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Environmental Impacts of the Use of Orimulsion®

Report to Congress on Phase 1 of the Orimulsion® Technology Assessment Program

Volume 2: Appendices B-H

Foreword

The U.S. Environmental Protection Agency is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory (NRMRL) is the Agency's center for investigation of technological and management approaches for preventing and reducing risks from pollution that threaten human health and the environment. The focus of the Laboratory's research program is on methods and their cost-effectiveness for prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites, sediments and ground water; prevention and control of indoor air pollution; and restoration of ecosystems. NRMRL collaborates with both public and private sector partners to foster technologies that reduce the cost of compliance and to anticipate emerging problems. NRMRL's research provides solutions to environmental problems by: developing and promoting technologies that protect and improve the environment; advancing scientific and engineering information to support regulatory and policy decisions; and providing the technical support and information transfer to ensure implementation of environmental regulations and strategies at the national, state, and community levels.

This publication has been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

E. Timothy Oppelt, Director
National Risk Management Research Laboratory

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Volume 2. Appendices B-H

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Abstract

Orimulsion, a bitumen-in-water emulsion produced in Venezuela, was evaluated to provide a better understanding of the potential environmental impacts associated with its use as a fuel. A series of pilot-scale tests were conducted at the U.S. Environmental Protection Agency's Environmental Research Center in Research Triangle Park, NC, to provide data on emissions of air pollutants from the combustion of Orimulsion 100 (the original formulation), Orimulsion 400 (a new formulation introduced in 1998), and a No. 6 (residual) fuel oil. These results, and results of full-scale tests reported in the technical literature, were evaluated to determine the potential air pollutant emissions and the ability of commercially available pollution control technologies to adequately reduce those emissions. Emissions of carbon monoxide (CO), oxides of nitrogen (NO_x), sulfur dioxide (SO_2), sulfur trioxide, particulate matter (PM), and organic and metal hazardous air pollutants (HAPs) were measured from each of these three fuels to provide a comparison between the "new" fuel (Orimulsion) and a fuel that has been commonly used in the U.S. (the No. 6 fuel oil). Results indicate that CO, NO_x, and PM emissions are likely to be nearly the same as those from the No. 6 fuel oil, that SO_2 emissions can increase if the fuel sulfur content increases, that the particles generated by Orimulsion 100 and 400 are likely to be smaller in diameter than those generated by No. 6 fuel oil, and that HAPs are also likely to be similar to those from No. 6 fuel oil. Both the full-scale results found in the literature and the pilot-scale results measured at EPA indicate that conventional air pollution control technologies can effectively reduce emissions to very low levels, depending upon the type of technology used and the desired emission levels. Because the bitumen in Orimulsion is heavier than water and due to the presence of a surfactant in the fuel, spills of Orimulsion are likely to be more difficult to contain and recover than are spills of heavy fuel oil, especially in fresh water. Additional study is needed before adequate containment and response approaches can be developed. Little, if any, work has been conducted by the fuel producer or the scientific community to address the remaining spill-related issues.

Preface

This report is the result of a request by the U.S. Congress to receive scientific information regarding the potential environmental impacts of the use of Orimulsion as a fuel. In the second half of the 1990s, there was considerable interest on the part of electric utilities in using Orimulsion, which was promoted as a low-cost fuel that could replace heavy fuel oil or coal. There were also many concerns raised by the environmental community regarding the environmental impact associated with switching to Orimulsion. In 1997, the U.S. Congress requested that the U.S. Environmental Protection Agency (EPA) conduct a study to evaluate the potential environmental impacts associated with the use of Orimulsion. EPA's Office of Research and Development provided funds to the National Risk Management Research Laboratory (NRMRL) to conduct this study, and a team of EPA experts in air pollution control, spill response, health effects, and environmental assessment was assembled to carry out the investigation. This report was prepared by EPA staff using data generated at EPA facilities as well as data collected from the general literature.

In 1998, Bituménes Orinoco (Bitor), the manufacturer of Orimulsion, changed the formulation of the fuel. The original fuel, renamed Orimulsion 100, was replaced with a new formulation named Orimulsion 400. Compared to the amount of information on Orimulsion 100, there is relatively little data on the performance of Orimulsion 400. While this report provides as much data as possible on the emissions and performance of Orimulsion 400, the bulk of the data are for the older formulation (Orimulsion 100). Although Orimulsion 100 is no longer produced, the results presented here are still believed to adequately describe the basic behavior of both formulations of Orimulsion. The key question to be addressed in this study is, "Is Orimulsion significantly different from other fossil fuels, and if so, how?" The differences between Orimulsion 100 and Orimulsion 400, as indicated both from the available data and the information provided by the manufacturer, are substantially smaller than the differences between Orimulsion and other fossil fuels. The report distinguishes between the two formulations where appropriate, but uses the generic term "Orimulsion" where such distinction is either unimportant or misleading. The recent reformulation is significant with respect to the surfactant used (which will affect spill toxicity) and the use of a magnesium-based additive (which will affect boiler tube deposition and particulate matter emissions). Other environmental issues appear to be impacted only to a minor degree by the change in formulation.

The emphasis of this report is on generation and control of air pollutants from the combustion of Orimulsion. Although there are other environmental issues associated with the use of Orimulsion, particularly spills of the fuel into water, EPA and NRMRL were advised on several occasions that questions related to air pollutant generation and control were the key unknowns associated with understanding the environmental impact potential of Orimulsion. The initial step in EPA's research activities was the convening of a workshop to discuss environmental issues related to Orimulsion use. This workshop, held February 8, 1998, concluded that there was a lack of information on particle size distribution and composition and on emissions and control of sulfur trioxide from Orimulsion combustion. The workshop also concluded that enough data existed to allow a comparative risk analysis for heavy fuel oil and Orimulsion, and therefore additional research in that area was not immediately required. The workshop noted that a lack of data existed describing the behavior, fate, and effects of Orimulsion spills in fresh water. However, the workshop concluded that investigations into these areas should be the responsibility of Bitor in the event they sought to market the fuel to users where spills into fresh water were possible. Considerable work has been conducted to quantify behavior, fate, and effects of Orimulsion in saltwater environments under the oversight of the International Orimulsion Working Group, of which Bitor is a member and the major source of funding. Thus this report has as its focus the generation and control of air pollutants, although other topics are also covered.

This focus was emphasized in the Orimulsion Technology Assessment Plan that was prepared to guide EPA's research efforts. This plan was reviewed and approved, with modifying comments, by a

panel of technical experts, mostly from outside the federal government. The only exception was one member from the U.S. Coast Guard. The Plan was then reviewed by the Office of Management and Budget (OMB), the U.S. Department of Energy, and the Office of Science and Technology Policy. EPA responded to comments made by each of these organizations and revised the Plan, which was approved by OMB on April 22, 1999.

The National Risk Management Research Laboratory was the lead organization for the study, and was chiefly responsible for preparation of Chapters 1-5 and 9-12. Robert E. Hall was the overall program lead, and C. Andrew Miller was the lead author of these chapters. Kevin Dreher of the National Health and Environmental Effects Research Laboratory prepared Chapter 6, on toxicity testing, with substantial assistance from Adriana Crain. Chapter 7, on spills, was prepared with assistance from Royal J. Nadeau of EPA's Office of Solid Waste and Emergency Response. Randall Wentsel of the National Center for Environmental Assessment prepared Chapter 8, on environmental assessment.

The conclusions stated in this report are scientific conclusions, and are not intended to provide guidance relative to regulatory requirements that may or may not apply to the use of Orimulsion.

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- Kim Jonas, Niels Groth-Andersen, Thorkild Meyer, and Hans Christensen of SK Power, Kalundborg, Denmark, and
- Morten Thellefsen Nielsen, Technical University of Denmark, Lyngby, Denmark.

Many of the reports from which full-scale data were taken were provided by Nelson Garcia Tavel of Bitor America, Jason Miles of Bitor Europe, and independent consultant Ken Olen.

Nomenclature and Acronyms

APCS	air pollution control system
API	American Petroleum Institute
APPCD	Air Pollution Prevention and Control Division
ARD	Arizona road dust
ASTM	American Society for Testing and Materials
BALF	bronchoalveolar fluid
bbl	barrels, U.S. petroleum
BTEX	benzene, toluene, ethylene, and xylenes
Btu	British thermal unit
CAA	Clean Air Act
CAAAs	Clean Air Act Amendments of 1990
CARB	California Air Resources Board
CE	Combustion Engineering
CEM	continuous emission monitor
CO	carbon monoxide
CO_2	carbon dioxide
DAS	data acquisition system
DQI	data quality indicator
EDX	energy dispersive x-ray
ENEL	Italian Electricity Generating Board
EPA	Environmental Protection Agency
ESP	electrostatic precipitator
FETC	U.S. Department of Energy's Federal Energy Technology Center
FGD	flue gas desulfurization
FPL	Florida Power & Light Company
GIS	geographical information systems
HAP	hazardous air pollutant
HEPA	high efficiency particulate air
HFO	heavy fuel oil
HQ	health quotient
IOWG	International Orimulsion Working Group
IURE	inhalation unit risk estimate
LAPIO	low API oil
LDH	lactate dehydrogenase
LNB	low NO_x burner
LOEC	lowest observable effects concentration
LOEL	lowest observed effect level
LOI	loss on ignition
MACS	miniature acid-condensation system
MDL	method detection limit
MEI	maximum exposed individual
MIR	maximum individual risk
NCEA	National Center for Environmental Assessment
NHEERL	National Health and Environmental Effects Research Laboratory
NO	nitric oxide
NOEC	no observable effects concentration
NO_x	nitrogen oxides
NRC	National Research Council

Nomenclature and Acronyms (Continued)

NRMRL . . . . . National Risk Management Research Laboratory
NSPS . . . . . New Source Performance Standard
O_2 . . . . . oxygen
OERR . . . . . Office of Emergency and Remedial Response
OFA . . . . . overfire air
ORD . . . . . Office of Research and Development
ORI 100 . . . . . Orimulsion 100
ORI 400 . . . . . Orimulsion 400
OSWER . . . . . Office of Solid Waste and Emergency Response
OTAP . . . . . Orimulsion Technology Assessment Plan
PAH . . . . . polycyclic aromatic hydrocarbon
PBS . . . . . Package Boiler Simulator
PC . . . . . pulverized coal
PDVSA . . . . . Petroléos de Venezuela, S.A.
PEA . . . . . performance evaluation audit
PM . . . . . particulate matter
$PM_{2.5}$ . . . . . particulate matter smaller than 2.5 µm in aerodynamic diameter
PM_{10} . . . . . particulate matter smaller than 10 µm in aerodynamic diameter
ppm . . . . . parts per million
QA . . . . . quality assurance
QAPP . . . . . quality assurance project plan
QC . . . . . quality control
ROFA 6 . . . . . residual oil fly ash (No. 6 fuel oil)
RSD . . . . . relative standard deviation
SASS . . . . . source assessment sampling system
SCR . . . . . selective catalytic reduction
SEM . . . . . scanning electron microscope
SMPS . . . . . scanning mobility particle sizer
SNCR . . . . . selective noncatalytic reduction
SO_2 . . . . . sulfur dioxide
SO_3 . . . . . sulfur trioxide
SVOC . . . . . semivolatile organic compound
TCLP . . . . . toxicity characteristic leaching potential
THC . . . . . total hydrocarbon
TSA . . . . . technical systems audit
VOC . . . . . volatile organic compound
VOST . . . . . volatile organic sampling train
WLFO . . . . . wet limestone forced oxidation
XRF . . . . . X-ray fluorescence

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Appendix B
Continuous Emission Monitoring Data for EPA Pilot-Scale Tests

CEM data collected from each of the 12 test runs are presented below. Figures B-1 through B-12 present CO, NO, O_2, and SO_2 concentrations (uncorrected) for each of the four test runs conducted for each of the three fuels. The top plot in each case shows O_2 concentration, and the bottom plot shows CO, NO, and SO_2. The sampling personnel attempted to collect samples when O_2 and CO fluctuations were minimal, and did not sample during periods when there were large fluctuations in conditions.

The plots are presented in chronological order, with Figures B-1 through B-4 showing results from tests of Orimulsion 400, Figures B5 through B-8 showing results from Orimulsion 100, and Figures B-9 through B-12 showing results from No. 6 fuel oil.

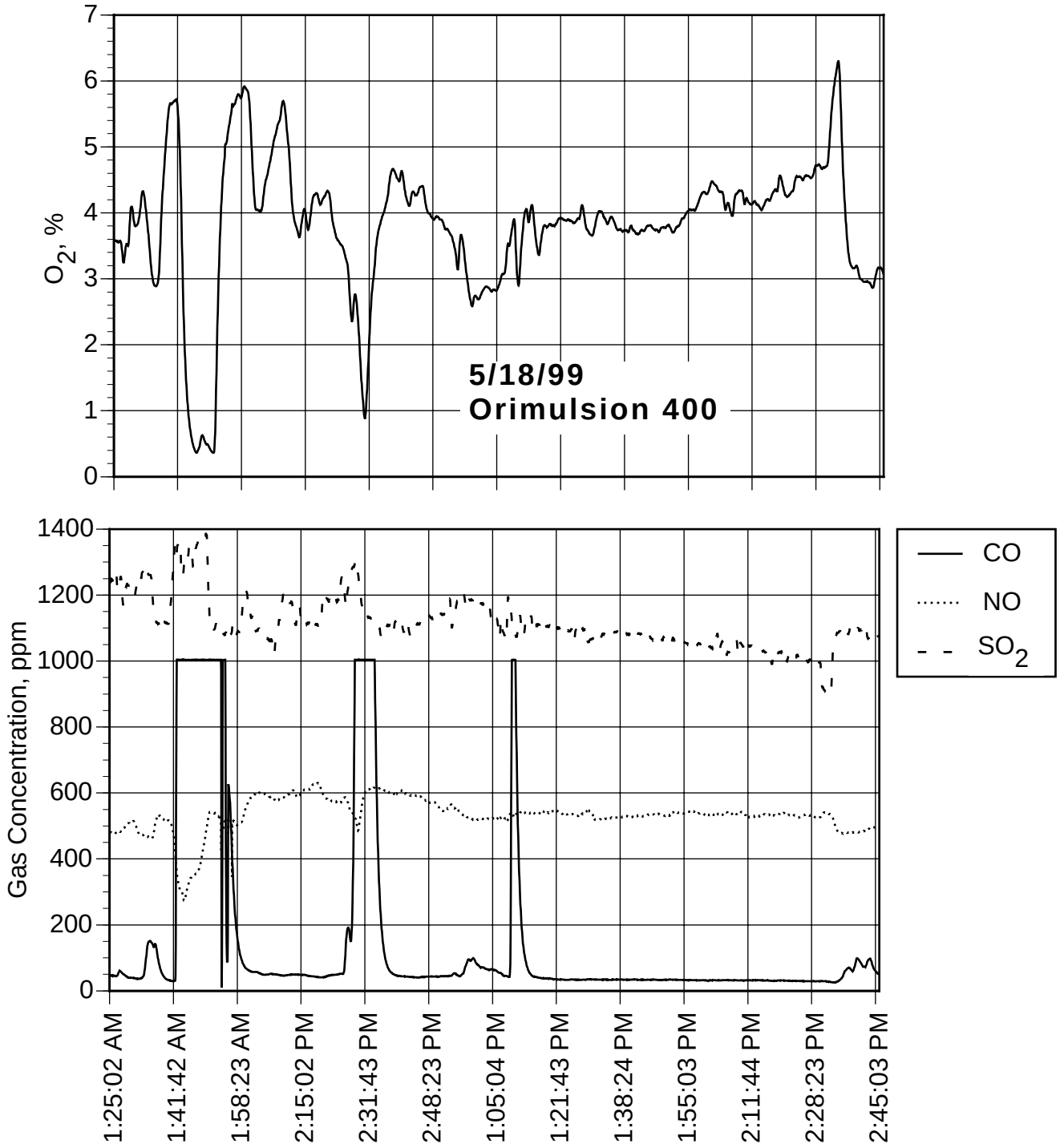

Figure B-1. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 18, 1999 during EPA's pilot-scale testing of Orimulsion 400.

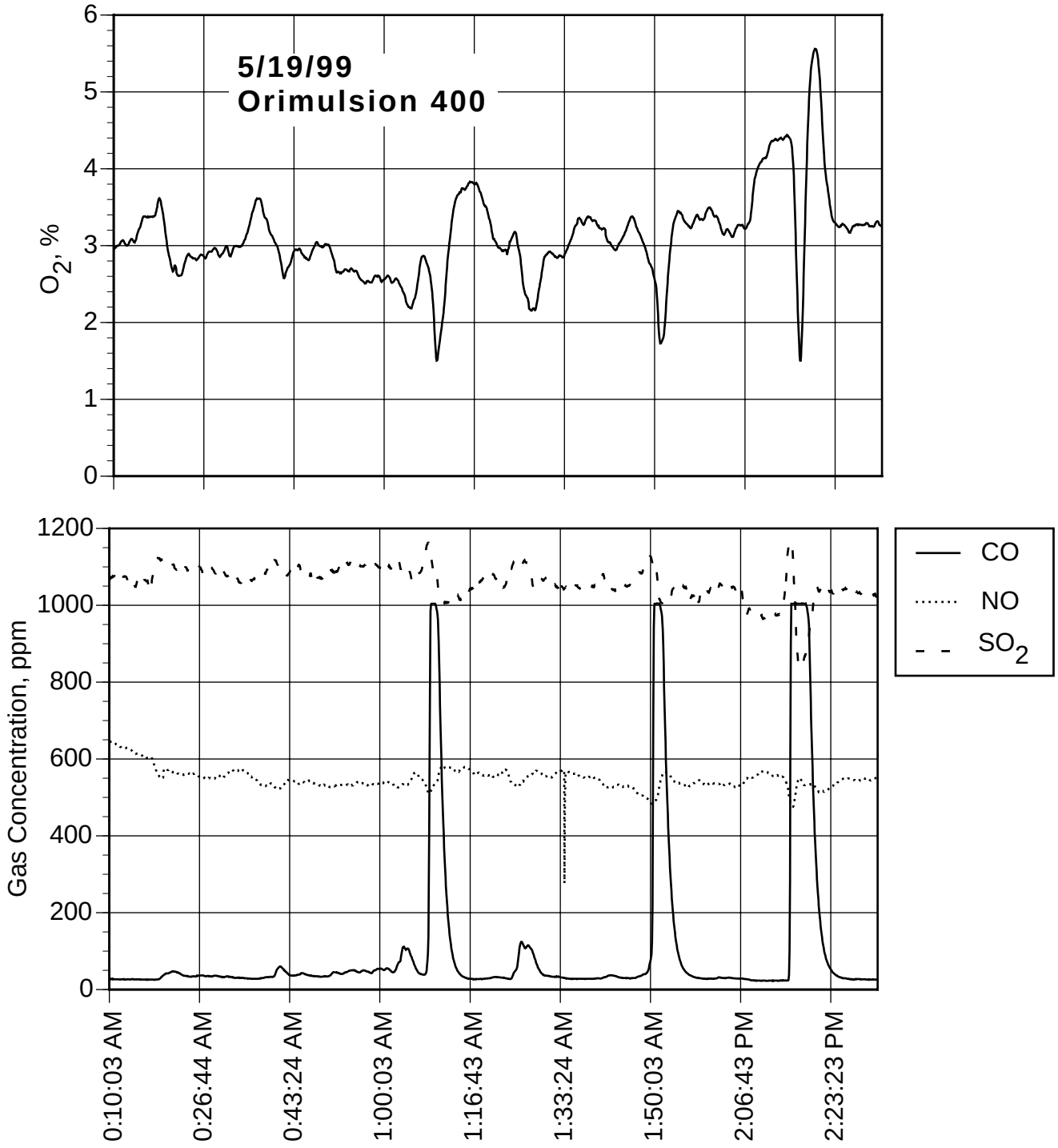

Figure B-2. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 19, 1999 during EPA's pilot-scale testing of Orimulsion 400.

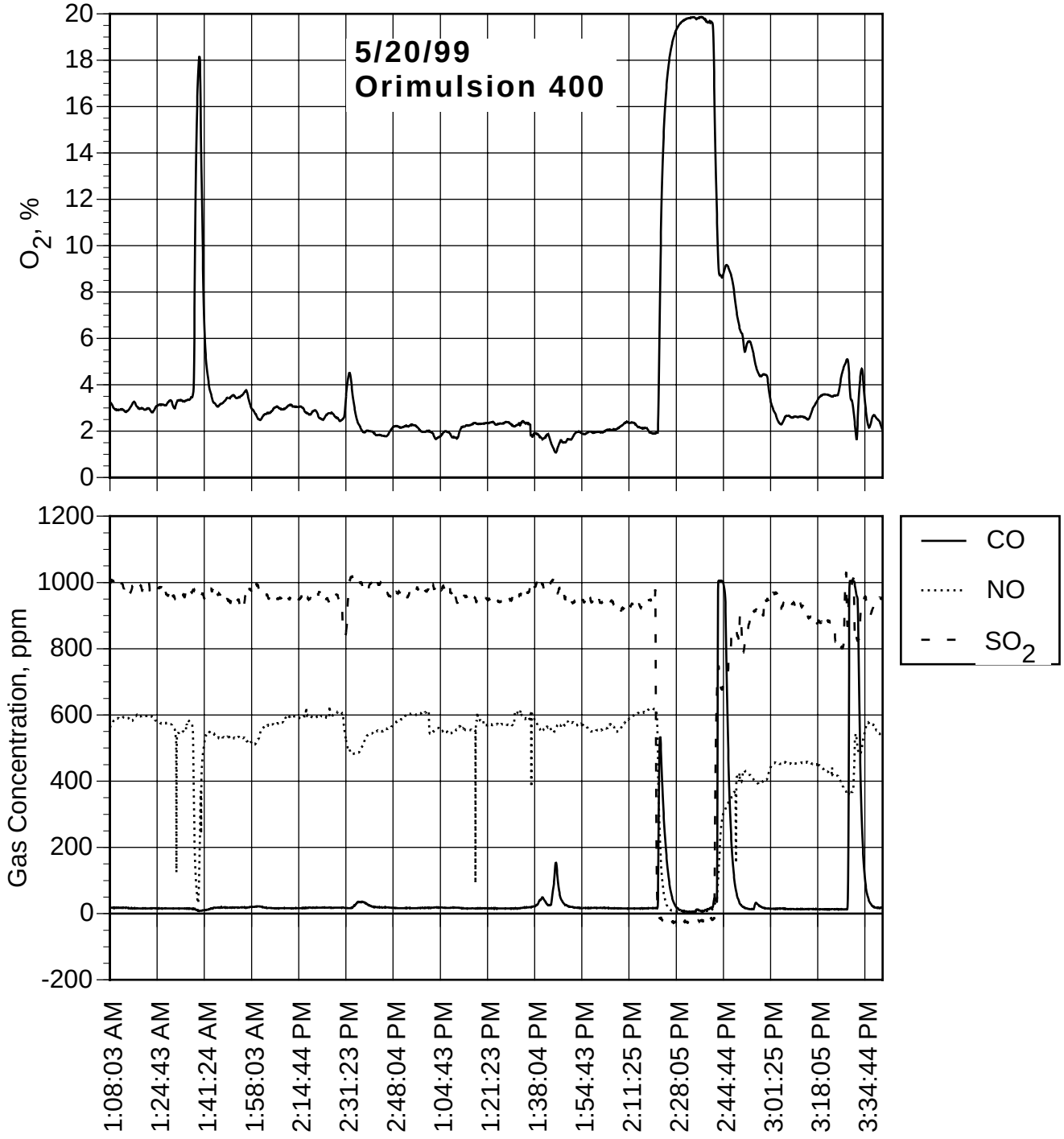

Figure B-3. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 20, 1999 during EPA's pilot-scale testing of Orimulsion 400.

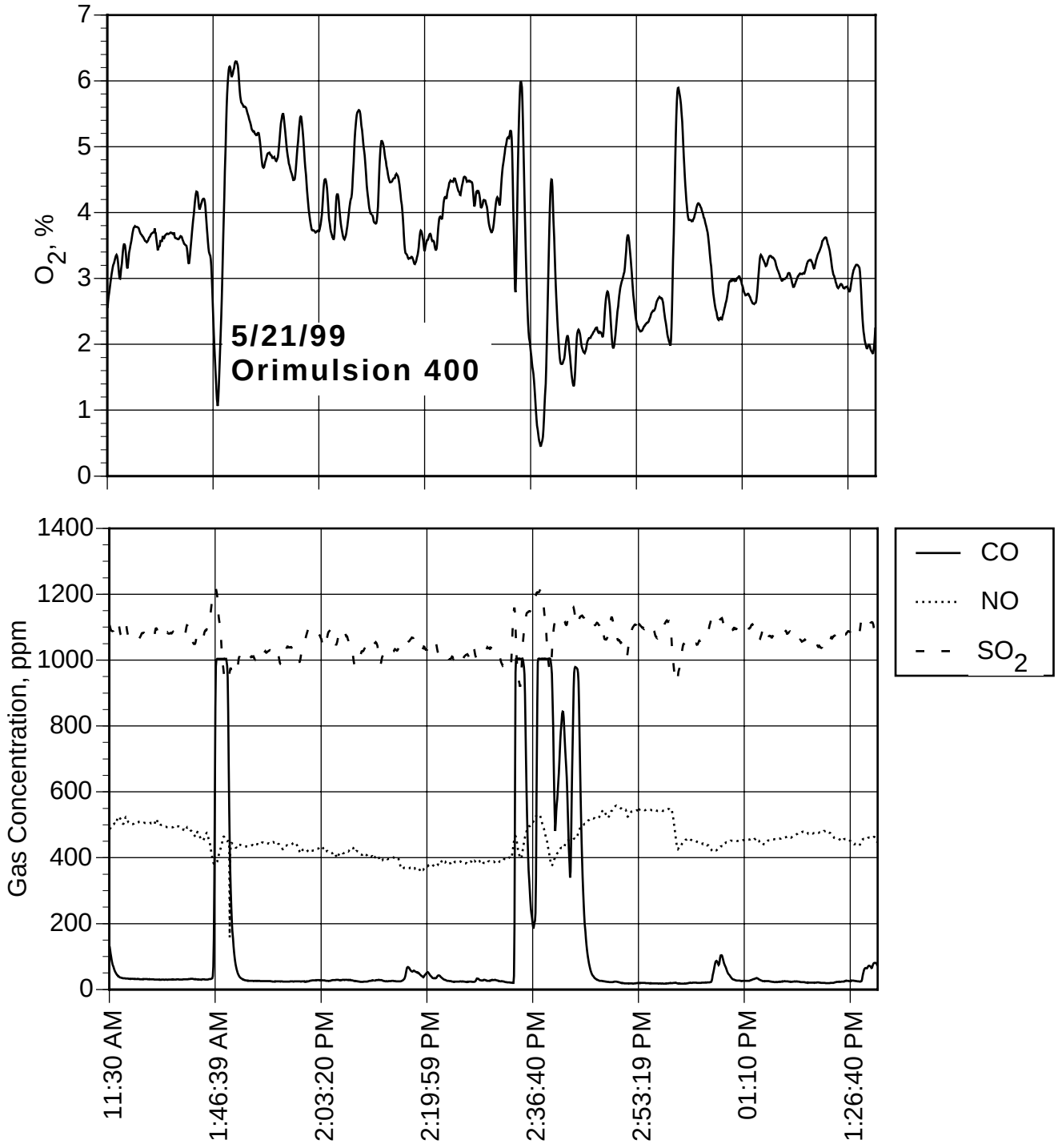

Figure B-4. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 21, 1999 during EPA's pilot-scale testing of Orimulsion 400.

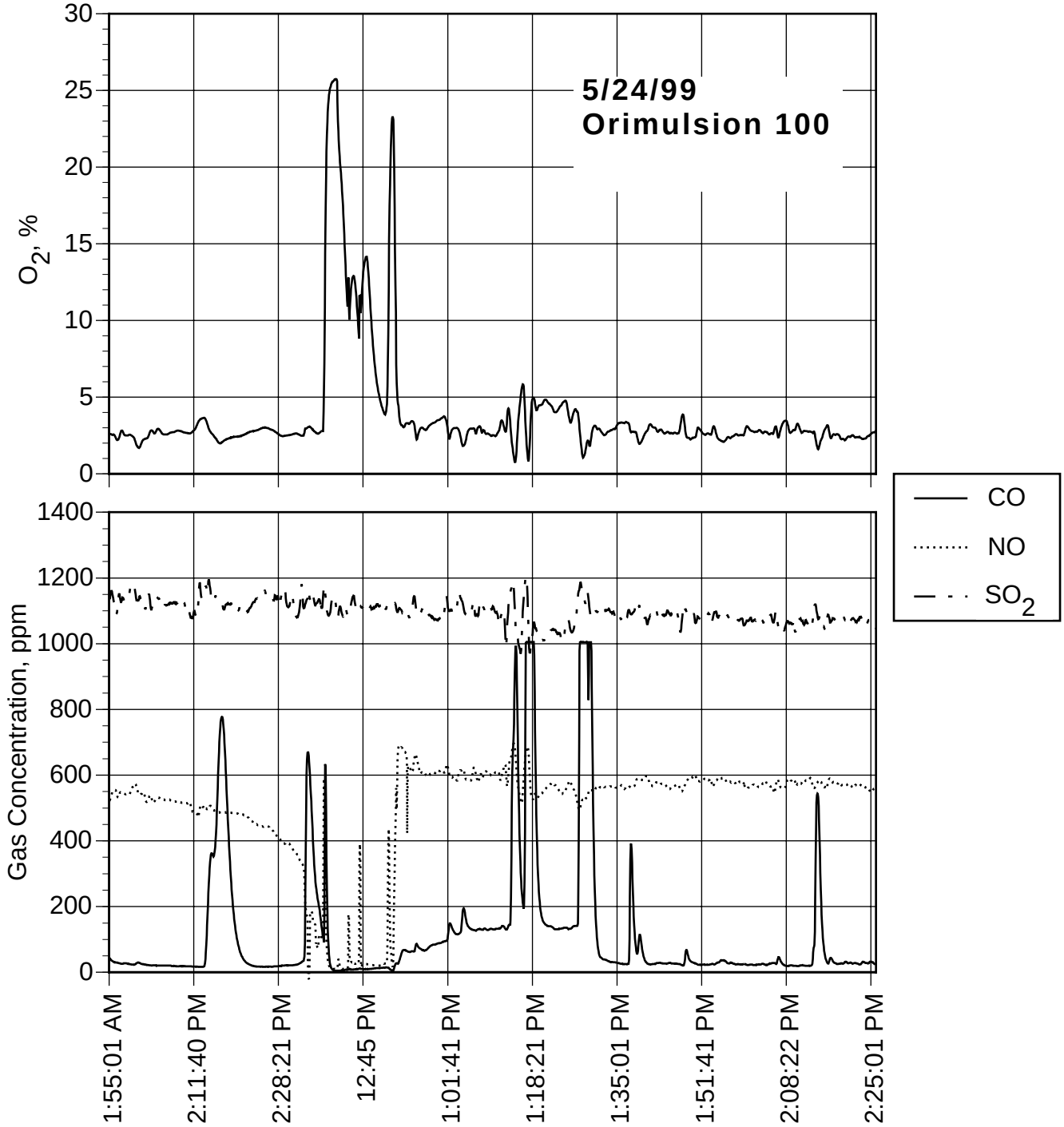

Figure B-5. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 24, 1999 during EPA's pilot-scale testing of Orimulsion 100.

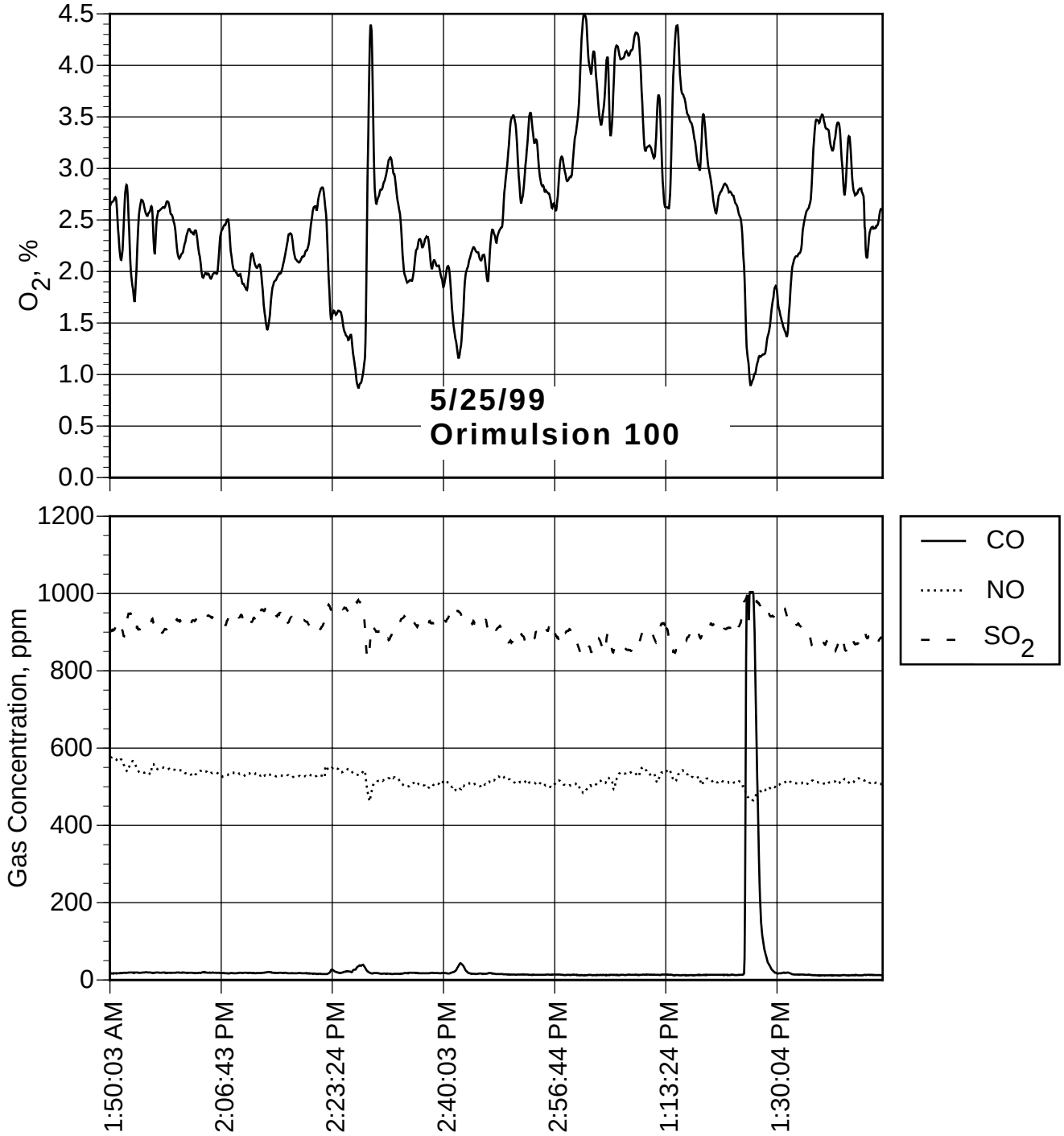

Figure B-6. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 25, 1999 during EPA's pilot-scale testing of Orimulsion 100.

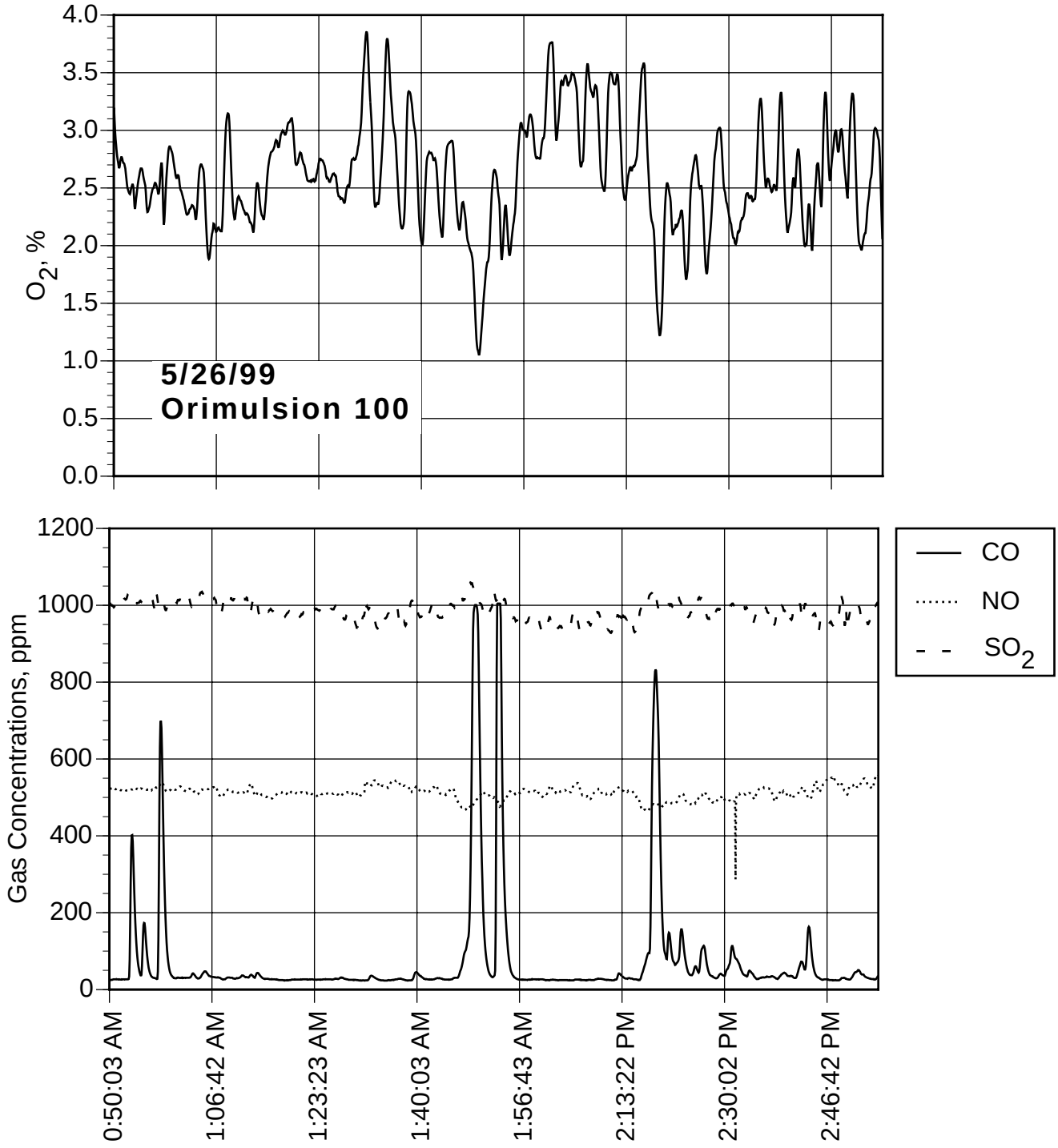

Figure B-7. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 26, 1999 during EPA's pilot-scale testing of Orimulsion 100.

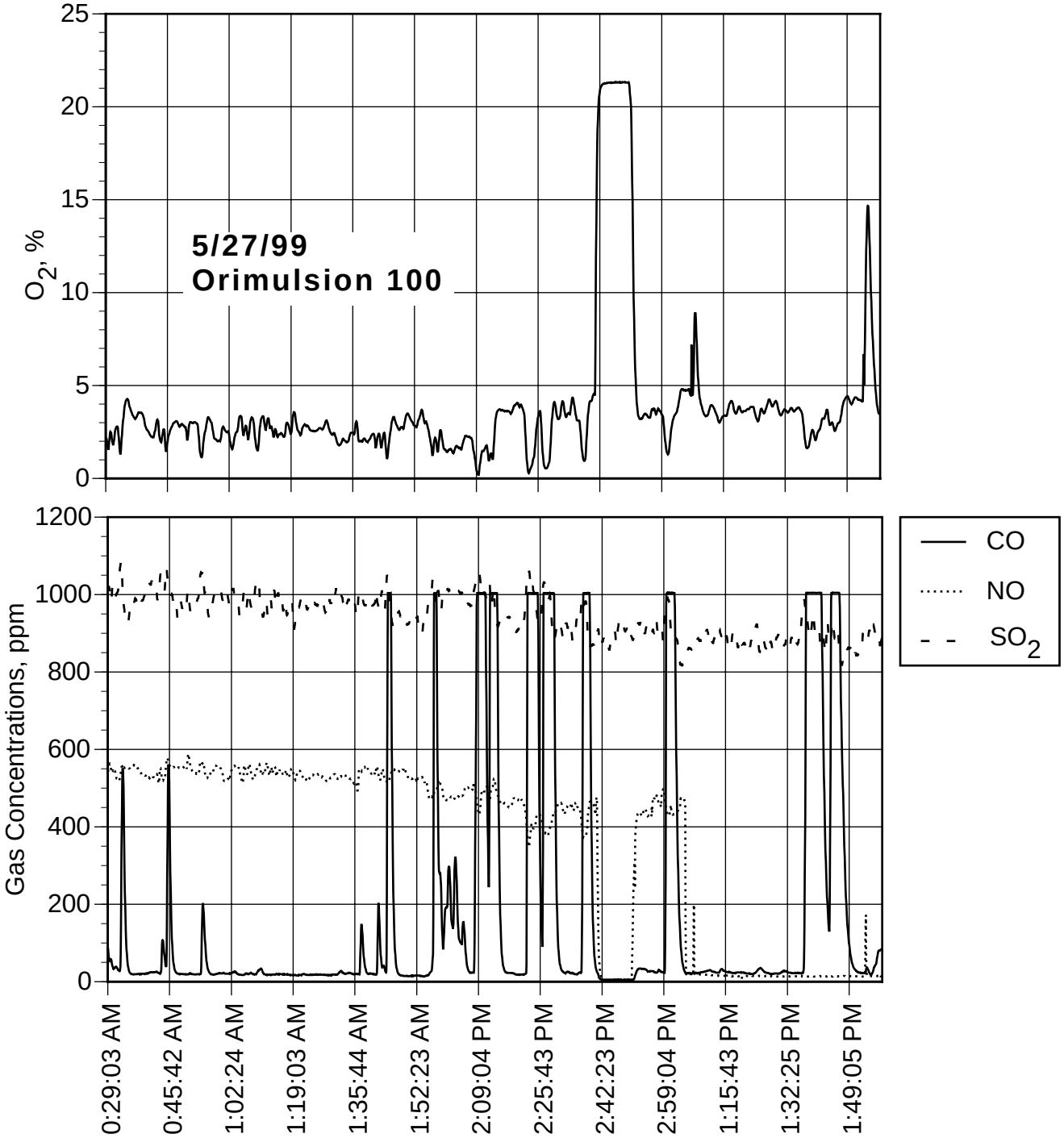

Figure B-8. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken May 27, 1999 during EPA's pilot-scale testing of Orimulsion 100.

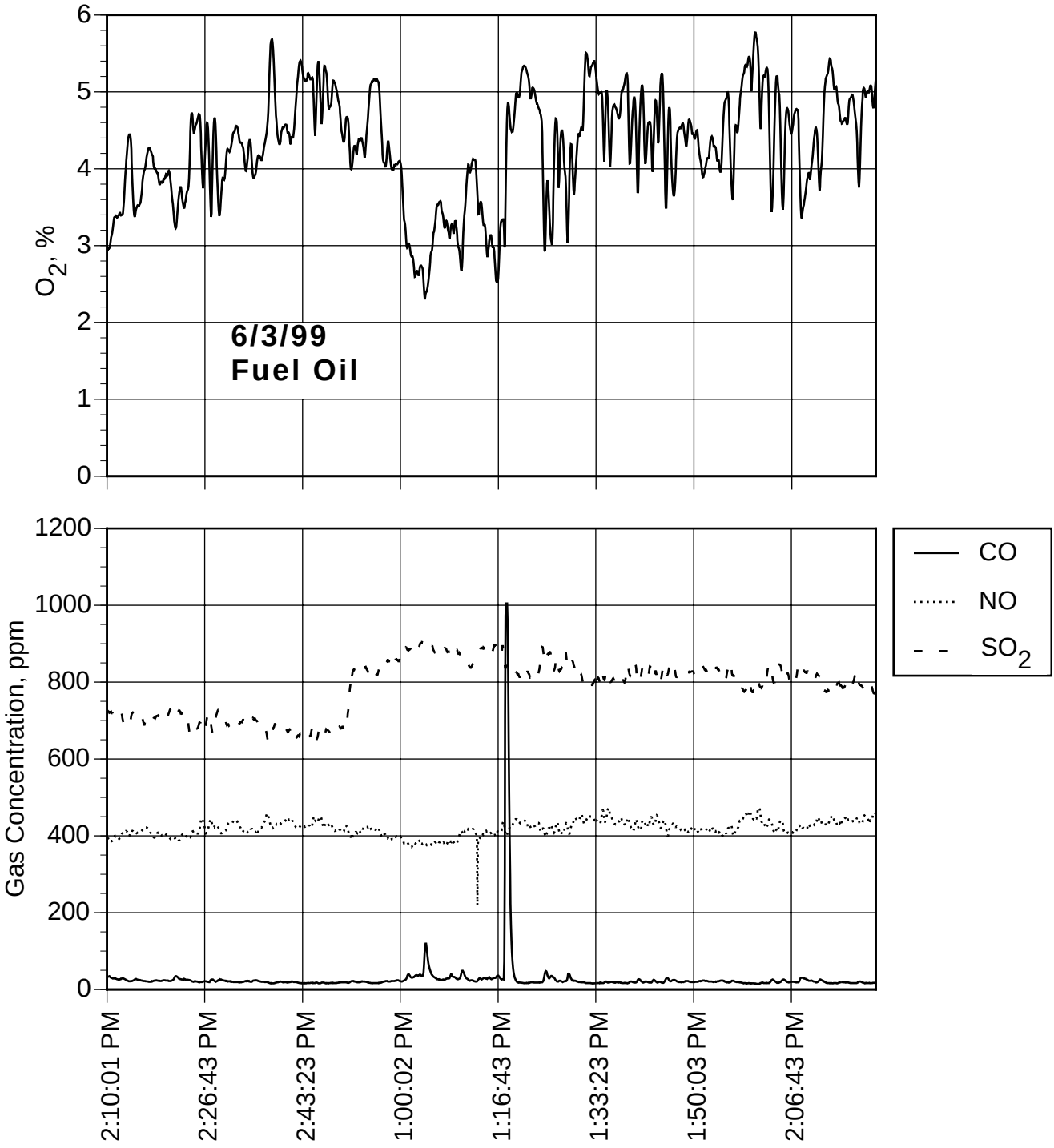

Figure B-9. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken June 3, 1999 during EPA's pilot-scale testing of No. 6 fuel oil.

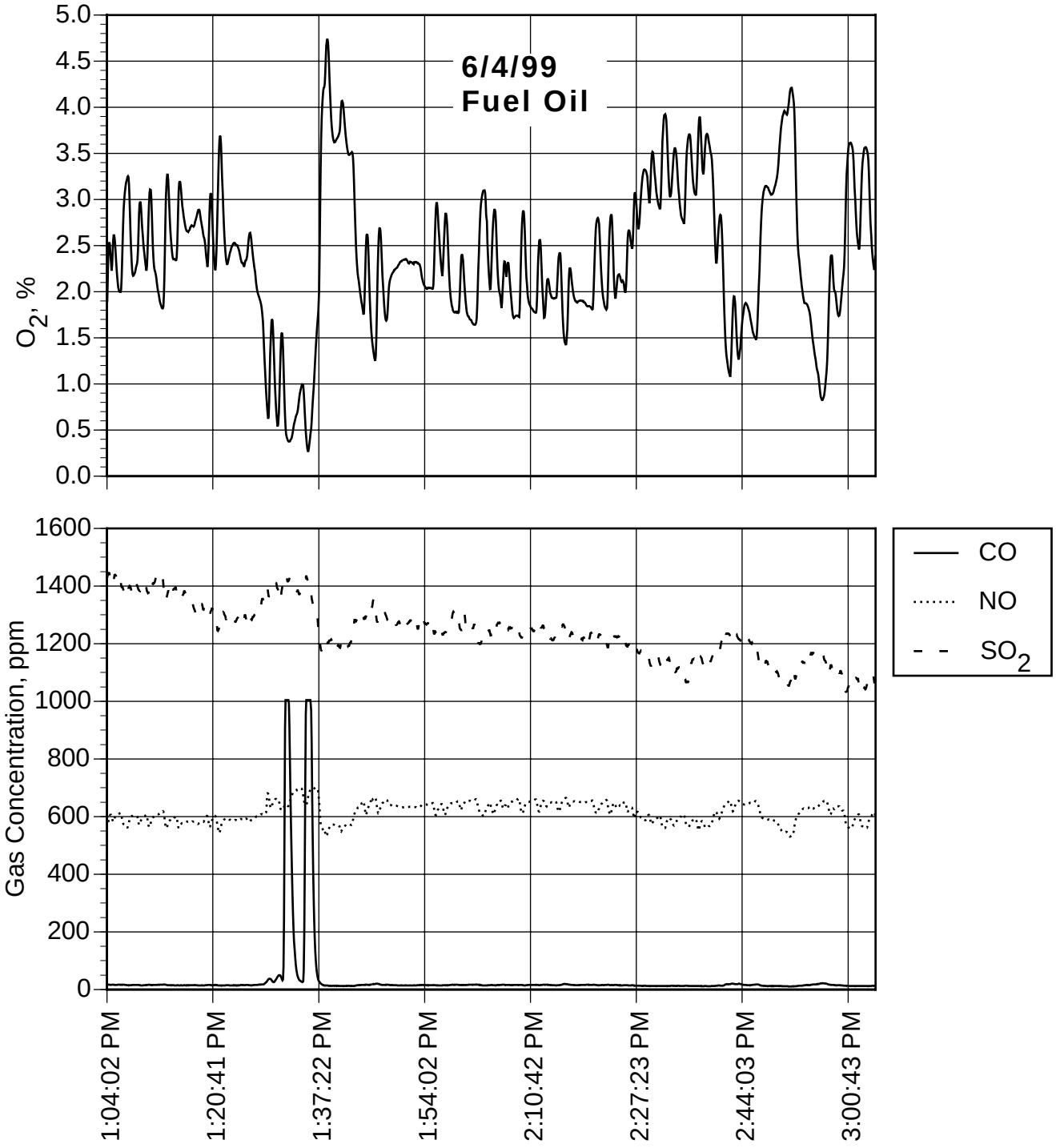

Figure B-10. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken June 4, 1999 during EPA's pilot-scale testing of No. 6 fuel oil.

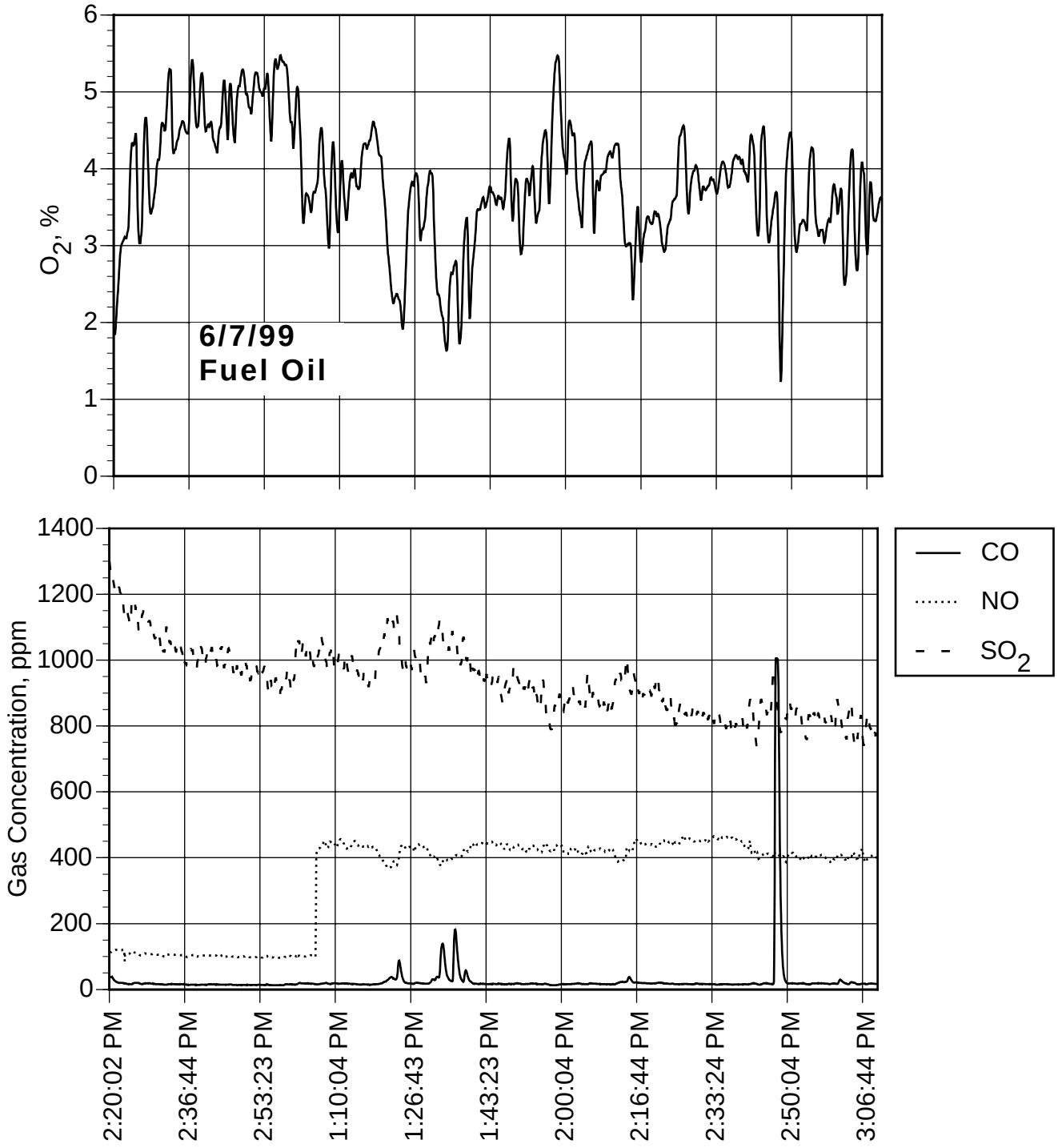

Figure B-11. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken June 7, 1999 during EPA's pilot-scale testing of No. 6 fuel oil.

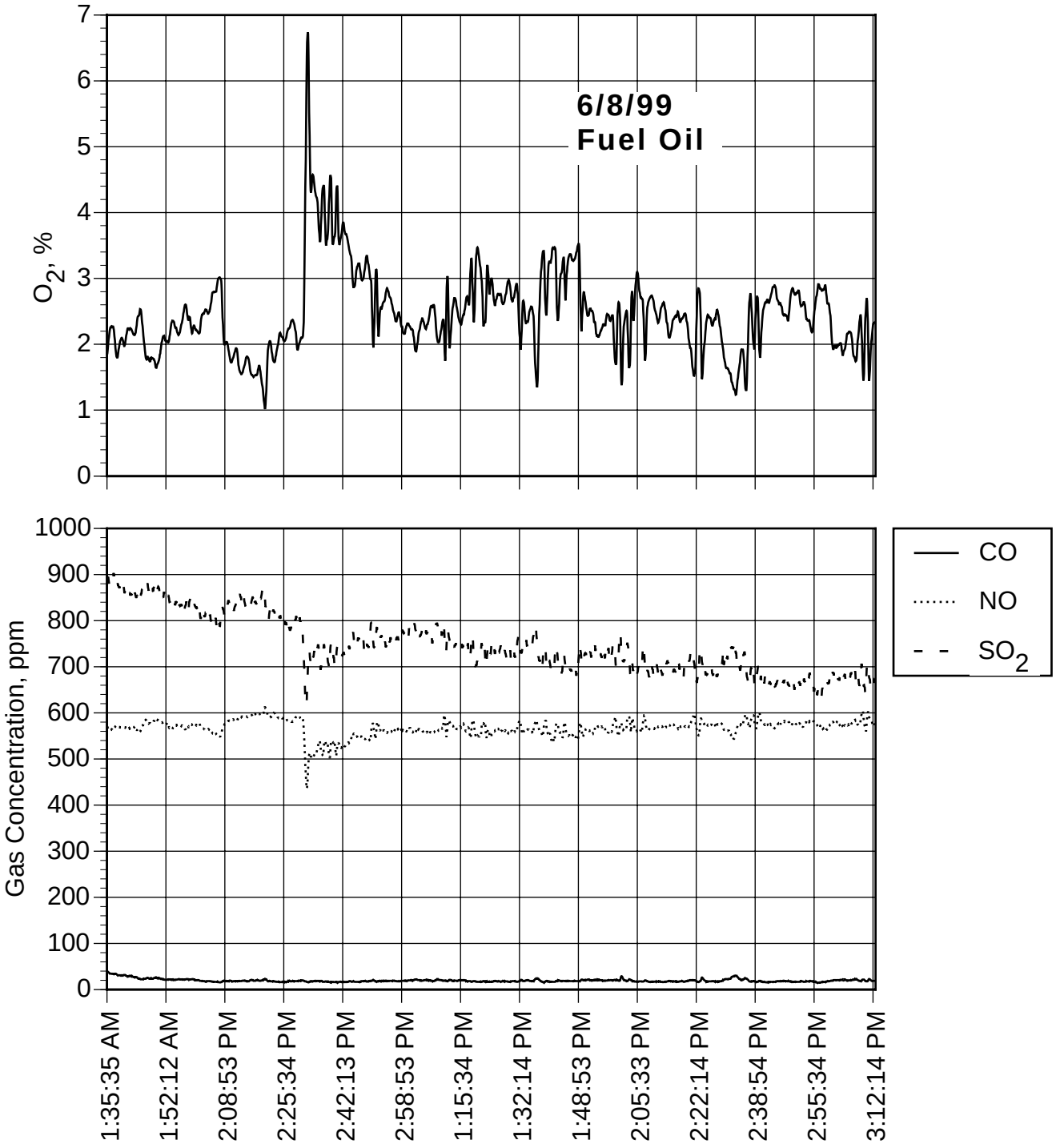

Figure B-12. CEM data for O_2 (top), CO, NO, and SO_2 (bottom) taken June 8, 1999 during EPA's pilot-scale testing of No. 6 fuel oil.

APPENDIX C
Volatile Organic Compound Analysis Laboratory Reports

Concentrations of volatile organic compounds (VOCs) were measured in EPA's Organics Support Laboratory, located in the Environmental Research Center in Research Triangle Park, NC. Analyses were conducted by chemists from ARCADIS Geraghty & Miller, the contractor for EPA's Air Pollution Prevention and Control Division.

The analyses were conducted to specifically determine levels of benzene, ethylene, toluene, and xylenes (BTEX), which were the criteria compounds for the analyses. The laboratory report stated that other compounds detected may have been outside the criteria used for BTEX, and the data should be evaluated using the case narrative supporting the data.

The following pages are the detailed case narrative and laboratory reports for each of the three samples collected from each of the three fuels. Also included are the matrix spike and matrix spike dupicate results and the results from the field blank used to evaluate laboratory contamination of the samples.

Case Narrative for Orimulsion VOST Analysis by GC/MS

A 5-point initial calibration was performed on April 28th and 29th, 1999. Each calibration level and the method detection limit study was performed by flash evaporation at 235°C of methanolic aliquots of standard VOC's. Each VOST pair was allowed to stand for 5 minutes (after flash evaporation) at a flow of 10mL/min., transferred to the GC/MS clamshell heater and thermally desorbed onto the GC/MS system. In an effort to ensure proper thermal transfer for all of the target compounds, each VOST tube pair was positioned to bias the Tenax portion fully into the heated zone. The calibration ranged between 10 ng and 250 ng on column. Internal standards were injected into the sidearm of the sparging vessel during each calibration and analysis. All target analytes had a relative standard deviation less than 30 % for this initial calibration.

Next, a 6 point method detection limit study was performed by spiking and analyzing a clean, VOST pair with the low level standard of 10 nanograms for each target VOC and surrogate VOC in accordance with SW-846 methodology for determination of detection limits. All target analytes had method detection limit values at least a factor of 2 less than the lowest calibration (PQL) except for two brominated compounds and tetrachloroethylene which were both below the PQL of 10 ng. Replicated matrix spikes of a separate BTEX standard was peformed using flash evaporation. Spike recoveries ranged from 87 % to 116 % (values not composited into a table but submitted in the regular report format). Two composited tables inclusive of the calibration response factor data and the method detection limit study are attached.

A mid-level standard was performed prior to daily sample analysis. Relative percent deviations less than 30 % when compared to the average response factors formed from the initial calibration were found for all target analytes of interest. The 4-bromofluorobenzene peak chosen from this standard passed method tuning criteria on each day. Prior to sample analysis, the system's inherent background for target components was determined. Sample VOST tubes were spiked prior to field sampling with surrogate compounds specified by the method. Samples were tagged on the data spreadsheets to reflect the target VOC background determined from the most recent matrix blank (other qualifiers were also attached). Values lower than the calculated MDL for a few compounds such as dichloromethane, toluene, 1,2-dibromoethane, m,p xylenes, bromobenzene and the dichlorobenzenes were noticed. The field blank demonstrated that all compounds were below the calculated detection limit except for dichloromethane (which was directly on the detection limit of 3.7 ng). All samples had similar results with low to mid-range values of benzene, toluene, xylenes and styrene present. Carbon disulfide and dichloromethane were present at varying levels. If you have any questions, please give Dennis (ext...2686) a call.

Bill Preston

Bill Preston

Arcadis Geraghty & Miller Chemist

Orimulsion VOST Method Detection Limit Study

Analyte	4/28/99 Run #1	4/29/99 Run #2	4/29/99 Run #3	4/29/99 Run #4	4/29/99 Run #5	4/29/99 Run #6	Std Dev	MDL(ng)
1,1 Dichloroethene	8.90	7.99	7.62	7.86	7.93	8.02	0.49	**1.6**
Iodomethane	10.45	9.40	8.47	7.99	8.07	7.69	1.04	**3.5**
Carbon Disulfide	8.37	7.60	7.15	7.21	7.31	7.47	0.50	**1.7**
Dichloromethane	14.04	13.74	13.55	13.88	16.23	17.06	1.10	**3.7**
t-1,2-Dichloroethene	9.52	8.84	8.61	8.65	8.64	8.60	0.38	**1.3**
1,1-Dichloroethane	9.55	8.73	8.33	8.51	8.90	9.35	0.47	**1.6**
c-1,2-Dichloroethane	9.97	9.27	8.80	9.15	9.05	8.56	0.44	**1.5**
Bromochloromethane	10.10	8.48	8.15	8.44	8.94	9.78	0.77	**2.6**
Chloroform	9.79	9.13	8.68	9.31	8.54	9.61	0.50	**1.7**
1,1,1-Trichloroethane	9.57	9.64	9.06	9.44	8.77	9.40	0.37	**1.2**
Carbon Tetrachloride	9.45	9.57	9.02	9.20	8.79	9.24	0.32	**1.1**
1,2-Dichloroethane	10.59	9.21	8.80	9.74	8.94	10.06	0.73	**2.4**
Benzene	13.14	12.06	11.94	10.72	11.69	12.43	0.87	**2.9**
Trichloroethene	10.15	9.52	11.40	9.99	8.72	9.04	0.98	**3.3**
1,2-Dichloropropane	9.83	9.53	11.86	9.94	8.93	9.89	1.10	**3.7**
Dibromomethane	10.54	8.91	10.76	9.87	8.39	9.45	1.02	**3.4**
Bromodichloromethane	9.64	9.18	9.97	9.69	7.54	7.51	0.97	**3.3**
c-1,3-Dichloropropene	9.90	8.84	10.27	9.84	7.72	8.70	1.04	**3.5**
Toluene	11.91	12.16	11.13	12.00	10.56	11.17	0.68	**2.3**
t-1,3-Dichloropropene	11.22	9.41	8.25	10.07	8.07	8.38	1.31	**4.4**
1,1,2-Trichloroethane	10.64	8.64	7.91	9.89	7.47	7.59	1.33	**4.5**
Tetrachloroethene	10.18	10.23	9.63	12.82	8.63	9.46	1.55	**5.2**
Dibromochloromethane	9.06	8.85	9.43	12.01	6.96	6.90	1.81	**6.1**
1,2-Dibromoethane	10.39	8.39	9.72	12.34	7.57	8.25	1.85	**6.2**
Chlorobenzene	10.11	9.33	8.55	10.66	7.65	7.98	1.20	**4.0**
Ethylbenzene	9.99	9.36	8.81	10.93	8.08	8.13	1.09	**3.7**
m,p-Xylenes	17.44	15.83	15.16	19.40	14.00	13.58	2.10	**7.1**
o-Xylene	10.13	9.05	8.67	11.41	8.03	7.47	1.33	**4.5**
Styrene	10.57	8.93	8.78	11.31	8.05	7.22	1.36	**4.6**
Bromobenzene	9.95	9.37	8.40	10.87	7.48	7.06	1.32	**4.4**
1,4-Dichlorobenzene	9.74	9.21	8.33	10.72	7.52	6.89	1.24	**4.2**
1,3-Dichlorobenzene	9.70	8.53	8.11	10.57	7.36	6.53	1.28	**4.3**
1,2-Dichlorobenzene	9.80	8.81	8.25	10.30	7.37	6.49	1.18	**4.0**

Response Factor Report Volatile

Method : H:\HPCHEM\2\METHODS\V042899.M (Chemstation Integrator)
Title : Orimulsion VOST analysis by Method 5041
Last Update : Wed May 05 20:07:56 1999
Response via : Initial Calibration

Calibration Files
3 =VS34289A.D 2 =VS24289A.D 1 =VS14289B.D
4 =VS44289A.D 5 =VS54299A.D

		Compound	3	2	1	4	5	Avg	%RSD
1)	I	Pentafluorobenzene	----------ISTD----------						
2)		ccc-1,1-Dichloroethen	0.800	0.854	0.666	0.722	0.699	0.748	10.32
3)		Iodomethane	0.756	0.772	0.739	0.625	0.652	0.709	9.30
4)		Carbon disulfide	1.621	1.709	1.240	1.424	1.420	1.483	12.47
5)		Dichloromethane	0.763	0.839	1.139	0.663	0.652	0.811	24.45
6)		trans-1,2-Dichloroeth	0.496	0.504	0.435	0.425	0.424	0.457	8.70
7)		1,1-Dichloroethane	0.948	1.007	0.848	0.821	0.816	0.888	9.60
8)		cis-1,2-Dichloroethen	0.534	0.548	0.493	0.449	0.451	0.495	9.23
9)		Bromochloromethane	0.669	0.677	0.627	0.584	0.549	0.621	8.88
10)		ccc-Chloroform	0.923	1.000	0.855	0.789	0.801	0.874	10.11
11)		1,1,1-Trichloroethane	0.740	0.757	0.646	0.626	0.598	0.673	10.49
12)		Carbon tetrachloride	0.623	0.623	0.524	0.524	0.477	0.554	11.86
13)	S	d4-1,2 Dichloroethane	0.435	0.472	0.514	0.444	0.364	0.446	12.38
14)		1,2-Dichloroethane	0.521	0.520	0.502	0.461	0.368	0.475	13.53
15)		Benzene	1.792	1.864	2.290	1.511	1.254	1.742	22.40
16)	I	1,4-Diflluorobenzene	----------ISTD----------						
17)		Trichloroethene	0.500	0.540	0.505	0.491	0.453	0.498	6.29
18)		ccc-1,2-Dichloroprop	0.422	0.448	0.394	0.366	0.371	0.400	8.66
19)		Dibromomethane	0.254	0.258	0.262	0.246	0.222	0.248	6.28
20)		Bromodichloromethane	0.493	0.572	0.468	0.449	0.442	0.485	10.89
21)		cis-1,3-Dichloroprope	0.532	0.602	0.521	0.498	0.478	0.526	9.00
22)	s	d8-Toluene	1.061	1.253	1.290	1.109	0.992	1.141	11.10
23)		ccc-Toluene	1.271	1.395	1.545	1.137	1.135	1.296	13.56
24)		trans-1,3-Dichloropro	0.381	0.467	0.444	0.380	0.306	0.395	15.92
25)		1,1,2-Trichloroethane	0.185	0.231	0.201	0.195	0.138	0.190	17.76
26)		Tetrachloroethene	0.329	0.350	0.324	0.293	0.294	0.318	7.71
27)		Dibromochloromethane	0.259	0.336	0.239	0.268	0.217	0.264	17.04
28)		1,2-Dibromoethane	0.273	0.309	0.289	0.306	0.215	0.278	13.75
29)	I	d5-Chlorobenzene	----------ISTD----------						
30)		Chlorobenzene	0.814	1.074	0.867	0.782	0.752	0.858	14.93
31)		ccc-Ethylbenzene	1.484	1.892	1.523	1.411	1.324	1.527	14.25
32)		m,p-Xylenes	0.444	0.591	0.489	0.448	0.341	0.462	19.51
33)		o-Xylene	0.404	0.548	0.438	0.416	0.357	0.433	16.38
34)		Styrene	0.565	0.813	0.658	0.588	0.488	0.623	19.69
35)	S	4-Bromofluorobenzene	0.477	0.705	0.547	0.537	0.352	0.524	24.41
36)		Bromobenzene	0.309	0.443	0.337	0.323	0.281	0.338	18.37
37)		d4-1,4-Dichlorobenzen	----------ISTD----------						

(#) = Out of Range

Response Factor Report Volatile

Method : H:\HPCHEM\2\METHODS\V042899.M (Chemstation Integrator)
Title : Orimulsion VOST analysis by Method 5041
Last Update : Wed May 05 20:07:56 1999
Response via : Initial Calibration

Calibration Files
3 =VS34289A.D 2 =VS24289A.D 1 =VS14289B.D
4 =VS44289A.D 5 =VS54299A.D

	Compound	3	2	1	4	5	Avg	%RSD
38)	1,3-Dichlorobenzene	0.926	1.430	0.997	0.963	0.834	1.030	22.48
39)	1,4-Dichlorobenzene	0.895	1.350	0.968	0.962	0.816	0.998	20.64
40)	1,2-dichlorobenzene	0.775	1.151	0.854	0.882	0.699	0.872	19.66

(#) = Out of Range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	5181405	Date Sampled:	05/18/99
Lab Sample ID:	9905029	Date Acquired:	05/24/99
MS Data file:	V995299A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/905181405SV10BL04-Clamshell temp controller failed to maintain at 233°c and was noticed at 330°C after analysis/Benzene in blank at 2.9 ng

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	86.1	P
d8-toluene (surr)	100.4	P
4-bromofluorobenzene(surr)	119.7	P

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	ND		c-1,3-Dichloropropene	ND	
Carbon Disulfide	5.9	J	Toluene	19.3	
Dichloromethane	183.0		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	3.9	J
Carbon Tetrachloride	ND		m,p-Xylenes	11.9	J
1,2-Dichloroethane	ND		o-Xylene	ND	
Benzene	40.2	B	Styrene	16.5	
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	5191058	Date Sampled:	05/19/99
Lab Sample ID:	9905030	Date Acquired:	05/24/99
MS Data file:	V995309A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/905191058SV20BL04-Clamshell desorber temp controller failed to maintain at 233°C and was noticed at 330°C after analysis/Benzene in blank at 2.9 ng

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	84.1	P
d8-toluene (surr)	97.3	P
4-bromofluorobenzene(surr)	107.6	P

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	5.5	J	c-1,3-Dichloropropene	ND	
Carbon Disulfide	59.9		Toluene	28.5	
Dichloromethane	59.9		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	ND	
Carbon Tetrachloride	ND		m,p-Xylenes	9.5	J
1,2-Dichloroethane	ND		o-Xylene	ND	
Benzene	102.9	B	Styrene	20.6	
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	5211256	Date Sampled:	05/21/99
Lab Sample ID:	9905041	Date Acquired:	05/24/99
MS Data file:	V995419A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/905211256SV10BL04-Clamshell temp controller failed to maintain at 233°c and was noticed at 330°C after analysis/Benzene in blank at 2.9 ng.

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	85.5	P
d8-toluene (surr)	32.2	F
4-bromofluorobenzene(surr)	109.1	P

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	6.1	J	c-1,3-Dichloropropene	ND	
Carbon Disulfide	72.4		Toluene	7.1	J
Dichloromethane	64.3		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	ND	
Carbon Tetrachloride	ND		m,p-Xylenes	9.2	J
1,2-Dichloroethane	ND		o-Xylene	ND	
Benzene	135.0	B	Styrene	22.3	
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	5241337	Date Sampled:	05/24/99
Lab Sample ID:	9905042	Date Acquired:	05/31/99
MS Data file:	V990542A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/905241337SV10BL01

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	65.8	F
d8-toluene (surr)	94.1	P
4-bromofluorobenzene(surr)	115.0	P

Compound	ng		Compound	ng
1,1 Dichloroethene	ND		Bromodichloromethane	ND
Iodomethane	ND		c-1,3-Dichloropropene	ND
Carbon Disulfide	7.6	J	Toluene	12.7
Dichloromethane	36.6		t-1,3-Dichloropropene	ND
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND
1,1-Dichloroethane	ND		Tetrachloroethene	ND
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND
Bromochloromethane	ND		1,2-Dibromoethane	ND
Chloroform	ND		Chlorobenzene	ND
1,1,1-Trichloroethane	ND		Ethylbenzene	ND
Carbon Tetrachloride	ND		m,p-Xylenes	ND
1,2-Dichloroethane	ND		o-Xylene	ND
Benzene	20.6		Styrene	ND
Trichloroethene	ND		Bromobenzene	ND
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND
Dibromomethane	ND		1,4-Dichlorobenzene	ND
			1,2-Dichlorobenzene	ND

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	5251243	Date Sampled:	05/25/99
Lab Sample ID:	9905051	Date Acquired:	05/31/99
MS Data file:	V990551A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/905251243SV10BL01

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	100.9	P
d8-toluene (surr)	71.0	P
4-bromofluorobenzene(surr)	119.8	P

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	ND		c-1,3-Dichloropropene	ND	
Carbon Disulfide	3.0	J	Toluene	13.3	
Dichloromethane	10.7		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	ND	
Carbon Tetrachloride	ND		m,p-Xylenes	7.5	J
1,2-Dichloroethane	ND		o-Xylene	ND	
Benzene	55.2		Styrene	9.3	J
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	5261102	Date Sampled:	05/26/99
Lab Sample ID:	9905057	Date Acquired:	05/31/99
MS Data file:	V990557A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/905261102SV10BL01

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	73.1	P
d8-toluene (surr)	96.3	P
4-bromofluorobenzene(surr)	117.0	P

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	ND		c-1,3-Dichloropropene	ND	
Carbon Disulfide	5.0	J	Toluene	19.1	
Dichloromethane	55.0		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	3.7	J
Carbon Tetrachloride	ND		m,p-Xylenes	10.0	J
1,2-Dichloroethane	ND		o-Xylene	ND	
Benzene	73.6		Styrene	5.4	J
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	6031301	Date Sampled:	06/04/99
Lab Sample ID:	9906006	Date Acquired:	06/17/99
MS Data file:	V996006A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/906031301SV10BLR6

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	64.7	F
d8-toluene (surr)	90.7	P
4-bromofluorobenzene(surr)	123.9	P

Compound	ng	Compound	ng
1,1 Dichloroethene	ND	Bromodichloromethane	ND
Iodomethane	ND	c-1,3-Dichloropropene	ND
Carbon Disulfide	28.9	Toluene	47.9
Dichloromethane	ND	t-1,3-Dichloropropene	ND
t-1,2-Dichloroethene	ND	1,1,2-Trichloroethane	ND
1,1-Dichloroethane	ND	Tetrachloroethene	ND
c-1,2-Dichloroethane	ND	Dibromochloromethane	ND
Bromochloromethane	ND	1,2-Dibromoethane	ND
Chloroform	ND	Chlorobenzene	ND
1,1,1-Trichloroethane	ND	Ethylbenzene	30.9
Carbon Tetrachloride	ND	m,p-Xylenes	113.1
1,2-Dichloroethane	ND	o-Xylene	37.6
Benzene	23.6	Styrene	15.3
Trichloroethene	ND	Bromobenzene	ND
1,2-Dichloropropane	ND	1,3-Dichlorobenzene	ND
Dibromomethane	ND	1,4-Dichlorobenzene	ND
		1,2-Dichlorobenzene	ND

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	6041340	Date Sampled:	06/04/99
Lab Sample ID:	9906015	Date Acquired:	06/17/99
MS Data file:	V996015A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/906041340SV10BLR6

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	57.3	F
d8-toluene (surr)	95.5	P
4-bromofluorobenzene(surr)	134.1	F

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	ND		c-1,3-Dichloropropene	ND	
Carbon Disulfide	7.2	J	Toluene	13.7	
Dichloromethane	383.8		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	5.2	J
Carbon Tetrachloride	ND		m,p-Xylenes	23.9	
1,2-Dichloroethane	ND		o-Xylene	6.4	
Benzene	20.0		Styrene	10.0	
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	6071305	Date Sampled:	06/07/99
Lab Sample ID:	9906018	Date Acquired:	06/16/99
MS Data file:	V990618A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/906071305SV10BLR6
Benzene in matrix blank at 4.9 ng.

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	64.5	F
d8-toluene (surr)	82.0	P
4-bromofluorobenzene(surr)	157.0	F

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	ND		c-1,3-Dichloropropene	ND	
Carbon Disulfide	22.3		Toluene	25.9	
Dichloromethane	ND		t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	8.2	J
Carbon Tetrachloride	ND		m,p-Xylenes	36.7	
1,2-Dichloroethane	ND		o-Xylene	9.9	J
Benzene	16.0	B	Styrene	10.4	
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	4301230/FB	Date Sampled:	04/30/99
Lab Sample ID:	9905001	Date Acquired:	04/30/99
MS Data file:	V995001A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Sample/904301230SV10BLR6/Field Blank
3.7 ng of dichloromethane was in the matrix blank

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	91.6	P
d8-toluene (surr)	101.6	P
4-bromofluorobenzene(surr)	120.6	P

Compound	ng		Compound	ng	
1,1 Dichloroethene	ND		Bromodichloromethane	ND	
Iodomethane	ND		c-1,3-Dichloropropene	ND	
Carbon Disulfide	ND		Toluene	2.3	J
Dichloromethane	3.7	J,B	t-1,3-Dichloropropene	ND	
t-1,2-Dichloroethene	ND		1,1,2-Trichloroethane	ND	
1,1-Dichloroethane	ND		Tetrachloroethene	ND	
c-1,2-Dichloroethane	ND		Dibromochloromethane	ND	
Bromochloromethane	ND		1,2-Dibromoethane	ND	
Chloroform	ND		Chlorobenzene	ND	
1,1,1-Trichloroethane	ND		Ethylbenzene	ND	
Carbon Tetrachloride	ND		m,p-Xylenes	ND	
1,2-Dichloroethane	ND		o-Xylene	ND	
Benzene	ND		Styrene	ND	
Trichloroethene	ND		Bromobenzene	ND	
1,2-Dichloropropane	ND		1,3-Dichlorobenzene	ND	
Dibromomethane	ND		1,4-Dichlorobenzene	ND	
			1,2-Dichlorobenzene	ND	

ND = not detected E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	Matrix Spike	Date Spiked:	05/25/99
Lab Sample ID:	9905049	Date Acquired:	05/25/99
MS Data file:	V990549a	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Tenax-B05689/T/C-B05695
Matrix Spike #1 at 150 ng each B,T,E,X component

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	86.6	P
d8-toluene (surr)	103.9	P
4-bromofluorobenzene(surr)	112.7	P

Compound	ng	Compound	ng
1,1 Dichloroethene	NS	Bromodichloromethane	NS
Iodomethane	NS	c-1,3-Dichloropropene	NS
Carbon Disulfide	NS	Toluene	**145.3**
Dichloromethane	NS	t-1,3-Dichloropropene	NS
t-1,2-Dichloroethene	NS	1,1,2-Trichloroethane	NS
1,1-Dichloroethane	NS	Tetrachloroethene	NS
c-1,2-Dichloroethane	NS	Dibromochloromethane	NS
Bromochloromethane	NS	1,2-Dibromoethane	NS
Chloroform	NS	Chlorobenzene	NS
1,1,1-Trichloroethane	NS	Ethylbenzene	**161.4**
Carbon Tetrachloride	NS	m,p-Xylenes	**173.8**
1,2-Dichloroethane	NS	o-Xylene	**168.8**
Benzene	**135.0**	Styrene	NS
Trichloroethene	NS	Bromobenzene	NS
1,2-Dichloropropane	NS	1,3-Dichlorobenzene	NS
Dibromomethane	NS	1,4-Dichlorobenzene	NS
		1,2-Dichlorobenzene	NS

ND = not spiked E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPCD Organic Support Laboratory
Volatile Organic Sampling Tube Report

Project:	Orimulsion		
Sample Name:	Matrix Spike	Date Spiked:	05/25/99
Lab Sample ID:	9905050	Date Acquired:	05/25/99
MS Data file:	V990550A	Analyst:	Bill Preston
Method:	5041A	QC reviewer:	Dennis Tabor

Sample Description/Narrative:

Tenax-B05689/T/C-B05695
Matrix Spike #2 at 150 ng each B,T,E,X component

Surrogates	% Recovery	
d4-1,2-dichloroethane(surr)	87.5	P
d8-toluene (surr)	89.4	P
4-bromofluorobenzene(surr)	112.5	P

Compound	ng	Compound	ng
1,1 Dichloroethene	NS	Bromodichloromethane	NS
Iodomethane	NS	c-1,3-Dichloropropene	NS
Carbon Disulfide	NS	Toluene	**139.9**
Dichloromethane	NS	t-1,3-Dichloropropene	NS
t-1,2-Dichloroethene	NS	1,1,2-Trichloroethane	NS
1,1-Dichloroethane	NS	Tetrachloroethene	NS
c-1,2-Dichloroethane	NS	Dibromochloromethane	NS
Bromochloromethane	NS	1,2-Dibromoethane	NS
Chloroform	NS	Chlorobenzene	NS
1,1,1-Trichloroethane	NS	Ethylbenzene	**169.0**
Carbon Tetrachloride	NS	m,p-Xylenes	**172.0**
1,2-Dichloroethane	NS	o-Xylene	**172.9**
Benzene	**130.4**	Styrene	NS
Trichloroethene	NS	Bromobenzene	NS
1,2-Dichloropropane	NS	1,3-Dichlorobenzene	NS
Dibromomethane	NS	1,4-Dichlorobenzene	NS
		1,2-Dichlorobenzene	NS

ND = not spiked E = Peak over calibration range
B=detected in blank J = Peak below the calibration range

APPENDIX D
Semivolatile Organic Compound Analysis Laboratory Reports

Case Narrative for Orimulsion Semivolatile Analysis by Method 8270

A five-level calibration was performed on June 24 -25th, 1999. Levels 1 through 4 (10,30,60, and 90 ug/mL) were analyzed on June 24th and level 5 (100 ug/mL) was analyzed on June 25th,1999. The relative standard deviation of the average response factors throughout the calibration range was generally below 10 % with few exceptions. The relative standard deviation for 13C6-2,5-phthalic anhydride was the only constituent greater than 30 % at 37.21%. A rigorous method detection limit study was not performed prior to sample analysis. Past semivolatile analysis allowed insight for establishing an arbitrary cutoff of 1 ug/mL (1 ng on column) for the instrumental detection limit. Sample concentrations near this value were scrutinized carefully to ensure excellent retention time matching and adequate confirmation ion ratios.

Method 8270 daily sample analysis consisted of initially passing the DFTPP tuning criteria. The monitoring for the presence of benzidine in the DFTPP tuning solution (which was present in all cases) and the monitoring for DDT lack of degradation were done daily prior to sample analysis. After the DFTPP passed all tuning criteria, a mid-point calibration standard was analyzed. The mid-level standard was compared to the initial calibration curve. All constituents of interest were less than 30 % relative deviation in all cases.

Each sampling condition had three separate analyses: XAD, filter, and the condensate which were analyzed between July 25th and July 29th, 1999. Pre-extraction surrogates were spiked into every sample and pre-sampling surrogates (additional APPCD-OSL QC) were added to the XAD portions only. Generally, the pre-extraction and pre-sampling surrogates passed pass/fail criteria (a

table comprising the acceptance criteria for the pre-sampling and pre-extraction surrogates is attached). Replicated matrix spikes of PAHs of interest determined recovery values between 50% and 77% when compared to the initial calibration. This directly parallels the surrogates recovery data. All samples had very low to non-detectable levels for most of the PAH targets and for the additional analyte list with a few exceptions for phthalates. If you have any questions, please give me a call at ext…2719.

Arcadis Geraghty & Miller Chemist,

Bill Preston

Bill Preston

Surrogates Recovery Limits Used for the Orimulsion Study

Description	Recovery limits
2-Fluorophenol	24-113
d5-Phenol	25-121
2,4,6-Tribromophenol	19-122
d5-Nitrobenzene	23-120
2-Fluorobiphenyl	30-115

Response Factor Report Semi2

Method : F:\ORIMUL~1\METHODS\S062499.M (RTE Integrator)
Title : Orimulsion PAH Analysis by method 8270
Last Update : Wed Jul 28 08:42:17 1999
Response via : Initial Calibration

Calibration Files
2 =SC26249A.D 1 =SC16249A.D 3 =SC36249A.D
4 =SC46249A.D 5 =SC56259A.D

		Compound	2	1	3	4	5	Avg	%RSD
1)	i	D4-1,4-dichlorobenzen	----------ISTD----------						
2)		n-Nitrosomethylethyla	0.743	0.757	0.815	0.817	0.816	0.790	4.64
3)		Methyl Methanesulfona	0.801	0.889	0.865	0.827	0.895	0.855	4.74
4)	S	2-Fluorophenol(surr#1	1.506	1.625	1.522	1.446	1.512	1.522	4.25
5)		n-Nitrosodiethylamine	0.610	0.622	0.674	0.671	0.660	0.647	4.55
6)		Bis(2-chloroethyl)eth	1.396	1.567	1.435	1.358	1.478	1.447	5.58
7)		Ethyl methanesulfonat	1.460	1.593	1.577	1.488	1.588	1.541	4.05
8)		Aniline	1.692	2.127	1.535	1.594	1.616	1.713	13.91
9)	S	D5-Phenol(surr#2)	1.698	1.873	1.775	1.662	1.751	1.752	4.62
10)	M	Phenol(CCC)	1.832	2.004	1.899	1.797	1.855	1.878	4.26
11)		2-Chlorophenol	1.378	1.538	1.456	1.382	1.467	1.444	4.62
12)		1,3-Dichlorobenzene	1.625	1.681	1.663	1.632	1.695	1.659	1.84
13)	M	1,4-Dichlorobenzene(C	1.653	1.778	1.712	1.647	1.744	1.707	3.33
14)	s	13C6-1,2 dichlorobenz	1.448	1.273	1.436	1.391	1.414	1.392	5.06
15)		1,2-Dichlorobenzene	1.516	1.624	1.553	1.491	1.599	1.557	3.56
16)		Benzyl Alcohol	0.862	0.886	0.913	0.815	0.868	0.869	4.17
17)		Bis(2-chloroisopropyl	0.650	0.742	0.678	0.653	0.661	0.677	5.61
18)		2-Methylphenol	1.238	1.374	1.311	1.175	1.258	1.271	5.92
19)		n-Nitrosospyrrolidine	0.517	0.558	0.565	0.533	0.511	0.537	4.51
20)		Acetophenone	1.886	2.054	1.938	1.736	1.931	1.909	6.03
21)		Hexachloroethane	0.687	0.746	0.700	0.668	0.737	0.708	4.66
22)		4-methylphenol	2.541	2.889	2.611	2.275	2.507	2.565	8.61
23)	M	N-nitrosodi-n-propyla	0.905	0.983	0.935	0.889	0.898	0.922	4.17
24)	i	D8-Naphthalene(QS#2)	----------ISTD----------						
25)	S	D5-Nitrobenzene(surr#	0.504	0.559	0.509	0.513	0.535	0.524	4.36
26)		Nitrobenzene	0.516	0.570	0.537	0.518	0.545	0.537	4.12
27)		1-Nitrosopiperidine	0.301	0.343	0.315	0.308	0.328	0.319	5.28
28)		Isophorone	0.936	1.053	0.977	0.965	1.013	0.989	4.56
29)		2,4-Dimethylphenol	0.326	0.359	0.337	0.336	0.339	0.339	3.64
30)		Bis(2-chloroethoxy)me	0.474	0.532	0.485	0.482	0.498	0.494	4.63
31)	s	13C6-2,5 dichlorophen	0.320	0.288	0.330	0.332	0.325	0.319	5.53
32)	M	2,4-Dichlorophenol(CC	0.317	0.340	0.329	0.322	0.344	0.330	3.53
33)		1,2,4-Trichlorobenzen	0.363	0.399	0.367	0.375	0.391	0.379	4.07
34)	s	13C6-Napthalene (pre	1.122	1.020	1.116	1.094	1.094	1.089	3.75
35)		Naphthalene	1.073	1.158	1.086	1.048	1.109	1.095	3.81
36)		2-Nitrophenol(CCC)	0.227	0.236	0.243	0.242	0.247	0.239	3.36
37)		2,6-Dichlorophenol	0.313	0.331	0.328	0.323	0.337	0.327	2.71
38)		Hexachloropropene	0.235	0.243	0.250	0.258	0.272	0.252	5.73

(#) = Out of Range

Response Factor Report Semi2

Method : F:\ORIMUL~1\METHODS\S062499.M (RTE Integrator)
Title : Orimulsion PAH Analysis by method 8270
Last Update : Wed Jul 28 08:42:17 1999
Response via : Initial Calibration

Calibration Files
2 =SC26249A.D 1 =SC16249A.D 3 =SC36249A.D
4 =SC46249A.D 5 =SC56259A.D

		Compound	2	1	3	4	5	Avg	%RSD
39)		4-Chloroaniline	0.378	0.434	0.321	0.215	0.248	0.319	28.27
40)	M	Hexachlorobutadiene(C	0.214	0.219	0.219	0.227	0.238	0.223	4.24
41)		n-Nitrosodi-n-butylam	0.225	0.236	0.246	0.241	0.236	0.237	3.41
42)	M	4-Chloro-3-methyl-phe	0.312	0.353	0.330	0.321	0.340	0.331	4.80
43)		2-Methylnaphthalene	0.651	0.716	0.658	0.647	0.677	0.670	4.22
44)	i	D10-Acenaphthene(QS#3	----------ISTD----------						
45)		Isosafrole	0.549	0.574	0.588	0.578	0.584	0.575	2.69
46)	s	13C6-Phthalic Anhydri	0.135	0.153	0.139	0.083	0.236	0.149	37.21
47)		1,2,4,5-Tetrachlorobe	0.670	0.707	0.709	0.709	0.722	0.704	2.79
48)	M	Hexachlorocyclopentad	0.429	0.426	0.460	0.462	0.465	0.448	4.36
49)	M	2,4,6-Trichlorophenol	0.434	0.452	0.464	0.463	0.458	0.454	2.63
50)		2,4,5-Trichlorophenol	0.471	0.483	0.492	0.484	0.489	0.484	1.64
51)	S	2-Fluorobiphenyl(surr	1.339	1.468	1.406	1.367	1.408	1.398	3.48
52)		2-Chloronaphthalene	0.473	0.488	0.490	0.478	0.481	0.482	1.49
53)		1,3 Dinitrobenzene	0.253	0.255	0.270	0.269	0.284	0.266	4.75
54)		2-Nitroaniline	0.490	0.500	0.491	0.475	0.502	0.492	2.17
55)		3-Nitroaniline	0.377	0.398	0.383	0.371	0.389	0.384	2.81
56)		Safrole	0.257	0.267	0.263	0.261	0.269	0.263	1.88
57)		Acenaphthylene	1.869	2.020	1.955	1.922	1.942	1.942	2.81
58)		1,4-Naphthoquinone	0.311	0.318	0.312	0.301	0.276	0.303	5.53
59)		Dimethylphathalate	1.421	1.480	1.431	1.408	1.465	1.441	2.09
60)		2,6-Dinitrotoluene	0.340	0.354	0.355	0.351	0.365	0.353	2.61
61)	M	Acenaphthene(CCC)	1.135	1.229	1.181	1.168	1.136	1.170	3.32
62)		1-Napthylamine	0.934	0.813	0.866	0.760	0.833	0.841	7.67
63)		2-Napthylamine	0.552	0.394	0.482	0.371	0.457	0.451	16.02
64)		4-Nitroaniline	0.543	0.540	0.463	0.463	0.518	0.505	7.83
65)	M	2,4-Dinitrophenol(SPC	0.163	0.136	0.187	0.196	0.205	0.178	15.74
66)		Dibenzofuran	1.679	1.771	1.709	1.666	1.746	1.714	2.57
67)		Pentachlorobenzene	0.512	0.529	0.539	0.535	0.554	0.534	2.84
68)		2,4-Dinitrotoluene	0.440	0.455	0.447	0.449	0.487	0.456	4.06
69)		2,3,4,6-Tetrachloroph	0.335	0.344	0.335	0.336	0.348	0.339	1.80
70)	M	4-Nitrophenol(SPCC)	0.318	0.293	0.320	0.319	0.333	0.317	4.57
71)		Fluorene	1.297	1.383	1.291	1.267	1.355	1.318	3.67
72)		Diethyl phathalate	1.439	1.563	1.441	1.422	1.530	1.479	4.27
73)		4-Chlorophenyl phenyl	0.638	0.652	0.654	0.644	0.671	0.652	1.88
74)		2-Methyl-4,6-dinitrop	0.252	0.228	0.265	0.274	0.293	0.263	9.23
75)		5-Nitro-o-toluidine	0.377	0.414	0.350	0.351	0.386	0.376	7.05
76)		Diphenylamine	1.090	1.114	1.096	1.072	1.130	1.100	2.03
77)	S	2,4,6-Tribromophenol(	0.179	0.182	0.183	0.185	0.193	0.184	2.90

(#) = Out of Range

Response Factor Report Semi2

Method : F:\ORIMUL~1\METHODS\S062499.M (RTE Integrator)
Title : Orimulsion PAH Analysis by method 8270
Last Update : Wed Jul 28 08:42:17 1999
Response via : Initial Calibration

Calibration Files
2 =SC26249A.D 1 =SC16249A.D 3 =SC36249A.D
4 =SC46249A.D 5 =SC56259A.D

		Compound	2	1	3	4	5	Avg	%RSD
78)		Diallate	0.698	0.763	0.674	0.656	0.713	0.701	5.86
79)		1,3,5-Trinitrobenzene	0.325	0.306	0.328	0.335	0.385	0.336	8.78
80)	i	D10-Phenanthrene(QS#4	----------ISTD----------						
81)		4-Bromophenyl phenyl	0.211	0.226	0.233	0.232	0.241	0.228	5.01
82)		Phenacetin	0.453	0.472	0.457	0.454	0.486	0.464	3.13
83)		Hexachlorobenzene	0.243	0.255	0.264	0.264	0.268	0.259	3.80
84)		4-Aminobiphenyl	0.516	0.432	0.526	0.464	0.507	0.489	8.11
85)		Dinoseb	0.221	0.197	0.250	0.258	0.267	0.239	12.08
86)	M	Pentachlorophenol(CCC	0.136	0.137	0.135	0.135	0.149	0.138	4.46
87)		Pentachloronitrobenze	0.093	0.096	0.098	0.098	0.104	0.098	4.09
88)		Phenanthrene	1.140	1.234	1.193	1.166	1.220	1.191	3.26
89)	s	d10-Anthracene	1.025	0.911	1.054	1.047	1.032	1.014	5.77
90)		Anthracene	1.172	1.262	1.223	1.199	1.251	1.221	3.03
91)		Di-n-butyl phthalate	1.541	1.578	1.533	1.494	1.622	1.553	3.12
92)		Isodrin	0.148	0.150	0.142	0.140	0.148	0.146	2.98
93)	M	Fluoranthene(CCC)	1.172	1.209	1.181	1.172	1.255	1.198	2.95
94)		3,3'-Dimethylbenzidin	0.245	0.324	0.256	0.257	0.296	0.275	12.16
95)	i	D12-Chrysene(QS#5)	----------ISTD----------						
96)		Pyrene	1.539	1.661	1.612	1.585	1.596	1.598	2.77
97)		Chlorobenzilate	0.405	0.420	0.424	0.416	0.438	0.420	2.90
98)	S	D14-Terphenyl(surr#6)	0.922	0.998	0.974	0.974	0.999	0.973	3.19
99)		p-Dimethylaminoazoben	0.289	0.322	0.292	0.276	0.281	0.292	6.16
100)		2-Acetylaminofluorene	0.582	0.545	0.651	0.651	0.671	0.620	8.65
101)		Benzyl butyl phthalat	0.815	0.876	0.831	0.809	0.854	0.837	3.31
102)		3,3'-Dichlorobenzidin	0.382	0.434	0.427	0.412	0.433	0.417	5.24
103)		Benzo(a)anthracene	1.336	1.434	1.423	1.401	1.443	1.408	3.07
104)		Chrysene	1.255	1.338	1.346	1.345	1.374	1.332	3.36
105)	i	D12-Perylene(QS#6)	----------ISTD----------						
106)	M	di-n-Octyl phthalate(	1.862	1.943	1.935	1.904	2.046	1.938	3.52
107)		Benzo(b)fluoranthene	1.206	1.296	1.282	1.266	1.344	1.279	3.93
108)		7,12-Dimethylbenz(a)a	0.520	0.568	0.565	0.562	0.585	0.560	4.27
109)		Benzo(k)fluoranthene	1.156	1.235	1.222	1.195	1.265	1.215	3.41
110)	M	Benzo(a)pyrene(CCC)	1.058	1.105	1.130	1.126	1.178	1.119	3.91
111)		3-Methylcholanthrene	0.520	0.531	0.558	0.549	0.561	0.544	3.26
112)		Indeno(1,2,3-cd)pyren	1.007	1.000	1.095	1.066	1.123	1.058	5.11
113)		Dibenz(a,h)anthracene	0.988	0.972	1.093	1.065	1.100	1.043	5.74
114)		Benzo(ghi)perylene	1.048	1.052	1.139	1.101	1.150	1.098	4.33

(#) = Out of Range

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/18/99	
Sample Name:	905181131F	Date Extracted:	06/01/99	
Lab Sample ID:	9905026	Date Acquired:	06/26/99	
MS Data file:	S995026A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905181131SBF0- Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	59	P	D5-Nitrobenzene(surr#3)	70	P
D5-Phenol(surr#2)	71	P	2-Fluorobiphenyl(surr#4)	72	P
2,4,6-Tribromophenol(surr#5)	87	P	D14-Terphenyl(surr#6)	93	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	1	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	ND		n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/18/99
Sample Name:	905181131F	Date Extracted:	06/01/99
Lab Sample ID:	9905026	Date Acquired:	06/26/99
MS Data file:	S995026A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905181131SBF0- Filter

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	7	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/18/99
Sample Name:	905181131F	Date Extracted:	6/1/99
Lab Sample ID:	9905026	Date Acquired:	6/26/99
MS Data file:	S995026A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905181131SBF0- Filter

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	7	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/18/99	
Sample Name:	905181131X	Date Extracted:	06/01/99	
Lab Sample ID:	9905027	Date Acquired:	06/26/99	
MS Data file:	S995027A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905181131WSBX0- XAD

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	80	P	D5-Nitrobenzene(surr#3)	89	P
D5-Phenol(surr#2)	66	P	2-Fluorobiphenyl(surr#4)	92	P
2,4,6-Tribromophenol(surr#5)	101	P	D14-Terphenyl(surr#6)	128	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	86	13C6-2,5 Dichlorophenol	92
13C6-Napthalene	87	13C6-2,5-Phthalate anhydride	142
D10-Anthracene	100		

Compound	**µg**		**Compound**	**µg**	
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND	
Methyl Methanesulfonate	ND		N-nitrosodi-n-propylamine	ND	
n-Nitrosodiethylamine	ND		Nitrobenzene	ND	
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND	
Ethyl methanesulfonate	ND		Isophorone	ND	
Aniline	ND		2,4-Dimethylphenol	ND	
Phenol(CCC)	2	J	Bis(2-chloroethoxy)methane	ND	
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND	
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND	
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	9	J
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND	
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND	
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND	
2-Methylphenol	ND		4-Chloroaniline	ND	
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND	
Acetophenone	8	J	n-Nitrosodi-n-butylamine	ND	
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND	

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/18/99
Sample Name:	905181131X	Date Extracted:	06/01/99
Lab Sample ID:	9905027	Date Acquired:	06/26/99
MS Data file:	S995027A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905181131WSBX0- XAD

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	15
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	2 J		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/18/99
Sample Name:	905181131X	Date Extracted:	6/1/99
Lab Sample ID:	9905027	Date Acquired:	6/26/99
MS Data file:	S995027A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905181131WSBX0- XAD

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	3	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/18/99	
Sample Name:	905181131C	Date Extracted:	NA	
Lab Sample ID:	9905028	Date Acquired:	06/26/99	
MS Data file:	S995028A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905181131SBI0 Condensate-Not spiked with pre-extraction surrogates

Pre Extraction Surrogates	**% Recovery**		**% Recovery**
2-Fluorophenol(surr#1)	NS	D5-Nitrobenzene(surr#3)	NS
D5-Phenol(surr#2)	NS	2-Fluorobiphenyl(surr#4)	NS
2,4,6-Tribromophenol(surr#5)	NS	D14-Terphenyl(surr#6)	NS

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/18/99
Sample Name:	905181131C	Date Extracted:	NA
Lab Sample ID:	9905028	Date Acquired:	06/26/99
MS Data file:	S995028A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905181131SBI0 Condensate-Not spiked with pre-extraction surrogates

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND	
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	3	J
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/18/99
Sample Name:	905181131C	Date Extracted:	NA
Lab Sample ID:	9905028	Date Acquired:	6/26/99
MS Data file:	S995028A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905181131SBI0 Condensate-Not spiked with pre-extraction surrogates

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	2	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/19/99	
Sample Name:	905191016F	Date Extracted:	06/01/99	
Lab Sample ID:	9905032	Date Acquired:	06/26/99	
MS Data file:	S995032A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905191016SBF0 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	51	P	D5-Nitrobenzene(surr#3)	58	P
D5-Phenol(surr#2)	61	P	2-Fluorobiphenyl(surr#4)	62	P
2,4,6-Tribromophenol(surr#5)	78	P	D14-Terphenyl(surr#6)	105	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/19/99
Sample Name:	905191016F	Date Extracted:	06/01/99
Lab Sample ID:	9905032	Date Acquired:	06/26/99
MS Data file:	S995032A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905191016SBF0 Filter

Compound	µg		Compound	µg	
2-Methylnaphthalene	ND		4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND		2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND		5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND		Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND		Diallate	ND	
2,4,5-Trichlorophenol	ND		1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND		4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND		Phenacetin	ND	
2-Nitroaniline	ND		Hexachlorobenzene	ND	
3-Nitroaniline	ND		4-Aminobiphenyl	ND	
Safrole	ND		Dinoseb	ND	
Acenaphthylene	ND		Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND		Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND		Phenanthrene	ND	
2,6-Dinitrotoluene	ND		Anthracene	ND	
Acenaphthene(CCC)	ND		Di-n-butyl phthalate	15	
1-Napthylamine	ND		Isodrin	ND	
2-Napthylamine	ND		Fluoranthene(CCC)	ND	
4-Nitroaniline	ND		3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND		Pyrene	ND	
Dibenzofuran	ND		Chlorobenzilate	ND	
Pentachlorobenzene	ND		p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND		2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND		Benzyl butyl phthalate	3	J
4-Nitrophenol(SPCC)	ND		3,3'-Dichlorobenzidine	ND	
Fluorene	ND		Benzo(a)anthracene	ND	
Diethyl phathalate	1	J			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/19/99
Sample Name:	905191016F	Date Extracted:	6/1/99
Lab Sample ID:	9905032	Date Acquired:	6/26/99
MS Data file:	S995032A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905191016SBF0 Filter

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	2	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/19/99	
Sample Name:	905191016C	Date Extracted:	06/01/99	
Lab Sample ID:	9905034	Date Acquired:	06/26/99	
MS Data file:	S995034A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905191016SBI0 Condensate

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	39	P	D5-Nitrobenzene(surr#3)	64	P
D5-Phenol(surr#2)	34	P	2-Fluorobiphenyl(surr#4)	67	P
2,4,6-Tribromophenol(surr#5)	87	P	D14-Terphenyl(surr#6)	113	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/19/99
Sample Name:	905191016C	Date Extracted:	06/01/99
Lab Sample ID:	9905034	Date Acquired:	06/26/99
MS Data file:	S995034A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905191016SBI0 Condensate

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/19/99
Sample Name:	905191016C	Date Extracted:	6/1/99
Lab Sample ID:	9905034	Date Acquired:	6/26/99
MS Data file:	S995034A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905191016SBI0 Condensate

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/19/99	
Sample Name:	905191016X	Date Extracted:	06/01/99	
Lab Sample ID:	9905033	Date Acquired:	06/26/99	
MS Data file:	S995033A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905191016SBX0 XAD

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	60	P	D5-Nitrobenzene(surr#3)	68	P
D5-Phenol(surr#2)	61	P	2-Fluorobiphenyl(surr#4)	72	P
2,4,6-Tribromophenol(surr#5)	89	P	D14-Terphenyl(surr#6)	119	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	66	13C6-2,5 Dichlorophenol	70
13C6-Napthalene	67	13C6-2,5-Phthalate anhydride	70
D10-Anthracene	86		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	4	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	6	J	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/19/99
Sample Name:	905191016X	Date Extracted:	06/01/99
Lab Sample ID:	9905033	Date Acquired:	06/26/99
MS Data file:	S995033A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905191016SBX0 XAD

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	13
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/21/99	
Sample Name:	905211135F	Date Extracted:	06/04/99	
Lab Sample ID:	9905043	Date Acquired:	06/27/99	
MS Data file:	S995043A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905211135SBF0 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	44	P	D5-Nitrobenzene(surr#3)	52	P
D5-Phenol(surr#2)	53	P	2-Fluorobiphenyl(surr#4)	57	P
2,4,6-Tribromophenol(surr#5)	80	P	D14-Terphenyl(surr#6)	101	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/21/99
Sample Name:	905211135F	Date Extracted:	06/04/99
Lab Sample ID:	9905043	Date Acquired:	06/27/99
MS Data file:	S995043A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135SBF0 Filter

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethylphathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	6	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/21/99
Sample Name:	905211135F	Date Extracted:	6/4/99
Lab Sample ID:	9905043	Date Acquired:	6/27/99
MS Data file:	S995043A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135SBF0 Filter

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	9	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/21/99
Sample Name:	905211135X	Date Extracted:	06/04/99
Lab Sample ID:	9905044	Date Acquired:	06/27/99
MS Data file:	S995044A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135BX0 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	56	P	D5-Nitrobenzene(surr#3)	63	P
D5-Phenol(surr#2)	57	P	2-Fluorobiphenyl(surr#4)	67	P
2,4,6-Tribromophenol(surr#5)	84	P	D14-Terphenyl(surr#6)	115	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	66	13C6-2,5 dichlorophenol	68
13C6-Napthalene	67	13C6-2,5-Phthalate anhydride	57
D10-Anthracene	82		

Compound	**µg**		**Compound**	**µg**	
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND	
Methyl Methanesulfonate	ND		N-nitrosodi-n-propylamine	ND	
n-Nitrosodiethylamine	ND		Nitrobenzene	ND	
bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND	
Ethyl methanesulfonate	ND		Isophorone	ND	
Aniline	ND		2,4-Dimethylphenol	ND	
Phenol(CCC)	5	J	Bis(2-chloroethoxy)methane	ND	
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND	
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND	
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	2	J
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND	
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND	
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND	
2-Methylphenol	ND		4-Chloroaniline	ND	
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND	
Acetophenone	6	J	n-Nitrosodi-n-butylamine	ND	
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND	

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/21/99
Sample Name:	905211135X	Date Extracted:	06/04/99
Lab Sample ID:	9905044	Date Acquired:	06/27/99
MS Data file:	S995044A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135BX0 Filter

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethylphathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	4	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/21/99
Sample Name:	905211135X	Date Extracted:	6/4/99
Lab Sample ID:	9905044	Date Acquired:	6/27/99
MS Data file:	S995044A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135BX0 Filter

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/21/99	
Sample Name:	905211135C	Date Extracted:	06/04/99	
Lab Sample ID:	9905045	Date Acquired:	06/27/99	
MS Data file:	S995045A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905211135SBI0 Condensate

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	34	P	D5-Nitrobenzene(surr#3)	59	P
D5-Phenol(surr#2)	25	P	2-Fluorobiphenyl(surr#4)	55	P
2,4,6-Tribromophenol(surr#5)	79	P	D14-Terphenyl(surr#6)	112	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/21/99
Sample Name:	905211135C	Date Extracted:	06/04/99
Lab Sample ID:	9905045	Date Acquired:	06/27/99
MS Data file:	S995045A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135SBI0 Condensate

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethylphathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/21/99
Sample Name:	905211135C	Date Extracted:	6/4/99
Lab Sample ID:	9905045	Date Acquired:	6/27/99
MS Data file:	S995045A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905211135SBI0 Condensate

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99	
Sample Name:	905241202F	Date Extracted:	06/04/99	
Lab Sample ID:	9905046	Date Acquired:	06/27/99	
MS Data file:	S995046A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905241202SBFOBLO1 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	51	P	D5-Nitrobenzene(surr#3)	59	P
D5-Phenol(surr#2)	60	P	2-Fluorobiphenyl(surr#4)	62	P
2,4,6-Tribromophenol(surr#5)	78	P	D14-Terphenyl(surr#6)	106	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		N-nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	1	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	ND		n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99
Sample Name:	905241202F	Date Extracted:	06/04/99
Lab Sample ID:	9905046	Date Acquired:	06/27/99
MS Data file:	S995046A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905241202SBFOBL01 Filter

Compound	µg		Compound	µg	
2-Methylnaphthalene	ND		4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND		2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND		5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND		Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND		Diallate	ND	
2,4,5-Trichlorophenol	ND		1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND		4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND		Phenacetin	ND	
2-Nitroaniline	ND		Hexachlorobenzene	ND	
3-Nitroaniline	ND		4-Aminobiphenyl	ND	
Safrole	ND		Dinoseb	ND	
Acenaphthylene	ND		Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND		Pentachloronitrobenzene	ND	
Dimethylphathalate	ND		Phenanthrene	ND	
2,6-Dinitrotoluene	ND		Anthracene	ND	
Acenaphthene(CCC)	ND		Di-n-butyl phthalate	8	J
1-Napthylamine	ND		Isodrin	ND	
2-Napthylamine	ND		Fluoranthene(CCC)	ND	
4-Nitroaniline	ND		3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND		Pyrene	ND	
Dibenzofuran	ND		Chlorobenzilate	ND	
Pentachlorobenzene	ND		p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND		2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND		Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND		3,3'-Dichlorobenzidine	ND	
Fluorene	ND		Benzo(a)anthracene	ND	
Diethyl phathalate	5	J			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/24/99
Sample Name:	905241202F	Date Extracted:	6/4/99
Lab Sample ID:	9905046	Date Acquired:	6/27/99
MS Data file:	S995046A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905241202SBFOBLO1 Filter

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99	
Sample Name:	905241202X	Date Extracted:	06/04/99	
Lab Sample ID:	9905047	Date Acquired:	06/28/99	
MS Data file:	S995047A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905241202SBW2BLO1-XAD

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	54	P	D5-Nitrobenzene(surr#3)	63	P
D5-Phenol(surr#2)	59	P	2-Fluorobiphenyl(surr#4)	64	P
2,4,6-Tribromophenol(surr#5)	78	P	D14-Terphenyl(surr#6)	98	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	64	13C6-2,5 dichlorophenol	71
13C6-Napthalene	66	13C6-2,5-Phthalate anhydride	116
D10-Anthracene	72		

Compound	**µg**		**Compound**	**µg**	
n-Nitrosomethylethylamine	ND				
Methyl Methanesulfonate	ND		4-methylphenol	ND	
n-Nitrosodiethylamine	ND		N-nitrosodi-n-propylamine	ND	
bis (2-chloroethyl) ether	ND		Nitrobenzene	ND	
Ethyl methanesulfonate	ND		1-Nitrosopiperidine	ND	
Ethyl methanesulfonate	ND		Isophorone	ND	
Aniline	ND		2,4-Dimethylphenol	ND	
Phenol(CCC)	3	J	Bis(2-chloroethoxy)methane	ND	
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND	
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND	
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	1	J
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND	
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND	
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND	
2-Methylphenol	ND		4-Chloroaniline	ND	
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND	
Acetophenone	5	J	n-Nitrosodi-n-butylamine	ND	
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND	

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99
Sample Name:	905241202X	Date Extracted:	06/04/99
Lab Sample ID:	9905047	Date Acquired:	06/28/99
MS Data file:	S995047A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905241202SBW2BLO1-XAD

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	9	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99
Sample Name:	905241202X	Date Extracted:	06/04/99
Lab Sample ID:	9905047	Date Acquired:	06/28/99
MS Data file:	S995047A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905241202SBW2BLO1-XAD

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion		Date Sampled:	05/24/99	
Sample Name:	905241202C		Date Extracted:	06/07/99	
Lab Sample ID:	9905048		Date Acquired:	06/28/99	
MS Data file:	S995048A		Analyst:	Bill Preston	
Method:	8270		QC reviewer:	Dennis Tabor	
	HRGC/LRMS		Extract Volume	1	ml
			Dilution Factor	1	

Sample Description/Narrative:

905241202SBIOBLO1 Condensates

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	36	P	D5-Nitrobenzene(surr#3)	56	P
D5-Phenol(surr#2)	31	P	2-Fluorobiphenyl(surr#4)	55	P
2,4,6-Tribromophenol(surr#5)	78	P	D14-Terphenyl(surr#6)	118	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND		
Methyl Methanesulfonate	ND	4-methylphenol	ND
n-Nitrosodiethylamine	ND	N-nitrosodi-n-propylamine	ND
bis (2-chloroethyl) ether	ND	Nitrobenzene	ND
Ethyl methanesulfonate	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99
Sample Name:	905241202C	Date Extracted:	06/07/99
Lab Sample ID:	9905048	Date Acquired:	06/28/99
MS Data file:	S995048A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905241202SBIOBLO1 Condensates

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/24/99
Sample Name:	905241202C	Date Extracted:	06/07/99
Lab Sample ID:	9905048	Date Acquired:	06/28/99
MS Data file:	S995048A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905241202SBIOBLO1 Condensates

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion		Date Sampled:	05/25/99	
Sample Name:	905251144F		Date Extracted:	06/04/99	
Lab Sample ID:	9905058		Date Acquired:	06/28/99	
MS Data file:	S995058A		Analyst:	Bill Preston	
Method:	8270		QC reviewer:	Dennis Tabor	
	HRGC/LRMS		Extract Volume	1	ml
			Dilution Factor	1	

Sample Description/Narrative:

905251144SBF0BLO1 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	50	P	D5-Nitrobenzene(surr#3)	59	P
D5-Phenol(surr#2)	62	P	2-Fluorobiphenyl(surr#4)	61	P
2,4,6-Tribromophenol(surr#5)	75	P	D14-Terphenyl(surr#6)	106	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND		
Methyl Methanesulfonate	ND	4-methylphenol	ND
n-Nitrosodiethylamine	ND	N-nitrosodi-n-propylamine	ND
bis (2-chloroethyl) ether	ND	Nitrobenzene	ND
Ethyl methanesulfonate	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99
Sample Name:	905251144F	Date Extracted:	06/04/99
Lab Sample ID:	9905058	Date Acquired:	06/28/99
MS Data file:	S995058A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905251144SBF0BLO1 Filter

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	11
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	11		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99
Sample Name:	905251144F	Date Extracted:	06/04/99
Lab Sample ID:	9905058	Date Acquired:	06/28/99
MS Data file:	S995058A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905251144SBF0BLO1 Filter

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	3	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99	
Sample Name:	905251144X	Date Extracted:	06/04/99	
Lab Sample ID:	9905059	Date Acquired:	06/28/99	
MS Data file:	S995059A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905251144SBXOBL01-XAD

Pre Extraction Surrogates	% Recovery			% Recovery	
2-Fluorophenol(surr#1)	55	P	D5-Nitrobenzene(surr#3)	61	P
D5-Phenol(surr#2)	60	P	2-Fluorobiphenyl(surr#4)	65	P
2,4,6-Tribromophenol(surr#5)	90	P	D14-Terphenyl(surr#6)	114	P

Pre Sampling Surrogates	% Recovery		% Recovery
13C6-1,2 Dichlorobenzene	61	13C6-2,5 Dichlorophenol	64
13C6-Napthalene	64	13C6-2,5-Phthalate anhydride	97
D10-Anthracene	86		

Compound	µg		Compound	µg
n-Nitrosomethylethylamine	ND			
Methyl Methanesulfonate	ND		4-Methylphenol	ND
n-Nitrosodiethylamine	ND		N-nitrosodi-n-propylamine	ND
bis (2-chloroethyl) ether	ND		Nitrobenzene	ND
Ethyl methanesulfonate	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	3	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	5	J	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99
Sample Name:	905251144X	Date Extracted:	06/04/99
Lab Sample ID:	9905059	Date Acquired:	06/28/99
MS Data file:	S995059A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905251144SBXOBL01-XAD

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	3	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99
Sample Name:	905251144X	Date Extracted:	06/04/99
Lab Sample ID:	9905059	Date Acquired:	06/28/99
MS Data file:	S995059A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905251144SBXOBL01-XAD

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	1	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion		Date Sampled:	05/25/99	
Sample Name:	90251144C		Date Extracted:	06/07/99	
Lab Sample ID:	9905060		Date Acquired:	06/28/99	
MS Data file:	S995060A		Analyst:	Bill Preston	
Method:	8270		QC reviewer:	Dennis Tabor	
	HRGC/LRMS		Extract Volume	1	ml
			Dilution Factor	1	

Sample Description/Narrative:

90251144SBIOBL01 Condensate

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	39	P	D5-Nitrobenzene(surr#3)	61	P
D5-Phenol(surr#2)	35	P	2-Fluorobiphenyl(surr#4)	59	P
2,4,6-Tribromophenol(surr#5)	77	P	D14-Terphenyl(surr#6)	127	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	5/19/99
Sample Name:	905191016X	Date Extracted:	6/1/99
Lab Sample ID:	9905033	Date Acquired:	6/26/99
MS Data file:	S995033A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905191016SBX0 XAD

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	3	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99
Sample Name:	90251144C	Date Extracted:	06/07/99
Lab Sample ID:	9905060	Date Acquired:	06/28/99
MS Data file:	S995060A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

90251144SBIOBL01 Condensate

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/25/99
Sample Name:	90251144C	Date Extracted:	06/07/99
Lab Sample ID:	9905060	Date Acquired:	06/28/99
MS Data file:	S995060A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

90251144SBIOBL01 Condensate

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib | ND = not detected | J = Peak below the calibration range | NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99	
Sample Name:	905261054F	Date Extracted:	06/09/99	
Lab Sample ID:	9905061	Date Acquired:	06/28/99	
MS Data file:	S995061A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905261054SBFOBL01 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	49	P	D5-Nitrobenzene(surr#3)	56	P
D5-Phenol(surr#2)	62	P	2-Fluorobiphenyl(surr#4)	62	P
2,4,6-Tribromophenol(surr#5)	83	P	D14-Terphenyl(surr#6)	117	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	2	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	ND		n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99
Sample Name:	905261054F	Date Extracted:	06/09/99
Lab Sample ID:	9905061	Date Acquired:	06/28/99
MS Data file:	S995061A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905261054SBFOBL01 Filter

Compound	µg		Compound	µg	
2-Methylnaphthalene	ND		4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND		2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND		5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND		Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND		Diallate	ND	
2,4,5-Trichlorophenol	ND		1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND		4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND		Phenacetin	ND	
2-Nitroaniline	ND		Hexachlorobenzene	ND	
3-Nitroaniline	ND		4-Aminobiphenyl	ND	
Safrole	ND		Dinoseb	ND	
Acenaphthylene	ND		Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND		Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND		Phenanthrene	ND	
2,6-Dinitrotoluene	ND		Anthracene	ND	
Acenaphthene(CCC)	ND		Di-n-butyl phthalate	8	J
1-Napthylamine	ND		Isodrin	ND	
2-Napthylamine	ND		Fluoranthene(CCC)	ND	
4-Nitroaniline	ND		3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND		Pyrene	ND	
Dibenzofuran	ND		Chlorobenzilate	ND	
Pentachlorobenzene	ND		p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND		2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND		Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND		3,3'-Dichlorobenzidine	ND	
Fluorene	ND		Benzo(a)anthracene	ND	
Diethyl phathalate	3	J			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99
Sample Name:	905261054F	Date Extracted:	06/09/99
Lab Sample ID:	9905061	Date Acquired:	06/28/99
MS Data file:	S995061A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905261054SBFOBL01 Filter

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99	
Sample Name:	905261054X	Date Extracted:	06/09/99	
Lab Sample ID:	9905062	Date Acquired:	06/28/99	
MS Data file:	S995062A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905261054SBXOBL01 XAD

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	41	P	D5-Nitrobenzene(surr#3)	56	P
D5-Phenol(surr#2)	53	P	2-Fluorobiphenyl(surr#4)	67	P
2,4,6-Tribromophenol(surr#5)	94	P	D14-Terphenyl(surr#6)	120	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	46	13C6-2,5 Dichlorophenol	61
13C6-Napthalene	55	13C6-2,5-Phthalate anhydride	218
D10-Anthracene	75		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	3	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	5	J	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99
Sample Name:	905261054X	Date Extracted:	06/09/99
Lab Sample ID:	9905062	Date Acquired:	06/28/99
MS Data file:	S995062A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905261054SBXOBL01 XAD

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	20	
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	1	J
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99
Sample Name:	905261054X	Date Extracted:	06/09/99
Lab Sample ID:	9905062	Date Acquired:	06/28/99
MS Data file:	$995062A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905261054SBXOBL01 XAD

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99	
Sample Name:	905261054C	Date Extracted:	06/07/99	
Lab Sample ID:	9905063	Date Acquired:	06/28/99	
MS Data file:	S995063A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

905261054SBIOBL01 Condensate

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	42	P	D5-Nitrobenzene(surr#3)	62	P
D5-Phenol(surr#2)	34	P	2-Fluorobiphenyl(surr#4)	60	P
2,4,6-Tribromophenol(surr#5)	77	P	D14-Terphenyl(surr#6)	108	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99
Sample Name:	905261054C	Date Extracted:	06/07/99
Lab Sample ID:	9905063	Date Acquired:	06/28/99
MS Data file:	S995063A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

905261054SBIOBL01 Condensate

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	05/26/99
Sample Name:	905261054C	Date Extracted:	06/07/99
Lab Sample ID:	9905063	Date Acquired:	06/28/99
MS Data file:	S995063A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

905261054SBIOBL01 Condensate

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib | ND = not detected | J = Peak below the calibration range | NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA	
Sample Name:	Glassware Blank	Date Extracted:	06/01/99	
Lab Sample ID:	9906001	Date Acquired:	06/28/99	
MS Data file:	S996001A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

Glassware Blank

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	71	P	D5-Nitrobenzene(surr#3)	79	P
D5-Phenol(surr#2)	80	P	2-Fluorobiphenyl(surr#4)	76	P
2,4,6-Tribromophenol(surr#5)	90	P	D14-Terphenyl(surr#6)	118	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range

NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA
Sample Name:	Glassware Blank	Date Extracted:	06/01/99
Lab Sample ID:	9906001	Date Acquired:	06/28/99
MS Data file:	S996001A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Glassware Blank

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	11
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion		
Sample Name:	Glassware Blank	Date Sampled:	NA
Lab Sample ID:	9906001	Date Extracted:	06/01/99
MS Data file:	S996001A	Date Acquired:	06/28/99
Method:	8270	Analyst:	Bill Preston
	HRGC/LRMS	QC reviewer:	Dennis Tabor
		Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

Glassware Blank

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99	
Sample Name:	906031216F	Date Extracted:	06/09/99	
Lab Sample ID:	9906007	Date Acquired:	06/28/99	
MS Data file:	S996007A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906031216SBFOBLR6 Filter

Pre Extraction Surrogates	% Recovery			% Recovery	
2-Fluorophenol(surr#1)	42	P	D5-Nitrobenzene(surr#3)	56	P
D5-Phenol(surr#2)	56	P	2-Fluorobiphenyl(surr#4)	68	P
2,4,6-Tribromophenol(surr#5)	85	P	D14-Terphenyl(surr#6)	116	P

Pre Sampling Surrogates	% Recovery		% Recovery
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	µg	Compound	µg
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99
Sample Name:	906031216F	Date Extracted:	06/09/99
Lab Sample ID:	9906007	Date Acquired:	06/28/99
MS Data file:	S996007A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906031216SBFOBLR6 Filter

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	10	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion		
Sample Name:	906031216F	Date Sampled:	06/03/99
Lab Sample ID:	9906007	Date Extracted:	06/09/99
MS Data file:	S996007A	Date Acquired:	06/28/99
Method:	8270	Analyst:	Bill Preston
	HRGC/LRMS	QC reviewer:	Dennis Tabor
		Extract Volume	1 ml
Sample Description/Narrative:		Dilution Factor	1

906031216SBFOBLR6 Filter

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	2	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99	
Sample Name:	906031216X	Date Extracted:	06/09/99	
Lab Sample ID:	9906008	Date Acquired:	06/28/99	
MS Data file:	S996008A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906031216SBXOBLR6 - XAD

Pre Extraction Surrogates	% Recovery			% Recovery	
2-Fluorophenol(surr#1)	48	P	D5-Nitrobenzene(surr#3)	60	P
D5-Phenol(surr#2)	58	P	2-Fluorobiphenyl(surr#4)	66	P
2,4,6-Tribromophenol(surr#5)	85	P	D14-Terphenyl(surr#6)	108	P

Pre Sampling Surrogates	% Recovery		% Recovery
13C6-1,2 Dichlorobenzene	49	13C6-2,5 Dichlorophenol	58
13C6-Napthalene	54	13C6-2,5-Phthalate anhydride	185
D10-Anthracene	73		

Compound	µg		Compound	µg	
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND	
Methyl Methanesulfonate	ND		n-Nitrosodi-n-propylamine	ND	
n-Nitrosodiethylamine	ND		Nitrobenzene	ND	
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND	
Ethyl methanesulfonate	ND		Isophorone	ND	
Aniline	ND		2,4-Dimethylphenol	ND	
Phenol(CCC)	4	J	Bis(2-chloroethoxy)methane	ND	
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND	
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND	
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	2	J
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND	
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND	
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND	
2-Methylphenol	ND		4-Chloroaniline	ND	
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND	
Acetophenone	5	J	n-Nitrosodi-n-butylamine	ND	
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND	

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99
Sample Name:	906031216X	Date Extracted:	06/09/99
Lab Sample ID:	9906008	Date Acquired:	06/28/99
MS Data file:	S996008A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906031216SBXOBLR6 - XAD

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	13
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	2 J		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99
Sample Name:	906031216X	Date Extracted:	06/09/99
Lab Sample ID:	9906008	Date Acquired:	06/28/99
MS Data file:	S996008A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906031216SBXOBLR6 - XAD

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99	
Sample Name:	906031216C	Date Extracted:	06/07/99	
Lab Sample ID:	9906009	Date Acquired:	06/29/99	
MS Data file:	S996009B	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906031216SBFOBLR6-Condensate

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	30	P	D5-Nitrobenzene(surr#3)	45	P
D5-Phenol(surr#2)	25	P	2-Fluorobiphenyl(surr#4)	42	P
2,4,6-Tribromophenol(surr#5)	57	P	D14-Terphenyl(surr#6)	83	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99
Sample Name:	906031216C	Date Extracted:	06/07/99
Lab Sample ID:	9906009	Date Acquired:	06/29/99
MS Data file:	S996009B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906031216SBFOBLR6-Condensate

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/03/99
Sample Name:	906031216C	Date Extracted:	06/07/99
Lab Sample ID:	9906009	Date Acquired:	06/29/99
MS Data file:	$996009B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906031216SBFOBLR6-Condensate

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	1	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib | ND = not detected | J = Peak below the calibration range | NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99	
Sample Name:	906041304F	Date Extracted:	06/09/99	
Lab Sample ID:	9906019	Date Acquired:	06/29/99	
MS Data file:	S996019B	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906041304SBFOBLR6 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	42	P	D5-Nitrobenzene(surr#3)	59	P
D5-Phenol(surr#2)	57	P	2-Fluorobiphenyl(surr#4)	65	P
2,4,6-Tribromophenol(surr#5)	75	P	D14-Terphenyl(surr#6)	105	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99
Sample Name:	906041304F	Date Extracted:	06/09/99
Lab Sample ID:	9906019	Date Acquired:	06/29/99
MS Data file:	S996019B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906041304SBFOBLR6 Filter

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	40
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	2 J		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99
Sample Name:	906041304F	Date Extracted:	06/09/99
Lab Sample ID:	9906019	Date Acquired:	06/29/99
MS Data file:	S996019B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906041304SBFOBLR6 Filter

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	9	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99	
Sample Name:	906041304X	Date Extracted:	06/09/99	
Lab Sample ID:	9906020	Date Acquired:	06/29/99	
MS Data file:	S996020B	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906041304SBXOBLR6 XAD

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	48	P	D5-Nitrobenzene(surr#3)	65	P
D5-Phenol(surr#2)	62	P	2-Fluorobiphenyl(surr#4)	71	P
2,4,6-Tribromophenol(surr#5)	91	P	D14-Terphenyl(surr#6)	123	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	53	13C6-2,5 Dichlorophenol	63
13C6-Napthalene	61	13C6-2,5-Phthalate anhydride	45
D10-Anthracene	73		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	3	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	4	J	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99
Sample Name:	906041304X	Date Extracted:	06/09/99
Lab Sample ID:	9906020	Date Acquired:	06/29/99
MS Data file:	S996020B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906041304SBXOBLR6 XAD

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	5	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99
Sample Name:	906041304X	Date Extracted:	06/09/99
Lab Sample ID:	9906020	Date Acquired:	06/29/99
MS Data file:	$996020B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906041304SBXOBLR6 XAD

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	1	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99	
Sample Name:	906041304C	Date Extracted:	06/15/99	
Lab Sample ID:	9906021	Date Acquired:	06/29/99	
MS Data file:	S996021B	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906041304SBIOBLR6 Condensate

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	51	P	D5-Nitrobenzene(surr#3)	74	P
D5-Phenol(surr#2)	46	P	2-Fluorobiphenyl(surr#4)	74	P
2,4,6-Tribromophenol(surr#5)	98	P	D14-Terphenyl(surr#6)	131	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99
Sample Name:	906041304C	Date Extracted:	06/15/99
Lab Sample ID:	9906021	Date Acquired:	06/29/99
MS Data file:	S996021B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906041304SBIOBLR6 Condensate

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/04/99
Sample Name:	906041304C	Date Extracted:	06/15/99
Lab Sample ID:	9906021	Date Acquired:	06/29/99
MS Data file:	S996021B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906041304SBIOBLR6 Condensate

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	1	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/08/99	
Sample Name:	906071229C	Date Extracted:	06/15/99	
Lab Sample ID:	9906024	Date Acquired:	06/29/99	
MS Data file:	S996024B	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906071229BIOBLR6 Condensate/d14-Terphenyl out of criteria

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	58	P	D5-Nitrobenzene(surr#3)	80	P
D5-Phenol(surr#2)	50	P	2-Fluorobiphenyl(surr#4)	80	P
2,4,6-Tribromophenol(surr#5)	105	P	D14-Terphenyl(surr#6)	138	F

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	NS	13C6-2,5 Dichlorophenol	NS
13C6-Napthalene	NS	13C6-2,5-Phthalate anhydride	NS
D10-Anthracene	NS		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/08/99
Sample Name:	906071229C	Date Extracted:	06/15/99
Lab Sample ID:	9906024	Date Acquired:	06/29/99
MS Data file:	S996024B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906071229BIOBLR6 Condensate/d14-Terphenyl out of criteria

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	ND
2,6-Dinitrotoluene	ND	Anthracene	ND
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	ND
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	ND
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	ND	Benzo(a)anthracene	ND
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/08/99
Sample Name:	906071229C	Date Extracted:	06/15/99
Lab Sample ID:	9906024	Date Acquired:	06/29/99
MS Data file:	S996024B	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906071229BIOBLR6 Condensate/d14-Terphenyl out of criteria

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/07/99	
Sample Name:	906071229F	Date Extracted:	06/21/99	
Lab Sample ID:	9906022	Date Acquired:	06/30/99	
MS Data file:	S996022A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906071229SBFOBLR6 Filter

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	56	P	D5-Nitrobenzene(surr#3)	73	P
D5-Phenol(surr#2)	68	P	2-Fluorobiphenyl(surr#4)	75	P
2,4,6-Tribromophenol(surr#5)	95	P	D14-Terphenyl(surr#6)	118	P

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	53	13C6-2,5 dichlorophenol	61
13C6-Napthalene	59	13C6-2,5-Phthalate anhydride	21
D10-Anthracene	69		

Compound	**µg**		**Compound**	**µg**
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND
Methyl Methanesulfonate	ND		n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND		Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND		Isophorone	ND
Aniline	ND		2,4-Dimethylphenol	ND
Phenol(CCC)	1	J	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	1	J	Naphthalene	ND
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND
2-Methylphenol	ND		4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND
Acetophenone	ND		n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/07/99
Sample Name:	906071229F	Date Extracted:	06/21/99
Lab Sample ID:	9906022	Date Acquired:	06/30/99
MS Data file:	S996022A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906071229SBFOBLR6 Filter

Compound	µg		Compound	µg	
2-Methylnaphthalene	ND		4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND		2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND		5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND		Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND		Diallate	ND	
2,4,5-Trichlorophenol	ND		1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND		4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND		Phenacetin	ND	
2-Nitroaniline	ND		Hexachlorobenzene	ND	
3-Nitroaniline	ND		4-Aminobiphenyl	ND	
Safrole	ND		Dinoseb	ND	
Acenaphthylene	ND		Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND		Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND		Phenanthrene	ND	
2,6-Dinitrotoluene	ND		Anthracene	ND	
Acenaphthene(CCC)	ND		Di-n-butyl phthalate	6	J
1-Napthylamine	ND		Isodrin	ND	
2-Napthylamine	ND		Fluoranthene(CCC)	ND	
4-Nitroaniline	ND		3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND		Pyrene	ND	
Dibenzofuran	ND		Chlorobenzilate	ND	
Pentachlorobenzene	ND		p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND		2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND		Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND		3,3'-Dichlorobenzidine	ND	
Fluorene	ND		Benzo(a)anthracene	ND	
Diethyl phathalate	2	J			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/07/99
Sample Name:	906071229F	Date Extracted:	06/21/99
Lab Sample ID:	9906022	Date Acquired:	06/30/99
MS Data file:	S996022A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906071229SBFOBLR6 Filter

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	34	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/07/99	
Sample Name:	906071229X	Date Extracted:	06/21/99	
Lab Sample ID:	9906023	Date Acquired:	06/30/99	
MS Data file:	S996023A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

906071229SBXOBLR6 XAD-d14-Terphenyl out of criteria
2,4,6-Tribromophenol out of criteria

Pre Extraction Surrogates	% Recovery			% Recovery	
2-Fluorophenol(surr#1)	72	P	D5-Nitrobenzene(surr#3)	87	P
D5-Phenol(surr#2)	85	P	2-Fluorobiphenyl(surr#4)	91	P
2,4,6-Tribromophenol(surr#5)	144	F	D14-Terphenyl(surr#6)	144	F

Pre Sampling Surrogates	% Recovery		% Recovery
13C6-1,2 Dichlorobenzene	59	13C6-2,5 Dichlorophenol	64
13C6-Napthalene	63	13C6-2,5-Phthalate anhydride	29
D10-Acenapthalene	78		

Compound	µg		Compound	µg	
n-Nitrosomethylethylamine	ND		4-Methylphenol	ND	
Methyl Methanesulfonate	ND		n-Nitrosodi-n-propylamine	ND	
n-Nitrosodiethylamine	ND		Nitrobenzene	ND	
Bis (2-chloroethyl) ether	ND		1-Nitrosopiperidine	ND	
Ethyl methanesulfonate	ND		Isophorone	ND	
Aniline	ND		2,4-Dimethylphenol	ND	
Phenol(CCC)	5	J	Bis(2-chloroethoxy)methane	ND	
2-Chlorophenol	ND		2,4-Dichlorophenol(CCC)	ND	
1,3-Dichlorobenzene	ND		1,2,4-Trichlorobenzene	ND	
1,4-Dichlorobenzene(CCC)	ND		Naphthalene	2	J
1,2-Dichlorobenzene	ND		2-Nitrophenol(CCC)	ND	
Benzyl Alcohol	ND		2,6-Dichlorophenol	ND	
Bis(2-chloroisopropyl)ether	ND		Hexachloropropene	ND	
2-Methylphenol	ND		4-Chloroaniline	ND	
n-Nitrosospyrrolidine	ND		Hexachlorobutadiene(CCC)	ND	
Acetophenone	6	J	n-Nitrosodi-n-butylamine	ND	
Hexachloroethane	ND		4-Chloro-3-methyl-phenol(CCC)	ND	

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/07/99
Sample Name:	906071229X	Date Extracted:	06/21/99
Lab Sample ID:	9906023	Date Acquired:	06/30/99
MS Data file:	S996023A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906071229SBXOBLR6 XAD-d14-Terphenyl out of criteria

Compound	µg		Compound	µg	
2-Methylnaphthalene	1	J	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND		2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND		5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND		Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND		Diallate	ND	
2,4,5-Trichlorophenol	ND		1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND		4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND		Phenacetin	ND	
2-Nitroaniline	ND		Hexachlorobenzene	ND	
3-Nitroaniline	ND		4-Aminobiphenyl	ND	
Safrole	ND		Dinoseb	ND	
Acenaphthylene	ND		Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND		Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND		Phenanthrene	ND	
2,6-Dinitrotoluene	ND		Anthracene	ND	
Acenaphthene(CCC)	ND		Di-n-butyl phthalate	9	J
1-Napthylamine	ND		Isodrin	ND	
2-Napthylamine	ND		Fluoranthene(CCC)	ND	
4-Nitroaniline	ND		3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND		Pyrene	ND	
Dibenzofuran	ND		Chlorobenzilate	ND	
Pentachlorobenzene	ND		p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND		2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND		Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND		3,3'-Dichlorobenzidine	ND	
Fluorene	ND		Benzo(a)anthracene	ND	
Diethyl phathalate	ND				

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/07/99
Sample Name:	906071229X	Date Extracted:	06/21/99
Lab Sample ID:	9906023	Date Acquired:	06/30/99
MS Data file:	S996023A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

906071229SBXOBLR6 XAD-d14-Terphenyl out of criteria

Compound	µg		Compound	µg
Chrysene	ND		Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	8	J	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND		Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND		Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND		Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA	
Sample Name:	Matrix Spike	Date Extracted:	06/21/99	
Lab Sample ID:	9906048	Date Acquired:	06/30/99	
MS Data file:	S996048A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

Matrix Spike-100 ug of PAH components only

Pre Extraction Surrogates	**% Recovery**		**% Recovery**
2-Fluorophenol(surr#1)	NS	D5-Nitrobenzene(surr#3)	NS
D5-Phenol(surr#2)	NS	2-Fluorobiphenyl(surr#4)	NS
2,4,6-Tribromophenol(surr#5)	NS	D14-Terphenyl(surr#6)	NS

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	51	13C6-2,5 Dichlorophenol	57
13C6-Napthalene	59	13C6-2,5-Phthalate anhydride	96
D10-Anthracene	84		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	55
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA
Sample Name:	Matrix Spike	Date Extracted:	06/21/99
Lab Sample ID:	9906048	Date Acquired:	06/30/99
MS Data file:	S996048A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Matrix Spike-100 ug of PAH components only

Compound	µg	Compound	µg
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND
1,3 Dinitrobenzene	ND	Phenacetin	ND
2-Nitroaniline	ND	Hexachlorobenzene	ND
3-Nitroaniline	ND	4-Aminobiphenyl	ND
Safrole	ND	Dinoseb	ND
Acenaphthylene	62	Pentachlorophenol(CCC)	ND
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND
Dimethyl phathalate	ND	Phenanthrene	72
2,6-Dinitrotoluene	ND	Anthracene	73
Acenaphthene(CCC)	59	Di-n-butyl phthalate	10
1-Napthylamine	ND	Isodrin	ND
2-Napthylamine	ND	Fluoranthene(CCC)	75
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND
2,4-Dinitrophenol(SPCC)	ND	Pyrene	75
Dibenzofuran	ND	Chlorobenzilate	ND
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND
Fluorene	69	Benzo(a)anthracene	75
Diethyl phathalate	ND		

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA
Sample Name:	Matrix Spike	Date Extracted:	06/21/99
Lab Sample ID:	9906048	Date Acquired:	06/30/99
MS Data file:	S996048A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Matrix Spike-100 ug of PAH components only

Compound	µg	Compound	µg
Chrysene	75	Benzo(a)pyrene(CCC)	77
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	72	Indeno(1,2,3-cd)pyrene	73
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	73
Benzo(k)fluoranthene	76	Benzo(ghi)perylene	73

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA	
Sample Name:	Matrix Spike Dup	Date Extracted:	06/21/99	
Lab Sample ID:	9906049	Date Acquired:	06/30/99	
MS Data file:	S996049A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

Matrix Spike Duplicate-100 ug of PAH components only

Pre Extraction Surrogates	% Recovery		% Recovery
2-Fluorophenol(surr#1)	NS	D5-Nitrobenzene(surr#3)	NS
D5-Phenol(surr#2)	NS	2-Fluorobiphenyl(surr#4)	NS
2,4,6-Tribromophenol(surr#5)	NS	D14-Terphenyl(surr#6)	NS

Pre Sampling Surrogates	% Recovery		% Recovery
13C6-1,2 Dichlorobenzene	47	13C6-2,5 Dichlorophenol	49
13C6-Napthalene	53	13C6-2,5-Phthalate anhydride	89
D10-Anthracene	78		

Compound	µg	Compound	µg
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	50
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA
Sample Name:	Matrix Spike Dup	Date Extracted:	06/21/99
Lab Sample ID:	9906049	Date Acquired:	06/30/99
MS Data file:	S996049A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Matrix Spike Duplicate-100 ug of PAH components only

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	53	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	66	
2,6-Dinitrotoluene	ND	Anthracene	67	
Acenaphthene(CCC)	52	Di-n-butyl phthalate	5	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	71	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	69	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	61	Benzo(a)anthracene	69	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	NA
Sample Name:	Matrix Spike Dup	Date Extracted:	06/21/99
Lab Sample ID:	9906049	Date Acquired:	06/30/99
MS Data file:	S996049A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Matrix Spike Duplicate-100 ug of PAH components only

Compound	µg	Compound	µg
Chrysene	69	Benzo(a)pyrene(CCC)	72
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	67	Indeno(1,2,3-cd)pyrene	67
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	67
Benzo(k)fluoranthene	72	Benzo(ghi)perylene	67

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/21/99	
Sample Name:	Resin Blank	Date Extracted:	06/21/99	
Lab Sample ID:	9906050	Date Acquired:	06/30/99	
MS Data file:	S996050A	Analyst:	Bill Preston	
Method:	8270	QC reviewer:	Dennis Tabor	
	HRGC/LRMS	Extract Volume	1	ml
		Dilution Factor	1	

Sample Description/Narrative:

Resin Blank-d14-Terphenyl is out of criteria

Pre Extraction Surrogates	**% Recovery**			**% Recovery**	
2-Fluorophenol(surr#1)	67	P	D5-Nitrobenzene(surr#3)	82	P
D5-Phenol(surr#2)	83	P	2-Fluorobiphenyl(surr#4)	85	P
2,4,6-Tribromophenol(surr#5)	113	P	D14-Terphenyl(surr#6)	154	F

Pre Sampling Surrogates	**% Recovery**		**% Recovery**
13C6-1,2 Dichlorobenzene	58	13C6-2,5 Dichlorophenol	59
13C6-Napthalene	61	13C6-2,5-Phthalate anhydride	101
D10-Acenapthalene	87		

Compound	**µg**	**Compound**	**µg**
n-Nitrosomethylethylamine	ND	4-Methylphenol	ND
Methyl Methanesulfonate	ND	n-Nitrosodi-n-propylamine	ND
n-Nitrosodiethylamine	ND	Nitrobenzene	ND
Bis (2-chloroethyl) ether	ND	1-Nitrosopiperidine	ND
Ethyl methanesulfonate	ND	Isophorone	ND
Aniline	ND	2,4-Dimethylphenol	ND
Phenol(CCC)	ND	Bis(2-chloroethoxy)methane	ND
2-Chlorophenol	ND	2,4-Dichlorophenol(CCC)	ND
1,3-Dichlorobenzene	ND	1,2,4-Trichlorobenzene	ND
1,4-Dichlorobenzene(CCC)	ND	Naphthalene	ND
1,2-Dichlorobenzene	ND	2-Nitrophenol(CCC)	ND
Benzyl Alcohol	ND	2,6-Dichlorophenol	ND
Bis(2-chloroisopropyl)ether	ND	Hexachloropropene	ND
2-Methylphenol	ND	4-Chloroaniline	ND
n-Nitrosospyrrolidine	ND	Hexachlorobutadiene(CCC)	ND
Acetophenone	ND	n-Nitrosodi-n-butylamine	ND
Hexachloroethane	ND	4-Chloro-3-methyl-phenol(CCC)	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/21/99
Sample Name:	Resin Blank	Date Extracted:	06/21/99
Lab Sample ID:	9906050	Date Acquired:	06/30/99
MS Data file:	S996050A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Resin Blank-d14-Terphenyl is out of criteria

Compound	µg	Compound	µg	
2-Methylnaphthalene	ND	4-Chlorophenyl phenyl ether	ND	
Isosafrole	ND	2-Methyl-4,6-dinitrophenol	ND	
1,2,4,5-Tetrachlorobenzene	ND	5-Nitro-o-toluidine	ND	
Hexachlorocyclopentadiene(SPCC)	ND	Diphenylamine	ND	
2,4,6-Trichlorophenol(CCC)	ND	Diallate	ND	
2,4,5-Trichlorophenol	ND	1,3,5-Trinitrobenzene	ND	
2-Chloronaphthalene	ND	4-Bromophenyl phenyl ether	ND	
1,3 Dinitrobenzene	ND	Phenacetin	ND	
2-Nitroaniline	ND	Hexachlorobenzene	ND	
3-Nitroaniline	ND	4-Aminobiphenyl	ND	
Safrole	ND	Dinoseb	ND	
Acenaphthylene	ND	Pentachlorophenol(CCC)	ND	
1,4-Naphthoquinone	ND	Pentachloronitrobenzene	ND	
Dimethyl phathalate	ND	Phenanthrene	ND	
2,6-Dinitrotoluene	ND	Anthracene	ND	
Acenaphthene(CCC)	ND	Di-n-butyl phthalate	6	J
1-Napthylamine	ND	Isodrin	ND	
2-Napthylamine	ND	Fluoranthene(CCC)	ND	
4-Nitroaniline	ND	3,3'-Dimethylbenzidine	ND	
2,4-Dinitrophenol(SPCC)	ND	Pyrene	ND	
Dibenzofuran	ND	Chlorobenzilate	ND	
Pentachlorobenzene	ND	p-Dimethylaminoazobenzene	ND	
2,4-Dinitrotoluene	ND	2-Acetylaminofluorene	ND	
2,3,4,6-Tetrachlorophenol	ND	Benzyl butyl phthalate	ND	
4-Nitrophenol(SPCC)	ND	3,3'-Dichlorobenzidine	ND	
Fluorene	ND	Benzo(a)anthracene	ND	
Diethyl phathalate	ND			

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPCD Organic Support Laboratory
Semi-Volatile Organics Report

Project:	Orimulsion	Date Sampled:	06/21/99
Sample Name:	Resin Blank	Date Extracted:	06/21/99
Lab Sample ID:	9906050	Date Acquired:	06/30/99
MS Data file:	S996050A	Analyst:	Bill Preston
Method:	8270	QC reviewer:	Dennis Tabor
	HRGC/LRMS	Extract Volume	1 ml
		Dilution Factor	1

Sample Description/Narrative:

Resin Blank-d14-Terphenyl is out of criteria

Compound	µg	Compound	µg
Chrysene	ND	Benzo(a)pyrene(CCC)	ND
di-n-Octyl phthalate(CCC)	ND	3-Methylcholanthrene	ND
Benzo(b)fluoranthene	ND	Indeno(1,2,3-cd)pyrene	ND
7,12-Dimethylbenz(a)anthracene	ND	Dibenz(a,h)anthracene	ND
Benzo(k)fluoranthene	ND	Benzo(ghi)perylene	ND

E = exceeded calib ND = not detected J = Peak below the calibration range NS= not spiked

APPENDIX E
Metals Analysis Laboratory Reports

PRISM
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Full Service Analytical & Environmental Solutions

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449 Springbrook Road
P.O. Box 240543
Charlotte, NC 28224-0543
Phone: 704/529-6364
1/800/529-6364
Fax: 704/525-0409

CASE NARRATIVE
08/11/99

CLIENT:	**ARCADIS Geraghty & Miller**	MATRIX:	**AIR**
PROJECT ID:	**Orimulsion**	NUMBER OF SOURCES:	**12**
LAB GROUP ID:	**8401E24**	DATE COLLECTED:	**05/18-7/1/99**
SAMPLE ID:	**AB34730 – AB34753**	DATE RECEIVED:	**07/2/99**

Sample Disposition:

36 containers were received on 07/2/99 11:00 in the laboratory. The samples were received in good condition.

Cross Reference of Field IDs to Laboratory IDs	
Sample Field ID	**Prism Laboratory ID**
907010942 Train 1 sample 1 907010942 Train 1 sample 2	AB34730
907010942 Train 1 sample 3	AB34731
907010943 Train 1 sample 1 907010943 Train 1 sample 2	AB34732
907010943 Train 1 sample 3	AB34733
906031215SMFOBLR6 906031215SMNOBLR	AB34734
906031215SMIOBLR6	AB34735
906041303SMFOBLR6 906031215SMNOBLR	AB34736
906031215SMIOBLR6	AB34737
906071228SMFOBLR6 906071228SMNOBLR	AB34738
906071228SMIOBLR6	AB34739
905171200SMFFBL01 905171200SMNFBL01	AB34740
905171200SMIFBL01	AB34741
905181131SMFOBL04 905181131SMNOBL04	AB34742
905181131SMIOBL04	AB34743
905191016SMFOBL04 905191016SMNOBL04	AB34744
905191016SMIOBL04	AB34745
905211133SMFOBL04 905211133SMNOBL04	AB34746
905211133SMIOBL04	AB34747

Cross Reference of Field IDs to Laboratory IDs	
Sample Field ID	Prism Laboratory ID
905241201SMFOBL01 905241201SMNOBL01	AB34748
905241201SMIOBL01	AB34749
905251142SMFOBL01 905251142SMNOBL01	AB34750
905251142SM1OBL01	AB34751
905261053SMFOBL01 905261053SMNOBL01	AB34752
905261053SMIOBL01	AB34753

Sample Analysis:

The samples were analyzed using approved USEPA methodology.

The following test method was utilized for the analysis of the samples:

Analytes	Test Method	Method Description
Metals	EPA Method 29	Determination of metals emissions from stationary sources.

Analytical Fraction 1A

Samples AB34748, AB34750, AB34752, AB34734, AB34736, AB34738, AB34744 and AB34746, were analyzed for nickel at a 1:200 dilution due to the high concentration of nickel.

Samples AB34748, AB34750, AB34752, AB34734, AB34736, AB34738, AB34742, AB34744 and AB34746, were analyzed for vanadium at a 1:200 dilution due to the high concentration of vanadium.

Zinc and antimony recoveries for sample AB34748 were outside specified limits, possible matrix interference suspected.

Zinc recovery for sample AB37736 was outside specified limits, possible matrix interference suspected.

The %RSD and matrix spike recovery for nickel and vanadium on samples AB34748and AB34746 was not calculated because of the high dilution needed.

The reporting limit standard in position 84 exhibited carry over from the previous samples. However, the values of the associated samples were greater than 10 times the reporting limit.

Analytical Fraction 2A

The matrix spike recovery for vanadium on sample AB34749 was outside laboratory control limits because the spike true value was less than one fifth the sample concentration.

Nickel and magnesium recoveries for sample AB34747 were outside specified limits, possible matrix interference suspected.

If you have any questions concerning this narrative report, please call (704) 529-6364.

PRISM LABORATORIES, INC.

Helmuth MB Janssen

Helmuth M.B. Janssen
Quality Assurance Manager

Lab Report

PRISM LABORATORIES, INC

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 906031215FILTE
Prism Sample ID: AB34734
Login Group: 6401E24
Sample Collection Date/Time: 6/3/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ
ARSENIC BY METHOD 29	5.1	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	20	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	11	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	7.0	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	53	ug	2.0	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	18	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	3000	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	30	ug	2.0	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	210	ug	20	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	780	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	29000	ug	400	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	6800	ug	400	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 906031215
Prism Sample ID: AB34735
Login Group: 8401E24
Sample Collection Date/Time: 6/3/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	6.4	ug	1.5	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	1.7	ug	1.5	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	16	ug	1.5	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	3.8	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	400	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	5.5	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	110	ug	15	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	630	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	3200	ug	1.5	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	150	ug	1.5	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 906041303FILTE
Prism Sample ID: AB34736
Login Group: 8401E24
Sample Collection Date/Time: 6/4/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/6/99 08:00	DHJ
ARSENIC BY METHOD 29	9.1	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	32	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	20	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	9.0	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	70	ug	2.0	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	30	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	4500	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	42	ug	2.0	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	69	ug	20	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	1000	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	46000	ug	400	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	6600	ug	400	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 906041303
Prism Sample ID: AB34737
Login Group: 8401E24
Sample Collection Date/Time: 6/4/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
ZINC BY METHOD 29	9.7	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	21	ug	1.5	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	Less than	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	Less than	ug	1.5	Method 29	7/28/99 14:47	DHJ
IRON BY METHOD 29	30	ug	15	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	3.0	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	3.0	ug	1.5	Method 29	7/28/99 14:47	DHJ
CADMIUM BY METHOD 29	3.0	ug	1.5	Method 29	7/28/99 14:47	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/28/99 14:47	DHJ
ANTIMONY BY METHOD 29	Less than	ug	1.5	Method 29	7/28/99 14:47	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/28/99 14:47	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

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PRISM LABORATORIES, INC.

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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 906071228FILTE
Prism Sample ID: AB34738
Login Group: 8401E24
Sample Collection Date/Time: 6/7/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
3OMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
3OMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
ZINC BY METHOD 29	1000	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	38000	ug	400	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	7600	ug	400	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	110	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	40	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	4100	ug	20	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	23	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	75	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	9.6	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	16	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	30	ug	2.0	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	7.6	ug	2.0	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

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PRISM LABORATORIES, INC.

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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 906071228
Prism Sample ID: AB34739
Login Group: 8401E24
Sample Collection Date/Time: 6/7/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
ZINC BY METHOD 29	9.4	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	8.7	ug	1.5	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	Less than	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
IRON BY METHOD 29	20	ug	15	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	2.4	ug	1.5	Method 29	7/12/99 14:47	DHJ
CADMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
ANTIMONY BY METHOD 29	1.7	ug	1.5	Method 29	7/12/99 14:47	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.
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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr. Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905271200FILTE
Prism Sample ID: AB34740
Login Group: 8401E24
Sample Collection Date/Time: 5/27/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
ZINC BY METHOD 29	7.5	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	12	ug	2.0	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	Less than	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	2.0	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	33	ug	20	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	2.0	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	6.8	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

ab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905271200
Prism Sample ID: AB34741
Login Group: 8401E24
Sample Collection Date/Time: 5/27/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
ZINC BY METHOD 29	14	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	2.4	ug	1.5	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	23	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	1.6	ug	1.5	Method 29	7/12/99 14:47	DHJ
IRON BY METHOD 29	20	ug	15	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	7.3	ug	1.5	Method 29	7/12/99 14:47	DHJ
CADMIUM BY METHOD 29	2.0	ug	1.5	Method 29	7/12/99 14:47	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
ANTIMONY BY METHOD 29	2.0	ug	1.5	Method 29	7/12/99 14:47	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905181131FILTE
Prism Sample ID: AB34742
Login Group: 8401E24
Sample Collection Date/Time: 5/18/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
ZINC BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	56000	ug	400	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	13000	ug	400	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	2100	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	20	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	43	ug	20	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	12	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	8.5	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	8.3	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	24	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	6.3	ug	2.0	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905181131
Prism Sample ID: AB34743
Login Group: 8401E24
Sample Collection Date/Time: 5/18/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
ANTIMONY BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
CADMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
COPPER BY METHOD 29	4.8	ug	1.5	Method 29	7/12/99 14:47	DHJ
CHROMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	26	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
MAGNESIUM BY METHOD 29	Less than	ug	15	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	8.1	ug	1.5	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905191016FILTE
Prism Sample ID: AB34744
Login Group: 8401E24
Sample Collection Date/Time: 5/19/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ
ARSENIC BY METHOD 29	8.4	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	29	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	8.2	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	17	ug	2.0	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	22	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	26	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	22	ug	2.0	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	4700	ug	20	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	15000	ug	400	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	67000	ug	400	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	2.0	ug	2.0	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905191016
Prism Sample ID: AB34745
Login Group: 8401E24
Sample Collection Date/Time: 5/19/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
ANTIMONY BY METHOD 29	2.0	ug	1.5	Method 29	7/12/99 14:47	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
CADMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
COPPER BY METHOD 29	4.7	ug	1.5	Method 29	7/12/99 14:47	DHJ
CHROMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	44	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
MAGNESIUM BY METHOD 29	220	ug	15	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	220	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	1100	ug	1.5	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	7.3	ug	1.5	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr. Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905211133FILTE
Prism Sample ID: AB34746
Login Group: 8401E24
Sample Collection Date/Time: 5/21/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 06:00	DHJ
ARSENIC BY METHOD 29	17	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	31	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	7.9	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	15	ug	2.0	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	45	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	96	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	35	ug	2.0	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	4900	ug	20	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	16000	ug	400	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	74000	ug	400	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	89	ug	2.0	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905211133
Prism Sample ID: AB34747
Login Group: 8401E24
Sample Collection Date/Time: 5/21/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
ANTIMONY BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
CADMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
COPPER BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
CHROMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	27	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 14:47	DHJ
MAGNESIUM BY METHOD 29	Less than	ug	15	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	2.0	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	3.2	ug	1.5	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	19	ug	1.5	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash. V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905241201FILTE
Prism Sample ID: AB34748
Login Group: 8401E24
Sample Collection Date/Time: 5/24/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ
ARSENIC BY METHOD 29	10	ug	2.0	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	23	ug	0.01	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	6.8	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	17	ug	2.0	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	8.2	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	69	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	19	ug	2.0	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	1500	ug	20	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	16000	ug	400	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	60000	ug	400	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905241201
Prism Sample ID: AB34749
Login Group: 8401E24
Sample Collection Date/Time: 5/24/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	1.8	ug	1.5	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	4.8	ug	1.5	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	2.4	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	100	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	2.2	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	3000	ug	15	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	700	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	3400	ug	1.5	Method 29	7/12/99 08:00	DHJ
ZINC BY METHOD 29	11	ug	1.5	Method 29	7/12/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.
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7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905251142FILTE
Prism Sample ID: AB34750
Login Group: 8401E24
Sample Collection Date/Time: 5/25/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
ZINC BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	62000	ug	400	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	15000	ug	400	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	2300	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	20	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	43	ug	20	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	8.9	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	7.1	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	23	ug	0.01	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	6.8	ug	2.0	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/8/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905251142
Prism Sample ID: AB34751
Login Group: 8401E24
Sample Collection Date/Time: 5/25/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
ZINC BY METHOD 29	15	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	14	ug	1.5	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	4.8	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	27	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	18	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	42	ug	15	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	3.0	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	2.9	ug	1.5	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	4.0	ug	1.5	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

M: Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr. Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905261053FILTE
Prism Sample ID: AB34752
Login Group: 8401E24
Sample Collection Date/Time: 5/26/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				7/7/99 08:00	DHJ
BOMB PREP. FOR METHOD 29	Completed				7/7/99 16:00	DHJ
ZINC BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	72000	ug	400	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	17000	ug	400	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	1600	ug	20	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	20	ug	2.0	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	78	ug	20	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	6.3	ug	2.0	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	8.0	ug	2.0	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	8.6	ug	2.0	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	27	ug	0.01	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	2.0	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	10	ug	2.0	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/6/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

7/29/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project Name: RN 992010.0024.00001
Customer Sample ID: 905261053
Prism Sample ID: AB34753
Login Group: 8401E24
Sample Collection Date/Time: 6/26/99
Lab Submittal Date/Time: 7/2/99 11:00

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
ZINC BY METHOD 29	14	ug	1.5	Method 29	7/12/99 08:00	DHJ
VANADIUM BY METHOD 29	3.4	ug	1.5	Method 29	7/12/99 08:00	DHJ
NICKEL BY METHOD 29	1.5	ug	1.5	Method 29	7/12/99 08:00	DHJ
MAGNESIUM BY METHOD 29	20	ug	15	Method 29	7/12/99 08:00	DHJ
MANGANESE BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
IRON BY METHOD 29	22	ug	15	Method 29	7/12/99 08:00	DHJ
CHROMIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
COPPER BY METHOD 29	7.9	ug	1.5	Method 29	7/12/99 08:00	DHJ
CADMIUM BY METHOD 29	1.8	ug	1.5	Method 29	7/12/99 08:00	DHJ
BERYLLIUM BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ANTIMONY BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
ARSENIC BY METHOD 29	Less than	ug	1.5	Method 29	7/12/99 08:00	DHJ
SAMPLE PREPARATION FOR METHO	Completed			Method 29	7/7/99 08:00	DHJ

Sample Comments:
RN 992010.0024.00001

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

9/21/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project ID: Orimulsion/RN992010.0024
Customer Sample ID: FOBLR6#2
Prism Sample ID: AB37197
Login Group: 9151E7
Sample Collection Date/Time: 6/3/99
Lab Submittal Date/Time: 7/29/99 14:30

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
LOSS ON IGNITION	16	%	1		8/5/99 08:00	DHJ

Sample Comments:

Angela D. Overcash, V.P. Laboratory Services

Lab Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

9/21/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project ID: Orimulsion/RN992010.0024
Customer Sample ID: COBLR6#1
Prism Sample ID: AB37198
Login Group: 9151E7
Sample Collection Date/Time: 6/3/99
Lab Submittal Date/Time: 7/29/99 14:30

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
LOSS ON IGNITION	59	%	1		8/5/99 08:00	DHJ

Sample Comments:

Angela D. Overcash, V.P. Laboratory Services

) Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

9/21/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project ID: Orimulsion/RN992010.0024
Customer Sample ID: FOBLC4#1
Prism Sample ID: AB37199
Login Group: 9151E7
Sample Collection Date/Time: 5/18/99
Lab Submittal Date/Time: 7/29/99 14:30

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				8/20/99 17:00	DHJ
ARSENIC BY METHOD 29	16	ug	2.5	Method 29	9/14/99 08:00	DHJ
ANTIMONY BY METHOD 29	3.8	ug	2.5	Method 29	9/14/99 08:00	DHJ
BERYLLIUM BY METHOD 29	17	ug	2.5	Method 29	9/14/99 08:00	DHJ
CADMIUM BY METHOD 29	41	ug	2.5	Method 29	9/14/99 08:00	DHJ
COPPER BY METHOD 29	35	ug	2.5	Method 29	9/14/99 08:00	DHJ
CHROMIUM BY METHOD 29	130	ug	2.5	Method 29	9/14/99 08:00	DHJ
IRON BY METHOD 29	3300	ug	25	Method 29	9/14/99 08:00	DHJ
MANGANESE BY METHOD 29	55	ug	2.5	Method 29	9/14/99 08:00	DHJ
MAGNESIUM BY METHOD 29	8100	ug	25	Method 29	8/14/99 08:00	DHJ
NICKEL BY METHOD 29	1600	ug	2.5	Method 29	9/14/99 08:00	DHJ
VANADIUM BY METHOD 29	7800	ug	120	Method 29	9/14/99 08:00	DHJ
ZINC BY METHOD 29	56000	ug	120	Method 29	9/14/99 08:00	DHJ

Sample Comments:

Angela D. Overcash, V.P. Laboratory Services

ab Report

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

9/21/99

Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project ID: Orimulsion/RN992010.0024
Customer Sample ID: FOBLC4#2
Prism Sample ID: AB37200
Login Group: 9151E7
Sample Collection Date/Time: 5/18/99
Lab Submittal Date/Time: 7/29/99 14:30

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
LOSS ON IGNITION	12	%	1		8/5/99 08:00	DHJ

Sample Comments:

Angela D. Overcash, V.P. Laboratory Services

b Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

9/21/99
Mr. Dennis Tabor
ARCADIS Geraghty & Miller
2301 Rexwoods Dr, Ste 100
Raleigh, NC 27607

Customer Project ID: Orimulsion/RN992010.0024
Customer Sample ID: FOBLC1#1
Prism Sample ID: AB37201
Login Group: 9151E7
Sample Collection Date/Time: 5/24/99
Lab Submittal Date/Time: 7/29/99 14:30

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
BOMB PREP. FOR METHOD 29	Completed				8/20/99 17:00	DHJ
ARSENIC BY METHOD 29	42	ug	2.5	Method 29	9/14/99 08:00	DHJ
ANTIMONY BY METHOD 29	12	ug	2.5	Method 29	9/14/99 08:00	DHJ
BERYLLIUM BY METHOD 29	49	ug	2.5	Method 29	9/14/99 08:00	DHJ
CADMIUM BY METHOD 29	35	ug	2.5	Method 29	9/14/99 08:00	DHJ
COPPER BY METHOD 29	59	ug	2.5	Method 29	9/14/99 08:00	DHJ
CHROMIUM BY METHOD 29	130	ug	2.5	Method 29	9/14/99 08:00	DHJ
IRON BY METHOD 29	2600	ug	25	Method 29	9/14/99 08:00	DHJ
MANGANESE BY METHOD 29	90	ug	2.5	Method 29	9/14/99 08:00	DHJ
MAGNESIUM BY METHOD 29	15000	ug	25	Method 29	9/14/99 08:00	DHJ
NICKEL BY METHOD 29	17000	ug	120	Method 29	9/14/99 08:00	DHJ
VANADIUM BY METHOD 29	79000	ug	120	Method 29	9/14/99 08:00	DHJ
ZINC BY METHOD 29	63000	ug	120	Method 29	9/14/99 08:00	DHJ

Sample Comments:

Angela D. Overcash, V.P. Laboratory Services

ab Report

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions

9/21/99

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Customer Project ID: Orimulsion/RN992010.0024
Customer Sample ID: FOBLC1#2
Prism Sample ID: AB37202
Login Group: 9151E7
Sample Collection Date/Time: 5/24/99
Lab Submittal Date/Time: 7/29/99 14:30

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

TEST PARAMETER	TEST RESULT	UNITS	MDL	METHOD REFERENCE	DATE/TIME STARTED	ANALYST
LOSS ON IGNITION	14	%	1		8/5/99 08:00	DHJ

Sample Comments:

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APPENDIX F
Orimulsion Spill References Cited by the NRC, U.S. Coast Guard, and Environment Canada Reports

Bitor (1999). "Orimulsion spill response manual," PdVSA and Bitor America Corp., Boca Raton, FL.

Bitor America (1997). "Orimulsion containment and recovery test carried out in Puerto La Cruz, Anzoatgui State, Venezuela," Bitor America, Boca Raton, FL, October 1996.

Brown, J.W., Fuentes, H.R., Jaffe, R., and Tsihrintzis, V.A. (1995). "Comparative evaluation of physical and chemical fate processes of Orimulsion and fuel oil No. 6 in the Tampa Bay marine environment," Chapter 4, *Comparative Ecological Risk Assessment - Final Report*, Center for Marine and Environmental Analysis, University of Miami, Miami, FL, June 1995.

CEDRE (1996). "Orimulsion bitumen clean-up trials," Centre de Documentation de Recherche et d'Experimentations, Brest, France, Report R.96.11.

Clement, F., Gunter, P., and Oland, D. (1997). "Trials of recovery and cleanup techniques on bitumen derived from Orimulsion," *Proceedings of the 1995 International Oil Spill Conference*, American Petroleum Institute, Washington, DC, pp. 89-93.

Deis, D.R., Tavel, N.G., Masciangioli, P., Villoria, C., Jones, M.A., Ortega, G.F., and Lee, G.R. (1997). "Orimulsion: Research and testing and open water containment and recovery trials," *Proceedings of the 1997 International Oil Spill Conference*, American Petroleum Institute, Washington, DC, pp. 459-467.

Febres, G.A., Goncalves, J.A., Masciangoli, P., and Vilas, J. (1996). "Fate and behavior of Orimulsion spilt in sea water,"unpublished report, Comparative Oil-Orimulsion Spill Assessment Program, Volume III, Florida Power and Light Company, Miami, FL.

Guénette, C., Sergy, G., and Fieldhouse, B. (1998). "Removal of stranded bitumen from intertidal sediments using chemical agents, Phase I: Screening of chemical agents," Environment Canada report, Emergency Sciences Division, Environment Canada, Edmonton, Alberta, Canada (18 pp.).

Gunter, P., and Sommerville, M. (1991). "Orimulsion spill trials - Nelson Dock, Liverpool," NETCEN, AEA Technology/BP Research, Oxfordshire, U.K., July/August 1991.

Harper, J.R., and Kory, M. (1997). "Orimulsion sediment interaction experiments," Report to Emergency Sciences Division, Environment Canada, Ottawa, Ontario, Canada (34 pp.).

Jokuty, P., Fieldhouse, B., Fingas, M., Whiticar, S., and Latour, J. (1998). "Characterizing the dynamics of Orimulsion spills in salt, fresh, and brackish water,"*Proceedings of the 21st Arctic and Marine Oilspill Program*, Technical Seminar, Environment Canada, Ottawa, Ontario, Canada, pp. 33-50.

Jokuty, P., Whiticar, S., Fingas, M., Wang, Z., Doe, K., Kyle, D., Lambert, P., and Fieldhouse, B. (1995). "Orimulsion: Physical properties, chemical composition, dispersability, and toxicity," Report EE-154, Environment Canada, Ottawa, Ontario, Canada.

Jokuty, P., Whiticar, S., Wang, Z., Doe, K., Fieldhouse, B., and Fingas, M. (1999). "Orimulsion-400; A comparative study," Report EE-160, Environment Canada, Ottawa, Ontario, Canada.

Lorenzo, T. (1996). "Orimulsion containment and recovery tests, October 1996, Puerto La Cruz, Venezuela," Trip report, EED Report Series No. 96, Emergencies Engineering Division, Environment Canada, Ottawa, Ontario, Canada.

Ostazeski, S.A., Stout, S.A., and Uhler, A.D. (1998). "Testing and characterization of Orimulsion 400 - Volume I - Technical Report," Final report to Bitor America Corp., 44 pp., February 25, 1998.

Ostazeski, S.A., Macomber, S.C., Roberts, L.G., Uhler, A.D., Bitting, K.R., and Hiltabrand, R. (1997). "The environmental behavior of Orimulsion spilled on water," *Proceedings of the 1997*

International Oil Spill Conference, American Petroleum Institute, Washington, DC, pp. 469-477.

Potter, T.L. (1995). "Chemistry of fuel oil #6 and Orimulsion," Chapter 14, *Comparative Ecological Risk Assessment - Final Report*, Center for Marine and Environmental Analysis, University of Miami, Miami, FL, June 1995.

Potter, T.L., Wu, J., Simmons, K., Kostecki, P., and Calabrese, E. (1997). "Chemical characterization of the water soluble fraction of Orimulsion-in-water dispersions," Department of Food Science and School of Public Health, University of Massachusetts, Amherst, MA.

Sneddon, R. (1989). "A report on a study to determine treatment options following spillage of Orimulsion into marine and freshwater environments," Oil Spill Service Centre, Southampton, UK.

Sommerville, M., Lunel, T., Bailey, N., Oland, D., Miles, C., Gunter, P., and Waldhoff, T. (1997). "Orimulsion," *Proceedings of the 1997 International Oil Spill Conference*, American Petroleum Institute, Washington, DC, pp. 479-487.

Wood, P. (1996). "Investigations into landspills of Orimulsion," Report by AEA Technology for Bitor Europe (18 pp.).

APPENDIX G
Additional Ecological Risk Assessment Studies

The original risk assessment by Harwell et al. (1995) was conducted for Bitor as part of their original permit application to the State of Florida, and the document was reviewed by an independent technical panel (chosen by EPA) for this report. The conclusions of that panel were presented in Chapter 8.

Following the original assessment, additional studies were conducted that were not reviewed by the independent panel. The studies for the updated assessment included:

1. Additional toxicity data on benthic organisms - Several additional benthic species indigenous to Tampa Bay were tested for acute toxicity to Orimulsion and to No. 6 fuel oil.
2. Additional toxicity data on the surfactant - Additional toxicological tests were conducted to evaluate the potential ecological impacts expected from exposure to the surfactant in Orimulsion 100 in the event of a spill, specifically focused on chronic life-cycle tests for endocrine disruption effects.
3. Additional ecorisk assessment on surfactant - Based on those new chronic life-cycle tests, a risk assessment was conducted on the ecological effects from the surfactant associated with Orimulsion 100 in the event of a large-scale spill into Tampa Bay.
4. Additional ecorisk assessment on shallow water and nursery areas - Similarly, based on the new acute toxicity information as well as the previous toxicity data, and using a new set of fate-and-transport calculations, a new comparative ecological risk assessment was conducted that focused on the risks to the shallow water critical habitats and nursery areas of Tampa Bay from Orimulsion 100 and No. 6 fuel oil.
5. Additional assessment of risk reductions in Tampa Bay and elsewhere - An assessment was conducted to examine the overall ecological risk reductions from fuel spills in Tampa Bay and other estuarine ecosystems within the State of Florida.
6. Aquatic toxicity studies were conducted on Orimulsion 400. Comparative studies indicated a similar toxicity of the two formulations.

The results of these studies were incorporated into an updated environmental risk assessment conducted for Bitor. The key conclusions of that assessment are listed below:

1. The risks to the shallow water, critical habitats of Tampa Bay were reported as being orders-of-magnitude lower for a major spill of Orimulsion than for a comparable spill of No. 6 fuel oil.
2. Exposures to the surfactant of Orimulsion 100 in Tampa Bay were reported as being many orders-of-magnitudes lower than the lowest observed effect level as measured through a partial life-cycle test using a sensitive fish species. It was concluded that a spill of Orimulsion 100 would pose no risk whatsoever for endocrine disruption of biota in Tampa Bay.
3. The updated assessment also noted that conversion from No. 6 fuel oil to Orimulsion at the Manatee plant would shift electricity production in the rest of the State of Florida, resulting in significant reduction in the risk of spills of #6 fuel oil in other areas of the State, including at the Biscayne National Park, Canaveral National Seashore, and other protected waters of Florida.
4. The toxicity of Orimulsion 400 (the current formulation) is comparable to Orimulsion 100. Further, the reformulation of the surfactant in Orimulsion 400 removes the concern regarding potential endocrine disruption.

These conclusions were cited in a document submitted in response to comments on this report by Bitor America (Harwell and Golder 2000). The document was prepared by the lead author of the initial environmental risk assessment reviewed for this report (Harwell et al. 1995) and by an associate of a technical firm that has conducted work in support of Bitor's permitting efforts in the U.S. The submitted document provides additional detail and data, but has not been independently reviewed and is therefore not included in its entirety as part of this report.

References cited in the updated environmental assessment but not in the original assessment are listed below.

Battelle (1998). Testing and Characterization of Orimulsion-400: Volume I - Technical Report, Battelle, Duxbury, MA.

Bergman, H., and H. Eckert (1990). "Effect of monoethanolamine on growth and biomass formation of rye and barley," *Plant Growth Regulation* **9**, pp. 1-8.

Bicknell R.J., A.E. Herbison, and J.P. Sumpter (1995). "Oestrogenic activity of an environmental persistent alkylphenol in the reproductive tract but not in the brain of rodents," *J. Steroid Biochem. Molec. Biol.*, **54**(1/2), pp. 7-9.

Bjornestad, E., A.R. Pedersen, and S. Bowadt (1998). "Ecotoxicological characterization of Orimulsion 400: A summary report," VKI Project No. 11020, Bitor Europe Ltd., Brentford, Middlesex, England, 16 pages, January 1998.

Davis, J.W., and C.L. Carpenter (1997). "Environmental assessments of the alkanolamine," in Reviews of Environmental Contamination and Toxicology, Volume 149, Springer-Verlag, New York, N.Y.

Environmental Health Research and Testing (1987). "Screening of priority chemicals for reproductive hazards: Monoethanolamine, diethanolamine and triethanolamine," report ETOX-85-1002, Environmental Health Research and Testing, Cincinnati, OH.

Environment Canada (1998). "Orimulsion-400™ - A comparative study," prepared by Emergencies Science Division, Environment Canada, Environmental Technology Centre, Ontario, Canada, 27 pages.

Esclapés, M.M., et al. (1998). Unpublished data using Orimulsion-400, PDVSA-INTEVEP, Caracas, Venezuela.

Esclapés, M.M., I. Galindo, and Y. Higuerey (1997). "Evaluación toxicologica de nuevas formulaciones de Orimulsion empleando bioindicadores acuaticos," report INT-4171, PDVSA-INTEVEP, Caracas, Venezuela.

Golder Associates Geoanalysis (1999). "Orimulsion-400 and fuel Oil #6: A comparative study of aquatic ecotoxicology," report 992210/3683 prepared for Bitor Italia S.r.l., Rome, Golder Associates Inc., Gainesville, FL.

Johnson I.C., G.S. Ward, and H.J. Liu (1998a). "Acute toxicity of Orimulsion-400 and Orimulsion 100 to two estuarine species," report 9937563 prepared for Bitor America Corporation, Golder Associates Inc., Gainesville, FL.

Johnson, I.C. G.S. Ward, and H.J. Liu (1998b). "Acute toxicity of Orimulsion-100 to estuarine species," COSAP research under the sponsorship of the University of Miami, (In: Ault *et al.*, 1995, Chapter 10) Golder Associates Inc., Gainesville, Florida.

Johnson, I.C., C. Metcalfe, Y. Kiparissis, G. Balch, G.S. Ward, J.Wheat, J. Liu, and T. Potter (1997). "Final report: Partial life-cycle studies using the estuarine fish sheepshead minnow to evaluate the potential reproductive and estrogenic effects of Intan-100," presented at the SETAC 18th Annual Meeting, Special Symposium on Endocrie Disruptors, San Francisco, California.

Knaak, J.B., H.W. Leung, W.T. Scott, J. Busch, and J. Bilsky (1997). "Toxicology of mono-, di-, and triethanolamine," in Reviews of Environmental Contamination and Toxicology, Volume 149, p. 1, Springer-Verlag, New York, N.Y.

Liberacki, A.B., T.L. Neeper-Bradley, W.J. Breslin, and G.J. Zielke (1996). "Evaluation of the developmental toxicity of dermally applied monoethanolamine in rats and rabbits," *Fundamental and Applied Toxicology (USA)*, **31**(1), pp. 117-123.

Mankes, R.F. (1986). "Studies on the embryopathic effects of ethanolamine in Long-Evans rats: preferential embryopathy in pups contiguous with male siblings in utero," *Teratog Carcinog*

Mutagen **6**, pp. 403-417.

Patty's Industrial Hygiene and Toxicology, (1982). Third Edition, Wiley and Sons, New York, NY.

Routledge, E.J., and J.P. Sumpter (1996). "Estrogenic activity of surfactants and some of their degradation products assessed using a recombinant yeast screen," *Environ. Toxicol. Chem.* **15**(3), pp. 241-248.

Soto, A.M., H. Justicia, J.W. Wray, and C. Sonnenschein (1991). "p-Nonylphenol: an estrogenic xenobiotic released from "modified" polystyrene," *Environ. Health Perspectives,* **92**, pp. 167-173.

Tennant, R.W., B.H. Margolin, M.D. Shelby, E. Zeiger, J.K. Haseman, J. Spalding, W. Caspary, M. Resnick, S. Stasiewicz, B. Anderson, and R. Minor (1987). "Prediction of chemical carcinogenicity in rodent from in vitro genetic toxicity assays," *Science* **236**, pp. 933-941.

United States Coast Guard (1997). "Micro- and meso-scale methods for predicting the behavior of low-API gravity oils (LAPIO) spilled in water," 1995 Oil Pollution Grants Program, Research and Special Programs, U.S. Coast Guard, Region , 1st District, Boston, MA.

Wason, S., E. Seigel, L. Sigell, M. McElwee, and W. Pratt (1991). "Acute exposure to ethanolamine: Lack of serious toxicity," *Veterinary and Human Toxicology,* **33**(4), p. 371.

APPENDIX H
Comparative Risk Methodology Synopsis of Harwell et al. (1995)

The NCEA review of the comparative risk assessment conducted by Harwell et al. (1995) included a synopsis of the methodology used in the assessment. The synopsis is presented below.

1) Meteorological and tidal conditions during and following the hypothetical spill event were input to a hydrodynamical model, based on actual records for Tampa Bay during January 1991 and August 1991. Hydrodynamical conditions during and following each scenario spill were simulated using the NOS-based 3-D hydrodynamical model. This model provided spatially explicit projections following a hypothetical spill scenario of the current vectors through the Tampa bay system and the area near the mouth of the Bay.

2) These output current vectors were input to a transport model to define the current field necessary to simulate the transport of the No. 6 fuel oil and Orimulsion. Also provided as inputs to the Orimulsion model and the SIMAP oil spill model were parameters representing the characteristics of the two fuel types as derived from chemical, physical, and weathering characteristics studies, as well as from values in the literature.

3) Transport of the spilled No. 6 fuel oil as an oil slick on the surface of Tampa Bay was simulated using the reparameterized SIMAP model analyses: the oil slick was modeled as a set of "spillets" at variable scales of resolution.

4) A post-processing algorithm was developed to generate a map of the movement of the oil slick over the duration of the simulation. The map of the movement of the oil slick was transferred into the GIS facility to produce maps of the Tampa Bay region and the oil slick coverage for each scenario analyzed.

5) Interception of the No. 6 fuel oil slick that came into contact with the shoreline was also simulated using the SIMAP model. Scientists developed another algorithm to calculate the amount of mass of oil slick intercepting each section of the shoreline.

6) The map of the interception of the oil slick was transferred into the GIS facility to produce maps that superimpose the coastal areas contacted by the No. 6 fuel oil slick overlain onto the coverage of the oil slick for each scenario analyzed.

7) The oil slick outputs could not be directly compared with the toxicological exposure-response because there are no data to relate the amount of fuel slick present (or cumulative value for each cell) to ecological effects. Consequently, exposure maps of a No. 6 fuel oil slick are presented with a scalar, using shades of brown to represent the area covered during a simulation by the oil slick. A qualitative examination of the potential effects of the oil slick from a spill of No. 6 fuel oil was developed, considering areal extent of the slick, the area and types of shoreline habitats intercepted by the oil slick, and historical experiences with No. 6 fuel oil spills contacting mangrove and seagrass ecosystems. Note that, since Orimulsion was considered not to develop a significant oil slick, this analysis was not done for Orimulsion scenarios.

8) A reformulated and reparameterized SIMAP model was used to simulate the movement of dissolved and particulate fractions entrained into the water column following a spill of No. 6 fuel oil. For each cell in the SIMAP grid for each time step, each non-zero value of aromatic concentration was noted. For each cell, the cumulative exposure (concentration x duration) was calculated, based on the maximum concentration seen at any level within the 5-layer water column during each time step. Units for the cumulative exposures are ppb-hr of dissolved aromatics.

9) Transport of spilled Orimulsion was simulated using the Orimulsion spill model. This model simulated the 3-D movement over time throughout Tampa Bay and associated waters of the Orimulsion particulates and dissolved fraction in the water column. The modeled fraction used in the risk characterization was the total hydrocarbon content of the water column.

10) The output files from the Orimulsion transport model were sent for post-processing. As for the aromatics in No. 6 fuel oil, the cumulative exposures of Orimulsion at each cell in the grid were calculated. Units for the cumulative exposures are ppm-hr of hydrocarbons.

11) As for No. 6 fuel oil aromatics, total Orimulsion hydrocarbons were transferred to the much higher resolution GIS and advanced visualization system for mapping and for calculations of co-occurrence.

12) The toxicity studies on the potential effects of No. 6 fuel oil and Orimulsion on mangroves and seagrasses were carefully examined. It was concluded that no ecologically significant habitat alteration to the mangrove or seagrass plant communities of Tampa Bay would result from a spill of either No. 6 fuel oil or Orimulsion. The focus then turned to an examination of water-column effects from the two fuel types and the oil slick effects from No. 6 fuel oil.

13) The toxicological information provided by the survey, the INTEVEP project on Orimulsion, and other literature reviews, plus the results of the toxicological experiments conducted on seagrasses, seagrass community invertebrate inhabitants, spotted sea trout early life stages, and mangroves, were examined to identify appropriate toxicological benchmarks for No. 6 fuel oil and Orimulsion. The result was the selection of the spotted sea trout yolksac larvae toxicological responses to represent the sensitive species present in the Tampa Bay ecosystem. This selection represents a conservative but ecologically and societally important choice.

14) Data for toxicity tests on spotted sea trout yolksac larvae were analyzed to identify dose-response and time-dependent exposure-response relationships. It was decided to use the 48-hr toxicity test for the oil-water dispersion (OWD) fraction of both Orimulsion and No. 6 fuel oil as most representative of conditions in Tampa Bay following a spill. In part, this decision derived from a detailed look at the frequency distribution of cumulative time of exposures and, in part, this decision related to the leveling off of toxicity at exposure periods exceeding 48 hours.

15) A series of steps was developed to convert from dosing to modeled conditions; for No. 6 fuel oil, this entailed calculating from the oil-water dispersed fraction stock solution concentrations and nominal concentrations through BTEX to aromatics concentrations effectively seen by the test organisms; for Orimulsion, it involved going from the concentration of Orimulsion in the dosing conditions to the total hydrocarbons simulated in the Orimulsion transport model.

16) These conversion factors were applied to toxicity data to derive lethality rate-modeled fraction exposure relationships. The concentrations were multiplied by 50 to represent the associated exposure of a two-day period (comparable to 48-hr tests).

17) Using these normalized exposure data, LC_{10} and LC_{95} values for aromatics for No. 6 fuel oil and total hydrocarbons for Orimulsion were calculated using a logistic equation to fit the raw data. The LC_{10} level was chosen on the assumption that no ecological responses would be ecologically significant at changes <10%. The LC_{95} level was chosen to represent a reasonable upper bound on the asymptotic logistic equation.

18) These LC_{10} and LC_{95} values were used to provide the scalars for the graphical representation of the exposure levels for each scenario simulation. By making this scaling, the graphical outputs for No. 6 fuel oil and for Orimulsion are directly comparable in terms of effects to the sensitive species. This allows direct, visual comparative analysis of the risks from each

fuel type for each scenario.

19) These simulations were completed for all 96 scenarios, and the resultant suites of graphical outputs were visually inspected to identify patterns with respect to the key scenario factors (location, seasonality, and wind/current conditions).

20) Based on these considerations, four individual scenarios were selected as representative of the types of transport and exposure regimes realized for the scenario set for each location. These four selected scenarios were then explored much more thoroughly for detailed ecotoxicological analyses.

21) The extensive database was entered into the GIS facility; we have acquired more than 50 separate environmental databases containing all relevant biological, ecological, and physical information from federal, state, and local agencies concerned with management of Tampa Bay. This extensive, unique database provides a unique capability to converge considerable distribution data with well-defined exposure regime projects.

22) A series of steps was developed to relate the exposure and co-occurrence data for the spotted sea trout species to population-level effects and recovery times. We conducted similar analyses for inland silversides (i.e., the less sensitive species).

23) A series of steps was developed to use the exposure and co-occurrence information to calculate quantitative values for comparing the risks of the two fuels to selected species in Tampa Bay. Three approaches for integrating exposure and effects information into an estimate of risk, derived from the EPA framework for ecological risk assessment, were used; single value comparisons (one-dimensional models of toxicant-organism interaction); joint distribution analysis (comparing distributions associated with estimates of exposure and effects); and population modeling.

24) Expert judgment was applied to all sets of the risk assessment analyses to develop the synthesis of the comparative risks to the ecological systems of Tampa Bay from a spill of No. 6 fuel oil and a spill of Orimulsion.

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

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16. ABSTRACT

The report gives results of an evaluation of Orimulsion, a bitumen-in-water emulsion produced in Venezuela, to provide a better understanding of the potential environmental impacts associated with its use as a fuel. Pilot-scale tests were conducted at EPA's Environmental Research Center in Research Triangle Park in North Carolina, to provide data on emissions of air pollutants from the combustion of Orimulsion 100 (the original formulation), Orimulsion 400 (a new formulation introduced in 1998), and No. 6 (residual) fuel oil, commonly used in the U. S. These results, and those of full-scale tests reported in the technical literature, were evaluated to determine the potential air pollutant emissions and the ability of commercially available pollution control technologies to adequately reduce those emissions. Results indicate that carbon monoxide, nitrogen oxide, and particulate matter (PM) emissions are likely to be nearly the same as those from No. 6 fuel oil, that sulfur dioxide emissions can increase if the Orimulsion sulfur content is higher than the fuel it replaces, that the PM generated by Orimulsion 100 and 400 is likely to be smaller in diameter than that generated by No. 6 fuel oil, and that hazardous air pollutants are also likely to be similar to those from No. 6 fuel oil. Conventional control technologies can effectively reduce emissions to very low levels.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Emission	Pollution Control	13B	14G
Bitumens	Carbon Monoxide	Stationary Sources	11G	07B
Emulsions	Nitrogen Oxides	Orimulsion	07D	
Fuels	Particles	Particulate	21D	
Combustion	Toxicity		21B	06T
Residual Oils				

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