South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

SOURCE TEST REPORT

17-337

Conducted at

Lubeco Inc.
6859 Downey Ave.
Long Beach, CA 90805

HEXAVALENT CHROMIUM EMISSIONS FROM A HEATED SODIUM DICHROMATE SEAL TANK AND A SCREENING TEST FOR A CHROMATE SPRAY BOOTH

TESTED:	April 27, 2017
ISSUED:	June 9, 2017
REPORTED BY:	Wayne Stredwick Air Quality Engineer II

REVIEWED BY:

Michael Garibay
Supervising Air Quality Engineer

SOURCE TEST ENGINEERING BRANCH

MONITORING AND ANALYSIS DIVISION

Cleaning the air that we breathe...

BACKGROUND

a. Firm. ....Lubeco Inc. Facility ID No. 41229

b. Test Location...6859 Downey Ave. Long Beach, CA 90805

c. Unit Tested ....Sodium Dichromate Seal Tank

d. Test Requested by ....Susan Nakamura, Planning, Rule Development, and Area Sources, (PRDAS) (909)396-3105

e. Reason for Test Request............................To Determine Emission Factors

f. Dates of Test...April 27, 2017

g. Source Test Performed by.........................Bill Welch, Wayne Stredwick Eric Padilla, Jason Aspell

h. Test Arrangements Made Through ....Steve Rossi, President Lubeco Inc. (562) 602-1791

i. Source Test Observed by ....Steve Rossi, Lubeco Inc. (562) 602-1791 Bruce Armbruster, JE Comp. Services (909) 483-3300

RESULTS for Hexavalent (Cr VI) at Lubeco Inc.

Parameter	Cr VI (ng/dscm)	Cr VI (lb/hr)	Cr VI (lb/hr-ft^2 tank)	Cr VI (lb/hr-ft^2 tank-% dichromate)
Run #1 Sodium Dichromate Seal Tank	232,000	1.58×10^{-4}	5.27×10^{-6}	9.94×10^{-7}
Run #2 Sodium Dichromate Seal Tank	292,000	2.03×10^{-4}	6.77×10^{-6}	1.28×10^{-6}
Run #3 Sodium Dichromate Seal Tank	208,000	1.51×10^{-4}	5.03×10^{-6}	9.49×10^{-7}
Sodium Dichromate Seal Tank Average	244,000	1.71×10^{-4}	5.69×10^{-6}	1.07×10^{-6}
Facility Upwind of Dichromate Seal Tank	17	N/A	N/A	N/A
Chromate Spray Booth Exhaust	33	N/A	N/A	N/A

INTRODUCTION

On April 27, 2017, personnel from the South Coast Air Quality Management District (SCAQMD) Source Test Engineering Branch conducted triplicate source tests for hexavalent chromium emissions from a heated sodium dichromate seal tank at Lubeco Inc., Long Beach, CA. The main objective of the testing was to provide a mass emission rate, which can be used to determine an emissions factor for heated sodium dichromate seal tanks used in plating operations. The second objective was to identify potential sources of emissions as measured by SCAQMD ambient air monitoring in the nearby south Paramount area.

The main focus of this report was to determine an emission factor for sodium dichromate seal tanks. However, Lubeco, Inc. also has three spray booths that are permitted to use chromate based paints. A screening test (sampling for hexavalent chromium concentration only) was also conducted to determine if the chromate spray booths could be a source of the elevated hexavalent chromium ambient levels in the surrounding area in addition to the sodium dichromate seal tank.

The test was requested by the SCAQMD Planning, Rule Development, and Area Sources (PRDAS) Division subsequent to previous screening tests on these tanks. PRDAS will evaluate the test results presented in this report and use the data for determining emission factors for these types of facilities.

The testing on the sodium dichromate seal tank consisted of 3-one hour sampling runs. The dichromate seal tank temperature and bath composition were also determined for a measure of operating conditions.

EQUIPMENT AND PROCESS DESCRIPTION

Aluminum has been used for many years in the military and aerospace industries. It is essential, however, that improved corrosion properties are imparted in the metal to improve corrosion resistance. Aluminum anodizing has been used for many years to enhance the corrosion performance of aluminum alloys by imparting a thin layer of chromium metal on the aluminum alloy's surface. The surface of the anodized aluminum consists of an inner thin barrier chromium layer and an outer thick chromium porous layer. The outer layer must be sealed or the microscopic holes on the surface will develop corrosion, and so the corrosion resistance of anodized aluminum depends largely on the effectiveness of the sealing operation.

During the sealing, the pores of the anodized aluminum alloy is hydrated, which fills the pores and provides improved corrosion resistance. However, the commonly used sealer contains hexavalent chromium, which is listed as a known carcinogenic. Other sealing processes include; hot water, cobalt acetate, nickel acetate, and trivalent chromium.

Lubeco, Inc. is a plating company located in Long Beach. Lubeco, Inc. was selected as the host facility for the testing due to elevated ambient monitoring readings in the nearby south Paramount area. All tests were conducted on a single tank measuring 10 feet long x 3 feet wide x 4 feet high. The tank was heated to between 200-203 ^{o}F, and had a mechanical mixer to keep a uniform temperature throughout the entire sealing process tank. There were no parts in the seal tank during testing.

Tank Dimensions	Type of Tank
10’L x 3’L x 4’H	Sodium Dichromate Seal

Operating Conditions Recorded During Run #1

Plating Solution Temperature	203	ºF
Plating Solution Chromic Acid Content	5.3	% by wt.
Duration of Test Run	60	min /test run
Average Capture Velocity into the Enclosure	80	ft. /min
Capture Efficiency of Ventilation System	100	%
Ventilation Rate	242	acfm

Operating Conditions Recorded During Run #2

Plating Solution Temperature	201	ºF
Plating Solution Chromic Acid Content	5.3	% by weight
Duration of Test Run	60	min /test run
Average Capture Velocity into the Enclosure	100	ft. /min
Capture Efficiency of Ventilation System	100	%
Ventilation Rate	246	acfm

Operating Conditions Recorded During Run #3

Plating Solution Temperature	200	ºF
Plating Solution Chromic Acid Content	5.3	% by weight
Duration of Test Run	60	min /test run
Average Capture Velocity into the Enclosure	70	ft. /min
Capture Efficiency of Ventilation System	100	%
Ventilation Rate	254	acfm

TESTING METHODOLOGY

The testing on the sodium dichromate seal tank consisted of triplicate one hour sampling runs.

A temporary reduced draft ventilation system was designed and constructed both to isolate the process and collect the resulting chromium emissions in a manner to facilitate the emissions measurement. This approach has been successfully employed in past SCAQMD testing on nickel, and chromium plating tanks and is recognized in a chrome testing protocol developed for the SCAQMD and the California Air Resources Board (ARB) (SCAQMD Technical Guidance Document for Rule 1469, dated June 18, 2013). A main concern was that a high flow ventilation system, such as a dedicated side-draft ventilation system may produce higher emissions due to entrainment of large splashed droplets that potentially fall back into the tanks or to the ground and may not become emissions to the atmosphere.

The temporary reduced draft system was designed to simulate emissions to the atmosphere of an unventilated tank. Mass emissions collected in the duct of a ventilated tank may be higher due to this effect. The temporary ventilation system consisted of 5 feet long x 3 feet wide x 5 feet high hood suspended at a distance of 8 inches above the solution surface, covering half of the host tank tested (see Figure 1). The other half of the tank was covered over with plastic. The hood was vented to a small blower which was set to achieve a specific velocity vertically through the hood. A straight run of ducting between the hood and the blower was used to isolate and measure the emissions from the tank. The facility's roll-up doors were left open during all tests so that fresh air was continuously allowed to flow through the building, along with fresh air entering the building from evaporative coolers on the building’s roof. The outlet of the test blower was oriented so that the air stream discharged away from the tank being tested and in the downstream direction of the airflow in the building to avoid re-entrainment in the test hood.

The hood and tank cover vent system operated as follows: The air flowed into the hood and traveled upwards through the hood at the specified velocity. Both the hood and the space above the tank acted as a settling zone where larger droplets that would normally not be carried away from the tank are allowed to fall back into the tank. By using a hood that has a similar or lower cross section than the tank, a low dilution air rate can be employed. The use of this low dilution air rate has the advantage of increasing the concentration in the duct which results in a lower relative error in the emission measurement. The approach also has the advantage of making the effects of contamination such as that in the ambient air to be less significant.

At a ventilation rate of 80-120 ft. /min as determined by a calibrated hot wire anemometer, the height of the hood was sufficient to create a uniform velocity over the lower cross-section of the hood and maintain this uniformity for the lower one third of the hood. This was done to ensure that no high or low velocity zones were present as to defeat the purpose of the hood in its lower section.

As previously approved and documented in the Rule 1469 Technical Guidance Document, the specific velocity was chosen to be approximately 100 ft. /min. This specific velocity was chosen for the following reasons:

1. The velocity is considered as the minimum velocity at which 100% capture of actual emissions to the atmosphere can be achieved. This was verified using the small scale capture hood and a smoke test.

2. The velocity is sufficiently low as to not overestimate the range of velocities that may be encountered in a building that houses the process. This is important since these internal air currents are responsible for transporting the emissions to the atmosphere. For purposes of comparison, 100 ft. /min equates to 1.14 miles per hour. Assuming that outdoor wind speeds typically vary from 3 -10 mph, it is not unreasonable to assume that 1.14 mph indoor air movements can be induced either by open doors, or the building's ventilation system.

3. According to the *American Conference of Governmental Industrial Hygienist Industrial Ventilation Manual*, 50 fpm is the indoor air speed created by an effective air conditioning system.

4. Calculations of settling velocity of small aerosols shows that small aerosol droplets less than 10 microns in diameter are capable of remaining airborne for several minutes, and much longer in moving air.

5. Past testing has been successfully employed using similar capture velocities during mist suppressant testing on chromic anodizing tanks.

SAMPLING AND ANALYTICAL PROCEDURES

Flow Rate

The gas velocity within the sampling duct was measured during each sampling run at eight points within the duct cross section as according to SCAQMD Methods 1.2 and 2.3. This was performed simultaneously with the pollutant sampling using a calibrated standard type Pitot tube with a differential pressure manometer, and a calibrated type "K" thermocouple with a potentiometer (Figure 2). The apparatus was checked for leaks both before and after use by introducing a pressure head and blocking the flow at the Pitot tip. An observation of the resulting stabilization in pressure at the manometer verified the absence of leaks in the system. The stack's access ports were located using the approach of SCAQMD Method 2.3 for ducts of less than 12 inches in diameter. Using this approach, the sampling access ports were located approximately eight stack diameters downstream and greater than two stack diameters upstream from flow disturbances. The velocity access ports were located approximately five stack diameters downstream from the sampling access ports and greater than two stack diameters upstream from flow disturbances. This configuration meets the SCAQMD Method 1.2 requirements for measurement site location.

The volumetric flow rate was calculated for each sampling run using the stack's cross sectional area and average gas velocity. The flow rate was corrected to standard conditions by using the stack temperature and pressure along with the barometric pressure measured with a calibrated aneroid barometer. The flow rate was also corrected to dry conditions using the moisture content as determined by the SCAQMD Method 4.1 weight gain from the chromium sampling trains as described in the following section.

Total and Hexavalent Chromium Sampling – CARB Method 425

A chromium sample was collected during each sampling run using CARB Method 425. The sample was collected from the locations within the sampling duct previously described in the velocity measurements. Each sample was collected over a period of 60 minutes using a sampling train consisting of a glass probe and nozzle connected by a six foot length of non-reactive tubing to the first of two Greenburg-Smith impingers each containing 100 ml of 0.1N sodium bicarbonate, an empty bubbler, and a bubbler containing tared silica gel desiccant (see Figures 3 & 4).

The impinger assembly was connected to a vacuum pump and a calibrated dry gas meter. The sampling apparatus was checked for leaks both before and after sampling by blocking the flow at the probe tip. An observation of the resulting decrease in flow at the meter to less than 0.02 cfm or four percent of the sampling rate indicated an acceptable leak rate. The impinger train was contained within an ice bath to condense water and other condensable matter present in the sample stream.

The impinger train was returned to the SCAQMD laboratory for recovery. The pH of the recovered solution was verified of being greater than 8.0 as specified in CARB Method 425. Hexavalent chromium collected in the nozzle, probe, and impingers was determined using ion chromatography with post column reactor (IC/PCR). Blank, and facility air upwind of the dichromate seal tank sample trains were also brought onto the test site, assembled, leak checked, and analyzed as above for quality control purposes.

Plating Solution Analysis

Samples of the plating solution were collected at the end of testing. The samples were analyzed for parameters typically monitored in the plating industry and reported with the process information.

Capture Efficiency

The capture efficiency was determined by a smoke test. The smoke test was accomplished using the steam generated by the dichromate seal tank. This technique can be used to verify 100% capture or conversely less than 100% capture by observing the flow of the steam into the capture hood. The observation of complete capture of the steam indicated 100% capture efficiency (see Figure 1).

The height of the capture hood and the ventilation rates were adjusted in an attempt to achieve the 50-100 ft. /min horizontally into the capture hood to ensure complete capture. The vertical velocity did not exceed 50 feet/min so that emissions would not be forced into the sampling ductwork that would otherwise be allowed to settle back into the tank.

TEST CRITIQUE

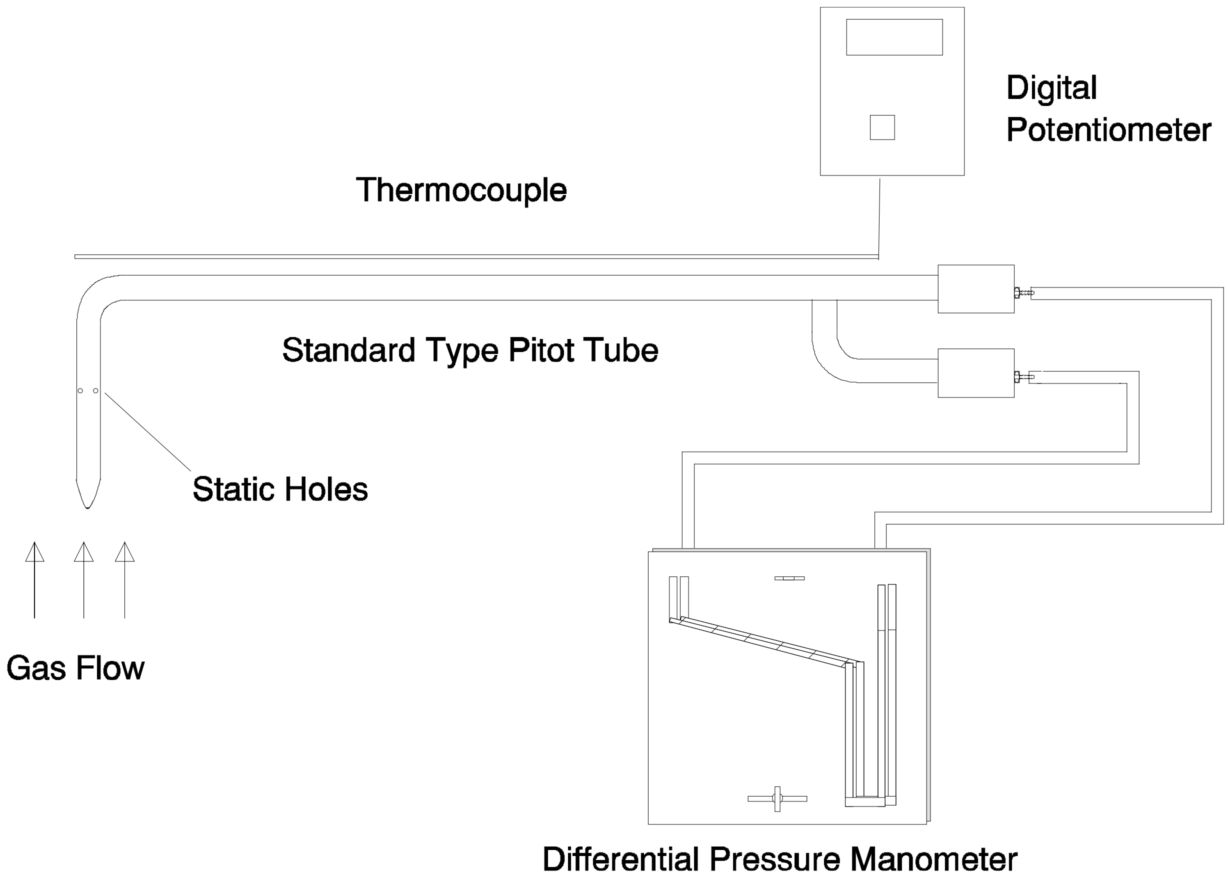
Overall, the sampling and analysis was successfully completed and the reported results are all considered to be accurate for the conditions that were tested. This report is limited to the presentation of the test results and a discussion of their accuracy. All issues related to the application of the emission factor results will be left for discussion outside the scope of the presentation of the results.

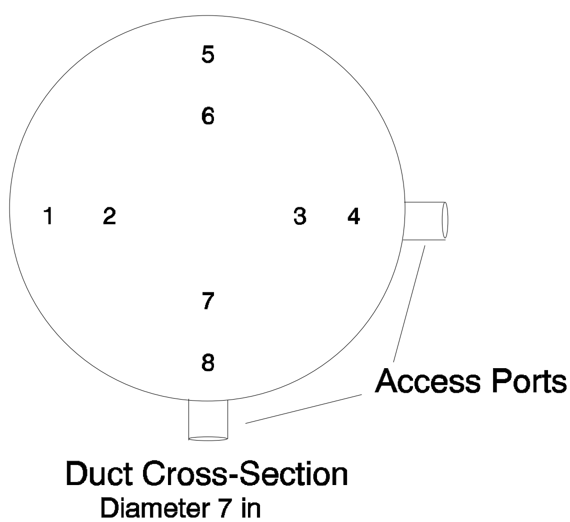
The blank train result indicated that there was no hexavalent chromium in the sample. The conclusion from this is that the sampling train media did not contribute to contamination of the sampling and that the sampling volumes were sufficient to bring the measured values well above the blank levels and lower detection limits of the analytical methods.

The results of the sampling taken from the ambient air in the workplace background (17 ng/dscm) represented 0.007% of the average hexavalent chromium concentrations during testing. This suggests that the temporary vent system did not contribute to the workplace background readings. Also, the third test run had the lowest hexavalent chromium emissions. With everything being the same during testing, this would say that the exhaust from the temporary enclosure was being exhausted from the incoming air and not being returned to the enclosure.

Parts were not processed during testing, since sealing tanks sit for extended periods of time without parts in them. It is also thought that the heating of the dichromate seal tanks is the cause of hexavalent chromium emissions and processing of parts does not have an effect on emissions.

Figure 1 - Photograph of Temporary Ventilation System with Sampling Location.





Traverse Point #	Distance from Inner Stack Wall (in)
1, 5	0.5
2, 6	1.75
3, 7	5.25
4, 8	6.5

Figure 2 - Flow Rate Measuring Apparatus.

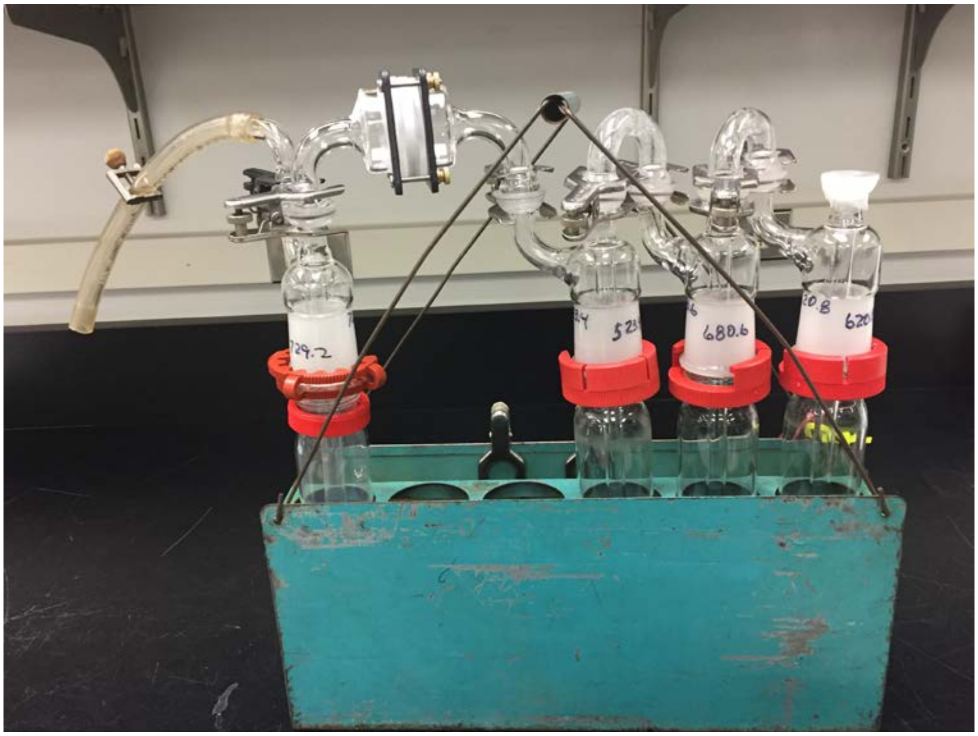


Figure 3 – Photograph of Chromium Sampling Train.

Figure 4 – Photograph of Chromium Sampling System.

APPENDIX 1

(Source Test Calculations)

SOURCE TEST CALCULATIONS

Average Velocity and Temperature

Run #1

Traverse Point #	Velocity Head #1 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)	Traverse Point #	Velocity Head #2 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)	Traverse Point #	Velocity Head #3 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)
1	0.040	128.3	14.07	1	0.030	126.7	12.17	1	0.030	127.7	12.18
2	0.040	127.1	14.05	2	0.040	128.1	14.07	2	0.040	127.7	14.06
3	0.040	125.9	14.04	3	0.050	126.0	15.70	3	0.040	127.5	14.06
4	0.040	125.4	14.03	4	0.040	125.4	14.03	4	0.040	126.7	14.05
5	0.030	126.6	12.17	5	0.050	127.3	15.71	5	0.050	127.0	15.71
6	0.040	127.4	14.06	6	0.050	127.0	15.71	6	0.050	126.1	15.70
7	0.050	126.0	15.70	7	0.050	127.0	15.71	7	0.050	125.5	15.69
8	0.050	126.3	15.70	8	0.050	127.1	15.71	8	0.050	125.1	15.69
	0.041	126.6	14.23		0.045	126.8	14.85		0.044	126.7	14.64
Average Temperature (^oF)	127		Average Velocity (fps) -				14.57				

Run #2

Traverse Point #	Velocity Head #1 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)	Traverse Point #	Velocity Head #2 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)	Traverse Point #	Velocity Head #3 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)
1	0.060	126.6	17.20	1	0.060	128.2	17.23	1	0.060	128.0	17.23
2	0.040	127.2	14.05	2	0.050	127.3	15.71	2	0.040	127.5	14.06
3	0.040	126.5	14.05	3	0.050	127.2	15.71	3	0.040	127.9	14.06
4	0.040	126.9	14.05	4	0.050	127.0	15.71	4	0.040	127.3	14.06
5	0.030	128.4	12.18	5	0.040	127.2	14.05	5	0.030	127.4	12.17
6	0.030	127.7	12.18	6	0.050	127.4	15.72	6	0.040	127.8	14.06
7	0.040	128.1	14.07	7	0.050	127.5	15.72	7	0.040	128.3	14.07
8	0.050	128.6	15.73	8	0.060	128.2	17.23	8	0.050	128.3	15.73
	0.041	127.5	14.19		0.051	127.5	15.89		0.043	127.8	14.43
Average Temperature (^oF)	128		Average Velocity (fps) -				14.83				

Where: Calculated Velocity = 2.9 x [Velocity Head x (460 + Temperature)]$^{0.5}$

SOURCE TEST CALCULATIONS

Run #3

Traverse Point #	Velocity Head #1 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)	Traverse Point #	Velocity Head #2 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)	Traverse Point #	Velocity Head #3 ("H_2O)	Temp. (^oF)	Calculated Velocity (fps)
1	0.040	122.0	14.0	1	0.040	121.4	13.99	1	0.040	121.0	13.98
2	0.040	120.5	14.0	2	0.040	122.4	14.00	2	0.040	120.8	13.98
3	0.050	120.9	15.6	3	0.050	121.0	15.63	3	0.050	121.4	15.64
4	0.050	120.5	15.6	4	0.050	120.4	15.62	4	0.050	120.6	15.63
5	0.040	120.5	14.0	5	0.040	119.2	13.96	5	0.040	118.3	13.95
6	0.050	120.9	15.6	6	0.050	121.3	15.63	6	0.050	118.4	15.60
7	0.040	120.4	14.0	7	0.050	121.9	15.64	7	0.050	119.6	15.61
8	0.050	121.3	15.6	8	0.050	121.4	15.64	8	0.050	119.9	15.62
	0.045	120.9	14.8		0.046	121.1	15.01		0.046	120.0	15.00
Average Temperature (^oF) -		121		Average Velocity (fps) -			14.94				

Where: Calculated Velocity = 2.9 x [Velocity Head x (460 + Temperature)]$^{0.5}$

SOURCE TEST CALCULATIONS
Flow Rate and Emissions

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Dr. Diamond Bar, California 91765-4182

Test No. 17-337 Test Date: 4/27/2017

SOURCE TEST CALCULATIONS

Tank Tested: Sodium Dichromate Seal Tank (#14)
Sample Train: Run #1 - Chrome Train #27 Input by: W. Stredwick

SUMMARY

A. Average Traverse Velocity	14.57	fps
B. Gas Meter Temperature (Use 60 deg.F for Temp Comp. Meters)	83.6	deg F
C. Gas Meter Correction Factor	1.0024	
D. Average Orifice Pressure	0.11	"$H_2$0
E. Nozzle Diameter	0.2110	inch

F. Stack Inside Diameter	7	inch	M. Pitot Correction Factor	0.99	
G. Stack Cross Sect. Area	0.267	ft2	N. Sampling Time	60	min
H. Average Stack Temp	126.7	deg F	O. Nozzle X-Sect. Area	0.00024	ft^2
I. Barometric Pressure	29.35	"HgA	P. Hex Chrome Sample Collection	0.07119	mg
J. Gas Meter Pressure (I+(D/13.6))	29.36	"HgA	Q. Total Chrome Sample Collection		mg
K. Static Pressure	-0.420	"$H_2$0	R. Water Vapor Condensed	34.2	ml
L. Total Stack Pressure (I+(K/13.6))	29.32	"HgA	S. Gas Volume Metered	11.499	dcf

T. Corrected Gas Volume [(S x J/29.92) x 520/(460+B) x C ..... 10.820 dscf

PERCENT MOISTURE/GAS DENSITY

U. Percent Water Vapor in Gas Sample ((4.64 x R)/((0.0464 x R) + T)) ..... 12.79 %

V. Average Molecular Weight (Wet):

Component	Vol. Fract.	x	Moist. Fract.	x	Molecular Wt.	=	Wt./Mole
Water	0.128		1.000		18.0	,	2.30
Carbon Dioxide	0.0000	Dry Basis	0.872		44.0	,	0.00
Carbon Monoxide	0.0000	Dry Basis	0.872		28.0	,	0.00
Oxygen	0.2090	Dry Basis	0.872		32.0	,	5.83
Nitrogen & Inerts	0.791	Dry Basis	0.872		28.2	,	19.45
						,	
						Sum	27.59

FLOW RATE

W. Gas Density Correction Factor (28.95/V)^.5	1.02	
X. Velocity Pressure Correction Factor (29.92/L)^.5	1.01	
Y. Corrected Velocity (A x M x W x X)	14.93	fps
Z. Flow Rate (Y x G x 60)	239	cfm
AA. Flow Rate (Standard) {Z x (L/29.92) x [520/(460+H)]}	208	scfm
BB. Dry Flow Rate (AA x (1-U/100))	181	dscfm

SAMPLE CONCENTRATION/EMISSION RATE

CC. Sample Concentration [0.01543 x (P/T)]	1.02E-04	gr/dscf
CC1. Sample Concentration (CC x 2288379600)	232,322	ng/dscm
DD. Sample Concentration [54,143xCC/ 51.996 (Molecular Wt.)]	1.06E-01	ppm
EE. Hexavalent Chrome Emission Rate (0.00857 x BB xCC)	1.58E-04	lb/hr
FF. Isokinetic Sampling Rate [(G x T x 100)/(N x O x BB)]	109.5	%

SOURCE TEST CALCULATIONS
Flow Rate and Emissions

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Dr. Diamond Bar, California 91765-4182

Test No. 17-337 Test Date: 4/27/2017

SOURCE TEST CALCULATIONS

Tank Tested: Sodium Dichromate Seal Tank (#14)
Sample Train: Run #2 - Chrome Train #5 Input by: W. Stredwick

SUMMARY

A. Average Traverse Velocity	14.83	fps
B. Gas Meter Temperature (Use 60 deg.F for Temp Comp. Meters)	93.5	deg F
C. Gas Meter Correction Factor	1.0024	
D. Average Orifice Pressure	3.30	"$H_2$0
E. Nozzle Diameter	0.4800	inch

F. Stack Inside Diameter	7	inch	M. Pitot Correction Factor	0.99	
G. Stack Cross Sect. Area	0.267	ft2	N. Sampling Time	60	min
H. Average Stack Temp	127.6	deg F	O. Nozzle X-Sect. Area	0.00126	ft^2
I. Barometric Pressure	29.35	"HgA	P. Hex Chrome Sample Collection	0.47374	mg
J. Gas Meter Pressure (I+(D/13.6))	29.59	"HgA	Q. Total Chrome Sample Collection		mg
K. Static Pressure	-0.400	"$H_2$0	R. Water Vapor Condensed	169.2	ml
L. Total Stack Pressure (I+(K/13.6))	29.32	"HgA	S. Gas Volume Metered	61.425	dcf

T. Corrected Gas Volume [(S x J/29.92) x 520/(460+B) x C .... 57.212 dscf

PERCENT MOISTURE/GAS DENSITY

U. Percent Water Vapor in Gas Sample ((4.64 x R)/((0.0464 x R) + T)) .... 12.07 %

V. Average Molecular Weight (Wet):

Component	Vol. Fract.		x	Moist. Fract.	x	Molecular Wt.	=	Wt./Mole
Water	0.121			1.000		18.0	,	2.17
Carbon Dioxide	0.0000	Dry Basis		0.879		44.0	,	0.00
Carbon Monoxide	0.0000	Dry Basis		0.879		28.0	,	0.00
Oxygen	0.2090	Dry Basis		0.879		32.0	,	5.88
Nitrogen & Inerts	0.791	Dry Basis		0.879		28.2	,	19.61
							,	
							Sum	27.67

FLOW RATE

W. Gas Density Correction Factor (28.95/V)^.5	1.02	
X. Velocity Pressure Correction Factor (29.92/L)^.5	1.01	
Y. Corrected Velocity (A x M x W x X)	15.17	fps
Z. Flow Rate (Y x G x 60)	243	cfm
AA. Flow Rate (Standard) {Z x (L/29.92) x [520/(460+H)]}	211	scfm
BB. Dry Flow Rate (AA x (1-U/100))	186	dscfm

SAMPLE CONCENTRATION/EMISSION RATE

CC. Sample Concentration [0.01543 x (P/T)]	1.28E-04	gr/dscf
CC1. Sample Concentration (CC x 2288379600)	292,377	ng/dscm
DD. Sample Concentration [54,143xCC/ 51.996 (Molecular Wt.)]	1.33E-01	ppm
EE. Hexavalent Chrome Emission Rate (0.00857 x BB xCC)	2.03E-04	lb/hr
FF. Isokinetic Sampling Rate [(G x T x 100)/(N x O x BB)]	109.3	%

SOURCE TEST CALCULATIONS
Flow Rate and Emissions

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Dr. Diamond Bar, California 91765-4182

Test No. 17-337 Test Date: 4/27/2017

SOURCE TEST CALCULATIONS

Tank Tested: Sodium Dichromate Seal Tank (#14)
Sample Train: Run #3 - Chrome Train #4 Input by: W. Stredwick

SUMMARY

A. Average Traverse Velocity	14.94	fps
B. Gas Meter Temperature (Use 60 deg.F for Temp Comp. Meters)	95.9	deg F
C. Gas Meter Correction Factor	1.0024	
D. Average Orifice Pressure	0.15	"$H_2$0
E. Nozzle Diameter	0.2240	inch

F. Stack Inside Diameter	7	inch	M. Pitot Correction Factor	0.99	
G. Stack Cross Sect. Area	0.267	ft2	N. Sampling Time	60	min
H. Average Stack Temp	120.7	deg F	O. Nozzle X-Sect. Area	0.00027	ft^2
I. Barometric Pressure	29.35	"HgA	P. Hex Chrome Sample Collection	0.07207	mg
J. Gas Meter Pressure (I+(D/13.6))	29.36	"HgA	Q. Total Chrome Sample Collection		mg
K. Static Pressure	-0.400	"$H_2$0	R. Water Vapor Condensed	28.6	ml
L. Total Stack Pressure (I+(K/13.6))	29.32	"HgA	S. Gas Volume Metered	13.268	dcf

T. Corrected Gas Volume [(S x J/29.92) x 520/(460+B) x C ..... 12.209 dscf

PERCENT MOISTURE/GAS DENSITY

U. Percent Water Vapor in Gas Sample ((4.64 x R)/((0.0464 x R) + T)) ..... 9.80 %

V. Average Molecular Weight (Wet):

Component	Vol. Fract.	x	Moist. Fract.	x	Molecular Wt.	=	Wt./Mole
Water	0.098		1.000		18.0	,	1.76
Carbon Dioxide	0.0000	Dry Basis	0.902		44.0	,	0.00
Carbon Monoxide	0.0000	Dry Basis	0.902		28.0	,	0.00
Oxygen	0.2090	Dry Basis	0.902		32.0	,	6.03
Nitrogen & Inerts	0.791	Dry Basis	0.902		28.2	,	20.12
						Sum	27.92

FLOW RATE

W. Gas Density Correction Factor (28.95/V)^.5	1.02	
X. Velocity Pressure Correction Factor (29.92/L)^.5	1.01	
Y. Corrected Velocity (A x M x W x X)	15.21	fps
Z. Flow Rate (Y x G x 60)	244	cfm
AA. Flow Rate (Standard) {Z x (L/29.92) x [520/(460+H)]}	214	scfm
BB. Dry Flow Rate (AA x (1-U/100))	193	dscfm

SAMPLE CONCENTRATION/EMISSION RATE

CC. Sample Concentration [0.01543 x (P/T)]	9.11E-05	gr/dscf
CC1. Sample Concentration (CC x 2288379600)	208,433	ng/dscm
DD. Sample Concentration [54,143xCC/ 51.996 (Molecular Wt.)]	9.48E-02	ppm
EE. Hexavalent Chrome Emission Rate (0.00857 x BB xCC)	1.51E-04	lb/hr
FF. Isokinetic Sampling Rate [(G x T x 100)/(N x O x BB)]	102.9	%

SOURCE TEST CALCULATIONS
Flow Rate and Emissions

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 E. Copley Dr. Diamond Bar, California 91765-4182

Test No. 17-337 Test Date: 4/27/2017

SOURCE TEST CALCULATIONS

Tank Tested: Ambient Sample
Sample Train: Ambient Background Chrome Train #7 Input by: W. Stredwick

SUMMARY

A. Average Traverse Velocity					fps
B. Gas Meter Temperature (Use 60 deg.F for Temp Comp. Meters)				93.3	deg F
C. Gas Meter Correction Factor				0.9910	
D. Average Orifice Pressure				3.40	"H_2O
E. Nozzle Diameter					inch
E1. Plating Amps					A
F. Stack Inside Diameter		inch	M. Pitot Correction Factor		
G. Stack Cross Sect. Area		ft2	N. Sampling Time	60	min
H. Average Stack Temp		deg F	O. Nozzle X-Sect. Area		ft2
I. Barometric Pressure	28.80	"HgA	P. Hex Chrome Sample Collection	0.0001	mg
J. Gas Meter Pressure (I+(D/13.6))	29.05	"HgA	Q. Total Chrome Sample Collection		mg
K. Static Pressure		"H_2O	R. Water Vapor Condensed	20	ml
L. Total Stack Pressure (I+(K/13.6))		"HgA	S. Gas Volume Metered	118.607	dcf

T. Corrected Gas Volume [(S x J/29.92) x 520/(460+B) x C .... 107.253 dscf

PERCENT MOISTURE/GAS DENSITY

U. Percent Water Vapor in Gas Sample ((4.64 x R)/((0.0464 x R) + T)) .... 0.86 %

V. Average Molecular Weight (Wet):

Component	Vol. Fract.	x	Moist. Fract.	x	Molecular Wt.	=	Wt./Mole
Water	0.009		1.000		18.0	,	0.15
Carbon Dioxide	0.0000	Dry Basis	0.991		44.0	,	0.00
Carbon Monoxide	0.0000	Dry Basis	0.991		28.0	,	0.00
Oxygen	0.2090	Dry Basis	0.991		32.0	,	6.63
Nitrogen & Inerts	0.791	Dry Basis	0.991		28.2	,	22.11
						Sum	28.90

FLOW RATE

W. Gas Density Correction Factor (28.95/V)^.5	1.00	
X. Velocity Pressure Correction Factor (29.92/L)^.5		
Y. Corrected Velocity (A x M x W x X)		fps
Z. Flow Rate (Y x G x 60)		cfm
AA. Flow Rate (Standard) {Z x (L/29.92) x [520/(460+H)]}		scfm
BB. Dry Flow Rate (AA x (1-U/100))		dscfm

SAMPLE CONCENTRATION/EMISSION RATE

CC. Sample Concentration [0.01543 x (P/T)]	1.44E-08	gr/dscf
CC1. Sample Concentration (CC x 2289714134)	32.9	ng/dscm
DD. Sample Concentration [54,143xC 51.996 (Molecular Wt.)]	1.50E-05	ppm
EE. Hexavalent Chrome Emission Rate (0.00857 x BB xCC)		lb/hr
FF. Isokinetic Sampling Rate [(G x T x 100)/(N x O x BB)]		%

APPENDIX 2

Equipment Information, Field Data, Calibration Data, and Laboratory Results

Western Analytical Laboratories

13744 Monte Vista Ave · Chino, CA 91710-5512 · Phone (909) 627-3628 · Fax (909) 627-0491 · www.walab.com

Customer:	South Coast AQMD	S465	**WAL No.:**	7050256
Address:	21865 E Copley Dr Diamond Bar , CA 91765-4182		**Date Received:**	05/12/17
Attention:	Joan Niertit		**Date Of Report:**	05/18/17
Sample Id:	Sodium Dichromate Seal 1710328-25		**Date Sampled:**	
			P.O.#	2017001307
Tank No:	SDS		**Gallons:**	

Analysis	Results	
DICHROMATE	5.30	% by wt

This analysis has been carried out under controlled laboratory conditions and any suggestions are made solely on that basis.

GC
Fax to 909- 396-2099

Report reviewed by Gregory Conti, Laboratory Director

SOURCE TEST REQUEST FOR EQUIPMENT/ANALYSIS

Company	Lubeco Inc. fac ID# 41229	Source Test No.	17-337
Address	6859 Downey Ave., Long Beach, CA 90805	Request Date	April 5, 2017
Basic Equipment	Sodium Dichromate Seal Tank, and Chromate Spray Booth	Control Device	Un-controlled
Analysis/Equipment Requested By	W. Stredwick	Date Equipment Needed	April ~~16~~, 2017 26 OAS
For Compliance, Rule(s)	Rule Development		
Other (specify)		Facility ID No.	41229
Dry Ice Needed	Yes	Laboratory No.	1710328

SAMPLE EQUIPMENT ANALYSIS REQUEST

Equipment Requested/ID #	Analysis Requested	Set ID
6- CARB Method 425 Trains	Hexavalent and Total Chromium, % moisture	
with sodium bicarbonate solution	Train Nos: 4, 5, 7, 13, 20, 27	
and filter in the back of train	Reference: Blue Book No. 41 Pages. 128	
	129, 132.	
Probes, tubing and tube fittings	Acid washed and sodium bicarbonate rinsed	
3 short probes	Return	
6 lengths tubing	Train 27: tubing, probe	
	20: tubing, no probe	
	13: blank	
	7: no tubing (ambient sample), fitting	
	5: probe + tubing	
	4: probe + tubing	
Sample start: 4/27/17 09:00	per Wayne Stredwick	
Sample end: 4/27/17 16:00		

SAMPLE EQUIPMENT CHAIN OF CUSTODY

Sample Equipment Set ID	From	To	For (S/T, Analysis, Cleanup, Not Used)	Date Received	Time
Trains 4,5,7,13,20,27	C. Schmolh	W. G. Stz	S/T	3-26-2017	2:30 PM
Tr. 4,5,7,13,20,27 3	Wg G.	C. Schmolh	Recovery	04/28/17	08:45 AM
Recovery Samples -07 thru -24	C. Schmolh	Chitte	Analysis	05/01/17	10:00 am

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 Copley Dr., Diamond Bar, CA 91765-4182
Page 1 of 2

MONITORING & ANALYSIS
REPORT OF LABORATORY ANALYSIS

TO Mike Garibay
Supervising A.Q. Engineer
Source Test & Engineering

SAMPLE(S) DESCRIBED AS
6 Hexavalent Chromium Trains

SAMPLING LOCATION
Facility ID 41229
Lubeco Inc.
6859 Downey Ave
Long Beach, CA 90805

LABORATORY NO 1710328
SOURCE TEST NO 17-337
DATE RECEIVED 04/28/17
RULE NO NA
REQUESTED BY Wayne Stredwick
DATE ANALYZED 4/28/2017
DATE REPORTED 5/4/2017

ANALYTICAL WORK PERFORMED, METHOD OF ANALYSIS AND RESULTS
Moisture and Hexavalent Chromium by CARB 425 (Sodium Bicarbonate(NaHCO3) solution)

	Train 4	Train 5	Train 7	Train 13	Train 20	Train 27
Moisture gain, g	28.6	169.2	9.0	-0.2	20.0	34.2
Silica gel% expended	10	99	90	0	99	60
Filter gain, g	-0.0001	0.0052	0.0071	-0.0008	0.0007	-0.0009
Impinger 1 pH	9-10	9	9-10	9	9	9-10
Impinger 2 pH	9-10	9	9-10	9	9	9-10
Cr^{+6} total ug	72.07	473.74	0.03	0.00	0.10	71.19

Recovery Notes:
Train 4: Probe was ~5 feet long and contained moisture. Tubing was ~12 feet long. Container 1 pH = 9
Train 5: Probe had a significant amount of moisture, Tubing: ~10.5 feet, Probe: ~6 feet. Container 1 pH = 9
Train 7: Ambient sample. No probe, no tubing. Container 1 pH = 9
Train 13: Blank sample. No probe, no tubing. The inlet to the first impinger was left uncovered near the facility for an undertermined amount of time.
Train 20: No probe. Tubing length ~13 feet. Container 1 pH = 9
Train 27: Probe had a significant amount of moisture. Tubing: ~13 feet. Probe: ~4 feet. Container 1 pH = 9.

NOTE: Additional significant figures provided for calculation purposes.

Reviewed By: [signature] Date Reviewed: 05/05/17
Joan Niertit, Principal A.Q. Chemist
Laboratory Services

Approved By: [signature] Date Approved: 5/5/17
Aaron Katzenstein, Ph.D.
Senior Manager
Laboratory Services
(909) 396-2219

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 Copley Dr., Diamond Bar, CA 91765-4182
Page 2 of 2

MONITORING & ANALYSIS
REPORT OF LABORATORY ANALYSIS

LABORATORY NO 1710328

REQUESTED BY Wayne Stredwick

ANALYTICAL WORK PERFORMED, METHOD OF ANALYSIS AND RESULTS
Moisture and Hexavalent Chromium by CARB 425 (Sodium Bicarbonate(NaHCO3) solution)

QUALITY CONTROL

BALANCE CHECK

Lab No.	Result (g)	Limit (g)	Check Status
B17D164-CCV1	100	±0.0005	Pass
B17D164-CCV2	500.0	±0.2	Pass

CCV RECOVERIES

Lab No.	Results (ppt)	Limit (%)	% Recovery
S17E004-CCV1	100	90-110	100
S17E004-CCV2	99	90-110	99
S17E004-CCV3	98	90-110	98
S17E007-CCV1	99	90-110	99
S17E007-CCV2	94	90-110	94
S17E007-CCV3	101	90-110	101
S17E007-CCV4	104	90-110	104
S17E007-CCV5	100	90-110	100
S17E007-CCV6	98	90-110	99

REF B17D164
S17E004
S17E007

South Coast Air Quality Management District

Test No. 17-337 Company: Lubeco Inc. Date: 4-27-17
Sampling Location: Sodium Di Chromate Seal Tank #14

Gas Velocity Data Run #1

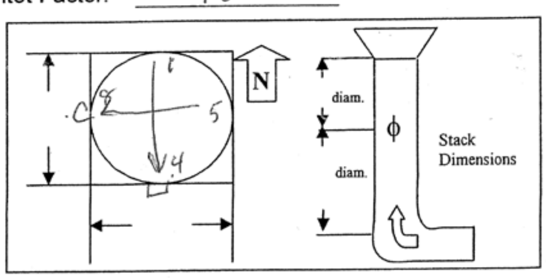
Pitot Tube Leak Check: Pass / Fail Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #	Velocity Head ("H_2O)	Temp. (°F)	Calc. Velocity (fps)	Velocity Head ("H_2O)	Temp. (°F)	Calc. Velocity (fps)	Velocity Head ("H_2O)	Temp. (°F)	Calc. Velocity (fps)
	1	.04	128.3		.03	126.7		.03	127.7	
	2	.04	127.1		.04	128.1		.04	127.7	
	3	.04	125.9		.05	126.0		.04	127.5	
	4	.04	125.4		.04	125.4		.04	126.7	
	5	.03	126.6		.05	127.3		.05	127.0	
	6	.04	127.4		.05	127.0		.05	126.1	
	7	.05	126.0		.05	127.0		.05	125.5	
	8	.05	126.3		.05	127.1		.05	125.1	
								(Average)		

Static Pressure in Stack: ~~[illegible]~~ WS " HgA (+/-) 0.42 " H_2O)
Barometric Pressure: 29.35 " HgA Pitot Factor: 1.0
Recorded By: WS

Calibration Data

Inclined Manometer	✓	(Cal:	N/A)
Magnehelic No.		(Cal:	)
Pitot Tube No.		(Cal:	)
Potentiometer No.	20304	(Cal:	4-26-17)
Thermocouple No.	10107	(Cal:	4-26-17)



Stack: Horizontal / Vertical Rectangular / Circular

South Coast Air Quality Management District

Test No. 17-337 Company: Cube Co Inc. Date: 4-27-17
Sampling Location: Sodium Dichromate Seal Tank #14 Sample Train: 27

Traverse Source Test Data Run #1

Pre-Test Leak Check:
Filter: _____ cfm @ _____ "Hg vac
Probe: 0 cfm @ 15 "Hg vac
Pitot Tube Leak Check: Pass / Fail

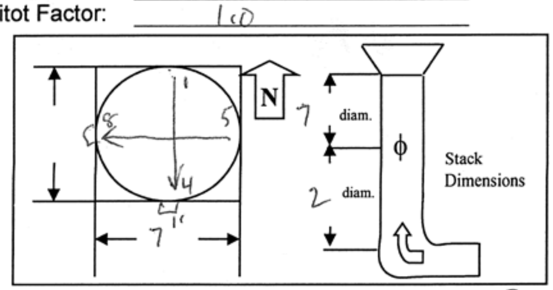
Post-Test Leak Check:
Filter: _____ cfm @ _____ "Hg vac
Probe: 0 cfm @ 3 "Hg vac
Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #	Gas Meter Reading (dcf)	Stack Velocity Head ("H_2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H_2O)	Probe Temp. °F	Filter Temp. °F	Imp. Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Vacuum " Hg
10:45		Start: 75.343											
+7.5	1	76.820	.04	127.6	14.06	0.176	0.10			63	76	76	2.0
+15	2	78.170	.04	127.6	14.06	0.176	0.10			41	81	79	2.0
+22.5	3	79.470	.04	126.5	14.04	0.177	0.10			43	83	80	2.0
+30	4	80.700	.04	125.7	14.04	0.170	0.10			43	85	83	2.0
+37.5	5	82.100	.05	127.0	15.71	0.189	0.12			51	86	84	2.0
+45	6	83.525	.05	126.8	15.71	0.189	0.12			43	87	85	2.5
+52.5	7	85.135	.05	126.2	15.70	0.189	0.12			42	89	86	2.5
+60	8	86.842	.05	126.2	15.70	0.189	0.13			43	90	87	2.5
(Net Vol. Uncorr.)			Avg.										

K-Factor: 0.5682 Stack Moisture: 6% Canister #: _____ Start: _____ "Hg vac

Nozzle Diameter: 0.211 "
Barometric Pressure: 29.35 " HgA
Static Pressure in Stack: +/(-) 0.42 " H_2O

Recorded By: W.S.
Pitot Factor: 1.0



Calibration Data

Inclined Manometer		(Cal: N/A)
Magnehelic No.		(Cal:)
Pitot Tube No.		(Cal:)
Potentiometer No.	20304	(Cal: 4-26-17)
Thermocouple No.	10102	(Cal: 4-26-17)
Gas Meter No.	N0714	(Cal: 3-24-17)
Meter Corr. Factor:	1.0024	

Sampling Probe: Stainless Steel / Borosilicate / Quartz
Stack: Horizontal / Vertical Rectangular / Circular

Revision 01/09

Tank Temp = 203°F
mechanical agitation

South Coast Air Quality Management District

Test No. 17-337 Company: LubeCo INC. Date: 4-27-17
Sampling Location: Sodium DiChromate Seal TANK #14

Gas Velocity Data Run #2

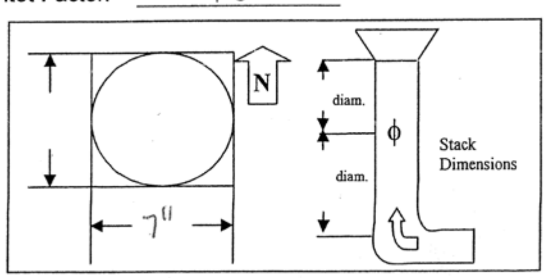
Pitot Tube Leak Check: Pass / Fail Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #		Velocity Head ("H_2O)	Temp. (°F)	Calc. Velocity (fps)		Velocity Head ("H_2O	Temp. (°F)	Calc. Velocity (fps)		Velocity Head ("H_2O	Temp. (°F)	Calc. Velocity (fps)
12:20													
	45		.03	128.4			.04	127.2			.03	127.4	
	26		.03	127.7			.05	127.4			.04	127.8	
	37		.04	128.1			.05	127.5			.04	128.3	
	48		.05	128.6			.06	128.2			.05	128.3	
	81		.06	126.6			.06	128.2			.06	128.0	
	62		.04	127.2			.05	127.3			.04	127.5	
	73		.04	126.5			.05	127.2			.04	127.9	
	84		.04	126.9			.05	127.0			.04	127.3	
											(Average)		

Static Pressure in Stack: ______ " HgA (+ / -) 0.40 " H_2O)
Barometric Pressure: 29.35 " HgA Pitot Factor: 1.0
Recorded By: WS

Calibration Data

Inclined Manometer	______	(Cal: N/A)
Magnehelic No.	______	(Cal: ______)
Pitot Tube No.	202304	(Cal: ______)
Potentiometer No.	~~10102~~ 20304	(Cal: 4-26-17)
Thermocouple No.	10102	(Cal: 4-26-17)



Stack: Horizontal / Vertical Rectangular / Circular

South Coast Air Quality Management District

Test No. 17-337 Company: LubeCo Inc. Date: 4-27-17
Sampling Location: Sodium Dichromate Seal Tank #14 Sample Train: 5

Traverse Source Test Data

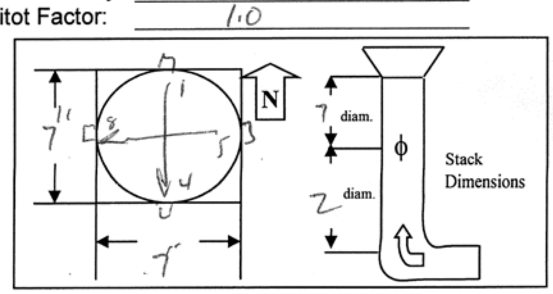
Run #2

Pre-Test Leak Check:	Post-Test Leak Check:
Filter: ____ cfm @ ____ "Hg vac	Filter: ____ cfm @ ____ "Hg vac
Probe: 0 cfm @ 15 "Hg vac	Probe: 0 cfm @ 12 "Hg vac
Pitot Tube Leak Check: Pass / Fail	Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #	Gas Meter Reading (dcf)	Stack Velocity Head ("H_2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H_2O)	Probe Temp. °F	Filter Temp. °F	Imp. Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Vacuum " Hg
		Start: 89.875											
+7.5	~~1~~ 5	94.110	0.04	127.5	14.06	0.91	2.88			58	89	86	10
+15	~~2~~ 6	101.400	0.04	127.7	14.06	0.91	2.88			57	91	87	10
+22.5	~~3~~ 7	108.650	0.045	128.0	14.92	0.97	3.26			59	93	90	12
+30	~~4~~ 8	116.330	0.055	127.6	16.48	1.07	4.04			51	96	93	12
+37.5	~~5~~ 1	121.450	0.045	127.6	14.91	0.97	3.28			46	94	91	12
+45	~~6~~ 2	132.860	0.045	127.2	14.91	0.97	3.33			47	98	95	12
+52.5	~~7~~ 3	140.350	0.045	127.2	14.91	0.97	3.34			45	99	96	12
+60	~~8~~ 4	149.300	0.045	127.0	14.90	0.97	3.36			53	100	98	12
(Net Vol. Uncorr.)			Avg.										

K-Factor: 0.5682 Stack Moisture: 6 % Canister #: ______ Start: ______ "Hg vac

Nozzle Diameter: 0.48 " Recorded By: WS
Barometric Pressure: 29.35 " HgA Pitot Factor: 1.0
Static Pressure in Stack: + / (-) 0.40 " H_2O



Calibration Data

Inclined Manometer ______	(Cal: N/A)
Magnehelic No. ______	(Cal: ______)
Pitot Tube No. ______	(Cal: ______)
Potentiometer No. 20304	(Cal: 4-26-17)
Thermocouple No. 10102	(Cal: 4-26-17)
Gas Meter No. N0714	(Cal: 3-24-17)
Meter Corr. Factor: 1.0024	

Sampling Probe: Stainless Steel / Borosilicate / Quartz Stack: Horizontal / Vertical Rectangular / Circular

Tank temp = 201 °F / mechanical agitation

Revision 01/09

South Coast Air Quality Management District

Test No. 17-337 Company: LubeCo Inc. Date: 4-27-17
Sampling Location: Sodium Dichromate Seal Tank

Gas Velocity Data Row #3

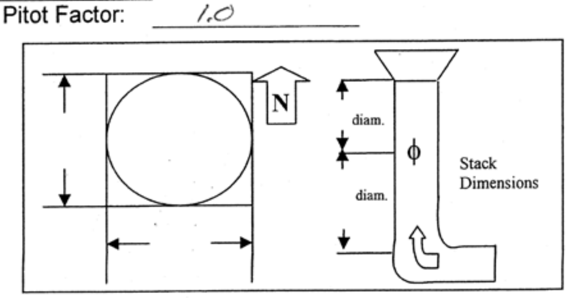
Pitot Tube Leak Check: Pass / Fail   Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #		Velocity Head ("H_2O)	Temp. (°F)	Calc. Velocity (fps)		Velocity Head ("H_2O	Temp. (°F)	Calc. Velocity (fps)		Velocity Head ("H_2O	Temp. (°F)	Calc. Velocity (fps)
	1		.04	122			.04	121.4			.04	121.0	
	2		.04	120.5			.04	122.4			.04	120.8	
	3		.05	120.9			.05	121.0			.05	121.4	
	4		.05	120.5			.05	120.4			.05	120.6	
	5		.04	120.5			.04	119.2			.04	118.3	
	6		.05	120.9			.05	121.3			.05	118.4	
	7		.04	120.4			.05	121.9			.05	119.6	
	8		.05	121.3			.05	121.4			.05	119.9	
											(Average)		

Static Pressure in Stack: ______ " HgA (+ / -) 0.40 " H_2O)
Barometric Pressure: 29.35 " HgA Pitot Factor: 1.0
Recorded By: WS

Calibration Data

Inclined Manometer		(Cal: N/A)
Magnehelic No.		(Cal:)
Pitot Tube No.	10102	(Cal: 9-26-17)
Potentiometer No.		(Cal:)
Thermocouple No.	~~[illegible]~~ 20304	(Cal: 4-26-17)



Stack: Horizontal / Vertical   Rectangular / Circular

South Coast Air Quality Management District

Test No. 17-337 Company: Lubeco Inc. Date: 4-27-17
Sampling Location: Sodium Dichromate Seal Tank Sample Train: 4

Traverse Source Test Data Run #3

Pre-Test Leak Check:
Filter: ______ cfm @ ______ "Hg vac
Probe: 0 cfm @ 15 "Hg vac
Pitot Tube Leak Check: Pass / Fail

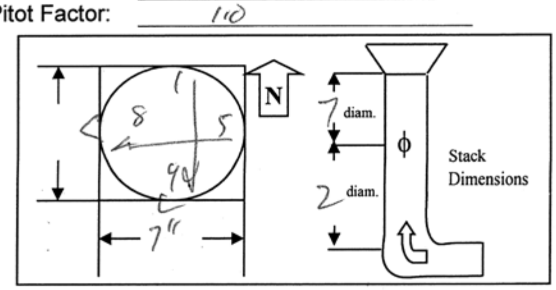
Post-Test Leak Check:
Filter: ______ cfm @ ______ "Hg vac
Probe: 0 cfm @ 3 "Hg vac
Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #	Gas Meter Reading (dcf)	Stack Velocity Head ("H_2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H_2O)	Probe Temp. °F	Filter Temp. °F	Imp. Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Vacuum " Hg
2:07		Start: 150,282											
+7.5	1	151.900	0.04	121.5	13.99	0.192	0.13			64	95	94	2.0
+15	2	153.500	0.04	121.2	13.98	0.192	0.13			58	96	95	2.0
+22.5	3	155.155	0.05	121.1	15.63	0.214	0.16			55	97	96	2.5
+30	4	156.700	0.05	119.3	15.61	0.215	0.16			48	96	95	2.5
+37.5	5	158.350	0.04	119.3	13.96	0.192	0.13			59	96	95	2.0
+45	6	160.150	0.05	120.2	15.62	0.215	0.16			60	97	96	2.5
+52.5	7	161.950	0.05	120.6	15.63	0.215	0.16			57	97	96	2.5
+60	8	163.550	0.05	120.9	15.63	0.215	0.16			54	97	96	2.5
(Net Vol. Uncorr.)			Avg.										

K-Factor: 0.5682 Stack Moisture: 6% Canister #: ______ Start: ______ "Hg vac

Nozzle Diameter: 0.214 "
Barometric Pressure: 29.35 " HgA
Static Pressure in Stack: + / (-) 0.40 " H_2O

Recorded By: WS
Pitot Factor: 1.0



Calibration Data

Inclined Manometer ______	(Cal: N/A)
Magnehelic No. ______	(Cal: ______)
Pitot Tube No. ______	(Cal: ______)
Potentiometer No. 20304	(Cal: 4-26-17)
Thermocouple No. 10102	(Cal: 4-26-17)
Gas Meter No. 00714	(Cal: 3-24-17)
Meter Corr. Factor: 1.0024	

Sampling Probe: Stainless Steel / Borosilicate / Quartz Stack: Horizontal / Vertical Rectangular / Circular

TANK TEMP = 200 °F
Mechanical Agitator
90-180 ft³/min into enclosure

Revision 01/09

South Coast
Air Quality Management District
AQMD
21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (909) 396-2000

South Coast Air Quality Management District

Test No. 17-~~338~~ ~~339~~ 337 Company: Lubeco Date: 4-27-17
Sampling Location: Ambient (SW corner of roof) Sample Train: 7

Traverse Source Test Data

Pre-Test Leak Check:
Filter: ______ cfm @ ______ "Hg vac
Probe: 0 cfm @ 15 "Hg vac
Pitot Tube Leak Check: Pass / Fail

Post-Test Leak Check:
Filter: ______ cfm @ ______ "Hg vac
Probe: 0 cfm @ 15 "Hg vac
Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #	Gas Meter Reading (dcf) Start:	Stack Velocity Head ("H_2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H_2O)	Probe Temp. °F	Filter Temp. °F	Imp. Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Vacuum " Hg
2:25 Pm		584.777					4.60			44	92	91	10
+15		602.22					4.60			55	99	93	10
+30		619.65					4.50			55	97	92	10
+45		636.83					4.40			39	95	91	10
+60		653.723					4.40			48	94	89	10
(Net Vol. Uncorr.)			Avg.										

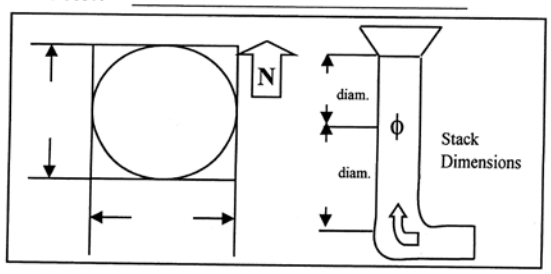
K-Factor: 0.5526 Stack Moisture: ______ Canister #: ______ Start: ______ "Hg vac

Nozzle Diameter: ______ "
Barometric Pressure: 28.80 " HgA
Static Pressure in Stack: + / - ______ " H_2O

Recorded By: SF
Pitot Factor: ______

Calibration Data

Inclined Manometer		(Cal: N/A)
Magnehelic No.		(Cal:)
Pitot Tube No.		(Cal:)
Potentiometer No.	N0315	(Cal: 3/23/17)
Thermocouple No.		(Cal:)
Gas Meter No.	N0715	(Cal: 3/23/17)
Meter Corr. Factor:	0.9910	



Sampling Probe: Stainless Steel / Borosilicate / Quartz

Stack: Horizontal / Vertical Rectangular / Circular

Revision 01/09

South Coast Air Quality Management District

Test No. 17-~~338~~ ~~339~~ 337 Company: Lubeco Date: 4/27/17
Sampling Location: Spray Booth Stack Sample Train: 20

Traverse Source Test Data

Pre-Test Leak Check:
Filter: _______ cfm @ _______ "Hg vac
Probe: 0.006 cfm @ 17 "Hg vac
Pitot Tube Leak Check: Pass / Fail

Post-Test Leak Check:
Filter: _______ cfm @ _______ "Hg vac
Probe: 0.003 cfm @ 13 "Hg vac
Pitot Tube Leak Check: Pass / Fail

Time	Sample Point #	Gas Meter Reading (dcf)	Stack Velocity Head ("H_2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H_2O)	Probe Temp. °F	Filter Temp. °F	Imp. Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Vacuum " Hg
		Start: 465.708											
11:10		480.08					3.40			37	86	84	10
+15		495.52					3.40			39	91	86	10
+30		509.88					3.40			38	95	88	10
+45		524.755	Stopped - operator lunch				3.40			41	99	92	10
+60		539.72					3.40			47	99	93	10
+75		554.57					3.30			36	94	90	10
+90		569.28					3.30			39	99	94	10
+105		584.315					3.30			37	100	94	10
+120													
(Net Vol. Uncorr.)		118.607	Avg.										

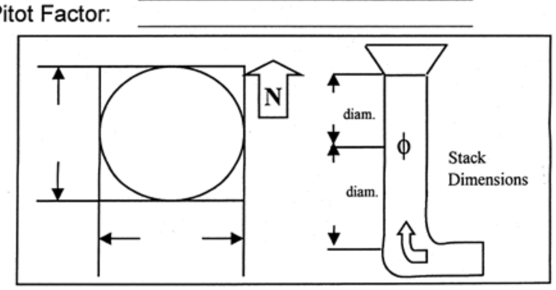
K-Factor: 0.5526 Stack Moisture: __________ Canister #: __________ Start: _______ "Hg vac

Nozzle Diameter: __________ "
Barometric Pressure: 28.80 " HgA
Static Pressure in Stack: + / - __________ " H_2O

Recorded By: EP
Pitot Factor: __________

Calibration Data

Inclined Manometer		(Cal: N/A)
Magnehelic No.		(Cal:)
Pitot Tube No.		(Cal:)
Potentiometer No.	N0315	(Cal: 3/23/17)
Thermocouple No.		(Cal:)
Gas Meter No.	N0715	(Cal: 3/23/17)
Meter Corr. Factor:	0.9910	



Sampling Probe: Stainless Steel / Borosilicate / Quartz

Stack: Horizontal / Vertical Rectangular / Circular

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
DRY GAS METER CALIBRATION WORKSHEET

Page 3

DATE : March 24, 20
PERFORMED BY: W. Stredwick

DRY GAS METER COEFFICIENT CALCULATIONS

STANDARD DRY GAS METER ID#: 7812470
With Coefficient of 1.0000

DRY GAS METER N0714

TRIAL	CFM	U/C FlowRate	TEMP	H2O	Corrected FlowRate	U/' FlowRate	TEMP	H2O	Corrected FlowRate	COEF	AVE:	OVERALL
1	1/4	0.3168	74	1.2	0.3089	0.3188	74	0.8	0.3105	0.9950	0.9960	1.0024
2	1/4	0.3158	74	1.2	0.3079	0.3158	74	0.8	0.3076	1.0010		
3	1/4	0.3158	74	1.2	0.3079	0.3186	74	0.8	0.3103	0.9922		
1	1/2	0.5311	74	2.8	0.5198	0.5316	74	1.88	0.5192	1.0012	1.0145	
2	1/2	0.5283	74	2.8	0.5172	0.5267	74	1.88	0.5144	1.0053		
3	1/2	0.5472	74	2.8	0.5356	0.5289	74	1.88	0.5165	1.0369		
1	3/4	0.7782	74	5.2	0.7662	0.7843	74	3.6	0.7692	0.9960	0.9986	
2	3/4	0.7846	74	5.2	0.7725	0.7879	74	3.6	0.7727	0.9997		
3	3/4	0.7861	74	5.2	0.7740	0.7890	74	3.6	0.7739	1.0002		
1	1	1.0097	74	9	1.0033	1.0157	74	6.05	1.0021	1.0012	1.0006	
2	1	1.0096	74	9	1.0032	1.0177	74	6.05	1.0041	0.9991		
3	1	1.0130	74	9	1.0066	1.0189	74	6.05	1.0052	1.0013		

CORRECTION FACTOR: 1.0024

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
DRY GAS METER CALIBRATION WORKSHEET

DATE: 3/23/2017

PERFORMED BY:
W.Stredwick

DRY GAS METER COEFFICIENT CALCULATIONS

DRY GAS METER ID : N0715

TRIAL	CFM	U/C FlowRate	TEMP	H2O	Corrected FlowRate	U/C FlowRate	TEMP	H2O	Corrected FlowRate	COEF	AVE:	OVERALL
1	1/4	0.2976	74	1.1	0.2904	0.2969	74	0.7	0.2894	1.0032	0.8697	0.9910
2	1/4	0.1764	74	1.1	0.1721	0.2948	74	0.7	0.2874	0.5988		
3	1/4	0.2959	74	1.1	0.2887	0.2941	74	0.7	0.2867	1.0072		
1	1/2	0.5498	74	2.2	0.5380	0.5351	74	1.975	0.5233	1.0280	1.0278	
2	1/2	0.5500	74	2.2	0.5381	0.5350	74	1.975	0.5232	1.0286		
3	1/2	0.5496	74	2.2	0.5377	0.5355	74	1.975	0.5237	1.0268		
1	3/4	0.7928	74	5.6	0.7822	0.7697	74	3.85	0.7561	1.0345	1.0347	
2	3/4	0.7907	74	5.6	0.7800	0.7678	74	3.85	0.7543	1.0342		
3	3/4	0.7907	74	5.6	0.7801	0.7668	74	3.85	0.7533	1.0355		
1	1	1.0267	74	9.6	1.0227	1.0046	74	6.55	0.9934	1.0295	1.0317	
2	1	1.0289	74	9.6	1.0249	1.0033	74	6.55	0.9921	1.0331		
3	1	1.0302	74	9.6	1.0262	1.0052	74	6.55	0.9939	1.0324		

DRY GAS METER ID : N0715

CORRECTION FACTOR: **0.9910**

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
DATA SHEET FOR THERMOCOUPLE/POTENTIOMETER CALIBRATION

Field Meter STQC# : C0301 & 20304
Ref. Thermometer # : ASTM 08343
Temperature Source(s): Jetra Furnace

Date: 4-26-17
Calibration By: W.S.
Calibration Period:
Semiannual____
Bimonthly____
Other____

Temp.*	A	C0301 Lead Wire STQC#____				20304 Lead Wire STQC#____				
		B		(B-A)100 / A **		B		(B-A)100 / A **		
Sensor STQC#	Ref. Temp.	Ch#1	Ch#2	Ch#1	Ch#2	Ch#1	Ch#2	Ch#1	Ch#2	COMMENTS
10102	32	32	32			33	33			
10102	215	214	215			214	214			
10102	655	655	656			655	656			

* All temperatures are in degrees F.
**Percent (%) difference should not exceed +/- 1.5%.

Page Number____

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
DATA SHEET FOR THERMOCOUPLE/POTENTIOMETER CALIBRATION

Field Meter STQC# : N0314 + N0315
Ref. Thermometer # : ASTM 08343
Temperature Source(s): JOFRA FURNACE

Date: 3-24-17
Calibration By: WS
Calibration Period:
Semiannual X
Bimonthly
Other

Temp.* Sensor STQC#	A Ref. Temp.	N0314 Lead Wire STQC# B Ch#1	B Ch#2	(B-A)100/A ** Ch#1	Ch#2	N0315 Lead Wire STQC# B Ch#1	B Ch#2	(B-A)100/A ** Ch#1	Ch#2	COMMENTS
10102	32	32	32			32	32			
20108	33	33	33			33	33			
50111	33	33	33			33	33			
20202	33	33	33			33	33			
C0112	33	33	33			33	32			
10102	211	211	212			212	212			
20108	211	211	211			211	211			
50111	211	211	211			211	211			
20202	212	215	214			212	212			
C0112	212	211	211			212	211			
10102	612	611	612			611	611			
20108	611	610	611			612	611			
50111	612	611	611			612	612			
20202	611	611	611			612	612			
C0112	612	612	611			612	611			

* All temperatures are in degrees F.
**Percent (%) difference should not exceed +/- 1.5%.

Page Number___