Attachment 2a

ATTCH 2
PAGES 19-26

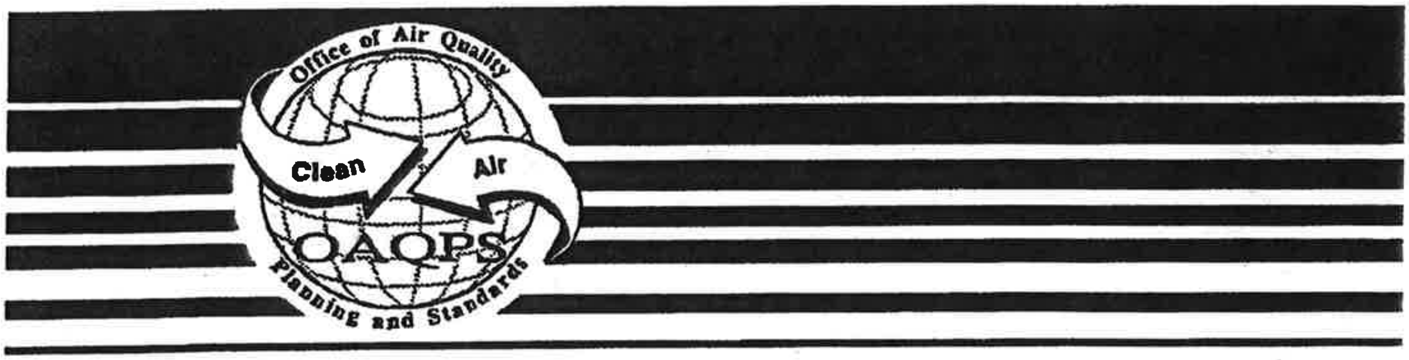
United States Environmental Protection Agency
Office Of Air Quality Planning And Standards
Research Triangle Park, NC 27711
EPA-454/R-00-019
December 2000

Air

EPA

HOT MIX ASPHALT PLANTS

EMISSION ASSESSMENT REPORT



ESTIMATED ANNUAL EMISSIONS FOR A TYPICAL BATCH MIX PLANT DRYER, HOT SCREENS, AND MIXER[a]

Pollutant	Oil-fired dryer	Natural gas-fired dryer
	Emissions, lb/yr	
Criteria Pollutants		
PM-10	2,700	2,700
VOC	820	820
CO	40,000	40,000
SO_2	8,800	460
NO_x	12,000	2,500
PAHs (semi-volatile HAPs)		
Naphthalene	3.6	3.6
2-Methylnaphthalene	7.1	7.1
Acenaphthene	0.090	0.090
Acenaphthylene	0.058	0.058
Anthracene	0.021	0.021
Benzo(a)anthracene	0.00046	0.00046
Benzo(a)pyrene	0.000031	0.000031
Benzo(b)fluoranthene	0.00094	0.00094
Benzo(g,h,i)perylene	0.00005	0.00005
Benzo(k)fluoranthene	0.0013	0.0013
Chrysene	0.00038	0.00038
Dibenz(a,h)anthracene	0.0000095	0.0000095
Fluoranthene	0.016	0.016
Fluorene	0.16	0.16
Indendo(1,2,3-cd)pyrene	0.00003	0.00003
Phenanthrene	0.26	0.26
Pyrene	0.0062	0.0062
Total PAHs	11	11
Volatile HAPs		
Acetaldehyde	32	32
Benzene	28	28
Ethylbenzene	220	220
Formaldehyde	74	74
Quinone	27	27
Toluene	100	100
Xylene	270	270
Total Volatile HAPs	751	751
Metal HAPs		
Arsenic	0.046	0.046
Beryllium	0.015	0.015
Cadmium	0.061	0.061
Chromium	0.057	0.057
Lead	0.089	0.089
Manganese	0.69	0.69
Mercury	0.041	0.041
Nickel	0.3	0.3
Selenium	0.049	0.049
Total metal HAPs	1.35	1.35

[a] Dryer, hot screens, and mixer controlled by fabric filter producing 100,000 tons of hot mix asphalt per year. Between 70 and 90 percent of HMA is produced using natural gas: most of the remaining HMA is produced using fuel oil.

ESTIMATED ANNUAL EMISSIONS FOR TYPICAL BATCH MIX PLANT LOAD-OUT OPERATIONS[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	52
VOC	391
CO	135
PAHs (semi-volatile HAPs)	
Acenaphthene	0.089
Acenaphthylene	0.0095
Anthracene	0.0239
Benzo(a)anthracene	0.0065
Benzo(b)fluoranthene	0.0026
Benzo(k)fluoranthene	0.00075
Benzo(g,h,i)perylene	0.00065
Benzo(a)pyrene	0.00078
Benzo(e)pyrene	0.0027
Chrysene	0.035
Dibenz(a,h)anthracene	0.00013
Fluoranthene	0.017
Fluorene	0.26
Indeno(1,2,3-cd)pyrene	0.00016
2-Methylnaphthalene	0.81
Naphthalene	0.43
Perylene	0.0075
Phenanthrene	0.28
Pyrene	0.051
Total PAHs	2.02
Other semi-volatile HAPs	
Phenol	0.40
Volatile HAPs	
Benzene	0.22
Bromomethane	0.040
2-Butanone	0.20
Carbon disulfide	0.054
Chloroethane	0.00087
Chloromethane	0.062
Cumene	0.46
Ethylbenzene	1.16
Formaldehyde	0.37
n-Hexane	0.62
Isooctane	0.0075
Methylene chloride	0.00
Methyl tert-butyl ether	0.00
Styrene	0.030
Tetrachloroethene	0.032
Toluene	0.87
1,1,1-Trichloroethane	0.00
Trichloroethene	0.00
Trichlorofluoromethane	0.0054
m-/p-Xylene	1.70
o-Xylene	0.33
Total volatile HAPs	6.18

[a] Uncontrolled emissions from 100,000 tons of hot mix asphalt per year

ESTIMATED ANNUAL EMISSIONS FOR TYPICAL BATCH MIX PLANT ASPHALT STORAGE TANK[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	ND
VOC	32
CO	3
PAHs (semi-volatile HAPs)	
Acenaphthene	0.0027
Acenaphthylene	0.0010
Anthracene	0.00092
Benzo(b)fluoranthene	0.00051
Fluoranthene	0.00022
Fluorene	0.00016
Naphthalene	0.087
Phenanthrene	0.025
Pyrene	0.00016
Total PAHs	0.12
Volatile HAPs	
Benzene	0.010
Bromomethane	0.0016
2-Butanone	0.012
Carbon disulfide	0.0051
Chloroethane	0.0012
Chloromethane	0.0074
Ethylbenzene	0.012
Formaldehyde	140
n-Hexane	0.032
Isooctane	0.000099
Methylene chloride	0.000086
Phenol	0.00
Styrene	0.0017
Toluene	0.020
m-/p-Xylene	0.061
o-Xylene	0.018
Total volatile HAPs	140

[a] Uncontrolled emissions from plant producing 100,000 tons of hot mix asphalt per year. Includes emissions from oil-fired hot oil heaters. All calculated PAH emissions and almost all of the formaldehyde emissions are from the oil-fired hot oil heater.

ESTIMATED ANNUAL EMISSIONS FOR A TYPICAL DRUM MIX DRYER[a]

Pollutant	No. 2 fuel oil-fired dryer	Natural gas-fired dryer
	Emissions, lb/yr	
Criteria Pollutants		
PM-10	4,600	4,600
VOC	6,400	6,400
CO	26,000	26,000
SO_2	2,200	680
NO_x	11,000	5,200
PAHs (semi-volatile HAPs)		
2-Methylnaphthalene	34	15
Acenaphthene	0.28	0.28
Acenaphthylene	4.4	1.7
Anthracene	0.62	0.044
Benzo(a)anthracene	0.042	0.042
Benzo(a)pyrene	0.0020	0.0020
Benzo(b)fluoranthene	0.020	0.020
Benzo(e)pyrene	0.022	0.022
Benzo(g,h,i)perylene	0.0080	0.0080
Benzo(k)fluoranthene	0.0082	0.0082
Chrysene	0.036	0.036
Fluoranthene	0.12	0.12
Fluorene	2.2	0.76
Indeno(1,2,3-cd)pyrene	0.0014	0.0014
Naphthalene	130	18
Perylene	0.0018	0.0018
Phenanthrene	4.6	1.5
Pyrene	0.60	0.11
Total PAHs	180	37
Volatile HAPs		
Isooctane	8.0	8.0
Hexane	184	180
Benzene	78	78
Ethylbenzene	48	48
Formaldehyde	620	620
Methyl chloroform	9.6	9.6
Toluene	580	30
Xylene	40	40
Total volatile HAPs	1,568	1,020
Metal HAPs		
Lead	3	0.12
Mercury	0.52	0.048
Antimony	0.036	0.036
Arsenic	0.11	0.11
Beryllium	0.000	0.000
Cadmium	0.082	0.082
Chromium	1.1	1.1
Manganese	1.5	1.5
Nickel	12.6	12.6
Selenium	0.070	0.070
Total metal HAPs	19	16

[a] Dryer controlled by fabric filter producing 200,000 tons of hot mix asphalt per year. Between 70 and 90 percent of HMA is produced using natural gas; most of the remaining HMA is produced using fuel oil

ESTIMATED ANNUAL EMISSIONS FOR TYPICAL DRUM MIX PLANT LOAD-OUT OPERATIONS[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	104
VOC	780
CO	270
PAHs (semi-volatile HAPs)	
Acenaphthene	0.177
Acenaphthylene	0.0191
Anthracene	0.0477
Benzo(a)anthracene	0.013
Benzo(b)fluoranthene	0.0052
Benzo(k)fluoranthene	0.0015
Benzo(g,h,i)perylene	0.0013
Benzo(a)pyrene	0.00157
Benzo(e)pyrene	0.0053
Chrysene	0.070
Dibenz(a,h)anthracene	0.00025
Fluoranthene	0.034
Fluorene	0.53
Indeno(1,2,3-cd)pyrene	0.00032
2-Methylnaphthalene	1.62
Naphthalene	0.85
Perylene	0.015
Phenanthrene	0.55
Pyrene	0.10
Total PAHs	4.05
Other semi-volatile HAPs	
Phenol	0.80
Volatile HAPs	
Benzene	0.43
Bromomethane	0.080
2-Butanone	0.41
Carbon disulfide	0.11
Chloroethane	0.0017
Chloromethane	0.12
Cumene	0.91
Ethylbenzene	2.3
Formaldehyde	0.73
n-Hexane	1.25
Isooctane	0.015
Methylene chloride	0.00
Methyl tert-butyl ether	0.00
Styrene	0.06
Tetrachloroethene	0.064
Toluene	1.74
1,1,1-Trichloroethane	0.00
Trichloroethene	0.00
Trichlorofluoromethane	0.011
m-/p-Xylene	3.40
o-Xylene	0.66
Total volatile HAPs	12.35

[a] Uncontrolled emissions from 200,000 tons of hot mix asphalt per year.

ESTIMATED ANNUAL EMISSIONS FOR TYPICAL DRUM MIX PLANT ASPHALT STORAGE TANK[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	ND
VOC	64
CO	6
PAHs (semi-volatile HAPs)	
Acenaphthene	0.0027
Acenaphthylene	0.0010
Anthracene	0.00092
Benzo(b)fluoranthene	0.00051
Fluoranthene	0.00022
Fluorene	0.00016
Naphthalene	0.087
Phenanthrene	0.025
Pyrene	0.00016
Total PAHs	0.12
Volatile HAPs	
Benzene	0.020
Bromomethane	0.0031
2-Butanone	0.025
Carbon disulfide	0.010
Chloroethane	0.0025
Chloromethane	0.015
Ethylbenzene	0.024
Formaldehyde	140
n-Hexane	0.064
Isooctane	0.00020
Methylene chloride	0.00017
Phenol	0.00
Styrene	0.0035
Toluene	0.040
m-/p-Xylene	0.12
o-Xylene	0.036
Total volatile HAPs	140

[a] Uncontrolled emissions from plant producing 200,000 tons of hot mix asphalt per year. Includes emissions from an oil-fired hot oil heater. All of the calculated PAH emissions and almost all of the formaldehyde emissions are from the oil-fired hot oil heater.

ESTIMATED ANNUAL EMISSIONS FOR TYPICAL DRUM MIX PLANT SILO FILLING OPERATIONS[a]

Pollutant	Emissions, lb/yr
Criteria Pollutants	
PM-10	120
VOC	2,400
CO	240
PAHs (semi-volatile HAPs)	
Acenaphthene	0.24
Acenaphthylene	0.0071
Anthracene	0.066
Benzo(a)anthracene	0.028
Benzo(e)pyrene	0.0048
Chrysene	0.11
Fluoranthene	0.076
Fluorene	0.51
2-Methylnaphthalene	2.7
Naphthalene	0.92
Perylene	0.015
Phenanthrene	0.91
Pyrene	0.22
Total PAHs	5.8
Other semi-volatile HAPs	
Phenol	0.00
Volatile HAPs	
Benzene	0.78
Bromomethane	0.12
2-Butanone	0.95
Carbon disulfide	0.39
Chloroethane	0.095
Chloromethane	0.56
Ethylbenzene	0.93
Formaldehyde	17
n-Hexane	2.4
Isooctane	0.0076
Methylene chloride	0.0066
Styrene	0.13
Toluene	1.5
m-/p-Xylene	4.6
o-Xylene	1.4
Total volatile HAPs	31

[a] Uncontrolled emissions from 200,000 tons of hot mix asphalt per year.

ESTIMATED ANNUAL YARD VOC EMISSIONS FOR TYPICAL BATCH MIX AND DRUM MIX HMA PLANTS[a]

	Batch mix[b]	Drum mix[c]
Pollutant	Emissions, lb/yr	
Criteria Pollutants		
PM-10	ND	ND
VOC	110	220
CO	36	72
PAHs (semi-volatile HAPs)	ND	ND
Other semi-volatile HAPs		
Phenol	0.00	0.00
Volatile HAPs		
Benzene	0.057	0.11
Bromomethane	0.011	0.021
2-Butanone	0.054	0.11
Carbon disulfide	0.014	0.029
Chloroethane	0.00023	0.0046
Chloromethane	0.017	0.033
Cumene	0.12	0.24
Ethylbenzene	0.31	0.62
Formaldehyde	0.10	0.19
n-Hexane	0.17	0.33
Isooctane	0.0020	0.0040
Methylene chloride	0.00	0.00
Styrene	0.0080	0.016
Tetrachloroethene	0.0085	0.017
Toluene	0.23	0.46
Trichlorofluoromethane	0.0014	0.0029
m-/p-Xylene	0.45	0.90
o-Xylene	0.088	0.18
Total volatile HAPs	1.6	3.3

[a] Fugitive VOC emissions from loaded haul truck for eight minutes after completion of load-out.

[b] Uncontrolled emissions from plant producing 100,000 tons of hot mix asphalt per year.

[c] Uncontrolled emissions from plant producing 200,000 tons of hot mix asphalt per year.

TFI 100 Burner Fuel
MATERIAL SAFETY DATA SHEET

Thermo Fluids, Inc. 4301 W. Jefferson Street, Phoenix, AZ 85043
Emergency Telephone (602) 272-2400

SECTION A. Product Identification and Emergency Information

PRODUCT NAME:	On-specification Used Oil Fuel
PRODUCT CATEGORY:	Industrial Fuel Oil
TRADE NAME:	TFI 100 Burner Fuel
PRODUCT APPEARANCE AND ODOR:	Dark Black/Brown Liquid Distinct Petroleum Odor

SECTION B. Components and Hazard Information

Components:	CAS Number	APPROX % WT.
Reclaimed Oil (petroleum)	8002-58-9	100%

This product meets the Used Oil Specifications as per EPA regulations 40 CFR 279.11.
This product does not contain PCB's in accordance with EPA regulations 40 CFR 761.20(e).
See Section E for Health and Hazard Information.
See Section H for additional Environmental Information.

EXPOSURE LIMIT FOR THIS PRODUCT:

OSHA Time-weighted average (TWA) permissible exposure limit (PEL) = 5mg/m3 for oil mist (mineral) based on a 8-hour workday.
Short Term exposure limit (STEL) = 10 mg/m3 (fifteen minute maximum).
Immediate Danger to Life and Health (IDLH) = 2500 mg/m3.

BASIS: OSHA Regulation 29 CFR 1910.1000 and recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute for Occupational Safety and Health (NIOSH).

SECTION C: Primary Routes of Entry and Emergency and First Aid Procedures

EYE CONTACT: If splashed into eyes, flush with potable water or eye irrigation fluid for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN: In case of skin contact, remove any contaminated clothing and wash skin with soap and water. Launder or dry clean clothing before re-use. If product is injected under the skin, the individual should be evaluated by a physician.

INHALATION: Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove victim from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation by trained personnel.

INGESTION: If ingested, DO NOT induce vomiting; call a physician immediately.

SECTION D. Fire and Explosion Hazard Information

FLASH POINT *(MINIMUM)*
>200 DegF (>93 Degrees C) EPA Method 1020 Closed Cup

AUTO IGNITION TEMPERATURE
>400 DegF (> 200 Degrees C) ASTM E 659

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) Hazard Identification:

HEALTH	FLAMMABILITY	REACTIVITY
1	1	0

This product is classified as a Class III(b) Combustible Liquid as per the 1994 Uniform Fire Code. Do not subject this Product to uncontrolled heat, sparks, pilot lights, static electricity or open flame.

FLAMMABLE OR EXPLOSIVE LIMITS *(approximate percent of volume in air)*
Established Values: Lower Explosive Limit 0.9 % Upper Explosive Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES: Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires and circumstances related to the situation. Plan fire protection response strategy through consultation with local fire protection authorities. Do not use direct water application.

HAZARDOUS DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS: When burned in totally uncontrolled conditions, product may produce carbon monoxide, sulfur oxides, aldehydes and other thermal decomposition products.

"EMPTY" CONTAINER WARNING: Liquid and/or Vapor can be dangerous. "Empty " drums should be completely drained, properly bunged and promptly returned to a drum reconditioner.

DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION E: Health and Hazard Information

VARIABILITY AMONG INDIVIDUALS: Petroleum hydrocarbons and synthetic lubricants may pose human health risks. Continuous contact with used oil has caused skin cancer in laboratory animals.
Exposure to liquids, vapors, mists or fumes should be minimized. In case of skin contact, wash thoroughly soap and water. Clean oil-soaked clothing before re-use.

EFFECTS OF OVEREXPOSURE (signs and symptoms of exposure)
In accordance with current OSHA Hazard Communication Standard criteria, this product does not require a human cancer warning.
Prolonged or repeated skin contact with this product tends to remove skin oils, possibility leading to irritation and dermatitis; however, based on human experience and available toxicology data, this product is not classified as either a "corrosive" nor an "irritant" by OSHA criteria.
Product contacting the eyes may cause eye irritation.
Product has low order of acute oral or dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

Product is judged to have an acute oral LD50 (rat) greater than 5 g /kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

SECTION F: Physical Data

The following are approximate or typical values and should not be used for precise design purposes.
INITIAL BOILING POINT: Approximately 460 DegF (238 DegC) by ASTM D-2887.
REID VAPOR PRESSURE = 0.2 psi @ 100 DegF by ASTM D-323
API GRAVITY = 27.5 - 28.0 @ 60 DegF.
VISCOSITY = 69 - 72 Centistokes @ 40 DegC (104 DegF)
SPECIFIC GRAVITY = 0.885 @ 60 DegF.
VAPOR DENSITY (Air = 1): Greater than 5
MOLECULAR WEIGHT: Approximately 255
PERCENT VOLATILE BY VOLUME: Negligible from open container in 4 hours @ 100 DegF
pH: Essentially neutral
EVAPORATION RATE: Less than 0.01
SOLUBILITY IN WATER @ 1 Atmosphere: Negligible, less than 0.1 %.
% Sulfur by Weight = 0.35-0.45
Total Halogens < 1000 ppm (EPA Method 9020)
Ash Dry Weight = 0.40 - 0.65% (ASTM D-482)
Total Lead = 5 - 70 ppm (EPA Method 239.2/7421)
Total Arsenic < 0.5 ppm (EPA Method 206.3/7060)
Total Chromium < 5.0 ppm (EPA Method 218.2/7191)
Total Cadmium < 2.0 ppm (EPA Method 213.2/7131)
Polychlorinated Biphenyls (PCB's) < 2.0 ppm (EPA Method 8080)

SECTION G: Reactivity

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc. as this presents serious explosion hazard.

SECTION H: Environmental Information

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Recover free product. Add sand, earth, or other suitable absorbent to contain the spread of spill and to absorb product. Minimize skin contact. Make every attempt to keep product out of sewers and watercourses by diking or impounding. Report spill to all appropriate authorities in accordance with Users Spill Prevention, Control and Countermeasure plan and governing regulations:

REPORTABLE QUANTITY (RQ), EPA Regulation 40 CFR 302 (CERCLA Section 102)
THRESHOLD PLANNING QUANTITY (TPQ) EPA Regulation 40 CFR 355
TOXIC CHEMICAL RELEASE REPORTING, EPA Regulation 40 CFR 372
None required for product or any constituent greater than 1% or 0.1% (carcinogen)

SECTION I: Protection and Precautions

VENTILATION: Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air, No smoking, or use of flame or other ignition source.
RESPIRATORY PROTECTION: Use proper full-face respiratory or supplied air in confined or enclosed spaces where product or residual product has been stored.
PROTECTIVE GLOVES: Use chemical resistant gloves to avoid prolonged or repeated skin contact.
EYE PROTECTION: Use splash goggles or face shield when eye contact may occur.
OTHER PROTECTIVE EQUIPMENT: Use chemical resistant apron or other impervious clothing. Avoid contaminating regular clothing, which could result in prolonged skin contact.

WORK PRACTICES / ENGINEERING CONTROLS: Keep containers closed when not in use. Do not store near heat, sparks, flame, or strong oxidants. It is recommended to store the product away from other more volatile fuel supplies such as diesel fuel. Storage tanks should be in good physical condition with no visible leaks or rust. Storage facilities should provide Secondary containment in the form of impervious flooring and walls around tanks and storage vessels as per 40 CFR 279. Storage tanks containing this product should be clearly labeled "On-specification Used Oil".

PERSONAL HYGIENE: Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals and at the end of work period. Product is readily removed from the skin by waterless hand cleaners followed by washing thoroughly with soap and water.

SECTION J: Transportation and OSHA Related Label Information

TRANSPORTATION AND INCIDENT INFORMATION: For further information relative to spills resulting from transportation incidents, refer to the latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents.
U.S. DOT HAZARDOUS MATERIAL SHIPPING DESCRIPTION
CLASS III(b) Combustible Liquid. Not Regulated. Placarding is generally not necessary in most states, however a UN 1270 placard may be used.
OSHA REQUIRED LABEL INFORMATION
Labels and annual reporting should be made in compliance with EPCRA right-to-know requirements.

Disclaimer Statements

Mixing this product with any other petroleum products or materials nullifies and voids the On-Specification certification by Thermo Fluids Inc.

The information and recommendations contained herein are, to the best of TFI's knowledge and belief, accurate and reliable as to the date issued. TFI does not warrant or guarantee their accuracy or reliability, and TFI will not be liable for any loss or damage resulting from the use or interpretation of this information.

The information and recommendations are offered for the User's consideration and examination, and it is the User's responsibility to satisfy itself that they are suitable and complete for the User's particular application. If Buyer or User repackages this product, TFI assumes no responsibility for safety or integrity of packaging,. Unless specifically arranged by written agreement, Thermo Fluids Inc is not responsible for users tanks or containers, or liable for any loss or damage arising from using these tanks or containers to store this product.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by TFI in order to provide additional health and hazard classification information. The ratings are based upon the criteria supplied by the developers of these rating systems, together with TFI's interpretation of he available data. For assistance and/or further information, contact Thermo Fluids, Inc.

SAFETY DATA SHEET

Section 1: Identification of the substance/mixture and of the company/undertaking

Product identifier

Trade name of the substance	Diesel Fuels and Gas Oils - All Grades (Refer to Synonyms for Product Name)
Identification No.	68334-30-5
Registration number	01-2119484664-27-XXXX
Synonyms	Ultra Low Sulfur Diesel, FAME Free-EN590-Ultra Low Sulfur Diesel, up to 7% FAME-Ultra Low Sulphur Gas Oil , Marked or Unmarked - FAME Free * High Sulfur Diesel * GTL Diesel * Unfinished Diesel

SDS number	2004a
Date of first issue	29-July-2011
Version number	03
Revision date	18-November-2011
Supersedes date	11-August-2011

Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Distribution of a substance. Formulation & (re) packaging of substances and mixtures. Use as a Fuel. Use as an intermediate.
Uses advised against	None known.

Details of the supplier of the safety data sheet

Supplier

Company name	Valero Marketing & Supply Company and Affiliates
Address	P.O. Box 696000 San Antonio Texas 78269-6000
General information:	
United States:	01/210 345 4593
Contact person	Not available.

Emergency telephone number	
Europe:	0044/(0)18 65 407333

Only Representative

Registrant Company name	The Acta Group EU, Ltd
Address	23 New Mount Street Manchester M1 2NN United Kingdom
Telephone number	+44 (0) 161 212 7407

Section 2: Hazards identification

Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Danger

Flam. Liq. 3, H226; Flammable liquid and vapour
Asp.Tox. 1, H304; May be fatal if swallowed and enters airways
Skin Irrit. 2, H315; Causes skin irritation
Acute Tox. 4, H332; Harmful if inhaled
Carc. 2, H351: Suspected of causing cancer
STOT RE 2, H373: May cause damage to organs through prolonged or repeated exposure
Aquatic Chronic 2, H411: Toxic to aquatic life with long lasting effects

Classification according to Directive 67/548/EEC or 1999/45/EC as amended

Classification
Harmful; Xn; R20
Harmful; Xn; R38
Harmful; Xn; R40
Harmful; Xn; R65
Dangerous for the environment; N; R51/53
The full text for all R-phrases is displayed in section 16.

Hazard summary

Physical hazards	Flammable liquid category 3
Health hazards	Skin corrosion/irritation category 2, Acute toxicity category 4 (inhalation), Aspiration category 1, Carcinogenicity category 2, Specific Target Organ Toxicity (repeat exposure) category 2
Environmental hazards	Chronic Aquatic toxicity category 2

Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains:	Fuels, diesel
Identification No.	649-224-00-6
Signal word	Danger
Hazard statements	Flammable liquid and vapour. May be fatal if swallowed and enters airways. Causes skin irritation. Harmful if inhaled. Suspected of causing cancer. .May cause damage to organs through prolonged or repeated exposure. .Toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention
P201: Obtain special instructions before use
P202: Do not handle until all safety precautions have been read and understood
P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P233: Keep container tightly closed
P240: Ground/bond container and receiving equipment
P241: Use explosion-proof electrical/ventilating/lighting/.../equipment
P242: Use only non-sparking tools
P243: Take precautionary measures against static discharge
P260: Do not breathe dust/fume/gas/mist/vapours/spray
P261: Avoid breathing dust/fume/gas/mist/vapours/spray
P264: Wash affected skin area thoroughly after handling
P270: Do not eat, drink or smoke when using this product
P271: Use only outdoors or in a well-ventilated area
P273: Avoid release to the environment
P280: Wear protective gloves/protective clothing/eye protection/face protection
P281: Use personal protective equipment as required

Response

P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P301 + P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P302 + P352: IF ON SKIN: Wash with plenty of soap and water
P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P308: IF exposed or concerned:
P308 + P313: IF exposed or concerned: Get medical advice/attention
P312: Call a POISON CENTER or doctor/physician if you feel unwell
P313: Get medical advice/attention
P314: Get medical advice/attention if you feel unwell
P321: Specific treatment (see ... on this label)
P330: Rinse mouth
P331: Do NOT induce vomiting
P332 + P313: If skin irritation occurs: Get medical advice/attention
P362: Take off contaminated clothing and wash before reuse
P370+P378: In case of fire: Use foam, carbon dioxide, dry powder or water fog for extinction
P391: Collect spillage

Storage
P403 + P235: Store in a well-ventilated place. Keep cool
P403 + P233: Store in a well-ventilated place. Keep container tightly closed
P405: Store locked up

Disposal
P501: Dispose of contents/container to ....

Supplemental label information	Repeated exposure may cause skin dryness or cracking.
Other hazards	Not assigned.

Section 3: Composition/information on ingredients

Substance

General information

Chemical name	%	CAS No./EC No.	REACH Pre- Registration No.	INDEX No.	Notes
Fuels, Diesel	100	68334-30-5/269-822-7	17-2119378924-24-0000	649-224-00-6	#
Classification:	DSD: Carc. Cat. 3;R40, Xn;R20-65, Xn;R38, N;R51/53 CLP: Flam. Liq. 3;H226, Asp. Tox. 1;H304, Skin Irrit. 2; H315, Acute Tox. 4;H332, Carc. 2;H351, STOT RE 2;H373, Aquatic Chronic 2;H411				

Section 4: First aid measures

General information	If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety datasheet to the doctor in attendance. Wash contaminated clothing before re-use.

Description of first aid measures

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Skin contact	Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, Always seek medical attention.
Eye contact	Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.

Ingestion	Rinse mouth thoroughly. Do not induce vomiting without advice from poison control centre. Do not give mouth-to-mouth resuscitation. Get medical attention immediately.
Most important symptoms And effects, both acute and delayed	Skin irritation. Defatting of the skin. Rash. May cause eye irritation on direct contact. Aspiration may cause pulmonary oedema and pneumonitis. In high concentrations, vapours are narcotic and may cause headache, fatigue, dizziness and nausea.
Indication of any immediate medical attention and special treatment needed	If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately. In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

Section 5: Firefighting measures

General fire hazards	The product is flammable, and heating may generate vapours which may form explosive vapour/air mixtures. Containers may explode when heated.
Extinguishing media	
Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.
Special hazards arising from the substance or mixture	Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Advice for firefighters	
Special protective equipment for firefighters	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Special firefighting Procedures	Withdraw immediately in case of rising sound from venting safety devices or any discolouration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Vapours may form explosive air mixtures even at room temperature. Prevent buildup of vapours or gasses to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage.

Section 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 for personal protective equipment. Local authorities should be advised if significant spillages cannot be contained.
For emergency responders	Keep unnecessary personnel away. Wear protective clothing as described in Section 8 of this safety data sheet.
Environmental precautions	Prevent from entering into soil, ditches, sanitary sewers, waterways and/or groundwater. If facility or operation has an "oil or hazardous substance contingency

plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Flammable. Review Fire Fighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways.
Contact fire authorities and appropriate federal, state and local agencies.

Methods and material for containment and cleaning up

For containment

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use non-sparking tools and explosion-proof equipment. Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas.

For cleaning up

Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste.

Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment.

Reference to other sections For personal protection, see section 8. For waste disposal, see section 13.

Section 7: Handling and storage

Precautions for safe handling

Wear personal protective equipment. Do not breathe dust/fume/gas/mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. The product is extremely flammable, and explosive vapour/air mixtures may be formed even at normal room temperatures.
DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feeding stuffs. Keep out of the reach of children.

Specific end use(s)

Distribution of a substance. Formulation & (re) packaging of substances and mixtures. Manufacture of substance. Use as a Fuel.

Section 8: Exposure controls/personal protection

Control parameters

Occupational exposure limits

Belgium, Exposure Limit Values

Material	Type	Value	From
Fuels, Diesel (68334-30-5)	TWA	100 mg/m3	Vapor and aerosol

Ireland, Occupational Exposure Limits

Material	Type	Value	From
Fuels, Diesel (68334-30-5)	TWA	100 mg/m3	

Italy, OELs

Material	Type	Value	From
Fuels, Diesel (68334-30-5)	TWA	100 mg/m3	Inhalable fraction and vapor

Portugal, VELs, Norm on occupational exposure to chemical agents (NP 1796)

Material	Type	Value	From
Fuels, diesel (68334-30-5)	TWA	100 mg/m3	Inhalable fraction

Recommended monitoring procedures	Follow standard monitoring procedures.
DNEL	Not currently publically available.
PNEC	Not currently publically available.
Exposure controls	
Appropriate engineering controls	Handle the substance under a closed system as much as possible. Ensure material transfers are under containment or extract ventilation. Clear transfer lines before decoupling. Use explosion-proof equipment.
Personal protection equipment	
General information	Use personal protective equipment as required. Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Keep working clothes separately. Launder contaminated clothing before reuse.
Eye/face protection	Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.
Skin protection **- Hand protection**	Wear chemical-resistant, impervious gloves. Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Viton, Polyurethane, Nitrile rubber. Suitable gloves can be recommended by the glove supplier. Gloves tested to EN374 are advised as a minimum standard. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.
- Other skin protection	Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.
Respiratory protection	Wear a NIOSH-approved (or equivalent) full-face piece airline respirator in the positive pressure mode with emergency escape provisions. In case of inadequate ventilation or risk of inhalation of vapours, use suitable respiratory equipment with gas filter (type A2). Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.
Thermal hazards	When material is heated, wear gloves to protect against thermal burns.
Hygiene measures	Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Wash hands before breaks and immediately after handling the product. Provide eye wash station and safety shower. Handle in accordance with good industrial hygiene and safety practices.
Environmental exposure Controls	Contain spills and prevent releases and observe national regulations on emissions.

Section 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Amber liquid.
Physical state	Liquid.
Form	Liquid.
Colour	Amber.
Odour	Petroleum.
Odour threshold	Not available.
pH	Not applicable.
Melting point/freezing Point	Not applicable.
Boiling point, initial boiling point, and boiling range	160 - 400 °C (320 - 752 °F)
Flash point	> 55 °C (> 131 °F) Pensky-Martens Closed Cup
Auto-ignition temperature	350 °C (662 °F)
Flammability (solid, gas)	Not available.
Flammability limit - lower (%)	1 % v/v
Flammability limit - upper (%)	6 % v/v
Oxidising properties	Not available.
Explosive properties	Not available.
Explosive limit	Not available.
Vapour pressure	0,04kPa @ 40 °C (104 °F)
Vapour density	> 1
Evaporation rate	Not available.
Relative density	0,81 - 0,89 @ 15°C (59°F)
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Log Pow: 2 - 7
Decomposition Temperature	Not available.
Viscosity	> 1,5 mm^2/s @ 40 °C (104 °F)
Percent volatile	Not available.
Other information	No relevant additional information available.

Section 10: Stability and reactivity

Reactivity	The product is stable and non reactive under normal conditions of use, storage and transport.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Hazardous polymerisation does not occur.
Conditions to avoid	Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Incompatible materials	Strong acids. Strong oxidizers such as nitrates, chlorates, peroxides.
Hazardous decomposition Products	Carbon oxides. Hydrocarbons.

Section 11: Toxicological information

Information on toxicological effects

Acute toxicity	Samples of vacuum or hydrocracked gas oils and distillate fuels have been tested in acute oral, dermal and inhalation studies. Results indicate the following: Rat oral LD50 > 9 ml/kg bodyweight (approx 7600 mg/kg bw) (API, 1980a,b)

	Rat inhalation LC50 ≥ 4.1 mg/l (ARCO, 1988) Rabbit dermal LD50 > 5 ml/kg bodyweight (approx 4300 mg/kg bw) (API, 1980a,b)
Skin corrosion/irritation	Samples of vacuum or hydrocracked gas oils and distillate fuels were tested in rabbit skin irritation studies (24 hour occluded). These data indicate that exposure to distillate fuels can cause skin irritation (API, 1980a; API, 1980b). There was no evidence of skin corrosion.
Serious eye damage/eye Irritation	The ability of vacuum or hydrocracked gas oils and distillate fuels to elicit eye irritation in rabbits has been investigated. None of the samples were irritating to the eye (API, 1980a; API, 1980b).
Respiratory or skin sensitisation	No studies were located for respiratory sensitization. For skin sensitization distillate fuel samples were tested and showed no evidence of skin sensitization (API, 1980a; API, 1980b).
Germ cell mutagenicity	The mutagenic potential of vacuum gas oils, hydrocracked gas oils, and distillate fuels have been extensively tested in both *in vivo* and *in vitro* tests. The *in vitro* results were ambiguous while the *in vivo* studies showed a lack of mutagenic activity. Based on the data available vacuum gas oils, hydrocracked gas oils, and distillate fuels are not considered to be germ cell mutagens (Deininger, G, et al, 1991; McKee, RH et al, 1994; API, 1985).
Carcinogenicity	Samples of vacuum gas oils, hydrocracked gas oils, and distillate fuels show variable activity in skin painting bioassays. Skin irritation has been shown to contribute to the development of tumors. Based on the data available these substances are considered as potentially carcinogenic (Biles RW et al, 1988).
Reproductive toxicity	No guideline or near-guideline studies were located that have examined the potential impact of gas oils on reproductive function, however gonadal histopathology and/or sperm parameters (counts; morphology) were among endpoints routinely included in sub-chronic dermal evaluations of some gas oils. The data indicate these substances are not reproductive toxicants (Mobil, 1989a; API, 1979a; API, 1979b).
Specific target organ toxicity - single exposure	Acute exposure studies do not indicate any specific organ toxicity following single exposure to vacuum or hydrocracked gas oils and distillate fuels (API, 1980a; API, 1980b; ARCO, 1988)
Specific target organ toxicity - repeated exposure	The repeat dose toxicity of vacuum or hydrocracked gas oils and distillate fuels has been tested. Following 13 week dermal exposure in Sprague-Dawley rats, thymus, liver, and bone marrow changes were noted in a dose dependent manner (ARCO, 1992; Mobil, 1989b).
Aspiration hazard	May be fatal if swallowed and enters airways. Vacuum or hydrocracked gas oils and distillate fuels span a range of viscosities with values reported as ≥1.5 mm2/s at 40°C.
Mixture versus substance Information	Not available.
Other information	Symptoms may be delayed.

Section 12: Ecological information

Toxicity	**Acute (short-term) Aquatic Hazard:** Acute aquatic toxicity studies on samples of vacuum or hydrocracked gas oils and distillate fuels report toxicity values in a range of 1-10 mg/l (EBSI, 1998a,b,c,d). The LL50 [96h] was 3.2 mg/l for fish (EBSI, 1998c).
Chronic (long-term)	

Aquatic Hazard:	**Chronic aquatic toxicity:** Chronic toxicity in fish is predicted utilising a QSAR and results in a 14 day NOEL of 0.083 mg/l. Long term toxicity to aquatic invertebrates is also predicted using QSAR. The 21 day NOEL is determined to be 0.21 mg/l (Redman et al, 2010)
Persistence and degradability	Gas oils are complex combinations of individual hydrocarbon species. Based on the known or expected properties of individual constituents, category members are not predicted to be readily biodegradable (The Petroleum HPV Testing Group, 2003; Mobil, 1999; Lee C, 1993). Some hydrocarbon constituents of gas oils are predicted to meet the criteria for persistence. Some components can be degraded by micro-organisms under aerobic conditions easily and are likely to bioaccumulate (log Kow values in the range of 4.0).
Mobility	Not available.
Environmental fate - Partition coefficient	Log Pow: 2 - 7
Mobility in soil	Not available.
Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
Other adverse effects	Toxic to aquatic life with long lasting effects.

Section 13: Disposal considerations

Waste treatment methods	
Residual waste	Dispose of in accordance with local regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.
EU waste code	13 07 01*
Disposal methods/ information	Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground.

Section 14: Transport information

ADR

UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	3
Subsidiary class(es)	-
Packing group	III
Environmental hazards	Yes
Labels required	3
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

RID

UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	3
Subsidiary class(es)	-
Packing group	III
Environmental hazards	No
Labels required	3
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

ADN

UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	3
Subsidiary class(es)	-
Packing group	III
Environmental hazards	Yes
Labels required	3
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IATA

UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	3
Subsidiary class(es)	-
Packing group	III
Environmental hazards	Yes
ERG Code	3L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	3
Subsidiary class(es)	-
Packing group	III
Marine pollutant	Yes
Labels required	3
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

Section 15: Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Regulations

Regulation (EC) No. 2037/2000 on substances that deplete the ozone layer, Annex I

Not listed.

Regulation (EC) No. 2037/2000 on substances that deplete the ozone layer, Annex II

Not listed.

Regulation (EC) No. 850/2004 on persistent organic pollutants, Annex I

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V

Not listed.

Directive 96/61/EC concerning integrated pollution prevention and control (IPPC): Article 15, European Pollution

Emission Registry (EPER)

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(1). Candidate List

Not listed.

Other regulations	The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended and respective national laws implementing EC directives. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006. 96/82/EC (Seveso II) Directive; Part 2 (Classified Substances) - Flammable
National regulations	Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work.
Chemical safety assessment	For this substance a chemical safety assessment has been carried out.

Section 16: Other information

List of abbreviations

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.
DNEL: Derived No-Effect Level.
PNEC: Predicted No-Effect Concentration.
PBT: Persistent, Bioaccumulative and Toxic.
vPvB: very Persistent and very Bioaccumulative.

References

API (1979a) Inhalation/teratology study in rats - fuel oil. Study conducted by Litton Bionetics Inc. API Health Environ. Sci. Dep. Rep. 27-30483. Washington DC: American Petroleum Institute

API (1979b) Teratology study in rats - diesel fuel. Study conducted by Litton Bionetics Inc. API Med. Res. Publ. 27-32174. Washington DC: American Petroleum Institute

API (1980a) Acute toxicity tests API #78-4 #2 home heating oil (50% cat). Study conducted by Elars Bioresearch Laboratories Inc. API Health Environ. Sci. Dep. Rep. 27-32068. Washington DC: American Petroleum Institute

API (1980b) Acute toxicity tests API #79-6 diesel fuel (marketplace sample). Study conducted by Elars Bioresearch Laboratories Inc. API Med. Res. Publ. 27-32817. Washington DC: American Petroleum Institute

API (1985) Acute *in vivo* cytogenetics assay in male and female rats of API 83-11. Study conducted by Microbiological Associates Inc. API Med. Res. Publ. 32-32408. Washington DC: American Petroleum Institute

ARCO (1988) Acute inhalation toxicity study in rats administered F-72-01 naval distillate. Study conducted by Bio/dynamics Inc. Study No. 85-7867A. Los Angeles CA: ARCO

ARCO (1992) 28-day dermal toxicity study in rats – F-102-01 naval distillate. UBTL Study No. 65365. Los Angeles CA: ARCO

Biles, R.W. et al (1988) Dermal carcinogenic activity of petroleum-derived middle distillate fuels. *Toxicology 53, 301-314*

Deininger, G. et al (1991) Middle distillates: analytical investigations and mutagenicity studies. Report No. 412-1. Hamburg: DGMK

EBSI (1998a) Alga toxicity test with *Skeletonemacostatum*.MRD-89-429. Study No. 142967SK. East Millstone NJ: Exxon Biomedical Sciences Inc.

EBSI (1998b) Alga toxicity test.MRD-89-429. Study No. 142967. East Millstone NJ: Exxon Biomedical Sciences Inc.

EBSI (1998c) Fish acute toxicity test with *Menidiaberylline*.MRD-89-429. Study No. 142940MB. East Millstone NJ: Exxon Biomedical Sciences Inc.

EBSI (1998d) Sheepshead minnow acute toxicity test.MRD-89-429. Study No.142961. East Millstone NJ: Exxon Biomedical Sciences Inc.

Lee, C. (1993) Water insoluble biodegradation test report. Method development using CONCAWE reference gas oil: Phase III. East Millstone NJ: Exxon Biomedical Sciences Inc.

McKee, R.H. et al (1994) Evaluation of the genetic toxicity of middle distillate fuels. *Environmental and Molecular Mutagenesis 23, 234-238*

Mobil (1989a) Developmental toxicity study in rats exposed dermally to vacuum tower overheads (VTO) (CAS 64741-49-7). Mobil Environ. and Health Sci. Lab. Study No. 62328. Princeton NJ: Mobil Oil Corporation

Mobil (1989b) Thirteen-week dermal administration of vacuum tower overheads to rats (CAS 64741-49-7). Mobil Environ. and Health Sci. Lab. Study No. 62326. Princeton NJ: Mobil Oil Corporation

Mobil (1999) Determination of the aerobic ready biodegradability of Nigerian diesel fuel using the OECD 301F manometric respirometry test method. Study conducted by Ecotoxicology Laboratory. Mobil Business Resources Corp. Study No. 68246. Paulsboro NJ: Mobil Business Resources Corp.

Redman, A. and Yadav, B. (2010) Aquatic toxicity predictions using the PETROTOX model for petroleum substance categories. Report prepared for CONCAWE. Mahwah NJ: HydroQual Inc.

The Petroleum HPV Testing Group (2003) High production volume (HPV) chemical challenge program. Test plan gas oils category. HPV Consortium No. 1100997.Administered by API. Washington DC: American Petroleum Institute

Information on evaluation method leading to the classification of mixture	The mixture is classified based on test data for physical hazards. The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details, refer to Sections 9, 11 and 12.
Full text of any statements or R-phrases and H-statements under Sections 2 to 15	R20 Harmful by inhalation. R38 Irritating to skin. R40 Limited evidence of a carcinogenic effect. R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R65 Harmful: may cause lung damage if swallowed. H226 - Flammable liquid and vapour. H304 - May be fatal if swallowed and enters airways. H315 - Causes skin irritation. H332 - Harmful if inhaled. H351 - Suspected of causing cancer. H373 - May cause damage to organs through prolonged or repeated exposure. H411 - Toxic to aquatic life with long lasting effects.
Training information	Not available.
Disclaimer	This material Safety Data Sheet (SDS) was prepared in accordance with EC No 1272/2008 by Valero Marketing & Supply. It does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.
Issue date	13-November-2013
Revision date	13-November-2013
Print date	13-November-2013

1. Distribution of the substance

Sector(s) of use:
SU 3: Industrial uses: Uses of substances as such or in mixtures at industrial sites

Control of environmental exposure:
ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles
ERC 5: Industrial use resulting in inclusion into or onto a matrix
ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates)
ERC 6b: Industrial use of reactive processing aids
ERC 6c: Industrial use of monomers for manufacture of thermoplastics
ERC 6d: Industrial use of process regulators for polymerization processes in production of resins, rubbers, polymers
ERC 7: Industrial use of substances in closed systems
ESVOC SpERC 1.1b.v1:

Control of worker exposure:
PROC 1: Use in closed process, no likelihood of exposure
PROC 2: Use in closed, continuous process with occasional controlled exposure
PROC 3: Use in closed batch process (synthesis or formulation)
PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC 8a: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filing line, including weighing)
PROC 15: Use as laboratory reagent

Processes, tasks and activities covered by this ES:
Bulk loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums ands small packs) of substance, including its sampling, storage, unloading, maintenance and associated laboratory activities

2 Exposure Scenario

2.1 Contributing scenario controlling environmental exposure for distribution of the substance

Control of environmental exposure

This section describes the release of the substance to the environment through distribution and repacking of the substance, and the measures which are expected to be taken to reduce and control the amount released to the environment

Product Characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Amount used per site (annual): 561,000 tonnes
Amount used per site (daily): 190,000 kilograms

Frequency and duration of use

Continuous use
300 emission days/year

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

Release fraction to air from process (initial release prior to RMM): 0.01
Release fraction to wastewater from process (initial release prior to RMM): 0.0001
Release fraction to soil from process (initial release prior to RMM): 0.001

Technical conditions and measures at process level (source) to prevent release

Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk from environmental exposure is driven by human via indirect exposure (primarily ingestion).
Prevent discharge of undissolved substance to or recover from onsite wastewater.
No wastewater treatment required.

Treat air emission to provide a typical removal efficiency of: 90%
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥: 0 %
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal. Efficiency of: ≥0%

Organizational measures to prevent/limit release from site

Prevent discharge of undissolved substance to or recover from wastewater. Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Estimated substance removal from wastewater via domestic sewage treatment: 94.1%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.1%
Maximum allowable site tonnage (M_{safe}) based on release following total wastewater treatment removal: 2.900,000kg/day
Assume domestic sewage treatment plant flow: 2000m^3/d

Conditions and measures related to external treatment of waste for disposal

External treatment and disposal of waste should comply with applicable regulations.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable regulations.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH. Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Use specifics: additional measures to reduce the predicted exposure beyond the estimated level.

2.2 Contributing scenario controlling worker exposure for formulation & (re)packaging of substance and mixtures

Control of worker exposure

This section describes the release of the substance to the environment through distribution and repacking of the substance, and the measures which are expected to be taken to reduce and control the amount released to the environment

Product Characteristics

Liquid product with potential for aerosol generation.
Vapour pressure: <0.5 kPa at STP
Concentration of substance in product: 100%

Amounts used

Amount used per site (annual): 561,000 tonnes
Amount used per site (daily): 190,000 kilograms

Frequency and duration of use

Daily use for all PROC activities. Durations specified for each PROC code:
PROC 1, 2, 3, 4, 8a, 8b & 15: 15 minutes to 1 hour per day
PROC 9: ≤ 8 hours per day

Human factors not influenced by risk management

Hands, forearms, face, neck and hair are expected to be exposed during normal operating procedures.

Other given operational conditions affecting worker exposure

Indoor use. Assumes use at not more than 20 °C above ambient temperature. Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures at process level (source) to prevent release

PROC 1, 2 & 3: Closed processes.
PROC 4: Enclosed transfers, batch processes.
PROC 8a: LEV (80% efficiency)
PROC 8b: Enclosed transfers, vented transfer points.
PROC 9: Enclosed transfers, vented transfer points.
PROC 15: Predominantly open transfers, fume cupboard used

Technical conditions and measures to control dispersion from source towards the worker

Provide extract ventilation to points where emissions occur. Use drum pumps where possible to reduce exposure from drum transfers. Where drum pumps cannot be used take particular care and use appropriate PPE to avoid exposure.

Organisational measures to prevent/limit releases, dispersion and exposure

Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Ensure relevant staff is informed of exposure potential and aware of basic actions to minimize exposures. Provide regular health surveillance as appropriate. Identify and implement corrective actions.

Conditions and measures related to personal protection, hygiene and health evaluation

Gloves (tested to EN374 standard) must be worn where contact with hands is possible.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37

Additional chemical resistant PPE (such as goggles, aprons, full body protection) should be provided based upon the level of exposure likely. Always consult an experienced occupational risk assessor prior to setting new operational procedures.

3. Exposure estimation and reference to its source

Environment:
Predicted Environmental Concentrations (PEC) were calculated using the emission factors and values listed in section 2.1 of this annex. Calculations were performed using the computer model Petrorisk version 6. Values are taken from the REACH registration dossier and Chemical Safety Report (CSR).

PEC air (mg/m^3)	2.4E-02
PEC freshwater (mg/l)	1.8E-03
PEC marine water (mg/l)	5.7E-05
PEC freshwater sediment (mg/kg ww)	1.4E+00
PEC marine sediment (mg/kg ww)	6.4E-02
PEC agricultural soil (mg/kg ww)	1.7E-01
PEC effluent (mg/l)	5.7E-03
PEC sludge (mg/kg dw)	2.0E+01

Workers:
The exposure of workers from each PROC code activity (based upon the above scenario "Control of worker exposure"), is characterized quantitatively below. The values presented below have been calculated using the ECETOC Targeted Risk Assessment (TRA) tool.
Dermal irritation:
Dermal irritation has been assessed in a qualitative manner. Safe use is assumed where the following good practice instructions are adopted and practiced:
Avoid direct skin contact with the product;
Identify potential areas for indirect skin contact;
Wear gloves (EN374) if direct hand contact with the substance or product is likely;
Clean up contamination/spills as soon as they occur;
Wash off skin contamination immediately, and;
Provide basic employee training to prevent/minimize exposure and to report any skin effects that may develop.

PROC code	**Inhalation exposure from process (mg/m^3)**	**LEV efficiency (%)**	**Predicted inhalation exposure (mg/m^3)**	**Dermal exposure from process (mg/kg/d)**	**Dermal protection efficiency (%)**	**Predicted dermal exposure (mg/kg/d)**
1	0.01	0	0.01	0.34	0	0.34
2	1	0	1	1.37	0	1.37
3	3	0	3	0.34	0	0.34
4	5	0	5	6.86	80	1.37
8a	10	80	2	13.71	90	1.37
8b	5	0	5	6.86	80	1.37
9	5	0	5	6.86	80	1.372
15	5	0	5	0.34	0	0.34

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

To ensure that the use of this substance is safe, downstream users should review this section and check the ES values against values for their own, site specific, actual use of the substance.

Environment:

Scaling may be necessary to account for differences between the environmental exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. Only aquatic Risk Characterization Ratio (RCR) values are applicable at the local (site specific level). RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Amount used per site (annual) (A)	561,000		Actual value/ES value=A
Emission days per year (E)	300		ES value/Actual value=E
Dilution factor (D)	Freshwater 10 Marine 100		Actual value/ES value=D
Release factor (R)	Wastewater: 0.1E-04		Actual value/ES value=R
Percentage substance removal from effluent (P)	Wastewater: 94.1		1-Actual value/1-ES value=P
RCR value	Freshwater: 4.8E-02 Marine water: 8.3E-04 Freshwater sediment: 5.5E-02 Marine sediment: 1.9E-03		A*E*D*R*P*RCR ES value=RCR actual

Workers:

Scaling may be necessary to account for differences between the worker exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Duration of exposure (hours) (D)	8		Actual value/8=D
LEV efficiency (%) (LEV)	PROC 1, 2, 3, 8b, 15: 0 PROC 8a: 80		Actual value/ES value=LEV
RPE efficiency (%) (RP)	All PROC: 0		Actual value/ES value=RPE
RCRinh	PROC 1, 2: 0.1 PROC 3: 0.04 PROC 4, 8b, 9, 15: 0.07 PROC 8a: 0.03		D*LEV*RPE*ES RCRinh=actual RCRinh
PPE efficiency (%) (PPE)	PROC 1, 2, 3, 15: 0 PROC 4, 8b, 9: 80 PROC 8a: 90		Actual value/ES value=PPE
RCRderm	PROC 1, 2, 4, 8a, 8b, 9: 0.47 PROC 3, 15: 0.12		D*PPE*ES RCRderm=actual RCRderm

1. Formulation & (re)packaging of substance and mixtures

Sector(s) of use:
SU 3: Industrial uses: Uses of substances as such or in mixtures at industrial sites
SU 11: Manufacture of rubber products

Control of environmental exposure:
ERC 2: Formulation of mixtures
ESVOC SpERC 2.2.v1: Formulation & (re)packing of substances and mixtures (industrial): solvent-borne

Control of worker exposure:
PROC 1: Use in closed process, no likelihood of exposure
PROC 2: Use in closed, continuous process with occasional controlled exposure
PROC 3: Use in closed batch process (synthesis or formulation)
PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC 5: Mixing or blending in batch processes for formulation or mixtures and articles (multistage and/or significant contact)
PROC 8a: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filing line, including weighing)
PROC 14: Production of mixtures or articles by tableting, compression, extrusion, pelletisation
PROC 15: Use as laboratory reagent

Processes, tasks and activities covered by this ES:
Formulation, packaging, and re-packaging of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tableting, compression, pelletisation, extrusion, large and small scale packing, maintenance, sampling and associated laboratory activities

2 Exposure Scenario

2.1 Contributing scenario controlling environmental exposure for formulation & (re)packaging of substance and mixtures

Control of environmental exposure

This section describes the release of the substance to the environment through formulation and repacking of the substance, and the measures which are expected to be taken to reduce and control the amount released to the environment

Product Characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Amount used per site (annual): 3,000 tonnes
Amount used per site (daily): 10,000 kilograms

Frequency and duration of use

Continuous use
300 emission days/year

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

Release factor to air from process (after typical onsite RMMs, consistent with EU Solvent Emissions Directive requirements): 1
Release fraction to wastewater from process (initial release prior to RMM): 0.002
Release fraction to soil from process (initial release prior to RMM): 0.01

Technical conditions and measures at process level (source) to prevent release

Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk from environmental exposure is driven by freshwater sediment.
Prevent discharge of undissolved substance to or recover from onsite wastewater.
Treat air emission to provide a typical removal efficiency of: 0%
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥: 59.9 %

If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal. Efficiency of:
≥0%

Organizational measures to prevent/limit release from site

Prevent discharge of undissolved substance to or recover from wastewater. Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Estimated substance removal from wastewater via domestic sewage treatment: 94.1%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.1%
Maximum allowable site tonnage (M_{safe}) based on release following total wastewater treatment removal:
680,000kg/day
Assume domestic sewage treatment plant flow: $2000m^3/d$

Conditions and measures related to external treatment of waste for disposal

External treatment and disposal of waste should comply with applicable regulations.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable regulations.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH. Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Use specifics: additional measures to reduce the predicted exposure beyond the estimated level.

2.2 Contributing scenario controlling worker exposure for formulation & (re)packaging of substance and mixtures

Control of worker exposure

This section describes the release of the substance to the environment through formulation and (re)packing of the substance, and the measures which are expected to be taken to reduce and control the amount released to the environment

Product Characteristics

Liquid product with potential for aerosol generation.
Vapour pressure: <0.5 kPa at STP
Concentration of substance in product: 100%

Amounts used

Amount used per site (annual): 3,000 tonnes
Amount used per site (daily): 10,000 kilograms

Frequency and duration of use

Daily use for all PROC activities. Durations specified for each PROC code:
PROC 1, 2, 3, 4, 8a, 8b & 15: 15 minutes to 1 hour per day
PROC 5, 9 & 14: ≤ 8 hours per day

Human factors not influenced by risk management

Hands, forearms, face, neck and hair are expected to be exposed during normal operating procedures.

Other given operational conditions affecting worker exposure

Indoor use. Assumes use at not more than 20 °C above ambient temperature. Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures at process level (source) to prevent release

PROC 1, 2 & 3: Closed processes.
PROC 4: Enclosed transfers, batch processes.
PROC 5: LEV (90% efficiency)
PROC 8a: LEV (80% efficiency)
PROC 8b: Enclosed transfers, vented transfer points.
PROC 9: Enclosed transfers, vented transfer points.
PROC 14: No technical conditions.
PROC 15: Predominantly open transfers, fume cupboard used

Technical conditions and measures to control dispersion from source towards the worker

Provide extract ventilation to points where emissions occur. Use drum pumps where possible to reduce exposure from drum transfers. Where drum pumps cannot be used take particular care and use appropriate PPE to avoid exposure.

Organizational measures to prevent/limit releases, dispersion and exposure

Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Ensure relevant staff is informed of exposure potential and aware of basic actions to minimize exposures. Provide regular health surveillance as appropriate. Identify and implement corrective actions.

Conditions and measures related to personal protection, hygiene and health evaluation

Gloves (tested to EN374 standard) must be worn where contact with hands is possible.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37

Additional chemical resistant PPE (such as goggles, aprons, full body protection) should be provided based upon the level of exposure likely. Always consult an experienced occupational risk assessor prior to setting new operational procedures.

3. Exposure estimation and reference to its source

Environment:
Predicted Environmental Concentrations (PEC) were calculated using the emission factors and values listed in section 2.1 of this annex. Calculations were performed using the computer model Petrorisk version 6. Values are taken from the REACH registration dossier and Chemical Safety Report (CSR).

PEC air (mg/m^3)	2.0E-02
PEC freshwater (mg/l)	1.5E-03
PEC marine water (mg/l)	2.8E-05
PEC freshwater sediment (mg/kg ww)	1.4E+00
PEC marine sediment (mg/kg ww)	6.3E-02
PEC agricultural soil (mg/kg ww)	1.7E-01
PEC effluent (mg/l)	2.8E-03
PEC sludge (mg/kg dw)	9.8E+00

Workers:
The exposure of workers from each PROC code activity (based upon the above scenario "Control of worker exposure"), is characterized quantitatively below. The values presented below have been calculated using the ECETOC Targeted Risk Assessment (TRA) tool.

Dermal irritation:
Dermal irritation has been assessed in a qualitative manner. Safe use is assumed where the following good practice instructions are adopted and practiced:
Avoid direct skin contact with the product;
Identify potential areas for indirect skin contact;
Wear gloves (EN374) if direct hand contact with the substance or product is likely;
Clean up contamination/spills as soon as they occur;
Wash off skin contamination immediately, and;
Provide basic employee training to prevent/minimize exposure and to report any skin effects that may develop.

PROC code	**Inhalation exposure from process (mg/m^3)**	**LEV efficiency (%)**	**Predicted inhalation exposure (mg/m^3)**	**Dermal exposure from process (mg/kg/d)**	**Dermal protection efficiency (%)**	**Predicted dermal exposure (mg/kg/d)**
1	0.01	0	0.01	0.03	0	0.03
2	1	0	1	1.37	0	1.37
3	3	0	3	0.34	0	0.34
4	5	0	5	6.86	80	1.37
5	25	90	2.5	13.71	90	1.37
8a	10	80	2	13.71	90	1.37
8b	5	0	5	6.86	80	1.37

9	5	0	5	6.86	80	1.372
14	5	0	5	3.43	80	0.69
15	5	0	5	0.34	0	0.34

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

To ensure that the use of this substance is safe, downstream users should review this section and check the ES values against values for their own, site specific, actual use of the substance.

Environment:
Scaling may be necessary to account for differences between the environmental exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. Only aquatic Risk Characterization Ratio (RCR) values are applicable at the local (site specific level). RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Amount used per site (annual) (A)	3000		Actual value/ES value=A
Emission days per year (E)	300		ES value/Actual value=E
Dilution factor (D)	Freshwater 10 Marine 100		Actual value/ES value=D
Release factor (R)	Wastewater: 2.0E-03		Actual value/ES value=R
Percentage substance removal from effluent (P)	Wastewater: 94.1		1-Actual value/1-ES value=P
RCR value	Freshwater: 8.9E-02 Marine water: 8.9E-03 Freshwater sediment: 1.5E-01 Marine sediment: 1.1E-02		A*E*D*R*P*RCR ES value=RCR actual

Workers:
Scaling may be necessary to account for differences between the worker exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Duration of exposure (hours) (D)	8		Actual value/8=D
LEV efficiency (%) (LEV)	PROC 1, 2, 3, 4, 8b, 9, 14, 15: 0 PROC 8a: 80 PROC 5: 90		Actual value/ES value=LEV
RPE efficiency (%) (RP)	All PROC: 0		Actual value/ES value=RPE
RCRinh	PROC 1, 2: 0.01 PROC 3: 0.04 PROC 4, 8b, 9, 14, 15: 0.07 PROC 5: 0.36 PROC 8a: 0.03		D*LEV*RPE*ES RCRinh=actual RCRinh
PPE efficiency (%) (PPE)	PROC 1, 2, 3, 15: 0 PROC 4, 8b, 9, 14: 80		Actual value/ES

	PROC 5, 8a: 90		value=PPE
RCRderm	PROC 1, 2, 4, 5, 8a, 8b, 9: 0.47 PROC 3, 15: 0.12 PROC 14: 0.24		D*PPE*ES RCRderm= actual RCRderm

1. Use as a fuel - Industrial

Sector(s) of use:
SU 3: Industrial uses: Uses of substances as such or in mixtures at industrial sites

Control of environmental exposure:
ERC 7: Industrial use of substances in closed systems
ESVOC SpERC 7.12a.v1:

Control of worker exposure:
PROC 1: Use in closed process, no likelihood of exposure
PROC 2: Use in closed, continuous process with occasional controlled exposure
PROC 3: Use in closed batch process (synthesis or formulation)
PROC 8a: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected

Processes, tasks and activities covered by this ES:
Process covers the use as a fuel (or fuel additives and additive components) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

2 Exposure Scenario

2.1 Contributing scenario controlling environmental exposure for use as a fuel - industrial

Control of environmental exposure

This section describes the release of the substance to the environment through the industrial use as a fuel, and the measures which are expected to be taken to reduce and control the amount released to the environment

Product Characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Amount used per site (annual): 1,500,000 tonnes
Amount used per site (daily): 500,000 kilograms

Frequency and duration of use

Continuous use
300 emission days/year

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

Release fraction to air from process (initial release prior to RMM): 0.025
Release fraction to wastewater from process (initial release prior to RMM): 0.00036
Release fraction to soil from process (initial release prior to RMM): 0

Technical conditions and measures at process level (source) to prevent release

Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk from environmental exposure is driven by freshwater sediment.
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.
Treat air emission to provide a typical removal efficiency of: 95%
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥: 97.7 %
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal. Efficiency of: ≥60.4%

Organizational measures to prevent/limit release from site

Prevent discharge of undissolved substance to or recover from wastewater. Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Estimated substance removal from wastewater via domestic sewage treatment: 94.1%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 97.7%

Maximum allowable site tonnage (M_{safe}) based on release following total wastewater treatment removal: 5,000,000kg/day
Assume domestic sewage treatment plant flow: 2000m^3/d

Conditions and measures related to external treatment of waste for disposal

Combustion emissions limited by required exhaust emission controls. Combustion emissions considered regional exposure assessment.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable regulations.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH. Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Use specifics: additional measures to reduce the predicted exposure beyond the estimated level.

2.2 Contributing scenario controlling worker exposure for use as a fuel - industrial

Control of worker exposure

This section describes the release of the substance to the environment through the industrial use as a fuel, and the measures which are expected to be taken to reduce and control the amount released to the environment

Product Characteristics

Liquid product with potential for aerosol generation.
Vapour pressure: <0.5 kPa
Concentration of substance in product: 100%

Amounts used

Amount used per site (annual): 1,500,000 tonnes
Amount used per site (daily): 500,000 kilograms

Frequency and duration of use

Daily use for all PROC activities. Durations specified for each PROC code:
PROC 1, 2, 3, 8a, 8b& 16: >4 hours per day
Covers daily exposures up to 8 hours

Human factors not influenced by risk management

Hands, forearms, face, neck and hair are expected to be exposed during normal operating procedures.

Other given operational conditions affecting worker exposure

Indoor use. Assumes use at not more than 20 °C above ambient temperature. Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures at process level (source) to prevent release

PROC 1, 2 & 3: Closed processes
PROC 8a: LEV (80% efficiency)
PROC 8b: Enclosed transfers, vented transfer points
PROC 16: Closed processes

Technical conditions and measures to control dispersion from source towards the worker

Provide extract ventilation to points where emissions occur. Use drum pumps where possible to reduce exposure from drum transfers. Where drum pumps cannot be used take particular care and use appropriate PPE to avoid exposure. Clean up contamination/spills as soon as they occur. Dispose of waste in accordance with regulatory requirements.

Organizational measures to prevent/limit releases, dispersion and exposure

Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Ensure relevant staff is informed of exposure potential and aware of basic actions to minimize exposures. Provide regular health surveillance as appropriate. Identify and implement corrective actions.

Conditions and measures related to personal protection, hygiene and health evaluation

Where there is the potential for exposure, ensure relevant staff are informed of exposure potential and aware of basic actions to minimize exposures. Gloves (tested to EN374 standard) must be worn where contact with hands is possible.

Additional good practice advice beyond the REACH CSA

Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37

Additional chemical resistant PPE (such as goggles, aprons, full body protection) should be provided based upon the level of exposure likely. Always consult an experienced occupational risk assessor prior to setting new operational procedures.

3. Exposure estimation and reference to its source

Environment:

Predicted Environmental Concentrations (PEC) were calculated using the emission factors and values listed in section 2.1 of this annex. Calculations were performed using the computer model Petrorisk version 6. Values are taken from the REACH registration dossier and Chemical Safety Report (CSR).

PEC air (mg/m^3)	2.9E-01
PEC freshwater (mg/l)	5.5E-02
PEC marine water (mg/l)	5.5E-03
PEC freshwater sediment (mg/kg ww)	2.1E+00
PEC marine sediment (mg/kg ww)	2.1E-01
PEC agricultural soil (mg/kg ww)	1.7E-01
PEC effluent (mg/l)	5.5E-01
PEC sludge (mg/kg dw)	1.9E+03

Workers:

The exposure of workers from each PROC code activity (based upon the above scenario "Control of worker exposure"), is characterized quantitatively below. The values presented below have been calculated using the ECETOC Targeted Risk Assessment (TRA) tool.

Dermal irritation:

Dermal irritation has been assessed in a qualitative manner. Safe use is assumed where the following good practice instructions are adopted and practiced:

Avoid direct skin contact with the product;

Identify potential areas for indirect skin contact;

Wear gloves (EN374) if direct hand contact with the substance or product is likely;

Clean up contamination/spills as soon as they occur;

Wash off skin contamination immediately, and;

Provide basic employee training to prevent/minimize exposure and to report any skin effects that may develop.

PROC code	**Inhalation exposure from process (mg/m^3)**	**LEV efficiency (%)**	**Predicted inhalation exposure (mg/m^3)**	**Dermal exposure from process (mg/kg/d)**	**Dermal protection efficiency (%)**	**Predicted dermal exposure (mg/kg/d)**
1	1	0	1	1.37	0	1.37
2	1	0	1	1.37	0	1.37
3	1	0	1	0.34	0	0.34
8a	5	80	1	13.71	90	1.37
8b	5	0	5	6.86	80	1.37
16	1	0	1	0.03	0	0.03

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

To ensure that the use of this substance is safe, downstream users should review this section and check the ES values against values for their own, site specific, actual use of the substance.

Environment:

Scaling may be necessary to account for differences between the environmental exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. Only aquatic Risk Characterization Ratio (RCR) values are applicable at the local (site specific level). RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Amount used per site (annual) (A)	1,500,000		Actual value/ES value=A

Emission days per year (E)	300		ES value/Actual value=E
Dilution factor (D)	Freshwater 10 Marine 100		Actual value/ES value=D
Release factor (R)	Wastewater: 3.6E-04		Actual value/ES value=R
Percentage substance removal from effluent (P)	Wastewater: 97.7		1-Actual value/1-ES value=P
RCR value	Freshwater: 8.0E-01 Marine water: 8.0E-02 Freshwater sediment: 9.1E-01 Marine sediment: 9.1E-02		A*E*D*R*P*RCR ES value=RCR actual

Workers:
Scaling may be necessary to account for differences between the worker exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Duration of exposure (hours) (D)	8		Actual value/8=D
LEV efficiency (%) (LEV)	PROC 1, 2, 3, 8b, 16: 0 PROC 8a: 80		Actual value/ES value=LEV
RPE efficiency (%) (RP)	All PROC: 0		Actual value/ES value=RPE
RCRinh	PROC 1, 2, 3, 8a, 16: 0.01 PROC 8b: 0.07		D*LEV*RPE*ES RCRinh=actual RCRinh
PPE efficiency (%) (PPE)	PROC 1, 2, 3, 16: 0 PROC 8a: 90 PROC 8b: 80		Actual value/ES value=PPE
RCRderm	PROC 1, 2: 0.47 PROC 3, 16: 0.12 PROC 8a, 8b: 0.47		D*PPE*ES RCRderm=actual RCRderm

1. Use as a fuel - professional

Sector(s) of use:
SU 22: professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Control of environmental exposure:
ERC 9a: Wide dispersive indoor use of substances in closed systems
ERC 9b: Wide dispersive outdoor use of substances in closed systems
ESVOC SpERC 9.12b.v1

Control of worker exposure:
PROC 1: Use in closed process, no likelihood of exposure
PROC 2: Use in closed, continuous process with occasional controlled exposure
PROC 3: Use in closed batch process (synthesis or formulation)
PROC 8a: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected

Processes, tasks and activities covered by this ES:
Process covers the use as a fuel (or fuel additives and additive components) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

2 Exposure Scenario

2.1 Contributing scenario controlling environmental exposure for use as a fuel - professional

Control of environmental exposure

This section describes the release of the substance to the environment through the professional use as a fuel, and the measures which are expected to be taken to reduce and control the amount released to the environment.

Product Characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Amount used per site (annual): 3340 tonnes
Amount used per site (daily): 9.15 kilograms

Frequency and duration of use

Continuous use
365 emission days/year

Environment factors not influenced by risk management

Local freshwater dilution factor: 10
Local marine water dilution factor: 100

Other given operational conditions affecting environmental exposure

Release factor to air from wide dispersive use (regional use only): 0.0001
Release fraction to wastewater wide dispersive use: 0.00001
Release fraction to soil from wide dispersive use (regional use only): 0.00001

Technical conditions and measures at process level (source) to prevent release

Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk from environmental exposure is driven by humans via indirect exposure (primary ingestion)
No wastewater treatment required.
Treat air emission to provide a typical removal efficiency of: N/A
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥0 %
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal. Efficiency of: ≥0%

Organizational measures to prevent/limit release from site

Prevent discharge of undissolved substance to or recover from wastewater. Do not apply industrial sludge to natural soils.
Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant

Estimated substance removal from wastewater via domestic sewage treatment: 94.1%
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs: 94.1%
Maximum allowable site tonnage (M_{safe}) based on release following total wastewater treatment removal: 140,000kg/day
Assume domestic sewage treatment plant flow: 2000m^3/d

Conditions and measures related to external treatment of waste for disposal

Combustion emissions limited by required exhaust emission controls. Combustion emissions considered regional exposure assessment.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable regulations.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH. Thus, the downstream user is not obliged to i) carry out an own CSA and ii) to notify the use to the Agency, if he does not implement these measures.

Use specifics: additional measures to reduce the predicted exposure beyond the estimated level.

2.2 Contributing scenario controlling worker exposure for formulation & (re)packaging of substance and mixtures

Control of worker exposure

This section describes the amount of the substance which may be exposed to workers through the professional use of the substance as fuel, and the measures which are expected to be taken to reduce the exposure amount.

Product Characteristics

Liquid product with potential for aerosol generation.
Vapour pressure: <0.5 kPa
Concentration of substance in product: 100%

Amounts used

Amount used per site (annual): 3340 tonnes
Amount used per site (daily): 9.15 kilograms

Frequency and duration of use

Daily use for all PROC activities. Durations specified for each PROC code:
PROC 1, 2, 3, 8a, 8b& 16: >4 hours per day
Covers daily exposures up to 8 hours

Human factors not influenced by risk management

Hands, forearms, face, neck and hair are expected to be exposed during normal operating procedures.

Other given operational conditions affecting worker exposure

Indoor use. Assumes use at not more than 20 °C above ambient temperature. Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures at process level (source) to prevent release

PROC 1, 2 & 3: Closed processes.
PROC 8a: LEV (80% efficiency)
PROC 8b: Enclosed transfers, vented transfer points.
PROC 16: Closed processes

Technical conditions and measures to control dispersion from source towards the worker

Provide extract ventilation to points where emissions occur. Use drum pumps where possible to reduce exposure from drum transfers. Where drum pumps cannot be used take particular care and use appropriate PPE to avoid exposure. Clean up contamination/spills as soon as they occur. Dispose of waste in accordance with regulatory requirements.

Organizational measures to prevent/limit releases, dispersion and exposure

Drain down systems and transfer lines prior to breaking containment. Drain down and flush equipment where possible prior to maintenance. Ensure relevant staff is informed of exposure potential and aware of basic actions to minimize exposures. Provide regular health surveillance as appropriate. Identify and implement corrective actions.

Conditions and measures related to personal protection, hygiene and health evaluation

Where there is the potential for exposure, ensure relevant staff are informed of exposure potential and aware of basic actions to minimize exposures. Gloves (tested to EN374 standard) must be worn where contact with hands is possible.

Additional good practice advice beyond the REACH CSA
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37

Additional chemical resistant PPE (such as goggles, aprons, full body protection) should be provided based upon the level of exposure likely. Always consult an experienced occupational risk assessor prior to setting new operational procedures.

3. Exposure estimation and reference to its source

Environment:
Predicted Environmental Concentrations (PEC) were calculated using the emission factors and values listed in section 2.1 of this annex. Calculations were performed using the computer model Petrorisk version 6. Values are taken from the REACH registration dossier and Chemical Safety Report (CSR).

PEC air (mg/m^3)	2.0E-02
PEC freshwater (mg/l)	1.5E-03
PEC marine water (mg/l)	2.8E-05
PEC freshwater sediment (mg/kg ww)	1.4E+00
PEC marine sediment (mg/kg ww)	6.3E-02
PEC agricultural soil (mg/kg ww)	1.7E-01
PEC effluent (mg/l)	2.8E-03
PEC sludge (mg/kg dw)	9.8E+00

Workers:
The exposure of workers from each PROC code activity (based upon the above scenario "Control of worker exposure"), is characterized quantitatively below. The values presented below have been calculated using the ECETOC Targeted Risk Assessment (TRA) tool.
Dermal irritation:
Dermal irritation has been assessed in a qualitative manner. Safe use is assumed where the following good practice instructions are adopted and practiced:
Avoid direct skin contact with the product;
Identify potential areas for indirect skin contact;
Wear gloves (EN374) if direct hand contact with the substance or product is likely;
Clean up contamination/spills as soon as they occur;
Wash off skin contamination immediately, and;
Provide basic employee training to prevent/minimize exposure and to report any skin effects that may develop.

PROC code	Inhalation exposure from process (mg/m^3)	LEV efficiency (%)	Predicted inhalation exposure (mg/m^3)	Dermal exposure from process (mg/kg/d)	Dermal protection efficiency (%)	Predicted dermal exposure (mg/kg/d)
1	1	0	1	1.34	0	1.34
2	1	0	1	1.34	0	1.34
3	1	0	1	0.34	0	0.34
8a	5	0	5	13.71	90	1.37
8b	5	0	5	6.86	80	1.37
16	20	30	14	0.34	0	0.34

4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

To ensure that the use of this substance is safe, downstream users should review this section and check the ES values against values for their own, site specific, actual use of the substance.
Environment:
Scaling may be necessary to account for differences between the environmental exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. Only aquatic Risk Characterization Ratio (RCR) values are applicable at the local (site specific level). RCR values <1 are considered to show safe use of the substance.

Parameter	ES value	Actual value	Safety scaling
Amount used per site (annual) (A)	3340		Actual value/ES value=A
Emission days per year (E)	365		ES value/Actual value=E
Dilution factor (D)	Freshwater 10 Marine 100		Actual value/ES value=D
Release factor (R)	Wastewater: 0.1E-04		Actual value/ES value=R
Percentage substance removal from effluent (P)	Wastewater: 94.1		1-Actual value/1-ES value=P

RCR value	Freshwater: 4.3E-02 Marine water: 4.1E-04 Freshwater sediment: 5.0E-02 Marine sediment: 1.4E-03		A*E*D*R*P*RCR ES value=RCR actual

Workers:
Scaling may be necessary to account for differences between the worker exposure scenario in section 2 and the actual (site specific) use of the substance. The following table shows a simple scaling method. Where data is missing or actual (site specific) values are not available, the ES values can be used for calculation purposes. RCR values <1 are considered to show safe use of the substance.

Parameter	**ES value**	**Actual value**	**Safety scaling**
Duration of exposure (hours) (D)	8		Actual value/8=D
LEV efficiency (%) (LEV)	PROC 1, 2, 3, 8a, 8b: 0 PROC 16: 30		Actual value/ES value=LEV
RPE efficiency (%) (RP)	All PROC: 0		Actual value/ES value=RPE
RCRinh	PROC 1, 2, 3: 0.1 PROC 8a, 8b: 0.7 PROC 16: 0.2		D*LEV*RPE*ES RCRinh=actual RCRinh
PPE efficiency (%) (PPE)	PROC 1, 2, 3, 16: 0 PROC 8a: 90 PROC 8b: 80		Actual value/ES value=PPE
RCRderm	PROC 1, 2: 0.46 PROC 3, 16: 0.12 PROC 8a, 8b: 0.47		D*PPE*ES RCRderm=actual RCRderm

Attachment 2b

The Avogadro Group, LLC

2014 EMISSION COMPLIANCE TESTS
EAGLE PEAK ROCK AND PAVING, INC.
ALTURAS, CALIFORNIA

Prepared For:

EAGLE PEAK ROCK AND PAVING, INC.
P.O. BOX 879
ALTURAS, CALIFORNIA 96101

For Submittal To:

SISKIYOU COUNTY AIR POLLUTION CONTROL DISTRICT
525 South Foothill Drive
Yreka, California 96097

Prepared By:

THE AVOGADRO GROUP, LLC
2825 Verne Roberts Circle
Antioch, California 94509
(925) 680-4300

October 10, 2014

REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and documented in this report were carried out by me or under my direction and supervision. I hereby certify that to the best of my knowledge, Avogadro operated in conformance with the requirements of ASTM D7036-04 during this test project.

Name: Chris Crowley, QSTI
Title: Project Manager
Sign:
Date: 10-10-14

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that to the best of my knowledge the presented material is authentic and accurate and conforms to the requirements of ASTM D7036-04.

Name: Ian Emerson, QSTI
Title: QA/QC Scientist
Sign:
Date: 10/10/14

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SUMMARY INFORMATION

Source Information

Source Location:	451 Granite Court Yreka, California 96097
Plant Contact:	Mr. Ken Worthan
Telephone:	(530) 233-4568
Regulatory Agency:	Siskiyou County Air Pollution Control District (SCAPCD)
Source:	Asphaltic Concrete Drum Hot-Mix Plant
Purpose:	Determination of compliance with permit conditions
Permit Nos.:	ATC/PTO 13-0412-AC
Procedures:	EPA Methods 1, 2, 3a, 4, 5/202, 7E, 9, 10, 18, and TO-15

Testing Company Information

Testing Firm:	The Avogadro Group, LLC 2825 Verne Roberts Circle Antioch, California 94509	
Certification:	ARB Independent Tester, Air Emission Testing Body (AETB)	
Contact:	Mr. Chris Crowley Project Manager	Mr. Erick Mirabella Client Account Manager
Telephone:	(925) 470-7901	(925) 680-0935
Facsimile:	(925) 680-4416	(925) 680-4416
Test Date (s):	September 9, 2014	

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SECTION 1.0

INTRODUCTION

The Avogadro Group, LLC (Avogadro) was contracted by Eagle Peak Rock and Paving Inc., (Eagle Peak) to perform a series of air emission tests at their portable hot mix asphalt plant currently located in Yreka, California. The tests were conducted on one hot mix asphalt plant to determine compliance with the source testing limitations of the Siskyou County Air Pollution Control District (SCAPD) Permits to Operate (PTOs) Nos. ATC/PTO 13-0412-AC.

The testing was conducted by Chris Crowley and Kyle Daneff of Avogadro on September 9, 2014. Ken Worthan of Eagle Peak coordinated the testing program. The tests were conducted according to a test plan dated August 25, 2014 that was submitted to and approved by the SCAPCD. Ms. Kimberly Sumner of the SCAPCD was present to observe most of the testing. Avogadro performed the tests to measure the following emission parameters:

- Emission Compliance:
    - ➢ CO (ppm volume dry, lb/hr)
    - ➢ NO_X (ppm volume dry, lb/hr)
    - ➢ VOC (ppm volume dry, lb/hr)
    - ➢ BTEX (ppm volume dry, lb/hr)
    - ➢ TPM (gr/dscf, gr/dscf@12% CO_2, lb/hr)
- O_2 and CO_2, (% volume dry) - for molecular weight & dilution calculations
- Stack volumetric flow rate (dscfm) and moisture content (% by volume)
- Visible Emissions (%)

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Avogadro. The average emission test results are summarized and compared to their respective permit limits in Table 1-1. Detailed results for individual test runs can be found in Section 6.0. All supporting data can be found in the appendices.

TABLE 1-1
SUMMARY OF AVERAGE COMPLIANCE RESULTS
YREKA PLANT
SEPTEMBER 9, 2014

Parameter	Unit	Permit Limit
Unit Data:		
Load, %	76.4	--
CO Emissions:		
ppm volume dry	351.6	--
lb/hr	24.98	--
NO_X Emissions:		
ppm volume dry	104.7	--
lb/hr as NO_2	12.55	140
VOC Emissions:		
ppm volume dry as CH_4	9.61	--
lb/hr as CH_4	0.400	--
Total BTEX Emissions:		
ppm volume dry	0.2610	--
lb/hr	0.057	--
Total Particulate Matter:		
gms/dscf	0.0150	0.04
gms/dscf @ 12% CO_2	0.0270	0.20
lb/hr	2.13	--
Visible Emissions:		
% Opacity	0.0	20

SECTION 2.0

TESTING CONTRACTOR

The test program was conducted by Avogadro. Portions of the sample analyses were subcontracted to qualified analytical laboratories. The contact persons for the project are:

• Project Manager:	Chris Crowley	(925) 470-7901
• Eagle Peak Rock and Paving:	Ken Worthan	(530) 233-4568
• Avogadro Laboratory:	Samantha Oliva	(925) 470-4505
• AAC Laboratory:	Marcus Hueppe	(805) 650-1642
• SCAPCD:	Kimberly Sumner	(530) 841-4030

Avogadro is a full service source testing and combustion consulting firm with extensive experience in air quality management and pollution control. Avogadro provided a professional source test team to conduct the testing as described in this report. The test team members that performed the tests have successfully conducted hundreds of similar compliance tests.

We have established a quality system that has lead to interim accreditation with ASTM Standard D7036-04 (March 16, 2012), and our project managers and test team leaders have already been certified under the qualified source testing individual (QSTI) program instituted by the Source Evaluation Society (SES). One qualified individual (QI), Mr. Chris Crowley was on site throughout the test program. Avogadro is also certified by the California Air Resources Board (CARB) under their Independent Contractor program, to conduct emission testing pursuant to Section 91200-21220, Title 17, California Code of Regulations.

Avogadro provided a professional source test team to conduct the testing as described in this report. Mr. Chris Crowley was project manager for the test program at the Yreka Hot-Mix Asphalt facility. As project manager, Chris's responsibilities included overseeing the execution and planning of all air sampling efforts including reporting and project coordination. Chris's primary objective was to ensure that the results generated by this test program meet the expectations and requirements of both Eagle Peak and the SCAPCD.

SECTION 3.0

SOURCE LOCATION INFORMATION

3.1 FACILITY DESCRIPTION

Eagle Peak operates a portable asphaltic concrete hot mix plant currently located in Yreka, California. The plant, manufactured by Terex is equipped with a Model E-275P counter flow rotary drum. The drum is equipped with a diesel-fired Hauck burner, rated at 100 MMBtu/hr. Particulate emissions from the dryer are controlled by a Terex Model RA-P-318 baghouse. The plant has a rated production capacity of 275 tons per hour (tph).

The plant produces asphalt for the surrounding area.

3.2 SAMPLING LOCATIONS

Emissions from the rotary mixing drum are drawn through a baghouse by an induced draft fan. Baghouse exhaust gases are discharged to the atmosphere through a rectangular stack. The stack dimensions (internal) are 39 inches wide by 52 inches deep (i.e., equivalent diameter (D_e) of 44.6 inches). The stack is equipped with five test ports positioned equidistant along the 39-inch side. The ports are located 56 inches upstream and 228 inches downstream of the nearest flow disturbances. A 20-point traverse (i.e., a 5 x 4 matrix) was conducted during each of the particulate tests, as per EPA Method 1 specifications.

The stack dimensions and traverse point locations are detailed in Appendix C.1.

SECTION 4.0

TEST DESCRIPTION

4.1 PROGRAM OBJECTIVES

The objective of the testing program was to determine the compliance status of the source with respect to the conditions specified in the ATC/PTO 13-0412-AC issued by the SCAPCD. The permit limitations are presented in Table 4-1.

TABLE 4-1
EMISSION PERMIT LIMITATIONS
YREKA PLANT

Emission Parameter	Units of Measurement	Permit Limitations	PTO Reference
Oxides of Nitrogen (NO_X)	lb/hr as NO_2	140	Condition 30
Carbon Monoxide (CO)	lb/hr	--	--
Volatile Organic Compounds (VOCs)	lb/hr as CH_4	--	--
BTEX	lb/hr	--	--
Particulate Matter (Total PM)	gr/dscf gr/dscf @ 12% CO_2	0.04 0.20	Condition 26.a Condition 27.a
Opacity	% Opacity	20	Condition 26.b

4.2 TEST CONDITIONS

The emission tests were conducted while the unit was operating at three different operating loads (62%, 76%, 91%). Test conditions were established by Eagle Peak personnel. The unit was fired exclusively on residual fuel oil (RFO) throughout the emission tests. Test conditions changed from run to run due primarily to the change in demand for product.

Operating data are summarized below and presented in detail in Appendix C.

- Asphalt production rate – 210 tons per hour
- Fuel firing rate – 1.00 gallons per ton of asphalt
- Baghouse inlet temperature – 285 °F
- Baghouse outlet temperature – 282 °F
- Fuel flow valve setting – 14%
- Combuston air setting – 31%
- Damper Setting – 45%

4.3 TEST PROGRAM SCHEDULE

The test program was completed in two days. The first day consisted of travel and set-up. The next day included the emission testing. The actual test program schedule is presented in Table 4-2.

TABLE 4-2
TEST PROGRAM SCHEDULE
YREKA PLANT

Day	Activity	Sample Runs	Run Duration
September 8, 2014	Mobilization and set-up	--	--
September 9, 2014	Emission Tests		
	PM	1, 2, 3 of 3	60 min. each
	NO_X, CO, O_2 and CO_2	1, 2, 3 of 3	60 min. each
	VOC	1, 2, 3 of 3	60 min. each
	BETX	1, 2, 3 of 3	60 min. each
	Opacity	1, 2, 3 of 3	6 min. each
	Volumetric Flow and Moisture	w/PM	60 min. each
September 10, 2014	Travel	--	--

4.4 AVOGADRO TEST PROCEDURES

The test procedures used by Avogadro in this testing program are summarized in Table 4-3. Descriptions of standard procedures are included in Appendix A. Additional information on specific applications or modifications to standard procedures is presented in the following sub-sections. Where any conflicts exist in the descriptions, the specific descriptions here in Section 4.4 will take precedence.

TABLE 4-3
TEST PROCEDURES
YREKA PLANT

Parameter	Measurement Principle	Reference Method	Detection Limits
NO_X	Chemiluminescence	EPA 7E	≤ 10 ppm
CO_2	Non-dispersive infrared	EPA 3A	≤ 0.5 %
O_2	Paramagnetism	EPA 3A	≤ 0.5 %
CO	Gas filter correlation	EPA 10	≤ 50 ppm
VOC	Tedlar bag / GC	EPA 18	≤ 0.26 ppm
BTEX	Gas chromatography/Mass spectroscopy	TO-15	≤ 7.0 ppbv
Particulate matter	Gravimetry with condensable analysis	EPA 5 / 202	≤ 0.0005 gr/dscf
Volumetric flow	pitot / temperature traverse	EPA 1, 2	--
Moisture content	Gravimetry	EPA 4	--
Visible Emissions	Certified Observer	EPA 9	0 %

4.4.1 Gaseous Emissions

Concentrations of the gaseous constituents of the stack gas (CO, NO_X, O_2, and CO_2) were measured using Avogadro's dry extractive continuous emissions monitor system (CEMS) described in Appendix A. This system meets the requirements of EPA and CARB methods for gaseous species. Additional test runs were performed for determination of CEMS relative accuracy.

The sample conditioning system includes a heated Teflon line (heated to approximately 265 °F) and chilled moisture removal system (chilled to approximately 37 °F) to prevent loss of NO_2 in the sampling system. The NO_X analyzer was operated in the NO_X mode to measure NO plus NO_2. A molybdenum catalyst converter was used to convert NO_2 to NO for measurement of total NO_X. The converter efficiency was checked and documented as described in EPA Method 7E.

The CEMS includes components to extract a representative sample from the source, remove the moisture and particulate matter from the sample stream, and transport the sample to the analyzers. The primary components of this subsystem are:

1) A stainless steel or glass probe - heated or insulated as necessary to avoid condensation,
2) Sample filtration - filters located on the probe, pump, and prior to all of the analyzers for removal of particulate matter,
3) Teflon tubing - connecting the probe to the sample conditioner and the sample conditioner to the analyzer manifold - heated or insulated as necessary to avoid condensation,
4) Sample conditioner - stainless steel flasks immersed in an ice bath to remove the moisture from the sample gas stream,
5) Vacuum pump - a leak-free pump with Teflon diaphragm to transport the sample gas through the system,
6) Sample manifold - a distribution system, constructed of stainless steel and Teflon tubing, to direct sample gas to the analyzers, and
7) Sample flow rate control - a series of rotameters, vacuum gauges and pressure gauges connected to the manifold used to maintain the appropriate sample flow rates.

The calibration gas system utilizes only EPA Protocol gases to verify the operation, linearity, and range settings of the electronic analyzers. The sample gas system allows for the introduction of the protocol gases to the analyzers either directly through the manifold (calibration error check - performed once daily) or through the sampling system (system bias check - performed with each run).

The electronic analyzers are rack-mounted and are maintained in the mobile lab. The data recording and acquisition system is based on a digital system known as MoleDAQ. It includes software for controlling the collection of calibration and emission monitoring data, and hardware for connection of the analyzer outputs to the recording system. Test results can be provided in three forms: On-site printouts of the digitized data, diskette recordings of the digitized data, and strip charts from the monitoring data. For this test program, on-site printouts of the one-minute averages are provided.

4.4.2 <u>Volatile Organic Compounds</u>

Concentrations of volatile organic compounds (VOCs) were measured by gas chromatographic analysis of sample gas collected in Tedlar bags. The method is a modification of EPA Method 18, as no pre-survey samples were taken. This method approach is justified, as the organic compound concentrations were relatively well known. Three Tedlar bags for each unit were filled with sample gas using a rigid displacement container. The sampling probe was connected to the bag with Teflon tubing. The samples were drawn over a 60-minute period from a single point chosen from the O_2 traverse. The bags were shipped to the Avogadro laboratory in Antioch, CA for GC/FID analysis of C_1 through C_5 hydrocarbons, and C_6 and above by column backflush. Analysis took place within 72 hours of sampling.

4.4.3 Particulate Matter Emissions

Test Description: The emissions of total particulate matter (PM) were measured using the procedures and equipment specified in EPA Methods 5 and 202 in conjunction with EPA Methods 1-4. These methods consist of the sampling and analytical methodology necessary to quantify filterable and condensable particulate matter from stationary sources. The quality assurance procedures detailed in the methods were followed.

Triplicate samples were 60 minutes in duration and collected aproximately 33 dscf of flue gas. The sampling was performed isokinetically with a full traverse of the sampling plane. Traverse points were chosen and located according to EPA Method 1.

Sampling Train Setup: The sampling system included a Method 5 nozzle, probe, and heated filter for collection of filterable particulate matter. Sample flowed through the Method 5 apparatus and then through a probe extension of heated Teflon tubing into the Method 202 impinger train. Sample was drawn through the entire system by a leak-free pump and into a calibrated dry gas meter to measure the total sample volume.

The sampling apparatus for filterable particulate matter therefore included a Method 5 nozzle, a heated probe equipped with an S-type pitot tube and thermocouple. The stainless steel nozzle was connected to the heated probe liner of stainless steel tubing. The probe was attached to an oven containing a heated filter holder containing a glass-fiber filter on a Teflon support disc. The probe temperature and oven were maintained at 248°F ± 25°F during sampling.

The sampling apparatus for condensable particulate matter (CPM) included the back half of the filter holder, which was connected by a probe extension of heated Teflon tubing to a condenser, an empty condensate dropout impinger (short stem), an empty modified Greenburg Smith impinger and a CPM filter holder. A Teflon membrane filter was loaded into the CPM filter holder. The dropout and impinger were immersed in a water bath, and water was circulated through the condenser, so that the temperature of the sample gas at the CPM filter outlet was maintained between 65 and 85°F (30°C).

The sampling apparatus included a second "cold" section for complete collection of moisture from the sample gas. The CPM filter was followed by two modified Greenburg Smith impingers (the first containing 100 ml of water, and the second containing silica gel) immersed in an ice bath and maintained at or below 68°F (20°C). The impinger train was connected by flexible tubing to the control box, which contained the sampling pump, calibrated dry gas meter, and ancillary temperature and pressure controllers and meters.

Sampling Train Preparation: All glassware parts used to collect and analyze samples were cleaned prior to the test with soap and water, followed by rinses with hot tap water, deionized water, acetone, and hexane, in that order. The impinger trains were assembled in the Avogadro laboratory, and transported to the test site for collection of blanks, final set-up for sampling, etc.

Blanks: A field train proof blank was collected while on-site prior to conducting the first emissions test. The probe extension, condenser, dropout and impinger, connecting glassware, and front half of the CPM filter housing were rinsed twice with water and collected into a clean glass sample container. The water rinses were followed by a single acetone rinse and two hexane rinses of all corresponding glassware, collected into a separate glass sample container. The liquid levels were marked on each sample container.

Following recovery of the first test run, field reagent blanks of 200 mL each were collected directly from the corresponding wash bottles for acetone, water, and hexane and analyzed as described in Sample Analysis.

A field train recovery blank was recovered (one per source type at the facility) following the sample recovery from the first or second test run performed. A CPM sampling train was assembled per the Sampling Train Setup description, and then purged with nitrogen (with 100 mL of water added to the first impinger) as described in Sampling Train Operation. The recovery blank sample was then recovered as described in Sample Recovery and analyzed per the description in Sample Analysis.

Sampling Train Operation: The sampling train was leak tested once prior to sampling and once following testing. The pre-test leak check was performed at a nominal vacuum to ensure that leakage does not exceed 0.02 cfm. The post-test leak check was performed at a vacuum greater than the highest vacuum recorded during the test to ensure that leakage did not exceed the lesser of a) 4 percent of the average sampling rate, or b) 0.02 cfm. During sampling, the CPM filter was maintained between 65°F and 85°F (20°C and 30°C) while the exit of the silica gel was maintained at or below 68°F (20°C). The sampling rate and nozzle size were chosen to allow isokinetic sampling at 100% ±10%.

Following sampling and the final leak check, the impinger train was moved to the field laboratory, and the impingers were each weighed to determine the mass of moisture collected. The contents of the condenser and dropout were quantitatively transferred with degassed water rinses to the second impinger, and more degassed, deionized ultra-filtered water was added (if necessary) until the tip of the impinger stem was 1 centimeter below the surface of the water. The front section of the impinger train (condenser to CPM filter) was then reassembled and purged with nitrogen through an inline filter at a rate of 14 L/min for 60 minutes. The temperature at the outlet of the CPM filter was maintained between 65 and 85°F during the nitrogen purge.

Sample Recovery: The "front-half" or filterable PM was recovered from the sampling apparatus as described in Method 5. The sample fractions included (1) the acetone rinses of the nozzle, probe liner, and the front-half of the filter holder, and (2) the filter. The acetone rinses were stored in a glass sample container and the liquid level was marked. The filter was placed back into its original Petri dish and sealed.

The "back-half" or condensable PM was recovered from the apparatus as described in Method 202. The sample fractions included (1) aqueous rinses (two rinses with water) of the back-half of the filterable filter holder, probe extension, condenser, impingers, connecting glassware, and the front half of the CPM filter holder, (2) organic rinses (one with acetone and two with hexane) of the same parts, and (3) the CPM filter. The filter was removed from the filter holder and placed into a Petri dish. The liquid levels were marked on each sample container. The third and fourth impingers (cold impinger and silica gel impinger) were also weighed and recorded but not collected as sample. Samples remained upright and were maintained below 85°F (30°C) during transport from the job site to the analytical laboratory.

Sample Analysis: Analyses were performed in Avogadro's in-house laboratory. All liquid sample fractions were measured either volumetrically to ± 1 mL or gravimetrically to ± 0.5 g.

The filterable sample fractions were reduced to dryness and desiccated to a constant weight as described in Method 5.

The CPM filter was extracted with water and with hexane in a sonicator as described in Method 202. The extractions were added to the aqueous and organic rinse containers.

The aqueous back-half sample was extracted three times with 30 mL of hexane in a separatory funnel. The combined hexane extracts were added to the organic rinses from the sampling train recovery, in a clean glass beaker, and evaporated at room temperature down to 10 mL. The organic contents were quantitatively transferred to a clean pre-tared weighing tin, evaporated at room temperature to dryness, and placed into the desiccator.

Following the extraction, the aqueous fraction was transferred to a 500 mL clean glass beaker and evaporated down to 10 mL on a hot plate or in an oven at 221°F (105°C) then allowed to dry at room temperature prior to being placed into the desiccator.

All sample fractions were desiccated for 24 hours in a desiccator containing anhydrous calcium sulfate and weighed at intervals of at least 6 hours to a constant weight following desiccation. The laboratory room temperature was maintained at or below 85°C (30°C) at all times.

If a constant weight was not achieved for the aqueous fraction then the residue was rehydrated in 100 ml of water, titrated to neutral pH, and dried and reweighed as described in Sections 11.2.2.2 to 11. 2.2.4 of Method 202.

Reporting: The results for each sample fraction are reported to the nearest 0.1 mg. The results were blank-corrected as described in the methods and presented separately as filterable particulate matter, condensable particulate matter and together as total particulate matter.

4.4.4 BTEX Emissions

Flue gas samples were collected in specially-prepared evacuated stainless-steel (SUMMA) canisters. A short piece of Teflon tubing was attached to each canister via a calibrated critical orifice. This system allowed sample collection without exposing the sample to pumps, flow meters, oils, etc.

Triplicate 60-minute runs were performed at a flow rate of approximately 0.07 liters per minute at one atmosphere. After sample collection, the canister was transported to the laboratory for analysis within 14 days. The method reporting limit is on the order of 0.8 to 7.5 ppb by volume. The individual target compounds are listed below:

BTEX
Benzene
Toluene
Ethyl Benzene
(m, p, o)-Xylenes

4.4.5 Visible Emissions

Visible emission measurements were conducted according to EPA Method 9. The observer stood at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back. The observer recorded opacity readings to the nearest 5 percent at 15-second intervals on an observational record sheet. SCAPCD requires that a minimum of 24 observations (6 minutes) be recorded. Each momentary observation was deemed to represent the average opacity for the 15-second period. Chris Crowley performed three visual, 6-minute tests on the source. He is certified to read opacity.

4.4.6 Volumetric Flow Rate

During the particulate matter tests, volumetric flow rates and moisture content were determined using EPA Methods 2 and 4 in conjunction with each test. The measured flow rates were used to calculate emissions in lb/hr.

4.4.7 Process Data

The plant's unit operating data was used to document process conditions during the test runs. Unit operating data was provided by Eagle Peak personnel. Data presented in this report includes asphalt production rate, fuel firing rate, baghouse temperatures and combustion settings to document load conditions. Avogadro provided barometric pressure and ambient temperature data throughout the day.

SECTION 5.0

QUALITY ASSURANCE AND REPORTING

5.1 SAMPLING AND ANALYTICAL QA/QC

Avogadro has instituted a rigorous QA/QC program for all of its air pollution testing. The program ensures that the emission data reported are as accurate as possible. The procedures included in the cited reference methods were followed for all steps of preparation, sampling, calibration, and analysis. Avogadro was responsible for preparation, calibration and cleaning of the sampling apparatus. Avogadro also conducted the sampling and sample recovery, storage and shipping.

Contract laboratories conducted some of the preparation and sample analyses. The laboratories that were used are established leaders in development and performance of the reference methods for which they have been selected. Their credentials for adherence to the required quality assurance procedures are well known.

5.2 QUALITY CONTROL REQUIREMENTS

Our Quality Assurance Program Summary, located in Appendix B, provides our equipment maintenance and calibration schedule, quality control acceptance limits, and any corrective action that may be needed. For additional quality control, Avogadro followed the procedures outlined below:

- All field equipment was visually inspected prior to testing and included pre-test calibration checks.
- Glassware was visually inspected prior to testing.
- Preliminary stack flow and temperature measurements were taken to assure correct isokinetic sampling.

5.3 DATA REDUCTION PROCEDURES

The raw data collected during the sampling and analysis procedures were used to calculate the results of the testing program. The analysis or reduction of the data to the final results followed these steps, where appropriate to the test method:

- Check field-sampling data for accuracy and calculate appropriate data averages (e.g., temperatures, pressures, volumes, etc.).
- Double check calculation of the data averages.
- Review all in-house and contract laboratory reports and ensure that

appropriate and/or required QA/QC steps were followed.

- Enter field and laboratory data to established and verified computer spreadsheets for calculation of volumetric flow rates, mass emission rates or other appropriate results.
- Double-check all lab and field data inputs.
- Perform example calculations by hand using raw data on a single test run for each type of emission result reported.
- Compile summary tables of results and review all table inputs.

This report includes copies of spreadsheet printouts (data input and results output) and example calculation checks. The field data sheets with average data calculations are also included. Standard conditions used for data reduction are 29.92 inches of mercury and 68 °F. All values found to be below the detection limit of the analytical method are reported as "less than" ("<") either the full detection limit value, one-half of the detection limit, or zero based on the applicable method.

SECTION 6.0

DISCUSSION OF RESULTS

The average results are compared to the permit limits and performance specifications in Table 1-1. The results of individual compliance test runs performed on the source are presented in Tables 6-1 through 6-3. The test results show that all of the emissions were within their respective permit compliance limits. Emissions have been reported in units consistent with those in the permits.

Due to daily fluctuations in the demand for hot-mix asphalt, Eagle Peak was not able to operate above 90% for all three test runs. Because of this, Runs 1 and 2 were conducted at typical operating loads of 61.8% to 76.4% respectively and Run 3 at 90.9% to show compliance at the maximum load.

Testing was paused for 45 minutes during Run 3 to clean the baghouse.

Additional information is included in the appendices. Appendix A contains generic descriptions of standard measurement procedures. Appendix B presents the quality assurance information, including instrument calibration data. Raw field data sheets are included in Appendix C. Appendix D presents the general and specific equations used for the emissions calculations and computer spreadsheets. Laboratory reports and chain of custody sheets for the samples are located in Appendix E and copies of the permits are located in Appendix F.

TABLE 6-1
RESULTS SUMMARY
PARTICULATE MATTER EMISSIONS
YREKA PLANT

Test No.:	**1-PM**	**2-PM**	**3-PM**	**Averages**
Date:	9/9/14	9/9/14	9/9/14	--
Time:	0841-0959	1119-1226	1515-1714	--
Process Data:				
Load, %	61.8	76.4	90.9	76.4
Flue Gas:				
O_2, % volume dry	12.39	11.42	11.50	11.77
CO_2, % volume dry	6.33	6.82	6.77	6.64
Moisture, % by volume	22.58	24.17	22.65	23.14
Flue gas temperature, °F	277.6	293.8	298.2	289.9
Volumetric flow rate, dscfm	17,000	17,405	15,747	16,717
F½ Particulate Matter:				
grns/dscf	0.0122	0.0126	0.0152	0.0133
grns/dscf @ 12% CO_2	0.0231	0.0222	0.0270	0.0241
lb/hr	1.78	1.89	2.05	1.91
B½ Particulate Matter:				
grns/dscf	0.0003	0.0005	0.0041	0.0016
grns/dscf @ 12% CO_2	0.0006	0.0008	0.0072	0.0029
lb/hr	0.04	0.07	0.55	0.22
Total Particulate Matter:				
grns/dscf	0.0125	0.0131	0.0193	0.0150
grns/dscf @ 12% CO_2	0.0237	0.0230	0.0342	0.0270
lb/hr	1.82	1.95	2.60	2.13
Opacity:				
% Opacity	0.0	0.0	0.0	0.0

TABLE 6-2
RESULTS SUMMARY
GASEOUS EMISSIONS
YREKA PLANT

Test No.:	**1-CEM**	**2-CEM**	**3-CEM**	**Averages**
Date:	9/9/14	9/9/14	9/9/14	--
Time:	0844-0944	1119-1219	1515-1707	--
Process Data:				
Load, %	61.8	76.4	90.9	76.4
Flue Gas:				
O_2, % volume dry	12.39	11.42	11.50	11.77
CO_2, % volume dry	6.33	6.82	6.77	6.64
Moisture, % by volume	22.58	24.17	22.65	23.14
Flue gas temperature, °F	277.6	293.8	298.2	289.9
Volumetric flow rate, dscfm	17,000	17,395	15,738	16,711
CO Emissions:				
ppm volume dry	165.6	227.2	662.0	351.6
lb/hr	12.28	17.24	45.44	24.98
NO_X Emissions:				
ppm volume dry	106.9	106.3	101.0	104.7
lb/hr	13.02	13.25	11.39	12.55
VOC Emissions:				
ppm volume dry	7.90	9.74	11.20	9.61
lb/hr as CH_4	0.335	0.423	0.440	0.400

TABLE 6-3
RESULTS SUMMARY
BTEX EMISSIONS
YREKA PLANT

Test No.:	1-CEM	2-CEM	3-CEM	Averages
Date:	9/9/14	9/9/14	9/9/14	--
Time:	0844-0944	1119-1219	1515-1707	--
Process Data:				
Load, %	61.8	76.4	90.9	76.4
Flue Gas:				
O_2, % volume dry	12.39	11.42	11.50	11.77
CO_2, % volume dry	6.33	6.82	6.77	6.64
Moisture, % by volume	22.58	24.17	22.65	23.14
Flue gas temperature, °F	277.6	293.8	298.2	289.9
Volumetric flow rate, dscfm	17,000	17,395	15,738	16,711
Benzene Emissions:				
ppmvd	0.1370	0.1450	0.2530	0.1783
lb/hr	0.0283	0.0307	0.0484	0.0358
Ethyl Benzene Emissions:				
ppmvd	0.0046	0.0039	0.0060	0.0048
lb/hr	0.0013	0.0011	0.0016	0.0013
Toluene Emissions:				
ppmvd	0.0455	0.0435	0.0699	0.0530
lb/hr	0.0111	0.0109	0.0158	0.0126
m,p - Xylene Emissions:				
ppmvd	0.0240	0.0171	0.0183	0.0198
lb/hr	0.0067	0.0049	0.0048	0.0055
o - Xylene Emissions:				
ppmvd	0.0048	0.0040	0.0064	0.0051
lb/hr	0.0013	0.0011	0.0017	0.0014
Total BTEX:				
ppmvd	0.2159	0.2135	0.3536	0.2610
lb/hr	0.049	0.049	0.072	0.057

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APPENDIX A

STANDARD MEASUREMENT PROCEDURES

Method:	**Continuous Emission Monitoring (CEM) System**
Reference:	SCAQMD 100.1, CARB 100, EPA 7E, 3A, 10, 6C
Principle:	Sample gas is drawn from the stack or duct through a sample conditioning system and is sent through a sample manifold to a series of gas analyzers for measurement of the concentrations of O_2, CO_2, NO_X, CO and SO_2.
Analyzers:	See the description pages for the individual analyzers; those pages follow this description of the sampling system.

The CEM sampling system includes three basic subsystems. These are (1) the sample interface, which includes the probe, connecting tubing, and the sample conditioning and transport system, (2) the gas analyzers and their calibration gases, and (3) the data acquisition system. This section presents a description of the sample interface, the calibration gases, and the data acquisition system. Descriptions of the individual analyzers are provided in following sections.

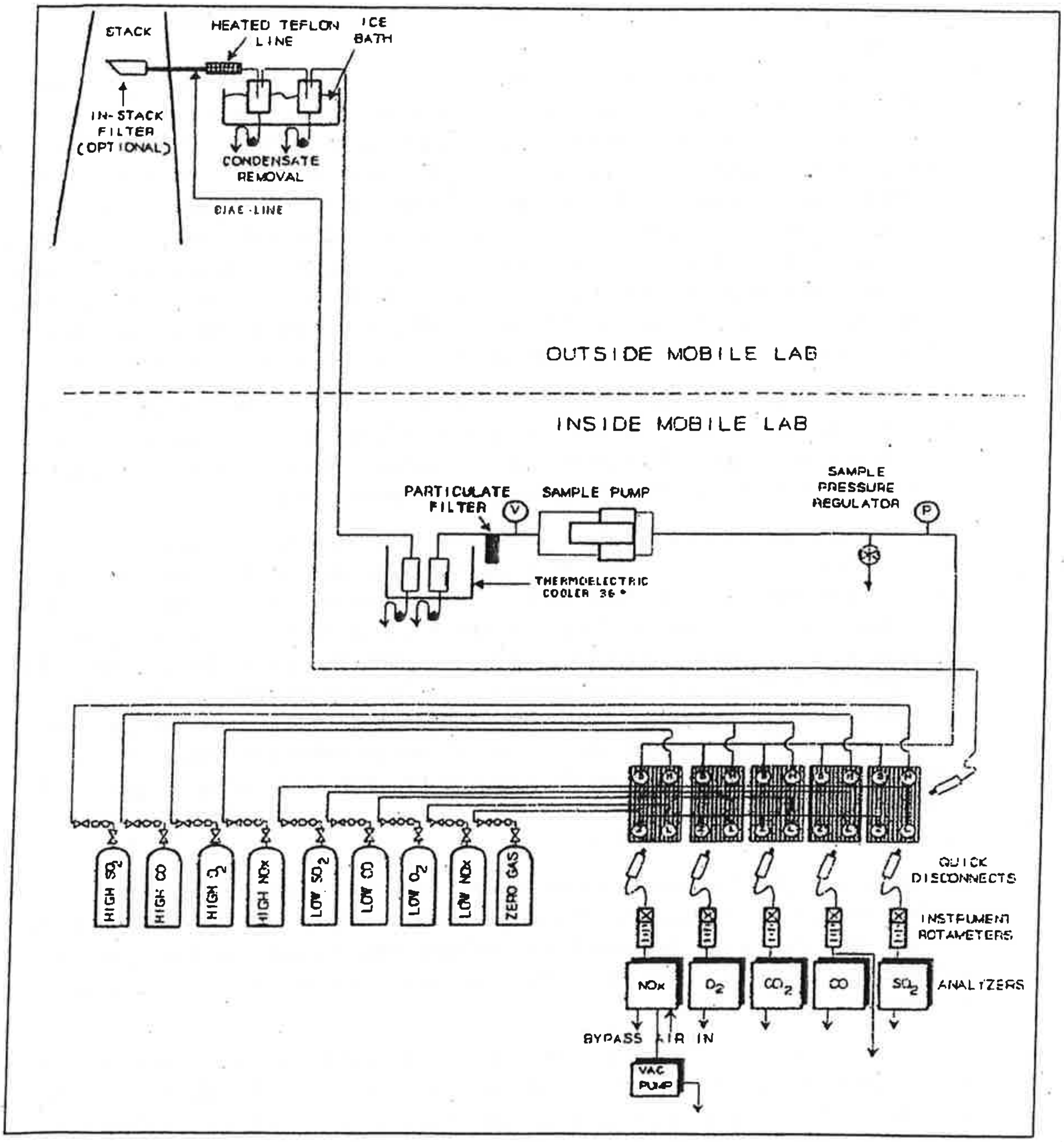
The sample interface includes components to extract a representative sample from the stack or duct, transport the sample to the analyzers, and remove moisture and particulate material from the sample. The system must also preserve the measured gases and deliver the sample for analysis without significant interference. A diagram of the system is provided in Figure 1. The sample interface system includes the following components.

- Probe – the probe is usually heated to prevent condensation of moisture. In some cases the probe may be unheated, depending on the dynamics of the stack environment (i.e. the temperature is high enough to prevent condensation without heating) and the gases to be measured for the testing program. The probe liner or tubing may be constructed of glass, Teflon, titanium or stainless steel, depending on the stack temperature, the matrix of stack gases and the gases to be measured. The probe length is chosen to provide access to the stack traverse points or sampling point required by the testing methods. When used at sources with significant particulate concentrations, the probe may include a filter either at the tip (in-stack) or in a heated box (out-of-stack).
- Heated line – a short section of flexible, heated Teflon tubing is used to connect the probe to the moisture removal system. The line is less than 6 feet in length except in cases where longer tubing is needed to allow traversing of the stack with a long probe (i.e. for stratification tests).
- Moisture conditioning system – the role of the moisture removal system is to cool the sample gas and condense the moisture for removal, yet to minimize the contact between the sample gas and the condensate. Contact between the sample and condensate may cause scrubbing or other interference with the concentration of some gases, especially the water-soluble gases such as SO_2 and NO_2. The sample must be cooled to 37°F or lower in order to present sufficiently dry sample gas to the analyzers. In most cases, two moisture removal systems are necessary to provide sufficient cooling. The first system includes knockout traps constructed of glass (e.g. "short stem" impingers) or stainless

steel immersed in an ice bath. The second system includes thermoelectrically-cooled knockouts with continuous moisture removal pumps, and sufficient cooling capacity to reduce the sample gas temperature to 37°F or below. The second system may be located at ground level, or on the stack. If the two systems are separated by a connecting line of Teflon tubing, the tubing must be at least 10°F warmer than the temperature of the gas leaving the first conditioner.

- Sample transport – a leak-free diaphragm pump is used to transport sample from the probe and moisture conditioning systems to the analyzers in the mobile lab. The pump may be in the mobile lab as shown in Figure 1, or may be located on the stack platform. In either case, a length of Teflon tubing is used to connect the systems at the sampling location or stack platform to the systems in the mobile lab. The "vacuum side" of the system from the probe to the pump is leak checked before and after the test runs by plugging the tip of the probe and drawing the pump's maximum vacuum (or at least the maximum vacuum recorded during the test runs) on the system and delivering all the sample through a single rotameter. The leak check passes if the total flow is less than 2% of the flow noted during the test runs (usually this means a leak rate below 0.5 scfh).
- Sample manifold – the pump delivers sample gas to the analyzers through a manifold system in the mobile lab. The manifold system includes valves for directing sample or calibration gases to any or all analyzers, and for controlling the sample pressure and flow rates. Manifold pressure is modulated using a back-pressure regulator.
- Gas analyzers and calibration gases – the individual gas analyzers are described on separate pages that follow this system description. The gases used for calibration of the analyzers are prepared and analyzed by EPA Protocol and are, at a minimum, certified by the manufacturer to be within 1% of the stated concentration. Each gas cylinder is equipped with a pressure regulator to supply the calibration gas to the analyzer at the same pressure and flow rate as the sample gas. The concentrations of the calibration gases are selected for the range of measurement necessary to determine compliance with emission limits. The gas concentrations necessary are provided in the test method, which must be consulted when choosing the gases to be used for a testing program. The direction of zero, span, or sample gas to each analyzer is accomplished by operation of the sample/calibration selector fittings.
- Calibration error and bias checks – calibration error is determined for each analyzer by directing zero gas, high-range and mid-range gases directly through the manifold to the analyzer. Bias checks are conducted before and after each test run by delivering zero and calibration gases in turn to the "tee" fitting at the back of the sampling probe just prior to the connecting Teflon tubing.
- Data acquisition system – the output of the analyzers is continuously recorded by a digital data acquisition system. The digital system, known as MoleDAQ, provides documentation of the range and calibrations for each analyzer, as well as recording of the output of the analyzer during each calibration error test, bias check and test run. The system also calculates the percent error, percent drift, and the test run results corrected for drift. Results can be provided from "on-site" printouts of one-minute average data, or from text computer files of the data. Where required by regulations, a digital or analog strip chart recorder may also be used to "back-up" the digital data.

Figure 1. CEM System Diagram



Method: **Oxygen (O_2) by Continuous Analyzer**

Reference: EPA 3A, EPA 20, CARB 100, BAAQMD ST-14, SCAQMD 100.1

Principle: A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of O_2 concentration.

Analyzer: California Analytical 100P, 110P, 200, 300, or Teledyne 320A

Measurement Principle: Paramagnetism

Ranges: 0-5, 0-10, 0-25, 0-100% O_2

Accuracy: 1% of full scale

Output: 0-10 V, linear

Interferences: In comparison to oxygen, other gases have such a minor magnetic susceptibility that most of them are insignificant. Exceptions to this are the nitrogen oxides, which are generally present in ppm concentrations so that their contribution to the measurement is insignificant.

Response Time: 90% <2 seconds

Sampling Procedure: A representative stack gas sample is collected and conditioned using the CEM system described previously. A stratification check traverse is performed at the start of a test program to select single or multiple-point sample locations.

Analytical Procedure: Oxygen is attracted by a magnetic field. This "paramagnetism" is measured in a special cell in which an electric current is produced that is proportional to the concentration of oxygen. This current is measured and conditioned by the instrument's electronic circuitry to give an output in percent O_2 by volume.

Method:	**Carbon Dioxide by (CO_2) by Continuous Analyzer**
Reference:	EPA 3A, CARB 100, BAAQMD ST-5, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of CO_2 concentration.
Analyzer:	California Analytical 100, 200, 300, or Horiba VIA 510
Measurement Principle:	Non-dispersive infrared (NDIR)
Accuracy:	1% of full scale
Ranges::	0-5 minimum, 0-100 maximum
Output:	0-10 V
Interferences:	A possible interference includes water. Since the instrument receives dried sample gas, this interference is not significant.
Response Time:	1.2 seconds
Sampling Procedure:	A representative stack gas sample is collected and conditioned using the CEM system described previously.
Analytical Procedure:	Carbon dioxide concentrations are measured by short path length non-dispersive infrared analyzers. These instruments measure the differential in infrared energy absorbed from energy beams passed through a reference cell (containing a gas selected to have minimal absorption of infrared energy in the wavelength absorbed by the gas component of interest) and a sample cell through which the sample gas flows continuously. The differential absorption appears as a reading on a scale as high as 0 to 100% CO_2.

Method: **Carbon Monoxide (CO) by NDIR/Gas Filter Correlation**

Reference: EPA 10, CARB 100, BAAQMD ST-6, SCAQMD 100.1

Principle: A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of CO concentration.

Analyzer: TEI Model 48, 48C, or Teledyne 300EM

Measurement Principle: NDIR/Gas Filter Correlation

Precision: 0.1% ppm

Ranges: 0-1 ppm minimum to 0-5,000 ppm maximum

Output: 0-10 V

Interferences: Negligible interference from water and CO_2

Rise/Fall Times (0-95%): 1 minute @ 1 1pm flow, 30 second integration time

Sampling Procedure: A representative stack gas sample is collected and conditioned using the CEM system described previously. Sample point selection has been described previously.

Analytical Procedure: Radiation from an infrared source is chopped and then passed through a gas filter which alternates between CO and N_2 due to rotation of a filter wheel. The radiation then passes through a narrow band-pass filter and a multiple optical pass sample cell where absorption by the sample gas occurs. The IR radiation exits the sample cell and falls on a solid state IR detector. The detector outputs from the two gas filters are correlated by a microprocessor for analysis of the CO concentration.

Method:	**Nitrogen Oxides (NO/NO_X) by Continuous Analyzer**
Reference:	EPA 7E, EPA 20, CARB 100, BAAQMD ST-13A, SCAQMD 100.1
Principle:	A sample is continuously drawn from the stack gas stream, conditioned, and conveyed to the instrument for direct readout of NO or NO_X.
Analyzer:	EcoPhysics CLD 70E, CLD 70S, California Analytical 600 CLD, or Thermo Scientific 42iHL
Measurement Principle:	Chemiluminescence
Ranges:	0-3 ppm minimum to 0-7500 ppm maximum ranges
Output:	0-10 V
Interferences:	Compounds containing nitrogen (other than ammonia) may cause interference.
Response Time:	90%, 1.5 seconds (NO mode) and 1.7 seconds (NO_X mode)
Sampling Procedure:	A representative stack gas sample is collected and conditioned using the CEM system described previously. If EPA Method 20 is used, that method's specific procedures for selecting sample points are used.
Analytical Procedure:	The oxides of nitrogen monitoring instrument is a chemiluminescent nitric oxide analyzer. The operational basis of the instrument is the chemiluminescent reaction of NO and ozone (O_3) to form NO_2 in an excited state. Light emission results when excited NO_2 molecules revert to their ground state. The resulting chemiluminescence is monitored through an optical filter by a high sensitivity photomultiplier tube, the output of which is electronically processed so it is linearly proportional to the NO concentration. The output of the instrument is in ppm volume dry.
	In the NO_X mode, the gas is passed through a converter which converts NO_2 to NO for a measurement of total NO_X concentration. NO_2 can be determined as the difference in readings between the analyzer's NO and NO_X modes. Use of a molybdenum catalytic converter instead of a stainless steel high-temperature converter eliminates conversion of NH_3 to NO.

Particulate Matter (PM) Emissions

Method: **EPA 5, Amended February 2000; EPA 202, Amended December 2010**
Deviations: **None**
Alternatives: **A field train proof blank was collected on-site instead of baking the glassware for 6 hours**
Pressurized nitrogen purge was used

Tester: The Avogadro Group, LLC

Lab: The Avogadro Group, LLC
Contact: Robert Odell (925) 680-4357, fax (925) 680-4416
Analysis: Gravimetric analysis performed by Avogadro

Test Description: The emissions of total particulate matter (PM) were measured using the procedures and equipment specified in EPA Methods 5 and 202 in conjunction with EPA Methods 1-4. These methods consist of the sampling and analytical methodology necessary to quantify filterable and condensable particulate matter from stationary sources. The quality assurance procedures detailed in the methods were followed.

The sampling was performed isokinetically with a full traverse of the sampling plane. Traverse points were chosen and located according to EPA Method 1.

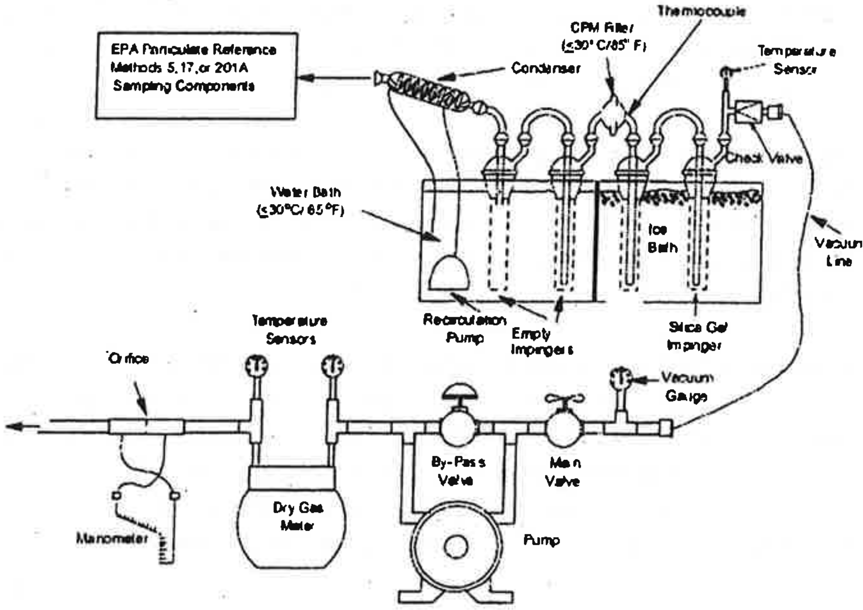


Figure 1. Schematic of Condensable Particulate Sampling Train

Sampling Train Setup: The sampling system included a Method 5 nozzle, probe, and heated filter for collection of filterable particulate matter. Sample flowed through the Method 5 apparatus and then through a probe extension of heated Teflon tubing into the Method 202 impinger train. Sample was drawn through the entire system by a leak-free pump and into a calibrated dry gas meter to measure the total sample volume.

The sampling apparatus for filterable particulate matter therefore included a Method 5 nozzle, a heated probe equipped with an S-type pitot tube and thermocouple. The glass or stainless steel nozzle was connected to the heated probe liner of glass or titanium or stainless steel tubing. The probe was attached to an oven containing a heated filter holder containing a glass-fiber filter on a Teflon support disc. The probe temperature and oven were maintained at 248°F ± 25°F during sampling.

The sampling apparatus for condensable particulate matter (CPM) included the back half of the filter holder, which was connected by a probe extension of heated Teflon tubing to a condenser, an empty condensate dropout impinger (short stem), an empty modified Greenburg Smith impinger and a CPM filter holder. A Teflon membrane filter was loaded into the CPM filter holder. The dropout and impinger were immersed in a water bath, and water was circulated through the condenser, so that the temperature of the sample gas at the CPM filter outlet was maintained between 65 and 85°F (30°C).

The sampling apparatus included a second "cold" section for complete collection of moisture from the sample gas. The CPM filter was followed by two modified Greenburg Smith impingers (the first containing 100 ml of water, and the second containing silica gel) immersed in an ice bath and maintained at or below 68°F (20°C). The impinger train was connected by flexible tubing to the control box, which contained the sampling pump, calibrated dry gas meter, and ancillary temperature and pressure controllers and meters.

Sampling Train Preparation: All glassware parts used to collect and analyze samples were cleaned prior to the test with soap and water, followed by rinses with hot tap water, deionized water, acetone, and hexane, in that order. The impinger trains were assembled in the Avogadro laboratory, and transported to the test site for collection of blanks, final set-up for sampling, etc.

Blanks: A field train proof blank was collected while on-site prior to conducting the first emissions test. The probe extension, condenser, dropout and impinger, connecting glassware, and front half of the CPM filter housing were rinsed twice with water and collected into a clean glass sample container. The water rinses were followed by a single acetone rinse and two hexane rinses of all corresponding glassware, collected into a separate glass sample container. The liquid levels were marked on each sample container.

Following recovery of the first test run, field reagent blanks of 200 mL each were collected directly from the corresponding wash bottles for acetone, water, and hexane and analyzed as described in *Sample Analysis*.

A field train recovery blank was recovered (one per source type at the facility) following the sample recovery from the first or second test run performed. A CPM sampling train was assembled per the *Sampling Train Setup* description, and then purged with nitrogen (with 100 mL of water added to the first impinger) as described in *Sampling Train Operation.* The recovery blank sample was then recovered as described in *Sample Recovery* and analyzed per the description in *Sample Analysis.*

Sampling Train Operation: The sampling train was leak tested once prior to sampling and once following testing. The pre-test leak check was performed at a nominal vacuum to ensure that leakage does not exceed 0.02 cfm. The post-test leak check was performed at a vacuum greater than the highest vacuum recorded during the test to ensure that leakage did not exceed the lesser of a) 4 percent of the average sampling rate, or b) 0.02 cfm. During sampling, the CPM filter was maintained between 65°F and 85°F (20°C and 30°C) while the exit of the silica gel was maintained at or below 68°F (20°C). The sampling rate and nozzle size were chosen to allow isokinetic sampling at 100% ±10%.

Following sampling and the final leak check, the impinger train was moved to the field laboratory, and the impingers were each weighed to determine the mass of moisture collected. The contents of the condenser and dropout were quantitatively transferred with degassed water rinses to the second impinger, and more degassed, deionized ultra-filtered water was added (if necessary) until the tip of the impinger stem was 1 centimeter below the surface of the water. The front section of the impinger train (condenser to CPM filter) was then reassembled and purged with nitrogen through an inline filter at a rate of 14 L/min for 60 minutes. The temperature at the outlet of the CPM filter was maintained between 65 and 85°F during the nitrogen purge.

Sample Recovery: The "front-half" or filterable PM was recovered from the sampling apparatus as described in Method 5. The sample fractions included (1) the acetone rinses of the nozzle, probe liner, and the front-half of the filter holder, and (2) the filter. The acetone rinses were stored in a glass sample container and the liquid level was marked. The filter was placed back into its original Petri dish and sealed.

The "back-half" or condensable PM was recovered from the apparatus as described in Method 202. The sample fractions included (1) aqueous rinses (two rinses with water) of the back-half of the filterable filter holder, probe extension, condenser, impingers, connecting glassware, and the front half of the CPM filter holder, (2) organic rinses (one with acetone and two with hexane) of the same parts, and (3) the CPM filter. The filter was removed from the filter holder and placed into a Petri dish. The liquid levels were marked on each sample container. The third and fourth impingers (cold impinger and silica gel impinger) were also weighed and recorded but not collected as sample. Samples remained upright and were maintained below 85°F (30°C) during transport from the job site to the analytical laboratory.

Sample Analysis: Analyses were performed in Avogadro's in-house laboratory. All liquid sample fractions were measured either volumetrically to ± 1 mL or gravimetrically to ± 0.5 g.

The filterable sample fractions were reduced to dryness and desiccated to a constant weight as described in Method 5.

The CPM filter was extracted with water and with hexane in a sonicator as described in Method 202. The extractions were added to the aqueous and organic rinse containers.

The aqueous back-half sample was extracted three times with 30 mL of hexane in a separatory funnel. The combined hexane extracts were added to the organic rinses from the sampling train recovery, in a clean glass beaker, and evaporated at room temperature down to 10 mL. The organic contents were quantitatively transferred to a clean pre-tared weighing tin, evaporated at room temperature to dryness, and placed into the desiccator.

Following the extraction, the aqueous fraction was transferred to a 500 mL clean glass beaker and evaporated down to 10 mL on a hot plate or in an oven at 221°F (105°C) then allowed to dry at room temperature prior to being placed into the desiccator.

All sample fractions were desiccated for 24 hours in a desiccator containing anhydrous calcium sulfate and weighed at intervals of at least 6 hours to a constant weight following desiccation. The laboratory room temperature was maintained at or below 85°C (30°C) at all times.

If a constant weight was not achieved for the aqueous fraction then the residue was re-hydrated in 100 ml of water, titrated to neutral pH, and dried and reweighed as described in Sections 11.2.2.2 to 11. 2.2.4 of Method 202.

Reporting: The results for each sample fraction are reported to the nearest 0.1 mg. The results were blank-corrected as described in the methods and presented separately as filterable particulate matter, condensable particulate matter and together as total particulate matter.

Method: **Stack Gas Velocity and Volumetric Flow Rate**

Reference: EPA Method 2, SCAQMD Method 2.1, ARB Method 2

Principle: The average gas velocity in a stack is determined from the measurement of the gas density and from the measurement of the average velocity head using a Type-S (Stausscheibe) Pitot tube.

Sampling Procedure: The velocity head and temperature are measured at traverse points specified by EPA Method 1 or SCAQMD Method 1.1. The velocity is measured using a Type-S Pitot tube and an inclined water manometer. The flow coefficient of the pitot tube is known. Temperature of the gas is measured using a thermocouple. The stack gas molecular weight is determined from independent measurements of O_2, CO_2, and H_2O concentrations.

Sample Analysis and Recovery: The stack gas velocity is determined from the measured average velocity head, the measured average temperature, the measured average duct static pressure, the measured dry concentrations of O_2 and CO_2, and the measured concentration of H_2O. The velocity is determined from the following set of equations:

$$V_s = 2.90 C_p \sqrt{\Delta p T_s \left[\frac{29.92}{P_s}\right]\left[\frac{28.95}{MW_{wet}}\right]} \qquad [\text{ ft/s }]$$

Δp = *Velocity/Head, inches H_2O* [in. H_2O]

T_s = *Gas Temperature, degrees R* [R]

P_s = *Absolute Static Pressure* [in Hg]

C_p = *Pitot Flow Coefficient* [unitless]

$$MW_{wet} = [(0.44)(\%CO_2)+(0.32)(\%O_2)+(0.28)(\%N_2)](1-\frac{\%H_2O}{100})+(18)(\frac{\%H_2O}{100})$$

The stack gas volumetric flow rate is determined from the measured stack gas velocity, the area of the stack at the measurement plane, and the measured gas temperature and pressure. The volumetric flow rate is determined from the following set of equations:

$$Q = (V_s)(AREA)(60) \qquad [\text{ wacfm }]$$

$$Q_{ws} = Q\left[\frac{T_{ref}}{T_s}\right]\left[\frac{P_s}{29.92}\right] \qquad [\text{ wscfm }]$$

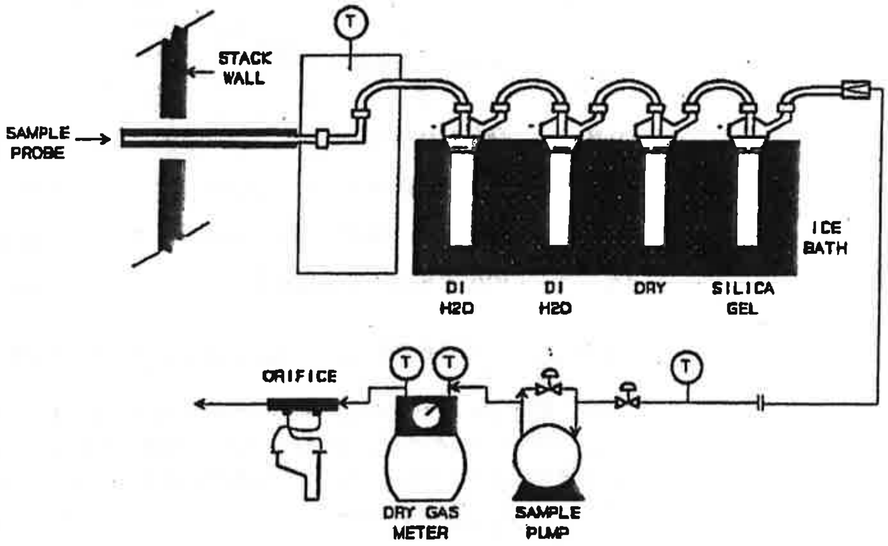
$$Q_{sd} = Q_{ws}\left[1-\frac{\%H_2O}{100}\right] \qquad [\text{ dscfm }]$$

Method: **Determination of Moisture in Stack Gases**

Applicable Ref. Methods: EPA 4, ARB 1-4, SCAQMD 4.1

Principle: A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined volumetrically or gravimetrically.

Sampling Procedure: The sample train used in the tests is shown in the following figure. The sample is drawn at a constant rate through a stainless steel probe. The probe is connected to an impinger train by Teflon tubing. The train consists of two Greenburg-Smith impingers which contain 100 ml water, an empty impinger as a knockout, and an impinger containing silica gel to protect the pump from moisture.



Sample Train for Determination of Moisture by EPA Method 4

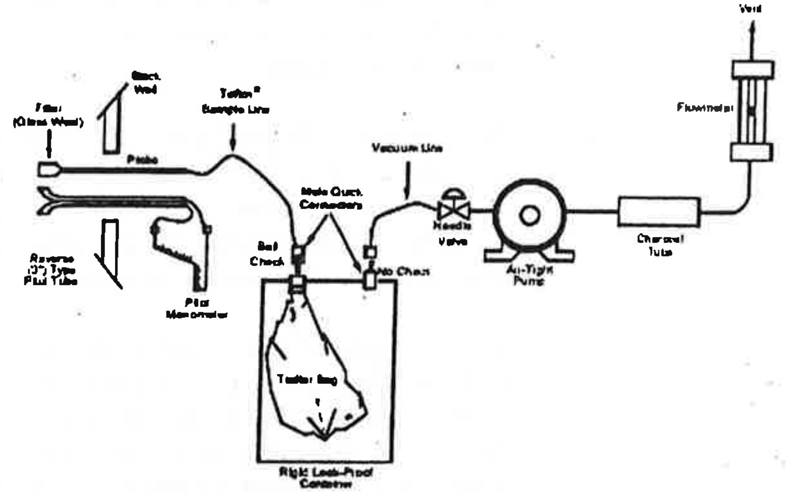
Sample Recovery and Analysis: Following testing, moisture content is determined gravimetrically from initial and final impinger weights.

Method: **Volatile Organic Compounds (VOC) by EPA Method 18**

Reference: EPA Method 18

Principle: A Tedlar bag is filled with sample gas at a constant rate. The bag contents are analyzed by gas chromatography–flame ionization detector for concentrations of C_1 through C_6+ hydrocarbons. .

Sampling Procedure: A sample is drawn through a probe of Teflon, glass, titanium or stainless steel tubing and through a length of flexible Teflon tubing directly into a Tedlar bag. The displacement or "lung" sampler is shown in the figure. A pump is used to draw or displace air out of the rigid container so that the bag fills with sample.



Apparatus for sampling of stack gas into a Tedlar bag

Analytical Procedure: The bag samples are transported to the laboratory for analysis using a gas chromatograph with a flame ionization detector (GC-FID). The GC-FID is calibrated with certified standard gases containing C_1 through C_6 hydrocarbons. The analysis includes column separation of the C_1 through C_6 compounds, and column backflush for the total compounds $>C_6$. The laboratory results are reported as ppm volume of methane, ethane, ethene, C_3, C_4, C_5, C_6 and $>C_6$ hydrocarbons as their methane equivalents.

Method:	**Determination of Volatile Organic Compounds (VOCs) by EPA Compendium Method TO-12 or TO-15**
Reference:	EPA Compendium Method TO-12 or TO-15
Principle:	An evacuated canister is filled with flue gas at a constant rate. The tank contents are analyzed for VOCs by preconcentration and gas chromatography (TO-12) or by gas chromatography/mass spectrometry (TO-15).
Sampling Procedure:	A sample is collected at the source (usually from a stack or vent) into a canister evacuated to 0.05 mm Hg. When the canister is opened to the source containing the VOCs to be sampled, the differential pressure causes the sample to flow into the canister. The flow rate is regulated so that it is constant and the period sampled is one hour if possible. Pitot and temperature measurements of the total stack or vent flow are made.
Analytical Procedure:	The canister is shipped immediately after sampling to the laboratory for analysis. For TO-12 analysis, a portion of the gaseous sample is drawn from the canister through a cryogenic trap. The sample is thermally desorbed from the trap and analyzed by GC/FID for low concentrations of organic compounds. For TO-15 analysis, a portion of the gaseous sample from the canister is drawn through a multisorbent packing. Next, the sample is thermally desorbed from the packing and backflushed from the trap onto a gas chromatographic column to separate the compounds. Compounds of interest are determined by mass spectrometry. The Avogadro Group, LLC subcontracts TO-12 and TO-15 analysis to qualified local laboratories experienced in the analytical procedures. These laboratories also supply the canisters for sampling.

Method: **Visual Determination of the Opacity of Emissions From Stationary Sources**

Reference: EPA 9

Principle: The opacity of emissions from stationary sources is determined visually by a qualified observer.

Qualifications and Testing: The qualified observer is certified according to section 3 of EPA Method 9. The observer must demonstrate the ability to read opacity readings in 5 percent increments of 25 different white plumes with an error not to exceed 15 percent opacity.

Sampling Procedure: The opacity shall be observed from the point of greatest opacity in that portion of the plume where condensed water vapor is not present. The observer shall not look continuously at the plume, but instead shall observe the plume momentarily at 15-second intervals. The readings shall be recorded to the nearest 5 percent. A minimum of 24 observations shall be recorded.

Data Reduction: Opacity shall be determined as an average of 24 consecutive observations recorded at 15-second intervals. The observations recorded on the data sheet shall be divided into sets of 24 consecutive observations. A set is composed of any 24 consecutive observations. Sets need not be consecutive in time and in no case shall two sets overlap. For each set of 24 observations, the average opacity shall be determined.

APPENDIX B

QUALITY ASSURANCE AND CALIBRATION DATA

QUALITY ASSURANCE PROGRAM SUMMARY AND CERTIFICATIONS

The Avogadro Group, LLC (Avogadro) ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA Officer and encompasses seven major areas:

1. Development and use of an internal QA manual.
2. QA reviews of reports, laboratory work, and field testing.
3. Equipment calibration and maintenance.
4. Chain of custody.
5. Continuous training.
6. Knowledge of current test methods.
7. Agency certification.

Each of these areas is discussed individually below.

Quality Assurance Manual. Avogadro has prepared a QA Manual according to EPA guidelines. The manual serves to document and formalize all of Avogadro's QA efforts. The manual is constantly updated, and each employee involved in technical services for emission measurements is required to read and understand its contents. The manual includes details on the other six QA areas discussed below.

QA Reviews. Avogadro's review procedure includes review of each source test report by a project QA Officer, including reviews of laboratory and field work, data sheets, data input, calculations and averages, and report text.

The most important review is the one that takes place before a test program begins. The QA Officer works closely with testing personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the California Air Resources Board (CARB). The schedules for maintenance and calibrations are given in Tables B-1 and B-2.

Quality control checks are also conducted in the field for each test program. A partial list of checks made as part of each CEM system test series is included below as an example of the field QA procedures.

- Sample acquisition and conditioning system leak check.
- 2-point analyzer calibrations (all analyzers)
- 3-point analyzer calibrations (analyzers with potential for linearity errors).
- Complete system calibration check ("dynamic calibration" through entire sample system).
- Periodic analyzer calibration checks (once per hour) are conducted at the start and end of each test run. Any change between pre- and post-test readings are recorded.
- All calibrations are conducted using gases certified by the manufacturer to be + 1% of label value (NBS traceable).
- Calibration and CEM performance data are fully documented, and are included in each source test report.

Chain of Custody. AG maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, AG documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only laboratory personnel have access. Neither other AG employees nor cleaning crews have keys to this area.

Data sheets are copied immediately upon return from the field, and this first generation copy is placed in locked storage. Any notes made on original sheets are initialed and dated.

Training. Personnel training is essential to ensure quality testing. AG has formal and informal training programs which include:

1. Attendance at EPA-sponsored training courses.
2. Enrollment in EPA correspondence courses.
3. A requirement for all technicians to read and understand AG's QA Manual.
4. In-house training and QA meetings on a regular basis.
5. Maintenance of training records.

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. AG subscribes to services which provide updates on EPA and CARB reference methods, and on EPA, CARB and local District rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. AG personnel maintain membership in the Air and Waste Management Association and in the Source Evaluation Society.

AGENCY CERTIFICATION

AG is certified by the CARB as an independent source test contractor for gaseous and particulate measurements. AG also participates in EPA QA audit programs for Methods 5, 6 and 7.

TABLE B-1
SAMPLING INSTRUMENTS AND EQUIPMENT CALIBRATION SCHEDULE
As Specified by the CARB

Instrument Type	Frequency of Calibration	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter (large)	12 months	Calibrated dry test meter	± 2% of volume measured
Dry Gas Meter	6 months or when repaired	Calibrated dry test meter	± 2% of volume measured
S-Type Pitot (for use with EPA-type sampling train	6 months	EPA Method 2	Cp constant (+5%) over working range; difference between average Cp for each leg must be less than 2%
Vacuum Gauges Pressure Gauges	6 months	Manometer	± 3%
Field Barometer	2 weeks (or on site)	Mercury barometer	± 0.2" Hg
Temperature Measurement (thermocouples)	6 months	NBS mercury thermometer or NBS calibrated platinum RTD	± 4 F for <400 F ± 1.5% for >400 F
Temperature Readout Devices	6 months	Precision potentiometer	± 2% full scale reading
Analytical Balance	12 months (check prior to each use)	Should be performed by manufacturer or qualified laboratory	± 0.3 mg of stated weight
Probe Nozzles	Each field day	Nozzle diameter check micrometer	Range <± 0.10 mm for three measurements
Continuous Analyzers	Every field day, Depends upon use, frequency and performance	As specified by manufacturers operating manuals, EPA NBS gases and/or reference methods	Satisfy all limits specified in operating specifications

TABLE B-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and Avogadro's Experience

Equipment	Performance Requirement	Maintenance Interval	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw manufacturer required vacuum and flow	Every 300 hours of operation or 6 months, whichever is less	1. Visual inspection 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	Every 300 hours of operation or 6 months, whichever is less After each test, if used in sampling of corrosive atmospheres (e.g. H_2S)	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by the manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER I-14-036

Independent Contractor Approval Pursuant to California Code of Regulations, Title 17, Section 91207

The Avogadro Group, LLC

WHEREAS, the Air Resources Board (ARB), pursuant to California Health and Safety Code, Section 41512, has established the procedures contained in California Code of Regulations, Title 17, Section 91200 and following, to allow the use of independent testers for compliance tests required by ARB;

WHEREAS, it has been determined that The Avogadro Group, LLC meets the requirements of ARB for performing ARB Test Methods 1, 2, 3, 4, 5, 8, 17, 100 (CO, CO_2, NO_X, O_2, SO_2, THC), Visible Emissions Evaluation (VEE), and U.S. Environmental Protection Agency (U.S. EPA) Test Methods 18, 201A, and 202 pursuant to Cal. Code Regs., Title 17, Section 91200 and following, when the following conditions are met:

1. The Avogadro Group, LLC calibrates its metering system in accordance with Section 5.3 of ARB Test Method 5, and establishes and maintains a log of the calibrations;
2. The Avogadro Group, LLC acquires and uses sulfuric acid in accordance with Section 3.3.5 of ARB Test Method 8;
3. The Avogadro Group, LLC uses a probe constructed in accordance with Section 2.1.3 of ARB Test Method 100;
4. The Avogadro Group, LLC uses noncalculating channels on its data acquisition system or a strip chart in accordance with Section 2.2.8 of ARB Test Method 100;
5. The Avogadro Group, LLC includes the following information on all strip charts and/or emissions data sheets: pollutant of interest, source, analyzer range, date and time, zero offsets, and the name(s) of the person(s) operating the instruments;
6. The Avogadro Group, LLC handles condensate in the sample bag while collecting the sample in accordance with Section 8.2.1.4 of U.S. EPA Test Method 18;
7. The Avogadro Group, LLC calibrates and repairs the nozzles it uses for U.S. EPA Test Method 201A in accordance with Section 10.1 of U.S. EPA Test Method 5, and establishes and maintains a log of the calibrations, which shall include notes of the repairs on each nozzle;

8. The Avogadro Group acquires and uses 300 to 500 ml glass beakers as required by Section 6.2.2 (c) of U.S. EPA Test Method 202;

9. The Avogadro Group acquires and uses a 0 to 100 ml glass burette in 0.1 ml graduations as required by Section 6.2.2 (f) of U.S. EPA Test Method 202;

10. The person performing VEE passed ARB Compliance Training Course #100: Fundamentals of Enforcement (FOE)/VEE (Smoke School) and is currently certified to conduct VEE. Any recertification for VEE, following the initial passage of ARB's FOE, must be from a certifying body recognized by ARB at the time VEE is performed; and

WHEREAS, ARB Executive Officer, pursuant to California Health and Safety Code Section 39516, issued Executive Order G-02-008, delegating to the Chief of ARB Monitoring and Laboratory Division (MLD) the authority to approve independent testers in accordance with Cal. Code Regs., Title 17, Section 91200 and following;

NOW, THEREFORE, I, Michael T. Benjamin, Chief of MLD, order that The Avogadro Group, LLC is granted approval from the date of execution of this order until June 30, 2016, to perform the test methods identified above subject to compliance with Cal. Code Regs., Title 17, Section 91200 and following.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his authorized representative may field audit one or more tests performed pursuant to this order for each test method identified above.

Executed at Sacramento, California this 6th day of August 2014.

Michael Benjamin

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, Title 17, Section 91207, until June 30, 2016, for those test methods listed below:

ARB Source Test Methods:

1, 2, 3, 4, 5, 8, 17

100 (CO, CO_2, NO_x, O_2, SO_2, THC)

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, Title 17, Section 91207, until June 30, 2016, for those test methods listed below:

U.S. EPA Test Methods 18, 201A, and 202
Visible Emissions Evaluation

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

Certificate of Accreditation

Stack Testing Accreditation Council

500 W. Wood Street • Palatine, IL • 60067
www.betterdata.org
stacmanager@betterdata.org

This is to certify that

The Avogadro Group, LLC

2825 Verne Roberts Circle, Antioch, California 94509

has been assessed and meets the requirements for interim accreditation under

ASTM D7036-04 and ASTM D7036-04 (Reapproved 2011)

Certificate Number: 2012.004.0000.0614
Certificate Expiration Date: 31 December 2014

Authorized Signature: ____________________ Date: 15 April 2014

This certificate is the property of STAC and must be surrendered immediately upon request.

CHRISTOPHER CROWLEY **Student ID: 43934**

is certified as a visible emission evaluator based on the score achieved and the criteria established by the U.S. EPA Reference Method 9.

Certification expires: 10/25/2014

James R. Ryden, Chief
Enforcement Division

04/24/2014
Certified Date

To verify this cert info, scan this QR code or visit www.arb.ca.gov/training/veeverification.php

Certified for: **100.1**
100.1 = Day
100.2 = Night

Average Deviation:
No Sun Glasses: White: **7.2** Black: **4.8**
Sun Glasses: White: Black:

Fold

California Environmental Protection Agency

Air Resources Board

VISIBLE EMISSION EVALUATION PROGRAM

Information on future schedule and locations:

Day cert: www.arb.ca.gov/training/courses.php?course=100.1
Night cert: www.arb.ca.gov/training/courses.php?course=100.2

To verify cert info: www.arb.ca.gov/training/veeverification.php

ARB, Enforcement Division, Training Section
P.O. Box 2815, Sacramento, CA 95812
arbtrain@arb.ca.gov
(916) 322 - 3937

Cut

Appendix B.2

Avogadro CEM and Equipment Calibration Data

```
MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

6:47:39
Project name: Eagle Peak Rock and Paving, Project number: 14206.0
Operator name: C.Crowley
Run Time: 60
Recording data every: 6 second(s)
Averaging those data every: 60 seconds
We are traversing the stack over 5 ports for 12.00 minutes per port.

Channel 1 is: O2
 Voltage:10.00 volts
 Offset:0.00 volts
 Range:25.000
Channel 2 is: CO2
 Voltage:10.00 volts
 Offset:0.00 volts
 Range:25.000
Channel 3 is: CO
 Voltage:5.00 volts
 Offset:0.00 volts
 Range:2500.000
Channel 4 is: NOx
 Voltage:10.00 volts
 Offset:0.00 volts
 Range:500.000

O2 cylinders utilized:
 Zero: 0 ()
 Mid: 8.956 (CC28717)
 High: 21.09 (SG9168927)
 Biasing with: Mid
CO2 cylinders utilized:
 Zero: 0 ()
 Mid: 8.632 (SG9168927)
 High: 18.19 (CC28717)
 Biasing with: Mid
CO cylinders utilized:
 Zero: 0 ()
 Mid: 951.8 (CC280063)
 High: 2403.0 (CC187172)
 Biasing with: Mid
NOx cylinders utilized:
 Zero: 0 ()
 Mid: 221.5 (CC206595)
 High: 470.5 (CC7000)
 Biasing with: Mid
```

```
MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

6:47:41
Project name: Eagle Peak Rock and Paving          Project number: 14206.0
Operator name: C.Crowley

Calibration

Analyzer: O2
Zero Reference: 0.000   Zero Reading: 0.001     Zero %Error: 0.005
Mid Reference: 8.956    Mid Reading: 8.933      Mid %Error: -0.109
High Reference: 21.09   High Reading: 21.1      High %Error: 0.047

Analyzer: CO2
Zero Reference: 0.000   Zero Reading: -0.009    Zero %Error: -0.049
Mid Reference: 8.632    Mid Reading: 8.515      Mid %Error: -0.643
High Reference: 18.19   High Reading: 18.18     High %Error: -0.055

Analyzer: CO
Zero Reference: 0.000   Zero Reading: 5.2       Zero %Error: 0.216
Mid Reference: 951.8    Mid Reading: 949.1      Mid %Error: -0.112
High Reference: 2403    High Reading: 2405      High %Error: 0.083

Analyzer: NOx
Zero Reference: 0.000   Zero Reading: -0.17     Zero %Error: -0.036
Mid Reference: 221.5    Mid Reading: 219.3      Mid %Error: -0.468
High Reference: 470.5   High Reading: 470.8     High %Error: 0.064
```

```
MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

6:56:48
Project name: Eagle Peak Rock and Paving, Project number: 14206.0
Operator name: C.Crowley

Initial Bias

Analyzer: O2
Zero Bias Ref: 0.000      Bias Reading: 0.111      Bias %Error: 0.522
Span Bias Ref: 8.956      Bias Reading: 8.967      Bias %Error: 0.161

Analyzer: CO2
Zero Bias Ref: 0.000      Bias Reading: 0.05       Bias %Error: 0.324
Span Bias Ref: 8.632      Bias Reading: 8.523      Bias %Error: 0.044

Analyzer: CO
Zero Bias Ref: 0.000      Bias Reading: -7.5       Bias %Error: -0.529
Span Bias Ref: 951.8      Bias Reading: 945.5      Bias %Error: -0.150

Analyzer: NOx
Zero Bias Ref: 0.000      Bias Reading: 0.045      Bias %Error: 0.046
Span Bias Ref: 221.5      Bias Reading: 217.1      Bias %Error: -0.468
```

Airgas

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles, CA 90059
(323) 568-2208 Fax: (323) 567-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI73E15A1051	Reference Number:	48-124406879-1
Cylinder Number:	CC28717	Cylinder Volume:	156.5 CF
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32013	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Dec 05, 2013

Expiration Date: Dec 05, 2021

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	9.000 %	8.956 %	G1	+/- 0.4% NIST Traceable	12/05/2013
CARBON DIOXIDE	18.00 %	18.19 %	G1	+/- 0.7% NIST Traceable	12/05/2013
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09060206	CC262089	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018
NTRM	08061315	CC255254	20.09 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jun 28, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Nov 13, 2013
SIEMENS OXYMAT 6	PARAMAGNETIC	Nov 25, 2013

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI70E15A7420	Reference Number:	48-124219805-4
Cylinder Number:	SG9168927	Cylinder Volume:	151.2 CF
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	NONPGVP	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 26, 2010

Expiration Date: May 26, 2018

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	8.500 %	8.632 %	G1	+/- 1% NIST Traceable	05/26/2010
OXYGEN	21.00 %	21.09 %	G1	+/- 1% NIST Traceable	05/26/2010
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	970510	SG9198971	10.818 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 15, 2012
NTRM	060608	CC207972	22.51 % OXYGEN/NITROGEN		May 01, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS % CO2	NDIR	May 10, 2010
SIEMENS OXYMAT 6	PARAMAGNETIC	May 10, 2010

Triad Data Available Upon Request

Notes:

Signature on file

Approved for Release

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0305	Reference Number:	48-124239691-1
Cylinder Number:	CC280063	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32014	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Nov 04, 2010

Expiration Date: **Nov 04, 2018**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	950.0 PPM	951.8 PPM	G1	+/- 1% NIST Traceable	10/26/2010, 11/04/2010
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	080604	CC146172	988.8 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Apr 05, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 CO	FTIR	Oct 05, 2010

Triad Data Available Upon Request

Notes:

Signature on file

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 South Alameda Street
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

Part Number:	E02NI99E15A3299	Reference Number:	48-124314251-4
Cylinder Number:	CC187172	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32012	Valve Outlet:	350
Gas Code:	APPVD	Analysis Date:	May 02, 2012

Expiration Date: May 02, 2015

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	2400 PPM	2403 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	020503	SG9152059	2484PPM CARBON MONOXIDE/NITROGEN	Oct 02, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS CO HIGH	NDIR	Apr 14, 2012

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A3866	Reference Number:	48-124274442-1A
Cylinder Number:	CC206595	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	660
Gas Code:	NO,BALN	Certification Date:	Aug 09, 2011

Expiration Date: **Aug 09, 2019**

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITRIC OXIDE	220.0 PPM	221.5 PPM	G1	+/- 1% NIST Traceable	08/02/2011, 08/09/2011
NITROGEN	Balance				
Total oxides of nitrogen		221.8 PPM		For Reference Only	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	090603	CC286503	250.6 PPM NITRIC OXIDE/NITROGEN		Dec 17, 2014

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 NO	FTIR	Jul 25, 2011

Triad Data Available Upon Request

Notes:

Signature on file

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0238	Reference Number:	48-124262681-1
Cylinder Number:	CC7000	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	NONPGVP	Valve Outlet:	660
Gas Code:	NO,BALN	Certification Date:	May 04, 2011

Expiration Date: May 04, 2019

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITRIC OXIDE	470.0 PPM	470.5 PPM	G1	+/- 1% NIST Traceable	04/26/2011, 05/04/2011
NITROGEN	Balance				
Total oxides of nitrogen		471.1 PPM		For Reference Only	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	100604	CC316079	495.6 PPM NITRIC OXIDE/NITROGEN		Feb 01, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 NO	FTIR	Apr 08, 2011

Triad Data Available Upon Request

Notes:

Signature on file

Approved for Release

Avogadro Group, Portland
Probe Inventory and Metrics

Date modified 7/2/2014
No. of probes: 29

ID	Manufacturer	Calibration			Length			Pitot size	Orsat / Static
		A-side	B-side	Expires	Effective	Tip-to-tip	Glass liner		
106	Apex	0.8106	0.8156	12/20/2014	2			1/4"	Y
2	Traverse Probe	0.8161	0.8133	12/20/2014	3	36	--	3/8"	
113	Millenium	0.7874	0.7796	7/17/2013	3			1/4"	
117	Apex	0.8160	0.8206	12/20/2014	4			1/4"	Y
75	Apex	0.8128	0.8134	12/20/2014	4			1/4"	Y
116	Millenium	0.7893	0.7796	7/17/2013	4			1/4"	Y
118	Apex	0.8116	0.8144	12/20/2014	4	62.75	58.25	3/8"	Y
107	Apex	0.8151	0.8145	12/20/2014	5			1/4"	Y
104	Millenium	0.7952	0.7931	7/17/2013	6			1/4"	Y
103	Millenium	0.8111	0.8150	12/20/2014	6			1/4"	
121	Traverse Probe	0.8144	0.8150	12/20/2014	6			3/8"	
119	Traverse Probe	0.8117	0.8117	12/20/2014	6			3/8"	
62-LONG	Traverse Probe	0.8111	0.8100	12/20/2014	6	78.5	--	1/4"	
62-SHORT	Traverse Probe	0.7845	0.7855	7/16/2013	6	77	--	1/4"	
19	Millenium	0.8172	0.8184	12/20/2014	6	88.25	82.5	1/4"	
53	Millenium	0.8161	0.8161	12/20/2014	6	89.125	82.375	3/8"	
109	Apex	0.8106	0.8156	12/20/2014	8			1/4"	Y
110	Traverse Probe	0.8172	0.8156	12/20/2014	8			1/4"	
32	Millenium	..8178	0.8167	12/20/2014	8	112.25	106.25	1/4"	
33	Millenium	0.8111	0.8089	12/20/2014	8	113	106.375	1/4"	
39	Apex	0.7747	0.7707	7/17/2013	9			1/4"	Y
38	Apex	0.8184	0.8145	12/20/2014	9	122.75	118.313	3/8"	Y
122	Traverse Probe	0.8138	0.8116	12/20/2014	10			3/8"	
120	Traverse Probe	0.8111	0.8122	12/20/2014	10			1/4"	Y
67	Apex	0.8150	0.8133	12/20/2014	10			1/4"	Y
69	Millenium	0.8023	0.7943	7/17/2013	10	128.375	125	1/4"	
70	Millenium	0.8132	0.8122	12/20/2014	12			1/4"	Y
42	Millenium	0.8011	0.7957	7/17/2013	12	161.5	154.438	3/8"	
46*	Millenium	0.8133	0.8184	12/20/2014	12	163	156	3/8"	Y

Note: Glass liner length.does not include ball or taper

MONTROSE
ENVIRONMENTAL

EPA Method 5
Meter Box Orifice Calibration, Leak Check, and Thermocouple Calibration English Meter Box Units, English K' Factor

Meter #:	CB-12
Calibrated by:	D.Morical
Expires:	12/30/14

Date:	06/30/14
Barometric Pressure:	28.01 (in. Hg)

Yd:	1.017
ΔH@:	1.852

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown below

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

Theoretical Critical Vacuum:	13.21 (in. Hg)

dH (in H2O)	Time (min)	Volume			Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	– Ambient Temperature –		
		Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
0.32	17.00	186.700	192.157	5.457	95.0	95.0	92.0	92.0	IZ 40	0.2401	23.0	65.0	65.0	65.0
0.66	15.00	192.157	199.135	6.978	91.0	91.0	89.0	89.0	IZ 48	0.3492	20.0	65.0	65.0	65.0
1.20	12.50	199.135	206.817	7.682	89.0	89.0	88.0	88.0	IZ 55	0.4607	18.0	65.0	65.0	65.0
2.00	7.50	206.817	212.853	6.036	88.0	88.0	88.0	88.0	IZ 63	0.5932	17.0	65.0	65.0	65.0
3.35	5.50	212.853	218.673	5.820	88.0	88.0	88.0	88.0	IZ 73	0.8141	16.0	65.0	65.0	65.0

– DRY GAS METER –
VOLUME CORRECTED

Vm(std) (cu ft)
4.875
6.260
6.942
5.471
5.294

—— ORIFICE ——

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
4.990	5.302
6.403	6.804
7.040	7.480
5.439	5.779
5.474	5.818

– DRY GAS METER –
CALIBRATION FACTOR
Yd

Value (number)	Variation (number)
1.023	0.006
1.020	0.003
1.014	-0.003
0.994	-0.023
1.034	0.017

—— ORIFICE ——
CALIBRATION FACTOR
ΔH@

Value (in H2O)	Variation (in H2O)
1.866	0.014
1.831	-0.021
1.918	0.066
1.930	0.078
1.718	-0.136

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	1.017
Average ΔH@	1.852
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6
Leak Rate, (in H_2O/min):	0
Pressure Range (in H_2O):	≥ 5
Leak Rate, (in H_2O/min):	0

Meter Box Thermocouple Readout Calibration

Input Temperature	Allowable* Temp. Dev.	Low	High
32	7	25	39
122	9	113	131
212	10	202	222
302	11	291	313
392	13	379	405
482	14	468	496
572	15	557	587
662	17	645	679
752	18	734	770
842	20	822	862
932	21	911	953

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
35	35	34	35	34	35
124	124	124	124	123	124
215	215	315	215	214	216
305	305	305			
393	393	393			
481					
572					
66					
752					
842					
931					

Thermocouple simulator	
Make:	omega
Model:	cl540
Serial Number:	104238
Cal Date:	8/15/2014

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Dave Marcum Singature Date: 6/30/14

Approved by: Name: Singature Date:

Meter Box Orifice Calibration, Pressure Leak Check, and Thermocouple Readout Calibration Form Revision 2

Created: 10/25/13 by IE Last Revised: 2/19/14 by IE

APPENDIX C

DATA SHEETS

Appendix C.1

Sampling Locations

Eagle Peak Rock & Paving / Yreka, CA

EPA Method 1 Point Determinations for Isokinetic Testing

(to be used for rectangular ducts with equivalent diameters <u>over 24 inches</u>)

Upstream diameter:	56.0	inches
Downstream diameter:	228.0	inches
Width (W), inches (port side):	39.0	
Length (L) or depth, inches:	52.0	
Number of ports:	5	
Port length, inches:	2.0	

$$De = \frac{2\,(L)\,(W)}{L + W}$$

$$A = (L)\,(W)$$

Equivalent diameter (De):	44.57	← ***Pass - De > 24.0 inches***
Equiv. upstream diameters:	1.26	← ***Pass - ≥ 0.5 diameters***
Equiv. downstream diameters:	5.12	← ***Pass - ≥ 2.0 diameters***
Area (A) in square feet:	14.083	← ***Pass - A ≥ 113 sq in.***
Minimum number of points:	20	← ***EPA Method 1, Figure1-1***

Table 1

Matrix			Total points
3	x	3	9
4	x	3	12
4	x	4	16
5	x	4	20
5	x	5	25
6	x	5	30
6	x	6	36
7	x	6	42
7	x	7	49

Cross-sectional layout for rectangular stacks

Table 1 or 2 is used for choosing the matrix based on rounding up (if necessary) the minimum number of points.

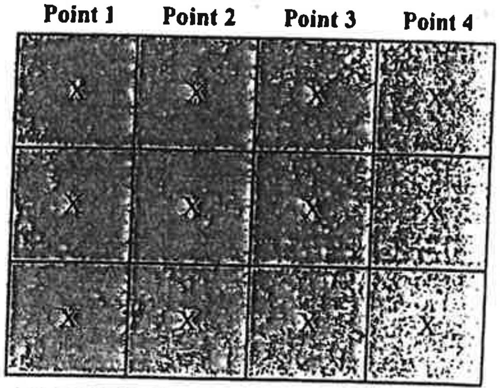
Number of points per port:	4	*This matrix was chosen by using or rounding up from* 20
Total number of points:	20	
Test matrix:	5 x 4	

Table 2 (Expanded)

Matrix			Total points
3	x	10	30
3	x	12	36
3	x	14	42
4	x	9	36

For expanding the number of points on one or both legs of matrix

Points	% of diameter	Points, distance from inner wall (in.)	Points, distance from outside tip (inc. w/ port length)
1	12.5	6.5	8.5
2	37.5	19.5	21.5
3	62.5	32.5	34.5
4	87.5	45.5	47.5
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA
NA	NA	NA	NA



Rectangular stack cross section divided into 12 equal areas with traverse points at the centroid of each area.

Appendix C.2

Plant Process Data

4.4.5 Visible Emissions (VE) Measurements

Visible emissions measurements will be conducted according to EPA Method 9. The observer will stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140 degree sector of his back. Opacity readings to the nearest 5 percent will be recorded at 15-second intervals on an observational record sheet. One six-minute/24 interval test run will be conducted concurrently with each particulate matter test.

4.4.6 Volumetric Flow Rate and Moisture Content

ack gas volumetric flow rate and moisture content will be determined according to EPA ethods 2 and 4. Flow traverses and moisture content determinations will be performed th each particulate run.

.7 Process Data

FIRST RUN

e plant's process instrumentation will be used to document unit load conditions during test runs. Process data will be collected by Eagle personnel and provided to Avogadro inclusion in the report. Process data to be presented in the report will include:

- ➢ Asphalt production rate – tons per hour 170
- ➢ Fuel firing rate – gallons per ton of asphalt 1.80
- ➢ Baghouse inlet and outlet temperatures – °F 273-I 267 o
- ➢ Fuel flow valve setting – % 10
- ➢ Combustion air setting – % 36
- ➢ Damper setting – % 40

9:29 A.M.

4.4.5 Visible Emissions (VE) Measurements

Visible emissions measurements will be conducted according to EPA Method 9. The observer will stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140 degree sector of his back. Opacity readings to the nearest 5 percent will be recorded at 15-second intervals on an observational record sheet. One six-minute/24 interval test run will be conducted concurrently with each particulate matter test.

4.4.6 Volumetric Flow Rate and Moisture Content

tack gas volumetric flow rate and moisture content will be determined according to EPA ethods 2 and 4. Flow traverses and moisture content determinations will be performed ith each particulate run.

.4.7 Process Data

2nd RUN

e plant's process instrumentation will be used to document unit load conditions during e test runs. Process data will be collected by Eagle personnel and provided to Avogadro inclusion in the report. Process data to be presented in the report will include:

- Asphalt production rate – tons per hour 210
- Fuel firing rate – gallons per ton of asphalt 1.00
- Baghouse inlet and outlet temperatures – °F 292 IN 293 OUT
- Fuel flow valve setting – % 18
- Combustion air setting – % 32
- Damper setting – % 48

11:47 A.M.

4.4.5 Visible Emissions (VE) Measurements

Visible emissions measurements will be conducted according to EPA Method 9. The observer will stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140 degree sector of his back. Opacity readings to the nearest 5 percent will be recorded at 15-second intervals on an observational record sheet. One six-minute/24 interval test run will be conducted concurrently with each particulate matter test.

4.6 Volumetric Flow Rate and Moisture Content

ack gas volumetric flow rate and moisture content will be determined according to EPA ethods 2 and 4. Flow traverses and moisture content determinations will be performed ith each particulate run.

7 Process Data

3rd RUN

plant's process instrumentation will be used to document unit load conditions during test runs. Process data will be collected by Eagle personnel and provided to Avogadro nclusion in the report. Process data to be presented in the report will include:

- Asphalt production rate – tons per hour 250
- Fuel firing rate – gallons per ton of asphalt 180
- Baghouse inlet and outlet temperatures – °F 290 IN 285 OUT

4:36 P.M.

- Fuel flow valve setting – % 14
- Combustion air setting – % 34
- Damper setting – % 48

Appendix C.3

Avogadro CEM Data

MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

Analyzer readings for Run 1

O_2 Channel was not recording correctly due to a Short.

Analyzers:	O2	CO2	CO	NOx
8:45:00	1.028	5.790	115.7	100.7
8:46:00	0.991	5.950	105.0	103.0
8:47:00	0.995	6.129	107.6	103.6
8:48:00	1.030	6.194	123.4	103.1
8:49:00	0.828	6.251	128.2	103.2
8:50:00	0.240	6.316	136.4	103.6
8:51:00	0.241	6.351	122.1	105.6
8:52:00	0.288	6.378	117.7	105.9
8:53:00	0.287	6.403	107.4	107.4
8:54:00	1.295	6.445	116.4	107.4
8:55:00	0.126	6.363	139.7	105.2
8:56:00	0.133	6.396	117.3	106.9
8:57:00	0.106	6.753	115.4	113.1
8:58:00	0.092	6.834	110.9	116.0
8:59:00	0.084	6.865	96.70	117.1
9:00:00	0.086	6.541	96.05	112.6
9:01:00	0.091	6.477	92.20	111.8
9:02:00	0.083	6.504	135.4	110.7
9:03:00	0.090	6.554	296.9	108.3
9:04:00	0.092	6.728	337.0	111.4
9:05:00	0.087	6.740	319.4	111.5
9:06:00	0.084	6.729	377.9	109.2
9:07:00	0.093	6.699	158.1	115.1
9:08:00	0.091	6.680	117.2	114.9
9:09:00	0.095	6.707	127.0	114.8
9:10:00	0.081	6.662	133.8	113.6
9:11:00	0.097	6.582	125.5	113.1
9:12:00	0.084	6.575	124.3	112.6
9:13:00	0.094	6.571	133.3	112.4
9:14:00	0.087	6.378	79.11	111.0
9:15:00	0.092	6.323	69.42	109.6
9:16:00	0.134	6.375	76.63	110.2
9:17:00	0.189	6.348	71.36	111.0
9:18:00	1.385	6.352	71.75	111.0
9:19:00	1.799	6.053	71.26	105.1
9:20:00	1.820	5.943	88.36	103.4
9:21:00	1.579	5.870	108.2	100.2
9:22:00	8.258	5.772	157.3	97.61
9:23:00	12.60	5.710	167.8	97.60
9:24:00	12.65	5.703	171.3	96.84
9:25:00	12.64	5.710	193.6	96.94
9:26:00	12.65	5.706	214.1	96.20
9:27:00	12.67	5.666	231.8	96.10
9:28:00	12.60	5.701	234.8	96.68
9:29:00	12.37	5.880	161.1	101.2
9:30:01	12.28	5.888	148.0	100.7
9:31:01	12.47	5.739	176.3	96.48
9:32:01	12.48	5.750	175.0	97.85
9:33:01	12.44	5.760	155.0	98.46
9:34:01	12.42	5.758	154.4	98.04
9:35:01	12.42	5.808	147.2	97.94
9:36:01	12.42	5.808	139.9	98.76
9:37:01	12.36	5.840	141.7	100.1
9:38:01	12.38	5.842	133.8	99.9
9:39:01	12.39	5.840	142.0	99.0
9:40:01	12.35	5.871	135.3	100.5
9:41:01	12.45	5.794	150.3	98.52

9:42:01	12.46	5.802	155.4	98.66
9:43:01	12.49	5.797	173.6	97.96
Run avg:	4.987	6.179	146.7	104.9
Run max:	2.130	6.903	99.4	99.9
Run min:	0.044	5.643	100.1	100.0

I

MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

9:50:40
Project name: Eagle Peak Rock and Paving, Project number: 14206.0
Operator name: C.Crowley

Run 1 Bias

Analyzer: O2
Zero Ref: 0 Span Ref: 8.956
Zero Calibration: 0.001 Inital Bias: 0.111 Bias Reading: 0.2975 Bias %Error: 1.4059 Bias Drift: 0.884
Span Calibration: 8.933 Inital Bias: 8.967 Bias Reading: 8.9303 Bias %Error: -0.0128 Bias Drift: 0.174
Corrected average:4.899

12.39 - Averaged and bias adjusted for data from 0923-E

Analyzer: CO2
Zero Ref: 0 Span Ref: 8.632
Zero Calibration: -0.009 Inital Bias: 0.05 Bias Reading: -0.0350 Bias %Error: -0.1429 Bias Drift: 0.467
Span Calibration: 8.515 Inital Bias: 8.523 Bias Reading: 8.3175 Bias %Error: -1.0858 Bias Drift: 1.130
Corrected average:6.332

Analyzer: CO
Zero Ref: 0 Span Ref: 951.8
Zero Calibration: 5.2 Inital Bias: -7.5 Bias Reading: -32.6500 Bias %Error: -1.5751 Bias Drift: 1.047
Span Calibration: 949.1 Inital Bias: 945.5 Bias Reading: 931.55 Bias %Error: -0.7303 Bias Drift: 0.581
Corrected average:165.6

Analyzer: NOx
Zero Ref: 0 Span Ref: 221.5
Zero Calibration: -0.17 Inital Bias: 0.045 Bias Reading: 2.0750 Bias %Error: 0.4772 Bias Drift: 0.431
Span Calibration: 219.3 Inital Bias: 217.1 Bias Reading: 215.43 Bias %Error: -0.8225 Bias Drift: 0.355
Corrected average:106.9

MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

Analyzer readings for Run 2

Analyzers:	O2	CO2	CO	NOx
11:20:00	11.90	6.137	115.9	98.90
11:21:00	11.92	6.122	105.4	99.5
11:22:00	11.92	6.109	107.2	99.3
11:23:00	12.05	6.029	104.8	98.37
11:24:00	12.00	6.054	108.9	99.4
11:25:00	12.01	6.037	110.8	99.5
11:26:00	12.01	6.063	115.5	99.5
11:27:00	11.95	6.103	116.6	100.8
11:28:00	11.96	6.078	109.1	100.7
11:29:00	11.95	6.063	117.9	100.4
11:30:00	12.01	6.048	118.9	99.1
11:31:00	12.04	6.029	128.6	98.13
11:32:00	12.05	6.030	138.1	98.27
11:33:00	12.04	6.036	137.6	98.65
11:34:00	11.97	6.058	135.2	98.93
11:35:00	11.99	6.046	139.3	98.65
11:36:00	12.02	6.036	138.0	98.44
11:37:00	11.63	6.420	129.1	103.5
11:38:00	11.15	6.672	128.6	106.0
11:39:00	11.07	6.776	130.3	106.4
11:40:00	11.03	6.776	142.8	107.2
11:41:01	10.97	6.792	150.3	106.9
11:42:01	11.07	6.722	148.8	105.6
11:43:01	11.06	6.731	157.1	105.2
11:44:01	11.06	6.749	149.6	105.3
11:45:01	11.09	6.752	139.1	106.1
11:46:01	11.08	6.764	145.5	105.5
11:47:01	11.12	6.717	149.5	104.8
11:48:01	11.11	6.749	170.3	104.0
11:49:01	11.16	6.738	186.8	102.8
11:50:01	11.11	6.762	199.5	103.6
11:51:01	11.12	6.745	202.5	104.0
11:52:01	11.06	6.828	194.8	105.5
11:53:01	10.97	6.882	199.9	106.6
11:54:01	10.92	6.888	201.8	107.1
11:55:01	10.84	6.931	197.1	107.1
11:56:01	10.85	6.912	210.9	106.7
11:57:01	10.88	6.855	220.0	105.5
11:58:01	10.95	6.781	252.4	103.9
11:59:01	10.97	6.796	229.0	105.3
12:00:01	10.90	6.834	268.3	104.6
12:01:01	10.96	6.831	301.6	103.2
12:02:01	10.97	6.827	214.3	104.6
12:03:01	10.97	6.838	221.4	105.2
12:04:01	11.02	6.809	203.6	105.1
12:05:01	11.07	6.791	185.6	105.8
12:06:01	11.09	6.786	209.6	105.8
12:07:01	11.00	6.838	206.4	107.1
12:08:01	11.01	6.793	294.5	105.7
12:09:01	11.10	6.795	315.8	104.9
12:10:01	10.91	6.880	270.7	108.4
12:11:01	10.94	6.838	373.6	105.4
12:12:01	10.98	6.805	340.3	104.8
12:13:01	11.14	6.713	360.9	104.7
12:14:01	10.92	6.848	331.0	108.4
12:15:01	11.10	6.723	302.0	106.7
12:16:01	11.14	6.696	290.5	105.9

12:17:01	11.16	6.698	306.1	105.2
12:18:01	11.15	6.723	324.5	105.8
Run avg:	11.31	6.579	196.1	103.7
Run max:	12.08	7.002	99.8	99.9
Run min:	10.83	5.982	100.4	100.0

```
MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

12:25:35
Project name: Eagle Peak Rock and Paving, Project number: 14206.0
Operator name: C.Crowley

Run 2 Bias

Analyzer: O2
Zero Ref: 0     Span Ref: 8.956
Zero Calibration: 0.001   Inital Bias: 0.2975   Bias Reading: 0.0503  Bias %Error: 0.2338   Bias Drift: 1.172
Span Calibration: 8.933   Inital Bias: 8.9303   Bias Reading: 8.8823  Bias %Error: -0.2404  Bias Drift: 0.228
Corrected average:11.42

Analyzer: CO2
Zero Ref: 0     Span Ref: 8.632
Zero Calibration: -0.009  Inital Bias: -0.0350  Bias Reading: 0.0115  Bias %Error: 0.1127   Bias Drift: 0.256
Span Calibration: 8.515   Inital Bias: 8.3175   Bias Reading: 8.3488  Bias %Error: -0.9137  Bias Drift: 0.172
Corrected average:6.817

Analyzer: CO
Zero Ref: 0     Span Ref: 951.8
Zero Calibration: 5.2     Inital Bias: -32.6500 Bias Reading: -41.9500 Bias %Error: -1.9621  Bias Drift: 0.387
Span Calibration: 949.1   Inital Bias: 931.55   Bias Reading: 950.15  Bias %Error: 0.0437   Bias Drift: 0.774
Corrected average:227.2

Analyzer: NOx
Zero Ref: 0     Span Ref: 221.5
Zero Calibration: -0.17   Inital Bias: 2.0750   Bias Reading: 0.8400  Bias %Error: 0.2147   Bias Drift: 0.262
Span Calibration: 219.3   Inital Bias: 215.43   Bias Reading: 213.93  Bias %Error: -1.1413  Bias Drift: 0.319
Corrected average:106.3
```

MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

Analyzer readings for Run 3

Analyzers:	O2	CO2	CO	NOx
15:16:00	12.56	5.591	379.8	77.89
15:17:00	12.17	5.972	268.4	89.68
15:18:00	12.00	6.034	206.0	93.52
15:19:00	11.33	6.570	412.2	97.38
15:20:00	11.26	6.516	410.5	95.62
15:21:00	11.33	6.487	430.5	95.50
15:22:00	12.36	5.606	276.4	85.65
15:23:00	12.38	5.790	247.1	88.01
15:24:00	12.21	5.860	237.3	89.83
15:25:00	12.13	5.932	263.2	90.61
15:26:00	11.91	6.163	260.7	94.05
15:27:00	10.88	6.920	467.3	103.8
15:28:00	10.62	7.025	525.6	105.3
15:29:00	10.63	7.008	509.0	105.3
15:30:00	10.59	7.043	496.2	106.6
15:31:01	10.75	6.922	549.7	103.7
15:32:01	10.53	7.116	969.5	104.6
15:33:01	10.42	7.198	949.0	107.7
15:34:01	10.46	7.102	1158	105.8
15:35:01	10.56	7.078	1438	103.6
15:36:01	10.51	7.125	1150	106.0
15:37:01	10.41	7.227	1118	108.1
15:38:01	10.39	7.165	1471	105.2
15:39:01	10.37	7.209	1421	107.1
15:40:01	10.32	7.215	1806	104.5
15:41:01	10.34	7.158	2491	100.8
15:42:01	10.28	7.196	2562	102.4
15:43:01	10.32	7.083	2589	98.77
15:44:01	10.88	6.730	2037	95.50
15:45:01	11.20	6.548	1744	94.68
16:38:04	11.34	6.551	719.5	100.1
16:39:04	11.30	6.594	328.5	105.1
16:40:04	11.44	6.464	299.2	104.1
16:41:04	11.68	6.295	275.9	100.7
16:42:04	11.86	6.201	332.6	97.61
16:43:04	11.80	6.235	317.5	99.1
16:44:04	11.75	6.274	333.6	98.26
16:45:04	11.70	6.313	251.0	102.1
16:46:04	11.65	6.377	275.7	100.8
16:47:04	11.63	6.376	271.4	102.8
16:48:04	11.54	6.453	297.0	102.8
16:49:04	11.52	6.488	302.5	102.4
16:50:04	11.51	6.447	272.6	103.9
16:51:04	11.50	6.459	476.2	93.92
16:52:04	11.51	6.428	500.4	93.30
16:53:04	11.51	6.444	432.8	95.04
16:54:04	11.55	6.461	385.2	97.06
16:55:04	11.50	6.438	359.9	97.41
16:56:04	11.62	6.380	323.6	97.77
16:57:04	11.60	6.389	326.3	97.71
16:58:04	11.62	6.400	324.2	97.37
16:59:04	11.73	6.296	315.1	96.57
17:00:04	11.83	6.223	305.3	98.15
17:01:04	11.92	6.144	290.1	97.28
17:02:04	12.03	6.114	304.8	96.81
17:03:04	11.93	6.169	291.6	98.80
17:04:04	11.87	6.200	296.9	97.85

17:05:04	11.94	6.169	328.4	96.08
17:06:04	12.36	5.796	366.4	91.87
Run avg:	11.38	6.502	653.9	98.74
Run max:	12.61	7.307	999.8	99.9
Run min:	10.23	5.541	1011	100.0

```
MoleDAQ Project Eagle Peak Rock and Paving
Sep 9 2014
Unit: Baghouse Stack

17:13:42
Project name: Eagle Peak Rock and Paving, Project number: 14206.0
Operator name: C.Crowley

Run 3 Bias

Analyzer: O2
Zero Ref: 0       Span Ref: 8.956
Zero Calibration: 0.001    Inital Bias: 0.0503    Bias Reading: 0.0100   Bias %Error: 0.0427   Bias Drift: 0.191
Span Calibration: 8.933    Inital Bias: 8.8823    Bias Reading: 8.8685   Bias %Error: -0.3058  Bias Drift: 0.065
Corrected average:11.50

Analyzer: CO2
Zero Ref: 0       Span Ref: 8.632
Zero Calibration: -0.009   Inital Bias: 0.0115    Bias Reading: -0.0733  Bias %Error: -0.3535  Bias Drift: 0.466
Span Calibration: 8.515    Inital Bias: 8.3488    Bias Reading: 8.2520   Bias %Error: -1.4458  Bias Drift: 0.532
Corrected average:6.769

Analyzer: CO
Zero Ref: 0       Span Ref: 951.8
Zero Calibration: 5.2      Inital Bias: -41.9500 Bias Reading: -18.3000 Bias %Error: -0.9779  Bias Drift: 0.984
Span Calibration: 949.1    Inital Bias: 950.15   Bias Reading: 956.40   Bias %Error: 0.3038   Bias Drift: 0.260
Corrected average:662.0

Analyzer: NOx
Zero Ref: 0       Span Ref: 221.5
Zero Calibration: -0.17    Inital Bias: 0.8400   Bias Reading: 2.6400   Bias %Error: 0.5972   Bias Drift: 0.383
Span Calibration: 219.3    Inital Bias: 213.93   Bias Reading: 215.03   Bias %Error: -0.9075  Bias Drift: 0.234
Corrected average:101.0
```

Appendix C.4

Particulate Matter Data Sheets

The [illegible]dro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT EAGLE PEAK PAVING
SAMPLE LOCATION Outlet
OPERATOR/ASSISTANT KJD
UNIT Baghouse
TEST NO. 1 -PM
TEST CONDITION 170 tph
METER VOL. (START/END) 909.095 / 947.906
METHOD EPA M5/202
AMB. TEMP., °F 70
PAGE 1 OF 1
PROJECT # 14206.0
DATE 7/9/14

ASSUMED PRE-TEST:

Baro. Pres, in. Hg.: 27.46
Stack Pres:
H2O Content:
O2 / CO2:
ΔP:
ΔH:
Stack Dia, Inches:
Sample Time: Total: 60
Per point: 3.0
Num of Traverse Points: 20
ΔH = 3.9 x ΔP

EQUIPMENT INFO:

Meter: ID #: CB-12
Yd value: 1.017
ΔH@ value: 1.852
Pitot: ID #: 19-B6
Cp value: 0.8172
Probe: ID #: 19
Material: glass
Nozzle: Diameter: 0.28[illegible]
Material: glass
Filter: Number: B770
Material: Glass

Reagent	Lot #
H2O	140lb17
Acetone	DK817
Hex	1311 0138

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	Empty	1000.8	803.2	= 197.6
# 2	Empty	680.4	656.4	= 24.0
# 3	H2O	671.2	657.7	= 13.5
# 4	Silica	925.6	910.0	= 15.6
# 5		Line	Rinse	= -30.0
# 6				=
# 7				=

Total Weight Gain: = 220.7

POST TEST INFO:

Filter Appearance: Light loading
Condensate App.: Clear
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre:	0.006	10	✓	KJD
Post:	0.007	9	✓	KJD

POST SAMPLING PURGE:

Time: 60 min
Flow l/min: 14 L/min
Temp °F: 70

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP	CPM Filter °F	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS.
1	841	~~0.20~~ .30	0.69	909.095	260	65	77	248	249	65		1	
2	3	.70	2.73	911.22	264	66	77	250	250	50		5	
3	6	.58	2.26	914.11	275	65	78	248	251	45		5	
4	9	.31	1.21	916.72	281	68	80	244	250			5	-.40
PC	12/858	—	—	918.224	—	—	—	—	—	—	—	—	—
1	900	.54	2.18	918.224	270	73	80	248	251	51		6	
2	15	.52	2.03	920.71	276	74	80	247	252	49		6	
3	18	.35	1.37	923.28	280	74	80	249	256	51		5	
4	21	.15	.59	925.41	282	77	80	250	248	53		3	
PC	24/912	—	—	926.57	—	—	—	—	—	—	—	—	
1	915	.43	1.68	926.577	275	78	81	248	251	56		6	
2	27	.35	1.36	929.42	276	80	81	249	252	54		6	
3	30	.25	.975	931.00	281	80	82	250	256	53		5	
4	33	.17	.66	932.61	280	83	82	250	250				
PC	36/927	—	—	934.059	—	—	—	—	—	—	—	—	
1	929	.42	1.64	934.059	280	82	82	250	248	54		6	
2	39	.31	1.21	936.81	281	85	82	251	251	54		6	
3	42.	.24	.936	938.62	284	84	82	252	250	55		5	
4	45.	.19	.74	940.28	281	86	83	253	256	56		5	
PC	48/939	—	—	941.73	—	—	—	—	—	—	—	—	
1	~~51~~ 48/941	.45	1.75	941.73	280	90	84	250	250	52		7	
2	~~54~~ 51	.25	.975	944.[illegible]1	282	90	86	251	249	53		6	
3	~~57~~ 54	.16	.624	945.55	281	91	87	252	250	54		4	
4	~~00~~/57	.12	.47	946.84	283	91	88	248	248	56		4	
				947.906									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: CC
Impingers Recovered: CC
Filter Loaded: CC
Filter Recovered: CC
Probe Wash: CC

TEST SUMMARY

Calculated by: CC
Checked by: CC
Sample Volume, ft³: 38.811
Water Collected, g: 220.7
Meter Temperature, °F: 79.1
Meter Pressure (ΔH), iwg: 1.327
Velocity (ΔP rms), iwg: 0.3225
Stack Pressure., iwg: -0.40
Stack Temperature, °F: 277.6
O2 / CO2: 12.39/6.33

Comments:

Rc cc 0.0

Generic Sample Train Data Sheet Revision 0

[illegible]

The gadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT EAGLE PEAK PAVING
SAMPLE LOCATION Stack
OPERATOR/ASSISTANT KJ/JS

UNIT Baghouse
TEST NO. 2 -PM
TEST CONDITION 210 TPH
METER VOL. (START/END) 948.325 / 985.375

METHOD EPA M5/202
AMB. TEMP., °F 80

PAGE 1 OF 1
PROJECT # 14206.0
DATE 9-9-14

ASSUMED PRE-TEST:
Baro. Pres, in. Hg.: 27.48
Stack Pres:
H_2O Content:
O_2 / CO_2:
ΔP:
ΔH:
Stack Dia, Inches:
Sample Time: Total: 60
Per point: 3
Num of Traverse Points: 20
Δ H = 3.2 x Δ P

EQUIPMENT INFO:
Meter: ID #: CB-12
Yd value: 1.017
ΔH@ value: 1.652
Pitot: ID #: 019-4-6
Cp value: 0.8172
Probe: ID #: 19
Material: glass
Nozzle: Diameter: 0.287
Material: glass
Filter: Number: 3771
Material: glass

Reagent	Lot #
H_2O	1401817
Acetone	OK817
Hexane	1311038

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
# 1	Empty	802.5	614.0	=	188.5
# 2	Empty	689.6	660.7	=	28.9
# 3	H2O	560.2	544.1	=	16.1
# 4	Silica	972.0	952.8	=	19.2
# 5		Line Rinse		=	-30.0
# 6				=	
# 7				=	

POST TEST INFO:
Total Weight Gain: = 222.7
Filter Appearance: Light loading
Condensate App.: Clear
Silica Gel Spent? (Y/N): no

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre:	0.006	13	✓	KJD
Post:	0.002	10	✓	KJD

POST SAMPLING PURGE:
Time: 60 min
Flow l/min: 14
Temp °F: 72

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP	CPM Filter °F	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS.
1	1119	.73	2.33	948.325	278	97	80	250	250	65	|	7	
2	3	.70	2.24	951.08	281	97	81	251	248	49	|	6	
3	6	.51	1.63	953.75	282	96	84	251	247	52	|	6	
4	9	.30	0.96	956.00	290	96	84	248	250	57	|		
PC	12/1131	—	—	952.735	—	—	—	—	—	—	—	—	
1	1133	.62	1.98	957.735	293	97	78	251	247	59	|	6	-
2	15	.56	1.79	959.96	297	96	75	250	246	58	|	6	
3	18	.48	1.54	962.31	299	96	78	250	249	62	|	6	
4	21	.30	1.15	964.50	297	96	82	249	247	62	|	6	-.46
PC	24/1145	—	—	966.33	—	—	—	—	—	—	—	—	
1	1146	.45	1.44	966.33	300	97	77	250	248	59	|	6	-
2	27	.37	1.18	968.42	295	97	76	251	248	59	|	6	
3	30	.34	1.08	970.23	296	48	77	250	250	59	|	5	
4	33	.30	.96	972.04	294	98	78	250	250	60	|	5	
PC	36/1158	—	—	973.75	—	—	—	—	—	—	—	—	
1	1200	.44	1.4	973.75	301	97	79	250	251	61	|	6	-
2	39	.27	.86	975.91	295	98	80	251	250	61	|	5	
3	42	.22	.70	977.41	296	99	81	251	250	61	|	5	
4	45	.17	.54	978.94	294	99	82	250	251	61	|	4	
PC	48/1210	—	—	980.00	—	—	—	—	—	—	—	—	
1	1214	.28	.90	980.00	301	99	81	250	248	62	|	5	
2	51	.21	.67	981.75	306	100	82	251	248	62	|	5	
3	54	.15	.48	983.00	294	100	83	250	251	63	|	4	
4	57	.15	.48	984.44	293	[illegible]	83	[illegible]	[illegible]	[illegible]	|	[illegible]	

CHAIN OF CUSTODY INFORMATION
Impingers Loaded: CC
Impingers Recovered: CC
Filter Loaded: CC
Filter Recovered: CC
Probe Wash: CC

TEST SUMMARY
Calculated by: CC
Checked by: CC
Sample Volume, ft³: 37.050
Water Collected, g: 222.7
Meter Temperature, °F: 97.7
Meter Pressure (ΔH), iwg: 1.217
Velocity (ΔP rms), iwg: 0.3579
Stack Pressure., iwg: -0.46
Stack Temperature, °F: 293.8
O_2 / CO_2: 11.42/6.82
Comments:

ro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT EAGLE PEAK PAVING
SAMPLE LOCATION Stack Exit
OPERATOR/ASSISTANT KJD
UNIT Baghouse
TEST CONDITION 250 tph
METER VOL. (START/END) 985.673 / 1020.242
TEST NO. 3-PM
METHOD EPA M5/202
AMB. TEMP., °F 55
PAGE 1 OF 1
PROJECT# 14206.0
DATE 9-9-14

ASSUMED PRE-TEST:
Baro. Pres, in. Hg.: 27.48
Stack Pres:
H2O Content:
O2 / CO2:
ΔP:
ΔH:
Stack Dia, Inches:
Sample Time: Total: 60
Per point: 3
Num of Traverse Points: 20
ΔH = 3.4 x ΔP

EQUIPMENT INFO:

Meter:	ID #:	CB-12
	Yd value:	1.017
	ΔH@ value:	1.852
Pitot:	ID #:	19
	Cp value:	0.8172
Probe:	ID #:	19
	Material:	glass
Nozzle:	Diameter:	0.287
	Material:	glass
Filter:	Number:	3773
	Material:	glass

Reagent	Lot #
H2O	141817
Acetone	0K817
Hexane	3110138

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
#1	Empty	793.7	617.3	=	176.4
#2	Empty	673.3	655.3	=	18.0
#3	H2O	652.0	640.6	=	11.4
#4	Silica	952.9	925.4	=	12.5
#5		Line Rinse		=	-30.0
#6				=	
#7				=	

Total Weight Gain: = 188.3

POST TEST INFO:
Filter Appearance: light Loading
Condensate App.: Clear
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre:	0.004	11	✓	KJD
Post:	0.005	9	✓	KJD

POST SAMPLING PURGE:
Time: 60
Flow l/min: 15
Temp °F: 73

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP	CPM Filter °F	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in.	STATIC PRESS.
1	1515	0.70	2.24	985.673	305	104	85	250	248	67		9	
2	3	.65	2.21	988.41	306	105	83	251	248	66		9	
3	6	.51	1.73	991.12	304	105	82	250	257	65		7	
4	9	.38	1.30	993.62	300	105	82	248	251	64		6	
PC	12/1527	–	–	995.35	–	–	–	–	–	–	–	–	–
1	1528	.53	1.80	995.35	302	105	84	250	248	60		7	
2	15	.42	1.43	997.86	307	105	83	250	251	60		7	
3	18	.45	1.53	999.98	305	105	82	251	250	59		6	
4	21	.36	1.22	2.14	302	104	82	251	252	58		6	-.38
PC	24/1540	–	–	4.00	–	–	–	–	–	–	–	–	
1	1542	.31	1.05	4.00	307	106	85	250	251	57		6	
2	27	.25	.85	5.82	300	107	84	251	252	60		6	
3	30	.26	.88	7.44	295	107	81	251	253	61		6	
4	33	.23	.78	9.11	296	106	80	250	250	61		6	
PC	36/[illegible]	–	–	10.61	–	–	–	–	–	–	–	–	
1	1648	.25	.85	10.61	295	105	81	250	249	62		6	
2	39	.19	.65	12.31	294	105	82	251	250	61		5	
3	42	.11	.37	13.61	296	105	83	250	250	61		5	
4	45	.13	.44	14.70	292	104	82	251	251	63		4	
PC	48/1700	–	–	15.81	–	–	–	–	–	–	–	–	
1	1702	.15	.51	15.81	290	105	82	251	249	62		5	
2	51	.12	.41	17.02	290	104	81	250	247	61		4	
3	54	.11	.37	18.23	291	103	80	250	246	66		4	
4	57	.10	.34	19.16	287	104	79	250	250	59		4	

CHAIN OF CUSTODY INFORMATION
Impingers Loaded: CC
Impingers Recovered: CC
Filter Loaded: CC
Filter Recovered: CC
Probe Wash: CC

TEST SUMMARY
Calculated by: CC
Checked by: CC
Sample Volume, ft³: 34.567
Water Collected, g: 188.3
Meter Temperature, °F: 105.0
Meter Pressure (ΔH), iwg: 1.049
Velocity (ΔP rms), iwg: 0.2850
Stack Pressure., iwg: -0.38
Stack Temperature, °F: 298.2
O2 / CO2: 11.50/6.77

Comments:
Run Contains a ~45 min pause b/c Baghouse plugged.

Generic Sample Train Data Sheet Revision 0

Appendix C.5

Visible Emissions Data Sheets

6.02 x 10²³

The Avogadro Group, LLC

VISIBLE EMISSION OBSERVATION FORM

1-PM

SOURCE INFORMATION

Company Name: Eagle Peak Rock and Paving
Address: 451 Granite Court
Yreka, CA 96097
Phone # 530-233-4568

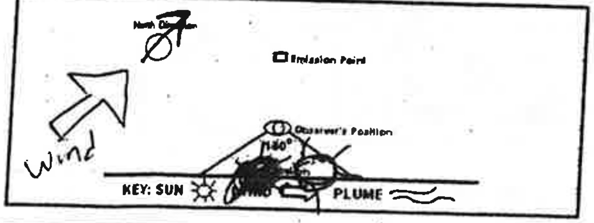
Source Description A/C Hot Mix Baghouse	I.D.#
Operation Mode / Output Rate 170 tph	
Control Equipment Baghouse	Operation Mode

PLUME INFORMATION	Start	End
Emission Point Description	Stack	''
Height Above Ground	~40'	
Height Relative to Observer	~40'	
Distance from Observer	~100'	
Direction from Observer	NW	
Plume Type: Continuous	✓	
Intermittent	—	
Fugitive	—	
Plume Color	No Plume	
Water Droplets Present?	NO	
Attached Plume	—	
Detached Plume	—	
Point in the plume at which the opacity was observed	Right above stack	
Description of Background	Blue Sky	
Color of Background	Blue	
Condition of Sky	Clear	
Wind Speed (mph)	0-5mph	
Wind Direction (From)	S	
Ambient Temp (°F)	72	
Relative Humidity (%)	19	

OBSERVATION RECORD

Date 9/9/14 Start 09:02 Stop 09:08

Min	Seconds 0	15	30	45	Min	Seconds 0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				



Range of Opacity Readings	Maximum	0	%
	Minimum	0	%
Number of readings above 0 %			
Average Opacity for 24 Readings =		0	%

Comments:

Observer's Name (print): Chris Crowley
Organization: The Avogadro Group, LLC
Certified By: CARB Date: 4/24/2014
Observer's Signature
Date: 9/9/14

The Avogadro Group, LLC

VISIBLE EMISSION OBSERVATION FORM 2-PM

SOURCE INFORMATION

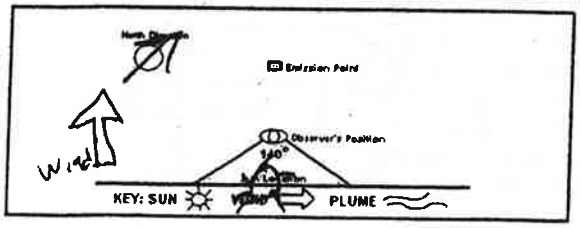
Company Name: Eagle Peak Rock and Paving
Address: 451 Granite Court
Yreka, CA 96097
Phone # 530-233-4568
Source Description: A/C Hot Mix Baghouse
I.D.#
Operation Mode / Output Rate: 210 TPh
Control Equipment: Baghouse
Operation Mode

PLUME INFORMATION	Start	End
Emission Point Description	Stack	
Height Above Ground	~40'	
Height Relative to Observer	~40'	
Distance from Observer	~100	
Direction from Observer	NW	
Plume Type: Continuous	X	
Intermittent	—	
Fugitive	—	
Plume Color	No plume	
Water Droplets Present?	NO	
Attached Plume	—	
Detached Plume	—	
Point in the plume at which the opacity was observed	right above Stack	
Description of Background	Blue	
Color of Background	Blue	
Condition of Sky	Clear	
Wind Speed (mph)	5 mph	
Wind Direction (From)	SE	
Ambient Temp (°F)	75°	
Relative Humidity (%)	18%	

OBSERVATION RECORD

Date 9/9/14 Start 11:32 Stop 11:38

Min	Seconds 0	15	30	45	Min	Seconds 0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				



Comments:

Range of Opacity Readings	Maximum	0 %
	Minimum	0 %
Number of readings above 0 %		
Average Opacity for 24	Readings =	0 %

Observer's Name (print): Chris Crowley
Organization: The Avogadro Group, LLC
Certified By: CARB Date: 4/24/14
Observer's Signature
Date: 9/9/14

The Avogadro Group, LLC

VISIBLE EMISSION OBSERVATION FORM 3-PM

SOURCE INFORMATION

Company Name: Eagle Peak Rock and Paving

Address: 451 Granite Court
Yreka, CA 96097

Phone # 530-233-4568

Source Description A/C Hot Mix Baghouse

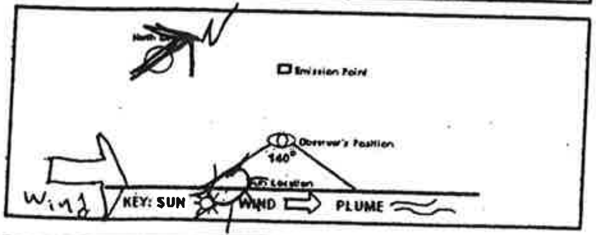
I.D.#

Operation Mode / Output Rate

Control Equipment Baghouse

Operation Mode

PLUME INFORMATION	Start	End
Emission Point Description	Stack	11
Height Above Ground	~40	
Height Relative to Observer	~40	
Distance from Observer	~100	
Direction from Observer	NW	
Plume Type: Continuous	✓	
Intermittent	—	
Fugitive	—	
Plume Color	None	
Water Droplets Present?	NO	
Attached Plume	—	
Detached Plume	—	
Point in the plume at which the opacity was observed	Right above Stack	
Description of Background	Blue	
Color of Background	Blue	
Condition of Sky	Clear	
Wind Speed (mph)	0-5	
Wind Direction (From)	SW	
Ambient Temp (°F)	85	
Relative Humidity (%)	16%	



Comments:

OBSERVATION RECORD

Date 9/9/14 **Start** 15 : 26 **Stop** 15 :32

Min	Seconds 0	15	30	45	Min	Seconds 0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Range of Opacity Readings	Maximum	0	%
	Minimum	0	%
Number of readings above 0 %			
Average Opacity for 24 Readings =		0	%

Observer's Name (print)
Chris Crowley

Organization:
The Avogadro Group, LLC

Certified By: CARB **Date:** 4/24/14

Observer's Signature

Date: 9/9/14

APPENDIX D

EMISSION CALCULATIONS

Appendix D.1

General Emissions Calculations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

a. Standard sample gas volume, dscf

$$V_{m\,std} = (0.03342)\,(V_m)\left[P_{bar} + \left(\frac{\Delta H}{13.6}\right)\right]\left(\frac{460 + T_{ref}}{460 + T_m}\right)(Y)$$

b. Water vapor volume, scf

$$V_{w\,std} = (0.0472)\,(V_{lc})\left(\frac{460 + T_{ref}}{528\ {}^\circ R}\right)$$

c. Moisture content, non-dimensional

$$B_{ws} = \left(\frac{V_{w\,std}}{(V_{m\,std} + V_{w\,std})}\right)$$

d. Stack gas molecular weight, lb/lb mole (dry)

$$MW_{dry} = [0.44\,(\%\ CO_2)] + [0.32\,(\%\ O_2)] + [0.28\,(\%\ N_2)]$$

e. Stack gas molecular weight, lb/lb mole (wet)

$$MW_{wet} = [MW_{dry}\ (1 - B_{ws})] + [18\,(B_{ws})]$$

f. Absolute stack pressure, in Hg

$$P_s = P_{bar} + \left(\frac{P_{sg}}{13.6}\right)$$

g. Stack velocity, ft/sec

$$V_s = (2.90)\,(C_p)\,\sqrt{(\Delta P)(T_s)}\ \sqrt{\left(\frac{29.92}{P_s}\right)\left(\frac{28.95}{MW_{wet}}\right)}$$

h. Actual stack flow rate, acfm

$$Q = (V_s)\,(A_s)\,(60\ min/hr)$$

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (Q)\left(\frac{460 + T_{ref}}{460 + T_s}\right)\left(\frac{P_s}{29.92}\right)$$

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (Q)\,(1 - B_{ws})\left(\frac{460 + T_{ref}}{460 + T_s}\right)\left(\frac{P_s}{29.92}\right)$$

k. Percent isokinetic

$$I = \left(\frac{(17.32)(460 + T_s)(V_{m\,std})}{(1 - B_{ws})(\Theta)(V_s)(P_s)(D_n^{\ 2})}\right)\left(\frac{528\ {}^\circ R}{T_{ref}}\right)$$

2. Gaseous Emissions

a. Concentration, ppm volume wet (i.e. to calculate wet ppm from dry ppm)

$$C_w = (C)(1 - B_{ws})$$

b. Concentration, ppm @ 3% O_2 dry

$$C_3 = (C)\left[\frac{(20.9 - 3.0)}{(20.9 - \%\ O_2)}\right]$$

c. Concentration, ppm @ 12% CO_2 dry

$$C_{12} = (C)\left(\frac{12.0}{\%\ CO_2}\right)$$

d. Concentration, ppm volume dry (i.e. to calculate dry ppm from wet ppm)

$$C = \left[\frac{C_w}{(1 - B_{ws})}\right]$$

e. Mass emission rate, lb/hr

$$M = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})\,(60\ min/hr)$$

where,

SV = specific molar volume of an ideal gas:

$SV = 379.5\ ft^3/lb\ mole\ for\ T_{ref} = 520\ °R$ (60 °F)

$SV = 383.1\ ft^3/lb\ mole\ for\ T_{ref} = 525\ °R$ (65 °F)

$SV = 385.3\ ft^3/lb\ mole\ for\ T_{ref} = 528\ °R$ (68 °F)

$SV = 386.8\ ft^3/lb\ mole\ for\ T_{ref} = 530\ °R$ (70 °F)

$SV = (379.5)\left[\frac{(460 + (T_{ref}\ °F))}{520}\right]$ at different reference temperatures

$°R = °F + 460$ (to convert reference temperature in $°F$ to $°R$, add 460)

f. Emission rate, lb/MMBtu

$$E = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

g. Mass emission rate, grams/bhp-hr

$$M_j = (M)\left(\frac{453.59\ g/lb}{J}\right)$$

3. Particulate Emissions

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

b. Grain loading corrected to 12% CO_2, gr/dscf @ 12% CO_2

$$G_{12} = (G)\left(\frac{12.0}{\%\,CO_2}\right)$$

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\,O_2}\right)$$

4. <u>Fuel Factor "F"</u>

a. Choice #1 – use the values for Fd provided in Method 19, Table 19-1
Choice #2 – if you have fuel ultimate and proximate analysis, calculate Fd
(need fuel weight %CHONS, HHV)
Stoichiometric fuel factor at 68 °F, dscf/MMBtu at 0% O_2:

$$F_d = \frac{(10^6)\,[3.64\,(\%H) + 1.53\,(\%C) + 0.14\,(\%N) + 0.57\,(\%S) - 0.46\,(\%\,O)]}{HHV,\ Btu/lb}$$

b. Fuel factor at 60 °F (use if all your volumes and flows are at 60 °F)

$$F_{d60} = F_d\left(\frac{520^\circ R}{528^\circ R}\right)$$

5. Miscellaneous Equations

a. Standard stack gas flow rate, calculated from fuel flow and F factor, dscfm

Note: Q_f and HHV need to be in units of either lb/hr and Btu/lb, or scf/hr and *Btu/scf. Do not mix units!*

(calculation based on stack %O_2)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_d)\left(\frac{20.9}{(20.9 - O_2)}\right) / (60\ min/hr)$$

or (calculation based on stack %CO_2 – see EPA Method 19 for values of F_c)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_c)\left(\frac{100}{CO_2}\right) / (60\ min/hr)$$

b. Destruction efficiency of emission control device, %

$$EFF = \left(\frac{C_{in} - C_{out}}{C_{in}}\right)(100)$$ based on concentrations

or

$$EFF = \left(\frac{M_{in} - M_{out}}{M_{in}}\right)(100)$$ based on mass emission rates

c. Cylinder gas audit, % accuracy

$$A_c = \left(\frac{(C_m - C_a)}{C_a}\right)(100)$$

Nomenclature:

A_c = accuracy of CEMS during cylinder gas audit (CGA), % difference
A_s = stack area, ft^2 (πr^2), where $\pi = 3.1416$ and r = radius (½ diameter) in feet
B_{ws} = flue gas moisture content (multiply by 100 for % by volume)
C = concentration of gaseous species, ppm volume dry
C_a = concentration of audit gas, ppm (for CGA, equation 5c)
C_m = concentration measured by CEMS, ppm (for CGA, equation 5c)
C_p = calibration factor for pitot tube, dimensionless
C_w = concentration of gaseous species, ppm volume wet
C_3 = corrected concentration of gaseous species, ppm @ 3% O_2 dry
C_{12} = corrected concentration of gaseous species, ppm @ 12% CO_2 dry
D_n = nozzle diameter, inches (inches = millimeters / 2.54 / 10)
E = mass emission rate, lb/MMBtu
EFF = destruction or removal efficiency of emission control device, % efficiency
F_c = stoichiometric "F" factor of fuel based on CO_2, dscf/MMBtu @ 100% CO_2
F_d = stoichiometric "F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2
G = particulate matter grain loading, grains/dscf
G_{12} = corrected particulate matter grain loading, grains/dscf @ 12% CO_2
G_m = mass of collected particulate matter, mg
I = % isokinetic sampling rate, %
J = brake horsepower, bhp
M_j = mass emission rate of measured species (s), g/hp-hr
M = mass emission rate, lb/hr
MW_{dry} = molecular weight of stack gas, dry basis
MW_{wet} = molecular weight of stack gas, wet basis
MW_s = molecular weight of gaseous species (s), lb/lb mole:

CO:	28.01	(can use 28)	NO_x as NO_2:	46.01	(can use 46)
SO_x as SO_2:	64.06	(can use 64)	Hydrocarbons as C:	12.01	(can use 12)
Hydrocarbons as CH_4:	16.04	(can use 16)	Hydrocarbons as C_3H_8:	44.10	(can use 44)
NH_3:	17.03	(can use 17)			

N_2 = nitrogen content of stack gas, % volume dry
Θ = sampling time, minutes
P_s = stack absolute pressure, in. Hg
P_{sg} = stack static pressure, inches of water, gauge (iwg)
Q = wet stack gas flow rate at actual conditions, acfm
Q_f = fuel flow rate, scfh or lb/hr (be careful of units)
Q_{ds} = dry stack gas flow rate at standard conditions, dscfm
Q_{ws} = wet stack gas flow rate at standard conditions, wscfm
SV = specific molar volume of an ideal gas at standard conditions, ft^3/lb mole
T_m = meter temperature, °R
T_{ref} = reference temperature, °R
T_s = stack gas temperature, °R
V_s = stack gas velocity, ft/sec
V_{lc} = volume of liquid collected in impingers, ml
V_m = dry meter volume uncorrected, acf
$V_{m\,std}$ = dry meter volume corrected to standard conditions, dscf
$V_{w\,std}$ = volume of water vapor at standard conditions, scf
Y = meter calibration coefficient, dimensionless

Appendix D.2

Gaseous Emissions Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Eagle Peak Paving
Unit / Location	Baghouse Stack
Stack area, square feet	14.083
Reference temperature, °F	68.000

Test number	1-GAS	2-GAS	3-GAS	Average
Date	9/9/14	9/9/14	9/9/14	--
Start / Stop time	0844-0944	1119-1219	1515-1707	--
SAMPLE TRAIN DATA				
Meter box number/ID	CB-12	CB-12	CB-12	--
Pitot coefficient	0.8172	0.8172	0.8172	0.8172
Meter calibration, Yd	1.017	1.017	1.017	1.017
Barometric pressure, in Hg	27.46	27.48	27.48	27.47
Meter box volume, acf	38.81	37.05	34.57	36.810
Impinger liquid volume, ml	220.70	222.70	188.30	210.6
Meter temperature, °F	79.10	97.65	104.95	93.9
Meter pressure, (Delta H) iwg	1.33	1.22	1.05	1.198
Velocity head, (Delta P) iwg	0.32	0.36	0.28	0.3218
Static pressure, iwg	-0.40	-0.46	-0.38	-0.41
Stack temperature, °F	277.60	293.80	298.20	289.9
ANALYZER DATA				
O_2, % volume dry	12.39	11.42	11.50	11.77
CO_2, % volume dry	6.33	6.82	6.77	6.64
CO emissions, ppm volume dry	165.60	227.20	662.00	351.60
NO_X emissions, ppm volume dry	106.90	106.30	101.00	104.73
VOC emissions as methane, ppm volume dry	7.90	9.74	11.20	9.61
VOLUMETRIC FLOW RATE				
1a Standard sample volume, dscf	35.606	32.871	30.260	32.912
1b Water vapor volume, scf	10.3861	10.5114	8.8878	9.9284
1c Moisture fraction, nondimensional	0.2258	0.2423	0.2270	0.2317
1d Stack gas molecular weight, dry	29.509	29.548	29.543	29.533
1e Stack gas molecular weight, wet	26.910	26.750	26.922	26.861
1f Absolute stack pressure, in Hg	27.431	27.446	27.452	27.443
1g Stack gas velocity, ft/sec	39.597	42.282	37.711	39.864
1h Stack flow rate, acfm	33,460	35,728	31,866	33,685
1i Stack Flow Rate (wscfm)	21,959	22,957	20,361	21,759
1j Stack flow rate - based on pitot, dscfm	17,000	17,395	15,738	16,711
EMISSIONS				
CO concentrations, ppm volume dry	165.6	227.2	662.0	351.6
2e CO mass emissions, lb/hr	12.28	17.24	45.44	24.98
2f CO mass emissions, lb/day*	270.1	379.2	999.7	549.7
NO_X concentrations, ppm volume dry	106.9	106.3	101.0	104.7
2e NO_X mass emissions, lb/hr as NO_2	13.02	13.25	11.39	12.55
2f NO_X mass emissions, lb/day as NO_2*	286.4	291.4	250.5	276.1
VOC concentrations, ppm volume dry	7.90	9.74	11.20	9.61
2e VOC mass emissions, lb/hr as Methane	0.335	0.423	0.440	0.400
2f VOC mass emissions, lb/day as Methane*	7.4	9.3	9.7	8.8

* - lb/day emissions are based on a maximum daily operation limit of 22-hours. 12am to 12am.

Appendix D.3

Particulate Matter Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Eagle Peak Paving
Unit / Location	Baghouse Stack
A (stack area), ft^2	14.083
T_{ref} (reference temperature), °F	68

Test number	1-PM	2-PM	3-PM	Average
Date	9/9/14	9/9/14	9/9/14	--
Start / Stop time	0841-0959	1119-1226	1515-1714	--
Meter box number	CB-12	CB-12	CB-12	--
C_p (pitot coefficient), dimensionless	0.8172	0.8172	0.8172	0.8172
Y (meter calibration factor), dimensionless	1.017	1.017	1.017	1.017
Θ (sample time), min	60	60	60	60.00
Nozzle diameter, in.	0.287	0.287	0.287	0.287
P_{bar} (barometric pressure), in Hg	27.46	27.48	27.48	27.47
V_m (meter box volume), acf	38.811	37.050	34.569	36.810
V_{lc} (impinger liquid volume), ml	220.7	222.7	188.3	210.6
T_m (meter temperature), °F	79.1	97.7	105.0	93.9
ΔH (meter pressure), in. H_2O	1.327	1.217	1.049	1.198
ΔP (velocity head), in. H2O	0.3225	0.3579	0.2850	0.3218
P_g (static pressure), in. Hg	-0.40	-0.46	-0.38	-0.41
T_s (stack temperature), °F	277.6	293.8	298.2	289.9
$\%O_2$ (oxygen stack gas), % volume dry	12.39	11.42	11.50	11.77
$\%CO_2$ (carbon dioxide stack gas), % volume dry	6.33	6.82	6.77	6.64
m_f (F½ particulate matter catch - filter), mg	17.40	16.87	18.83	17.70
m_a (F½ particulate matter catch - acetone rinse), mg	10.76	10.05	11.00	10.60
m_{cpm} (B½ particulate matter catch - total condensible, blank corrected), mg	0.68	0.96	7.99	3.21
m_n (total particulate matter catch), mg	28.84	27.88	37.82	31.51
1a $V_{m(std)}$ (standard sample volume), dscf	35.606	32.874	30.262	32.914
1b $V_{w(std)}$ (water vapor volume), scf	10.386	10.480	8.861	9.909
1c B_{ws} (moisture fraction), non-dimensional	0.2258	0.2417	0.2265	0.2314
1d MW_{dry} (stack gas molecular weight), dry	29.509	29.548	29.543	29.533
1e MW_{wet} (stack gas molecular weight), wet	26.910	26.756	26.929	26.865
1f P_s (absolute stack pressure), in Hg	27.431	27.446	27.452	27.443
1g V_s (stack gas velocity), ft/sec	39.597	42.277	37.707	39.860
1h Q (stack flow rate), acfm	33,460	35,724	31,862	33,682
1i Q_{ws} (stack flow rate), wscfm	21,959	22,954	20,358	21,757
1j Q_{ds} (stack flow rate), dscfm	17,000	17,405	15,747	16,717
1k I (isokinetic ratio), %	109.45	98.70	100.43	102.86
3a G (F½ grain loading), gr/dscf	0.0122	0.0126	0.0152	0.0133
3b G_{12} (F½ grain loading), gr/dscf @ 12% CO_2 dry	0.0231	0.0222	0.0270	0.0241
3c M (F½ mass emissions), lb/hr	1.78	1.89	2.05	1.91
3d E (F½ mass emissions), lb/day*	39.12	41.47	45.16	41.92
3a G (B½ grain loading), gr/dscf	0.0003	0.0005	0.0041	0.0016
3b G_{12} (B½ grain loading), gr/dscf @ 12% CO_2 dry	0.0006	0.0008	0.0072	0.0029
3c M (B½ mass emissions), lb/hr	0.04	0.07	0.55	0.22
3d E (B½ mass emissions), lb/day*	0.94	1.48	12.10	4.84
3a G (total grain loading), gr/dscf	0.0125	0.0131	0.0193	0.0150
3b G_{12} (total grain loading), gr/dscf @ 12% CO_2 dry	0.0237	0.0230	0.0342	0.0270
3c M (total mass emissions), lb/hr	1.82	1.95	2.60	2.13
3d E (total mass emissions), lb/day*	40.06	42.95	57.26	46.76

* - lb/day emissions are based on a maximum daily operation limit of 22-hours. 12am to 12am.

Appendix D.4

BTEX Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Eagle Peak	Test number	1-BTEX-1
Unit / Location	Hot-Mix Plant	Date	9/9/14
Test method	EPA TO-15	Start / Stop time	0844-0944

Meter box number	CB-12	Barometric pressure, in Hg	27.46
Reference temperature, °F	68	Meter temperature, °F	79.1
Fuel type	RFO	Stack temperature, °F	277.6
Fuel "HHV", Btu/scf	N/A	Stack O_2, % volume dry	12.39
Fuel "F" factor, dscf/MMBtu	N/A	Stack CO_2, % volume dry	6.33

Volatile Organic Compounds	**ppbv**
Benzene	137.00
Toluene	45.50
Ethyl Benzene	4.63
m,p-Xylene	24.00
o-Xylene	4.80

Stack flow rate, dscfm	17,000

Benzene, ppmvd	0.1370
Benzene, lb/hr	0.0283
Benzene, lb/day*	0.6232
Toluene, ppmvd	0.0455
Toluene, lb/hr	0.0111
Toluene, lb/day*	0.2442
Ethyl Benzene, ppmvd	0.0046
Ethyl Benzene, lb/hr	0.0013
Ethyl Benzene, lb/day*	0.0286
m, p-Xylene, ppmvd	0.0240
m, p-Xylene, lb/hr	0.0067
m, p-Xylene, lb/day*	0.1484
o-Xylene, ppmvd	0.0048
o-Xylene, lb/hr	0.0013
o-Xylene, lb/day*	0.0297
BTEX ppmvd	0.216
BTEX lb/hr	0.049
BTEX lb/day*	1.074

* - lb/day emissions are based on a maximum daily operation limit of 22-hours. 12am to 12am.

Note: Sample values were not blank corrected.

Note: Non-detect values are reported at the detection limit.

SOURCE TEST DATA SUMMARY

Client	Eagle Peak	•	Test number	2-BTEX-1
Unit / Location	Hot-Mix Plant	•	Date	9/9/14
Test method	EPA TO-15	•	Start / Stop time	1119-1219

Meter box number	N/A	•	Barometric pressure, in Hg	27.48
Reference temperature, °F	68	•	Meter temperature, °F	97.7
Fuel type	RFO	•	Stack temperature, °F	293.8
Fuel "HHV", Btu/scf	N/A	•	Stack O_2, % volume dry	11.42
Fuel "F" factor, dscf/MMBtu	N/A	•	Stack CO_2, % volume dry	6.82

Volatile Organic Compounds	**ppbv**
Benzene	145.00
Toluene	43.50
Ethyl Benzene	3.94
m,p-Xylene	17.10
o-Xylene	3.96

Stack flow rate, dscfm	17,395

Benzene, ppmvd	0.1450
Benzene, lb/hr	0.0307
Benzene, lb/day*	0.6749
Toluene, ppmvd	0.0435
Toluene, lb/hr	0.0109
Toluene, lb/day*	0.2389
Ethyl Benzene, ppmvd	0.0039
Ethyl Benzene, lb/hr	0.0011
Ethyl Benzene, lb/day*	0.0249
m, p-Xylene, ppmvd	0.0171
m, p-Xylene, lb/hr	0.0049
m, p-Xylene, lb/day*	0.1082
o-Xylene, ppmvd	0.0040
o-Xylene, lb/hr	0.0011
o-Xylene, lb/day*	0.0251
BTEX ppmvd	0.214
BTEX lb/hr	0.049
BTEX lb/day*	1.072

* - lb/day emissions are based on a maximum daily operation limit of 22-hours. 12am to 12am.

Note: Sample values were not blank corrected.

Note: Non-detect values are reported at the detection limit.

Run 2

SOURCE TEST DATA SUMMARY

Client	Eagle Peak	Test number	3-BTEX-1
Unit / Location	Hot-Mix Plant	Date	9/9/14
Test method	EPA TO-15	Start / Stop time	1515-1707

Meter box number	N/A	Barometric pressure, in Hg	27.48
Reference temperature, °F	68	Meter temperature, °F	105.0
Fuel type	RFO	Stack temperature, °F	298.2
Fuel "HHV", Btu/scf	N/A	Stack O_2, % volume dry	11.50
Fuel "F" factor, dscf/MMBtu	N/A	Stack CO_2, % volume dry	6.77

<u>Volatile Organic Compounds</u>	<u>ppbv</u>
Benzene	253.00
Toluene	69.90
Ethyl Benzene	5.97
m,p-Xylene	18.30
o-Xylene	6.41

Stack flow rate, dscfm	15,738

Benzene, ppmvd	0.2530
Benzene, lb/hr	0.0484
Benzene, lb/day*	1.0654
Toluene, ppmvd	0.0699
Toluene, lb/hr	0.0158
Toluene, lb/day*	0.3473
Ethyl Benzene, ppmvd	0.0060
Ethyl Benzene, lb/hr	0.0016
Ethyl Benzene, lb/day*	0.0342
m, p-Xylene, ppmvd	0.0183
m, p-Xylene, lb/hr	0.0048
m, p-Xylene, lb/day*	0.1047
o-Xylene, ppmvd	0.0064
o-Xylene, lb/hr	0.0017
o-Xylene, lb/day*	0.0367
BTEX ppmvd	0.354
BTEX lb/hr	0.072
BTEX lb/day*	1.588

* - lb/day emissions are based on a maximum daily operation limit of 22-hours. 12am to 12am.

Note: Sample values were not blank corrected.

Note: Non-detect values are reported at the detection limit.

Run 3

BTEX Results
Eagle Peak
Hot-Mix Plant

Test No:	1-BTEX-1	2-BTEX-1	3-BTEX-1	AVERAGES
Date:	9/9/14	9/9/14	9/9/14	--
Time:	0844-0944	1119-1219	1515-1707	--
O_2, % volume dry:	12.390	11.420	11.500	11.770
CO_2, % volume dry:	6.33	6.82	6.77	6.64
Flow Rate, dscfm:	17,000	17,395	15,738	16,711
Benzene, ppmvd	0.1370	0.1450	0.2530	0.1783
Benzene, lb/hr	0.028	0.031	0.048	0.036
Benzene, lb/day*	0.623	0.675	1.065	0.788
Toluene, ppmvd	0.0455	0.0435	0.0699	0.0530
Toluene, lb/hr	0.011	0.011	0.016	0.013
Toluene, lb/day*	0.244	0.239	0.347	0.277
Ethyl Benzene, ppmvd	0.0046	0.0039	0.0060	0.0048
Ethyl Benzene, lb/hr	0.001	0.001	0.002	0.001
Ethyl Benzene, lb/day*	0.029	0.025	0.034	0.029
m, p-Xylene, ppmvd	0.0240	0.0171	0.0183	0.0198
m, p-Xylene, lb/hr	0.007	0.005	0.005	0.005
m, p-Xylene, lb/day*	0.148	0.108	0.105	0.120
o-Xylene, ppmvd	0.0048	0.0040	0.0064	0.0051
o-Xylene, lb/hr	0.001	0.001	0.002	0.001
o-Xylene, lb/day*	0.030	0.025	0.037	0.030
BTEX ppmvd	0.2159	0.2135	0.3536	0.2610
BTEX lb/hr	0.049	0.049	0.072	0.057
BTEX lb/day*	1.07	1.07	1.59	1.24

* - lb/day emissions are based on a maximum daily operation limit of 22-hours. 12am to 12am.

Note: Sample values were not blank corrected.

Note: Non-detect values are reported at the detection limit.

Appendix D.5

Example Calculations

EXAMPLE CALCULATIONS
GASEOUS EMISSIONS

Project name:	Eagle Peak	**Project number:**	14206.0
Computed by:	C. Crowley	**Calculation date:**	10-10-14
Run number:	2-GAS	**Gaseous species:**	NOx

EMISSIONS DATA

Reference temperature, °R	528	T_{ref} = (°F plus 460)
Concentration of gaseous species, ppmvd	106.3	C
Flue gas moisture content, non-dimensional	24.23	B_{ws}
Dry stack gas flow rate at standard conditions, dscfm	17,395	Q_{ds}
Stack O_2, % volume dry	11.42	O_2
Stack CO_2, % volume dry	6.82	CO_2
"F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2	—	F_d
Brake horsepower, bhp	—	J
Molecular weight of gaseous species, lb/lb mole	46.01	MW_s where,

MW_s = 28.01 for CO; 46.01 for NO_X as NO_2; 64.06 for SO_X as SO_2
17.03 for NH_3; 12.01 for carbon, C; 16.04 for methane (CH_4)

Specific molar volume of an ideal gas at standard conditions, ft^3/lb mole	385.3	SV where,

SV = 379.5 ft^3/lb mole for T_{ref} at 520 °R (60 °F)

SV = 385.3 ft^3/lb mole for T_{ref} at 528 °R (68 °F)

SV = 386.8 ft^3/lb mole for T_{ref} at530 °R (70 °F)

$$SV = (379.5)\left[\frac{((T_{ref}\ °R))}{520}\right]$$ at different reference temperatures

Note: The results calculated in the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

2. GASEOUS EMISSIONS

b. Concentration, ppm @ 15% O_2 dry

~~$C_{15} = (C)\left[\frac{(20.9-15.0)}{(20.9-\%\ O_2)}\right]$~~

~~$C_{15} = (106.3)\left[\frac{(20.9-15.0)}{(20.9-11.42)}\right]$~~

~~C_{15} = __________ ppm @ 15% O_2~~

e. Mass emissions, lb/hr

$$M = (C)(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})(60\ min/hr)$$

$$M = (106.3)(10^{-6})\left(\frac{46.01}{385.3}\right)(17,395)(60)$$

M = 13.25 lb/hr ✓

f. Emission rate, lb/MMBtu

~~$E = (C)(10^{-6})\left(\frac{MW_s}{SV}\right)(F_d)\left(\frac{20.9}{20.9-\%\ O_2}\right)$~~

~~$E = (\quad)(10^{-6})\left(\frac{\quad}{\quad}\right)(\quad)\left(\frac{20.9}{20.9-\quad}\right)$~~

~~E = __________ lb/MMBtu~~

EXAMPLE CALCULATIONS
PARTICULATE MATTER EMISSIONS

Project name: Eagle Peak
Project number: 14206.0
Computed by: C. Crowley
Calculation date: 10-10-14
Run number: 2-PM

EMISSIONS DATA

Mass of collected particulate matter, mg	27.88	G_m
Dry stack gas flow rate at standard conditions, dscfm	17,405	Q_{ds}
Dry meter volume at standard conditions, dscf	32.874	$V_{m\,std}$
Stack O_2, % volume dry	11.42	O_2
Stack CO_2, % volume dry	6.82	CO_2
"F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2	—	F_d

3. PARTICULATE MATTER EMISSIONS

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

$$G = (0.01543)\left(\frac{27.88}{32.874}\right)$$

G = 0.013 gr/dscf

***Note:** The results calculated on this page and the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.*

b. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

$$M = (\ 0.013\ )(\ 17405\ )\left(\frac{60}{7000}\right)$$

$M = \underline{\ 1.94\ }$ lb/hr ✓

c. Emission factor, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

$$E = (\qquad)\left(\frac{1\ lb}{7000\ gr}\right)(\qquad)\left(\frac{20.9}{20.9 - \qquad}\right)$$

$E = \underline{\qquad\qquad}$ lb/MMBtu

d. Emission rate, tons/year

$$E = (M)\left(\frac{8{,}424\ \text{hours}}{\text{year}}\right)\left(\frac{\text{ton}}{2000\ \text{lbs}}\right)$$

$$E = (\qquad)\left(\frac{8{,}424}{2{,}000}\right)$$

$E = \underline{\qquad\qquad}$ tons/year

APPENDIX E

LABORATORY REPORTS

Appendix E.1

BTEX Analyses

Atmospheric Analysis & Consulting, Inc.

CLIENT	: The Avogadro Group
PROJECT NAME	: Eagle Peak Rock & Paving – Baghouse Stack
PROJECT NUMBER	: 14206.0
AAC PROJECT NO.	: 141501
REPORT DATE	: 09/16/2014

On September 15, 2014, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for BTEX analysis by EPA method TO-15. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Return Pressure (mmHga)
1-BTEX	141501-74300	674.4
2-BTEX	141501-74301	639.6
3-BTEX	141501-74302	577.6

An initial reading of each canister's vacuum was taken and recorded. Subsequently, each canister was brought to positive pressure using UHP-He and the final pressure was recorded.

TO-15 Analysis - Up to a 500 mL aliquot of sample is concentrated, put through a water and CO_2 management system, cryofocused and injected into the GC/MS (full scan mode) for analysis following EPA Method TO-15 as specified in the SOW.

No problems were encountered during receiving, preparation and/ or analysis of these samples. The test results included in this report meet all requirements of the NELAC Standards and/or AAC SOP# TO.15.10.

I certify that this data is technically accurate, complete and in compliance with the terms and conditions of the contract. The Laboratory Director or his designee, as verified by the following signature, has authorized the release of the data contained in this hardcopy data package.

If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 11 pages.

Certificate #E87837

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : The Avogadro Group
PROJECT NO : 141501
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 09/15/2014
DATE REPORTED : 09/16/2014

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	1-BTEX			Sample Reporting Limit (SRL) (MRLxDF's)	2-BTEX			Sample Reporting Limit (SRL) (MRLxDF's)	Metho Reportin Limi (MRL
AAC ID	141501-74300				141501-74301				
Date Sampled	09/09/2014				09/09/2014				
Date Analyzed	09/16/2014				09/16/2014				
Can Dilution Factor	1.50				1.59				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	137		5.0	3.8	145		5.0	4.0	0.5
Toluene	45.5		5.0	3.8	43.5		5.0	4.0	0.5
Ethylbenzene	4.63		1.0	0.8	3.94		1.0	0.8	0.5
m & p-Xylenes	24.0		5.0	7.5	17.1		1.0	1.6	1.0
o-Xylene	4.80		1.0	0.8	3.96		1.0	0.8	0.5
BFB-Surrogate Std. % Recovery	100%				97%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Marcus Hueppe
Laboratoy Director

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : The Avogadro Group
PROJECT NO : 141501
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 09/15/2014
DATE REPORTED : 09/16/2014

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	3-BTEX			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	141501-74302				
Date Sampled	09/09/2014				
Date Analyzed	09/16/2014				
Can Dilution Factor	1.76				
	Result	Qualifier	Analysis DF		
Benzene	253		5.0	4.4	0.5
Toluene	69.9		5.0	4.4	0.5
Ethylbenzene	5.97		1.0	0.9	0.5
m & p-Xylenes	18.3		1.0	1.8	1.0
o-Xylene	6.41		1.0	0.9	0.5
BFB-Surrogate Std. % Recovery	93%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Marcus Hueppe
Laboratoy Director

ANALYSIS DATE : 09/16/2014
ANALYST : JJG

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS081214-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15
Continuing Calibration Verification of the 09/08/2014 Calibration

Compounds	Conc	Daily Conc	%REC*
4-BFB (surrogate standard)	10.00	9.95	100
Chlorodifluoromethane	10.40	9.15	88
Propene	10.50	9.53	91
Dichlorodifluoromethane	10.10	9.39	93
Chloromethane	10.10	9.02	89
Dichlorotetrafluoroethane	10.30	9.56	93
Vinyl Chloride	10.30	9.55	93
Methanol	20.10	18.06	90
1,3-Butadiene	10.20	9.09	89
Bromomethane	10.00	9.20	92
Chloroethane	10.00	9.17	92
Dichlorofluoromethane	10.50	9.50	90
Ethanol	10.80	9.81	91
Vinyl Bromide	10.10	9.81	97
Acetone	10.40	9.58	92
Trichlorofluoromethane	10.50	9.66	92
2-Propanol (IPA)	11.00	10.97	100
Acrylonitrile	11.90	11.64	98
1,1-Dichloroethene	10.20	9.81	96
Methylene Chloride (DCM)	10.10	9.30	92
Allyl Chloride	10.50	9.62	92
Carbon Disulfide	10.20	9.73	95
Trichlorotrifluoroethane	9.90	9.23	93
trans-1,2-Dichloroethene	9.90	9.26	94
1,1-Dichloroethane	10.10	9.22	91
Methyl Tert Butyl Ether (MTBE)	10.20	9.65	95
Vinyl Acetate	11.00	10.35	94
2-Butanone (MEK)	10.30	9.31	90
cis-1,2-Dichloroethene	10.40	9.68	93
Hexane	10.20	9.34	92
Chloroform	9.90	9.42	95
Ethyl Acetate	9.90	8.96	91
Tetrahydrofuran	10.20	9.37	92
1,2-Dichloroethane	10.30	9.72	94
1,1,1-Trichloroethane	10.20	9.56	94

ANALYSIS DATE : 09/16/2014
ANALYST : JJG

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS081214-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15
Continuing Calibration Verification of the 09/08/2014 Calibration

Compounds	Conc	Daily Conc	%REC*
Benzene	10.40	10.03	96
Carbon Tetrachloride	10.30	10.21	99
Cyclohexane	10.30	9.84	96
1,2-Dichloropropane	10.40	9.83	95
Bromodichloromethane	10.30	10.26	100
1,4-Dioxane	10.30	9.91	96
Trichloroethene (TCE)	10.30	10.14	98
2,2,4-Trimethylpentane	10.40	10.02	96
Heptane	10.40	10.19	98
cis-1,3-Dichloropropene	10.90	11.08	102
4-Methyl-2-pentanone (MiBK)	10.10	9.84	97
trans-1,3-Dichloropropene	10.90	10.95	100
1,1,2-Trichloroethane	10.40	9.86	95
Toluene	10.60	10.21	96
2-Hexanone (MBK)	10.70	10.13	95
Dibromochloromethane	10.60	10.94	103
1,2-Dibromoethane	10.50	10.25	98
Tetrachloroethene (PCE)	10.20	9.95	98
Chlorobenzene	10.70	10.76	101
Ethylbenzene	10.60	10.35	98
m & p-Xylenes	20.60	20.48	99
Bromoform	10.30	10.99	107
Styrene	10.70	10.92	102
1,1,2,2-Tetrachloroethane	10.70	10.65	100
o-Xylene	10.70	10.42	97
4-Ethyltoluene	10.40	10.20	98
1,3,5-Trimethylbenzene	10.50	10.29	98
1,2,4-Trimethylbenzene	10.50	10.41	99
Benzyl Chloride (a-Chlorotoluene)	10.70	10.75	100
1,3-Dichlorobenzene	10.70	10.59	99
1,4-Dichlorobenzene	10.40	10.20	98
1,2-Dichlorobenzene	10.50	10.18	97
1,2,4-Trichlorobenzene	10.40	10.39	100
Hexachlorobutadiene	10.30	9.95	97

* - %REC should be 70-130%

Marcus Hueppe
Laboratory Director

Quality Control/Quality Assurance Report

CLIENT ID	: Laboratory Control Spike	DATE ANALYZED	: 09/16/2014
AAC ID	: LCS/LCSD	DATE REPORTED	: 09/16/2014
MEDIA	: Air	UNITS	: ppbv

TO-15 Laboratory Control Spike Recovery

Compound	Sample Conc.	Spike Added	Spike Res	Dup Spike Res	Spike % Rec *	Spike Dup % Rec *	RPD** %
1,1-Dichloroethene	0.0	10.20	9.81	10.03	96	98	2.2
Methylene Chloride (DCM)	0.0	10.10	9.30	9.05	92	90	2.7
Benzene	0.0	10.40	10.03	9.87	96	95	1.6
Trichloroethene (TCE)	0.0	10.30	10.14	9.90	98	96	2.4
Toluene	0.0	10.60	10.21	10.18	96	96	0.3
Tetrachloroethene (PCE)	0.0	10.20	9.95	9.74	98	95	2.1
Chlorobenzene	0.0	10.70	10.76	10.71	101	100	0.5
Ethylbenzene	0.0	10.60	10.35	10.23	98	96	1.2
m & p-Xylenes	0.0	20.60	20.48	20.07	99	97	2.0
o-Xylene	0.0	10.70	10.42	10.33	97	97	0.9

* Must be 70-130%

** Must be < 25%

Marcus Hueppe
Laboratory Director

Method Blank Analysis Report

MATRIX : AIR
UNITS : ppbv
ANALYSIS DATE : 09/16/2014
REPORT DATE : 09/16/2014

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	Method Blank	RL
AAC ID	MB 091614	
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
Allyl Chloride	<RL	0.5
Carbon Disulfide	<RL	0.5
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	0.5
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Heptane	<RL	0.5

Method Blank Analysis Report

MATRIX	: AIR	**ANALYSIS DATE**	: 09/16/2014
UNITS	: ppbv	**REPORT DATE**	: 09/16/2014

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID AAC ID	Method Blank MB 091614	RL
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	0.5
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylenes	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
1,2,4-Trichlorobenzene	<RL	0.5
Hexachlorobutadiene	<RL	0.5
System Monitoring Compounds		
BFB-Surrogate Std. % Recovery	92%	--

RL - Reporting Limit

Marcus Hueppe
Laboratory Director

Quality Control/Quality Assurance Report

AAC ID : 141501-74300
MATRIX : Air

DATE ANALYZED : 09/16/2014
DATE REPORTED : 09/16/2014
UNITS : ppbv

TO-15 Duplicate Analysis

Compound		Sample Conc	Duplicate Conc	% RPD
Chlorodifluoromethane		<SRL	<SRL	0.0
Propene	"E"	510	505	1.0
Dichlorodifluoromethane		<SRL	<SRL	0.0
Chloromethane		<SRL	<SRL	0.0
Dichlorotetrafluoroethane		<SRL	<SRL	0.0
Vinyl Chloride		<SRL	<SRL	0.0
Methanol		<SRL	<SRL	0.0
1,3-Butadiene		27.6	28.4	2.9
Bromomethane		<SRL	<SRL	0.0
Chloroethane		<SRL	<SRL	0.0
Dichlorofluoromethane		<SRL	<SRL	0.0
Ethanol		<SRL	<SRL	0.0
Vinyl Bromide		<SRL	<SRL	0.0
Acetone		271	272	0.4
Trichlorofluoromethane		<SRL	<SRL	0.0
2-Propanol (IPA)		<SRL	<SRL	0.0
Acrylonitrile		<SRL	<SRL	0.0
1,1-Dichloroethene		35.2	35.7	1.4
Methylene Chloride (DCM)		<SRL	<SRL	0.0
Allyl Chloride		<SRL	<SRL	0.0
Carbon Disulfide		<SRL	<SRL	0.0
Trichlorotrifluoroethane		<SRL	<SRL	0.0
trans-1,2-Dichloroethene		<SRL	<SRL	0.0
1,1-Dichloroethane		<SRL	<SRL	0.0
Methyl Tert Butyl Ether (MTBE)		<SRL	<SRL	0.0
Vinyl Acetate		<SRL	<SRL	0.0
2-Butanone (MEK)		18.8	18.3	2.7
cis-1,2-Dichloroethene		<SRL	<SRL	0.0
Hexane		<SRL	<SRL	0.0
Chloroform		<SRL	<SRL	0.0
Ethyl Acetate		<SRL	<SRL	0.0
Tetrahydrofuran		<SRL	<SRL	0.0
1,2-Dichloroethane		<SRL	<SRL	0.0
1,1,1-Trichloroethane		<SRL	<SRL	0.0
Benzene		137	136	0.7
Carbon Tetrachloride		<SRL	<SRL	0.0

Quality Control/Quality Assurance Report

AAC ID : 141501-74300
MATRIX : Air

DATE ANALYZED : 09/16/2014
DATE REPORTED : 09/16/2014
UNITS : ppbv

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Cyclohexane	<SRL	<SRL	0.0
1,2-Dichloropropane	<SRL	<SRL	0.0
Bromodichloromethane	<SRL	<SRL	0.0
1,4-Dioxane	<SRL	<SRL	0.0
Trichloroethene (TCE)	<SRL	<SRL	0.0
2,2,4-Trimethylpentane	<SRL	<SRL	0.0
Heptane	<SRL	<SRL	0.0
cis-1,3-Dichloropropene	<SRL	<SRL	0.0
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	0.0
trans-1,3-Dichloropropene	<SRL	<SRL	0.0
1,1,2-Trichloroethane	<SRL	<SRL	0.0
Toluene	45.5	44.9	1.3
2-Hexanone (MBK)	<SRL	<SRL	0.0
Dibromochloromethane	<SRL	<SRL	0.0
1,2-Dibromoethane	<SRL	<SRL	0.0
Tetrachloroethene (PCE)	<SRL	<SRL	0.0
Chlorobenzene	<SRL	<SRL	0.0
Ethylbenzene	<SRL	<SRL	0.0
m & p-Xylenes	24.0	24.3	1.2
Bromoform	<SRL	<SRL	0.0
Styrene	11.6	11.6	0.0
1,1,2,2-Tetrachloroethane	<SRL	<SRL	0.0
o-Xylene	<SRL	<SRL	0.0
4-Ethyltoluene	<SRL	<SRL	0.0
1,3,5-Trimethylbenzene	<SRL	<SRL	0.0
1,2,4-Trimethylbenzene	<SRL	<SRL	0.0
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	0.0
1,3-Dichlorobenzene	<SRL	<SRL	0.0
1,4-Dichlorobenzene	<SRL	<SRL	0.0
1,2-Dichlorobenzene	<SRL	<SRL	0.0
1,2,4-Trichlorobenzene	<SRL	<SRL	0.0
Hexachlorobutadiene	<SRL	<SRL	0.0
System Monitoring Compounds			
BFB-Surrogate Std. % Recovery	97%	97%	0.1

SRL - Sample Reporting Limit
"E" - Estimated values shown for duplicate purposes only.

Marcus Hueppe
Laboratory Director

AAC # 141501

CHAIN OF CUSTODY

Client/Project Name: Eagle Peak Rock & Paving

Project No. 206.0 → 14206.0 ☒ Lump-sum ☐ T&M

☒ California ☐ Medford ☐ Portland

Sampler: (Signature)

Project Location/Sample Location: Baghouse Stack

BAAQMD: ☐ Yes ☒ No

P.O. No.

Send Analytical Report To: ccrowley@montrose-env.com C. Crowley

ANALYSES

Full 202? ☐ Yes. ☐ No

Sample No./ Identification	Date	# of Containers	Lab Sample Number	Type of Sample	BTEX EPA TO-15 (Benzene, Ethyl benzene Toluene, Xylene M,P,O) (M,P,O)			Remarks
1-BTEX	9-9-14	1	74300	Summa Can	X			
2-BTEX	9-9-14	1	74301	Summa Can	X			
3-BTEX	9-9-14	1	74302	Summa Can	X			

Relinquished by: (Signature) Chris Crowley	Date 9-10-14	Time 1357	Received by: (Signature)	Date 09/15/14	Time 1002
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Sample Collected By:

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
(925) 680-4300 • (925) 680-4416 FAX

Fedex

Analytical report due date: ____

White: Project Mgr.

Appendix E.2

Particulate Matter Analyses

The Avogadro Group, LLC

Air Quality Consulting and Source Emissions Testing

PARTICULATE MATTER RESULTS

Client: Eagle Peak

Project: 14206.0

	Test No.:	1-PM	2-PM	3-PM
	Front-Half Particulate Catch			
m_f	Filter catch, net mg	17.40	16.87	18.83
m_a	Probe / nozzle rinse (acetone), net mg	10.76	10.05	11.00
	Total filterable particulate matter catch, net mg	*28.16*	*26.92*	*29.83*
	Back-Half Particulate Catch			
m_i	Aqueous rinse (ASTM Type II water), net mg	0.93	1.17	8.40
m_o	Organic rinse (hexane and acetone), net mg	1.02	1.06	0.86
	Uncorrected condensible particulate matter catch, net mg	*1.95*	*2.23*	*9.26*
	Back-Half Blank Catch			
m_{ib}	Field blank aqueous rinse (ASTM Type II water), net mg	0.40	0.40	0.40
m_{ob}	Field blank organic rinse (hexane and acetone), net mg	0.87	0.87	0.87
m_{fb}	*Total condensible particulate matter blank catch, net mg*	*1.27*	*1.27*	*1.27*
m_{cpm}	*Corrected condensible particulate matter catch, net mg*	*0.68*	*0.96*	*7.99*
	Total Particulate Matter Catch, net mg	**28.84**	**27.88**	**37.82**

Notes: The front-half acetone fractions were blank-corrected according to EPA Methods 5 / 17.
The back-half fractions were blank corrected according to EPA Method 202 Section 12.2. $m_{cpm} = m_i + m_o - (m_{ib} + m_{ob})$ (Eqs. 2 & 4)
The back-half fractions blank correction values is $(m_{ib} + m_{ob})$ or 2.0mg, whichever is lesser, according to EPA Method 202 Section 12.2.

Prepared by: ______________________ Date: 9/26/14

David Kawasaki
Laboratory Technician

Reviewed by: Samantha Oliva Date: 9/29/14

Samantha Oliva
Laboratory Manager

AVOGADRO PARTICULATE MATTER RESULTS

Client: Eagle Peak

Project: 14206.0

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	Filter (F½)	N/A	3772	Tare 1	0.3505	0.3505	--	--	--	--	--
				Tare 2	0.3503	0.3505	--	--	--	--	--
				Tare 3	0.3503	0.3506	--	--	--	--	--
				Average	**0.3504**	**0.3505**	**0.17**	N/A	N/A	N/A	N/A
1-PM	Filter (F½)	N/A	3770	Tare 1	0.3526	0.3699	--	--	--	--	--
				Tare 2	0.3526	0.3700	--	--	--	--	--
				Tare 3	0.3526	0.3701	--	--	--	--	--
				Average	**0.3526**	**0.3700**	**17.40**	N/A	N/A	N/A	**17.40**
2-PM	Filter (F½)	N/A	3771	Tare 1	0.3512	0.3679	--	--	--	--	--
				Tare 2	0.3513	0.3682	--	--	--	--	--
				Tare 3	0.3512	0.3682	--	--	--	--	--
				Average	**0.3512**	**0.3681**	**16.87**	N/A	N/A	N/A	**16.87**
3-PM	Filter (F½)	N/A	3773	Tare 1	0.3498	0.3684	--	--	--	--	--
				Tare 2	0.3495	0.3684	--	--	--	--	--
				Tare 3	0.3496	0.3686	--	--	--	--	--
				Average	**0.3496**	**0.3685**	**18.83**	N/A	N/A	N/A	**18.83**

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	Probe/Nozzle Acetone (F½)	35.7	I453	Tare 1	2.25238	2.25296	--	--	--	--	--
				Tare 2	2.25239	2.25301	--	--	--	--	--
				Tare 3	2.25234	2.25296	--	--	--	--	--
				Average	**2.25237**	**2.25298**	**0.61**	0.0017%	N/A	N/A	N/A
1-PM	Probe/Nozzle Acetone (F½)	64.8	I454	Tare 1	2.26085	2.27223	--	--	--	--	--
				Tare 2	2.26082	2.27225	--	--	--	--	--
				Tare 3	2.26080	2.27220	--	--	--	--	--
				Average	**2.26082**	**2.27223**	**11.40**	0.0017%	1.10	0.65	**10.76**
2-PM	Probe/Nozzle Acetone (F½)	64.7	I455	Tare 1	2.25919	2.26989	--	--	--	--	--
				Tare 2	2.25914	2.26984	--	--	--	--	--
				Tare 3	2.25914	2.26984	--	--	--	--	--
				Average	**2.25916**	**2.26986**	**10.70**	0.0017%	1.10	0.65	**10.05**
3-PM	Probe/Nozzle Acetone (F½)	84.6	I456	Tare 1	2.26999	2.28178	--	--	--	--	--
				Tare 2	2.26994	2.28183	--	--	--	--	--
				Tare 3	2.26994	2.28179	--	--	--	--	--
				Average	**2.26996**	**2.28180**	**11.84**	0.0017%	1.44	0.85	**11.00**

Note: The acetone fractions were blank-corrected according [illegible]

AVOGADRO PARTICULATE MATTER RESULTS
Client: Eagle Peak
Project: 14206.0

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	Organic Rinse (B½)	126.8	1457	Tare 1	2.27579	2.27660	--	--	--	--	--
				Tare 2	2.27576	2.27665	--	--	--	--	--
				Tare 3	2.27574	2.27665	--	--	--	--	--
				Average	**2.27576**	**2.27663**	**0.87**	0.0007%	N/A	N/A	0.87
1-PM	Organic Rinse (B½)	149.1	1458	Tare 1	2.26820	2.26924	--	--	--	--	--
				Tare 2	2.26821	2.26921	--	--	--	--	--
				Tare 3	2.26816	2.26919	--	--	--	--	--
				Average	**2.26819**	**2.26921**	**1.02**	0.0007%	N/A	N/A	1.02
2-PM	Organic Rinse (B½)	162.8	1459	Tare 1	2.25517	2.25618	--	--	--	--	--
				Tare 2	2.25517	2.25623	--	--	--	--	--
				Tare 3	2.25512	2.25622	--	--	--	--	--
				Average	**2.25515**	**2.25621**	**1.06**	0.0007%	N/A	N/A	1.06
3-PM	Organic Rinse (B½)	190.2	1460	Tare 1	2.27483	2.27570	--	--	--	--	--
				Tare 2	2.27486	2.27572	--	--	--	--	--
				Tare 3	2.27488	2.27574	--	--	--	--	--
				Average	**2.27486**	**2.27572**	**0.86**	0.0007%	N/A	N/A	0.86
FB-PM	Aqueous Water (B½)	199.6	39	Tare 1	71.9532	71.9539	--	--	--	--	--
				Tare 2	71.9532	71.9537	--	--	--	--	--
				Tare 3	71.9536	71.9536	--	--	--	--	--
				Average	**71.9533**	**71.9537**	**0.40**	0.0002%	N/A	N/A	0.40
1-PM	Aqueous Water (B½)	317.1	221	Tare 1	74.7646	74.7654	--	--	--	--	--
				Tare 2	74.7647	74.7658	--	--	--	--	--
				Tare 3	74.7648	74.7657	--	--	--	--	--
				Average	**74.7647**	**74.7656**	**0.93**	0.0002%	N/A	N/A	0.93
2-PM	Aqueous Water (B½)	339.6	613	Tare 1	73.2131	73.2142	--	--	--	--	--
				Tare 2	73.2131	73.2145	--	--	--	--	--
				Tare 3	73.2136	73.2146	--	--	--	--	--
				Average	**73.2133**	**73.2144**	**1.17**	0.0002%	N/A	N/A	1.17
3-PM	Aqueous Water (B½)	302.4	806	Tare 1	73.7307	73.7391	--	--	--	--	--
				Tare 2	73.7307	73.7396	--	--	--	--	--
				Tare 3	73.7312	73.7391	--	--	--	--	--
				Average	**73.7309**	**73.7393**	**8.40**	0.0002%	N/A	N/A	8.40

The Avogadro Group, LLC

Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE

EPA METHOD 5/202

Client: Eagle Peak

Project: 14206.0

Custody

Three sets of samples were received September 10, 2014. Each set included a filter, probe/nozzle rinse, CPM filter, impinger water, and rinse. One set of field blanks for each fraction was also received. According to the chain-of-custody, these samples were collected September 9, 2014. All samples were received in good condition with no signs of loss.

Analysis

Samples were analyzed for particulate matter using the analytical procedures in EPA Methods 5 (Determination of Particulate Matter Emissions from Stationary Sources) and 202 (Determination of Condensable Particulate Matter Emissions from Stationary Sources). Samples were analyzed September 23-26, 2014 after desiccating for at least 24 hours. The results were blank corrected according to the test methods.

Front-Half Analysis

The filters were light brown in color. The probe/nozzle rinses appeared as tan residues.

Back-Half Analysis

The aqueous fractions appeared as beige residues. 3-PM was also oily. The organic fractions appeared as faint white residues upon evaporation.

QC Notes

Prior to analysis, the accuracy of the balance was checked using 500 mg, 2 g, and 100 g ASTM E617-97 Class 1 Stainless Steel weights.

The Avogadro Group, LLC

Air Quality Consulting and Source Emissions Testing

End of Document

CHAIN OF CUSTODY

Client / Project Name: Eagle Peak Rock and Paving	**Project / Sample Location:** A/C Hot Mix Plant Baghouse	**Test / Analytical Method:** EPA 5/New 202 (total PM with condensable analysis)
Project No. 14206.0	**Purchase Order No.** / **Quote No.**	**Special Analysis / Reporting Instructions:** *Please retain the RBs and proof blanks, but do not analyze these fractions at this time. E-mail me the preliminary results upon completion of the analysis.*
Sent Analytical Report To: Chris Crowley	**Sampler or PM Signature:**	

Run / Sample #	Date	Containers	Sample Fraction	Reagent	Lab / Sample ID #
1-PM	9/9/14	1	Fraction 1 - (Front Half filter)	--	
"	9/9/14	1	Fraction 2 - (Front-half rinses)	acetone	
"	9/9/14	1	Fraction 3 - (Impinger contents & back-half rinses)	Water	
"	9/9/14	1	Fraction 4 - (Back-half organic rinses)	Acetone/Hexane	
"	9/9/14	1	Fraction 5 - (Back-half Filter)	--	
2-PM	9/9/14	5	Same as Run 1		
3-PM	9/9/14	5	Same as Run 1	"	
FB-PM	9/9/14	5	Same as Run 1	"	
PB-PM	9/8/14	1	Fraction 3 - (Impinger contents & back-half rinses)	"	
PB-PM	9/8/14	1	Fraction 4 - (Back-half organic rinses)	Water	
				Acetone/Hexane	
RB-PM	9/9/14	1	Reagent Blank		
RB-PM	9/9/14	1	Reagent Blank	acetone	
RB-PM	9/9/14	1	Reagent Blank	water	
Total Containers		25		Hexane	

Relinquished by: (signature)	Date 9-10-14	Time 1237	Received by: (signature)	Date 9/10/14	Time 1340
Relinquished by: (signature)	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	Date	Time	Received by: (signature)	Date	Time

6.02×10^{23}

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

Preliminary results (analysis) due by: ____________

Final lab report due by: ____________

Appendix E.3

Volatile Organic Compound Analyses

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

HYDROCARBON ANALYSIS RESULTS

Client: Eagle Peak Rock & Paving
Regulatory Agency: Siskiyou County Air Pollution Control District
VOCs are defined as: Total Non-Methane Hydrocarbons
Project: 14206.0
Date Collected: September 9, 2014
Date Analyzed: September 10, 2014

Test No:	1-VOC	2-VOC	3-VOC
VOC results:	7.90	9.74	11.2

NOTES:

Reporting Limits: methane 0.13 ppmv, ethane 0.07 ppmv, C3 0.04 ppmv, > C3 0.13 ppmv
THC 0.52 ppmv methane, TNMHC 0.39 ppmv methane, TNMNE 0.26 ppmv methane

Samantha Oliva Date: 9/15/14
Samantha Oliva
Laboratory Manager

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

HYDROCARBON ANALYSIS RESULTS
Client: Eagle Peak Rock & Paving
Project: 14206.0
Date Collected: September 9, 2014
Date Analyzed: September 10, 2014

Test No:		1-VOC	2-VOC	3-VOC
Methane, ppmv		1.37	1.34	2.61
Non-methane hydrocarbons, ppmv				
ethane	Concentration in ppmv of component	< 0.07	< 0.07	< 0.07
ethene		2.30	2.97	3.15
C3		< 0.04	< 0.04	< 0.04
> C3 (ppmv units of methane)		3.31	3.79	4.93
Total hydrocarbons (THC)		**9.28**	**11.1**	**13.8**
Total non-methane hydrocarbons (TNMHC)		**7.90**	**9.74**	**11.2**
Total non-methane non-ethane hydrocarbons (TNMNE)		**7.90**	**9.74**	**11.2**

NOTES: THC, TNMNE and TNMHC expressed as ppmv units of methane

When THC, TNMHC, and/or TNMNE fell below the reporting limit (< 0.52 ppmv, < 0.39 ppmv and < 0.26 ppmv, respectively), values were calculated by taking the sum of the methane equivalent concentrations of the detected species and of the detection limits of the remaining species that were not detected.

Reporting Limits: methane 0.13 ppmv, ethane 0.07 ppmv, C3 0.04 ppmv, > C3 0.13 ppmv
THC 0.52 ppmv methane, TNMHC 0.39 ppmv methane, TNMNE 0.26 ppmv methane

Samantha Oliva

Date: 9/10/14

Samantha Oliva
Laboratory Manager

The Avogadro Group, LLC

Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE
EPA METHOD 18
Client: Eagle Peak Rock & Paving
Project: 14206.0

Custody
Three samples collected in Tedlar bags were received on September 10, 2014. According to the Chain of Custody, these samples were collected on September 9, 2014. All samples were received in good condition with no signs of loss.

Sample Analysis Notes
Samples were analyzed for hydrocarbons using the analytical procedures in EPA Method 18 (Measurement of Gaseous Organic Compound Emissions by Gas Chromatography). Samples were analyzed on September 10, 2014 (within 72 hours of sample collection). Hydrocarbon results were corrected to dry concentrations as described in Method 18.

Calibration Notes
All calibration standards were within 5% of their mean values. Pre- and post-test analyses of a mid level standard differed by no more than 5%. Therefore, no post-test calibration was performed. Audits were within 10% of the certified cylinder value.

The Avogadro Group, LLC

Air Quality Consulting and Source Emissions Testing

End of Document

CHAIN O[illegible]USTODY

Clien[illegible]ject Name: Eagle [illegible] Rock & Paving

Project No.: 4206.0

☒ Lump-sum ☐ T&M

☒ California ☐ Medford ☐ Portland

Sampler: (Signature)

Project Location/Sample Location: Baghouse Stack

BAAQMD: ☐ Yes ☒ No

P.O. No.

Send Analytical Report To: C. Crowley

ANALYSES

Full 202? ☐ Yes ☐ No

Sample No./ Identification	Date	# of Containers	Lab Sample Number	Type of Sample	EPA M-18 mod. VOC's			Remarks
1-VOC	9-9-14	1		Tedlar Bag	X			
2-VOC	9-9-14	1		↓	X			
3-VOC	9-9-14	1			X			

Relinquished by: (Signature) [illegible] Crowley	Date 9-10-14	Time 1235	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Sample Collected By:

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
(925) 680-4300 • (925) 680-4416 FAX

Analytical report due date: ______

White: Project Mgr.

Appendix E.4

Fuel Analyses

PRECISION PETROLEUM LABS, INC.

CERTIFICATE OF ANALYSIS

LABORATORY ADDRESS
5915 Star Lane, Houston, TX 77057
Ph. 713-680-9425 Fax: 713-680-9564
Website: precisionlabs.org

Client Name: Thermo Fluids-Medford, OR
Street Address: 535 Industrial Circle
City, State, Zip: White City, OR 97503

INVOICE No.	61887		
LAB REFERENCE No.	2014-08-650	DATE RECEIVED	08-19-2014
AUTHORIZED BY	Eric Felber	DATE/TIME COLLECTED	N/A
PRODUCT ID	TFI-155 Used Oil From Medford Tank 11	MATRIX TYPE	Liquid

TEST	TEST METHOD	REPORTING LIMIT	TEST RESULTS
Gravity API @ 60°F	D-287	----	30.9
Flash Point, °F	S.W. 1010	-10°F	> 200
Viscosity CST @ 40°C	D-445	1	56.14
Pour point, °F	D-97	-10°F	< -10
Sulfur, Wt%	D-4294	0.020	0.2742
Ash, Wt%	D-482	0.001	0.546
Total halogen, PPM	S.W. 9077	----	PASS
Total halogen, PPM	S.W. 9075	200	BRL
PCB's, PPM	S.W. 8082	0.50	BRL
Water by distillation, Vol%	D-95	0.05	3.2
Sediment by extraction, Wt%	D-473	0.01	0.12
Heat of combustion, BTU/Lb	D-240	2,150	18,769
Heat of combustion, BTU/GAL	D-240	2,150	135,418
pounds per gallon @ 60°F	-----	---	7.215
Glycols, Wt%	G.C./FID	0.10	0.29

TOTAL METAL	TEST METHOD	PREPARATION METHOD	REPORTING LIMIT, PPM	TEST RESULTS, PPM
Arsenic	EPA-6010B	EPA-3040/3050	1.00	BRL
Cadmium	EPA-6010B	EPA-3040/3050	1.00	BRL
Chromium	EPA-6010B	EPA-3040/3050	1.00	BRL
Lead	EPA-6010B	EPA-3040/3050	2.00	2.55

Daniel Zabihi
QA Manager

Date: 08-20-2014

PRIMARY ACCREDITATION TCEQ, #T104704203-TX
ARIZONA LICENSE # AZ0630

QUALIFIERS & ABBREVIATIONS: BRL - Below Reporting Limit; SCL - Test performed by an approved subcontract laboratory; B - Analyte was detected in the associated method blank; Matrix spike/matrix spike duplicate (M), Laboratory control sample (L), Calibration criteria (C), and Surrogate (S) recoveries were outside acceptance limits. Test deviation applied to Method 8260 (VOCS).

COMMENTS: There were no quality assurance anomalies associated with these tests.

ECISION PETROLEUM LABS, INC.'S RESPONSIBILITY FOR THE ABOVE ANALYSIS, OPINIONS OR INTERPRETATIONS IS LIMITED TO
E INVOICE AMOUNT. RESULTS ARE REPORTED ON AN "AS IS" BASIS, UNLESS OTHERWISE NOTED. THE TEST RESULTS RELATE
Y TO THE SUBMITTED SAMPLE IDENTIFIED ON THIS REPORT. TEST RESULTS MEET ALL REQUIREMENTS OF NELAC FOR TESTS
LISTED ON THE LABORATORY'S CURRENT FIELDS OF ACCREDITATION (EPA 1010, 6010, 8082, 8260, and 9075).

APPENDIX F

OPERATING PERMITS

COUNTY OF SISKIYOU

AIR POLLUTION CONTROL DISTRICT

525 SOUTH FOOTHILL DRIVE
YREKA, CALIFORNIA 96097-3090
PHONE: (530) 841-4029
FAX: (530) 842-6690

PATRICK J. GRIFFIN
Air Pollution Control Officer
ELDON BECK
Assistant Air Pollution Control Officer

Authority to Construct/Permit to Operate

IS HEREBY GRANTED TO

EAGLE PEAK ROCK AND PAVING, INC.

ATC/PTO 13-0412-AC

Owner

Eagle Peak Rock and Paving, Inc.
P.O. Box 879
Alturas, CA 96101
Phone: (530) 233-4568
Fax: (530) 233-4918
Email: [illegible]eaglepeak@yahoo.com
KW

Operator

Eagle Peak Rock and Paving, Inc.
P.O. Box 879
Alturas, CA 96101
Phone: (530) 233-4568
Fax: (530) 233-4918
Email: [illegible]eaglepeak@yahoo.com
KW

EQUIPMENT LOCATION: 451 Granite Court Yreka, CA

EQUIPMENT DESCRIPTION: Hot Mix Asphalt Plant (See Appendix A)

FACILITY THROUGHPUT: A maximum of 300 tons per hour

POWER SOURCE: ~~PERP Registered Generators or Grid Power~~
MAIN LINE POWER

This Authority to Construct/Permit to Operate (ATC/PTO) allows the legal owner/operator to construct and operate an Asphalt Concrete Hot Plant according to the following conditions:

GENERAL:

1. Conditions contained in this ATC/PTO are intended to assure that components of this facility are designed and operated in compliance with all Siskiyou County Air Pollution Control District (District) Rules and Regulations. The District reserves the right to amend this permit, if the need arises, to insure compliance of this facility or to abate any public nuisance. The legal owner/operator is also responsible for compliance with all other District, state and federal regulations not noted in this permit.
   [District Rule 2.7]
2. This ATC/PTO is not transferable from either one location to another, from one piece of equipment to another, or from one person or operator to another, except on written approval of the Air Pollution Control Officer. Such transfers are subject to the provisions of state and District Rules and Regulations.
   [District Rule 2.3]
3. In order to determine the nature, extent, quantity or degree of air contaminants which are or may be discharged by a stationary source, the Control Officer may at any time require from any person subject to these permit conditions to test for air emission contaminants.
   [District Rule 2.10]
4. The person to whom this ATC/PTO is issued shall be responsible for payment of all applicable fees.
   [District Rule 3.1]
5. A person to who has been granted a Permit to Operate any article, machine, equipment, or other contrivance shall display such Permit to Operate, or approved facsimile, in such a manner as to be clearly visible and accessible. In the event that the Permit to Operate cannot be displayed the Permit to Operate shall be maintained readily available at all times on the operating premises.
   [District Rule 2.1]
6. If any provision of this ATC/PTO is found to be invalid, such finding shall not affect the remaining provisions.
   [District Rule 1.5]
7. Any alteration or change in equipment or method of operation that is not authorized by this ATC/PTO, shall be immediately reported to the District. Such change may require additional review, analysis, and amendment of this ATC/PTO.
   [District Rule 2.1-A]
8. The "Right of Entry" as stipulated in California Health and Safety Code Section 41510, of Division 26, shall apply at all times.
   [District Rule 2.7]

9. The operator(s) of this facility shall comply with all applicable requirements pursuant to California Health and Safety Code, Part 6, Air Toxics "Hot Spots" Infomation and Assessment Act of 1987 (AB 2588) Sections 44300 through 44394, District Hot Spot Prioritization Guidelines, and District written requests.
   [District Rule 2.7]

10. All equipment installed for the purpose of controlling or abating emissions of air contaminants shall be maintained and operated in accordance with the manufacturer's specifications for optimum performance efficiency. No machinery shall operate unless all emission control systems are in place and properly operating.
   [District Rule 2.7]

11. No person shall discharge from any source whatsoever, such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause, or have a natural tendency to cause injury or damage to business or property.
   [District Rule 4.2]

OPERATION CONDITIONS:

12. For the purpose of this permit, a breakdown condition means an unforeseeable failure or malfunction of any air pollution control equipment or related operating equipment which causes a violation of any emission limitation or restriction prescribed by this permit, applicable rules and regulations, or by state law. A breakdown shall be reported to the District Office as soon as reasonably possible, but no later than one (1) hour after its detection during a regular business day or one (1) hour after the start of the next business day, whichever is sooner. Report all applicable breakdowns to the District at (530) 841-4029 or 841-4030.
   [District Rule 2.12]

13. In the event of any violation of District Rules and Regulations, the facility owner / operator shall cease operation of the violating equipment and take corrective action to end such violation. Once repaired or adjusted, operation of said equipment shall not commence until permit condition # 12 has been satisfied.
   [District Rule 2.7 B]

14. The operator shall comply with CCR Title 17, Section 93106 (b) (2) as it pertains to the sale of serpentine material in the State of California.
   [District Rule 2.7 B]

15. Any chemical change (*a change means any modification in quantity or species of chemicals used*) or the addition of crumb rubber to the mix design in the manufacturing of asphalt concrete, shall be reviewed for emission levels and approved by the District prior to use.
   [District Rule 2.10]

16 **The operator shall comply with all components of the Mitigation Monitoring Program (MMP) (1999 and 2010 versions) prepared in conjunction with Use Permits 2858 and 3962 by the City of Yreka and incorporated as conditions of this permit.**
[District Rule 2.7]

17 All grading and construction activities shall be required to incorporate the following dust control measures, as per the **2010 City of Yreka Use Permit 3962 Mitigation Monitoring and Reporting Program MM2: [District Rule 2.7]**

- All active construction areas shall be watered at least twice daily;
- Soil stabilizers shall be applied to inactive construction areas, as needed;
- All unpaved access roads and staging areas at the construction site shall be paved, have soil stabilizers applied, or have water applied three times daily;
- Traffic speeds on unpaved roads shall be limited to 15mph;
- Exposed stockpiles of soil and other backfill material shall be enclosed or covered, and watered twice daily or have soil binders added;
- All trucks hauling soil and other loose materials shall be covered or have at least two feet of free board;
- If visible soil materials are carried onto adjacent public streets, such streets shall be swept with water sweepers; and
- Dust-producing activities shall be suspended when high winds create construction-induced visible dust plumes moving beyond the project site, in spite of dust control measures.

18 The plant shall use odor counteractants, which will be introduced into the stack flue gas to neutralize any odors that may be produced, if odor complaints are received.
[District Rule 2.7] [1999 MMP 4.5.4B]

19 Maximum quantity of hot mix asphalt shall not exceed 300 tons per hour.
[District Rule 2.7]

20 The maximum temperature of the mix as it exits the drum-mixer shall be:

a. 310°F for conventional asphalt; and

b. The asphalt plant shall not operate at a temperature in excess of 325°F during production of rubberized asphalt concrete. **[2010 MM 4.3.4]**
[District Rule 2.7]

21 The asphalt drum mix plant baghouse shall be operated and maintained in a manner capable of complying with the manufacturers PM10 control efficiency of 99.9%.
[District Rule 2.7]

22 The asphalt drum mix plant baghouse shall be equipped with a pressure gauge for measuring pressure drop across the bags. Baghouse pressure drop readings shall be maintained according to manufacturer's specification and recorded twice daily and these recordings shall be retained by the owner/operator for two (2) years and made available to District staff upon request.
[District Rule 2.7]

23 Spare bags for the asphalt drum mix plant baghouse shall be kept on site for immediate replacement of leaking or torn bags.
[District Rule 2.7]

OPERATIONAL HOURS:

24 When operating the Asphalt Concrete Hot Plant (ACHP) on line (grid) power, the owner/operator may operate the ACHP a **maximum of 22 hours in any 24 hour period** (midnight to midnight).
[District Rule 2.7]

25 When operating the ACHP and powered by the Caterpillar Model C32, 1372 BHP diesel-fired gen set permitted under PTO 13-0418, the owner/operator shall operate the ACHP and gen set a **maximum of 12.5 hours in any 24 hour period** (midnight to midnight).
[District Rule 2.7]

EMISSIONS CONDITIONS:

26 The asphalt plant ducted emission points shall not discharge into the atmosphere any gases which:

a. Contain particulate matter in excess of 90 mg / dscm (0.04 grains / dscf).
[40 CFR 60.92, (1) subpart 1]

b. Exhibit twenty (20) percent opacity (Ringlemann #1) or greater.
[40 CFR 60.92, (2) subpart 1]

27 No person shall discharge from any single source whatsoever any one or more of the following contaminants in any state or combination thereof, exceeding in concentration at the point of discharge.

a. Any source with an approved Authority to Construct after July 1, 1987: **0.20 grains** per cubic foot of exhaust gas calculated to 12 percent carbon dioxide. **[District Rule 4.4(b) (2)]**

28 Except as provided in these conditions, a person shall not discharge into the atmosphere from any single source of emission whatsoever, any air contaminant for a period or periods aggregating more than three minutes in any one hour which is:

a. As dark or darker in shade as that designated as **No. 2 on the Ringelmann chart** as published by the United States Bureau of Mines.

b. Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in part "a" above. **[District Rule 4.1]**

COMBINED FACILITY EMISSIONS:

29 Emissions produced by the asphalt plant shall be less than **250 pounds** per day for any pollutant for which there is a national ambient air quality standard (excluding carbon monoxide which is 2,500 pounds per day), or any precursor of such pollutant. **[District Rule 6.1]**

30 No person shall discharge oxides of nitrogen in excess of 140 pounds per hour for new or expanded installations, calculated as nitrogen dioxide (NO_2) **[District Rule 4.4]**

31 All property roads and stockpiles shall be watered as required to maintain dust levels at / or below 40% Opacity and shall not cause such quantities of air contaminants or other material to be emitted which cause injury, detriment, nuisance of annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property. **[District Rule 4.1, 4.2]**

TESTING REQUIRMENTS:

32 Every load of Recycled Oil to be used as a combustion fuel shall be tested to ensure that it meets the following standards:

a. Total lead: 50 mg/kg or less.
b. Total arsenic: 5 mg/kg or less.
c. Total Chromium: 10 mg/kg or less.
d. Total cadmium: 2 mg/kg or less.
e. Total halogens: 1000 mg/kg or less of halogens listed in 40 CFR Part 261 Appendix VIII.
f. Total polychlorinated biphenyls (PCBs): less than 2 mg/kg.

[Health and Safety Code 25250] [District Rule 2.7]

FUEL REQUIREMENTS:

33 As of September 1st, 2006 the fuel used to power the permitted generator/s shall not exceed a sulfur content of 15 parts per million as required in the guidelines of Title 13, California Code of Regulations, Section 2281 and 2282, (Last amended August 14, 2004).

[District Rule 2.7]

RECORD KEEPING:

34 The following records shall be continuously maintained onsite for the duration of this permit and made available to the District upon request. These records shall be kept in a clear and concise format requiring the following data.

[District Rule 2.7]

Subject	Information required daily
Hours of Operation **(hours / day)**	Daily hours of operation for the Asphalt plant
Production **(tons / day)**	Actual daily production for the Asphalt plant
Fuel Usage **(gals / day)**	Fuel usage for the Drum Dryer

35 Continued compliance with the District Rules and Regulations, and the California Health and Safety Code is required for this permit to remain in effect.
[District Rule 2.7]

36 It is the owner/operators responsibility to comply with all laws, ordinances and regulations of other governmental agencies, which are applicable to the equipment to be used.
[District Rule 2.7

37 This facility will be notified by January 15 of each year of the annual renewal fee based upon the current fee schedule. It is the facility owner/operator's responsibility to pay the required fee in a timely manner. Failure to pay fees may result in penalties or permit suspension.
[District Rule 3.1 B]

I have read and understood the above permit conditions.

Owner/operator signature: ______________________ **Date** [illegible]

An Authority to Construct permit is hereby granted. *Once construction is complete, the owner/operator shall notify the District. Once notified, the District shall inspect the operation for compliance with all applicable laws, rules and permit conditions. If compliance is determined, District staff shall sign off on the* ***Post Construction Inspection*** *below, which will change the status of this Authority to Construct to a* ***Permit to Operate****.*

- ***Post Construction Inspection:*** Date 5-2-13

Issue Date: 4-23-2013

ELDON BECK
Asst. Air Pollution Control Officer
Siskiyou County Air Pollution Control District