



# OIL ON PUGET SOUND

AN INTERDISCIPLINARY STUDY IN SYSTEMS ENGINEERING

Directed by JURIS VAGNERS and coordinated by PAUL MAR

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The full implications of water-borne oil transportation on the environmental, economic, and social quality of the greater Puget Sound region are the subject of this report prepared in a graduate systems engineering course sponsored by the Washington Sea Grant program at the University of Washington.

Twenty-seven students, representing thirteen disciplines ranging from engineering to business administration and from fisheries to law, describe the natural resources and industries of this unique estuarine environment, identify potential sources of oil spills, and evaluate the effectiveness of agencies and methods presently available to prevent oil spills and to contain and clean them up when they occur. A summary of the legal issues—local, national, and international—provides a perspective for appraising proposed regulatory legislation.

This report offers data basic to more detailed studies of problem areas in Puget Sound as well as other critical estuarine areas exposed to potential oil pollution, and will be of interest to all who are seriously concerned with the difficult decisions that remain to be made concerning the future of such areas.

Juris Vagners is assistant professor of aeronautics and astronautics at the University of Washington. At the time the report was written, Paul Mar was a graduate student in business administration and a member of the class.

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An Interdisciplinary Study in Systems Engineering



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**Supervised by JURIS VAGNERS**

**Coordinated by PAUL MAR**

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## PREFACE

As part of the University of Washington's goal to adapt academic talent to solve real world problems, a six-month interdisciplinary course was formulated to study the prevention and control (containment and cleanup) of oil spills in Puget Sound. Administered by the College of Engineering Committee on Ocean Engineering as OE 551 and 552, students and faculty from various disciplines within the campus were integrated to study this timely and controversial topic. The graduate schools of business, fisheries, geography, law, and the various schools within the College of Engineering were represented.

The objectives set forth at the beginning of the study were to define the oil spill problem in Puget Sound and to formulate a model for the solution of the problem. The study group discovered, as the study progressed, that identifying the sources and consequences of oil spills was a most time-consuming task. If solving a problem warrants a ten dollar reward, then definition of that problem should be worth at least one hundred dollars. At least this was the sentiment of the group upon completion of their study. Thus, the primary efforts of the students were in collecting, analyzing, and evaluating data on Puget Sound and its related oil industry. It was only after completion of this tedious task that a meaningful solution could emerge.

The tempo of this report is to critically evaluate the current status of oil spill prevention and control in Puget Sound, and to suggest recommendations to alleviate any noticeable deficiencies. In this day of public outcry for environmental conservation, many have been accused of casting stones upon previously accepted and long established practices. This is evident in this report in terms of the evaluations. But it also has been a demonstrated fact that recommendations for altering existing institutions go unheard until these stones have been thrown.

The study has been performed with a minimum of bias, and as much as possible, without undue influence or pressure from self-interest groups. As the reader progresses through the text, he will quickly

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perceive that there are no pure angels, no pure devils. All the groups evaluated in the report are aware of the oil pollution problem, though their actions frequently reflect only their narrow view of the problem.

For the results of this study to evolve into an effective solution to the oil spill problem, the organizations involved, and the people within them, must consent willingly to change. Nothing could be worse than blindly instituting some legislation, technique, or procedure without fully understanding or accepting the overall impact of its activation. Too often, such fragmented actions are taken to obtain short run, narrow solutions to problems without evaluating the bigger picture.

Historically, plans to cope with oil spills have emerged as the aftermath of disasters, or have been formulated in a vacuum, without considering the implication or consequence of such plans. Therefore, the most important message of this report is: The environmental preservation of the Puget Sound region requires the coordinated effort of all responsible and capable parties, whether they represent society or industry.

Endnotes have been used throughout the reports and have been tabulated at the end of the various subsections, rather than inconvenience the reader with one gigantic list. A bibliography of the data sources is listed in Section V.

The status of the technical information in this document is as reported up to August 30, 1971.

## ACKNOWLEDGMENTS

This report is the result of a two-quarter graduate systems engineering course, Ocean Engineering 551 and 552, conducted by Juris Vagners, Assistant Professor of Aeronautics and Astronautics at the University of Washington, during the Winter and Spring quarters of 1971. Special thanks are accorded to Dr. Vagners for his role as coordinator and advisor, and to his faculty team. Also, a word of praise is due the two very capable student leaders from OE 551 and 552, Robert Stockman and Roger Harman, respectively. Lastly, a very deserving word of thanks is extended to the many members of industry, government, and academic institutions who provided the valuable inputs for this study.

As is typical with most studies, documentation of the study efforts for this project became a monumental task. Special thanks are given to the secretaries of the Department of Aeronautics and Astronautics and the Division of Marine Resources for their long hours. As with most scientific reports, the final writing efforts are usually borne by a very few. The sweat and toil of composing the contents between these covers belongs to the following group: Greg Bargmann, Robert Behm, John Cathey, Jacques Durringer, Charles Gundersen, Roger Harman, Charles Klabunde, Tim Larson, Mark Longmeier, Paul Mar, Terje Melkstavik, Michael Redfield, Chris Rusch, Robert Stockman, John Von Ries, and James Walsh.

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