INTRODUCTION

WHAT IT'S FOR

The control room is where process variables and supporting systems can be monitored and controlled remotely for the whole production complex.

WHY IT'S IMPORTANT

The control room is important as it allows an operator to monitor many processes and systems from one location. The control room not only contains controls for various quantity and quality control of process variables but also contains master control for most of the systems designed solely for safety purposes (such as gas detection system and ESD system). The way the systems are monitored and controlled can have a large impact on the facilities operating cost.

WHAT IT DOES

The control room collects information throughout the production complex and either uses it for some type of control or to supply information. The information is used to make operating decisions and for accounting to ensure products and feeds are accounted for. In order to manage the large amount of information being monitored, tracked, trended, and accounted for there are systems in place in the control room that are solely for managing and administering the information. Some of this information is handled well by available technology like computers, but not all information required is easily or economically adaptable so there is still a strong dependence on the control room operator to manually make informed decisions and gather required information.

WHAT IT CONSISTS OF

Inputs

The only thing that goes to the control room is information. Now the information may take many forms. It may be computer information, on/off switches, a video signal or other information transmitting devices. Once the information reaches the control room the specific system that manages that information will do whatever it is supposed to do. This could include processes that need to be performed on the information given.

Outputs

The only thing that leaves the control room is information. Now information can leave the control room in as many forms as it has entered in and more. This information may be raw data that came to the control room or it may be processed

information. The processed information would include things like if process variable information was sent to the control room and a computer performed some mathematical functions based on that information then generated new information and sent it back out similar to the way it was sent in. Sometimes information is collected in the control room and leaves the control room as only a printed out hard copy.

Supporting Systems

The control room information is impacted by the following:

- Control room operator
- Nova gas nominations
- Pembina NGL & oil nominations
- Gas Plant liquid nominations
- Gas Plant gas nominations
- Field production
- Field Data Capture System (FDC)
- Daniel's computer system
- Flare monitoring system (camera)
- Gas detection system
- ESD system
- Gas chromatograph system
- Bailey computer system

FIELD DATA CAPTURE (FDC) SYSTEM

WHAT IT'S FOR

The Field Data Capture system is a computer based control system which allows remote control to the production and injection wells in the field. As there is no field operators that normally work at night this system is monitored by the control room operator at the production complex. This computer is located in the control room and operators will monitor the system for alarms and make changes as requested by the field operators.

WHAT IT DOES

The Field Data Capture section receives signals (input) from transmitters in the A and B Pool fields which transmit process variables and produces (output) control signals to the field.

The system also performs many other functions such as trending variables and doing well test sequences. This is more important to the field operators and if required to do something for them they will verbally assist the control room

operator through whatever request he is asked to perform. The control room operator can also shutdown equipment for power savings and in emergency situations.

HOW IT WORKS

The following describes the Field Data Capture system:

Refer to "Figure 1 simplified illustration of the FDC Network".

At each well in the A and B Pool fields there is a RTU (Remote Terminal Unit) such as a HP48000, HP48050, Comeau, or a Fisher ROC. At the satellites in the field there is either a Teledyne RTU or multiple satellites are connected to a TRW RTU. These RTU's are computers that control equipment and gather information. They send and receive information required to do this over radio waves.

The digital information from a field site is modulated or in other words mixed with a carrier radio wave. This provides a way to send information through the air. At high points in the field there are two repeater stations (at 10-22 and 10-06) set up to collect the radio signals from all the RTU's. There the RTU signals are demodulated or the radio signal is removed so the information can be organized into one stream of information at each repeater station. This combining of many streams into one structured stream is referred to as multiplexing. The multiplexed information is then modulated again at each of the two repeater locations and sent to the base station at 10-06 (across the road from the production complex flare pit). There the information is demodulated and sent to the UNIX 9000 HP server in the production complex computer room via a hard wire.

The Bailey computer from the production complex also feeds information about miscible flood compositions, pressures, flows and temperatures to the UNIX 9000 HP server. The B Pool FDC terminal is tied directly to the UNIX 9000 HP server and allows information to be accessed and control parameters to be sent back to the field. The control parameters are sent back to the field in exactly the same way they were sent from the field only the path is reversed.

The terminals in the FDC shop, production complex control room and the A Pool room communicate through a bridge with the UNIX 9000 HP server over a fiber optic cable. These three terminals have control access to the field. There is also a bridge between the UNIX 9000 HP and the LAN (Local Area Network) which allows information to be sent and received. Some information that is passed on to the LAN goes to an Oracle database for PVCS to use. PVCS is a production accounting package. Because the information is bridged to the LAN it can be accessed, providing access is granted, from the Pengrowth workstation on the LAN or any workstation across the wide area network.

The UNIX 9000 HP is located in the computer room at the Production Complex office. If for any reason, the alarm in the CCR comes on (computer room fire

alarm), the CCR operator or designate has to checkout the alarm to find out what the problem is. When this alarm goes off, it means there is a high temperature in the computer room, and it shuts down all the computers in the room. High temperature is 28°C.

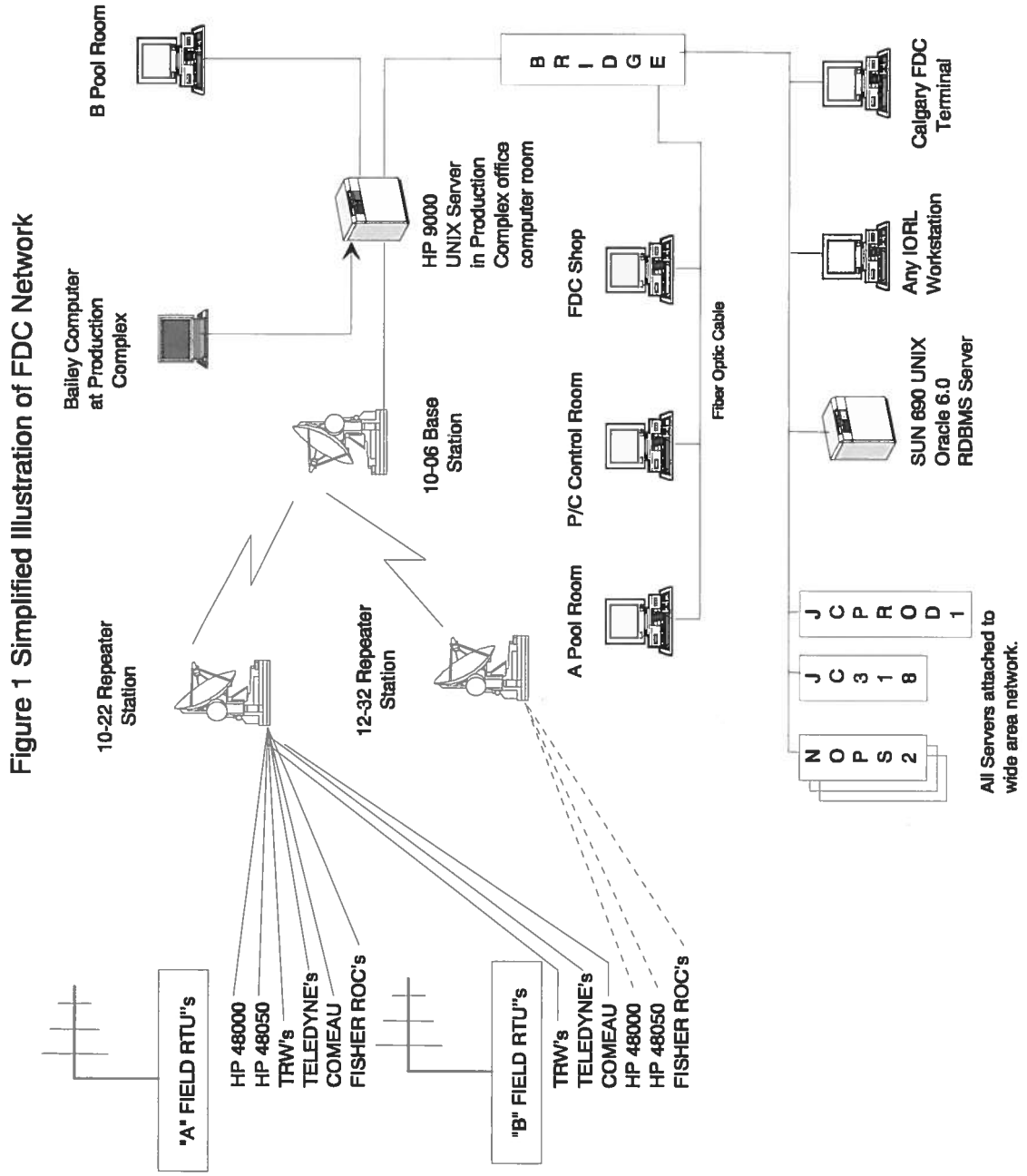


Figure 1 Simplified Illustration of FDC Network

DANIEL'S COMPUTER SYSTEM

WHAT IT'S FOR

The Daniel's computer system is a bank of computers located in the control room which display product flows. The flows can be used by operators as flow indication but there primary purpose is to store and print product flow information for accounting.

WHAT IT DOES

The Daniel's flow computer system receives information from flow elements on product lines within the production complex. It then corrects the flow for temperature, pressure, and compressibility factors. Then the information is stored and sent to the AMS system at the Judy Creek Gas Conservation Plant. Also reports are generated every morning and printed out by the computer. It is important to ensure a good quality report is generated because this is basically how we are paid or charged for products.

There is a procedure pasted on the wall beside the flow computers that tells how to reprint reports that may have not printed out well.

OPERATING YOUR AREA

SECTION CONTENT

This section deals with the *knowledge* part of your training. In this section you will learn about strategies that are a big part of making informed control room decisions. The strategies are as follows:

- The process control strategy
- The power consumption strategy
- The liquid and gas supply control strategy
- Maintenance call out strategy
- Field call out strategy
- P/C pipeline monitoring strategy
- P/C office computer room strategy
- Miscible injection control strategy (also see Miscible Injection Training Workbook)

By understanding these strategies it will allow an operator to manage the processes at the production complex in the most efficient and economical way.

USING THIS SECTION

Subjects in this section are labeled by functions (e.g., power consumption strategy, field call out strategy) as much as possible to make referencing easy.

PROCESS CONTROL STRATEGY

WHAT IT IS FOR

The process control strategy has been developed as a tool for control room operators in training.

Main control goals

The control room operator at the production complex is monitoring many processes at once. Besides watching for abnormal conditions to develop and preventing upset conditions the control room operator is really only trying to achieve a few things. The main process related concerns of the control room operator are as follows:

- Maintain A and B Pool gas lift pressures
- Maintain 7-6 water injection plant discharge pressure and tank levels
- Maintain appropriate gas loads down the high and low pressure gas lines to the Gas Plant
- Maintain the miscible flood solvent injection pressure and blend ratio
- Maintain the inlet header back pressure on the field as low as possible
- Monitor tank farm levels
- Maintain condensate recovery from Station 3 & 4 at desired levels
- Blend crude oil and butane with Judy oil

By no means are these all the variables monitored by the control room operator, but they are the primary concerns. There are many different things that influence these factors and it is not possible to document every different scenario. So with that in mind, tops or guidelines can only be offered to aid the control room operator in making adjustments to achieve the desired results.

Maintain A & B Pool gaslift pressures

In the summer months try to keep the A and B Pool gaslift units at desired rpm keep the units from going down on high engine temperature. In the winter months they can be loaded more to try and utilize running units and maintain temperatures.

Following is the changes that can be considered to maintain a constant gaslift pressure by keeping the compressors running in hot weather conditions.

For A Pool gaslift the following things may be changed but consideration must be given to the effects on the rest of the processes.

- Increase 287 makeup pressure (up to a maximum of 4150 kPa due to compressor rod loading) which will slow the units down.

- Increase the back pressure on Station 3 and 4 to put more flow down the 287 line.

- Increase 60# header pressure by adjusting pressure controllers on the low pressure line to get more compressor gas throughput which in turn slows the units down.
- Increase the loading on 3rd stage to slow down the rpm's of the units

- If possible an extra White or Superior can be run on hot days to unload or slow down the rest of the units so they will not go down on high temperatures.

- Increase pressure on 2nd stage discharge pressure controller pic-138

For B Pool gaslift the following things may be changed but consideration must be given to the effects on the rest of the processes.

- Increase K-1104's suction pressure to increase B Pool gaslift pressure causing unit to slow down.

- To increase the suction pressure:
  1. Increase setpoint on K1104 suction control.
  2. Run extra Clark or Solar on hot days to keep 600# header pressured up so gaslift unit can slow down.
  3. Reduce 287 pressure if possible.
  4. Speed up Clarks or Solars.
  5. Phone field contact and ask if gaslift pressure can be decreased to slow units down to keep on-line.

Maintain 7-6 water injection plant discharge pressure and tank levels

In the summer months try to keep the water injection pumps from going down on high engine temperature. In the winter months they can be sped up more to try and utilize running units.

It should be noted that preference is given to running a Solar injection pump over the electric drivers due to high electrical cost whenever possible. Also normally P-1105 electric injection pump is utilized as a standby pump because it has no speed control and smaller capacity. Whenever economics warrants it, preference will be given to running an electric driver over a Solar.

Tips for maintaining 7-6 water injection plant discharge pressure:

- Maintain 7-6, H_2O pressures at 14.4
- Maintain tank levels and adjust injection pump speed accordingly.
- Maintain suction pressure to pumps
  1. How many pumps operating (charge pumps)
  2. Suction relief set correctly

- Contact field to change injection rate on injection wells or change rate on predetermined injection well on FDC screen after hours.
- Call field operator and obtain verbal permission to operate plant with low discharge pressure until tank levels return to normal operating levels then injection pressure should be returned to set point.

Maintain appropriate gas loads down the high and low pressure gas lines to the gas plant

The gas load being sent down the high and low pressure gas lines to the Gas Plants can and will vary from time to time depending on the compressors available at the Production Complex and the Gas Plant. By calling the Gas Plant control room and communicating they can help assist in determining if more or less should be put from low to high pressure line or from the high to low pressure line.

Note: When putting condensate into the high pressure line, ensure that there is a minimum 140 km^3 (5 MSCF) of gas flow to carry the liquids. If this flow is not maintained it will cause the line to slug off or in other words become blocked with liquids. It is an expensive situation to correct not to mention it causes a business interruption.

Following are some ways of shifting load between the high and low pressure lines:

- Change speed on compressors in Station 3 and 4
- Start and stop compressors in Station 3 and 4
- Lowering the 60# pressure control on the Bailey increases flow down low pressure line and decreases flow down the high pressure line.
- Manually open or close Station 3's, V1 recycle valve. Closing increases high and decreases low.
- Decrease 287 makeup line pressure to increase flow on high pressure line and decrease low pressure line. (**Note**: this does speed up gaslift compressors.)
- Lower Station 4 discharge pressure (makes minor changes).

MAINTAIN THE MISCIBLE PRESSURES AND BLEND PRESSURE

Solvent:

The solvent pressure is affected by the flow rate injected into the system (flow rate of liquids and gas injected). To increase pressure you can speed up pumps. This, due to the gas to liquid ratio control at miscible, will increase the gas flow to pool, this combination increases the pressure in the solvent system.

Blend:

The blend control at miscible is controlled by blending the gas with liquid prior to the pipeline system. The system is operated on a gas to liquid ratio with that ratio determined by calculation of flow rate of liquid to gas. Gas to liquid composition and solvent composition are also inputs into control scheme. For a more detailed description see miscible blend control section.

MAINTAIN THE INLET HEADER PRESSURE FROM THE FIELD AS LOW AS POSSIBLE

The inlet header pressure is controlled by the 60# header pressure control which dumps to the gas plant. The limits are simple, don't knock any compressor down on low suction pressure, keep enough pressure for separators to dump, and don't bump the 60# flare open.

Tips

When starting A or B Pool increase the 60# header pressure to prevent large slugs. Also a manual valve on the inlets should be pinched in to decrease flow. By bringing on the flow slow and steady units will not be knocked down from liquid slugs as line flow changes.

MAINTAIN CONDENSATE RECOVERY FROM STATION 3 & 4 AT DESIRED LEVELS

MAINTAIN CONDENSATE PRODUCTION VOLUMES AS REQUIRED

Condensate production at the Production Complex is maintained at certain points that are determined by engineering to provide adequate condensate to inject into the A Pool oil to increase the API gravity and decrease A Pool oil sales temperature and to keep within contract specifications of Pembina Pipelines. This condition has an impact on oil volumes as well, approximately 80 – 100 m^3/day. Condensate production is affected by temperatures and flow rates of the compressors within the complex, gas lift units have an effect on the production of condensate. Discharge temperatures on gas lift units should be maintained at

30°C whenever possible to maximize condensate production for gas lift. But the main source of condensate is provided by the Station 3 and Station 4 process.

To maximize condensate production in Station 3 & 4 process, the following guidelines have been developed. These guidelines are to be used as a starting point and it must be stressed that the stations discharge pressure and dew points must be operated in such a manner so that the A & B Pool gas lift compressors have their requirements satisfied first.

To maintain condensate production from Station 4 ensure:

1. Speed of units 100%

2. 1st stage discharge temperatures at 28 – 30° C (2 turbines operating maximum)

3. Discharge pressure on 2nd stage set at such a point that K-1104 and A Pool 287 requirements are met. Normally 3800 – 3900 kPa would be sufficient.

4. 2nd stage discharge temperatures 28 – 30°C

To maintain condensate production in Station 3 ensure:

1. Set discharge pressure control to meet requirements of K-1104 suction. This is controlled with PIC-1104 on Bailey.

2. Control 2nd stage suction temperature at scrubber at 25 – 27°C

3. Unit speed at 100%

4. V-1 recycle closed

5. 2nd stage discharge temperatures at 28 – 30°C.

There are other limiting factors in the plant that are to be considered when trying to maximize condensate production. There is the line size from Station 3 & 4. The size of the pressure control valve at the injection point into the A Pool crude (treating step). K-1114 vapour recovery compressor throughput is the main limiting factor.

LIQUID AND GAS SUPPLY CONTROL STRATEGY

WHAT IS IT FOR

The liquid and gas supply control strategy is done by the reservoir engineer based on the WAG. Now if the nomination is not enough then an estimated volume should be requested through Calgary gas and liquid control. They will then nominate the volume required to the suppliers. Then the following guidelines are set up to aid decisions during abnormal operating.

HOW IT WORKS

Following are the guidelines that have been agreed upon at the miscible injection meeting August 12, 1993. This applies to both the liquid and gas nominations.

Gas

- Maximize use of rich gas from Gas Plant to meet nomination as well as blend requirements.

Liquids

- Minimum flow rate for Pembina metering purposes should be maintained at 100 tonnes.
- Minimize use of Louise Creek mark up gas unless requested by reservoir engineer.
- Minimize flow for Gas Plant purpose 420 tonnes of total outlet from Plant 6. This maintains fuel gas requirements and plant operating specs. At the Gas Plant.

MAINTENANCE CALL OUT STRATEGY

There is no formal documented maintenance call out strategy for the production complex. Presently it is just as seen required by the control room operator decision. The control room operator must look at each situation and determine the value of calling out maintenance.

Mechanical and Instrument Assistance

Presently there is no formal on call person available. Basically you call whom you need and discuss problems then they will assess the problem. If they are available they will come out and correct the problem. The maintenance personnel contact the CCR prior to leaving for the weekend if they will be available.

FIELD CALL OUT STRATEGY

WHAT IT IS FOR

The field call out strategy was developed to give the control room operator some guidelines around what determines a field callout situation and who should be notified.

Oil Hours 'til 07:00 (3m^3 from callout 'til 07:00

Callout @ 7:00 p.m. = 12 hrs. = 6 m^3/d well
9:00 p.m. = 10 hrs. = 7.2 m^3/d well
11:00 p.m. = 8 hrs. = 9 m^3/d well
01:00 a.m. = 6 hrs. = 12 m^3/d well

Any alarms for wells after 01:00 we would like to be called at 05:00 a.m. so we could come out a bit early to start the well.

Oil Winter Below -20°C

Callout - All wells

Gas Wells

Summer Before 12:00 a.m. 10-11-64-11 at 21 km^3/d

Winter All gas wells. Come out and at least get the heaters going so we start the compressors in the a.m. without having to rent a Herman Nelson

Satellites All Alarms are a callout

B Pool 02-30-63-11 and 04-20-63-11 All alarms

VR Down is NOT a callout

Injection Call to open or cut injection if required immediately.

P/C COMPLEX PIPELINE MONITORING STRATEGY

WHAT IT IS FOR

The P/C pipeline monitoring strategy is simply a clarification on what pipelines the P/C is responsible for. This is to ensure the control room operator is aware of the pipelines that they are responsible for basically first response to leaks or failures.

WHAT IT CONSISTS OF

The P/C is responsible for monitoring the following lines for abnormalities.

- The high-pressure line to the Gas Plant
- The low pressure line to the Gas Plant
- Fuel gas from the Gas Plant
- Fuel gas line from 12-12 (also goes to 2-30)
- The fuel gas line to 7-6 produced water injection
- Viking gas lines to 12-6 to fuel gas comp

Control room operators are also conscious of the field lines like solvent injection, water injection, and gas lift. On FDC the wells can be checked for sudden irregularity in flow rates by calling up reports on wells. There the 24 hour average, the last hour average and the instantaneous flows can be compared and consideration can be given to whether this makes sense with produced water injection tank levels and miscible flood discharge pressures and flows. Using basic common sense and allowing for changes in the system to stabilize will help determine and alert field personnel of potential leaks.

For lines like the high and low pressure lines to the Gas Plant, leak detection is hard to detect at this end. The Gas Plant is more likely to notice a line break first so communication on load significant load changes with them will be a major factor in helping determine whether a line break is suspect or not. The fuel gas line from 12-12 and the main fuel line from the Gas Plant supply fuel gas to the Production Complex. A line break in the 12-12 line will start knocking down field units like 2-30. If the main fuel line breaks units at the Production Complex will go down on low fuel pressure.

P/C OFFICE COMPUTER ROOM STRATEGY

OVERVIEW

The computer room at the Judy Creek Production Office is located in Room 033. This room is equipped with temperature and humidity sensors to protect the computer equipment. The sensors are wired into alarms at the Production Complex Control Room. Since every major computer system for the Judy Creek Production Complex and Office is located in this room, attending to alarms in this room is critical. Ignoring these alarms could lead to damage to $200 – 300K worth of computer equipment and loss of access to all computer systems.

Determine Cause of Alarm

When the control room operator receives a heat or temperature alarm at the Production Office, someone must do a physical check to verify the cause of the alarm. If the alarm sounds during normal office hours, the control room can contact Ann Jackman at local 7125 to check the cause of the alarm. After hours, the control room operator will be responsible to find someone to check the cause of the alarm. The alarm that is received in the control room may be caused by one of the sensors in the computer room or it could be caused by the main office alarm system.

Computer Room Alarm

An alarm in the Production Office computer room could be caused by excessive temperature in the computer room or improper humidity levels, the most common cause being a malfunction of the air conditioning system.

During normal office hours, the control room should try to contact Ann Jackman at local 7125. If this individual can not be located, do not just leave a message, try to page her. The alarm must have immediate attention to prevent damage! If the alarm occurs after office hours, the control room operator is responsible for dispatching a person to handle the alarm.

The first step to handling the alarm is to eliminate the excessive heat or humidity in the computer room. The easiest method to achieve this is to prop open both doors to the computer room and start portable fans to circulate air through the room. This will probably not bring the temperature back to the normal 19-20°Celsius but it will prevent the temperature from increasing to the point of damaging the equipment.

If the alarm is caused by a malfunction of the air conditioning, the second step to handling the alarm is to contact Ann Jackman at local 7125. Ann will handle getting the air conditioning fixed. If the air conditioning unit is not working shut the unit down using the switches on the top of the unit. This will eliminate the additional heat being generated by the unit.

MISCIBLE INJECTION CONTROL STRATEGY

Overview

The overall objective in operating the Miscible Injection is to supply a correctly blended solvent of Methane Gas, C1+, ratioed proportionally with C2+ liquid and to flood the injection pool as quickly as possible. This generally means maintaining a high injection pressure.

The solvent blend is referred to a miscible equivalence and as the components of the blend are nominated and have varying composition the control of the blend is paramount.

If the solvent becomes too lean (too much methane) the solvent becomes immiscible with the reservoir fluid greatly reducing the effectiveness of the flood. The miscible injection control objective is to maintain the WAG cycle based miscible equivalent as close to the set point as possible, and to maintain the maximum injection pressure all the time within miscible equivalence excursion limits. The WAG set point limits are 1.85 to 2.1 for A Pool and 1.69 to 1.87 for B Pool. A typical WAG cycle is a 7-day cycle. Within this cycle, there are times when the inlet liquid and/or gas qualities vary. As they vary, this will affect the amount of inlet liquid and gas needed. As both inlet liquid and gas are nominated, deviations away from nomination in order to meet the miscible equivalent setpoint may not always be met.

During these quality excursions, it is also desirable to maintain the flood at maximum injection pressure. To maintain the maximum injection pressure during inlet quality variation situation, it will be necessary to deviate away from the WAG cycle based miscible equivalence set point. Therefore, the real time miscible equivalence setpont may not be that of the WAG cycle setpoint all the time. Under ideal conditions, when all wells behave as planned, inlet liquid and gas maintain at planned qualities and quantities, the real time miscible equivalence setpoint will be the same as that of the WAG cycle based setpoint.

Details of the application of the controls are to be found in miscible injection area of operation where you will see these subjects:

- Injection Pressure Control
- Miscible Equivalence Control
- Gas Blend Control
- Gas Injection Rate Control

FLARE MONITORING SYSTEM

WHAT IT IS FOR

The Flare Monitoring System is a video monitor screen located in the control room that allows the control room operator to monitor the flare stack for excess flare. The flare stack is not easily viewed from the control room so this helps alert the control room operator if he is not aware that the flare is going. Some times PSV's can lift and unless you can hear it or see frost on the PSV then the only thing you may see is a flare at the flare stack.

Another use of this monitoring system is for security. The camera can be turned remotely from the control room to face the parking lot or security gates to check out who is driving in.

WHAT IT DOES

The flare monitoring system does nothing more then provide a visual monitoring system for the flare pit, security and some in plant about ground pipelines.

WHAT IT CONSISTS OF

The flare monitoring system consists of a video camera mounted below the emergency evacuation siren on a remote control support and a video monitor in the control room with the remote control switches.

HOW IT WORKS

The video signal from the camera goes to the video monitor in the control room where it is displayed. The switches located on the monitor in the control room allow the camera to be turned left and right or up and down. Also the focus can be manually changed if the picture appears fuzzy from the monitor.

GAS DETECTION SYSTEM

WHAT IT IS

The gas detection system is a combination of electronic based devices that can measure the amount of combustible gas present in the atmosphere within the plant. All of the gas detection monitors send some information to the control room.

WHAT IT IS FOR

The gas detection system is in place to help provide a safe work environment by constantly monitoring for a dangerous amount of combustible gas.

WHAT IT DOES

The gas detection system has three primary functions monitor, alarm and activate emergency mode or shutdown mode.

The first function is to monitor at strategic points for combustible gas present in the atmosphere. The strategic points are simply where a gas leak in the process is most likely to happen or where because of air movement and gas density a leak in the process could best be detected.

The second function is to alarm when gas is detected over an established limit (10% L.E.L). This is done with sirens and lights to ensure everyone is aware a potentially dangerous situation exists.

The third function is to activate an emergency mode or shutdown mode if more gas is detected then maximum operating amount (30% L.E.L.). This will initiate an ESD (Emergency Shutdown Mode) to establish a safe environment and to prevent further accumulation of combustible gas.

WHAT IT CONSISTS OF

- Gas heads located throughout plant
- Gas detector panel monitors (in control room)
- Screens on Bailey computer (miscible flood and PWIP monitors)
- Gas detector panel monitors (in water plant old control room)
- Gas detector panel monitors (in miscible flood MCC)
- Rotating red flashing beacons throughout plant
- Audible sirens located in plant.

HOW IT WORKS

Equipment Description

The production complex utilizes one make of gas detection and monitoring system. This is a single channel Bacharach system. For the physics behind how a gas head detects gas refer to the Bacharach Manual as it explains very well.

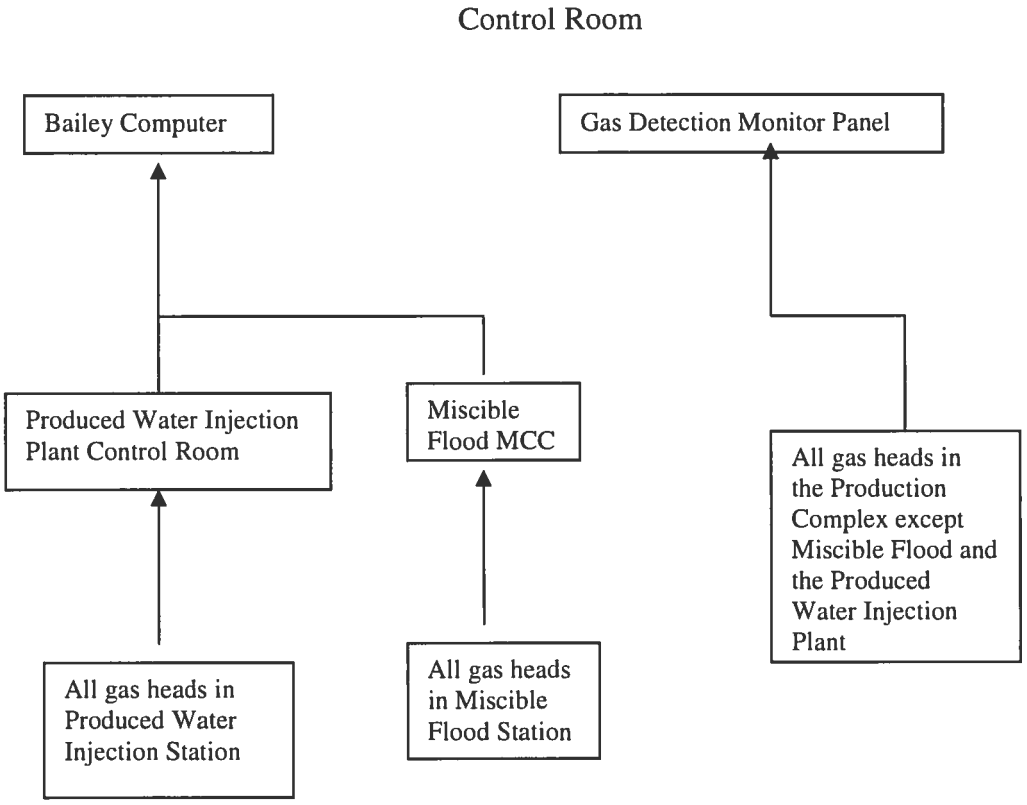
For most of the production complex the heads are located in the different areas and the signal is fed into the control room to a panel full of gas detector monitors where the signal can be observed. However, the produced water injection plant and the miscible flood stations actual monitors are located out in the plants. Modifications have been made to allow a signal to be monitored in the production complex control room. Refer to Figure 1 Gas Detection Simplified Overview.

The produced water injection plant has been interfaced with the Bailey computer to give the P/C control room operator information about the status of the gas detectors located in the produced water injection control room. All it will tell him is if a gas head is alarming or whether a head is failed. It does not tell which head is alarming or failed just that one has. Then some one must go down to the produced water injection plant control room to find out which head is alarming or failed. The gas heads can not be bypassed or reset from the P/C control room.

The miscible flood station has also been interfaced with the Bailey computer to give the P/C control room operator information about the gas detectors located in the miscible flood MCC building. More information is available from the miscible flood station on the Bailey computer. All the gas head signals can be viewed on the Bailey computer. The exact head that is alarming or failed can be located on the Bailey screen and monitored. The gas heads can not be reset or bypassed from the P/C control room.

All the rest of the gas heads located in the production complex have a monitor located on the gas detection panel in the control room. There they can be monitored, acknowledged, reset and bypassed (refer to critical procedure).

Production Complex Gas Detection
Simplified Overview
Figure 1



Gas Head Locations

Production Complex Control Room

- Gas heads fed to gas detection panel in P/C control room
- Number – this is used by I/E Group for calibration record sheets

Number	Location	Number	Location
1	Recycle Building	31	K-1113 Compressor
2	K-1114 Building West	33	K-1105 Ceiling
3	K-1114 Building East	34	K-1106 Ceiling
4	SK-21	35	K-1112 Ceiling
5	S-1	36	K-1113 Ceiling
6	T-1 and T-3	37	K-1101 Trench East
7	T-3 Floor	38	K-1103 Trench West
8	T-3 Ceiling	39	P-13 A & B Condensate Pumps
9	S-19 Ceiling	40	K-1101 Compressor
10	S-20 Floor	41	K-1102 Compressor
13	K-1733 Ceiling	42	K-1103 Compressor
14	K-1733 Compressor	43	K-1101 Ceiling
15	K-1733 Trench	44	K-1103 Ceiling
16	K-1734 Ceiling	45	K-1105 Fan
17	K-1734 Compressor	46	K-1106 Fan
18	K-1734 Trench	47	K-1112 Fan
19	Gas Lift Contactor Building	48	K-1113 Fan
20	Gas Lift Reconcentrator	49	P-1507 Ceiling
21	T-10 Process II East Ceiling	50	P-1505 Floor
22	S-13 Process II West Ceiling	51	K-1501 Ceiling
25	K-1104 Compressor	52	K-1501 Compressor
26	K-1105 Compressor	53	K-1502 Ceiling
27	K-1106 Compressor	54	K-1502 Compressor
28	K-1110 Compressor	55	K-1503 Ceiling
29	K-1111 Compressor	56	K-1503 Compressor
30	K-1112 Compressor	On FDC	K-1029

Produced Water Injection Plant

- Gas heads fed to gas detection panel in produced water injection plant, control room and alarm and fail status is sent to P/C control room via the Bailey.

Number	Location	Number	Location
61	Control Room	67	Charge Pumps
62	Generator Room	68	P-1110 Pump
63	Boiler Room	69	P-1105 Room
64	Trench H_2S	70	P-1103 Turbine
65	Pipe way South	71	P-1104 Turbine
66	Fuel Gas Building	72	Pipe way North

Miscible Flood Station

- Gas heads fed to gas detection panel in miscible flood station MCC and the status and signals sent to P/C control room via the Bailey.

Number	Location	Number	Location
73	K-1804 Ceiling	81	P-1803 Ceiling
74	K-1803 Ceiling	82	P-1802 Pump
75	K-1803 Compressor	83	P-1802 Ceiling
76	K-1802 Ceiling	84	P-1801 Pump
77	K-1802 Compressor	85	P-1801 Ceiling
78	K-1801 Ceiling	86	Boiler Room
79	K-1801 Compressor	87	Generator Room
80	P-1803 Pump	88	Analyzer Building

Supporting Material

As well as understanding this document the operator must have an understanding of the following sections of the Bacharach Instruction Manual .

Page 1-1	General Description
Page 1-1	Gas Detection Units
Page 1-2	Detector Sensing Device
Page 1-26 & 1-32	Indicators
Page 1-32	Controls
Page 4-1	Daily Inspection

EMERGENCY SHUTDOWN SYSTEM

WHAT IT IS

The emergency shutdown (ESD) system is a combination of electronic and pneumatic devices that can be activated to either shutdown or shutdown and depressure a process that is unsafe or potentially unsafe.

Note: Once any ESD has been activated for purpose other than a planned test the emergency siren should be activated right away to clear people out of the plant.

WHAT IT IS FOR

The ESD system is for isolating a process if assessment has been made that there is no other safe way of correcting a deviation in the normal operation causing an unsafe or potentially unsafe situation. The ESD system provides a means to remotely or locally isolate a process or several processes to prevent injury to people and further equipment damage.

WHAT IT DOES

The ESD system at the Production Complex has two modes that can be activated. The two modes are Mode 1 and Mode 2. These modes do not mean exactly the same thing through all the operating area. The following tells more specifically what the modes mean in each process area.

Process 1 and 3

A Mode 1 in this area causes the process flows to isolate and equipment to stop but not depressure.

Other things besides the manual Mode 1 activation stations that can activate a Mode 1:

- A 30% combustible gas detection on GD4, GD5, GD6, GD7, GD8, GD9 and GD10
- A Mode 2 ESD (automatically initiates a Mode 1)
- Low instrument air pressure (LPS-1 located on K-1119 & K-1120 skid)
- T2 treater emergency (a treater emergency is when the flame arrester reaches 600°F or the stack reaches 800°F).

Process 2

A Mode 1 in this areas causes the process flows to isolate and equipment to stop but not depressure.

Note: Condensate dumps from gas lift area do not shut on an ESD of Process 2.

Other things besides the manual Mode 1 activation stations that can activate a Mode 1:

- Low instrument air pressure
- A 30% combustible gas detection on GD21 or GD22.
- A Mode 2 ESD (automatically initiates a Mode 1)
- A high pressure in S10
- A high pressure in S11
- A high pressure on T10 treater

Station 4 (Solars)

A Mode 1 in this area causes the equipment to stop and process flows to isolate but not depressure.

Things that can activate a Mode 1 ESD:

- Low instrument air pressure
- A 30% combustible gas detection on GD49, GD50, GD51, GD52, GD53, GD54, GD55 or GD56
- A Station 4 Mode 2 ESD (automatically initiates a Mode 1)
- A push button in North end MCC bldg.
- A high liquid level in the inlet separator V-1501
- A high liquid level in the entrainment separator V-1502
- A high liquid level in the 2nd stage suction scrubber V-1504
- A high liquid level in the 2nd stage discharge scrubber V-1505 (alarm only)

A Mode 2 in this area causes the process flow to isolate, equipment to stop, and depressure the process.

Things that can activate a Mode 2 ESD:

- All manual ESD stations except the two Mode 1 ESD stations
- The Station 4 Mode 2 button in CCR.

Station 3 (Clarks)

A Mode 1 in this area causes the process flows to isolate and equipment to stop but not depressure.

Others things besides the manual Mode 1 activation stations that can activate a Mode 1:

- A 30% combustible gas detection on GD37, GD38, GD39, GD40, GD41, GD42, GD43 or GD44.
- A Mode 2 ESD (automatically initiates a Mode 1)
- Low instrument air pressure (PSL-149)
- A high level in V1 suction scrubber (LSH-1)
- A high level in the V2 interstage scrubber (LSH-20)
- Fuel gas scrubber high level

- A high suction pressure (PSH-44)
- A high interstage pressure (PSH-47)
- A high temperature on the interstage gas from the cooler
- A high level in V3 discharge scrubber LSH-28
- A high discharge pressure PSH46
- A high level in the C1A, C1B, LSH-D5 and LSH-D6

Station 3 Mode 2 can be activated in the CCR and it will isolate process flow, stop equipment and depressure process.

Gaslift (White Building ESD)

A Mode 1 in this area causes the process flows to isolate and equipment to stop but not depressure.

Other things besides the manual Mode 1 activation stations that can activate a Mode 1:

- Low instrument air
- A 30% combustible gas detection on GD19, GD20, GD25, GD26, GD27, GD28, GD29, GD30 and GD31
- A Mode 2 ESD (automatically initiates a Mode 1)

A Mode 2 can only be activated from the Fieldgate Complex button in the CCR and it will isolate process flow, stop equipment, and depressure process.

Vapour Recovery Unit (STVR K-1114)

A Mode 1 in this area causes the process flows to isolate and equipment to stop but not depressure.

Other things besides the manual Mode 1 activation stations that can activate a Mode 1:

- A 30% combustible gas detection on GD2 & GD3
- A Mode 2 ESD (automatically initiates a Mode 1)

A Mode 2 can be activated from the CCR and it will isolate process flow, stop equipment and depressure process.

Gas Lift (Superiors ESD)

A Mode 1 in this area causes the process flows to isolate and equipment to stop but not depressure.

Other things besides the manual Mode 1 activation stations that can activate a Mode 1:

- A 30% combustible gas detection on GD13, GD14, GD15, GD16, GD17 and GD18

- A Mode 2 ESD (automatically initiates a Mode 1)

A Mode 2 can only be activated in the CCR and it will isolate process flow, stop equipment and depressure process.

Miscible Flood (MFI)

A Mode 1 in this area causes the process flows to isolate and equipment to stop but not depressure.

Other things besides the manual Mode 1 activation stations that can activate a Mode 1:

- A 30% combustible gas detection on GD73, GD74, GD75, GD77, GD78, GD79, GD80, GD81, GD82, GD83, GD84, GD85, GD86 or GD87
- A miscible flood Mode 2 ESD (automatically initiates a Mode 1)
- A low instrument air pressure (PSLL-1872)

A Mode 2 in this area causes the process flow to isolate, equipment to stop and the process to depressure. ***Can be Mode II from CCR***

- There are only two manual ESD stations that can activate a Mode 2 ESD

Produced Water Injection Plant (Bailey Computer)

A Mode 1 in this area causes the equipment to stop but not isolate process.

Things that can activate a Mode 1:

- A 30% combustible gas detection on GD61, GD62, GD63, GD65, GD66, GD67, GD68, GD69, GD70, GD71, or GD72
- A PWIP Mode 2 ESD (automatically initiates a Mode 1)
- A Mode 1 can be activated from the Bailey computer
- A lose of air to the water plant control room for 10 minutes
- A Mode 1 can be activated from the water plant control room

A Mode 2 in this area causes the process flow to isolate and equipment to stop.

Other things can activate a Mode 2:

- A Mode 2 can be activated from the Bailey computer
- All the manual ESD stations in the water plant activate a Mode 2 except in the water plant control room there is one push-button that can activate a Mode 1.

WHAT IT CONSISTS OF

- Emergency evacuation panel with status lights (P/C control room)
- ESD panel with status lights (P/C control room)
- Screens on Bailey computer (for PWIP ESD activation and status)
- Locate activation switches located in process areas

HOW IT WORKS

Equipment Description

There is a panel in the P/C control room that has ESD activation buttons for all of the Production Complex except the produced water injection plant. Refer to Figure 1 and 2 for layout of the ESD panel and emergency evacuation panel layouts. The produced water injection plant ESD activation switches are located on the Bailey computer. These are just the activation points within the control room. In each plant area there is also several local activation switches that can be used.

The majority of the plant except the produced water injection plant utilize an electric solenoid system that shuts the air off just upstream of the ESD or control valve and vent the pressure to the control valve off. Once the air pressure drops the valve pressurized by the air will fail to their predetermined "air off" position. On valves to flare they will open and on process isolation valves they will close. Also an energized relay will de-energize the run signal to the rotating equipment.

The produced water injection plant utilizes the Bailey computer where an ESD Mode 1 or Mode 2 can be activated. The computer sends a digital signal to an electric relay which in turn stops the designated rotating equipment and trips the solenoids open on the designated valves.

Out in the process areas there is local activation switches that will initiate a Mode 1 ESD. Some are pneumatic and some are electric. The pneumatic type have a valve that must be opened. This will in turn depressure a header (referred to as an ESD header) causing a ESD to initiate. The electric switch found in the plant does the same thing as the control room activation button.

Note: The point the ESD was activated from must be reset before an ESD will reset.

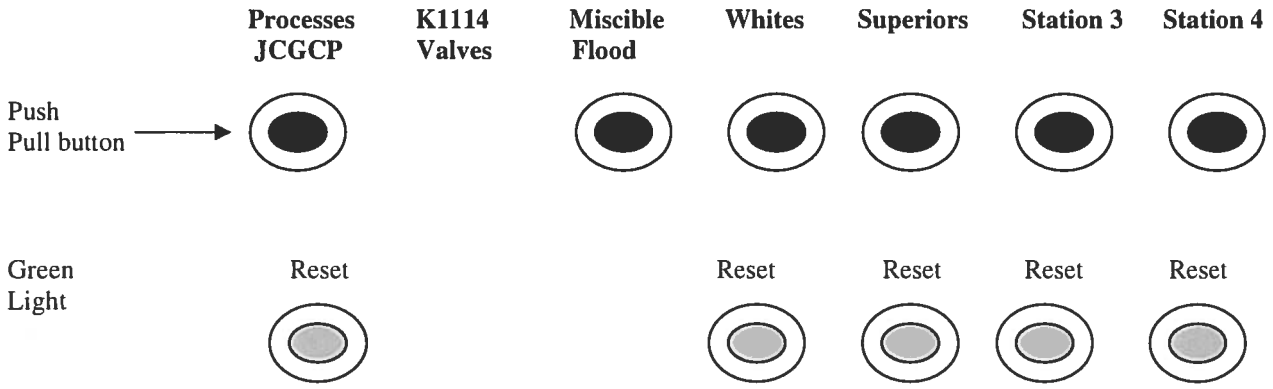
Resetting an ESD

In some areas of the plant certain valves must be manually reset after the ESD system has been reset.

Where is it Located

Refer to the Figure attached "Production Complex ESD Station Locations" for location of all manual ESD stations.

FIGURE 1
PRODUCTION COMPLEX
CONTROL ROOM ESD PANEL
MODE 2 ESD



MODE 1 ESD

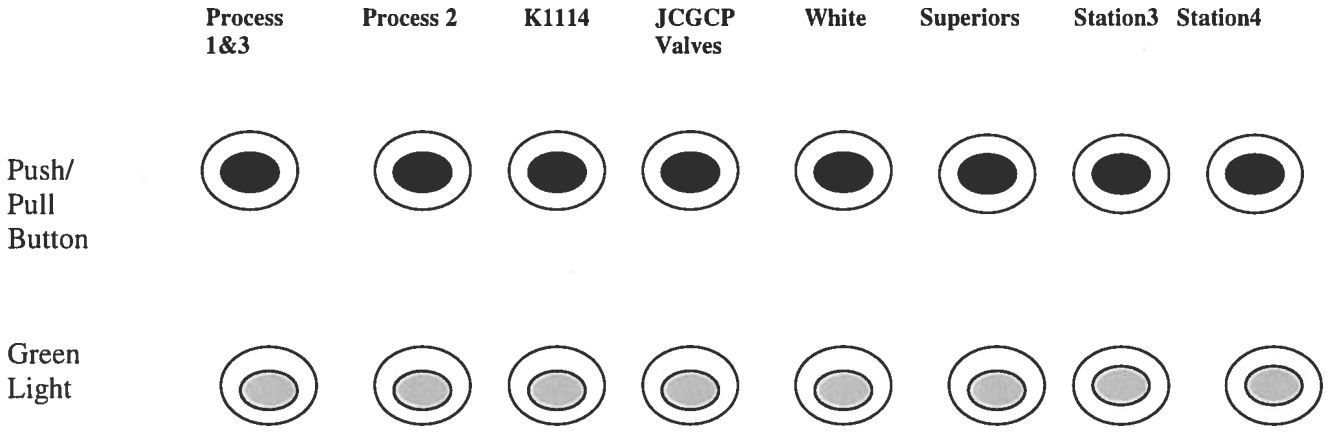
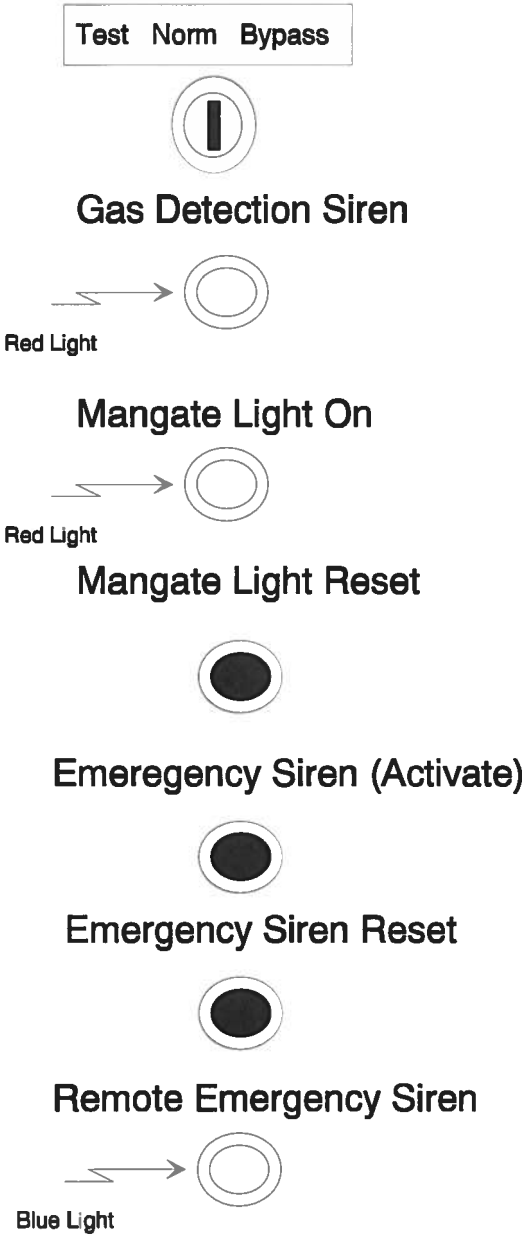


Figure 2
Production Complex Control Room Emergency Evcuation Panel



GAS CHROMATOGRAPH SYSTEM

WHAT IT IS

The gas chromatograph system is a combination of testing equipment in the plant and a computer station in the control room for monitoring. The testing equipment in the plant is simply an on-line gas chromatograph.

WHAT IT'S FOR

The gas chromatograph system is for measuring the gas composition of Station 3 and Station 4 discharge gas, MFIS inlet gas and liquid and outlet. The primary use of the gas composition readings are for gas accounting (component balances) and P/C instrument group which uses these numbers to calculate compressibility factors which are manually inputted as fixed data to the Daniels computers for flow corrections. Even though operations does not control the plant based on composition it is important to ensure the system is working properly all the time.

WHAT IT DOES

The gas chromatograph system for Station 3 and Station 4 does not control anything therefore it does not do much just supplies information. The information is printed out automatically at 6:00 a.m. daily and the reports are forwarded to gas accounting.

WHAT IT CONSISTS OF

- A computer workstation in the control room running MC-503 software
- A printer in the control room
- A gas chromatograph located in Station 3
- A gas chromatograph located in Station 4

HOW IT WORKS

Both Station 3 and Station 4 have separate gas chromatographs (GC's) but they both send information to the same computer in the control room. So one system will be explained and it applies to both.

A slip stream is taken off Station 4 discharge gas and ran through a switching block. The switching block either diverts flow to the GC or bypasses the GC and return the gas to the gas stream. When it is time to take a sample the switching valve switches to send flow to the GC. This is done by preset times from the computer in the control room.

The sample is then heated to a controlled temperature in GC oven and fed into a column in the GC. Helium carrier gas is combined with the sample before it heads through the column to establish a reference. The gas and helium flows

through a column that allows the components to separate out. The smaller molecule components travel through the column quicker and the heavier molecules move slower.

At the end of the column is a detector head for the gas and helium sample. There is another detector head which helium is passed over continuously for a base line reference signal. The detector head is basically a thin filament with a small electric current flowing through. As gas is passed over the filament heated by running a small electric current through the gas basically cools it at a certain rate. Different size molecules have different amounts of heat they can absorb or different heat capacities. This in turn changes the resistance of the filament that changes the current flowing through the filament. This current change is then converted to a millivoltage signal. The analog signal is converted to a digital signal and fed to the computer in the control room.

The computer then interprets the information using the MC-503 software into a format which the information can be displayed, trended, and reported.

Reprinting a Daily Report

If for some reason the printer jams or provides a poor quality hard copy at the time it automatically prints out then the report must be manually printed out. If a report needs to be manually printed it must be done by 12:00 am the following day from which it was to automatically print out. After this time that report is written over by a new report and the information is lost.

To manually print a report hit "esc" on the GC computer from the main menu only. This should give a DOS prompt. Then type "Report.Bat". This will print the report. Then start MC-503 program up again to get back to normal. To do this, simply type "MC503". The program should be running again.

Stopping and Starting Gas Chromatographs

There may be a time when operations may be required to start a GC and stop a GC. This is done using the computer in the control room. To see if a GC is running or stopped check the analyzer status by typing "N" from the main menu. There it will show whether it is stopped or running. You can not stop or start a GC from this menu you must return to the main menu and go into "I" which allows you to start and stop the GC's.

Recognizing Alarms and Clearing

An alarm on a GC can be seen from the main menu. If you look across the bottom the GC number will appear in green when there is no alarms and they are on-line. When the number turns red this tells you there is an alarm on that GC and you should press "N" from the main menu to see what is alarming. If the

number is white it is "off-line" or not in use at the present time. If the alarm can be reset then reset it and log alarm to I/E group.

BAILEY COMPUTER SYSTEM

How This Book Works

This book is not written in the standard Training Workbook format because the Bailey Computer System has good information existing. The way this book was set up is that there will be a gestalt sheet up front that acquired knowledge and skills can be accredited.

Then this brief explanation of how this book works. Following this will be the learners objectives. The required reading will be flagged in the Table of Contents.

Following each section in bold (e.g. General Information) there will be a test that will be done to reinforce information learned in each section. Then any required supplementary readings will be listed and a test will follows.

And finally there will be a final validation which will summarize all the sections.

Learner Objectives

Understanding how to use the Bailey Computer to:

- Monitor controls and process variables
- Change control modes
- Change set points
- Manually operate controls
- Make trends
- Find and acknowledge alarms
- Use and understand the keys on console

Following is a list of sections in the Bailey Network 90 Operator's Manual that must be understood.

General Information

The whole section should be read.

Displays

The whole section should be read.

Keyboard Console

The whole section should be read.

Controlling and Monitoring a Process

The whole section should be read.

Recording and Long Term Storage of Process Data

The following should be read:

- Logging
- Alarm Log
- Trend Log
- Trip Log
- Periodic Log

Reading not in this book that needs to be read:

- Bailey Network 90 System 030 section in the "Bailey Network 90 System and Miscible Control Strategy" book.

CRUDE OIL/BUTANE BLENDING

Heavy crude oil and butane trucked into the Production Complex are blended with Judy A Oil and Judy B Oil. This is blended via density control. This is blended via density control and cannot exceed 825 kg/m3. The length of time it takes to blend the crude oil and butane varies.

The control variables are:

- Density
- Level of tank 1A
- Level of butane bullets
- Flow control set point
- Monthly nominations.

BAILEY OPERATING SYSTEM

As various types of controllers and status switches, these controllers control pressure in psi, kPa, mPa, inches of W.C. depending on their location. They also control levels in feet and percentage. The flow controllers control in m^3/day and km^3/day. Status switches give indication if valves are open or closed and indicate if products are oil or water. They also indicate if units are running or down, depending on the application.

Field Data Capture – Introduction

WHAT IT'S FOR

The field data capture area enables the operator to monitor and control the operating conditions of the Judy Creek A&B Pools.

WHY IT'S IMPORTANT

This area enables the operator to verify that all field operations are operating normally, and when an abnormal operating condition occurs it enables the operator to identify the cause and take immediate corrective action.

WHAT IT DOES

There are two prime inputs for this area:

- The desired and actual operating conditions for the field. The desired values of the operating conditions are input by the operator into the computers located in the field office and PC control room
- The actual values of the operating conditions are measured by field located instruments which send these actual values to the controls located in the computer.

The controls are configured by the control schemes so that they respond to make the actual values of the operating conditions equal the desired value of the operating conditions. The control schemes are input into the computer by the systems engineer during plant commissioning and are not changed by the control room operator. However the control room operator should know how these schemes work to control the operating conditions in the plant.

The computer screen enables the operator to:

- Display and printout selections of the actual and desired values of the operating conditions.
- Start and stop equipment.
- Adjust the process flows in the field to establish the desired operating conditions.
- Select and display the actual and totaled values of many of the process flows in the field.

- Receive a composition analysis of some of the gas and oil flows to enable the operator to verify that the field is producing specification product.
- Be alerted by audible and visible alarms of an abnormal operating condition.
- Be provided with control and indication of the online or off line status of all of the wells.
- Obtain data file for PVCS production accounting system.

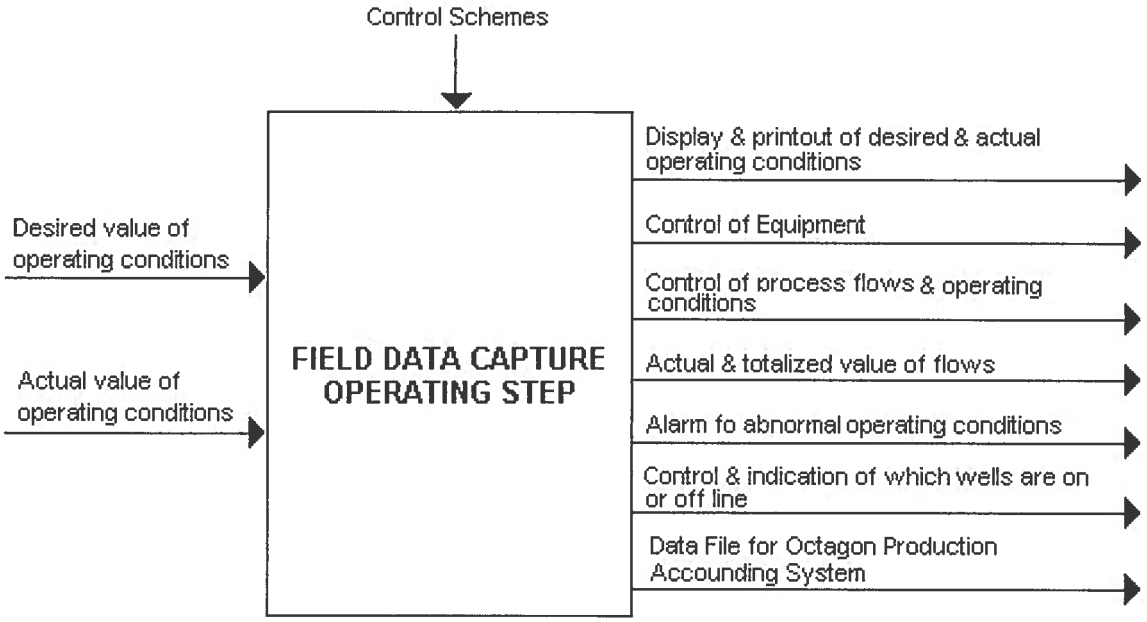


Figure 3-1: Input Output Diagram

WHAT IT CONSISTS OF

Inputs

The inputs for the field data capture operating area are provided from all the areas of operation in the field. They are the actual values of the operating conditions in the field. In addition the desired value of these operating conditions is input by the operator.

Outputs

The ultimate output of this area of operation is a controlled field operation which produces oil and gas at the optimum production rate. However the actual outputs are:

- Control of flows and operating conditions
- Control of plant and equipment
- Display and printout of the value of the desired and actual operating conditions for all operating equipment in the field.
- Actual and totaled values of most of the process flows
- Control and indication of which wells are on or off line
- Alarm of field abnormal operating conditions
- Data file for PVCS Production Accounting system

Other Inputs

To control the field, the computer and instrumentation is configured by the control schemes. These schemes customize the instruments so that they fit the controlling requirements of the field.

Other Outputs

There are none.

Hazards

The operator in the field office is not exposed to the plant environment and therefore there are no hazards. However the potential for causing hazards in the field by improper FDC operation exists. The field office operator must take great care to monitor and control the plant operating conditions so that hazards are not introduced as well as identify and correct any abnormal operating conditions that occur.

Functional Sections

Functional sections of the FDC operating area are:

- H.P. (Hewlett Packard) UNIX distributing control systems (DCS)
- Flow metering
-

H.P. UNIX DCS section

The H.P. UNIX DCS section consists of the H.P. UNIX DCS computer and the following peripheral devices:

Operator workstation

- Keyboard and mouse
- Monitors
- Printers (laser jet and paint jet)

Field input devices

- Field transmitters
- Field switches
- Valve status switches
- RTU's

Field Output devices

- Electric motors
- Switching valves
- Control valves
- RTU's

The desired operating conditions are input by the operator into the H.P. UNIX DCS computer. The operator uses the keyboard and mouse to select the appropriate screen and the keyboard to input the desired operating condition values (set points). The values of the actual operating conditions are input into the H.P. UNIX DCS computer by the following field located devices:

- Field transmitters
- Field switches
- Valve status switches
- RTU's

The H.P. UNIX DCS computer uses the control schemes configured into the computer to process these inputs and generate the controlling outputs to the following field located devices:

- Electric motors
- Switching valves
- Control valves
- RTU's

The monitor displays the selected screen and the operator uses the mouse and keyboard to make changes to set points on the screen. The screen can be printed out on the printer.

Metering Section

The Metering section consists of the following instruments:

- Field located process transmitters
- Flow meters

These flow meters display the flow rate and the totaled flow rates.
The **Well head instrumentation** consists of the following instruments.

- Field located status switches
- Field mounted control switches

These field located status switches sense the operating conditions of the wells and display the status on the well head indicators. The control switches enable the operator to put some of the wells on line and take some of the wells off line.

- Field located press switches
- Computer alarm Annunciators

These field located process switches sense the alarm condition and switch to record and flash an alarm in the computer.

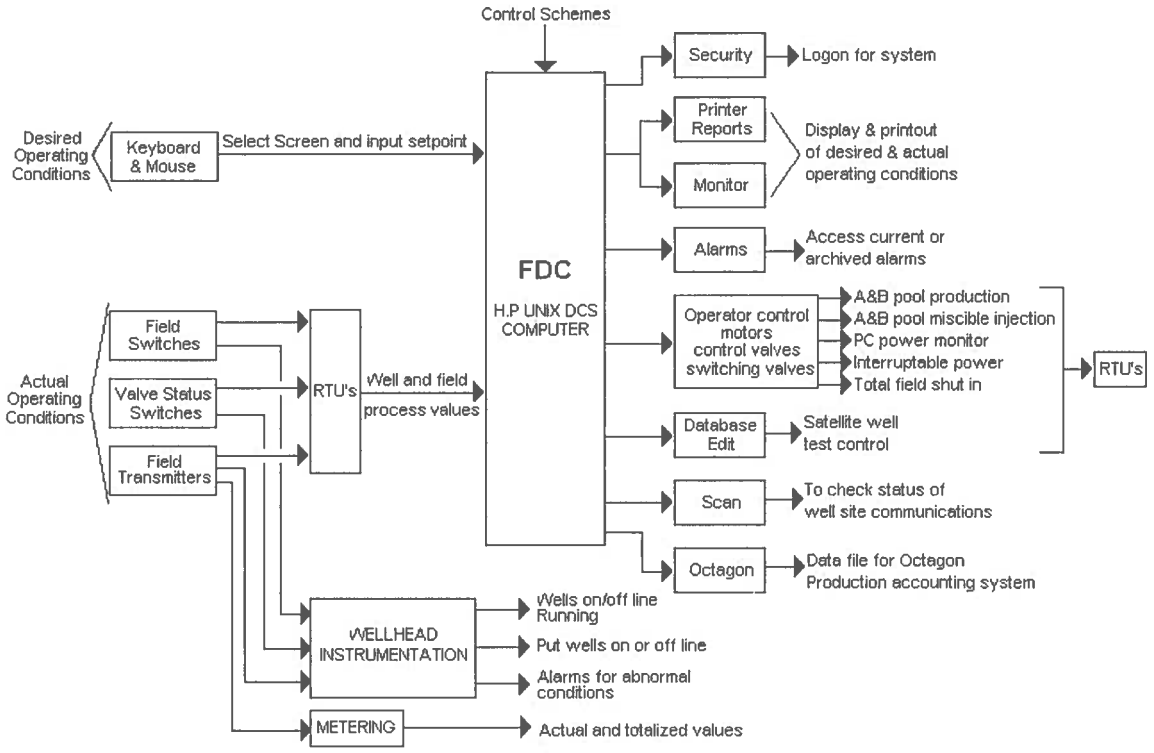


Figure 3-2: Functional Block Diagram

HP-UNIX DCS

TOOLS

All tools are in this section with the text that relates to the diagram.

WHAT ITS FOR

The purpose of the HP-UNIX section is tell the operator what is happening in the field and to enable the operator to start and stop equipment, open, close and modulate valves and operate the wells.

WHAT IT DOES

The computer takes in actual information from the field and desired conditions from the operator and returns the computed information to operate the wells and equipment in the field.

WHAT IT CONSISTS OF

The H.P. Unix DCS section

The H.P. Unix DCS Workstation

The workstation consists of a monitor, mouse and keyboard. The mouse is used to select screens from those displayed on the drop down menus available on the monitor screen and to select controls that need to be used to adjust the operating conditions of the plant. The numeric keys on the keyboard are used to input values to the selected controls. There is also a regular computer keyboard that the operator uses keyboard to input control data and operate the field.

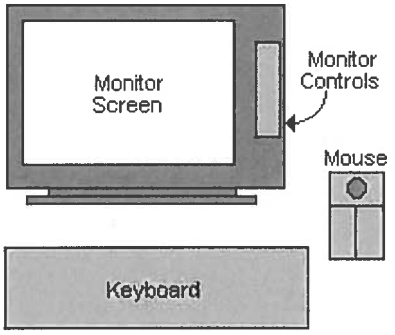


Figure 3-3: HP-UNIX Workstation

HOW IT WORKS

The Hewlett Packard DCS work station provides the operator with information about the operating conditions of the process and enables the operator to take action to control the process. The DCS is used to control most of the areas of operation on the field.

The workstation has interactive screens. These screens have menu bars which activate pull down menus providing access to the other screens. The operator can use the mouse to locate and select the screens that enable the process operating conditions to be monitored and adjusted. The mouse changes shape as you move it and goes from a normal arrow sign to a picture of the mouse that you are holding when you move it to an action screen. Should the mouse (arrow) be moved outside the area of an active screen it will change to the picture of a real mouse. The following figure 3.4 – H.P. – UNIX DCS Screens Ladder Diagram shows the relationship between the menu bars and the flow diagram screens and prompts on the monitor.

See HP – UNIX DCS Screens Ladder Diagram

The first level of the Ladder is the twelve menu bar buttons which are first displayed when you log into the system. The main button is the OPERATOR CONTROL button as it provides access to all operator interactive screens through a series of pulldown screens and screen prompts. We use the ALARM, PRINTER REPORTS and DATABASE EDIT, pulldown menu bar buttons to get some of our reports and enable well testing. The other buttons are used mainly by the technicians who do the computer configuration.

The second level of the Ladder is the pulldown menu activated by the OPERATOR CONTROL menu bar button. This display shows a list of eight items called Schematics (numbered 1-8 on figure 3.4) and the ladder diagram lists the screens that can be accessed and used with each item. Most of the items on the Operator Control pull down menu call up a single screen which, in the case of the first five, (Numbers 1, 2, 3, 4 & 5) is a map of the wells. These screens can then be used to open up more information about each item on the schematic map. The other three items, (Numbers 6, 7 & 8) on the list deal with events taking place in the whole field and some of the Production Complex.

The third level of the Ladder is the menu activated by the list of items displayed on the map. There are seven items for "B" Pool Production map and eight items on the "A" Pool Production map. Each of the items opens up another map or table to display the status of the item selected.

The fourth level of the Ladder is activated by selecting an individual well, satellite or other item on the map which will then display that item as a unit on the interactive screen.

The fifth level of the Ladder provides access to the interactive screens the operator uses to monitor and control the operating conditions in the field. Once an interactive screen is pulled up the operator can change setpoints of controllers and call up some other screens to show more detail about the operating conditions for the selected part of plant displayed on the screen. The types of screens that can be called up are as follows"

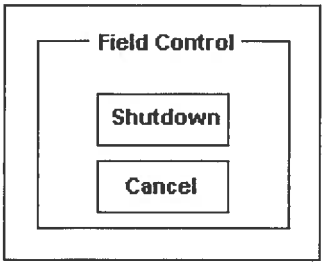
- Controller details (setpoints)
- Trends
- Detail flow diagrams
- Alarms

To logon select the Security button and it will ask for a logon ID. It will then ask for your password which has to be changed every 60 days. Once this is down you have access to the FDC System.

Security Database **Reports Scan Screen** **Reports Trends** **Historian Display** **Config System**	The Security menu bar is used to logon to the screens. Using the Scan menu bar operators can look at certain well communications. These 8 menu bar buttons are not usually used on a day to day basis by the operator.
Database Edit	Menu bar button available calls up: Well Test Editor (available to operators) Database Editor (security) Leak Detector Editor (security) System Variables (security) HP Database Editor (security)
Alarm	Menu bar button available. Calls up list of current alarms as well as archived alarms that can be accessed from the previous days.
Printer Reports	Menu bar button available. Used to print reports of the items that are controlled by the operator.
Operator Control	Menu bar button available on all screens. Calls up two menu's either OBU or GBU menu. We use OBU menu in the field.

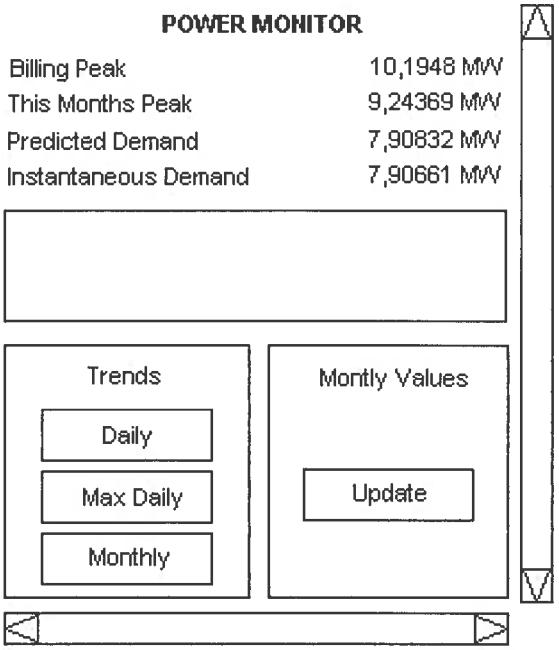
1.	A Pool Production	Fig. 6-12
	Downtime Report	Fig. 6-13
	A Pool G/L Discharge	Fig. 6-14
	Meter 502 Nova (A)	
	Wells in test	Fig. 6-15
	Gas Lift rates	Fig. 6-9 and 18
	RTU Locations	Fig. 6-21
	Sub Power Usage (A)	
	Exit	
2.	B Pool Production	Fig. 6-40
	Downtime Report	
	Wells in test	Fig. 6-42
	Gas Lift rates	Fig. 6-9 and 43
	RTU Locations	Fig. 6-47
	FWKO's (B)	Fig. 6-50 and 51
	K1104 Status (B)	
	Exit	
3.	A Pool Miscible Inj	Fig. 6-28
	A Pool Injection Report	Fig. 6-5

Figure 3-4: HP-UNIX DCS Screens Ladder Diagram



This screen is self explanatory, a click on Shutdown will shutdown all pumpjacks and submersible pumps in A & B Pool.

Figure 3-5: Total Field Shut in Screen

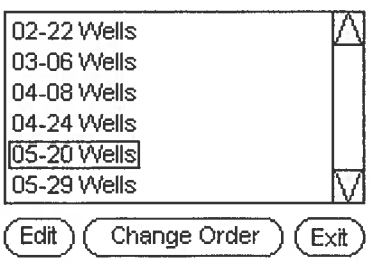


This screen gives a synopsis of where the power demand has peaked for the month and from here you can pick the trends at different intervals.

The Data Base Edit Screen

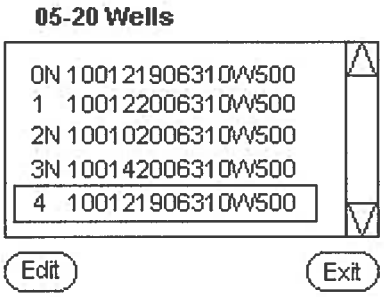
When this menu button is selected it brings up five sub menus, Database Editor, Leak Detect Editor, Well Test Editor, System Variables and HP Database Editor. Due to the levels of security the only one that we can use is the Well Test Editor and from this we get these screens which are opened by highlighting the action that you require.

Figure 3-6: Power Monitor Screen



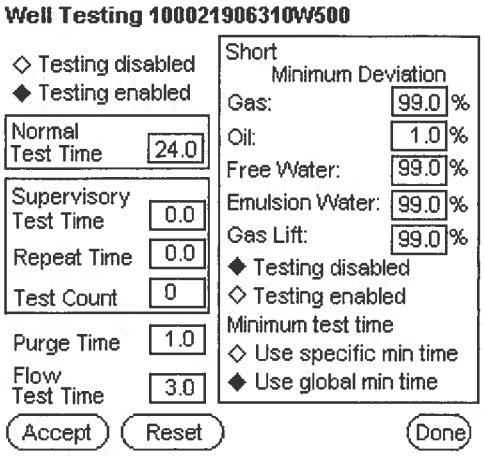
This screen is a list of satellites and when you have highlighted your requirements, as in the above example, we get the following screen.

Figure 3-7: Well Test Satellite Selection Diagram



This shows a list of all the wells associated with the selected satellite and now we can select a specific well for testing.

Figure 3-8: Well Test Selection Diagram



This gives the detail required for putting the well on test or for taking it off test. The right-hand side of the screen works on standard deviations and is not used normally by operators. The left-hand side of the diagram tells us if the well is in the testing sequence or if this is disabled. You have the normal test time but you can also superimpose differing times under supervisory. You can select a test time, say how often you want it repeated and the number of times you want it repeated. For example, if you said the test time you want is 20 hours, to be repeated in 20 hours, for 10 times, and all other wells are on 24 hour tests, then the well you have selected will go on test every other test until 10 times have been used. The purge time set occurs after every test and the flow test time says that if there is no response from the oil meter in the set time the test will abort and go to the next scheduled.

Accept means that you accept the set conditions and reset means that if you have wrongly set new conditions this will take you back to the original settings.

Figure 3-9: Well Test Enabling Diagram

The Alarm Screen

This alarm screen is pulled up when the ALARM button on the menu bar is selected, Archived and Current Alarms can be chosen. They provide a summary of all alarms that have occurred and provide information about the alarm condition. This is a current alarm screen.

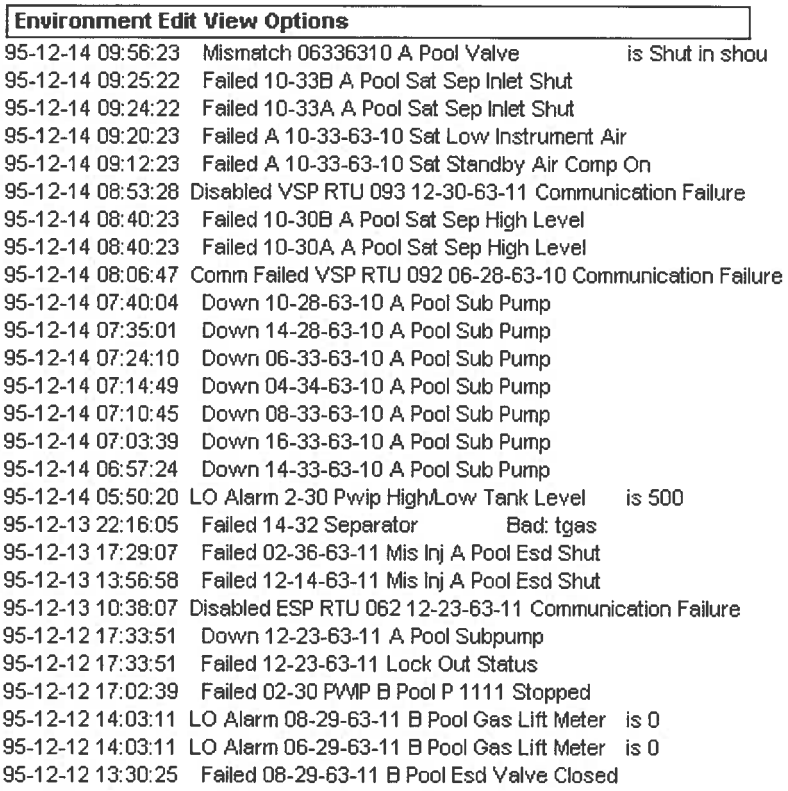


Figure 3-10: Alarm Screen Diagram

Printer Reports

This is a menu button that when opened pulls down a list of screens that can be printed and the list is similar to the items used in the first screen opened by the OPERATOR CONTROL button and is as follows:

- Inj A Pool
- Inj B Pool
- Inter Power Reports
- Alarms
- R. Tap Errors
- Window Dump P. Jet

- Window Dump L. Jet
- Gas Lift A Pool
- Gas Lift B Pool
- Sub Downtime
- Months Peak Power

As can be seen from this list two or three of the items are for use by the system administrator and are not available to us.

Metering

What It Is For

The Metering section provides the operator with the means to control some of the field variables at the desired set points.

What It Does

It takes in current information about the individual field variables and sends back the control signals to be used by the operator.

What It Consists Of

The metering section consists of the following instruments:

- Field located process transmitters
- Panel mounted controllers
- Field located control valves

These control loops are used to control operating conditions in several different areas of operation.

How They Work

Each of the controllers enable the operator to control one process variable such as flow, level, pressure, temperature and so on. The controllers will control the process variable automatically but they also enable the operator to manually control the process variable.

The following description of controller instrumentation is now only at 2-30.

The value of the process variable is measured in the field by a transmitter that transmits the measured value of the process variable to the controller. The transmitter generates a pneumatic signal which corresponds to the measurement value of the process variable. The controller receives this measurement signal and displays the value on the measurement scale.

The controller compares the actual "measurement" with the "setpoint". The setpoint value is input to the controller by operator.

The controller can operate in either of two modes, automatically (Auto) of manually (Man).

In the Auto mode the controller compares measurement to the setpoint and generates a pneumatic output signal which is sent to the control valve. The control valve opening determines the measurement value of the process variable. The pneumatic controller output signal drives the control valve to an opening which will change the measured value of the process variable to equal the setpoint value. The value of the controller pneumatic output signal is displayed on the output indicator of the controller. The output indicator has a scale 0 to 100 which indicates the % opening of the control valve.

In the Manual mode of operation the control valve opening can only be changed by turning the manual adjust knob. The high and low output limit indicators identify the range the output should stay between for normal operating conditions they do not limit the output.

Foxboro Vortex flow meters are used at many sites to feed the RTU's which in turn transmit the information back to the HP DCS.

ANNUNCIATORS

What Is It For

The Annunciator is to warn the operator of an alarm condition in any area of the field.

What Does It Do

An instrument in the field will signal an alarm condition which initiates the annunciator for that instrument.

What Does It Consist Of

The annunciator section consists of:

- FDC alarms
- Acknowledge menu on the FDC
- Field transmitters

How Does It Work

When an instrument in the filed detects an alarm condition, it sends a signal to the FDC of this deviation. The signal goes to the annunciator for that instrument in the HP UNIX DCS computer, which warns the Operator that he has problems. It does this by sounding an alarm and the light for the offending alarm starts to flash until acknowledge of when it becomes steady. The computer records the alarms for the equipment connected to the FDC. All of the rest of the field areas have their own panel.

Wellhead Instrumentation

What Is It For

The wellhead instrumentation is to give the operator the conidtions, on which to make decisions, in any area of the field.

What Does It Do

The wellhead instrumentation measures the current conditions at the wellhead and gives the operator this information.

What Does It Consist Of

The wellhead instrumentation section consists of:

- Local instruments
- Field transmitters

How Does It Work

Wellhead Instrumentation

The local instrumentation measures the local conditions for that well and how it is performing at the current time.

This instrumentation allows the operator to start, stop and adjust wells in the field and gives the status of each well.

Evidence of Good Operation

PERIODIC CHECKS

A glance at selected indicators (e.g., lights, gauges or charts) will help you quickly determine whether your area of operation is working properly.

Check What	Check For	Limits
Gas Pressure to PC	Pressure	3850 kPa to 4200 kPa
Quantity of gas processed	Volume	Optimize flows from each satellite

Figure 3-11: Evidence of Good Operation

Monitoring temperature, pressures, levels and flows around the facility and knowing what is normal will give most of the evidence needed to judge good operation. Sounds and smells are also used as indicators.

FDC Controls – Introduction

What It Is For

The purpose of the FDC Controls is to show how the field can be operated from the FDC location.

What It Does

From the main menu bar, seen when we log into the FDC, we can select the items that we need to operate the field from the FDC location.

What It Consists Of

The main menu bar usually of interest to us contains:

- Alarms
- Database Edit
- Printer Reports
- Operator Control

How It Works

Alarms when we open up this menu item we get

- Current Alarms
- Historical Alarms
- Archived Alarms

We usually use the current alarms item but historical alarms gives the same screen.

Data Base Edit opens up to several items:

- *Data Base Editor*
- *Leak Detect Editor*
- *Well Test Editor*
- *System Variables*
- *HP Data Base Editor*

We can only access well test editor, as the ones in italics are for the use of the technicians.

Printer Reports gives most of the reports of interest to the operator such as:

- *Comm Stats*
- Inj A Pool
- Inj B Pool
- Inter Pwr Report
- *Alarms*
- *R Tap Errors*
- Window Dump PJet
- Window Dump LJet
- Gas Lift A Pool
- Gas Lift B Pool
- Sub Down Time
- Months Peak Power
- All Sub Pump Trend

You will get a report by clicking on the one you require that is in normal type. Those in italics are not available to the operator.

Operator Control just gives one selection "Schematics" and when we open this we get:

- A Pool Production
- A Pool Miscible Injection
- A Pool PWI System
- B Pool Production
- B Pool Injection
- PC Power Monitor
- Water Cut Backs
- Interruptible Power
- Total Field Shut In

We would use the first five items on the list on a daily basis.

Alarm Screen

What Is It For

The Alarm screen has been developed as a tool for field operators to maintain knowledge of the current status of the equipment in the field.

What It Does

The FDC takes in current information about the status of most of the equipment in the field and should anything go wrong with that equipment, it provides a record of that event.

What It Consists Of

It consists of a screen displaying all of the alarms that have occurred during the last couple of days. Records for longer periods are kept within the FDC.

How It Works

Many of the variable measurements in the field have some method of communicating with the FDC and any problems that occur with these measurements will show up on the alarms screen. It will flash and give a regular beep until that alarm has been acknowledged.

Figure 1

Data Base Edit

What It Is For

The Database Edit menu opens up to the Well Test Editor so that we can edit the testing of the wells

What It Does

The FDC takes in current information about the status of the current well testing in the field and allows the operator to change the parameters of a test or the timing of the test.

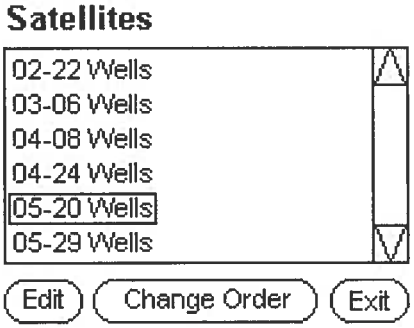
What It Consists Of

It consists of a series of screens opened up in sequence and they are:

- Configure Well Testing
- Satellites
- Wells
- Well Testing
- Change Order

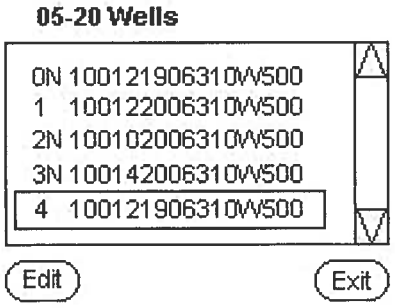
How It Works

Configure Well Testing brings up a screen with boxes for edit, change order and exit. If we click on edit we get the next screen



Satellites gives a list of all of the satellites in the A&B Pool. This also has a box for edit and one for done. We highlight the satellite that we want to look at, in our case 5-50 satellite and then click on edit.

Figure 4-11: Satellites Screen Diagram



Wells gives a list of the wells reporting to the selected satellite and this also has boxes for edit and done. Now we have to select the well that we require, in out case 12-19, so we highlight that well and then click on edit.

Figure 4-12: Wells Screen Diagram

Well Testing is the screen that we get when we click on edit after highlighting as seen above. Down the left side of the screen we have two diamonds, testing disabled and testing enables. Disabled means that the well is NOT in the testing sequence whereas enabled means it will take its turn which is what is highlighted on the screen.

Below this is the normal test time which gives the duration of the test and we show 24 hours. If we want to change the factors for this well we use the supervisory box where we can change the time of the test, how frequently it is to be tested in the current sequence and how many times you want to test at this new repeat time. Below this we have Purge Time which is the time we want to purge before we start a new test and below this, the time that we wait with no flows on the meters before the test aborts and goes to the next well in the sequence.

On the right hand side of the screen the box titled short is if we want to take the test from the standard time to a shorter time. What you would do is set the deviations in flows that you will accept for the test to be completed. In our example we are saying that we are not too interested in what happens to all of the factors except oil. Here we say that as soon as the flow of oil stabilizes to a deviation of 1% this test will finish the next test in sequence will commence. We then have the enabled and disabled diamonds as before, but this side is disabled. And much the same as the other side of the screen we use a minimum test time before the test is aborted and in this case it is the 3 hours shown opposite.

The boxes across the bottom are for accepting the changes, resetting the conditions back to what they were before changes were made and the third box "Done" gets you out of this screen.

Change Order screen is obtained by going back to the Satellites screen and again highlighting the satellite where we want to change the order, then click on change order. This will bring up a list of wells reporting to that satellite and the current order in which they will go into test. You need to change that order by grabbing the wells you want to move and putting them where you want them.

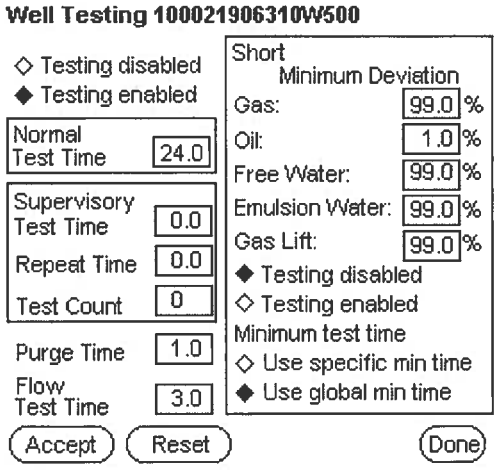


Figure 4-13: Well Testing Screen Diagram

PRINTER REPORTS

What It Is For

The Printer Reports are a hard copy of some of the events taking place in the field.

What It Does

It takes the information from the FDC, that can be seen on the screen and makes a hard copy of some of the more relevant information by just picking the desired report from the list.

What It Consist Of

It consists of a list of reports that are available and they are:

- *Comm Stats*
- Inj A Pool
- Inj B Pool
- Inter Pwr Report
- *Alarms*
- *Rtap Errors*
- Window Dump PJet
- Window Dump LJet
- Gas Lift A Pool
- Gas Lift B Pool
- Sub Down Time
- Months Peak Power
- All Sub Pump Trend

How It Works

The items in italics are not available to the operators and the two Window Dumps will be discussed later.

All of the other items on the list may be printed on the laser printer by just clicking on the report that you want.

Window Dump PJet is much the same as the other items except that when you click on this you will print the item that is on the screen at that time on the colored printer.

Window Dump LJet prints the screen on the black and white printer the same as the other report.

A&B POOL PRODUCTION SCREENS

What It Is For

The A & B Pool Production screens have been developed as a tool for field operations.

What It Does

The FDC takes in current information about the field and provides information on hoe to deal with events that may occur.

What It Consists Of

The field operator at Judy Creek is monitoring many processes at once. Besides watching for abnormal conditions to develop and preventing upset conditions the field operator is really only trying to achieve a few things. The main process related concerns of the field operator are as follows:

- Downtime Report
- A Pool Gas Lift Discharge
- Wells in Test
- Gas Lift Rates
- Sub Power Usage
- RTU's Location
- FWKO's (B Pool)

How It Works

A & B Pool Production screens give a map display of the satellites in the respective pools, together with several prompt instructions seen in the sample screens in the Control Diagrams. From this screen we go to the individual satellite which displays the test separator together with the status of its current test position together with the inlet manifold, from which we can get the current status of each well. If you were to select test on the individual well then the test history will be displayed. These screens are used to ensure that the test program is progressing according to plan and that there are no problems with that separator. Beneath the drawing of the satellite is the air compressor status and a gas lift control panel if applicable for that satellite. This gives the set point and design rate for the individual wells together with the current rate and a 24 hour trend. You need to click on the set point or design rate to change these values or on the 24 trend if you want to see a trend.

Downtime Report provides a screen of the performance of the electrically driven well equipment, i.e. Pumpjacks and Submersibles, for the current day and

yesterday. From this we can determine where the problems with this equipment are or have been.

A Pool Gas Lift Discharge is a trend of the discharge pressure of the gas lift compressors at the PC. We can only observe this screen.

Wells in Test gives a snapshot of the situation and status of each of the satellites in that particular field. It gives the well in test, status of the test, duration of the test and the volumes of oil, gas and water collected in the test.

Gas Lift Rates gives a list of all of the gas lift wells in the pool together with the target rate for that well with the set point, the current rate, the rate for the last hour and the last day. It also gives totals for all of the wells.

Sub Power Usage gives a graph of the power going to the field over the last 24 hours.

RTU's Location is a map of where the RTU's are located and the satellites that they serve.

FWKO's brings up a map of the 2-30 plant together with the free water knock outs and the 4-20 compressor station, all in B Pool. The current conditions at each of the places is also displayed. If you click on one of the figures on the map you will get a trend of the last 24 hours conditions.

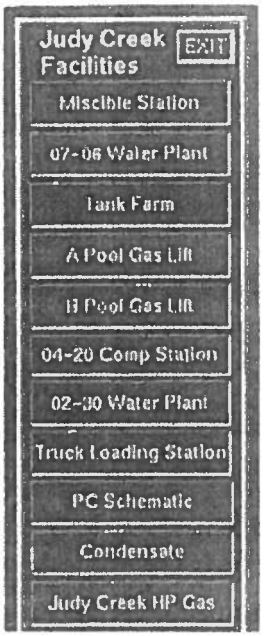


Figure 2

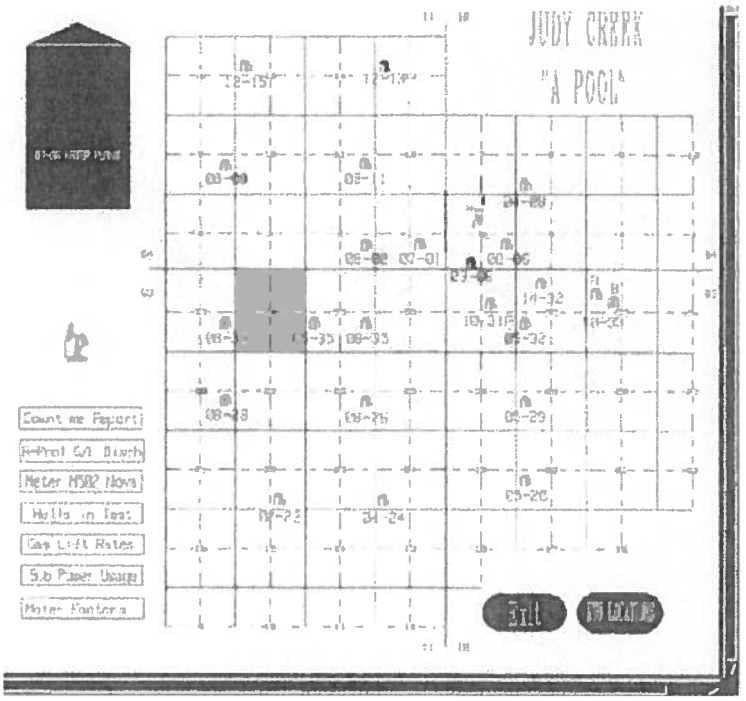


Figure 3

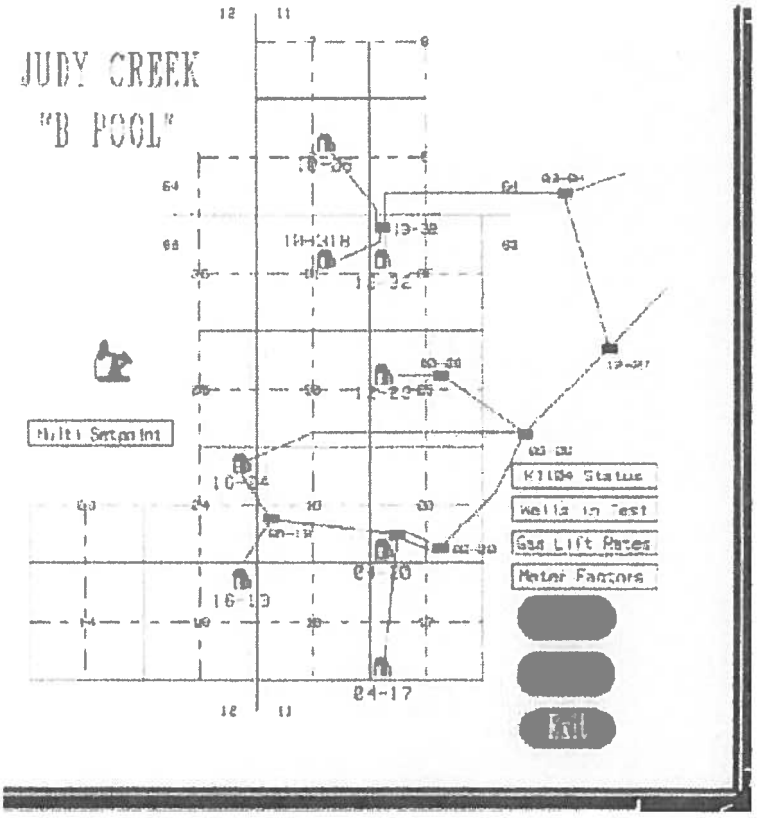


Figure 4

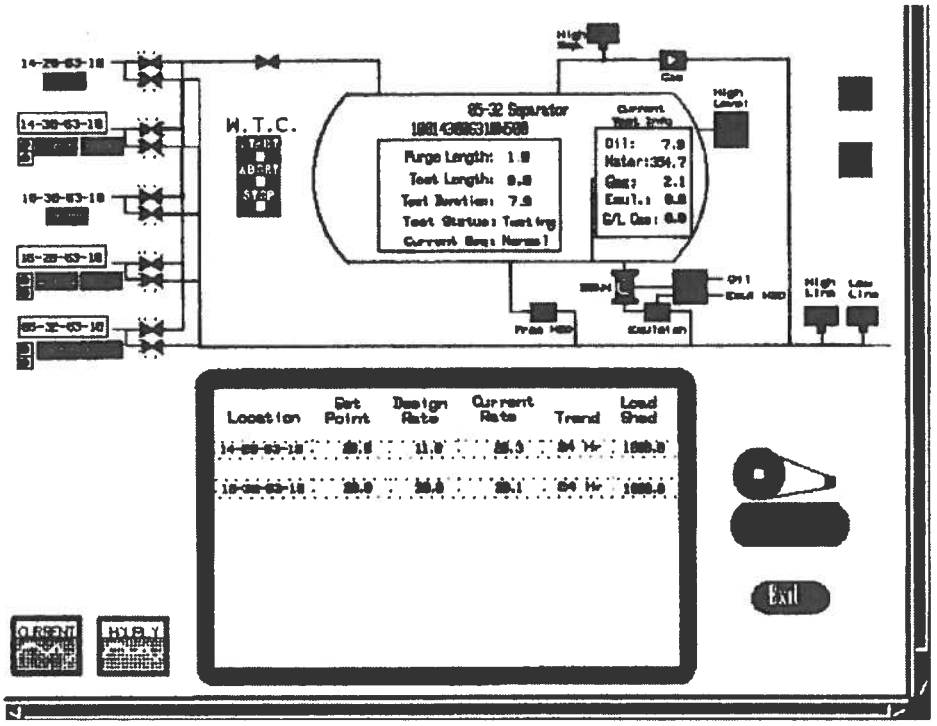


Figure 5

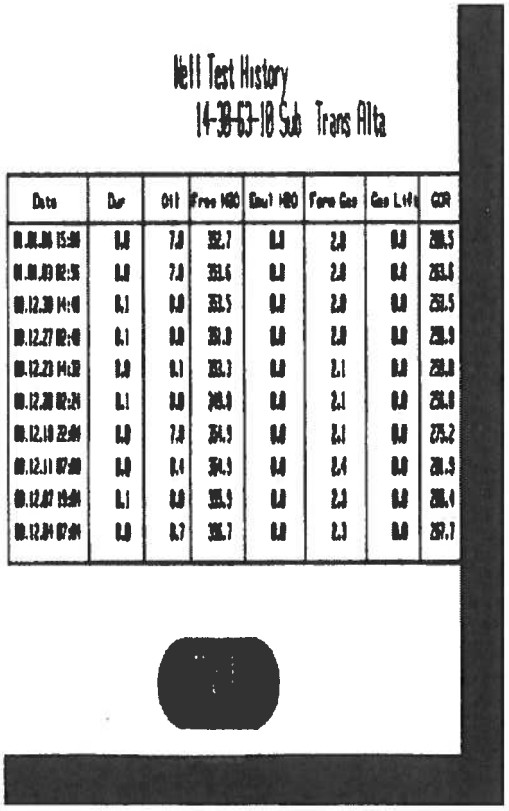


Figure 6

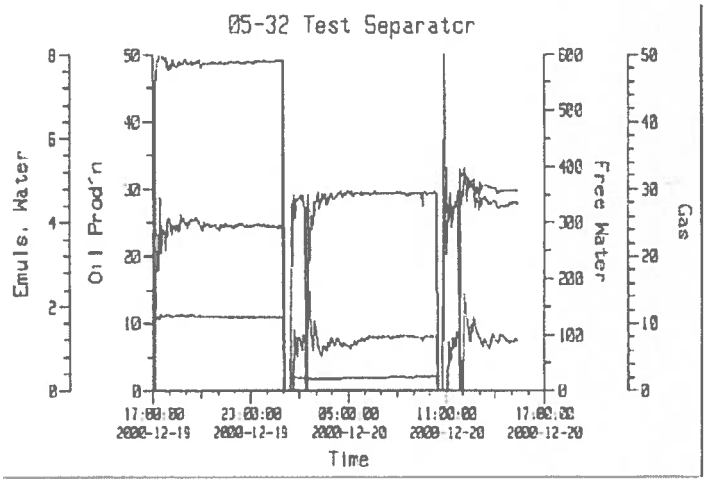


Figure 7

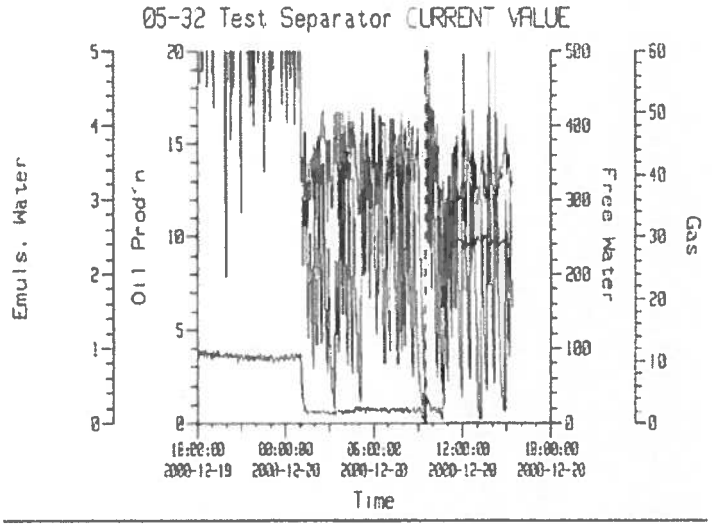


Figure 8

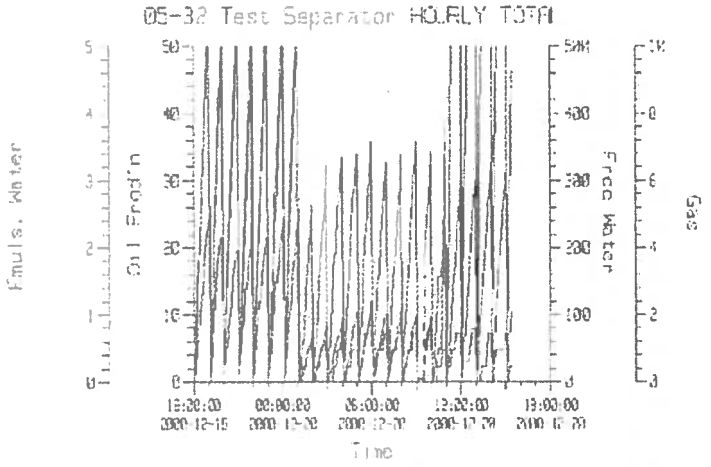


Figure 9

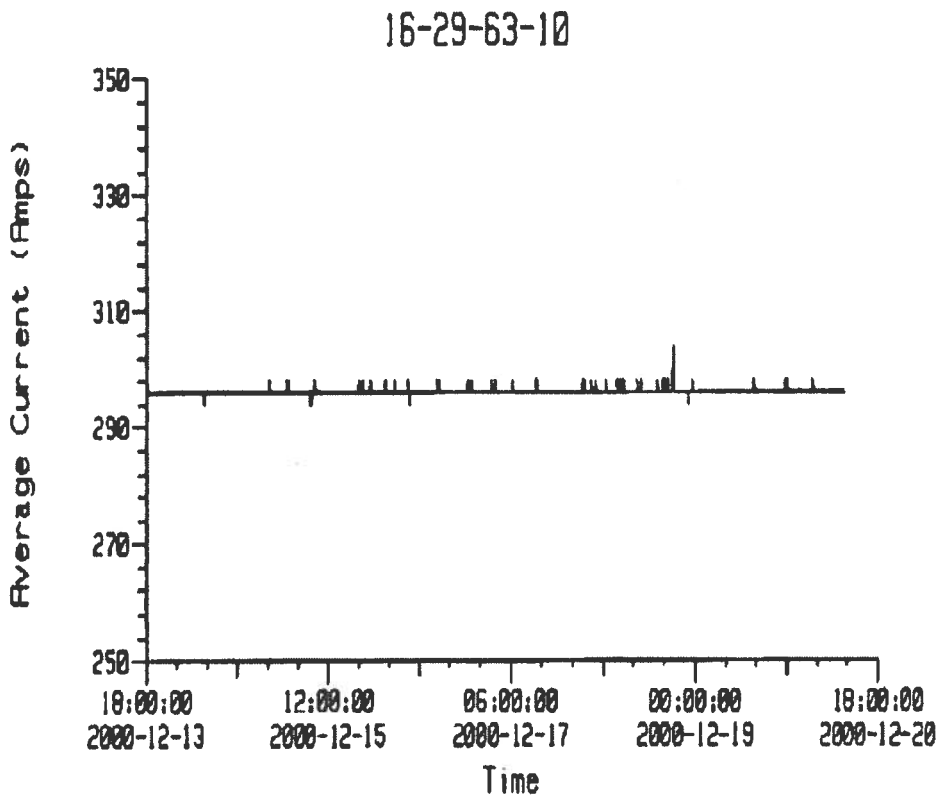


Figure 10

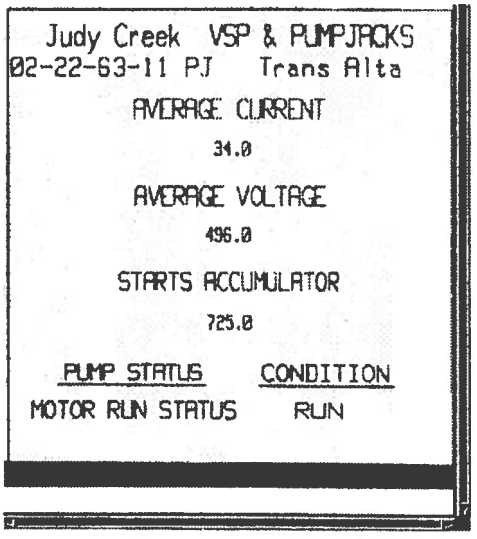


Figure 11

Pumpjack and Submersible Pump Down Time Report 13-06-06 09:05:38

Wells	Power Company	Current Day Down Time Hrs	Previous Day Down Time Hrs
02-22-63-11 PJ	Trans Alta	0.00	0.00
04-23-63-11 Sub	Trans Alta	0.00	0.00
10-23-63-11 Sub	Trans Alta	0.00	0.00
11-07-64-10 Sub	Alta Power	0.00	0.00
02-23-63-11 PJ	Trans Alta	0.00	0.00
04-14-63-11 Sub	Trans Alta	0.00	0.00
06-23-63-11 Sub	Trans Alta	??????	??????
06-24-63-11 Sub	Trans Alta	0.00	0.00
08-23-63-11 PJ	Trans Alta	0.00	0.00
10-14-63-11 Sub	Trans Alta	0.00	0.00
12-18-63-10 PJ	Trans Alta	0.00	0.00
14-23-63-11 Sub	Trans Alta	0.84	0.00
16-23-63-11 Sub	Trans Alta	0.00	0.00
04-26-63-10 PJ	Trans Alta	0.00	0.10
10-26-63-10 PJ	Trans Alta	??????	??????
10-19-63-10 PJ	Trans Alta	0.00	0.00
12-26-63-10 Sub	Trans Alta	0.00	0.00
12-21-63-10 Sub	Trans Alta	0.00	0.00
16-24-63-11 Sub	Trans Alta	0.00	0.00
02-29-63-10 Sub	Trans Alta	0.00	0.00
08-29-63-10 Sub	Trans Alta	0.00	0.00
08-30-63-10 Sub	Trans Alta	0.00	0.00
14-19-63-10 Sub	Trans Alta	??????	??????
16-19-63-10 Sub	Trans Alta	0.00	0.00
06-32-63-10 PJ	Trans Alta	0.00	0.00
14-30-63-10 Sub	Trans Alta	0.00	0.00
16-29-63-10 Sub	Trans Alta	0.00	0.00
04-26-63-11 Sub	Trans Alta	0.00	0.00
04-35-63-11 Sub	Trans Alta	0.00	0.00
08-27-63-11 PJ	Trans Alta	0.00	0.00
08-34-63-11 Sub	Trans Alta	0.00	0.00
14-26-63-11 PJ	Trans Alta	0.00	0.00
14-29-63-11 Sub	Trans Alta	0.00	0.00
16-27-63-11 Sub	Trans Alta	0.00	0.00
16-34-63-11 Sub	Trans Alta	0.00	2.27
14-36-63-11 Sub	Trans Alta	0.00	0.00
16-36-63-11 Sub	Trans Alta	0.00	0.00
02-02-64-11 Sub	Alta Power	0.00	0.00
06-02-64-11 Sub	Alta Power	0.00	0.00
08-02-64-11 Sub	Alta Power	0.00	0.00
08-03-64-11 Sub	Alta Power	0.00	0.00
10-02-64-11 PJ	Alta Power	0.00	0.21
10-03-64-11 Sub	Alta Power	0.00	0.00
12-01-64-11 PJ	Alta Power	0.00	0.30
14-02-64-11 Sub	Alta Power	0.00	1.71
14-03-64-11 Sub	Alta Power	??????	??????
16-05-64-10 Sub	Alta Power	0.00	0.00
02-10-64-11 Sub	Alta Power	0.00	0.00
10-10-64-11 Sub	Alta Power	0.00	0.00
02-11-64-11 Sub	Alta Power	??????	??????
04-12-64-11 PJ	Alta Power	0.00	0.00
12-11-64-11 PJ	Alta Power	0.00	0.10
16-02-64-11 Sub	Alta Power	0.00	0.00
16-11-64-11 Sub	Alta Power	0.00	0.00
04-26-63-11 Sub	Trans Alta	0.00	0.00
08-25-63-11 Sub	Trans Alta	0.00	0.00
10-24-63-11 Sub	Trans Alta	0.00	0.00
14-25-63-11 Sub	Trans Alta	0.00	0.00
16-26-63-11 Sub	Trans Alta	0.00	0.00
02-27-63-11 Sub	Trans Alta	0.00	0.00
12-27-63-11 Sub	Trans Alta	0.00	0.00
02-34-63-11 Sub	Trans Alta	0.00	0.00
06-03-64-11 Sub	Alta Power	0.00	0.00
12-03-64-11 Sub	Alta Power	0.00	0.00
12-34-63-11 Sub	Trans Alta	0.00	0.00
06-35-63-11 Sub	Trans Alta	0.00	0.00
08-35-63-11 Sub	Trans Alta	0.00	0.00
14-35-63-11 Sub	Trans Alta	0.00	0.00
08-36-63-11 Sub	Trans Alta	0.00	0.00
16-25-63-11 Sub	Trans Alta	0.00	0.00
02-13-64-11 PJ	Alta Power	0.00	0.00
04-13-64-11 PJ	Alta Power	0.00	0.00
12-13-64-11 PJ	Alta Power	0.00	0.00
14-14-64-11 PJ	Alta Power	0.00	0.00
07-22-64-11 Sub	Alta Power	0.00	0.00
04-15-64-11 PJ	Alta Power	0.00	0.00
10-15-64-11 PJ	Alta Power	0.00	0.00
08-05-64-10 Sub	Alta Power	0.00	0.00
02-04-64-10 Sub	Trans Alta	0.00	0.00
04-33-63-10 Sub	Trans Alta	0.00	0.00
11-04-64-10 Sub	ATCO Power	0.00	0.00
14-33-63-10 Sub	Trans Alta	0.00	0.00
02-34-63-10 Sub	Trans Alta	0.00	0.00
04-28-63-10 Sub	Trans Alta	1.86	24.00
06-33-63-10 Sub	Trans Alta	0.00	0.00
10-28-63-10 Sub	Trans Alta	0.00	0.00
14-28-63-10 Sub	Trans Alta	1.87	24.00
14-33-63-10 Sub	Trans Alta	0.00	0.00
06-20-63-11 Sub	Trans Alta	0.00	0.00
02-06-64-11 Sub	ATCO Power	0.00	0.00
12-13-63-12 Sub	Trans Alta	0.00	0.00
12-18-63-11 PJ	Trans Alta	0.00	0.00
04-30-63-11 PJ	Trans Alta	0.00	0.00
12-19-63-11 PJ	Trans Alta	0.00	0.00
12-30-63-11 Sub	Trans Alta	0.00	0.00

Figure 12

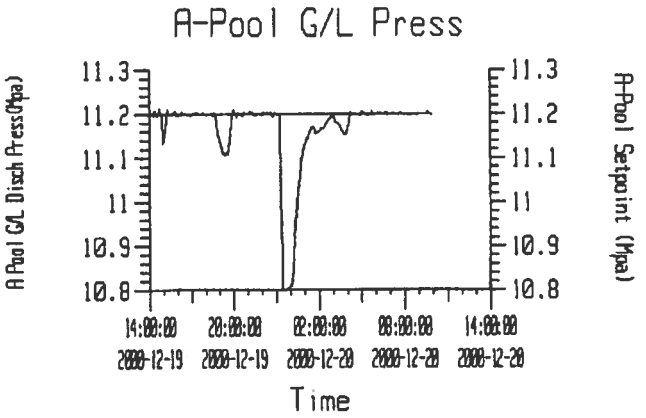
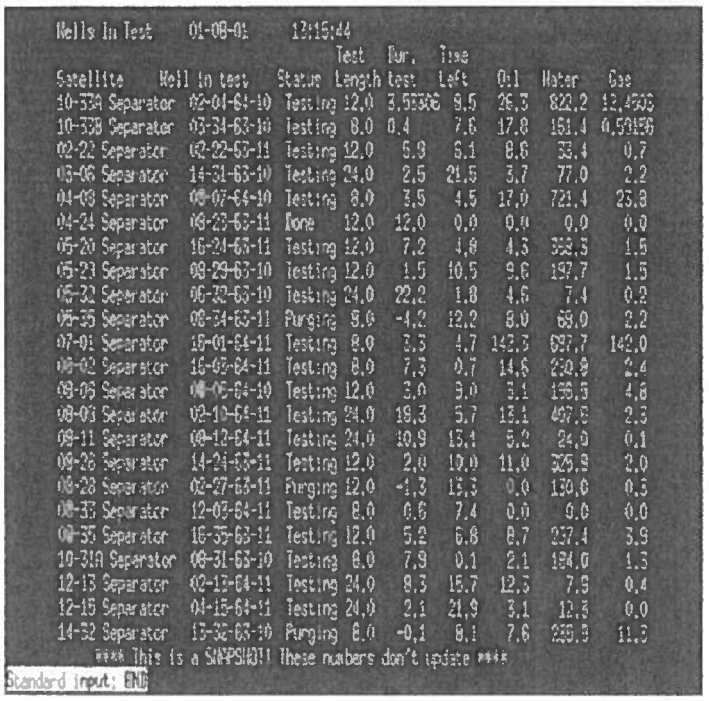


Figure 13



Wells In Test 01-08-01 12:15:44

Satellite	Well in test	Status	Test Length	Dur. test	Time Left	Oil	Water	Gas
10-33A Separator	02-04-63-10	Testing	12.0	3.5	8.5	26.3	822.2	12.4
10-33B Separator	03-34-63-10	Testing	8.0	0.4	7.6	17.8	161.4	0.5
02-22 Separator	02-22-63-11	Testing	12.0	5.9	6.1	8.6	33.4	0.7
03-06 Separator	14-31-63-10	Testing	24.0	2.5	21.5	3.7	77.0	2.2
04-03 Separator	08-07-64-10	Testing	8.0	3.5	4.5	17.0	721.4	23.8
04-24 Separator	08-23-63-11	None	12.0	12.0	0.0	0.0	0.0	0.0
05-20 Separator	16-24-63-11	Testing	12.0	7.2	4.8	4.3	353.5	1.5
05-23 Separator	08-29-63-10	Testing	12.0	1.5	10.5	9.6	197.7	1.5
05-33 Separator	06-32-63-10	Testing	24.0	22.2	1.8	4.6	7.4	0.2
05-35 Separator	08-34-63-11	Purging	8.0	-4.2	12.2	8.0	69.0	2.2
07-01 Separator	15-01-64-11	Testing	8.0	3.3	4.7	142.3	697.7	142.0
08-02 Separator	15-02-64-11	Testing	8.0	7.3	0.7	14.6	230.9	2.4
08-05 Separator	08-05-64-10	Testing	12.0	3.0	9.0	3.1	135.5	4.6
08-03 Separator	02-10-64-11	Testing	24.0	18.3	5.7	13.1	497.5	2.3
09-11 Separator	08-12-64-11	Testing	24.0	10.9	13.1	5.2	24.0	0.1
09-26 Separator	14-24-63-11	Testing	12.0	2.0	10.0	11.0	326.9	2.0
09-28 Separator	02-27-63-11	Purging	12.0	-1.3	13.3	0.0	130.0	0.3
08-33 Separator	12-07-64-11	Testing	8.0	0.6	7.4	0.0	0.0	0.0
08-35 Separator	15-35-63-11	Testing	12.0	5.2	6.8	8.7	237.4	3.9
10-31A Separator	08-31-63-10	Testing	8.0	7.9	0.1	2.1	184.0	1.3
12-13 Separator	02-13-64-11	Testing	24.0	8.3	15.7	12.3	7.9	0.4
12-15 Separator	04-15-64-11	Testing	24.0	2.1	21.9	3.1	12.3	0.0
14-32 Separator	15-32-63-10	Purging	8.0	-0.1	8.1	7.6	230.9	11.3

**** This is a SNAPSHOT! These numbers don't update ****

Standard Input: END

Figure 14

Gas Lift Rates (MCF/DAY) 12-28-00 09:55:47

Well	Target Rate	Set Point	Current Rate	Last Hour	Last Day	Tubing Press	Casing Press	Injectio Press
14-31-63-10	11.0		34.0	31.5	33.0	*******	*******	11183.0
06-07-64-10	11.0	0.0	0.0	0.0	0.0	2964.0	11169.0	11137.0
06-08-64-10	21.0	12.0	0.0	0.0	0.0	1123.0	11392.0	11095.0
08-07-64-10	12.0	15.0	16.8	16.7	15.0	3736.0	10436.0	11464.0
08-08-64-10	25.0	20.0	23.4	19.9	20.1	1551.0	9816.0	11214.0
12-08-64-10	11.0	17.0	19.9	16.8	13.2	1684.0	7904.0	11165.0
14-08-64-10	26.0	20.0	0.0	0.0	0.0	980.0	11120.0	11160.0
14-06-64-10	11.0	25.0	26.1	25.2	25.1	2681.0	10204.0	11125.0
14-29-63-10	11.0	20.0	22.5	20.1	20.1	588.0	7396.0	11138.0
16-30-63-10	30.0	20.0	31.9	27.9	30.1	0.0	9698.0	11069.0
01-01-64-11	26.0	26.0	30.0	25.0	26.1	1489.0	6748.0	11070.0
04-01-64-11	36.0	35.0	41.6	34.6	35.2	1513.0	9740.0	11190.0
08-01-64-11	33.0	30.0	34.8	29.7	30.2	1113.0	8976.0	11013.0
09-01-64-11	23.0	23.0	26.4	23.0	23.1	1049.0	8900.0	11170.0
16-01-64-11	20.0	0.0	0.0	0.0	0.0	6783.0	8464.0	8782.0
01-06-64-10	10.0	25.0	25.3	25.1	25.1	1110.0	10704.0	11397.0
08-05-64-10	10.0	20.0	23.3	19.9	20.1	1310.0	8824.0	11129.0
08-06-64-10	10.0	25.0	26.0	25.8	26.2	1649.0	9132.0	11115.0
16-06-64-10	26.0	0.0	0.0	0.0	0.0	3843.0	6316.0	8826.0
06-31-63-10	25.0		30.6	33.0	33.2	*******	*******	*******
08-31-63-10	33.0		30.4	25.9	25.9	*******	*******	*******
11-31-63-10	33.0		32.7	30.0	27.8	*******	*******	*******
03-05-64-10	16.0		0.0	1.0	0.0	*******	*******	*******
06-32-63-10	34.0		33.4	30.5	19.0	*******	*******	*******
11-32-63-10	21.0	20.0	23.5	19.9	20.1	*******	*******	11252.0
13-32-63-10	0.0	30.0	34.6	30.1	30.2	*******	*******	11187.0
15-32-63-10	39.0		6.8	5.8	5.2	*******	*******	*******
			-------	-------	-------			
Total Gas Lift Rates (MCF/DAY)			572.4	504.3	502.4			

Louisa Creek (MCF/DAY)	Current Rate	Last Hour	Last Day
	--------	-------	-------
Dove Meter M502 (MCF/DAY)	0.0	0.0	0.0

Figure 15

Gas Lift Rates (E3D/DAY) 12-20-00 09:55:45

Well	Target Rate	Set Point	Current Rate	Last Hour	Last Day	Tubing Press Current Value KPA	Casing Press Current Value KPA	Injection Press Current Value KPA
06-17-63-11	13.0	27.0	29.6	27.0	27.0	2042.0	12544.0	13527.0
08-18-63-11	26.0	33.0	36.9	33.4	33.1	2834.0	16756.0	13725.0
10-17-63-11	17.0	30.0	33.6	30.7	30.1	2068.0	11912.0	13671.0
16-07-63-11	13.0	13.0	12.7	12.1	12.1	2353.0	9546.0	13743.0
06-20-63-11	15.0	30.0	33.7	29.9	30.1	2346.0	10496.0	13496.0
08-19-63-11	23.0	30.0	33.6	30.2	30.1	4516.0	11260.0	13482.0
10-17-63-11	30.0	30.0	33.6	30.0	30.3	2381.0	12288.0	13942.0
14-20-63-11	26.0	30.0	33.3	29.9	30.0	2251.0	11432.0	13683.0
15-19-63-11	34.0	34.0	30.5	34.1	34.1	1096.0	11353.0	13705.0
16-19-63-11	20.0	20.0	22.0	21.9	20.1	2148.0	13456.0	13826.0
08-06-64-11	22.0	30.0	33.6	30.4	30.2	3403.0	13304.0	13895.0
02-31-63-11	13.0	15.0	16.6	15.0	15.1	1972.0	12413.0	13442.0
06-31-63-11	31.0	31.0	35.5	31.3	31.2	3787.0	12840.0	13366.0
10-31-63-11	28.0	25.0	27.9	26.9	25.1	1972.0	11844.0	13589.0
04-32-63-11	25.0	26.0	31.0	28.0	26.1	1867.0	12836.0	13399.0
06-29-63-11	18.0	25.0	29.4	25.2	25.1	1662.0	7908.0	13496.0
08-29-63-11	25.0	15.0	16.8	14.8	15.1	3909.0	13216.0	13673.0
08-30-63-11	28.0	30.0	33.2	30.2	30.1	2653.0	12576.0	13663.0
16-20-63-11	26.0	0.0	0.0	0.0	0.0	985.0	2748.0	7000.0
16-30-63-11	10.0	25.0	29.2	24.9	25.1	1723.0	12704.0	13635.0
06-32-63-11	29.0	24.0	26.4	24.0	24.1	1684.0	13384.0	13311.0
12-32-63-11	38.0	42.0	47.6	40.9	40.3	1476.0	11326.0	13446.0
16-31-63-11	36.0	36.0	40.5	36.2	36.4	1363.0	12913.0	13846.0
10-19-63-11	25.0	30.0	33.2	30.3	30.1	2015.0	13396.0	13726.0
12-30-63-11	18.0	22.0	24.5	22.1	22.0	3020.0	10444.0	13590.0
Total Gas Lift Rates (E3D/DAY)			721.1	647.2	704.9			

Figure 16

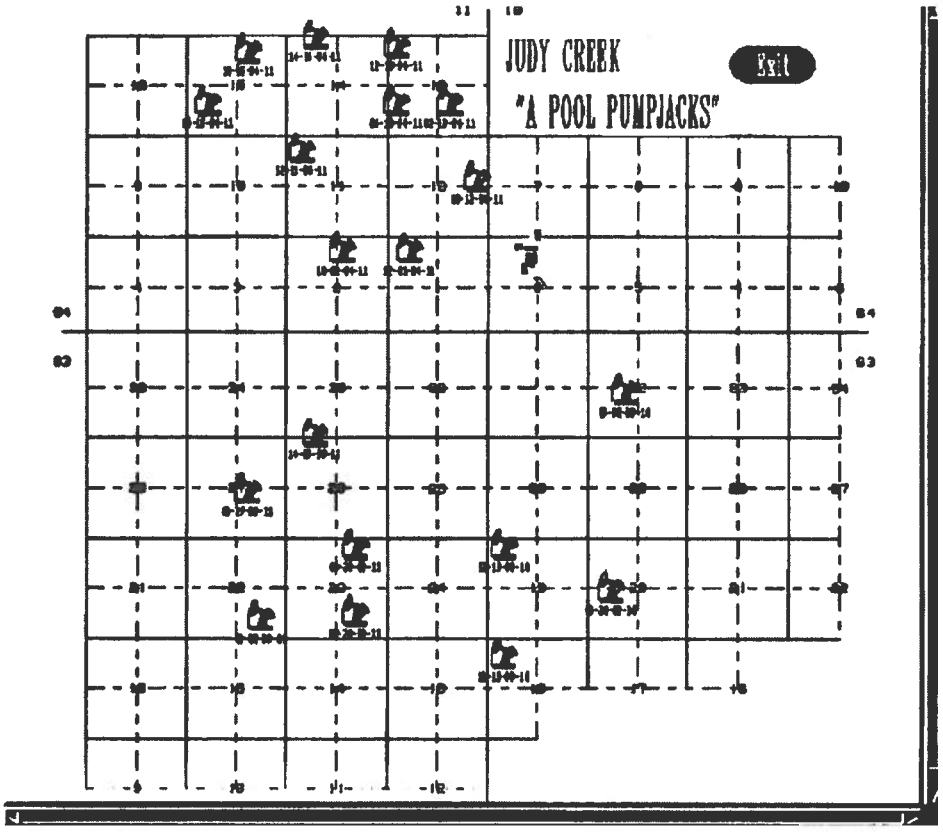


Figure 17

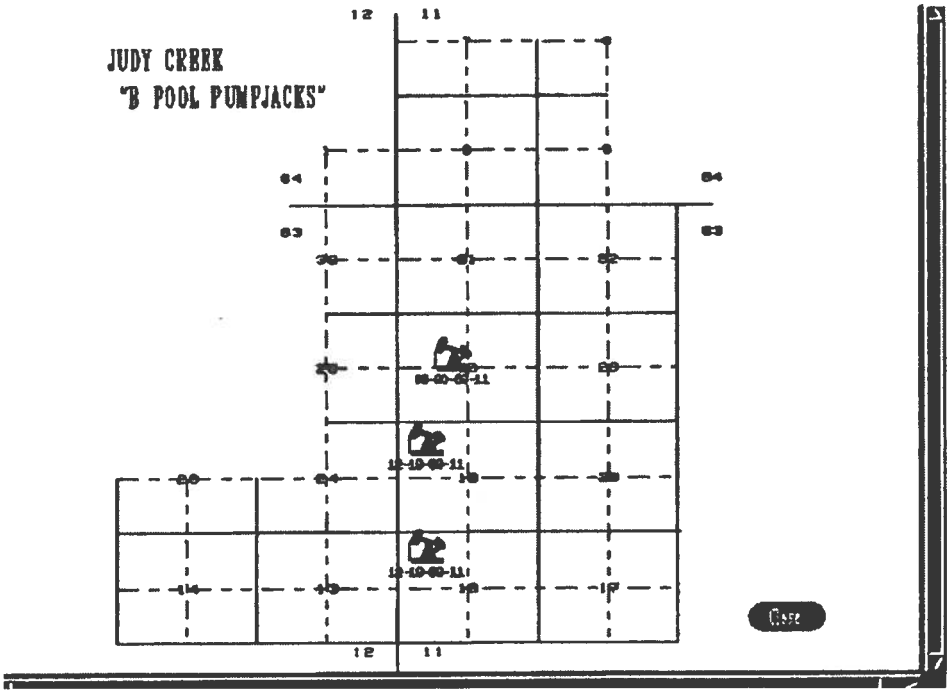


Figure 18

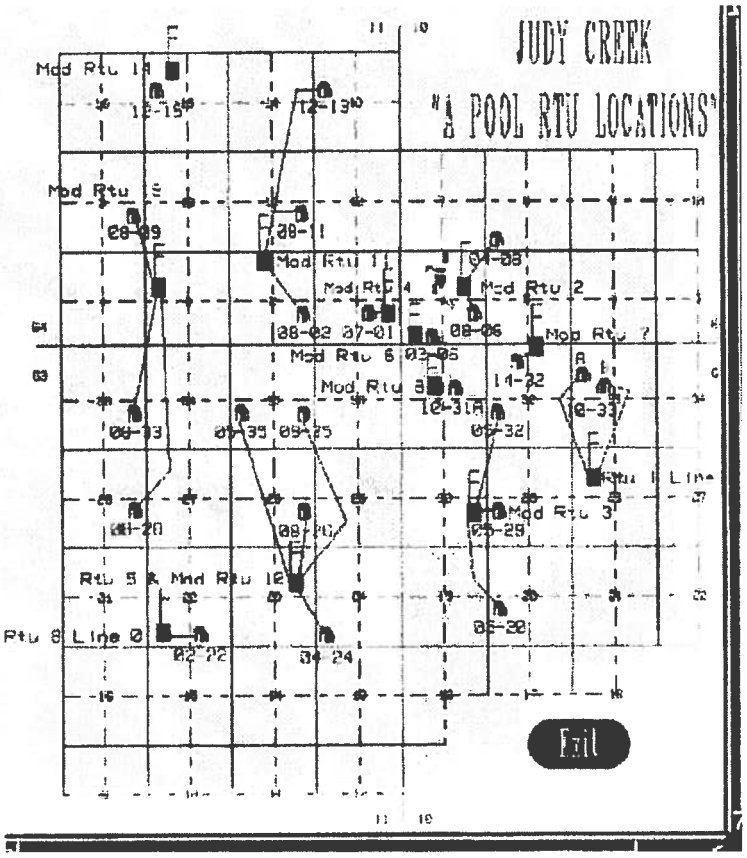


Figure 19

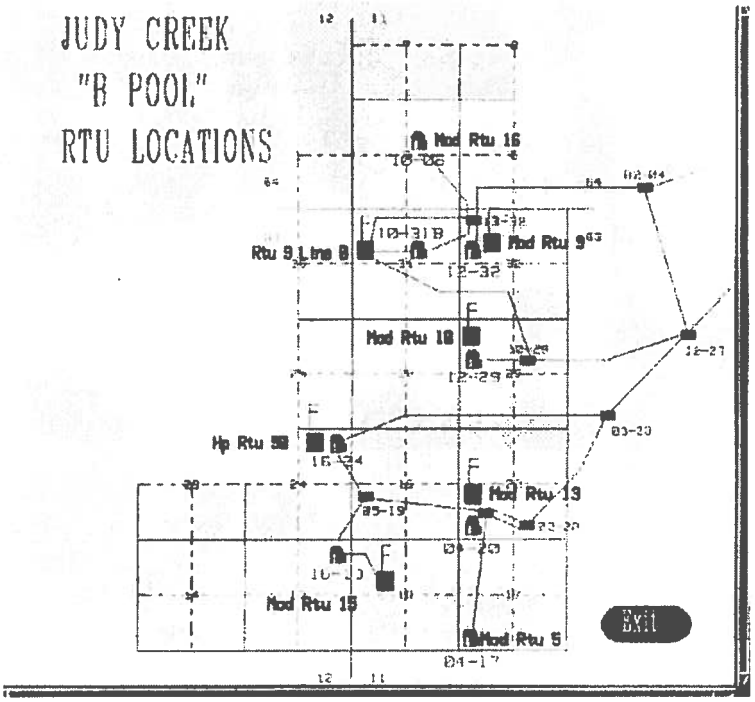


Figure 20

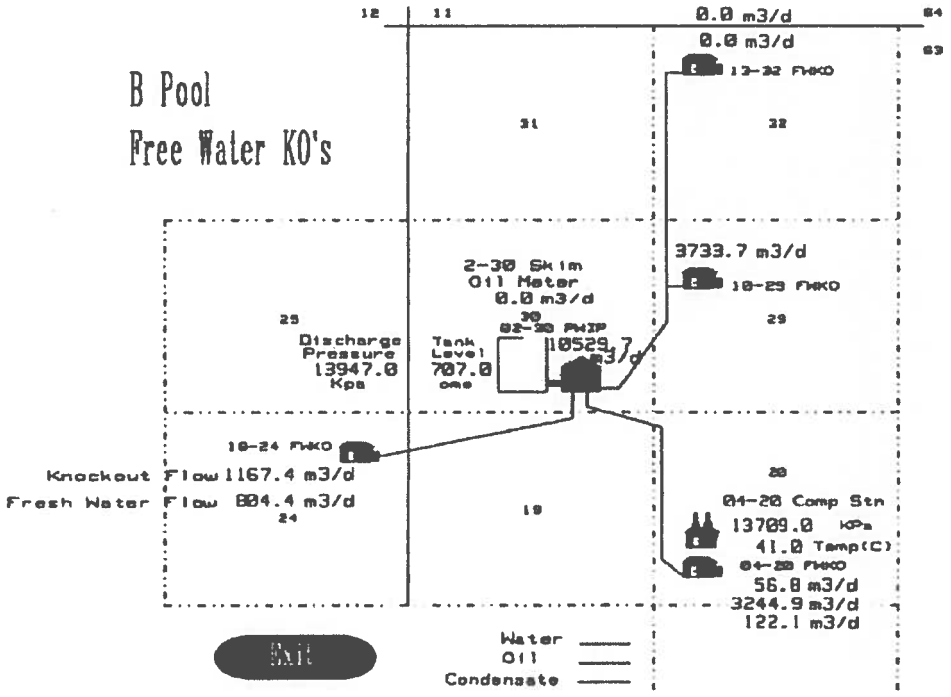


Figure 21

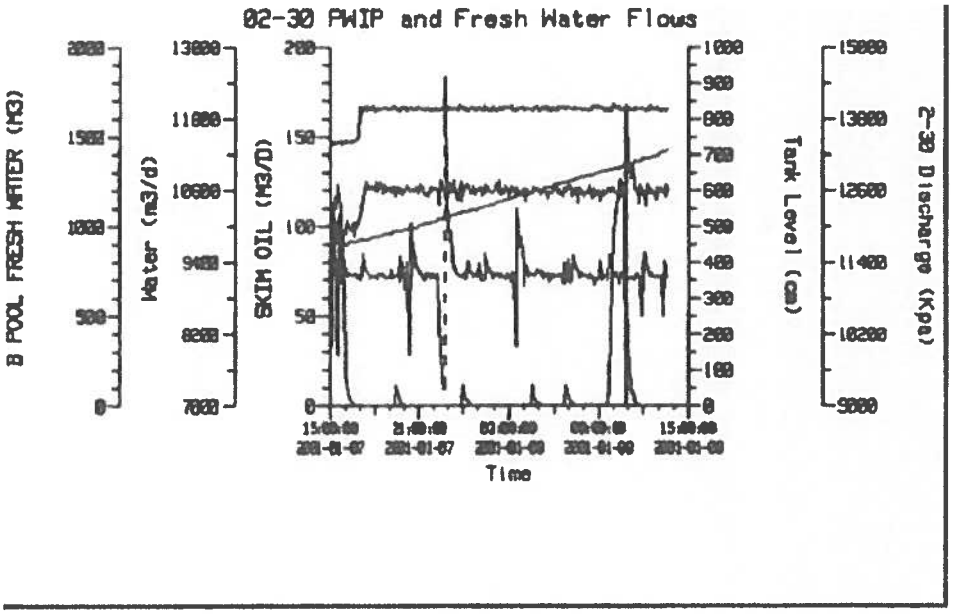


Figure 22

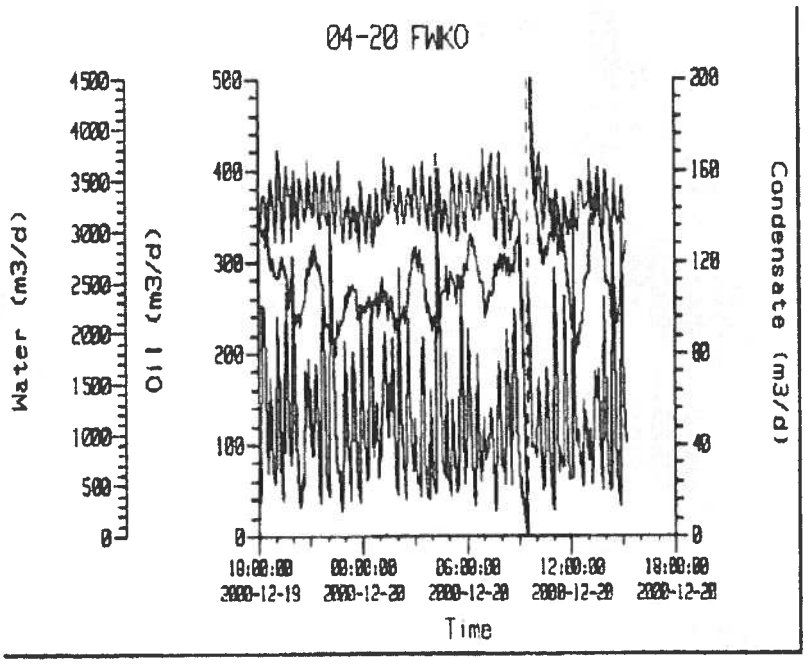


Figure 23

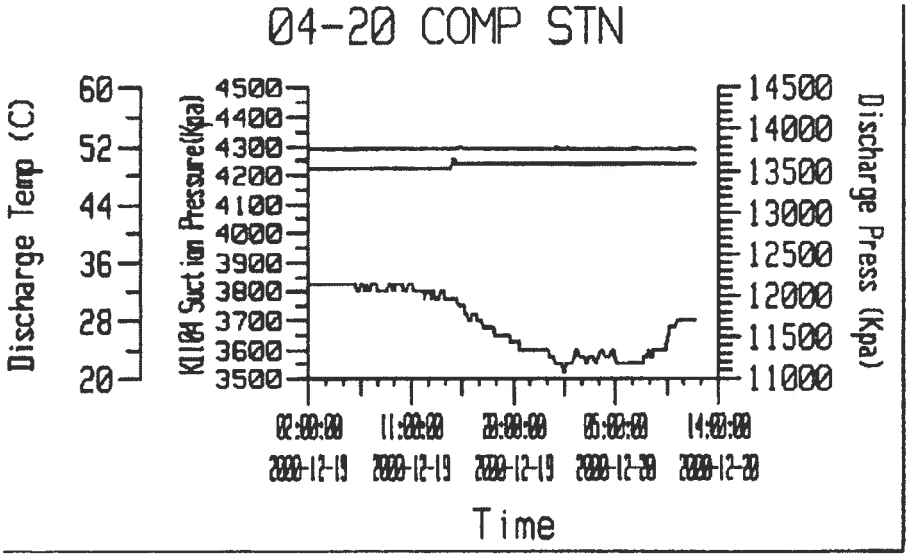


Figure 24

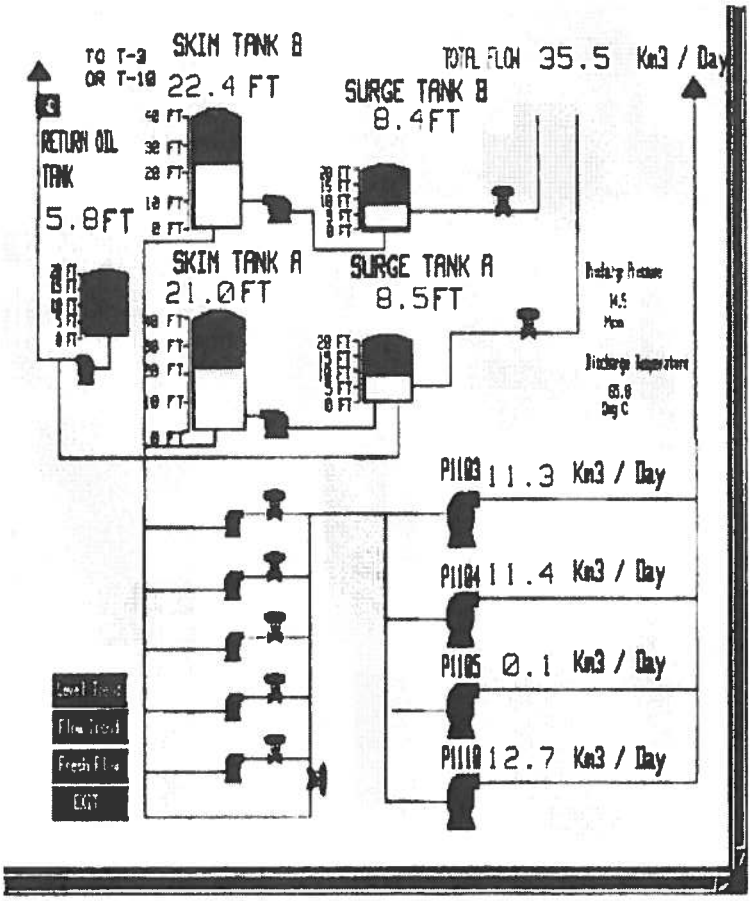


Figure 25

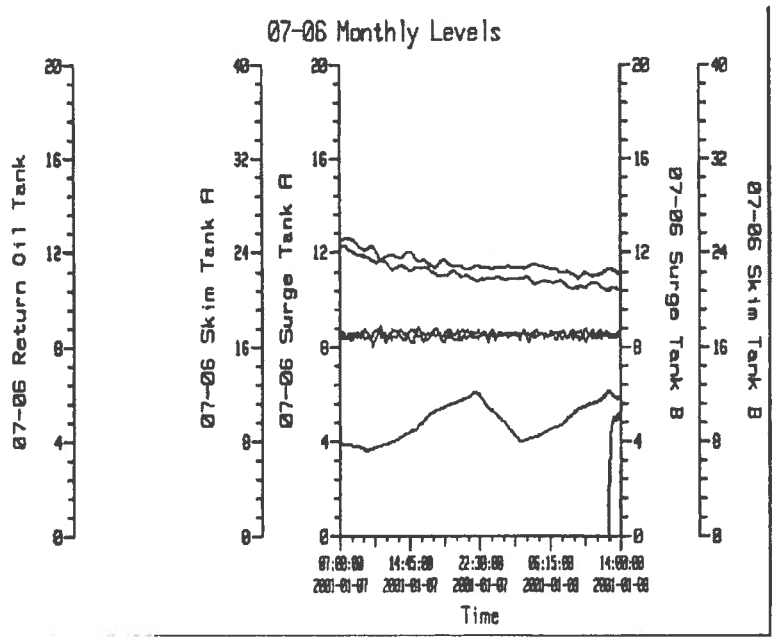


Figure 26

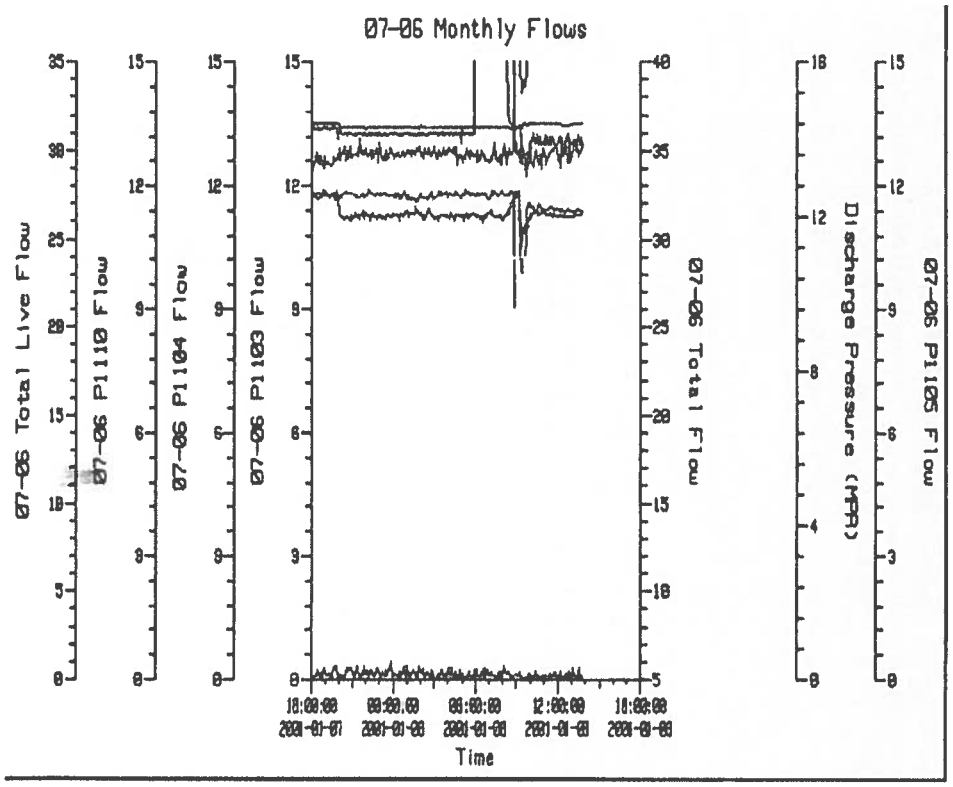


Figure 27

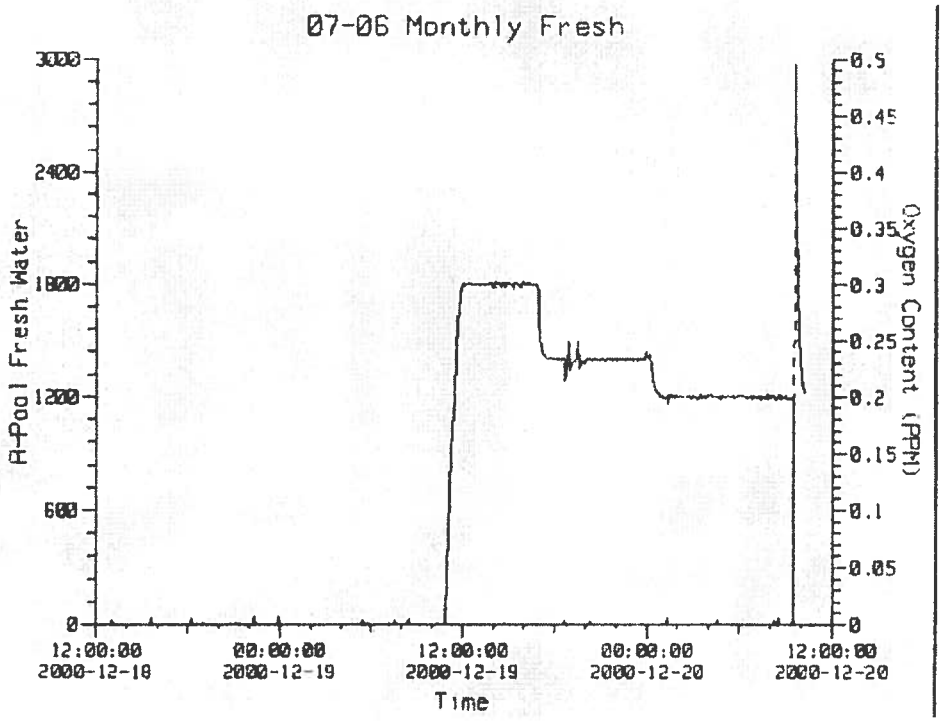


Figure 28

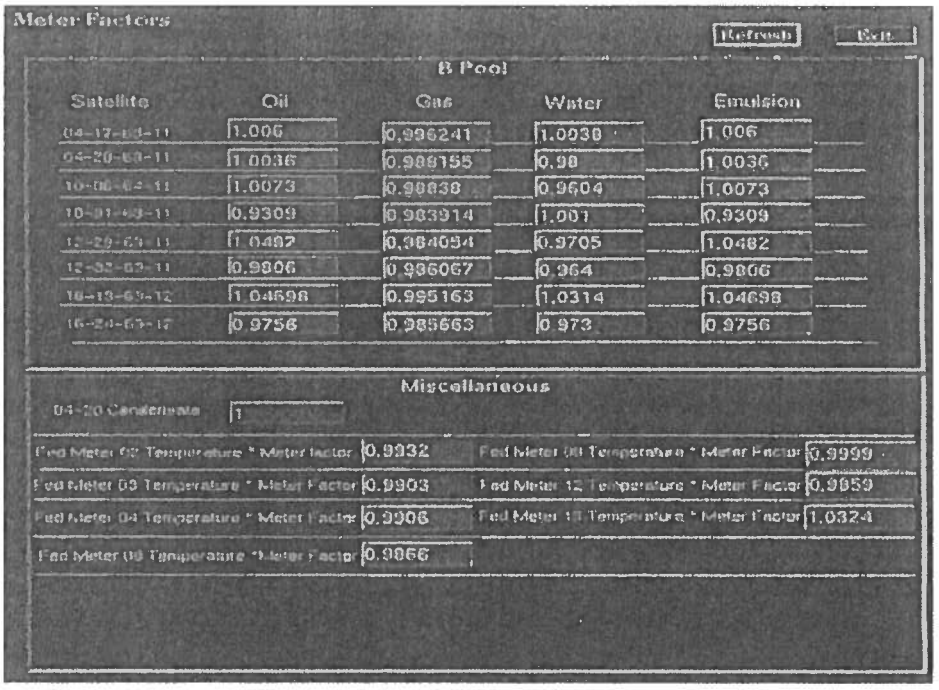


Figure 29

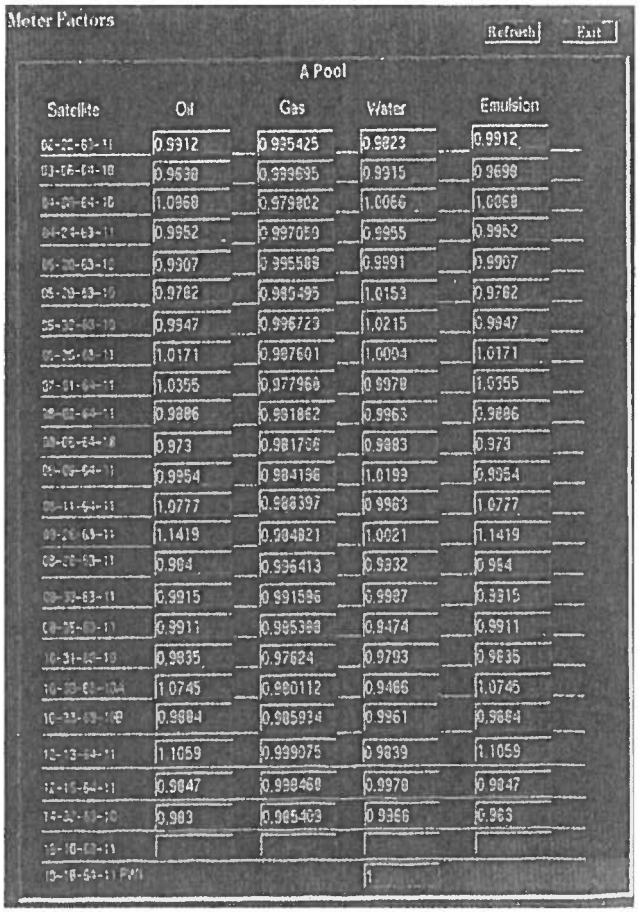


Figure 30

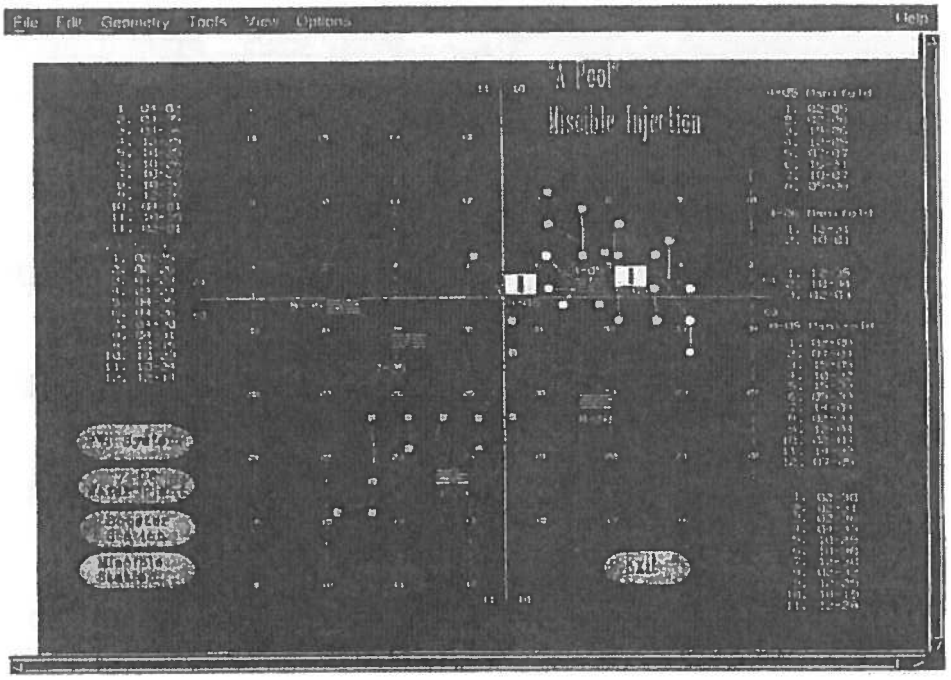


Figure 31

A & B POOL MISCIBLE INJECTION

What It Is For

The A & B Pool Miscible Injection screen gives a display of the conditions, past and current, in the miscible flood in A & B Pool.

What It Does

It takes in information from the field about the solvent, water and chase gas going to the miscible floods and produces this information in several forms on the FDC screen.

What It Consists Of

The main processes relating to the operator are:

- A Pool Miscible Injection
- A Pool PWI System
- B Pool Water Injection System
- Gas Rates
- Solvent Rates
- 2-30 Skim Oil Report
- B Pool Injection Report

How It Works

The A Pool Miscible Injection Screen is a map of A Pool showing the miscible injection manifolds with the wells that report to them. At the sides the map the satellites are listed with the location numbers of the wells that report to them. Also there are 2 boxes and if you click on Miscible Station you will get a schematic display of what is going on with the pumps, compressors and valves at the PC Miscible Station. With the A Pool Inj Report box you get a table of all of the wells in A Pool with the current conditions for tubing and casing pressures and the last day, last hour and current flows of water and solvent.

If you click on any of the manifold icons you will get a map of that manifold with all of the wells reporting to it and the flow of water to the individual well. Also on this screen are boxes for chase gas and solvent and if you click on one of these you get the same map but with the chase gas or solvent going to the individual wells. If you click on one of the wells you will get a drawing of the wellhead with the casing pressure. There are also the ESD valve and the choke and you can operate either of these by clicking on them but be careful you don't inadvertently shut the well in.

A Pool PWI System displays a map of the PWI wells in A Pool with the volume of water going to that well. Also on the screen are the current statistics for 7-6 produced water plant and 10-9 fresh water plant. There is an icon for the 16-25 booster station which will display a schematic drawing of the equipment and conditions at the station.

If you click on the individual well you will get a drawing of that wellhead with the current flow rate.

B Pool Water Injection System will show a map of the wells in B Pool with the volume of water going to the individual wells. There is also the discharge pressure for the 10-18 booster pump with stop and start buttons.

If you click on the individual well you get a picture of the wellhead together with the flows and pressure. If there is a choke on the wellhead you will be able to adjust it from this diagram.

Gas Rates gives a map of the wells as the water system but without the 10-18 booster pump. The rates of case gas are also displayed and clicking on the wellhead will give the same availability as with water above.

Solvent Rates is an exact reproduction of gas rates but showing the solvent figures.

2-30 Skim Oil Report is a table of the rate of the amount of oil skimmed for the current day, the previous day and the last 20 days.

B Pool Injection Report is the same as the A Pool report above with a table of the current tubing and casing pressures for each well together with the current, last hour and last day rates for solvent and water. There is also a column for the set point for many of the wells. Below that table is a similar but smaller table for those wells that inject only water, so it only has the columns for water.

On this screen we also have the total daily flows from the free water knock outs, the 2-30 produced water plant and the amount injected into B Pool.

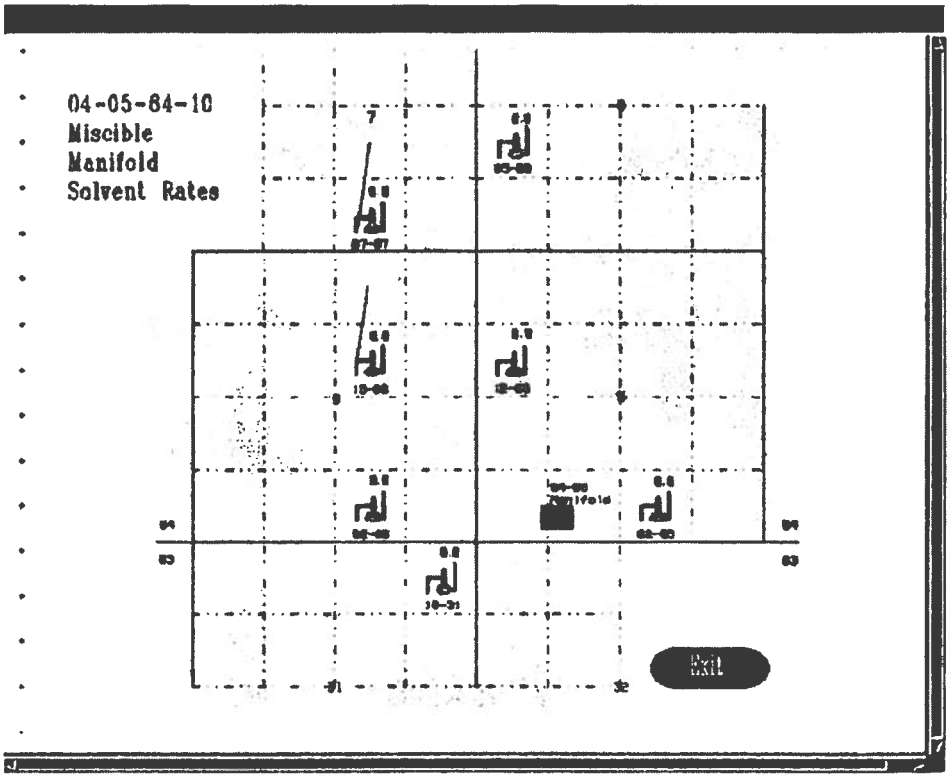


Figure 32

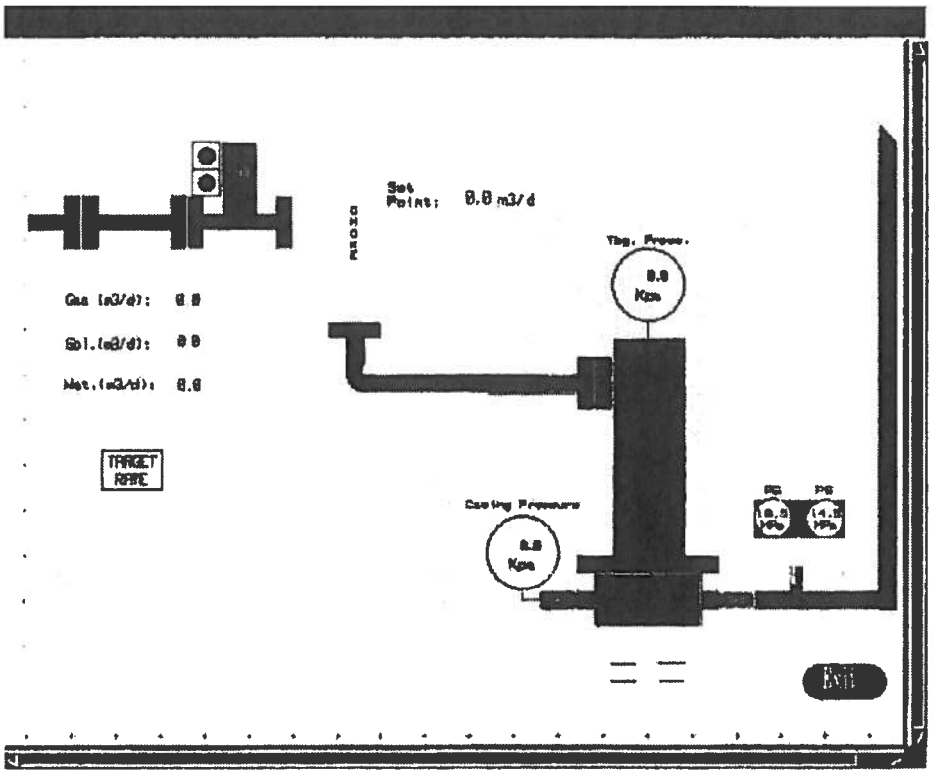


Figure 33

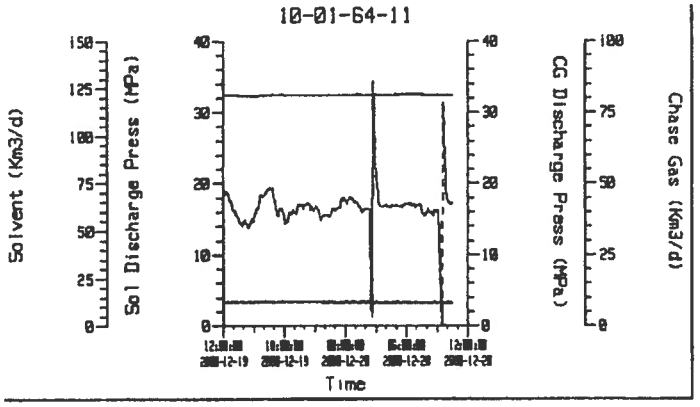


Figure 34

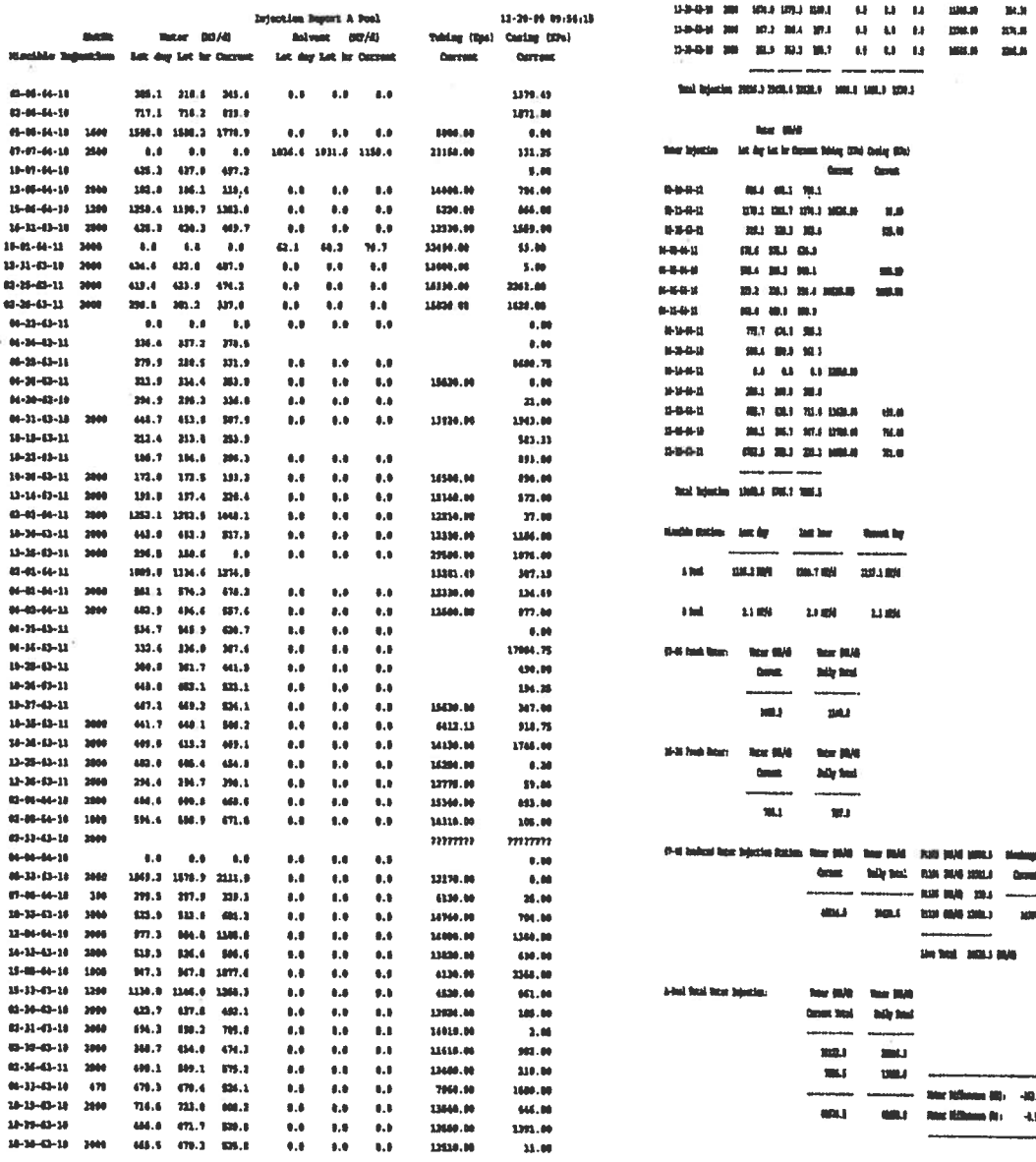


Figure 35

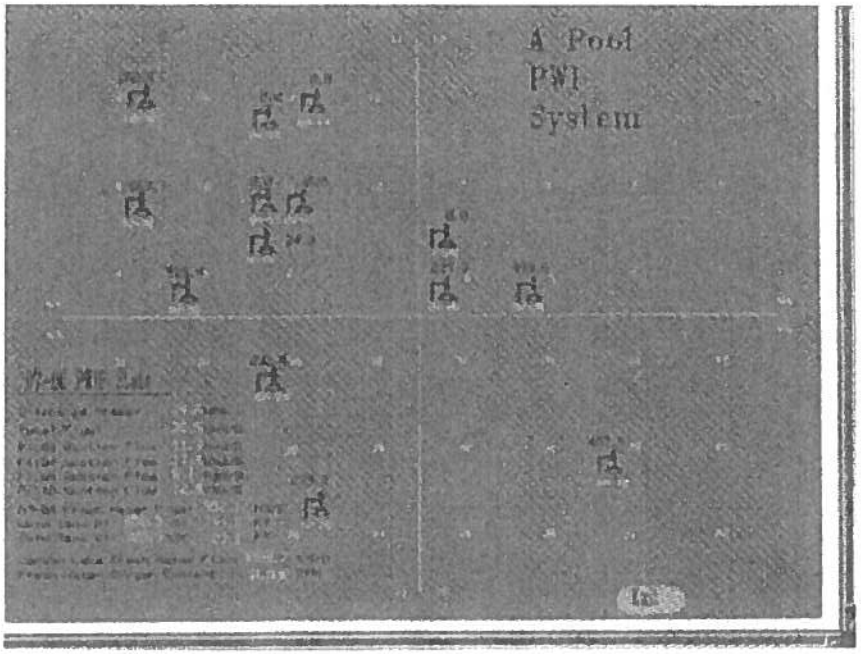


Figure 36

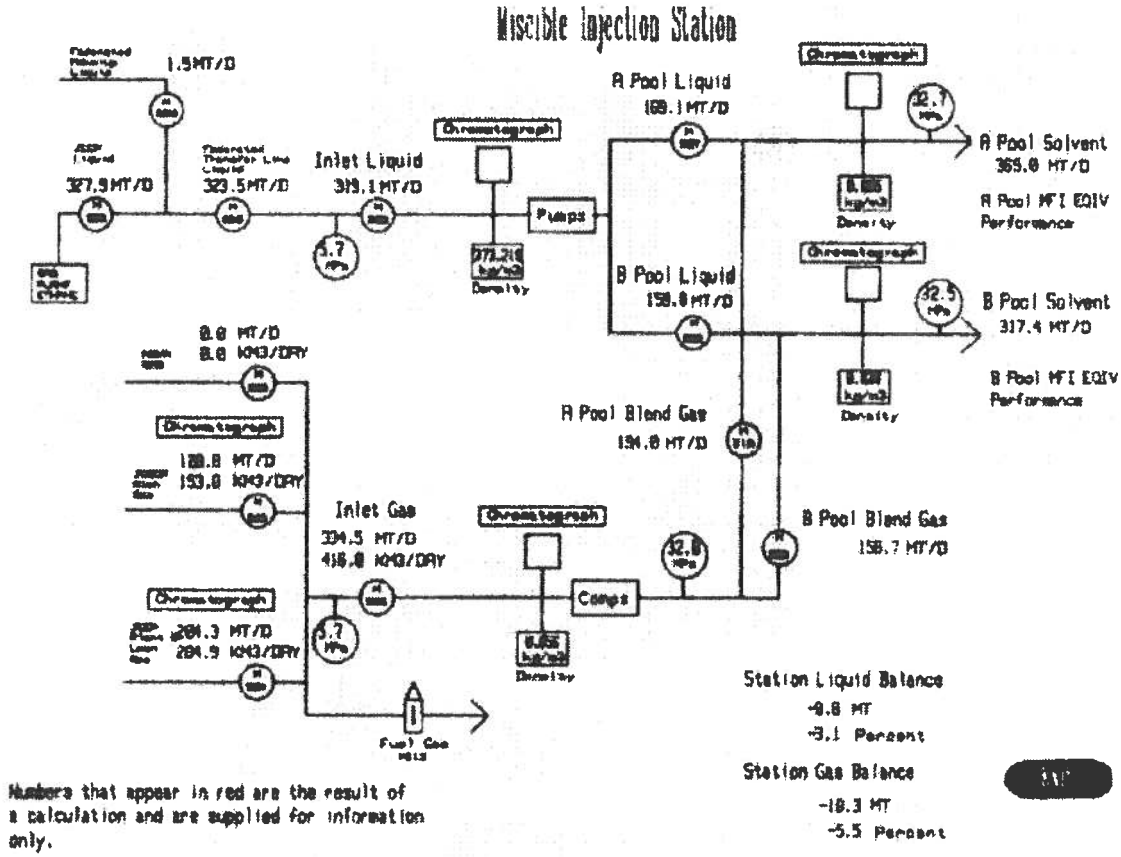


Figure 37

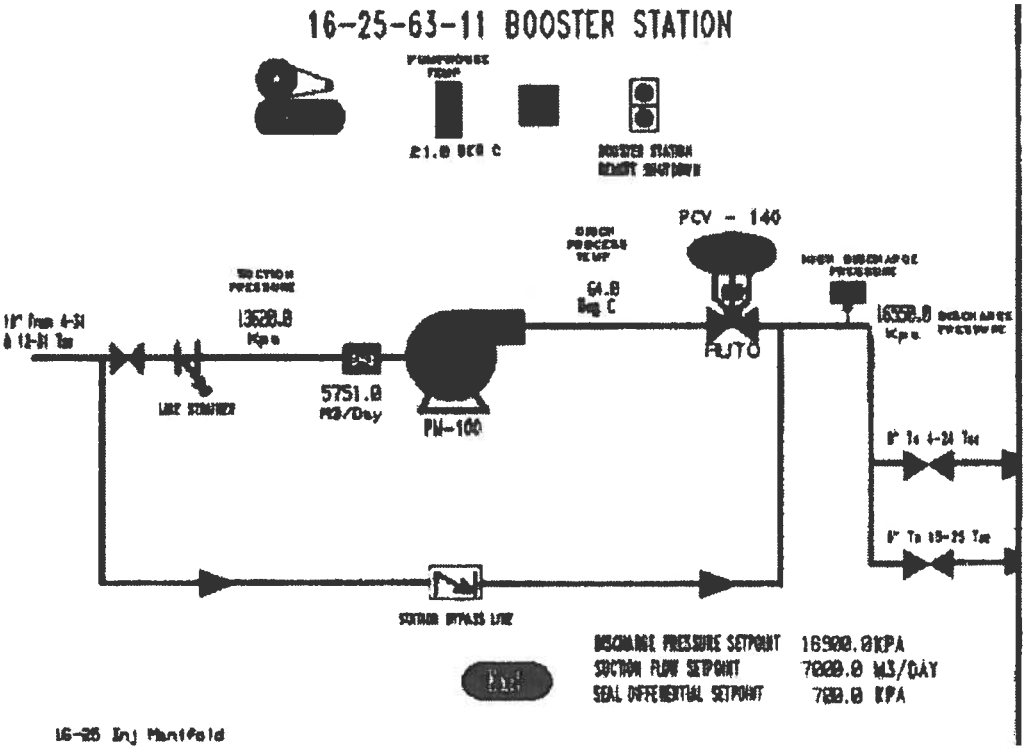


Figure 38

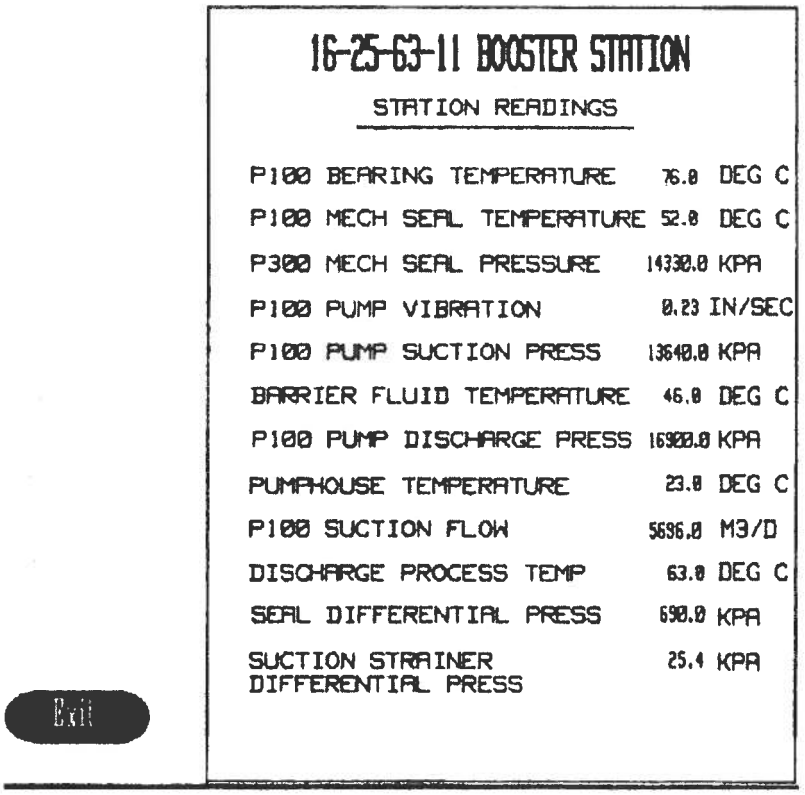


Figure 39

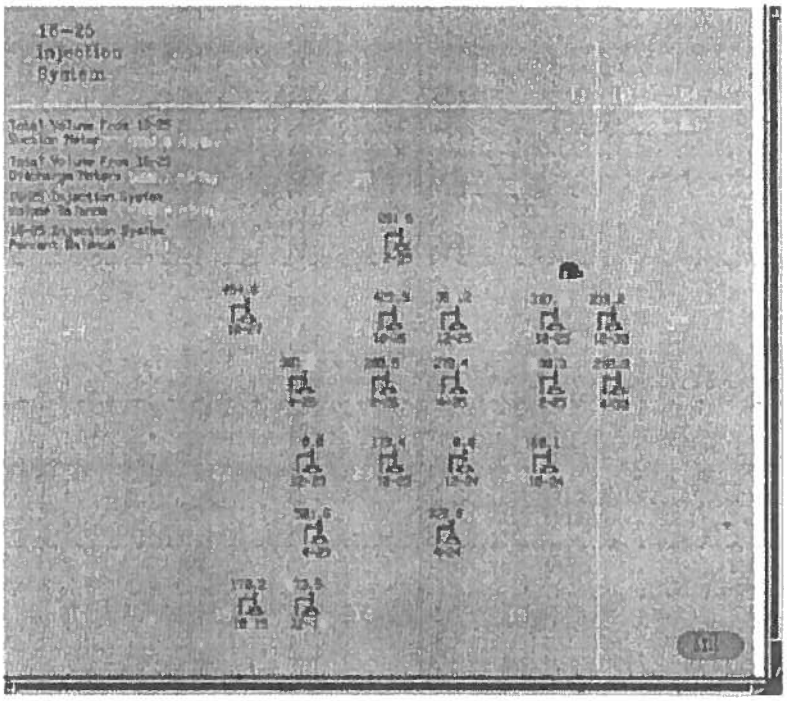


Figure 40

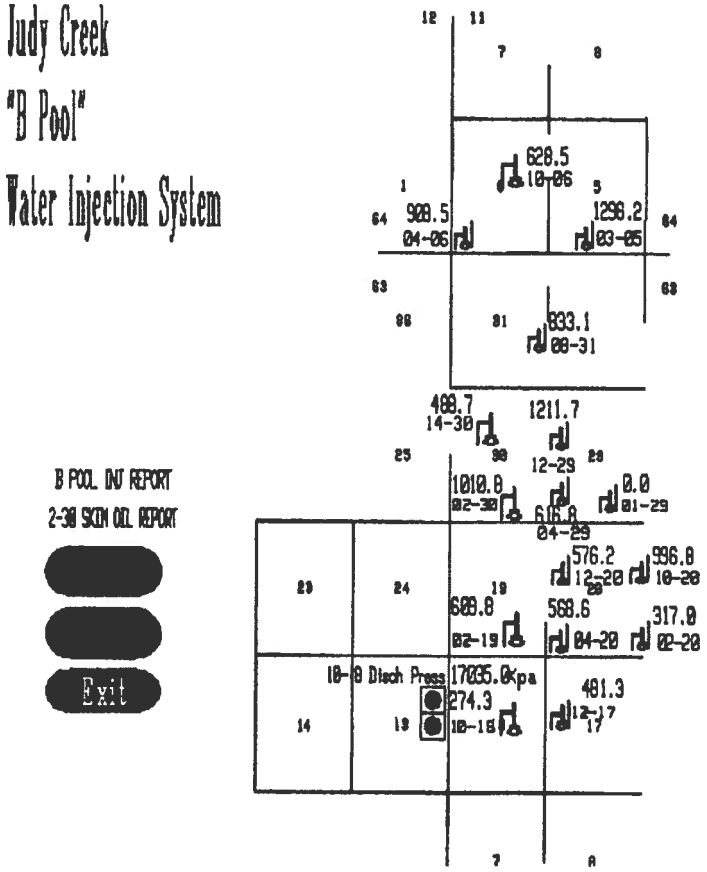


Figure 41

Injection Report B Pool 12-20-00 09:55:24

		Water M3/DAY			Solvent (M3/D)			Tubing (KPa)	Casing (KPa)
	SetPt	Lst day	Lst hr	Current	Lst day	Lst hr	Current	Current	Current
Miscible									
01-29-63-11	2000	1723.2	1716.8	1808.6	0.0	0.0	0.0	11939	320.0
02-20-63-11	0	0.0	0.0	0.0	0.0	0.0	0.0	12649	0.0
03-06-64-11	850	1818.9	932.2	862.7	0.0	0.0	0.0	4250	0.0
04-06-64-11	2000	918.7	907.6	906.3	0.0	0.0	0.0	759	1160.0
04-20-63-11	2000	804.7	806.2	787.1	0.0	0.0	0.0	12769	859.7
04-29-63-11	2000	620.8	619.2	672.7	0.0	0.0	0.0	13460	587.0
08-31-63-11	2000	898.1	893.1	1087.1	0.0	0.0	0.0	10590	845.0
10-20-63-11	2000	871.8	868.8	947.4	0.0	0.0	0.0	12214	1660.3
12-17-63-11	2000	490.2	489.8	546.1	0.0	0.0	0.0	14109	1596.0
12-20-63-11	2000	577.5	575.3	639.9	0.0	0.0	0.0	13210	289.0
12-29-63-11	2000	1265.6	1265.8	1409.9	0.0	0.0	0.0	12089	208.0
		------	------	------	------	------	------		
TOTAL INJECTION		8959.7	8853.0	9790.9	0.0	0.0	0.0		
		------	------	------	------	------	------		

Water M3/DAY	SetPt	Lst day	Lst hr	Current	Tubing (KPa) Current
02-19-63-11	2000	628.6	626.4	687.2	13000
02-30-63-11	2000	1868.8	1876.1	1177.3	30923
10-06-64-11	2000	636.1	636.0	696.9	10429
10-10-63-11		6829.2	275.0	300.0	17150
14-30-63-11	500	686.4	683.8	537.4	*****
		------	------	------	
TOTAL INJECTION		9627.1	3096.5	3398.8	
		------	------	------	

2-30 PWIP DAILY WATER CUT
13671.60 M3/DAY

2-30 PWIP DISCHARGE PRESSURE
13963.00 kPa

B POOL PWRO DAILY WATER OUTPUT

04-20 PWRO Sep	3659.75	
10-29 PWRO Sep	3427.24	
13-32 PWRO Sep	0.00	
16-24 PWRO Sep	1560.49	

TOTAL	8647.49	M3/DAY

TOTAL B POOL FIELD INJECTION

9790.9	
3398.8	

13189.6	M3/DAY

Figure 42

20-Dec-00 Page 1

2-30 PWIP DAILY SKIM OIL

Date	Previous Daily Total	Current Daily Total
00/11/20	8.50	4.80
00/11/21	5.30	4.50
00/11/22	4.90	4.70
00/11/23	5.10	4.10
00/11/24	4.50	4.50
00/11/25	4.90	4.50
00/11/26	4.90	4.60
00/11/27	5.10	4.70
00/11/28	9.90	1.20
00/11/29	5.20	1.20
00/11/30	5.40	1.10
00/12/01	5.60	1.10
00/12/02	5.50	1.10
00/12/03	5.40	1.10
00/12/04	12.10	1.20
00/12/05	5.50	0.70
00/12/06	5.20	0.00
00/12/07	1.00	1.20
00/12/08	5.10	1.20
00/12/09	5.60	0.00
00/12/10	7.70	1.30
00/12/11	5.40	1.30
00/12/12	5.20	1.30
00/12/13	18.50	1.30
00/12/14	6.30	1.30
00/12/15	4.80	1.30
00/12/16	5.20	1.20
00/12/17	4.90	1.20
00/12/18	5.10	1.20
00/12/19	5.20	1.30
00/12/20	5.30	1.20
Total Monthly Skim Oil	188.30	61.40

Figure 43

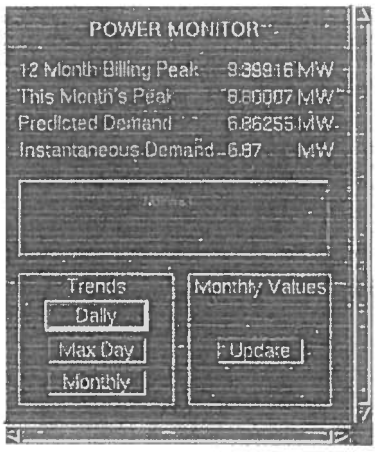


Figure 44

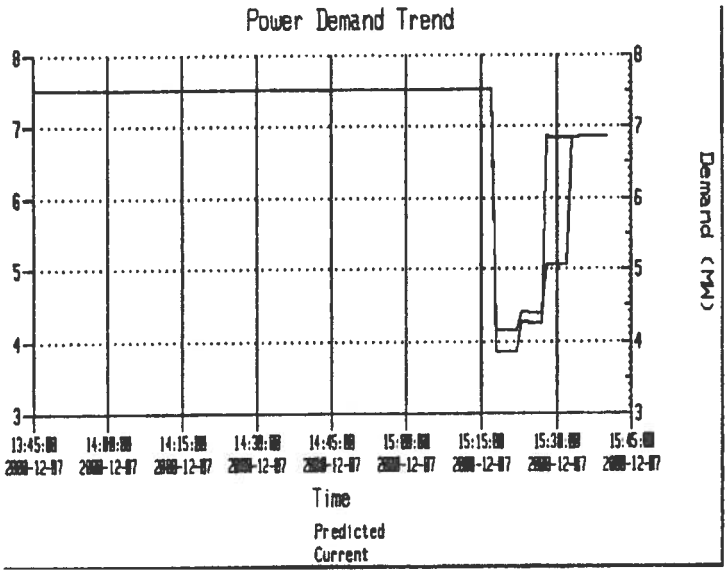


Figure 45

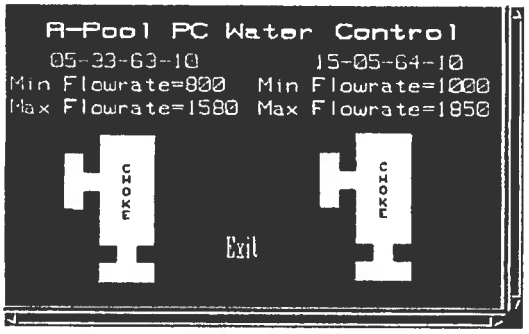


Figure 46

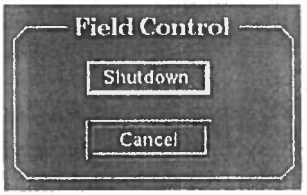


Figure 47

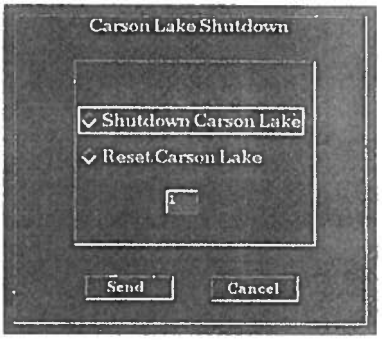


Figure 48

OTHER SCREENS-OPERATOR CONTROL

What It Is For

There are 5 screens to help keep us aware of what is going on with some of the other areas of interest.

What It Consists Of

The screens are:

- PC Power Monitor
- Interruptible Power Control
- Total Field Shut In

How It Works

Each of these screens has a different purpose and we will look at each one.

PC Power Monitor displays a short term trend graph but trends for different lengths of time may be obtained by clicking on the small boxes displayed in the small control panel on the screen. You can also see the max daily rate by opening that box. On the other side of the box you can update the monthly values. Also in the control box you have the figures for

- Billing Peak
- This Months Peak
- Predicted Demand
- Instantaneous Demand

The power monitor box can be seen in the Control diagrams

Interruptible Power Control display 2 red electricity symbols with the concerned areas for interruptible power. This is used when instructed to shed power and can be seen in the sample screens in the Control Diagrams.

Total Field Shut In displays a small box with two instructions cancel and shutdown. The shutdown one will do just that for any of the wells which require power.

OIL MEASUREMENT – TRUCKING OIL FROM PRODUCTION COMPLEX

Our Oil Business Unit the following procedure on.

PURPOSE

To ship oil from the Production Complex to the field for A Pool, B Pool and Viking wells.

STANDARDS

Responsibilities

CCR operator ensures that tank truck driver puts TDG labels supplied on his tickets, and opening and closing meter numbers for accounting purposes.

Qualifications

Knowledge of production tank farm and loading area piping. TDG training.

GUIDELINES

See TDG manual for more information on shipping oil.

Expert Contact

Control Room Operator.

GENERAL PROCEDURE

1. The well services representative will notify the PC/CCR operator that oil is required.

2. The tank truck driver radios the CCR that he is at the loading station.

3. The CCR operator will unlatch the control valve on the loading line, using the FDC control system.

4. The trucker will write the opening meter reading on the trucking ticket.

5. The trucker will put a TDG transportation sticker on each copy of his ticket. Stickers are located in the ticket box.

6. The trucker will open the control valve and the block valve, then load the oil required.

7. When the required oil has been loaded, the trucker will shut the block valve and record the closing meter reading.

8. The trucker will leave the ticket in the ticket box.

9. The CCR operator will write the oil temperature on the trucking ticket.

10. The CCR operator will shut the loading line control valve.

11. The CCR operator will forward the trucking ticket to the production analyst.

ACCOUNT FOR OIL GOING TO 7-6 DURING SK-21 UPSET

Our Oil Business Unit the following procedure.

PURPOSE

Operations need to provide accurate estimates of oil going to 7-6 Produced Water Injection Station.

STANDARDS

Accounting of oil must be kept accurate as possible.

Qualifications

Knowledge of the process.

GUIDELINES

Expert Contact

CCR operator/Production Accountant

GENERAL PROCEDURE

1. Notify PC coordinator of the upset.

2. PC coordinator will consult the operations specialist.

3. Operation specialist will provide actual production number, by using the actual and comparing with the daily history volume, assuming no process upsets. The delta between the daily production and the actual production would be the unmetered volume.

4. An upset ticket will then be issued and forwarded to the Production Accountant.

TRANSFER A OR B POOL OIL FROM OIL PRODUCTION TANKS TO TANKS AT 7-6

Our Oil Business Unit the following procedure.

PURPOSE

Operations personnel transfer A or B Pool oil from oil production tanks to the tanks at 7-6 when there are pipeline restrictions, or whenever there is a problem with the production tanks for A or B Pool.

HAZARDS

H_2S/Flammable hydrocarbon vapors.

STANDARDS

Qualifications

Person doing this job must be check out annually on Gas Testing/SCBA

Special Equipment

3-way gas monitor

GUIDELINES

See Pengrowth Safety Program and Critical Procedures

Expert Contact

CCR operator

GENERAL PROCEDURE

1. Notify the CCR operator of the work to be done.
2. Prepare skim tank at 7-6 for oil storage.
3. Set up valving around oil return meter at 7-6 to meter oil being sent to skim tanks.
4. Set up valving in Process 1 to direct oil from the recycle pumps down to 7-6.
5. Get opening reading from oil return meters (from Bailey).

6. Use recycle pump to pump A or B Pool oil from production tanks to 7-6.

7. After transferring desired amount of oil, shut off recycle pump and close valving from production tank.

8. Return valves in Process 1, around the return oil meter, and the skim tank to normal operating positions.

9. Get closing readings from oil return meter (from Bailey).

10. Document volume metered, BS & W of oil, whether oil is from A or B Pool, process changes that may affect density (K-1114 discharge going to Station 3 inlet), and the reason for storing oil, on the oil return ticket.

11. Send ticket to production accountant and leave copy in CCR with daily production sheet.

BAILEY 3 WAY CONTROLLERS

A 3 way controller is a controller which gets its input from more than source. It can come from a pressure transmitter, a level transmitter, a flow transmitter or a density controller. There are several 3 way controllers configured in the Bailey DCS system. They include the turbine flow at the PWIP, the flow from P901 to the blend skid. The speed of the C_2 pumps at miscible, the recycle valve at miscible, the condensate back pressure control valve.

The speed control for the turbine as the PWIP receives input from the discharge pressure transmitter (PWIP-PIC-90) as well as the skim tanks level transmitter (PWIP-PIC-2037AB) as well as from each units own individual flow . Whichever transmitter has the lowest output signal is the controller which is controlling the speed of the units (P1103/P1104).

The flow leaving Tank 1A through P901 flow control valve TKFRM-PIC-866) receives input from Tank 1A level transmitter (TKFRM-PIC-870), the density control set point (TKFRM-PIC-866) as well as the flow control setpoint (TKFRM-PIC-866). Whichever one of these input devices has the lowest output is the control factor of how much flow is coming out of Tank 1A.

The speed of the ethane pumps at the Miscible Station receives its input from a high discharge pressure transmitter (MISC-PIC-1810), a low suction pressure transmitter (MISC-FIC-1807). This is the input to FIC-1801. Input comes from this controller FIC-1801 (MISC-FIC-1801). Whichever input has the lowest output in the controller which is in control at that time.

The recycle valve at miscible controls the discharge gas pressure. It gets its input from the low suction pressure transmitter (MISC-PIC-1828) as well as the high discharge pressure transmitter (MISC-PIC-1831). Whichever of these has the lowest output is in control of the valve.

Input from discharge pressure control on K1802 when its running as well it adds .5 mPa to discharge control on K1802.

The condensate back pressure controller (PRO-PIC-173) controls the pressure of the condensate entering the 10" A Pool x-over. It gets its input from the K1104 back pressure control valves (GLB-PIC-1104A or GLB-PIC-1104B) whichever one is in service. There is an internal intervention which takes this setpoint and subtracts 500 kPa and then forwards it to the controller.

TRANSFER OIL FROM ONE PRODUCTION TANK TO ANOTHER

Our Oil Business Unit the following procedure.

PURPOSE

Operations personnel are required to transfer oil from one production tank to another during process upsets or if there is a problem with a production tank.

HAZARDS

H_2S/Flammable hydrocarbon vapors.

REGULATIONS

Qualifications

Knowledge of tank farm. Person entering tank farm must have H_2S Alive and Confined Space Entry Courses. Back up person must have First Aid Certificate, H_2S Alive and Confined Space Entry Courses.

Special Equipment

3-way gas monitor/SCBA

GUIDELINES

See Pengrowth Safety Program and Critical Procedures

Expert Contact

CCR operator

Notes and Cautions

The tank farm (inside the berm) is classified as a confined space.

GENERAL PROCEDURE

1. Notify the CCR operator.
2. Stop oil production into production tank and isolate if conditions permit.
3. Determine volume of oil in tank, by level transmitter.

4. Isolate tank that will be receiving oil if conditions permit and determine volume in it.

5. Open transfer line from the sending to receiving tank.

6. Transfer desired amount of oil.

7. Close transfer line from sending to receiving tank.

8. Return both sending and receiving tank valving to normal operating positions.

9. Document the time, volume, and reason for transfer of oil in the CCR daily log and daily production sheet (both copies).

PUMP OIL FROM RETURN OIL TANK OR SKIM TANK TO PROCESS

Our Oil Business Unit the following procedure.

PURPOSE

Operations personnel are required to pump any oil in the return oil tank, or the skimmer tanks at 7-6 back to the process daily. This will ensure any oil collected at 7-6 is accounted for.

HAZARDS

Small amounts of H_2S/ hydrocarbon gases.

STANDARDS

A Pool oil must be returned to A Pool process and B Pool oil must be returned to B Pool process, to ensure proper accounting of oil.

Qualifications

Knowledge of valving at 7-6 and valving in processes.

GUIDELINES

See Pengrowth Safety Program and Critical Procedures

Expert Contact

CCR operator/Production Accountant

GENERAL PROCEDURE

1. Ensure appropriate valving is open from oil return tank to the oil return pump.
2. Verify valving position around oil return meter to ensure oil is being metered accurately.
3. Verify valving is open to appropriate process.
4. Get opening meter reading from Area 5L on the Bailey.
5. Start oil return pump.

6. Shut off oil return pump after oil has been returned from the skim tank. Pump should shut down automatically on a low level of 3 feet in the oil return tank.

7. Get closing meter reading.

8. Return all valving to normal operating conditions.

9. Fill out the oil return ticket to include:

   - Date
   - Amount of oil transferred
   - If it was A or B Pool oil
   - Which process it was returned to
   - The amount of oil remaining in storage at 7-6
   - The reason why it was at 7-6 (e.g. storage due to nominations or normal carry over).

11. Send a copy of the oil return ticket to the Production Accountant and keep one copy in the CCR with the daily production sheet.

RESPONDING TO A LEL GAS ALARM

Refer to Critical Procedures for the Production Complex for Responding to a LEL gas alarm.

RESPONDING TO A MANDOWN

Refer to Critical Procedures for the Production Complex for Responding to a Mandown.

RESPONDING TO UNPLANNED POWER OUTAGE

PURPOSE

Operators have to respond to a unplanned power outage (power out for more than five minutes on the 25 KV utility system). Must manage a controlled shutdown of the Production Complex and the field systems to ensure proper steps are taken to prevent damage to the facilities, environment and personnel in the event of loss of instrument air.

HAZARDS

- possible grass fires due to large flare
- failures in inlet production lines due to hydraulic surges

Notes and Cautions

The following people must be contacted:

- field personnel on call
- Gas plant CCR
- Pembina Pipeline
- ATCO
- Trans Alta Power Ltd.
- Alberta forestry during the fire season
- Plant foreman on call

A controlled production shut in is required to prevent process upsets and the closing of the inlets due to high levels and the pressures thus preventing possible over pressuring of field lines.

GENERAL PROCEDURE

1. Contact Power Company.
   _____To obtain the cause and the duration of the power loss
   _____Shut in submersible pumps in the field using FDC control (this will reduce the chance of over pressuring the group lines in the field)

2. Contact field personnel on call
   _____Shut in field equipment, field operator deems necessary (satellites)

3. Ensure emergency generators are running
   _____Miscible generator
   _____P.W.I.P. generator

4. Block in and depressure gaslift and V.R units
   _____Gaslift units K1105, 6,12,13 and K1733 & 34
   _____V.R unit K1114

5. Check K1104 and Station #3 (Clarks) to see if they are still running , shut down and block in if running
   _____Clarks K1101, 2 & 3

6. If P1103 & 4 are still running, lower the 7-6 P.W.I.P. levels and then shut the units down.

7. Switch all local start/stop switches to the stop position through the entire plant
   _____This will prevent uncontrolled start up of equipment when power returns.

BYPASS GAS DETECTION FOR CALIBRATION OR MAINTENANCE

Refer to Critical Procedures for the Production Complex for bypassing gas detection for calibration or maintenance.

SAFETY DEVICE BYPASSING

Refer to Critical Procedures for the Production Complex for Safety Device Bypassing.

THAW FROZEN OR HYDRATED LINES

Refer to Critical Procedures for the Production Complex for Thaw Frozen or Hydrated Lines.

CONFINED SPACE ENTRY

Refer to Critical Procedures for the Production Complex for Confined Space Entry.

VENTING OR DRAINING HYDROCARBON LIQUIDS

Refer to Critical Procedures for the Production Complex for Venting or Draining Hydrocarbon Liquids.

7-6-64-11 EQUIPMENT INFO

P1103 and P1104 are gas fired turbine pumps. The amount of flow each unit puts out is controlled by the speed of the turbine. The speed output is determined via a three way select that receives inputs from the discharge pressure controller, the tank level controller, and the unit flow set point controller. These units flow are usually in the discharge pressure control, as it is the key component to the plants operation. During normal operating conditions the unit flow set points are set 200 to 500 cubic meters higher than normal flow. This is done in order to absorb the bounces in the PWIP distribution system. P1103 and P1104 have high flow alarms at 12000 m^3 flow. The high flow shutdowns are set at 12600 m^3. These units can be controller locally at the unit or remotely by the DCS system in the control room.

P1105 is a fixed speed electric driver. A flow control valve on the unit controls the flow for this unit with the controller only controlled at the unit. There is only a high flow shutdown on the unit set at 12600 m^3 flow.

P1110 is a fixed speed electric driver. Two flow control valves locates on the unit control the flow for this unit. This unit can be controlled locally or via the DCS system. The flow set point for this unit is normally set 1500 – 2000 m^3 higher than the actual flow to ensure that both flow control valves stay open to prevent flow surges to minimize the strain on the pump, as the fluctuations are very large when the valves start throttling. The high flow shutdown for this unit is 16761 m^3.

There is no high flow alarm shutdown or low pressure alarm for the PWIP. On the DCS system there is a plant status page which is on display 90% of the time. On this page the PWIP discharge pressure is displayed and configured to change from the normal color of green and change to the color of orange when the PWIP discharge pressure drops below 14 mPa.

RTAP/FDC FIELD MONITORING SYSTEM

This system is used to monitor both A and B Pool wells/facilities. Status, flow rates, set points and shutdowns can be controlled using this system. It is a windows based system using a mouse and menu bars. The username for the CCR is JCPC and the password is JCPC. The OBU menu is used for the Production Complex.

This system can also access information from the other Judy Creek areas using the GBU menu.

ELECTRICAL POWER SYSTEMS (ALL SYSTEMS) – START UP

PURPOSE

This procedure describes how operators prepare electrical systems for a complete start-up.

Electrical systems might have been shut down for the following reasons:

- Power interruptions
- Equipment inspections

Before starting up electrical systems the operator needs to know what caused the shutdown and follow the appropriate parts of this procedure to bring electrical systems back on line.

Failure to follow the procedure could result in safety, environmental, financial or reputation consequences.

HAZARDS

Possible electrical explosion could result when resetting breaker.

REGULATIONS

See WHMIS sheets and MSDS (material safety data sheets) for fuel gas (methane) and diesel fuel.

STANDARDS

See Pengrowth Safety Guide and Critical Procedures standards for NOISE, GAS DETECTION, LOCKOUTS.

Responsibilities

N/A

Qualifications

Employee performing critical tasks must be checked out annually be a certified electrician.

The operator must be fully trained and competent in these procedures before starting up electrical systems without supervision.

Special Equipment

See Section Overview

GUIDELINES

Expert Contact

Contacts for additional information include senior operator, engineering, and electricians.

Notes and Cautions

N/A