

Uranerz Energy Corporation/NRC Coal Bed Methane Meeting May 27, 2008

American Stock Exchange
Toronto Stock Exchange **URZ**

Frankfurt
Exchange **U9E**

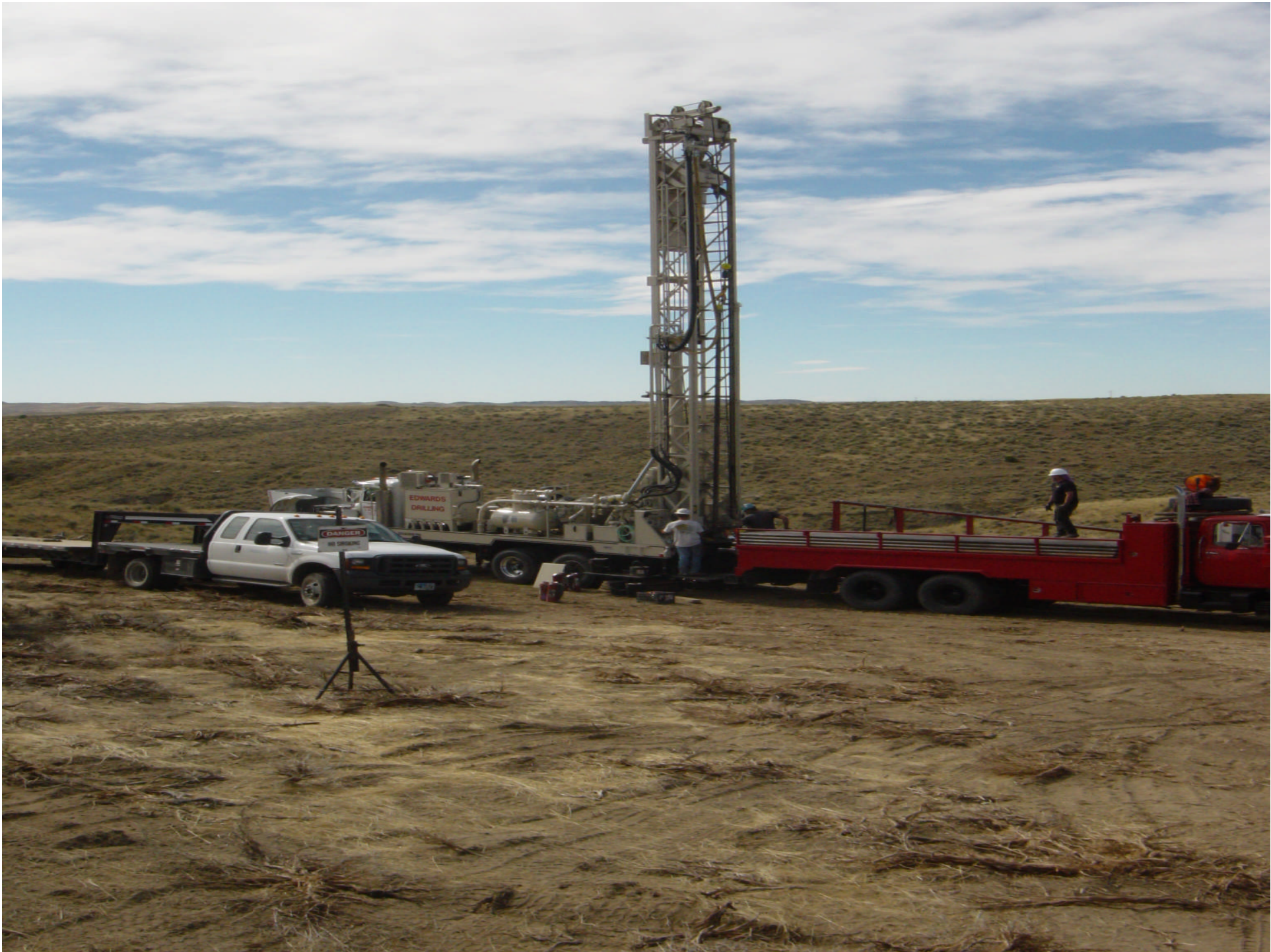
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Coal Bed Methane (CBM) Overview

- ❧ CBM began in the early 1990's in the Powder River Basin.
- ❧ Methane (Natural Gas) is released from the coal formation by dewatering the coal seam.
- ❧ The natural gas is adsorbed in the coal pores under hydrostatic pressure. The dewatering of the coal causes a pressure drop that releases the natural gas from the coal.

Coal Bed Methane Overview – Cont.

- ❧ The Big George coal seam is the target for CBM activity in the Uranerz Energy Corporation Powder River Basin ISR Complex.
- ❧ The coal seam is approximately 1400 to 1800 feet below the surface and is approximately 50+ feet thick.
- ❧ Drilling operations are very similar to that of ISR method except that the equipment and disturbance is bigger.











Activity at the Nichols Ranch ISR Project

- ❧ Currently 3 CBM operators working in or near the Nichols Ranch and Hank license areas.
- ❧ CBM activity began in Hank last year (2007) in Section 31 and Section 6. Piping, electricity, road improvements, and drilling occurred.
- ❧ CBM drilling activity will begin in Nichols Ranch this year (2008) in Section 17. Road improvements, piping and electrical installation was completed last year. Drilling will begin this year.
- ❧ More activity to east of Section 17 (Nichols Ranch) began this spring.

105° 59' 48.834" W
43° 48' 40.362" N

R 76 W R 75 W

105° 50' 33.008" W
43° 48' 44.835" N

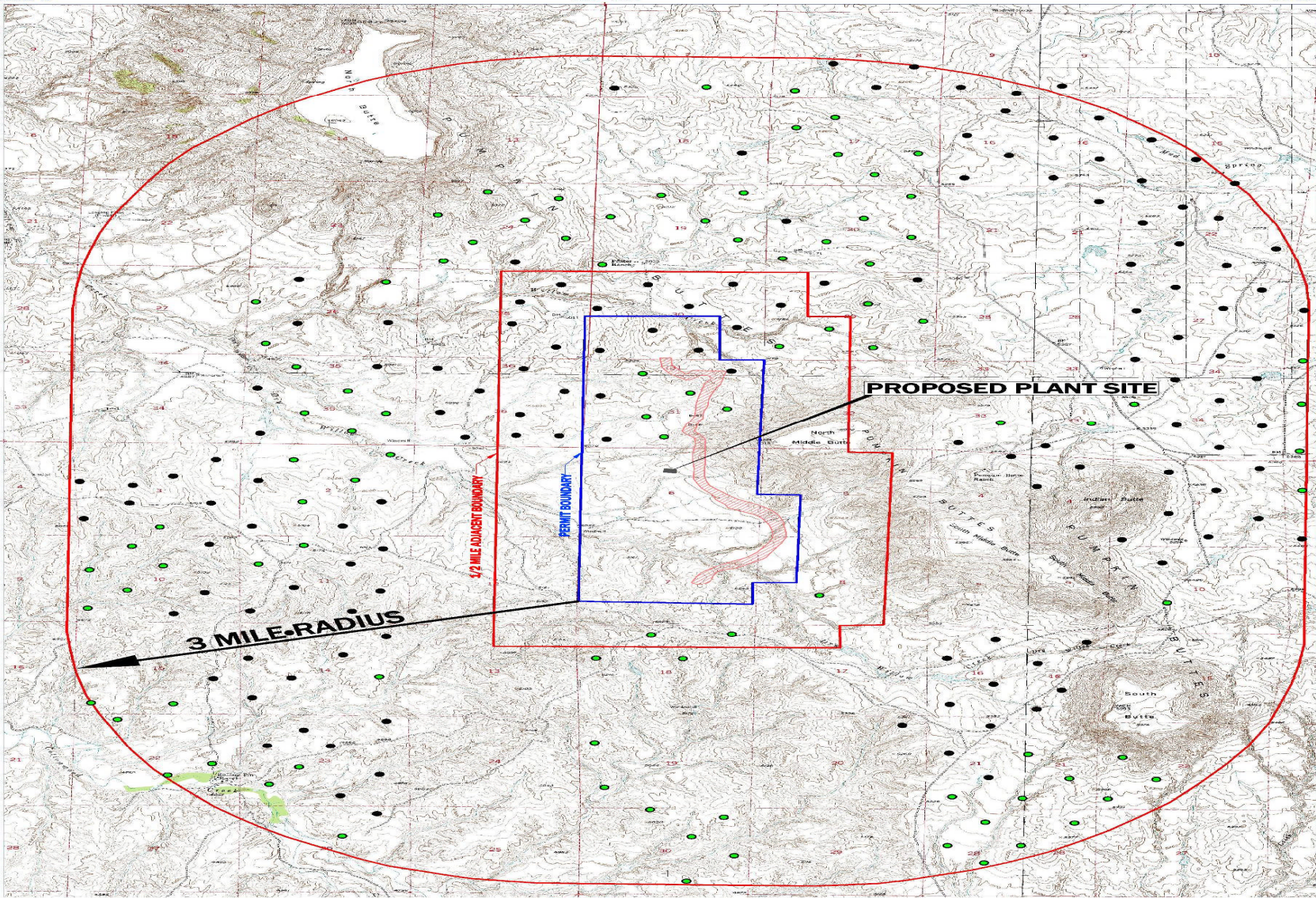
T 44 N
T 43 N

T 44 N
T 43 N

43° 39' 43.370" N
106° 50' 59.636" W

R 76 W R 75 W

106° 50' 29.469" W
43° 39' 47.820" N



PROPOSED PLANT SITE

PERMIT BOUNDARY

4.2 MILE ADJACENT BOUNDARY

3 MILE RADIUS

LEGEND

- COMPLETED WELLS
- PERMITTED WELLS
- PROJECTED WELL FIELD



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NICHOLS RANCH URB PROJECT
EXHIBIT D6-4
HANK LINE
COAL BED METHANE WELLS
(3 MILE RADIUS)

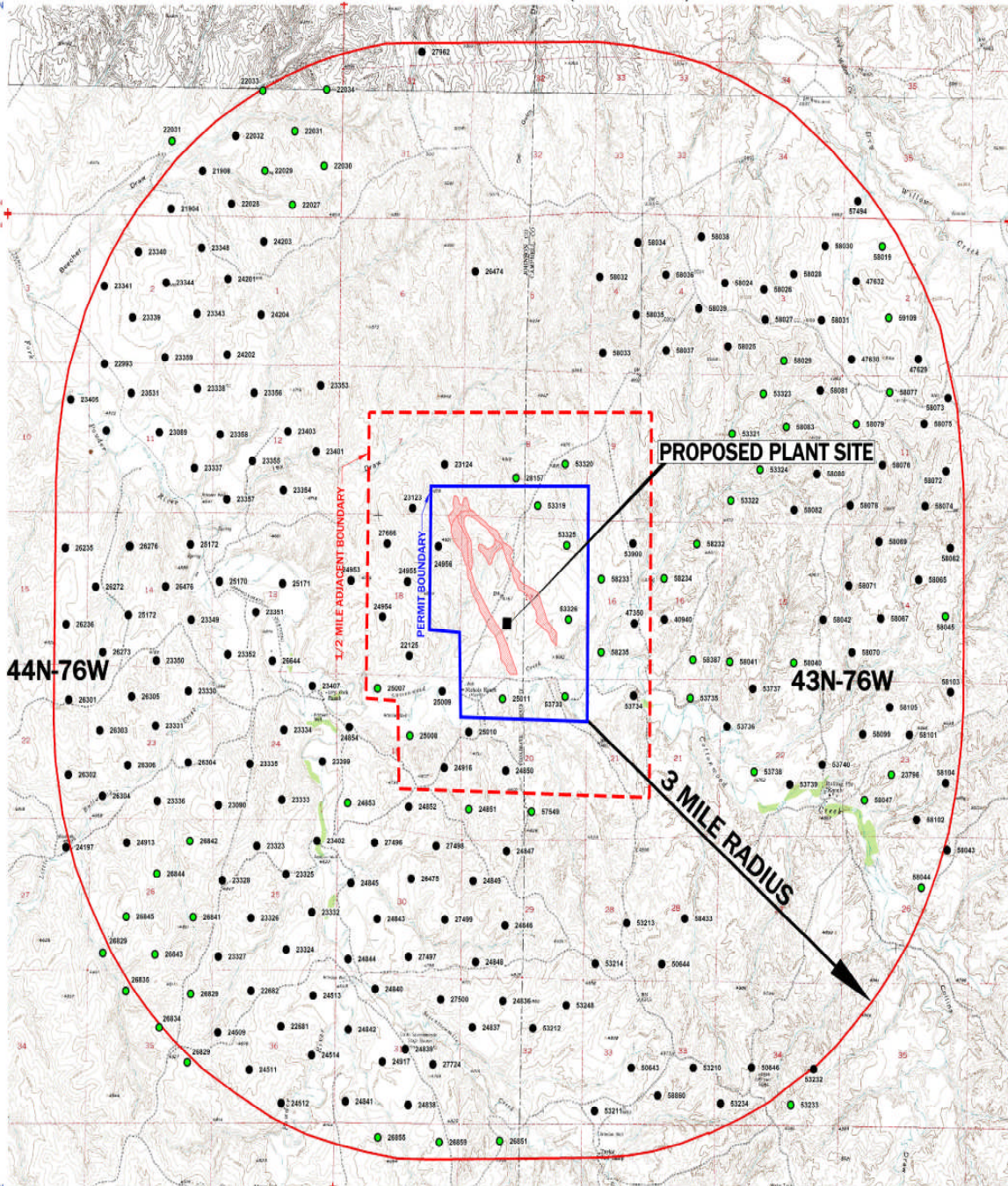
Rev: 0-M.P.	Date: 05/12/2009
Author: RANDY LUTZ	Reviewed: JEFF
Scale: 1:24,000	Project: 080000-20-104
DWG: 080001 D6-4	

43° 45' 27.907" N

43° 45' 33.054" N

T 44 N
T 43 N

T 44 N
T 43 N



44N-76W

43N-76W

PROPOSED PLANT SITE

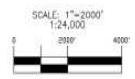
1/2 MILE ADJACENT BOUNDARY

PERMIT BOUNDARY

3 MILE RADIUS

LEGEND

- COMPLETED WELLS (APL 49-005-#)
- PERMITTED WELLS
- PROJECTED WELL FIELD



43° 38' 30.653" N
106° 5' 58.254" W

R 76 W
R 75 W

43° 38' 35.779" N
105° 56' 23.695" W

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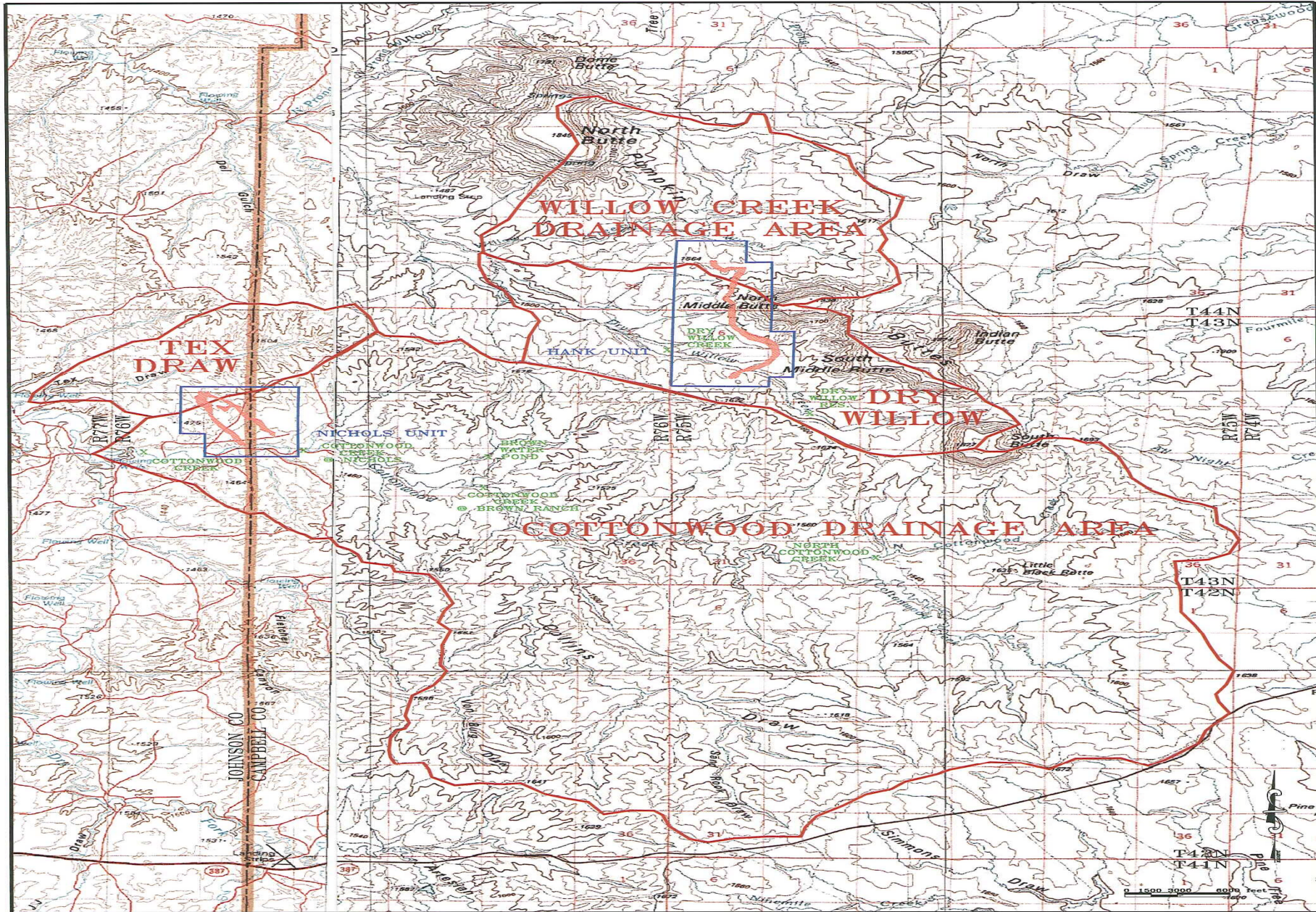
THE STATE OF MONTANA
COUNTY OF DEWEESE
DEPARTMENT OF ENVIRONMENTAL QUALITY

**NICHOLS RANCH URB PROJECT
EXHIBIT D6-3
NICHOLS RANCH UNIT
COAL BED METHANE WELLS
OF WELLS**

Rev. 3-2017 Date: 07/25/2017
Deliver: M027-07013 Revision: Date:

CBM Surface Discharge

- Each of the three operators will discharge differently.
 - The coal seam dewatering at Hank will be pumped to a large tank and then pumped approximately 30 miles away and be injected into the Madison formation.
 - The operator in Section 17 will surface discharge the CBM water into Tex Draw Located to the NW of the Nichols Ranch License area.
 - The operator in Section 16 will have some discharge into surface impoundments.

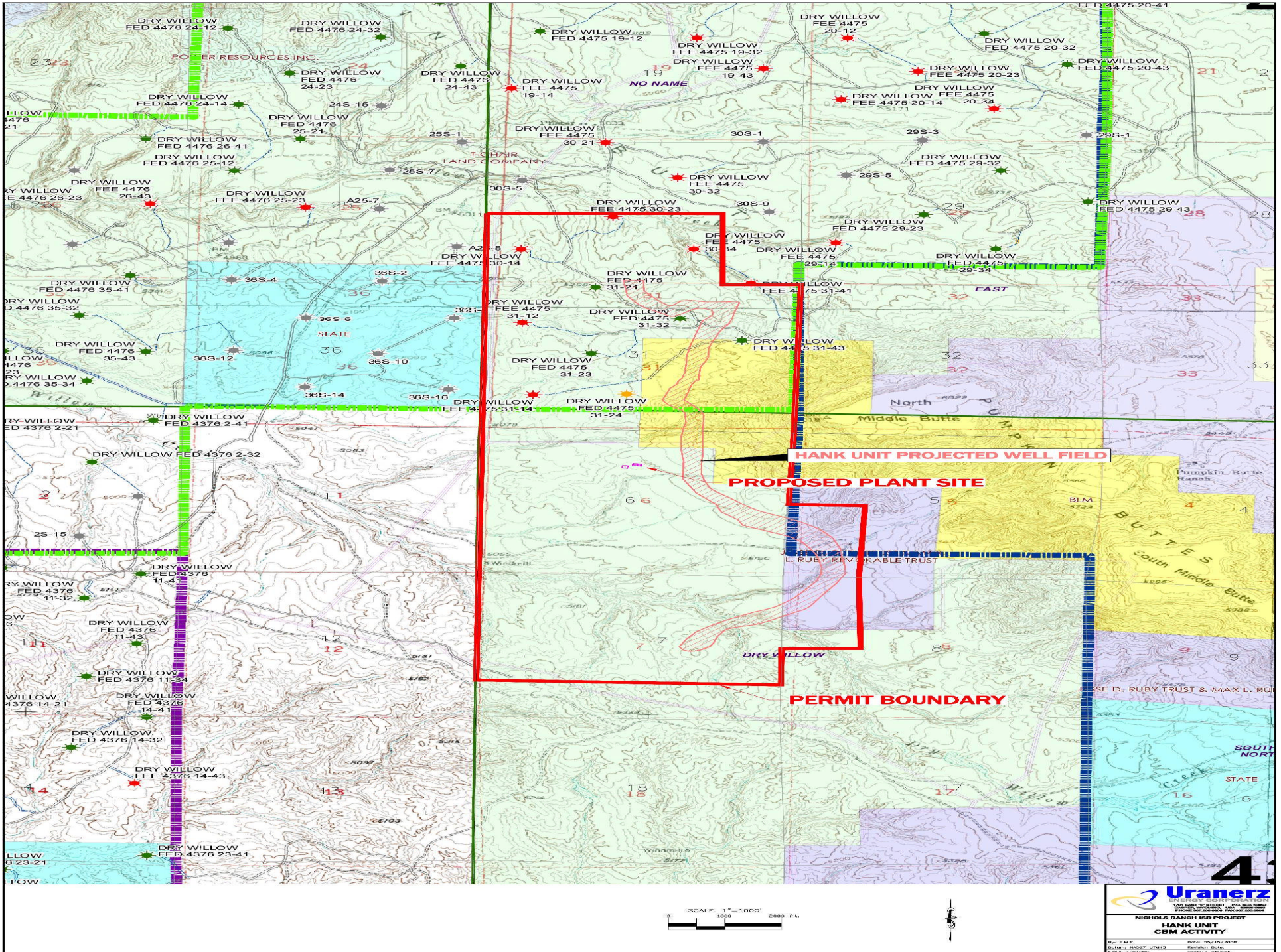


By: lgrh Date: 10/16/07
 Contour Interval Rev. date: 03/08
 DWG: C:\PROJECTS\2007-14\ DRAINAGE AREA\ DRAINAGE-LH

LEGEND: WELLFIELD
 Drainage area divide
 Permit Boundary
 Land surface contours in meters



FIGURE D6-1. SURFACE DRAINAGE AREAS



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ENVIRONMENTAL CONSULTANTS

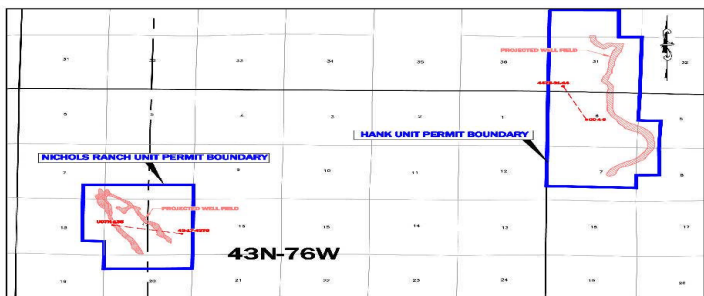
**NICHOLS RANCH ISR PROJECT
 HANK UNIT
 CBM ACTIVITY**

Rev: 04/24/2018
 Bottom: HANCOZ_JIM13
 Date: 04/24/2018
 Drawn: Karaman



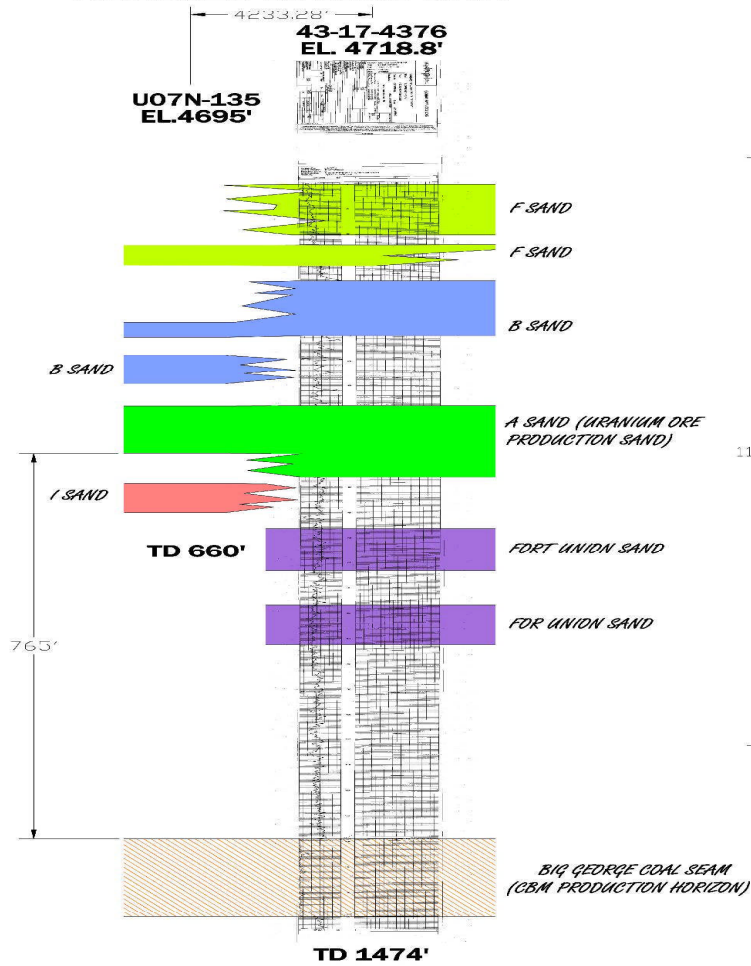
Geologic and Hydrologic Separation of CBM From Nichols Ranch ISR Project

- ✧ The target coal seam (Big George) is vertically separated from the Nichols Ranch ISR Project at the following distances:
 - ✧ Nichols Ranch – 765 feet
 - ✧ Hank – 1160 feet
- ✧ In between the uranium ore production sand and the coal seam exists several sands and mudstone, siltstone aquitards.



LOCATION MAP
SCALE: 1"=4000'

NICHOLS RANCH UNIT



HANK UNIT

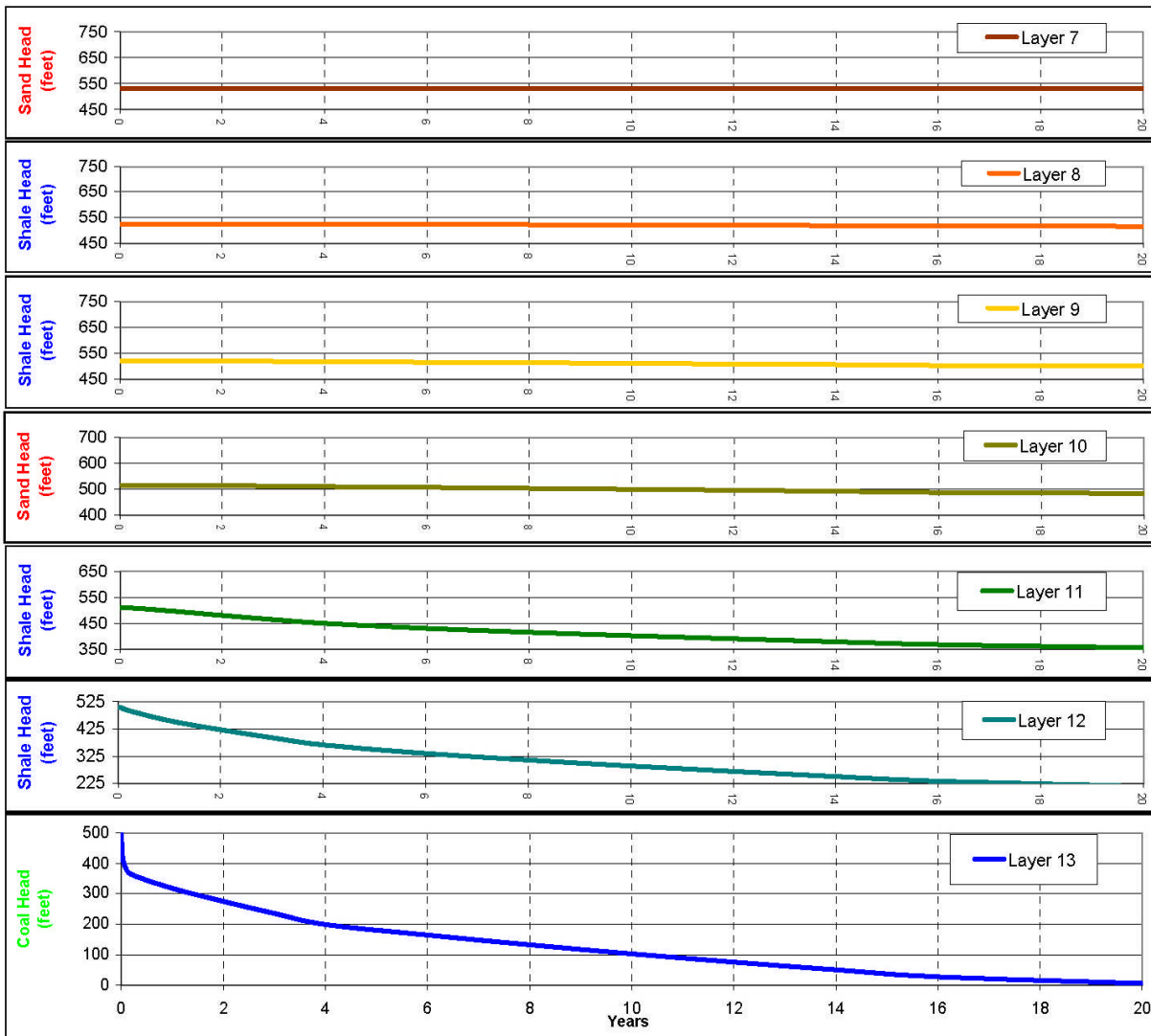


TD 2000'



Groundwater Drawdown From CBM

- ❧ The potential for groundwater drawdown from the removal of water from the coal seam was an impact discussed during the CBM EIS that was finalized in 2003.
- ❧ BLM has several monitor wells in place to measure the drawdown in the coal and the overlying sand.
- ❧ BLM CBM EIS and our modeling concur on the effects of coal seam water removal and the upper sands.



40 foot thick sand
 Transmissivity
 = 424 gal/day/ft
 Total drawdown = 0.1 feet

50 foot thick shale
 Transmissivity
 = 0.5 gal/day/ft
 Total drawdown = 9.1 feet

50 foot thick shale
 Transmissivity
 = 0.5 gal/day/ft
 Total drawdown = 19 feet

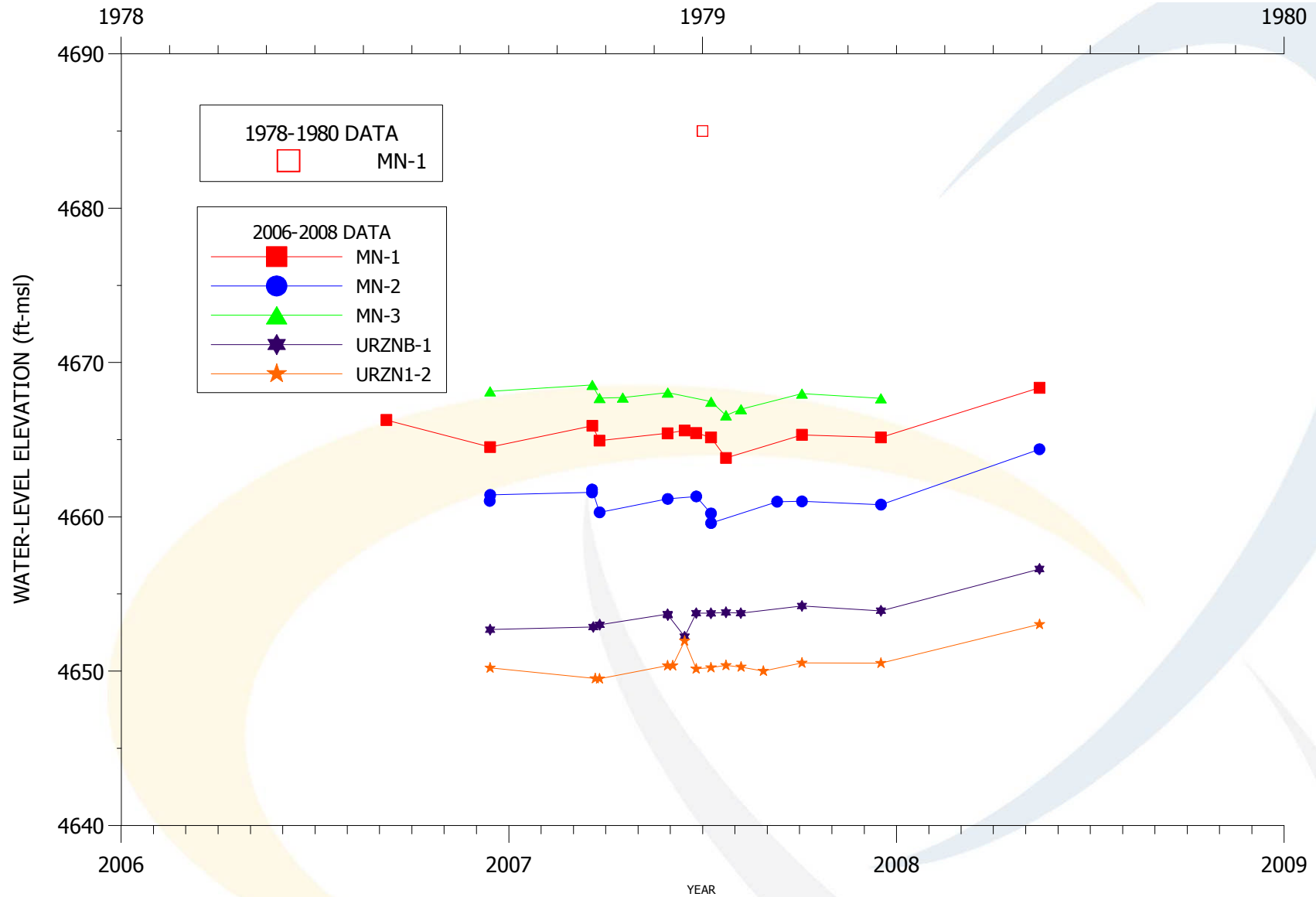
40 foot thick sand
 Transmissivity
 = 21 gal/day/ft
 Total drawdown = 32 feet

20 foot thick shale
 Transmissivity
 = 0.5 gal/day/ft
 Total drawdown = 154 feet

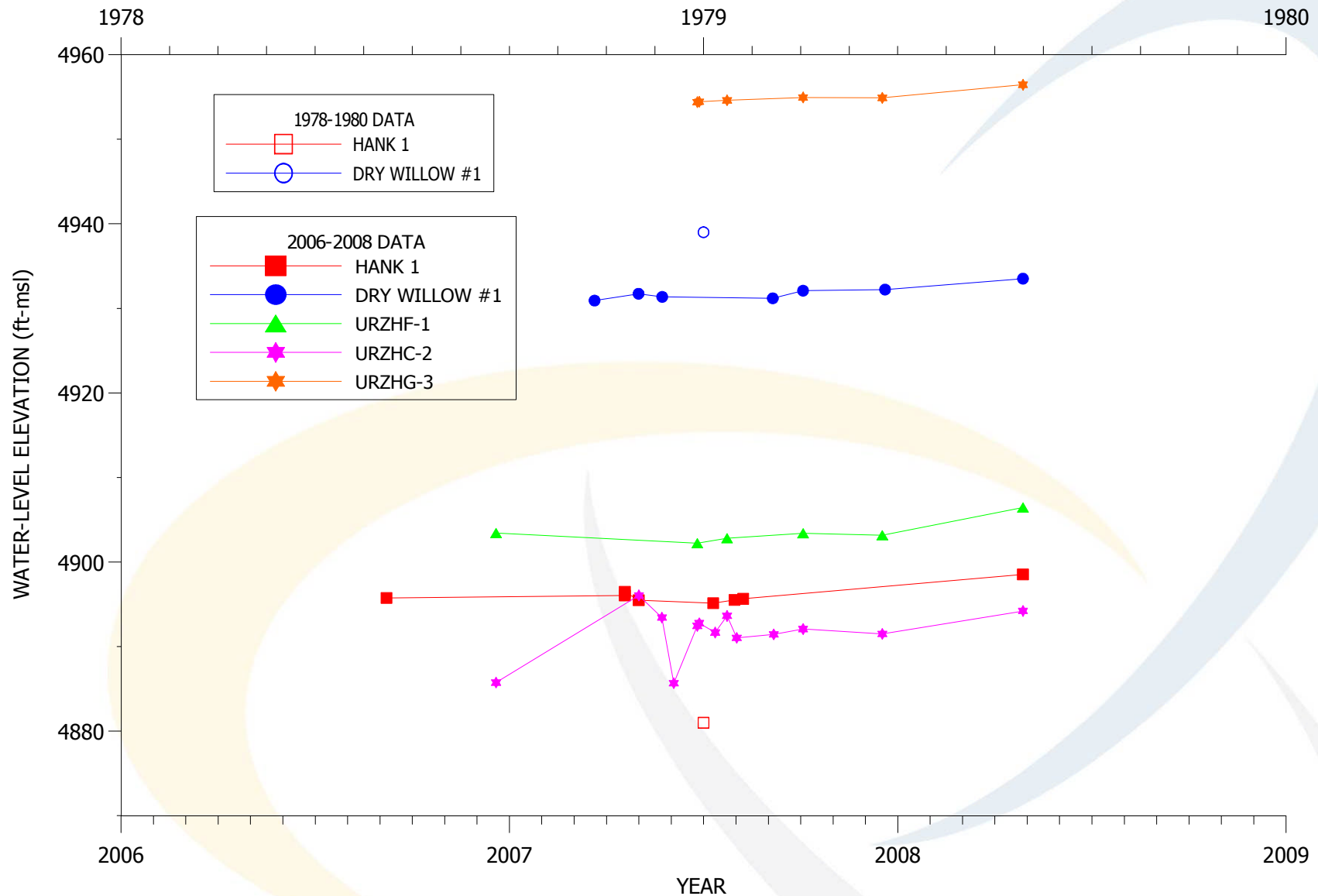
20 foot thick shale
 Transmissivity
 = 0.5 gal/day/ft
 Total drawdown = 291 feet

40 foot thick coal
 Transmissivity
 = 21 gal/day/ft
 Total drawdown = 493 feet

Predicted Water Level Changes In Coal and Overlying Layers



WATER-LEVEL ELEVATION VERSUS TIME FOR WELLS MN-1, MN-2, MN-3, URZNB-1 AND URZN1-2



WATER-LEVEL ELEVATION VERSUS TIME FOR WELLS HANK 1, DRY WILLOW #1, URZHF-1, URZHC-2 and URZHG-3

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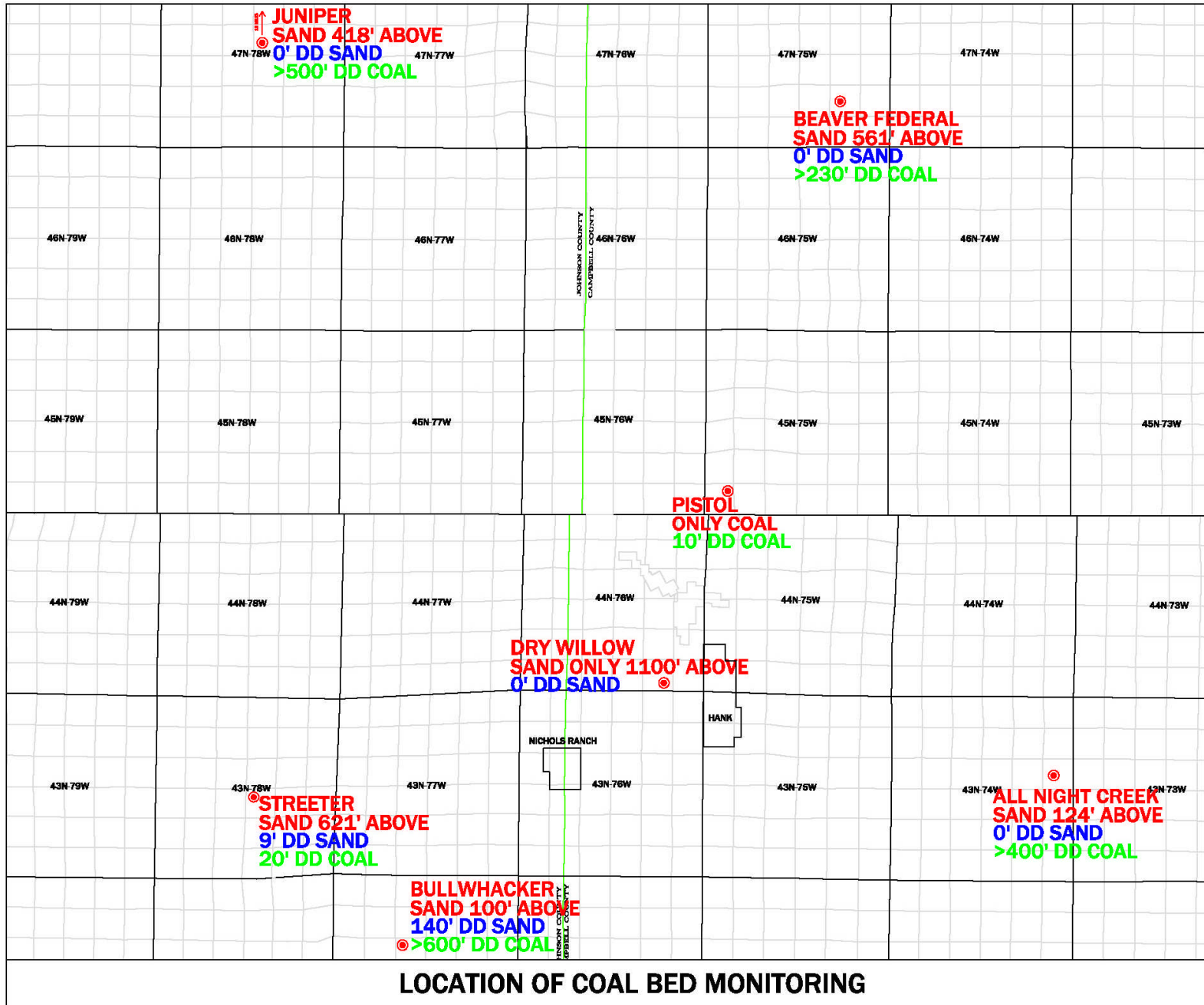
URZ

Frankfurt Exchange

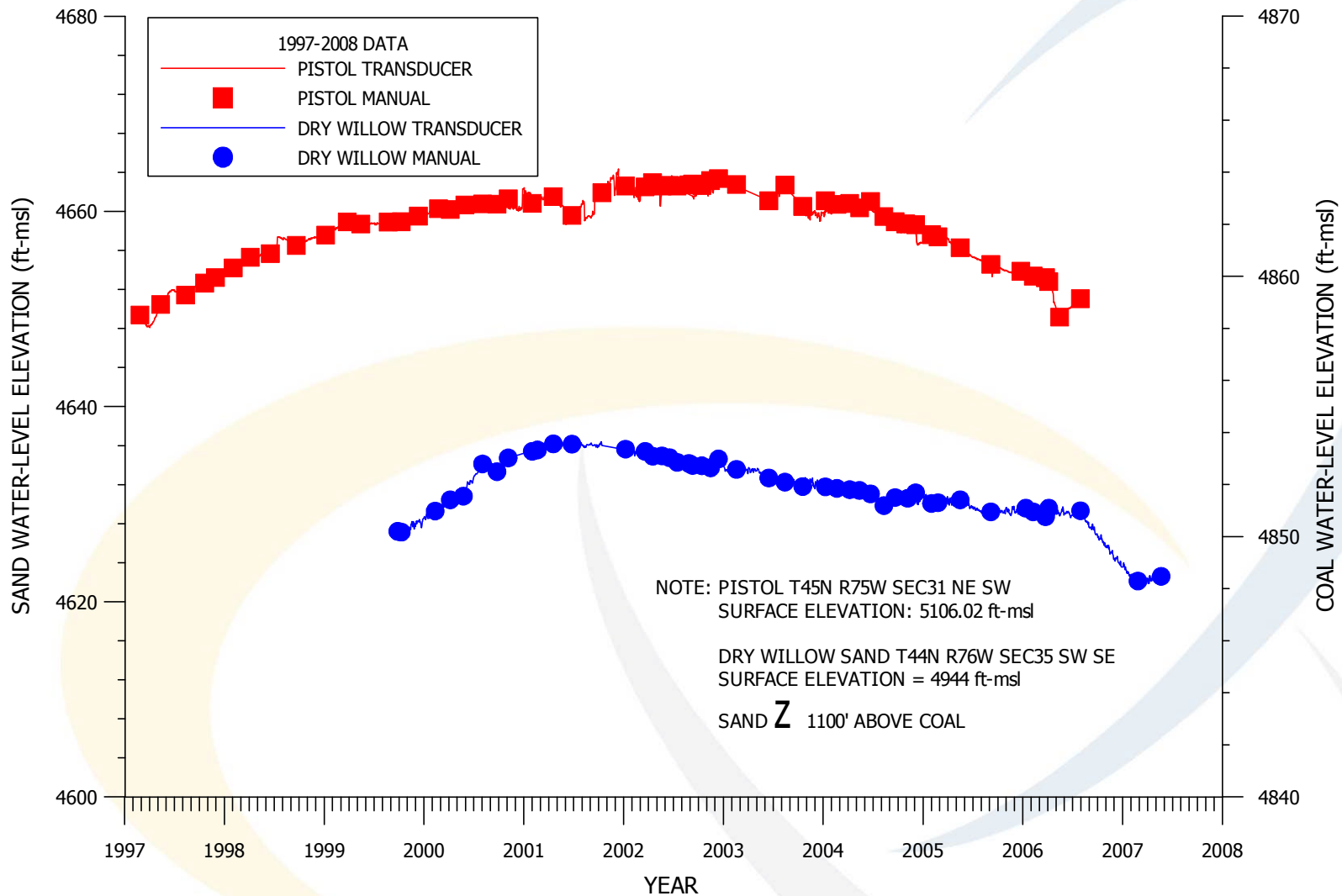
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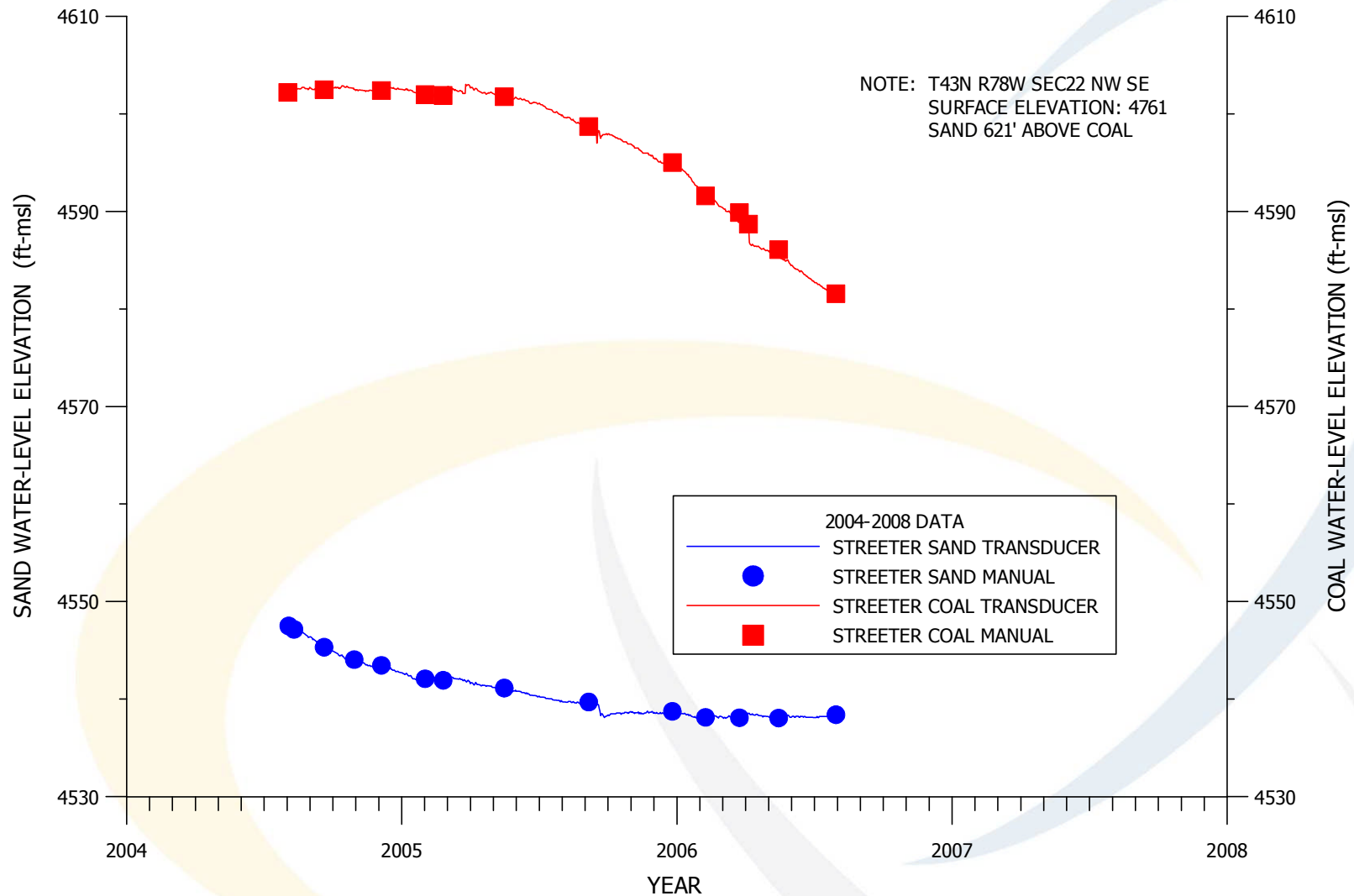
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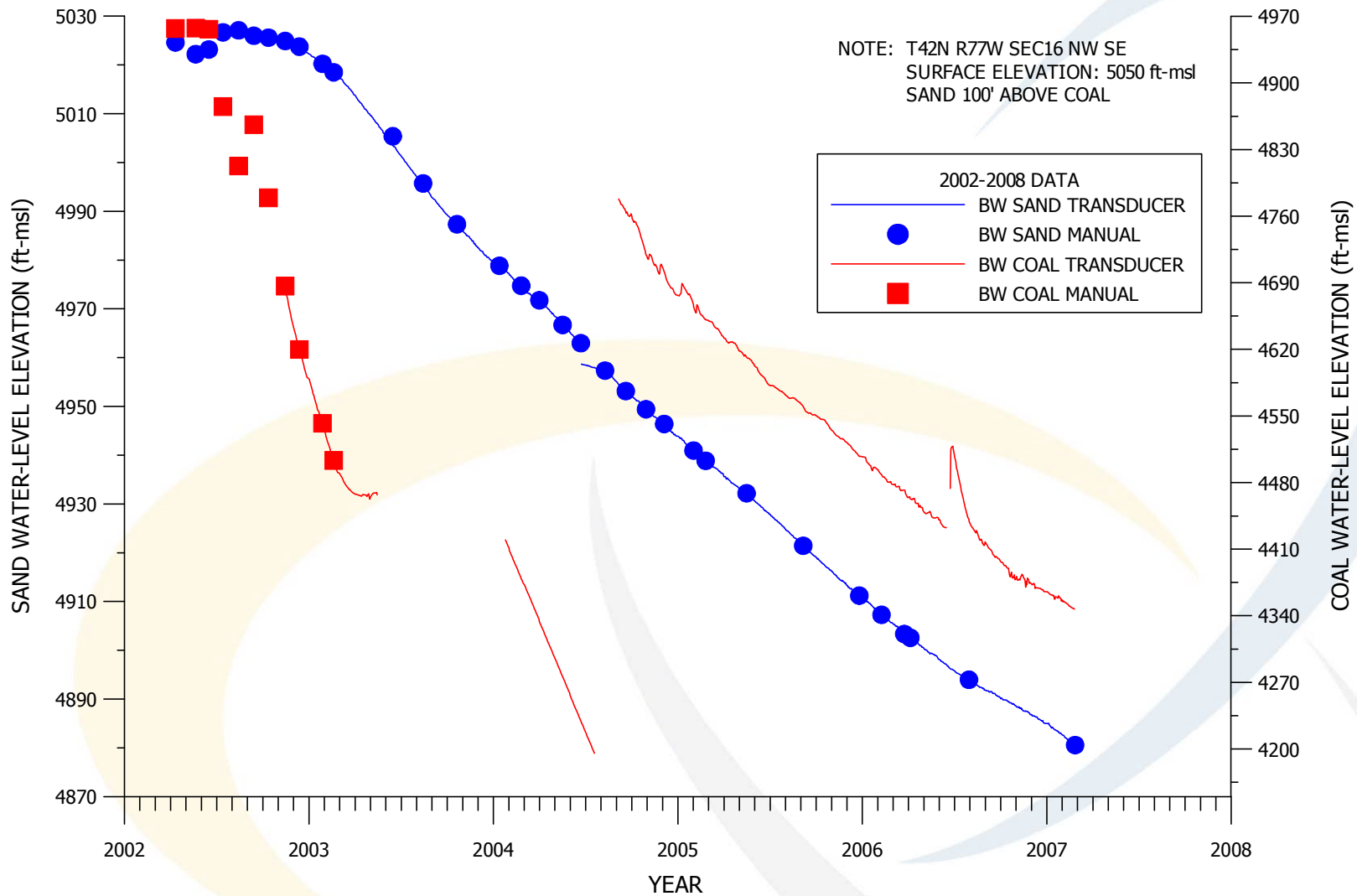
LOCATION OF COAL BED MONITORING



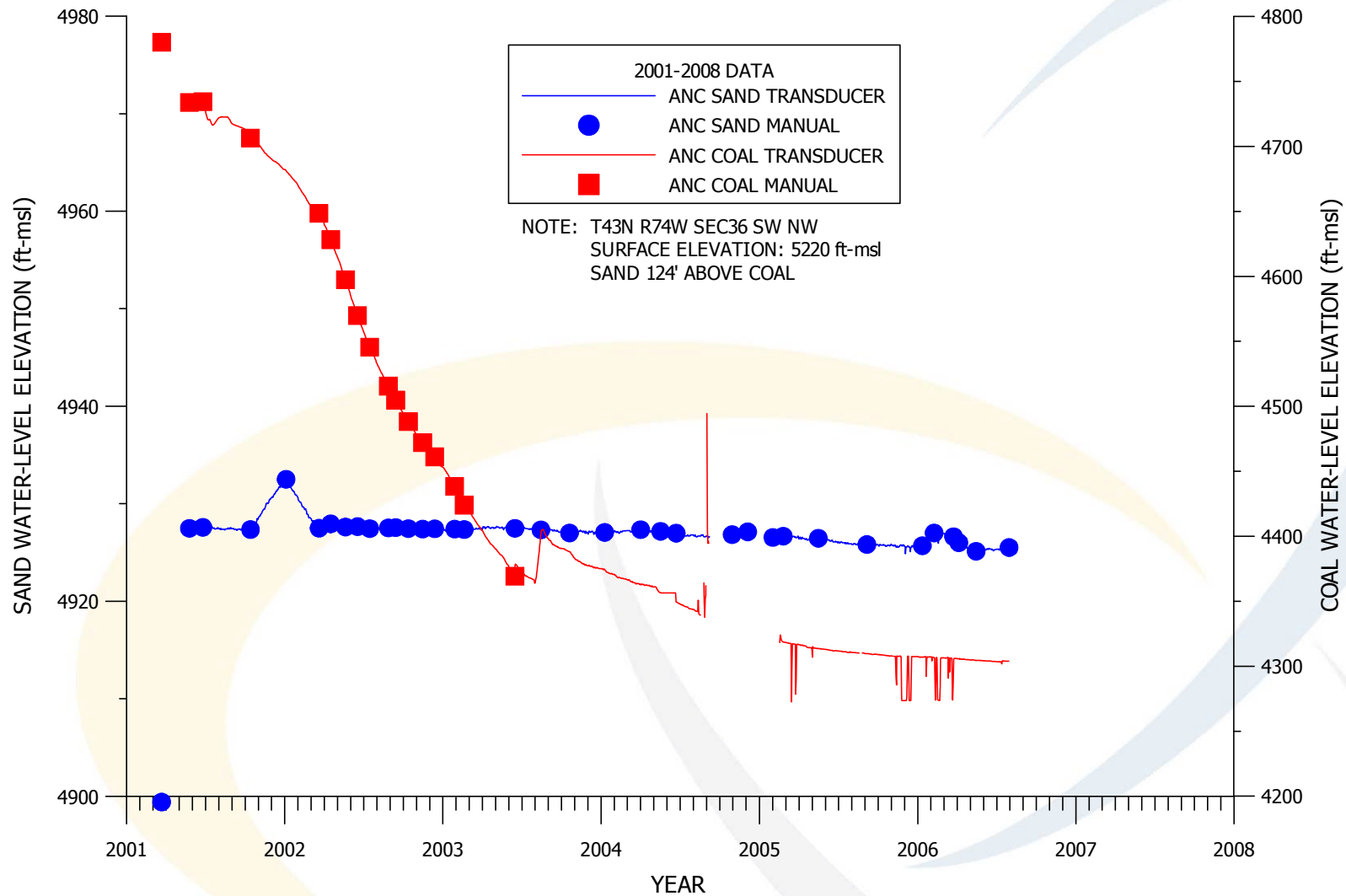
WATER-LEVEL ELEVATION VERSUS TIME FOR PISTOL COAL AND DRY WILLOW SAND WELLS



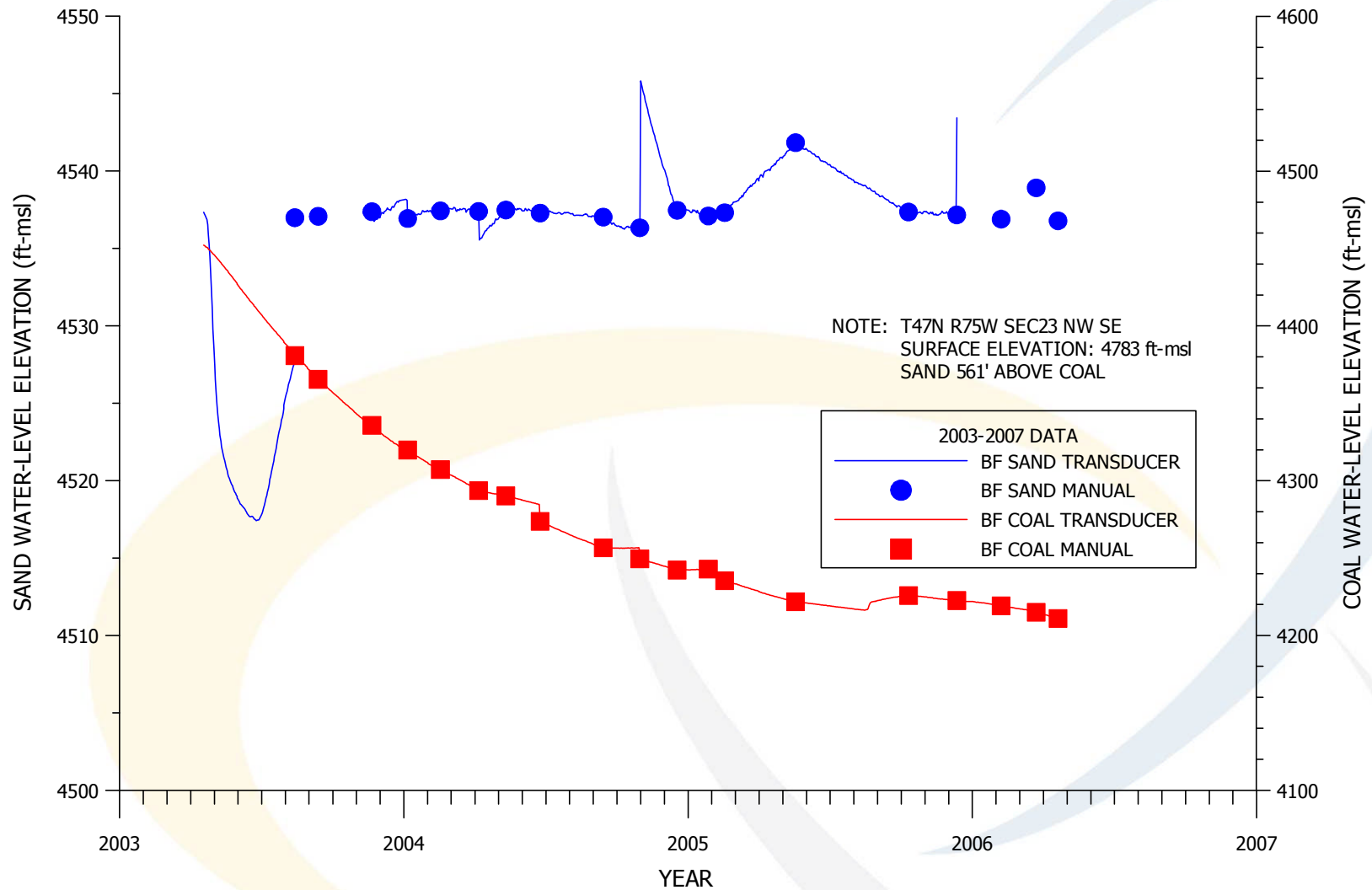
WATER-LEVEL ELEVATION VERSUS TIME FOR STREETER SAND and COAL WELLS



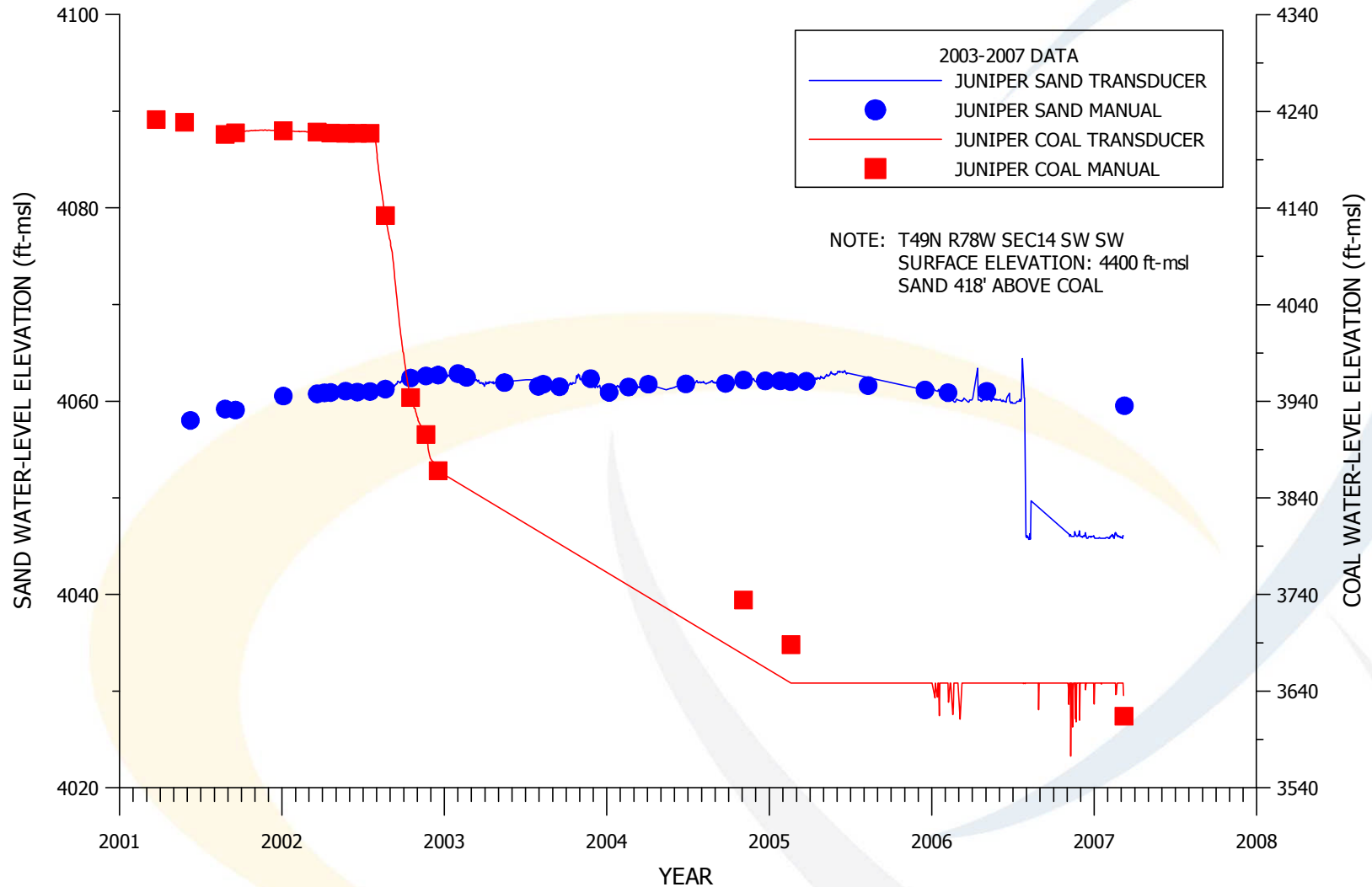
WATER-LEVEL ELEVATION VERSUS TIME FOR BULLWHACKER SAND and COAL WELLS



WATER-LEVEL ELEVATION VERSUS TIME FOR ALL NIGHT CREEK SAND and COAL WELLS



WATER-LEVEL ELEVATION VERSUS TIME FOR BEAVER FEDERAL SAND and COAL WELLS



WATER-LEVEL ELEVATION VERSUS TIME FOR JUNIPER SAND and COAL WELLS

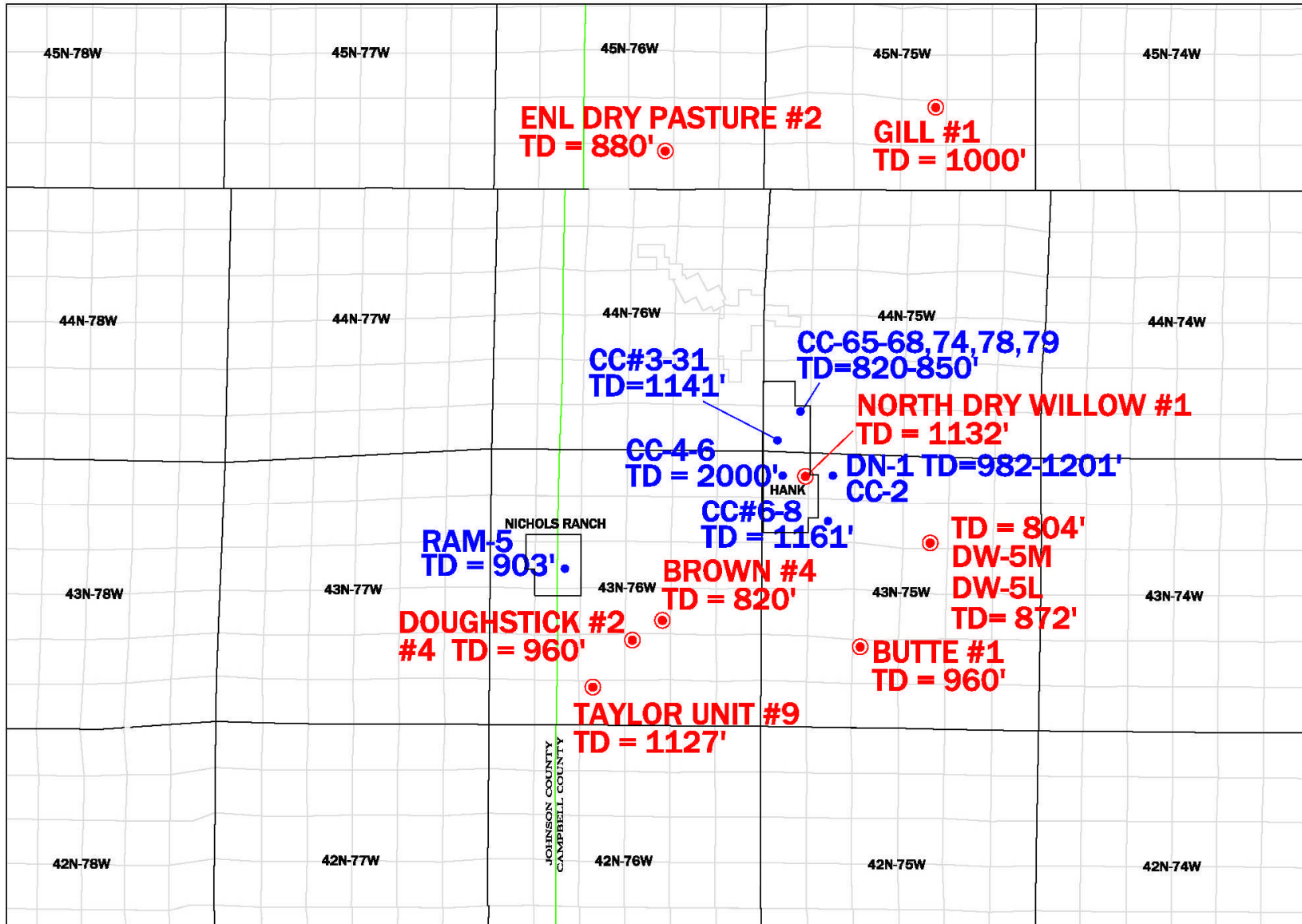
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LEGEND
 ● PERMITTED WELLS >800'
 ● DEEP DRILL HOLES >800'

DEEP WELLS AND DRILL HOLES NEAR NICHOLS RANCH PERMIT

AQUIFER PROPERTIES

NICHOLS-A SAND

Transmissivity = 350 gal/day/ft or 47 ft²/day

Aquifer Thickness = 90 feet

Hydraulic Conductivity = 0.50 ft/day or 0.24 Darcy

Storage Coefficient = 1.8E-4

HANK - F SAND

Transmissivity = 400 gal/day/ft or 53 ft²/day

Aquifer Thickness = 90 feet

Hydraulic Conductivity = 0.60 ft/day or 0.29 Darcy

Specific Yield = 0.05

AQUITARD PROPERTIES

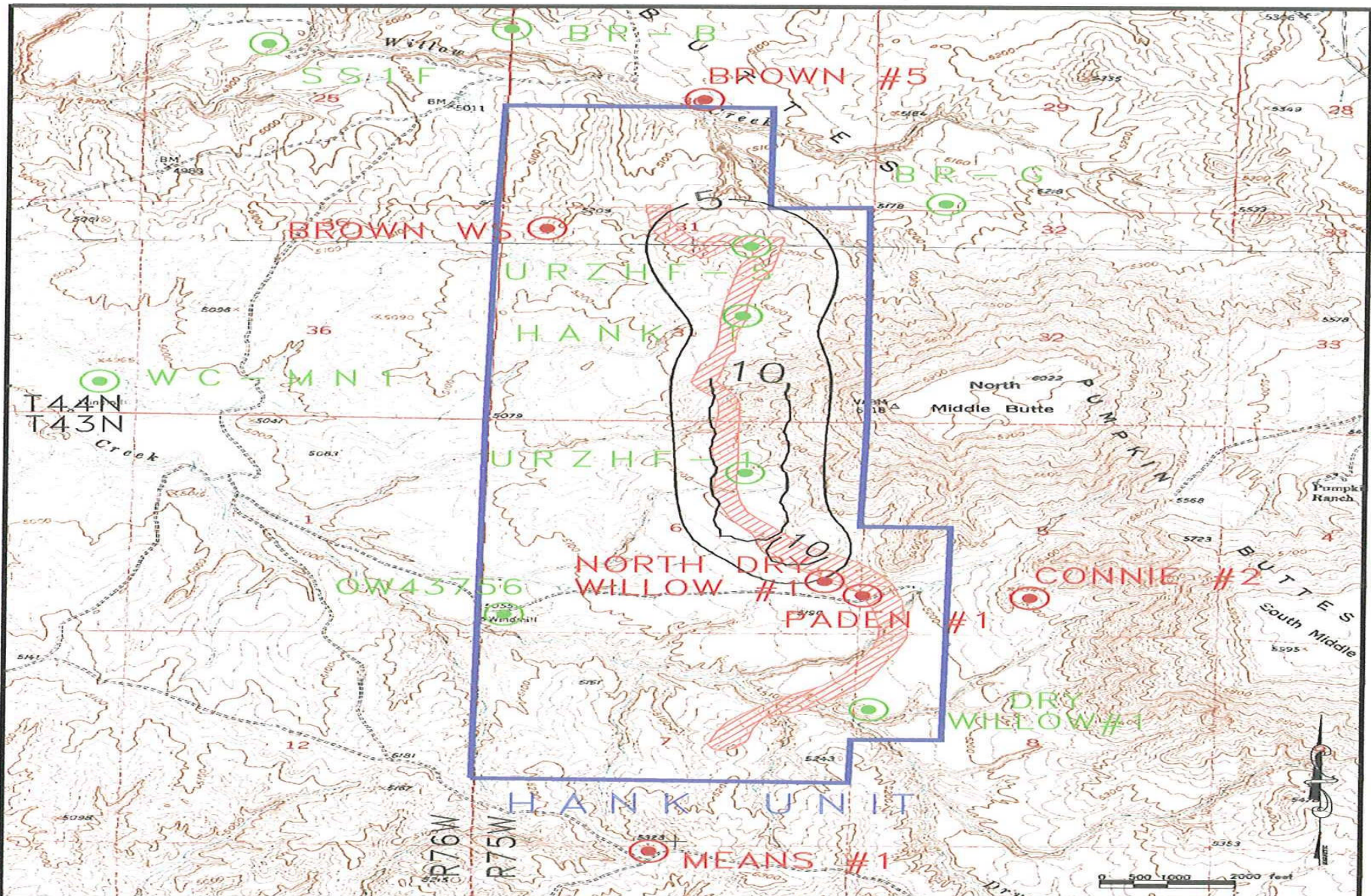
Measured Vertical Hydraulic Conductivities at North Butte Permit
6.4E-9 to 6.9E-8 cm/sec

Other Powder River Basin measured values are similar

∴ Vertical Hydraulic Conductivities low enough,
tests need to define continuity of aquitards

Nichols and Hank test to date demonstrate vertical confinement.

Wellfield tests will further define vertical confinement



By: lgrh Date: 03/08
 Contour Interval: Revision Date:
 DWG: C:\PROJECTS\2007-14\SANDS lgrh

LEGEND: WELLFIELD
 URZNF-3 F SAND WELL

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 Casper, Wyoming
 USA 82605-0850

FIGURE 7-2. HANK UNIT PREDICTED DRAWDOWN AT THE END OF THREE YEARS OF ISR FOR THE F SAND, FT.

Health Physics

- After the initial installation of the CBM well, only routine monitoring of the gas houses will take place.
- One CBM operator will check on gas houses once a week to collect data.
- CBM operators will not enter into plant sites. May occasionally pass through well field.
- Would consider CBM workers as members of the public.

Health Physics Continued.

- ❧ CBM activity would not contribute to gaseous or particulate effluents. No emissions unless there is a pipeline break.
- ❧ Overall contribution to fugitive dust would be minimal.
- ❧ CBM folks conduct pre-operational environmental studies on wildlife, vegetation, etc.
- ❧ CBM service life is approximately 7 -10 years. After service life, pipes are abandoned in place. Well sites are reclaimed.

Interaction with BLM

- ✧ To date, there has been little interaction with the BLM in regards to CBM.
- ✧ Uranerz has contacted CBM producers about operations.
- ✧ Uranerz has maintained communication with the BLM with issues raised by the CBM development (cultural resources).

Questions/Wrap Up

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