

Oil Technology

Funding Profile by Subprogram

(dollars in thousands)

	FY 2003 Comparable Appropriation	FY 2004 Comparable Appropriation	FY 2005 Base	FY 2005 Request	FY 2005 Request vs Base	
					\$ Change	% Change
Petroleum – Oil Technology	40,983	35,078	35,078	15,000	-20,078	-57.2%
Total, Petroleum – Oil Technology	40,983	35,078	35,078	15,000	-20,078	-57.2%

Mission

The mission of the Oil Technology Program is to implement a policy, science and technology development program to resolve the environmental, supply, and reliability constraints of producing and using fossil energy resources. We do this by investing in research with clear and tangible public benefits and by developing policy options. These benefits include a cleaner environment, more secure and stable energy supplies, and increased domestic oil production.

Benefits

Each year Fossil Energy estimates the benefits of program activities to support Government Performance and Results Act (GPRA) reporting. Methods are complex and vary by program. The oil and Gas Programs have traditionally used two separate economic and engineering modeling systems to calculate selected economic and energy security benefits. In 2002, a two-year effort, involving external peer review, was begun to integrate these two separate modeling systems into one system for improved simulation of resource and market conditions, and consistency of technology assumptions and model outputs. Under the previous two model systems, deficiencies, such as the assumption of unlimited industry capital availability, could result in an overestimation of industry’s response to DOE’s R&D products. Conversely, deficiencies, such as only modeling upstream R&D activities and not calculating the synergistic benefits of oil and gas R&D efforts, could result in an underestimation of the benefits of DOE’s programs.

The new model will provide the following expected benefits:

- Complimentary technology development in oil and gas research.
- Full R&D program activities can be modeled.
- Ability to calculate synergistic benefits of both programs.

As part of the effort to conform to the President’s Management Agenda in a shorter-term, Fossil Energy has undertaken an integrated program benefits analysis of oil, natural gas, coal and power systems research within Fossil Energy to develop Fossil Energy-wide program benefits estimates. This analysis,

using the Energy Information Administration National Energy Modeling System (NEMS), is examining all Fossil Energy research programs on a common basis with respect to modeling assumptions and should enable aggregate and comparative assessments of the benefits of Fossil Energy research programs.

Background

Fossil Energy programs have been realigned to support the President's climate change and energy security goals. The Oil Technology Program increases energy security by facilitating environmentally responsible oil and gas exploration and development. The President's National Energy Policy emphasizes that 21st century technology is the key to environmental protection and new energy production.

The program's focus is on areas that require a Federal presence to achieve national energy goals. The budget delineates program goals, such as Enhanced Oil Recovery/CO₂ Injection, Domestic Resource Conservation, and Environmental Science, as funding categories. For example, the President's climate change goal will be met by research and technology development that supports effective management practices of carbon dioxide and other greenhouse gases. CO₂ injection supports this goal by revitalizing domestic energy production while storing carbon. When appropriate, collaborations with other Federal agencies, industry, academia, and states are used to meet program goals.

America's energy security is enhanced by research and technology development to support a vibrant U.S. oil and gas industry that will continue to be the base for global exploration and production. The Oil Technology Program includes research to support solid policy decision-making and technology development to allow greater access to energy resources with minimal environmental impact.

Strategic and Program Goals

The Department's Strategic Plan identifies four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that tie to the strategic goals. The Coal and Other Power Systems program supports the following goal:

Energy Strategic Goal

General Goal 4: ENERGY SECURITY: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Oil Technology program has one program goal which contributes to General Goal 4 in the "goal cascade".

Program Goal 04.57.00.00: Oil Technology, Energy Security: The goal of the Oil Technology program is to enhance U.S. energy security by managing and funding oil exploration and production (E&P) research and policy which results in development of domestic oil resources in an environmentally sound and safe manner

**Fossil Energy Research and Development/
Petroleum - Oil Technology**

FY 2005 Congressional Budget

Contribution to Program Goal 04.57.00.00: Oil Technology, Energy Security

A strong domestic oil resource provides a solid foundation for energy security. The Program accomplishes this goal through the following long-term goal:

- Over the planning horizon (2003-2025), program efforts through public-private partnerships will result in a cumulative economically recoverable reserve increase of 2 billion barrels. The program benefit estimate is based upon the Energy Information Administration's National Energy Modeling Systems (NEMS).

This measure is the cumulative total economically recoverable oil resource added from existing and expected projects. The baseline production is the AEO 2003 Reference case production forecast and price assumptions. Benefits with and without the program will be calculated over the planning horizon via an integrated econometric computer program – the Energy Information Administration's National Energy Modeling System (NEMS). The targets for this measure reflect the cumulative total output through 2025 from the NEMS model analysis. Annually, technology results will be used to update the NEMS parameters to model the program annual outputs and long-term projected outcomes. This analysis is to be repeated retrospectively each year to obtain a comparative actual value reflective of the R&D success. Benefits from natural gas environmental funding are combined with benefits from the oil environmental funding and reported in the oil program.

Annual Performance Results and Targets

FY 2000 Results	FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets
<p>Complete demonstration and transfer of seven advanced secondary and tertiary technologies, adding 92 million barrels of reserves, increasing the number of economic wells and reducing abandonment rates (MET GOAL)</p> <p>Complete field testing and monitoring of two technologies for downhole separation of oil and water, resulting in reduction in produced water and potential increase in oil production per well. (NEARLY MET GOAL)</p>	<p>Complete demonstration of five advanced secondary and tertiary technologies. Based on models, it is estimated these technologies will increase near-term incremental production by 1.7 million barrels of oil, and long-term incremental production by over 2.4 billion barrels of oil. (NEARLY MET GOAL)</p> <p>Demonstrate the field application of a shoulder-mounted, portable video methane leak detection system that can be used to significantly reduce costs of leak monitoring at refineries and other facilities while reducing harmful air emissions. Annual savings of \$500,000 per year per refinery, on average, would result from regulatory acceptance and application of this technology. (BELOW EXPECTATIONS)</p>	<p>Demonstrate a small-diameter, lightweight composite drill pipe for ultra-short radius drilling. (MET GOAL)</p>	<p>Increase access to the domestic oil resources remaining in the reservoir due to lack of advanced technology. Focus on high risk research (award 6 projects and issue 1 solicitation - Micro-hole technologies) for future applications on state and federal lands and waters, and on addressing nearer-term barriers. Select and award 4 projects with independents, and on a regional basis award 4 projects-PUMP. Award 2 projects in Advanced Technologies and select band award projects under the Broad Funding Announcement. (MET GOAL)</p> <p>Advance the state-of-the-art in oil recovery processes by conducting bench tests (in surfactant behavior, and in paraffin deposition) and develop conceptual models and techniques related to chemical flooding, reservoir and flow simulation, reservoir characterization for enhanced oil recovery technologies to increase the amount of oil that can be recovered from discovered reservoirs (MET GOAL)</p> <p>Reduce the number of dry holes drilled in frontier areas, and increase near-term energy security through field testing (3 projects) improved oil recovery techniques, seismic (1 project), data acquisition (2 projects), and interpretation (1 project) in existing light and heavy oil</p>	<p>Enhance access to remaining domestic oil resources using advanced technology by focusing on high-risk research (award 3 projects—Micro-hole technology); issuing competitive solicitation and awarding three projects. Initiate Russian cooperative Research Program; and conduct model integration peer review and industry strategic program review.</p> <p>Advance the state-of-the-art in oil recovery processes by conducting bench tests in surfactant behavior (2 projects); modeling on-conventional reservoirs, studying gel control of water production, developing seismic algorithms to better identify hydrocarbon targets; testing 2 prototypes (3-phase separator and micro-hole completion), modeling sweep efficiency for enhanced oil recovery technologies to increase the amount of oil that can be recovered from discovered reservoirs, and completing tundra modeling and pond work, conducting wettability studies as well as initiating fracture development study.</p>	<p>Develop technologies through 4 projects which will contribute to increasing domestic oil supplies in an environmentally friendly manner.</p>

Annual Performance Results and Targets

FY 2000 Results	FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets
			<p>reservoirs at sites ranging from Alaska to Utah. Initiate full-scale test of newly developed vibration sonic tool. (NEARLY MET GOAL)</p> <p>Stimulate current production through accelerated transfer of technology to U.S. producers, especially small independent companies that have limited exposure to the technology needed to increase the oil resource base through 66 regional workshops, including one on micro-hole technologies, publish 2 newsletters, and 2 reports. (MET GOAL)</p>		

Means and Strategies

Domestic Oil and Gas Supply: Four strategies are the focus of efforts in this program: (1) protecting the environment through enhanced design and efficiency of Domestic oil and natural gas exploration, recovery, processing, transport, and storage operations; (2) supporting technology paths that private companies cannot risk undertaking alone; (3) providing scientific and technological information and analysis to assist policymakers in their decision-making; and, (4) optimizing environmental protection by contributing to science-based improvements in regulations that reduce uncertainties and costs. The strategies related to increasing domestic supplies are achieved by: increasing recovery through lower cost drilling, wellbore improvements, and improved stimulation technology; improving geoscience technologies to locate and measure oil and gas within reservoirs; extending the life of mature oil and gas fields and reducing well abandonment; improving technologies for enhanced oil recovery processes; and modeling estimates of potential economic recovery of domestic oil and gas through a range of technologies, economic criteria, and legislative and regulatory scenarios.

The Oil Technology program will use various means and strategies to achieve its program goals. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

Validation and Verification

The impact of the Domestic Oil Supply program is expanded by: performing R&D activities in partnership with universities, State and local governments, industry, and other stakeholders; using cost-share projects and diverse technology paths to improve chances of success, and to create a direct technology transfer component; seeking synergy of the capabilities of multiple governmental agencies and industry, including the unique capabilities of National Laboratories; collaborating with other agencies to effectively promulgate domestic production technologies; investing jointly with other groups in promising technologies for target resource areas; conducting, with input from National Laboratories; field demonstrations in collaboration with industry, academia, and others; and transferring technologies in cooperation with State and industry organizations, including the Petroleum Technology Transfer Council (PTTC).

External Factors Affecting Performance:

World oil prices, corporate mergers and acquisitions, issues related to access to public lands, availability of capital, and new and evolving environmental legislation and regulation may affect oil program results.

Planned Program Evaluation:

The Office of Natural Gas and Petroleum Technology annually performs an internal review of the R&D portfolio as an integral part of annual budget preparation. Projects are evaluated periodically at contractor review conferences and as part of road-mapping workshops to determine R&D gaps. National Energy Technology Laboratory (NETL) product managers individually monitor projects with status and major milestone reporting documented in a NETL project database. NETL in-house R&D projects are peer reviewed by external experts from academia and industry. At this time, DOE is developing specific metrics that are applicable to better quantify and evaluate R&D results. In addition, program benefits are

estimated using macroeconomic and detailed industry-specific models. Modeling assumptions and methods are reviewed externally, and the results are compared to results from other programs to determine the best application of R&D resources.

To validate and verify program performance, FE will conduct various internal and external reviews and audits. FE's programmatic activities are subject to continuing review by the Congress, the General Accounting Office, the Department's Inspector General, the Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, state environmental and health agencies, the Defense Nuclear Facilities Safety Board, and the Department's Office of Engineering and Construction Management. Each year, the Office of Engineering and Construction Management conducts external independent reviews of selected projects. In addition, various Operations/Field Offices commission external independent reviews of site baselines or portions of the baselines. Additionally, FE Headquarters senior management and Field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget.

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. The Oil Technology program has incorporated feedback from OMB into the FY 2005 Budget Request and has taken or will take the necessary steps to continue to improve performance.

Assessment under PART found the program ineffective. The program purpose is well-defined and annual performance measures have been agreed to. However, modeling assumptions need to be made transparent and the program lacks a vigorous peer review process.

Funding by General and Program Goal

(dollars in thousands)

	FY 2003	FY 2004	FY 2005	\$ Change	% Change
General Goal 4, Energy Security					
Program Goal 04.57.00.00, Oil Technology, Energy Security					
Exploration and Production	22,667	18,450	3,000	-15,450	-83.7%
Reservoir Life Extension/Management	8,724	6,914	5,000	-1,914	-27.7%
Effective Environmental Protection	9,592	9,714	7,000	-2,714	-27.9%
Total, General Goal 4 (Petroleum – Oil Technology)	40,983	35,078	15,000	-20,078	-57.2%

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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and regulatory issues.

The enhanced domestic supply resulting from these programs support the vision of ensuring a reliable and affordable supply of petroleum. The reliable supply aspect will be augmented by programs engaging in international relationships to support and enhance diversity of global oil supply. These programs will include such activities as technology transfer and conservation in priority countries/regions. *Participants include Northrop Grumman, 4th Wave Imaging, Paulsson Geophysical Services, Univ. Wyoming, Mass. Inst. Tech, TBD.*

In FY 2004, reservoirs will be identified based upon economics, technological issues, and feasibility for benefit from CO₂ injection. Technology to make CO₂ flooding applicable to a wider class of reservoirs will be pursued. Oil reservoirs will be mapped with locations of existing industrial sources and the price and/or incentives for CO₂ that would be needed to make the project economical. Flooding scenarios will be considered to leave maximum CO₂ in the reservoir. Program success will offer options for future carbon management policy choices. *Participants to be determined.*

There was no activity in FY 2003.

- **Diversity of Global Oil Supply** 0 0 990

In FY 2005, diversification of international sources of oil supplies will be supported through bilateral activities with nations that are expanding their oil industry, including Venezuela, Canada, Russia, Mexico, and certain countries in West Africa. Bilateral and multi-lateral work will include technology exchanges and joint research, development and demonstration under the Administration’s North American Initiative and other international agreements.

No funding was requested for this activity in FY 2004 and FY 2003.

- **Advanced Drilling, Completion and Stimulation** 1,987 1,975 0

No funding is requested for this activity in FY 2005.

FY 2004 and FY 2003 funding continued upgrades to the Advanced Cuttings Transport Facility that allowed high-temperature/high-pressure experimentation on energized fluids (air, mist, gas assisted, foam, etc.) and synthetic drill fluids, cements, and transport of fluids in horizontal and inclined wellbores. *Participants included: PRRC, University of Tulsa, National Labs, NETL.*

- **Advanced Diagnostics and Imaging Systems** 4,967 4,939 0

No funding is requested for this activity in FY 2005.

FY 2004 and FY 2003 funding continued development of advanced reservoir diagnostics and imaging systems to optimize oil discovery and recovery. Developed quantitative engineering parameters that control rock-fluid interactions which impact oil production. Continued fundamental geoscience efforts focusing on geoscience/engineering reservoir characterization on naturally fractured reservoirs. *Participants included: Cal Tech, National Labs, NAS, ERCH.*

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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- **Multi-National Laboratory/Industry Partnership and National Laboratory Supporting Research**..... 1,987 1,975 0

No funding is requested for this activity in FY 2005.

FY 2004 and FY 2003 funding continued the transfer of technologies that advance understanding of the characteristics and producibility from oil reservoirs. *Participants included: National Labs*

- **Reservoir Efficiency Processes**..... 5,100 4,940 0

No funding is requested for this activity in FY 2005.

FY 2004 and FY 2003 funding continued development of improved gas flooding recovery methods and advanced the state-of-the-art in reservoir simulation. *Participants included: NETL, TBD.*

- **Analysis and Planning**..... 1,936 0 0

No funding is requested for this activity in FY 2005 and FY 2004. Appropriate planning and analysis activities will be undertaken in the relevant program areas.

FY 2003 funding continued technical planning and analysis support for implementing and evaluating effective and efficient oil technology research programs. Enhanced and maintained statistical data, models and supporting systems to evaluate petroleum policy options and to enhance metrics capabilities. Validated the effectiveness of the oil technologies to meet programmatic and agency goals. *Participants included: RMC, IOGCC, TRW.*

- **Fundamental Research - PRIME**..... 4,967 0 0

No funding is requested for this activity in FY 2005 and FY 2004.

FY 2003 funding continued development of PRIME, pre-application research focused on the development of exploration and production technologies. General areas include remote sensing, geochemical survey and improved resolution of 3-component seismic, slimhole tools for logging and testing, remote wireless monitoring and control tools, and advanced petroleum recovery technologies. *Participants include Univ. of AL, Univ. of WY, TerraTek, Univ. of Tulsa, Univ. of So. Miss., Univ. of TX at Austin, Rice Univ., TX EES, Stanford.*

- **Arctic Research**..... 1,491 1,481 0

No activity in FY 2005.

In FY 2004 and FY 2003, research will continue on the oxygen transport membrane being conducted at the University of Alaska, Fairbanks. Other research will be conducted in oil-related projects through the Office of Arctic Energy including tundra travel model for the North Slope of Alaska, characterization and alteration of wettability states of Alaskan reservoirs, and physical, biological and chemical implications of mid-winter pumping of tundra ponds. *Participants*

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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included UAF, AK Dept. Natural Resources, TBD.

- **Russia Technology Program**..... **0** **988** **0**

No funding is requested for this activity in FY 2005.

In FY 2004, the Russian Cooperative Research Program will include, but not be limited to, one or more of the following technology focus areas: USGS-Russian Offshore Arctic Resource Assessment; World Bank Global Gas Flaring Initiative; Arctic Construction and Operations Technology Transfer Initiative; “Full Value Chain” Oil Spill Restoration; Prevention, and Response Program; and/or, U.S.-Russia Commercial Energy Summit Education Initiative.

No funding was requested for this activity in FY 2003.

- **Program Support**..... **232** **177** **30**

Fund technical and program management support.

- Reservoir Life Extension/Management** **8,724** **6,914** **5,000**

In FY 2005, the Reservoir Life Extension/Management program will focus on Domestic Resource Conservation (DRC) that will target partnerships with industry and academia to foster cost effective technologies and encourage best practices and approaches to conserve reservoir access to marginal well fields that make up 40% of our domestic production. The overall goal of DRC is to optimize Federal efforts to maintain U.S. domestic oil production capacity and enhance access to the remaining oil resource target.

In FY 2004, the Reservoir Life Extension/Management program was refocused on Domestic Resource Conservation which will target partnerships with industry and academia to foster cost effective technologies and encourage best practices and approaches to conserve reservoir access to marginal well fields that make up 40% of our domestic production. The goal is to optimize Federal efforts to maintain U.S. domestic oil production capacity and enhance access to the remaining oil resource target.

In previous years, Reservoir Life Extension/Management focused on shorter-term research with public benefits and a much more defined return on investment. Given the industry’s incentive to continue this type of research on its own, Federal funding was redirected to longer-term, higher risk efforts that can help preserve U.S. academic and technological leadership in this area.

- **Domestic Resource Conservation** **8,635** **6,844** **4,950**

In FY 2005, elements include: 1) Key technology prototype development, such as micro-hole technologies, for enabling improved access and minimizing environmental impact; 2) Technology transfer with special emphasis on independents; and 3) Policy analysis and planning to prioritize program efforts and provide policy evaluations to maximize impact on domestic oil recovery over a wide range of technological and economic conditions. *Participants include PTTC, Northrop Grumman, NETL and TBD.*

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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In FY 2004, elements include: 1) Key technology prototype development, such as micro-hole technologies, for enabling improved access and minimizing environmental impact; 2) Technology transfer with special emphasis on independents; and, 3) Policy analysis and planning to prioritize program efforts and provide policy evaluations to maximize impact on domestic oil recovery over a wide range of technological and economical conditions. *Participants to be determined.*

In FY 2003, the following activities were conducted: selected competitive projects that partner with independents to accelerate field testing and use of effective technologies; addressed critically underdeveloped resources owned and managed by Native American Tribes and Corporations; disseminated petroleum RD&D results to domestic stakeholders; developed mechanisms that foster communication between industry and researchers; continued to expedite the use of cost effective, more efficient, environmental friendly technologies that increase recovery; continued support of Minority Education Initiative; continued to provide other energy related educational opportunities; populated the Internet-accessible database of "best practices" resulting from the PUMP projects and conferences; and issued solicitation for "PUMP" projects to address short-term demonstrations of critical technologies in specific regions. *Participants included: INEEL, Penn State, HQ, APTA, CEED, COMET, GWPC, U. of Ok, PTTC, RMC, NETL, other National Labs, TBD.*

■ Program Support	89	70	50
Fund technical and program management support.			
Effective Environmental Protection	9,592	9,714	7,000

The Effective Environmental Protection program will continue to focus on technologies and practices that reduce the environmental impact of oil exploration, production, and processing while minimizing the cost of effective environmental protection and compliance. The program supports energy security by helping to overcome the environmental barriers that limit access to domestic resources. The program also supports the President's Clear Skies Initiative by reducing emissions from oil production and processing. The program supports the recommendations of the National Energy Policy by encouraging additional recovery from existing wells, providing science and technology to allow additional oil development on Federal lands and providing answers to environmental questions that are limiting oil exploration and production in the National Petroleum Reserve - Alaska. Activities will provide a complete examination of specific impact of produced water and the more general problem of water management. A detailed roadmap of the necessary actions will be presented in a public workshop for discussion and inclusion of stakeholder views. The overall objective is to help balance the need to develop the Nation's energy resources while maintaining our environmental values. This program fills critical information and technical gaps that are needed to meet the Nation's energy needs without sacrificing environmental quality.

■ Environmental Science	0	9,618	6,930
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In FY 2005, conduct targeted activities to define and solve specific problems in key areas,

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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specifically: 1) management of produced water and technology development that makes produced water a resource for beneficial uses; and 2) ensuring maximum sustainable access to oil resources on Federal lands. A public education and outreach program will be conducted to ensure that accurate information about the impacts of oil development is presented to the public. Develop objective, credible scientific data for regulatory decisions as part of a program-wide environmental strategy for maintaining U.S. oil production capacity. *Participants include: KS State Univ, Northrop Grumman, TX -EES, Univ of N Carolina, Univ of TX at Austin, NETL, LBNL, LLNL TBD.*

In FY 2004, conduct targeted activities to define and solve specific problems in key focus areas, specifically: 1) management of produced water and technology development that makes produced water a resource for beneficial uses; and, 2) ensuring maximum sustainable access to oil and gas resources on Federal lands. An outreach program will be conducted to ensure that accurate information about the impacts of oil and gas development is presented to the public. Develop objective, credible scientific data for regulatory decisions as part of a program-wide environmental strategy for maintaining U.S. oil production capacity. *Participants include: NETL, National Labs, BLM, TBD*

FY 2003 funding was included in the activities below.

■ **Program Planning and Data Analysis** **880** **0** **0**

In FY 2005 and FY 2004, activity combined in Environmental Science activity above.

FY 2003 funding continued analysis of industry environmental trends and available technologies. Maintained performance measurement data for program planning and technology transfer. Provided energy and economic analyses for legislative and regulatory initiatives related to oil environmental issues. Provided analysis of refinery related environmental issues and regulations. *Participants included: PERF, National Labs, EPA*

■ **Streamline State/Tribal/Federal Regulations** **2,687** **0** **0**

In FY 2005 and FY 2004, activity combined in Environmental Science activity above

FY 2003 funding continued development, in cooperation with Federal and State agencies, of streamlined environmental regulations and regulatory processes with emphasis on reducing permitting times for refinery upgrades and domestic production from public lands, while maintaining environmental protection. The objective of this key activity was to increase domestic production and refinery capacity by reducing the cost of compliance. *Participants included: ORNL and other National Labs, University of Tulsa, IOGCC.*

■ **Risk Assessment**..... **1,953** **0** **0**

In FY 2005 and FY 2004, activity combined in Environmental Science activity above.

FY 2003 funding continued development of credible scientific data for regulatory decision making in all aspects of exploration, production, and processing. *Participants included: National*

(dollars in thousands)

FY 2003	FY 2004	FY 2005
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Laboratories, BLM, PERF, GWPC

- **Technology Development**..... 3,974 0 0

In FY 2005 and FY 2004, activity combined in Environmental Science activity above.

FY 2003 funding continued development of technologies to reduce produced water handling costs and explored innovative refinery technologies that could significantly reduce CO₂ emissions.

Participants included: NETL and other National Laboratories, University of Tulsa, GEER.

- **Program Support**..... 98 96 70

Fund technical and program management support.

- Total, Petroleum - Oil Technology** 40,983 35,078 15,000

Explanation of Funding Changes

FY 2005 vs. FY 2004 (\$000)

Exploration and Production

- Decreases consist of termination of work in Advanced Drilling, Completion and Stimulation, Advanced Diagnostics and Imaging Systems, Partnership Program, Advanced Technologies for High Risk Resources; and Arctic Research. Planning and Analysis is reduced because the program is being realigned to specifically support the President’s climate change and energy security goals -15,450

Reservoir Life Extension

- Decreases consist of termination of work in Technology Development with independents, Native American program, Field Demonstrations, and PUMP. Outreach and Technology Transfer is reduced because the program is being realigned to specifically support the President’ climate change and energy security goals -1,914

Effective Environmental Protection

- Decreases consist of termination of research on lower priority environmental issues, such as remediation, NORM, air emissions, and work the conducted by the Natural Gas and Oil Technology Partnership -2,714

- Total Funding Change, Petroleum - Oil Technology** -20,078