

Legend

Vertical Scale

0 feet

50 feet

100 feet

200 feet

Horizontal Scale as Designated

Geophysical Log Explanation


Gamma Ray Curve

Spontaneous Potential (SP) Curve

Resistivity Curve

Saturated Zone

AMSL: Above Mean Sea Level

**Crow Butte
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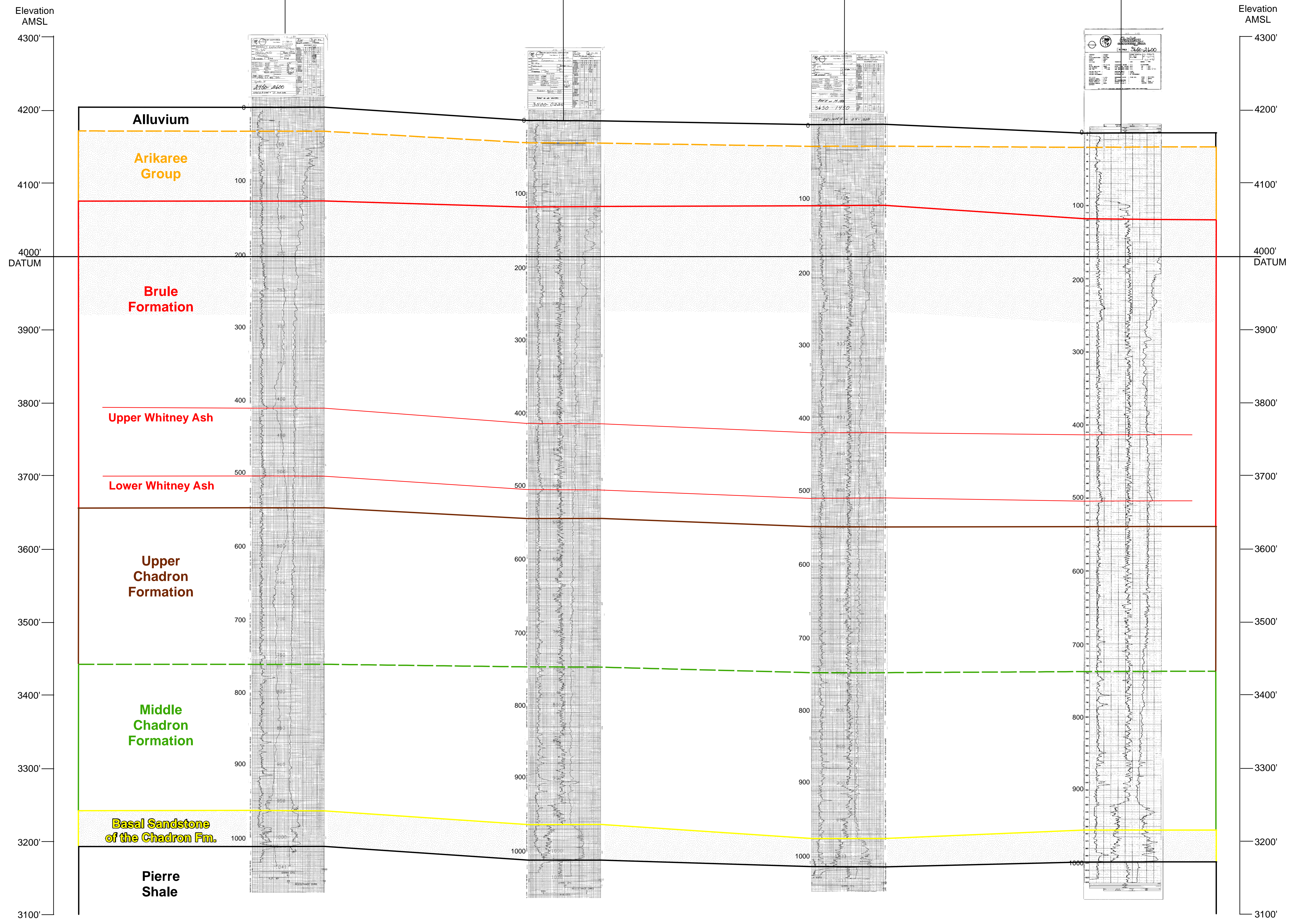
**Figure 2.6-3i
Marsland Structural
Cross Section I-I'**

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\c041428\Desktop\OBOW TEMP\TR ARCTR 3-I'.mxd	Checked by: JS

Looking North

J
West

J'
East



Legend

Vertical Scale
0 feet
50 feet
100 feet
200 feet


Horizontal Scale
as Designated

AMS: Above Mean Sea Level

Geophysical Log Explanation

Gamma Ray Curve
Spontaneous Potential (SP) Curve
Resistivity Curve

Saturated Zone

 **Crow Butte Resources, Inc.**

**Figure 2.6-3j
Marsland Structural
Cross Section J-J'**

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\cd41426\Desktop\BROW TEMP\TR-NEC\TR-J-J.mxd	Checked by: JS

Looking North

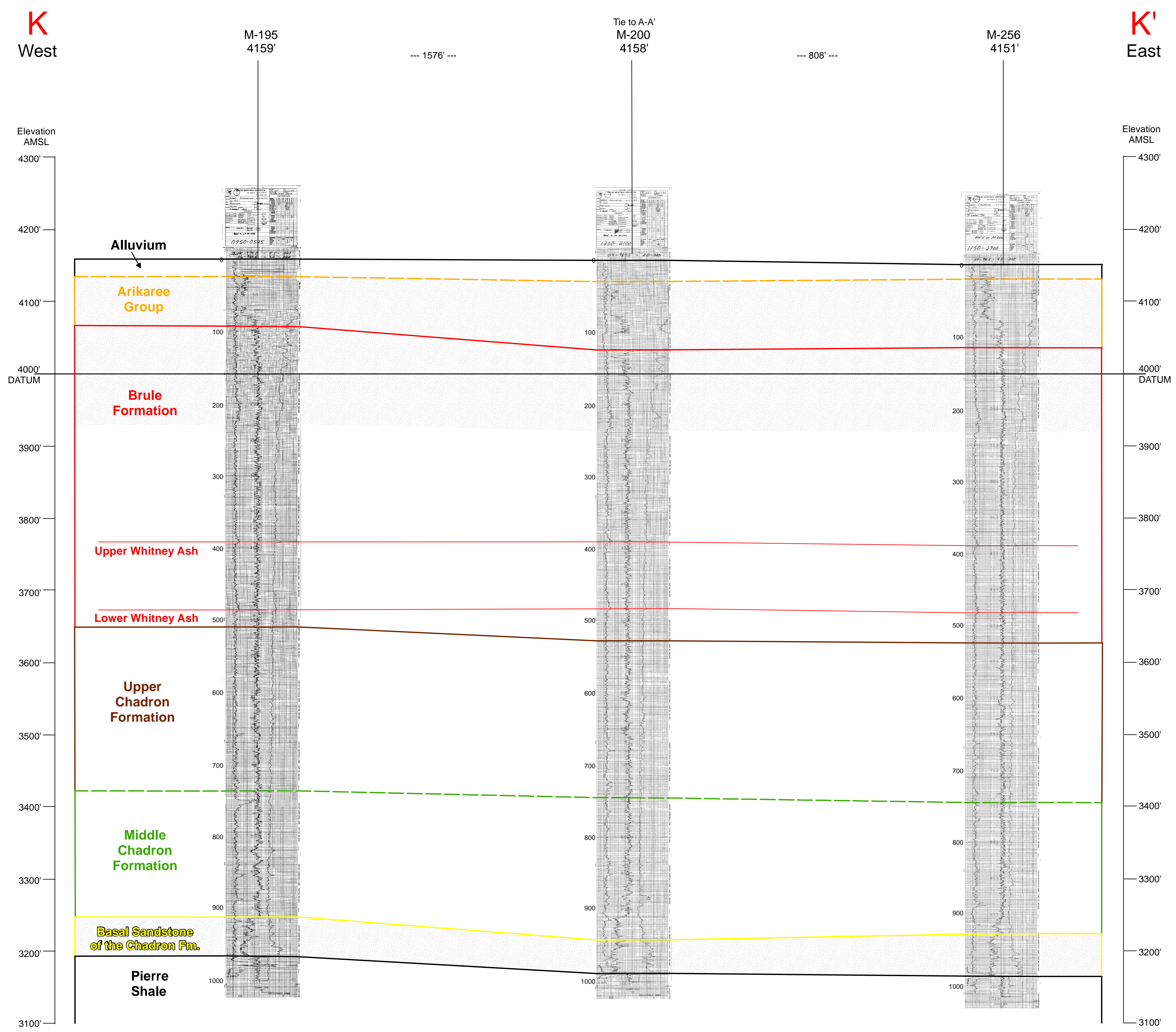


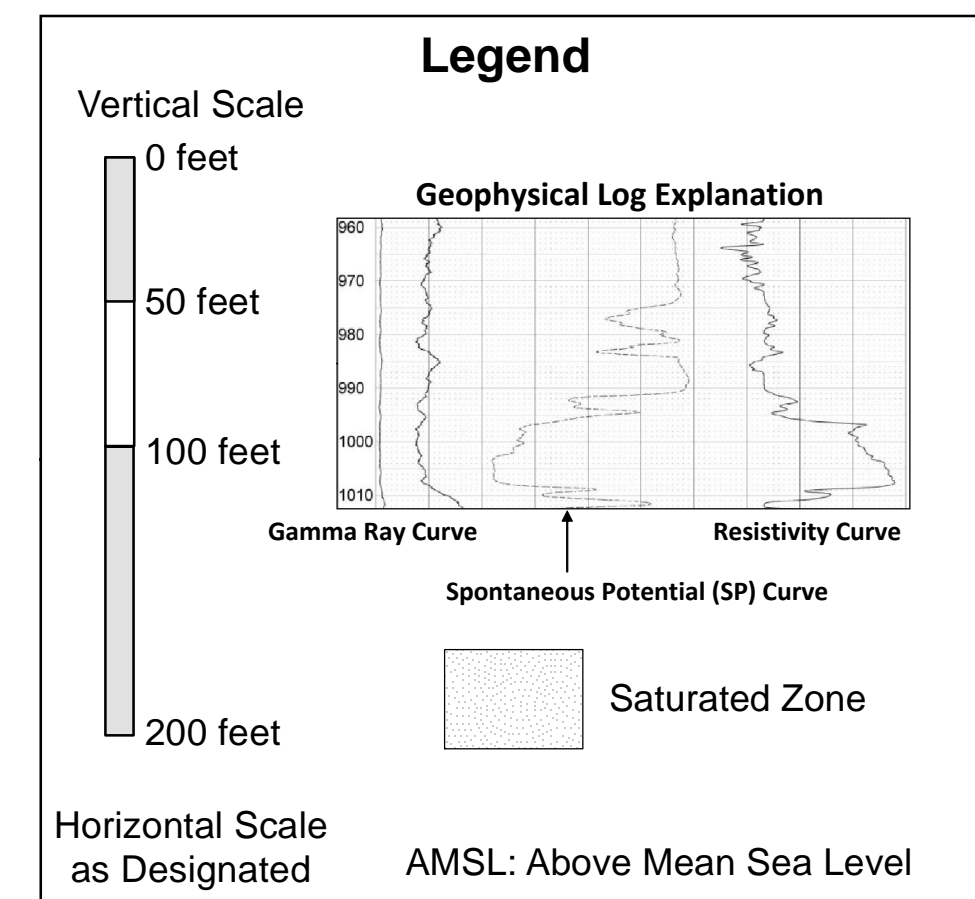
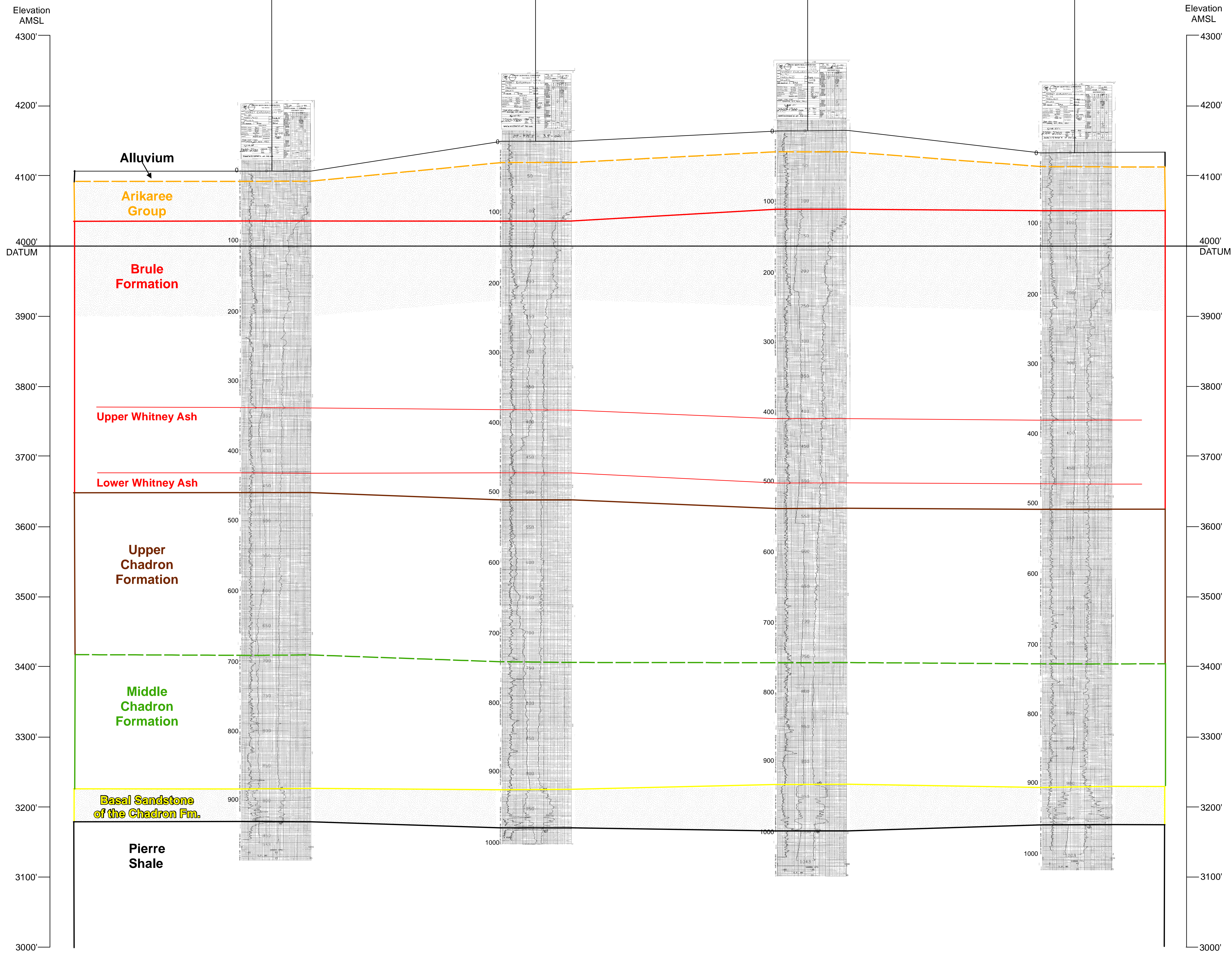
Figure 2.6-3k
Marsland Structural
Cross Section K-K'

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\cd414\OneDrive\BROW TEMP\TR-NR\OTR_K-K'.mxd	Checked by: JS

Looking North

L
West

L'
East

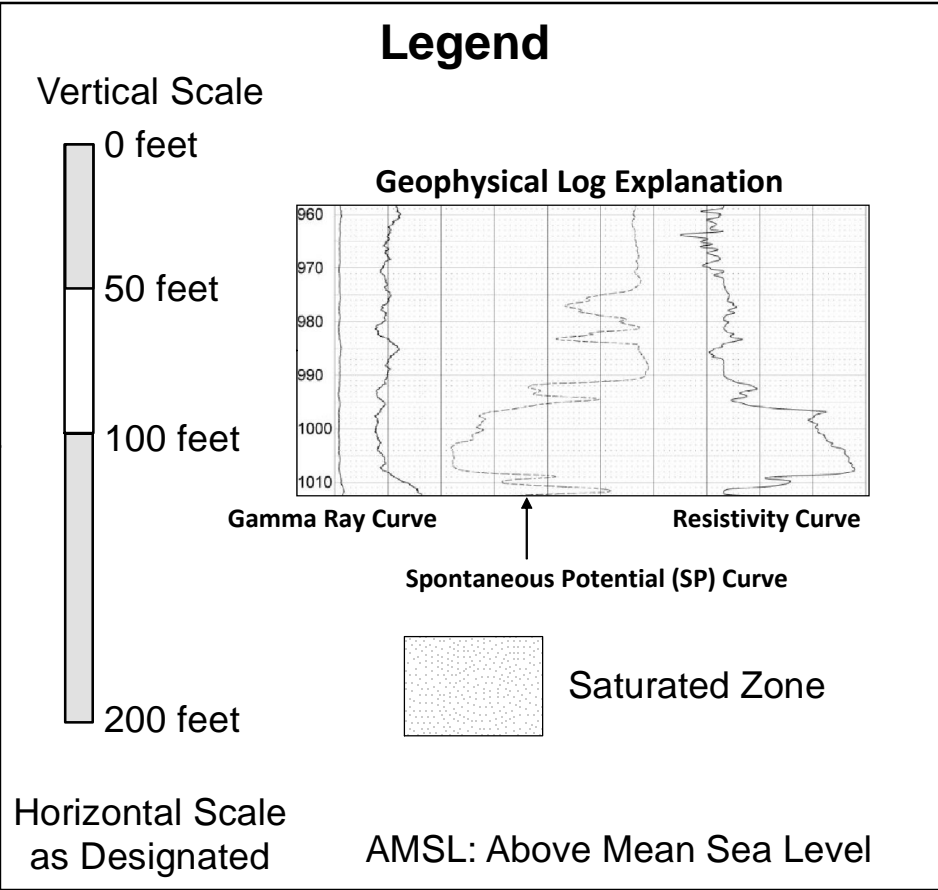
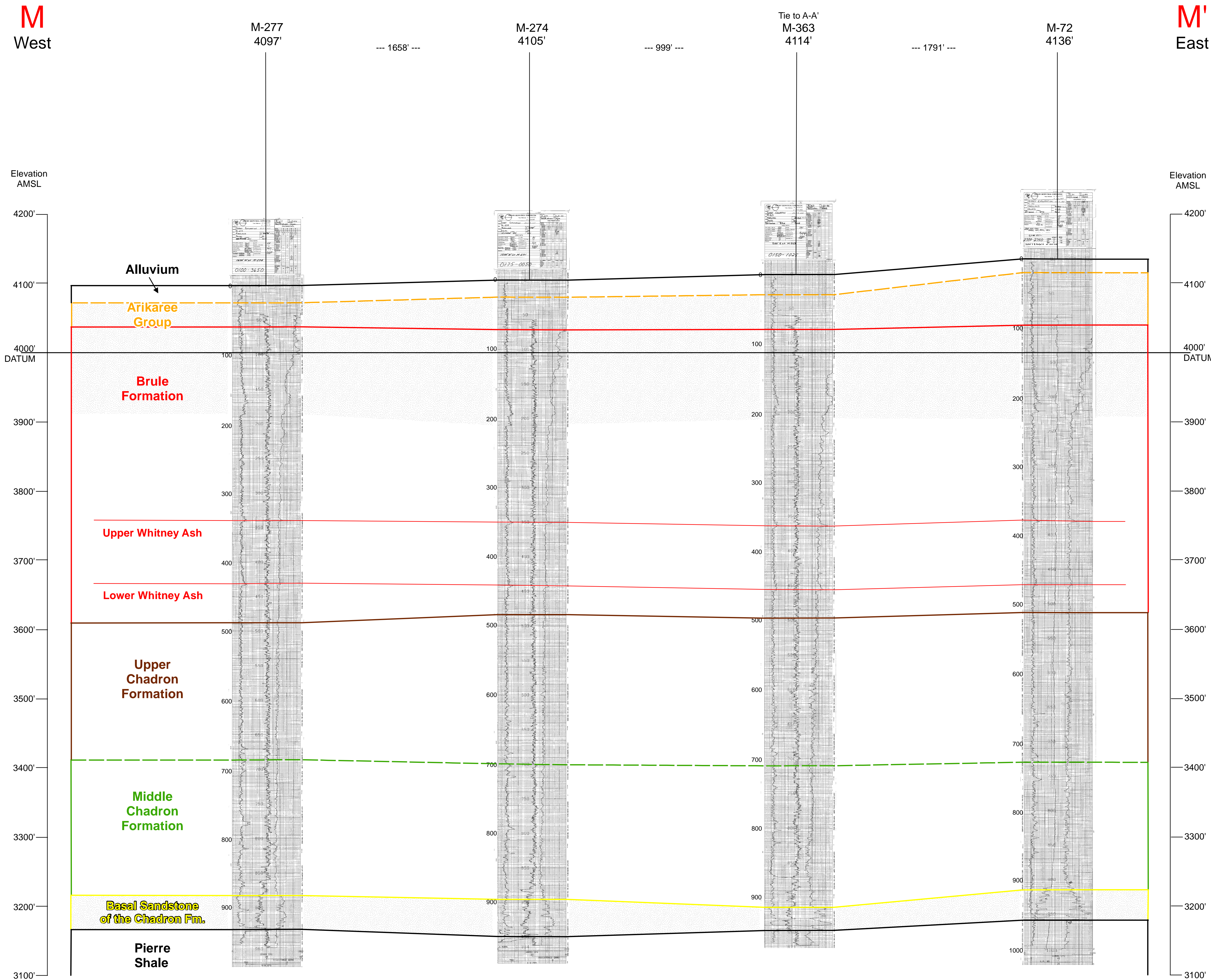


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**Figure 2.6-3I
Marsland Structural
Cross Section L-L'**

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\cd4142\Desktop\BOW TEMP\TR-ARC\TR_L-L'.msd	Checked by: JS

Looking North

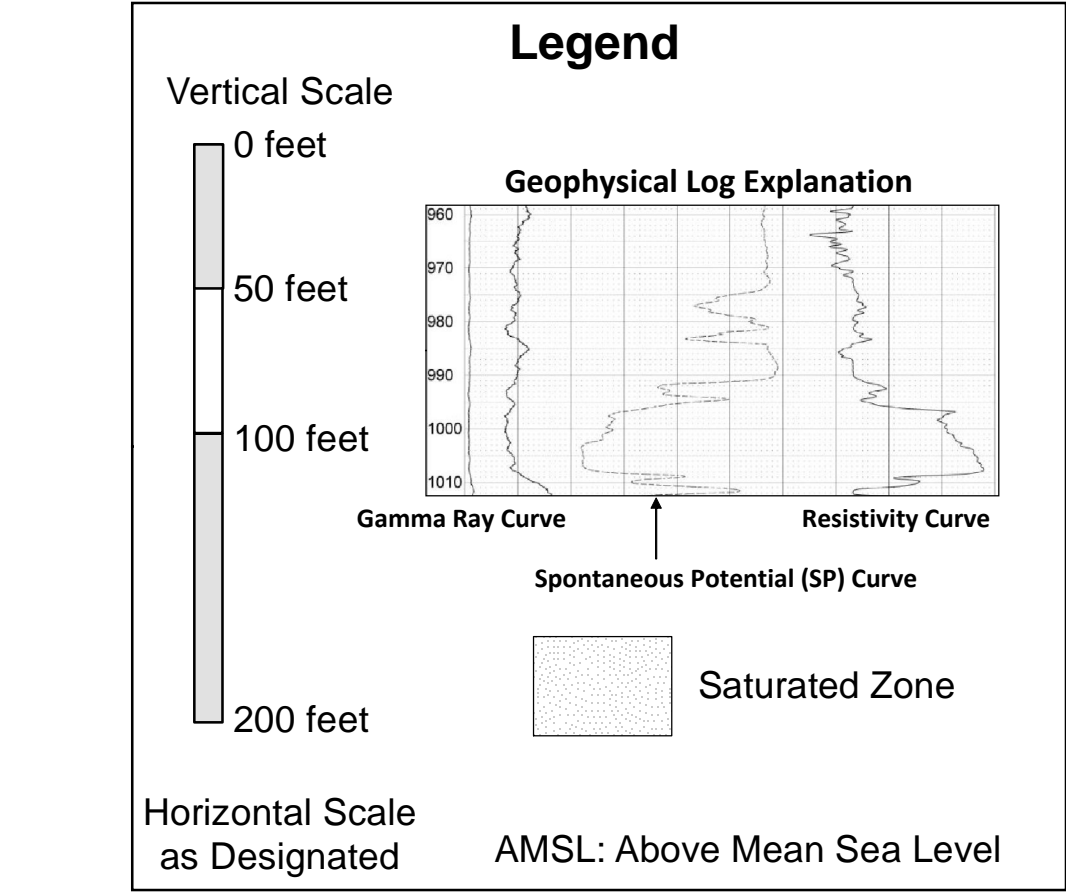
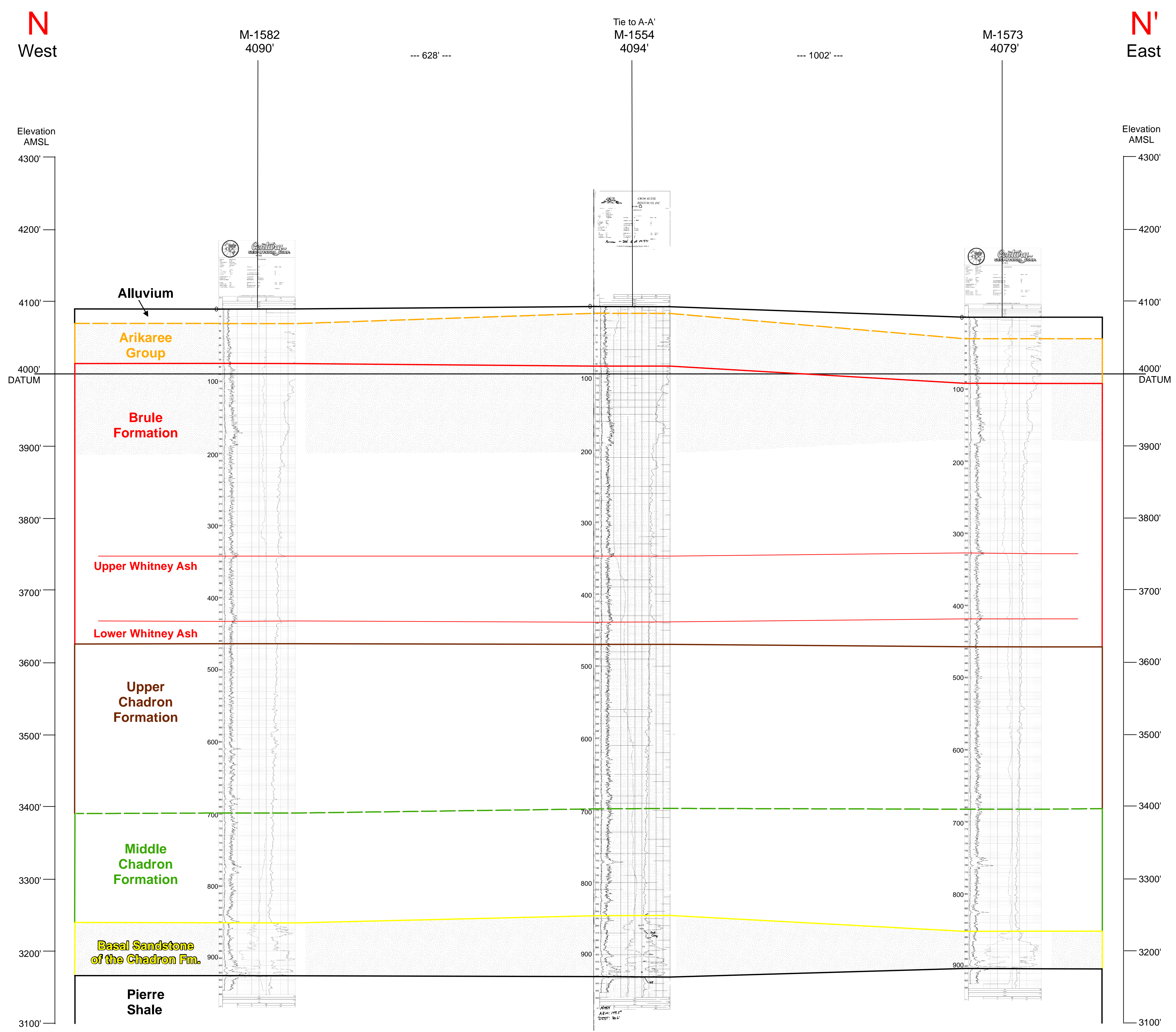



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**Figure 2.6-3m
Marsland Structural
Cross Section M-M'**

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\ca04142\Desktop\DOB\TEMP\TR-NR\CTR_M-M'.mxd	Checked by: JS

Looking North



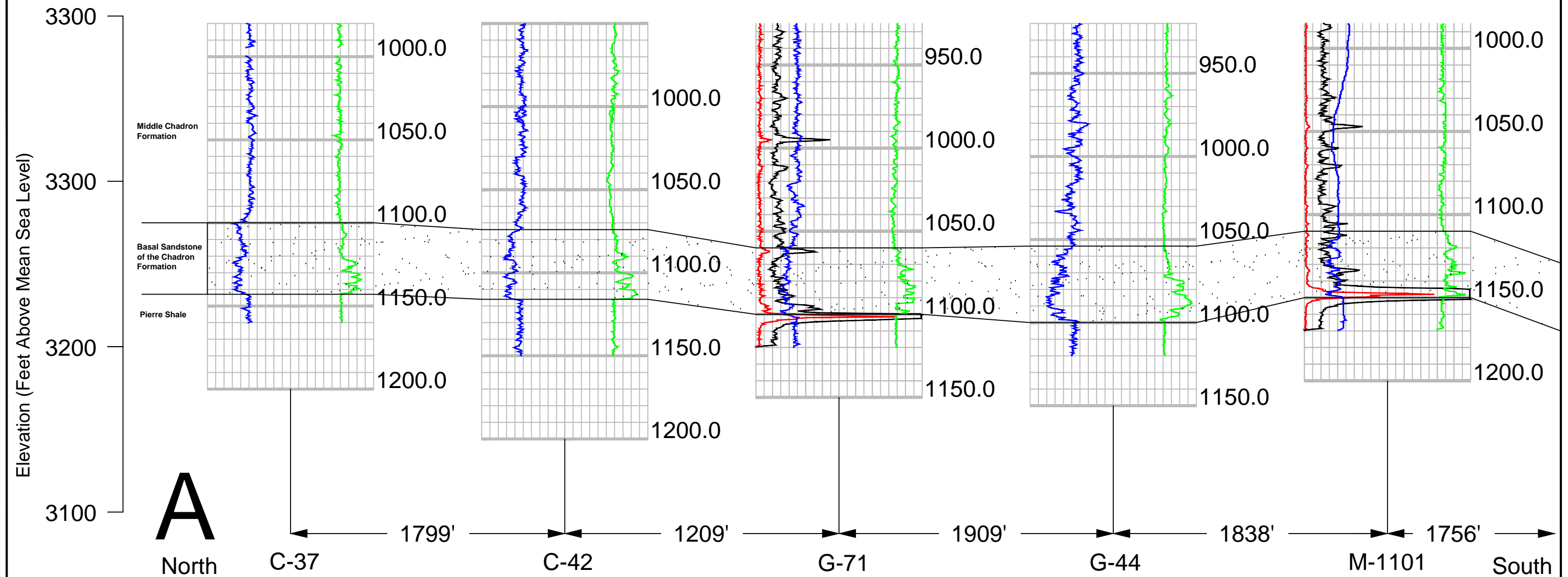
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**Figure 2.6-3n
Marsland Structural
Cross Section N-N'**

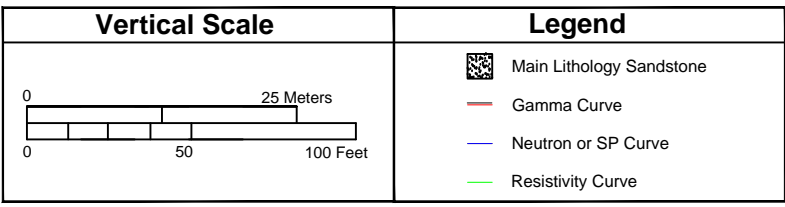
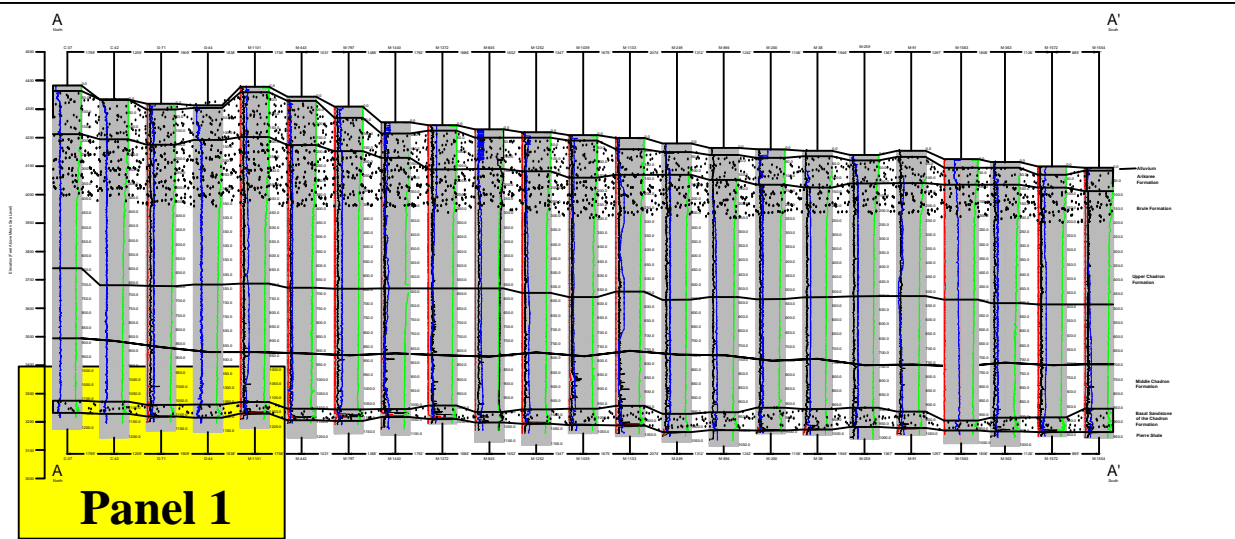
Scale: See Scale Bar	Date: 12/8/2016
C:\Users\ca64142\Desktop\BROW TEMP\TR-NR\CTR_N-N'.msd	Checked by: JS

Looking North

Marsland Cross-Section A-A' - Panel 1



CROSS-SECTION PANEL LOCATION

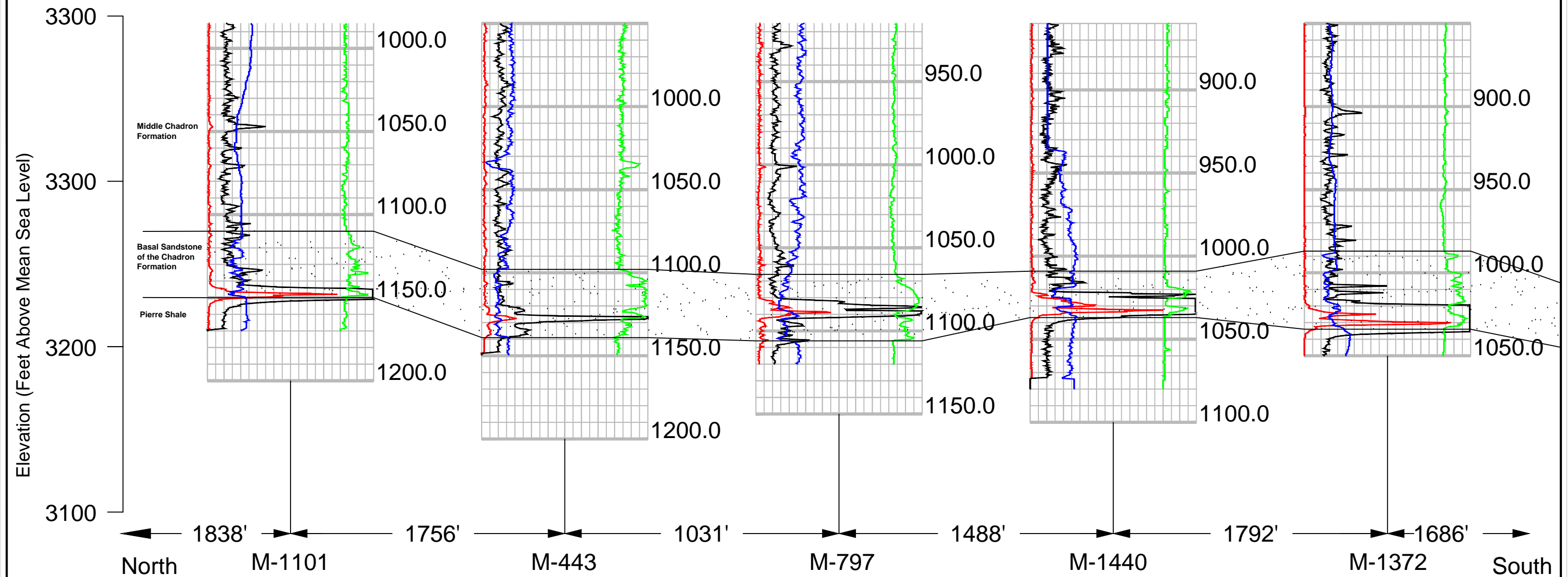


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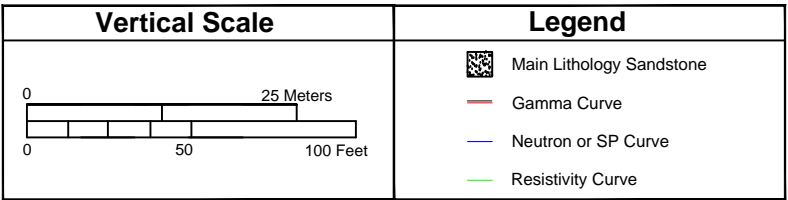
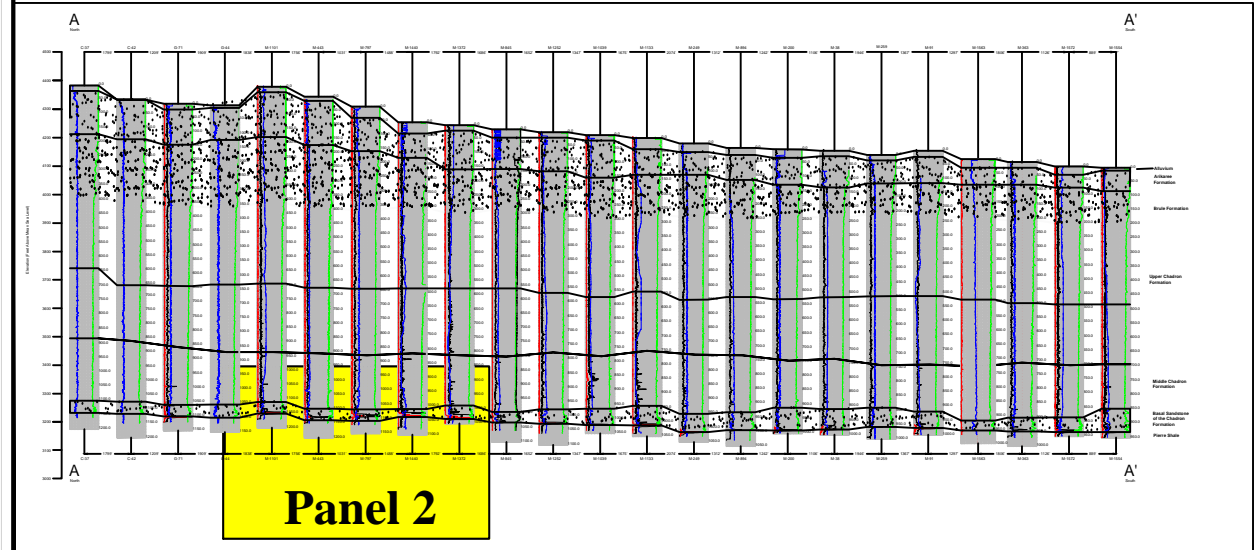
FIGURE 2.6-30
EXPANDED MARSLAND
CROSS SECTION A-A'
PANEL 1

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-30.pdf	By: WB

Marsland Cross-Section A-A' - Panel 2



CROSS-SECTION PANEL LOCATION



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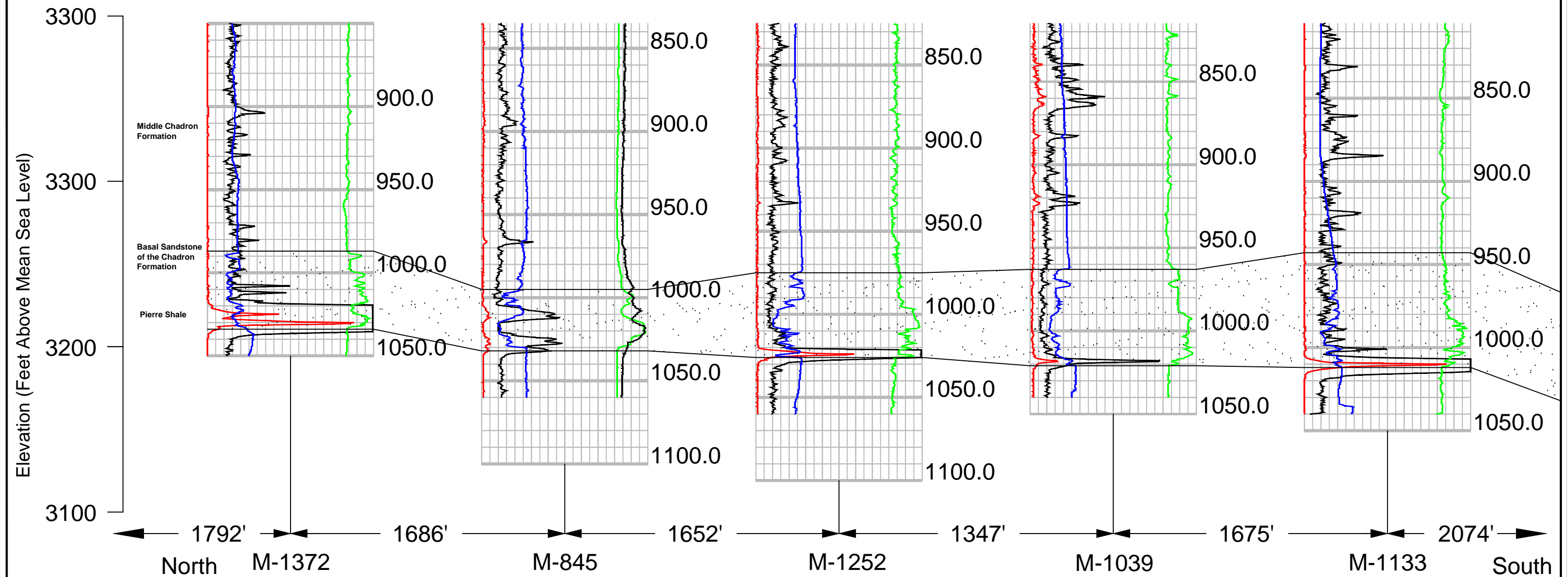
FIGURE 2.6-3p

EXPANDED MARSLAND CROSS SECTION A-A'

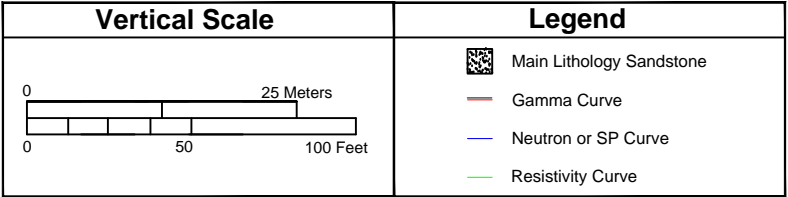
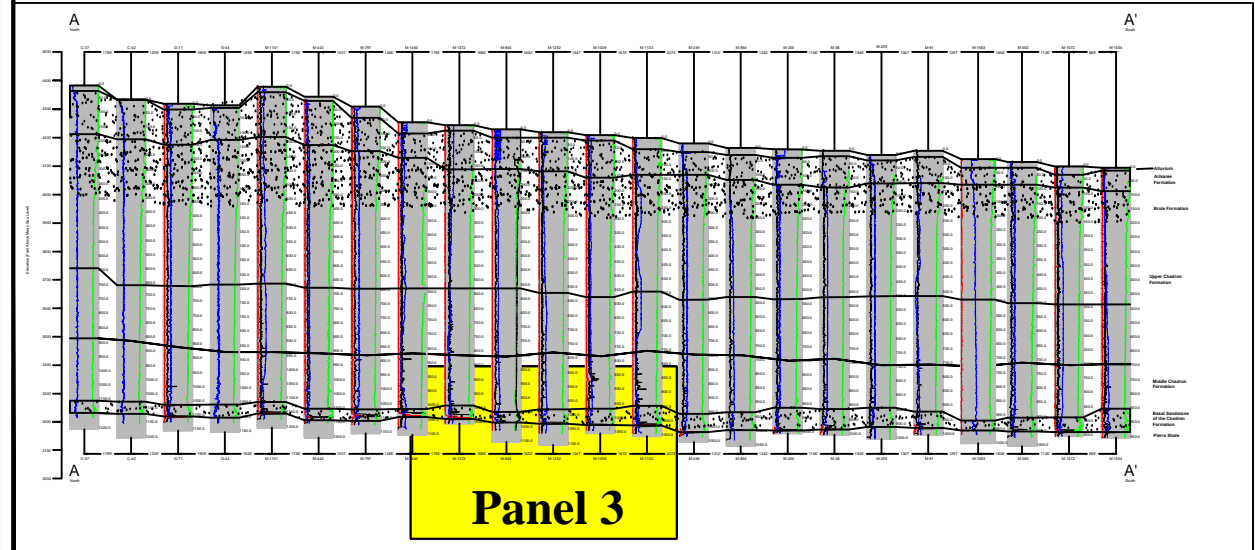
PANEL 2

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3p.pdf	By: WB

Marsland Cross-Section A-A' - Panel 3



CROSS-SECTION PANEL LOCATION



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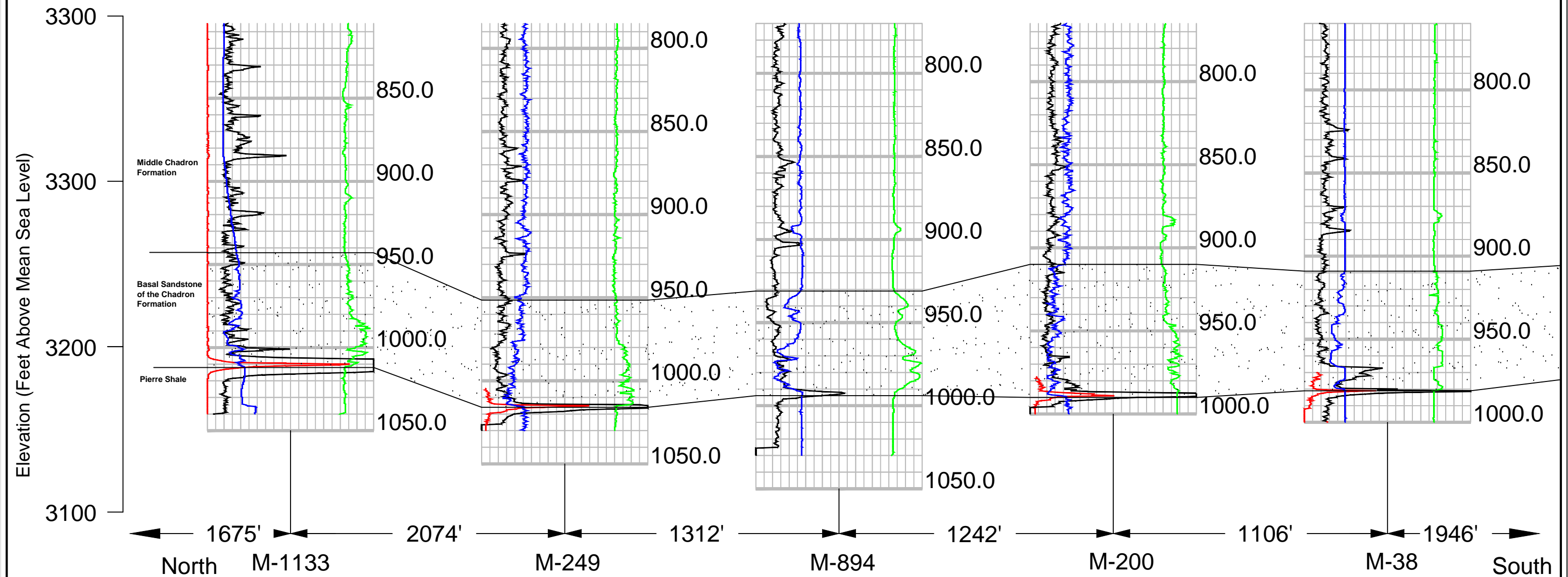
FIGURE 2.6-3q

EXPANDED MARSLAND
CROSS SECTION A-A'

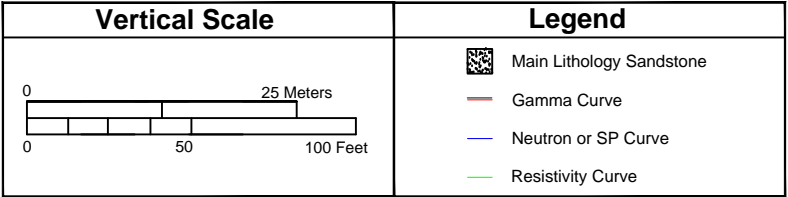
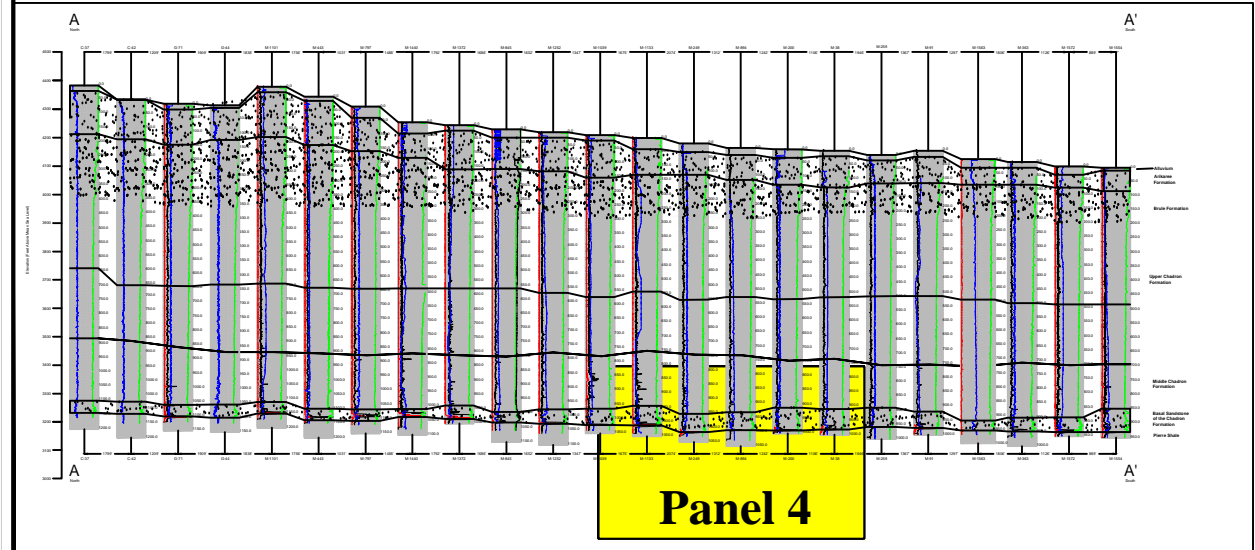
PANEL 3

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3q.pdf	By: WB

Marsland Cross-Section A-A' - Panel 4



CROSS-SECTION PANEL LOCATION



**Crow Butte
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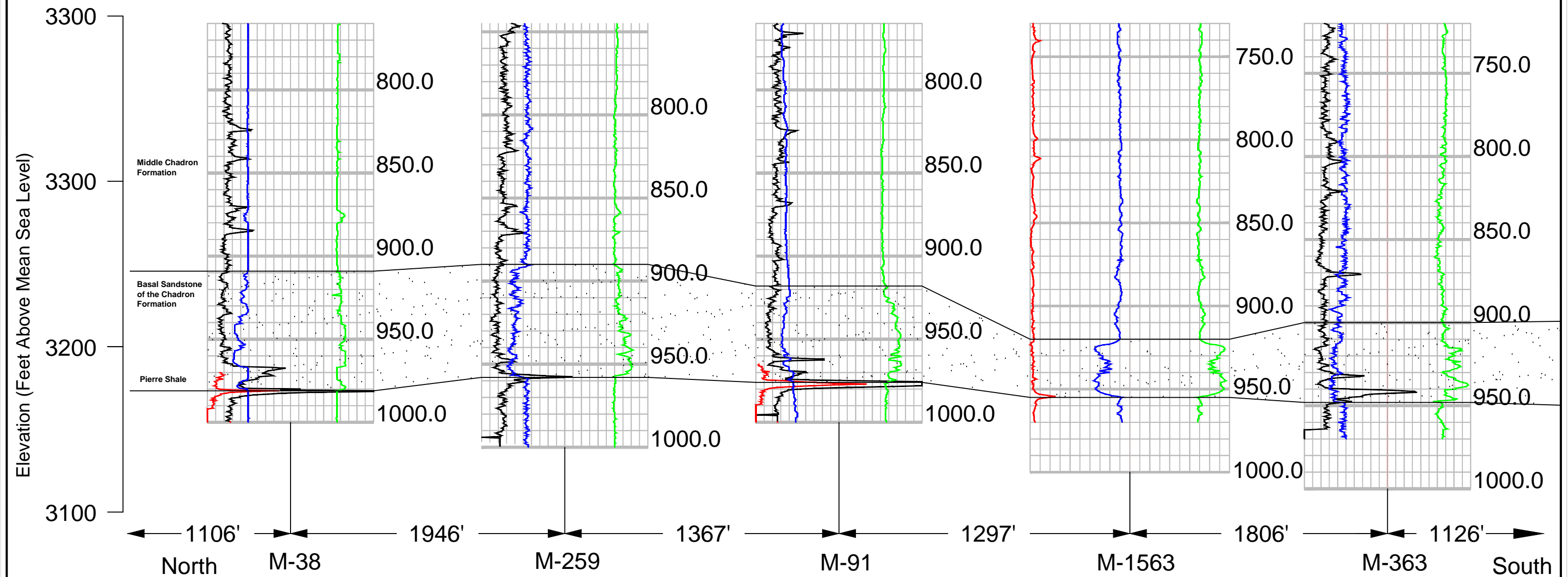
FIGURE 2.6-3r

EXPANDED MARSLAND
CROSS SECTION A-A'

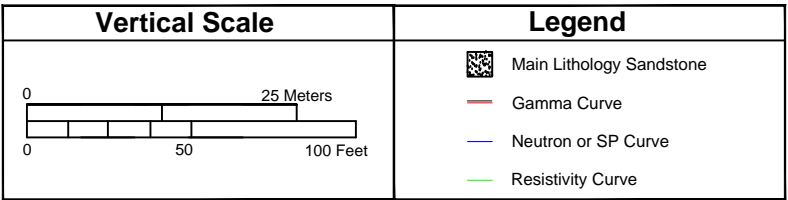
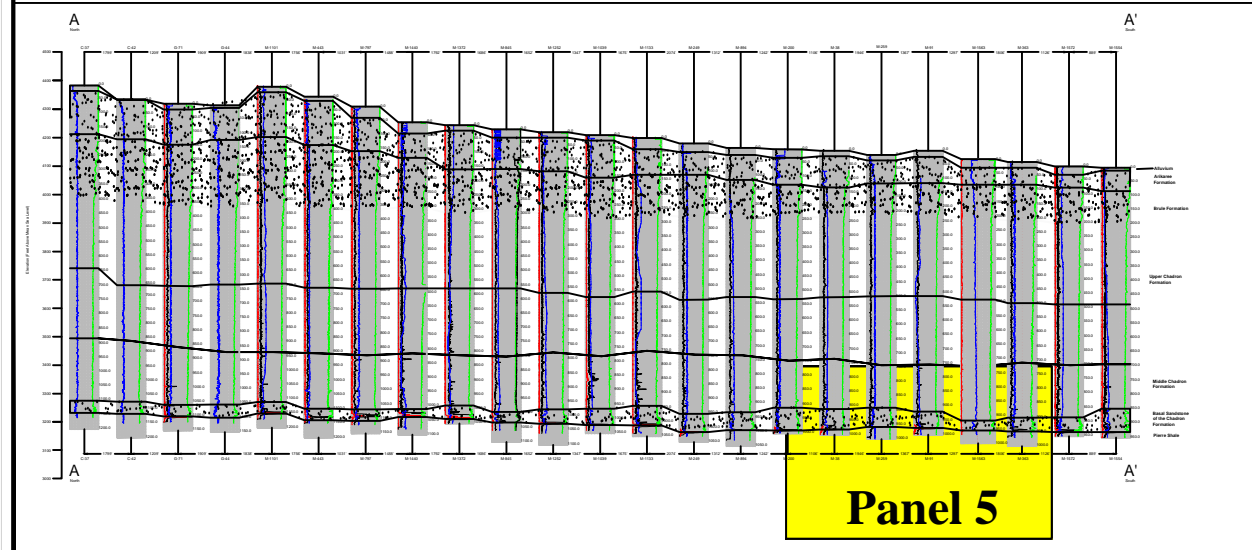
PANEL 4

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3r.pdf	By: WB

Marsland Cross-Section A-A' - Panel 5



CROSS-SECTION PANEL LOCATION

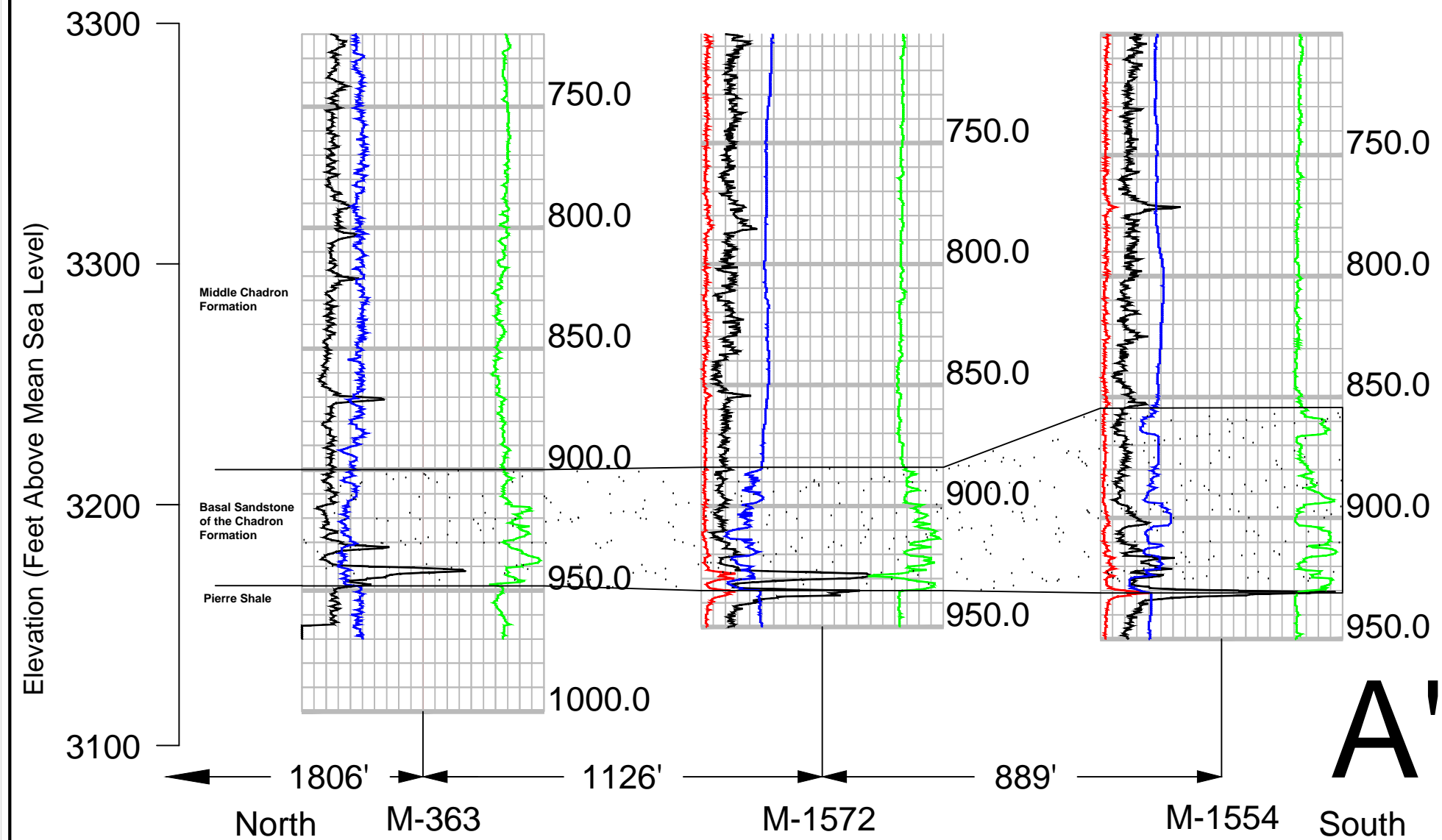


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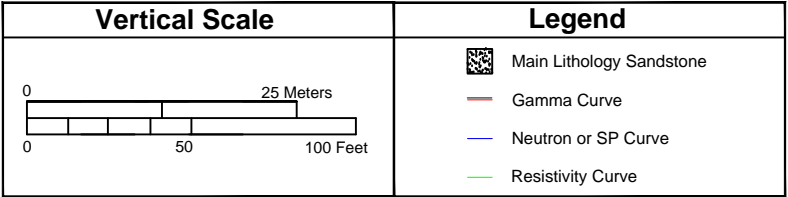
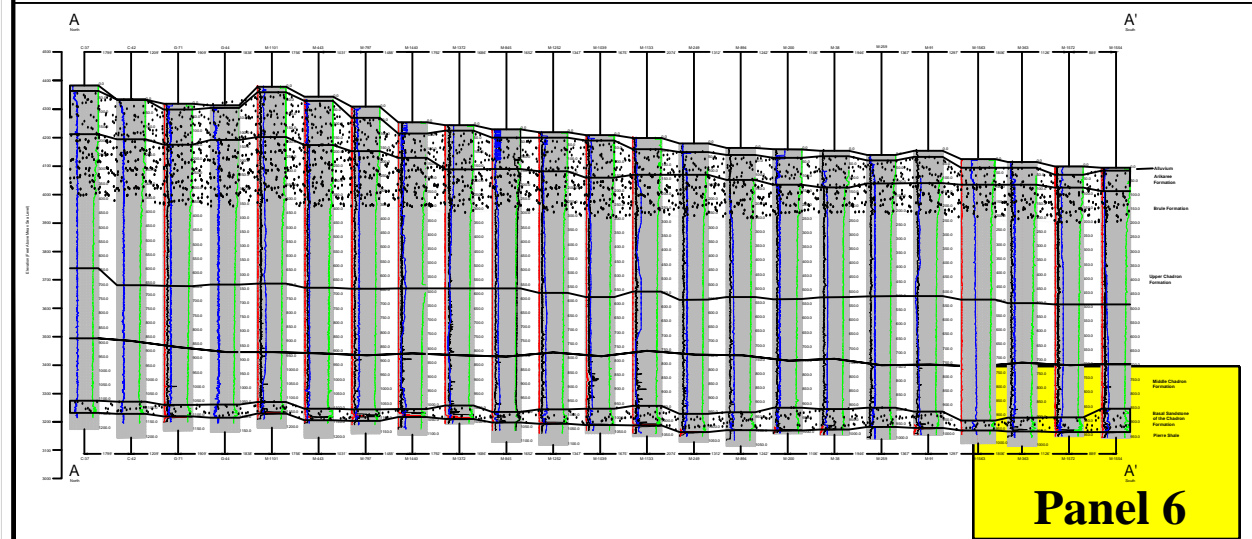
FIGURE 2.6-3s
EXPANDED MARSLAND
CROSS SECTION A-A'
PANEL 5

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3s.pdf	By: WB

Marsland Cross-Section A-A' - Panel 6



CROSS-SECTION PANEL LOCATION



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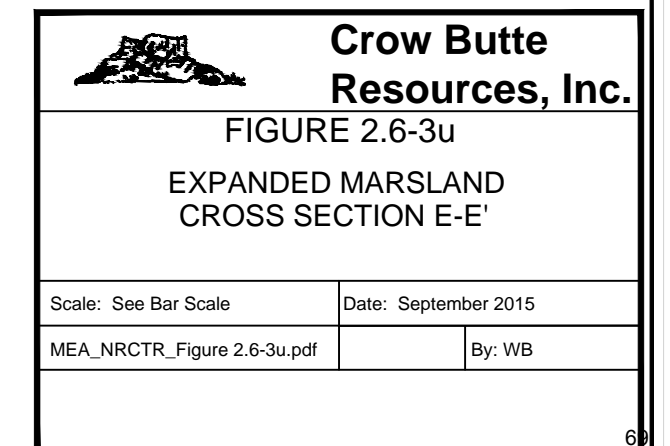
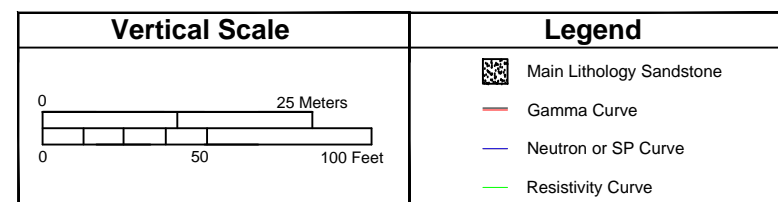
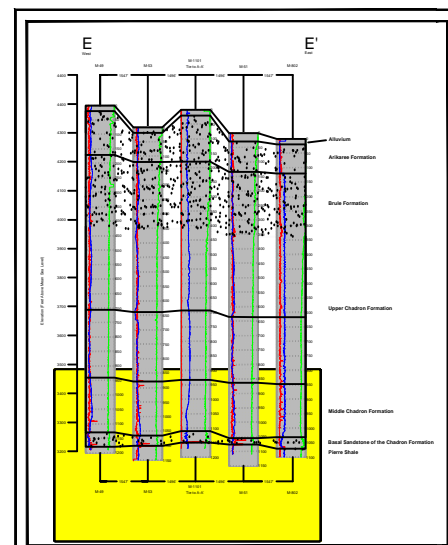
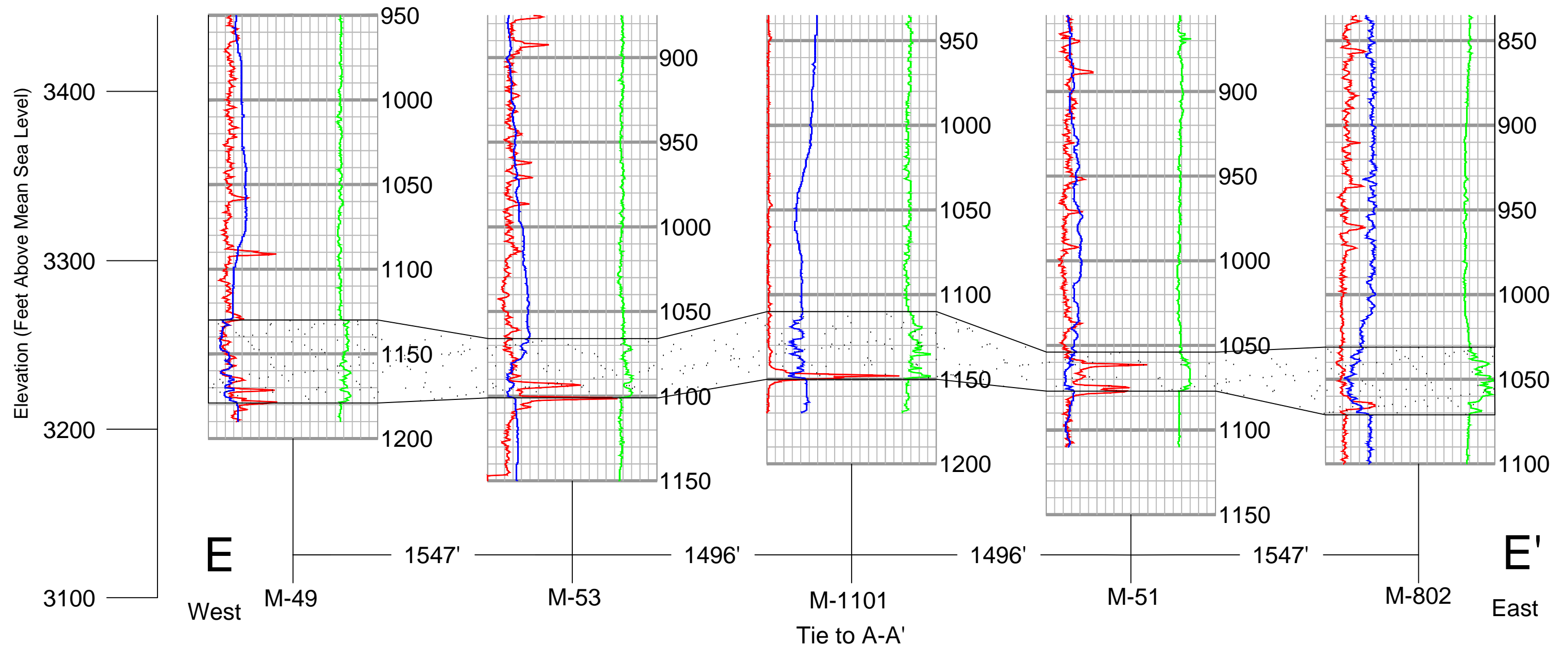
FIGURE 2.6-3t

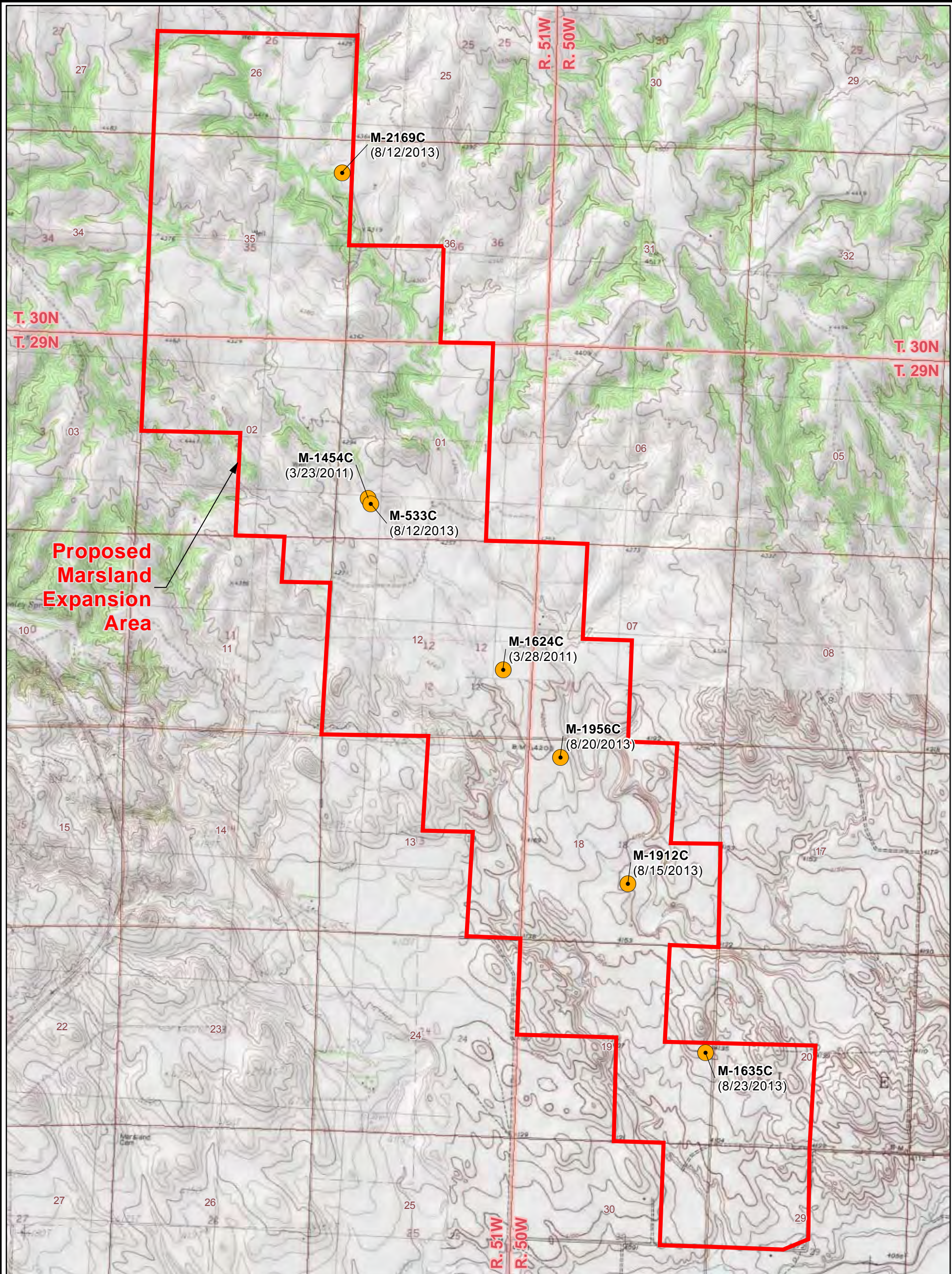
EXPANDED MARSLAND CROSS SECTION A-A'

PANEL 6


Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3t.pdf	By: WB


Expanded Marsland Cross-Section E-E'






LEGEND


 Coring Location

 Proposed Marsland Expansion Area


M-1635C Location ID
(8/23/2013) Date of Collection

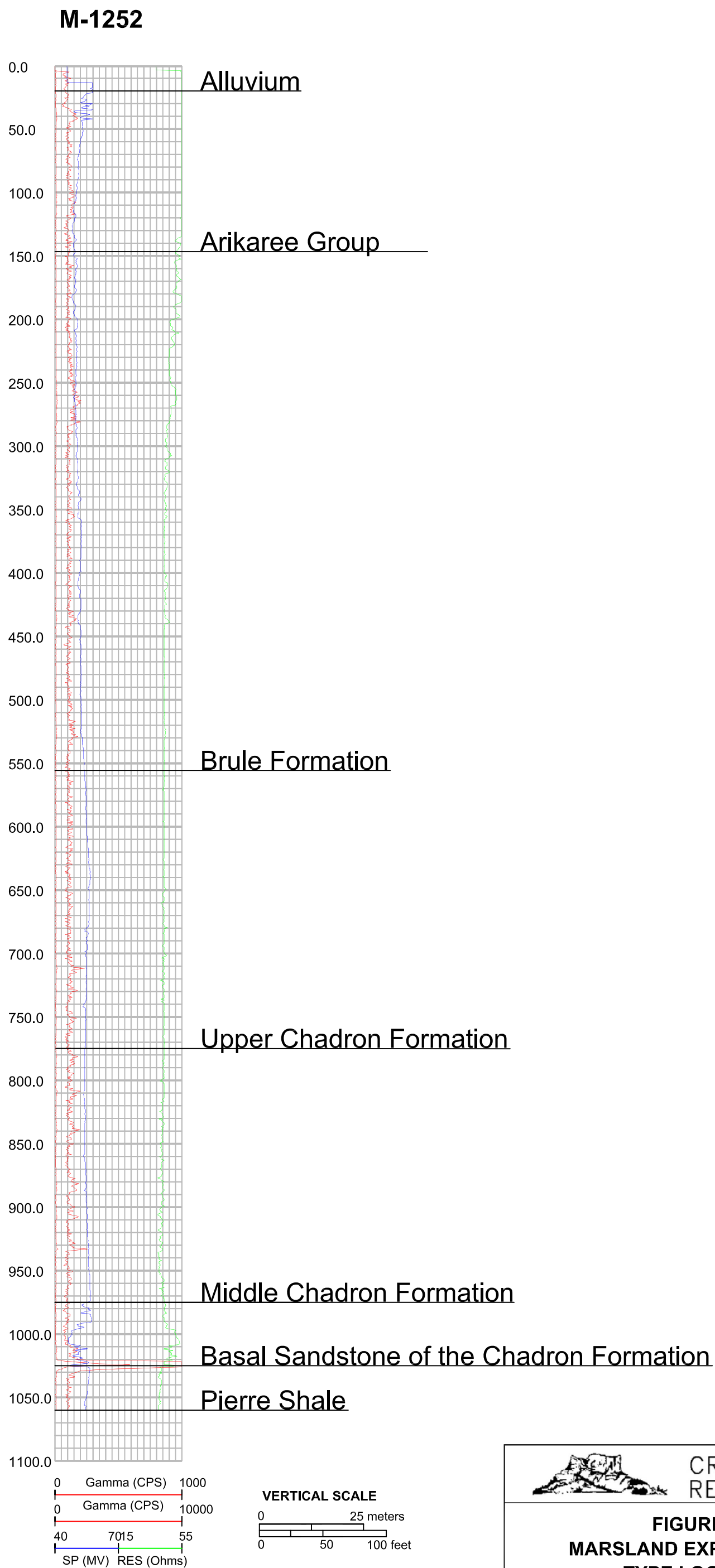

0 1,250 2,500
Feet

PROJECTION: NAD 1983, STATE PLANE
NEBRASKA NORTH, FIPS 2600
SOURCES: US TOPO MAPS, SERVICED
BY ESRI ARCGIS ONLINE



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RESOURCES, INC.

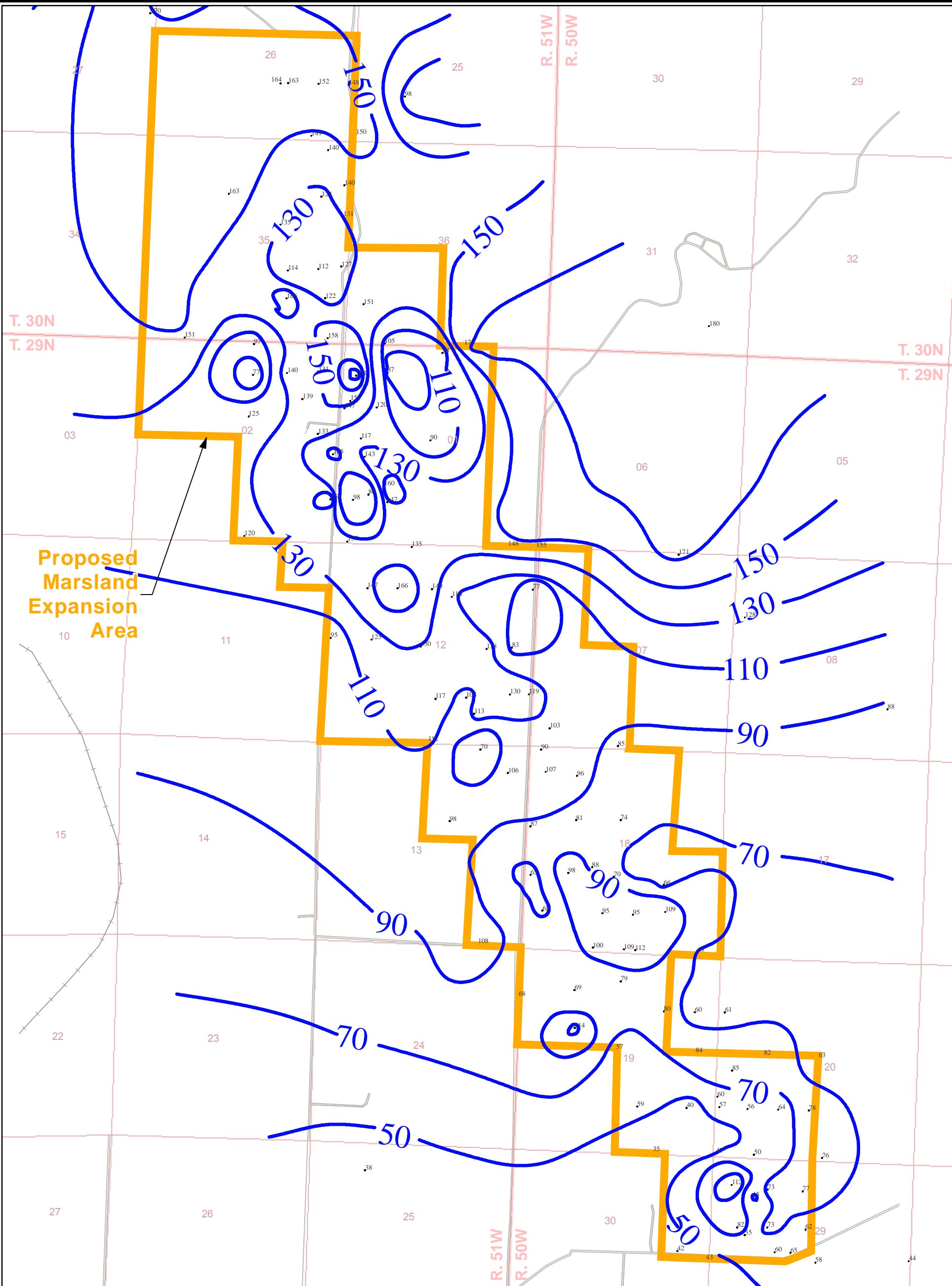
**FIGURE 2.6-4
MARSLAND EXPANSION AREA
CORING LOCATIONS**

PROJECT: CO001636	MAPPED BY: JC	CHECKED BY: JEC
 630 Plaza Drive, Ste. 100 Highlands Ranch, CO 80129 P: 720-344-3500 F: 720-344-3535 www.arcadis-us.com		



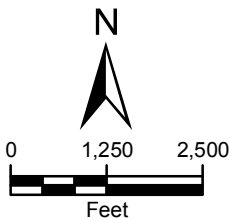
Source: Cameco Resources, 2011

	<p>CROW BUTTE RESOURCES, INC.</p>
<p align="center">FIGURE 2.6-5</p> <p align="center">MARSLAND EXPANSION AREA</p> <p align="center">TYPE LOG (M-1252)</p>	
<p>PROJECT: CO001636</p>	<p>MAPPED BY: JC</p>
<p>CHECKED BY: JA</p>	
<p align="center">  ARCADIS </p>	
<p align="right"> 630 Plaza Drive, Ste. 100 Highlands Ranch, CO 80129 P: 720-344-3500 F: 720-344-3535 www.arcadis-us.com </p>	



LEGEND

- Proposed Mariland Expansion Area
- Borehole Location and Unit Thickness Reading (Feet)
- Isopach Contour (Feet)
- Railroad
- Road



PROJECTION: NAD 1927, STATE PLANE
NEBRASKA NORTH, FIPS 2601



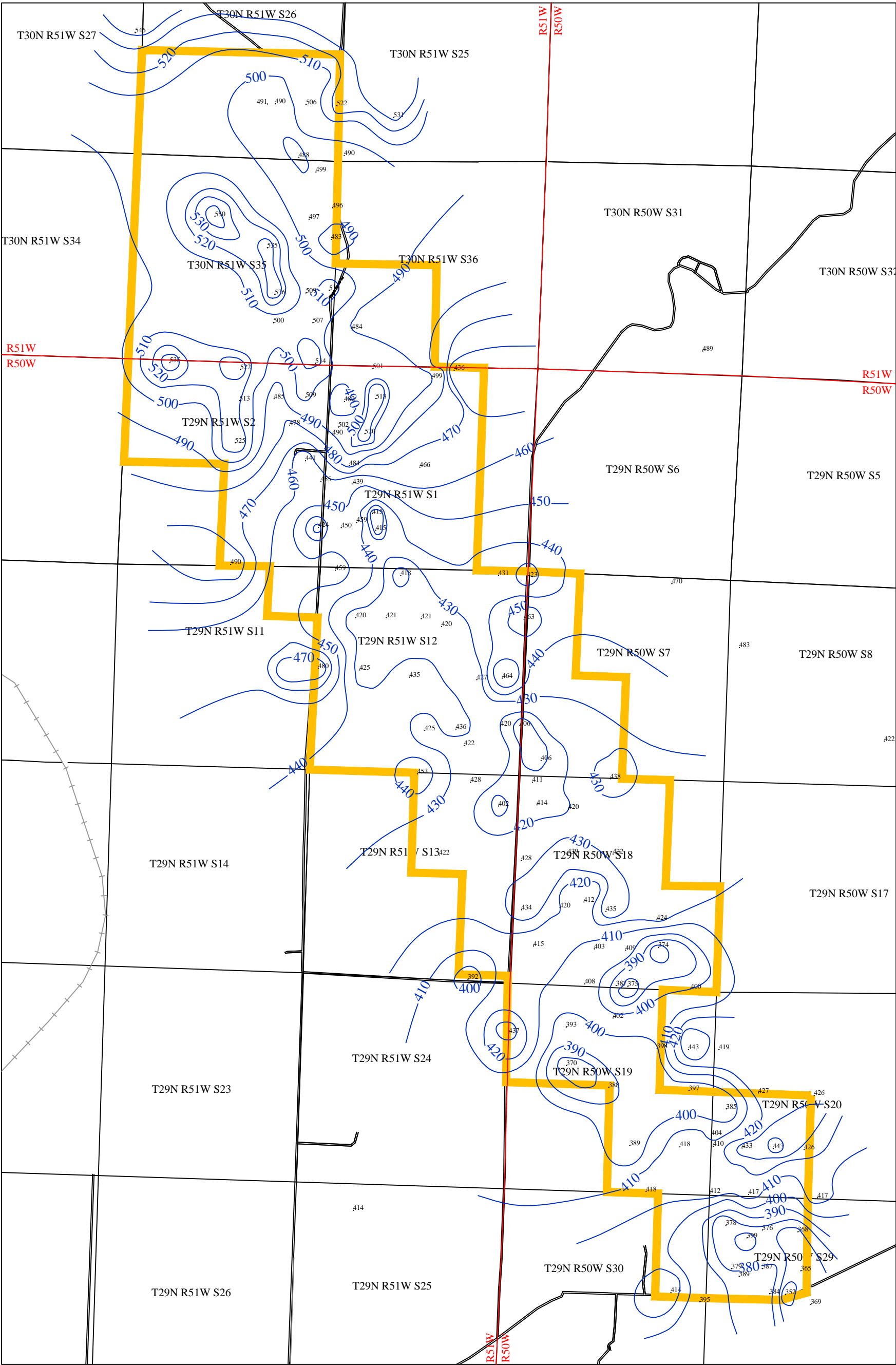
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FIGURE 2.6-6
MARILAND ISOPACH MAP
ARIKAREE GROUP

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: MS

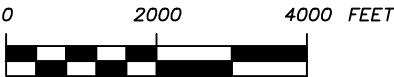


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LEGEND

- Proposed Marsland Expansion Area
- Borehole Location and Unit Thickness (FT)
- Isopach Contour - Unit Thickness (FT)
- Railroad
- Road



PROJECTION: NAD 1983, STATE PLANE
NEBRASKA NORTH, FIPS 2600
SOURCES: US TOPO MAPS - USGS


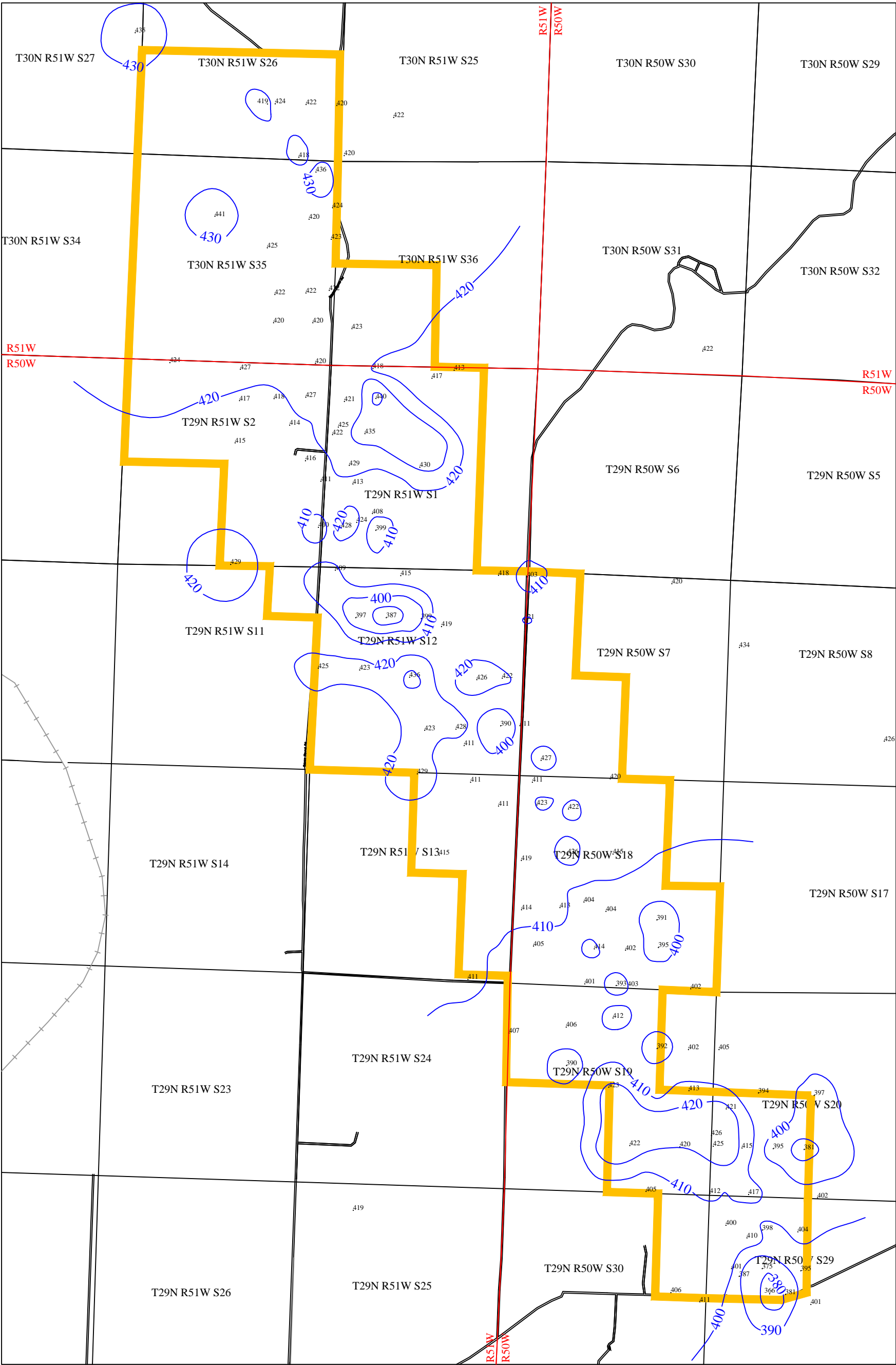
**Crow Butte
Resources, Inc.**

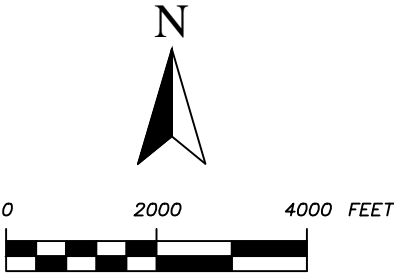
Figure 2.6-7
Marsland Isopach Map
Brule Formation

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-7.pdf	By: WB



LEGEND

- Proposed Marsland Expansion Area
- Borehole Location and Unit Thickness (FT)
- Isopach Contour - Unit Thickness (FT)
- Railroad
- Road



PROJECTION: NAD 1983, STATE PLANE
NEBRASKA NORTH, FIPS 2600
SOURCES: US TOPO MAPS - USGS


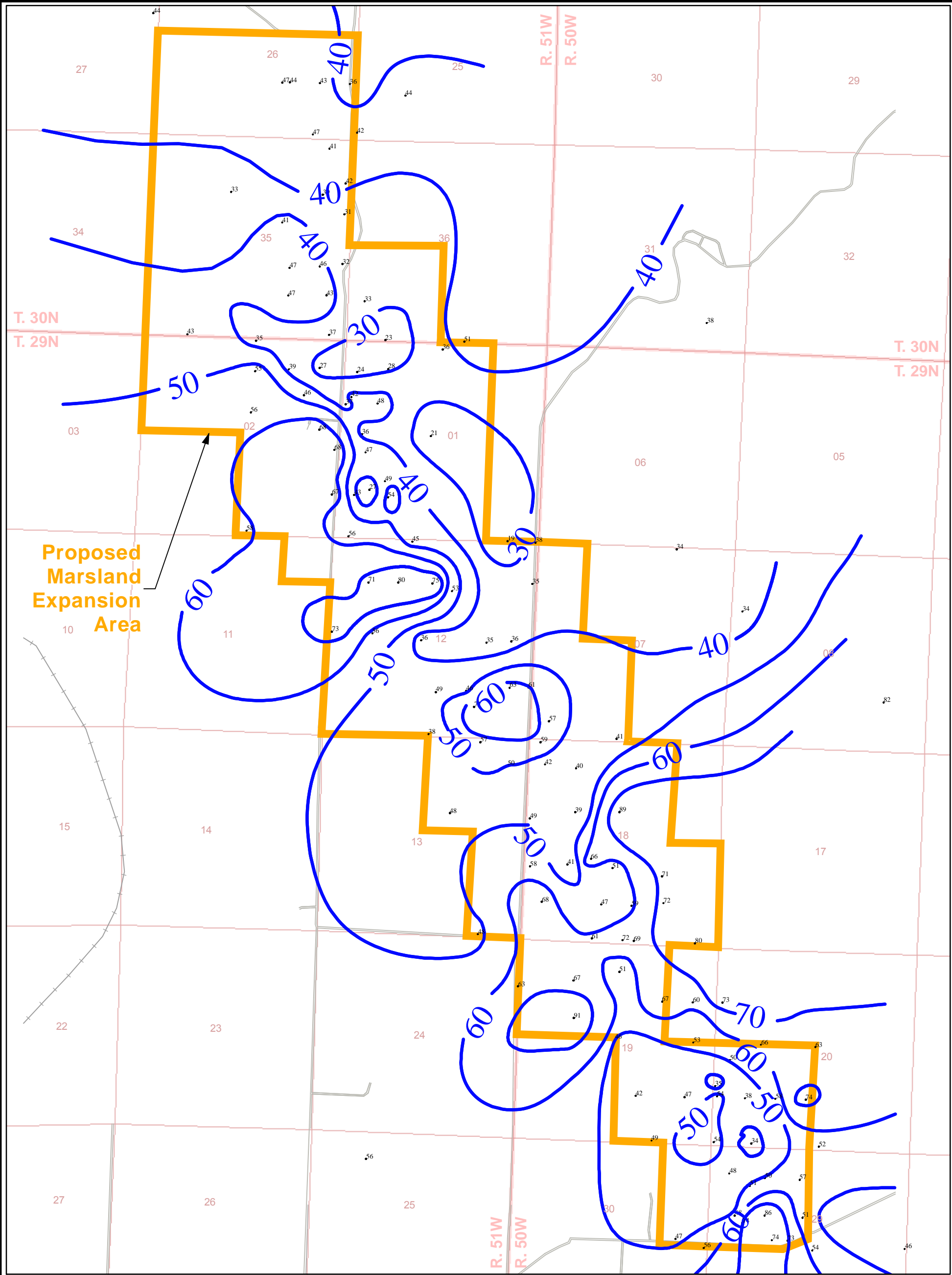
**Crow Butte
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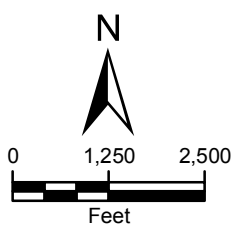
Figure 2.6-8
Marsland Isopach Map
Upper and Middle
Chadron Formation

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-8.pdf	By: WB



LEGEND

- Proposed Marsland Expansion Area
- Borehole Location and Unit Thickness Reading (Feet)
- Isopach Contour (Feet)
- Railroad
- Road



PROJECTION: NAD 1927, STATE PLANE
NEBRASKA NORTH, FIPS 2601



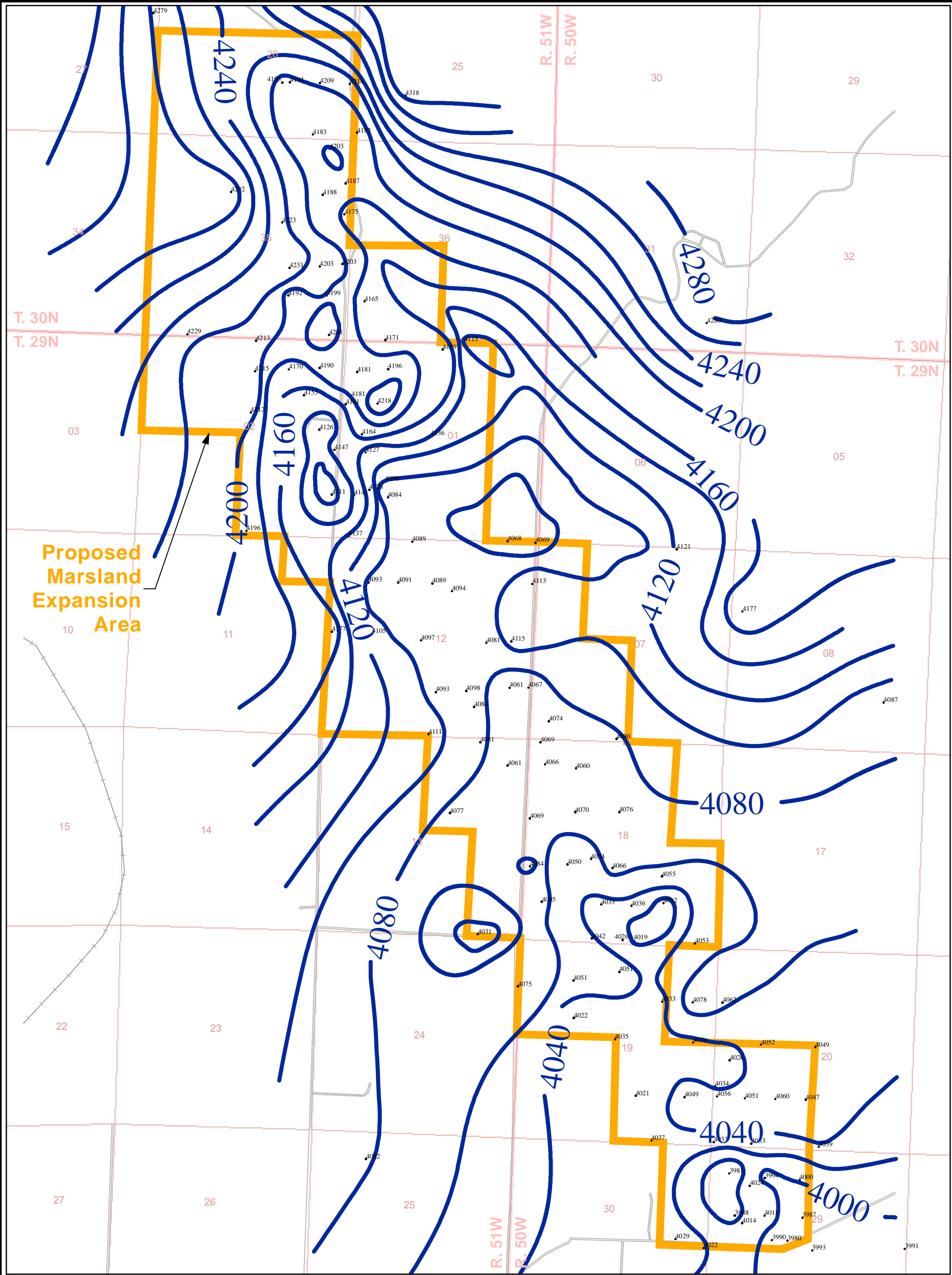
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**FIGURE 2.6-9
MARSLAND ISOPACH MAP
BASAL SANDSTONE OF
THE CHADRON FORMATION**

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: MS



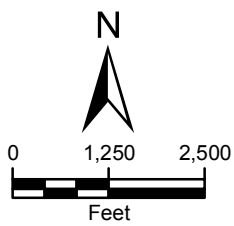
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LEGEND

- Proposed Marland Expansion Area
- Borehole Location and Elevation - Top of Brule Formation (FT-AMSL)
- Elevation Contour - Top of Brule Formation (FT-AMSL)
- Railroad
- Road

FT-AMSL = Feet Above Mean Sea Level



PROJECTION: NAD 1927, STATE PLANE
NEBRASKA NORTH, FIPS 2601



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FIGURE 2.6-10
MARSLAND STRUCTURE MAP
TOP OF BRULE FORMATION

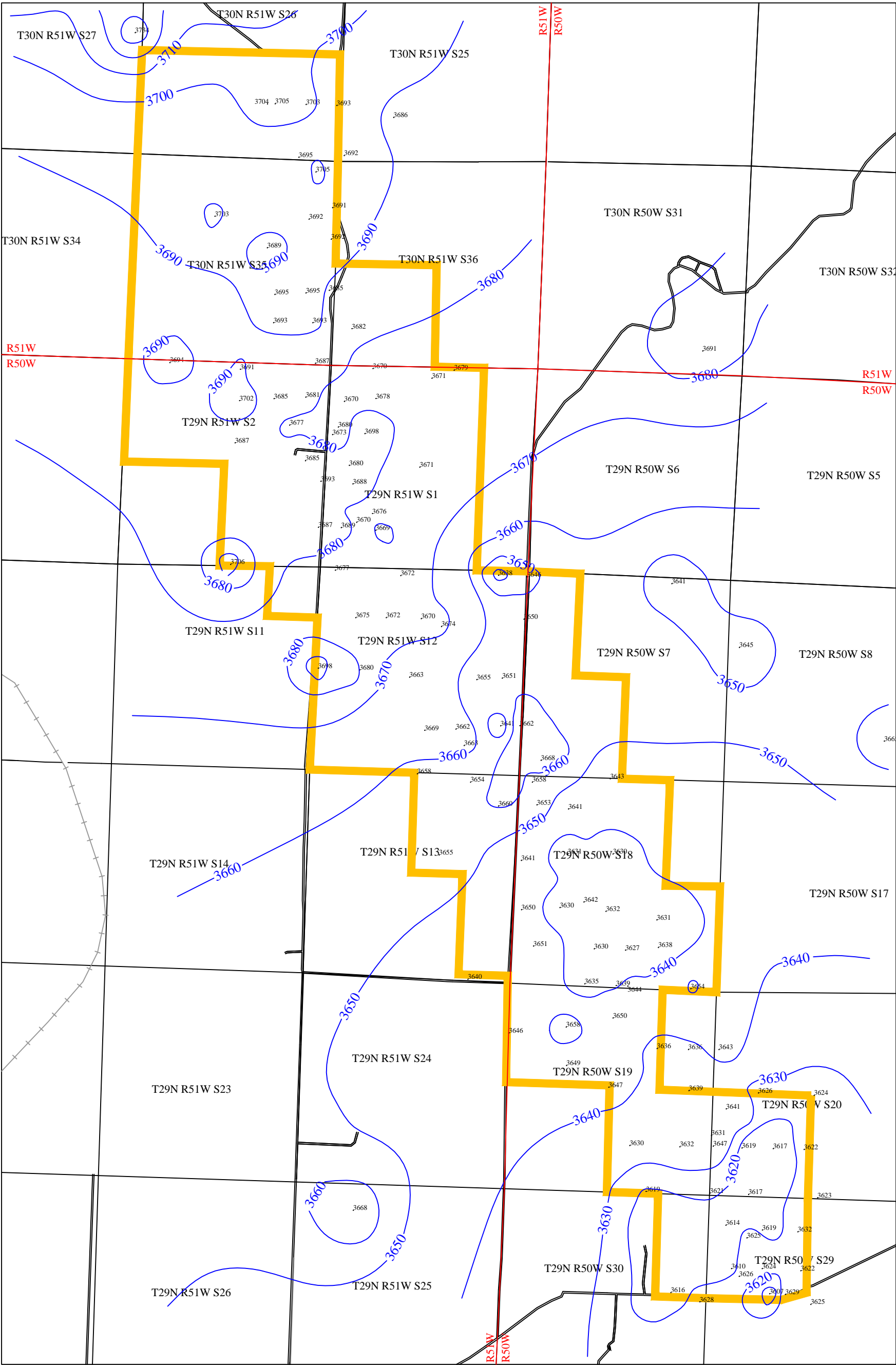
PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: MS

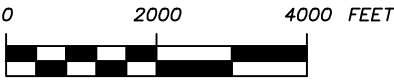


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LEGEND

- Proposed Marsland Expansion Area
- Borehole Location and Elevation (FT-AMSL) - Top of Chadron Formation
- Elevation Contour - Top of Chadron Formation (FT-AMSL)
- Railroad
- Road



PROJECTION: NAD 1983, STATE PLANE
NEBRASKA NORTH, FIPS 2600
SOURCES: US TOPO MAPS - USGS


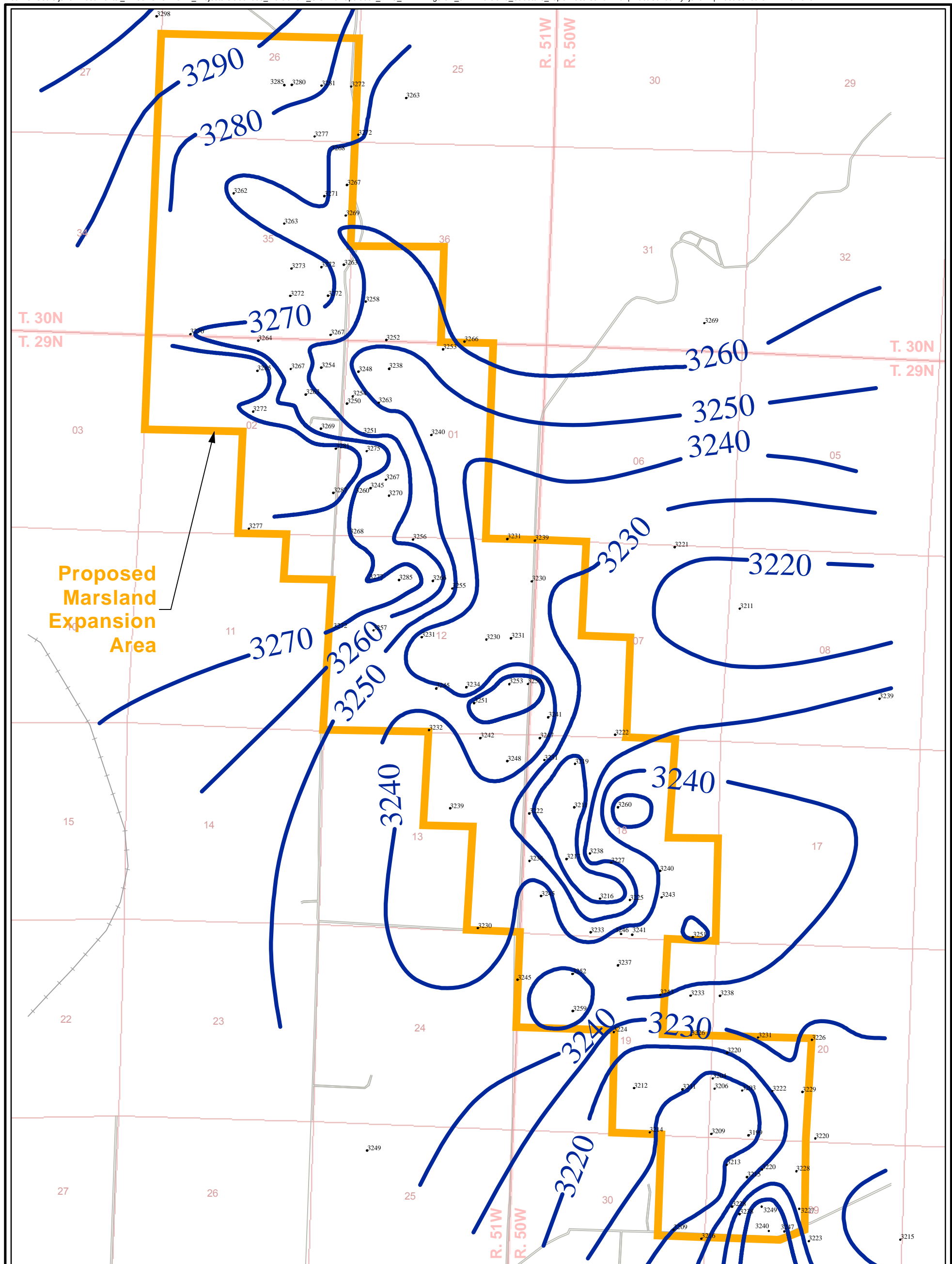
**Crow Butte
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Figure 2.6-11
Marsland Structure Map
Top of Chadron Formation

Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-11.pdf	By: WB

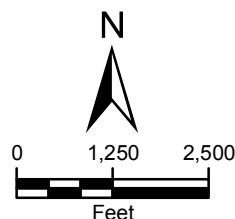
FT-AMSL = Feet Above Mean Sea Level



LEGEND

-  Proposed Marsland Expansion Area
- 3249 Borehole Location and Elevation - Top of Basal Sandstone (FT-AMSL)
-  Elevation Contour - Top of Basal Sandstone (FT-AMSL)
-  Railroad
-  Road

FT-AMSL = Feet Above Mean Sea Level



PROJECTION: NAD 1927, STATE PLANE
NEBRASKA NORTH, FIPS 2601



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FIGURE 2.6-12
MARSLAND STRUCTURE MAP
TOP OF BASAL SANDSTONE OF
THE CHADRON FORMATION

PROJECT: CO001636

MAPPED BY: JC

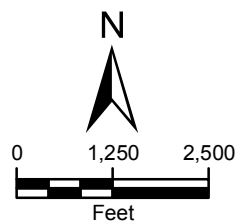
CHECKED BY: MS



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FT-AMSL = Feet Above Mean Sea Level



PROJECTION: NAD 1927, STATE PLANE
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**FIGURE 2.6-13
MARSLAND STRUCTURE MAP
TOP OF PIERRE SHALE**

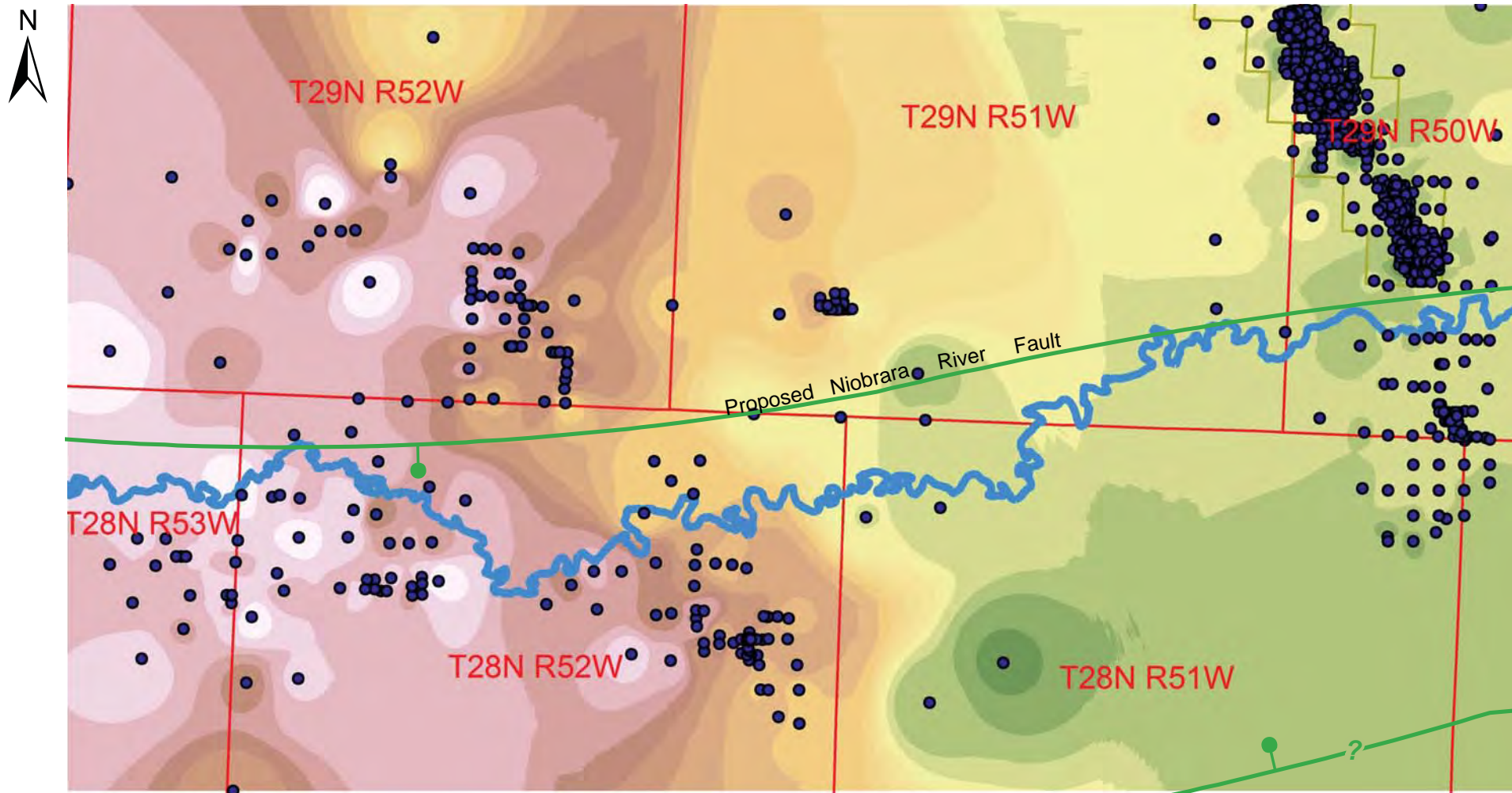
PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: MS



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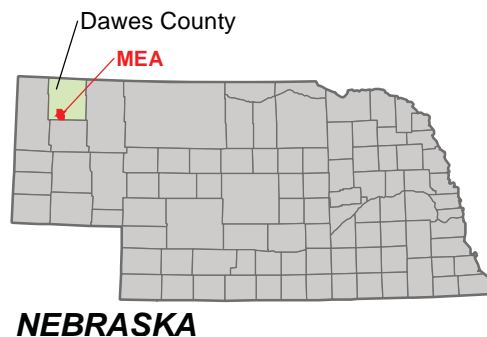
LEGEND

- Boring Locations Used for Structural Interpretation
- Proposed Marland Expansion Area (MEA)
- Niobrara River

Elevation - Top of Pierre Shale (FT-AMSL) (Structural contour interval is 20 feet)

3,100 - 3,120	3,220 - 3,240	3,340 - 3,360
3,120 - 3,140	3,240 - 3,260	3,360 - 3,380
3,140 - 3,160	3,260 - 3,280	3,380 - 3,400
3,160 - 3,180	3,280 - 3,300	3,400 - 3,420
3,180 - 3,200	3,300 - 3,320	3,420 - 3,440
3,200 - 3,220	3,320 - 3,340	

- Fault Interpretations by DeGraw (1971)
(Ball on downthrown side; ? denotes inferred)



**CROW BUTTE
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FIGURE 2.6-14 REGIONAL STRUCTURE CONTOUR MAP - TOP OF PIERRE SHALE

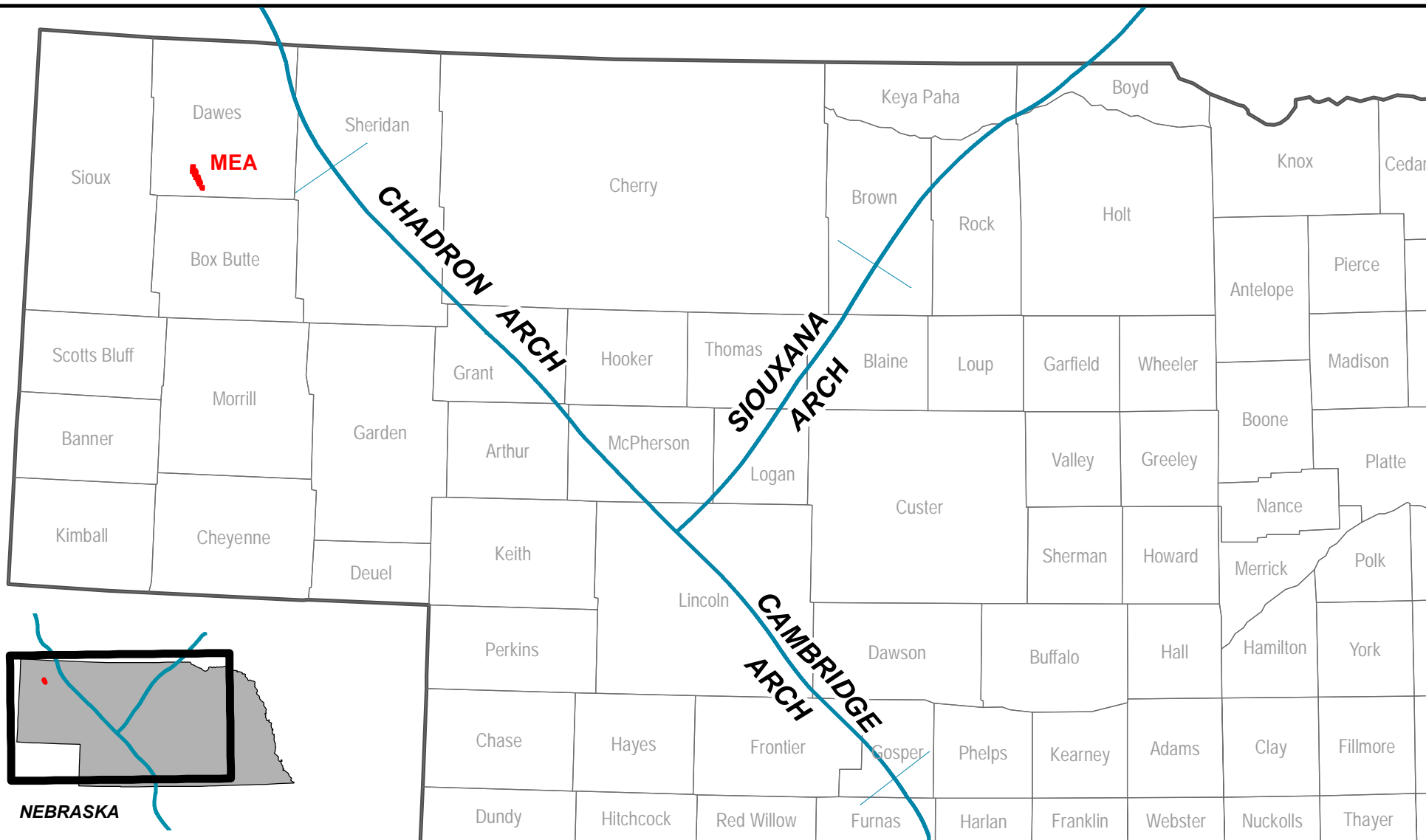
PROJECT: CO001636.00001

MAPPED BY: JC

CHECKED BY: JEC

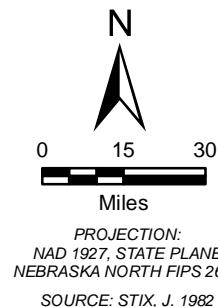


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LEGEND

- Proposed Marsland Expansion Area (MEA)
- Nebraska County Boundary
- Nebraska State Boundary



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**FIGURE 2.6-15
LOCATION OF CHADRON ARCH
AND CAMBRIDGE ARCH IN NEBRASKA**

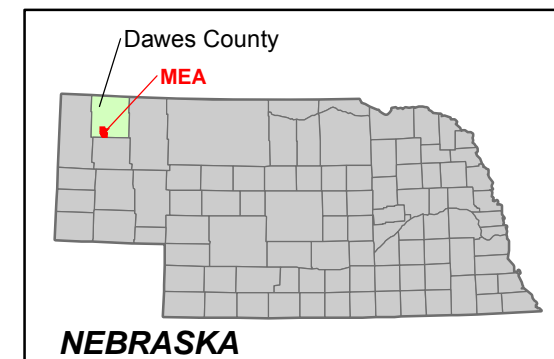
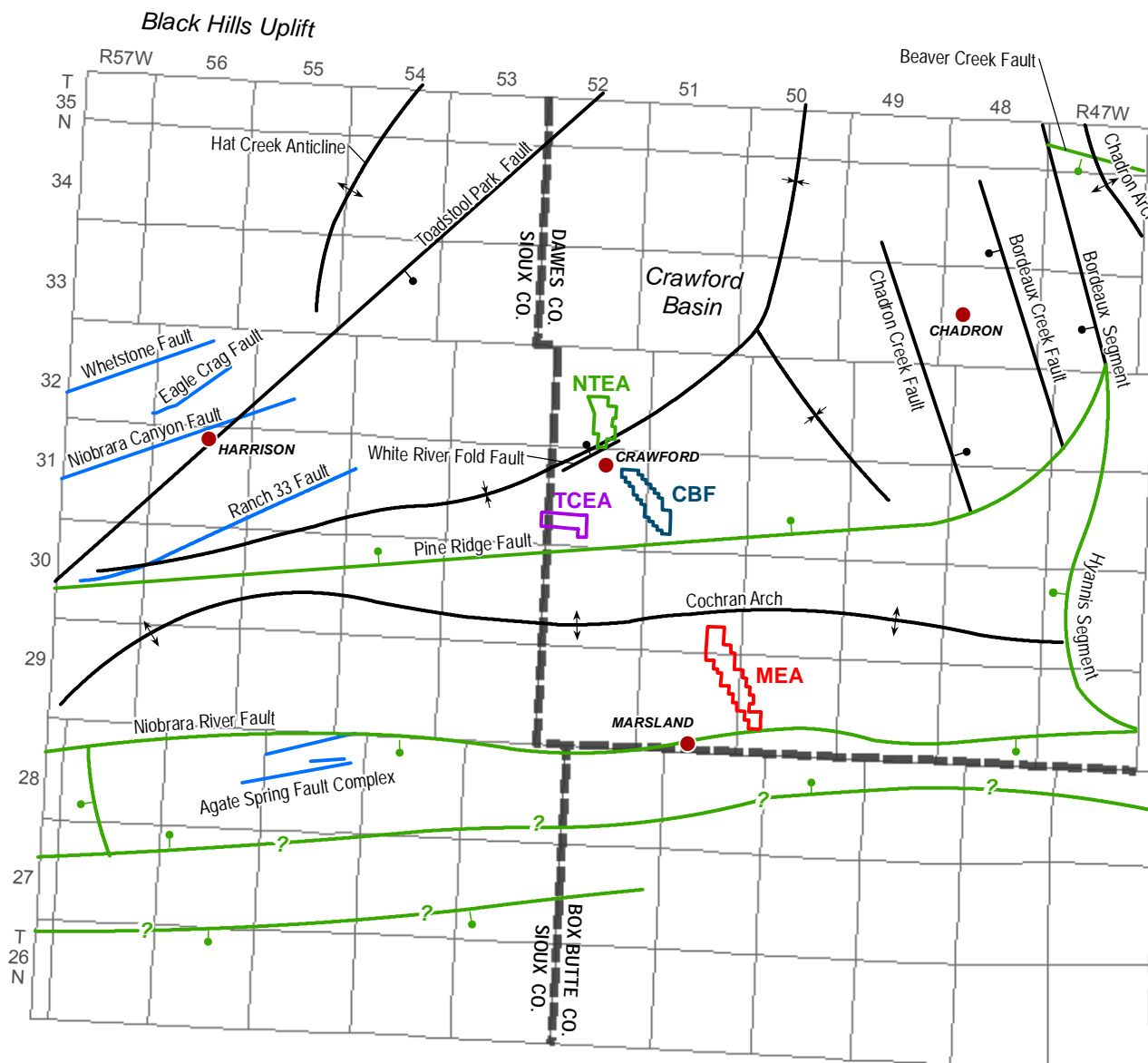
PROJECT: CO001636

MAPPED BY: JC

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LEGEND

- City/Town
- Fault (Ball on downthrown side)
- Fault Interpretations by DeGraw (1971)
(Ball on downthrown side; ? denotes inferred)
- Fault Interpretations by Hunt (1990)
- ↕ Anticline
- ↕ Syncline
- County Boundary
- Proposed Marsland Expansion Area (MEA)
- Crow Butte Facility (CPF) Permit Area
- Proposed North Trend Expansion Area (NTEA)
- Proposed Three Crow Expansion Area (TCEA)

Source:
Modified from DeGraw, 1969;
WFC-White River Fault only (Collings & Knode, 1984)



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**FIGURE 2.6-16
STRUCTURAL FEATURES MAP OF
THE CRAWFORD BASIN**

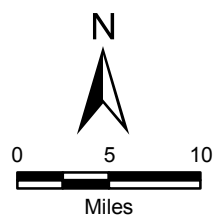
PROJECT: CO001636

MAPPED BY: JC

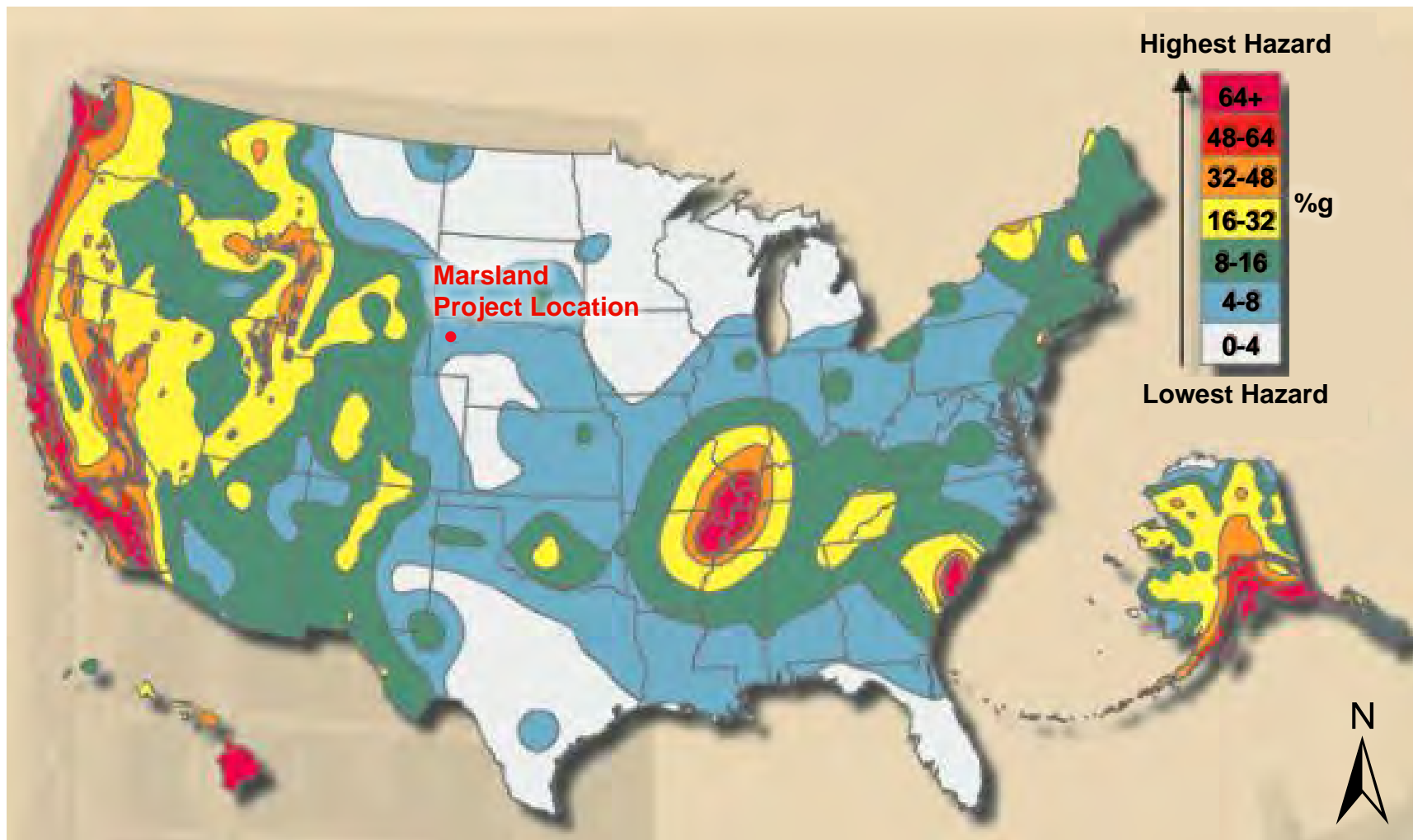
CHECKED BY: JEC



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PROJECTION:
NAD83, UTM ZONE 14N



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**FIGURE 2.6-17
EARTHQUAKE HAZARD RANKING
IN THE U.S.**

PROJECT: CO001636.00001

MAPPED BY: JC

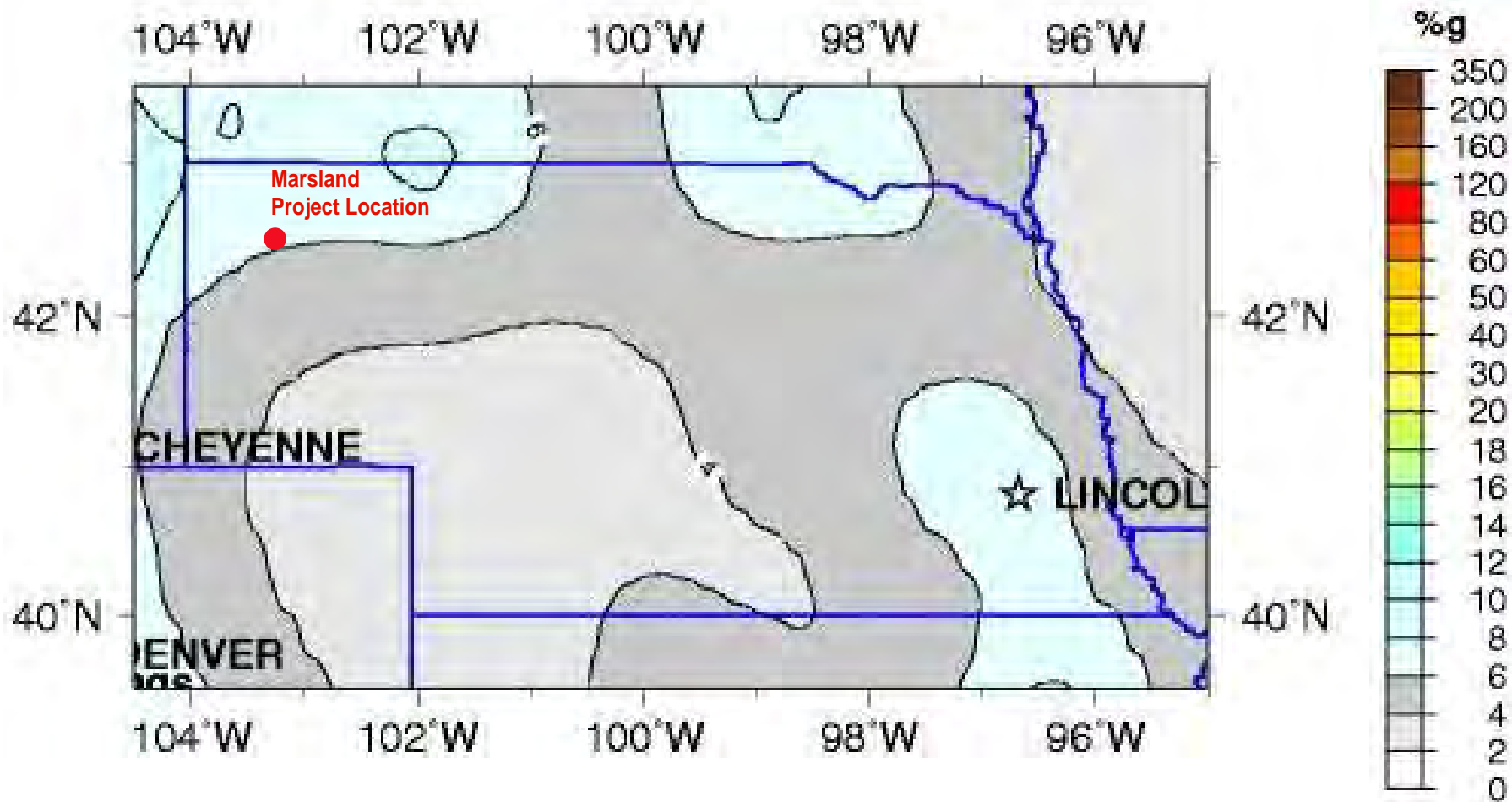
CHECKED BY: JEC



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KK:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2.6-15 Seismic Hazard Map for Nebraska.ai @ 05/14/2013



Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
Site: NEHRP B-C boundary
National Seismic Hazard Mapping Project (Peterson, M.D. 2008)



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FIGURE 2.6-18
SEISMIC HAZARD MAP
FOR NEBRASKA (2008)

PROJECT: CO0016 6.00001

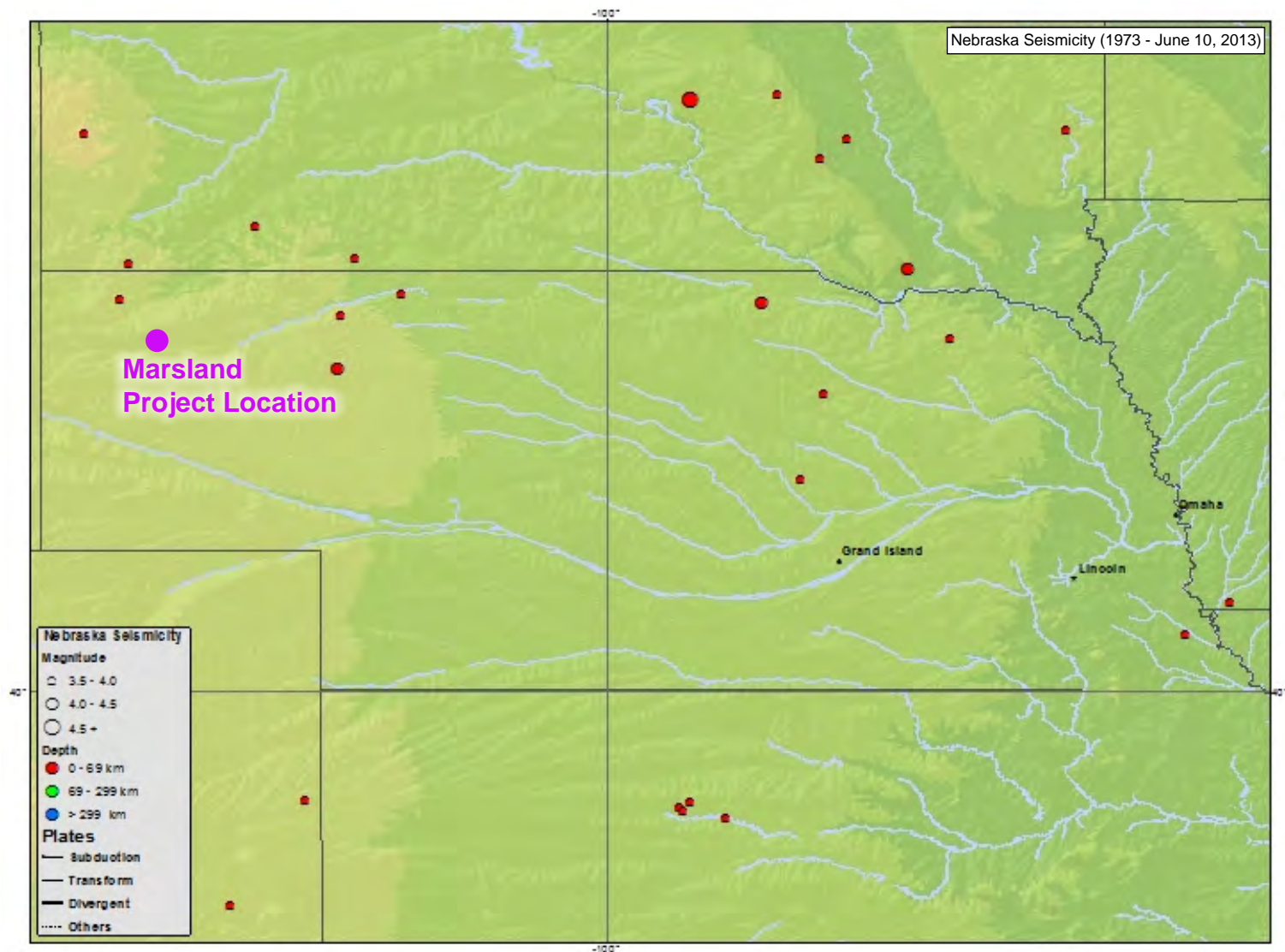
MAPPED BY: JC

CHECKED BY: LW

SOURCE: USGS 20009a



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FIGURE 2.6-19
SEISMICITY OF NEBRASKA
1973 - 2013

Source: <http://earthquake.usgs.gov/earthquakes/states/nebraska/seismicity.php>

PROJECT: CO001636.00001

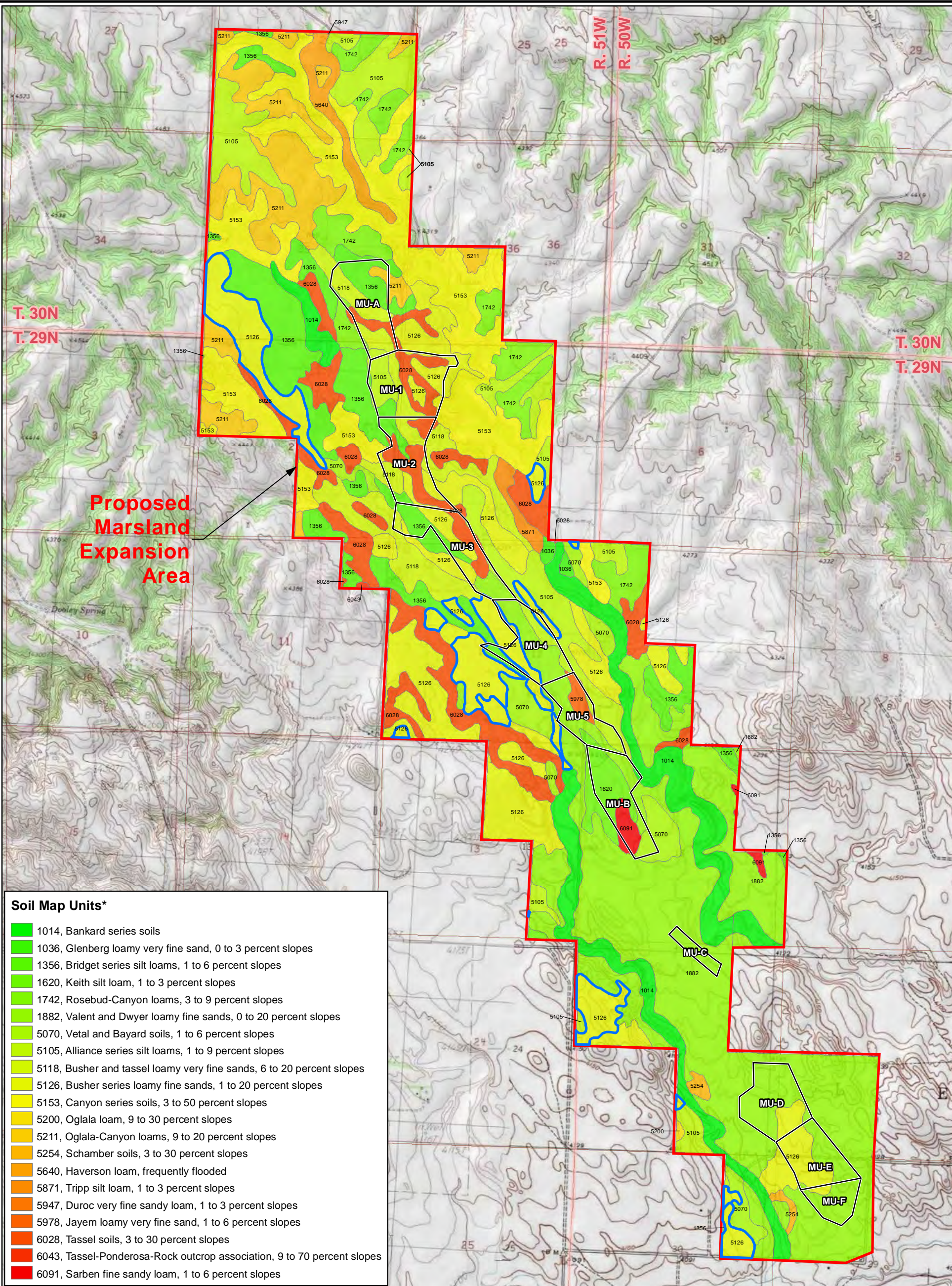
MAPPED BY: JC

CHECKED BY: JEC



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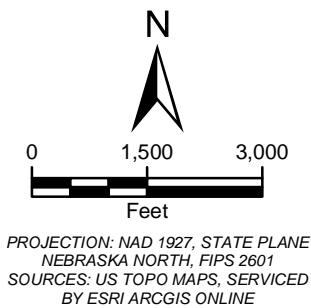



- Soil Map Units***
- 1014, Bankard series soils
 - 1036, Glenberg loamy very fine sand, 0 to 3 percent slopes
 - 1356, Bridget series silt loams, 1 to 6 percent slopes
 - 1620, Keith silt loam, 1 to 3 percent slopes
 - 1742, Rosebud-Canyon loams, 3 to 9 percent slopes
 - 1882, Valent and Dwyer loamy fine sands, 0 to 20 percent slopes
 - 5070, Vetel and Bayard soils, 1 to 6 percent slopes
 - 5105, Alliance series silt loams, 1 to 9 percent slopes
 - 5118, Busher and tassel loamy very fine sands, 6 to 20 percent slopes
 - 5126, Busher series loamy fine sands, 1 to 20 percent slopes
 - 5153, Canyon series soils, 3 to 50 percent slopes
 - 5200, Oglala loam, 9 to 30 percent slopes
 - 5211, Oglala-Canyon loams, 9 to 20 percent slopes
 - 5254, Schamber soils, 3 to 30 percent slopes
 - 5640, Haverson loam, frequently flooded
 - 5871, Tripp silt loam, 1 to 3 percent slopes
 - 5947, Duroc very fine sandy loam, 1 to 3 percent slopes
 - 5978, Jayem loamy very fine sand, 1 to 6 percent slopes
 - 6028, Tassel soils, 3 to 30 percent slopes
 - 6043, Tassel-Ponderosa-Rock outcrop association, 9 to 70 percent slopes
 - 6091, Sarben fine sandy loam, 1 to 6 percent slopes

LEGEND

- Mine Unit
- Soil units mapped by NRCS as exhibiting prevelant erosion
- Proposed Marsland Expansion Area

* Soil map units 1014, 1356, 1882, 5105, 5126, and 5153 represent combined NRCS map units. The map unit number represents the NRCS map unit with the greatest extent within the Proposed Marsland Expansion Area. See text for complete description of soil map units.






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**FIGURE 2.6-20
SOILS**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: CM



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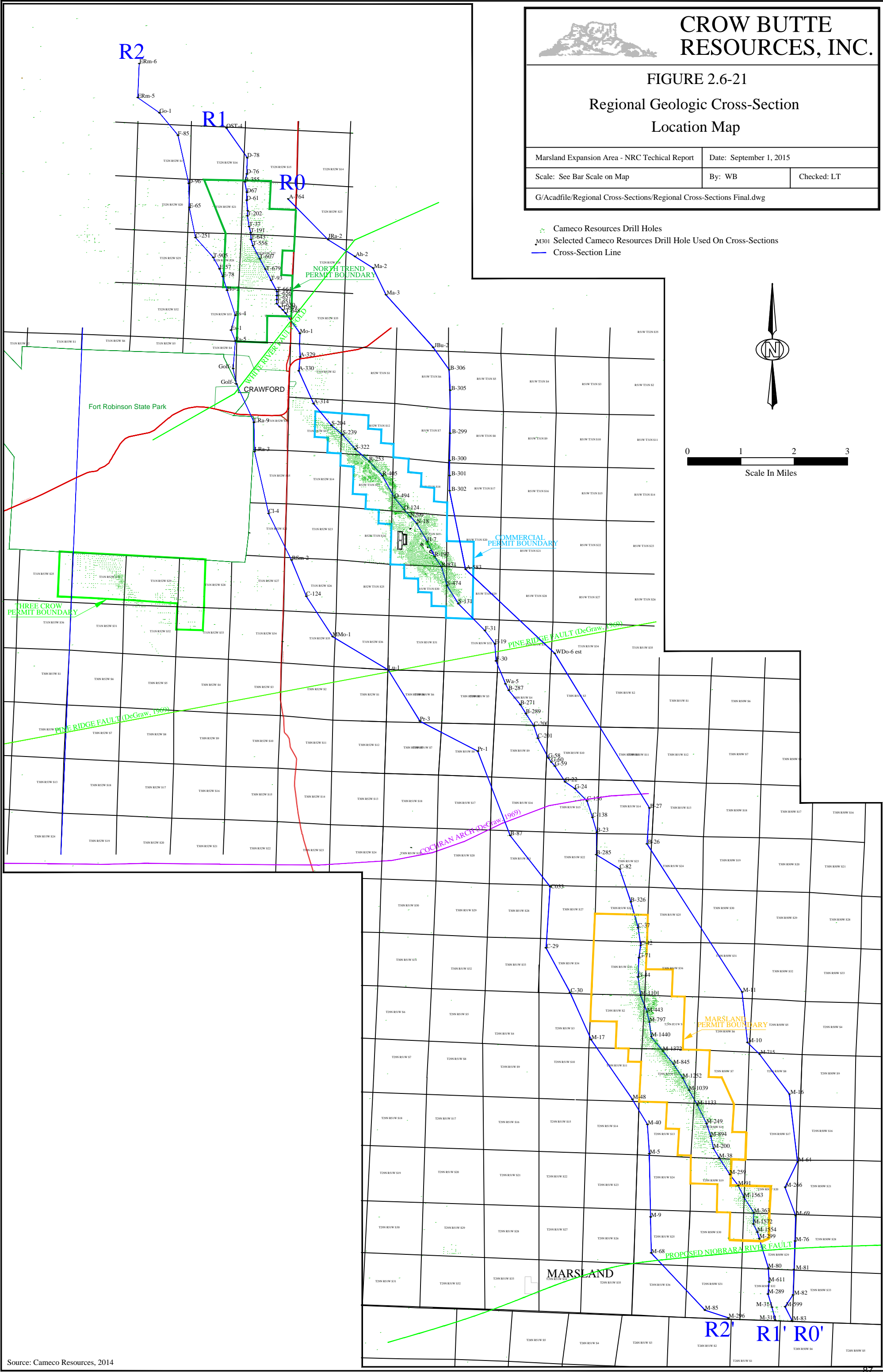
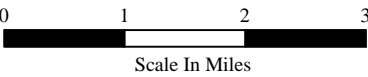
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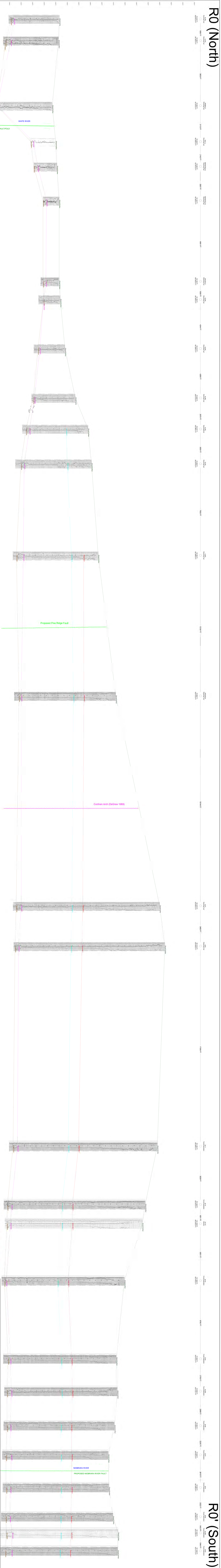
FIGURE 2.6-21

Regional Geologic Cross-Section
Location Map

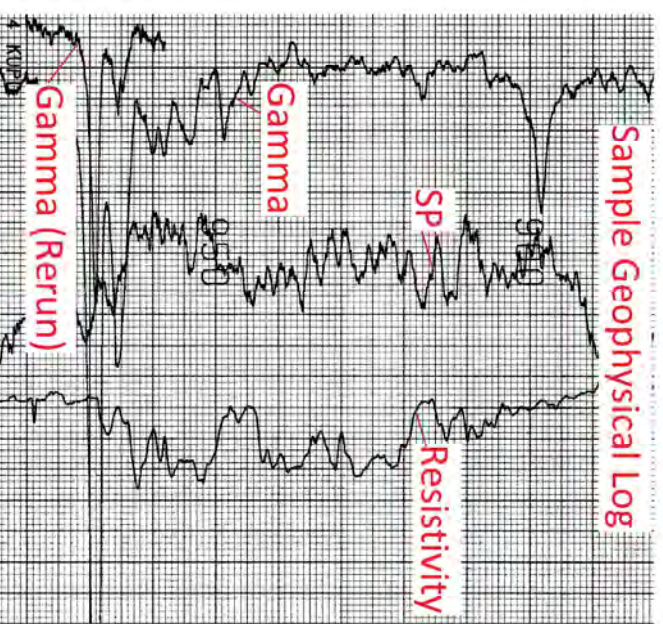
Marland Expansion Area - NRC Technical Report		Date: September 1, 2015	
Scale: See Bar Scale on Map		By: WB	Checked: LT
G:/Acadfile/Regional Cross-Sections/Regional Cross-Sections Final.dwg			

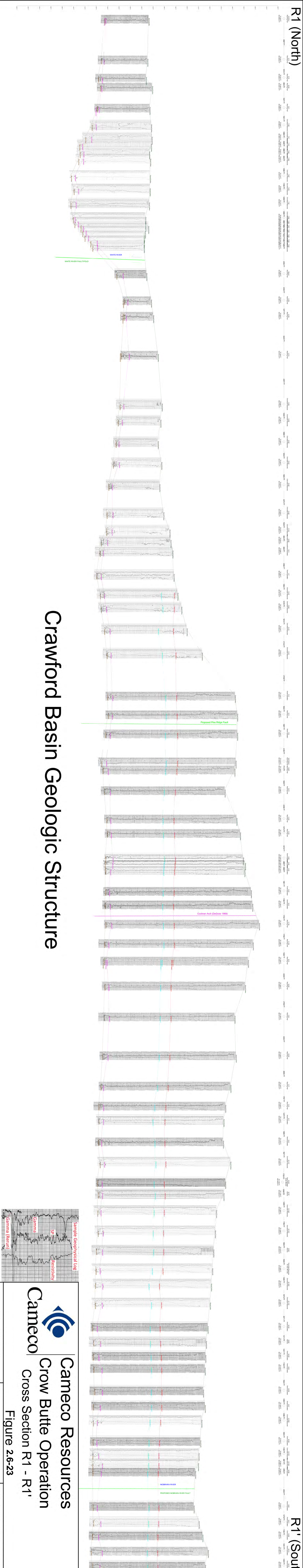
- Cameco Resources Drill Holes
- M301 Selected Cameco Resources Drill Hole Used On Cross-Sections
- Cross-Section Line



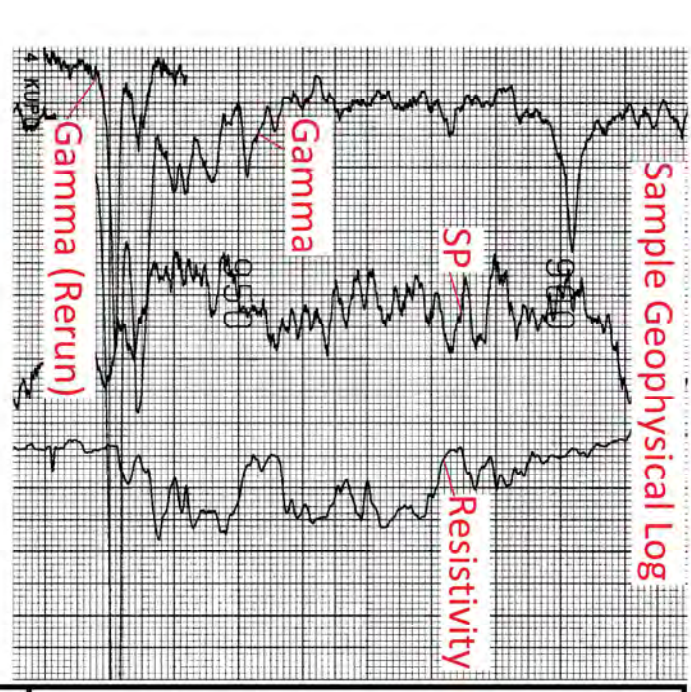



Crawford Basin Geologic Structure





Crawford Basin Geologic Structure





Cameco Resources
Crow Butte Operation
Cross Section R1 - R1'

Date: SEPTEMBER 2015

Department: Land & Evaluation

Vertical Exaggeration = 10X

Figure 2.6-23