Memorandum Of Understanding

Between
U.S. Coast Guard District 5 (USCG)
and
U.S. Environmental Protection Agency Region III (EPA)
and
U.S. Department of the Interior (DOI)
and
U.S. Department of Commerce/
National Oceanic and Atmospheric Administration (DOC/NOAA)
and
State of Delaware Department of Natural Resources and Environmental Control (DE DNREC)
and
State of Maryland Department of the Environment (MDE)
and
Commonwealth of Virginia Secretary of Natural Resources (VASNR)

PURPOSE

This document is designed to implement sections of Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the requirements of 33 USC 1321 (j) (4) (C) (v), the Federal Water Pollution Control Act (FWPCA), as amended by the Oil Pollution Act (OPA) of 1990. This document provides preauthorization for use of in-situ burning by the USCG Federal On-Scene Coordinator (FOSC) in response to coastal oil discharges within the jurisdiction of the Region III Regional Response Team (RRT).

This document will be incorporated into Subpart J of the Regional Contingency Plan (RCP) and appropriate Area Contingency Plans (ACP).

AUTHORITY

Subpart J of the NCP specifies that RRT's shall address, as part of their planning activities, the desirability of using appropriate burn agents, and that RCP's shall, as appropriate, include applicable preauthorization plans and address the specific contexts in which such products should and should not be used.

Subpart J also provides that the FOSC, with the concurrence of the EPA representative to the RRT, and the States with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the Department of Commerce/ National Oceanic and Atmospheric Administration (DOC/NOAA) and Department of the Interior (DOI) natural resource trustees, may authorize the use of burning agents on a case-by-case basis.

Commander, Fifth Coast Guard District, has pre-designated the USCG COTP HR as the FOSC for oil discharges in the COTP HR zone, the USCG COTP PHI as the FOSC for oil discharges in the COTP PHI zone, and the USCG Commander ACTBALT as the FOSC for oil discharges in the COTP BALT zone (as defined in 33 CFR Part 3 and subject to joint response boundary agreements with EPA), and has delegated to each COTP the authority and responsibility for compliance with the Federal Water Pollution Control Act (FWPCA).

The Governor of the State of Delaware has designated the Secretary of the Department of Natural Resources and Environmental Control (DNREC) the authority and responsibility for providing approval for the use of in-situ burning for the control of oil spills in or affecting Delaware waters.

The Governor of the State of Maryland has designated the Secretary of the Department of Environment (MDE) the authority and responsibility for providing approval for the use of in-situ burning for the control of oil spills in or affecting Maryland waters.

The Governor of the Commonwealth of Virginia has designated the Secretary of Natural Resources (VASNR) the authority and responsibility for providing approval for the use of in-situ burning for the control of oil spills in or affecting Virginia waters.

The DOI and DOC/NOAA are designated Federal trustees of certain natural resources under Subpart G of the NCP and are to be consulted regarding the determination to burn oil in-situ in United States waters.

This document constitutes pre-concurrence for USCG, EPA,, DNREC, MDE, VASNR, DOC/NOAA, and DOI for the use of in-situ burning in the preapproved area ("A" zone).

SCOPE

The USCG, EPA, DOI, DOC/NOAA, the states of Delaware and Maryland and the Commonwealth of Virginia agree that the primary method of controlling discharged oil shall be the physical removal of the oil from the environment. These agencies recognize that in certain circumstances the effectiveness of physical containment and removal of the oil is limited and may add to adverse environmental impact, and that the utilization of in-situ burning, alone or in conjunction with mechanical removal methods and/or chemical countermeasures, may be considered as a better approach to minimize substantial threat to public health or welfare, or minimize serious environmental damages.

This document establishes the advance approval under which in-situ burning may be used by the FOSC in certain waters under the jurisdiction of RRT III. These waters include the Areas of Responsibility (AOR's) for the USCG COTPs for Philadelphia, Baltimore, and Hampton Roads. The geographic areas and advance approval conditions are as follows (see Figure 1):

1) "A" Zones - Preauthorization for Open-Water Burning

Geographic Scope:
Zone "A" is defined as waters under the jurisdiction of RRT III and not classified as "B", or "R" zones, that lie 3 nautical miles (nm) and seaward of the Territorial Sea Baseline (as defined in 33 CFR 2.05-10) along the coast of (south of the demarcation between Federal Region II and Region III) and along the coastal shores of Delaware, Maryland and Virginia to the outermost extent of the Exclusive Economic Zone (EEZ).

Advance Approval for Zone "A":
Within Zone "A", the decision to use in-situ burning rests solely with the FOSC provided that the requirements listed under the "Protocols" section of this agreement are followed.

No further concurrence on the part of the USCG FOSC is required with EPA, DOC/NOAA, DOI, or the states of Delaware, Maryland, or Virginia.

The USCG will immediately notify EPA, DOC/NOAA, DOI, and the states of Delaware, Maryland, or Virginia of a decision to conduct burning within the "A" zone via RRT representatives.

2) "B" Zones - Waters Requiring Case-by-Case Approval

Geographic Scope:
Zone "B" is defined as waters under the jurisdiction of RRT III and not classified as "A" or "R" zones, that 1) lie within state territorial boundaries, 2) are designated as marine reserves, National Marine Sanctuaries, National or State Wildlife Refuges, units of the National Park Service, or proposed or designated Critical Habitats, or 3) are considered coastal wetlands, including submerged algal beds and submerged seagrass beds.

If the FOSC feels that in-situ burning within the "B" zone would be beneficial, a request for authorization must be submitted to the RRT, along with the information specified in the checklist in Appendix II. The FOSC is granted authority to conduct in-situ burning in "B" zones only after concurrence is given by EPA, DOC/NOAA, DOI, and the affected states/commonwealth. The RRT will respond to the FOSC's request for burning in Zone "B" within four hours after deliberative communication is established.

The USCG FOSC will immediately notify EPA, DOC/NOAA, DOI, and the states of New Jersey, Delaware, Maryland, or the Commonwealth of Virginia of a decision to initiate an approved burn within the "B" zone via their RRT representatives.

3) "R" Zones - Restricted Zones

Geographic Scope:
An "R" zone is defined as an area under the jurisdiction of RRT III and not classified as an "A" or "B" zone, that has been designated by the RRT or the Area Committees as a restricted zone.

No in-situ burning operations will be conducted in an "R" zone unless 1) in-situ burning is necessary to prevent a clear, immediate, and extreme risk to human health or safety, or 2) an emergency modification of this agreement is made on an incident-specific basis.

PROTOCOLS

As attested by the signatures set forth at the end of this document, the USCG, EPA, DOI, DOC/NOAA, DNREC, MDE, and DEQ, agree that the predesignated FOSC has the authority and may order the use of in-situ burning on oil discharges using the guidelines found in Subpart J and Appendix M of the Region III RCP and Annex G of the COTPs ACPs subject to the following conditions:

1. The decision to use in-situ burning on a discharge of oil in accordance with this Agreement rests solely with the pre-designated USCG FOSC. This responsibility may not be delegated.

2. The FOSC may authorize the use of in-situ burning on a discharge of oil to prevent or substantially reduce the hazard to human life without obtaining concurrences from EPA or the affected states, without following protocols established in this MOU, and without following the guidelines in the RCP and ACPs. If in-situ burning is used in this manner, RRT notifications shall be made as soon as practicable. Once the risk to human life has subsided, these exceptions no longer apply.

The following protocols assume that risk to human life is not a factor:

3. Prior to any in-situ burn operations, the FOSC will review the decision diagram contained in Appendix I.

4. The USCG agrees with EPA, DOI, DOC/NOAA, and the states that if a decision has been made to use in-situ burning under the provisions of this agreement, the FOSC will immediately notify EPA, DOI, DOC/NOAA and the states of that decision. This initial notification will include, but is not limited to, the following information to the extent available:

Type and amount of oil discharged
Area affected
The projected area of impact of the oil if not burned

Reasons why in-situ burning has been selected as a mitigation technique
On-scene weather

5. In zones "A", "B", or "R", the FOSC will make every effort to insure that the State Historic Preservation Officer(s) (SHPOs) associated with those states that the burn may have an affect upon, is notified. If the SHPO(s) are not notified before the burn, the FOSC will make every effort to contact and notify the SHPO(s) that a burn took place. In either case, the FOSC will provide the SHPO(s) with the date and location of the burn and the location of the staging area for the equipment.

6. The checklist form in Appendix II shall be completed for all burns and provided to RRT members in a timely manner for documentation and informational purposes. If the Responsible Party (RP) requests the use of in-situ burning, members of this organization will be responsible for completing the checklist in Appendix II. If the RP is unknown and the request to burn is made by another party, the FOSC will be responsible for completing this checklist.

7. Burning will be conducted by trained professionals using recognized techniques and technology. Burning will be conducted in a way that allows for safe and effective control of the burn to the maximum extent feasible, including the ability to rapidly stop the burn if necessary. Containment and control using fire-resistant boom is recognized as the preferred method of burning. All practical efforts to limit the potential for igniting the source or adjacent, uncontained, or uncontrollable slicks will be made.

8. In-situ burning is advised only when the meteorological and sea conditions are operationally favorable for a successful burn. The FOSC will give due consideration to the direction of the wind and the possibility of the wind blowing precipitate over population centers or sensitive resources onshore. A safety margin of 45 degrees of arc on either side of predicted wind vectors should be considered for shifts in wind direction.

9. Health and Safety Concerns -

(a) OPERATORS: Assuring workers' health and safety is the responsibility of employers and the USCG FOSC who must comply with all Occupational Safety and Health Administration (OSHA) regulations. Prior to any in-situ burn operations, a site safety plan must be submitted to the FOSC.

(b) PUBLIC: Burning should be stopped if it becomes an unacceptable health risk to the general public. If at any time during burning operations, exposure limits are expected to exceed federal air quality standards in nearby populated areas, then operations will immediately cease. The Level of Concern (LOC) for particulates for the general public in Region III is 150 ug/m3 (PM-10) averaged over one hour. Public advisories may be required prior to initiating a burn.

10. In-situ burning will be conducted in accordance with any consultations approved by the U.S. Fish and Wildlife Service and the NOAA National Marine Fisheries Service under Section 7 of the Endangered Species Act. Prior to beginning an in-situ burn, it will be determined if threatened or endangered species are present in the burn area or otherwise at risk from any burn operations, fire, or smoke. Measures will be taken to prevent risk to any wildlife, especially endangered or threatened species. Examples of potential protection methods may include moving the location of the burn to an area where listed species are not present, temporary employment of hazing techniques, if effective, and physical removal of listed species individuals under the authority of the trustee agency. If the risk to endangered or threatened species cannot be eliminated or reduced sufficiently, the burn will not be conducted.

11. The FOSC will make every reasonable effort to continuously evaluate the decision to burn, and allow RRT agencies and the affected states the opportunity for comment. Formal requests to discontinue a burn when submitted by agencies through their RRT representative will be immediate grounds for discontinuance of burn operations.

12. Monitors representing the USCG, EPA, federal trustee agencies, the affected states, OSHA, and the responsible party will have the opportunity to monitor in-situ burning operations, when feasible:

(a) Monitoring to establish "continue / discontinue" data for input to the FOSC will be conducted in accordance with protocols outlined in Appendix III. Unless smoke plumes are predicted to cross over populated or environmentally sensitive areas, an inability to conduct monitoring operations will not be automatic grounds for discontinuing or prohibiting in-situ burn operations. Real-time PM-10 monitoring will be initiated when trajectories indicate potential movement toward populated or environmentally sensitive areas, and will be in place prior to the start of burn operations.

(b) All burns must incorporate constant visual observations to monitor smoke plume behavior. A trial burn may be conducted to better estimate plume behavior prior to operational burning. The burn should be stopped if the plume contacts or threatens to contact the ground in populated or environmentally sensitive areas.

13. Mechanical recovery equipment shall be mobilized on-scene when feasible for backup and complementary response capability. Provisions should be made for collection of burn residue following the burn(s).

14. If in-situ burning is used, a post incident debriefing will take place within 45 days to gather information concerning its effectiveness and to determine whether any changes to this agreement are necessary. The debriefing will be chaired by the USCG FOSC by arranging the time, place, and date of the debrief. The results of the debrief will be included in the FOSC report.

AMENDMENTS

This document may be amended in whole or in part as is mutually agreeable to all parties thereto. Area Committees may submit further defined areas for use/non-use of in-situ burning for consideration and approval by the RRT concurrence agencies. Approved amendments shall be found in a separate appendix to this document.

CANCELLATION

This document may be canceled in whole or in part by any party thereto. Cancellation will take place 30 days following delivery of written notification to each of the agencies participating in this Memorandum of Understanding.

FIGURES

I. Region III ISB Authorization Zones

APPENDICES

I. FOSC ISB Decision Diagram
II. ISB Evaluation Checklist
III. ISB Monitoring Protocols

SIGNATURES

Anthony Regalbuto

Captain Anthony Regalbuto, USCG
Chief, Marine Safety Division
Fifth Coast Guard District
RRT Co-Chair

9/24/97
Date

Dennis P. Carney

Mr. Dennis Carney
Chief, Removal Branch
U.S. Environmental Protection Agency, Region III
RRT Co-Chair

9/24/97
Date

Don Henne

Mr. Don Henne
RRT III Representative
U.S. Department of Interior

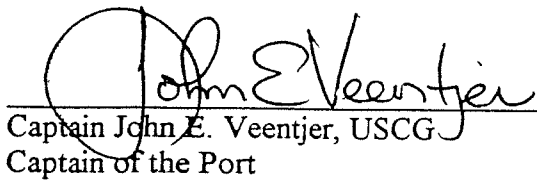
9/24/97
Date

Gerald E. Wheaton

Commander Gerald Wheaton
RRT III Representative
U.S. Department of Commerce

9/24/97
Date

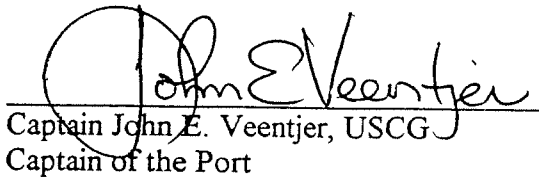
SIGNATURES
(continued)



Captain John E. Veentjer, USCG
Captain of the Port
USCG MSO/Group Philadelphia
Fifth Coast Guard District

9/25/97
Date

SIGNATURES
(continued)



Captain John E. Veentjer, USCG
Captain of the Port
USCG MSO/Group Philadelphia
Fifth Coast Guard District

9/25/97
Date

SIGNATURES
(continued)

Captain Richard E. Bennis, USCG
Captain of the Port
USCG MSO Hampton Roads
Fifth Coast Guard District

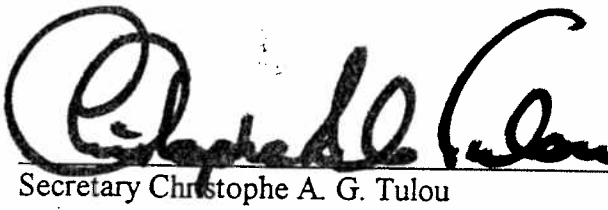
9/26/97
Date

SIGNATURES
(continued)

12/2/97
Date

Captain Charles L. Miller, USCG
Captain of the Port
USCG Activities Baltimore
Fifth Coast Guard District

SIGNATURES
(continued)



Secretary Christophe A. G. Tulou
Department of Natural Resources and Environmental Control
State of Delaware

1.14.98
Date

SIGNATURES
(continued)

Jane Nishida

Jane T. Nishida
Secretary
Department of Environmental
State of Maryland

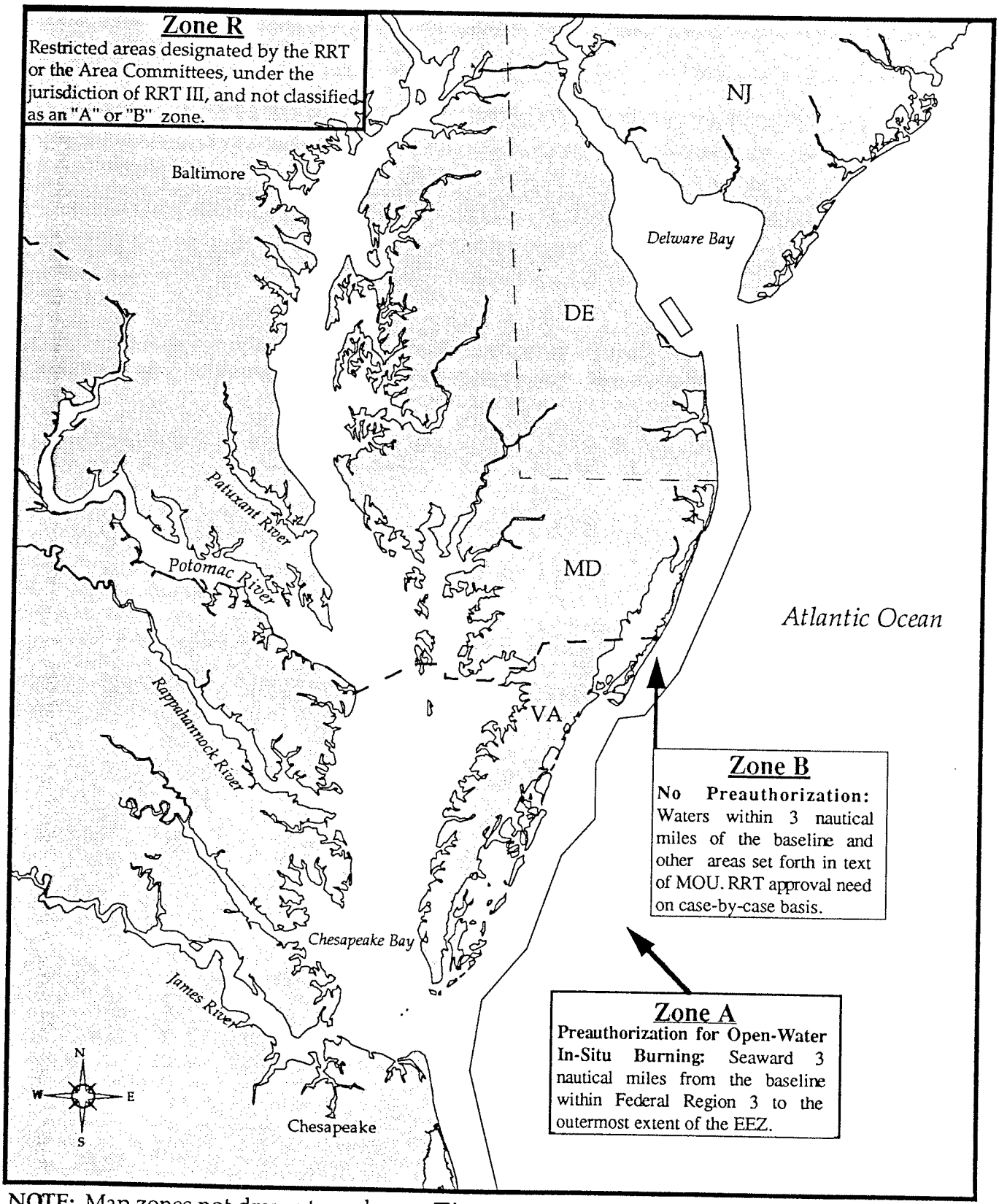
12/5/97
Date

SIGNATURES
(continued)

Becky Norton Dunlop
Secretary of Natural Resources
Commonwealth of Virginia

November 3, 1997
Date

Region III In-Situ Burning Authorization Zones

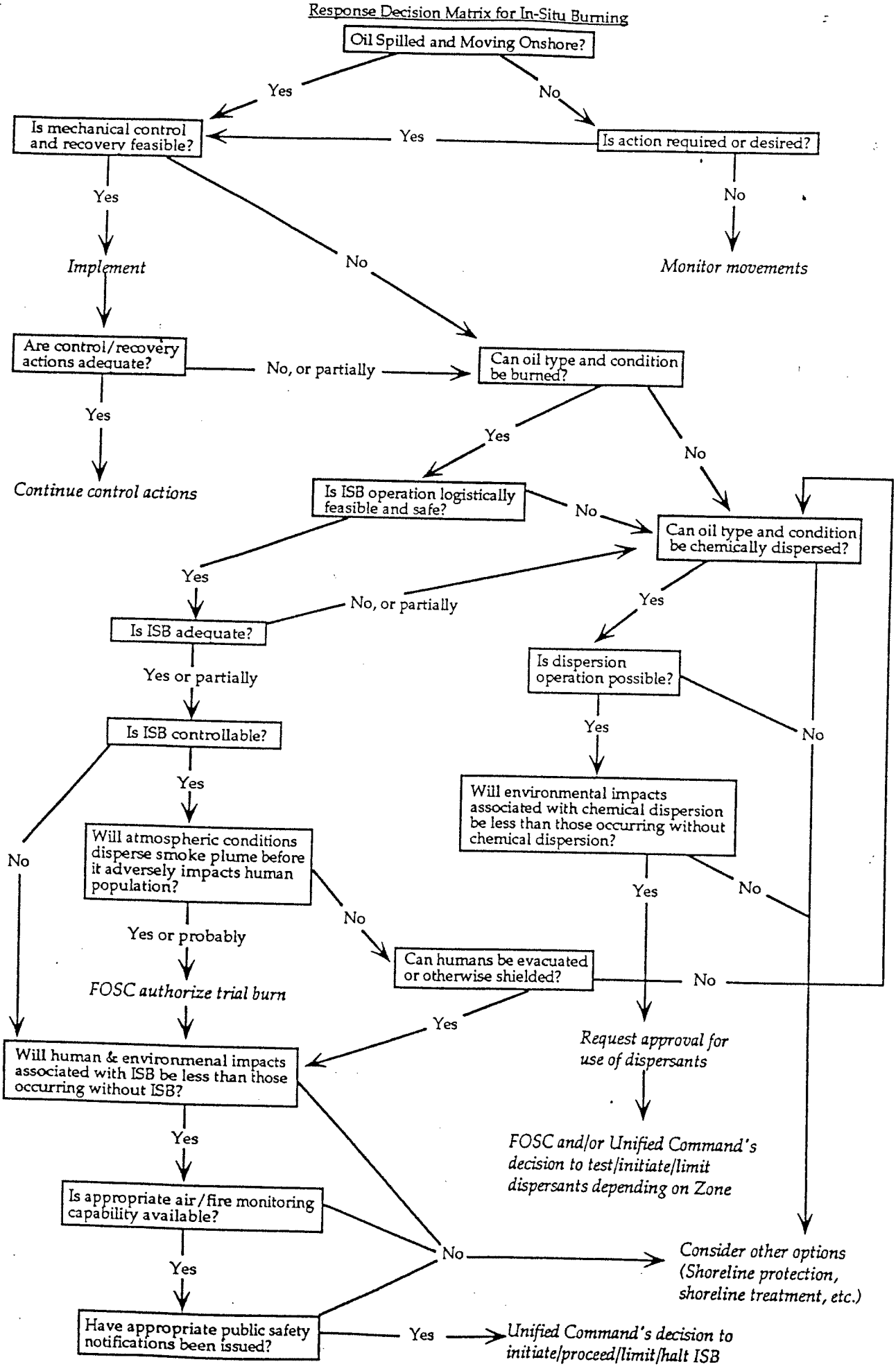


NOTE: Map zones not drawn to scale

Figure 1

Memorandum of Understanding concerning Preauthorization of In-Situ Burning in federal Region III.

APPENDIX I


Response Decision Matrix for In-Situ Burning
Oil Spilled and Moving Onshore?
Yes
No
Is mechanical control and recovery feasible?
Yes
Is action required or desired?
Yes
No
Implement
Monitor movements
No
Are control/recovery actions adequate?
No, or partially
Can oil type and condition be burned?
Yes
Continue control actions
Yes
No
Is ISB operation logistically feasible and safe?
No
Can oil type and condition be chemically dispersed?
Yes
No, or partially
Yes
Is ISB adequate?
Is dispersion operation possible?
Yes or partially
Yes
No
Is ISB controllable?
Yes
Will environmental impacts associated with chemical dispersion be less than those occurring without chemical dispersion?
No
Will atmospheric conditions disperse smoke plume before it adversely impacts human population?
Yes
No
Yes or probably
No
Can humans be evacuated or otherwise shielded?
No
FOSC authorize trial burn
Yes
Request approval for use of dispersants
Will human & environmenal impacts associated with ISB be less than those occurring without ISB?
FOSC and/or Unified Command's decision to test/initiate/limit dispersants depending on Zone
Yes
Is appropriate air/fire monitoring capability available?
No
Consider other options (Shoreline protection, shoreline treatment, etc.)
Yes
Have appropriate public safety notifications been issued?
Yes
Unified Command's decision to initiate/proceed/limit/halt ISB

APPENDIX II: ISB EVALUATION & RESPONSE CHECKLIST

STEP # ONE: EVALUATION OF THE NEED FOR BURNING

Nature, Size and Type of Product spilled

A. Name of incident: _____

B. Date and time of incident: Month/Day/Year _____; Time _____

C. Incident: Grounding ____ Transfer Operations ____ Explosion ____
Collision ____ Blowout ___ Other _____

D. Did source burn? Yes ____ No ___
Is source still burning? Yes ____ No ____

E. Spill location: Latitude _____; Longitude _____

F. Distance (in miles) and direction to nearest land: _____;
nearest human use area _____;

G. Product released: Heavy Crude _____ Bunker C _____ #6 fuel _____
Medium crude _____ Diesel / #2 _____ Jet fuels/gasoline _____ Other ____

H. Product easily emulsified? Yes ____ No ____

I. Product already emulsified? No ____ Light emulsion (0-20%)____
Moderate emulsion (21-50%)____ Heavy emulsion (>51%)____ Unknown ____

J. Estimated volume of released product: gals ____ bbls ____ tons ____

K. Estimated volume of product potentially released: # gals ____ bbls ____
tons _____

L. Release status: Continuous ____ Intermittent ____
One time only, now stopped ____
If continuous or intermittent, specify rate of release:
gals ____ bbls ____ tons ___

M. Estimated water surface covered (square miles):_____

Weather, Current and Forecasted

A. Weather: Clear ____ Partly Cloudy ____ Overcast ____ Rain ____ Snow ____ Fog
____ 24-hour projection: _____ 48-hour projection: _____

B. Wind Speed: _____ knots Direction (from):_____
24-hour projection: _____ knots Direction (from)_____
48-hour projection: _____ knots Direction (from)_____

C. Stability Class: A___ B___ C___ D___ E___

D. Tidal Currents

Date	Time / knots	Time	Time / knots
Max Flood	_____	slack _____	Max. Ebb _____
Max Flood	_____	slack _____	Max. Ebb _____
Max Flood	_____	slack _____	Max. Ebb _____
Max Flood	_____	slack _____	Max. Ebb _____

E. Dominant current, net drift: Speed _____ knots Direction (from)_____

F. Sea state: Calm ____ Choppy ____ Swell ____ Waves: <1 ft____ 1-3 ft____
>3 ft ____ 24-hour projection: _____ 48-hour projection: _____

G. Ice Present: Yes ____ No ____; Percent coverage: <10%____ 11-30%____
31-50%____ 51-100%____

Trajectories of Spill

A. Estimated trajectory (see attached chart/map):

B. Expected area(s) and time(s) of land fall: _____
_____
_____
(see attached chart/map)

C. Estimated percent naturally dispersed and evaporated within first 24 hours:
_____

Evaluation of Response Operations

A. Size, forecasted weather and trajectories, amount of available equipment, time to deploy and time to recover? Yes ____ No ____

B. Has dispersant use been fully evaluated? Yes ____ No ____

C. Why is in-situ burning necessary?(provide a brief explanation)
_____
_____
_____
_____
_____

D. Will in-situ burning be used in addition to mechanical recovery and/or dispersant use? Yes ____ No ____

E. Will in-situ burning be used instead of mechanical recovery and/or dispersant use? Yes ____ No ____, (If so provide a brief explanation)
_____
_____
_____
_____
_____

STEP # TWO: BURNING FEASIBILITY CHECKLIST

Weather, Sea, and Oil Conditions

A. Wind: < 20 Knots? Yes ____ No ____

B. Waves: < 3 feet in choppy wind driven seas? Yes ___ No ____
< 6 feet in large swells? Yes ___ No ___

C. Currents: < 0.75 knots relative velocity boom/water? Yes ___ No ___

D. Visibility: Sufficient to see oil, vessels towing boom, and suitable for aerial overflight for burn observation? Yes ___ No ___

E. Oil Condition: 1. Fresh oil,< 2-3 days exposure Yes ___ No ___
2. >2-3 mm, (0.1 inch) thickness Yes ___ No ___
3. < 25% water content for optimal ignition Yes ___ No ___

Equipment & Personnel

A. Vessels, Fire Boom, Residue Containment equipment available? Yes ___ No ___
Vessels equipped with appropriate fire fighting gear? Yes ___ No ___

B. Aircraft(s) for ignition and aerial observation available? Yes ___ No ___
(Flight requirements daylight hours, visibility > 1 mile ceiling > 500 feet, FAA certified for helitorch)

C. Ignition System: 1. Available? Yes ___ No ___
2. Type/method to be used? _____
3. Burn Promoters? Yes ___ No ___

D. Personnel properly trained, equipped with safety gear, & covered by site safety plan? Yes ___

E. Communications System available to communicate with aircraft, vessels and control base available and working? Yes ___ No ___

Proposed Burn Plan

A. Proposed burning strategy (circle appropriate responses)
1. Ignition away from source after containment and movement to safe location
2. Immediate ignition at or near source
3. Ignition of uncontained slick(s) at a safe distance

B. Estimated amount of oil to be burned in boom, expressed by sq. ft.: _____

C. Estimated duration of burn in minutes: _____

D. Are simultaneous burns planned? Yes ___ No ___
If yes how many? _____

E. Are sequential or repeat burns planned (not simultaneous)? Yes ___ No ___

F. Method for terminating the burn:
_____
_____

G. Proposed method for ignition: _____
_____

H. Ability to collect burned oil residue: Yes ___ No ___

I. Estimated smoke plume trajectory (miles): _____

STEP # THREE: IS BURNING ACCEPTABLE?

Evaluation of Anticipated Emissions

A. Using a section of an appropriate chart, plot and calculate the following locations and distances:

1. Location of proposed burn in reference to source.

2. Location of proposed burn in reference to nearest ignitable oil slick or slicks.

3. Location of proposed burn in reference to nearest land.

4. Location of nearby human habitation/use areas,(e.g. towns/villages fishing/Rec. camps, airports/strips, roads etc.).

Determine the following:

1. Distance between burn and land, or non flat terrain ____ (miles)

2. Distance between proposed burn and spill source ____ (miles)

3. Distance between burn and human habitation/use area ____ (miles)

4. Surface of the proposed burn or burns _____ (approx. sq. ft.)

5. Will impairment of visibility affect airports? Yes ___ No ___

B. 1. Consider (if applicable), the risk of accidental (secondary) fires? Yes ___ No ____

2. Can burning be conducted in a controlled fashion? Yes ___ No ____

C. Using a distance of X miles with the forecasted wind direction plot the estimated smoke plume with particulate concentration >150 $\mu g/m^3$.

D. Determine if the anticipated smoke plume will disperse before reaching populated areas? Yes ___ No ____

Determination of Acceptability

A. Does the estimated smoke plume impact a populated area with particulate concentrations averaged over one hour exceeding 150 $\mu g/m^3$?
Yes ____ No ____

If No, Burning is Acceptable, proceed to Step Four
If Yes, continue with B.

B. Can the impacted population be temporarily relocated prior to burning?
Yes ____ No ____

If Yes, initiate warning or evacuation and authorize burning AFTER population is protected, proceed to Step Four. If No do not authorize burning!

STEP # FOUR: CONTROLS & CONDITIONS

Operational Controls, Required for All Burns

A. Forecasted weather, winds and atmospheric stability class obtained?
Yes ___ No ___

B. Trial burn conducted, observed, and anticipated smoke plume behavior confirmed ? Yes ___ No ___

C. Safe downwind distance validated, or expanded if winds are inconsistent with anticipated forecast? Yes ___ No ___

D. Burn extinguishment measures in place and available? Yes ___ No ___

Public Notifications

A. Level 1 public notification, (e.g. radio broadcast to public, safety zone broadcast to mariners, road closure, etc.) implemented? Yes ____ No ____

B. Provisions to initiate Level 2,3,or,4 warnings, instructions available (if appropriate) Yes ___ No ___

Unified Command Decision Regarding In-Situ Burning

Steps One through Four Completed - Time and Date: _____

A. _____ Do not conduct in-situ burn

B. _____ In-situ burning may be conducted in limited or selected areas (see attached chart)*

C. _____ In-situ burning may be conducted as requested in Step # 3

Signature of Federal On-Scene Coordinator:

_____

Printed Name of Federal On-Scene Coordinator:

_____

Signature of State On-Scene Coordinator:

_____

Printed Name of State On-Scene Coordinator:

_____

Time and Date of Decision: _____

Additional conditions that apply:

_____

_____

_____

_____

_____

_____

_____

APPENDIX III: IN-SITU BURN MONITORING PLAN

Why Monitor? What To Sample? When To Monitor?

Controlled in-situ burning is a relatively new approach to oil spill response. There are legitimate concerns about exposing the general public and sensitive environments to the resulting smoke plume; however, gases (CO_2, NO, NO_x, SO_2) coming off the burn are generally not considered to be a probable threat to public safety or sensitive environments in that they are expected to dissipate rapidly to background levels within a few hundred feet of the initial burn site.

The smoke plume generated is composed of soot, PAHs, and trace levels of aldehydes, ketones, and esters. Levels of concern are associated with particulates that are 10 micrometers or less in aerodynamic diameter (PM-10); other particulates will have fallen out of the smoke plume within relatively short distances from the initial burn site. Particulates less than or equal to 5 micrometers are considered a health hazard because these particulates can transport to areas deep within the lungs. PAHs, which are known to be metabolized to carcinogens are found to be adsorbed to these particulates.

To make decisions concerning the continuation of an in-situ burn, it is advisable to have information concerning concentrations of smoke particulates of 10 micrometers or less (PM-10s).

This monitoring is to be established when there is reason to believe that weather and/or location of the burn could produce a situation in which the general public and/or sensitive environments could be affected by the smoke plume. However, until experience is gained in the practical application of this monitoring, it will also be established even when there are no threats as mentioned above. It is expected that experience will be gained after a few operational uses of this monitoring plan, and subsequent use of the plan will likely be used only for monitoring populated or sensitive areas.

How Is In-Situ Burn Monitoring Data Used?

The PM-10 data will be taken in real-time and will be read from a digital readout as well as being stored in a data logger for subsequent downloading. If the digital readouts are consistently near or exceed the level of concern as defined in the appropriate RRT approved "In-situ Burn Plan" the SSC will immediately relay the results to the FOSC. The FOSC will act in accordance with the guidance provided in the RRT approved "In-Situ Burn Plan."

In-Situ Burn Sampling Methodology

The procedure for monitoring PM-10 particulate emissions from the in-situ burn, to compare to a level of concern as specified by the RRT "In-situ Burn Plan" for consideration to continue or terminate burn operations is as follows:

Real-time monitoring for airborne PM-10 particulates will be carried out. The monitor to be used will be a portable infrared aerosol monitor capable of detecting smoke particulate. (Figure 4) The instrument gives a real-time reading of PM-10 concentration. It has a data logger for data storage, statistical analysis and report generation and can be used with a portable computer (PC) (DOS or Apple operating systems) if appropriate software is available. (Note: During the first few uses of these real-time instruments, filter samples will be taken concurrently by separate devices and methods to validate the real-time readouts.)

Operation of the system is easy and straight forward as follows (consult operator's manual for details):

1 Upon arrival near the sampling site, unpack monitor and data logger and connect them via the analog signal cable. The monitor may be placed on a tripod or left free standing (approximate weight is 9 pounds).

2 Turn on both systems, allowing a 5 minute warm-up period. Both systems can be operated for 6 to 8 hours with the batteries included.

3 Zero the instrument, then perform secondary calibration. The monitor has a pre-filtered, clean-air calibration capability built in for field use.

4 Check the monitor with the reference scatterer provided (a light scattering insert that provides a constant value) for approximately 30 seconds.

5 Select measurement time constant as 32 seconds. Introduce the monitor into the atmosphere to be sampled. The monitor reads at a rate of 3 times per second. Each sample period will be equal to or greater than 5 minutes and an average level recorded.

6 When conditions allow, after sampling for the desired time, disconnect the data logger from the monitor, and connect it to the PC via the computer interface cable.

7 Place the data logger into the playback mode to load data into the software for statistical analysis and/or report generation.

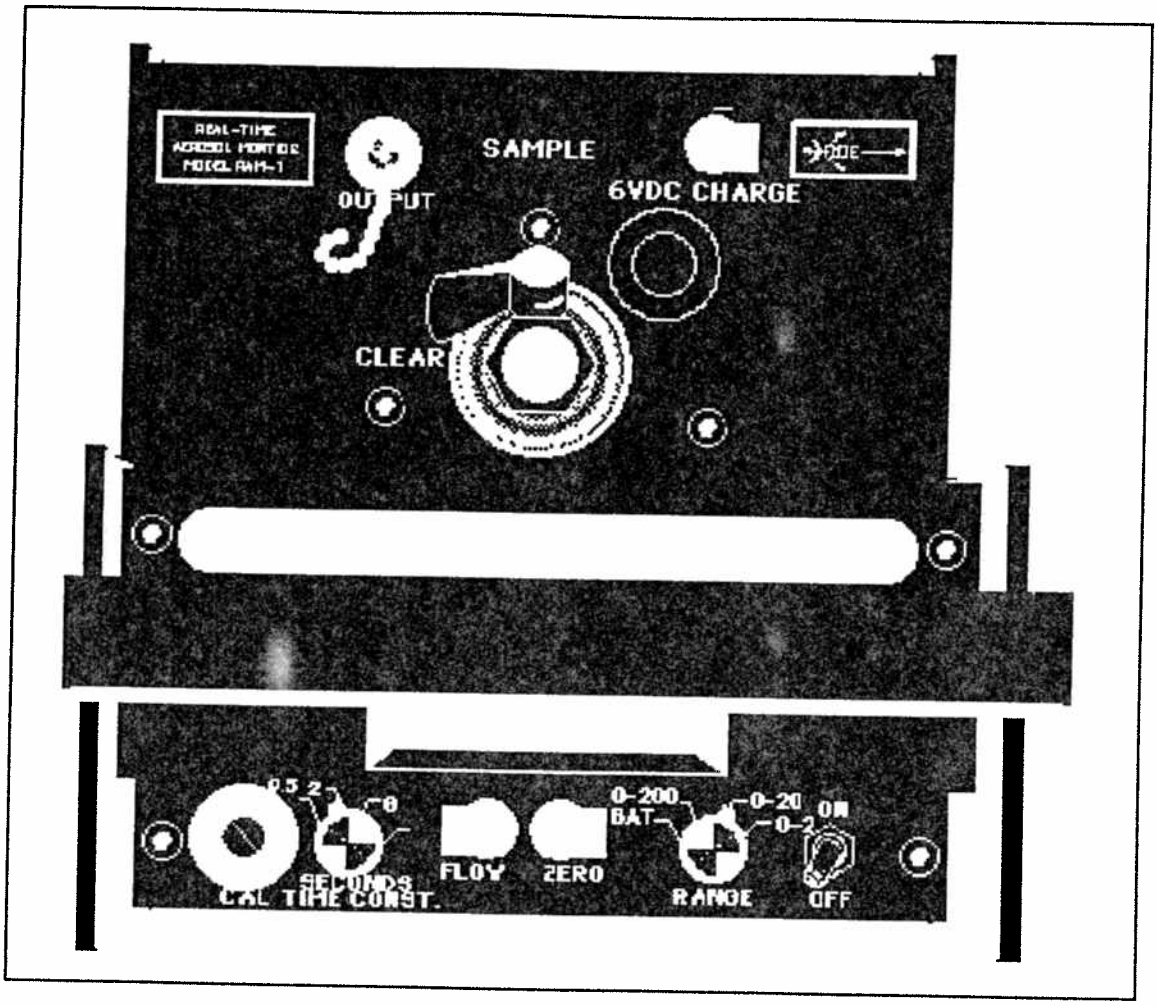


Figure 4. RAM -1 portable infrared aerosol monitor.

There will be a **monitoring controller** managing the burn monitoring operation and a **photographer (video and stills)** with the monitoring controller. The field personnel will consist of **three 2-person monitoring teams** deployed downwind from the burn site to operate PM-10 detection meters along the shoreline over which the smoke plume is expected to pass or over which it is passing.

All three teams will determine ambient PM-10 levels in the assigned areas before the burn begins. Ideally, this will be accomplished a minimum of one hour before the burn begins.

Team #1 will setup monitor #1 in a stationary configuration on the shoreline that could possibly be affected and as close to the expected initial downwind centerline as possible.

Team #2 will operate monitor #2 as a mobile unit on the shoreline in an arc that is as close to 45° each side of the smoke plume centerline as terrain will allow. Team #2 will take a minimum of two sets of readings evenly spaced over each arc defined by the 45° angle on

either side of the smoke plume centerline; each sampling set will consist of two to three 5-minute samplings.

Team #3 will establish monitor #3 as a stationary unit on the shoreline at a site of possible impact to human populations or in an environmentally sensitive area. Unless directed by the monitoring controller to the contrary, this team will be stationary throughout the sampling period for any particular burn.

All three teams will continue monitoring operations as long as the burn is in progress and the smoke plume is crossing over the shoreline or is reasonably expected to cross the shoreline.

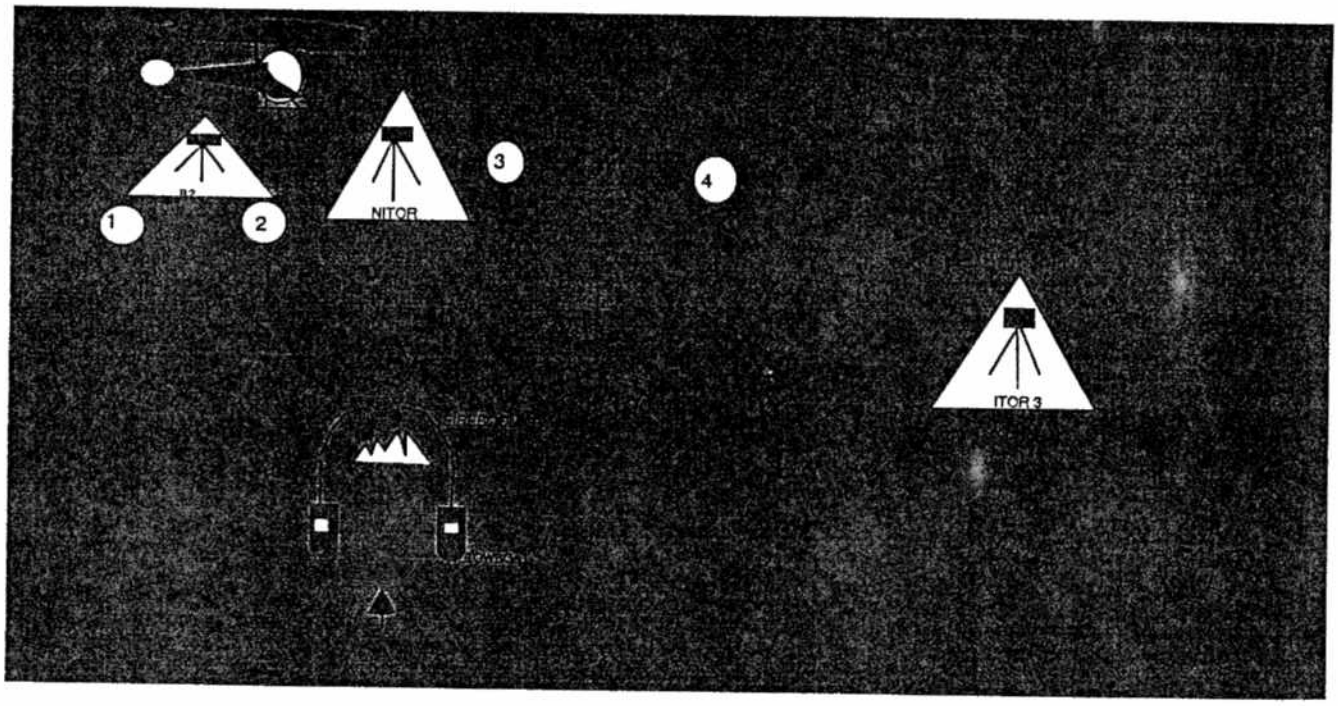


Figure 5. PM-10 monitors #1 and #3 are stationary; #2 is mobile. Monitor #1 is stationed on the shoreline directly on the expected downwind centerline of the smoke plume. Monitor #2 takes samples at two to three sites located 45° each side of the plume centerline (i.e., circled locations 1, 2, 3, and 4). Monitor #3 is stationed at a population center of concern or in an environmentally sensitive area of concern.

The monitoring teams will radio the results to the monitoring controller after collecting two or more consecutive 5-minute samples having PM-10 concentrations equal to or exceeding the established level of concern and determining that the resulting data are not from instrument error or inappropriate sampling techniques. The controller will advise the FOSC of the levels of PM-10 concentration sampled and the significance of the sampling results regarding the in-situ burn in progress.

Readings taken by the PM-10 meters are automatically logged into a data logger along with a date/time group. Positioning should be provided by a satellite navigation system (GPS) if one is available, and is to be coordinated with the PM-10 logging.