FE-1517-67
Dist. Cat. UC-90d

Fluor MPR-78-5

MASTER

COAL LIQUEFACTION PILOT PLANT

CRESAP, WEST VIRGINIA

MONTHLY TECHNICAL PROGRESS REPORT

MAY, 1978

Fluor Engineers and Constructors, Inc.

3333 Michelson Drive

Irvine, California 92730

Date Published - August, 1978

PREPARED FOR THE UNITED STATES

DEPARTMENT OF ENERGY

Under Contract No. EX-76-C-01-1517

REA

NOTIFICATION OF TRIPS

Name	Duration	Destination	Purpose
G. O. Fredrickson	5/15-5/26	Cresap, West Va.	DOE Meeting and LCDC Support
F. U. Leonard	5/15-5/19	Cresap, West Va.	DOE Meeting
D. G. Chapel	5/7-5/19	Cresap, West Va.	Unit 600 Startup
R. V. Cates	5/15-5/26	Cresap, West Va.	Unit 600 Startup

I. SUMMARY

During this month, two plant runs were accomplished: 008 and 009.

Run 008 went from May 2 through May 17, with the Hydrogenation Section (600) on line for 130 hours on solvent/Dox oil, 15 hours on stored extract, and 6 hours on fresh extract (integrated operation).

Run 009 involved Section 600 only, and ran from May 24 through June 1, with the section operating for 67 hours on solvent/Dox oil.

Summary data are presented in the Appendix, Table I.

II. MAJOR PROBLEMS AND SOLUTIONS

A. Section 600 Pluggages

Even though the first reactor, D-A601A, is being operated as a preheater without catalyst, catalyst carry-overs continue to occur in the second reactor, D-A601D.

Runs have been terminated by catalyst being carried over into the suction of the recycle pump, J-A608D. In the case of a light carry-over, the catalyst goes through the pump and accumulates in the FCV-6006 valve, which controls recycle rate, and in the FCV-6014 valve, which controls the forward flow from the reactor. Both valves normally operate very nearly fully closed.

1. FRC-6006 - Recycle Flow Control

The valve is located between the B-A602B recycle heater and the bottom inlet of the D-A601D reactor; it controls recycle flow rate via signal from a venturi meter, FE-6006, which is located in a vertical run upstream of the heater. FE-6006 is sized for a flow rate of 0-50 gpm. During start-up, flows in the order of 10 to 12 gpm are sufficient to ebullate the bed. The precision of the meter in this range is very low; significant changes in flow are difficult to detect. The substitution in this service of a venturi with a range of 0 to 20 gpm, formerly in attritor loop service, is under consideration.

2. FCV-6014 - Forward Flow Control

The valve is located on a line which branches from the recycle loop downstream of the J-A608D reactor recycle pump. The controller is reset by the reactor level controller, LRC-6003.

II. MAJOR PROBLEMS AND SOLUTIONS

A. Section 600 Pluggages (Continued)

It has generally been possible to establish temperatures and expansion of the catalyst bed with solvent and hydrogen. The introduction of Dox oil or extract results in a change in the properties (density, viscosity) of the recycle oil, requiring a change (generally a reduction) in the recycle rate to maintain normal bed expansion without carry-over. It is during these transition periods that carry-over occurs.

B. Section 600 - Instrument Reliability

Summarized below are significant instrument problems experienced during May in Section 600.

1. Nuclear Density Detectors

The most critical problem has been the reliability of Robertshaw nuclear density detector on D reactor, LI-6007A. Despite substantial repairs to the electronics, reliable operation was not achieved. The upper nuclear detector on A reactor, LI-6006A, was switched to the LI-6007A position, after the decision was made to operate D-A601A without catalyst. After relocation, this detector also failed. A thorough recheck of all cables for electrical leaks to ground and/or other discontinuities showed no problems. Consequently, detector LI-6006B was moved to LI-6007A location. Both detectors on D-A601D are presently working.

To improve reliability, both Robertshaw nuclear detectors on the D reactor will be replaced by Kay-Ray nuclear detectors during the next shutdown.

2. Recycle Flow Meters

Over-sized flow meters at FE-6005 and FE-6006 have hampered control of reactor recycle flow rates. The operation of the recycle heaters, B-A602A/B, and the control of catalyst bed expansion have been adversely affected by the inability of the operators to reproduce a 12 gpm flow rate on a 50 gpm meter. The venturis removed from the attritor loops, FE-6031/6032 will be re-ranged for 20 gpm and installed at FE-6005/6006 during the next outage.

3. Instrument Purge Pumps, J-A614A/B

Problems continue to be encountered with pumps J-A614A/B which provide liquid purges for the high-pressure instrumentation.

II. MAJOR PROBLEMS AND SOLUTIONS

B. Section 600 - Instrument Reliability

3. Instrument Purge Pumps, J-A614A/B (Continued)

Frequent checking of the purge rates by the operating technicians has been instituted in an attempt to correct the apparent random swings in flow rates. Pressure pulses emitted by the pumps are reflected in the instrument readouts by a wide oscillating band. To reduce this effect, the cams on the pumps were synchronized and purge rate settings were lowered. This action reduced the noise-to-signal ratio appreciably. Periods of low or no purge flow to the instruments result in frequent pluggages of the impulse lines and resulting erroneous readings. These problems are still being investigated. Active consideration is being given to replacing the purge system.

C. Hydrogen Makeup Compressors

JC-A900A

On April 27, 1978, the hydrogen valves in the fourth and fifth stages of JC-A900A were replaced with nitrogen valves for pressure testing Section 600 using methane gas. This was attempted on April 28 but was interrupted due to lifting of the third stage relief valve PSV-939, which was repaired.

A temporary cooling water system for JC-A900A was installed to keep interstage gas temperatures above the dew point. This consisted of a small tank, pump, and hose fittings. A PMR (plant modification request) was prepared to provide a permanent, temperature-controlled system to maintain the desired 140°F water temperature.

A spare set of hydrogen valves was installed in place of the fourth and fifth stage nitrogen valves in JC-A900A. The compressor was operated satisfactorily for several hours on methane gas on May 2. On May 3, the compressor was shut down because of high pressures between the second and third, and fourth and fifth stages. The second stage suction valve was found to be satisfactory, as was the fourth stage discharge valve. The second stage discharge valve leaked through; dirt and rust were found under the seat. The plate on the fifth stage suction valve was broken, and the plate on the fifth stage discharge valve was damaged. A new second stage valve was installed with a new plate for the fifth stage suction valve. All other parts were lapped and reinstalled. During this shutdown, the hydrogen transfer line was blown down through a filter; very little foreign material was collected. Some dirt particles were found in the suction strainer. The compressor suction knockout drum, F-A917, was opened and found to be clean. It was therefore

II. MAJOR PROBLEMS AND SOLUTIONS

C. Hydrogen Makeup Compressors

JC-A900A (Continued)

decided to operate the transfer line without further chemical cleaning, since most solids appeared to be generated within the compressor itself. On May 4 another shutdown occurred due to failure of the fifth stage relief valve, PSV-944. The fifth stage suction and discharge valves were inspected. The valve plate on the suction valve was found broken in two and the discharge valve spring was broken. Norwalk valves were installed at both positions.

The failed components were examined metallurgically. The valve spring and plate were identified as type 440 and 410 stainless steel with a Rockwell-C hardness of 51 and 40, respectively. To resolve this problem, new valve plates for the fourth and fifth stages were machined from Armco Nitronic 60, which is an austenitic stainless steel with twice the strength of common 18-8 grade stainless steel. Based on the favorable recommendations and experience of the P & M SRC plant at Ft. Lewis, Washington and the International Nickel Company, valve springs made of Inconel X-750 will be purchased. Further, Hoerbiger Corporation is incorporating an improved design into the fourth and fifth stage valves scheduled for delivery on May 25 and June 20, respectively. Hoerbiger's changes include heavier valve guards on the fourth stage and a lighter spring design in the fifth stage valves.

On May 5, failure of the fifth stage valves caused another shutdown of the JC-A900A machine. The fourth and fifth stage valves were disassembled. Only minor scoring was noted. The valve parts were lapped prior to reinstallation. Minor machine work was done on the fourth stage discharge valve seat.

Further problems were experienced on May 9: the pressure between the fourth and fifth stages became unstable. The valve guard and plate on the fourth stage discharge valve were broken. Only slight wear was noted on the fifth stage suction valve. The fourth stage suction and fifth stage discharge valves were in satisfactory condition. A rebuilt fourth stage discharge valve was installed. The new Nitronic 60 valve plates were installed on May 10 on both the fourth and fifth stage valves. The machine was run-in, but a shutdown was required after approximately twenty minutes. A piece broken from the web area of the fourth stage suction valve guard was lodged between the valve plate and the guard of the fourth stage discharge valve. The fifth stage suction valve leaked during this test. The damaged sections of the fourth stage valve guards were machined and reinstalled. The following day, the compressor was operated normally for approximately two hours to pressure test Section 600.

II. MAJOR PROBLEMS AND SOLUTIONS

C. Hydrogen Makeup Compressors

JC-A900A (Continued)

The compressor was shut down on May 17 because the pressure between the third and fourth stages was increasing over the previous 24 hours of operation. The fourth and fifth stage valves were inspected: the fourth stage discharge valve plate was cracked. A previously lapped set of valves was installed. In an effort to eliminate the frequent failure of the fourth and fifth stage valve plates, the valve plates were remachined around the outer edge to relieve any stress concentration. The valve bodies were also machined evenly to improve the seating of the valve plate.

From May 24 through May 29 the compressor was operated for approximately 125 hours without incident; however, a series of valve failures were experienced over the next three days. A discharging fourth stage relief valve caused the initial shutdown on May 29. Cracked plates were found in the fourth stage discharge and fifth stage suction valves. The spring was broken in the fifth stage discharge valve. Five hours following repairs, another shutdown occurred. In this case, a small piece of metal had lodged under and broke the fifth stage discharge valve plate. The other fourth and fifth stage valves were undamaged.

On May 31 the machine was shut down twice because of fluctuating pressures bewteen the third and fourth stages. During these two outages, no broken parts were found except that the fourth stage discharge plate and both fifth stage valve plates were bent. In order to reduce valve flutter and the impact loading imposed by the disc alternately contacting guards and seats, the lift on the fourth stage valves was reduced from 0.055 inches to 0.045 inches and from 0.071 inches to 0.051 inches on the fifth stage valves.

New valves were ordered from France Compressor Products (Voss Valves) in the continuing effort to improve compressor operability. These valves will contain Inconel X-750 springs and Inconel 600 plates.

JC-A900B

The JC-A900B compressor remains out of service for repairs to the third stage cylinder. Fabrication of the new Norwalk cylinder is in progress; delivery is scheduled for the week of June 5. The radius of the third stage piston was reduced by 0.010 inches to remove rough spots and to prevent scoring of the new cylinder. An X-ray examination of the new cylinder casting at Norwalk revealed some internal defects and an internal crack in the outer water jacket. These will be repaired, and if the cylinder passes hydrotesting, it

II. MAJOR PROBLEMS AND SOLUTIONS

C. Hydrogen Makeup Compressors

JC-A900B (Continued)

will be accpeted. A recommendation to purchase another cylinder casting free from internal defects is being evaluated.

D. Industrial Waste Water Control

The resin was again lost from the primary adsorber, C-A1230A; activated carbon was recharged in its place at 20 percent of the cost of new resin. The waste water from the equalization basin was diverted by temporary piping first through the older carbon charge in the secondary adsorber, L-A1230B, and then through the L-A1230A column to the final holding pond.

During the first three weeks in which the waste water was treated through the L-A1230B activated carbon; the effluent from the Fram unit has averaged 0.21 ppm phenol. The industrial outfall to the Ohio River from the final holding pond, F-A1234, averaged 0.55 ppm phenols for roughly the same time period; the maximum measured value was 1.9 ppm phenol. This confirms that bypassing of the chemical sewer system does occur.

An air flotation test unit has been leased from Pollution Control Engineering, Inc.; testing will begin in June. The "Tricellerator" will handle the total flow from the API separator to the Fram. Until this unit is operational, some irreversible fouling of the activated carbon in L-A1230B can be expected.

Laboratory studies to determine the phenol loading capacity of activated carbon following methanol regenerations and regenerations with caustic followed by neutralization with acid were started. Carbon regenerated once by either method will remove more phenol than the resin it replaces. The tests are continuing.

E. C-A601 Reactor Effluent Cooler Tube Damage

On May 17 the C-A601 reactor effluent cooler developed a leak, causing extract to be released onto equipment in the immediate vicinity. This resulted in shutdown of Section 600.

Inspection revealed that three of the 52 tubes in the exchanger had pulled out of the inlet and/or outlet headers. This condition resulted from stresses created when these tubes became plugged with extract, causing them to cool while the remaining tubes were still at operating temperature. Normally C-A601 sees only vapors. On this occasion D-A601A overflowed when the level control system

II. MAJOR PROBLEMS AND SOLUTIONS

E. C-A601 Reactor Effluent Cooler Tube Damage (Continued)

malfunctioned. Liquids containing extract were carried from the reactor into the cooler where the extract congealed and plugged the tubes, resulting in the differential thermal stresses which pulled the tubes out of the header boxes.

The exchanger was repaired by removing the damaged tubes and inserting tapered plugs into the header boxes to block off the tube holes. The plugs were then back-welded on the exterior of the header, and a 7500 psig hydrostatic test pressure was applied. All repair work was performed in accordance with the ASME Boiler and Pressure Vessel Code and was inspected by a National Board Authorized Inspector.

III. PROGRESS BY PLANT SECTION

A. Operations

Table I, Operating Summary - Hours of Operation, summarizes the operating history through Run 009.

B. Technical

Section 100 - Coal Preparation

Thirty-two tons of coal were ground and dried during thirteen hours of operation this month for an average throughput of 2.5 tph. As the current 100 ton inventory of coal in Section 100 has been processed, shipments of freshly mined coal from the Ireland preparation plant will resume. The typical operating data are summarized in the Appendix, Table II. Analytical data giving the ultimate, proximate, and sieve analysis of the coal may be found in Table IX.

Section 200 - Coal Extraction

Section 200 had been on line for thirteen hours when the failure of C-A601 brought about the shutdown of both the extraction and hydrotreating ends of the plant, terminating Run 008. The operating data for Section 200 are shown in the Appendix, Table III. A total of 7.2 tons of coal were fed to Section 200 during Run 008. A thirty weight percent slurry was heated to 740-750°F in B-A201 slurry preheater. The ratio of donor solvent to MAF coal was 0.4; the total solvent-to-MAF coal ratio in the extractor was 2.85. An extractor agitator speed of fifty rpm was maintained throughout the run. The depth of extraction, based upon only one sample, was 55 percent. Plugs in the sample station valves prevent sampling by the prescribed method; a modification of the sample station is planned for next month.

III. PROGRESS BY PLANT SECTION

B. Technical (Continued)

Section 300 - Solids Separation

During Run 008, system upsets were caused by Section 500 operating problems. The upsets only permitted the collection of limited steady-state data, shown in the Appendix, Table IV. The limited sampling, however, did indicate that the THF insolubles in the overflow to Section 500 were held at less than one wt %.

Several problems in the hot flush solvent system were corrected. A minimum flow through, the C-A308 solvent cooler was established to reduce low-flow shutdowns of the B-A301 solvent heater, and operating procedures were modified to avoid system overheating.

Section 500 - Solvent Recovery

At the start of Run 008, Section 500 was used to prepare a dilute extract feed for Section 600. This required transferring stored extract from the F-A1109B product oil tank to the F-A1107A slop tank where it was diluted to 15 percent extract. The operating conditions are summarized in the Appendix, Table V. During start-up the feed was topped in the flash still to a five percent boiling point of 475°F to avoid flashing problems in Section 600. Subsequently, the F-A1107A material was reconcentrated from 15 percent to 25 percent before feeding to Section 600. As the extraction end of the plant was brought on line, a dual feed of solvent from Section 300 at nine gpm was blended with 32 percent extract at 1.5 gpm from F-A1109B in the feed to the B-A501 flash still heater. The E-A501 flash still was operated at 12.1 psia while maintaining 485°F in the overhead vapors.

Severe cavitation in the J-A502A/B flash still bottoms pump occurred while preparing to feed forward from Section 300, through Section 500, to Section 600. This caused Section 300 to become overfilled and required the temporary interruption of coal feed to Section 200. The problem was traced to excessive light ends in the solvent which vaporized at pump suction conditions. A jumper line was installed between Section 600 and Section 500 to bring Dox oil into the flash still loop. The addition of the higher-boiling material lowered the vapor pressure and stopped the cavitation. In another incident, the extract concentration to Section 500 was inadvertently allowed to reach levels near 70 percent instead of the targeted 30 percent to 35 percent concentration. This resulted from the absence of fractions boiling between the start-up solvent and extract, or between 600°F and 800°F. As a result, the extract concentration in the flash still bottoms doubled from 35 percent to 70 percent following a modest 10°F increase in operating temperature to 490°F. The system pressure was maintained at 12.1 psia throughout this period.

III. PROGRESS BY PLANT SECTION

B. Technical

Section 500 - Solvent Recovery (Continued)

After clearing Section 300 of extract following the shutdown of Section 600, Section 500 was used to consolidate and clean up tank farm inventories. All of the available recycle solvent was stripped of the excessive light ends at 490°F and 12.1 psia and placed in the F-A1101B recycle solvent tank. The heavy feed and product stocks were combined in the F-A1109B product oil tank to provide a uniform feed for the next hydrotreating run.

Section 600 - Hydrogenation

Section 600 was started up four times during May; the operating data are summarized in the Appendix, Table VI. In the early part of Run 008, two start-up attempts were thwarted (on May 3 and on May 4, 1978) by JC-A900A makeup hydrogen compressor valve failures and catalyst carry-over from the D-A601A/D reactors. The aggregate operating period in a start-up mode of operation with solvent feed was 45 hours.

On May 6, 1978 Run 008 was resumed with 20 percent rerun extract feed. The run extended for 70 hours until the closure seal failed on the F-A605 entrainment separator, causing an immediate shutdown. Extract feed was processed for fifteen hours. Modest desulfurization was observed at the mild hydrotreating temperatures in the reactors. The section was operated at a system pressure of RP-200 (reference pressure minus 200) with hydrogen partial pressure of RH+180 (reference hydrogen pressure plus 180). The premature shutdown precluded reaching the targeted operating temperatures.

Run 008 was resumed on May 15 with the assistance of the C-E Lummus start-up engineer. Dox oil was successfully utilized as a transition feedstock between the recycle solvent heating phase of the start-up and the introduction of extract feed. Extract, at concentrations approaching 70 percent in the feed, was hydrotreated until 0200 hours, May 17. Recycle oil was heated to 750-800°F, in the presence of hydrogen gas in both reactor loops without evidence of coking. At that time, a level instability in D-A601A resulted in extract being carried overhead from the reactor into the C-A601 reactor effluent cooler. The subsequent tube failures are discussed in Section II of this report. The operating period was too short to reach steady-state conditions, but at D-A601A operating temperatures of 650°F and above, reaction exotherms of 15°F to 40°F were observed. At operating temperatures in D-A601D of 700°F, an exotherm of 8°F to 20°F was observed. These are indicative of desulfurization and hydrocracking reactions.

III. PROGRESS BY PLANT SECTION

B. Technical

Section 600 - Hydrogenation (Continued)

Prior to start of Run 009, the catalyst was removed from D-A601A. The reactor was operated as a feed preheater and stabilizer. Based on the results of Run 008, hydrogen injection was added to both reactor recycle heater inlets to increase tube velocity and suppress heater coking tendency. Run 009 was 46 hours into start-up and a 50/50 mixture of solvent and Dox oil feed was being processed when catalyst and liquid level instrument failures on D-A601D necessitated a temporary slumping of the catalyst bed until the instruments were repaired. During the attempts to reexpand the bed, catalyst was carried over into the B-A602B heater recirculation loop plugging flow control valve FCV-6006 and associated lines.

Section 700 - Fractionation

Warm closed-loop circulation was maintained in Section 700 until the start-up of Section 600. Solvent was then received and transferred to the tank farm as required. During extract hydrogenation, the product oil was accumulated in the B-A704 vacuum column reboiler at 2.4 psia and 340°F prior to being transferred to the F-A1109A product oil tank. Control of the B-A704 vacuum was obtained through the use of a globe valve which replaced the ball valve and FO-719 flow orifice on the spill back line to the jets. The C-A701A/B air coolers were bypassed when a blockage occurred. A small amount of middle distillate was removed from the E-A703 fractionator, but no blending was attempted. Operating data are summarized in the Appendix, Table VII.

Operation during Run 009 was similar to Run 008. The section was used to transfer product fuel oil to the tank farm and to recover donor solvent. Again, no middle distillate was blended, although a small quantity was produced.

Following the flush out of Section 600 with solvent, the vacuum system was used to transfer the Section 500 bottoms to F-A1109B during the tank inventory consolidation operation. The fractionation section was also used to route all the light ends from the recycle solvent to the naphtha tanks.

Section 800 - Carbonization

The carbonizer was operated from May 17 to May 19 using a new grid plate and new feed nozzles. Grid temperatures all read within 100°F of each other; 825°F was the highest reading. The new grid eliminated the previous problem of hot spots caused by poor air distribution.

III. PROGRESS BY PLANT SECTION

B. Technical

Section 800 - Carbonization (Continued)

A few char agglomerates which were about one-quarter inch in diameter and which could be crushed between the fingers, were formed in the fluidized bed. These agglomerates have only been noticed when the lower feed nozzle was used.

The lower feed nozzle, which had been coated by means of chemical vapor deposition with titanium carbide, was used for about three hours before partial plugging occurred. For the remainder of operation, the upper feed nozzle, which had been plated with Gullite chrome alloy, was used. The upper nozzle was inspected after shutdown; no wear was seen.

Typical carbonizer operating data for this period are shown in the Appendix, Table VIII.

The strainer on the char quench pump, J-A803, plugged with char fines as soon as it was put into service. Several cures for this problem are being studied, including modifying the strainer, using a pump capable of handling larger solids, and improving the char flow from the carbonizer.

Section 1200 - Environmentals

The NPDES discharge permit effluent limits were exceeded twice during May. The data are shown in the Appendix, Tables X and XI. The high oil and grease content of the industrial waste water effluent was the result of the runoff bypassing the chemical sewers.

C. Maintenance and Engineering

Section 200 - Coal Extraction

Repairs to the top and bottom seals on L-B205 agitator were completed. Coal fines were found in the seal flush piping to the extractor bottom seal, which required cleaning of all associated piping, including supply filter, L-B214B. An existing drain connection was removed from the bottom seal gland, and the seal flush supply was upgraded to provide injection into the seal cavity at two points 180° apart.

After coal was introduced to Section 200, a minor external leak developed on the top L-B205 seal. The seal oil made contact with the vessel strip heaters and caused a small fire. This situation was corrected by installing a drain line to divert seal oil leakage away from the vessel wall.

III. PROGRESS BY PLANT SECTION

C. Maintenance and Engineering (Continued)

Section 300 - Solids Separation

Several problems were corrected in the hot flush solvent system. It was necessary to replace C-A308 solvent cooler, motor, fan bearings, and rotary air coupling. The motor was damaged by overloading caused by a high blade pitch angle. The pitch angle was reset to the specified six degrees. C-A308 is presently operating satisfactorily.

The secondary anti-solvent heater, B-B306, failed due to a short caused by the relative movement between the electric heating elements and the process piping. The heater element was pulled back into place and secured to the piping by silver soldering. It is presently in service.

Section 500 - Solvent Recovery

Venturis FE-502/507 were pulled due to erratic readings. Partial pluggage of the process taps with solidified extract material was found. Heat tracing was reinstalled and better insulation was provided to prevent recurrence.

Section 600 - Hydrogenation

During Run 008, a leak developed at the head of F-A605 entrainment separator. The seal was repaired on F-A605, but, while pressure-testing the vessel, another leak developed on E-A601 absorber top head seal. After trying both TFE and Viton O-ring seals on F-A605 and E-A601, a combination of TFE rings and RTV silicone sealant was found to make an effective seal.

On May 4 JC-A601B recycle compressor was shut down for internal inspection due to inadequate discharge capacity. Valve inspection revealed only slight wear on the seats. The valve plates were all lapped. Inspection of the piston, piston rings and cylinder showed them to be in satisfactory condition. On May 15 the head was machined and a new gasket was installed, which corrected the head gasket leak. Then, on May 31 the compressor was shut down due to low discharge pressure. Discharge valves were found plugged with a grease-like material and had to be cleaned. This is believed to be associated with liquid carry-over from the reactor. Satisfactory operation has not yet been obtained. Work is presently in progress to lap the valves, clean suction screen and piping and make packing adjustments to correct the problem of too low a discharge volume.

III. PROGRESS BY PLANT SECTION

C. Maintenance and Engineering

Section 600 - Hydrogenation (Continued)

JC-A601A compressor was shut down on May 17 due to a low discharge pressure. Discharge valves were inspected and found to be flooded with water. The suction screen was clogged and had collapsed. A PMR was submitted recommending installation of new de-mister pads on F-A602, F-A605 and E-A601, to reduce liquid carry-over to the suction of the J-A601A/B compressors. Also, to reduce liquid carry-over, pulsation dampeners are being blown down.

Prior to start of Run 008, replacement of plungers, stroke adjusters and packing boxes was effected on J-A608BX/DX lube oil pumps. In addition, discharge piping was replaced with flexible stainless steel tubing and new pulsation dampeners were installed. This was done to remove piping strain from the pumps, provide improved venting, and reduce surges in discharge pressure (PMR 143).

Liquid material from D-A601A reactor caused pluggage in C-A601 effuent cooler and subsequent leakage of tubes in the cooler. Three exchanger tubes required removal. Tapered plugs were installed in these tubes and seal welded. The heat exchanger was hydrotested and inspected by a National Board Inspector in accordance with ASME code.

IV. TEST PROGRAMS

A. Test 1100 - Pumps

1. Mechanical Seals

In Table XII in the Appendix are summarized the seal failures encountered during May, their causes, and the remedial action taken.

Many of the single seals are flushed with a side stream from the pump discharge. Before entering the seal, the flush flow is directed through a liquid cyclone to improve its clarity. The underflow from these cyclones normally returns to the pump suction. Inspection revealed many of the underflow lines to be plugged. The pluggage probably resulted from a combination of conditions, including uninsulated lines, complex underflow geometrics, and occasional operation with higher than normal extract and/or solids concentrations. A PMR was initiated to modify the seal flush piping to improve the underflow pattern.

IV. TEST PROGRAMS

A. Test 1100 - Pumps

1. Mechanical Seals (Continued)

Efforts continue to improve the reliability of mechanical seals in hot slurry services. High temperatures and vibration effects have led to the complete deterioration of the Durafite packing and cooking of the Viton O-rings. The Dupont Kalpz O-rings, which have chemical resistance similar to Teflon and are suitable for use in the 500°F to 550°F temperature range, are on order to be evaluated in the J-A313 pump service.

2. Pump Linings

J-A313B Primary Feed Pump	The Stellite No. 6 coating on the stuffing box side of the impeller was worn around the peripheral region. There was some chipping on the impeller eye and erosion around the wear ring. Thickness measurements of the coating on the impeller face show a gradual decrease of the coating thickness ranging from 0.011 inches to no coating on the outer periphery. The coating was considerably eroded at a point on the head which is adjacent to the cutwater area. The PTI-54 coating on the case was completely removed; a few remnants remained near the vortex breaker area. The discharge end of the volute race was severely eroded and jagged. After being photographed, the pump was reassembled with a new Tribaloy 800 coated case and head and an existing Stellite No. 6 impeller.
J-A803B Char Slurry Pump	The pump was coated with Tribaloy 800. Significant erosion was noted around the wear ring of the impeller eye giving a grooved appearance. Slight chipping was observed on the impeller edge and head internals with resultant corrosion. The case also showed signs of wear, and the volute had some corroded, rust colored areas. There was some chipping on the wear ring of the case apparently during assembly/disassembly of the pump. The pump internals were photographed.

IV. TEST PROGRAMS

A. Test 1100 - Pumps

2. Pump Linings (Continued)

Several PMR's are being implemented to hard coat pumps for needed wear resistance:

a. The case of the J-A804B pump was weld repaired. After weld repairs are made to the case, the pump will be sent out for a 0.005 inch electroless nickel coating (PMR 133).

b. The head and case of the J-A313B primary feed pump were sent out for welding and the machining of an antiswirl ring on the head to prevent erosion near the cutwater area. Plans include to coat this pump with electroless nickel (PMR 26).

c. Polishing of the new 2 x 13 SVCN Pacific Pump internals, for reduction of surface roughness, is scheduled for the week of June 12. The pump will then be hard coated with "Nye-Carb" (PMR 139).

3. Other Problems

The J-A803B char slurry pump was inspected due to loss in the discharge pressure. The impeller, seal flush tubing, and cyclone separator was found plugged with char. They were cleaned prior to reinstallation.

The J-A701B stabilizer charge pump was inspected during the seal failure. The stainless steel head was eroded considerably on the edge periphery, and there was some wear of the case in the volute and cutwater area.

Two pumps suffered from freeze damage. A new bearing housing was used in the J-A502 flash still bottoms pump while the housing from the J-A706B fractionator bottoms pump was repaired using the Devcon sealing compound.

B. Test 1300 - Fired Heaters

The B-A201 slurry preheater heat transfer report (preliminary) for Runs 004 and 005 was issued. Similar conclusions were drawn as for Run 003. The inside heat transfer coefficient for the solvent dropped sharply after coal was processed. The Run 007 report will include heat transfer characterizations of the preheater with both solvent and slurry in the system.

IV. TEST PROGRAMS (Continued)

C. Test 1700 - Control Valves

Installation of the XLV-1781-A test letdown valve in Section 600 is complete. The valve will be put into service after instrument checkout. It should be noted that this is not a shutoff valve; as installed, it will pass approximately 1.7 gpm in the closed position.

A purchase order was issued to fabricate a tungsten carbide trim for the LCV-201-1/2 letdown valves in the 200 area for mid-June delivery. After clearing the lines around XLV-1751 test valve, its performance was satisfactory.

Inspection of the FCV-6014 flow control valve showed that lubrication was required around the packing area. No other major problems were found. Performance of this valve will be closely monitored to determine the reasons for its erratic behavior.

D. Test 1900 - Erosion-Corrosion

A memo was issued wherein methods were outlined for determining erosion rates of coated pumps in slurry services using the Minitector 150 thickness gauge. Preliminary measurements on the new J-A313B Tribaloy 800 coated pump showed that the readings were reproducible and remained fairly constant within each geometry.

V. LABORATORY

Various blends of the plus 470°F cut from donor solvent and Dox oil were studied for changes in API gravity and atmospheric D-86 distillation curves. The data revealed that the API gravity will provide a timely control analysis for determining the Dox oil percentage when using a mixture of these materials as a start-up feed for Section 600. A report summarizing the data was issued.

Phenol loading tests were conducted in the laboratory on two activated carbon columns. Industrial waste water obtained was spiked with approximately 250 ppm total phenols using phenol, cresol, and xylenol in proportions similar to those found in the plant effluent. Flows were maintained at four to five bed volumes per hour to simulate plant conditions. After each twelve bed volumes (1000 m), a sample of the effluent was analyzed for phenol. After complete phenol breakthrough, the columns were regenerated, one with methanol and the other with caustic, following which the loading tests were repeated. The results indicate that while methanol regeneration is a viable option, caustic regeneration appears to be less effective. Both carbon columns were subsequently regenerated with methanol; the loading tests are being repeated.

V. LABORATORY (Continued)

A program to maintain an active reference file of the contents of each storage vessel was started. The data, which are shown in the Appendix, Table XIII will be updated at the conclusion of each operating period.

Two D-86 Duramatic Distillation Units, retained from Cresap I, were returned to the vendor for service. The vendor advised that both were beyond economical repair. They will be returned to Liquefied Coal for appropriate disposition. The Brookfield Viscometer, which had not been used during the present Cresap operation, was found to be beyond repair by its vendor. A new Brookfield Viscometer was purchased. The Antek Nitrogen Analyzer was returned from the vendor after service; a new detector was installed.

VI. SAFETY AND HEALTH

There were two disabling injuries in May. An operating technician sprained her ankle. Nine lost-time days resulted in May; she is expected to return to work by June 22. A temporary craftsman (boilermaker) was struck in the shin while attempting to remove the internals from a vessel; this injury resulted in two lost-time days.

Two OSHA recordable injuries without lost time occurred. An operating technician received a sprained foot from striking it against a pipe. Another operating technician received second degree steam burns from an improperly connected hose coupling.

An Employee/Management Safety Committee met as scheduled to review the monthly plant inspection report. Safety meetings were monitored on all shifts. A fire and safety equipment inspection was completed on May 24. Fire brigade training was held on May 17 and 24; the use of equipment and new hose installations were emphasized.

Company physicals are being scheduled throughout the calendar year to redistribute the attendant administrative work load. Twelve skin examinations remain to be completed this quarter.

The NORIMAC meeting was attended on May 31, 1978.

VII. DEPARTMENTS

Administrative

The Office and Professional Employees International Unit, Local No. 33, AFL-CIO has successfully petitioned the National Labor Relations Board to hold a certification election on June 23. At that time, fifteen clerical employees will have the opportunity to vote whether or not they wish to be represented by that union.

VII. DEPARTMENTS (Continued)

Personnel

Recruiting efforts continue; several engineering and laboratory openings exist. Three acceptable candidates for the five Analyst openings were found among those interviewed. Four engineers were interviewed; three seem excellent prospects.

Operations

Major efforts during this period again have centered on recruiting and hiring of operating technicians, job bidding, interviews, the selection for promotions and transfer within the Department, and realignment of Department supervision. As of May month-end, the Operations Department is at total authorized strength, counting two operating technician candidates, who have been hired pending physical examination.

A major realignment of Area II shift supervision occurred early in this period, when the B Shift Supervisor was transferred into the Technical Department as a Shift Engineer. To fill this vacancy, the C Shift Supervisor was moved to B Shift, the D Shift Supervisor was moved to C Shift, and Ken Wycherly was promoted from A Operating Technician on D Shift to Shift Supervisor on D Shift.

Technical

Shift Engineering assignments were realigned to accommodate changes being made in Operating supervision. D. A. Wilmot was made an Area I Shift Supervisor and L. E. Watkins, Jr. was transferred to the Shift Engineering position on C Shift.

Engineering activities, in addition to the preparation of run plans and reports, were directed towards closer monitoring of start-up activities. In particular, the development and maintenance of control charts to facilitate timely shift-to-shift, and interdepartmental communications was stressed.

In the Data Processing group, the DEC Maintenance Engineer repaired faulty tape unit. Resurfaced system discs were received from Scopus Corporation and are ready for use. Several Material Balance program changes were implemented after discussion with SCD programmers. Eighty-four spare process data points were activated to enable the accumulation of test program process information. An updated version of the Lab Files Index, denoting all modifications to the original file, was issued. A program to display or print the data points in user-desired sequences was written.

Page(s) Missing

from

Original Document

APPENDIX

TABLES

TABLE I

OPERATING SUMMARY - HOURS OF OPERATION

Run No.	001	002	003	004	005	006	007	008	009
Date	10/11/77	10/17/77	11/15-21/77	12/16-18/77	1/25-2/7/78	3/19-20/78	3/20-24/78	5/2-17/78	5/24-6/1/78
Extraction (200)*					(1)	(2)	(1)	(1)	(2)
@ Slurry Concentrations of									
10%	1	20							
15%			144	55	73				
20%							64	13	
Temperature	<700	640	700±	700±	700±		700±	700±	
Rate, tpd	5	5	5±	5±	6±		11	15	
Hydrogenation (600)									
Solvent/Dox oil						33	11	130	67
Stored Extract								15	
Fresh Extract							40	6	

* (1) Intermittent
(2) Section 600 only

TABLE II
OPERATING CONDITIONS
SECTION 100 - COAL PREPARATION

Run Number	008	008
Date	5/04/78	5/18/78
Time	2100-2400	1730-0130
Duration, Hours	3	9
Coal Feed Rate, tpd	56	65
Ground Coal, tons	7	25
Temperatures, F	400	
Heater Outlet	280	
Hot Gas to Mill		
Spinner Separator		
Cyclone	220	
Baghouse	110	
Pressures, Inches Water Column		
Roller Mill Inlet	4	
Cyclone Differential	1	
Fan Discharge	11	
Air Heater		
Mill Differential	1	
Spinner Separator Speed, rpm		

TABLE III
OPERATING CONDITIONS
SECTION 200 - EXTRACTION*

Run Number		008	008	008
Date, 1978		5/16	5/16	5/17
Time of Day		1500	2200	0200
Duration, Hours		6	4.5	2
Coal Feed Rate, tpd		14.4	16.2	16.5
Coal Concentration, wt %		25	25	25
Solvent Feed Rate, gpm		5.6	6.3	6.5
Extraction Depth, wt % MAF Coal		56		
Flow Rates, scfh or gpm				
Slurry to Preheater	FR-223	8	9	9
Spray Solvent to Extractor	FR-255	0.8	0.8	0.5
Slurry from Extractor	FR-256	10.0	8.0	11.0
Overhead Condensate	FR-202	0.7		0.3
Nitrogen Purge	FI-203			
Overhead Gas	FR-201	1500	1500	1500
<u>B-A201 Slurry Preheater</u>				
Process Temperatures, F				
Inlet	XTI-1311-1	97	96	78
First Section, 260 ft	XTI-1311-20	406	410	387
Second Section, 520 ft	XTI-1311-21	479	482	482
Effluent, 785 ft	TRC-206	750	740	740
Tube Skin Temperatures, F				
61 ft (1)	XTI-1311-3	925	831	773
148 ft	XTI-1311-5	802	766	841
235 ft	XTI-1311-7	644	607	587
323 ft	XTI-1311-9	715	718	666
410 ft	XTI-1311-11	798	773	723
497 ft	XTI-1311-13	829	819	876
588 ft	XTI-1311-15	818	797	770
694 ft	XTI-1311-17	844	825	809
737 ft	XTI-1311-18	841	825	807
785 ft	XTI-1311-19	836	820	803
Skin-to-Process Temperature Differentials, F				
First Section, 260 ft		238	197	200
Second Section, 520 ft		350	337	394
Third Section, 785 ft		138	118	143
Heat Flux, Btu/hr-ft^2				
First pass, 0 ft to 260 ft		7330	8110	7730
Second pass, 260 ft to 520 ft		1850	2050	2720
Third pass, 520 ft to 785 ft		6870	7860	7350
Stack Temperature, F	XTI-1311-28	1312	1295	1296

(continued next page)

Table III (Cont'd)

Run Number		008	008	008
Date		5/16	5/16	5/17
Time		1500	2200	0200
Duration, Hours		6	4.5	2
Coal Feed Rate, tpd		14.4	16.2	16.5
Pressures, psig (2)				
Inlet		520	540	535
1st Pass Drop, 0 to 260 ft	XPDR-1311-1	27	30	34
2nd Pass Drop, 260 to 520 ft	XPDR-1311-2	28	30	36
3rd Pass Drop, 520 to 785 ft	XPDR-1311-3	34	36	40
Outlet		430	440	440
<u>D-A201 Extractor</u>				
Agitator Speed, rpm	XSI-1800	55	54	54
Process Temperatures, F, Top to Bottom				
Vapor Outlet	TR-1-12	635	600	610
Stage 12	TR-1-11	700	660	665
Stage 11	TR-1-10	760	735	745
Stage 10, feed point	TR-1-9			
Stage 8	TR-1-8	760	745	750
Stage 7	TR-1-7	755	740	740
Stage 5	TR-1-6	750	740	740
Stage 4	TR-1-5	745	735	740
Stage 3	TR-1-4	730	735	735
Stage 2	TR-1-3	725	720	725
Stage 1	TR-1-2	725	720	710
Slurry outlet	TR-1-24	700	700	690
<u>Residence Time, Minutes</u>				
Above 700F				
Above 725F				
Above 750F				
Above 775F				
<u>Other Temperatures, F</u>				
C-A205 Precondenser in	TR-1-17	625	600	575
C-A201 Extractor Condenser out	TI-1-12	74	60	60
LCV-201 Letdown Valve in	TIC-202	700	680	690

*Note Numbers in parentheses refer to the following:

1. Distance from preheater inlet.
2. Differential pressures are measured independently.

TABLE IV
OPERATING CONDITIONS*
SECTION 300 - SOLIDS SEPARATION

Run number		008	008	008
Date, 1978		5/16	5/17	5/19
Time of day (1)		avg.	avg.	avg.
Flow rates, gpm				
F-B331, primary settler feed	FR-325	10.8	17.1	15.5
F-B331, primary settler overflow	FRC-327	7.5	8.9	7.5
F-B331, primary settler underflow	FRC-326	5.1	5.1	5.1
Wash solvent to secondary settler	FRC-328	0.7	1.8	0
F-B330 secondary settler overflow	FRC-331	2.7	2.3	2.5
F-B330 secondary settler underflow	FRC-321	2.5	2.8	2.4
Temperatures, F				
F-B332 primary feed tank	TI-1-16	614	640	619
F-A301 feed tank	TI-1-20	556	586	555
F-B331 primary settler	TI-1-46-9 (2)			
F-B330 secondary settler	TI-1-36	495	507	508
F-B308 overflow surge tank	TI-1-38	510	539	500
Pressures, psig				
F-B332 primary feed tank	PRC-306	125	120	115
F-A301 feed tank	PRC-305	150	147	150
F-B331 primary settler	PRC-330	155	155	150
F-B330 secondary settler	PRC-322			
F-B308 overflow surge tank	PRC-316	130	129	130
Solids concentration, wt %				
F-B331 primary settler feed			3.5	
F-B331 primary settler overflow			0.7	0.5
F-B331 primary settler underflow			7.3	
F-B330 secondary settler overflow			1.1	
F-B330 secondary settler underflow		39.2	19.0	14.9
Characteristic data				
Primary overflow/underflow ratio		1.5	1.7	1.3
Secondary overflow/underflow ratio		1.1	0.8	
Primary upflow velocity, in/min		0.27	0.32	
Secondary upflow velocity, in/min		0.34	0.30	
Primary solids flux, lb/hr-ft^2			5.1	
Secondary solids flux, lb/hr-ft^2			21.1	

*Note Numbers in parentheses refer to these comments:

1. Coal was fed to Section 200 from 1215 hrs May 16 to 1805 hrs May 16, and from 1930 hrs May 16 to 0200 hrs May 17, 1978.

2. Primary settler temperature indicator was inaccurate; it read 230F to 240F.

TABLE V
OPERATING CONDITIONS*
SECTION 500 - SOLVENT RECOVERY

Run number		008	008	008	008
Date, 1978		5/8	5/9	5/16	5/17
Time of day		Avg.	Avg.	Avg	0800
Feed source		(1)	(1)	(1)	(1)
Flow rates, gpm					
Feed from Section 300 (1)	FRC-501	4.0	4.0	4.0	4.0
Flash still recirculation	FRC-502	40	40	40	39
Reflux	FRC-504	3.8	3.3	3.7	4.0
Overhead product	FR-506	0	0	0	0
Recycle solvent product	FR-509	7.5	7.5	6.3	8
Extract product	FRC-507	2.0	2.3	0.3	2
Pond water return	FRC-503	0	0	0	0
Temperatures, F					
B-A501 heater inlet	TI-3-16	451	452	479	469
B-A501 heater outlet	TRC-501	523	532	554	438
E-A501 flash vapor	TI-3-7	480	482	493	481
E-A501 flash liquid	TI-5C-15	463	462	489	473
E-A502 column overhead vapor	TI-3-9	403	398	390	394
E-A502 column tray 14	TI-3-10	427	424	434	423
E-A502 column tray 2	TI-3-11	461	459	461	459
B-A502 reboiler vapor	TR-4-9	438	437	444	449
B-A502 reboiler liquid	TI-3-15	463	466	453	447
Pressures					
B-A501 heater outlet, psig	PRC-501		35	35	35
E-A502 column overhead, psia	PRC-503		11.1		11.1
E-A502 column differential, in WC	PDR-508		5		6
Extract concentration, wt % (2)		17	34	62(3)	

*Note: Numbers in parentheses refer to the comments below:

1. Re-run extract, nominally 20%, from F-A1109.
2. Actually the residue from distilling at 240C, 1 mm Hg.
3. Two samples: 55% and 69% extract.

TABLE VI

OPERATING CONDITIONS
SECTION 600 - EXTRACT HYDROGENATION*

Run number		008	008	008	008
Date, 1978		5/8	5/9	5/10	5/17
Time of day		2200	0400	1830	0230
Feed Material		Nominal 20% Rerun Extract from Tankage		DOX Oil	Dox Oil/-Extract
Liquid flow rates, gpm					
Feed to D-A601A hydrogenation reactor	FR-6037	2.5	2.5	2.5	2.9
D-A601A reactor recirculation	FRC-6005	13.2	11.5	7.5	10.0
Feed to D-A601D hydrogenation reactor	FRC-6013				
D-A601D reactor recirculation	FRC-6006		1.5	10.4	
D-A601D reactor product	FRC-6014	1.5		1.0	
Hydroresidue product	FRC-712				
Lean oil circulation	FRC-6010		10.0		
Gas flow rates, scfh					
Makeup hydrogen	FRC-6036	6,300	6,000	3,000	7,500
Total treat gas	FR-6041	38,500	38,400	39,000	42,000
D-A601A reactor treat gas	FRC-6001	19,500	19,400	20,000	22,000
D-A601D reactor treat gas	FRC-6002	19,000	19,000	19,000	20,000
Vapors to C-A601 reactor effluent cooler	XFR-1204			28,800	
Vapors to C-A602 reactor effluent condenser	XFR-1211				
Vapors to D-A601 absorber	FR-6042	19,500		17,600	17,200
Loop purge gas	FR-6022			2,150	4,900
Sections 600 and 700 combined off-gas	FR-6052	460	490	35	
Process temperatures, F (3)					
D-A601A reactor inlet	TI-5A-20	687	690	584	480
D-A601A reactor, 5 ft above grid	TR-3-18	745	727	635	575
D-A601A reactor, 17 ft above grid	TR-3-17	745	730	635	600
D-A601A reactor vapor space	TR-3-13	728	697	618	

TABLE VI (Continued)

Run number	008	008	008	008
Date, 1978	5/8	5/9	5/10	5/17
Time of day	2200	0400	1830	0230
Feed Material				
Characteristic data (3) (Continued)				
Treat gas hydrogen content, vol %				
Loop purge gas hydrogen content vol %				
Hydrogen consumption, scf/bbl				
Space velocity, lb extract/lb catalyst per hr				

*Notes: Numbers in parentheses refer to these comments

1. Includes approximately 4,000 scfh added to the process inlet of B-A602A reactor recycle heater.
2. Includes approximately 4,000 scfh added to the process inlet of B-A602B reactor recycle heater.
3. Proprietary information is shown as follows: for pressures, read "1.00 RP as 100% of reference pressure."
"1.00 RH as 100% of reference hydrogen partial pressure."
for space velocities, read "1.05 SV as 105% of the reference space velocity."

TABLE VII
OPERATING CONDITIONS*
SECTION 700 - PRODUCT FRACTIONATION

Run number		008	008	008	008
Date, 1978		5/8	5/9	5/16	5/17
Time of day		Avg.	Avg.	Avg.	Avg.
Liquid flow rates, gpm					
B-A704 vacuum column feed from F-A612	FRC-712	1.6	2.4	1.4	1.7
B-A704 vacuum column bottoms	FR-718	1.3	2.2	3.8	3.0
B-A704 vacuum column overheads	FR-717				
E-A702 stabilizer feed	FRC-701				
E-A703 fractionator feed	FRC-703				
Donor solvent make	FR-708	1.2	0.5	2.0	1.6
Cutter stock make	FRC-705	0.5	0.5	0.4	0.4
Naphtha make	FR-709	0.1	0.1	0.0	0.05
Fuel oil product	FR-720	0.3	2.4	3.7	3.2
Gas flow rates, scfh					
F-A710 economizer off gas	FR-710				
E-A702 stabilizer off gas	FR-702				
Temperatures, F					
B-A704 vacuum column vapor	TI-3-5	390	424		
B-A704 vacuum column liquid	TR-4-15				
E-A702 stabilizer overhead	TR-4-10				
E-A702 stabilizer feed	TI-3-17	482	370		
E-A702 stabilizer tray 9	TI-3-18	476	366		
B-A702 stabilizer bottoms	TR-4-14				
B-A702 stabilizer reboiler vapor	TR-4-16	366	333	357	338
B-A702 stabilizer reboiler liquid	TIC-702	540	535		330
E-A703 fractionator overhead	TR-4-13				
E-A703 fractionator tray 24	TI-3-23				
E-A703 fractionator tray 20	TRC-703	220	245		240
E-A703 fractionator tray 18	TI-3-24	220	240		240
E-A703 fractionator tray 12	TI-3-25	210	432		432
B-A703 fractionator reboiler vapor	TIC-704	490	350		
Pressures					
B-A704 vacuum column overhead, psia	PR-707	12.4	6.0		11.0
F-A710 economizer overhead, psig	PRC-705	20	20		23
E-A702 stabilizer overhead, psig	PRC-702	73	75	77	76
E-A703 fractionator overhead, psig	PRC-703	1.5	1.0		1.7
Characteristic data					
ASTM D-86 5% boiling point, F					
Naphtha					
Cutter stock					
Donor solvent					
Fuel oil		8.9			8.9
API gravity, degrees		14			< 14
Naphtha					
Cutter stock					
Donor solvent					
Fuel oil					
Fuel oil analyses					
Pour point, F					
Viscosity, centipoise at 122F					
Solids content, wt %					
Ash content, wt %					
Sulfur content, wt %					

*Note: Numbers in parentheses refer to these comments:

1. Blank spaces indicate data unavailable.

TABLE VIII
OPERATING CONDITIONS*
SECTION 800 - CARBONIZATION

Run number		008	008
Date, 1978		5/17	5/18
Time of day		Avg.*	Avg.**
Gas flow rates, scfh			
Recycle gas	FRC-809	1,000	0
Combustion air	FRC-801	8,500	3,500
Fluidizing gas	FR-830	14,500	13,000
Liquid flow rates, gpm			
Feed rate	FRC-323	2.5	1.8
Solvent/ tar make rate	FR-833	4.7	3.2
Sour water make rate	FR-843	0	0
Char/water slurry to pond	FRC-838	31	34
Temperatures, F			
D-A801 carbonizer top	TI-1-26	610	600
D-A801 carbonizer upper bed	TR-2-8	760	750
D-A801 carbonizer lower bed	TR-1-23	760	750
D-A801 carbonizer grid plate	TR-1-21	760	760
D-A801 carbonizer upper lift leg	TI-1-48-20	760	750
D-A801 carbonizer lower lift leg	TI-1-48-19	760	750
Fluidizing gas	TR-2-7	150	150
E-A801 spray tower	TI-1-30	330	320
L-A806 2nd stage liq./gas contactor	TI-48-3	290	280
D-A801 carbonizer pressure, psig		3.8	3.3
Characteristic data (1)			
Average bed particle diameter, in		0.002 (28 mesh)	
Minus 325 mesh content, wt %		2.2	
Feed concentration, wt % solids		19	
Tar char slurry, wt % solids		14	
Water char slurry wt % solids		10	

* Started feed to Section 800 at 0615 hrs.
** Stopped feed to Section 800 at 0800 hrs, stopped internal circulation at 1130 hrs.

Note: Numbers in parentheses refer to these comments:

1. Typical for this run.

TABLE IX
ANALYTICAL DATA
SECTIONS 100 AND 800 - COAL AND CHAR ANALYSES*

Material	Coal	Char
Run number	008	008
Date	12/4/77	
Time	Typical	Typical
Serial number	3982	Average (3)
Moisture, wt %, as received	1.1	3.4
Proximate, wt %, dry	42.2	27.8
Volatile matter	48.7	59.4
Fixed carbon	9.1	12.8
Ash		
Ultimate Analysis, wt %, dry		
Carbon	73.8	56.2
Hydrogen	5.1	1.5
Nitrogen	1.8	1.4
Oxygen (difference)	5.6	21.7
Sulfur	4.5	6.4
Ash	9.1	12.8
Sieve analysis, cummulative wt % retained on Tyler mesh		
8	0.0 (1)	24.2 (2)
14	0.0	39.9
28	0.1	53.4
48	3.6	68.7
100	20.3	84.0
200	54.3	94.3
325	77.5	97.8
-325 mesh, wt %	22.5	2.2

* Note: Numbers in parentheses refer to the comments below:

1. Average sieve analysis of SN 10,819, 10,824, and 10,826, taken on 7/4/78.

2. Sample 9339, 5/17/78.

3. Averaged ultimate and proximate analyses of char from earlier runs.

TABLE X

INDUSTRIAL WASTE WATER EFFLUENT

MONITORING DATA FOR MONTH OF May

PARAMETER	VALUE REPORTED	DATE STANDARD	5/7	5/14	5/21	5/28	5/31
FLOW (gal/day)	Daily Flow	Monitor					
TSS (mg/l)	Measurement	60 mg/l		5.2	22.6	13.5	
	Av.. to Date	30 mg/l		5.2	13.9	13.8	13.8
TDS (mg/l)	Measurement	Monitor			5050		
	Av. to Date				5050	5050	5050
COD (mg/l)	Measurement	Monitor	245		305		
	Av. to Date						
OIL & GREASE (mg/l)	Measurement	15 mg/l	0.0	6.0	40	33	0.0
	Av. to Date	10 mg/l	0.0	3.9	15.33	19.8	15.8
PHENOL (mg/l)	Measurement	1.0 mg/l	0.30	0.52	1.03	0.36	
	Av. to Date	0.05 mg/l	0.30	0.42	0.61	0.55	0.55
NH_3 (mg/l)	Measurement	30 mg/l	0.04	0.24	12.1	0.8	1.0
	Av. to Date	15 mg/l	0.04	0.14	4.13	3.30	3.12
CYANIDE (mg/l)	Measurement	0.2 mg/l	0.0000	0.0010	0.0000	0.0000	0.0000
	Av. to Date	Monitor	0.0000	0.0005	0.0003	0.0003	0.0002
PHOSPHATES (mg/l)	Measurement	Monitor					
	Av. to Date						
pH	Measurement	6.0 $\leq$ pH 9.0	7.1	7.5	7.8	7.4	6.8
TOT. RES. Cl (mg/l)	Measurement	Monitor					
	Av. to Date						
ARSENIC (mg/l)	Measurement	Monitor	0.0	0.0		0.0	
	Av. to Date						
LEAD (mg/l)	Measurement	Monitor					
	Av. to Date						
CADMIUM (mg/l)	Measurement	Monitor					
	Av. to Date						
MERCURY (mg/l)	Measurement	Monitor	0.0001	0.00008			
	Av. to Date						
TOTAL IRON (mg/l)	Measurement	Monitor	1.02				
	Av. to Date						
TOTAL COPPER (mg/l)	Measurement	Monitor	0.03				
	Av. to Date						
ALUMINUM (mg/l)	Measurement	Monitor	0.19	.036		0.001	
	Av. to Date						
HEX. CHROMIUM (mg/l)	Measurement	0.05 mg/l	.042	.036		0.001	
	Av. to Date						
ZINC (mg/l)	Measurement	Monitor	0.17				
	Av. to Date						

TABLE XI

SANITARY WASTE WATER EFFLUENT

PARAMETER	VALUE REPORTED	DATE STANDARD	5/7	5/14	5/21	5/28	5/31
			MONITORING DATE FOR MONTH OF May				
TSS (mg/l)	Measurement	45 mg/l					
	Av. to Date	30 mg/l					
BOD_5 (mg/l)	Measurement	45 mg/l					
	Av. to Date	30 mg/l					
Fecal Coliform (No./100 ml)	Measurement	400					
	Av. to Date	200	44,000*		9.0		
pH	Measurement	$6.0 \leq$ pH 8.6	7.905	7.862	7.807	7.799	0.0
Tot. Resid Cl	Measurement	> 0.5 mg/l	37.585	22.456	13.177	18.251	0.0

*Sample taken when there was no effluent flow. The chlorine feed was halted to clean the chlorination chamber. The sampling laboratory was instructed by telephone to resample and not to draw samples unless water was flowing over the effluent weir.

TABLE XII

SEAL FAILURES, THEIR CAUSES, AND REMEDIAL ACTION TAKEN

Pump No.	Designation	Type of Seal	Cause of Failure	Remedial Action Taken
J-A313B	Primary Feed	Durametallic double	Seal springs jammed with coal fines.	Seal faces relapped and new Viton O-rings and seal assembly used.
J-A501	Flash Still Feed	Sealol single	*Solids packed in seal bellows leading to second seal faces.	New seal assembly installed.
J-A502B	Flash Still Bottoms	Sealol single	Extract accumulations led to worn seal sleeve and faces.	Seal faces relapped and new sleeve installed.
J-A506	Extract Solvent Recovery	John Crane single	Slightly worn seal faces.	New seal assembly installed.
J-A611	Flush Oil	John Crane single	Chipped carbon faces.	New seal assembly installed.
J-A701B	Stabilizer Charge	Durametallic single	*Char fines and shaft sleeve wear in Teflon wedge area.	New seal assembly installed.
J-A701C	Stabilizer Charge	John Crane single	One of the O-rings was out of position.	New seal assembly installed.
J-A704A	Vacuum Column Bottoms	Sealol single	*Char fines in the seal bellows assembly.	New seal assembly installed.
J-A704B	Vacuum Column Bottoms	Sealol single	*Char fines on the seal bellows assembly.	Rotary seal face relapped and used along with new seal parts.
J-A708A	Fractionator Bottoms	Sealol single	*Char fine in the seal bellows assembly.	Seal faces relapped and used along with new seal parts.
J-A901A	Amine	John Crane single	Worn seal faces.	New seal assembly installed.
J-A1010B	Deaerator Feed	John Crane single	Worn seal faces.	New seal assembly installed.
J-A1109A	Tank Transfer	Durametallic single	Coal fines in seal cavity leading to worn seal faces.	Seal assembly cleaned and new seal faces and wedge ring used.

*Pluggage of the cyclone drain was noted in these pump services.

TABLE XIII

STORAGE TANK ANALYSES SUMMARY

Material	← Recycle Solvent →		← Donor Solvent →			← Product Naphtha →		Product Fuel Oil	Stored Extract	DOX Oil	Sure-Sol 180
Tank Number	F-A1101A	F-A1101B	F-A1106A	F-A1106B	F-A1106C	F-A1102A	F-A1102B	F-A1109A	F-A1109B	F-A614	As Received
API Gravity, corrected to 60F	9.8	11.3	12.1	13.4	13.1	40.9	12.6	7.4	8.3	-1.3	10.6
Atmospheric Distillation (ASTM D-86), vol % Versus Temperature, F								(4)	(4)	(4)	
Initial boiling point	443	449	425	432	412	248	405	453	451	394	450
5	459	462	445	436	440	450	420	471	479	518	467
10	464	465	460	452	450	461	440	480	484	713	470
30	474	474	470	467	463	469	465	490	498	728	478
50	482	482	475	473	475	482	477	502	514	758	486
70	494	493	481	482	488	491	489	521	540		494
90	516	517	503	504	550	531	512	695			520
95											544
End point	550	535	537	531	561	545	524	715	611	794	548
Recovery, vol %	98.5	97.0	98.0	98.0	93.0	99.0	98.0	94.5	90.6	78.0	99.0
Composition, wt %											
Moisture	0.1	0.2	0.0	0.0	0.2			0.1	0.1		
Solvent (1)	99.2	99.2	98.2		95.6			80.8	77.1	40.7	
+825F (2)	0.7	0.3	1.3		3.9			19.0	22.7	59.3	
THFI (3)	0.04	0.56	0.51		0.55			0.23	0.25	0.04	
Elemental Analyses, wt %											
Carbon	91.1	91.0	91.1	91.1	91.0	90.7	91.4		89.7	89.1	92.1
Hydrogen	8.0	7.9	8.1	8.1	8.9	8.3	8.2		8.4	7.3	7.9
Nitrogen	0.9	1.1	0.8	0.9	0.0	1.0	0.4		1.5	1.8	0.0
Sulfur	0.05	0.06	0.00	0.00	0.02	0.00	0.00	0.25	0.46	1.77 (5)	0.00
Sample Date, 1978	5/17	5/25	4/27	4/27	5/23, 5/25	11/15/77	11/15/77	5/22	5/23	5/26	
Serial Numbers	9359	9604	8771	8722	9542, 9605	3409	3403	9522	9552	9614	

Notes:

1. Material which distilled at 240C, 1mm Hg.
2. Residue from note 1, less THF insolubles.
3. Material insoluble in tetrahydrofuran (THF).
4. Atmospheric distillation of the solvent recovered from vacuum distillation at 240C, 1mm Gh.
5. DOX oil ash contains 0.2 wt % copper.

TABLE XIV
OPERATING CHRONOLOGY
Area I

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 1

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
4/24	1500					Received sump pump (rental), for clean out of the API & Equil'n. Basin to the Extract Pond.
	1600			"A" boiler down for inspection/repairs to provide design capacity.		
4/25	0800			F-A1024 Solomatic malfunctioned. Spare installed from warehouse.		Worked on API basin clean out to Extract Pond.
4/26	1600	4-Hour leak test on the top extractor seal. No leakage at 550 psi supply pressure, 0 psi in the extractor.				
	2000					API clean out complete. Begin Equil'n. Basin cleanout.
4/27	1400			"A" boiler opened at handholes - 1/16" of sludge scale. Sampled to lab.		
4/28	1000	Coal solids found in bottom & top seal purges on the extractor. Cleaned lines, changed filters. Opened, cleaned & closed LB-210 strainers.				
	1500					Clean out of the Equil'n. Basin completed. Rental pump returned to Savage.
	1645			JC-A1030B has bad rings. Down for repair.		

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
4/28	1900		Raising from 30% to 50% of design.			
	2330	Tried grinding coal - bridged at F-A103.				
4/29	0330	Cleaned out F-A103.				
	0535				Started feed F-A1109B → 500 → F-A1107A. Total of 2400 gallons, of 32% extract.	
	1000	Ran test of bottom extractor seal emerg. supply with D. Winder. Supply valve stroke adjusted. PSL to provide backup purge set at ~430 psi.		JC-A1030B repairs started.	Added 2800 gallons of hot flush to F-A1107A to obtain 14.9% extract.	
	1730			Brine discharge line from salt tank plugged with fines Cleared temporarily.		ME OH thermosyphon re-boiler appears plugged.
4/30	0355	Started filling D-A201 via J-A202B.				
	0745					Added fire water to maintain level in FHP.
	0830	PRC-202 recalibrated.				
	1130					Flushed distillation column & reboiler of oils & resin. Still no success in ME OH recovery.
	1630					Shut off fire water.

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
4/30	1930					Adsorber columns back on line after API & Equil'n. Basins filled.
5/1	0050		J-A901B shut down. By-passed DB-904 & restarted pump.			
	0125		J-A901B shut down. J-A901A placed in service (leaking)			
	0515		DB-904 back on line.			
	0830		J-A901B repaired - loose wire - back on line.			
	0900	Started LB-205 with D. Winder.				
	0930	Process lines plugged at LCV-201's with coal solids. Hot flush to LCV-201, sample station, No. 11, & G-A201's also found plugged with coal solids.				
	1300				Sampled F-A1101A & B, F-A1107A, & F-A1109B for sulfur.	
	1615		Lost process methane due to Hope Gas low supply press. (90 psi), B-A901 burners were firing.			
	1211		Process methane back into reformer, returned to 50% rates.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/2	0445		Process methane off when failed steam trap on F-A1107A failed & steam press. dropped, tripping Maxon.			
	0450		Maxon reset.			
	0800	J-A204 cavitated - emerg. seal supply activated but quickly emptied. No apparent damage to bottom seal.				
	1300					Repairs to 2^o adsorber bottom screens completed. 35 ft^3 of carbon was floated into the tank.
	1455		Began feeding methane to 900C.			
	1620		Began feeding hydrogen to 900C.			
	1800	Pluggage in hot flush to LCV-201's cleared & cut lines rewelded.				
	2130					2^o adsorber on line, normal service, after water sealing.
	2345			"A" boiler back on line in normal service.		

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 1

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/3	1000					Plugged thermosyphon reboiler.
	1800	All hot flushes cleared of pluggage & rewelded.				
	1816		Fed H_2 to 900C.			L-A1230A primary adsorber level measured loss of ~ 20 cu.ft. = 40% of original charge of XAD-7 resin charged on 4/14/78.
	2017	Electrical power outage which lasted ~40 sec. No apparent damage to the bottom extractor seal.				
5/4	0100	Ran each J-202 pump for 2 hours each - all O.K. All hot flushes purged.				
	0230				Blended F-A1107A to ~10% extract for feed to 600 via 500.	
	0445		Blended methane with product hydrogen.			
	0800	Redrilled the capillary tube to the bottom extractor seal purge. Calibrated bottom seal emergency purge PSL.	Valved off methane from H_2 product line.			Thermosyphon reboiler hydroblasted clean & reinstalled.
	1200	Agitator started at 50-60 RPM. VS-224/226 cycle O.K.		Vacuuming sludge from softening salt tank.		

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/4	1445		Methane blended with product H_2.			
	1700	Started heating B-A201 preheater.				
	2100	Began grinding coal. Ran good until roller mill feed valve, L-A103A, sheared key at 0115 hours.				
5/5	0830		Raised H_2 rates from 60% $\longrightarrow$ 80% of design.			J-A1232, the Equilization Basin pump inoperable. Down for bearing repairs.
	1730	Pulled XCV-1751 to unplug inlet.				
	2200	XPDT-1311 preheater coil pressure drop X-mitter legs plugged with coal solids. Blown clear.				
5/6	1403	Cleared XCV-1751 of pluggage.				
	1803		Regenerated process methane carbon adsorbers.			
5/7	0800	Holding hot circulation at 8 gpm, 400 psi, 600°F, at 50-60 RPM.				
	2230	Sample point No. 11 installed per J. Sharpe.				

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/8	0300			B-A1010B boiler stack temp. rose above 500°F. Evidence of fire side sooting. Will hydroblast clean during next maint. shut down.		
	1310				Started feeding 500 from F-A1109B.	
5/9	0500	Raised preheater outlet to 700°F to prepare for .				
	1000	Cooled to 600°F - problems in 600.				
	1023				Stopped feed to 500 from F-A1109B. Flushed lines.	
	1030	L-A202 plugged with solvent wet coal.				
	1700	Pluggage cleared.			Started working off F-A1107B → 500 → F-A110[illegible].	
5/10	1400		J-A901A lean MEA pump repairs completed.			
	2015		Methane sent to 900C.			
	2045		H_2 valved to 900C, methane blocked off.			
5/11	0030				Stopped working off F-A1101B at heel of ~ 3000 gal. 500 Plugged with heavies.	
	0515	Heated up to 700°F for extraction.				
	0645				Seal oil usage increased due to J-A502 seal leakage.	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/11	0700				Heavy usage of seal oil traced to J-A502A/B pump seals.	
	0800					The L-A1230 A primary resin level was measured Resin loss has continued Carbon will be charged in the primary adsorber next week.
5/12	1345	Roller mill feed valve, L-A103A, repaired.				
	1400					The dirty methanol basin was recirculated through a filter bag to remove lost resin. Only ~ 5 gallons of resin were recovered.

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 1

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/13 and 5/14		On hot internal recirculation at 600°F, 8 gpm, at 50 RPM, & 400 psig in the extractor.	H_2 rates at 80%.			
5/16	1135	Integrated forward solvent flow with 300.				
	1215	Started coal forward for extraction.				
	1805	Coal feed to extraction stopped due to problems in 500.				
	1936	Resumed coal feed for extraction.				
5/17	0130	Coal feed for extraction stopped due to C-A601 rupture.				
	1220	De-integrated with Sec. 300 Maintaining internal recirculation. Top extractor seal continues to lose about 6 gallons/24 hrs. to outside weephole. Bottom extractor seal is virtually drip tight.				
	1730	Ground coal for 3 hours to top up F-A104.				
5/18	0900	Cool down & depressurize for cold standby.	Reduce from 80% design rate to 30% design rates, minimum standby.		F-A1107A/B combined into A to rework through 500.	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/19	1400					Pulled top head of primary adsorber L-A1230A to change screens & charge carbon.
	1500					The adsorber feed pump, J-A1232, bearings failed. Also, the J-A1124 F.H.P. skimmer pump failed.
	1700					The skimmer pump was repaired.
5/20					Working off F-A1107A.	
5/21	1015				Began working off F-A1109A through 500.	
5/22	0300	FE-273/256 pulled for inspection to improve information on process slurry flow rates to pre-heater & to Sect. 300.				
	0930			Shut down B-A1010A boiler for maintenance of firing controls.		
	1800				Completed transfer of material to 500 for re-work.	
5/23	0700			N_2 transfer pump failed while being operated by Airco to fill over storage tank.		
	0800	FE-223/256 reinstalled ready to operate.				

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 3

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/23	1000			Charged silica gel dessicant in instrument air dryers. Installed new thermowell on L-A1030B dryer. Downstream filter elements replaced.		
	1400			Found football sized chunks of moist soot in burner tile of B-A1010A. Sampled for analyses & boiler cleaned of chunks.		
	2345			When L-A1030B instrument air dryer came on line, a 30 psi occurred across the dryer. Normal is 2-5 psi.		
5/24	0900			Leak checking the inert gas, instrument air, & nitrogen distribution systems. Repairing leaks as possible. Some leaks can only be repaired by shutting down the system on plant turnaround.		
	2100		H_2 valved into 900C for use as required.			
5/25	1000				Loaded 50 cubic feet of activated carbon into the primary adsorber.	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 100/200 COAL EXTRACTION	SECTION 900 HYDROGEN GENERATION	SECTION 1000 UTILITIES	SECTION 1100 OFFSITES	SECTION 1200 ENVIRONMENTALS
5/25	1105			Airco tube trailer tied into high pressure N_2 header to service the preheater & extractor.		
	1500					Industrial waste water flowing from the equilization basin, to the secondary (partially depleted) adsorber, then through the newly charged primary adsorber, & then to the final holding pond.
5/26				Removed silica gel from the L-A1030B instrument air dryer & repaired the heater assembly.		

TABLE XIV
OPERATING CHRONOLOGY

Area II

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 1

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
4/24	0001	Hot Circulation.	Warm Circulation.		Columns on circulation		Down.
	0900				Shut down B-A704 for work on LSL-713.		
	1000	Hot flush system at 300°F. C-A308 over-loading.					
	1200					Char bed fluidized.	
	1230					Test complete. System shutdown.	
	1800			System flooded with fire water.		Blind in water line to F-A802.	
	2000					Using J-A803A to assist in API cleanout.	
4/25	0200			Using J-A608C/D to flush lines from Rx's. Pumps & meters all O.K			
	0800			Maint. on 608BX/DX pumps.			
	1000						Test ran JC-A900A for Engr.
	1015						Test complete, Comp. down.
	1600		Brought system down to isolate AE-501.				
	1830					Test fired B-A801 - all O.K.	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
4/26	0200			Drain cleared on suction of J-A608D.			
	0400			Gas feed line checked & blown clear.			
	0900						Welding drain pots on Hydrogen line.
	1800		Re-established circ. on flash still.				
	1900	Heat balance test on C-A308.					
	2000			Reactor heads installed on both Rx's.			
	2015					Finished transfer of API material;lines flushed.	
	2200	Test complete on C-A308.					
4/27	0200				B-A704 circulating.		
	0730			Pressure checking at 600 psig with N_2.			
	1745						Start JC-A900A for Maint.
							Shut down JC-A900A. Test complete.
	1800			Lube oil feed rate set at 10 ccs/min. to J-A608C/D pumps.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
4/27	1830			All purge lines from J-A614A are checked & O.K.			
	2210						Start JC-A900A.
	2220						Shut down JC-A900A. RV-939 lifting.
4/28	0010						Removed RV-939.
	0745			Pressured to 600 with N_2.			
	0900	Reset conditions on C-A308 controls per specs.					
	0930			Start filling A Rx. with solvent.			RV-939 re-installed.
	1000						Checked 4th Stage suction. O.K.
	1030			Circ. A Rx. with J-A608C.			Test run JC-A910A.
	1040						Shut down JC-A910A.
	1125			Filling D Rx.			
	1245			Circ. D Rx. with J-A608D.			
	1300	Reset flow alarm & shut down switches on hot flush system.		Lit pilot on B-A602A.	LSL-713 test O.K.		

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
4/28	1400	Heating hot flush system to 500°F.					Installed new 4th Stage dischg. valve.
	1600						Test ran JC-A900A.
	1615						Shut down JC-A900A. Test Complete.
	1700			Heating Rx's. for dehydration.			
	1800			Lit pilot on B-A602B.			
4/29	0100		Transfer from F-A1109B through 500 to F-A1107A.				
	0420			System pressured to RP.-1800 psig.			Ran JC-A900A on N_2 to pressure system to 700 psi.
	0430						Shut down JC-A900A.
	0650			Started cooldown on Rx's. Dehydration complete.			
	1000		Transfer complete from F-A1109B to F-A1107A.				
	1400			Rx's. drained.			
	1600		Warm circulation.				
	1630			Started catalyst charge to D Rx.			
	1830			Charge complete.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
4/29	2000			Start catalyst charge to A Rx.			
	2100			Charge complete.			
	2200			Start I.G. purge of both Rx's.			
4/30	0100			Drained B-A602A.			
	0300			Drained B-A602B.			
	0400						Started JC-A900A on N_2.
	0500						Stopped N_2, started Methane.
	0700			Press. test at RP -500 psig.			
	0900			Press. test at RP +500 psig.			
	1100			Start depressure to RP -500 psig.			
	1130			Start JC-A601B.			
	1200			Start gas flow to Rx's			
5/1	0001			Heating to dehydrate catalyst.			
	0730	Controller malfunction on C-A308.					
	1500	Hot flush system back up to temp.					

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/1	1800			Catalyst drying comp.			JC-A900A shutdown to change N_2 valves 4th & 5th stages to Hydg.
	1900		Start heat up to provide topped solvent to 600 for start up.				
	2100		Feeding topped solvent to F-A608A.				
	2200	Reduced temp. in hot flush system to 500°F, problems with C-A308.					
	2230						Test ran JC-A900A. O.K.
5/2	0030						Started JC-A900A on Methane.
	0100			Pressuring system to RP psig.			
	0220						JC-A900A comp. stopped. Not needed.
	0240			Start feed A Rx.			
	0245		Feeding topped solv. to F-A608.				
	0345			Stop feed A Rx.			
	0350			Start feed D Rx.2 gpm.			
	0415			Filled heater loop.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/2	0425			Stopped feed D Rx.			
	0430			Filled heater loop.			
				Pilots on A & B heater lit.			
	0500		System secured, hldg. hot standby.				
	0515			Increased gas flow to 9 roots.			
	0845			Recycle flow established A Rx.			
	0930			Fired A heater.			
	1130			Recycle flow established D Rx.			
	1140			Fired B-A602B heater.			
	1300	Started cooling hot flush system for shut down.					
	1310			Getting entrainment carryover from Rx's.			
	1400	Start feed from F-A308 to 500.	Feeding from F-A308 to makeup in 600.				
		Hot flush system secured.					
	1430	Stopped feed to 500.	Stopped feeding from 308.				

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 4/24/78 - 5/3/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/2	1500	Restart hot flush system.					Start JC-A900A on Methane.
	1630						Changed to H_2 feed.
	1930			Absorber loop on line.			
5/3	0000						RV-934, 1st stage dischg. lifting. (65% H_2)
	0001	Temp. 520°F on hot flush.	Hot standby ready to feed 600.	A Rx.			
	0015						Shutdown.
	0125			B-A602A heater tripped on low flow - let down to replace Rd on htr. (RV O.K.)(PSE-6044)			
	0200						Test ran for M.W.check O.K. to run.
	0345						4th Stage dischg. RV-943.
	0350						Start adding Methane to cut purity.
	0440			Shutdown 602-B. Shutting down.			
	0530						Shutdown.
	1400					Checked flow controls, pumps on char quench system.	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/3	0000						RV-934 first stage discharge lifting (65% H_2).
	0015						Shut down JC-A900A.
	0125			B-A602A heater tripped on low flow - let down to replace PSE-6044 on heater.			
	0200						Test ran for M.W. Check - O.K. to run.
	0345						Fourth stage dischg. lifting (RV-943).
	0350						Start adding Methane to cut purity.
	0440			Shutdown 602B.			
	0500			A Rx. blocked in. RP -500 psig.			
	0530			D Rx blocked in. RP -1500 psig			Shutdown JC-A900A.
	0600			Absorber loop blocked.			
	0900			Drained F-A608A to 500 Area. Refilled with topped solvent, 5% BP, 485°F.			
	1000		Start up to produce topped solvent for 600.				
	1030					Checked flow controls & pumps on char quench system.	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 2

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/3/	1300		Went to hot stand-by status.				
	1400	C-A308 locked at 6° pitch = max. cooling.					
	1700						Checked FV-917, demist pad O.K.
	180'						Start JC-A900A third & fourth stage press. the same. Stop compressor.
	1900						Start A Compressor on H_2.
	2020	Power outage - restart all pumps & agitators O.K.	Power outage - re-start pumps.	Power outage - re-start pumps.			Power outage - re-start A Compressor.
5/4	0200		Start process topped solvent for 600.				
	0330			Problem with DP-6019.			
	0445						Started bleeding in CH_4 to feed line.
	0530			Stop JC-A601B. Start JC-A601A.			
	0800						Back to pure H_2 feed.
	1500						Bleed in CH_4.
	1630			Started JC-A601B.			
	1645			Bonnet on check C-34 leaking, tightened, O.K.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/4	1800			Bad switch on J-A608C.			
	1900			Flow gas started to both Rx's.			
	1930			Stop JC-A601B. Start JC-A601A.			
	2130			Lost makeup H_2 to gas loop.			
	2145						Fifth stage valve not holding.
5/5	0100			Restart system. D loop plugged.			Restart JC-A900A.
	0615			Lost makeup H_2.			Fourth stage dischg. relief.
	0800			Shut down.			
	0915			Shut down recycle gas			
	1000			Try to unplug drains.			
	1300			System purged with N_2.			JC-A900A test run for Maint. O.K.
	1315						Shut down JC-A901.
	1400			Isolate D Rx.			
	1430			FCV-6006 pulled, lines plugged.			
	1700			Pressuring A Rx. for 1 Rx. operation.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/5	2000						Start JC-A900A Methane & H_2 feed.
	2030			Gas feed to A Rx. for heatup.			
	2230			Clearing lines on D loop. Plugged with catalyst.			
	2245						Reduce pressure, first stage lifting.
	2330						Fourth stage dischg. is high - not lifting.
5/6	0130				Line up to integrate with 600.		
	0700			Gas to D Rx. for heat-up.			
	1010	Start feed from 308 to 500.	Start feed from 300.				
	1330	Stop feed to 500. Lost level in F-A308.	Stop feed from 300.				
	1415			Start recycle on A Rx.			
	1420				Took material from F-A612 (level high).		
	1430						Went on all H_2 feed to Compressor.
	1445			Fill 602B heater loop.			
	1530			Intermittent firing of B-A602A for heatup.		Cleanup area.	
	1700			Stable at 630°F			

PAGE NO.: 5

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/7	0645						JC-A900A down for maint. Fourth stage dischg. broken plate.
	1130						JC-A900A on line.
	1145			Start repressure. A Rx. 475°F. D Rx. 510°			
	1330						Bleed CH_2 into hydrogen feed.
	1600			Full set samples.			
	1830		Start feed from 11Q7A				
	2100						Cut out CH_4.
5/8	0030			Lost LRC-6014, went to Maint. Lost D Rx. level, stop pump.			
	0100		Decrease heat, percent extract high at 23%.	Level back, temp. dropping.			
	0330			Lost level A Rx. at 695°F.			
	0500		Percent extract at 10%.				
	1400	Start feed to 500, 4 gpm.	Take feed from 300 & 1109B.				
	1430			Temperatures on Rx. ↑ 725.			
	1500			Increase feed to 2.5 gpm.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/8	1600		Adjusting rates to give stable feed to 600.				
	1730			Stable at 710°F.			
	1830		Feeding 2.2 gpm from 1109B.	Samples taken.			
	1930	Feeding approx. 9.0 gpm.					
	2100				Plug in line to C-A701 from oil product cooler.		
	2230			Stable at 720°F. Samples taken.	Drummed peoduct, 8 drums.		
5/9	0001	Feeding 500 with solvent.					
	0330				Bypassing C-A701.		
	0800					Startup.	
	0815			Fuel gas surge, lost A recycle flow.			
	0830					Water in FT-832.	
	0845			Found head leaking F-A605. Start shutdown.			
	0915					Startup O.K. all loops circulating.	
	0930						Shutdown JC-A900A.
	1100		Stopped taking feed from 1109B.				

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/9	1400	Cut feed to 500.	Stopped feed from 300	Liquid purge complete		Shutdown total system	
	1500						Pulled fourth & fifth stage valves for inspection.
	1700		Start recovery of solvent from 1107.				
	1800			Gas purge complete.			
	1830			Head removed on F-A605.			
	1900			Worked at clearing plugs, A Rx. loop.			
5/10	1400			B-A602A & lines plugged.			
	1530			Head replaced on F-A605.			
	1700		Solvent recovery from 1107B.				
	1730			Setting up for one Rx. operation.			Replacing fourth & fifth stage valves in JC-A900A.
	1750			Hydroblasters in to clear B-A602A.			
	1800			Start purging system with N_2.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/10	2100						Test ran JC-A900A.
	2200			B-A602A cleared - hydroblasters released			
				Start pressuring system for 500 psi pressure test.			
	2300		Heavies buildup plugging E-A501 lines.	Max, pressure 100 psi.			
	2330		AR-501 at full scale.				Started JC-A900A.
5/11	0001			Found leaking head on F-A605.			
	0030						Shut down JC-A900A - not needed.
	0100			Set up B-A602A for decoke.			
	0110			Pluggage in coils.			
	0200				Lost levels in columns		
	0300				Circulation on columns restarted.		
	0815		System clear and on circulation.				
	0930				Checked C-A707 for leakage - O.K.		
	1045			Coils & lines steaming clear.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/3/78 - 5/12/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/11	1300			North vert. leg by FCV-6005 plugged.			
5/12	0700			Decoke complete, bottom to top.			
	0730			Reverse flow giving pluggage.			
	0830			Line clear, setting up decoke, top to bottom.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/13	1450			F-A605 leak, 500 psi/ 15 min.			
	2300			Plugged line cleared by hydroblasters.			
5/14	1300			Press. with high pressure N_2.			
	1345						Start A Compressor.
	1500						Shutdown JC-A900A.
	1645						Start A Compressor.
	2130			B-A602A decoke compl.			
	2145			Head leak JC-601B at 500 psig.			
5/15	0001		Start topping solvent for F-A608.				
	0200			F-A605 press. test O.K. at RP +500 psig.			
	0300			Level in both Rx's.			
	0430			Absorber loop on.			
	0500		Pump J-A502's cavitating.				
	0530			Gas flow to D Rx.			
	0715		Drop temp. to control.				
	0730			Set 1 √ gas flow to A Rx.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/15	0845			Stop gas feed to drain excessive level from Rx's.			
	1730			Repressuring system.			
	1830			Problem with JC-A601B ΔP. JC-A601A at max.cap.			
	2000			Gas feed to Rx's 6 V.			
	2100			Line from F-A614 to F-A608B checked, O.K.			
5/16	0130			Hot dox oil to 400°F.			
	0500				Heating columns for operation.		
	0545			Start fill A Rx.			
	0600		Feed forward to F-A608A.				
	0700			Circ. on A Rx.			
	0715			Forward feed to fill D Rx.			
	0800			H_2 feed to heaters.			
	0815			Heaters fired.			
	0950			Dox oil feed to F-A608A @ 1 gpm, per run plan.			
	1130	Intergrate with 200.					

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 3

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/16	1145		Integrate with 800 & 300. J-A502 cavitation.				
	1200					Fluidize D-A801 bed. Start heatup.	
	1310				B-A701 "B" leg ground fault.		
	1830		Fed Dox oil system, line up O.K.				
	1950		Start extract feed to F-A608A.	Taking extract from 500.			
	2030	Over filled F-A301. LRC off by 20%.					
	2130			Temp. excursion on A heater recycle flow upset (to 850 - 0 book) (Temporary plug on FCV-6005).			
5/17	0130			Level control problems A Rx.			
	0140			Tube rupture C-A601 (Temp.@ 450°F) exit.			
	0200			Start orderly S.D. Feeding Dox oil to 500°F.			
	0245	Stopped coal feed from 200. Clearing system to 500.					

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 4

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/17	0300		Feeding 30% extract to F-A1109B.				
	0600			Feeding solvent.			
	0630					Start feed to D-A801 bottom nozzle (O.H. temp. low).	
	0700	Stop feed to 500.	Stop extract feed from 300.				
	1000					Change to top feed nozzle. O.H. temp. up to 630°F.	
	1200						Stop JC-A900A, fourth stage suction is high. Broken plate fifth stg
	1400			Solvent sample for 600 O.K.			
	1430			Stop feed.			
	1950			Hydroblasters in to clean up C-A601.			
	2000			Start ammonia neutralization of overhead lines.			
5/18	0400			Start purge of NH_3 from overhead piping.			
	0800			System clear to open C-A601.		Stopped feed from 300	

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 5

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/18	1000			Inspect suction strainers JC-A601A - collapsed. Inspect suction strainers JC-A601B - blinded.			
	1100					System cooled down - shut down.	
	1200			Inspect tubes C-A601.			
	1300			Drained catalyst from A Rx.			
	1600			Hydroblastors finished with tubes.			
	1900		Start taking feed from solvent recovery.	Close up C-A601 to steam clean.			
	2000			Start steam through O.H. lines through C-A601.			
	2100		Start forward feed To B-A1101B.	Start steam through recycle lines from E-A601 through F-A605.			
5/19	0500			A Rx. system circ. with solvent & drained.			
	0645			Steam off to cool down.			
	0800		Finish recovery of material from F-A1101A.				
	0815		Start feeding from F-A1107A.				

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/19	1430			Hooking up to decoke B-A602A.			
	1600			Start decoke B-A602A.			
5/20	1230			B-A602A decoke complete. Set for reverse flow.			
5/21	0400			Decoke complete B-A602A.			
	0730		Stop feed from 1101A.				
	1030		Start feed from F-A1109A.				
	1300				Problems with plug strainer, J-A704's.		
	1800				Pulled strainers out - J-A704's.		
	2300				Replaced strainers, no further problems.		
5/22	1400			Finished charging approx. 2 cu.ft. catalyst to D Rx.			
	2130						Test ran JC-A900A on N_2.
	2400		Completed rework of 1109A material.				
5/23	0330			C-A601 returned to Operations.			

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/23	0500		Shut down to clear FE-502, 507.	Liquid circulation established for clean-out.			
	1200			Liquid in system on 300°F.			
	1800			Stopped clean out - liquid circulation.			
	2130			Drained lines.			
	2200		Started up system to forward topped solvent for F-A608.				
	2230			Ready to start purge.			
5/24	0200			Start system purge with N_2. Head leak F-A605.			
	0330						Started JC-A900A on H_2.
	0930				J-A701B seal bad.		
	1000				J-A701C seal bad.		
	1130			Attempted to start recycle JC-A601A.			
	1200			614 pumps installed with paired stages.			
	1300			RP +500 psig test o.k. F-A605 O.K. Leak on E-A601/small.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/24	1445		FRC-501 reinstalled.				
	1500			Stop JC-A601A, pull auction strainers.			
	1645			Started venting down to remove blind in O. H. line E-A601.			
	1700						Stopped compressor.
	1830			Blind removed.			
	2100						Restart JC-A900A on H_2.
5/25	0400			Filling A rx. with liquid.			
	0420			Start circ. on A Rx.			
	0530			Start gas flow through D Rx.			
	0630			Manually jump Maxon to fire B-A601.			
	0700			Level on A Rx."blown" overhead to F-A601 → F-A617. Fired B-A602A.			
	0745			Level re-established A Rx.			
	1800			Fill D Rx.			
	1830			Establish recycle.			
	2000			Start forward flow.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

DATE: 5/13/78 - 5/23/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/26	0400		E-A501 at 475°F over-head 5" vac.				
	0600			H_2 full open to A Rx.			
	0630			H_2 full open to B Rx.			
	0800			Start Dox oil feed.			
	0815			Stopped A recycle comp. Start B recycle.			
	0830			Stop Dox oil feed. Go to solvent.			
	1130			Start Dox oil feed.			
	1200	Stopped all flows to correct B-B306.					
	1340			Lost level D Rx.			
	1420			Cut H_2 flow to A Rx. to 5m CFH. B recycle gas comp. overloaded.			
	1430			Nukes on D density pegged out.			
	1500			Insulation fire on line from B-A602A - extinguished.			
	1600	Flows restarted. B-B306 repaired.	Feed from F-A1106B - out of recycle solvent.				
	1630			Temp. spread & O.H. temp. for Rx. indicates reaction.			

OPERATING SUMMARY OF STATUS - PROBLEMS - PROGRESS

PAGE NO.: 10

DATE: 5/13/78 - 5/26/78

DATE	REAL TIME	SECTION 300 SOLIDS SEPARATION	SECTION 500 SOLVENT RECOVERY	SECTION 600 HYDROGENATION	SECTION 700 FRACTIONATION	SECTION 800 - LOW TEMP. CARBONIZATION	SECTION 900 COMPRESSION
5/26	1700			Low recycle established D Rx.			
	1730			Going to solvent feed - has been 50/50.			
	1745			Plugged FCV-6006.			
	1800		Feed from F-A1101.				
	1830			Start shut down of D Rx.			
	2230			Remove FCV-6006.			