Appendix A—Assessment of OCS Oil and Natural Gas Resources

The undiscovered conventionally recoverable oil and natural gas resource estimates included in this report are based on information contained in the OCS Report (MMS 96-0034) entitled, *An Assessment of the Undiscovered Hydrocarbon Potential of the Nation's Outer Continental Shelf*, published by the Minerals Management Service in 1996. This appendix includes the principal geologic information on which these resource estimates were made. The MMS used a play analysis approach for this assessment. A play is defined as a group of oil/natural gas accumulations that share a common geologic history. A play is classified based on the availability of geological, geophysical, and geochemical data, the stage of oil/natural gas detection and discovery, and the degree of confidence in the play concept as established (confirmed by test drilling), frontier (confirmed by detection), or conceptual (no physical confirmation). A series of maps follow that show the play analysis for areas under moratoria.

Appendix B—Summary of the National Research Council's Recommendations on the Environmental Studies Program and the MMS's Responses

Upon completion of its full review of the ESP (the reports on physical oceanography, ecology, social and economic studies, the "Presidential Task Force," and Georges Bank), the NRC completed a summary report in 1993 in which they provided programmatic recommendations and priorities for MMS and the ESP.

To help prepare this report, the subcommittee discussed with MMS staff these NRC reviews and how the MMS had responded to the reviews. The following background information was prepared by the MMS and was used as the basis of discussion at the subcommittee's April 1996 meeting. The recommendations and priorities listed in the left column are taken directly from the NRC's Summary Report *Assessment of the U.S. Outer Continental Shelf Environmental Studies Program: IV. Lessons and Opportunities*. The responses in the right column represent the MMS staff opinion addressing the NRC recommendations as of April 1996.

Recommendations—Lessons and Opportunities

Recommendation 1. The ESP should receive continued support and strengthening to meet its mandated objectives to provide information to predict, assess, and manage environmental impacts of OCS oil and gas development. Recommendations of the previous reports in this series, concerning physical oceanography, ecology, and social and economic studies, should be fully implemented.	**MMS Response:** We concur in this recommendation. There has been added MMS management support and oversight of the ESP to ensure studies are being done that are necessary for decisions. However, similar to other Federal Government programs, the ESP has received a smaller budget since 1993. In addition, MMS has more responsibilities for sand and gravel projects, but without additional funding.
Recommendation 2. **General Recommendation:** There is an urgent need to strengthen significantly the ESP conceptual framework within which credible science can proceed to acquire the environmental information needed for decisions about OCS oil and gas activities.	**MMS Response:** Develop ESP Strategic Plans and a 2-year cycle. Developing stronger assurance that studies are linked to OCS Lands Act-related decisions needed for areas with most upcoming activity.
Specific Recommendations: **2a.** MMS should strengthen the role and pay greater heed to the advice of the OCS Advisory Board's Scientific Committee, and key officials in MMS and the Department of the Interior should use the Scientific Committee more effectively in the interpretation and application of environmental information in the OCS decision-making process. The Scientific Committee should have a separate budget within MMS and staff persons whose main responsibilities are to support its mission.	**MMS Response:** Overall we would say we are "heeding the advice" better, but not perfectly. Chair and Vice Chair meet regularly with MMS Director. Scientific Committee meetings have been reformatted to key in on several "strategic" topics. This Policy Committee/Scientific Committee subcommittee is an example of advice being sought by MMS management. Scientific Committee members are invited to participate in design/review of key studies. Scientific Committee budget and staff support come from ESP, but is not totally separate due to staffing restrictions.

2b. MMS should recognize the importance of socioeconomic research and assessments to the successful management of OCS resources and should execute a more effective nationwide socioeconomic research program. A nationally coordinated socioeconomic studies program would allow for comparisons among regions, for overall priority setting, and for coordination of studies across disciplinary lines. (The OCS Advisory Board's Scientific Committee made a similar recommendation that was not given sufficient priority within MMS.)	**MMS Response:** We have been attempting to do this. More social and economic studies have been funded and planned in each area. Working with the Scientific Committee on developing the overall "national guidance" on social and economic studies, however, progress has been slow. Regional workshops have been held in Gulf of Mexico and Pacific to help develop a social and economic studies agenda. We have recently lost key social and economic staff in several locations. Current staffing is limited, and has been affected by overall government downsizing. (Also see 2d.)
2c. MMS should place a high priority on a review by its Scientific Committee of current ESP programs in the Gulf of Mexico region with the intent of significantly enhancing the generic and regional studies of that area.	**MMS Response:** Over the last several years, MMS has given Gulf of Mexico studies much higher priority. Major efforts in oceanography, monitoring, marine mammals, social and economic studies have been made. The ESP Strategic Plan allows the Scientific Committee to give more strategic advice on GOM studies. Scientific Committee members are involved in "future" issues, such as the cross-cutting lease abandonment issue.
2d. MMS should take additional steps to attract and retain qualified scientists for its ESP staff. Career paths should be available for advancement within MMS on the basis of merit in science and in the applications of science. Exchanges of personnel with other agencies, industry, and the academic sector (using Intergovernmental Personnel Act anointments and appointments of visiting scientists) should be used to foster long-term professional ties between the ESP and the professional scientific community.	**MMS Response:** We agree, but the recent downsizing has made this difficult. We are emphasizing more "sharing of staff" throughout the bureau (i.e. each office may not have a full complement of staff.) Future changes in personnel rules may make "non-supervisory" career paths easier. We have had limited exchanges of personnel.

Recommendation 3. MMS should emphasize studies that address the effects of the exploration, development, and production phases of OCS activities. These studies should include a mix of generic long-term studies and site-specific studies and should focus on the long-term effects, or lack thereof, of exploration, development, and production.	**MMS Response**: We have attempted to make this shift. We have focused much more than in the past on the Gulf of Mexico. Began/continued several long-term monitoring studies: GOOMEX in the Gulf of Mexico; CAMP in California; Flower Gardens in the Gulf of Mexico; whale monitoring during drilling in Alaska; chemosynthetics in the Gulf of Mexico; lease abandonment issues; air quality in the Gulf of Mexico; NORM physical oceanography is more useful for contingency planning. Coastal Marine Institute's (CMI's) in Louisiana and California aimed at postlease activities.
Recommendation 4. MMS should expand its ESP to include more of the potential or known effects of activities on nearshore areas and on land.	**MMS Response:** We have attempted to do this: wetland studies; social and economic studies on onshore communities; oceanographic studies include nearer shore waters; bird rookeries; COOGER in California; main part of our CMI's has been to do research of mutual concern to coastal States.
Recommendation 5. MMS should integrate its modeling and field programs better to improve environmental assessments. This integration should be the focus of a longer term assessment of the effects of exploration, development, production, and termination of OCS activities.	**MMS Response:** This comment was especially aimed at our reliance on oceanographic circulation models used for our oil—spill modeling. We now try to ensure that our field programs that gather observational data are fully coordinated with our oceanographic circulation modeling efforts. This has been done for the LATEX program in the western and central Gulf of Mexico and our efforts with Scripps in California, and is now being done as we begin a program in the eastern Gulf of Mexico. Likewise our circulation model for the Atlantic coast area used observational data for skill assessments.

Recommendation 6. MMS, in concert with other Federal and state agencies and industry, should incorporate appropriate monitoring of postleasing impacts in its environmental studies. The OCS Advisory Board's Scientific Committee should develop recommendations about monitoring the biological, physical, and socioeconomic effects of OCS activities, for example, to ascertain how this information is used in managing environmental risk, to improve the use of information, and to show how the data could be used in the development or validation of models of long-term effects. MMS should make use of data from state agencies and industry as appropriate. Of course, the adequacy of these data should be evaluated by MMS.	**MMS Response:** We have developed postlease monitoring studies; examples: GOOMEX in Gulf of Mexico(now done by the U.S. Geological Survey/National Biological Division (USGS/BRD)); CAMP in Pacific (with USGS/BRD); whale monitoring during operations in Arctic (coordinated with National Marine Fisheries Service); Flower Gardens monitoring (with National Oceanographic and Atmospheric Agency (NOAA)); joint work with DOE in Gulf of Mexico (produced waters, NORM); MMS inspectors perform EPA National Pollutant Discharge Elimination System related tests; more overall emphasis in the GOM Scientific Committee has assisted on some specific projects, primarily validation of physical oceanographic models. Scientific Committee - social and economic national procedures will address social and economic monitoring.
Recommendation 7. MMS should expand the ESP's University Initiative to include more OCS regions, as it currently plans to do. It should consider the pool of eligible researchers and the amount of peer review. For example, a university in one region might have many of the professional and other resources needed to study various aspects of the Outer Continental Shelf, but it will not have, nor should it be expected to have, all of the high-quality resources needed to address all studies in the region pertinent to OCS activities. The University Initiative should coordinate and focus nationwide talent on particular regional problems.	**MMS Response:** Converted the University Initiative (UI) program into the CMI program, which includes matching State funds. Expanded to include Louisiana, California, and Alaska. Researchers from other institutions and States are allowed, but have had varying success. Scientific Committee will be reviewing to see whether other changes should be made, for example more consortium approach and improvement of peer review. Scientific Committee assists in overall oversight of the CMI's, and was very instrumental in straightening out some early problems with the original UI's.

Recommendation 8. The advent of significant initiatives in coastal oceanography and coastal marine monitoring by Federal agencies such as the Environmental Protection Agency, the National Science Foundation, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, and the National Aeronautics and Space Administration makes this a good time for MMS to continue productive partnerships and to forge new partnerships with these agencies to make the best use of the nation's financial resources and scientific personnel to meet MMS's -- and the nation's -- needs.	**MMS Response:** MMS continues to cooperate with other federal agencies when it is beneficial to both. MMS has special relationships with USGS and the USGS/BRD within DOI, and also with the Fish and Wildlife Service; has a number of joint efforts with NOAA (with National Ocean Service, National Marine Fisheries Service, National Data Buoy Center); EPA; and also has relationships with DOE, DOD (the Navy).
Recommendation 9. The ESP's budget should be reviewed by the OCS Advisory Board's Scientific Committee, and recommendations should be sent to the Director of MMS and to the Secretary of the Interior, keeping in mind the priorities discussed below. Budget requests should be explicitly related to those priorities and to demands by Congress and others for specific information.	**MMS Response:** The Scientific Committee has become more involved in budget discussions with the MMS Director. For example, they have expressed concerns over the information demands faced by the ESP while the budget has declined, and likewise over the new demands faced by the ESP from the new efforts of the sand and gravel program.

Priorities -- Lessons and Opportunities

Priority 1. MMS's first priority should be to strengthen its relationship with its own Scientific Committee and to develop a national perspective for the ESP.	**MMS Response:** MMS has attempted to do this, as discussed in Recommendation 2 above.

Priority 2. This NRC Committee (BEST Committee to review the OCS ESP) cannot--and should not--prescribe a detailed plan of studies for the ESP. Because factors change continually, it can only give broad guidance. The process of deciding how much science is enough should be a process whereby scientific knowledge provides to decisionmakers an assessment of potential impacts and risks--including the range of uncertainty--associated with an action. The response to scientific uncertainty need not always be the commissioning of additional studies. Issues such as cost of time, money, and human resources, and the cost of meaningfully reducing the uncertainty should be considered, and any decision whether or not to conduct further studies should have a rational basis that can be documented.	**MMS Response:** MMS has carefully tried to evaluate the need for each study, to ensure that will contribute to information that decisionmakers will need, and that can contribute a meaningful amount of new information.
General Priority 1. MMS should continue to improve the integration of modeling and field studies, particularly in physical oceanography, although the advice applies to all disciplines.	**MMS Response:** As noted by the NRC, and as encouraged by the Scientific Committee, MMS has made very positive strides to do this, as witnessed by the integration of modeling and field observations in the Gulf of Mexico and in southern California. See Recommendation 5 above.
General Priority 2. MMS should develop a coherent socioeconomics program in regions other than Alaska.	**MMS Response:** MMS has put more emphasis on social and economic work in the Pacific and Gulf of Mexico Regions. Both regions have held workshops to help develop regional agendas and priorities. The MMS continues to work with the Scientific Committees to develop an overall national guidance document for social and economic. Also see Recommendation 2b.

General Priority 3. MMS should seek to elucidate the *long-term* biological, social, and economic effects of OCS oil and gas activities. The ESP should study those areas where there has been activity--the central and western Gulf of Mexico and southern California--rather than only the areas where potential new activity is contemplated. If MMS cannot learn from areas with leasing, exploration, development, production, and phasing out of production, it will not be able to mitigate damage and less able to provide essential information to decision makers and the public.	**MMS Response:** MMS has devoted more resources to the Gulf of Mexico and to southern California. See Recommendation 3 & 4. Plus, MMS has attempted to summarize its conclusions about the effects from actual OCS activity in its OCS Lands Act sec. 20(e) Cumulative Effects reports.

Appendix C—Subcommittee Members

Larry P. Atkinson (CO-CHAIR), Old Dominion University, Norfolk, Virginia.

Warner Chabot, Center for Marine Conservation, San Francisco, California

Kim Crawford, North Carolina Division of Coastal Management, Raleigh, North Carolina

Donald Michael Fry, University of California at Davis, Davis, California

William R. Herrin, Chevron U.S.A. Production Company, New Orleans, Louisiana

Lee Huskey, University of Alaska at Anchorage, Anchorage, Alaska

Ernest A. Mancini (CO-CHAIR), University of Alabama, Tuscaloosa, Alabama

Lisa Polak, Executive Office of the Governor, Tallahassee, Florida

James P. Ray, Shell Oil Products Co./Shell Chemical Co., Houston, Texas

Subcommittee Meetings

February 27, 1996, Herndon, Virginia
April 19, 1996, Herndon, Virginia
June 11-12, 1996, New Orleans, Louisiana
August 6, 1996, Herndon, Virginia
September 19, 1996, Herndon, Virginia
December 9-10, 1996 New Orleans, Louisiana
February 20, 1997, Teleconference

Subcommittee Staff

John Goll, Minerals Management Service, Herndon, Virginia

Terry Holman, Minerals Management Service, Herndon, Virginia