



Murphy Oil Company LTD.

Seal Polymer Pilot
Scheme Approval No.11320
Annual ERCB Progress Presentation

SEAL EOR Facilities

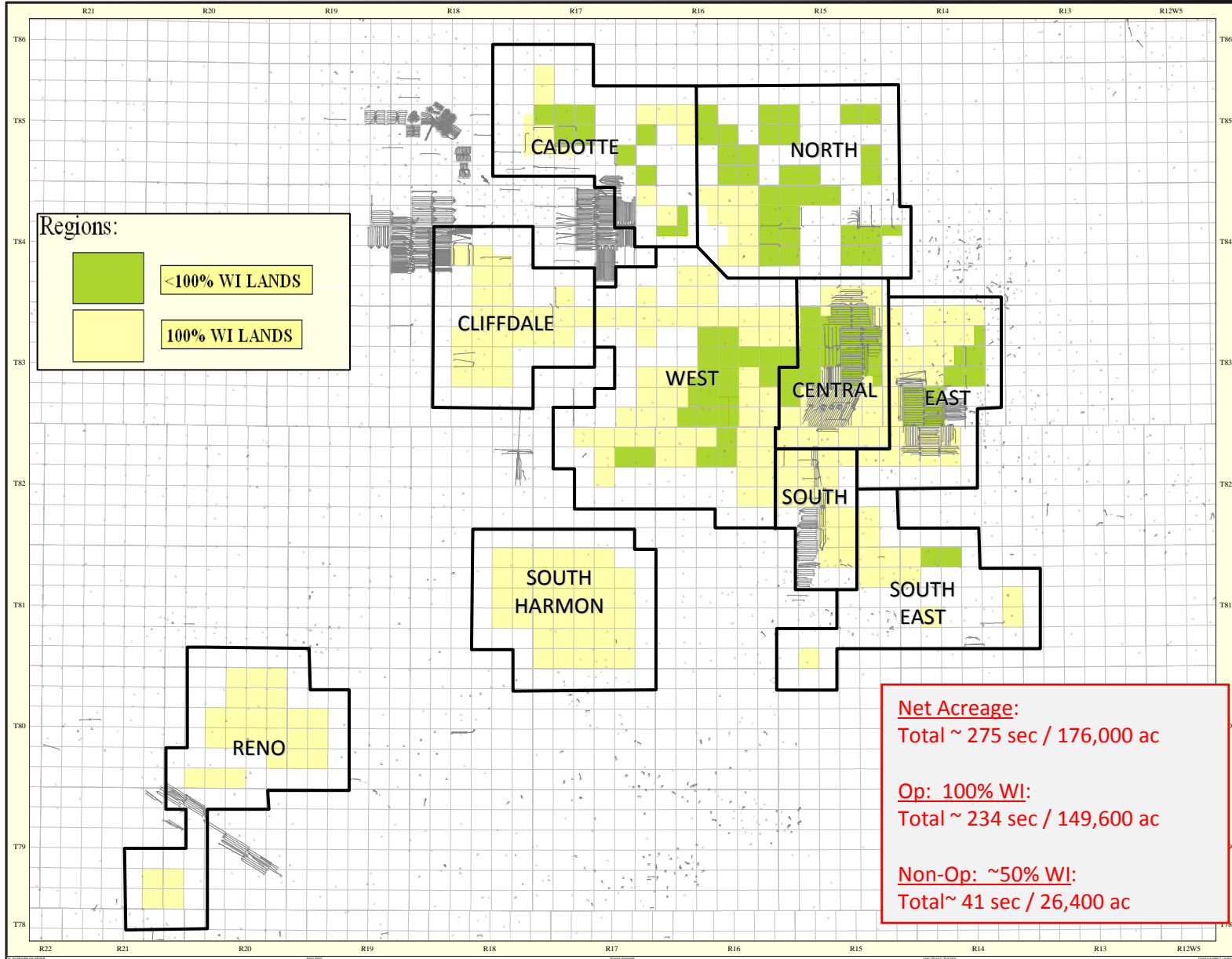
April 18, 2011



- ◆ **Current Approval Status**
- ◆ **Geological Overview**
- ◆ **Flood Performance**
- ◆ **Future Plans**
- ◆ **Injection Pressure Discussions**
- ◆ **Non-Saline Water Use and Conservation**
- ◆ **ERCB Compliance**
- ◆ **Conclusions**



Seal Location



Murphy's Primary and EOR Approvals

MURPHY HZ TEST
Approval # 10915A
2 well per section

MURPHY PROPOSED
AMENDMENT TO Approval
10329C
Application #1599417
Approval #10329F

MURPHY DOWN-SPACING
Original approval # 9355
Consolidated #10329
Amendment approval #10329F
OSR076

MURPHY HZ TEST
Approval # 10290
1 well per section

MURPHY DOWN-SPACING Approval
11306

POLYMER EOR TEST
Approval # 11320
7 injectors and producers

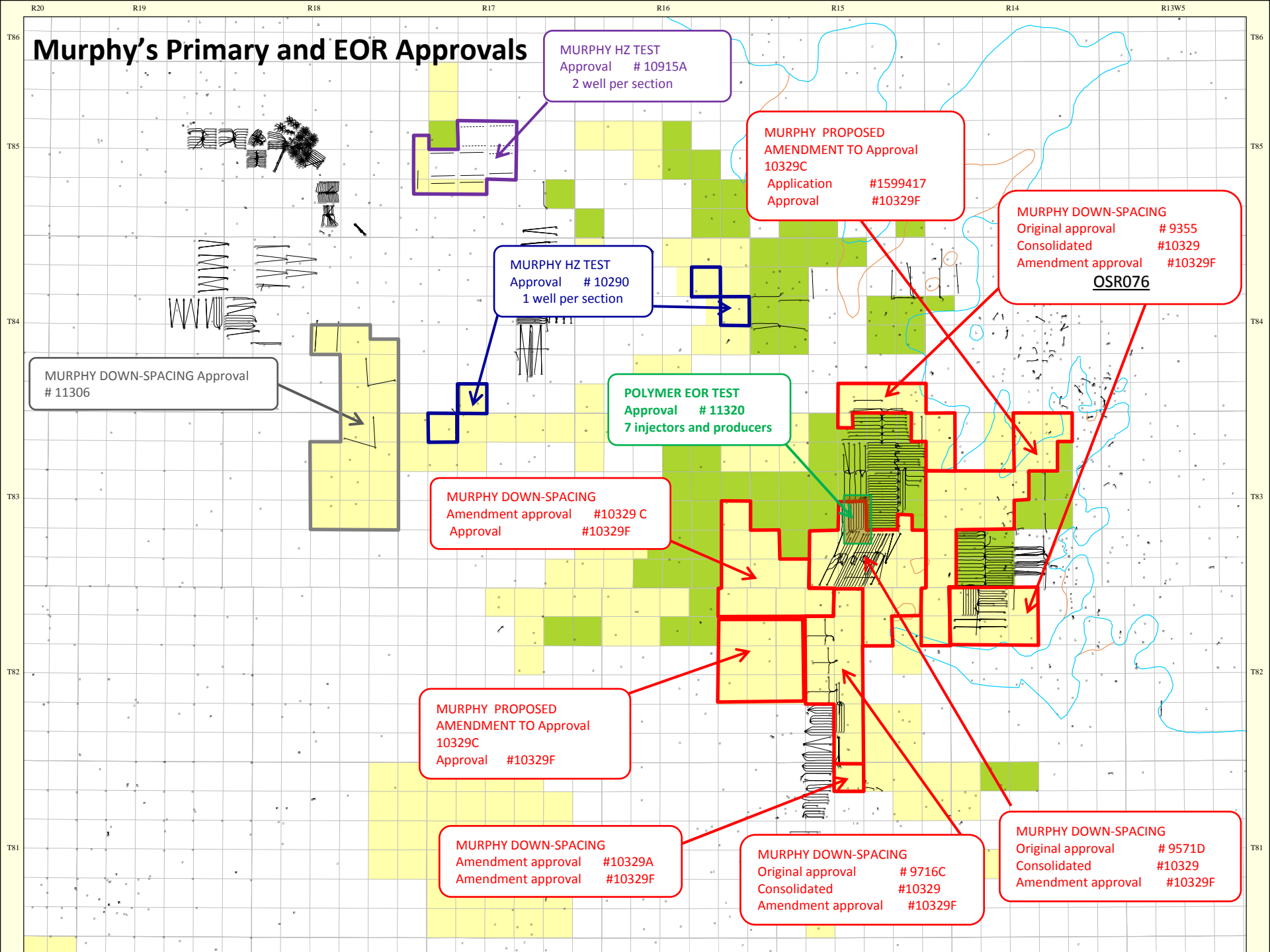
MURPHY DOWN-SPACING
Amendment approval #10329 C
Approval #10329F

MURPHY PROPOSED
AMENDMENT TO Approval
10329C
Approval #10329F

MURPHY DOWN-SPACING
Amendment approval #10329A
Amendment approval #10329F

MURPHY DOWN-SPACING
Original approval # 9716C
Consolidated #10329
Amendment approval #10329F

MURPHY DOWN-SPACING
Original approval # 9571D
Consolidated #10329
Amendment approval #10329F



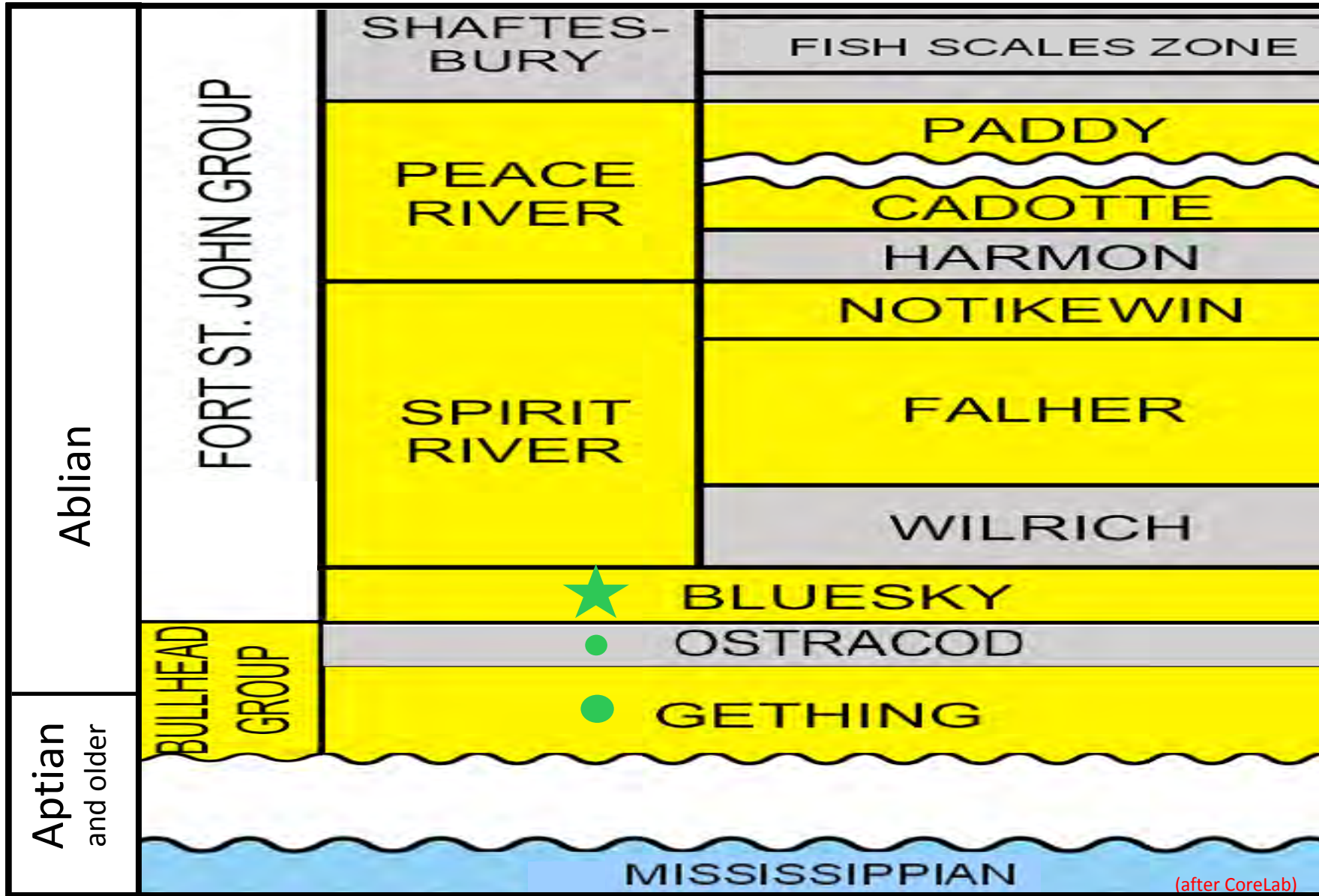


◆ **Bluesky Sand**

- ◆ **Unconsolidated cherty litharenite, V fine medium grained, medium sorting**
- ◆ **Depth of 600-650m TVD**
- ◆ **Net Pay Range 4 - 18m**
- ◆ **Porosity 25 - 34%**
- ◆ **Permeability 300 - 7000mD**
- ◆ **Reservoir temperature 19 °C**
- ◆ **Water Saturation < 35%**
- ◆ **Oil Viscosity (dead oil) 5,000 – 20,000 cp @ 20 °C**
- ◆ **Initial Reservoir Pressure 4500 - 5000kPa**



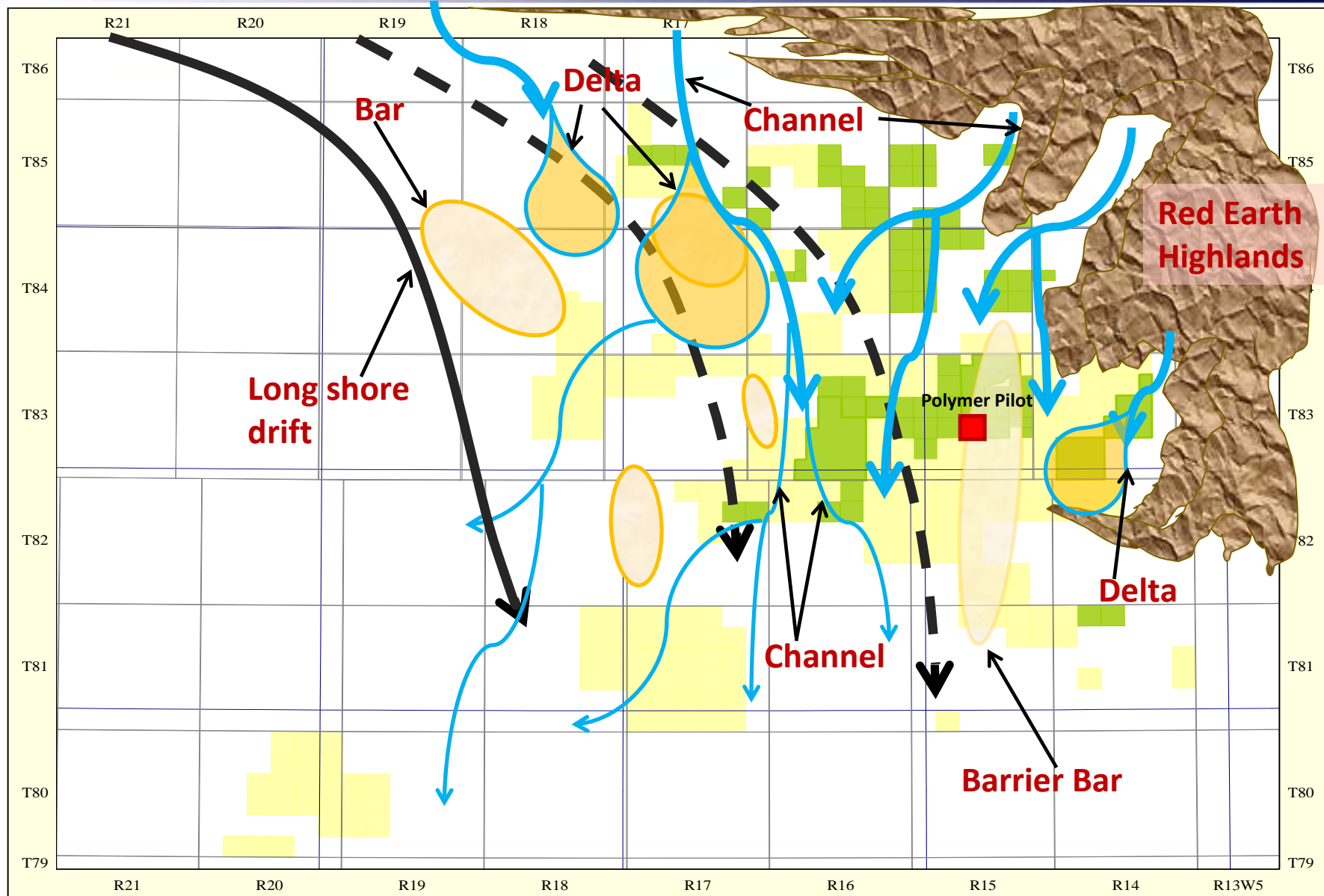
General Stratigraphy



(after CoreLab)



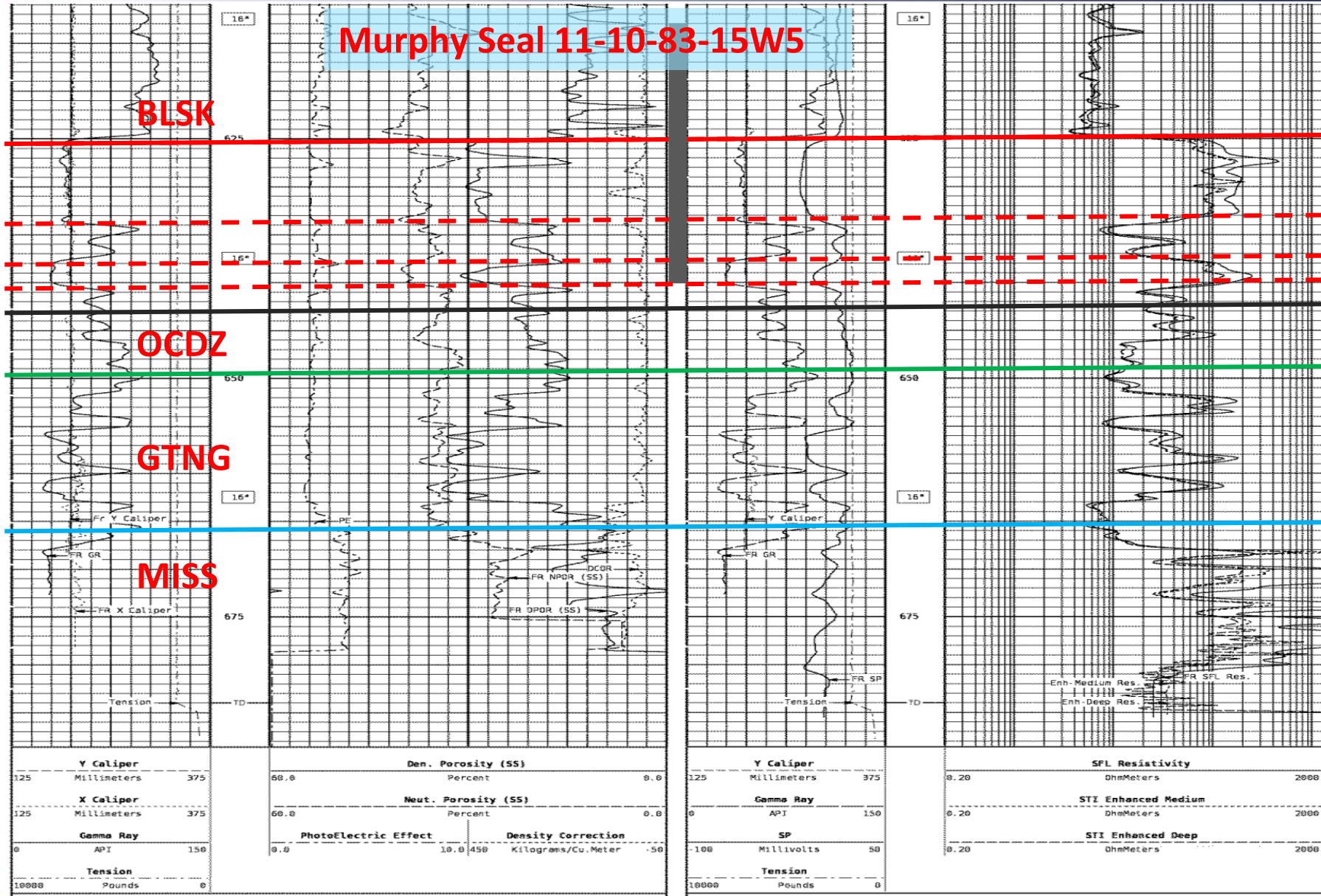
Bluesky Depositional Model Seal Lake area



File: SEAL.MasterMap-facies-cartoon. Datum: NAD27 Projection: Stereographic Center: N56.17798 W116.61709 Created in AccuMap™, a product of IHS



Murphy Seal Type Log



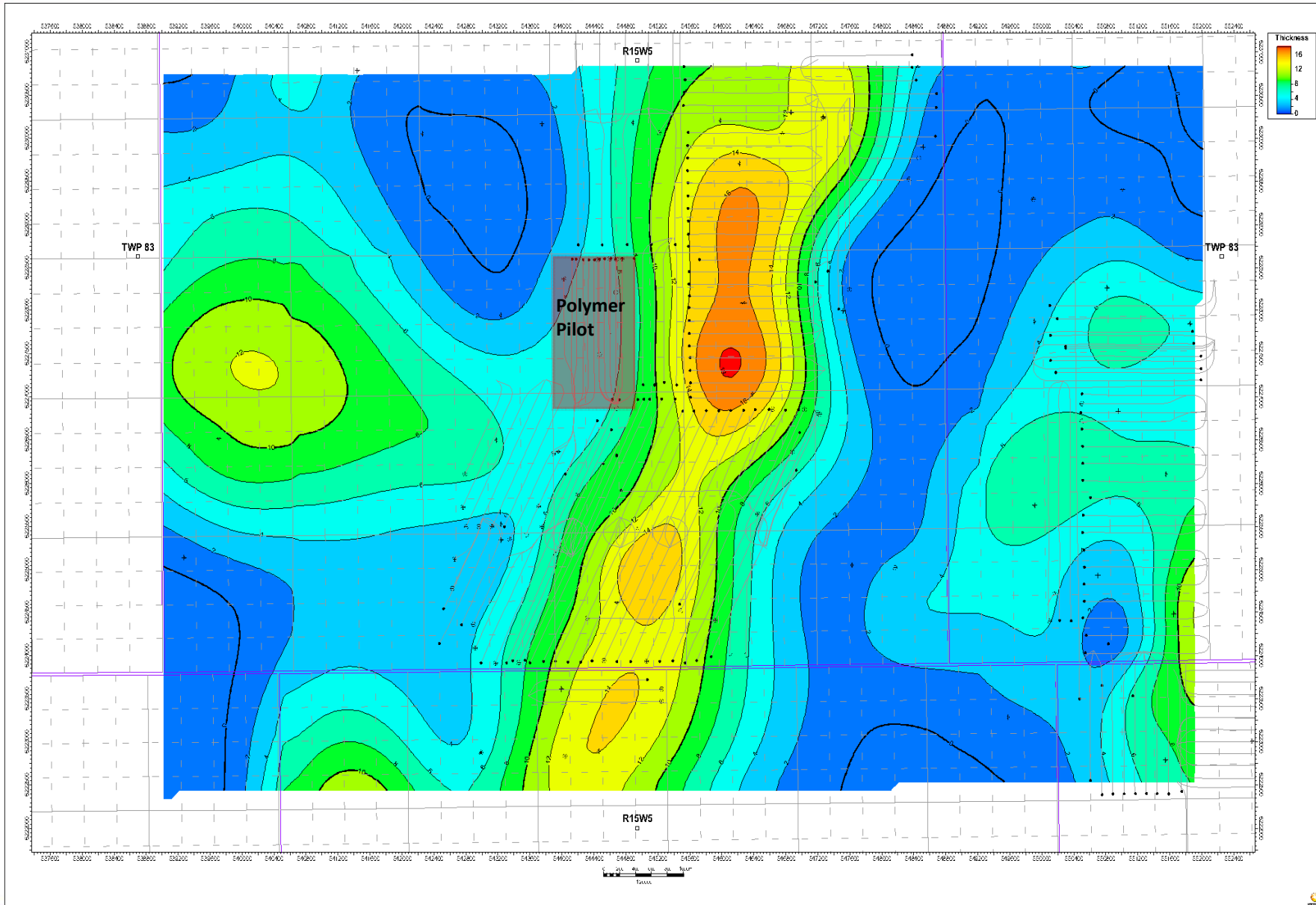


Net Bitumen Pay Cutoffs

- ◆ **Gamma: 20-50API (clean sand)**
- ◆ **Porosity > 24%**
- ◆ **Resistivity > 20 ohm**
- ◆ **$S_o > 65\%$ (oil zone)**
- ◆ **Permeability > 500mD**
- ◆ **Viscosity (dead oil) < 14,000 cSt@20°C**

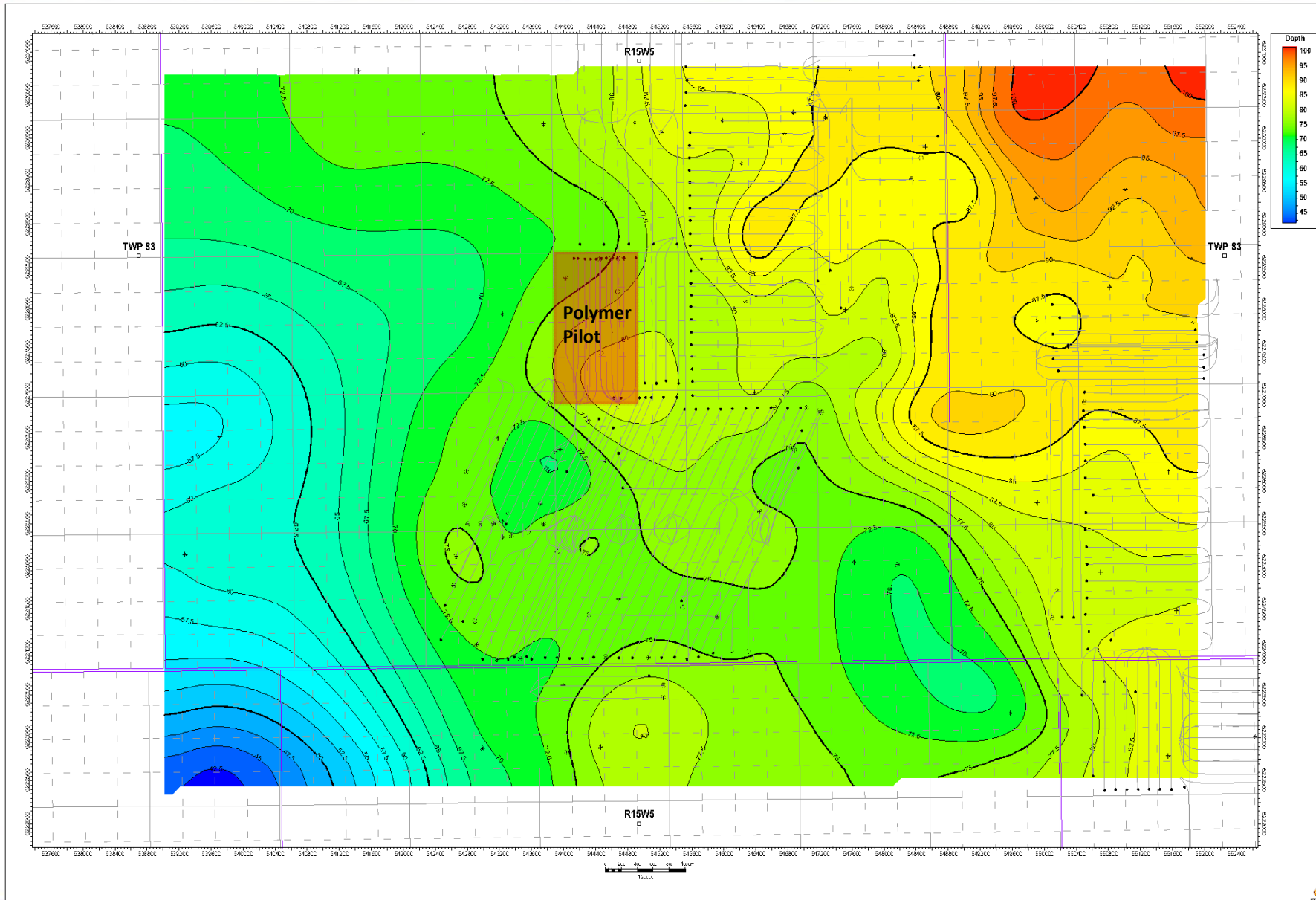


Bluesky Net Pay Map



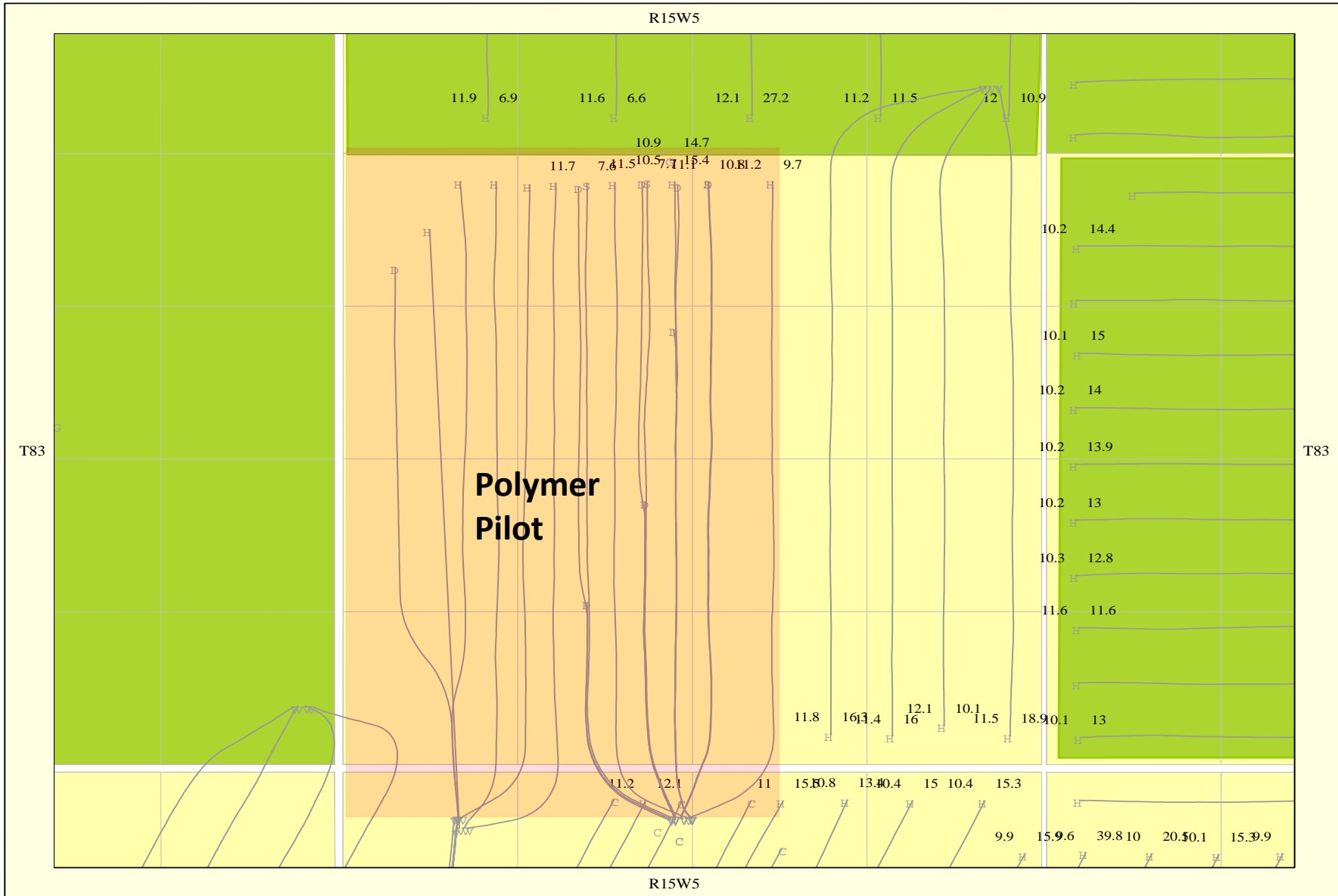


Bluesky Structure Map



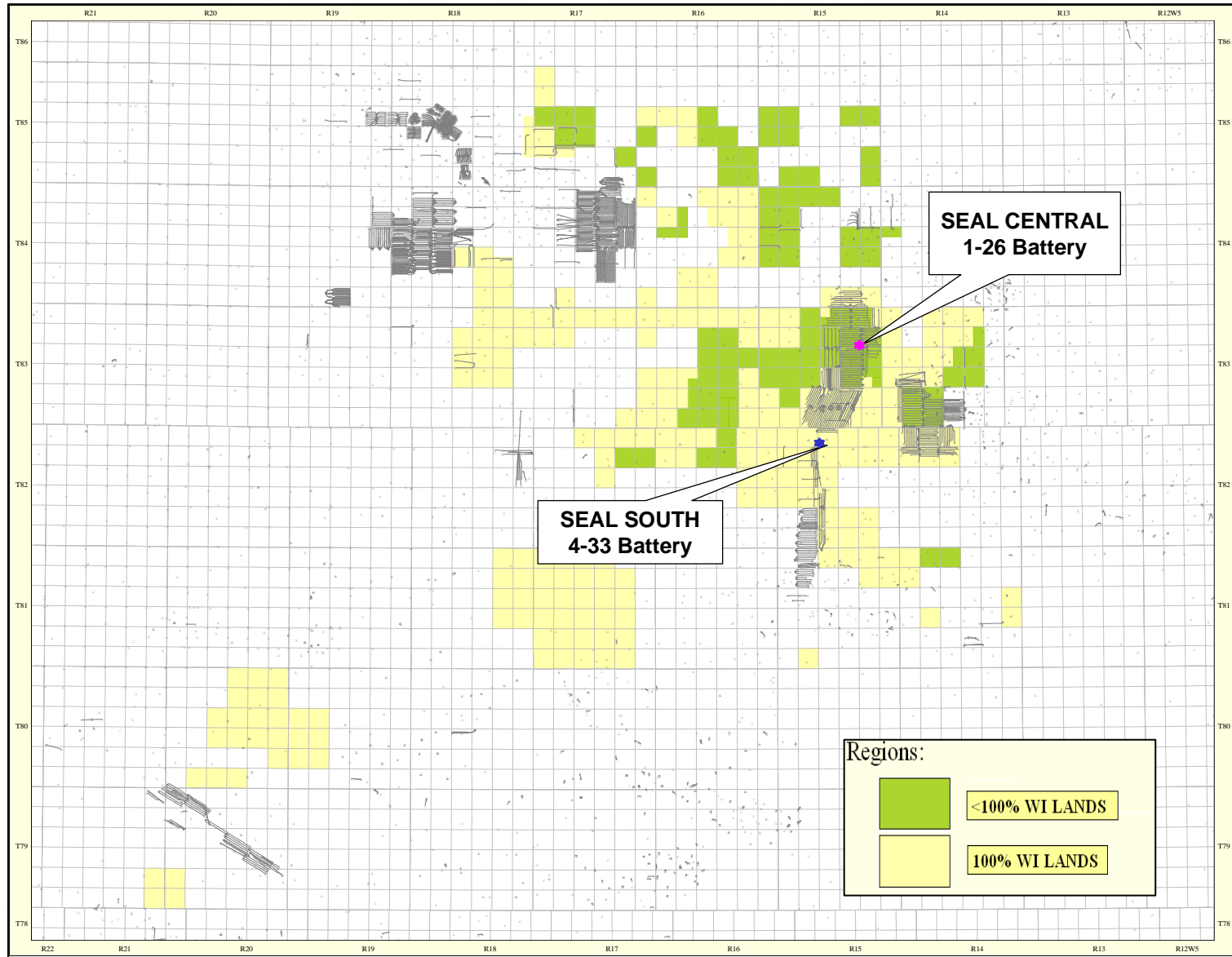


API and Viscosity



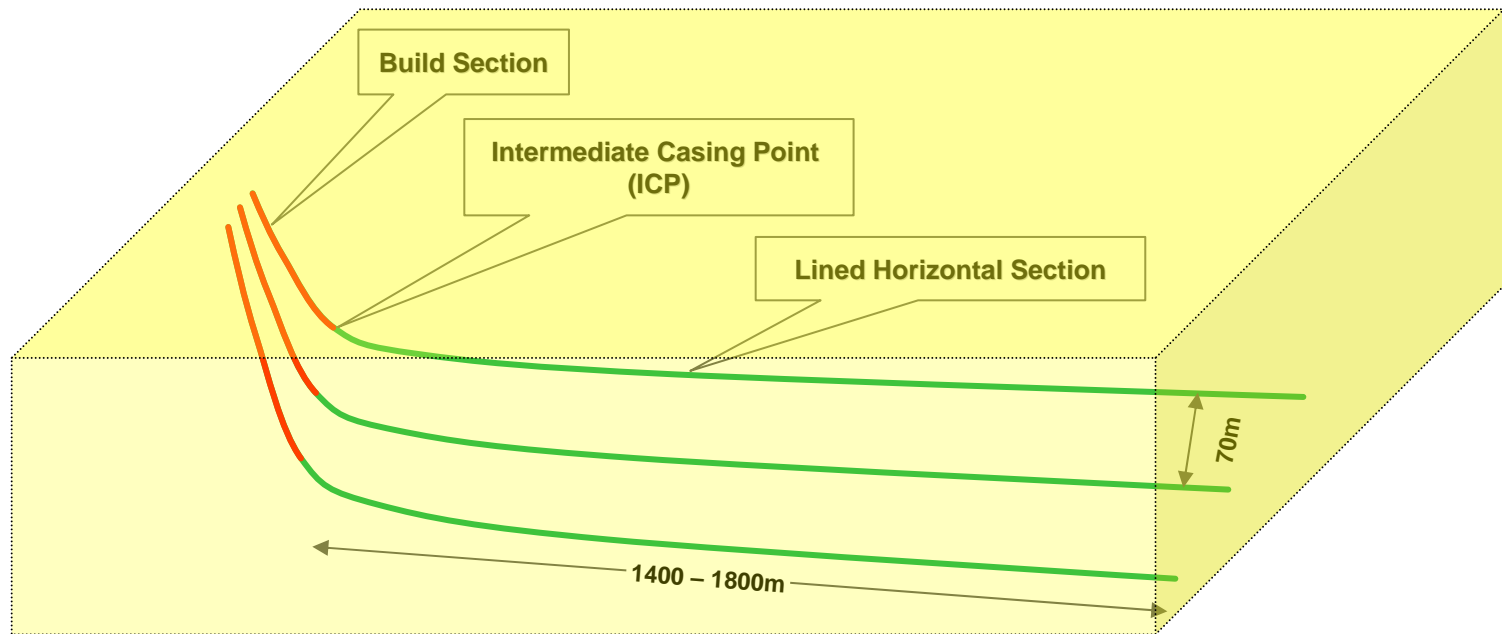


Battery Locations



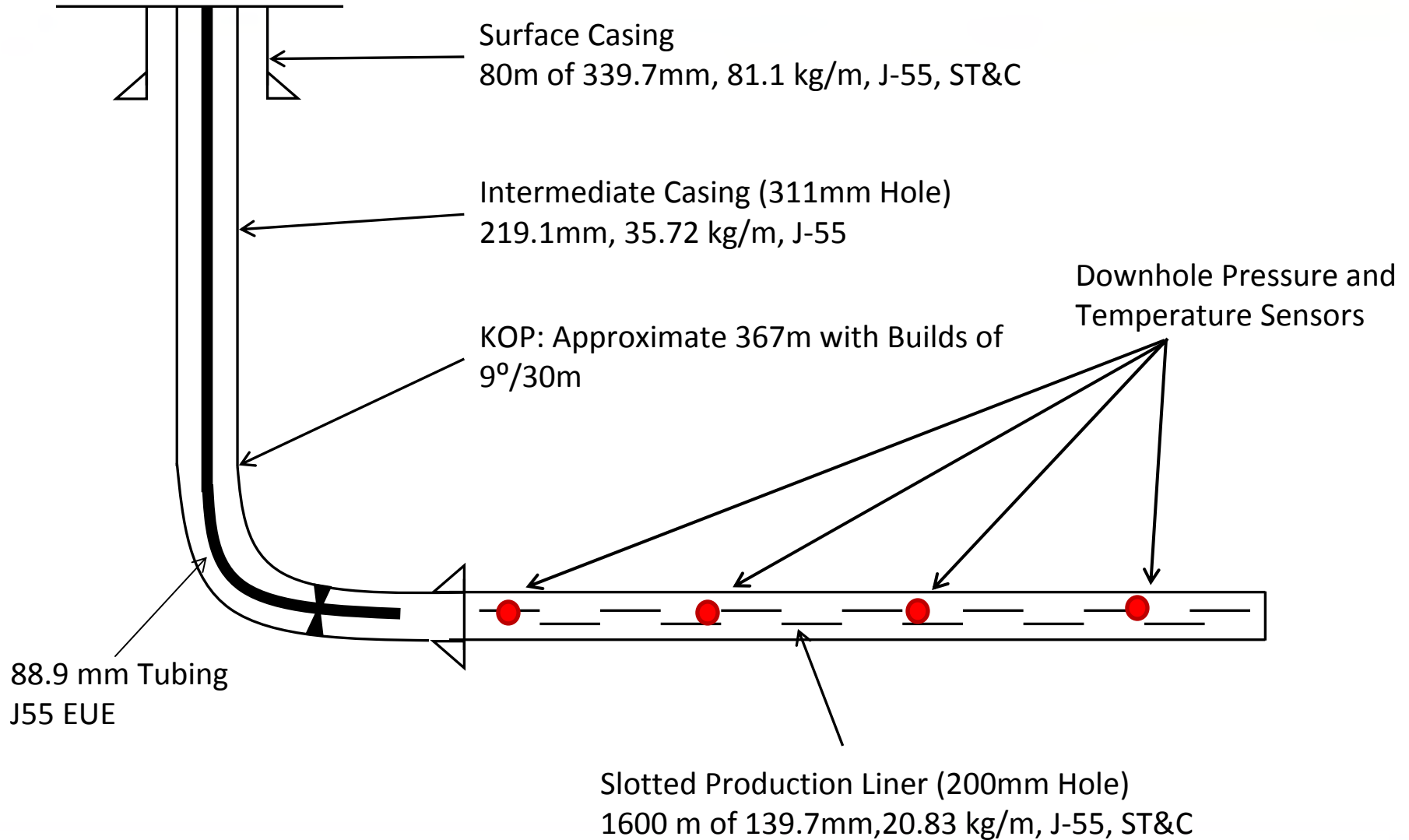


Typical Drilling Configuration





Typical Completion Details



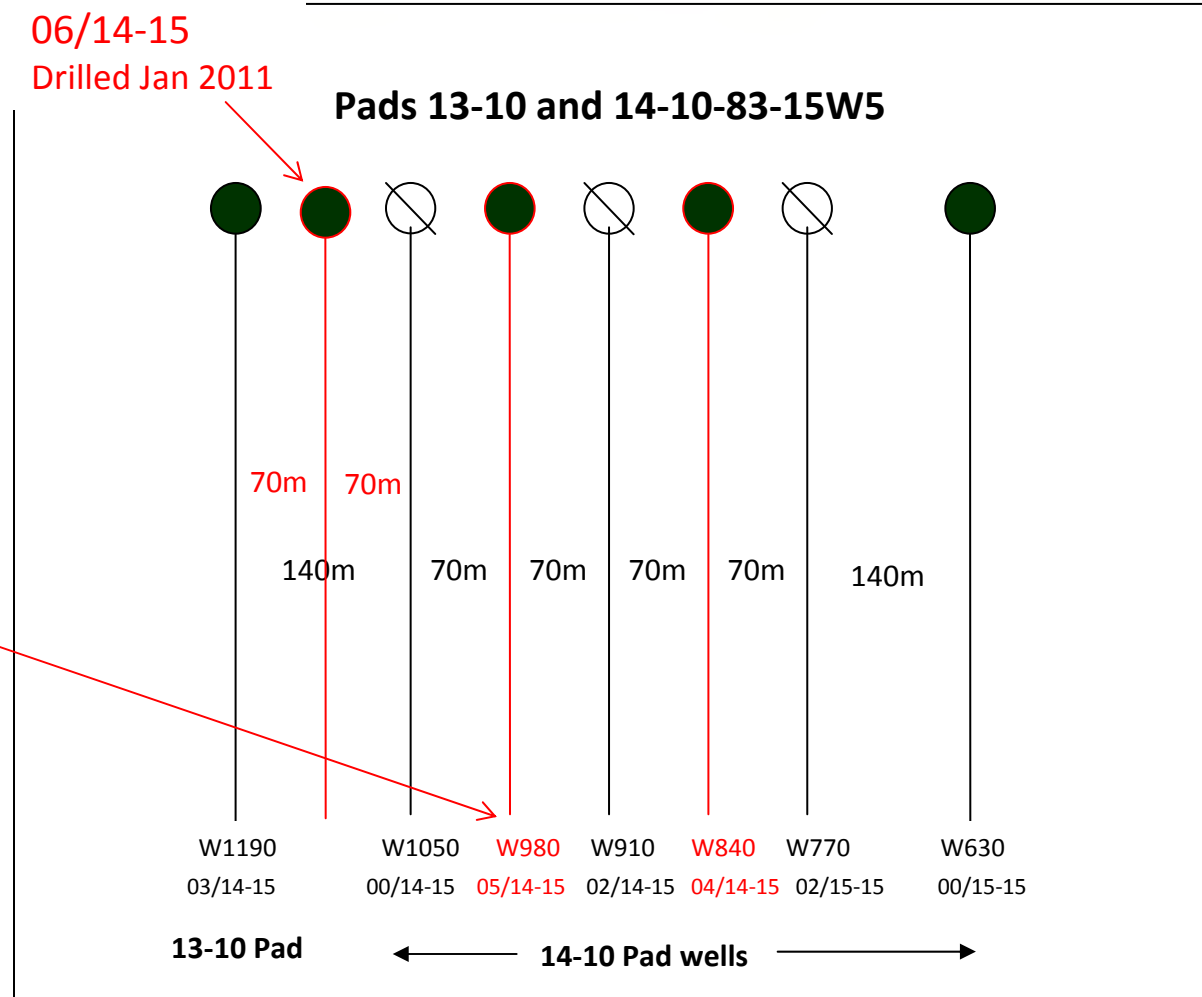


Seal Polymer Pilot

- 3 injectors, 4 producers
- 1400m long lined horizontal wells
- 70 meters well spacing
- Injection started Oct 2010

In the approval this well is listed as 03/15-15-083-15W5!

W1120
06/14-15
Drilled Jan 2011





Pilot Location:

- **Lowest viscosity compared to other locations**
- **>10 m net pay**
- **Good initial oil production**
- **Murphy's 100% working interest**
- **Pipeline connected**

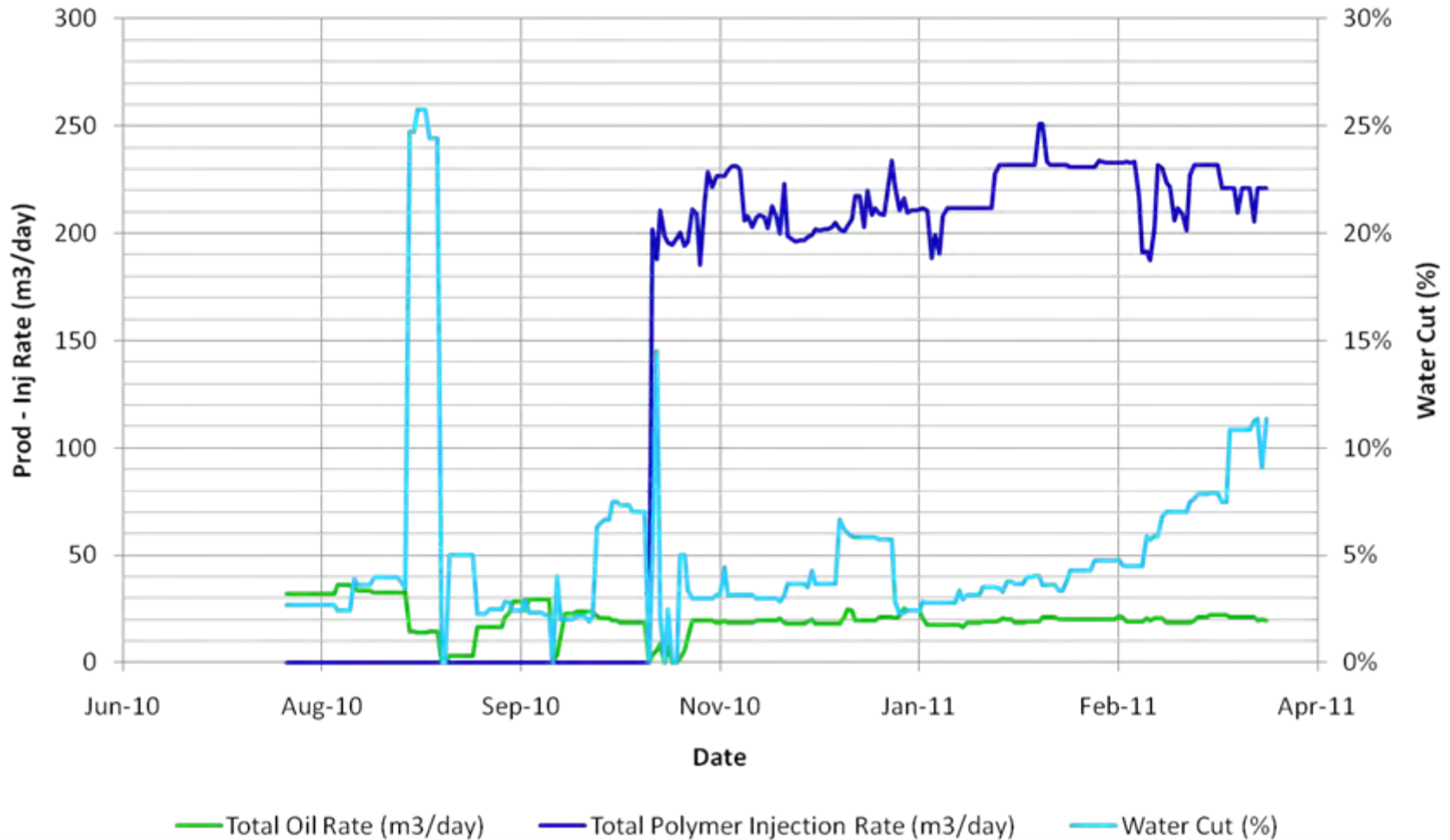
Well Placement Criteria:

- **Primary well are usually placed within top 5 meters of the Bluesky formation due to better reservoir properties – lower viscosity and higher permeability**



Production-Injection Profile

Polymer Pilot Field Results





- ◆ **First Polymer Injection in October 2010**
- ◆ **Expected Polymer Response Q2 to Q3, 2011**
- ◆ **Increased Water cut from 3% to 15% at W840**
- ◆ **No polymer break through yet**
- ◆ **Cumulative volume of polymer injected to date 42.5 e³m³ or 64% reservoir voidage (voidage volume 66 e³m³)**
- ◆ **Primary Recovery Factor at 5%, Expected Incremental Recovery Factor after Polymer Flood is 8.8%**
- ◆ **All the produced solution gas from the pilot wells is captured and tied in to the 4-33 battery.**



💧 **Polymer Pilot Approval Pressure (Approval # 11320)**

- ◆ MAWHIP 3,780 kPa
- ◆ MABHIP 9,800 kPa

💧 **Monitoring Injection Pressure**

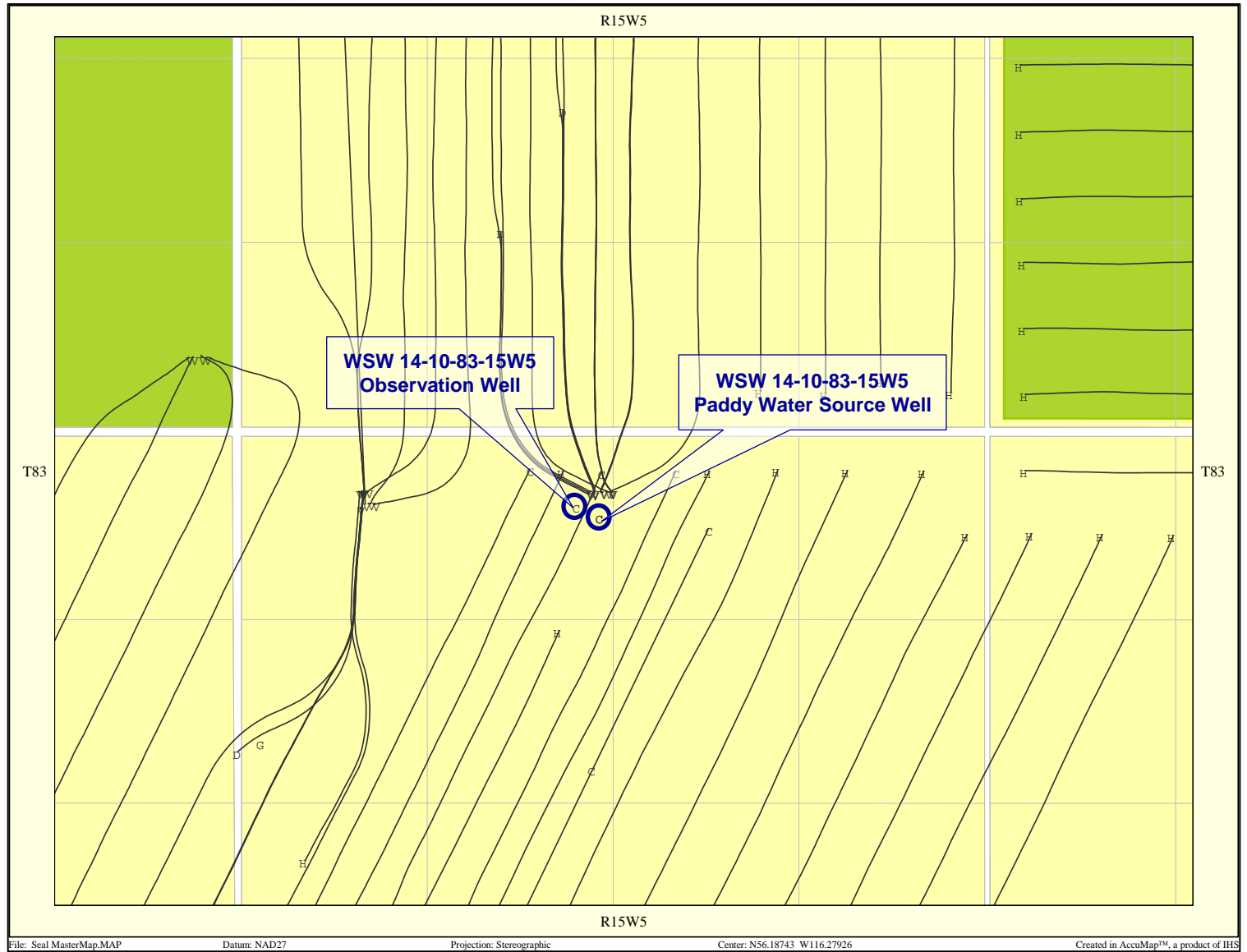
- ◆ Down hole injection pressure and temperature are monitored in all three injectors via four sensors along the length of the horizontal injectors
- ◆ Surface pressure recorded daily and monitored to ensure MAWHIP is not exceeded



- ◆ **Murphy currently has temporary diversion license 00275245-00-00 with Alberta Environment for the diversion of up to 164,260 m³ of Paddy water for injection with an expiry date of 2011-08-01**
- ◆ **Murphy is applying for a permanent diversion license**
 - ◆ **An observation well has been drilled to monitor Paddy source water well**
 - ◆ **Pressure data will be collected on daily basis and will be analyzed for wellbore and regional effect of the aquifer diversion**
- ◆ **Murphy is planning on using saline water sources for the expansion of the polymer pilot**
- ◆ **In compliance with Alberta energy regarding monthly reporting and all other terms of the License**



Paddy Well Location





Expansion Plans Discussion

- **Murphy is planning on expanding the polymer pilot at Seal central area to include 5 more pads**
- **Expansion area have similar reservoir properties and interwell spacing**
- **Application for the expansion area is planned for May 2011 submission to ERCB**



Scheme Approval and Compliance

- ◆ **Murphy is not aware of any outstanding compliance issues regarding the current approvals**



- **Murphy is committed to maximizing the value of the Resource for both itself and the Province of Alberta through it's Royalty Interest**
- **Compliance with all ERCB regulations continues to be a top priority**