SECTION IV: CONCLUSIONS AND RECOMMENDATIONS

IV-A. CONCLUSIONS

The results of the six-month interdisciplinary study on oil spill prevention and control on Puget Sound have been documented in the preceding sections and the appendices. The list of conclusions below present a capsule summary of the subject matter in this report; where applicable, reference to specific portions of the text is noted.

1. The oil industry is but one of several economically vital industries which rely on the Puget Sound waters for their survival in the Northwest. Therefore, all sectors must strive to achieve a unified effort in preserving this asset.

2. The presently accepted method of determining the value of resources is based on economics. But the value assigned to a given resource is that which is perceived by interested groups and not society in general. (Section II-D, III-B, part 2.)

3. The potential sources of oil spills in the Puget Sound area are well known. These include both large and small volume discharges. (Section III-A.)

4. The probabilities of a spill from these sources and/or the expected quantity spilled are not accurately known. (Section III-A.)

5. Estimates of the quantity of oil discharged in an oil industry related accident (i.e., during transport, transfer, or production) is fairly accurate under ideal visibility conditions. Estimates under adverse weather conditions can attain high accuracy by deductive techniques, but these results are achieved too late to initiate any effective cleanup response capability. (Section III-A, Appendix 12.)

6. The quantity of oil discharged by pleasure boats, municipal sewer systems, industrial effluence, or consumer disposal would be difficult to assess by any means, because of the high frequency of occurrence and small amounts involved per incident. (Section III-A.)
7. There presently is no detailed, comprehensive inventory on the biological and other natural resources that inhabit the waters of Puget Sound. This report has attempted to initiate action to fill this void. (Section II-2.)

8. The effects of petroleum products, either refined or crude oil, on the biological resources are not fully understood. There is evidence of both long-term and short-term damage. (Appendix 14.)

9. There presently exists no scientific technique for evaluation of resources inherent to assigning protective priorities during an oil spill. This report proposes a mechanism for achieving this end. (Section III-B, Part 2.)

10. The effects of an oil spill on the profitability of the commercial fishing industry are known. The economic loss of a ban on sale of a given seafood product line can be accurately estimated. (Section II-D.)

11. The effects of an oil spill on tourism, pleasure boating and sport fishing are predicted to be economically detrimental but the extent is not known. (Section II-D.)

12. The response capability required to clean up an oil spill on Puget Sound is at best minimal, and most likely unknown. This applied to contingency plans as well as manpower and equipment. (Section III-B, Part 1, Appendix 12.)

13. Commercially available containment and cleanup devices have demonstrated high levels of effectiveness in calm water, ideal visibility conditions. However, their performances under adverse conditions is questionable. Integrated containment cleanup systems are needed to cope with the variety of environmental conditions on Puget Sound. (Section III-B, Part 3, Appendix 5, 6, and 12.)

14. Data collection techniques on oil spill statistics is at best, primitive and fragmentary. (Sections III-A; III-C, Part 1; and Appendix 13.)
15. Prevention techniques for waterborne transportation of oil are mostly in the planning stages. Their effect on Puget Sound waters will not be felt for several years. (Section III-C, Part 1.)

16. Prevention techniques utilizing low cost, well planned traffic controls are effective short-term solutions to the ship collision problem. (Section III-C, Part 2.)

17. Prevention techniques for vessel/shore oil transfer operations satisfy current Coast Guard regulations. But their effectiveness in preventing an actual oil spill is questionable. Table III-C3 summarizes the findings of the study team surveying eleven facilities. (Section III-C, Part 4, Appendix I.)

18. Historical data on oil industry efforts in water conservation have indicated that, at best, a minimum level has been expended. (Section II-E.)

19. The value of visually tracking an oil spill or visually assessing water quality subsequent to a cleanup operation is questionable. "Out of sight, out of mind," is not an adequate criteria for environmental protection. (Appendix 12.)

20. A computer-based model for tracking the behavior of an oil spill would be feasible for Puget Sound, given an accurate assessment of the environment. (Appendix 8.)

21. The Washington State government has not backed up its laws on oil spills with the necessary resources to effectively prevent and control these spills. The most apparent shortcomings are manpower and funds. (Appendix 2.)

22. With regard to oil spill prevention and control, the regional offices of federal agencies are merely extensions of the central headquarters. While it is important to have uniform management control functions to cope with oil spills on the national level, operational controls of the regional office should be adapted to the local conditions, and not stated in general terms. (Section III-B, Appendix 2 and 7.)
23. Because of the proximity of Puget Sound to international waters, the technique for oil spill cleanup and prevention should be compatible with international regulations. This applied especially to Canadian regulations governing oil spills. (Appendix 4.)

24. Detailed data needs to be collected and refined before any probability results on ship collision and oil spills in Puget Sound can achieve acceptable levels of accuracy. (Appendix 13.)
IV-B. RECOMMENDATIONS

Recent events are providing evidence that increasing concern on the oil-on-water problem is surfacing in the Puget Sound region. Historically, the time delay between awareness and action has been the most significant roadblock to effectiveness. Hopefully, this barrier is slowly being lifted.

A bill was introduced June 16 of this year, by Senator Magnuson and Hart regarding the environmental quality and protection of ports, harbors, and navigable waters in the U.S. It will increase penalties imposed on transport of hazardous cargo, including oil, and give the USCG powers to establish regulations to prevent damage to water resources. Other recent developments in governmental regulations with respect to oil spills include a set of proposed USCG rules. Though these will not be implemented for some time, they include provisions for double bottomed tank barges, minimum lighting requirements for oil handling terminals, and approved operational instructions for oil transfer. In addition, the 13th Coast Guard District is gearing up its manpower level capable of monitoring 90% of oil transfer operations in the Puget Sound region for the next six months.

EPA has established guidelines to:

1. establish minimum criteria to plan and implement state, local and regional response capability;
2. identify critical water use areas;
3. incorporate interconnecting communication systems between the various agencies;
4. inventory containment and cleanup equipment on the local level;
5. develop agreements with third party contractors; and
6. specify priorities for resource protection.

It must be emphasized to EPA that these goals are indeed honorable, but that until the regional officers are given the authority and necessary resources to initiate action, the guidelines will remain only dreams.

The Washington State Oil Cooperative has set forth plans to examine their response capability, with the goal of integrating manpower and equipment of individual facilities into an interfirm response plan. Implementation date of this plan is not available at the present time.
The Boeing Company has surfaced on two fronts of the oil-on-water problem. There are reports that the firm has developed a surveillance and cleanup system utilizing a 727 airplane and sorbents. No details are presently available. In addition, it is engaged in the design of an oil waste process and plant in Boardman, Oregon, a city located on the Columbia River in the northeast part of that state. Current plans call for transporting oil wastes from as far as Portland to that site.

Based on the findings summarized in Section IV-A, recommendations have been made in this report on improving the total effort of oil spill control and prevention on Puget Sound, along with the predicted benefits. The following outline summarizes these suggestions, assigning recommendations to the party responsible and capable of their implementation.

1. Oil Industry

   a. Improve inter- and intra-communication and eliminate ambiguity when disseminating information.

   b. Critically examine oil spill response capability of individual facilities. This includes the assessment of manpower, equipment, and environmental conditions. Update capability where necessary.

   c. Provide funding and guidelines to evaluate state-of-the-art oil spill containment, cleanup, and prevention equipment. Assistance and advice to such equipment manufacturers will increase the overall effectiveness of abatement techniques.

   d. Examine the value of, and compliance with the present prevention regulations set forth by state and federal agencies. Suggest improvement where deemed necessary.

   e. Point up the necessity for improved surveillance techniques, both for oil-on-water sensing, and the tracking of an oil spill. This entails taking a wider viewpoint, than which exists presently, on the facility location studies.
2. **Other Industries, Special Interest Groups, and Academia**

   a. Critically examine all possible sources of potential oil spills, and initiate corrective action where necessary. This includes prompt and accurate reporting of spill incidents.

   b. Assume a wider perspective than that of self-interest in viewing the oil-on-water problem in Puget Sound.

   c. Establish criteria for environmental quality that are both realistic and relevant. Include the valuation of resources in the criteria, where available.

   d. Provide manpower and equipment to manage and operate a continuous monitoring of the inventory of Puget Sound resources.

   e. Provide manpower and equipment to conduct studies on the consequences of oil on Puget Sound resources. This includes prediction of short-term and long-term effects.

   f. Develop techniques to monitor waterways to enhance the capability for detection of oil-on-water.

   g. Develop positive incentives for the proper disposal of waste oils.

   h. Critique the resource protection techniques presented in this report. Suggest improvements or modifications where necessary.

   i. Evaluate the cost-effectiveness of a traffic control system for Puget Sound, and the possibility of expanding the utilization of such a system to other fields.

   j. Carefully research and accurately document technical data when providing support evidence in reports and testimonies. Nothing discredits an argument quicker than to misquote quantitative information.

3. **Washington State Government Agencies**

   a. Provide the necessary funding and guidelines for a detailed study to inventory Puget Sound resources.

   b. Provide funding and manpower to adequately enforce State statutes related to oil pollution.
c. Make public the state oil spill response plan.

d. Integrate its role in oil spill response capability with that of the federal government.

e. Critically examine oil transfer and discharge operations of state controlled vessels (i.e., ferries, patrol boats). Insure that proper techniques and devices are onboard to prevent the possibility of a spill.

f. Examine the State of Maine's Coastal Conveyance of Petroleum Act for applicability to the waters of Puget Sound. In particular, consider their plans for funding cleanup capabilities.

g. Resolve conflicts with federal agencies on the definition of water quality and environmental standards for Puget Sound.

h. Update waterborne commerce log procedures. Require vessels to provide timetable of travel on Sound, including all destinations, cargo transfers, and fueling operations.

4. Federal Agencies

a. Adapt oil spill related operational controls to the local environment of Puget Sound.

b. Develop and train personnel to become locally oriented in their responsibility and decision making logic.

c. Insure compatibility between state and federal statutes.

d. Insure prompt implementation of international oil spill prevention resolutions.

e. Provide liaison to international organizations on the efforts and progress of oil spill abatement in the United States. Obtain commitments from foreign governments to reciprocate accordingly.

f. Provide funds and guidelines to investigate short- and long-term effects of oil on biological and other natural resources. This includes the selection of technically capable parties to participate in such studies.
g. EPA should evaluate the cost effectiveness of their Northwest regional post-spill assessment capabilities. This includes both the management and operation involved.

h. Provide stiffer regulations on the shipping industry to prevent purposeful discharge of oil onto the waters of Puget Sound. This may require the implementation of an integrated surveillance network for the area.

i. Evaluate the cost-effectiveness of computer based oil spill surveillance as compared to the state-of-the-art. Job security should not be a criterion in the retention of outdated techniques.

j. Initiate a mechanism to provide prompt retrieval of information for interested parties. This includes, historical oil spill data, incidences for violation of regulations and ship collisions.

The following general recommendations are made for regional studies and data required for evaluating the oil spill contingency planning in any given region. The information necessary is identified only according to its impact in a potential spill situation and hence only certain aspects of a particular body of data are indicated. No ordering of importance or priority is implied by the order of items presented in this note.

1. Oceanographic Data. The extent and accuracy to which current patterns in a given region are known must be defined. Available information must be presented in a form easily used in field work by personnel not necessarily trained in the reading of tide and current tables; thus graphical or chart representation is desirable. Gross current patterns in mid-channel of large passages usually suffice. Considerable detail in terms of surface current, turbulence, sub-surface reverse currents must be available in the vicinity of ecologically sensitive areas which must be protected from oil influx. The location, extent and strength of tide rips should be known throughout the potentially threatened area. Fresh water inflow and amount of silt carried (silt acts as a sinking agent, causing possible sub-surface suspended oil concentrations; c.f., San Francisco spill) must be known by time of year. Detailed current data should be available for all terminal locations. Potential wave conditions
under varying extremes of wind known to occur in the region must be identified by area so that effectiveness of available mechanical devices may be assessed prior to deployment.

2. **Meteorological Data.** Wind and visibility conditions in the threatened area must be monitored so that this information can be integrated with current information to assess potential effectiveness of available equipment. Data should be sufficiently dense to formulate local forecasting. The accuracy of existing weather forecasting for the given area should be evaluated on a continuing basis. Peculiarities in wind patterns due to local topography should be readily available.

3. **Topography, Bathymetry.** The bathymetry of a given area should be available in a form such that identification of shallow areas of less than one meter or 1/2 fathom depth by tidal conditions is readily available. (No effective clean-up equipment exists which operates in shallow water areas.) All areas of less than 20-fathom depth should be identified - the bathymetry information should be available in chart form for rapid retrieval. General bottom characteristics - rocky, muddy, etc., should be identified. The surrounding shoreline topography at high and low tide should be identified by type and constituent material - rocky, sandy, mud flats, reeds and grass, etc. Vehicle and personnel access to shoreline from the land must be identified and where nonexistent, feasibility established.

4. **Biological Resource Inventory.** The biologically sensitive areas in region must be identified by type, seasonal and geographical sensitivity. For each sensitive area, detailed topography, bathymetry and current information must be available. Since usually there are only few such areas in a given region, detailed protection plans for each should be available and appropriate equipment identified. Biological baseline data - such as would be determined in evaluation of post-spill effects - should be available for these areas.

5. **Protection Priority Evaluation.** Predetermined priorities must be established as to resource protection in the event of a spill. Areas that may be intentionally contaminated to protect a resource should be identified and the social and legal consequences of such action studied.
6. **Oily Waste Disposal.** Areas for disposal of oily waste, contaminated sorbents and debris must be identified. Studies of ground water flow, drainage and soil stability at potential disposal sites should be made to insure that waste disposal poses no further hazards.

Specific contingency plans should be checked out via "fire drills" in order to identify communications, administrative and logistical problem areas. Theoretically estimated reaction times under ideal to adverse conditions should be verified or modified by use of fire drills - these also serve actual personnel training functions. The plans should then be modified based on the drill experience. Problems of tracking, monitoring and predicting spill movement under adverse conditions - fog, darkness, sea state - should be evaluated. The listings of available equipment and services should be periodically checked, updated and verified. Checks on at least one contingency plan revealed 20 - 30% of the telephone numbers listed were invalid. In addition, availability of equipment and mobilization times from neighboring regions should be determined and updated (this implies close liaison between regions in terms of industry, state and federal agencies responsible in oil pollution problems). Provisions, both financial and logistical, should be made for immediate activation of damage assessment studies to provide knowledge and understanding of the effects of spills. Such knowledge can then be used to modify accepted contingency plans and clean-up procedures.
ENDNOTES SECTION IV

1 Senate Bill: S. 2074 -- To Promote the Safety and Protect the Environmental Quality of Ports, Waterfront Areas, and the Navigable Waters of the United States, June 16, 1971.

2 Initial public hearing scheduled for October 4, 1971.


5 Seattle Times, August 19, 1971, p. 1
