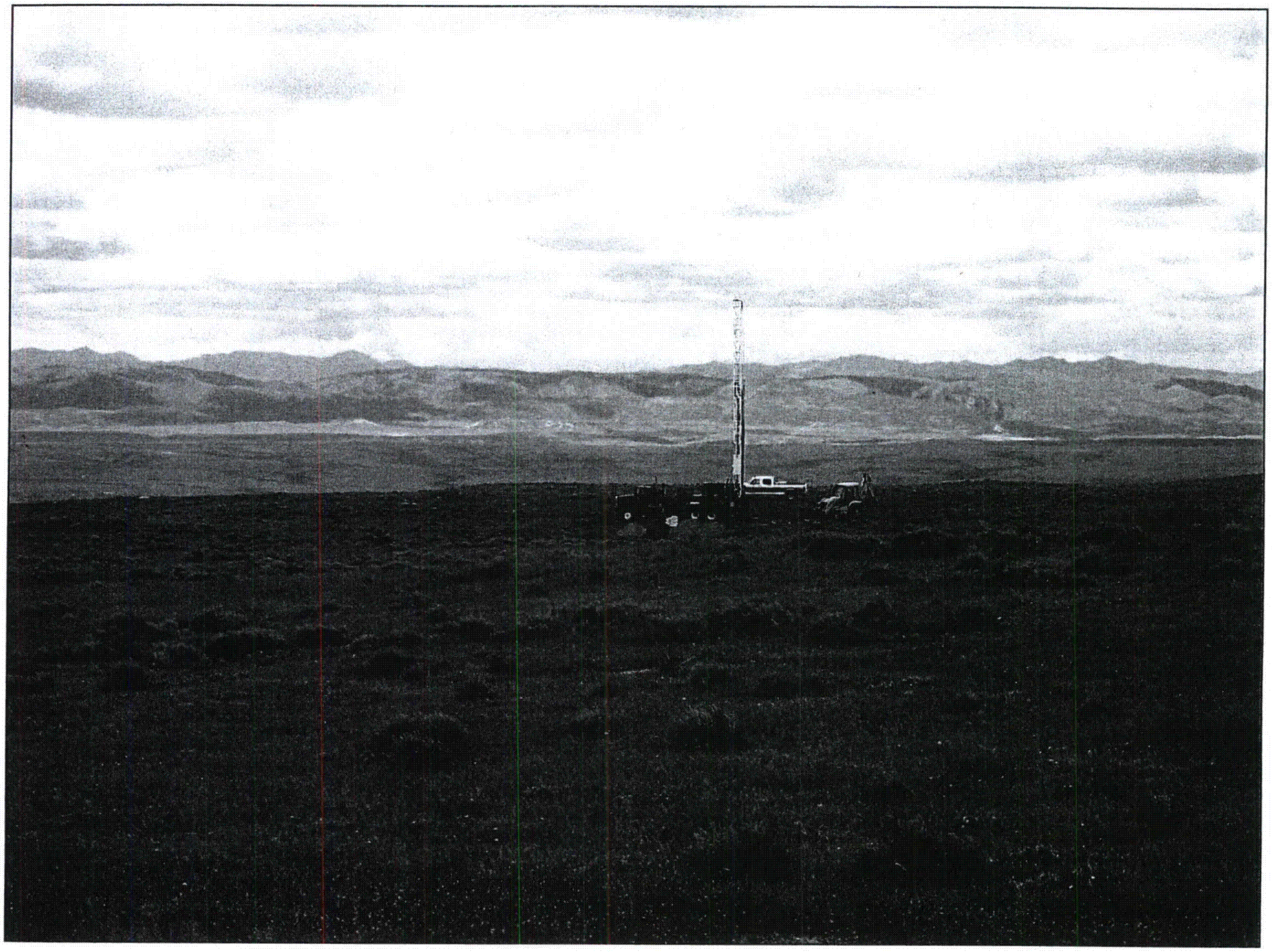
SUA-1341 License Amendment
Ludeman Project
Converse County, Wyoming

Technical Report
Volume II Section 2.6

December 2011



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2.6 GEOLOGY

All figures and tables discussed in Sections 2.6.1 through 2.6.4 are presented in Addendum 2.6-A at the end of Section 2.6.

2.6.1 Regional Geology

The Powder River Basin extends over much of northeastern Wyoming and southeastern Montana, and consists of a large north-northwest trending asymmetric syncline. The basement axis lies along the western edge of the basin, and the present surface axis lies to the east of the basement axis. The basin is bounded by the Big Horn Mountains and Casper Arch to the west, the Black Hills to the east, and the Hartville Uplift and Laramie Mountains to the south.

The Powder River Basin is filled with marine, non-marine, and continental sediments ranging in age from early Paleozoic through Cenozoic. Sediments reach a maximum thickness of about 18,000 feet in the deepest parts of the basin, and probably range from 16-17,000 feet thick in the proposed Ludeman Project (proposed project) area, due to the close proximity to the deepest part of the basin.

The southern part of the basin contains Lance, Fort Union, Wasatch and White River formation outcrops. The Upper Cretaceous Lance formation is the oldest of these units, and consists of 1,000 to 3,000 feet of thinly-bedded, brown to gray sands and shales. The upper part contains minor, dark carbonaceous shales and thin coal seams, indicating a changing depositional environment over time, which was in this case the gradual regression of a shallow inland sea (APS, 1980).

The Paleocene Fort Union formation conformably overlies the Lance and consists of poorly consolidated continental and shallow non-marine deposits in two members. The lower member consists of fine-grained, clay-rich, drab to pink sandstone, with minor claystone and coal. The sandstones were deposited as alluvial fans and braided stream channels during erosion of the uplifted Black Hills, Bighorn, and Laramie Mountains. These sandstone horizons are the host rocks for the uranium deposits in the proposed project area. Within the proposed project area, mineralization is found in 50- to 100-foot-thick sandstone lens which extends over an area of two townships and ranges. On a regional scale, mineralization is localized and controlled by facies changes within this sandstone, including thinning of the sandstone unit, decrease in grain size, and increase in clay and organic material content (Galloway and Walton, 1974; Sharp et al., 1964).

The upper member of the Fort Union formation consists of shale, clayey sandstone, fine-to-coarse-grained sandstone, and some extensive sub bituminous lignite beds. Thick coal seams have been observed in the central and northern portions of the Powder River Basin. These seams thin or completely disappear toward the southern portion of the Powder River Basin. The total thickness of the Fort Union formation varies between 2,000 and 3,500 feet (APS, 1980; Galloway and Walton, 1974; Sharp et al., 1964).

The early Eocene Wasatch formation unconformably overlies the Fort Union formation around the margins of the basin. However, the two formations are conformable and gradational towards the basin center. The relative amount of coarse, permeable clastics increases near the top of Fort Union, and the overlying Wasatch formation contains numerous beds of sandstone which are sometimes correlatable over wide areas. Except in isolated areas of the Powder River Basin, the Wasatch-Fort Union contact is arbitrarily set at the top of the thicker coals or of some thick sequence of clays and silts. A definitive marker bed is not present in the proposed project area of the basin.

The Wasatch formation has been mostly removed by erosion and only small scattered outcrops are present in the proposed project area. The Wasatch is similar to the Fort Union, but also contains thick lenses of coarse, crossbedded, arkosic sands deposited in a high-energy fluvial environment. The Wasatch formation reaches a maximum thickness of about 1,600 feet and dips northwestward from one degree to two-and-a-half degrees in the southern part of the Powder River Basin (Sharp et al., 1964).

The Oligocene White River formation overlies the Wasatch formation and has been removed from most of the basin by erosion. Remnants of this unit crop out on the Pumpkin Buttes, located approximately 50 miles to the north of the proposed project, and at the extreme southern edge of the Basin (about 15 miles to the south). The White River consists of clayey sandstone, claystone, a boulder conglomerate and tuffaceous sediments (Sharp et al., 1964). The youngest sediments consist of Quaternary alluvial sands and gravels locally present in larger valleys. Quaternary eolian sands can also be found locally.

The Teapot and Parkman sandstones are approximately 8,500 to 9,000 feet below land surface in this area, and are the next hydrologically significant geologic units below the Fort Union sands. The water quality of three well samples from the Parkman sandstone in Johnson County (see Whitcomb, Cummings and McCullough, 1966) near the outcrop of this formation contained total dissolved solids from 1360 to 3060 mg/l. Water quality is normally poorer at greater distances from its outcrop area, making the use of these aquifers questionable in this area.

The Madison limestone and Tensleep sandstone are approximately 15,000 feet below the land surface and would produce the largest discharge rates from wells in this area. The Madison is known to flow at several thousand gallons per minute to the Midwest area (see Crist and Lowry, 1972), and the flows from the Tensleep sandstone in this area are in the hundreds of gpm. However, the water quality of the Madison and Tensleep in the

Powder River Basin is poor. Therefore, even though the Madison and Tensleep aquifers produce large quantities of water, the quality would probably make those aquifers unusable. Only the Fort Union formation will be discussed further, because the lower units will not be influenced by this project.

2.6.2 Site Geology

The site is located in the southwestern part of the Powder River Basin approximately three miles south of the Tertiary Wasatch-Fort Union formation contact. The Fort Union formation underlies the surface Wasatch formation, and is part of the thick Powder River sedimentary series and consists of mudstones, siltstones and clays with minor crossbedded sandstone channels and occasional thin limestone and lignite beds (Galloway and Walton, 1974; Lemmers and Smith, 1981). The Fort Union formation sandstones were deposited in a fluvial paleo-drainage system which flowed generally in a north-northeastly direction. The host rocks for the uranium ore deposits in the proposed project area are the arkosic sandstones of the Lebo member of the Fort Union formation. These channel deposits are confined by mudstones that serve as aquitards to the water saturated aquifers.

The arkosic sandstones of the Lebo member are gray to red, flat-bedded, clay rich, crossbedded, cherty and poorly sorted, with grain sizes in individual beds ranging from fine to very coarse with coarse being the average. Minor to very abundant pyrite and carbonaceous material are present in most of the unaltered channel deposits. The finer-grained rocks range from medium gray siltstones to dark gray carbonaceous claystone. Structure contours indicate a gentle dip to the northeast at an average of one degree (Lemmers and Smith, 1981).

Uranium One exploration nomenclature designated most of the sands in the proposed project area with decreasing numbers with depth. Figure 2.6-1 depicts the sand units relative to this project. Cross sections from exploration logs were developed for the area to evaluate the aerial distribution of these sands. Figure 2.6-2 shows the locations of the 14 geological cross sections included in Figures 2.6-3 through Figure 2.6-16 (A-A' through N-N' respectively). Figure 2.6-17 contains a copy of a typical geophysical log from the proposed project area.

The 40 and 50 Sands are separated by 9 to 123 feet of the 50/40 Shale and extend aerially across the proposed project area. The approximate thickness of the 40 and 50 Sands are 11 to 146 feet and 10 to 158 feet, respectively. Figures 2.6-18 through Figure 2.6-20 are isopach maps of the 40 Sand, the 50/40 Shale, and the 50 Sand. These Sands contain trace amounts of mineralization in various locations within the proposed project area, however these deposits are not considered economical at this time.

The 60 Sand is separated from the 50 Sand by 4 to 113 feet of the 60/50 Shale. Figure 2.6-21 is an isopach map of the 60/50 Shale. This sand is the first sand below the 70 Sand, which is the first unit which contains the economic ore deposits in the area, and is therefore referred to as the underlying 60 Sand. Figure 2.6-22 is an isopach map of the underlying 60 Sand. The sand ranges from 0 to 160 feet thick within the proposed project area, pinching out in various locations.

The 70 Sand is the first proposed ore production sand and is separated from the 60 Sand by 2 to 99 feet of the 70/60 Shale. Figure 2.6-23 is an isopach map of the 70/60 Shale. This sand is laterally extensive and ranges from 13 to 164 feet thick. Figure 2.6-24 is an isopach map of the production 70 Sand.

The 80 Sand is the next proposed Production Zone Sand and is separated from the 70 Sand by the 80/70 Shale which ranges from 5 to 137 feet thick. An isopach map of the 80/70 Shale is shown in figure 2.6-25. This sand is anywhere from 0 to 161 feet thick with pinch-outs present in various locations within the proposed project area. Figure 2.6-26 shows an isopach map of the production 80 Sand.

The final Production Zone Sand is the 90 Sand, and it is separated from the 80 Sand by the 90/80 Shale. Figure 2.6-27 is an isopach map of the 90/80 Shale which ranges from 5 to 166 feet thick. This sand is laterally extensive within the proposed project area and its thickness ranges from 19 to 299 feet. The 100/90 Shale overlies the 90 Sand and ranges from 3 to 119 feet thick. Figures 2.6-28 and 2.6-29 are isopach maps of the production 90 Sand and the overlying 110/90 Shale, respectively.

The 100 and 110 Sands are overlying sands within the proposed project area and separated by 2 to 82 feet of the 110/100 Shale. The approximate thickness of the 100 and 110 Sands are 9 to 127 feet and 29 to 147 feet, respectively. Both sands and the 110/110 Shale have been eroded in various locations within the proposed project area. Figures 2.6-30 through Figure 2.6-32 are isopach maps of the 100 Sand, the 110/100 Shale, and the 110 Sand.

The uppermost overlying sand in the proposed project area is the 120 Sand, which is separted from the 110 Sand by 2 to 82 feet of the 120/110 Shale. The thickness of the 120 Sand ranges from 29 to 147 feet and is largely eroded in the southeastern portion of the proposed project area. Isopach maps of the 120/110 Shale and 120 Sand are seen in Figures 2.6-32A and 2.6-32B, respectively.

2.6.3 Ore Mineralogy and Geochemistry

The Production Zones (70, 80, and 90 Sands) in the proposed project area are classified as arkosic sandstones with calcite and clays as the dominant cementing material. The mean size of the clay particles is about 0.3 millimeters and the slime content (-325 mesh) is three to six percent. The dominant clay is montmorillonite, approximately 50 percent, and the other clays, illite and kaolinite, each comprise about 25 percent of the total clay content. There are also trace amounts of chlorite present (Conoco, 1982).

The uranium commonly occurs as coatings on the surfaces of the sand grains. It is often associated with either calcite or clay cement but occasionally it is associated with woody lignite fragments. Very little crystalline uranium mineral has been identified in the samples except for the occasional presence of uraninite. Other minerals associated with the sandstones include pyrite, magnetite, ilmenite, and almandine garnet (Conoco, 1982).

2.6.4 Drill Holes

The proposed project was extensively explored from the 1970s through the mid-1990s with exploration work and drilling completed by Kerr McGee, UNC Teton, Everest Minerals, Union Pacific Railroad Company, Urangesellschaft, Nuclear Assurance Company, Cordero, Morrison Nuclear, Denison Mines (US) Inc., R.L. Peterson, Arizona Public Service Company, Malapai, Uranium Resources Inc, and Power Resources Inc. Approximately 4,574 rotary drill holes and approximately 66 core holes were completed by these companies. Mineral resource estimates are based on radiometric equivalent uranium grade as measured by the geophysical logs and verified by core drilling and chemical analysis. Drill holes completed by these companies were reported plugged in accordance with Wyoming Statute WS 35-11-404 in effect at the time.

Uranium One conducted delineation and verification drilling in 2007 and 2008 totaling 1,107 rotary drill holes, 1 core hole and 42 monitor wells. The drilling was conducted under WDEQ-LQD Drilling Notifications 332DN and 339DN, and all drill holes were plugged in accordance with Wyoming Statute WS35-11-404 as documented.

Table 2.6-1 lists all drill holes known to Uranium One in the proposed project area and Figure 2.6-33 an index a map showing the inset maps of these known drill holes. Figures 2.6-34 through 2.6-47 are the inset maps showing the know drill holes with better detail.

2.6.5 Soils

The proposed Uranium One Ludeman Project was evaluated by BKS Environmental Associates, Inc., Gillette, Wyoming in 2008. A total of 19,890.78 acres were included in the final soil mapping of the proposed project area. Soils mapped by BKS Environmental Associates, Inc. are illustrated in Addendum 2.6.5-G Map.

Stripping depths for the proposed project were evaluated during mapping and sampling. Soil depths within a given mapping unit will vary based on any combination of the five primary soil forming factors, i.e., climate including effective precipitation, organisms, relief or topography, parent material, and time. Subtle differences in any one of the previously mentioned factors will impact development between series and within series designation but may not be as noticeable as when topography is a major factor. The proposed topsoil salvage depths for the proposed project are based on laboratory data of the samples found within the borders of the area, as well as field observations and knowledge of the soils in Converse County, Wyoming.

Soils in the proposed project area are typical for semi-arid grasslands and shrublands in the Western United States. Parent material included colluvium, residuum, and alluvium. Most soils are classified taxonomically as Ustic Torriorthents, Ustic Haplargids, or Ustic Torrifluvents.

Almost all soils have some suitable topsoil. The primary limiting factors within the proposed project area are saturation percentage, SAR-sodium adsorption ratio, selenium, calcium carbonates, and texture (sand or clay percentage).

Refer to Addendum 2.6.5-B for the Ludeman Tables. Refer to Addendum 2.6.5-C for the Soil Mapping Unit Descriptions. Refer to Addendum 2.6.5-D for the Sampled Soil Series Descriptions. Refer to Addendum 2.6.5-E for the Soil Laboratory Analysis. Refer to Addendum 2.6.5-F for the Prime Farmland Designation.

Refer to Addendum 2.6-B for the Ludeman Tables 2.6-2 through 2.6-8. Refer to Addendum 2.6-C for the Soil Mapping Unit Descriptions. Refer to Addendum 2.6-D for the Sampled Soil Series Descriptions. Refer to Addendum 2.6-E for the Soil Laboratory Analysis. Refer to Addendum 2.6-F for the Prime Farmland Designation.

2.6.5.1 Methodology

General

Baseline soils inventories for the proposed project area consisted of refinement of the 2002 Natural Resources Conservation Service (NRCS) mapping for Southern Converse County, Wyoming. Mapping was completed by BKS Environmental Associates, Inc. (BKS) of Gillette, Wyoming.

Review of Existing Literature

NRCS mapping within the proposed project area was reviewed.

Soil Survey

Field mapping was conducted according to techniques and procedures outlined in the National Cooperative Soil Survey. WDEQ LQD Guideline 1 was used as a guide during all phases of the study.

A reconnaissance of the proposed project area familiarized field personnel with the area during the summer of 2008. Soil profiles were examined on a widely scattered basis according to physiographic configuration. Information derived from these profiles was used to determine which soils were likely to occur on specific landscape positions.

Following the reconnaissance survey, a higher intensity Order 1-2 soil survey was conducted during June 10-12, 17-20, 30, and July 1-2, 2008. Actual soil boundaries were identified in the field by exposing additional soil profiles to determine the nature and extent of soil series on the project. The soil boundaries were delineated on a 1:20,000 aerial map, for purposes of license submittal. Refer to Table 2.6-2 for license and proposed disturbance acreages.

Soil Sampling, Description, and Analysis

Sampling of soil series identified within the proposed disturbed area generally followed WDEQ Guideline 1 recommendations for 3 sampled pedons for series encompassing greater than 5 percent of the production area, 2 sampled pedons for series encompassing 2 to 5 percent of the production area, and 1 sampled pedon for series encompassing less than 2 percent of the production area. Please see Tables 2.6-2 and 2.6-3 for Ludeman mapping units and associated acreages and the soil series sample summary.

Since the full extent of the proposed disturbed area (well fields, facilities, and newly-constructed roads) is unknown at this time, acreage estimates of the approximate initial ore body itself and the proposed facilities and major road network were utilized to determine soil sample numbers for laboratory analysis. Initial sample numbers based on this best estimation of the proposed disturbed area at this time are outlined in Table 2.6-2.

All soil samples were collected with a Giddings truck mounted auger to paralithic contact or a maximum depth of 60 inches, whichever was shallower. Sample profiles were described in the field, to the extent possible, by the physical and chemical nature of each profile horizon. Backhoe pits were not utilized for soil sampling.

Sample locations were identified on a base map, and global positioning system (GPS) locations were collected with hand-held Garmin GPS units. Soil samples were placed in clean, labeled, polyethylene plastic bags, and sealed to limit sample drying. Samples were kept as cool as possible, but were not stored on ice. Samples were delivered to Energy

Laboratories Inc. in Gillette, Wyoming when the sampling was completed for later shipment to Casper, Wyoming.

Additional sampling for analysis may be warranted at a later date when additional major disturbed areas are defined, e.g., ore body extension.

2.6.5.2 Results and Discussion

<u>Soil Survey - General</u>

General topography of the area ranged from nearly level uplands to very steep hills, ridges and breaks of dissected shale plains. The soils occurring on the proposed project were generally a sandy or coarse texture throughout upland areas and fine, clay textured soils occurring in or near drainages. The proposed project area contained deep soils on level upland areas with shallow and very shallow soils located on hills, ridges and breaks.

<u>Soil Mapping Unit Interpretation</u>

The primary purpose of the 2008 fieldwork was to characterize the soils within the proposed project area in terms of topsoil salvage depths and related physical and chemical properties. The total number of samples per series was established in line with WDEQ Guideline 1 recommendations based on estimated acreage of soil series known within the proposed project area. Refer to Addendum 2.6.5-C and 2.6.5-D for soil mapping unit descriptions and soil series descriptions, respectively.

<u>Analytical Results</u>

Analyzed parameters, as defined in WDEQ Guideline 1, are in Addendum 2.6.5-E, Lab Analysis Report. Laboratory soil texture analysis did not include percent fine sands. Field observations of fine sands within individual pedestals as well as sample site topographic position were used in conjunction with laboratory analytical results to determine series designation. Where applicable, field observation of fine sands is also included in the textures found in the soil series descriptions in Addendum 2.6.5-D. In several of the pedestal sampling locations, laboratory analysis yielded finer or coarser than expected textures (based upon field observations). Where textures are not typical for the series, it is noted in the Range of Characteristics (according to field observations, lab analysis) in the soil series descriptions.

<u>Evaluation of Soil Suitability as a Plant Growth Medium</u>

Approximate salvage depths of each map unit series is presented in Table 2.6-7 and ranged from 0.0 to 5.0-feet. Within the proposed project area, suitability of soil as a plant growth medium is generally affected by physical factors such as texture (sand or clay percentage) and saturation percentage. Chemical limiting factors included selenium (Se), calcium carbonate ($CaCO_3$) content (based upon field observations of strong or violent effervescence), sodium adsorption ratio (SAR), electrical conductivity (EC), and pH. According to WDEQ Guideline 1, marginal material was found in 37 of the 56 profiles. Unsuitable material was found in 3 of the 56 profiles. Marginal or unsuitable parameter information for sampled profiles is identified in Table 2.6-5. A summary of trends in marginal or unsuitable parameters as it relates to soil series is found in Table 2.6-6. Based on laboratory analysis and field observations, marginal material parameters primarily consisted of texture (sand or clay percentage), saturation percentage, calcium carbonates, selenium, and SAR.

Topsoil Volume Calculations

Based on the 2008 fieldwork with associated field observations and subsequent chemical analysis, the recommended topsoil average salvage depth over the proposed project area was determined to be 2.13 feet. Refer to Table 2.6-7, Summary of Approximate Soil Salvage Depths.

Soil Erosion Properties and Impacts

Based on the soil mapping unit descriptions, the hazard for wind and water erosion within the proposed project area varies from negligible to severe. The potential for wind and water erosion is mainly a factor of surface characteristics of the soil, including texture and organic matter content. Given the coarse texture of the surface horizons throughout the majority of the proposed project area, the soils are more susceptible to erosion from wind than water. See Table 2.6-8 for a summary of wind and water erosion hazards within the proposed project area.

Prime Farmland Assessment

Prime farmland was assessed by Tim Schroeder, the District Conservationist out of Douglas, Wyoming. No prime farmland was indicated within the proposed project area. Refer to Addendum 2.6.5-F for the NRCS letter of negative determination.

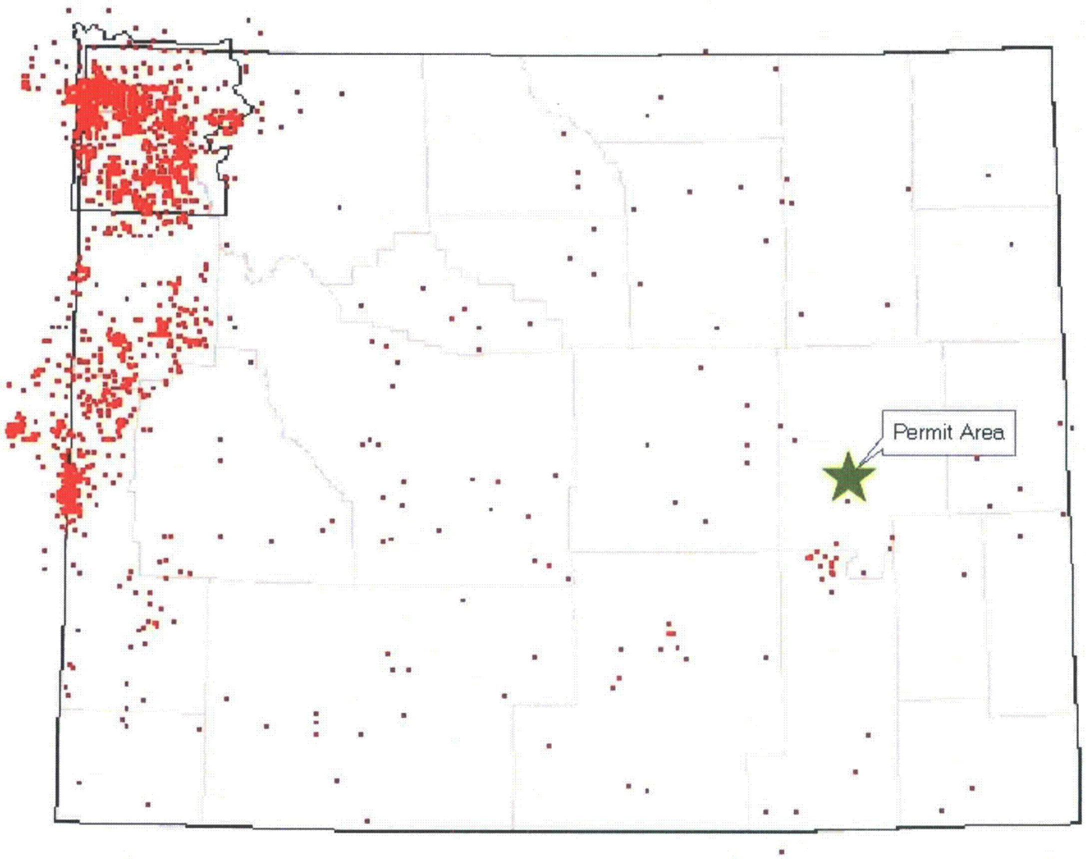
2.6.6 Seismology

The discussion of seismology within the proposed project area and surrounding areas includes: an analysis of historic seismicity, a deterministic analysis of nearby faults, an analysis of the maximum credible "floating earthquake," and a discussion of the existing short- and long-term probabilistic seismic hazard analysis.

2.6.6.1 Historic Seismicity

The proposed project area is located in the east-central Wyoming. Historically, east-central Wyoming has had a low to moderate level of seismicity compared to the rest of the State of Wyoming. As shown in Figure 2.6-48, most of the historical earthquakes occurred in the west-northwest portion of Wyoming. Historic seismic events for Converse County and other counties surrounding the proposed project area including Albany, Campbell, Carbon, Johnson and Natrona Counties are summarized below. The historic seismic activity information was acquired from the United States Geological Survey (USGS, website) and the Wyoming State Geological Survey (WSGS, 2002).

Figure 2.6-48: Historical Seismic Activities in the State of Wyoming



* Red dots are locations of epicenters for those magnitude > 2.5 or intensity > 11 earthquakes recorded from1871 to present. (Wyoming Water Resource Data System Web Site, http://www.wrds.uwyo.edu/, Online Data, Cooperative Projects, Wyoming Earthquake Database, April 2008)

Converse County

Fifteen magnitude 3.0 and greater earthquakes have been recorded in Converse County. The first earthquake recorded in Converse County occurred on April 14, 1947. The earthquake had an intensity of V, and was felt near LaPrele Creek southwest of Douglas.

On August 21, 1952, an intensity IV earthquake occurred approximately seven miles north-northeast of Esterbrook, approximately 30 miles south of Douglas, WY. It was felt by several people in the area, and was reportedly felt 40 miles to the southwest of Esterbrook. Three additional earthquakes have occurred in the same location as the August 21, 1952 event. The first, a small magnitude event with no associated magnitude or intensity, occurred on September 2, 1952. The second, an intensity III event, occurred on January 5, 1957. The third, an intensity IV event occurred on March 31, 1964. No damage was reported for any of the events.

On January 15, 1978, a magnitude 3.0, intensity III earthquake occurred approximately three miles northeast of Esterbrook, in Converse County. No damage was reported.

Two earthquakes occurred in Converse County in the 1980s. On November 15, 1983, a magnitude 3.0, intensity III earthquake occurred approximately 15 miles northeast of Casper in western Converse County. No damage was reported. On December 5, 1984, a non-damaging, magnitude 2.9 earthquake occurred in the Laramie Range in southern Converse County.

Four earthquakes occurred in Converse County in the 1990s. On June 30, 1993, a magnitude 3.0 earthquake was located approximately 15 miles north of Douglas. No damage was reported. On July 23, 1993, a magnitude 3.7, intensity IV earthquake occurred in southern Converse County, approximately 13 miles north-northwest of Toltec in northern Albany County. This event was felt as far away as Laramie. On December 13, 1993, another earthquake occurred approximately eight-miles east of Toltec. This non-damaging event had a magnitude of 3.5. On October 19, 1996, a magnitude 4.2 earthquake was recorded approximately 15 miles northeast of Casper in western Converse County. No damage was reported, although the event was felt by many Casper residents.

Three earthquakes occurred in Converse County in the 2000s. On February 15, 2004 a magnitude 3.5, intensity III earthquake was located approximately ten miles north-northwest of Douglas. In the same general region, on August 29, 2004, a magnitude 3.8, intensity IV earthquake was located approximately ten miles north-northwest of Douglas. No damage was recorded. The most recent event was on November 3, 2008. A magnitude 3.7 earthquake was recorded approximately 1.5 miles northeast of Douglas.

Albany County

On August 27, 1938, an intensity III earthquake was recorded in northern Albany County, approximately 45 miles southeast of Casper. No damage was associated with the event.

In 1984, a series of earthquakes were recorded in northern Albany County. The most significant earthquake to occur in the area occurred on October 18, 1984. This magnitude 5.5, intensity VI event was centered approximately 44 miles southeast of Casper. It was felt in Wyoming, South Dakota, Nebraska, Colorado, Utah, Montana, and Kansas. The earthquake was one of the largest felt in eastern Wyoming. A number of aftershocks occurred in the same area; the most significant were magnitude 4.5, intensity IV and magnitude 3.8 events occurring on October 18, 1984; a magnitude 3.5 event on October 20, 1984; magnitude 3.3 events on October 19, November 6, and December 17, 1984; a magnitude 3.1 event on October 22, 1984; a magnitude 3.2 event on October 24, 1984; and a magnitude 2.9 event on December 5, 1984. On June 12, 1986, a magnitude 3.0 earthquake occurred in the same general area.

On October 9, 1993, a magnitude 3.7, intensity IV earthquake occurred in northern Albany County, approximately 37 miles southeast of Casper. The earthquake was felt in Garrett.

On April 13, 2000, a magnitude 3.3 earthquake occurred in northern Albany County, approximately 39 miles southeast of Casper. No damage was reported.

A search of the USGS website's earthquake data base for recent seismic activity within 50 kilometers of the proposed project site did not return any events in Albany County.

Campbell County

Five magnitude 2.5 and greater earthquakes have been recorded in other portions of Campbell County. The first earthquake recorded in the county occurred on May 11, 1967. This magnitude 4.8 earthquake was centered in southwestern Campbell County approximately seven miles west-northwest of Pine Tree Junction. The second event took place on February 18, 1972, when a magnitude 4.3 earthquake occurred approximately 18 miles east of Gillette. No damage was reported for either event.

Two earthquakes were recorded in Campbell County during the 1980s. On May 29, 1984, a magnitude 5.0, intensity V earthquake occurred approximately 24 miles west-southwest of Gillette. The earthquake was felt in Gillette, Sheridan, Buffalo, Casper, Douglas, Thermopolis, and Sundance. On October 29, 1984, a magnitude 2.5 earthquake occurred approximately 25 miles west-northwest of Gillette. No damage was reported.

On February 24, 1993, a magnitude 3.6 earthquake occurred in southeastern Campbell County approximately ten miles east-southeast of Reno Junction. No damage was reported.

A search of the USGS website's earthquake data base for recent seismic activity within 50 kilometers of the proposed project site did not return any events in Campbell County.

Carbon County
On May 29, 1973, an earthquake of no specific magnitude or intensity occurred near the Ferris Mountains in Carbon County, approximately 23 miles southwest of Alcova. This earthquake was not felt. A magnitude 3.0 earthquake was recorded in northern Carbon County on February 1, 2000. No one reported feeling this event, which was centered approximately 22 miles south of Alcova.

Natrona County
Twelve magnitude 2.5 or intensity III and greater earthquakes have been recorded in Natrona County. The first earthquake that occurred in Natrona County took place on December 10, 1873, approximately two miles south of Powder River. People in the area reported feeling the earthquake as an intensity III event. Two of the earliest recorded earthquakes in Wyoming occurred near Casper. On June 25, 1894, an estimated intensity V earthquake was reported approximately three miles southwest of Evansville. Residents on Casper Mountain reported that dishes rattled to the floor and people were thrown from their beds. Water in the Platte River changed from fairly clear to reddish, and became thick with mud due to the riverbanks slumping into the river during the earthquake. An even larger earthquake was felt in the same area on November 14, 1897. This intensity VI-VII earthquake, one of the largest recorded in central and eastern Wyoming caused considerable damage to a few buildings. On October 25, 1922, an intensity IV-V earthquake was detected approximately six miles north-northeast of Bar Nunn. The event was felt in Casper, at Salt Creek, 50 miles north of Casper and at Bucknum, 22 miles west of Casper. No significant damage was reported at Casper.

One of the first earthquakes recorded near Midwest occurred on December 11, 1942. The intensity IV-V event occurred approximately 14 miles south of Midwest. Although no damage was reported, the event was felt in Casper, Salt Creek, and Glenrock. On August 27, 1948, another intensity IV earthquake was detected approximately six miles north-northeast of Bar Nunn. No damage was reported.

In the 1950s, two earthquakes caused some concern among Casper residents. On January 23, 1954, an intensity IV earthquake occurred approximately seven miles northeast of Alcova. No damage was reported. On August 19, 1959, an intensity IV earthquake was recorded north of Casper, approximately six miles north-northeast of Bar Nunn. People in Casper reported feeling this event. However it is uncertain if this earthquake actually occurred in the Casper area, as it coincides with the Hebgen Lake, Montana, earthquakes that initiated on August 17, 1959.

Only one earthquake was reported in Natrona County in the 1960s. On January 8, 1968, a magnitude 3.8 earthquake occurred approximately ten miles north-northwest of Alcova. No damage was reported.

An earthquake of no specific magnitude or intensity occurred approximately 13 miles southeast of Ervay on June 16, 1973. No one felt this earthquake and no damage was reported.

No other earthquakes occurred in Natrona County until March 9, 1993, when a magnitude 3.2 earthquake was recorded 17 miles west of Midwest. No damage was reported. A magnitude 3.1 earthquake also occurred in the far northwestern corner of the county on November 9, 1999. No one reported feeling this earthquake that was centered approximately 32 miles northwest of Waltman.

On February 1, 2003, a magnitude 3.7 earthquake occurred approximately 16 miles north-northeast of Casper. Numerous Casper residents felt this event.

Johnson County

Eight magnitude 2.5 and greater earthquakes have been recorded in Johnson County. The first earthquake recorded in the county occurred on October 24, 1922. The location was originally determined to be near Buffalo, and classified the event as an intensity II earthquake. Based upon a description of the earthquake in the October 27, 1922 edition of the Sheridan Post, however, the location and assigned intensity may be in error. The Sheridan Post reported that at Cat Creek, eight miles east of Sheridan, houses were shaken and dishes were rattled. In addition, the October 26, 1922 edition of the Sheridan Post reports that only a slight earthquake shock was felt in Sheridan. Based upon this information, it seems reasonable to locate the earthquake eight miles east of Sheridan, and to assign an intensity of IV-V to the event.

On September 6, 1943, an intensity IV earthquake was felt in the Sheridan area, although the epicenter was determined to be approximately three to four miles south-southwest of Buffalo. Beds and chairs were reported “to sway” in the Sheridan area.

Two earthquakes were recorded in Johnson County in the 1960s. A magnitude 4.7 earthquake occurred on June 3, 1965. This event was centered approximately 12 miles south of Kaycee. On April 12, 1966, an earthquake of no specified magnitude or intensity was detected approximately 25 miles southwest of Buffalo. No one reported feeling these events.

On September 2, 1976, a magnitude 4.8, intensity IV-V earthquake was felt in Kaycee. The event was located approximately 33 miles northeast of Kaycee. No damage was reported.

A magnitude 5.1, intensity V earthquake occurred on September 7, 1984, approximately 33 miles east-southeast of Buffalo. The earthquake was felt throughout northeastern Wyoming, including Buffalo, Casper, Kaycee, Linch, and Midwest, and in parts of southeastern Montana. No significant damage was reported.

Two earthquakes were detected in Johnson County in 1992. The first occurred on February 22, 1992. This magnitude 2.9 event was recorded approximately 18 miles east of Buffalo. As expected with such a small earthquake, no damage was reported. Most recently, a magnitude 3.6, intensity IV earthquake occurred on August 30, 1992. The earthquake was centered near Mayoworth, approximately 22 miles west-northwest of Kaycee. It was felt in Barnum and Kaycee, but no damage was reported.

2.6.6.2 Deterministic Analysis of Regional Active Faults with a Surficial Expression

There are no known exposed active faults with a surficial expression in Converse County. As a result, no fault-specific analysis can be generated for Converse County (WSGS, 2002).

2.6.6.3 Floating or Random Earthquake Sources

The Floating or Random Earthquake Sources was excerpted from the Basic Seismological Characterization for Converse County, Wyoming report prepared by the Wyoming State Geological Survey (WSGS, 2002). Many federal regulations require an analysis of the earthquake potential in areas where active faults are not exposed, and where earthquakes are tied to buried faults with no surface expression. Regions with a uniform potential for the occurrence of such earthquakes are called tectonic provinces. Within a tectonic province, earthquakes associated with buried faults are assumed to occur randomly, and as a result can theoretically occur anywhere within that area of uniform earthquake potential. In reality, that random distribution may not be the case, as all earthquakes are associated with specific faults. If all buried faults have not been identified, however, the distribution has to be considered random. "Floating earthquakes" are earthquakes that are considered to occur randomly in a tectonic province.

It is difficult to accurately define tectonic provinces when there is a limited historic earthquake record. When there are no nearby seismic stations that can detect small-magnitude earthquakes, which occur more frequently than larger events, the problem is compounded. Under these conditions, it is common to delineate larger, rather than smaller, tectonic provinces.

The U.S. Geological Survey identified tectonic provinces in a report titled "Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States" (Algermissen et al, 1982). In that report, Converse County was classified as being located in a tectonic province with a "floating earthquake" maximum magnitude of 6.1. Geomatrix (1988) suggested using a more extensive regional tectonic province, called the "Wyoming Foreland Structural Province", which is approximately defined by the Idaho-Wyoming Thrust Belt on the west, 104° West longitude on the east, 40° North latitude on the south, and 45°□ North latitude on the north. Geomatrix estimated that the largest "floating" earthquake in the "Wyoming Foreland Structural Province" would have a magnitude in the 6.0 – 6.5 range, with an average value of magnitude 6.25.

Federal or state regulations usually specify if a "floating earthquake" or tectonic province analysis is required for a facility. Usually, those regulations also specify at what distance a floating earthquake is to be placed from a facility. For example, for uranium mill tailings sites, the Nuclear Regulatory Commission requires that a floating earthquake be placed 15 kilometers from the site. That earthquake is then used to determine what horizontal accelerations may occur at the site. A magnitude 6.25 "floating" earthquake, placed 15 kilometers from any structure in Converse County, would generate horizontal accelerations of approximately 15 percent of the acceleration due to gravity at the site. Critical facilities, such as dams, usually require a more detailed probabilistic analysis of random earthquakes. Based upon probabilistic analyses of random earthquakes in an area distant from exposed active faults (Geomatrix, 1988), however, placing a magnitude 6.25 earthquake at 15 kilometers from a site will provide a fairly reasonable estimate of design ground accelerations.

2.6.6.4 Probabilistic Seismic Hazard Analyses

The seismic hazard analyses was excerpted from the Basic Seismological Characterization for Converse County, Wyoming report prepared by the Wyoming State Geological Survey (WSGS, 2002) and updated with current USGS data (USGS website). The USGS publishes probabilistic acceleration maps for 500-, 1000- and 2500-year time frames. The maps show what accelerations may be met or exceeded in those time frames by expressing the probability that the accelerations will be met or exceeded in a shorter time frame. For example, a ten-percent probability that acceleration may be met or exceeded in 50 years is roughly equivalent to a 100 percent probability of exceedance in 500 years.

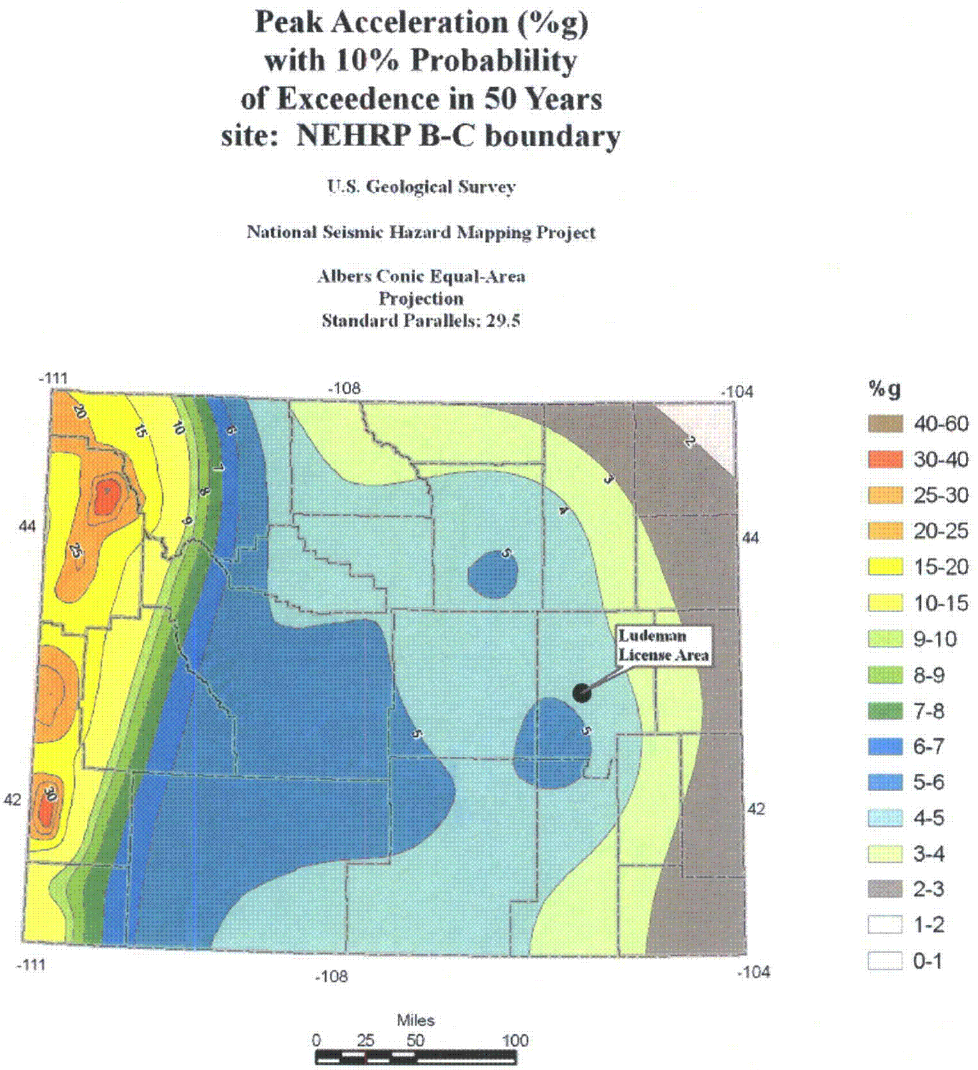
The USGS recently (2008) generated new probabilistic acceleration maps for Wyoming. The 2008 USGS hazard data was used to generate probability of exceedance maps for the 500-, 1000-, and 2500-year time frames. It is anticipated that the 2008 hazard data will be the basis for seismic design maps in future editions of the National Earthquake Hazards

Reduction Program (NEHRP) Recommended Provisions, the American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) 7 Standard, and the International Building and Residential Codes.

The 2008, 500-year (10 percent probability of exceedance in 50 years), 1000-year (5 percent probability of exceedance in 50 years), and 2500-year (two percent probability of exceedance in 50 years) maps are provided below as Figures 2.6-49, 2.6-50, and 2.6-51, respectively. The 500-year map was often used for planning purposes for average structures, and was the basis of the most current Uniform Building Code (UBC). The UBC has been replaced by the International Building Code (IBC), which is based upon probabilistic analyses. The International Building Code, however, uses a 2500-year map as the basis for building design. The maps reflect current perceptions on seismicity in Wyoming. In many areas of Wyoming, ground accelerations shown on the USGS maps can be increased due to local soil conditions. For example, if fairly soft, saturated sediments are present at the surface, and seismic waves are passed through them, surface ground accelerations will usually be greater than would be experienced if only bedrock was present. In this case, the ground accelerations shown on the USGS maps would underestimate the local hazard, as they are based upon accelerations that would be expected if firm soil or rock were present at the surface. Intensity values and descriptions can be found in Table 2.6-9 and Table 2.6-10.

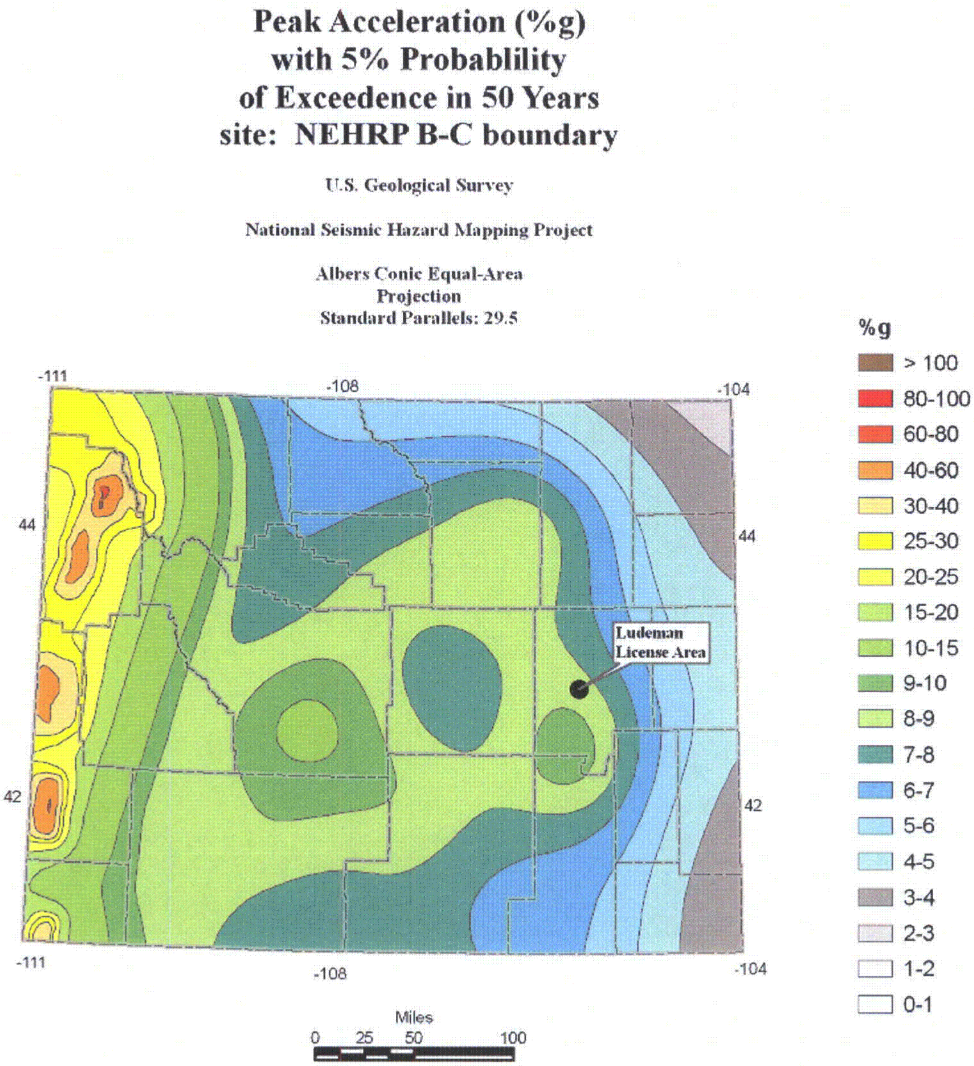
Based upon the 2008, 500-year hazard map (10 percent probability of exceedance in 50 years) (Figure 2.6-49), the estimated peak horizontal acceleration in Converse County ranges from three percent of the acceleration due to gravity in the northeastern portion of the county to greater than six percent of the acceleration due to gravity in the southwestern portion of the county. These accelerations are roughly comparable to intensity IV (1.4 percentg to 3.9 percent g) and V (3.9 percent g to 9.2 percent g) earthquakes. These accelerations are comparable to the low end of accelerations to be expected in Seismic Zone 1 of the Uniform Building Code. The proposed project would be subjected to an acceleration of approximately four to five percent of the acceleration due to gravity or intensity V. Intensity V earthquakes can result in cracked plaster and broken dishes.

Figure 2.6-49: 500-year probabilistic acceleration map, ten percent probability of exceedance in 50 years (Wyoming State Geological Survey, 2008).



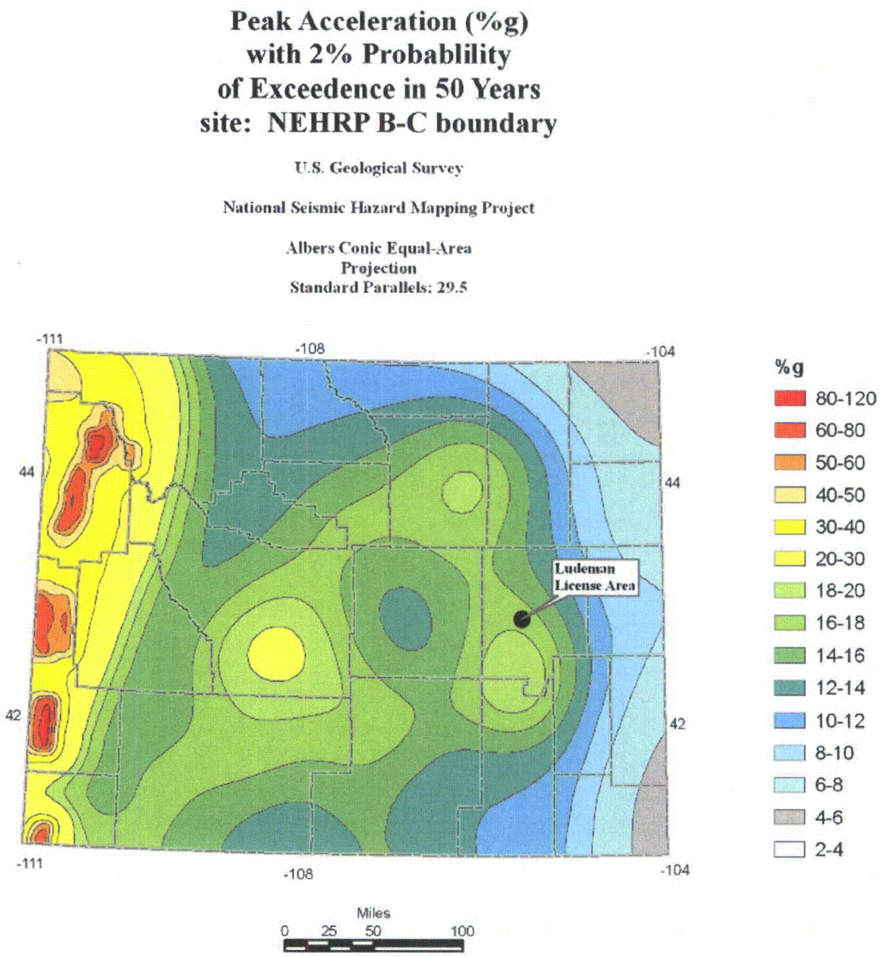
Based upon the 2008, 1000-year hazard map (5 percent probability of exceedance in 50 years) (Figure 2.6-50), the estimated peak horizontal acceleration in Converse County ranges from five percent of the acceleration due to gravity in the northeastern part of the county to greater than nine percent of the acceleration due to gravity in the southwestern corner of the county. Those accelerations are roughly comparable to intensity V earthquakes (3.9 percent g to 9.2 percent g). The proposed project would be subjected to an acceleration of approximately eight to nine percent of the acceleration due to gravity or intensity V. Intensity V earthquakes can result in cracked plaster and broken dishes.

Figure 2.6-50: 1000-year probabilistic acceleration map, five percent probability of exceedance in 50 years (Wyoming State Geological Survey, 2008).



Based upon the 2008, 2500-year hazard map (twopercent probability of exceedance in 50 years) (Figure 2.6-51), the estimated peak horizontal acceleration in Converse County ranges from nine percent of the acceleration due to gravity in the northeastern corner of the county to over 19 percent of the acceleration due to gravity in the southwestern quarter of the county. Those accelerations are roughly comparable to intensity VI earthquakes (9.2 percent g to 18.0 percent g) to intensity VII earthquakes (18.0 percent g – 34.0 percent g). The proposed project would be subjected to an acceleration of approximately 16 to 18 percent of the acceleration due to gravity or intensity VI. Intensity VI earthquakes can result in fallen plaster and damaged chimneys.

Figure 2.6-51: 2500-year probabilistic acceleration map, two percent probability of exceedance in 50 years (Wyoming State Geological Survey, 2008).



As the historic record is limited, it is nearly impossible to determine when a 2500-year event last occurred in the county. Because of the uncertainty involved, and based upon the fact that the International Building Code utilizes 2500-year events for building design, it is suggested that the 2500-year probabilistic maps be used for Converse County analyses. This conservative approach is in the interest of public safety.

Table 2.6-9: Modified Mercalli Intensity and Peak Ground Acceleration

Modified Mercalli Intensity	Acceleration (%g) (PGA)	Perceived Shaking	Potential Damage
I	<0.17	Not felt	None
II	0.17 – 1.4	Weak	None
III	0.17 – 1.4	Weak	None
IV	1.4 – 3.9	Light	None
V	3.9 – 9.2	Moderate	Very Light
VI	9.2 – 18	Strong	Light
VII	18 – 34	Very Strong	Moderate
VIII	34 – 65	Severe	Moderate to Heavy
IX	65 – 124	Violent	Heavy
X	>124	Extreme	Very Heavy
XI	>124	Extreme	Very Heavy
XII	>124	Extreme	Very Heavy

Table 2.6-10: Abridged Modified Mercalli Intensity Scale

Intensity	Description
I	Not felt except by a very few under especially favorable circumstances.
II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like passing of truck. Duration estimated.
IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing automobiles rocked noticeably.
V	Felt by nearly everyone, many awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster and damaged chimneys. Damage slight.
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars.
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks.
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into the air.

The 2008 earthquake probability maps for the 2500-year time frame, suggest a scenario that would result in moderate damage to buildings and their contents, with damage increasing from the northeast to the southwest. More specifically, the probability-based worst-case scenario could result in the following damage at points throughout Converse County:

<u>Intensity VII Earthquake Areas</u>

Douglas
Glenrock
Orin
Orpha
Rolling Hills

In intensity VII earthquakes, damage is negligible in buildings of good design and construction, slight-to-moderate in well-built ordinary structures, considerable in poorly built or badly designed structures such as unreinforced masonry buildings. Some chimneys will be broken.

<u>Intensity VI Earthquake Areas</u>

Bill
Lost Springs
Shawnee

In intensity VI earthquakes, some heavy furniture can be moved. There may be some instances of fallen plaster and damaged chimneys. The effects of earthquakes on wells are not specific and can differ from well to well. Temporary water pressure increases can occur from earthquakes from faults at distance of approximately 2500 miles away, but primarly occure within approximately 10 miles. Offsets of water levels in wells can occur from earthquakes within 650 miles, but are much more likely to occur from an earthquake within 250 miles. The largest water level offset recorded was a one meter rise.

2.6.7 References

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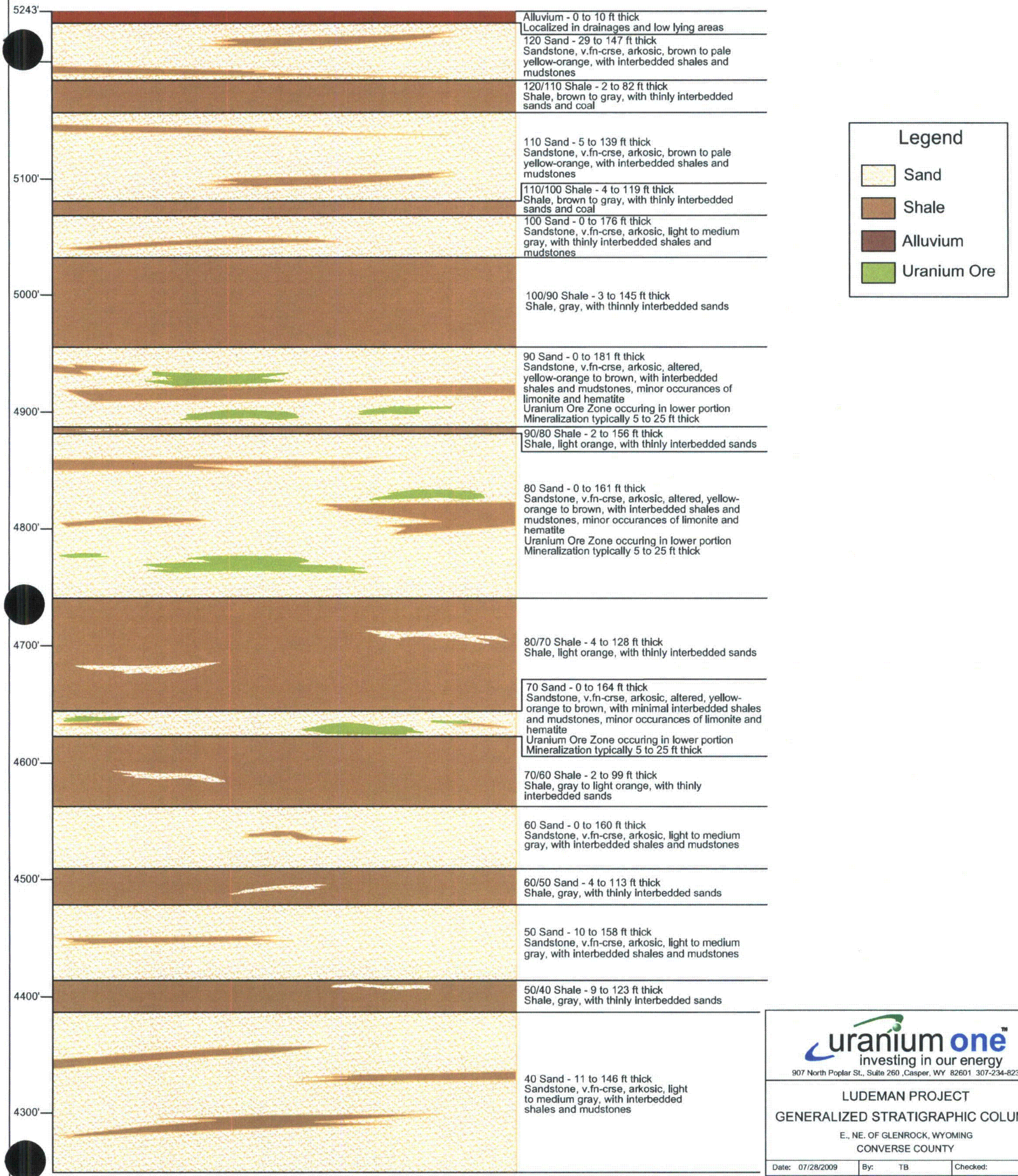
FIGURES

ADDENDUM 2.6-A

GEOLOGY FIGURES AND TABLES

FIGURES



SCALE BASED ON TYPE LOG IN FIGURE 2.6-17

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LUDEMAN PROJECT

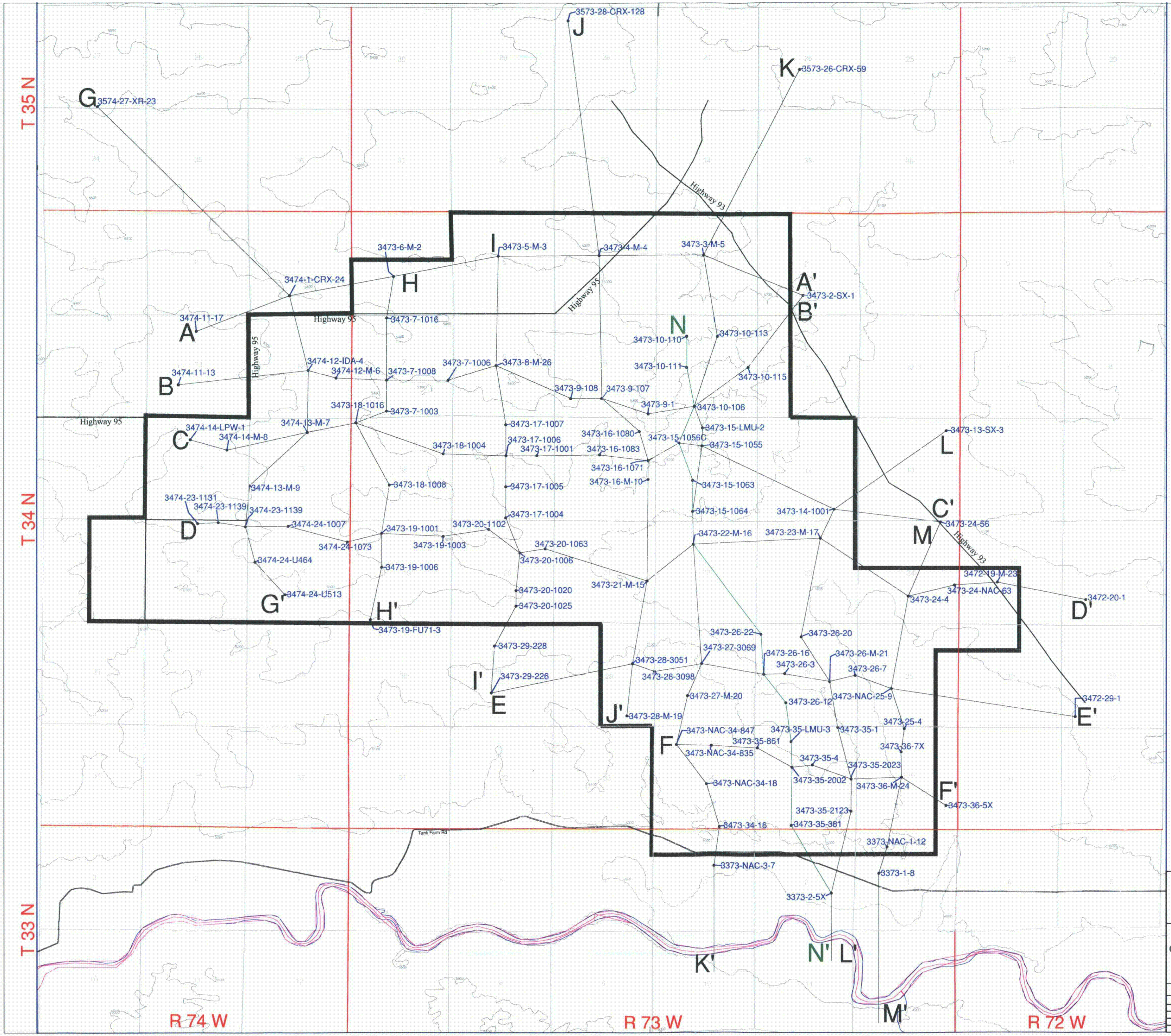
GENERALIZED STRATIGRAPHIC COLUMN

E., NE. OF GLENROCK, WYOMING

CONVERSE COUNTY

Date: 07/28/2009	By: TB	Checked:

Rev. No.	Description	Date	By	FIGURE:
				2.6-1



0 1/2 Mile 1 Mile

0 1 Km

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LUDEMAN PROJECT
GEOLOGICAL CROSS-SECTION INDEX MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WYOMING

Date: 05/23/2008	By: TB	Checked:	
Rev. No.	Description	Date	By
1		02/09/2009	TC

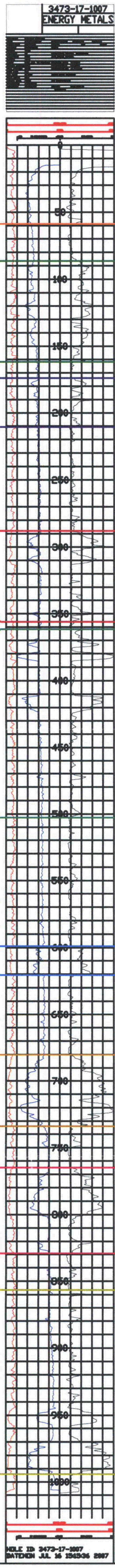
FIGURE:
2.6-2

The 14 Drawings specifically referenced in the Table of Contents have been processed into ADAMS.

These drawings can be accessed within the ADAMS package or by performing a search on the Document/Report Number.

D01 thru D14

Ludeman Type Log
3743-17-1007



120 Sand	Sandstone, v.fn-crse, arkosic, brown to pale yellow-orange, with interbedded shales and mudstones
120/110 Shale	Shale, brown to gray, with thinly interbedded sands and coal
110 Sand	Sandstone, v.fn-crse, arkosic, brown to pale yellow-orange, with interbedded shales and mudstones
110/100 Shale	Shale, brown to gray, with thinly interbedded sands and coal
100 Sand	Sandstone, v.fn-crse, arkosic, light to medium gray, with thinly interbedded shales and mudstones
100/90 Shale	Shale, gray, with thinnly interbedded sands
90 Sand	Sandstone, v.fn-crse, arkosic, altered, yellow-orange to brown, with interbedded shales and mudstones, minor occurances of limonite and hematite
90/80 Shale	Shale, light orange, with thinly interbedded sands
80 Sand	Sandstone, v.fn-crse, arkosic, altered, yellow-orange to brown, with interbedded shales and mudstones, minor occurances of limonite and hematite
80/70 Shale	Shale, light orange, with thinly interbedded sands
70 Sand	Sandstone, v.fn-crse, arkosic, altered, yellow-orange to brown, with interbedded shales and mudstones, minor occurances of limonite and hematite
70/60 Shale	Shale, gray to light orange, with thinly interbedded sands
60 Sand	Sandstone, v.fn-crse, arkosic, light to medium gray, with interbedded shales and mudstones
60/50 Shale	Shale, gray, with thinly interbedded sands
50 Sand	Sandstone, v.fn-crse, arkosic, light to medium gray, with interbedded shales and mudstones
50/40 Shale	Shale, gray, with thinly interbedded sands
40 Sand	Sandstone, v.fn-crse, arkosic, light to medium gray, with interbedded shales and mudstones

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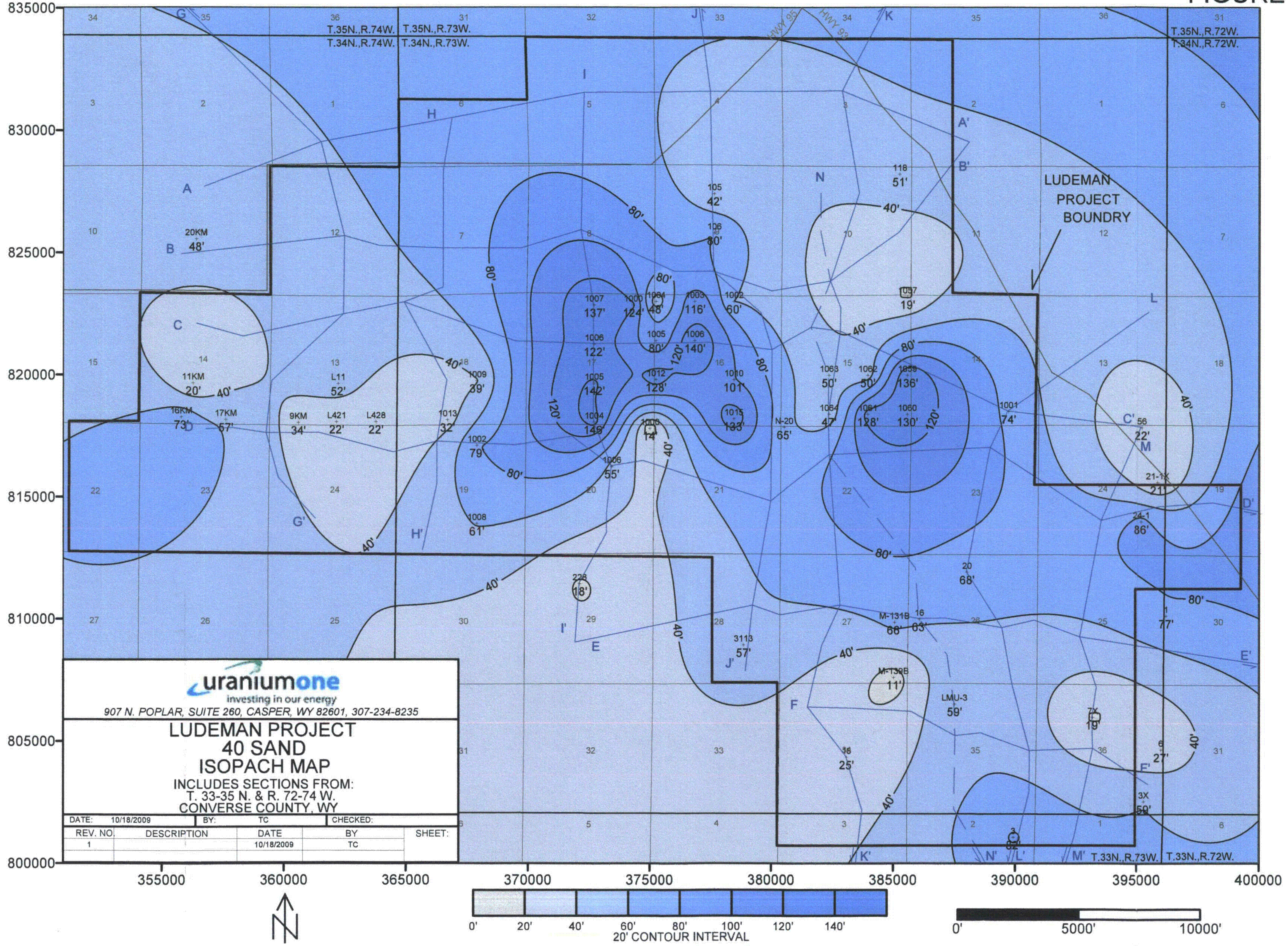
LUDEMAN URANIUM PROJECT
TYPICAL GEOPHYISCAL LOG FROM THE LUDEMAN PROJECT AREA
T.34N., R.73W., Sec. 17
CONVERSE COUNTY, WYOMING

Date: 04/02/09	By: TC	Checked:

Rev. No.	Description	Date	By	FIGURE: 2.6-17

FIGURE 2.6-18



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LUDEMAN PROJECT
40 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. 1
DESCRIPTION
DATE 10/18/2009
BY TC
SHEET:
LUDEMAN PROJECT BOUNDRY
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
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T.33N.,R.73W.
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0'
20'
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80'
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140'
20' CONTOUR INTERVAL
0'
5000'
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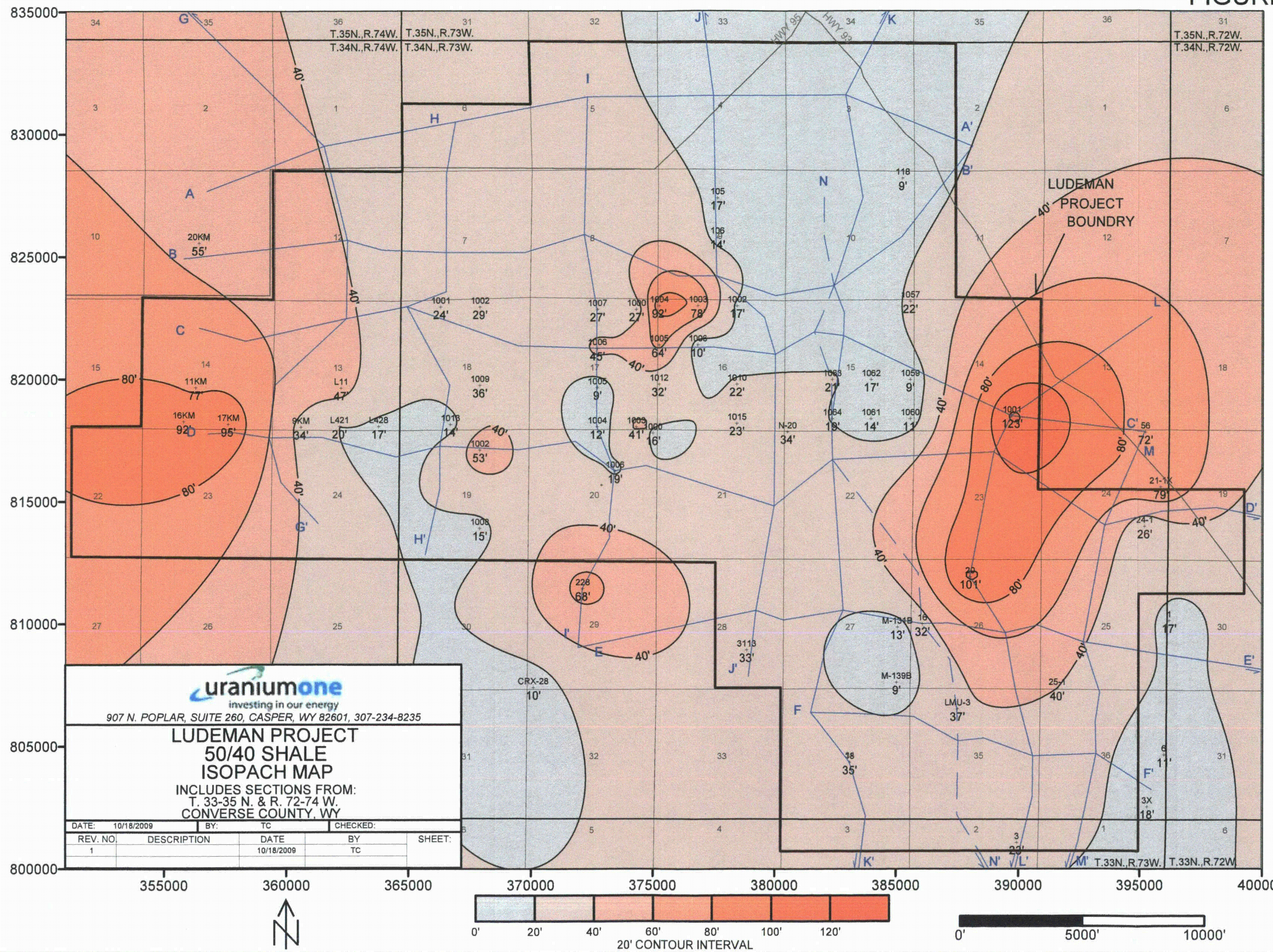
FIGURE 2.6-19



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LUDEMAN PROJECT
50/40 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
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LUDEMAN PROJECT BOUNDRY
T.35N.,R.74W.
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0' 20' 40' 60' 80' 100' 120'
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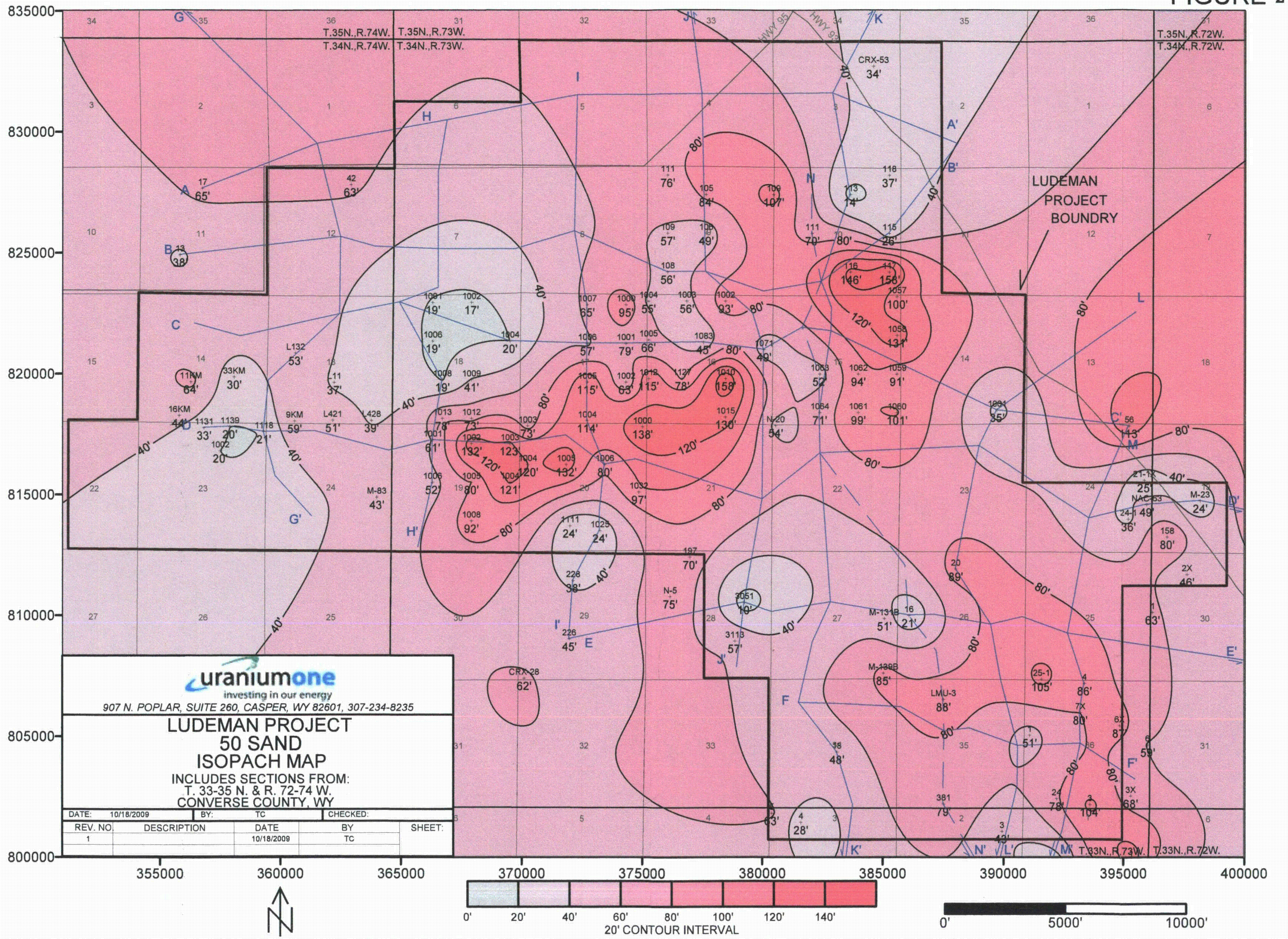
FIGURE 2.6-20



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LUDEMAN PROJECT
50 SAND
ISOPACH MAP

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T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY

DATE: 10/18/2009	BY: TC	CHECKED:	
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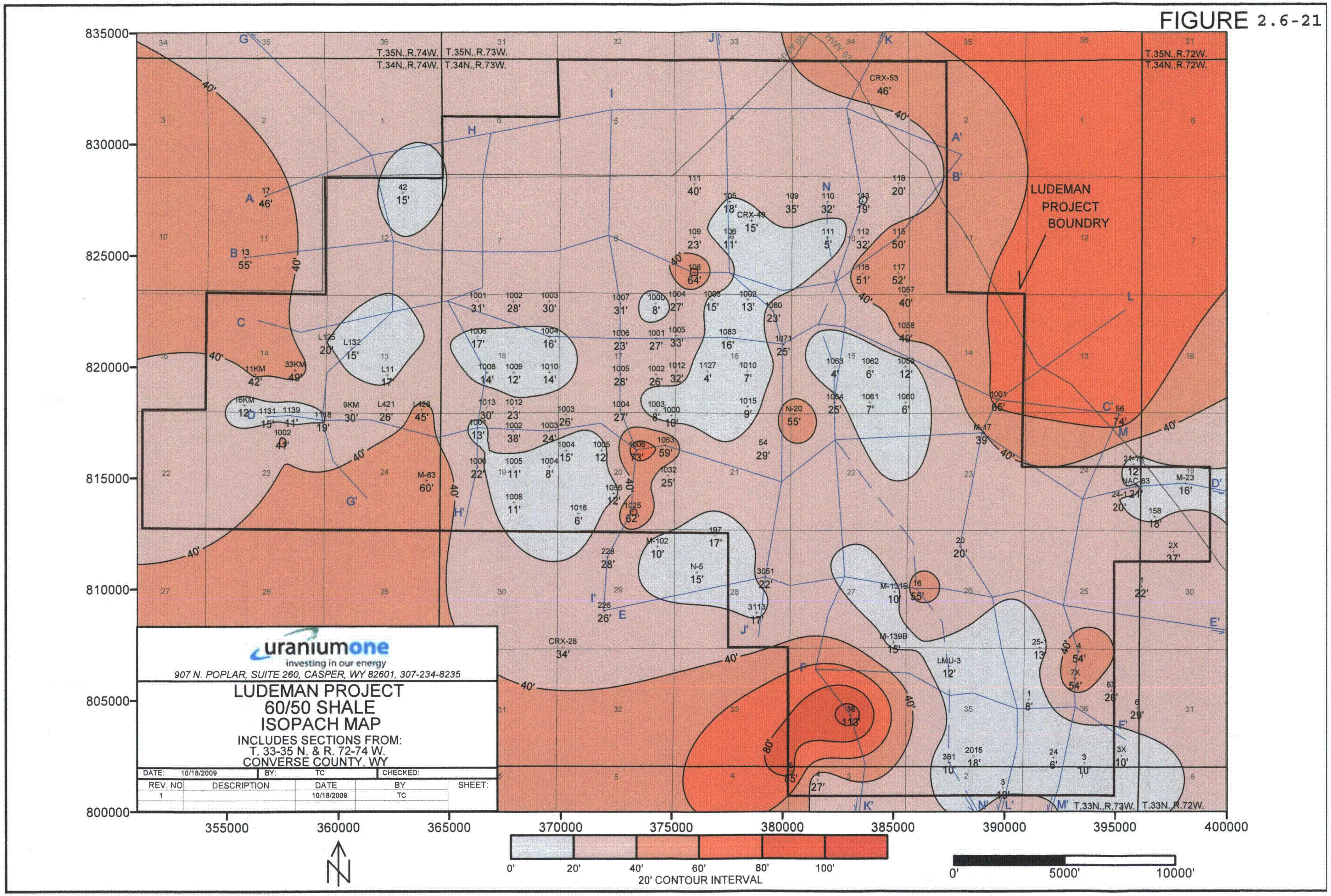

FIGURE 2.6-21
LUDEMAN PROJECT BOUNDRY
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T.34N.,R.74W. T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W. T.33N.,R.72W.
HWY 95
HWY 93
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907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
60/50 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
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CONVERSE COUNTY, WY
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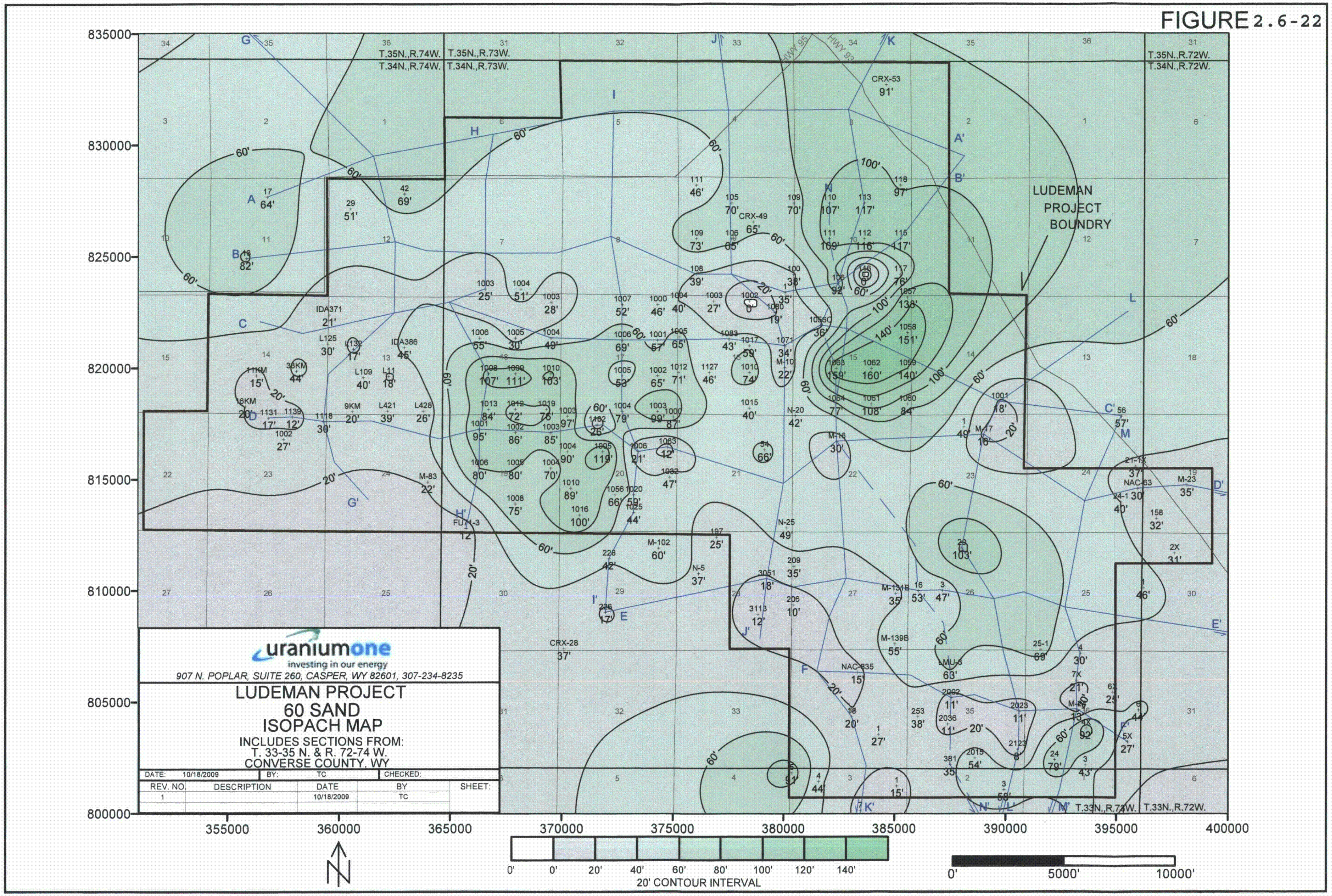
FIGURE 2.6-22
LUDEMAN PROJECT BOUNDRY
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T.35N.,R.73W.
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T.35N.,R.72W.
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T.33N.,R.73W.
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HWY 95
HWY 93
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907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
60 SAND
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CONVERSE COUNTY, WY
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TC
0'
0'
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100'
120'
140'
20' CONTOUR INTERVAL
0'
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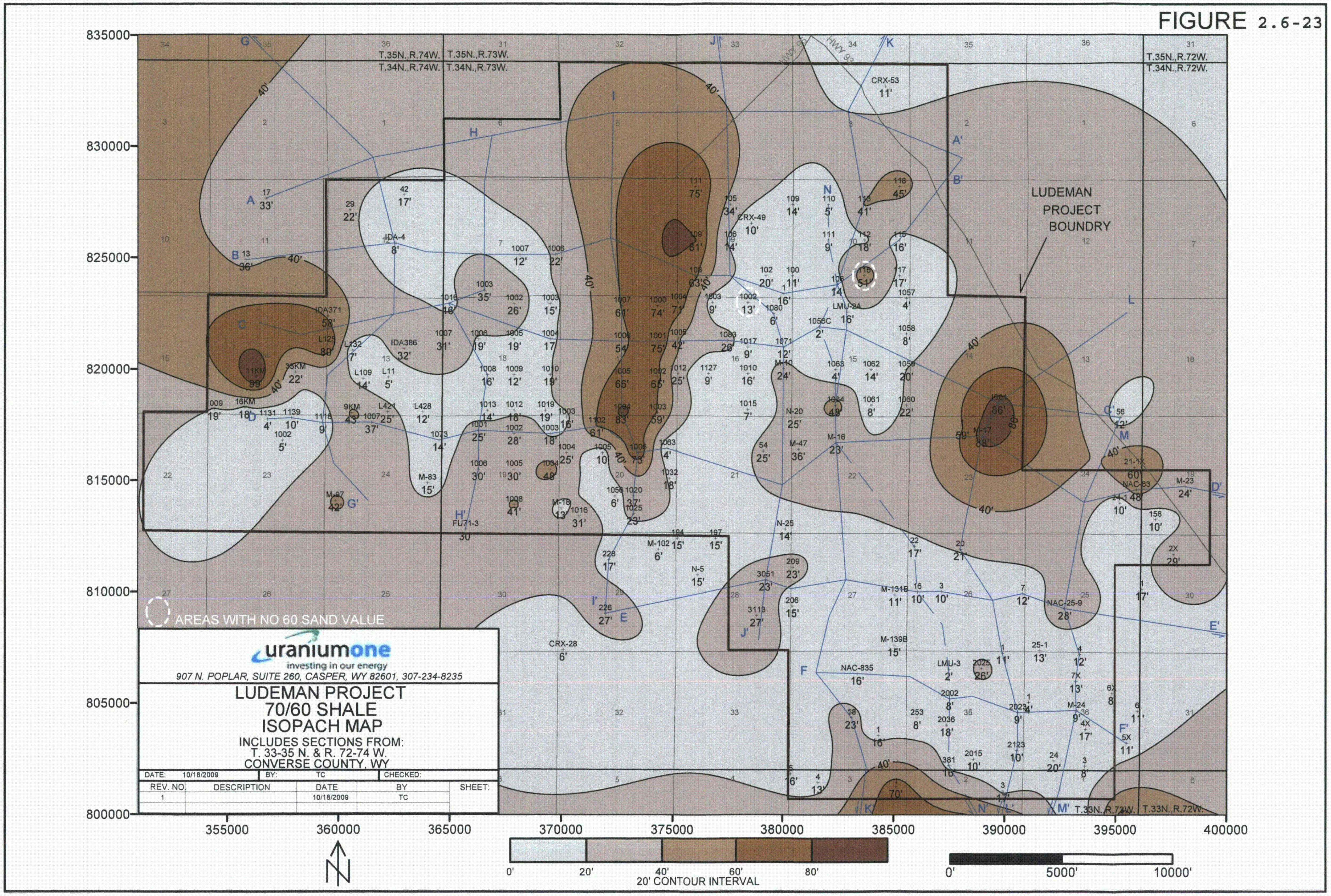
FIGURE 2.6-23



LUDEMAN PROJECT BOUNDRY
AREAS WITH NO 60 SAND VALUE
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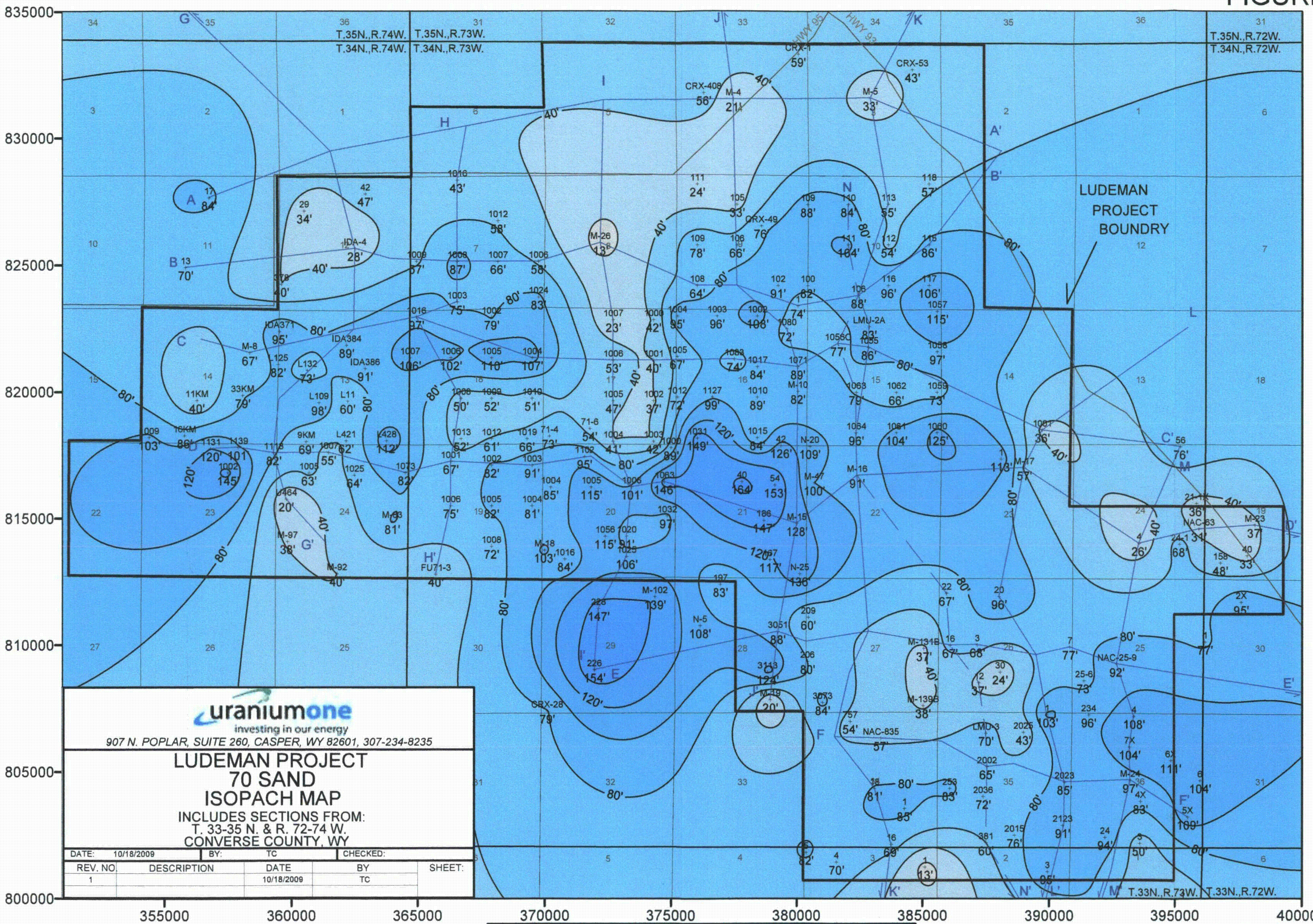
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
70/60 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. DESCRIPTION DATE BY SHEET:
1 10/18/2009 TC
0' 20' 40' 60' 80'
20' CONTOUR INTERVAL
0' 5000' 10000'

FIGURE 2.6-24



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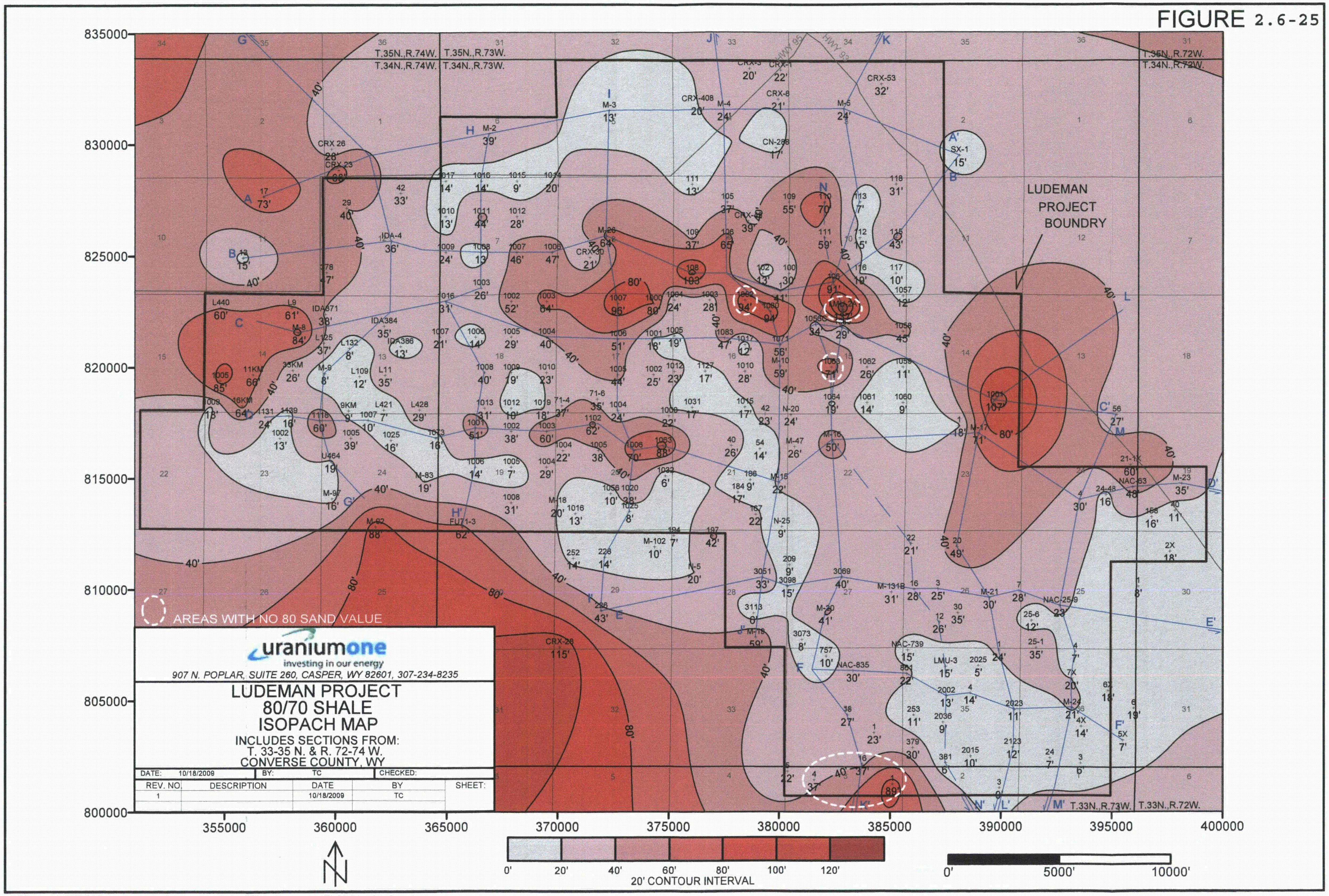
LUDEMAN PROJECT
70 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY

DATE: 10/18/2009	BY: TC	CHECKED:	
REV. NO.	DESCRIPTION	DATE	BY	SHEET:
1		10/18/2009	TC	



LUDEMAN PROJECT BOUNDRY
AREAS WITH NO 80 SAND VALUE
uraniumone
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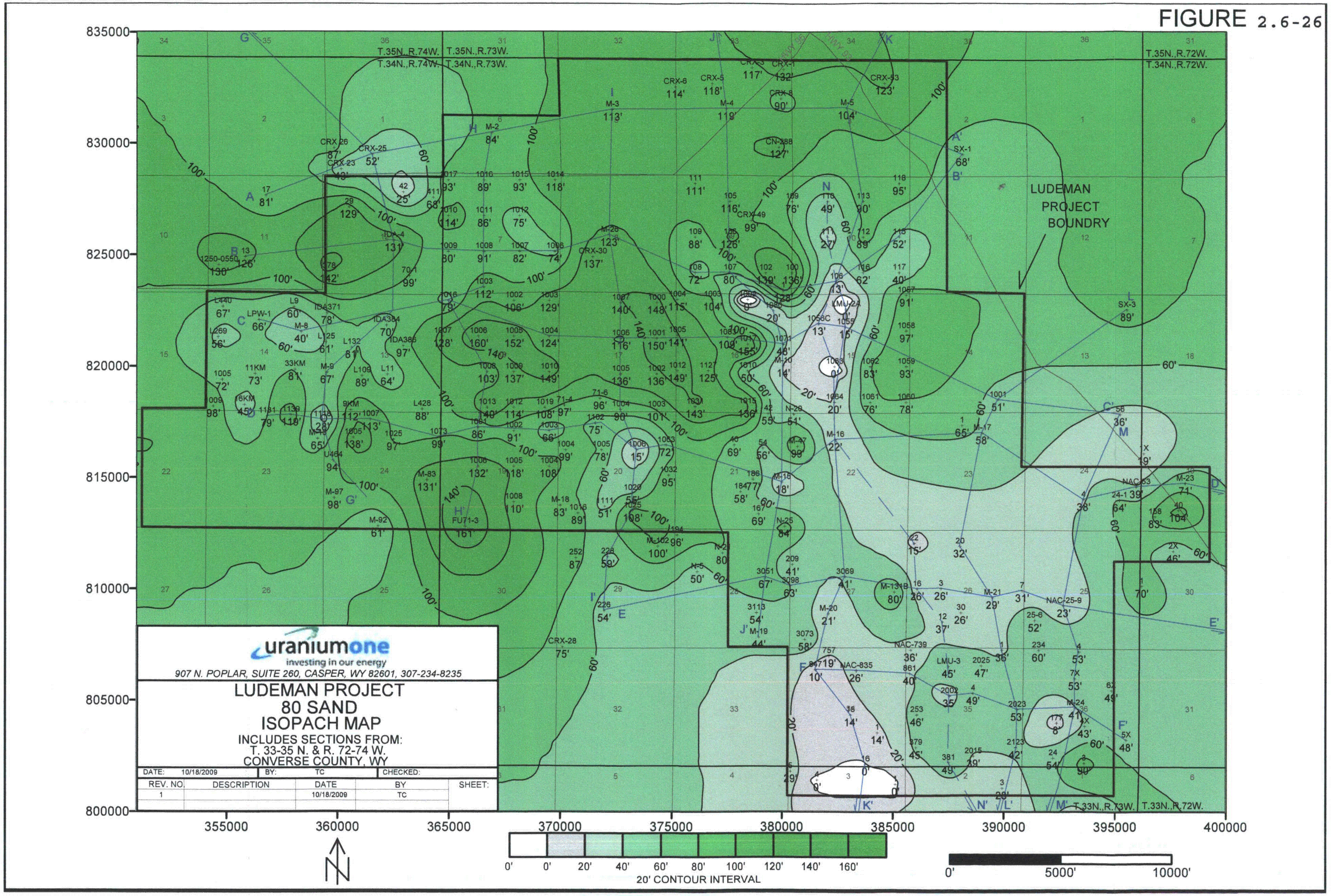
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
80/70 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. 1
DESCRIPTION
DATE 10/18/2009
BY TC
SHEET:
0' 20' 40' 60' 80' 100' 120'
20' CONTOUR INTERVAL
0' 5000' 10000'
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
HWY 95
HWY 93

FIGURE 2.6-25


LUDEMAN PROJECT BOUNDRY
uraniumone
investing in our energy
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
80 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO.
DESCRIPTION
DATE
BY
SHEET:
1
10/18/2009
TC
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
835000
830000
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000
0'
0'
20'
40'
60'
80'
100'
120'
140'
160'
20' CONTOUR INTERVAL
0'
5000'
10000'
FIGURE 2.6-26

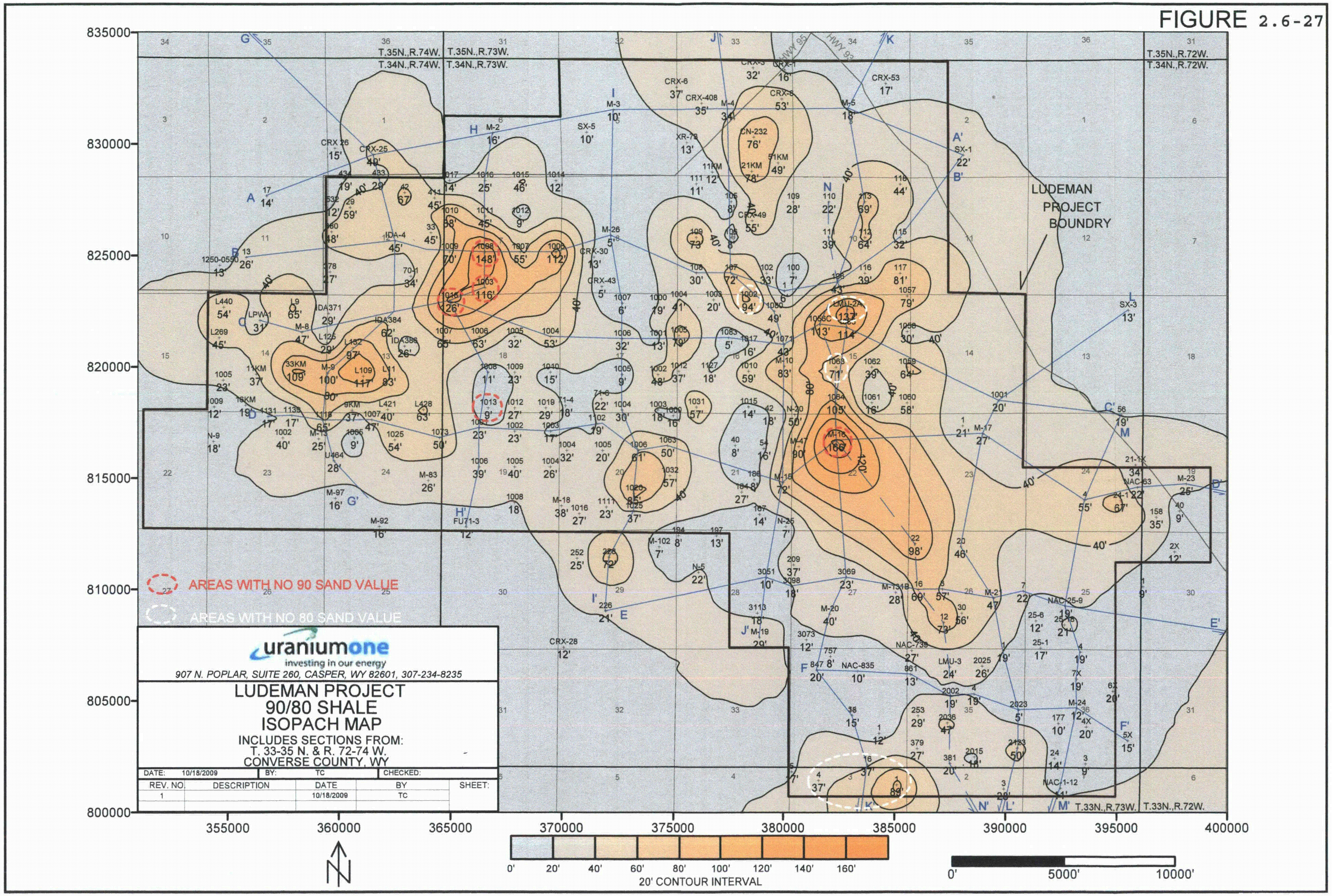


FIGURE 2.6-27
LUDEMAN PROJECT BOUNDRY
AREAS WITH NO 90 SAND VALUE
AREAS WITH NO 80 SAND VALUE
uraniumone
investing in our energy
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
90/80 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. 1
DESCRIPTION
DATE 10/18/2009
BY TC
SHEET:
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
HWY 95
HWY 93
835000
830000
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000
0'
20'
40'
60'
80'
100'
120'
140'
160'
20' CONTOUR INTERVAL
0'
5000'
10000'

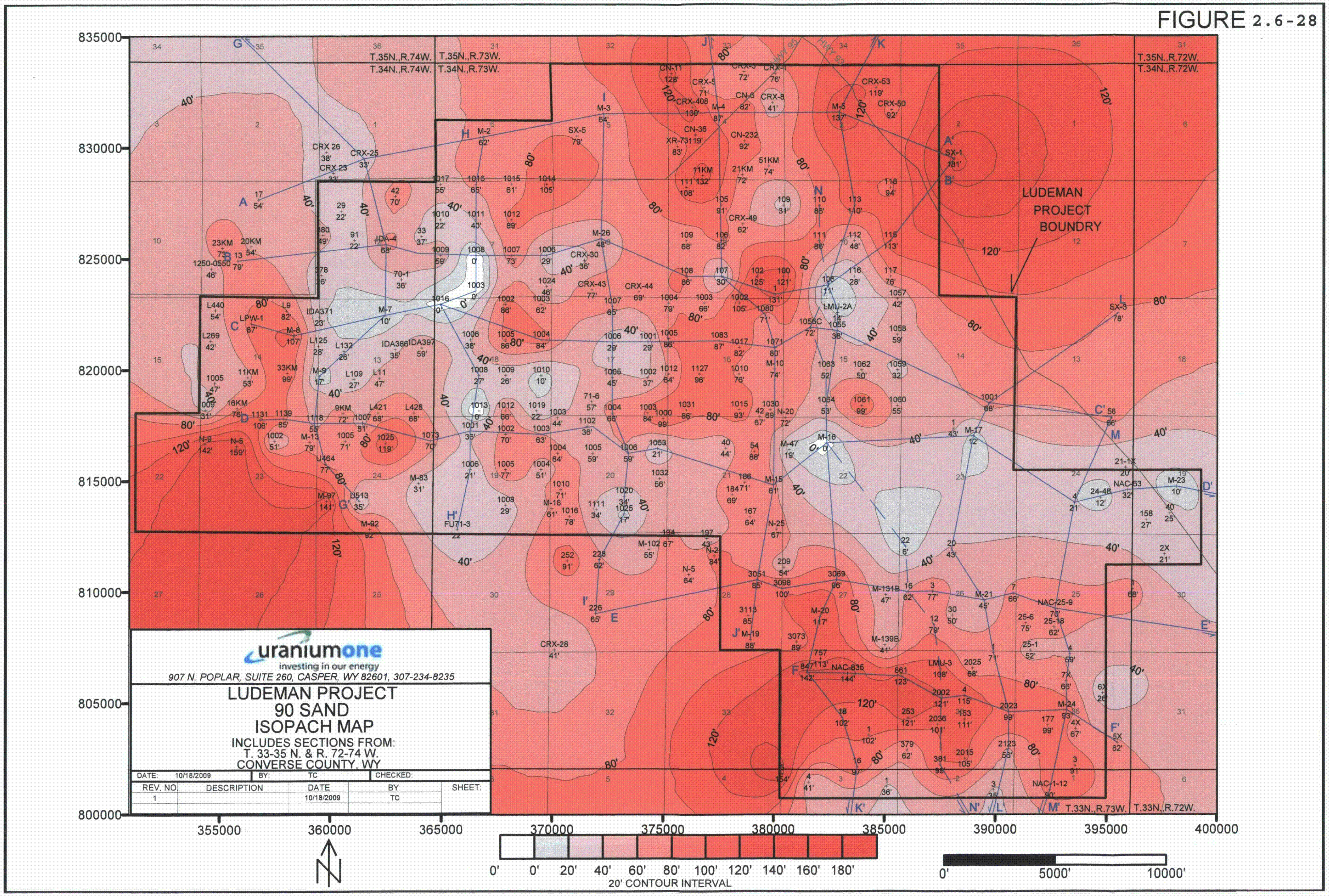


FIGURE 2.6-28
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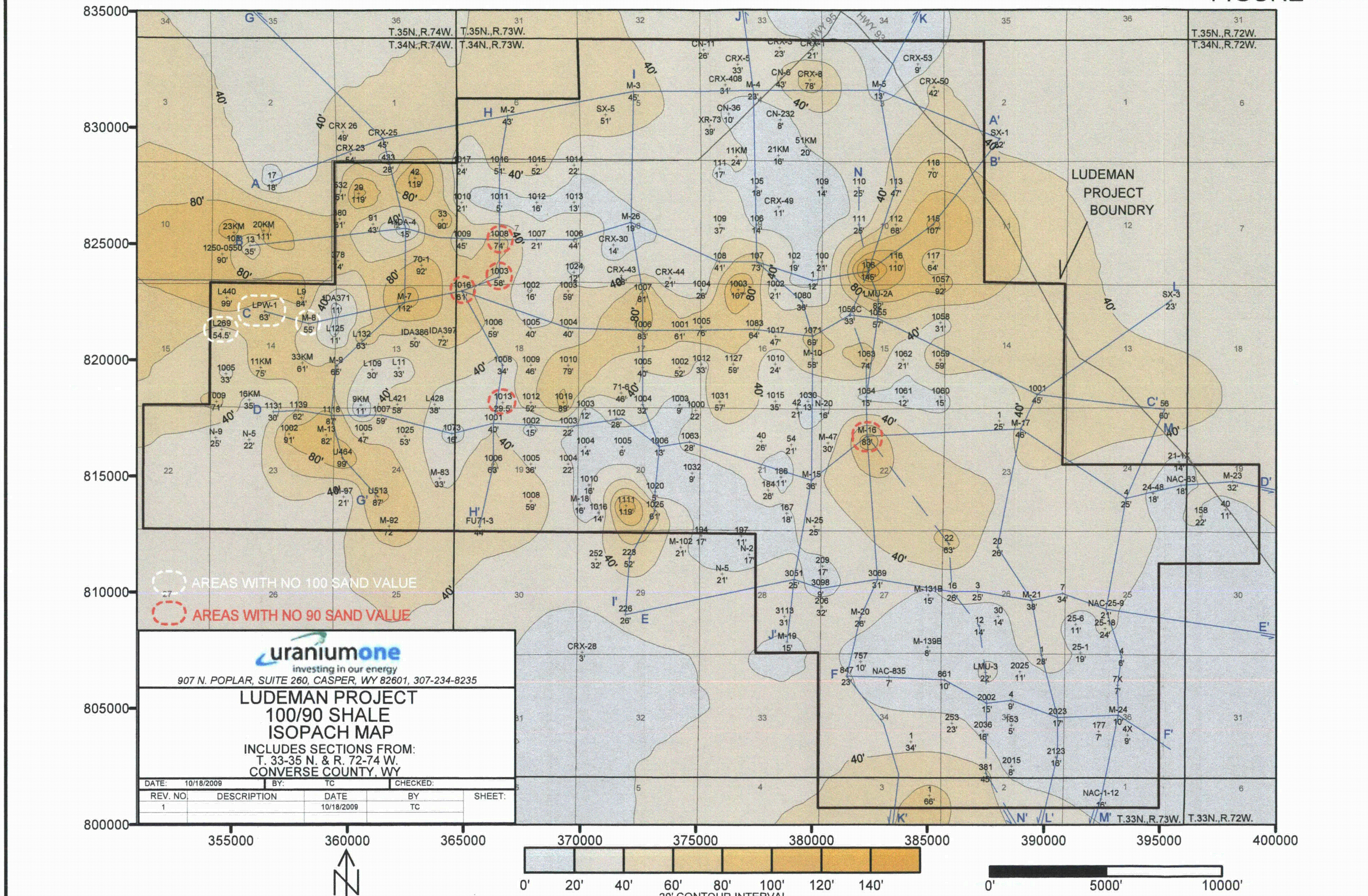
LUDEMAN PROJECT
90 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO.
DESCRIPTION
DATE
BY
SHEET:
1
10/18/2009
TC
LUDEMAN PROJECT BOUNDRY
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
835000
830000
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000
0'
0'
20'
40'
60'
80'
100'
120'
140'
160'
180'
20' CONTOUR INTERVAL
0'
5000'
10000'
N

FIGURE 2.6-29


LUDEMAN PROJECT BOUNDRY
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
AREAS WITH NO 100 SAND VALUE
AREAS WITH NO 90 SAND VALUE
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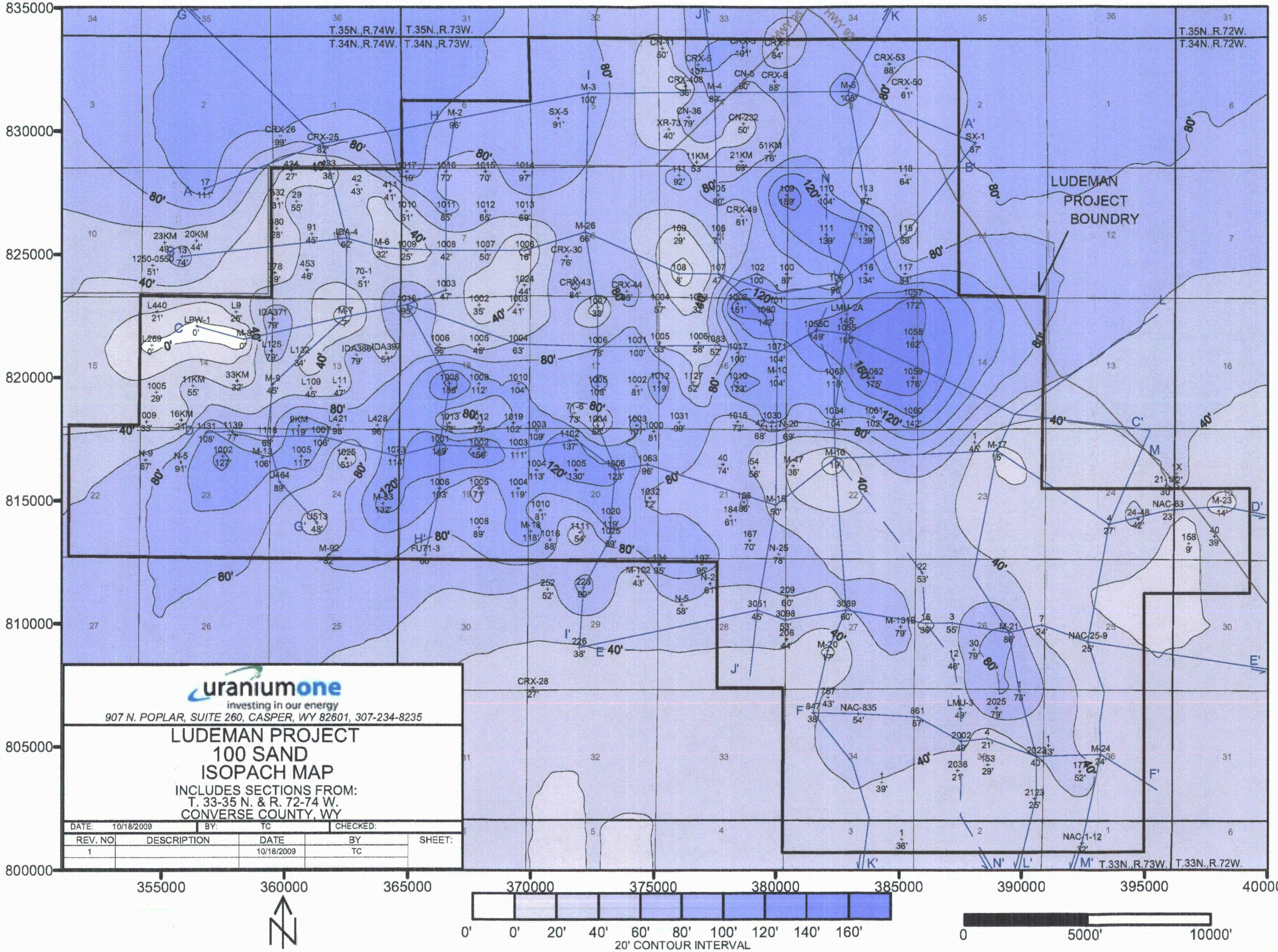
investing in our energy
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
100/90 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. | DESCRIPTION | DATE | BY | SHEET:
1 | | 10/18/2009 | TC |
835000
830000
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000
0' 20' 40' 60' 80' 100' 120' 140'
20' CONTOUR INTERVAL
0' 5000' 10000'

FIGURE 2.6-30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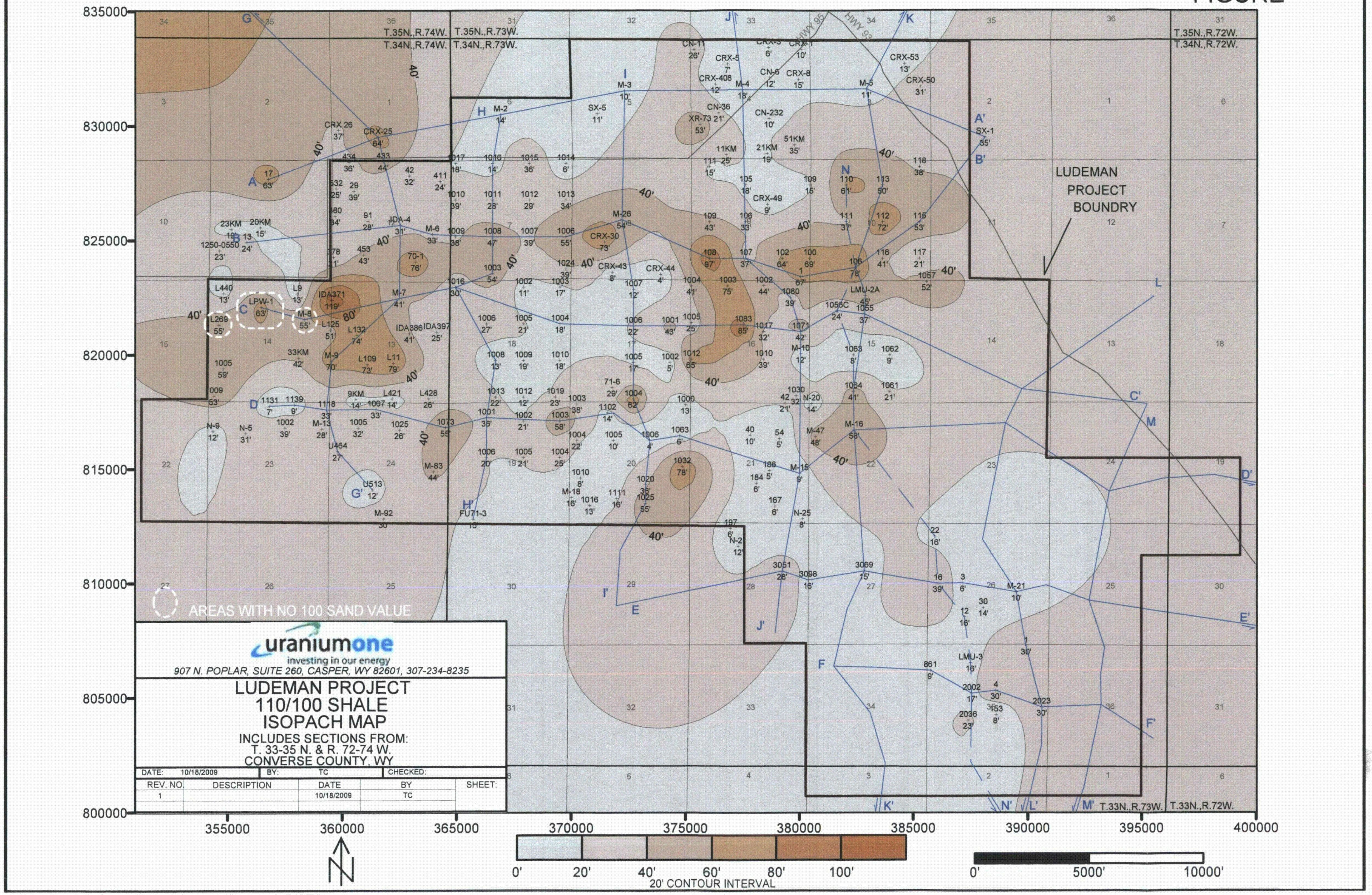
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
100 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO
DESCRIPTION
DATE
BY
SHEET:
1
10/18/2009
TC
LUDEMAN PROJECT BOUNDRY
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
HWY 95
HWY 93
835000
830000
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000
0'
0'
20'
40'
60'
80'
100'
120'
140'
160'
20' CONTOUR INTERVAL
0
5000'
10000'
N

FIGURE 2.6-31


LUDEMAN PROJECT BOUNDRY
AREAS WITH NO 100 SAND VALUE
uraniumone
investing in our energy
907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
110/100 SHALE
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. 1
DESCRIPTION
DATE 10/18/2009
BY TC
SHEET:
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
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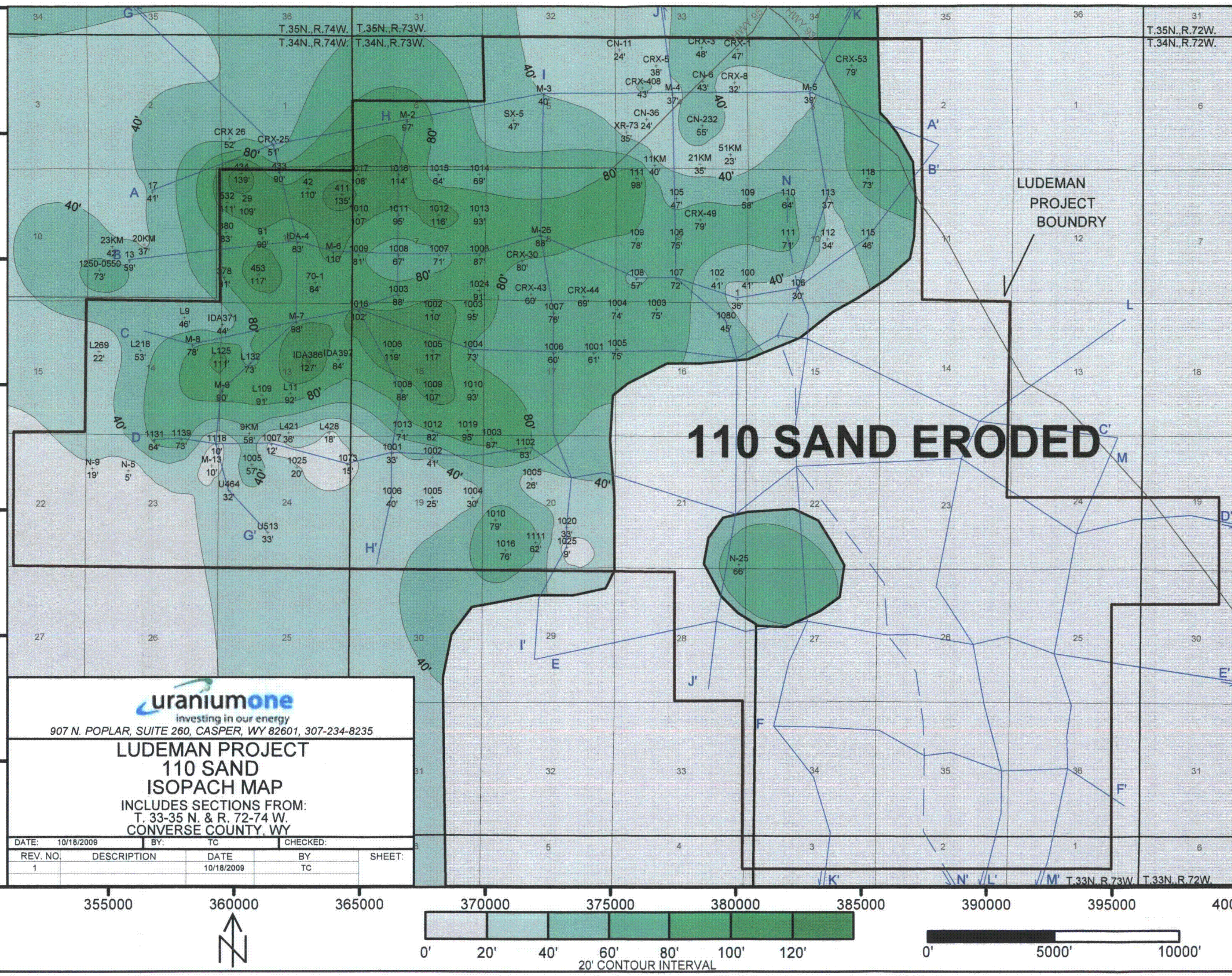
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000
0' 20' 40' 60' 80' 100'
20' CONTOUR INTERVAL
0' 5000' 10000'

FIGURE 2.6-32



110 SAND ERODED
LUDEMAN PROJECT BOUNDRY
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907 N. POPLAR, SUITE 260, CASPER, WY 82601, 307-234-8235
LUDEMAN PROJECT
110 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO. 1
DESCRIPTION
DATE 10/18/2009
BY TC
SHEET:
0' 20' 40' 60' 80' 100' 120'
20' CONTOUR INTERVAL
0' 5000' 10000'
T.35N.,R.74W.
T.35N.,R.73W.
T.34N.,R.74W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
835000
830000
825000
820000
815000
810000
805000
800000
355000
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365000
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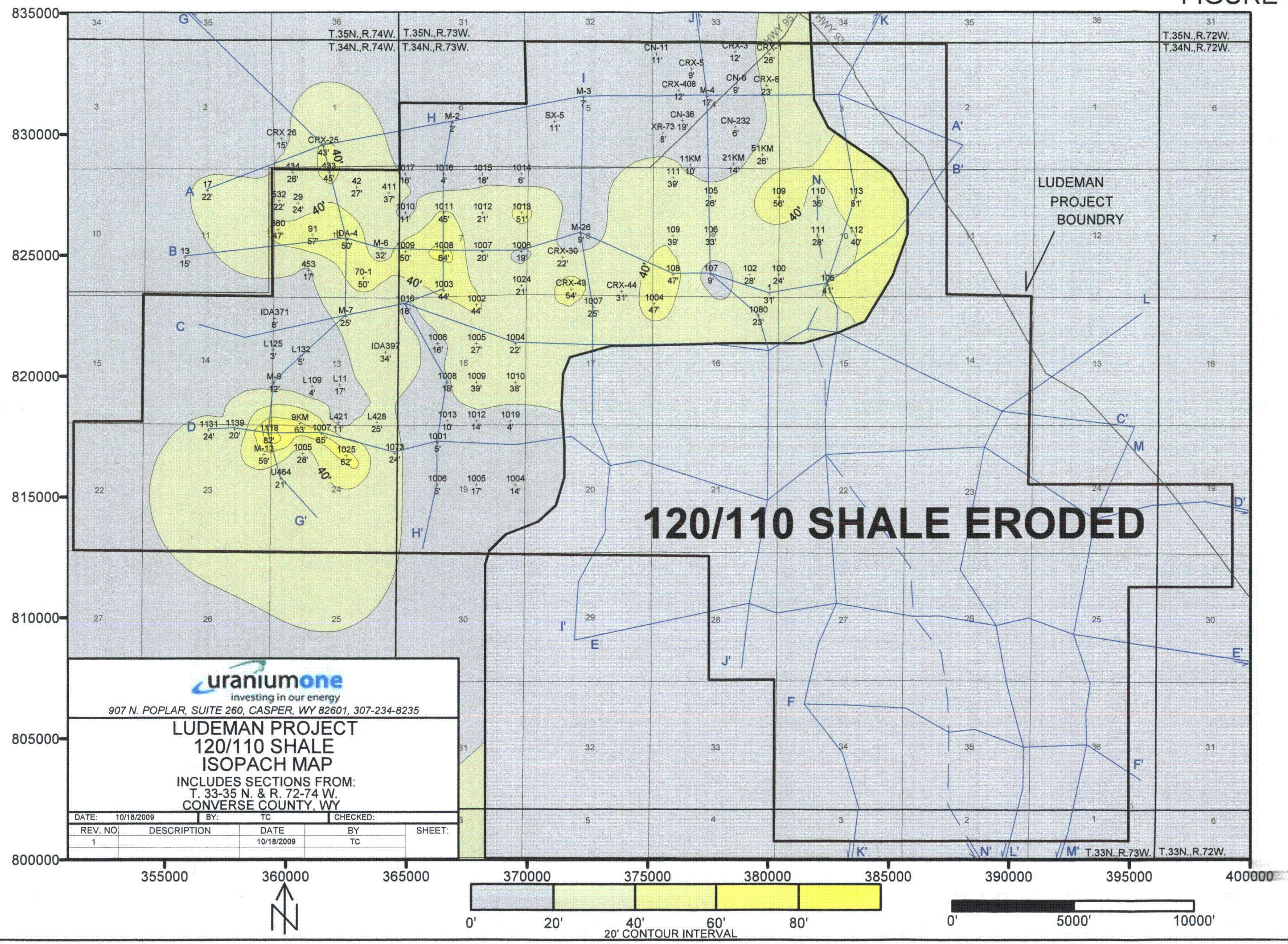
375000
380000
385000
390000
395000
400000

FIGURE 2.6-32A



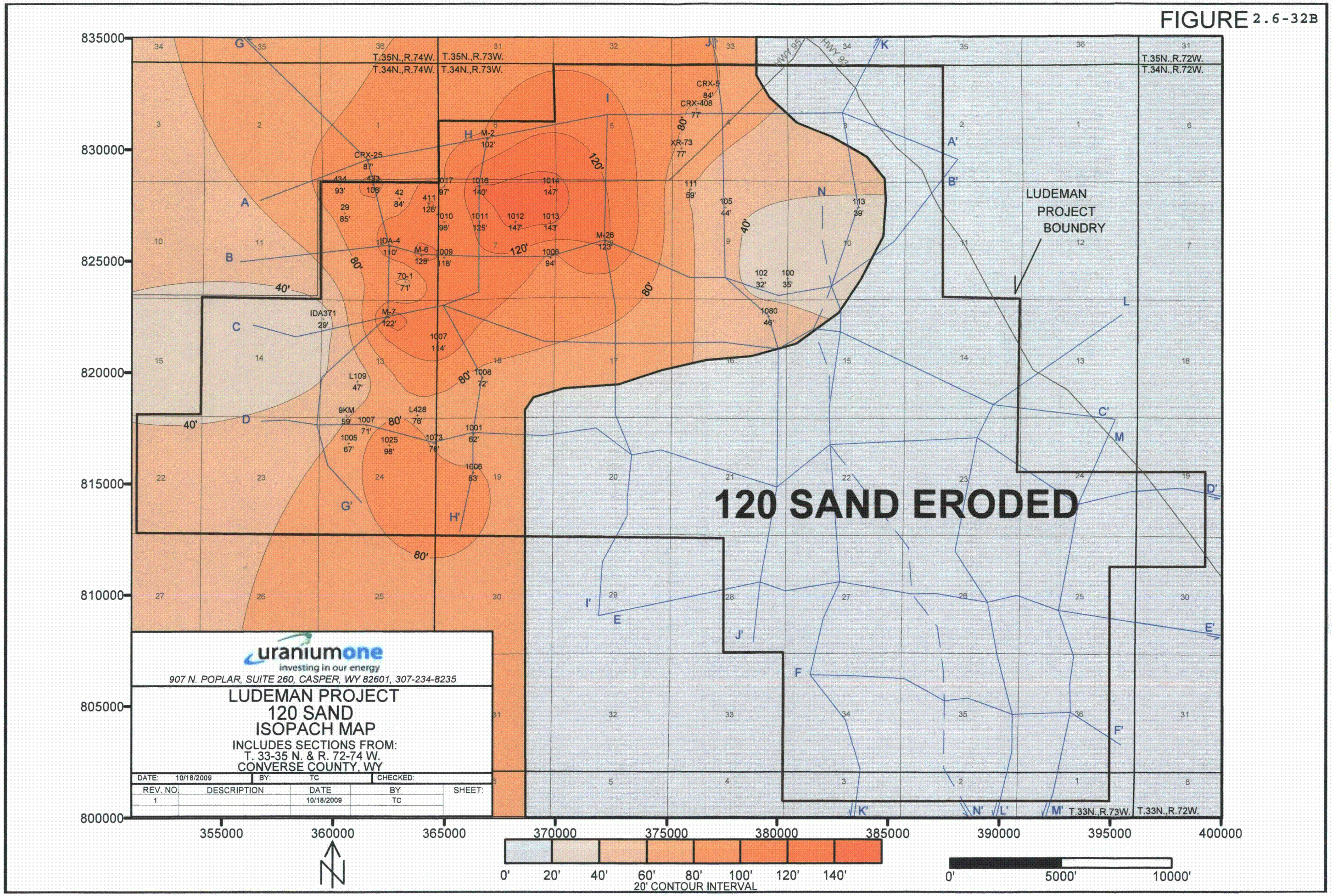


FIGURE 2.6-32B
LUDEMAN PROJECT BOUNDRY
120 SAND ERODED
T.35N.,R.74W.
T.34N.,R.74W.
T.35N.,R.73W.
T.34N.,R.73W.
T.35N.,R.72W.
T.34N.,R.72W.
T.33N.,R.73W.
T.33N.,R.72W.
HWY 95
HWY 93
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LUDEMAN PROJECT
120 SAND
ISOPACH MAP
INCLUDES SECTIONS FROM:
T. 33-35 N. & R. 72-74 W.
CONVERSE COUNTY, WY
DATE: 10/18/2009
BY: TC
CHECKED:
REV. NO.
DESCRIPTION
DATE
BY
SHEET:
1
10/18/2009
TC
0'
20'
40'
60'
80'
100'
120'
140'
20' CONTOUR INTERVAL
0'
5000'
10000'
835000
830000
825000
820000
815000
810000
805000
800000
355000
360000
365000
370000
375000
380000
385000
390000
395000
400000

The 15 Drawings specifically referenced in the Table of Contents have been processed into ADAMS.

These drawings can be accessed within the ADAMS package or by performing a search on the Document/Report Number.

D15 thru D29