# St. Clair River Replacement

# Project Execution Plan

# Appendix 1 – Contractor’s Drilling Execution Plan

# Contractor's Drilling Execution Plan

Enbridge will follow the *Canadian Association of Petroleum Producers' (CAPP) document Planning HDD for Pipeline Construction September 2004*, section 9.9 - "Contractor's Drilling Execution Plan" throughout the HDD process as set out below:

*1.0 Overview*

*1.1 Each step to be taken during mobilization, surface preparation, sump construction, anchor installation, casing installation, pilot hole drilling, hole opening operation, pullback operation and demobilization.*

See "Construction Process" section of the Main Project Plan.

*1.2 Detailed drawing showing the intended drill path in plan and profile, depth of cover, entry angle, exit angle, depth and size of surface casings, and any other pertinent data.*

The detailed HDD design drawing was developed by GeoEngineers at the direction of Enbridge, and will be provided separately.

*2.0 Drill rig specifications including push/pull force, torque and other specifications of the specific rig to be used on this project.*

Either the Hercules Rig or Atlas 840 Rig or may be used depending on equipment availability. Both of these rigs are equally capable executing the St Clair River drill and pullback, with the Hercules having additional thrust and pull capability than required at this location. Specific information about these rigs is attached to the end of this appendix as **ITEM 1** and **ITEM 2**.

*3.0 A full description of the drilling fluid recycling system, fluid flow operating rate, tanks, pumps, solids control/recycling, centrifuge(s), etc.*

See "*Drill Mud Recycling System"* paper in Appendix 3.

*4.0 Proposed water supply for drilling.*

Water will be purchased from the municipal water supplies of Marysville, Michigan and St Clair Township, Ontario by the contractor.

*5.0 Drilling pipe description with certifications (size, grade and quantity).*

See "*MATERIALS- Drill Stem*" information attached as **ITEM 3** to the end of this appendix.

*6.0 Details of drill rig anchoring system.*

See drawing **ITEM 4** attached to the end of this appendix showing the deadman anchoring system.

*7.0 Proposed steering system with limitations and access requirements.*

MGS or Gyro will be used in conjunction with ParaTrack2. See attachments at the end of this appendix pertaining to Steer Tool System **ITEM 5**, Magnetic Guidance System **ITEM 6**, Drillguide gyro steering tool **ITEM 7**, and ParaTrack2 **ITEM 8**.

*8.0 Pressure monitor type and pressure range, if required.*

See ParaTrack2 specifications, **ITEM 8** attached to the end of this appendix.

*9.0 Electronic drilling recorder type and functions monitored (if required).*

See EDR Brochure, **ITEM 9** attached to the end of this appendix.

*10.0 Sample of daily drilling reports.*

See attached reports: 1) Daily Report **ITEM 10**, 2) DAILY PROGRESS **ITEM 11**, 3) DRILLSHEET **ITEM 12**, 4) REAMSHEET **ITEM 13**, and 5) Pullback Report **ITEM 14**.

*11.0 Contingency plan to be employed in event of:*

*11.1 Casing removal difficulties.*

Casing is not expected to be used on this project, unless there are guidance issues in the immediate vicinity of the HDD entry. If casing is installed and difficult to remove, the casing will be dug up and pulled until it comes free.

*11.2 Inadvertent returns to surface.*

See Inadvertent Return Plan (Appendix 2).

*11.3 Equipment lost in the hole.*

In the unlikely event of lost equipment downhole, the contractor will attempt to "fish out" the lost equipment by utilizing specialized tools designed to rethread the drill pipe onto the lost equipment. If this is not possible the contractor will deviate slightly from the designed drill path and drill around the lost equipment, with approval from Enbridge.

*11.4 Hole collapse during pipe pull.*

If the hole collapses during pipe pullback an assessment will be conducted by all parties involved and a determination will be agreed upon as to what direction should be taken. If the collapse is not too severe, assistance can be provided from the pipe side utilizing pneumatic assist or thrusting in order to complete the pullback. However, if the collapse is more severe than the pipe will be pulled out of the hole and a determination will be made whether the existing borehole can be re-conditioned for pipe pullback. As a last resort the hole will be re-drilled, from the opposite side if necessary.

*11.5 Pipe getting stuck during pull back.*

If the pipe becomes stuck during pullback, additional rotational and/or pulling force will be applied to un-stick the pipe. If required, a pneumatic hammer or pipe thruster will be attached to the back of the pull string to help push the pull sting through the hole.

*11.6 Appearance of severe damage to the coating during pullback.*

The pipe coating will be inspected prior to installation and also holiday tested during pullback just prior to the downhole. ANY coating damaged during the pullback that can be safely exposed at the uphole (where the pipe is not too deep) will be repaired. In addition, Enbridge will verify that the cathodic protection system has adequate capacity to ensure the pipe is protected from corrosion.

*11.7 Appearance of severe damage to the pipe during pullback.*

The pipe is completely inspected prior to installation. If any severe damage is observed at the uphole after installation, an In-Line Inspection tool will be sent through the pipe by Enbridge to verify the occurrence and severity of damage. An engineering decision will be made by Enbridge based on the In-Line Inspection tool data.

*12.0 A drilling fluid mitigation plan, including:*

*12.1 A description of the proposed fluid type and additives complete with manufacturer's specifications (MSDS, etc.).*

*The possible bentonite drilling mud brands are:*

- *Max Gel*
- *Super-Gel X*
- *Quick-Gel*
- *Bara-Kade*

*The possible additives (pending authorization from the appropriate agencies) are:*

- *Suspend-It*
- *Drill-Terge*
- *InstaVis Plus*
- *RelPac Xtra Low*
- *Macro Fill*

See the attachments to "*Drill Mud Recycling System"* paper in Appendix 3 for more information and the MSDS documents for these substances.

*12.2 Written authorization from appropriate agencies to use additives, if required.*

Enbridge will acquire written authorization from the appropriate agencies for the additives above prior to commencement of drilling.

*12.3 Emergency response plan:*

*12.3.1 Notification procedures.*

See Inadvertent Return Plan (Appendix 2).

*12.3.2 Emergency containment and clean-up procedures plan for inadvertent fluid migration or release in a water body or on land (including inadvertent returns).*

See Inadvertent Return Plan (Appendix 2).

12.3.3 Emergency response equipment on site.

See Inadvertent Return Plan (Appendix 2).

*13.0 A description of the fluid cleaning, recycling and control systems, including volumes of fluids and water tankage required.*

See attachments to "*Drill Mud Recycling System"* paper in Appendix 3.

*14.0 Disposal plan composed of:*

*14.1 An estimate of the complete composition of the drilling waste including the relative quantities of water, bentonite, other sediments and drill cuttings, and any additives which may be necessary during construction or to allow flocculation prior to.*

The expected maximum material to dispose will consist of the following:

| Cubic feet | Cubic meters | Material |
|---:|---:|:---:|
| 16,935 | 479.5 | Drill Cuttings |
| 81,289 | 2,301.8 | Water |
| 3,387 | 95.9 | Bentonite |
| <15 | <0.4 | Additives |
| 101,625.80 | 2,877.72 | **Total** |

No flocculation material is expected to be used for disposal.

*14.2 Method of containment and, if appropriate, disposal of drilling fluids onsite.*

Drilling fluids will be contained in the drill hole sump or in frac tanks until shipment. Large open top dumpsters will be used to hold separated tailings from the mud unit.

*14.3 Off-site disposal plan (fluid disposal options).*

The drilling mud is recycled many times and the tailings are separated by the mud unit. The tailings (and the drilling mud removed during swab and pullback) will be trucked to an environmentally approved gravel pit, farm field or landfill as fill material. Mud disposal locations will be identified, environmentally qualified and permitted in both Ontario and Michigan. It is expected that the majority of drilling mud and drill tailings will be disposed at a pre-approved location in Michigan.

A DIVISION OF MICHELS CORPORATION

817 W. Main Street, P.O. Box 128
Brownsville, WI 53006
Telephone: (920) 583-3132
Fax: (920) 583-3429
www.michels-usa.com

# HERCULES
# (4) RIGS OWNED & OPERATED

## DRILL RIG SPECIFICATIONS

| | |
|---|---|
| Height: | 13' 6" |
| Length: | 53' |
| Width: | 8' 6" |
| Horsepower: | 1500+ HP (750 HP ea) |

## DRILL RIG CAPACITY

| | |
|---|---|
| Torque Capacity: | 160,000 Ft/Lbs |
| Max Spindle Speed: | 100 RPM |
| Thrust/Pull: | 1,260,000 Lbs |

## DRILLING SPECIFICATIONS (DIRT)

MAXIMUM RECOMMENDED

| | |
|---|---|
| Back Ream: | 96" |
| Drilling Distance: | 8,000' |

## DRILLING SPECIFICATIONS (ROCK)

MAXIMUM RECOMMENDED

| | |
|---|---|
| Back Ream: | 60" |
| Drilling Distance: | 8,000' |

## SURVEY SYSTEM SPECIFICATIONS

| | |
|---|---|
| Type: | Downhole probe transmits tool face, three dimensional coordinate data to surface |
| Accuracy: | +/-0.1° All Angles |
| Max Locating Depth: | Unlimited |

## SECONDARY SURVEY SYSTEM SPECIFICATIONS

| | | |
|---|---|---|
| Type: | **Tru-Track** | |
| Accuracy: | ± 2% of Vertical Depth of borehole | |
| Type: | **ParaTrack** | |
| Accuracy: | Inclination | ±0.1° |
| | Azimuth | ±0.4° |
| | Toolface | ±0.5 |

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# ATLAS 840
# (7) RIG OWNED & OPERATED

## DRILL RIG SPECIFICATIONS

| | |
|---|---|
| Weight: | 88,000 - 93,000Lbs Varies |
| Height: | 13' 6" |
| Length: | 54' |
| Width: | 8' 6" |
| Engine: | Dsl Cat Model 3456 or 3412 |
| Horsepower: | 660 HP or 750 HP |

## DRILL RIG CAPACITY

| | |
|---|---|
| Torque Capacity: | 160,000 Ft/Lbs |
| Max Spindle Speed: | 100 RPM |
| Thrust/Pull: | 840,000 Lbs |

## DRILLING SPECIFICATIONS (DIRT)

MAXIMUM RECOMMENDED

| | |
|---|---|
| Back Ream: | 60" |
| Drilling Distance: | 6,500' |

## DRILLING SPECIFICATIONS (ROCK)

MAXIMUM RECOMMENDED

| | |
|---|---|
| Back Ream: | 52" |
| Drilling Distance: | 6,500' |

## SURVEY SYSTEM SPECIFICATIONS

| | | |
|---|---|---|
| Type: | Downhole probe transmits tool face, 3 dimensional coordinate data | |
| Accuracy: | +/-0.1° All Angles | |
| Max Locating Depth: | Unlimited | |
| | Toolface | ±0.5° |

## SECONDARY SURVEY SYSTEM SPECIFICATIONS

| | | |
|---|---|---|
| Type: | **Tru-Track** | |
| Accuracy: | ± 2% of Vertical Depth of borehole | |
| Type: | **ParaTrack** | |
| Accuracy: | Inclination | ±0.1° |
| | Azimuth | ±0.4° |
| | Toolface | ±0.5° |

**Appendix 1 – ITEM 2**

**MATERIALS – Drill Stem:**

1) Oil field drill stem - will vary from job to job with the type and diameter being dependent upon size of pipe to be installed, drilling conditions and availability of drill rig. At a minimum, Michels utilizes premier Grade S-135 drill stem maintained and tested in accordance with API standards, Grant Prideco Specification, and manufacturer's recommended standards and practice.

All of Michels drill stem is continuously inspected both visually on-site during operations and routinely in the Michels' yard in Brownsville, WI. The tube or body, welds and tool joints are all visually inspected for wear and tear as well as cracking. Those found to exhibit abnormalities will be marked and set aside for additional physical testing either in the field or back in Brownsville. If necessary and at additional costs testing equipment can be brought to the site.

**Michels Type-I to be used on this project**

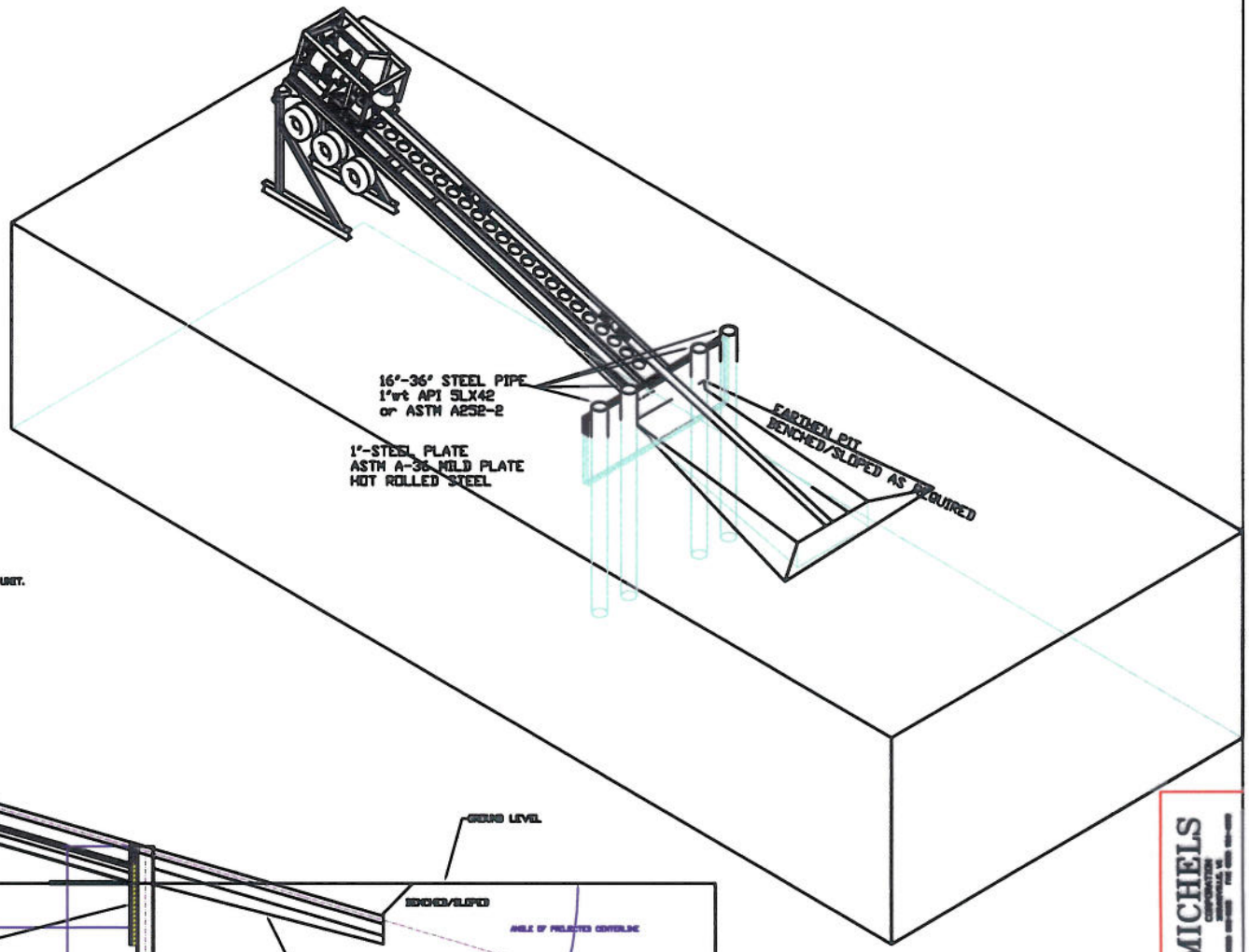
- 6-5/8" Full Hole with Double Shoulder Connection
- Wall thickness = 0.500" wt and larger
- 34.4#/Lnft Section length ±31-foot
- Joint type: FHDS

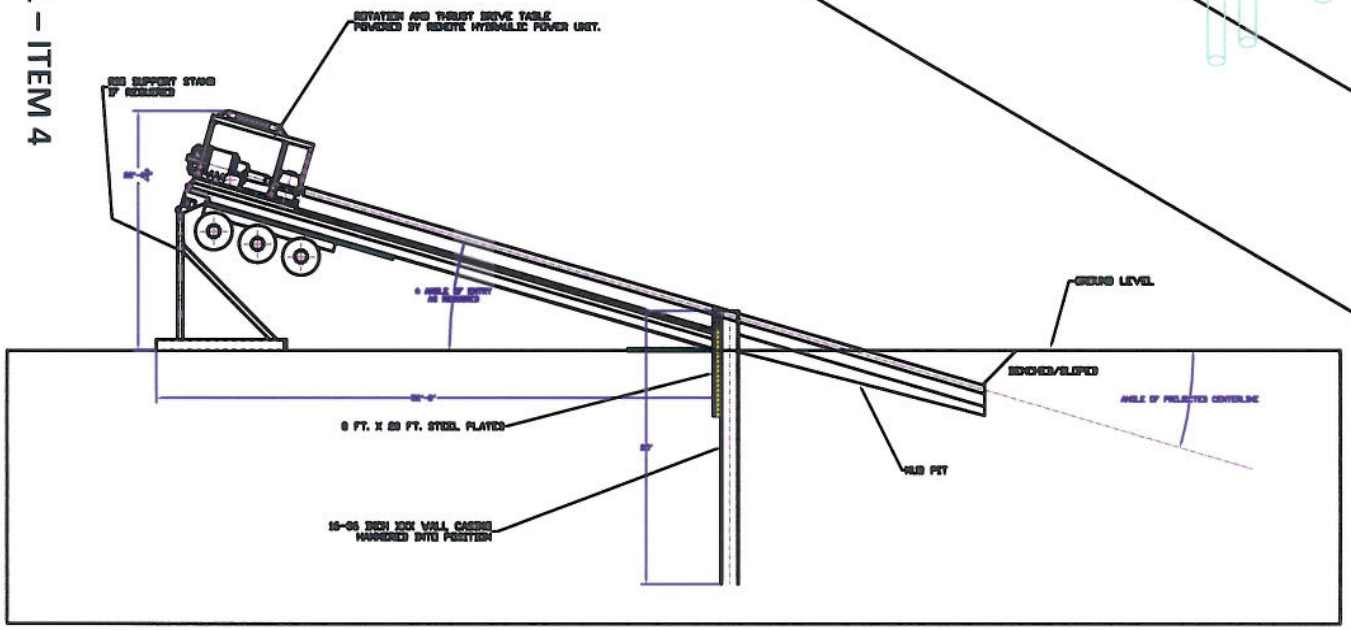
The quantity of drill stem required for a project is determined by the anticipated drill length for the proposed crossing, diameter, expectant geotechnical formation and the amount of distance available for drill stem to be strung down the R.O.W. during reaming operations. If the entire crossing length is available for laydown on the exit side the length of the crossing is multiplied by two for the amount of drill stem required to complete the crossing. Only certified drill stem will be used to complete the crossing as it is in the best interest of Michels for performing a successful installation.

Proprietary to Michels


*© Copyright, Michels Directional Crossings, a Division of Michels Corporation, 2010*

NOTE: TYPICAL DEADMAN UTILIZED. VARIOUS MODIFICATION MADE TO DEADMAN BASED ON CONDITIONS ENCOUNTERED AT SITE.




MICHELS CORPORATION

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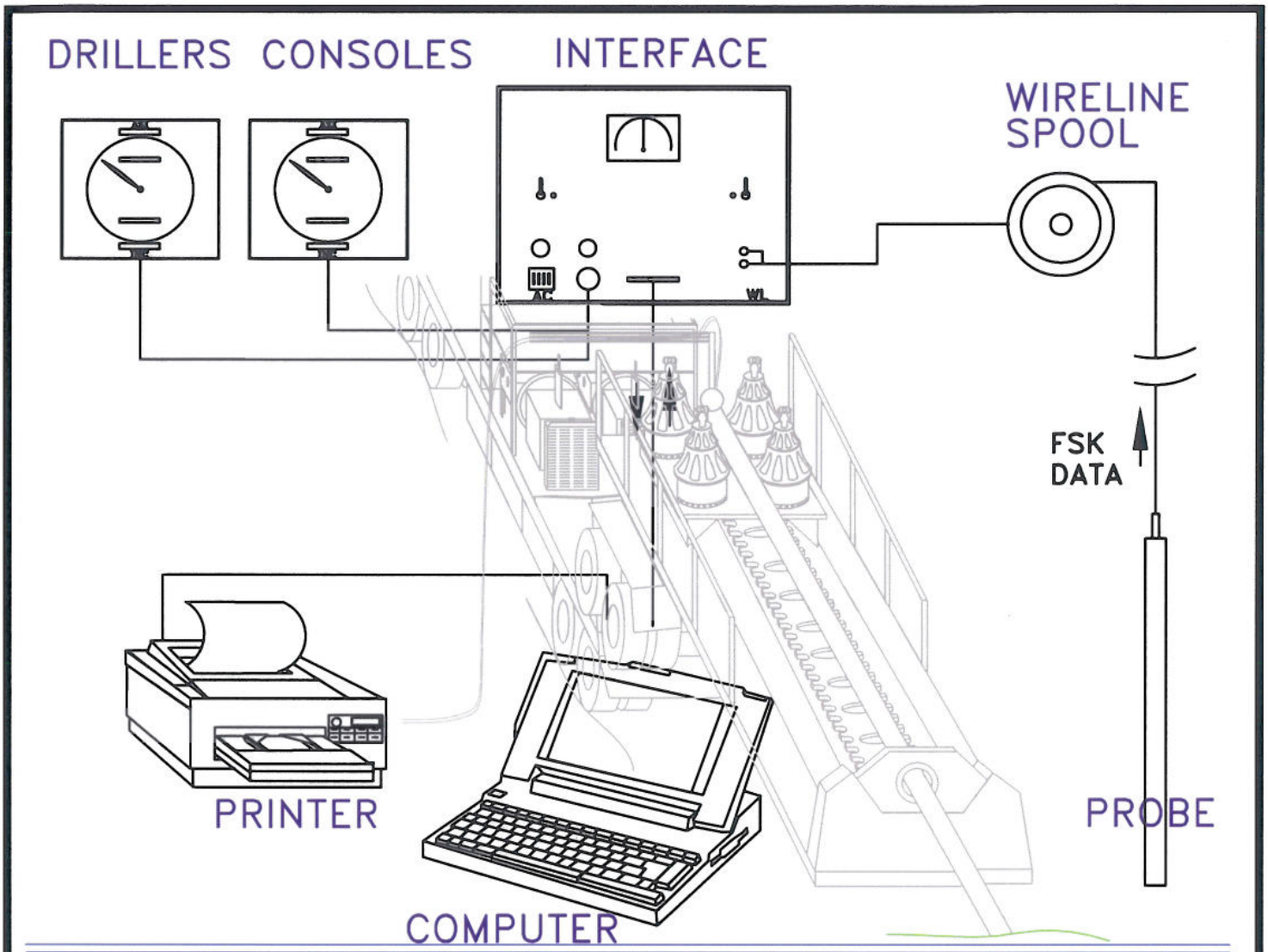
ENVIRONMENTAL SERVICES

PRESENTATION

CASING INSTALLATION

Appendix 1 – ITEM 4




## STEER TOOL SYSTEM

**PROBE:** MFG=TENSOR

THE PROBE IS THE HEART OF THE STEERING TOOL SYSTEM. ALL DATA TRANSMITTED UP HOLE BY WIRE LINE IS MEASURED FROM THIS INSTRUMENT. THE PROBE CONSISTS OF ORIENTATION MODULE (MAGNETIC & GRAVITATIONAL SENSORS) DIGIT CIRCUITRY, MODULATING CIRCUITRY & CONTROL CIRCUITRY.

**INTERFACE UNIT:** MFG=TENSOR

CONTAINS POWER CONTROL CIRCUITRY, DEMODULATING CIRCUITRY, & INTERFACE CIRCUITRY. POWER IS SUPPLIED TO THE PROBE & DATA IS SENT BACK TO THE INTERFACE, DEMODULATED & SENT TO THE COMPUTER. THE COMPUTER COMPUTES DIRECTIONAL INFORMATION & SENDS IT TO THE DRILLER'S CONSOLE VIA THE INTERFACE UNIT

**DRILLER'S CONSOLE:** MFG=TENSOR

CONTAINS TWO LCD DISPLAYS, DRIVE CIRCUITRY, (FOR POINTER) & CONTROL CIRCUITRY. RECEIVES DIRECTIONAL INFORMATION FROM THE COMPUTER VIA THE INTERFACE UNIT. THE AZIMUTH & AZIMUTH MODE (M=MAGNETIC ZERO DECLINATION, T=TRUE NON ZERO DECLINATION) ARE ON THE TOP DISPLAY, WHILE THE INCLINATION & TOOL FACE MODE (H=HIGHSIDE, M=MAGNETIC) ARE ON THE BOTTOM DISPLAY. TOOLFACE IS INDICATED BY THE POINTER.

**COMPUTER:**

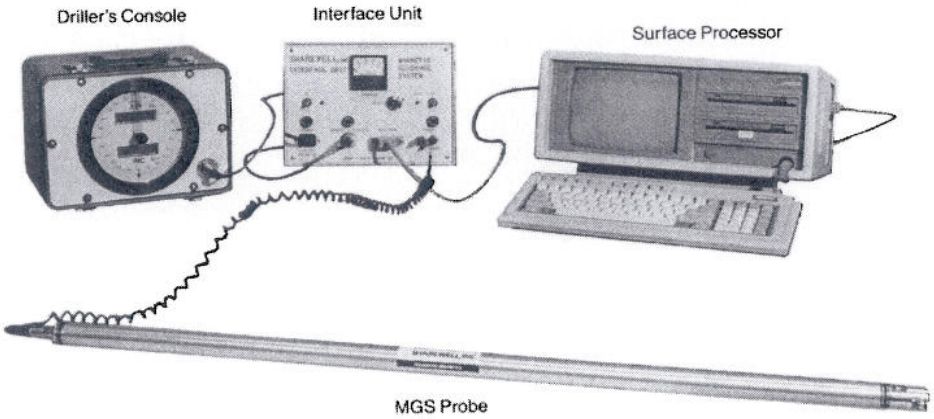
RECEIVES DATA FROM THE PROBE (VIA INTERFACE UNIT), PROCESSES IT, DISPLAYS DIRECTIONAL INFORMATION, & THEN SENDS AZIMUTH, AZIMUTH MODE, INCLINATION, TOOL FACE MODE, & TOOL FACE TO DRILLER'S CONSOLE DECLINATION, T=TRUE NON ZERO DECLINATION) ARE ON THE TOP DISPLAY, WHILE THE INCLINATION & TOOL FACE (VIA INTERFACE)

**PRINTER:**

ANY PARALLEL PRINTER WILL WORK.

MICHELS DIRECTIONAL CROSSINGS
A DIVISION OF MICHELS CORPORATION
817 W. MAIN ST., P.O. BOX 128 BROWNSVILLE, WISCONSIN 53006
PHONE NUMBER (920) 583-3132 FAX NUMBER (920) 583-3429

# MAGNETIC GUIDANCE SYSTEM




The Magnetic Guidance System (M.G.S.) is designed to address a wide range of applications from normal oil and gas drilling to drainhole and pipeline river crossing drilling.

While directional drilling with either a downhole motor or jetting operation, the system permits you to guide the bit with utmost accuracy. Data is transmitted to surface via a single-conductor wireline.

The system comprises three main sub-sections: the downhole probe, the surface processing unit, and the driller's remote display.

Useful features include the ability to monitor the magnetic moments during drilling operations and to perform probe operational diagnostics while downhole as well as to verify probe calibration at the drilling location.

The directional engineer has the option to drill using either magnetic tool face or gravity tool face, along with having the magnetic hole direction and hole inclination displayed on a continuous basis from the remote readout. The surface processing unit provides duplicate output as the remote display, as well as the magnetic parameters including voltage temperature. A printed record of the data is available at selected intervals by the operator. The M.G.S. downhole probe incorporates the latest technology in accelerometers, magnetometers, calibration and modeling techniques to provide a rugged and reliable tool.

## PROBE SPECIFICATIONS

**SENSORS:**

3 Axis Accelerometers → All Angle Capability
3 Axis Magnetometers → All Angle Capability

**DIMENSION & RATING:**

| | |
|---|---|
| Probe Length | 47.25" |
| Probe Diameter | 1.38" |
| Protective Housing | 1.75" x 6' |
| Protective Housing Pressure Rating | 20,000 P.S.I. |
| Maximum Operating Temperature | 125°C |
| Repeatability | 0.2° at Horizontal<br>0.5° at 4° or Less |
| Accuracy | ± 1% |

**DRILLER'S CONSOLE:**

Two 4-character L.C.D. displays for Inclination, Azimuth and Tool Face Mode
360° Rotating Pointer for Tool Face Position
Hermetically Sealed Unit
12 Vac Operation
Electronics Isolated From Case
Easily Positioned Near Driller

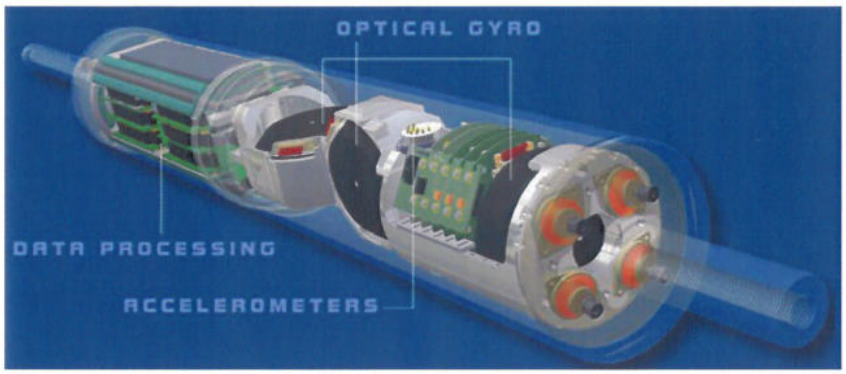
**SOFTWARE:**

Displays Individual Sensor Values
Display of All Magnetic Parameters
Tool Face Offset Option
Complete Diagnostic Check
Automatic Tool Face Switching Mode Option
Data Printout on Request
Menu Driven
Borehole Survey Calculations

**SURFACE PROCESSOR:**

COMPAQ Portable or IBM Compatible with Printer

# *DRILLGUIDE GYRO STEERING TOOL*




## Technical Specifications –

| | |
|---|---|
| Electric Power (Input on surface) | 110-Volts AC / 50 Hz |
| Electric Power (Output to Downhole Tool) | 48-Volts AC |
| Tool OD | 6-5/8-inches |
| Tool Length | 9-ft |
| Tool Joint Connection (Box Up x Pin Down) | 4-1/2 IF |
| Maximum Allowed Torque (on Tool Housing) | 18,000-foot pounds |
| Maximum Allowed Push/Pull (on Tool Housing) | 75,000-pounds |
| Maximum Allowed Temperature (on Tool) | 120-f |
| Maximum Allowed Shock (on Tool) | 50-g (half sine wave) |
| Maximum Allowed Vibration (on Tool) | 20-g up to 200-Hz |
| Maximum Allowed Mud Pressure (on Tool) | 650-psi |
| Maximum Allowed Side Load (on Tool Housing) | 33,000-pounds |

## Accuracy –

| | |
|---|---|
| Azimuth | 0.04° |
| Inclination | 0.01° |
| Tool Face | 0.02° |

For additional information - http://www.drillguide.com

**Vector Magnetics LLC**
236 Cherry Street
Ithaca, New York 14850
607-273-8351 Fax: 607-273-6137

# ParaTrack2 Survey and Guidance System Specifications

Downhole Survey Probe

Shock mounted triaxial accelerometers and magnetometers, temperature sensor and digitizing circuitry contained in 1.750 in. dia. x 55.3 in. long beryllium copper pressure barrel. Telemetry and power via wireline.

| | |
|---|---|
| Temperature Rating: | 85°C |
| Pressure Rating: | 1200 bar |
| Survey Accuracy: | |
| Inclination: | ±0.1° |
| Azimuth: | ±0.4° |
| Toolface: | ±0.5° |
| Maximum wireline length: | 5000 meters |

Interface Unit

| | |
|---|---|
| Input: | 85-265 VAC 50-60 HZ |
| Output: | 48VDC, 50 mA |

Guidance System

A single signal wire earthed at each end or with a return wire to close the loop.

| | |
|---|---|
| Guidance Unit Input: | 85-265 VAC 50-60 HZ |
| Guidance Unit Output: | 34 VRMS, 6 Amps p-p max. |
| Position Accuracy: | ±2% of separation from signal wire |

Drillpipe and Borehole Pressure Module

(requires compatible survey probe)

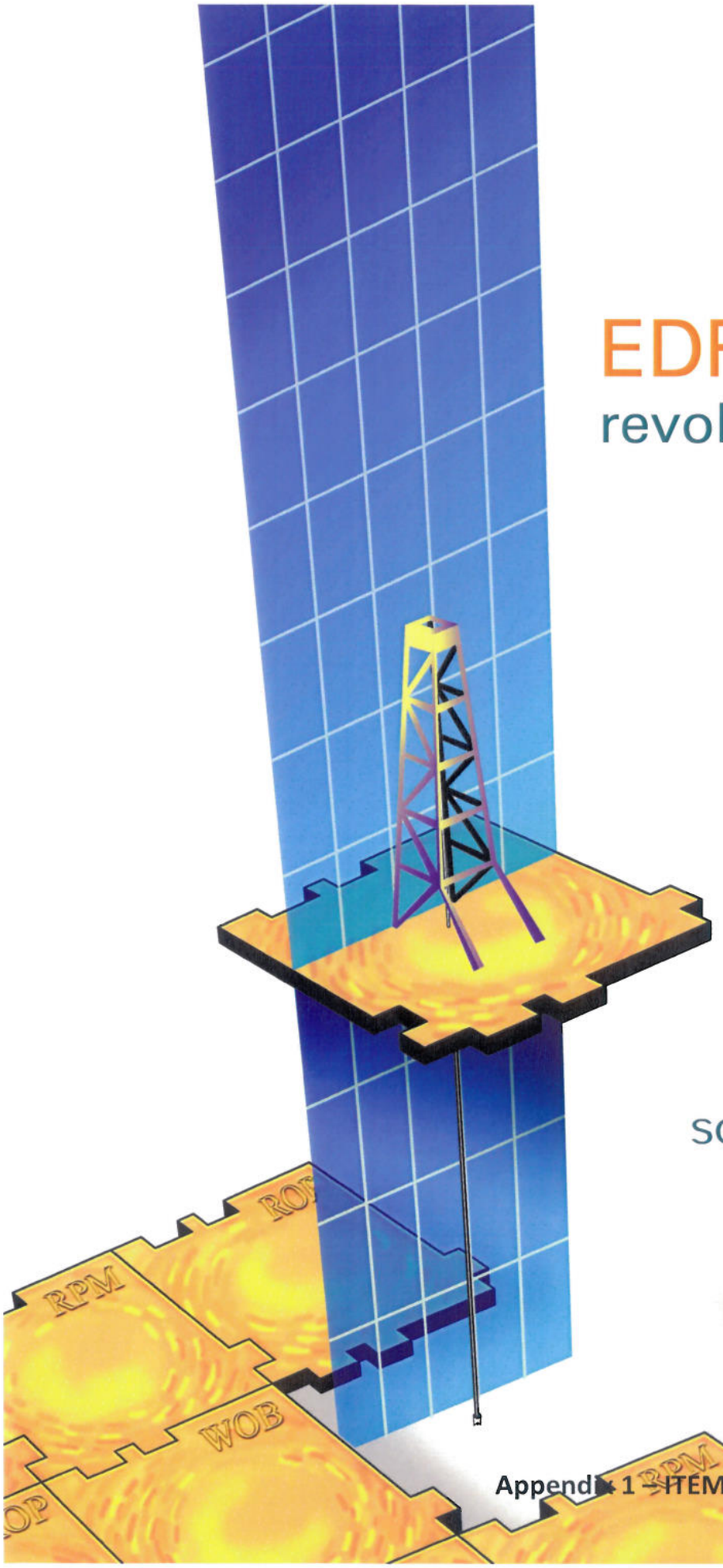
Borehole gauge, 0-500 psi Full Scale, 1200 psi survival, 2400 psi burst

Drillpipe gauge, 0-2000 psi Full Scale, 6000 psi survival, 10000 psi burst

Non-linearity +/-0.1 %FS

Hysteresis +/-0.015 %FS

Repeatability +/-0.01 %FS




pason
systems corp

# EDR

revolutionizing wellsite
electronic
data monitoring
recording
and sharing

solving the wellsite
information puzzle

www.pason.com

## What Is It?

The Pason EDR "Electronic Drilling Recorder" is a robust system of computers networked around a drilling rig to provide drilling data to wellsite personnel. The EDR is analogous to an office local area network. Drilling information is wired around the lease so that users can have easy and economical access to this information on demand. Just as a wellsite worker expects there to be power provided to his trailer, he can now expect there to be a drilling data network.

In its simplest form the EDR can be used as a drilling recorder. It can also be upgraded to link the rig manager, foreman, geologist, mudlogger, directional staff, UBD serviceman or any other wellsite users together on a data network. Drilling data can be viewed on any of these workstations, and data can be logged and stored on site. The system permits secure remote access to the EDR network and data transfer - via satellite link - to the home office.

## System Components

A complete system consists of the following components:

- Doghouse color touch screen flat panel computer
- Rig manager workstation (includes a UPS and a printer)
- Foreman workstation (includes a printer)
- Geologist workstation (includes a printer)
- Sensor set
- Satellite link to the Pason DataHub

## Standard Sensors

Sensors provided by Pason are as follows:

- Depth/ROP - monitors the bit at all times
- Hook Load - electronic transducer connected to rig load cell or electronic sensor mounted to the dead line
- Standpipe pressure sensor
- Non-contact pump stroke sensors
- RPM - rotary table sensor or top drive interface
- Table torque sensor (electric rigs or top drive only)

## Pason DataHub

All drilling and reported data is automatically transferred via satellite to the Pason DataHub. Customers and other authorized users can view or print these reports at any time simply by accessing the Pason DataHub.

## EDR Features

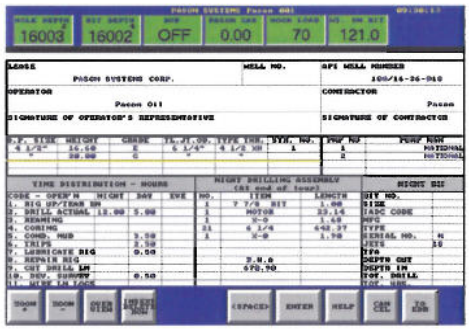
- Bit position is monitored at all times, not just when the Kelly is in use
- All drilling data is stored to disk every 10 seconds
- Historical data can be viewed by scrolling or jumping back without limit
- All sensor traces can be individually scaled and "zoomed" to provide optimum resolution
- Pipe tally model for drillers with automatic adds and renumbering of joints
- Sample catcher administrator
- Messaging system
- Ton miles calculator
- ROP calculation
- WOB calculation
- Pumping displacement calculator
- Bit hours
- Circulating hours

## Reports

- ASCII data export based on time and on depth for selected parameters
- Drilling log showing all sensor traces
- Pipe tally
- Geological ROP report showing minutes/foot in 5, 2, 1 or 0.5 foot intervals

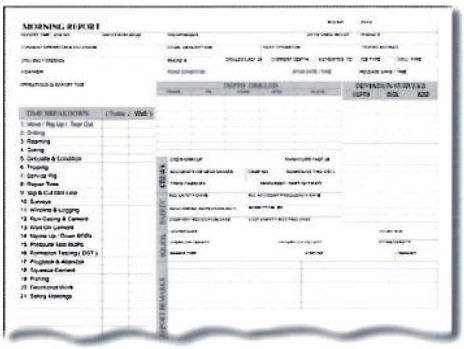
## Electronic Tour Sheets

Crews can create Electronic Tour Sheets at the doghouse EDR and at any workstation on the Pason rig network. This IADC approved electronic entry of the Tour Sheet information allows hard copies to be printed and easily transferred into other reports or applications.




## Contractor Morning Reports

A comprehensive Contractor Morning Report is "auto populated" from the Electronic Tour Sheet data. Additional fields are then entered to complete the data set needed to manage the rigs operation, safety, payroll and regulatory reporting.




## Report Features

- Secure, easy daily transmission to the office
- Repetitious data (such as well name) is automatically copied to the next day
- Digital copy means easy-to-read, with no risk of data destruction
- Bit information is summarized into a convenient record of the complete well allowing easy analysis
- Contractor payroll report spans all rigs within a company
- Contractor Morning Report is generated using Tour Sheet information, eliminating time spent re-typing previously collected data

## EDR - Display Screens

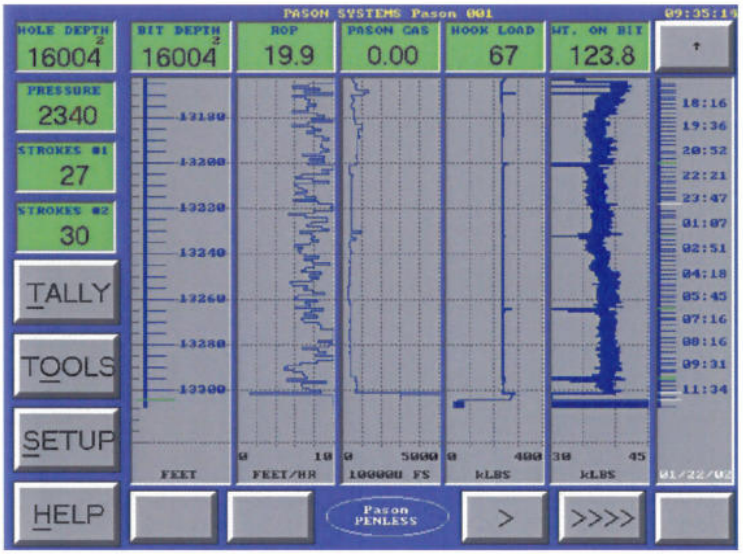
EDR computers have clear informative screens for managing the drilling process and entering operational data into Tour Sheets and Morning Reports.

*Easy Navigation Around the Menu Screens*

*Clearly labeled "touch screen" buttons allow EDR users to intuitively navigate around the systems utilities and features.*

*The drilling operation can be managed from the dog house EDR and various wellsite monitors. A combination of digital numbers and traces optimally display the necessary information to monitor the rigs critical operations such as drilling, circulating and tripping.*

*Drilling traces can be displayed on depth or time and can be easily scaled and scrolled to previous events.*




*Optimum Presentation of Drilling Information*

**Appendix 1 – ITEM 9**

Pason Systems

## United States
16080 Table Mountain Parkway
Suite 500
Golden, Colorado
80403
Tel: (720) 880-2000
E-mail:sales@pason.com

1424 North Sam Houston
Suite 160
Houston, Texas
77032
Tel: (281) 227-0600
E-mail: sales@pason.com

## Canada
6130 - 3rd Street SE
Calgary, Alberta
T2H 1K4
Tel: (403) 301-3400
E-mail: sales@pason.com

**Appendix 1 – ITEM 9**

**MICHELS DIRECTIONAL CROSSINGS**
**DAILY PROGRESS REPORT**
**GULFSTREAM PIPELINE**
**MICHELS JOB #** _____

**LOCATION:** _____
**DATE:** _____
**WEATHER:** _____
**PREPARED BY:** _____

| EMPLOYEE | CLASS | HOURS |
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## OPERATIONAL INFORMATION

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|---|---|
| OPERATION PERFORMED: | |
| HOLE SIZE: | |
| TOOL IN USE: | |
| FOOTAGE TODAY: | |
| FOOTAGE TO DATE: | |
| RATE OF PENETRATION: | |

## DRILLING FLUIDS INFORMATION

(CIRCLE ONE)

| | | |
|---|---|---|
| BENTONITE USED TODAY: | | BAGS/PALLETS |
| BENTONITE JOB TO DATE: | | BAGS/PALLETS |
| DID YOU LOSE CIRCULATION TODAY: | | YES/NO |
| VOLUME OF FLUIDS LOST: | | GALLONS |
| TANKERS HAULED TODAY: | | |
| DISPOSAL VOLUME TODAY: | | GALLONS |
| DUMPTRUCKS TODAY: | | |
| SOLIDS DISPOSED TODAY: | | CUBIC YARDS |

**SUMMARY OF DAILY ACTIVITIES AND PROGRESS:**

**UPDATES TO DRILL PLAN, FLUID SYSTEM, AND/OR DRILLING SCHEDULE:**

**MICHELS CORPORATION**
**DAILY PROGRESS REPORT**

**LOCATION:** 0
**DATE:** #VALUE!
**JOB #:** 0
**WEATHER:**

_____ **CUSTOMER**
_____ **OWNER**

| EMPLOYEE | CLASS | HOURS |
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| MATERIALS RECEIVED | SUPPLIER |
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**SUMMARY OF DAILY ACTIVITIES AND PROGRESS:**

**INSPECTION AND/OR CLIENT REMARKS:**

MICHELS DIRECTIONAL CROSSINGS

PROJECT_____ CASING DEPTH_____ CASING SIZE _____

LOCATION_____ BIT MANUF_____ BIT CODE_____ BIT SIZE_____

JOB # _____ MOTOR MAKE_____ MOTOR SN# _____ SETTING: _____

SHEET # _____ OF_____ MD IN_____ MD OUT_____ JETS_____ GPM_____

| DATE | JOINT # | LENGTH | MD | INC | AZI | AWAY | CALC ELEV | CALC IGHT/LEF | TT ELEV | TT IGHT/LEF | HTOTAL | DIP | 3-JT RADIUS |
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Appendix 1 – ITEM 12

# MICHELS DIRECTIONAL CROSSINGS

## DAILY REAMING LOG

PROJECT_____
MICHELS JOB#_____
LOCATION_____
SHEET #_____ OF _____

REAMER MANU_____REAMER SN_____
REAMER SIZE:_____ PILOT SIZE:_____
CUTTER STYLE_____CUTTER MANU_____

| DATE | JOINT # | TIME | TOTAL HRS | TORQUE | PUSH/PULL | PUMP PRESSURE | START/STOP TIMES & NOTES |
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Appendix 1 – ITEM 13

Drilled Length [ ] Pilot Hole Stems [ ]

Michels Directional Crossings

11/18/2010

**River Crossing Name:**

| | | | Times | | Pulling Time | | Breaks | | | | Breaks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Footage | Stem | Date | Start | Finish | Joint | Total | Start | End | Time | Reason | Start | End | Time | Pressure | Pull Load | H\|L High/Low Gear |
| | #1 | | | | | | | | | | | | | | | |
| | #2 | | | | | | | | | | | | | | | |
| | #3 | | | | | | | | | | | | | | | |
| | #4 | | | | | | | | | | | | | | | |
| | #5 | | | | | | | | | | | | | | | |
| | #6 | | | | | | | | | | | | | | | |
| | #7 | | | | | | | | | | | | | | | |
| | #8 | | | | | | | | | | | | | | | |
| | #9 | | | | | | | | | | | | | | | |
| | #10 | | | | | | | | | | | | | | | |
| | #11 | | | | | | | | | | | | | | | |
| | #12 | | | | | | | | | | | | | | | |
| | #13 | | | | | | | | | | | | | | | |
| | #14 | | | | | | | | | | | | | | | |
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| | #38 | | | | | | | | | | | | | | | |
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| | #40 | | | | | | | | | | | | | | | |
| | #41 | | | | | | | | | | | | | | | |
| | #42 | | | | | | | | | | | | | | | |
| | #43 | | | | | | | | | | | | | | | |
| | #44 | | | | | | | | | | | | | | | |
| | #45 | | | | | | | | | | | | | | | |
| | #46 | | | | | | | | | | | | | | | |
| | #47 | | | | | | | | | | | | | | | |

**Appendix 1 – ITEM 14**