The Corps of Engineers currently is executing its mission to import and distribute refined products and to repair and restore the Iraqi oil infrastructure through a sole source contract awarded to Kellog, Brown and Root. This contract will be replaced with two contracts awarded competitively under this solicitation.

The accompanying ROM covers the work required to execute this mission. Damage assessments provided by the current sole source contractor formed the baseline from which government personnel prepared the ROM. Since not all damage assessments had been completed at the time of the ROM was prepared, it was based on a statistically significant sample of damage assessments and may not reflect all the work required to restore the infrastructure to pre-war conditions.

The ROM is being released to remove any perception that the current sole source contractor has information concerning the requirements of the government which are not available to other potential bidders.

The ROM shows the amount of work projected to be done for the repair and restoration of the Iraqi oil infrastructure, its rough dollar value, and the schedule for accomplishing that work. It includes both the requirement to repair and restore the Iraqi oil fields and related infrastructure and the requirement to import and distribute refined products to meet urgent Iraqi domestic needs until sufficient domestic production is restored to levels at which imports no longer are required.

To the extent that the ROM identified specific project locations and dollar amounts, those have been deleted. In addition, only a summary chart of the projected costs has been provided to avoid compromising the current government estimate for any individual work item.

The schedule in the ROM represents the government's best estimate for the completion of all necessary repair and restoration. Under this schedule, a significant amount of the work needed is likely to have been begun under the current sole source contract before a competitive contract can be awarded. This is particularly true for the long lead time items.

The ROM identifies a funding requirement of $1.68 Billion, which includes a 20% contingency and which may vary by up to 40%. In the FY 03 Supplemental Appropriation Bill, Congress created a "Natural Resources Restoration Fund" to which $.489 Billion may be transferred from the "Iraqi Freedom Fun" to execute this mission. The Corps does not presently know when additional funds may be made available. Nor does it know the exact amount of that funding. Obviously, a significant delay in the receipt of additional funds will delay the schedule projected in the ROM. This may result in some of the work currently projected to be under contract by the

time a competitive contract is awarded being available for award under the competitive contract. In addition, there remains the possibility of significant additional intentional damage or looting affecting the oil fields and related infrastructure. This could result in significant work not covered by the ROM which may be available for award under the competitive contract, assuming that the necessary funding is made available.

It is the intent of the government that the Iraqi Oil Ministry assume responsibility for its own affairs, including repair and rehabilitation of the oil fields and related infrastructure, as soon as possible. Consequently, political decisions may be made which impact the amount of work which may be available under the competitive contract.

Iraqi Oil Infrastructure Restoration
Strategic Plan
Rough Order of Magnitude (ROM)

as of 03 JUN 2003

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EXECUTIVE SUMMARY

Overview

This Rough Order of Magnitude (ROM) estimate has been prepared to establish a common vision of the restoration of the physical systems comprising the Iraqi oil infrastructure to pre-war capability at project completion. The key element of the report is a high-level project timeline and spending curve that represents a prioritized sequence of activities to restore the oil infrastructure system. This would enable decision-makers to weigh schedule and cost considerations against the benefits associated with the work in the schedule. Important objectives include:

- Support to decisions regarding scope of work to be completed; and funded by respective parties;
- Predict the time, funding and staffing required to complete the mission;
- Enable decisions to be made regarding acquisition strategy for the balance of the project.

The project will require a significant investment just to address damaged facilities. This report was intended to facilitate an informed decision among stakeholders as to the end point vision of the project.

This ROM is based upon an estimate of plus or minus 40% precision, with a 20% contingency included. The intent was NOT to improve (no upgrades nor expansions) the system. However as result of restoration, *incidental* improvements (upgrades and expansions) may result.

The role of the contractor is technical support, repair and logistics support; the contractor is not expected to operate the oil facilities. Meanwhile, the Iraqi Oil Ministry, as the owner of the facilities, will be responsible for an ever-increasing amount of the work, the operations of the oil facilities, and the safety, operations and environmental standards.

ROM Scope

Items considered within the ROM scope include the following:

- Spending on the project beginning on 10 March 2003
- Equipment to support the Bayji Refinery turnaround (expected SEP/OCT 2003)
- Major projects requiring interim solutions
    - Water in the South
    - Pipelines (both Crude, Natural Gas, LPG, and Refined Products) over the Tigris River at al Fatah Bridge
    - Interim pumping station
- Provide those Materials (spares, chemicals, additives, etc.), not in stock, for a period up to six months

Items considered to be outside of the ROM scope include the following:

- Building & Fixture Repairs
- Data Restoration
- Social (Hospitals, Schools, Housing, etc.)
- Service Stations
- LPG Bottles

- Only the (12) wells that were on-fire will be considered in-scope. All other wells and down-hole work will be considered out of scope.

- Only the remediation of environmental spills that were directly attributable to the hostilities will be considered in scope. All other environmental work will be considered out of scope.

- Salary costs of Iraqi Oil Ministry employees will be considered out of scope.

Planning Cases

The assessment team utilized three planning cases for the ROM. The first case consisted of total crude production of 1.13 million barrels of oil per day, beginning 01 June 2003 at a cost of 0.2 billion US dollars. This would be broken into two categories: 0.54 million barrels of oil per day for domestic consumption and 0.59 million barrels of oil per day for export. The second case consisted of total crude production of 3.00 million barrels of oil per day, beginning 31 December 2003 at a total project cost of approximately 1.0 billion US dollars. This would be broken into two categories: 0.60 million barrels of oil per day for domestic consumption and 2.40 million barrels of oil per day for export. However as part of the second case, the crude production was not available on a sustainable basis and a number of interim solutions remained in service.

The third case also consisted of total crude production of 3.00 million barrels of oil per day, beginning 31 December 2003 at a total project cost of approximately 1.4 billion US dollars. Meanwhile volume of the oil available for domestic use and for export would remain the same. The difference between cases two and three is that in case three the system will have the permanent facilities in operation and will be a more robust system.

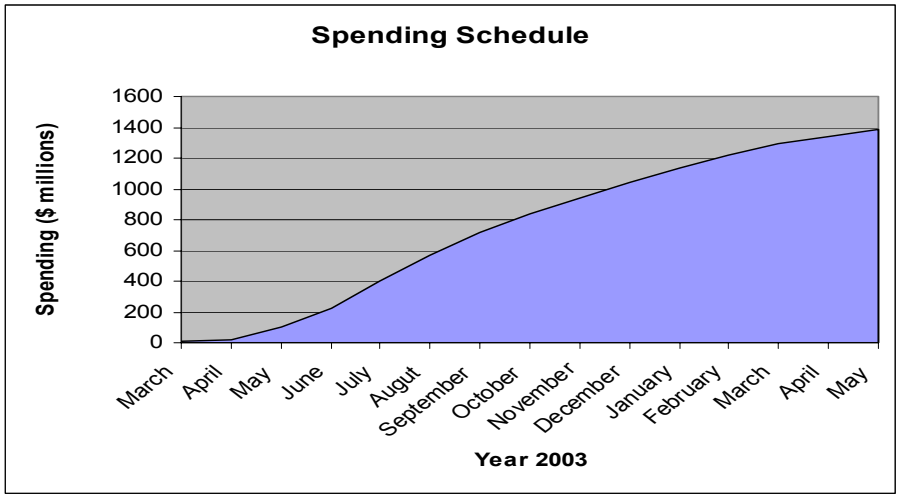
Key Assumptions

There were a number of assumptions that were key to the ROM:

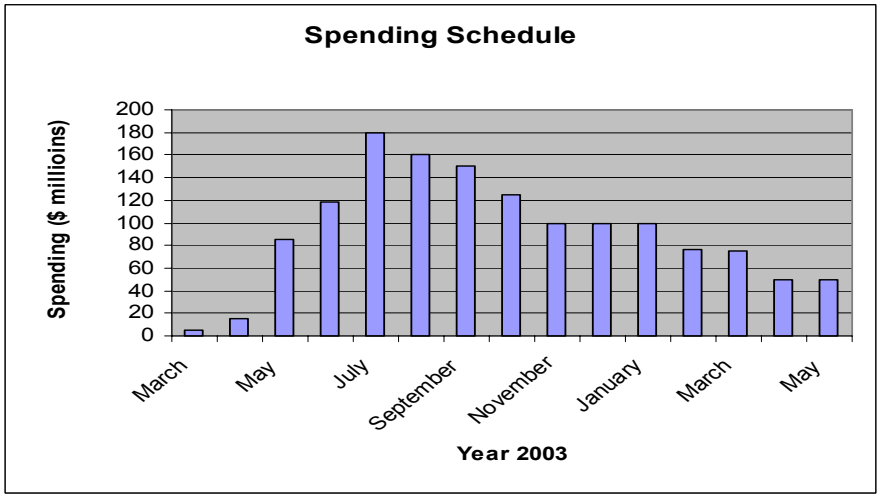
- Crude production on 01 June 2003: 1.1 million barrels per day
- Crude production on 31 December 2003: 3.0 million barrels per day
- The condition of those systems that have been assessed provides a reasonable representation of those other systems that have not yet been assessed.
- Assessment did not include actually operating the equipment. It was assumed that if equipment appeared to be operational, it was.
- Security in place
- Outside infrastructure (electricity, communications, etc.) exists, is reliable, and is not considered in scope

Project Cost (contingency not included)

The following table shows the projected spending over the life of the ROM.



The following table shows the projected monthly spending.



Unresolved issues

There were a number of issues that remain unresolved, including:

- The physical system is currently not stable, security issues remain
- Funding must provide for initial purchase of tools and long-lead items;
- The ultimate demand for fuel imports is uncertain, especially given an uncertain refinery production schedule;
- Determine the most cost-effective means to build LPG storage to meet winter needs;

- Determine the best allocation of US and Iraqi Oil Ministry efforts;
- Provide communications to support system operation;
- Identify improvements necessary to sustain production

Next Steps

The assessment team recommends the following:

- Foster discussions between Team RIO, Coalition Provisional Authority (CPA) and the Iraqi Oil Ministry
- Develop Memorandum of Agreement (MOA) between:
    - Team RIO
    - Coalition Provisional Authority (CPA)
    - Iraqi Oil Ministry
- Further detail the work packages and respective responsibilities for execution;
- Develop overall Work Plan & Schedule

INTRODUCTION

The United States Army Corps of Engineers was assigned the responsibility to repair and restore the oil infrastructure by the Department of Defense. Team RIO (Restore Iraqi Oil) was organized to fulfill the mission. The mission included:

- Extinguishing oil well fires following hostilities
- Safe shut down of oil facilities during the initial stages of the war
- Provide environmental restoration for both marine and land-based oil spills
- Repair and restoration of facilities damaged as the result of the war
- Assist the Oil Ministry in the restart, operation, maintenance, and distribution of the oil system

Although the general types of work were defined previously, details would depend upon many factors, such as the degree of system damage and the post-war relationship that would develop between the existing oil management structure and the new provisional government. With hostilities essentially past and the Oil Ministry rapidly being reconstituted, the present assessment offers an opportunity to define the scope of Team RIO's efforts, and allow planning for related and increasing subsequent work by the Oil Ministry.

Iraq Oil Infrastructure

The Iraq Oil infrastructure is an integrated system. In order to return the system to pre-war production levels, the major parts of the system need to be restored and repaired, including:

- Oil fields, including wells, flowlines and gas-oil separation plants (GOSPs)
- Pipeline systems and pump stations
- Refineries, gas processing, and stabilization plants
- Associated utilities including water treatment and electrical power
- Distribution network

There are two major oil regions in Iraq. The southern region consists of 12 producing oil fields and northern region consists of 10 producing oil fields and 2 producing gas fields. The Rumalia fields in the south and the Kirkuk fields in the north produce approximately 70% of the country's crude oil and natural gas production. The large GOSPs associated with the oil fields separate the gas from the oil, and additional stabilization plants in the north remove toxic hydrogen sulfide gas.

A system of pipelines throughout the country transports crude oil and gas from the wells through the GOSPs and pump stations to the refineries and gas processing plants or to export terminals. Product pipelines of varying sizes transport LPG, benzene, and diesel to the distribution points and export outlets. The network includes strategic pipelines to transfer large volumes for domestic use and export pipelines for transporting to Turkey, Syria, and marine platforms in the Arabian Gulf.

There are three major refineries in Basrah, Baghdad, and Bayji, accounting for 70% of the refined product production in the country. Several smaller modular refineries, "topping plants" are situated in key areas throughout the country. These topping plants produce gasoline, LPG, kerosene, diesel, and various industrial lubricants to meet specific local and regional needs.

Elements of the infrastructure work in concert to create a carefully balanced, inter-dependent operation. Water is a key resource for oil production. Water is used to wash the salt from the crude and to inject into the underground reservoir for pressure maintenance. An important and closely related interface is the electrical power system, which requires crude oil or natural gas to power the generating plants. A failure of one component in the system creates a related problem elsewhere in the system. For example, the electrical power grid is dependent upon fuel from the oil and gas system while the oil field production facilities require electrical power to produce the fuel.

Iraq Oil Ministry

The Oil Ministry consists of 22 separate organizations. Of the 22 companies operating within the Oil Ministry, 5 companies are included in Upstream division, 8 companies are included in Downstream division, and 9 divisions are included with in the Directorates division. The Upstream and Downstream divisions include substantial assets for their operating business. The directorates are in support of these divisions and the overall Oil Ministry. The Oil Ministry includes the following:

Upstream Division

North Oil Company	South Oil Company
State Company Oil Projects	Iraqi Drilling Company
Oil Exploration Company	

Downstream Division

LPG Bottling Company	North Refining Company
Central Refinery Company	South Refining Company
North Gas Company	South Gas Company
South Gas Company	
Oil Products Distribution Company	Petroleum Pipeline Company

Directorates & Other

State Oil Marketing	Iraqi Tanker Company
National Manufacturing Department	Economics & Finance Department
Economics & Finance Directorate	Administration & Legal Department
Planning, Studies & Follow-up Directorate	Technical Directorate
Reservoir & Fields Development Directorate	Control & Internal Audit Directorate

SCOPE OF ESTIMATE

This Rough Order of Magnitude (ROM) estimate includes the restoration work, commencing 10 Mar 2003, needed to restore damage due to the war.

Purpose & Objective

The main purpose of the ROM scope is to develop a budget quality estimate (conceptual level) for the work necessary to restore the Iraqi oil industry to a pre-war level of production. Key benchmarks, must be sustainable, include:

- Restoring the LPG production capacity to meet domestic needs
- Regaining the pre-war oil production capacity (3 million barrels of oil per day)
- Restoring the refining capacity to meet domestic needs
- Restoring the gas production levels for fuel and feedstock
- Regaining the export capacity

Basic Assumptions

- UN Procurement and export sanction provisions will not affect target goals and crude oil, imported or exported products, or oilfield system materials and equipment
- Outside infrastructure for utilities, power, communications or other such services are provided in a timely manner by others

- Production targets set by the Oil Ministry are:
  - 1.1 million barrels per day of crude oil production by mid-June, 2003
  - 3.0 million barrels per day of crude oil production by end of year 2003
- The quality of estimate shall be a "concept level" rough order of magnitude, within +/- 40% accuracy
- No upgrades (except incidental to repairs) or expansions are included
- Role of USACE Contractor is technical support and logistics support; USACE Contractor is not expected to operate facilities
- The Oil Ministry will be responsible for the majority of the labor for the repairs and operations
- The Oil Ministry will be responsible for establishing the operating procedures, safety and environmental standards
- Initial assessments prepared by the USACE Contractor, first-hand inspections by the report preparation team and recommendations by Oil Ministry management shall be used as the basis for estimating damage for each system
- Engineering judgment will be used where appropriate to justify needs and priorities

Delineation of Scope

Included

- Operating systems repairs
- Tools and consumable materials (spares, chemicals, additives, etc.) for a period of six months
- Specific vehicles and heavy equipment identified by the Oil Ministry
- Security, safety and environmental
- Communications
- Equipment to support refinery turnaround (late Summer 2003)
- Temporary restoration of water treatmenti (ability to remove salt from crude oil and water injection)
- Temporary restoration of pipelines (Crude, Natural Gas, LPG, and Refined Products) over the Tigris river on the al Fathah Bridge (movement of Kirkuk crude oil and products south)
- Temporary restoration of pump station
- LPG and benzene stocks until refinery production can meet domestic requirements
- Repair of the 12 oil wells damaged due to the war
- Remediation of environmental spills that are directly attributable to the war
- Cost estimates for delivery, transportation and installation

Excluded

- Upgrades (except incidental to repairs) or expansions
- Labor costs of Oil Ministry employees
- Building and fixture repairs (e.g. windows, wall, desks, computers)
- Restoration of Oil Ministry data (e.g. well logs, payroll records)
- Other local and social activities (e.g. housing, hospitals, schools supported by the Oil Ministry)
- Service Stations
- LPG Bottles

ESTIMATING METHODOLOGY

This ROM represents a team effort between the Oil Ministry and Team RIO. Data was collected from the Oil Ministry and Team RIO. Facility assessments were performed by Team RIO, Oil Ministry companies and jointly with Team RIO and the Iraqi operating personnel. Team RIO performed the analysis and validation will involve Oil Ministry management.

Data collection

The Oil Ministry provided significant input, based upon the institutional knowledge of the oil systems. Given the general objectives of the ROM, the Oil Ministry established the production goals for crude and products, and developed a strategy to meet those goals. The strategy identified the facilities required to meet the goals. The Oil Ministry also provided input on repairs and projects necessary to meet those goals.

Team RIO provided information from the facility assessments that had been conducted to date. While this information was somewhat limited with respect to the number of facilities that had been covered, nevertheless, the information was produced in a systematic manner and provided a relatively high level of detail. The assessment data, therefore, provided a valuable means to calibrate the cost estimates associated with a given type of facility and a perceived level of damage.

Analysis

In general, costs were organized into six major categories:

Category 1	System Restoration
Category 2	System Maintenance and Operating Equipment
Category 3	Vehicles and Heavy Equipment
Category 4	Security, Safety and Environment
Category 5	Communications
Category 6	Other

Within each category, the assessment team developed a parametric approach to estimate the associated costs.

Category 1, Operating System Restoration

The team established representative unit costs for generic types of facilities, given discrete (subjectively determined) levels of damage. For example, a pump station with minimal damage was estimated to cost $1 million, while repair of a major refinery was assigned a value of $15 million. In other cases, such as pipeline repair, unit prices were established; for example, a cost per kilometer per inch of pipe diameter. This price was applied to the dimensions of the damaged pipeline, adjusted by multiplying a representative level of damage (percentage). In those cases where an upgrade or expansion had been identified, analysis was undertaken comparing an as-is repair versus and upgrade or expansion and the the most cost effective approach was chosen. The exact separation of assets (pipelines) was not clearly known so the costs to repair all non-crude pipelines and facilities is included in the Oil Products Distribution Company.

Category 2 and 3, Operating & Maintenance and Vehicles & Heavy Equipment

Specific operating, maintenance and heavy equipment was identified by the Oil Ministry. The team collated the information, collected market information on prices and delivery costs of

representative equipment. For the Category 2 equipment it is recommended to multiply the costs on the spreadsheets by 2 to account for unavailable information.

Category 4, Security, Safety and Environment

Specific security, safety and environmental equipment, materials or services were identified. The team collected market information on prices and delivery costs of representative equipment. 180 days of Contractor-supplied spill clean-up is provided in the estimate.

Category 5, Communications
This estimate accounts for the necessary hardware and systems needed for the internal communications of the Oil Ministry (e.g. various companies to talk with the field operating personnel, and allow the operating companies to communicate with their pump stations and the export terminals).

Category 6, Other
Included in this category are the temporary repairs needed prior to the completion of the permanent repairs, the cost to import LPG and benzene into Iraq until the Iraqi refineries can meet domestic requirements and the cost of the Team RIO staff.

Costs were collected and tabulated within each category by cost element and by company. This approach enabled comparison among the inputs from various sources.

RESULTS

Cost

The overall ROM cost is approximately $1.4 Billion (+/- 40%).

It is important to stress that this ROM estimate is based on the best current information available from limited damage assessments. More detailed assessment, negotiations and planning will be required in order to establish the project baseline and manage execution.

Cost by Category (contingency included in each category)

Category 1	Systems Restoration	$ 980 million	58%
Category 2*	System Maintenance & Operating Equipment	$ 21 million	1%
Category 3	Vehicles and Heavy Equipment	$ 65 million	4%
Category 4	Security, Safety and Environment	$ 70 million	4%
Category 5	Communications	$ 43 million	3%
Category 6	Other (driven by benzene & LPG costs)	$ 499 million	30%
Total		$1,678 million	100%

* The recommended factor of 2 has been applied to this estimate.

Costs of 6 highest Sub-Categories (excludes benzene, LPG & contingency costs, % of total est.)

Pump station	$ 128 million	11%
Gas plants	$ 116 million	10%
GOSPs	$ 114 million	10%
Water plants	$ 110 million	9%
Product pipelines (natural gas, refined products)	$ 73 million	6%
LPG pipelines	$ 64 million	5%

Costs of 5 Largest Individual Items (excludes contingency costs, % of total est)

Benzene and LPG supply	$ 225 million	16%
Temporary & permanent repair of water treatment plants	$ 62 million	4%

Temporary & permanent repair of pump stations	$ 50 million	4%
Security fencing	$ 28 million	2%
Bus (25 & 45 passenger)	$ 11 million	1%

Cost Associated with Four Major Companies (excludes benzene, LPG & contingency costs, % of total)

South Oil Company	$ 370 million	31%
North Oil Company	$ 285 million	24%
Oil Products Distribution/Pipeline Company	$ 163 million	14%
Iraq Drilling Company	$ 43 million	4%

Cost of War Damage versus Looting (excludes contingency, % of total)

War Damage	$ 457 million	33%
Benzene & LPG costs	$ 225 million	
Water Treatment (permanent & temporary)	$ 50 million	
Product pipeline damage (1/3 of cost of LPG & NG)	$ 45 million	
Wells	$ 39 million	
GOSPs (1/3 of cost)	$ 35 million	
Crude pipeline damage (1/3 of cost)	$ 13 million	
Miscellaneous	$ 50 million	
Looting (balance of cost)	$ 943 million	67%

Average Weekly Cost of Ongoing Looting (20 Mar to 31 May 2003)

$943 million/10 weeks	$ 95 million/week

Schedule

Restoration work covered by this assessment began in March 2003, and would continue until approximately mid 2004. The schedule is dependent upon many factors including funding and the amount of work the Iraqi Oil Ministry is able to accomplish.

The restoration of the Iraq Oil Infrastructure must be done in phases. The initial phase will involve repairs to enable production to return to pre-war levels of internal consumption and export. The second phase will involve replacing the facilities to sustain the target goal of 3 million BOPD. "Initial Repairs" and "Temporary Replacement" will encompass the initial phase of work with "Sustainment Repairs" and system upgrades involved in the second phase.

"**Initial Repairs**" commenced as soon as hostilities allowed for civilians to enter the oilfield and plants, and will continue until at least 31 December 2003. The first steps after extinguishing fires and stopping spills were to begin assessing damage and to identify priorities for return to service. In general, these types of repairs focused on immediate needs to establish control over the oil systems and to resume limited production to meet emergency needs for fuel.

"Temporary Replacement" are those site-specific project activities that must be expedited in order to meet the facility needs for target goals for production, processing, consumption demand, and export capability. These replacements, which generally require long-lead equipment, have in some cases already begun and are expected to be completed by 2nd Qtr 2004 (Apr-Jun). New, used, or rehabilitated equipment may be leased or purchased to meet these needs. Judgments will be needed to determine whether the interim solution will be part of the permanent repair or restoration. Examples include lease of water treatment facilities to restore industrial water supply for oil processing and injection, export pump packages for temporary replacement of pump station, temporary bridge by-pass pipelines at the al Fathah River crossing site, and temporary LPG importation facilities.

"Sustainment Repairs" activities are those project needs which require more detailed engineering to design, specify, procure long lead components, manufacture, assemble, ship, construct, and install. These are critical facility needs to support the reliable and safe operation of the Iraq oil infrastructure. Drilling rigs (to replace stolen equipment), work-over rigs (to replace stolen equipment), suitable pump and compressor station facilities, pipeline rehabilitation replacements, processing plant and terminal restoration, refining, buildings, and any related utility needs would fit into this category.

OUTSTANDING ISSUES

Security - Continuing Losses

Funding Timeline

Funding Source

Uncertain Scope of Fuel Imports

Need for LPG Reserves

Allocation of Work Effort between the Oil Ministry and Team RIO

Communications System Improvements

Sustain production

NEXT STEPS

This assessment identifies the scope of work that would enable the Oil Ministry to restore production to pre-war levels. In itself, the report may have limited value, as it does not provide adequate details for budget or schedule management. However when reviewed by stakeholders an discussed, the assessment could be invaluable, especially to provide the basis for:

- Establishing agreement among Team RIO, the Oil Ministry and the Coalition Provisional Authority (CPA) on the types of activities and extent of oil system restoration to be performed by Team RIO and funded by the US Government
- Developing detailed work plans for the overall Team RIO project, including schedule activities and budget cost elements
- Delineating roles, responsibilities and interfaces among the Oil Ministry and Team RIO with respect to the reconstruction project

Each of these are time-sensitive tasks, important to successful project completion.

APPENDICES

Appendix 1: Cost Tables
Appendix 2: Product Supply and Demand

Appendix 1 – Cost Tables

	Cost By Company																								
	Upstream					Downstream								Other & Directorates										Team RIO	Total (X$1000)	Summary (X$1000)
	North Oil Company (NOC)	South Oil Company (SOC)	State Company Oil Projects	Oil Exploration Company	Iraq Drilling Company (IDC)	LPG Bottling Company	North (Bayji) Refining Co.	Central (Doura) Refining Co.	South (Basra) Refining Co.	North Gas Co.	South Gas Co.	Oil Products Distribution Co.	Petroleum Pipeline Company	State Oil Marketing (SOMO)	Iraqi Tanker Company	National Manufacturing Dept	Economics & Finance	Planning, Studies & Follow-up	Reservoir & Fields Development	Technical	Administration & Legal Dept	Control & Internal Audit			
CAT 1 - SYSTEM RESTORATION																									
UPSTREAM																									$605,520
Wells	$5,000	$34,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$39,000	
GOSP	$46,000	$68,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$114,000	
Gas Plant	$49,000	$67,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$116,000	
Stablization	$7,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$7,000	
Water Plants	$20,000	$90,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$110,000	
Pump Station	$91,000	$37,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$128,000	
Offshore Terminal	$0	$11,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$11,000	
Pipelines	$18,600	$19,920	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$38,520	
Drilling	$0	$0	$0	$0	$42,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$42,000	
DOWNSTREAM																									$211,776
Large Refinery	$0	$0	$0	$0	$0	$0	$15,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$15,000	
Intermediate Refinery	$0	$0	$0	$0	$0	$0	$6,000	$6,000	$6,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$18,000	
Small Refinery	$0	$0	$0	$0	$0	$0	$4,500	$0	$1,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$5,500	
LPG & Natural Gas	$0	$0	$0	$0	$0	$6,500	$0	$0	$0	$3,000	$4,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$13,500	
LPG	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$24,351	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$24,351	
Refined Product	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$63,397	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$63,397	
Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$72,028	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$72,028	
TOTAL CAT 1 - SYSTEM RESTORATION																									$817,296
CAT 2 - SYSTEM MAINTENANCE & OPERATING EQUIPMENT																									
Maintenance Tools	$0	$508	$0	$0	$0	$0	$0	$60	$0	$1,190	$20	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$1,778	
Test & Quality Control	$0	$0	$0	$0	$0	$0	$0	$0	$0	$170	$95	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$265	
Maintenance Equip	$1,012	$1,415	$0	$0	$0	$0	$0	$80	$0	$179	$89	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$2,776	
Spare Parts	$0	$0	$0	$0	$0	$0	$0	$0	$3,577	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$3,577	
2X Factor																			$8,395					$8,395	
TOTAL CAT 2 - SYSTEM MAINTENANCE & OPERATING EQUIPMENT																									$16,790
CAT 3 - VEHICLES & HEAVY EQUIPMENT																									
Handling	$8,495	$7,385	$0	$0	$0	$0	$131	$831	$1,766	$1,977	$4,905	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$25,490	
Earthmoving	$1,738	$2,010	$0	$0	$0	$0	$0	$0	$48	$117	$353	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$4,265	
Specialized	$1,425	$4,040	$0	$0	$0	$0	$0	$0	$0	$628	$965	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$7,059	
People Transportation	$4,966	$4,266	$0	$0	$0	$0	$280	$263	$1,602	$2,571	$3,453	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$17,400	
TOTAL CAT 3 - VEHICLES & HEAVY EQUIPMENT																									$54,215

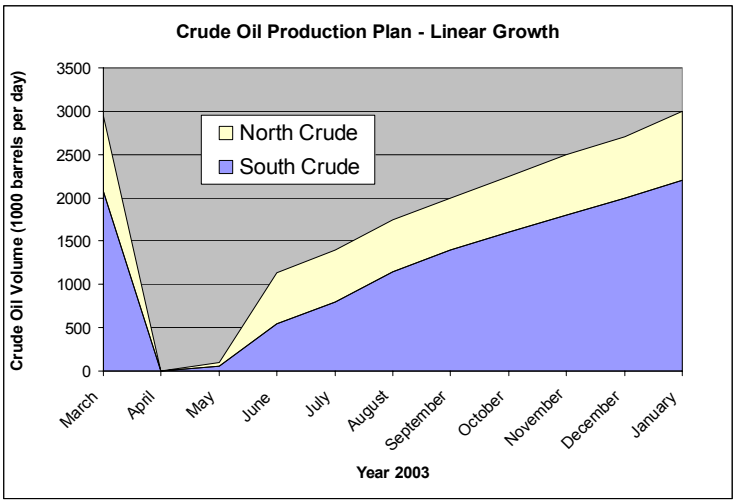
Oil Infrastructure Restoration ROM Estimate

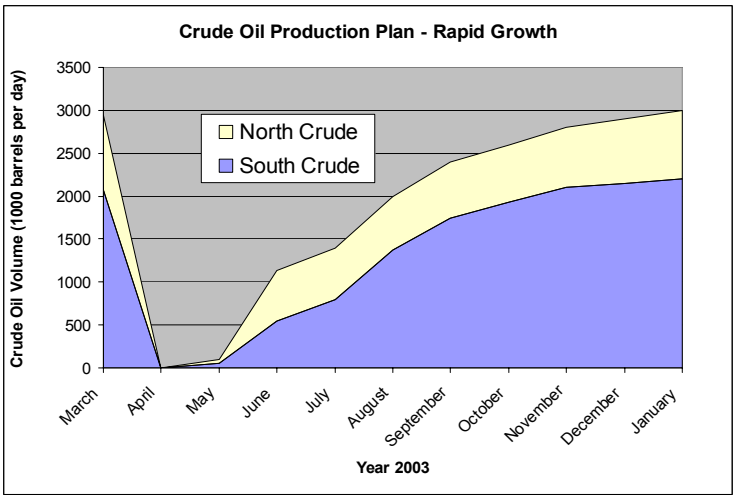
CAT 4 - SECURITY, SAFETY & ENVIRONMENT																									
Security	$11,050	$2,400	$0	$0	$175	$1,175	$3,350	$675	$850	$5,175	$5,175	$1,175	$375	$0	$235	$0	$0	$0	$0	$0	$0	$0		$31,810	
Safety	$4,143	$3,216	$0	$0	$240	$430	$1,141	$872	$630	$1,463	$2,231	$330	$220	$0	$120	$0	$0	$0	$0	$0	$0	$0		$15,035	
Environment	$4,150	$4,150	$0	$0	$200	$200	$400	$400	$400	$400	$400	$200	$200	$0	$200	$0	$0	$0	$0	$0	$0	$0		$11,300	-
TOTAL CAT 4 - SECURITY, SAFETY & ENVIRONMENT																									$58,145
CAT 5 - COMMUNICATIONS																									
Oil Ministry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$26,340							$26,340	
Individual Companies	$1,700	$1,700	$450	$255	$240	$215	$230	$230	$230	$210	$210	$564	$220	$275	$400	$230	$235	$750	$250	$250	$265	$245		$9,354	-
TOTAL CAT 5 - COMMUNICATIONS																									$35,694
CAT 6 - OTHER																									
process water repair		$11,600																						$11,600	
Pump Station	$9,120																							$9,120	
Import and distribute fuels																	$224,780							$224,780	
Support																							$4,000	$4,000	
Base Camps & Offices																							$24,000	$24,000	
Security																							$21,000	$21,000	
Assessments & Evaluations																							$37,600	$37,600	
Project Management & Admin																							$23,100	$23,100	
Accrued costs (as of 1 Jun 03)																							$60,900	$60,900	-
TOTAL CAT 6 - OTHER																									$416,100
SUBTOTAL - IRAQ OIL INFRASTRUCTURE RESTORATION																									$1,398,239
CONTINGENCY 20%	$56,880	$73,922	$90	$51	$8,571	$1,704	$6,206	$1,882	$3,221	$3,416	$4,379	$32,409	$203	$55	$191	$46	$51,950	$150	$50	$50	$53	$49	$34,120	$279,648	$279,648
GRAND TOTAL - IRAQ OIL INFRASTRUCTURE RESTORATION																									$1,677,887
Company Total	$341,279	$443,530	$540	$306	$51,426	$10,224	$37,239	$11,294	$19,323	$20,496	$26,275	$194,454	$1,218	$330	$1,146	$276	$311,700	$900	$300	$300	$318	$294	$204,720	$1,677,887	

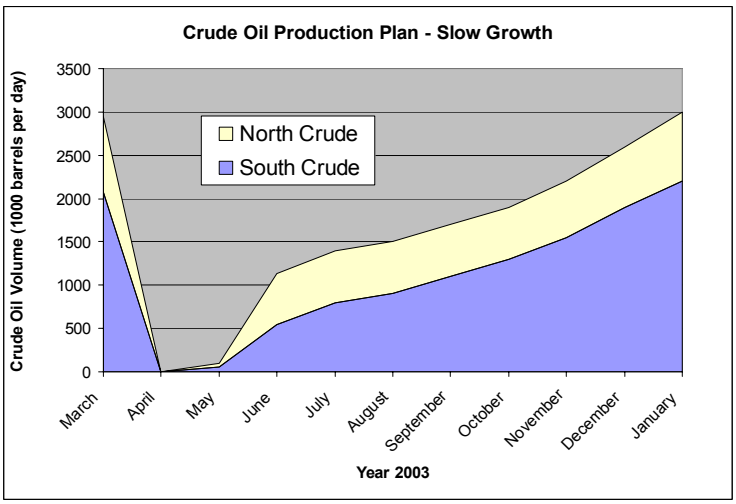
Appendix 2 Production and Demand

Crude Production

Out of the following crude production growth cases:



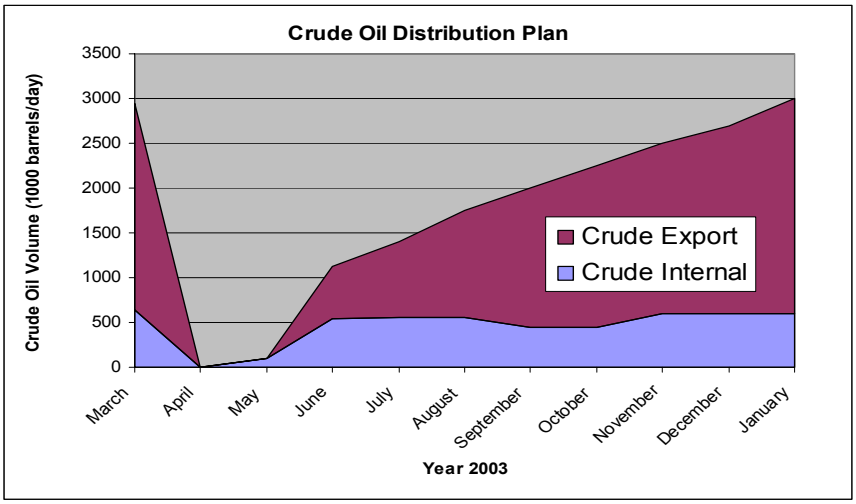


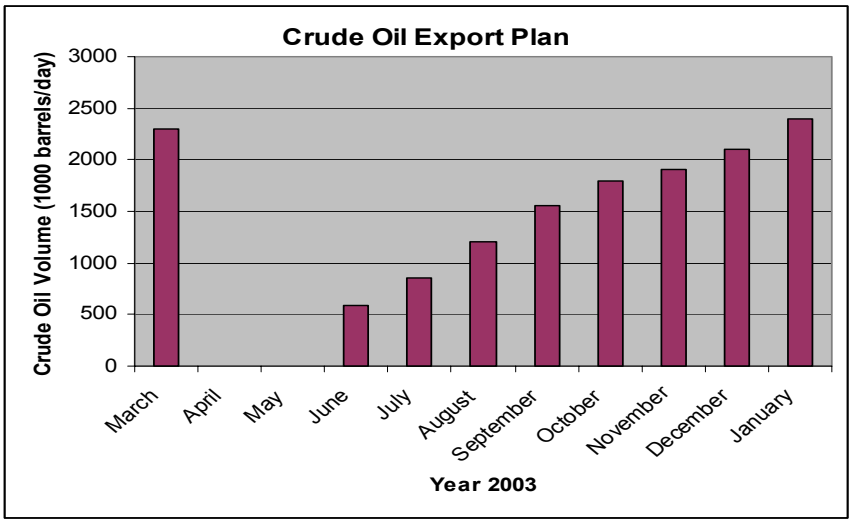


The Linear Growth Case was selected as the base case for the ROM.

Crude Distribution

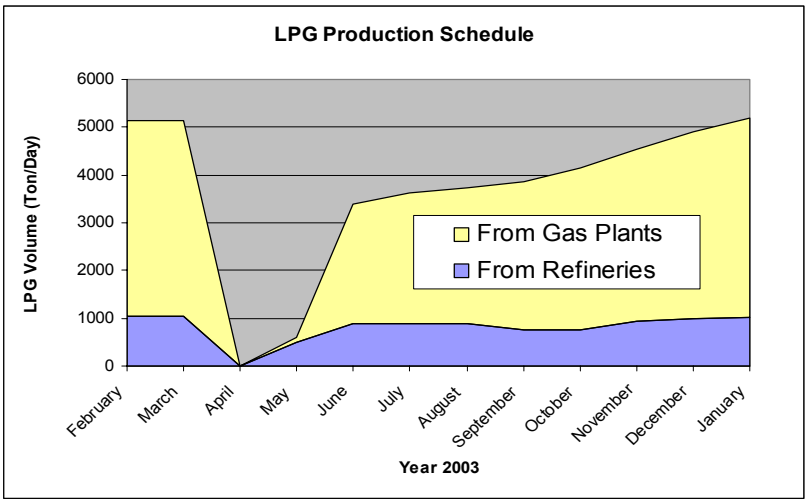
Based on current and projected production and internal demand of crude oil, the tables to the below reflect crude production and planned exports. It is also based on a projected shutdown of Bayji-North Refinery during SEP/OCT 2003.

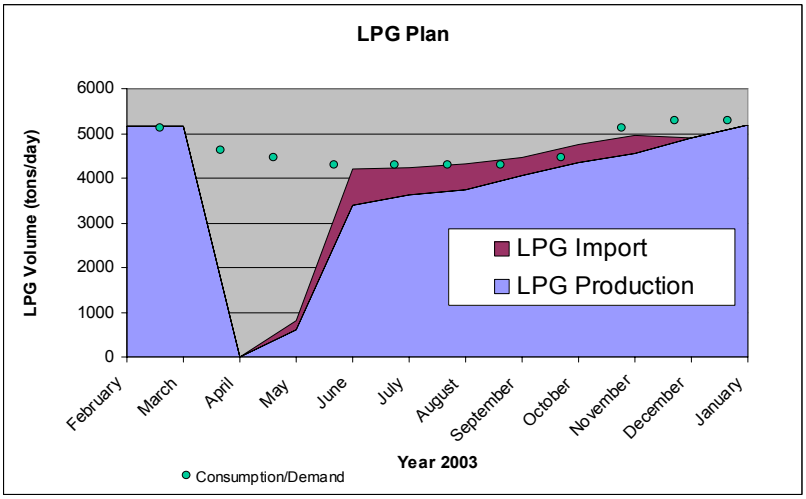


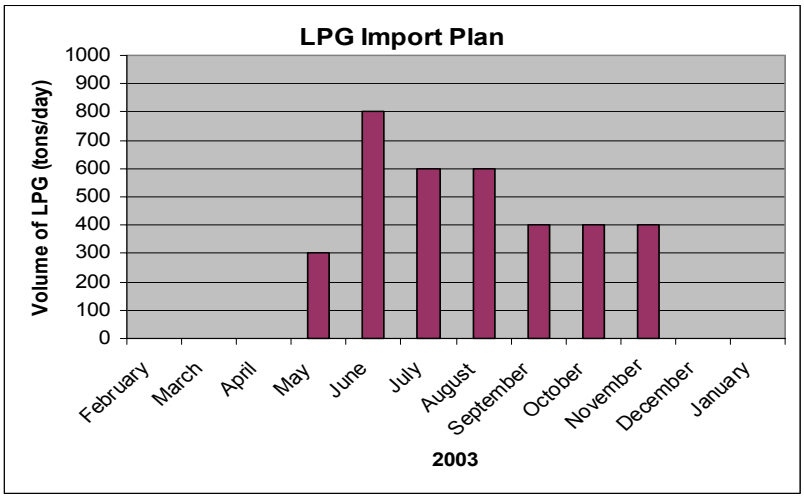


LPG Plan

Based on current and projected production and demand of LPG, the following tables reflect the LPG Plan and the expected imports to meet demand. Demand was based on monthly averages for the years 2000, 2001 & 2002. A projected shutdown of Bayji-North Refinery during SEP/OCT 2003 was taken into effect. The cost basis for LPG was $430 per ton.



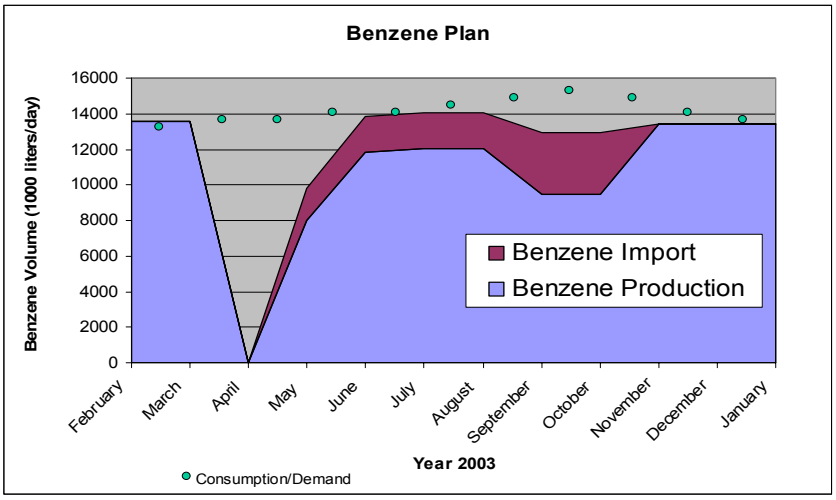



LPG Import Plan
Volume of LPG (tons/day)
1000
900
800
700
600
500
400
300
200
100
0
February
March
April
May
June
July
August
September
October
November
December
January
2003

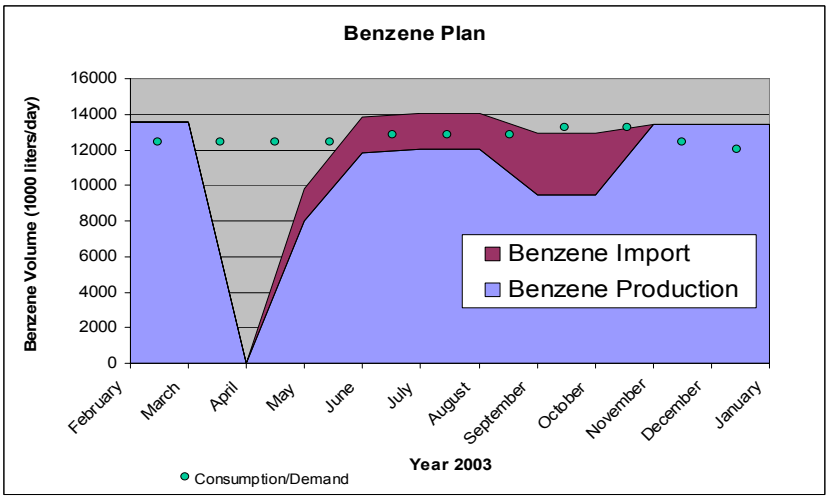
Benzene (Gasoline) Demand Base Case

Out of the following crude production growth cases:

Consumption based on monthly averages for the years 2000, 2001 & 2002



Consumption/Demand based on monthly averages for the years 2000, 2001 & 2002 2000 & 2001 (Base Case)



The consumption based on monthly averages for the years 2000 & 2001 was selected as the base case for the ROM.

Benzene (Gasoline) Plan

Based on current and projected production and demand of benzene, the following tables reflect the benzene plan and the expected imports to meet demand. Demand was based on monthly averages for the years 2000 & 2001. A projected shutdown of the Bayji-North Refinery during SEP/OCT 2003 was taken into effect. The cost basis for benzene was $0.40 per liter.