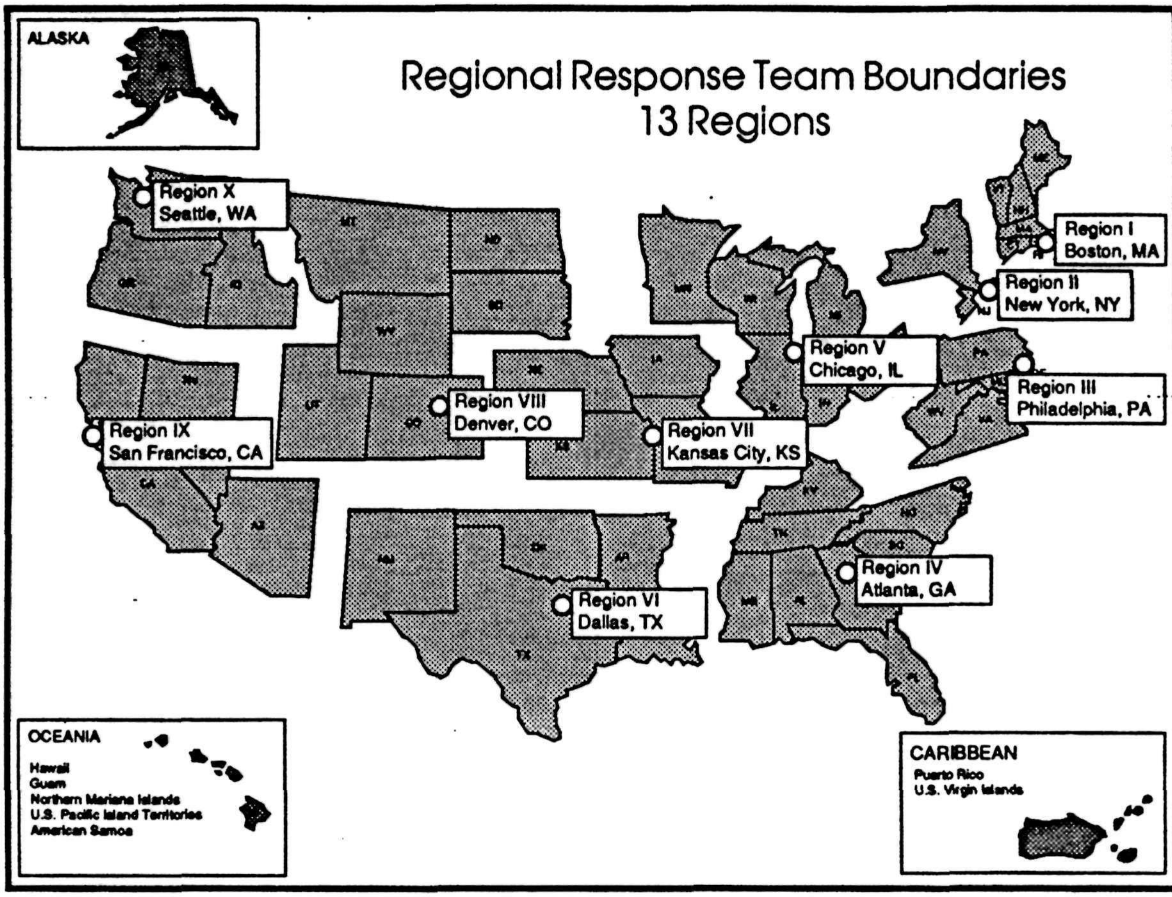
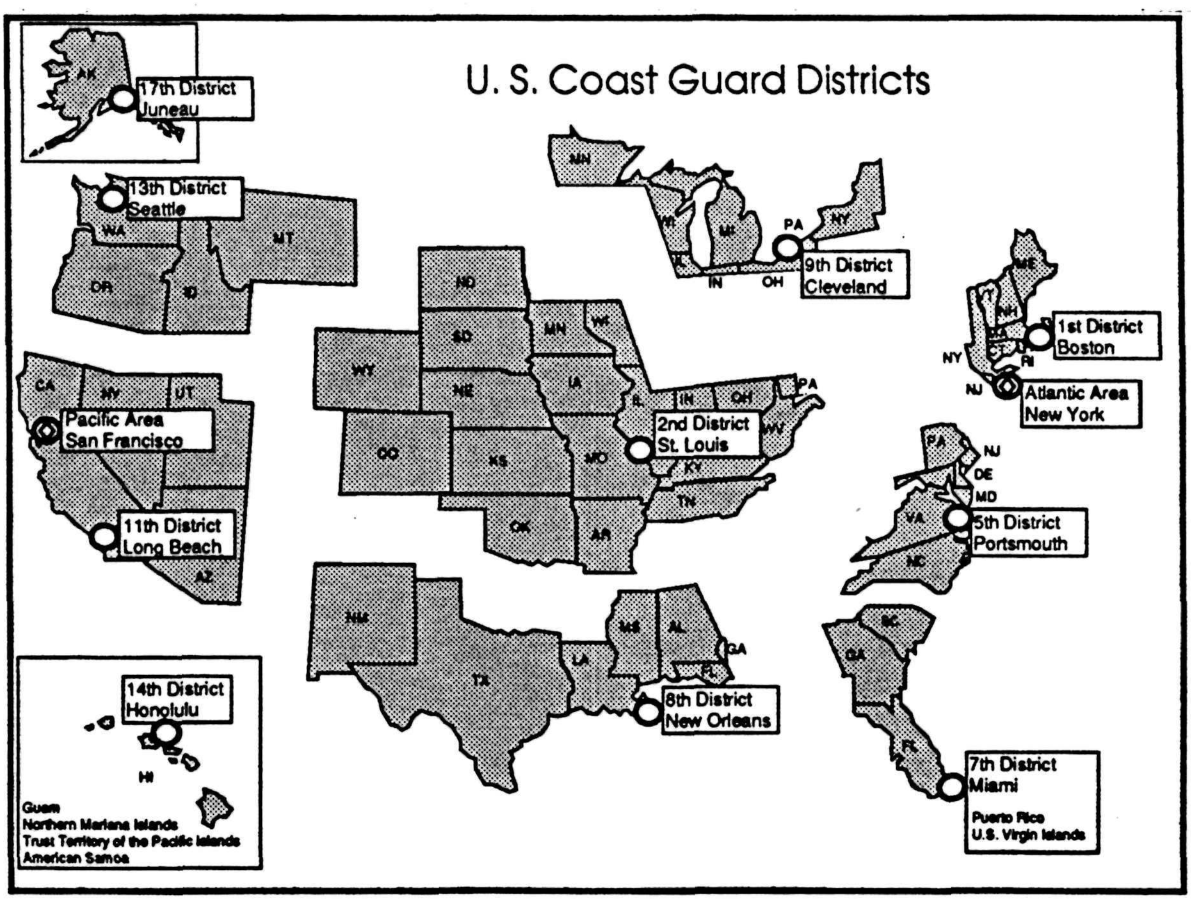
CONTINGENCY PLANNING

Park Plans
Decision Support System



Regional Response Team Boundaries
13 Regions
ALASKA
Region X
Seattle, WA
Region I
Boston, MA
Region II
New York, NY
Region V
Chicago, IL
Region III
Philadelphia, PA
Region VIII
Denver, CO
Region IX
San Francisco, CA
Region VII
Kansas City, KS
Region IV
Atlanta, GA
Region VI
Dallas, TX
OCEANIA
Hawaii
Guam
Northern Mariana Islands
U.S. Pacific Island Territories
American Samoa
CARIBBEAN
Puerto Rico
U.S. Virgin Islands



U. S. Coast Guard Districts
17th District
Juneau
13th District
Seattle
9th District
Cleveland
1st District
Boston
Atlantic Area
New York
Pacific Area
San Francisco
2nd District
St. Louis
11th District
Long Beach
5th District
Portsmouth
14th District
Honolulu
8th District
New Orleans
7th District
Miami
Puerto Rico
U.S. Virgin Islands
Guam
Northern Mariana Islands
Trust Territory of the Pacific Islands
American Samoa

"Federalizing" an Oil Spill

One of the sources of confusion throughout the early days of the Exxon Valdez spill response, certain aspects of the June weekend spills, and indeed many major spills, is widespread discussion of the adequacy of funding available to combat spill effects, using such terms as "to Federalize" or "Federalization" or even "partial Federalization".

The "Federalization" terminology has come to be used to describe situations in which an OSC decides whether to use Federal funding to pay cleanup contractors for a spill response effort, based on the adequacy of the performance of the spiller's response. The question of "Federalization" is associated in people's minds, however, not only with funding of the cleanup, but with the amount of control or command authority vested in the On-Scene Coordinator. Can the OSC be in control of the spill scene, bringing all possible efforts to bear on the response effort if he is relying on the spillers' activities and funding? Doesn't "Federalization" bring both more money and more control to bear on the response operation?

The questions are answered in the following paragraphs taken almost word for word from the current Coast Guard guidance to its OSCs:

> Normally, the removal of the oil spill is done by the responsible party, and the OSC must ensure that the operations are being conducted properly. "Proper" includes both the timeliness and the adequacy of removal operations that are necessary to control the spread of the discharge and to mitigate the environmental effects. When appropriate, the OSC shall guide the discharger on the preferred course of action. The OSC shall use his or her good judgement in determining the extent of monitoring required and the need for the presence of the Coast Guard, EPA, or other agencies on scene. The extent of monitoring required will largely depend on the known capabilities and the reliability of the discharger and/or the discharger's cleanup firm. The OSC will monitor or ensure that a capable representative from another Federal, State, or local government agency monitors, all responsible party cleanups.
>
> Under the Clean Water Act, whenever a responsible party--the spiller or polluter--is unknown or is not acting responsibly, or when the spiller's removal effort is insufficient, the OSC may assume partial or total control of response activities. In some instances, the OSC may determine that the spiller's response efforts should continue, but that some Federal assistance is necessary to augment the cleanup, such as providing some cleanup resources that the spiller cannot or will not provide. Whenever it is necessary for the Federal Government to expend funds in support of a cleanup operation for purposes other than monitoring, the OSC may declare a Federal spill for the area, activate the Pollution Fund established under the Clean Water Act to cover expenses and take whatever actions are necessary to ensure a proper oil spill cleanup.

For years, the National Response System has operated effectively on the principle that the industry spiller is the first line of defense, and further that the "polluter pays" principle can be an effective way to maximize use of scarce public funds and limited equipment supplies. The existing system provides for On-Scene Coordinators to have the control they need to be sure of maximum effect from available resources, and the tools to access additional resources. For Exxon Valdez, the resources were inadequate. For the June weekend, they were brought to bear effectively on three major spills occurring on the Gulf and East coasts within a two day time span.

A different question also causing confusion at the time of the Exxon Valdez incident was whether or not there should be "a Federal disaster declaration." Again, this question was usually raised in the context of the availability of Federal funding, and often also with thought of additional Federal controls that could expedite spill response actions.

The Federal Emergency Management Agency (FEMA) has the responsibility to advise the President on the need for declarations of disaster, considered at the request of a Governor. Disaster declarations are not limited to natural disasters such as Hurricane Hugo or the Loma Prieta earthquake, nor are disaster declarations precluded

"Federalizing" an Oil Spill (Cont'd)

for oil spills within the larger category of technological disasters. However, the primary focus of a disaster declaration is for aid in repairing or replacing infrastructure and social services impaired by an event beyond the ability of State governments to cope, coupled with a pre-designed emergency management structure.

There are well established criteria and procedures followed by FEMA in considering such a declaration. During the Exxon Valdez response, FEMA consulted with NRT members at length in formulating its recommendation that the benefits of such a declaration were not relevant to that incident, nor would the emergency management structure add anything to the on-scene management capability already provided by the Coast Guard operating with the backup provided for in the National Contingency Plan.

Hence, "Federalization," as used to describe the use of public money to pay for a cleanup, and "Federal disaster declarations," for providing relief and assistance to those harmed by a situation are separate issues, but both are potentially available during catastrophic oil spills.

What Does It Mean to "Federalize" a Spill?

Never before in the history of oil spill response has the federal government had as much authority over the cleanup of an oil spill as it has today. The USCG in particular is the federal arm responsible for ensuring an "effective and immediate removal of a discharge" into water (OPA 1990, Title IV, Subtitle B, Sec. 4201). This can be accomplished in a number of ways: the USCG can either conduct (and fund) the cleanup itself and request reimbursement from the spiller, direct others as to how to clean up the spill, or monitor the cleanup activities of others to make sure they remain on the right track.

The process essentially was straight-forward until the word "federalization" came into the picture. Since the Exxon Valdez spill, the phrase "to federalize a spill" has become as confusing as it is common. "Oh yes, the 'F' word," said Commander Richard Softye in New York. "We try to avoid the word as much as possible."

According to Captain William Holt of the Marine Environmental Response Department at Coast Guard headquarters, the word "federalization" was used internally as a shorthand version of "federal assumption of responsibility." "It meant that we [the USCG] took over the financing of the cleanup." During the chaos of the Exxon Valdez spill, however, "a lot of people were using the word" erroneously to refer to management instead of funding. It was during that spill that the term "slowly evolved into a confusion matter of who's in charge. It became a red flag."

The question of who is in charge brings up another problem. If a spill is "federalized" only when the USCG is footing the bill, the public might perceive the government's role in a spiller-funded response as too passive. "Monitoring is another one of those words that drives people crazy," said Holt. So what about "direct?" "In the Exxon Valdez spill, we were trying to play both ends against the middle. Exxon paid, but we directed. Fortunately, Exxon went along with that. But how far does that authority go? Telling someone how to spend his money [doesn't always go over very well]."

Almost everyone ***OSLR*** spoke with said they now refrain from describing a spill response as "federalized." Better, they said, to use words like "monitoring" or "directing" or "funding" and hope for as little confusion as possible. As one source commented, "There's enough ambiguity in this field already."

Training: OSC/RRT Exercises

There are a number of different types of drills and exercises that take place each year in the pollution response field. Some, like the Regional Response Team/On Scene Coordinators exercises, involve "table-top" planning and accident simulations. These exercises are conducted by personnel from the Coast Guard Marine Safety School in Yorktown, Virginia, six times per year. All actions within the drills are simulated. No people or equipment are moved. The goal of these simulations is to exercise the various contingency plans which would be used in a real spill. The Design Team, comprised of all levels of government and local agencies as well as industry and local response personnel, specifically design these accident scenarios to test the local response network.

A good example of this type of drill was held in Long Beach, California on August 2, 1989. Over 400 individuals from various agencies and organizations attended. The planning that went into organizing this exercise started a full six months prior to the drill. Close coordination between the Coast Guard, RRT Region IX, various government agencies, industry and members of the local emergency response system was necessary to ensure that the exercise ran smoothly. After completion of the simulation, a critique identified the level of success that was achieved, and identified any areas that might need further attention.

Some of the pollution response drills that are held each year involve the actual deployment of equipment and personnel. An excellent example of this type of drill was performed at Yorktown, Virginia. At 2:00 a.m. on October 26, 1989, a "no notice" drill was held. Except for a few key personnel, no advance notice of this drill was given. The response was outstanding. By the time the drill had ended that evening, over 100 people, 10 boats, 5,000 feet of boom, two skimmers, and one helicopter had been used to contain a "spill" of peat moss that was placed in the water to simulate an oil spill. A critique was held the following day to evaluate the drill. A large number of organizations were involved in this "cleanup." The Coast Guard, EPA, NOAA, RRT Region III, Navy, various state agencies and departments of Virginia, Amoco Oil Company, and local contractors all participated in the drill. In fact, not only did Amoco Oil Company participate, they originated the idea and paid all of the local contractor's fees. This is just one good example of how industry and the Federal, State, and local governments work together to combat oil spills.

Response Options to an Oil Spill

Only a few basic options exist for response to any oil spill. However, the ability to use these options may be limited by factors such as weather conditions. The major options include:

> Containing the spilled oil with barriers such as booms, which are floating barriers that are placed in the water. The oil is then recovered from the surface of the water with skimmers, which remove the oil directly from the surface of the water using suction or an oleophilic surface, and sorbent materials, which soak up the oil into a solid material that can be removed from the water.
>
> Using booms to divert floating surface oil from impacting ecologically sensitive areas or other high priority areas.
>
> Physical removal of oil from shorelines, beaches, etc. that have been impacted using water sprays or by removing oiled sand or other material.
>
> Dispersing the oil from the surface of the water to the subsurface using chemical dispersants.

Two other options are in-situ burning of oil and bioremediation of impacted shorelines. In-situ burning involves burning the oil on the surface of the water by placing a wicking material in the oil, lighting the oil, and allowing it to burn in place. Bioremediation involves using bacteria to decompose the oil either on the surface of the water or on oiled shorelines. The last two options are still in their infancy, have many limitations, and have not been extensively researched.

Regional Response Team
(NCP defined)

VERSUS

Area Committees
(OPA 1990 defined)

TABLE 1. Classification and properties of oil types with respect to their behavior during spills.

OIL TYPE	EXAMPLES	PHYSICAL/CHEMICAL PROPERTIES	TOXICOLOGICAL PROPERTIES
(1) Light, volatile oils	Distillate fuels such as gasoline, diesel, No. 2 fuel oil	- Spread rapidly - High evaporation and solubility rates - Tend to form unstable emulsions - Very toxic to biota when fresh - May penetrate substrate - Can be removed from surfaces by simple agitation and low pressure flushing	- Acute toxicity is related to the content and concentration of the aromatic fractions - Aromatic fractions are very toxic due to the presence primarily of napthalene compounds and, to a lesser extent, benzene compounds - Heavy molecular weight compounds are acutely less toxic, but may be chronically toxic since many are either known or potential carcinogens - Acute toxicity of individual aromatic fractions will vary among species due to differences in the rate of uptake and rate of release of these compounds - Mangroves and marsh plants may be chronically affected due to penetration and persistence of aromatic compounds in sediments
(2) Moderate to heavy oils	Medium to heavy paraffin-based refined oils and crude oils	- Moderate to high viscosity - Toxicity variable depending on light fraction composition - In tropical climates, rapid evaporation and solution form less toxic weathered residue with toxicity due more to smothering - Light fractions may contaminate interstitial water	- Acute and chronic toxicity in marine organisms is likely to result from: 1) Mechanical or physical coverage - oil completely smothering organisms often causing death 2) Chemical toxicity - results from the exposure of very toxic aromatic fractions of the oil to marine organisms 3) A combination of mechanical or physical coverage and chemical toxicity.

TABLE 1. (Continued)

OIL TYPE	EXAMPLES	PHYSICAL/CHEMICAL PROPERTIES	TOXICOLOGICAL PROPERTIES
		- Tend to form stable emulsions under high physical energy conditions - Variable penetration, a function of substrate grain size - High potential for sinking after weathering and uptake of sediment - Generally removable from water surface when fresh - Weather to tar balls and tarry residue	- Mechanical or physical smothering causes acute toxicity in many marine organisms and chronic toxicity in many marine plants (especially mangroves)
(3) Residual oils	Asphalt, Bunker C, No.6 fuel oil, waste oil	- Form tarry lumps at ambient temperatures - Non-spreading - Relatively non-toxic due to substrate - May soften and flow when stranded in sun - Cannot be recovered from water surface using most cleanup equipment - Easily removed manually from beaches	- Acute and chronic toxicity occurs more from smothering effects than from chemical toxicity, due to the small proportion of toxic aromatic fractions found in heavy, residual oils - Toxicity is more common in marine plants (especially mangroves) and sedentary organisms than in mobile organisms - Acute and chronic toxicity also results from thermal stress, due to the elevation of temperatures in oiled habitats

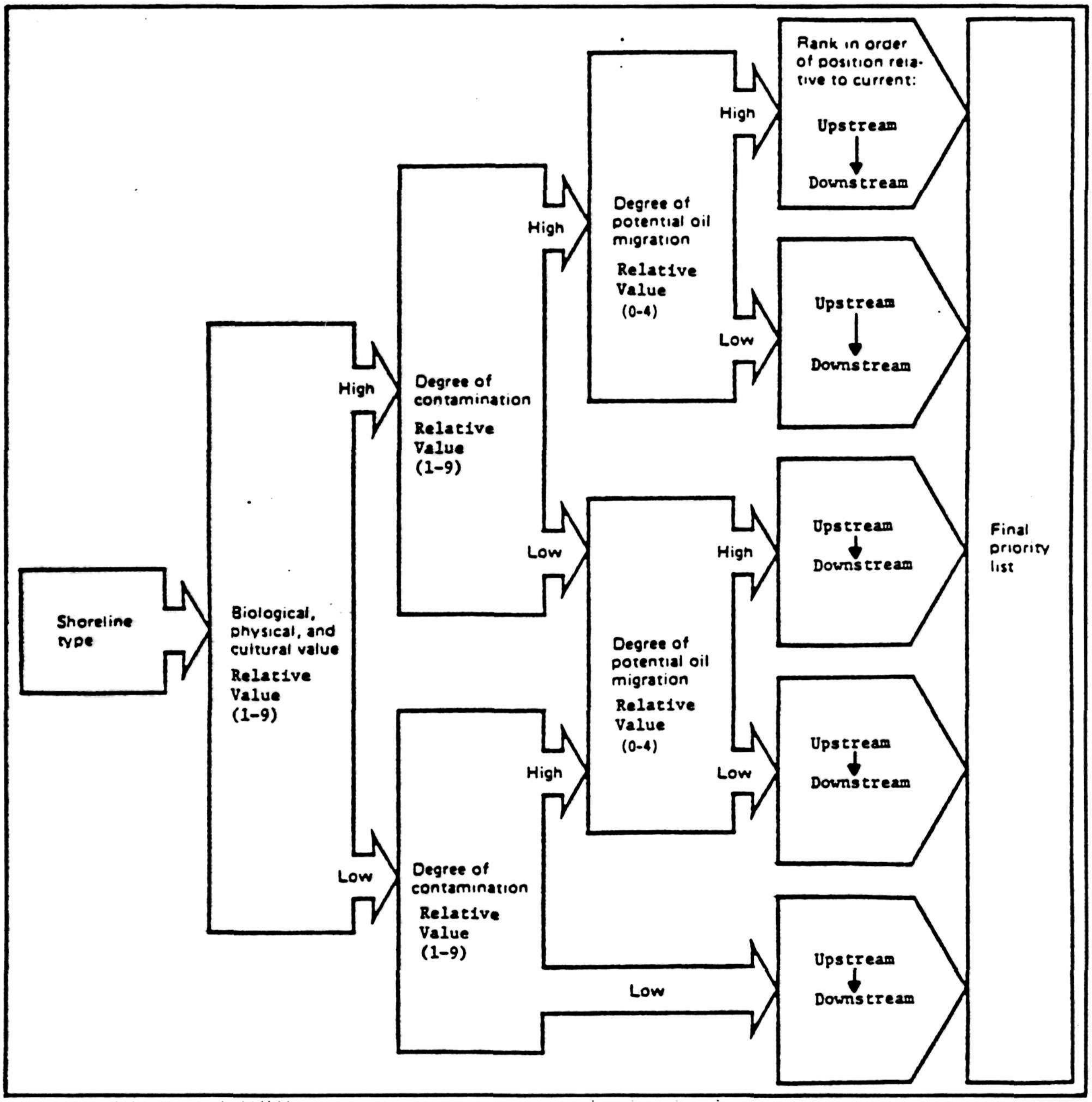


Figure 1. Decision guide for cleanup priorities (modified from Foget et al. 1979).

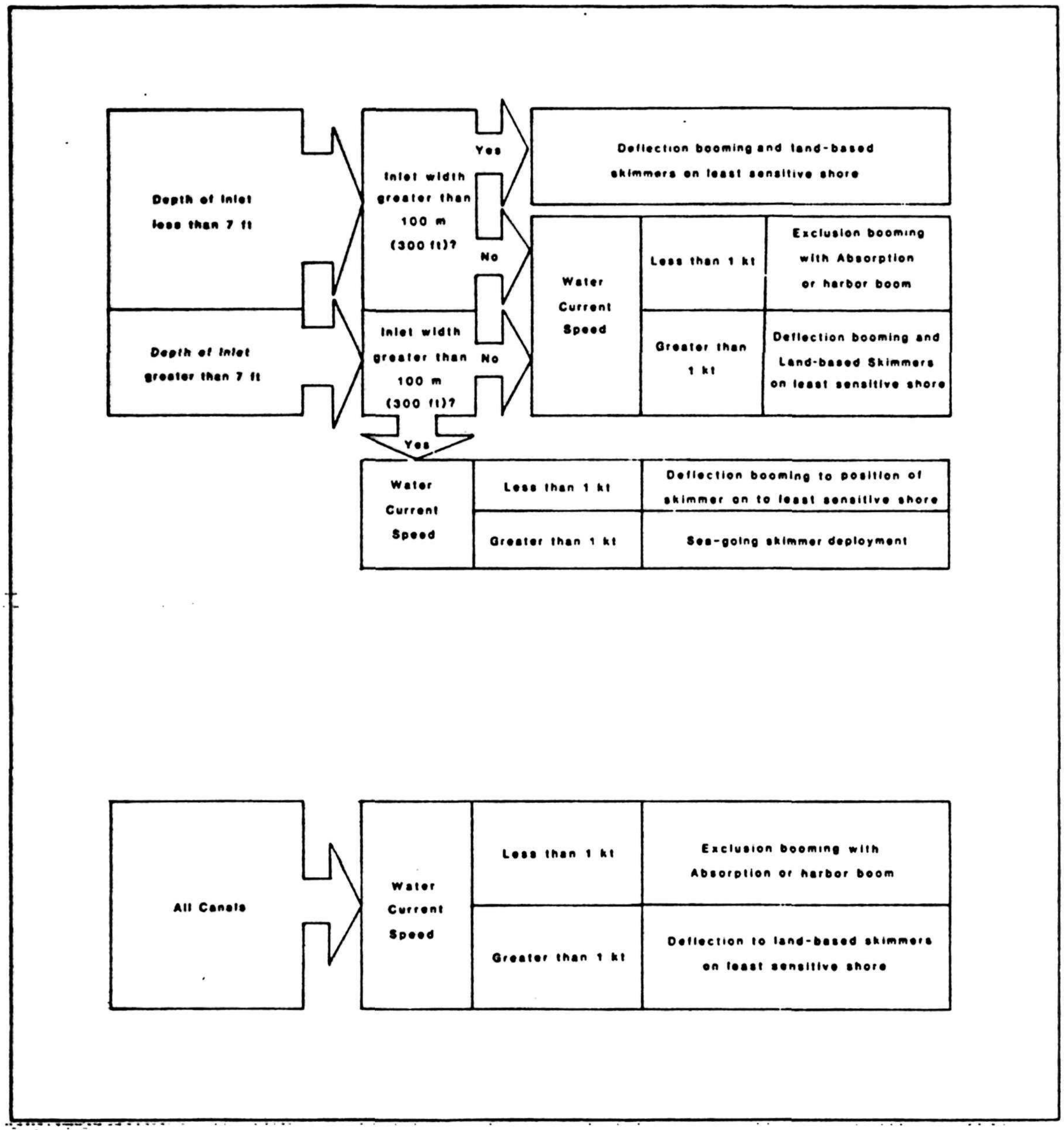


FIGURE 7. Decision key for using the atlas to determine protection techniques (adapted from Foget et al., 1979).

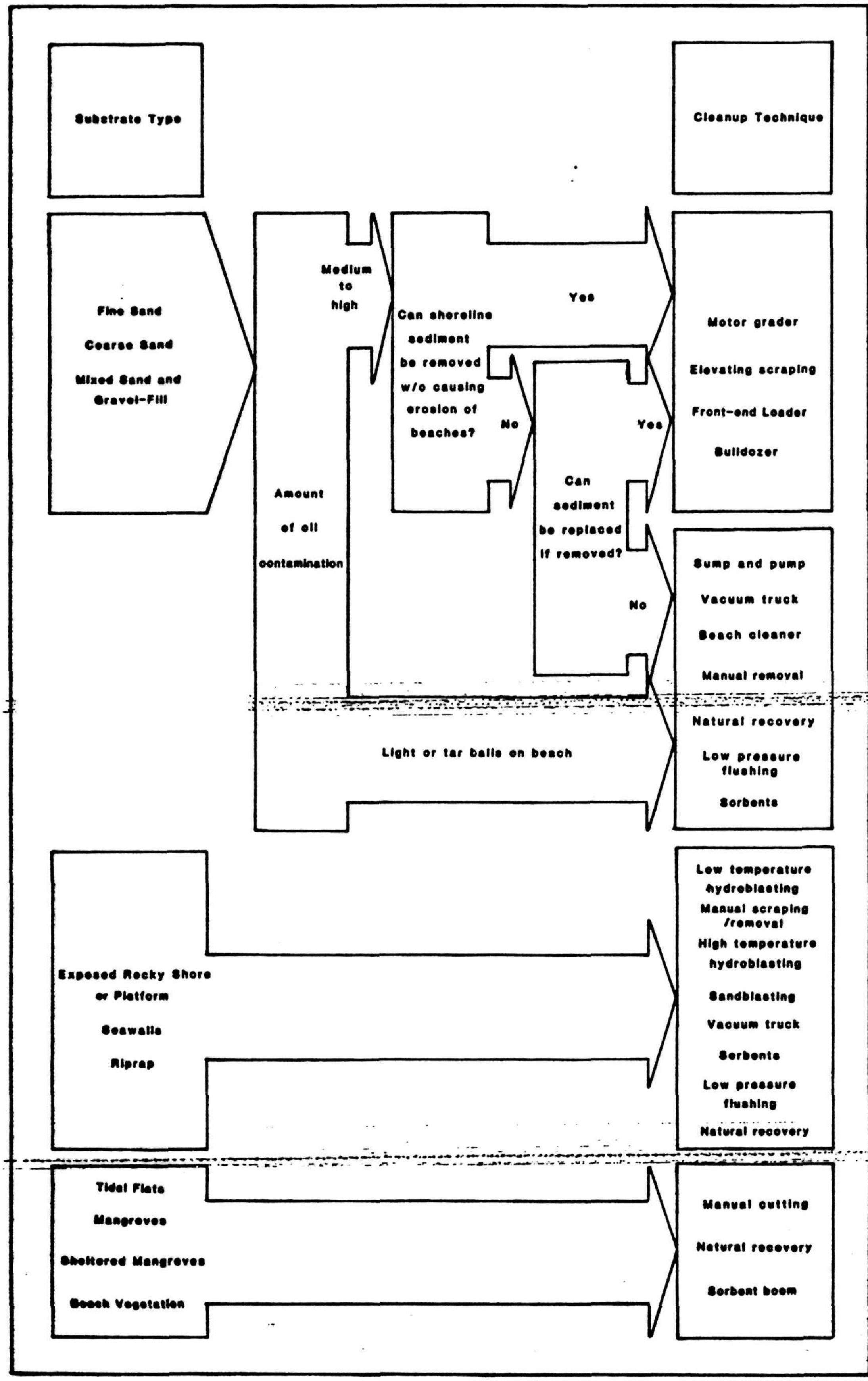


FIGURE 8. Recommended cleanup techniques as a function of substrate (adapted from Foget et al., 1979).

TABLE 4. Effects and conditions to be considered when selecting cleanup techniques for oiled shorelines in South Florida (modified from Foget et al., 1979).

CLEANUP TECHNIQUES	PHYSICAL EFFECTS	BIOLOGICAL EFFECTS	CONDITIONS
a) Motor grader windrows, elevating scraper pickup	Removes only upper 3 cm of beach.	Removes shallow burrowing polychaetes, bivalves, and amphipods. Recolonization likely to rapidly follow natural replenishment of the substrate.	ESI=3, 4 Where penetration <3 cm and area is open to traffic.
b) Elevating scraper pickup	Removes upper 3-10 cm of beach. Minor reduction of beach.	Removes shallow and deeper burrowing polychaetes, bivalves, and amphipods. Recolonization likely to follow natural replenishment of substrate.	ESI=3, 4 Where penetration <10 cm and area is open to traffic.
c) Motor grader windrows, front-end loader pickup	Removes only 3 cm of beach when properly done.	Removes shallow burrowing polychaetes, bivalves, and amphipods. Recolonization likely to rapidly follow natural replenishment of the substrate.	ESI=3, 4 Where penetration <3 cm and area is open to traffic. Slower than a and b.
d) Front-end loader pickup	Removes 10-25 cm of beach. Reduction of beach stability. Erosion and beach retreat.	Removes almost all shallow and deep burrowing organisms. Restabilization of the physical environment slow; repopulation by animals and plants is slow.	ESI=3, 4, 5 Where penetration <10 cm and accumulations are moderate and area is open to traffic. Preferred for moving gravel and sediment.
e) Bulldozer into piles; front-end loader pickup	Removes 15-50 cm of beach. Loss of beach stability. Severe erosion and beach retreat. Inundation of back shores.	Removes all organisms. Restabilization of substrate and repopulation by animals and plants is extremely slow.	ESI=3, 4, 5, 6 Where penetration is deep, oil accumulations are heavy and area will support only limited traffic.

continued....

TABLE 4. Effects and conditions to be considered when selecting cleanup techniques for oiled shorelines in South Florida (modified from Foget et al., 1979).

CLEANUP TECHNIQUES	PHYSICAL EFFECTS	BIOLOGICAL EFFECTS	CONDITIONS
f) Low temperature hydroblasting channeled into recovery area	Can disturb surface of substrate.	Removes some organisms and shells from the substrate, damage to remaining organisms variable. Oil not recovered can be toxic to organisms downslope of cleanup activities.	ESI=1, 2, 6, 8 Preferred to remove oil from rocky scarps, platforms, riprap, and seawalls with recovery equipment.
g) High temperature hydroblasting channeled into recovery area	Adds heat (100°C) to surface.	Removes organisms from substrate, but mortality due to the heat is more likely. Oil not recovered can be toxic to organisms downslope of cleanup activities.	ESI=1, 2, 6, 8 To remove sticky oil from rocky scarps, platforms, riprap, and seawalls, with recovery equipment. Needs freshwater supply. Generally not recommended.
h) Sandblasting	Adds material to the environment. Potential recontamination, erosion, and deeper penetration into substrate.	Removes all organisms and shells from the substrate. Oil not recovered can be toxic to organisms downslope of cleanup activities.	ESI=1, 8 Last resort to remove thin tarry oil residue from seawalls for aesthetic reasons. Generally not recommended.
i) Manual scraping with hand tools	Selective removal of materials. Labor-intensive activity can disturb sediments/organisms.	Removes some organisms from the substrate, crushes others. Oil not removed or recovered can be toxic to organisms repopulating rocky substrate or inhabiting sediment downslope of cleanup activities.	ESI=1, 8 To remove light oil residue from seawalls. Difficult on irregular surfaces common in South Florida. Needs foot access, scraping.

continued....

TABLE 4. Effects and conditions to be considered when selecting cleanup techniques for oiled shorelines in South Florida (modified from Foget et al., 1979).

CLEANUP TECHNIQUES	PHYSICAL EFFECTS	BIOLOGICAL EFFECTS	CONDITIONS
j) Manual removal of oiled materials	Removes 3 cm or less of beach. Selective. Sediment disturbance and erosion potential.	Removes and disturbs shallow burrowing organisms. Rapid recovery.	ESI=1-6 To remove scattered, oily debris on shores with no equipment access. Least environmental damage.
k) Sump and pump or vacuum truck	Needs natural pits or excavation of a sump 60-120 cm deep. Some oil will probably remain in beach sediments.	Removes organisms at sump location. Potentially toxic effects from oil left on the shoreline. Recovery depends on completeness of cleanup at the sump.	ESI=1-5, 8 To remove surface, fluid oil on firm substrate, in conjunction with diversion booms with land or boat access.
l) Low-pressure flushing channeled into recovery area	Does not disturb surface to any great extent. Potential for recontamination, if recovery is not complete.	Leaves most organisms intact. Oil not recovered can be toxic to organisms downslope of cleanup.	ESI=1-6 To remove scattered or light oil and oil debris on shores with no heavy equipment access. Least environmentally damaging techniques.
m) Beach cleaner pulled across beach	Disturbs upper 5 to 10 cm of beach.	Disturbs shallow burrowing organisms.	ESI=3, 4 To pick up hard patties or tar balls on large beaches open to traffic.

continued....

TABLE 4. Effects and conditions to be considered when selecting cleanup techniques for oiled shorelines in South Florida (modified from Foget et al., 1979).

CLEANUP TECHNIQUES	PHYSICAL EFFECTS	BIOLOGICAL EFFECTS	RECOMMENDED USE
n) Manual sorbent application	Selective removal of material. Labor-intensive activity can disturb sediments.	Foot traffic may crush organisms.	ESI=1-6, 8 To remove pooled or small amounts of floating, light nonsticky oil. Needs foot or boat access and disposal containers. Very expensive methods.
o) Manual cutting of vegetation	Disturbs sediments because of extensive use of labor; can cause erosion.	Removes and crushes some organisms. Rapid recovery. Heavy foot traffic can cause root damage and subsequent slow recovery.	ESI=1-8 To remove oiled vegetation excluding mangroves, subto scientific consultation.
p) Burning	Heavy air pollution; causes erosion; root systems are damaged.	Kills surface organisms caught in burn area. Residual matter may be somewhat toxic (heavy metals).	Not recommended in South Florida.
q) Push contaminated substrate into surf for natural recovery	Disruption of top layer of substrate; leaves some oil in intertidal area; high potential for recontamination.	Kills most of the organisms inhabiting the uncontaminated substrate. Recovery of organisms usually more rapid than with removing substrate. May damage nearshore seagrasses and corals.	ESI=5, 6 (limited use) To speed natural cleaning of gravel beaches in high wave energy conditions where sediment removal is not advisable. Generally not applicable to South Florida.

continued....

TABLE 4. Effects and conditions to be considered when selecting cleanup techniques for oiled shorelines in South Florida (modified from Foget et al., 1979).

CLEANUP TECHNIQUES	PHYSICAL EFFECTS	BIOLOGICAL EFFECTS	CONDITIONS
r) Break up pavement	Disruption of sediments. Leave oil on beach.	Disturbs shallow and deep-burrowing organisms.	ESI=5, 6 (limited use) Used in high wave energy areas where heavy oils and residues have created a pavement on coarse-grained beach sediments. Generally not applicable to South Florida.
s) Natural recovery	Some oil may remain on beach and could contaminate clean areas.	Potential toxicity effects and smothering by the oil. Potential incorporation of oil into the food web. Potential elimination of habitat if organisms will not settle on residual oil.	ESI=1-10 Used for light accumulation on low priority shores or areas with difficult accessibility. Recommended for sheltered tidal flats and most mangrove-dominated shorelines.
t) Sorbent boom nearshore to absorb oil as it is released	Some disruption of sediments during frequent changes of sorbent. Labor-intensive and expensive.	Foot and boat traffic may disrupt organisms.	ESI=9-10 Most useful in small, heavily oiled, sheltered areas to minimize recontamination as oil is naturally removed.

TABLE 5. The rate of cleanup (hours per acre) by technique in descending order from most to least time consuming. These rates are based on 100 foot hauling distance (from Foget et al., 1979).

RELATIVE RANK	CLEANUP TECHNIQUE	ROUGH ESTIMATE OF CLEANING RATE IN HOURS PER ACRE
1)	Steam cleaning	67.5
2)	Manual cutting	62.3
3)	Sandblasting	54.0
4)	High-pressure flushing (hydroblasting)	45.0
5)	Combination bulldozer/ front-end loader	10.0
6)	Front-end loader (rubber-tired), tracked	6.6
7)	Combination motor grader/ front-end loader (rubber-tired), tracked	2.4
8)	Push contaminated substrate into surf	2.0
9)	Combination motor grader/ elevating scraper	1.0
10)	Elevating scraper	1.0
11)	Breaking up pavement	0.6
12)	Beach cleaner	0.5

6
Technical Basis of Decision Making

This chapter considers the scientific and technical information reviewed in the previous chapters and uses that information to recommend what to do when an oil spill occurs.

FINDINGS FROM PREVIOUS CHAPTERS

The preceding chapters have shown the following:

- Recent chemical formulations can effectively disperse an oil that spreads on water if the oil viscosity is lower than approximately 2,000 cSt. Dispersion becomes progressively more difficult with increasing viscosity until, at viscosities higher than around 10,000 cSt, little oil is dispersed.
- For small, medium, and most large spills, dispersed oil concentrations in open waters tend to decrease rapidly owing to tidal currents and other transport processes.
- Very large spills, such as *Ixtoc I,* may introduce such a large, continuous flow of oil that normal, open-sea current cannot provide rapid dispersal. However, for most spills, unless water circulation is limited, organism exposure to dispersed oil is likely to be low compared with the exposures required to cause behavioral changes or mortalities.
- The principal benefit of oil spill control by chemical dispersion or mechanical recovery is the prevention of oil from stranding

on shore, entering sensitive shoreline habitats, or entering sensitive areas such as seabird colonies or sea otter locations. Serious adverse biological effects from untreated oil have been documented on seabirds (if present) at many spills, and by oil that concentrates on shores.

- Dispersants are most effective when applied early. Oil becomes progressively less dispersible with time as its viscosity increases by loss of volatile hydrocarbons and by formation of water-in-oil emulsions (for a number of oils). Thus, the decision to use dispersants should be made as rapidly as possible after a spill occurs, preferably within the first few hours.
- Spilled oils generally attain an average slick thickness of 0.1 mm or less in an hour or two, and this thickness appears to be relatively independent of spill size for those oils that spread on water. However, it should be noted that the distribution of oil on water is usually not uniform, and there may be some areas within the slick that are significantly thinner or thicker than 0.1 mm.
- As water temperature decreases, oil viscosities increase. Thus, oils that spread in tropical or temperate climates are less able to spread at arctic water temperatures. Lower temperatures may also cause additional oils to be solid or semisolid because the temperature is below their pour point. Some oils have pour points in excess of the highest likely ambient temperatures; little spreading occurs when they spill.
- The dispersant spray must hit the thicker part of the slick. Aerial or boat spraying usually requires direction by spotter aircraft.
- Dissolved hydrocarbons in the water column after dispersion of an oil slick are largely limited to areas close to the spill source, because most of the volatile and soluble hydrocarbons in the oil evaporate rapidly from the slick before dispersion. Hydrocarbons dissolved in the water also evaporate into the atmosphere and are diluted rapidly in the water column. These dissolved hydrocarbons (many of which are aromatic) appear to produce the most immediate biological toxicity.

TECHNICAL QUESTIONS

A number of technical questions must be answered when considering dispersant use as an oil spill countermeasure. These questions are discussed in this section.

Response Options

Whether a countermeasure is needed or whether the spill will be dissipated by natural forces before it can impact a sensitive resource must be determined. Natural dissipation can be expected if the seas are rough, the oil is thinly spread on the water surface, the spill is not threatening a shore or sensitive area, or the volume of oil spilled is small.

Alternative countermeasures, their availability, and determination of their ability to remove more or less oil than dispersants are further considerations. It should be noted that mechanical containment and recovery are generally ineffective if the oil layer is relatively thin (less than about 0.05 mm), or if the sea is moderately rough, typically sea state 4 or greater.

Environmental Considerations

The use of a chemical dispersant may not be appropriate on all portions of a spill. While laboratory and mesoscale tests have shown that the acute biological effect of dispersed oil is no worse than of untreated oil per unit of oil, there are species and habitats, such as benthic organisms and mollusks, that may suffer greater damage than that caused by untreated oil. However, several nearshore studies (Chapter 4) have shown that dispersal of oil offshore reduces its impact on intertidal and benthic communities.

The problem of anticipating environmental damage is tied to an assessment of natural populations and habitats that could be threatened by an oil spill. This environmental assessment should be done and the results incorporated into scenarios for areas of concern as a component of the prespill information base supporting the decision-making process. Since inaction in undertaking spill treatment may cause the greatest environmental harm, the environmental assessment data and information base should be sufficient, and operational scenarios that include this information should be understood and accepted as part of prespill planning. The desirable objective in the decision-making process is to be able to focus on operational details, such as the location of aircraft and boats relative to the spill, at the time of an accidental spill.

Other Factors That Affect Decision Making

Spill size is important because the area covered by the slick may be so great that it overwhelms mechanical response capabilities and possibly even dispersant spray capabilities. Thus, making logical decisions concerning oil spill control requires evaluation of the capabilities of available methods. For purposes of this discussion, an average slick thickness of 0.1 mm is used.

Method capabilities are limited also by operating conditions, which imply that operations should be carefully monitored during a spill. Monitoring, control, and evaluation usually can best be done from the air by spotter aircraft. Thus, operations, whether by skimmers, spray boats, or spray aircraft, are limited to daylight and adequate flying conditions. Night operations are seldom possible, except possibly for spray barges (and boats) and skimmers operating at the source of a continuous spill.

Skimmers with 100 percent efficiency encountering a 0.1-mm-thick slick at 1 kn, with sweep widths of 10 m (3.3 ft) and 100 m (33 ft), would collect, respectively, 116 bbl, and 1,160 bbl of oil in a 10-hr day. Thus, it would take all day for one skimmer with a 10-m sweep width to collect about 100 bbl of oil unless it can operate in areas where the oil thickness is greater than 0.1 mm. A large oceangoing skimmer system with a 100-m encounter width (heavy seaboom, three ships, and collection barge) might handle a 1,000-bbl spill in a day under ideal conditions. If the oil has a high viscosity, and has not been spread by wind and waves, skimmers may have greater collection potential. Skimming systems are also limited by wind, currents, and sea state. It should be noted that the percentage of oil recovered at accidental spills has been low, particularly with large spills.

Spray boats, moving through a slick at 6 kn with spray widths of 5 to 10 m (16 to 33 ft) and operating with 100 percent efficiency (although this is unlikely), might disperse, respectively, 350 to 700 bbl of oil over 10 hr. Although a spray boat can operate in sea states where skimming systems are ineffective, larger waves reduce its efficiency. The boat may have to decrease speed, and the outboard nozzles may dip into the water. Larger boats roll less and can carry large amounts of dispersant. Spray planes have the advantage of spraying dispersant rapidly, but may have the disadvantage of not carrying large amounts of dispersant. They also are capable of rapid response, and of response to more remote areas (perhaps the only response). Small planes and helicopters have limited range from a support base. A large plane flying at 140 kn with a spray swath width of 100 m could cover 28.5 km^2 in 1 hr. Thus, the capacity of the spray tanks, not the slick area, is the controlling factor. Ideally, a C-130 (Hercules) aircraft with ADDS, which has a 130-bbl tank that can spray 2,600 bbl of oil with a dispersant-oil ratio of 1:20 on each flight, could make six to eight flights per day depending on the distance from base to slick.

The above analysis for spray boats and aircraft has assumed 100 percent dispersion of the slick. Generally, that is not the case. Higher dispersant application rates might be required, and correspondingly larger spray capabilities required for oils that are not so readily dispersible. Because water-in-oil emulsion formation hinders or prevents effective chemical dispersion, to be effective, oil slicks should be sprayed before the oil incorporates water. In practice if control of the entire slick is not possible, spraying should be directed to the slick closest to shore or a sensitive resource.

Weather Conditions

In general, oil is dispersed more readily when the sea is rough than when it is calm. Mackay (1986) suggests that chemical dispersion may be less effective at wind speeds under about 7 m/sec, although this is not a precise threshold nor is its value firmly established. This does not mean that dispersants should not be applied, but they are likely to be less effective. Conversely, if the seas are very rough (sea state 5 or higher), treatment may not be necessary because wind and wave action might be adequate to remove the spilled oil from the water surface quickly and application may not be practical under rough conditions. However, two other factors should be considered in rough seas:

1. The spill will move relatively quickly (rapid advection) at high wind speeds, so time available for response may be less.
2. Some of the naturally dispersed oil may resurface as the weather moderates and the seas subside.

ADVANCE PLANNING

Although some of the information needed for decision making will only be available at the time of the spill, much can be obtained well in advance and incorporated into an advance plan for oil spill control. The following information would be desirable for dispersant use, but much of it applies to other control methods as well:

- potential sources of crude oils and products that may be spilled—type of oils produced in or transported through the area of interest, volumes involved, routes traveled (tankers and pipelines), and locations of oil production platforms;
- environmentally sensitive resources that might be impacted by spilled oil—relative sensitivities, local priorities for protection, and relative importance, that is, to the resource management agencies;
- available dispersants and storage locations—dispersant properties and performance with oils of concern, and appropriate application rates;
- available equipment—type and location, with proper calibration for dispersants to be used, and availability of adequately trained operators; and
- monitoring—available means to monitor dispersant application and their effectiveness, other appropriate measurements or observations, needed instruments, and trained operators.

Additional site-specific data are also needed, such as spill location, volume and type of oil, and local meteorological and hydrographic information. Finally, one more component is needed in order to prepare for dispersant use: a well-conceived system for making the dispersant-use decision, and acceptance of this system by the regulatory agencies that are involved.

DECISION SCHEMES

The use of the technical information discussed above may be illustrated by decision-making diagrams, accompanied by extensive footnotes and text. Examples are shown in Figures 6-1 to 6-4. They are similar in some ways, but each was developed for a different purpose and each emphasizes different aspects of spill response. (It should be noted that these decision diagrams are used for illustrative purposes and do not by themselves comprise complete decision-making tools.)

The decision-making diagrams shown have been selected from those that are in use primarily in the United States. However, they are similar to diagrams that have been published elsewhere, e.g., by the International Maritime Organization (1982) and the International Petroleum Industry Environmental Conservation Association (1980).

These diagrams have been proposed for use by spill response coordinators at the time of a spill, but it appears likely that such use

will only be effective if the spill response coordinator has experience with their use, for example, through training sessions in advance of a spill. This is because dispersant-use decisions should be made promptly; any delays can result in serious loss of dispersant effectiveness. Thus, those who provide and assemble the background data should be trained in its use, and regulatory decision makers should also be trained so that they will understand the decisions made and the need for speedy action. Ideally, the decision to use dispersants should be made prior to a spill.

U.S. EPA Oil Spill Response Decision Tree

The U.S. EPA procedure, programmed for use on personal computers, is one of the more detailed and complete decision-making procedures available (Flaherty et al., 1987). At each node in the decision diagram the user may request an explanation of the factors involved in each option. Help menus include information on mechanical containment and recovery, observation techniques and needs, and conditions that would lead to a decision to let natural processes clean up the spill. Consideration is given to the effectiveness of different countermeasures, weather conditions, spill site, oil type, and other factors.

Although it is not shown in Figure 6-1, the text of the program explains that simultaneous use of more than one countermeasure may be appropriate. Little or no guidance is given on evaluating the environmental trade-offs that usually must be made between untreated versus dispersed oil.

The most time-consuming component of a dispersant-use decision is the question of environmental damage: Will dispersant use result in more or less damage than nonuse? This question should preferably be addressed prior to any spill, when decisions should be made about the locations and the conditions under which dispersant use should be considered or when their use would be inappropriate.

API Decision Diagram

The API decision diagram is one of the less complex. It is based on the concept that spraying the oil slick will have little or no adverse biological effects based on a comparison of field hydrocarbon exposures with laboratory bioassays and behavioral studies. It also brings in spill size as it relates to the spill control capabilities of skimmers, spray boats, and spray aircraft.

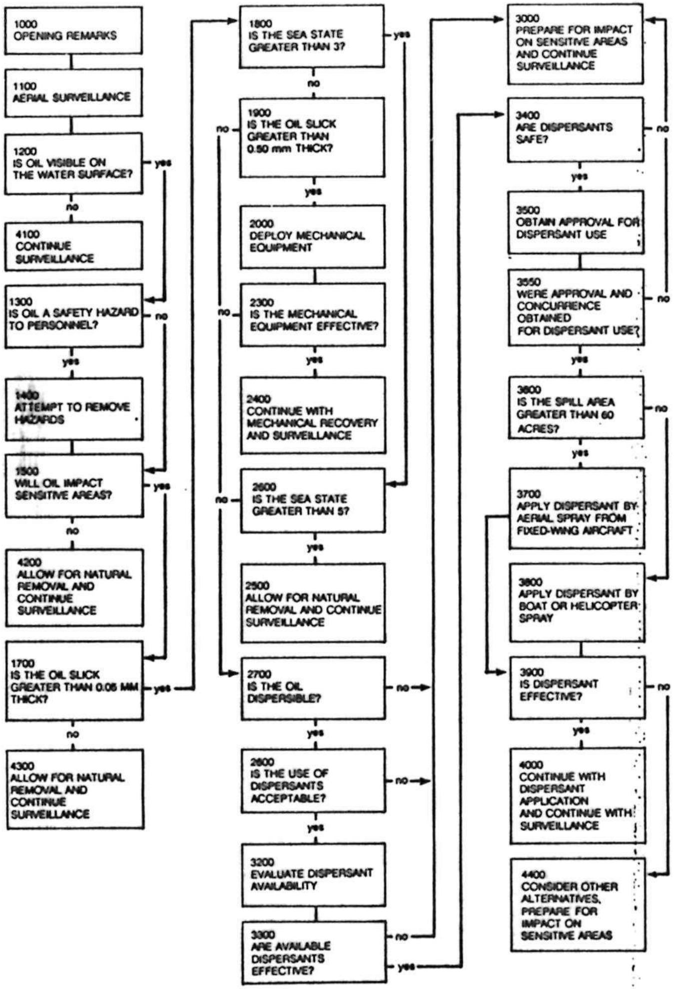


FIGURE 6-1 U.S. Environmental Protection Agency Oil Spill Response Decision Tree. Source: Flaherty et al., 1987.

Figure 6-2 is an oil spill control diagram that outlines the realistically available options. If the estimated spill volume is less than 1,000 bbl, a choice can be made between mechanical recovery and dispersant spraying. This choice depends on availability of mechanical equipment and suitability of winds, waves, currents, and response time; or availability of spray planes and dispersibility of the oil (Figure 6-2, lower left). If neither option is available, the shoreline or sensitive habitats can be cleaned using appropriate methods, such as those suggested by API (1985), or the oil can be left to weather naturally.

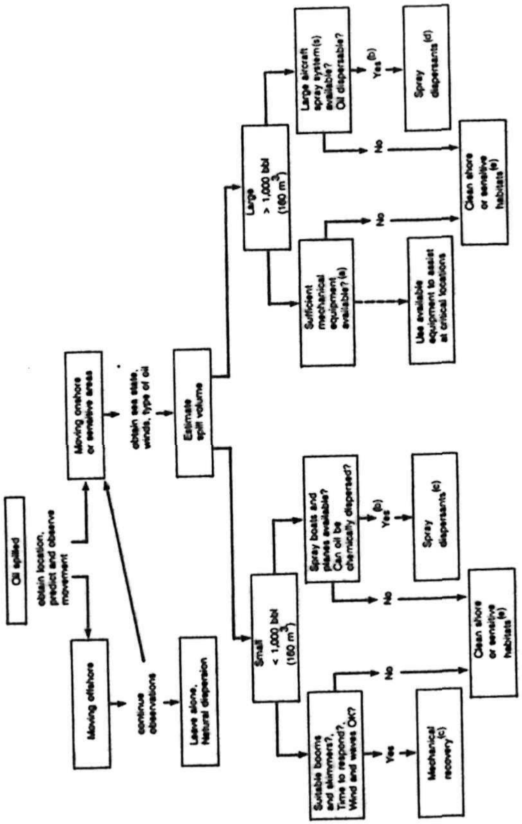
Spills much over 1,000 bbl per day have little possibility of being controlled by mechanical means unless conditions are ideal (waves less than 1.3 m and surface currents less than 1 kn) and a large amount of equipment is available. Dispersant application by large aircraft spraying systems would appear to be the only serious control possibility for large oil spills (Figure 6-2, lower right). Because it is unlikely that there will be sufficient mechanical equipment available to control larger oil spills, equipment that is available should be used to collect or divert spilled oil as it approaches critical locations.

Mechanical equipment can be used effectively on spills of oils that have pour points above the ambient temperature, are highly viscous, do not spread, or have formed a viscous mousse. If the oils have not spread, mechanical recovery devices have less area to cover.

Health hazards must be considered. Mechanical cleanup and spray boat personnel must be protected from volatile hydrocarbons when operating in an oil slick downwind near, for example, a well blowout. Special precautions must be taken if the oil and associated gas contain hydrogen sulfide (H_2S). Operations also must be outside the zone in which gas and air forms an explosive mixture.

SLR Dispersant Decision-Making Workbook

The objective of this decision-making method is solely to indicate whether or not dispersant use is environmentally appropriate. The S. L. Ross (SLR) workbook (Figure 6-3) gives methods for characterizing, on a numerical basis, the environmental impacts on populations that may be at risk from either dispersed or untreated oil (Trudel and Ross, 1987). Using these computed values, methodical and objective decisions can be made regarding the advisability of dispersant use or nonuse from an environmental perspective. Other



(a) It is unlikely that sufficient mechanical equipment will be available to clean up a large spill.
(b) With the approval of the federal on-scene coordinator and the concurrence of the EPA and the state(s).
(c) Small spills normally should be completely controlled, particularly if both mechanical and chemical methods are used. However, under some conditions some oil may need to be removed from the shore.
(d) Large spills, particulary 10,000 to 30,000 bbls per day, will be difficult to control. Only large aircraft spray systems are suitable and some oil may still strand. However, oil that is kept off the shore will lessen adverse effects.
(e) Appropriate methods should be used to clean shorelines and sensitive habitats. See, for example, API (1985).

FIGURE 6-2 API dispersant-use decision diagram. Source: API Task Force, 1986.

aspects of spill response (i.e., mechanical recovery and natural removal) are deliberately not considered, because they are considered to be separate parts of the oil spill countermeasures problem. No guidance is given on dispersant application rates, effects of weather conditions, spill size, or oil condition.

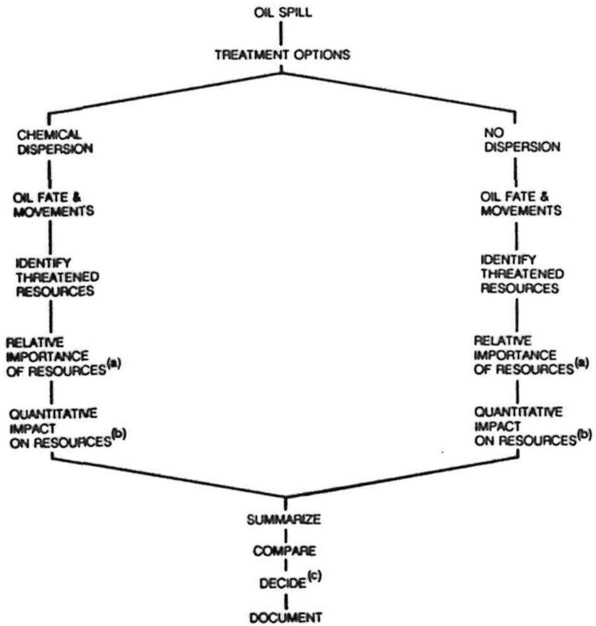
State of Alaska Dispersant-Use Guidelines

The State of Alaska's guidelines are illustrated in Figure 6-4. The user must assemble a significant amount of information prior to making a dispersant-use decision, including a comparison of the effects of dispersed oil and untreated oil on populations at risk (Regional Response Team Working Group, 1986). However, this system gives no guidance as to how to make the comparison and appears to assume a fairly high level of expertise by the user. Accompanying the decision tree are maps and text showing zones in which dispersants

- may be used with approval by the federal on-scene coordinator (OSC);
- may be used only with concurrence of the EPA and the state plus consultation with the Regional Response Team; or
- may not be used.

Federal Region IX (California) has dispersant-use guidelines that are similar in many ways to those of the State of Alaska, except that maps have not been prepared in California showing areas where the OSC may approve dispersant use unilaterally. It may be noted that the Region IX guidelines have been used on two occasions to reach decisions favorable to dispersant use—in 1984 at the Puerto Rican spill (Zawadzki et al., 1987) and at the 1987 *M/V PacBaroness* spill (Oil Spill Intelligence Report, 1987b,c). However, it should also be noted that on both occasions it took more than 24 hr to come to this decision (Onstad, private communication).

The objective of this method is solely to indicate, from a regulatory perspective, whether dispersant use is or is not appropriate to consider. Note that the OSC must notify the U.S. EPA and the State of Alaska as soon as possible if he or she authorizes dispersant use. The zones are defined by bathymetry and currents, biological parameters, nearshore human activities, and time required to respond. The zones were defined by a subcommittee of the Alaska Regional Response Team. The zones were not evaluated by procedures such as those in the SLR workbook. In the event that dispersant use may



(a) Relative importance of sensitive resources is determined by the affected regulatory agencies in terms of "High," "Medium," and Low"; the determination is based on local priorities.
(b) Quantitative impact on resources is calculated using environmentally based algorithms; these algorithms yield a quantitative estimate of the degree of impact on each resource in terms of "Major," "Moderate," "Slight," or "Negligible."
(c) The dispersant use decision is based on a comparison of the impacts on affected resources by the spilled oil if chemically dispersed versus the impacts (usually on a different set of affected resources) by the untreated oil.

FIGURE 6-3 SLR decision-making method. Source: Trudel et al., 1983.

be authorized, no guidance is given as to application rates or effects of conditions such as weather, spill size, and oil condition.

Comparison of Decision-Making Diagrams

The four decision-making diagrams shown in Figures 6-1 through 6-4 are compared in Table 6-1. From the comparison, it appears that

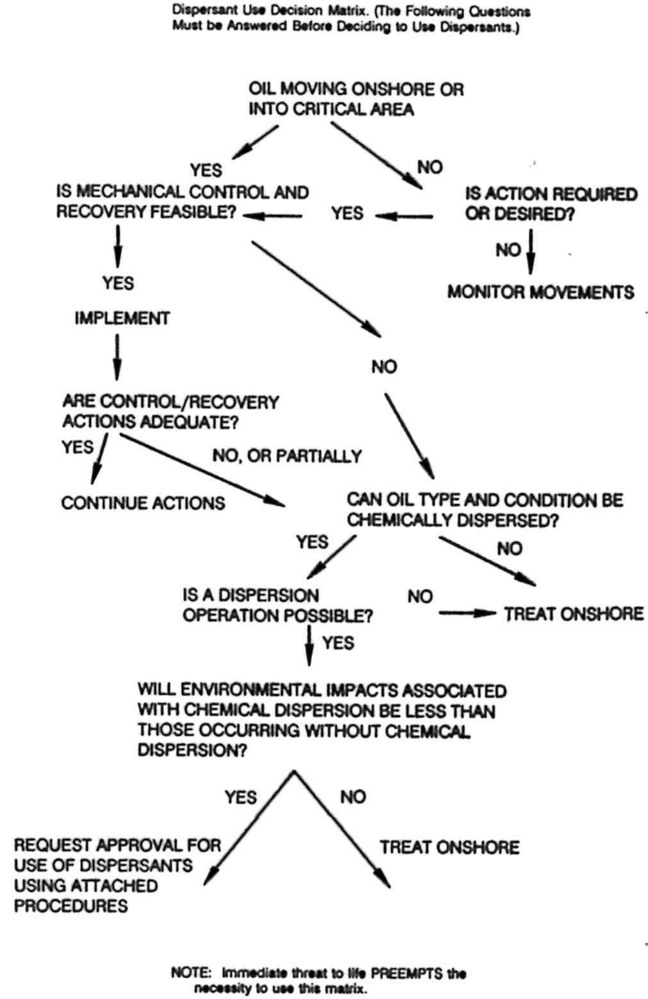


FIGURE 6-4 State of Alaska dispersant use decision matrix. Source: Regional Response Team Working Group, 1986.

TABLE 6-1 Comparison of Decision-Making Diagrams

Factor	EPA, Figure 6-1	API, Figure 6-2	SLR, Figure 6-3	Alaska, Figure 6-4
Surveillance	1	2		2
Personnel hazards	1			
Danger to sensitive areas	1	1	1	1
Is natural removal appropriate?	1	2		2
Is oil thick enough to be a concern?	1		2	1
Spill size	2	1	1	1
Is mechanical recovery feasible?	1	2		1
Is mechanical recovery effective?	1	2		1
Is the oil dispersible?	1	1		1
Are dispersant resources available and effective?	1	1		2
Need to obtain approval	1	2		1
Are environmental impacts of dispersed oil less than those of untreated oil?	1		1	1
Is dispersant use effective?		1	2	2
Application rates	1			

KEY: 1 = Primary consideration or guidance is given; 2 = Included only indirectly or by inference.

the U.S. EPA Oil Spill Response Decision Tree (Figure 6-1) is more complete and detailed than the others. It was developed as an overall tool to guide response to an oil spill. As reported by Flaherty et al. (1987), a user can reach a decision within a few minutes, providing the data are available. The speed of use of this process results in part from its having been programmed for a personal computer, which makes it particularly suited for training purposes.

The API decision diagram (Figure 6-2) emphasizes the need for dispersant use as the only really feasible means of responding to spills that exceed the capabilities of available booms and skimmers. In many cases mechanical cleanup capabilities may be only on the order of 1,000 bbl per day. Figure 6-2 points out the serious limitations to mechanical containment and recovery for extremely large spills (over 1,000 bbl per day). The concepts embodied in the API

decision diagram could be effectively incorporated into the EPA computer program, which would be especially useful for training response personnel.

The SLR decision-making method (Figure 6-3) addresses almost exclusively the question of biological trade-offs. It is relatively unique in its approach to comparing the environmental (biological) effects of dispersed oil with the those of untreated oil. This methodology appears to be needed in order to make the judgments called for both in the U.S. EPA computerized Oil Spill Response Decision Tree and the Alaska decision matrix, which is designed as a means of regulating and controlling dispersant use.

In-Situ Burning

Most of the research and practical applications with *in-situ* burning have been done in the Canadian Arctic, where it has been "proven to be the most effective method of cleanup," accor ing to Ian Buist, researcher at S.L. Ross Environmental Ltd., Ottawa, Ontario, Canada. Buist s that, although more research is needed to better develop the technique for temperate spill situa- tions, *in-situ* burning does offer a "tremendous opportunity to do something really quickly, whi the oil is thick and fresh — before it emulsifies." Alan A. Allen of Spiltec, in Anchorage, Alas USA, a renowned expert on combustion, reported that he "continuously gets efficiencies of 95 98%" when using *in-situ* burning as an oil spill cleanup technique.

Though shown to be a highly effective, efficient method of oil spill cleanup, fears about safety, health effects, and air pollution from smoke emissions have prevented most countries from eve attempting *in-situ* burning as an option for cleaning up an oil slick. Abdul Rahman A. Al-Sulta undersecretary of the Ministry of Oil in Kuwait, said that no *in-situ* burning is allowed in Kuw Likewise, according to a study by the US Congress' Office of Technology Assessment (1990), European countries currently allow *in-situ* burning as a response option.

Some countries cautiously mention *in-situ* burning as a last response option that can only be u dertaken after special permission is granted by health authorities. A. Moldan of the Departme of Environment Affairs in South Africa said that in his country the on-scene coordinator must sult with health authorities before combustion can proceed. Captain Alex Gibb of New Zealan Maritime Transport said that *in-situ* burning in New Zealand could only be employed "after co sultation with environmental experts in several departments."

Emissions from *In-situ* Combustion

The most commonly cited reason for avoiding the use of *in-situ* burning as a response option i the pollution that the ensuing smoke will cause. Concerns about pollution and health effects n not be particularly well founded. The US Office of Technology Assessment pointed out that " visible air pollution from an *in-situ* burn must be balanced against the invisible air pollution caused by allowing evaporation of toxic volatile components of the oil" (US Congress/OTA 199

David Evans of the National Institute of Standards and Technology, in Gaithersburg, Marylanc USA, has been studying emissions from oil combustion for several years. His research has sh that "the emissions from burning one gallon of crude oil is like burning three logs in a fireplac woodstove, in terms of the amount of polycyclic aromatic hydrocarbons emitted." Polycyclic aromatic hydrocarbon compounds are of most concern to air quality specialists. Evans explair that about 10% by weight of the original oil turns to these compounds in the form of "soot," with about 75% turning to carbon dioxide (CO_2), a small percentage of carbon monoxide (CO), and the rest to water. "The major product of any combustion — from an oil furnace, power plant, or automobile — is always carbon dioxide," said Evans. "The length of an *in-situ* burn is so localized and so short, that it is insignificant in terms of any global problem," adds Allen. "People have to consider whether they want the smoke in the air for a short time or the oil on the beach."

In the summer of 1990, Evans will be working with the US Minerals Management Service, the American Petroleum Institute, and Environment Canada, to conduct further burn emissions studies on smaller 50-foot diameter burns with the US Coast Guard in Mobile, Alabama, USA, in preparation for a large-scale off-shore burn test slated for 1991. "We'll try to measure away all speculation about burn emissions," Evans said.

Vessel Destruction

Buist feels that masters, owners, and insurers are particularly concerned about burning, especially if it destroys the vessel. "They're trained that fire and tankers do not mix under any circumstances," he said. According to Buist, the cost of cleanup should be weighed against the cost of destroying the tanker. "Many times the cost of destroying the vessel in a burn would be so small compared to the cost of the cleanup," Allen said. But he cautioned that if the burning would destroy the integrity of the vessel in such a way that it would release considerably more oil, or sink, and consequently release oil over a long period of time, it may be best to avoid the destruction of the vessel.

Educating Planners for Better Decision-Making

In general, Buist feels that the public, regulatory agencies, and ship owners and operators need to be educated about the benefits of burning as a response option. "Someday people will realize that the pros far outweigh the cons." To this end, Allen and Evans are conducting educational programs with response personnel, air quality specialists, and state and federal decision-makers to inform them about the facts on *in-situ* burning as an efficient, safe response option. "A lot of the decisions on burning come down to people's opinions. We're trying to get rid of the opinion part and replace it with fact."

As with dispersants, there is a relatively small "window of opportunity" of about one to two hours during which the process of *in-situ* burning will be most successful. After this time, the oil becomes too emulsified to ignite properly, said Buist. Little research has been done on techniques for the combustion of highly emulsified oil (more than 50%-70% water). In order for oil spilled on water to burn, it must be relatively fresh and at least three millimeters thick. Evaporation of volatile components of the oil in the early hours after a spill also make the oil less combustible (Alaska Oil Spill Commission 1990, vol. II).

The decision to use *in-situ* burning as an early response option should be made in a timely and informed manner, as is the case with dispersants. The best way to accomplish this, according to Buist, Allen, and Evans, is through informed pre-approval for burning under specific circumstances and in specific locations. Upper-level decision-makers, as well as response personnel and on-scene coordinators, need to be well enough informed about the technique of burning to be able to establish pre-approval criteria. Allen met in April 1990 with Governor Steven Cowper (Alaska,

USA) and the Alaska Oil Spill Commission, who proved to be a "receptive audience" to his ideas on "pre-approval." "I think we'll see a change of attitude in that area," Allen said.

As part of the decision-making process, the various factors that might influence the success of a combustion effort should be examined. These might include: ignitability of the oil; flashback and explosion potential; safe operating distances from the fire; wind-direction; how long it will take for emissions to dilute to state or federal standards; and the possibility of a smoke-plume situation developing. Buist explained that under certain atmospheric conditions and in certain locations, inversion layers develop in the atmosphere trapping the smoke-plume and fumes, much like the "smog" is trapped in the Los Angeles, California, USA, area during much of the year.

As of yet, no comprehensive decision-making tools, such as the computer systems or matrices designed for dispersant decisions, have been developed to assist authorities. Buist said that such a system has been "put on paper" for Exxon in the Beaufort Sea, and the Regional Response Team in Alaska has a "checklist" that they apply to *in-situ* burning decisions. The development of a decision-making system and a reduction in the bureaucratic steps necessary for approval for *in-situ* burning would accelerate the decision-making process and consequently make for more successful implementation of combustion as a response option.

Changing Attitudes about Combustion

According to Buist, S.L. Ross has recently been consulted on in-situ burning by the Scandinavian countries and the United Kingdom, indicating a possible change of attitude. Allen said that, in the spring of 1990, he gave educational seminars on *in-situ* burning in Australia and at an international conference in Bahrain, which was attended by Kuwait, Saudi Arabia, and the United Arab Emirates, among others. Allen reported that there was considerable interest in combustion at these meetings. Later this year, Allen will be travelling to Japan, Singapore, and Venezuela, all of whom have invited him to conduct educational programs for oil spill response personnel and decision-makers.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

NOV 1 1983

PEP - ENVIRONMENTAL REVIEW MEMORANDUM NO. ER83-2

To: Heads of Bureaus and Offices

From: Office of Environmental Project Review

Subject: Preliminary Natural Resources Surveys

1. Purpose. The purpose of this memorandum is to delineate Departmental procedures for conducting preliminary surveys of oil discharges and hazardous substance releases (incidents or sites) to determine whether damages have occurred to natural resources under the trusteeship of the Secretary of the Interior.

2. Authority. Sections 107 and 111 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA, also known as Superfund Act); Section 311 of the Clean Water Act, as amended (CWA); Executive Order 12316; and Subpart G of the National Oil and Hazardous Substance Contingency Plan (NCP).

3. Scope. These procedures pertain only to determining whether or not natural resources under the trusteeship of the Department are present in the vicinity of an incident or site and, if present, whether or not damages have occurred to them from that incident or site since December 10, 1980. These procedures do not pertain to a formal assessment of the degree or extent or the value of any such damages found to exist nor do they pertain to responses, including removal or remedial actions, conducted pursuant to the NCP (910DM4).

4. Natural Resources Trust. CERCLA provides that the Federal and State Governments, as trustees for natural resources, may bring claims against responsible parties and/or the Superfund for any damages to these resources caused by the release of hazardous substances. CERCLA also provides that any claims for damages caused by oil discharges which are compensable, but unsatisfied, by the CWA may be brought against the Superfund. States are trustees for natural resources within their borders including the territorial sea. Federal agencies are trustees only: (1) for those natural resources within the sovereign jurisdiction of the Federal Government and (2) for those resources which they manage or protect. These limitations are interpreted as follows: "Sovereign jurisdiction" pertains to those resources seaward of the outer limit of the territorial sea and those resources within States where the Federal Government has established or reserved, or States have relinquished, exclusive jurisdiction to the United States. "Manage or protect" is a jurisdictional authority derived from Federal statute, international treaty, Indian treaty, Executive Order or similar directive. This latter jurisdiction may or may not be concurrent with that of States. Thus there may be both Federal and State trustees as well as more than one Federal trustee.

5. Interior's Trusteeship.

A. Natural resources under the Secretary's trust fall into three broad categories:

(1) Natural resources on, over or under lands owned by the United States and managed by the Department. Examples include resources in units of the National Park (NPS) and National Wildlife Refuge (FWS) systems, public lands (BLM) and other project lands and properties (all bureaus).

(2) Natural resources, not on lands described above, for which the Department has specific authority to manage or protect. Examples include mineral resources on the OCS (MMS); Federal minerals on private or non-Interior lands (BLM); water resources stored or regulated by Interior projects (BR); migratory birds and certain anadromous fish protected by international treaties (FWS); and certain endangered and threatened species and marine mammals protected by Federal statutes (FWS).

(3) Natural resources protected by treaty or other authority pertaining to Native American tribes or located on lands held by the United States in trust for Native American tribes, communities or individuals. Examples include natural resources on Indian reservations, village lands and allotments as well as certain off-reservation water, fishery and subsistence resources protected by treaty or statute (BIA).

B. The Secretary's trust under CERCLA does not extend to non-natural resources such as constructed facilities, man-made archeological or historical objects, or persons (or their remains). Nor are trust responsibilities interpreted to extend to natural resources where the Secretary's involvement: (1) is merely consultative or hortatory (e.g., Fish and Wildlife Coordination Act, National Historic Preservation Act); (2) is restricted to the regulation or cleanup of private actions on private lands (e.g., Surface Mining Control and Reclamation Act); (3) is limited to technical or financial assistance (e.g., Land and Water Conservation Fund, Abandoned Mine Land Fund, Historic Preservation Fund, Federal aid for fish and wildlife restoration); or (4) is related to broad data collection or research authorities (e.g., water, minerals, fish and wildlife data and research programs).

6. Natural Resources Surveys.

A. The purpose of a preliminary natural resources survey is to gather and analyze facts in order to determine whether sufficient cause exists to conduct a damage assessment and pursue a claim for damages to natural resources under the trusteeship of the Department. The principal facts to be gathered are whether any such resources are present in the vicinity of the incident or site and, if so, whether there are any damages to them from the incident or site.

B. Damages claimed under CERCLA must have occurred or be continuing after December 10, 1980, and any damage claims may not overlap response claims for cleanup activities conducted pursuant to the NCP. Thus, any natural resources damages claimed will usually be those residual damages after response (removal or remedial) actions have been completed. If there are uncertainties about timing or the extent of cleanup, they should be identified in the survey.

7. Initiation. Natural resources surveys may be initiated in the following situations:

A. Notification by the On-Scene Coordinator (OSC). Bureaus should, as a routine matter, consider whether there are any damages to natural resources when involved in NCP response activities. Generally, a natural resources survey should not be documented if no resources managed or protected by the Department are present. If resources under the jurisdiction of other bureaus are present the Regional Environmental Officer (REO) should be immediately informed to determine whether a Departmental survey should be initiated.

B. Sites on the National Priorities List (NPL). The Department, acting at the initiation of the Office of Environmental Project Review will conduct and document natural resources surveys at all sites on the NPL. A preliminary review of the NPL indicates that most of these sites will not involve Interior's trust responsibilities. These surveys will be scheduled over the next 2 - 3 years and will be conducted as a part of the Department's normal environmental review (ER) process managed by OEPR.

C. Enforcement Actions. On occasion the Department of Justice, Environmental Protection Agency (EPA), U.S. Coast Guard (USCG), or the Department's Solicitor may request that a natural resources survey be conducted to assist in other related enforcement or legal actions. These surveys include those provided for in the attached EPA/DOI Memorandum of Understanding (MOU) on this subject and will be managed by OEPR.

D. Other Natural Resources Trustees. On occasion, State or other Federal trustees may request the Department to conduct a survey to determine whether multiple trustee-ships are involved in an incident or site. Any such requests will be referred to the appropriate REO (in the case of a State trustee) or OEPR (in the case of another Federal trustee) and the survey will be managed by OEPR.

E. Bureau Initiative. There may be other situations not described above where bureaus may wish to conduct natural resources surveys at their own initiative to meet their own priorities. In these cases bureaus should provide copies of any documentation to the appropriate REO. If resources are involved under the jurisdiction of more than one bureau, OEPR may initiate a Departmental survey.

8. Procedure.

A. OEPR will distribute and control Departmental natural resources surveys through its existing ER process. Bureaus with a possible jurisdictional involvement will be designated and, where appropriate, bureaus with special expertise about resources near the incident or site will be identified to participate in the survey. OEPR's distribution memorandum will also establish schedules, contact points and signature authority.

B. Bureau survey comments will indicate whether Departmental trust resources are present and, if so, whether they are affected by oil spills or hazardous substance releases from the incident or site. The presence of such resources can usually be obtained from existing reference material (e.g., maps, deeds, records, reports, studies). Effects may already be documented in incident reports or bureau or EPA records. Where uncertainty exists about either the presence or effects on Interior resources, a field inspection and, in some cases, limited sampling and laboratory analyses may be necessary. Field visits and any data collection will be coordinated with the REO in order to share information and minimize expenses where possible. Bureaus are responsible for ensuring that field personnel are properly trained and aware of safety precautions when making field visits.

C. Based upon bureau input and its own review, OEPR will prepare a memorandum report of the Department's natural resources survey findings. Bureaus will be consulted if their input is substantively modified or challenged.

D. If a proposed report indicates that sufficient cause exists to initiate a damage assessment leading to a claim for damages to natural resources under the trusteeship of the Department, OEPR will consult with the Solicitor's Office.

9. <u>Funding</u>. The Assistant Secretary - Policy, Budget and Administration has established the following Departmental policies for funding natural resources surveys:

A. The routine conduct of natural resources surveys is considered to be a responsibility of the Department of the Interior and will be accommodated within its ongoing mission and environmental review activities.

B. Where these surveys find that damages exist to resources under the Department's trust and that sufficient cause exists to proceed with a damage assessment, the costs of these surveys will be documented by bureaus and later included in the costs of conducting the damage assessment when presenting a damage claim and/or seeking reimbursement pursuant to CERCLA.

C. Where these surveys have been conducted at the request of EPA pursuant to our MOU on this subject, allowable costs will be reimbursed in accordance with procedures established in the next paragraph.

10. <u>EPA/DOI MOU Reimbursement Procedures.</u>

A. Reimbursable costs are limited to those allowable costs identified in the MOU.

B. Reimbursement for each survey is limited to those bureaus identified in each OEPR distribution memorandum.

C. Upon receipt of a distribution memorandum and prior to obligating any funds, bureau reviewing officials will contact the REO and receive verbal approval of their scope of work and estimated costs. They will also coordinate with the REO about any visits to EPA regional offices and any necessary field inspections in order to minimize costs and share data with the REO, other bureaus and EPA.

D. Within thirty (30) days of completion of a survey (measured from the date reviews are due to the REO), reviewing officials will submit a request for reimbursement (SF 1081) to the REO for approval and forwarding to OEPR. The SF 1081 must identify the survey ER# and need only itemize costs to the 2-digit object class.

E. Upon receipt by OEPR the SF 1081 will be forwarded to the Fiscal Division of the Office of Administrative Services for payment to the appropriate bureau office.

F. Bureaus will keep detailed financial accounts of all costs incurred on a site-specific basis. These accounts will include, at a minimum, employee hours spent, travel and per diem expenses, and any other costs and receipts in accordance with the accounting requirements specified in the MOU. Pursuant to Section 111(k) of CERCLA, these detailed financial accounts will be available foraudit by the Inspector General.

11. Limitations.

A. This memorandum provides practical information and guidance to bureaus conducting preliminary natural resources surveys as a part of the Department's responsibilities as a trustee of certain natural resources. It does not purport to give definite legal guidance on all of the complexities of CERCLA's definitions and provisions affecting natural resources trustees. The reader is referred to CERCLA itself, the Solicitor's Office and OEPR.

B. This memorandum does not provide instructions for the conduct of damage assessments. Responsibility for preparing regulations for the assessment of damages to natural resources has been assigned by E.O. 12316 to the Secretary of the Interior and in turn to OEPR. Pending promulgation of these regulations, bureaus should consult OEPR prior to initiating a damage assessment.

Bruce Blanchard
Director

Attachment (EPA/DOI MOU)

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
1689 C STREET, ROOM 119
ANCHORAGE, ALASKA 99501-5126

OIL SPILL RESPONSE AND NATURAL RESOURCES RESTORATION

DISCUSSION APRIL 12, 1989

CERCLA AND EO 12580

Section 101	-	Defines natural resources
Section 107(f)(2)(A)	-	Provides for Federal trustees
Section 107(f)(2)(B)	-	Provides for State trustees
Section 107(f)(2)(C)	-	Rebuttable presumption if use regulations
Section 301(c)	-	Provides for regulations for assessing damages to natural resources

KEY PROVISIONS OF CERCLA RELATING TO NATURAL RESOURCE DAMAGE ASSESSMENTS

- CERCLA provides that, in addition to cost-recovery for response and cleanup actions, State and Federal trustees of natural resources may recover damages for injury to natural resources

- CERCLA provides that sums recovered by a Federal natural resource trustee shall be retained by the trustee for use only to restore, replace, or acquire the equivalent of the injured natural resources

- CERCLA defines natural resources very broadly; the regulations group the natural resources into five categories: ground water, surface water, air, biological, and geologic resources

- CERCLA defines damages as damages for injury or loss of natural resources, therefore, the regulations specify that injury is a measurable adverse change in the chemical or physical quality or the viability of a natural resource and that damage is the amount of money sought as compensation for the injury

- CERCLA provides that liability is for damages for injuries to natural resources, including the reasonable costs of assessing such injury, plus prejudgment interest

- CERCLA requires regulations containing the "best available" procedures to perform assessments; two kinds of regulations are required: (1) simple, standardized type A and (2) individual, site-specific type B procedures

- CERCLA provides that the assessment regulations are available for use by natural resource trustees to assess damages to natural resources for purposes of CERCLA and Section 311(f)(4) and (5) of the Clean Water Act

- CERCLA provides that assessments by Federal or State trustees performed in accordance with the regulations are provided the legal evidentiary status of a rebuttable presumption in an administrative or judicial proceeding

- CERCLA provides for negotiation of settlements and requires notification of Federal trustees of these negotiations since a covenant not to sue for natural resource damages may be granted only if trustees have agreed in writing to the covenant

NATURAL RESOURCE DAMAGE ASSESSMENT RULE
43 CFR Part 11

- Use of rule optional, at the discretion of the Trustee
- Rules are compensatory not punitive, damage assessment aimed at measuring loss
- Cost-effectiveness and reasonable cost define the limits of damage assessment work, no "double counting"
- Public and the spiller are involved in the process through public notice, review of plans and comment prior to final plans
- Rebuttable Presumption of all findings by Trustees is assumed
- Emergency restorations are permitted as temporary actions to prevent or reduce injury to natural resources
- Damages are for injuries to resources independent of response actions

NATURAL RESOURCE DAMAGE ASSESSMENT REGULATIONS

EXECUTIVE SUMMARY

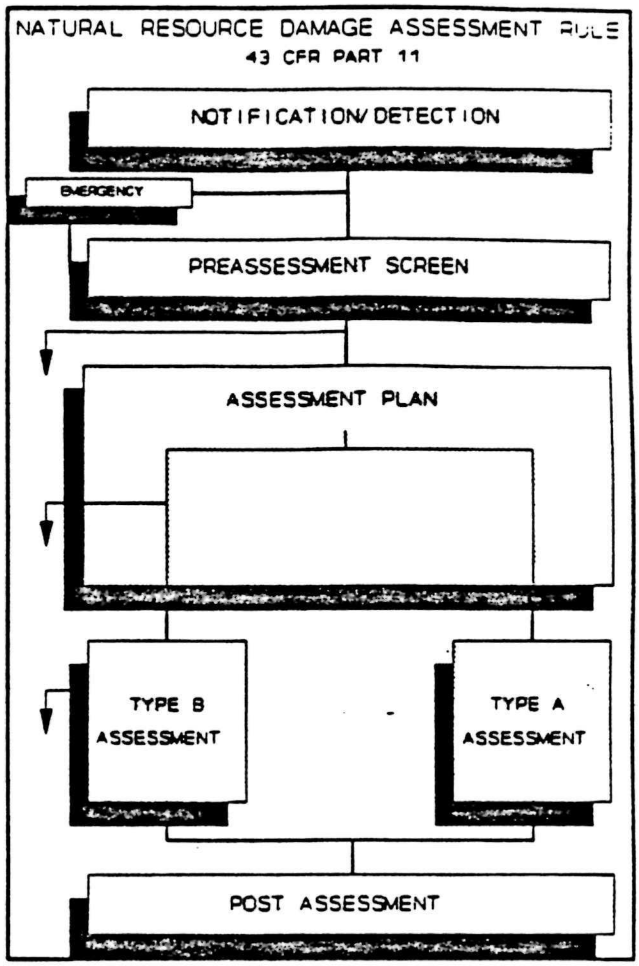
The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), provides that, in addition to cost-recovery for response and cleanup actions, natural resource trustees may recover damages for injury to natural resources, including the reasonable costs of assessing such injury, plus any prejudgment interest. Natural resources are defined by CERCLA to be: land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any State or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe. Damages are for the injury to, destruction of, or loss of natural resources resulting from a discharge of oil or a release of a hazardous substance. Compensation for damages under CERCLA may be sought only by those trustees for natural resources indicated in the above definition.

Section 301(c) of CERCLA requires the promulgation of regulations for use by trustees in establishing damages for injuries to natural resources for the purposes of CERCLA and Section 311(f)(4) and (5) of the Clean Water Act (CWA). Section 301(c)(2) calls for the natural resource damage assessment regulations in the following terms:

> (2) Such regulations shall specify: (A) standard procedures for simplified assessments requiring minimal field observation, including establishing measures of damages based on units of discharge or release or units of affected area, and (B) alternative protocols for conducting assessments in individual cases to determine the type and extent of short- and long-term injury, destruction, or loss. Such regulations shall identify the best available procedures to determine such damages, including both direct and indirect injury, destruction, or loss and shall take into consideration factors, including, but not limited to, replacement value, use value, and ability of the ecosystem or resource to recover.

These regulations have been promulgated as type A and type B procedures, and are codified at 43 CFR Part 11. The use of these regulations is optional, but natural resource damage assessments performed by Federal or State trustees in accordance with these regulations are provided the legal evidentiary status of a rebuttable presumption in an administrative or judicial proceeding.

The rule provides a process for natural resource damage assessments with four major components. The first component includes several steps prior to initiating an assessment. All natural resource damage assessments contain these same initial steps. These steps can begin with the notification of or detection by the natural resource trustee of a discharge or release. Provisions are made for emergency restoration as authorized by Section 111(i) of CERCLA. The trustee must perform a preassessment screen to determine that a CERCLA or CWA-covered incident has occurred and that resources of the trustee may have been affected. A determination is required upon completion of the preassessment screen as to the appropriateness of further assessment actions.



The second component requires the preparation of an Assessment Plan before initiating an assessment using either the type A or type B procedures. The level of detail contained in the Assessment Plan should be consistent with the rule's requirement for reasonable cost. The trustee must also comply with the rule's requirements for coordination with co-trustees, identification and involvement of the potentially responsible party, and public involvement in the development of the Assessment Plan. Also, the trustee must decide whether to conduct a type A or type B assessment. All decisions on the selection of the methodologies, including, but not limited to, parameter values and other assumptions used to implement the type A or type B methodologies must be documented. This documentation must be set out in the Assessment Plan. The Assessment Plan should ensure that only the reasonable costs of assessment will be incurred.

In the third component, the trustee begins either the type A or type B assessment. Both the type A and type B procedures follow the same three steps. Each type of assessment requires an Injury Determination phase, a Quantification phase, and a Damage Determination phase.

The type A procedure contained in the March 20, 1987, final rule provides for simplified assessments of damages in coastal and marine environments. The rule uses a computer model referred to as the Natural Resource Damage Assessment Model for Coastal and Marine Environments (NRDAM/CME). The specific data inputs required for the type A Assessment Plan provide the incident-specific data required to use the NRDAM/CME.

The NRDAM/CME determines the pathway of contamination through a physical fates submodel. Natural resource injury is determined through the interaction of the physical fates and biological effects submodels. Quantification of the effects of the discharge or release is determined within the biological effects submodel. The baseline level of services of the natural resources, contained in the NRDAM/CME data bases, and both the change in services and resource recoverability are calculated. The NRDAM/CME performs the Damage Determination through the use of an economic damages submodel. The economic damages submodel incorporates use value methodologies to determine damages. An economic data base is contained in the NRDAM/CME that uses market and nonmarket prices for the services provided by the natural resources. A description of the NRDAM/CME and sources of data that may be applicable for input to the NRDAM/CME is contained in the preamble to the final type A rule.

If the assessment is to follow the type B procedures, the same three steps are also required. During the Injury Determination phase, the assessment focuses on determining that an injury to the resource has occurred and that the injury has resulted from the discharge or release. After injury has been confirmed in this phase, the assessment moves into the Quantification phase. The focus of the Quantification phase is on identifying the services, such as habitat, recreation, or erosion control, provided by the resource, determining the baseline level of such services, and quantifying the reduction in services resulting from the discharge or release. The Quantification phase is closely related to the third phase of the type B assessment, the Damage Determination phase. In the Damage Determination phase, where focus is on economic valuation or costing techniques, the monetary compensation for injury is calculated, based on either the restoration or replacement costs or the loss in use value of the resources.

At the end of every natural resource damage assessment, whether a type A or a type B procedure is followed, the fourth component consists of several post-assessment requirements. These requirements include a Report of Assessment to act as the administrative record of the assessment, the establishment of an account for damage assessment awards, and the development of a Restoration Plan to ensure that all damage assessment awards are used for the restoration or replacement of the injured resources.

THE NATURAL RESOURCE DAMAGE ASSESSMENT RULE
43 CFR Part 11

MAJOR CONCEPTS EMBODIED IN THE RULE

- The use of the rule is optional, at the discretion of the trustee
- Damages are compensatory, not punitive, since assessment is aimed at measuring loss
- Rebuttable presumption is important to trustee decisionmaking
- Damages are for injuries residual to response actions
- Cost-effectiveness and reasonable cost are defined and distinct
- Public and PRPs are involved through notice, review, and comment
- Emergency restorations are temporary actions to prevent or reduce injury

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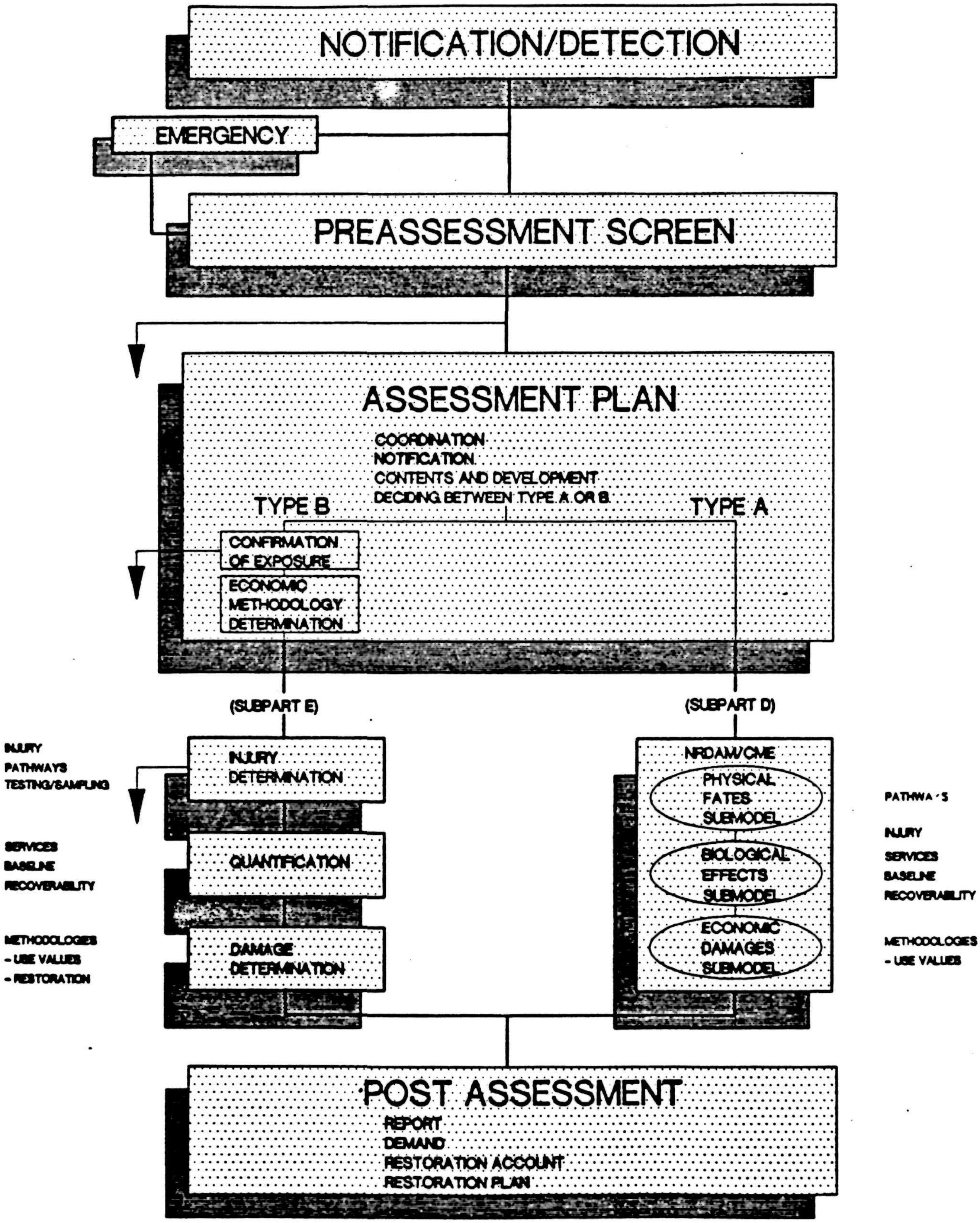
NATURAL RESOURCE DAMAGE ASSESSMENT RULE
43 CFR PART 11



CRITERIA

- DISCHARGE OR RELEASE?
- AFFECTED NATURAL RESOURCES?
- INJURIOUS SUBSTANCE QUANTITY AND CONCENTRATION?
- REASONABLE COST DATA?
- RESPONSE ACTION REMEDY?

DEFINITIONS

- INJURY
  - A MEASURABLE ADVERSE CHANGE IN THE CHEMICAL OR PHYSICAL QUALITY OR THE VIABILITY OF A NATURAL RESOURCE
- DAMAGE
  - THE AMOUNT OF MONEY SOUGHT AS COMPENSATION FOR INJURY TO NATURAL RESOURCES AS PROVIDED BY CERCLA

ASSESSMENT PLANNING

- TRUSTEE COORDINATION
- PRP IDENTIFICATION
- NOTICE OF INTENT
- DRAFT ASSESSMENT PLAN
- PUBLIC REVIEW

TYPE B ASSESSMENT

PROVIDE ALTERNATIVE METHODOLOGIES FOR CONDUCTING NATURAL RESOURCE DAMAGE ASSESSMENTS IN INDIVIDUAL CASES

IMPLEMENTATION STAGE

- NATURAL RESOURCE TRUSTEE'S ROLE
- POTENTIALLY RESPONSIBLE PARTY'S ROLE
- ASSESSMENT PLAN REVIEW

POST ASSESSMENT

- REPORT OF ASSESSMENT
- "DEMAND" FOR DAMAGES
- RESTORATION ACCOUNT
- RESTORATION PLAN

TRUSTEE RECOVERIES

- ASSESSMENT COSTS
- DAMAGES FOR INJURIES
- PREJUDGMENT INTEREST

NATURAL RESOURCE GROUPS

- AIR
- SURFACE WATER
- GROUND WATER
- GEOLOGIC
- BIOLOGICAL

INJURY DETERMINATION

- INJURY DEFINITIONS
- PATHWAY DETERMINATION
- TESTING AND SAMPLING METHODS

BIOLOGICAL RESOURCES

- INJURY -

- ADVERSE CHANGE IN VIABILITY
- FOOD, DRUG, AND COSMETIC ACT GUIDELINES
- STATE HEALTH DIRECTIVES

BIOLOGICAL VIABILITY

- CATEGORY TYPES:
  - DEATH
  - DISEASE
  - BEHAVIORAL ABNORMALITIES
  - CANCER
  - GENETIC MUTATIONS
  - PHYSIOLOGICAL MALFUNCTIONS
  - PHYSICAL DEFORMATIONS
- MEASURED BY BIOLOGICAL RESPONSES

BIOLOGICAL RESPONSE

- ACCEPTANCE CRITERIA -

- COMMONLY DOCUMENTED RESPONSE
- DOCUMENTED IN FREE-RANGING ORGANISMS
- DOCUMENTED IN CONTROLLED EXPERIMENTS
- MEASUREMENTS PRODUCE VALID RESULTS

FISH AND WILDLIFE SPECIES

- DEATH INJURY -

- BRAIN CHOLINESTERASE ENZYME ACTIVITY
- FISH KILL INVESTIGATIONS
- WILDLIFE KILL INVESTIGATIONS
- IN SITU BIOASSAYS
- LABORATORY TOXICITY TESTING

FISH AND WILDLIFE SPECIES

- DISEASE INJURY -

- FIN EROSION

FISH AND WILDLIFE SPECIES

- BEHAVIORAL ABNORMALITIES -

- CLINICAL BEHAVIORAL SIGNS OF TOXICITY
- AVOIDANCE

FISH AND WILDLIFE SPECIES

- CANCER -

- FISH NEOPLASM

FISH AND WILDLIFE SPECIES

- PHYSIOLOGICAL MALFUNCTIONS -

- EGGSHELL THINNING
- REDUCED AVIAN REPRODUCTION
- DELTA-AMINOLEVULINIC ACID DEHYDRASE (ALAD) INHIBITION
- REDUCED FISH REPRODUCTION

FISH AND WILDLIFE SPECIES

- PHYSICAL DEFORMATIONS -

- OVERT EXTERNAL MALFUNCTIONS
- SKELETAL DEFORMITIES
- INTERNAL WHOLE ORGAN AND SOFT TISSUE MALFORMATIONS
- HISTOPATHOLOGICAL LESIONS

SURFACE WATER RESOURCES

- INJURY -

- SAFE DRINKING WATER ACT STANDARDS
- SAFE DRINKING WATER ACT CRITERIA
- CLEAN WATER ACT CRITERIA
- RESOURCE CONSERVATION AND RECOVERY ACT HAZARDOUS WASTE
- SUBSTANCE CONCENTRATIONS INJURING OTHER RESOURCES

GROUND WATER RESOURCES

- INJURY -

- SAFE DRINKING WATER ACT STANDARDS
- SAFE DRINKING WATER ACT CRITERIA
- CLEAN WATER ACT CRITERIA
- SUBSTANCE CONCENTRATIONS INJURING OTHER RESOURCES

GEOLOGIC RESOURCES

- INJURY -

- RESOURCE CONSERVATION AND RECOVERY ACT HAZARDOUS WASTE
- pH ABOVE 8.5 OR BELOW 4.0
- SODIUM ABSORPTION RATIO ABOVE 0.176
- DECREASED WATER HOLDING CAPACITY
- MICROBIAL RESPIRATION IMPEDANCE

GEOLOGIC RESOURCES

- INJURY (CONTINUED) -

- CARBON MINERALIZATION INHIBITION
- RESTRICTED MINERAL USE
- UNSATURATED ZONE PHYSICAL/CHEMICAL CHANGE
- INVERTEBRATE TOXIC RESPONSE
- PLANT TOXIC RESPONSE
- SUBSTANCE CONCENTRATIONS INJURING OTHER RESOURCES

AIR RESOURCES

- INJURY -

- CLEAN AIR ACT EMISSION STANDARDS
- SUBSTANCE CONCENTRATIONS INJURING OTHER RESOURCES

DEFINITIONS

- ASSESSMENT AREA
  - THE GEOGRAPHICAL AREAS WITHIN WHICH NATURAL RESOURCES HAVE BEEN AFFECTED BY A DISCHARGE OR RELEASE
- SERVICES
  - FUNCTIONS PERFORMED BY ONE RESOURCE FOR ANOTHER OR MAN

QUANTIFICATION

- OBJECTIVE -

MEASURE THE CHANGE IN THE QUANTITY AND QUALITY OF THE SERVICES PROVIDED BY THE INJURED RESOURCES

QUANTIFICATION

- STEPS -

- MEASURE EXTENT OF INJURY
- ESTIMATE BASELINE CONDITIONS
- ESTIMATE RESOURCE RECOVERY PERIOD
- ESTIMATE REDUCTION IN SERVICES

MEASURE OF DAMAGES

- Restoration Costs

PLUS

- Compensable Values

RESTORATION COSTS

- Direct Costs

PLUS

- Indirect Costs

COMPENSABLE VALUES

- Use Values

PLUS

- Nonuse Values

COMPENSABLE VALUES

- LOST PUBLIC USES
  - RECREATION OR OTHER PUBLIC USE
  - LOST FEES OR OTHER PAYMENTS
  - LOST ECONOMIC RENT
  - OPTION AND EXISTENCE VALUES
- TRUSTEE ENTERPRISE LOST NET INCOME

DAMAGE DETERMINATION PLAN (11.81)

- Identifies Restoration Alternatives
- Estimates Lost Services
- Estimates Recovery Periods
- Identifies Selected Alternative

RESTORATION ALTERNATIVES (11.82)

- "Reasonable Number"
- Range of Actions
- Services Lost
- Selection Factors

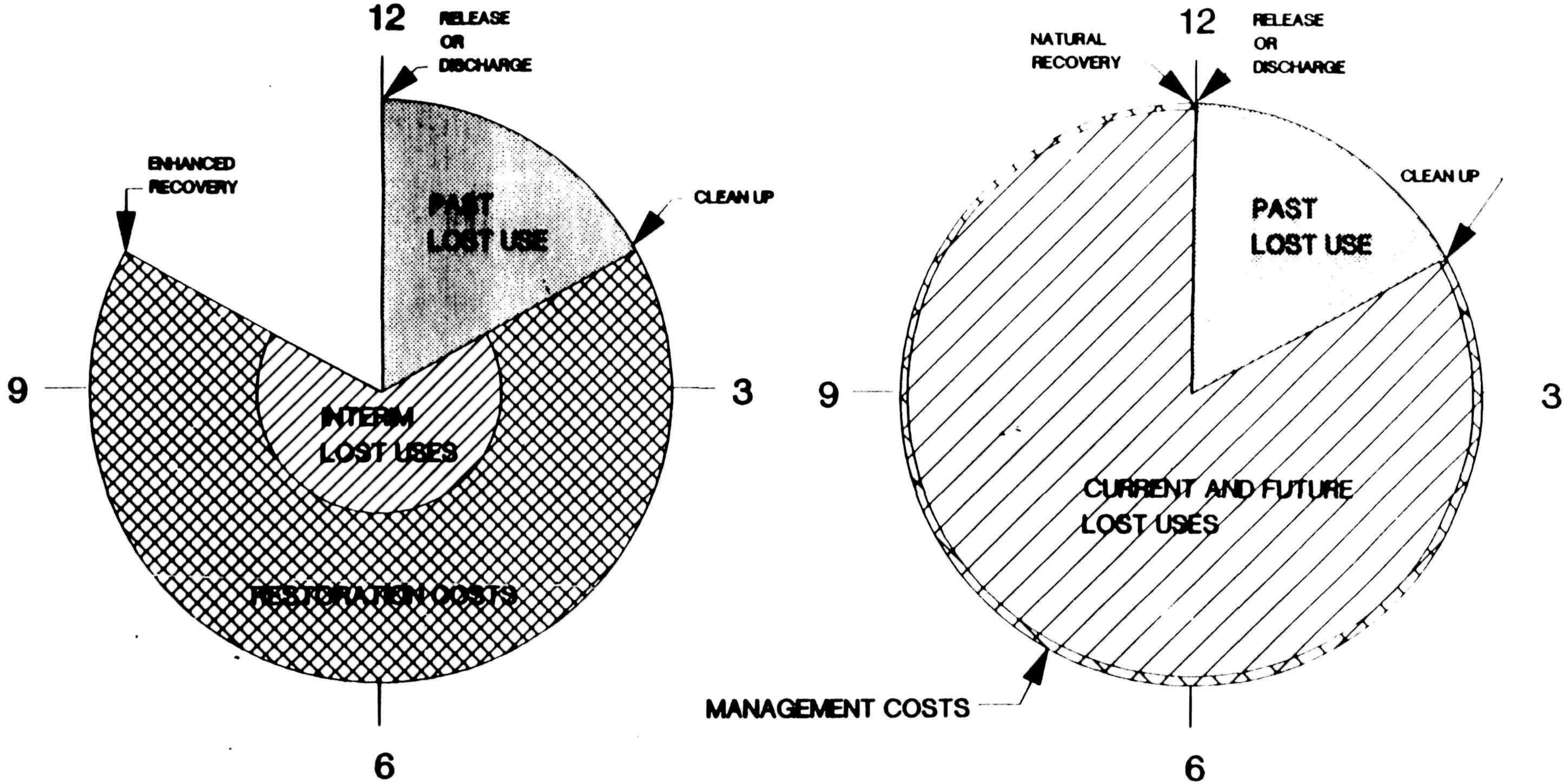
METHODOLOGIES (11.83)

- Cost Estimating Methodologies

- Valuation Methodologies

MEASURE OF DAMAGES

TIME CLOCK ILLUSTRATION



INTENSIVE RESTORATION ◄---- RANGE ----► MINIMAL MANAGEMENT ACTION

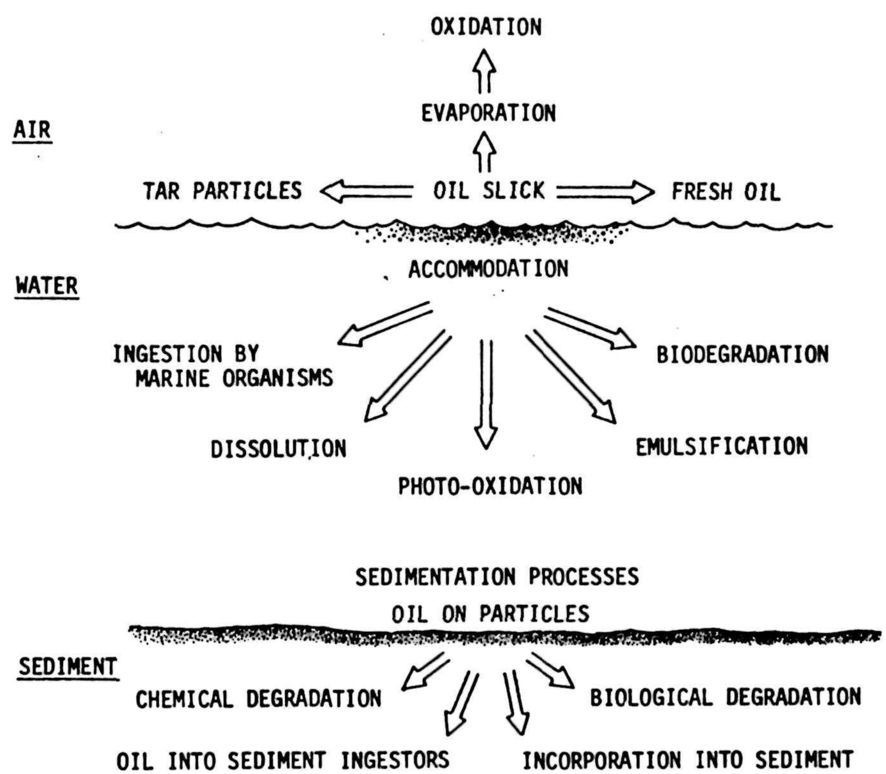


Figure 1. Fate of oil at sea: biological, physical, and chemical processes.

LIST OF FEDERAL REGISTER PUBLICATIONS: NATURAL RESOURCE DAMAGE ASSESSMENT REGULATIONS

1. **Final Type B Rule:** August 1, 1986, 51 FR 27674

2. **Final Type A Rule:** March 20, 1987, 52 FR 9042

3. **SARA Amendments:** February 22, 1988, 53 FR 5166

4. **Type A Corrections:** March 25, 1988, 53 FR 9769

5. **Notice of Availability:** November 16, 1987, 52 FR 43763; five final type B technical information documents, U.S. Department of the Interior, Washington, DC; June 1987; available from National Technical Information Service (NTIS); 5285 Port Royal Road, Springfield, VA 22161; (703) 487-4650:

    Type B Technical Information Document: Application of Air Models to Natural Resource Injury Assessment; 80 pp.; PB88-100128; price $14.95

    Type B Technical Information Document: Approaches to the Assessment of Injury to Soil Arising from Discharges of Hazardous Substances and Oil; 64 pp.; PB88-100144; price $14.95

    Type B Technical Information Document: Injury to Fish and Wildlife Species; 154 pp.; PB88-100169; price $19.95

    Type B Technical Information Document: Guidance on Use of Habitat Evaluation Procedures and Habitat Suitability Index Models for CERCLA Applications; 51 pp.; PB88-100151; price $12.95

    Type B Technical Information Document: Techniques to Measure Damages to Natural Resources, 200 pp.; PB88-100136; price $19.95

    Type B Technical Information Documents Set; PB88-100110; price $70.50

6. **Measuring Damages to Coastal and Marine Natural Resources:** Concepts and Data Relevant to CERCLA Type A Damage Assessments; National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; PB87-142485; ph: (703) 487-4650.

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TRUSTEE RECOVERIES

- ASSESSMENT COSTS
- DAMAGES FOR INJURIES
- PREJUDGMENT INTEREST

NOAA

Natural Resources Damages Assessment Regulations

TRUSTEE FUNCTIONS

- Assess natural resource damages
- Present a claim to recover damages
- Develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent
- Recover "reasonable costs" of assessment

MEASURE OF DAMAGES

- Cost to restore, rehabilitate, replace, or acquire the equivalent; **plus**
- Diminution in value pending restoration; **plus**
- Reasonable cost of assessment

SCOPE OF RULE

- Injury, destruction, loss, or loss of use
- Oil into or upon navigable waters
- Upon adjoining shorelines
- Exclusive economic zone

INFORMATION NEEDED

- Lethal effects of oil and its byproducts
- Long-term, sub-lethal or chronic effects
- Restoration techniques and costs
- State of knowledge on determining values
- Availability of models for assessments

RANGE OF PROCEDURES

- Schedule or table estimating damages based upon certain parameters of the spill
- Computer model
- Any other procedures appropriate for determining use and nonuse values and restoration costs

COMPENSATION TABLE

- Based on restoration costs, **plus** use and nonuse values
- Compensatory, not punitive
- Regional specificity, National consistency

EXPEDITED ASSESSMENT

- Based upon analysis of survey
- Work with consultation groups
- Perhaps contracting it out

EXISTING RULE

- Procedures and methodologies to adopt or modify for assessments under OPA
- Preliminary hypothesis regarding extent of injury be required prior to initiating an assessment
- Thresholds for determining extent and nature of injury

TRUSTEE COORDINATION

- Within Federal agency
- Among Federal agencies
- Among Federal and State agencies
- With Indian tribes

TRUSTEE COORDINATION

- Trustee Coordination Plan
- Trustee Coordinator
- Rebuttable Presumption

TRUSTEE COORDINATION PLAN

- Trustee Coordinator
- Consensus/Decisionmaking
- Trustee Working Group

TRUSTEE COORDINATOR

- Coordinate & monitor assessment process
- Schedule & prepare for meetings
- Central contact point for Trustee Working Group
- Records & documents

EARLY SAMPLING

- National Plan for initial data gathering
- Regional plans outlining individual roles
- Specific plans for high risk areas

COORDINATION WITH RESPONSE

- Response need is preeminent
- Trustee Coordinator is contact point
- Identify data needs for overlap
- Trust Fund - USCG
- Identify points of interaction

COORDINATION WITH LEGAL COUNSEL

- No role specified within rule
  - Advice and counsel during rulemaking
  - Participation limited in actual assessment

COORDINATION WITH PRP

- PRPs may provide verifiable data
- Parallel to Superfund process
- PRP may conduct tasks, trustee oversight
- Possibly use public "oversight" groups

COORDINATION WITH PUBLIC

- Information available for response
- Public "docket"
- Informed public
- Pre-spill planning
- Consent decree to remain public

NOAA

OFFICE OF GENERAL COUNSEL

DAMAGES ASSESSMENT REGULATIONS TEAM

Please note new address and FAX number for NOAA's Damages Assessment Regulations Team:

Randall Luthi
Linda Burlington
GC/NOAA/DART
Room 422
WSC #1
6001 Executive Blvd.
Rockville, MD 20852

PH: (301) 227-6332
(FTS) 394-6332

FAX: (301) 231-0157.

NATURAL RESOURCE DAMAGE ASSESSMENT REGULATIONS

EXECUTIVE SUMMARY

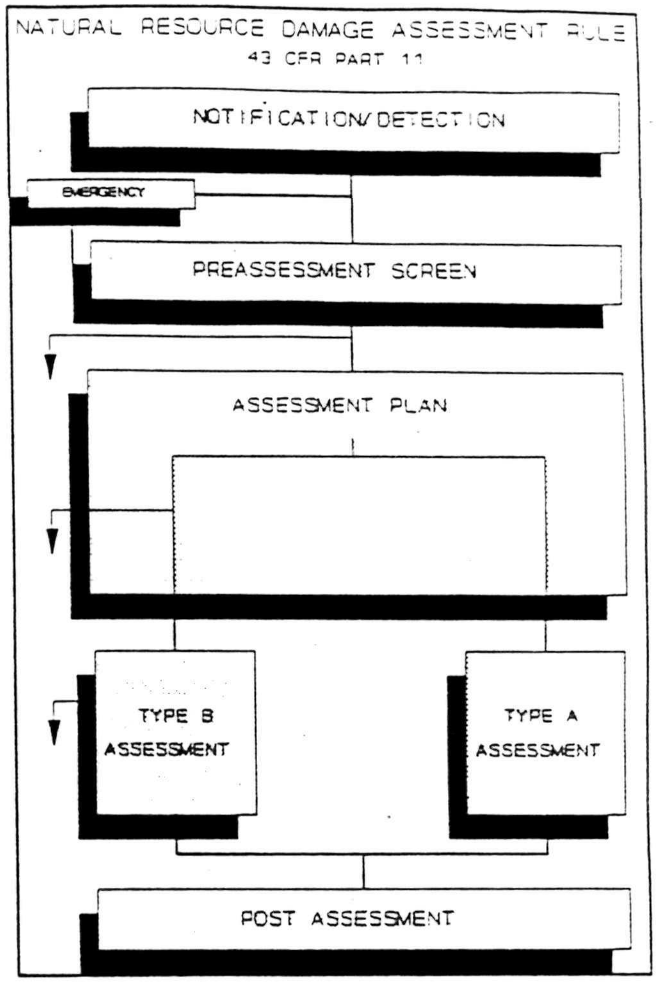
The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), provides that, in addition to cost-recovery for response and cleanup actions, natural resource trustees may recover damages for injury to natural resources, including the reasonable costs of assessing such injury, plus any prejudgment interest. Natural resources are defined by CERCLA to be: land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any State or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe. Damages are for the injury to, destruction of, or loss of natural resources resulting from a discharge of oil or a release of a hazardous substance. Compensation for damages under CERCLA may be sought only by those trustees for natural resources indicated in the above definition.

Section 301(c) of CERCLA requires the promulgation of regulations for use by trustees in establishing damages for injuries to natural resources for the purposes of CERCLA and Section 311(f)(4) and (5) of the Clean Water Act (CWA). Section 301(c)(2) calls for the natural resource damage assessment regulations in the following terms:

> (2) Such regulations shall specify: (A) standard procedures for simplified assessments requiring minimal field observation, including establishing measures of damages based on units of discharge or release or units of affected area, and (B) alternative protocols for conducting assessments in individual cases to determine the type and extent of short- and long-term injury, destruction, or loss. Such regulations shall identify the best available procedures to determine such damages, including both direct and indirect injury, destruction, or loss and shall take into consideration factors, including, but not limited to, replacement value, use value, and ability of the ecosystem or resource to recover.

These regulations have been promulgated as type A and type B procedures, and are codified at 43 CFR Part 11. The use of these regulations is optional, but natural resource damage assessments performed by Federal or State trustees in accordance with these regulations are provided the legal evidentiary status of a rebuttable presumption in an administrative or judicial proceeding.

The rule provides a process for natural resource damage assessment with four major components. The first component includes several steps prior to initiating an assessment. All natural resource damage assessments contain these same initial steps. These steps can begin with the notification of or detection by the natural resource trustee of a discharge or release. Provisions are made for emergency restoration as authorized by Section 111(i) of CERCLA. The trustee must perform a preassessment screen to determine that a CERCLA or CWA-covered incident has occurred and that resources of the trustee may have been affected. A determination is required upon completion of the preassessment screen as to the appropriateness of further assessment actions.



The second component requires the preparation of an Assessment Plan before initiating an assessment using either the type A or type B procedures. The level of detail contained in the Assessment Plan should be consistent with the rule's requirement for reasonable cost. The trustee must also comply with the rule's requirements for coordination with co-trustees, identification and involvement of the potentially responsible party, and public involvement in the development of the Assessment Plan. Also, the trustee must decide whether to conduct a type A or type B assessment. All decisions on the selection of the methodologies, including, but not limited to, parameter values and other assumptions used to implement the type A or type B methodologies must be documented. This documentation must be set out in the Assessment Plan. The Assessment Plan should ensure that only the reasonable costs of assessment will be incurred.

In the third component, the trustee begins either the type A or type B assessment. Both the type A and type B procedures follow the same three steps. Each type of assessment requires an Injury Determination phase, a Quantification phase, and a Damage Determination phase.

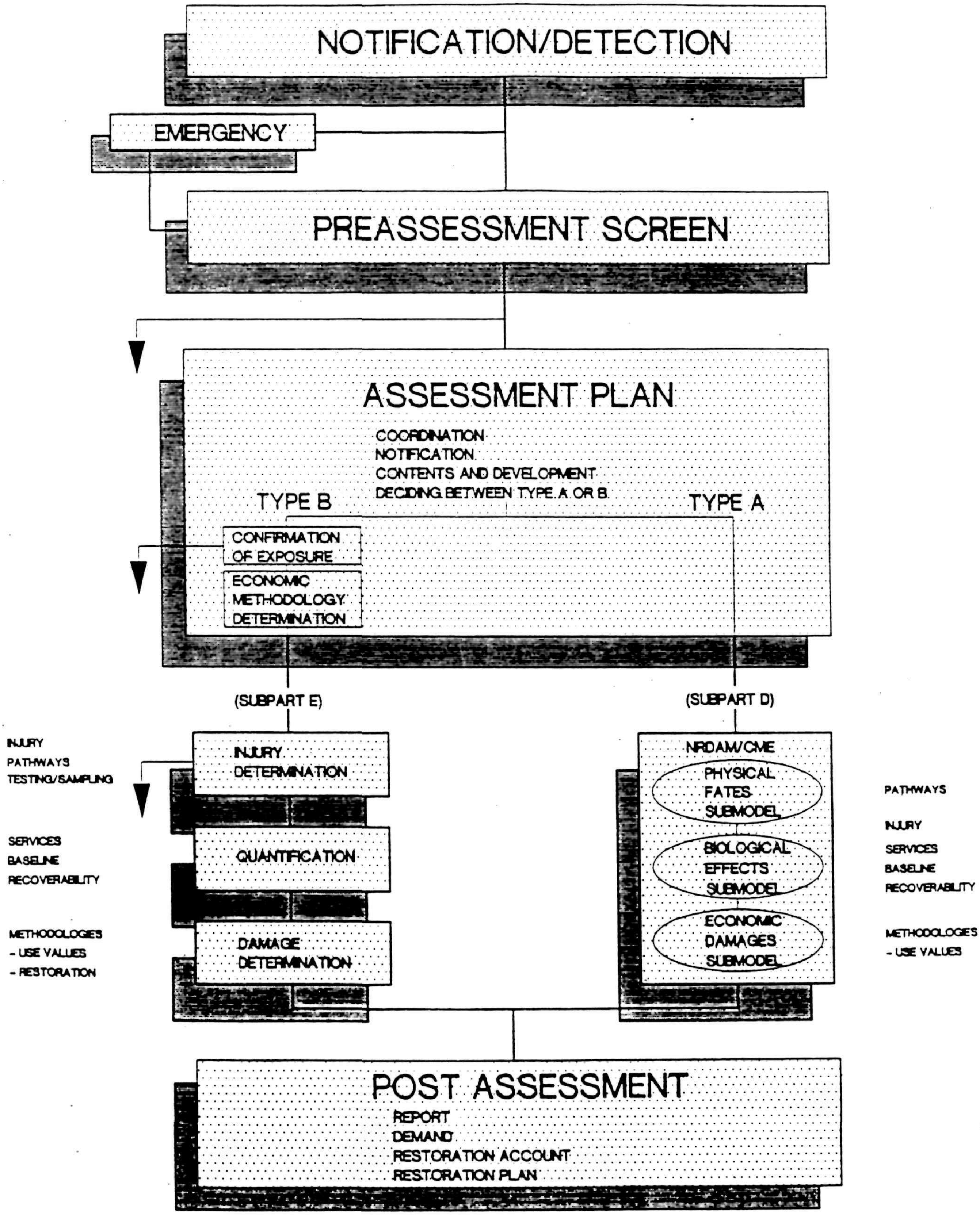
The type A procedure contained in the March 20, 1987, final rule provides for simplified assessments of damages in coastal and marine environments. The rule uses a computer model referred to as the Natural Resource Damage Assessment Model for Coastal and Marine Environments (NRDAM/CME). The specific data inputs required for the type A Assessment Plan provide the incident-specific data required to use the NRDAM/CME.

The NRDAM/CME determines the pathway of contamination through a physical fates submodel. Natural resource injury is determined through the interaction of the physical fates and biological effects submodels. Quantification of the effects of the discharge or release is determined within the biological effects submodel. The baseline level of services of the natural resources, contained in the NRDAM/CME data bases, and both the change in services and resource recoverability are calculated. The NRDAM/CME performs the Damage Determination through the use of an economic damages submodel. The economic damages submodel incorporates use value methodologies to determine damages. An economic data base is contained in the NRDAM/CME that uses market and nonmarket prices for the services provided by the natural resources. A description of the NRDAM/CME and sources of data that may be applicable for input to the NRDAM/CME is contained in the preamble to the final type A rule.

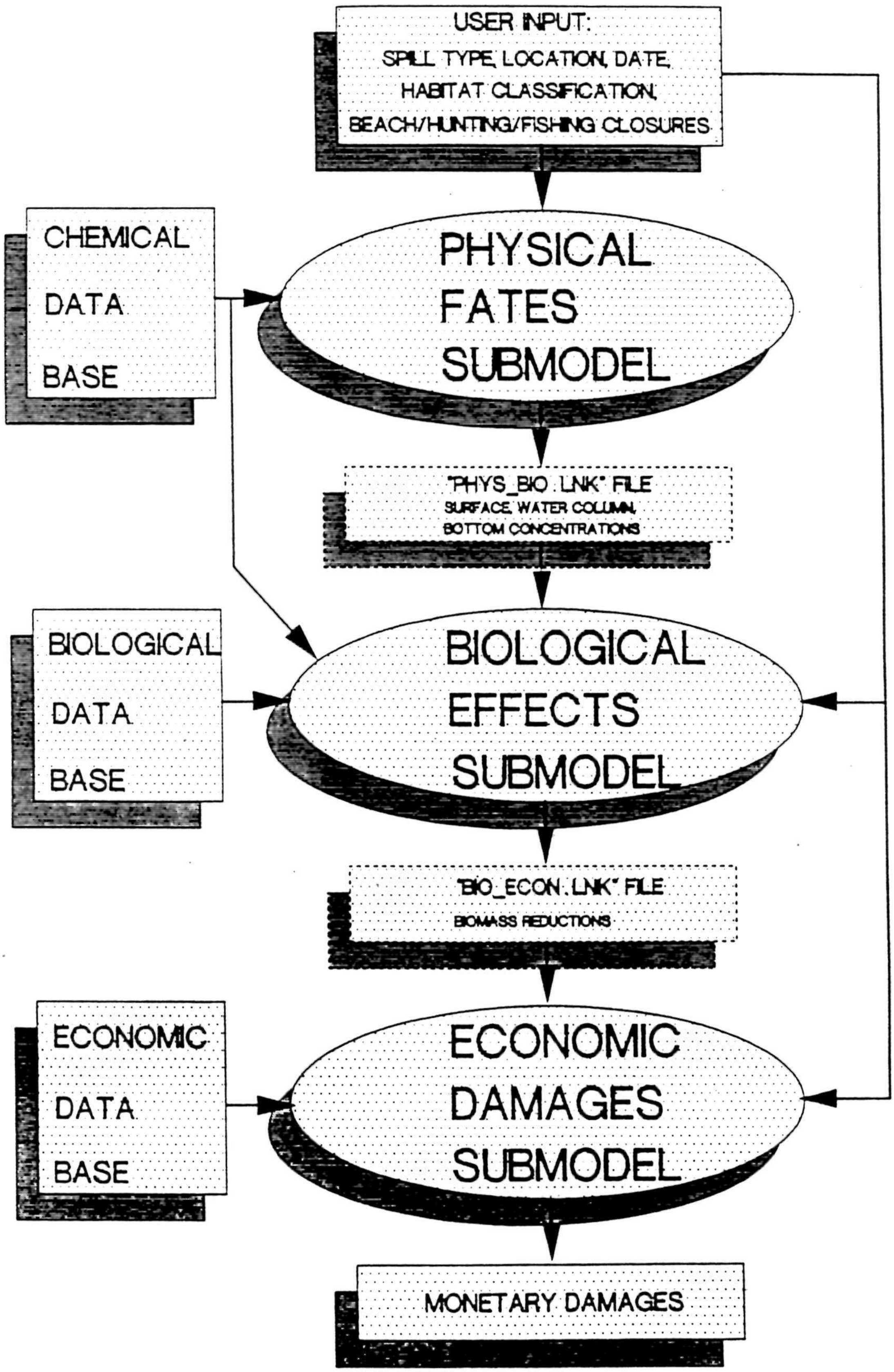
If the assessment is to follow the type B procedures, the same three steps are also required. During the Injury Determination phase, the assessment focuses on determining that an injury to the resource has occurred and that the injury has resulted from the discharge or release. After injury has been confirmed in this phase, the assessment moves into the Quantification phase. The focus of the Quantification phase is on identifying the services, such as habitat, recreation, or erosion control, provided by the resource, determining the baseline level of such services, and quantifying the reduction in services resulting from the discharge or release. The Quantification phase is closely related to the third phase of the type B assessment, the Damage Determination phase. In the Damage Determination phase, where focus is on economic valuation or costing techniques, the monetary compensation for injury is calculated, based on either the restoration or replacement costs or the loss in use value of the resources.

At the end of every natural resource damage assessment, whether a type A or a type B procedure is followed, the fourth component consists of several post-assessment requirements. These requirements include a Report of Assessment to act as the administrative record of the assessment, the establishment of an account for damage assessment awards, and the development of a Restoration Plan to ensure that all damage assessment awards are used for the restoration or replacement of the injured resources.

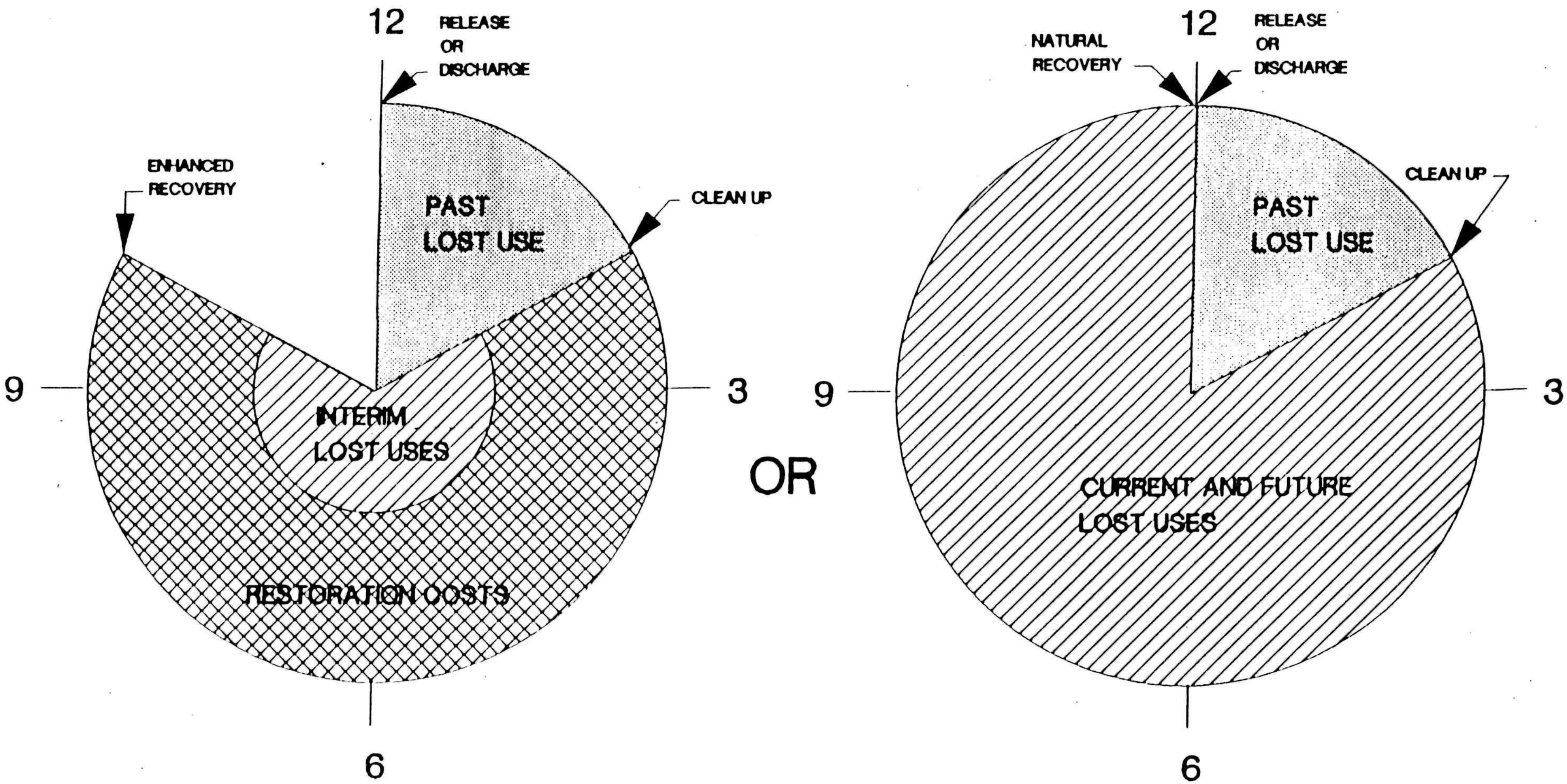
NATURAL RESOURCE DAMAGE ASSESSMENT RULE
43 CFR PART 11



MODEL SYSTEM OVERVIEW
NRDAM/CME



RECOVERABLE DAMAGES
CALCULATION TIME PERIOD



RESTORATION METHOD

LOST USE METHOD

NATURAL RESOURCE DAMAGE ASSESSMENT RULE
COURT CHALLENGES TO 43 CFR PART 11

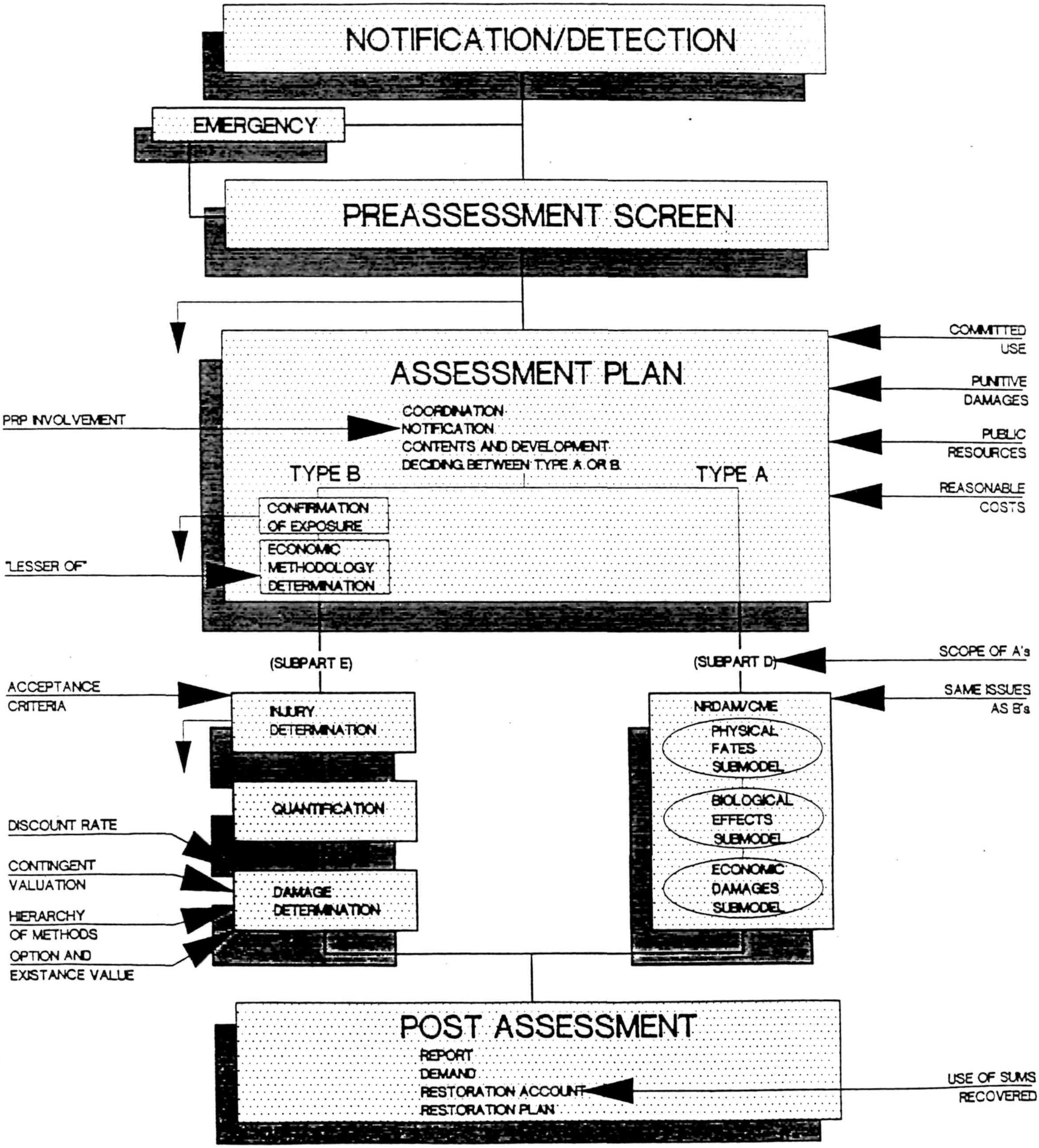
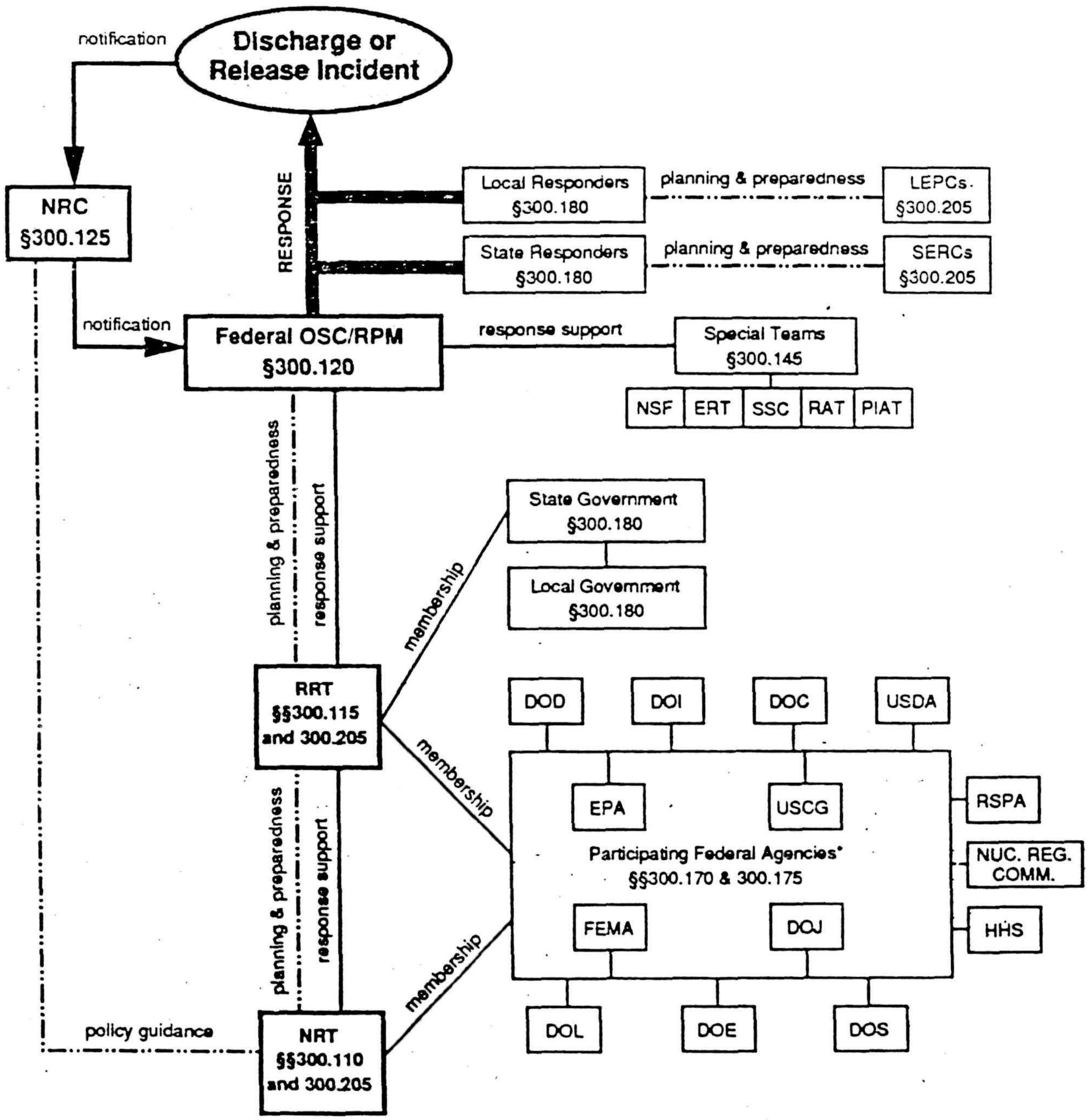


Figure 1

National Response System Concepts



*The same federal agencies participate on both the National Response Team (NRT) and the Regional Response Team (RRT). Federal agencies on the RRT are represented by regional staff. Abbreviations used in this figure are explained in §300.4.

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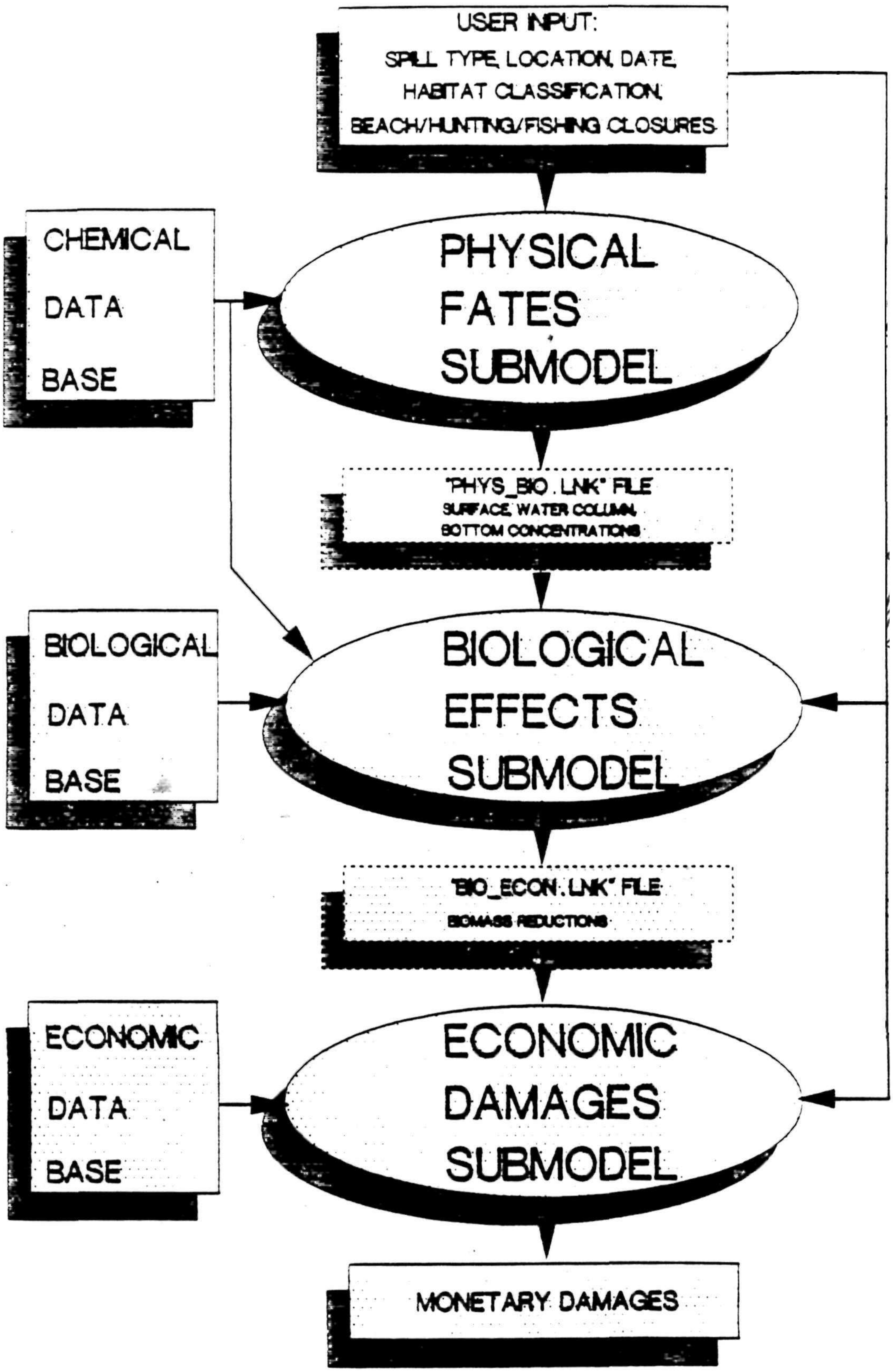
NRDA TYPE A PROCEDURES

MODEL SYSTEM OVERVIEW
NRDAM/CME



COASTAL AND MARINE ENVIRONMENTS