DOWL HKM

November 3, 2011
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Ms. Pebbles Clark
Reclamation Specialist
Montana Department of Environmental Quality
Abandoned Mine Lands Program
P.O. Box 200901
Helena, MT 59620-0901

Subsidence Investigation – Phase 1 Summary
505 Platt Avenue South
Red Lodge, Carbon County, MT

Dear Ms. Clark:

The following memorandum summarizes the investigation activities performed by DOWL HKM during August and September 2011 in regards to a complaint of subsidence at the above referenced property located in Red Lodge, Montana. This work was completed as outlined in Task Order No. 19, which was issued pursuant to DEQ Contract No. 407033 between DOWL HKM (Contractor) and the Montana Department of Environmental Quality (DEQ). The purpose of Task Order No. 19 is for review of existing data related to the settlement complaint by Mr. Leonard Anderson and his son Mr. William Anderson for his father's property located at 505 Platt Avenue South and performing a site survey and inspection.

If you have any questions regarding this project, please contact me at (406) 869-6372 or email to cpeterson@dowlhkm.com.

Sincerely,

DOWL HKM

Charles L. Peterson, PG
Project Manager

Carla Van Siclen, PG
Geologist/GIS Specialist

Encl. Memorandum Report and CD

MEMORANDUM

TO: Ms. Pebbles Clark, Reclamation Specialist
Montana Department of Environmental Quality
Abandoned Mine Lands Program

FROM: Charles L. Peterson, PG, Project Manager
Carla Van Siclen, PG, Geologist/GIS Specialist

SUBJECT: Subsidence Investigation – Phase 1 Summary
505 Platt Avenue South
Red Lodge, Carbon County, MT

DATE: November 3, 2011
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PROJECT DESCRIPTION

Mr. Leonard O. Anderson is the owner of the property at 505 Platt Avenue South. Mr. William Anderson is the son of Mr. Leonard Anderson. According to a letter dated March 23, 2011 from Mr. William Anderson, The Montana Department of Environmental Quality - Abandoned Mine Lands Program (DEQ-AML) was first contacted regarding potential settlement at the subject property on March 23, 2011. The location of the subject property is shown on Figure 1 in Appendix A. According to Mr. Williams' March 23, 2011 letter, "There's a general appearance of the land caving-in". Mr. Williams also expresses his concern over structural stability of the house foundation and that other structural damage may occur in the future. The DEQ-AML made an initial site visit on April 25-26, 2011 and took photographs of the subject property and surrounding area. Current and future assessment activities by the DEQ-AML and DOWL HKM are directed at determining if settlement at the subject is property is directly related to mine subsidence or other mining related activities.

During August 2011 DOWL HKM personnel conducted three site visits and performed a spot elevation survey of the subject property, the sidewalk and street. Charlie Peterson, a Professional Geologist with DOWL HKM, and DEQ personnel Pebbles Clark (Project Manager), Nick Kujawa, and Devin Clary made an initial site visit on August 4th, 2011. The purpose of the initial site visit was to assess current conditions at the site. On August 25th, 2011 DOWL HKM Professional Geologist, Carla Van Siclen, and Licensed Surveyor, Bob Rux, conducted a site inspection and performed a spot elevation survey. Photos were taken during the August 4th and 25th site visits (See Appendix B). On August 30th Charlie Peterson and Carla Van Siclen performed a third site inspection of the subject property to review the surveyed locations and observations made during the previous visits. The following sections provide the results of the survey and site inspection.

BACKGROUND

Local Geologic Setting

Red Lodge, Montana is located on the northern edge of the Beartooth Mountain Range along the Rock Creek valley. Quaternary alluvial terraces and recent alluvium overlie the Tertiary Fort Union

Formation in the area. Figure 2 in Appendix A is a geologic map of the Red Lodge area (Lopez, 2005). A thick Quaternary alluvial terrace deposit (Qat2) forms the west edge of the valley and is referred to as the West Bench. Thinner deposits of Quaternary alluvium (Qat3 and Qat4) overlie the Fort Union which has been eroded to form the east edge (East Bench) of the valley. The town of Red Lodge is underlain by Quaternary terrace deposits and recent alluvium (Qat1 and Qal).

Based on a review of published material and well logs, the thickness of the alluvium appears to vary from a few feet to over 100 feet in the valley bottom. As part of a preliminary study of the potential for subsidence in the Red Lodge and Bearcreek Areas, Chen-Northern (1987) advanced a drill hole (DH-3) to 450.5 feet approximately two to three blocks northwest of the subject property (Figure 3 in Appendix A). The base of the alluvium was encountered at a depth of 108 feet. At least 85 feet of alluvium was encountered in drill hole DH-4 advanced as part of the Spectrum (1998) investigation and grouting project. However, during well log research of the Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) website several well logs along the central and east sides of town noted encountering relatively shallow (less than 25 feet) bedrock (Figure 3 in Appendix A).

Some of the wells penetrated the bedrock fifty feet or more and were installed by different drilling companies. Note that the Object ID listed near each well can be used as a cross reference with Table 1 in Appendix C. Table 1 presents additional well information obtained directly from the GWIC website, with the exception of the "Depth to Bedrock" information which was added by DOWL HKM after review of the well logs. There is some indication that the exploration holes referenced in Campbell (1906) also encountered bedrock at a shallow depth. Based on this information, relatively shallow bedrock may exist below the subject property.

The Fort Union Formation is readily exposed along the east bench and consists of mainly shale, siltstone, sandstone, and coal deposits. The bedrock in the Red Lodge area dips approximately 25 degrees to the south-southwest toward the Beartooth Mountains (Lopez, 2005). The coal deposits are part of the Red Lodge-Bearcreek Coal Field, formerly the Red Lodge Coal Field (Roberts, 1999 and Woodruff, 1909). The coal deposits are present on the east and west benches as well as below the town of Red Lodge.

Groundwater

As previously mentioned; groundwater well information was retrieved from the MBMG GWIC database and reviewed. Well locations were plotted in ArcGIS using the latitude and longitude coordinates provided in the GWIC database and are shown on Figure 3 in Appendix A. Note that the accuracy of the coordinate locations provided by GWIC can vary substantially depending on the method used to locate the wells. According to the GWIC metadata, some wells were located using a more accurate Global Positioning System (GPS) and a site visit has been conducted. However, most of the wells were located by contract drillers and landowners using a township, range, section, and tract description and substantial errors in location are possible. Additional well information is provided in Table 1in Appendix C.

The subject property is located approximately one block west of Rock Creek. The depth of groundwater below the surface near the subject property appears to be in the range of 6 to 17 feet. According to the MBMG GWIC website 15 long term monitoring stations exist in Carbon County. However, only one well (Object ID 32) is located in the valley bottom. This well is located

approximately eight blocks north of the subject property and is completed at a depth of 38 feet in alluvium. Static water level readings have been collected at this site since 2002. Water level readings were relatively consistent from 2002 through 2010 and ranged from about 12 to 14 feet below ground surface. However, in 2011 the range in water level readings varied from about 9 feet to 15.6 feet below the ground surface. Review of the United States Geological Survey (USGS) National Water Information System Mapper website, no long term groundwater monitoring sites maintained by the USGS are located in the town of Red Lodge. No additional water level information was reviewed for this study.

Mining History

Coal was first discovered along the east side of the Rock Creek drainage in the mid-1860's (Spectrum, 1989 and Anderson, 1983). There was no accessible market at the time, but with the completion of the Laurel to Red Lodge railroad in 1889, commercial mining commenced (Spectrum, 1989 and Anderson, 1983). The Red Lodge mining district consisted of two mines, the Sunset and Red Lodge Mines, referred to on the Carbon County Historical Society website as the West Side or Sunset Mine and the East Side or Sunrise Mine, respectively.

Campbell (1906) identifies eleven coal beds in the Red Lodge area and notes that additional thin beds of coal occur lower down in the rock section. Roberts (1999) states that "in the Red Lodge district, at least seven coal beds, originally designated as coal beds 1 through 7, were identified in the coal-bearing interval of the Fort Union." Two additional beds were later discovered which are referred to as beds Number (No.) 1½ and 4½ (Roberts, 1999 and Woodruff, 1909). According to Combo (1949), eight beds of coal (No. 1, 1½, 2, 3, 4, 4½, 5, and 6) are known to have been worked in the vicinity of Red Lodge.

Hard copies of the historic mine maps and information related to a project conducted by MSU-B College of Technology which took the historical mine maps and converted them to a three dimensional electronic format was provided to DOWL HKM by DEQ-AML. The MSU-B information indicates that maps for coal beds No. 1½, 2, 3, 4, 5, and 6 were located and converted to a digital format. A preliminary summary memo for the MSU-B project indicates that they were not able to locate any records for beds No. 4½, 7, or 8. There is also no information on coal bed No. 1 in the data from the MSU-B project. Although they may exist, it appears that historic mine maps for these four beds have not been located. Also, based on review of the Chen-Northern (1987) report, another map showing mining of the No. 2 bed below the town of Red Lodge exists. Historical mine maps exist for six of the eight beds known to be worked in the vicinity of Red Lodge (No. 1½, 2, 3, 4, 5, and 6). It is the understanding of DOWL HKM that no maps have been located for beds No. 1 or 4½ or beds No. 7 or 8, which ***may indicate*** these beds were not mined extensively in the Red Lodge area.

Mine workings underlie the East and West Benches as well as portions of the town of Red Lodge. Preliminary review of the Chen-Northern (1987) report, historical maps, and the data developed by MSU-B show that the No. 4 and No. 5 beds were mined in the area below the subject property. The No. 2 bed was mined to within approximately ½ block south of the subject property. The No. 2 bed would have had workings closest to the surface in the area of the subject property. However, no underground mine map of the No. 2 bed in this area has been located by the DEQ-AML. As part of a preliminary study of the potential for subsidence in the Red Lodge and Bearcreek Areas, Chen-Northern (1987) borrowed mine maps from Meridian Minerals and developed three maps of the

Red Lodge area showing depth of cover, cumulative mined thickness, and subsidence potential. Electronic versions of these maps, which were imported into ArcGIS and geo-referenced by DOWL HKM are presented in their modified form as Exhibits 1, 2, and 3 in Appendix A. The cumulative mined thickness map (Exhibit 2 in Appendix A) shows that approximately 18 feet of material has been mined from below the area of the subject property. Chen-Northern (1987) also developed cross sections of mine limits (Exhibit 4 in Appendix A), the locations of which are shown on Exhibit 1(Note that cross section A-A' and C-C' are mislabeled and should be reversed when comparing the cross sections to the map).

Relatively shallow bedrock may exist below the subject property, however, based on Chen-Northerns' interpretation (Exhibit 1 and Cross section B-B'), it appears that mining in the area of the subject property occurred about 500 feet below the ground surface and deeper. Near the southwest corner of the subject property, it appears that the No. 2 bed was mined at a depth of between 300 and 350 feet. Note that the original mine maps and any maps interpreted from the original mine maps may have some level of inaccuracy associated with them. Reasons for these inaccuracies could range from original survey errors to assumptions made during conversion to an electronic format. The location of the pillars, voids, tunnels, and any below grade features should be considered approximate.

The coal production in 1889 was 6,000 tons and in 1920 production was over a million tons (Spectrum, 1989 and Anderson, 1983). In 1924, coal production began in Colstrip, Montana, forcing a cut back in production at Red Lodge (Spectrum, 1989 and Anderson, 1983). The West Side Mine closed July 31, 1924 and the East Side Mine closed June 30, 1932 (Zupan and Owen, 2000). According to the Mining Artifacts & History website, "The Great Depression forced more mines to close, and in 1943 an underground explosion killed 74 men at the Smith Mine in Bearcreek four miles east of Red Lodge, devastating the community and effectively ending coal mining in Carbon County."

Subsidence related to the mining activities has been documented east of Red Lodge and in the Bear Creek Area (Spectrum, 1989). Chen-Northern (1987) only identified two small areas of moderate subsidence potential on the east side of town, just south of the subject property (Exhibit 3, Appendix A). It has been approximately 70 to 80 years since mining ceased in the Red Lodge area. Although subsidence related to mining could have occurred in that time, based on the information reviewed by DOWL HKM, it appears that the Hymer Mine Shaft subsidence on Adams Avenue South is the only documented <u>active</u> subsidence within the town of Red Lodge.

<u>History of the Subject Property</u>

According to DEQ-AML documents, the house at 505 Platt Avenue South was moved in from Bear Creek in the 1940's. DOWL HKM reviewed the Sanborn Fire Insurance maps of the property from 1891, 1896, 1901, 1907, 1912 and 1927 at the Carbon County Historical Society in Red Lodge, Montana. There is no Sanborn map coverage of the property in 1891, 1896, or 1901. The Sanborn maps from 1907 and 1927 show nothing on the property. There is a small structure along the west side of the property on the 1912 Sanborn map but it is not present on the 1927 Sanborn map. Letters of correspondence from the Williams to the DEQ-AML dated March 23, 2011, May 16, 2011, and June 2, 2011 do not give any details as to when the settlement was first observed at the subject property or whether there was a slow or fast progression of settlement observed. Based on the review of documents provided to DOWL HKM by DEQ-AML, the landowner did not provide

any detailed information (such as previous surveys or photographs) documenting settlement or the progression of settlement.

The March 23rd letter states that "There's a general appearance of the land caving-in… and this condition has already caused considerable 'sinking' of the foundation". The May 16th letter states that 'sinking' situation is progressively worsening. A follow up letter to Mr. Williams from DEQ-AML regarding their April 25-26, 2011 site visit states that "We found no major depression or open horizontal/vertical workings visible from the surface". This letter also states that DEQ-AML will continue to gather data and is taking the complaint seriously.

FIELD INVESTIGATION

Site Inspection

The site inspection included visual inspection of the property and the exterior of the house at 505 Platt Ave. S. and taking photographs of pertinent features (See Figures 4a and 4b in Appendix A, and Appendix B). The general condition of the sidewalk, street (Platt Avenue South), and the neighbors' yards to the north and south of the subject property were also noted. The residence at 505 Platt Ave. S. is a one story wooden framed house built upon a concrete foundation. There is an enclosed porch attached to the front of the house and concrete steps leading up to the porch. A set of concrete steps lead up to a door/entrance on the north side of the house. There appears to be a cellar below at least a portion of the house based on a door entrance near the northwest corner of the house. As previously mentioned, the original house was thought to have been moved onto the lot in the 1940s. The house is provided with city water and sanitary sewer service, underground natural gas and overhead electric service.

At the time of the April 25-26, 2011th site visit by DEQ-AML, the front porch had been jacked up and was resting on wood blocks. The footing below the front porch had been partially removed. The front porch appeared to be in the same condition during the August 4th site visit by DOWL HKM (see photos in Appendix B). Between August 4 and August 25, 2011 the footing below the front porch had been completely removed. Some soil had been excavated and concrete blocks had been placed at the southeast corner on what appeared to be alluvium consisting of coarse clasts (gravel, cobbles and boulders) in a sand matrix. Wood shims had been placed between the concrete block and the porch floor. A small gap (about 1 centimeter) was visible between the main part of the house and the foundation at the southeast corner, presumably related to the jacking-up of the front porch. The northeast corner of the porch was still resting on wood blocks. Although a portion of the porch foundation had been removed prior to any site visit by DOWL HKM, it appears that the porch foundation may have been a separate structure from the main house foundation.

The yard surrounding the house consists of a lawn and a few trees and ornamental bushes and no underground sprinkler system was observed. There is a detached garage/structure located along the west side of the lot. There is a concrete (city) sidewalk along the east side of the property. Two concrete walkways were observed leading from the city sidewalk: one to the front steps and one along the north side of the house. The sidewalk and walkways are uneven and cracked. A low spot is visible in the walkway leading to the front steps.

The concrete foundation of the main part of the house was well exposed and appeared to be in relatively good condition. Three cracks were observed and documented the foundation: one crack

that had been repaired was observed along the north foundation wall and two hairline cracks were observed along the south and east foundation walls. No significant opening or offset (horizontal or lateral) of the cracks was observed, although the crack that had been filled was somewhat obscured. A crack was also observed between the concrete stairs on the north side of the house and the foundation. The cracks observed in the foundation wall and between the steps and the foundation are very common and typical in this type and age of construction.

Spot Elevation Survey

Spot elevation measurements of the ground surface were collected in the yard of 505 Platt Ave. S, the city sidewalk and of Platt Ave. S. on August 25th, 2011. Survey locations are shown on Figures 4a and 4b in Appendix A. The vertical survey data collected for 505 Platt Ave. S. was collected using an optical, survey grade Sokkia B-1 level. The horizontal positions for these points were measured using a Trimble R-6 dual frequency survey grade GPS receiver in RTK mode. The high level of horizontal accuracy that the survey grade GPS receiver provided will enable the same the spot elevation locations to be re-established in the future. However, because there was a concern that the GPS unit may have some multi-path interference that would cause vertical inaccuracies due to the close proximity of some of the locations to the house, a differential survey of these positions was also conducted. Control for the vertical survey was NGS benchmark "R 215". A separate level loop was run from National Geodetic Survey (NGS) benchmark "Red Lodge" through "R215" that same day. The vertical datum for this survey is North American Vertical Datum (NAVD) 88. The horizontal datum is North American Datum (NAD) 83. Horizontal coordinates are Montana Zone 2500 State Plane. Horizontal units are International Feet and vertical units are U.S. Survey Feet.

Several survey transects were made across the front yard, including across the low spot in the walkway. Transects were also made along the north, south, and west side of the house. Additional spot elevation locations of the yard were surveyed (Figure 4a in Appendix A). This initial survey shows a low spot exists in the center of the front yard with the lowest elevation being recorded along the middle of the concrete walkway leading to the front door However, because local elevation variation exists around the house, a more appropriate way to identify any active settlement is to compare these elevations with a future survey. The extent and rate of settlement is not documented at this site. However, if active settlement is occurring, movement on the order of ½ inch or less should be detectable through the survey methods utilized for this project.

A survey transect was made of the city sidewalk and the block of Platt Ave. S. where the subject property resides (Figure 4b in Appendix A). The survey results indicate that there is a general and consistent grade down to the north of the city sidewalk and Platt Ave. S. However, there is a slightly lower spot in Platt Ave. S. just east of the north property line of 505 Platt Ave. S.

CONCLUSIONS

- A low spot does exist in the front yard.
- The front porch had been jacked up and a portion of the foundation removed prior to any site visit, and therefore the initial condition of the front porch could not be documented.

- The concrete foundation of the main part of the house was well exposed and appeared to be in relatively good condition. The cracks observed in the foundation wall and between the steps and the foundation are very common and typical in this type and age of construction.

- The flatwork (sidewalk and walkways) and foundation conditions observed during the August 2011 site visits to the subject property are not unlike other flatwork and foundations observed around the town of Red Lodge. There are many reasons for the settlement of flatwork and foundations that are unrelated to mine subsidence. The age of the flatwork and foundation, type of construction, foundation depth, soil and rock type present below the foundation, depth to groundwater or groundwater fluctuations, utility related issues, extreme weather conditions, and tree roots can all be contributing factors to the current condition of the flatwork and foundations.

- It is very difficult to assess the rate, amount, and extent of settlement over time without documentation prior to the 2011 site visits. DOWL HKM was not provided with previous documentation of settlement such as a survey or photographs. Photographs are not as reliable as survey data but can be very useful to document changes in a structure or a visible crack.

- Based on well log review, relatively shallow (less than 25 feet) bedrock may exist below the subject property. However, mining activities appear to have occurred at depths of between 300 and 350 feet and deeper to the southwest of the subject property and 500 feet and deeper in the area of the subject property.

- Preliminary review of the Chen-Northern (1987) report, historical maps, and the data developed by MSU-B show that the No. 4 and No. 5 beds were mined in the area below the subject property. A cumulative mined thickness map developed by Chen-Northern (1987) shows that approximately 18 feet of material has been mined from below the area of the subject property. Chen-Northern (1987) also shows the No. 2 bed was mined to within approximately ½ block south of the subject property. The No. 2 bed would have had workings closest to the surface in the area of the subject property. However, no underground mine map of the No. 2 bed in this area has been located by the DEQ-AML. Note that the original mine maps and any maps interpreted from the original mine maps may have some level of inaccuracy associated with them and the location of the pillars, voids, tunnels, and any below grade features should be considered approximate.

RECOMMENDATIONS

Based upon review of the information supplied by DEQ-AML, published information, the site inspection, and survey results, to determine if the observed settlement is directly related to mine subsidence or other mining related activities, the following recommendations are made:

- It is recommended that periodic site inspections and surveys be completed to monitor and document any potential settlement. The survey should include repeating the initial survey to document the location, rates, and magnitude of any subsidence. It is recommended that a survey be conducted before winter (November) and again in the spring after the snow melts.

- Leaking water lines can cause soil settlement or migration of fine-grained soil along the utility trench and subsequent settlement. DOWL HKM recommends the water supply line servicing the house be located and tested for leaks and all utility line locations be documented. DOWL HKM has requested a utility locate in order to confirm the location of all utility lines including the water line that services the house. On September 14, 2011, DOWL HKM submitted a utility locate request to the one-call utility locate service to have the utilities marked for this property. However, no utilities had been marked as of September 17, 2011. A follow-up field check should be conducted to make sure utilities have been marked.

- Although no major depression or open horizontal/vertical workings were observed during site visits to the subject property, the rate of potential settlement is not known, therefore, safety could be an issue at the site and DEQ-AML may have to develop a site safety plan while monitoring continues.

- DEQ-AML should keep in touch with the land owner on regular basis to monitor the situation.

- The concrete foundation of the main part of the house was well exposed and appeared to be in relatively good condition. Although a portion of the porch foundation had been removed prior to any site visit by DOWL HKM, it appears that the porch foundation may have been a separate structure from the main house foundation and may have been constructed differently. Differences in foundation construction techniques used on different portions of a house foundation can sometimes magnify even minor settlement of the surface soil. If the water/utility lines are found to be in sound condition, DOWL HKM recommends a shallow foundation investigation near the northeast corner of the house to document the soil types present below the footings as well as footing types and depths. This investigation may include interviews with the landowners or the contractor that removed the porch foundation.

- Additional instrumentation could potentially be installed, such as crack monitors, to guage whether there is any movement in the house foundation.

- An attempt should be made to locate any additional mine maps or mine related information, particularly the map of the No. 2 bed or any information referenced in the Chen-Northern (1987) report specific to the Red Lodge area mining.

- DOWL HKM recommends that interviews be conducted with select landowners on the 500 block of Platt Avenue South using a standardized questionnaire format. The interviews will help develop a historical perspective of the potential settlement.

- A sub-surface exploration program may be considered after the above mentioned recommended tasks are completed.

- The objectives of any sub-surface exploration program are recommended to determine basic geologic conditions including documenting depth to groundwater, soil types and

thicknesses, and depth to bedrock. The exploration program may be designed to establish the depth, thickness, and current condition of the existing coal beds. A thorough and well designed exploration program can most likely determine whether collapse of the mined coal seams has occurred locally. However, documenting active subsidence is a separate issue and a much more difficult task. There are numerous types of drill rigs and drilling contractors that can penetrate the coarse alluvium and bedrock to the depths required by any drilling program.

LIMITATIONS AND CONCERNS

- Very little sub-surface information exists near the subject property and no subsurface evaluation was conducted of the subject property for this study.

- No documented information regarding the rate, amount, and extent of settlement was provided to DOWL HKM.

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APPENDIX A

FIGURES AND EXHIBITS

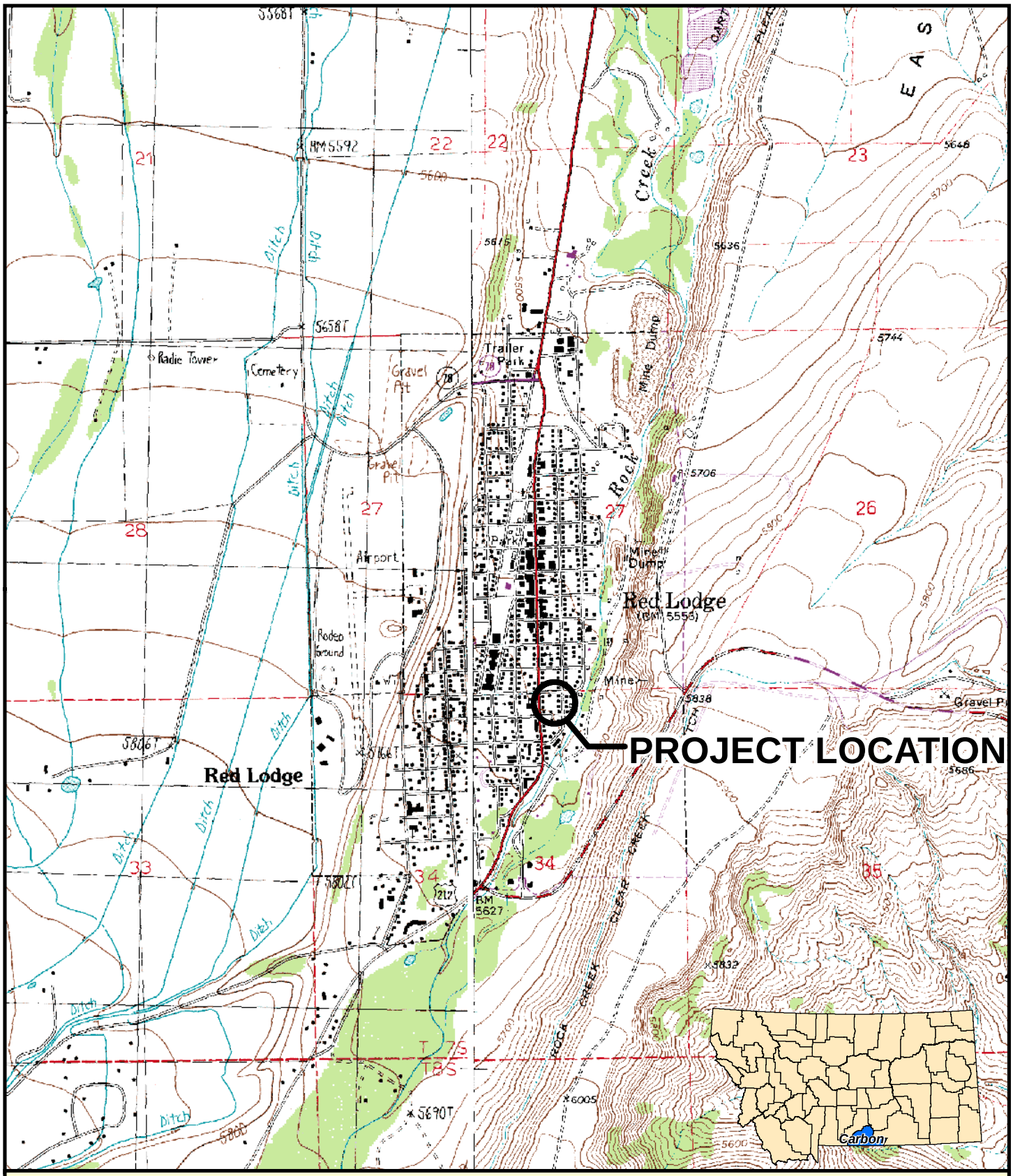

Figure 1 - Vicinity Map
505 Platt Avenue South
Block 35, Lot 2, Red Lodge First Addition
Red Lodge, Montana

Map Source: USGS 7.5 Minute Topographic Map Series
Red Lodge East and Red Lodge West Quadrangles

N
W E
S

0 1,000 2,000
Feet

DOWL HKM

Job #: 4031.20281

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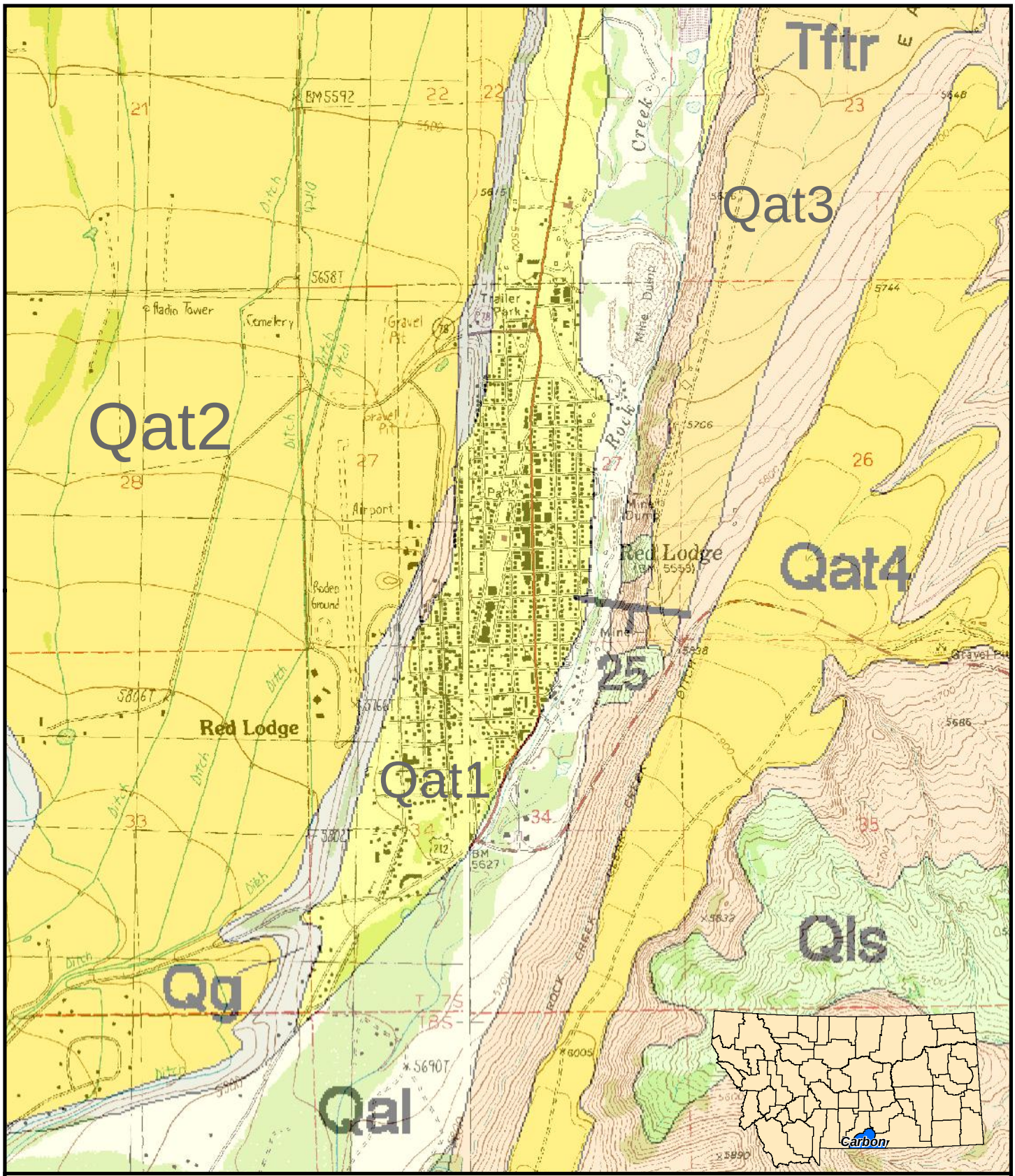

Figure 2 - Geologic Map
Red Lodge, Carbon County Montana

Map Source: Lopez, 2005, Geology of the Red Lodge Area Carbon County, Montana (Modified by DOWL HKM)

N
W E
S

0 1,000 2,000
Feet

DOWL HKM

Job #: 4031.20281

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Figure 3 - Area of Potential Shallow Bedrock

Legend

Select GWIC Wells

- 9 (56) Depth to Bedrock in feet

Drill Holes

- USGS Bulletin 316, 1906
- Chen-Northern, 1987
- Spectrum Engineering Inc., 1998
- House of interest
- Possible Shallow Bedrock (<25 feet) and (Object ID) See Table 1 [>38 = greater than 38 feet]

Background: 2009 NAIP; Note that well locations are approximate and based on data provided on the MBMG GWIC Website

0 200 400 800 Feet

DOWL HKM

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Figure 4a - August 2011 Site Survey

Contours (in feet)

5566.5

Property Line

Survey by DOWL HKM
Horizontal Datum: Montana State Plane NAD83 International Feet
Vertical Datum: NAVD 88 US Feet
Property Boundary: State Cadastral Data (2011)
(Note: Structures, Property Boundaries, Cracks and Contours Approximate)

DOWL HKM

0 2.5 5 Feet

505 Platt Avenue South

Crack 2

Hairline Crack 3

Hairline Crack 1

Cellar Door

Stairs

House

Concrete Edge Flower Bed

Front Porch

Edge of Sidewalk

Edge of Walkway

5575.77 5577.95 5577.57 5577.96 5577.29 5577.12 5577.52 5577.45 5577.48 5577.51 5577.5 5577.46 5577.23 5576.88 5576.95 5576.57 5576.34 5576.05 5575.96 5576.06 5577.2 5577.68 5576.68 5576.23 5577.91 5578.19 5578.94 5576.63 5576.11 5576.39 5576.9 5576.35 5576.31 5578.51 5578.33 5578.27 5578.02 5577.68 5577.47 5576.94 5576.61 5576.38 5576.38 5576.35 5576.47

5577.5 5578.0 5576.0 5577.0 5576.5 5575.5 5577.5 5577.0

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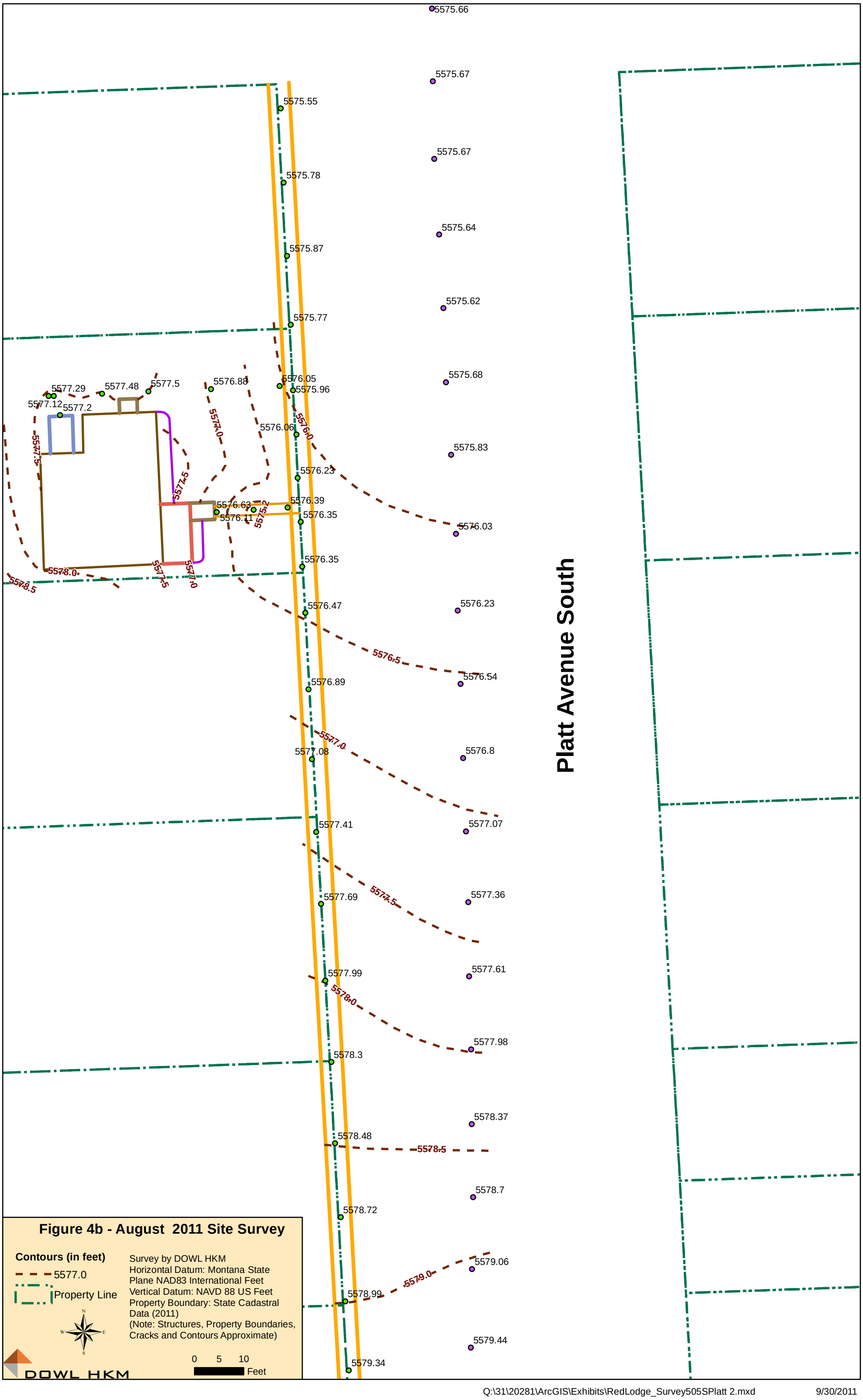
9/30/2011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5577.5
5577.69
5577.36
5577.99
5577.61
5578.0
5577.98
5578.3
5578.37
5578.48
5578.5
5578.7
5578.72
5579.0
5579.06
5578.99
5579.44
5579.34
Platt Avenue South
Figure 4b - August 2011 Site Survey
Contours (in feet)
5577.0
Property Line
Survey by DOWL HKM
Horizontal Datum: Montana State Plane NAD83 International Feet
Vertical Datum: NAVD 88 US Feet
Property Boundary: State Cadastral Data (2011)
(Note: Structures, Property Boundaries, Cracks and Contours Approximate)
N
W
E
S
0 5 10
Feet
DOWL HKM
Q:\31\20281\ArcGIS\Exhibits\RedLodge_Survey505SPlatt 2.mxd
9/30/2011

Exhibit 1-Depth of Cover

Legend

House of interest

Drill Holes

- Chen-Northern, 1987
- Spectrum, 1998

Contour Interval = 50'
UPPER LIMIT - NO. 1-1/2 BED
UPPER LIMIT - NO. 2 BED
UPPER LIMIT - NO. 3 BED
UPPER LIMIT - NO. 4 BED
UPPER LIMIT - NO. 5 BED
UPPER LIMIT - NO. 6 BED

N

Background: 2009 NAIP; Depth of Cover Map Overlay: Chen-Northern Inc., 1987 modified by DOWL-HKM 2011 (Note: Map Contacts are Approximate)

0 250 500 1,000 Feet

DOWL HKM

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Exhibit 2-Cumulative Mined Thickness

Legend

House of interest

Drill Holes

- Chen-Northern, 1987
- Spectrum, 1998

Cumulative Mined Thickness (feet)

N

Background: 2009 NAIP; Cumulative Mined Thickness Overlay: Chen-Northern Inc., 1987 modified by DOWL-HKM 2011 (Note: Map Contacts are Approximate)

0 250 500 1,000 Feet

DOWL HKM

Q:\31\20281\ArcGIS\Exhibits\RedLodge_Mined Thickness505Platt.mxd 9/21/2011

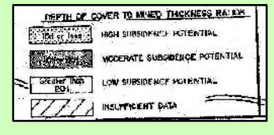
Exhibit 3-Subsidence Potential

Legend

House of interest

Drill Holes

- Chen-Northern, 1987
- Spectrum, 1998



N

Background: 2009 NAIP; Subsidence Potential Map Overlay: Chen-Northern Inc., 1987 modified by DOWL-HKM 2011
(Note: Map Contacts are Approximate)

0 250 500 1,000 Feet

DOWL HKM

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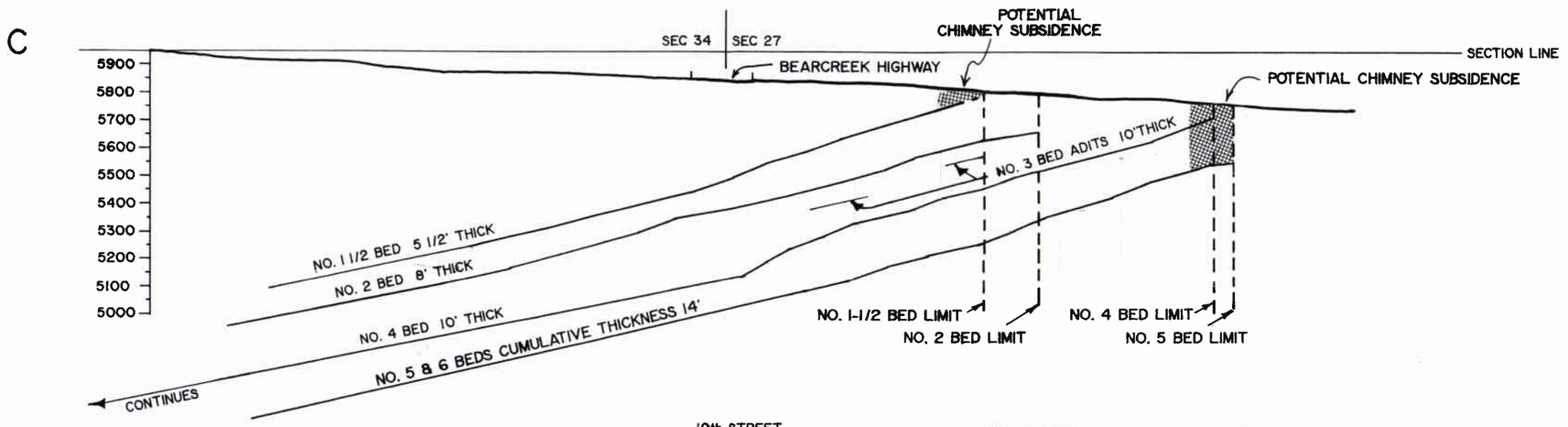
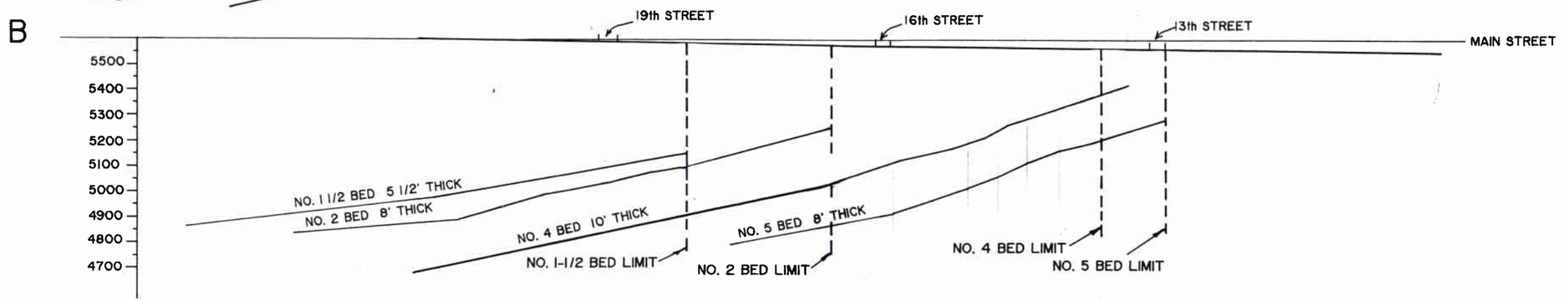




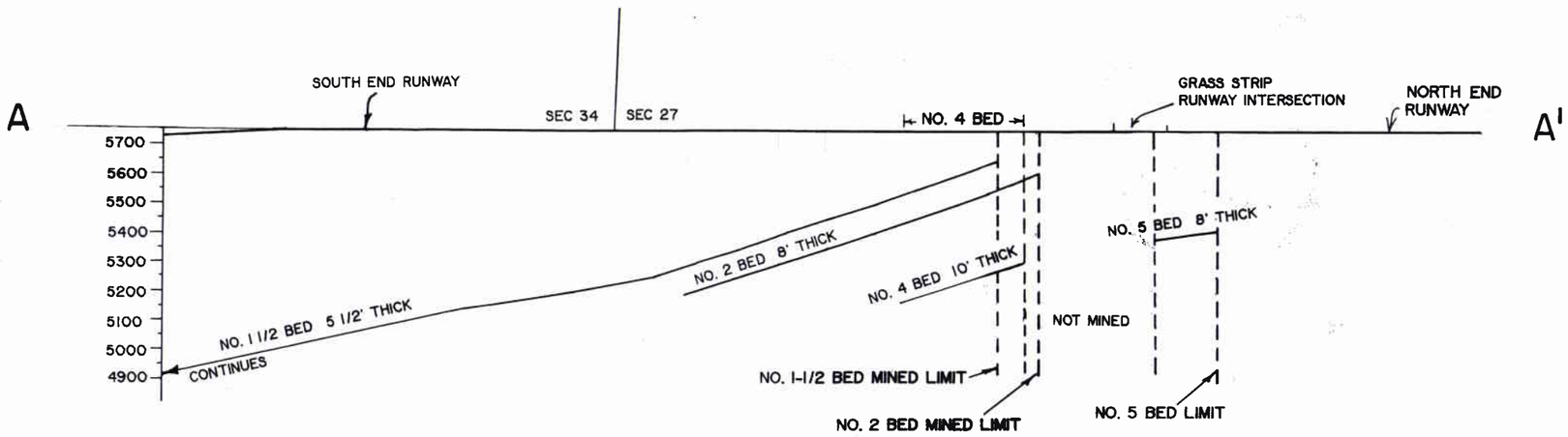


Exhibit - 4 Cross Sections

STATE OF MONTANA
DEPARTMENT OF STATE LANDS
HELENA, MONTANA

BEARCREEK/RED LODGE SUBSIDENCE STUDY

CROSS SECTIONS OF MINE LIMITS

Northern
Engineering and Testing, Inc.

Drawn: LNR
Checked: JMP
Scale: 1" = 500'
Date: 10/29/87

DRAWING NO.
87-3001.D-7

APPENDIX B

PHOTOGRAPHS

View Southwest of House
505 Platt Avenue South, Red Lodge, MT
100_2701.JPG

View North from South End of Block. View of Platt Avenue South and Sidewalk
Platt Avenue South, Red Lodge, MT
100_2700.JPG

View Southwest of House
521 Platt Avenue South, Red Lodge, MT
100_2699.JPG

View Northwest of Concrete Driveway
519 Platt Avenue South, Red Lodge, MT
100_2698.JPG

View North of House
511 Platt Avenue South, Red Lodge, MT
100_2697.JPG

View Southwest of House
519 Platt Avenue South, Red Lodge, MT
100_2696.JPG

View South of Front Yards of 511, 515, and 519 Platt Avenue South
Platt Avenue South, Red Lodge, MT
100_2695.JPG

View North of the Porch Foundation Partially Removed
505 Platt Avenue South, Red Lodge, MT
100_2694.JPG

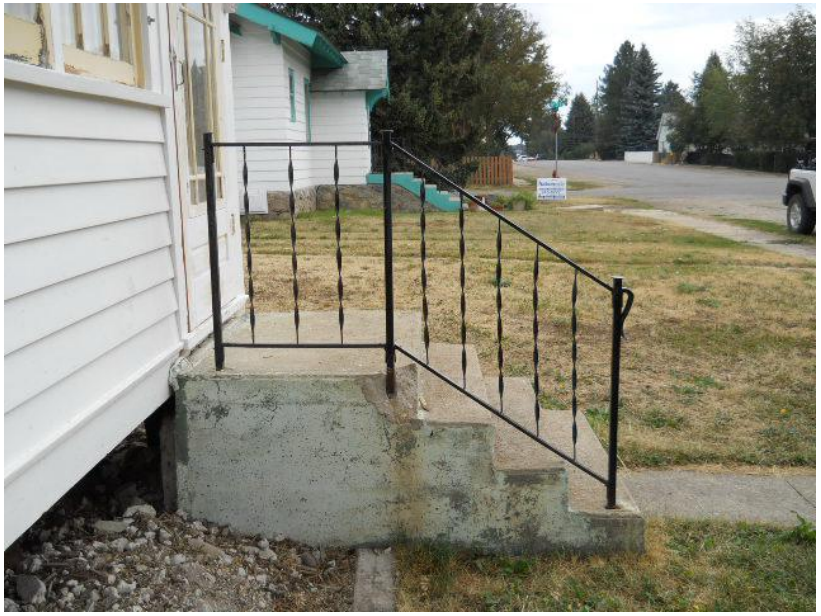
View East of the Back of the House
505 Platt Avenue South, Red Lodge, MT
100_2693.JPG

View North of the Front Yard and Sidewalk
501 Platt Avenue South, Red Lodge, MT
100_2692.JPG

View South of the Front Yard
505 Platt Avenue South, Red Lodge, MT
100_2691.JPG

View West of the front of the House
505 Platt Avenue South, Red Lodge, MT
100_2690.JPG

9/22/2011 4:18:44 PM
View West of east side of house
505 Platt Avenue South, Red Lodge, MT
2011-0072.JPG



8/25/2011 9:55:20 AM
View North of Front Porch of House
505 Platt Avenue South, Red Lodge, MT
2011-0073.JPG

8/25/2011 9:56:08 AM
View Northwest of South Side of House
505 Platt Avenue South, Red Lodge, MT
2011-0074.JPG

8/25/2011 10:38:31 AM
View East of West Side of House (South Half)
505 Platt Avenue South, Red Lodge, MT
2011-0075.JPG

8/25/2011 10:38:41 AM
View East of West Side of House (North Half)
505 Platt Avenue South, Red Lodge, MT
2011-0076.JPG

8/25/2011 10:38:53 AM
View South of North Side of House near Cellar Door
505 Platt Avenue South, Red Lodge, MT
2011-0077.JPG

8/25/2011 10:39:00 AM
View South of North Side of House. Note Patched Crack
505 Platt Avenue South, Red Lodge, MT
2011-0078.JPG

8/25/2011 10:41:03 AM
View South of North Side of House Near Side Door.
505 Platt Avenue South, Red Lodge, MT
2011-0079.JPG

8/25/2011 10:41:21 AM
View West of East Side of House
505 Platt Avenue South, Red Lodge, MT
2011-0080.JPG

8/25/2011 10:41:28 AM
View West of East Side of House
505 Platt Avenue South, Red Lodge, MT
2011-0081.JPG

8/25/2011 10:41:38 AM
View West of Front Porch (East Side of House)
505 Platt Avenue South, Red Lodge, MT
2011-0082.JPG

8/25/2011 10:46:01 AM
View North of South Foundation Wall. Hairline Crack Visible (Crack 1)
505 Platt Avenue South, Red Lodge, MT
2011-0083.JPG

8/25/2011 10:46:45 AM
View South of North Foundation Wall. Repaired Crack Visible (Crack 2)
505 Platt Avenue South, Red Lodge, MT
2011-0084.JPG

8/25/2011 10:47:07 AM
View West of East Foundation Wall. Hairline Crack Visible (Crack 3)
505 Platt Avenue South, Red Lodge, MT
2011-0085.JPG

8/25/2011 10:50:08 AM
View South of Backyard and West Side of House
505 Platt Avenue South, Red Lodge, MT
2011-0086.JPG

8/25/2011 10:54:09 AM
View South of Sidewalk in Front of Subject Property
Platt Avenue South, Red Lodge, MT
2011-0087.JPG

8/25/2011 10:54:20 AM
View South of Road in Front of Subject Property
Platt Avenue South, Red Lodge, MT
2011-0088.JPG

APPENDIX C

TABLE 1 – WELL INFORMATION

Table 1 - Well Information

OBJECT ID	GWIC ID	Latitude	Longitude	Geomethod LatLon	Datum LatLon	Township	Range	Section	Quarter Sections	Site Type	DNRC Water Right	Site Name	Altitude	Primary Aquifer	Total Depth	Static Water Level	Depth Water Enters	Pumping Water Level	Yield	Test Type	Test Hours	Drillstem Setting	Recovery Water Level	Recovery Time	Drilling Company	Date Completed	Well Use	Depth to Bedrock (feet)
2	104754	45.19122	-109.242207	TRS-SEC	NAD83	7S	20E	27	AD	WELL	0	BEAR CREEK LAND	0		101	48	75	48	5	BAILER	1				TOLAND	1/1/1979	DOMESTIC	28
3	104737	45.18934	-109.250401	TRS-SEC	NAD83	7S	20E	27		WELL	0	LOUMA BEN	0		60	13	0	48	15	BAILER	1				B & H	1/1/1960	DOMESTIC	18
4	104817	45.17554	-109.251521	TRS-SEC	NAD83	7S	20E	34	BDD	WELL	0	NOE JAMES A.	0		38	9	38	0	50	AIR	1				MURPHY	6/23/1988	IRRIGATION	>40
5	104806	45.17459	-109.250144	TRS-SEC	NAD83	7S	20E	34		WELL	0	MARTIN CHUCK	0		38	11	38	38	50	AIR	1				B & H	5/5/1983	DOMESTIC	>38
6	104815	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	ZUMBRUN LLOYD & GLADYS	0		30	5	30	0	50	AIR	1		5	1	B & H	6/2/1988	IRRIGATION	>32
8	104807	45.18027	-109.247389	TRS-SEC	NAD83	7S	20E	34	AB	WELL	0	FOUNTAIN PARK	0		58	7	58	20	70	PUMP	2				B & H	6/2/1984	IRRIGATION	>58
9	104812	45.17932	-109.251521	TRS-SEC	NAD83	7S	20E	34	BAD	WELL	0	BECKL RANDY	0		39	18	39	38	25	AIR	2				ROCK CREEK DRILLING INC	4/9/1985	DOMESTIC	>40
12	128248	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	WILLIAMS DONALD E.	0		38	18	38	35	35	AIR	1		18	1	B & H	6/11/1992	IRRIGATION	>40
13	144954	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	HAUGE LEE	0		35	15	33	30	35	AIR	1		15	1	B & H	6/15/1992	IRRIGATION	>35
14	104740	45.18934	-109.250401	TRS-SEC	NAD83	7S	20E	27		WELL	0	WYER STEPHEN C	0		86	25	70	75	6	BAILER	2				B & H	1/1/1971	DOMESTIC	20
15	144255	45.1931	-109.244939	TRS-SEC	NAD83	7S	20E	27	A	WELL	0	RED LODGE LIONS CLUB	0		38	0	38	35	35	AIR	1				B & H	6/19/1992	IRRIGATION	>38
20	104816	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	SPENCER VER	0		38	8	38	35	50	AIR	1				B & H	5/14/1987	IRRIGATION	>38
22	124992	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	KLESSONS DAVE	0		40	6	38	36	40	AIR	1		6	1	B & H	10/9/1990	IRRIGATION	>40
24	149927	45.18027	-109.247389	TRS-SEC	NAD83	7S	20E	34	AB	WELL	0	NORBY H. LEE	0		80	10	50	75	20	AIR	2.5		10	0.5	B & H	10/29/1993	DOMESTIC	17
28	104750	45.1931	-109.244939	TRS-SEC	NAD83	7S	20E	27	A	WELL	0	ANDERSON DAVID B.	0		39	7	39	0	50	OTHER	0				B & H	1/1/1982	DOMESTIC	>39
32	104763	45.19034	-109.246741	SUR-GPS	NAD83	7S	20E	27	ACCA	WELL	0	ADAMS JOEL	5544	112SNGR	38	13	38	35	50	AIR	1				B & H	1/1/1985	DOMESTIC	>38
33	104736	45.18934	-109.250401	TRS-SEC	NAD83	7S	20E	27		WELL	0	TRUNER JESS	0		75	26	58	65	6	BAILER	2				B & H	1/1/1964	DOMESTIC	26
34	104741	45.18934	-109.250401	TRS-SEC	NAD83	7S	20E	27		WELL	0	CITY OF RED LODGE	0		74	0	0	0	0	OTHER	0					1/1/1961	DOMESTIC	70
36	104766	45.18276	-109.249036	TRS-SEC	NAD83	7S	20E	27	DCC	WELL	0	LOCKRIDGE DORIS M.	0		38	9	38	38	50	AIR	1				B & H	1/1/1983	UNKNOWN	>38
37	104767	45.18276	-109.243573	TRS-SEC	NAD83	7S	20E	27	DDC	WELL	0	LAUDON CLARENCE	0		38	6	39	38	30	OTHER	0					1/1/1982	DOMESTIC	>38
39	164284	45.18122	-109.246011	TRS-SEC	NAD83	7S	20E	34	ABA	WELL	0	JARVI CLARA T.	0		25	6	25	0	6	AIR	1		6	0.16	AAQUA DRILLING INC	8/5/1997	IRRIGATION	>25
41	104808	45.18122	-109.246011	TRS-SEC	NAD83	7S	20E	34	ABA	WELL	0	AMUNDSON DUKE	0	125FRUN	45	17	25	25	17	BAILER	1.5				B & H	9/13/1974	DOMESTIC	16
42	104809	45.18122	-109.246011	TRS-SEC	NAD83	7S	20E	34	ABA	WELL	0	SCHUBERT JACK	0		110	10	0	100	10	BAILER	2				STILLWATER	9/7/1984	DOMESTIC	14
43	142744	45.18027	-109.252899	TRS-SEC	NAD83	7S	20E	34	BA	WELL	0	JUDD DAVE	0		38	19	38	35	50	AIR	2		19	0.5	B & H	12/30/1993	IRRIGATION	>40
44	176392	45.17932	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAC	WELL	0	THORMATTLEN WALLACE	0		40	14	40	38	30	AIR	1		14	0.03	DOUGLAS DRILLING	8/5/1999	IRRIGATION	>40
45	189170	45.18122	-109.251521	TRS-SEC	NAD83	7S	20E	34	BAA	WELL	0	BREMER DARREH	0		39	21	39	0	40	AIR	1	39	21	0.16	AAQUA DRILLING INC	5/17/2001	DOMESTIC	>40
48	104805	45.17459	-109.250144	TRS-SEC	NAD83	7S	20E	34		WELL	0	CASTOGNE VIC	0		38	9	38	38	50	AIR	1				B & H	5/6/1983	UNKNOWN	>38
49	104810	45.18122	-109.248766	TRS-SEC	NAD83	7S	20E	34	ABB	WELL	0	LAMPI HUGO	0		39	12	39	38	100	AIR	2				B & H	1/15/1983	DOMESTIC	>39
50	144956	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	FRONTIER COMMUNITIES INC.	0		33	13	33	30	50	AIR	1		13	1	B & H	8/27/1992	IRRIGATION	>35
51	144958	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	FRONTIER COMMUNITIES INC.	0		37	13	37	35	50	AIR	1		13	1	B & H	8/27/1992	IRRIGATION	>37
52	122491	45.1837	-109.24767	TRS-SEC	NAD83	7S	20E	27	DC	WELL	60328	ANDERSON GEORGE	0		39	20	39	35	30	AIR	1				B & H	5/31/1985	IRRIGATION	>39
54	104739	45.18934	-109.250401	TRS-SEC	NAD83	7S	20E	27		WELL	0	PITCHER BOB	0		98	48	40	80	8	OTHER	0					1/1/1972	DOMESTIC	22
55	104753	45.19122	-109.242207	TRS-SEC	NAD83	7S	20E	27	AD	WELL	0	PALMER BILL BEAR CK	0		101	35	80	70	50	BAILER	2				TOLAND	1/1/1979	DOMESTIC	25
56	124989	45.18558	-109.244939	TRS-SEC	NAD83	7S	20E	27	D	WELL	0	RILEY MRS. JACK	0		60	17	40	55	15	AIR	1		17	1	B & H	8/6/1991	IRRIGATION	9
57	124991	45.18746	-109.24767	TRS-SEC	NAD83	7S	20E	27	DB	WELL	0	MALLIN RICHARD	0		30	15	28	25	50	AIR	1		15	1	B & H	8/7/1991	IRRIGATION	>30
58	131624	45.18746	-109.24767	TRS-SEC	NAD83	7S	20E	27	DB	WELL	0	HOINES EVERETT	0		40	9	38	37	50	AIR	1				B & H	6/6/1986	IRRIGATION	>40
59	201872	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	LUOMA OLIVER	0		40	6	40	0	90	AIR	1.5	39	6	0.05	DOUGLAS DRILLING	7/10/2002	IRRIGATION	>40
60	196856	45.18793	-109.251084	TRS-SEC	NAD83	7S	20E	27	CAAD	WELL	0	TRUE VALUE (KEN)	0		40	21	40	0	60	AIR	1.5	39	21	0.03	DOUGLAS DRILLING	3/27/2002	IRRIGATION	>40
61	196859	45.18276	-109.251767	TRS-SEC	NAD83	7S	20E	27	CDD	WELL	0	GROUP REGIS	0		40	2	40	0	80	AIR	1.5	39	2	0.03	DOUGLAS DRILLING	5/14/2002	IRRIGATION	>40
63	258484	45.18027	-109.252898	TRS-SEC	NAD83	7S	20E	34	BA	WELL	0	GRANT SUSAN	0		40	12	40	0	40	AIR	2	40	12	0.03	DOUGLAS DRILLING	9/2/2009	IRRIGATION	>40
64	164282	45.19028	-109.246304	TRS-SEC	NAD83	7S	20E	27	ACD	WELL	102176	DAVEY GERALDINE L	0		28	12	28	0	12	AIR	1				AAQUA DRILLING INC	9/26/1997	IRRIGATION	>29
65	120251	45.17743	-109.251521	TRS-SEC	NAD83	7S	20E	34	BDA	WELL	0	KLEPICH GEORGE	0		39	13	39	35	50	AIR	1				B & H	5/24/1985	DOMESTIC	>40
66	144138	45.19122	-109.242207	TRS-SEC	NAD83	7S	20E	27	AD	WELL	0	MARVIN MARY	0		38	6	38	35	50	AIR	1		6	0.5	B & H	8/22/1991	IRRIGATION	>38

Table 1 - Well Information

67	161385	45.17932	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAC	WELL	0	WISE JEFF	0		40	25	32	35	15	PUMP	1				B & H	8/21/1996	DOMESTIC	44
68	173022	45.18122	-109.246011	TRS-SEC	NAD83	7S	20E	34	ABA	WELL	0	BROWN VERNETTA	0		25	7	25	0	60	AIR	0		7	0.2	AAQUA DRILLING INC	8/6/1996	IRRIGATION	>25
69	239572	45.18122	-109.246011	TRS-SEC	NAD83	7S	20E	34	ABA	WELL	0	COLT COMMUNICATIONS L.L.P.	0		40	6	39	0	75	AIR	1	39	6	0.08	AAQUA DRILLING INC	8/8/2007	DOMESTIC	>40
70	247582	45.19592	-109.243573	TRS-SEC	NAD83	7S	20E	27	AAB	WELL	0	CITY OF RED LODGE	0		49	21	49	0	80	AIR	1	50	21	5	AAQUA DRILLING INC	7/14/2008	PUBLIC WATER SUPPLY	>49
75	189953	45.1884	-109.249036	TRS-SEC	NAD83	7S	20E	27	DBB	WELL	0	RAY JUDD FORD INC	0		20	15	10	0	0	OTHER	0				B & H	4/26/2001	MONITORING	>20
76	126442	45.17743	-109.248766	TRS-SEC	NAD83	7S	20E	34	ACB	WELL	0	WHITTEN R.P.	0		28	11	28	28	20	AIR	1		11	0.1	ROCK CREEK DRILLING INC	10/4/1991	DOMESTIC	>28
78	919820	45.18652	-109.243573	TRS-SEC	NAD83	7S	20E	27	DAC	PETWELL	0	DIAMOND DRILL -2	0		0	0	0	0	0		0							Unk
79	243803	45.19122	-109.24767	TRS-SEC	NAD83	7S	20E	27	AC	WELL	0	O'NIEL GREG	0		60	30	22	0	10	AIR	1	60	30	0.07	DOUGLAS DRILLING	12/5/2007	UNKNOWN	50
80	183507	45.18122	-109.246011	TRS-SEC	NAD83	7S	20E	34	ABA	WELL	0	MOUNTAIN LOG Y SEDOR	0		50	14.5	38	0	11	AIR	1	50		0.17	AAQUA DRILLING INC	5/27/2000	DOMESTIC	14
81	192991	45.17932	-109.251521	TRS-SEC	NAD83	7S	20E	34	BAD	WELL	0	EDWARDS KEITH	0		38	14	38	0	100	AIR	2	34	14	0.25	B AND H	6/15/2001	IRRIGATION	>40
83	214190	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	DOWNING GALE	0		40	6	40	0	60	AIR	1.5	40	6	0.03	DOUGLAS DRILLING	7/23/2002	IRRIGATION	>40
85	243804	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	KYNER JAMES	0		40	8	40	0	20	AIR	1	40	8	0.05	DOUGLAS DRILLING	8/25/2006	IRRIGATION	>40
87	155408	45.18122	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAB	WELL	0	HUDAK EXCAVATION & CONSTRUCTION	0		180	57	80	175	8	AIR	1.5		57	1	B & H	4/1/1996	DOMESTIC	53
88	157948	45.18934	-109.250401	TRS-SEC	NAD83	7S	20E	27		WELL	0	RED LODGE SCHOOL DISTRICT NO 1	0		60	0	0	0	0	OTHER	0				AMERICAN DRILLING & SUPPLY	8/14/1996		>60
89	219745	45.18027	-109.247389	TRS-SEC	NAD83	7S	20E	34	AB	WELL	0	CLARKS BUS SERVICE *WELL 2	0		8	5	0	0	0	OTHER	0				DOUGLAS DRILLING	6/2/2005	MONITORING	>8
90	104764	45.1837	-109.24767	TRS-SEC	NAD83	7S	20E	27	DC	WELL	0	RED LODGE SCHOOL DISTRICT NO 1	0		60	22	59	40	90	PUMP	8				B & H	1/1/1983	IRRIGATION	>60
92	164285	45.18122	-109.251521	TRS-SEC	NAD83	7S	20E	34	BAA	WELL	0	TIMONEN SIGRID S.	0		24	6	24	0	40	AIR	1		6	0.16	AAQUA DRILLING INC	8/5/1997	IRRIGATION	>24
94	223129	45.18746	-109.24767	TRS-SEC	NAD83	7S	20E	27	DB	WELL	0	SALLADE CHARLES	0		40	26	40	0	30	AIR	2	40	26	0.1	DOUGLAS DRILLING	11/22/2005	IRRIGATION	>40
95	201857	45.1837	-109.24767	TRS-SEC	NAD83	7S	20E	27	DC	WELL	0	RONNING TRACY	0		40	6	20	0	40	AIR	1.5	39	6	0.02	DOUGLAS DRILLING	12/6/2002	IRRIGATION	35
98	128247	45.18122	-109.248766	TRS-SEC	NAD83	7S	20E	34	ABB	WELL	0	SLANTZ RUSSELL	0		28.5	11	28	28	30	AIR	1		11.5	0.1	ROCK CREEK DRILLING INC	10/7/1991	DOMESTIC	>28.5
100	219742	45.17459	-109.250144	TRS-SEC	NAD83	7S	20E	34		WELL	0	LEFEBVRE JOE	0		40	0	40	0	60	AIR	1.5	40		2	DOUGLAS DRILLING	6/2/2005	IRRIGATION	>40
101	158424	45.18464	-109.251767	TRS-SEC	NAD83	7S	20E	27	CDA	WELL	0	RED LODGE SCHOOL DISTRICT	0		58	20	0	55	50	AIR	2		20	0.5	B & H	8/23/1996	IRRIGATION	>60
102	243777	45.1837	-109.24767	TRS-SEC	NAD83	7S	20E	27	DC	WELL	0	JORDEN LINDA	0		37	10	20	0	30	AIR	1	37	10	0.03	DOUGLAS DRILLING	3/31/2008	IRRIGATION	35
104	187291	45.17932	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAC	WELL	0	MARCHELLO GUIDO/ MARY	0		33	14	33	33	30	AIR	0		12	0.03	DOUGLAS DRILLING	8/11/1999	IRRIGATION	>33
106	161390	45.18122	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAB	WELL	0	PILATI MICHAEL	0		38	17	38	35	40	AIR	1		17	0.5	B & H	10/1/1996	IRRIGATION	>40
107	211966	45.18746	-109.24767	TRS-SEC	NAD83	7S	20E	27	DB	WELL	0	BERTRAM KELLY	0		40	22	0	0	60	OTHER	1	40	22	0.2	DOUGLAS DRILLING	5/3/2004	DOMESTIC	>40
108	243779	45.1837	-109.24767	TRS-SEC	NAD83	7S	20E	27	DC	WELL	0	JORDAN LINDA	0		40	15	20	0	20	AIR	1	40	15	0.03	DOUGLAS DRILLING	3/31/2008	IRRIGATION	15
111	212138	45.17932	-109.251521	TRS-SEC	NAD83	7S	20E	34	BAD	WELL	0	JAQUITH PHILLIP	0		40	20	0	0	50	AIR	1	36	20	0.25	B AND H	5/14/2004	IRRIGATION	>40
112	201873	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	NEARPASS BAYARD	0		40	6	40	0	40	AIR	1.5	39	6	0.03	DOUGLAS DRILLING	7/9/2002	IRRIGATION	>40
113	219749	45.18027	-109.247389	TRS-SEC	NAD83	7S	20E	34	AB	WELL	0	FINSTAD ERIC *PILATI MIKE	0		40	0	40	0	38	AIR	1.5	36			DOUGLAS DRILLING	6/5/2005	IRRIGATION	>40

Table 1 - Well Information

114	251942	45.1837	-109.24767	TRS-SEC	NAD83	7S	20E	27	DC	WELL	0	SCHUBERT DIANA	0		40	12	20	0	25	AIR	1	40	12	0.03	DOUGLAS DRILLING	4/8/2008	IRRIGATION	38?
116	222195	45.17743	-109.251521	TRS-SEC	NAD83	7S	20E	34	BDA	WELL	0	MEIER RYAN AND JONI	0		77	41	57	0	20	AIR	1	77	41	0.08	AAQUA DRILLING INC	8/8/2005	DOMESTIC	62?
117	258470	45.17648	-109.252898	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	BRYNGELSON MARY	0		40	6	40	0	40	AIR	1.5	40	6	0.03	DOUGLAS DRILLING	7/29/2009	IRRIGATION	>40
118	124993	45.17743	-109.251521	TRS-SEC	NAD83	7S	20E	34	BDA	WELL	0	FORMANACK ROBERT W.	0		39	12	39	38	50	AIR	1				B & H	1/20/1983	DOMESTIC	>39
124	158425	45.17932	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAC	WELL	0	JURKOVICK RAY	0		38	27	38	30	18	AIR	1				B & H	9/23/1996	DOMESTIC	40
125	158426	45.17932	-109.251521	TRS-SEC	NAD83	7S	20E	34	BAD	WELL	0	THOKE WILLIAM P.	0		38	16	38	35	40	AIR	1		16	0.5	B & H	10/1/1996	IRRIGATION	>40
129	253522	45.18212	-109.24908	NAV-GPS	NAD83	7S	20E	27	DCC	WELL	0	GREER RICK	0		40	18	0	0	50	AIR	1	39	18	0.08	AAQUA DRILLING INC	10/20/2009	GEOTECH	>39
130	122490	45.18746	-109.24767	TRS-SEC	NAD83	7S	20E	27	DB	WELL	0	KANE JAMES	0		35	20	35	0	25	AIR	1				ROCK CREEK DRILLING INC	5/27/1977	DOMESTIC	>35
132	132672	45.18122	-109.254276	TRS-SEC	NAD83	7S	20E	34	BAB	WELL	0	NOGLICH MIKE VIRGINIA K. & PATRICK	0		39	18	39	39	35	AIR	1		18	0.1	ROCK CREEK DRILLING INC	9/1/1992	IRRIGATION	>39
133	144140	45.19122	-109.242207	TRS-SEC	NAD83	7S	20E	27	AD	WELL	0	THAYER BETTY	0		30	14	28	25	40	AIR	1		14	1	B & H	8/3/1991	IRRIGATION	>30
137	211991	45.17648	-109.252899	TRS-SEC	NAD83	7S	20E	34	BD	WELL	0	GRIBBLE KANDACE	0		40	23	0	0	45	AIR	1.5	40	23	0.2	DOUGLAS DRILLING	4/7/2004	IRRIGATION	>40
138	216524	45.18027	-109.247389	TRS-SEC	NAD83	7S	20E	34	AB	WELL	0	SOMMERFELD ANTHONY	0		60	10	20	0	20	AIR	1.5	60	10	0.03	DOUGLAS DRILLING	11/2/2004	DOMESTIC	15
139	226280	45.18276	-109.246304	TRS-SEC	NAD83	7S	20E	27	DCD	WELL	0	MICHEAL JEFF	0		19	9	18	0	30	AIR	1	18	9	0.08	AAQUA DRILLING INC	5/11/2006	DOMESTIC	18?
140	192990	45.1786	-109.2514	NAV-GPS	NAD27	7S	20E	34	BAD	WELL	0	WESTER MIKE AND NANCY	0		38	12	38	0	100	AIR	2	36	14	0.25	B AND H	6/15/2001	IRRIGATION	>40
141	207153	45.1802	-109.2534	NAV-GPS	NAD27	7S	20E	34	BAB	WELL	0	WISE JEFF	0		48	29	48	0	36	AIR	2	44	29	0.5	B AND H	9/5/2003	DOMESTIC	46
142	212293	45.1941	-109.2443	NAV-GPS	NAD27	7S	20E	27	ABD	WELL	0	BEAM CRAIG	0		32	10	32	0	35	AIR	2	30	10	0.25	B AND H	3/31/2004	IRRIGATION	>32
143	212299	45.176	-109.2492	NAV-GPS	NAD27	7S	20E	34	BDD	WELL	0	DOUTHIT BERT	0		40	12	38	0	60	AIR	2	35	12	0.25	B AND H	4/26/2004	IRRIGATION	>40
144	132671	45.18	-109.2513	MAP	NAD27	7S	20E	34	BAACC	WELL	0	CITY OF RED LODGE - WELL 1 SOURCE 2	0		74	20	0	0	900	OTHER	0					9/17/1961	PUBLIC WATER SUPPLY	Unk
145	173024	45.1783	-109.2481	NAV-GPS	NAD27	7S	20E	34	BDA	WELL	0	PARK BRETTNER	0		38	9	38	0	70	AIR	0		9	0.25	B & H	9/23/1998	DOMESTIC	>40
146	187237	45.1796	-109.2517	NAV-GPS	NAD27	7S	20E	34	BAC	WELL	0	ENGLER ED	0		58	18	58	0	75	AIR	1	56	18	0.25	B & H	12/6/2000	IRRIGATION	>60
147	247616	45.18328	-109.2441	SUR-GPS	NAD27	7S	20E	27	DDC	WELL	0	SWENSON RANDY	0		22	7	10	0	25	AIR	1	22	7	0.08	AAQUA DRILLING INC	7/10/2008	DOMESTIC	13
148	189172	45.1792	-109.2531	NAV-GPS	NAD27	7S	20E	34	BAC	WELL	0	MCBRIDE BARBRA	0		40	22	39	0	0	AIR	1	36	22	1	B & H	4/25/2001	IRRIGATION	>40
150	244817	45.18598	-109.24775	NAV-GPS	WGS84	7S	20E	27	DBC	WELL	0	PORTH ARCHITECTS	0		40	20	39	0	60	AIR	1	39	20	0.08	AAQUA DRILLING INC	5/28/2008	DOMESTIC	>40
151	244816	45.186	-109.247867	NAV-GPS	WGS84	7S	20E	27	DBD	WELL	0	PORTH ARCHITECTS	0		40	20	39	0	60	AIR	1	39	20	0.08	AAAA WATER WELL DRILLING INC	5/28/2008	DOMESTIC	>40
152	247579	45.18347	-109.249333	NAV-GPS	WGS84	7S	20E	27	CDD	WELL	0	RED LODGE PUBLIC SCHOOL	0		44	22	43	0	50	AIR	1	43	22	0.08	AAQUA DRILLING INC	8/4/2008	PUBLIC WATER SUPPLY	>44
153	252187	45.18257	-109.251833	NAV-GPS	WGS84	7S	20E	27	DDC	WELL	0	RUTHERFORD CHARLES AND LINDA	0		43	23	43	0	50	AIR	1	43	23	0.08	AAQUA DRILLING INC	5/27/2009	DOMESTIC	>43
155	241643	45.17648	-109.247389	TRS-SEC	NAD83	7S	20E	34	AC	WELL	0	DOEDEN KATHY	0		40	10	40	0	30	AIR	1	40	10	0.03	DOUGLAS DRILLING	1/2/2008	IRRIGATION	>40
156	104811	45.17648	-109.247389	TRS-SEC	NAD83	7S	20E	34	AC	WELL	0	KARAS BENJAMIN K.	0	110TRRC	30	8	30	0	200	OTHER	0				ß	8/1/1959	DOMESTIC	>30
157	231468	45.17743	-109.246011	TRS-SEC	NAD83	7S	20E	34	ACA	WELL	0	COLT COMUNICATIONS LLC MPPP	0		25	6	25	0	60	AIR	1	25	6	0.08	AAQUA DRILLING INC	9/11/2006	DOMESTIC	>25
158	173023	45.1794	-109.2439	NAV-GPS	NAD27	7S	20E	34	ABD	WELL	0	MARTIN DON	0		100	14	60	0	18	AIR	0		14	0.5	B & H	7/16/1998	DOMESTIC	16
162	124990	45.18746	-109.242207	TRS-SEC	NAD83	7S	20E	27	DA	WELL	0	JARVI TAIMI	0		30	11	0	25	40	AIR	1		11	1	B & H	8/12/1991	IRRIGATION	>30
163	251765	45.18746	-109.242207	TRS-SEC	NAD83	7S	20E	27	DA	WELL	0	DANE, ELIZABETH	0		40	9	40	0	30	AIR	1.5	40	9	0.03	DOUGLAS DRILLING	1/8/2009	IRRIGATION	>40
164	247545	45.19462	-109.24093	SUR-GPS	NAD27	7S	20E	27	AAD	WELL	0	RED LODGE PUBLIC SCHOOL	0		65	25	64	0	300	AIR	1	64	25	0.08	AAQUA DRILLING INC	7/12/2008	DOMESTIC	64
165	231524	45.19592	-109.240841	TRS-SEC	NAD83	7S	20E	27	AAA	WELL	0	BEARTOOTH NATURE CENTER	0		88	33	87	0	125	AIR	1	88	33	0.08	AAQUA DRILLING INC	9/14/2006	DOMESTIC	>88

APPENDIX D

ELECTRONIC FILES
(REPORT, FIGURES AND EXHIBITS, GIS FILES FOR SURVEY DATA)