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October 9, 2006

BY OVERNIGHT DELIVERY

Mr. Gary Yee
California Air Resources Board
Post Office Box 2815
Sacramento, CA 95812

Ms. Laura Yannayon
U.S. Environmental Protection Agency
Region 9, Air Division
Permits Office (Air-3)
75 Hawthorne Street
San Francisco, CA 94105

Re: BHP Billiton Mitigation Report

Dear Laura and Gary:

As you know, BHP Billiton LNG International ("BHP's") entered into a contract with Olympic Tug & Barge ("Olympic"), owners of the tug Pacific Falcon, to repower the vessel propulsion engines as mitigation for the emissions from the Cabrillo Port project. BHP previously submitted a report to you both outlining the anticipated emission reductions to be gained from this project that calculated baseline emissions based on a weighted emission factor derived from the vessels that were hauling the barge Jovalan at the time. EPA submitted comments suggesting that it was more appropriate to utilize an actual source tested emission factor from the Pacific Falcon for calculation of emission reductions. The ARB indicated that it was in agreement to use the Pacific Falcon test data for computing baseline emissions so long as the test results were more conservative than the four tug emission factor proposed in the initial mitigation report. Therefore, BHP requested that its consultant, OceanAir Environmental, arrange for source testing of the tug Pacific Falcon. A source test protocol consistent with the ISO 8178 E-3 test cycle and South Coast Rule 1631 was prepared and submitted to you both. Consistent with this

Oregon
Washington
California
Utah
Idaho

protocol, BHP's contractor (Almega Environmental) performed the stack test on September __, 2006. NOx testing was done using CARB Method 100. The enclosed report outlines the results and provides you with the associated procedures and Quality Assurance documentation.

The Almega report documents a mode weighted NOx emission factor (average of port and starboard engines) of 9.74 g/bhp-hr. As you will note, this is lower than the emission rate proposed in the report previously submitted to you. We have therefore recalculated the anticipated emission reductions. When the source test emission factor is employed, the predicted emissions decreases total 67.9 tons of NOx per year. The revised spreadsheet demonstrating the emissions calculations is included with this letter.

BHP previously submitted to you the NOx source test report for the testing performed on the tug Klihyam. Enclosed with this letter is a copy of the revised spreadsheet reflecting the NOx emission factor derived from the test. As we previously indicated, the total NOx reductions anticipated from repowering the Klihyam will be a minimum of 97.6 tons of NOx per year.

A summary of the original emission reduction estimates and the final emission reduction calculations follows:

<u>M/V Klihyam</u>

Old NOx reductions = 138.7 tons/yr
New NOx reductions = 97.6 tons/yr

<u>M/V Pacific Falcon</u>

Old NOx reductions = 78.0 tons/yr
New NOx reductions = 67.9 tons/yr

Total Annual NOx Reductions:	**165.5 tons per year**
Stationary Source Emissions:	**75.9 tons per year**
Total Project NOx Emissions[a]:	**124.0 tons per year**

[a]Stationary Source + Vessel in Federal Waters

Based on the emission decreases anticipated from the two tug repowering projects, BHP believes that it has more than satisfied its commitment to EPA to mitigate the stationary source NOx

emissions and its commitment to CARB to substantially mitigate the project NOx emissions. In fact, with this level of emission reduction the project substantially exceeds the mitigation requirements that would be required if the project were located onshore. Therefore, we believe that our mitigation obligations are fully satisfied.

Please contact me if you have any questions about this report.

Sincerely,

Thomas R. Wood

cc (w/o attachments):
Amy Zimpfer
Margaret Alkon
Peter Douglas
Mike Villegas
Dwight Sanders
Mark Prescott
Cheryl Karpowicz
Renee Klimczak
Rick Abel

Attachments: Pacific Falcon Source Test Report
Pacific Falcon Emission Reduction Spreadsheets
Klihyam Emission Reduction Spreadsheets

Almega
ENVIRONMENTAL

SOURCE TEST REPORT

Emissions Testing of Two Internal Combustion Engines for NO_X and O_2

Prepared for:

Ocean Air
P.O.Box No.1318
Somis, CA 93066

Equipment Location:

Marine Vessel at Pacific Falcon

Test Date(s): 20 September 2006

Report Date: 4 October 2006

Project: c-8415, Revision: 00

Prepared by:

Almega Environmental & Technical Services
5251 McFadden Avenue
Huntington Beach, CA 92649

Prepared by: _____
Bikash Sharma, Project Manager

Reviewed by: _____
John Phillips, President

TABLE OF CONTENTS

No.	Section	Page
	Table of Contents	i
1.0	Executive Summary	1
	1.1 Summary of Results	2
2.0	Introduction	4
	2.1 Document Outline	4
3.0	Test Results and Discussion	5
	3.1 Test Discussion	5
4.0	Equipment and Process Description	7
	4.1 Process Description	7
	4.2 Operating Conditions During Testing	7
	4.3 Sampling Locations	7
5.0	Sampling and Analytical Procedures	8
	5.1 CARB Method 100 – Continuous Monitoring of Gaseous Emissions, CEMS	8
	5.2 EPA Method 19 – Fuel Meter Flow Rate	12
6.0	Quality Assurance / Quality Control	13
	6.1 General QA/QC	13
	6.2 Project-Specific QA/QC	13

TABLE OF CONTENTS - Continued

Appendices

Appendix A - General Calculations and Formulae

Appendix B - Approvals and Certifications

B1 - CARB Testing Approvals

Appendix C - Continuous Monitoring of Gaseous Emissions, CEMS

C1 - CEMS – Results and Calculations
C2 - CEMS – Stripchart
C3 - CEMS – DAS One-minute Data
C4 - CEMS – QA/QC

Appendix D - Quality Assurance and Quality Control (QA/QC)

D1 - CEMS Calibration Gas Certificates

Appendix E - Facility Process Data

1.0 EXECUTIVE SUMMARY

Key project information is provided in the summary below. Test results are summarized in Table 1-1.

Customer	Ocean Air P.O.Box No.1318 Somis, CA 93066 Contact: Mr. Mahesh Talwar, tel. (805) 386-1882
Equipment Location	Marine Vessel at Pacific Falcon
Equipment	Two Internal combustion Engines
Test Objective	Measure emissions of NO_X and O_2 inorder to determine an emission factor for oxides of nitrogen for a tug boat engine powered by two EMD 16-645 engines
Test Requested by	Mr. Mahesh Talwar of Ocean Air
Test Date(s)	20 September 2006
Testing Firm	Almega Environmental & Technical Services 5251 McFadden Avenue Huntington Beach, CA 92649 Contact: Mr. Bikash Sharma, tel (714) 889-4000
Test Personnel	Tim Ta and Robert Summerlin of Almega Environmental & Technical Services
Measurements CEMS: NO_X, O_2 Stack Flow Rate (calculated)	 EPA Instrumental Analyzer Method EPA Method 19

Table 1-1. Engine Exhaust Emissions test
PORT ENGINE
Test Date: 9/20/2006
Fuel Type: ULSD
Engine Type: 16-645E6
Engine Rating: H.P. 1950 @ RPM 900
Location: M/V Pacific Falcon

A. ENGINE PERFORMANCE DATA	100%	75%	50%	25%
Engine Power (prophp)	1,595	1,100	750	315
Engine power (kw)	1190	821	560	235
Fuel Flow (kg/hr)	340	232	164	70
Intake Air (dry kg/hr)	13942	12587	11918	7724
Exhaust flow (dry kg/hr)	14282	12819	12082	7794
Engine RPM	901	810	718	569
Engine RPM % of Rated	1.00	0.90	0.80	0.63
Engine Load % of Rated	0.82	0.56	0.38	0.16
BSFC (lbs fuel/bhp-hr)	0.470	0.466	0.481	0.490
Gal/hr Prop fuel	106.9	73.1	51.5	22.0
B. GASEOUS EMISSIONS				
NOx (dry ppmv)	688.3	481.04	313.03	187.89
O2 (%)	14.35	15.91	17.17	18.43
C. EXHAUST EMISSIONS ANALYSIS				
Mode Weighting Factors	0.2	0.5	0.15	0.15
Weighted Specific NOx (gms/kw-hr)	4.21	6.60	1.21	0.47

D. RESULTS

Total Mode Weighted NOx	**12.49 gms/kw-hr**	**9.32 gms/bhp-hr**
Cycle weighted H.P.		**1,029 H.P.**

Table 1-2. Engine Exhaust Emissions test
STARBOARD ENGINE
Test Date: 9/20/2006
Fuel Type: ULSD
Engine Type: 16-645E6
Engine Rating: H.P. 1950 @ RPM 900
Location: M/V Pacific Falcon

A. ENGINE PERFORMANCE DATA	100%	75%	50%	25%
Engine Power (prophp)	1,800	1,380	875	400
Engine power (kw)	1343	1029	653	298
Fuel Flow (kg/hr)	384	292	191	89
Intake Air (dry kg/hr)	14901	14596	12678	9088
Exhaust flow (dry kg/hr)	15285	14888	12869	9177
Engine RPM	934	852	750	591
Engine RPM % of Rated	1.04	0.95	0.83	0.66
Engine Load % of Rated	0.92	0.71	0.45	0.21
BSFC (lbs fuel/bhp-hr)	0.470	0.466	0.481	0.491
Gal/hr Prop fuel	120.7	91.7	60.0	28.0
B. GASEOUS EMISSIONS				
NOx (dry ppmv)	743.81	569.48	431.04	243.35
O2 (%)	13.99	15.51	16.82	18.23
C. EXHAUST EMISSIONS ANALYSIS				
Mode Weighting Factors	0.2	0.5	0.15	0.15
Weighted Specific NOx (gms/kw-hr)	4.03	7.52	1.48	0.59

D. RESULTS

Total Mode Weighted NOx	**13.63 gms/kw-hr**	**10.16 gms/bhp-hr**
Cycle weighted H.P.		**1,241 H.P.**

2.0 INTRODUCTION

Almega Environmental & Technical Services (Almega) was retained by Ocean Air Environmental, LLC. to conduct emissions testing a tug boat powered by two EMD 16-645 engines. The purpose of the test was to determine an emission factor for oxides of nitrogen. The testing was done in accordance with ISO 8178 Emission Test Cycle.

Oxides of nitrogen in the exhaust were tested using the EPA instrumental analyzer method. Almega Environmental is a CARB approved source test company.

2.1 Document Outline

This report is organized as follows. Section 1.0 is a summary of the project and test results. Section 2.0 describes the project, its objectives and approach. Section 3.0 discusses test results. Section 4.0 describes the equipment tested and applicable sampling locations. Section 5.0 describes the sampling and analysis procedures used to conduct the testing. And Section 6.0 describes Quality Assurance and Quality Control activities performed. The Appendices contain test results, calculated data, raw field data, facility process and test data, calibration records, and certification documents.

3.0 TEST RESULTS AND DISCUSSION

The testing was conducted after the arrival of Almega's test personal and set-up of test equipment. The Source was operated by plant personnel during testing activities. No unusual operating conditions were noted during the test periods.

3.1 Test Discussion

Test results were summarized in Table 1-1 and 1-2 and discussed below.

Port Engine:

100 % Load (Mode 1):

- The measured NO_X concentration was 688.3 ppmv on dry basis and NOx emission was 4.21 gms/kw-hr. The measured oxygen concentration at this load was 14.35%.

75% Load (Mode 2):

- The measured NO_X concentration was 481.04 ppmv on dry basis and NOx emission was 6.60 gms/kw-hr. The measured oxygen concentration at this load was 15.91%.

50% Load (Mode 3):

- The measured NO_X concentration was 313.03 ppmv on dry basis and NOx emission was 1.21 gms/kw-hr. The measured oxygen concentration at this load was 17.17%.

25% Load (Mode 4):

- The measured NO_X concentration was 187.89 ppmv on dry basis and NOx emission was 0.47 gms/kw-hr. The measured oxygen concentration at this load was 18.43%.

The total measured NOx emissions (Total mode weighted NOx) for this engine were 12.49 gms/kw-hr and 9.32 gms/bhp-hr.

Engines are rated at 1950 h.p. @ 900 rpm, and maximum rpm achieved during the test.

Starboard Engine:

100 % Load (Mode 1):

- The measured NO_X concentration was 743.81 ppmv on dry basis and NOx emission was 4.03 gms/kw-hr. The measured oxygen concentration at this load was 13.99%.

75% Load (Mode 2):

- The measured NO_X concentration was 569.48 ppmv on dry basis and NOx emission was 7.52 gms/kw-hr. The measured oxygen concentration at this load was 15.51%.

50% Load (Mode 3):

- The measured NO_X concentration was 431.04 ppmv on dry basis and NOx emission was 1.48 gms/kw-hr. The measured oxygen concentration at this load was 16.82%.

25% Load (Mode 4):

- The measured NO_X concentration was 243.35 ppmv on dry basis and NOx emission was 0.59 gms/kw-hr. The measured oxygen concentration at this load was 18.23%.

The total measured NOx emissions (Total mode weighted NOx) for this engine were 13.63 gms/kw-hr and 10.16 gms/bhp-hr.

Engines are rated at 1950 h.p. @ 900 rpm, and maximum rpm achieved during the test.

Stack gas flow rate was derived from the fuel flow rate using the EPA's F-factor and measures oxygen in the exhaust as specified in EPA's Method 19. RPM was read from the vessel on board tachometer. Fuel flow was determined using fuel flow meter on board vessel that are capable of measuring the supply and return flow rate for each engine.

4.0 EQUIPMENT AND PROCESS DESCRIPTION

The process and equipment tested are described below.

4.1 Tug Boat Engines Description

Tug Boat Klihyam engines are model EMD 16-645E6, rated at 1950 h.p. at 900 rpm each. Each engine has its own separate exhaust stack. Engines contained diesel fuel.

4.2 Engine Operating Conditions During Testing

Each engine was operated first at each of the four operating modes of the E-3 test cycle. 100% load and 100% rpm was derived from the full throttle position.

4.3 Sampling Locations

Sample probe was dropped in from the exhaust stack opening. The engines exhaust from the engine room in the lowest deck, the exhaust is located straight up from the upper deck. There is at least 10-15 ft of straight run. Stack diameter is estimated to be 12 inches.

5.0 SAMPLING AND ANALYTICAL PROCEDURES

Test measurements were performed according to sampling and analysis procedures promulgated by the California Air Resources Board (CARB), or US Environmental Protection Agency (EPA). The sampling and analysis procedures used for this test program are summarized below. Any modifications or deviations not addressed herein are discussed in Section 3 of this report.

5.1 EPA Instrumental Analyzer Method – Continuous Monitoring of Gaseous Emissions, CEMS
5.2 EPA Method 19 – Stack Gas Volumetric Flow Rate (calculated)

5.1 EPA Instrumental Analyzer Method - Continuous Monitoring of Gaseous Emissions, CEMS

In this Method, gaseous components of the stack gas (NO_X, and O_2 are measured continuously according to EPA instrumental analyzer method using Almega's mobile continuous emissions monitoring system (CEMS). Figure 5-1 is a schematic of Almega's CEMS.

The CEMS extracts and conditions a representative stack gas sample and analyzes the gas using one or more analytical instruments. Typical CEMS instrumentation is described in Table 5-1. The extraction and conditioning system consists of a stainless steel heated probe, a short heated TFE sample line, a conditioning system, a TFE-diaphragm pump and a TFE transport (sample) line. The sample conditioning system, consisting of water knockout impingers and/or a thermoelectric condenser, removes moisture before the gas is delivered to the analyzers. Sample flow and delivery are controlled using a flow control panel that includes valves, pressure gauges, and flow meters (Rotameters). The flow control panel allows the user to deliver sample gas to any and all instruments. Instrument readings are recorded using a real-time strip chart and an electronic data acquisition system (DAS). Other pertinent data such as calibration gas cylinder numbers and concentrations, test location, dates, times, and operator identification are also recorded on the strip chart and on the field data form.

Sampling includes pretest and post-test calibration and bias checks for each sampling run. Raw concentration data are corrected for sampling system bias using the following equation:

$$C_{CORR} = C_{MA} \times \frac{(C_i - BIAS_{ZERO})}{(BIAS_{SPAN} - BIAS_{ZERO})}$$

Where:
C_{CORR} = Concentration, corrected for drift and bias
C_i = Average measured concentration (raw value)
$BIAS_{ZERO}$ = Average instrument response during zero bias check
C_{MA} = Certified concentration of applicable span gas
$BIAS_{SPAN}$ = Average instrument response during span bias check

The following QA/QC activities are performed during testing.

- Prior to testing, each individual analyzer is calibrated (adjusted) by introducing zero, hi-span and mid-span gases directly into each analyzer and by making corresponding adjustments.

- Prior to testing, calibration error, linearity and system bias checks are performed on each analyzer. Calibration error and linearity checks are performed by injecting known calibration gases directly to each instrument. System bias checks are performed by injecting calibration gases at the sampling-probe/junction or at the sampling probe tip.

- The system response time for each parameter is determined at the moment when the calibration gas for the bias check reaches 95% of its expected concentration value.

- A Leak Check is conducted before sampling and periodically thereafter to ensure that no leakage occurs in the entire sampling apparatus. The leak check is performed on the vacuum side by sealing the probe tip and increasing vacuum to above 20 inches of mercury. After the vacuum stabilizes, it should hold constantly at about 20 in. Hg On the pressure side, the pressure gauge indicator should drop to zero and flow to each individual Rotameter also should drop to zero to indicate a successful leak check.

- Calibration gases used to span instrumentation conform to EPA Protocol-1. Certified gases are no older than 18 months for stable constituents (e.g. O_2, CO_2, NO_X, CO, SO_2 and THC) and 6 months for unstable constituents (e.g. NO_2). Certificates of analysis for calibration gases are included in the report.

- NO_2-to-NO conversion efficiency (CE) check is performed according to the procedure in Method 100 and the results of the CE check are included in the report.

- In some cases, a non-standard calibration gas value is generated using Almega's STEC "gas divider". If used, the gas divider will be field-certified according to EPA Method 205 "Verification of the Gas Dilution System for Field Instruments Calibration" and the certification data is included in the report.

Figure 5-1. Continuous Emissions Monitoring System

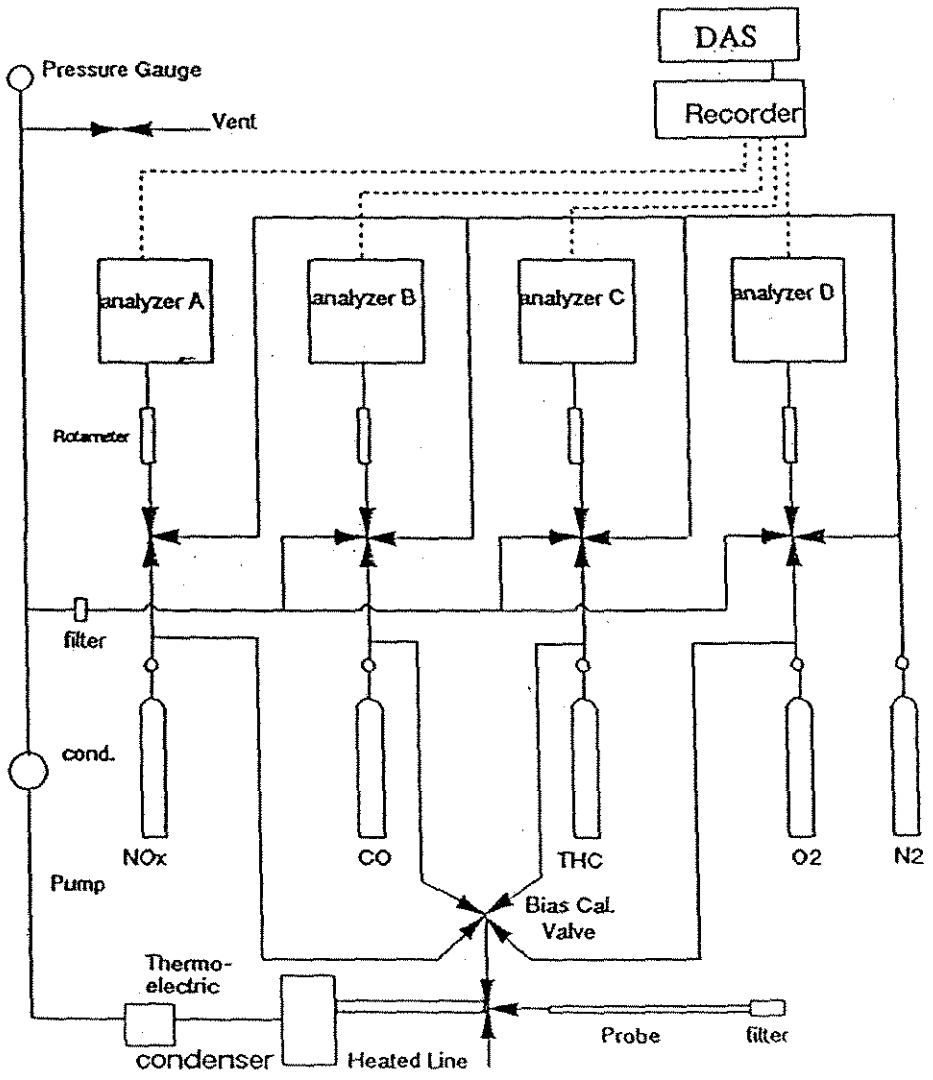


TABLE 5.1. ALMEGA CEMS – EQUIPMENT SPECIFICATIONS

ANALYZERS					
Specification	**O2**	**CO2**	**NOx**	**CO**	**SO2**
Manufacturer	Teledyne	Servomex	Thermo Electron	Thermo Electron	Western Research
Model	326RA	1400B	10A/10S	48/48H	721A2
Analytical Principle	E-Chemical Cell	NDIR	Chemiluminescent	NDIR-GCC	NDUV
Ranges	%: 0-5, -10, -25	%: 0-5, -10, -20	ppmv: 0-2.5, -10, -25, -50, -100, -250, -1,000	ppmv: 0-20, -50, -100, -200, -500, -1k, x10	ppmv: 0-10, -25, -50, -100, -200, -300
Accuracy, % of Full Scale	+/- 1%	+/- 1%	+/- 1%	+/- 1%	+ 0.5%
Repeatability, % of Full Scale	0.5%	0.5%	0.5%	0.5%	0.5%
Sensitivity, % of Full Scale	0.5%	0.5%	0.5%	0.5%	<2% of Range
Zero/Span Drift, % of Full Scale	+/- 1%, in 24 Hrs	+/- 1%, in 24 Hrs	+/- 1%, in 24 Hrs	+/- 1%, in 24 Hrs	-
Response Time	3 Seconds	<2 Seconds	1.7 Seconds	<2.0 Seconds	30 seconds
Linearity, % of Full Scale	< 1%	< 1%	< 1%	< 1%	< 1%
Output	1V DC, 5V DC	0.1V DC, 1V DC	1V DC, 10V DC	1V DC, 10V DC	0-1V DC

OTHER CEMS EQUIPMENT				
Specification	**Sample Conditioner**		**Stripchart Recorder**	
System used	Primary	Back-up	System used	Primary
Manufacturer	Almega	Universal	Manufacturer	Yokogawa
Model	(in-house)	Model 540	Model	Model 2400
Principle	Refrigeration	Refrigeration	Pen Response	3 sec.
Max. Inlet Temperature	300 F	500 F	Input Voltage	user-selectable
Max. Inlet Pressure	50 psi	50 psi	Chart Speed	user-selectable
Max. Flow Rate	10 SCFH	7.0 Lpm	Chart Width	10 inches
Max. Water Concentration	50%	50%	Output	user-selectable
Outlet Dew-Point Temperature	< 37 F	35 F +/- 4 F	No. of Channels	30 user-select. 30 calc'd
Dew-Point Stability		+/- 0.5 F	Colors	10 color, user-selectable

5.2 EPA Method 19 – Stack Gas Volumetric Flow Rate (Calculated)

In this Method, the stack gas volumetric flow rate is stoichiometrically calculated using actual or published fuel gas characteristics and monitored data. The stack gas volumetric flow rate is calculated based on fuel rate, the heating value of the fuel, and the applicable F-factor (per EPA Method 19). The stoichiometric result is corrected for excess air using measured O_2 concentration or other parameter (e.g. CO_2). The equation used to calculate stack gas flow rate follows.

$$DSCFM = Q_f * HV * F_d / 1{,}000{,}000 * 20.9 / (20.9 - O_2)$$

where:

DSCFM	=	Stack gas flow rate, dscfm
Q_f	=	Fuel meter flow rate, cfm
HV	=	Fuel higher heating value, Btu/scf
F_d	=	Fuel dry oxygen F-factor, dscf/MMBtu
O_2	=	Stack gas O_2 content

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

Almega applies stringent quality assurance and quality control (QA/QC) procedures to ensure the validity of measurements for all test methods. The following section discusses general and project-specific QA/QC measures.

6.1 General QA/QC

Generally, Almega's QA/QC procedures follow guidelines from the "Quality Assurance Handbook for Air Pollution Measurement Systems," Volume I through III. And, procedures for pretest preparation and calibration of sampling equipment are followed. Standardized written procedures, calculator programs, and computer spreadsheets are used for test planning, pre-survey, equipment checklist, preliminary calculations, testing, data analysis, and reporting. Pretest equipment preparation and maintenance include organization of the following equipment prior to testing:

- Mobile RM CEM test van: Check fluids, fuel, mechanical conditions, verify operation of CEM instruments, sample lines and sample conditioner prior to the date of the source test.

- Sampling Equipment: Check meter boxes, pitot tubes, manometers and thermocouples to ensure in good working conditions and in proper calibrations. Preclean sampling trains and seal all openings prior to use.

Table 6.1 shows the test equipment calibration schedules. Table 6.2 shows the test equipment maintenance schedules.

6.2 Project-Specific QA/QC

This project included specific QA/QC activities required to validate the test results. These QA/QC activities are based on the test methods discussed in Section 4 and generally acceptable test procedures. Reference Methods used for source testing are promulgated by the US Environmental Protection Agency (EPA). Any deviations from published Methods are approved in advance by the regulatory agency, prior to implementation if possible. Project-specific QA/QC activities and results that may impact test results are discussed in Section 3.

TABLE 6-1. TEST EQUIPMENT CALIBRATION SCHEDULE

Type Of Equipment	**Calibration Period**	**Standard Or Method Of Calibration**
Thermocouples	6 Months (ice, boiling water, hot oil)	Mercury Thermometer, three point calibration
Dry Gas Meters	6 Months	Calibrated Test Meter
Field Barometers	6 Months Check prior to usage	Mercury Barometer
S-Type Pitot	6 Months, check prior to usage	EPA Method 2, Measure physical configuration. Reshape pitot tips or calibrate if configuration does not meet the limits.
Pressure gauges	6 Months	Five-point calibration against manometer
	1 month	Three-point check
Temp. Meters	6 Months	Precision Potentiometer
CEM Systems	Bimonthly, or poor performance	Specified by Manufacture.

TABLE 6-2. TEST EQUIPMENT MAINTENANCE

Equipment	Check For	Correction	Frequency
CEM Systems malfunction, noise, drift, conversion efficiency for NO_X anlzr.	Absence of by the manufacture	As required or depend on performance	Bimonthly
Pumps leakage, flow, proper vacuum	Absence of Replace parts	Inspect, clean, of usage	300 hours
Flow Devices zeroing, obstruction, deformation	Levelling, or re-calibrate	Clean, replace, of usage	300 hours
Calibration Gases Pressure	Expiration date, tank gases	Re-certify, order new testing	2 months and prior to field
Regulators Gauge precision	Malfunction,	Repair or replace	3 months and prior to field testing
Gas Divider precision	Malfunction	Repair or replace	Monthly and before field testing
Condensers temperature	Leakage,	Repair or replace	Monthly and before field testing
Heated lines temperature, cleanliness	Leakage,	Repair, Clean, replace	Monthly and before field testing

APPENDICES

APPENDIX A

GENERAL CALCULATIONS AND FORMULAE

GENERAL CALCULATIONS

Standard conditions: 29.92 in.Hg, 68 °F

Gas Moisture at standard conditions (scf): $V_{WTR} = K2*V_{COND}$
K2 = 0.04707 @ 68 °F, 0.0464 @ 60 °F

Sample volume at standard conditions (scf):
Vmstd =K1*Vmacf*Ym*(Pbar+dH/13.6)/(Tm+460)
K1 = 17.64 @ 68 °F, 17.38 @ 60 °F

Percent of water: $\%H_2O = 100*Vmstd/(Vmstd+Vwtr)$

Dry molecular weight: $M_d = (44*\%CO_2+32*\%O_2+28*(\%N_2+\%CO))/100$

Wet molecular weight: $M_w = M_d*(1-\%H_2O/100)+18*(\%H_2O/100)$

Stack gas pressure (In. Hg): $P_{stk} = P_{bar}+P_{sta}/13.6$

Average velocity head: Ave. dP = $\{SQRT\ (dP)\}^2$

Stack gas velocity (fps): $V = 85.49*C_p*SQRT(dP)*SQRT((T_S+460)/(P_{STK}*M_w))$

Percent of excess air: $\%EXCA = 100*(\%O_2-0.5\%CO)/(0.264(\%N_2-(\%O_2-0.5\%CO)))$

Stack gas flow (scfm): $Q_{STK} = 60(1-\%H_2O/100)*V*A*(528/(T_s+460))*P_{stk}/29.92$

Concentration at 3% O_2: $PPM\ @\ 3\%\ O_2 = PPM_{measured}*17.9/(20.9-\%O_2)$

Emissions lb/MMBtu:
$lb/MMBtu=PPM*10^{-6}*(MW\ lb/lb\text{-}mole)/SV\ Mole*F_d*20.9/(20.9-\%O_2)$

Emissions lb/hr:
$lb/hr = PPM*10^{-6}*((MW\ lb/lb\text{-}mole)/SV)*F_d*FF*(1050\ Btu/scf)*20.9/(20.9-\%O_2)$

<u>CALCULATIONS FOR METHOD 100</u>:

Corrected PPM = $(PPM_{measured}-C_o)*C_{ma}/(C_m-C_o)$

Where: C_o = Average of initial and final bias zeros
C_m = Average of initial and final bias calibrations
C_{ma} = Certified gas value used for the bias calibration.

CALCULATIONS FOR METHOD 100, continued

Calibration Error=	100*(Certified value-Anlzr response)/Anlzr range
Percent Bias=	100*(Direct anlz. response-Bias response)/Anlz. range
System Zero/Span Drifts=	100*(Final-Initial)/Analz. range
Linearity=	100*(Anlz. mid. gas response-Predictive value)/range

Where the Predictive Value for the mid gas is found by a straight line drawn between hi gas and zero gas calibration points which can be calculated from the straight line equation, Y=mx+b where m is the slope of the line and b is the Y-intercept. The calculation is done by a computer spreadsheet for Method 100.1.

DEFINITIONS

A:	Stack cross area, Square feet
Cp:	Pitot coefficient
@h:	Orifice Pressure, In. H2O
MW:	Molecular weight
Md:	Dry molecular weight of flue gas
Mw:	Wet molecular weight of flue gas
Pbar:	Barometric pressure, In. Hg
Psta:	Static Pressure, In. H2O
Pstk:	Stack pressure, In, Hg
P:	Stack differential pressure, In. H2O
Qstk:	Stack gas flow, scfm
Tm:	Meter temperature, F
Ts:	Stack gas temperature, F
Vcond:	Volume of water condensation, ml
Vm:	Meter volume, acf
Vmstd:	Sample gas at standard conditions, scf
Vwtr:	Water vapor volume, scf
Ym:	Meter correction factor
SV:	Specific molar volume, 379.5 dscf/Lb.mole at 60F, or 385.3 dscf/Lb.mole at 68F
FF:	Fuel Flow Rate (SCF/HR)
Fd:	Dry Fuel Factor, for natural gas Fd=8710 Dscf/MMBTU at 68F.

APPENDIX B

APPROVALS AND CERTIFICATIONS

Appendix B1

CARB Testing Approvals

State of California

Air Resources Board

Approved Independent Contractor

Almega Environmental & Technical Services, Incorporated

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to section 91207, title 17, California Code of Regulations, until June 30, 2007, for those test methods listed below:

ARB Source Test Methods
1, 2, 3, 4, 5, 8, 11, 13B, 17
100(CO, CO2, NOx, O2, SO2, THC), 410A, 434

William V. Loscutoff, Chief
Monitoring and Laboratory Division

90 56165

APPENDIX C

CONTINUOUS MONITORING OF GASEOUS EMISSIONS, CEMS

Appendix C1

CEMS – Results and Calculations

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Port Board
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response				Calibration Drift (%)		System Bias Error (%)				Concentration	
						Initial		Final				Initial		Final		Avg DAS	Drift-corr.
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span	(Cm)	(Ccorr.)
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	14.25	14.35
100%	14:13	nd															
Load	14:23	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	682.70	688.30

C1-1

AETS CEMS Data -- Run-by-Run Basis

	100 % Load-Port Board		
	Time	O2	Nox
#	AVG	14.25	682.70
1	14:22:00	14.20	683.20
2	14:23:00	14.30	682.20

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Port Board
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response				Calibration Drift (%)		System Bias Error (%)				Concentration	
						Initial		Final				Initial		Final		Avg DAS	Drift-corr.
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span	(Cm)	(Ccorr.)
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	15.80	15.91
75%	14:30	nd															
Load	14:40	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	477.75	481.04

C1-3

AETS CEMS Data -- Run-by-Run Basis

	75 % Load-Port Board		
	Time	O2	Nox
#	AVG	15.80	477.75
1	14:39:00	15.80	477.30
2	14:40:00	15.80	478.20

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Port Board
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response Initial		System Bias Response Final		Calibration Drift (%)		System Bias Error (%) Initial		System Bias Error (%) Final		Concentration	
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span	Avg DAS (Cm)	Drift-corr. (Ccorr.)
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	17.05	17.17
50%	14:43	nd															
Load	14:53	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	311.60	313.03

AETS CEMS Data -- Run-by-Run Basis

	50 % Load-Port Board		
	Time	O2	Nox
#	AVG	17.05	311.60
1	14:52:00	17.00	310.90
2	14:53:00	17.10	312.30

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Port Board
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response Initial		System Bias Response Final		Calibration Drift (%)		System Bias Error (%) Initial		System Bias Error (%) Final		Concentration	
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span	Avg DAS (Cm)	Drift-corr. (Ccorr.)
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	18.30	18.43
25%	14:57	nd															
Load	15:07	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	187.85	187.89

AETS CEMS Data -- Run-by-Run Basis

	25 % Load-Port Board		
	Time	O2	Nox
#	AVG	18.30	187.85
1	15:06:00	18.30	187.50
2	15:07:00	18.30	188.20

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Starboard
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response Initial		System Bias Response Final		Calibration Drift (%)		System Bias Error (%) Initial		System Bias Error (%) Final		Concentration Avg DAS	Concentration Drift-corr.
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span	(Cm)	(Ccorr.)
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	13.90	**13.99**
100%	15:18	nd															
Load	15:28	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	737.60	**743.81**

AETS CEMS Data -- Run-by-Run Basis

	100 % Load-Starboard		
	Time	O2	Nox
#	AVG	13.90	737.60
1	15:27:00	13.90	737.30
2	15:28:00	13.90	737.90

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Starboard
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response Initial		System Bias Response Final		Calibration Drift (%)		System Bias Error (%) Initial		System Bias Error (%) Final		Concentration	
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span	Avg DAS (Cm)	Drift-corr. (Ccorr.)
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	15.40	**15.51**
75%	14:30	nd															
Load	14:40	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	565.20	**569.48**

AETS CEMS Data -- Run-by-Run Basis

	75 % Load-Starboard		
	Time	O2	Nox
#	AVG	15.40	565.20
1	15:41:00	15.40	562.00
2	15:42:00	15.40	568.40

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Starboard
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response				Calibration Drift (%)		System Bias Error (%)				Concentration	
						Initial		Final				Initial		Final		Avg DAS (Cm)	Drift-corr. (Ccorr.)
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span		
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	16.70	**16.82**
50%	15:46	nd															
Load	15:56	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	428.30	**431.04**

AETS CEMS Data -- Run-by-Run Basis

	50 % Load-Starboard		
	Time	O2	Nox
#	AVG	16.70	428.30
1	15:55:00	16.60	437.80
2	15:56:00	16.80	418.80

RM CONTINUOUS EMISSIONS MONITORING SYSTEM

Facility: Sause Brothers
City: Olympic, Seattle
Source: ICE-Starboard
Date: 09/20/2006
Operator: TA / RS

Test Duration: 10 min.

Gas Data		DIR-Cal For:		9/20
Type	F.S.	CERT	zero	Cal
O2	25	12	0	12.0
nd	nd			
nd				
Nox	1000	441	1	439.2

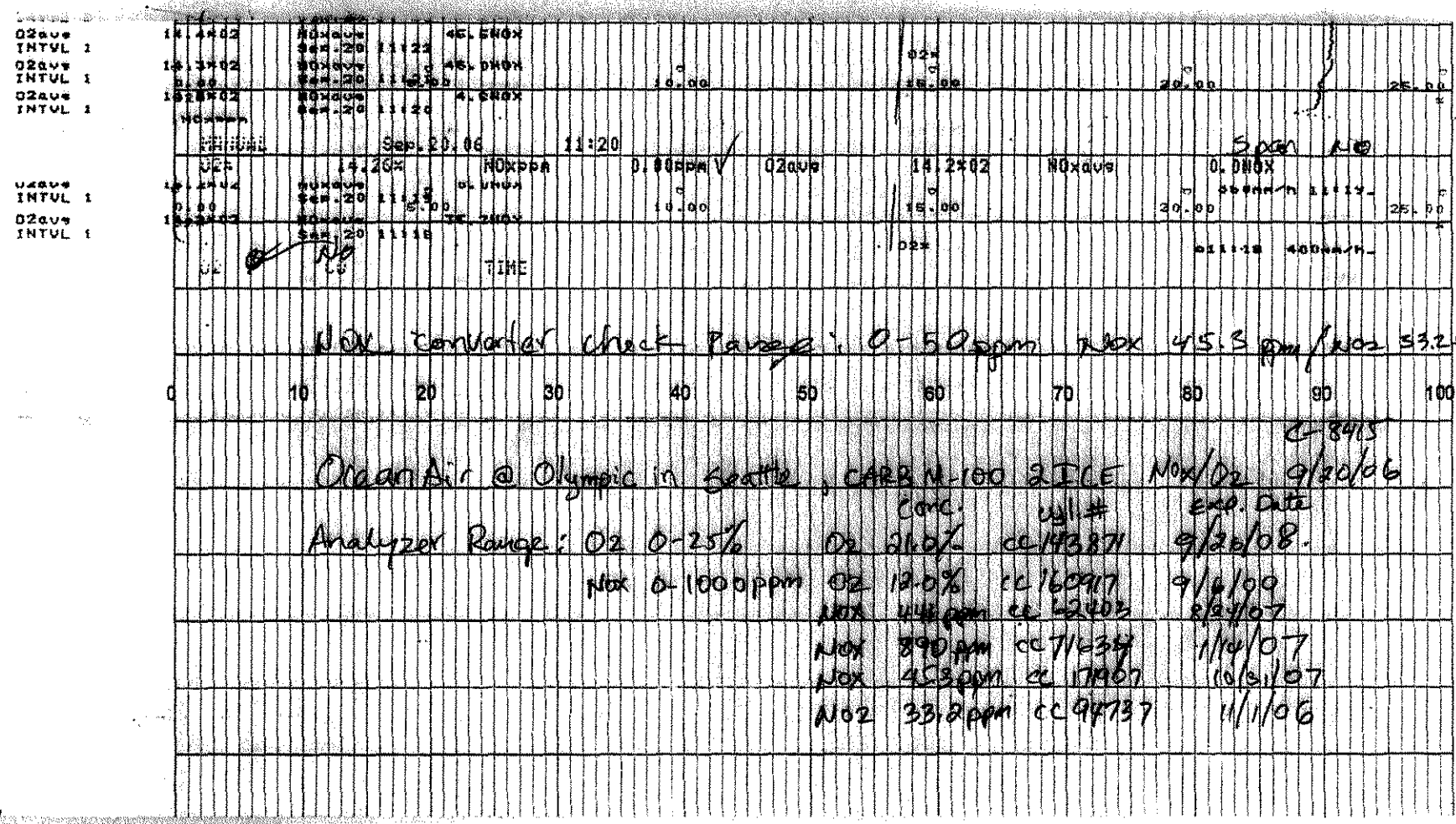
Run No.	Date Time Start End	Gas Type	Gas Value	RM Direct Calibration Response		System Bias Response Initial		System Bias Response Final		Calibration Drift (%)		System Bias Error (%) Initial		System Bias Error (%) Final		Concentration Avg DAS (Cm)	Concentration Drift-corr. (Ccorr.)
				zero	span	Zero (iZ)	Span (iSP)	Zero (fZ)	Span (fSP)	Zero (Zdr)	Span (Cdr.)	Zero	Span	Zero	Span		
1	9/20	O2	12	0.00	11.98	0.02	11.93	0	11.91	-0.1	-0.1	0.1	-0.2	0.0	-0.3	18.10	**18.23**
25%	16:00	nd															
Load	16:10	nd															
		Nox	441	1.00	439.20	0.5	436	3.6	440.3	0.3	0.4	-0.1	-0.3	0.3	0.1	242.70	**243.35**

AETS CEMS Data -- Run-by-Run Basis

	25 % Load-Starboard		
	Time	O2	Nox
#	AVG	18.10	242.70
1	16:09:00	18.10	241.80
2	16:10:00	18.10	243.60

Appendix C2

CEMS – Stripchart



NOx converter check Range: 0-50ppm NOx 45.5 ppm / NO2 33.2 ppm

C-8415

OceanAir @ Olympic in Seattle, CARB M-100 2ICE NOx/O2 9/20/06

Analyzer Range: O2 0-25%

NOx 0-100ppm

	Conc.	cyl.#	Exp. Date
O2	21.0%	CC143871	9/20/08
O2	12.0%	CC160917	9/6/09
NOx	44ppm	CC 42403	8/24/07
NOx	890ppm	CC71634	11/4/07
NOx	45.3ppm	CC 17907	10/31/07
NO2	33.2ppm	CC94737	11/1/06

NO2 in NOX mode

MANUAL Sep.20.06 11:35
O2% 14.94% NOxppm 0.73ppm O2ave 14.9%O2 NOxave 0.7NOX

O2ave 14.9%O2 NOxave 0.9NOX
INTVL 1 Sep.20 11:34
O2ave 14.9%O2 NOxave 0.9NOX
INTVL 1 Sep.20 11:33 400mm/h 11:33
O2ave 14.8%O2 NOxave 1.1NOX
INTVL 1 Sep.20 11:32
O2ave 14.8%O2 NOxave 1.8NOX
INTVL 1 Sep.20 11:30
O2ave 14.7%O2 NOxave 1.7NOX
INTVL 1 Sep.20 11:29
O2ave 14.7%O2 NOxave 4.5NOX
INTVL 1 Sep.20 11:28
O2ave 14.6%O2 NOxave 4.4NOX
INTVL 1 Sep.20 11:28

NO2 in NO Mode

MANUAL Sep.20.06 11:28
O2% 14.04% NOxppm 45.45ppm O2ave 14.6%O2 NOxave 45.5NOX

O2ave 14.6%O2 NOxave 46.7NOX
INTVL 1 Sep.20 11:27
O2ave 14.6%O2 NOxave 46.2NOX
INTVL 1 NOxppm Sep.20 11:26

MANUAL Sep.20.06 11:25
O2% 14.52% NOxppm 0.04ppm O2ave 14.5%O2 NOxave 0.1NOX Span NOX

INTVL 1 Sep.20 11:26
O2ave 14.5%O2 NOxave 0.7NOX
INTVL 1 NOxppm Sep.20 11:24

NOX

MANUAL Sep.20.06 11:23
O2% 14.43% NOxppm 45.58ppm O2ave 14.4%O2 NOxave 45.6NOX

INTVL 1 Sep.20 11:23
O2ave 14.4%O2 NOxave 45.5NOX
INTVL 1 Sep.20 11:22
O2ave 14.3%O2 NOxave 46.0NOX
INTVL 1 Sep.20 11:21
O2ave 14.2%O2 NOxave 4.6NOX
INTVL 1 NOxppm Sep.20 11:20

MANUAL Sep.20.06 11:20 Span NO
O2% 14.20% NOxppm 0.00ppm O2ave 14.2%O2 NOxave 0.0NOX

O2ave 14.2%O2 NOxave 0.0NOX
INTVL 1 Sep.20 11:19 350mm/h 11:19
O2ave 14.2%O2 NOxave 0.7NOX
INTVL 1 Sep.20 11:18 11:18 400mm/h

NO

O2 TIME

NOX Converter check Range: 0-50ppm NOx 45.3 ppm / NO2 53.2 ppm

C-8415

Operator @ Olympia in Seattle, CARB M-100 2TLE NOx/O2 9/20/06

C2-2

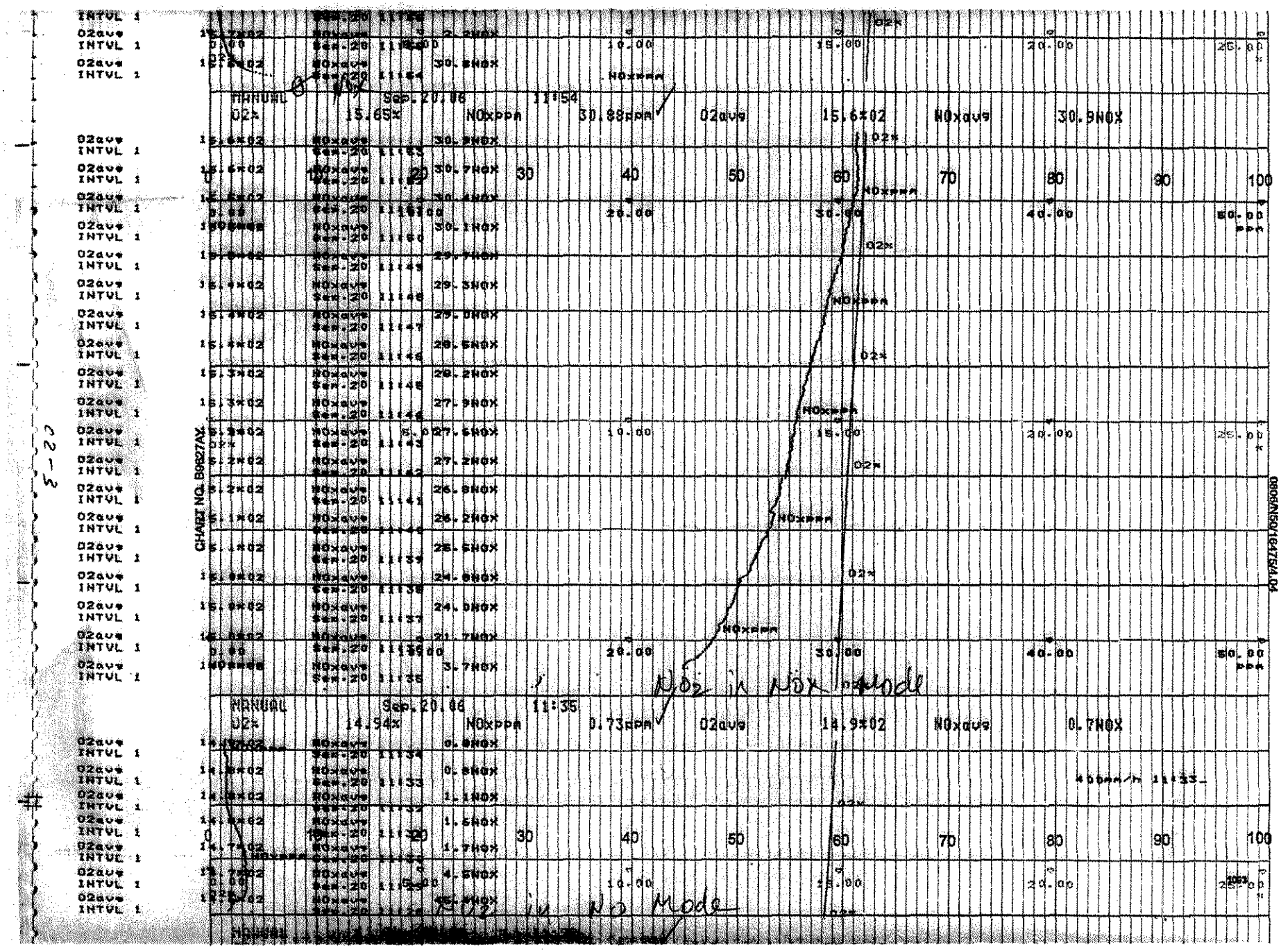


CHART NO. B9827AX
MANUAL Sep.20.06 11:54
O2% 15.65% NOxppm 30.88ppm O2ave 15.6%O2 NOxave 30.9NOX
MANUAL Sep.20.06 11:35
O2% 14.94% NOxppm 0.73ppm O2ave 14.9%O2 NOxave 0.7NOX
NOx in NOx Mode
NOx in NOx Mode
400ppm/h 11:33
0 10 20 30 40 50 60 70 80 90 100
0.00 10.00 20.00 30.00 40.00 50.00 ppm
0.00 5.00 10.00 15.00 20.00 25.00 %
O2% NOxppm
0905N50161475A.04
C2-3

MANUAL Sep.20.06 12:16 High
O2= 9.00% NOxppm 1.0ppm O2ave 0.0%O2 NOxave 1.2NOX

O2ave INTVL 1 0.0%O2 NOxave 1.9NOX Sem.20 12:16

O2ave INTVL 1 15.9%O2 NOxave 588.5NOX Sem.20 12:15

O2ave INTVL 1 15.2%O2 NOxave 652.1NOX Sem.20 12:11 300ppm 12:11

O2ave INTVL 1 15.1%O2 NOxave 762.5NOX Sem.20 12:10

O2ave INTVL 1 15.0%O2 NOxave 149.7NOX Sem.20 12:09

O2ave INTVL 1 15.1%O2 NOxave 233.5NOX Sem.20 12:06

O2ave INTVL 1 15.0%O2 NOxave 229.2NOX Sem.20 12:07

O2ave INTVL 1 15.0%O2 NOxave 230.5NOX Sem.20 12:06

O2ave INTVL 1 15.0%O2 NOxave 214.5NOX Sem.20 12:05

O2ave INTVL 1 15.0%O2 NOxave 473.1NOX Sem.20 12:04

O2ave INTVL 1 15.0%O2 NOxave 179.0NOX Sem.20 12:03

O2ave INTVL 1 15.0%O2 NOxave 6.0%6.8NOX Sem.20 12:02

MANUAL Sep.20.06 12:01
O2= 15.09% NOxppm 45.33ppm O2ave 15.9%O2 NOxave 45.3NOX

INTVL 1 Sem.20 12:04

O2ave INTVL 1 15.0%O2 NOxave 45.5NOX Sem.20 12:00

O2ave INTVL 1 15.0%O2 NOxave 44.1NOX Sem.20 12:00 400ppm

O2ave INTVL 1 0.00 Sem.20 11:59:00 2.1NOX Sem.20 11:58

MANUAL Sep.20.06 11:58
O2= 15.78% NOxppm 0.26ppm O2ave 15.8%O2 NOxave 0.3NOX

O2ave INTVL 1 15.7%O2 NOxave 0.4NOX Sem.20 11:57

O2ave INTVL 1 15.7%O2 NOxave 0.5NOX Sem.20 11:56

O2ave INTVL 1 15.7%O2 NOxave 2.2NOX Sem.20 11:55:00

O2ave INTVL 1 15.5%O2 NOxave 30.9NOX Sem.20 11:54

MANUAL Sep.20.06 11:54
O2= 15.65% NOxppm 30.88ppm O2ave 15.6%O2 NOxave 30.9NOX

O2ave INTVL 1 15.6%O2 NOxave 30.9NOX Sem.20 11:53

O2ave INTVL 1 15.6%O2 NOxave 30.7NOX Sem.20 11:52

O2ave INTVL 1 0.00 Sem.20 11:51:00 30.1NOX Sem.20 11:50

O2ave INTVL 1 [illegible]

INTVL 1 NOxppm Sep.20*12:42

O2avg INTVL 1 12.0*O2 NOxavg 442.5NOX Sep.20*12:40

O2avg INTVL 1 12.0*O2 NOxavg 479.6NOX Sep.20*12:38

O2avg INTVL 1 11.9*O2 NOxavg 490.0NOX Sep.20*12:36

O2avg INTVL 1 11.8*O2 NOxavg 379.5NOX Sep.20*12:34

O2avg INTVL 1 15.9*O2 NOxavg 5.603.5NOX Sep.20 12:32

O2%

0 10 20 30 40 50 60 70 80 90 100

NOxppm

0.0 10.00 15.00 20.00 25.00

O2%

MANUAL Sep.20.06 12:31

O2% 20.98% ✓ NOxppm 894.1ppm ✓ O2avg 21.0*O2 NOxavg 892.9NOX

mid

O2avg INTVL 1 21.0*O2 NOxavg 890.2NOX Sep.20*12:30

O2avg INTVL 1 21.0*O2 NOxavg 881.2NOX Sep.20*12:28

0.0 200.0 400.0 600.0 800.0 1000.0 ppm

O2avg INTVL 1 20.9*O2 NOxavg 866.2NOX Sep.20*12:26

O2avg INTVL 1 21.0*O2 NOxavg 884.9NOX Sep.20*12:24

O2avg INTVL 1 21.0*O2 NOxavg 902.0NOX Sep.20*12:22

O2avg INTVL 1 21.0*O2 NOxavg 888.0NOX Sep.20*12:20

O2avg INTVL 1 21.0*O2 NOxavg 893.7NOX Sep.20*12:18

0.00 5.00 10.00 15.00 20.00 25.00

O2avg INTVL 1 22.9*O2 NOxavg 128.2NOX Sep.20 12:16

MANUAL Sep.20.06 12:16

O2% 0.00% ✓ NOxppm 1.0ppm ✓ O2avg 0.0*O2 NOxavg 1.2NOX

High

O2avg INTVL 1 [illegible] NOxavg [illegible] Sep.20*12:15

O2avg INTVL 1 15.1*O2 NOxavg 588.5NOX Sep.20*12:13

NOxppm

Value Col B

O2avg INTVL 1 15.2*O2 NOxavg 852.1NOX Sep.20 12:11

300ppm/H 12:11

O2avg INTVL 1 16.1*O2 NOxavg 762.5NOX Sep.20 12:09

0.0 10.0 20.0 30 40.0 50 60.0 70 80.0 90 100.0

O2avg INTVL 1 150.9*O2 NOxavg 169.7NOX Sep.20 12:05

NOxppm

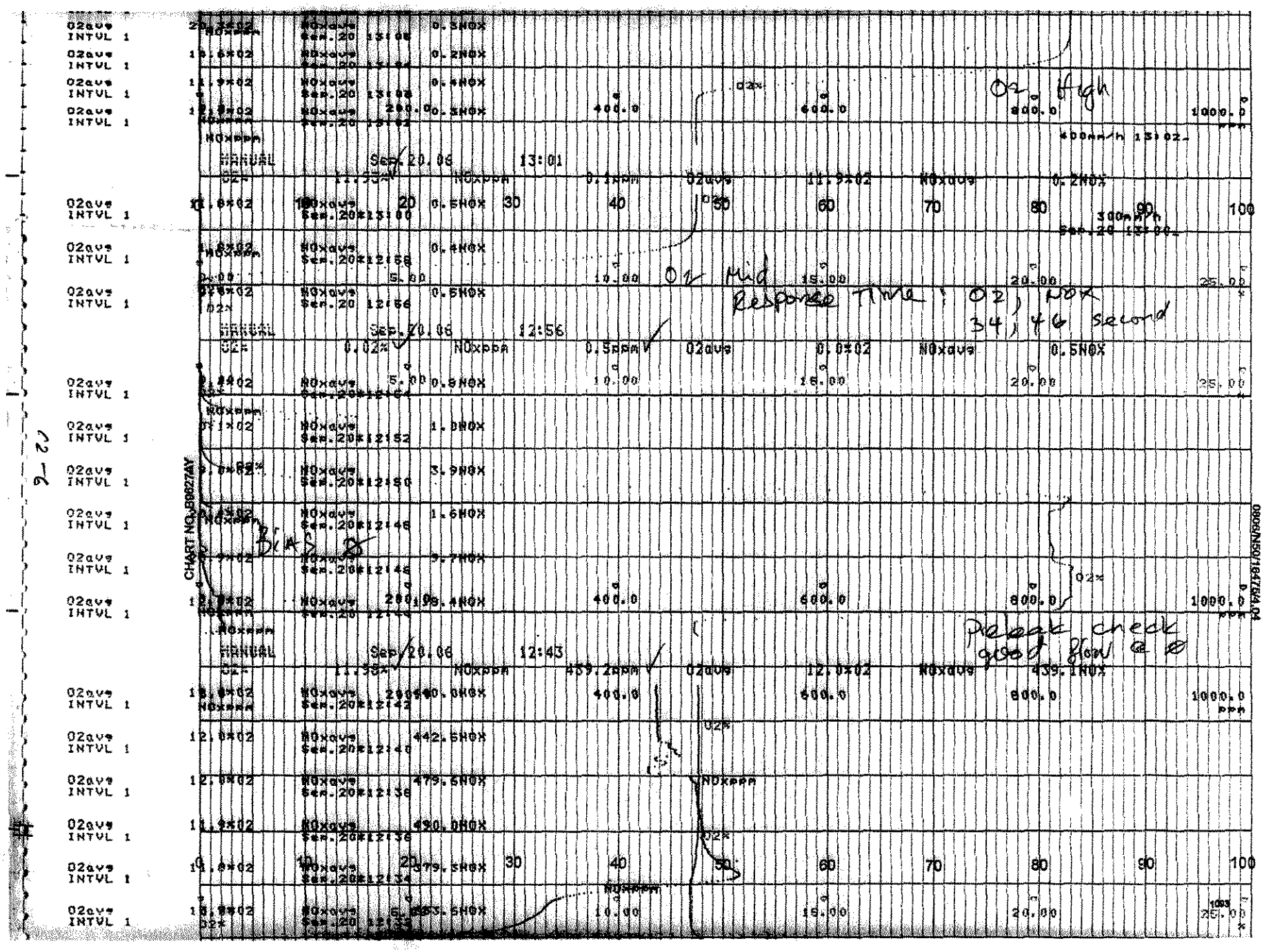
O2avg INTVL 1 15.1*O2 NOxavg 833.5NOX Sep.20 12:06

O2avg INTVL 1 16.0*O2 NOxavg 829.2NOX Sep.20 12:04

O2avg INTVL 1 15.8*O2 NOxavg [illegible] Sep.20 12:02

O2%

C2-5



0905/N50/184754.04

MANUAL Sep.20.06 13:23
O2% 0.03% NOxppm 436.0ppm O2ave 0.0%O2 NOxave 435.1NOX

INTVL 1
O2ave 0.0%O2 NOxave 428.2NOX
INTVL 1
O2ave 0.0%O2 NOxave 433.5NOX
INTVL 1
O2ave 0.0%O2 NOxave 435.7NOX
INTVL 1
O2ave 0.0%O2 NOxave 427.4NOX
INTVL 1
O2ave 0.0%O2 NOxave 414.5NOX
INTVL 1
O2ave 0.0%O2 NOxave 392.5NOX
INTVL 1
O2ave 0.0%O2 NOxave 440.4NOX
INTVL 1
O2ave 0.0%O2 NOxave 382.2NOX
INTVL 1
O2ave 0.0%O2 NOxave 357.4NOX
INTVL 1
O2ave 0.0%O2 NOxave 424.5NOX
INTVL 1
O2ave 0.1%O2 NOxave 448.5NOX
INTVL 1
O2ave 0.1%O2 NOxave 478.1NOX
INTVL 1
O2ave 0.3%O2 NOxave 429.1NOX
INTVL 1
O2ave 0.4%O2 NOxave 139.0NOX
INTVL 1
O2ave 20.4%O2 NOxave 2.5NOX
INTVL 1
O2ave 20.9%O2 NOxave 0.2NOX
INTVL 1

MANUAL Sep.20.06 13:07
O2% 20.89% NOxppm 0.2ppm O2ave 20.9%O2 NOxave 0.2NOX

O2ave 20.9%O2 NOxave 0.2NOX
INTVL 1
O2ave 20.3%O2 NOxave 0.3NOX
INTVL 1
O2ave 14.6%O2 NOxave 0.2NOX
INTVL 1
O2ave 11.9%O2 NOxave 0.4NOX
INTVL 1
O2ave 11.9%O2 NOxave 0.3NOX
INTVL 1

O2 High

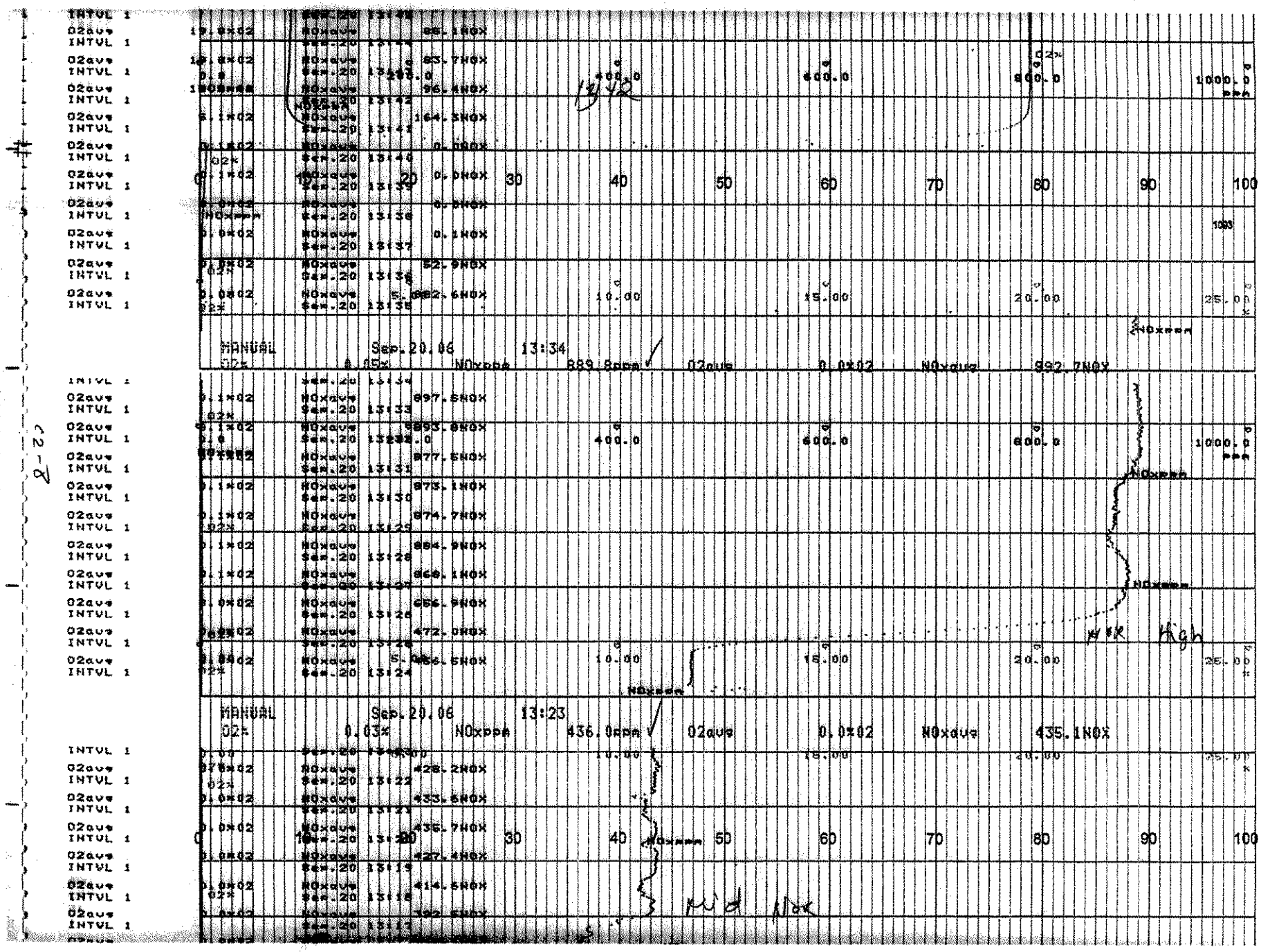
MANUAL Sep.20.06 13:01
O2% 11.93% NOxppm 0.1ppm O2ave 11.9%O2 NOxave 0.2NOX

O2ave 11.6%O2 NOxave 0.5NOX
INTVL 1
O2ave 0.0%O2 NOxave 0.4NOX
INTVL 1
O2ave 0.0%O2 NOxave
INTVL 1

O2 Mid Response Time (O2, NOX)

Mid NOx

Z-2


MANUAL Sep.20.06 13:34
02% 0.05% NOxppm 889.8ppm 02ave 0.0%02 NOxave 892.7NOx
MANUAL Sep.20.06 13:23
02% 0.03% NOxppm 436.0ppm 02ave 0.0%02 NOxave 435.1NOx
High
Mid Max

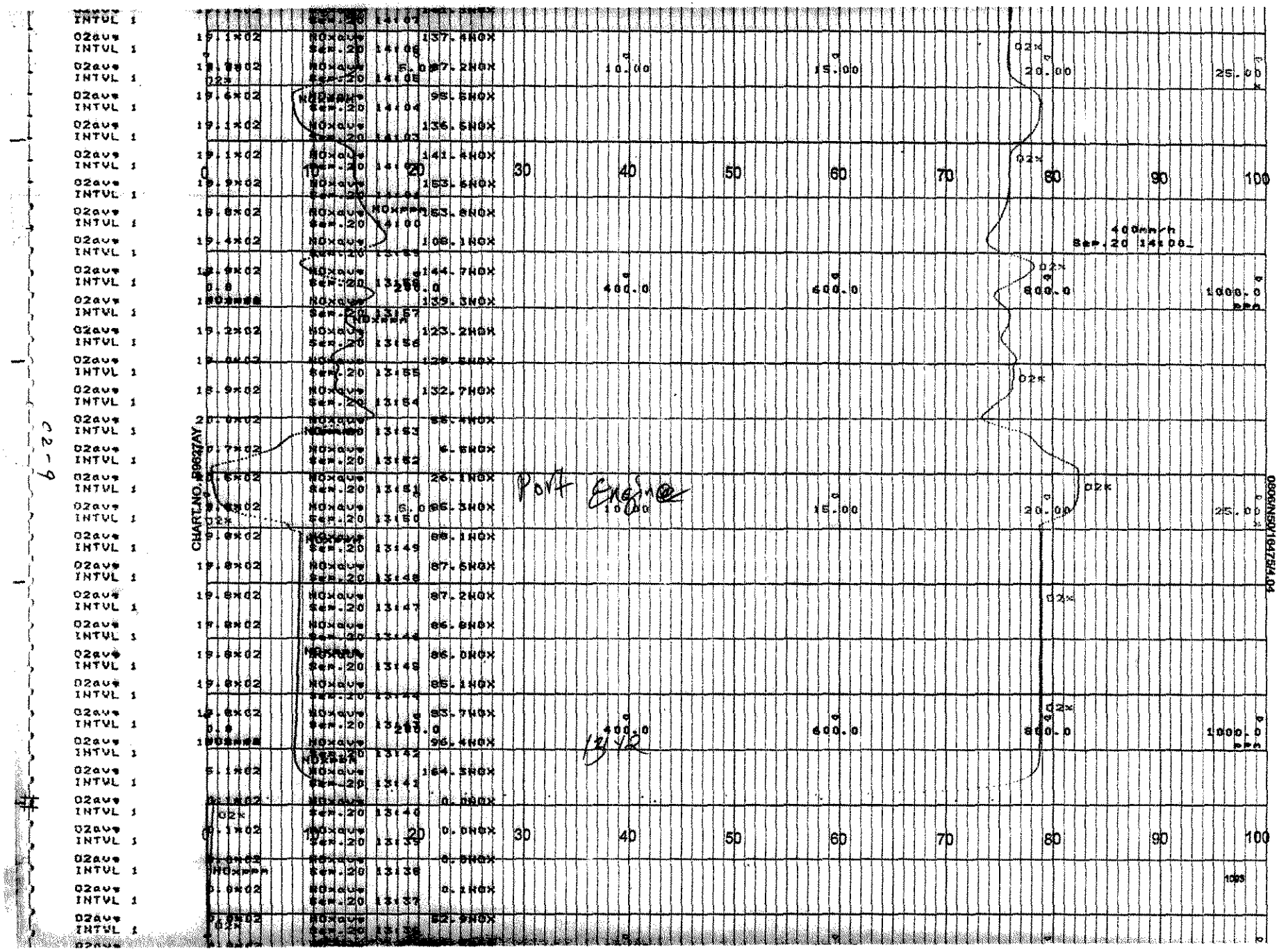
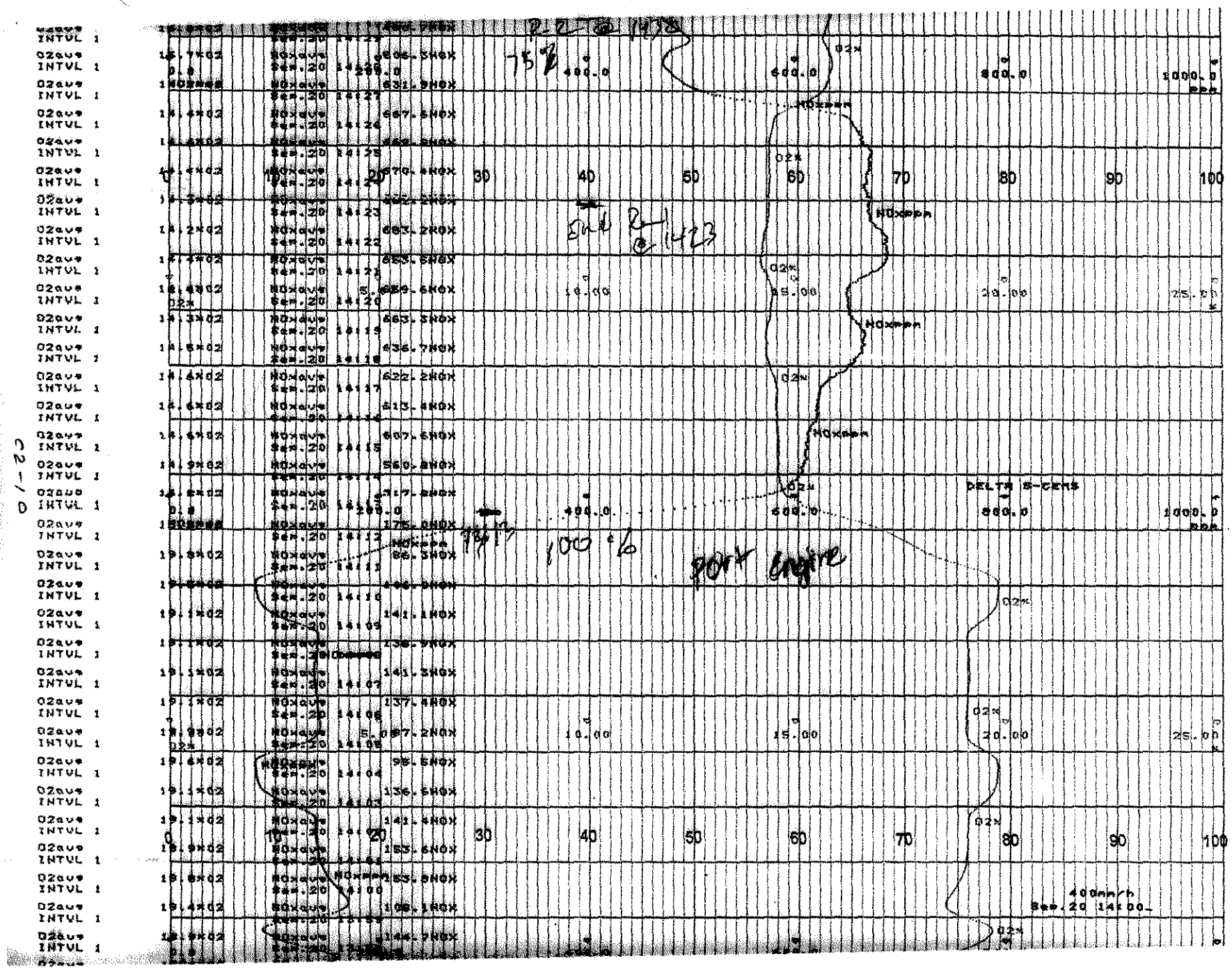
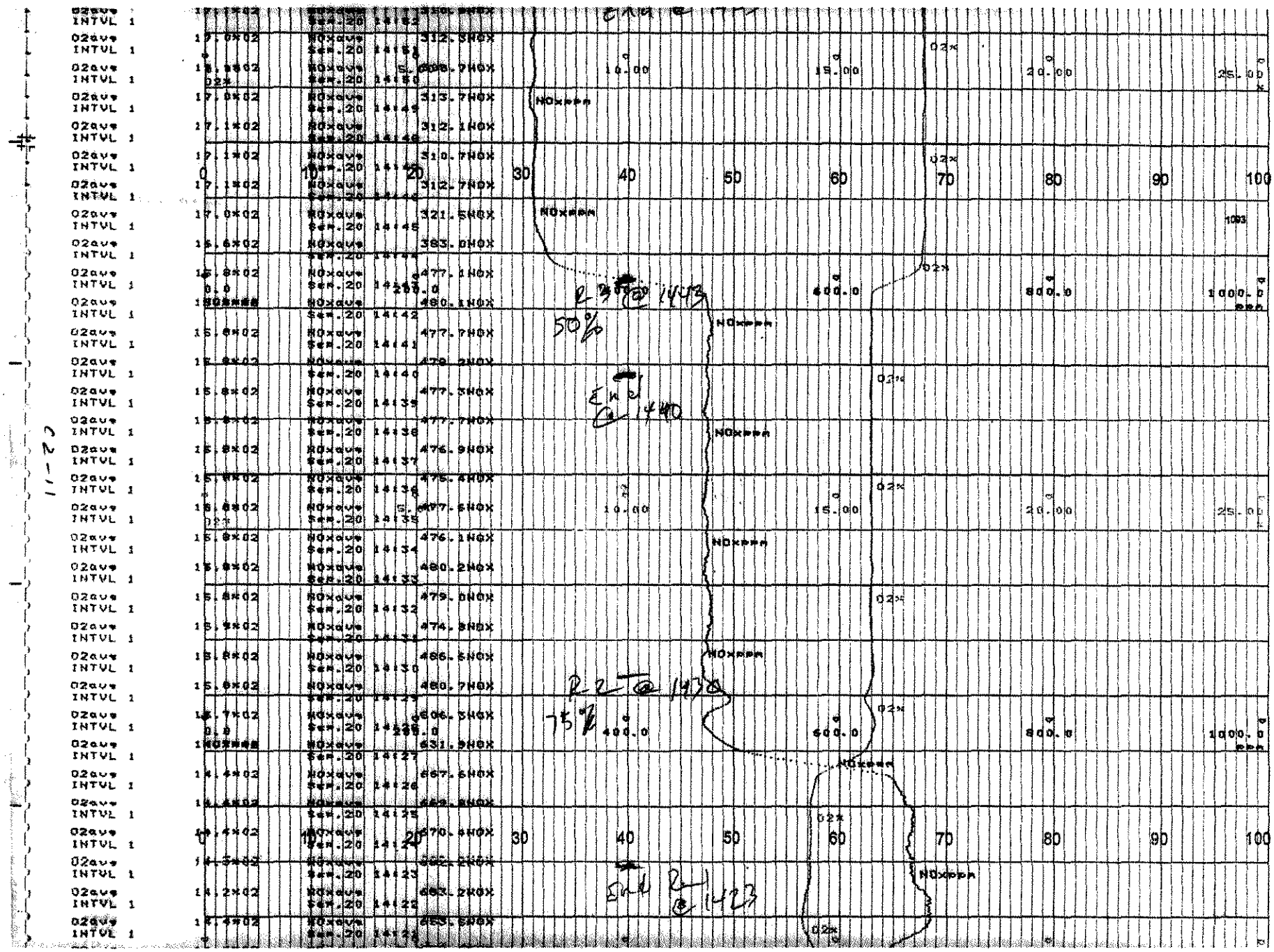


CHART NO. 89627AY
Port Engine
400mm/h
Sep.20 14:00
0506N50/1647514.04


O2ave
INTVL 1
NOxave
Sep.20 14:23
Sep.20 14:22
Sep.20 14:21
Sep.20 14:20
Sep.20 14:19
Sep.20 14:18
Sep.20 14:17
Sep.20 14:16
Sep.20 14:15
Sep.20 14:14
Sep.20 14:13
Sep.20 14:12
Sep.20 14:11
Sep.20 14:10
Sep.20 14:09
Sep.20 14:08
Sep.20 14:07
Sep.20 14:06
Sep.20 14:05
Sep.20 14:04
Sep.20 14:03
Sep.20 14:02
Sep.20 14:01
Sep.20 14:00
NOxppm
O2%
DELTA S-CEMS
400mm/h
Sep.20 14:00
400.0
600.0
800.0
1000.0
10.00
15.00
20.00
25.00
30
40
50
60
70
80
90
100

C2-D


End @ 1444
R-2 @ 1443
50%
End @ 1440
R-2 @ 1438
75%
End R @ 1423
NOx
O2%
0
10
20
30
40
50
60
70
80
90
100
10.00
15.00
20.00
25.00
400.0
600.0
800.0
1000.0

C-2-11

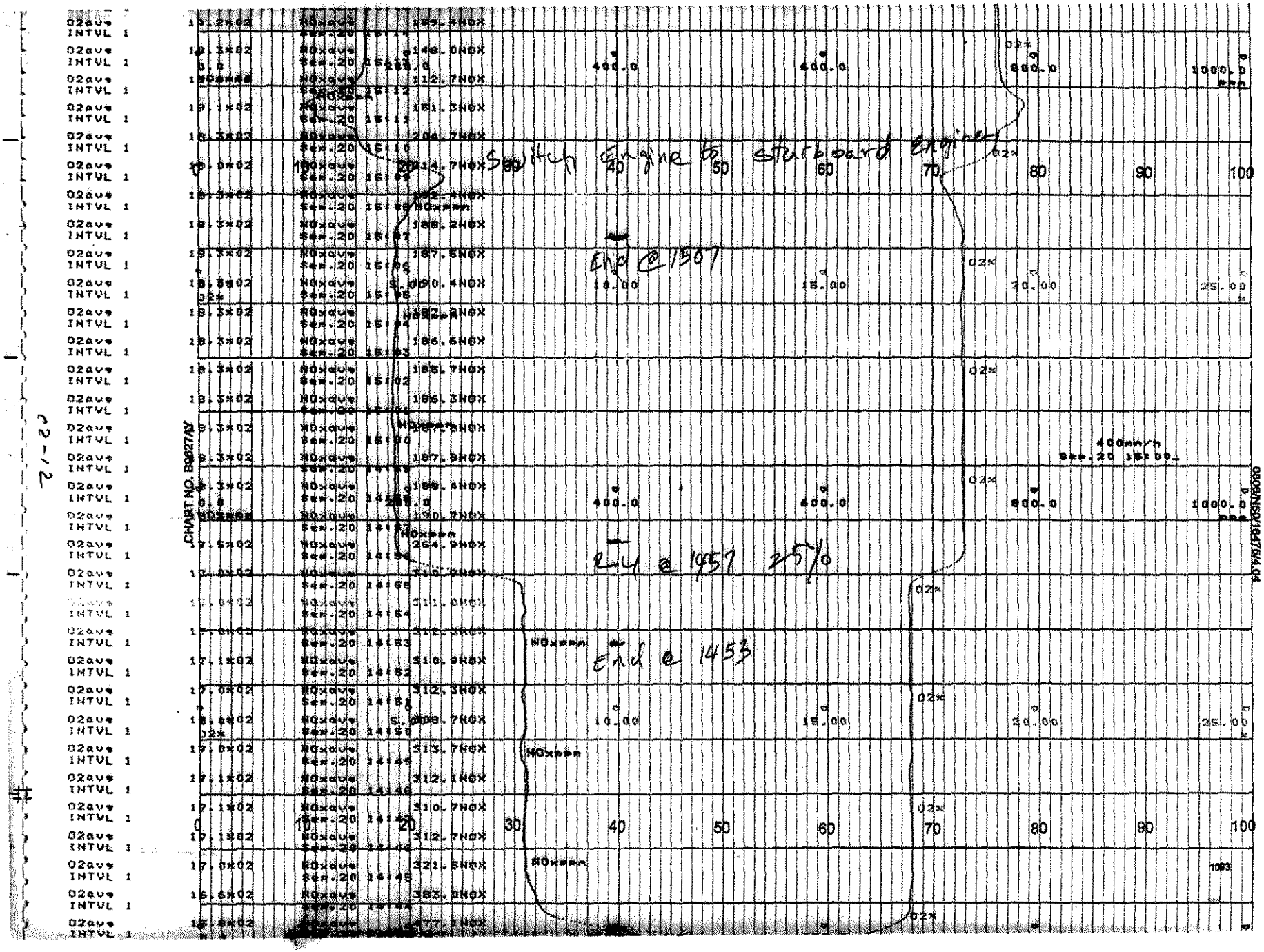
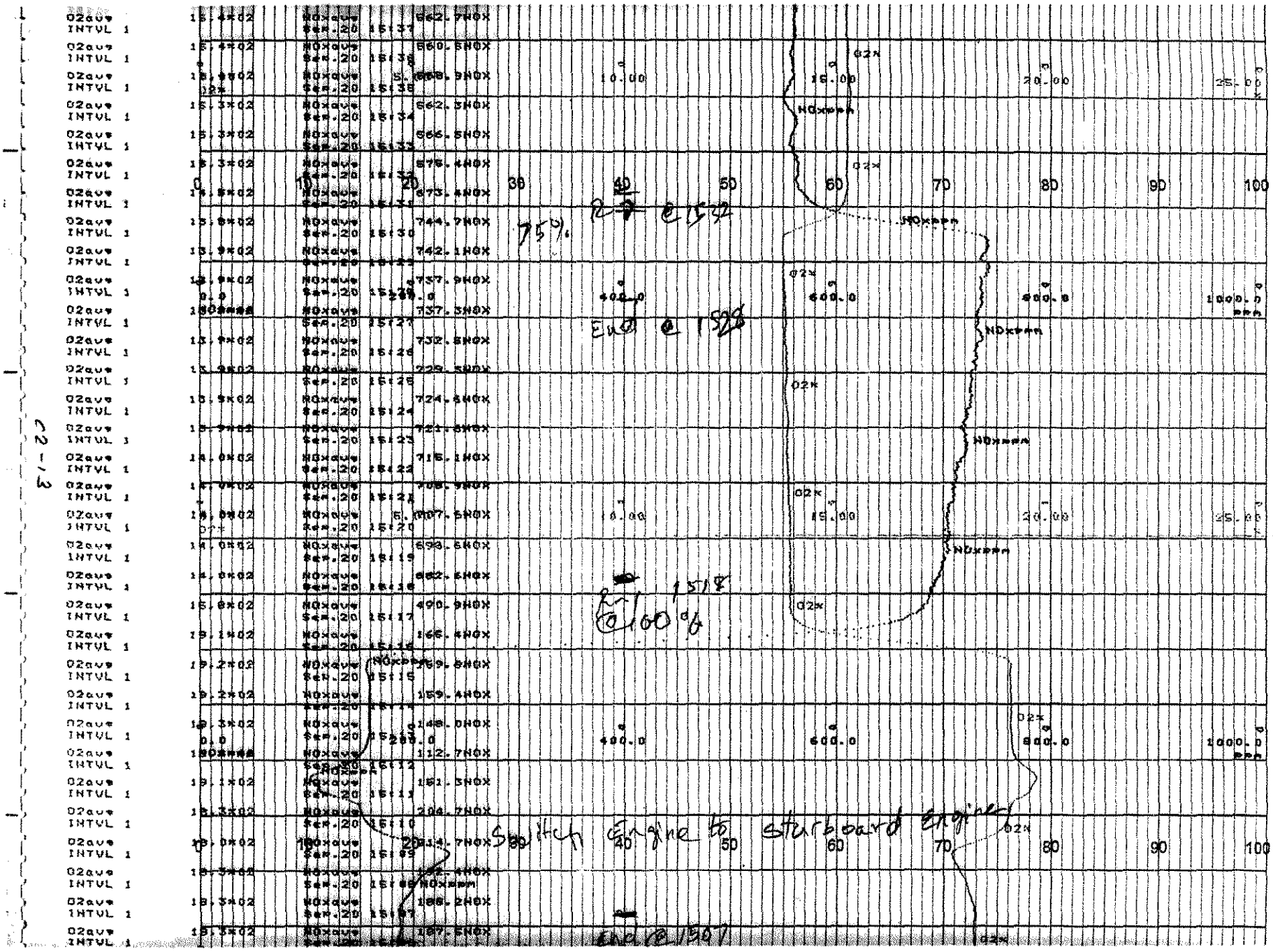
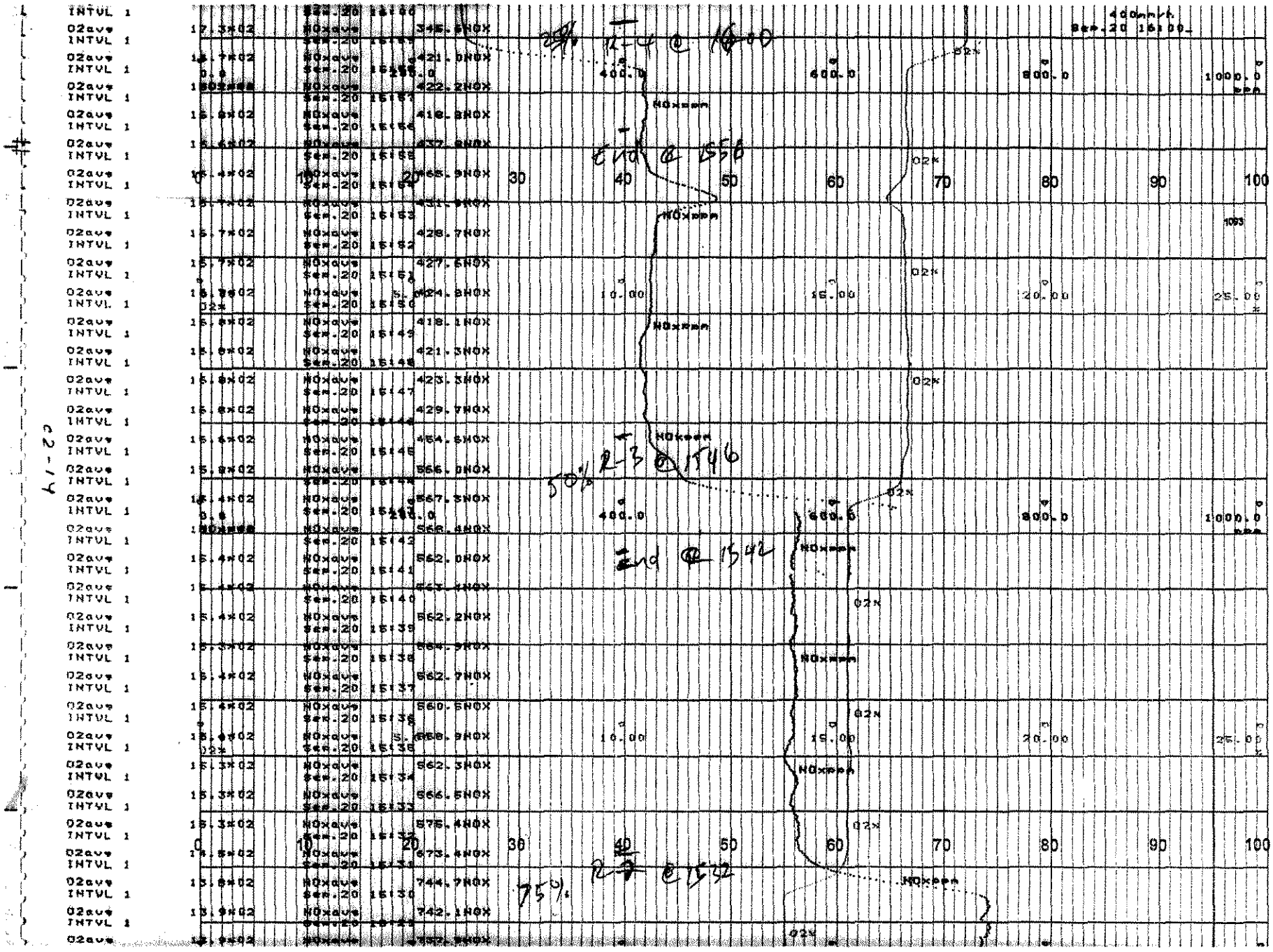


CHART NO. B9827AY
Switch Engine to Starboard Engine
End @ 1507
End @ 1457 25%
End @ 1453
400mm/h
Sep.20 15:00
NOxppm
O2%
0
10
20
30
40
50
60
70
80
90
100
400.0
800.0
1000.0
10.00
15.00
20.00
25.00

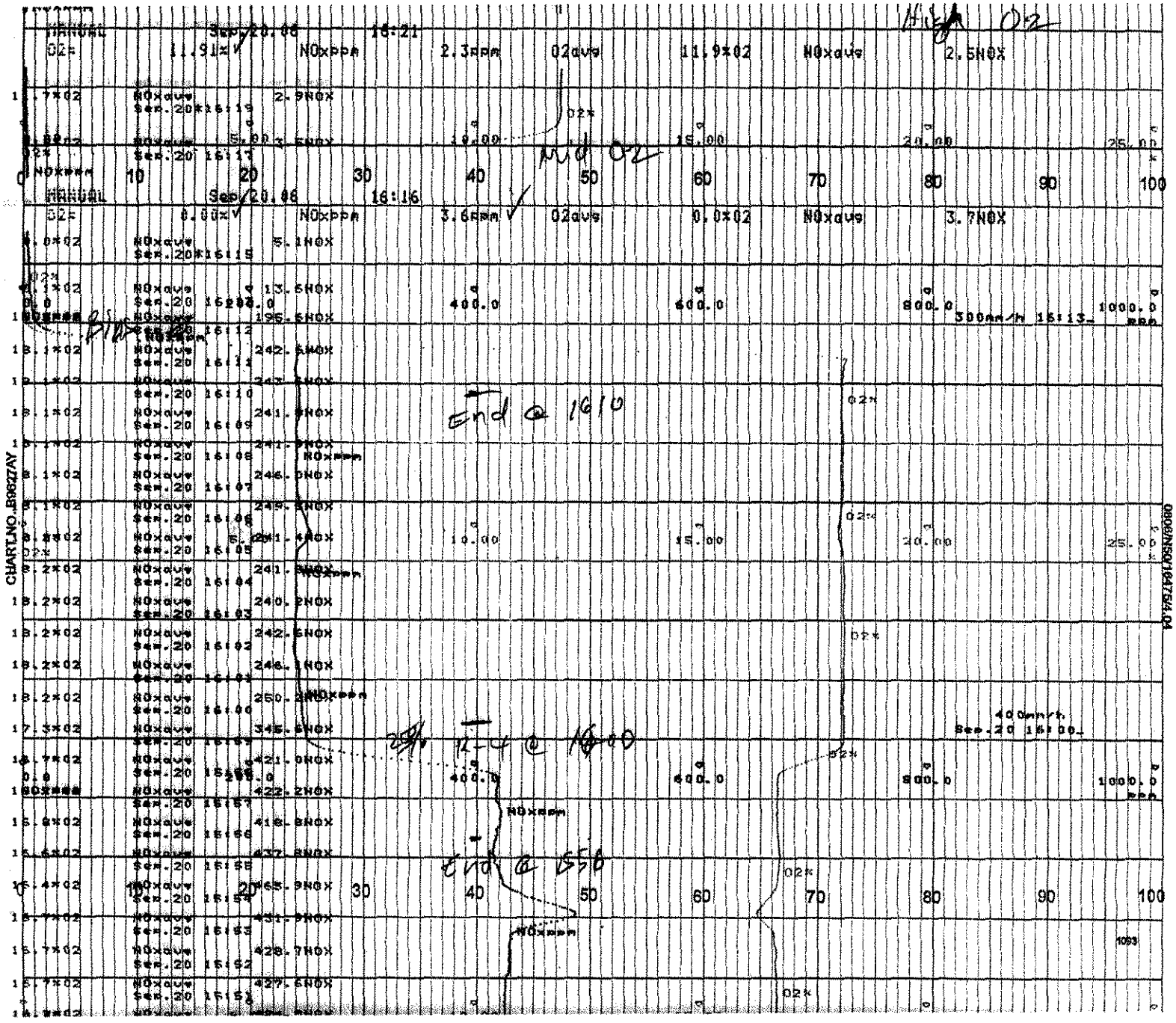
C2-12


O2ave INTVL 1
NOxave
Ser.20
O2%
NOx***
10.00
15.00
20.00
25.00
400.0
600.0
800.0
1000.0
0
10
20
30
40
50
60
70
80
90
100
75%
End @ 1522
End @ 1528
1518
@ 100%
Switch Engine to Starboard Engine
End @ 1507

C2-13


INTVL 1
O2avg
NOxavg
Sep.20 16:00
400mm/h
Sep.20 16:00
25% R-4 @ 1600
End @ 1550
50% R-3 @ 1546
End @ 1542
75% R-2 @ 1542
NOxppm
O2%
400.0
600.0
800.0
1000.0
10.00
15.00
20.00
25.00
0
10
20
30
40
50
60
70
80
90
100
1093

C2-19


MANUAL Sep/20.06 16:21
O2F 11.91%V NOxppm 2.3ppm O2ave 11.9%O2 NOxave 2.5NOX
High O2
O2ave INTVL 1
11.7%O2 NOxave 2.9NOX
Sep.20 16:19
O2ave INTVL 1
NOxave 5.0 3.5NOX
Sep.20 16:17
NOxppm
Mid O2
MANUAL Sep/20.06 16:16
O2F 8.00%V NOxppm 3.6ppm O2ave 0.0%O2 NOxave 3.7NOX
O2ave INTVL 1
8.0%O2 NOxave 5.1NOX
Sep.20 16:15
O2ave INTVL 1
8.1%O2 NOxave 13.5NOX
Sep.20 16:13
NOxave 195.5NOX
Sep.20 16:12
NOxppm
8.1%O2 NOxave 242.5NOX
Sep.20 16:11
8.1%O2 NOxave 243.5NOX
Sep.20 16:10
8.1%O2 NOxave 241.9NOX
Sep.20 16:09
End @ 1610
8.1%O2 NOxave 241.9NOX
Sep.20 16:08
NOxppm
8.1%O2 NOxave 246.0NOX
Sep.20 16:07
8.1%O2 NOxave 245.5NOX
Sep.20 16:06
8.0%O2 NOxave 241.4NOX
Sep.20 16:05
8.2%O2 NOxave 241.8NOX
Sep.20 16:04
NOxppm
8.2%O2 NOxave 240.2NOX
Sep.20 16:03
8.2%O2 NOxave 242.5NOX
Sep.20 16:02
8.2%O2 NOxave 246.1NOX
Sep.20 16:01
8.2%O2 NOxave 250.2NOX
Sep.20 16:00
NOxppm
7.3%O2 NOxave 345.5NOX
Sep.20 16:59
End @ 1600
400mm/h
Sep.20 16:00
7.7%O2 NOxave 421.0NOX
Sep.20 15:58
7.8 NOxave 422.2NOX
Sep.20 15:57
NOxppm
6.8%O2 NOxave 418.8NOX
Sep.20 15:56
6.6%O2 NOxave 437.8NOX
Sep.20 15:55
End @ 550
6.4%O2 NOxave 465.9NOX
Sep.20 15:54
NOxppm
5.7%O2 NOxave 431.9NOX
Sep.20 15:53
5.7%O2 NOxave 428.7NOX
Sep.20 15:52
5.7%O2 NOxave 427.5NOX
Sep.20 15:51
O2ave
CHART NO. B9627AY
0906N50/1847564.04
1093

C2-15

02avg INTVL 1 | 0.0%02 | NOxavg 5.0 2.2NOX | 10.00 | 15.00 | 20.00 | 25.00
02%

02avg INTVL 1 | 0.0%02 | NOxavg 877.3NOX
Sep.20%16:47

02avg INTVL 1 | 0.0%02 | NOxavg 827.9NOX
Sep.20%16:46

02avg INTVL 1 | 0.0%02 | NOxavg 893.7NOX
Sep.20%16:43

02avg INTVL 1 | 0.0%02 | NOxavg 884.3NOX
Sep.20%16:41

02avg INTVL 1 | 0.0%02 | NOxavg 200 527.0NOX | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 ppm
NOxppm | Sep.20 16:39

High NOX

MANUAL Sep.20.06 16:38
O2% 0.01% NOxppm 440.3ppm ✓ O2avg 0.0%02 NOxavg 440.3NOX

02avg INTVL 1 | 0.0%02 | NOxavg 200 489.8NOX | 400.0 | 600.0 | 800.0 | 1000.0 ppm
NOxppm | Sep.20%16:37

02avg INTVL 1 | 0.0%02 | NOxavg 394.5NOX
Sep.20%16:35

Mid NOX

02avg INTVL 1 | 0.0%02 | NOxavg 461.5NOX
Sep.20%16:33

02avg INTVL 1 | 0.0%02 | NOxavg 489.9NOX
Sep.20%16:31

02avg INTVL 1 | 0.1%02 | NOxavg 491.9NOX
Sep.20%16:29

02avg INTVL 1 | 0.4%02 | NOxavg 5.0 23.6NOX | 10.00 | 15.00 | 20.00 | 25.00
02% | Sep.20 16:27
NOxppm

MANUAL Sep.20.06 16:26
O2% 20.07% ✓ NOxppm 2.0ppm O2avg 20.9%02 NOxavg 2.1NOX

02avg INTVL 1 | 20.4%02 | NOxavg 2.4NOX
Sep.20%16:24

02avg INTVL 1 | 0.0%02 | NOxavg 200 02.5NOX | 400.0 | 600.0 | 800.0 | 1000.0 ppm
NOxppm | Sep.20 16:22
NOxppm

High O2

MANUAL Sep.20.06 16:21
O2% 11.91% ✓ NOxppm 2.3ppm O2avg 11.9%02 NOxavg 2.5NOX

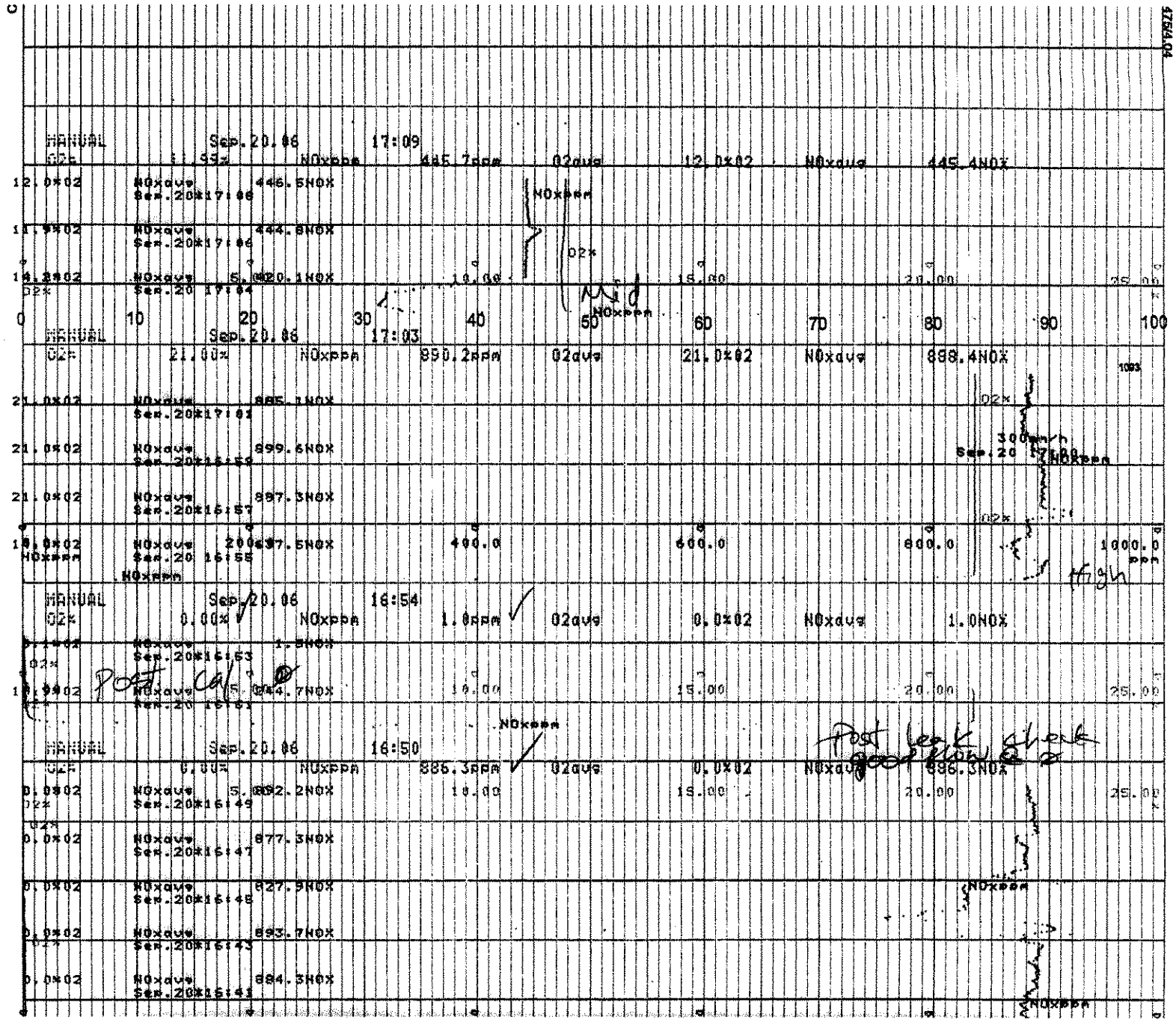
02avg INTVL 1 | 11.7%02 | NOxavg 2.9NOX
Sep.20%16:19

02avg INTVL 1 | 0.0%02 | NOxavg 5.0 3.5NOX | 10.00 | 15.00 | 20.00 | 25.00
02% | Sep.20 16:17
NOxppm | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100

Mid O2

MANUAL Sep.20.06 16:16
O2% 0.00% ✓ NOxppm 3.6ppm ✓ O2avg 0.0%02 NOxavg 3.7NOX

C2-6


MANUAL Sep.20.06 17:09
O2% 11.99% NOxppm 485.7ppm O2ave 12.0%O2 NOxave 445.4NOx
MANUAL Sep.20.06 17:03
O2% 21.00% NOxppm 990.2ppm O2ave 21.0%O2 NOxave 888.4NOx
MANUAL Sep.20.06 16:54
O2% 0.00% NOxppm 1.0ppm O2ave 0.0%O2 NOxave 1.0NOx
MANUAL Sep.20.06 16:50
O2% 0.00% NOxppm 886.3ppm O2ave 0.0%O2 NOxave 896.3NOx
NOxppm
O2%
High
Post cal
Post leak check good flow
C2-4

Appendix C3

CEMS – QA/QC

RM CALIBRATION DATA

FACILITY: Sause Brothers
CITY: Olympic, Seattle
UNIT TESTED: ICE
DATE: 9/20/2006
MSTVO: TA / RS

		QA/QC	
		O2	**Nox**
A	High Span Gas Concentration	21.00	890.00
B	Mid Span Gas Concentration	12.00	441.00
C	Initial Zero Response	0.00	1.00
D	Initial High Span Response	20.98	894.10
E	Initial Mid Span Response	11.98	439.20
F	*Initial System Bias Zero*	0.02	0.50
G	*Initial System Bias Response, Span*	11.93	436.00
H	*Final System Bias Zero*	0.00	3.60
I	*Final System Bias Response, Span*	11.91	440.30
J	Final Zero Response	*0.00*	*1.00*
K	Final High Span Response	*21.00*	*890.20*
L	Final Mid Span Response	*11.99*	*445.70*
M	Analyzer Range	25	1000
	Response Time (sec)	34	46
N	***Initial Linearity*** *= {(E-C)-((D-C)xB)/A} x 100/M*	***0.0***	***-0.4***
O	***Final Linearity =*** *{(L-J)-((K-J)xB)/A} x 100/M*	*0.0*	*0.4*
P	***Initial RM Cal Error, Zero (%F.S.) =*** *[C/M] x 100*	***0.0***	***0.1***
Q	***Final RM Cal Error, Zero (%F.S.) =*** *[J/M] x 100*	*0.0*	*0.1*
R	***Initial RM Cal Error, Mid (%F.S.) =*** *[(E-B)/M] x 100*	***-0.1***	***-0.2***
S	***Final RM Cal Error, Mid (%F.S.) =*** *[(L-B)/M] x 100*	*0.0*	*0.5*
T	***Initial RM Cal Error, High (%F.S.) =*** *[(D-A)/M] x 100*	***-0.1***	***0.4***
U	***Final RM Cal Error, High (%F.S.) =*** *[(K-A)/M] x 100*	*0.0*	*0.0*
V	***Initial System Bias, Zero (%F.S.) =*** *[(F-C)}/M] x 100*	***0.1***	***-0.1***
W	***Final System Bias, Zero (%F.S.) =*** *[(H-J)}/M] x 100*	***0.0***	***0.3***
X	***Initial System Bias, Upper (%F.S.) =*** *[(G-D*)}/M] x 100*	***-0.2***	***-0.3***
Y	***Final System Bias, Upper (%F.S.) =*** *[(I-K**)}/M] x 100*	***-0.3***	***-0.5***
	Average NOx Converter Test, (%) - (from stripchart) =		***90.8%***

* D or E, whichever gas was used for bias check
** K or L, whichever gas was used for bias check

Facility:	Sause Brothers
City:	Olympic, Seattle
Source:	ICE
Date:	09/20/2006
Operator:	TA / RS

NO2-to-NO CONVERTER EFFICIENCY CALCULATION

NO2 CONCENTRATION (Co):	33.20
AUDIT GAS WITH NO MODE (C1):	0.73
AUDIT GAS WITH NOx MODE (C2):	30.88

CALCULATIONS:

D1=|C2-C1|=	30.15
D2=|Co-C2|=	**2.32**

% CONVERTER EFFICIENCY: %CE=D1*100/Co= 90.8

Acceptance Criteria*	**(Yes/No)**
D2 < 1 ppm:	no
% Converter Efficiency > 90% :	yes

STATUS: PASS

* NO2-to-NO Conversion Efficiency must be greater than 90%, OR NO2-response must be within 1 ppmv of expected value.

APPENDIX D

QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

AIR LIQUIDE™

CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Cylinder Number: CC143871

Customer: ALMEGA ENVIRONMENTAL
HUNTINGTON BEACH, CA

P.O. Number:
Item Number:

Shipping Order Number: 17980986
Transfer Number:
Lot Number: SFS89905
Valve: CGA590
Cyl. Pressure:* 2000PSIG

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 26-Sep-05

Expiration Date: 26-Sep-08

COMPONENT	REQUESTED Concentration	ASSAY Concentration			
Carbon Dioxide	**4.5 %**	**4.50**	**±**	**0.05**	**%**
Oxygen	**21 %**	**21.0**	**±**	**0.3**	**%**
Nitrogen	**Balance**	**Balance**			

Reference Standard Employed For Analysis:

Concentration				Component	Balance	SRM Cyl. No.	NTRM No.	Exp. Date	Sample No.	Type
5.006	±	0.026	%	Carbon Dioxide	Nitrogen	CC62828	950808	04/08/06	PA	GMIS
21.11	±	0.14	%	Oxygen	Nitrogen	CC62828	950808	04/08/06	PA	GMIS

Analysis Information

Component	Carbon Dioxide		First Triad Analysis: 9/26/2005				
Analyzer Information			Trial 1	Trial 2	Trial 3	Units	
Manufacturer:	Hewlett Packard	Zero	0	0	0	%	
Model Number:	5890A	Reference	4.997	5.006	5.039	%	
Serial Number:	3336A54620	Candidate	4.486	4.498	4.544	%	
MPR Last Calibrated:	09/09/05	Result	4.494	4.498	4.514	%	
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID		
			MEAN ANALYTICAL RESULT:			4.502	%

Component	Oxygen		First Triad Analysis: 9/26/2005				
Analyzer Information			Trial 1	Trial 2	Trial 3	Units	
Manufacturer:	Hewlett Packard	Zero	0	0	0	%	
Model Number:	5890A	Reference	21.12	21.11	21.15	%	
Serial Number:	3336A54620	Candidate	20.959	20.945	21.01	%	
MPR Last Calibrated:	09/13/05	Result	20.95	20.95	20.97	%	
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID		
			MEAN ANALYTICAL RESULT:			20.95	%

Analyst Signature: Eric Barron

Approved by: David Connolly

AIR LIQUIDE AMERICA, L.P. Region Office • 8832 Dice Road, Santa Fe Springs, CA 90670-2516
Phone: (562) 945-1383 • Fax: (562) 693-1156

AIR LIQUIDE™

CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section No. 2.2, Procedure . G-1

Cylinder Number: CC160917

Customer: ALMEGA ENVIRONMENTAL
HUNTINGTON BEACH, CA

P.O. Number:
Item Number:

Shipping Order Number: 22179821
Transfer Number:
Lot Number: SFS100034
Valve: CGA 590
Cyl. Pressure:* 2000PSIG

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 6-Sep-06

Expiration Date: 6-Sep-09

COMPONENT	REQUESTED Concentration	ASSAY Concentration			
Carbon Dioxide	**9 %**	**8.99**	**±**	**0.11**	**%**
Oxygen	**12 %**	**12.0**	**±**	**0.1**	**%**
Nitrogen	**Balance**	**Balance**			

Reference Standard Employed For Analysis:

Concentration				Component	Balance	SRM Cyl. No.	NTRM No.	Exp. Date	Sample No.	Type
5.012	±	0.035	%	Carbon Dioxide	Nitrogen	CC62828	950808	06/29/08	PA	GMIS
21.19	±	0.11	%	Oxygen	Nitrogen	CC62828	950808	06/29/08	PA	GMIS

Analysis Information

Component	Carbon Dioxide		First Triad Analysis: 9/6/2006			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	5.027	5.029	5.021	%
Serial Number:	3336A54620	Candidate	9.021	9.015	9.020	%
MPR Last Calibrated:	08/08/06	Result	8.994	8.985	9.004	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:		8.994	%

Component	Oxygen		First Triad Analysis: 9/6/2006			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	21.25	21.27	21.27	%
Serial Number:	3336A54620	Candidate	12.07	12.08	12.07	%
MPR Last Calibrated:	08/15/06	Result	12.04	12.03	12.02	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:		12.03	%

Analyst Signature: _____ Eric Barron

Approved by: _____ Thuan Tran

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Phone: (562) 945-1383 • Fax: (562) 693-1156

D1-2

AIR LIQUIDE™

RECERTIFICION of ANALYSIS

EPA Protocol Gases

Cyl. Number:	Cyl. Pressure:*	Lot Number:
CC71634	1750PSIG	SFS76505
Assay Date:	**Expiration Date:**	**Document Number:**
01/14/05	01/14/07	14987834
Customer:		**P.O. Number:**
ALMEGA ENVIRONMENTAL & TECHNICAL SERVICES HUNTINGTON BEACH, CA		300626

*Mixture is valid only to 150 psig

COMPONENT Name	REQUESTED Concentration	ASSAY Concentration
Nitric Oxide	890 ppm	890 ± 10 ppm
NOx		890 ppm
Nitrogen	Balance	Balance

EPA Protocol
Section No. 2.2, Procedure . G-1

Analyst: Thuan Tran
Approved by: David Connolly

REFERENCE STANDARD EMPLOYED FOR ANALYSIS

Concentration	Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
772 ± 4 ppm	Nitric Oxide	Nitrogen	CC 155857	SFS51402	06/03/05	ME	GMIS

Nitric Oxide
GAS ANALYZER EMPLOYED

Manufacturer:	Beckman
Model Number:	951A
Serial Number:	00100508
MPR Last Calibrated:	12/17/04
Analytical Principle:	Chemiluminescent

ANALYSIS SUMMARY

	04/29/03 Triad 1	04/29/03 Triad 2	04/29/03 Triad 3	Nitric Oxide Units
Zero				Vdc
Reference	Initial Analysis			Vdc
Candidate				Vdc
Result				ppm
Evaluation	VALID	VALID	VALID	
MEAN ANALYTICAL RESULT:			890.0 ppm	

	01/14/05 Triad 4	01/14/05 Triad 5	01/14/05 Triad 6	Nitric Oxide Units
Zero	0	0	0	Vdc
Reference	772	773	773	Vdc
Candidate	891	891	892	Vdc
Result	891.0	889.8	890.8	ppm
Evaluation	VALID	VALID	VALID	
MEAN ANALYTICAL RESULT:			890.6 ppm	

Analyst:	Approved by:
Thuan Tran	David Connolly

AIR LIQUIDE AMERICA, L.P. Region Office • 8832 Dice Road, Santa Fe Springs, CA 90670-2516
Phone: (562) 945-1383 • Fax: (562) 693-1156

D-3

QUIDE

RECERTIFICATION OF ANALYSIS

ɜrference-Free Multi-Component EPA Protocol Gases

.. Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Cylinder Number: CC62403

Customer: ALMEGA ENVIRONMENTAL & TECHNICAL
HUNTINGTON BEACH, CA
P.O. Number: 300800
Item Number:

Shipping Order Number 17644036
Transfer Number:
Lot Number: SFS89060
Valve: CGA 660
Cyl. Pressure:* 1200PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 24-Aug-05

Expiration Date: 24-Aug-07

Component	REQUESTED Concentration	ASSAY Concentration		
Nitric Oxide	**441 ppm**	**441**	**± 6**	**ppm**
NOx		**441**	**ppm**	
Nitrogen	**Balance**	**Balance**		

Reference Standard Employed For Analysis:

Concentration				Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
495	±	5	ppm	Nitric Oxide	Nitrogen	CC179951	SFS63900	09/16/06	QA	GMIS

Analysis Information:

Component	Nitric Oxide		First Triad Analysis 02/17/04					Second Triad Analysis 08/24/05				
Analyzer Information			Trial 1	Trial 2	Trial 3	Units			Trial 4	Trial 5	Trial 6	Units
Manufacturer:	Beckman	Zero				Vdc		Zero	0	0	0	Vdc
Model Number:	951A	Reference				Vdc		Reference	501	500	501	Vdc
Serial Number:	00100508	Candidate	INITIAL ANALYSIS			Vdc		Candidate	447	447	447	Vdc
MPR Last Calibrated:	08/02/05	Result				ppm		Result	441.6	442.5	441.6	ppm
Analytical Principle:	Chemiluminescent	Evaluation	VALID	VALID	VALID			Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:			441.0	ppm		MEAN ANALYTICAL RESULT:			441.9	ppm

Analyst Signature: Thuan Tran

Approved by: Eric Barron

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D-4

AIR LIQUIDE

CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Cylinder Number: CC171907

Customer: ALMEGA ENVIRONMENTAL
HUNTINGTON BEACH, CA

P.O. Number:
Item Number:

Shipping Order Number 18339741
Transfer Number:
Lot Number: SFS90837
Valve: CGA 660
Cyl. Pressure:* 2000PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 31-Oct-05

Expiration Date: 31-Oct-07

Component	REQUESTED Concentration	ASSAY Concentration		
Nitric Oxide	**45 ppm**	**45.3**	**± 0.7**	**ppm**
NOx		**45.3**	**ppm**	
Nitrogen	**Balance**	**Balance**		

Reference Standard Employed For Analysis:

Concentration				Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
49.4	±	0.6	ppm	Nitric Oxide	Nitrogen	CC196515	SFS73789	04/15/07	RG	GMIS

Analysis Information:

Component	Nitric Oxide		Fast Triad Analysis 10/24/05					Second Triad Analysis 10/31/05				
Analyzer Information			Trial 1	Trial 2	Trial 3	Units			Trial 4	Trial 5	Trial 6	Units
Manufacturer:	Beckman	Zero	0	0	0	Vdc		Zero	0	0	0	Vdc
Model Number:	951A	Reference	491	491	491	Vdc		Reference	492	492	491	Vdc
Serial Number:	00100508	Candidate	449	450	449	Vdc		Candidate	452	451	451	Vdc
MPR Last Calibrated:	10/10/05	Result	45.17	45.27	45.17	ppm		Result	45.38	45.28	45.38	ppm
Analytical Principle:	Chemiluminescent	Evaluation	VALID	VALID	VALID			Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:			45.21	ppm		MEAN ANALYTICAL RESULT:			45.35	ppm

Analyst Signature: Thuan Tran

Approved by: David Connolly

AIR LIQUIDE AMERICA, L.P. Region Office • 8832 Dice Road, Santa Fe Springs, CA 90670-2516
Phone: (562) 945-1383 • Fax: (562) 693-1156

Spectra Gases, Inc.

3434 Route 22 West, Branchburg, New Jersey 08876 USA

ISO 9001:2000

Shipped from: 80 Industrial Drive, Alpha, NJ 08865

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

CUSTOMER: Almega Environmental
SGI ORDER # : 0088807
ITEM# : 1
P.O.# : 300978

CYLINDER # : CC-94737
CYLINDER PRES: 2000 PSIG
CGA OUTLET: 660

CERTIFICATION DATE: 5/1/2006
EXPIRATION DATE: 11/1/2006

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Nitrogen Dioxide	4/24/2006 5/1/2006	33.01 ppm 33.33 ppm	33.2 ppm	+/- 3%

BALANCE Air
PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Nitric Oxide	NTRM-81684	CC-133685	99.5 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Nitrogen Dioxide	CAI-400-CLD	6L09004	Chemi	4/24/2006

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 150 PSIG.

ANALYST: FRED PIKULA

DATE: 5/1/2006

Tel: +1 908-252-9300 Fax: +1 908-252-0811
www.spectragases.com

0-6

APPENDIX E

FACILITY PROCESS DATA

M/V Pacific Falcon Reading taken by Steve Sonni, 9/20/06

Starboard

Time	Rack Position	RPM	H.P.	Fuel, gph
3:20	1.05	935	1800	120.7
3:25	1.05	935		
3:30	1.05	933		
3:35	1.22	851	1380	91.7
3:40	1.22	853		
3:45	1.22	852		
3:49	1.38	750	875	60.0
3:53	1.38	749		
3:58	1.38	750		
4:04	1.56	590	400	28.0
4:09	1.56	590		
4:14	1.56	592		
Avg over E-3 Cycle			1241.25	83.19

PORT

Time	Rack	RPM	H.P.	Fuel, gph
2:18	1.16	901	1595	106.9
2:23	1.16	902		
2:28	1.16	899		
2:35	1.32	810	1100	73.1
2:40	1.32	809		
2:45	1.32	810		
2:48	1.46	715	750	51.5
2:53	1.46	719		
2:58	1.46	719		
3:01	1.6	570	315	22
3:06	1.6	570		
3:11	1.64	566		
Avg over E-3 cycle			1028.75	65.655

M/V Klihyam
Revised Worksheets

ATTACHMENT A

M/V Klihyam
Emission Reduction Summary

A. Trip Logs Summary

Line Haul Distances

SCAQMD Jursidiction	82	16.87%
VCAPCD Jurisdiction	44	9.05%
SBAPCD Jurisdiction	130	26.75%
SLOAPCD	60	12.35%
MBUAPCD Jurisdiction	100	20.58%
BAAQMD Jurisdiction	70	14.40%
	486	

SCAQMD and BAAQMD miles include the turn into the Port

B. Emission Factors

Baseline			
NOx	11.31	gms/bhp-hr	Reference: Almega Source test of M/V Klihyam
PM	0.53	gms/bhp-hr	Reference: GM EMD Manufacturers Specification
NOx Correction for California fuel	1		Almega testing already done with California fuel
PM Correction for California fuel	0.8		
Corrected NOx	11.31	gms/bhp-hr	
Corrected PM	0.424	gms/bhp-hr	
Repower			
NOx	4.87	gms/bhp-hr	Reference: USEPA Tier 2 Emission Limit
PM	0.107	gms/bhp-hr	
NOx Correction for California fuel	0.87		
PM Correction for California fuel	0.9		
Corrected NOx	4.2369	gms/bhp-hr	
Corrected PM	0.0963	gms/bhp-hr	

Revised 10/08/2006

ATTACHMENT A

M/V Klihyam
Emission Reduction Summary

C. Emission Reductions

Methodology for calculating emission reductions: SCAQMD Rule 1631 - Pilot Credit Generation Program for Marine Vessels (SIP-approved MSERC calculation method peer reviewed by USEPA)

Emission reductions (tons/yr) = (EFbase-EFrepower) x ECF x Fuel Burn / 454/2000
where ECF = Energy Consumption Factor

EFBase = 11.31 gms/bhp-hr	Reference: Almega Test
EFrepower = 4.87 gms/bhp-hr	Reference: USEPA Tier 2 Emission Limit
ECF = 22.61 bhp-hr/gal	Reference: ElectroMotive 8-710 Tier 2 Certificate of Conformity 22.61 bhp-hr/gal = 1/(0.314 lb/bhp-hr /7.1 lb/gal) @ 900 RPM

C.1 Emission Reductions by Segment

Line Haul segment	
NOx	79.24 tons/yr
PM	3.67 tons/yr
Local Los Angeles/Long Beach/El Segundo segment	
NOx	12.97 tons/yr
PM	0.60 tons/yr
Local San Francisco, Richmond, Martinez segment	
NOx	5.39 tons/yr
PM	0.25 tons/yr
Total Emission Reductions NOx	**97.60 tons/yr**
Total Emission Reductions PM	**4.52 tons/yr**

Revised 10/08/2006

ATTACHMENT A

M/V Klihyam
Emission Reduction Summary

C.2 Emissions Reductions by Air District

NOx

	Line Haul Segment tons/yr	Local Segment tons/yr	Total tons/yr	% of All
SCAQMD	13.37	12.97	26.34	26.99%
VCACPD	7.17	0.00	7.17	7.35%
SBAPCD	21.19	0.00	21.19	21.72%
SLOAPCD	9.78	0.00	9.78	10.02%
MBUAPCD	16.30	0.00	16.30	16.71%
BAAQMD	11.41	5.39	16.80	17.22%
	79.24	18.36	97.60	

PM

	Line Haul Segment tons/yr	Local Segment tons/yr	Total tons/yr	% of All
SCAQMD	0.62	0.60	1.22	26.99%
VCACPD	0.33	0.00	0.33	7.35%
SBAPCD	0.98	0.00	0.98	21.72%
SLOAPCD	0.45	0.00	0.45	10.02%
MBUAPCD	0.76	0.00	0.76	16.71%
BAAQMD	0.53	0.25	0.78	17.22%
	3.67	0.85	4.52	

ATTACHMENT A

M/V Klihyam
Emission Reduction Summary

E. Trip Logs

E.1. Line Haul Trips 3/10-05-3/10-06

From	To	# trips	Hrs	Avg hrs/trip
Richmond	Los Angeles	20	1039	52.0
Long Beach	Richmond	5	353	70.6
Richmond	Long Beach	1	50	50.0
Los Angeles	Richmond	9	445	49.4
El Segundo	Richmond	7	343	49.0
Martinez	Long Beach	2	92	46.0
Los Angeles	San Francisco	1	40	40.0
Rodeo	Long Beach	1	50	50.0
Long Beach	Martinez	1	56	56.0
El Segundo	Benecia	2	100	50.0
		49	2568	52.4

One trip on 12/16/05 115 hrs (weather delayed), average load factor = 0.45
2453 hours at 0.97 load factor, 115 hours at 0.1 load factor
Composite load factor = 0.93

E.2. Local Los Angeles/Long Beach/El Segundo 3/10-05-3/10-06

# trips	Hrs	Avg hrs/trip
157	521.2	3.3

E.3. Local Richmond, Martinez, Benecia 3/10-05-3/10-06

# trips	Hrs	Avg hrs/trip
85	216.6	2.5

E.4. Data Reduction

Total run hours	3305.8	for 3/10/05 - 3/10/06
Total trips	291	for 3/10/05 - 3/10/06
Avg/trip hrs/trip	11.4	for 3/10/05 - 3/10/06

Service	Engine H.P.	Load Factor	Fuel Consumption gal/hr	Total Hrs Actual	Total Fuel Consumed Calculated gal	Total Fuel Consumed Adjusted for Actual, gal	% of total Fuel
Line haul	3,627	0.93	192.2	2,568	493,597	449,486	81.19%
Local Los Angeles/El Segundo/Long Beach	2,925	0.75	155.0	521	80,799	73,578	13.29%
Local Richmond/Benecia/Martinez	2,925	0.75	155.0	217	33,578	30,578	5.52%
				3,306	607,975	553,642	

Revised 10/8/2006

M/V Pacific
Falcon
Revised Worksheets

A. Fuel Logs Summary

2004	Millennium Dawn, Gal	Millennium Star, Gal	Tug Eagle Gal	CF Campbell Gal	Total All Tugs, Gal
January	10,417	11,642	26,849	0	48,908
February	18,062	12,115	28,540	0	58,717
March	6,635	11,493	26,234	0	44,362
April	12,935	22,176	13,644	0	48,755
May	11,655	13,185	0	0	24,840
June	8,521	0	36,636	0	45,157
July	25,877	0	22,042	0	47,919
August	22,950	0	15,090	0	38,040
September	29,260	0	27,618	0	56,878
October	7,254	0	21,386	0	28,640
November	12,666	0	34,868	0	47,534
December	14,612	0	29,033	0	43,645
	180,844	70,611	281,940	0	533,395

2005	Millennium Dawn, Gal	Millennium Star, Gal	Tug Eagle Gal	CF Campbell Gal	Total All Tugs, Gal
January	6,009	0	18,415	0	24,424
February	27,133	0	28,066	0	55,199
March	11,591	0	29,195	0	40,786
April	17,036	0	27,055	0	44,091
May	14,032	0	20,402	0	34,434
June	31,514	0	11,640	0	43,154
July	637	0	17,030	0	17,667
August	23,043	0	0	0	23,043
September	43,440	0	0	0	43,440
October	42,018	0	0	0	42,018
November	31,310	0	0	0	31,310
December	19,548	17,512	0	0	37,060
	267,311	17,512	151,803	0	436,626

2006	Millennium Dawn, Gal	Millennium Star, Gal	Tug Eagle Gal	CF Campbell Gal	Total All Tugs, Gal
January	24,152	24,014	0	0	48,166
February	22,500	39,470	0	28,201	90,171
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
	46,652	63,484	0	28,201	138,337

Revised 10/08/2006

Total fuel consumed most recent 12 months period March 2005 through February 2006

Vessel	Fuel, Gal	% of Total
Millennium Dawn	280,821	56.69%
Millennium Star	80,996	16.35%
Tug Eagle	105,322	21.26%
CF Campbell	28,201	5.69%
Total	495,340	100.00%

Revised 10/08/2006

B. Trip Logs

B.1. Line Haul Trips 3/01-05-2/28-06

From	To	# trips	Hrs	Avg hrs/trip
San Francisco	LA/LB	8	584	73.0
LA/LB	San Francisco	23	1811	78.7
San Francisco	Ellwood	4	280	70.0
Ellwood	LA/LB	15	632	42.1
LA/LB	Ellwood	15	480	32.0
		65	3787	58.3

San Francisco trips include San Francisco, Martinez, Richmond, Alameda, Rodeo, Avon
LA/LB include Los Angeles, Long Beach, El Segundo

B.2. Local Los Angeles/Long Beach/El Segundo 3/01-05-2/28-06

# trips	Hrs	Avg hrs/trip
29	838	28.9

Includes idle hours for vessel while loading, cleaning, safety check etc

B.3. Local Richmond, Martinez, Benicia 3/01-05-2/28-06

# trips	Hrs	Avg hrs/trip
24	549	22.9

Includes idle hours for vessel while loading, cleaning, safety check etc

B.4. Data Reduction

Total run hours	5174	for 3/01/05 - 2/28/06
Total trips	118	for 3/01/05 - 2/28/06
Avg/trip hrs/trip	43.8	for 3/01/05 - 2/28/06

Service	Engine H.P.	Load Factor	Fuel Consumption gal/hr	Total Hrs Actual	Total Fuel Consumed Calculated gal	Total Fuel Consumed Adjusted for Actual, gal	% of total Fuel
Line haul	2,845	0.70	139.4	3,787	527,838	459,290	92.72%
Local Los Angeles/El Segundo/Long Beach	610	0.15	29.9	838	25,031	21,781	4.40%
Local Richmond/Benicia/Martinez	610	0.15	29.9	549	16,399	14,269	2.88%
				5,174	569,268	495,340	

Revised 10/08/2006

C. Emission Reduction Calculations

C.1. Trip Logs Summary

Line Haul Distances

For Line Haul Trips from/to S.F. to LA			For line haul trips from/to Ellwood to LA	
SCAQMD Jurisdiction	82	16.87%	82	56.16%
VCAPCD Jurisdiction	44	9.05%	44	30.14%
SBAPCD Jurisdiction	130	26.75%	20	13.70%
SLOAPCD	60	12.35%	146	
MBUAPCD Jurisdictior	100	20.58%		
BAAQMD Jurisdiction	70	14.40%		
	486			

SCAQMD and BAAQMD miles include the turn into the Port
Approx. 70% of the total line haul hours are for trips between S.F. and LA, remaining 30% are for trips between Ellwood and LA

C.2. Emission Factors

	Engine	H.P.	NOx lbs/hr	CO lbs/hr	HC lbs/hr	PM lbs/hr
Millennium Dawn	3516B	2200	43.88	2.06	0.64	0.4
Millennium Star	3516B	2200	43.88	2.06	0.64	0.4
Tug Eagle	3512B	1500	See gms/bhp-hr data below			
CF Campbell	3516B	2000	59.82	1.56	1.41	0.33

	Engine	H.P.	NOx gms/bhp-hr	CO gms/bhp-hr	HC gms/bhp-hr	PM gms/bhp-hr	Corrected NOx (note 1) gms/bhp-hr	Corrected PM (note 1) gms/bhp-hr
Millennium Dawn	3516B	2200	9.06	0.43	0.13	0.08	8.51	0.07
Millennium Star	3516B	2200	9.06	0.43	0.13	0.08	8.51	0.07
Tug Eagle	3512B	1500	18.10	1.75	0.05	0.10	17.01	0.08
CF Campbell	3516B	2000	13.58	0.35	0.32	0.07	12.76	0.06

Note 1: Correction factor for California fuel NOx 0.94, PM 0.8

Fleet Average Baseline Emission Factors	2039.78	11.24	0.70	0.13	0.09	10.56	0.07

Fleet average emission factor calculated using the formula= (emission factor for Millennium Dawn x % contribution to total yearly fuel + EF Millennium Star x % contribution of Millennium Star to total yearly fuel + EF for Tug Eagle x % contribution total yearly fuel + emission factor for CF Campbell x % contribution of CF Campbell to total yearly fuel)
% fuel contribution numbers taken from the table in Attachment A, Fuel Logs Summary (Table at the end)

Example: Fleet Avg NOx factor = gms/bhp-hr 9.06 x 0.5669 + 9.06 x 0.1635 + 18.10 x 0.2126 + 13.58 x 0.0569
= 11.24

Baseline

Fleetwide

NOx (corrected for California fuel)	10.56	gms/bhp-hr	From table above
NOx (corrected for California fuel)	9.74	gms/bhp-hr	Actual source test of Pacific Falcom by Almega
Nox baseline used for emissions reduct	9.74	gms/bhp-hr	Per CARB direction, use the lower number
CO	0.70	gms/bhp-hr	
HC	0.13	gms/bhp-hr	
PM (corrected for California fuel)	0.07	gms/bhp-hr	
Total Fuel	495,340	gallons/yr	

Repower

NOx	4.87	gms/bhp-hr	Reference: USEPA Tier 2 Emission Limit
PM	0.107	gms/bhp-hr	
NOx Correction for California fuel	0.87		
PM Correction for California fuel	0.9		
Corrected NOx	4.2369	gms/bhp-hr	
Corrected PM	0.0963	gms/bhp-hr	

C.3. Emission Reductions

Methodology for calculating emission reductions: SCAQMD Rule 1631 - Pilot Credit Generation Program for Marine Vessels (SIP-approved MSERC calculation method peer reviewed by USEPA)

Emission reductions (tons/yr) = (EFbase-EFrepower) x ECF x Fuel Burn / 454/2000
where ECF = Energy Consumption Factor

EFbase =	9.74	gms/bhp-hr	Reference: GM EMD Manufacturers Specification
EFrepower	4.24	gms/bhp-hr	Reference: USEPA Tier 2 Emission Limit
ECF =	22.61	bhp-hr/gal	Reference: ElectroMotive 8-710 Tier 2 Certificate of Conformity
			22.61 bhp-hr/gal = 1/(0.314 lb/bhp-hr /7.1 lb/gal) @ 900 RPM

C.4 Emission Reductions by Segment

Line Haul segment

NOx	62.94	tons/yr		
	To/Fm S.F. to LA line haul segment		44.06	tons/yr
	To/Fm Ellwood to LA line haul segment		18.88	tons/yr

Local Los Angeles/Long Beach/El Segundo segment

NOx 2.98 tons/yr

Local San Francisco, Richmond, Martinez, Avon, Rodeo segment

NOx 1.96 tons/yr

Total Emission Reductions NOx 67.88 tons/yr

C.5 Emissions Reductions by Air District

NOx

	Line Haul Segment tons/yr	Local Segment tons/yr	Total tons/yr	% of All
SCAQMD	18.04	2.98	21.02	30.97%
VCACPD	9.68	0.00	9.68	14.26%
SBAPCD	14.37	0.00	14.37	21.17%
SLOAPCD	5.44	0.00	5.44	8.01%
MBUAPCD	9.07	0.00	9.07	13.36%
BAAQMD	6.35	1.96	8.30	12.23%
	62.94	4.94	67.88	