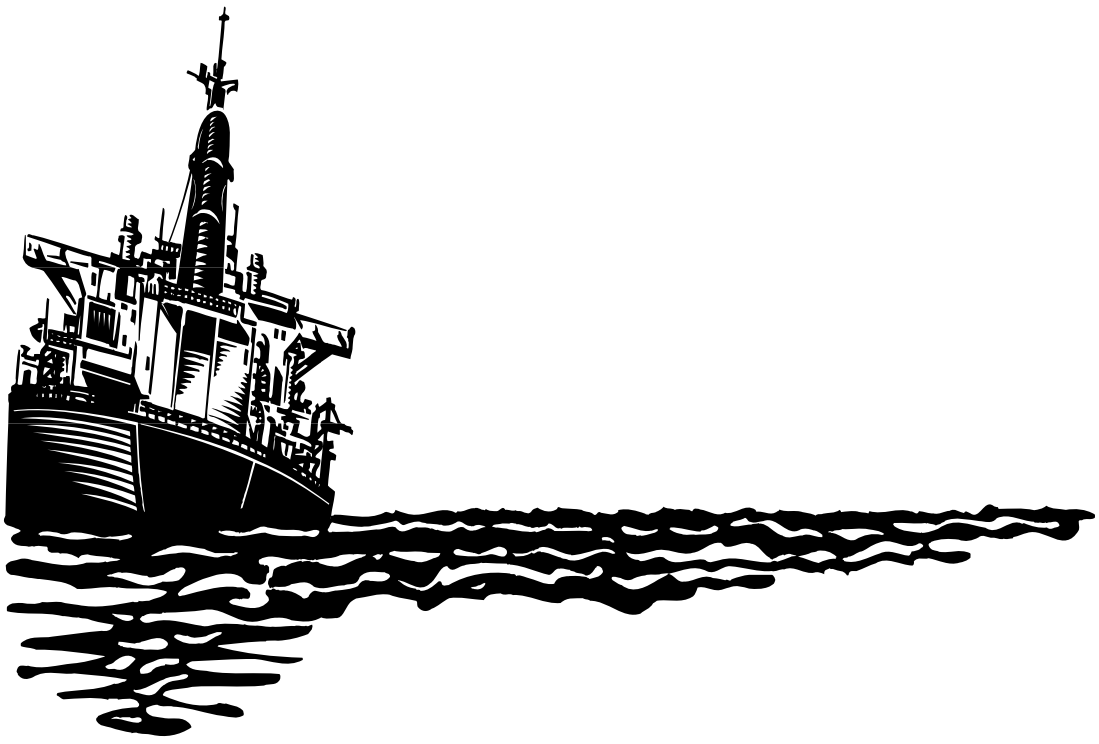
Washington State Department of Ecology
Air Quality Program

Draft Standard Air Modeling/Monitoring Operating Procedures for In Situ Oil Spill Burns



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AUTHORIZATION FOR OVERTIME AND PER DIEM

This form authorizes designated AQP staff working on the insitu oil spill burn activities to be compensated for overtime hours and for per diem costs.

Overtime hours and per diem costs must be documented.

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Program Manager
Air Quality Program

INTRODUCTION

This manual contains the standard operating procedures that will be used by Department of Ecology Air Quality Program (AQP) staff engaged in evaluating meteorological conditions, modeling, and monitoring air quality in response to an oil spill on Washington coastal or inland waters. The evaluation of meteorological conditions, modeling and monitoring information will be used by Unified Command staff to determine whether in situ burning is an option for managing the spilled oil.

Background

"In Situ" is the Latin term for *in place*. In situ burning, as it relates to oil spills, is the controlled burning of oil on water at or near the spill site.

Under the federal Oil Pollution Act of 1990, the U.S. Coast Guard and EPA formed a committee with the states of Washington, Oregon, and Idaho, called the Northwest Area Committee, to develop the Northwest Area Contingency Plan. This plan guides all actions during the response to an oil or hazardous substance spill in the three state area, and is included as Appendix A of this manual.

It is the policy of the Northwest Area Committee that when certain conditions are met, in situ burning will be allowed, and in some circumstances encouraged in the Northwest. Washington follows this policy. A primary consideration is the protection and safety of human life. The authority to approve a burn rests with the Unified Command (staff responsible for directing the response) who must determine that an application to burn conforms with approved guidelines (see Appendix B of the Northwest Area Contingency Plan).

In situ burning has been recognized for many years as an effective way to eliminate large quantities of spilled oil. It is one control option to be considered in a multi media assessment of spill management control options and their ability to reduce the overall risk of damage to people, the land, water, and air.

Pollutants of Concern

Burning of spilled crude oil or oil products generates three general categories of by-products:

1. Airborne components
2. Unburned oil
3. Combustion residues

Airborne components from a burn are mostly carbon dioxide and water (tests have shown that 90% or more of the oil combusted goes to these products.) The remaining airborne components will be in a highly visible plume of smoke containing a mixture of particulates, polynuclear aromatic hydrocarbons (PAHs), sulfur compounds including sulfur dioxide (SO_2), carbon monoxide (CO), nitric oxide (NO), and other nitrogen oxides (NO_x). If the oil is not burned, the

oil's more volatile organic materials will evaporate and create their own health and environmental risks.

Human health concerns are the highest priority for decision-makers when planning a spill response. Currently available information suggests that although health concerns exist for exposure to smoke from oil fires (mostly concerning respirable particulates), many air quality and in situ burning experts believe that the risk is relatively small. The Northwest Area Contingency Plan in Appendix A and Chapters 4 and 5 of this document provides a more extensive discussion of pollutant levels, fates, and risks.

Washington State Department of Ecology Air Quality staff will both model the plume and use a mobile van equipped to monitor plume impacts. It is generally accepted that other pollutants dissipate, reaching background levels well before PM_{10} does. An in situ smoke plume usually stays well above ground level (hundreds to thousands of feet) but it can reach the ground due to land features or meteorological factors.

The pollutants that will be monitored are particulate matter less than ten microns in diameter (PM_{10}), carbon monoxide (CO), and sulfur dioxide (SO_2). The national and Washington State ambient air quality standard for PM_{10} is 150 micrograms per cubic meter ($\mu g/m^3$) on a 24-hour average. The Northwest Area Contingency Plan uses a more conservative standard of 150 $\mu g/m^3$ averaged over one hour. Focus sheets which provide a discussion of the respective health effects of these pollutants are provided in Appendix B.

Unburned oil will remain even after a successful burn. The Unified Command in charge of spill clean up operations will need to make a decision on the additional measures that must be taken to minimize the residual oil's impact.

Solid burn residues will be similar to the original oil in composition, minus the highly volatile components. Because the residues are thicker and tarry they have the potential to sink.

Control Options

Three general categories of oil spill response options include:

1. Mechanical containment and recovery of oil
2. Application of chemical dispersants
3. In situ burning

Mechanical skimming of crude oil is initially the least harmful management option for the environment, however, it generates a large quantity of oil and water mixture to be stored and treated later.

Chemical dispersants cause oil to break into small droplets that can be mixed into and decomposed within the water column. They do not remove oil from the water, but spread it into the lower levels of water, reducing the spilled oil's impact on surface wildlife and sensitive areas on shore.

In situ burning alters the composition of the spilled oil by eliminating from 90 to 99 percent of the original volume of oil collected in a fire resistant boom.

In recent years, significant advancements have been made in the development of techniques and equipment for the safe and effective ignition and controlled burning of spilled oil. Fire proof booms can be used to physically isolate and contain floating oil, allowing control of the conditions for ignition and burning, and giving the ability to stop a burn if needed.

Spill prevention is the first line of defense in spill response planning. Since large quantities of oil are shipped through Washington every year, it is prudent to assume that a spill can and will occur. While physical containment and mechanical removal of spilled oil are preferred, alternate response techniques must be available to minimize an oil spill's effects. The proper use of in situ burning allows response personnel some additional control over the type and location of an oil spill's impact on human health, wildlife, and the environment.

References (*in the order they were mentioned*):

1. Northwest Area Contingency Plan In Situ Burning Policy and Operational Guidelines (dated June 1995/Publication #95-259). Prepared for the Northwest Area Committee by Washington State Department of Ecology's Spill Policy and Prevention Section.

COMMUNICATION AND NOTIFICATION

In the event of an oil spill, the following sequence of contacts will be made to initiate the procedures that the Air Quality Program (AQP) staff will conduct to determine the appropriateness of an in situ burn.

1. ***Unified Command*** will make a preliminary decision whether in situ burning is an appropriate consideration (according to the procedures outlined in the Northwest Area Contingency Plan In Situ Burning Policy and Operational Guidelines[1] provided in Appendix A). That decision will be based on the information provided to them in the Spill Application Checklist in Appendix B of the Northwest Area Contingency Plan In Situ Burning Policy and Operational Guidelines.

2. If the preliminary determination is that burning the spilled oil is a viable option, the ***State On-Scene Coordinator*** will contact ***Ecology's AQP Communication's Coordinator*** to initiate the AQP procedures necessary to make the final recommendation whether or not to burn the spilled oil. That recommendation will be based on an evaluation of whether the air pollutants emitted from the burning oil have the potential to exceed the adopted conservative health based air quality standards.

3. The ***AQP Communication's Coordinator*** will contact the ***State Meteorologist***.

4. The ***State Meteorologist*** will contact the ***AQP Modeler***.

5. The ***AQP Communication's Coordinator*** will immediately relocate physically to a work area where he/she is in close proximity to the ***State Meteorologist*** and the ***AQP Modelor*** to allow visual and verbal one-on-one communication during the course of the oil spill burn activities. The ***AQP Communication Coordinator's*** phone messages will be transferred to his/her new location for the duration of the insitu oil spill burn activities.

6. The ***State Meteorologist*** will contact ***AQP Monitoring Staff*** alerting them to be prepared to initiate the procedures outlined in "Chapter 5 – Air Quality Monitoring at the In Situ Oil Spill Burn Site", "Chapter 6 - Safety Procedures", and "Chapter 7 - Quality Assurance" of the SOP.

7. The ***AQP Communications Coordinator*** will solicit four volunteers (AQP staff) who will work in pairs serving as spotters. The ***State Meteorologist*** will provide instructions to the spotters (about their destinations and responsibilities) until the spotters reach their respective destinations. Once the spotters reach their respective destinations, they will follow the instructions given by the ***AQP Monitoring Coordinator***.

8. All routine calls regarding the insitu oil spill burn activities will be routed to the *AQP* ***Communication's Coordinator*** and he/she will either handle the call or route it to the appropriate insitu oil spill staff.

9. Any problems or complaints encountered by AQP staff during the insitu oil spill burn activities should be routed to the ***AQP Communication's Coordinator***. The ***AQP Communication's Coordinator*** will manage the problem (if appropriate) or route it to the ***State Meteorologist***.

10. The ***State Meteorologist***, working in conjunction with the ***AQP Modeler***, will follow the procedures outlined in "Chapter 3 – "Evaluation of Meteorological and Air Quality Data" and in Chapter 4 - "Modeling" of the Washington State Department of Ecology's Air Quality Program Standard Operating Procedures (SOP) as the basis for making a recommendation whether or not to burn the spilled oil.

11. The ***AQP Modeler***, working in conjunction with the ***State Meteorologist***, will follow the procedures outlined in "Chapter 4 – Modeling" of the SOP as the basis for making a recommendation whether or not to burn the spilled oil.

12. Based on the information gathered in items 10 and 12 above, the ***State Meteorologist*** will contact the ***State On-Scene Coordinator*** with a recommendation whether or not to burn the spilled oil.

13. If the ***State Meteorologist*** recommends that the burn be initiated, he/she will contact the ***AQP Monitoring Staff*** to initiate procedures outlined in "Chapter 5 – "Air Quality Monitoring at the In-Situ Oil Spill Burn Site", "Chapter 6- Safety Procedures", and "Chapter 7- Quality Assurance" of the SOP.

14. During the in situ oil spill burn, the ***State Meteorologist*** and the ***AQP Modeler*** will track the real time meteorological conditions at the site of the in situ burn and continue to model the pollutant concentrations in the smoke plume (based on monitoring data transmitted to them at Ecology's headquarters office by the monitoring team at the site of the in situ burn) to determine if the burn can continue safely.

15. The ***State Meteorologist*** will continue to inform ***Unified Command*** about the air quality impacts of the in situ oil spill burn.

16. If the ***State Meteorologist*** determines that there is a potential for the health based PM_{10} standard to be exceeded, he/she will contact ***Unified Command*** and inform ***Unified Command*** of the impending exceedance and recommend that the in situ burn be stopped.

17. If conditions continue to be favorable for burning the oil, the burn will continue until ***Unified Command*** makes the final decision to terminate the oil spill response.

References (*in the order they were mentioned*):

1. Northwest Area Contingency Plan In Situ Burning Policy and Operational Guidelines (Publication #95-259)

EVALUATION OF METEOROLOGICAL AND AIR QUALITY DATA

The ***Washington State Meteorologist*** (***State Meteorologist***) will follow the protocol outlined below:

a. Contact the ***AQP modeler*** and alert him/her that there has been an oil spill and that there may be an in situ burn. The ***AQP modeler*** will work in conjunction with, and in parallel to, the protocol of the ***State Meteorologist***. The ***AQP modeler's*** protocol is outlined in Chapter 4.

b. Contact the ***AQP monitoring staff*** alerting them to be prepared to initiate the in situ oil spill burn procedures outlined in "Chapter 5 – "Air Quality Monitoring at the In Situ Oil Spill Burn Site", "Chapter 6 - Safety Procedures", and "Chapter 7 - Quality Assurance" of the SOP.

c. Determine if background ambient air quality is good enough to add the additional pollutant impact from an in situ burn. He/she does this by evaluating the following sources of information:

- The ***State Meteorologist*** will evaluate the PM_{10}, $PM_{2.5}$, and CO data generated from the Air Quality Program's Stationary Monitoring Network[1&2] to determine if there are any trends toward impaired air quality.

- The ***State Meteorologist*** will contact local air pollution authorities to determine if they anticipate declaring impaired air status due to pollution trends. The National Weather Service will also be contacted to determine if any air stagnation advisories are anticipated due to decreasing ventilation/increasing stagnation.

d. Evaluate general weather conditions.

e. Contact the Department of Natural Resources (DNR) Fire Weather Meteorologist: alert him/her that there has been an oil spill and that there may be an in situ burn,

- discuss weather conditions, and
- review/discuss DNR's slash burn schedule

f. Call ***Unified Command*** for an on-site weather report/observations. Setup with ***Unified Command*** procedures and reschedule for receiving weather/observational data on a frequent basis from on-site personnel.

g. Conduct the detailed meteorological and weather data analysis of the spill area. The list below summarizes suggested websites that contain meteorological data:

University of Washington Atmospheric Science Weather Information
(http://www.atmos.washington.edu/):

Surface Observations:

- Recent Northwest Observations
- Western Washington Surface Map
- Northwest Marine Data
  - Pacific Northwest Buoy and Lighthouse Data

Upper Air Observations:

- Sand Point Seattle Profiler:
  - 2 km time-height cross section
  - 4 km time-height cross section
  - Hourly virtual temperature soundings
  - Daily virtual temperature soundings

- Upper Air Radiosonde Soundings
  - Quillayute

Washington State Weather Forecasts from the National Weather Service:

- Washington Zone Forecast
- Washington Marine Forecast
- Washington State Forecast Discussion
- Washington State Forecast

Other Regional Weather Forecast Products:

- British Columbia Forecasts

Current Satellite Images:

- Goes-West Visible Satellite Imagery:
  - 1 km resolution for the Pacific Northwest
- Goes-West Infrared Satellite Imagery:
  - 2 km resolution for the Pacific Northwest

Intellicast – Seattle Radar Image
(http://www.intellicast.com/weather/):

- Seattle Radar Image

Sailcast – Marine Forecast
(http://www.intellicast.com/cgi-bin/):

- Marine Forecast

Pacific Northwest MM5 Mesoscale Numerical Forecasts (http://www.atmos.washington.edu/mm5rt/):

- Various forecast periods in the 12 km domain including:
  - SLP, 40 m winds, 925 mb temperature
  - 850 mb heights, temperature, winds
  - 850 mb heights, relative humidity
  - 750 mb vertical velocity, horizontal wind vectors
  - 3-hour precipitation, SLP
  - Subdomain SLP, 40 m winds, 925 mb temperature
  - Subdomain 850 mb heights, temperature, winds
  - ventilation index

- Various forecast periods in the 4 km domain in spill area cross section:
  - W - Strait of Juan de Fuca – E
  - S - Puget Sound - N
  - SW - Fraser/San Juan Islands – NE
  - W - Puget Sound – E

h. Contact the Lead Forecaster at the National Weather Service at (206) 526-6083:

- alert him/her that there has been an oil spill and that there may be an in situ burn,
- determine the synoptic weather situation, and
- determine wind patterns in the spill area.

i. Contact the Local Air Pollution Control Authorities:

- alert them that there has been an oil spill and that conditions may support an in situ burn, and
- request weather/observational and monitoring assistance in respective areas of their jurisdiction if available.

j. Contact Ecology's Regional Office Air Quality Program Section Heads and alert them that there has been an oil spill and that there may be an in situ burn.

k. Make a subjective trajectory and plume behavior analysis.

l. Confer with ***AQP modeler*** on existing and forecasted weather situation.

m. Evaluate model runs.

n. Confer with ***AQP modeler*** about additional model runs to determine likely and worst case conditions.

o. Inform ***Unified Command*** of the decision to burn or not to burn and the related qualifying conditions.

p. Contact the ***AQP monitoring van staff and the Spotters***. Ask them to initiate procedures outlined in "Chapter 5– "Air Quality Monitoring at the In-Situ Oil Spill Burn Site", "Chapter 6- Safety Procedures", and "Chapter 7- Quality Assurance" of the SOP. Provide specific instructions to ***Spotters*** regarding their respective destinations and tasks until they arrive at their respective destinations.

q. Continue to track real time meteorological conditions at the site of the in situ oil spill burn and continue to model the pollutant concentrations in the smoke plume (based on monitoring data transmitted to them at Ecology's headquarters office by the ***AQP monitoring van staff*** at the site of the in situ burn) to determine if the burn can be continued safely.

r. Continue to inform ***Unified Command*** of the status of air quality impacts from the in situ oil spill burn.

s. Contact ***Unified Command*** if there is a potential for the health based PM_{10} standard to be exceeded. Recommend that the in situ burn be terminated.

References (*in the order they were mentioned*):

1. 1997 Air Quality Annual Report for Washington State (Publication #97-208). Provides a discussion of the Air Quality Program's Stationary Monitoring Network.

2. 1996 Air Quality Data Summary (Publication #98-200/January 1998). Provides a discussion of the Air Quality Program's Stationary Monitoring Network

MODELING

The ***Air Quality Program (AQP) Modeler*** will follow the protocol outlined below:

a. Confer with the ***State Meteorologist*** about the meteorology/weather data that he/she has evaluated.

b. Review data at a number of different Internet sites. A list of suggested Internet locations is provided below:

- University of Washington (http://www.atmos.washington.edu/) for information on Pacific Northwest MM5 Mesoscale Numerical Forecasts, Satellite forecasts, National Weather Service Models, and Northwest weather observations.

- National Climate and Atmospheric __RAP(http://www.atmos.washington.edu/): for information on satellite, Northwest Weather Service Models and animated models.

- FSL (http://www.fsl.noaa.gov/): for information on satellite, Northwest Weather Service Models and animated models.

- NWS (http://www.nws.noaa.gov/): National weather service products.

- Purdue University modeling products from the National Weather Service.

- University of Utah (http://www.atmos.utah.edu) modeling products from the National Weather Service.

- Numerical Model Forecast Charts (Research Applications at NCAR)

c. Prepare the output field for input into VIS5-D (see glossary for a description of this model's capabilities).

d. Develop a 3-D animation of the plume and the trajectory.

e. Discuss the plume and trajectory behavior with the state meteorologist.

f. Rerun MM5 using a higher grid-field resolution.

g. Download balloon soundings. Use as input for the 3-D ALOFT model.

h. Run the 3-D ALOFT model.

i. Run the 2-D ALOFT model.

j. Rerun the 3-D model a minimum of 12 times to develop a variety of scenarios of the plume's behavior.

k. Discuss the modeling results with the ***State Meteorologist***.

l. In conjunction with the ***State Meteorologist***, make a decision about whether to burn or not to burn and determine/outline the qualifying conditions based on the modeling results.

m. Continue modeling the plume based on weather updates, updates from ***the AQP Monitoring Van*** staff at the in situ site, and from industries in the area of the burn that have volunteered to provide weather updates and descriptions of the plume's behavior.

AIR QUALITY MONITORING AT THE IN SITU OIL SPILL BURN SITE

The ***Air Quality Program Monitoring Staff*** (monitoring van staff and spotter staff) will follow the respective protocols outlined below:

Spotter Staff:

1. ***Spotters*** will work in teams of two to a vehicle. One of the ***Spotters*** in a team will be designated as the leader of the team. During the course of the insitu oil spill burn activities, the leaders of the respective ***Spotter*** teams will communicate with the appropriate AQP staff as described in items 2 through 5 below.

2. Once the ***Spotters*** have been notified to prepare for an insitu oil spill burn , the team leader will designate tasks to him/herself and the other spotter in the team to ensure that all of the preparation tasks are completed (reserving a vehicle from either the Ecology or the State motor pools, borrowing cell phones from AQP staff or other programs that will not have problems with dead zones, and stocking the vehicle with the equipment outlined on the "Spotters Vehicles Equipment Checklist" provided in Appendix D).

3. ***Spotters*** will get instructions regarding their destinations and tasks from the ***State Meterorologist***. Once the ***Spotters*** have been instructed to leave for their designated destination they will travel directly to the destination (taking no meal breaks on route to the destination). ***Spotters*** will communicate with the ***State Meterorologist*** via cell phone on route to the site and continue to take instructions from the ***State Meterorologist*** until arriving at their respective destinations.

4. Once the ***Spotters*** have arrived at their respective destinations they will follow instructions from the ***AQP Monitoring Van Coordinator***.

5. Spotters will document their activities (who?, what?, where?, when?, and how?), travel costs, and the data collected.

Monitoring Van Staff:

1. The ***AQP Monitoring Van Coordinator***, upon contact from the state meteorologist, will initiate air quality monitoring activities.

2. The ***AQP Monitoring Van Coordinator*** will arrange to meet designated ***AQP Monitoring Van Staff*** at the van/equipment warehouse.

3. The Mobile Air Monitoring Van will be stocked with the equipment identified on the "Mobile Air Monitoring Van Equipment Checklist" provided in Appendix D.

4. Once the van is stocked , the ***Monitoring Van Coordinator*** will contact the ***State Meteorologist*** to confirm and establish "ready status".

5. The ***State Meteorologist*** and the ***Monitoring Van Coordinator*** will further discuss spill status information (*Location, probable activities, impacts, monitoring perspective, travel route and estimated time of arrival).*

6. The ***Monitoring Van Coordinator*** and the other monitoring van staff person will document significant information on a log and depart for the first destination.

7. The ***Monitoring Van Coordinator*** will maintain communications with the ***State Meteorologist*** for adjustments in activities as situations dictate.

8. The ***Monitoring Van staff*** will perform equipment calibration references and operational checks (as conditions allow) during travel to the site.

9. The ***Monitoring Van staff*** will conduct the following activities at the first location:

   - Review status with the ***State Meteorologist***.
   - Complete equipment operational check and calibrations (reference operations and QA procedures).
   - Note real-time readings and peaks and report them to the ***State Meteorologist***.
   - Establish the location of the most representative meteorological monitoring location and install equipment at that location.
   - Discuss need for second meteorological site with the ***State Meteorologist***.
   - Continue to provide status of air quality, spill, and general meteorological conditions to the ***State Meteorologist*** during the course of insitu oil spill burn activities.
   - Discuss or initiate background air quality scanning through possible impact/population area.
   - ***Monitoring Van Staff*** will document their activities (who?, what?, where?, when?, and how?), travel costs, and the data collected.

10. Continue operations as directed by the ***State Meteorologist***.

11. Discontinue monitoring operations when directed by the ***State Meteorologist***.

12. Return and complete post spill calibrations.

13. Submit gathered data and related log and calibration checks to ***State Meteorologist***.

Van operations are to be performed by staff fully familiar with and competent in the instrumentation identified on the checklist.

SAFETY PROCEDURES

Air Quality Program Safety Plan

This chapter provides a discussion of the safety procedures that must be followed by the ambient air quality monitoring team (monitoring team) during an in situ oil spill burn. The monitoring team includes the monitoring van staff and the spotters.

The Air Quality Program (AQP) developed and implemented the "Air Quality Program Safety Plan" (Safety Plan) in June of 1995. Members of the monitoring team have been trained in accordance with the criteria outlined on the Safety Plan and will follow the procedures outlined in the Safety Plan. The monitoring team staff has access to copies of the safety plan at their respective AQP offices and a copy of the safety plan is available in each of the monitoring team vehicles.

Safety and Hazard Recognition Training

The safety plan outlines the safety and hazard recognition training that is required for the activities (ambient air monitoring, calibration and repair, and quality assurance) conducted by the monitoring team while carrying out their duties.

During an in situ oil spill burn, air monitoring staff may be exposed to hazards involved in lifting equipment; working with compressed gases; compressed gas cylinders and chemicals; working around vehicular traffic; driving; exposure to fugitive emissions; working with electricity; and working around animals and poisonous vegetation. Air monitoring staff have been trained to deal with these hazards in accordance with the criteria outlined in the safety plan.[1- 14].

The monitoring team is also required to follow the criteria outlined in the safety plan regarding medical monitoring, personal protective equipment, first aid and CPR, and equipping vehicles to ensure that they are safe[15-18].

The spotters will be required to be trained in all of the parameters defined above except for the 40-Hour Hazardous Materials Training and Refresher Courses.

References (*in the order they were mentioned*):

1. 40-Hour Hazardous Materials Training and Refresher Courses- Chapter II, Section 4 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

2. Ambient Air Monitoring – Chapter III (Safety Training), Section 2 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

3. Meteorological Monitoring – Chapter III (Safety Training), Section 3 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

4. Calibration and Repair – Chapter III (Safety Training), Section 5 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

5. Quality Assurance – Chapter III (Safety Training), Section 8 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

6. Vehicle Operations – Chapter III (Safety Training), Section 9 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

7. Lifting – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 2 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

8. Working with Compressed Gases/Compressed Gas Cylinders and Chemicals – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 3 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

9. Working Around Vehicular Traffic – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 5 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

10. Vehicle Safety – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 6 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

11. Working Around Fugitive Emissions – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 9 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

12. Working With Electricity – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 10 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

13. Chemical Safety – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 11 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

14. Working Around Animals and Poisonous Vegetation – Chapter IV (Hazard Recognition For Air Quality Program Staff Activities), Section 12 of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

15. Medical Monitoring - Chapter V of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

16. Personal Protective Equipment - Chapter VI of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

17. First Aid and CPR - Chapter VII of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

18. Equipping Vehicles - Chapter VIII of the "Air Quality Program Safety Plan" (dated June 1995/Publication #95-212)

QUALITY ASSURANCE

This chapter provides a discussion of the quality assurance procedures that must be followed by the ambient air quality monitoring team (monitoring team) to ensure that generation, storage, and use of air monitoring data meets specific precision, accuracy, and data completeness criteria and that the data is representative and reproducible.

The Air Quality Program (AQP) developed and implemented the "Air Monitoring Quality Assurance Plan and Procedures"[1] (Quality Assurance Plan) in 1995. Members of the monitoring team are experienced and qualified in accordance with the criteria outlined in the Quality Assurance Plan and will follow those procedures. The monitoring team staff has access to copies of the Quality Assurance Plan at their respective AQP offices.

The Quality Assurance Plan provides criteria for procurement and installation of equipment, data documentation, preventative maintenance, quality control and precision checks, performance and systems audits, corrective actions and data validation.

The monitoring team will be monitoring air quality for particulate matter that is less than 10 microns in diameter (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), meteorological conditions, and visibility. A brief discussion of the quality assurance criteria for each of these parameters follows.

PM_{10}

The mobile air quality monitoring van will be equipped with a Series 1400a Tapered Element Oscillating Microbalance Ambient PM_{10} Monitor (TEOM) manufactured by Rupprecht & Patashnick Co., Inc[2]. which generates a continuous real-time measurement of PM_{10}.

The mobile air quality monitoring van will be equipped with a MiniVol Portable Sampler (manufactured by Air Metrics[3]) which generates measurements of PM_{10}.

Monitoring team staff will use the operating procedures described in references 2 and 3 and the quality assurance procedures described in reference 1, Section IV.

CO

The mobile air quality monitoring van will be equipped with a Model 48 Gas Filter Correlation (GFC) Ambient Analyzer (manufactured by Thermo Environmental Instruments Inc.[4]) which generates a continuous real-time measurement of ambient carbon monoxide.

Monitoring team staff will use the operating procedures described in reference 4 and the quality assurance procedures described in reference 1, Section V.

SO_2

The mobile air quality monitoring van will be equipped with a Thermo Electron's Model 43A Pulsed Fluorescent SO_2 ambient air analyzer (manufactured by Thermo Environmental instruments Inc.[5]) which generates a real-time measurement of ambient sulfur dioxide.

Monitoring team staff will use the operating procedures described in reference 5 and the quality assurance procedures described in reference 1, Section VI.

Meteorological Conditions

The mobile air quality monitoring van will be equipped with a Weatherpack 2000 (manufactured by Coastal Environmental Systems[6]) which generates measurements of wind, air temperature, relative humidity, and barometric pressure.

Monitoring team staff will use the operating procedures described in reference 6 and the quality assurance procedures described in reference 1, Section VIII.

Visibility

The mobile air quality monitoring van will be equipped with a M903 Nephelometer (manufactured by Radiance Research[7]) which measures the real time light scattering coefficient (visibility).

Monitoring team staff will use the operating procedures and the quality assurance procedures described in reference 7.

References (*in the order they were mentioned*):

1. Air Monitoring Quality Assurance Plan and Procedures (Publication #95-201/1995)

2. Operating Manual for the TEOM Series 1400a Ambient Particulate (PM-10) Monitor, May 1996 Revision B (R&P Part Number 42-003347). Rupprecht & Patashnick Co., Inc., 25 Corporate Circle, Albany, NY 12203.

3. MiniVol Portable Sampler Operation Manual. Air Metrics, 225 North 5th, Suite 501, Sprinfield, Oregon 97477.

4. Model 48 Gas Filter Correlation (GFC) Ambient Analyzer Instruction Manual, November 19, 1994. Thermo Environmental Instruments, Inc., 8 West Forge Parkway, Franklin, Massachusetts 02038.

5. Model 43A Pulsed Fluorescent SO_2 ambient air analyzer. Thermo Environmental Instruments, Inc., 8 West Forge Parkway, Franklin, Massachusetts 02038.

6. Weatherpak-2000. Coastal Environmental Systems, 100 First Avenue South, Suite 200, Seattle, WA 98134-1216. December 12, 1996.

7. M903 Nephelometer, ROM version 2.37. Radiance Research, 535 NW 163 St., Seattle, WA 98177