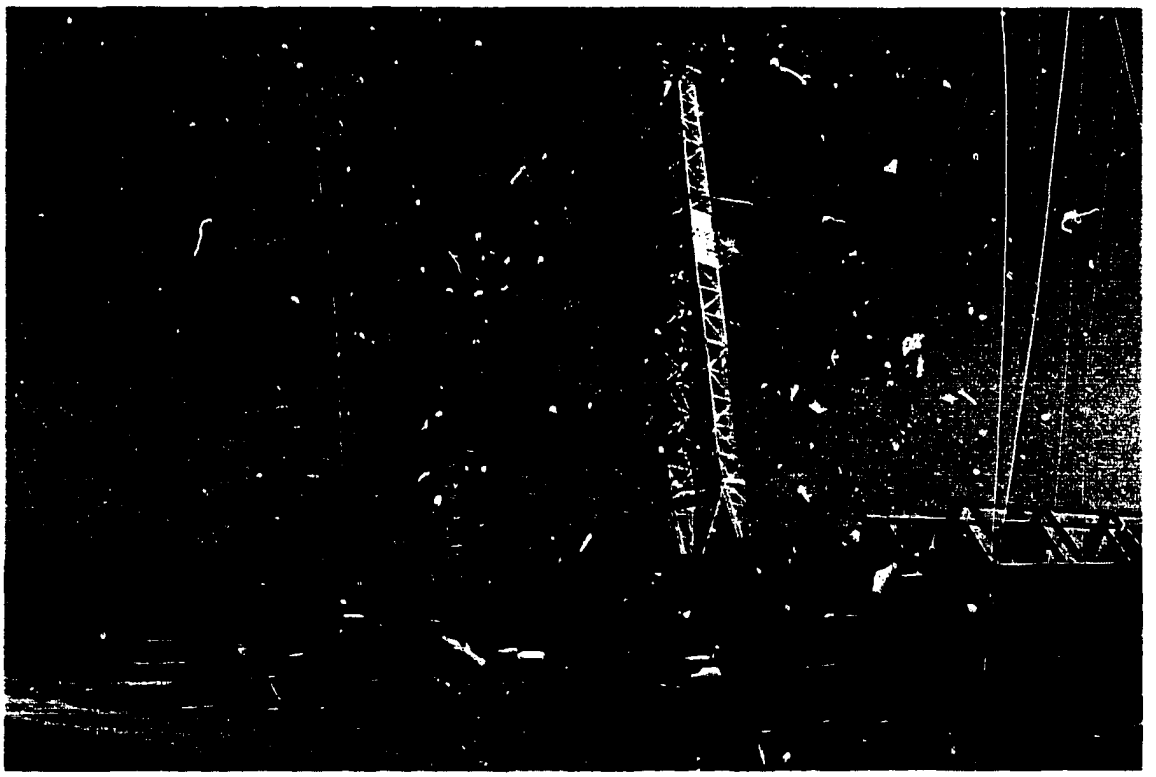
PN-ABR-531
PN 88064

United States Agency for International Development

Bureau for Europe and New Independent States
Office of Energy, Environment and Technology

Bureau for Global Programs, Field Support and Research
Office of Energy and Infrastructure

TECHNICAL ASSISTANCE FOR RIG SELECTION AND MODIFICATION TO SUPPORT ARMENIA'S OIL/GAS DRILLING PROGRAM



Prepared by:

Energy Technology Innovation Project
Contract No. DHR-5741-Q-00-1062-00;
Delivery Order No. 3

Prime Contractor: Bechtel Corporation
Subcontractor: John Pasley

March 1994

EXECUTIVE SUMMARY

The National 610 rig purchased by Armoil was an excellent choice for the drilling program in Armenia. It is small enough to be readily moved from location to location, yet heavy enough to drill to the depths of 3000-4000 meters called for by the data available. It should actually be able to drill to approximately 4700 meters (before the use of downhole motors would be required for any additional depth). A larger rig would be much more difficult and expensive to move, and require more fuel and crew as well. In the 3000-4000 meter range, this rig can be reasonably expected to drill more wells in a given period of time than a larger rig, due to its mobility.

The reconditioning program has restored this rig to a "like-new" standard, except for some minor cosmetic items which have no effect on its strength or drilling capabilities. Since the rig was completely stripped of old paint and repainted with multiple coats of epoxy paint, it even looks as good as it is inside, and should remain in excellent condition for several years' drilling without any major breakdowns. The rig is now ready to ship, and could be dismantled, crated, and loaded aboard a ship in about three weeks.

This rig is an ideal vehicle for the program intended, and will have a secondary benefit of providing a showcase for American technology and efficiency of operation. It is estimated that a 4000 meter well will take less than 60 days to drill with this equipment. It can then be knocked down, moved, and be ready to drill on a new site within 7-10 days (the "tool pusher" [field superintendent] who has used this rig before says it takes only 4 days!). By way of contrast, a Russian drilling crew generally plants vegetable gardens as they set up their rigs, since the process takes a couple of years per hole using Russian drilling technology.

BACKGROUND

Late in November, 1993, Armoil (the Armenia Gas and Oil Development Fund, Inc.) purchased an oil drilling rig from Rutherford Oil Company in Houston. The rig is a *National* model *610*, built in 1981. The derrick is rated at 300 tons, and the hoisting equipment at 250 tons. It is capable of drilling to depths of 4700 meters using normal techniques, and additional depths by using lighter drill pipe and downhole motors. Detailed specifications are attached as Appendix A.

This rig is small enough to be relocated rapidly and economically, yet big enough to drill to the depths required to prove Armenia's probable oil and gas reserves. It would then be capable of developing any oil or gas fields worthy of further effort. Any larger rig would be less economical in operation for either purpose and consume substantially more fuel. A larger rig, because of the significant increase in the time and equipment needed to relocate it, would end up drilling less footage and fewer wells.

When purchased, the rig had been "stacked" (stored) at the Refugio Drilling Company yard near Magnolia, Texas for about two years. Prior to that, it had been used extensively, drilling perhaps 100 wells. The owner of the rig, Rutherford Oil and Gas, was represented by Mike Rutherford, Jr.

It is my understanding that the rig was represented to be nearly new, but no records of previous drilling activity were made available, nor was Armoil allowed to survey the machinery in a meaningful manner. Only after the purchase was consummated and payment in full made was an inspection allowed. The lack of maintenance records and operating histories, pre-sale survey, and the fact that the rig was stacked in a storage yard rather than set up and operating made it practically impossible to predict the cost of preparing the rig for Armenia with any accuracy.

The choice of how much renovation to do was a difficult one. A program designed to simply get the rig running, with a purely cosmetic paint job as the main feature would be much too expensive during the life of this exploratory program, since down time would quickly translate into wasted money. The opposite end of the scale, complete restoration to "new" condition by the original equipment manufacturers, would cost too much initially.

An important factor in determining the extent of renovation required was that the rig would be working in Armenia, far from any sources of parts and technicians which might be needed in the event of a breakdown. A stoppage which could be remedied in a couple of days in Texas would halt operations in Armenia for weeks or months at a time. This would, in turn, cause massive cost overruns in any drilling program, and risk losing the drill string and hole as well. Similarly, it would be impractical to perform major repairs there, due to the extreme difficulty of transporting large, heavy parts to Armenia promptly or dependably.

For this reason, it was decided to renovate the rig to a high standard of dependability in Houston, but not to "new" condition. Assemblies with substantial wear were to be rebuilt, replacing any parts with less than 50% of their life remaining. Critical components such as the draw-works, which had no backup units, had to be 100% dependable.

The "draw-works" is the heart of an oil drilling rig. This massive, multi-purpose machine weighs over 85,000 pounds and is powered by two large Caterpillar diesels. They are connected to a gear-case which allows them to power the rotary table (which turns the drill pipe and bit), to power the main winch (which precisely raises and lowers as much as 250 tons of drill pipe or casing), to power the mud pump (a high-pressure pump which is used to circulate the drilling mud down through the drill pipe and back up to the surface), and to power a number of lesser functions on the rig. If something goes wrong with the draw-works, the entire drilling operation is paralyzed. The potential for major losses in this case is immense, particularly if there are several miles of drill pipe in the hole at the time. The draw-works simply has to be dependable. If it breaks down, it must be repaired as quickly as possible.

RENOVATION

After the purchase was finalized, preliminary inspections at the storage yard indicated the need to perform substantial renovation work in order to avoid frequent breakdowns once drilling began. Based on the information revealed by these field inspections, it was decided to send the major components to qualified local machine shops to have this work done. Adequate facilities to do this work did not exist at the storage yard, but do exist in the Houston area. Each component was evaluated separately, and bids were received from several firms for each. Don Rumson, of Asia-Pacific, in his letter dated February 22, 1994 describes the strategy employed. A copy is attached as Appendix B, since it provides useful insight into the process. Asia-Pacific did quite a thorough job in an effort to give Armoil the optimum rig for the best price.

Based on these bids, and on providing the best value to Armoil for the program intended, the work was farmed out to the machine shops giving us the maximum value without sacrificing quality. All of these shops meet API (American Petroleum Institute) requirements, and are providing certification of the work done. As a secondary benefit, this will save substantial money on insurance, since the rig's excellent condition is now fully documented.

Work in the shops was supervised by qualified mechanics working directly for Asia-Pacific. They performed much of the work done, saving perhaps 20-40% on the off-site labor costs incurred. They also insured that Armoil was not billed for work done for others. Daily reports were done by Asia-Pacific's mechanic where the work was done on a time and material basis (for example, at National and Roberds-Johnson). Those reports were used to verify billings. The work in progress was also inspected by Armoil representatives and Asia-Pacific's engineering staff on a frequent basis. In my opinion, the rig was restored to an appropriate standard for the service intended.

As the work progressed, it appeared as though little or no preventive maintenance had been performed on this equipment. Since the rig was leased to others, it seems that the operators did little or no maintenance. "Forced" maintenance (repairing the machinery only when it breaks) was apparently the only maintenance this rig ever got. In many cases, it appears that the machinery was run with damaged parts, causing further damage. An example of this was the mud pump: the cross-heads were broken and the clutch and "bull gear" were also damaged, which could have been caused by continuing to run the machinery despite obvious damage. Even inexpensive maintenance seems to have been neglected. For example, adding anti-corrosion agents to the cooling liquid would have greatly extended the life of the radiators. This does not appear to have been done, which probably accounts for the premature failure of nearly every radiator on the rig. It is impossible to tell if this was a deliberate program (actually, the lack of any program), or if it was simply due to poorly trained operational people or other factors. Either way, next to no preventive maintenance seems to have been done.

This one major factor resulted in significant cost over-runs. Since these problems occurred with nearly all of the components, regardless of whose shop did the work, it was obvious as the renovation progressed that this rig had drilled many more feet than Armoil had estimated. While

the basic rig was and is a good piece of equipment, almost every moving part of the rig was badly worn. Inspections made at the storage site in December identified problems serious enough to justify moving the major components to properly equipped machine shops for renovation. However, the full extent of the wear only became obvious when the machinery was taken completely apart. Then, there was little choice but to complete the repairs properly. The actual renovation was carried out to the very high standards required for service in Armenia, and the rig is now in "nearly-new" condition.

Without extensive repairs, this rig would have had frequent, major breakdowns, resulting in seriously disruptive down-time, regardless of where it was working. Those breakdowns would have resulted in far higher costs than those experienced renovating this rig. Based on drilling as few as two wells, I believe Armoil will still come out well ahead from a cost standpoint. Based on four wells, the savings should be significant.

We will never know if a different rig could have been bought and upgraded for less. I am inclined to think not. From my discussions with Asia-Pacific's staff and many other people I encountered in Houston, most of what's out there is in disrepair, or less suitable for Armoil's needs, or both. A smaller rig would not drill to the depths required. A bigger rig would have cost significantly more to renovate and operate. The total program costs would have been higher. Since 1982, few (if any) new rigs have been built, making this one of the newest rigs around. Replacement cost would run about $4,000,000 to build a new rig to this design. With all that said, Armoil now has the right piece of equipment, in nearly new condition, at less than half the cost of a new rig.

SUBCONTRACTORS

GENERAL: The various firms involved in the renovation of the rig performed very well. They exhibited high standards of workmanship as well as helping minimize costs by making their experience, contacts, and business relationships available to Armoil. The more important ones included:

ASIA-PACIFIC: Asia-Pacific was the prime subcontractor, providing overall management of the selection and renovation of the rig. The pivotal sub, they provided their expertise and support at every step of the way. All Asia-Pacific's principals have appropriate engineering degrees and extensive field experience gained on rigs all over the world. No-one in this company is willing to do second-rate work, and 14 to 16 hour days were put in regularly to get the program moving and to keep it moving in the right direction. They know the capabilities and reputations of the various repair shops and suppliers in the Houston area and elsewhere. The use of their "short list" permitted Armoil to avoid sub-standard firms and the waste motion of sorting them out. It made it possible to negotiate better terms and conditions with the subs, such as allowing our labor to work in their shops. Armoil got prices somewhat lower than market for a substantial part of the work, due to their reputation in the industry. Had Armoil attempted to renovate this equipment without their expertise, the work would have cost an additional $300,000 or more, and taken several months longer to complete.

NATIONAL OILWELL: National Oilwell has the reputation of building the best oil drilling rigs in the business. A National rig is like a Mack truck: built very solidly, from the best materials and designs available. As the original equipment manufacturer, National Oilwell was by far the best choice to inspect the rig itself. Their personnel made as thorough a survey of the rig as was possible in the outdoor storage yard where the rig was stacked. This survey indicated the need for extensive renovation, requiring the facilities of a heavy machine shop.

Having work done by National sometimes costs from 10-20% more than similar machine shops, but they stand behind their work 100% and can provide replacement parts and expertise immediately, anywhere in the world, in the event of a breakdown. National's intimate knowledge of the machinery and their commitment to provide on-site backup in the event of a breakdown represent long-term savings for the drilling program. By allowing Asia-Pacific to use their own mechanics to do much of the work in their shop, the initially higher labor cost was reduced considerably for this renovation work. They were able to train an experienced mechanic (who is willing to go to Armenia) on this particular equipment's repair and maintenance. Because of this, National was clearly the best choice for overhauling the draw-works, despite the somewhat higher initial costs of using them. Any such premium costs should be recovered on the first well.

STEWART STEVENSON: One of the largest and best-equipped Caterpillar diesel engine dealers in the country, Stewart Stevenson was the clear choice for evaluating and renovating the diesel engines which power the draw-works, generators, air compressor, and mud pump. Their mechanics proved to be both expert and hard-working. They also allowed Asia-Pacific to provide their own personnel to assist with the more tedious aspects of the work, which saved substantial labor costs compared to having semi-skilled work done by premium mechanics. Most of the diesel work was done in the storage yard or in National and Roberds-Johnson shops to save money on hauling the diesels back and forth, since the work required only hand tools to do. With the exception of their radiators, the diesels had been reasonably maintained. Still, some problems were found and repaired which would have resulted in more serious damage to the engines if not corrected.

As a footnote, based on fuel problems experienced at other projects in Armenia, the diesel fuel available in Armenia can be expected to be badly contaminated. The addition of heavy-duty filters to the fuel supply system is strongly recommended to avoid costly down time later. Bringing western lubricating oils and other fluids is also strongly recommended. The Russian-made stuff just doesn't do an adequate job, and would quickly damage this equipment.

ROBERDS-JOHNSON: One of the better heavy machine shops in Houston, they bid on much of the major renovation work needed. They had the capability to do the entire job in-house, eliminating 3rd party subcontractors, and an excellent work force. By using several shops, Asia-Pacific was able to complete the overall project in a shorter period of time. This competition also kept National more competitive.

It was decided to use Roberds-Johnson for overhauling the crown block, traveling block, and mud pump, rather than National, since they were more competitive on the pricing. These

components can be quickly changed out with similar units if they break down and are more readily repaired in the field. These components are less critical than the draw-works. A replacement could be flown in in a couple of days. An example of the type of savings realized has to include the "bull gear" which drives the crankshaft of the mud pump. This gear is about 42" in diameter, and had a number of cracked and missing teeth. The replacement part, if purchased from National, cost $20,000. Asia Pacific found a qualified independent machine shop which could duplicate the gear for $8000. It took two extra weeks to cut the new gear from a forged blank, but this was not on the critical path and did not delay the overall project.

SUPERIOR OILFIELD PRODUCTS: Detailed inspection revealed that the BOP (BlowOut Protection) Stack was too badly worn to meet safety standards. The potential disaster of a blowout is such that this equipment absolutely has to work properly. If it fails, the entire drilling crew can die horribly, and serious damage to the rig can also be expected.

Only Superior and Quality Oilfield Products (a subsidiary of National) had certified shops capable of doing extensive BOP Stack work. Superior bid $36,000, vs $50,000 from Quality/National. An independent engineer witnessed and certified the entire rebuilding process, which included extensive welding build-up of worn areas, heat treating the body of the BOP stack, and precision machining of all mating and wear surfaces, as well as the final pressure testing. All seals were replaced as well, leaving the unit in like-new condition. This vital piece of equipment is rated for pressures of 5000 psi, and was successfully tested after reconditioning to 10,000 psi (the requirement for a 5000 psi BOP stack).

EAGLE INSPECTION SERVICES: Specialists in the inspection of drill pipe and welded structures, Eagle was the lowest-priced of several qualified testing firms. They thoroughly inspected the drill pipe, drill collars, and drilling subs, plus *every* structural welds in the substructure and the derrick. Repaired areas were rechecked, since a bad weld or bent structural member could bring down the whole rig. A faulty piece of drill pipe could break off a mile or two down and cause significant problems and expense. These extensive and detailed inspections insure that the rig's structure and drill string meet or exceed requirements.

PRECISION STRUCTURAL INTERNATIONAL: Damaged steel members were analyzed to insure that the steel put back into the rig was equal to what was specified and used for the original assembly. This was necessary because the rig, as engineered, required fairly high-strength steel for its structural members. Using steel of a lower strength was not acceptable.

RIG STAR: Rig Star provided certified welders for repairs to the substructure, derrick, and other critical welding. In addition to being over 25% cheaper than the nearest bid, they produced very high quality work (verified by Eagle) with little or no waste motion. The total welding costs were a bit above budget partly because of the extent of replacement necessary, and partly due to improvements made to reduce operating costs. Again, these costs are expected to be recovered ~~on the first or second well.~~

An example is the addition of a smaller compartment to the mud tanks, which will substantially reduce the amount of drilling mud consumed and improve control of the mix (which can be expected to produce additional savings). This is an important savings for operation in Armenia, both in dollars and in logistics, since the mud components must be brought into Armenia from abroad. Mud chemicals and cement are too heavy to fly in economically in the large quantities required.

WATERS INTERNATIONAL: Waters was able to provide good, refurbished second-hand equipment at prices well below National and others. They refurbished the rotary table and the various tongs and other pipe-handling equipment used on the rig.

APPENDIX A

RIG SPECIFICATIONS

AND INVENTORY

Wiley

RIG 1

DRAWWORKS: NATIONAL 610, MANUFACTURED 1981, DRILLING DEPTH 6000'-10,000'

DRAWWORKS POWER: 2-D-379 TAC CATERPILLAR ENGINES RATED @ 600 HP CONTINUES.

MAST: DERRICK SERVICE INTERNATIONAL 136' X 21' 600,000 LB HOOK LOAD

SUBSSTRUCTURE: DERRICK SERVICE INTERNATIONAL 18' MAIN STRUCTURE, 16' ENGINE STRUCTURE, BUILT IN TOOL AND CHANGE HOUSE. DRILLER DOG HOUSE ON FLOOR. CASING CAPACITY 600,000 LB. SETBACK CAPACITY 400,000 LB.

BLOCK/HOOK: NATIONAL 540-G-250 (250 TON) BLOCK HOOK,

As Bought

SWIVEL: NATIONAL P-300 (300 TON)

PUMPS: 2-NATIONAL 8-P-80, 800 HORSEPOWER EACH, ONE INDEPENDENTLY DRIVEN BY CATERPILLAR D-398, WITH NATIONAL C-300 TORQUE CONVERTER.

ROTARY: NATIONAL C-275 WITH SPLIT AND SOLID MASTER BUSHINGS (27 1/2")

BLOWOUT EQUIPMENT: 1-13 5/8 HYDRIL, ANNULAR PREVENTER, H2S TREATED WITH STAINLESS STEEL RING GROOVES.
1-13 5/8 CAMERON DOUBLE TYPE "U" WITH 4-4 1/16" FLANGED OUTLETS.
1-KOOMEY 130 GALLON ACCUMULATOR UNIT IN INDEPENDENT HOUSE.
~~1-5000 PSI RATED CHOKE AND KILL MANIFOLD, H2S TREATED.~~

MUD TANKS: 2-STEEL TANKS, TOTAL CAPACITY OF 630 BARRELS, WITH AGITATORS

SOLIDS CONTROL: 1-EACH DERRICK SHALE SHAKER, DESANDER DEMCO, DESILTER DEMCO.

DRILL PIPE: AS NEEDED

LIGHT PLANT: 2-D-353 CATERPILLAR WITH 300 KW GENERATORS.

SUPERVISOR QUARTERS: 10' X 40' SKID MOUNTED BUNKHOUSE ~~W/CENTRAL HEAT AND AIR~~

WATER TANK: SKID MOUNTED 500 BARREL CAPACITY.

FUEL TANK: SKID MOUNTED 9000 GALLON CAPACITY

OTHER EQUIPMENT: VARCO KELLEY SPINNER, BEAR AUTOMATIC DRILLER, AIR WINCH, MATHEY WIRE LINE UNIT WITH .092 WIRELINE, APPROXIMATELY. 15000'

BEST AVAILABLE DOCUMENT

C

RIG 1, DATA SUMMARY, SERIAL NUMBERS

DRAWWORKS:	610 NATIONAL, MFT. 1980, SERIAL #170
ENGINES:	2-CATERPILLAR D353, SERIAL NUMBER 46B09077, 46B09076, ARRANGEMENT 7N4374, FOR GENERATORS. 2-CATERPILLAR D379, SERIAL NUMBER 66B07025, 66B07026, ARRANGEMENT NUMBER NOT AVAILABLE. 1-CATERPILLAR D398, SERIAL NUMBER 66B08822, ARRANGEMENT NUMBER, 3N-1127.
MUD PUMPS:	2-NATIONAL 8-P-80, SERIAL NUMBERS 833, 834.
MAST:	DERRICK SERVICES INTERNATIONAL, SERIAL NUMBER 274-240.
SUBSTRUCTURE:	DERRICK SERVICES INTERNATIONAL, SERIAL NUMBER NOT AVAILABLE.
TRAVELING:	BLOCK 250 TON NATIONAL, SERIAL NUMBER 4541 N. HOOK UNITIZED WITH BLOCK, NUMBER 47YF SWIVEL, NATIONAL SERIAL NUMBER 3455 N. KELLEY SPINNER, VARCO SERIAL NUMBER 3J2311190.
ROTARY:	NATIONAL, C-275, SERIAL NUMBER NOT AVAILABLE.
BOP:	ANNULAR, 13 5/8 X 5000, HYDRIL, SERIAL NUMBER 0836. DOUBLE, 13 5/8 X 5000, CAMERON TYPE U, DOUBLE SERIAL NUMBER 6976290. CHOKE MANIFOLD, VETCO 5000, PSI RATING. KOOMEY, CLOSING UNIT, SERIAL NUMBER 1507.
MUD TANKS:	2 TOTAL CAPACITY 850 BARREL, COMPLETE WITH ABITATORS, SHALE SHAKER, DESANDER DESILTER ETC
GENERATORS:	2-CATERPILLAR, ONE 333 KW, SERIAL NUMBER, 250TH4564, ONE 300 KW, SERIAL NUMBER 250TH4531.
DRILL PIPE, AND COLLARS:	NONE
TOOLS:	FOLEY TONGS, INGERSOLL RAND AIR HOISTS, VARCO SPINNING WRENCH, MATHEY WIRE LINE UNIT, MUD GUARD ETC.
FUEL:	9,000 GALLON WITH LUBSTER.
TOOL PUSHER HOUSE:	1 SKIDDED COMPLETE 10' X 40' X 9'.
MISC.	4 X 5 WATER PUMP, DIESEL POWERED, SERIAL NUMBER 2A1C1530. AIR COMPRESSORS, GARDNER DENVER, NUMBER, WBO-4015. QUINCY 330, SERIAL NUMBER 295575-LS21, 2-QUINCY 5120, SERIAL NUMBER 200201LS, 200283LS.

BEST AVAILABLE DOCUMENT

REFUGIO DRILLING COMPANY
FM 1488 YARD
MAGNOLIA, TEXAS

RIG INVENTORY: RIG 1, COMPLETED AND VERIFIED BY E. L. BURNS, AND JIM NELSON, ON 5-14-92, AT THE MAGNOLIA YARD.

DRAWWORKS

NATIONAL 610, MECHANICAL DRAWWORKS, SERIAL NUMBER 170, RATED AT 750 COMBINED ENGINE HORSEPOWER, NOMINAL DRILLING DEPTH OF 6,000 TO 10,000 FEET. EQUIPPED WITH NATIONAL MAKE-UP AND BREAK-OUT, TYPE B-2 CATHEADS, MAIN DRUM OF 20" X 46 13/16", TYPE K BRAKE DRUM, AND WIRELINE GROOVING OF 1 1/8". STANDARD HOISTING SPEEDS OF 4 FWD, 2 REV, ROTARY SPEED OF 2 FWD, 1 REV., AND CATSHAFT SPEEDS OF 2 FWD, 1 REV. DRILLERS CONSOLE WITH TOTCO TYPE 50 WEIGHT INDICATOR, 2 MUD PRESSURE, ROTARY TORQUE, LINE PULL AND RPM GAUGES. BEAR AUTOMATIC DRILLER, SERIAL NUMBER 7194. CROWN SAFETY DEVICE. PARMAC HYDROMATIC BRAKE, TYPE 281, SERIAL NUMBER 56226. DRAWWORKS DRIVEN BY NATIONAL, DT-20-1 1/4 COMPOUND, WITH A 2 SECTION, 1 1/4" QUADRUPLE ENGINE COMPOUND CHAIN. ENGINE CONNECTIONS ARE 20" AIR CLUTCHES, AND ONE V-BELT PUMP DRIVE WITH 24" AIR CLUTCH. 1 AIR COMPRESSOR, QUINCY MODEL 350, SERIAL NUMBER 295373-L921, V-BELT DRIVEN, FROM COMPOUND PINION SHAFT.

BEST AVAILABLE DOCUMENT

DRAWWORKS POWER

ENGINE 1, CATERPILLAR D-379, TURBO CHARGED DIESEL ENGINE. RADIATOR COOLED, WITH HEAT EXCHANGER FOR TORQUE CONVERTER. ENGINE SERIAL NUMBER, 68B07025 ARRANGEMENT NUMBER 3N1129. ENGINE IS COMPLETE WITH SAFETY SHUT DOWNS, INSTRUMENT CLUSTER, HYDRAULIC GOVERNOR, SKIDDED, INGERSOLL RAND AIR STARTER. POWER DRIVE IS ACCOMPLISHED THRU A NATIONAL C-245-125, TORQUE CONVERTER. SERIAL NUMBER 4863, OIL PRESSURE, TEMPERATURE GAUGES, TYPE "FH" ARRANGEMENT.

ENGINE 2, CATERPILLAR D-379, TURBO CHARGED DIESEL ENGINE. RADIATOR COOLED, WITH HEAT EXCHANGER FOR TORQUE CONVERTER. ENGINE SERIAL NUMBER, 68B07026 ARRANGEMENT NUMBER 3N1129. ENGINE IS COMPLETE WITH SAFETY SHUT DOWNS, INSTRUMENT CLUSTER, HYDRAULIC GOVERNOR, SKIDDED INGERSOLL RAND AIR STARTER. POWER DRIVE IS ACCOMPLISHED THRU A NATIONAL C-245-125, TORQUE CONVERTER. SERIAL NUMBER 4864, OIL PRESSURE, TEMPERATURE GAUGES, TYPE "FH" ARRANGEMENT.

BEST AVAILABLE DOCUMENT

MUD PUMPS

PUMP 1, NATIONAL 8-P-80, TRIPLEX MUD PUMP, SERIAL NUMBER 834, TWO PIECE MODULAR FLUID END, TWO-PIECE PISTON ROD, ROD LUBRICATOR, PINION DRIVEN THRU COMPOUND. MUD MANIFOLD SYSTEM, INCLUDING DEMCO 4" X 5000 PSI MUD VALVE, HYDRIL K-20-5000 PULSATION DAMPENER, SERIAL NUMBER 86129, OTECO PRESSURE RELIEF VALVE, NATIONAL SUCTION DAMPENER, 5" X 6" MISSION CENTRIFUGAL CHARGING PUMP, SERIAL NUMBER M19472, POWERED BY 40 HORSEPOWER EXPLOSION PROOF ELECTRIC MOTOR, 1175 RPM, FRAME 364 T, ID # P368627263-ZF, GROOVED BULL WHEEL, BELT GUARDS, ON OILFIELD SKID WITH SUBSTRUCTURE MOUNTING BRACKETS.

PUMP 2, NATIONAL 8-P-80, TRIPLEX MUD PUMP, SERIAL NUMBER 833, TWO PIECE MODULAR FLUID END, TWO-PIECE PISTON ROD, ROD LUBRICATOR, INDEPENDENT DRIVE. MUD MANIFOLD SYSTEM INCLUDING DEMCO 4" X 5000 PSI RATED MUD VALVE, HYDRIL K-20-5000 PULSATION DAMPENER, SERIAL NUMBER 85973, 5" X 6" MISSION CENTRIFUGAL CHARGING PUMP, SERIAL NUMBER M19469, POWERED BY 40 HORSEPOWER EXPLOSION PROOF ELECTRIC MOTOR, 1175 RPM, FRAME 364 T, ID # P368627A61-ZF, OTECO PRESSURE RELIEF VALVE, NATIONAL SUCTION DAMPENER, ON UNITIZED OILFIELD SKID WITH DRIVE UNIT. DRIVE UNIT: CATERPILLAR D-398 TAC, DIESEL ENGINE SERIAL NUMBER 66B08822, ARRANGEMENT NUMBER 3N-1127, SAFETY SHUT DOWN, INSTRUMENT CLUSTER, RADIATOR COOLED, WITH HEAT EXCHANGER. NATIONAL TORQUE CONVERTER MODEL C-304-64, SERIAL NUMBER 4721, OIL PRESSURE, TEMPERATURE GAUGES, TYPE "FH" ARRANGEMENT. INGERSOLL RAND AIR STARTER.

BEST AVAILABLE DOCUMENT

MAST

DERRICK SERVICES INTERNATIONAL, SERIAL NUMBER 274-240, RATED AT 600,000 LBS, HOOK LOAD CAPACITY WITH 10 LINES STRUNG TO THE TRAVELING BLOCK, MAXIMUM PIPE SET BACK OF 400,000. MAST HEIGHT IS 136' BY 21' WIDE AT SUB STRUCTURE. CROWN BLOCK ASSEMBLY GROOVED FOR 1 1/8 WIRE LINE, BUMPER BLOCKS, DERRICK CLIMBING ASSIST, RACKING PLATFORM, TONG COUNTER WEIGHTS, EXPLOSION PROOF LIGHTING, TWO 20' OUTSIDE MAST BOOMS, WIRE LINE SHEAVE, HOISTING LINES, WIRE LINE GUIDE, STAND PIPE, KELLEY HOSE, AIR LINES, AND MAST HEADACHE RACK.

TRAVELING EQUIPMENT

TRAVELING BLOCK: NATIONAL TYPE 8, MODEL 540-8-250, SERIAL NUMBER 4541N, RATED AT 250 TONS. BUILT-IN HYDRAULIC SNUBBER, ROTATION LOCK AND UNITIZED HOOK NUMBER 47YF. SKIDDED BLOCK HOOK CARRIER.

SWIVEL: NATIONAL P-300 SERIAL NUMBER 3455N, RATED AT 300 TONS, WITH 3 INCH DIAMETER FLUID PASSAGES.

KELLEY SPINNER: VARCO SERIAL NUMBER 5J2511190, TYPE 6500 POWER SUB, TOTALLY ENCLOSED, PNEUMATIC DRIVE, AND ATTACHED TO SWIVEL.

UPPER KELLEY VALVE: OMSCO UPPER KELLEY VALVE AND SAFETY HEAD, SERIAL NUMBER 5308, PART NO KVSH-88, RATED AT 10,000 PSI, WITH 6 5/8" TOOL JOINTS AND ATTACHED TO KELLEY SPINNER.

ONE 5 1/4" HEX KELLEY WITH 6 5/8" BOX X 4 1/2" PIN WITH RATHOLE SHUCK.

BEST AVAILABLE DOCUMENT

SUBSTRUCTURE AND DRILLERS DOG HOUSE

SUBSTRUCTURE; DERRICK SERVICES INTERNATIONAL, CONSISTING OF AN EIGHT SECTION STRUCTURE. OVER ALL ASSEMBLED HEIGHT OF 18 FEET, 17' HIGH ENGINE FOUNDATION, TOTAL LENGTH 51 1/2'. CASING CAPACITY 600,000 LB. SETBACK CAPACITY 400,000. MUD MANIFOLD WITH DEMCO 4 1/16" X 5000 PSI RATED GATE VALVE AND STRUCTURE STAND PIPE TO VIBRATOR HOSES. CONSTRUCTED IN SUBSTRUCTURE, ONE CLOTHES CHANGE ROOM, WITH PERSONNEL LOCKERS, BENCHES, AND ELECTRIC HEATER. ONE PARTS ROOM WITH, DERRICK AND STRUCTURE PINS WITH KEEPERS, PARTS FOR AIR VALVES, FILTERS. FOR AIR, FUEL OIL, HOSE CLAMPS, DRESSER STYLE COUPLINGS AND GASKETS, USED PIPE FITTINGS, COUPLINGS, WIRE LINE CLAMPS, PACKING FOR MUD GUARD, PACKING FOR OTECO MUD PRESSURE RELIEF VALVE, KING NIPPLES, ASSORTED SIZES, BAKER FLOW VALVES, EXPLOSION PROOF LIGHTS, HAMMER WRENCHES, FOOT VALVES, SEAL GASKETS FOR CHAIN GUARDS, ASSORTED FAN BELTS, BALL VALVES, ASSORTED NEW AND USED GATE VALVES ASSORTED HAND TOOLS, CHAIN TONGS, SLEDGE HAMMERS, WRENCHES, HAMMER UNIONS, BOP RAM RUBBERS, BONNET SEALS FOR CAMERON BOP, SHAKER SCREENS, AND 1 310 SIMPLEX TRAC JACK. 1 NATIONAL TOTCO DRILLING LINE ANCHOR SERIAL NUMBER T6157. 1 AIR RECEIVER, RATED AT 200 PSI MFT. DATE 1980, SERIAL NUMBER 207110. BOP CONTROL LINES, AND ALL AIR, FUEL LINES NECESSARY FOR FULL RIG DRILLING OPERATIONS. CAT WALK, V-DOOR RAMP AND SNUBBING POST. STAIRS, HANDRAILS, FLOOR PLATES, CENTER PIECES, STAND BACK AREA, AND SWING OUT SUPPORTS FOR DRILLERS DOG HOUSE.

DRILLERS DOG HOUSE: SKIDDED ALL STEEL UNIT, APPROXIMATELY 8' X 20', PERSONNEL LOCKERS AND BENCHES, ELECTRIC HEATER, KNOWLEDGE BOX, REMOTE KOOMEY UNIT SERIAL NUMBER 1253, EXPLOSION PROOF LIGHTING, ASSORTMENT OF HAND TOOLS AND RIG SUPPLIES.

BEST AVAILABLE DOCUMENT

ROTARY DRIVE

ROTARY TABLE: NATIONAL C-275 SERIAL NUMBER NOT AVAILABLE, STATIC LOAD RATING OF 500 TONS, TABLE OPENING OF 27 1/2" COMPLETE WITH 1 SOLID MASTER BUSHING, 1 SPLIT MASTER BUSHING, ROTARY CHAIN GUARD AND TORQUE SENSOR.

ROTARY DRIVE BUSHING: ONE VARCO HEX KELLEY DRIVE BUSHING WITH ALL PINS AND ROLLERS.

BEST AVAILABLE DOCUMENT

BLOWOUT EQUIPMENT

ANNULAR: 13 5/8" X 5000 PSI RATED, HYDRIL, ANNULAR PREVENTER, SERIAL NUMBER 0836, 13 5/8" 5000 PSI RATING, LOWER FLANGE 13 5/8" 5000 PSI RATING, STUDDED TOP, H2S TRIMMED WITH STAINLESS STEEL RING GROOVE.

DOUBLE: 13 5/8" X 5000 PSI RATED, DOUBLE, CAMERON TYPE "U", SERIAL NUMBER 697629 13 5/8" 5000 PSI FLANGED TOP X 13 5/8" FLANGED BOTTOM, 4 FLANGED 5000 PSI RATED OUTLETS, ONE SET OF 4 1/2 PIPE RAMS AND ONE SET OF BLIND RAMS. H2S TRIMMED WITH STAINLESS STEEL RING GROOVE.

CLOSING UNIT: KOOMEY UNIT, SERIAL NUMBER 1507, TYPE 80, ID# R-7658-00, TRIPLEX PUMP NUMBER VE12513, 3 AIR PUMPS, UNIT MODEL NUMBER 130-11SSSX, ACCUMULATOR BOTTLES, LINES, 6 STATION, ENCLOSED IN A 8' X 30' ALL STEEL, SKIDDED HOUSE, WITH PUMP PARTS ROOM. CONTAINING EXPENDABLE PUMP PARTS, (USED AND NEW LINERS, PISTONS, RODS), RIG LIGHTS, ROLLER CHAIN, DESANDER AND DESILTER PARTS, SWIVEL PACKING, RAM RUBBERS, WEAR PLATES, OTECO PRESSURE RELIEF VALVE AND PARTS, DRESSER STYLE SLEEVES, AND COUPLINGS, USED PARTS FOR DERRICK SHAKER, PULSATION DAMPNER RUBBER, AND ASSORTMENT OF USED FITTINGS.

~~CHOKE KILL MANIFOLD: ONE 5000 PSI RATED, H2S TRIMMED, CHOKE KILL MANIFOLD, 2 1 1/16" X 5000 PSI RATED, VETCO MANUAL GATE VALVES, 6 2 1/16" X 5000 PSI RATED, VETCO MANUAL GATE VALVES, 1 UNIBOLT CHOKE 5000 PSI RATED, 1 MUD PRESSURE GAUGE, 1 CONNECTING SPOOL 5000 PSI RATING, 1 DESASSER SHOP MADE. MANIFOLD SYSTEM MOUNTED ON OILFIELD SKID WITH ADJUSTABLE WEIGHT.~~ ASSORTMENT OF DOUBLE STUDDED ADAPTORS FOR BOP STACK.

BEST AVAILABLE DOCUMENT

MUD SYSTEM

SHALE SHAKER TANK: ALL STEEL CONSTRUCTION, APPROXIMATELY 10' X 33' X 7'. ONE SAND TRAP COMPARTMENT, APPROXIMATELY 10' X 13 1/2' X 7', 144 BBL CAPACITY, DESANDER, DESILTER SETTLING COMPARTMENT, APPROXIMATELY 10' X 15 1//2' X 7', 166 BBL CAPACITY, AND ONE COMPARTMENT APPROXIMATELY 10' X 5 1/2 X 6', 64 BBL CAPACITY. TOTAL BBL CAPACITY APPROXIMATELY 374. 1 SINGLE DERRICK "SANDWICH" HIGH SPEED SHALE SHAKER, SERIAL NUMBER 296, WITH ELECTRIC MOTOR AND MOTOR CONTROLS. ONE 6" X 8" MISSION MAGNUM CENTRIFUGAL PUMP, SERIAL NUMBER 2245-1, POWERED BY ONE, 60 HP. EXPLOSION PROOF ELECTRIC MOTOR, 1175 RPM, FRAME 405T, ID# P40G249A-02-ZF, 230/480 VOLT AC, FOR DESANDER. ONE 6" X 8" MISSION MAGNUM CENTRIFUGAL PUMP, SERIAL NUMBER 1976-M, POWERED BY ONE, 60 HP. EXPLOSION PROOF ELECTRIC MOTOR, 1175 RPM, FRAME 405T, ID#P40G250A-02-ZF, 230/480 VOLT AC, FOR DESILTER. STARTER AND MOTOR CONTROLS, POWER CABLES, AND APPELTON ELECTRICAL CONNECTIONS. ONE 2 CONE DEMCO DESANDER, ONE 12 CONE DEMCO DESILTER, ONE BRANDT MUD AGITATOR, POWERED BY ONE 10 HP. EXPLOSION PROOF ELECTRIC MOTOR, FRAME 215T, 1755 RPM. SERIAL ID NUMBER NOT AVAILABLE. MUD CLEAN OUT GATES, WITH EASY LIFT HANDLES, HIGH PRESSURE MUD WASH OUT GUNS, WITH PRESSURE RELIEF VALVES, EXPLOSION PROOF LIGHTING, HAND RAILS, STEEL GALVANIZED WALK WAYS, AND MUD SAMPLE AREA.

SUCTION TANK: ALL STEEL CONSTRUCTION, APPROXIMATELY 10' X 33' X 7'. TWO COMPARTMENTS, APPROXIMATELY 10' X 17' X 7', 182 BBL CAPACITY, EACH, AND ONE "WELL SLUGGING" COMPARTMENT APPROXIMATELY 10' X 6' X 7', 64 BBL CAPACITY. APPROXIMATE TOTAL BBL CAPACITY APPROXIMATELY 428. TWO 6" X 8" MISSION MAGNUM CENTRIFUGAL PUMPS, SERIAL NUMBER 20406, POWERED BY ONE, 60 HP. EXPLOSION PROOF ELECTRIC MOTOR, 1175 RPM, FRAME 405T, ID# P406249A-61-ZF, 230/480 VOLT AC. ONE 6" X 8" MISSION MAGNUM CENTRIFUGAL PUMP, SERIAL NUMBER 19410, POWERED BY ONE, 60 HP. EXPLOSION PROOF ELECTRIC MOTOR, 1175 RPM, FRAME 405T, ID # P406250A-61-ZF, 230/480 VOLT AC. STARTER AND MOTOR CONTROLS, POWER CABLES, AND APPELTON ELECTRICAL CONNECTORS. ~~TWO BRANDT MUD AGITATORS,~~ POWERED BY TWO 10 HP. EXPLOSION PROOF ELECTRIC MOTOR, FRAME 215T, 1755 RPM. MUD CLEAN OUT GATES, EASY LIFT HANDLES, HIGH PRESSURE MUD WASH OUT GUNS, WITH PRESSURE RELIEF VALVES, EXPLOSION PROOF LIGHTING, HAND RAILS, STEEL GALVANIZED WALK WAYS, MUD MIXING HOPPER, PIPING, CAUSTIC MIXING BARREL, AND MUD SAMPLING AREA.

BEST AVAILABLE DOCUMENT

WATER TANK: ALL STEEL CONSTRUCTION, 10' X 44' X 8' APPROXIMATELY 500 BARRELS, ON OILFIELD SKID WITH TWO 3" X 4" CENTRIFUGAL PUMPS. ONE MISSION SERIAL NUMBER 5620, POWERED BY ONE 25 HP. EXPLOSION PROOF ELECTRICAL MOTOR, 230/460 VOLT AC. ID # P32B6338-G2-ZF. ONE DEMCO SERIAL NUMBER, 0611, POWERED BY ONE 25 HP. EXPLOSION PROOF ELECTRICAL MOTOR, 230/460 VOLT AC. ID #P32B3000A-G4-ZB. ALL MOTOR CONTROLS, STARTERS, POWER CABLES AND APPELTON CONNECTIONS.

BEST AVAILABLE DOCUMENT

LIGHT PLANT

ONE CATERPILLAR GENERATOR, MODEL SRCR, 1200 RPM, 460/230 VOLT AC. 60 CYCLE, SERIAL NUMBER 250TH4564, 333 KW. 419 KVA. STANDBY RATING. POWERED BY CATERPILLAR D-333, A TURBO CHARGED, RADIATOR COOLED DIESEL ENGINE ON UNITIZED OILFIELD SKID WITH GENERATOR. SERIAL NUMBER 46B09077, ARRANGEMENT. NUMBER 7N4374 ENGINE IS COMPLETE WITH ALL SAFETY SHUT DOWNS, INSTRUMENT CLUSTER, HYDRAULIC GOVERNOR, INGERSOLL RAND AIR STARTER.

ONE CATERPILLAR GENERATOR, MODEL SRCR, 1200 RPM, 460/230 VOLT AC. 60 CYCLE, SERIAL NUMBER 250TH4531, 300 KW. 375 KVA. STANDBY RATING. POWERED BY CATERPILLAR D-333, A TURBO CHARGED, RADIATOR COOLED DIESEL ENGINE ON UNITIZED OILFIELD SKID WITH GENERATOR. SERIAL NUMBER 46B09016, ARRAIGNMENT NUMBER 7N4374 ENGINE IS COMPLETE WITH ALL SAFETY SHUT DOWNS, INSTRUMENT CLUSTER, HYDRAULIC GOVERNOR, INGERSOLL RAND AIR STARTER.

UNIVERSAL SWITCH GEAR, SERIAL NUMBER 180-297, WITH MOTOR CONTROLS, SYNCHRONISERS AND PARALLEL DRIVE UNITS, ELECTRICAL PANELS WITH VOLTS, CYCLES, AMPS, METERS. MAIN BREAKERS, AND SUB BREAKER PANELS, ONE DRY TYPE TRANSFORMER, GENERAL ELECTRIC, SERIAL NUMBER 123D874

COLD START UNITS. ONE TWO CYLINDER LISTER DIESEL ENGINE, SERIAL NUMBER 667HR2-A3023, FUEL TANK, ELECTRIC AND MANUAL START, WITH QUINCY MODEL 5120 AIR COMPRESSOR, SERIAL NUMBER 200201LS, BELT DRIVEN, FROM ENGINE, SIZE 6 3/4" X 4", WITH ALTERNATE POWER PROVIDED BY ONE 20 HP., EXPLOSION PROOF MOTOR, FRAME 256T, ID#K125611CS7054BEW, 230/460 VOLT, 1773 RPM. RIG AIR SUPPLIED FROM QUINCY MODEL 5120, SERIAL NUMBER 200203LS, BELT DRIVEN, FROM A 20 HP EXPLOSION PROOF ELECTRIC MOTOR, MODEL KM, FRAME 256T, 1730 RPM, ID# NOT LEGIBLE. ONE 250 GALLON AIR RECEIVER TANK, PRESSURE RELIEF VALVE, 200 PSI WORKING PRESSURE, SERIAL NUMBER 3024-2. COMPRESSORS ARE UNITIZED IN GENERATOR HOUSE, APPROXIMATELY 10' X 40' X 10'. ALL STEEL, HEAVY DUTY OILFIELD SKIDDED CONSTRUCTION, WITH HINGED AND SLIDING DOORS.

BEST AVAILABLE DOCUMENT

DRILL PIPE HEAVY WEIGHT COLLARS SUBS

~~DRILL PIPE FOR RIG 1, IS SEPARATED BY GRADE, WEIGHT, AND IS CONSOLIDATED WITH DRILL PIPE FOR ALL RIGS, STORED AND MAINTAINED AT THE MAGNOLIA YARD. FOR THE PURPOSE OF THIS INVENTORY ALL DRILL PIPE IS CONTAINED IN DRILL PIPE SUMMARY.~~

~~HEAVY WEIGHT PIPE IS CONSOLIDATED WITH THE HEAVY WEIGHT FOR ALL RIGS, STORED AND MAINTAINED AT THE MAGNOLIA YARD. FOR THE PURPOSE OF THIS INVENTORY ALL HEAVY WEIGHT PIPE IS CONTAINED IN THE SUMMARY.~~

~~DRILL COLLARS ARE CONSOLIDATED WITH THE DRILL COLLARS FROM ALL RIGS, STORED AND MAINTAINED AT THE MAGNOLIA YARD. FOR THE PURPOSE OF THIS INVENTORY ALL DRILL COLLARS ARE CONTAINED IN THE SUMMARY.~~

~~SUBS:~~ 4—6 5/8" LIFT SUB

6—4 1/2" XH LIFT SUB

3—6 5/8" X 4 1/2" XH CROSS OVER SUB

2—KELLEY SAVER SUBS

1—GRAY INSIDE BOP

2—4 1/2" XH X 4 1/2" REG BIT SUB

2—6 5/8" BIT SUBS

1—LOWER KELLEY VALVE

BEST AVAILABLE DOCUMENT

HANDLING TOOLS

1-SET OF FOLEY TYPE B TONGS, INCLUDING ALL LATCH AND LUG JAWS.

1-VARCO MODEL 10 AIR-POWERED SAFETY SPINNING WRENCH, RIGHT AND LEFT ROTATION WITH ROLLERS FOR 4 1/2" OD DRILL PIPE.

1-SET, 106" ELEVATOR BAILS.

2-4 1/2" DRILL PIPE ELEVATORS 225 TON RATING.

2-4 1/2" DRILL PIPE SLIPS.

1-6" DRILL COLLAR SLIPS, WITH SAFETY CLAMPS.

1-8" DRILL COLLAR SLIPS, WITH SAETY CLAMPS.

1-OTECO MUD GUARD.

1-LOT ASSORTED BIT BREAKERS.

1-INGERSOLL RAND AIR HOIST, SERIAL NUMBER REM 77557. MODEL K-4U.

1-MATHEY WIRE LINE UNIT, SERIAL NUMBER NOT AVAILABLE, INCLUDING WIRE LINE, GUIDE, AND COUNTER.

BEST AVAILABLE DOCUMENT

FUEL TANK

SKIDDED CYLINDER TANK, 8' X 40' X 10', CAPACITY OF 9000 GALLONS OF DIESEL FUEL. ADJUSTABLE AND ELEVATED DAY TANK FOR GRAVITY FEED SYSTEM. 2 GEAR DRIVEN, 2" X 2" ROPER FUEL PUMPS, EACH SEPARATELY POWERED BY A 5 HP. EXPLOSION PROOF MOTOR, FRAME 184T, 1735 RPM. FUEL FILTERING IS ACCOMPLISHED THRU TWO FILTERING SYSTEMS, ONE EXPENDABLE ELEMENT, AND ONE NELSON/WINSLOW LARGE CAPACITY, HIGH VOLUME EXCHANGEABLE FILTER. ONE 5 COMPARTMENT LUBSTER, WITH CATCH BASIN. TOP GRATING WALKWAY, INLET AND INSPECTION PORTS, EXPLOSION PROOF LIGHTNING. A UNITIZED SYSTEM ON HEAVY DUTY OILFIELD SKID.

BEST AVAILABLE DOCUMENT

SUPPORT EQUIPMENT

ONE SELF CONTAINED, 4" X 5" HARRISBURG CENTRIFUGAL WATER PUMP. SERIAL NUMBER 17843, POWERED BY ONE GENERAL MOTORS 271 DIESEL ENGINE, SERIAL NUMBER 2A1C1330, ARRANGEMENT NUMBER 1023-5100, WITH INSTRUMENT CLUSTER, SAFETY SHUT DOWN, HYDRAULIC GOVERNOR, ELECTRIC STARTER, FUEL TANK, RADIATOR COOLED, UNITIZED ON OILFIELD SKID, WITH PUMP.

ONE SELF CONTAINED, GARDNER DENVER AIR COMPRESSOR, MODEL WBO-4015, RADIATOR COOLED, FAN BELT DRIVEN WATER PUMP FOR CIRCULATION, POWERED BY GENERAL MOTORS 371, DIESEL ENGINE. SERIAL NUMBER 3A96485, ARRANGEMENT NUMBER 1033, ALLISON POWER TAKE OFF, BELT GUARD, ELECTRIC STARTER, INDEPENDENT RADIATOR FOR ENGINE COOLING INSTRUMENT CLUSTER, HYDRAULIC GOVERNOR, WITH SAFETY SHUT DOWNS. ONE AIR RECEIVER TANK, 1980, NUMBER B208, WORKING PRESSURE OF 200 PSI. HYDRO SEAL PRESSURE RELIEF VALVE. LARGE CAPACITY FUEL TANK, UNITIZED ON HEAVY DUTY OILFIELD TYPE SKID.

ONE DRILL LINE STAND, CHAIN DRIVEN WIRE LINE SPOOL, POWERED BY FMC LINK BELT GEAR REDUCER, NUMBER 33-084495PA, UNITIZED WITH AND POWERED BY 15 HP. EXPLOSION PROOF MOTOR 230/460 VOLT AC, FRAME 254T, STARTER CONTROLS AND ELECTRIC POWER CABLE. MOUNTED WITH WIRE LINE ON SPOOL, TO HEAVY DUTY OILFIELD SKID 8' X 16', WITH MANUAL BRAKE.

ONE 30' X 4' X 8', HEAVY DUTY JUNK BOX, ON OILFIELD SKID WITH REINFORCED ENCLOSED SIDES.

ONE HEAVEY DUTY WORK BENCH, ASSORTNMENT OF USED PARTS.

RIG FLOOR BUG BLOWERS.

BEST AVAILABLE DOCUMENT

TOOL PUSHERS QUARTERS

STEEL CONSTRUCTED, TOTALLY ENCLOSED, ON OILFIELD SKID, APPROXIMATELY 10' X 40' X 9'. CONTAINING ONE MASTER BEDROOM, ONE BATH, WITH SHOWER, SINK, TOILET. KITCHEN AREA INCLUDING APPLIANCES, IE., STOVE, SINK, REFRIGERATOR, BREAKFAST BAR. COUCH, DESK, TWO FILE CABINETS, CLOSETS, ASSORTED USED RIG SUPPLIES, BUNK BEDS, DRILLERS DESK, ETC. CENTRAL HEAT AND AIR CONDITIONING. COVERED PORCH, AND STEEL GRATED ENTRANCE. LIGHTNING AND PLUMBING UNITIZED THROUGH SKID TO EXTERIOR.

BEST AVAILABLE DOCUMENT

REFUGIO DRILLING COMPANY
RIG #1

Drill Pipe, Collars and Heavy Weight

Smooth handbend

184 Joints of Range 2, Grade E, 16.60 L.B. 4 1/2" D.P. – $10/
126 Joints of Range 2, Grade G, 16.60 L.B. 4 1/2" D.P – $13/
126 Joints of Range 2, Grade E, 20.00 L.B. 4 1/2" D.P.
19 Joints of Range 2, Mixed Grade Junk
6 Joints of Range 2, Heavy Weight D.P.
16 Joints of Range 2, 6 1/2" Drill Collars
7 Joints of Range 2, 8" Drill Collars

Miscellaneous Equipment

One Triplex Mud Pump, Powered by Caterpillar Engine, Radiator, Skidded and with Spare Parts.

BEST AVAILABLE DOCUMENT

APPENDIX B

LETTER FROM ASIA-PACIFIC

BEST AVAILABLE DOCUMENT

Asia Pacific, Inc. 12345 Jones Road • Houston, Texas 77070 • (713) 469-5901 • Facsimile: (713) 469-2351

February 22, 1994

Facsimile Transmission

Mr. Mel Melconian
The Armenia Oil and Gas Development Fund
One Hovchild Plaza, 4000 Route 66
Tinton Falls, New Jersey 07753

SUBJECT: Armoil Rig/Refurbishment Strategy

Dear Mel:

As purchased from Rutherford Oil Co., the rig seemed to be in excellent condition from an appearance, design, and original equipment standpoint. However, neither maintenance records nor operating histories were available to aid in making a quantative evaluation of the rig's mechanical condition.

Subsequent detailed inspections revealed that the rig drilled a lot of footage, as evidenced by wear to drill pipe, rotary table, kelly spinner, etc. Obviously it operated under a forced maintenance, rather than a preventative maintenance, system. This is evidenced by the fact that many wear parts were beyond tolerance that would have been allowed by a preventative maintenance system; parts were broken (pump crossheads) because of lack of maintenance; and major components (clutch and bull gear) were left in the system even though they were broken and would have eventually caused more severe damage.

Armoil had several options as regarding rig refurbishment. The extreme ends of the spectrum were:

1) Have OEM manufacturers and service companies repair/replace all components to like-new specifications.

2) Do only what is necessary to get rig running; apply a cosmetic coat of paint and continue on a forced maintenance system.

The first option would be too expensive in the short run and the second option would be too expensive over time.

BEST AVAILABLE DOCUMENT

The option chosen was to bring the rig to like-new performance, rather than like-new specifications, and then to initiate a preventive maintenance program to maintain the desired level of performance. Under this philosophy, most parts with greater than half life remaining were left in place, and many replacement parts, while certified for the purpose intended, were not necessarily OEM parts.

Asia Pacific feels that this strategy was not only the most economical way to approach the job but that it resulted in a finished product that represents very good value for the money spent (as measured by replacement cost for a rig with the same capabilities).

Major inspections were conducted by:

National Oilwell - major drilling equipment

Stewart Stevenson - engines, generators, centrifugal pumps, oil compressors, winches, BOP control unit, BOP's, and other auxiliary equipment.

Eagle Oilfield Inspection Services, Inc. - derricks, substructures, other load bearing members, welding, drill pipe, drill collars, and drilling subs.

Precision Structural International, Inc. - steel specifications

Roberds-Johnson - traveling equipment (blocks, hook, swivel)

Asia Pacific personnel have had previous working experiences with all of the above companies.

Repair vendor selection was based on the following criteria:

a) outstanding reputation in the industry
b) demonstrated good performance and reliability
c) proper certification documented
d) previously experienced by personnel of Asia Pacific
e) competitive price
f) fixed bid price, or published price list

Listed below are most of our major vendors along with competitors they were evaluated against.

BEST AVAILABLE DOCUMENT

VENDOR	COMPETITOR
National Oilwell	No competition, OEM
Stewart & Stevenson	Mustang Power Systems, Caterpillar OEM. Stewart & Stevenson more versatile and not tied to OEM. Same cost per man hour.
Roberds-Johnson	Drilling Structures, IDM, Petro Equipment Exchange. Roberds-Johnson could handle entire job and not rely on 3rd party contractors, had much better facility, more experience, price competitive.
Eagle Inspection Services, Inc.	Tubescope, Baker. Eagle had much better prices.
Superior Oilfield Products, Inc.	Quality Oilfield Products. Superior more competitive on price, i.e, $36,000 for stack vs. $50,000. No other vendor could quote competitively on stack.
Waters International	National Supply, Charter Supply. Waters has more in-depth services and can offer and hand refurbished equipment rather than new.
Rig Star	Drilling Structures, IDM. Rig Star more competitively priced. Rig Star provided wide range of welding service for total $62,000. Drilling Structures bid $89,000 and IDM bid $52,930 for winterizing (wind walls) alone.
Glidden Paint Co.	No competitor. We felt Glidden system by far best for rig.

BEST AVAILABLE DOCUMENT

Each of these vendors were visited on one or more occasions by Mel Melconian and John Pasley. To our knowledge, with the exception of two occasions, they were favorably impressed. One occasion is with Rig Star where Mr. Melconian expressed concerns that the welding hours were excessive.

Another issue is the cost of radiator core replacement. This is simply a parts change-out procedure where we paid the going rate for parts. The price seems high, but these are large radiators. It was surprising to Asia Pacific that these cores were corroded internally. Apparently they had been operated without addition of corrosion inhibitor - a relatively minor expense.

Any operation will always be more efficient if done a second or third time. Welding was done while painting and other rig-up activities were conducted. Clearly each interfered with the other. However, from overall time effectiveness, that is, rather than extending operations for 5 or 6 weeks, these activities were conducted simultaneously with minimium interference always being considered in scheduling work.

Compared to competitive prices Rig Star's labor and material costs were low and the quality of their work, as evidenced by weld inspections, outstanding.

We make additional commentary about some major expense items -

> **Mast** - In order to support rated load, the bent and cracked members of the derrick had to be straightened. Forty three girders were replaced.
>
> **Mud Pump** - When it was discovered that the clutch between the torque converter and the pump had been wedged in the engaged position, essentially by-passing the clutching function, some insight into the broken main crankshaft gear (bull gear) was had.
>
> The $3,000 clutch should have been repaired - probably for below $1,000. One can only presume that this disregard for equipment damage occurred when the rig was on lease to another drilling contractor (Penwell).
>
> Asia Pacific's efforts resulted in a replacement crankshaft gear being machined in an independent shop for $8,000 rather than $20,000 as quoted from National Oilwell, the original equipment manufacturer.
>
> **Drawworks** - Approximately $150,000 was spent on the drawworks and associated drive compound. This is a rugged assembly of sprockets, gears, chains, bearings, seals and lubrication members. It is the means by which the drill or casing strings weighing up to 600,000 pounds are raised and lowered from the well bore. There is no back- up drawworks system, and most repair work if done

BEST AVAILABLE DOCUMENT

In the field is done with difficulty. For these reasons extensive repairs were carried out by National Oilwell, the original equipment manufacturer. National Oilwell can and will supply certified mechanics and often hard to get replacement parts should field repair be necessary. This can greatly reduce rig down time, and it was agreed that in this instance the approximate 20% cost premium represented an advised investment.

All work on drawworks was done in presence of one or more Asia Pacific supplied personnel known to be experienced mechanics. These men also functioned as helpers to National 's shop service mechanics, thereby somewhat reducing overall labor costs.

A summary of work to drawworks will be provided with final paperwork.

Prime movers and generators - The entire rig will be dependent upon several large caterpillar generators and diesel engines for power. Diesel supply will be of uncertain and varying quality. Care was taken to overhaul all diesel engines and generators by a certified mechanic. He was assisted by Asia Pacific supplied yard labor and supervised by Asia Pacific's Drilling Engineering Staff.

Following purchase and refurbishment, Armoil has a world class drilling rig which, properly maintained, will drill efficiently for many years. Unless you happen upon a rare bargain, we do not know of a comparable rig at an equal or lower price.

Regards,

ASIA PACIFIC, INC.

Donald Remson

DRR/jm

BEST AVAILABLE DOCUMENT

2