



UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD

In the Matter of  
  
CROW BUTTE RESOURCES, INC.  
  
(Marsland Expansion Area)

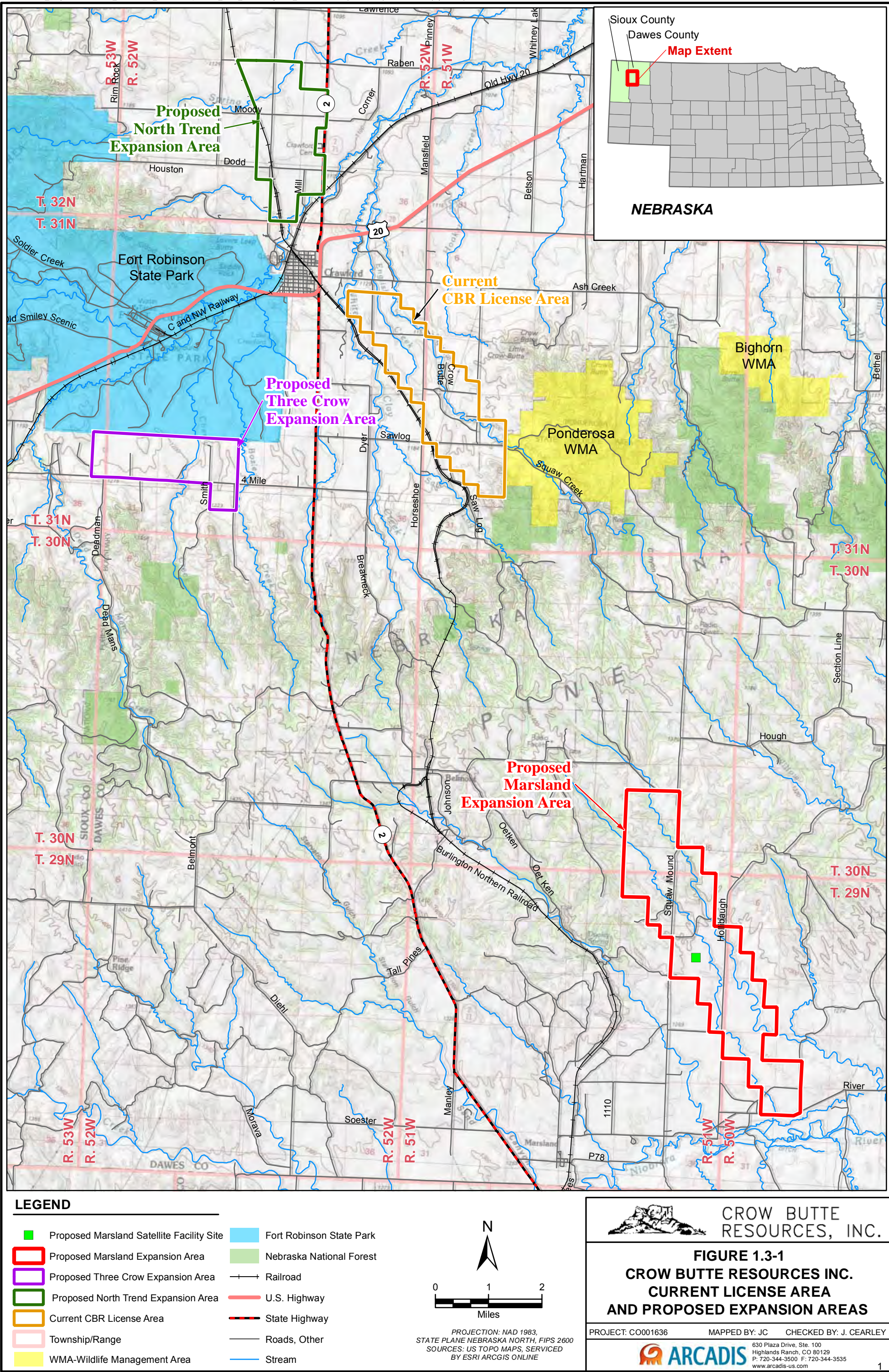
Docket No. 40-8943-MLA-2  
  
ASLBP No. 13-926-01-MLA-BD01

Hearing Exhibit

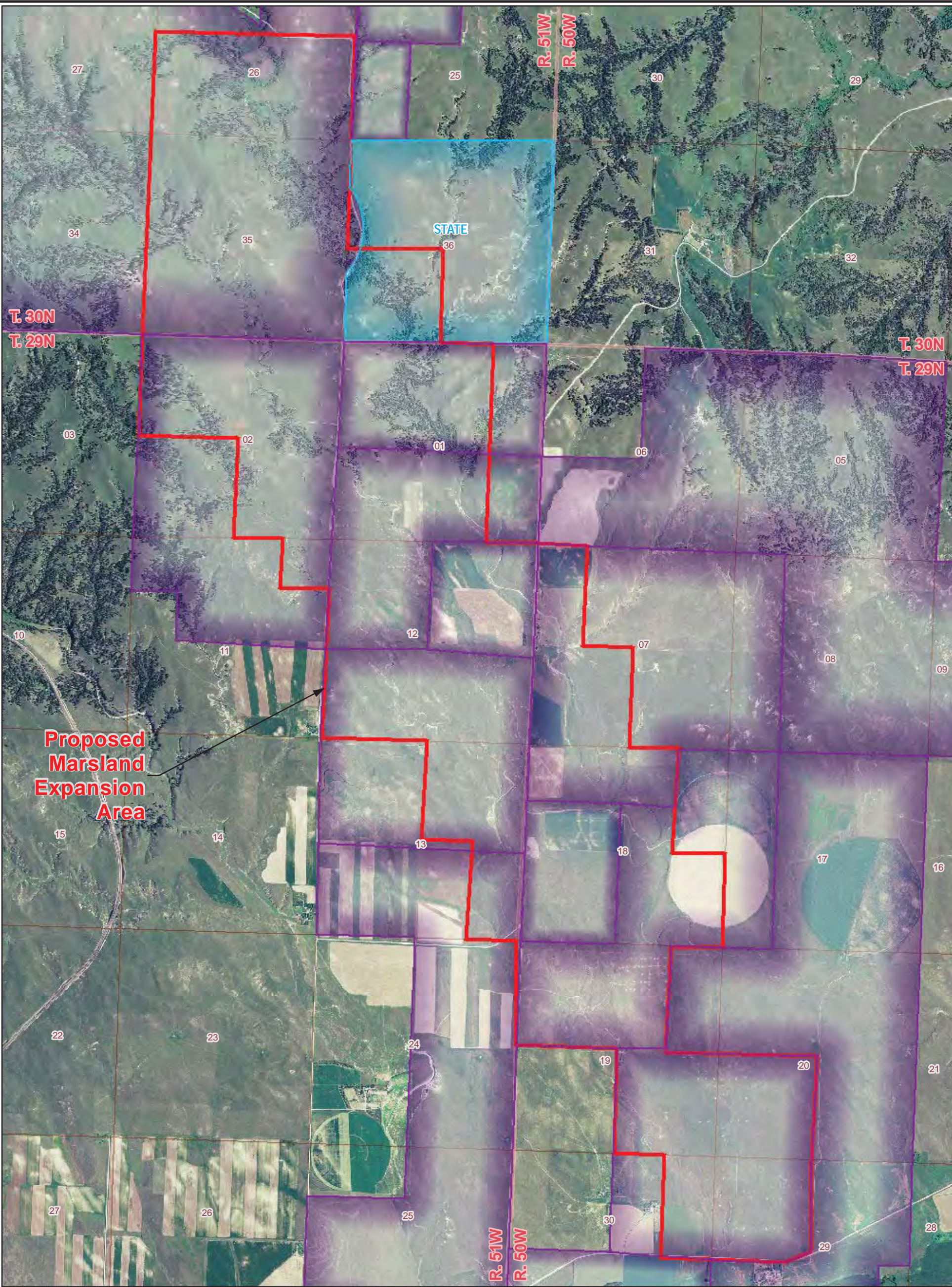
Exhibit Number:

Exhibit Title:



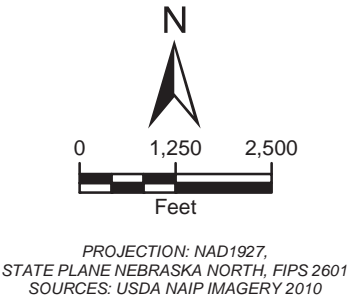






LEGEND

- Proposed Marsland Expansion Area
- Private Land
- State Land



PROJECTION: NAD1927,  
STATE PLANE NEBRASKA NORTH, FIPS 2601  
SOURCES: USDA NAIP IMAGERY 2010



CROW BUTTE  
RESOURCES, INC.

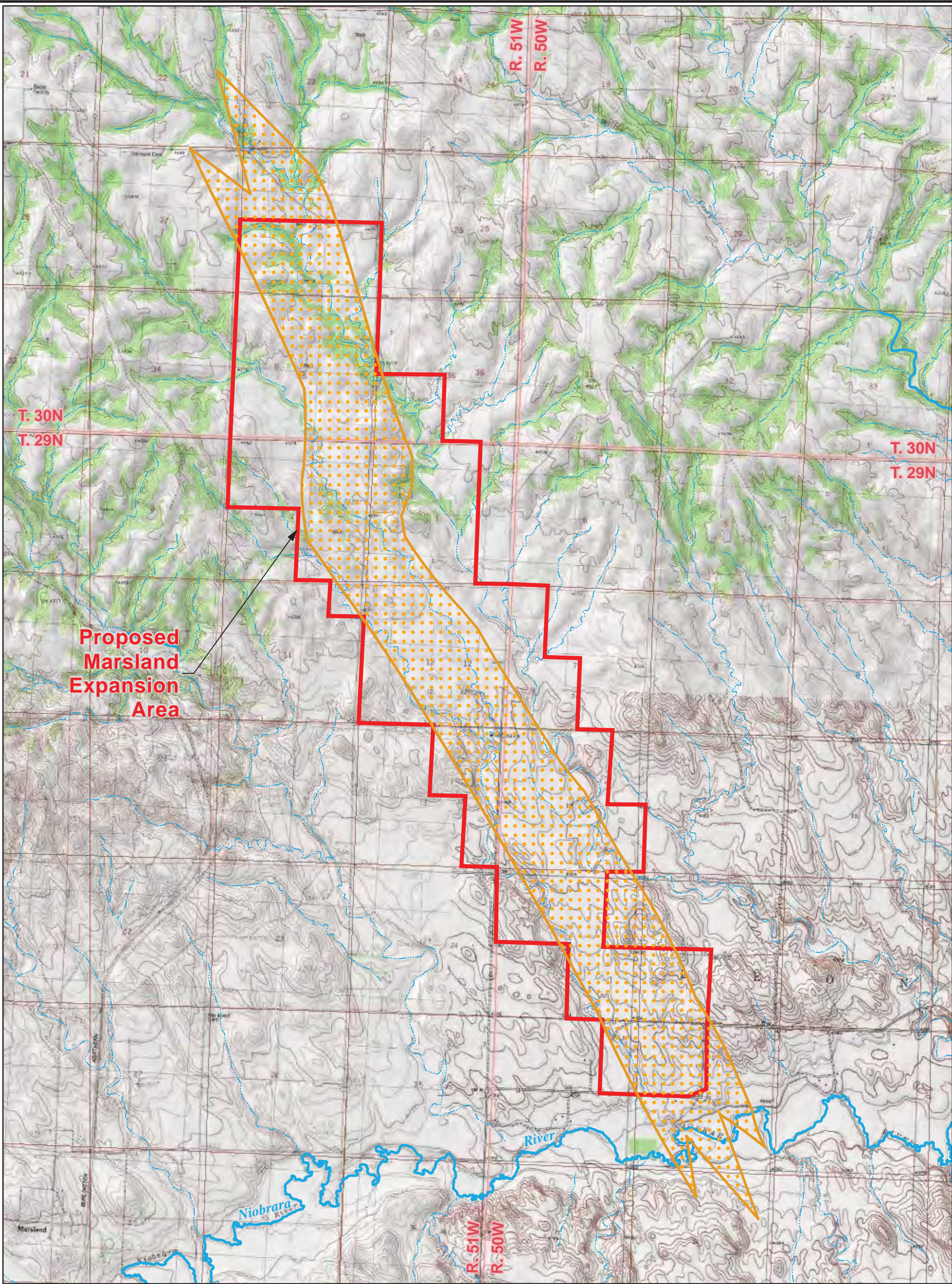
FIGURE 1.3-2  
MARSLAND EXPANSION AREA  
LAND OWNERSHIP

PROJECT: CO001636      MAPPED BY: JC      CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





**LEGEND**

- Estimated Ore Body
- Proposed Marmland Expansion Area
- Perennial Stream/River
- Intermittent Stream/River

0 1,750 3,500  
Feet

PROJECTION: NAD1927,  
STATE PLANE NEBRASKA NORTH, FIPS 2601  
SOURCES: USA TOPO MAPS, SERVICED  
BY ESRI ARCGIS ONLINE

CROW BUTTE  
RESOURCES, INC.

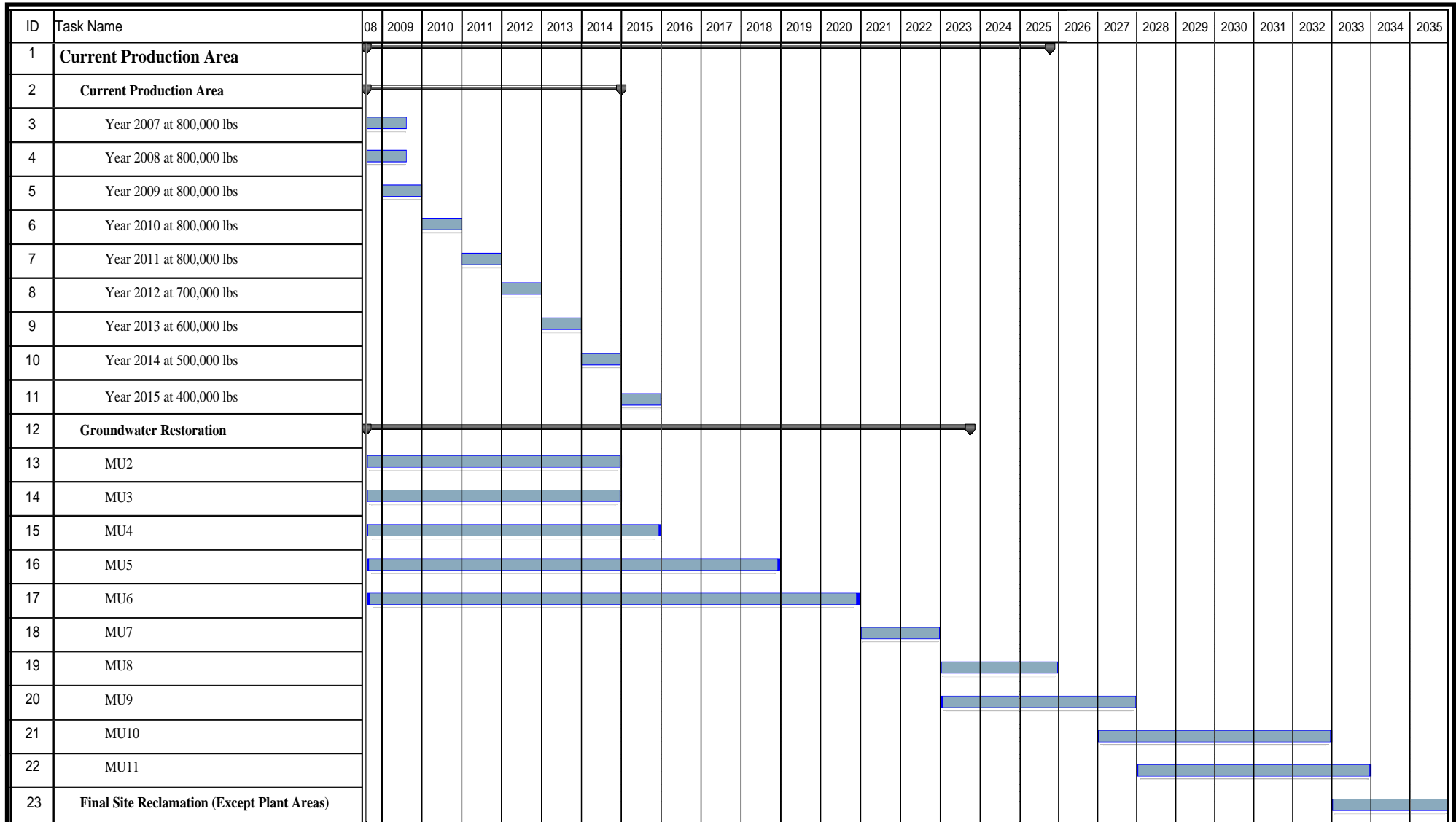
**FIGURE 1.4-1  
MARSLAND EXPANSION AREA  
ESTIMATED ORE BODY**

PROJECT: CO001636      MAPPED BY: JC      CHECKED BY: MS

ARCADIS

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Task



Group By Summary



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 1.7-1  
CURRENT PRODUCTION AREA  
MINE UNIT TIMELINE  
EFFECTIVE AS OF JULY 1, 2013**

PROJECT: CO001636.00001

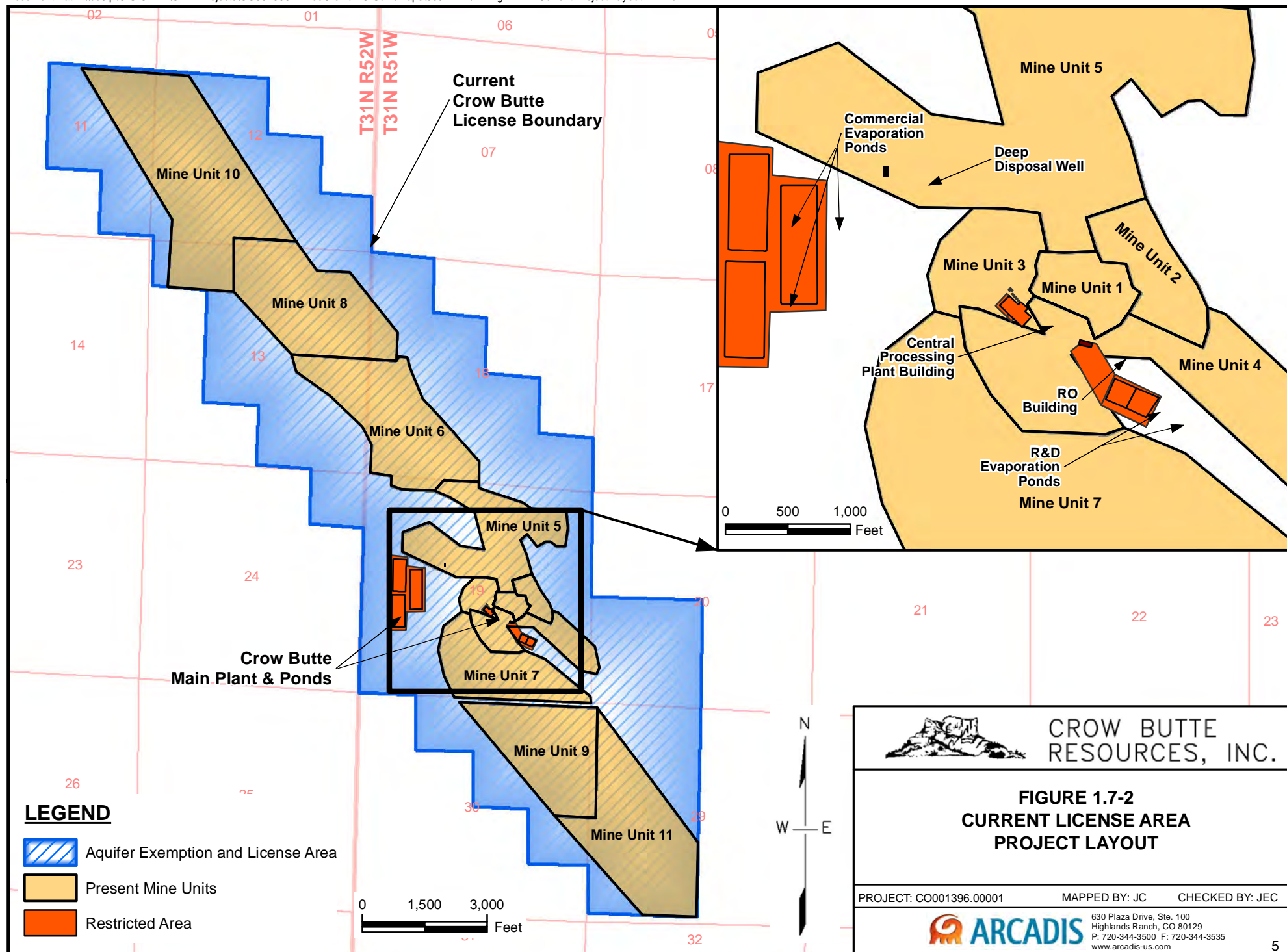
MAPPED BY: JC

CHECKED BY: JEC

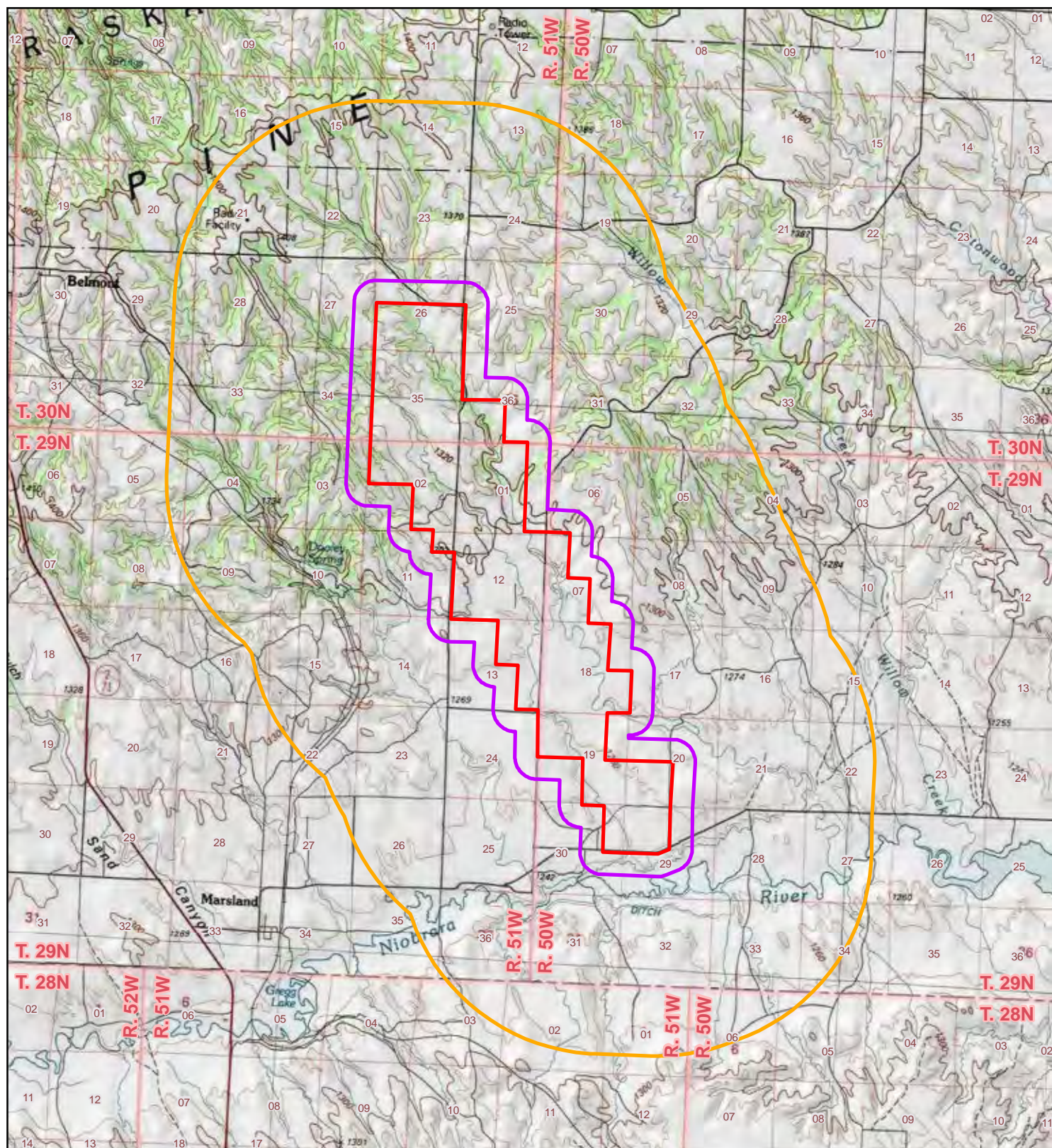


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





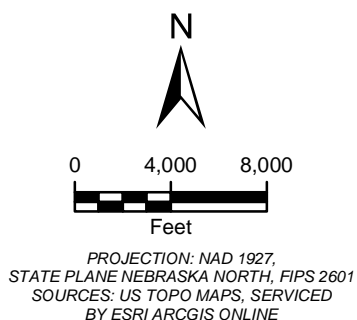




## LEGEND

- Proposed Marland Expansion Area
- ZOEI Boundary (1/4-mile fixed radius)
- AOR Boundary (2-mile fixed radius)

ZOEI = Zone of Endangering Influence  
AOR = Area of Review



**CROW BUTTE  
RESOURCES, INC.**

## FIGURE 1.7-3 PROJECT LOCATION MAP ZOEI AND AOR

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: J. CEARLEY

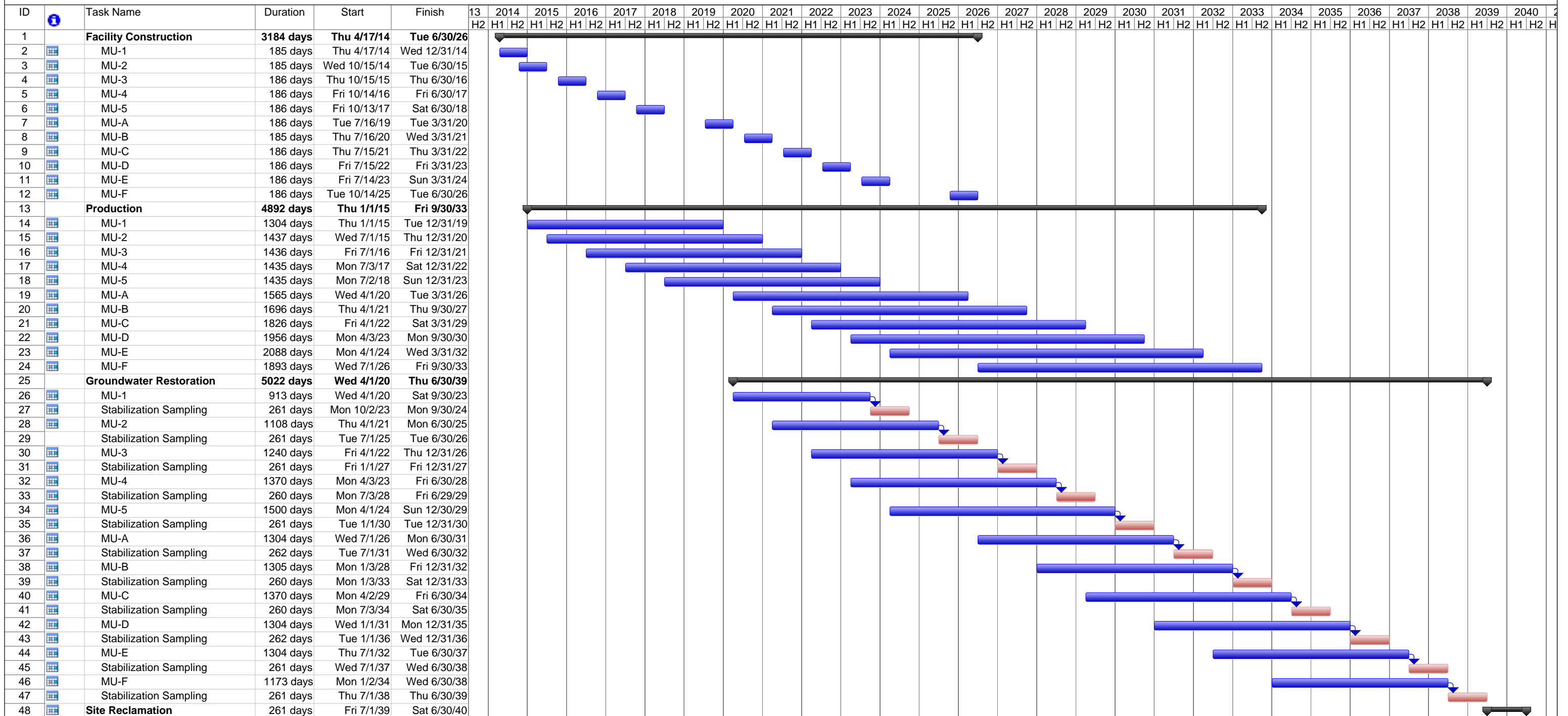




















**ARCADIS**

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

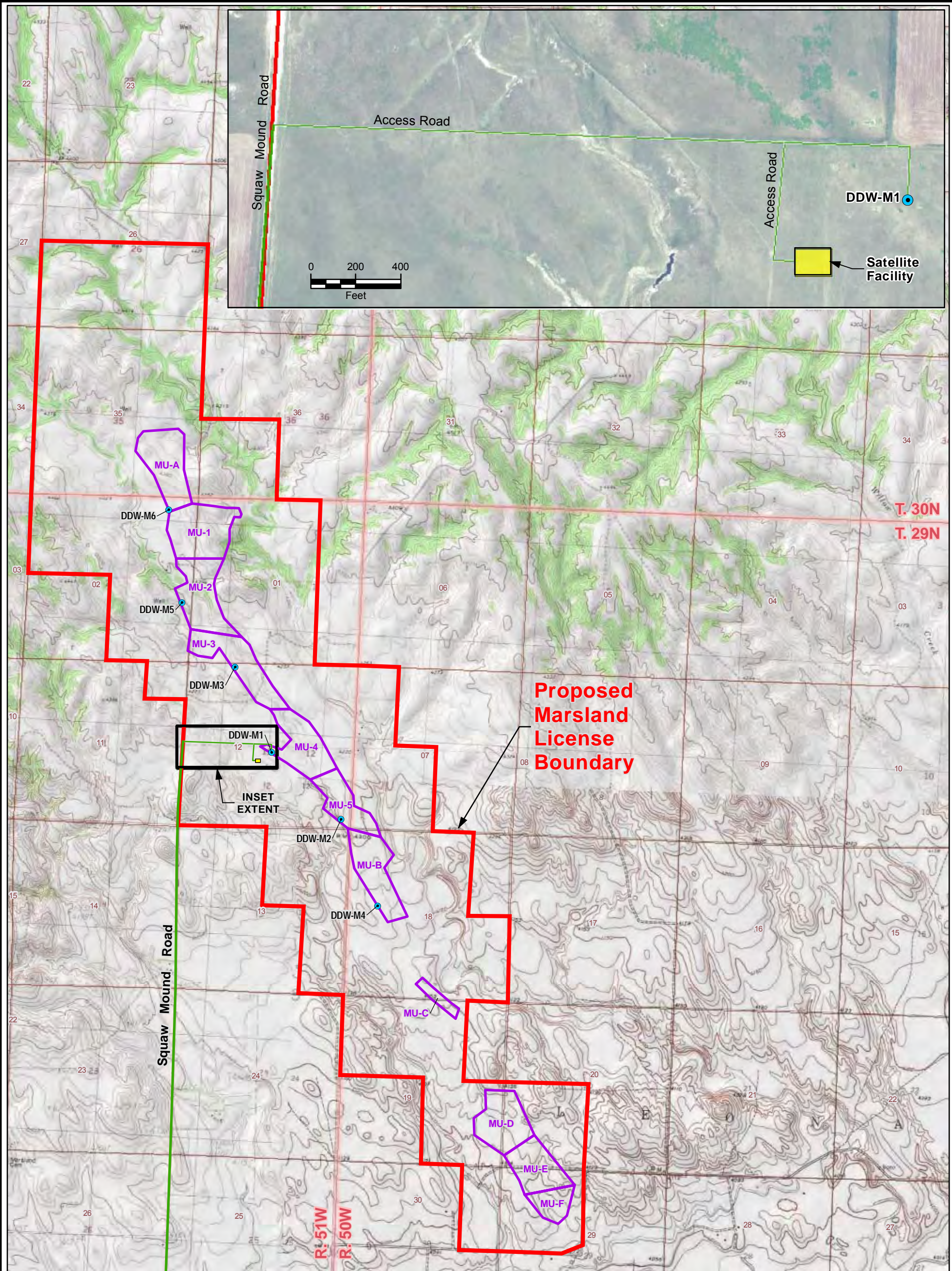


**Figure 1.7-4 Marland Expansion Area Mining and Restoration Timeline**



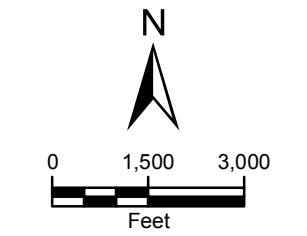
Project: Marsland Expansion Area Date: Wed 5/22/13	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Progress	
	Split		External Tasks		Inactive Summary		Manual Summary		Deadline	
	Milestone		External Milestone		Manual Task		Start-only			
	Summary		Inactive Task		Duration-only		Finish-only			
Page 1										





LEGEND

- Proposed Deep Disposal Well
- Squaw Mound Road
- Access Road
- Satellite Facility (Restricted Area)
- Mine Unit
- Proposed Marsland License Boundary



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



CROW BUTTE  
RESOURCES, INC.

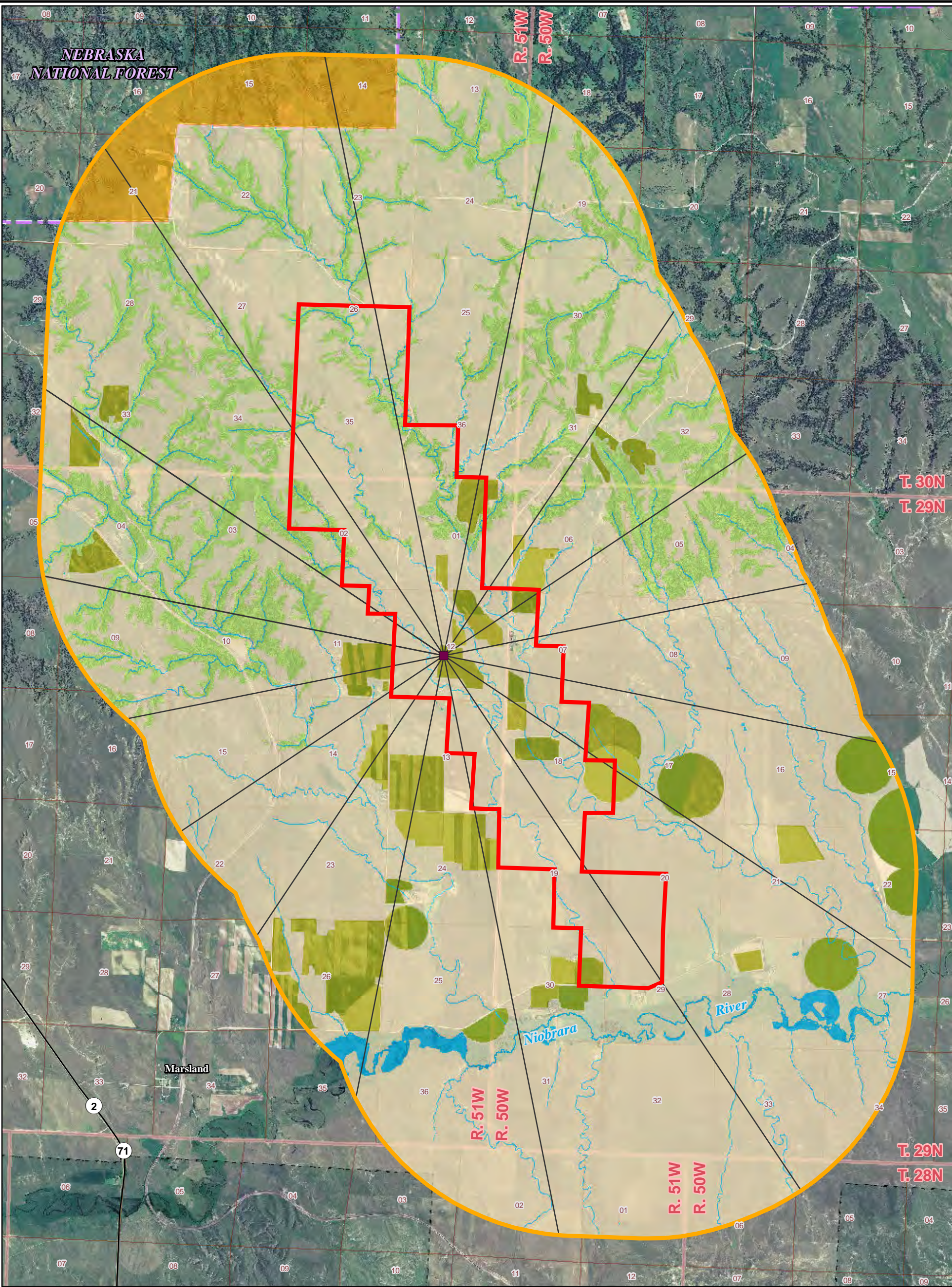
FIGURE 1.7-5  
GENERAL ARRANGEMENT  
SATELLITE FACILITY VIEW

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





LEGEND

- Proposed Marsland Satellite Plant Centroid

Compass Sector Boundary

Proposed Marsland Expansion Area

Area of Review

Nebraska National Forest Boundary
- Land Use\*

Cropland

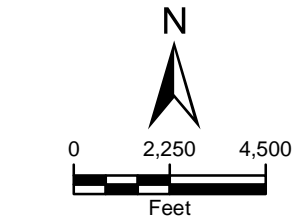
Drainage/Potential Wetland

Forest Land

Rangeland

Recreational Land

\* Land use data were interpreted from aerial image. The delineation of "Drainage/Potential Wetland" type also referenced NHD Flowlines and NWI Wetland Dataset.



PROJECTION: NAD1927,  
STATE PLANE NEBRASKA NORTH, FIPS 2601  
SOURCES: USDA NAIP IMAGERY 2010



CROW BUTTE  
RESOURCES, INC.

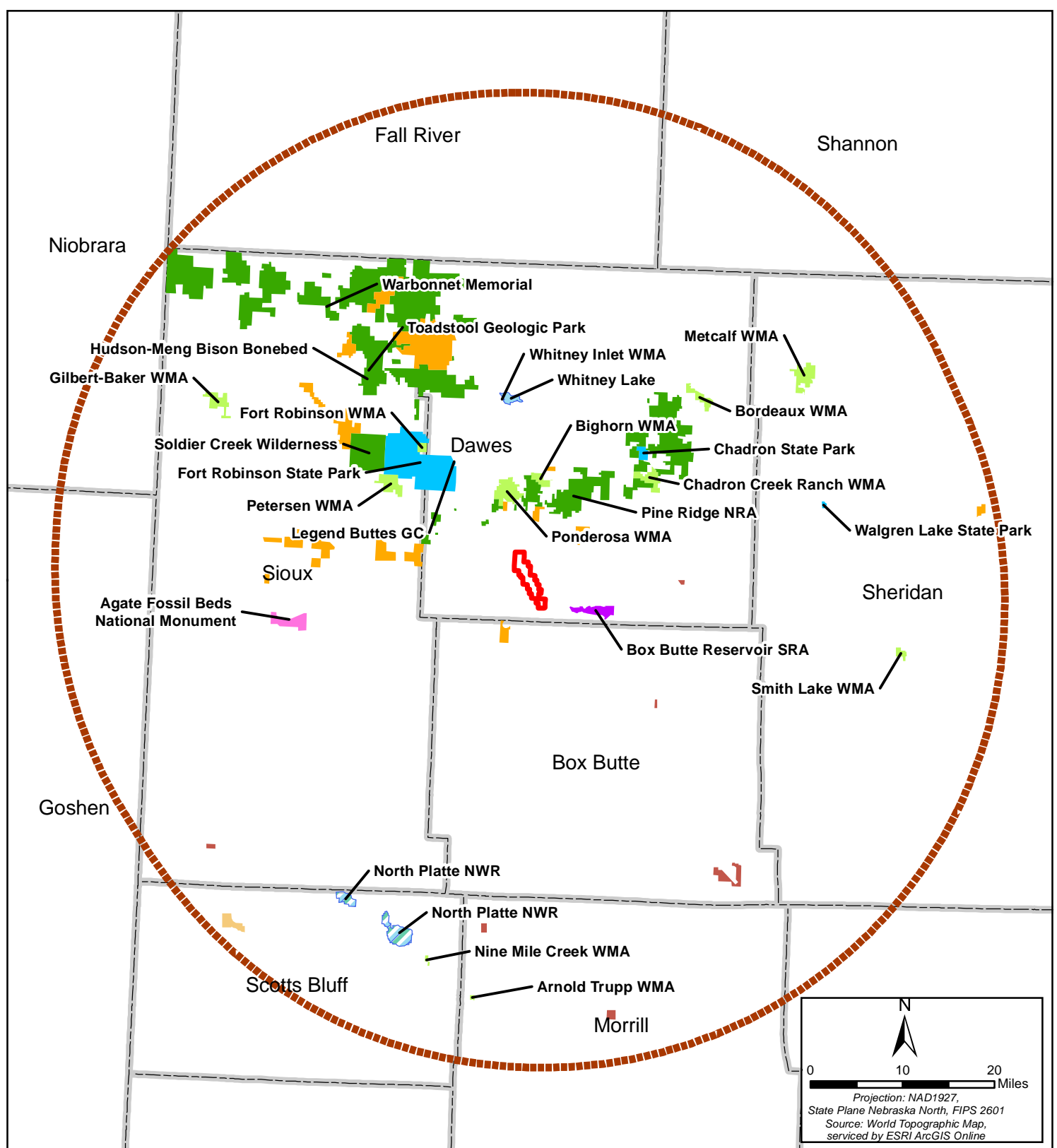
FIGURE 2.2-1  
MARSLAND EXPANSION AREA  
LAND USE

PROJECT: CO001636      MAPPED BY: JC      CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





## LEGEND

- |  |                                     |  |                                |
|--|-------------------------------------|--|--------------------------------|
|  | Agate Fossil Beds National Monument |  | Conservation Partner Lands     |
|  | Proposed Marland Expansion Area     |  | Natural Resource District Area |
|  | 50 Mile Radius                      |  | Nebraska National Forest       |
|  | Wildlife Management Area            |  | National Wildlife Refuge       |
|  | State Recreation Area               |  | Open Fields and Waters         |
|  | State Park; Walgren Lake State Park |  | Whitney Lake                   |



**CROW BUTTE  
RESOURCES, INC.**

## FIGURE 2.2-2 MARSLAND EXPANSION AREA PROXIMITY TO RECREATION AREAS AND WILDLIFE MANAGEMENT AREAS

PROJECT: CO001636

MAPPED BY: JC

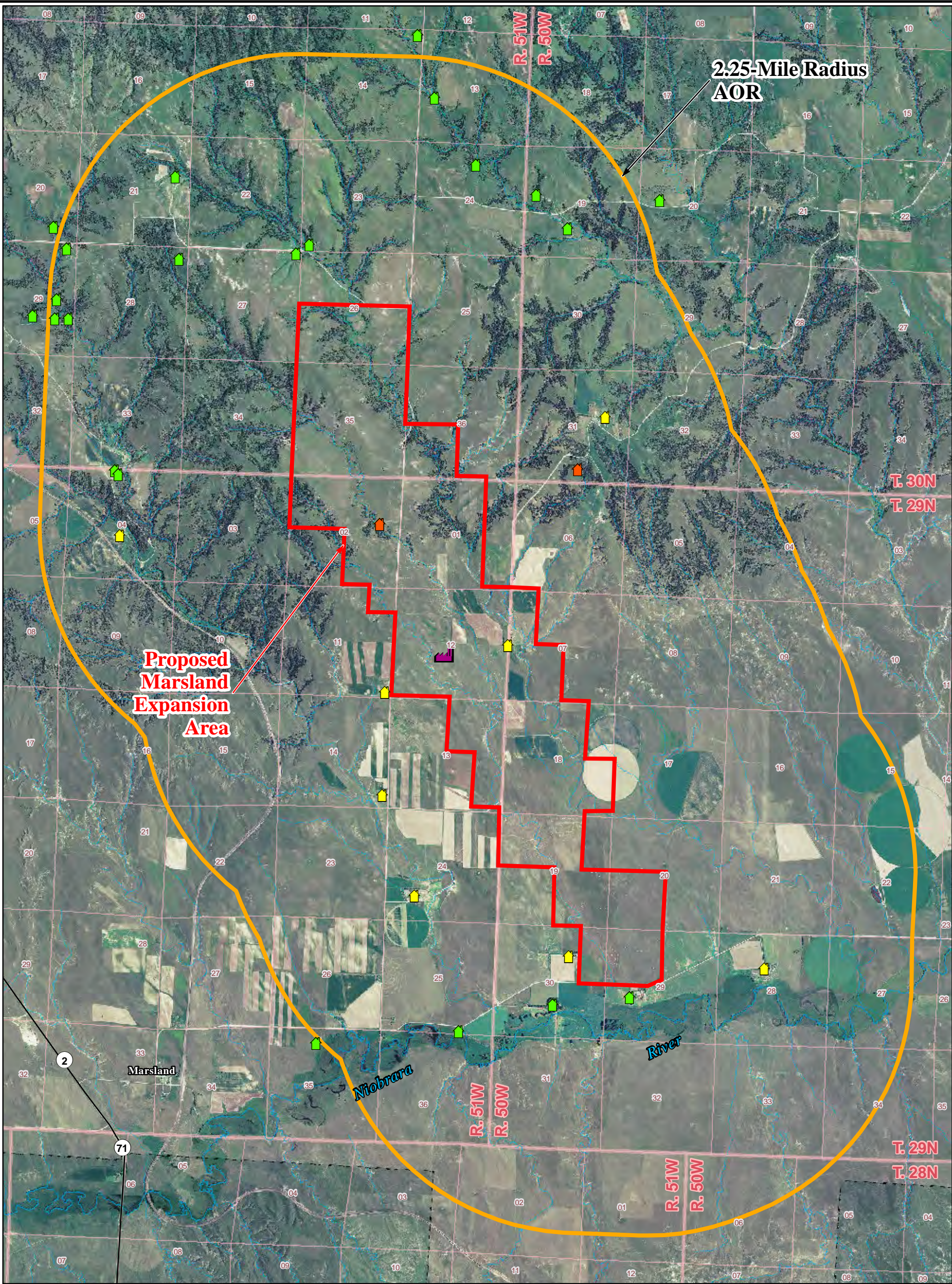
CHECKED BY: CM



**ARCADIS**

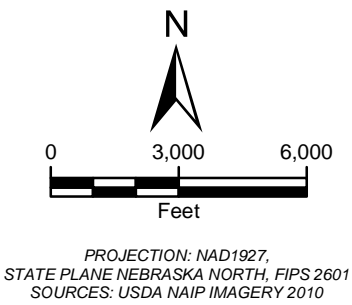
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com






LEGEND

- Structure
- Satellite Plant
- Occupied Residence
- Unoccupied Residence
- Proposed Marsland Expansion Area
- Area of Review (AOR)
- Intermittent Stream/River
- Perennial Stream/River






CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.2-3**  
**AERIAL PHOTO DEPICTING LOCATION OF  
RURAL RESIDENCES AND OTHER LAND  
FEATURES IN THE AREA OF REVIEW**

PROJECT: CO001636

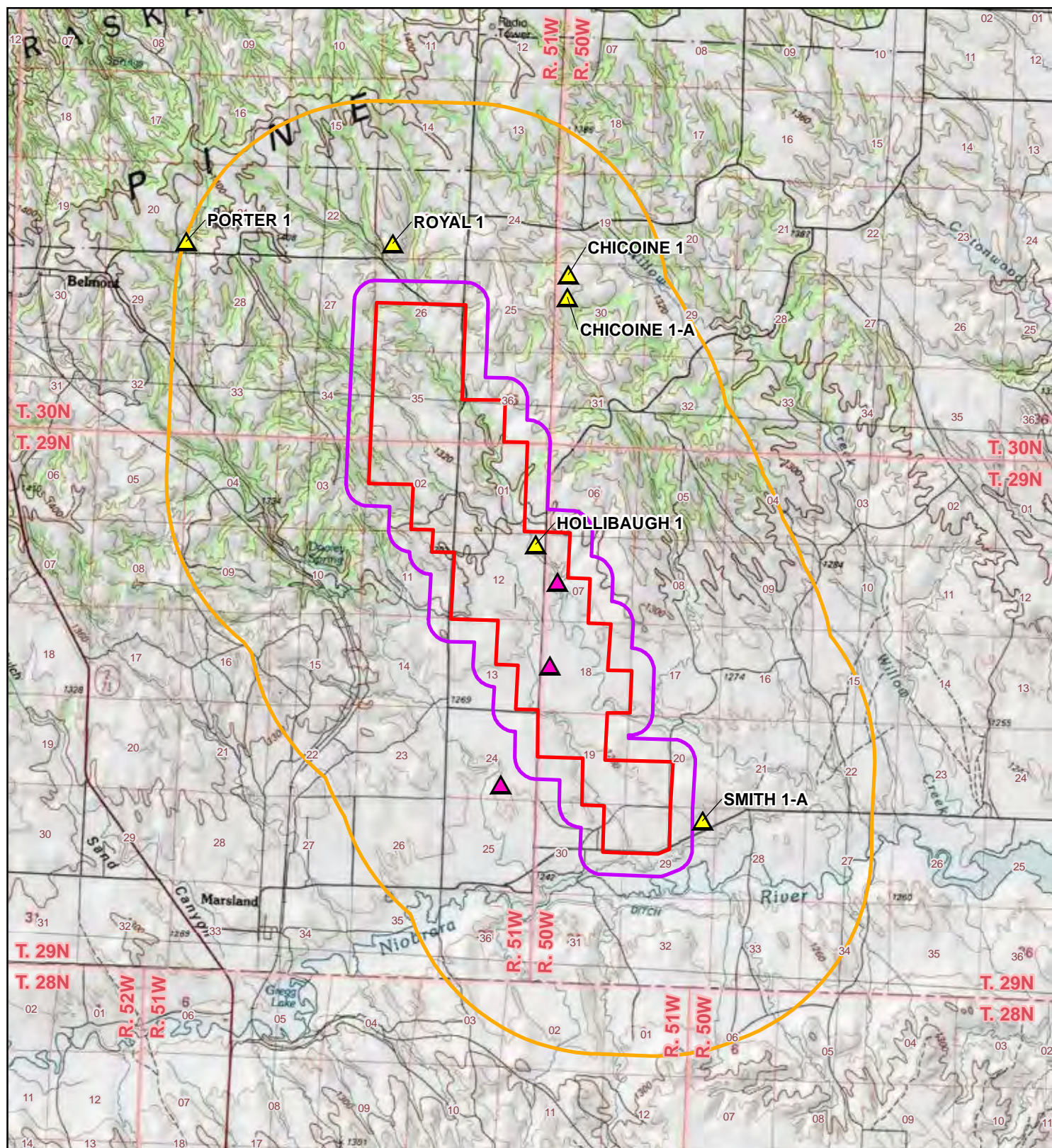
MAPPED BY: JC

CHECKED BY: J. CEARLEY



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





## LEGEND

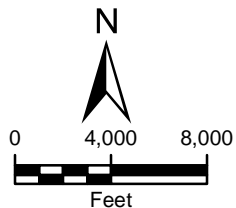
- Sand/Gravel Pit, Inactive
- Dry Hole, Dry and Abandoned
- Proposed Marsland Expansion Area
- ZOEI Boundary (1/4-mile fixed radius)
- AOR Boundary (2-mile fixed radius)

### Sources for Sand/Gravel Pits

1. Dawes County, (<http://dawes.assessor.gisworkshop.com/Assessor/index.jsp>), Accessed on 08/03/2011, and
2. Burchett, R.R. 1971. Directory of Nebraska Quarries, Pits and Mines. Resource Report Number 5. University of Nebraska Conservation and Survey Division, Lincoln. March.

### Sources for Oil/Gas Test Holes

Nebraska Oil and Gas Conservation Commission, (<http://www.nogcc.ne.gov/NOGCCPublications.aspx>), Accessed on 08/01/2011



PROJECTION: NAD 1927,  
STATE PLANE NEBRASKA NORTH, FIPS 2601  
SOURCES: US TOPO MAPS, SERVICED  
BY ESRI ARCGIS ONLINE



**CROW BUTTE  
RESOURCES, INC.**

## FIGURE 2.2-4 MARSLAND EXPANSION AREA LOCATIONS OF GRAVEL PITS AND OIL/GAS TEST HOLES

PROJECT: CO001636

MAPPED BY: JC

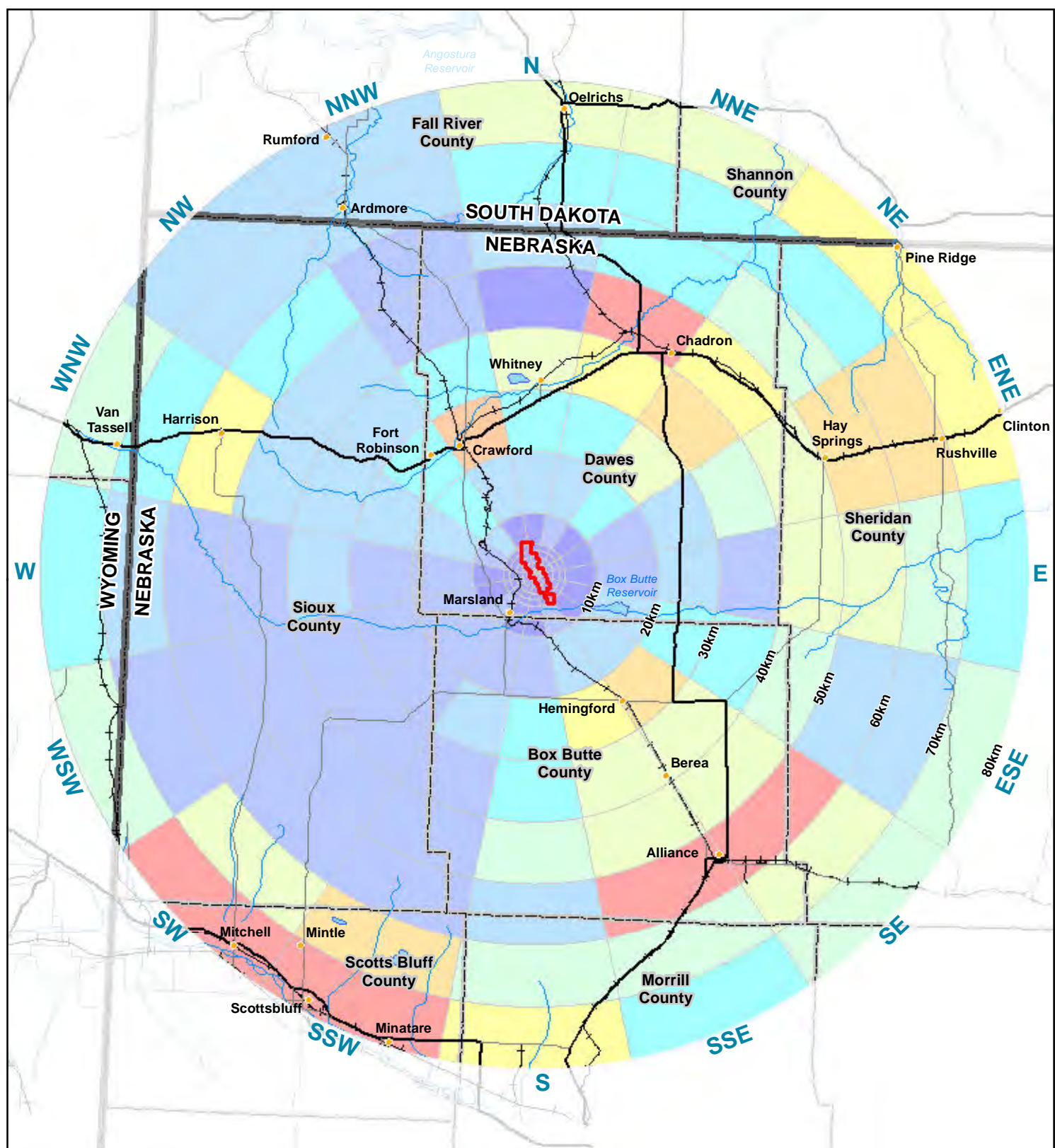
CHECKED BY: J. CEARLEY



**ARCADIS**

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
[www.arcadis-us.com](http://www.arcadis-us.com)

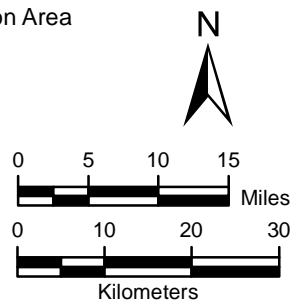




## LEGEND

  Proposed Cameco/Marlsand Expansion Area  
Population (Census 2010)

	0 - 6		86 - 208
	7 - 18		209 - 523
	19 - 31		524 - 1,101
	32 - 51		1,102 - 2,997
	52 - 85		2,998 - 19,150



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 2.3-1  
SIGNIFICANT POPULATION CENTERS  
WITHIN AN 80-Km (50 mi) RADIUS  
OF THE MARSLAND SITE**

PROJECT: CO001636

MAPPED BY: JC

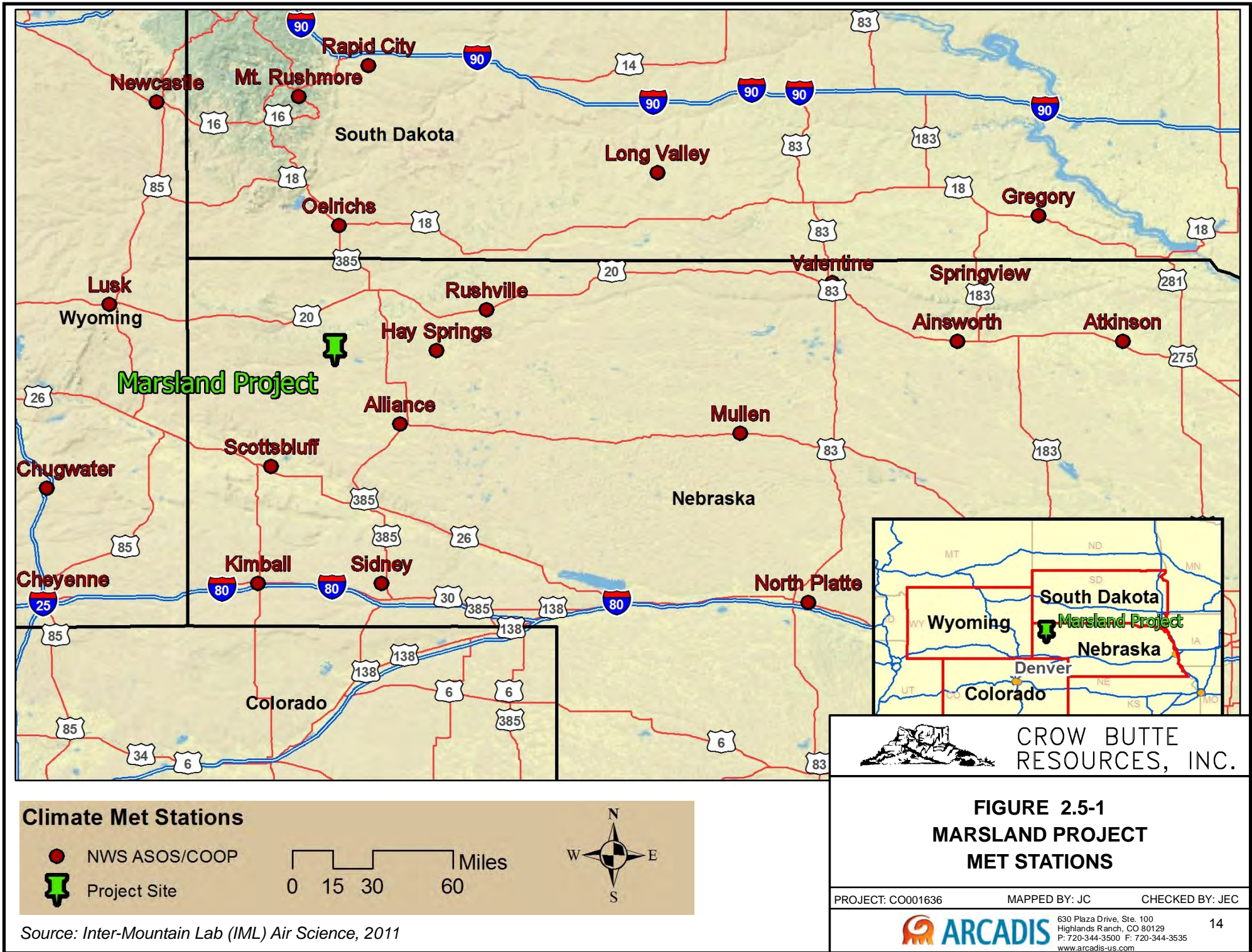
CHECKED BY: CM



**ARCADIS**

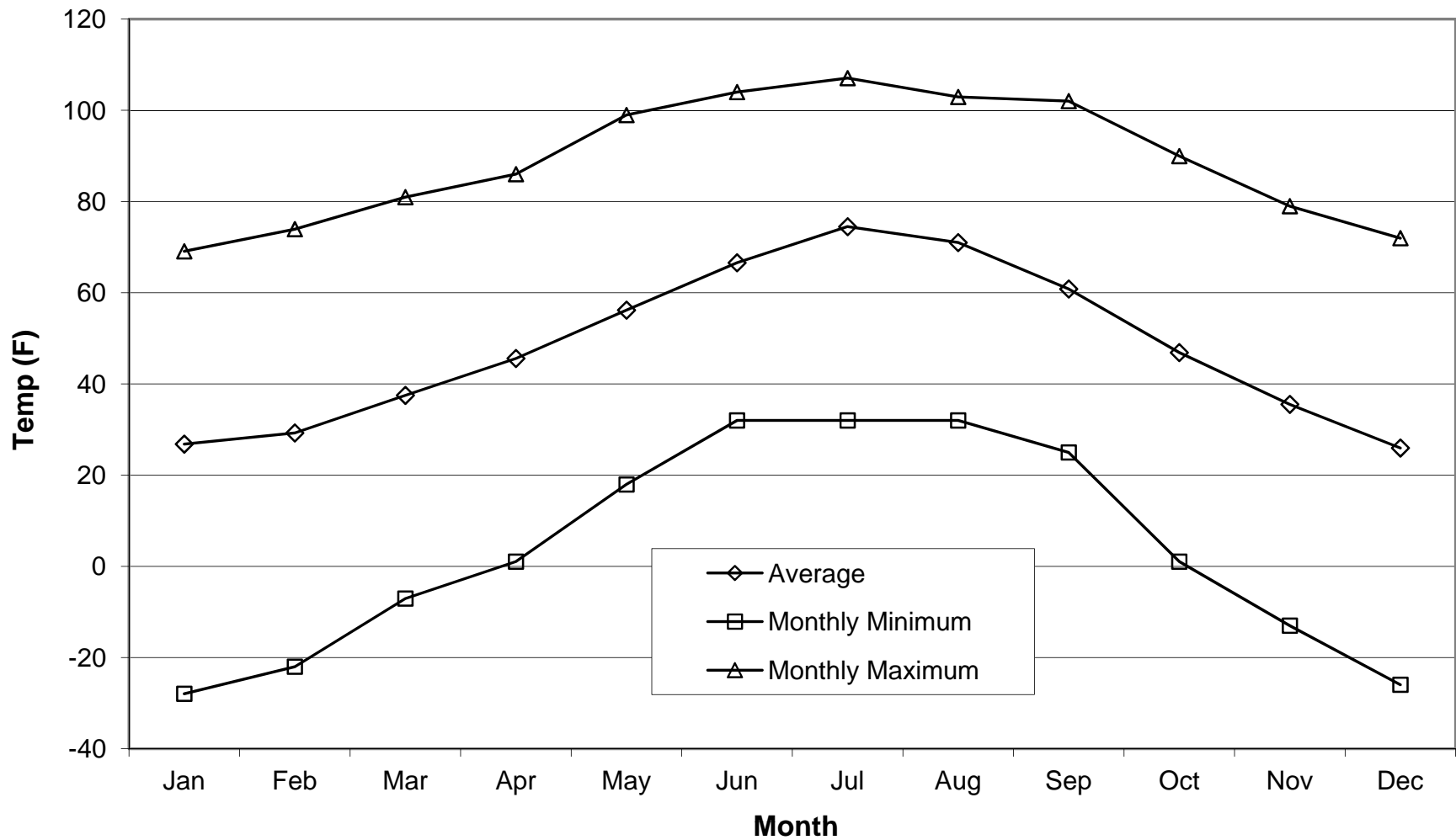
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Source: Inter-Mountain Lab (IML) Air Science, 2011





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-2  
SCOTTSBLUFF AP  
MONTHLY TEMPERATURES**

PROJECT: CO001636

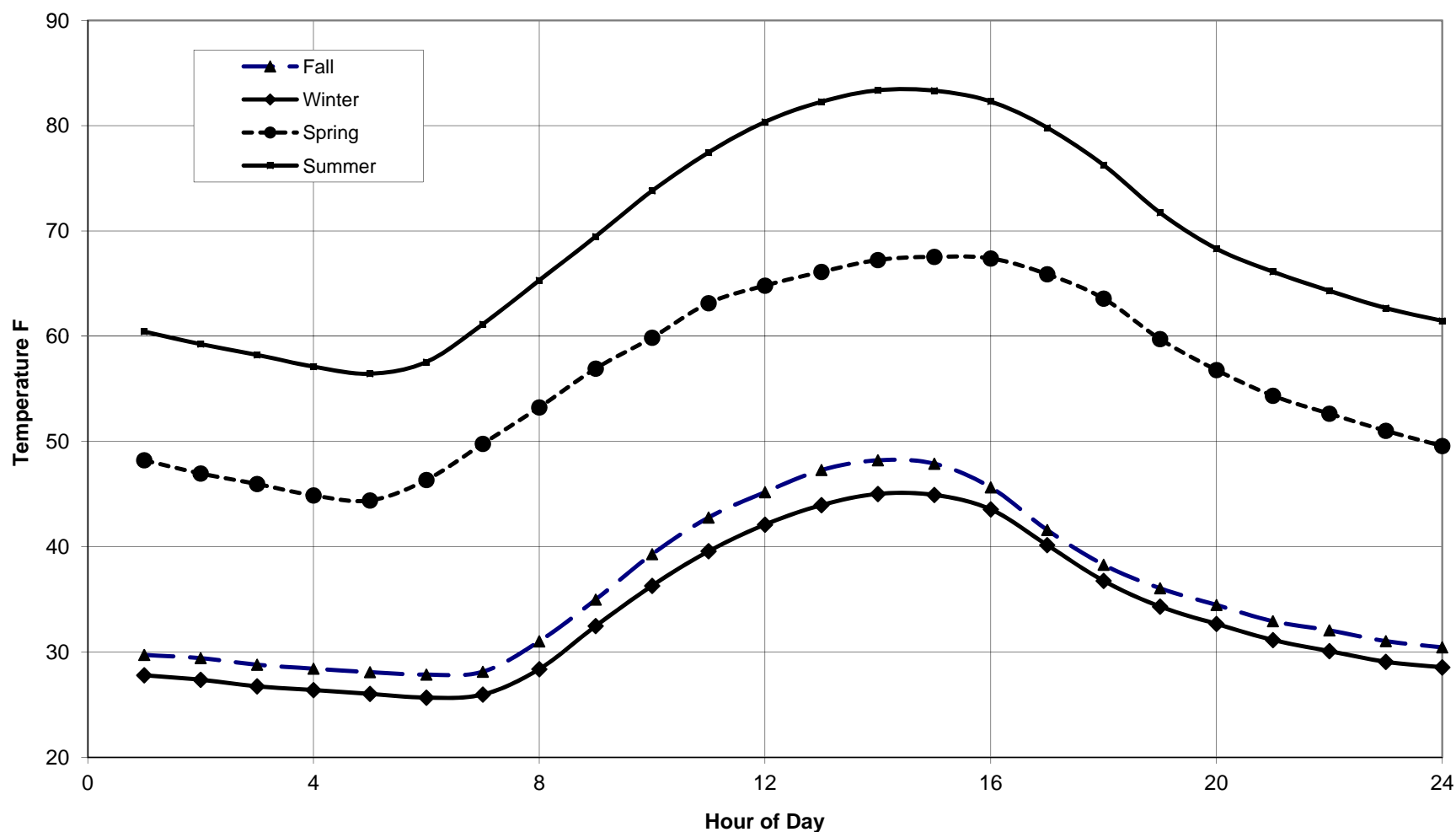
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-3**  
**SCOTTSBLUFF AP SEASONAL**  
**DIURNAL TEMPERATURE VARIATIONS**

PROJECT: CO001636

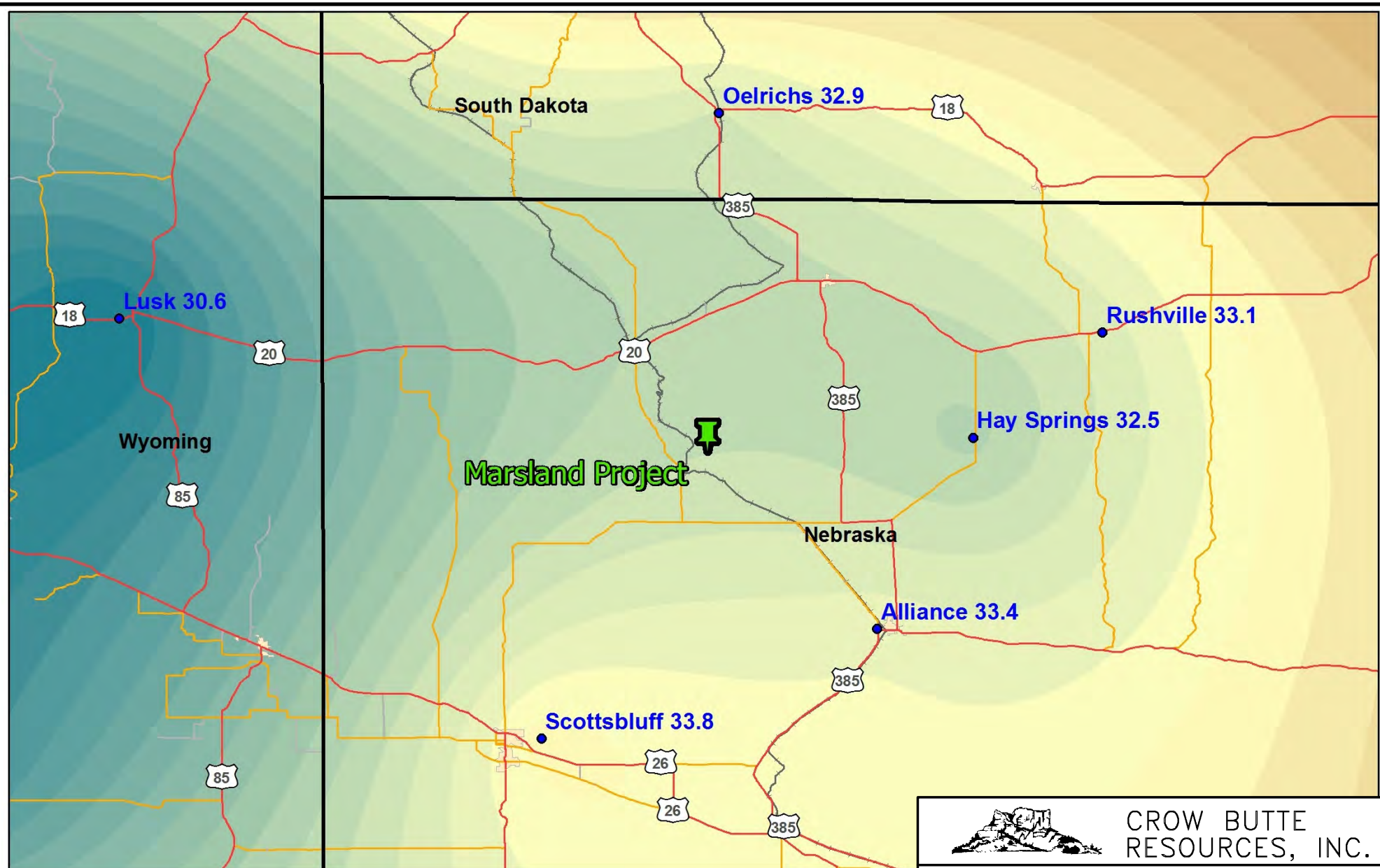
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Average Annual  
Minimum Temperature (°F)



0 5 10 20 Miles



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-4  
REGIONAL ANNUAL AVERAGE  
MINIMUM TEMPERATURES**

PROJECT: CO001636

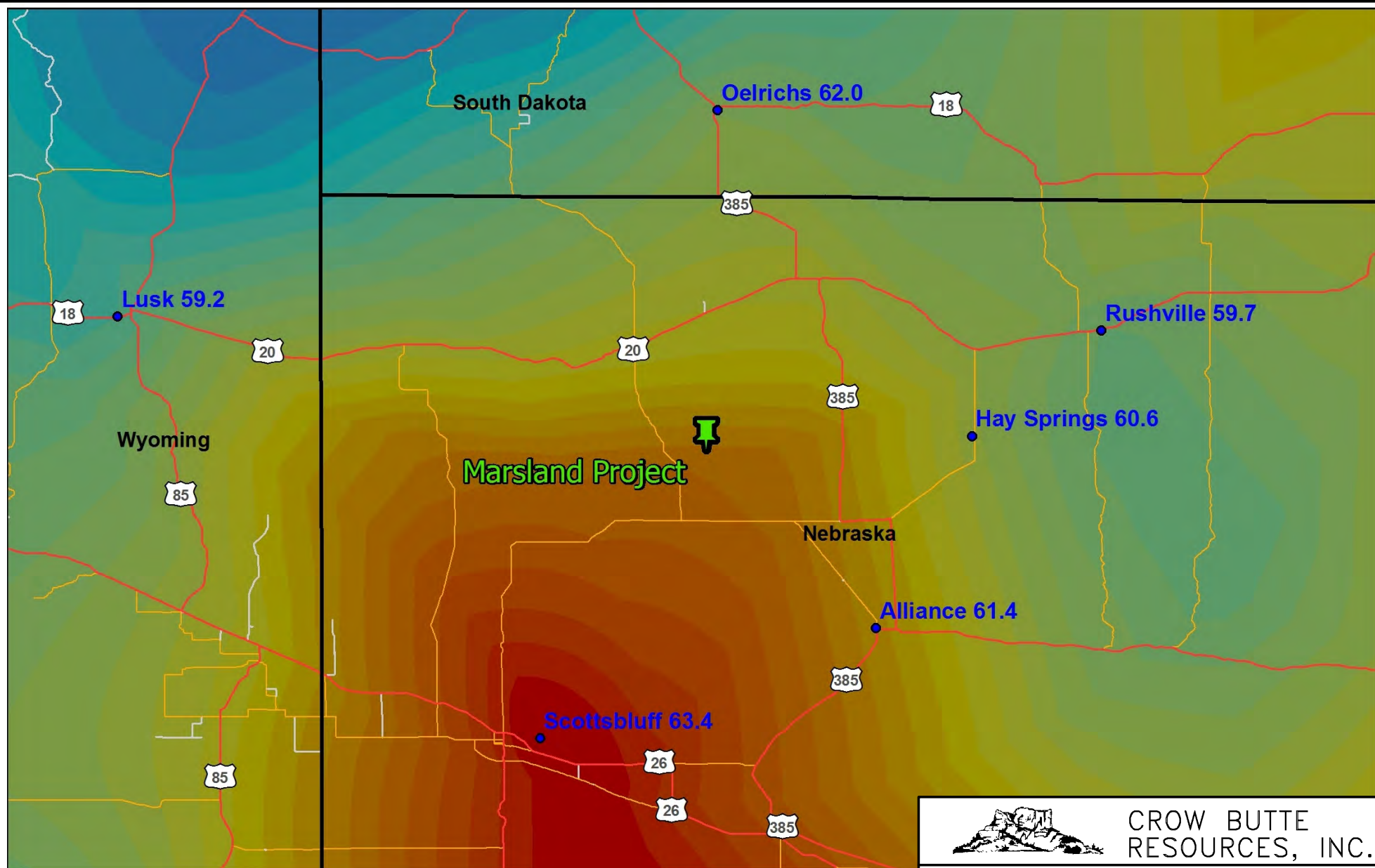
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Average Annual  
Maximum Temperature (°F)



0 5 10 20 Miles



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-5  
REGIONAL ANNUAL AVERAGE  
MAXIMUM TEMPERATURES**

PROJECT: CO001636

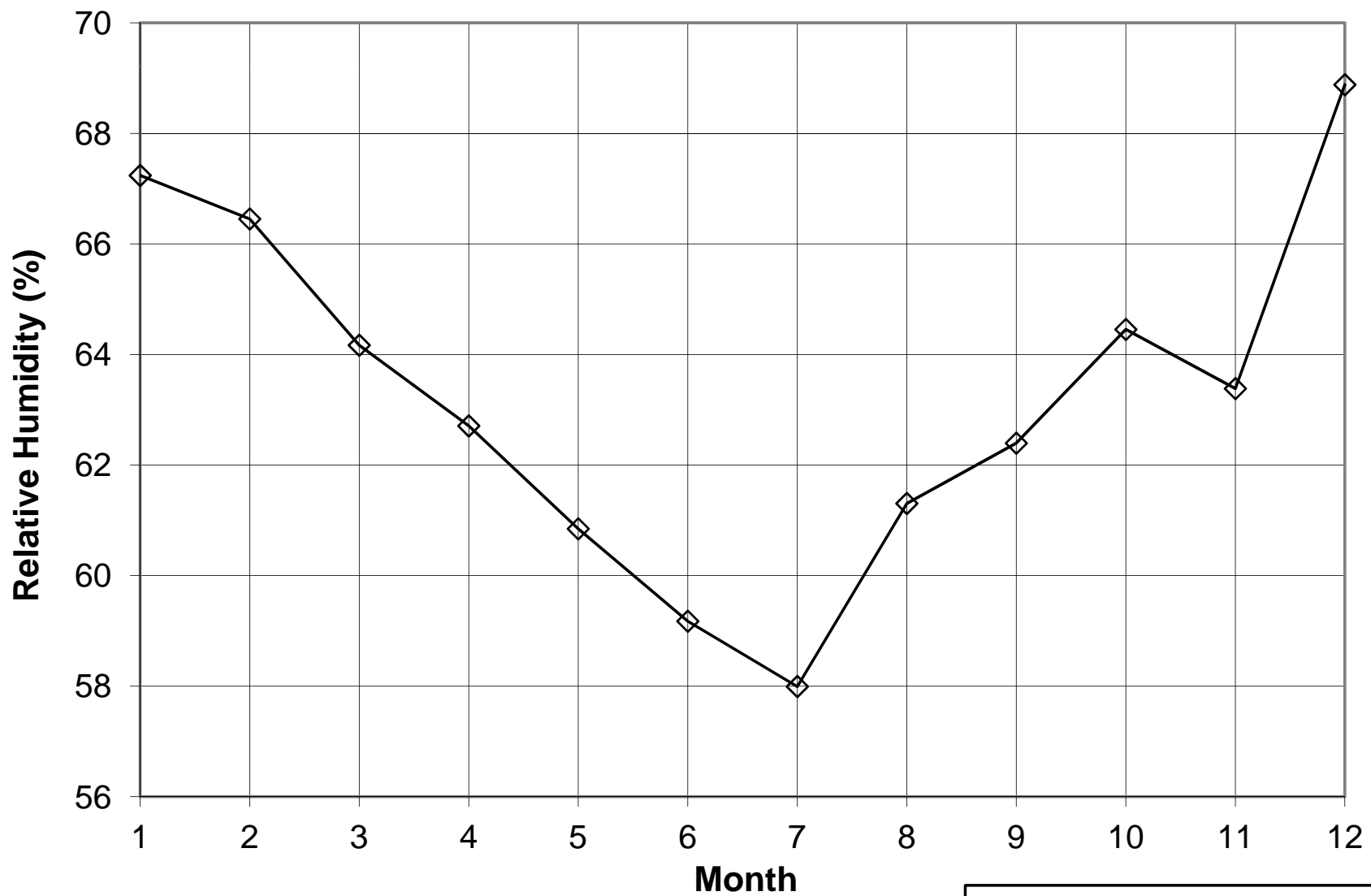
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-6**  
**MONTHLY RELATIVE HUMIDITY**  
**STATISTICS FOR SCOTTSBLUFF AP**

PROJECT: CO001636

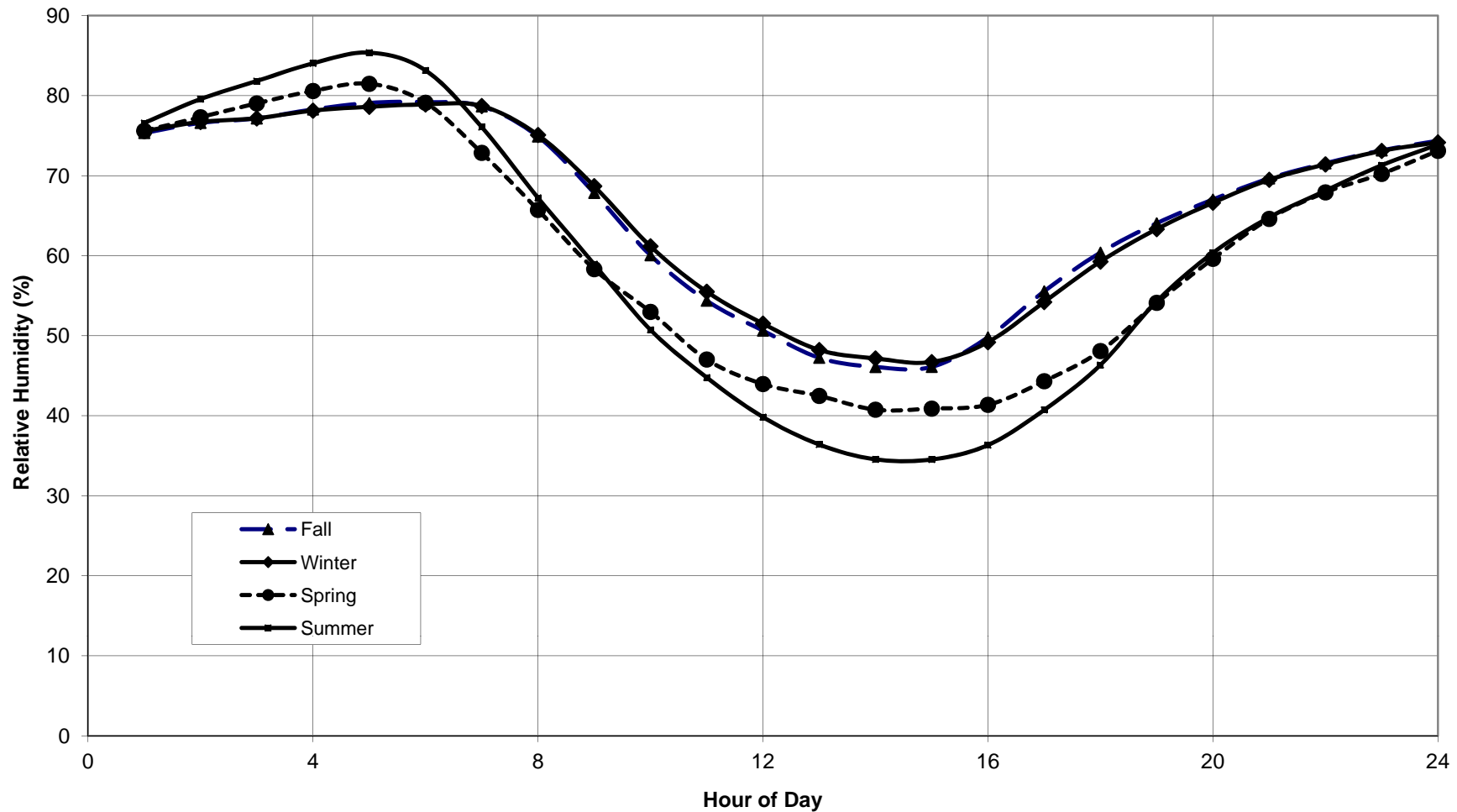
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-7**  
**DIURNAL VARIATION IN RELATIVE**  
**HUMIDITY FOR SCOTTSBLUFF**  
**BY SEASON**

PROJECT: CO001636

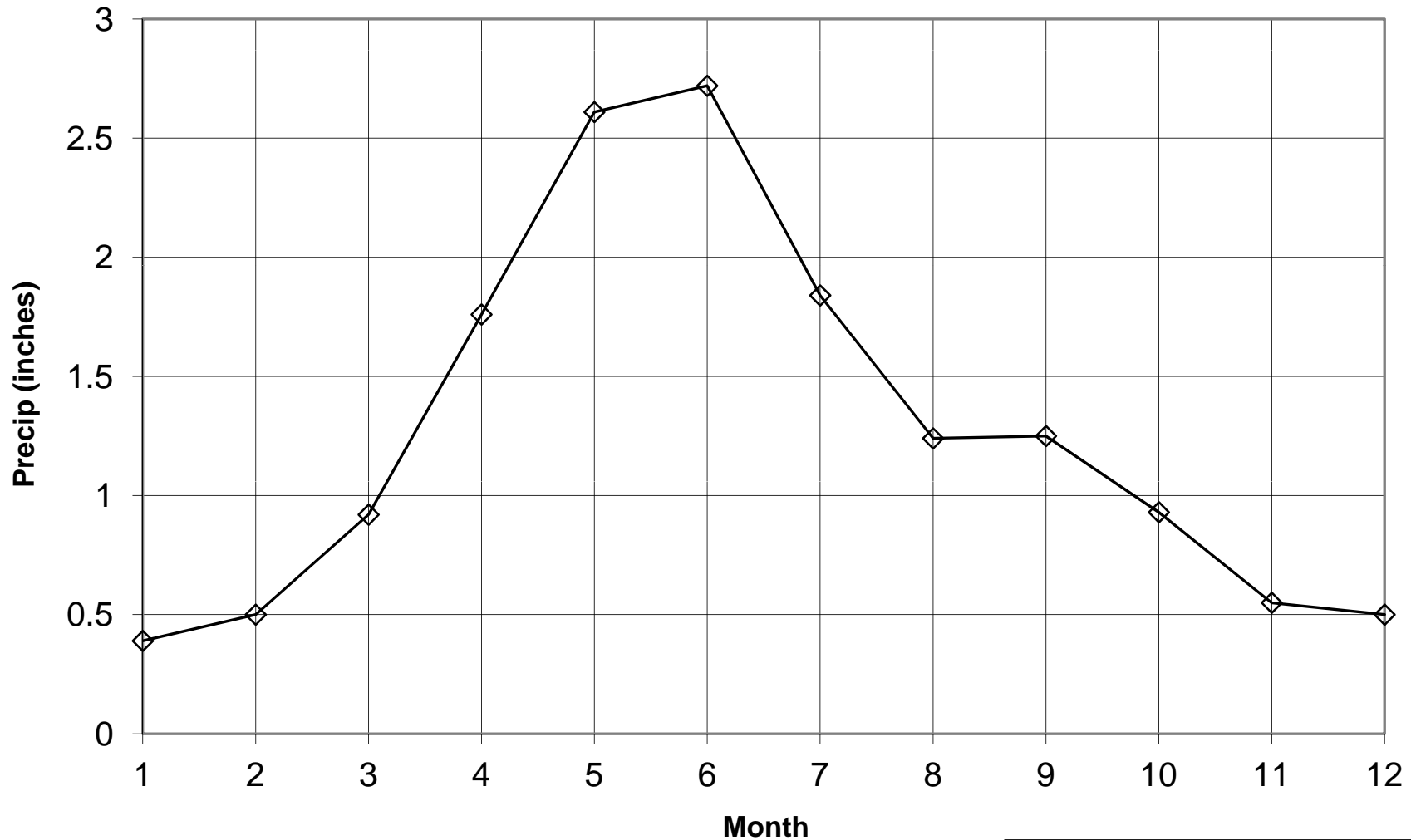
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-8**  
**SCOTTSBLUFF AP**  
**MONTHLY AVERAGE PRECIPITATION**

PROJECT: CO001636

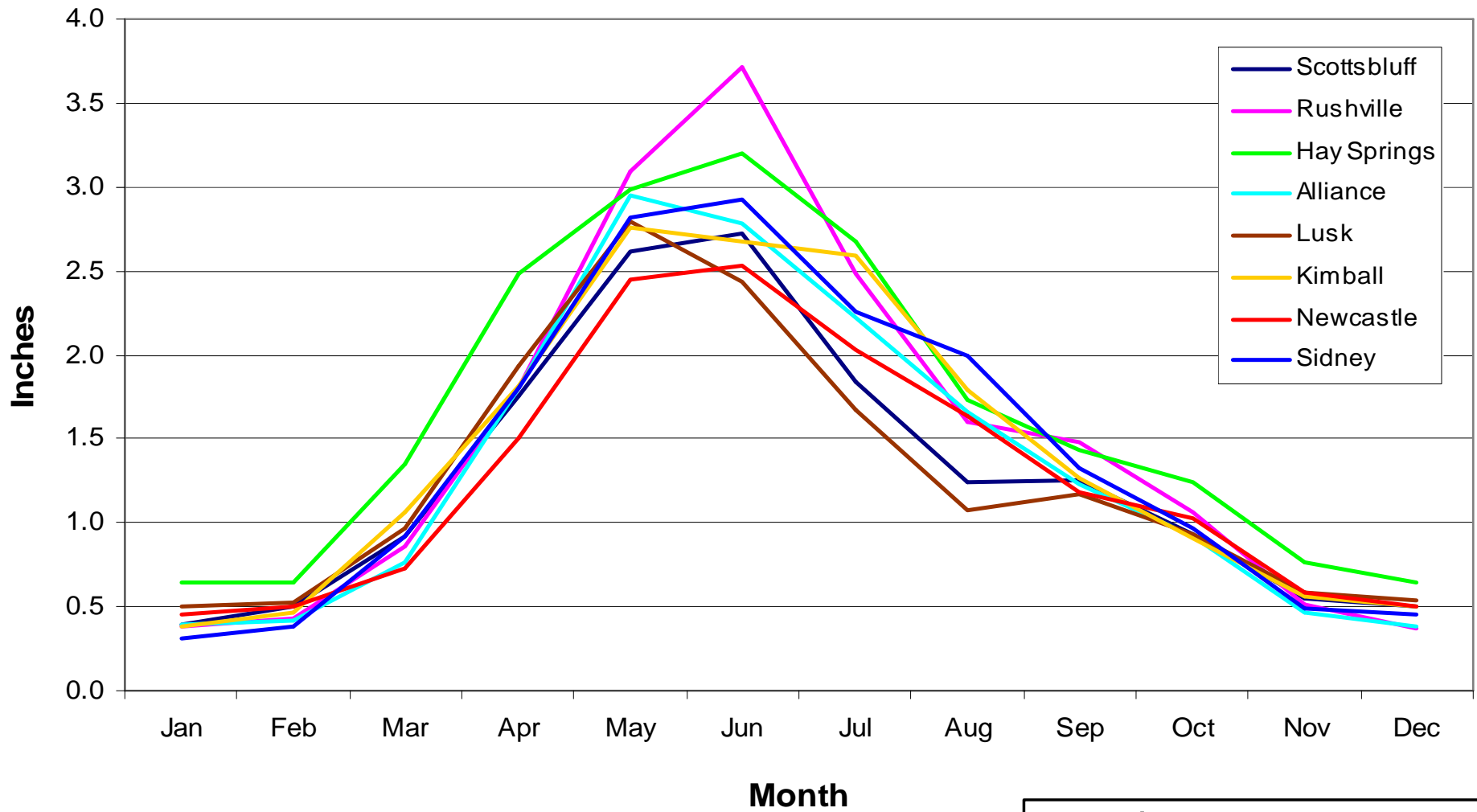
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-9  
REGIONAL  
MONTHLY AVERAGE PRECIPITATION**

PROJECT: CO001636

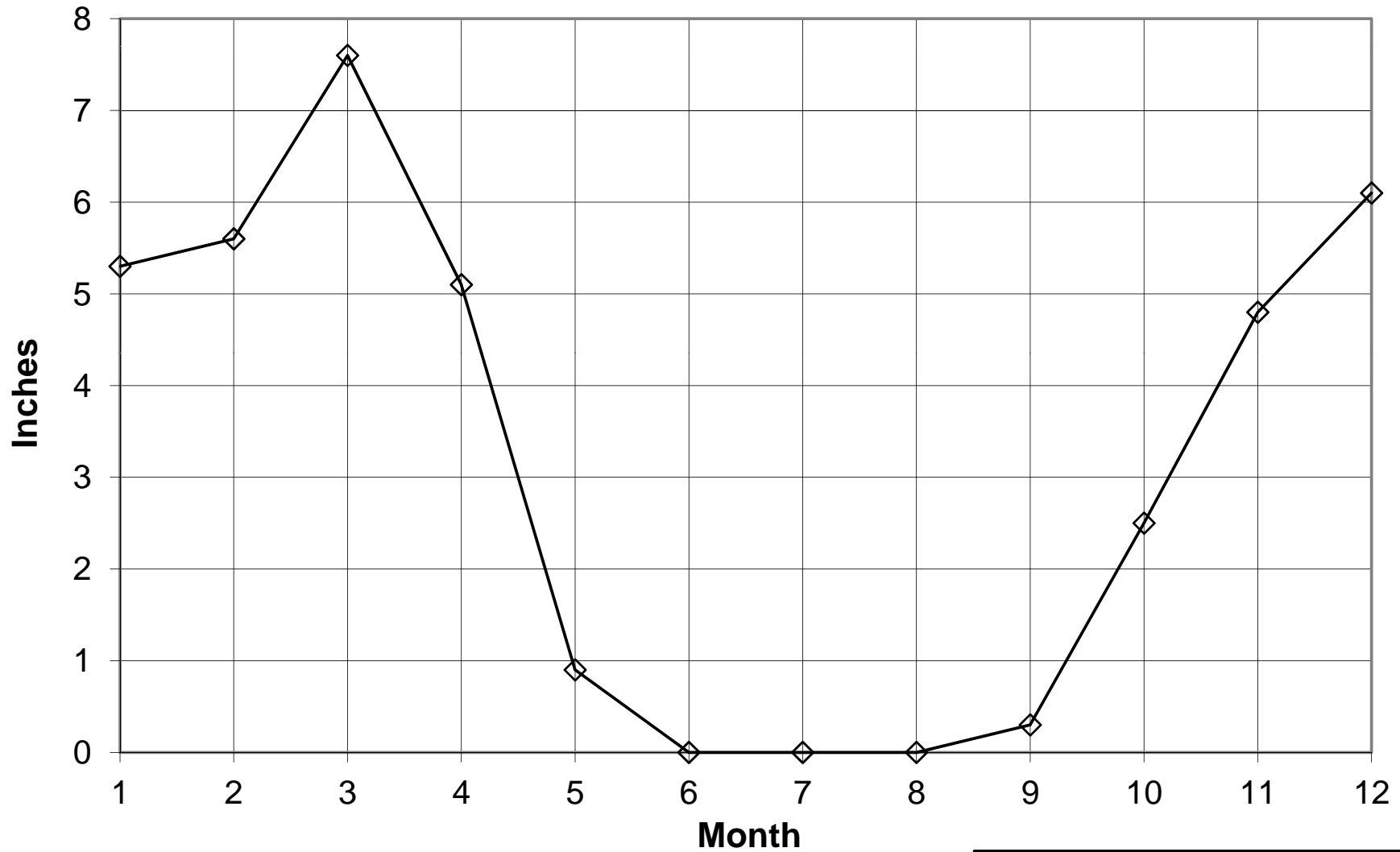
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-10  
SCOTTSBLUFF AP  
MONTHLY SNOWFALL**

PROJECT: CO001636

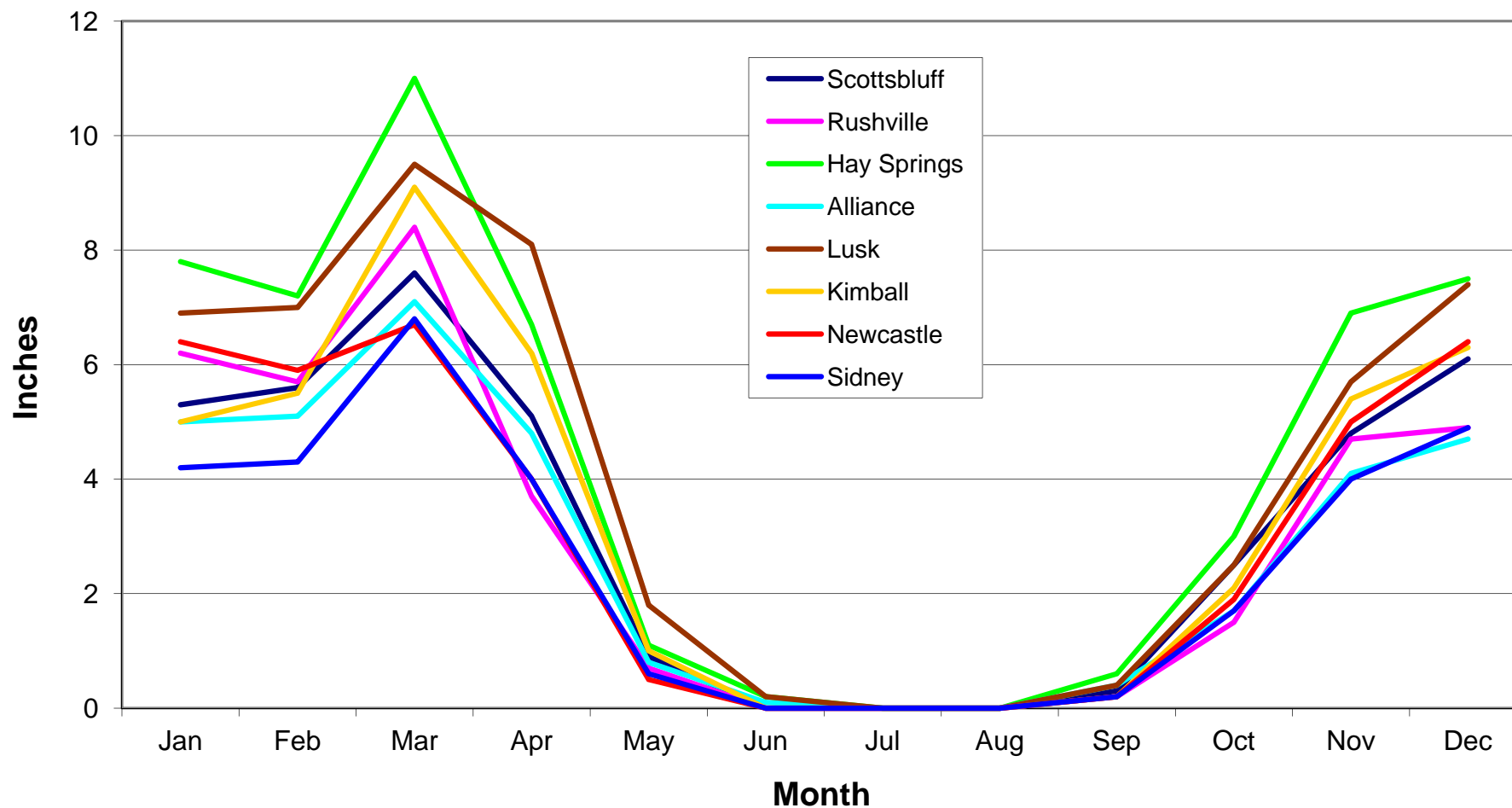
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-11**  
**REGIONAL**  
**MONTHLY AVERAGE SNOWFALL**

PROJECT: CO001636

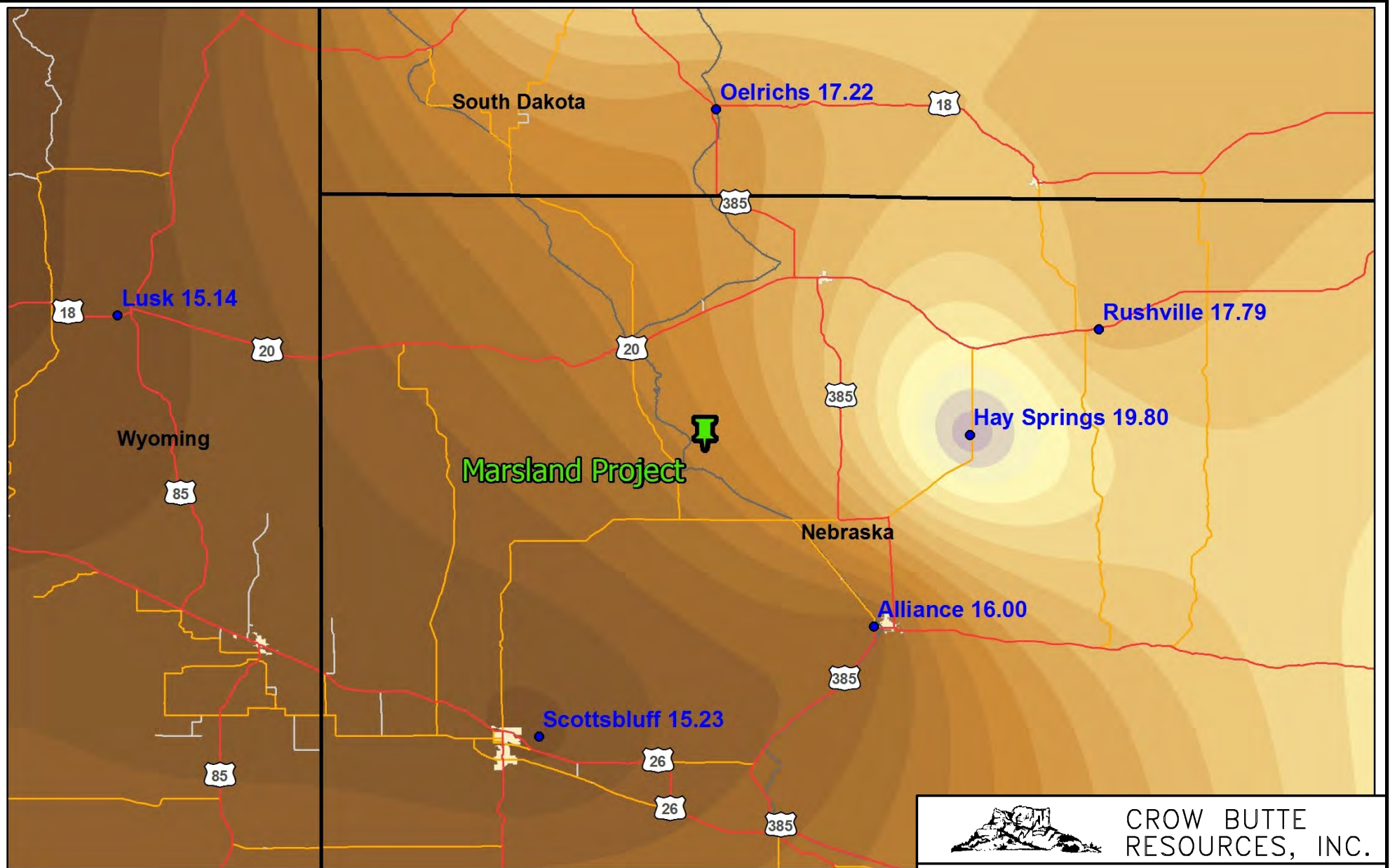
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Average Annual  
Precipitation (in)

Max: 23.2  
Min: 14.8

0 5 10 20 Miles



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-12  
REGIONAL ANNUAL AVERAGE  
PRECIPITATION**

PROJECT: CO001636

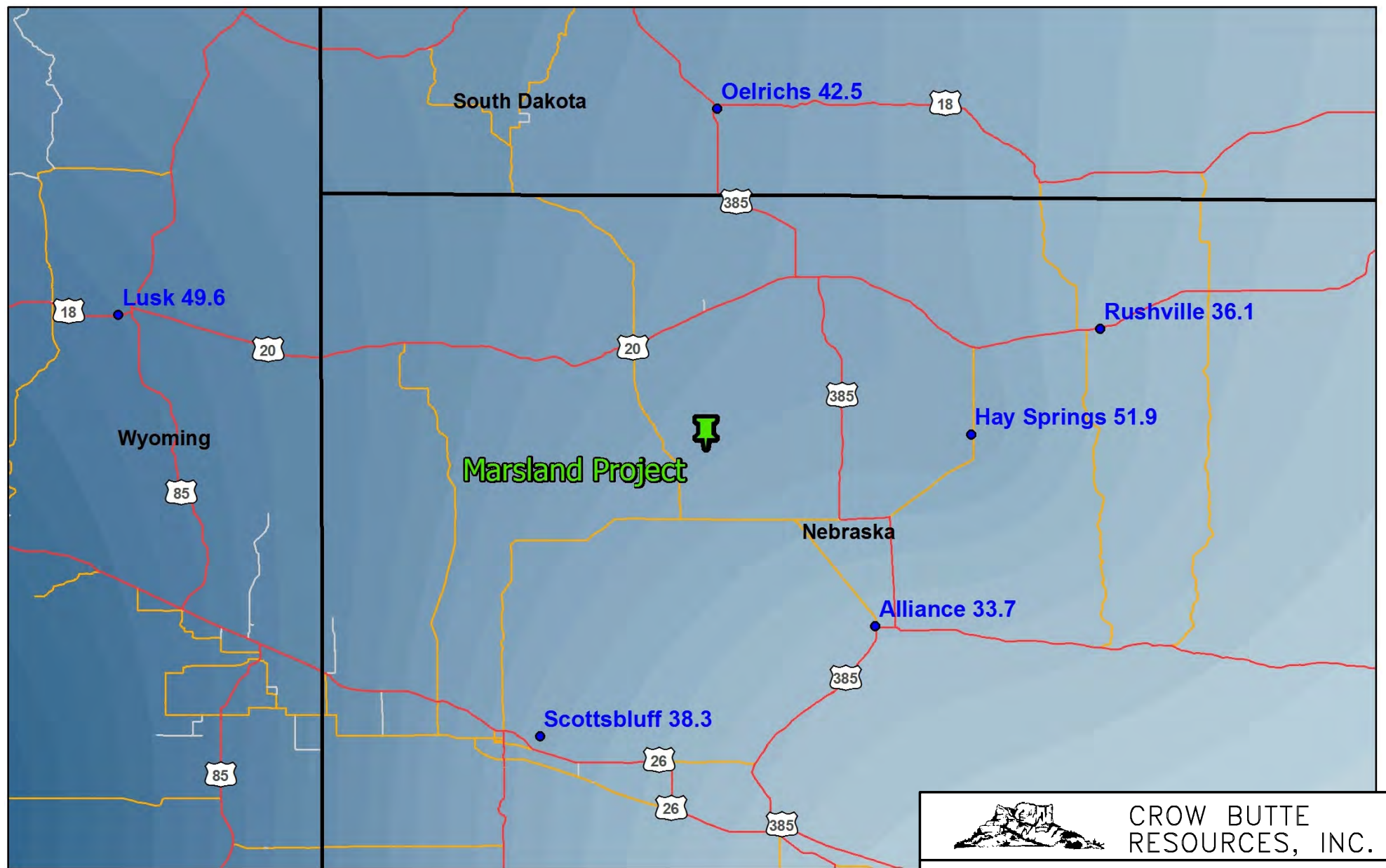
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Average Annual  
Snowfall (in)

Max: 61.8



Min: 32.3

0 5 10 20 Miles



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-13  
REGIONAL ANNUAL AVERAGE  
SNOWFALL**

PROJECT: CO001636

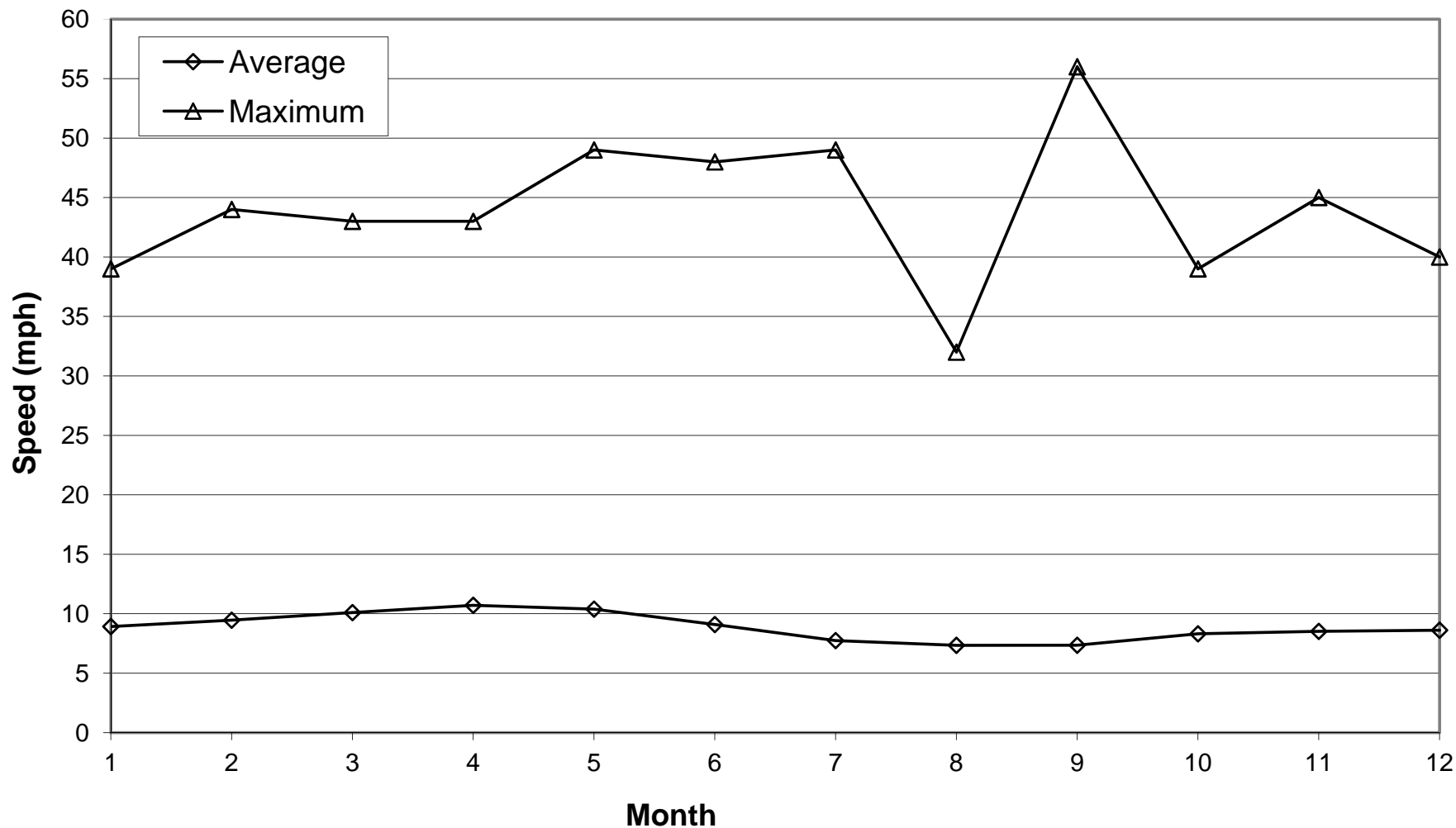
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-14  
SCOTTSBLUFF AP  
15-YEAR WIND SPEEDS**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: JEC

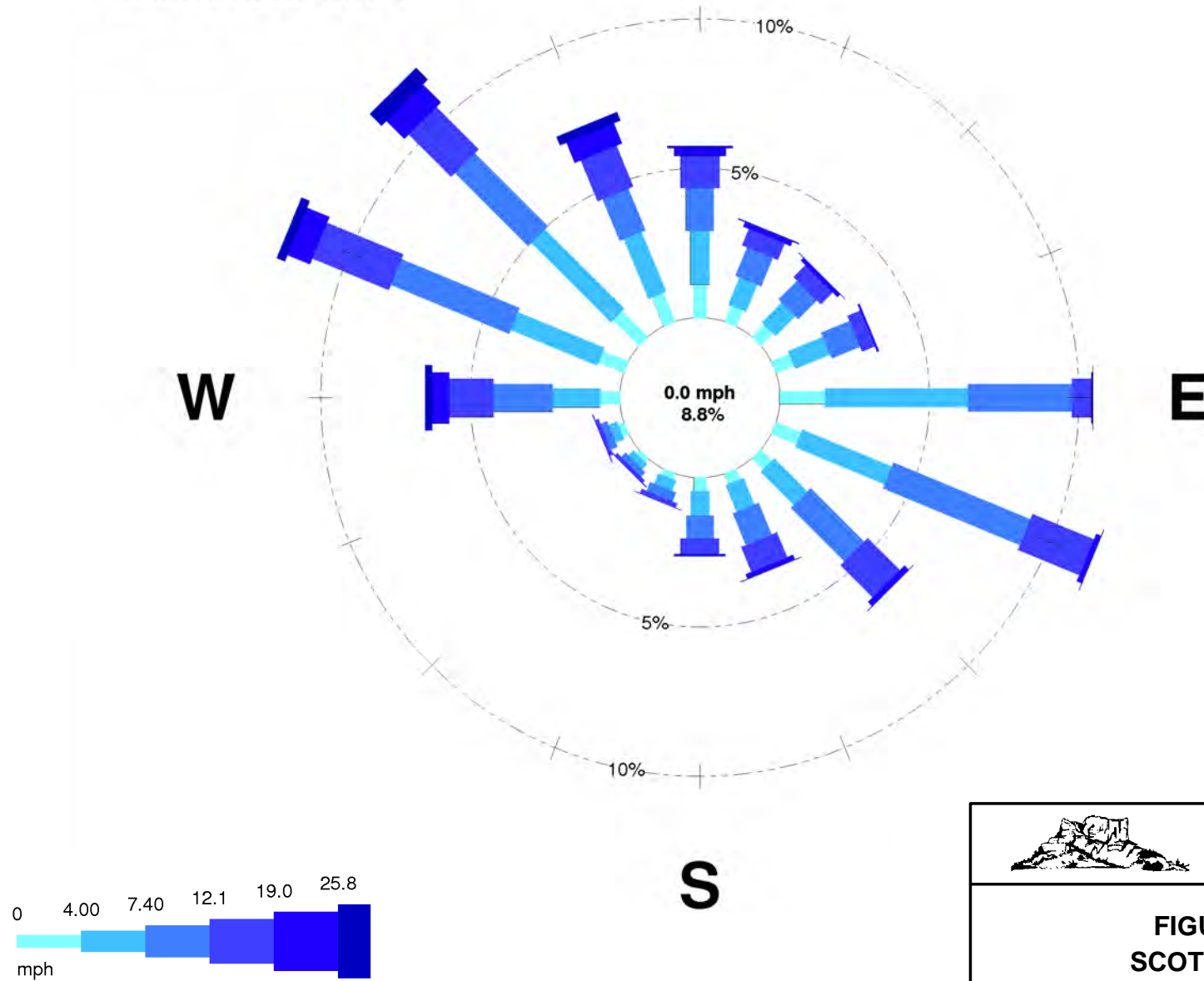


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



# Wind Rose Scottsbluff Airport

Scottsbluff, NE  
11/1/1996 Hr. 1 to 8/31/2011 Hr. 23



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-15  
SCOTTSBLUFF AP  
15-YEAR WIND ROSE**

PROJECT: CO001636

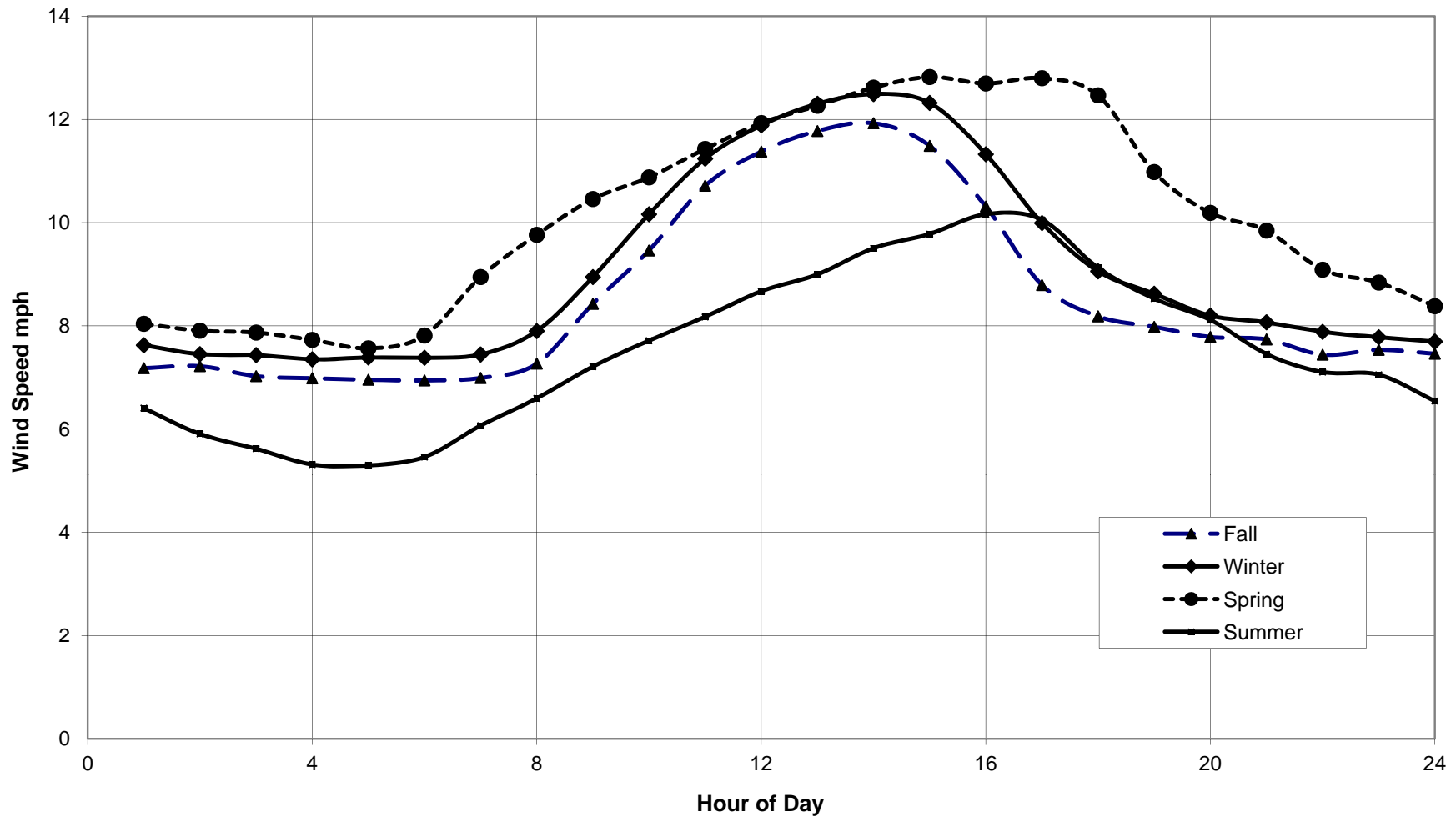
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-16  
SCOTTSBLUFF AP  
DIURNAL WIND SPEEDS BY SEASON**

PROJECT: CO001636

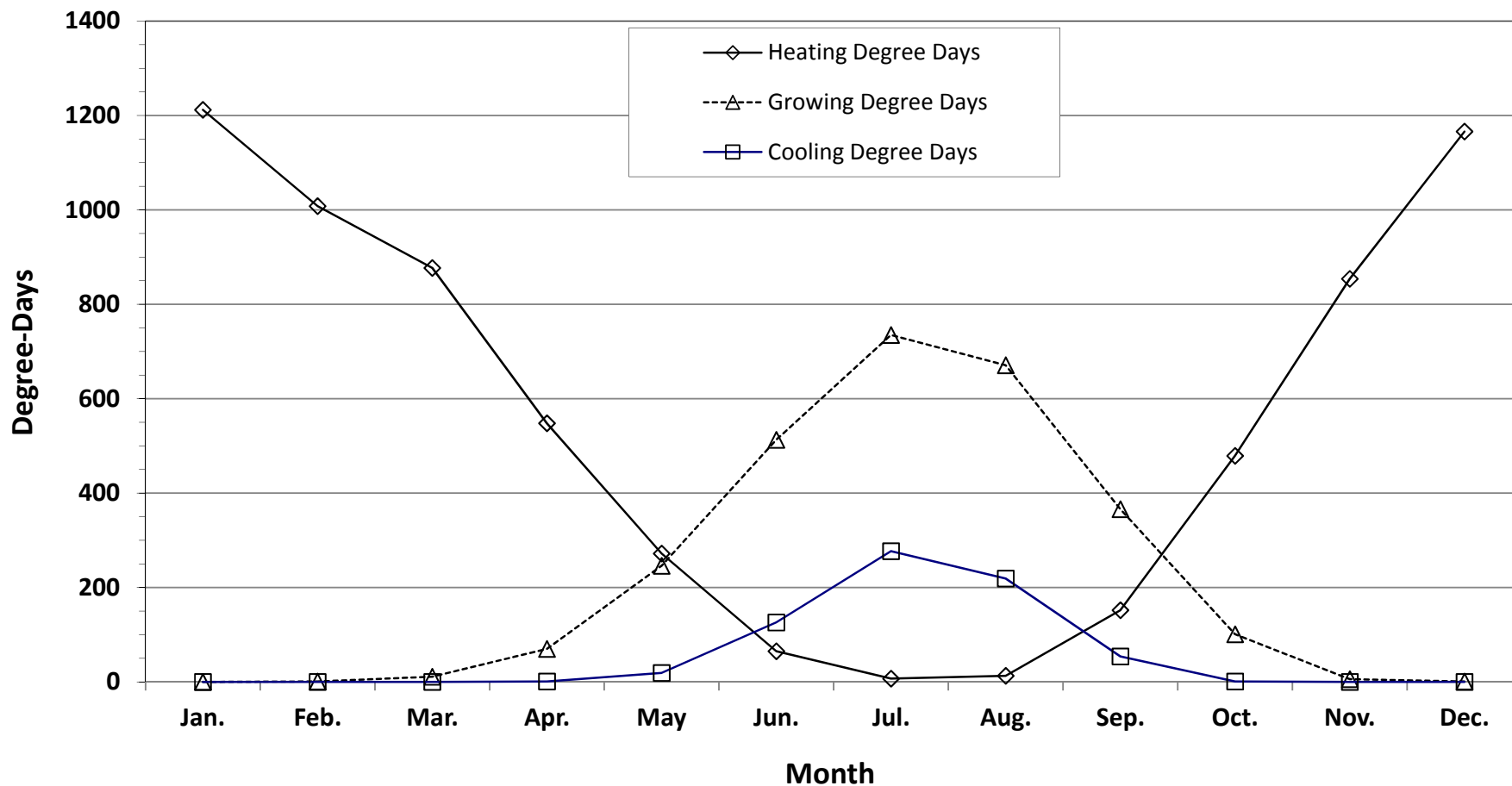
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-17  
SCOTTSBLUFF AP  
COOLING, HEATING, AND GROWING  
DEGREE DAYS**

PROJECT: CO001636

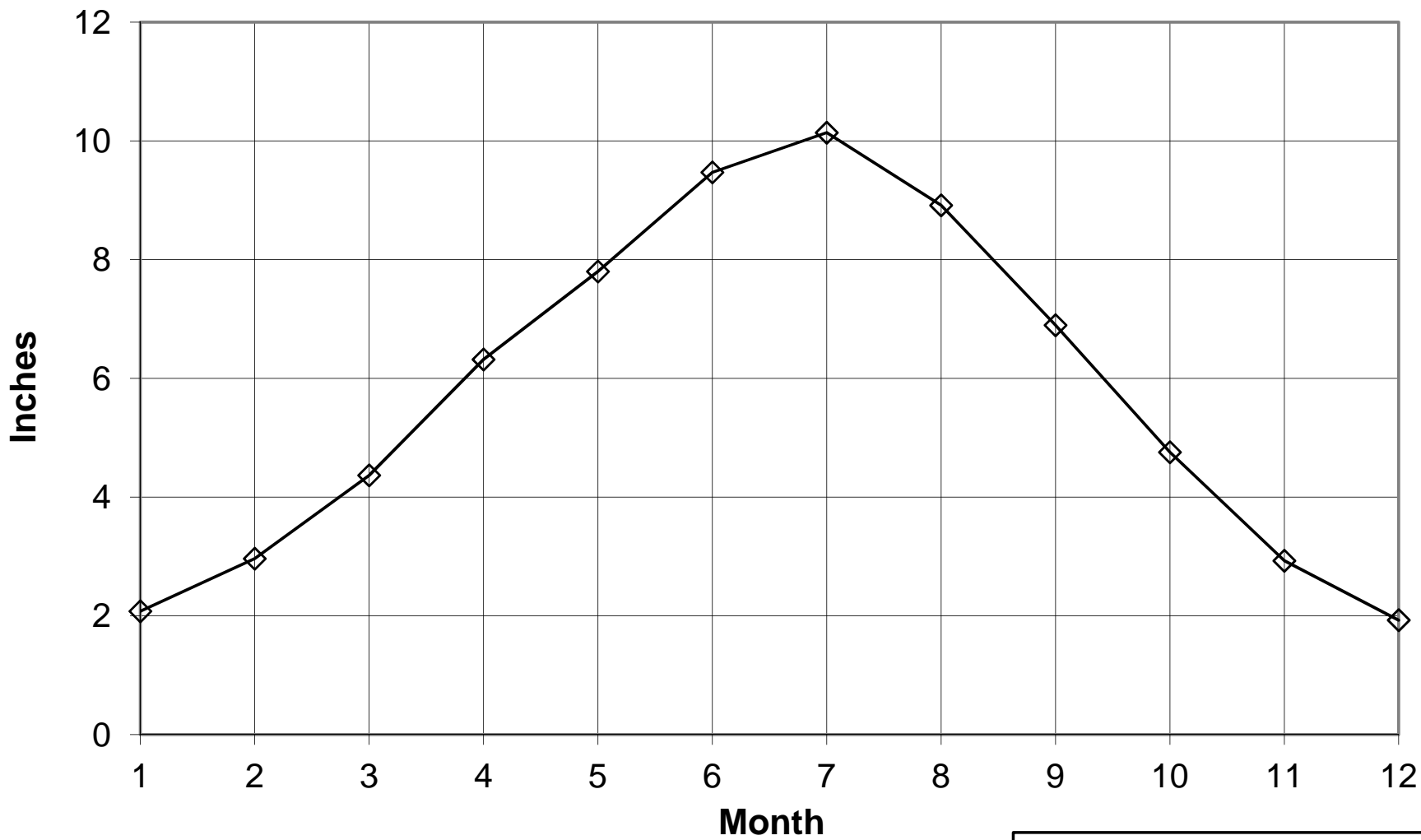
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-18  
SCOTTSBLUFF AP  
POTENTIAL EVAPOTRANSPIRATION**

PROJECT: CO001636

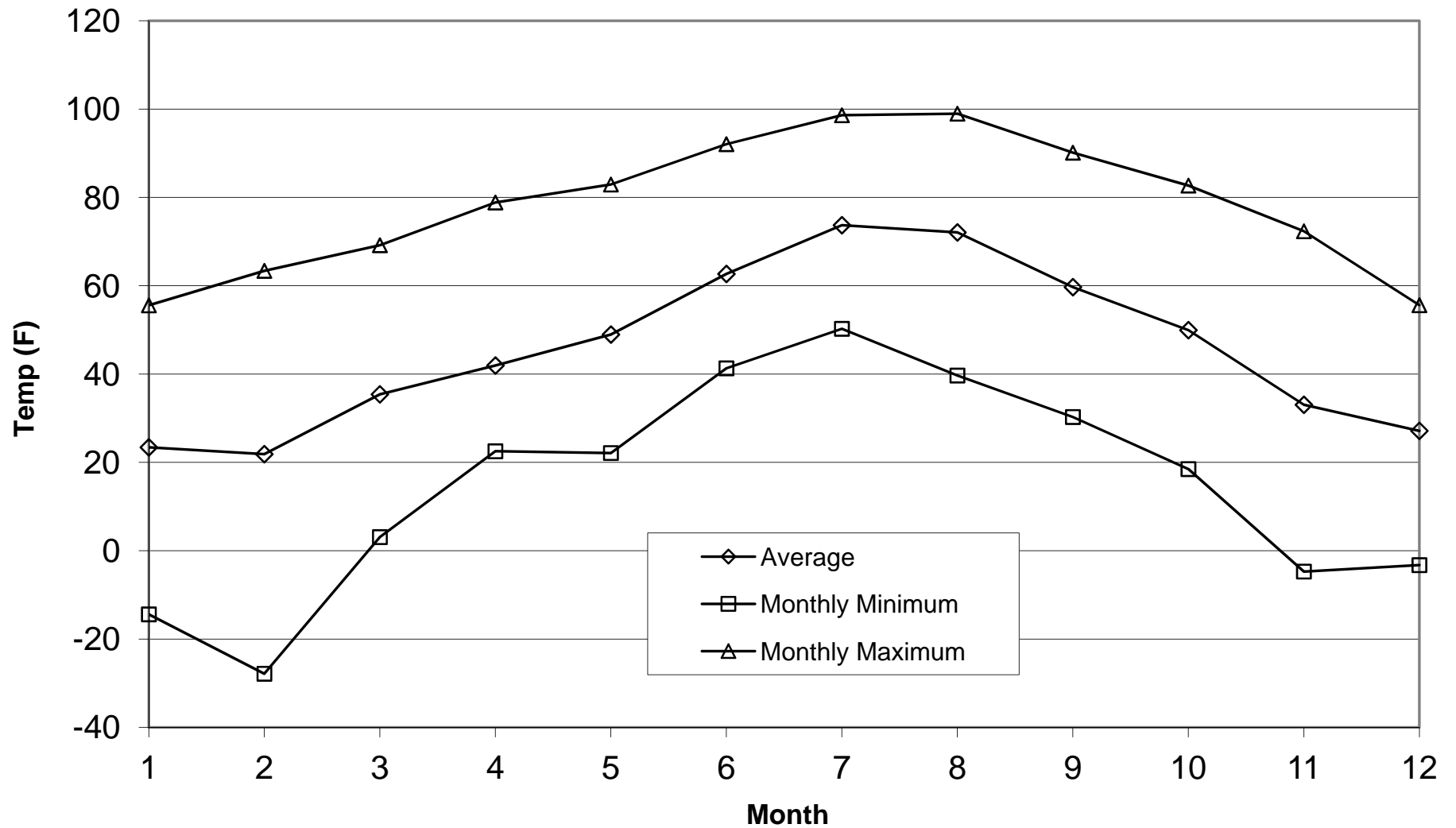
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-19  
MARSLAND EXPANSION AREA  
MONTHLY TEMPERATURES**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: JEC

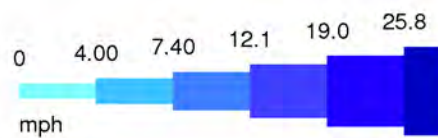
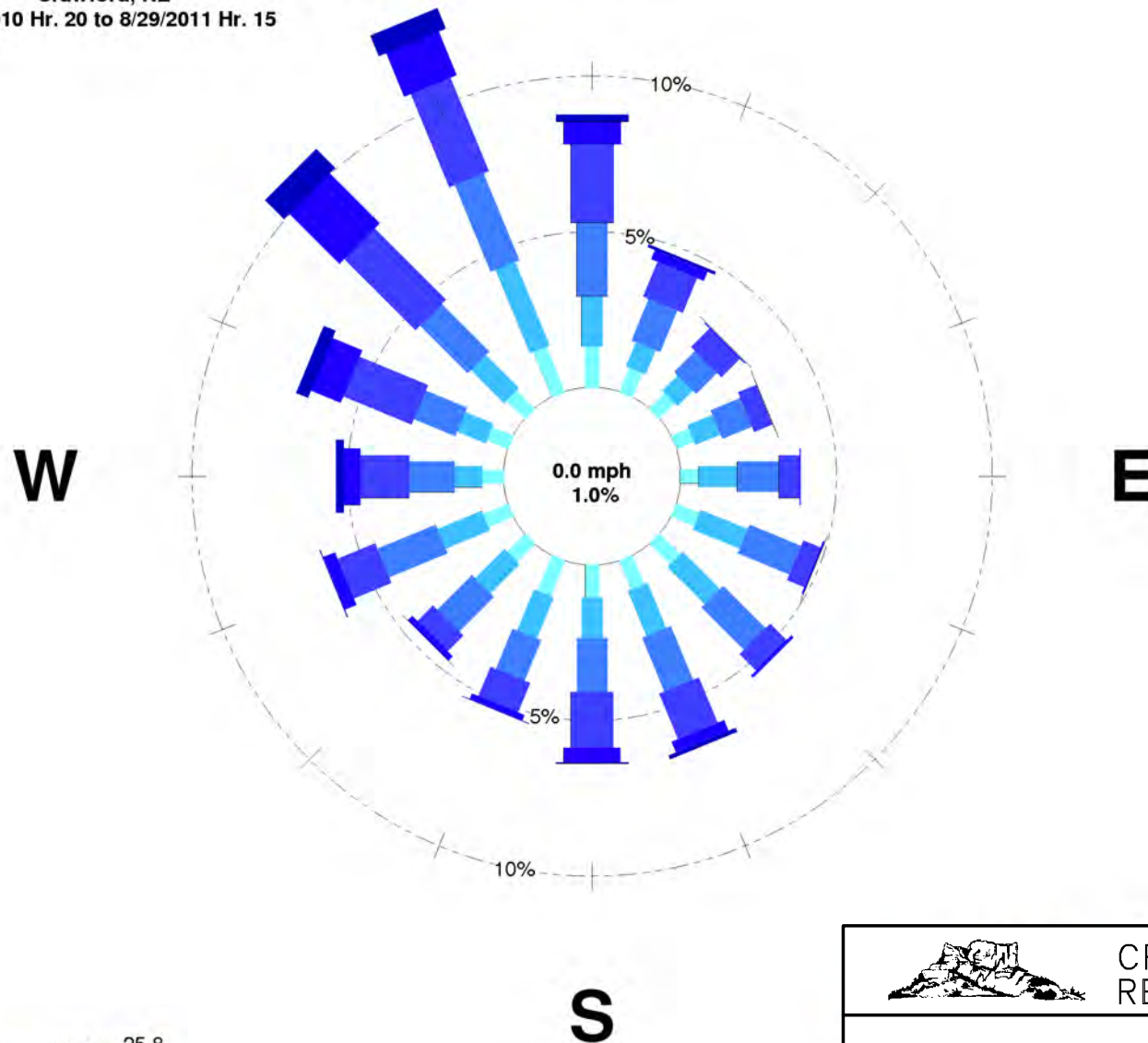


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



# Wind Rose Marsland Expansion Met Station

Crawford, NE  
8/28/2010 Hr. 20 to 8/29/2011 Hr. 15



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-20  
MARSLAND EXPANSION AREA  
WIND ROSE**

PROJECT: CO001636

MAPPED BY: JC

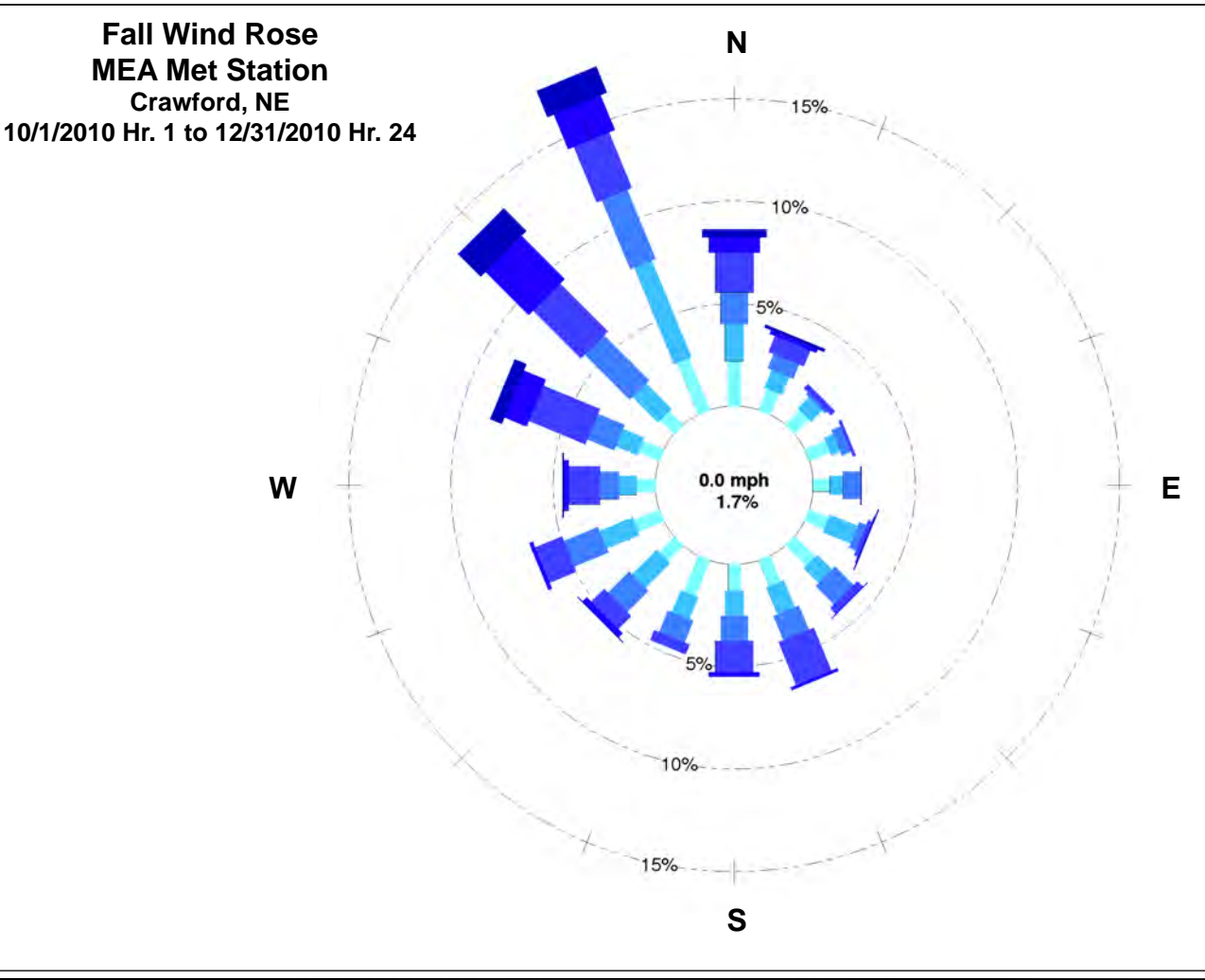
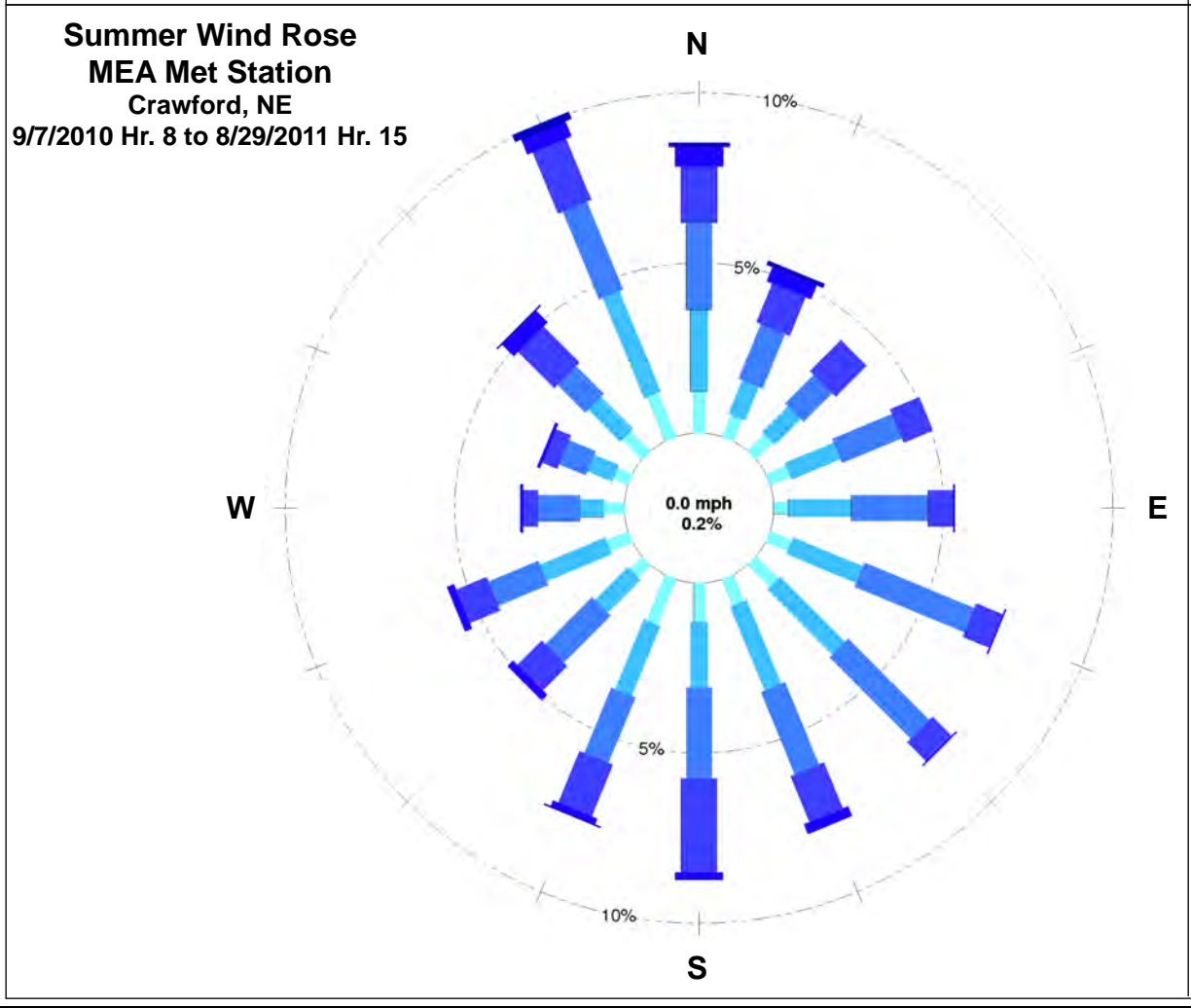
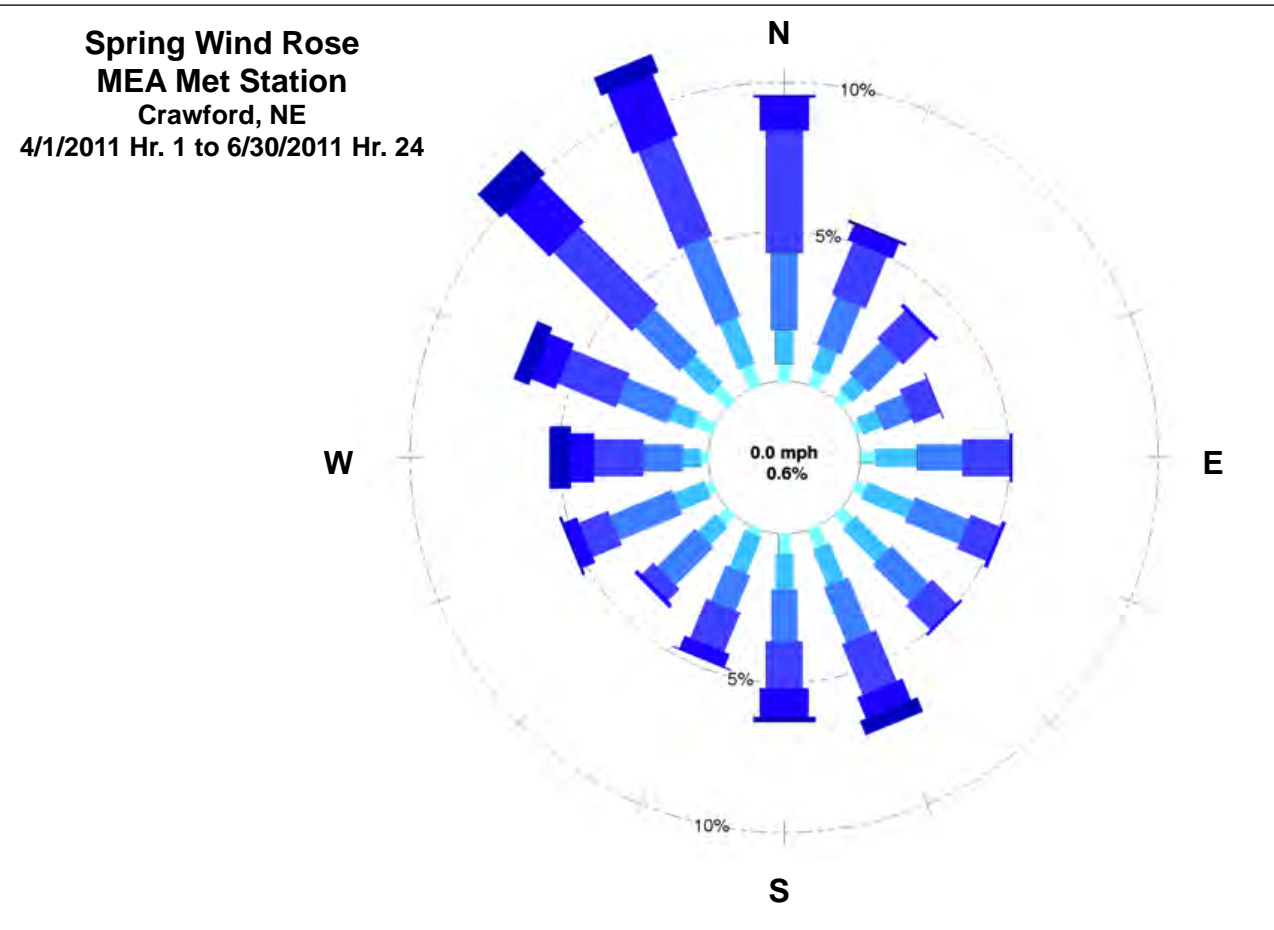
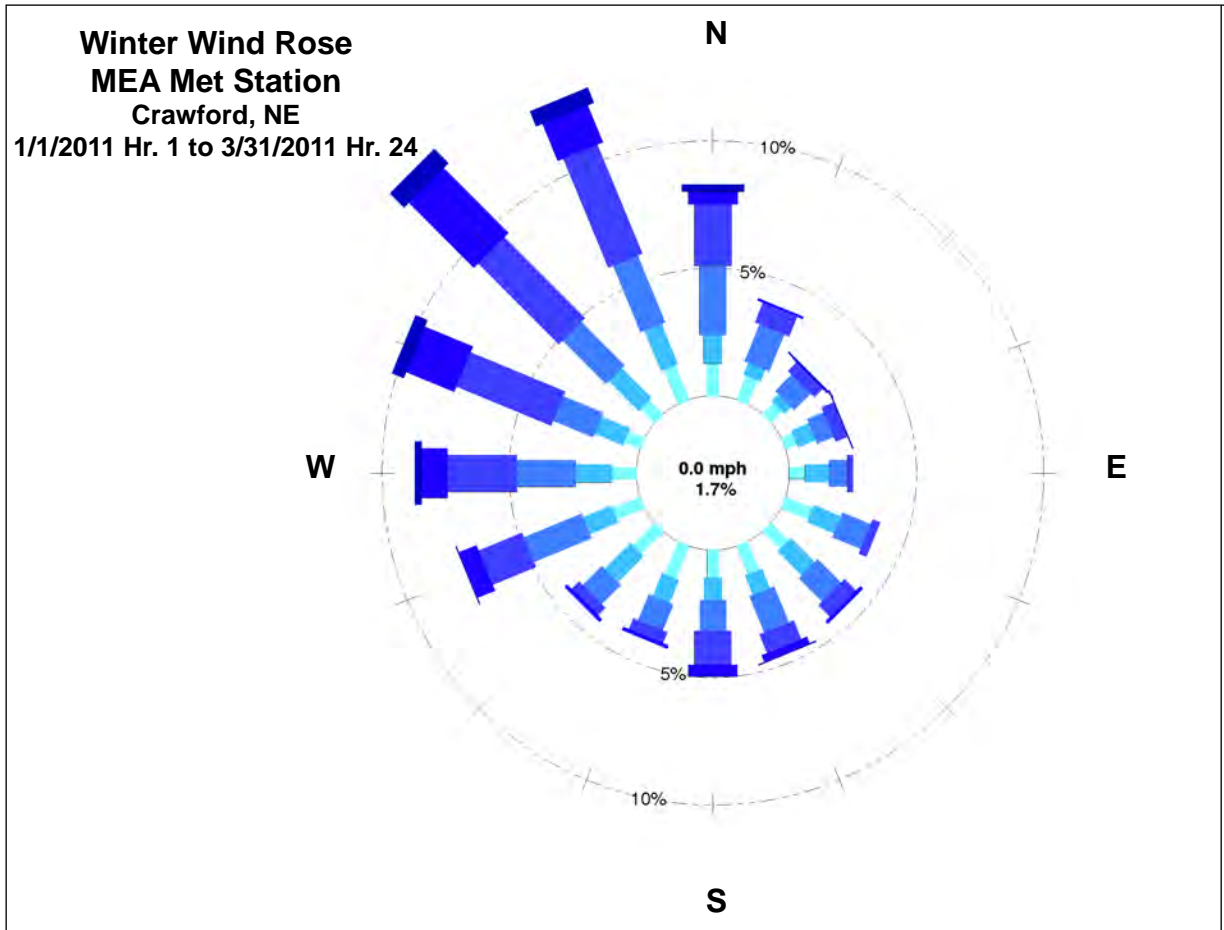
CHECKED BY: JEC



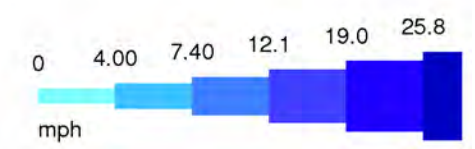
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com




K:\CBR\_Projects\CO001636\_Marland\3\_IMAGES\Illustrator\TR Figure 2.5-21 Marland Expansion Area Seasonal Wind Roses\_11x17.ai @ 10/17/2011



**Note:** The “summer” wind rose represents the 3rd calendar quarter, which includes July, August and September. Because the monitoring year spans parts of two calendar years, the summer wind rose software program utilized all of the available summer data from both years. This turned out to be September of 2010 (beginning with the 7th), July of 2011, and August of 2011 (up to the 29th). So the summer months are extracted from the stated date range.




Source:  
Inter-Mountain Lab (IML) Air Science, 2011

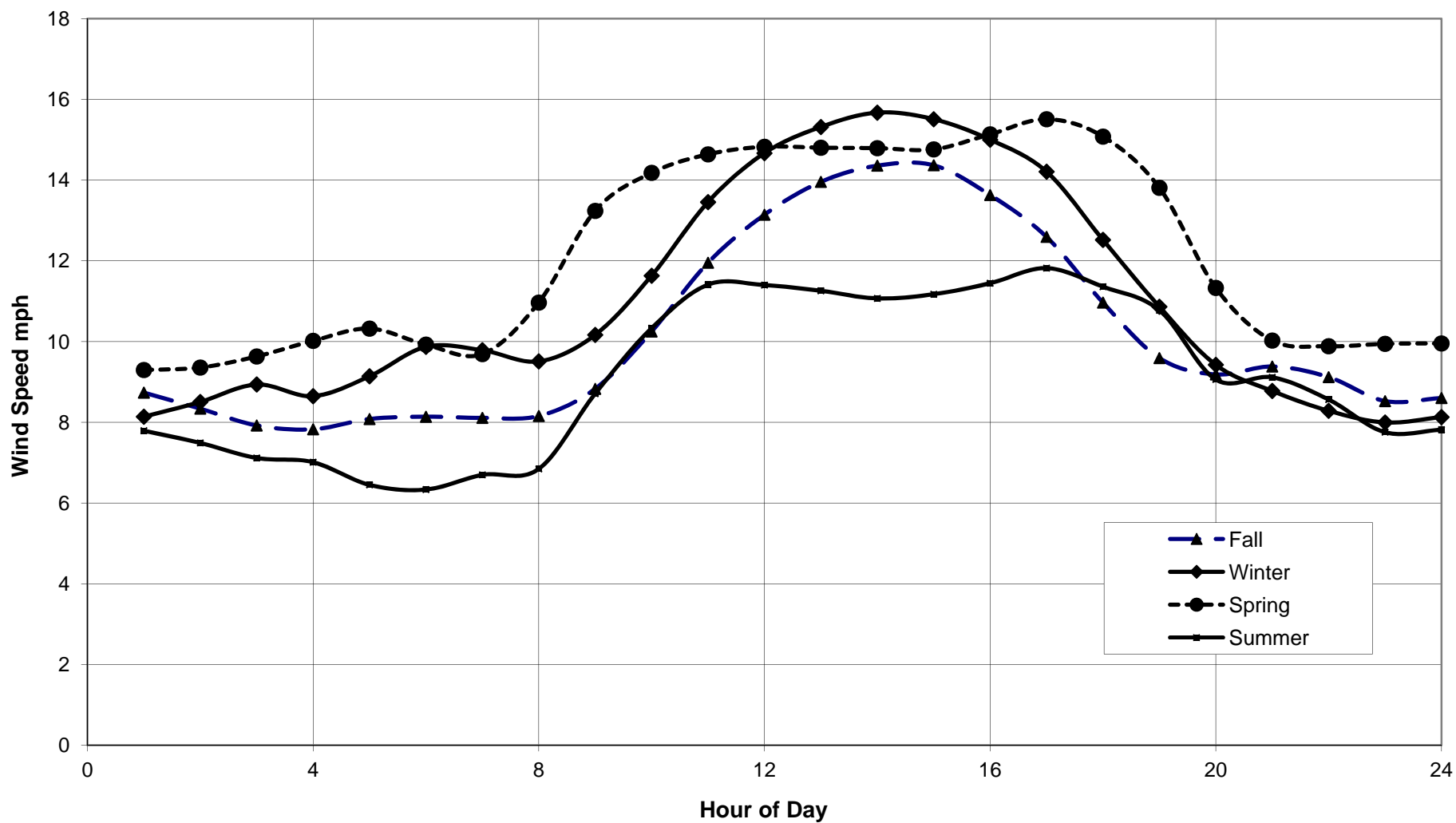
**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 2.5-21  
MARSLAND EXPANSION AREA  
SEASONAL WIND ROSES**

PROJECT: CO001636    MAPPED BY: JC    CHECKED BY: JEC

 **ARCADIS**  
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-22  
MARSLAND EXPANSION AREA  
DIURNAL WIND SPEEDS**

PROJECT: CO001636

MAPPED BY: JC

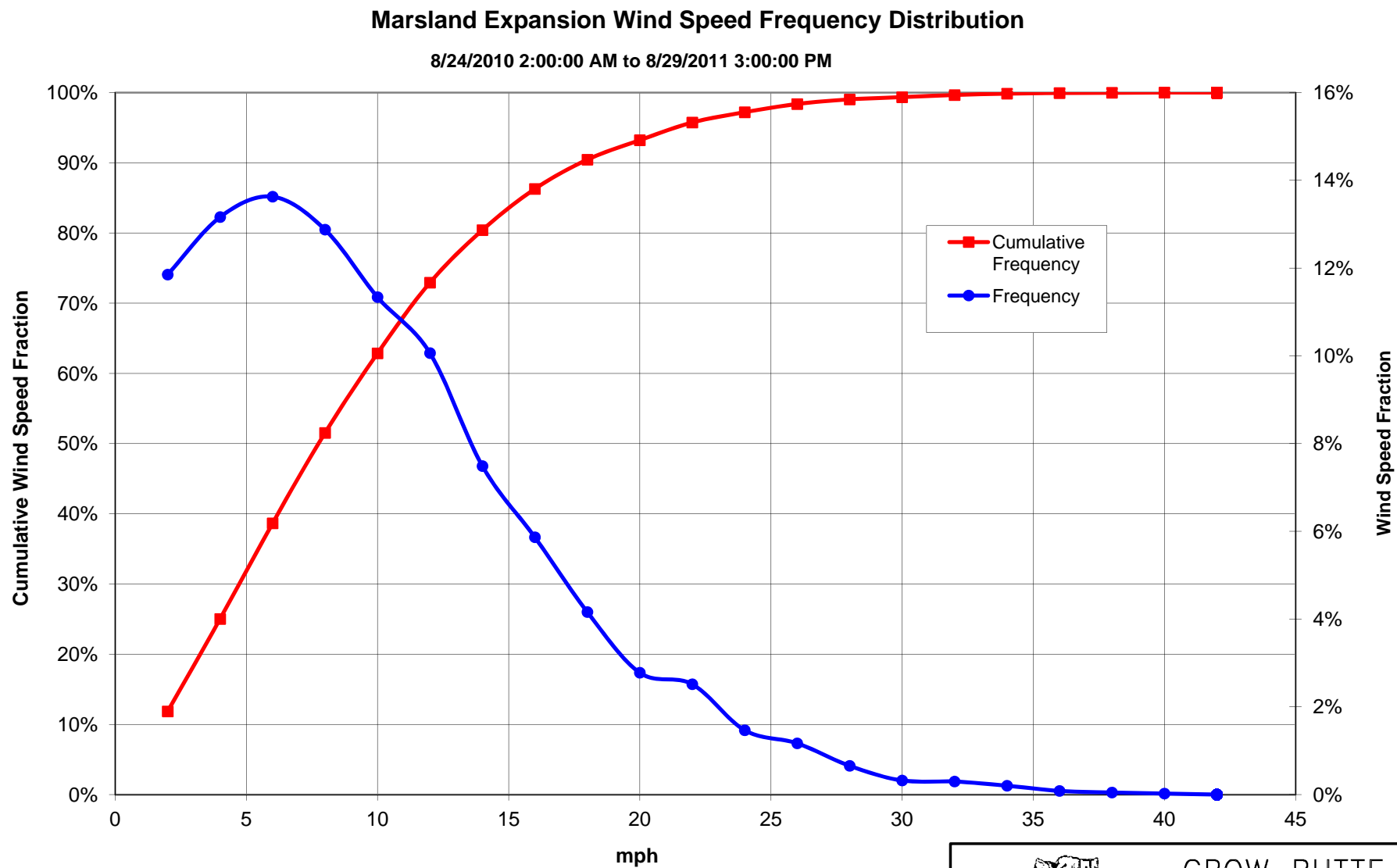
CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



K:\CRR\_P\Projects\CO001636\_Marland\3\_IMAGES\Illustrator\TR Figure 2\_5-23 MEA Wind Speed Distribution.ai @ 11/08/2011



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-23  
MARSLAND EXPANSION AREA  
WIND SPEED DISTRIBUTION**

PROJECT: CO001636

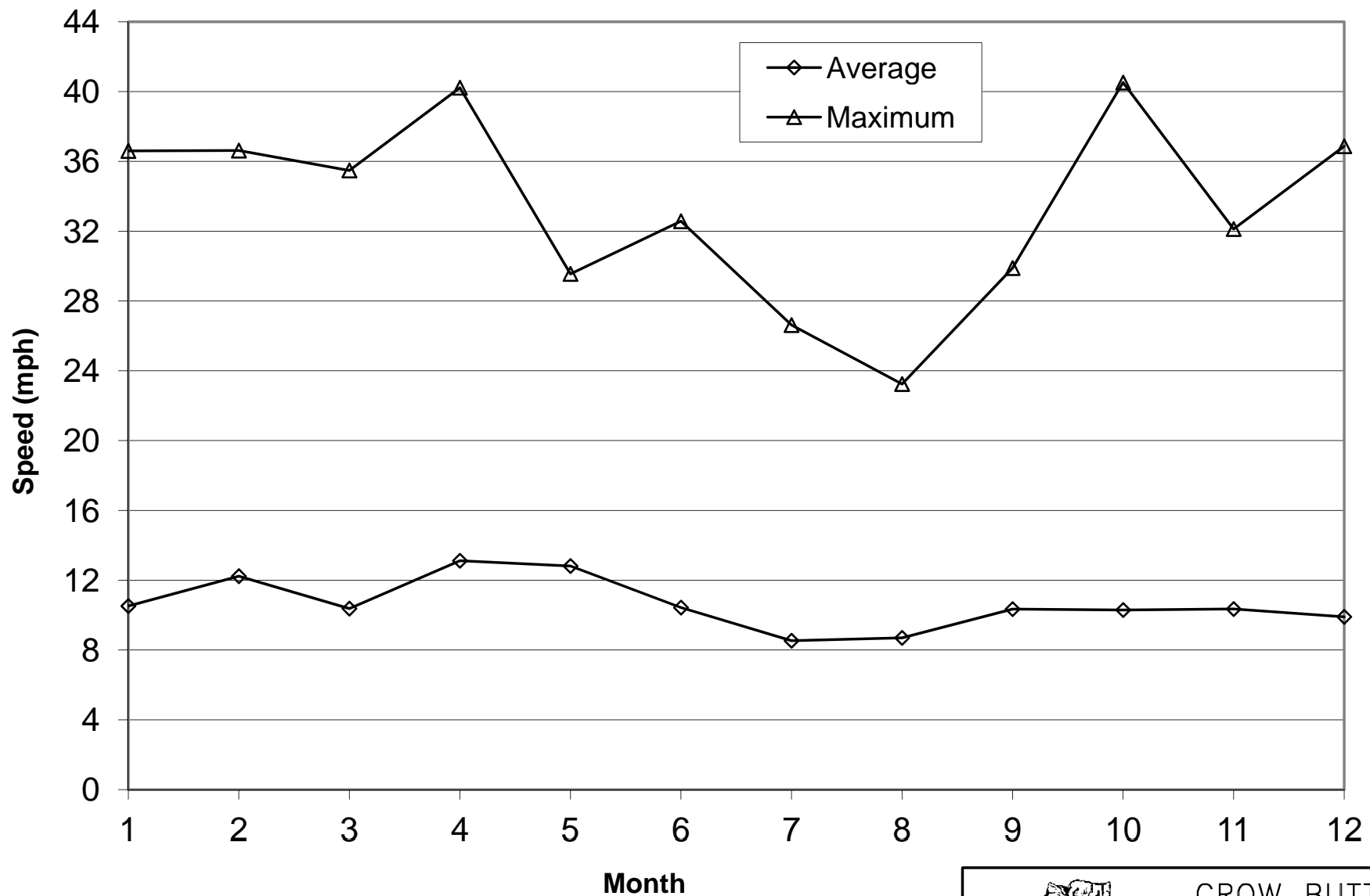
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-24  
PROJECT AREA  
MONTHLY AVERAGE WIND SPEEDS**

PROJECT: CO001636

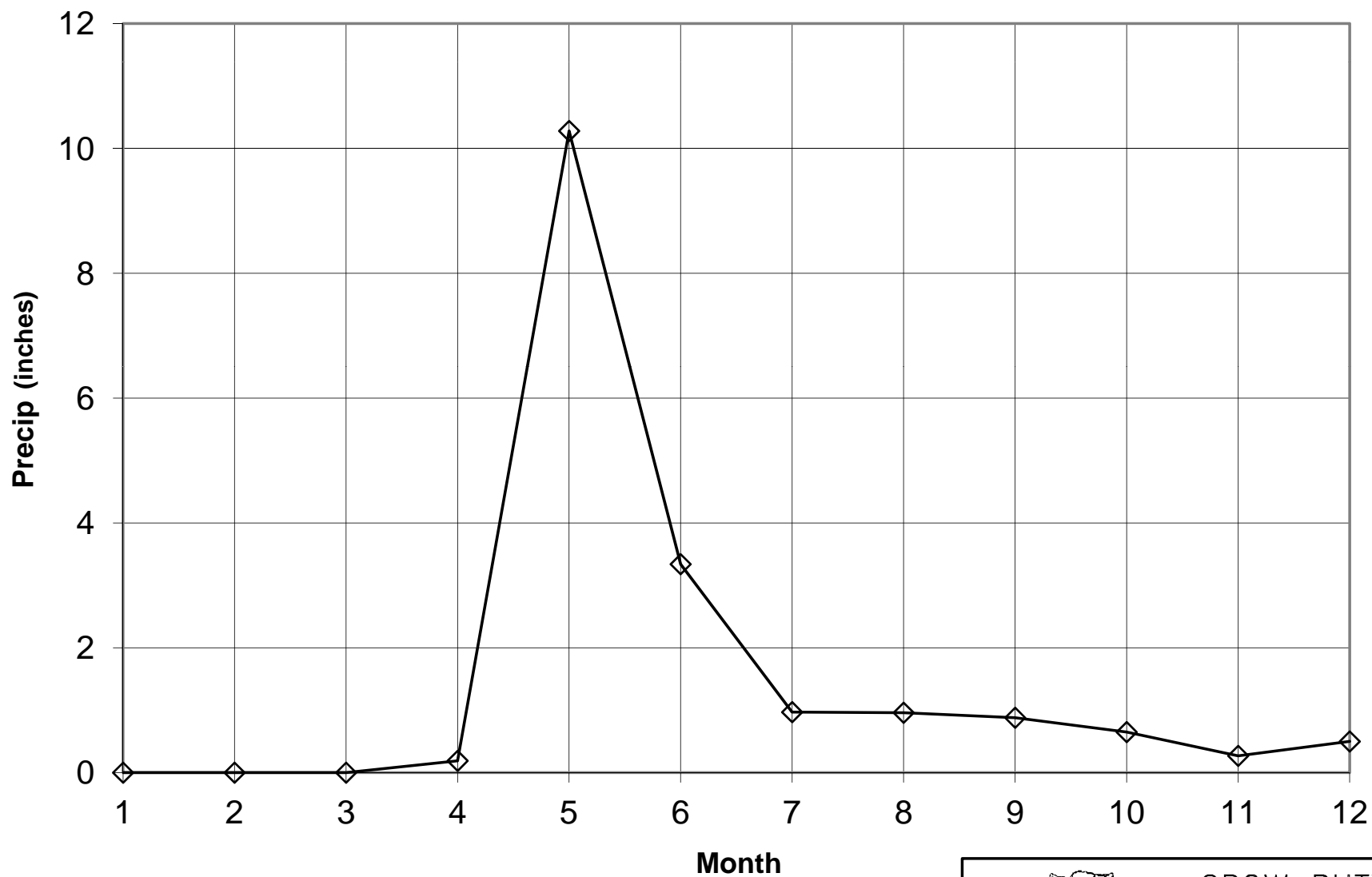
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-25**  
**MARSLAND EXPANSION AREA**  
**TOTAL MONTHLY PRECIPITATION**

PROJECT: CO001636

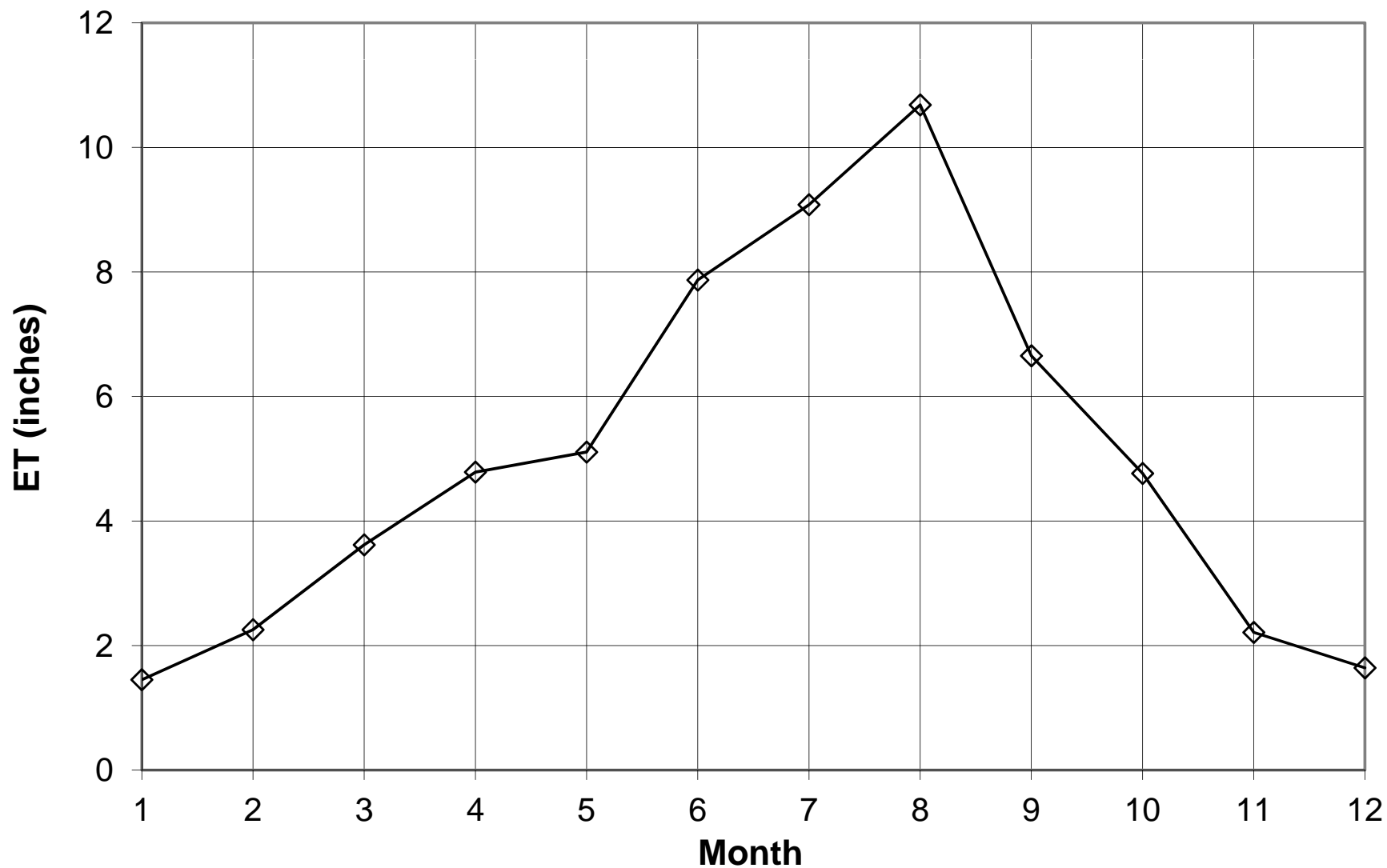
MAPPED BY: JC

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:

Calculation based on Penman Equation, from data supplied by Cameco Resources, from 8/24/2010 to 8/29/2011.



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-26**  
**MARSLAND EXPANSION AREA**  
**POTENTIAL MONTHLY**  
**EVAPOTRANSPIRATION**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: JEC

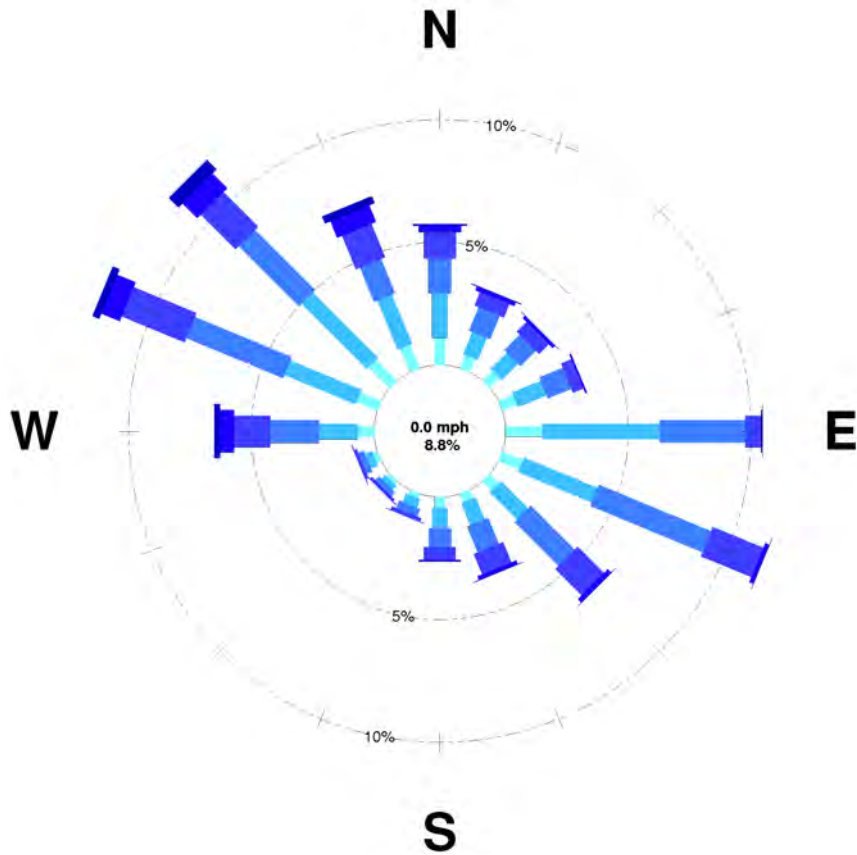


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

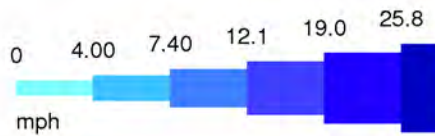
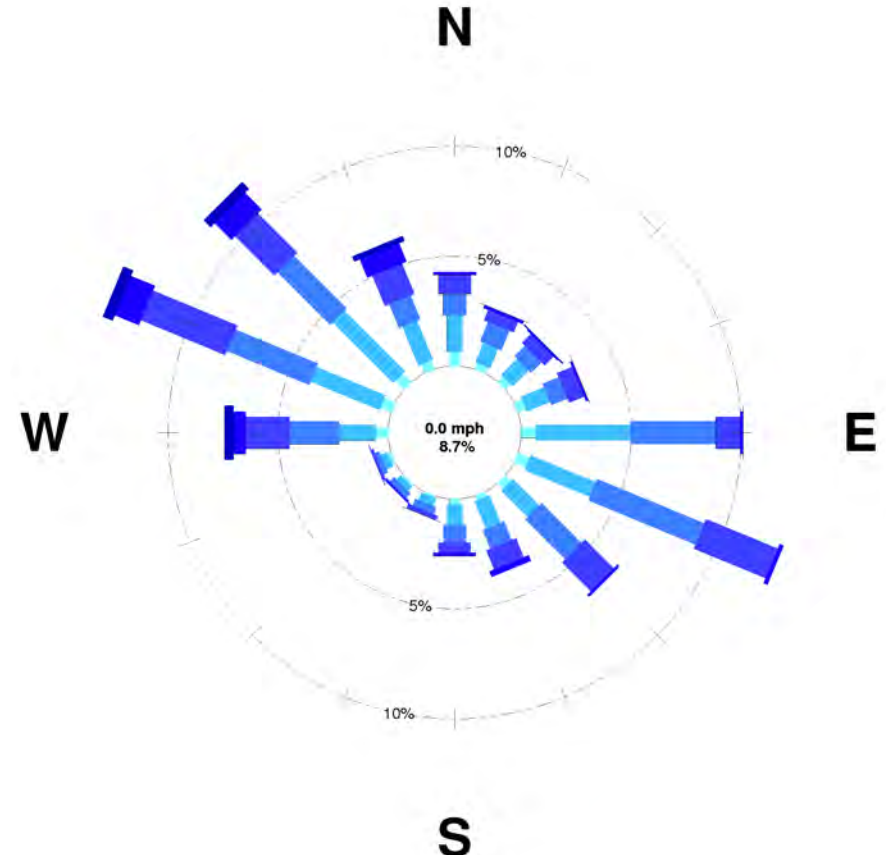


K:\CNR\_Projects\CO001636\_Marland3\_IMAGES\Illustrator\TR Figure 2\_5-27 Scottsbluff 15-Year vs Baseline Year Wind Roses.ai @ 10/17/2011

**Wind Rose**  
**Scottsbluff Airport**  
Scottsbluff, NE  
11/1/1996 Hr. 1 to 8/31/2011 Hr. 23



**Wind Rose**  
**Scottsbluff Airport**  
Scottsbluff, NE  
8/24/2010 Hr. 2 to 8/29/2011 Hr. 15



Source: Inter-Mountain Lab (IML) Air Science, 2011



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-27**  
**SCOTTSBLUFF 15-YEAR vs**  
**BASELINE YEAR WIND ROSES**

PROJECT: CO001636

MAPPED BY: JC

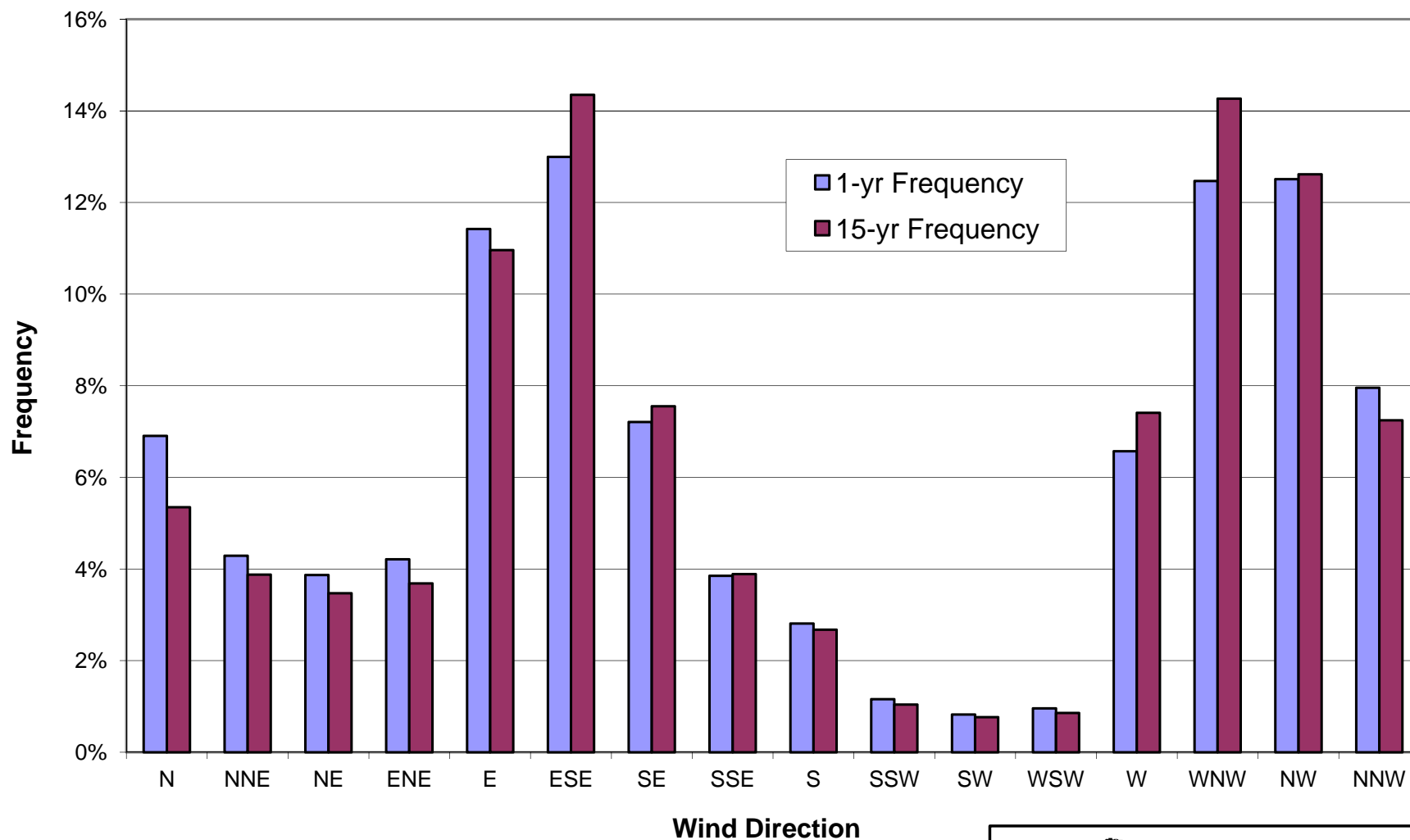
CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



# Scottsbluff Airport Wind Direction Distribution



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-28**  
**SCOTTSBLUFF 15-YEAR**  
**VS BASELINE YEAR**  
**WIND DIRECTIONS**

PROJECT: CO001636

MAPPED BY: JC

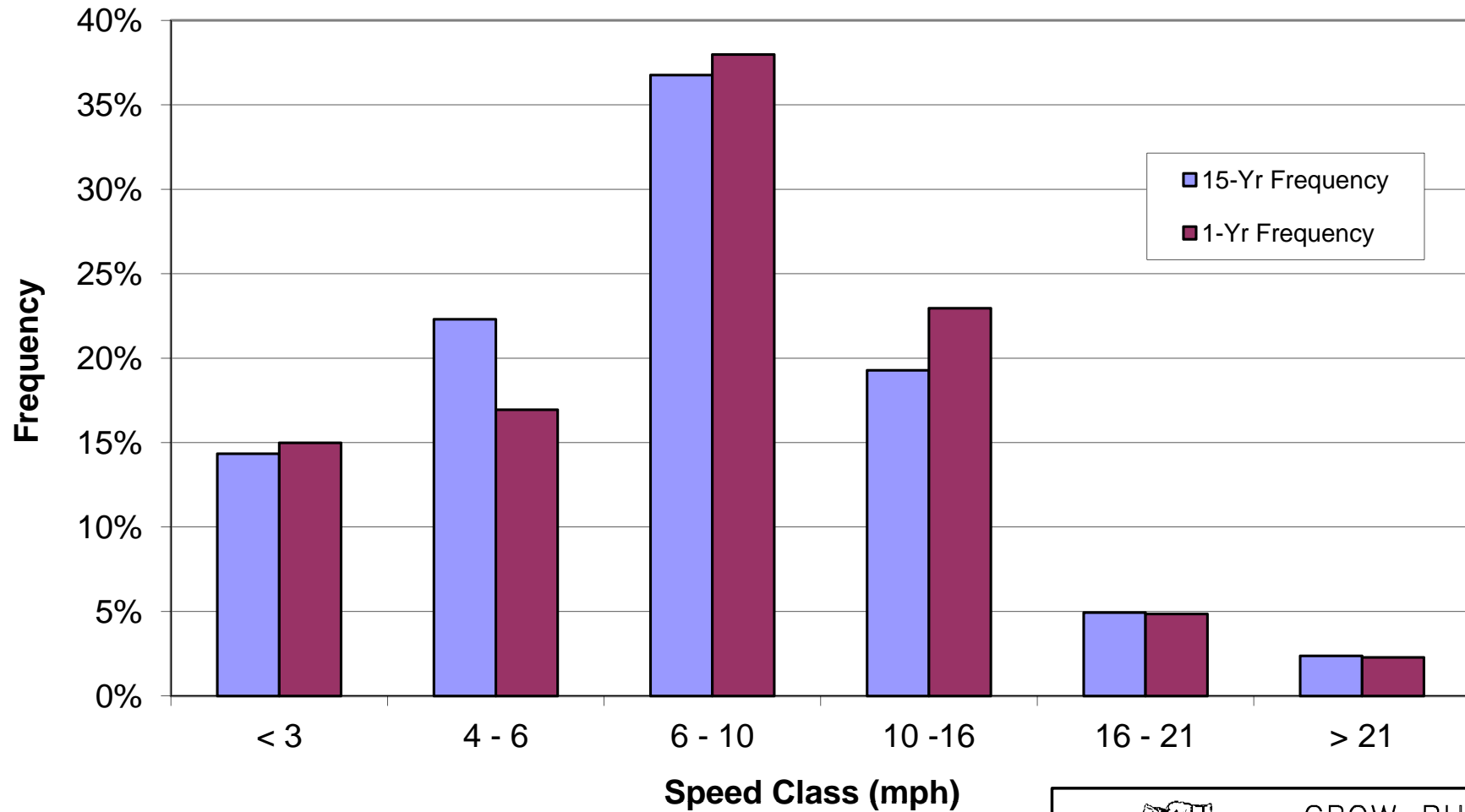
CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



## Scottsbluff Airport Wind Speed Distribution



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-29**  
**SCOTTSBLUFF 15-YEAR**  
**VS BASELINE YEAR**  
**WIND SPEEDS**

PROJECT: CO001636

MAPPED BY: JC

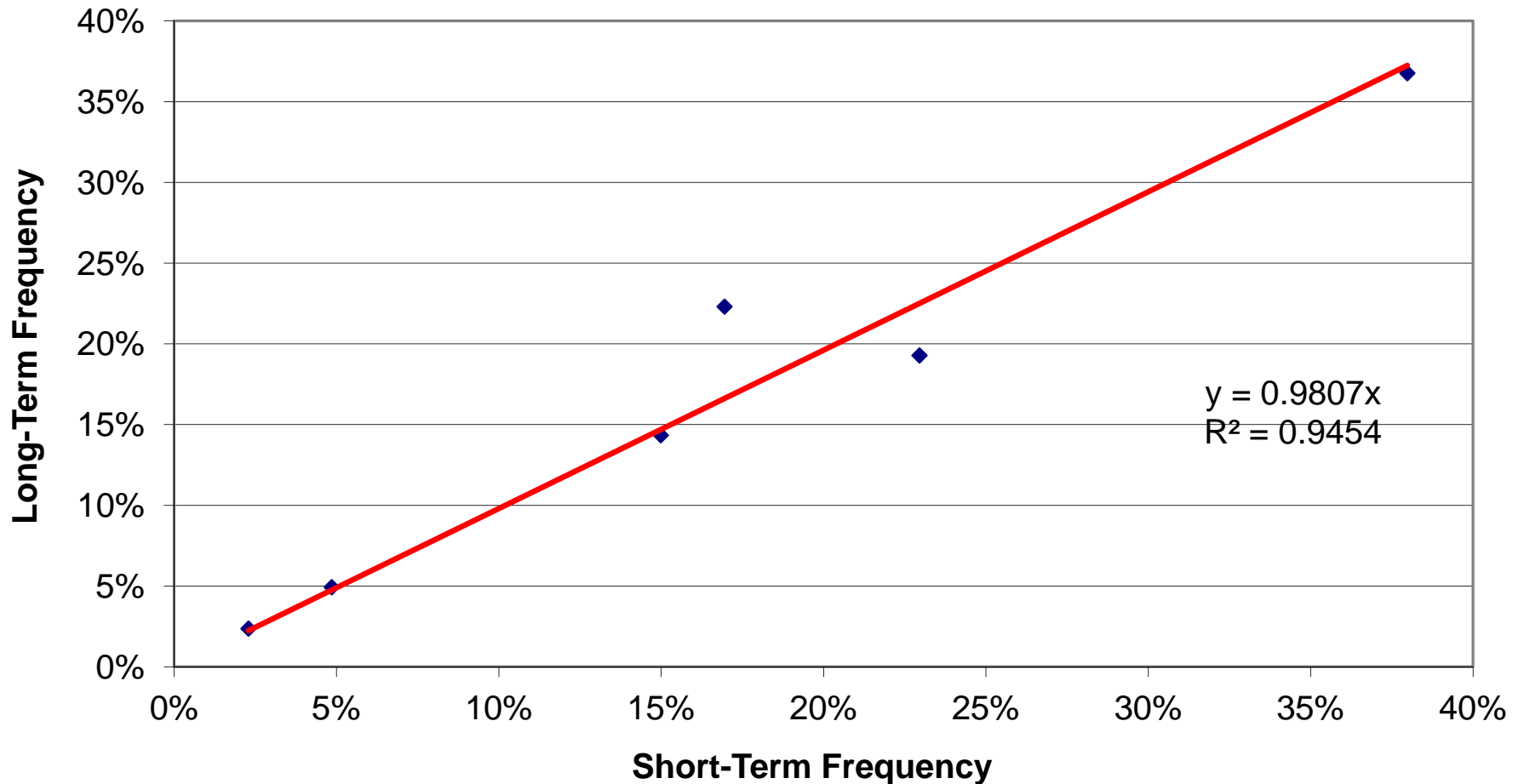
CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



## Scottsbluff Wind Speeds: Correlation Between Short and Long Term



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 2.5-30  
SCOTTSBLUFF 15-YEAR  
VS BASELINE YEAR  
WIND SPEED DISTRIBUTIONS**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: JEC

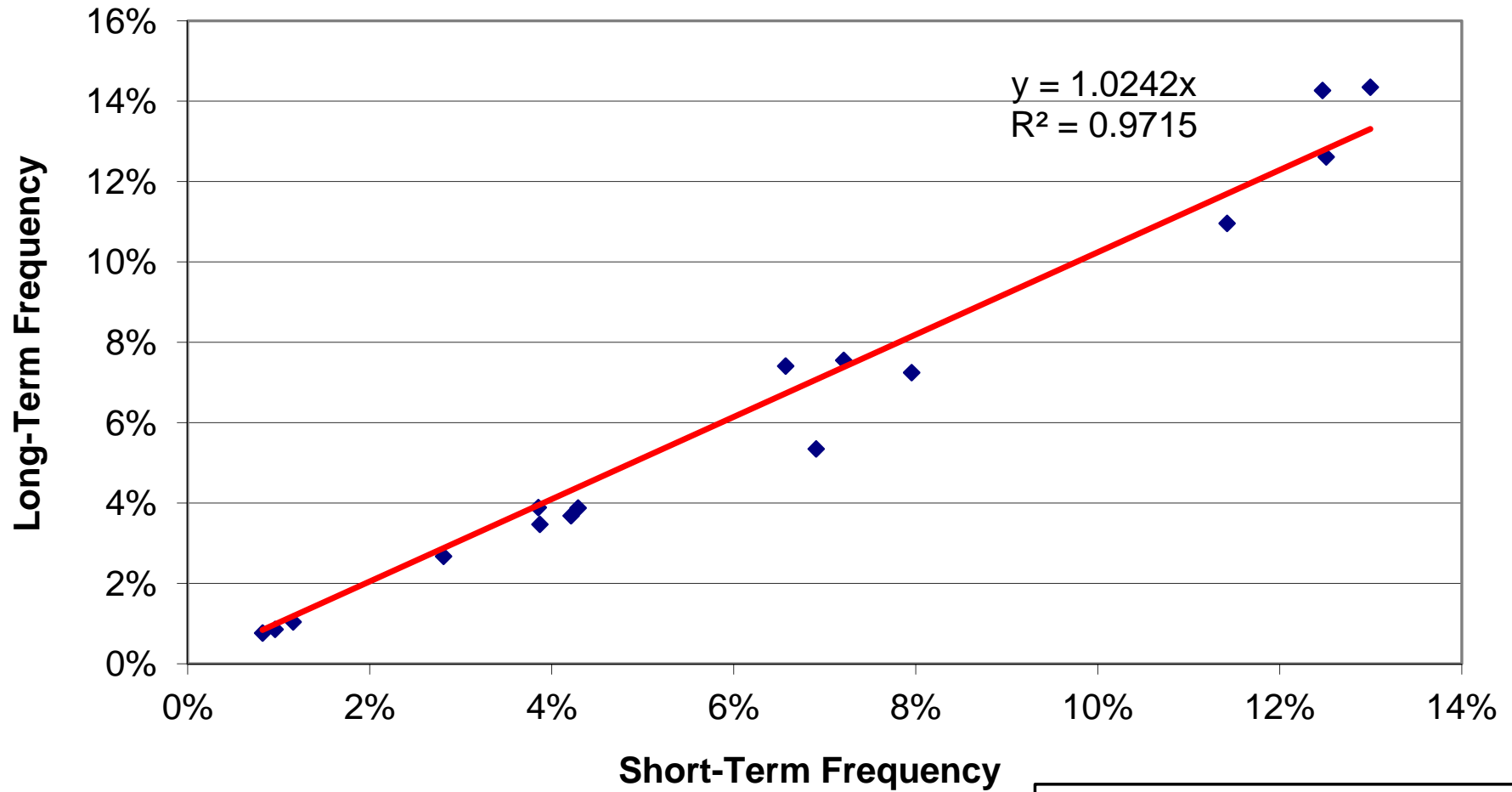


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

Source:  
Analysis by IML Air Science using hourly data supplied by National Climate Data Center,  
from 1996 through 2011.



## Scottsbluff Wind Direction: Correlation Between Short and Long Term



Source:

Analysis by IML Air Science using hourly data supplied by National Climate Data Center, from 1996 through 2011.



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-31**  
**SCOTTSBLUFF 15-YEAR**  
**VS BASELINE YEAR**  
**WIND DIRECTION DISTRIBUTIONS**

PROJECT: CO001636

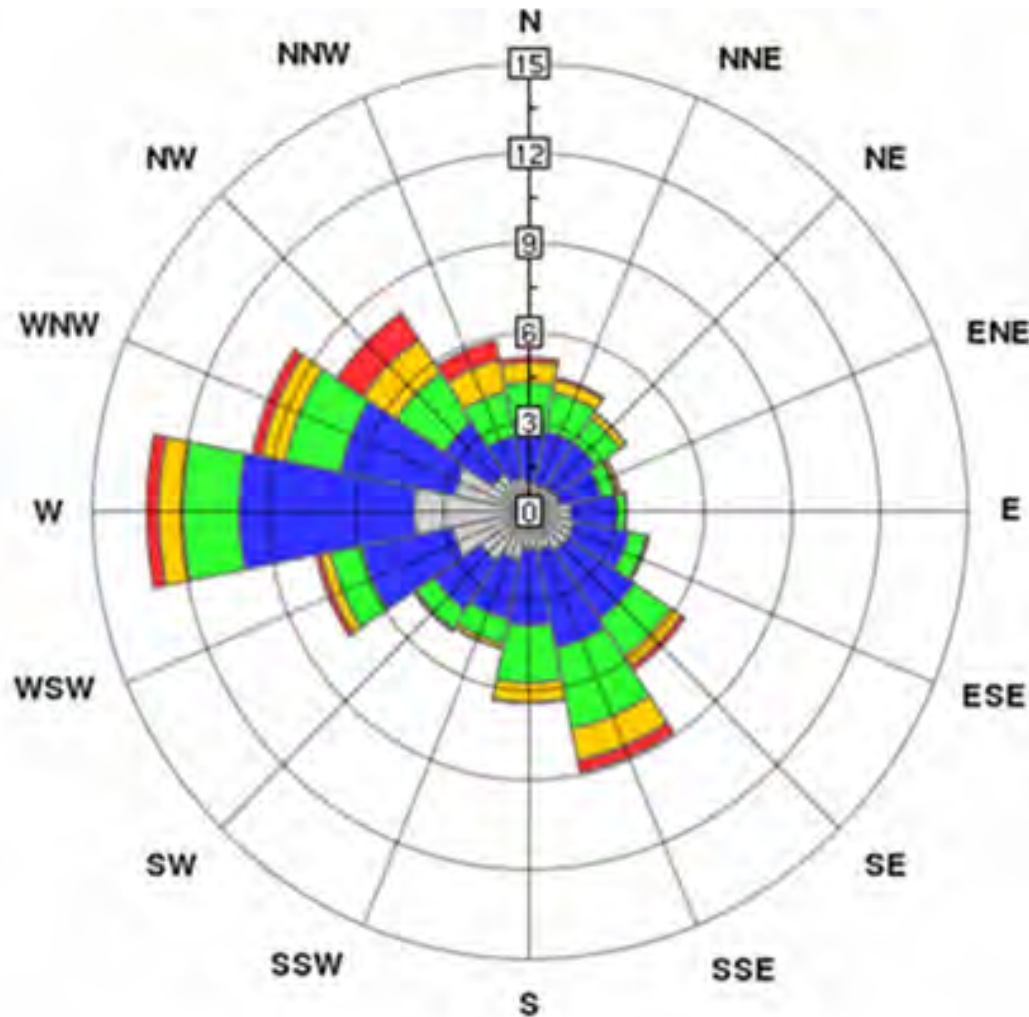
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





### Alliance West

Station ID: a250138

Location: 42.02, -103.13

Elevation: 3978 Feet



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.5-32**  
**ALLIANCE WEST 10-YEAR WIND ROSE**  
**1996-2005**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: JEC



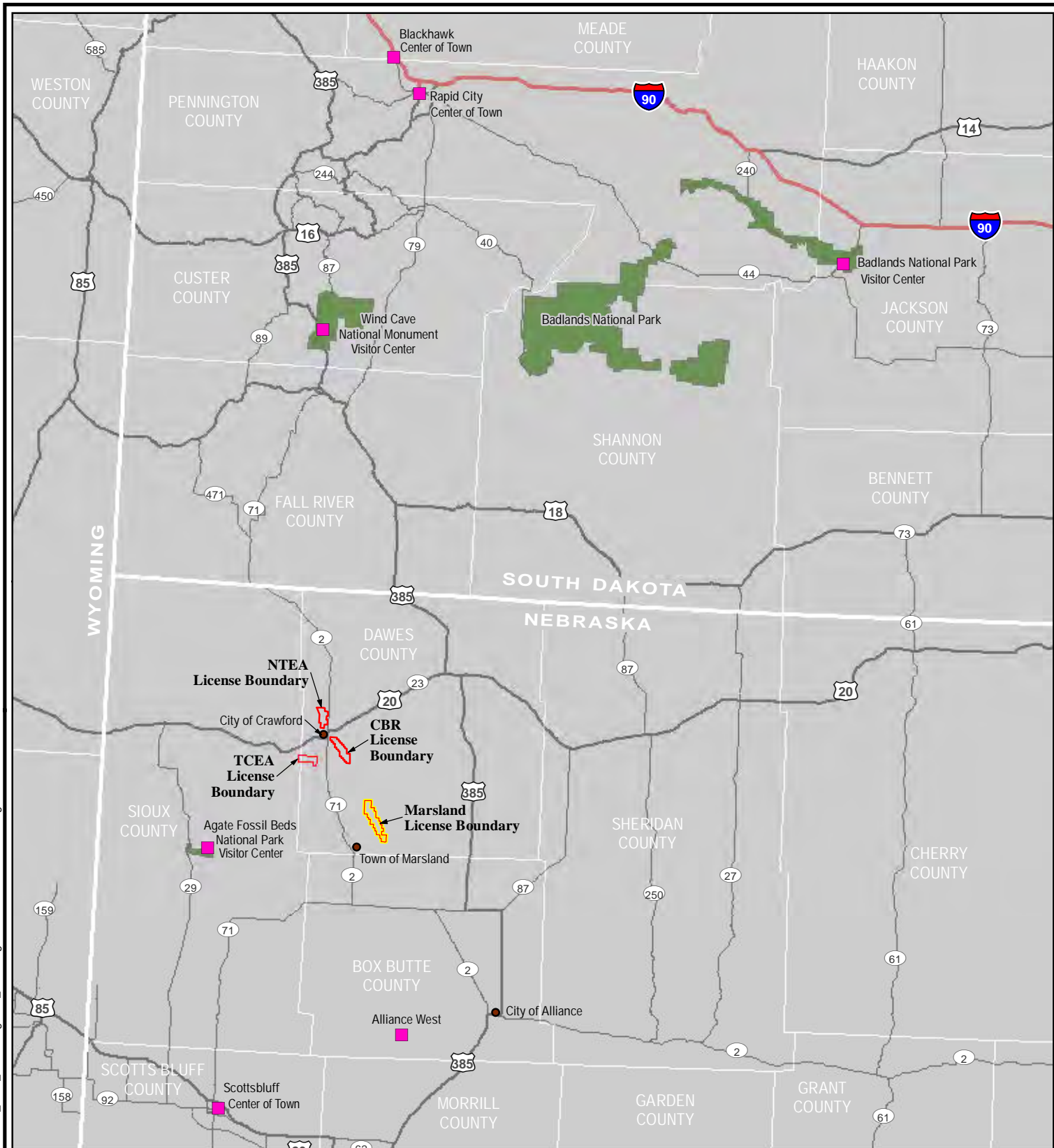
**ARCADIS**

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

45

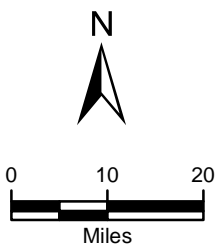
Source: Smith 2013.





## LEGEND

- City/Town of Interest
- Regional Ambient Air Monitoring Site
- ▭ Mariland License Boundary
- ▭ Other License Boundary
- National Park/Monument
- Interstate Highway
- U.S. Route
- State Highway



PROJECTION:  
NAD 1983 UTM ZONE 13N



**CROW BUTTE  
RESOURCES, INC.**

## FIGURE 2.5-33 LOCATION OF REGIONAL AMBIENT AIR MONITORING SITES

PROJECT: CO001636

MAPPED BY: JC

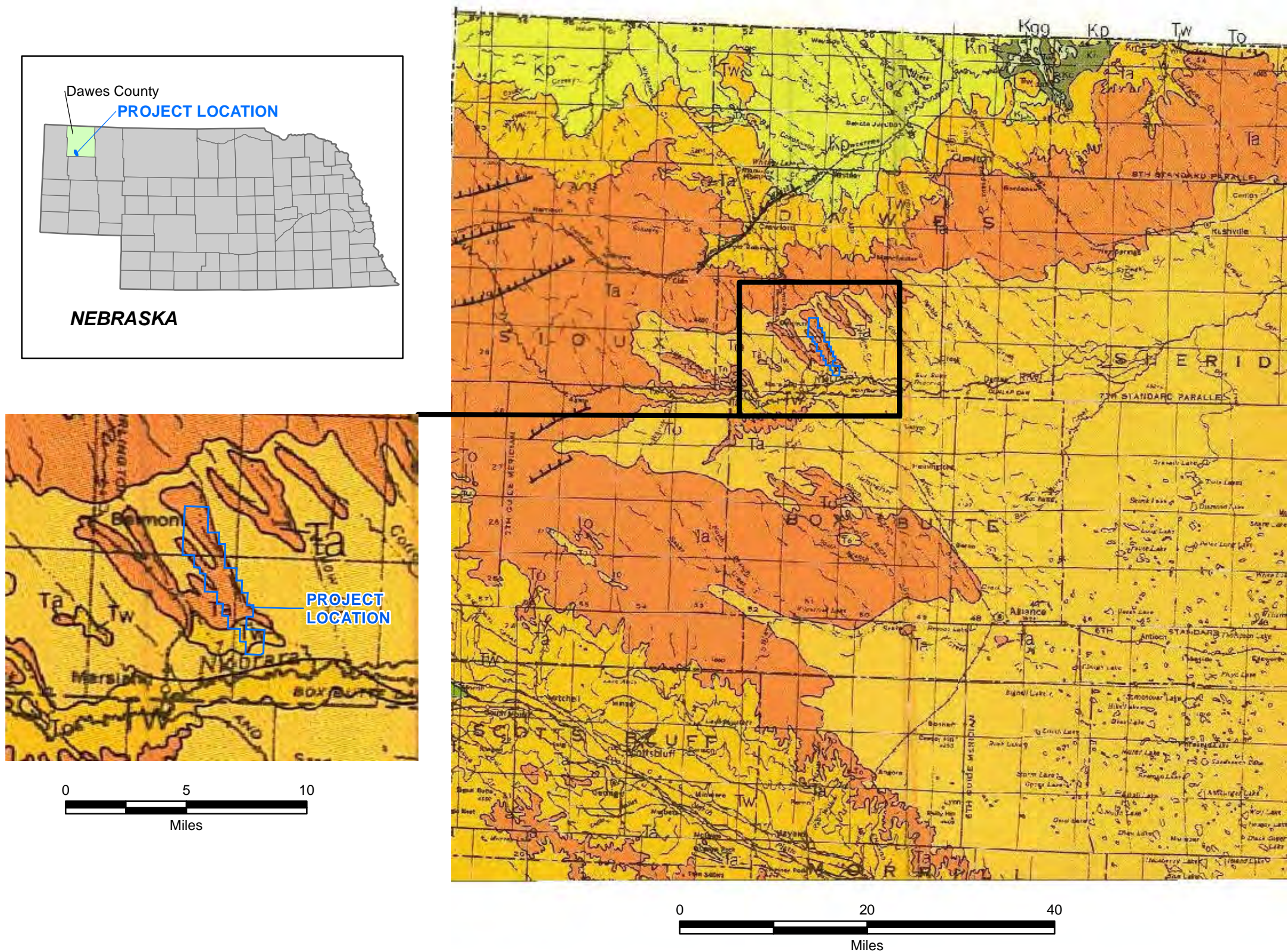
CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



K:\CBR\_Projects\CO001636\_Marlsand2\_GIS\ArchMaps\0004\_NRC\_TRTR Figure 2.6-1 Bedrock Geology of the Marsland Expansion Area.mxd - 11/10/2011 @ 3:22:32 PM



LEGEND		
GEOLOGIC PERIOD	SERIES	GROUP OR FORMATION
TERTIARY	MIOCENE	OGALLALA
		ARIKAREE
	OLIGOCENE	WHITE RIVER
CRETACEOUS	UPPER CRETACEOUS	Montana
		Fox Hills
		Pierre
		Niobrara
		Colorado
		Carlile
JURASSIC	LOWER CRETACEOUS	Greenhorn-Graneros
		DAKOTA
PERMIAN	BIG BLUE	CHASE
		COUNCIL GROVE
PENNSYLVANIAN	VIRGIL	ADMIRE
		WABAUNSEE
		SHAWNEE
	MISSOURI	DOUGLAS
		LANSING
		KANSAS CITY
MISSISSIPPIAN	DES MOINES	MARMATON
DEVONIAN		
SILURIAN		
ORDOVICIAN (Middle & Upper)		
CAMBRIAN & ORDOVICIAN (Lower)		
PRECAMBRIAN		

Source:  
Burchett, R.R., 1986, *Geologic bedrock map of Nebraska*:  
University of Nebraska Conservation and Survey Division,  
*Geologic Maps and Charts 1*, scale 1:1000000.

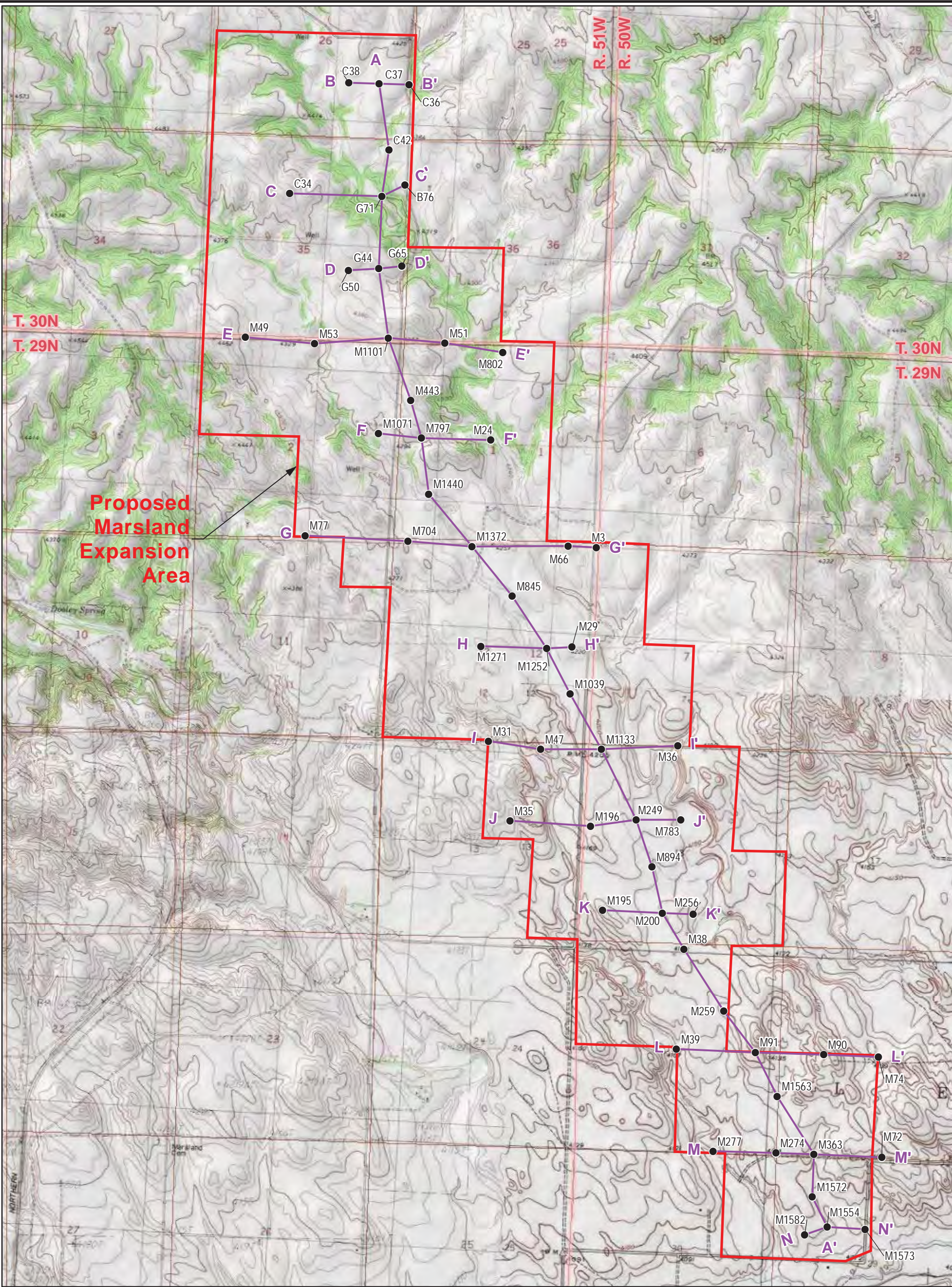
PROJECTION: NAD 1927, STATE PLANE  
NEBRASKA NORTH FIPS 2601

CROW BUTTE  
RESOURCES, INC.

FIGURE 2.6-1  
BEDROCK GEOLOGY OF THE MARSLAND EXPANSION AREA

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





**LEGEND**


- Borehole
- Cross Section Line
- ▭ Proposed Marmland Expansion Area

N

0 1,500 3,000

Feet

PROJECTION: NAD 1927, STATE PLANE  
NEBRASKA NORTH, FIPS 2601  
SOURCES: US TOPO MAPS, SERVICED  
BY ESRI ARCGIS ONLINE



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.6-2**


**MARSLAND CROSS-SECTION MAP**

**SHOWING ARTIFICIAL PENETRATIONS**

PROJECT: CO001636

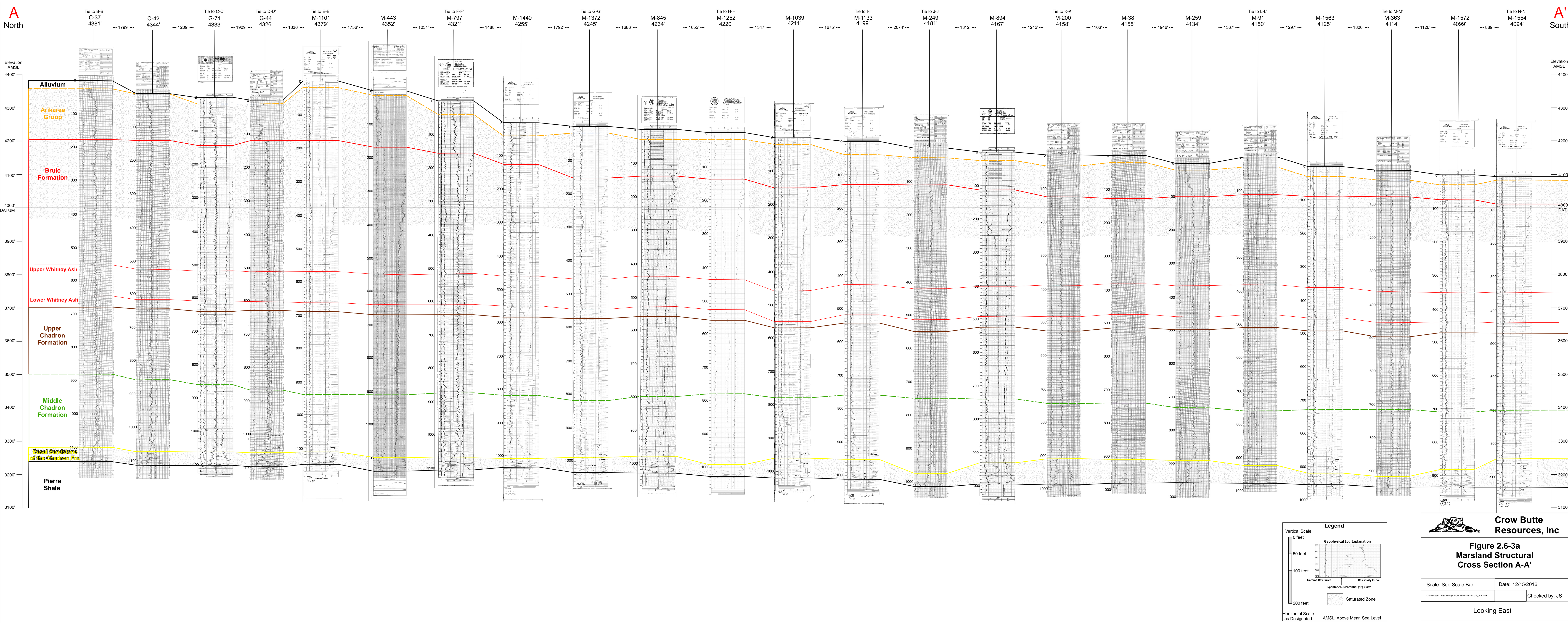
MAPPED BY: JC

CHECKED BY: JA



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

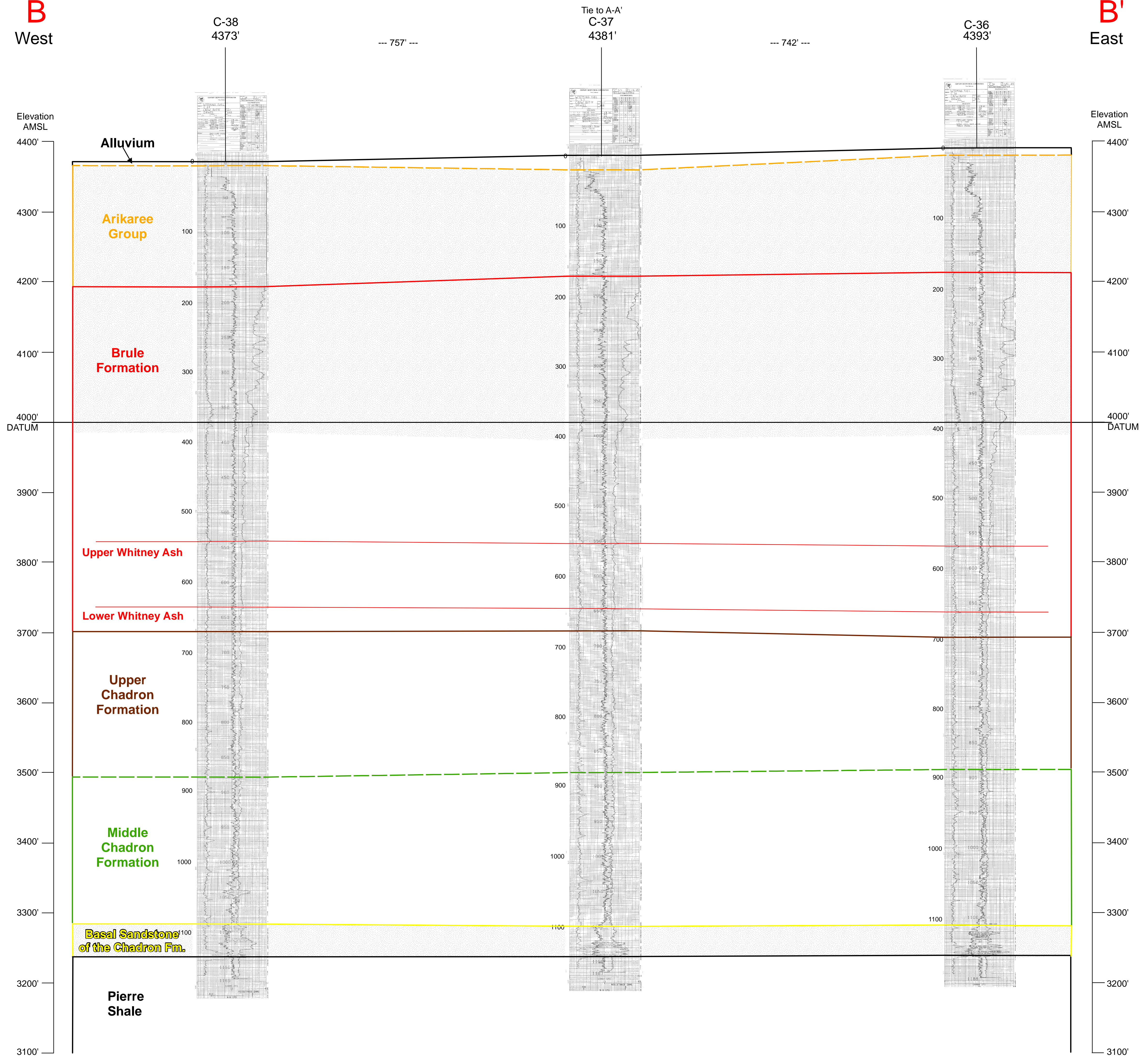






**B**  
West

**B'**  
East



**Legend**


Vertical Scale  
0 feet  
50 feet  
100 feet  
200 feet

Horizontal Scale  
as Designated

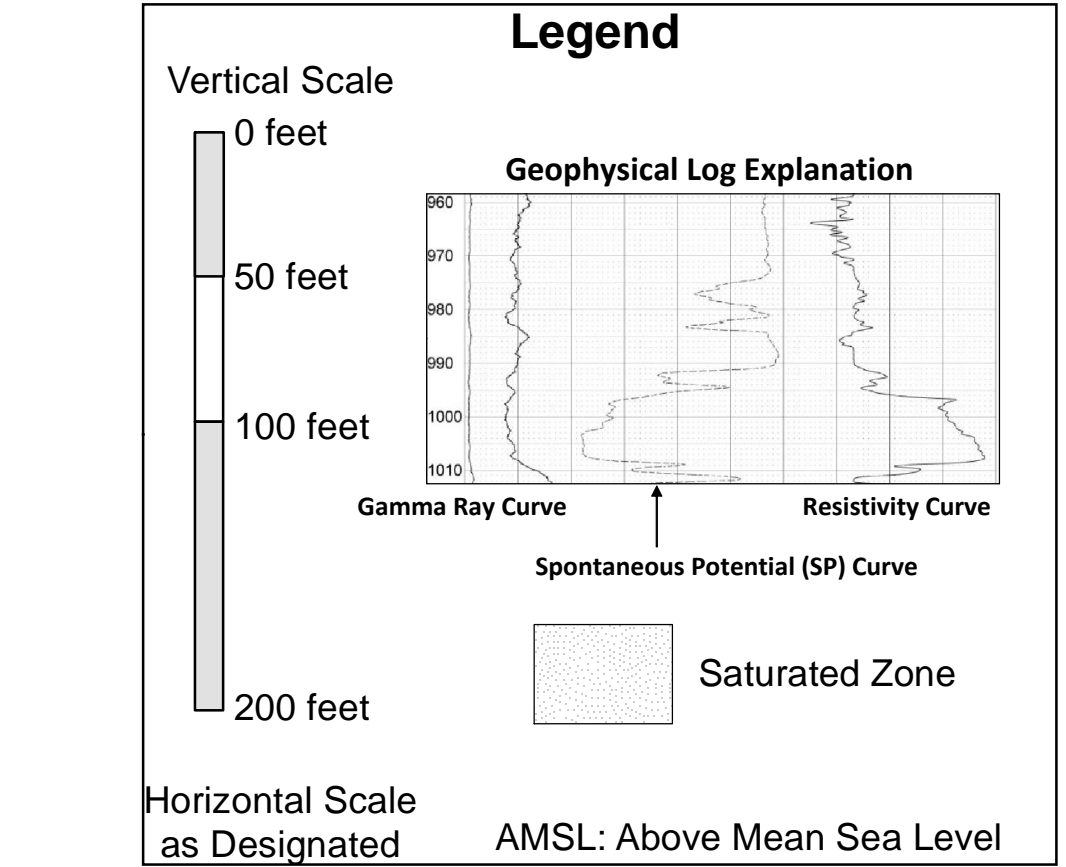
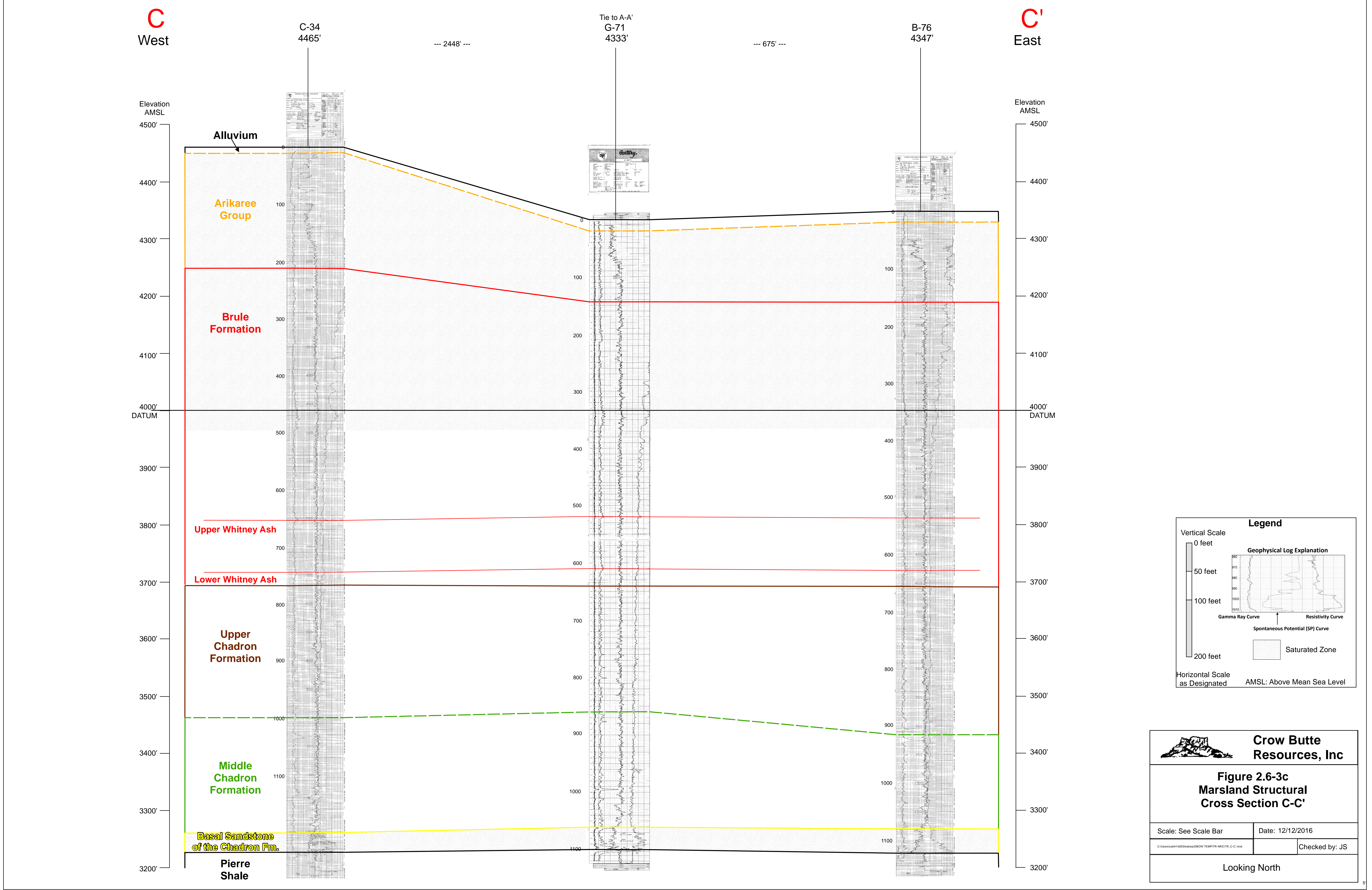
AMS: Above Mean Sea Level


**Geophysical Log Explanation**

Gamma Ray Curve  
Spontaneous Potential (SP) Curve  
Resistivity Curve  
Saturated Zone

 <b>Crow Butte Resources, Inc</b>		
<b>Figure 2.6-3b Marsland Structural Cross Section B-B'</b>		
Scale: See Scale Bar	Date: 12/12/2016	
C:\Users\c41426\Desktop\DOBOW\TEMP\TR-NR\CTR_B-B'.mxd		Checked by: JS
Looking North		





**Crow Butte  
Resources, Inc**

**Figure 2.6-3c  
Marsland Structural  
Cross Section C-C'**

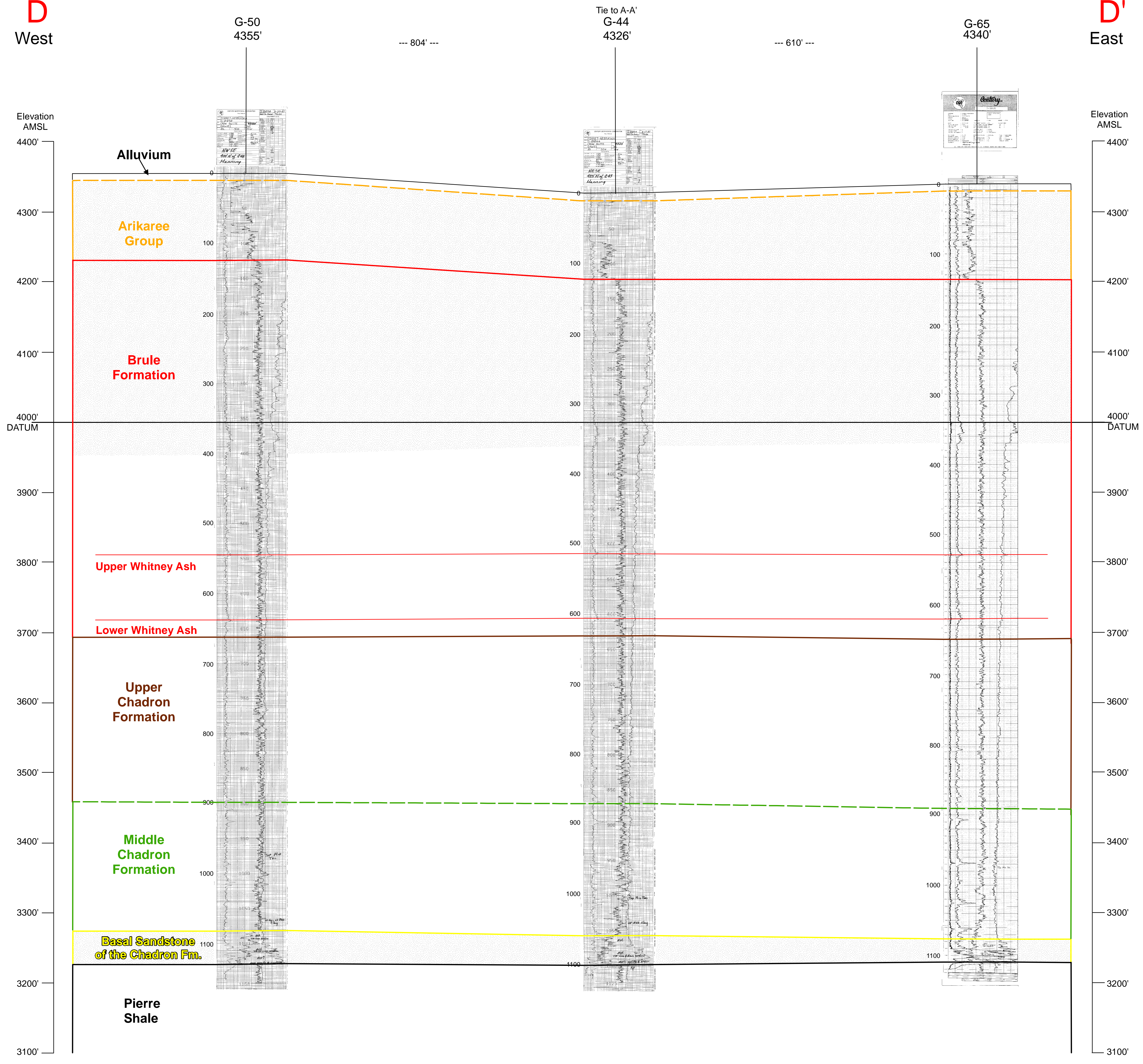
Scale: See Scale Bar	Date: 12/12/2016
C:\Users\ca041426\Desktop\BROW TEMP\TR-NR\CTR_C-C'.mxd	Checked by: JS

Looking North



D  
West

D'  
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

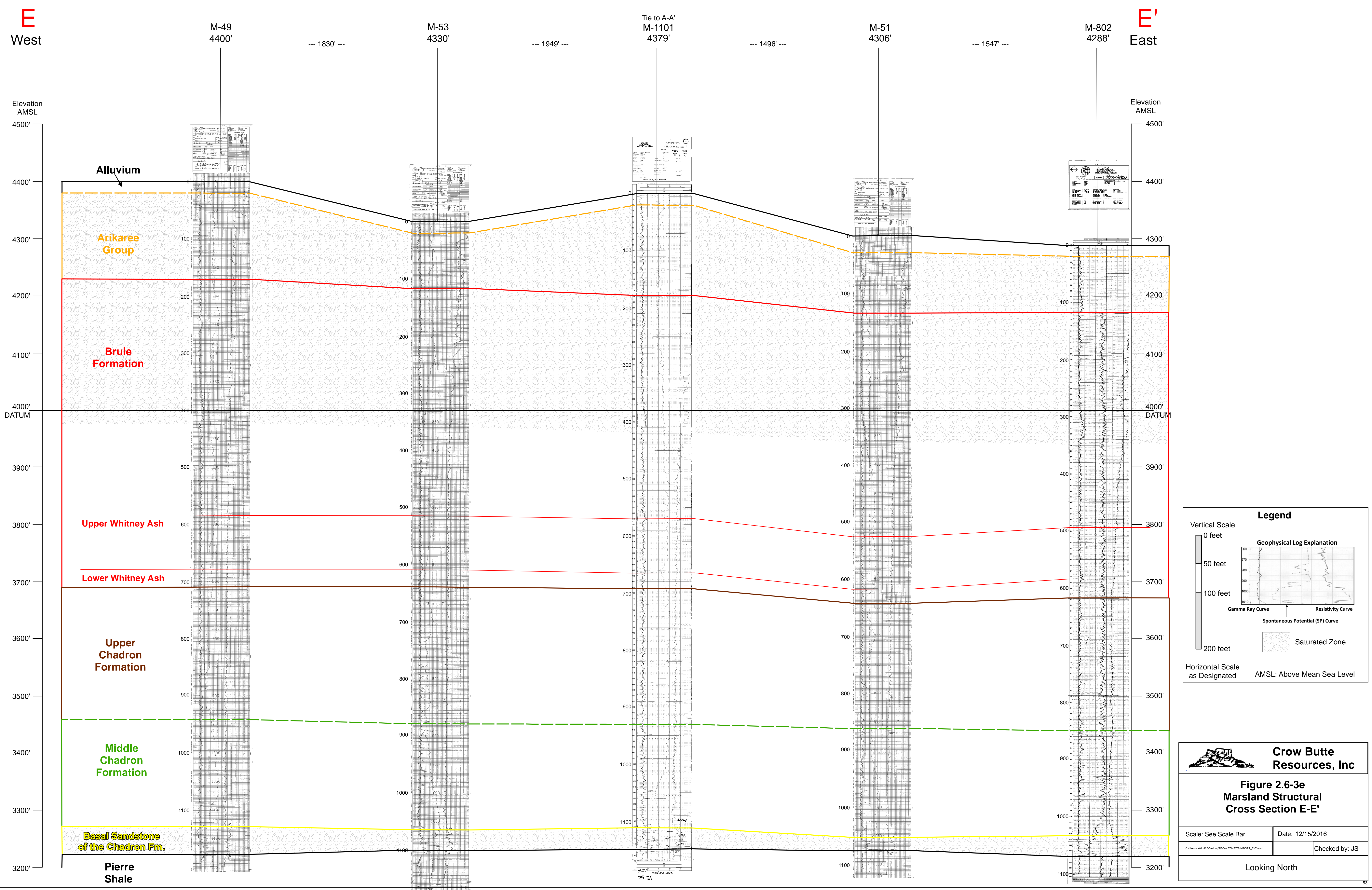
 **Crow Butte Resources, Inc**

**Figure 2.6-3d  
Marsland Structural  
Cross Section D-D'**

Scale: See Scale Bar	Date: 12/12/2016
C:\Users\ca041426\Desktop\CBOW TEMP\TR-NR\CTR_D-D'.mxd	Checked by: JS

Looking North





**Legend**

Vertical Scale

0 feet

50 feet

100 feet

200 feet

Horizontal Scale as Designated

AMSL: Above Mean Sea Level


**Geophysical Log Explanation**

Gamma Ray Curve

Spontaneous Potential (SP) Curve

Resistivity Curve

Saturated Zone

 **Crow Butte Resources, Inc**

**Figure 2.6-3e**  
**Marsland Structural**  
**Cross Section E-E'**

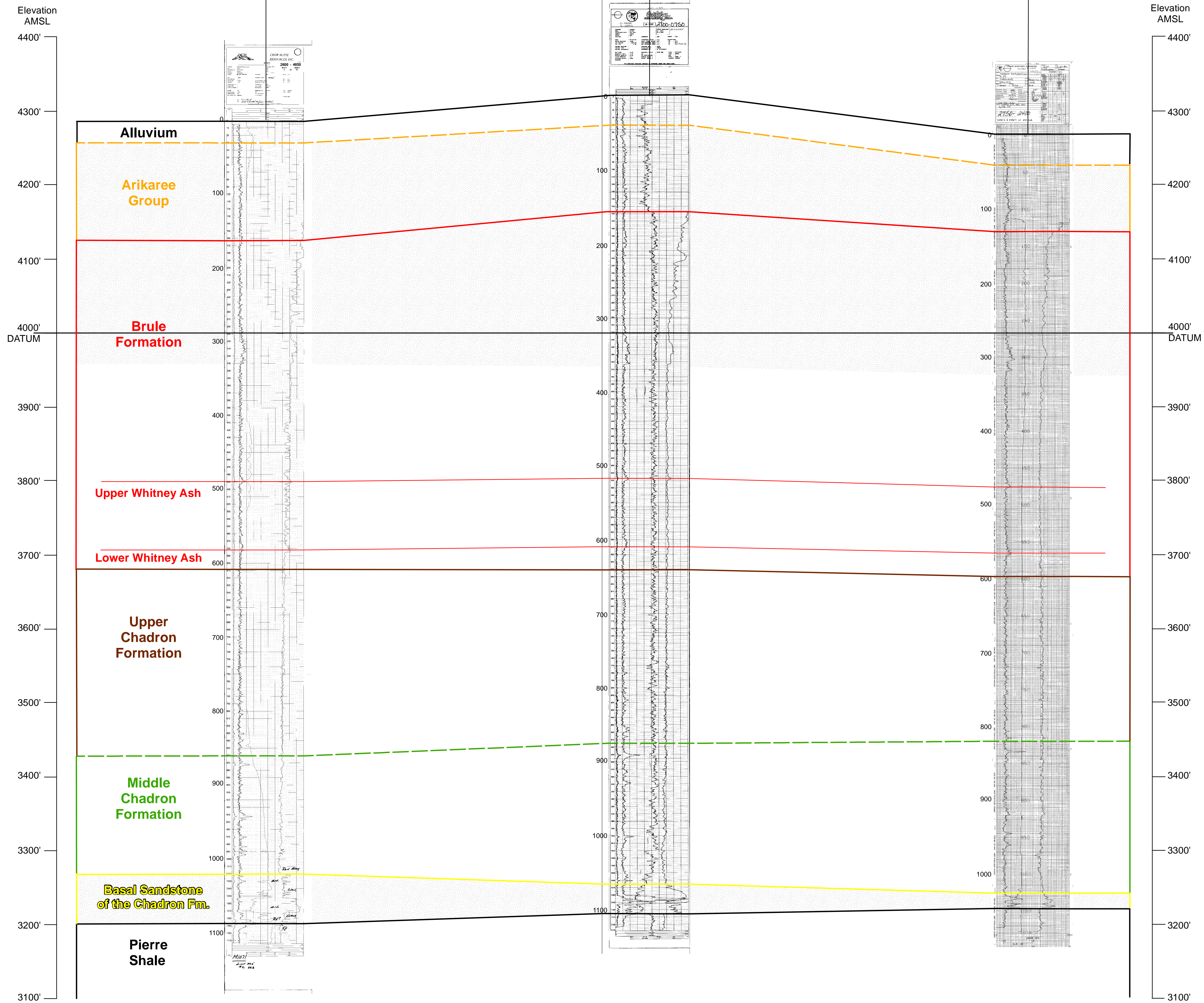
Scale: See Scale Bar	Date: 12/15/2016
C:\Users\j0061426\Desktop\CROW TEMP\TS MARCTR_E-E.mxd	Checked by: JS

Looking North



F  
West

F'  
East



**Crow Butte  
Resources, Inc**

**Figure 2.6-3f  
Marsland Structural  
Cross Section F-F'**

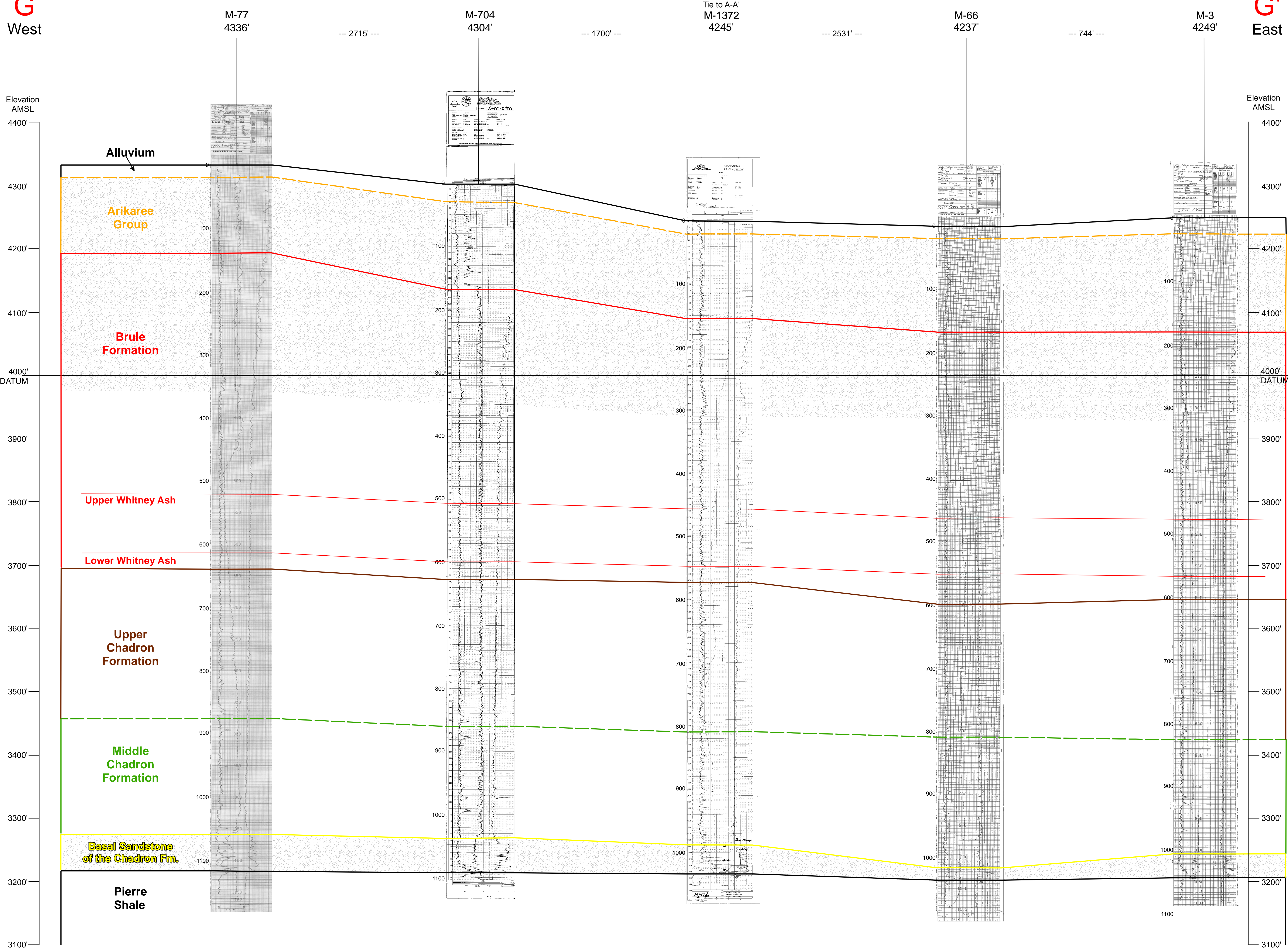
Scale: See Scale Bar	Date: 12/8/2016
C:\Users\col41428\Desktop\CBOW TEMP\TR-NRQTR_F-F.mxd	Checked by: JS

Looking North



G  
West

G'  
East



**Legend**

Vertical Scale

0 feet  
50 feet  
100 feet  
200 feet

Horizontal Scale as Designated

AMSL: Above Mean Sea Level

**Geophysical Log Explanation**

Gamma Ray Curve  
Resistivity Curve  
Spontaneous Potential (SP) Curve

Saturated Zone

**Crow Butte Resources, Inc.**

**Figure 2.6-3g  
Marsland Structural  
Cross Section G-G'**

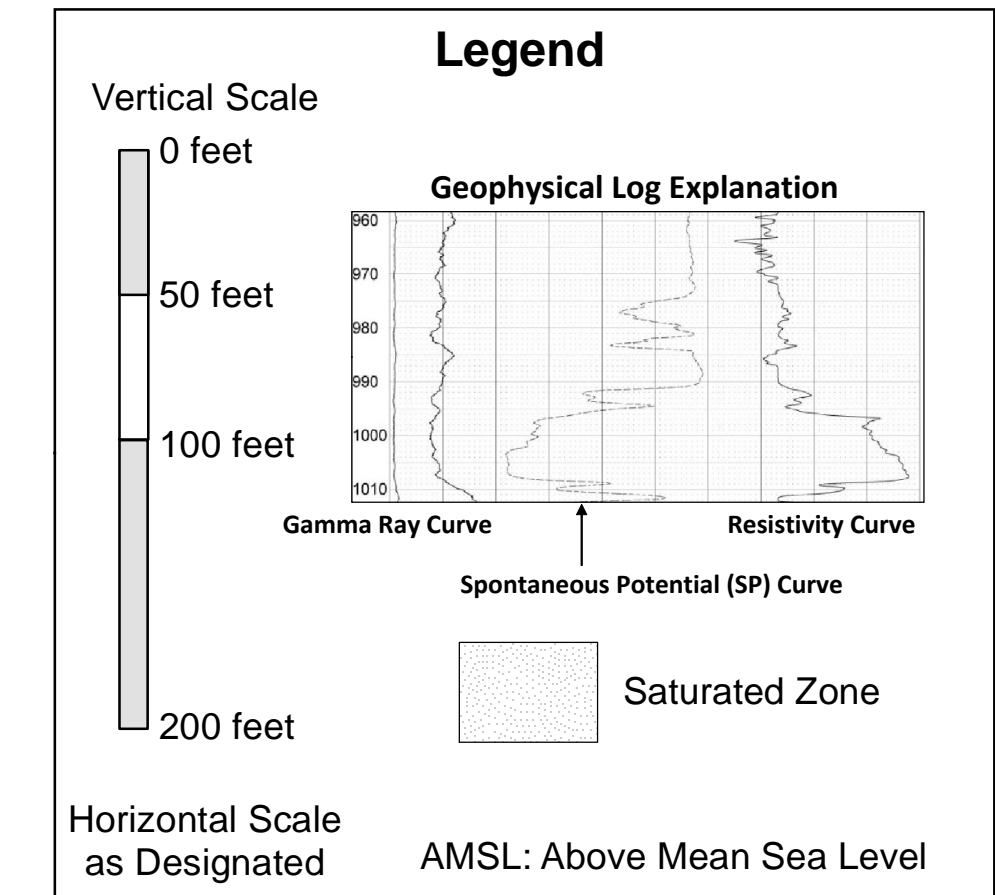
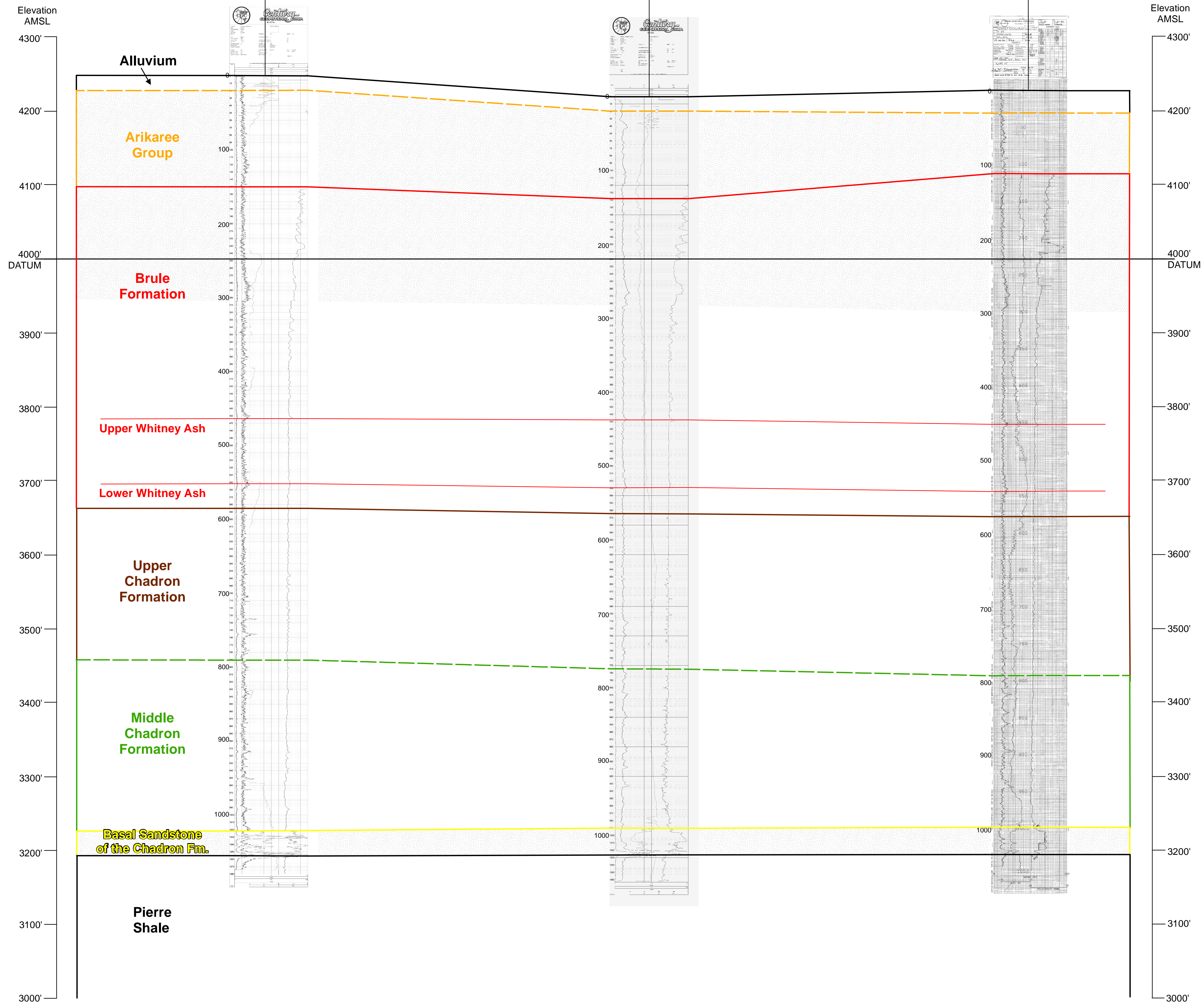
Scale: See Scale Bar	Date: 12/8/2016
C:\Users\j041428\Documents\GROW TEMP\TR MARCTR_G-G'.ind	Checked by: JS


Looking North



H  
West

H'  
East



**Crow Butte  
Resources, Inc**

**Figure 2.6-3h  
Marsland Structural  
Cross Section H-H'**

Scale: See Scale Bar

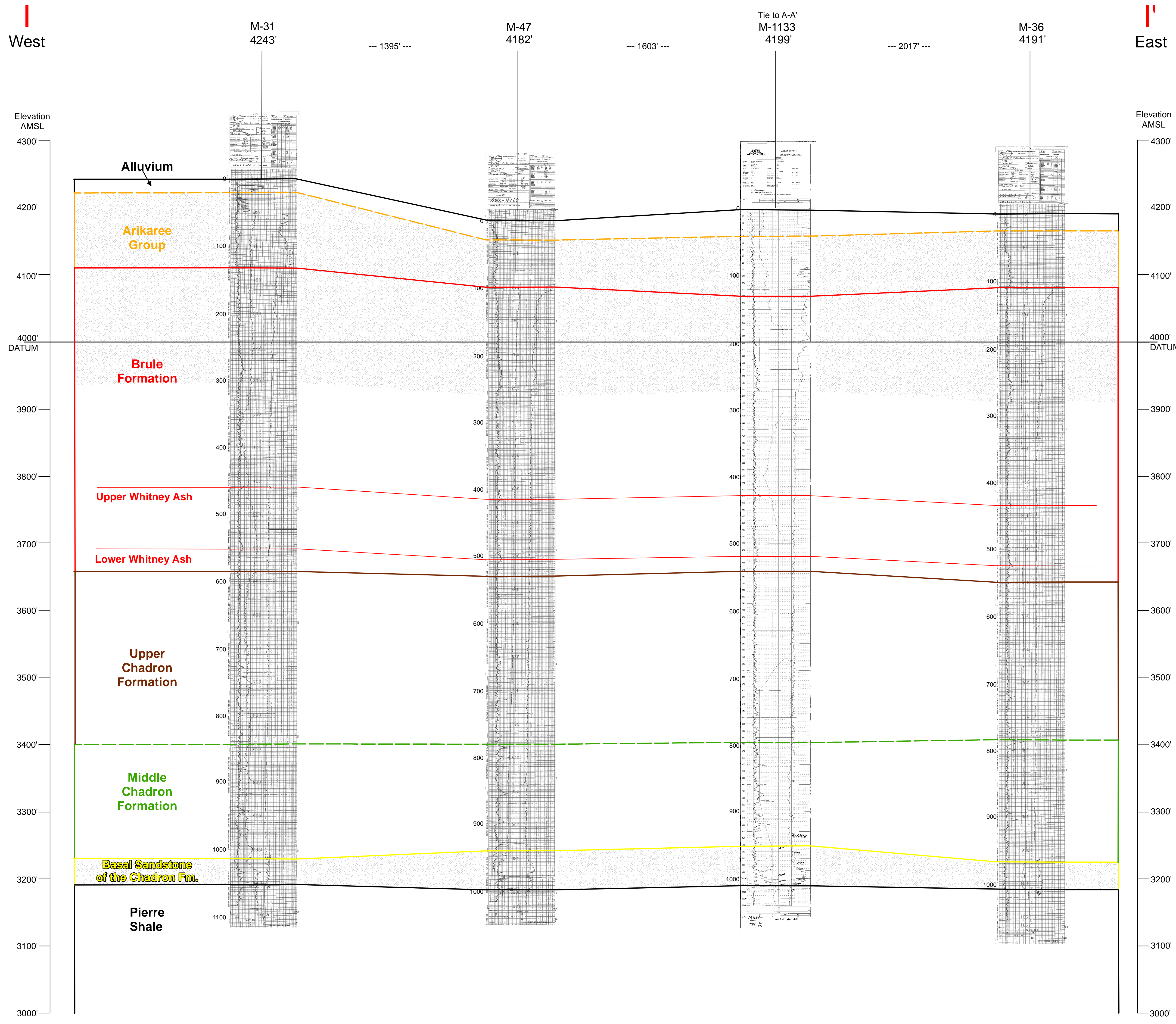
Date: 12/15/2016

C:\Users\ca041426\Desktop\CBOW\TEMP\TR-NRQ\TR\_H-H'.mxd

Checked by: JS

Looking North





**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  
Resources, Inc**

**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

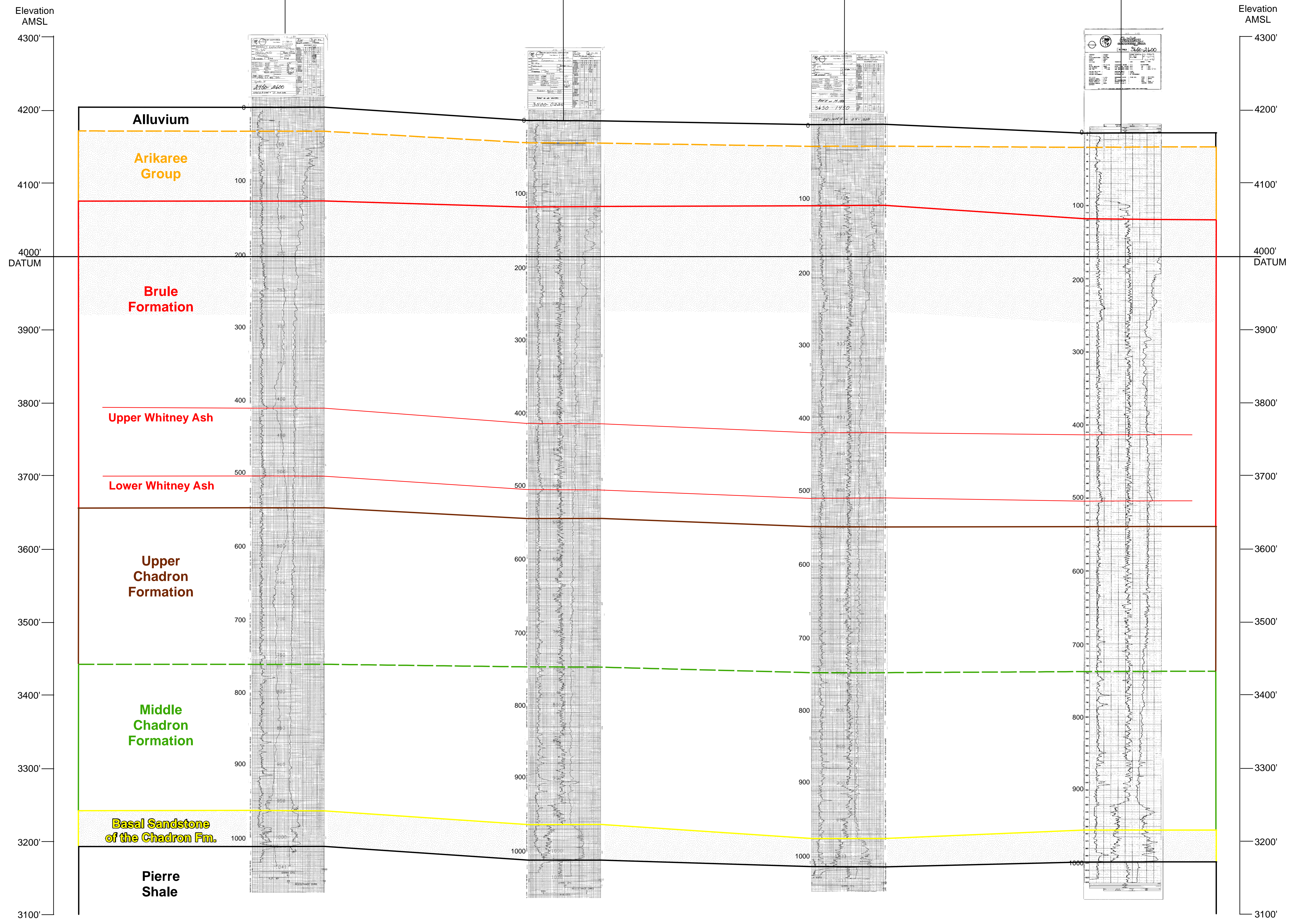
Checked by: JS

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

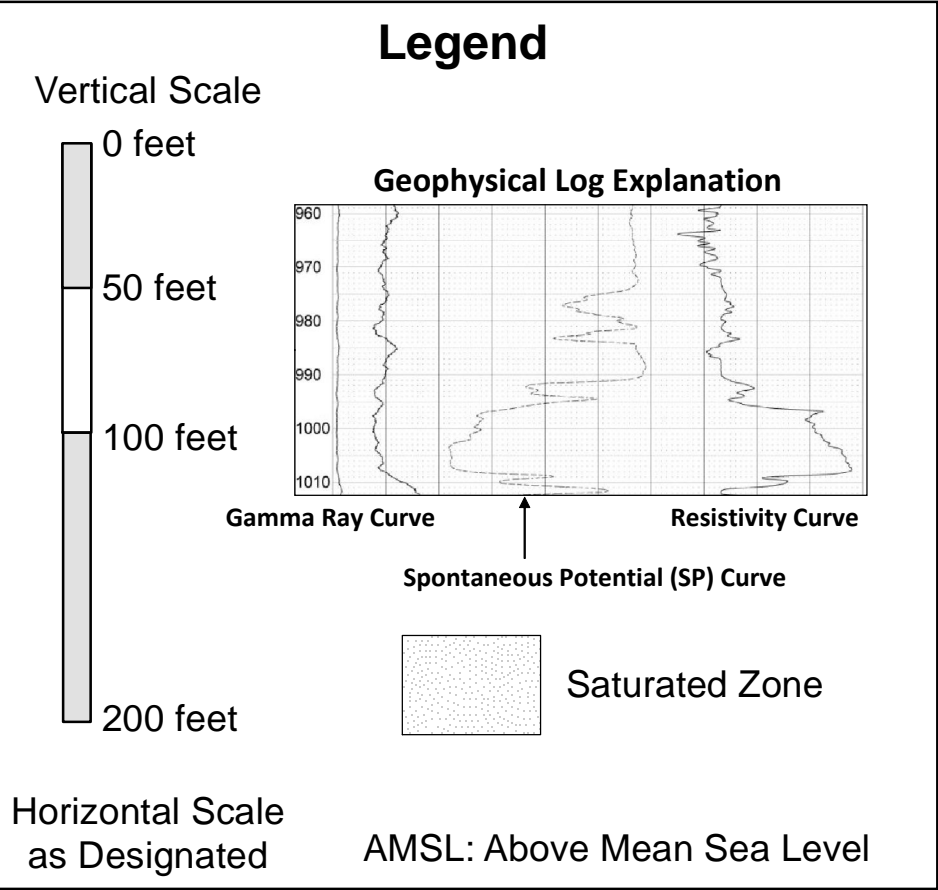
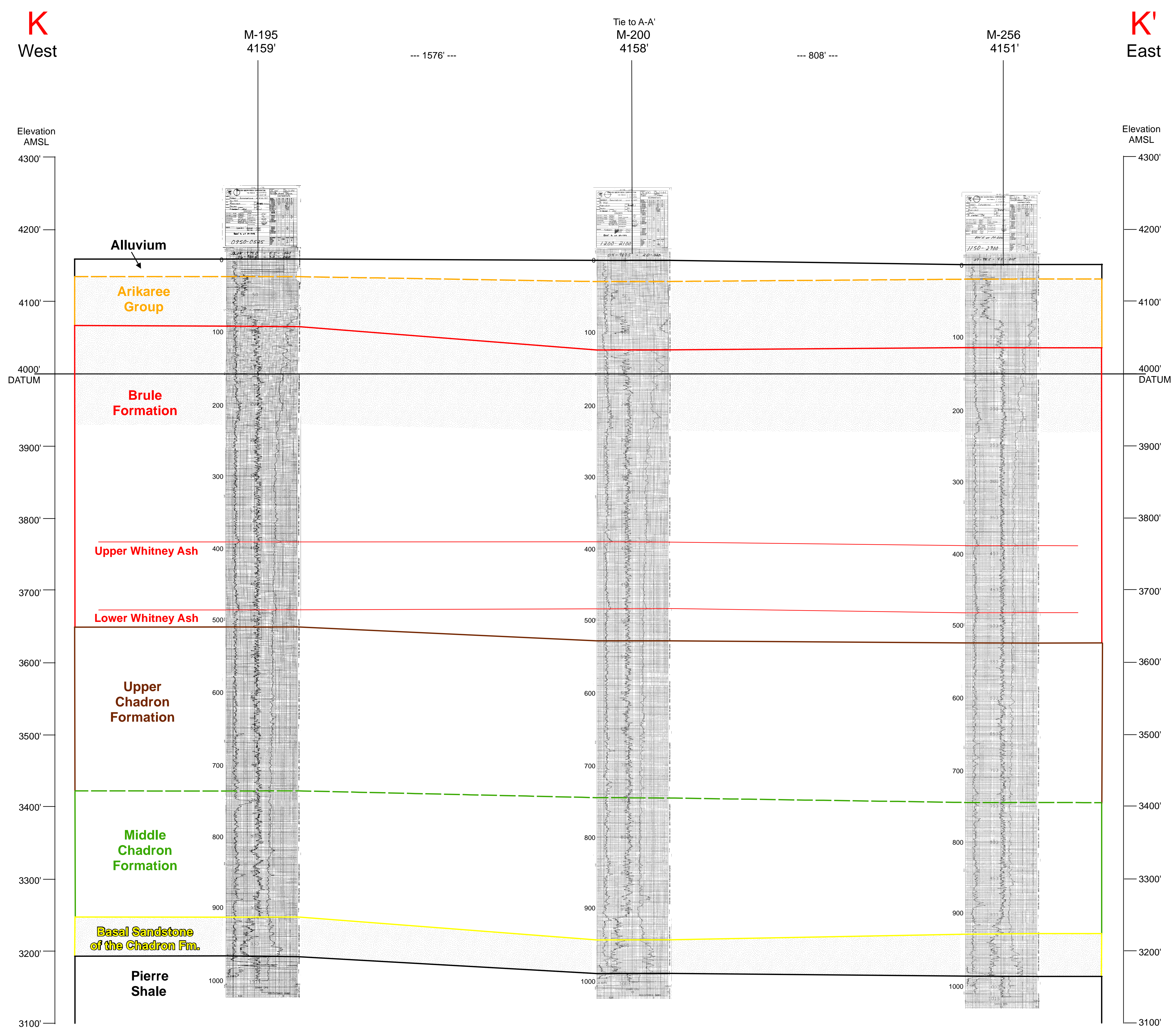
 **Crow Butte Resources, Inc.**

**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





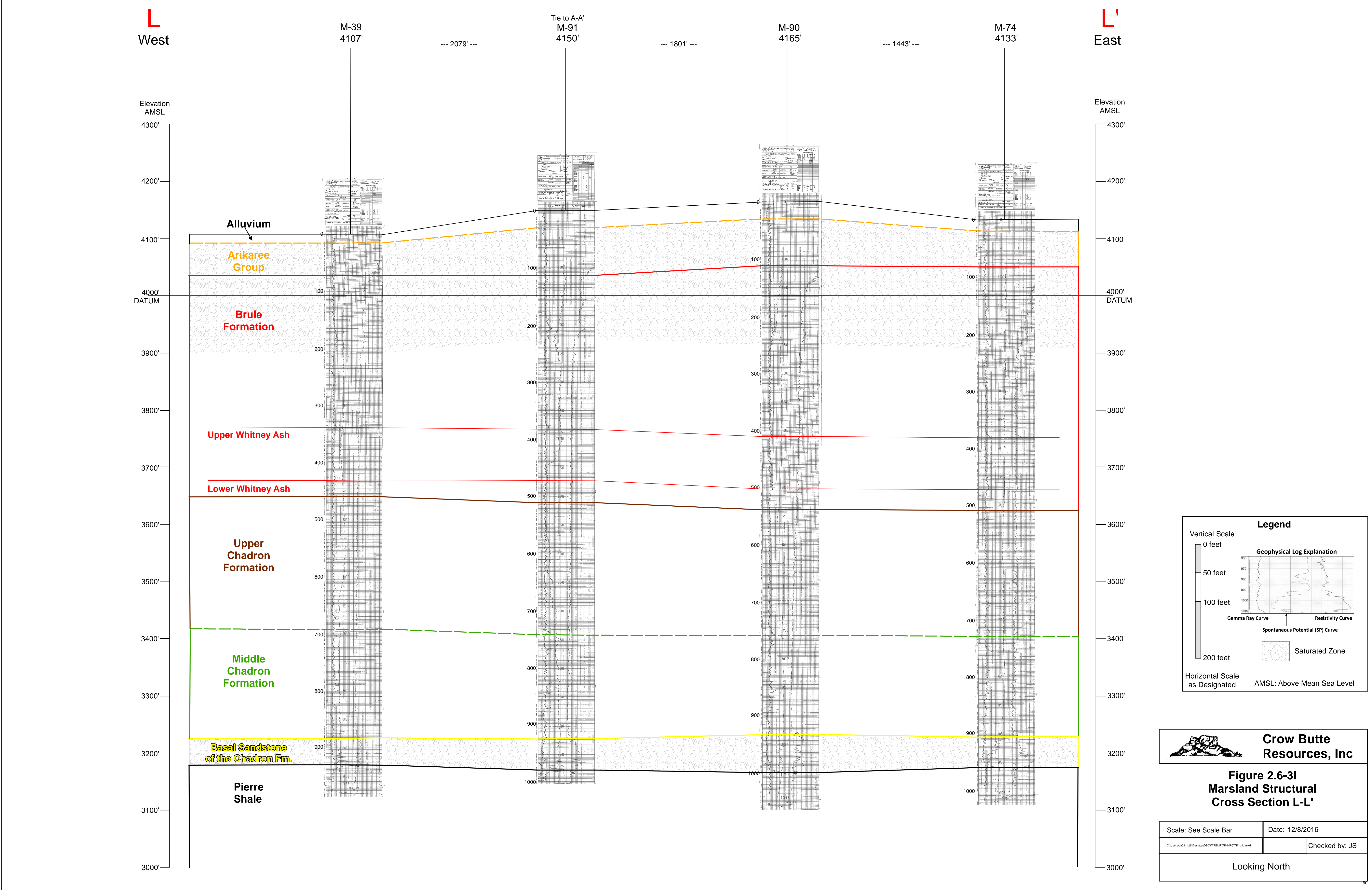
**Crow Butte  
Resources, Inc**

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

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\cd4143\Desktop\DR01W TEMP\TR-NR\DR_K-K'.mxd	Checked by: JS

Looking North





**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

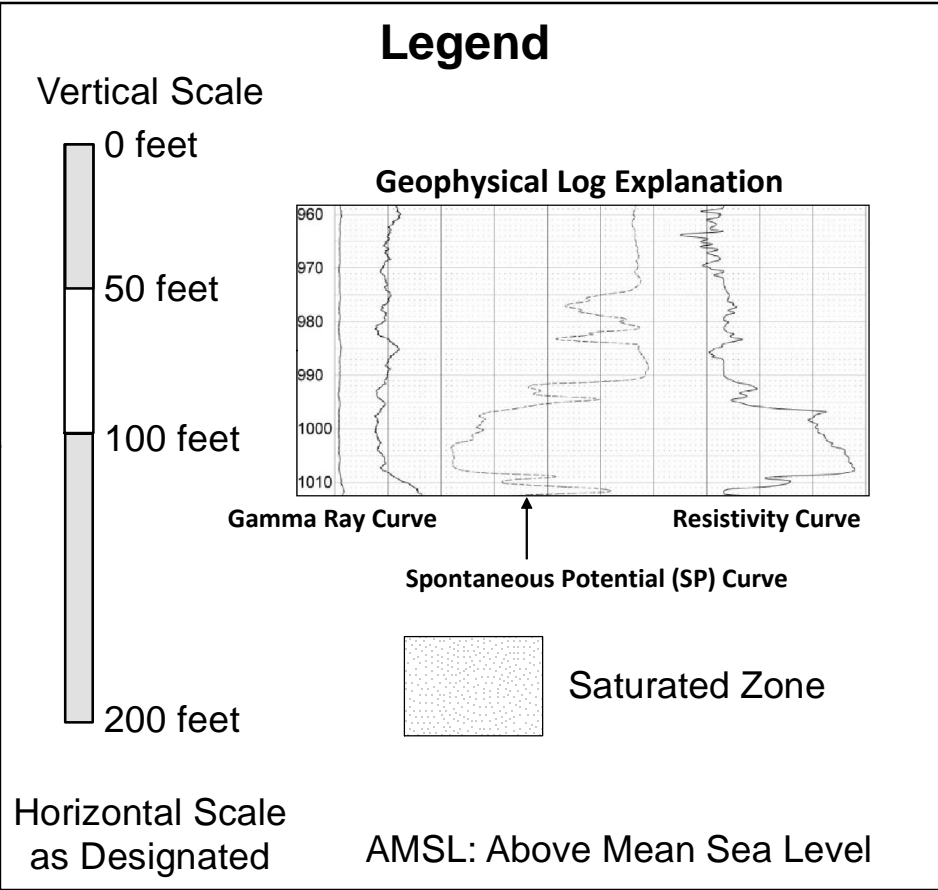
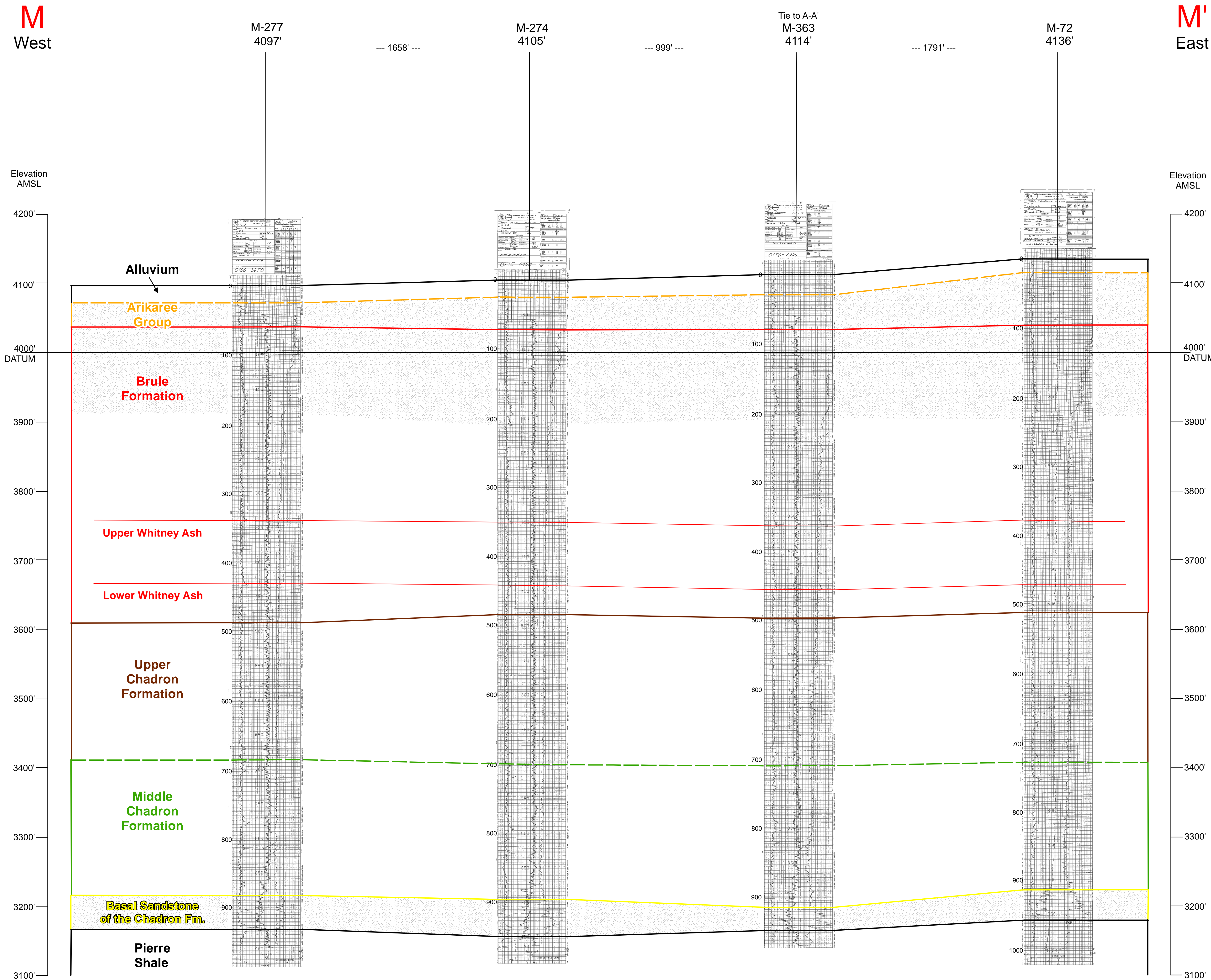
 **Crow Butte Resources, Inc.**

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

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

Looking North





**Crow Butte  
Resources, Inc**

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

Scale: See Scale Bar

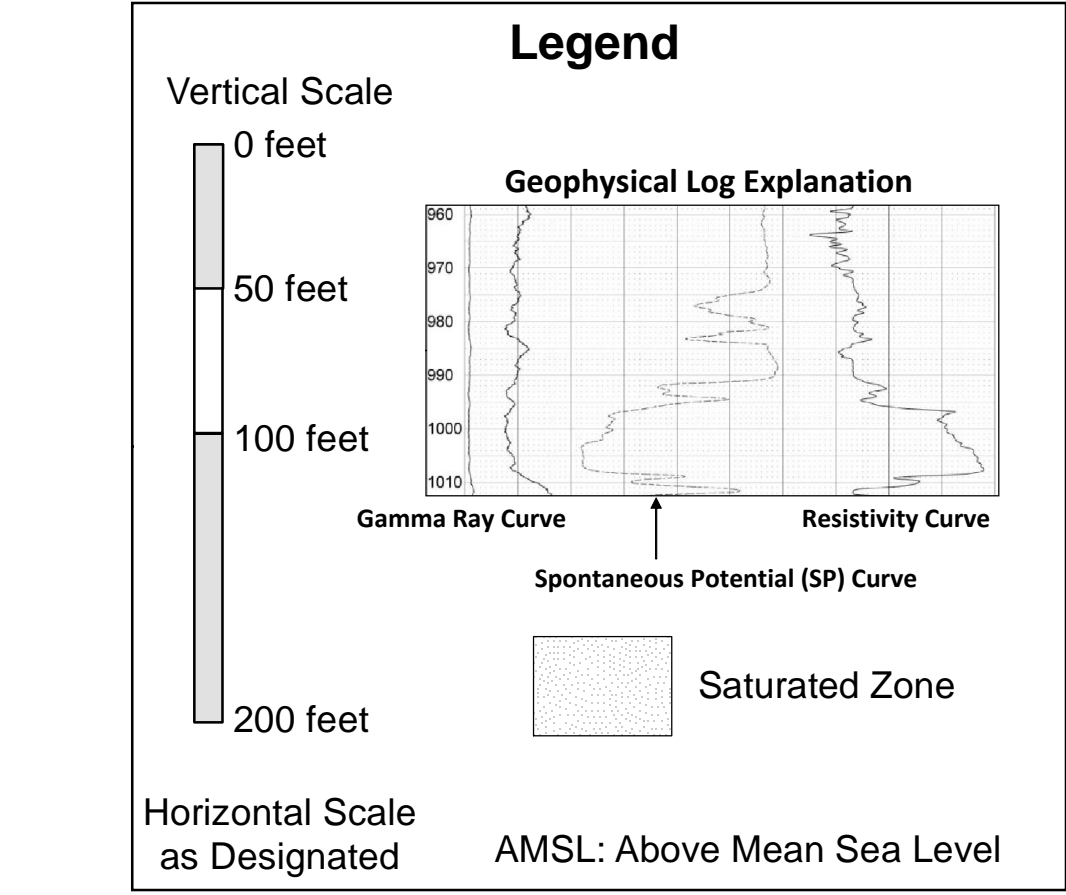
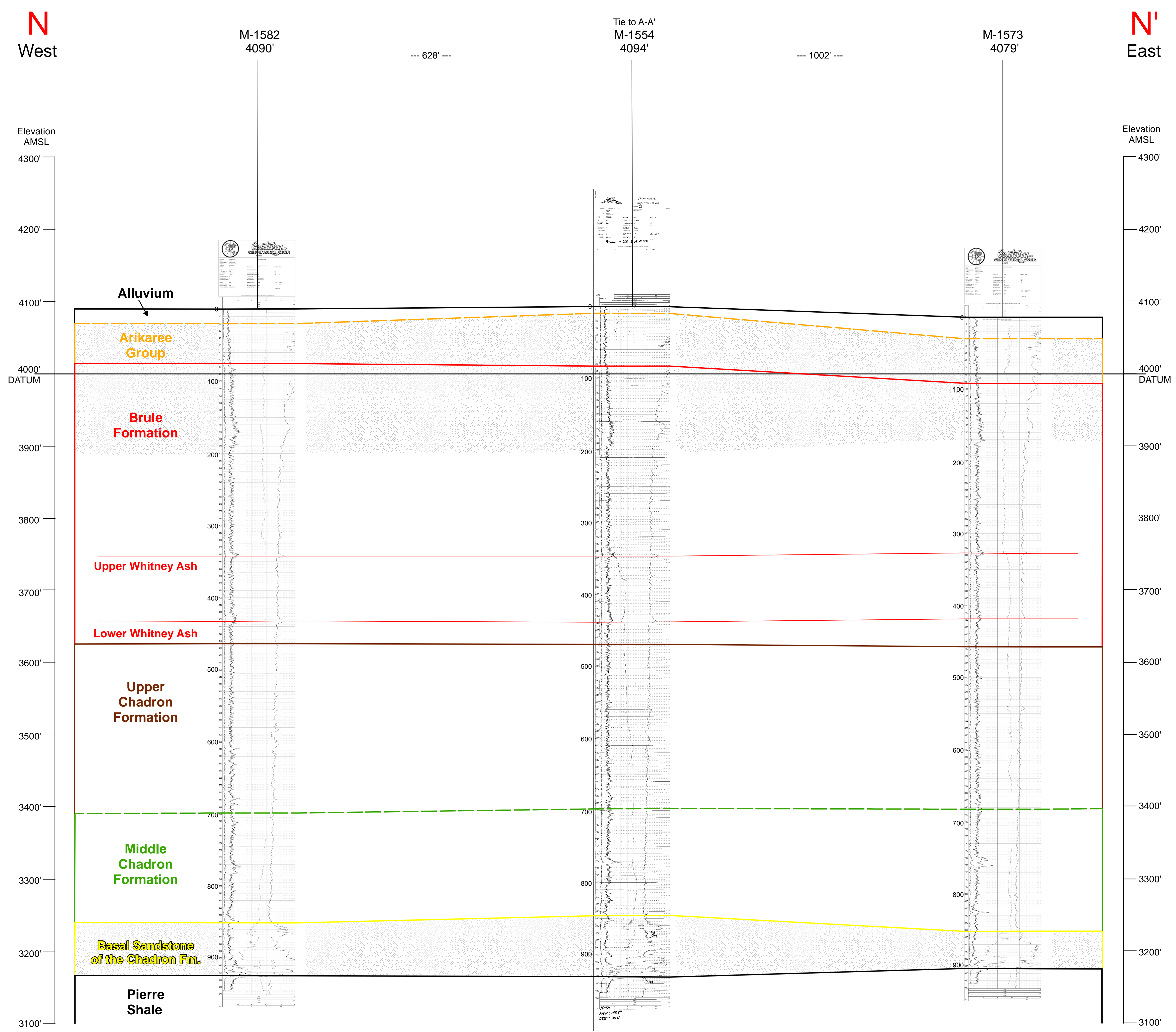
Date: 12/8/2016


C:\Users\ca04142\Desktop\DOB\TEMP\TR-NR\CTR\_M-M'.mxd

Checked by: JS

Looking North





**Crow Butte  
Resources, Inc**

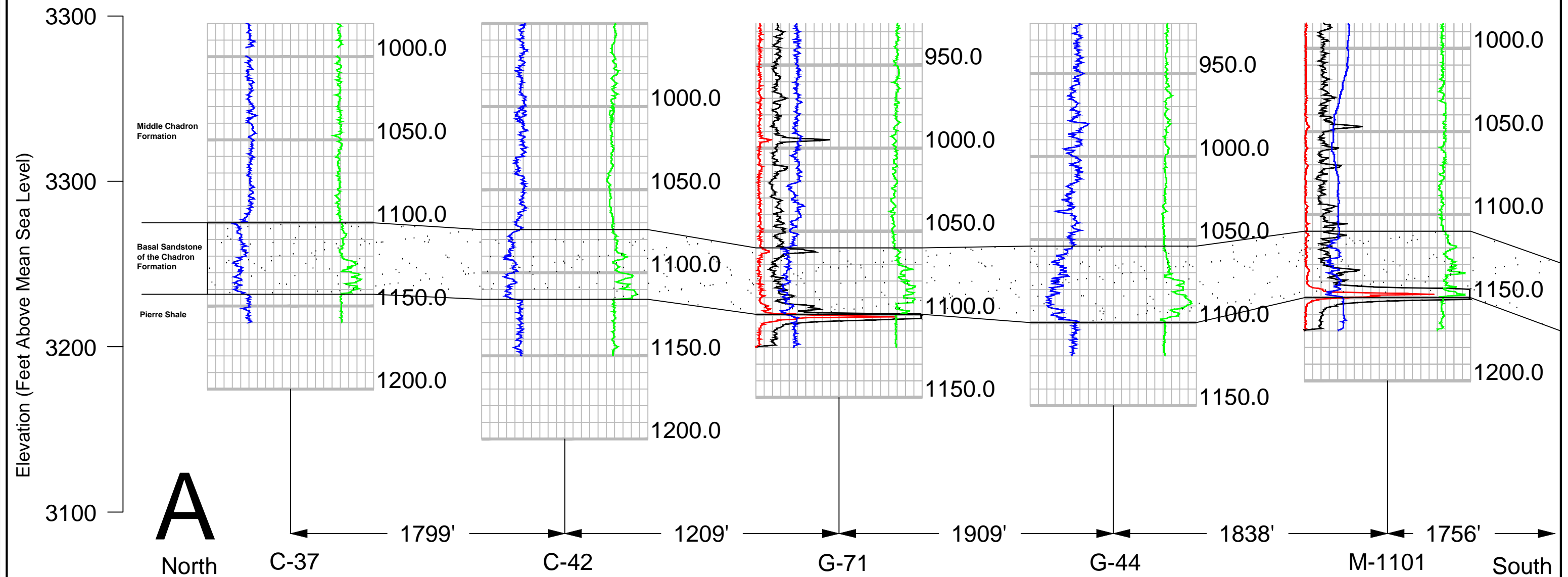
**Figure 2.6-3n  
Marsland Structural  
Cross Section N-N'**

Scale: See Scale Bar	Date: 12/8/2016
C:\Users\ca64142\Desktop\DR00W TEMP\TR-NR\CTR_N-N'.msd	Checked by: JS

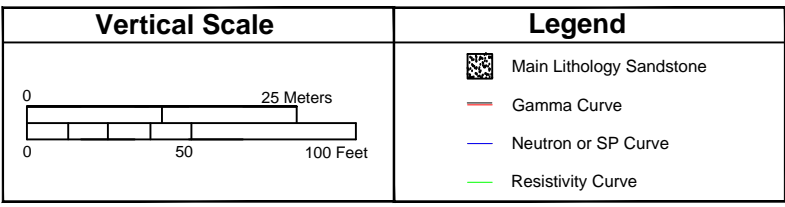
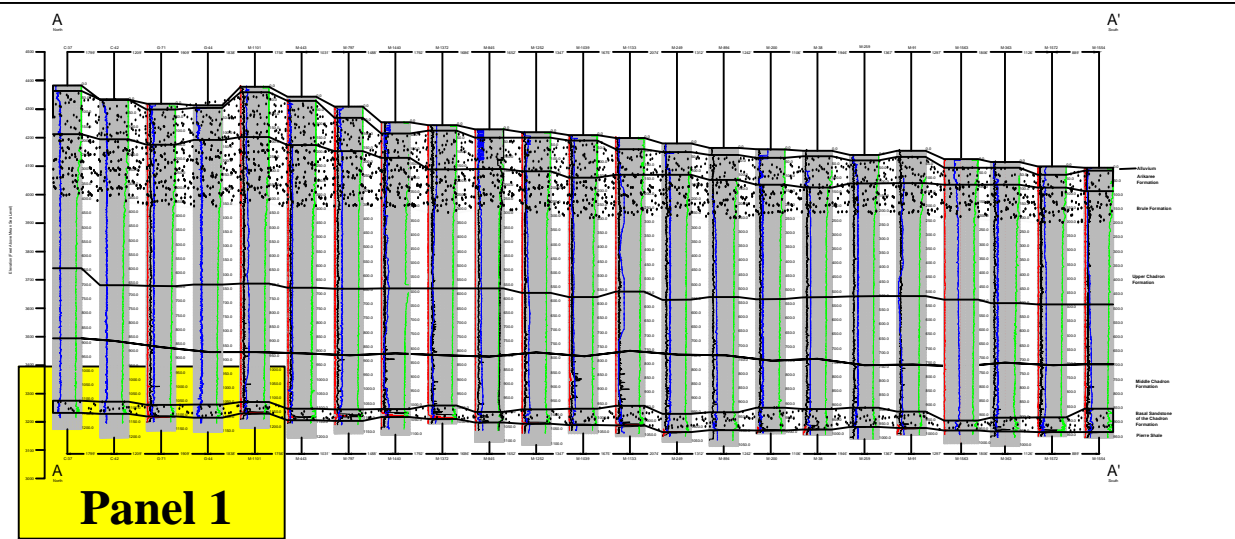
Looking North



Marsland Cross-Section A-A' - Panel 1



CROSS-SECTION PANEL LOCATION



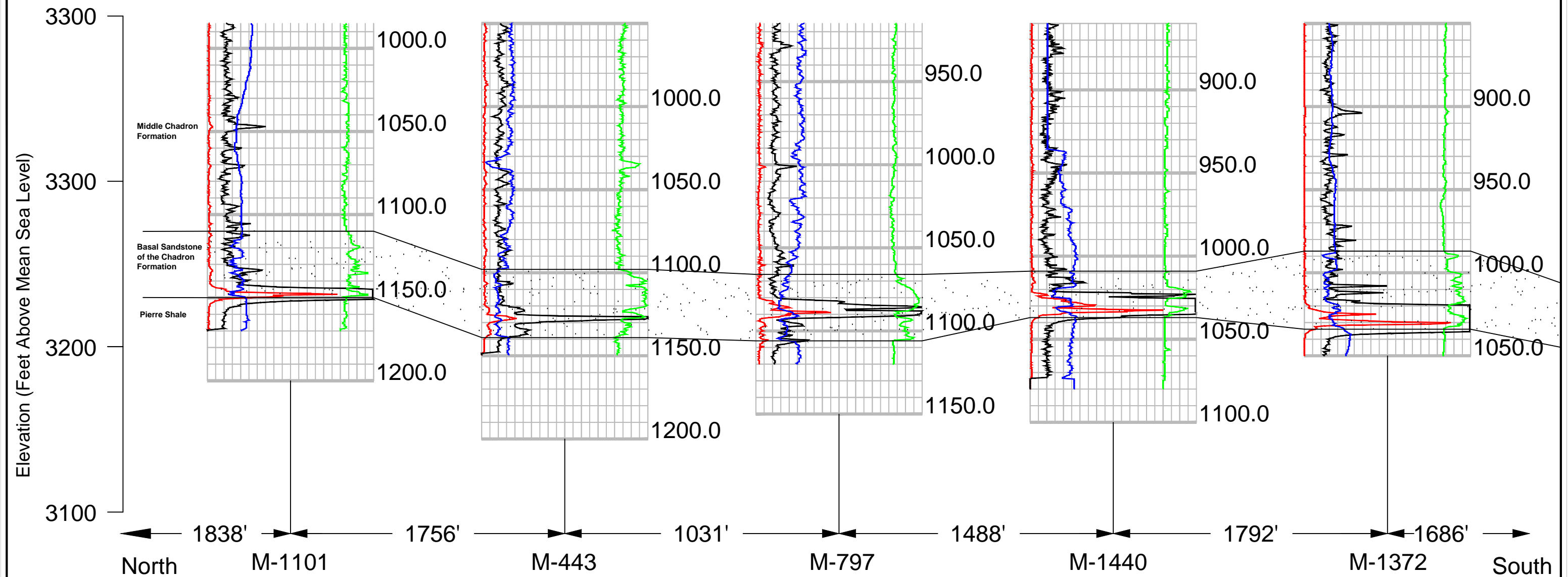
**Crow Butte Resources, Inc.**

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

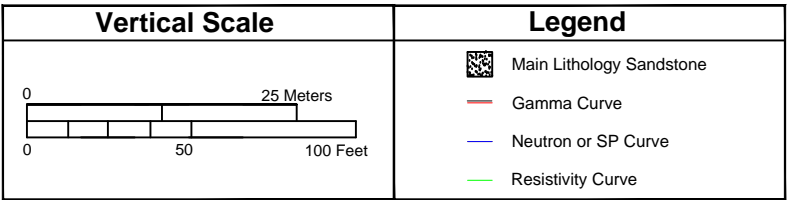
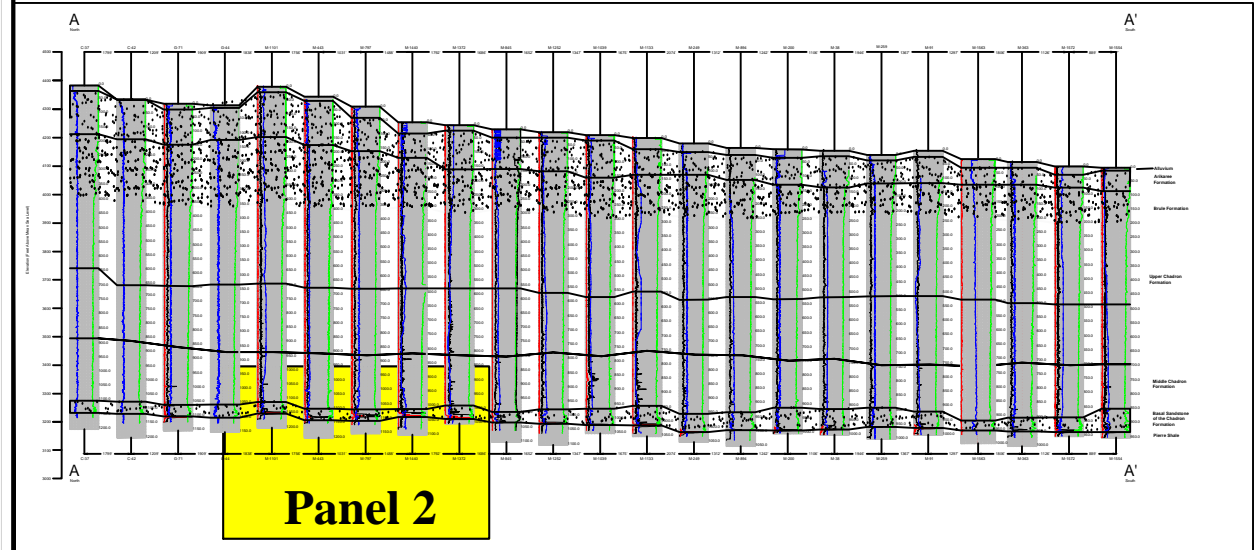
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-30.pdf	By: WB



Marsland Cross-Section A-A' - Panel 2



CROSS-SECTION PANEL LOCATION



**Crow Butte Resources, Inc.**

FIGURE 2.6-3p

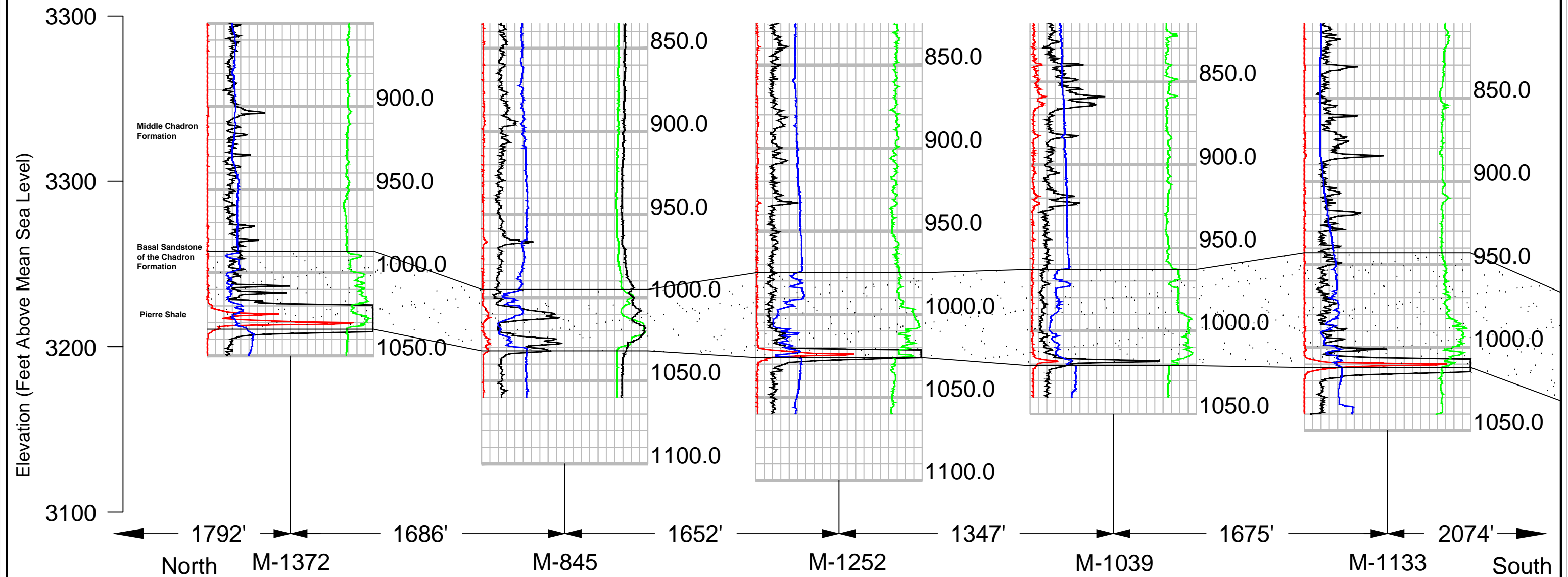
EXPANDED MARSLAND CROSS SECTION A-A'

PANEL 2

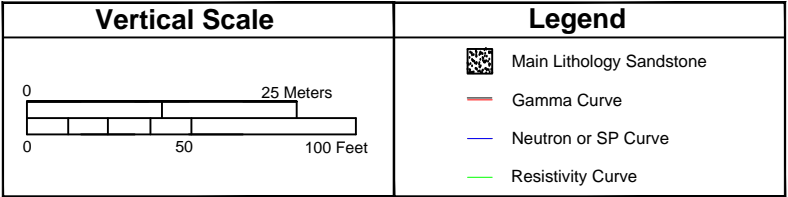
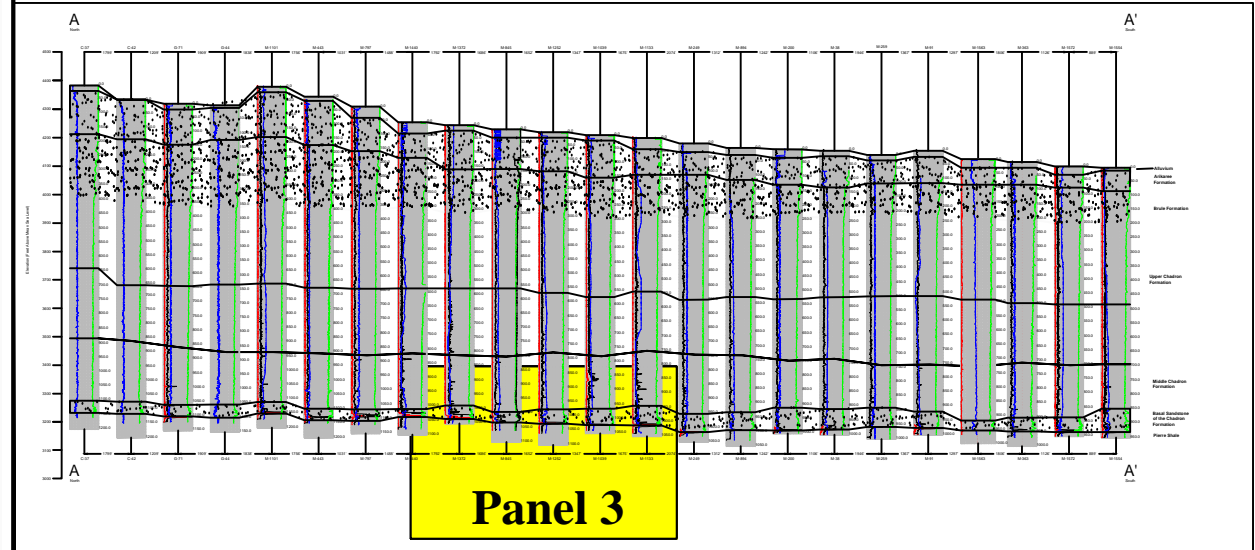
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3p.pdf	By: WB



Marsland Cross-Section A-A' - Panel 3



CROSS-SECTION PANEL LOCATION



**Crow Butte  
Resources, Inc.**

FIGURE 2.6-3q

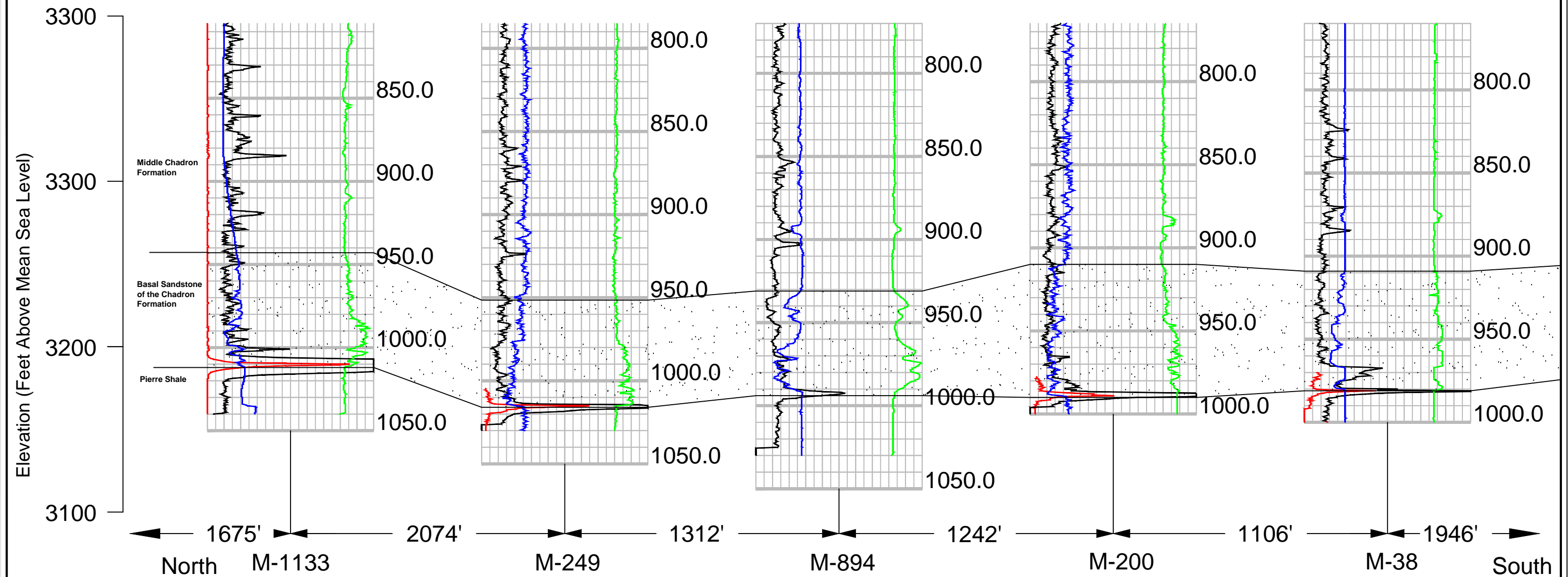
EXPANDED MARSLAND  
CROSS SECTION A-A'

PANEL 3

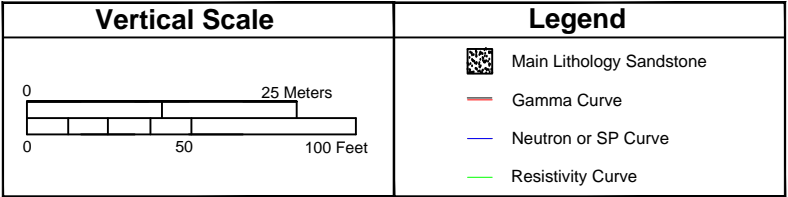
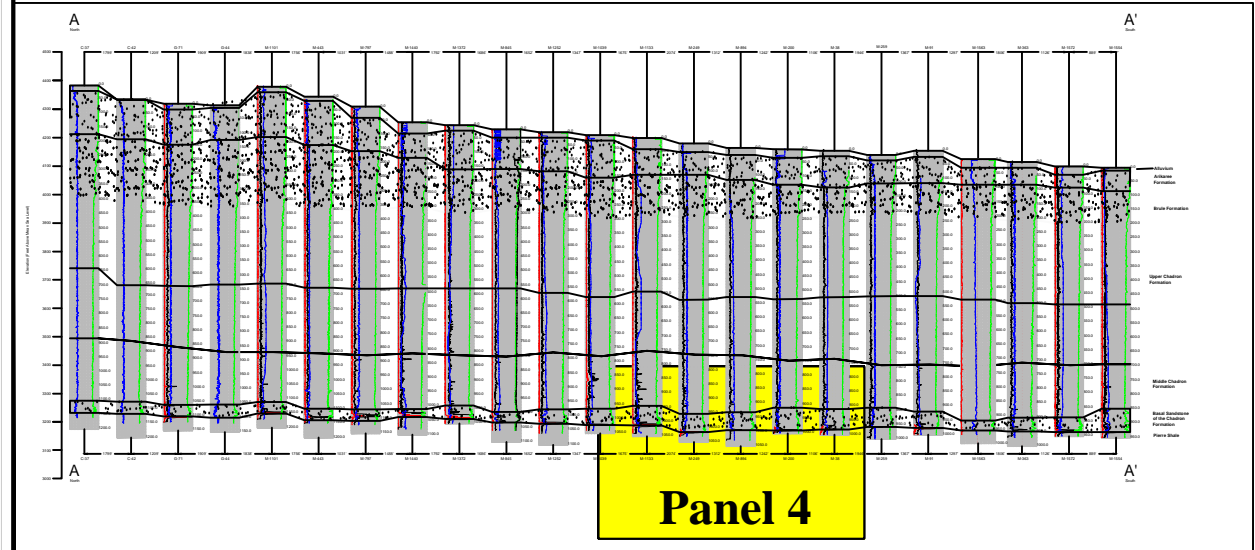
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3q.pdf	By: WB



Marsland Cross-Section A-A' - Panel 4



CROSS-SECTION PANEL LOCATION



**Crow Butte  
Resources, Inc.**

FIGURE 2.6-3r

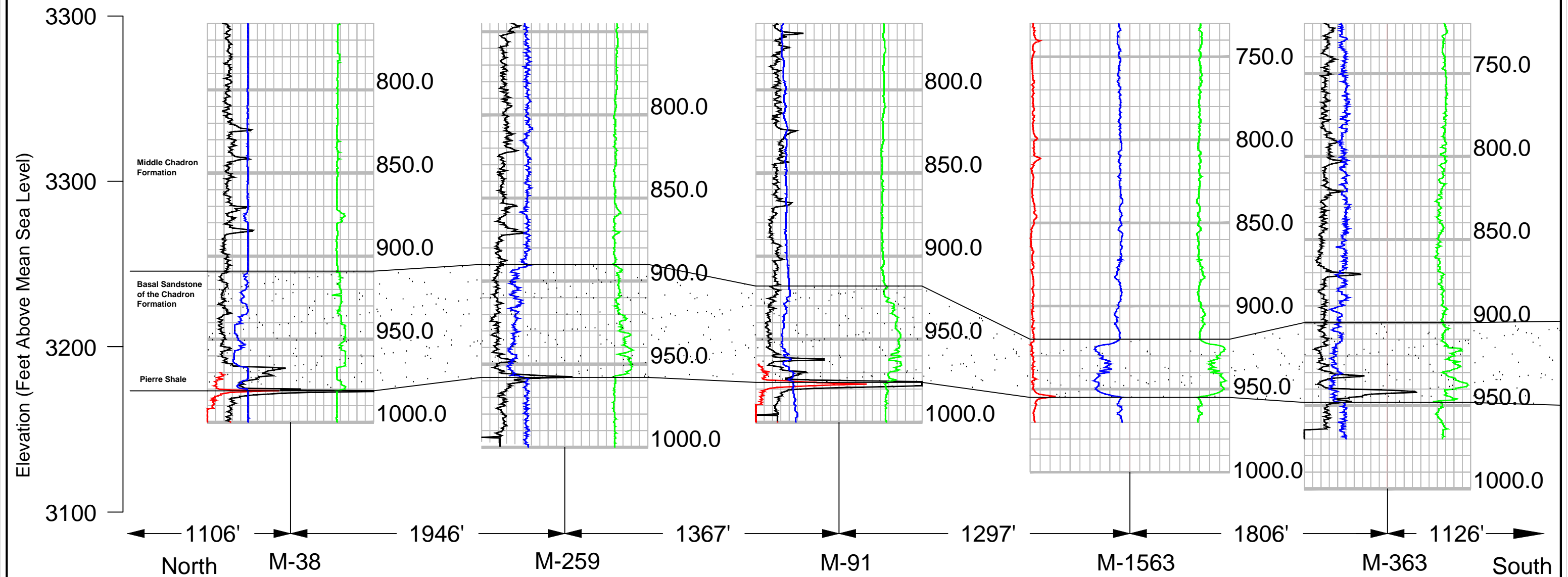
EXPANDED MARSLAND  
CROSS SECTION A-A'

PANEL 4

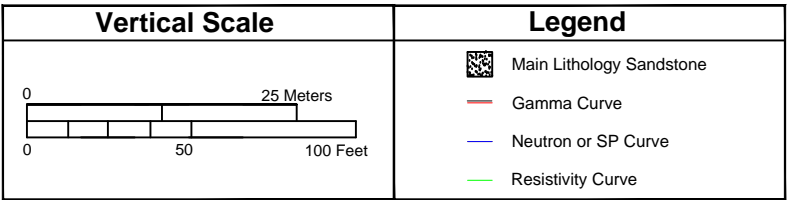
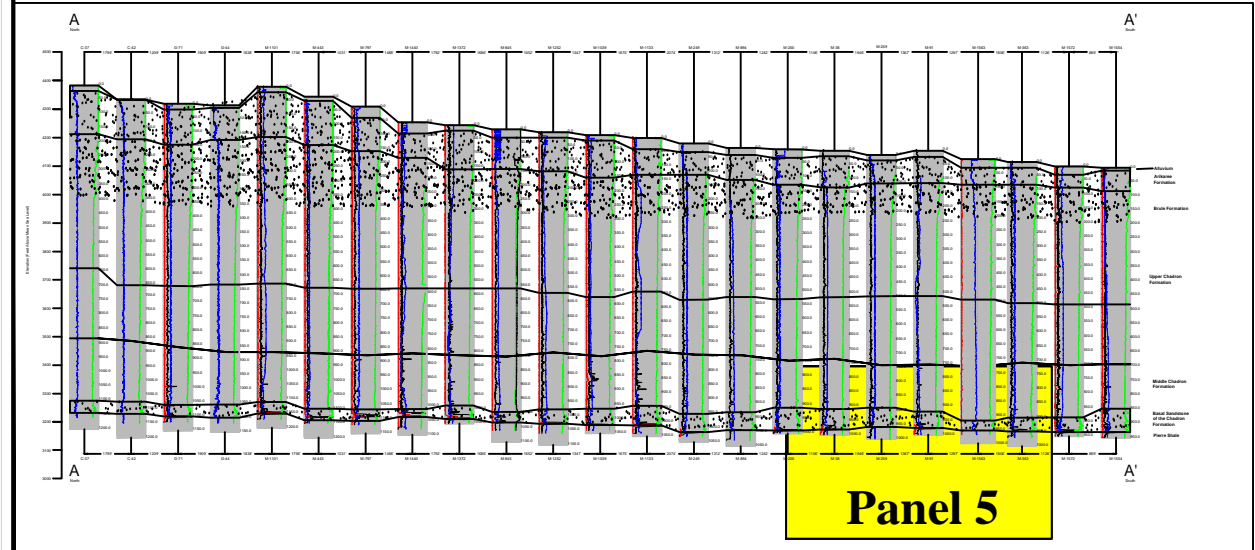
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3r.pdf	By: WB



Marsland Cross-Section A-A' - Panel 5



CROSS-SECTION PANEL LOCATION




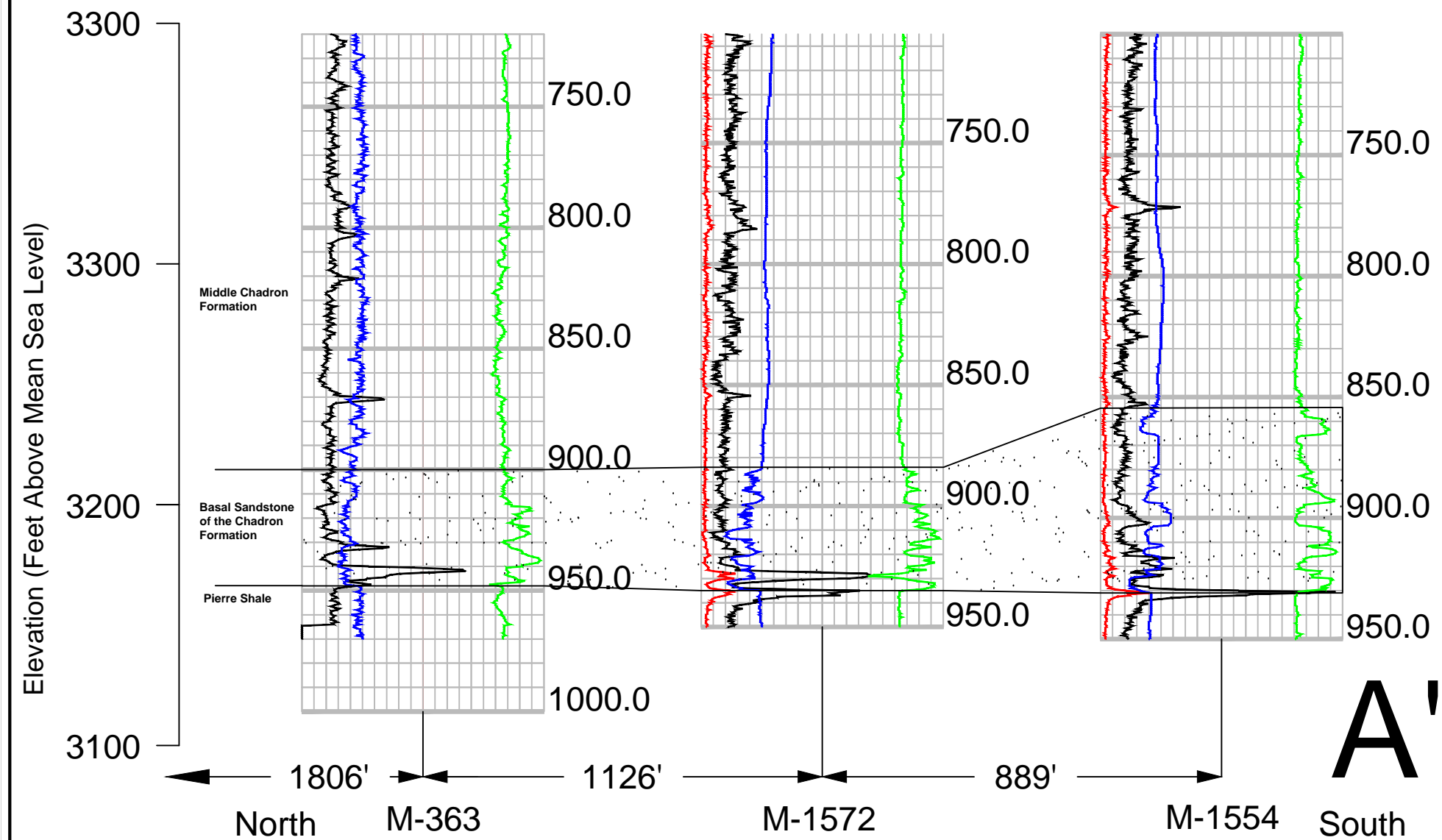
**Crow Butte  
Resources, Inc.**

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

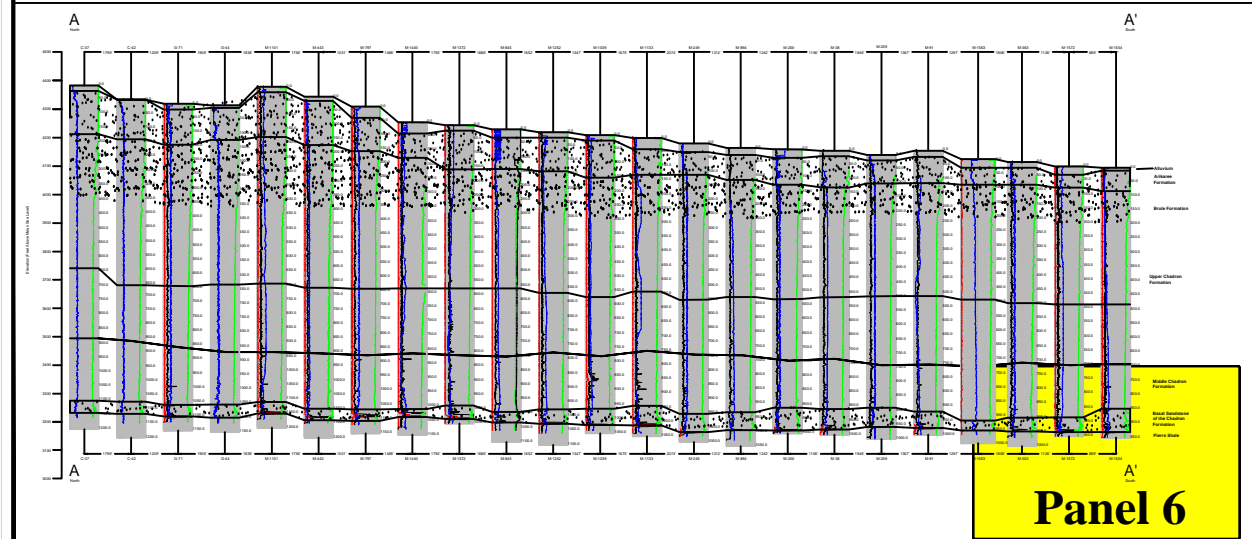
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-3s.pdf	By: WB



Marsland Cross-Section A-A' - Panel 6



CROSS-SECTION PANEL LOCATION

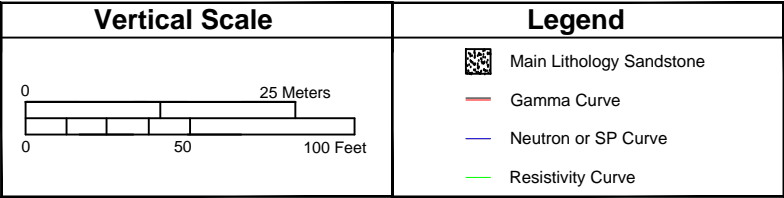
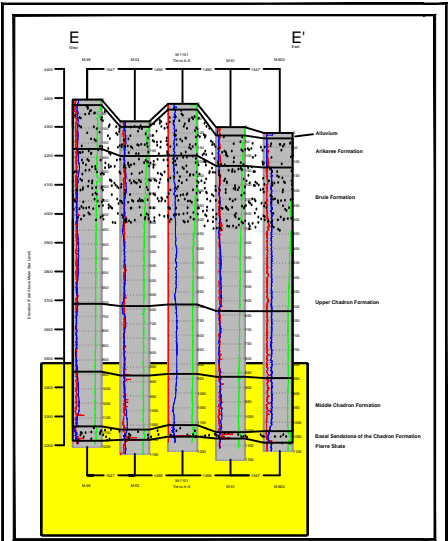
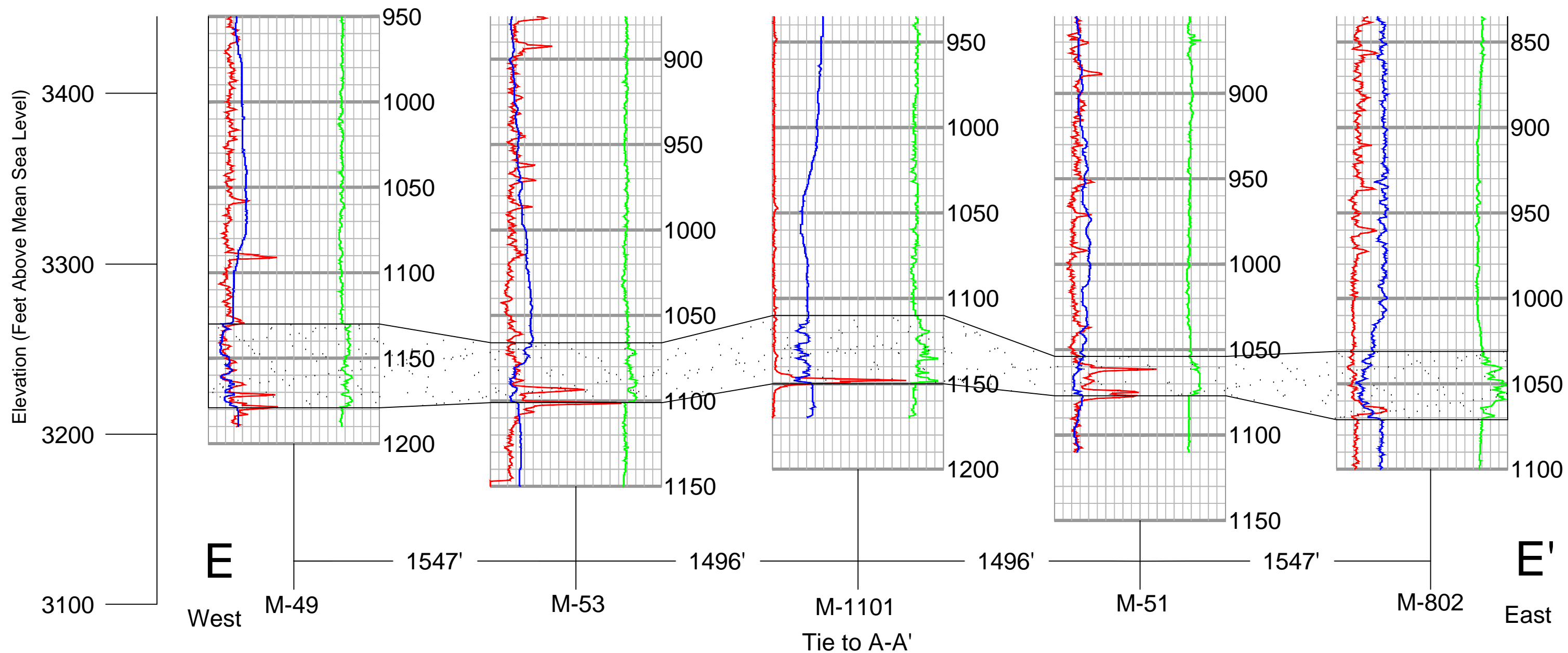


Vertical Scale	Legend
	<ul style="list-style-type: none"><li>Main Lithology Sandstone</li><li>Gamma Curve</li><li>Neutron or SP Curve</li><li>Resistivity Curve</li></ul>

<b>Crow Butte Resources, Inc.</b>	
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'

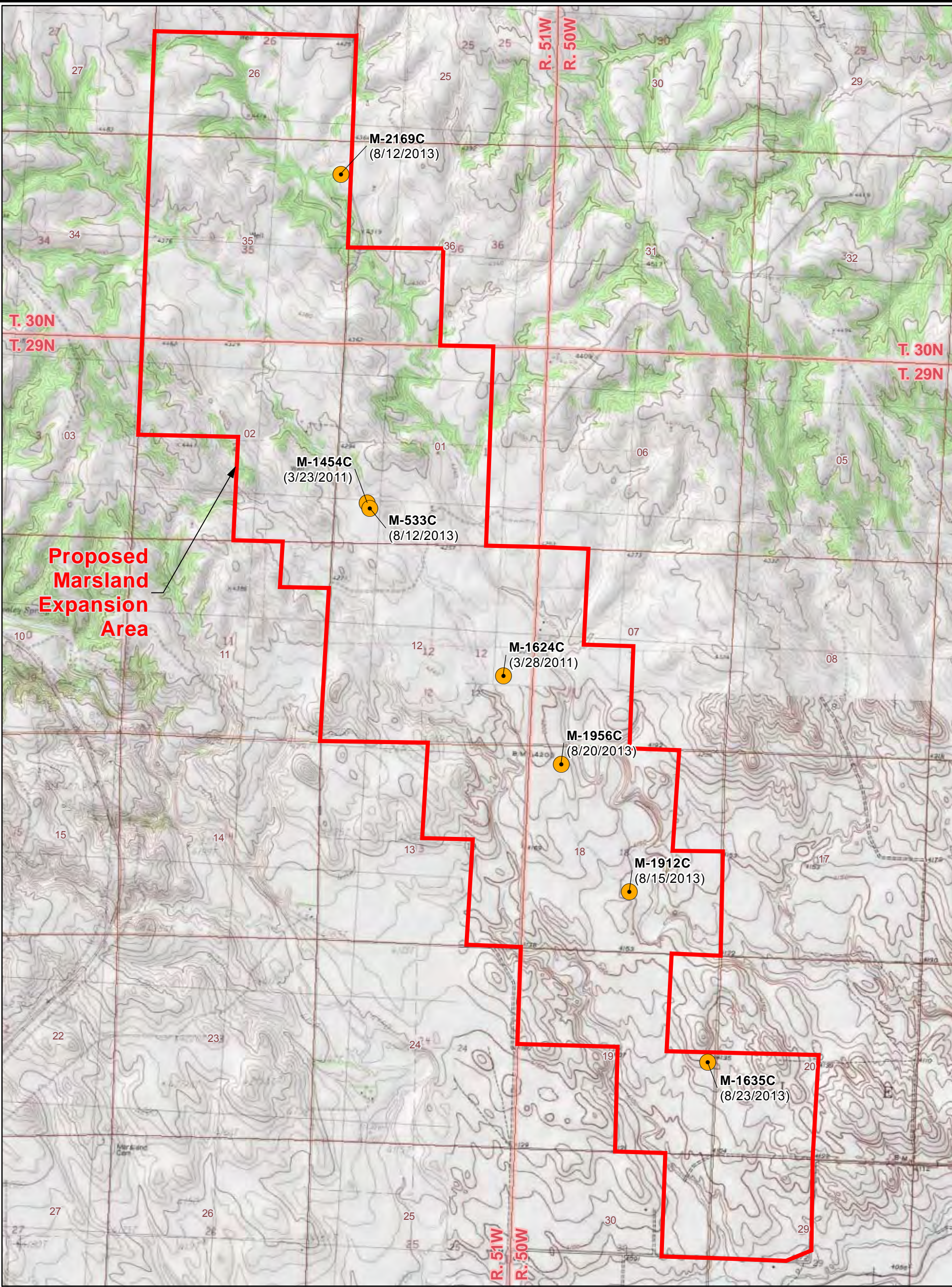


**Crow Butte Resources, Inc.**


FIGURE 2.6-3u  
EXPANDED MARSLAND  
CROSS SECTION E-E'


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






**LEGEND**

Coring Location

Proposed Marsland Expansion Area

**M-1635C** Location ID


(8/23/2013) Date of Collection

**N**

01,2502,500

Feet

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


**CROW BUTTE  
RESOURCES, INC.**

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

PROJECT: CO001636

MAPPED BY: JC

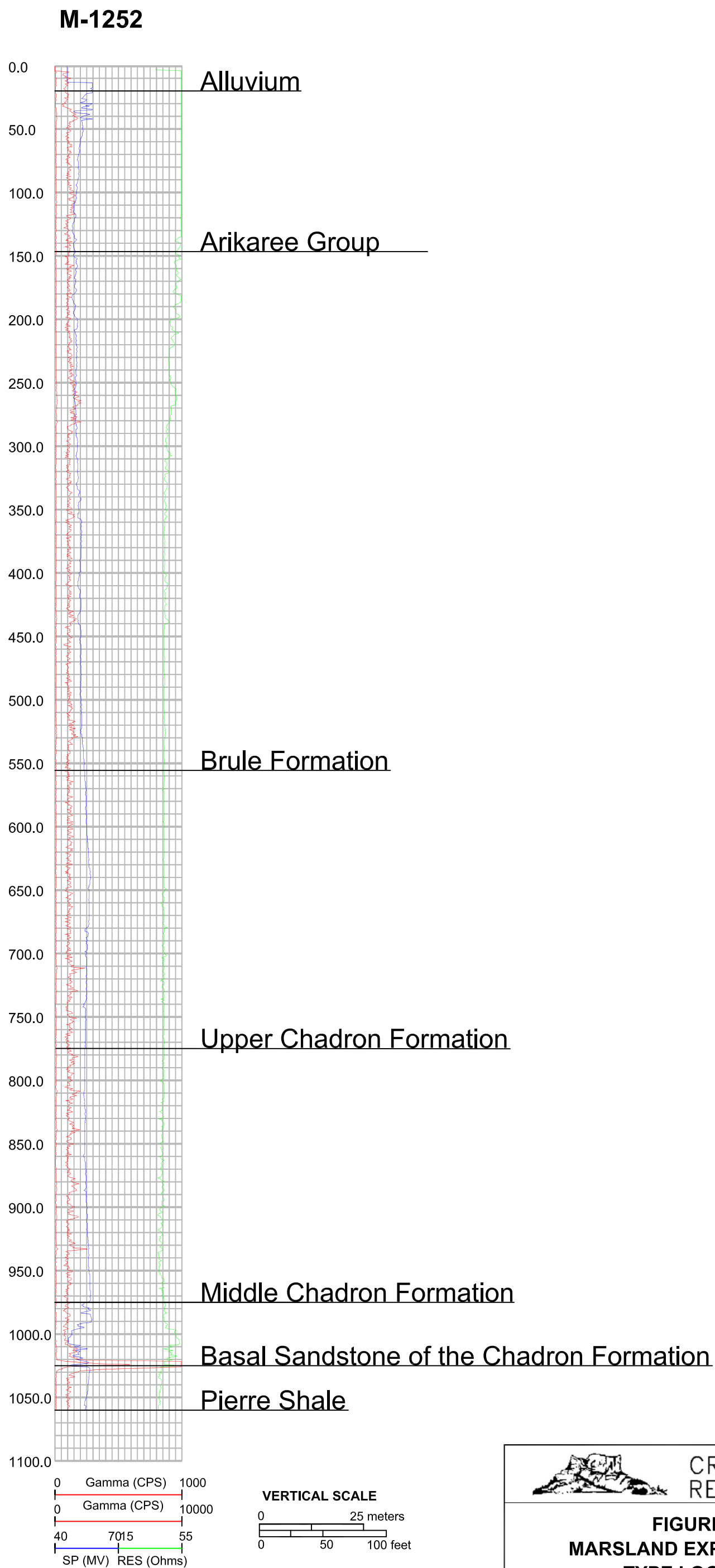
CHECKED BY: JEC

**ARCADIS**

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

70



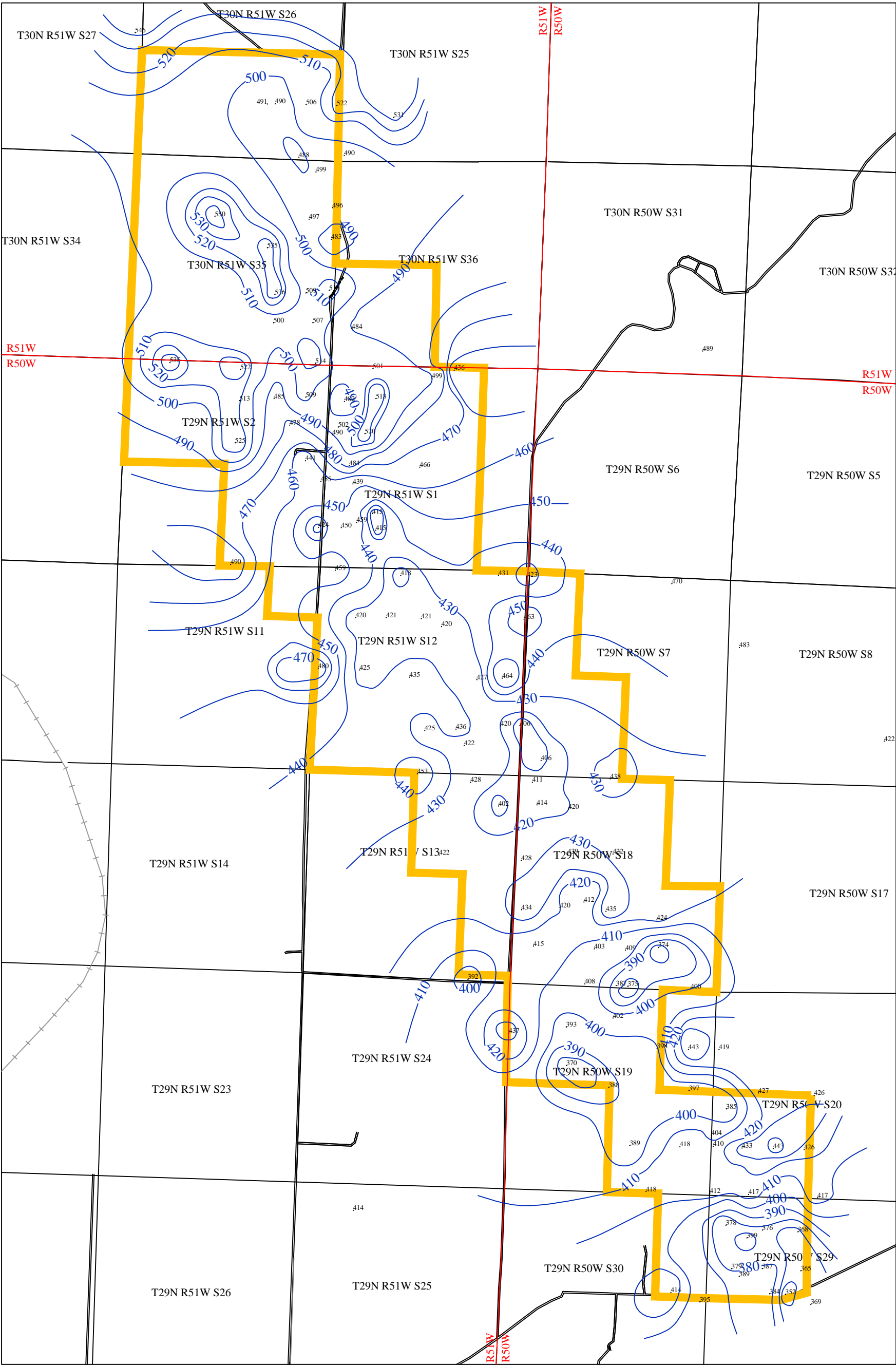


Source: Cameco Resources, 2011



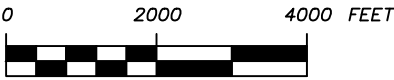
## 2





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


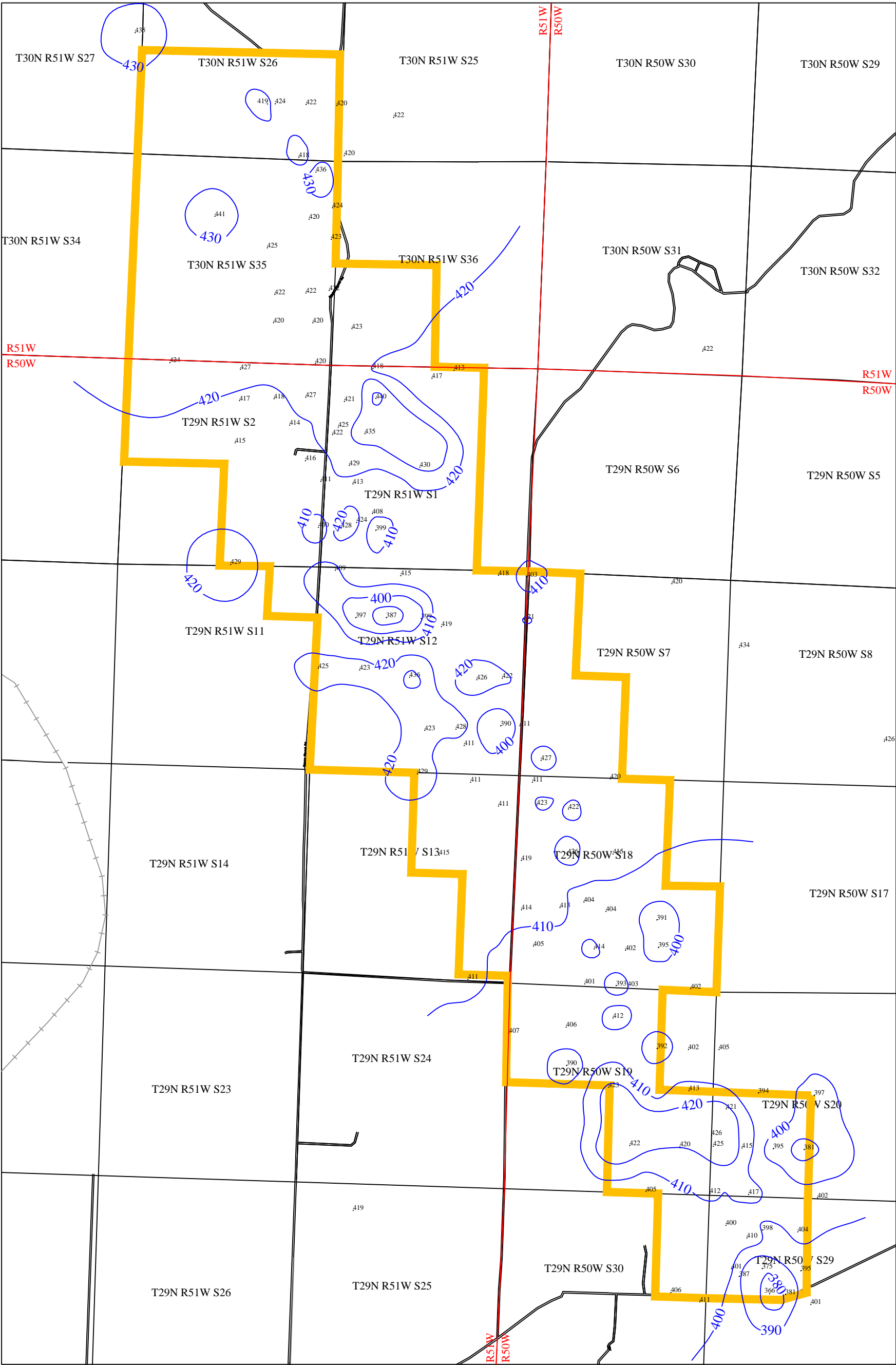
**Crow Butte  
Resources, Inc.**

Figure 2.6-7  
Marsland Isopach Map  
Brule Formation

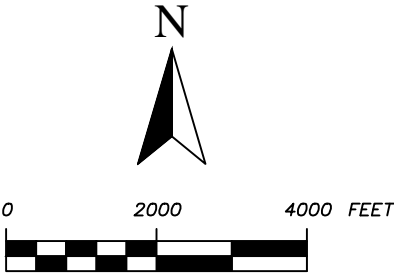
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-7.pdf	By: WB





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


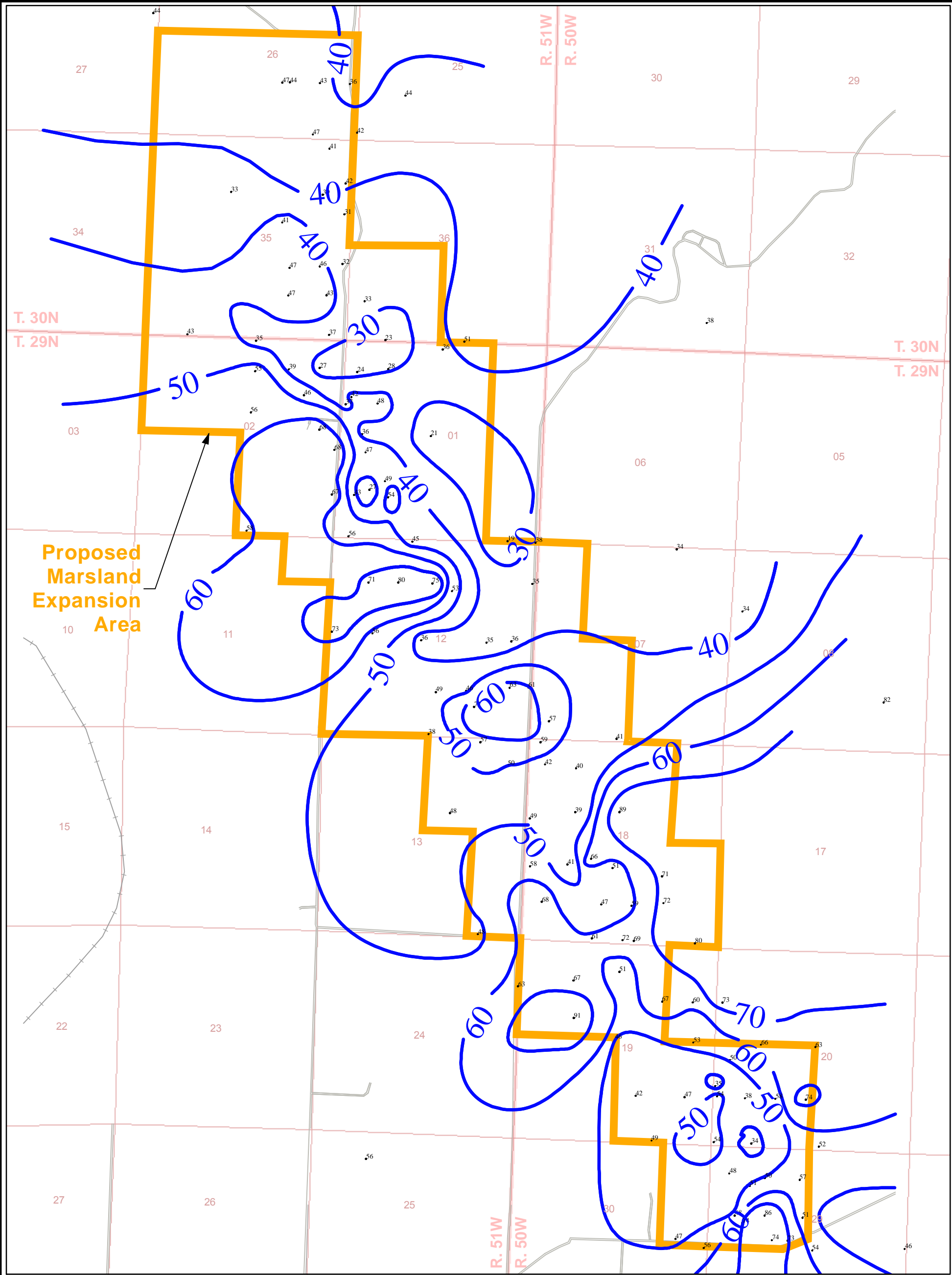
**Crow Butte  
Resources, Inc.**

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

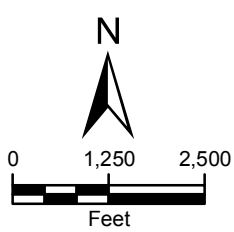
Scale: See Bar Scale	Date: September 2015
MEA_NRCTR_Figure 2.6-8.pdf	By: WB





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



CROW BUTTE  
RESOURCES, INC.

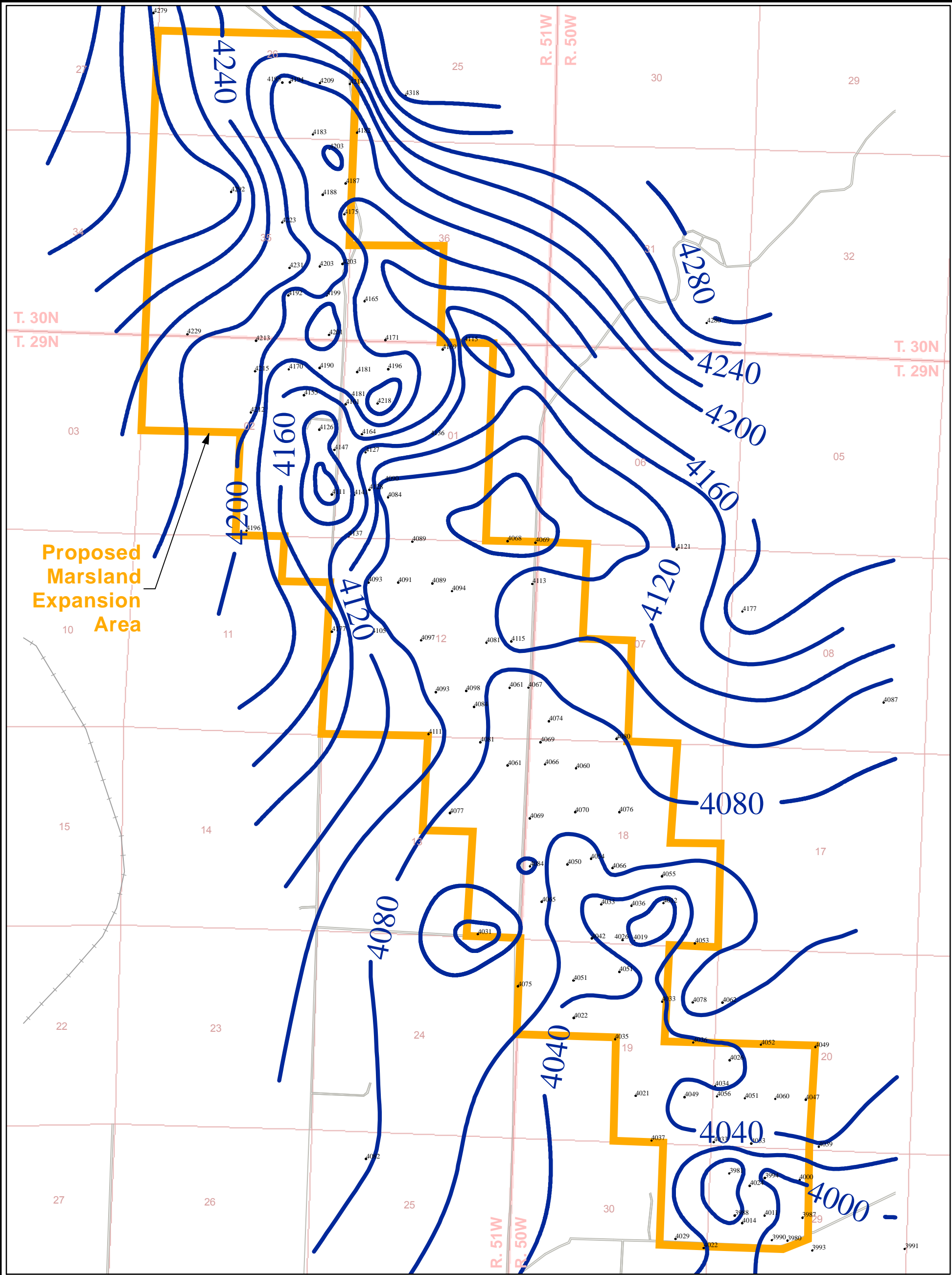
**FIGURE 2.6-9  
MARSLAND ISOPACH MAP  
BASAL SANDSTONE OF  
THE CHADRON FORMATION**

PROJECT: CO001636      MAPPED BY: JC      CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





**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

0 1,250 2,500  
Feet

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

CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.6-10**  
**MARSLAND STRUCTURE MAP**  
**TOP OF BRULE FORMATION**

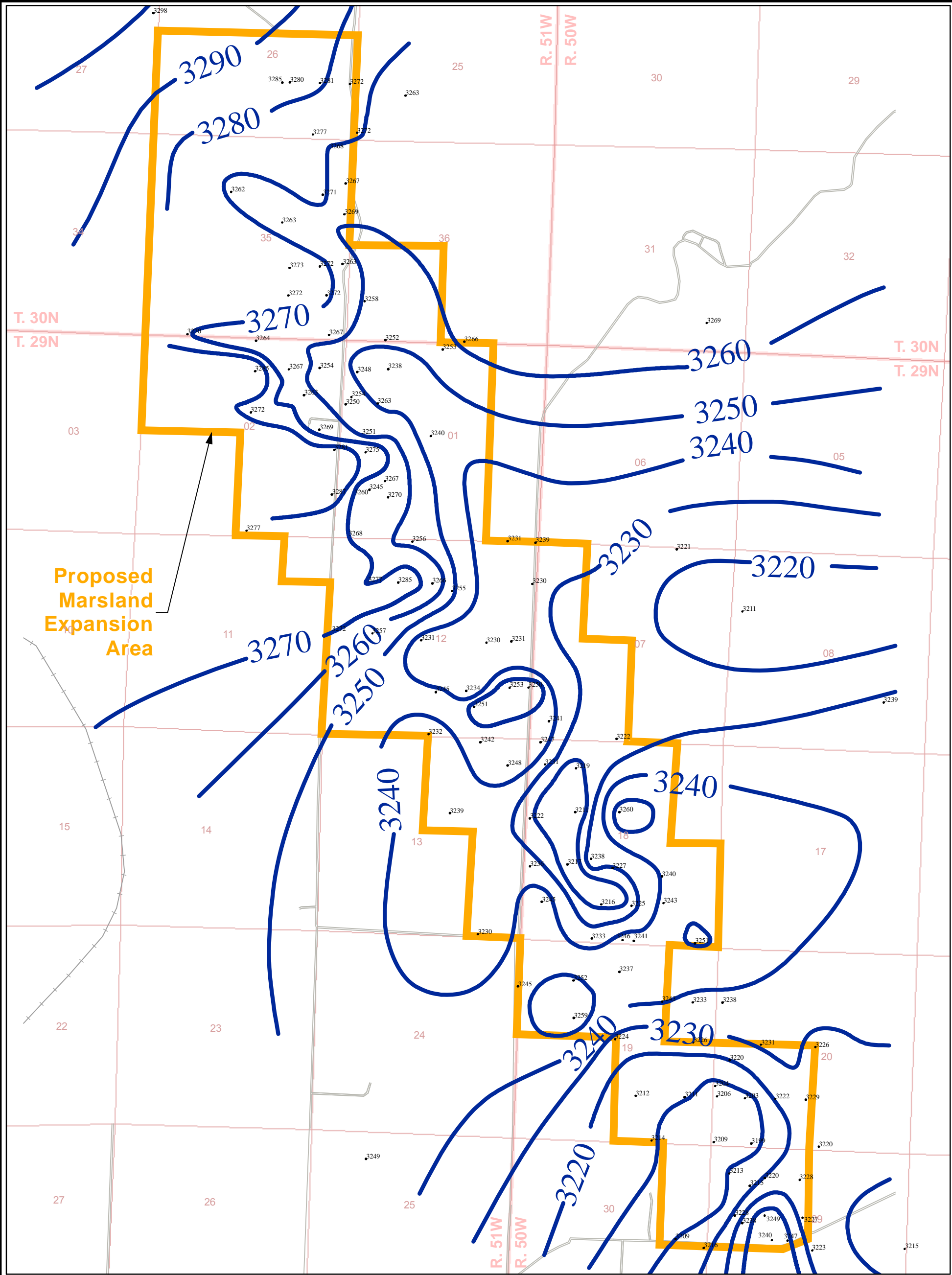
PROJECT: CO001636	MAPPED BY: JC	CHECKED BY: MS
-------------------	---------------	----------------

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



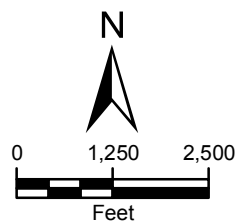








FT-AMSL = Feet Above Mean Sea Level



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



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.6-13  
MARSLAND STRUCTURE MAP  
TOP OF PIERRE SHALE**

PROJECT: CO001636

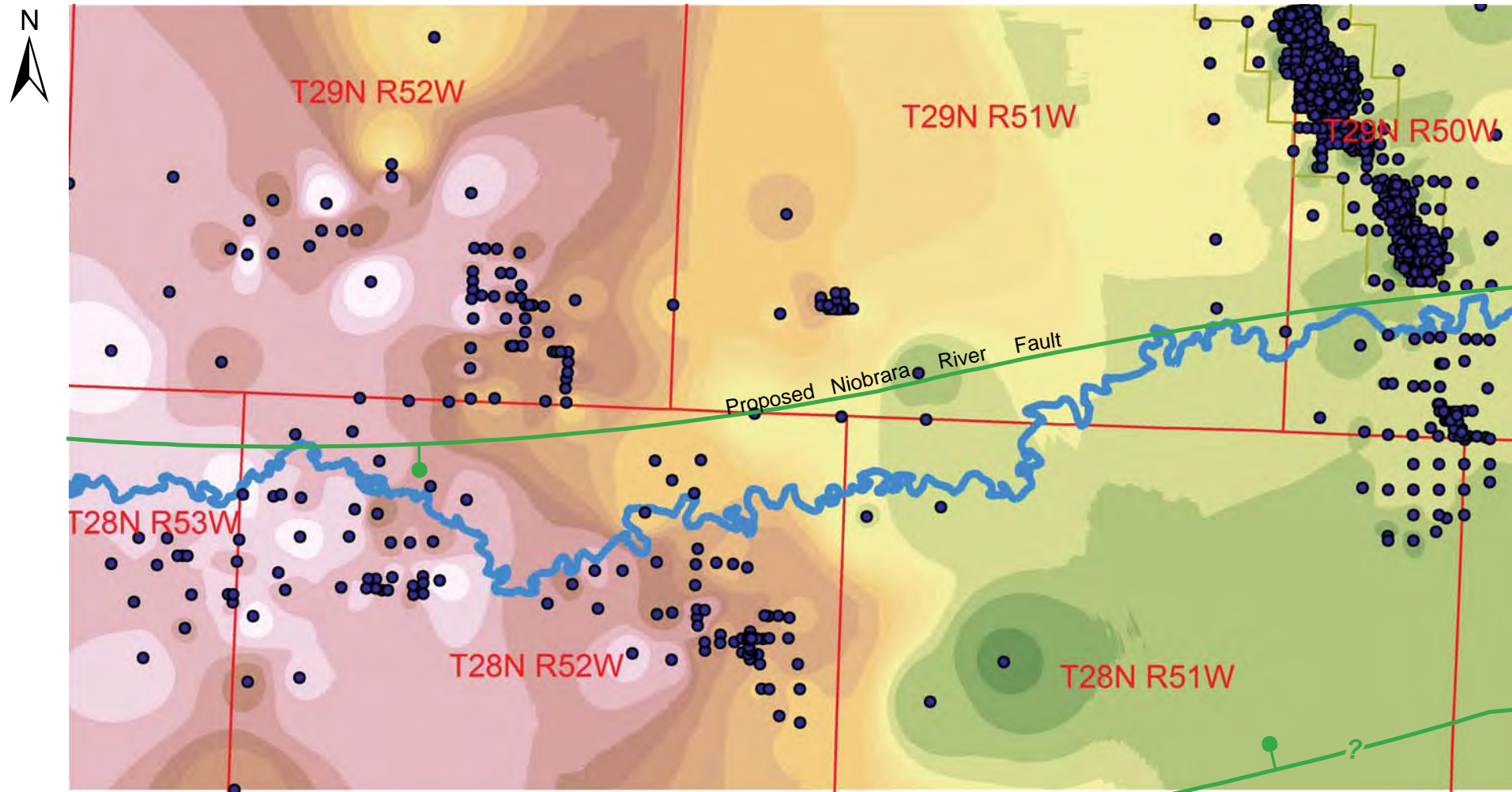
MAPPED BY: JC

CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
[www.arcadis-us.com](http://www.arcadis-us.com)





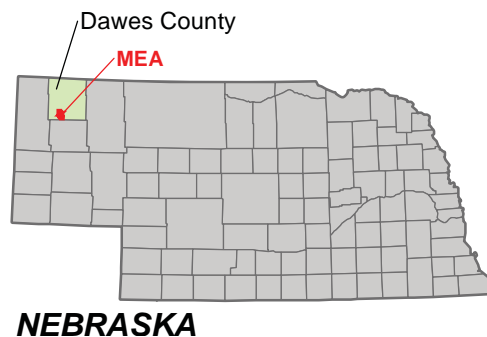
## LEGEND

- 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  
RESOURCES, INC.

## FIGURE 2.6-14 REGIONAL STRUCTURE CONTOUR MAP - TOP OF PIERRE SHALE

PROJECT: CO001636.00001

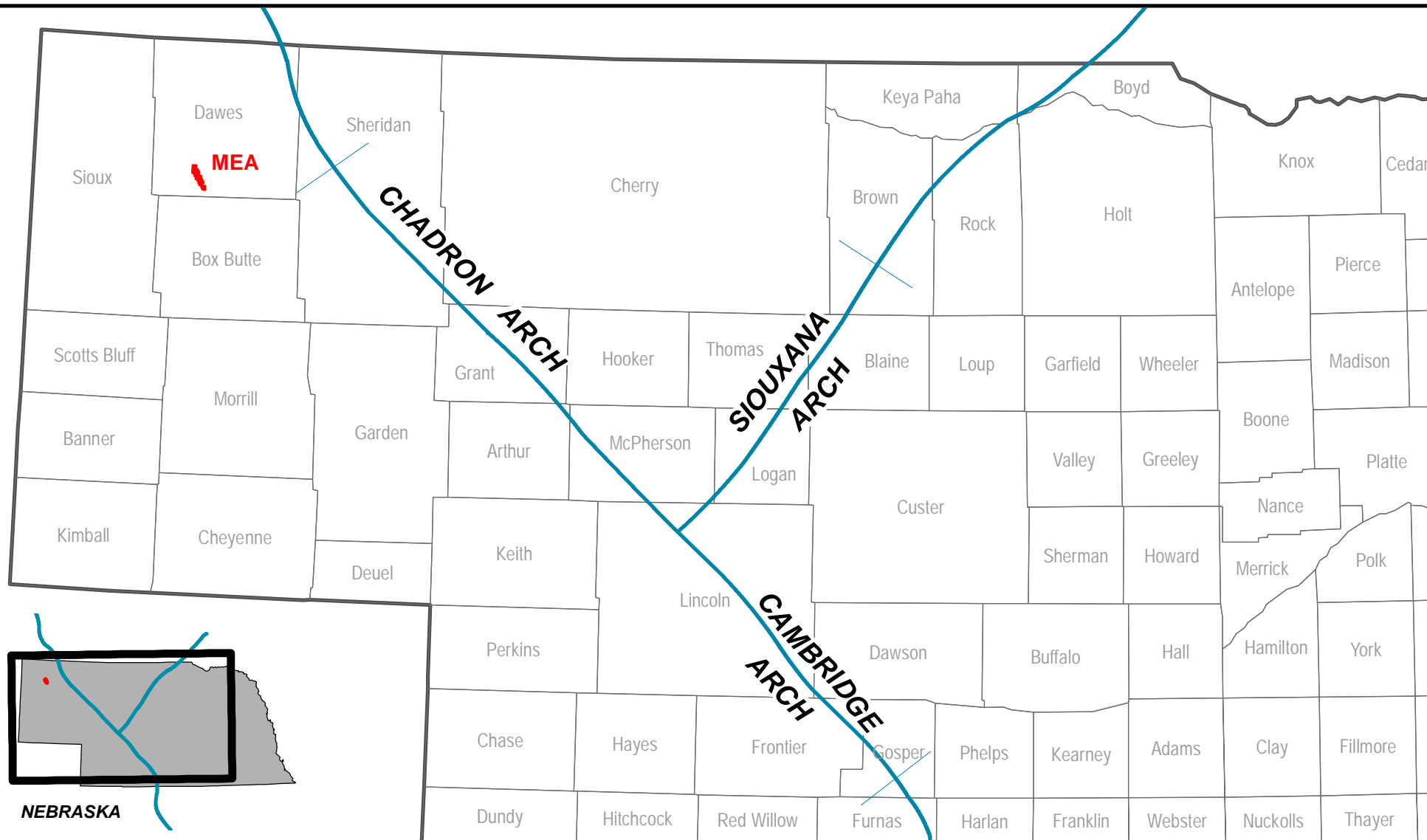
MAPPED BY: JC

CHECKED BY: JEC



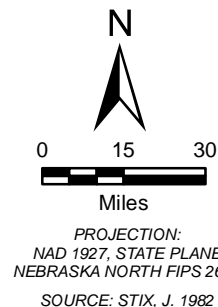
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





# **LEGEND**

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



**CROW BUTTE  
RESOURCES, INC.**

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

PROJECT: CO001636

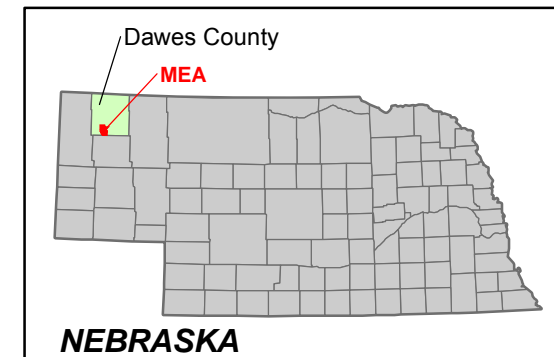
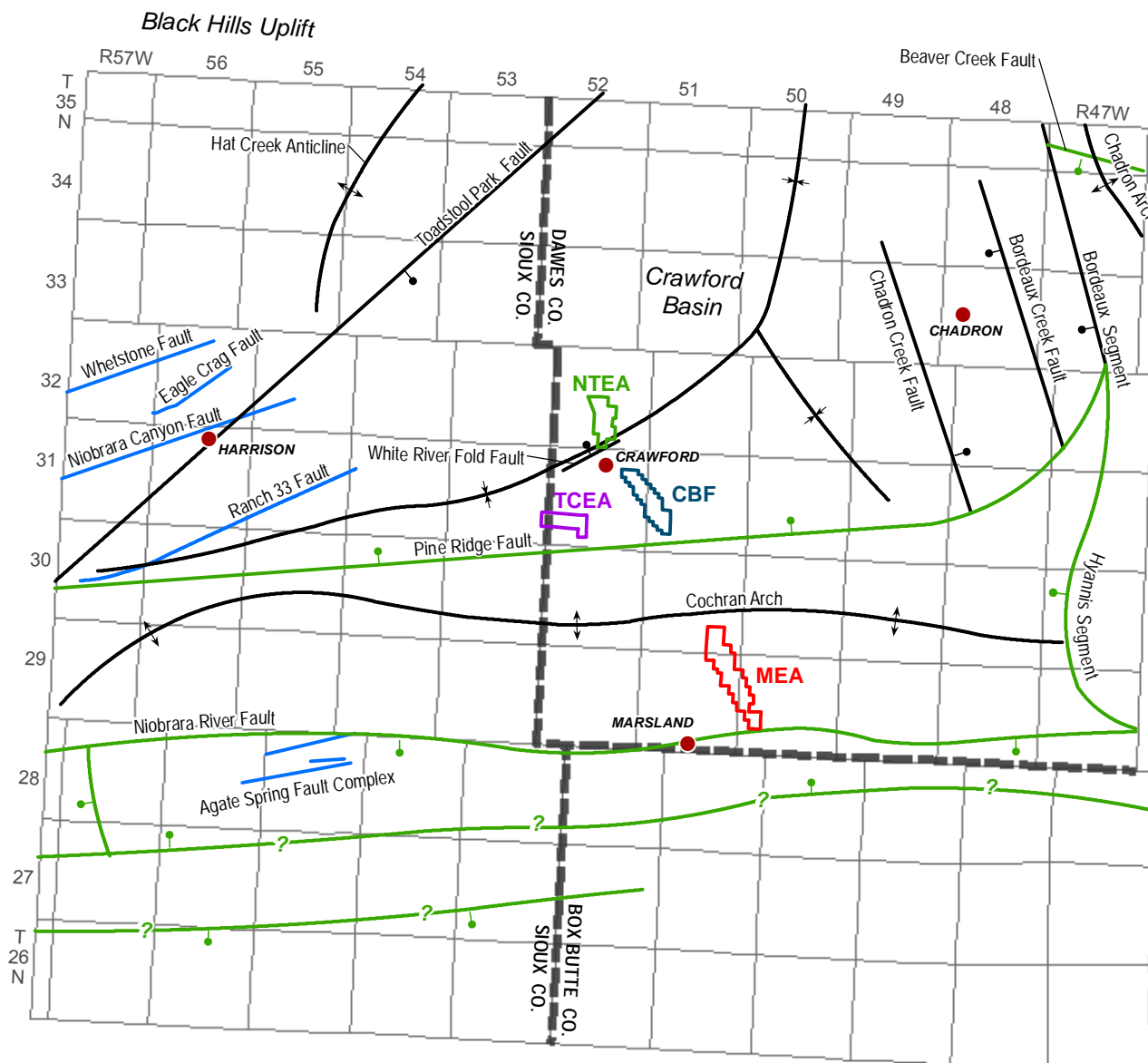
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





### 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)



**CROW BUTTE  
RESOURCES, INC.**

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

PROJECT: CO001636

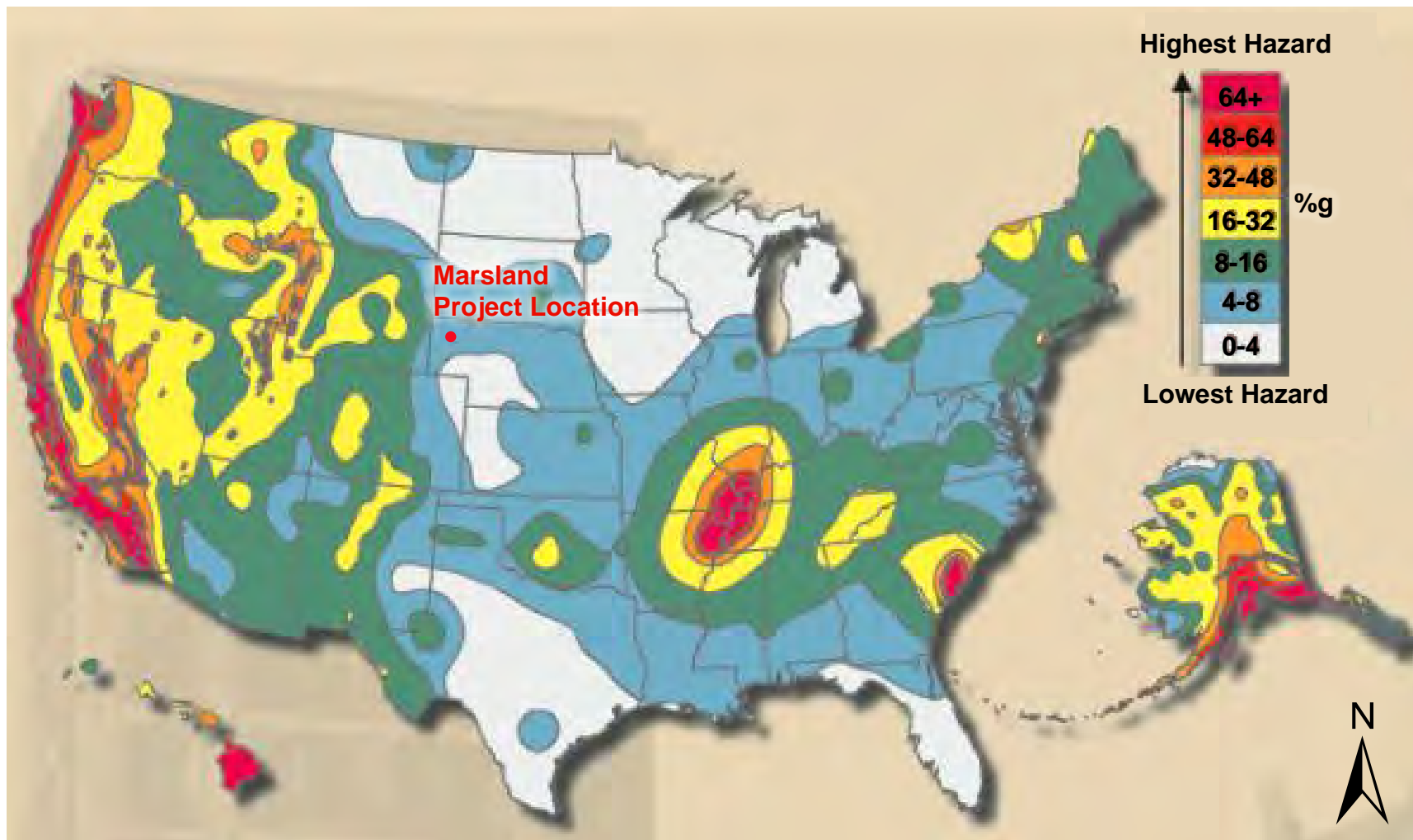
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





**CROW BUTTE  
RESOURCES, INC.**

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

PROJECT: CO001636.00001

MAPPED BY: JC

CHECKED BY: JEC

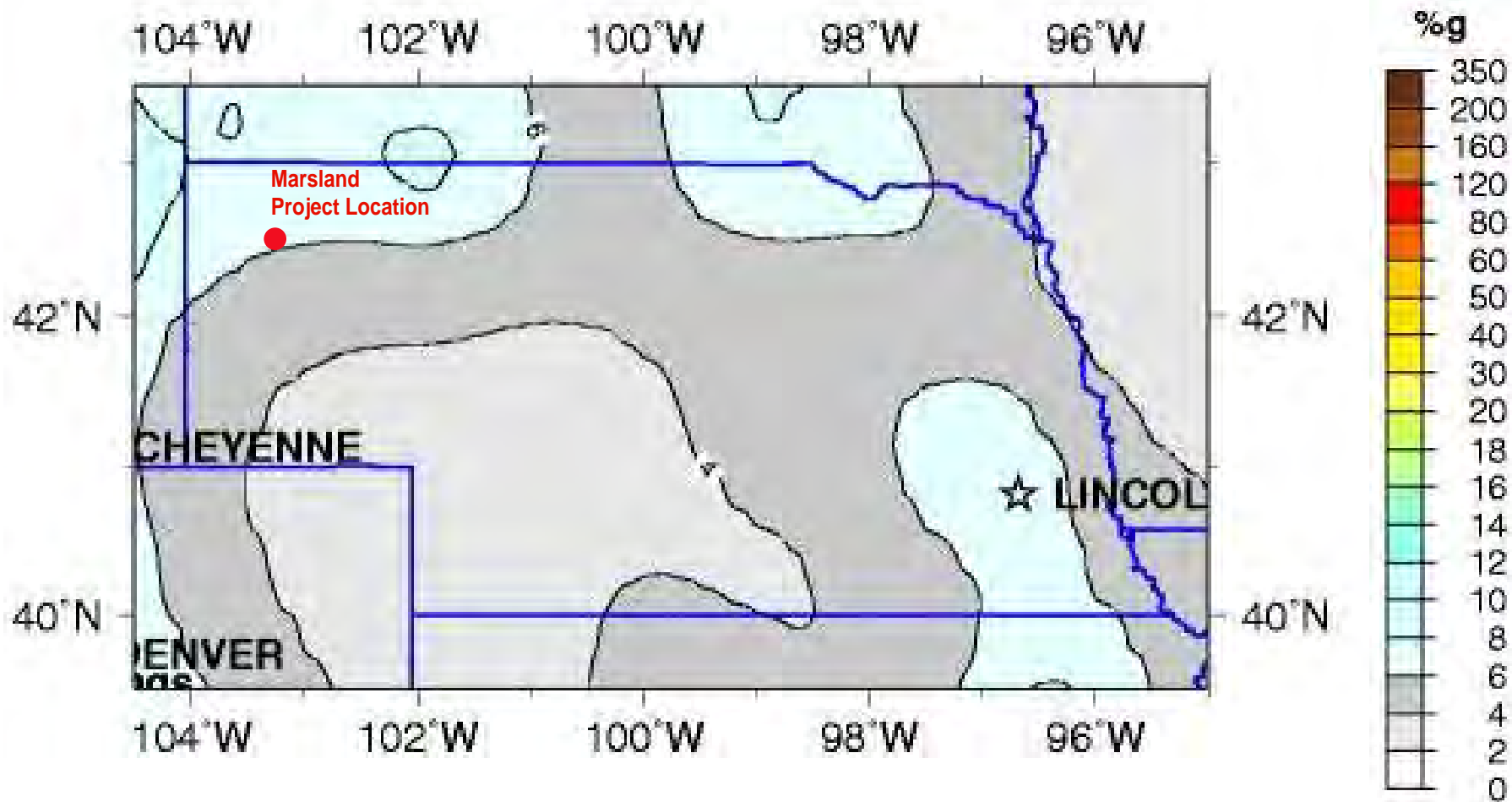


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

83



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)



CROW BUTTE  
RESOURCES, INC.

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

PROJECT: CO0016 6.00001

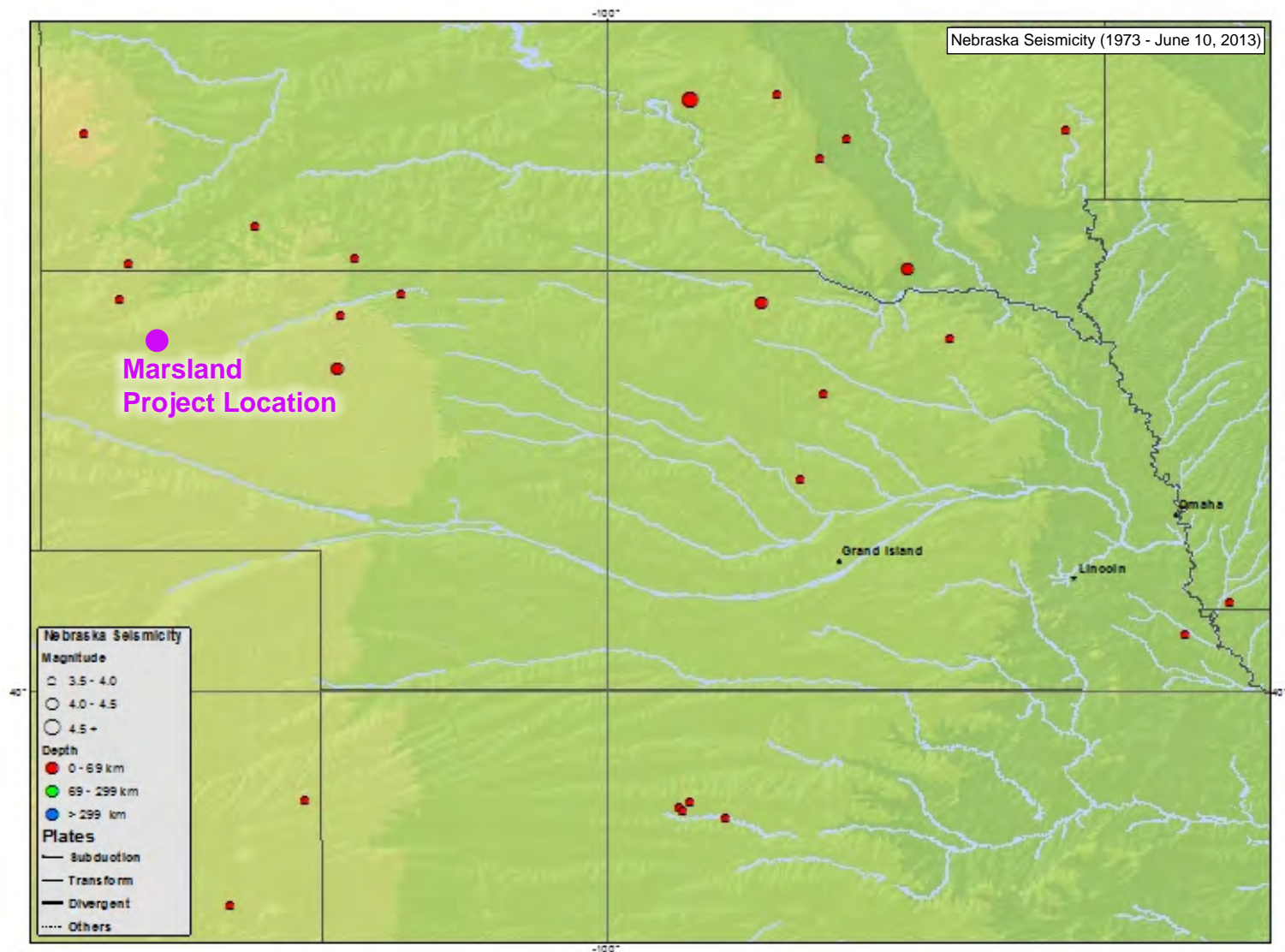
MAPPED BY: JC

CHECKED BY: LW



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**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

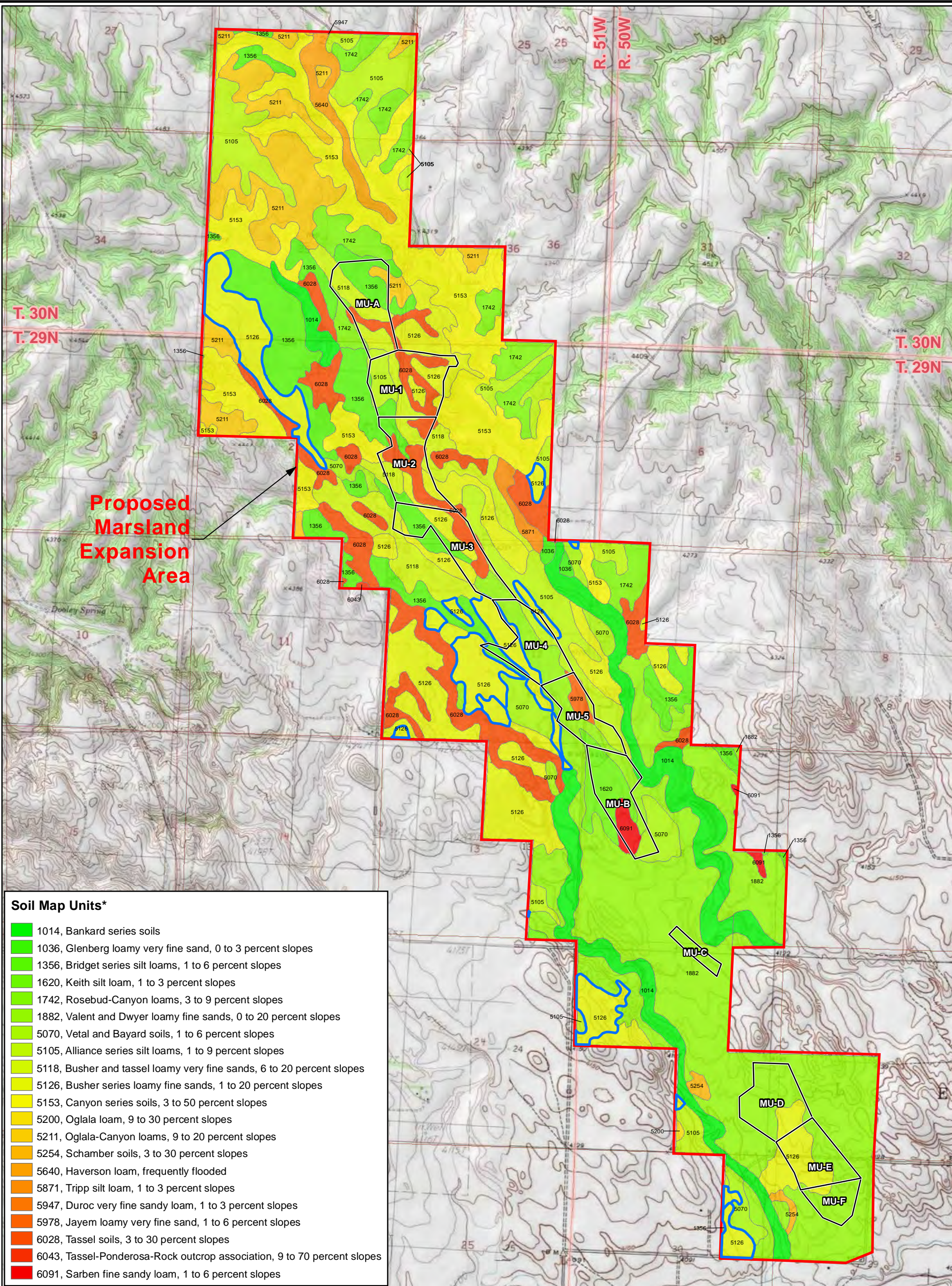
CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
[www.arcadis-us.com](http://www.arcadis-us.com)

85



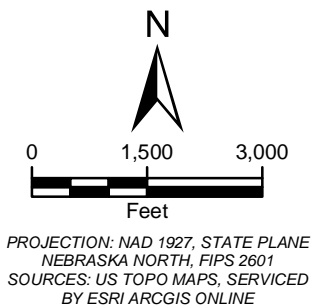


- Soil Map Units\***
- 1014, Bankard series soils
  - 1036, Glenberg loamy very fine sand, 0 to 3 percent slopes
  - 1356, Bridget series silt loams, 1 to 6 percent slopes
  - 1620, Keith silt loam, 1 to 3 percent slopes
  - 1742, Rosebud-Canyon loams, 3 to 9 percent slopes
  - 1882, Valent and Dwyer 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.



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.6-20  
SOILS**

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: CM



ARCADIS  
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Marsland 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			

FIGURE 2.6-21

Regional Geologic Cross-Section

Location Map

Marsland 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

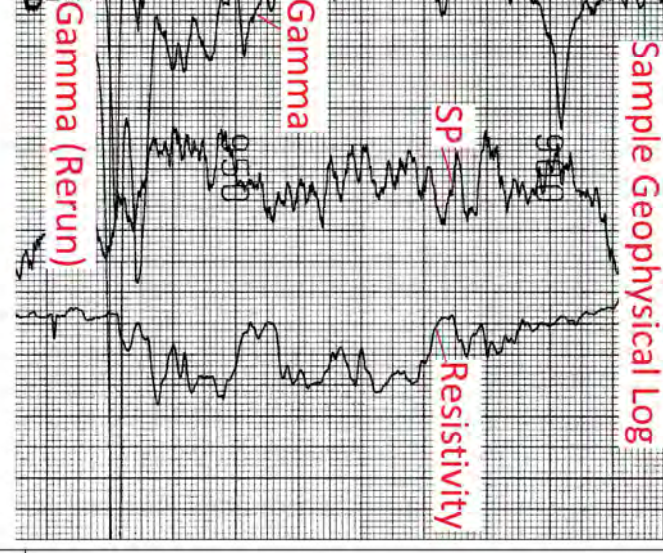
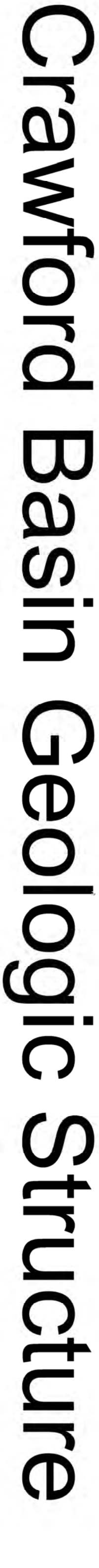
Selected Cameco Resources Drill Hole Used On Cross-Sections

Cross-Section Line

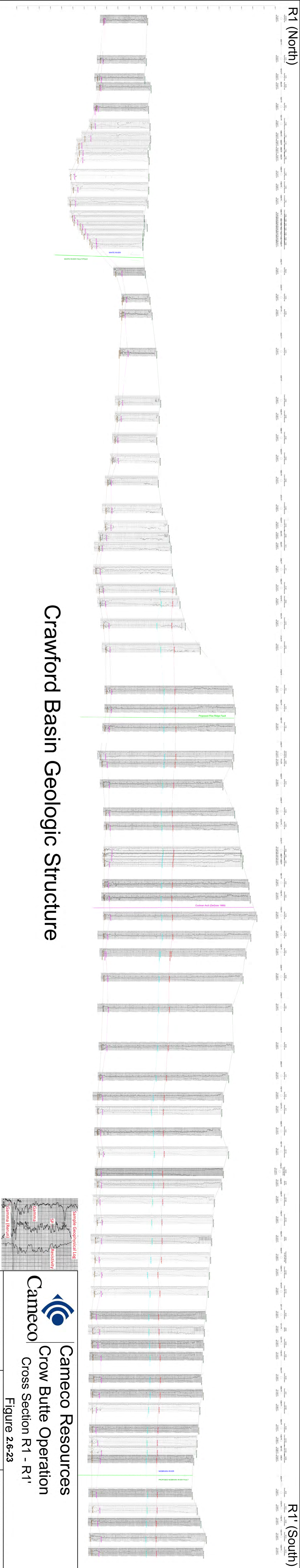
0123

Scale In Miles









# Crawford Basin Geologic Structure

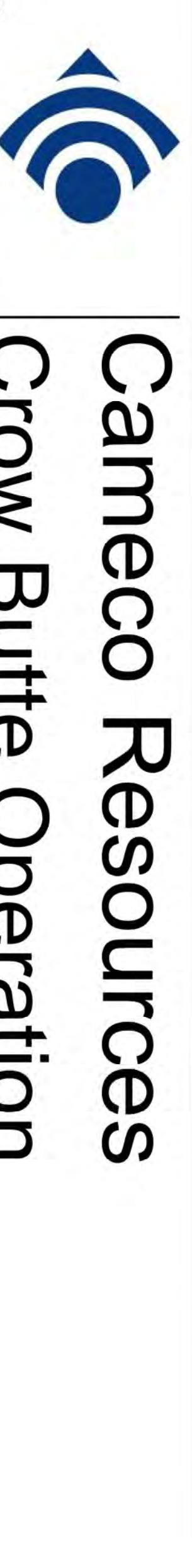


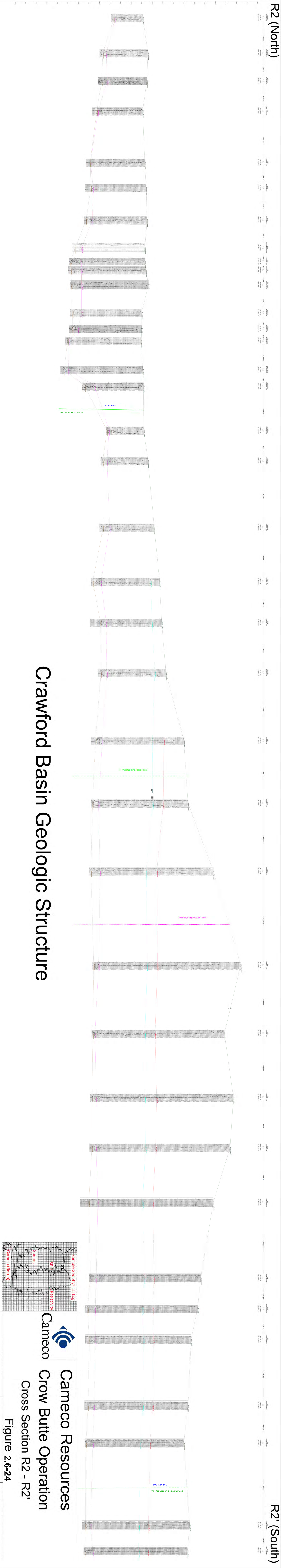
Figure 2.6-23

Date: SEPTEMBER 2015

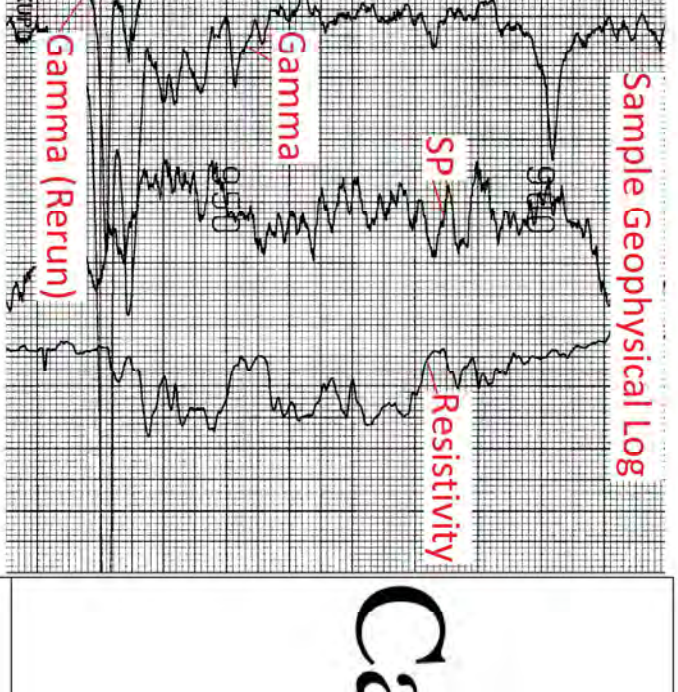
Department: Land & Evaluation


Vertical Exaggeration = 10X





# Crawford Basin Geologic Structure





**Cameco Resources**

**Crow Butte Operation**

**Cross Section R2 - R2'**

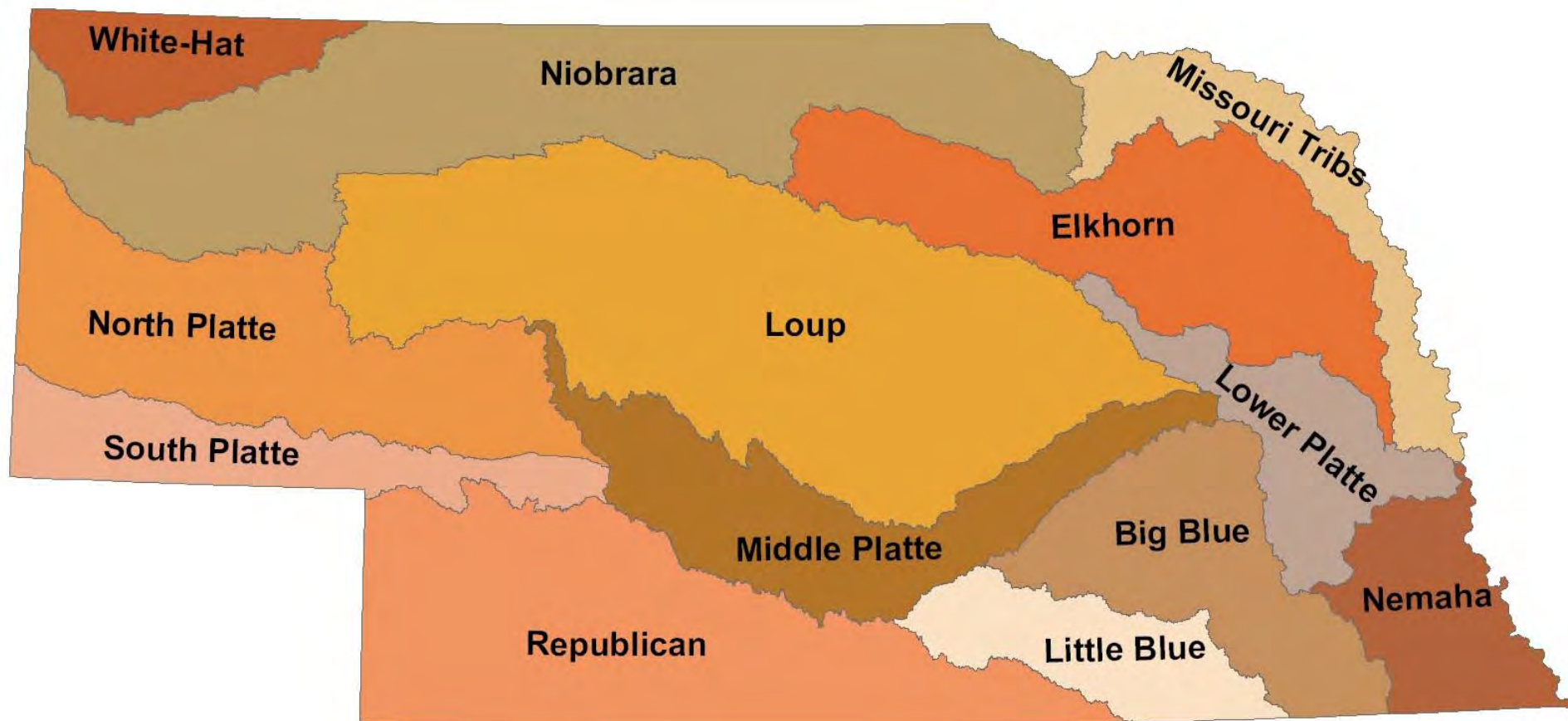
**Figure 2.6-24**

Date: September 2015

Department: Land & Evaluation

Vertical Exaggeration: 10X





**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 2.7-1  
NEBRASKA'S MAJOR RIVER BASINS**

PROJECT: CO001636

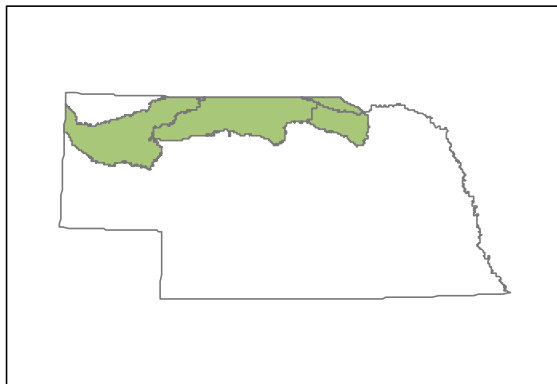
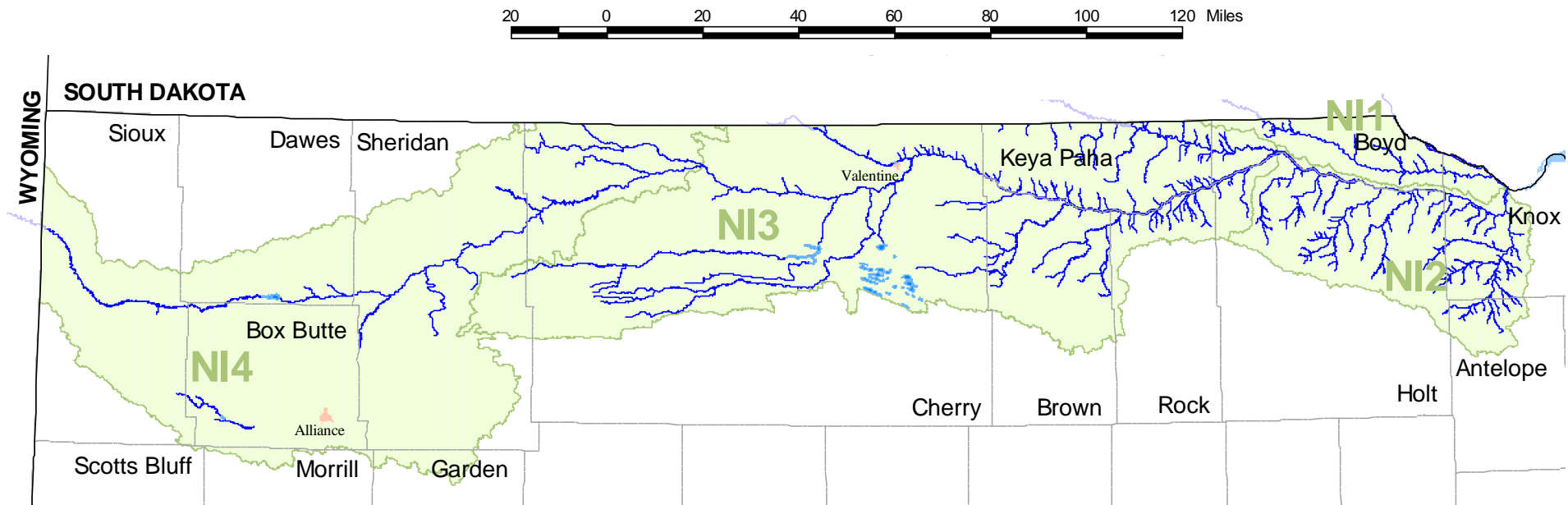
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
[www.arcadis-us.com](http://www.arcadis-us.com)





Source: NDEQ, 2009



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 2.7-2  
NIOBRARA RIVER BASIN  
(AND SUBBASINS)**

PROJECT: CO001636

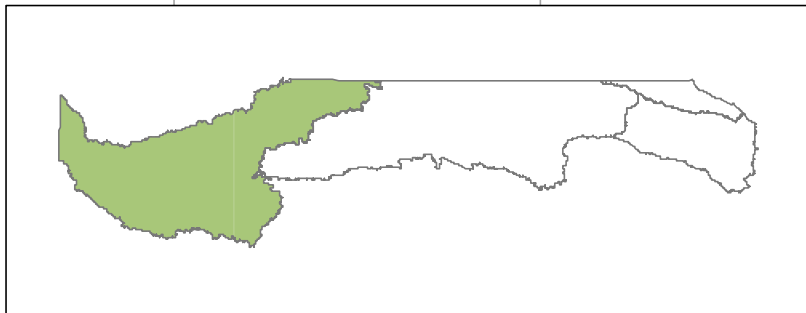
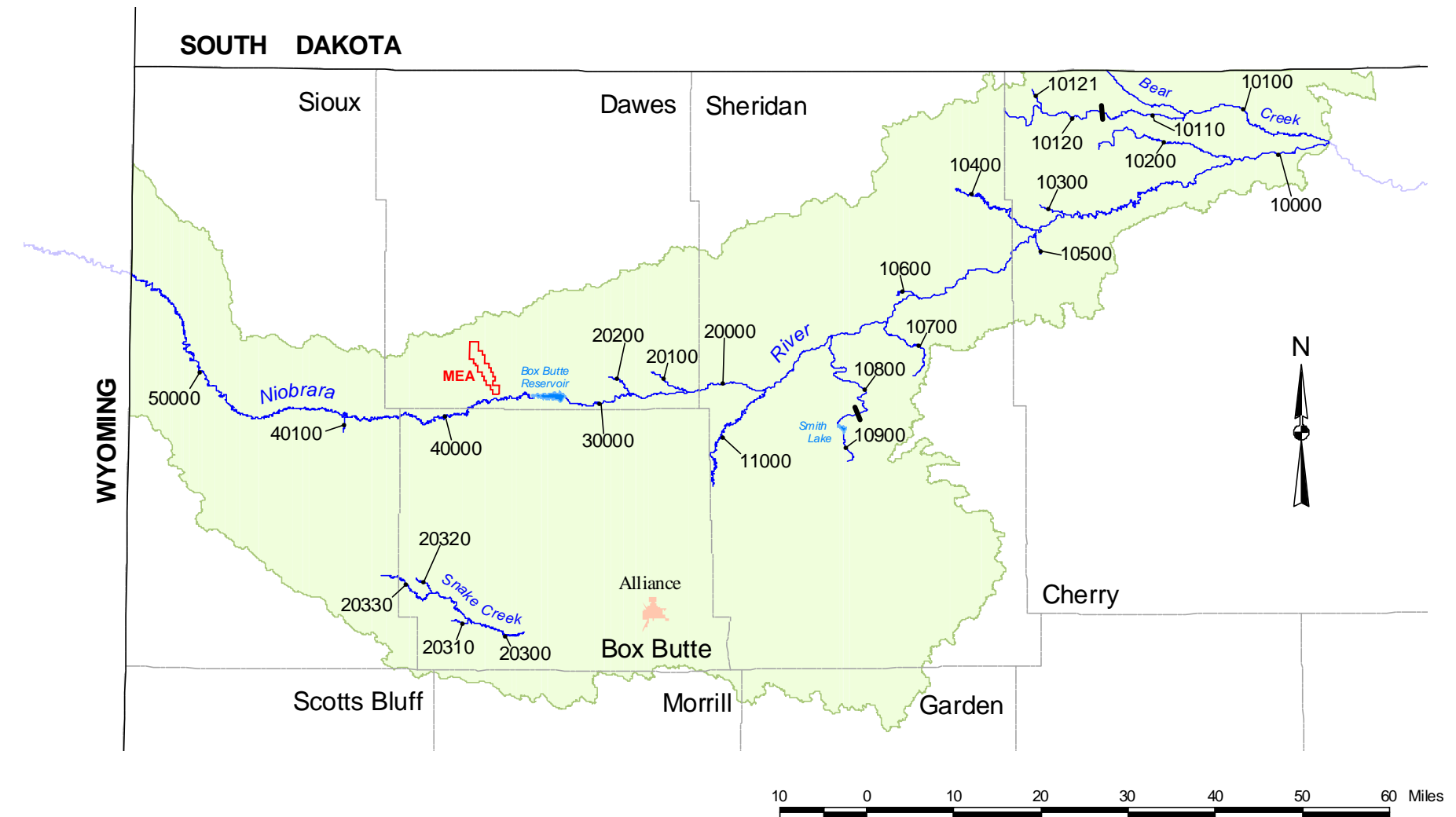
MAPPED BY: JC

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: NDEQ, 2009



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 2.7-3  
NIOBRARA RIVER SUBBASIN N14**

PROJECT: CO001636

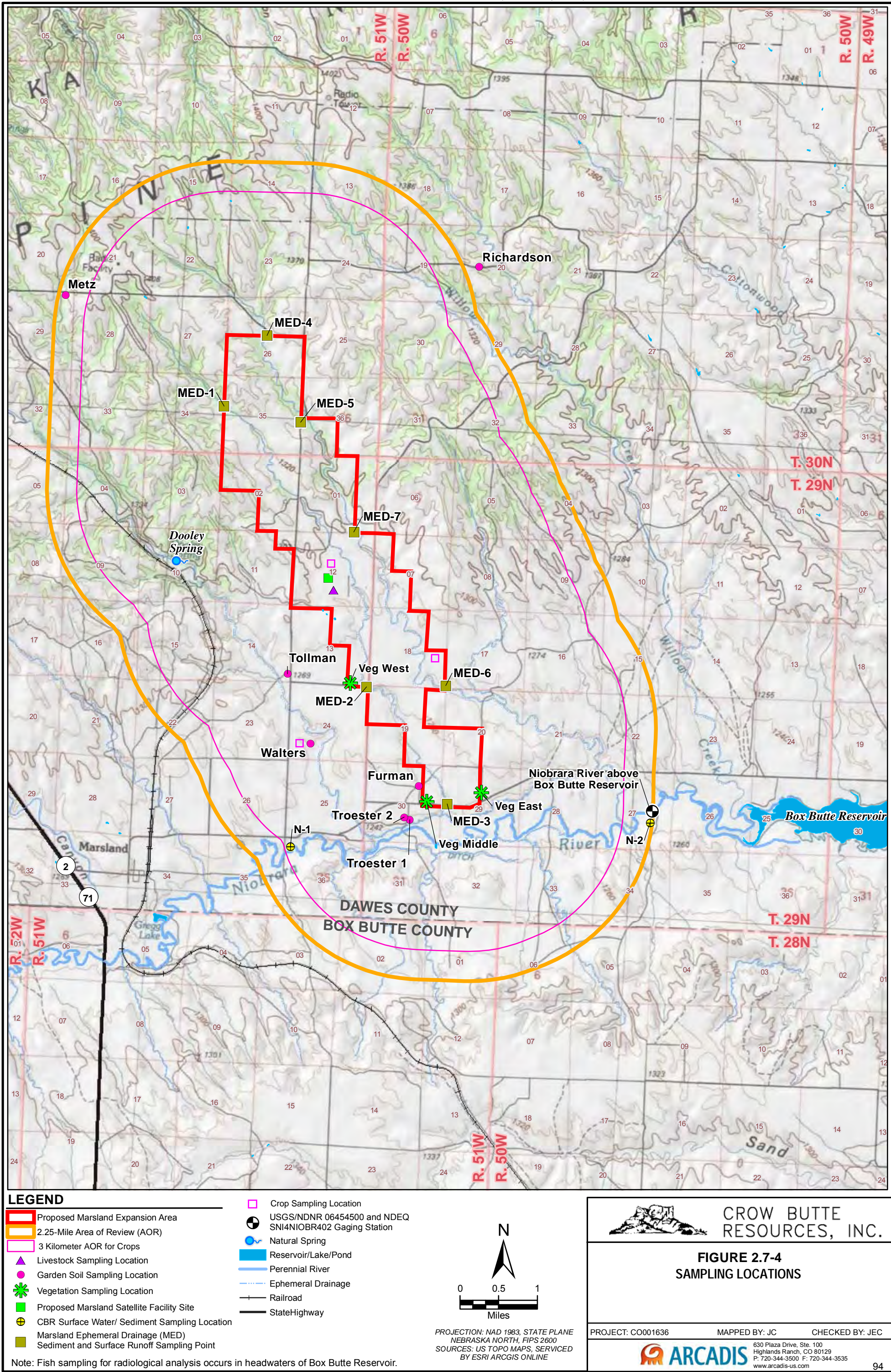
MAPPED BY: JC

CHECKED BY: JEC



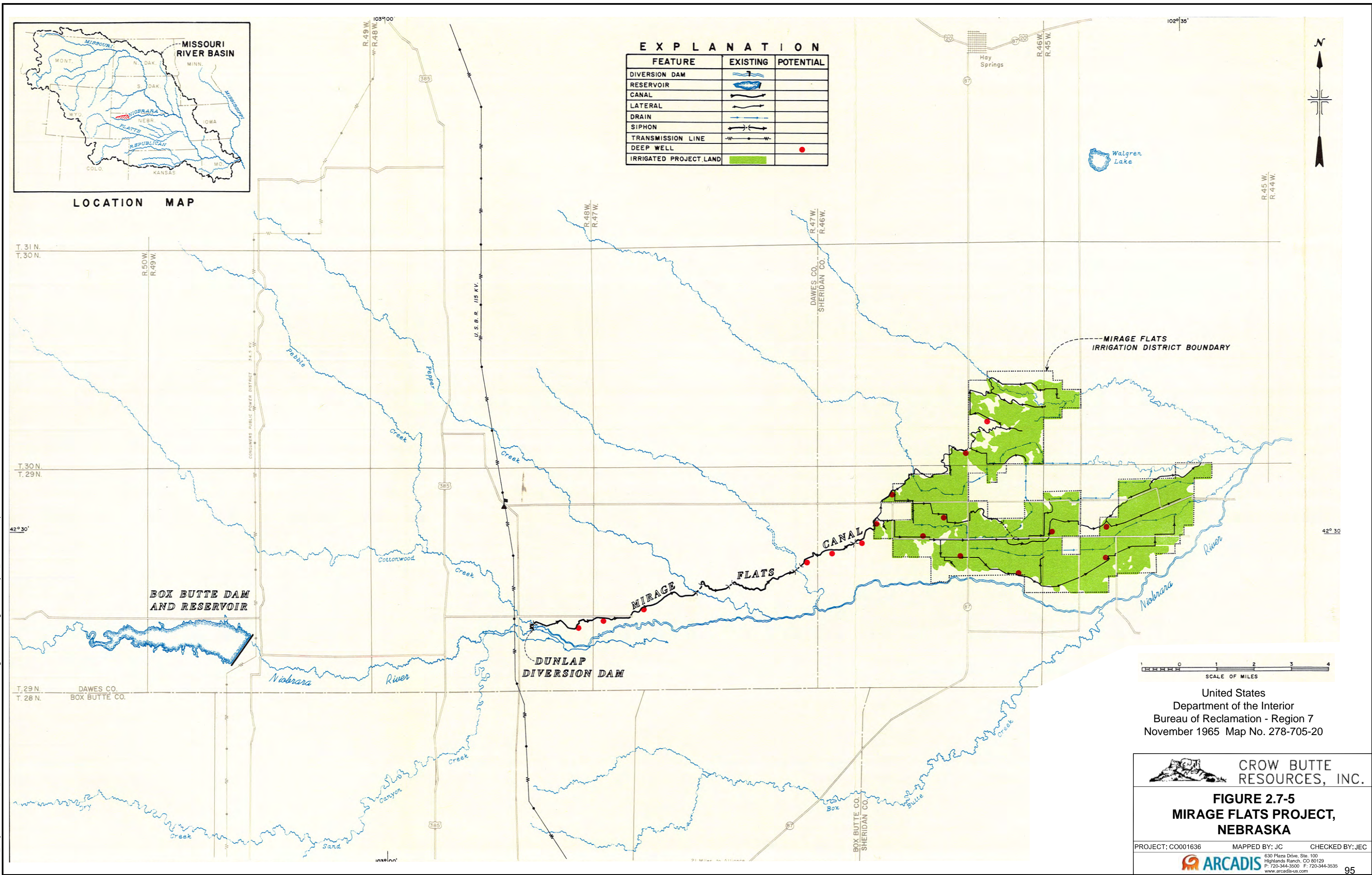
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



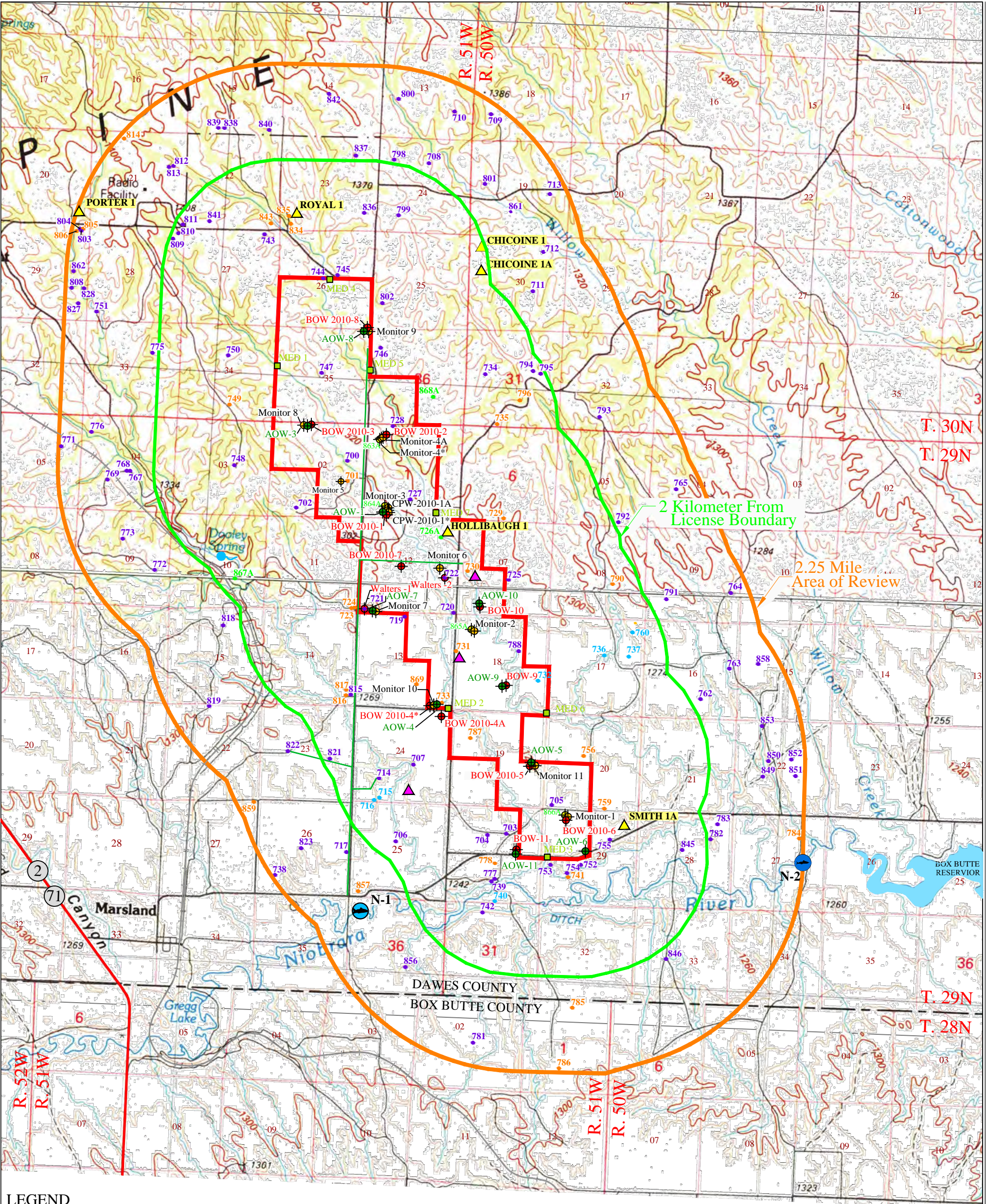




K:\CBR\_Projects\CO001636\_Marland\3\_IMAGES\Illustrator\TR Figure 2.7-5 Mirage Flats Project\_11x17Landscape.ai @ 10/15/2011







Proposed Marsland Expansion Area

Area of Review (AOR)

2 Kilometer Boundary From License Boundary

Surface Water/Fish Sampling Location

Ephemeral Drainage Sediment Sampling Point

Natural Spring

Monitor-1

Basal Sandstone of the Chadron Formation Well and Well ID

BOW-2010-1

Brule Formation Well and Well ID

AOW-1

Arikaree Group Well and Well ID

866A

Abandoned Chadron Monitor Well and Well ID

Sand/Gravel pit, Inactive

Oil/Gas Test holes

781

Active Well and Well ID

786

Inactive Well and Well ID

732

Seasonal Well and Well ID

726A

Abandoned Well and Well ID

Powerline

Railroad

\* BOW-2010-4 and Monitor 4 are inactive and scheduled to be abandoned.

N

0

2000

4000

6000

FEET

PROJECTION: NAD 1983, STATE PLANE NEBRASKA NORTH, FIPS 2600

SOURCES: US TOPO MAPS - USGS

CAMECO RESOURCES

CROW BUTTE OPERATIONS

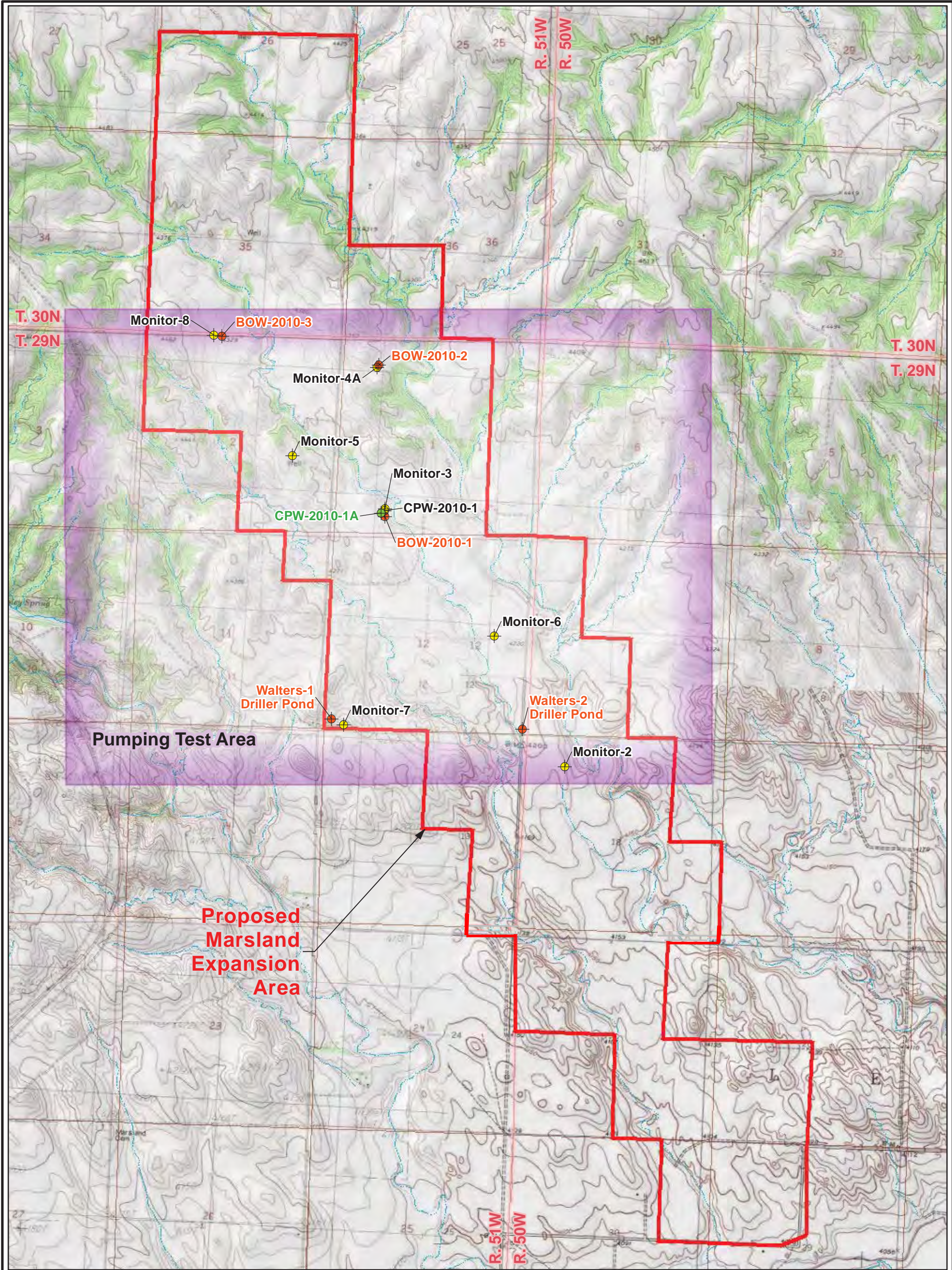
Figure 2.7-6

MAJOR SURFACE FEATURES/STRUCTURES WITHIN AOR AS PER TITLE 122, CHAPTER 11, SECTION 006.09

File C:\Users\ca200049\Desktop\Marsland Permitting\NRC TR Figure 2.7-6.dwg

96

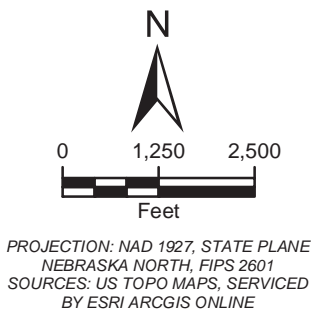




LEGEND

Pumping Test Monitoring Wells

- Basal Chadron Sandstone Well
- Basal Chadron Sandstone Well (Pumping Well)
- Brule Formation Well
- Proposed Marsland Expansion Area
- Pumping Test Area
- Intermittent Stream/River



CROW BUTTE  
RESOURCES, INC.

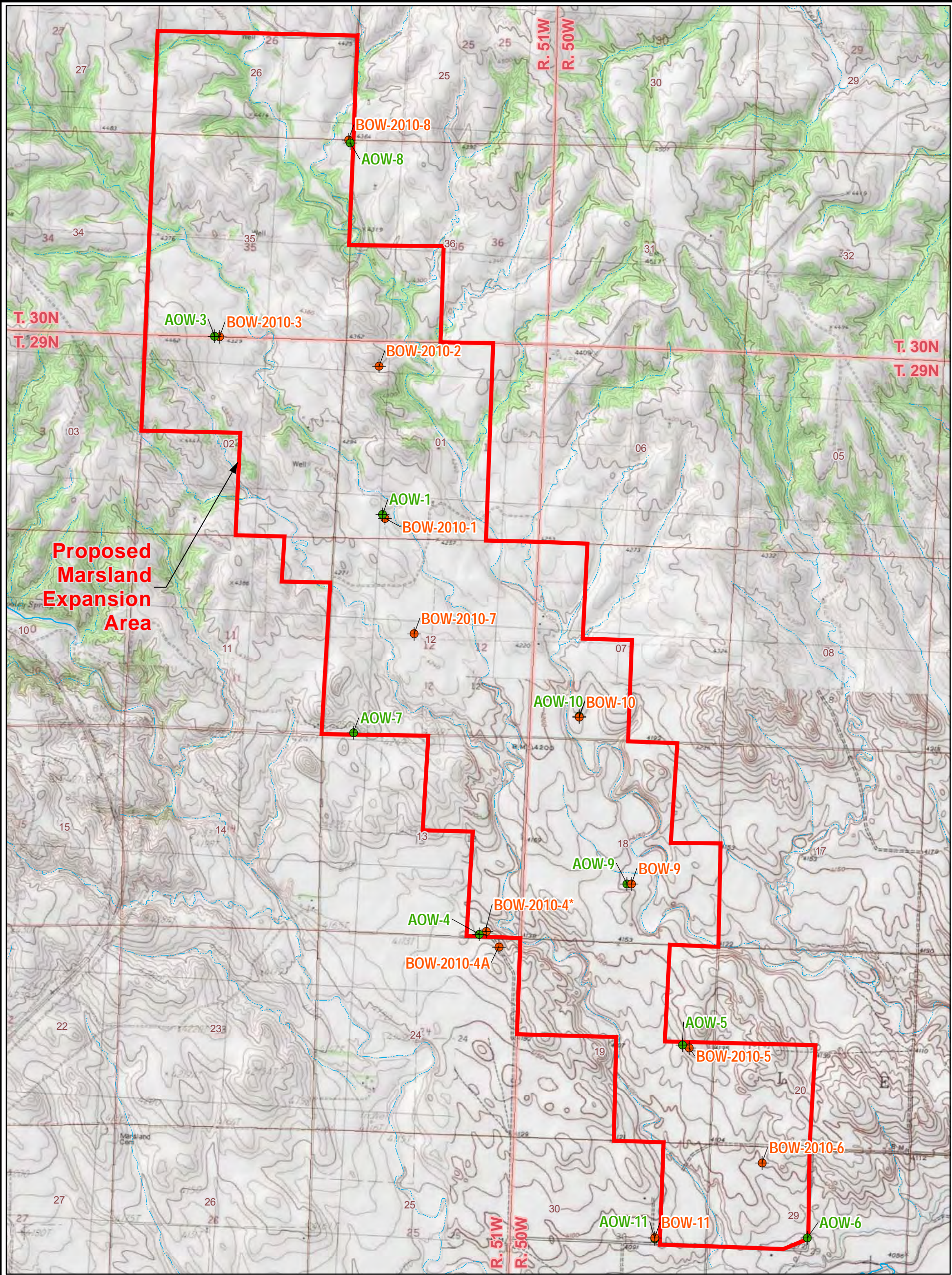
FIGURE 2.7-7  
MARSLAND EXPANSION AREA  
PUMPING TEST WELL LOCATIONS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com






**LEGEND**

- Arikaree Group Well
- Brule Formation Well
- Proposed Marsland Expansion Area
- Intermittent Stream/River

\* BOW-2010-4 is inactive and scheduled to be abandoned.

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




CROW BUTTE  
RESOURCES, INC.

**Figure 2.7-8  
MARSLAND  
ARIKAREE AND BRULE MONITOR WELLS**

PROJECT: CO001636

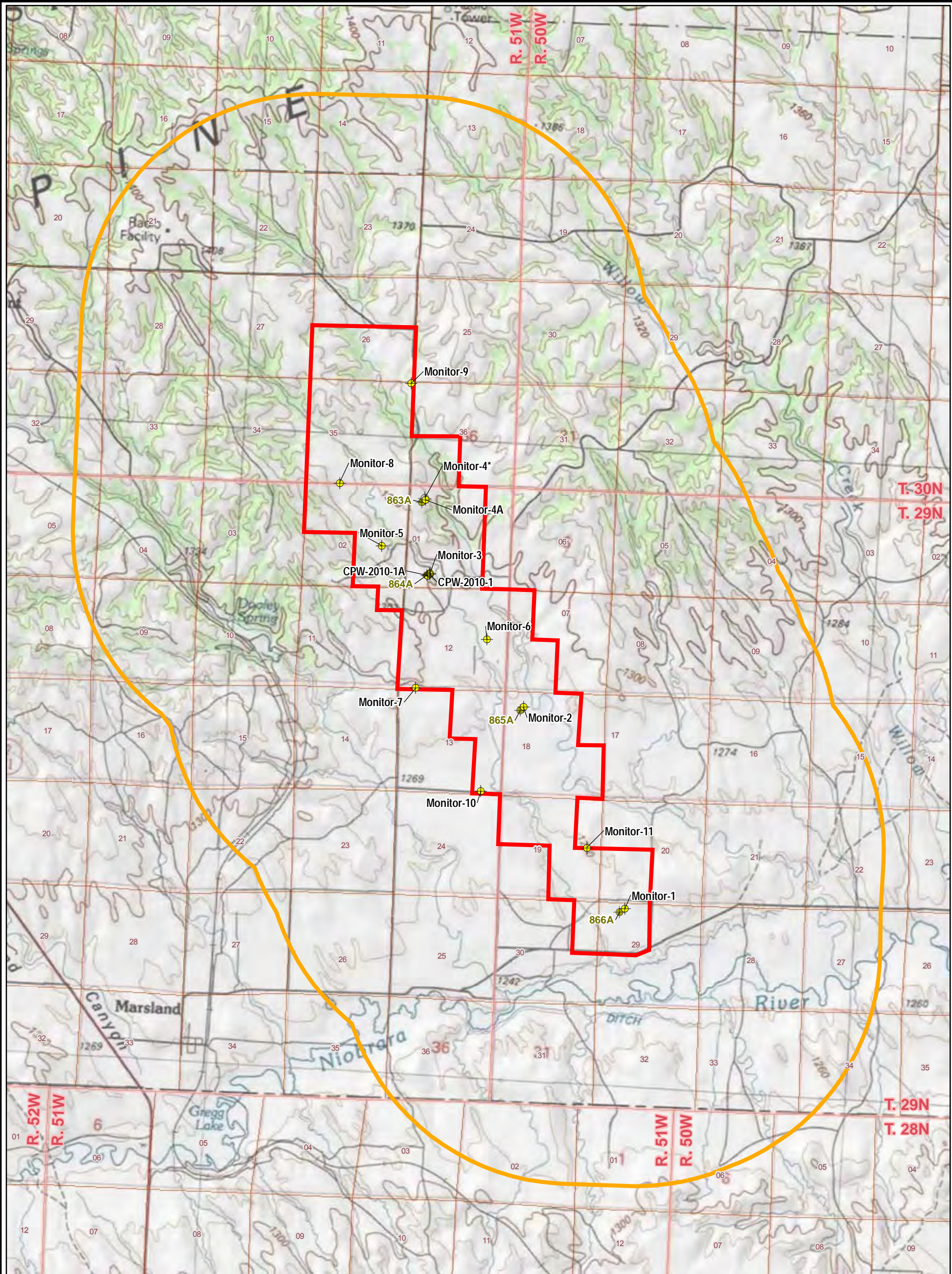
MAPPED BY: JC

CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





**LEGEND**

Proposed Marsland Expansion Area

Area of Review (AOR)

**Pumping Test Monitoring Wells**

Monitor-5 Active Basal Sandstone of the Chadron Formation Well and Well ID

Monitor-4\* Inactive Basal Sandstone of the Chadron Formation Well and Well ID

865A Abandoned Chadron Monitor Well and Well ID

Miles

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

CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.7-9**  
**LOCATION OF MEA ACTIVE, INACTIVE AND  
ABANDONED CHADRON MONITOR WELLS  
THAT PENETRATE THE INJECTION ZONE**

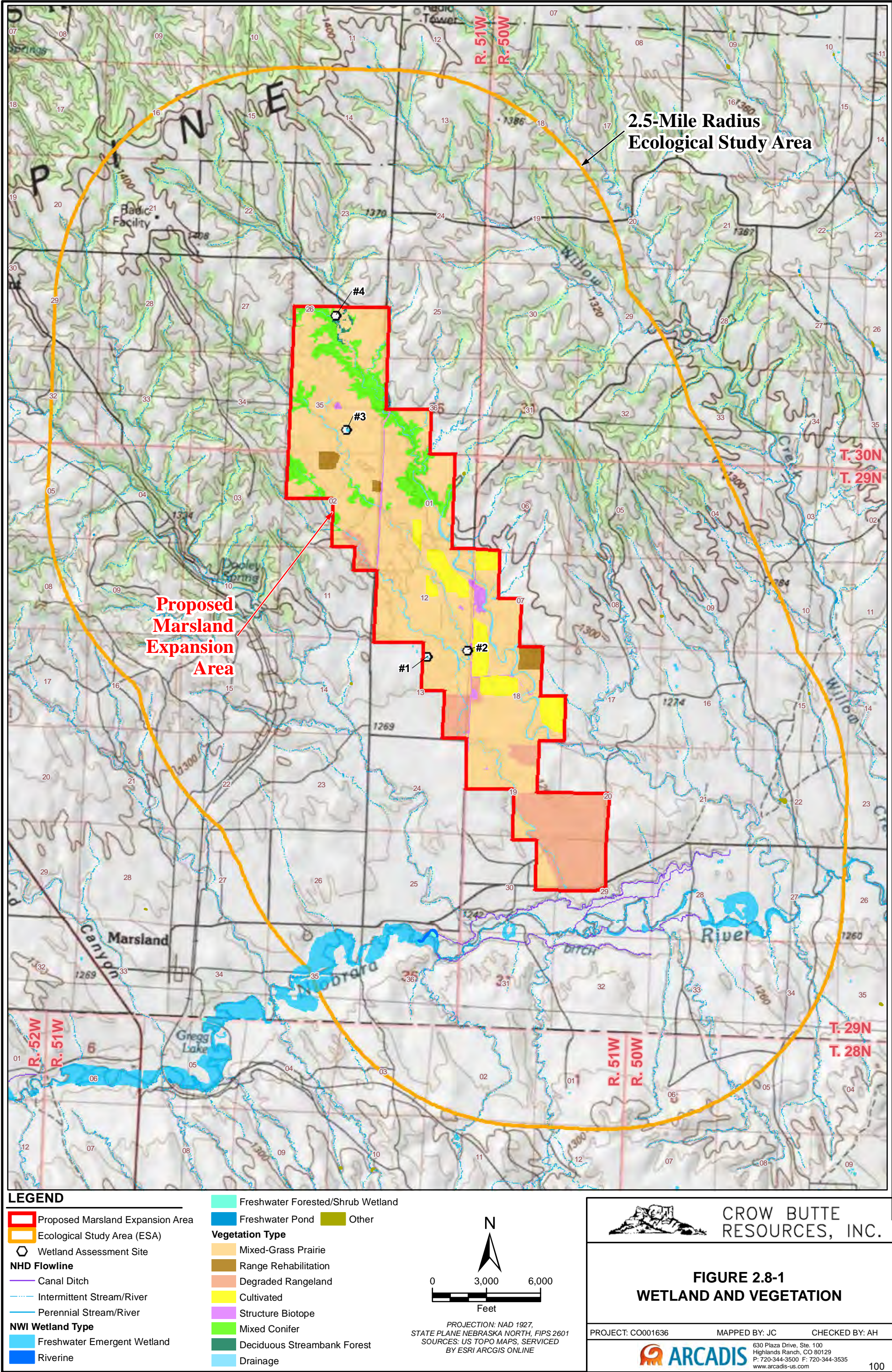
PROJECT: CO001636      MAPPED BY: JC      CHECKED BY: AH

ARCADIS

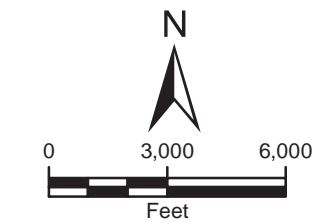
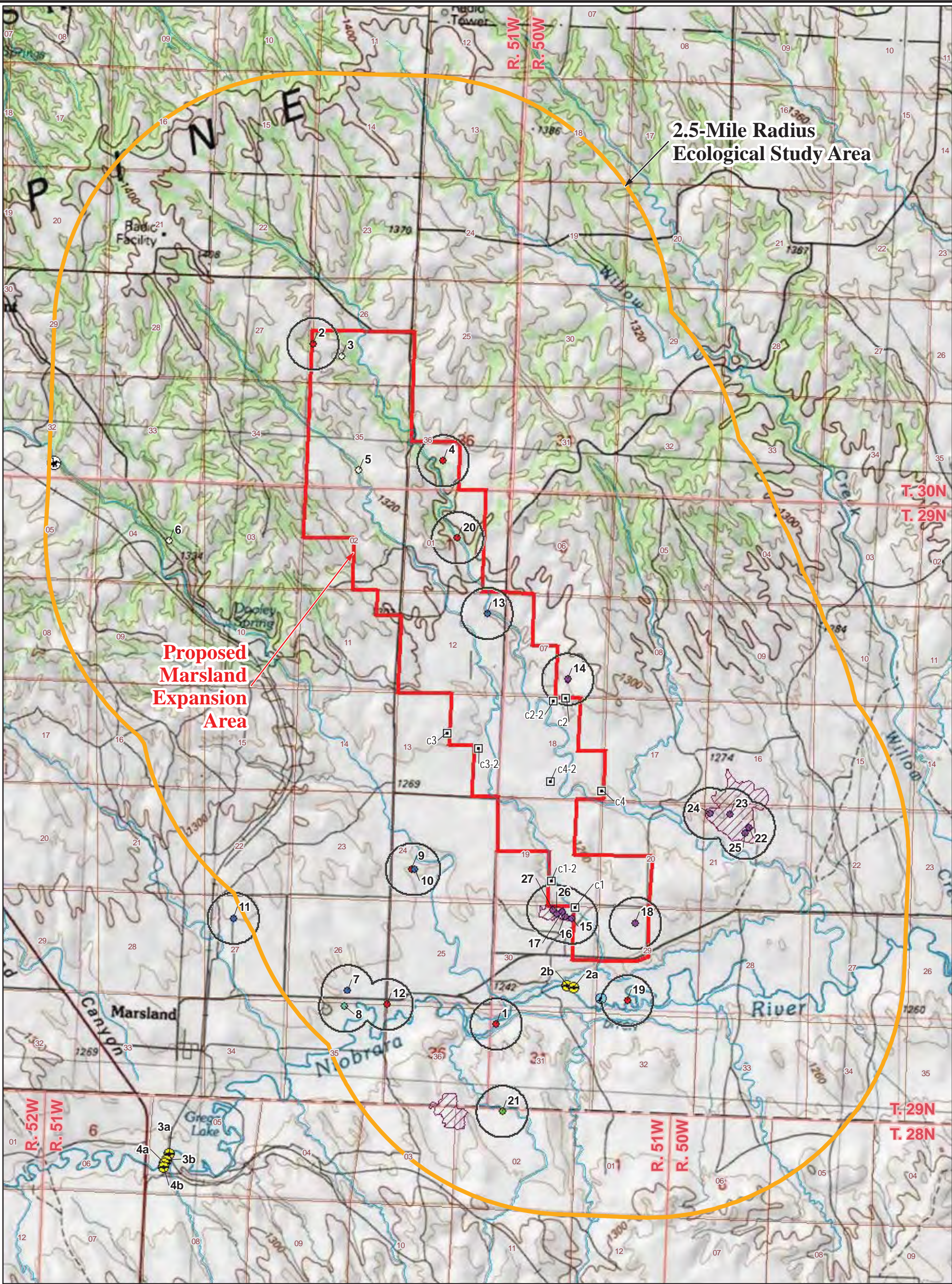
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

99









PROJECTION: NAD 1927,  
STATE PLANE NEBRASKA NORTH, FIPS 2601  
SOURCES: US TOPO MAPS, SERVICED  
BY ESRI ARCGIS ONLINE



CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.8-2  
WILDLIFE MAP**

PROJECT: CO001636      MAPPED BY: JC      CHECKED BY: AH





630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



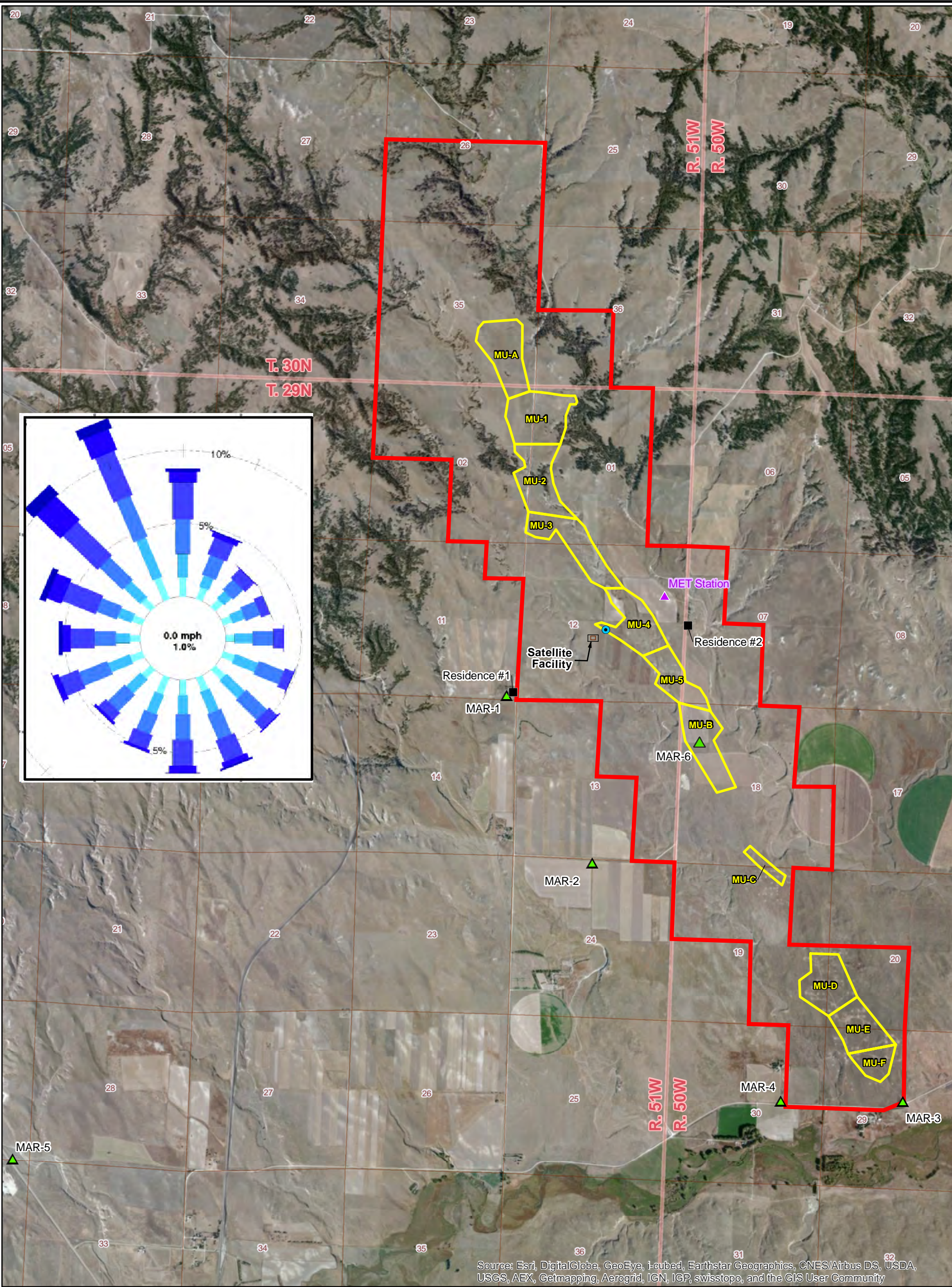
Figure 2.9-1 Marsland Expansion Area Preoperational/Preconstruction Monitoring Program Timeline

Task	Start	Finish	2013												2014												2015					
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Surface Water (Niobrara River N-1 & N-2)	Sep-13	Sep-14																														
Surface Water (Ephemeral Drainages)	Apr-13	Continuing																														
Vegetation (Forage)	Jun-13	Sep-13																														
Food (Fish)	May-14	Sep-14																														
Food (Livestock)	Mar-14	Mar-14																														
Food (Crops/Alternate Soil Sampling)	Aug-13	Aug-13																														
Soil	Jun-14	Nov-14																														
Sediment (MED-1 through MED-6)	Oct-13	May-14																														
Sediment (MED-7)	Oct-14	Apr-15																														
Direct Radiation	May-14	Nov-14																														

 Samples will be collected when water flow becomes available

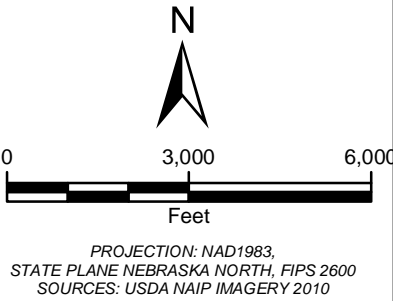
 Sampling completed





LEGEND

- Proposed Deep Disposal Well
- Pre-operational Baseline/Operational Air Sampling Station
- Residence
- Mine Unit
- Proposed Marsland Expansion Area



CROW BUTTE  
RESOURCES, INC.

FIGURE 2.9-2  
LOCATION OF ENVIRONMENTAL AIR  
SAMPLING STATIONS AT MARSLAND  
EXPANSION AREA

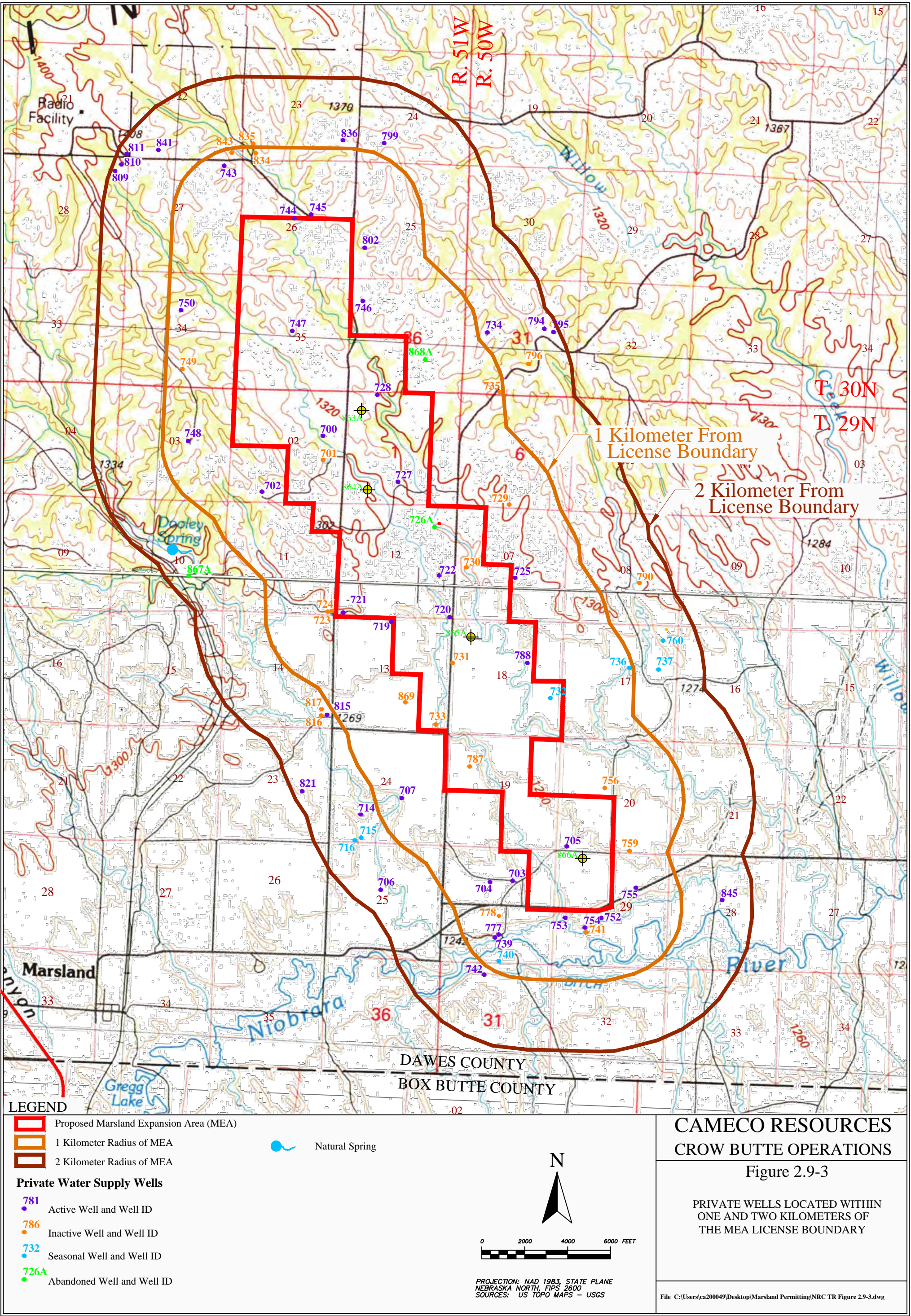
PROJECT: CO001636 MAPPED BY: JC CHECKED BY: MS



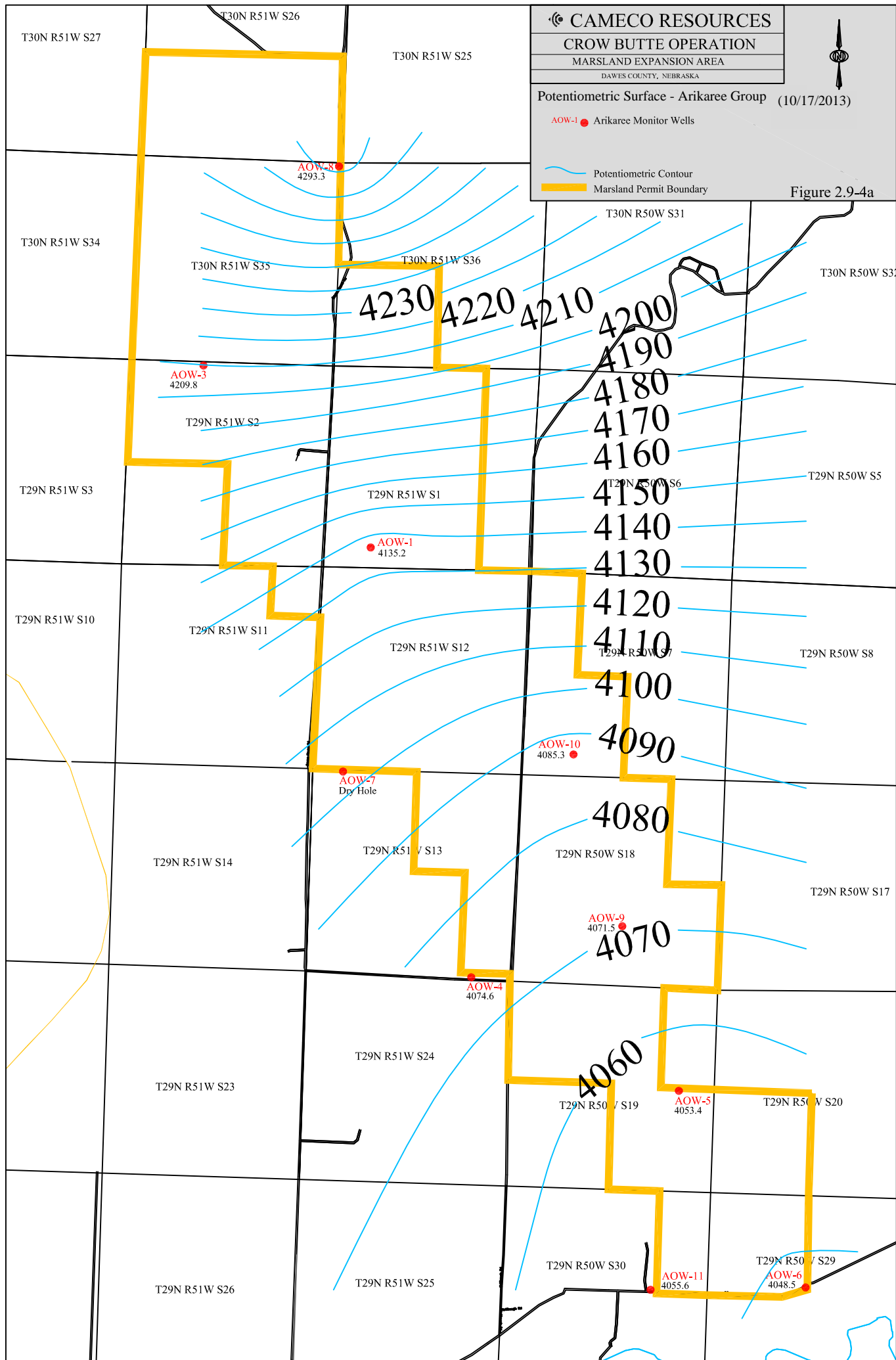
ARCADIS

630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com









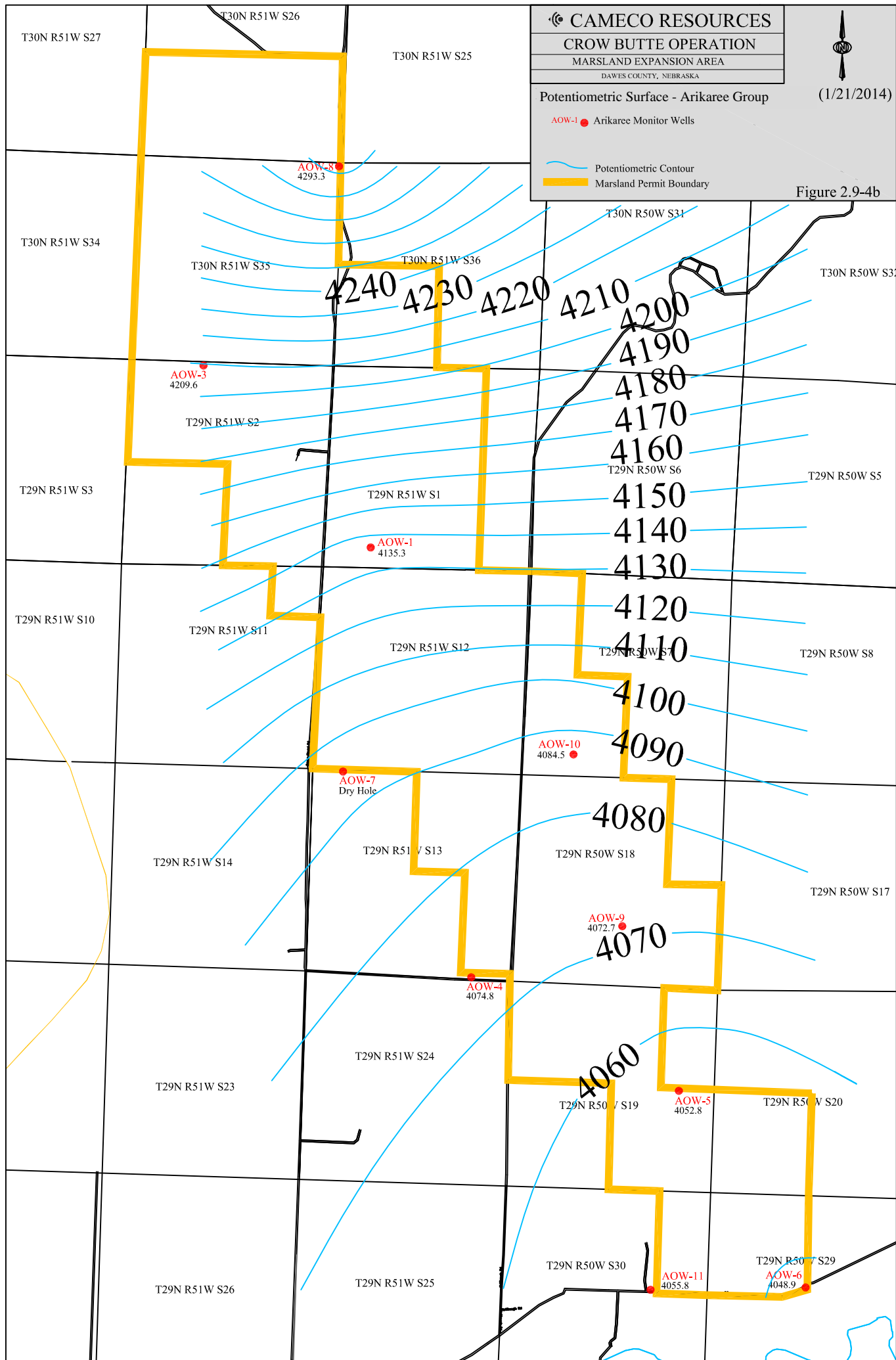
Potentiometric Surface - Arikaree Group (10/17/2013)

AOW-1 Arikaree Monitor Wells

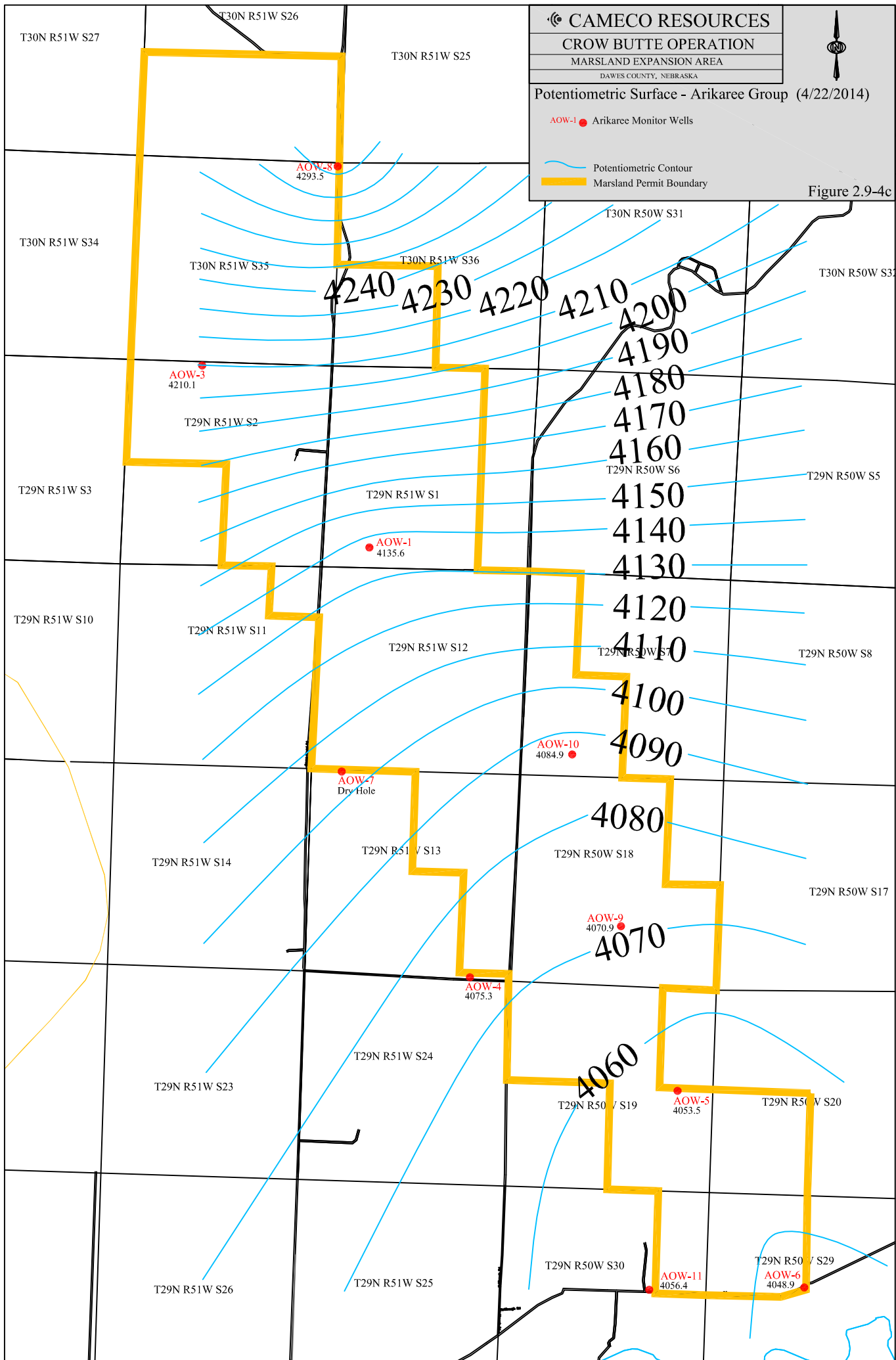
Potentiometric Contour  
Marsland Permit Boundary

Figure 2.9-4a











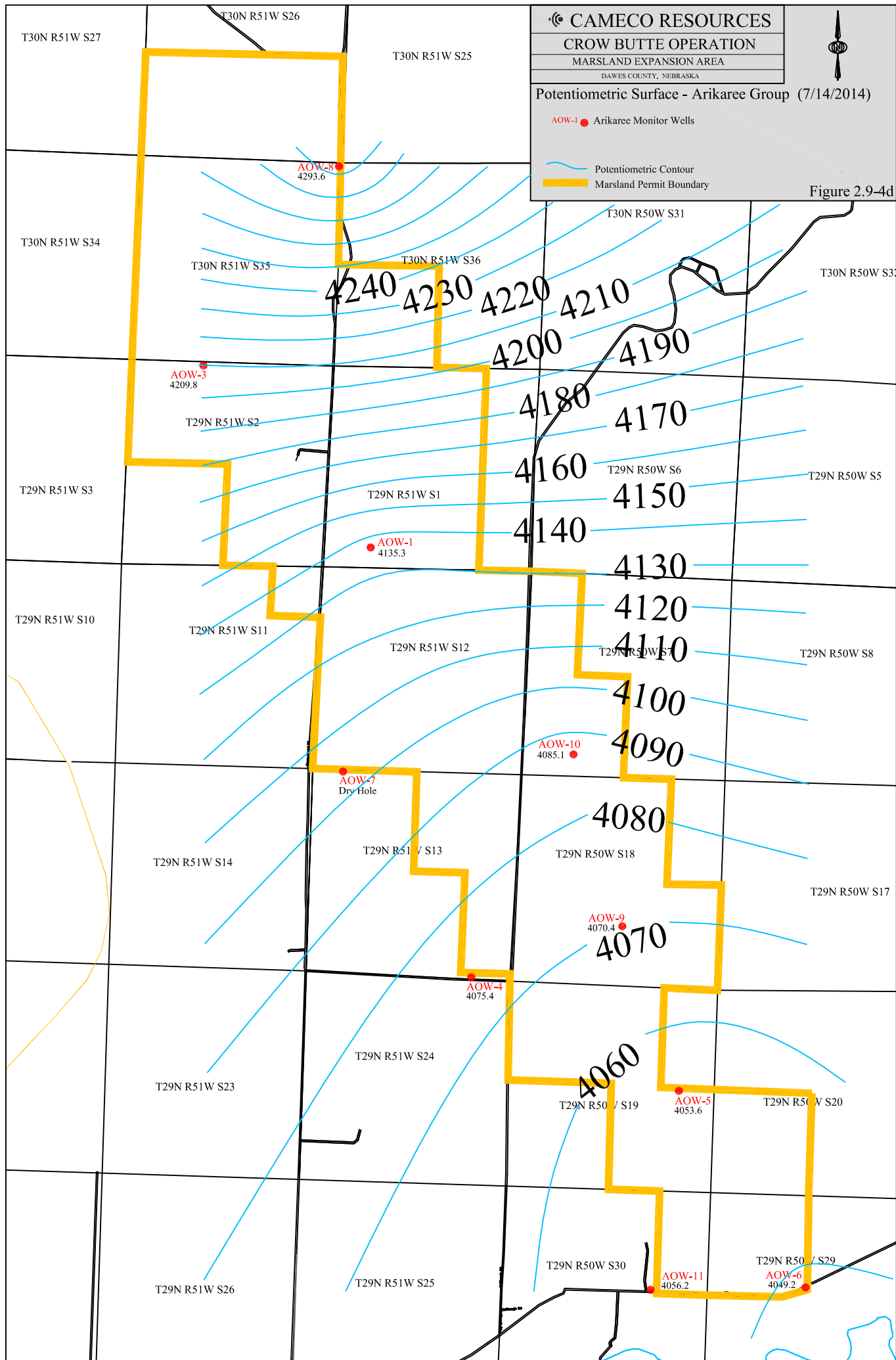
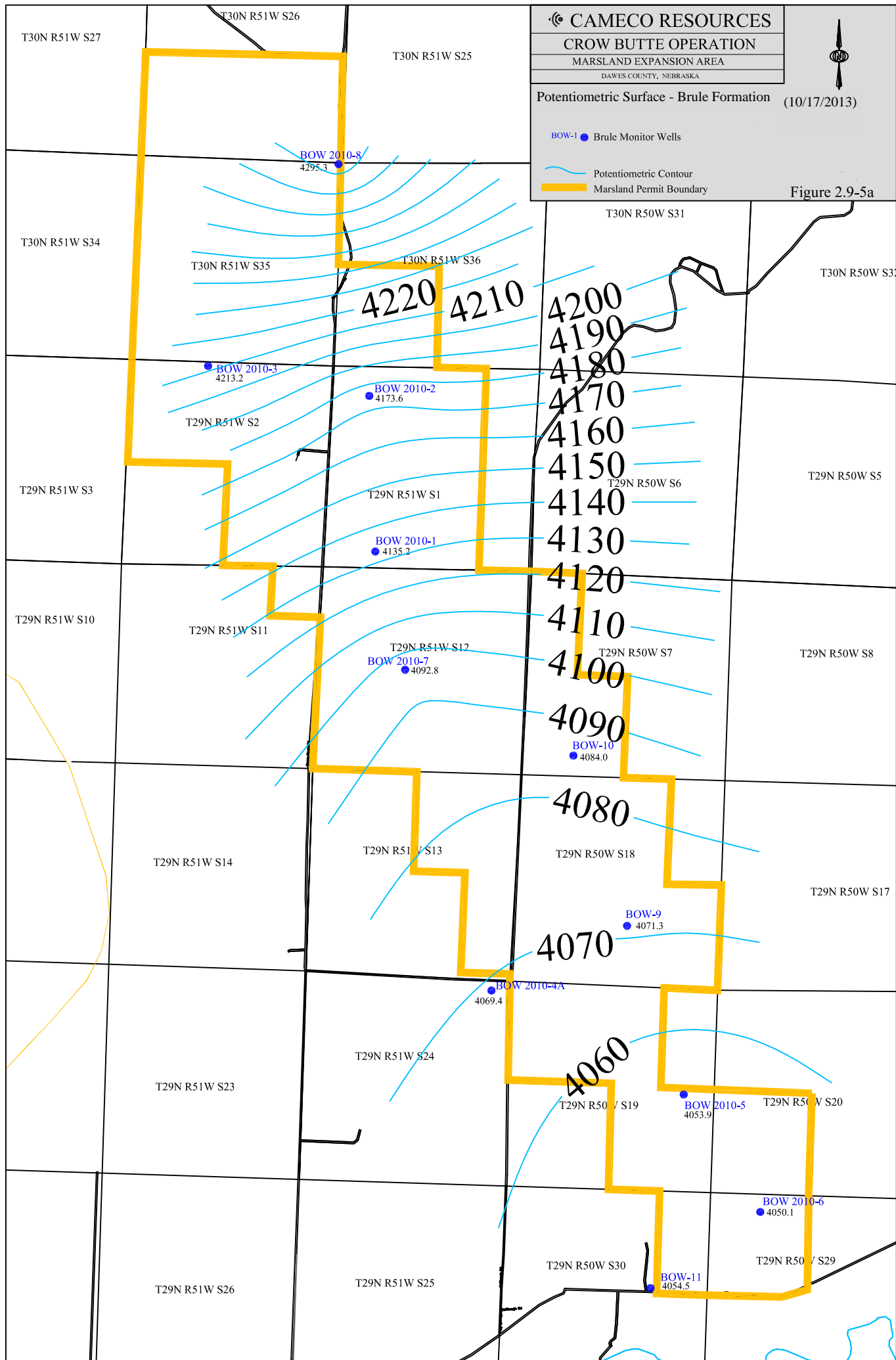
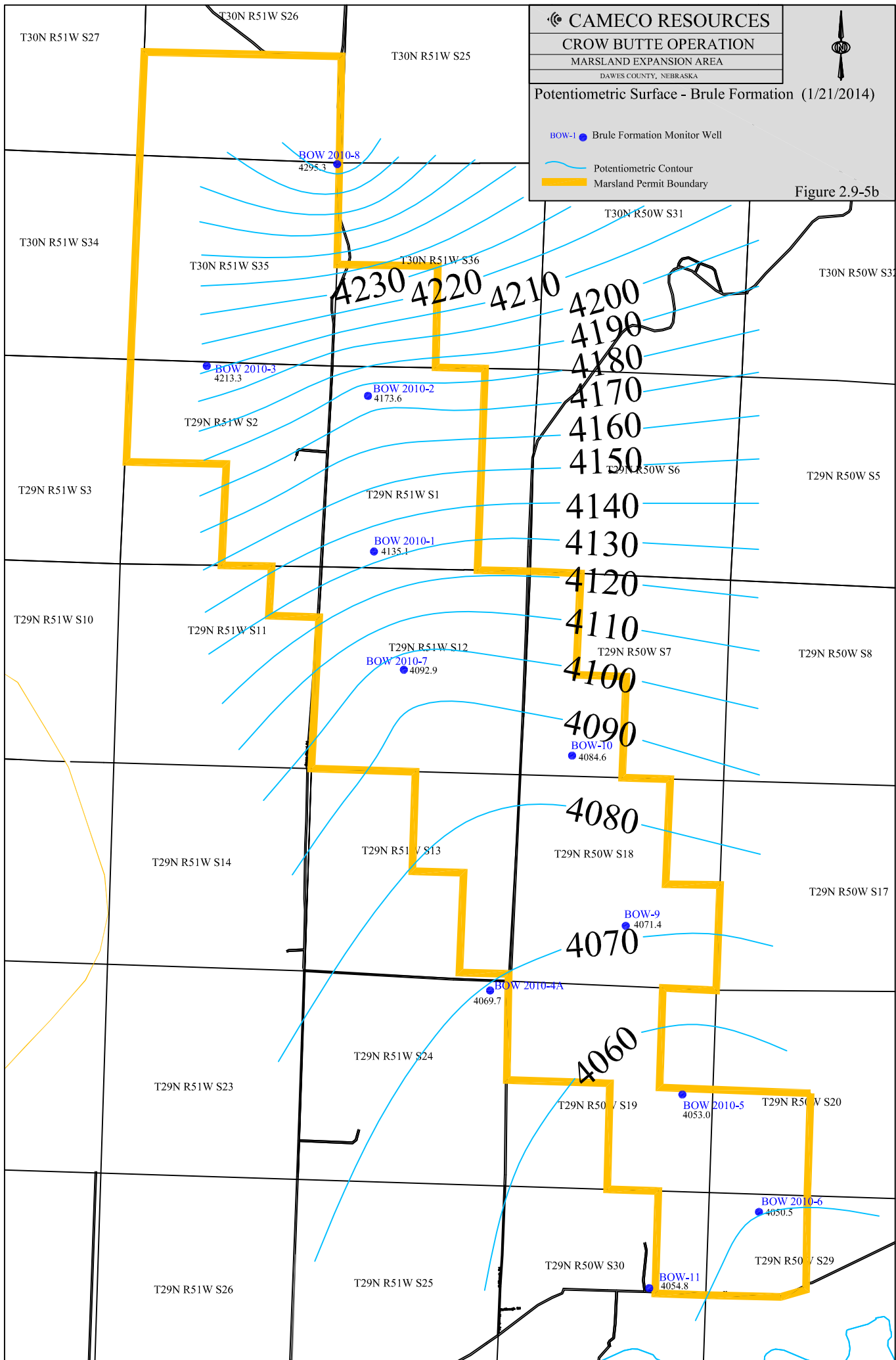


Figure 2.9-4d

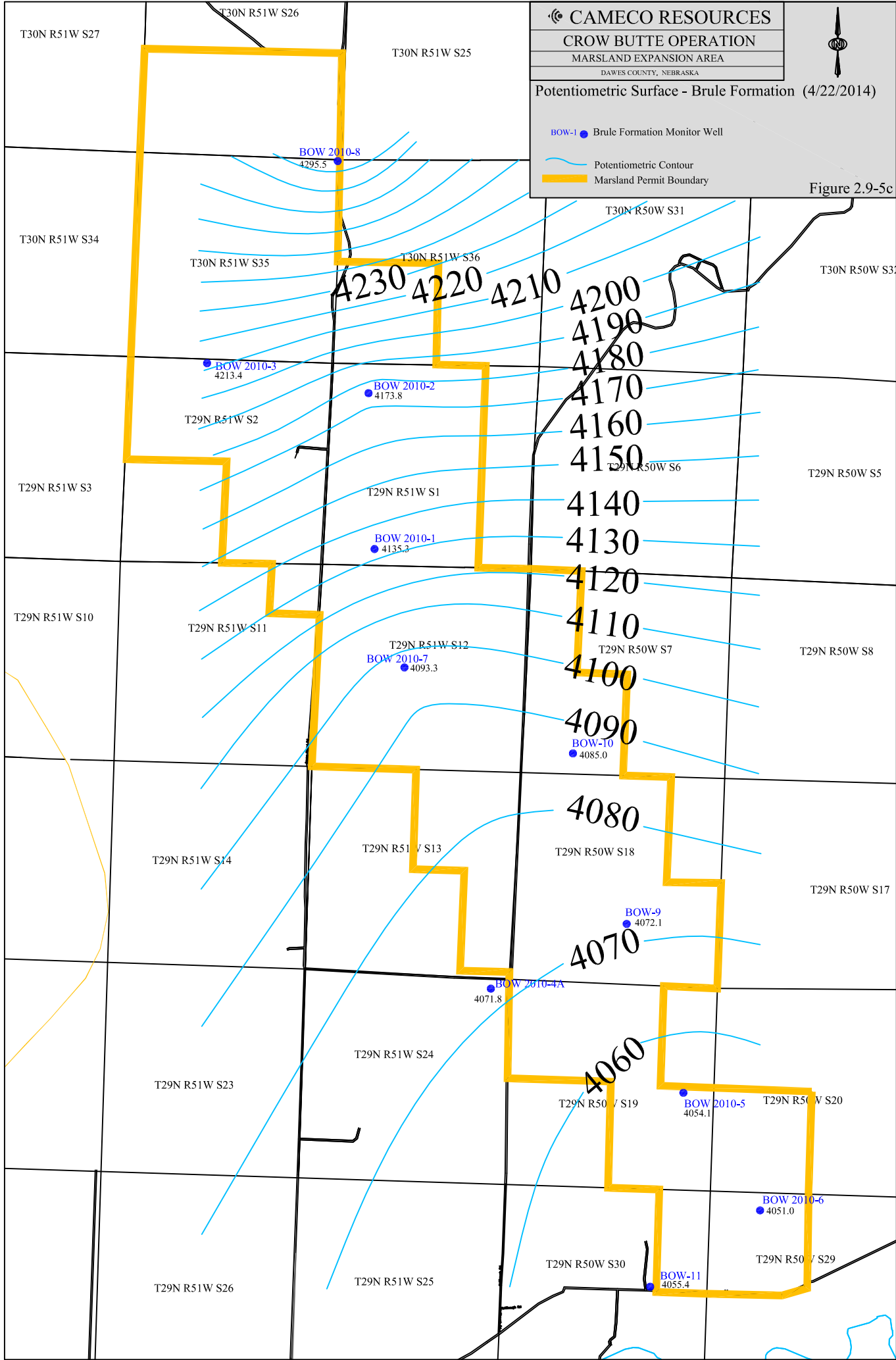




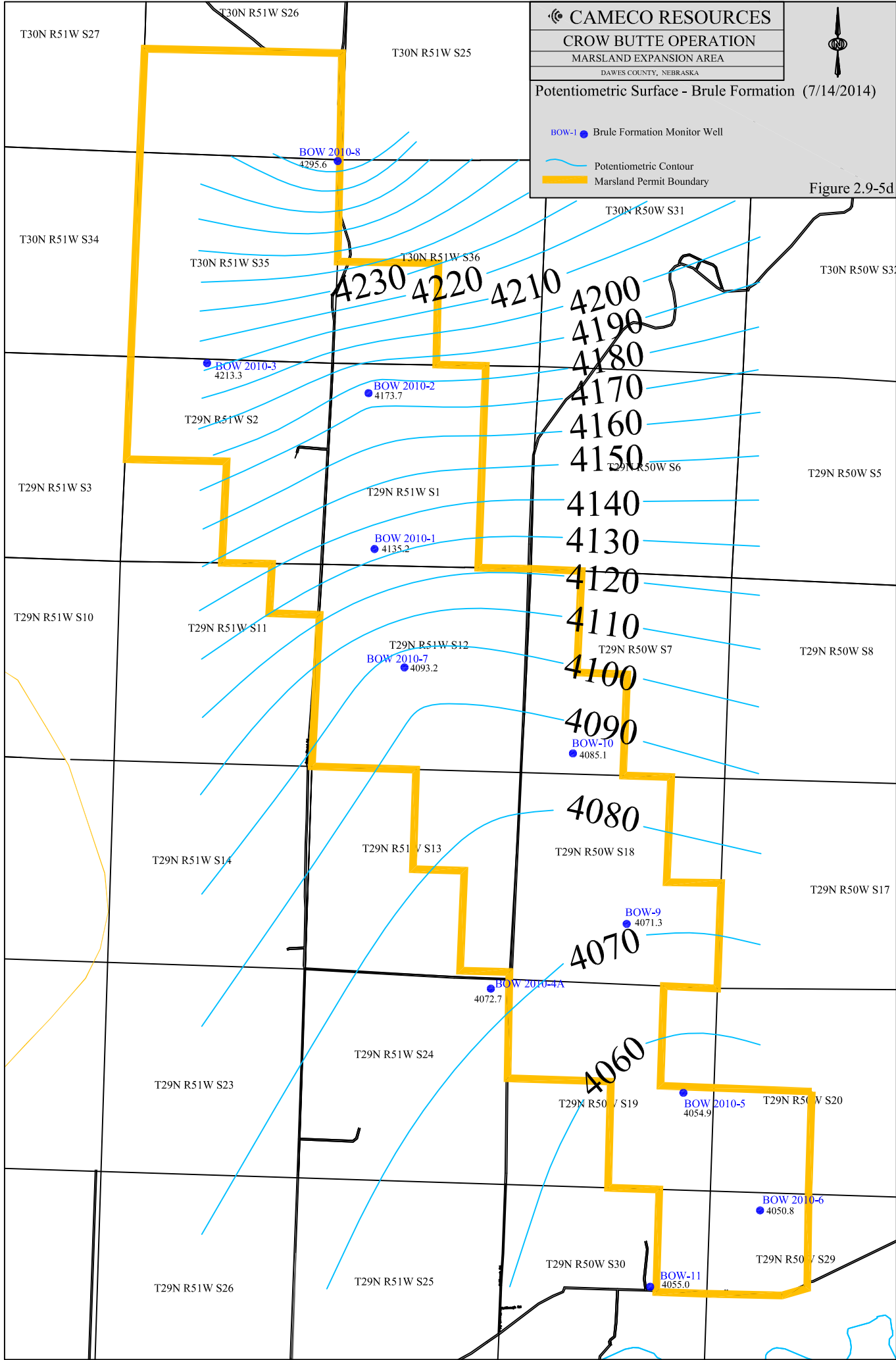












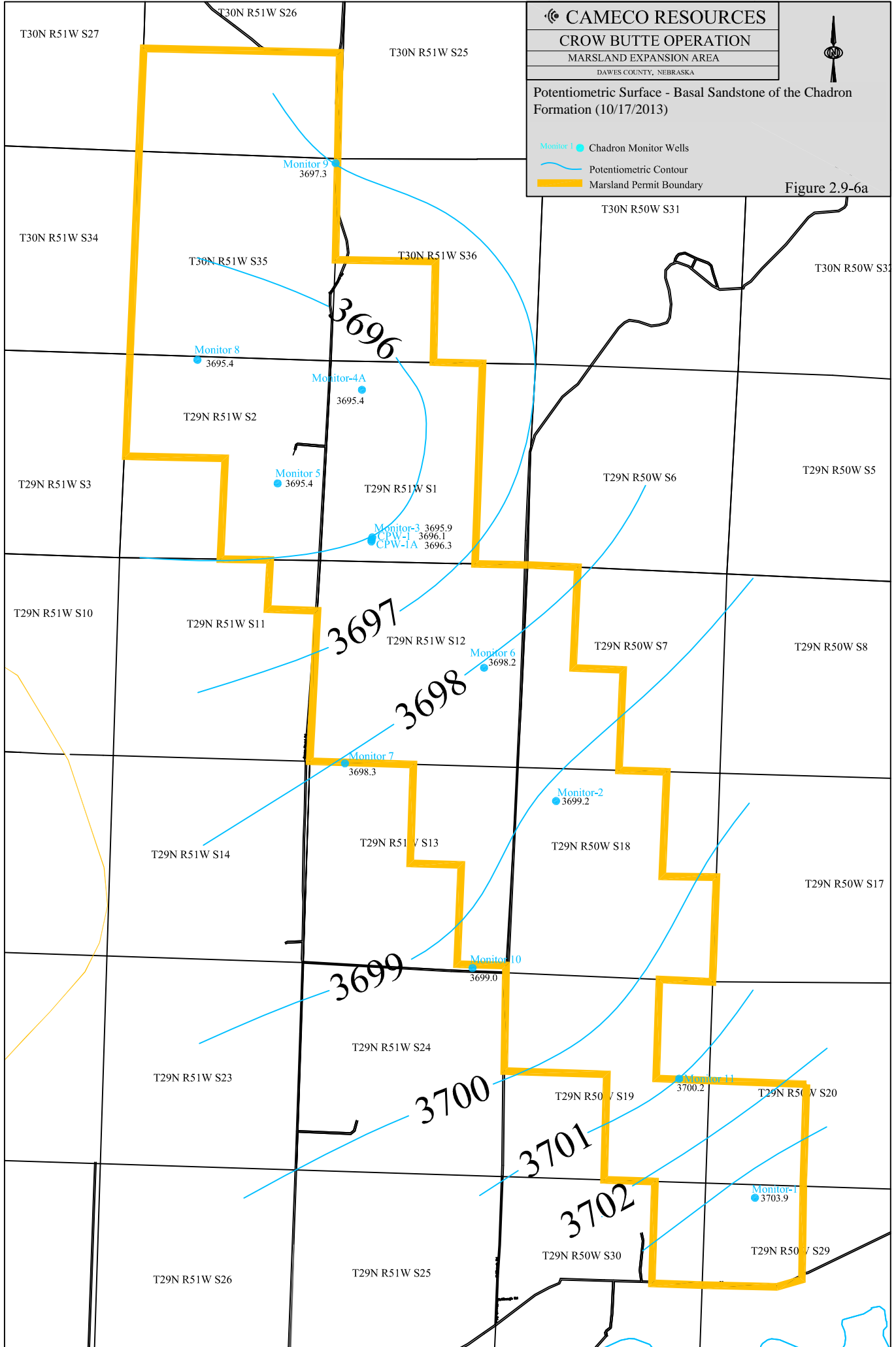




Potentiometric Surface - Basal Sandstone of the Chadron Formation (10/17/2013)

- Monitor 1 ● Chadron Monitor Wells
- Potentiometric Contour
- Marsland Permit Boundary

Figure 2.9-6a



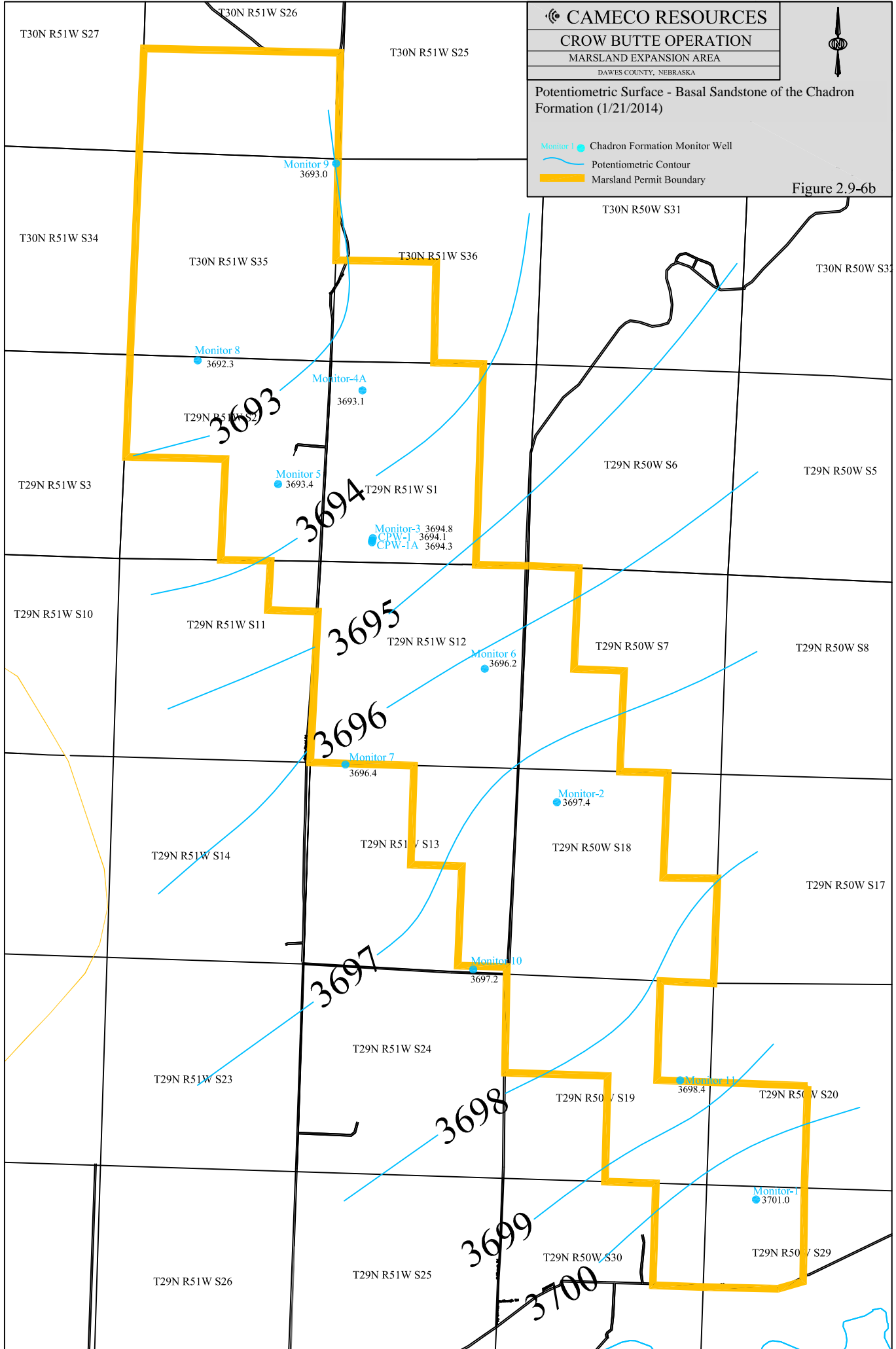




Potentiometric Surface - Basal Sandstone of the Chadron Formation (1/21/2014)

- Monitor 1 ● Chadron Formation Monitor Well
- Potentiometric Contour
- Marsland Permit Boundary

Figure 2.9-6b



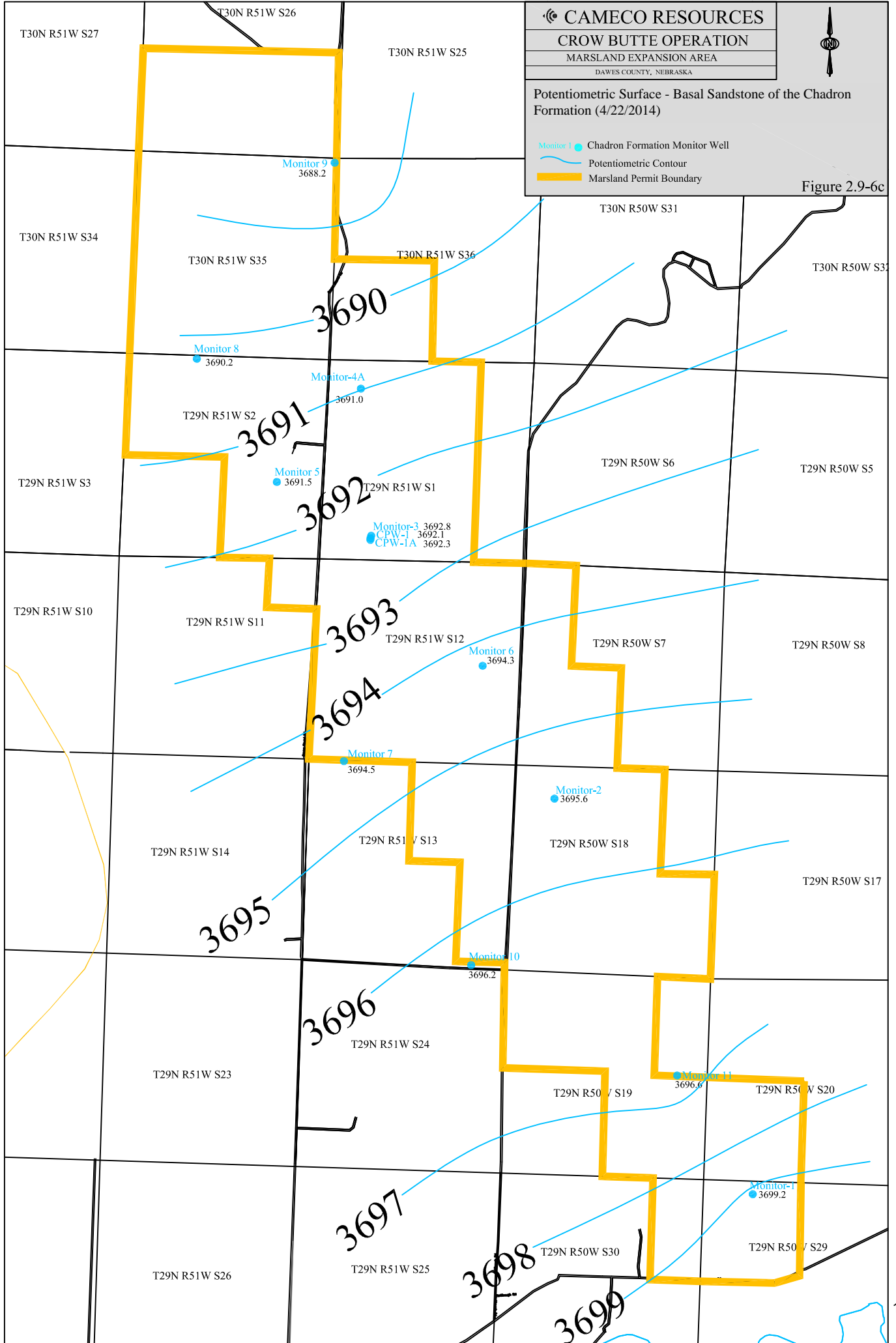




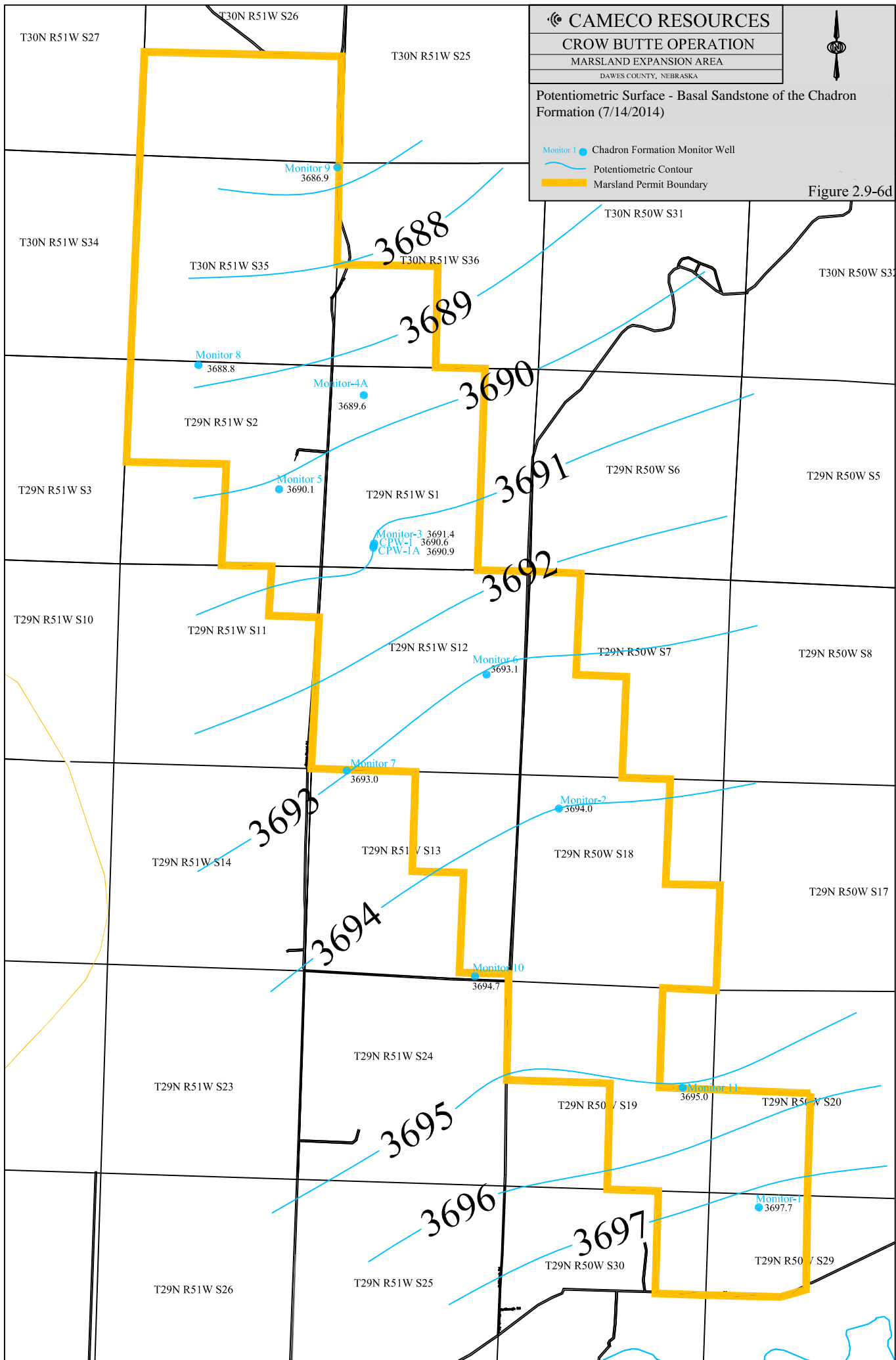
Potentiometric Surface - Basal Sandstone of the Chadron Formation (4/22/2014)

- Monitor 1 Chadron Formation Monitor Well
- Potentiometric Contour
- Marsland Permit Boundary

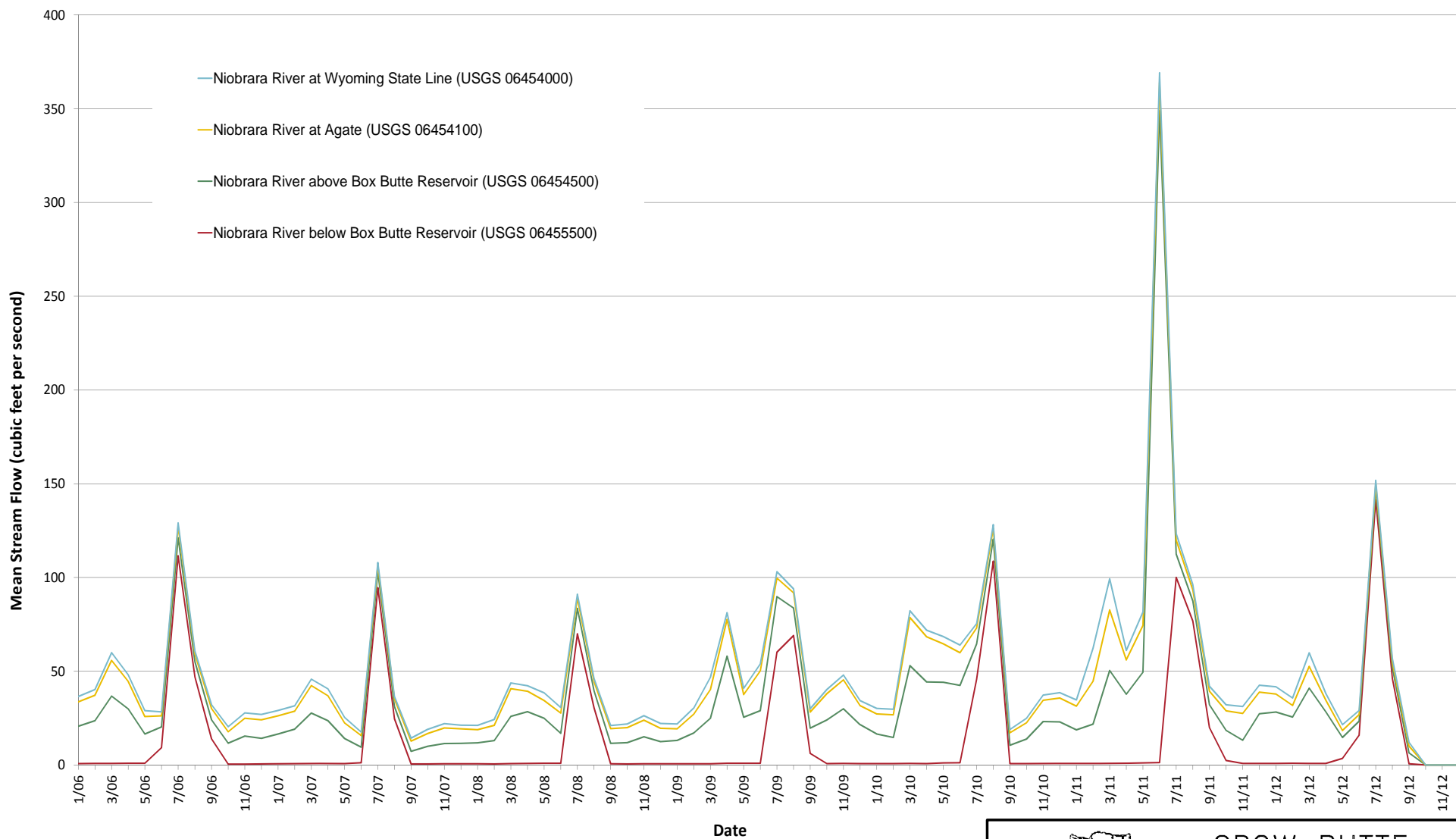
Figure 2.9-6c











CROW BUTTE  
RESOURCES, INC.

**FIGURE 2.9-7**  
**UPPER NIOBRARA RIVER**  
**AVERAGE FLOWS AT**  
**USGS/NDNR STREAM GAGING STATIONS**

PROJECT: CO001636

MAPPED BY: JC

CHECKED BY: JEC

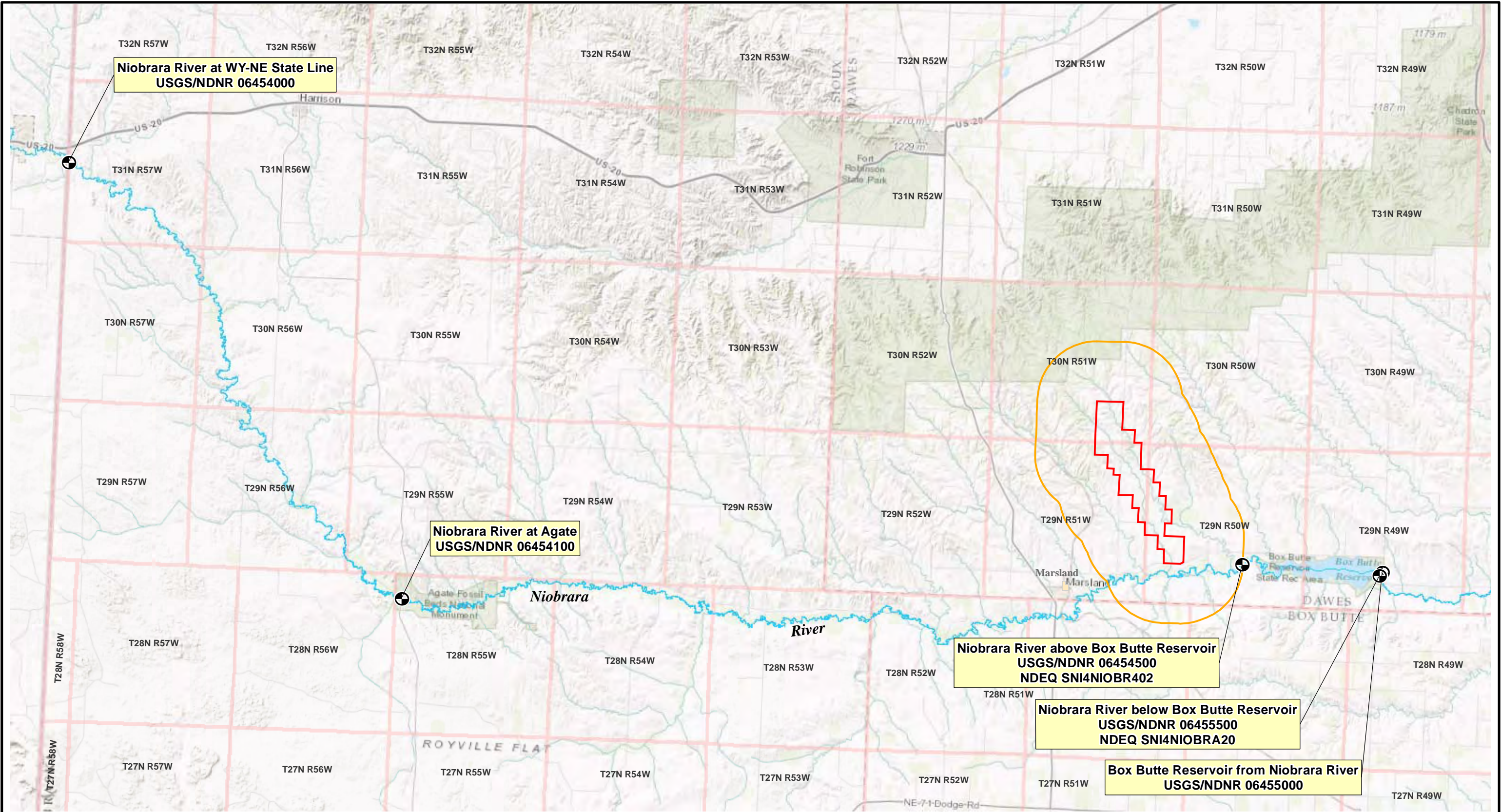


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

117

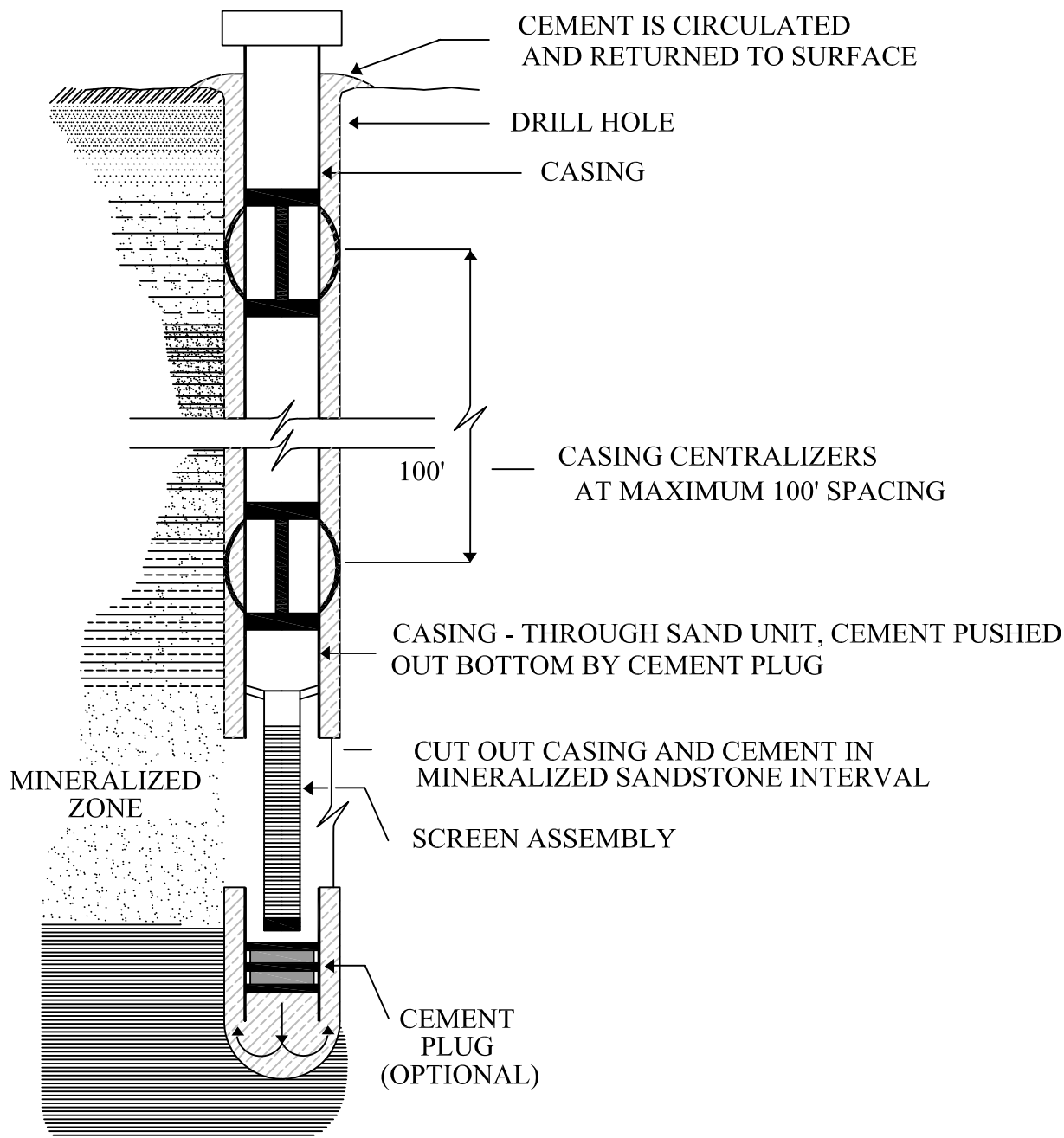
Source: Williams.2013; Table F.1-3





<b>LEGEND</b> USGS/NDNR Stream Gaging Station and NDEQ Sampling Location Niobrara River Proposed Marsland Expansion Area Area of Review (AOR)		 0 2 4 Miles	
<p>PROJECTION: NAD 1983, STATE PLANE NEBRASKA NORTH FIPS 2600 SOURCE: TOPOGRAPHIC MAP, SERVICED BY ESRI/ARCGIS ONLINE</p>		 <b>FIGURE 2.9-8</b> <b>USGS/NDNR STREAM GAGING STATIONS</b> <b>AND NDEQ SAMPLING LOCATIONS FOR NIOBRARA RIVER</b>	
PROJECT: CO001636		MAPPED BY: JC	
		830 Plaza Drive, Ste. 100 Highlands Ranch, CO 80129 P: 720-344-3500 F: 720-344-3535 www.arcadis-us.com	





CROW BUTTE  
RESOURCES, INC.

FIGURE 3.1-1  
TYPICAL MINERALIZED ZONE COMPLETION FOR  
INJECTION/PRODUCTION WELLS  
METHOD NO.1

PROJECT: CO001396.02

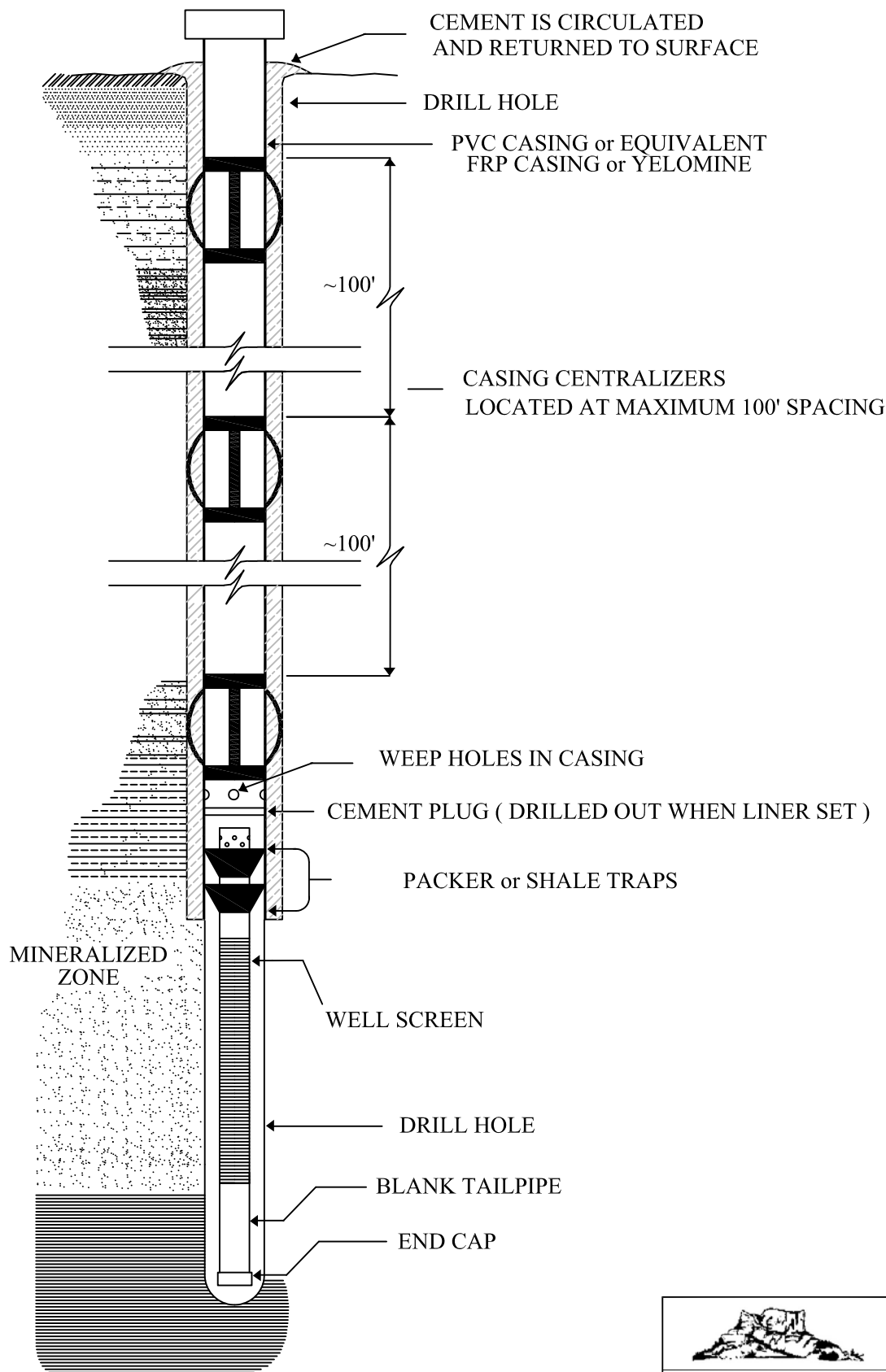
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

FIGURE 3.1-2  
TYPICAL LINER COMPLETION FOR MONITOR OR  
INJECTION/PRODUCTION WELLS  
METHOD NO.2

PROJECT: CO001396.02

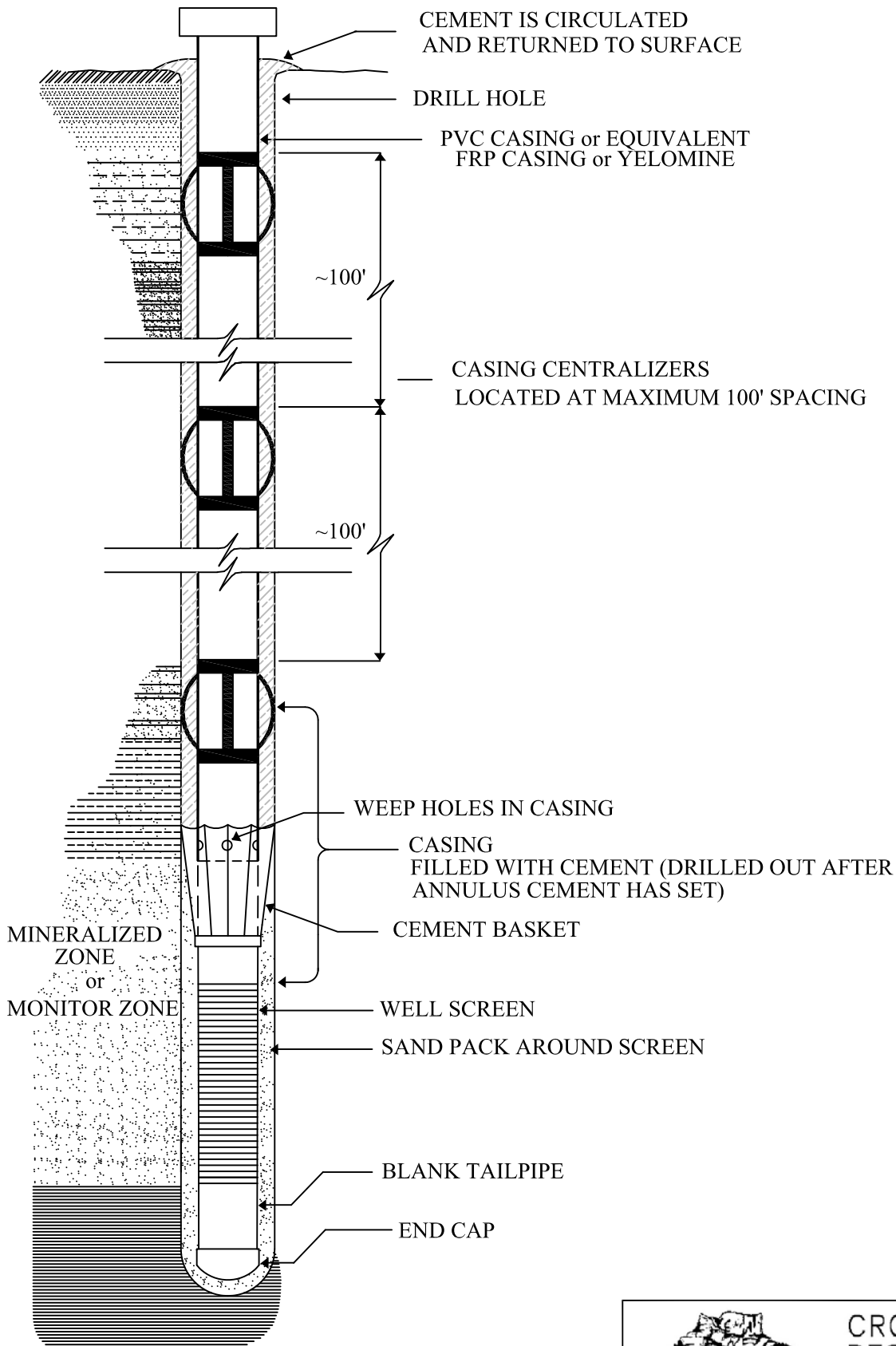
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

FIGURE 3.1-3  
TYPICAL CEMENT BASKET COMPLETION FOR  
MONITOR OR INJECTION/PRODUCTION WELLS  
METHOD NO.3

PROJECT: CO001396.02

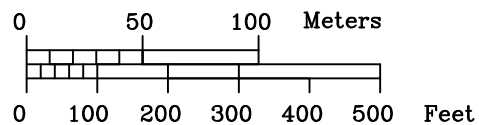
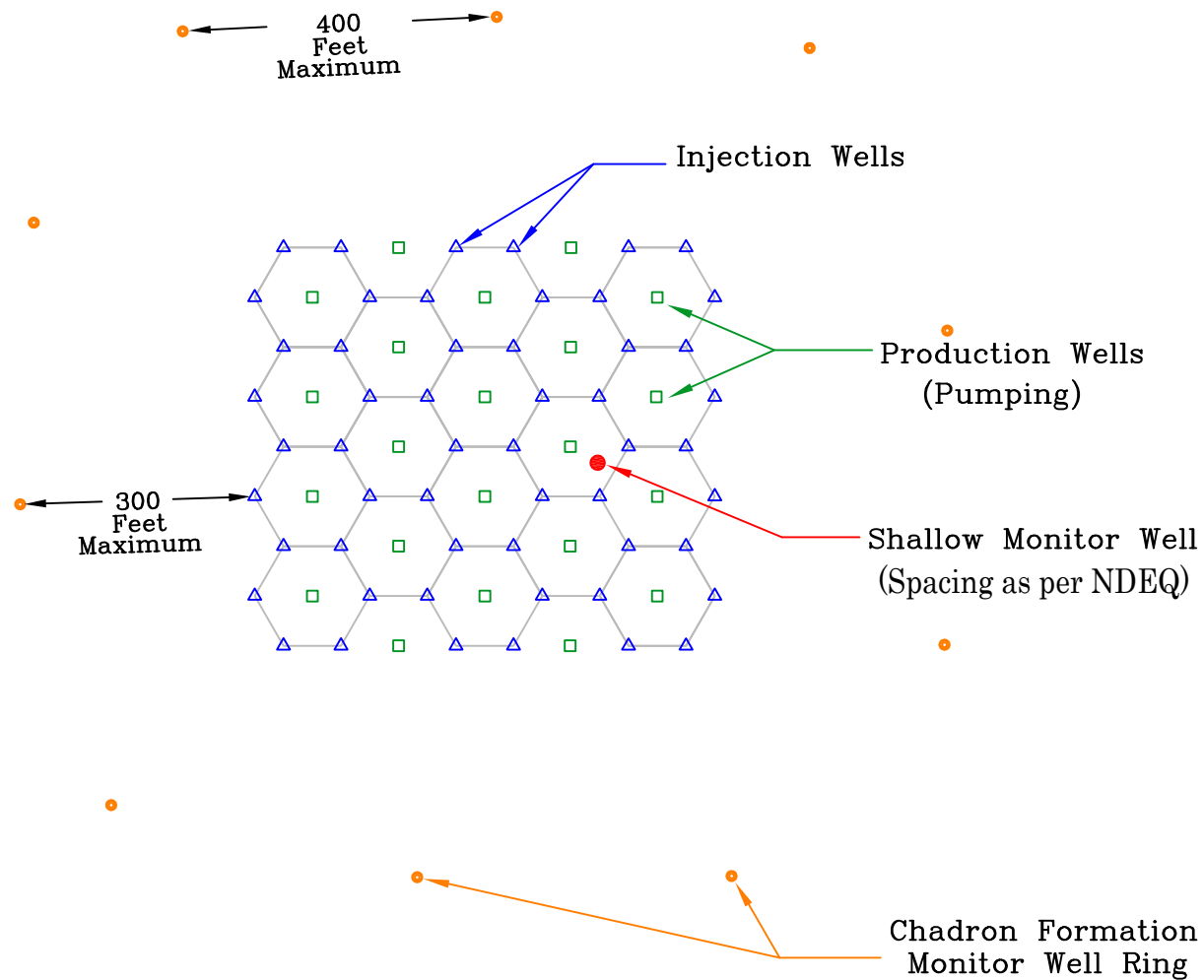
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





CROW BUTTE  
RESOURCES, INC.

**FIGURE 3.1-4**  
**TYPICAL WELLFIELD LAYOUT**

PROJECT: CO001636

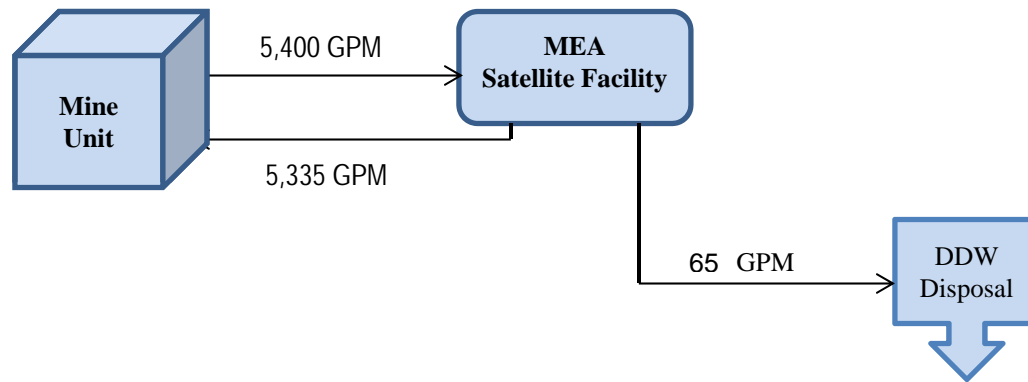
MAPPED BY: JC

CHECKED BY: JEC

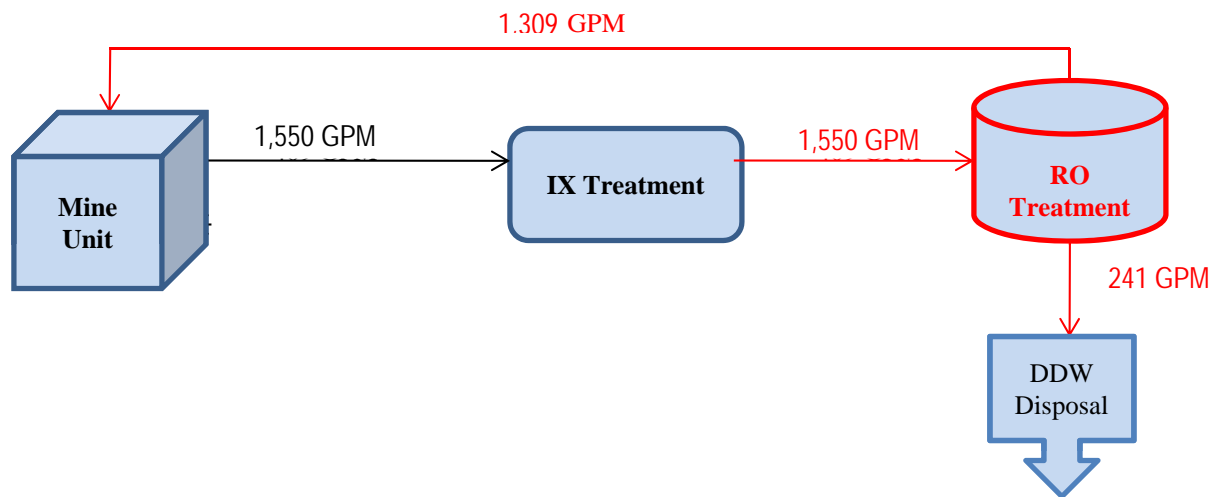


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





**Water Balance Flow Example for Production**



**Water balance Flow Example: Restoration – IX Treatment & RO Treatment Phase**



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 3.1-5  
WATER BALANCE FOR  
MARSLAND FACILITY**

PROJECT: CO001636.00001

MAPPED BY: JC

CHECKED BY: JEC



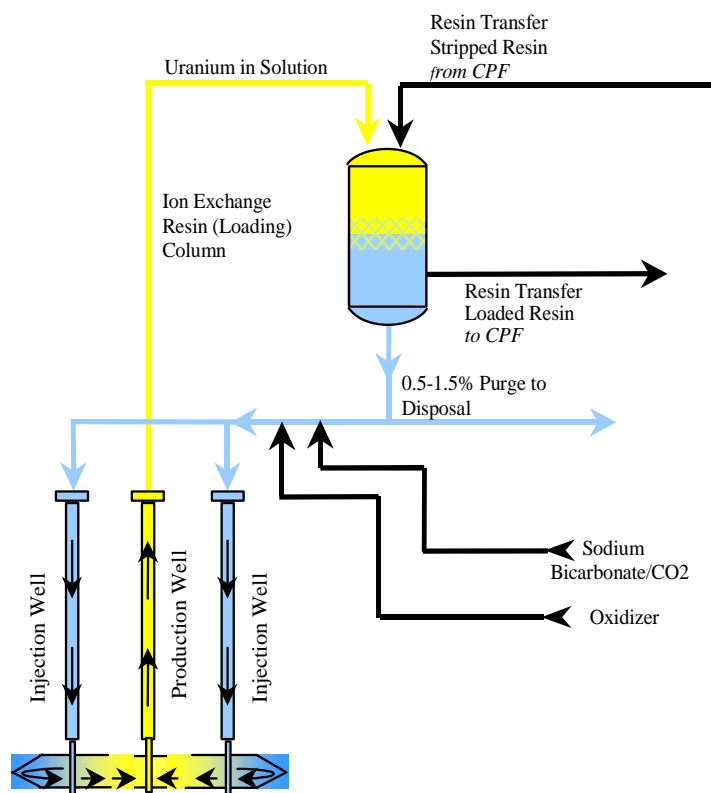
630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

123

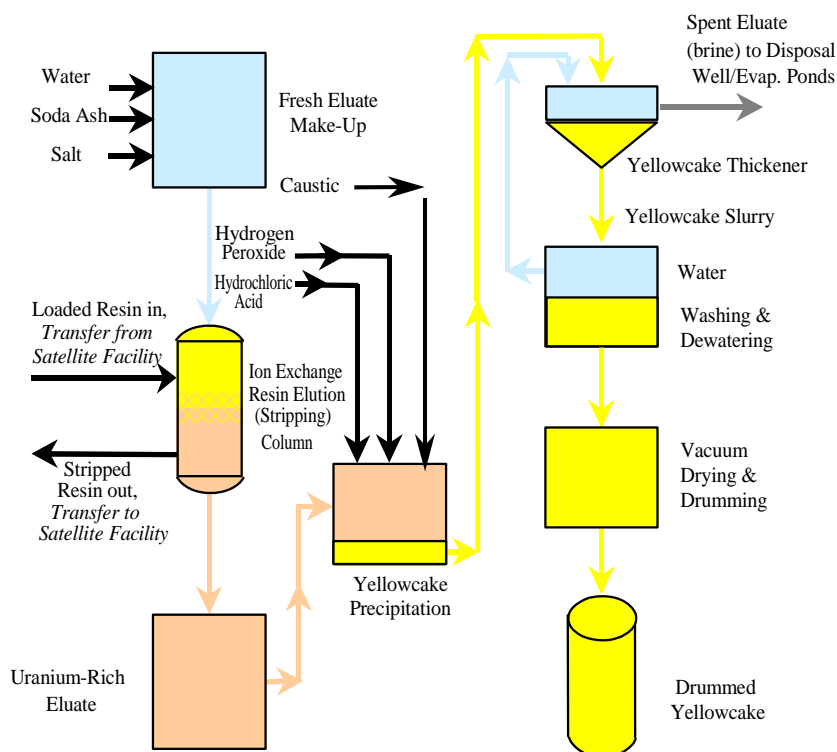
September 2015



### Satellite Facility (Uranium Extraction)



### Current CBR Production Facility (CPF) (Uranium Recovery)



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 3.1-6  
MARSLAND EXPANSION AREA  
SATELLITE FACILITY AND  
CURRENT CBR PRODUCTION FACILITY  
PROCESS FLOW DIAGRAM**

PROJECT: CO001636.00001

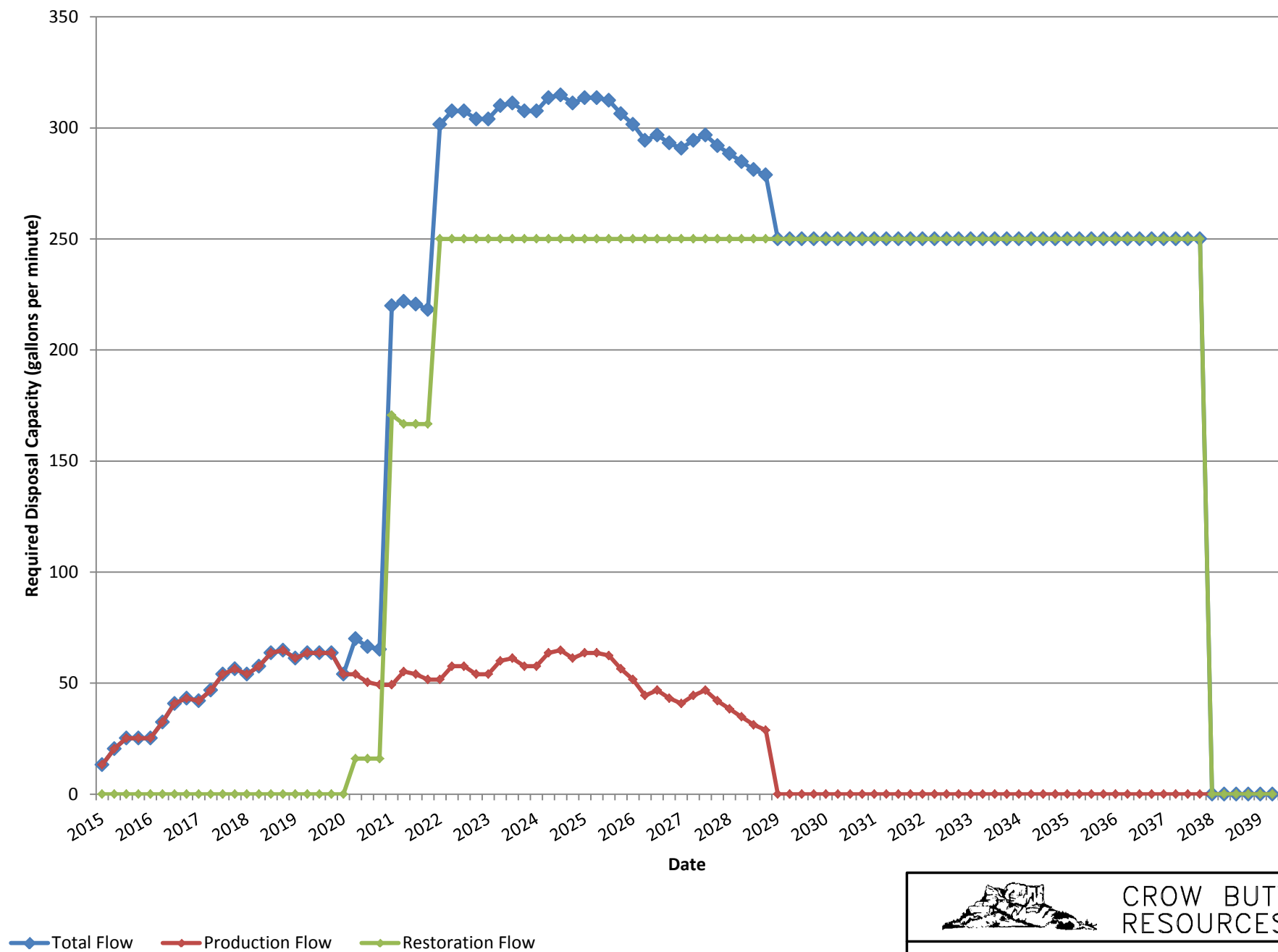
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



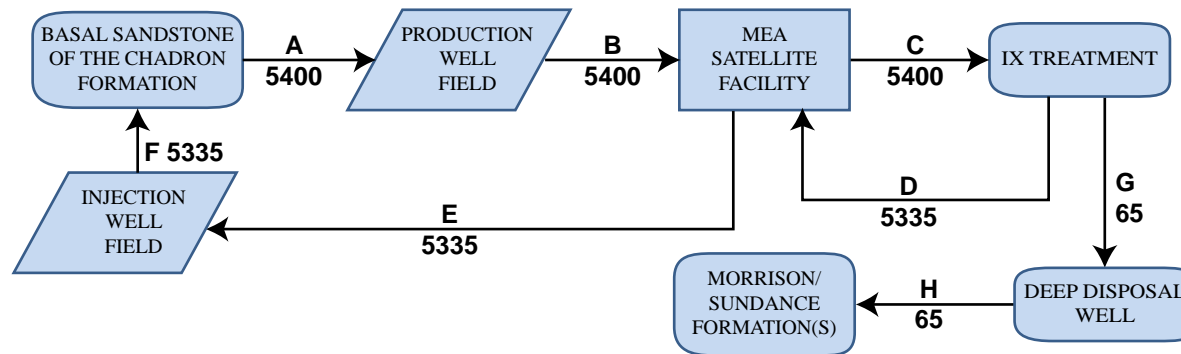


CROW BUTTE  
RESOURCES, INC.

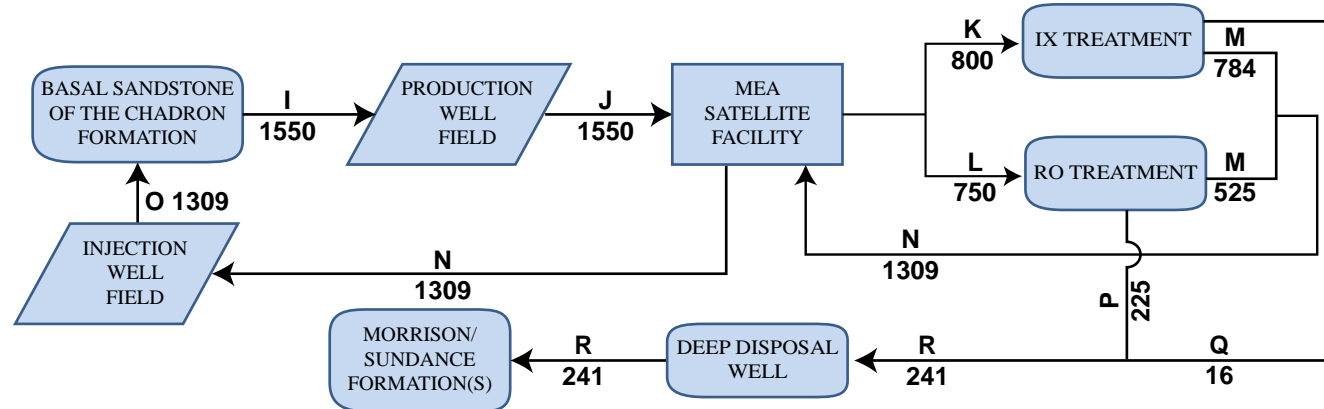
**FIGURE 3.1-7**  
**DISPOSAL WATER BALANCE**  
**MARSLAND EXPANSION AREA**



## PRODUCTION



## RESTORATION



Stream ID	Description
A	Extraction from Basal Sandstone of the Chadron Formation 850-1,200 ft bgs
B	Extraction solution piped from production well field to satellite facility
C	Sent for IX Treatment
D	Recovered solution
E	Recovered solution piped from satellite facility to injection well field
F	Injection into Basal Sandstone of the Chadron Formation
G	Production bleed (1.2%) sent to deep disposal well
H	Injection into Morrison/Sundance Formations 3,400-3,700 ft bgs
I	Extraction from Basal Sandstone of the Chadron Formation
J	Extraction solution piped from production well field to satellite facility
K	Sent for IX Treatment
L	Sent for RO Treatment
M	Recovered solution
N	Recovered solution piped from satellite facility to injection well field
O	Injection into Basal Sandstone of the Chadron Formation
P	RO Bleed sent to deep disposal well
Q	IX Bleed sent to deep disposal well
R	Injection into Morrison/Sundance Formations

### NOTES:

1. Balanced for maximum flow rates projected to occur during 3Q 2024.
2. All flow rates are in gallons per minute.

### ABBREVIATIONS:

- IX** Ion Exchange
- RO** Reverse Osmosis
- MEA** Marsland Expansion Area

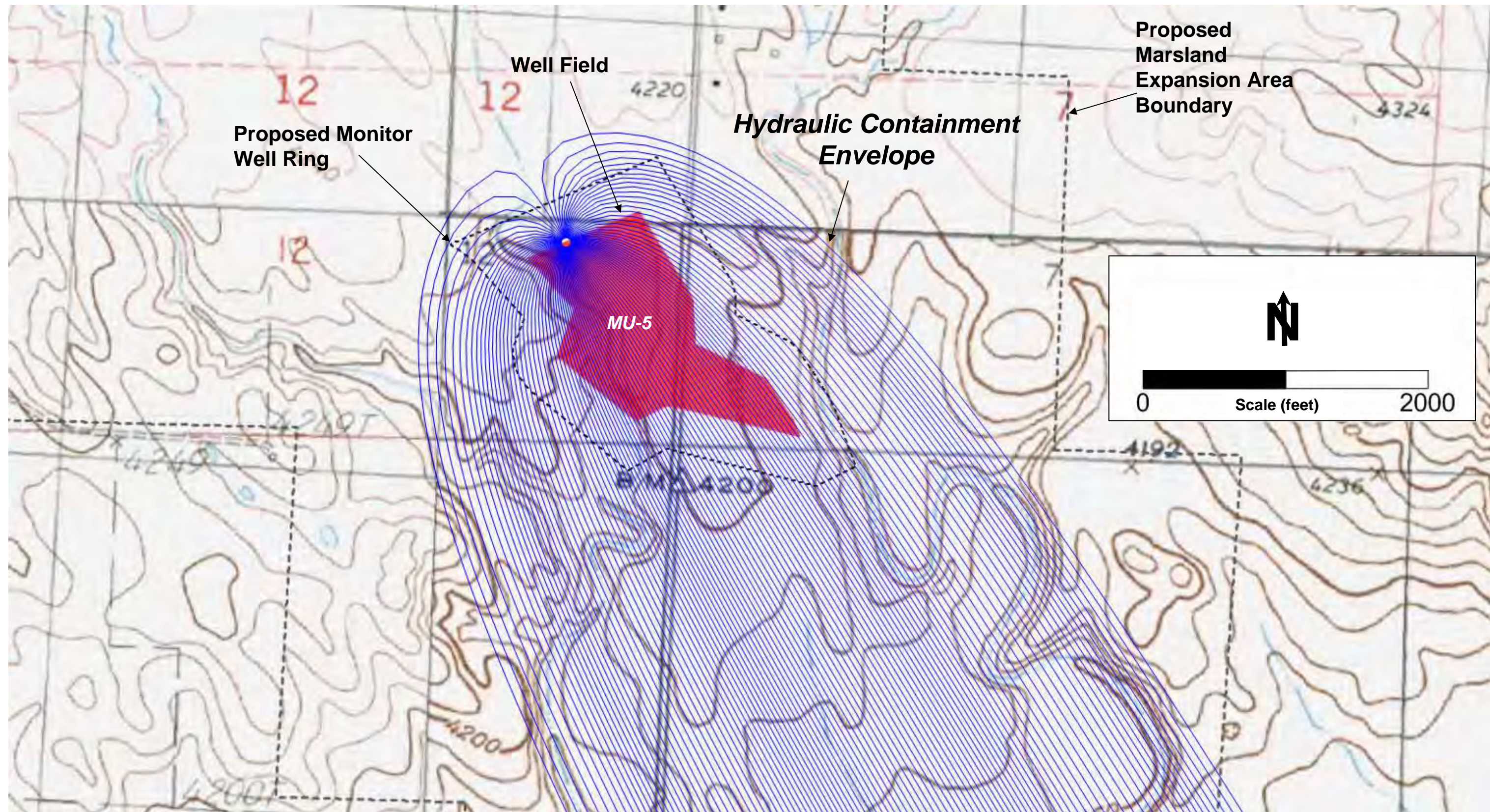


**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 3.1-8  
MARSLAND EXPANSION AREA  
WATER BALANCE AND  
PROCESS FLOW DIAGRAM**

September 2015





Source: AQUI-VER, INC., 5/30/2013



CROW BUTTE  
RESOURCES, INC.

**FIGURE 3.1-9  
MARSLAND HYDRAULIC  
CONTAINMENT ANALYSES**

PROJECT: C0001636 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

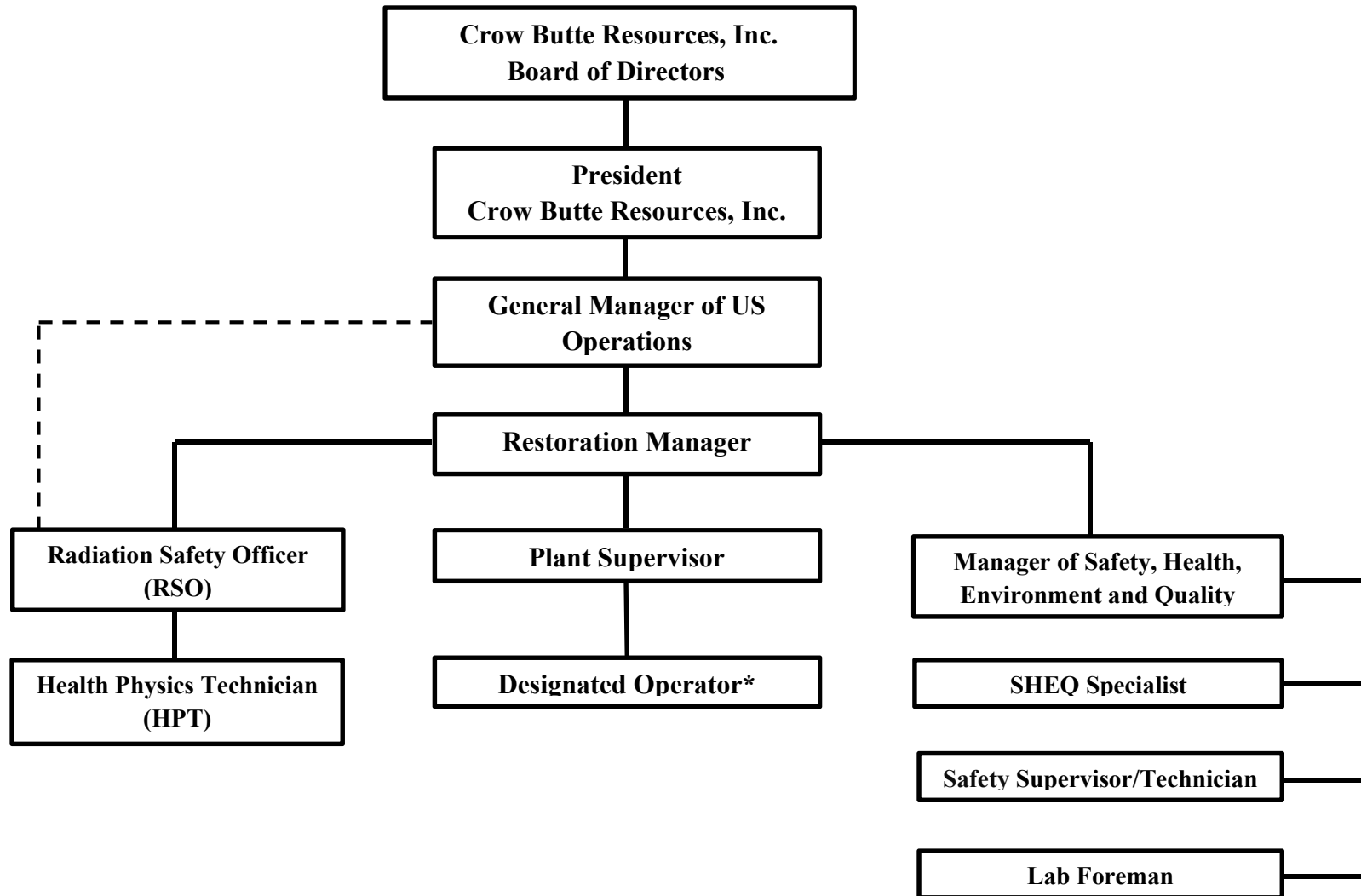








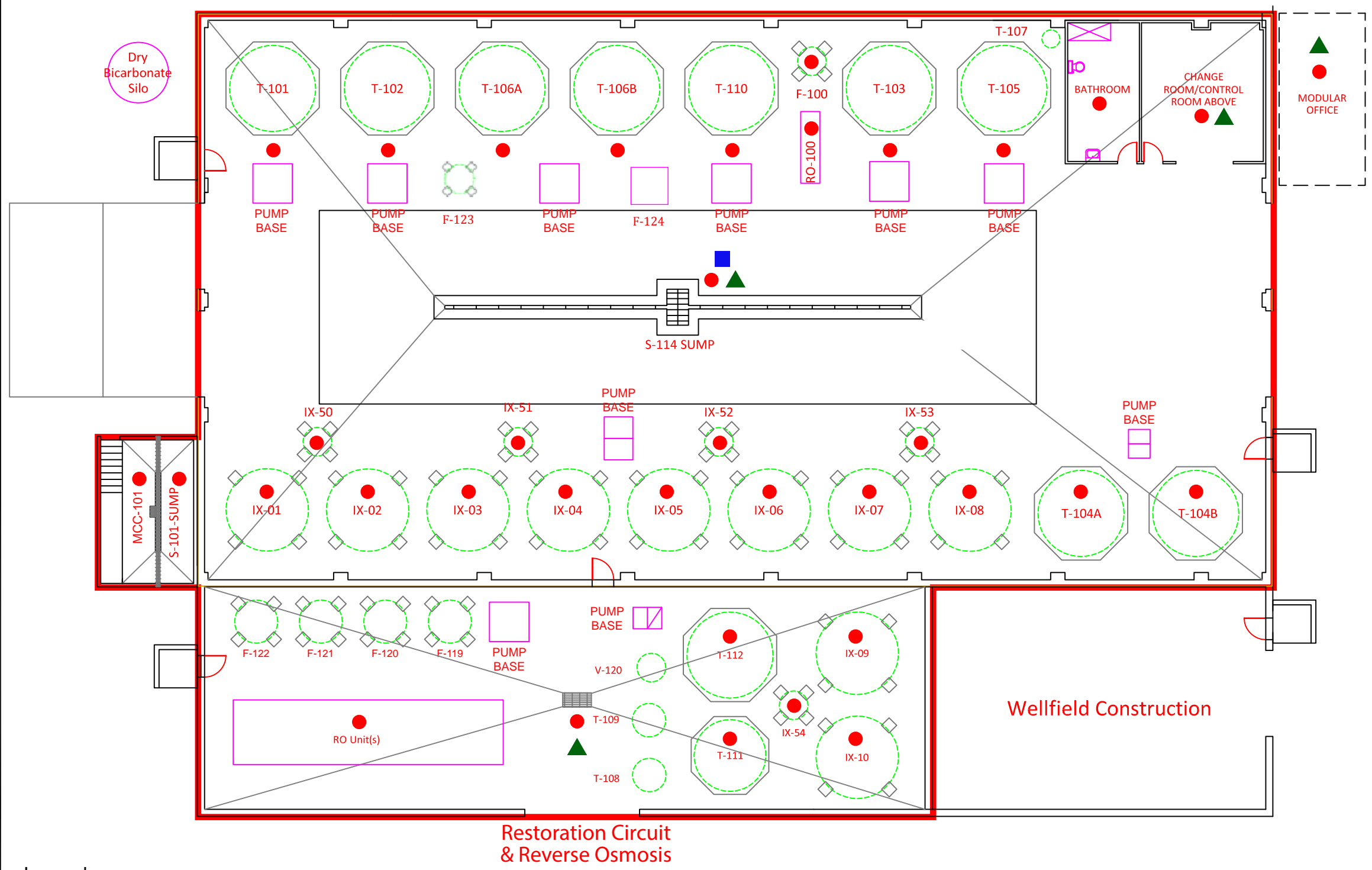
**Figure 5.1-1: Crow Butte Resources Organizational Chart**



\*Qualifications for Designated Operator described in Marsland Expansion Area Technical Report, Section 5.5.4




K:\CBR\_Projects\CO001636\_Marsland\3\_IMAGES\Illustrator\ER Figure 1\_1-8 MEA SAT Building Layout\_ Revised.ai @ 08/08/2013 By: J.Chen



Tank (# Each)	Description
IX-01 through 08	Ion Exchange
IX-50 through 54	Ion Exchange Resin Trap
IX-09 through 10	Restoration IX Column
T-101	Bicarbonate Mix
T-102	Bicarbonate Storage
T-103	Reverse Osmosis Feed
T-104A	Resin Transfer
T-104B	Resin Transfer
T-105	Water supply/Make-up Water
T-106A	Wastewater
T-106B	Wastewater
T-107	Water Pressure Tank
T-108	Sodium Sulfide Day
T-109	Sodium Sulfide Mix
T-110	Well Work Over Fluid
T-111	RO Cleaning Tank
T-112	Permeate Tank
F-119 through 122	RO Filter
V-120	Degaser
F-100	Sock filters
MCC-101	Injection pumps on trunk lines to wellfield
RO-100	RO Pump Base
F-123	Filter
F-124	Belt Filter

- Legend:
- Gamma Survey Location
  - ▲ Radon Testing Location
  - Airborne Particulate Survey Location
  - Restricted Area


- Notes:
- 1. Illustration only, not to scale.
  - 2. Adapted from Cameco Resources, 2011.



CROW BUTTE  
RESOURCES, INC.

**FIGURE 5.7-2**  
**PROPOSED OPERATIONAL**  
**RADIOLOGICAL MONITORING LOCATIONS**  
**FOR SATELLITE FACILITY**

PROJECT: CO001636    MAPPED BY: JC    CHECKED BY: JEC

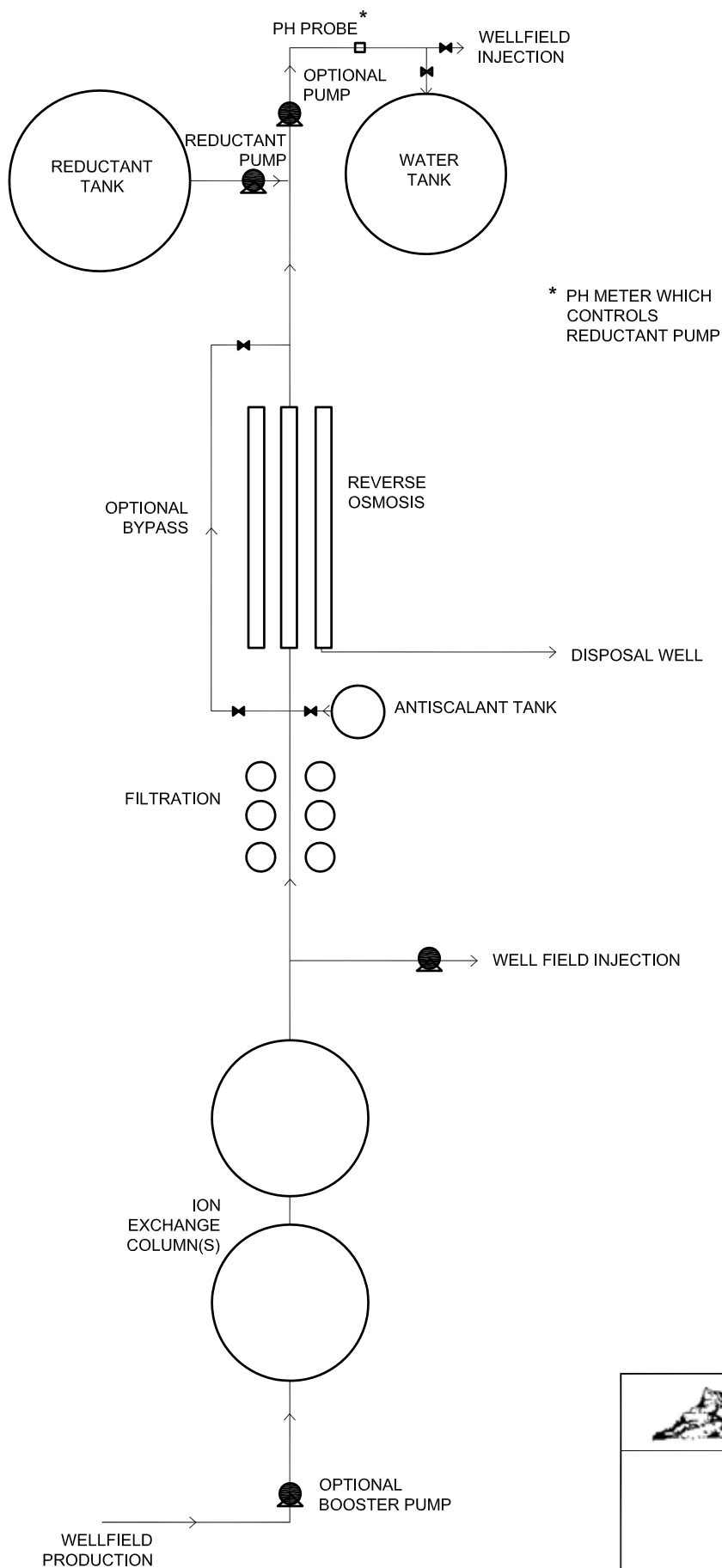


630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com

September 2015

130





CROW BUTTE  
RESOURCES, INC.

**FIGURE 6.1-1  
RESTORATION PROCESS  
FLOW DIAGRAM**

PROJECT: CO001396.02

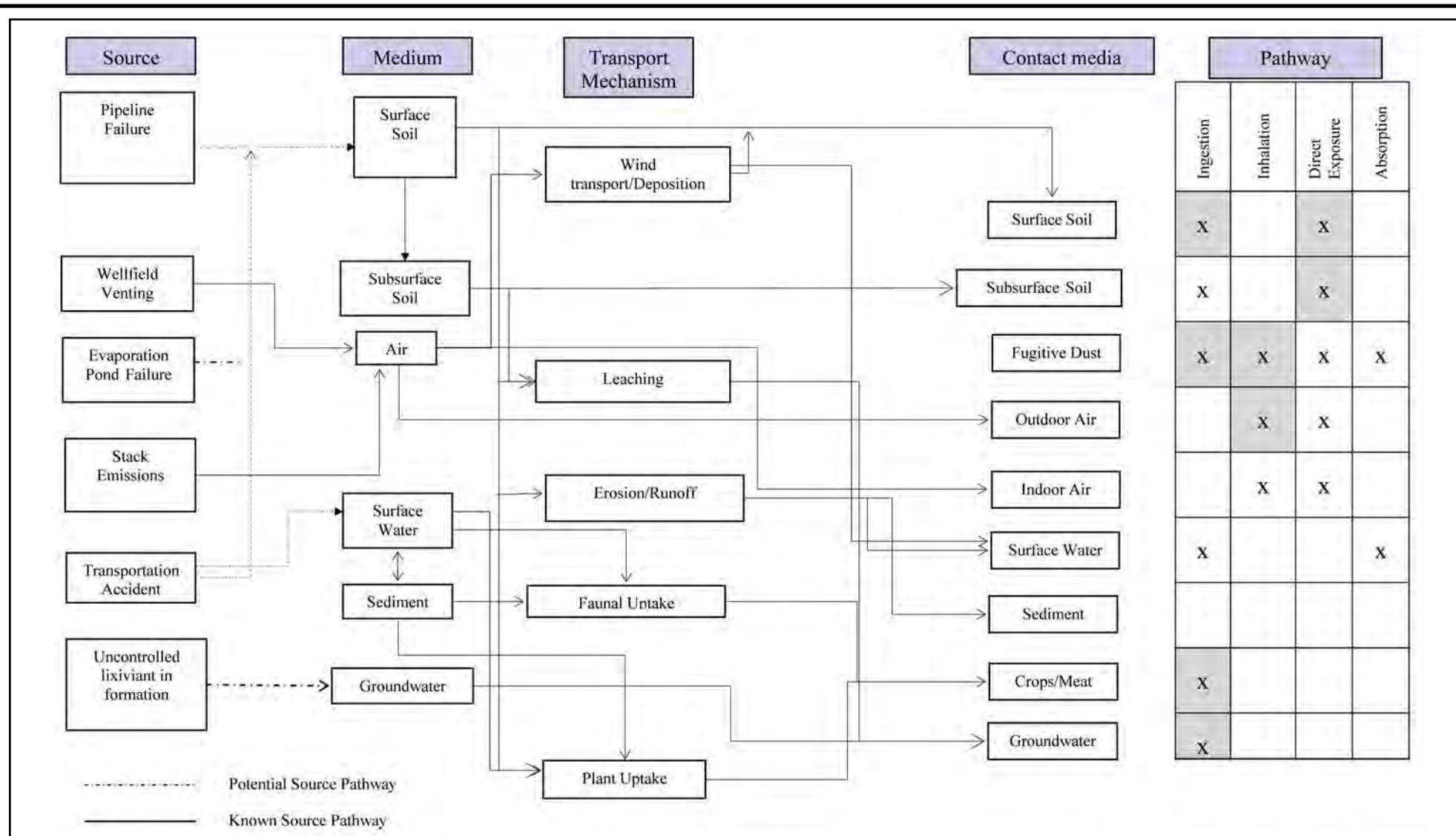
MAPPED BY: JC

CHECKED BY: JEC



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com





Note: X depicts the pathway that outlines the route which radiological emissions may follow to reach the public.  
 Gray shading depicts predominant pathway.



**CROW BUTTE  
RESOURCES, INC.**

**FIGURE 7.3-1  
MARSLAND  
HUMAN EXPOSURE PATHWAYS FOR  
KNOWN AND POTENTIAL SOURCES OF  
RADIOLOGICAL EMISSIONS**

PROJECT: CO001396.00001

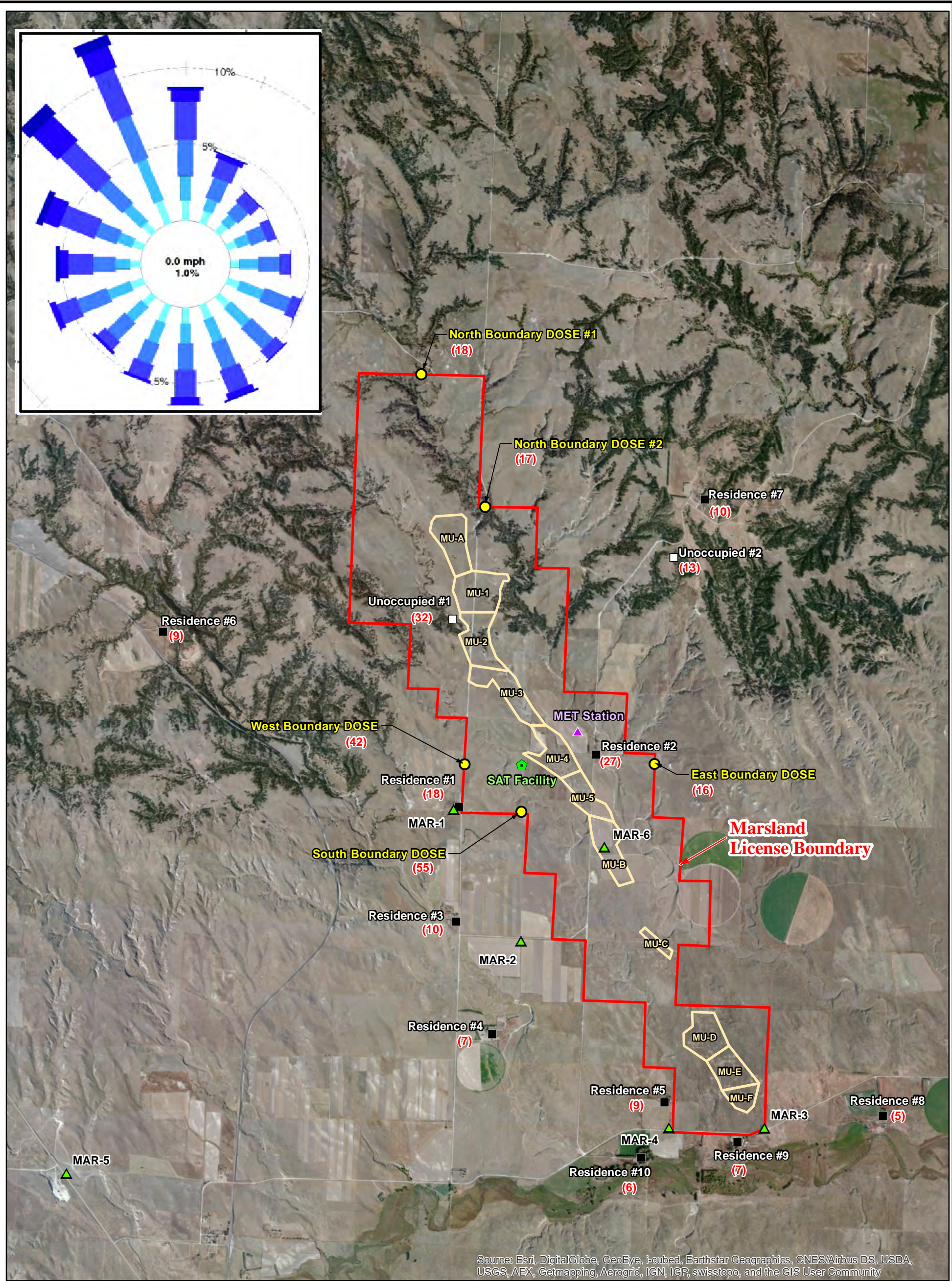
MAPPED BY: JC

CHECKED BY: LW



630 Plaza Drive, Ste. 100  
 Highlands Ranch, CO 80129  
 P: 720-344-3500 F: 720-344-3535  
 www.arcadis-us.com

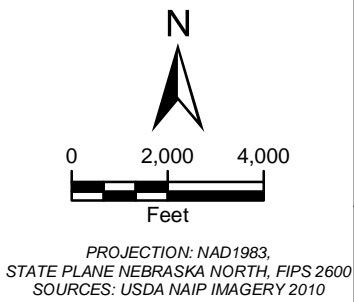




LEGEND

- Air Sample Station
  - Boundary Dose Point
  - Residence (Occupiable)
  - Unoccupied Structure (Unoccupiable)
  - Proposed Satellite Plant Location
  - MEA Met Station
  - Project Boundary
  - Mine Unit
  - MEA Mildos Estimated Radiation Dose Rate (in mrem/yr)
- MEA = Marsland Expansion Area  
mrem = millirems per year

Map Updated on: 10/9/2014



CROW BUTTE  
RESOURCES, INC.

FIGURE 7.3-2  
MILDOS RECEPTORS  
RESIDENCES AND DESIGNATED MEA  
LICENSE BOUNDARY LOCATIONS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: MS



630 Plaza Drive, Ste. 100  
Highlands Ranch, CO 80129  
P: 720-344-3500 F: 720-344-3535  
www.arcadis-us.com



