NATIONAL RESPONSE TEAM
Science & Technology Committee

GUIDANCE ON BURNING SPILLED OIL IN SITU
December 1995

BACKGROUND

On October 3, 1993, the Alaska Regional Response Team (RRT) requested a position paper from the National Response Team (NRT) on the recommended limits for short-term human exposure to particulates measuring less than 10 microns (PM-10) while spilled oil is burned in situ. To respond to this request, the NRT asked its Science and Technology Committee to obtain guidance from the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA). CDC and OSHA, working through the Science and Technology Committee, convened a workgroup of public health and oil-spill specialists to review existing data on the subject, discuss appropriate exposure levels, and identify any remaining gaps in the data on the public health implications of burning oil. The meeting took place on June 21 and 22, 1994, in Atlanta, Georgia. A draft report of recommendations from the meeting was forwarded to the Science and Technology Committee, which made minor revisions to the report based on agencies' comments and recent research results from experimental burns. This document was then forwarded to the NRT for concurrence and distribution.

These recommendations are designed to assist RRTs in developing contingency plans for burning spilled oil in situ. Discussion Items 1 through 3 refer to issues concerning the general population in the areas where the oil will be burned. Discussion Item 4 refers to issues relating to workers and emergency responders. Attached is a workgroup-reviewed background document on health and safety issues associated with burning spilled oil in situ. A list of research priorities is also attached, based upon discussions from the Atlanta workshop and subsequent discussions by the NRT S & T Committee.

[NOTE: At the time of publication of this document, EPA was under a court order to review and revise, if necessary, the PM-10 National Ambient Air Quality Standard by January 1997. EPA was considering a PM fine standard that would address particulates less than 2.5 microns in diameter. If EPA does revise or amend the PM-10 standard or if there is any other formally promulgated standard relevant to this issue, this guidance will be revised, and RRTs should re-evaluate their ISB contingency plans accordingly.]

DISCUSSION

Item 1. Acceptable Distance from the General Population for Burning Spilled Oil In Situ

The selection of an acceptable distance from population centers at which to burn spilled oil should be based primarily on the extent of the potential for human exposure to the smoke. Distances should be set so as to minimize the chance for excessive public exposure to particulates, even if the plume touches down. Therefore, if the wind is blowing away from population centers, the spilled oil may be burned close to these areas. If, however, the wind is likely to carry the smoke in the direction of a population center, more caution is needed. If there is no real-time air sampling for PM-10 during the

burn, a distance should be selected at which smoke plume trajectory modeling or actual burns in similar environmental and meteorological conditions have shown that the maximum concentration of particulates does not exceed the level of concern (which is discussed in Item 2). A margin of safety should be included for burns where no sampling or only limited sampling will be conducted. If real-time sampling for PM-10 is part of the monitoring procedure during the burn, then the process of selecting an acceptable distance is more flexible. In such a case, feedback from samplers will assist in determining whether exposure to the public is likely to be excessive and whether burning should be terminated.

Item 2. PM-10 Level of Concern for General Populations

Levels of concern for public health associated with burning spilled oil in situ should be assessed in the context of the effect of oil spills in general and the risk the spill poses to people and the environment. The impact of a temporary reduction in air quality from particulates due to burning should be weighed against the impact of an untreated spill on the environment. A large percentage (20%-50%) of the spilled oil will evaporate and cause a temporary reduction in air quality from volatile organic compounds. In other words, whether the oil is burned or allowed to evaporate, air quality will be compromised. The decision whether to burn, or to continue to burn, must be made in consideration of all of the risks and tradeoffs posed to human health and the environment by the spill and the available countermeasures. These issues should be discussed and resolved during the planning process.

The Environmental Protection Agency established a National Ambient Air Quality Standard for PM-10 of 150 μg/m3 averaged over 24 hours, a standard considered protective of public health. We recommend that burning spilled oil in situ should not increase PM-10 levels in ambient air above that standard. This means that spilled oil can be burned in situ if it does not increase PM-10 exposure of the general population beyond the national standard. It also means burning is not recommended if the air quality in the region already exceeds the 150 μg/m3 limit and burning the oil will add to PM-10 exposure of the general population. Burning is still feasible in such a region if PM-10 exposure of the general population is not increased. In cases where state or local standards are more stringent than national standards, differences should be resolved in the contingency planning process.

Because spilled oil will probably be burned for short durations, averaging the resulting concentrations over 24 hours may be inappropriate. Until data are available to justify raising the allowable concentration levels for short periods, there is no scientific justification for recommending a short-term concentration level other than 150 μg/m3. Pending the results of current and planned research and development of in situ burning and risk assessment, we recommend a conservative upper limit of 150 μg/m3 averaged over 1 hour while burning spilled oil in situ. This recommendation will be continually evaluated and may be modified as results of test and actual in situ burn data become available.

The 150 μg/m3 concentration level should not be considered a fine line between safe and unsafe; rather it is a general guideline. If it is exceeded substantially, human exposure to particulates may be elevated to a degree that justifies terminating the burn. If particulate levels are generally below the limit, with only minor transitory incursions to higher concentrations, there is no reason to believe that the population is unacceptably exposed above the accepted National Ambient Air Quality Standard from the burn. This assumption is strengthened by the fact that the spilled oil normally will not be burned continuously for 24 hours.

The same assumption applies to monitoring the air with real-time instruments while the oil is burning. These instruments give instantaneous data and can be set to average their readings for several seconds to several hours. If instruments average their readings over a 15 minute period, individual readings should not be used to determine whether the burn should continue (one reading may be elevated because of a transient smoke source nearby); rather readings should be used as a group to ascertain a trend. The recommendation to continue burning or to stop should be based on trends and not a single measurement.

Item 3. Appropriate Monitoring Strategies

It is important to make a distinction between monitoring and sampling. For documentation purposes, a burn can be monitored visually without using any instrument other than a camcorder or a camera. The burn should be monitored when the resulting smoke poses a risk to an adjacent population.

Sampling involves measuring the concentration of smoke constituents in the environment. Environmental sampling for PM-10 should be conducted in the immediate vicinity of the population that may be affected. We understand, however that the decision to sample and how to sample may depend on the resources available for conducting the sampling and local guidelines. The RRTs and any affected state should resolve these issues in the planning process and integrate the results of their deliberations into the contingency plans for burning spilled oil in situ. In some parts of the country, sampling will be required by local guidelines. In others, it will not. Sampling protocols should be developed and agreed upon during the planning process.

Item 4. Safety and Health Guidance for Responders

Workers involved with in situ oil burning operations have the same rights to a safe and healthful work environment as any other worker under the Occupational Safety and Health Act. Such workers include responders, contractors, government workers, and other related employees. Worker protection from hazards associated with in situ burning is the responsibility of their employer. Employers must be aware of OSHA's safety and health regulations (and any local or state regulations) applicable to burning spilled oil in situ. Employers must have safety programs, identify hazards, establish emergency procedures, provide proper personal protective equipment, and provide required training. They should also recommend some additional safety measures, such as the use of a helitorch or other ignition device, may also be needed. In the absence of specific requirements, the Occupational Safety and Health Act stipulates that employers have a "general duty" to provide a safe and healthful workplace to their employees.

If personnel from nearby ships are asked to assist with the burning (as was the case in the burning conducted after the Exxon Valdez spill) they must have received all the necessary safety and health training and must be current on any post-training requirements.

RECOMMENDATIONS

Airborne particulate concentrations are not the only issue to be considered in the decision whether to burn or continue burning. The risks posed by in situ burning must be considered among all the risks posed to human health and the environment by oil spills and the countermeasures available to the On-Scene Coordinator. These trade-offs should be discussed and resolved by the RRT in the planning process. This planning

process should include coordination with the appropriate EPA Regional office and State air pollution agency to identify all applicable regulations and requirements. It is also recommended that materials be prepared during the planning process to be available during a response. Should a burn be considered, these materials could be used to inform the public. Such materials can be provided as Public Service Announcements or through other similar media channels.

To minimize exposure of general populations to PM-10 from burning oil in situ, we recommend the following:

1. Select the acceptable distance from population centers for burning oil in situ on the basis of the potential for human exposure to the smoke.

2. Until better data are available, plan not to expose population centers to a conservative concentration level of 150 μg/m3 of PM-10 averaged over 1 hour .

3. Plan to terminate the burn if a change in wind direction or other weather conditions will cause the recommended exposure level to be exceeded.

4. Plan to measure particulate levels during the burn by environmental sampling in the immediate vicinity of any potentially affected population.

5. If no sampling is planned, select the allowable distance from the burn to downwind populations on the basis of data from smoke plume trajectory models or actual burns in a similar environment that show that the population's maximum exposure to PM-10 does not exceed the level of concern. Include a margin of safety for burns where no sampling or limited sampling will be conducted.

RESEARCH PRIORITIES

1. Develop accurate data on how far downwind PM-10 generated from an oil spill burn is measurable;

2. Develop/locate improved, less costly, and deployable monitoring equipment and technology for real time measurement of PM-10 during oil burns;

3. Test the validity of smoke plume trajectory models, which include features such as terrain, through field measurements;

4. Develop scientifically based information on the health effects of short-term exposure to PM-10 generated from oil spill burns;

5. Develop improved strategies for monitoring people's exposure and the concentration levels in the environment in order to assess public health risks;

6. Develop improved means of determining the health and safety consequences and trade-offs associated with in situ burning and alternative countermeasures; and

7. Develop a simplified smoke plume trajectory model for use in screening different burn scenarios during burn plan development.