

**REPORT OF THE GROUP OF
UNITED NATIONS EXPERTS
ESTABLISHED PURSUANT TO
PARAGRAPH 30 OF THE
SECURITY COUNCIL RESOLUTION
1284 (2000)**

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APPENDICES

- I - Photographic record
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UNITED NATIONS

THE GROUP OF EXPERT'S ITINERARY

| <u>DATE</u> | <u>TIME</u> | <u>EVENT</u> |
|-------------|-------------------------|--|
| 15/01/00 | | Group travel to Amman, Jordan |
| 16/01/00 | 06:00 | Travel to Baghdad |
| 17/10/00 | 10:45 11:15 12:15 | Initial meeting at Ministry of Oil Meeting with H.E. The Minister of Oil Meetings to discuss and finalise itinerary |
| 18/01/00 | 09:00 12:00 | Visit to Daura Refinery Visit to Taji LPG Bottling Plant |
| 19/01/00 | 09:00 12:00 15:00 | Depart North to Kirkuk Meeting with NOC Management Visits to local sites (AB-2, IT-1) |
| 20/01/00 | 09:00 | Team A - Gas Processing Plant , Kirkuk Store Team B - AB-8, Khabbas Separation Station |
| 21/01/00 | 07:30 | Team A - IT-2, IT-1A Team B - ZAB Water Injection Facility, Memlelah region, Jamboor North, various well heads. |
| 22/01/00 | 09:00 11:00 14:30 | Review Meeting with NOC Management Visit to Baiji Refinery Travel to Baghdad |
| 23/01/00 | 10:30 | Ministry of Oil - Review of North |
| 24/01/00 | 08:00 10:00 19:00 | Depart for South Visit to Kut LPG Filling Plant Meeting with SOC Management |
| 25/01/00 | 08:00 | Team A - Zubair-1 and 2 Tank Farms, S Rumailah Area, Water Injection cluster stations. Team B - Visit to Basrah Refinery, Garmat Ali Water Intake Station. |
| 26/01/00 | 08:00 06:00 | Team A - Southern Gas Installations, Khor al-Zubair LNG facility Team B - Visit Khor al-Amaya and Mina al-Bakr |
| 27/01/00 | 08:00 11:00 | Review Meeting with SOC Management Depart for Baghdad |
| 28/01/99 | 08:30 | Group Meeting in Baghdad |
| 29/01/99 | 09:30 19:30 | Ministry of Oil - Review of South Ministry of Oil - Meeting with H.E. Minister of Oil |
| 30/01/00 | 10:00 12:00 | Meeting with SOMO Management Ministry of Oil - Final Meeting |
| 31/01/00 | 07:00 | Depart for Amman, Jordan |

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

MAIN CONCLUSIONS

- The lamentable state of the Iraqi Oil Industry has not improved.
- The level of oil exports during phase 7 will decline from the level of 2.2 million barrels per day achieved in phase 6, to a level of between 1.8 to 1.9 million barrels per day.
- A further production decline of between 5% to 15% per annum is forecast unless the delivery of spare parts and equipment is immediately accelerated.
- The oil transportation infra-structure has not been improved during the last two years.
- Insufficient spare parts and equipment have arrived in time to sustain production.
- The issues of pollution and safety have not been addressed.
- An alternative investment strategy for optimising production, by applying modern recovery techniques such as horizontal drilling, is recommended.

1. TERMS OF REFERENCE

“The group of experts will undertake, in cooperation with the Government of Iraq and taking into account previous studies carried out by United Nations oil experts, the following:

- a) A comprehensive survey of the condition of the Iraqi oil production sector and export capacity.
- b) To review alternatives for increasing Iraq’s petroleum production and export capacity in a manner consistent with the purposes of relevant Security Council resolutions, and on the options for involving foreign oil companies in Iraq’s oil sector, including investments, subject to appropriate monitoring and controls.

- c) To review and submit a list of additional spare parts and equipment necessary not only for the purpose of meeting the immediate requirements but also to enable Iraq to increase its exports of petroleum and petroleum products, in order to meet the humanitarian purposes set out in Security Council resolution 986 (1995) and related resolutions.
- d) To assess the impact of holds on contract applications for oil spare parts and equipment on the capacity of oil production and export in Iraq.
- e) To make recommendations regarding arrangements for the monitoring of oil spare parts and equipment.”

2. INTRODUCTION

At the request of the Secretary-General of the United Nations, the team of experts visited Iraq to carry out a survey of the condition of the Iraqi oil production sector, and its oil export capacity.

The group consisted of six experts, three of whom took part in the March 1998 mission, and were present in Iraq between January 16th and 31st, 2000.

3. METHODOLOGY

For the purpose of comparison with the March 1998 mission the group followed a similar itinerary, with additional visits to sites considered pertinent to the terms of reference. These included, amongst others, the loading platforms in the Arabian Gulf, the water-injection input to the South Oil Company system at Garmat Ali, and the LNG terminal at Khor al-Zubair.

On arrival in Iraq, initial meetings were held with the Ministry of Oil to agree an itinerary for the duration of the mission. Three senior members of the Ministry were assigned to accompany the group throughout the period.

At these initial meetings the group was advised, at Ministerial level, that in the current political environment:

- There would be no discussion on the matter of options for involving foreign oil companies in Iraq’s oil sector.
- On completion of the mission, and not before, the Ministry of Oil would advise it's estimates of oil production, sub-divided into North and South only.
- Refinery throughputs were not an issue for discussion.

Physical inspections were carried out at all sites visited, and discussions held with both senior and local installation staff. Detailed photographic and video records were made at all stages.

4. GENERAL OBSERVATIONS

The group has to report that the previously noted lamentable state of the Iraqi oil industry has not improved. It is apparent that the decline in the condition of all sectors of the industry continues, and is accelerating in some cases. This trend will continue, and the ability of the Iraqi oil industry to sustain the current reduced production levels will be seriously compromised, until effective action is taken to reverse the situation.

4.1. PRODUCTION

In order to maximise revenue, and in expectation of the arrival of spare parts and equipment during 1998 and thereafter, production of crude oil was incrementally increased to a level of 3 million barrels per day (bpd) by November 1999, without the technical resources to apply "good oil field practice".

This was achieved by the implementation of inadequately controlled water-injection programs in the North and South, bringing on-stream some of the pre-1991 stock of pre-drilled wells, and by initiation of production from fields such as Saddam and West Qurna.

The Iraqi oil industry is unable to sustain production at these levels due to its inability to replace the lost capacity of depleted strata and "watered-out" wells. The suspension of drilling, well-workover and completion activities, and delays in the commissioning of wet-crude treatment plants, directly result from a lack of spare parts and equipment.

Without prompt action, a continued decline in production is strongly indicated. The Iraqi oil industry continues to adopt high-risk solutions in order to balance the production quantity/oil-price equation against the necessity to export crude oil, to produce gas for domestic use, and to refine products for transportation and power generation.

4.2. INVESTMENT LEVELS

A two year perspective of Iraqi production has enabled several key conclusions regarding the effectiveness of the "Oil-for-Food" spare parts and equipment program to be drawn:

- Since December 1996, some 2,000 million barrels of oil have been produced;
- Investment in the oil sector has been set at US\$1,200 million;

The current level of cash-injection for the industry thus equates to 60 US cents per barrel, based over two years. This cost should strictly be viewed as hard currency operating expenditure ("OPEX") plus the equivalent of a few cents per barrel for running costs paid in local currency. Not all items on the program are operating consumables or services, and about one third of the value could be construed as investment in infrastructure i.e. capital expenditure ("CAPEX").

The norm for mature onshore oil production operations in the Middle East (outside Iraq) is approximately US\$1.50/bbl/annum OPEX.

The inadequacy of the monetary value of the program to sustain production operations is now self-evident. At the time of the spare parts and equipment program inception, however, all parties accepted the initial compromise of US\$300 million per phase on the assumption of a much quicker implementation of the program.

Future investment strategy should be structured to fulfil two main criteria, which are:

- A pragmatic expectation that whatever sum is invested should give value for money, and not be wasted.
- Expenditure on new oil field technology is permitted, in order to optimise the amount of oil recovered from the assets (i.e. oil reservoirs).

To meet these criteria an alternative to the current "straight replacement" strategy for spare parts and equipment for the Iraqi oil industry is recommended. Current oilfield drainage practice will result in a large percentage of the oil remaining in the ground, with ultimate recoveries of only 15% to 20% of the oil volumes-in-place being typical.

Implementation of modern technologies associated with horizontal well exploitation (horizontal drilling, 3D seismic acquisition and reservoir simulation in particular) should help to bring ultimate recoveries of between 35 and 50% of oil volumes-in-place, and are strongly recommended for additional investment funding in the near future. The cost of such a commitment is estimated to be of the order of US\$100 million per annum to be effective.

In order to offset current declines in production capacity, a longer-term perspective dictates the inclusion of new projects to develop known reserves that remain unexploited.

The capital expenditure to develop and recover 200 million barrels from a new oilfield in the South would probably exceed US\$300 million, assuming proximity to the main export infrastructure and utilities, and take up to 2 years to install production facilities and drill wells. A similar, but shallower, field project in the North might cost US\$250 million. In the event that additional infra-structure may be required, then these CAPEX figures could easily be doubled. (CAPEX range US\$1.5 to US\$3.0 per barrel commensurate with similar Middle Eastern onshore fields elsewhere).

Such projects should not be commissioned until there was certainty that the export infrastructure would be available to handle the plateau-rate of production expected from each new oilfield.

It therefore follows that any recommended investment support for horizontal drilling projects should generally precede that for the development of new oilfields.

4. 3. REFINING

The refineries at Beiji, Daura and Basrah have all been partly re-habilitated since the hostilities, and operate on a simple hydro-skimming technology basis.

To achieve this without access to replacement parts, damaged refinery units were cannibalized resulting in a lack of "back-up" for most units. Failure of such units, exacerbated by a lack of spare parts and equipment, will lead to a serious limitation of refining capacity.

The lack of functioning instrumentation and control equipment has resulted in the "hands-on" operation of most refinery units. Combined with the lack of spare parts and equipment, this has lead to the accelerating deterioration of

equipment, and also to a decline in the morale and motivation of operating staff.

The quality of refined products remains extremely poor, and waste water effluents are highly contaminated, both continuing to seriously impact environmental conditions.

The general lack of safety, fire-fighting and environmental control equipment gives rise to an increasing level of concern.

4. 4. TRANSPORTATION & STORAGE

The constraints noted in the transportation and storage of crude oil, and identified in the March 1998 report, remain and have not been effectively resolved.

The Iraq/Turkey Pipeline system (ITP) continues to operate without an effective control system. Intermediate storage capacity has been marginally addressed but this capacity will remain ineffective, as will proposed repairs to the ITP pipeline, until key items required for the safe storage and transportation of crude oil are released from hold.

There has been no improvement in the condition of the Mina al-Bakr loading platform. The safety and operational capabilities of this facility remain a major concern.

Repairs to the strategic line are required to increase movement of oil from the South to the North. Until repairs to this line are completed, overall export volumes will be reduced, following completion of repairs to the ITP.

Two berths at the Khor al-Amaya loading platform are under repair as an alternative to Mina al-Bakr, should technical problems occur.

The export of crude oil via the Iraq/Saudi Pipeline is not considered a priority by the Ministry of Oil.

The export of crude oil via the Iraq/Syrian Pipeline, as stated by the Ministry of Oil, is not being contemplated before 2001.

4. 5. SPARE PARTS AND EQUIPMENT

The spare parts and equipment program has not been demonstrably effective. Only some US\$250 million of spare parts and equipment of the US\$900 million approved under phases 4, 5 and 6 have arrived.

As reported in March 1998 “a sharp increase in production without concurrent expenditure on spare parts and equipment would severely damage oil-containing rocks, and pipeline systems”. This has now occurred.

The reasons for the lack of effectiveness of the spare parts and equipment program are many and the situation can be summarised as “too little, too late”.

An agreed and specific mechanism, whereby the holds applied to contracted spare parts and equipment can be resolved in a timely fashion, is recommended. Without such a mechanism, or an acceptable alternative review procedure, the existing deadlock will continue.

In the meantime the Iraqi oil industry will continue to scale down their expectations, increasingly taking the operational “safe route”, resulting in reduced production.

5. FURTHER CONCLUSIONS

- There is a need to review the structure of the procedure controlling the purchasing of oil spare parts and equipment. Recommendations for approval mechanism modifications are detailed in the report covering the Impact of Holds.
- As recommended in previous reports, the value of spare parts authorized for purchase in Phases 6 and 7 should be increased to US\$ 600 million per phase.
- Transportation capacity is theoretically sufficient for current production levels, but requires infrastructure repairs to sustain such levels. Given the condition of the Mina al-Bakr loading platform, an alternative is strongly recommended.
- The issues of safety and environmental damage require urgent and immediate attention as no improvement has been noted since the group's March 1998 report. The effluent outfalls from the refineries continue to pollute the local water tables, refined products still contain unacceptably high levels of sulphur, and the air pollution from flares remains uncontrolled.

UPSTREAM REPORT

UPSTREAM REPORT

SUMMARY

The level of Iraqi oil production over the last two years has been dictated by the needs of humanitarian aid and global oil-price constraints. The physical characteristics of the Iraqi giant oil fields ultimately govern their production levels, and the fields have reacted adversely to inadequately controlled secondary recovery techniques (water injection and gas lift). Oil wells and surface equipment have been subjected to the severe stress of over-production for the last six months, and the Oil Ministry has been obliged to make a virtue out of necessity, and announce a planned reduction in overall output of “at least 10%”.

The fortuitous increase in oil price during phase 6 enabled the industry to contemplate a return to “good oilfield practice” by reducing output, and still achieve the US\$5.265 Billion target during phase 7.

It is the opinion of the group of experts that further production cuts will be forced upon the field operators as a result of a continuing deterioration in subsurface production capacity, and surface processing and transportation infrastructure. However well intentioned the original “Oil-for-Food” spares program was, the reality is that too little essential equipment is arriving in Iraq at the appropriate time to provide a solution to the daily crises experienced by the industry’s management.

There is a consensus amongst the director-generals of the seven companies visited that even if all constraints on normal commercial activity were removed immediately, it would take a minimum of one year (and up to three years in extreme cases) to attain a situation of normality and sustain an export level of 2.5 million barrels per day.

A prime indicator of the changing circumstances of the Iraqi oil industry is a noticeable increase in environmental pollution since the March 1998 mission.

The main remedy to counter-act the deterioration in production and export levels will be for the Iraq oil industry to apply horizontal drilling techniques to improve the overall recovery factors of the producing oilfields.

UNITED NATIONS

Whereas senior Oil Ministry personnel are aware of the global picture of the situation regarding the spares program, the majority of technical managers met during site visits by the group of experts did not have the luxury of insight into the ethos of the Memorandum of Understanding and its practical manifestations. From their limited viewpoint, the implied promises of technical help, and the oil industry's corresponding expectations, have not been met.

UNITED NATIONS

NORTHERN OIL COMPANY

OVERVIEW OF THE NORTHERN PRODUCING REGION

The “Oil-for-Food” spares program has failed to establish and support a sustainable oil production system in the North. Apart from the successful delivery of de-watering chemicals to treat wet crude, and bactericide to treat injection water, the impression received was “too little, too late” with regard to the supply of essential items.

It should also be noted that the water-injection program for Kirkuk Field reached a point of critical balance during the last few months and contributed significantly to the trends described. With an oil-column of only 30 to 50 metres remaining in Avana and Baba Domes, and a re-pressured common aquifer, the injection program needs very careful control to prevent water breakthrough along the fracture system in the limestone reservoir. With no telemetry, nor operational communications, nor adequate water-treatment spares, the possibility of irreversible damage to the reservoir of this super-giant field is now imminent.

Basic gas-lift equipment has been installed in 22 wells on the Baba Dome since 1998 and this compensates to some extent for the production difficulties created by disposal of residual crude into this reservoir prior to this time.

Towards the end of phase 6 from late October, 1999, the cumulative effect of a deteriorating processing system, combined with excessive draw-down of the oil reservoirs, started to take its toll. As a result, the North Oil Company has been forced to respond to the crescendo of upstream and downstream failures that occur almost daily, and reduce the demand on the producing wells.

The statistics for the first month of phase 7, coinciding with the Mission’s visit, indicate a fall in overall production to less than 1 million barrels per day (bpd), commensurate with Ministerial instruction to reduce output by approximately 10%. The move to reduce production might be interpreted as making a “virtue out of a necessity”, but in reality is a resumption of good oil field husbandry.

UNITED NATIONS

ASSESSMENT OF CURRENT PRODUCTION LEVELS

There are thirteen developed oilfields in the operational area of North Oil Company. The four most significant contributors are ranked in order of productive capacity:

| | |
|------------|-----|
| KIRKUK | 755 |
| BAI HASSAN | 95 |
| JAMBUR | 45 |
| KHABAZ | 5 |

In March 1998 the remainder were cited as having potential to contribute to the growth in output projected by the Oil Ministry, and were confirmed as still operational during the current Mission :

| | |
|-------------|----|
| SADDAM | 15 |
| AIN ZALAH * | 5 |
| BUTMAH * | 5 |
| SUFAIYA * | 5 |

* these operate under central control from Ain Zalah

The following fields do not contribute :

QAYARAH
NAFT KHANAH
EAST BAGHDAD
BALAD
TIKRIT

The average daily production for the North at the start of phase 7 is "950,000 to 1,000,000 bpd", according to the Ministry. Based on an analysis of data provided to the group during site visits, and integrating this with data supplied during previous missions, the assessment of current production is as indicated above, totalling 930,000 bpd. At present the only local consumption is the feed of Jambur and Bai Hassan crude to Beiji Refinery estimated at 140,000 bpd. Based on the group's assessment of Kirkuk area crude oil analysis, refining generates 38% of the volume delivered to Beiji (estimate 53,000 bpd) as "residual" or "reduced" crude. Varying proportions of this are returned to the export line to Ceyhan, whereas two years ago it was injected into Baba Dome. An alternative disposal facility has been created at Jebel Pur, south of Kirkuk, where unwanted by-products including reduced crude are injected into a well at this location.

UNITED NATIONS

INDEPENDENT MASS BALANCE ESTIMATE FROM OBSERVED DATA

On Monday 24th at SOC the Team of Experts was told that “the ratio of SOC/NOC exports is 60/40” (57.2/42.8 or 1.34 ratio was the average during Phase 6).

Therefore: (where “RC” = residual crude from the primary refining process)

$$(\text{NOC prodn} - \text{Beiji} + \text{RC}) * 1.5 = (\text{SOC prodn} - \text{Basra} - \text{Daura} - \text{Jordan} + \text{RC})$$

$$(910 - 140 + 70) * 1.5 = (\text{SOC} - 170 - 70 - 80 + 120)$$

$$1260 = \text{SOC} - 200$$

$$\text{SOC Prod n} = 1.46 \text{ million bpd}$$

Later in the same meeting the Team was advised that SOC production is currently running at 1.4 Million bpd, which was the main “unknown” in our investigations.

Without the official figure for NOC overall production, the expert’s prediction of 930,000 bpd can only be tested by sensitivity analysis regarding the ratio between NOC and SOC export figures, and a careful check on the disposal of the residual crude. Over the past two years the Ministry has stated that 100,000 bpd residual crude is “spiked” into the northern export line. This figure may well be reduced during phase 7.

Therefore, as an initial “snapshot” at the start of the visit to the southern operations :

| | | |
|------------------|---|--------------------------------|
| Total production | = | 2.36 million bpd (0.91 + 1.45) |
| Total export | = | 1.90 million bpd |
| Local use | = | 0.46 million bpd |

At the end of the mission, in Baghdad, several “question-and-answer” sessions helped to clarify the overall picture. Residual crude disposal into the NOC export to Ceyhan was quoted as “approximately 60,000 bpd”, which was a close corroboration of the estimate made previously by the group of experts.

UNITED NATIONS

The final prediction of average production for the Iraq Oil Industry during phase 7 is as follows :

| | | |
|------------------|---|--------------------------------|
| Total production | = | 2.43 million bpd (0.93 + 1.50) |
| Total export | = | 1.97 million bpd |
| Local use | = | 0.46 million bpd |

based on re-injection ("spiking") of crude exports with one third of the residual crude produced by the refining process. There is a caveat attached to the above figures "assuming no major breakdowns, and/or decision by the operators to reduce output".

SITE VISIT – KHABAZ FIELD SEPARATOR AND COMPRESSOR STATION

The Khabaz Field produces from a shallow limestone reservoir and various estimates were given regarding current output. The design capacity of the processing plant is for 30,000 bpd, but this has never been attained in practice. With only one train still operating, and the fact that no de-watering equipment is functional, only a limited throughput of about 5,000 bpd from dry-crude wells is achieved.

Compressed gas is sent to the Northern Gas plant.

SITE VISIT – OIL-PROCESSING PLANT

There are two oil-processing plants in the north.

The team of experts visited the oil-processing plant where oil from Khabaz, Bai Hassan, Jambur and Kirkuk Fields is processed. The design capacity of the plant is close to 1 Million bpd. The second plant at Saralu only treats Kirkuk oil and has a design capacity of 240,000 bpd that is understood to be under-utilised at present. At present the hydrogen sulphide and carbon dioxide removal systems are partly out of order. In particular H₂S corrosion may therefore at any time lead to a severe accident and in turn may result in a significant reduction in oil exports before necessary repairs can be made.

A lack of instrumentation and in-field communications creates severe operational problems for this facility.

FIELD VISIT – NORTH JAMBUR WORKOVER RIG

The oil produced from Jambur comes from two different limestone strata: sweet crude from the shallow Tertiary (22 wells) and sour crude from the deep Cretaceous (32 wells). The Tertiary production represents about a fifth of the total production of about 30,000 bpd.

The Iraq Drilling Company has three operational drilling rigs and two workover rigs in the North. The experts observed two workover rigs on North Jambur Field, one stacked and the other rigged up at well number 15 (a 10,000 ft Cretaceous producer), to which a visit was made.

A visit was also made to well number 35 (another deep well) which was shut in last year when the wellhead began to sink into the ground, due to severe corrosion and casing failure caused by hydrogen sulphide rotting the steel. Not only did this represent a total loss of production, but it signalled the likelihood that the remaining 31 deep wells would suffer similar fates.

With the delay of conventional production-logging service contracts etc it is impossible to identify which wells are in a dangerous condition. With the delay in supply of mud chemicals, well casings made of hydrogen sulphide resistant steel (C-75), tubing spools and wellhead valves with stainless steel facings there is very little that can be done to prevent the eventual loss of the existing production system in Jambur Field.

The EMSCO workover rig was in a sad state of disrepair, with the Caterpillar SCR power-train running like a coal-fired steam-train. It had already taken the crew about 6 weeks to enter the well, discover the unsafe state of the production tubing, and pull the corroded production casing (well TD was 3500m and they had put a cement plug up to 3190m). The idealised plan was to install a new liner and re-complete the well, but there are no materials available. As a consequence the well was effectively “blowing-out” and the oil was being burnt in a flare-pit some 100 yards from the rig – a flare visible from several miles away. With no bentonite it was impossible for IDC to make a heavy drilling-mud to kill the well, so the well production is lost for many months. It was also noted that the high percentage of hydrogen sulphide in the crude was also contributing to the heavy pollution produced by the flare.

The current expectation is that all the remaining 30 deep wells will require workover and re-completion; thus, with only one rig operational and capable of a workover every three months, the desire for a practical solution to the dilemma is very strong.

UNITED NATIONS

Notes:

Jambur crude contains 2.7% H₂S;

AB8 associated gas contains 21.9% H₂S, after separation from crude;

AB7 discharge gas has 10.3mol percent H₂S, 6.8mol percent CO₂.

FIELD VISIT – ZAB RIVER PUMP-STATION & WATER-TREATMENT PLANT

The water-injection facilities for maintaining aquifer pressure in the two oil-producing domes of the Kirkuk Field were inspected, with a view to assessing their effectiveness and ability to continue to operate in the current spares-shortage environment.

The intake pumps from the Zab River are situated at a plant sited on the "saddle" between Avanah and Baba Domes. The system is designed to extract and treat 1.5 million barrels of river water per day, of which approximately 1 to 1.1 million barrels of water per day (bwpd) are injected into the aquifer underlying the oil column in Kirkuk. The water is distributed from the water-treatment plant to the edges of the field from its central position. Some wells are 50 kms distant.

Due to various holds on pump spares and water-treatment chemicals, the quality and rate of injection water is difficult to control.

Owing to lack of communications the control of the rate of injection to each well, and overall, is entirely run on guesswork. The injection program over the last two years has succeeded in re-pressuring the aquifer so that it has now reached a critical point of mass balance. The injection pressures have to be controlled to "a few psi" (pounds per square inch) throughout the field, in order to achieve a balance between two critical factors. Too high a rate of injection results in the water passing directly into the wells and increasing the percentage of water in the produced crude oil; too low a rate results in a further decline in the flowing pressure of the crude, and hence a drop in production rates.

The quality of the water injected into the aquifer should be carefully controlled, in order to prevent detrimental changes to the reservoir waters. If river-silt is injected, the reservoir rocks become blocked and less permeable. If "hard" water is injected, precipitation of scale can occur in the reservoir.

Various chemicals are used to treat the in-going water (aluminium sulphate and chlorine gas (as a bactericide) being the main items). The delay in arrival of certain spares has resulted in a breakdown of the automatic chemical dosing systems. At present the aluminium sulphate is introduced at the rate of one "wheel barrow per day" to treat 1.1 million barrels, by means of a man with a shovel.

FIELD VISIT TO DRILLING RIG – NEW WELL KIRKUK #356

The Team visited the site of an in-fill well on Baba Dome, fairly close to Kirkuk town. The rig was an EMSCO with a depth capability of 3000 metres, drilling a vertical shallow well to 1500 m. This is the only IDC rig currently able to drill in the North, the rig operator having cannibalised two other rigs for various spares. Many international drilling contractors have bid to drill similar wells in this region, using their own equipment – the normal expectation is to drill and complete such a well in approximately 15 to 20 days.

Under the current constraints IDC's performance is severely curtailed and the norm is to drill in about 3 months, without the safe working practices accepted throughout the global industry. In particular the drilling-fluid (drilling "mud") is restricted to the use of water, due to "holds" on mud-chemicals such as drilling-grade bentonite. This means that if any hydrocarbons are encountered (where the reservoir pressure exceeds normal hydrostatic head) the inevitable result will be oil or gas blow-out. It is not possible to make a heavy, water-based drilling-fluid containing barytes, without the viscosifying properties of the clay material (bentonite).

SOUTHERN OIL COMPANY

OVERVIEW OF THE SOUTHERN PRODUCING REGION

Current production has fallen back to approximately 1.5 million bpd, as a result of a wide range of inter-related operational difficulties. During 1999 a total of 56 wells ceased to produce, of which 51 have been killed by water-influx. 5 wells have had to be closed-in because of the effects of severe salt-water corrosion. These key wells were producing a total of 60 to 80,000 bpd prior to shut-in, and have caused considerable pollution of surrounding areas before discovery of the problem. An additional 5 wells were closed in during 1998, with a similar impact on production.

The initial success of the North Rumaila water-injection program, which started in March 1999, has now been eclipsed by spares problems and the predicted breakthrough of water into some of the wells, which have "watered out".

The group of experts conclude that the situation has reached a critical point where a combination of the difficulties associated with lack of spares, lack of management control of the production process, and the unseen risks of endemic corrosion, will combine within the next six to twelve months to create a highly probabilistic catastrophic failure. This failure may hopefully be relatively benign, halting production for a few days or weeks, but there exists a fairly high risk of a disaster in terms of pollution and a small possibility of loss of life.

The myriad problems with failing surface process equipment manifests in a dismal pall of black smoke which hangs in the air for a radius of probably 25 miles around Basra town. On a journey to South Rumaila Field the group of experts counted 11 separate flare sites (often comprising multiple flares), each one representing a system failure. Most of the flares are burning off rich hydrocarbon gasses, natural gasoline, and, occasionally, wet crude.

UNITED NATIONS

ASSESSMENT OF CURRENT PRODUCTION LEVELS

There are seven developed oilfields in the operational area of South Oil Company currently on-stream :

| | |
|--------------------------|-----|
| SOUTH RUMAILA | 690 |
| NORTH RUMAILA | 525 |
| ZUBAIR | 155 |
| WEST QURNA | 55 |
| MISSAN (was AMARA) | 45 |
| LUHAIS | 25 |
| BIN UMR (a.k.a NAHR UMR) | 5 |

totalling 1.5 million bpd, compared with 1.75 million bpd average during phase 6. The main factors affecting the quality and rates of production are :

- Production is from sandstone reservoirs with average vertical depths around 10,000 feet;
- Oil produced from the three largest producers has no, or little, hydrogen sulphide and is good quality light and medium crude;
- The reservoir water is very saline (220,000 ppm Cl-);
- The smaller producers have heavier oil and very saline formation waters;
- Reported gas-oil-ratios are between 500 and 700 scf/bbl;
- Two grades of crude are produced from Rumaila North and Zubair (light and medium).

The water injection program in North Rumaila is providing pressure support to the Main Pay only. Owing to the non arrival of spares ordered in phase 6, the injected water cannot be filtered down to the 4-micron particle-size required for injection into the Mishrif reservoir. Existing facilities allow filtration down to 7 microns only, which is acceptable for the Main Pay operation only.

The loss of function of various pumps results in a 1 to 1 voidage replacement of produced oil by injected water in the North Rumaila project, a shortfall of about 50% in the requirement to increase the pressure of the aquifer.

Zubair does not have pressure-support either in the Mishrif or Main Pay.

FIELD VISIT – SOUTH RUMAILA WELLHEAD #37

One of the most ominous failures in the Southern production system is the sudden loss of a producing well due to the effects of salt water corrosion. The sequence of events that occurred at the well site visited by the group of experts is typical of the 10 corrosion failures that have occurred in the last two years:

- Deep below the surface the steel casing rots through due to the extreme conditions of salinity, pressure and temperature, and oil begins to leak into substrata around the well. Depending on geological conditions the leakage may spread and accumulate below ground for many months.
- Eventually the oil escapes to the surface, possibly some distance from the wellhead, and begins to flood the surrounding desert.
- Once detected by SOC personnel, a remedial program should be implemented to repair the down hole problems; without the necessary equipment to repair the well, the only course of action is to “kill” the well by pumping fluid down the annulus to hold back the oil.
- In South Rumaila the bottom-hole reservoir pressure is fairly low, due to the restricted water-injection program in this sector; this enabled the well to be killed with water. The SR#37 well was producing about 12,000 bpd of dry oil until corrosion destroyed it.
- Normal oilfield practice in known corrosive environments would be to check the well at regular intervals and also treat with anti-corrosion chemicals etc – a facility unavailable to SOC in the present situation.
- In the neighbourhood of the well it was noted that there was a revival of agriculture which is at risk from the spreading pollution of the well.

It is axiomatic that similar well failures will occur throughout the coming months.

FIELD VISIT TO SOUTH RUMAILA WATER-INJECTION PUMP-STATION #10

This facility was typical of the 10 water-injection sites that are divided equally between North and South Rumaila Fields. Unlike the northern operation, this plant was not functioning, due to a lack of spare parts for the main pumps.

FIELD VISIT TO WATER TREATING/WATER INJECTION PLANT AT GARMAT ALI

Water from a tributary of the Euphrates is treated with chemicals to clear it of minerals and clay and prepared for injection into the water layer under the oil in the Fields. The plant, built by the Russians and commissioned in 1982, consists of a water-pumping station, and a plant for the preparation of chemical solution. There are also basins for mixing water and chemicals in order to bind minerals and clay, separation of water and sludge using sand and gravel filters and a pump station for pumping the treated water to the injection wells. The sludge deposited on the filters is back-washed from the filters after which it settles in large tanks. The clean water is recycled to the entrance of the water intake stage, the sludge being disposed of in the desert.

Of the four water intake pumps, with a total capacity of about 185 thousand cubic meters per day, three were in operation (140,000 m³/day), from the ten outlet-pumps to the oil fields only 20 percent were in operation.

This volume of water is currently being sent to the line water-drive scheme in North Rumaila, but is inadequate to provide the designed pressure-maintenance and flood-front progression.

RECOMMENDATIONS TO INCREASE SUSTAINABLE OIL PRODUCTION

Both the NOC and SOC have a number of pre-drilled wells that can, in many cases, be worked-over and completed as new producers to replace the annual losses referred to above. The number of wells is approximately 400, of which 100 are in the north. However, to make use of this resource as a priority, it is essential that a variety of contracts on hold are released in a manner acceptable to all parties concerned. The items include Technical Services Contracts for coiled-tubing units, production-logging, and other specialist services plus the supply of mud materials, completion chemicals, tubing, casing, flow-lines and perforating equipment.

It is essential to also refurbish sufficient drilling and work over units to optimise the use of the available pre-drilled wells, or bring in foreign companies to help break the log-jam of drilling and work over projects.

Poor oilfield husbandry has already resulted in an irreversible reduction in the ultimate recovery of oil from individual reservoirs. Crisis management will continue to exacerbate the permanent loss of huge reserves of oil. The group of experts estimates that some of the sandstone reservoirs in the south may only have ultimate recoveries of between 15% and 25% of the total oil that could be drained, because of inadequate water-drive facilities. The industry norm for analogous reservoirs in other countries is in the 35% to 60% range.

FOR THE NORTH :

The early introduction of horizontal-drilling concepts to the continued exploitation of the Kirkuk Domes is strongly recommended, implemented without recourse to 3D seismic acquisition and analytical techniques, in the massive limestones. All the reservoir monitoring and measuring equipment associated with standard oilfield production practices should also be installed as a matter of high priority.

FOR THE SOUTH :

The early introduction of horizontal-drilling concepts to the continued exploitation of the Main Pay and Mishrif is strongly recommended, including 3D seismic acquisition and analytical techniques, wire line electrical-logging and reservoir simulation (computer-modelling). All the reservoir monitoring and measuring equipment associated with standard oilfield production practices should also be installed as a matter of high priority.

UNITED NATIONS

INVOLVEMENT OF FOREIGN COMPANIES

To sustain and increase oil production and export capacity it is the view of the experts that involvement of foreign companies would be helpful and, in principle, the Ministry of Oil welcomes this.

However, as noted previously, the Ministry of Oil declined to take part in discussions on this matter and was only willing to discuss the involvement of foreign companies through the use of short-term technical service contracts ("TSC's"), such as well logging, pipeline pigging, and the drilling and work over of wells.

Originally, P.S.A.'s (production sharing agreements) were under discussion with various foreign oil companies. Since May, 1999, a change in policy took place, including the concept of "Mini-Projects" which would involve the external financing of the development of a limited number of portions of super-giant oilfields, or undeveloped (but proven) smaller oilfields. The Ministry proposed to offer attractive terms that included the concept of additional compensation to the contractor, based on oil production increments from each Mini-Project (usually referred to as a "Risk-Reward" form of contract).

Since May, 1999, the issues associated with this concept have been re-examined, partly in the context of a tripling of the oil-price. The Ministry's conclusion is that they now wish to organise short-term TSC's linked to the Phases of the MOU.

With the limited funds allocated to the oil industry, only a small number of technical service contracts are expected to start this year.

To get foreign companies to enter into, and to start up a TSC, it is confirmed by the Ministry that payment has to be guaranteed. Therefore sufficient funds have to be put aside before the start-up of such projects. This will obviously reduce the availability of the funds to be used for spare parts and equipment.

The current procedure regarding approval of contracts of this kind has taught contractors that approval, if given, may come much later than they originally expected and the group of experts expect contractors to increase contract prices to reflect this. In its turn this results in less money available to the oil sector.

UNITED NATIONS

It is anticipated that production and export capacity may be increased more rapidly by, for example, dedicating a larger share of the revenues from increased oil exports to the oil sector. The experts suggested that they could assist the Ministry in examining alternatives that would enable the extension of TSC's beyond the current horizon of six months, but such dialogue was declined at present.

THE INVESTMENT PERSPECTIVE

As discussed in the Executive Summary of the Report, the motives which originally established the precedent of the spare parts and equipment program receiving funding of US\$300 Million every 6-month phase were driven by humanitarian and political considerations.

The passage of time has allowed a broader consideration of the issues involved in financing one of the largest unitary oil-producing operations in the world.

The accepted “norm” of operating expenditure (OPEX) for onshore oilfields in the Middle East, other than in Iraq, is a rule-of-thumb equating to US\$1.50 per barrel produced per annum. In the “hard currency” countries, other than Iraq, this cost includes a significant element of overheads and labour costs, in addition to the world market consumables required to keep oilfields producing. In the present situation, Iraqi local OPEX is probably the equivalent of only a few US cents per barrel per annum (based on 7000 employees and 2000 Dinars to the dollar).

Thus, in a regularised situation, the Iraqi oil industry would require an annual investment (OPEX only) of approximately US\$1.3 Billion to sustain an average daily production of 2.5 Million barrels.

In this context, the spare parts and equipment program effectively equates to an “OPEX and CAPEX” program far short of any notional target for either class of expenditure.

DOWNSTREAM REPORT

DOWN STREAM REPORT

CONDITION OF REFINERIES

After suffering severe war damage the three major refineries in Iraq, at Beiji in the north, Daura near Baghdad and Basrah in the south, were partly rehabilitated. The only heavy oil conversion unit in Iraq, the 38,000-bpd hydro-cracker unit at Beiji refinery, was not repairable and has not been put back into operation again. The rehabilitation of the refineries into simple hydro-skimming refineries is a remarkable technical and human achievement.

In order to produce appropriate products to satisfy internal demand - LPG for domestic use, gasoline and gas-oil as automotive fuel - treating units have been re-instated as much as possible. De-sulphurisation of fuel gas and LPG is marginal and about 1 ppm by weight of sulphur (H₂S) is found in the LPG bottled for domestic use, twice as much as is normally acceptable in commercial LPG. Naphtha is hydro-treated in order to be able to process it in the reformers for the manufacturing of gasoline. Most of the reformers are in operation but the efficiency is low because of mechanical shortcomings of the units and/or the low residual activity of the catalysts. The reformer effluent octane numbers range from 71 RON at the worst and up to 89 RON in the best refinery, all far below modern standards. The resulting commercial gasoline octane rating is as low as 81 RON even where large amounts of tetra-ethyl-lead (TEL) are added. Gas oil for use as automotive diesel fuel is not treated and the sulphur content is in the order of 1.0 up to 1.2 % wt.

Owing to a lack of spare parts, some of the refinery units were cannibalized to provide equipment for the other units. Consequently, nearly all the operational units run with rotating equipment having no spares or back up, so that failure of rotating equipment leads to a loss in refining capacity. Many instruments are missing and a large number of the refining units, both distillation and treatment, are operated by hand control. This results to many disturbances and failures. More seriously, because of this and the lack of materials to maintain the units, the condition of the refinery equipment is deteriorating fast. Moreover, the holds on many spare parts and equipment, ordered to maintain and rehabilitate refinery equipment, and the delays in the delivery of the authorized spare parts, demoralize and demotivate refinery staff.

UNITED NATIONS

The direct effects of this situation result in bad "house-keeping", and reduced (and in some cases, totally lacking) maintenance programs, and poor safety awareness. The group also noted that the standard of good housekeeping and maintenance in the upstream sector is much better than in the downstream refining sector.

This may be a consequence of a lower experience level in the refinery industry, possibly exacerbated by the fact that working conditions are worse in the Beiji refinery, where it was mentioned that it was difficult to find young new employees because of its less attractive location and bad secondary conditions.

In Table 1 the data for refinery throughput (design capacity, estimated in March 1998 and during the group's visit) are given. In Table 2 data can be found on product quality.

Safety and environment

Insufficient attention is paid to safety procedures at most places visited by the group of experts. The most common safety violations observed by the visiting team were as follows:

- Personnel working without safety shoes, helmets, gloves, ear protectors at all the units at all sites, without exception.
- Bad housekeeping and maintenance are often evidenced by open (or half-closed) sewer hatches even on footpaths, and large oil spillages at the working sites leading to unnecessary safety risks. Notable exceptions were seen at a few sites where safety and housekeeping were much better controlled, for example, the Khor Al-Zubair Gas Separation Plant, Basrah Refinery, and the Iraq-Turkey Crude Transport Stations IT-1, IT-1A and IT-2.

Besides notations above, some specific examples of serious safety violations are listed below:

- At the Daura refinery the demineralisation water units create a lot of risk precedents due to extensive water spillage on the floor, and filters working under high pressure; water could be seen pouring out from filters and flowing down the filter sides.

UNITED NATIONS

- At the Basrah refinery a portacabin unit has replaced the function of the CD-2 electrical power-switching house, which was recently damaged by fire and almost empty of equipment. This portacabin contains no intrinsically safe switchgear, has no gas detection units present, and as it is situated within 30 metres of an operating refinery unit, is an invitation to a disaster.
- At the Taji and Kut Gas Bottling Stations the handling of gas cylinders was rough and cylinders were sometimes thrown up to 3 metres, especially during the unloading from trucks, creating a risk of explosion and further damage. In spite of the fact of limited testing, the repaired cylinders were not marked recording this, or the dates when the tests expired. A query on this subject was answered by the response that "there is no such practice in Iraq".

Environmental assessment

The three main Iraqi refineries have problems with operation of the waste water treating units that results in highly polluted discharge to the local rivers.

At the Daura refinery the effluent water spilling into the Tigris river is light brown in colour and contains, according to the local operator, a lot of oil. Visually there was no oil layer on the effluent water or in the return canal to the Tigris. According to the analysis of the waste water treating pumps P-10 and P-18, the waste water from Daura refinery contains many pollutants as can be seen from the table given below:

| Test | P-10 | P-18 | Notes : |
|------------|--------|-------|-------------|
| Components | | | |
| PH | 7.4 | 7.5 | |
| Oil | 500 | 60 | (ppm) |
| COD | > 1062 | > 144 | mg O2/liter |
| BOD | > 265 | 2% | mg O2/liter |
| Phenol | 0.75 | 0.2 | (ppm) |
| S.S. | 200 | 5.0 | (ppm) |
| SO4 | 142 | 145 | (ppm) |

Beiji refinery, the biggest plant in Iraq, contributes considerably to the pollution of the waters of the Tigris River. The mechanical skimmers are in bad shape and new concrete basins for the biological and chemical treating have been built but the necessary pumps and control instruments have a 10-month delay in delivery.

At the Basrah refinery only the old and first stage of the waste water treatment plant, and the mechanical oil skimmers, work well and water and oil pumps are in operation. The civil construction of the two following steps in the waste water treatment (the biological and chemical treatment) are nearly finished but the works cannot be completed because of the holds on the rest of the equipment. As result of the current situation the group observed the same 3 * 5 km lake covered with an oil layer, at the approaches to the refinery, reported on two years ago.

The second environmental problem is pollution of the atmosphere by chimneys of power stations and refinery furnaces, as well as by flares. The stack of the Daura refinery can be seen from afar in Baghdad because a broad and long brown-black flue gas trail is all over the sky.

Basra Refinery has to burn a lot of hydrocarbon gas due to lack of cooling capacities to condense those components. The big flares are also seen from far.

Khor-al-Zubair gas separation plant was also producing a large amount of smoke and carbon dioxide when the group of experts visited it. We were advised that currently all natural gasoline condensed at the plant from wet gas has to be burned by flaring. Basrah refinery had no possibility to process natural gasoline at the time of the group's visit.

Quality of refined products

While the throughput of the refineries has been largely restored after bombing, the quality of the products is extremely poor. Sulphur in the petroleum gas used in power stations is high and causes air pollution. The sulphur content of domestic LPG (heating and cooking) is twice the level of international specifications. Automotive gasoline has a low octane number, resulting in serious knock problems in the old, and degrading, car population. Automotive gas oil - diesel - is in most cases untreated and causes serious pollution through the emission of SO_x and excessive amounts of particulates.

The more advanced quality improvements produced in Western refineries, such as reduced benzene and aromatics content of motor gasoline, reduced end-boiling point of the gasoline and improved cetane number and lower sulphur content of the diesel oil, are not yet even dreamed of in Iraq.

Projects have, however, been proposed to increase the octane number of the motor gasoline through isomerization of the light end of the gasoline, the pentane and hexane fraction. A “hold” has been put on these proposals.

Operational efficiency

The visits were too short to allow any serious attention to the efficiency of the operation in the refineries. From first impressions it is quiet clear that energy consumption in refineries visited is far above normal oil industry standards. Much insulation material is missing and therefore much heat is lost to the environment and because of lack of materials, the situation cannot be rectified. What is not missing, is damaged; as a consequence rainwater enters equipment, wetting the insulation causing accelerated corrosion.

Because of a lack of material and spare parts, many damaged or leaking heat exchangers and air-coolers cannot be repaired. There are two main consequences: temperatures in gas-liquid separators are too high and large volumes of gas and hydrocarbons have to be flared. Moreover, much less useful heat can be recovered and is lost for the process and the operation is less energy effective.

In modern refineries much energy is saved through very effective co-generation of heat and power. This is not the case in the Iraqi refineries. Even internal power generation is not yet applied and the refineries depend for their power on the national grid, which is very unreliable. Because of the rapidly increasing number of power dips, surges and cuts in the public electricity grid, the number of stops and downtime of the refineries grows alarmingly fast. In the Beiji refinery the excessive number of power reductions or outages, sometimes two per hour, contribute much to the reduced throughput.

Maintenance

The lack of spare parts and materials is so serious that part of the primary crude distillation capacity has been taken out of operation and has been stripped of rotating equipment and control instruments to keep the other part running. That is even more so with the product treating units.

Moreover, the control of the refinery processes has become so cumbersome that equipment suffers from poor operation and degrades fast.

Another understandable and very negative effect of the holds and proposed projects, and the long delivery of items, is that management and operational personnel see the degrading of their industry, become frustrated and lose

motivation. This is the worst that can happen to this industry after the difficult partial rehabilitation of the refinery industry.

UNITED NATIONS

Spare parts requirement

The lack of spare parts leads to bad maintenance and repair of the damaged and further crumbling refinery industry. In this industry the development of use of special materials has been progressing fast, and old applications are no longer available, or are extremely costly, because of infrequent demand.

The lack of spare parts is not the only cause for the degradation of the oil industry. After the first generation that took over the oil industry, the number of younger graduates and engineers that followed is low, and their experience level is limited. It is easy to understand that the care for equipment and materials is therefore a low priority and that the awareness for good housekeeping that goes hand in hand with good maintenance is also reduced.

The same holds for the awareness for safety and care for a good environment, which are both far below modern standards. More staff training is needed to change the general attitude in these matters.

Table 1 - Estimated Refinery Crude Throughputs (bpd)

| | Nominal | Mar 1998 | Jan 2000 |
|--------------------|---------|----------|----------|
| Beiji | 300,000 | 285,000 | 140,000 |
| Basrah | 170,000 | 130,000 | 165,000 |
| Daura | 100,000 | 75,000 | 70,000 |
| Export to Jordan | | 80,000 | 80,000 |
| Refinery Fuel Burn | | 40,000 | 40,000 |

Table 2 - Refinery Product Quality

| Quality of produced products | 1998 | Basrah Refinery | Daura Refinery | Beiji Refinery |
|---|------|---|---|---|
| LPG - ppm wt of sulphur | 725 | 100 – 200 | 100 – 200 | 4-10 |
| Gasoline - RON | 78 | 81 (84 ¹⁾) | 81 (84 ¹⁾) | 81 (84 ¹⁾) |
| Reformate - RON | | 88 - 91 | 81 (84 ¹⁾) | 75 –76 91 |
| Kerosene - Sulphur - Smoke point mm - Freezing point °C | 0.21 | 1 – 10(ppm) 27 -55 | 0.1 - 0.2 (%s) 27 -55 | 1 –10 (ppm) 26 -55 |
| Gasoil - % of sulphur | 1.0 | 1.0 – 1.2 | 1.0–1.2 | 1. – 1.2(0.1 ²⁾) |
| Fuel Oil - % of sulphur | 4.0 | 4. – 4.5 | 4 – 4.5 | 5 |
| Lubrication oil - % of sulphur - VI - Color - Pour Point °C | | .7 – 0.85 95 3.0 (1.0 ³⁾) -6 | 1.0 (0.6 ³⁾) 95 3.0 (1.05 ³⁾) -6 | .7 – 0.85 95 3.0 (1.0 ³⁾) -6 |

- 1) In order to bring up octane number the construction of an isomerization unit has been proposed.
- 2) After implementation of the HDS project.
- 3) After hydrotreatment that currently hasn't worked constantly due to the problems with hydrogen recycle compressor.

CONCLUSIONS

It has taken the international oil refining industry a long time to establish yardsticks to measure, and establish, standards that have to be maintained in order to sustain operations, create safe working conditions for people and to protect the environment.

Although the effort of the Iraq oil industry has been enormous, and is notable for its effort to reinstate production after severe damage in a very short time, the lack of means to keep this industry in good shape in terms of capital, equipment and material, and also from the point of view of human resources, is very apparent.

Owing to a lack of materials, spare parts and long delivery times maintenance standards have slipped, and staff have severely demotivated. The oil industry is degrading, safety is below conventionally accepted standards, the environment is endangered, and the ultimate recovery potential of oil and gas in the fields is jeopardized. The current situation, if left unchanged, will lead inexorably to the demise of the oil industry.

INDIVIDUAL FACILITY REPORTS

DAURA REFINERY

The Daura refinery is a simple hydro-skimming refinery, which implies that no "bottoms" conversion processes are used, except for the manufacturing of lubricating oils and the production of bitumen. The throughput of the refinery was given as the nominal design capacity of 100,000 bpd and because of the low on-stream times more exact figures could not be given. Owing to lack of spare pumps, pump failures now result in downtime of the units. A mixture of Kirkuk and Basrah crude is being mostly processed.

The refinery is geared to the production of middle distillates, such as diesel and gas oil. The quality of the gas oil is low, as the sulphur content varies between 1.0 and 1.2 per cent. Figures for the cloud-point were not available. A project has been started to bring the sulphur content down to 0.1 per cent in the future by installing a gas oil hydro de-sulphurisation unit.

A dual purpose kerosene is being produced and treated in an existing de-sulphurisation unit. The sulphur level is brought back to between 50 and 100 ppm. Smoke point of the kerosene is mostly in the order of 24 mm, while the freezing point is as low as -55 °C.

In order to produce gasoline for the local market, naphtha is processed in a naphtha hydro-treater, followed by a reformer unit. The octane number of the reformat is rather low, in the region of about 78 RON points. Gasoline on the market has an octane number of about 81 RON points, indicating that some octane boost from other high octane components or additives is being used. In order to bring the octane number of the gasoline up to about 84 RON points, a plan for the construction of an once-through isomerisation unit has been proposed.

The liquid petroleum gas (LPG), mainly out of the crude oil distillation (untreated) and the naphtha reformer, is sent to the LPG bottling plant at Taji where it is mixed with treated (amine) LPG from the oil fields. Because of shortage of the chemical amine, the treating of the LPG from the oil fields is not optimal and the LPG is not sulphur-free.

The refinery is - compared with European standards - in a deplorable state and would have been closed as a consequence of the high personnel safety risk and the low maintenance. That the refinery still turns out products from such outdated and heavily cannibalized units is in itself a miracle, and has only been possible thanks to the inventiveness and dedication of management and staff.

The main cause of the bad maintenance of the plant is the lack of spare parts, pumps, compressors, control instruments, maintenance equipment and measurement devices to make possible quality checks and preventative maintenance. On the other hand, it also appears that the number, and expertise, of personnel has degraded with time, along with an awareness of good housekeeping and safety. There are more than enough examples that show that the badly maintained state of the units, and the lack of spare parts, will bring a further decline in the availability of process and utility units, and unnecessary risks to personnel.

Air Dryers

Chilled and/or absorbent dryers for instrument air are in such a bad state that further maintenance or repair is no longer possible. The excessive water content of the instrument air is leading to condensate formation and malfunctioning of control instruments. This will make operation of the process units impossible with consequently a dramatic drop in refinery throughput. The project for the installation of a new air dryer (Comm No 00536) has been put on hold by the US "pending further consideration", although released by the UK.

Raw Water quality.

The level of the river Tigris has not only dropped but has also deteriorated in recent years, with an exceptional increase of sediment and ion content over the last month. For example, the analysis of raw water quality is given below:

Raw Water Analysis.

| <i>Test</i> | <i>Result</i> | <i>Notes</i> |
|--------------|---------------|----------------|
| P.H. | 7.7 | |
| M-alk | 240 | p.p.m as CaCo3 |
| Ca.H | 436 | " " " |
| Cl | 392 | " " " |
| Conductivity | 2000 | µp/cm |
| T.D.S. | 1220 | p.p.m as CaCo3 |
| T. | 600 | " " " |
| Turbidity | 15 | N.T.U. |

The present electrostatic precipitators are designed for a conductivity of the raw water of only half the value that is now measured in the raw water.

UNITED NATIONS

Without additional demineralised water facilities (COMM No 53556), the amount of de-mineralised water produced now with the bad raw water quality will be half of normal, and this will lead to only half the potential of steam-raising capacity and consequently a serious reduced refinery throughput.

Steam Generation.

The boilers for steam generation, built in 1954 and 1958, were in a deplorable state. Flue gases were coming out of the walls of the heaters. Fuel, boiler-feed water and steam were leaking from the supply and product lines. Virtually no control instrumentation is present, with fuel oil leaking everywhere. It would not be a surprise if a major failure, and possibly a serious accident, occurs in the very near future. (COMM No 53556 – Pending)

Hydrogen compression.

In the Daura refinery lubrication oils are manufactured and the last step of the production route is a hydro-finishing step. Hydrogen from the naphtha catalytic reformer has to be boosted to a higher pressure. At the moment the hydro-finishing plant is out of operation owing to a lack of spare parts. The lubrication oils produced at the moment suffer in quality, owing to a lack of the necessary hydrogen after-treating.

Equipment Insulation.

In many process units the insulation is so badly damaged, or insufficiently repaired, that not only is heat lost, but, more dangerously, rainwater will wet the insulation and significantly increase corrosion of the unit construction material.

Environmental pollution.

The stack of the refinery produces a broad, long brown-black flue gas trail across the sky that is easily visible throughout Baghdad.

The effluent water discharging into the Tigris River has a light-brown coloured appearance and contains, according to the local operator, a lot of oil. During the visit no oil layer on the effluent water could be seen in either the river or in the return canal to the Tigris. The analysis of the waste water treating pumps P-10 and P-18, and the analyses received from Daura refinery, contain many pollutants as given in the Table below:

Power Plant Waste Water Treatment.

| <i>Test</i> | <i>P-10</i> | <i>P-18</i> | <i>Notes</i> |
|-------------|-------------|-------------|----------------------|
| Sulphide | 7.4 | 7.5 | R - (m3/hr) |
| Oil | 500 | 60 | IP - (ppm) |
| SOD | >1062 | >144 | Microscopic Analysis |
| BOD | >265 | 2% | |
| Phenol | 0.75 | 0.2 | |
| S.S. | 200 | 5.0 | |
| SO4 | 142 | 145 | |

Safety clothing.

Safety helmets were seldom seen - although one was seen in the car of the general manager, and two workers in a large group pulling a heat exchanger were seen wearing helmets. Visitors were allowed to walk around without helmets, safety shoes or any other protection. Maintenance people at work in the refinery were not wearing safety shoes.

Open sewer.

A large uncovered manhole was noted in front of the Safety Department building; anyone not looking could fall in the hole and suffer injury. A car could have dropped a wheel into the hole. When coming out of the Safety Building, the general manager himself laid the cover in place while many people looked on. None of the safety staff appreciated the danger.

BEIJI REFINERY

The refinery process starts with crude oil distillation in three different crude distillers with a rated total capacity of 300,000 bpd , but only half can be realized at present. Gas and LPG are insufficiently de-sulphurised, the LPG dispatched outside the refinery for domestic use containing about 10 ppm sulphur. Naphtha is hydro-treated before being upgraded to motor gasoline in three reformers, two semi-regenerative and one continuous regenerated catalytic reformer (CCR) from UOP. The reformat of one semi-regenerative reformer has an octane number of 90 up to 91 RON, the other produces a reformat with only 70 up to 75 octane number. The regeneration of catalyst and/or delivery of new catalyst seems to be a problem. No affirmative answer was given on the question for a project to recover catalyst activity. The CCR, installed in 1984, produces a reformat with an octane number of 90 up to 91 RON. Activity cannot be

increased because of damage to the internals, as well as the reactor and the catalyst regenerator. This damage was caused about 7 or 8 years ago.

The heat transfer in the heater is seriously hampered by hot spots on the coils. It seems that the fuel/air ratio control is not, or badly, working. Moreover the fuel composition varies widely, and no instrumentation is available to measure the fuel quality and to automatically control the combustion. As a consequence the octane number of the gasoline is low, even if large amounts of Tetra-Ethyl-Lead (TEL) are blended into the gasoline pool. In order to be able to increase the octane number of the gasoline a project for the installation of a "tops" isomerisation unit has been proposed.

Because of a lack of spare parts for the hydrogen fresh-feed compressors, hydro treating of middle distillates is not sufficient. The sulphur content of kerosene is 0.6 percent, the amount of sulphur in the gas oil is between 1.0 and 1.2 percent sulphur.

In order to increase the output of lubrication oils, the reinstatement of an inoperative lubricating oil plant and the repair of the propane de-asphalting unit has been proposed.

In addition, the high vacuum distillation unit and the hydro-cracker are out of operation owing to lack of spare parts and materials. The hydro-cracker unit is at this time being stripped of equipment for use in other units.

The refinery experiences many regular shutdowns as it has no internal power generation capability, for which it depends totally on the National Grid. The very poor stability of the national electricity grid supply, where 2 to 3 interruptions per hour are not unusual, grows increasingly worse. Two years ago the refinery had only 2 up to 3 power interruptions per week, at most.

The management plans to give priority to the following activities in the coming months:

- waste water treatment,
- lubricating oil plant rehabilitation,
- the construction of an isomerisation unit,
- attention to the safety standards in the refinery.

The general impression during the visit of the refinery was that housekeeping is far below normal refinery practice, and that maintenance is very bad. Tools, equipment and spare parts were lying around and when asked why, the answer from the plant manager was that tidying up the plant was the responsibility of the maintenance department, and not his. It is very probable that much material, spare parts and equipment is wasted in this way.

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Awareness for safety is very low. Of maintenance people at work only one single man was seen wearing a safety helmet. No safety shoes, no safety glasses, nor protective clothing or ear protection was used by the working people, nor by any people going around in the refinery. We very much doubt if personnel have any knowledge of what to do in an emergency!

Housekeeping of the spare parts in the warehouse looks very bad with all types of material lying in chaos. A newly arrived, very expensive stainless steel heat exchanger bundle lay seriously damaged and probably no longer usable, half unpacked next to others. Undoubtedly the lack of materials and spare parts has serious repercussions, but it is hard to imagine that under this management and with this personnel the operation, the throughput and product quality can be sustained at present levels, even if enough spare parts and materials were available. It is still even more doubtful whether the present experience level and the motivation of the people at the Beiji refinery is good enough to think even of a possible restoration of the old design throughput and normal product quality.

It is virtually impossible to comprehend the immense effort that has been made by the management, senior staff and personnel to get this refinery into operation again, given the evident lack of the necessary finance, spare parts and experience level. But, without a doubt, the overall condition of this refinery is degrading, and very fast.

BASRAH REFINERY

Basrah Refinery was built in the early 1970's and came on stream in 1973. From an international perspective it is seen as a rather young refinery of simple design (hydro-skimming refinery). The refinery plans show two identical middle-size crude distillers of 70,000 bpd capacity each, and three small crude distiller units each of 10,000 bpd capacity. Total nominal capacity is therefore 170,000 barrels per day. We were advised that on the day of the group's visit the larger crude distillers were running at 98% of their rated capacity, and the smaller units at 100% of their rated capacity.

The kerosene-minus fraction taken over the top of the crude distillers 1 and 2, is hydro-treated and re-distilled and split into LPG, light naphtha, heavy naphtha and kerosene. The hydro-treated heavy naphtha is processed in semi-regenerative reformers into reformat with an octane number of 82 in reformer 1 and an octane number of 88 to 89 in reformer 2. Reformer 1 lacks steam-superheating heat exchanger bundles (on hold) and the bi-metallic catalyst has lost part of its activity.

The reformat, blended together with the light naphtha, has an octane number of about 51 to 54 RON, producing a gasoline for the market of about 81 octane, but a large amount of tetra-ethyl lead has to be added. The installation of an isomerisation unit for the treating of light naphtha has been foreseen in order to raise octane number and minimize TEL in the gasoline. The gas oil hydro-desulphurisation unit is out of operation and stripped of essential equipment. The untreated gas oil has a sulphur content of between 0.9 and 1.0 percent.

In 1996 one of the two lubrication oil facilities was brought back into operation again. A project has been presented to rehabilitate and bring into operation the second lubrication oil plant. The short residue of the vacuum unit for the lubrication oil plant is used for bitumen. The reduced crude from the crude distillers is mostly re-injected into the oil fields. Sometimes reduced crude, possibly mixed with middle distillates to attain a given viscosity, is used as fuel for the power stations.

Much material and spare parts for maintenance are missing. For example, a larger part of the heat exchanger bundles in the crude distiller 1 overhead air coolers are plugged or missing, and some of the fans are out of operation. Moreover, bundles of the forced-cooling water tower are plugged or missing. As a consequence cooling and condensation of the overhead of crude distiller is too low and appreciable amounts of gas and LPG are sent to the flare and burned. A large black flare gas plume hung over the refinery to be seen from far. The power switch house in CD-1 is old but well maintained. At CD-2 the power switch house is almost empty and replaced to a Portacabin unit; the Portacabin is not spark free, no gas detection is present – an invitation to disaster!

The old and first stages of the waste water treatment plant, the mechanical oil skimmers, work well. Water and oil pumps are in operation. The civil constructions of the two following steps in the waste water treatment, the biological and chemical treatment are about finished but the works cannot be completed because of the holds on the rest of the equipment.

Housekeeping and maintenance in this refinery is reasonable, sometimes bad, but much better than in the Beiji refinery.

The refinery has no internal power generation and depends for power supply on the outside grid. Power dips occur at least three times a week and generally once per month the refinery goes down as a consequence of a power cut, mostly in the winter season.

Owing to a lack of control instrumentation, the refinery is for the larger part operated on hand-control. The personnel seem well experienced and dedicated,

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but this could erode fast as frustration grows over the many and long holds on the projects proposed to sustain the operation and increase the quality of products. Maintenance is reduced due to the lack of materials and the refinery continues to degrade as a result.

TRANSPORTATION REPORT

TRANSPORTATION REPORT

Northern Oil Company

The current pipeline system for NOC crude output to Turkey, via the Iraq/Turkey Pipeline (ITP), remains unchanged since last reported on March 1998. NOC crude oil is bulked and pumped out through the 40" line from the IT-1 pumping station to IT-1A, where oil from Saddam field is also received. The oil is then pumped out to the Turkish border at Zahko, through the MS-1 metering station via the IT2-A booster station directly bypassing the idle IT-2 pumping station (at which repairs are said to be completed by early 2001) through both the 40" and 46" lines. Use of the two lines in this section of the ITP boosts capacity, and also acts as a relief for the 40" line that is damaged in this area and cannot operate under full design pressure. The crude oil is then transferred from Zahko, via the metering system, through the 40" line into Turkish territory, after which the 46" line is also involved, and thence to the loading port at Ceyhan on the Turkish coast.

The following locations in the NOC area were visited and inspected: IT-1, IT1-A, Fathah and al-Memleha areas, IT-2 pumping station, and their associated tank farms.

Observations:

- The defective main pump motors at IT-1 and IT-2 have been repaired in Turkey since the mission in March 1998, and essential spare parts for pump and rotating machinery (mainly gaskets and seals) have been received, allowing urgent repairs and maintenance to be carried out. At other stations (K-1 and K-3) performance is still below capacity owing to delays in the approval of spare parts contracts, as well as many others being on "hold", such as COMM No 53019 (Instrumentation for K-3 control room P/O/H for "technical specs" 05/05/99, although contract for construction of relevant crude oil storage tanks approved and construction under way).
- Two contracts for the supply of the necessary equipment for the rehabilitation of IT-2 have been approved in Phase 4, however the complete integration of this station requires the existing SCADA control system components (COMM No 53408 for replacement of obsolete telemetry system for control of ITP pumping stations P/O/H 15/11/99 on "hold" because items are on the "1051 list") to allow safe operation, and integration into the existing system.

- The Phase 4 intelligent pigging service contract for the leaking 40" pipeline (COMM No 00035) around the Fathah and al-Memleha area (from IT-1 to km 75 at Fathah) is now completed, and the initial report reveals a serious deterioration of the pipeline, which is worse than expected. Various sectors along most of the length of the line apparently require more extensive repairs than envisaged. This now makes it necessary to carry out a further intelligent pigging operation for the remainder of the 40" pipeline from Fathah to MS-1. This should obtain a true picture of the condition of the line and repairs can be made where required. At present the working pressure of the line in the above mentioned area has been further reduced (since March 1998) to 20 bar from the advised design pressure of 52 bar.

Some new 40" pipe, for the original repairs, have been received and stored at the spare parts storage area at Kirkuk, NOC. Little has been used in the al-Memlehah area although it was noted that a small section of the line has been replaced at km 71 in this region. Evidence of leaks in and around the al-Memlehah area from the 40" line was again sighted, and leaks continue.

- The 46" line to MS-1, and thence Ceyhan, cannot be fully integrated with the system as it lacks the necessary metering facilities (COMM No 53428 covering the metering system of the 46" line at MS-1 is on hold for "1051" reasons) as well as the upgrading of the existing facilities of the 40" line, particularly the SCADA system (COMM No 53408 on hold for "1051" reasons).

Due to continued pressure reduction on the 40" line as well as the need for higher export rates, the 46" line is used in parallel with the 40" line from IT-1A to IT-2A .

- Tele-control systems in almost all the pumping stations were found to be severely defective and inoperable, and in urgent need of spares and maintenance to establish the essential overall control of operations, and thus avoid crash stops and shutdowns, with adverse consequences. Both the Iraq Turkey Pipeline (ITP) SCADA system, and the ITP microwave system that carries its data and functions are obsolete, with no spare parts or replacement units available, making the replacement of both systems essential. Relevant contracts COMM Nos. 00513 P/O/H 22/06/99, released by UK 01/07/99 and on hold by US "pending further study" and COMM No 53408, see above.

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- Remote monitoring, safety controls, environmental protection and fire controls aspects are severely compromised due to lack of spares and instruments, further delay in the rectification of these aspects may lead to serious operational problems and subsequent damage.
- Current throughput capability of the ITP system is in the range of 1,000,000 bpd. This could be increased to close to the design capacity of 1,600,000 bpd if:
 1. The 46" line is fully integrated to the system, requiring the installation of a metering station at the MS-1 metering station, and
 2. The re-commissioning of the pumping station at IT-2. This will be possible once the required pumps/controls/and auxiliary systems are installed and tested. We are advised by NOC that the civil engineering work required could be carried out with internal resources, and that the balance of equipment required is on order. However, the site visit to this installation revealed that there is much work to be completed and the advised completion date of early 2001 is thought to be optimistic. We also noted that the electrical sub-station at IT-2 had been fully repaired.
 3. Renewal of the corroded sections of the 40" line at the al-Memleha area are completed. The final report of the recently completed intelligent pigging contract, and any further repairs that are indicated by the proposed intelligent pigging of the remainder of the 40" line up to MS-1, will need to be taken into account.
 4. The arrival of the urgently required spares and equipment for pump motors, controls, tele-controls, and associated tools and machinery, thus allowing a safe and environmentally acceptable operating situation.

Southern Oil Company

Crude oil produced from fields in the South is pumped, after treatment, either directly via the limited number of storage tanks to the distribution manifold at al-Fao installation for export via the Mina al-Bakr offshore loading platform, or pumped from PS-1 to the refineries, or into the strategic line to the northern system for distribution to power stations, Jordan and the ITP. The section of the strategic line to Saudi Arabia is reported as closed and has not been inspected since 1991.

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The pipeline from PS-1 to K-3 to IT-1 in the North is used to transport surplus of crude from southern production as far as K-3, for exports to Jordan, and thence to the ITP

From the al-Fao installation, crude oil is pumped via two 48" sea lines to Mina al-Bakr. Two more 32" and one 48" sea lines run from al-Fao to the Khor al-Amaya terminal not currently used for export, but under repair.

The following locations in the South were visited: Zubair-1, Zubair-2 tank farms and pumping stations, South Rumaila stations, water injection cluster stations, Khor al-Amaya and Mina al-Bakr terminals, and various other related installations.

Observations:

- Further degradation of the pipelines at various locations with evidence of oil leakage has resulted in reduction of line pressures, resulting from the high salinity of the wet crude (280,000 ppm NaCl salinity in certain areas) further damaging the already corroded pipelines.
- Pumping capabilities were found below required capacity owing to inoperative pumps and/or prime movers. It was observed that some turbine parts have been cannibalized for use at PS-1.
- Station auxiliaries and associated machinery (control panels, compressors, chemical pumps, fire pumps and safety controls, and mobile maintenance machines) were found still in very poor condition, and in need of urgent spares and unit replacements.
- Storage capacities found reduced further by two 23,000 cubic metre storage tanks at Zubair farm because of leaking bottoms, again resulting from high salinity levels in the crude, since last reported in March 1998. No extra tanks were built during this time to counter the major loss of original storage capacities, which adversely effects the production capacity when no loading is taking place at Mina al-Bakr, for example because of bad weather (which was the case during the visit of the group).
- Lack of SCADA control and the tele-control system that carry its data and functions to Mina al-Bakr and to PS1/K3 pipeline. The relevant contracts are still on "hold" (COMM No 00216, 00218 and COMM No 53474), which leads to loss of control and co-ordination.

- The urgent need for rehabilitation of al-Fao tank farm to allow for additional oil bulking, thus providing a buffer storage capacity when loading is suspended and reducing the necessity of shutting in the production wells.
- The strategic pipeline from PS-1 to K-3 is in urgent need of inspection and repair to damage due to corrosion. The line suffers from many weak points along its length causing a reduction of pressure rating and hence its flow capacity. A contract to repair a selected few of these weak points over a length of only 2 km is on hold (COMM No 53574 - on hold for "composition of pipes"). The pipeline also lacks the telecommunication systems essential for operation to carry data, control and voice signals, as in other cases.
- The ISP line to Saudi Arabia is still closed and has not been inspected since 1991. The re-opening of this line is subject to political considerations that are advised as not likely to be settled in the short term.
- Continued non-operation of the Khor al-Amaya terminal. However it was seen that some minor repairs on the terminal are currently being carried out by Iraqis.
- Intelligent pigging and inspection /maintenance of the sea lines both to Mina al-Bakr and Khor al-Amaya (being on the same network from al-Fao) are required as there is serious concern over their condition to avoid leakages, export interruption and possible major sea water pollution from leakages. COMM No 00462 covers this contract and remains on hold, although re-submitted for Mina al-Bakr only.
- The lack of electrical medium tension voltage cables and switch-gear has led to the use of booster pumps in some stations rather than the operable main pumps.
- The partial repair/rehabilitation of the Khor al-Amaya terminal is handicapped by the absence of complementary systems (fire fighting, controls, instrumentation, telecommunication and tele-controls) under COMM No's 00139, 00140, 00141, 00142, 00339, 00349, 00350, 00365 (Export facility not authorized under the "Oil-for-Food" agreement).

If these contracts are released and approved, two jetties can be made operational allowing for additional rates of export initially estimated at 300,000 bpd and possibly increasing to 600,000 bpd.

- The metering system in Mina al-Bakr is still incomplete as the contract COMM No 53470 to complete the metering system on both berths is on hold. Loading arms at Mina al-Bakr are not fully operational, and in need of spares, cables, pipes and cathodic protection.
- Remote monitoring, safety controls, environmental protection and fire controls/equipment are non-operational due to lack of spares and instruments, on both the land stations and at Mina al-Bakr terminal, and further delay of rectification of these aspects may lead in the near future to serious disasters or damage.

OFFSHORE CRUDE OIL EXPORT FACILITIES

MINA AL-BAKR AND KHOR AL-AMAYAH:-

Shore Pumping and Storage Facilities

Zubair -1

- Main Pumps, originally commissioned in 1975, damaged in 1991, rebuilt '91/'92. Three turbine pumps; each rated at 45,000 barrels per hour (bph). One pump currently out of service (Compressor casing cracked). Remaining two are main pumps for Mina al-Bakr. This is not their original design purpose.
- Auxiliary and associated equipment, instrumentation and control panels, compressors and chemical pumps, fire pumps and safety controls, mobile maintenance equipment are all in poor condition and in need of specific spare parts and repair.
- Storage tank capacity is based on 10 x 22,000 M3 and 10 x 33,000 M3 oil storage tanks totalling 550,000 M3 (3.46 million barrels). Four tanks stated out of service. Tank mixers are not operational.

Zubair - 2

- Original installation as main storage and pump station for the Iraq to Saudi (Yanbu) pipeline, this facility is now used as buffer storage for Zubair-1. Original facility had sixteen storage tanks, thirteen are destroyed leaving three currently operational providing approximately 58,000 M3 (365,000 barrels) additional storage capability for Zubair-1. Storage is further reduced due to tank bottom leaks.
- Four main turbine pumps all out of service. Eight booster pumps of which only two are operational are used as oil transfer pumps between Zubair-2 to Zubair-1.
- PS1 allows for additional storage of 5 x 500,000 Barrels; total 2.5 million barrels. Facility has four main turbine pumps; one stated permanently out of service. One used for internal pumping; one dedicated for Mina al-Bakr pumping; one stand-by.

- Pumping to Mina al-Bakr terminal under current circumstances is from Zubair-1 and PS1 to al-Fao manifold station. (al-Fao also has lines from S. Rumailah and Basrah Heavy product; these lines from the fields to al-Fao are currently closed).

Crude Oil Supply to Sea Terminals

Oil storage for Mina al-Bakr Terminal at Zubair-1 and PS1 is limited to approximately six million barrels. Due to operational considerations (product supply to Basrah refinery) this would be an absolute maximum. Current production is estimated at 1.45 million barrels per day, giving no more than four days maximum production quantity storage.

Any disruption to the loading schedule, or harsh weather conditions at Mina al-Bakr, will rapidly utilise available storage, requiring production fields to be shut in, with an adverse effect on field production.

Pumping capabilities at Zubair-1 and PS-1 are disrupted due to poor maintenance and lack of necessary spare parts. If mechanical problems occur, and are prolonged, they will again lead to production cut backs, as there is no buffer storage capacity to store oil.

The main pumping capability to Mina al-Bakr Terminal is provided from Zubair-1 and PS1. The original design provided the main pumping from al Fao storage and manifold station. Additional stresses are placed on the system as pumping through the current system imposes higher line pressures.

The safety and integrity of the sub-sea lines are not established. Intelligent pigging and inspection of these lines (two main 48" lines to Mina al-Bakr; three main lines to Khor al-Amayah) is overdue and would allay concerns on possible environmental damage, prolonged shut-down or reduction of export operations from the South.

Mina al-Bakr

The terminal is a 1,000 meter long steel structure, located some 50 kilometres from al-Fao manifold station; in the Northern Gulf sea. An accommodation platform is located at the Northern end and a helicopter landing pad at the extreme Southern end.

The terminal consists of two main loading platforms. Each platform is inter-linked with support platforms, maintaining mooring dolphins and main electrical generators.

The terminal was commissioned in 1972; it sustained damage in the Iraq / Iran war and again during the 1991 Gulf war. Re-commissioning was carried out by the Iraqi's within their own limited resources to the minimum level required for operational purposes.

Brown and Root; the original builders are said to have carried out a full structural survey and necessary repairs of the Platforms in 1989 and 1990. Damage in the 1991 Gulf war is said to have been more superficial. Repairs being carried out by the Iraqi's, as necessary to open operations. The platform has a Cathodic Protection system, the integrity of which is unknown.

The terminal is currently manned by 80 S.O.C. personnel and 6 UN Oil Monitors.

- The two main loading platforms; A and B, support all crude oil pipelines, meter skids, chiksan loading arms and control rooms. Platform A accommodates Berths 1 and 2; for vessels maximum deadweight 250,000 tons. Platform B accommodates Berth 3 for vessels maximum deadweight 300,000 tons; Berth 4, maximum deadweight 250,0000 tons.
- The terminal is fed by two 48" lines from al-Fao. A 48" branch line from each sea line is connected to each platform.
- The lines are designated as North Sea Line and South Sea Line. The North Sea Line delivers oil to Platform A. At this time, a 'Pig trap' is available, but not presently fixed to the line head. The South Sea Line has a fixed 'Pig trap' on Platform B. Displacement of oil to shore is possible with return to Zubair-1 or PS1, via the alternate line.
- Each sea line currently operates on a max throughput rate of 45,000 barrels per hour (bph). This is based on current pumping arrangements from the storage tank farms. The original design allowed for pumping from al-Fao; two turbines used for each line allowing an operational rate of 70,000 bph, per line. Maximum rate to the terminal being 140,000 bph.
- Loading arrangements at the terminal originally allowed four vessels alongside. Each berth operated from its own control room provided with eight meters and auto sampling for quality control. Three 16 inch chiksan arms available for connection to the vessels manifold, each arm had loading capacity of 40,000 bph. Each platform is provided with a meter prover.
- Current operations are based in only one of the two original control rooms, per platform. Of the original 32 meters available; loading is metered via 8

meters per platform. Berths 1 and 3 operate on only two loading arms. All auto samplers are out of service, requiring maintenance and testing. Platform meter provers require calibration and instrumentation check.

- In practice, only two vessels are loaded at any one time; one per platform. A third vessel may come alongside and commence with a low rate, anticipating the completion of an earlier vessel.
- The maximum rate available in current circumstances is approximately 88,000 bph in total for all berths.
- Operation of the main loading valves, chiksan loading arms and vessel access gangways is all based on hydraulics. Lack of available replacement piston seals now leads to inefficient operation of these systems. Hydraulic oil constantly leaks from the system causing pollution and creating a safety hazard on the terminal platforms and walkways.

Vessels Mooring Facilities.

- Only 2 of the original four mooring tugs are still in service. This was complimented in the latter part of 1999 by two new tugs. This brings requirements up to the required number. However, there are no supply or crew change vessels and no mooring boats. This places an additional strain on the existing mooring tugs, as they must also cover for these requirements. The two original tugs are in an extremely poor state and are often in port for repairs and maintenance. Supply of the newer vessels had facilitated the flexibility of the terminal to allow for tug maintenance in port.
- Normal operations for the terminal require 4 mooring tugs on stand-by. Three would be used for berthing; one for vessels departure. Six smaller mooring tugs are required for assisting with ropes. Two 50 passenger / supply boats are necessary for crew changes and supplies.
- It is noted that no safe gangway or terminal access for personnel is available at al-Fao Jetty or Mina al-Bakr Terminal. Use of tugs for crew change often necessitates tug-to-tug transfers en route to the terminal for which there is no safe access between the tugs.

Terminal Electrical Supply.

- Electrical generation is based on 4 main units with one emergency lighting rig. Two of the main units are out of service due to mechanical and electrical generation faults.
- The two operational units work on a 15 day alternating cycle. An additional mobile unit has been added for emergency use. Power supply is adequately covered by one operational unit. Advised power supply is approximately one megawatt. Power cuts are minimal but evident.

Safety Systems.

- Operational communications are out of service. Lack of SCADA controls and monitoring systems imposes serious concerns over the safe operations at the terminal. Personnel safety remains at high risk. Consequential damages can not be estimated.
- The fire fighting system is fed by seawater. It is stated as operational. However, no fire drills or equipment tests are observed.
- There is no evidence of assembly or evacuation plans. Few life jackets are in evidence.
- Two new life boats are stored on Platform B, approximately 1 Km away from the accommodation platform. They are not available for emergency use. Each are rated for 32 persons only.
- Voice communication with the shore is unreliable and often out of service.

Accommodation.

- The original accommodation area was destroyed by military action. Current facilities were built by S.O.C. They are basic to allow the accommodation of essential personnel.
- Water is provided by one Reverse Osmosis unit, producing 4 cubic meters per hour. This is often out of service and supply is supplemented by barge deliveries. Rationing is common. There is currently no hot water supply on the terminal.

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- The current condition of building fabric is poor. Furnishings and equipment are old and in need of replacement. Cabin and bathroom fittings are in various states of disrepair. Mixed hydraulic oil, crude oil pollution and dirt on the terminal is evident within the accommodation area. Electrical air conditioning and heating equipment is old, requiring replacement on safety grounds.
- Kitchen equipment is old. Electrical appliances pose a fire threat and utensils a health threat. Insect infestation is rife. Cold storage equipment is old and inefficient. Food preparation areas are limited and in need of replacement. Food Supplies are often transported without refrigeration. There is a lack of variety. All terminal garbage and waste is disposed of into the sea.

Khor al-Amaya.

The terminal, as commissioned in the late 1960's, consists of piled structures connected by walkways, approximately 880 metres in length. Originally four tanker berths are provided. Maximum allowable deadweight 330,000 Tons. Maximum sailing draft 21.00 metres. The original construction placed the accommodation at the Southern end with the heli-pad at the extreme Northern end. The terminal consists of 2 main loading platforms inter-linked with support platforms for mooring dolphins. Platform A accommodates berths 5 and 6; platform B, berths 7 and 8. The terminal was completely destroyed in the 1980's Iran / Iraq war.

Rehabilitation of the terminal has been limited to Platform B; berths 7 and 8 of the terminal. A 'support' maintenance and accommodation rig has been placed adjacent to Platform B. S.O.C have carried out their own inspection of the terminal structures, making reinforcement to the original frames. The terminal has no Cathodic Protection System.

- The terminal is supplied via 3 sub-sea lines from the al-Fao manifold station; 2 x 32" lines with the main headers at Platform A. and one 42" line with main header at Platform B. The 42" line is intended for use and was stated to be pressure tested to 20 bar. This line is stated to be full of Crude to the platform header.
- A 42" SURTEC SPA pig trap is available on the platform, though not installed. Pipe-work allowing connection of the 42" line to the 32" line was observed thus allowing for line displacement return to the shore during intelligent pigging operation.

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- Connection of the main header valve to the meter skids is not complete. Installation of connecting pipe-work; 5 pressure relief valves, valve actuators and expansion joints are necessary.
- Seven 16" turbine meters are sited on the platform for berths 7 and 8. None of these meters are currently operational.
- A control room cabin is provided on Platform B. No instrumentation.
- From the main 42" supply line to the metering skids, current work is focused on the re-commissioning of berth 7 only. Later it is intended to develop berth 8.
- Pipe-work from the metering skids to berth 7 loading arms is incomplete; 3 further expansion joints are required.
- Four x 16" loading arms are available on berth 7 (berth 8 also). These are designed for hydraulic operation. There is no hydraulic system. This is required for loading arm operation. (Berth 8: same condition applies).
- Loading arm valves are electrically operated and stated to be in operational condition. (Berth 8 not operational).
- Original auto samplers are completely destroyed. A sampling point has been designated after the metering skid. A valve system is required to allow manual sampling.
- The original meter proving system is destroyed. No proving facility is available.
- Surge and slop tank pumps are required. Three pumps for the surge and 4 pumps for the slop tanks.

Vessels Mooring Facilities.

- Berthing structures at the loading arm platform and associated 'dolphin' platforms are in place. Wood buffers on the flexible fenders require replacing; rubber "Yokohama" fenders are also required.
- No terminal-side gangway is available for boarding of vessels alongside.

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- For operation of the mooring/un-mooring of vessels independently from Mina al-Bakr, additional mooring tugs and boats will be required. Initially 3 mooring tugs and 4 mooring boats. Associated crew boats and supply vessels are also required.

Terminal Electrical Supply.

- The original Electricity generators are destroyed. Power is currently supplied by 2 portable units on the support platform. Restoration of main power units is required. Requirement is for 3 x 750 K/watt units, plus cabling, switch gear and ancillary equipment.

Safety Systems.

- A portable fire pump is available and temporary piping for use on the platform. Requirement for new system; electrical fire-pump, control and monitoring system, associated valves, additional foam system, electrical and diesel drive motor, jockey pump, halogen fire extinguishers.

Communications.

- All Communications are currently via radio system to Mina al-Bakr, with connection to the shore. Safety and operational considerations require the installation of a communications tower and microwave system, operational SCADA controls and monitoring system, voice/data communications.

Accommodation.

- Accommodation is provided on the support platform rigged adjacent to platform B. This comprises 46 cabins (one and two man) each with shower room and communal dining and recreational areas. Air conditioning is based on a central unit. Compressor unit is in poor condition, is inefficient and regularly out of order. It requires replacement.
- Water is provided by barge, the terminal having no Reverse Osmosis or equivalent water purification system.
- Kitchen and communal areas are in much the same state of disrepair as is the case on Mina al-Bakr. The kitchen has increased facilities to those on Mina al-Bakr but much of the equipment is out of order or in a state of disrepair. The cold storage rooms have inefficient cooling systems and require regular repair.

General comments on Khor al-Amaya

Considering the poor condition of the available equipment; cranes, welding units, one working tug boat and general tools, much appears to have been accomplished on platform B, particularly if the damage sustained was similar to the original accommodation and platform A areas.

SOC representatives are of the opinion that if they can receive the further equipment and items ordered, they would be able to complete the necessary work to open one berth in a month. This appears highly optimistic and, if achievable, would be based on simple reinstatement of pumping only. No associated back-up systems or facilities would be included in such an estimate.

The specific expertise to reliably reinstate the metering skids, associated control room instrumentation, main valves operation, loading arm and gangway hydraulics system, loading system integrity, communications and safety monitoring and fire systems, must be available.

Any realistic estimate on timing must account for the unhindered progress of spare-parts orders, order and delivery process time, delivery to the terminal and installation, system preparation and integrity testing.

Khor al-Amaya will allow flexibility for export of Crude from the South. Current pressure on Mina al-Bakr does not allow for repair work which may require berth closure. Khor al-Amaya can provide a reduced capacity alternative to Mina al-Bakr in event of cessation of operations.

SOC and SOMO representatives advise that the operation of Khor al-Amaya will not reduce exports from Mina al-Bakr. They advise that additional crude will be made available through the provision of Basrah Heavy grade. This would depend on the supply to al-Fao, storage and pumping facilities which the group of experts understand are not currently in place.

CRUDE OIL EXPORT FLEXIBILITY

CRUDE OIL EXPORT FLEXIBILITY

Under the "Oil for Food" program, Iraq currently exports crude oil through two export outlets, the Iraqi - Turkish pipeline to Ceyhan in Turkey, and the Mina al-Bakr terminal.

The group of experts is of the view that current Iraqi oil exports are not limited by the export outlet capacity. However the lack of spares, and the deterioration of the export system over the last three years, leads the experts to believe that even to sustain, let alone to increase, export capacity a greater degree of flexibility should be built into the oil export chain.

At present it is unlikely that the pipeline system running from the Basrah area and to Yanbu in Saudi Arabia, an important export route prior to the military action in 1990/91, will be used in the near future as it is not considered a priority by the Ministry of Oil.

Given this situation, an important key to increased flexibility will be the upgrading of the Strategic Pipeline system enabling the transport of oil from the south to the north of the country, and vice versa.

The capacity of this system was originally 800,000 bpd and its capacity, according to the Ministry of Oil, is currently reduced to approximately 350,000 bpd.

Pipeline repairs, upgrading of the pumping capacity and the reconstruction of storage tanks at K3/Haditha is expected to bring the pipeline capacity back to 800,000 bpd subject, of course, to the removal of holds on certain key items required to achieve this.

Should the second pipeline (which was not completed before the war) be part of such a rehabilitation program a total capacity of 1,350,00 bpd is anticipated for this system.

The upgrading of this pipeline system will also open up for the use of the pipeline running to the Mediterranean, through Syria, which is presently not ready for operation, if and when decisions are made to use it. The Ministry of Oil, however, states that it is mostly in working condition but is unlikely to be considered for use until 2002 at the earliest.

To ensure the potential for the full use of the Strategic pipeline system it is essential to upgrade the twin pipeline system through Turkey which may bring the export potential through the North up to the design capacity of 1.6 million

barrels per day. The availability of sufficient storage capacity in Ceyhan is obviously a pre-requisite to achieve such a level of export capacity.

The physical conditions at the Mina al-Bakr terminal identify the potential for reduced exports through this outlet. An increasing number of ship owners may refuse to load their vessels at a terminal lacking the control – and communication – systems needed for the safe operation of the export system. The refurbishment of the neighboring export terminal Khor al-Amaya, destroyed during the Iran – Iraq war, is currently under way.

This terminal represents another alternative for the increase of export outlet flexibility.

For the safe operation of the total logistical network (export terminals, pipeline systems, tank-farms, etc.) the upgrading of the telecontrol, safety and communication systems is strongly recommended.

Metering facilities may also have to be installed prior to the use of an expanded export system. This will also ensure a smoother and more efficient use of the total export chain and may assist in achieving increased revenues from the sale of oil resulting from the increased potential for rapid adjustments to quickly changing market conditions.

SITE VISIT REPORTS

SITE VISIT REPORTS

The following Section summarises the information gathered, and observations made, by the group of experts during its tour of the Iraq oil industry. It is divided into the three categories of installations that are directly linked to :

- A : PRODUCTION “UPSTREAM”
- B : REFINING AND PRODUCTS “DOWNSTREAM”
- C : TRANSPORTATION “EXPORT INFRASTRUCTURE”

PRODUCTION - UPSTREAM

1. GAS COMPRESSION STATION AB-1, KIRKUK.

FUNCTION: The gas removed from the crude oil is re-pressurised for transfer to the Gas Separation Plant for further processing (see below).

PROBLEMS: In this gas compression station three two-stage compressors are normally operational. At the last visit in March 1999 one compressor was out of operation and spare parts had been ordered; they have not yet been delivered. This year, a second compressor had to be taken out of operation.

SPARE PARTS ISSUES: Compressor spares have been ordered and delivery is imminent.

COMMENTS: The last, and only, gas compressor is still in operation but the station cannot operate at design capacity; flaring of large quantities of gas is therefore daily practice which is both wasteful and because of high sulphur contents adds to pollution.

2. NORTH JAMBUR WELLHEAD # 35

FUNCTION: To control the flow of oil from the limestone reservoir into the production system. This well used to produce sour crude from the Cretaceous limestone below 8,000 feet subsurface.

PROBLEMS: The well was shut in last year when the well head began to sink into the ground, due to severe corrosion, and casing failure caused by hydrogen sulphide rotting the steel.

SPARE PARTS ISSUES: With holds delaying conventional production-logging service contracts it is impossible to identify which wells are in a dangerous condition - Comm No 00496 delayed 12 months, still on hold.

With the holds effecting the supply of mud chemicals (Comm No 0075 delayed 12 months, now approved), tubing spools and wellhead valves with stainless steel facings (Comm No 53311 delayed 7 months, now approved) there is very little that can be done to prevent the eventual loss of the existing production system in Jambur Field until spare parts and equipment arrive in country.

COMMENTS: Not only does this represent a total loss of production, but also it signals the likelihood that the other 31 wells in the field will suffer a similar fate unless rapid action is taken to prevent this.

3. GAS SEPARATION PLANT, KIRKUK

FUNCTION: The gas removed from the crude oil is received from the Gas Compression Plant (see above), in order to extract first the hydrogen sulphide and carbon dioxide, to dry it with the aid of molecular sieves and separate dry gas (methane and ethane) from LPG (propane and butane) and natural gasoline (pentane and heavier).

PROBLEMS: The amount of sulphur in the dry gas cannot be reduced below 15 milligrams/Kg. The design capacity for the total LPG recovery is 200 tonnes/day. At the moment only 100 tonnes/day is being produced. Of the four sulphur recovery unit only two are in operation. Of the four boilers only three are in operation. Of the six sulphur flakers only two are currently operating.

SPARE PARTS ISSUES: Much equipment for the units in operation has been cannibalized from other units and therefore have no spares or backup. Many items ordered under Phase 5 of the program have been put on hold; Comm No 53070 for boiler feed pumps has been on hold for 10 months, Comm No 53009 for heat exchangers has been on hold for 11 months, Comm No 53379 for pumps has been on hold for 7 months, Comm No 630759 for boiler upgrade still pending, Comm No 53555 for boiler feed water pumps has been on hold for five months for chemical warfare dual-use concerns.

COMMENTS: 100 tonnes a day of extracted sulphur is currently produced, 700,000 tonnes of sulphur has been stockpiled and has to be stored. This important plant is in very poor condition, and is likely to come to a complete halt unless the holds are removed.

4. NORTH JAMBUR WORKOVER RIG

FUNCTION: Periodically, oil producing wells require re-entry for a variety of reasons associated with damage repair and control of oil flow. This equipment is generally a lighter version of the type of rig used to drill the original oil well.

PROBLEMS: The EMSCO workover rig was in sad state of disrepair, with the power-generation system being of major concern. As a consequence the well was effectively “blowing-out” and the oil was being burnt in a flare-pit some 100 yards from the rig – a flare visible from several miles away. The well production is lost for many months.

SPARE PARTS ISSUES: Parts for the rig have been ordered, but are on hold - Comm No 53287 for 8 months. The well is unsafe and needs recompletion, but there are no materials available. The order for bentonite, essential for making a drilling “mud” which can be weighted-up with heavy barytes, has only just been released after 12 months delay.

COMMENTS: The current expectation is that all the remaining 30 deep wells will require workover and recompletion; thus, with only one rig operational and capable of a workover every three months, the safety and long-term contribution of the field is in jeopardy.

5. OIL PROCESSING PLANT - AB-2

FUNCTION: The oil from the separator stations in Khabaz, Bai Hassan, Jambur and Kirkuk Fields is gathered here for further processing. The main purpose is to remove sulphur prior to delivery to the export system.

PROBLEMS: At present the hydrogen sulphide and carbon dioxide removal systems are partly out of order. In particular, H₂S corrosion may therefore at any time lead to a severe accident in the plant, that in turn may result in a significant reduction in oil exports, before necessary repairs can be made.

SPARE PARTS ISSUES: A lack of instrumentation and in-field communications creates severe operational problems for this facility. Comm No 00518, on hold for 11 months, refers.

COMMENTS: This plant is critical to the export of crude oil through the ITP.

6. KHABAZ FIELD SEPARATOR AND COMPRESSOR STATION

FUNCTION: The throughput of about 5,000 bpd of dry crude from the field is separated from the associated gas at this plant.

PROBLEMS: With only one separator/compression train still operating, and the fact that no de-watering equipment is functional, production is cut back to prevent water contaminating the oil.

SPARE PARTS ISSUES: Contracts for mechanical spares and servicing are on hold. Equipment for wet crude treatment under Comm No's 53312/3/4 has been under evaluation by OIP for 8 months.

COMMENTS: The design capacity of the processing plant is for 30,000 bpd, but this has never been attained in practice. Compressed gas is sent to the Northern Gas Plant.

7. GAS COMPRESSION STATION - AB-8

FUNCTION: This is one of nine compressor stations in the Kirkuk complex and receives gas from the larger of the two oil-processing plants (AB-2).

PROBLEMS: Turbine overhaul is long overdue. This station always had only one turbine train and is therefore particularly vulnerable to shut-down.

SPARE PARTS ISSUES: Contracts for turbine spares and servicing are on hold. Spares and supplies for the system that injects corrosion inhibitor have been approved but not yet arrived. Stainless-steel components are essential throughout the system in order to resist corrosion, but all are currently on hold for "1051" reasons.

COMMENTS: The feedstock gas originates mainly from Jambur and has an average hydrogen sulphide content of 18%.

8. ZAB RIVER PUMP-STATION & WATER-TREATMENT PLANT

FUNCTION: This plant was designed to provide large volumes of clean water for a number of uses, the principal one being to supply water-injection facilities for maintaining aquifer pressure in the two oil-producing domes of the Kirkuk Field. The system is designed to extract and treat 1.5 million barrels of river water per day, of which approximately 1 to 1.1 million barrels of water per day (bwpd) are injected into the aquifer underlying the oil column in Kirkuk.

PROBLEMS: If river silt is injected, the reservoir rocks become blocked and less permeable. If "hard" water is injected, precipitation of scale can occur in the reservoir.

SPARE PARTS ISSUES: Owing to various holds on pump spares and water treatment chemicals, the quality and rate of injection water is difficult to control. The delay in arrival of certain spares has resulted in a breakdown of the automatic chemical dosing systems. Due to lack of communications the control of the rate of injection to each well is entirely run on guesswork. Comm No 53293 covering pumps and equipment has just been released from hold after 6 months

COMMENTS: The intake pumps from the Zab River are situated at a plant sited on the "saddle" between Avanah and Baba Domes. Some injection wells are 50 kms distant.

9. DRILLING RIG AT NEW WELL : KIRKUK #356

FUNCTION: The rig was an EMSCO with a depth capability of 3000 metres, drilling a vertical shallow well to 1500 m.

PROBLEMS: This is the only Iraq Drilling Company (IDC) rig currently able to drill in the North, the rig operator having cannibalised two other rigs for various spares. Many international drilling contractors have bid to drill similar wells in approximately 15 to 20 days. Under the current constraints IDC's performance is severely curtailed and their norm is to drill in about 3 months.

SPARE PARTS ISSUES: The drilling-fluid ("mud") is restricted to the use of water, due to hold on mud chemicals such as drilling-grade bentonite - Comm No 0075 has just been released after 12 months delay. A wide variety of essential spares for the rig power plant and drilling machinery components are on hold.

COMMENTS: The well is designed as an in-fill well on Baba Dome, between existing producing wells, fairly close to Kirkuk town.

10. SOUTH RUMAILA WELLHEAD #37

FUNCTION: Prior to shut-in, this well produced 12,000 bpd of dry crude.

PROBLEMS: This well, in the southern production system, suffered an unpredictable sub-surface failure due to the effects of saltwater corrosion. It is typical of the 10 corrosion failures that have occurred in the last two years.

SPARE PARTS ISSUES: All of the necessary equipment to repair the well is on hold. Normal oilfield practice in known corrosive environments would be to check the well at regular intervals and also treat with anti-corrosion chemicals. Comm No 00463 for production well logging services, which would have prevented such an occurrence, has been on hold for 8 months

COMMENTS: Large pools of crude oil have formed on the surface for at least 100 m around the well. In the neighbourhood of the well it was noted that there was a revival of agriculture (mainly tomato crops under polythene sheeting) which is at risk from the spreading pollution of the well.

11. SOUTH RUMAILA WATER-INJECTION PUMP-STATION #10

FUNCTION: This is part of an extensive network of water-injection stations, typical of the 10 water-injection sites which are divided equally between North and South Rumaila Fields.

PROBLEMS: As noted in March 1999, the electric motors driving the pumps are missing, as is all the electrical control systems and piping for water delivery.

SPARE PARTS ISSUES: Unlike the Northern operation, this plant was not functioning, due to a lack of spare parts for the main pumps, which are currently on hold. Comm No 00531 has just been released after a hold of seven months.

COMMENTS: Pressure maintenance in the southern portion of South Rumaila, close to the Kuwaiti border, is virtually non-existent. The effects on production from this area are dramatic.

12. BASRAH WATER TREATMENT/INJECTION PLANT AT GARMAT ALI

FUNCTION:Water from a tributary of the Euphrates is treated with chemicals to clear it of minerals and clay and prepared for injection into the oil water layer under the oil in the fields. The plant, built by the Russians and commissioned in 1982, consists of a water pumping station, a chemical plant for the preparation of the chemical solution, basins for the mixing of the water and chemicals in order to bind minerals and clay, separation of water and sludge using sand and gravel filters and a pump station for pumping the treated water to the fields.

PROBLEMS: Of the four water intake pumps with a total capacity of about 185 thousand cubic meter per day, only three were in operation(140,000 m³/day), and of the ten outlet-pumps to the oil fields only 20 percent were in operation.

SPARE PARTS ISSUES: Chlorine injection system now ineffective, replaced by manual use of sodium hypochlorite. Many items ordered under a large number of different contracts on hold.

COMMENTS: The availability of cleaned water to support the water-drive injection scheme in North Rumailah is insufficient to provide the designed pressure maintenance and flood front progression.

13. PRODUCTS STORAGE FACILITY AT KOHR AL-ZUBAIR

FUNCTION: The storage facilities for LPG (propane and butane) and NGL (natural gasoline) at Kohr al-Zubair were built in 1981 in order to stock LPG and NGL from the nearby gas separation plants of the Zubair Field, to be exported from the nearby shipping facility at Umm Qasr.

PROBLEMS: As virtually unused, there are few problems to be addressed at this plant.

14. KOHR AL-ZUBAIR GAS SEPARATION PLANT

FUNCTION: All the wet gas from the South and North Rumaila Fields is processed in two gas separation units. In another plant in the North Rumaila Field wet gas is separated into dry gas (C2 minus, methane and ethane) and broad-cut (propane and heavier hydrocarbons). The broad-cut is pumped to the second gas separation Plant in the South.

PROBLEMS: NGL has to be flared. In the one gas separation train in the South only four compressors (turbines) are operating.

SPARE PARTS ISSUES: The overall housekeeping and maintenance of the plant is reasonable but because of lack of spare parts the unit is operated in a critical phase. The unit is being run "on one leg" and further equipment failure will without doubt lead to the shut down of the gas separation plant. There are many holds on the contracts for spare parts.

COMMENTS: The gas from the Rumaila Field is sweet and contains only traces of sulphur and carbon dioxide.

REFINING - DOWNSTREAM

15. DAURA REFINERY

FUNCTION: The Daura refinery is a simple hydro-skimming refinery, which means that no “bottoms-conversion” processes are used, except for the manufacturing of lubricating oils and the production of bitumen. The throughput of the refinery was advised to have a nominal design capacity of 100,000 bpd. A mixture of Kirkuk and Basrah crude is the process feedstock.

GENERAL IMPRESSION: The refinery is, by comparison with European standards, in a poor state and elsewhere would be closed as a consequence of the high safety risk to personnel and the low standards of maintenance.

PROBLEMS: The main cause of the bad maintenance of the plant is the lack of spare parts, pumps, compressors, control instruments, maintenance equipment and measurement devices to allow quality checks and preventative maintenance. It also appears that the number, and expertise, of personnel has degraded with time, along with an awareness of good housekeeping and safety.

MINOR PROBLEMS: Helmets were seldom seen. Visitors were allowed to walk around without helmets, safety shoes or any other protection. Maintenance people at work in the refinery were not seen wearing safety shoes.

16. BEIJI REFINERY

FUNCTION: The Beiji refinery, built originally to function as a complex hydro-cracking conversion refinery, has been rehabilitated as a simple hydro-skimming refinery, by cannibalising the hydrocracker. It means that no “bottoms” conversion processes are used in this refinery, except for the manufacturing of lubricating oils and the production of bitumen. A mixture of crude oils from the Bai Hassan and Jambur Fields in the North of Iraq is the process feedstock. The refinery is geared to the production of middle distillates, such as diesel and gas oil. Naphtha is hydro-treated before being upgraded to motor gasoline. Part of the reduced crude is used as commercial fuel, part is delivered to the power plant and the remaining part is re-injected into the export crude oil.

PROBLEMS: The refinery experiences many regular shutdowns. As the refinery has no internal power generation capability it depends totally on the National Grid. The instability of the external electricity supply, where two to three interruptions per hour are not unusual, is increasing. Two years ago the refinery had only two to three power interruptions per week maximum.

SPARE PARTS ISSUES: With the delay in the delivery of spare parts, the re-instatement of the hydro-cracker conversion unit and the rehabilitation of the product de-sulphurisation units, have all been abandoned. This means that high levels of reduced crude are pumped back into shallow disposal wells, and that product quality is very poor.

COMMENTS: Given the necessary spare parts and equipment, the management intend to give priority to waste water treatment, lubricating oil plant rehabilitation, the construction of an isomerisation unit, and attention to the safety standards in the refinery. The general impression during the visit to the refinery is that housekeeping is far below normal refinery practice, and that maintenance is very bad. Safety awareness is very low. Without a doubt the overall condition of this refinery is rapidly degrading.

17. BASRAH REFINERY

FUNCTION: This is a hydro-skimming refinery. The refinery design has two identical middle-size crude distillers of 70,000 bpd capacity each, and three small crude distiller units of each 10,000 bpd capacity. Total nominal capacity is therefore 170,000 barrels per day. The kerosene-minus fraction taken off the top of the crude distillers #1 and #2 is hydro-treated, re-distilled and split into LPG, light naphtha, heavy naphtha and kerosene. The hydro-treated heavy naphtha is processed in semi-regenerative reformers into reformat with an octane number of 82 in reformer #1 and an octane number of 88 to 89 in reformer #2. The reduced crude from the crude distillers is mostly re-injected into either disposal wells or exported crude streams. Reduced crude, possibly mixed with middle-distillates to attain a given viscosity, is used as fuel for the power stations.

PROBLEMS: Much material and spare parts for maintenance are missing. Bundles of the forced-cooling water tower pipes are plugged or missing. As a consequence cooling and condensation of the overhead of crude distillate is too low and appreciable amounts of gas and LPG are sent to the flare and burned. The refinery has no internal power generation and depends for power supply on the outside grid. Power dips occur at least three times a week and generally once per month the refinery goes down as a consequence of a power cut, mostly in the winter season.

SPARE PARTS ISSUES: Owing to a lack of control instrumentation, the refinery is mainly operated manually. The personnel are experienced and dedicated, but this is eroding as frustration increases regarding the many holds on the spares required to sustain the operation and increase the quality of products. Owing to a lack of materials, maintenance has been reduced and the refinery continues to degrade. The wastewater treatment plant and the mechanical oil skimmers work well; water and oil pumps are in operation. The civil construction of subsequent steps with the waste

water and biological and chemical treatment facilities are nearly finished, but cannot be completed because of the holds on the rest of the equipment.

COMMENTS: Housekeeping and maintenance in this refinery is moderately good, and certainly much better than in the Beiji refinery. The installation of an isomerisation unit for the treating of light naphtha has been foreseen in order to raise octane number and minimise TEL in the gasoline. The gas-oil hydro-desulphurisation unit is out of operation and stripped of essential equipment. In 1996 one of the two lubrication oil facilities was brought back into operation again. A project has been presented to rehabilitate the second lubrication oil plant. The short residue of the vacuum unit for the lubrication oil plant is used for bitumen.

18. TAJI LPG BOTTLING PLANT

FUNCTION: At the Taji site both a LPG bottle filling station and a solvents plant are operated. Naphtha pumped from the refinery is topped, producing pentane and a food-grade hexane fraction. The rest of the topped naphtha is pumped back to the Daura refinery.

PROBLEMS: Old bottles worn out and many were severely damaged. The bottle filling system is totally unsafe, and the whole complex is in a bad state of disrepair.

SPARE PARTS ISSUES: Comm No 00568 refers to ultrasonic testing and safety equipment on hold for five months; Comm No 53427 is for fire fighting equipment on hold for four months; Comm No 00573 also for fire fighting on hold for three months.

COMMENTS: The first impression of the bottling plant was that of a workplace with bad housekeeping, bad maintenance, low discipline and low safety awareness. The handling of gas bottles was poor and it was noted that some bottles, including new ones, were thrown from a distance of several metres on to the ground. The filling itself was correct and new filling-heads were used. Personnel safety was low; no capped safety shoes were used, no gloves etc. In spite of the fact of testing, the repaired bottles didn't have any labels or marks regarding future checking. The marks about date of producing, or the last testing or next testing, were not found on any old bottles checked on the site. Although no direct serious failures could be found in the operation of the filling plant, the overall impression is one of below standard practice.

19. KUT LPG BOTTLING PLANT

FUNCTION: The bottling plant had four production trains of which two are completely cannibalised, one was in operation and the last one was under repair.

PROBLEMS: The bottling activities at this site are carried out under the most dangerous of circumstances, with a complete lack of safety and fire fighting equipment availability.

SPARE PARTS ISSUES: Comm No 53356 on hold for seven months, covers various spare parts for cylinder repair and maintenance.

COMMENTS: Even more than in the north at Taji, the housekeeping and maintenance were well below any recognised standard. Gas bottles were not checked for leakage, and the handling of bottles was very rough because, we were advised, of a lack of fork-lift trucks.

20. KUT LPG BOTTLE MANUFACTURING PLANT

FUNCTION: Next to the Gas Bottling Plant SOC operates a bottle manufacturing plant. The aim is to produce 600,000 bottles per year out of old plate steel. At the moment only old bottles are maintained and painted. A new machine is being installed that will test the bottles automatically.

PROBLEMS: Also here maintenance standards are low or totally missing. Electric cabling at machines, and also from the lighting of the building, was hanging open and naked from machines and on walls.

SPARE PARTS ISSUES: Comm No's 53337, 53317, 630115, 630111 all on hold and would supply vital equipment for repairing, constructing and painting LPG cylinders.

COMMENTS: The gutters were half covered with sheets of steel. People were walking around with naked feet or with nearly no foot protection at all. Management or other personnel gave little attention to safety.

TRANSPORTATION - EXPORT INFRASTRUCTURE

21. CRUDE PUMPING STATION IT-1

FUNCTION: From this station, crude-oil from various tank-farms in the Kirkuk region is gathered, and pumped through two 30" lines either to the Beiji Refinery or to pump station IT-1A on the Iraq Turkey pipe-line ("ITP").

PROBLEMS: In the fifteen days leading up to the group's visit about 20 percent of capacity was lost through many temporary interruptions to the crude flow. The main causes of intermittent flow are due to operational problems in the fields (often caused by power outages and equipment repair downtimes) with occasional examples of bad weather affecting the loading terminal at Ceyhan in Turkey.

SPARE PARTS ISSUES: Management of crude transportation through this line is unsafe because no information on the operations down the line is available at the moment. The solution, which requires delivery of a replacement telemetric control signal system, is unavailable due to the hold put on Comm No 53408.

COMMENTS: This facility is well maintained and the equipment, pumps and electric motors are apparently in good operational condition; similarly the control room is neat and well kept. The whole operation of the crude export line from the Kirkuk area to the loading terminal at Ceyhan in Turkey is controlled from this point.

22. CRUDE PUMPING STATION IT-1A

FUNCTION: From the tank farm at IT-1A crude is pumped through the ITP system via two lines, consisting of a 40" and a 46" crude line, to Ceyhan.

PROBLEMS: As reported in March 1998, there are many leaks in 40" line in the region of al-Memlehah.

SPARE PARTS ISSUES: The necessary pipe to replace the corroded 40" line is available, but equipment for the repairs are on hold such as various earth-moving, grading and heavy equipment - Comm No's 0078 and 53250 refer. At the MS-1 metering station, no metering equipment is available for the 46" line - Comm No 53428, on hold, refers.

COMMENT: For any increase in oil exports through the North, the 40" line needs to be repaired and the 46" line needs to have the requisite metering station installed. One without the other is a waste of money.

23. CRUDE PUMPING STATION - IT-2

FUNCTION: At the moment the storage tanks of station IT-2 are only used as an interrupt buffer for the 46" crude line. When operating the pumping station will significantly increase the flow rate of oil to the North for export to Turkey

COMMENTS: The pumping station IT-2 was completely destroyed by aerial bombing. A project to reinstate the pumping station has been approved. If all the material is delivered on time, the management hopes to reinstate the facility by the end of year 2000.

24. MINA AL-BAKR OFFSHORE LOADING PLATFORM

FUNCTION: This is the only point of export of crude oil from southern Iraq, and is currently the only offshore facility available in operation. It enables transportation of about 60% of available export volumes to the world market.

PROBLEMS: Shore lines need inspection, safety issues need addressing, accommodation needs improvement, berthing facilities inadequate, communications poor, inadequate and unsafe transportation to shore, inadequate fire-fighting facilities.

SPARE PARTS ISSUES: Comm No 00462, on hold for seven months, covers shore line intelligent pigging, Comm No 53470, on hold for six months, covers metering system, as does Comm No 53474. Comm No 00476, Comm No 00476, on hold for 13 months, covers communications.

COMMENTS: This offshore platform is an essential part of the the Iraqi exporting facilities and is in a deplorable state. At any time there could be a major failure in this export route and it is therefore essential that it is refurbished to a reasonable standard as a matter of urgency.

25. KHOR AL-AMAYA OFFSHORE TERMINAL

FUNCTION: This loading facility was designed as part of the Mina Al-Bakr export system, sharing common lines. It would supplement and enhance the operational efficiency of the entire offshore complex, if repaired.

PROBLEMS: Shore lines need inspection, platform needs substantially rebuilding

SPARE PARTS ISSUES: Every single application for spare parts and equipment is on hold.

COMMENTS: The availability of this loading platform would give added flexibility to the export of oil from the South in case of problems at Mina al-Bakr.

THE IMPACT OF HOLDS

THE IMPACT OF HOLDS

The group investigated the impact of holds on contract applications for oil spare parts and equipment on the capacity of oil production and export in Iraq.

At initial planning meetings with the Ministry of Oil it became apparent that this investigation was perceived as being of major importance. The group therefore requested the Ministry to task the operating companies scheduled for visits to prepare documentation covering the more significant holds.

1. BACKGROUND

At the time of the group's visit to Iraq, in March 1998, the estimate of current production was 2,200,00 bpd, realizing an export potential of 1,500,000 bpd. The monitored export figures at that time were 1,200,000 bpd.

The group's March 1998 report noted that:

"a sharp increase in production without concurrent expenditure on spare parts and equipment would severely damage oil-containing rocks, and pipeline systems, and would be against the accepted principles of good oil field husbandry."

and furthermore that:

"to ensure gradually increasing and sustainable crude oil production and the improvement of the oil industry of Iraq in general, with due regard to environmental and pollution issues, the group of experts estimates that the expenditure required will be approximately an amount of US\$ 1.2 billion to reach production levels of 3,000,000 bpd".

In November 1999 production reached 3,000,000 bpd, and export levels peaked for a short time at 2,300,000 bpd. The increase in production between March 1998 and November 1999 was 36%.

The value of spare parts and equipment covered by Letter of Credit payment as of early March, 2000 is advised as being US\$ 250 million. This represents 28% of the value approved under phases 4,5 and 6.

In the reviews of spare parts and equipment for phases 6 and 7 submitted by the Ministry of Oil the group of experts noted the continuing decline in the

condition of the Iraqi oil industry, and their concern for its ability to sustain increasing production levels. They recommended that the value of spare parts and equipment for phases 6 and 7 should be increased from US\$ 300 million to US\$ 600 million.

The value of the delivered spare parts and equipment covered by Letter of Credit payment as of early March, 2000 is therefore less than 14% of that recommended.

2. CURRENT PRODUCTION

The increase in production since March 1998 has been achieved by:

- The improvement in reservoir pressure resulting from the effects of previous re-injection, and the delivery of chlorine allowing enhancement of water treatment and injection,
- The delivery of emulsification chemicals, allowing the enhancement of wet crude treatment,
- The commencement of production from Saddam and West Qurna oil fields,
- The connection of previously drilled wells, and the use of gas lift in the North,
- The work-over of a limited number of wells.

The increase in production without access to the majority of contracted spare parts and equipment has resulted in a situation where crude oil production at the levels achieved in November 1999 is no longer sustainable, and production has dropped in recent weeks by 300,000 bpd, or 10%.

3. FUTURE PRODUCTION

The level of future production will be a function of:

- The time frame required to approve, deliver and commission the spare parts and equipment already contracted,
- The agreement to the recommended values of spare parts and equipment in phases 6 and 7,

- The level of damage already sustained in producing fields,
- The level of production in the next few months.

4. THE IMPACT OF HOLDS ON PRODUCTION

The recent decrease in production and exports of crude oil are the result of a number of factors, including:

- The failure to replenish depleted wells,
- The delays in implementing wet crude treatment projects,
- The loss of producing wells - 56 in the South alone,
- The failure to carry out major overhauls of plant and equipment,
- The delays in the repair to the Iraq/Turkey Pipeline and SCADA system, IT-2 and K-3.
- The continuing decline of the national power supply system, and its effect on the oil industry,
- The further decline in conditions on the Mina al-Bakr loading platform,
- The limitations of the crude oil storage and transportation systems.

All these factors are impacted by the lack of spare parts and equipment. A detailed analyses of the holds considered by the operating companies visited as having the greatest impact on production is attached under Addendum No 1.

The Ministry of Oil has now concluded that no commitment to future rates of production can be given without the delivery and commissioning of contracted spare parts, equipment and services necessary to sustain production at a level that will not further seriously damage producing fields.

Until the majority of spare parts and equipment ordered under phases 4 to 7 are in place the group would agree with this statement; the decision faced by the Ministry of Oil at this point in time is to balance a level of production to continue the humanitarian aid under the "Oil for Food" program against an acceptable level of damage to their oil fields. The level of exports monitored since the beginning of phase 7 has averaged 1.8 million bpd, which would indicate an average production level of 2.3 to 2.4 million bpd.

5. PROBLEM AREAS

The lack of effectiveness of the spare parts and equipment program is now most apparent. The key problem areas are considered to be:

- The short-term planning regime dictated by the six-month time span of each phase, when delivery time for equipment and spares is often nine months or more.
- The long delays in obtaining approval of individual contracts, in some cases exceeding a year, after which contracted suppliers may not wish to perform as contracted, either on price or delivery, which has an adverse effect on the planning and scheduling of repairs and maintenance.
- Large contracts placed on hold because one, or a few, items are considered unacceptable. Specific and timely advice on the unacceptable items would allow revised contracts to be raised for the balance of non-contentious items.
- The lack of specificity in reasons given for holds. Non-specific reasons, such as "dual usage concern" and "not directly related to the repair of the Iraqi oil infrastructure for the purposes of increasing exports", effectively result in holds that cannot be removed and allocated funds cannot be utilized for other essential needs.
- The lack of time limits. Delays for evaluation for "mission clarification" and holds "pending further clarification" remain in place seemingly indefinitely.
- The lack of consistency regarding holds between phases. Spare parts and equipment approved, contracted and delivered in phase 4 are placed on hold in phases 5 and 6.
- The delay in response to requests for "technical specifications" from certain suppliers.
- The lack of clarification of holds based on "1051" concerns. Without specificity, action cannot be taken to resolve such holds, nor can re-ordering of such items be avoided in subsequent contracts.
- The obsolete nature of certain spare parts and equipment required by the Iraqi oil industry. In some cases complete replacement is the only practical option.
- The policy of continuing with "old technology" within limited budgetary constraints.

6. RECOMMENDATIONS

There is an urgent need for agreed and specific mechanisms whereby the holds applied to contracted spare parts and equipment can be investigated and resolved within a reasonable time frame. Without such mechanisms, or acceptable alternative review procedures, the existing delays in the delivery of spare parts and equipment will continue.

6.1. Proposals for approval mechanism modifications:

- Delays in approval to contracts for such reasons as “mission evaluation”, “pending further clarification” and “pending further consideration” should be investigated by the OIP after a specific period (say 3 months maximum). If there is no likelihood of the hold being lifted, the purchaser should be advised of this, and the contract voided.
- Prompt advice should be provided by the OIP to the purchaser when individual items within a contract result in the holding of a complete contract. This will allow the purchaser to delete the item, or to negotiate a revised contract without inclusion of these items.
- Specific reasons should be given for holds for “dual use” and “items not directly related to the repair of the Iraqi oil infrastructure for purposes of increasing oil exports”. This will allow the purchaser to either answer the questions raised, or re-consider the contract in the light of the specific reasons for the hold.
- Holds for “1051” reasons. The purpose of the “1051” list is understood to be to prevent the acquisition of equipment considered capable of utilization in the manufacture of weapons of mass destruction. The technical nature of many of the items required for the oil industry often result in contracts for spare parts and equipment that are included on the “1051” list. For example, corrosive resistant stainless steels are specified in pumps handling corrosive liquids, and certain items of laboratory equipment (such as gas-liquid chromatograms) are common to many scientific procedures. The use of such equipment cannot be avoided and should be accommodated within the existing monitoring function. Furthermore the specific reason for the hold should be advised to the purchaser so that future contracts containing these items could be avoided.
- Contracts on hold for “end use/user information” and “require technical specifications” should be released when this information is supplied; if information supplied is insufficient to release the hold, or incorrect, a request should be submitted specifying exactly what is required.

- The reason for a hold should not be changed from the original, after technical issues have been answered.
- The purchaser should ensure that the supplier replies in a timely fashion to requests for technical specifications. If not provided within an agreed time frame, the OIP should advise the purchaser so that action can be taken to ensure provision of requested information.
- Whilst reviewing the holds the group has noted that spare parts and equipment approved in phase 4 have been placed on hold in phases 5 and 6. In view of the need to increase the effectiveness of the spare parts program a consistent approach is recommended.

6.2. The value of spare parts and equipment approved per phase.

The issue of the value of spare parts and equipment approved per phase, recommended at a level of US\$ 600 million in phases 6 and 7 but only approved at US\$ 300 million, needs to be resolved.

As illustrated in the report, the level of investment within the oil industry in Iraq is far below industry practice. Given the current poor condition of the oil industry the group's recommendation for the approval of US\$ 600 million in phases 6 and 7 is maintained. The amount of investment required to fully repair the Iraqi oil industry is much greater than the sums in question, and has been predicated by balancing the needs of the industry with the requirement to continue the humanitarian aid program. However, since the inception of the "Oil for Food" program there has been a significant increase in the market price of crude oil which means that further funds could be allocated to spare parts and equipment without impacting on funds available for the humanitarian aid program.

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|--|--|---|
| 00153 | Chemical additives for well workover acid jobs | Customs report 14/10/98, P/O/H 21/10/98 | US: Pending adequate assurances regarding monitoring of end use of specific components which can be used to develop Sarin | Production the in SOC area has dropped, and will continue to do so until work – including well work-over maintenance - is carried out. SOC replied to queries on the hold by their letter dated 02/02/99 forwarded via SOMO; notwithstanding the hold remains in place. |
| 00429 | Chemical additives for well workover acid jobs | Customs report 19/12/98, P/O/H 29/12/98 | US: Dual use concerns/chemical weapons. | Comments as above regarding impact of this hold on production. SOC replied to the queries on the hold by their letter dated 04/03/99 forwarded by SOMO; the hold remains in place. |
| 00431 | Chemical additives for well workover acid jobs | Customs report 19/12/98, P/O/H 29/12/98 | US: Dual use concerns/chemical weapons. | Comments as above regarding impact of this hold on production. . SOC replied to the queries on the hold by their letter dated 28/02/99 forwarded by SOMO; the hold remains in place. |
| 00463 | Production well logging services | Reviewed 11/01/99, customs report 15/03/99, P/O/H 21/06/99 | US: for list of equipment & PLT tools and will they be removed when personnel leave | Without production well logging, operators cannot monitor "down-hole" conditions. In the SOC field this has lead to serious water break through, and collapsed casing/wells resulting in both serious water problems (exacerbated by the wet water treatment plants "on hold") and lost production. . SOC replied to the queries on the hold by their letter dated 11/07/99 forwarded by SOMO; the hold remains in place. |
| 53587 | Well head valves & spare parts | Customs report issued 13/10/99. POH 21/10/99. | US: Valves are on the "1051" list. Reasons for hold changed by US 11/1/00 to "need technical specifications and material composition on all valves". | As a result of this hold no well heads are available, consequently no new wells drilled in SOC area in Phases 4, 5 or 6. There is now a drop in production. The contract remains on hold. |
| 00114 | Perforation materials and explosive charges | Reviewed 29/09/98, P/O/H 26/01/99 | US: Pending further consideration of plastic explosives (rdx) | Without perforation charges drilled wells cannot produce, and there is little point in drilling further wells. Items such as are in this contract are a pre-requisite to sustaining and increasing production; hence the recent decrease in production. SOC replied to the queries on the hold by their letter dated 13/05/99 forwarded by SOMO; the hold remains in place. |

SOUTH OIL COMPANY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---------------------------------------|---|---|--|
| 00523 | Spare parts for drilling equipment | Reviewed 05/03/99, customs report 15/06/99, P/O/H 22/06/99, released by UK 24/06/99 | US: For technical specifications for item 1, and dimension diagrams for item 2 | Drilling equipment, and the necessary repairs of same, are required before new wells (to replace lost production) can be brought on-line. The requested information responsible for the holds was provided as per SOC's letter dated 08/07/99 forwarded via SOMO. Nevertheless the hold remains. |
| 00567 | Submersible pumps | Customs report 29/07/99, P/O/H 06/08/99 | US: items 25-26 have bw/cw "dual use" applications, item 10.4.1 is on the "1051" list, items 32-35 have BW/CW "dual use" applications | The contract covers spare parts for submersible pumps required for well work-over, completion and reservoir control. Items mentioned as having BW/CW "dual use" and "1051" applications are advised as having been removed from the contract as per SOC's letter dated 12/03/99 forwarded by SOMO. The contract remains on hold. |
| 53509 | Coiled tubing, spares and accessories | Customs report 06/12/99, P/O/H 14/12/99 | US: Technical specifications on item No 3 (hydraulic pumps) item No 17 (jetting nozzles) items No 1-14 (torch) and item No 1-8 (data acquisition system). | The French supplier has answered all the queries forming the hold, and has even visited New York to explain the technique of coiled tubing work-over to the Committee. The hold remains, and well work-overs cannot be completed, reducing production output. |
| 53592 | Coiled tubing, spares and accessories | Reviewed 25/10/99, P/O/H 12/11/99 | US: Items 10 and 34 are on the "1051" list | For impact of no well work-overs, see above. An SOP has been agreed with the monitoring agency, and at all times the equipment is under the control of the contractor. The hold remains. |
| 00463 | Production well logging services | Reviewed 11/01/99, customs report 15/03/99, P/O/H 21/06/99 | US: for list of equipment & PLT tools and will they be removed when personnel leave | Without production well logging, production cannot be controlled, and water breakthrough occurs. The issues resulting in the hold have been answered by the SOC in their letter dated 11/07/99 and forwarded by SOMO. The monitoring agency can monitor the service provided. The hold remains. |
| 53577 | Open and closed hole logging services | Contract dated 22/07/99, contract submitted 20/09/99. Currently Evaluating | Customs "need technical specifications/services" | Without production well logging, production cannot be controlled, and water break through occurs, resulting in casing corrosion and leading to complete well failure; also results in wet crude production which requires excessive treatment. Lack of this service effects production. The contract remains on hold. |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|------------------------------------|---|--|---|
| 53130 | Laboratory analysis chemicals | Reviewed 26/04/99, P/O/H 04/05/99 | US: For technical specs on items 7, 18, 19 - "dual use" concerns; UK: Full details of end use required also details of the relevant sector codes and a copy of the front page of application. | This contract covers laboratory analyses chemicals. The SOC states that required information to release the holds has been supplied; the contract remains on hold. |
| 53397 | Chemicals | Reviewed 19/07/99, P/O/H 27/07/99 | UK: Information on the modalities to be used to monitor the impex rated propanol by the UN observers | This contract, for laboratory chemicals, reagents and equipment includes propanol - a simple solvent commonly used in standard oil industry tests. The modalities for monitoring have been discussed with the OIP. The contract remains on hold. |
| 00495 | Laboratory chemicals and equipment | Reviewed 02/02/99, customs report 15/06/99, P/O/H 22/06/99, released by US 22/09/99 | UK: Full monitoring details of impex rated toluene and ethanol | A contract containing basic reagents and testing equipment for oil quality control and testing. Modalities of monitoring impex rated solvents have been discussed with the OIP. The contract remains on hold. |
| 53196 | Chemicals | Customs report 20/08/99, P/O/H 30/8/99. Reasons for hold changed by UK 30/11/99. UK: toluene & ethanol are impex rated chemicals which could be used in the manufacture of VX gas. | US: for technical specs on items 16, 9 - goods on "1051" list. UK: need details of how these goods will be monitored in Iraq | This contract contains a range of chemicals, reagents and equipment for quality control analyses in the SOC production fields. SOC have replied, via SOMO, regarding the technical specifications. The monitoring issue can be addressed by the "in-country" monitors. The contract remains on hold. |
| 53300 | Laboratory equipment | Reviewed 14/06/99 - need list of spare parts. Customs report issued on 12/11/99. P/O/H 22/11/99. | US: Goods are on the "1051 list", technical specs on items 1, 4, 12, 13, 20, 22E, 24 & 25 and supplied computers are required | No line items entered on UN database. SOC advise that the requested information regarding technical specifications and computer details have been supplied as per their letter dated 21/01/00, forwarded by SOMO. Interestingly, similar equipment was approved and delivered under Phase 4 of the MOU. The contract remains on hold. |
| 53431 | Equipment for | Customs report issued | US: technical specs on computer | This contract contains specialized equipment for field |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|---|--|--|
| | geological labs and spare parts | on 11/08/99. P/O/H 19/8/99. | system - dual use concerns | geological testing requirements, including an elemental analyser. Such analyses are essential for interpretation of geological data obtained in the field. The questions regarding "dual use" concerns - responsible for the hold – were answered by SOC in their letter dated 16/09/99, forwarded by SOMO. The contract remains on hold. |
| 53029 | Oil spare parts for degassing stations. | Review commenced 04/01/99, completed and issued 04/07/99, P/O/H 16/04/99 | US: For technical specifications. | This contract contains equipment for the construction of degassing (gas/oil separation) banks at DG-8 degassing station. The queries on specification responsible for the hold were answered by SOC as per their letter dated 03/06/99, forwarded by SOMO. The supplier – Zarubezhneft - also supplied this information via their Mission. Without adequate degassing, crude oil cannot be transported, refined or exported; the poor condition of these units has been described in this (and previous) reports and therefore directly impacts on the ability to export crude oil. The hold remains in place. |
| 53535 | Flow control valves | Sector item code submitted was incorrect. Customs report issued on 02/09/99. P/O/H 14/9/99. | US: Need technical specs for valves; which valve components are made of non-corrosive material? What is the composition of the valves? | This contract covers flow control valves for well heads, manifolds and subsequent flow lines to surface installations. They are essential for safe control of flow rates and delivery; in their absence the only option is to shut off the well, thereby impacting on production. SOC have answered the queries responsible for the hold by their letter dated 07/10/99, forwarded by SOMO. The hold remains in place. |
| 53578 | Dehydration and desalting units | P/O/H 29/10/99 | US: Pending final decision on payment mechanism and technical specs | This contract contains equipment required for water and salt removal from the crude oil production stream. This is now particularly vital as the watering-out problem in wells in the South has now become extreme, effecting production. The queries resulting in the hold were answered by SOC by their letter dated 14/12/99, forwarded by SOMO. Similar equipment was approved in Phase 4. The hold remains in place. |
| 53574 | Flow lines; coated pie lines. | Customs report 22/09/99, P/O/H | US: Need material composition of the valves & pipes | No line items on UN database. SOC advise this contract is for steel pipe, coated with polyethylene. Oil from production wells |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|-----------------------------------|---|--|---|
| | | 30/09/99. | | cannot be transported without necessary flow lines. The queries resulting in the hold were answered by SOC in their letter dated 25/10/99, forwarded by SOMO. The contract remains on hold. |
| 00462 | Pigging for export lines. | Reviewed 10/01/99, customs report 15/03/99, P/O/H 21/06/99. | US: For technical specs on computers & oscilloscope & items 17 through 68 on list A, and items 1 through 11 on list B have "dual use" concerns & export facility not authorised under the oil-for-food programme | This contract originally comprised the intelligent pigging and inspection of the common shore lines from North Rumailah to Fao, and one sea line to Khor al-Amaya, and two sea lines to Mina al-Bakr loading platforms. The issues resulting in the hold have been addressed by SOC in their letter dated 15/08/99, forwarded by SOMO. In order to ensure the contract proceeds, all reference to Khor al-Amaya (KAA) has been removed; this however will result in much higher costs for the pigging of the line to KAA when approved. The condition of the loading lines to the platform(s) is very pertinent as they contain some 32,000 tonnes of crude oil each and leakages, or worse, could result in significant pollution to the Arabian Gulf. As yet this contract remains on hold. |
| 53223 | Electrical equipment | Customs report 10/11/99, P/O/H 18/11/99 | US: Items 9 and 11 are on the "1051" list. | The equipment in this contract comprises electrical items for the repair to 10 cluster pumping station providing water injection facilities in the SOC area, which were severely damaged in the war. Sustained production cannot be maintained without efficient and controllable water injection, as has now occurred. Items resulting in the hold have been addressed by SOC's letter dated 12/12/99, and forwarded by SOMO. The contract remains on hold. |
| 00510 | Control Room Spares | Reviewed 15/02/99; customs report issued 15/06/99. P/O/H 22/06/99. Released by UK 04/08/99. | US: For technical specs - items 14a,b,c,15b,c,e have "dual use" concerns. | This contract comprises control room equipment for the North and South Rumailah gas compressor stations; poor control of compressing operations affects operating efficiency and ability to export crude oil. The queries leading to the holds were answered by SOC in their letter dated 08/07/99 forwarded via SOMO. The contract remains on hold. |
| 53158 | Control and field instrumentation | Reviewed 03/06/99, P/O/H 11/06/99. | US: For more information on contract | This contract comprises spare parts for diesel engines and equipment at Zubair, N & S Rumailah de-gassing stations |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|---|--|---|
| | and spares | Released by UK 09/07/99 | | which are essential for the treatment of crude oil before export. The queries leading to the hold have addressed by SOC. The contract remains on hold. |
| 53229 | Control instrumentation spares | Reviewed 20/05/99, P/O/H 28/05/99. | US: For technical specs on nozzles and clarification of goods to be shipped. | This contract comprises measurement and control instrumentation for the Basrah Refinery. The issues noted for the hold have been addressed in SOC's letter dated 01/07/99 and forwarded by SOMO; the nozzles noted have been withdrawn for the contract. Notwithstanding, the contract remains on hold. |
| 630052 | Fan for gas coolers, fans for heat exchanger | Reviewed/Customs report i04/11/99. P/O/H 11/11/99. Released by UK 29/11/99 (application form and list of goods are illegible) | US: Goods on "1051" list | Equipment in this contract is for fan units in both the gas cooler plant and the heat exchangers. The fans are noted as being defective. The reasons for the hold have been addressed by SOC in their letter dated 12/01/00 and submitted via SOMO. The contract remains on hold. |
| 630044 | Mechanical spares for Broom & Wade air compressors. | P/O/H 08/11/99 | US: For detailed end use/user information | This equipment is for repairs to air compressors situated at Zubair, N & S Rumailah degassing stations which are essential for the treatment of crude oil before export. The detailed information required was supplied by SOC as per their letter dated 23/11/99 submitted via SOMO. The contract remains on hold. |
| 53470 | Metering system equipment | Reviewed 03/08/99, P/O/H 10/08/99 | US: For technical specifications. | This contract covers requirements for the metering system at Mina al-Bakr which is non-functional. As a result, exported quantities are ascertained by reference to loading vessel's calibration charts. The refurbishment of the metering system is a necessary priority. The technical specifications referred to in the US hold were supplied by SOC is their letter dated 22/09/00, via SOMO, but the hold remains. |
| 53485 | Spare parts for turbo pumps etc | Reviewed 05/08/99, DP amendment | US: Pending further technical review | This contract includes pumps and related equipment destined for depots, tanks farms, the Messan field, and N & S Rumailah |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|-----------------------------------|--|---|---|
| | | req'd/requested 06/07/99; DP amended 12/08/99; customs report issued 17/08/99, P/O/H 24/08/99 | | gas compressor stations; all such items are important for the reliable and safe operation of units. In reply to the hold, SOC has written on 13/10/99, via SOMO, with information to assist in the technical review. The contract remains on hold. |
| 00476 | Spare parts for radio PCM system. | Reviewed 19/01/99, P/O/H 26/01/99. | US: Pending OIP telecom study. | This equipment is required for the refurbishment of the PCM system at Mina al-Bakr. It is difficult to relate this requirement, for an offshore loading platform, to the OIP Telecommunications Study which has - in any event - been published. The lack of acceptable communications between Mina al-Bakr and the shore pumping installations has been focused on before, and has resulted in a number of shipping lines/charterers refusing to load at this terminal. The hold remains in place. |
| 53434 | Fire fighting equipment | Customs report 213/08/99, P/O/H 23/08/99 | US: For technical specifications on Item No 4 | Item No 4 is for 50 kg of dry chemical powder fire extinguisher; SOC advise that the technical specifications for this item have been supplied. The hold remains in place. |
| 00121 | | Reviewed 30/09/98; customs report issued 16/02/99, P/O/H 25/02/99 | US: For technical specifications on truck mounted grader, fuel truck and dump truck | The items comprising this contract are required for maintenance work throughout the SOC area. Thr queries related to the hold were answered in SOC's letter dated 11/03/99, forwarded by SOMO. To this date the contract remains on hold. |
| 00570 | Cranes | P/O/H 06/08/99 | US: Missile program and military dual use applications | The items comprising this contract consist of cranes to 30, 50 and 80-100 tonne capacity, and they are on hold for military "dual use" concerns. The reasons stated for the hold were addressed by SOC's letter dated 01/09/99, forwarded by SOMO. Without access to high capacity and high reach cranes approved spare parts (such as large chiller units) cannot be put in position in operating facilities where the positioning of the item can be 20/30 metres above ground. The hold remains. |
| 53449 | Heavy equipment | Customs report 13/08/99, P/O/H | US: dual use concerns | This order comprises two 30 tonne cranes, one with four wheel drive and steering, for use on the Mina al-Bakr loading |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|-----------------------------------|---|---|---|
| | | 23/08/99 | | platform. The dual use concerns have been answered by SOC's letter dated 01/09/99, via SOMO. The hold remains in place. |
| 53451 | Spare parts for heavy equipment | Customs report 30/07/99, P/O/H 06/08/99 | US: Pending further technical evaluation | The items in this contract consist of basic, simple spare parts for the maintenance of existing Caterpillar equipment including seals, hydraulic pumps, radiators etc . The issue of "pending further technical evaluations" was addressed in SOC's letter dated 13/09/99, forwarded by SOMO. The parts remain on hold. |
| 53350 | Engine spares for heavy equipment | Customs report 30/06/99, P/O/H 09/07/99 | US: For technical specifications on the heavy vehicles. | This contract contains spares for a Mercedes Truck, Type 1924, and consists mainly of engine and transmission items. The requested specifications on the vehicle were supplied as per SOC's letter dated 14/09/99. The hold remains in place. |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|--|---|---|
| 00245 | Aluminium foil for packing for cooling towers | Reviewed 24/10/98; clarification rec'd regarding shipping routing 05/11/98, POH 13/11/98 | US: More information on contract | This contract is for aluminium foil packing for the cooling towers at the Kirkuk Power Generation centre. As the balance of spare parts and equipment have been approved, this item is holding up a major power generation project which is essential to the operations in the NOC area. NOC advise that the requested information has been supplied. |
| 00496 | Production well logging services | Reviewed 04/02/99, customs report 15/03/99, P/O/H 21/06/99 | US: For list of equipment & PLT tools and will they be removed when personnel leave | Without production well logging, operators are unaware of what is happening "down-hole" making continuous production difficult to control, water breakthrough difficult to predict, and has lead to collapsed casing and lost production. The reasons for the hold have all been clarified by NOC, but the hold remains in place. |
| 53145 | Valves and pipe fittings | Reviewed 05/05/99, P/O/H 13/05/99 | US: Pending further technical evaluation | Prevents completion and connection of drilled wells, therefore impacts ability to export crude oil which has now resulted in decreased exports. Same materials from China approved in Phase 4 (Comm No 00116), and also repeated in Phase 6. This hold has been under "further technical evaluation" since May 1999, and remains in place. |
| 53142 | Drilling pipe threading machines | Reviewed 04/05/99, P/O/H 12/05/99 | US: Pending further consideration | Without threading to drilling pipes, wells cannot be drilled. Seriously impacts ability to export crude oil and resultant decrease in exports now apparent. The "further consideration" has continued since May 1999 and the hold remains in place. |
| 53287 | Coiled tubing unit, spare and accessories | Reviewed 30/06/99, P/O/H 09/07/99 | US: For technical specifications on computers - dual use concerns. | Coiled tubing units are an essential tool for well workovers; if wells are not maintained production drops off, as has now occurred. A direct impact on the ability to export crude oil. NOC state that they have supplied the technical specifications on computers but the hold remains in place. |
| 53364 | Drilling bits | Reviewed 03/07/99, P/O/H 28/07/99 | US: Need technical specs for nozzles. | Cannot drill for oil without drill bits, and nozzles are an integral part. Specs have long been supplied. |
| 53312/3/4 | Equipment for wet crude treatment | Reviewed 11/06/99, not yet circulated. | Contracts still under evaluation by OIP | The lack of wet crude treatment plants and equipment has seriously impacted the ability of the NOC to sustain production, especially as water cut problems associated with recent water injections programs are now being experienced. Similar contracts were approved in Phase 4 (Comm No 00394, Comm No 00464) and continue "under evaluation". |
| 53610 | Supply & | Contract signed by | Contract still under | Please see comments above regarding Comm No's 53312/3/4 |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|---|---|--|
| | commissioning of wet crude equipment | SOMO 01/08/99, submitted 04/10/99. | evaluation by OIP | |
| 0078 | Construction and heavy equipment vehicles | Reviewed 12/09/98, customs report issued 19/01/99, P/O/H 26/01/99. | US: Need technical specs for the cranes and overhead hydraulic platforms. | Lack of this equipment severely hampers repair work, and hydraulic platforms are required for overhead work in processing plants where (for example) heat exchanger bundles which require pulling could be 10/20 metres above ground level. The technical specifications have been supplied but the hold remains in place. |
| 53250 | Engines for heavy equipment | Reviewed 27/05/99, P/O/H 25/06/99. | US: For technical specifications - dual usage concerns. | As heavy equipment under Comm No 0078 was put on hold, NOC contracted to purchase replacement engines for existing repairable equipment. These have been put on hold for "dual use" concerns notwithstanding the provision of requested specifications. As the heavy equipment in Comm No 0078 remains on hold from January 1999, and the engines ordered under this contract remain on hold, the availability of this heavy equipment to the NOC in the near future is doubtful. |
| 53408 | SCADA supervision control and data acquisition system for ITP | Reviewed/customs report 22/07/99, contract amended to remove payment clause, new customs report 08/11/99, P/O/H 15/11/99. | US: Goods on "1051" list. | The SCADA control system for the Iraq/Turkey pipeline (ITP) is essential for the safe and reliable transfer of crude oil from Iraq to Turkey. It has nothing to do with communications other than to allow data transmission between pumping stations. Without the repair of this system the contracted and approved repairs to the ITP are negated, and the possibility of a major system failure are significantly increased which may result in the cessation of exports via Turkey. These repairs are also scheduled to integrate with similar improvements planned to the SCADA system by BOTAS on the Turkish side of the ITP. |
| 53428 | Metering system equipment for MS-1 | Reviewed 29/07/99, P/O/H 16/12/99 | US: Pending final Committee decision on payment mechanism, and technical specifications - "1051" goods. | This contract covers the installation of a new metering system at MS-1 (Zahko) on the 46" export line to Turkey without which this line cannot be used to increase exports to the design capacity of the system. Again, the "hold" on this contract means that, until removed, contracted and approved repairs to the ITP are negated, and exports from the North will remain lower than those from the South. |
| 53294 | Control instrumentation | Reviewed 11/05/99, P/O/H 26/08/99. | US: Items 3 and 7 are on the "1051" list. | Lack of vibration monitoring has caused significant damage to rotating machinery. This contract contains equipment required to replace the |

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| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---------------------------|--|--|--|
| | | | | obsolete control system on gas turbines powering the NOC water injection system, and the Avanah field oil production pumping station and impacts directly on ability to export crude oil. Similar spare parts under Comm No 53293 were approved. |
| 00518 | Control instrumentation | Reviewed 01/03/99, customs report issued 15/06/99, P/O/H 22/06/99, released by UK 24/06/99 | US: Technical specs - corrosive resistant aspects of goods have "dual use" concerns. | This equipment is mainly required for control of H2S and CO2 emissions; as these are corrosive gases anti-corrosive materials are predicated; technical specifications have been supplied but the hold remains. |
| 53019 | Control instrumentation | Reviewed 27/04/99, P/O/H 05/05/99 | US: Technical specifications. | This contract is for control instrumentation on the contracted and approved storage tanks being constructed at K-3, specifically for automatic tank gauging systems to allow safe and efficient operation. Lack of control instrumentation will impact on the operation of the ITP system and proposed increased exports through the system to Turkey. Technical specifications have been supplied but hold remains in place from May 1999 |
| 53254 | Mobile steam generator | Reviewed 27/05/99, customs report issued 07/07/99, P/O/H 14/07/99 | US: For technical specifications - "dual use" concerns. | This contract is for a simple mobile steam generating boiler of capacity 5 tonnes per hour required for "steaming out" the accumulated crude oil residues from storage tanks before entry and repair. The shortage of crude oil bulking facilities has direct impact on export capabilities. The technical specifications have been supplied but the hold remains in place since July 1999 |
| 53179 | Digital radio links | P/O/H 02/06/99 | US: Pending further consideration. UK: Final end user details still requested. | This contract covers vital communications equipment for the Jamboor field to enable operational control of field activities. The information requested regarding end user details has been supplied, and the hold remains "pending further consideration" by the US since June 1999. |
| 00513 | Telecommunications system | Reviewed 18/02/99, customs report 15/06/99, P/O/H | US: Pending further study | This contract is for replacement of the obsolete ITP tele-communications system, including all radio and multiplex equipment, PABX, ITP mobile system with solar power system for repeaters. This |

NORTH OIL COMPANY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|---|---|--|
| | | 22/06/99, released by UK 01/07/99 | | system is required for the verbal operational control of the ITP system. The hold was released by the UK in July 1999, but is still "pending further study" by the US since June 1999 and remains in place. |
| 00550 | Mobile radio system | Reviewed 15/04/99 | Under evaluation. Mission clarification requested for "additional information". | Contract covers equipment for mobile telephone system to replace the inoperative North Oil Company mobile network system. |
| 00516 | Telephone equipment and parts | Reviewed 19/02/99, customs report 23/03/99, P/O/H 21/06/99 | US: for technical specs on test & repair equipment, transportability & features of the system, also info on 15 GIGHZ radios, switches, test equipment, tools & training for maintenance, is this to replace inoperable or obsolete equipment. | This contract covers equipment to replace the Baba area telephone system. A complete listing of test and repair equipment has been submitted and there is some concern that the process is delayed because of the inclusion of an oscilloscope? The situation needs clarification as the original contract dates from December 1998. |
| 53052 | Generator | Review commenced 01/04/99, customs report issued 06/10/99. | On evaluation regarding payment schedule | This contract covers an electrical power generator, powered by a gas turbine, for the Ain Zalah region, and has been under evaluation since April 1999. |
| 53081 | Oil Spare Parts | Contract dated 27/02/99, submitted 07/04/99. | Under evaluation. Mission clarification required for additional information. | This contract covers equipment for two rotating drum oil removal skimmers, used for environmental control of oil spillages and accumulations. |
| 53227 | Pumps and parts | Customs report 19/07/99, P/O/H 27/07/99 | UK: List of spare parts required | This equipment is for the Jamboor South degassing station, and includes electrically driven condensate pumps; when operating they will allow increased exports of crude oil of 5,000 bpd. The list of spare parts requested has been supplied. |
| 53195 | Chemical additives for well workover acid jobs | Reviewed 12/05/99, P/O/H 20/05/99, released by UK on 07/06/99 | US: For technical specifications on biocide - dual use concerns | Well workovers are essential to ensure continued production from working wells. We are advised the issue of the technical specifications has been answered, the UK released the hold, but the US hold from June 1999 remains. |

NORTH OIL COMPANY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|--|---|--|
| 53194 | Carbon heat exchanger tubes | Customs report 24/06/99, P/O/H 02/07/99 | US: For technical specifications | This equipment for the gas processing plant is urgently required to improve operating efficiency. The technical specifications requested have been supplied. |
| 53242 | Mobile diesel welding machine & parts | Customs report 24/06/99, P/O/H 02/07/99. | US: For technical specifications | This equipment is required to carry out maintenance and repair work throughout the Kirkuk oil producing fields; mobile equipment is therefore unavoidable. The specifications have been supplied but the contract remains on hold. An earlier contract in Phase 4 for the same equipment was approved. |
| 53329 | Chiller spare parts for processing plant | Customs report 24/06/99, P/O/H 01/07/99 | US: For technical specifications on item # 15 - dual use concerns | There is no item # 15 in this contract. The condition of the North Gas Processing plant is highlighted in the main body of this report, and it's reduced efficiency produces excessive flaring, pollution and is inefficient |
| 53392 | Oil spare parts | Customs report 16/07/99 | Evaluating - for payment schedule | This contract, dated 18/04/99 and submitted 23/06/99, covers electrical generating equipment required throughout the NOC area. There seems to be no progress on the evaluation process. |
| 53324 | Diesel driven water pumps & parts | Customs report 22/06/99, P/O/H 30/06/99 | US: For material composition of pumps | This equipment is for simple horizontal low lift water pumps within the North area processing plants, which will improve the operating efficiency of the plants. The requested composition of the pumps has been supplied. |
| 53403 | Gas Turbine Spare Parts | Reviewed 20/07/99, final evaluation 26/01/00 | Contract still on evaluation. Mission clarification required for additional information | This contract covers spare parts for the gas turbines at AB-2 gas compressor plant and comprise thermocouples, transducers and fire detection equipment. Inefficient gas processing results in excessive flaring which is both wasteful, and causes significant pollution. |
| 53567 | Laboratory testing equipment for geological analyses | Reviewed 04/10/99, P/O/H 12/10/99 | US: For technical specifications - goods have "dual use" concerns. | This contract covers laboratory testing equipment for use at well production sites and the central laboratory at the gas processing plant to analyse oil, gas and water quality. It is all simple, routine oil industry standard equipment. We are advised the "dual use" concerns have been answered by return, but contract remains on hold. |

BEIJI REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|--|---|---|
| 53349 | Compressor repair kits | Customs report 01/07/99, P/O/H 12/07/99. | US: Item 110 (suction valves) have "dual use" concerns, need diameter of suction valves and are they corrosive resistant? | Refineries need compressors at many stages of their operation, which suffer corrosion problems from H2S resulting in two recent explosions in the refinery. Requested information has been supplied, but hold remains. |
| 53447 | Telephone equipment and parts | Customs report 27/08/99, P/O/H 07/09/99 | US: Pending further technical review | The refinery requires a working telephone system to control internal operations, and to communicate with the oil industry in general. |
| 53297 | Control instrumentation | Customs report 15/09/99, P/O/H 23/09/99. | US: Pending further evaluation. | This contract is for pneumatic control instrumentation on an LPG unit damaged recently in a fire. |
| 53468 | Instrumentation | P/O/H 03/02/00 | UK: detailed info required on each item of contract, which has value greater than US\$1,000 | This contract, which is on hold for the extraordinary request for "information on all items over US\$ 1,000 per item" is for instrumentation for the hydro-treater and sulphur recovery units. These units, when operating correctly, will improve the appalling quality of products and reduce toxic sulphur discharge to the environment. |
| 53561 | River water pump and heat exchangers. | Customs report 15/09/99, P/O/H 23/09/99 | US: need material components of the pumps to include inlets & outlets, are they made of corrosion resistant material, need technical specs on the heat exchangers, are the tubes made w/ corrosion resistant material | The river water pumps are required to pump water from the surrounding water supplies for refinery use. The requested information has been supplied but the hold remains in place. |
| 630004 | Pumps, compressors, turbines & spare parts. | Customs report on 09/09/99, P/O/H 16/09/99 | US: Chemical composition of pumps. | The pumps in question are for recycling gas with a high H2S content, and therefore need to be corrosion proof. |
| 630006 | Rotating equipment with spares | Customs report 22/05/99, P/O/H 30/05/99. | US: Need end use/user information. | This contract includes equipment for the asphalt plant project at the refinery to replace the unit destroyed in 1991. Currently heavy residues have to be re-injected into the producing fields to dispose of them, which is wasteful, expensive and leads to pollution. The end use/user information has been supplied. |
| 630065 | Fire fighting trucks, equipment & | Reviewed 10/11/99. Customs report issued 13/12/99. | US: BW "dual use" applications | This contract includes trucks and elevated monitors with nozzles, foam and dry powder fire extinguishing chemicals. These chemicals were approved under Comm No 00212 in |

BEIJI REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|-----------------------------------|---|--|---|
| | spares | POH by US & UK 21/12/99. Released by UK 22/12/99 | | Phase 4 but the hold remains in place. The use of fire fighting chemicals for BW dual use applications seems obtuse. |
| 630120 | Analytical instruments | Reviewed 19/11/99, P/O/H 21/12/99 | US: Items 4a and 4c on "1051" list | Line items not yet listed in UN database, but advised by refinery management that consists mainly of glassware requirements for routine quality control determinations. |
| 630194 | Rotating equipment and spares | Reviewed 08/12/99, P/O/H 16/12/99 | US: Technical specifications and detailed end use/user information | Line items not yet listed in UN database. |
| 630199 | Measurement and control equipment | Customs report 09/12/99, P/O/H 17/12/99 | US: For technical specifications. | Line items not yet listed in UN database. |
| 630081/2 | Rotating equipment and spares | Reviewed 15/11/99, P/O/H 14/12/99 | US: Pending further review and for detailed end use. | Line items not yet listed in UN database. |

BASRAH REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|--|--|--|
| 00175 | Waste water treatment equipment from Ionics, fire-fighting equipment, laboratory equipment. | Reviewed 15/10/98; detailed list of goods requested from supplier; list supplied 04/11/98. P/O/H 13/11/98. Corr.1 circ. 27/7/99 requesting removal of items related to "lab equipment", reducing total value to \$4,294,000. (these items are the reason for "on hold"). Corr.1 P/O/H by UK 29/7/99. Released by UK 6/8/99 | US: Technical specifications on Item No 8 - laboratory equipment | The Ionics waste water equipment is the same as ordered and approved under Phase 4 for Daura refinery. The contract includes skimmers and biological/chemical water treatment equipment. The laboratory equipment, listed as the reason for the hold, has been removed from the contract and the price adjusted accordingly. The removal of this hold has even been discussed directly between the Ministry of Oil and the OIP. To date no resolution to this situation has been found, and the hold remains in place. |
| 00438 | Hear exchanger spare parts | Customs report issued 23/12/99, P/O/H 04/01/99 | US: Not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | This contract covering heat exchanger units has remained on hold for over one year, for the stated reason of "not directly related to repair of Iraq oil infrastructure etc". This reason for hold only seems to appear on items destined for the Basrah Refinery, and there is no mechanism for countering this. |
| 00542 | Steam generator | Reviewed 22/03/99, customs report issued 07/07/99, P/O/H 14/07/99 | US: Not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | This contract contains equipment to repair one of the two steam boilers at the Basrah Refinery. One boiler suffered a direct hit during the hostilities and all operations are now dependant on the remaining unit which suffers from poor quality water input (see Comm No 00316 below). |
| 00414 | Waste water treatment parts | Reviewed 15/12/98, customs report 04/03/99, P/O/H 11/03/99 | US: Not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | This contract contains equipment for waste water treatment at the Basrah Refinery and the hold again is such that no effective counter to it can be made. The impact of poor waste water treatment at the Basrah Refinery, also noted in March 1998, remains unresolved to the detriment of the surrounding countryside and local population. This is a serious and damaging environmental situation which must be resolved. |

BASRAH REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|--|---|--|
| 00316 | Complete de-mineralization plant | Reviewed 19/11/98, customs report 10/03/99, P/O/H 21/06/00 | US: purchase is not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports, need info on specific resins employed on the ion exchange column purity of water produced | This contract comprises a complete de-mineralization unit, and spare parts for the existing reverse osmosis unit, to produce acceptable water quality for boiler operations. Whilst technical questions have been answered the hold for "not directly related etc" cannot be countered, and the hold remains in place. |
| 00441 | Vehicles for crew transportation and spares. | Customs report issued 23/12/98. POH 04/01/99. Released by UK 16/2/99 (UK: Need explanation of how such vehicles are related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports). As requested 6/7/99 origin of goods changed from UAE, S. Africa, Philippines or Asia to Japan. | US: Pending further technical evaluation. | This contract itemises the requirements to move staff around a large complex. The queries resulting in the hold have been addressed, but remains on hold "pending further technical evaluation". As the hold dates back to January 1999, and various changes have been made regarding vehicle sourcing in July 1999, the question as to how long the "technical evaluation" will take needs to be addressed. |
| 00164 | Platform vehicle with spare parts. | Customs report issued 13/10/98 P/O/H 20/10/98. Released by UK 26/4/99 (UK: Exact location where equipment will be used; technical information; explanation of how goods will be used to export more oil under oil for food programme). | US: Purchase not directly related to repairs for the purpose of increasing exports. | This contract covers the purchase of a single platform truck required to replace high mast lighting throughout the refinery. The reason for the hold cannot be countered, so the hold remains in place. |
| 00107 | Pumps and spare parts | Reviewed 27/09/98. P/O/H 05/10/98. Released by UK 16/10/98 (UK: list of spares required). | US: Purchase not directly related to repairs for the purpose of increasing exports | This contract contains spares and equipment for rotating equipment in the Basrah Refinery. The reason for the hold cannot be countered, so the hold remains in place. |
| 00146 | Pumps and | Reviewed 07/10/98, P/O/H | US: Purchase is not directly | This contract contains spares and equipment for rotating |

BASRAH REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|---|--|---|
| | spare parts | 15/10/98 | related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports. | equipment in the Basrah Refinery. The reason for the hold cannot be countered, so the hold remains in place. |
| 00281 | Couplings and transmission units for pumps | Reviewed 05/11/99, P/O/H 13/11/99. | US: Purchase is not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports. | This contract contains various mechanical items required for the repair and maintenance of pumps throughout the Basrah Refinery. The reason for the hold cannot be countered, so it remains in place. |
| 00284 | Couplings and transmission units for pumps | Reviewed 05/11/99, P/O/H 13/11/99. | US: Purchase is not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports. | This contract contains various mechanical items required for the repair and maintenance of pumps for the NGL line to Khor al-Zubair. The reason for the hold cannot be countered, so it remains in place. |
| 53035 | Drinking water tanker with spares. | Reviewed 26/03/99, P/O/H 05/04/99 | US: Purchase is not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports. | This contract merely seeks to supply a simple drinking water truck for use in delivering potable water to staff working "on-site". Denying the labour force access to potable water hardly seems applicable, even if the repairs are not related to increasing exports. |
| 53008 | Motor control centres | Reviewed 16/03/99, customs report 17/03/99, P/O/H 24/03/99. | US: Purchase is not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports. | These items are required for control instrumentation repair and maintenance in the Refinery; lack of instrumentation control results in manual control. The reason for the hold cannot be countered, so it remains in place. |
| 53016 | Control instrumentation | Reviewed 17/03/99, customs report 11/06/99, P/O/H 21/06/99, released by UK 29/09/99 on receipt of requested technical specifications. | US: Purchase is not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports & need info on intercom stations and end use info | Notwithstanding the supply of the requested technical specifications, the hold remains in place because of the intercom stations items. |
| 53573 | Forklifts | Customs report 21/09/99, | US: Pending further review. | This contract covers the purchase of 5 forklift trucks and |

BASRAH REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|---|---|--|
| | | P/O/H 25/09/99. | | spare parts required for use in the Refinery. Until the "further review" is completed, and outcome advised, the hold will remain in place. |
| 53137 | Pumps and turbines | Reviewed 29/04/99, P/O/H 07/05/99. | US: Purchase not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | This contract covers the purchase of centrifugal pumps and steam turbines for use throughout the Refinery. The reason for the hold cannot be countered, so it remains in place |
| 53171 | Measuring instruments | Customs report issued on 22/09/99. POH 30/9/99. Reason for hold changed from "pending further evaluation" to "purchase not directly related" on 01/10/99. | US: Purchase not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | This contract is for standard electrical measuring equipment ("Avo's", "Megga's" etc) and after "evaluation" the reason for the hold has been changed to "not directly related etc". . The reason for the hold cannot now be countered, so it remains in place. |
| 53330 | Control, protection and measuring system | Reviewed 23/06/99, customs report 07/07/99, P/O/H 15/07/99. | US: Items 1 & 2 computers, dual use. Items on "1051" list. | The items in this contract are for control protection and measurement to allow more accurate control of refinery operations. Queries have been answered, but items remain on hold. |
| 53348 | Instruments | Customs report 03/07/99, P/O/H 14/07/99 | US: Purchase not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | The equipment in this contract comprises basic laboratory equipment (pH meter, conductivity meter and accessories) used for water analyses. The reason for the hold is obtuse in that testing of water quality is required for both operational and environmental reasons. |
| 53463 | Instruments | Reviewed 02/08/99, customs report 24/08/99, P/O/H 24/08/99 | US: Purchase not directly related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | The equipment in this contract comprises basic proscribed ASTM methodology petroleum testing equipment required for quality control of crude and refined products. It is necessary for the control of refinery operations to know how effective the various refinery processes are, and to control the quality of the output (which is extremely poor) |
| 53533 | Instruments | Customs report 30/08/99, | US: Purchase not directly | The equipment in this contract comprises basic proscribed |

BASRAH REFINERY

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|---|----------------|---|---|
| | for environmental protection and laboratory | P/O/H 08/09/99 | related to the repair of the Iraqi oil infrastructure for the purpose of increasing exports | ASTM methodology petroleum testing equipment required for quality control of crude and refined products, and air analyses. It is required to measure quality of products, and therefore refining processes; poor quality products high in sulphur have serious environmental effects. |

DAURA REFINERY

| P/O/H | Description | | Reason for hold | Impact |
|--------------|--|--|--|--|
| 00536 | Air dryer for pneumatic instrumentation | 21/06/99. Released by UK 06/07/99 | US: Pending further technical consideration | Results in water condensing in control instruments for process units; effects refinery operation |
| 53066 | Raw water treatment plant | Commenced review 04/06/99, customs report issued 12/11/99, P/O/H 22/11/99, released by UK 22/11/99. | US: Tech specs on pumps, valves and all parts in contact with fluids. Buyer says already supplied. | Demineralized water output reduced which effects steam generation capacity and therefore refinery operations |
| 53141 | X-ray unit & consumables; diesel powered compressor | Pending. Reviewed 11/05/99, P/O/H 19/05/99 | US: For technical specifications. Buyer says already supplied | X-ray unit required for "on-site" NDT inspections to determine structural integrity of units. Compressor required for general use in refinery |
| 53140 | Boiler Tubes | Reviewed 29/04/99; P/O/H 07/05/99 | US: for technical specs. Buyer says already supplied. | Boilers built between 1954 and 1958, are noted to be "in a deplorable state". The refinery cannot operate efficiently without constant supply of steam. |
| 53164 | NDT inspection & testing equipment, tools and consumables. | Reviewed 07/05/99, P/O/H 17/05/99, released by UK 22/06/99. | US: pending further technical review | Inability to carry out NDT inspections precludes preventative maintenance. |
| 53262 | Ultrasonic flow detector and accessories. | Reviewed 28/05/99, P/O/H 08/06/99. | US: for technical specs on ultrasonic flow detector type. Buyer says already supplied. | Instrumentation required for maintenance scheduling. |
| 53381 | Portable gas detection apparatus & measurement instrumentation | Reviewed 15/07/99, P/O/H 22/07/99. Released by UK 01/10/99. Line Item No 1 amended and circulated 26/01/00 | US: Line Items 1-5, and 7, on "1051" list. Also need technical specs for Line Item No 7. | Instrumentation required for toxic gas detection in refinery, and to measure turbidity, conductivity and sedimentation. Without detection, or safety equipment, endangers lives of refinery operators. |
| 53539 | Pumps and spare parts | Reviewed 31/08/99, P/O/H 09/09/99. | US: Possible "dual use", need chemical composition of the parts of the pumps that are in contact with the fluid being pumped, particularly the inlets and outlets. | Without pumps a refinery cannot operate. All pumps contain, to a greater or lesser extent dependant on their intended use, various grades of stainless steel. |
| 53548 | Horizontal pumps | Reviewed 07/09/99, P/O/H | US: For composition (corrosion | As above |

DAURA REFINERY

| P/O/H | Description | | Reason for hold | Impact |
|--------------|----------------------------------|--|--|---|
| | | 15/09/99 | resistant) material | |
| 53586 | Valves and associated parts | Reviewed 29/09/99, P/O/H 07/10/99 | US: need technical specifications for valves. | Valves and associated equipment controlling movement of fluids and gases are an integral part of refinery operation |
| 53556 | Water demineralisation equipment | Reviewed 05/00/00, P/O/H 19/01/00. Released by UK 20/01/00 | US: Technical specs on computers and transfer pumps. | This equipment is urgently required to complete the repairs to the water demineralisation plant, in order to provide sufficient steam capacity to operate the refinery. Similar equipment, from the same manufacturer, was approved in Phase 4. |

GAS FILLING PLANT - KUT

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|------------------------------------|--|--|---|
| 53336 | Valves and parts | Reviewed 23/06/99, customs report 07/07/99, P/O/H 14/07/99 | US: Technical specifications on items 13/14 and 28 | This contract consists of various equipment items for cylinder maintenance. The required information regarding Line Items 13, 14 and 28 have been supplied but the contract remains on hold. The appalling working conditions resulting from the lack of equipment for cylinder maintenance, and the dangerous condition of cylinders, beggars description. |
| 53337 | Painting unit for LPG cylinders | Customs report 23/06/99, P/O/H 01/07/99 | US: Technical specifications/dual usage concerns. | This contract comprises an LPG cylinder painting unit. The technical specifications requested have been supplied. LPG cylinders are manufactured from mild steel; in the harsh and salty environment of Iraq they rust rapidly. Repair and painting of these cylinders is most certainly recommended. |
| 53317 | Steel plates for LPG cylinder body | Customs report 17/06/99, P/O/H 25/06/99 | US: Technical specifications/dual usage concerns. | This contract is for steel plate to construct LPG cylinders. With a cylinder population of c.14,000,000, and ageing, the cost of replacement from the international market is prohibitive and local production would seem an elegant solution. The technical specifications requested have been supplied, but contract remains on hold. |
| 630115 | LPG Filling Plants | Customs report 19/11/99, P/O/H 29/11/99 | US: For detailed end user information | This contract is advised as comprising dies for LPG cylinder repair and manufacture. The information regarding end user has been supplied. The contract remains on hold. |
| 630111 | Heavy equipment for LPG plant | Customs report 18/11/99, P/O/H 29/11/99 | US: For detailed end user information | This contract is advised as comprising heavy equipment for utilisation in the maintenance plant to replace old and worn out machinery. The request for end user information has been supplied. The contract remains on hold. |

GAS FILLING PLANT - TADJI

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|---|---|---|
| 00534 | LPG pumps | Reviewed 15/06/99, P/O/H 23/06/99, released by UK 06/07/99 | US: For technical specs on pump material, specifically inlets and outlets | Lack of functional LPG pumps prevents the safe filling of LPG cylinders, some now provided under the MOU, and repair of damaged carousels. |
| 00568 | Ultrasonic testing and safety equipment | Reviewed 02/08/99, P/O/H 10/08/99. | US: Dual use concerns for missile programs and other weapons of mass destruction/conventional weapons capabilities. | This equipment is required to check the construction integrity of LPG gas bottles prior to re-filling, thus preventing potentially dangerous bottles being re-filled and distributed to the population. |
| 00573 | Fire & safety equipment | Reviewed 15/11/99, P/O/H 23/11/99. | US: Chemical name of item No 3, and technical specs on item No 4. | The repairing, filling and transportation of LPG cylinders is hazardous; lack of fire-fighting and safety equipment cannot be condoned. This simple piece of equipment is required for re-charging carbon dioxide fire extinguishers |
| 53337 | Painting unit for LPG cylinders | Reviewed 23/06/99, P/O/H 11/07/99. | US: Technical specifications - dual use concerns | The re-painting of badly rusted cylinders, after necessary cleaning, extends their life. It also allows the local manufacture of cylinders, which also require painting, thus reducing the drain on the humanitarian aid program. |
| 53317 | Steel plate for LPG cylinder bodies. | Reviewed 16/06/99, P/O/H 25/06/99 | US: For technical specs - dual use concerns. | The availability of steel plate to manufacture LPG cylinders locally would remove the necessity of replacing the damaged stock of 14,000,000 cylinders via the MOU. The information requested has been supplied. |
| 53380 | Electrical generator | Reviewed 15/07/99, P/O/H 22/07/99 | US: Goods on "1051" list. | This item(s) is required for power supply within the LPG filling stations, many of which are in the remote countryside without a reliable grid connection. |
| 53427 | Fire equipment - monitor with ball valve and nozzle; portable LPG gas leakage detectors. | Reviewed 26/07/99, customs report 11/10/99, P/O/H 19/10/99. | US: Needs technical specs on the type of nozzle and tanks that are requested. Need technical specs on the gas detector. | By definition, LPG gas detection equipment is necessary in an LPG filling plant. Likewise, directional water pumping equipment is a necessity in case of fire. Irrespective of the provision of the required information, this equipment remains on hold. |
| 53161 | Flow metering for LPG plants. | Reviewed 07/05/99, P/O/H 17/05/99 | US: For technical specs on batch controllers. | Without accurate flow measurement of LPG between tanks, trucks, loading bays, cylinder filling carousels the whole operation of the LPG plant is compromised from a safety point of view, as well as an operational one. |

GAS FILLING PLANT - TADJI

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|--|--|--|
| 53260 | High pressure test pumps for LPG filling plants. | Reviewed 27/05/99, customs report issued 03/06/99,, P/O/H 10/06/99, released by UK 14/06/99. | US: For technical specs on material composition of pumps, and ability to pump corrosive materials. | These pumps are used to hydrostatically test the structural integrity of LPG cylinders. Owing to their absence many accidents have occurred, including loss of life, due to poor cylinder structure. The requested information has been supplied |
| 53328 | Rotating machinery and electrical water pumps | Reviewed 22/06/99, P/O/H 30/06/99. | US: For material composition of pumps | The electrical and diesel pumps in this contract are for the fire-fighting systems at LPG bottling plants. |
| 630034 | Draining and evacuation units for LPG cylinders | Reviewed 11/10/99, P/O/H 19/10/99. | US: Need material composition of the compressors. | Prior to repair of any nature, it is imperative that the LPG cylinders are completely free of LPG residues, to prevent possible explosion if "hot-work" is required. The requested information has been supplied, the hold remains in place. |
| 630029 | Air dryers | Reviewed 08/10/99, P/O/H 18/10/99 | US: Items 1 & 2 have nuclear weapons dual use applications and are on the "1051" list. Need technical specs on air dryers and spare parts. | Air dryers are essential for the safe operation of control equipment, and for provision of instrument air. The specifications required have been supplied. |

GAS FILLING PLANT - TADJI

| COMM No | Description | P/O/H | Reason for hold | Impact |
|----------------|--|--|---|--|
| 53082 | Absorbtion spectrophotometer, cathode lamps & spares | Reviewed 12/04/99, customs report 14/04/99, P/O/H 21/04/99 | US: Pending further technical evaluation. | This contract covers the provision of one standard laboratory spectrophotometer and associated detection lamps for routine gas analyses . The original apparatus was seen in the gas processing plant central laboratory and it is extremely old and unreliable. Currently less accurate portable analysers are used for plant operational control, which is far from ideal. |
| 53070 | Boiler feed water pumps and spare parts | Reviewed 08/04/99, P/O/H 19/04/99 | US: For technical specifications on pumps. | The contract covers the pumps that supply water to the boilers. Basically, no water feed - no steam - plant shutdown. The buyer advises the technical specifications were despatched over six months ago, and no response. Therefore is the contract still on hold for the stated reason, or another? |
| 53009 | Aluminium alloy gas heat exchangers | Reviewed 16/03/99, P/O/H 24/03/99 | US: For technical specifications and "dual use" concerns. | Lack of heat exchangers reduces the efficiency of the gas extraction process, thereby effecting export capability. Same items were approved and delivered, from identical supplier, under Comm No 00135 in Phase 4. The technical specifications have been supplied. |
| 563073 | Forklifts | Reviewed 08/04/99, P/O/H 19/04/99 | US: Pending further technical evaluation | Order comprises 3, 5 and 10 ton capacity forklift trucks required for movement of heavy items during repair and maintenance throughout the gas processing plant. The evaluation process continues. |
| 53376 | Instrumentation and spares | Customs report 09/07/99, P/O/H 19/07/99 | US: Technical specifications on gas chromatograph - "dual use" concerns. | This equipment and spares consist of basic gas chromatography equipment, and specifications have been supplied. Items remain on hold. It is difficult to control the operations of a major gas extraction installation without accurate information regarding the plant's operational parameters. |
| 53216 | Continuous monitoring computerised SCADA system | Reviewed 24/05/99, P/O/H 02/06/99. | US: for technical specs on computers. UK: clarification of the type of computer that will be supplied, 64GB RAM appears a little excessive and may not even exist. | The question of the computer memory has been clarified, and is 6.4GB (typographical error in original submission). The items remain on hold from June 1999. |

GAS FILLING PLANT - TADJI

| COMM No | Description | P/O/H | Reason for hold | Impact |
|---------|---|--|---|---|
| 53379 | Pumps and parts | Reviewed 15/07/99, P/O/H 22/07/99 | US: Vertical pumps contain liquid sulphur. Items on "1051" list. | The de-sulphurisation of the gases extracted from crude oil result in pure sulphur, of which some 350 tonnes is produced daily. This sulphur is flaked in a nearby unit, and is stored in the open. The pumps are required to move the sulphur from extraction site to the flaking and storage site. Identical items (sulphur transfer pumps) were approved and delivered under Comm No 00357 in Phase 4. |
| 53417 | Control instrumentation | Customs report 22/07/99, P/O/H 30/07/99 | US: Complete operated valves have CW "dual use" capabilities. Goods on "1051" list | This contract contains control instrumentation, and associated remote control valves, for use with sulphur. The sulphur has to be removed from the crude prior to export. |
| 53555 | Boiler Feed Water Pump | Customs report 10/09/99, P/O/H 20/09/99 | US: Pumps have CW "dual use" applications and are on "1051" list. | Boiler water feed pumps are essential to maintain a constant supply of steam for plant operations. Without adequate and reliable supply of steam the plant ceases to operate. |
| 630186 | Instruments and spares | Reviewed 06/12/99, P/O/H 14/12/99 | US - Detailed end use and technical specifications. UK - Specifications of hydrogen cells and exact details of its end-use. | Included in this contract, covering general equipment for routine laboratory analyses, is a hydrogen generator. This is to provide pure hydrogen, by electrolysis of water, for GLC standardisation purposes. The required information has been submitted. |
| 630759 | Equipment for industrial water treatment and steam generation and spares. | Pending. Contract dated 01/10/99, and submitted 30/11/99 | Still pending. | Contract urgently required and comprises a boiler upgrade for existing steam generation system. Current system is unreliable and is causing plant stoppages. |

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PHOTOGRAPHIC RECORD

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APPENDIX 2

GRAPHS

APPENDIX 3

GROUP OF EXPERTS

The Group of Experts

Mr. Graham Brett -Team Leader

British national. Mr. Brett has been responsible for the operational management of the independent oil and spare parts inspection services in Iraq since the beginning of the "Oil for Food" program, and has over 30 years of experience in all aspects of the oil industry.

Mr. Ali Al-Aqrawabi

Jordanian national. Mr. Ali Al-Aqrawabi is a Master Mariner and in this capacity, he will concentrate on the constraints of the storage, pipeline transport and marine loading of petroleum cargoes.

Dr. M. Peutz

Dutch national. Dr Peutz is a process engineer with over 35 years of worldwide experience in the oil industry. He will investigate the current status of the refining and downstream sectors of the oil industry of Iraq.

Dr. Igor Prokofiev

Russian national. Dr Prokofiev is an engineer in the gas and oil refining sectors with 14 years experience in the oil industry. He will concentrate on the refining and downstream activities of the Iraqi oil industry.

Mr. Arnstein Wigestrang

Norwegian national. Mr Wigestrang was involved in the "Oil for Food" program during its initial stages, advising the United Nations in the development of the program and subsequently spent a short period of time as an oil overseer at the United Nations Headquarters in New York. Mr. Wigestrang has 20 years of experience in various sectors of the oil industry, particularly on the commercial aspects of oil production and distribution.

Mr. Paul Wood

British national. Mr. Wood is a Petroleum Engineer with extensive international experience of oil fields, especially on production evaluation of reservoirs. His expertise will assist the group of experts in the evaluation of current production of oil fields in Iraq, and the potential to sustain and/or increase production levels.

