance and policy rely on the use of performance based standards, otherwise known as Best Performance Standards (BPS), to assess significance of project-specific greenhouse gas emissions on global climate change during the environmental review process required by CEQA.

Use of BPS is a method of streamlining the CEQA process of determining significance and is not a required emission reduction measure. Projects implementing BPS would be determined to have a less than cumulatively significant impact. Otherwise, demonstration of a 29 percent reduction in GHG emissions, from business-as-usual, is required to determine that a project would have a less than cumulatively significant impact. The guidance, however, does not limit a lead agency's authority in establishing its own process and guidance for determining significance of project related impacts on global climate change.

On March 28, 2012, the San Luis Obispo Air Pollution Control District adopted CEQA greenhouse gas (GHG) emission thresholds for residential, commercial, and industrial projects. The thresholds were developed based on substantial evidence that adheres to

the requirements of Senate Bill 97 in a consistent and defensible manner, and ensures new development is able to provide its fair share of GHG reductions to meet the State's AB 32 GHG reduction goals.

The San Luis Obispo Air Pollution Control District adopted a menu approach for residential/commercial land use projects as the most effective approach for assessing the GHG emission impacts for development projects in San Luis Obispo County. Any of the following three options may be used to determine the significance of a residential or commercial project's GHG emission impacts: 1) Qualitative GHG Reduction Strategies (e.g., Climate Action Plans); or, 2) Bright-Line Threshold (1,150 MT CO2e/yr); or: 3) Efficiency-Based Threshold (4.9 $MTCO_2e$/SP/yr). ~~(4.9 MT CO2e/SP service population/yr).~~

The Santa Barbara County Air Pollution Control District (SBAPCD) adopted ~~is developing~~ GHG significance thresholds on April 30, 2015 for projects where the SBAPCD is the lead agency. Their ~~proposed~~ GHG threshold is 10,000 $MTCO_2eq$/yr, the same as SCAQMD's Tier 3 screening threshold. ~~To date, the SBAPCD has not adopted its proposed GHG threshold.~~

The Ventura County Air Pollution Control District (VCAPCD) has not yet adopted any one of these approaches to setting a threshold of significance for land use development projects nor has it developed its own method of determining significance in the area of project GHG emissions. CEQA Guidelines §15064.7(c) states: *"When adopting thresholds of significance, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence."*

The recently adopted revisions to the State CEQA Guidelines, described above, added a new evaluation section for GHG emissions to the CEQA Guidelines initial study checklist (See Appendix G of the CEQA Guidelines). That section poses the following questions:

Would the project:

1. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing emissions of GHGs?

Given the explicit requirements of these revised CEQA Guidelines, the County of Ventura has determined, with the assistance of VCAPCD, that it will use the following Threshold of Significance to determine the potential environmental impact significance of proposed GHG emissions. This Threshold was selected after an extensive review of

(1) federal, state, and regional agency GHG regulatory thresholds and (2) GHG CEQA thresholds of significance being developed or adopted by local air quality agencies in California. Thus, for purpose of the County's processing of discretionary permit applications, the Threshold of Significance (i.e. the point where a project's contribution to the impact of global warming is cumulatively considerable) is as follows:

> **A project has a cumulatively considerable impact on global climate change if it would cause an increase in GHG emissions in excess of 10,000 metric tonnes of CO_2e per year.**
>
> ~~**The project would generate GHG emissions (in CO2e) in excess of 10,000 metric tons per year.**~~

This threshold is consistent with CEQA significance thresholds adopted by the SCAQMD and the SBAPCD. ~~threshold proposals in the SCAQMD, the VCAPCD, and the SBAPCD~~. Therefore, while not all local air quality districts have formally proposed or adopted this or any other threshold of significance for GHG emissions, it is considered a reasonably suitable threshold for this environmental impact analysis.

Because the project's anticipated annual direct and indirect GHG emissions (1,196 $MTCO_2e$ per year) is far before this threshold of significance, no potentially significant impacts related to greenhouse gas emissions would occur with project implementation. Impacts would be less than significant (Class III).

~~(397 metric tons per year for the three new wells and one-re-drilled well; 630 metric tons per year for all six wells at the facility and associated trucking) is far before this threshold of significance, no potentially significant impacts related to greenhouse gas emissions would occur with project implementation. Impacts would be less than significant (Class III).~~

4.5 Water Resources

4.5.1 Water Quantity

The operation of the oil and gas facility does not involve a long-term demand for water. Water will be consumed as part of the drilling process. It is estimated that approximately 3,500 barrels (147,000 gallons) of water will be consumed in the drilling of each new or modified well. In addition, about 20,000 gallons of water will be temporarily stored onsite for fire suppression purposes during drilling operations. Thus, a total of 14,000 barrels (588,000 gallons or 1.8 Acre-foot) of water will be consumed during well installation. Averaged over the 25-year life of the proposed project, the short-term water use would be equivalent to 0.07 Acre-Feet per year of water demand. With regard to groundwater quantity, the adopted County Initial Study Assessment Guidelines (ISAGs) state:

Final

Subsequent Environmental Impact Report

SCH # 2015021045

Appendix K

Memoranda prepared by the Ventura County Air Pollution Control District

VENTURA COUNTY
AIR POLLUTION CONTROL DISTRICT
Memorandum

TO: Clerk of the Board – Ventura County Board of Supervisors DATE: October 19, 2015

CC: Brian Baca
RMA/Planning Division

FROM: Michael Villegas MV
Air Pollution Control Officer

SUBJECT: CALIFORNIA RESOURCES CORPORATION (CRC) APPLICATION TO RENEW CUP 3344

As requested by the Ventura County Planning Department staff, Ventura County Air Pollution Control District (VCAPCD) staff reviewed the greenhouse gas (GHG) emissions estimates for Conditional Use Permit (CUP) 3344, which is a proposal for 19 oil wells. Moreover, Planning District staff provided District staff a Greenhouse Gas Emissions Technical Report prepared by InterAct (InterAct Report) at the request of CRC for the project (October 2015). InterAct is a local environmental consulting firm specializing in management of regulatory, permitting and compliance projects for oil and gas production facilities and drilling projects, with emphases on land use, air quality, water use and health risk assessments.

The InterAct Report estimates of GHG emissions from the project are based on several assumptions, which VCAPCD have determined to be reasonable and provides a conservative estimate of GHG emissions of the project. Since GHG emissions were not historically measured at the subject CRC facilities, the fugitive methane and carbon dioxide emissions from well operations were estimated based on the ratio of GHG emissions to regulated reactive organic gases (ROG) from oilfield production facilities.

VCAPCD staff recently conducted a review of its long-standing oil well ROG emission factor of two pounds of ROG per day per well during development of the upcoming 2016 Air Quality Management Plan. This review confirmed, by comparison to recent field data and modeling methods used by the Air Resources Board (ARB) and Santa Barbara County APCD, that the ROG emission factor used by the VCAPCD and for the InterAct report is appropriate.

The InterAct Report uses several "worst case" estimates in its analysis including methane content, ROG content and CO_2 content of the gas produced by the wells in this project. Using worst case estimates would be expected to significantly overestimate the GHG emissions from the proposed new CRC oil wells.

VCAPCD staff reviewed data from the California Air Resources Board (ARB) and the California Department of Oil, Gas and Geothermal Resources to determine the average methane emissions from oil wells statewide. Based on this review, VCAPCD staff determined the InterAct estimate of methane emissions from this project is more than four times the statewide average. Therefore, VCAPCD believes the estimate of methane emissions for this review is very conservative and thus overestimates the methane emissions that will occur as a result of the proposed 19 oil wells.

Since methane constitutes the vast majority of the direct GHG emissions from oil production activities, VCAPCD staff reviewed currently accepted global warming potential (GWP) estimates for methane. USEPA and ARB currently use a GWP for methane of 25 times that of carbon dioxide (CO_2) over 100 years for the EPA national inventory and the 2015 California GHG Inventory, respectively. This GWP value is based on the fourth assessment report by the Intergovernmental Panel on Climate Change (IPCC) issued in 2007 and is consistent with the First Update to the AB32 Scoping Plan (May 2014).

IPCC issued its fifth assessment report in 2014, which increased the GWP estimate of methane to 34 times that of CO_2 over 100 years. Others have advocated for shorter GWP time frames which would increase the GWP of methane and methane emission estimates even further. However, for official inventories and impact assessments, VCAPCD recommends using the GWP of 25 currently used by USEPA and ARB for regulatory inventories and related activities.

Based on these assumptions, VCAPCD staff conducted an independent analysis of the GHG emissions increase from this project. The VCAPCD analysis of project GHG emissions correlated very closely with the analysis presented in the InterAct Report. Therefore, VCAPCD staff agrees with the conclusion of the InterAct Report that the GHG emissions increase of the project will be less than significant.

If you have any questions, please contact me at (805) 645-1440.

VENTURA COUNTY
AIR POLLUTION CONTROL DISTRICT
Memorandum

TO: Mike Villegas
Air Pollution Control Officer

DATE: October 19, 2015

FROM: Tyler Harris
Air Quality Engineer

SUBJECT: CALIFORNIA RESOURCES CORPORATION (CRC) APPLICATION TO RENEW CUP 3344 – INDIRECT GREENHOUSE GAS (GHG) EMISSIONS AND GHG SIGNIFICANCE THRESHOLDS

As requested by the Ventura County Planning Department staff, Ventura County Air Pollution Control District (VCAPCD) staff calculated estimates of the greenhouse gas (GHG) emissions increase for Ventura County Conditional Use Permit (CUP) 3344, which is a proposal for 19 new oil wells.

VCAPCD staff used assumptions provided by Planning Department staff and detailed in a Greenhouse Gas Emissions Technical Report prepared by InterAct (InterAct Report) at the request of CRC for the project (October 2015). The InterAct Report stated the project included 18 new oil wells, so VCAPCD recalculated emissions based on the correct project description of 19 new oil wells.

Using the site-specific assumptions provided, I estimated the proposed wells will each emit 5.64 metric tonnes (MT) of methane and 0.664 MT of CO_2 per year. It should be noted the statewide average methane emissions from oil wells is approximately 1.27 MT per year, so this estimate is over four times the statewide average.

GHG emissions are calculated in carbon dioxide equivalents (CO2e) for emissions inventory and regulatory purposes. The United States Environmental Protection Agency (USEPA) and California Air Resources Board (CARB) currently use a global warming potential (GWP) of 25 pounds CO2e per pound of methane for inventory and regulatory purposes. Therefore, direct GHG emissions from the proposed 19 oil wells will increase 2,691 MT CO2e per year if the project is approved and fully implemented.

The InterAct Report also included information on the indirect GHG emissions from the generation of grid electricity used to power the proposed oil well pumps. Using the assumptions in the InterAct Report and correct number of proposed oil wells, I estimated the indirect GHG emissions increase as 5,968 MT CO2e per year.

However, these indirect emissions are covered under California's Cap and Trade (C&T) Regulation. The cap and trade program is part of the state of California's compliance with Assembly Bill 32, the Global Warming Solutions Act of 2006. All GHG emissions from entities covered under C&T should be considered fully compliant with the California Environmental Quality Act (CEQA) and fully mitigated.

The C&T program has undergone full CEQA review and survived multiple court challenges. The C&T program's GHG emissions cap is required by law to be the maximum technically feasible and cost-effective emissions reductions. In addition, all increases in GHG emissions at covered entities fall under the cap and so must be offset elsewhere for the whole program to maintain compliance. The cap also decreases with time, forcing additional emissions reductions from all covered GHG sources.

It is therefore appropriate to consider GHG from grid electricity used at a source to be fully mitigated and such indirect GHG emissions should not be considered when determining the significance of climate impacts from a project. Only the 2,691 MT CO2e per year direct GHG emissions increase from the proposed project should be considered when determining if the proposal will have a significant impact on the environment.

Ventura County and VCAPCD have not adopted significance thresholds for GHG to determine if a project will cause significant adverse impacts related to a CEQA global climate change analysis. However, a few air districts and one neighboring county have adopted significance thresholds for CEQA GHG analyses. The most restrictive by far is the threshold adopted by Santa Barbara County which has adopted a significance threshold of 1,000 MT CO2e per year. The most common CEQA GHG significance threshold is 10,000 MT CO2e per year, which has been adopted by the South Coast and Sacramento Metropolitan Air Quality Management Districts, and Santa Barbara County and San Luis Obispo County Air Pollution Control Districts.

In contrast to these stringent thresholds, CARB has set the threshold for inclusion in the GHG Cap and Trade Program at 25,000 MT CO2e per year facility-side, and USEPA has set a regulatory applicability threshold for GHG at an increase of 75,000 MT CO2e per year. Antelope Valley APCD and Mojave Desert APCD have both adopted 100,000 MT CO2e per year as their CEQA significance threshold.

While Ventura County regulatory agencies have not formally adopted greenhouse gas thresholds, they have used the threshold of 10,000 MT CO2e per year to evaluate the significance of some previous projects in approved CEQA documents. Therefore, I recommend maintaining consistency with previous projects and comparing the GHG emissions increase from this proposal to the 10,000 MT CO2e per year threshold. Since the estimated GHG increase from this project is 2,691 MT CO2e per year, the impact is not significant.

GREENHOUSE EMISSIONS TECHNICAL REPORT

In Support of California Resources Corporation Application to Renew CUP 3344

Prepared for:

CALIFORNIA RESOURCES CORPORATION

270 Quail Court, Suite 201
Santa Paula, CA 93060

Prepared by:

InterAct
4567 Telephone Rd., Suite 203
Ventura CA 93003
Contact: U. Micovic
Office: 805-658-5600, Cell: 805-218-4774

October 2015

1.0 Background

California Resources Corporation (CRC) has applied to the County of Ventura to renew Conditional Use Permit (CUP) 3344, because the previously approved CUP was expiring. The previously approved CUP contained allowance for 36 oil and gas wells, 18 of which have not been drilled at the time the permit expired. However all 36 wells, including the undrilled wells, have been approved through the California Environmental Quality Act (CEQA) review and approval process by the County (1978 and 1984 CEQA Documents).

It is understood that the previous CEQA evaluations have not addressed Greenhouse Gas (GHG) emissions from project because at the time the GHG was not part of the required evaluation. This report is prepared to demonstrate that the GHG emissions from the proposed project are below the current CEQA threshold and therefore the project does not have a significant impact to the Air Quality.

2.0 Greenhouse Gas (GHG) CEQA Threshold and Impacts Evaluation

GHG emissions are measured in terms of carbon dioxide (CO_2) equivalents (CO_2e). The current Ventura County CEQA threshold for GHGs is 10,000 Metric tons per year (MT/year) of CO_2e incrementally added by a proposed project. This threshold is also approved by the Ventura County Air Pollution Control District (VCAPCD).

Under CEQA, the existing operations or conditions are considered a baseline for a proposed project. Additional impacts from the proposed project activities are evaluated against the approved CEQA threshold. If impacts are below the threshold, the project impacts are deemed as less than significant under CEQA.

3.0 Estimation of the Greenhouse Gas (GHG) Emissions from Project

The CUP 3344 renewal project proposes drilling and operation of a maximum of 18 new oil and gas wells. The proposed project will not add any operational facilities; it does not propose additional operational traffic, nor traffic from routine maintenance. The wells will use electricity to power the pumping units that are needed to pump the oil and gas to the surface. It is assumed as a worst case scenario that each pumping unit would be a 150 horsepower (HP) motor.

Therefore, the only source of GHG emissions from the project would be from the additional wells: fugitive emissions of gas and indirect emissions due to electricity consumption by the pumping units.

3.1 GHG Emissions from Fugitive Leaks

Emissions from oil and gas wells occur through fugitive leaks in the valves and connections that are part of wells construction. Those well emissions are in the form of produced gas escaping through the minute leaks that are inherent to valves and connections and are accounted for and permitted by VCAPCD. Produced gas from an oil and gas well has methane (CH4) as the majority compound. It also has Reactive Organic Compounds (ROCs) regulated by the VCAPCD, and it has carbon dioxide (CO_2). Methane and CO_2 are GHGs that have Global Warming Potential (GWP). GWP of CO_2 is assigned a value of one (1). The US EPA identifies methane as a GHG and assigns it a GWP of 25 times that of CO_2 (http://www3.epa.gov/climatechange/glossary.html#M):

"Methane (CH4): A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at 25 times that of carbon dioxide (CO2). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. The GWP is from the IPCC's Fourth Assessment Report (AR4)"

Knowing how much methane and CO_2 are emitted from fugitive leaks of the proposed wells, we can estimate the GHG emissions from those proposed wells and thus from the proposed project.

The VCAPCD dictates that emissions of ROCs from an oil and gas well be estimated at 2 lbs/day (see Attachment 1). As a worst case scenario, it is assumed that ROC portion in the produced gas is 5% (although it is typically higher). As a worst case scenario, it is assumed that there is 85% methane in the produced gas (for comparison, Santa Barbara APCD lists a worst case scenario of methane portion in produced gas at 84%), although gas analyses from the CRC leases typically have much lower percentage of methane. As a worst case scenario, it is assumed that there is 10% of CO_2 in the produced gas. Therefore, knowing emissions of ROCs from the wells, we can calculate emissions of methane and CO_2 from those wells

Emissions of the GHG from the project are estimated as follows:

CH4 = (ROC) x (CH4 at 85% of total emissions) / (ROC at 5% of total emissions)

CO2 = (ROC) x (CO2 at 10% of total emissions) / (ROC at 5% of total emissions)

GHG Emissions = [(Emissions of CH4) x (GWP of 25)] + (Emissions of CO2)

3.2 Indirect GHG Emissions from Electricity Consumption

As a worst case scenario, it is assumed that each well will be equipped with a pumping unit with a 150 HP electrical motor (the majority of wells operate with 50 HP motors). The likely electricity supplier to the proposed project is So Cal Edison, which lists its current electricity GHG emissions as 705 CO_2e Emissions from Delivered Electricity Rate (lbs/MWh) (https://www.sce.com/wps/wcm/connect/68145014-2eba-40c2-8587-6482ce056977/CRR_08202013.pdf?MOD=AJPERES&ContentCache=NONE).

Thus electricity related GHG emissions from the 18 proposed wells would be:

705 lbs/CO_2e per MWh x 18 wells x 150 HP/well x 0.746 HP/kWh /1000 kW/MW x 8700 hrs/yr =

= 5,654 MT CO_2e/year

3.3 Total GHG Emissions

The emissions factors, calculations, references and assumptions are shown in Figure 1 below. It is demonstrated that the combined emissions of methane CO2 equivalents and CO2 from the proposed project are below the CEQA threshold for GHGs and thus the project GHG impacts are less than significant.

4.0 Evaluation Preparer

This evaluation is prepared by Uliana Micovic of InterAct. Her credentials are presented in Attachment 2.

Figure 1 Project Worst Case GHG Emissions Estimates

Fugitive Leaks Emission Factors and Percentages

Oil & Gas Well ROC EF, lbs/day-well*	ROCs % in produced gas	Methane % in produced gas	CO2 % in produced gas	Number of Wells**
2.00	5%	85%	10%	18

Methane (CH4) Emissions from Fugitives

Methane emissions, lbs/day/well	Methane emissions, all wells, lbs/day	Methane Emissions tons/year	Methane Emissions, MT/year	CH4 Global Warming Potential (CO2e)****	Methane CO2e Emissions, MT/year
34.00	612.00	111.69	101.54	25.00	2538.41

Carbon Dioxide (CO2) Emissions from Fugitives

CO2 Emissions, lbs/day/well	CO2 Emissions, all wells, lbs/day	CO2 Emissions, tons/year	CO2 Emissions, MT/year	CO2 Global Warming Potential ****	CO2e Emissions, MT/year
4.00	72.00	13.14	11.95	1.00	11.95

Indirect GHG Emissions from Electricity

HP of a well motor	HPs for Motors on all wells	HP-hours per year	kWh/year from all Motors	MWh/year from all Motors	CO2e Emissions, MT/year
150.00	2700.00	23,652,000	17644392	17644	5,654.23

GHG Emissions (Fugitive Leaks + Indirect from Electricity)

GHG Total Emissions (CO2e of CH4) + (CO2), MT/yr	CEQA Threshold for CO2e, MT/yr	Project Below threshold?
8,205	10,000	Yes

Factors and Coefficients

2 lbs/day	* Emission Factor for ROCs from Oil & Gas Well Reference: VCAPCD PEETS	**365**	days/yr
18	** Number of new Wells on CUP 3344	**2,000**	lbs/ton
84%	*** SBCAPCD Definition of ROG	**2,200**	lbs/Metric Tonne or lbs/MT
25	**** Methane Global Warming Potential	**0.746**	kWh is equal to 1 hp-hr
http://www3.epa.gov/climatechange/glossary.html#C		**705**	lbs/MWH (per SCEdison)

ATTACHMENT 1
VCAPCD PEETS Emissions Factors

PEETS Emission Factors

SCC 31000122	Crude Oil Well	Pounds per Well-Day	Date of Change
Reactive Organics		2	7/30/1997
VCAPCD factor			

ATTACHMENT 2
Uliana Micovic Credentials as an Air Quality Engineer

ULIANA MICOVIC

InterAct

POSITION Regulatory Services Manager / Sr. Air Quality Engineer

EXPERIENCE

Management of regulatory, permitting / compliance projects for oil and gas production facilities and drilling projects, with emphases on land use, air quality, water use, and health risk.

Over 17 years of experience in project management, permitting, compliance, and environmental analysis for the oil and gas industry. CEQA / NEPA specialist, concentrating in air quality, greenhouse gases, water quality, safety, and health risk assessments for oil and gas and other industrial projects. Experienced in injection well applications and Well Stimulation notices for hydraulic fracturing projects. Knowledgeable in the local, state, and federal air and water quality control rules and policies, and emission control technologies, land use issues and permitting strategies. Hands-on compliance with a variety of regulatory requirements, including special and conditional use permits, and CEQA mitigation measures. Additionally, 6 years of experience in analytical laboratory analysis requirements & methods (air and water quality and oil fingerprinting).

REPRESENTATIVE EXPERIENCE

Air Quality Evaluations, Permitting and Compliance
Preparation of Air Quality Impact assessments for Oil and Gas and other projects, including Greenhouse Gasses (GHGs):

- 2002 Tranquillon Ridge Project EIR (Nuevo).
- Paredon Project EIR (Venoco)
- Draft Elwood Full Field Development EIR (Venoco)
- Draft Carpinteria Field Development EIR (POOI)
- Draft EMT Lease Extension EIR (Venoco)
- Nacimiento Water Project EIR

Internal verifications of GHGs emissions for oil and gas facilities.

Analysis of various air quality control districts' regulations with respect to emissions control technologies for fuel burning and oil storage equipment.

Health Risk Assessments (HRA's) of oil production facilities.

Strategy development on meeting regulations with the best economic outcome for the client. Analysis of facility equipment, its installation schedule and sizing with the goal of minimizing or avoidance of emissions offsets payments. Comparative cost vs. emissions analysis for various Best Available Control Technologies (BACT).

Evaluation of drilling emissions, and preparation of Drilling Emission Reduction & Monitoring Plans. Emission Reduction Credits (ERCs) applications, budgeting & procurement.

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Federal Permits (Title V, Part 70) permitting/compliance, permit application preparation, permit modifications.

Various Compliance Plans development and compliance: Inspection and Maintenance (I&M) Programs and Operator Management Plans for fugitive emissions and engines. Source Test Plans. Meter calibration and maintenance plans.

Meteorological station design per the EPA and SCAQMD requirements. Met data analysis and validation per the EPA's data quality assurance requirements.

CEQA / NEPA Projects
As Project Manager, managed all aspects of permit applications requiring CEQA, assisted clients in strategizing and agency communications.

As Principal Investigator, conducted CEQA / NEPA environmental analyses of oil and gas, and other industrial projects. Conducted air quality analysis (including GHGs), developed emission inventories and emissions reduction measures. Prepared Health Risk Assessments (HRA) according to the toxic emissions regulations. Performed noise propagation modeling, noise & vibration measurements and analysis (including drilling rig vibration analysis). Developed mitigation measures to decrease industrial noise, noise from traffic and project noise, as well as development of traffic mitigation measures, fire protection and safety measures for oil and gas and industrial projects. Prepared Conditional Use Permit applications. Prepared Hazards consequence analyses, and fault tree analyses. Performed process safety, hazards/risk assessments.

Oil and Gas Production Facilities and Drilling projects in California
Management/leading role in land use permitting of various projects, including air quality, conditional use and special use permit applications, permit modifications/renewals, zoning clearances, agency communications, CEQA review and mitigation measures issues and compliance; preparation of compliance plans and operator training materials, environmental documents audits/review in behalf of oil and gas operators.

Oil and Gas Facilities in the Gulf of Mexico
Permitting of decommissioning and removal of offshore platforms and pipelines (W&T, Louisiana). Regulatory and environmental due diligence review of an onshore gas plant and associated off- and onshore pipelines to assess liabilities for the future abandonment and removal (Yellowhammer Gas Plant, Alabama).

Industrial Projects in California
Conducted technical studies and development of SOPs as part of a comprehensive Risk Management Program (RMP) for 14 water and sewer treatment facilities that use chlorine and/or sulfur dioxide. Interacted with operating personnel to define operating tasks and with maintenance personnel to improve the procedures in the computer-based maintenance system. Participated in development of Process Safety and RMP programs for several other water treatment and refrigeration facilities that use anhydrous ammonia.

Developed risk management programs according to California Accidental Release Program and US EPA RMP. Coordinated and monitored a technical validation & testing program of a cutting edge hazardous materials remediation technology.

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ULIANA MICOVIC

InterAct

Analytical Laboratory Experience
Improvement / development of adsorbents manufacturing methods. Scale-up to production in accordance with ISO 9000. Development of SOPs and QC/QA methods. Design (materials flow, operation logistics) of an adsorbents manufacturing facility (2000 sq. ft.). Development of gas chromatography and gas purification equipment. Development of GC and GC/MS applications for U.S. EPA, USP, & ASTM methods. Market and customer database analysis; customer relations; promotional literature development.

PROFESSIONAL HISTORY

InterAct (formerly Pacific Management Tech. Inc. & Fairweather Pacific) 2007 – present

Staff Engineer, Marine Research Specialists (MRS), (formerly Arthur D. Little) 1998 – 2007

Research Engineer, Supelco (Analytical laboratory supplies manufacturer) 1994 – 1998

EDUCATION AND TRAINING

MS, Chemical Engineering, Michigan Technological University, Houghton, MI – 1993

BS, Chem. Eng., Mendeleev Institute of Chemical Technology, Moscow, Russia – 1991

PASSPORT industrial facility safety training
Fundamentals of Project Management, Fred Pryor Educational Resources, Inc.
Thermal Hazards Evaluation and Pressure Relief Design, Arthur D. Little, Inc.
Business Writing Course, Fred Pryor Educational Resources, Inc.
Marketing Management Certificate, Pennsylvania State University
Fundamentals of Glass Technology, Center for Professional Advancement
Business Environment Laws, Pennsylvania State University

OTHER

Professional Affiliations
Member of American Institute of Chemical Engineers (AIChE) since 1993

Presentations
"Oilfield Produced Water – Overview", EUCI Webinar, March 2015.

"Performing Well Integrity Reviews for Injection and Hydraulic Fracturing Permit Approval", at State Lands Commission "Prevention Frist" Conference, Oct 2014.

"Examining How to Streamline the Process for Attaining a UIC Permit to Allow Continued Production", at California Water Management 2014 Conference.

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Mirada Agnew Lease Greenhouse Gas Emissions Calculations

VCAPCD Emission Factor Conversion

VCAPCD ROC emission factor	**2**	lb ROC/well/day
ROC emissions increase	0.365	short tons ROC/well-year
conversion to metric tonnes	0.9072	MT/short ton
ROC emissions increase per well	0.3311	MT ROC/well-year

MT = metric tonnes = 1,000 kg = 2,200 lb

Direct Project GHG Emissions

number of wells **3**

Methane Emissions

estimated ROC emissions	0.3311	MT ROC/well-year
methane content of produced gas	85%	worst case from InterAct report
ROC content of produced gas	5%	worst case from InterAct report
ratio of methane emission to ROC	17	
estimated methane emissions per project well	5.63	MT CH4/well-year
estimated project methane emissions increase	**16.9**	MT CH4/year

California average CH4 emissions per well (2005 data)
1.27 MT CH4/well-year
4.43 ratio of project (worst case) to average

CO2 Emissions

estimated ROC emissions	0.3311	MT ROC/well-year
ROC content of produced gas	5%	worst case from InterAct report
CO2 content of produced gas	10%	worst case from InterAct report
ratio of CO2 emissions to ROC	2	
estimated CO2 emissions per well	0.662	MT CO2/well-year
estimated project CO2 emissions increase	**2.0**	MT CO2/year

Global Warming Potential of Methane	Total Mirada Agnew Lease Project Direct CO2e (CO2 + CH4) Emissions Increase (MT/year)
25	424
28	475
34	576
36	610
72	1,218
86	1,454
100	1,691

Mirada Agnew Lease Greenhouse Gas Emissions Calculations

Indirect GHG Emissions from Electric Pumps (subject to cap and trade program)

pumping unit power	150	hp (worst case estimate from InterAct report)
indirect GHG emission factor	705	lb CO2e/MWh delivered (2012 Sustainability Report)
conversion	0.000746	MW/hp
maximum annual hours of operation	8,760	hr
annual indirect GHG emissions per well	314.1	MT CO2e/well-year
indirect GHG emissions increase from project	**942.4**	MT CO2e/year

Total (Direct + Indirct) Project GHG Emissions

Global Warming Potential of Methane	Total (Direct + Indirect) Mirada Agnew Lease Project CO2e (Emissions Increase (MT/year)
25	1,367
28	1,417
34	1,519
36	1,552
72	2,160
86	2,397
100	2,633

Mirada Agnew Lease .8 HHD

Ventura County APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Commercial	1.00	User Defined Unit	5.00	50.00	10

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	31
Climate Zone	8			**Operational Year**	2014
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - per applicant

Vehicle Trips - per applicant

Vechicle Emission Factors - per applicant

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017																332.0431
2018																25.2144
Total																**357.2575**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017																332.0428
2018																25.2144
Total																**357.2571**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area																2.0000e-005
Energy																0.0000
Mobile																9.7576
Waste																0.0000
Water																0.0000
Total																**9.7576**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area																2.0000e-005
Energy																0.0000
Mobile																9.7576
Waste																0.0000
Water																0.0000
Total																9.7576

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase