

**APPENDIX 4-VII**

**CONSTRUCTION AND CALIBRATION OF THE NUMERICAL GROUNDWATER  
FLOW MODEL**

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# 1 INTRODUCTION

This Appendix describes the construction and calibration of a three-dimensional, numerical groundwater flow model constructed in support of the MEG Energy Corp. (MEG) Christina Lake Regional Project – Phase 3 (the Project). The work involved in the construction and calibration of the groundwater flow model can be described by the following three tasks:

1. Development of a conceptual framework of regional scale and local scale hydrogeology:
  - selection of a Regional Study Area (RSA) and model domain of adequate aerial extent to simulate local effects of the Project Case and Planned Development Case (PDC) groundwater withdrawal and bound by reasonably natural hydrology features such as major river valleys;
  - mapping the occurrence of hydrostratigraphic units across the RSA; and
  - mapping the vertical and lateral distribution of pore pressures, hydraulic permeability and storage of selected hydrostratigraphic units.
2. Construction of a three-dimensional (3-D) numerical groundwater flow model based on the mapped occurrence of hydrostratigraphic units and assigned boundary conditions:
  - selection of numerical modelling software suitable for solving the regional-scale groundwater flow model;
  - discretize the model in the vicinity of existing and proposed groundwater users;
  - construction of a 3-D numerical groundwater flow model that represents the conceptual model; and
  - selection and assignment of boundary conditions that approximate regional influences on groundwater flow patterns.
3. Calibration of the numerical model to available static and transient data:
  - calibration of the model to mapped groundwater flow distributions, local hydraulic head measurements, measured Wiau Channel discharge rates and estimated groundwater recharge rates;
  - calibration of the model to pumped volumes and pressure data collected during 125 days of groundwater production from the Upper Clearwater Aquifer in the middle of the Local Study Area (LSA); and
  - calibration of the model to injection volumes and pressure data collected during 10 months of wastewater injection into the McMurray Aquifer.

## **2 CONCEPTUAL FRAMEWORK**

### **2.1 CONCEPTUALIZATION OF GROUNDWATER FLOW**

Details regarding geologic and hydrogeologic mapping and the local and regional conceptualization of groundwater flow are described in the Hydrogeology Baseline Report (Appendix 4-II). The following summary provides a brief overview of the local and regional flow systems to facilitate the subsequent discussions of model construction and calibration. Tables associated with the contraction and calibration of the numerical model are found in Attachment A and figures are found in Attachment B.

The Hydrogeology RSA is located within the Athabasca River Watershed. Surface elevations across the RSA range from less than 300 metres above sea level (masl) at the confluence of the Athabasca and Clearwater rivers to greater than 800 masl in the May Hills (Figure B-1).

Figure B-2 is a regional stratigraphic column that summarizes the geologic formations that underlie the RSA, from the Middle Devonian Period bedrock to ground surface. Twenty-six geologic formations that occur in the RSA were divided into 27 hydrostratigraphic units based on interpreted groundwater flow and hydraulic properties (Figure B-2). Each of the 27 hydrostratigraphic units are discussed in detail in Appendix 4-II.

Regional groundwater flow in the overburden sediments and the Upper Cretaceous bedrock generally reflect topography with groundwater flow directed away from upland areas such as the Stony Mountain Uplands and the Mostoos Hills Upland toward topographic lows such as the Clearwater and Athabasca river valleys.

Vertical gradients within the Quaternary, Tertiary and Cretaceous sediments suggest a downward-directed flow potential from ground surface to Devonian bedrock throughout most of the RSA with the steepest vertical pressure gradients noted in the Joli Fou Aquitard, the Clearwater Shale Aquitard and the Wabiskaw Shale Aquitard (Figure B-3).

Groundwater flow patterns in the RSA are influenced by the incision of Tertiary and Quaternary aged valleys into Cretaceous bedrock. Some of these channels, such as the Christina Channel which cuts through the LSA, are regionally extensive and completely incise the Colorado Group shale. The interpreted distribution of hydraulic head values in the Empress Channel Aquifer are



illustrated in Figure B-4. A hydraulic low of less than 560 masl occurs in the Empress Channel Aquifer in Township 76, Range 6 (Figure B-4). The location of this observed low is approximately coincident to an area where the Christina Channel has incised through the Colorado Group and the Empress Channel Aquifer directly overlies the Lower Grand Rapids Aquifer. Groundwater mounding in the Grand Rapids Formation is interpreted to occur in the vicinity of the incision. Figure B-5 illustrates the groundwater mounding in the Grand Rapids Formation below the Christina Channel and northward-directed groundwater flow toward the Clearwater and Athabasca river valleys that occurs throughout most of the RSA.

Hydraulic heads in the Clearwater Formation also show evidence of groundwater mounding where the Empress Channel Aquifer incises the Grand Rapids Formation (Figure B-6). Groundwater flow throughout the rest of the RSA is generally directed north toward the Clearwater and Athabasca river valleys or west toward the subcrop location of the Grosmont Aquifer.

The hydraulic head distribution in the McMurray Formation is presented in Figure B-7. As compared to groundwater in the Grand Rapids and Clearwater formations, flow patterns in the McMurray Aquifer are interpreted to be less influenced by recharge from the Christina Channel. Groundwater flow on the north portion of the RSA is directed north toward the Clearwater and Athabasca river valleys. Groundwater flow in the west half of the RSA is directed west toward the subcrop location of the Grosmont Aquifer. Groundwater flow in the east portion of the RSA is directed east toward the zero edge of the underlying Prairie Aquiclude where it drains to the underlying Keg River Aquifer.

## **2.2 REGIONAL STUDY AREA AND NUMERICAL MODEL DOMAIN**

The RSA for the hydrogeology assessment is shown in Figure B-1. An RSA was selected that would be coincident with the numerical model domain and was of adequate areal extent to simulate project-specific effects of groundwater withdrawal and wastewater disposal as well as cumulative effects including operations from adjacent in-situ projects considered in the PDC. The RSA was defined primarily on the basis of interpreted regional geology and groundwater flow patterns and covers an area of approximately 30,000 km<sup>2</sup>.

The extent of the RSA is defined by the following:

- *North* – The Clearwater River, extending from the Saskatchewan border to the confluence of the Athabasca River and the eastward-flowing section of the Athabasca River to the confluence of the Clearwater River.
- *East* – The Saskatchewan border extending from the middle of Township 69 to the Clearwater River. The Saskatchewan border is interpreted to be approximately coincident with the groundwater flow direction in the Grand Rapids and Clearwater formations.
- *South* – The centre of Township 69 extending from the Saskatchewan border to the Athabasca River. This border is interpreted to be approximately coincident with the groundwater flow direction in the McMurray Formation.
- *West* – The northerly flowing portion of the Athabasca River, extending from the middle of Township 69 to Township 87.

## 3 MODEL CONSTRUCTION

### 3.1 SOFTWARE SELECTION

This work assumes that a representative elementary volume (Bear 1972) of the porous medium exists and can represent the effective hydraulic behaviour of the medium. Groundwater flow within the RSA was interpreted to be normal gravity-driven flow and can be represented by the fluid continuity equation:

$$\frac{\partial}{\partial x} \left( K_x \frac{\partial h}{\partial x} \right) + \frac{\partial}{\partial y} \left( K_y \frac{\partial h}{\partial y} \right) + \frac{\partial}{\partial z} \left( K_z \frac{\partial h}{\partial z} \right) = S_s \frac{\partial h}{\partial t}$$

where:

- $x, y, z$  = the principal components of space (L);
- $h$  = hydraulic head (L);
- $S_s$  = specific storage (L<sup>-1</sup>);
- $K$  = hydraulic conductivity (L/t); and
- $t$  = time.

The major assumptions within the continuity equation and in its application are that the fluid is incompressible, groundwater flow follows Darcy's Law, and the fluid throughout the study area has a constant density.

Groundwater flow was simulated in this study using the FEFLOW (Finite Element subsurface FLOW) simulator developed by WASY Ltd. (2004). FEFLOW was used to solve for 3-D, mass conservative groundwater flow within fully saturated porous media using finite element discretization of the media.

### 3.2 INCORPORATION OF GEOLOGIC MAPPING

The geologic interpretation used in the numerical model for the Project hydrogeology effects assessment was developed in co-operation with Devon Canada Corporation (Devon) and EnCana FCCL Oil Sands Ltd. (EnCana). More specifically, the geologic mapping builds on geologic interpretations published by Devon (2006) and EnCana (2007). Devon reviewed 870 wireline well logs within a 12-township area surrounding the Jackfish and Jackfish 2 Project for 16 geologic units and integrated this local data with two-

dimensional (2-D) and 3-D seismic for key units. In addition to the local mapping, Devon reviewed 167 wireline logs within the RSA to extend the local interpretation for 15 hydrostratigraphic units throughout the RSA. EnCana (2007) conducted additional geologic mapping of the Middle Clearwater Aquifer and the McMurray Aquifer over a 16-township area.

Table A-1 presents a summary of the data sources used in the numerical model geologic interpretation. The MEG geologic picks are presented in Tables A-2 through A-5. Selected surfaces and isopachs of hydrostratigraphic units represented in the numerical model are presented in Figures B-8 through B-36.

As compared to the geologic interpretations presented by Devon (2006) and EnCana (2007), the numerical model benefited from additional regional and/or local hydrostratigraphic mapping for the following key units:

- the McMurray Aquifer;
- the Wabiskaw Shale Aquitard;
- the Upper Clearwater Aquifer; and
- the Clearwater Shale Aquitard.

The following subsections describe the geologic/hydrostratigraphic mapping methodology for each of these units.

### **3.2.1 McMurray Aquifer Isopach**

A total of 257 petrophysical logs located mainly in the Project lease area were reviewed within the LSA (Table A-2). This data was included in the numerical model to compliment geologic mapping conducted by Devon (2006) and EnCana (2007). The geologic interpretation used in the numerical model was constructed by incorporating the McMurray Aquifer interpretation of Devon (2006), EnCana (2007) and MEG in designated areas as discussed below.

In the vicinity and south of the Devon disposal wells in Township 75-Range 6, Township 75-Range 5 and Township 74-Range 5, the Devon McMurray Aquifer interpretation was incorporated by digitizing the McMurray Aquifer isopach contours presented by Devon in the Application for approval of the Jackfish 2 Project (Devon 2006). In the vicinity and east of the EnCana disposal wells in Township 76, Range 6 the EnCana (2007) McMurray Aquifer interpretation was maintained by using the EnCana geologic picks and isopach map. In the remainder of the LSA, the McMurray Aquifer interpretation is a compilation of the MEG and EnCana geologic picks.

For cases where more than one geologic pick existed for the same location, the values were compared and if the value variance was small, the minimum value was retained. At well location 4-29-077-04 W4M, there was a large discrepancy between the EnCana and MEG isopach values. For this well, the geophysical log was reviewed and it was determined that the higher value was representative of the McMurray Aquifer net thickness at this location. The compiled LSA data set was then integrated with the Devon (2006) RSA data set and interpolated over the RSA (Figure B-33).

### **3.2.2 Wabiskaw Shale Aquitard Isopach**

A total of 179 petrophysical logs were reviewed within the RSA (Table A-3). The table includes picks for the Wabiskaw Shale unit top structure, bottom structure and isopach. The top and bottom structure data was interpolated over the RSA and the Wabiskaw Shale isopach map was obtained by subtracting the Wabiskaw Shale bottom structure map from the Wabiskaw Shale top structure map.

### **3.2.3 Upper Clearwater Aquifer Isopach**

A total of 1,496 petrophysical logs were reviewed within the LSA (Table A-4). Within the LSA, two stratigraphically distinct sand bodies are considered to represent one hydrostratigraphic unit. These sand bodies are referred to as the Clearwater 'O' and the Clearwater 'A' sand units. The Clearwater 'O' sand unit thickens to the north of the LSA and the Clearwater 'A' sand unit is present over most of the LSA. The two sand units can occur at the same location however, where the Clearwater 'O' net sand is thick, the Clearwater 'A' net sand is generally thin and vice versa.

In the eastern part of the RSA, the two sand units amalgamate into one sand package. Where the 'O' and 'A' sand units amalgamate into one sand package, the identified net sand thickness was considered to be the Upper Clearwater Aquifer. Outside of the area where the amalgamation occurs, the Upper Clearwater Aquifer thickness was considered to be equal to the Clearwater 'O' net sand thickness where the 'O' net sand thickness is greater than 4 m (north of the LSA) and equal to the Clearwater 'A' net sand thickness where the 'A' net sand thickness is greater than 4 m (within the LSA). This Upper Clearwater Aquifer thickness construction process ensured that the transmissivity of the unit was not overestimated. The net sand isopach data were appended to an existing regional dataset (Devon 2006) and interpolated over the RSA (Figure B-24).

### 3.2.4 Clearwater Shale Aquitard Isopach

Based on MEG geologic mapping, a total of 754 Clearwater Shale isopach point values were generated within a mapped area that extends from Townships 73 to 80 and Ranges 1 to 9 W4M (Table A-5). The Clearwater Shale Aquitard isopach values were generated such that the shale portion of the Clearwater that separates the Upper Clearwater Aquifer from the overlying Grand Rapids is adequately represented. The top structure of the Clearwater Shale Aquitard was easily identified across the mapped area and is coincident with the Clearwater Formation top structure. The base structure of the Clearwater Shale Aquitard was a generated surface based on the presence of thick Clearwater ‘A’ or ‘O’ sand units.

In general, where the Clearwater ‘O’ sand unit is thick, the Clearwater ‘A’ sand unit is thin and vice versa. For the purposes of this assessment, where the Clearwater ‘O’ net sand thickness is greater than or equal to 4 m, the Clearwater ‘O’ top structure was chosen to represent the Clearwater Shale Aquitard base structure. Where the Clearwater ‘O’ unit isopach was thin (less than 4 m), the Clearwater Shale bottom structure was constructed by adding the Clearwater ‘A’ top structure to the Clearwater ‘O’ net sand isopach. This was completed to not overestimate the amount of shale separating the Upper Clearwater Aquifer from the overlying Lower Grand Rapids Aquifer and effectively generated a net shale thickness where the Clearwater ‘O’ sand unit was thin.

The 754 MEG Clearwater Shale Aquitard top and bottom structure values were appended to an existing regional dataset and interpolated across the RSA. The Clearwater Shale Aquifer isopach was obtained by subtracting the Clearwater Shale Unit bottom structure from the Clearwater Formation structure and is presented in Figure B-23.

## 3.3 MODEL DISCRETIZATION

The model domain and RSA boundaries are described in Section 2.2 and extend up to 170 km east-west from the Saskatchewan border to the Athabasca River (Range 1 W4M to Range 17 W4M) and up to 200 km north-south from Township 69 to the Clearwater and Athabasca rivers (Township 89). The model domain covers a 31,000 km<sup>2</sup> area, is up to 1,100 m deep and represents a total volume of 21,000 km<sup>3</sup>.

A two-dimensional finite element mesh was constructed throughout the model domain with additional refinement in the vicinity of groundwater supply and wastewater disposal wells at the Project and at adjacent projects throughout the

RSA. The simulated well locations for the Existing and Approved Case (EAC), Project Case, and PDC scenarios are summarized in Table A-6. The model was discretized with a mesh of approximately 14,818 nodes per mesh layer (Figure B-37 and B-38) with a maximum refinement of 1-m node spacing occurring in the vicinity of the Project water supply and wastewater disposal wells. Node spacing was also refined in the vicinity of key geologic features and at water supply and wastewater disposal wells at the adjacent projects. The node spacing increased to a maximum distance of approximately 6 km throughout the RSA.

The model was discretized vertically into 26 layers (Table A-7). In general, one layer was assigned to each hydrostratigraphic unit. In the case of the Clearwater Formation, the Undifferentiated Clearwater Aquifer/Aquitard is represented in five different layers to achieve an adequate vertical refinement around the Upper Clearwater, Middle Clearwater and Lower Clearwater aquifers.

Since several of the hydrostratigraphic units have been completely eroded within the RSA, the mapped geologic structures were adapted in two circumstances: in the vicinity of bedrock channels and on the north end of the RSA in the major river valleys.

### **3.3.1 Modelled Geometries in Incised Channels**

As mapped, the top of bedrock surface has several deeply incised bedrock channels within the RSA and in some cases several hydrostratigraphic units below the incised channels have been eroded (Figure B-39). For example in the thalweg of the Christina Channel, the LaBiche, Viking and Joli Fou formations have all been eroded.

The simulated structures of hydrostratigraphic units below the channels were deflected below the mapped bedrock surface. Where a hydrostratigraphic unit has been completely eroded, a minimum model layer thickness of 1 m was preserved and the unit was assigned hydraulic properties equal to the channel aquifer; this is illustrated in Figure B-39.

### **3.3.2 Modelled Geometries in Major River Valleys**

The LaBiche, Viking, Joli Fou, Grand Rapids, Clearwater and McMurray formations are all mapped to subcrop in the Athabasca and Clearwater river valleys on the northern boundary of the RSA.

To incorporate the absence of these units into the numerical model the following adaptations were employed (Figure B-39):

- Geologic mapping of the Clearwater Shale Aquitard and underlying geologic structures was projected into the Athabasca and Clearwater river valleys based on the mapped structures where the units have not been removed by Quaternary and more recent erosional events.
- These projected formation structures were imported into the model and used to represent the structures for hydrostratigraphic units in the Clearwater, McMurray and Devonian formations.
- Simulated structures of all hydrostratigraphic units above the Clearwater Shale Aquitard, including ground surface, were deflected to remain a minimum of 1 m above the underlying unit. Where these units have been eroded and are no longer present (Figure B-9) the modelled layer was assigned hydraulic properties representative of the Undifferentiated Overburden Aquifer/Aquitard.

### **3.4 BOUNDARY CONDITIONS**

Boundary conditions assigned to the model were chosen to approximate the regional groundwater flow patterns summarized in Section 2.1 and to approximate the major groundwater fluxes in the RSA.

Groundwater recharge and discharge to the overburden aquifers was represented by assigning a specified hydraulic head boundary condition to the top of the model. The specified head value assigned to each node at the ground surface was equal to the topographic elevation at the node. Specified hydraulic head values at ground surface range from 234 to 821 masl (Figure B-8). Within and adjacent to the Clearwater and Athabasca river valleys, a constraint was placed on the specified head nodes in slice one (ground surface) to allow flux out of the model only.

Based on the large permeability contrast between the Empress Channel Aquifer and the LaBiche/Joli Fou Aquitards, it is likely that a significant amount of groundwater flows across the eastern and western Empress Channel Aquifer boundaries of the model. Boundary conditions for the Empress Channel were approximated using reported hydraulic head measurements in the Wiau and Christina Channels as discussed and mapped in Section 2.1. The western boundary of the Empress Channel Aquifer was assigned a specified head value approximately equal to the ground elevation where the Empress Channel Aquifer outcrops in the Athabasca River Valley ( $h = 470$  masl; Figure B-12). The eastern boundary of the Empress Channel Aquifer within the Wiau Channel was



assigned a specified head value of 680 masl (Figure B-12). The eastern boundary of the Empress Channel Aquifer within the Christina Channel was assigned a specified head value of 620 masl (Figure B-12). The specified head values on the eastern boundaries were based on interpreted water levels in the channels.

Constant head boundaries, with a flux out only constraint, were also assigned to the Viking Aquifer (Figure B-15), the Upper Grand Rapids Aquifer (Figures B-18 and B-19), Lower Grand Rapids Aquifer (Figures B-20 and B-21), Upper Clearwater Aquifer (Figure B-24), and the McMurray Aquifer (Figure B-33). The boundary condition was assigned where the units are mapped to outcrop in the Christina and Athabasca river valleys. A constraint was placed on the specified head nodes to only allow flux out of the model (Figure B-39).

As described in Section 2.1, the Grosmont Aquifer acts as a drain for the McMurray Aquifer and thus lateral groundwater flow in the McMurray Aquifer within the study area is predominantly towards the west. The influence of the Grosmont drain is represented in the numerical model by assigning a specified hydraulic head boundary condition of 350 masl along the west boundary of the Grosmont Aquifer (Figure B-35).

As mapped in Figure B-7, there is a component of flow in the McMurray Formation to the east, specifically in the southeast portion of the model domain. This component of flow is likely the result of the Prairie Aquiclude being absent in the eastern portion of the model domain. As described in Section 2.1, regional groundwater flow is interpreted to drain into the Winnipegosis Aquifer. This influence of the Winnipegosis Aquifer is represented in the numerical model by assigning specified hydraulic heads on the eastern portion of the study area where the Prairie Aquiclude is absent (Figure B-36). The specified hydraulic head values at the south are 440 masl and a constant gradient was applied up to the northern boundary where a specified head of 250 masl was assigned.

All other model boundary surfaces were assigned no-flow boundary conditions as it was assumed that the net groundwater flux across these surfaces is negligible compared to groundwater recharge, groundwater flow through the Wiau Channel, groundwater flow from the Viking, Grand Rapids and Basal McMurray aquifers to the Athabasca, Christina, and Clearwater river valleys, groundwater flow towards the Grosmont Aquifer, and groundwater flow into the Winnipegosis Aquifer.

## **4 MODEL CALIBRATION**

Prior to the model calibration, the hydraulic parameters of many of the hydrostratigraphic units were understood to some degree because of the regional estimates summarized in the Hydrogeology Baseline Report (Appendix 4-II) and because of experience gained by MEG at the Christina Lake Regional Project.

The calibration process is described in the following sections and the hydraulic properties of the calibrated model are summarized in Table A-7.

### **4.1 STEADY-STATE CALIBRATION**

Once the mesh was constructed and boundary conditions specified, the model was calibrated by adjusting the hydraulic properties assigned to each model hydrostratigraphic unit. Three types of steady-state calibration targets were used:

- Simulated head distribution was compared to mapped hydraulic gradients across the RSA from selected hydrostratigraphic units with an emphasis on the Empress, Grand Rapids, Clearwater and McMurray formations.
- Simulated hydraulic head values from selected hydrostratigraphic units were compared to interpreted and measured hydraulic head values across the RSA. The interpreted hydraulic head values were derived primarily from Drill Stem Test (DST) data and the measured hydraulic head values were derived primarily from water well or vibrating wire piezometer data.
- Simulated vertical gradients were compared to observed pressure versus depth gradients at four locations across the RSA.
- Simulated fluxes were compared to measured precipitation rates, estimates of groundwater recharge, and the estimated flux through the Empress Channel Aquifer.

#### **4.1.1 Calibration to Mapped Hydraulic Gradients**

Simulated hydraulic head distributions and values were compared spatially and graphically to mapped (interpreted) hydraulic head distributions in the Empress, Grand Rapids, Clearwater and McMurray formations. The simulated hydraulic head distributions of the Empress Channel Aquifer, Lower Grand Rapids, Upper Clearwater Aquifer, and McMurray Aquifer are presented in Figures B-40 through B-43 and are in close agreement with the flow directions and gradients of the mapped hydraulic head distributions (Figures B-4 through B-7). The

simulated flow patterns in the Empress Channel, Grand Rapids, Clearwater and McMurray aquifers are discussed below.

#### **4.1.1.1 Empress Channel Aquifer**

The simulated steady-state hydraulic head distribution in the Empress Channel Aquifer is compared to the mapped hydraulic gradient for the Empress Channel Aquifer. The steady-state calibration targets for the spatial distribution of the Empress Channel Aquifer hydraulic heads included:

- flow from east to west in the Wiau Channel;
- flow to the hydraulic low in the Christina Channel in Township 76 Range 6 W4M; and
- the general magnitude and gradient of hydraulic heads in the Christina and Wiau Channels.

As presented in Figures B-4 and B-40, there is close agreement between the spatial distribution of simulated and observed hydraulic head with respect to each of the calibration targets.

#### **4.1.1.2 Grand Rapids Aquifer**

The simulated steady-state hydraulic head distribution in the Grand Rapids Aquifer is compared to the mapped hydraulic gradient for the undifferentiated Grand Rapids Formation. Calibration targets for the comparison included:

- flow to the north and northwest towards the Athabasca and Clearwater rivers;
- groundwater mounding in the Grand Rapids below the Wiau and Christina Channels; and
- the general magnitude and gradient of hydraulic heads in the RSA.

There is close agreement between the spatial distribution of the Grand Rapids simulated hydraulic heads (Figure B-41) and observed hydraulic heads (Figure B-5) with respect to each of the calibration targets.

#### **4.1.1.3 Upper Clearwater Aquifer**

The simulated steady-state hydraulic head distribution in the Upper Clearwater Aquifer is compared to the mapped hydraulic gradient for the undifferentiated Clearwater Formation. Calibration targets for the comparison included:

- flow to the north in the northern portion of the RSA towards the Athabasca and Clearwater rivers;
- flow to the west on the western portion of the RSA towards the Grosmont Formation subcrop location and/or the Athabasca River;
- groundwater mounding below the Wiau and Christina Channels; and
- the general magnitude and gradient of hydraulic heads in the RSA.

There is close agreement between the spatial distribution of the Upper Clearwater Aquifer simulated hydraulic heads (Figure B-42) and observed hydraulic heads (Figure B-6) with respect to each of the calibration targets.

#### **4.1.1.4 McMurray Aquifer**

The simulated steady-state hydraulic head distribution in the McMurray Aquifer is compared to the mapped hydraulic gradient for the undifferentiated McMurray Formation. Calibration targets for the comparison included:

- flow to the north towards the Athabasca and Clearwater rivers;
- flow to the west towards the Grosmont Formation;
- flow to the east in the southeast portion of the RSA where the underlying Prairie Aquiclude is absent; and
- the general magnitude and gradient of hydraulic heads in the RSA.

There is close agreement between the spatial distribution of the McMurray Aquifer simulated hydraulic head (Figure B-43) and undifferentiated McMurray observed hydraulic head (Figure B-7) with respect to each of the calibration targets.

### **4.1.2 Calibration to Hydraulic Head Data**

Hydraulic head mapping is described in the Hydrogeology Baseline Report (Appendix 4-II) and was based on 158 published hydraulic head values and 1,128 reported DST pressures.

A comparison of simulated hydraulic heads values versus the 178 published hydraulic head values from across the RSA is illustrated in Figure B-44. There is relatively close agreement between the simulated and observed hydraulic head values throughout the RSA. The average difference between the observed hydraulic heads and simulated hydraulic heads was -1 m and the mean absolute difference was 14 m.

As evidenced in Figures B-5 through B-7, the DST data points are unevenly distributed across the RSA and due to the inherent uncertainties of the DST data adjacent points often have conflicting head values. To quantify the error between the simulated steady-state hydraulic heads and the interpreted hydraulic head values across the RSA, a data set of interpreted hydraulic head values was generated by sampling the interpreted hydraulic head contours in a grid pattern. This sampled data set offers a more widely distributed and smoothed calibration dataset compared to the clustered measured hydraulic head values obtained from DST data. As illustrated in Figure B-45, a plot of 295 simulated versus interpreted hydraulic heads, there is relatively close agreement between the simulated and interpreted hydraulic head values throughout the RSA. The average difference between the observed hydraulic heads and simulated hydraulic heads was -3 m and the mean absolute difference was 21 m.

### **4.1.3 Calibration to Vertical Gradients**

Four pressure versus depth plots were used to evaluate the model calibration to vertical gradients. Simulated steady-state pressures for the multi-depth measurements are presented in Figures B-46 through B-49. As illustrated in these figures, the model calibration provides a reasonable approximation of the hydraulic heads and vertical gradients at these locations in varying physiographic and geologic settings.

This is evidenced by contrasting the relatively smooth vertical gradients at the 12-24-082-7 W4M (Figure B-47) and 10-11-074-8 W4M (Figure B-48) locations with the sharp contrasts in vertical gradients at the 9-24-085-9 W4M (Figure B-46) and the 6-31-075-6 W4M (Figure B-49) locations. Given that these pressure versus depth locations are located throughout the RSA and well away from the assigned boundary conditions, the model is judged to adequately represent the major influences on vertical hydraulic gradients in the RSA.

### **4.1.4 Calibration to Estimated Fluxes**

A summary of the simulated steady-state groundwater flow budget is presented in Table A-8. Precipitation across the study area is likely highly variable with a

precipitation rate of 465 mm/year in Fort McMurray (Gulf 2001) and probably more than 600 mm of annual precipitation at Stony Mountain (Longley 1972). Based on previous studies, the recharge rate at surface is estimated to be 7.3 mm/year (Gulf 2001). In addition, simulated recharge to the Manville Aquifers was estimated to range from 1.2 to 3.5 mm/yr in five regional scale numerical models constructed in, or adjacent to, the RSA (Husky 2003; ConocoPhillips 2006; Devon 2006; NAOSC 2007; EnCana 2007). These constraints were used to develop a recharge calibration target of between 1 to 5 mm/year to the Manville Aquifers. Once calibrated, the steady-state model simulated a net vertical flux of 1.4 mm/year downward.

As reported by Stewart (2003), a series of springs discharge water from the Empress Channel Aquifer within the Wiau Channel into the Athabasca River valley. The total discharge from the springs was estimated to be 7,680 m<sup>3</sup>/day (Stewart 2003). Therefore, this represents the minimum flux from the Empress Channel Aquifer at the western boundary of the model. Once calibrated, the simulated steady-state net flux at the western boundary of the Empress Channel Aquifer was 29,000 m<sup>3</sup>/day (Table A-8) and is greater than the minimum calibration target of 7,680 m<sup>3</sup>/day. This flux is judged to be a reasonable representation of Wiau Channel discharge to the Athabasca River.

## **4.2 TRANSIENT CALIBRATION**

Given that the Project plans to source make-up water from the Upper Clearwater Aquifer and inject wastewater into the McMurray Aquifer, transient calibrations to local groundwater use was completed for these aquifers.

### **4.2.1 Upper Clearwater Aquifer**

The numerical model was used to simulate 125 days of groundwater withdrawal from two Upper Clearwater Aquifer water wells (8-16-77-5 W4M and 2-16-7-5 W4M) and was calibrated to continuous pressure data recorded at two observation wells located between 183 and 409 m away from the pumped wells (Table A-9). A plot of the measured and simulated pumping rates is illustrated in Figure B-50.

The model was calibrated by systematically adjusting the hydraulic conductivity and specific storage of the Upper Clearwater Aquifer and adjacent hydrostratigraphic units. The simulated drawdown due to pumping is posted in Figure B-51 with the observed drawdown data for the same points. The simulated drawdown at the 7-16-077-5 W4M and 10-16-077-5 W4M monitoring locations is in close agreement to the observed values. Based on the transient

calibration the model was judged to be a useful tool for evaluating groundwater flow and groundwater withdrawal in the Upper Clearwater Aquifer.

## 4.2.2 McMurray Aquifer

The numerical model was used to simulate 10 months of wastewater injection into two McMurray Aquifer disposal wells (located at 15-35-076-4 W4M) and was calibrated to continuous pressure data recorded at three observation wells (10-33-076-4 W4M, 2-33-076-4 W4M, and 16-28-076-4 W4M) located between 3,200 and 3,500 m away from the disposal wells (Table A-9). A plot of the measured and simulated injection rates is illustrated in Figure B-52.

The model was calibrated by systematically adjusting the hydraulic conductivity and specific storage of the McMurray Aquifer and adjacent hydrostratigraphic units. The simulated change in water level due to pumping is posted in Figure B-53 with the observed change in water level data for the same points. The simulated change in water level at the 10-33-076-4 W4M and 16-28-076-4 W4M monitoring locations is in relatively close agreement to the observed values, however, the simulated change in water level at the 2-33-076-04 W4M monitoring location is greater than the observed change in water levels (Figure B-53). A higher conductivity would be required to obtain a better match at the 2-33-076-4 W4M monitoring location.

Based on the transient calibration in the vicinity of the disposal wells where the Aquifer is 50 m thick, the McMurray Aquifer was judged to have a hydraulic conductivity of  $1.5 \times 10^{-4}$  to  $5.4 \times 10^{-5}$  m/s. For the purposes of this work, the lower (more conservative) hydraulic conductivity value of  $5.4 \times 10^{-5}$  was chosen to be representative of the McMurray Aquifer. This is approximately twice as large as the calibrated hydraulic conductivity of  $2.3 \times 10^{-5}$  m/s reported by Devon (2006) in a thinner and more channelized portion of the McMurray Aquifer at 12-15-75-6 W4M. The McMurray Aquifer was therefore assigned two different hydraulic conductivities. In the north-south trending regional Devonian low where the McMurray Aquifer is thickest (Figure B-33) a hydraulic conductivity of  $5.4 \times 10^{-5}$  m/s was assigned and where the McMurray Aquifer is thinner a hydraulic conductivity of  $2.3 \times 10^{-5}$  m/s was assigned (Figure B-33, Table A-7). The numerical model as calibrated is judged to be a conservative tool for evaluating groundwater flow and wastewater injection in the McMurray Aquifer.

## 5 SUMMARY OF MODEL CONSTRUCTION AND CALIBRATION

The numerical groundwater flow model construction and calibration process and conclusions supported by the model construction and calibration process are presented below:

- The numerical model was built based on a regional conceptualization of groundwater flow presented in the Hydrogeology Baseline Report (Appendix 4-II).
- Twenty-seven hydrostratigraphic units from ground surface to the Middle Devonian Prairie Formation were incorporated in the model construction.
- The steady-state model was calibrated to published hydraulic head mapping, industry pressure data, measured hydraulic heads, regional estimates of groundwater recharge and published estimates of Wiau Channel discharge.
- The calibrated model does a reasonable job of approximating the horizontal and vertical hydraulic gradients across the RSA.
- The steady-state flow budget seems reasonable based on regional estimates of groundwater recharge and the estimated discharge of the Wiau Channel to the Athabasca River.
- The model was used to simulate groundwater withdrawal from two Upper Clearwater Aquifer supply wells over a period of 125 days. The simulated pressure changes at two observation wells, located between 183 and 409 m away, were very similar to observed pressure changes. The model is judged to be a useful tool for evaluating groundwater flow and groundwater withdrawal in the Upper Clearwater Aquifer.
- The model was used to simulate wastewater injection into two McMurray Aquifer disposal wells over a period of 10 months. The simulated pressure changes at four observation wells, located between 1,600 and 3,500 m away, were compared to observed pressure changes to derive a conservative estimate of McMurray Aquifer hydraulic conductivity and specific storage. The model is judged to be a conservative tool for evaluating groundwater flow and wastewater injection in the McMurray Aquifer.
- The calibrated numerical model is a useful tool for simulating the effects of groundwater withdrawal from the Upper Clearwater Aquifer and wastewater injection into the McMurray Aquifer. The model is also judged to be a useful tool for predicting the vertical propagation of pressure changes and potential interference effects with other projects in the RSA.



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**ATTACHMENT A**

**GROUNDWATER FLOW MODEL TABLES**

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**Table A-1 Summary of Hydrostratigraphic Unit Data Sources**

Hydrostratigraphic Unit (or Surface)	Local Study Area (LSA) Data Source	Regional Study Area Data Source (Excluding LSA)
Undifferentiated Overburden Aquifer/Aquitard	Wireline Logs; Devon (2006) and Andriashek (2003)	Andriashek (2003)
Empress Terrace	Wireline Logs; Devon (2006) and Andriashek (2003)	Andriashek (2003)
Empress Channel Aquifer	Wireline Logs; Devon (2006) and Andriashek (2003)	Andriashek (2003)
LaBiche Aquitard	Wireline Logs; Devon (2006)	Wireline Logs; Devon (2006)
Viking Aquifer	Wireline Logs; Devon (2006)	Wireline Logs; Devon (2006)
Joli Fou Aquitard	Wireline Logs; Devon (2006)	Wireline Logs; Devon (2006)
Upper Grand Rapids Aquifer	Wireline Logs; Devon (2006)	Wireline Logs; Devon (2006)
Lower Grand Rapids Aquifer	Wireline Logs; Devon (2006)	Wireline Logs; Devon (2006)
Clearwater Shale Aquitard	Wireline Logs; Devon (2006) and Wireline Logs; this study	Wireline Logs; Devon (2006)
Upper Clearwater Aquifer	Wireline Logs; Devon (2006) and Wireline Logs; this study	Wireline Logs; Devon (2006)
Middle Clearwater Aquifer	Wireline Logs; EnCana (2007)	Wireline Logs; Devon (2006)
Lower Clearwater Aquifer	Wireline Logs; Devon (2006)	Wireline Logs; Devon (2006)
Wabiskaw Shale Aquitard	Wireline Logs; this study	Wireline Logs; this study
Wabiskaw Aquifer/Aquitard	Wightman et al. (1995)	Wightman et al. (1995)
Wabiskaw Bitumen Aquitard	Wightman et al. (1995)	Wightman et al. (1995)
Undifferentiated McMurray Aquifer/Aquitard	Wightman et al. (1995)	Wightman et al. (1995)
McMurray Bitumen Aquitard	Wightman et al. (1995)	Wightman et al. (1995)
McMurray Aquifer	Wireline Logs; Devon (2006), Wireline Logs; EnCana (2007) and Wireline Logs; this study	Wightman et al. (1995)
Sub-Cretaceous Unconformity (Top of Devonian)	Wireline Logs; Devon (2006) and Wightman et al. (1995)	Wireline Logs; Devon 2006 and Wightman et al. (1995)
Winterburn Aquifer/Aquitard	Wireline Logs; Devon (2006), Bachu et al. (1993) and Wightman et al. (1995)	Bachu et al. (1993) and Wightman et al. (1995)
Grosmont Aquifer	Wireline Logs; Devon (2006), Bachu et al. (1993) and Wightman et al. (1995)	Bachu et al. (1993) and Wightman et al. (1995)
Ireton Aquitard	Wireline Logs; Devon (2006), Bachu et al. (1993) and Wightman et al. (1995)	Bachu et al. (1993) and Wightman et al. (1995)
Cooking Lake/Beaverhill Lake Aquifer/Aquitard	Wireline Logs; Devon (2006), Bachu et al. (1993) and Wightman et al. (1995)	Bachu et al. (1993) and Wightman et al. (1995)
Watt Mountain Aquitard	Wireline Logs; Devon 2006 and Bachu et al. (1993)	Bachu et al. (1993)
Prairie/Muskeg Aquiclude	Wireline Logs; Devon 2006 and Bachu et al. (1993)	Bachu et al. (1993)
Keg River/Winnipegosis Aquifer	Wireline Logs; Devon (2006) and Bachu et al. (1993)	Bachu et al. (1993)

**Table A-2 Geology Picks – McMurray Aquifer**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	McMurray Aquifer Net Isopach [m]
00/11-16-076-04W4/0	527454	6159868	616	619	7
AA/11-17-076-04W4/0	525855	6159871	621	624	16
AA/09-17-076-04W4/0	526491	6160011	620	623	4
AA/14-15-076-04W4/0	529143	6160267	610	614	22
00/13-17-076-04W4/0	525268	6160305	623	626	0
AA/16-18-076-04W4/0	524963	6160421	617	620	0
00/13-14-076-04W4/0	530141	6160466	602	605	9
AA/02-23-076-04W4/0	531024	6160757	607	611	12
AA/08-19-076-04W4/0	524865	6161229	609	612	0
AA/06-20-076-04W4/0	525831	6161231	616	620	14
00/06-22-076-04W4/0	529105	6161256	611	615	15
00/13-19-076-04W4/0	523893	6161784	589	593	10
AA/15-20-076-04W4/0	526207	6161786	611	614	7
00/13-20-076-04W4/0	525529	6161798	613	617	0
AA/16-19-076-04W4/0	525004	6161862	609	612	4
AA/02-28-076-04W4/0	527861	6162337	589	592	10
AA/01-29-076-04W4/0	526540	6162361	601	604	13
AA/02-29-076-04W4/0	526214	6162363	606	609	10
00/02-26-076-04W4/0	531080	6162486	588	591	13
00/06-28-076-04W4/0	527488	6162664	585	589	13
AA/08-29-076-04W4/0	526742	6162893	588	591	17
AA/10-30-076-04W4/0	524401	6163171	585	588	5
00/10-27-076-04W4/0	529581	6163254	593	596	22
AB/13-29-076-04W4/0	525414	6163444	586	589	3
AB/14-29-076-04W4/0	525997	6163508	583	586	4
AA/15-30-076-04W4/0	524671	6163518	581	584	0
AA/15-28-076-04W4/0	527755	6163576	581	585	22
AA/01-31-076-04W4/0	524933	6163801	578	581	2
AA/04-32-076-04W4/0	525395	6163932	578	582	1
AA/03-33-076-04W4/0	527402	6163932	577	580	8
00/02-33-076-04W4/0	527812	6163937	580	583	17
AA/01-33-076-04W4/0	528187	6163998	583	587	15
AA/01-32-076-04W4/0	526515	6164017	582	586	24
AA/04-33-076-04W4/0	527224	6164128	579	582	15
00/06-33-076-04W4/0	527544	6164151	577	581	4
AA/08-31-076-04W4/0	524974	6164161	582	585	6
AB/07-33-076-04W4/0	527990	6164192	579	583	19
AA/06-32-076-04W4/0	525619	6164195	577	580	11
AA/07-33-076-04W4/0	527706	6164296	575	578	17
AA/05-32-076-04W4/0	525252	6164304	581	584	18
00/08-34-076-04W4/0	529670	6164341	580	584	41
AB/05-33-076-04W4/0	527104	6164398	578	582	19
AA/07-32-076-04W4/0	526162	6164418	576	579	21
AA/06-36-076-05W4/0	522666	6164421	570	573	14
AB/08-32-076-04W4/0	526715	6164441	575	579	18
AA/06-33-076-04W4/0	527414	6164512	577	581	25
AA/08-33-076-04W4/0	528336	6164513	581	585	27
00/12-36-076-05W4/0	522277	6164526	569	573	22
00/10-33-076-04W4/0	527885	6164649	575	578	22
AA/12-33-076-04W4/0	527162	6164698	578	582	17
AA/12-32-076-04W4/0	525242	6164738	583	586	13
AA/09-32-076-04W4/0	526807	6164746	574	577	15
AB/11-33-076-04W4/0	527446	6164790	576	580	31
AB/12-32-076-04W4/0	525466	6164884	580	584	21

**Table A-2 Geology Picks – McMurray Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	McMurray Aquifer Net Isopach [m]
AA/13-33-076-04W4/0	527146	6164968	572	575	29
AB/13-33-076-04W4/0	526873	6164971	572	576	27
AA/13-32-076-04W4/0	525270	6165018	577	581	21
AA/15-32-076-04W4/0	526137	6165173	586	589	34
00/15-31-076-04W4/0	524681	6165176	574	577	17
AA/14-32-076-04W4/0	525839	6165189	578	581	28
AA/14-31-076-04W4/0	524349	6165322	572	576	18
AC/01-06-077-04W4/0	524985	6165365	574	578	26
00/03-01-077-05W4/0	522523	6165461	571	575	17
AB/04-05-077-04W4/0	525313	6165468	574	577	23
AA/04-05-077-04W4/0	525597	6165530	574	579	9
00/01-01-077-06W4/0	513463	6165534	564	567	1
AA/03-03-077-05W4/0	519267	6165543	561	564	2
AA/03-05-077-04W4/0	525837	6165591	572	575	21
AA/01-04-077-05W4/0	518370	6165607	566	569	24
00/03-05-077-05W4/0	515981	6165608	580	583	10
AB/01-06-077-04W4/0	524953	6165707	572	576	28
00/02-06-077-04W4/0	524443	6165716	571	574	17
AA/05-05-077-04W4/0	525336	6165839	571	575	34
AA/08-05-077-05W4/0	516945	6165898	575	578	22
AA/05-05-077-05W4/0	515500	6165936	576	580	25
00/05-03-077-05W4/0	518982	6165951	566	570	7
AA/06-04-077-04W4/0	527512	6165975	574	577	55
AB/08-04-077-05W4/0	518574	6166073	572	575	26
AA/11-06-077-05W4/0	514236	6166252	568	572	3
00/12-05-077-04W4/0	525208	6166376	571	574	24
AA/12-04-077-05W4/0	517156	6166377	578	582	10
00/09-01-077-06W4/0	513538	6166415	564	566	5
AA/11-05-077-05W4/0	516010	6166416	579	582	17
AA/11-05-077-04W4/0	525850	6166432	571	574	35
00/11-03-077-04W4/0	528893	6166433	578	582	67
AA/12-06-077-04W4/0	523761	6166464	575	578	6
AB/13-04-077-05W4/0	517427	6166571	577	580	12
AA/16-06-077-05W4/0	515033	6166669	583	586	19
AC/13-04-077-05W4/0	517158	6166692	578	581	13
AA/14-04-077-05W4/0	517697	6166720	576	579	8
AA/15-06-077-05W4/0	514639	6166838	569	572	6
AA/16-04-077-05W4/0	518384	6166864	577	581	26
AB/16-06-077-05W4/0	515081	6166907	576	580	10
AA/02-09-077-05W4/0	517941	6167004	577	581	29
AA/01-07-077-05W4/0	515301	6167056	583	586	5
AA/04-09-077-05W4/0	517234	6167097	580	584	16
00/01-07-077-05W4/0	515030	6167145	575	579	6
AA/02-07-077-05W4/0	514722	6167163	573	577	2
AA/04-10-077-05W4/0	519020	6167164	578	582	5
AA/03-09-077-05W4/0	517549	6167171	581	585	18
AA/03-07-077-05W4/0	514287	6167196	568	571	6
AA/05-09-077-05W4/0	517326	6167367	585	588	17
AB/07-07-077-05W4/0	514928	6167391	577	581	2
AA/06-07-077-05W4/0	514252	6167424	567	570	4
AB/08-07-077-05W4/0	515307	6167430	578	581	4
AB/08-09-077-05W4/0	518347	6167542	579	582	20
00/07-11-077-05W4/0	521183	6167620	575	578	16
00/08-07-077-05W4/0	515131	6167621	570	573	4
00/07-07-077-04W4/0	524570	6167639	580	583	19

**Table A-2 Geology Picks – McMurray Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	McMurray Aquifer Net Isopach [m]
AB/11-09-077-05W4/0	517517	6167786	588	591	29
AA/12-07-077-05W4/0	514078	6167812	571	574	6
AA/10-08-077-05W4/0	516474	6167849	587	590	16
AB/10-07-077-05W4/0	514965	6167867	570	574	7
AA/09-07-077-05W4/0	515364	6167870	570	574	11
AA/12-09-077-05W4/0	517118	6167878	587	591	20
AA/12-08-077-05W4/0	515753	6167989	572	576	17
AB/11-07-077-05W4/0	514261	6167991	571	575	6
AC/10-07-077-05W4/0	514755	6168003	570	573	11
AB/12-08-077-05W4/0	515439	6168095	570	574	10
AA/11-09-077-05W4/0	517508	6168101	587	591	20
AA/16-07-077-05W4/0	515200	6168156	569	572	7
AB/13-07-077-05W4/0	513894	6168162	565	569	4
AA/16-08-077-05W4/0	516955	6168163	586	589	13
AB/16-12-077-06W4/0	513385	6168240	565	568	0
AA/15-07-077-05W4/0	514772	6168288	570	573	6
AA/13-08-077-05W4/0	515545	6168289	569	573	12
AA/16-10-077-05W4/0	520077	6168314	580	583	42
AA/13-07-077-05W4/0	514065	6168367	566	569	6
AA/14-07-077-05W4/0	514364	6168367	567	570	2
00/16-12-077-06W4/0	513675	6168389	565	568	0
00/14-07-077-05W4/0	514226	6168441	566	570	0
00/03-18-077-05W4/0	514395	6168506	566	571	4
AC/01-13-077-06W4/0	513647	6168563	565	568	0
AB/04-18-077-05W4/0	513961	6168591	566	569	0
00/04-18-077-05W4/0	513811	6168667	565	569	0
AB/01-16-077-05W4/0	518637	6168711	583	588	9
00/02-14-077-04W4/0	531061	6168732	572	576	62
00/03-15-077-04W4/0	528918	6168773	571	574	51
AA/01-17-077-05W4/0	516748	6168829	575	578	14
AB/03-16-077-05W4/0	517454	6168853	582	586	15
00/04-13-077-05W4/0	521959	6168867	570	574	26
AA/03-17-077-05W4/0	516109	6168874	571	574	4
AB/02-18-077-05W4/0	514855	6168894	567	570	15
09/01-13-077-06W4/0	513607	6168906	564	569	0
AA/06-13-077-06W4/0	512690	6168987	561	565	0
AB/05-16-077-05W4/0	517183	6169002	579	582	11
00/05-18-077-05W4/0	513992	6169020	565	570	0
AA/08-13-077-06W4/0	513756	6169040	565	568	0
AA/06-18-077-05W4/0	514258	6169044	566	569	3
AC/03-18-077-05W4/0	514302	6169045	556	570	5
F1/07-16-077-05W4/0	518147	6169091	583	587	29
F1/08-16-077-05W4/0	518143	6169105	583	587	23
F1/03-16-077-05W4/0	518138	6169120	583	587	22
AA/07-15-077-05W4/0	519555	6169127	580	584	36
AA/08-15-077-05W4/0	520079	6169128	582	586	42
AA/06-16-077-05W4/0	517485	6169159	579	584	18
AA/07-17-077-05W4/0	516268	6169167	570	573	7
AA/07-16-077-05W4/0	517876	6169179	580	584	19
AB/08-17-077-05W4/0	516630	6169215	572	575	7
AE/06-18-077-05W4/0	514443	6169220	566	569	10
AB/08-13-077-06W4/0	513680	6169223	564	568	0
00/06-18-077-05W4/0	514302	6169243	566	569	5
AA/08-17-077-05W4/0	516930	6169258	575	579	11
AA/05-16-077-05W4/0	517334	6169272	579	582	9

**Table A-2 Geology Picks – McMurray Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	McMurray Aquifer Net Isopach [m]
AA/05-18-077-05W4/0	514009	6169281	565	569	0
AB/07-18-077-05W4/0	514801	6169283	567	570	11
AA/07-13-077-06W4/0	513051	6169286	562	565	0
00/08-16-077-05W4/0	518295	6169308	581	585	27
00/11-18-077-05W4/0	514256	6169363	566	570	4
AA/10-13-077-06W4/0	513345	6169382	562	565	0
AB/11-18-077-05W4/0	514504	6169415	566	569	8
AB/11-16-077-05W4/0	517643	6169417	578	582	13
AB/09-16-077-05W4/0	518476	6169417	580	584	26
00/10-16-077-05W4/0	518056	6169418	580	585	20
AA/09-18-077-05W4/0	515116	6169431	567	571	10
AB/09-13-077-06W4/0	513546	6169464	563	567	4
AA/10-17-077-05W4/0	516421	6169501	571	575	11
AB/12-18-077-05W4/0	513905	6169507	565	568	2
AB/10-18-077-05W4/0	514682	6169508	567	570	4
AA/10-15-077-05W4/0	519512	6169532	579	583	26
AA/12-15-077-05W4/0	518730	6169536	579	583	17
AA/09-15-077-05W4/0	520066	6169575	584	588	35
AB/12-16-077-05W4/0	517098	6169592	574	577	14
AA/11-18-077-05W4/0	514415	6169595	567	570	2
AA/09-13-077-06W4/0	513681	6169598	565	568	7
AA/10-18-077-05W4/0	514784	6169651	567	570	8
AA/11-17-077-05W4/0	516104	6169662	570	574	4
AA/09-16-077-05W4/0	518537	6169671	580	583	33
AA/10-16-077-05W4/0	518192	6169673	580	580	19
AA/12-16-077-05W4/0	517396	6169676	574	577	12
AA/09-17-077-05W4/0	516659	6169694	571	574	15
AA/12-18-077-05W4/0	514116	6169701	565	568	2
AA/12-17-077-05W4/0	515581	6169714	569	573	13
00/12-18-077-05W4/0	513825	6169737	564	567	5
AA/13-13-077-06W4/0	512466	6169806	560	564	0
AA/16-13-077-06W4/0	513512	6169844	562	565	3
AA/15-15-077-05W4/0	519842	6169846	582	585	15
AB/14-18-077-05W4/0	514309	6169886	566	570	3
AA/16-16-077-05W4/0	518388	6169927	579	583	13
AA/15-16-077-05W4/0	518014	6169929	577	581	15
AA/14-16-077-05W4/0	517636	6169930	574	578	17
AA/13-16-077-05W4/0	517246	6169933	573	577	16
AA/16-18-077-05W4/0	515055	6169992	568	571	7
AA/15-13-077-06W4/0	513346	6170039	563	566	3
AB/16-17-077-05W4/0	516708	6170039	570	573	12
AC/13-18-077-05W4/0	513832	6170062	563	566	4
AC/16-16-077-05W4/0	518537	6170106	581	584	19
AA/04-19-077-05W4/0	513978	6170246	562	566	11
AB/01-20-077-05W4/0	516858	6170264	571	574	12
AA/04-21-077-05W4/0	517336	6170270	571	575	15
AA/02-21-077-05W4/0	518158	6170270	575	578	13
AA/02-19-077-05W4/0	514716	6170348	565	569	6
AA/03-21-077-05W4/0	517761	6170369	574	577	15
AB/04-24-077-06W4/0	512417	6170402	561	564	6
AB/01-21-077-05W4/0	518395	6170443	574	577	27
AA/01-20-077-05W4/0	516935	6170518	571	574	16
AB/06-19-077-05W4/0	514573	6170613	564	567	11
00/05-24-077-05W4/0	522213	6170629	584	588	49
AA/06-21-077-05W4/0	517495	6170635	571	575	17



**Table A-2 Geology Picks – McMurray Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	McMurray Aquifer Net Isopach [m]
AA/07-21-077-05W4/0	518121	6170661	573	576	26
AA/05-21-077-05W4/0	517115	6170753	570	574	21
AB/08-21-077-05W4/0	518488	6170754	573	576	20
00/08-20-077-05W4/0	516728	6170798	570	574	12
AA/06-19-077-05W4/0	514323	6170799	563	566	16
00/07-22-077-05W4/0	519547	6170800	582	585	8
AA/06-24-077-06W4/0	512791	6170802	562	565	16
AA/08-19-077-05W4/0	515017	6170812	567	571	11
AB/07-21-077-05W4/0	517853	6170889	571	575	18
AA/11-24-077-06W4/0	512629	6171015	563	566	17
AA/12-21-077-05W4/0	517282	6171027	570	574	20
AA/12-24-077-06W4/0	512306	6171101	562	566	8
AA/10-21-077-05W4/0	518079	6171143	571	575	20
00/11-19-077-05W4/0	514249	6171203	563	566	7
AA/09-24-077-06W4/0	513452	6171211	561	564	21
AA/09-21-077-05W4/0	518499	6171230	572	575	19
AA/11-20-077-05W4/0	516097	6171303	568	571	10
AA/09-19-077-05W4/0	515079	6171307	568	571	16
00/13-24-077-06W4/0	512365	6171402	564	567	4
00/15-22-077-05W4/0	519527	6171455	580	585	15
AA/14-22-077-06W4/0	509574	6171486	566	569	0
AA/16-21-077-05W4/0	518320	6171592	571	574	29
AA/03-25-077-06W4/0	512771	6171802	564	567	9
AA/04-30-077-05W4/0	514000	6171821	562	565	13
AA/01-30-077-05W4/0	515243	6172001	563	566	16
00/04-29-077-04W4/0	525482	6172136	580	583	50
00/07-27-077-05W4/0	519536	6172246	581	584	21
AA/06-25-077-06W4/0	512860	6172264	565	568	15
00/11-28-077-05W4/0	517642	6172602	571	574	32
AA/03-36-077-06W4/0	512805	6173502	568	571	3
00/07-35-077-06W4/0	511646	6174026	573	576	0
00/10-34-077-05W4/0	519836	6174254	577	580	19
00/09-36-077-06W4/0	513372	6174345	573	577	6
00/11-31-077-05W4/0	514519	6174347	578	582	24
00/10-33-077-05W4/0	518038	6174368	580	583	26
00/02-02-078-06W4/0	511644	6175330	591	594	0
00/06-12-078-05W4/0	522521	6177183	575	579	42
00/02-23-078-05W4/0	521128	6180219	571	575	55

**Table A-3 Geology Picks – Wabiskaw Shale Aquitard**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Wabiskaw Shale Top Structure		Wabiskaw Shale Base Structure		Wabiskaw Shale Isopach [m]
					[mKB]	[masl]	[mKB]	[masl]	
00/01-15-079-07W4/4	500007	6188113	561	564	285	279	291	273	6
00/01-15-080-08W4/0	490160	6197873	652	656	366	290	372	284	6
00/01-16-081-05W4/0	517795	6207723	480	483	203	280	212	271	9
00/01-22-070-13W4/0	443080	6102771	583	587	427	160	436	151	9
00/01-25-083-02W4/0	551702	6230686	477	481	208	273	214	267	6
00/02-17-078-08W4/0	487241	6178571	577	579	310	269	316	263	6
00/02-18-079-03W4/0	534106	6188248	569	573	311	262	318	255	7
00/02-22-071-05W4/3	520367	6112193	663	665	425	240	432	233	7
00/02-25-077-19W4/0	386136	6173431	554	558	365	193	371	187	7
00/03-10-088-03W4/0	537067	6274186	474	476	145	331	152	324	7
00/03-14-073-03W4/0	541012	6130264	716	721	498	223	506	215	8
00/03-21-074-07W4/0	498749	6141367	689	693	428	265	438	255	10
00/03-26-068-17W4/2	404861	6085687	551	555	442	113	451	104	9
00/03-27-079-17W4/0	401106	6192562	555	559	342	217	349	210	7
00/03-34-080-07W4/0	499149	6202733	603	606	325	281	330	276	5
00/04-25-074-06W4/0	512952	6143001	662	666	399	267	410	256	11
00/04-30-084-14W4/0	425060	6240748	542	545	244	301	249	296	5
00/05-08-071-06W4/0	506426	6109143	656	660	443	217	446	214	3
00/05-10-086-17W4/0	400795	6255885	506	510	210	300	214	296	4
00/05-12-074-15W4/3	424999	6139198	696	700	514	186	522	178	8
00/05-12-076-19W4/0	385156	6159391	575	579	411	168	419	160	8
00/05-15-068-03W4/0	539461	6082021	736	738	515	223	521	217	6
00/05-19-079-02W4/0	543089	6190447	521	525	253	272	260	265	7
00/05-23-070-08W4/0	492419	6102808	631	635	434	201	438	197	4
00/05-23-075-10W4/0	471699	6151376	683	686	460	226	471	215	11
00/05-27-075-07W4/0	499151	6152895	664	667	409	258	421	246	12
00/06-01-077-19W4/0	385892	6167530	562	566	379	187	381	185	2
00/06-03-074-18W4/0	392971	6137962	591	594	452	142	461	133	9
00/06-11-072-13W4/0	443150	6119124	643	647	475	172	483	164	8
00/06-12-085-17W4/0	404419	6246410	510	513	221	292	226	287	5
00/06-14-079-15W4/2	422484	6189239	638	648	408	240	416	232	8
00/06-15-074-03W4/0	539087	6140312	655	658	477	181	482	176	5
00/06-16-069-03W4/0	538110	6091710	719	722	528	194	535	187	7
00/06-16-074-04W4/0	527749	6139999	617	620	375	245	379	241	4
00/06-16-083-13W4/0	438098	6227773	572	574	286	288	293	281	7
00/06-21-079-14W4/0	429081	6190581	710	714	472	242	479	235	7
00/06-23-079-13W4/0	442004	6190469	683	686	439	247	445	241	6
00/06-25-082-15W4/0	424587	6221537	567	570	292	278	295	275	3

**Table A-3 Geology Picks – Wabiskaw Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Wabiskaw Shale Top Structure		Wabiskaw Shale Base Structure		Wabiskaw Shale Isopach [m]
					[mKB]	[masl]	[mKB]	[masl]	
00/06-26-076-06W4/0	511002	6162551	567	570	314	256	319	251	5
00/06-28-076-17W4/2	400282	6163797	693	696	506	190	513	183	7
00/06-30-083-05W4/0	513285	6230838	532	535	248	287	257	278	9
00/06-35-068-13W4/0	443754	6086703	599	602	453	149	462	140	9
00/07-08-068-10W4/0	468659	6080192	711	713	553	160	561	152	8
00/07-10-073-13W4/0	442256	6129144	665	669	478	191	488	181	10
00/07-11-075-17W4/0	403715	6149211	640	644	476	168	484	160	8
00/07-12-079-05W4/0	522695	6187169	529	532	269	263	276	256	7
00/07-13-078-01W4/0	562036	6179117	579	583	303	280	309	274	6
00/07-14-070-17W4/0	405311	6102239	578	581	458	123	469	112	11
00/07-14-074-12W4/0	453683	6140202	660	664	457	207	462	202	5
00/07-15-068-06W4/0	511089	6081750	694	697	504	193	513	184	9
00/07-15-082-13W4/0	441048	6218221	613	616	339	277	348	268	9
00/07-16-077-17W4/0	400966	6170095	614	617	423	194	429	188	6
00/07-17-075-03W4/0	536166	6149993	624	627	420	207	425	202	5
00/07-20-072-01W4/0	556199	6122656	692	696	496	200	502	194	6
00/07-21-070-06W4/0	509430	6102806	638	641	425	216	427	214	2
00/07-21-071-01W4/0	558053	6112846	730	735	541	194	546	189	5
00/07-21-084-10W4/0	468056	6238856	634	637	327	310	340	297	13
00/07-22-074-17W4/0	403414	6142590	587	590	474	116	480	110	6
00/07-22-078-10W4/0	470766	6180715	633	636	372	264	379	257	7
00/07-24-086-03W4/0	541220	6258519	475	477	143	334	149	328	6
00/07-26-069-01W4/0	561574	6095103	690	694	478	216	483	211	5
00/07-29-074-09W4/0	478026	6143344	660	664	420	244	426	238	6
00/07-29-078-03W4/0	535830	6182146	551	555	291	264	299	256	8
00/07-32-079-06W4/0	506179	6193341	547	550	276	274	284	266	8
00/07-33-079-01W4/0	556854	6193890	531	534	253	281	257	277	4
00/08-12-082-17W4/0	405937	6216971	535	538	275	263	282	256	7
00/08-15-069-06W4/0	511237	6091559	698	701	493	208	499	202	6
00/08-15-071-13W4/0	442071	6111420	633	636	473	163	483	153	10
00/08-15-079-10W4/0	470595	6188469	669	672	402	270	409	263	7
00/08-16-069-07W4/0	500077	6091515	624	627	429	198	436	191	7
00/08-16-072-06W4/0	509087	6120484	711	715	468	247	476	239	8
00/08-16-075-05W4/4	518411	6149786	617	621	362	259	369	252	7
00/08-16-080-10W4/0	469158	6198512	690	694	411	283	419	275	8
00/08-16-081-13W4/0	439631	6208578	685	688	423	265	430	258	7
00/08-21-074-05W4/0	519000	6141661	654	657	392	265	405	252	13
00/08-22-074-10W4/0	471675	6141878	667	670	439	231	449	221	10

**Table A-3 Geology Picks – Wabiskaw Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Wabiskaw Shale Top Structure		Wabiskaw Shale Base Structure		Wabiskaw Shale Isopach [m]
					[mKB]	[masl]	[mKB]	[masl]	
00/08-24-076-02W4/0	552717	6161338	631	634	305	329	309	325	4
00/08-33-081-01W4/0	556898	6213306	481	485	228	257	235	250	7
00/09-06-085-13W4/0	435858	6244563	538	541	232	309	240	301	8
00/09-07-080-01W4/0	554030	6197346	562	565	272	293	279	286	7
00/09-09-085-05W4/0	517236	6245629	474	479	180	299	184	295	4
00/09-10-071-19W4/0	383267	6111170	582	586	467	119	473	113	6
00/09-11-071-17W4/0	404534	6110652	560	563	422	141	430	133	8
00/09-11-074-14W4/0	434369	6139244	731	734	546	188	553	181	7
00/09-12-073-01W4/0	563124	6129544	665	670	455	215	463	207	8
00/09-16-083-03W4/2	536867	6228043	460	464	166	298	171	293	5
00/09-17-084-06W4/0	506142	6237469	494	498	202	296	210	288	8
00/09-21-081-10W4/0	469308	6209910	706	709	419	290	428	281	9
00/10-01-079-16W4/0	414594	6186649	604	607	377	230	383	224	6
00/10-09-074-08W4/0	489322	6138832	699	703	444	259	452	251	8
00/10-09-080-17W4/2	399956	6198172	554	558	330	228	336	222	6
00/10-10-084-15W4/0	420748	6236636	548	550	246	304	252	298	6
00/10-11-076-08W4/0	492090	6158328	638	640	392	248	402	238	10
00/10-14-073-10W4/0	473085	6130783	660	664	440	224	445	219	5
00/10-14-074-08W4/0	492560	6140515	697	702	447	255	458	244	11
00/10-15-071-07W4/0	500755	6111377	647	650	425	225	432	218	7
00/10-15-071-08W4/0	491012	6111381	665	669	447	222	457	212	10
00/10-15-072-03W4/0	540013	6121054	690	694	477	217	482	212	5
00/10-15-072-08W4/0	490936	6121154	684	687	451	236	459	228	8
00/10-15-073-08W4/0	491026	6130777	711	714	475	239	479	235	4
00/10-16-072-07W4/0	499167	6121123	699	702	470	232	476	226	6
00/10-16-078-13W4/0	440219	6179799	665	669	428	241	434	235	6
00/10-16-084-03W4/0	536490	6237590	455	458	186	272	193	265	7
00/10-20-077-03W4/0	535790	6171106	565	569	329	240	338	231	9
00/10-21-083-17W4/0	399545	6230411	540	543	270	273	275	268	5
00/10-22-078-05W4/2	519659	6180938	589	591	323	268	328	263	5
00/10-23-072-10W4/0	473056	6122779	669	672	457	215	462	210	5
00/10-28-075-06W4/0	508282	6153350	615	618	360	258	373	245	13
00/10-31-073-20W4/0	368849	6137540	695	697	558	139	564	133	6
00/10-32-076-03W4/0	535839	6164716	575	580	350	230	356	224	6
00/11-04-074-13W4/0	440112	6137563	696	700	507	193	516	184	9
00/11-08-068-01W4/0	556130	6081005	666	670	533	137	543	127	10
00/11-11-081-03W4/0	539715	6206754	465	468	211	257	219	249	8
00/11-11-083-08W4/0	490445	6226193	732	735	439	296	447	288	8

**Table A-3 Geology Picks – Wabiskaw Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Wabiskaw Shale Top Structure		Wabiskaw Shale Base Structure		Wabiskaw Shale Isopach [m]
					[mKB]	[masl]	[mKB]	[masl]	
00/11-15-068-07W4/0	500972	6081993	637	640	460	180	466	174	6
00/11-15-073-05W4/0	519965	6130604	683	686	429	257	434	252	5
00/11-15-073-06W4/2	510068	6130730	679	683	420	263	429	254	9
00/11-15-077-07W4/0	499652	6169620	568	571	305	266	313	258	8
00/11-15-079-09W4/2	479781	6188862	675	679	401	278	407	272	6
00/11-15-080-13W4/0	440323	6199252	685	688	435	253	442	246	7
00/11-16-079-04W4/0	527043	6188849	528	532	268	264	273	259	5
00/11-16-080-06W4/0	507255	6198674	581	584	310	274	320	264	10
00/11-18-081-06W4/0	504082	6208375	558	560	273	287	282	278	9
00/11-20-072-17W4/0	399222	6123821	580	583	427	156	433	150	6
00/11-21-069-17W4/0	401463	6094468	557	560	454	106	460	100	6
00/11-22-074-16W4/0	412612	6142959	646	649	472	177	477	172	5
00/11-22-077-10W4/0	470354	6171287	642	646	397	249	403	243	6
00/11-29-074-01W4/0	555278	6144048	694	697	471	226	475	222	4
00/11-34-070-01W4/0	559141	6106582	702	707	508	199	513	194	5
00/12-11-076-10W4/0	471691	6158332	668	672	428	244	440	232	12
00/12-14-072-05W4/0	521049	6120871	714	718	473	245	476	242	3
00/12-15-075-08W4/0	489649	6150172	649	653	404	249	415	238	11
00/12-16-070-07W4/0	498934	6101475	649	651	433	218	443	208	10
00/12-21-077-08W4/0	488017	6171153	563	567	304	263	310	257	6
00/12-22-068-05W4/0	520164	6083749	691	693	492	201	504	189	12
00/12-27-082-10W4/0	469433	6221435	710	713	419	294	426	287	7
00/12-29-082-03W4/0	534534	6221514	475	478	188	290	195	283	7
00/13-03-081-17W4/0	401201	6206574	545	549	295	254	301	248	6
00/13-09-078-07W4/2	497886	6177893	549	553	274	279	286	267	12
00/13-14-075-16W4/0	412526	6151395	729	733	548	185	553	180	5
00/13-15-070-05W4/0	519936	6101955	668	672	409	263	421	251	12
00/13-15-079-08W4/0	488905	6189524	611	615	330	285	337	278	7
00/13-15-079-11W4/2	459732	6189495	688	691	424	267	431	260	7
00/13-16-079-12W4/0	448294	6189688	682	685	426	259	432	253	6
00/13-21-073-17W4/0	400823	6133770	578	582	411	171	417	165	6
00/14-14-074-11W4/2	462858	6140887	671	674	458	216	466	208	8
00/14-15-081-07W4/0	499188	6208602	623	628	340	288	348	280	8
00/14-22-070-10W4/0	471595	6103417	646	649	456	193	464	185	8
00/14-27-072-06W4/0	510112	6124652	710	714	476	238	482	232	6
00/15-05-068-08W4/0	488312	6079384	669	672	506	166	511	161	5
00/15-08-076-05W4/0	516273	6158713	573	577	325	252	331	246	6
00/15-16-071-03W4/0	538143	6111667	678	683	492	191	498	185	6

**Table A-3 Geology Picks – Wabiskaw Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Wabiskaw Shale Top Structure		Wabiskaw Shale Base Structure		Wabiskaw Shale Isopach [m]
					[mKB]	[masl]	[mKB]	[masl]	
00/16-04-070-19W4/0	382947	6100146	556	559	459	100	474	85	15
00/16-15-076-13W4/0	441706	6160490	714	718	504	214	510	208	6
00/16-15-080-05W4/0	519422	6198990	466	469	211	258	218	251	7
00/16-16-077-13W4/0	440526	6170220	682	685	457	228	463	222	6
00/16-16-081-08W4/0	488510	6208611	734	737	443	294	452	285	9
00/16-19-072-18W4/0	388512	6124235	605	609	467	142	472	137	5
00/16-20-071-19W4/0	380363	6114710	591	595	469	126	477	118	8
00/16-27-070-20W4/0	374987	6106769	589	592	482	110	491	101	9
02/01-15-075-13W4/0	441580	6149721	705	709	508	201	514	195	6
02/04-22-070-03W4/0	539416	6102687	705	707	476	231	481	226	5
02/07-33-079-01W4/0	556862	6193890	531	534	250	284	257	277	7
03/10-14-076-07W4/0	501817	6159851	592	595	329	266	338	257	9
AA/02-17-090-07W4/0	495251	6294987	453	453	128	325	134	319	6
AA/02-20-088-05W4/0	514786	6277189	463	466	132	334	137	329	5
AA/03-16-077-05W4/0	517818	6168676	585	588	334	254	341	247	7
AA/04-22-087-07W4/0	497770	6267559	437	440	115	325	120	320	5
AA/05-23-077-06W4/0	510868	6170805	563.8	566.8	306	261	317	250	11
AA/06-10-087-06W4/0	508047	6264798	444.5	447.5	111	337	118	330	7
AA/06-18-084-07W4/0	493648	6237258	732.7	734.4	429	305	435	299	6
AA/08-21-073-07W4/0	499513	6131902	730.5	734.2	478	256	490	244	12
AA/09-14-078-06W4/0	511711	6179142	586.7	589.9	328	262	333	257	5
AA/10-02-087-06W4/0	509956	6263513	450.4	453.4	125	328	132	321	7
AA/10-27-086-07W4/0	499000	6260200	486.4	489.4	185	304	191	298	6
AA/11-15-083-06W4/0	508516	6227937	585	587.4	292	295	301	286	9
AA/11-15-083-07W4/0	498554	6227713	698.3	700.3	405	295	414	286	9
AA/16-16-082-07W4/0	498437	6218350	744.7	746.2	456	290	464	282	8
AC/07-28-085-10W4/0	468071	6250166	519.9	523.1	215	308	220	303	5

**Table A-4 Geology Picks – Upper Clearwater Aquifer**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/01-25-076-01W4/0	562294	6162605	28
00/08-24-076-02W4/0	552717	6161338	26
AA/07-27-076-04W4/0	529390	6162611	25
AA/01-28-076-04W4/0	528308	6162319	25
AA/10-30-076-04W4/0	524401	6163171	24
00/10-30-076-04W4/0	524691	6163222	24
AA/04-32-076-04W4/0	525395	6163932	24
00/06-22-076-04W4/0	529105	6161256	24
00/08-34-076-04W4/0	529670	6164341	24
00/13-10-076-04W4/0	528563	6158829	24
AA/15-30-076-04W4/0	524671	6163518	24
00/06-35-076-05W4/0	520725	6164140	24
00/08-34-076-04W4/2	529670	6164341	24
AA/02-28-076-04W4/0	527861	6162337	24
AA/08-30-076-04W4/0	524977	6162718	24
AA/07-28-076-04W4/0	527883	6162688	23
AA/04-33-076-04W4/0	527224	6164128	23
AB/14-29-076-04W4/0	525997	6163508	23
AA/04-16-076-04W4/0	526970	6159093	23
00/10-27-076-04W4/0	529581	6163254	23
AA/09-29-076-04W4/0	526600	6163255	23
AA/02-29-076-04W4/0	526214	6162363	23
AA/13-32-076-04W4/0	525270	6165018	23
AB/13-29-076-04W4/0	525414	6163444	23
AA/08-33-076-04W4/0	528336	6164513	23
AA/12-06-077-04W4/0	523761	6166464	23
AA/06-07-077-05W4/0	514252	6167424	23
AB/07-07-077-05W4/0	514928	6167391	23
AA/08-02-077-05W4/0	521589	6166101	23
AA/08-29-076-04W4/0	526742	6162893	23
AB/11-07-077-05W4/0	514261	6167991	23
AA/03-33-076-04W4/0	527402	6163932	23
AA/06-29-076-04W4/0	525694	6162887	23
AA/10-31-076-04W4/0	524441	6164876	23
00/14-10-077-06W4/0	509620	6168396	23
AA/08-28-076-04W4/0	528321	6162796	23
AA/10-02-077-05W4/0	521168	6166368	23
AA/06-36-076-05W4/0	522666	6164421	23
AA/04-05-077-04W4/0	525597	6165530	23
00/07-31-076-04W4/0	524733	6164341	23
00/01-07-077-05W4/0	515030	6167145	23
AA/03-07-077-05W4/0	514287	6167196	23
AA/03-03-077-05W4/0	519267	6165543	23
AA/07-33-076-04W4/0	527706	6164296	23
AA/11-01-077-05W4/0	522571	6166215	23
AA/02-05-077-04W4/0	526163	6165515	23
AA/01-04-077-05W4/0	518370	6165607	23
AA/09-32-076-04W4/0	526807	6164746	23
AA/12-30-076-04W4/0	523784	6163007	22
AA/14-28-076-04W4/0	527410	6163481	22
AA/03-05-077-04W4/0	525837	6165591	22
00/15-35-076-04W4/0	531170	6165308	22
AA/16-34-076-05W4/0	520120	6165223	22
AA/09-36-076-05W4/0	523435	6164885	22
AA/01-31-076-04W4/0	524933	6163801	22

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
02/15-35-076-04W4/0	531057	6165160	22
00/14-11-077-06W4/0	510993	6168154	22
AB/16-06-077-05W4/0	515081	6166907	22
AA/09-28-076-04W4/0	528229	6163140	22
AA/12-33-076-04W4/0	527162	6164698	22
AB/07-33-076-04W4/0	527990	6164192	22
AA/05-32-076-04W4/0	525252	6164304	22
AA/06-18-077-05W4/0	514258	6169044	22
AA/01-32-076-04W4/0	526515	6164017	22
AB/05-33-076-04W4/0	527104	6164398	22
00/03-18-077-05W4/0	514395	6168506	22
AA/06-35-076-05W4/0	520976	6164122	22
00/05-03-077-05W4/0	518982	6165951	22
00/03-01-077-05W4/0	522523	6165461	22
00/06-08-077-05W4/0	516206	6167624	22
AB/08-32-076-04W4/0	526715	6164441	22
00/10-22-076-03W4/0	539367	6161698	22
AA/04-29-076-04W4/0	525235	6162400	22
AA/02-07-077-05W4/0	514722	6167163	22
AA/08-22-076-04W4/0	529894	6161126	22
00/14-33-076-03W4/0	537242	6165202	22
00/11-04-077-05W4/0	517476	6166149	22
AA/15-20-076-04W4/0	526207	6161786	22
AA/13-31-076-04W4/0	523928	6165174	22
AA/09-07-076-04W4/0	524875	6158079	22
00/10-27-076-05W4/0	519813	6163197	22
AA/15-33-076-05W4/0	518154	6165216	22
AA/06-34-076-05W4/0	519206	6164282	22
00/08-30-076-03W4/0	534826	6162853	22
AB/04-05-077-04W4/0	525313	6165468	22
00/12-36-076-05W4/0	522277	6164526	22
AB/11-33-076-04W4/0	527446	6164790	22
AA/04-26-076-04W4/0	530310	6162352	22
00/10-21-076-04W4/0	527970	6161619	22
AA/01-33-076-04W4/0	528187	6163998	22
00/01-01-077-06W4/0	513463	6165534	21
00/06-16-077-06W4/0	507767	6169029	21
00/14-07-077-05W4/0	514226	6168441	21
AA/12-07-077-05W4/0	514078	6167812	21
AA/16-28-076-04W4/0	528257	6163636	21
00/05-18-077-05W4/0	513992	6169020	21
AA/15-28-076-04W4/0	527755	6163576	21
00/02-33-076-04W4/0	527812	6163937	21
AA/11-07-077-05W4/0	514452	6167855	21
AB/08-04-077-05W4/0	518574	6166073	21
AA/12-32-076-04W4/0	525242	6164738	21
AA/03-18-077-05W4/0	514245	6168591	21
AA/16-06-077-05W4/0	515033	6166669	21
AB/13-04-077-05W4/0	517427	6166571	21
AC/13-33-076-04W4/0	526956	6165345	21
00/05-12-077-05W4/0	522287	6167621	21
00/13-32-076-04W4/0	525572	6165275	21
AA/08-35-076-05W4/0	521834	6164187	21
00/16-12-076-04W4/0	533136	6158784	21
AA/06-08-076-04W4/0	525963	6158042	21



**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
AA/14-07-077-05W4/0	514364	6168367	21
00/08-07-077-05W4/0	515131	6167621	21
AA/03-04-077-05W4/0	517794	6165515	21
AA/07-32-076-04W4/0	526162	6164418	21
00/02-06-077-04W4/0	524443	6165716	21
AA/14-31-076-04W4/0	524349	6165322	21
AB/05-31-076-04W4/0	523636	6164392	21
AA/10-08-077-05W4/0	516474	6167849	21
00/04-29-077-04W4/0	525482	6172136	21
AA/15-07-077-05W4/0	514772	6168288	21
AB/13-07-077-05W4/0	513894	6168162	21
AA/15-06-077-05W4/0	514639	6166838	21
00/13-14-076-04W4/0	530141	6160466	21
AB/10-07-077-05W4/0	514965	6167867	21
AB/12-32-076-04W4/0	525466	6164884	21
00/10-32-076-03W4/0	535840	6164716	21
AA/05-08-077-05W4/0	515578	6167699	21
00/16-10-077-06W4/0	510351	6168364	21
AA/14-33-076-05W4/0	517503	6165213	21
AA/02-23-076-04W4/0	531024	6160757	21
AB/07-18-077-05W4/0	514801	6169283	21
AA/09-07-077-05W4/0	515364	6167870	21
AA/11-19-076-04W4/0	524310	6161449	21
AA/14-32-076-04W4/0	525839	6165189	21
AA/12-04-077-05W4/0	517156	6166377	21
AA/03-16-077-05W4/0	517818	6168676	21
AA/07-18-077-05W4/0	514625	6169127	21
00/05-33-076-03W4/0	536795	6164399	21
00/06-19-076-03W4/0	534096	6161293	21
00/10-33-076-04W4/0	527885	6164649	21
AA/04-07-077-04W4/0	523738	6167167	21
AA/05-05-077-04W4/0	525336	6165839	21
AC/10-07-077-05W4/0	514755	6168003	21
00/03-14-077-06W4/0	510999	6168916	21
AA/07-07-077-05W4/0	514709	6167642	21
AB/10-33-076-05W4/0	517963	6164833	21
09/01-13-077-06W4/0	513607	6168906	21
AA/06-33-076-05W4/0	517676	6164213	21
AB/05-16-077-05W4/0	517183	6169002	21
F1/08-16-077-05W4/0	518143	6169105	21
00/02-26-076-04W4/0	531080	6162486	21
AA/15-32-076-04W4/0	526137	6165173	21
AB/11-33-076-05W4/0	517736	6164624	20
AA/07-33-076-05W4/0	518090	6164329	20
AB/13-33-076-04W4/0	526873	6164971	20
AA/10-28-076-04W4/0	527900	6163169	20
F1/07-16-077-05W4/0	518147	6169091	20
00/05-15-077-06W4/0	509147	6169031	20
AB/03-16-077-05W4/0	517454	6168853	20
AC/01-06-077-04W4/0	524985	6165365	20
AA/05-08-077-04W4/0	525218	6167651	20
AA/13-28-076-04W4/0	526986	6163532	20
AA/01-13-077-06W4/0	513648	6168773	20
AA/03-17-077-05W4/0	516109	6168874	20
AA/16-04-077-05W4/0	518384	6166864	20

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
AA/01-29-076-04W4/0	526540	6162361	20
00/15-31-076-04W4/0	524681	6165176	20
AA/06-07-077-04W4/0	524181	6167599	20
AB/14-18-077-05W4/0	514309	6169886	20
00/12-05-077-04W4/0	525208	6166376	20
AA/06-33-076-04W4/0	527414	6164512	20
AA/08-05-077-05W4/0	516945	6165898	20
AA/13-13-077-06W4/0	512466	6169806	20
AA/09-13-077-06W4/0	513681	6169598	20
AA/11-33-076-05W4/0	517480	6164810	20
00/06-03-077-03W4/0	538827	6166112	20
00/11-30-076-07W4/0	494718	6163114	20
AB/12-18-077-05W4/0	513905	6169507	20
AA/06-13-077-06W4/0	512690	6168987	20
AA/13-07-077-05W4/0	514065	6168367	20
00/16-27-075-04W4/0	529800	6153800	20
AA/04-18-077-05W4/0	514052	6168801	20
AA/07-05-077-05W4/0	516325	6166098	20
AA/05-05-077-05W4/0	515500	6165936	20
AA/05-11-077-05W4/0	520368	6167572	20
AA/16-19-076-04W4/0	525004	6161862	20
AB/08-07-077-05W4/0	515307	6167430	20
00/10-10-077-06W4/0	509939	6167908	20
00/10-10-077-06W4/2	509939	6167908	20
AA/15-05-077-05W4/0	516466	6166853	20
AA/12-17-077-05W4/0	515581	6169714	20
00/12-18-077-05W4/0	513825	6169737	20
AA/08-31-076-04W4/0	524974	6164161	20
AB/08-09-077-05W4/0	518347	6167542	20
AA/06-04-077-04W4/0	527512	6165975	20
00/10-22-076-01W4/0	558837	6161799	20
00/11-09-076-02W4/0	546944	6158624	20
00/14-29-076-03W4/0	535435	6163588	20
AE/06-18-077-05W4/0	514443	6169220	20
AB/16-23-077-06W4/0	511802	6171400	20
AA/16-23-077-06W4/0	512038	6171404	20
AA/09-24-077-06W4/0	513452	6171211	20
AC/01-13-077-06W4/0	513647	6168563	20
AC/03-18-077-05W4/0	514302	6169045	20
AB/12-16-077-05W4/0	517098	6169592	20
AA/06-05-077-04W4/0	525710	6165814	20
00/06-33-076-04W4/0	527544	6164151	20
00/08-16-077-05W4/0	518295	6169308	20
AA/01-17-077-05W4/0	516748	6168829	20
AA/03-08-077-04W4/0	525941	6167178	20
00/10-18-077-06W4/0	504926	6169453	20
AA/15-32-076-05W4/0	516531	6165204	20
00/06-18-077-05W4/0	514302	6169243	20
AA/02-18-077-05W4/0	514700	6168648	20
AB/02-18-077-05W4/0	514855	6168894	20
00/11-03-077-04W4/0	528893	6166433	20
AA/13-04-077-05W4/0	517386	6166857	20
AA/06-32-076-04W4/0	525619	6164195	20
AA/02-13-077-06W4/0	513348	6168609	20
00/08-33-076-05W4/0	518413	6164296	20

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/10-27-077-04W4/0	529519	6172965	20
AB/04-18-077-05W4/0	513961	6168591	20
AB/16-12-077-06W4/0	513385	6168240	20
AA/02-09-077-05W4/0	517941	6167004	20
AC/13-04-077-05W4/0	517158	6166692	20
00/07-07-077-04W4/0	524570	6167639	20
AA/08-13-077-06W4/0	513756	6169040	19
AA/13-33-076-04W4/0	527146	6164968	19
AA/02-07-077-04W4/0	524535	6166991	19
AA/05-18-077-05W4/0	514009	6169281	19
AA/11-16-077-05W4/0	517819	6169680	19
AA/10-13-077-06W4/0	513345	6169382	19
AA/16-18-077-05W4/0	515055	6169992	19
AA/03-25-077-06W4/0	512771	6171802	19
00/06-28-076-04W4/0	527488	6162664	19
AA/05-16-077-05W4/0	517334	6169272	19
AA/11-05-077-04W4/0	525850	6166432	19
00/07-32-076-05W4/0	516531	6164353	19
00/07-13-077-06W4/0	513350	6168979	19
AA/13-18-077-05W4/0	513952	6169881	19
AA/11-18-077-05W4/0	514415	6169595	19
00/03-05-077-05W4/0	515981	6165608	19
AA/13-08-077-05W4/0	515545	6168289	19
AB/01-06-077-04W4/0	524953	6165707	19
00/14-31-077-03W4/0	533939	6174818	19
AA/12-17-076-04W4/0	525503	6160005	19
00/07-17-077-06W4/0	506720	6169028	19
00/11-14-077-06W4/0	511118	6169737	19
AA/01-07-077-05W4/0	515301	6167056	19
AA/16-08-077-05W4/0	516955	6168163	19
AA/09-17-076-04W4/0	526491	6160011	19
AA/02-30-076-04W4/0	524455	6162221	19
AA/11-17-076-04W4/0	525855	6159871	19
AA/07-16-077-05W4/0	517876	6169179	19
00/05-01-078-04W4/0	531986	6175863	19
AA/07-13-077-06W4/0	513051	6169286	19
AA/11-06-077-05W4/0	514236	6166252	19
AB/10-18-077-05W4/0	514682	6169508	19
AA/11-17-077-05W4/0	516104	6169662	19
AA/03-19-077-05W4/0	514325	6170445	19
AA/12-09-077-05W4/0	517118	6167878	19
00/07-11-077-05W4/0	521183	6167620	19
AA/15-07-077-04W4/0	524548	6168363	19
00/10-16-077-05W4/0	518056	6169418	19
AA/12-21-077-05W4/0	517282	6171027	19
AA/12-18-077-05W4/0	514116	6169701	19
AA/12-08-077-05W4/0	515753	6167989	19
AB/11-18-077-05W4/0	514504	6169415	19
AB/08-17-077-05W4/0	516630	6169215	19
00/06-05-077-05W4/0	515924	6166049	19
AA/08-17-077-05W4/0	516930	6169258	19
00/10-29-076-05W4/0	516465	6163163	19
00/05-01-076-04W4/0	532129	6156316	19
AA/16-07-077-05W4/0	515200	6168156	19
00/02-23-077-04W4/0	531108	6170427	19

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
AA/11-05-077-05W4/0	516010	6166416	19
AA/10-17-077-05W4/0	516421	6169501	19
AA/04-19-077-05W4/0	513978	6170246	19
AA/09-17-077-05W4/0	516659	6169694	19
AB/09-16-077-05W4/0	518476	6169417	19
AC/16-16-077-05W4/0	518537	6170106	19
AA/01-18-077-04W4/0	524947	6168854	19
00/11-34-077-03W4/0	538733	6174557	19
00/10-32-076-05W4/0	516418	6164803	19
AA/02-23-077-06W4/0	511582	6170404	19
AB/12-08-077-05W4/0	515439	6168095	19
AB/08-13-077-06W4/0	513680	6169223	19
00/05-10-077-05W4/0	518903	6167617	19
AA/14-15-076-04W4/0	529143	6160267	19
F1/03-16-077-05W4/0	518138	6169120	19
AA/04-10-077-05W4/0	519020	6167164	19
AA/01-30-077-05W4/0	515243	6172001	19
00/11-26-077-04W4/0	530784	6172956	19
AA/01-06-076-04W4/0	525099	6155732	19
AA/02-13-076-06W4/0	513083	6159029	19
AA/04-24-077-06W4/0	512379	6170203	18
AA/04-08-077-04W4/0	525298	6167010	18
AA/16-21-077-05W4/0	518320	6171592	18
AA/06-21-077-05W4/0	517495	6170635	18
AA/10-21-077-05W4/0	518079	6171143	18
00/07-26-077-05W4/0	521456	6172574	18
00/01-29-077-04W4/0	526635	6172007	18
AA/01-23-077-06W4/0	512094	6170501	18
AA/06-22-077-06W4/0	509502	6170704	18
AA/12-24-077-06W4/0	512306	6171101	18
AB/06-19-077-05W4/0	514573	6170613	18
AB/09-13-077-06W4/0	513546	6169464	18
AB/11-16-077-05W4/0	517643	6169417	18
AA/09-16-077-05W4/0	518537	6169671	18
00/04-13-077-05W4/0	521959	6168867	18
03/10-29-077-05W4/0	516424	6172779	18
00/06-29-077-03W4/0	535527	6172416	18
AA/03-26-077-06W4/0	511066	6172101	18
AA/14-18-077-05W4/0	514327	6170086	18
AC/13-18-077-05W4/0	513832	6170062	18
00/10-20-076-07W4/0	496896	6161577	18
AA/07-18-077-04W4/0	524414	6169120	18
00/07-30-076-05W4/2	514848	6162812	18
AA/13-05-077-05W4/0	515781	6166850	18
AA/11-23-077-06W4/0	510987	6171123	18
AB/11-24-077-06W4/0	512734	6171302	18
AA/08-18-077-05W4/0	515046	6169092	18
AA/11-24-077-06W4/0	512629	6171015	18
00/12-11-077-04W4/0	530454	6167852	18
AA/06-06-077-04W4/0	524357	6166064	18
00/07-22-077-05W4/0	519547	6170800	18
00/11-19-077-03W4/0	533940	6171078	18
AA/07-24-077-06W4/0	513092	6170805	18
00/11-03-077-06W4/0	509447	6166345	18
AA/06-25-077-06W4/0	512860	6172264	18

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/10-31-076-05W4/0	514785	6164719	18
AA/05-24-077-06W4/0	512524	6170701	18
AA/02-19-077-05W4/0	514716	6170348	18
00/14-16-077-05W4/0	517562	6170118	18
AA/12-13-077-05W4/0	522108	6169584	18
00/11-02-077-04W4/0	530513	6166459	18
AA/06-24-077-06W4/0	512791	6170802	18
AA/08-23-077-06W4/0	512045	6170807	18
00/07-30-076-05W4/0	514848	6162812	18
00/11-18-077-05W4/0	514256	6169363	18
00/05-30-077-05W4/0	513983	6172540	18
AA/01-24-077-06W4/0	513614	6170406	18
00/02-26-077-06W4/0	511647	6172169	18
02/10-29-077-05W4/0	516480	6172696	18
AA/02-21-077-05W4/0	518158	6170270	18
00/13-20-076-04W4/0	525529	6161798	18
00/15-22-077-05W4/0	519527	6171455	18
AA/05-23-077-06W4/0	510868	6170805	18
AA/14-04-077-05W4/0	517697	6166720	18
AB/04-24-077-06W4/0	512417	6170402	18
AA/11-09-077-05W4/0	517508	6168101	18
AA/12-15-077-05W4/0	518730	6169536	18
AA/10-18-077-05W4/0	514784	6169651	18
00/10-33-077-05W4/0	518038	6174368	18
AA/08-14-077-05W4/0	521697	6169172	18
00/11-28-077-05W4/0	517642	6172602	18
AA/05-21-077-05W4/0	517115	6170753	18
00/02-18-077-04W4/0	524413	6168846	18
00/08-06-078-04W4/0	524699	6175517	18
00/09-01-077-06W4/0	513538	6166415	18
00/10-18-076-04W4/0	524691	6159968	18
AA/14-22-077-06W4/0	509574	6171486	18
AA/09-23-077-06W4/0	511827	6171007	18
AA/04-30-077-05W4/0	514000	6171821	18
00/02-21-077-05W4/0	517979	6170186	18
AA/08-13-077-05W4/0	523206	6169078	18
00/08-20-077-05W4/0	516728	6170798	18
00/14-33-077-03W4/0	537108	6175000	18
00/10-19-077-06W4/0	504898	6171290	17
AA/08-06-077-05W4/0	515033	6166042	17
AA/07-21-077-05W4/0	518121	6170661	17
00/02-02-078-06W4/0	511644	6175330	17
AA/04-20-076-04W4/0	525450	6160831	17
AA/09-21-077-05W4/0	518499	6171230	17
00/03-18-077-04W4/0	524081	6168824	17
00/07-27-077-05W4/0	519536	6172246	17
AA/08-22-077-07W4/0	500555	6170930	17
00/11-16-076-04W4/0	527454	6159868	17
AA/05-14-077-05W4/0	520499	6169146	17
AA/06-19-077-05W4/0	514323	6170799	17
AA/03-36-077-06W4/0	512805	6173502	17
AA/15-15-077-05W4/0	519842	6169846	17
AA/03-13-077-05W4/0	522490	6168778	17
AA/15-16-077-05W4/0	518014	6169929	17
00/09-30-077-06W4/0	505261	6172584	17

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/13-29-077-04W4/0	525453	6173133	17
AA/10-30-077-06W4/0	505212	6172670	17
00/06-34-076-05W4/0	519480	6164203	17
00/12-20-077-06W4/0	505963	6170959	17
AA/15-13-077-06W4/0	513346	6170039	17
AA/02-25-077-06W4/0	513152	6171834	17
AA/16-13-077-06W4/0	513512	6169844	17
AA/03-09-077-05W4/0	517549	6167171	17
00/07-15-077-06W4/0	510041	6169030	17
AB/01-16-077-05W4/0	518637	6168711	17
AB/07-21-077-05W4/0	517853	6170889	17
AA/16-10-077-05W4/0	520077	6168314	17
AB/11-09-077-05W4/0	517517	6167786	17
00/13-19-076-04W4/0	523893	6161784	17
AA/10-15-077-05W4/0	519512	6169532	17
00/13-24-077-06W4/0	512365	6171402	17
00/11-21-077-05W4/0	517434	6171328	17
AA/01-13-077-05W4/0	523207	6168614	17
00/06-24-077-07W4/0	502839	6170724	17
AA/04-23-077-06W4/0	510852	6170400	17
00/08-13-076-04W4/0	533184	6159470	17
AA/04-21-077-05W4/0	517336	6170270	17
AA/16-16-077-05W4/0	518388	6169927	17
AA/02-20-076-04W4/0	526367	6160716	17
00/10-36-077-05W4/0	522899	6174381	17
00/10-36-076-06W4/0	513166	6164677	17
AA/09-18-077-05W4/0	515116	6169431	17
AA/02-01-078-06W4/0	513246	6175349	17
AA/14-16-077-05W4/0	517636	6169930	17
00/06-20-077-04W4/0	525753	6170764	17
00/06-02-078-04W4/0	530504	6175607	17
AA/16-22-077-07W4/0	500617	6171654	17
00/06-09-077-05W4/0	517821	6167619	16
AA/13-16-077-05W4/0	517246	6169933	16
00/11-19-077-05W4/0	514249	6171203	16
AA/12-16-077-05W4/0	517396	6169676	16
AA/08-19-077-05W4/0	515017	6170812	16
AA/03-21-077-05W4/0	517761	6170369	16
AA/07-15-077-05W4/0	519555	6169127	16
AA/11-20-077-05W4/0	516097	6171303	16
AA/03-19-076-04W4/0	524156	6160735	16
AA/05-13-077-05W4/0	522146	6169200	16
00/07-02-078-05W4/0	521128	6175849	16
00/05-04-078-05W4/0	517380	6175487	16
AA/14-22-077-07W4/0	499887	6171571	16
AA/06-33-077-06W4/0	508040	6173935	16
00/03-15-077-04W4/0	528918	6168773	16
AA/16-18-076-04W4/0	524963	6160421	16
AA/10-16-077-05W4/0	518192	6169673	16
00/07-17-076-07W4/0	496672	6159538	16
AA/11-23-077-07W4/0	501406	6170959	16
00/07-35-077-06W4/0	511646	6174026	16
AA/08-19-076-04W4/0	524865	6161229	16
00/10-34-077-05W4/0	519836	6174254	16
00/05-18-077-03W4/0	533574	6169271	16

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/07-21-076-07W4/0	498503	6161033	16
00/15-08-076-05W4/0	516273	6158713	16
00/06-29-077-06W4/0	506157	6172353	16
00/11-27-077-06W4/0	509505	6172834	16
AA/06-20-076-04W4/0	525831	6161231	16
00/02-12-077-07W4/2	503515	6166929	16
00/06-10-077-06W4/0	509414	6167522	16
00/06-03-077-06W4/0	509699	6165781	16
00/10-08-076-05W4/0	516464	6158229	16
AA/06-36-075-05W4/0	522574	6154756	16
AA/05-09-077-05W4/0	517326	6167367	16
00/07-33-077-04W4/0	527576	6174119	16
00/08-34-077-07W4/0	500536	6174113	16
00/09-34-077-04W4/0	529632	6174540	16
00/08-10-077-06W4/0	510260	6167317	16
00/10-22-077-06W4/0	509768	6170979	16
00/07-11-076-05W4/0	521214	6157997	16
00/05-35-077-05W4/0	520645	6173854	16
00/10-15-076-05W4/0	519890	6160002	16
AA/08-32-077-07W4/0	497333	6173920	16
AA/08-26-077-07W4/0	502022	6172523	15
00/10-03-077-06W4/0	510013	6166400	15
00/10-04-077-06W4/0	508324	6166376	15
00/02-31-077-07W4/0	495345	6173750	15
00/07-30-077-04W4/0	524548	6172247	15
AA/08-28-077-07W4/0	498916	6172406	15
00/12-30-076-05W4/0	514001	6163039	15
00/06-30-076-05W4/0	514488	6162754	15
00/15-33-077-06W4/0	508215	6174974	15
00/03-03-078-06W4/0	509501	6175189	15
AA/04-09-077-05W4/0	517234	6167097	15
AA/06-34-077-07W4/0	499832	6174038	15
AA/09-23-075-05W4/0	521806	6151765	15
00/13-01-078-06W4/0	512432	6176305	15
AA/08-15-077-05W4/0	520079	6169128	15
00/06-35-077-04W4/0	530626	6174271	15
00/09-04-078-02W4/0	547658	6176142	15
00/10-20-077-03W4/0	535790	6171106	15
00/14-02-078-06W4/0	510912	6176277	15
AA/09-15-077-05W4/0	520066	6169575	15
00/12-25-077-05W4/0	522206	6172622	15
00/06-27-077-07W4/0	499874	6172263	15
00/07-22-077-07W4/0	500255	6170918	15
00/10-23-076-08W4/0	492086	6161534	15
00/12-29-076-07W4/0	496106	6163230	15
00/15-04-078-04W4/0	527574	6176519	15
AA/14-35-077-07W4/0	501394	6174736	15
AA/15-28-077-07W4/0	498396	6173219	15
00/05-18-077-06W4/0	504286	6169058	15
00/07-04-078-03W4/0	537597	6175936	15
00/08-05-078-05W4/0	516684	6175482	15
00/11-04-076-05W4/0	517742	6156677	15
AA/05-32-077-07W4/0	496026	6173848	15
00/11-06-078-05W4/0	514357	6176075	15
AA/07-22-077-06W4/0	509912	6170751	15

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
AA/14-27-077-07W4/0	499866	6173019	15
AA/08-33-077-07W4/0	498936	6174003	15
AA/16-21-077-07W4/0	499041	6171651	15
AA/16-33-077-07W4/0	498912	6174795	15
00/09-20-076-05W4/0	516910	6161322	15
00/06-32-077-06W4/0	506168	6174066	15
02/05-22-077-07W4/0	499508	6170893	15
00/05-19-077-04W4/0	523678	6170814	14
00/09-06-077-04W4/0	524830	6166417	14
00/05-22-077-07W4/0	499432	6170890	14
AA/06-25-076-06W4/0	512888	6162657	14
00/02-12-077-07W4/0	503515	6166929	14
00/07-32-077-07W4/0	496767	6173921	14
AA/15-01-078-07W4/0	503481	6176363	14
00/01-01-076-05W4/0	523457	6155692	14
00/05-06-077-02W4/0	543309	6166098	14
AA/08-31-075-04W4/0	525013	6154780	14
00/10-25-077-07W4/0	503461	6172923	14
AA/12-02-078-06W4/0	510659	6176028	14
00/10-31-077-06W4/0	504859	6174443	14
00/02-10-078-04W4/0	529585	6176741	14
00/03-28-077-02W4/0	546762	6172040	14
00/08-01-078-05W4/0	523336	6175508	14
00/10-16-076-05W4/0	518170	6159965	14
AA/11-36-077-07W4/0	503067	6174221	14
AA/14-26-077-07W4/0	501397	6172998	14
AA/16-31-077-07W4/0	495592	6174748	14
00/05-24-077-05W4/0	522213	6170629	14
00/11-31-077-05W4/0	514519	6174347	14
00/13-17-076-04W4/0	525268	6160305	14
00/06-12-078-05W4/0	522521	6177183	14
00/11-02-078-07W4/0	501390	6175813	14
00/11-07-076-03W4/0	533868	6158431	14
AA/06-33-077-07W4/0	498093	6173943	14
00/10-08-078-06W4/0	506481	6177450	14
AA/11-03-078-06W4/0	509497	6176061	14
AA/07-28-077-07W4/0	498370	6172403	14
00/09-36-077-06W4/2	513372	6174345	13
00/15-07-078-04W4/0	524571	6178057	13
00/09-36-077-06W4/0	513372	6174345	13
AA/15-33-077-07W4/0	498387	6174795	13
00/05-28-077-07W4/0	497662	6172365	13
AA/03-30-076-05W4/0	514304	6162337	13
00/05-08-077-06W4/0	505879	6167459	13
00/07-02-076-05W4/0	521300	6156078	13
00/11-12-077-07W4/0	503025	6167865	13
AA/13-19-076-05W4/0	514153	6161700	13
00/10-27-077-06W4/0	509951	6172854	13
00/05-07-078-05W4/0	514058	6177191	13
00/10-29-077-07W4/0	496998	6172885	13
00/11-09-078-04W4/0	527297	6177521	13
AA/01-13-076-06W4/0	513431	6159003	13
AA/13-12-076-06W4/0	512456	6158650	13
AA/16-34-077-07W4/0	500568	6174842	13
00/06-03-078-07W4/0	499780	6175676	13



**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/06-32-075-04W4/0	525897	6154444	13
00/13-02-077-07W4/0	501080	6166580	13
00/02-06-078-06W4/0	504855	6175359	13
00/11-21-077-07W4/0	497998	6171246	13
00/16-27-077-07W4/0	500567	6173234	13
AA/02-21-077-07W4/0	498358	6170319	13
AA/03-13-076-06W4/0	512886	6159168	13
AA/04-13-076-06W4/0	512213	6158857	13
00/08-05-078-07W4/0	497136	6175507	13
00/04-18-076-03W4/0	533545	6158937	12
00/07-04-078-07W4/0	498373	6175587	12
AA/07-11-076-06W4/0	511600	6157798	12
AA/12-13-076-06W4/0	512381	6159827	12
00/09-06-076-05W4/0	515132	6156678	12
00/10-27-076-07W4/0	500134	6163056	12
AA/07-13-076-06W4/0	513182	6159429	12
00/04-19-076-05W4/0	514160	6160799	12
AA/03-22-077-07W4/0	499864	6170324	12
AA/08-27-077-07W4/0	500406	6172440	12
00/11-05-078-06W4/0	506208	6176167	12
00/05-08-078-05W4/0	515682	6177185	12
00/11-07-077-06W4/0	504428	6167946	12
02/05-15-078-04W4/0	528710	6178924	12
AA/04-12-076-06W4/0	512540	6157531	12
AA/16-05-078-07W4/0	497099	6176528	12
00/13-24-075-04W4/0	532140	6152407	12
00/09-24-076-06W4/0	513572	6161436	12
00/12-11-078-06W4/0	510708	6177494	12
00/16-32-077-07W4/0	497396	6174677	12
04/03-16-076-06W4/0	508068	6159162	12
AA/07-24-076-06W4/0	513177	6161038	12
AA/08-24-076-06W4/0	513391	6160861	12
AA/15-13-076-06W4/0	513179	6160329	12
AA/15-32-077-07W4/0	496986	6174677	12
00/05-15-078-04W4/0	528710	6179071	12
00/06-05-078-07W4/0	496640	6175474	12
AA/07-14-076-08W4/0	492106	6159540	12
00/15-26-075-04W4/0	531319	6153868	12
00/08-17-078-03W4/0	536116	6178959	12
AA/08-11-076-06W4/0	511814	6157655	12
AA/08-12-076-06W4/0	513587	6157801	12
AA/12-12-076-06W4/0	512386	6158197	12
AA/14-06-076-05W4/0	514253	6156947	12
AA/16-11-076-06W4/0	511796	6158471	12
00/08-25-076-06W4/0	513686	6162738	12
AA/15-09-078-06W4/0	508366	6177911	12
00/08-14-078-05W4/0	521549	6179084	12
AA/01-14-076-06W4/0	511951	6158919	12
AA/09-11-076-06W4/0	511954	6158199	12
00/08-10-076-05W4/0	520313	6157648	11
00/11-15-077-07W4/0	499652	6169620	11
00/15-33-076-07W4/0	498654	6164962	11
AA/03-12-076-06W4/0	512789	6157399	11
AA/09-30-077-07W4/0	495663	6172893	11
AA/15-13-076-04W4/0	532722	6160422	11

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/07-18-078-06W4/0	504816	6178662	11
00/10-01-078-08W4/0	493825	6176013	11
AA/07-09-076-06W4/0	508185	6157849	11
AA/08-21-077-07W4/0	498831	6170896	11
AA/09-12-076-06W4/0	513586	6158201	11
AA/14-13-076-06W4/0	512591	6160070	11
AA/14-30-077-07W4/0	495043	6173078	11
00/08-10-078-07W4/2	500445	6177250	11
00/14-31-075-04W4/0	524124	6155261	11
02/12-22-076-07W4/0	499485	6161287	11
AA/01-12-076-06W4/0	513476	6157564	11
AA/02-16-077-07W4/0	498408	6168767	11
AA/05-14-076-06W4/0	510916	6159596	11
AA/05-21-077-07W4/0	497552	6170836	11
AA/10-24-076-06W4/0	513278	6161575	11
AA/11-12-076-06W4/0	512786	6158198	11
AA/13-28-077-07W4/0	497650	6173253	11
00/01-35-075-04W4/0	531529	6154451	11
00/15-02-076-04W4/0	531167	6156947	11
00/07-16-078-04W4/0	527932	6179113	11
AA/06-13-076-06W4/0	512860	6159576	11
AA/13-11-076-06W4/0	510875	6158532	11
00/07-25-077-06W4/0	512966	6172578	11
00/07-22-078-05W4/0	519642	6180547	11
00/15-11-076-06W4/0	511563	6158592	11
AA/02-14-076-06W4/0	511552	6159017	11
AA/05-13-076-06W4/0	512497	6159341	11
00/06-20-077-07W4/0	496618	6170830	11
00/07-21-078-04W4/0	527801	6180697	11
00/10-07-078-06W4/0	504822	6177814	11
00/11-06-077-07W4/0	494834	6166432	11
00/11-36-077-08W4/0	493247	6174368	11
02/06-12-076-06W4/0	512792	6157857	11
AA/09-14-076-06W4/0	511949	6159828	11
00/07-15-078-05W4/0	519638	6178917	11
00/07-18-076-05W4/0	514913	6159338	11
00/08-10-078-07W4/0	500445	6177250	11
00/10-05-077-06W4/0	506667	6166320	11
AA/03-07-076-05W4/0	514248	6157373	11
AA/09-18-077-07W4/0	495538	6169583	11
AA/16-12-076-06W4/0	513585	6158600	11
00/09-10-077-07W4/0	500385	6167926	10
00/06-22-078-04W4/0	528758	6180698	10
00/10-23-076-06W4/0	511548	6161436	10
00/12-16-077-07W4/0	497811	6169602	10
AA/08-14-076-06W4/0	511800	6159240	10
00/06-19-078-04W4/0	524003	6180702	10
00/06-11-078-07W4/0	501254	6177117	10
00/10-22-078-05W4/2	519659	6180938	10
AA/16-20-077-07W4/0	497358	6171670	10
00/13-25-075-04W4/0	532025	6153723	10
00/06-17-078-05W4/0	516127	6179053	10
00/02-35-075-05W4/0	521367	6154144	10
00/06-12-076-06W4/0	512949	6157942	10
00/11-19-077-07W4/0	494769	6171299	10

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/13-07-076-05W4/0	514133	6158513	10
AA/10-11-076-06W4/0	511553	6158214	10
AB/13-16-076-06W4/0	507477	6160219	10
00/02-31-077-04W4/0	524519	6173755	10
00/06-13-077-07W4/0	503084	6169031	10
00/06-24-077-08W4/0	493397	6170921	10
00/09-07-078-07W4/0	495463	6177717	10
02/11-10-077-07W4/0	499803	6167894	10
00/11-08-078-06W4/0	506088	6177448	10
00/02-23-078-05W4/0	521128	6180219	10
00/01-28-078-02W4/0	547638	6181781	10
00/11-18-077-07W4/0	494690	6169701	10
00/15-19-078-03W4/0	534256	6181394	10
AA/03-19-077-07W4/0	494918	6170380	10
AA/05-11-076-06W4/0	510756	6157796	10
AA/08-19-077-07W4/0	495692	6170786	10
AA/12-11-076-06W4/0	510755	6158196	10
AA/13-10-078-06W4/0	509033	6177916	10
00/13-24-078-04W4/0	531914	6181254	10
00/05-24-076-06W4/0	512329	6160986	10
00/07-35-076-07W4/0	501829	6164326	10
00/11-07-078-07W4/0	494919	6177713	10
00/11-30-075-04W4/0	524213	6153411	10
AA/01-11-076-06W4/0	511956	6157399	10
AA/02-12-076-06W4/0	513187	6157407	10
AA/04-14-076-06W4/0	510693	6159005	10
AA/09-23-076-06W4/0	511806	6161594	10
F1/04-24-076-06W4/0	512491	6160780	10
00/03-36-075-04W4/0	532362	6154146	10
AA/09-14-078-06W4/0	511711	6179142	10
00/06-20-078-04W4/0	525523	6180698	10
00/11-07-077-07W4/0	494818	6168073	10
AA/03-24-076-06W4/0	512858	6160637	10
AA/10-12-076-06W4/0	513186	6158200	10
AA/11-18-077-07W4/0	494869	6169658	10
00/01-25-076-06W4/0	513575	6162268	10
00/01-33-075-05W4/0	518392	6154300	10
00/14-24-078-05W4/0	522321	6181162	10
00/04-36-077-08W4/0	492678	6173405	10
00/08-15-077-07W4/0	500700	6169003	10
AA/02-29-077-07W4/0	496720	6172056	10
AA/07-12-076-06W4/0	513157	6157816	10
AA/12-26-076-06W4/0	510833	6162890	10
AA/16-19-077-07W4/0	495739	6171682	10
AB/14-13-076-06W4/0	512779	6160328	10
00/01-36-075-04W4/0	533146	6154376	9
00/08-26-078-04W4/0	531189	6182104	9
00/03-07-077-07W4/0	494733	6166952	9
00/03-14-076-06W4/0	511228	6159128	9
00/07-06-076-04W4/0	524447	6156411	9
00/08-23-076-06W4/0	512096	6161033	9
00/09-09-077-07W4/0	498915	6167885	9
00/12-06-077-06W4/0	504211	6166366	9
AA/07-14-076-06W4/0	511450	6159417	9
00/07-29-078-03W4/0	535830	6182146	9

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/10-01-076-05W4/0	523025	6156743	9
AA/10-10-076-06W4/0	509904	6158209	9
AA/14-24-077-08W4/0	493233	6171428	9
AA/16-09-076-06W4/0	508698	6158622	9
AA/01-18-077-07W4/0	495836	6168896	9
AA/15-09-076-06W4/0	508290	6158592	9
00/02-10-077-07W4/0	500108	6167121	9
00/09-16-078-06W4/0	508516	6179256	9
00/12-05-077-07W4/0	496267	6166370	9
00/15-12-076-06W4/0	513323	6158481	9
AA/01-23-076-06W4/0	511953	6160644	9
AA/02-26-076-06W4/0	511357	6162372	9
AA/05-18-076-05W4/0	513839	6159478	9
AA/08-15-076-06W4/0	510200	6159246	9
AA/10-06-076-06W4/0	505192	6156750	9
AA/10-13-076-06W4/0	513180	6159829	9
AA/11-13-076-06W4/0	512781	6159828	9
AA/14-09-076-06W4/0	507890	6158591	9
AA/16-14-076-06W4/0	511893	6160167	9
00/03-34-078-05W4/0	519307	6183507	9
00/13-09-078-07W4/0	497886	6177893	9
AA/02-11-076-06W4/0	511473	6157316	9
AA/09-13-076-06W4/0	513580	6159830	9
00/12-11-077-07W4/0	500962	6167870	9
00/05-10-077-07W4/0	499347	6167482	9
00/03-31-075-03W4/0	534205	6154463	9
00/07-16-076-06W4/0	508418	6159540	9
00/07-30-078-03W4/0	534185	6182339	9
00/11-09-077-07W4/0	497994	6167966	9
00/11-23-076-06W4/0	511146	6161437	9
00/11-28-078-05W4/0	517718	6182465	9
AA/12-10-076-06W4/0	508994	6158153	9
AA/14-12-076-06W4/0	512785	6158598	9
AA/16-15-076-06W4/0	510317	6160224	9
00/09-07-079-07W4/0	494963	6187469	9
00/08-29-076-06W4/0	506887	6162556	9
00/13-10-077-07W4/0	499348	6168278	9
00/06-29-075-03W4/0	535499	6153191	9
00/08-17-078-07W4/0	497396	6178885	9
00/08-25-075-05W4/0	523301	6152928	9
00/10-23-078-04W4/0	531018	6180904	9
00/12-14-078-07W4/0	500904	6179072	9
AA/05-12-076-06W4/0	512288	6157797	9
AA/13-18-076-05W4/0	514096	6160072	9
AB/08-14-076-06W4/0	512050	6159418	9
AA/11-24-076-04W4/0	532349	6161541	9
00/07-19-078-03W4/0	534258	6180692	9
00/03-06-077-06W4/0	504675	6165633	9
00/06-03-076-08W4/0	490090	6156024	9
00/09-13-076-06W4/0	513470	6159730	9
00/15-09-076-06W4/0	508219	6158788	9
00/16-34-078-07W4/0	500706	6184386	9
AA/01-24-076-06W4/0	513735	6160835	9
AA/03-20-077-07W4/0	496575	6170336	9
AA/06-23-077-08W4/0	491525	6170932	9

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
AA/16-10-076-06W4/0	510323	6158632	9
00/11-14-078-06W4/0	510981	6179133	8
00/06-16-078-07W4/0	498002	6178743	8
00/07-30-078-03W4/2	534185	6182339	8
03/03-16-076-06W4/0	507693	6158975	8
AA/02-15-076-06W4/0	509878	6158879	8
AA/11-14-076-06W4/0	511059	6159827	8
AA/13-01-076-06W4/0	512256	6156966	8
AA/14-11-076-06W4/0	511100	6158581	8
AA/14-20-077-07W4/0	496672	6171531	8
00/10-26-075-04W4/0	531196	6153505	8
00/11-21-078-05W4/0	517768	6181045	8
00/05-29-078-04W4/0	525259	6182262	8
00/06-11-076-06W4/0	511099	6157860	8
00/08-09-076-06W4/0	508799	6157923	8
00/11-07-079-04W4/0	523728	6187385	8
00/11-08-077-07W4/0	496324	6167743	8
00/11-32-076-07W4/0	496467	6164769	8
00/15-17-079-04W4/0	525920	6189600	8
02/11-08-077-07W4/0	496285	6168098	8
AA/01-15-076-06W4/0	510320	6159025	8
AA/03-10-076-06W4/0	509514	6157397	8
AA/04-11-076-06W4/0	510867	6157523	8
AA/11-08-078-08W4/0	486854	6177662	8
00/03-09-078-08W4/0	488542	6176999	8
00/03-25-078-02W4/0	551674	6181979	8
00/04-23-075-05W4/0	520491	6151158	8
00/06-24-076-06W4/0	512670	6161144	8
00/13-14-076-06W4/0	510651	6160180	8
02/10-22-078-05W4/0	519804	6181000	8
AA/04-15-076-06W4/0	509256	6159153	8
AA/04-16-076-06W4/0	507477	6158920	8
AA/15-31-075-06W4/0	505140	6155367	8
00/01-33-075-05W4/3	518392	6154300	8
00/08-13-076-06W4/0	513472	6159568	8
00/09-09-076-06W4/0	508690	6158194	8
00/12-23-076-06W4/0	510746	6161433	8
00/16-05-076-06W4/0	506944	6156791	8
AA/06-23-076-06W4/0	511262	6161106	8
AA/11-10-076-06W4/0	509523	6158194	8
AA/14-10-076-06W4/0	509377	6158734	8
AB/10-36-075-06W4/0	513096	6154830	8
AB/16-13-076-06W4/0	513679	6160187	8
00/12-27-078-04W4/0	528522	6182567	8
00/02-16-076-06W4/0	508131	6158976	8
00/03-03-078-08W4/0	489883	6175202	8
00/14-13-077-08W4/0	493146	6169818	8
02/15-09-076-06W4/0	508424	6158765	8
AA/05-15-076-06W4/0	509120	6159422	8
00/09-20-078-06W4/0	506908	6180899	8
00/03-25-078-05W4/0	522478	6181902	8
00/04-01-076-06W4/0	512386	6155951	8
00/09-08-078-07W4/0	497439	6177748	8
00/10-04-077-07W4/0	498441	6166448	8
00/16-08-079-04W4/0	526017	6187681	8

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
AA/01-28-075-06W4/0	508798	6152738	8
AA/02-17-076-06W4/0	506725	6159188	8
AA/05-10-076-06W4/0	509124	6157784	8
AA/07-15-076-06W4/0	509919	6159424	8
AA/07-23-076-06W4/0	511546	6161035	8
AA/10-01-076-06W4/0	513308	6156710	8
AA/12-16-077-07W4/0	497698	6169611	8
00/02-32-078-03W4/0	535935	6183505	8
00/05-15-078-07W4/0	499425	6178948	8
00/06-25-077-08W4/0	493122	6172307	8
00/13-25-075-06W4/0	512538	6153593	8
02/10-01-077-07W4/0	503496	6166294	8
AA/02-29-075-06W4/0	506506	6152738	8
AA/03-23-076-06W4/0	511148	6160634	8
AA/06-16-076-07W4/0	498101	6159416	8
AA/11-11-076-06W4/0	511119	6158197	8
AB/08-15-076-06W4/0	510419	6159425	8
00/05-14-077-07W4/0	500804	6168998	8
00/10-11-076-08W4/0	492090	6158328	8
00/05-21-078-05W4/0	517018	6180664	8
00/07-26-077-08W4/0	492105	6172342	8
00/10-14-075-05W4/0	521329	6150035	8
00/10-22-078-05W4/0	519659	6180938	8
00/15-02-076-06W4/0	511649	6156830	8
AA/01-35-075-06W4/0	511844	6154172	8
AA/02-04-076-06W4/0	508303	6155925	8
AA/02-23-076-06W4/0	511600	6160731	8
00/05-24-078-06W4/0	512473	6180350	7
00/07-23-078-06W4/0	511440	6180625	7
00/15-25-078-05W4/0	522678	6182831	7
00/10-30-078-04W4/0	524606	6182725	7
00/05-23-076-06W4/0	510730	6161033	7
00/06-14-076-06W4/0	511016	6159597	7
00/06-26-076-06W4/0	511002	6162551	7
00/07-24-076-07W4/0	503483	6160939	7
00/16-09-078-07W4/0	498792	6177911	7
AA/01-36-075-06W4/0	513475	6154291	7
AA/08-30-077-07W4/0	495677	6172348	7
AA/13-10-076-06W4/0	509122	6158593	7
AA/14-15-076-06W4/0	509518	6160222	7
AA/16-13-076-06W4/0	513387	6160058	7
AB/13-36-075-06W4/0	512494	6155311	7
00/01-16-076-06W4/0	508569	6159038	7
00/06-30-077-07W4/0	494921	6172273	7
00/09-06-077-06W4/0	505511	6166374	7
00/11-03-077-07W4/0	499658	6166394	7
02/11-16-076-06W4/0	507914	6159740	7
AA/10-26-076-06W4/0	511356	6162896	7
AA/12-16-076-06W4/0	507547	6159857	7
AA/12-32-075-06W4/0	505933	6154761	7
AA/13-02-076-06W4/0	510874	6156858	7
AB/01-16-076-06W4/0	508667	6158955	7
F1/03-16-076-06W4/0	507910	6158972	7
00/06-33-076-06W4/2	507680	6164159	7
00/07-04-077-07W4/0	498321	6165875	7

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/11-33-075-05W4/0	517740	6154811	7
00/09-13-075-04W4/0	533146	6150254	7
00/01-22-078-06W4/0	510162	6180166	7
00/12-26-075-06W4/0	510865	6153487	7
00/12-36-078-04W4/0	531863	6184032	7
00/16-35-075-06W4/0	511812	6155221	7
AA/02-01-076-06W4/0	513220	6155945	7
AA/06-29-075-06W4/0	506460	6153085	7
AA/07-10-076-06W4/0	509923	6157795	7
AA/09-16-077-07W4/0	499006	6169595	7
AA/13-15-076-06W4/0	509235	6160102	7
00/01-08-076-06W4/0	507059	6157391	7
00/04-23-077-08W4/0	491305	6170460	7
00/07-20-075-06W4/0	506637	6151490	7
00/11-32-076-06W4/0	506062	6164641	7
AA/01-10-076-06W4/0	510308	6157433	7
AA/01-16-076-06W4/0	508495	6159223	7
AA/01-23-075-05W4/0	521654	6150851	7
AA/02-02-076-06W4/0	511655	6155911	7
AA/03-11-076-06W4/0	511157	6157397	7
AA/09-30-075-06W4/0	505484	6153428	7
AA/10-14-076-06W4/0	511619	6159957	7
AA/12-13-077-08W4/0	492962	6169552	7
AA/15-10-076-06W4/0	510043	6158510	7
AB/11-35-075-06W4/0	511347	6154779	7
AA/11-35-076-08W4/0	491585	6164769	7
00/03-22-075-05W4/0	519347	6151118	7
00/04-03-076-06W4/0	509189	6155939	7
00/07-32-078-03W4/0	535737	6184024	7
00/08-15-076-06W4/0	510203	6159259	7
00/10-25-078-04W4/0	532477	6182669	7
00/16-34-075-06W4/0	510242	6155183	7
02/04-16-076-06W4/0	507636	6159075	7
04/05-16-076-06W4/0	507374	6159584	7
AA/03-28-075-06W4/0	507758	6152740	7
AA/04-10-076-06W4/0	509240	6157520	7
AA/04-34-075-06W4/0	509209	6154257	7
AA/05-08-076-06W4/0	505845	6157946	7
AA/10-04-076-06W4/0	508311	6156540	7
AA/15-04-076-06W4/0	508341	6157071	7
00/05-15-078-08W4/0	489664	6178715	7
00/11-01-076-06W4/0	512603	6156446	7
02/06-16-076-06W4/0	508072	6159437	7
AA/02-22-076-06W4/0	509916	6160632	7
AA/04-29-075-06W4/0	506004	6152738	7
AA/09-16-076-06W4/0	508687	6159821	7
AA/11-15-076-06W4/0	509519	6159823	7
AA/11-23-075-05W4/0	520966	6151739	7
AA/13-13-076-06W4/0	512379	6160326	7
AA/14-14-076-06W4/0	510999	6160225	7
AA/14-35-075-06W4/0	511017	6155286	7
AB/13-34-075-06W4/0	509204	6155281	7
00/09-04-077-07W4/0	498946	6166356	7
00/06-33-076-06W4/0	507680	6164159	7
00/04-34-075-05W4/2	519039	6154299	7

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/01-30-075-06W4/0	505444	6152743	7
00/06-28-075-05W4/0	517781	6152994	7
00/10-26-075-05W4/0	521437	6153495	7
00/11-27-077-08W4/0	489808	6172622	7
02/01-16-076-06W4/0	508717	6158880	7
AA/01-22-076-06W4/0	510316	6160633	7
AA/12-04-076-06W4/0	507669	6156458	7
00/06-25-076-05W4/0	522388	6162631	7
00/16-28-078-05W4/0	518260	6183030	7
00/11-17-078-07W4/0	496470	6179379	7
00/13-24-078-07W4/0	502739	6181107	7
00/15-13-075-04W4/0	532893	6150620	7
02/05-16-076-06W4/0	507431	6159480	7
AA/02-03-076-06W4/0	510029	6155621	7
AA/08-23-076-07W4/0	502048	6160836	7
AA/13-09-076-06W4/0	507536	6158600	7
AA/13-29-075-06W4/0	505979	6153731	7
AA/16-03-076-06W4/0	510211	6156915	7
AA/16-17-076-06W4/0	507113	6160168	7
AB/11-29-075-06W4/0	506423	6153428	7
00/11-34-077-08W4/0	489957	6174471	6
00/04-34-075-05W4/0	519039	6154299	6
00/01-35-078-05W4/0	521451	6183451	6
00/04-14-075-05W4/0	520693	6149459	6
00/10-07-076-06W4/0	505130	6158187	6
00/10-27-078-07W4/0	499967	6182677	6
00/11-05-076-06W4/0	506407	6156625	6
00/11-17-077-07W4/0	496637	6169699	6
00/12-16-076-06W4/0	507324	6159689	6
00/15-17-076-06W4/0	506648	6160217	6
02/03-08-076-06W4/0	506259	6157389	6
05/11-16-076-06W4/0	507861	6159842	6
11/11-16-076-06W4/0	507879	6159626	6
AA/03-22-076-06W4/0	509716	6160474	6
AA/10-16-077-07W4/0	498354	6169607	6
AA/10-22-076-07W4/0	500133	6161405	6
AA/11-17-077-07W4/0	496487	6169663	6
AA/15-15-076-06W4/0	510071	6160109	6
00/09-21-078-06W4/0	508534	6181060	6
00/02-15-075-05W4/0	519641	6149539	6
00/02-25-076-07W4/0	503334	6162369	6
00/03-16-076-06W4/0	507935	6159006	6
00/10-11-075-05W4/0	521371	6148523	6
00/12-05-075-06W4/0	505787	6146762	6
03/05-16-076-06W4/0	507481	6159383	6
05/05-16-076-06W4/0	507535	6159283	6
AA/01-33-075-06W4/0	508766	6154054	6
AA/05-17-076-06W4/0	506009	6159597	6
AA/06-04-076-06W4/0	507790	6156133	6
AA/06-05-076-06W4/0	506197	6156136	6
AA/06-06-076-05W4/0	514262	6156188	6
AA/06-31-075-06W4/0	504600	6154739	6
AA/09-17-077-07W4/0	497315	6169626	6
AA/12-29-075-06W4/0	505861	6153467	6
00/03-27-075-06W4/0	509696	6152649	6



**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/07-17-078-06W4/0	506567	6178964	6
F1/10-22-075-06W4/0	510101	6151706	6
00/08-16-075-05W4/0	518411	6149786	6
00/08-22-076-06W4/0	510346	6161056	6
00/10-13-077-08W4/0	493623	6169536	6
00/12-23-075-06W4/0	510621	6151708	6
AA/01-34-075-06W4/0	510245	6154291	6
AA/04-17-076-06W4/0	505857	6159017	6
AA/09-15-076-06W4/0	510318	6159824	6
AA/15-14-076-06W4/0	511388	6160246	6
00/07-21-078-06W4/0	508057	6180633	6
00/13-32-078-04W4/0	525476	6184413	6
00/10-05-079-04W4/0	525963	6185622	6
00/06-17-076-06W4/0	506130	6159337	6
00/10-10-079-07W4/0	499716	6187197	6
00/10-36-076-07W4/0	503398	6164697	6
00/11-10-077-07W4/0	499650	6167913	6
00/11-15-076-06W4/0	509520	6159923	6
AA/02-22-076-07W4/0	500315	6160602	6
AA/07-26-077-08W4/0	491826	6172417	6
AA/08-10-076-06W4/0	510182	6157652	6
AA/12-15-076-06W4/0	509119	6159822	6
AA/12-28-075-06W4/0	507454	6153427	6
AA/14-32-075-06W4/0	506162	6155260	6
AA/16-33-075-06W4/0	508724	6155350	6
AB/12-16-076-06W4/0	507624	6159844	6
AC/12-16-076-06W4/0	507386	6159884	6
00/01-27-078-06W4/0	510124	6181837	6
00/02-23-077-08W4/0	491956	6170269	6
00/06-17-079-04W4/0	525236	6188466	6
00/10-12-078-08W4/0	493761	6177691	6
00/11-16-076-06W4/0	507901	6159634	6
00/12-21-078-07W4/0	497768	6180752	6
00/13-11-075-05W4/0	520610	6148756	6
AA/01-30-075-06W4/0	505542	6152442	6
00/01-33-078-05W4/0	518539	6183398	6
00/05-15-076-06W4/0	509040	6159569	6
00/06-10-076-06W4/0	509662	6157832	6
00/07-06-079-03W4/0	533905	6185315	6
00/09-34-077-08W4/0	490783	6174483	6
00/10-19-078-07W4/0	495211	6180711	6
00/13-05-076-06W4/0	506017	6157035	6
00/15-03-075-05W4/0	519773	6147129	6
02/14-24-075-05W4/0	522791	6152320	6
AA/02-30-075-06W4/0	505010	6152737	6
AA/04-32-075-06W4/0	505878	6154216	6
AA/06-02-076-06W4/0	511267	6156306	6
AA/08-05-076-06W4/0	506970	6156117	6
AA/13-32-075-06W4/0	505809	6155209	6
AA/13-33-075-06W4/0	507321	6155342	6
AA/15-32-075-06W4/0	506572	6155211	6
00/16-20-076-06W4/0	506882	6161702	6
00/04-31-078-05W4/0	514038	6183415	6
00/05-03-079-05W4/0	518527	6185251	6
00/03-14-078-08W4/0	491551	6178436	6

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/04-35-077-08W4/0	491012	6173399	6
00/08-36-076-07W4/0	503847	6164448	6
00/10-05-076-05W4/0	516500	6156725	6
00/11-31-076-06W4/0	504468	6164544	6
00/13-17-076-06W4/0	505877	6160217	6
02/12-16-076-06W4/0	507644	6159669	6
AA/06-03-076-06W4/0	509653	6156197	6
AA/11-04-076-06W4/0	508016	6156509	6
AA/13-04-076-06W4/0	507580	6156817	6
AA/16-32-075-06W4/0	506970	6155238	6
AB/02-04-076-06W4/0	508440	6155684	6
00/09-35-078-05W4/0	521454	6183985	6
00/07-26-078-05W4/0	521108	6182299	6
00/03-09-077-07W4/0	498031	6167091	6
00/06-27-075-05W4/0	519187	6152983	6
00/12-17-076-06W4/0	505874	6159817	6
00/12-32-076-06W4/0	506010	6164635	6
00/15-10-075-05W4/0	519688	6148724	6
00/15-20-075-06W4/0	506640	6152067	6
00/15-29-075-06W4/0	506847	6153773	6
00/16-08-076-06W4/0	507048	6158598	6
AA/09-14-076-07W4/0	502210	6159837	6
00/02-16-078-08W4/0	488712	6178569	5
AA/15-33-075-06W4/0	508400	6155349	5
00/04-04-076-06W4/0	507315	6155911	5
00/05-12-075-05W4/0	522379	6148156	5
00/05-16-076-06W4/0	507576	6159558	5
00/06-16-076-06W4/0	507719	6159510	5
00/06-22-077-08W4/0	489936	6170561	5
00/07-03-075-05W4/0	519964	6146457	5
00/10-21-077-08W4/0	488744	6170969	5
00/12-15-076-06W4/0	509120	6160022	5
00/14-24-075-05W4/0	522485	6152058	5
02/06-15-076-06W4/0	509522	6159323	5
AA/02-05-076-06W4/0	506666	6155891	5
AA/02-32-075-06W4/0	506609	6153972	5
AA/04-14-076-07W4/0	500863	6159067	5
AA/07-14-076-07W4/0	501760	6159413	5
AA/08-29-075-06W4/0	506992	6152750	5
AA/09-29-075-06W4/0	507192	6153388	5
AA/13-14-076-07W4/0	500798	6160023	5
AA/16-16-076-06W4/0	508686	6160221	5
00/02-18-076-06W4/0	505128	6159104	5
00/07-13-077-08W4/0	493594	6168988	5
00/11-14-076-06W4/0	511143	6159787	5
03/06-16-076-06W4/0	508019	6159540	5
03/11-16-076-06W4/0	507810	6159941	5
AA/07-33-075-06W4/0	508326	6154435	5
AA/10-16-076-06W4/0	508403	6159954	5
AA/08-32-075-06W4/0	507086	6154519	5
00/10-28-078-06W4/0	508070	6182642	5
00/03-05-076-06W4/0	506277	6155879	5
00/11-03-076-06W4/0	509421	6156693	5
00/12-05-076-06W4/0	505912	6156749	5
00/12-30-075-05W4/0	514231	6153218	5

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
02/11-10-075-08W4/0	489752	6148419	5
AA/01-04-076-06W4/0	508644	6155929	5
AA/01-05-076-06W4/0	506971	6155666	5
AA/03-14-076-07W4/0	501318	6159014	5
AA/10-15-076-06W4/0	509918	6159824	5
AA/14-17-076-06W4/0	506255	6160218	5
00/07-01-079-05W4/0	522669	6185557	5
00/07-32-075-06W4/0	506573	6154412	5
00/10-16-075-05W4/0	517999	6150051	5
00/10-20-077-08W4/0	487307	6171354	5
00/11-23-078-07W4/0	501529	6180825	5
00/15-31-078-03W4/0	534253	6184419	5
02/08-15-076-06W4/0	510128	6159424	5
AA/04-05-076-06W4/0	505807	6155870	5
AA/05-14-076-07W4/0	500919	6159463	5
AA/05-23-076-07W4/0	501006	6160936	5
AA/06-14-076-07W4/0	501339	6159515	5
AA/13-20-075-06W4/0	505942	6152103	5
AA/13-28-075-06W4/0	507516	6153790	5
AA/14-33-075-06W4/0	507883	6155354	5
00/06-30-078-05W4/0	514510	6181967	5
00/05-22-078-07W4/0	499447	6180514	5
00/07-20-075-05W4/0	516614	6151205	5
00/10-20-078-07W4/0	496895	6180739	5
00/12-08-076-06W4/0	505817	6158347	5
00/16-26-078-03W4/0	541016	6183040	5
AA/11-24-076-06W4/0	512588	6161586	5
00/10-33-075-06W4/0	508231	6154800	5
AA/03-33-075-06W4/0	507800	6154219	5
00/11-36-078-06W4/0	512864	6184000	5
00/05-30-075-06W4/0	504352	6152753	5
00/10-01-079-04W4/0	532143	6185633	5
00/12-12-079-04W4/0	531368	6187256	5
00/12-23-076-07W4/0	500902	6161375	5
00/13-01-079-05W4/0	521798	6186064	5
AA/04-33-075-06W4/0	507463	6154094	5
AA/15-07-076-06W4/0	505132	6158555	5
AA/12-33-075-06W4/0	507293	6154787	5
00/01-28-075-03W4/0	538151	6152735	5
00/03-32-075-06W4/0	506229	6154233	5
00/06-15-076-06W4/2	509459	6159618	5
00/06-21-075-06W4/0	507787	6151225	5
00/07-30-076-06W4/0	504833	6162550	5
00/10-13-078-08W4/0	493744	6179281	5
00/12-22-078-08W4/0	489595	6180867	5
03/12-16-076-06W4/0	507620	6159715	5
AA/10-19-075-06W4/0	505143	6151720	5
AA/10-32-075-06W4/0	506588	6154771	5
AA/01-01-076-07W4/0	503602	6155976	5
00/14-35-078-06W4/0	510907	6184351	4
00/01-11-079-04W4/0	531210	6186683	4
00/02-32-075-08W4/0	486920	6154275	4
00/06-23-075-05W4/0	521048	6151211	4
00/08-09-075-05W4/0	518396	6148265	4
00/11-11-077-08W4/0	491590	6167920	4

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/11-11-079-05W4/0	520546	6187373	4
00/13-12-077-08W4/0	492935	6168192	4
AA/03-15-076-06W4/0	509521	6159023	4
AA/02-19-076-06W4/0	505125	6160788	4
00/06-03-079-04W4/0	528678	6185540	4
00/06-09-077-08W4/0	488319	6167687	4
00/06-36-075-06W4/3	512634	6154551	4
00/09-27-078-08W4/0	490791	6182367	4
00/10-17-076-06W4/0	506494	6159838	4
00/16-32-078-05W4/0	516629	6184394	4
AA/04-23-076-06W4/0	510858	6160730	4
AA/04-26-076-06W4/0	510826	6162363	4
AA/12-14-076-06W4/0	510750	6159825	4
AA/15-16-076-06W4/0	508286	6160220	4
00/13-03-079-05W4/0	518285	6186170	4
00/06-02-077-08W4/0	491391	6165720	4
00/10-16-075-06W4/0	508397	6150147	4
00/12-01-079-04W4/0	531487	6185666	4
AA/01-32-075-06W4/0	506893	6154283	4
AA/03-18-076-06W4/0	504665	6159015	4
AA/11-15-076-07W4/0	499732	6159818	4
AA/11-33-075-06W4/0	507979	6154795	4
00/01-01-076-05W4/2	523457	6155692	4
00/05-27-075-07W4/0	499151	6152895	4
00/09-07-079-03W4/0	534245	6187324	4
00/10-05-079-03W4/0	535746	6185888	4
00/11-23-078-08W4/0	491468	6180885	4
00/15-34-078-05W4/0	519647	6184570	4
02/05-15-076-06W4/0	509122	6159322	4
AA/01-25-075-07W4/0	503810	6152699	4
AA/07-22-076-06W4/0	510044	6161055	4
AA/09-17-076-06W4/0	506936	6159641	4
AA/13-19-075-06W4/0	504370	6152110	4
AA/14-02-075-06W4/0	511284	6147103	4
AA/04-02-076-06W4/0	510670	6155895	4
00/11-21-076-08W4/0	488127	6161476	4
00/13-34-078-06W4/0	509185	6184315	4
00/01-12-079-04W4/0	532617	6186653	4
00/05-34-078-06W4/0	509114	6183696	4
00/02-17-078-08W4/0	487241	6178571	4
00/09-17-076-06W4/0	507134	6159878	4
00/13-27-078-07W4/0	499441	6182997	4
02/11-01-077-08W4/0	493242	6166392	4
AB/14-16-076-06W4/0	507887	6160220	4
AA/09-11-076-07W4/0	502220	6158209	4
00/02-12-078-09W4/0	483962	6176716	4
00/03-18-076-06W4/0	504717	6158956	4
00/05-08-079-05W4/0	515263	6187010	4
00/06-36-078-07W4/0	502922	6183672	4
00/09-09-079-03W4/0	537515	6187357	4
02/10-28-077-08W4/0	488856	6172826	4
AA/06-07-076-06W4/0	504627	6157786	4
AA/14-16-076-06W4/0	507700	6160047	4
00/07-12-079-05W4/0	522695	6187169	4
00/06-05-079-05W4/0	515640	6185418	4

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/06-22-076-06W4/0	509376	6161039	4
00/07-34-076-07W4/0	500079	6164249	4
00/09-07-076-06W4/0	505426	6158187	4
00/15-04-079-05W4/0	517597	6186044	4
AA/13-01-076-07W4/0	502694	6157041	4
00/02-18-079-03W4/0	534106	6188248	4
00/05-31-079-03W4/0	533173	6193390	4
00/06-33-077-08W4/0	488396	6173944	4
00/07-29-078-07W4/0	496985	6181967	4
00/11-22-075-05W4/0	519376	6151587	4
02/12-15-076-06W4/0	509121	6159722	4
00/10-02-079-05W4/0	520764	6185658	4
00/10-12-075-06W4/0	513324	6148514	3
00/16-10-079-04W4/0	529314	6187906	3
AA/02-14-076-07W4/0	501734	6158999	3
AA/10-16-076-08W4/0	488837	6159801	3
00/01-05-078-08W4/0	487379	6175224	3
00/01-18-076-06W4/0	505425	6159016	3
00/04-07-078-08W4/0	484635	6176705	3
00/04-30-076-08W4/0	484784	6162408	3
00/06-01-076-07W4/0	503018	6156117	3
00/08-18-076-06W4/0	505424	6159456	3
00/09-15-077-08W4/0	490950	6169346	3
00/09-32-075-06W4/0	506962	6154962	3
00/10-11-079-04W4/0	530574	6187241	3
00/10-24-078-09W4/0	483851	6180705	3
AA/04-21-076-06W4/0	507486	6160628	3
00/11-16-079-04W4/0	527043	6188849	3
00/02-10-079-07W4/0	499515	6186649	3
00/03-20-076-06W4/0	506254	6160627	3
00/06-06-079-05W4/0	513850	6185391	3
00/09-14-079-04W4/0	531152	6188883	3
00/11-30-078-06W4/0	504731	6182676	3
00/13-36-078-07W4/0	502397	6184390	3
00/14-01-079-06W4/0	512293	6186017	3
AA/03-21-076-06W4/0	507982	6160600	3
AA/16-01-076-07W4/0	503728	6156792	3
00/07-15-079-06W4/0	509346	6188617	3
00/03-09-079-07W4/0	497385	6186501	3
00/11-01-075-05W4/2	522572	6146762	3
00/11-06-078-08W4/0	485116	6176039	3
00/11-36-078-08W4/0	493086	6184074	3
00/15-13-079-04W4/0	532157	6189330	3
00/15-26-078-07W4/0	501842	6182998	3
00/02-17-079-03W4/0	535727	6188343	3
00/04-11-075-06W4/0	510886	6147813	3
00/10-07-077-08W4/0	485440	6167803	3
00/12-21-077-08W4/0	488017	6171153	3
02/12-15-075-06W4/0	509159	6150135	3
AA/07-18-076-06W4/0	505129	6159604	3
AA/11-12-077-08W4/0	493115	6167957	3
00/01-24-075-04W4/0	533378	6151031	3
00/08-04-079-06W4/0	508058	6185132	3
00/05-23-079-04W4/2	529855	6190080	3
00/08-17-077-08W4/0	487687	6169244	3

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/10-10-077-08W4/0	490184	6168050	3
00/10-16-077-08W4/0	488638	6169556	3
AA/04-22-076-06W4/0	509117	6160630	3
AA/09-23-076-07W4/0	502165	6161401	3
AA/10-34-076-08W4/0	490287	6164643	3
00/01-27-075-07W4/0	500341	6152381	3
AA/05-24-075-07W4/0	502644	6151514	3
AA/10-12-076-07W4/0	503279	6158297	3
00/15-08-077-08W4/0	487300	6168137	3
00/07-14-077-08W4/0	492091	6169048	3
00/07-21-076-06W4/0	508284	6161030	3
00/07-28-078-07W4/0	498639	6182072	3
00/10-28-077-08W4/0	488785	6172830	3
00/11-08-079-03W4/0	535366	6187336	3
00/11-34-078-07W4/0	499902	6184216	3
AA/02-21-076-06W4/0	508286	6160630	3
AA/04-24-076-07W4/0	502751	6160814	3
AA/08-02-076-07W4/0	502244	6156113	3
AA/11-01-076-07W4/0	502904	6156665	3
AA/11-28-076-06W4/0	508067	6162897	3
00/05-11-079-06W4/0	510068	6186828	2
00/07-14-079-05W4/0	521043	6188667	2
00/09-18-076-06W4/0	505435	6159818	2
00/10-19-077-08W4/0	485539	6171266	2
00/10-21-079-06W4/0	507768	6190565	2
00/10-23-076-07W4/0	501863	6161403	2
00/11-05-075-06W4/0	506248	6146921	2
00/01-10-075-06W4/0	510444	6147793	2
00/05-23-079-04W4/0	529855	6190080	2
00/05-34-078-07W4/0	499461	6183592	2
00/08-29-078-08W4/0	487473	6182264	2
00/10-12-079-07W4/0	503037	6187198	2
00/10-14-076-07W4/0	501817	6159857	2
00/10-25-077-09W4/0	483677	6172918	2
00/11-16-075-06W4/0	507802	6150182	2
AA/08-20-076-06W4/0	507189	6160885	2
AA/12-07-076-06W4/0	504217	6158201	2
00/13-27-078-06W4/0	509230	6182717	2
00/05-16-079-05W4/0	516633	6188608	2
00/06-04-078-08W4/0	488481	6175714	2
00/06-12-079-06W4/0	512190	6187134	2
00/09-26-079-06W4/0	511339	6192107	2
00/11-01-075-05W4/0	522572	6146762	2
00/12-33-078-08W4/0	488042	6184017	2
00/15-10-079-03W4/0	538715	6187713	2
00/13-09-075-03W4/0	536821	6148975	2
00/02-14-077-04W4/0	531061	6168732	2
00/05-15-079-05W4/0	518577	6188639	2
00/05-17-079-05W4/0	515076	6188579	2
00/05-22-079-04W4/0	528136	6190245	2
00/06-31-077-08W4/0	484932	6173970	2
00/07-19-076-06W4/0	505132	6160932	2
00/07-20-079-04W4/0	525558	6190384	2
00/08-01-078-09W4/0	484115	6175808	2
00/08-02-075-06W4/0	511964	6146382	2

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/09-12-079-07W4/0	503100	6187134	2
00/10-21-078-08W4/0	488737	6180750	2
00/10-29-077-08W4/0	487254	6172763	2
00/10-32-077-08W4/0	487151	6174529	2
00/15-16-079-04W4/0	527336	6189614	2
02/05-23-079-04W4/2	529930	6190133	2
00/06-30-077-08W4/0	485271	6172209	2
00/07-09-075-06W4/0	508382	6147985	2
00/08-36-079-06W4/0	512963	6193367	2
02/10-04-075-05W4/0	518018	6147038	2
AA/02-15-076-07W4/0	500221	6158910	2
00/07-33-078-06W4/0	508064	6183835	2
00/03-04-078-08W4/0	488531	6175253	2
00/03-06-076-08W4/0	485081	6155985	2
00/03-12-077-08W4/0	493104	6167235	2
00/04-27-079-07W4/0	498820	6191303	2
00/06-19-079-04W4/0	523868	6190378	2
00/07-35-078-07W4/0	501822	6183572	2
00/08-21-076-06W4/0	508684	6160968	2
00/10-11-079-06W4/0	511210	6187181	2
00/10-25-078-08W4/0	493468	6182373	2
00/10-32-076-08W4/0	487186	6164837	2
00/11-21-076-06W4/0	507765	6161586	2
00/12-06-076-07W4/0	494570	6156665	2
00/13-08-076-06W4/0	505888	6158581	2
AA/02-24-075-07W4/0	503427	6150841	2
AA/07-26-075-07W4/0	501953	6153139	2
AA/16-14-076-07W4/0	502059	6160102	2
00/06-26-075-03W4/0	540419	6153243	2
00/12-25-079-04W4/0	531563	6192211	2
00/06-18-079-05W4/0	513782	6188745	2
00/06-23-079-05W4/0	520538	6190268	2
00/07-10-079-06W4/0	509514	6187118	2
00/12-22-079-07W4/0	498907	6190688	2
AA/06-11-076-07W4/0	501409	6157807	2
AA/08-15-076-07W4/0	500422	6159534	2
00/07-27-079-04W4/0	529156	6191749	2
00/02-35-079-04W4/0	530681	6193117	2
00/10-03-077-08W4/0	490498	6166428	2
00/10-22-079-04W4/0	529204	6190849	2
00/10-27-079-04W4/0	529104	6192419	2
00/11-02-077-08W4/0	491451	6166429	2
00/11-18-080-06W4/0	504195	6198558	2
00/06-24-079-06W4/0	512268	6190247	1
00/03-34-075-08W4/0	489812	6154271	1
00/07-13-075-06W4/0	513312	6149627	1
00/12-03-079-06W4/0	508757	6185572	1
00/13-02-079-06W4/0	510385	6185979	1
00/14-07-076-06W4/0	504626	6158586	1
00/04-13-080-06W4/0	512016	6198071	1
00/10-30-079-04W4/0	524206	6192362	1
00/15-20-078-08W4/2	487116	6181346	1
AA/07-13-076-07W4/0	503396	6159416	1
AA/11-02-076-08W4/0	491734	6156626	1
00/11-26-078-08W4/0	491637	6182375	1

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/02-30-078-08W4/0	485583	6181812	1
00/06-05-076-07W4/0	496289	6156073	1
00/06-18-075-06W4/0	504559	6149599	1
00/07-35-079-04W4/0	530745	6193403	1
00/12-31-079-06W4/0	503538	6193621	1
00/13-25-079-04W4/0	531646	6192888	1
AA/10-08-077-08W4/0	487210	6167755	1
00/05-12-080-06W4/0	512018	6196674	1
00/07-32-079-06W4/0	506179	6193340	1
00/10-11-079-03W4/0	540441	6187405	1
00/11-28-079-04W4/0	526886	6192461	1
00/13-35-079-06W4/0	510427	6194011	1
AA/04-11-076-07W4/0	500883	6157586	1
00/06-08-075-06W4/0	506180	6147975	1
00/06-20-080-06W4/0	505685	6199818	1
00/11-28-079-06W4/0	507188	6192305	1
00/06-10-075-06W4/0	509429	6147948	1
00/07-07-079-05W4/0	514151	6186995	1
00/08-13-079-06W4/0	512967	6188741	1
00/09-04-075-07W4/0	498829	6146931	1
00/10-26-079-04W4/2	530698	6192492	1
00/11-04-075-06W4/0	507885	6146755	1
00/16-19-075-08W4/0	486008	6151982	1
00/07-17-075-03W4/0	536166	6149993	1
00/01-34-075-07W4/0	500341	6154226	1
00/10-08-076-08W4/0	487241	6158282	1
AA/06-12-076-07W4/0	502949	6157805	1
AA/08-12-076-07W4/0	503695	6157644	1
00/12-31-078-07W4/0	494594	6184052	0
00/10-01-075-07W4/0	503494	6146966	0
00/06-23-075-07W4/0	501254	6151221	0
AA/05-10-076-07W4/0	499331	6157814	0
00/06-16-075-07W4/0	497948	6149517	0
00/12-05-075-07W4/0	496031	6146736	0
00/15-23-075-04W4/0	531210	6152036	0
00/06-31-079-04W4/0	523699	6193652	0
00/10-09-080-04W4/0	527500	6197180	0
00/01-06-075-05W4/0	515282	6145997	0
00/01-14-079-03W4/0	540992	6188488	0
00/01-27-075-08W4/0	490662	6152742	0
00/02-08-077-08W4/0	487174	6167295	0
00/02-19-075-08W4/0	485279	6150853	0
00/03-34-079-03W4/0	538251	6193069	0
00/05-03-075-08W4/0	489691	6146315	0
00/05-05-075-05W4/0	515831	6146396	0
00/05-24-075-05W4/0	522359	6151355	0
00/05-25-074-08W4/0	493469	6143386	0
00/05-29-079-05W4/0	514956	6191983	0
00/05-30-079-05W4/0	513600	6191961	0
00/06-04-075-08W4/0	488439	6146432	0
00/06-08-074-01W4/0	555467	6138623	0
00/06-23-075-03W4/0	540554	6151638	0
00/06-24-076-09W4/0	483408	6161243	0
00/06-26-074-03W4/0	540700	6143466	0
00/06-26-079-05W4/0	520551	6191919	0



**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/06-28-078-08W4/0	488563	6182263	0
00/06-28-079-05W4/0	517198	6192016	0
00/06-34-079-06W4/0	508890	6193290	0
00/07-01-075-07W4/0	503210	6146381	0
00/07-07-075-06W4/0	505242	6148019	0
00/07-08-075-05W4/0	516495	6148216	0
00/07-13-075-07W4/0	503521	6149644	0
00/07-28-076-06W4/0	508400	6162587	0
00/07-29-079-04W4/0	525798	6191862	0
00/07-33-079-05W4/0	517378	6193272	0
00/08-06-075-08W4/0	485916	6146646	0
00/08-14-079-06W4/0	511352	6188735	0
00/09-11-075-08W4/0	492201	6148492	0
00/09-17-075-08W4/0	487327	6150108	0
00/09-23-079-06W4/0	511296	6190687	0
00/09-34-078-08W4/0	490976	6184078	0
00/10-04-075-07W4/0	498653	6146928	0
00/10-06-075-07W4/0	495356	6146952	0
00/10-10-075-07W4/0	500224	6148556	0
00/10-10-076-05W4/0	519907	6158434	0
00/10-10-080-04W4/0	528973	6197112	0
00/10-11-075-07W4/0	501887	6148585	0
00/10-16-079-06W4/0	507755	6188949	0
00/10-18-077-08W4/0	485669	6169743	0
00/10-19-075-07W4/0	495149	6151586	0
00/10-20-074-01W4/0	555909	6142313	0
00/10-25-079-06W4/0	512672	6192221	0
00/10-31-079-05W4/0	514155	6193709	0
00/10-33-079-04W4/0	527443	6193758	0
00/10-34-075-07W4/0	500249	6155080	0
00/10-34-079-04W4/0	528877	6193725	0
00/10-35-078-08W4/0	492027	6184090	0
00/11-01-077-08W4/2	493140	6166337	0
00/11-06-079-06W4/0	504057	6185870	0
00/11-08-075-08W4/0	486472	6148421	0
00/11-08-079-06W4/0	505618	6187145	0
00/11-10-075-08W4/0	490083	6148435	0
00/11-18-075-08W4/0	484927	6149994	0
00/11-22-079-06W4/0	508898	6190674	0
00/11-27-079-06W4/0	508923	6192396	0
00/11-29-074-01W4/0	555278	6144048	0
00/11-33-079-04W4/0	526910	6193698	0
00/11-36-075-07W4/0	502905	6155074	0
00/12-07-075-08W4/0	484645	6148418	0
00/12-08-075-08W4/0	486142	6148466	0
00/12-09-075-08W4/0	487805	6148442	0
00/12-14-075-08W4/0	491263	6150239	0
00/12-15-075-08W4/0	489650	6150172	0
00/12-19-079-05W4/0	513606	6190425	0
00/12-20-079-05W4/0	515107	6190455	0
00/12-20-080-04W4/0	524897	6200332	0
00/12-32-078-08W4/0	486243	6184006	0
00/13-32-079-05W4/0	515307	6194070	0
00/13-34-079-06W4/0	508704	6194099	0
00/14-18-075-08W4/0	485082	6150660	0

**Table A-4 Geology Picks – Upper Clearwater Aquifer (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Upper Clearwater Aquifer Isopach [m]
00/14-20-079-04W4/0	525240	6190914	0
00/15-28-079-05W4/0	517396	6192661	0
00/16-11-079-03W4/0	540763	6187980	0
AA/01-28-076-06W4/0	508581	6162390	0
AA/03-28-076-06W4/0	508009	6162340	0
AA/08-14-076-07W4/0	502143	6159478	0
AA/09-28-076-06W4/0	508566	6162870	0
AA/10-11-077-08W4/0	491871	6167846	0
AA/10-11-078-08W4/0	491903	6177726	0
AA/10-30-079-06W4/0	504467	6192120	0
AA/14-14-076-07W4/0	501362	6160221	0

**Table A-5 Geology Picks – Clearwater Shale Aquitard**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/08-31-075-04W4/0	525013	6154780	613.1	617.3	308.9	306.2	2.7
00/14-31-075-04W4/0	524124	6155261	616.9	620.1	310.7	307.6	3.1
00/16-34-075-06W4/0	510242	6155183	607.3	611.3	319.8	316.7	3.1
AA/04-02-076-06W4/0	510670	6155895	599.6	603.6	327.5	324.0	3.5
00/07-35-079-04W4/0	530745	6193403	476.7	479.1	320.0	316.0	4.0
AA/07-33-075-06W4/0	508326	6154435	599.6	603.7	319.5	315.4	4.1
00/01-28-078-02W4/0	547638	6181781	570.9	573.9	314.3	310.2	4.1
AA/01-33-075-06W4/0	508766	6154054	607.6	611.7	321.4	317.2	4.2
00/12-06-076-07W4/0	494570	6156665	610.0	612.7	329.5	325.3	4.2
00/06-36-075-06W4/3	512634	6154551	608.8	612.6	337.2	332.8	4.4
AA/02-03-076-06W4/0	510029	6155621	599.4	603.6	324.7	320.3	4.4
AA/01-22-076-06W4/0	510316	6160633	565.1	568.1	329.8	325.4	4.4
00/10-33-075-06W4/0	508231	6154800	598.1	601.9	321.3	316.8	4.5
00/09-32-075-06W4/0	506962	6154962	597.2	601.0	325.0	320.3	4.7
AA/11-33-075-06W4/0	507979	6154795	595.6	600.6	322.0	317.2	4.8
00/11-36-075-07W4/0	502905	6155074	620.0	623.0	326.9	322.0	4.9
AA/02-23-076-04W4/0	531024	6160757	606.5	610.5	305.7	300.8	4.9
AA/16-03-076-06W4/0	510211	6156915	586.7	590.7	327.5	322.5	5.0
00/15-35-076-04W4/0	531170	6165308	577.0	581.0	310.9	305.9	5.0
00/08-13-076-04W4/0	533184	6159470	595.1	598.1	314.1	309.0	5.1
00/06-18-079-05W4/0	513782	6188745	470.6	473.6	331.4	325.9	5.5
AA/09-07-076-04W4/0	524875	6158079	625.4	629.6	309.9	304.3	5.6
00/06-19-076-03W4/0	534096	6161293	610.1	614.0	299.2	293.6	5.6
AA/15-33-075-06W4/0	508400	6155349	600.2	601.6	320.8	315.1	5.7
AA/12-04-076-06W4/0	507669	6156458	597.1	602.1	330.0	324.3	5.7
00/08-30-076-03W4/0	534826	6162853	591.5	595.0	310.9	305.2	5.7
00/04-03-076-06W4/0	509189	6155939	594.8	597.5	327.3	321.5	5.8
AA/06-03-076-06W4/0	509653	6156197	593.6	597.8	329.2	323.4	5.8
AA/08-10-076-06W4/0	510182	6157652	578.7	582.7	328.5	322.7	5.8
AA/04-34-075-06W4/0	509209	6154257	608.3	611.3	323.0	317.1	5.9
AB/13-34-075-06W4/0	509204	6155281	599.1	602.1	323.6	317.7	5.9
00/11-26-077-04W4/0	530784	6172956	576.3	580.1	311.8	305.9	5.9
00/16-35-075-06W4/0	511812	6155221	604.5	609.6	338.8	332.8	6.0
00/10-10-076-05W4/0	519907	6158434	599.8	602.9	311.4	305.4	6.0
00/06-03-077-06W4/0	509699	6165781	557.6	561.8	336.8	330.8	6.0
00/07-29-078-03W4/0	535830	6182146	551.2	555.0	323.2	317.2	6.0
00/13-27-078-06W4/0	509230	6182717	545.5	549.3	333.3	327.3	6.0
AA/06-04-076-06W4/0	507790	6156133	597.8	601.6	326.8	320.7	6.1
00/06-19-079-04W4/0	523868	6190378	475.2	478.7	327.0	320.9	6.1
AA/03-22-076-06W4/0	509716	6160474	567.9	571.9	336.3	330.1	6.2
00/06-22-076-04W4/0	529105	6161256	610.7	614.5	321.5	315.3	6.2
00/01-01-076-05W4/2	523457	6155692	613.5	617.7	321.1	314.9	6.2
AA/12-13-076-06W4/0	512381	6159827	572.1	575.0	330.2	323.9	6.3
00/07-33-079-05W4/0	517378	6193272	482.7	485.8	333.8	327.5	6.3
AA/13-28-075-06W4/0	507516	6153790	601.7	605.4	320.0	313.6	6.4
AA/08-14-076-06W4/0	511800	6159240	571.9	573.3	333.9	327.5	6.4
AA/07-18-076-06W4/0	505129	6159604	567.8	570.8	338.9	332.5	6.4
AC/01-13-077-06W4/0	513647	6168563	565.1	568.4	322.4	316.0	6.4
AA/16-33-075-06W4/0	508724	6155350	598.2	603.2	325.1	318.7	6.4
AA/03-33-075-06W4/0	507800	6154219	597.1	601.2	321.1	314.6	6.5
AA/02-22-076-06W4/0	509916	6160632	565.3	568.4	334.9	328.4	6.5
AA/06-25-076-06W4/0	512888	6162657	556.1	560.1	318.8	312.3	6.5
00/07-06-079-03W4/0	533905	6185315	552.0	555.0	321.1	314.6	6.5
02/12-15-076-06W4/0	509121	6159722	567.9	572.1	338.7	332.1	6.6
AA/02-14-076-06W4/0	511552	6159017	572.2	575.3	335.0	328.4	6.6

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/13-13-076-06W4/0	512379	6160326	571.9	574.9	330.0	323.4	6.6
AA/02-04-076-06W4/0	508303	6155925	598.9	602.7	327.0	320.3	6.7
00/09-07-076-06W4/0	505426	6158187	579.8	584.2	328.5	321.8	6.7
00/14-29-076-03W4/0	535435	6163588	595.6	599.1	310.9	304.2	6.7
00/05-18-077-03W4/0	533574	6169271	568.0	571.2	297.9	291.1	6.8
AA/12-07-076-06W4/0	504217	6158201	589.3	592.9	336.1	329.3	6.8
AA/06-08-076-04W4/0	525963	6158042	614.3	618.3	308.0	301.1	6.9
AA/01-36-075-06W4/0	513475	6154291	599.6	602.7	323.5	316.5	7.0
00/10-08-076-05W4/0	516464	6158229	578.9	581.9	323.5	316.5	7.0
AA/01-10-076-06W4/0	510308	6157433	578.9	581.9	330.4	323.3	7.1
00/02-18-076-06W4/0	505128	6159104	575.4	579.1	334.7	327.6	7.1
00/06-24-076-06W4/0	512670	6161144	566.8	570.5	325.4	318.3	7.1
AA/12-33-075-06W4/0	507293	6154787	596.3	600.4	325.3	318.1	7.2
AB/02-04-076-06W4/0	508440	6155684	598.9	603.0	326.0	318.8	7.2
00/11-07-076-03W4/0	533868	6158431	617.1	620.3	295.0	287.8	7.2
AA/13-09-076-06W4/0	507536	6158600	570.1	572.5	334.5	327.3	7.2
AA/07-23-076-06W4/0	511546	6161035	571.0	574.3	324.4	317.2	7.2
AA/06-23-076-06W4/0	511262	6161106	573.0	576.0	326.0	318.8	7.2
00/06-26-079-05W4/0	520551	6191919	482.2	485.4	323.5	316.3	7.2
AA/04-33-075-06W4/0	507463	6154094	598.3	602.4	324.1	316.9	7.2
AA/13-04-076-06W4/0	507580	6156817	591.1	594.7	324.4	317.1	7.3
00/15-29-075-06W4/0	506847	6153773	605.1	608.9	323.0	315.7	7.3
AA/01-32-075-06W4/0	506893	6154283	597.9	602.0	327.2	319.9	7.3
AA/14-35-075-06W4/0	511017	6155286	602.2	605.2	328.3	321.0	7.3
AA/02-02-076-06W4/0	511655	6155911	603.8	608.0	331.3	324.0	7.3
00/08-33-076-05W4/0	518413	6164296	568.2	571.8	329.0	321.7	7.3
AA/13-29-075-06W4/0	505979	6153731	608.5	613.5	321.9	314.5	7.4
AA/11-10-076-06W4/0	509523	6158194	575.7	579.6	337.0	329.6	7.4
AA/11-24-076-06W4/0	512588	6161586	566.5	569.7	323.7	316.3	7.4
AA/16-34-076-05W4/0	520120	6165223	565.3	568.6	331.4	324.0	7.4
00/07-07-077-04W4/0	524570	6167639	579.7	583.1	324.1	316.7	7.4
AA/02-32-075-06W4/0	506609	6153972	604.1	608.2	325.6	318.1	7.5
00/06-05-076-07W4/0	496289	6156073	659.1	663.4	334.2	326.7	7.5
AA/07-13-076-07W4/0	503396	6159416	584.7	587.8	336.4	328.9	7.5
AA/10-02-077-05W4/0	521168	6166368	564.6	568.1	322.2	314.7	7.5
00/15-31-078-03W4/0	534253	6184419	560.3	564.1	325.1	317.6	7.5
AA/04-32-075-06W4/0	505878	6154216	605.2	609.3	323.7	316.1	7.6
AA/06-31-075-06W4/0	504600	6154739	607.0	611.1	319.7	312.1	7.6
AA/04-26-076-04W4/0	530310	6162352	605.5	609.7	302.7	295.1	7.6
AA/13-28-076-04W4/0	526986	6163532	580.0	583.0	320.2	312.6	7.6
AA/04-33-076-04W4/0	527224	6164128	578.7	582.0	323.2	315.6	7.6
AA/06-33-076-05W4/0	517676	6164213	562.4	565.7	332.4	324.8	7.6
AA/15-31-075-06W4/0	505140	6155367	603.3	607.4	320.6	313.0	7.6
AB/04-18-077-05W4/0	513961	6168591	565.8	568.8	324.0	316.4	7.6
AA/08-32-075-06W4/0	507086	6154519	597.1	600.6	325.3	317.6	7.7
00/04-04-076-06W4/0	507315	6155911	596.9	600.1	330.7	323.0	7.7
00/07-28-076-06W4/0	508400	6162587	560.5	563.9	348.8	341.1	7.7
AA/10-30-076-04W4/0	524401	6163171	584.5	587.7	327.4	319.7	7.7
AA/01-35-075-06W4/0	511844	6154172	597.2	600.2	329.1	321.4	7.7
00/09-06-076-05W4/0	515132	6156678	602.6	607.5	329.1	321.4	7.7
AB/10-33-076-05W4/0	517963	6164833	566.3	569.3	327.1	319.4	7.7
00/04-01-076-06W4/0	512386	6155951	606.0	608.7	333.4	325.6	7.8
AA/07-10-076-06W4/0	509923	6157795	580.9	583.9	331.4	323.6	7.8
AA/16-32-075-06W4/0	506970	6155238	597.3	600.9	325.3	317.5	7.8
AA/01-04-076-06W4/0	508644	6155929	595.8	600.8	328.5	320.7	7.8

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/11-04-076-06W4/0	508016	6156509	596.2	600.3	325.8	318.0	7.8
00/08-10-076-05W4/0	520313	6157648	608.5	612.7	314.8	307.0	7.8
AA/04-16-076-04W4/0	526970	6159093	614.0	617.2	318.5	310.7	7.8
00/13-20-076-04W4/0	525529	6161798	613.1	616.5	328.0	320.2	7.8
AA/06-34-076-05W4/0	519206	6164282	560.0	564.1	324.8	317.0	7.8
AA/12-10-076-06W4/0	508994	6158153	574.3	577.0	337.9	330.0	7.9
00/13-08-076-06W4/0	505888	6158581	576.9	581.2	326.5	318.6	7.9
AA/09-32-076-04W4/0	526807	6164746	573.8	576.9	322.0	314.1	7.9
00/06-09-077-05W4/0	517821	6167619	583.0	586.2	321.4	313.5	7.9
AA/12-32-075-06W4/0	505933	6154761	602.2	606.3	325.8	317.9	7.9
AA/10-32-075-06W4/0	506588	6154771	599.5	603.5	324.6	316.7	7.9
AA/10-15-076-06W4/0	509918	6159824	568.4	571.6	337.8	329.9	7.9
AA/07-33-076-05W4/0	518090	6164329	562.1	565.1	328.1	320.2	7.9
00/03-32-075-06W4/0	506229	6154233	601.9	605.7	324.6	316.6	8.0
AB/11-35-075-06W4/0	511347	6154779	596.3	600.3	330.7	322.7	8.0
AA/13-32-075-06W4/0	505809	6155209	603.6	607.9	323.4	315.4	8.0
AA/02-01-076-06W4/0	513220	6155945	595.5	599.7	332.2	324.2	8.0
00/16-05-076-06W4/0	506944	6156791	591.1	594.7	330.8	322.8	8.0
AA/16-01-076-07W4/0	503728	6156792	607.6	610.6	331.5	323.5	8.0
00/07-11-076-05W4/0	521214	6157997	616.2	620.2	312.1	304.1	8.0
AA/06-13-076-06W4/0	512860	6159576	573.3	576.5	332.9	324.9	8.0
AA/04-23-076-06W4/0	510858	6160730	570.5	574.7	329.2	321.2	8.0
AA/07-24-076-06W4/0	513177	6161038	570.8	574.8	321.9	313.9	8.0
00/10-22-076-03W4/0	539367	6161698	632.2	634.6	285.5	277.5	8.0
AB/13-29-076-04W4/0	525414	6163444	586.0	589.0	325.8	317.8	8.0
AA/04-32-076-04W4/0	525395	6163932	578.3	582.0	325.2	317.2	8.0
AA/07-33-076-04W4/0	527706	6164296	575.4	578.4	323.5	315.5	8.0
00/03-05-077-05W4/0	515981	6165608	580.2	583.2	324.2	316.2	8.0
00/02-23-077-04W4/0	531108	6170427	576.1	579.9	289.2	281.2	8.0
00/07-32-078-03W4/0	535737	6184024	549.8	553.0	322.5	314.5	8.0
AA/14-32-075-06W4/0	506162	6155260	598.6	602.2	323.7	315.6	8.1
02/03-08-076-06W4/0	506259	6157389	583.3	587.9	325.2	317.1	8.1
AA/01-14-076-06W4/0	511951	6158919	572.9	575.9	335.7	327.6	8.1
AA/04-14-076-06W4/0	510693	6159005	568.4	572.3	337.9	329.8	8.1
00/13-14-076-06W4/0	510651	6160180	565.7	569.7	338.7	330.6	8.1
00/06-35-076-05W4/0	520725	6164140	569.1	572.6	326.4	318.3	8.1
AB/11-33-076-04W4/0	527446	6164790	576.2	579.5	323.2	315.1	8.1
00/15-08-076-05W4/0	516273	6158713	572.9	576.9	324.5	316.4	8.1
00/08-24-076-02W4/0	552717	6161338	630.6	633.7	308.6	300.5	8.1
AA/15-28-076-04W4/0	527755	6163576	581.1	584.6	326.1	318.0	8.1
00/07-32-076-05W4/0	516531	6164353	576.1	579.7	330.3	322.2	8.1
AB/11-33-076-05W4/0	517736	6164624	571.0	574.3	325.6	317.5	8.1
00/10-32-076-05W4/0	516418	6164803	574.9	578.0	326.5	318.4	8.1
AA/11-12-076-06W4/0	512786	6158198	577.0	580.9	336.3	328.1	8.2
AA/01-23-076-06W4/0	511953	6160644	568.0	571.1	328.8	320.6	8.2
00/13-19-076-04W4/0	523893	6161784	589.3	592.5	325.2	317.0	8.2
AB/13-36-075-06W4/0	512494	6155311	594.3	597.3	330.6	322.4	8.2
00/15-31-076-04W4/0	524681	6165176	573.7	576.7	329.6	321.4	8.2
00/07-32-075-06W4/0	506573	6154412	600.4	604.2	327.4	319.1	8.3
AB/08-14-076-06W4/0	512050	6159418	571.4	574.4	336.9	328.6	8.3
AA/02-23-076-06W4/0	511600	6160731	568.7	572.7	328.4	320.1	8.3
AA/08-18-077-05W4/0	515046	6169092	567.1	570.1	326.4	318.1	8.3
00/16-26-078-03W4/0	541016	6183040	543.3	546.1	312.4	304.1	8.3
AA/13-33-075-06W4/0	507321	6155342	601.9	605.5	327.3	319.0	8.3
AA/02-05-076-06W4/0	506666	6155891	593.0	598.1	327.3	319.0	8.3

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
00/07-06-076-04W4/0	524447	6156411	629.6	633.8	320.7	312.4	8.3
00/13-32-076-04W4/0	525572	6165275	580.5	583.0	328.8	320.5	8.3
AA/01-05-076-06W4/0	506971	6155666	595.4	599.0	327.7	319.3	8.4
AA/14-06-076-05W4/0	514253	6156947	593.2	596.4	328.4	320.0	8.4
AA/11-11-076-06W4/0	511119	6158197	572.5	576.4	336.2	327.8	8.4
AA/03-30-076-05W4/0	514304	6162337	567.9	572.9	323.0	314.6	8.4
AA/13-33-076-04W4/0	527146	6164968	571.7	575.0	323.5	315.1	8.4
AB/04-05-077-04W4/0	525313	6165468	573.6	577.1	323.0	314.6	8.4
AA/04-05-077-04W4/0	525597	6165530	573.9	579.1	328.0	319.6	8.4
00/06-03-077-03W4/0	538827	6166112	587.4	590.6	304.7	296.3	8.4
AA/08-05-076-06W4/0	506970	6156117	591.7	596.0	329.1	320.7	8.4
AA/10-04-076-06W4/0	508311	6156540	597.3	601.1	328.3	319.9	8.4
00/13-05-076-06W4/0	506017	6157035	594.9	598.7	326.1	317.7	8.4
AA/01-32-076-04W4/0	526515	6164017	582.2	585.7	322.1	313.7	8.4
00/12-36-076-05W4/0	522277	6164526	569.4	572.6	328.1	319.7	8.4
00/03-05-076-06W4/0	506277	6155879	593.7	597.5	327.4	318.9	8.5
AA/03-10-076-06W4/0	509514	6157397	584.9	587.9	333.1	324.6	8.5
AA/04-10-076-06W4/0	509240	6157520	585.0	589.0	333.1	324.6	8.5
AA/07-09-076-06W4/0	508185	6157849	581.8	584.8	334.2	325.7	8.5
AA/10-10-076-06W4/0	509904	6158209	573.5	573.5	333.5	325.0	8.5
AA/15-10-076-06W4/0	510043	6158510	570.6	574.6	336.2	327.7	8.5
AA/16-10-076-06W4/0	510323	6158632	568.4	571.4	336.4	327.9	8.5
AA/04-13-076-06W4/0	512213	6158857	573.1	577.0	335.4	326.9	8.5
AA/05-18-076-05W4/0	513839	6159478	574.2	577.3	327.3	318.8	8.5
AA/15-15-076-06W4/0	510071	6160109	566.2	570.2	336.2	327.7	8.5
AA/10-24-076-06W4/0	513278	6161575	568.1	571.3	319.2	310.7	8.5
00/02-26-076-04W4/0	531080	6162486	587.6	591.2	303.8	295.3	8.5
AB/05-33-076-04W4/0	527104	6164398	578.4	581.7	323.0	314.5	8.5
AB/08-32-076-04W4/0	526715	6164441	575.3	578.5	321.0	312.5	8.5
AA/15-32-076-05W4/0	516531	6165204	575.5	578.5	325.5	317.0	8.5
AA/09-11-076-06W4/0	511954	6158199	576.8	579.7	334.9	326.3	8.6
AA/01-16-076-06W4/0	508495	6159223	568.1	571.2	333.7	325.1	8.6
AA/14-14-076-06W4/0	510999	6160225	567.7	570.8	336.7	328.1	8.6
F1/04-24-076-06W4/0	512491	6160780	570.0	573.0	330.7	322.1	8.6
00/06-34-076-05W4/0	519480	6164203	569.4	573.0	329.7	321.1	8.6
00/07-31-076-04W4/0	524733	6164341	578.3	581.5	329.4	320.8	8.6
AA/06-05-076-06W4/0	506197	6156136	586.6	590.3	327.8	319.2	8.6
AA/06-02-076-06W4/0	511267	6156306	583.3	587.3	330.8	322.2	8.6
AA/10-06-076-06W4/0	505192	6156750	601.8	605.4	322.3	313.7	8.6
AA/06-07-076-06W4/0	504627	6157786	596.6	600.7	333.1	324.5	8.6
00/13-10-076-04W4/0	528563	6158829	599.0	603.1	327.1	318.5	8.6
AA/10-14-076-06W4/0	511619	6159957	566.4	570.4	335.1	326.5	8.6
AA/02-19-076-06W4/0	505125	6160788	565.9	568.9	339.1	330.5	8.6
AA/13-19-076-05W4/0	514153	6161700	568.6	572.6	323.6	315.0	8.6
AA/06-35-076-05W4/0	520976	6164122	569.8	573.1	324.1	315.5	8.6
AA/02-15-076-06W4/0	509878	6158879	569.2	573.4	337.8	329.1	8.7
AA/09-15-076-06W4/0	510318	6159824	565.5	569.7	340.7	332.0	8.7
AA/01-11-076-06W4/0	511956	6157399	577.5	578.8	325.6	316.9	8.7
AA/14-32-076-04W4/0	525839	6165189	577.5	580.5	324.1	315.4	8.7
00/06-10-076-06W4/0	509662	6157832	580.9	585.0	332.4	323.6	8.8
AA/13-01-076-06W4/0	512256	6156966	579.1	583.1	329.0	320.2	8.8
00/07-18-076-05W4/0	514913	6159338	570.1	573.3	331.1	322.3	8.8
AB/08-15-076-06W4/0	510419	6159425	566.0	569.2	339.2	330.4	8.8
AA/16-14-076-06W4/0	511893	6160167	569.0	572.0	332.3	323.5	8.8
AB/01-06-077-04W4/0	524953	6165707	572.2	575.7	328.8	320.0	8.8

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/04-18-077-05W4/0	514052	6168801	565.7	569.0	325.0	316.2	8.8
AA/13-32-076-04W4/0	525270	6165018	577.2	580.5	324.9	316.0	8.9
AA/11-05-077-05W4/0	516010	6166416	579.2	582.3	325.9	317.0	8.9
AA/15-05-077-05W4/0	516466	6166853	580.7	583.7	322.7	313.8	8.9
AA/15-32-075-06W4/0	506572	6155211	597.9	601.5	324.6	315.7	8.9
00/15-02-076-06W4/0	511649	6156830	590.2	595.7	342.8	333.9	8.9
00/08-15-076-06W4/0	510203	6159259	568.3	572.4	341.1	332.2	8.9
AA/09-14-076-06W4/0	511949	6159828	570.7	573.7	334.1	325.2	8.9
AA/04-24-076-07W4/0	502751	6160814	572.7	575.7	341.6	332.7	8.9
AA/04-05-076-06W4/0	505807	6155870	590.7	594.3	324.6	315.6	9.0
AA/03-12-076-06W4/0	512789	6157399	583.8	586.8	329.4	320.4	9.0
AA/04-12-076-06W4/0	512540	6157531	582.8	586.8	330.3	321.3	9.0
AA/16-12-076-06W4/0	513585	6158600	577.9	581.0	331.8	322.8	9.0
00/03-14-076-06W4/0	511228	6159128	569.2	573.2	339.1	330.1	9.0
AA/05-13-076-06W4/0	512497	6159341	572.8	576.0	337.1	328.1	9.0
AA/07-14-076-06W4/0	511450	6159417	569.7	572.7	338.2	329.2	9.0
AA/01-24-076-06W4/0	513735	6160835	571.8	575.0	327.6	318.6	9.0
00/07-19-076-06W4/0	505132	6160932	566.0	570.3	341.8	332.8	9.0
AA/06-32-076-04W4/0	525619	6164195	577.4	580.4	323.8	314.8	9.0
AA/12-32-076-04W4/0	525242	6164738	582.7	586.1	327.7	318.7	9.0
00/03-01-077-05W4/0	522523	6165461	571.1	574.7	331.5	322.5	9.0
AA/03-04-077-05W4/0	517794	6165515	573.8	576.9	333.9	324.9	9.0
AA/13-07-077-05W4/0	514065	6168367	566.1	569.4	324.5	315.5	9.0
AA/14-07-077-05W4/0	514364	6168367	566.6	570.3	321.8	312.8	9.0
00/11-01-076-06W4/0	512603	6156446	599.6	599.1	339.7	330.6	9.1
00/07-26-077-05W4/0	521456	6172574	585.2	588.2	323.2	314.1	9.1
00/11-05-076-06W4/0	506407	6156625	592.9	596.6	326.1	317.0	9.1
00/11-04-076-05W4/0	517742	6156677	602.9	606.7	329.0	319.9	9.1
00/10-05-076-05W4/0	516500	6156725	613.3	615.7	330.8	321.7	9.1
00/12-05-076-06W4/0	505912	6156749	598.4	602.1	325.3	316.2	9.1
00/01-08-076-06W4/0	507059	6157391	585.8	589.3	326.5	317.4	9.1
AA/08-11-076-06W4/0	511814	6157655	576.4	580.4	336.3	327.2	9.1
00/08-13-076-06W4/0	513472	6159568	576.0	579.7	331.8	322.7	9.1
00/11-15-076-06W4/0	509520	6159923	568.7	572.9	338.1	329.0	9.1
AA/03-23-076-06W4/0	511148	6160634	569.6	572.7	331.8	322.7	9.1
00/08-25-076-06W4/0	513686	6162738	556.9	560.4	323.8	314.7	9.1
00/05-01-078-04W4/0	531986	6175863	577.0	580.0	314.6	305.5	9.1
00/11-22-079-06W4/0	508898	6190674	476.1	479.1	334.6	325.5	9.1
00/12-31-079-06W4/0	503538	6193621	551.9	555.4	339.5	330.4	9.1
AA/09-12-076-06W4/0	513586	6158201	581.1	584.2	331.3	322.1	9.2
AA/04-15-076-06W4/0	509256	6159153	568.1	571.9	341.5	332.3	9.2
00/09-18-076-06W4/0	505435	6159818	565.4	569.7	341.2	332.0	9.2
00/11-16-076-04W4/0	527454	6159868	616.2	619.2	330.2	321.0	9.2
AA/13-18-076-05W4/0	514096	6160072	573.2	577.2	322.2	313.0	9.2
AA/03-24-076-06W4/0	512858	6160637	570.6	573.6	329.0	319.8	9.2
AA/02-29-076-04W4/0	526214	6162363	606.3	609.3	323.5	314.3	9.2
00/06-28-076-04W4/0	527488	6162664	585.2	589.0	325.5	316.3	9.2
00/15-07-078-04W4/0	524571	6178057	579.2	583.1	319.7	310.5	9.2
AA/08-12-076-06W4/0	513587	6157801	584.8	587.8	332.6	323.4	9.2
AA/08-15-076-06W4/0	510200	6159246	568.0	571.2	339.1	329.9	9.2
AA/07-15-076-06W4/0	509919	6159424	568.6	571.8	340.4	331.1	9.3
00/06-33-076-04W4/0	527544	6164151	577.0	580.8	325.9	316.6	9.3
00/11-03-076-06W4/0	509421	6156693	591.3	594.4	333.6	324.3	9.3
AA/13-10-076-06W4/0	509122	6158593	569.3	572.4	339.1	329.8	9.3
02/01-16-076-06W4/0	508717	6158880	567.8	571.9	337.8	328.5	9.3

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AB/01-16-076-06W4/0	508667	6158955	567.4	571.4	337.6	328.3	9.3
00/05-15-076-06W4/0	509040	6159569	568.0	572.2	339.3	330.0	9.3
00/04-19-076-05W4/0	514160	6160799	571.7	575.3	326.0	316.7	9.3
AA/05-18-077-05W4/0	514009	6169281	565.4	568.7	329.6	320.3	9.3
00/05-15-079-05W4/0	518577	6188639	489.7	493.4	329.6	320.3	9.3
00/06-01-076-07W4/0	503018	6156117	593.6	597.4	331.5	322.1	9.4
AA/05-10-076-06W4/0	509124	6157784	585.0	587.0	336.0	326.6	9.4
AA/05-11-076-06W4/0	510756	6157796	576.0	579.0	337.2	327.8	9.4
AA/07-12-076-06W4/0	513157	6157816	581.8	584.9	329.7	320.3	9.4
02/06-12-076-06W4/0	512792	6157857	580.9	585.2	335.0	325.6	9.4
00/15-11-076-06W4/0	511563	6158592	573.6	577.7	337.2	327.8	9.4
AA/13-12-076-06W4/0	512456	6158650	573.4	577.4	336.4	327.0	9.4
AA/01-15-076-06W4/0	510320	6159025	568.2	571.1	337.2	327.8	9.4
AB/14-13-076-06W4/0	512779	6160328	572.9	576.0	333.9	324.5	9.4
00/06-22-076-06W4/0	509376	6161039	567.4	571.1	339.4	330.0	9.4
00/07-13-077-06W4/0	513350	6168979	563.3	566.5	331.2	321.8	9.4
AA/11-01-076-07W4/0	502904	6156665	593.7	596.8	331.6	322.2	9.4
AA/12-11-076-06W4/0	510755	6158196	575.6	578.5	338.6	329.2	9.4
AA/10-11-076-06W4/0	511553	6158214	575.2	578.2	337.1	327.7	9.4
AA/08-22-076-04W4/0	529894	6161126	601.7	605.9	279.1	269.7	9.4
00/12-36-078-04W4/0	531863	6184032	554.1	557.3	317.8	308.4	9.4
AA/10-01-076-06W4/0	513308	6156710	587.5	591.7	329.1	319.6	9.5
00/08-09-076-06W4/0	508799	6157923	577.4	581.3	336.4	326.9	9.5
AA/10-12-076-06W4/0	513186	6158200	579.0	580.3	334.9	325.4	9.5
00/15-12-076-06W4/0	513323	6158481	577.8	581.8	335.7	326.2	9.5
00/16-08-076-06W4/0	507048	6158598	573.2	577.6	333.1	323.6	9.5
00/01-16-076-06W4/0	508569	6159038	567.8	571.9	338.0	328.5	9.5
AA/05-14-076-06W4/0	510916	6159596	569.1	572.1	339.9	330.4	9.5
00/06-14-076-06W4/0	511016	6159597	569.3	572.0	339.8	330.3	9.5
AA/10-13-076-06W4/0	513180	6159829	574.8	578.8	330.0	320.5	9.5
AA/14-13-076-06W4/0	512591	6160070	572.0	575.0	332.8	323.3	9.5
AA/07-27-076-04W4/0	529390	6162611	602.1	606.1	322.0	312.5	9.5
AA/14-33-076-05W4/0	517503	6165213	572.7	576.4	329.0	319.5	9.5
00/11-02-077-04W4/0	530513	6166459	576.7	579.9	317.3	307.8	9.5
00/11-19-077-03W4/0	533940	6171078	569.7	573.9	311.1	301.6	9.5
00/06-35-077-04W4/0	530626	6174271	579.5	582.7	330.3	320.8	9.5
00/14-33-077-03W4/0	537108	6175000	565.2	568.2	323.9	314.4	9.5
00/06-23-079-05W4/0	520538	6190268	482.3	485.5	325.6	316.1	9.5
AA/13-02-076-06W4/0	510874	6156858	580.7	584.7	331.9	322.3	9.6
AA/13-11-076-06W4/0	510875	6158532	570.0	574.0	337.4	327.8	9.6
AA/16-09-076-06W4/0	508698	6158622	569.3	572.0	339.2	329.6	9.6
AA/14-10-076-06W4/0	509377	6158734	569.3	572.3	340.4	330.8	9.6
AA/15-04-076-06W4/0	508341	6157071	581.9	586.0	331.8	322.2	9.6
AA/02-12-076-06W4/0	513187	6157407	587.5	590.6	328.1	318.5	9.6
AA/04-11-076-06W4/0	510867	6157523	577.4	581.4	335.5	325.9	9.6
00/06-12-076-06W4/0	512949	6157942	581.6	585.7	334.8	325.2	9.6
AA/12-12-076-06W4/0	512386	6158197	577.2	580.2	334.1	324.5	9.6
AA/14-09-076-06W4/0	507890	6158591	570.2	574.2	334.6	325.0	9.6
00/02-16-076-06W4/0	508131	6158976	568.7	572.8	333.1	323.5	9.6
AA/02-13-076-06W4/0	513083	6159029	573.3	576.2	335.1	325.5	9.6
00/09-13-076-06W4/0	513470	6159730	575.9	579.9	333.1	323.5	9.6
00/11-04-077-05W4/0	517476	6166149	575.3	578.7	331.3	321.7	9.6
00/12-11-077-04W4/0	530454	6167852	580.2	583.4	306.5	296.9	9.6
00/06-02-078-04W4/0	530504	6175607	582.3	585.3	335.3	325.7	9.6
00/07-19-078-03W4/0	534258	6180692	556.2	560.2	330.0	320.4	9.6



**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/06-06-076-05W4/0	514262	6156188	597.8	601.0	321.3	311.6	9.7
AA/02-11-076-06W4/0	511473	6157316	576.9	579.9	335.0	325.3	9.7
00/06-15-076-06W4/2	509459	6159618	568.9	573.8	341.2	331.5	9.7
AA/12-14-076-06W4/0	510750	6159825	567.1	570.3	340.2	330.5	9.7
AB/16-13-076-06W4/0	513679	6160187	571.7	574.7	327.2	317.5	9.7
AA/05-32-076-04W4/0	525252	6164304	580.7	584.0	326.8	317.1	9.7
00/07-14-079-05W4/0	521043	6188667	491.8	494.8	327.2	317.5	9.7
00/12-19-079-05W4/0	513606	6190425	475.0	478.0	333.0	323.3	9.7
AA/03-11-076-06W4/0	511157	6157397	577.6	580.6	334.6	324.9	9.7
AA/11-15-076-06W4/0	509519	6159823	569.2	572.3	339.1	329.4	9.7
00/08-34-076-04W4/0	529670	6164341	579.7	583.6	321.6	311.9	9.7
AA/11-13-076-06W4/0	512781	6159828	572.8	576.5	334.9	325.1	9.8
AB/14-29-076-04W4/0	525997	6163508	582.7	586.0	318.9	309.1	9.8
AA/01-12-076-06W4/0	513476	6157564	586.5	590.7	328.7	318.9	9.8
AA/14-11-076-06W4/0	511100	6158581	570.8	573.8	336.6	326.8	9.8
02/15-09-076-06W4/0	508424	6158765	568.8	572.8	336.5	326.7	9.8
00/03-18-076-06W4/0	504717	6158956	583.7	587.7	342.1	332.3	9.8
AA/03-15-076-06W4/0	509521	6159023	569.0	572.0	341.3	331.5	9.8
AA/03-13-076-06W4/0	512886	6159168	573.3	576.3	335.7	325.9	9.8
00/11-14-076-06W4/0	511143	6159787	566.6	570.0	337.1	327.3	9.8
AA/11-14-076-06W4/0	511059	6159827	566.1	569.2	338.3	328.5	9.8
AA/14-15-076-04W4/0	529143	6160267	609.5	613.5	318.8	309.0	9.8
AA/08-24-076-06W4/0	513391	6160861	570.8	574.0	326.7	316.9	9.8
00/10-27-076-04W4/0	529581	6163254	592.5	595.7	321.0	311.2	9.8
AA/01-33-076-04W4/0	528187	6163998	583.2	587.1	324.0	314.2	9.8
00/12-05-077-07W4/0	496267	6166370	560.2	563.2	348.2	338.4	9.8
00/02-10-078-04W4/0	529585	6176741	578.6	582.6	329.6	319.8	9.8
AA/15-14-076-06W4/0	511388	6160246	565.8	568.9	334.2	324.3	9.9
AA/11-28-076-06W4/0	508067	6162897	554.5	557.8	344.0	334.1	9.9
00/05-17-079-05W4/0	515076	6188579	471.2	474.2	336.4	326.5	9.9
00/09-09-076-06W4/0	508690	6158194	575.7	579.9	340.1	330.2	9.9
AA/15-13-076-06W4/0	513179	6160329	571.8	575.1	329.1	319.2	9.9
00/07-30-076-05W4/0	514848	6162812	559.3	563.1	324.6	314.7	9.9
AA/16-04-077-05W4/0	518384	6166864	577.4	580.5	327.8	317.9	9.9
00/03-15-077-04W4/0	528918	6168773	570.9	574.1	320.1	310.2	9.9
00/10-02-079-05W4/0	520764	6185658	536.8	539.8	339.8	329.9	9.9
AA/16-11-076-06W4/0	511796	6158471	575.4	578.6	337.1	327.1	10.0
00/13-07-076-05W4/0	514133	6158513	577.5	581.5	325.2	315.2	10.0
02/06-15-076-06W4/0	509522	6159323	568.7	572.6	342.4	332.4	10.0
AA/05-15-076-06W4/0	509120	6159422	567.8	571.0	341.9	331.9	10.0
00/09-20-076-05W4/0	516910	6161322	572.9	577.0	321.9	311.9	10.0
AA/02-18-077-05W4/0	514700	6168648	567.7	570.7	325.4	315.4	10.0
00/08-17-078-03W4/0	536116	6178959	567.0	570.0	323.0	313.0	10.0
00/07-30-078-03W4/0	534185	6182339	550.4	554.2	333.4	323.4	10.0
00/10-15-076-05W4/0	519890	6160002	582.3	585.3	317.4	307.3	10.1
00/12-05-077-04W4/0	525208	6166376	570.9	574.4	327.9	317.8	10.1
00/05-10-077-05W4/0	518903	6167617	580.3	583.5	324.4	314.3	10.1
00/01-34-075-07W4/0	500341	6154226	631.4	634.1	335.0	324.9	10.1
00/07-02-076-05W4/0	521300	6156078	614.9	618.8	319.8	309.7	10.1
AA/07-11-076-06W4/0	511600	6157798	574.7	579.3	336.3	326.2	10.1
02/05-15-076-06W4/0	509122	6159322	567.7	571.8	342.5	332.4	10.1
00/03-18-077-04W4/0	524081	6168824	580.1	583.8	324.8	314.7	10.1
AA/07-13-076-06W4/0	513182	6159429	573.5	576.5	329.5	319.3	10.2
00/06-20-077-04W4/0	525753	6170764	574.3	577.7	320.7	310.5	10.2
00/06-34-079-06W4/0	508890	6193290	503.2	506.3	342.4	332.2	10.2

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/05-08-076-06W4/0	505845	6157946	575.2	579.4	327.1	316.9	10.2
00/06-25-076-05W4/0	522388	6162631	594.1	597.1	321.9	311.6	10.3
AA/13-01-076-07W4/0	502694	6157041	600.4	603.4	334.8	324.5	10.3
AA/14-12-076-06W4/0	512785	6158598	573.8	576.8	337.2	326.9	10.3
00/15-09-076-06W4/0	508219	6158788	568.9	573.1	334.6	324.3	10.3
02/08-15-076-06W4/0	510128	6159424	567.8	572.0	340.2	329.9	10.3
AA/05-17-076-06W4/0	506009	6159597	564.6	568.9	334.8	324.5	10.3
AA/07-32-076-04W4/0	526162	6164418	575.9	579.1	319.3	309.0	10.3
AA/05-12-076-06W4/0	512288	6157797	579.0	582.0	334.4	324.0	10.4
00/10-07-076-06W4/0	505130	6158187	583.1	585.3	327.7	317.3	10.4
AA/04-16-076-06W4/0	507477	6158920	568.6	572.6	336.0	325.6	10.4
00/10-16-076-05W4/0	518170	6159965	580.9	583.4	313.2	302.8	10.4
00/13-27-078-07W4/0	499441	6182997	549.7	553.3	346.2	335.8	10.4
AA/08-02-076-07W4/0	502244	6156113	583.4	587.0	332.1	321.7	10.4
00/06-11-076-06W4/0	511099	6157860	573.9	578.0	337.6	327.2	10.4
00/14-07-076-06W4/0	504626	6158586	582.2	586.6	336.1	325.6	10.5
00/04-18-076-03W4/0	533545	6158937	603.8	607.3	311.4	300.9	10.5
AA/02-17-076-06W4/0	506725	6159188	568.3	570.5	335.5	325.0	10.5
AA/08-14-076-07W4/0	502143	6159478	593.8	597.6	348.1	337.6	10.5
AA/14-14-076-07W4/0	501362	6160221	602.7	606.5	349.0	338.5	10.5
00/03-20-076-06W4/0	506254	6160627	562.9	567.0	339.7	329.2	10.5
00/10-27-076-05W4/0	519813	6163197	569.7	573.9	325.5	315.0	10.5
AB/08-04-077-05W4/0	518574	6166073	571.8	574.8	332.6	322.1	10.5
00/05-08-079-05W4/0	515263	6187010	495.1	498.1	336.5	326.0	10.5
00/10-01-076-05W4/0	523025	6156743	620.9	623.3	312.7	302.1	10.6
AA/06-33-076-04W4/0	527414	6164512	576.9	580.6	324.7	314.1	10.6
00/11-03-077-04W4/0	528893	6166433	577.9	581.5	319.2	308.6	10.6
AA/05-10-076-07W4/0	499331	6157814	604.1	607.2	336.3	325.7	10.6
AA/12-33-076-04W4/0	527162	6164698	578.1	581.6	325.3	314.7	10.6
00/11-34-078-07W4/0	499902	6184216	546.2	549.6	343.3	332.7	10.6
00/15-04-079-05W4/0	517597	6186044	498.2	501.3	337.3	326.7	10.6
AA/02-14-076-07W4/0	501734	6158999	594.7	599.4	346.2	335.5	10.7
00/14-33-076-03W4/0	537242	6165202	584.6	588.2	306.4	295.7	10.7
00/07-04-078-03W4/0	537597	6175936	561.5	565.7	326.0	315.3	10.7
00/10-25-078-04W4/0	532477	6182669	560.8	564.0	332.8	322.1	10.7
03/03-16-076-06W4/0	507693	6158975	568.6	571.6	338.1	327.4	10.7
AA/06-18-077-05W4/0	514258	6169044	566.1	569.4	327.6	316.9	10.7
00/06-29-077-03W4/0	535527	6172416	585.0	588.7	294.6	283.9	10.7
00/10-30-076-04W4/0	524691	6163222	586.0	589.2	327.9	317.1	10.8
00/10-14-076-07W4/0	501817	6159857	592.0	595.3	346.6	335.8	10.8
00/10-18-076-04W4/0	524691	6159968	627.0	629.4	320.7	309.9	10.8
00/06-05-079-05W4/0	515640	6185418	529.4	533.1	335.6	324.8	10.8
AA/01-01-076-07W4/0	503602	6155976	593.7	597.4	326.9	316.0	10.9
00/08-21-076-06W4/0	508684	6160968	564.4	568.5	334.9	324.0	10.9
00/06-26-076-06W4/0	511002	6162551	566.9	570.0	334.9	324.0	10.9
00/15-26-078-07W4/0	501842	6182998	537.9	541.5	344.0	333.1	10.9
00/13-36-078-07W4/0	502397	6184390	547.1	550.7	338.7	327.8	10.9
00/10-20-077-03W4/0	535790	6171106	564.6	568.8	305.8	294.9	10.9
00/11-08-079-06W4/0	505618	6187145	507.0	510.5	341.3	330.4	10.9
00/13-17-076-04W4/0	525268	6160305	623.2	626.4	330.4	319.4	11.0
AA/02-21-076-06W4/0	508286	6160630	565.1	568.2	334.5	323.5	11.0
00/11-34-077-03W4/0	538733	6174557	588.9	592.1	320.8	309.8	11.0
00/07-11-077-05W4/0	521183	6167620	575.1	578.3	329.4	318.3	11.1
00/13-17-076-06W4/0	505877	6160217	564.0	568.6	342.8	331.7	11.1
00/07-28-078-07W4/0	498639	6182072	551.2	554.9	344.5	333.4	11.1

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
00/07-35-078-07W4/0	501822	6183572	541.3	544.4	343.0	331.9	11.1
00/12-08-076-06W4/0	505817	6158347	577.1	581.4	328.4	317.2	11.2
AA/16-14-076-07W4/0	502059	6160102	589.5	593.4	346.0	334.8	11.2
AA/09-28-076-06W4/0	508566	6162870	555.1	558.1	342.9	331.7	11.2
00/07-35-076-07W4/0	501829	6164326	562.5	565.5	349.8	338.6	11.2
00/07-07-079-05W4/0	514151	6186995	502.9	505.9	337.9	326.7	11.2
00/05-16-079-05W4/0	516633	6188608	469.5	472.7	338.7	327.5	11.2
00/10-21-079-06W4/0	507768	6190565	479.1	482.7	340.2	329.0	11.2
00/06-36-078-07W4/0	502922	6183672	528.9	532.8	341.9	330.6	11.3
00/10-23-076-07W4/0	501863	6161403	587.4	590.6	340.7	329.4	11.3
00/12-20-080-04W4/0	524897	6200332	470.6	473.0	344.8	333.5	11.3
AA/08-23-076-07W4/0	502048	6160836	588.6	589.2	337.4	326.0	11.4
00/12-11-077-07W4/0	500962	6167870	562.1	565.7	349.5	338.1	11.4
00/07-29-078-07W4/0	496985	6181967	545.6	548.6	345.0	333.6	11.4
00/07-26-078-05W4/0	521108	6182299	575.7	578.8	333.7	322.3	11.4
00/05-34-078-07W4/0	499461	6183592	549.9	553.7	347.4	336.0	11.4
AA/16-15-076-06W4/0	510317	6160224	565.4	570.0	338.6	327.2	11.4
00/07-24-076-07W4/0	503483	6160939	572.8	575.8	344.6	333.2	11.4
AA/07-18-077-05W4/0	514625	6169127	566.4	569.7	329.6	318.2	11.4
AA/09-11-076-07W4/0	502220	6158209	599.5	602.5	341.4	329.9	11.5
AA/03-18-076-06W4/0	504665	6159015	583.4	586.7	341.4	329.9	11.5
00/10-32-076-03W4/0	535840	6164716	575.3	579.5	303.0	291.5	11.5
00/11-30-078-06W4/0	504731	6182676	561.1	564.1	331.1	319.6	11.5
00/15-28-079-05W4/0	517396	6192661	493.0	496.6	328.1	316.6	11.5
00/11-28-079-06W4/0	507188	6192305	513.8	516.8	341.4	329.8	11.6
AA/01-28-076-06W4/0	508581	6162390	557.3	560.3	344.8	333.2	11.6
AA/13-18-077-05W4/0	513952	6169881	563.4	567.1	329.6	318.0	11.6
00/08-36-079-06W4/0	512963	6193367	452.6	456.2	341.5	329.9	11.6
00/07-16-076-06W4/0	508418	6159540	565.8	569.8	333.0	321.3	11.7
AA/07-22-076-06W4/0	510044	6161055	564.0	568.0	337.9	326.2	11.7
AA/07-05-077-05W4/0	516325	6166098	579.7	582.8	327.5	315.8	11.7
00/05-12-077-05W4/0	522287	6167621	577.5	579.9	330.9	319.2	11.7
00/11-27-079-06W4/0	508923	6192396	488.8	492.3	337.3	325.6	11.7
02/06-16-076-06W4/0	508072	6159437	566.4	569.5	339.1	327.4	11.7
AA/06-14-076-07W4/0	501339	6159515	607.1	610.8	348.9	337.1	11.8
00/07-21-076-07W4/0	498503	6161033	608.1	611.4	344.4	332.6	11.8
AA/09-17-076-06W4/0	506936	6159641	562.6	565.8	336.8	325.0	11.8
00/16-28-078-05W4/0	518260	6183030	552.5	556.1	327.0	315.2	11.8
00/13-35-079-06W4/0	510427	6194011	498.5	502.1	341.0	329.2	11.8
AA/08-15-076-07W4/0	500422	6159534	607.9	610.9	341.4	329.5	11.9
00/10-21-076-04W4/0	527970	6161619	600.2	602.6	322.5	310.6	11.9
00/07-32-079-06W4/0	506179	6193340	547.4	550.4	340.0	328.1	11.9
AA/09-16-076-06W4/0	508687	6159821	566.1	569.2	334.3	322.4	11.9
AA/12-18-077-05W4/0	514116	6169701	564.8	567.8	330.1	318.2	11.9
00/09-23-079-06W4/0	511296	6190687	463.3	466.9	337.3	325.4	11.9
00/09-17-076-06W4/0	507134	6159878	562.6	566.5	341.9	329.9	12.0
00/06-24-079-06W4/0	512268	6190247	469.1	472.1	338.9	326.9	12.0
AA/14-17-076-06W4/0	506255	6160218	563.7	567.0	336.6	324.5	12.1
00/07-33-078-06W4/0	508064	6183835	550.5	553.5	339.1	327.0	12.1
00/14-01-079-06W4/0	512293	6186017	515.8	519.0	337.0	324.9	12.1
03/05-16-076-06W4/0	507481	6159383	566.7	570.7	340.3	328.1	12.2
AA/14-16-076-06W4/0	507700	6160047	563.7	566.9	346.0	333.8	12.2
00/04-13-077-05W4/0	521959	6168867	570.3	573.5	320.9	308.7	12.2
00/11-07-078-07W4/0	494919	6177713	556.2	559.5	346.5	334.3	12.2
00/13-34-078-06W4/0	509185	6184315	540.4	543.4	335.4	323.2	12.2

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
02/04-16-076-06W4/0	507636	6159075	568.2	571.2	335.6	323.4	12.2
AE/06-18-077-05W4/0	514443	6169220	566.2	569.2	332.9	320.6	12.3
00/07-33-077-04W4/0	527576	6174119	594.0	597.5	331.4	319.1	12.3
AA/03-21-076-06W4/0	507982	6160600	562.8	566.6	336.3	324.0	12.3
AA/10-22-076-07W4/0	500133	6161405	589.0	592.0	344.6	332.3	12.3
AA/11-16-077-05W4/0	517819	6169680	577.4	581.2	325.7	313.3	12.4
00/12-03-079-06W4/0	508757	6185572	503.6	506.6	343.4	331.0	12.4
04/03-16-076-06W4/0	508068	6159162	568.6	572.4	336.8	324.4	12.4
05/05-16-076-06W4/0	507535	6159283	567.1	570.1	339.1	326.7	12.4
00/07-21-076-06W4/0	508284	6161030	565.5	568.8	335.8	323.4	12.4
00/10-16-079-06W4/0	507755	6188949	487.8	491.4	338.8	326.4	12.4
AA/13-14-076-07W4/0	500798	6160023	605.9	608.9	338.8	326.3	12.5
00/15-17-076-06W4/0	506648	6160217	561.9	566.1	335.9	323.3	12.6
AA/11-33-076-05W4/0	517480	6164810	572.2	575.2	328.9	316.3	12.6
00/15-33-076-07W4/0	498654	6164962	556.0	559.5	345.7	333.1	12.6
00/08-01-078-05W4/0	523336	6175508	571.2	575.1	322.9	310.3	12.6
AA/09-23-076-07W4/0	502165	6161401	585.8	588.8	341.3	328.7	12.6
00/09-34-077-04W4/0	529632	6174540	587.4	590.4	330.5	317.9	12.6
AA/08-12-076-07W4/0	503695	6157644	603.9	607.9	337.2	324.5	12.7
00/11-30-076-07W4/0	494718	6163114	568.5	571.5	346.5	333.8	12.7
00/02-18-077-04W4/0	524413	6168846	580.4	583.6	326.7	314.0	12.7
AA/16-05-078-07W4/0	497099	6176528	546.0	547.1	348.9	336.2	12.7
00/07-10-079-06W4/0	509514	6187118	474.6	477.6	339.3	326.6	12.7
00/13-32-079-05W4/0	515307	6194070	475.0	478.0	338.4	325.7	12.7
AA/10-12-076-07W4/0	503279	6158297	596.8	605.6	343.6	330.9	12.7
AA/08-20-076-06W4/0	507189	6160885	561.0	565.1	336.1	323.4	12.7
AA/06-16-076-07W4/0	498101	6159416	607.7	610.8	339.4	326.6	12.8
AA/02-22-076-07W4/0	500315	6160602	597.4	607.8	348.9	336.1	12.8
AB/11-07-077-05W4/0	514261	6167991	570.8	574.5	327.4	314.6	12.8
AA/14-27-077-07W4/0	499866	6173019	555.8	558.8	352.5	339.7	12.8
00/11-06-079-06W4/0	504057	6185870	551.9	554.9	340.8	328.0	12.8
00/02-18-079-03W4/0	534106	6188248	569.2	572.8	324.6	311.8	12.8
00/02-25-076-07W4/0	503334	6162369	561.5	565.2	340.0	327.1	12.9
00/06-05-078-07W4/0	496640	6175474	540.1	544.2	351.4	338.5	12.9
AA/13-15-076-06W4/0	509235	6160102	566.4	570.4	339.6	326.7	12.9
AA/04-21-076-06W4/0	507486	6160628	562.2	566.2	338.6	325.7	12.9
AA/06-34-077-07W4/0	499832	6174038	559.7	562.7	352.1	339.2	12.9
00/06-06-079-05W4/0	513850	6185391	535.9	539.1	337.8	324.9	12.9
00/08-13-079-06W4/0	512967	6188741	472.9	475.9	335.8	322.9	12.9
00/07-17-076-07W4/0	496672	6159538	616.8	620.0	341.9	328.9	13.0
00/12-15-076-06W4/0	509120	6160022	566.2	570.9	340.5	327.5	13.0
02/12-22-076-07W4/0	499485	6161287	594.9	599.0	346.3	333.3	13.0
AA/03-28-076-06W4/0	508009	6162340	555.4	558.4	347.1	334.1	13.0
00/13-02-079-06W4/0	510385	6185979	488.3	491.3	335.4	322.3	13.1
00/03-16-076-06W4/0	507935	6159006	568.7	572.7	337.0	323.8	13.2
02/05-16-076-06W4/0	507431	6159480	565.8	569.8	342.0	328.8	13.2
03/11-16-076-06W4/0	507810	6159941	563.8	567.8	343.8	330.6	13.2
AA/05-23-076-07W4/0	501006	6160936	600.0	603.0	346.3	333.1	13.2
AC/13-18-077-05W4/0	513832	6170062	562.7	566.4	330.0	316.8	13.2
00/08-04-079-06W4/0	508058	6185132	509.4	512.4	339.3	326.1	13.2
00/13-34-079-06W4/0	508704	6194099	504.9	508.0	341.5	328.3	13.2
00/10-25-078-08W4/0	493468	6182373	560.2	563.9	348.1	334.9	13.2
AA/10-18-077-05W4/0	514784	6169651	566.7	569.7	331.4	318.1	13.3
AA/11-23-077-07W4/0	501406	6170959	567.1	568.6	348.9	335.6	13.3
00/05-14-077-07W4/0	500804	6168998	568.5	572.0	352.8	339.5	13.3

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/04-26-076-06W4/0	510826	6162363	570.9	574.4	336.0	322.6	13.4
AA/03-19-077-05W4/0	514325	6170445	562.9	566.3	330.2	316.8	13.4
00/08-14-079-06W4/0	511352	6188735	467.8	470.8	337.9	324.5	13.4
00/06-12-079-06W4/0	512190	6187134	475.8	479.3	339.1	325.7	13.4
00/12-20-079-05W4/0	515107	6190455	478.6	481.8	334.8	321.4	13.4
F1/03-16-076-06W4/0	507910	6158972	569.6	573.8	335.4	321.9	13.5
AA/14-15-076-06W4/0	509518	6160222	568.1	571.2	341.2	327.7	13.5
00/11-32-076-07W4/0	496467	6164769	555.7	559.0	350.3	336.8	13.5
00/12-23-076-07W4/0	500902	6161375	589.5	593.0	346.1	332.5	13.6
00/15-04-078-04W4/0	527574	6176519	574.0	577.0	331.8	318.2	13.6
00/12-16-076-06W4/0	507324	6159689	563.5	567.5	343.9	330.2	13.7
AA/04-22-076-06W4/0	509117	6160630	566.2	570.1	337.2	323.5	13.7
00/07-15-079-06W4/0	509346	6188617	465.3	468.3	340.5	326.8	13.7
04/05-16-076-06W4/0	507374	6159584	563.7	567.7	343.5	329.7	13.8
00/11-21-076-06W4/0	507765	6161586	560.8	564.4	337.6	323.8	13.8
00/06-20-077-07W4/0	496618	6170830	557.1	560.6	350.5	336.7	13.8
00/07-32-077-07W4/0	496767	6173921	549.5	552.7	350.1	336.3	13.8
00/06-20-078-04W4/0	525523	6180698	560.2	563.2	324.8	311.0	13.8
00/09-26-079-06W4/0	511339	6192107	453.7	457.3	342.3	328.5	13.8
AA/06-12-076-07W4/0	502949	6157805	599.0	602.1	339.6	325.6	14.0
00/07-30-076-06W4/0	504833	6162550	555.9	558.9	345.9	331.9	14.0
00/11-18-077-05W4/0	514256	6169363	566.3	569.8	335.8	321.8	14.0
AA/08-22-077-07W4/0	500555	6170930	570.7	573.4	348.2	334.2	14.0
00/06-30-077-07W4/0	494921	6172273	552.9	556.4	352.6	338.6	14.0
00/10-25-079-06W4/0	512672	6192221	469.6	472.6	342.6	328.6	14.0
AA/14-26-077-07W4/0	501397	6172998	565.1	567.6	351.4	337.3	14.1
00/16-32-077-07W4/0	497396	6174677	553.8	556.5	348.2	334.1	14.1
00/11-14-078-06W4/0	510981	6179133	593.3	596.3	334.9	320.8	14.1
00/06-16-076-06W4/0	507719	6159510	567.7	571.7	343.5	329.3	14.2
AA/08-26-077-07W4/0	502022	6172523	570.6	572.9	346.7	332.5	14.2
AA/15-28-077-07W4/0	498396	6173219	555.6	557.9	347.2	333.0	14.2
00/01-27-078-06W4/0	510124	6181837	542.1	545.9	328.5	314.3	14.2
00/12-31-078-07W4/0	494594	6184052	555.1	558.6	348.2	334.0	14.2
AA/11-18-077-05W4/0	514415	6169595	566.8	569.8	332.4	318.1	14.3
00/10-29-077-07W4/0	496998	6172885	552.0	555.0	347.4	333.1	14.3
00/10-10-080-04W4/0	528973	6197112	471.8	474.9	309.4	295.1	14.3
AB/06-19-077-05W4/0	514573	6170613	564.0	567.3	330.2	315.9	14.3
00/07-04-078-07W4/0	498373	6175587	552.0	555.3	350.7	336.4	14.3
00/05-23-079-04W4/0	529855	6190080	536.1	539.2	339.2	324.9	14.3
AA/12-07-077-05W4/0	514078	6167812	570.6	573.9	329.9	315.5	14.4
00/16-20-076-06W4/0	506882	6161702	560.2	563.9	345.6	331.2	14.4
00/01-12-079-04W4/0	532617	6186653	557.7	561.5	330.3	315.9	14.4
00/10-27-076-07W4/0	500134	6163056	570.0	573.0	344.4	329.9	14.5
00/05-28-077-07W4/0	497662	6172365	554.3	558.4	351.0	336.5	14.5
AA/08-28-077-07W4/0	498916	6172406	554.4	554.4	347.5	333.0	14.5
00/06-32-077-06W4/0	506168	6174066	597.6	601.7	347.9	333.3	14.6
00/13-25-079-04W4/0	531646	6192888	477.9	481.4	333.7	319.1	14.6
00/08-29-076-06W4/0	506887	6162556	556.5	559.9	350.6	336.0	14.6
00/14-02-078-06W4/0	510912	6176277	606.7	609.7	334.6	320.0	14.6
00/13-02-077-07W4/0	501080	6166580	558.9	562.3	349.6	334.8	14.8
AB/12-18-077-05W4/0	513905	6169507	564.5	568.2	334.5	319.7	14.8
AA/04-11-076-07W4/0	500883	6157586	604.7	607.7	338.9	324.0	14.9
AA/08-21-077-07W4/0	498831	6170896	558.9	561.2	348.9	334.0	14.9
00/06-27-077-07W4/0	499874	6172263	558.7	561.7	349.0	334.1	14.9
00/10-23-078-04W4/0	531018	6180904	564.3	568.0	319.0	304.1	14.9

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AB/10-07-077-05W4/0	514965	6167867	570.2	573.5	333.6	318.7	14.9
00/11-19-077-07W4/0	494769	6171299	552.6	555.7	348.1	333.2	14.9
00/09-07-078-07W4/0	495463	6177717	553.4	557.5	347.1	332.2	14.9
AA/06-11-076-07W4/0	501409	6157807	604.9	608.0	341.0	326.0	15.0
02/11-10-077-07W4/0	499803	6167894	563.2	565.9	351.1	336.1	15.0
00/08-20-077-05W4/0	516728	6170798	570.1	574.0	333.1	318.1	15.0
00/06-24-077-08W4/0	493397	6170921	553.6	557.4	349.4	334.4	15.0
00/10-12-078-08W4/0	493761	6177691	556.1	559.4	346.4	331.4	15.0
02/05-15-078-04W4/0	528710	6178924	572.6	576.1	329.3	314.3	15.0
00/05-21-078-05W4/0	517018	6180664	575.9	578.9	330.5	315.5	15.0
00/15-13-079-04W4/0	532157	6189330	563.8	567.3	333.7	318.7	15.0
00/11-03-077-07W4/0	499658	6166394	560.5	563.6	348.4	333.3	15.1
00/01-33-078-05W4/0	518539	6183398	533.0	536.8	334.7	319.6	15.1
00/08-34-077-07W4/0	500536	6174113	558.0	562.1	351.6	336.5	15.1
00/09-36-077-06W4/2	513372	6174345	572.9	577.0	338.4	323.2	15.2
00/06-03-078-07W4/0	499780	6175676	551.8	554.9	351.9	336.7	15.2
00/06-16-078-07W4/0	498002	6178743	545.6	548.9	348.3	333.1	15.2
00/11-08-079-03W4/0	535366	6187336	548.7	551.9	326.0	310.8	15.2
AB/11-18-077-05W4/0	514504	6169415	566.3	569.3	335.6	320.4	15.2
00/07-22-078-05W4/0	519642	6180547	577.2	580.9	334.1	318.9	15.2
00/12-16-077-07W4/0	497811	6169602	561.7	565.4	351.4	336.1	15.3
00/10-20-076-07W4/0	496896	6161577	611.9	614.6	342.1	326.8	15.3
00/11-21-077-05W4/0	517434	6171328	570.8	574.2	334.0	318.7	15.3
00/10-19-078-07W4/0	495211	6180711	547.5	550.9	345.9	330.5	15.4
00/16-32-078-05W4/0	516629	6184394	498.5	501.7	333.4	318.0	15.4
AA/11-07-077-05W4/0	514452	6167855	568.5	571.8	330.8	315.4	15.4
00/05-22-077-07W4/0	499432	6170890	559.5	563.0	347.1	331.7	15.4
00/12-25-079-04W4/0	531563	6192211	469.4	472.4	333.7	318.2	15.5
00/11-18-077-07W4/0	494690	6169701	558.6	561.6	349.5	333.9	15.6
AA/15-33-076-05W4/0	518154	6165216	571.0	574.1	333.8	318.1	15.7
00/11-10-077-07W4/0	499650	6167913	564.1	567.1	352.2	336.5	15.7
00/11-21-077-07W4/0	497998	6171246	556.6	559.6	347.8	332.1	15.7
00/13-01-079-05W4/0	521798	6186064	531.9	535.0	330.0	314.3	15.7
00/10-31-079-05W4/0	514155	6193709	457.3	460.9	337.9	322.2	15.7
AA/03-18-077-05W4/0	514245	6168591	566.3	569.6	328.6	312.9	15.7
AC/10-07-077-05W4/0	514755	6168003	569.7	573.4	332.5	316.7	15.8
AA/03-17-077-05W4/0	516109	6168874	570.7	574.0	329.5	313.7	15.8
AA/16-18-077-05W4/0	515055	6169992	568.2	571.2	330.5	314.7	15.8
00/13-09-078-07W4/0	497886	6177893	549.3	553.4	349.6	333.8	15.8
00/15-34-078-05W4/0	519647	6184570	532.1	536.1	335.6	319.8	15.8
00/05-08-077-06W4/0	505879	6167459	562.0	566.1	350.9	335.0	15.9
AA/14-18-077-05W4/0	514327	6170086	565.9	569.0	330.8	314.9	15.9
02/05-22-077-07W4/0	499508	6170893	559.5	562.2	346.9	330.9	16.0
00/10-11-079-06W4/0	511210	6187181	491.5	494.5	341.4	325.4	16.0
00/08-15-077-07W4/0	500700	6169003	569.0	572.5	355.4	339.3	16.1
00/10-34-077-05W4/0	519836	6174254	577.0	580.0	330.2	314.1	16.1
00/11-31-076-06W4/0	504468	6164544	559.3	562.7	347.6	331.5	16.1
00/12-32-076-06W4/0	506010	6164635	562.3	565.0	350.0	333.9	16.1
00/11-32-076-06W4/0	506062	6164641	563.3	566.8	350.6	334.5	16.1
AA/04-14-076-07W4/0	500863	6159067	608.6	611.6	343.9	327.7	16.2
00/05-04-078-05W4/0	517380	6175487	585.9	589.8	334.8	318.6	16.2
00/01-22-078-06W4/0	510162	6180166	562.6	565.6	334.8	318.6	16.2
00/09-35-078-05W4/0	521454	6183985	591.5	595.6	326.3	310.1	16.2
00/11-09-078-04W4/0	527297	6177521	551.9	555.8	326.1	309.9	16.2
00/09-08-078-07W4/0	497439	6177748	548.6	552.7	348.1	331.9	16.2

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
00/11-28-077-05W4/0	517642	6172602	570.9	574.1	333.7	317.4	16.3
02/10-29-077-05W4/0	516480	6172696	573.4	576.5	327.5	311.2	16.3
00/05-15-078-04W4/0	528710	6179071	562.6	566.6	330.1	313.8	16.3
00/11-21-078-05W4/0	517768	6181045	579.5	583.3	339.0	322.6	16.4
00/07-22-077-07W4/0	500255	6170918	575.5	579.0	348.8	332.4	16.4
00/07-02-078-05W4/0	521128	6175849	575.7	579.6	327.4	310.9	16.5
AA/11-15-076-07W4/0	499732	6159818	604.3	607.9	340.5	323.9	16.6
00/06-19-078-04W4/0	524003	6180702	562.1	566.0	333.5	316.9	16.6
00/11-31-077-05W4/0	514519	6174347	578.2	582.3	337.4	320.7	16.7
00/16-34-078-07W4/0	500706	6184386	548.4	552.0	344.9	328.2	16.7
00/08-10-078-07W4/0	500445	6177250	537.4	540.1	349.4	332.6	16.8
00/08-10-078-07W4/2	500445	6177250	537.4	540.1	349.4	332.6	16.8
03/10-29-077-05W4/0	516424	6172779	574.3	577.5	330.6	313.8	16.8
00/11-05-078-06W4/0	506208	6176167	590.0	593.0	342.8	326.0	16.8
00/06-11-078-07W4/0	501254	6177117	533.4	536.8	346.3	329.5	16.8
00/11-28-078-05W4/0	517718	6182465	563.9	567.6	327.3	310.5	16.8
AA/15-07-077-05W4/0	514772	6168288	569.5	572.8	329.7	312.8	16.9
00/06-05-077-05W4/0	515924	6166049	580.6	584.0	336.5	319.5	17.0
AA/15-01-078-07W4/0	503481	6176363	562.5	564.2	344.6	327.6	17.0
00/08-14-078-05W4/0	521549	6179084	575.7	579.6	335.0	318.0	17.0
00/08-05-078-05W4/0	516684	6175482	577.0	580.0	335.5	318.4	17.1
00/05-30-079-05W4/0	513600	6191961	473.6	477.3	344.3	327.2	17.1
00/07-27-077-05W4/0	519536	6172246	580.7	584.1	335.8	318.6	17.2
00/10-33-077-05W4/0	518038	6174368	580.2	583.2	331.0	313.8	17.2
00/05-15-078-07W4/0	499425	6178948	532.5	535.8	347.5	330.3	17.2
00/05-24-078-06W4/0	512473	6180350	573.9	577.4	336.0	318.8	17.2
00/05-11-079-06W4/0	510068	6186828	474.4	478.2	339.2	322.0	17.2
00/11-07-077-06W4/0	504428	6167946	562.1	565.1	350.2	332.9	17.3
00/11-15-077-07W4/0	499652	6169620	567.8	571.2	350.1	332.8	17.3
00/10-22-078-05W4/0	519659	6180938	588.5	591.0	337.5	320.2	17.3
AB/11-24-077-06W4/0	512734	6171302	563.7	566.7	335.4	318.0	17.4
00/10-13-078-08W4/0	493744	6179281	525.8	530.0	345.0	327.6	17.4
00/11-17-078-07W4/0	496470	6179379	542.5	545.6	348.4	331.0	17.4
00/16-09-078-07W4/0	498792	6177911	537.5	541.1	342.6	325.2	17.4
00/05-24-077-05W4/0	522213	6170629	584.2	588.0	322.2	304.7	17.5
00/11-08-078-06W4/0	506088	6177448	575.4	578.4	342.8	325.3	17.5
00/15-33-077-06W4/0	508215	6174974	614.1	617.8	339.2	321.6	17.6
02/10-22-078-05W4/0	519804	6181000	583.8	587.6	335.2	317.6	17.6
AB/16-23-077-06W4/0	511802	6171400	563.8	567.1	334.8	317.2	17.6
00/10-07-078-06W4/0	504822	6177814	564.1	567.6	344.5	326.9	17.6
00/11-19-077-05W4/0	514249	6171203	562.9	566.4	338.1	320.4	17.7
00/07-21-078-04W4/0	527801	6180697	566.0	569.0	331.0	313.1	17.9
00/10-22-077-06W4/0	509768	6170979	564.3	568.4	341.6	323.7	17.9
00/13-24-077-06W4/0	512365	6171402	563.6	567.3	337.6	319.7	17.9
00/06-12-078-05W4/0	522521	6177183	575.3	578.7	324.8	306.9	17.9
00/07-15-078-05W4/0	519638	6178917	577.6	581.3	320.8	302.8	18.0
00/07-16-078-04W4/0	527932	6179113	555.2	558.2	331.8	313.8	18.0
AA/02-25-077-06W4/0	513152	6171834	564.0	567.2	334.7	316.6	18.1
00/07-18-078-06W4/0	504816	6178662	535.4	538.3	344.9	326.8	18.1
00/06-17-078-05W4/0	516127	6179053	577.2	580.2	329.0	310.9	18.1
00/10-28-078-06W4/0	508070	6182642	543.8	547.5	337.5	319.4	18.1
00/05-29-079-05W4/0	514956	6191983	479.6	482.6	344.1	326.0	18.1
AA/05-05-077-05W4/0	515500	6165936	576.1	579.5	334.2	316.0	18.2
AA/06-19-077-05W4/0	514323	6170799	563.3	566.3	333.2	315.0	18.2

**Table A-5 Geology Picks – Clearwater Shale Aquitard (continued)**

Unique Well Identifier	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Ground Elevation [masl]	KB [masl]	Clearwater Flow Model Structure [masl]	Clearwater 'O'/A' Structure [masl]	Clearwater Shale Isopach [m]
AA/07-24-077-06W4/0	513092	6170805	560.5	563.6	330.4	312.2	18.2
AA/11-24-077-06W4/0	512629	6171015	562.7	566.0	334.8	316.6	18.2
00/05-30-077-05W4/0	513983	6172540	565.0	568.5	336.5	318.3	18.2
00/11-06-078-05W4/0	514357	6176075	574.0	578.0	337.0	318.8	18.2
00/12-11-078-06W4/0	510708	6177494	606.4	610.5	334.8	316.5	18.3
00/05-22-078-07W4/0	499447	6180514	507.7	511.4	347.3	329.0	18.3
AA/05-24-077-06W4/0	512524	6170701	562.1	565.2	332.4	314.0	18.4
00/10-20-078-07W4/0	496895	6180739	545.9	549.3	347.8	329.4	18.4
00/12-14-078-07W4/0	500904	6179072	531.5	535.0	345.3	326.8	18.5
00/12-21-078-07W4/0	497768	6180752	523.3	527.4	346.6	328.1	18.5
AA/02-23-077-06W4/0	511582	6170404	561.8	564.9	335.0	316.4	18.6
00/02-23-078-05W4/0	521128	6180219	571.4	574.9	338.5	319.8	18.7
00/09-20-078-06W4/0	506908	6180899	535.0	537.7	339.7	321.0	18.7
AB/04-24-077-06W4/0	512417	6170402	561.0	564.3	332.6	313.8	18.8
AA/09-23-077-06W4/0	511827	6171007	563.2	566.4	333.8	315.0	18.8
00/15-25-078-05W4/0	522678	6182831	565.9	568.3	327.7	308.9	18.8
00/11-11-079-05W4/0	520546	6187373	521.0	525.8	329.8	310.9	18.9
00/05-07-078-05W4/0	514058	6177191	582.5	585.9	335.0	316.0	19.0
00/11-23-078-07W4/0	501529	6180825	533.5	537.2	347.7	328.7	19.0
00/04-31-078-05W4/0	514038	6183415	523.4	527.1	334.4	315.4	19.0
00/10-30-078-04W4/0	524606	6182725	561.3	564.7	334.9	315.8	19.1
00/11-17-077-07W4/0	496637	6169699	559.3	562.7	351.5	332.3	19.2
00/03-25-078-05W4/0	522478	6181902	561.3	564.3	336.6	317.4	19.2
00/05-03-079-05W4/0	518527	6185251	533.4	536.4	330.8	311.5	19.3
AA/10-26-076-06W4/0	511356	6162896	557.0	560.6	331.8	312.4	19.4
00/13-24-078-07W4/0	502739	6181107	547.2	550.2	338.7	319.2	19.5
AA/01-23-077-06W4/0	512094	6170501	561.9	565.2	334.6	315.0	19.6
00/10-27-078-07W4/0	499967	6182677	548.2	552.1	344.6	325.0	19.6
00/14-24-078-05W4/0	522321	6181162	565.3	569.1	339.7	319.9	19.8
00/09-21-078-06W4/0	508534	6181060	536.1	539.3	336.2	316.3	19.9
00/07-23-078-06W4/0	511440	6180625	559.1	562.1	330.3	310.2	20.1
00/13-32-078-04W4/0	525476	6184413	543.4	547.7	311.5	291.0	20.5
00/11-36-078-06W4/0	512864	6184000	533.7	536.7	335.4	314.7	20.7
00/14-35-078-06W4/0	510907	6184351	537.3	540.3	334.3	313.6	20.7
AA/08-06-077-05W4/0	515033	6166042	573.5	576.7	328.6	307.8	20.8
00/06-30-078-05W4/0	514510	6181967	553.1	556.3	334.3	313.5	20.8
00/01-35-078-05W4/0	521451	6183451	580.8	584.5	334.1	313.1	21.0
00/02-35-079-04W4/0	530681	6193117	486.6	489.2	339.6	318.1	21.5
00/07-01-079-05W4/0	522669	6185557	547.5	550.7	328.3	306.7	21.6
00/09-07-079-03W4/0	534245	6187324	552.1	555.3	327.1	304.1	23.0



**Table A-6 Location of Groundwater Supply and Wastewater Disposal Wells Used for Predictive Simulations**

Project	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Completion Aquifer	Well Use
Canadian Natural Kirby Pilot Project	497240.00	6133027.00	Empress Channel Aquifer	supply
	493532.00	6132165.00	McMurray Aquifer	disposal
Canadian Natural Kirby Project	497410.00	6132489.00	Lower Grand Rapids Aquifer	supply
	498044.00	6132542.00	Empress Channel Aquifer	supply
	498050.00	6132536.00	Empress Channel Aquifer	supply
	495225.00	6134160.00	McMurray Aquifer	supply
	495206.00	6134171.00	Lower Grand Rapids Aquifer	supply
	489378.00	6135092.00	McMurray Aquifer	supply
	491272.00	6135729.00	McMurray Aquifer	disposal
Connacher Great Divide and Algar Projects	487787.00	6140497.00	McMurray Aquifer	disposal
	447185.24	6217716.17	Lower Grand Rapids Aquifer	supply
ConocoPhillips Surmont Project	453097.10	6222357.52	McMurray Aquifer	disposal
	502606.25	6230773.39	Lower Grand Rapids Aquifer	supply
	503920.80	6226836.50	Lower Grand Rapids Aquifer	supply
	503110.00	6226982.50	Lower Grand Rapids Aquifer	supply
	504334.50	6228611.20	Lower Grand Rapids Aquifer	supply
	500228.00	6228536.00	Lower Grand Rapids Aquifer	supply
	494365.31	6204860.74	Lower Grand Rapids Aquifer	supply
	505745.03	6204604.90	Lower Grand Rapids Aquifer	supply
	497492.14	6208081.60	Lower Grand Rapids Aquifer	supply
	507546.39	6209119.26	Lower Grand Rapids Aquifer	supply
	499478.65	6210842.57	Lower Grand Rapids Aquifer	supply
	494441.87	6215674.96	Lower Grand Rapids Aquifer	supply
	500979.72	6216768.65	Lower Grand Rapids Aquifer	supply
	509003.23	6213282.88	Lower Grand Rapids Aquifer	supply
	509305.14	6217417.40	Lower Grand Rapids Aquifer	supply
	499298.26	6222330.32	Lower Grand Rapids Aquifer	supply
	508468.08	6220810.54	Lower Grand Rapids Aquifer	supply
	504683.00	6224844.65	Lower Grand Rapids Aquifer	supply
	508866.89	6224602.59	Lower Grand Rapids Aquifer	supply
	497380.79	6228601.60	Lower Grand Rapids Aquifer	supply
	507051.54	6228464.29	Lower Grand Rapids Aquifer	supply
	510369.36	6228135.26	Lower Grand Rapids Aquifer	supply
	501041.15	6232643.56	Lower Grand Rapids Aquifer	supply
	506235.01	6230792.63	Lower Grand Rapids Aquifer	supply
	508740.54	6232611.18	Lower Grand Rapids Aquifer	supply
	510461.50	6230290.10	Lower Grand Rapids Aquifer	supply
	520092.00	6231110.00	McMurray Aquifer	disposal/supply
	517063.00	6230976.00	McMurray Aquifer	disposal/supply
	521849.00	6229563.00	McMurray Aquifer	disposal/supply
	515190.00	6229546.00	McMurray Aquifer	disposal/supply
	518637.00	6229086.00	McMurray Aquifer	disposal/supply
	520343.00	6227948.00	McMurray Aquifer	disposal/supply
	517223.00	6227170.00	McMurray Aquifer	disposal/supply
521229.00	6226342.00	McMurray Aquifer	disposal/supply	
518929.00	6225974.00	McMurray Aquifer	disposal/supply	
516721.00	6224669.00	McMurray Aquifer	disposal/supply	
519803.00	6224560.00	McMurray Aquifer	disposal/supply	
518812.00	6223389.00	McMurray Aquifer	disposal/supply	
Petro-Canada Meadow Creek Project	479481.30	6241219.30	Lower Grand Rapids Aquifer	supply
	474201.80	6237928.70	Lower Grand Rapids Aquifer	supply
	482754.50	6237470.20	Lower Grand Rapids Aquifer	supply
	484217.89	6239241.39	McMurray Aquifer	disposal
JACOS Hangingstone Project	461577.83	6236553.09	McMurray Aquifer	disposal
	464512.52	6231090.42	Quaternary/Tertiary Aquifer	supply

**Table A-6 Location of Groundwater Supply and Wastewater Disposal Wells Used For Predictive Simulations (continued)**

Project	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Completion Aquifer	Well Use
PetroBank Whitesands Project	483339.00	6168049.00	Empress Channel Aquifer	supply
	483339.00	6168049.00	Middle Clearwater Aquifer	disposal
Devon Jackfish and Jackfish 2 Projects	507473.81	6153435.20	Terrace Sand Aquifer	supply
	509133.30	6150159.50	Lower Grand Rapids Aquifer	supply
	509567.20	6152678.90	Lower Grand Rapids Aquifer	supply
	509606.90	6151741.20	Lower Grand Rapids Aquifer	supply
	510595.40	6150280.30	McMurray Aquifer	disposal
	511917.90	6150270.80	McMurray Aquifer	disposal
	513222.70	6149618.50	McMurray Aquifer	disposal
EnCana Christina Lake Thermal Project	507134.71	6159873.61	Empress Channel Aquifer	supply
	506937.16	6159637.36	Empress Channel Aquifer	supply
	507067.60	6159372.40	Middle Clearwater Aquifer	supply
	507879.00	6158948.70	Middle Clearwater Aquifer	supply
	507851.20	6158972.00	Middle Clearwater Aquifer	supply
	507070.10	6159382.40	Middle Clearwater Aquifer	supply
	507589.90	6159177.60	McMurray Aquifer	disposal
	508130.30	6159296.00	McMurray Aquifer	disposal
	507909.90	6158971.70	McMurray Aquifer	disposal
	507876.00	6158942.50	McMurray Aquifer	disposal
	531056.50	6165159.80	McMurray Aquifer	disposal
	531071.50	6165159.80	McMurray Aquifer	disposal
	531087.90	6165155.66	McMurray Aquifer	disposal
Nexen/OPTI Long Lake and Long Lake South Projects	502279.90	6251686.70	Lower Grand Rapids Aquifer	supply
	507571.30	6248056.00	Lower Grand Rapids Aquifer	supply
	507163.30	6248859.80	Lower Grand Rapids Aquifer	supply
	509194.80	6249670.20	Lower Grand Rapids Aquifer	supply
	507567.30	6250482.10	Lower Grand Rapids Aquifer	supply
	507160.20	6250888.50	Lower Grand Rapids Aquifer	supply
	507564.10	6252501.00	Lower Grand Rapids Aquifer	supply
	509191.80	6251297.20	Lower Grand Rapids Aquifer	supply
	502886.33	6261196.60	Lower Grand Rapids Aquifer	supply
	503225.30	6246373.50	Lower Grand Rapids Aquifer	supply
	502656.40	6256207.70	Lower Grand Rapids Aquifer	supply
	507313.90	6246571.70	Lower Grand Rapids Aquifer	supply
	505403.39	6250448.61	Empress Channel Aquifer	supply
	505521.60	6251296.19	Empress Channel Aquifer	supply
	521646.87	6247095.90	McMurray Aquifer	supply
	516822.88	6251063.89	McMurray Aquifer	supply
	515716.88	6245240.91	McMurray Aquifer	supply
	531276.84	6235581.94	McMurray Aquifer	supply
	527988.85	6237607.93	McMurray Aquifer	supply
	519841.87	6236772.93	McMurray Aquifer	supply
521443.87	6239593.93	McMurray Aquifer	supply	
512061.89	6242391.92	McMurray Aquifer	supply	
StatoilHydro Kai Kos Dehseh Project	476988.83	6211836.94	Lower Grand Rapids Aquifer	supply
	478047.02	6211061.19	Lower Grand Rapids Aquifer	supply
	479434.64	6211120.63	Lower Grand Rapids Aquifer	supply
	478593.42	6208696.03	Lower Grand Rapids Aquifer	supply
	478188.55	6204698.45	Lower Grand Rapids Aquifer	supply
	479421.08	6204720.64	Lower Grand Rapids Aquifer	supply
	484573.10	6207084.78	Lower Grand Rapids Aquifer	supply
	487841.58	6206835.97	Lower Grand Rapids Aquifer	supply
	487686.21	6205318.78	Lower Grand Rapids Aquifer	supply
484740.21	6205265.17	Lower Grand Rapids Aquifer	supply	

**Table A-6 Location of Groundwater Supply and Wastewater Disposal Wells Used For Predictive Simulations (continued)**

Project	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Completion Aquifer	Well Use
StatoilHydro Kai Kos Dehseh Project (continued)	486306.52	6205281.80	Lower Grand Rapids Aquifer	supply
	487519.33	6203529.03	Lower Grand Rapids Aquifer	supply
	441615.74	6191619.38	Lower Grand Rapids Aquifer	supply
	445929.68	6191400.60	Lower Grand Rapids Aquifer	supply
	445466.25	6198311.31	Lower Grand Rapids Aquifer	supply
	447565.89	6196785.05	Lower Grand Rapids Aquifer	supply
	449534.05	6198073.86	Lower Grand Rapids Aquifer	supply
	451367.04	6198030.16	Lower Grand Rapids Aquifer	supply
	453602.49	6196559.73	Lower Grand Rapids Aquifer	supply
	455673.69	6195760.34	Lower Grand Rapids Aquifer	supply
	457535.33	6195732.39	Lower Grand Rapids Aquifer	supply
	459358.54	6195537.03	Lower Grand Rapids Aquifer	supply
	464993.49	6185198.55	Lower Grand Rapids Aquifer	supply
	467270.16	6186859.02	Lower Grand Rapids Aquifer	supply
	468385.58	6184817.22	Lower Grand Rapids Aquifer	supply
	471476.96	6185711.46	Lower Grand Rapids Aquifer	supply
	467260.52	6181582.73	Lower Grand Rapids Aquifer	supply
	471872.83	6180593.12	Lower Grand Rapids Aquifer	supply
	472821.36	6178607.19	Lower Grand Rapids Aquifer	supply
	468722.27	6178885.30	Lower Grand Rapids Aquifer	supply
	471923.38	6223974.73	Upper Clearwater Aquifer	supply
	475045.89	6225396.08	Upper Clearwater Aquifer	supply
	476638.25	6225094.38	Upper Clearwater Aquifer	supply
	486236.30	6218196.03	Upper Clearwater Aquifer	supply
	457739.55	6172274.88	Middle Clearwater Aquifer	supply
	459362.38	6172251.34	Middle Clearwater Aquifer	supply
	461010.08	6172242.20	Middle Clearwater Aquifer	supply
	467950.77	6171881.93	Middle Clearwater Aquifer	supply
	467062.56	6165351.56	Middle Clearwater Aquifer	supply
	460754.39	6156890.34	Middle Clearwater Aquifer	supply
	488263.49	6216076.84	McMurray Aquifer	supply
	494319.33	6211437.88	McMurray Aquifer	supply
	445929.68	6191400.60	McMurray Aquifer	supply
	447565.89	6196785.05	McMurray Aquifer	supply
	449534.05	6198073.86	McMurray Aquifer	supply
	455673.69	6195760.34	McMurray Aquifer	supply
	459315.58	6195575.85	McMurray Aquifer	supply
	467270.16	6186859.02	McMurray Aquifer	supply
	468385.58	6184817.22	McMurray Aquifer	supply
	468267.91	6185224.86	McMurray Aquifer	supply
	467260.52	6181582.73	McMurray Aquifer	supply
	472821.36	6178607.19	McMurray Aquifer	supply
452580.86	6172542.80	McMurray Aquifer	supply	
466224.28	6163767.28	McMurray Aquifer	supply	
465588.49	6162193.88	McMurray Aquifer	supply	
464988.42	6169352.96	McMurray Aquifer	supply	
460764.02	6158489.52	McMurray Aquifer	supply	
449046.92	6198948.15	McMurray Aquifer	supply	
486272.92	6218229.75	McMurray Aquifer	disposal	
494342.94	6213093.67	McMurray Aquifer	disposal	
441659.90	6191647.52	McMurray Aquifer	disposal	
445466.25	6198311.31	McMurray Aquifer	disposal	
451367.04	6198030.16	McMurray Aquifer	disposal	
457535.33	6195732.39	McMurray Aquifer	disposal	

**Table A-6 Location of Groundwater Supply and Wastewater Disposal Wells  
Used For Predictive Simulations (continued)**

Project	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Completion Aquifer	Well Use
StatoilHydro Kai Kos Dehseh Project (continued)	466638.67	6185188.05	McMurray Aquifer	disposal
	469918.46	6185178.72	McMurray Aquifer	disposal
	471872.83	6180593.12	McMurray Aquifer	disposal
	468722.27	6178885.30	McMurray Aquifer	disposal
	449662.50	6172824.43	McMurray Aquifer	disposal
	464983.97	6167747.00	McMurray Aquifer	disposal
	467062.56	6165351.56	McMurray Aquifer	disposal
	460750.28	6160119.73	McMurray Aquifer	disposal
	460754.39	6156890.34	McMurray Aquifer	disposal
	465981.31	6171640.06	McMurray Aquifer	disposal
467331.42	6188680.72	McMurray Aquifer	disposal	

**Table A-7 Hydrostratigraphic Units and Assessed Hydraulic Parameters**

Hydrostratigraphic Unit	Slice Number	Hydraulic Conductivity [m/s]		Specific Storage [m <sup>-1</sup> ]
		Horizontal	Vertical	
Undifferentiated Overburden Aquifer/Aquitard	1	1.0E-07	8.0E-10	3.00E-06
Empress Terrace Aquifer	2	1.0E-04	1.0E-05	3.00E-06
Empress Channel Aquifer	3	2.0E-04	2.0E-05	3.00E-06
LaBiche Aquitard	4	1.0E-09	3.0E-11	3.00E-06
Viking Aquifer	5	1.0E-06	1.0E-08	3.00E-06
Joli Fou Aquitard	6	1.0E-09	6.0E-12	3.00E-06
Upper Grand Rapids Aquifer/Aquitard	7	3.0E-07	1.0E-10	3.00E-06
Lower Grand Rapids Aquifer	8	1.7E-05	3.0E-06	3.00E-06
Clearwater Shale Aquitard	9	1.0E-09	2.0E-11	3.00E-06
Upper Clearwater Aquifer	10	1.35E-05	1.1E-06	1.00E-06
Undifferentiated Clearwater Aquifer/Aquitard	11	3.0E-07	2.0E-10	3.00E-06
Middle Clearwater Aquifer	12	3.3E-05	3.0E-06	3.00E-06
Undifferentiated Clearwater Aquifer/Aquitard	13	3.0E-07	2.0E-10	3.00E-06
Lower Clearwater Aquifer	14	3.0E-05	3.0E-06	3.00E-06
Undifferentiated Clearwater Aquifer/Aquitard	15	3.0E-07	2.0E-10	3.00E-06
Wabiskaw Shale Aquitard	16	1.0E-09	3.0E-12	3.00E-06
Undifferentiated Wabiskaw Aquifer/Aquitard	17	3.0E-07	1.0E-10	3.00E-06
Wabiskaw Bitumen Aquitard	18	1.0E-09	6.0E-12	3.00E-06
Undifferentiated McMurray Aquifer/Aquitard	19	3.0E-07	1.0E-10	3.00E-06
McMurray Bitumen Aquitard	20	1.0E-09	6.0E-12	3.00E-06
McMurray Aquifer	21	5.4E-05/2.3E-05	5.4E-06/2.3E-06	4.00E-06
Winterburn Aquifer/Aquitard	22	3.0E-07	1.0E-10	3.00E-06
Grosmont Aquifer	23	7.0E-06	7.0E-07	3.00E-06
Ireton Aquitard	24	1.0E-09	1.0E-11	3.00E-06
Cooking Lake/Beaverhill Lake Aquifer/Aquitard	25	3.0E-07	1.0E-09	3.00E-06
Watt Mountain Aquitard	26	1.0E-09	5.0E-11	3.00E-06
Prairie/Muskeg Aquiclude (base of model)	27	n/a	n/a	n/a

n/a = Not applicable.

**Table A-8 Numerical Groundwater Flow Model – Simulated Flow Budget – Steady State Model Calibration**

Constant Head Boundary	Simulated Steady State Groundwater Flow Budget [m <sup>3</sup> /d]
Ground Surface (net mass balance)	112,396
Wiau Channel West (Empress Channel Aquifer)	-28,915
Wiau Channel East (Empress Channel Aquifer)	3,192
Christina Channel East (Empress Channel Aquifer)	2,819
Viking Aquifer	-1,414
Upper Grand Rapids Aquifer	-671
Lower Grand Rapids Aquifer	-34,012
Upper Clearwater Aquifer	-154
McMurray Aquifer	-11,273
Grosmont Aquifer	-17,375
Winnipegosis Aquifer	-24,597
Mass Balance (m <sup>3</sup> /d; summation of inflows and outflows)	-3.7
Net Mass Balance (% Difference)	-0.003%

Notes: Inflow (+) / Outflow (-).

Values in table may be referenced in text with fewer significant digits for ease of reading.

**Table A-9 Location of Groundwater Supply, Wastewater Disposal and Monitoring Wells Used for Transient Calibration**

Well Identifier	Surface Location	Easting (NAD27, Zn 12)	Northing (NAD27, Zn 12)	Aquifer	Well Use
MEG S2 Hardy 2-16-77-5	07-16-077-05W4M	518338.00	6169123.00	Upper Clearwater Aquifer	supply well
MEG S3 Hardy 8-16-77-5	07-16-077-05W4M	518018.00	6169052.00	Upper Clearwater Aquifer	supply well
PT 7-16-77-5	07-16-077-05W4M	518156.00	6169100.00	Upper Clearwater Aquifer	pressure transducer
PT 10-16-77-5	10-16-077-05W4M	518066.00	6169428.00	Upper Clearwater Aquifer	pressure transducer
15-35B	15-35-076-04W4M	531008.91	6165132.07	McMurray Aquifer	disposal well
15-35C	15-35-076-04W4M	531081.58	6165239.31	McMurray Aquifer	disposal well
8-34 Observation Well	08-34-076-04W4M	529800.56	6164121.56	McMurray Aquifer	pressure transducer
10-33 Observation Well	10-33-076-04W4M	527894.83	6164657.96	McMurray Aquifer	vibrating wire piezometer
2-33 Observation Well	02-33-076-04W4M	527821.71	6163946.22	McMurray Aquifer	vibrating wire piezometer
16-28 Observation Well	16-28-076-04W4M	528266.81	6163645.46	McMurray Aquifer	vibrating wire piezometer

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**ATTACHMENT B**

**GOUNDWATER FLOW MODEL FIGURES**



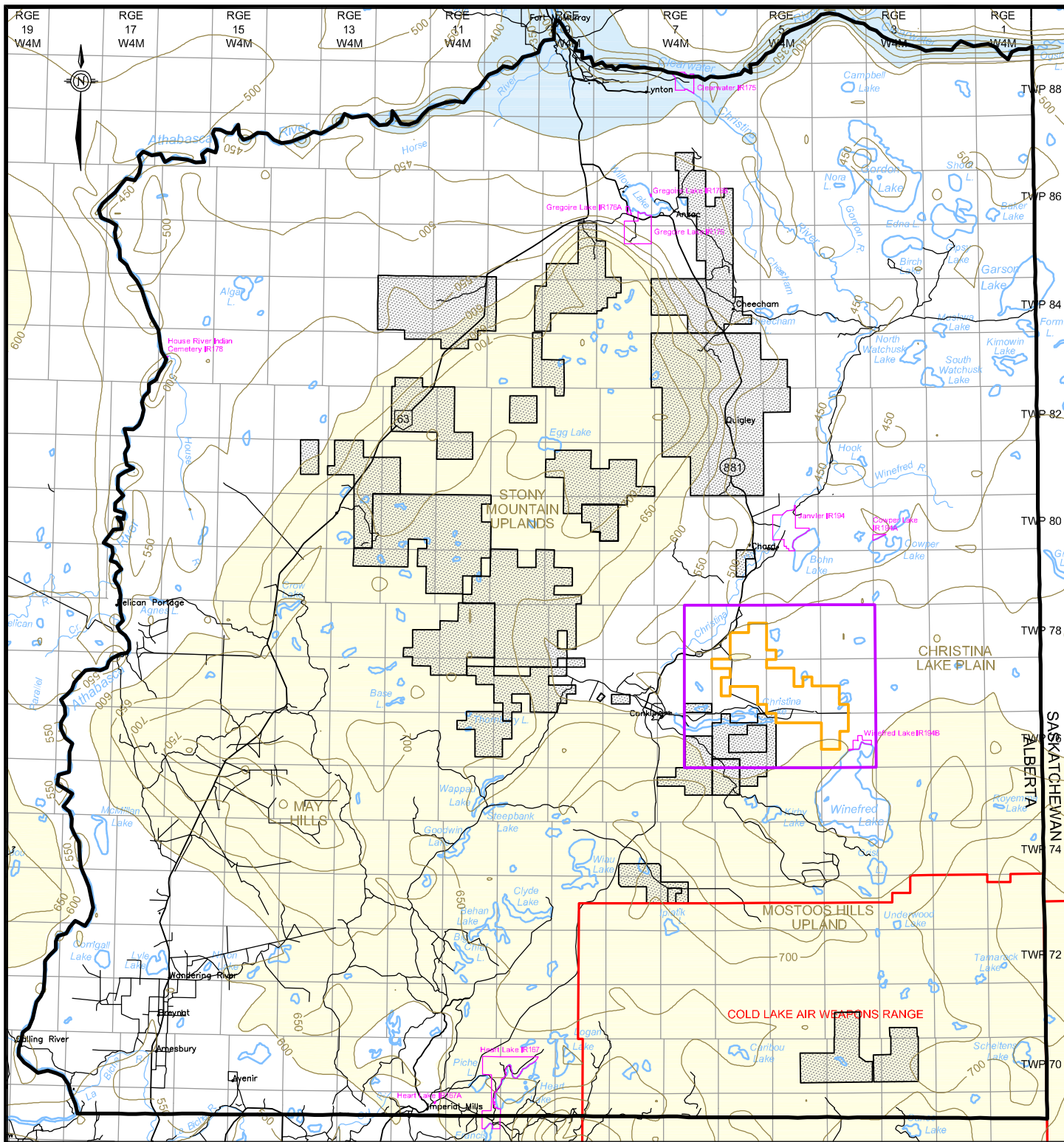
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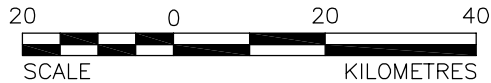
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 500- GROUND ELEVATION CONTOUR (mast)
- ELEVATION <400 (mast)
- ELEVATION >600 (mast)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



PROJECT  
**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

TITLE  
**HYDROGEOLOGY LOCAL AND REGIONAL STUDY AREAS**




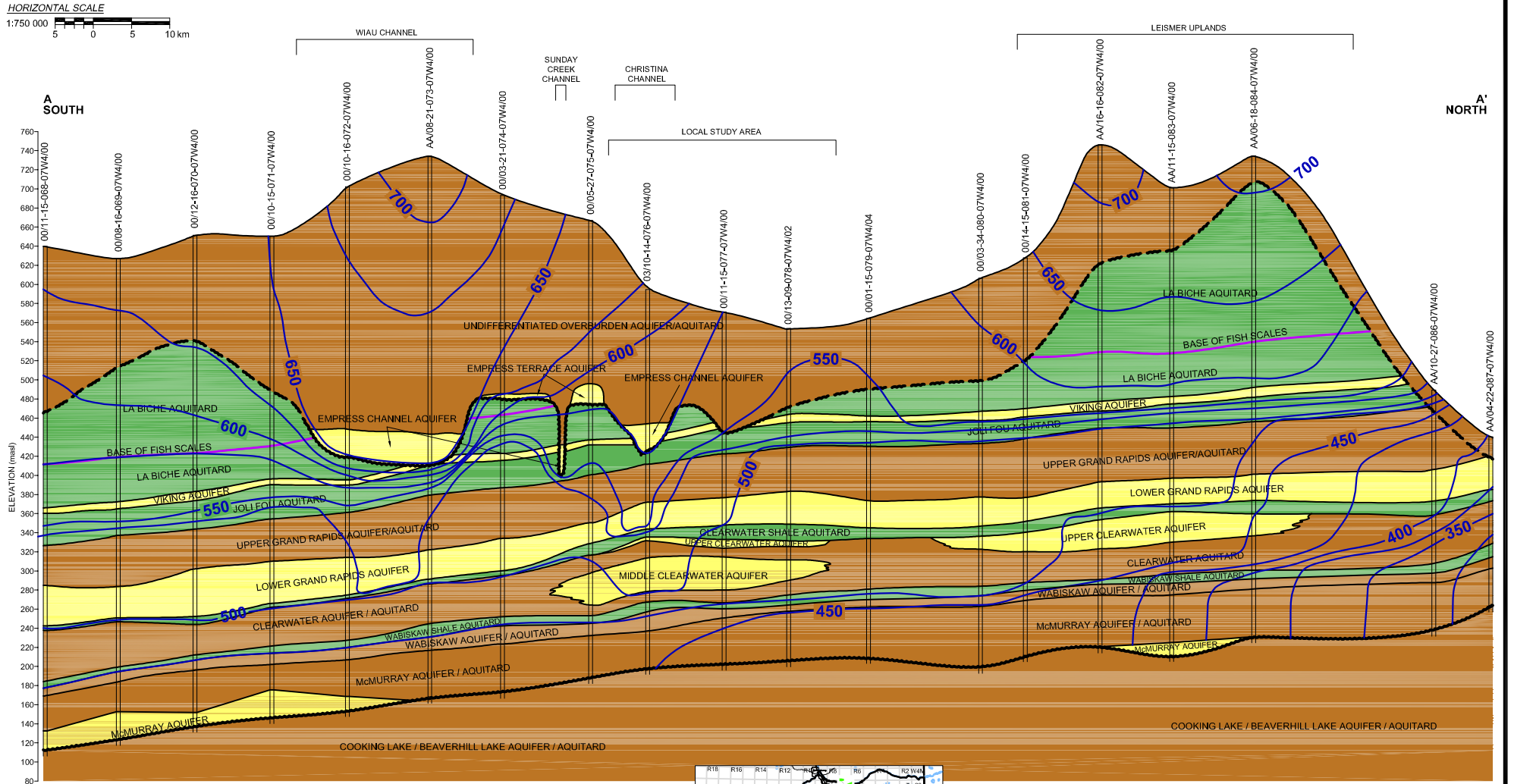
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PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	
REVIEW RP 31/01/08	

**FIGURE B-1**

ERA	PERIOD	EPOCH	GROUP	FORMATION	REGIONAL HYDROSTRATIGRAPHIC UNIT		
CENOZOIC	QUATERNARY			GRAND CENTRE	ETHEL LAKE AQUIFER		
				SAND RIVER			
				MARIE CREEK			
				ETHEL LAKE			
				BONNYVILLE			
				MURIEL LAKE			
				BRONSON LAKE			
	EMPRESS UNIT 3	TERRACE SAND	EMPRESS TERRACE AQUIFER				
	TERTIARY			EMPRESS UNIT 2			
	MESOZOIC	CRETACEOUS	L	COLORADO	LEA PARK	EMPRESS CHANNEL AQUIFER	
La BICHE					1st WHITE SPECKLED SHALE 2nd WHITE SPECKLED SHALE BASE OF FISH SCALES		La BICHE AQUITARD
VIKING					VIKING AQUIFER		
JOLI FOU					JOLI FOU AQUITARD		
UPPER GRAND RAPIDS					UPPER GRAND RAPIDS AQUIFER/AQUITARD		
LOWER GRAND RAPIDS					LOWER GRAND RAPIDS AQUIFER		
CLEARWATER FORMATION					CLEARWATER SHALE		CLEARWATER SHALE AQUITARD
					CLEARWATER O		UPPER CLEARWATER AQUIFER
					CLEARWATER A		
					CLEARWATER B		CLEARWATER AQUIFER / AQUITARD
		CLEARWATER C	LOWER CLEARWATER AQUIFER				
WABISKAW MEMBER		WABISKAW SHALE AQUITARD					
McMURRAY		UNDIFFERENTIATED WABISKAW AQUIFER / AQUITARD					
		WABISKAW BITUMEN AQUITARD	WABISKAW AQUIFER / AQUITARD				
		UNDIFFERENTIATED McMURRAY AQUIFER / AQUITARD					
		McMURRAY BITUMEN AQUITARD	McMURRAY AQUIFER				
PALEOZOIC		DEVONIAN	U	WOODBEND	WINTERBURN (WBRN)	WBRN AQUIFER / AQUITARD	
					GROSMONT	GROSMONT AQUIFER	
					IRETON	IRETON AQUITARD	
	BEAVERHILL LAKE			COOKING LAKE	COOKING LAKE / BEAVERHILL LAKE AQUIFER / AQUITARD		
				WATERWAYS			
				SLAVE POINT			
				FORT VERMILLION			
	ELK POINT			M	WATT MOUNTAIN	WATT MOUNTAIN AQUITARD	
					MUSKEG	PRAIRIE / MUSKEG AQUICLUDE	
					PRAIRIE EVAPORITE	KEG RIVER / WINNIPEGOSIS AQUIFER	
	KEG RIVER / WINNIPEGOSIS						

PROJECT				
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3				
TITLE				
REGIONAL STRATIGRAPHIC AND HYDROSTRATIGRAPHIC COLUMNS				
 MEG ENERGY CORP.	PROJECT	04-1334-001.6100	FILE No.	3459-SP_02-07.cdr
	DESIGN	MAL	14/12/07	SCALE AS SHOWN
	CADD	ADF	14/12/07	REV. 0
	CHECK	GM	31/01/08	<b>FIGURE B-2</b>
	REVIEW	RP	31/01/08	



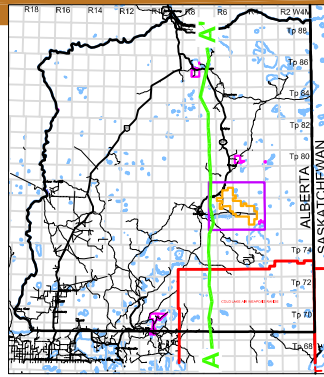
**LEGEND**

- UNCONFORMABLE CONTACT (ASSUMED LOCATION)
- UNCONFORMABLE CONTACT
- CONFORMABLE CONTACT
- CONFORMABLE CONTACT (ASSUMED LOCATION)
- INTERPRETED HYDRAULIC HEAD CONTOUR (masl)  
Contour Interval = 25 metres
- AQUIFER
- AQUIFER / AQUITARD
- AQUITARD

**REFERENCE**

MODIFIED FROM DEVON (2006)  
 McMURRAY FORMATION TOP OUTSIDE LSA FROM:  
 WIGHTMAN, D., ATTALLA, M., WYNNE, D., STROBL, R., BERHANE, H., COTTERILL, D. AND T. BEREZNIUK, 1995. "RESOURCE CHARACTERIZATION OF THE McMURRAY / WABISKAW DEPOSIT IN THE ATHABASCA OIL SANDS AREA: A SYNTHESIS." AOSTRA TECHNICAL PUBLICATION SERIES #10, ALBERTA DEPARTMENT OF ENERGY EXTERNAL RELATIONS AND COMMUNICATIONS, EDMONTON, ALBERTA, DECEMBER 1995.

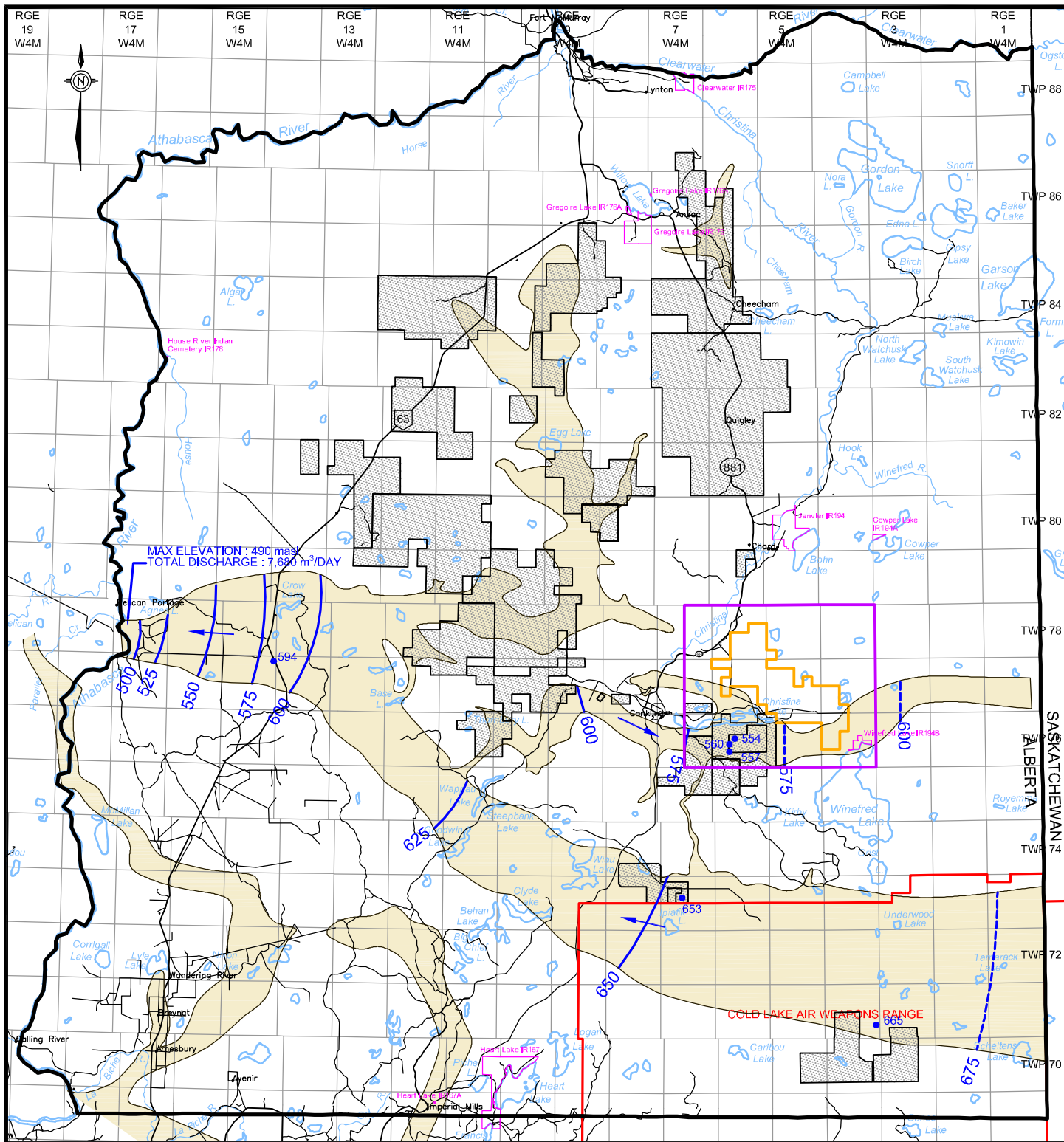
LOCATION OF DEVONIAN SUBCROPPING UNITS FROM:  
 BACHU, S., J.R. UNDERSCHULTZ, B. HITCHON, AND D. COTTERILL, 1993. "REGIONAL-SCALE SUBSURFACE HYDROGEOLOGY IN NORTHEAST ALBERTA." BULLETIN No. 61, ALBERTA GEOLOGICAL SURVEY, ALBERTA RESEARCH COUNCIL, EDMONTON, ALBERTA.



LOCATION PLAN  
NTS

<b>PROJECT</b>		CHRISTINA LAKE REGIONAL PROJECT - PHASE 3	
<b>TITLE</b>		<b>SCHEMATIC HYDROSTRATIGRAPHIC CROSS-SECTION OF GROUNDWATER FLOW</b>	
	PROJECT 04-1334-001.6100		FILE No. 3459-XS_PH3-07
	DESIGN	MAL	14/12/07
	CADD	ADF	14/12/07
	CHECK	GM	18/01/08
REVIEW	RP	31/01/08	SCALE AS SHOWN REV. 0
<b>FIGURE B-3</b>			





MAX ELEVATION : 490 masl  
TOTAL DISCHARGE : 7,690 m<sup>3</sup>/DAY

COLD LAKE AIR WEAPONS RANGE

**LEGEND**

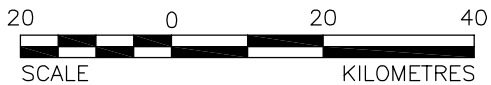
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500— HYDRAULIC HEAD (masl)
- EMPRESS CHANNEL AQUIFER
- 560 MEASURED HYDRAULIC HEAD (masl)


**REFERENCE:**  
ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
DEVON 2006

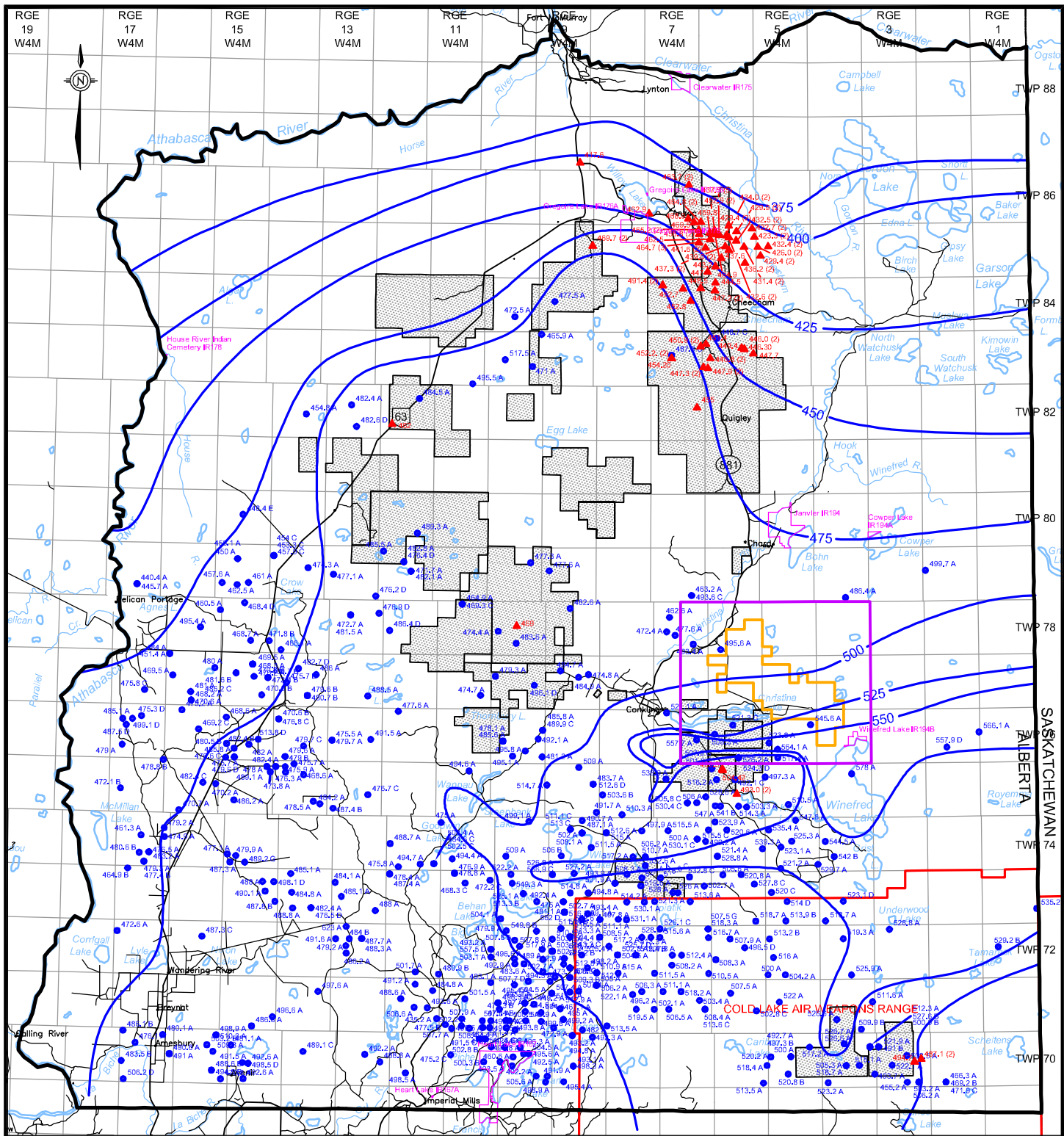
**NOTE:**  
\* ALSO KNOWN AS HAMLET OF JANVIER.

**DATUM:**  
NAD 27 PROJECTIONS: UTM ZONE 12



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
EMPRESS CHANNEL AQUIFER HYDRAULIC HEAD MAP			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			
			<b>FIGURE B-4</b>

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**LEGEND**

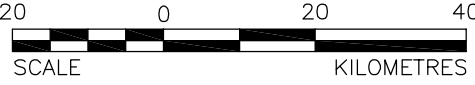
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500— HYDRAULIC HEAD (mast)
- 492.6 D EQUIVALENT HYDRAULIC HEAD (mast), QUALITY CONTROL CODE
- ▲ 437.3 (2) REPORTED LOWER GRAND RAPIDS AQUIFER HYDRAULIC HEAD VALUES (mast), (NUMBER OF DATA POINTS AVERAGED)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

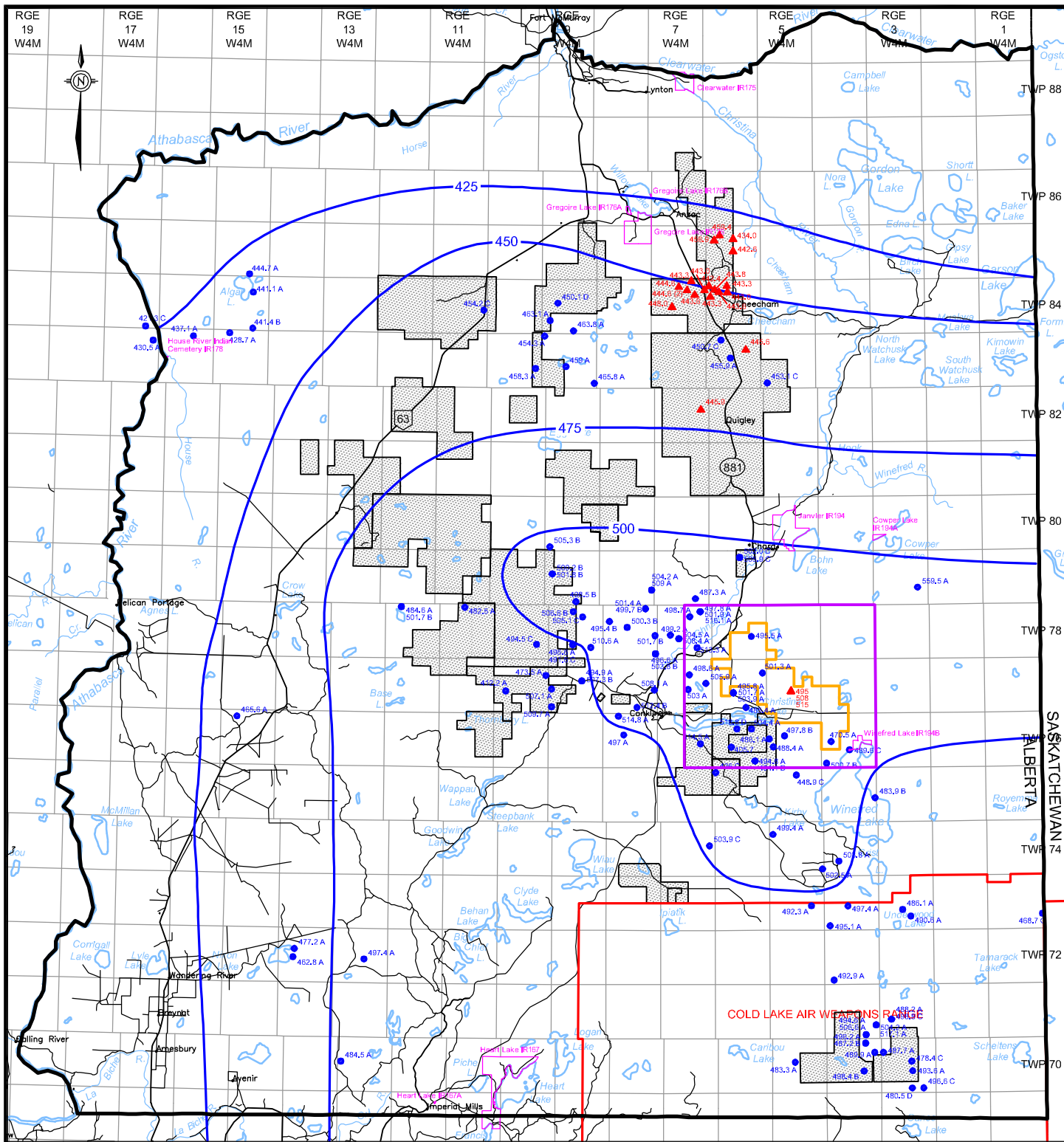


<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
UNDIFFERENTIATED GRAND RAPIDS FORMATION HYDRAULIC HEAD MAP			
PROJECT 04-1334-001.6100		FILE No. 3459-SP_PH3_3-07	
DESIGN MAL	14/12/07	SCALE AS SHOWN	REV. 0
CADD ADF	18/12/07	<b>FIGURE B-5</b>	
CHECK GM	31/01/08		
REVIEW RP	31/01/08		

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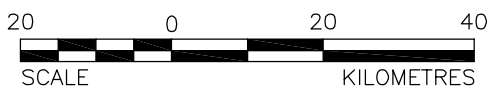
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500— HYDRAULIC HEAD (mast)
- 487.3 C EQUIVALENT HYDRAULIC HEAD (mast), QUALITY CONTROL CODE
- ▲ 448.2 (2) REPORTED UPPER CLEARWATER AQUIFER HYDRAULIC HEAD VALUES (mast), (NUMBER OF DATA POINTS AVERAGED)


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

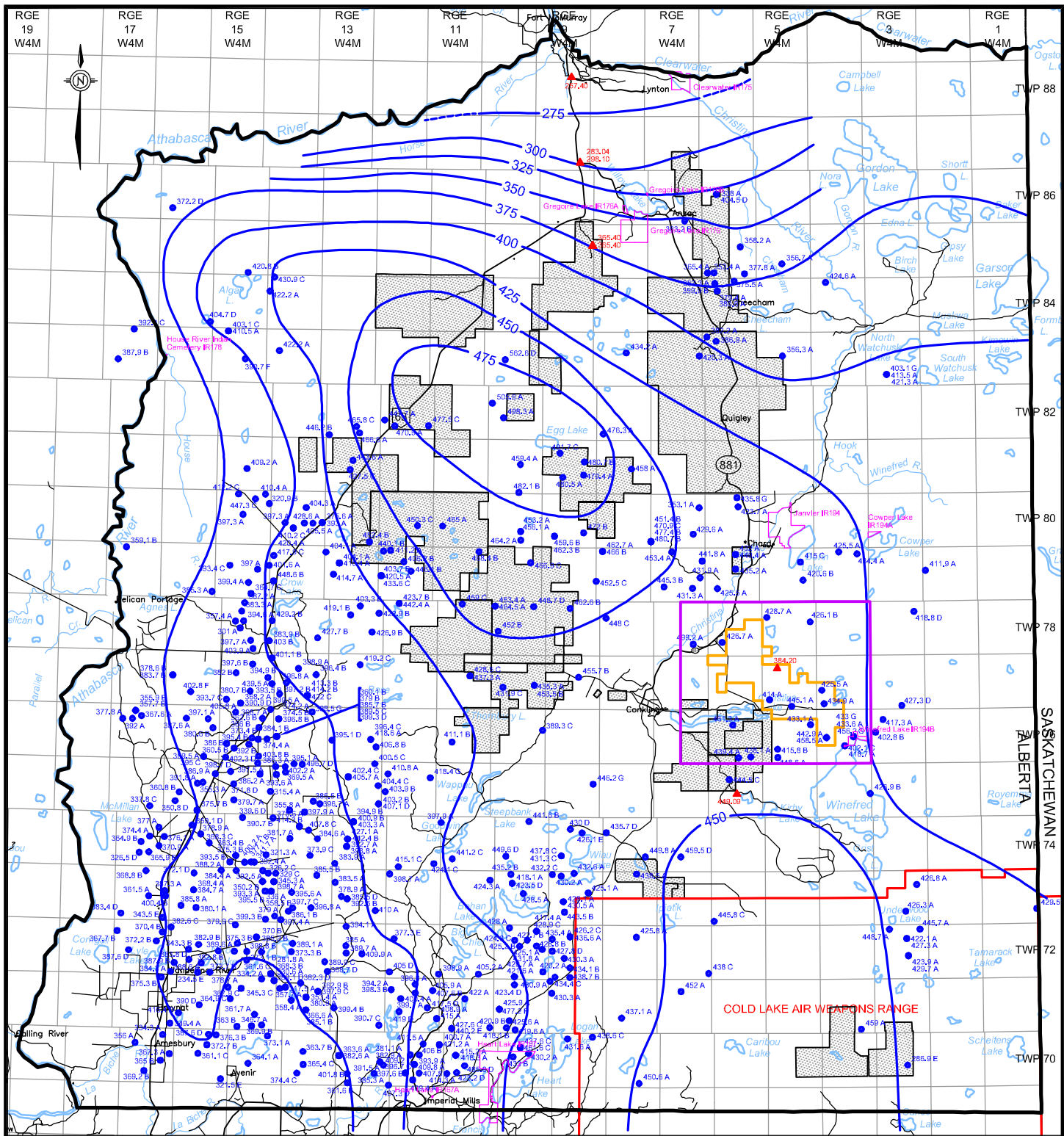
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
UNDIFFERENTIATED CLEARWATER FORMATION HYDRAULIC HEAD MAP			
PROJECT 04-1334-001.6100		FILE No. 3459-SP_PH3_3-07	
DESIGN MAL	14/12/07	SCALE AS SHOWN	REV. 0
CADD ADF	18/12/07		
CHECK GM	31/01/08		
REVIEW RP	31/01/08		
 MEG ENERGY CORP.		<b>FIGURE B-6</b>	





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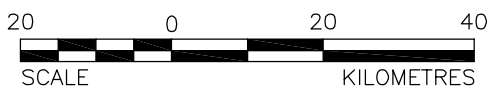
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500— HYDRAULIC HEAD (mast)
- 487.3C EQUIVALENT HYDRAULIC HEAD (mast), QUALITY CONTROL CODE
- ▲385.4 (2) REPORTED McMURRAY AQUIFER HYDRAULIC HEAD VALUES (mast), (NUMBER OF DATA POINTS AVERAGED)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

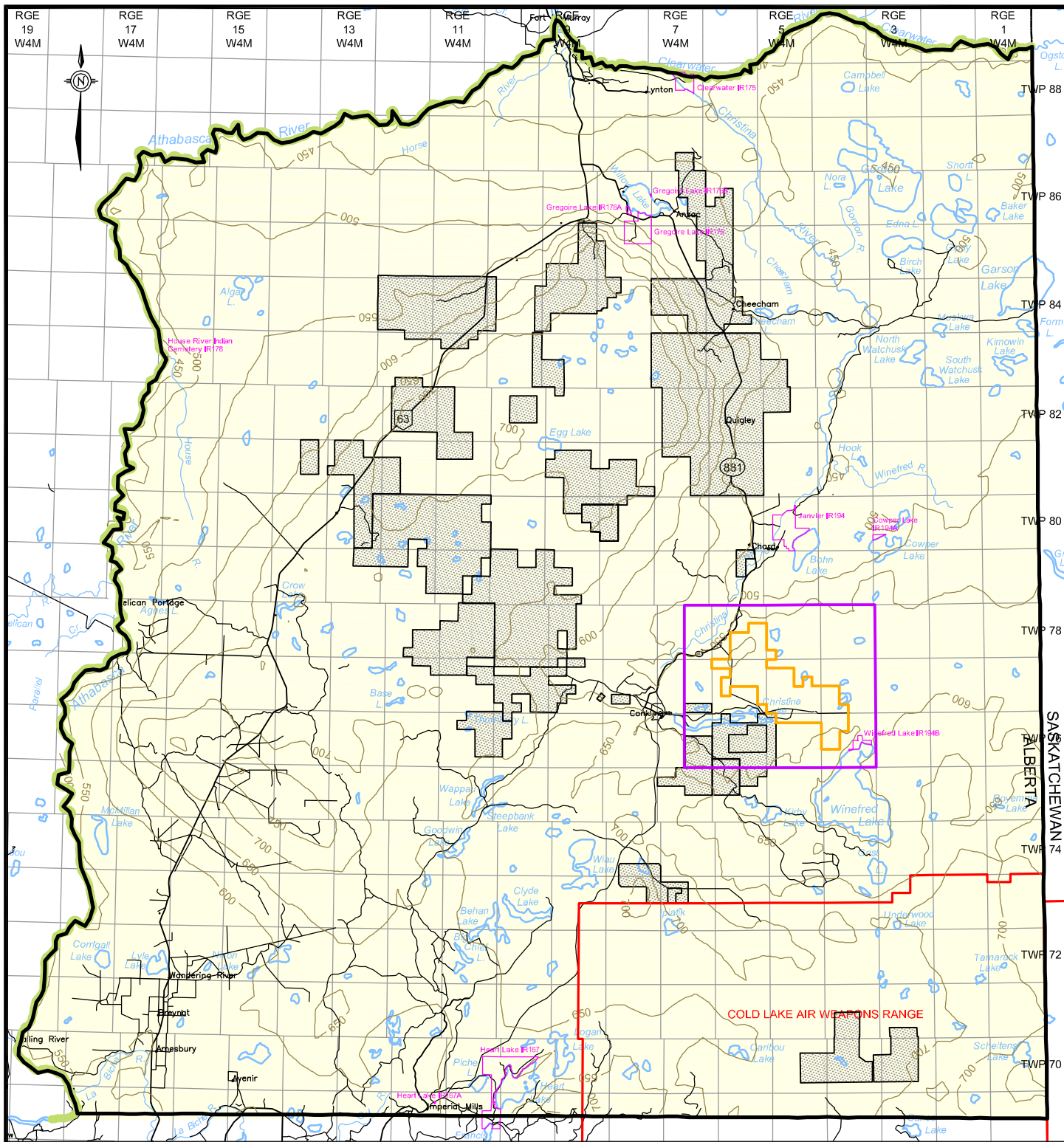
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>			
<b>TITLE</b>			
<b>UNDIFFERENTIATED McMURRAY FORMATION HYDRAULIC HEAD MAP</b>			
<b>PROJECT</b>	04-1334-001.6100	<b>FILE No.</b>	3459-SP_PH3_3-07
<b>DESIGN</b>	MAL 14/12/07	<b>SCALE</b>	AS SHOWN REV. 0
<b>CADD</b>	ADF 18/12/07	<b>FIGURE B-7</b>	
<b>CHECK</b>	GM 31/01/08		
<b>REVIEW</b>	RP 31/01/08		



MEG ENERGY CORP.



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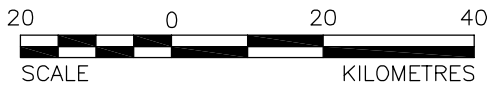
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▨ REGIONAL STUDY AREA (RSA)
- ▨ LOCAL STUDY AREA (LSA)
- ▨ COLD LAKE AIR WEAPONS RANGE
- 600- CONTOURS (mast)
- CONSTANT HEAD NODE - ASSIGNED RIVER ELEVATION
- CONSTANT HEAD NODE - ASSIGNED GROUND ELEVATION

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

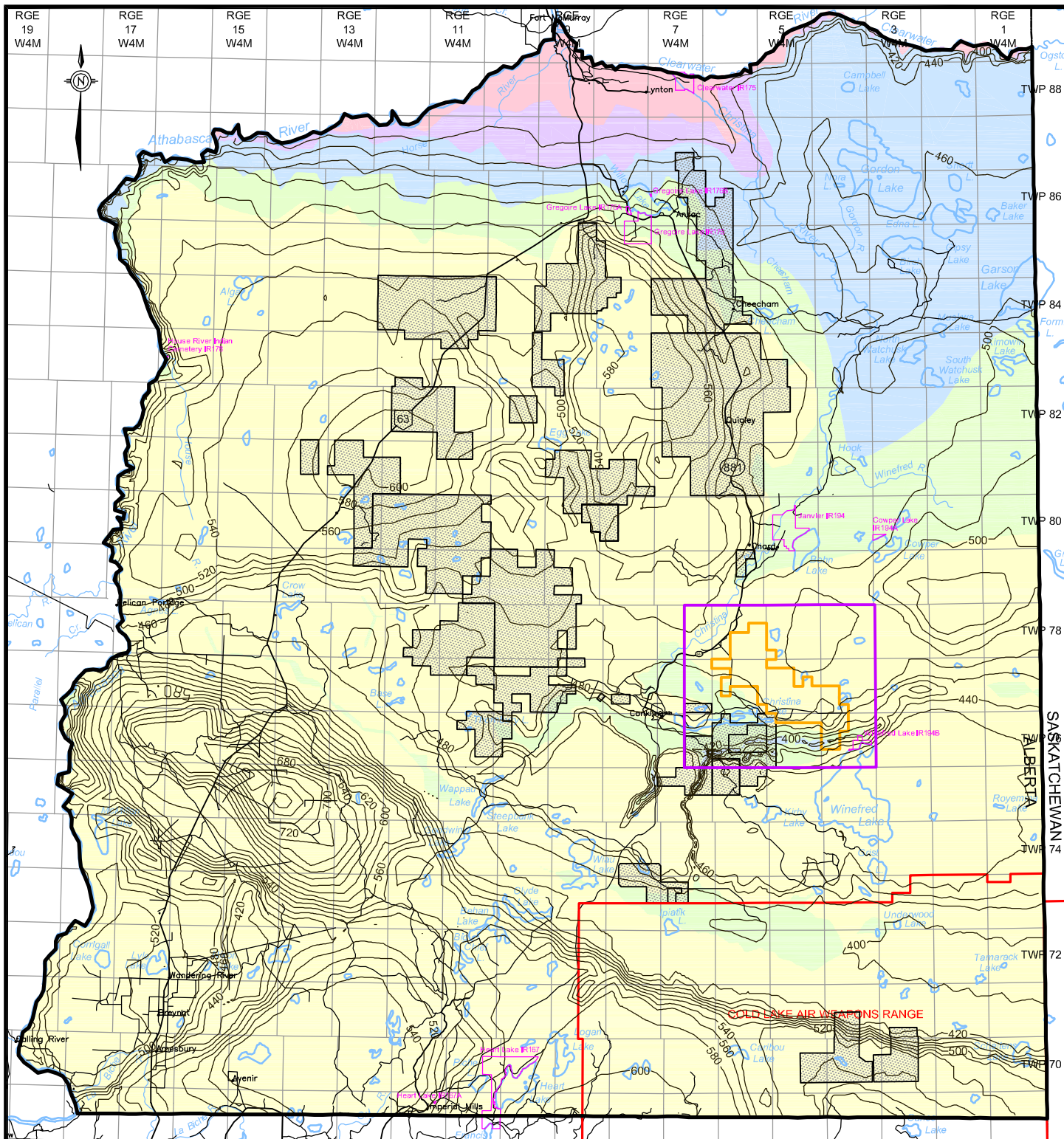
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>	<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>		
<b>TITLE</b>	<b>GROUND SURFACE (TOP SLICE) ELEVATION AND ASSIGNED BOUNDARY CONDITIONS</b>		
	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			<b>FIGURE B-8</b>





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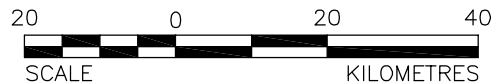
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500- CONTOURS (mast)
- LABICHE SUBCROPPING FORMATION
- JOLI FOU / VIKING SUBCROPPING FORMATION
- UPPER GRAND RAPIDS SUBCROPPING FORMATION
- LOWER GRAND RAPIDS SUBCROPPING FORMATION
- CLEARWATER SUBCROPPING FORMATION


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

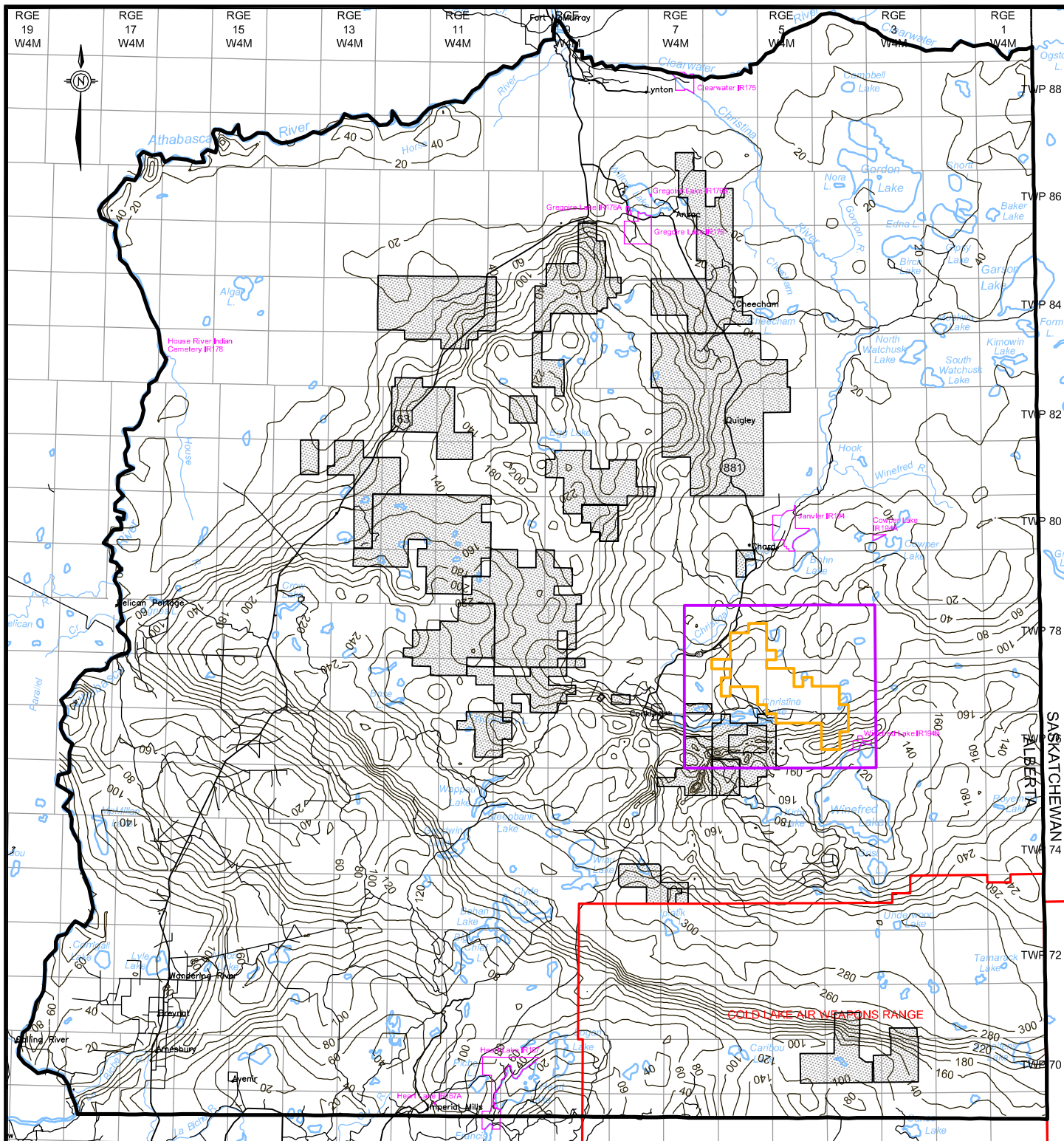
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
MODELLED TOP OF BEDROCK SURFACE AND SUBCROPPING FORMATIONS (SLICE 4)			
	PROJECT 04-1334-001.6100		FILE No. 3459-SP_PH3_3-07
	DESIGN	MAL	14/12/07
	CADD	ADF	18/12/07
	CHECK	GM	31/01/08
REVIEW	RP	31/01/08	SCALE AS SHOWN
			<b>REV. 0</b>
			<b>FIGURE B-9</b>



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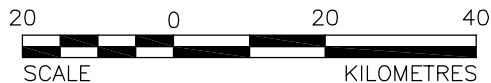
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 20- ISOPACH (m)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**  
 CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

**TITLE**  
 UNDIFFERENTIATED OVERBUDEN  
 AQUIFER/AQUITARD (TOP OF BEDROCK  
 TO GROUND SURFACE) ISOPACH

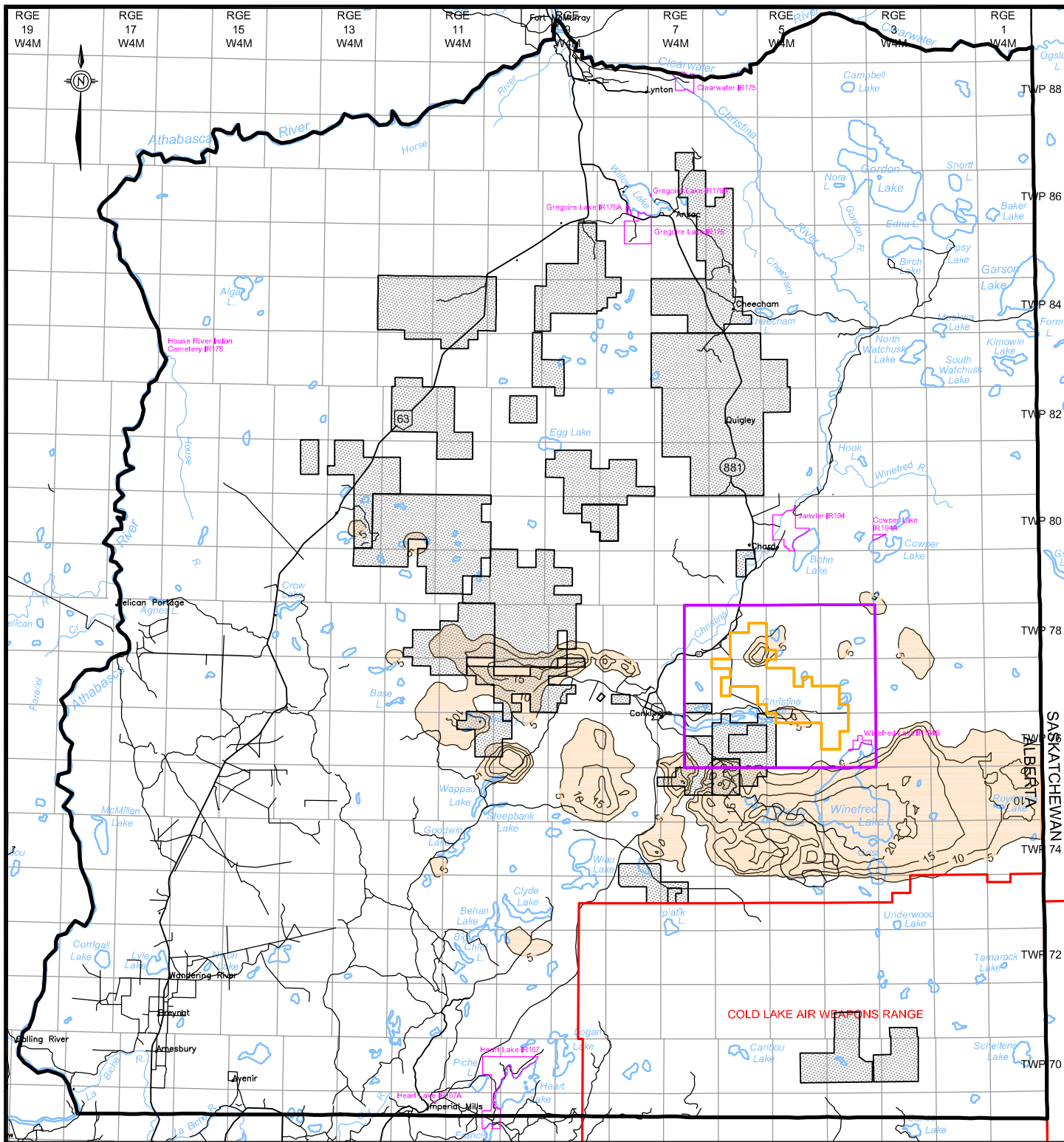


MEG ENERGY CORP.

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	
REVIEW RP 31/01/08	

**FIGURE B-10**





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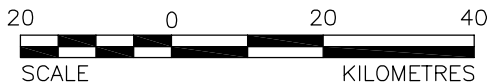
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 10- ISOPACH (m)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

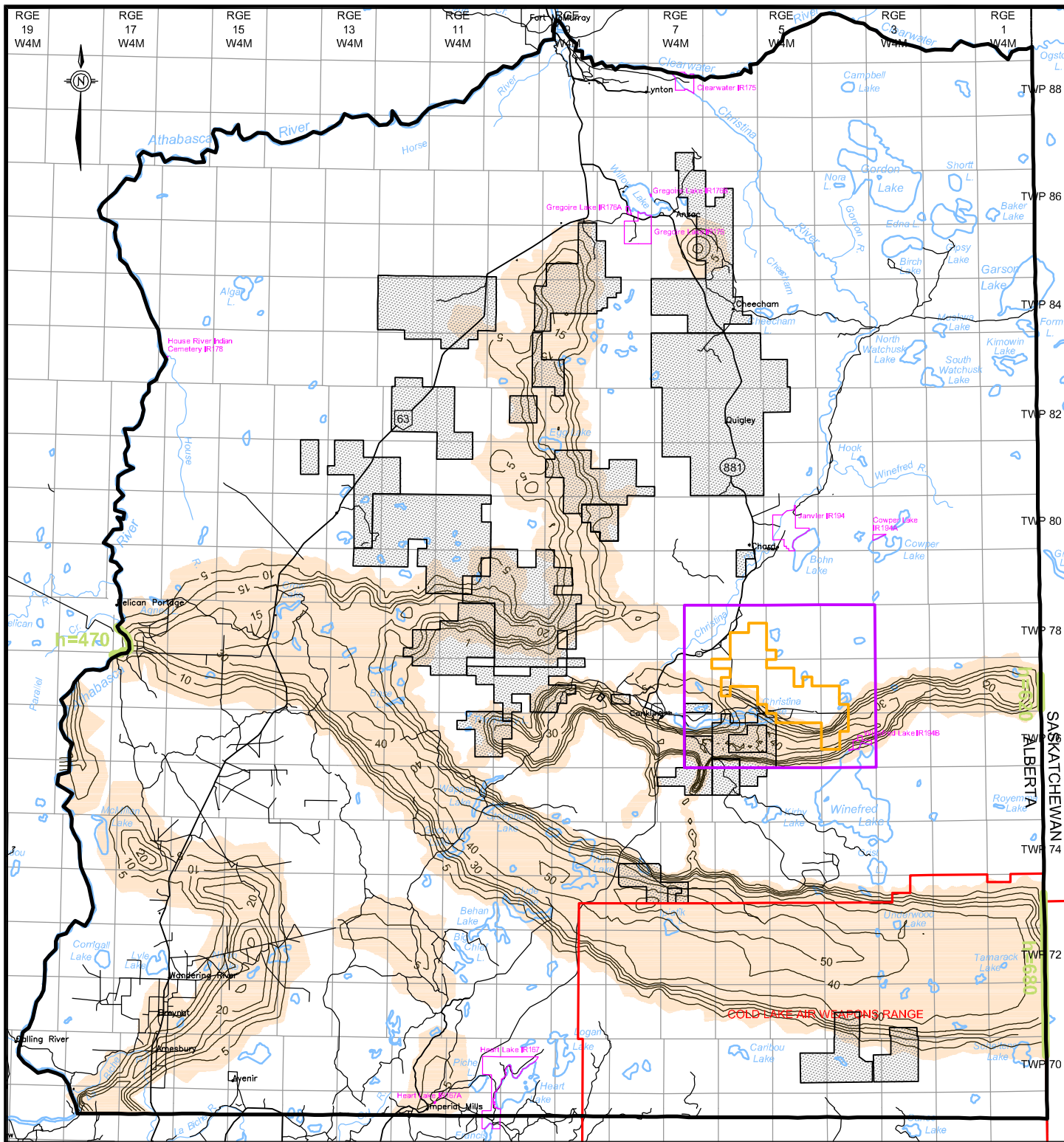
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<p><b>PROJECT</b></p> <p style="text-align: center;"><b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b></p> <p><b>TITLE</b></p> <p style="text-align: center;"><b>TERRACE SAND AQUIFER ISOPACH</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PROJECT 04-1334-001.6100</td> <td>FILE No. 3459-SP_PH3_3-07</td> </tr> <tr> <td>DESIGN MAL 14/12/07</td> <td>SCALE AS SHOWN REV. 0</td> </tr> <tr> <td>CADD ADF 18/12/07</td> <td></td> </tr> <tr> <td>CHECK GM 31/01/08</td> <td></td> </tr> <tr> <td>REVIEW RP 31/01/08</td> <td></td> </tr> </table> <p style="text-align: center; font-weight: bold; font-size: 1.2em;">FIGURE B-11</p>	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0	CADD ADF 18/12/07		CHECK GM 31/01/08		REVIEW RP 31/01/08	
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07										
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0										
CADD ADF 18/12/07											
CHECK GM 31/01/08											
REVIEW RP 31/01/08											

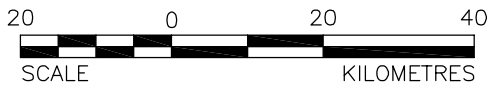


MEG ENERGY CORP.



**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 20- ISOPACH (m)
- CONSTANT HEAD NODES



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

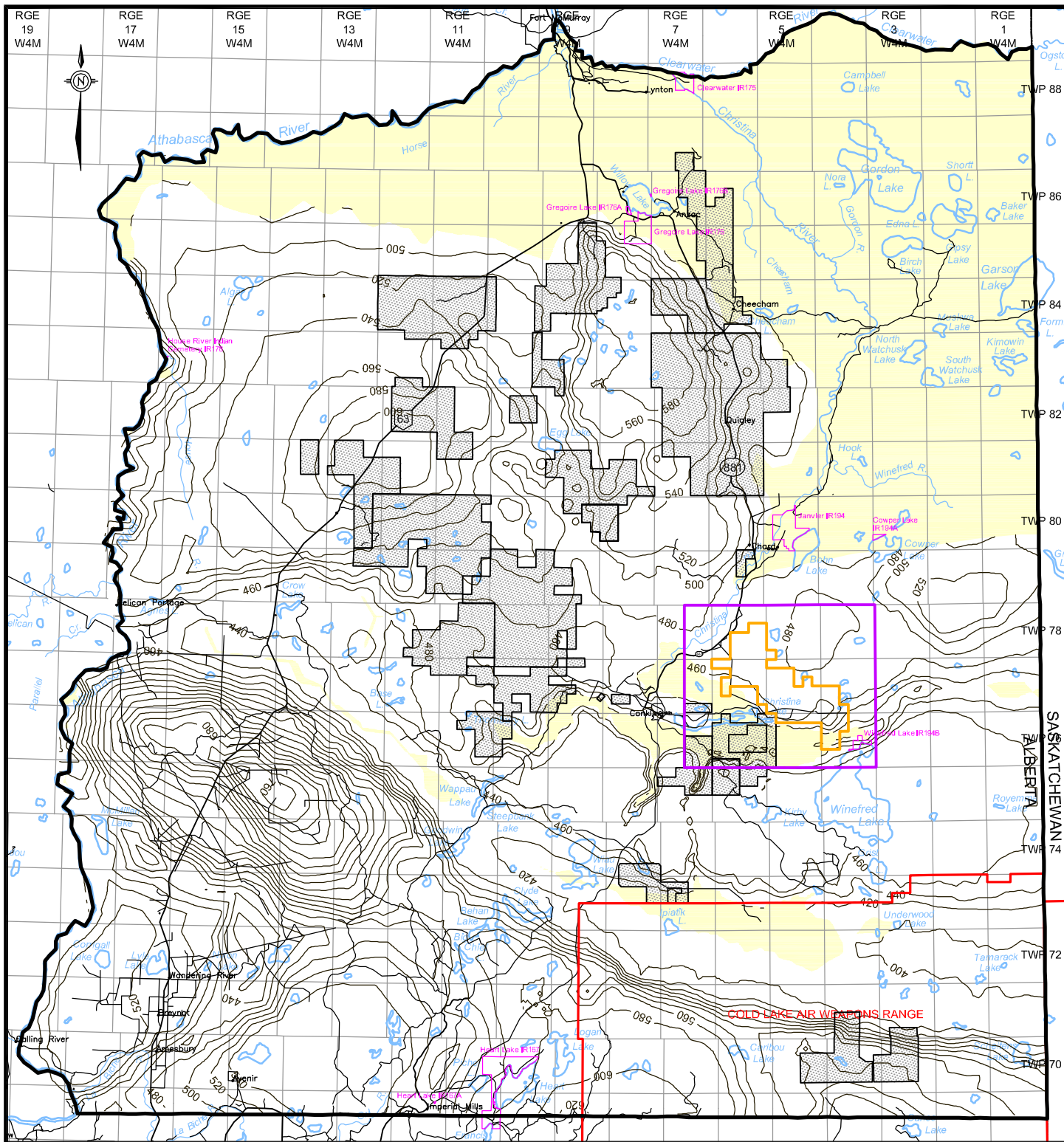
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

PROJECT  
**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

TITLE  
**EMPRESS CHANNEL AQUIFER ISOPACH AND ASSIGNED BOUNDARY CONDITIONS**

	PROJECT 04-1334-001.6100		FILE No. 3459-SP_PH3_3-07	
	DESIGN	MAL	14/12/07	SCALE AS SHOWN
	CADD	ADF	18/12/07	REV. 0
	CHECK	GM	31/01/08	<b>FIGURE B-12</b>
	REVIEW	RP	31/01/08	





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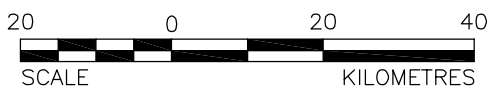
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▨ REGIONAL STUDY AREA (RSA)
- ▨ LOCAL STUDY AREA (LSA)
- ▨ COLD LAKE AIR WEAPONS RANGE
- 500- STRUCTURE (m)
- FORMATION ABSENT

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

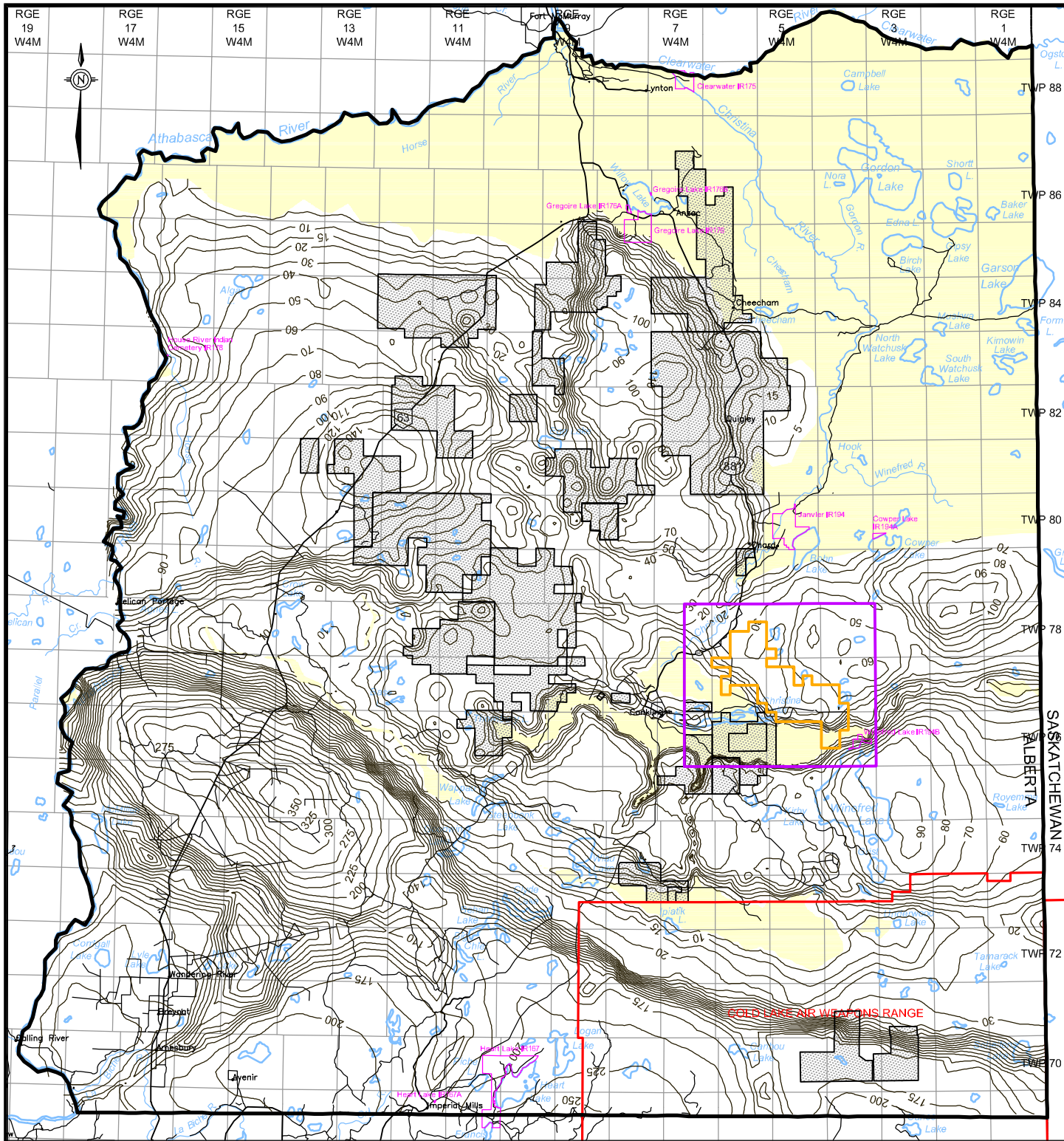
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 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



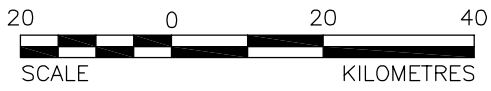
<b>PROJECT</b>	<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>		
<b>TITLE</b>	<b>LA BICHE AQUITARD STRUCTURE</b>		
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			FIGURE B-13



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**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 110- ISOPACH (mast)
- FORMATION ABSENT



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

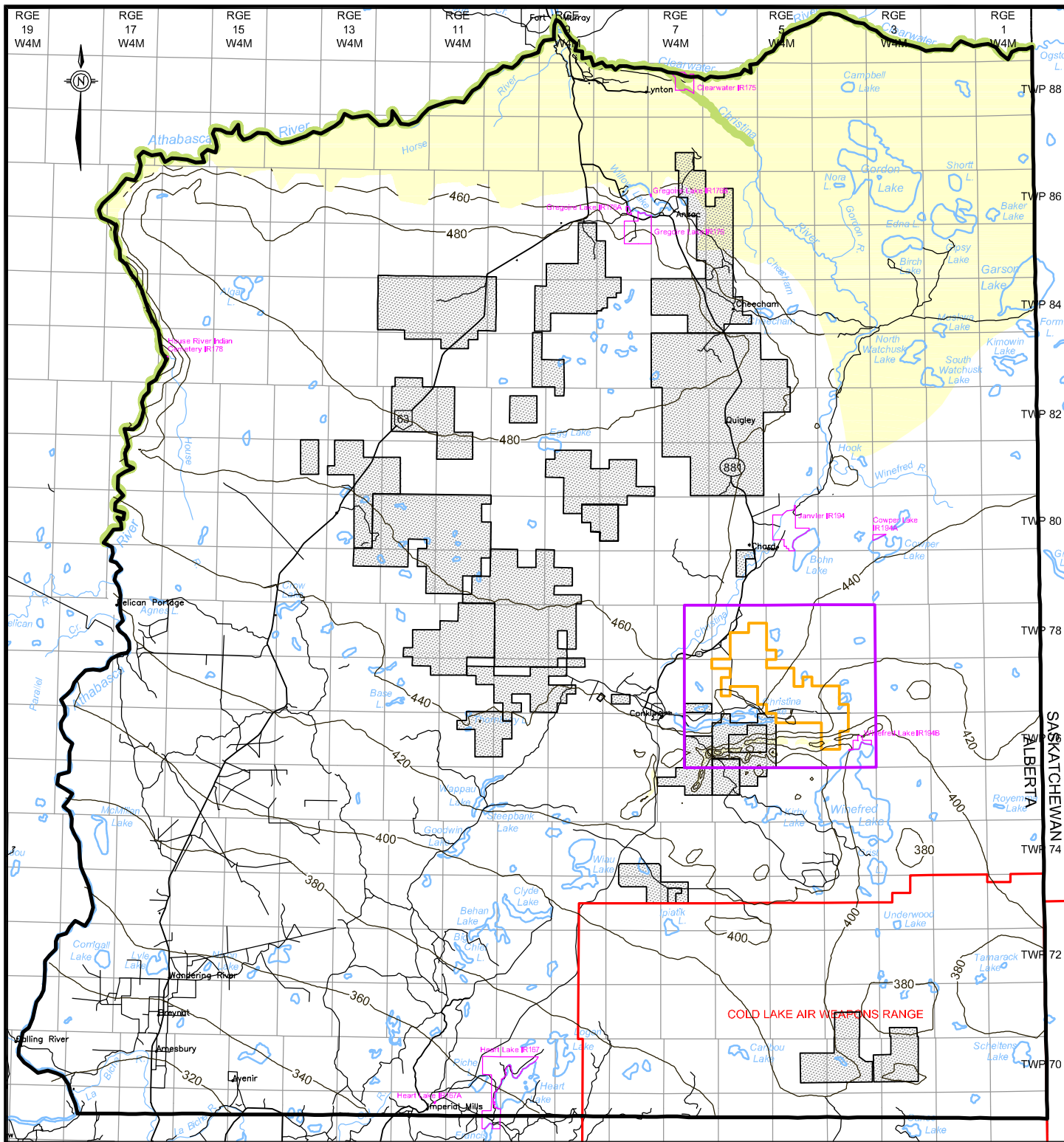
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 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

<b>PROJECT</b>			
<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>			
<b>TITLE</b>			
<b>LA BICHE AQUITARD ISOPACH</b>			
<b>MEG ENERGY CORP.</b>		PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
		DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
		CADD ADF 18/12/07	
		CHECK GM 31/01/08	
REVIEW RP 31/01/08		<b>FIGURE B-14</b>	

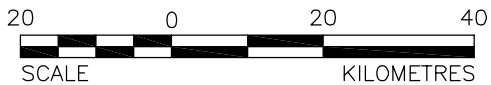


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**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 320- STRUCTURE (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION
- FORMATION ABSENT



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
 DEVON 2006

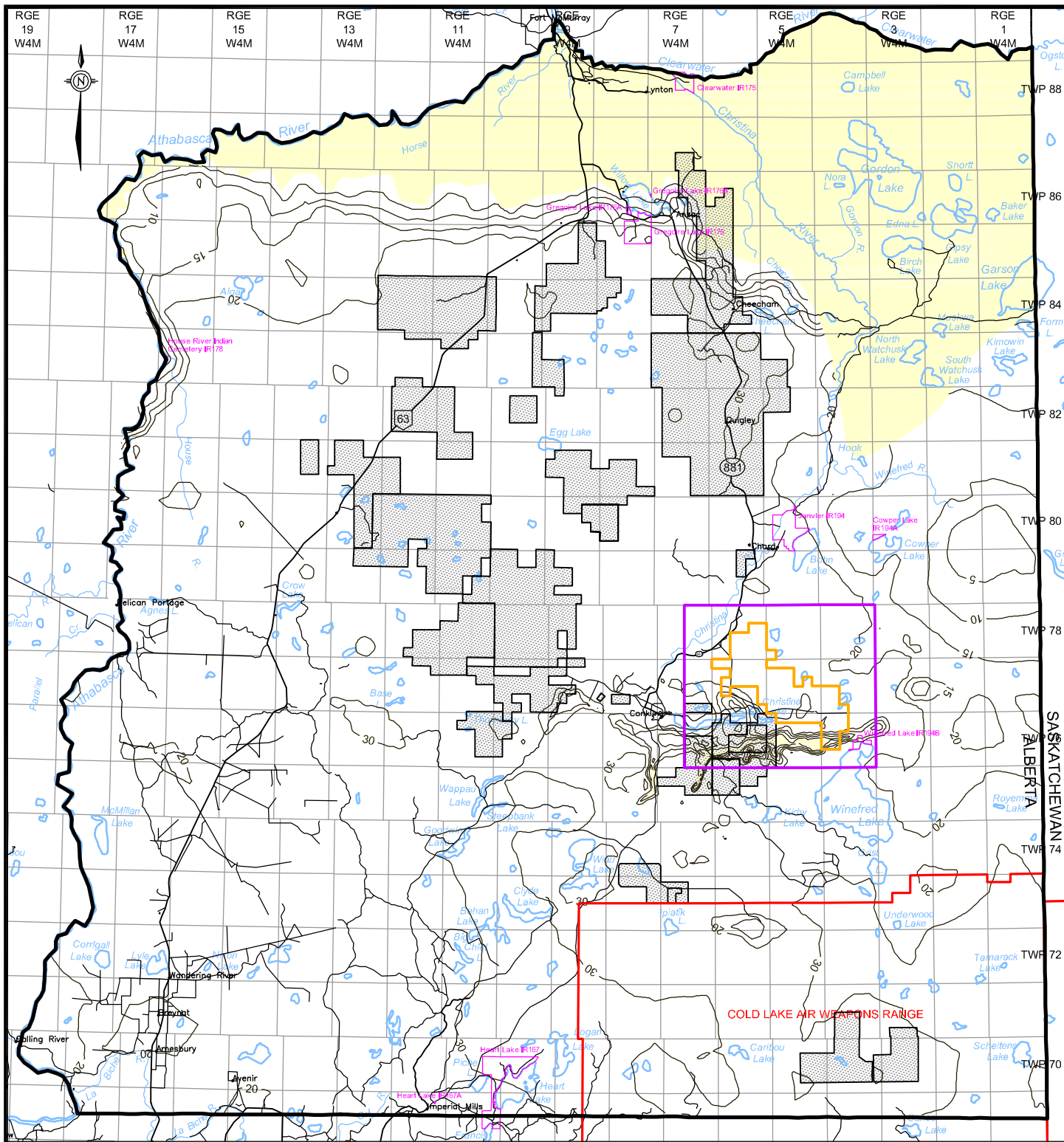
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

<b>PROJECT</b>	<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>		
<b>TITLE</b>	<b>VIKING AQUIFER STRUCTURE AND ASSIGNED BOUNDARY CONDITIONS</b>		
	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			<b>FIGURE B-15</b>



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**LEGEND**

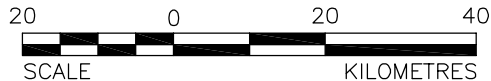
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 20- ISOPACH (mast)
- FORMATION ABSENT

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



PROJECT  
**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

TITLE  
**JOLI FOU AQUITARD ISOPACH**

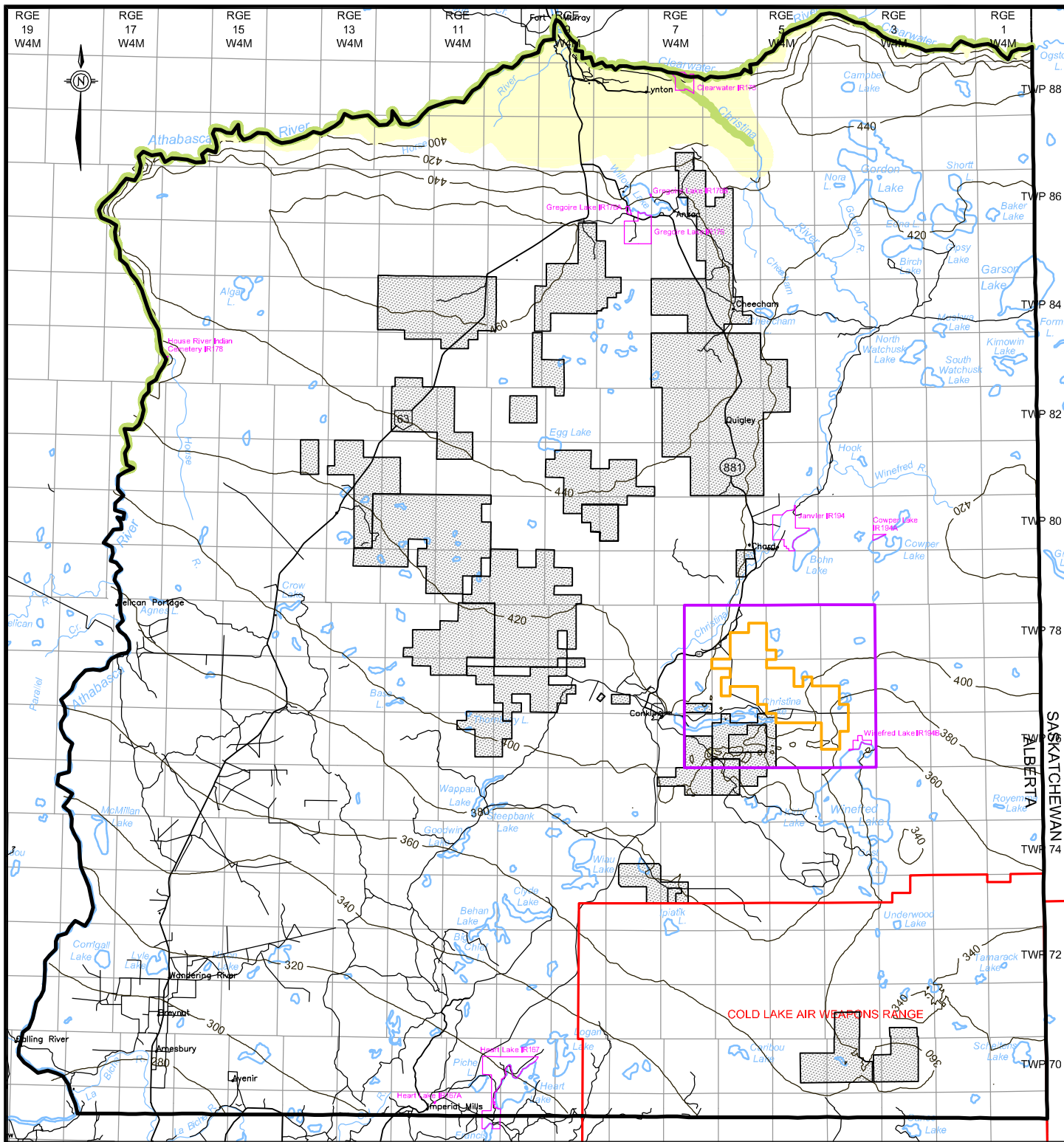


MEG ENERGY CORP.

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	<b>FIGURE B-17</b>
REVIEW RP 31/01/08	



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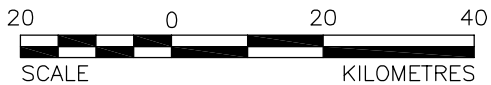
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 320- STRUCTURE (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION
- FORMATION ABSENT

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
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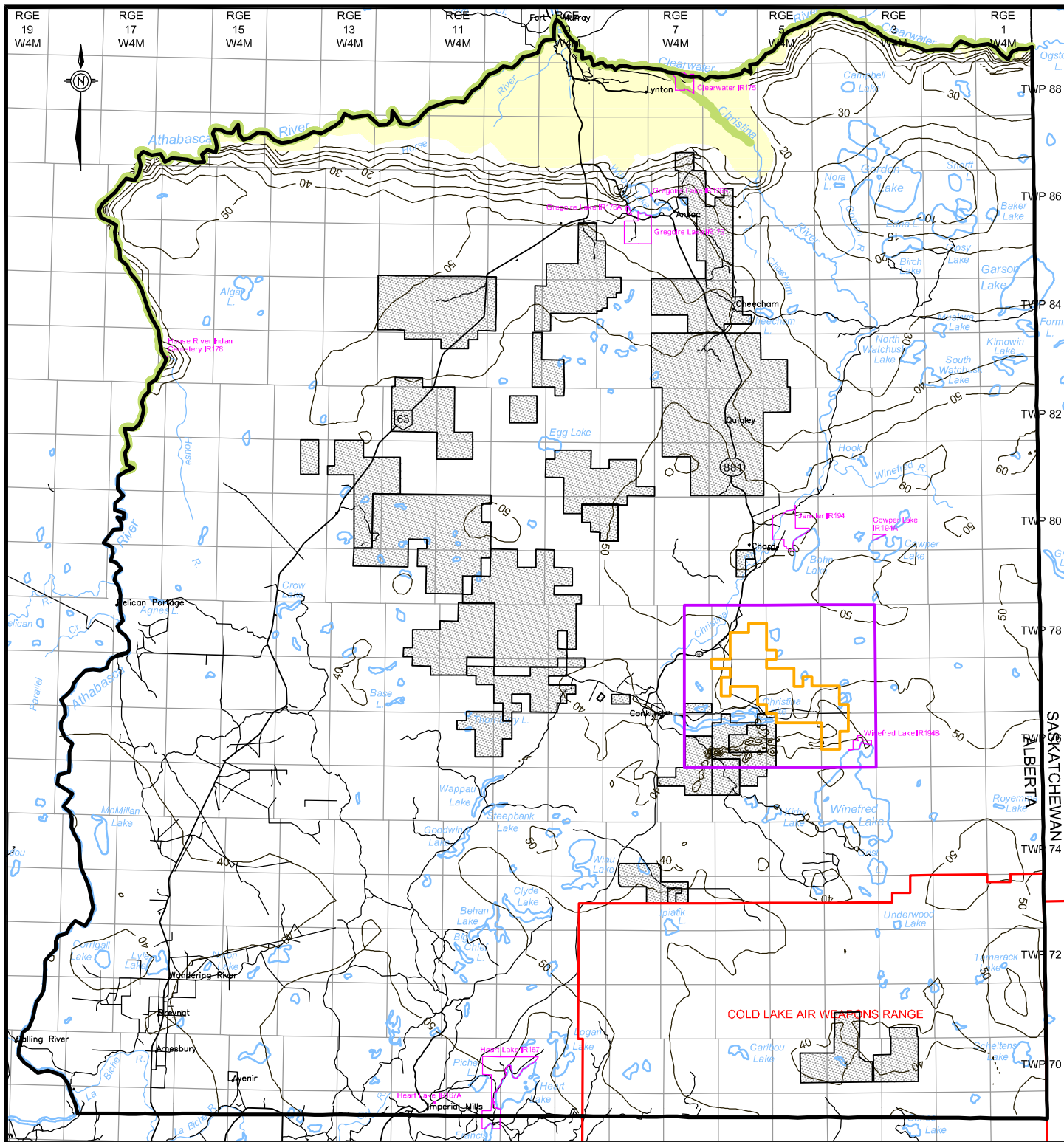
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<p><b>PROJECT</b>          CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</p> <p><b>TITLE</b>  <b>UPPER GRAND RAPIDS          AQUIFER / AQUITARD STRUCTURE AND          ASSIGNED BOUNDARY CONDITIONS</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PROJECT 04-1334-001.6100</td> <td>FILE No. 3459-SP_PH3_3-07</td> </tr> <tr> <td>DESIGN MAL 14/12/07</td> <td>SCALE AS SHOWN REV. 0</td> </tr> <tr> <td>CADD ADF 18/12/07</td> <td></td> </tr> <tr> <td>CHECK GM 31/01/08</td> <td></td> </tr> <tr> <td>REVIEW RP 31/01/08</td> <td></td> </tr> </table> <p style="text-align: right; font-weight: bold; font-size: 1.2em;">FIGURE B-18</p>	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0	CADD ADF 18/12/07		CHECK GM 31/01/08		REVIEW RP 31/01/08	
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07										
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0										
CADD ADF 18/12/07											
CHECK GM 31/01/08											
REVIEW RP 31/01/08											





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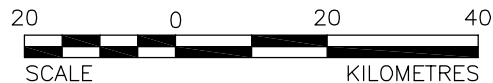
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▨ REGIONAL STUDY AREA (RSA)
- ▨ LOCAL STUDY AREA (LSA)
- ▨ COLD LAKE AIR WEAPONS RANGE
- 40- STRUCTURE (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION
- FORMATION ABSENT

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
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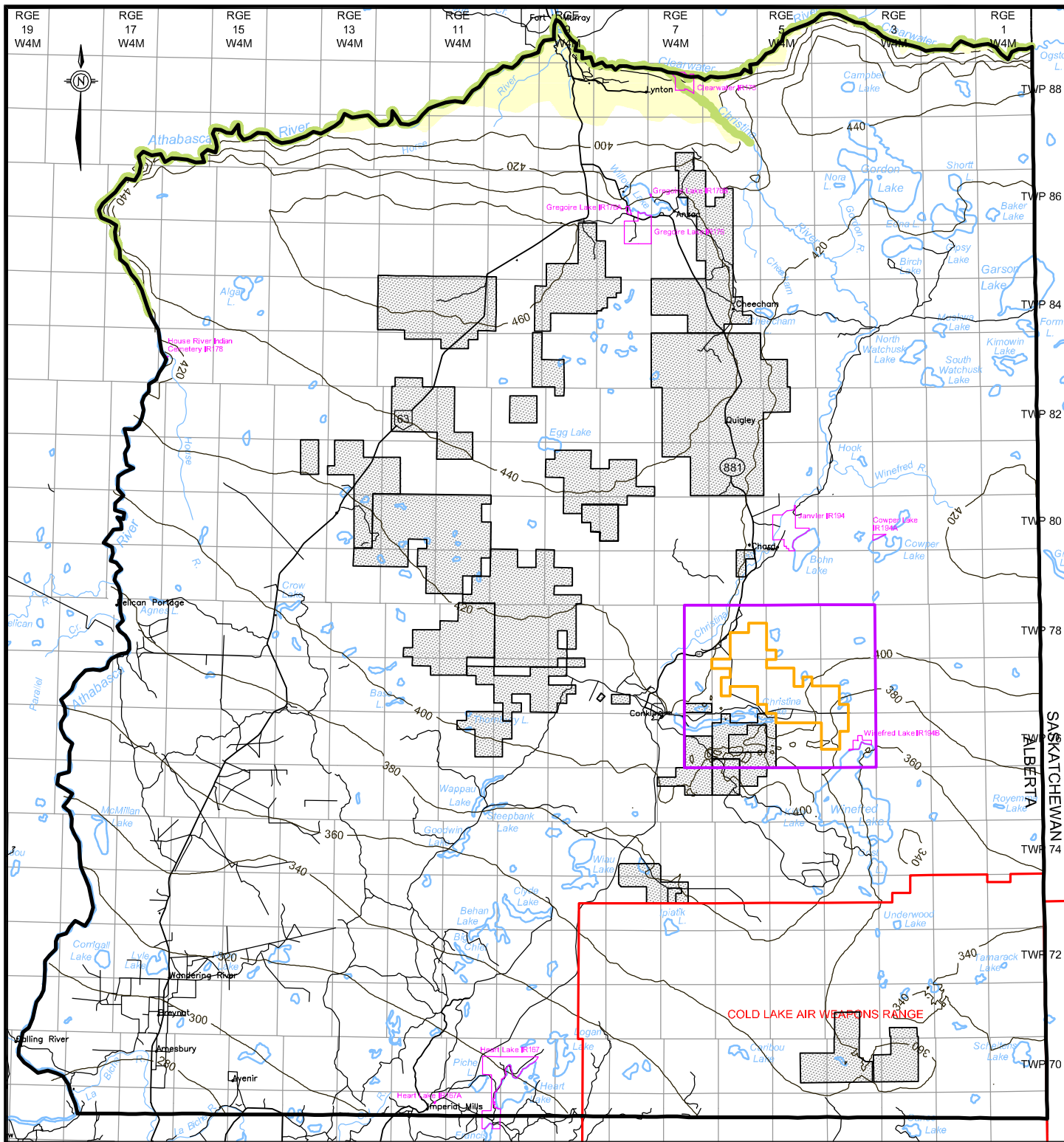
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>			
<b>TITLE</b>			
<b>UPPER GRAND RAPIDS AQUIFER / AQUITARD ISOPACH AND ASSIGNED BOUNDARY CONDITIONS</b>			
		MEG ENERGY CORP.	
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	CHECK GM 31/01/08	REVIEW RP 31/01/08	<b>FIGURE B-19</b>

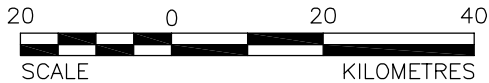


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**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 300- STRUCTURE (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION
- FORMATION ABSENT



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

PROJECT

**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

TITLE

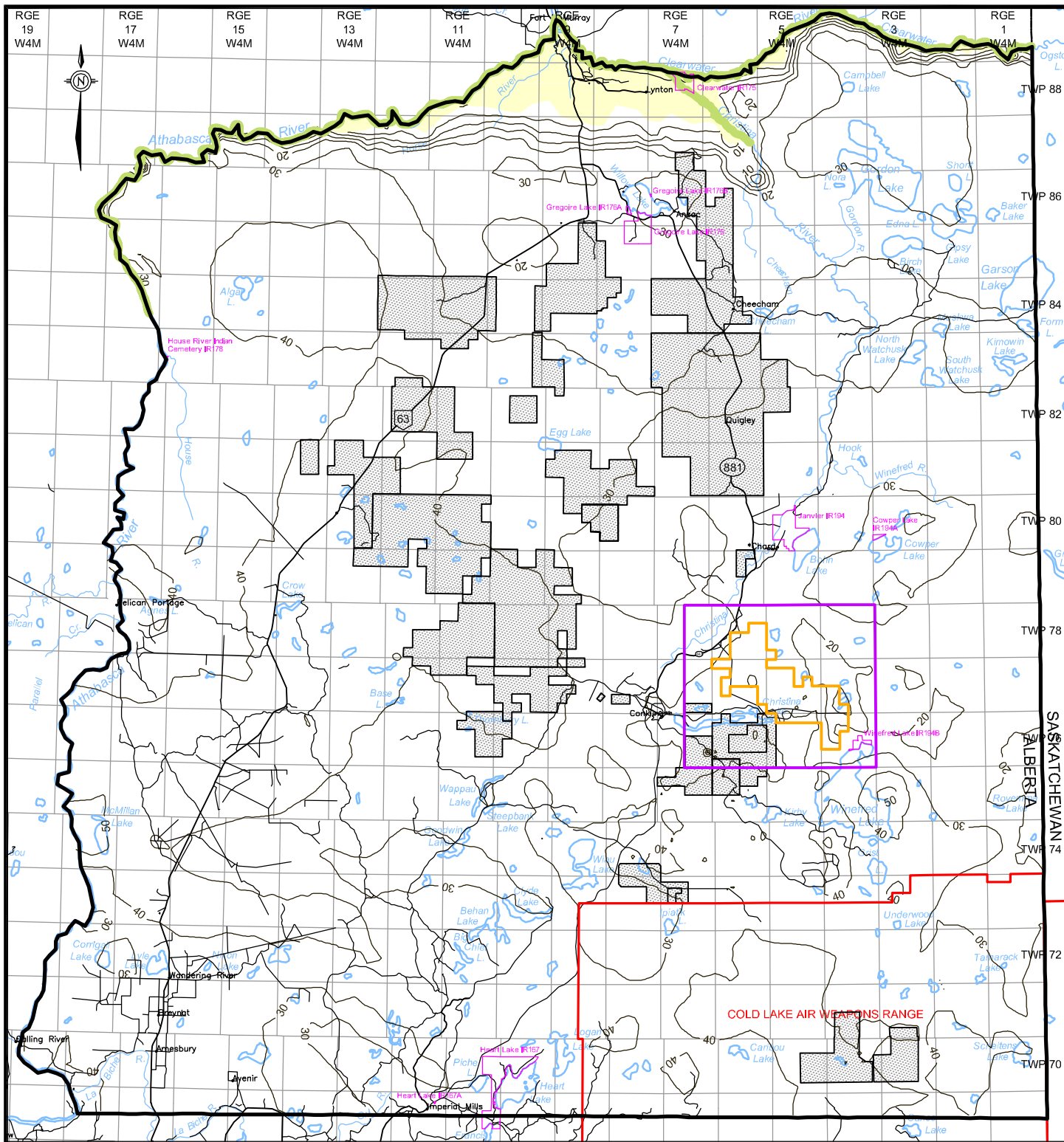
**LOWER GRAND RAPIDS AQUIFER  
 STRUCTURE AND ASSIGNED  
 BOUNDARY CONDITIONS**



MEG ENERGY CORP.

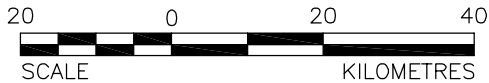
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	
REVIEW RP 31/01/08	

**FIGURE B-20**



**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 30- ISOPACH (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION
- FORMATION ABSENT



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

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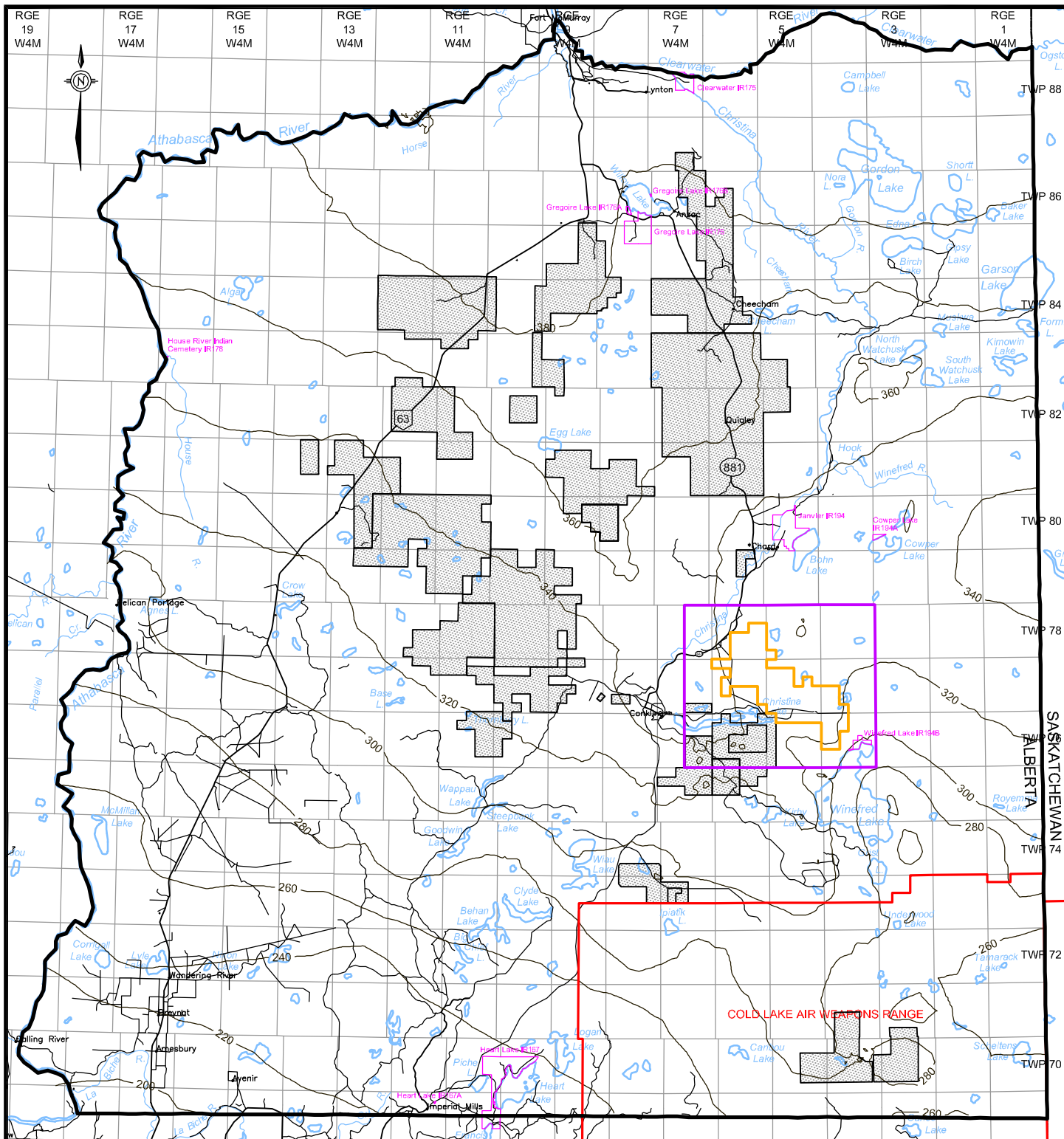
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

PROJECT  
**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

TITLE  
**LOWER GRAND RAPIDS AQUIFER ISOPACH AND ASSIGNED BOUNDARY CONDITIONS**

	PROJECT 04-1334-001.6100		FILE No. 3459-SP_PH3_3-07	
	DESIGN	MAL	14/12/07	SCALE AS SHOWN
	CADD	ADF	18/12/07	REV. 0
	CHECK	GM	31/01/08	<b>FIGURE B-21</b>
REVIEW	RP	31/01/08		



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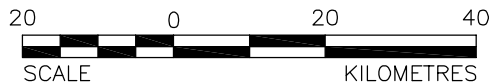
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (masl)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**  
 CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

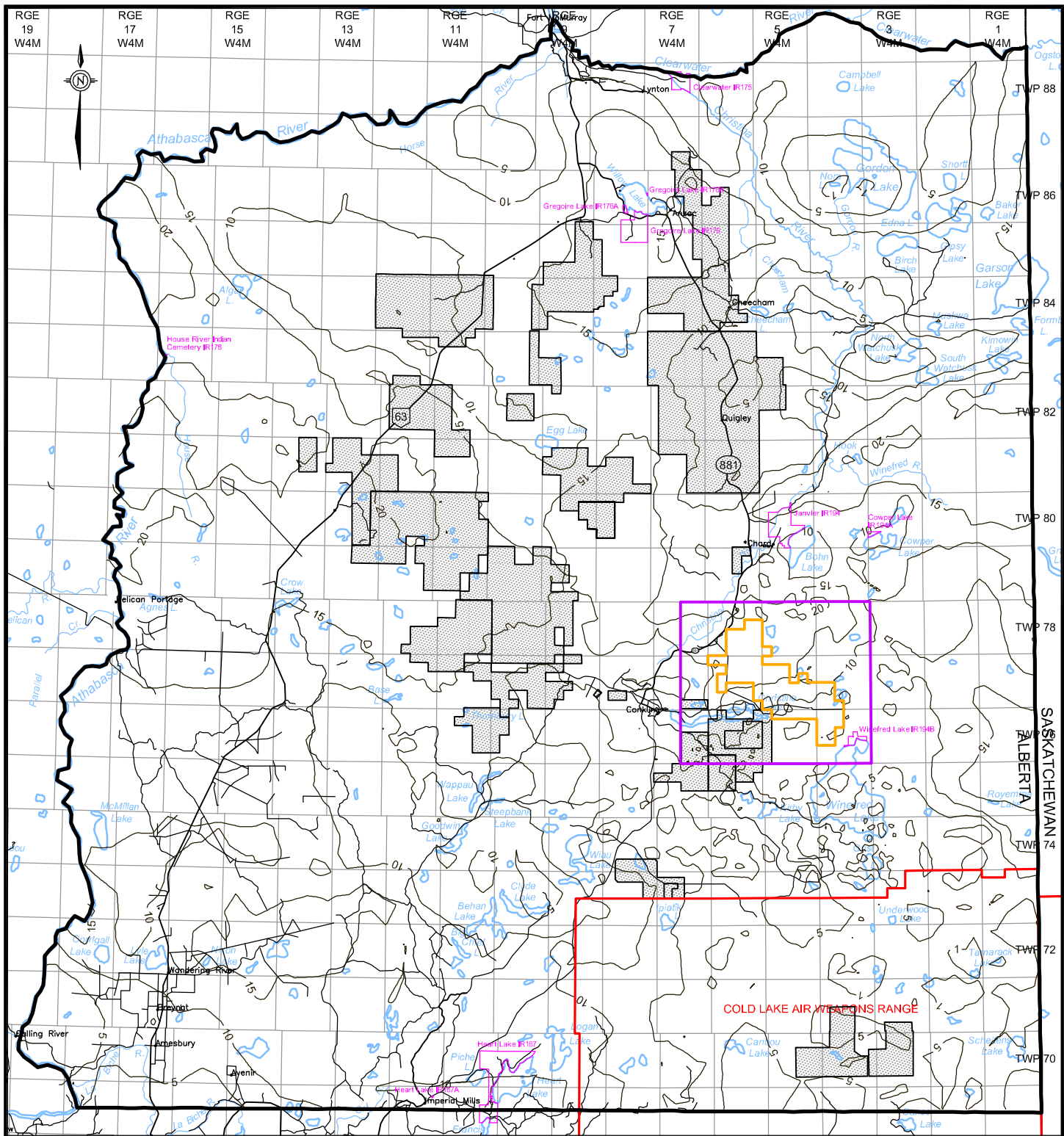
**TITLE**  
 CLEARWATER SHALE AQUITARD (TOP OF CLEARWATER FORMATION) STRUCTURE



MEG ENERGY CORP.

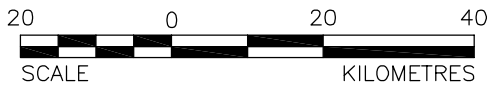
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	<b>FIGURE B-22</b>
REVIEW RP 31/01/08	





**LEGEND**

- ROAD
  - RIVER
  - OPEN WATER
  - INDIAN RESERVE
  - MEG LEASE BOUNDARY
  - ADJACENT IN-SITU OIL SANDS PROJECT
  - REGIONAL STUDY AREA (RSA)
  - LOCAL STUDY AREA (LSA)
  - COLD LAKE AIR WEAPONS RANGE
- 10- ISOPACH (m)



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
 DEVON 2006

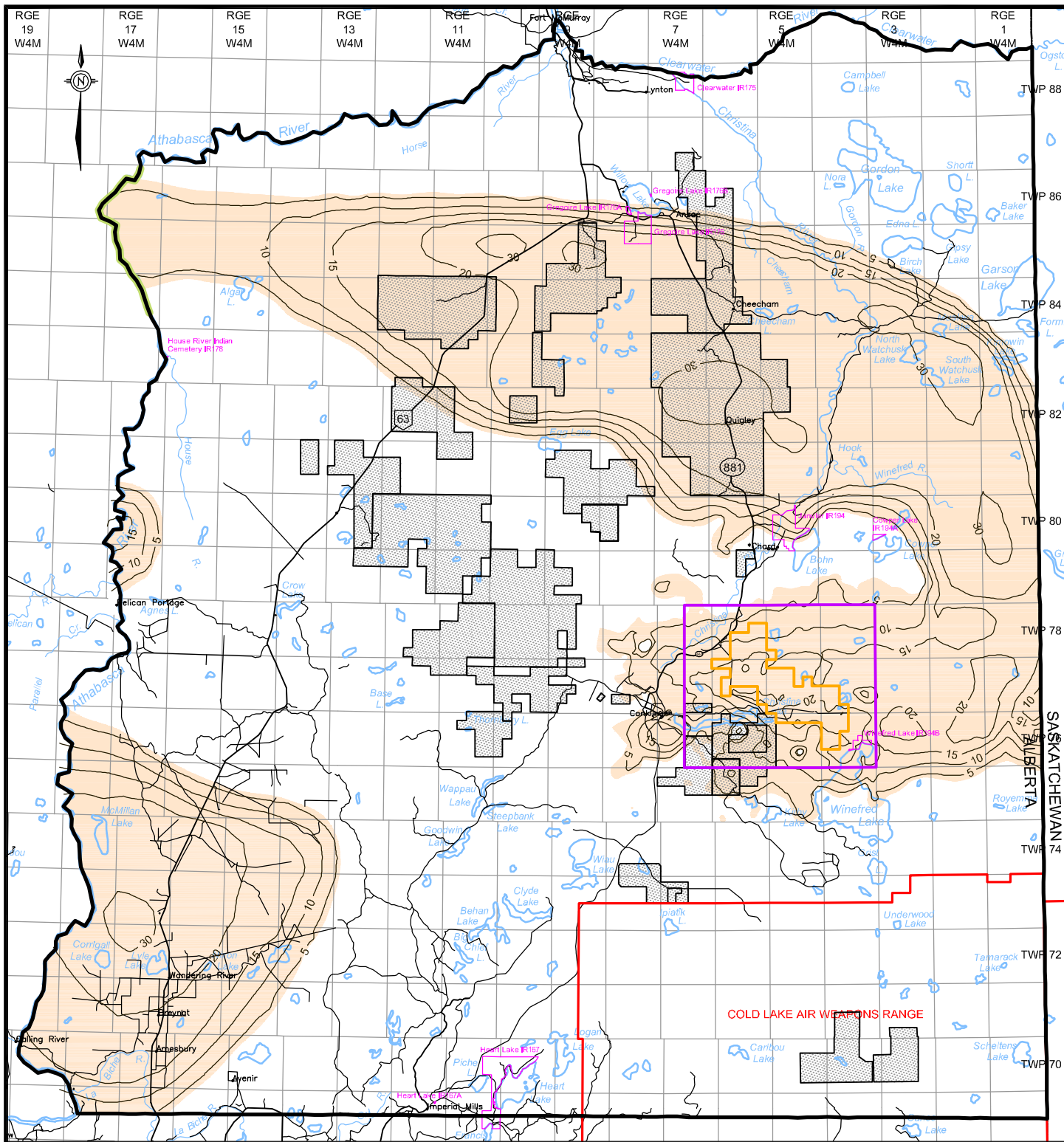
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

<p><b>PROJECT</b></p> <p style="text-align: center;">CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</p> <p><b>TITLE</b></p> <p style="text-align: center;"><b>CLEARWATER SHALE AQUITARD ISOPACH</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">PROJECT 04-1334-001.6100</td> <td style="width: 33%;">FILE No. 3459-SP_PH3_3-07</td> </tr> <tr> <td>DESIGN MAL 14/12/07</td> <td>SCALE AS SHOWN REV. 0</td> </tr> <tr> <td>CADD ADF 18/12/07</td> <td></td> </tr> <tr> <td>CHECK GM 31/01/08</td> <td></td> </tr> <tr> <td>REVIEW RP 31/01/08</td> <td></td> </tr> </table> <p style="text-align: center; font-weight: bold; font-size: 1.2em;">FIGURE B-23</p>	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0	CADD ADF 18/12/07		CHECK GM 31/01/08		REVIEW RP 31/01/08	
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07										
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0										
CADD ADF 18/12/07											
CHECK GM 31/01/08											
REVIEW RP 31/01/08											
<span style="font-weight: bold; font-size: 1.2em;">MEG ENERGY CORP.</span>											

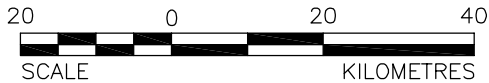
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**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▨ REGIONAL STUDY AREA (RSA)
- ▨ LOCAL STUDY AREA (LSA)
- ▨ COLD LAKE AIR WEAPONS RANGE
- 20- CONTOUR (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION



**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

**PROJECT**

**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

**TITLE**

**UPPER CLEARWATER AQUIFER ISOPACH AND ASSIGNED BOUNDARY CONDITIONS**

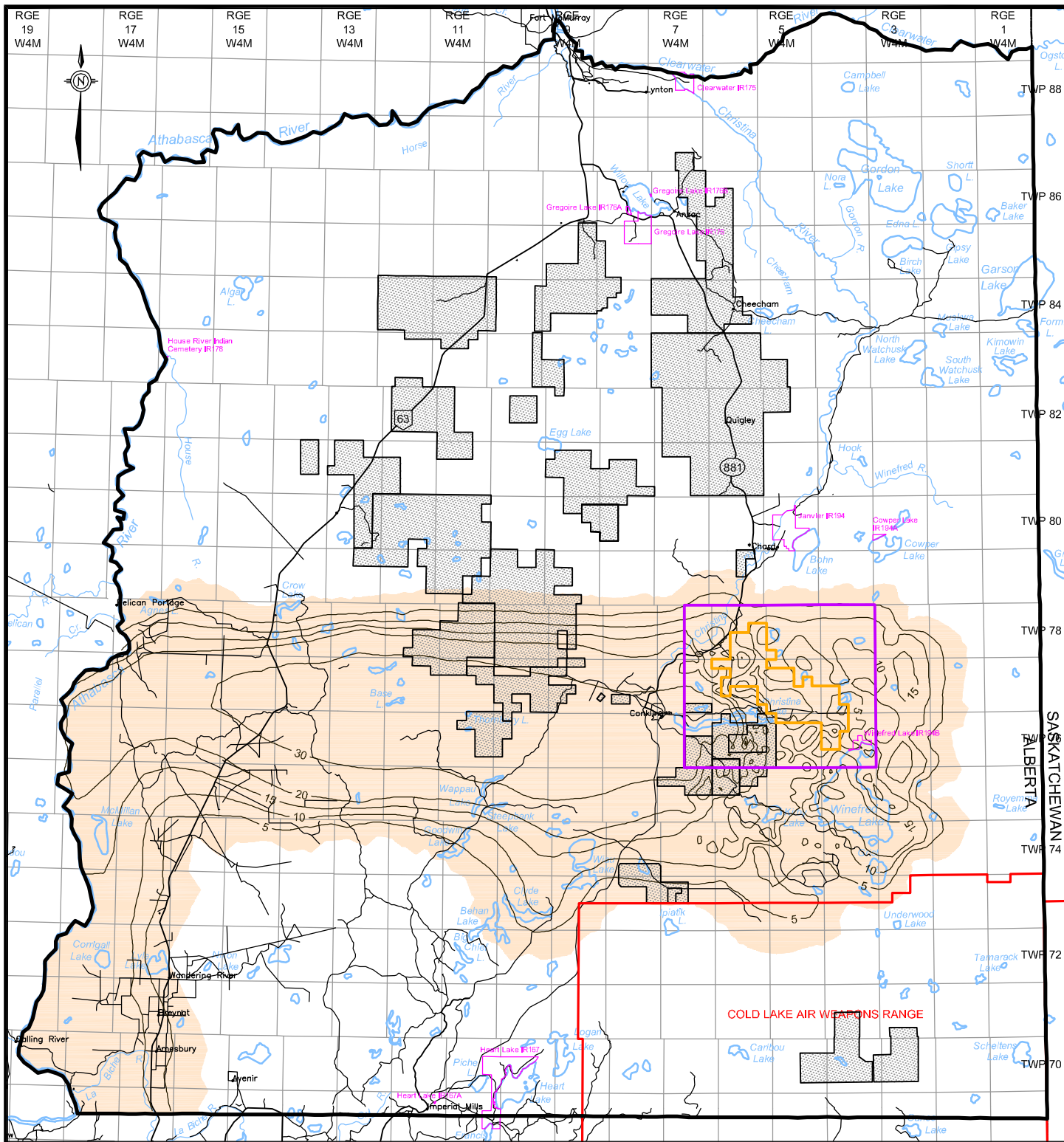


MEG ENERGY CORP.

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	
REVIEW RP 31/01/08	

**FIGURE B-24**





**LEGEND**

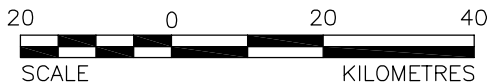
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 20— CONTOUR (m)


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

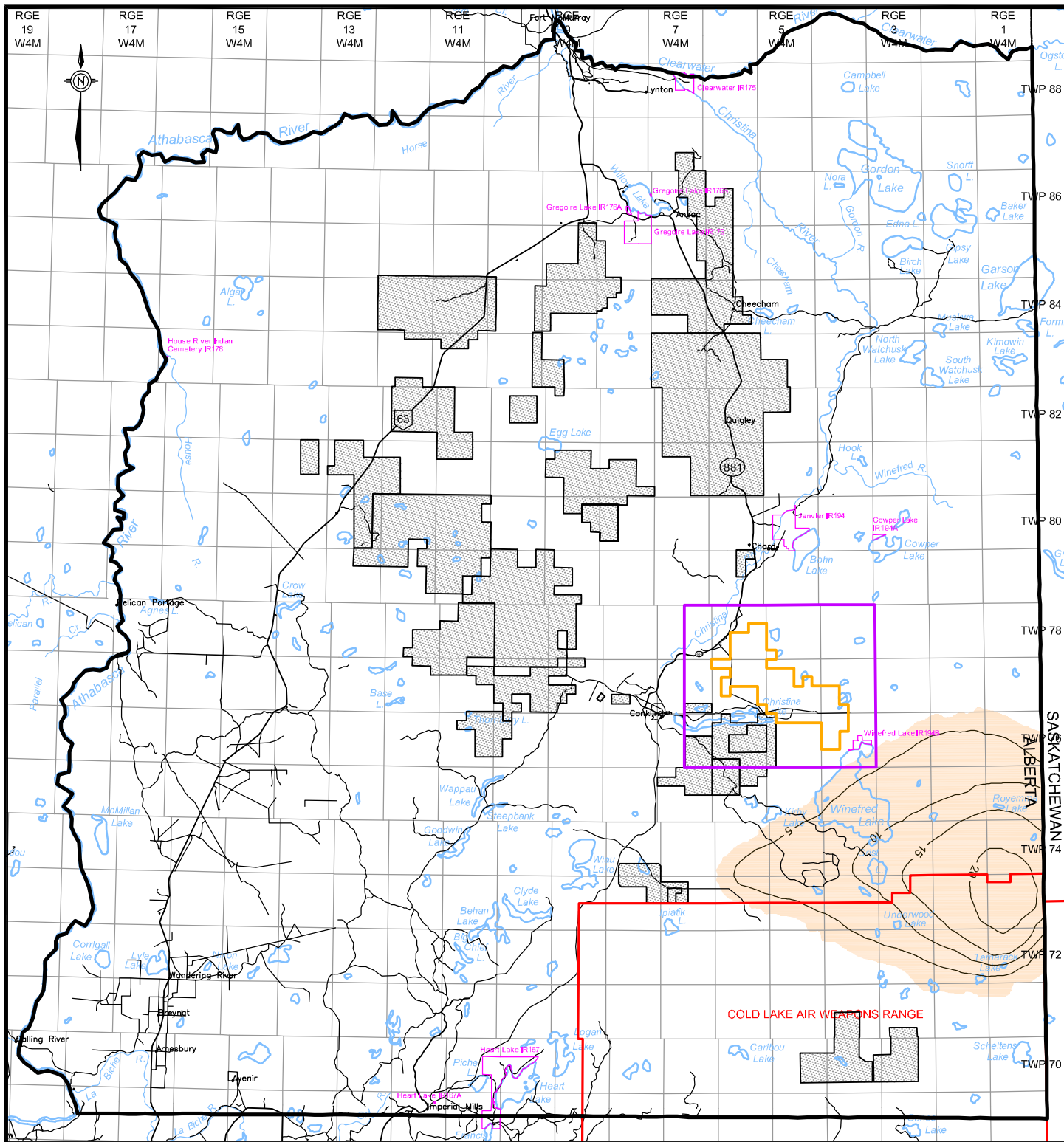
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
MIDDLE CLEARWATER AQUIFER ISOPACH			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			<b>FIGURE B-25</b>



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**LEGEND**

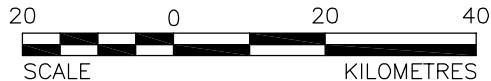
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▨ REGIONAL STUDY AREA (RSA)
- ▨ LOCAL STUDY AREA (LSA)
- ▨ COLD LAKE AIR WEAPONS RANGE
- 20— CONTOUR (m)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**  
 CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

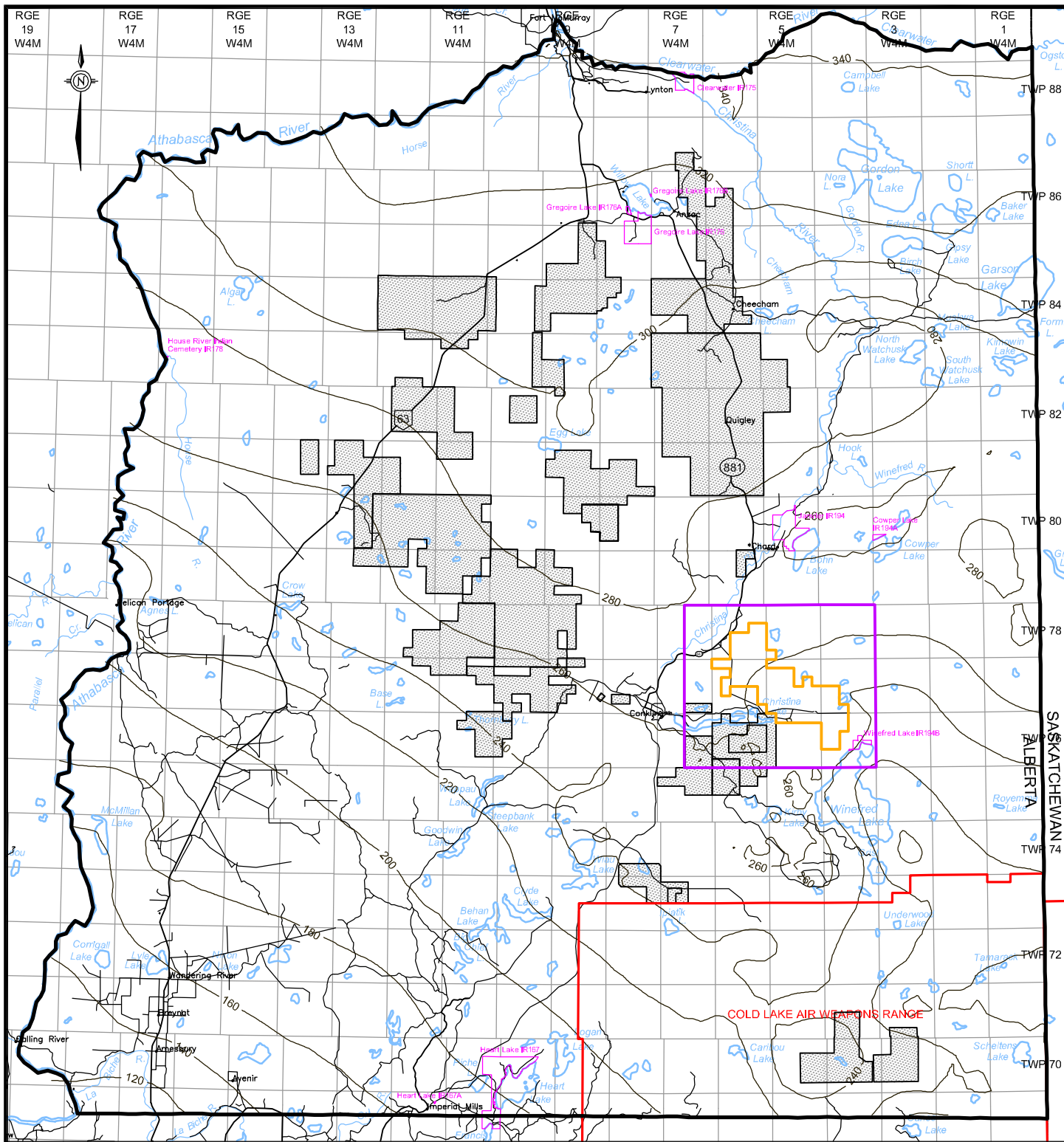
**TITLE**  
 LOWER CLEARWATER AQUIFER ISOPACH



MEG ENERGY CORP.

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	<b>FIGURE B-26</b>
REVIEW RP 31/01/08	

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**LEGEND**

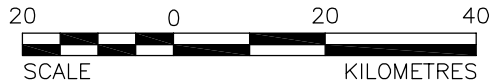
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (m)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**  
 CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

**TITLE**  
 WABISKAW SHALE AQUITARD  
 (TOP OF WABISKAW MEMBER)  
 STRUCTURE



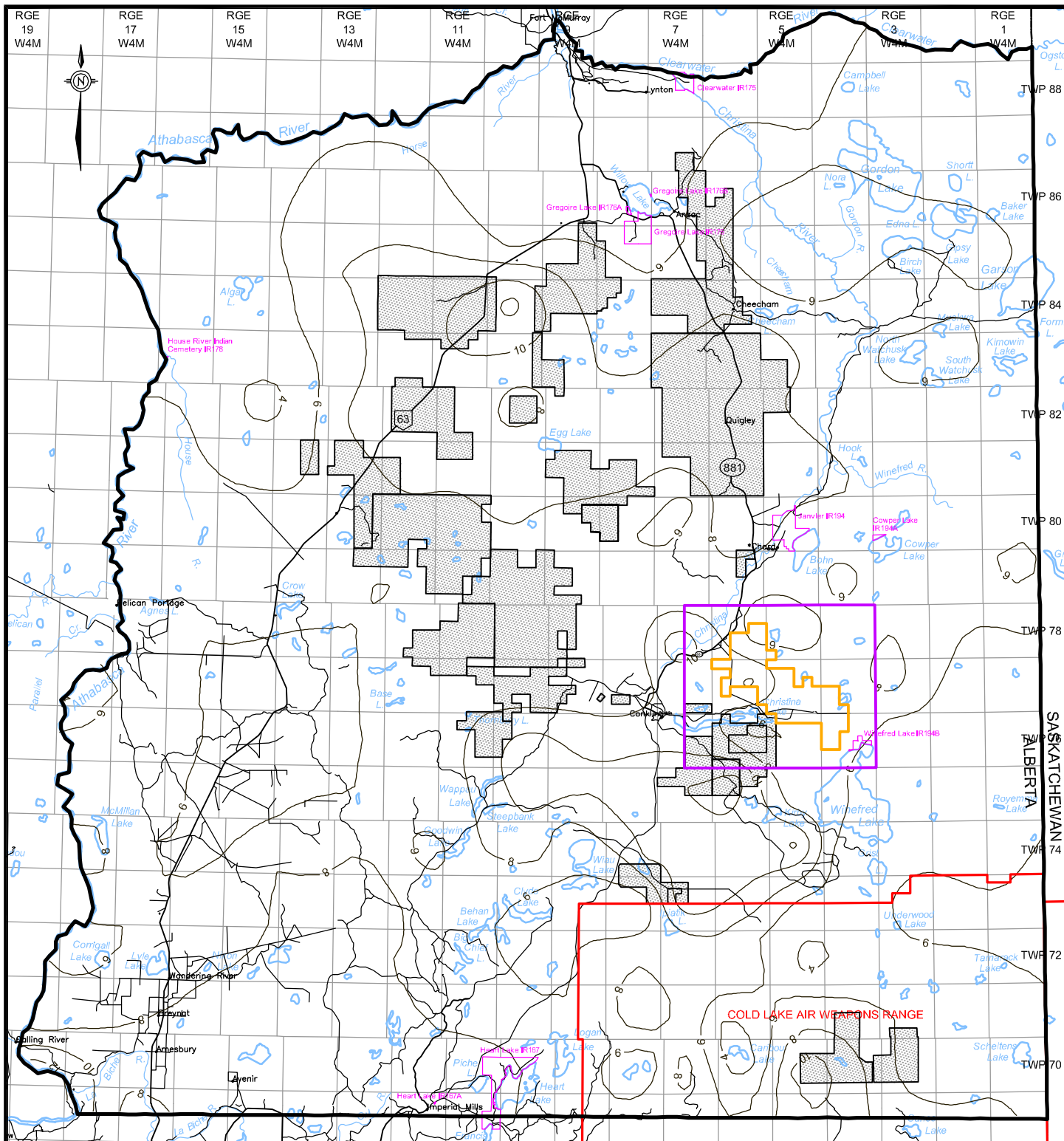
MEG ENERGY CORP.

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	
REVIEW RP 31/01/08	

**FIGURE B-27**



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**LEGEND**

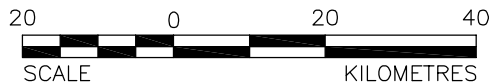
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 10- CONTOUR (m)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**  
 CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

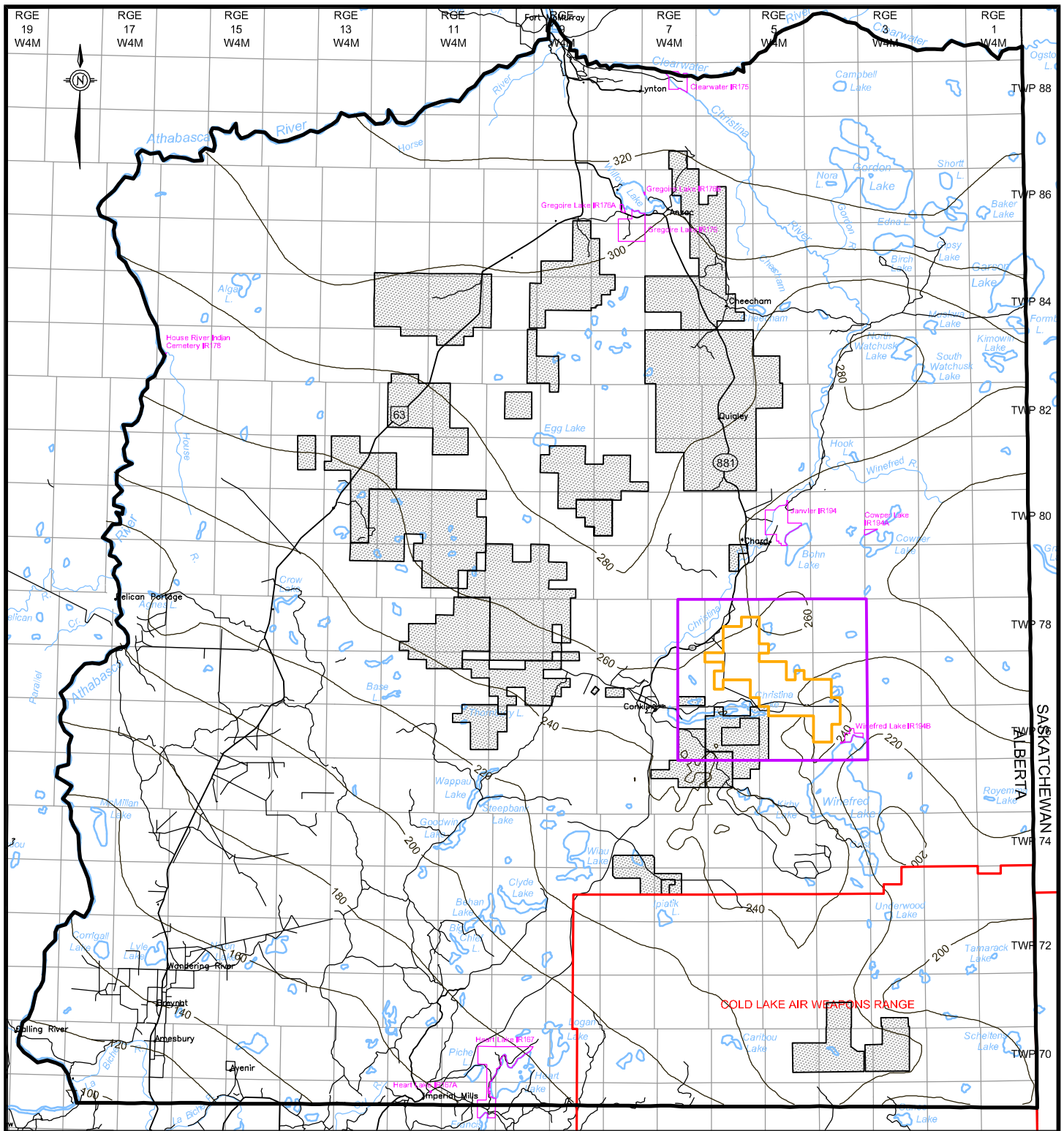
**TITLE**  
 WABISKAW SHALE AQUITARD ISOPACH



MEG ENERGY CORP.

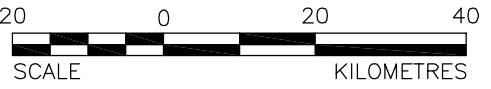
PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	<b>FIGURE B-28</b>
REVIEW RP 31/01/08	

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**LEGEND**

- ROAD
  - RIVER
  - OPEN WATER
  - INDIAN RESERVE
  - MEG LEASE BOUNDARY
  - ▨ ADJACENT IN-SITU OIL SANDS PROJECT
  - ▨ REGIONAL STUDY AREA (RSA)
  - ▨ LOCAL STUDY AREA (LSA)
  - ▨ COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (m)




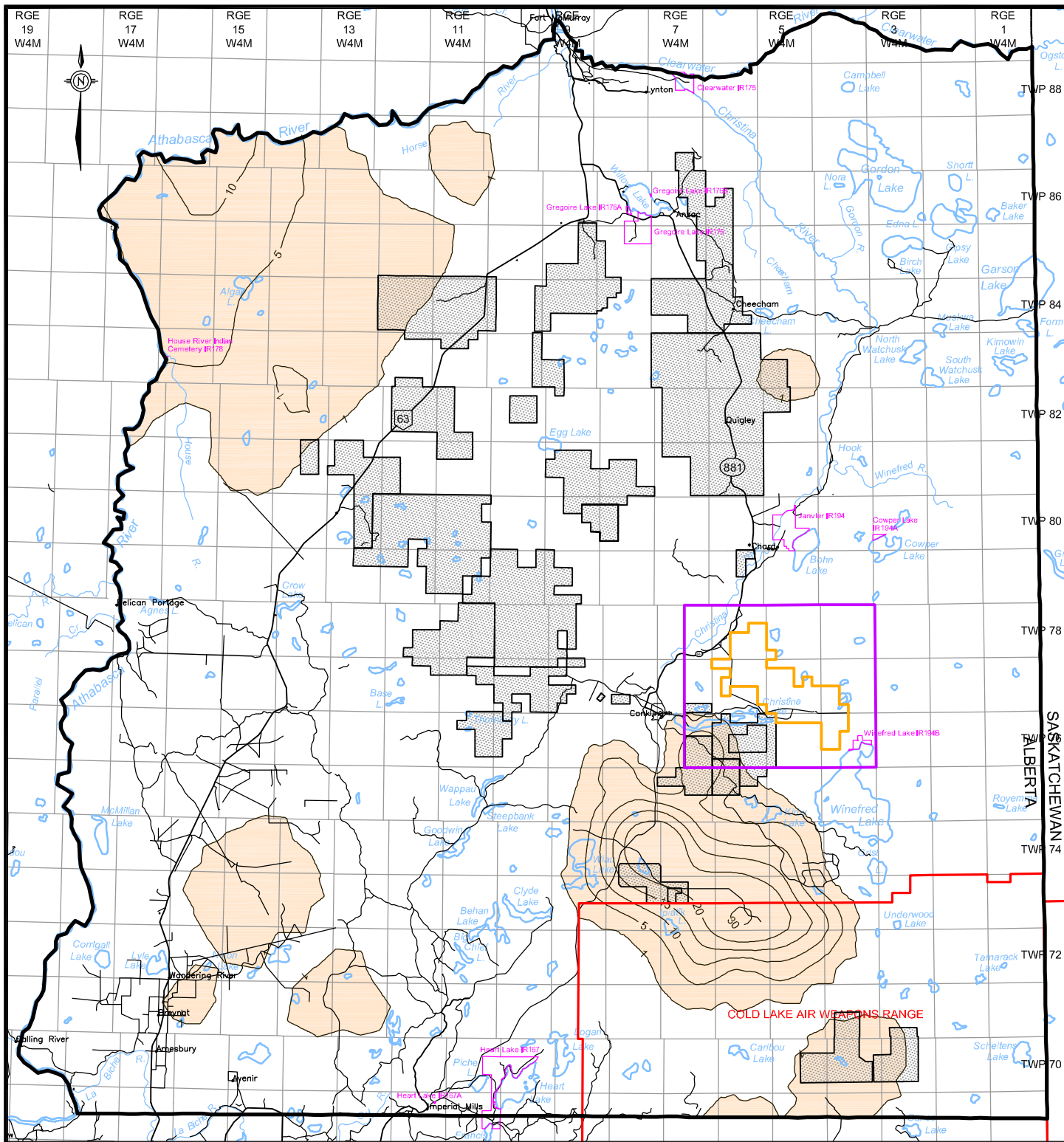
**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

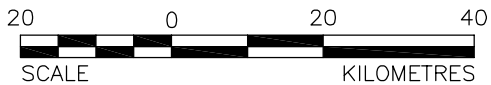
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
UNDIFFERENTIATED WABISKAW AQUIFER/AQUITARD STRUCTURE			
 <b>MEG ENERGY CORP.</b>		PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
		DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
		CADD ADF 18/12/07	
		CHECK GM 31/01/08	
REVIEW RP 31/01/08	<b>FIGURE B-29</b>		



**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 10— CONTOUR (m)




**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

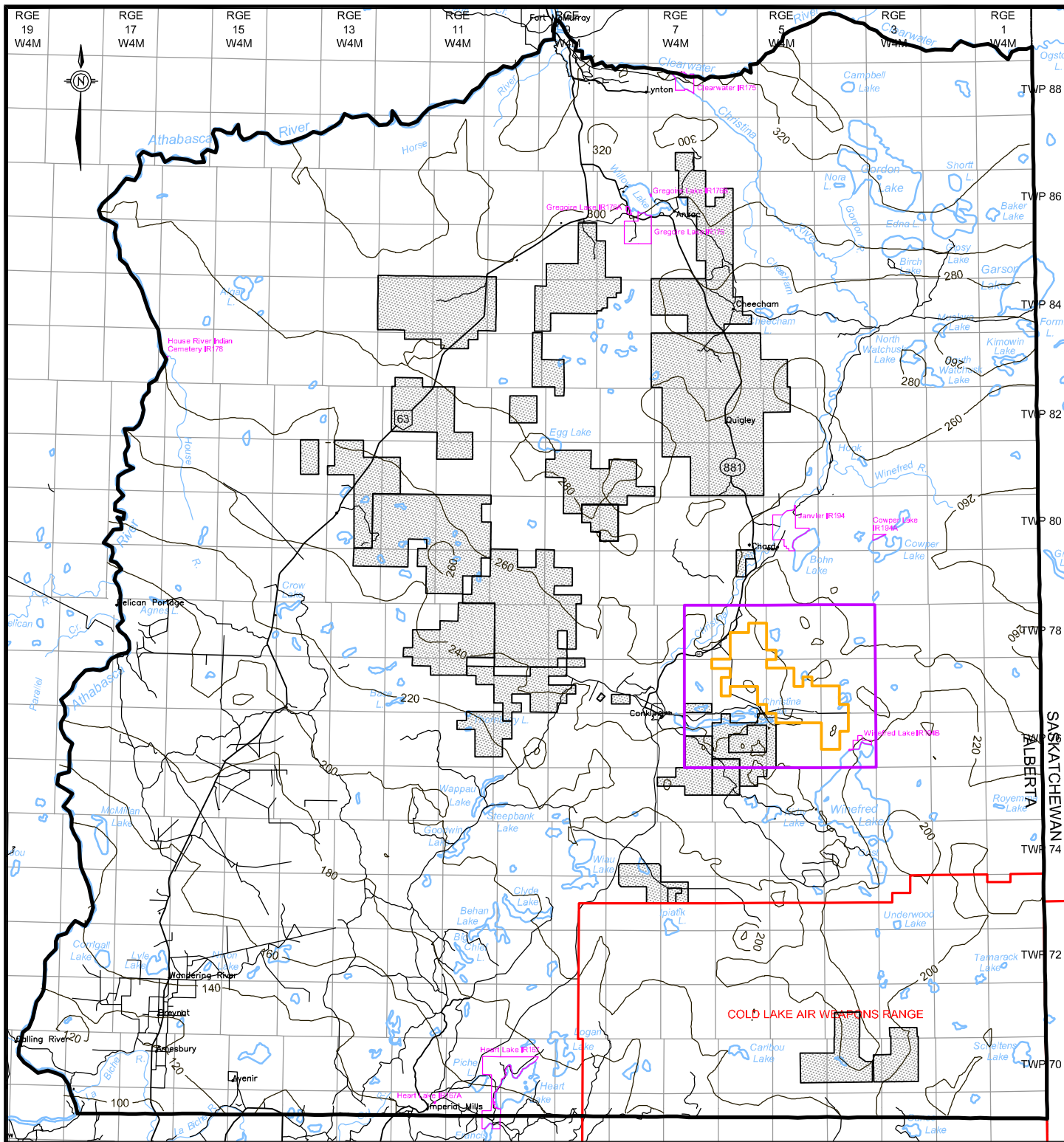
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

<b>PROJECT</b>			
<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>			
<b>TITLE</b>			
<b>WABISKAW BITUMEN AQUITARD ISOPACH</b>			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			
			<b>FIGURE B-30</b>

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**LEGEND**

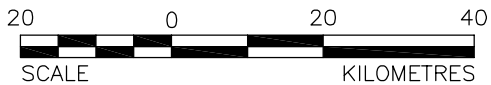
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (masl)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

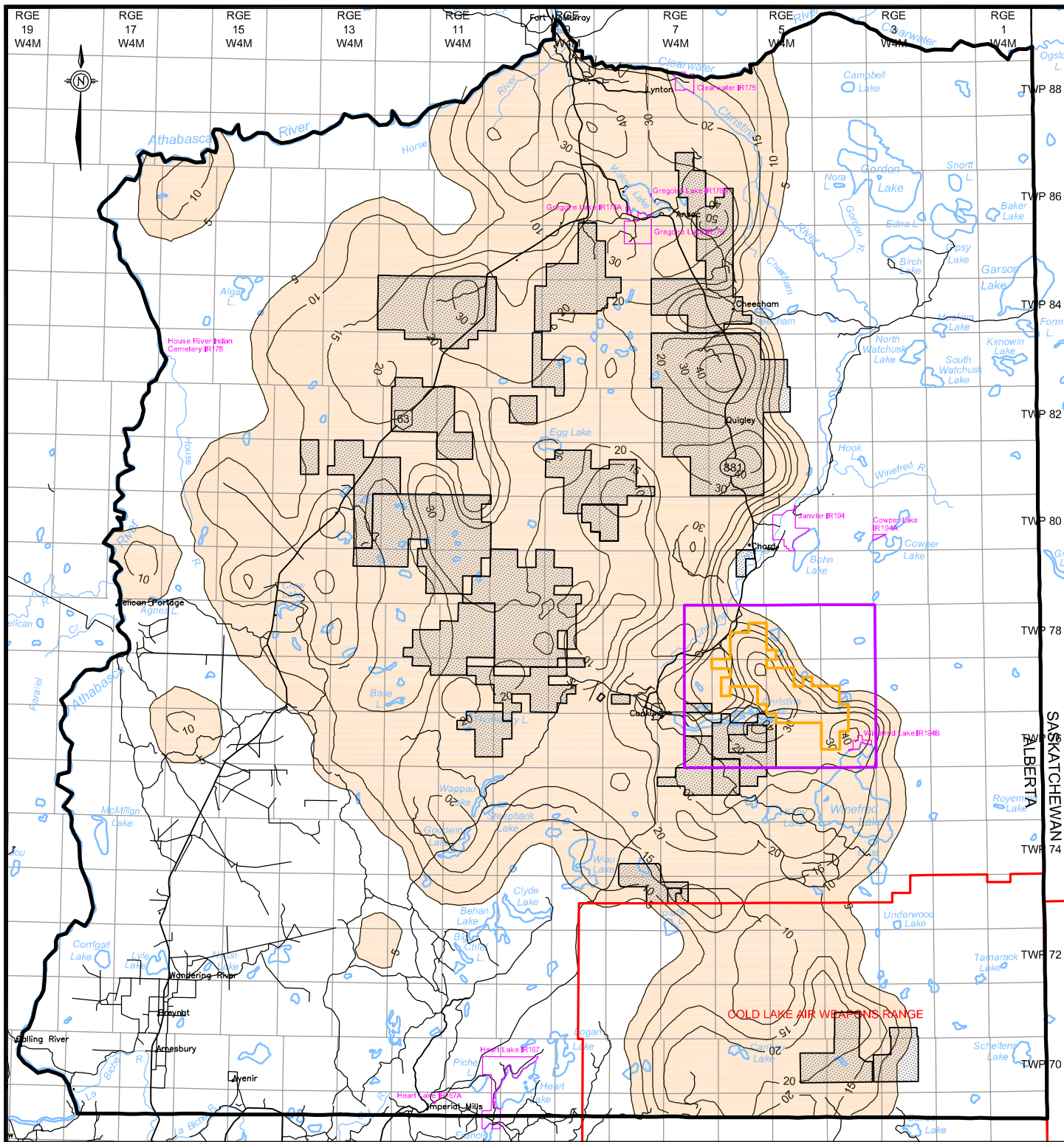
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b> CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b> UNDIFFERENTIATED MCMURRAY AQUIFER/AQUITARD (TOP OF MCMURRAY FORMATION) STRUCTURE			
	PROJECT 04-1334-001.6100		FILE No. 3459-SP_PH3_3-07
	DESIGN	MAL	14/12/07
	CADD	ADF	18/12/07
	CHECK	GM	31/01/08
REVIEW	RP	31/01/08	SCALE AS SHOWN
			<b>REV. 0</b>
			<b>FIGURE B-31</b>



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**LEGEND**

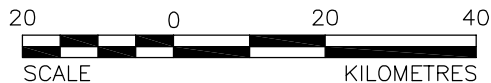
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 20— CONTOUR (m)

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

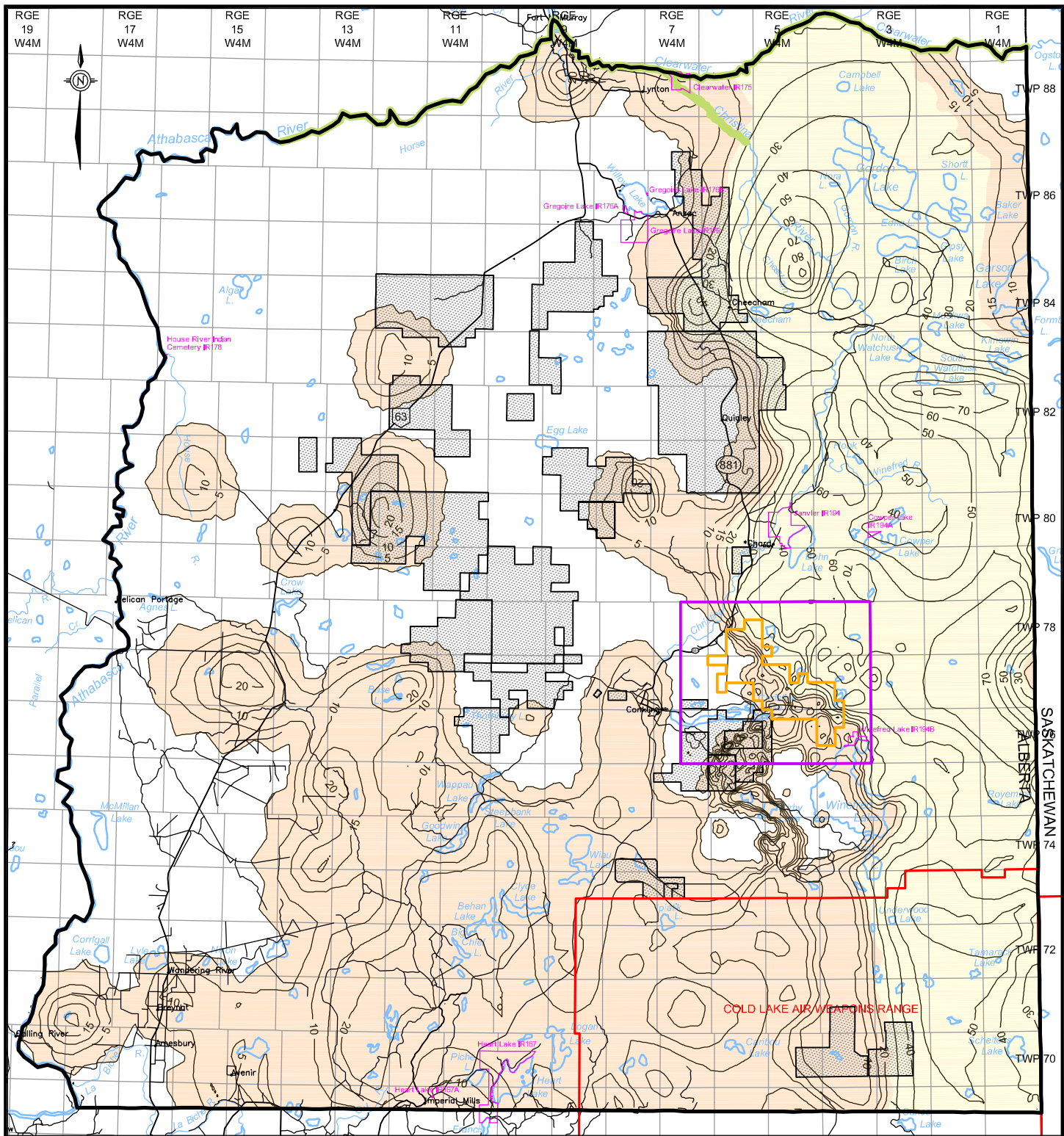
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>	<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>		
<b>TITLE</b>	<b>MCMURRAY BITUMEN AQUITARD ISOPACH</b>		
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			FIGURE B-32





**LEGEND**

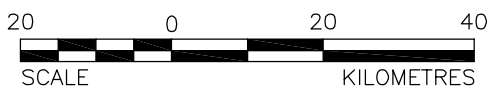
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 10- CONTOUR (m)
- CONSTANT HEAD NODE ASSIGNED RIVER ELEVATION
- ASSIGNED HYDRAULIC CONDUCTIVITY OF  $2.3 \times 10^{-5}$  m/s
- ASSIGNED HYDRAULIC CONDUCTIVITY OF  $5.4 \times 10^{-5}$  m/s

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

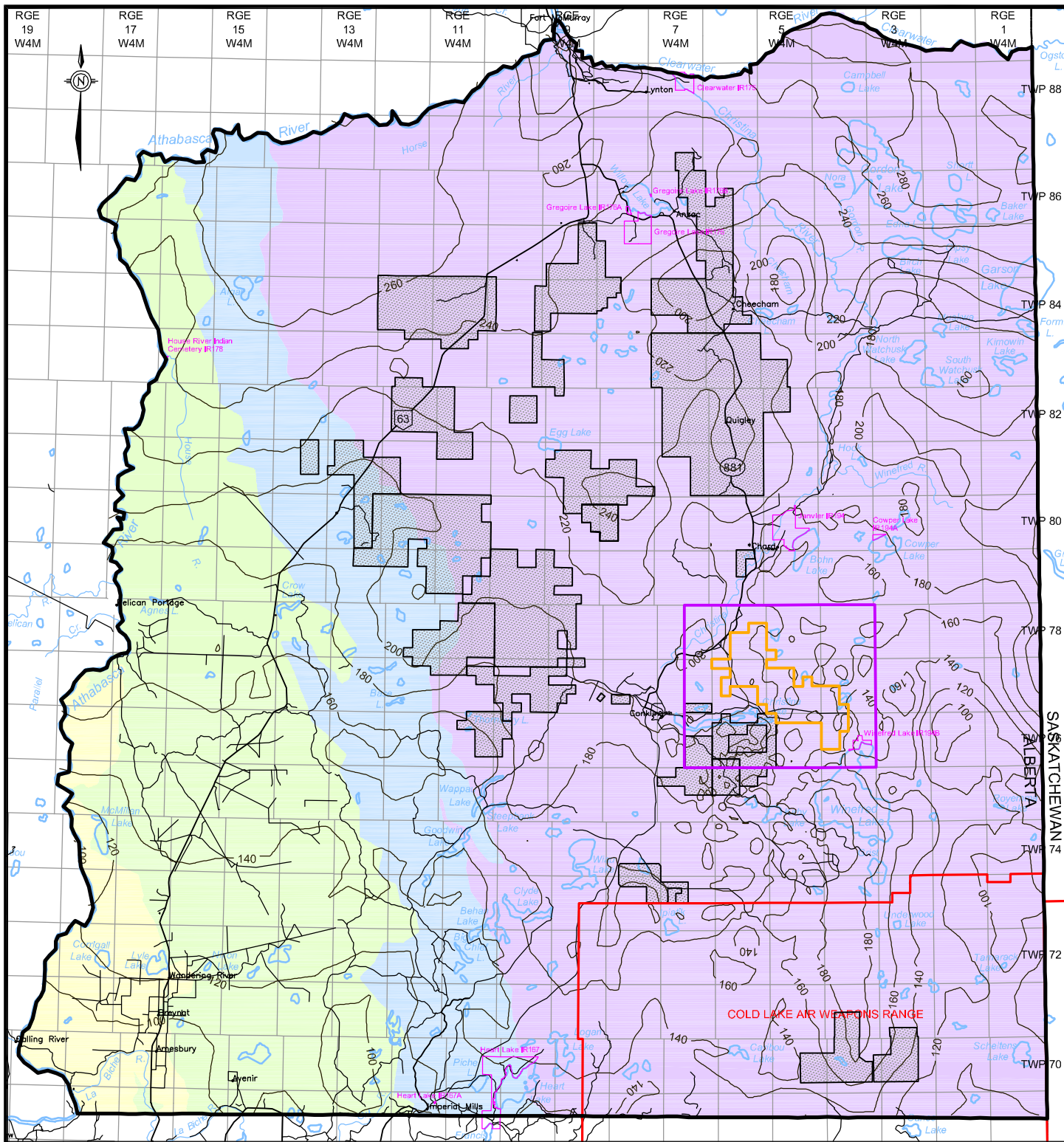


**PROJECT**  
 CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

**TITLE**  
 MCMURRAY AQUIFER ISOPACH

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	<b>FIGURE B-33</b>
REVIEW RP 31/01/08	

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**LEGEND**

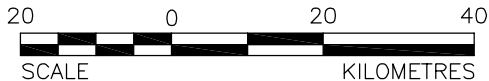
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (masl)
- WINTERBURN SUBCROPPING FORMATION
- GROSMONT SUBCROPPING FORMATION
- IERTON SUBCROPPING FORMATION
- BEAVERHILL LAKE / COOKING LAKE SUBCROPPING FORMATION

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.

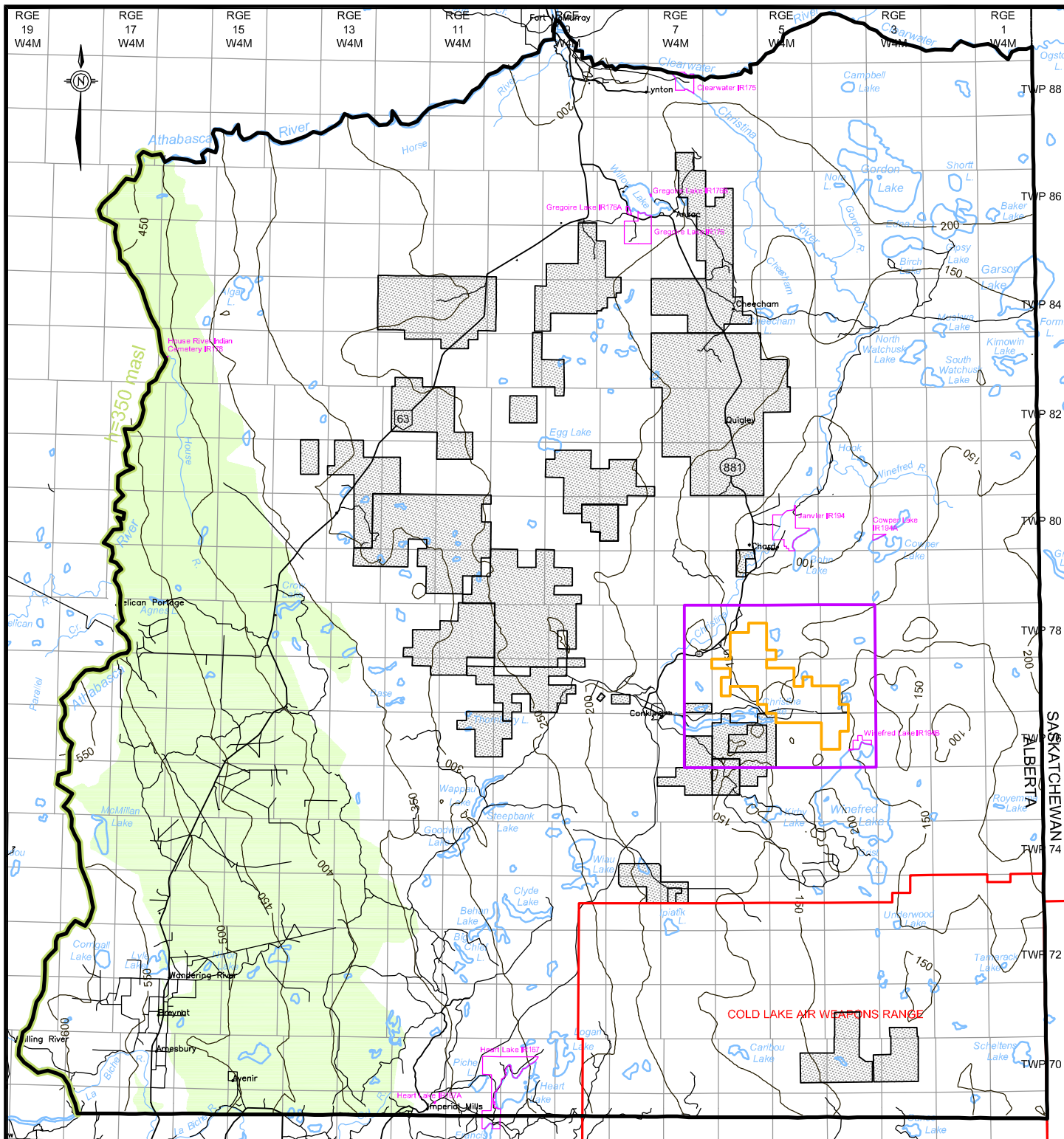
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12



<b>PROJECT</b>			
<b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>			
<b>TITLE</b>			
<b>TOP OF DEVONIAN (SUB-CRETACEOUS UNCONFORMITY) STRUCTURE AND SUBCROPPING FORMATIONS</b>			
	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			
			<b>FIGURE B-34</b>



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**LEGEND**

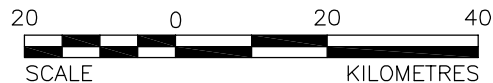
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (masl)
- CONSTANT HEAD NODE
- GROSMONT SUBCROPPING FORMATION AT PRE-CRETACEOUS UNCONFORMITY

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**

**CHRISTINA LAKE REGIONAL PROJECT - PHASE 3**

**TITLE**

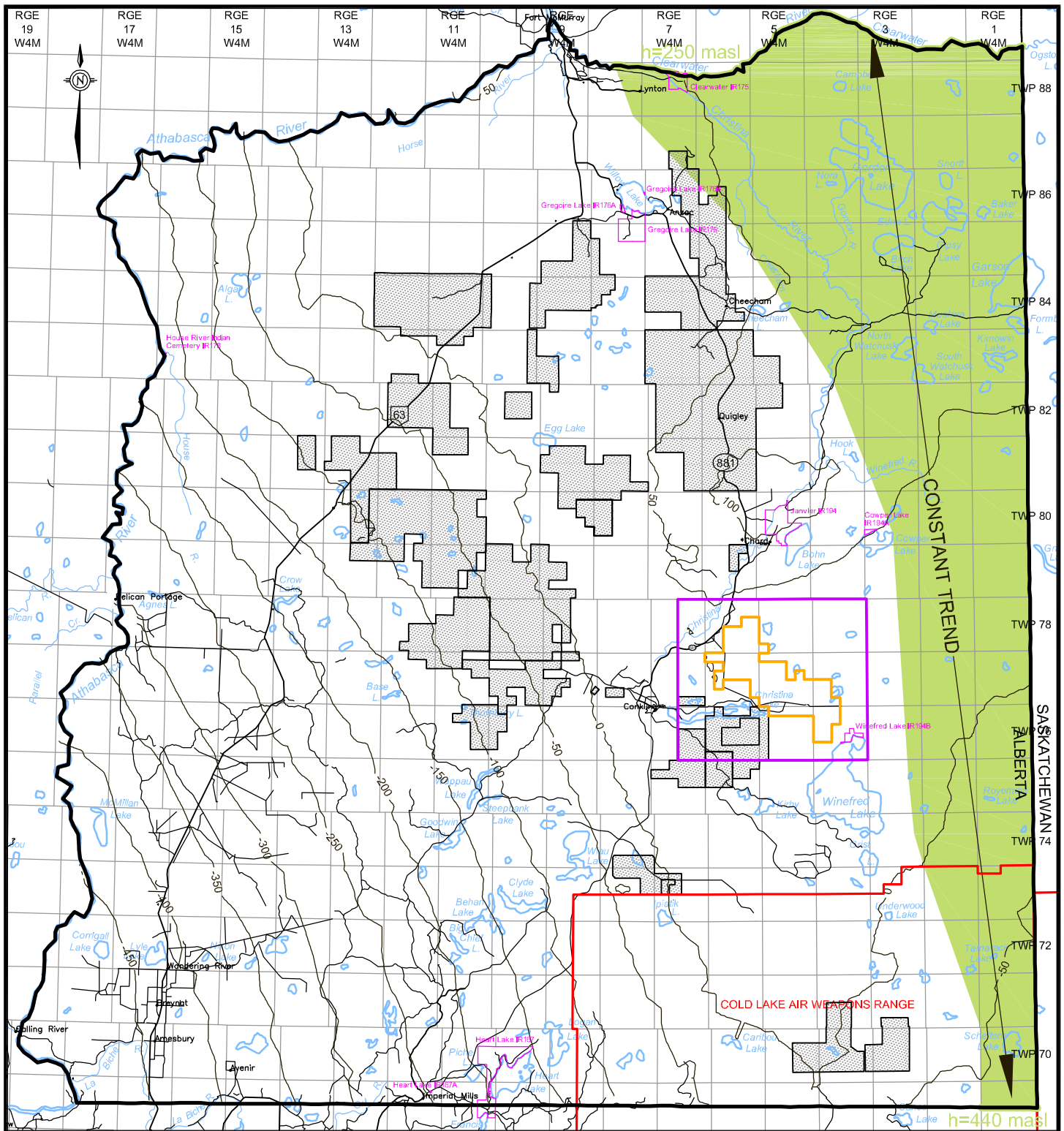
**UNDIFFERENTIATED DEVONIAN ISOPACH AND ASSIGNED BOUNDARY CONDITIONS**



MEG ENERGY CORP.

PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	<b>FIGURE B-35</b>
REVIEW RP 31/01/08	

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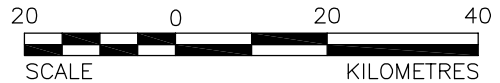
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 200- CONTOUR (masl)
- PRAIRIE AQUICLUDE ABSENT CONSTANT HEAD NODES ASSIGNED


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

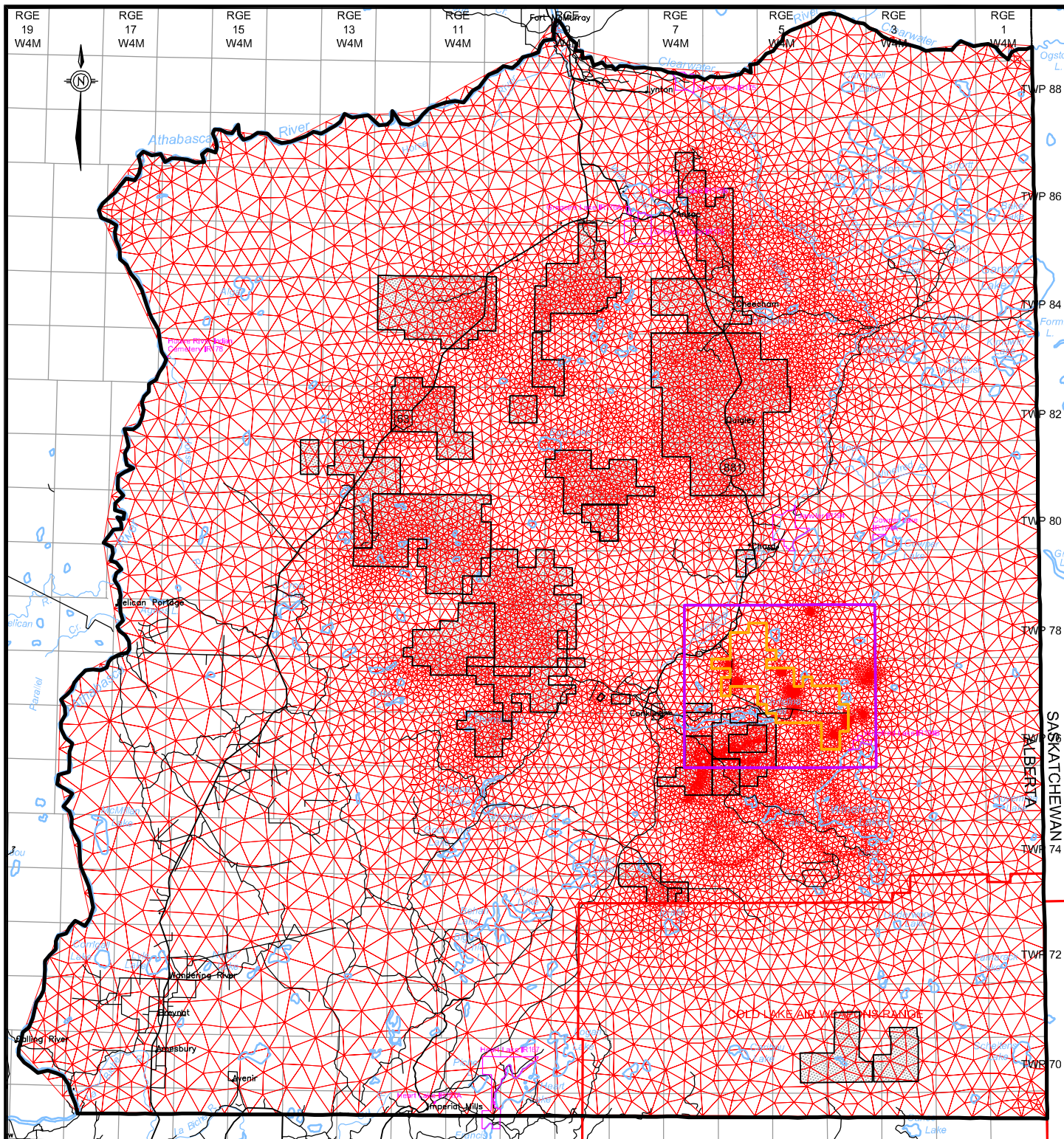
**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
PRAIRIE AQUICLUDE / BASE OF MODEL STRUCTURE AND ASSIGNED BOUNDARY CONDITIONS			
 <b>MEG ENERGY CORP.</b>	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08	<b>FIGURE B-36</b>		



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**LEGEND**

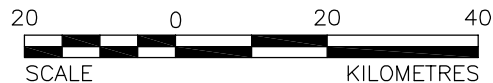
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

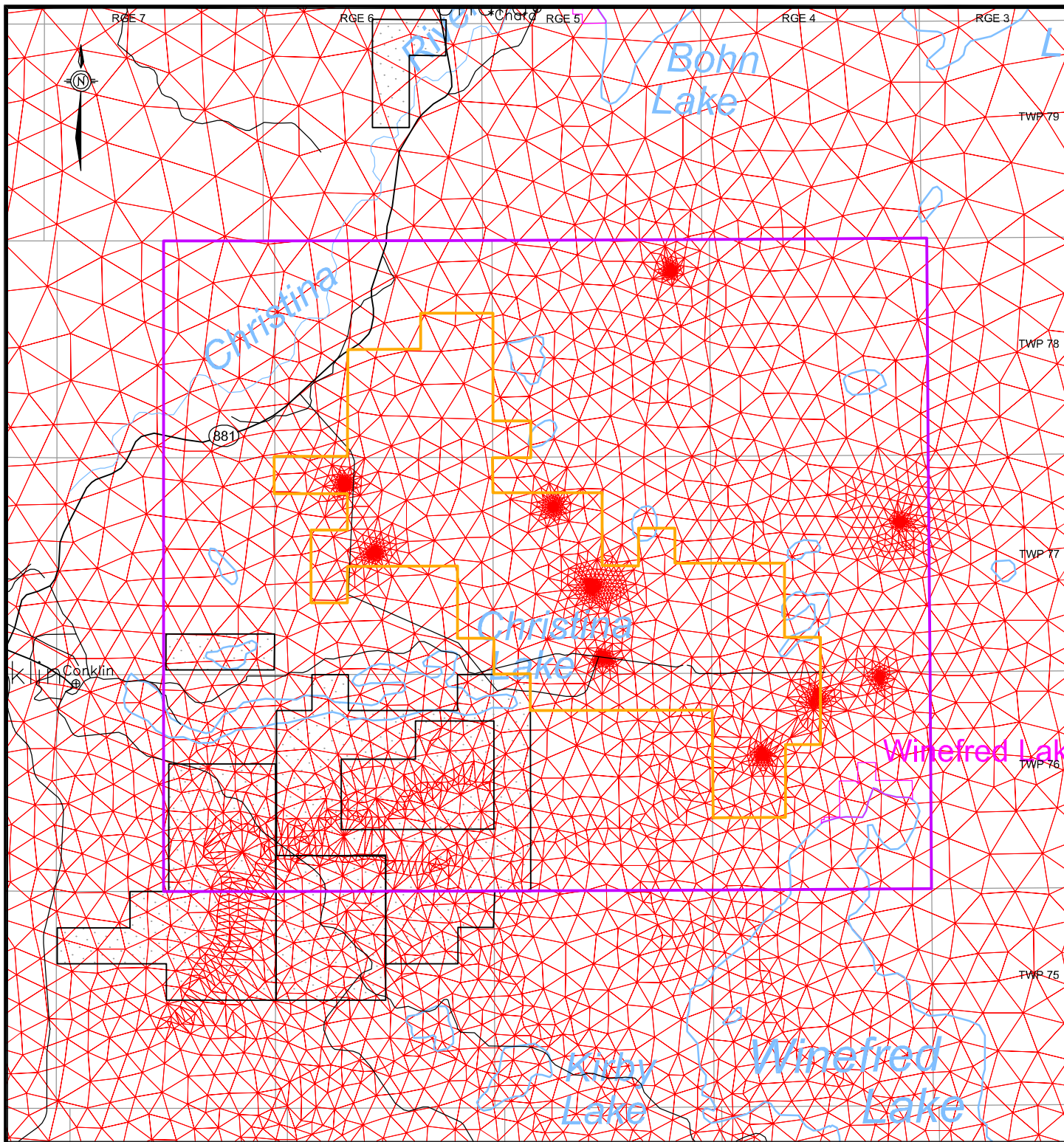
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
FINITE ELEMENT MESH REGIONAL STUDY AREA			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
	REVIEW RP 31/01/08		
			<b>FIGURE B-37</b>

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**LEGEND**

- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE

**REFERENCE:**

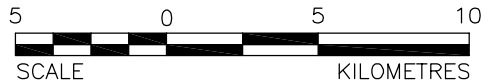
ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**

NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
DEVON 2006

**NOTE:**  
\* ALSO KNOWN AS HAMLET OF JANVIER.



**PROJECT**

CHRISTINA LAKE REGIONAL PROJECT - PHASE 3

**TITLE**

**FINITE ELEMENT MESH  
LOCAL STUDY AREA**

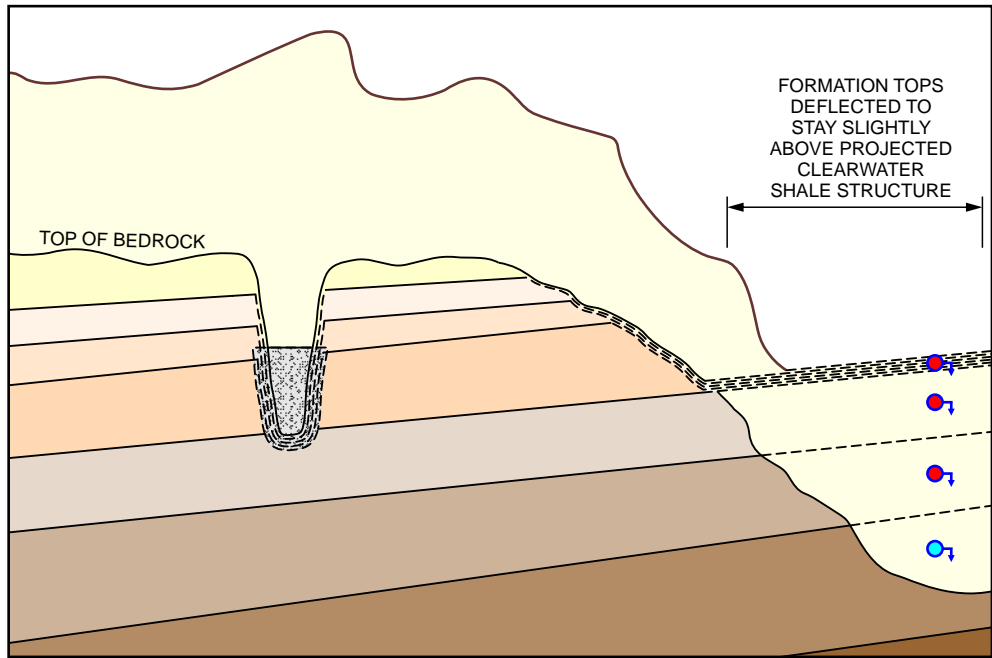
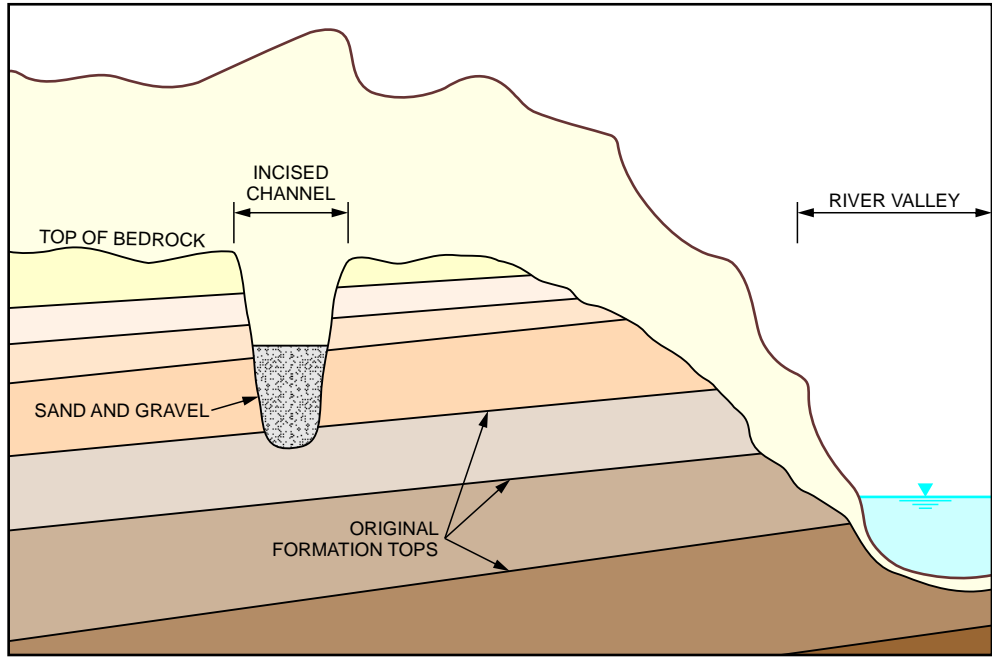


MEG ENERGY CORP.





PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07
DESIGN MAL 14/12/07	SCALE AS SHOWN REV. 0
CADD ADF 18/12/07	
CHECK GM 31/01/08	
REVIEW RP 31/01/08	

**FIGURE B-38**





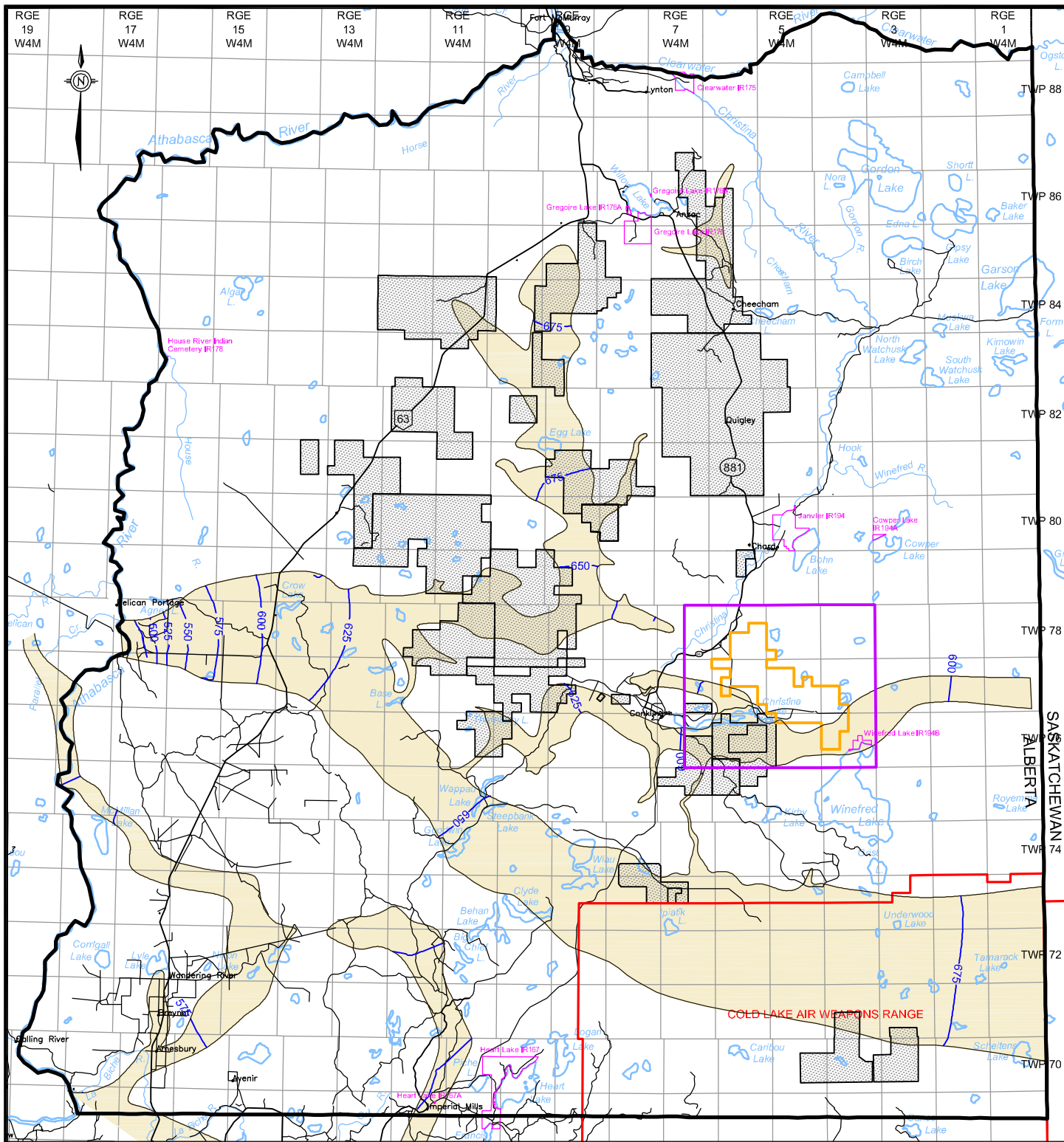
**LEGEND**

-  CONSTANT HEAD APPLIED TO RIVER BOUNDARY WITH CONSTRAINT OF FLUX OUT ONLY
-  OVERBURDEN PROPERTIES ASSIGNED TO DEFLECTED LAYERS
-  SAND AND GRAVEL ASSIGNED TO LAYER
-  CONSTANT HEAD APPLIED TO BOUNDARY

PROJECT				
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3				
TITLE				
<b>SCHEMATIC CROSS-SECTION OF LAYER MANIPULATION AT NORTHERN BOUNDARY AND BELOW BEDROCK CHANNELS</b>				
PROJECT		04-1334-001.6100	FILE No. 3459-SP_02-07.cdr	
DESIGN	MAL	14/12/07	SCALE	AS SHOWN
CADD	ADF	14/12/07	REV.	0
CHECK	GM	31/01/08	<b>FIGURE B-39</b>	
REVIEW	RP	31/01/08		



MEG ENERGY CORP.



**LEGEND**

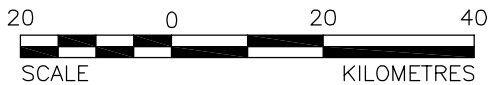
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500- HYDRAULIC HEAD (mast)
- EMPRESS CHANNEL AQUIFER


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

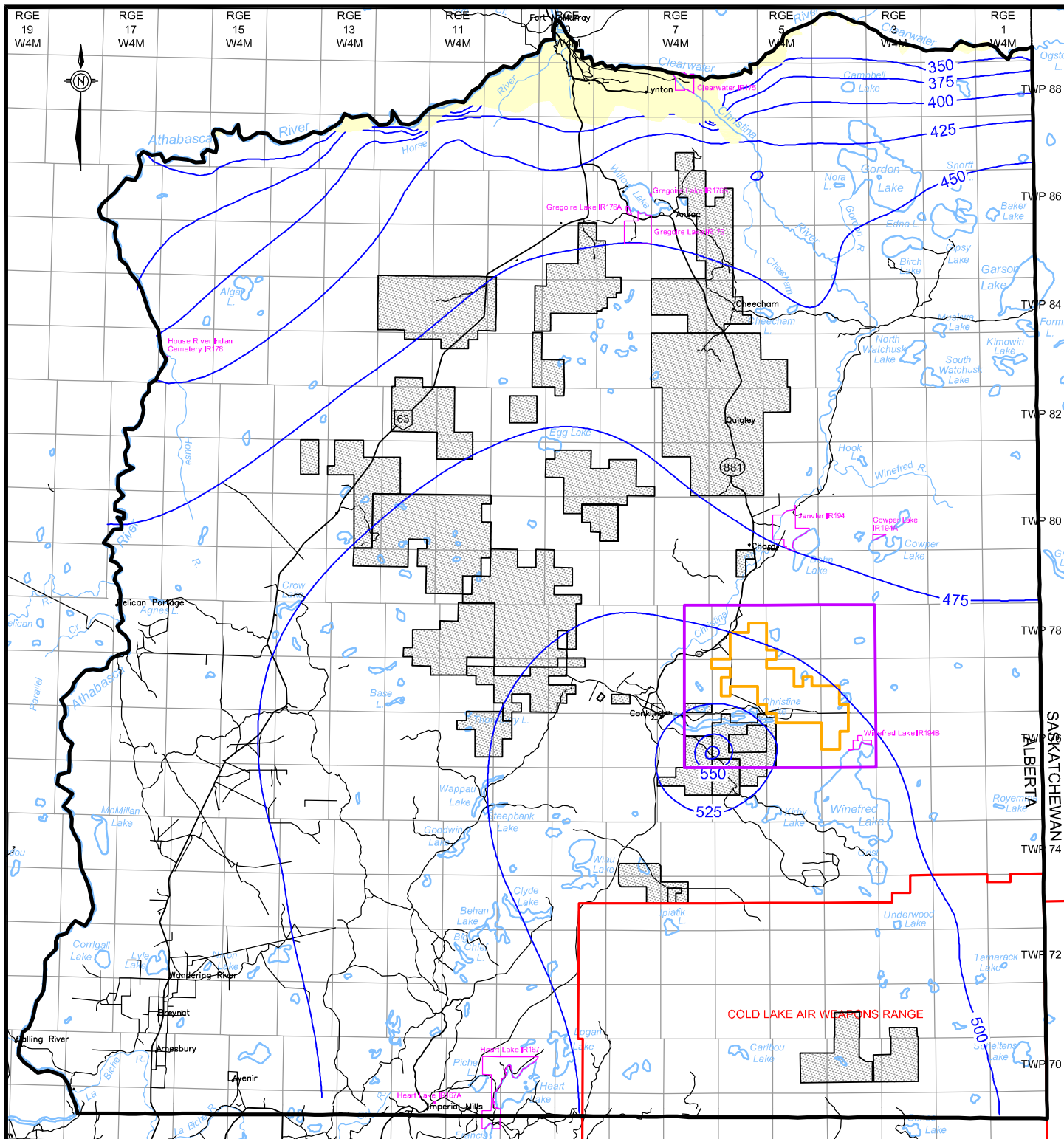
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
EMPRESS CHANNEL AQUIFER SIMULATED HYDRAULIC HEAD MAP (SLICE 3)			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			
			<b>FIGURE B-40</b>

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**LEGEND**

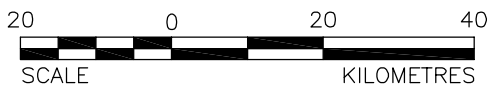
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 500— HYDRAULIC HEAD (mast)
- FORMATION ABSENT


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

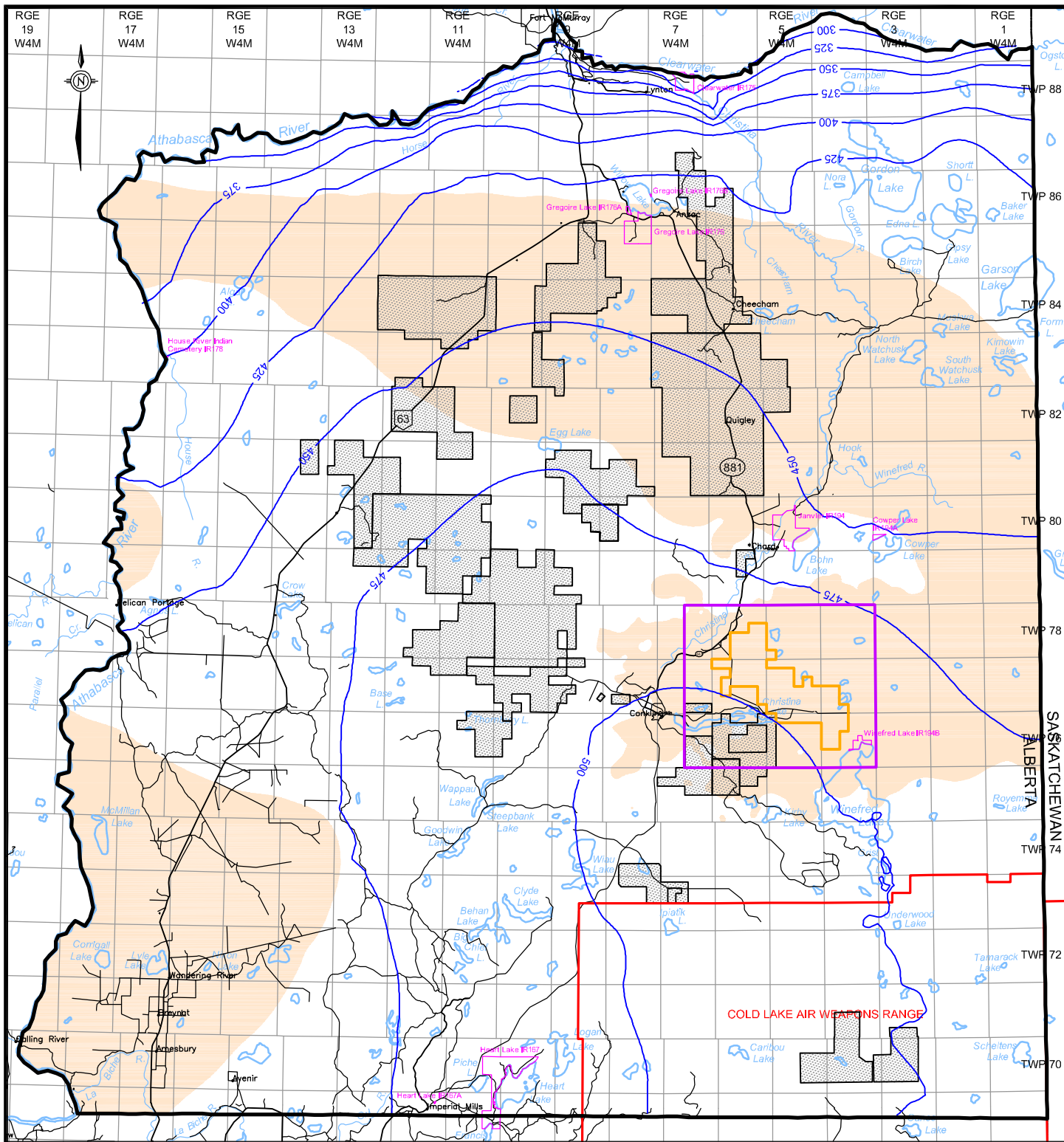
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
LOWER GRAND RAPIDS AQUIFER SIMULATED HYDRAULIC HEAD MAP (SLICE 8)			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			<b>FIGURE B-41</b>





**LEGEND**

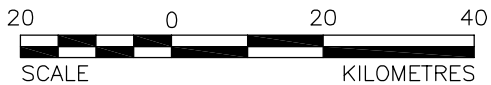
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ▨ ADJACENT IN-SITU OIL SANDS PROJECT
- ▭ REGIONAL STUDY AREA (RSA)
- ▭ LOCAL STUDY AREA (LSA)
- ▭ COLD LAKE AIR WEAPONS RANGE
- 500— HYDRAULIC HEAD (mast)


**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

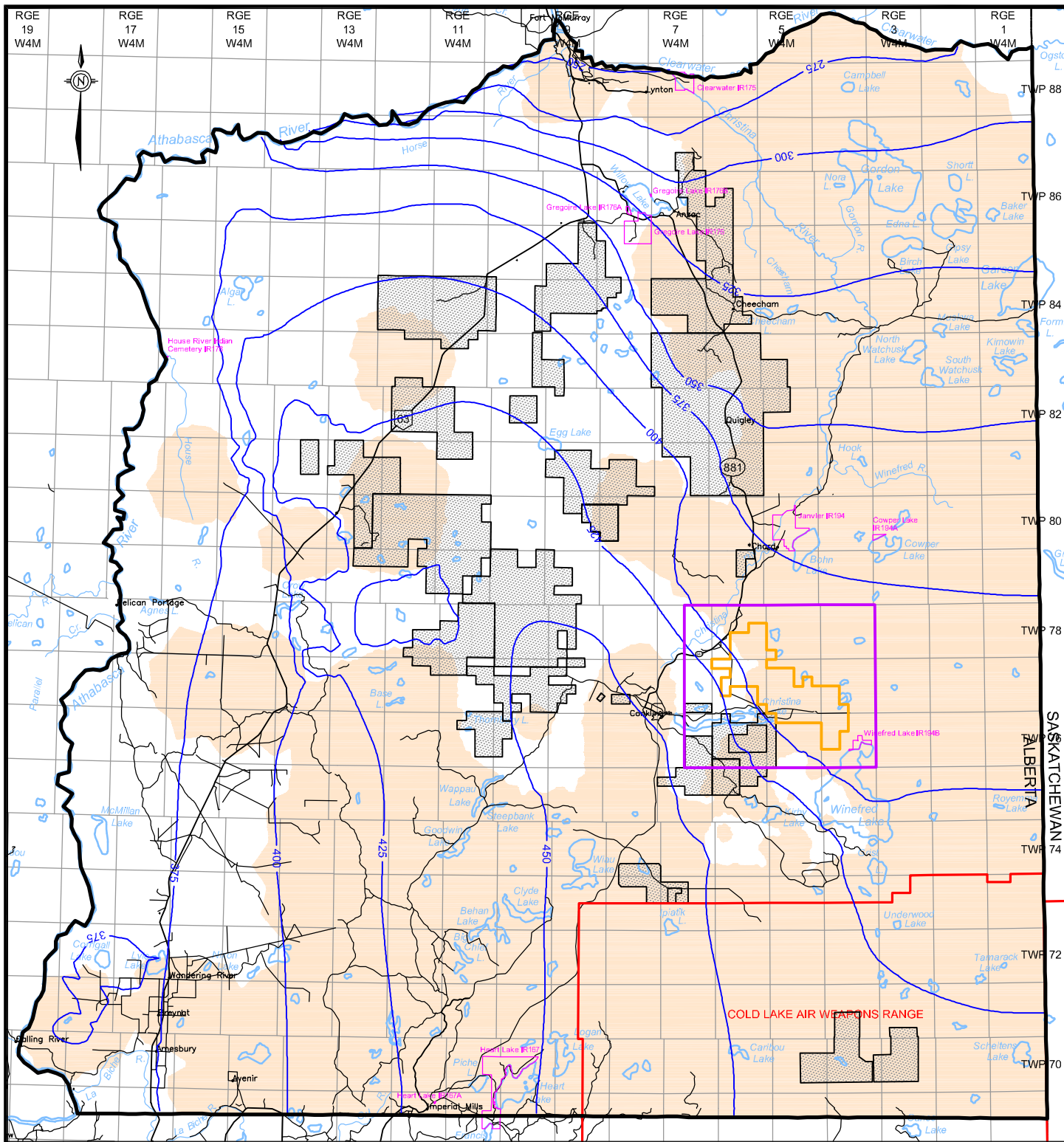
**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.



<b>PROJECT</b>			
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b>			
UPPER CLEARWATER AQUIFER SIMULATED HYDRAULIC HEAD MAP (SLICE 10)			
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08			<b>FIGURE B-42</b>

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**LEGEND**

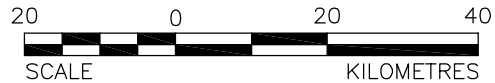
- ROAD
- RIVER
- OPEN WATER
- INDIAN RESERVE
- MEG LEASE BOUNDARY
- ADJACENT IN-SITU OIL SANDS PROJECT
- REGIONAL STUDY AREA (RSA)
- LOCAL STUDY AREA (LSA)
- COLD LAKE AIR WEAPONS RANGE
- 400- HYDRAULIC HEAD (mast)
- McMURRAY AQUIFER PRESENT

**REFERENCE:**  
 ALBERTA NTDB DIGITAL OBTAINED FROM GEOMATICS CANADA, AUGUST 2001.  
 SASKATCHEWAN NTDB DATA OBTAINED FROM ISC, AUGUST 2001.

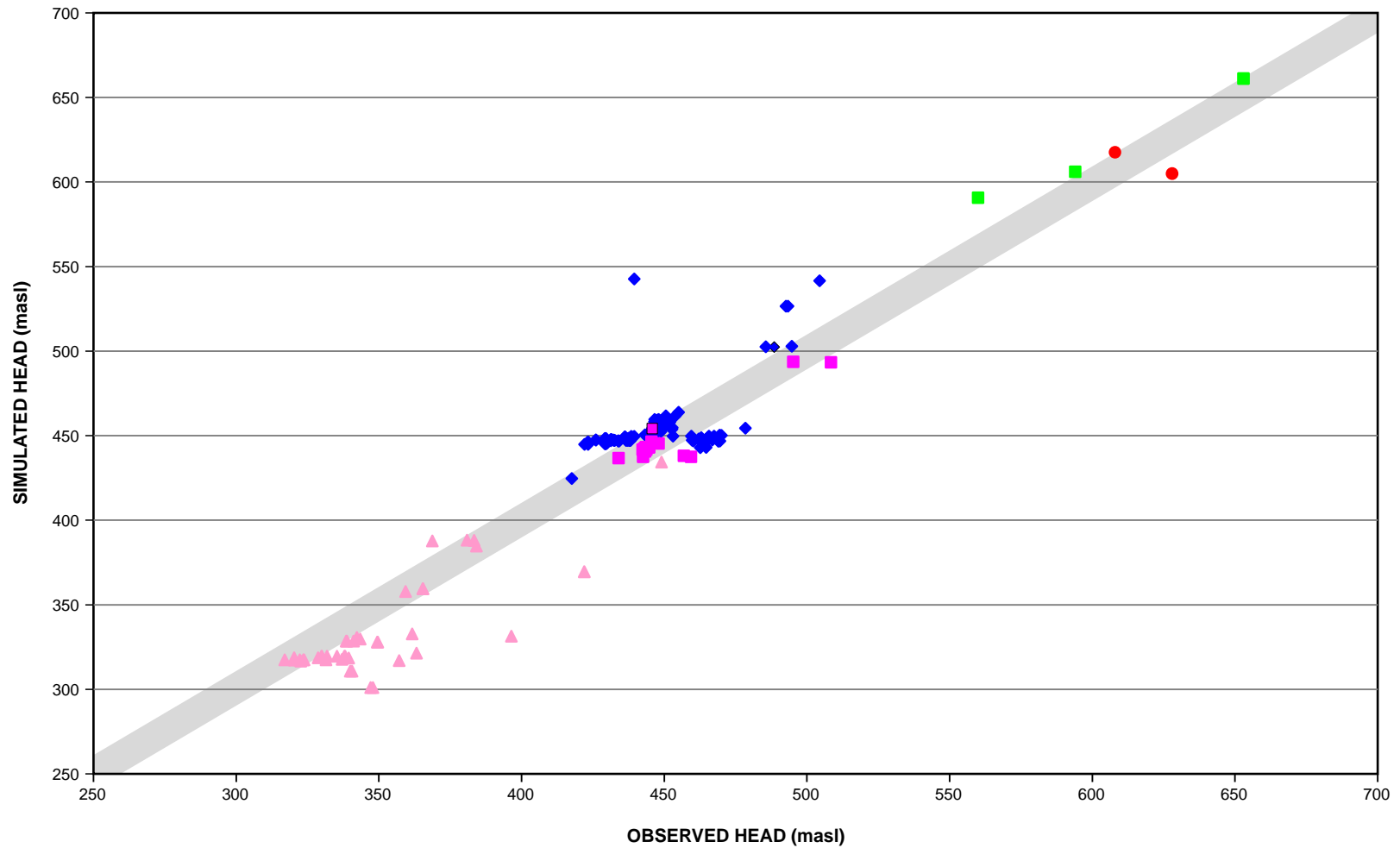
**DATUM:**  
 NAD 27 PROJECTIONS: UTM ZONE 12

**SOURCE:**  
 DEVON 2006

**NOTE:**  
 \* ALSO KNOWN AS HAMLET OF JANVIER.




<b>PROJECT</b> CHRISTINA LAKE REGIONAL PROJECT - PHASE 3			
<b>TITLE</b> MCMURRAY AQUIFER SIMULATED HYDRAULIC HEAD MAP (SLICE 21)			
	PROJECT 04-1334-001.6100	FILE No. 3459-SP_PH3_3-07	
	DESIGN MAL 14/12/07	SCALE AS SHOWN	REV. 0
	CADD ADF 18/12/07		
	CHECK GM 31/01/08		
REVIEW RP 31/01/08	<b>FIGURE B-43</b>		

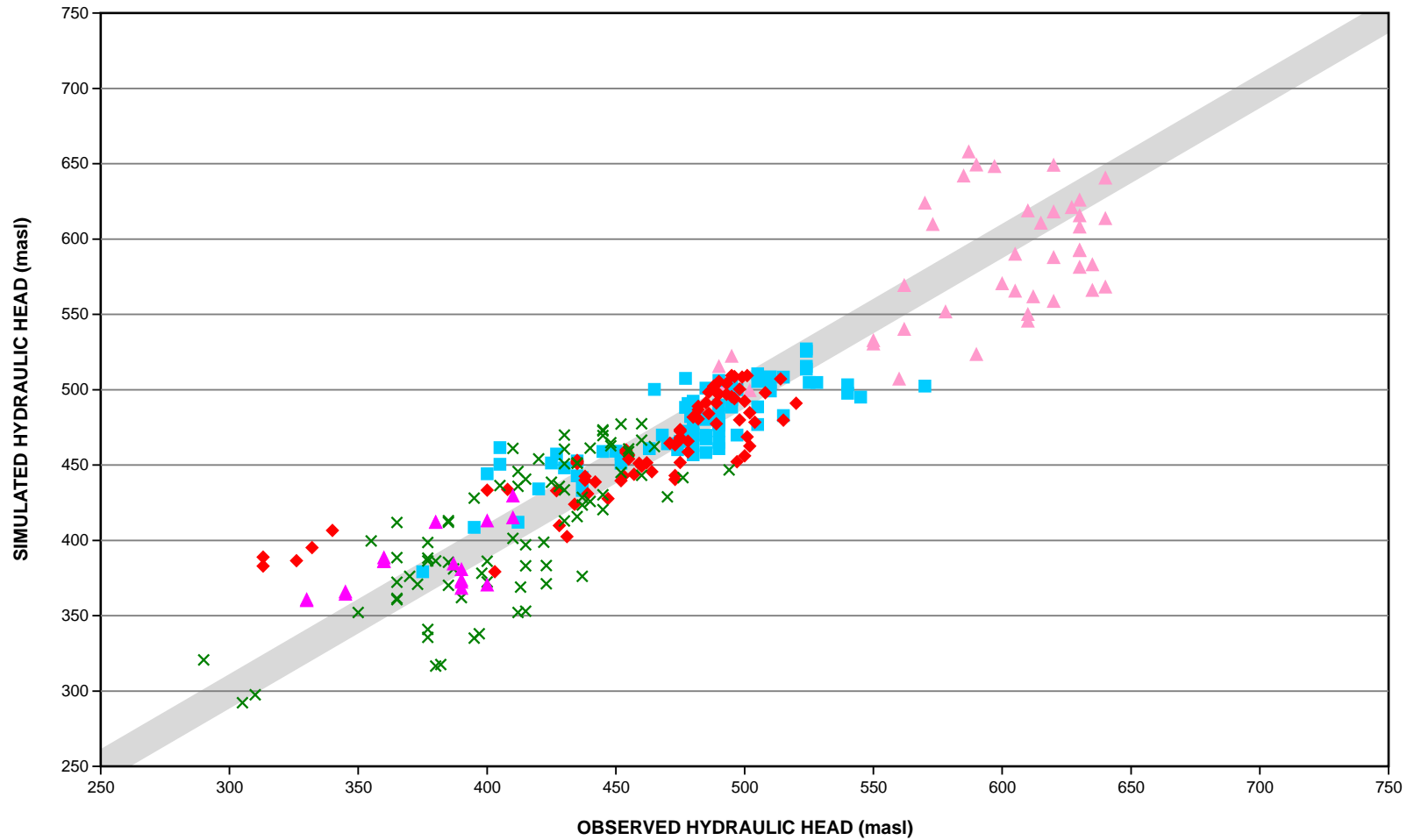


**LEGEND**

- EMPRESS TERRACE AQUIFER
- EMPRESS CHANNEL AQUIFER
- ◆ LOWER GRAND RAPIDS AQUIFER
- UPPER CLEARWATER AQUIFER
- ▲ McMURRAY AQUIFER


PROJECT <b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>						
TITLE <b>SIMULATED vs MEASURED HYDRAULIC HEADS</b>						
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100		FILE No. 3459-MA_2-07.cdr			
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN	REV. 0
	CADD	GDE	18/12/07	<b>FIGURE B-44</b>		
	CHECK	GM	31/01/08			
	REVIEW	RP	31/01/08			

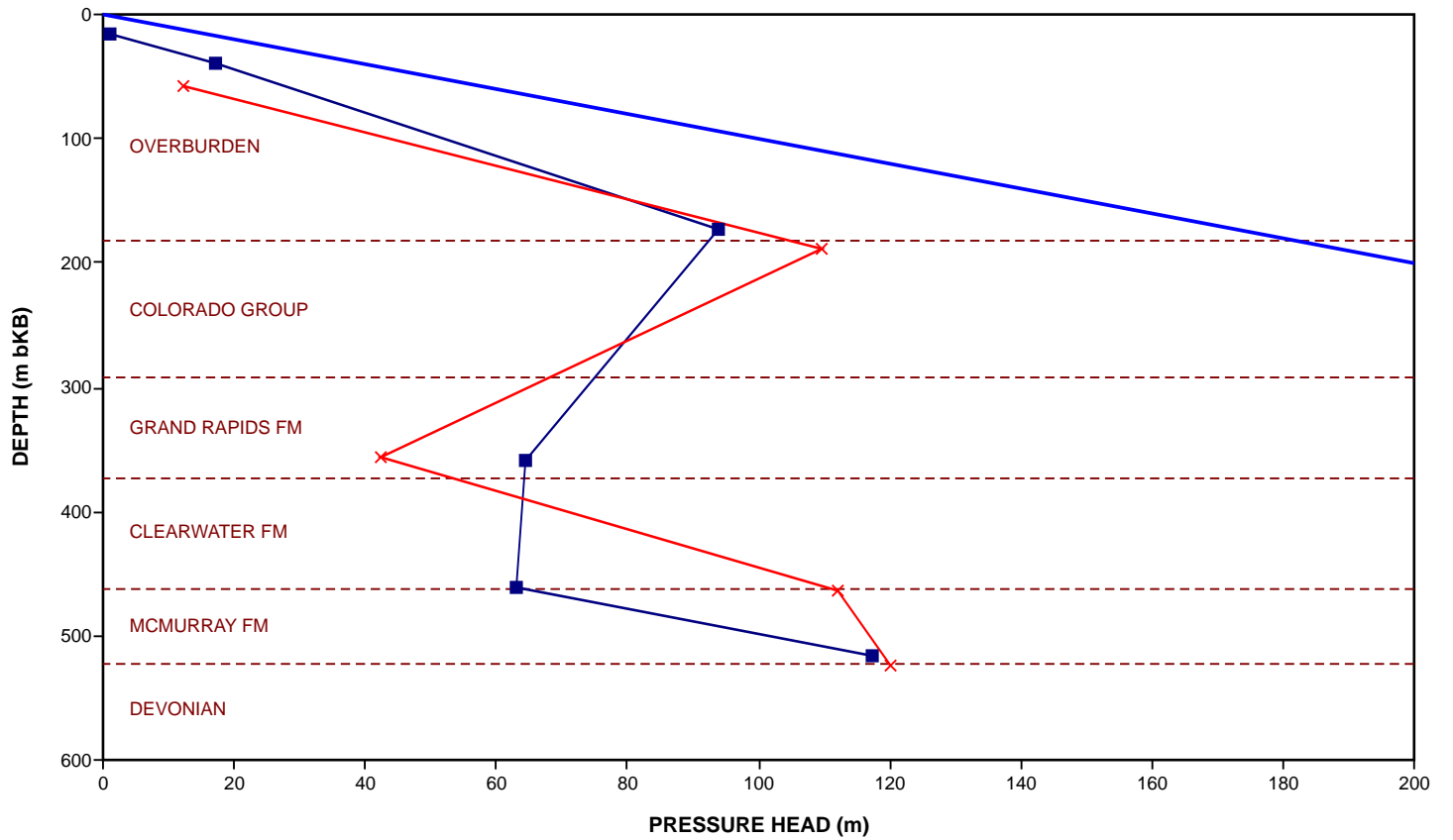
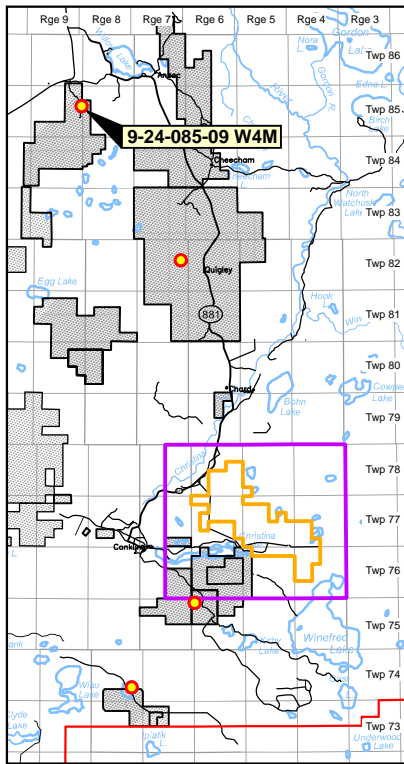




**LEGEND**


- ▲ VIKING
- UNDIFFERENTIATED GRAND RAPIDS
- ◆ UNDIFFERENTIATED CLEARWATER
- × UNDIFFERENTIATED McMURRAY
- ▲ GROSMONT AQUIFER

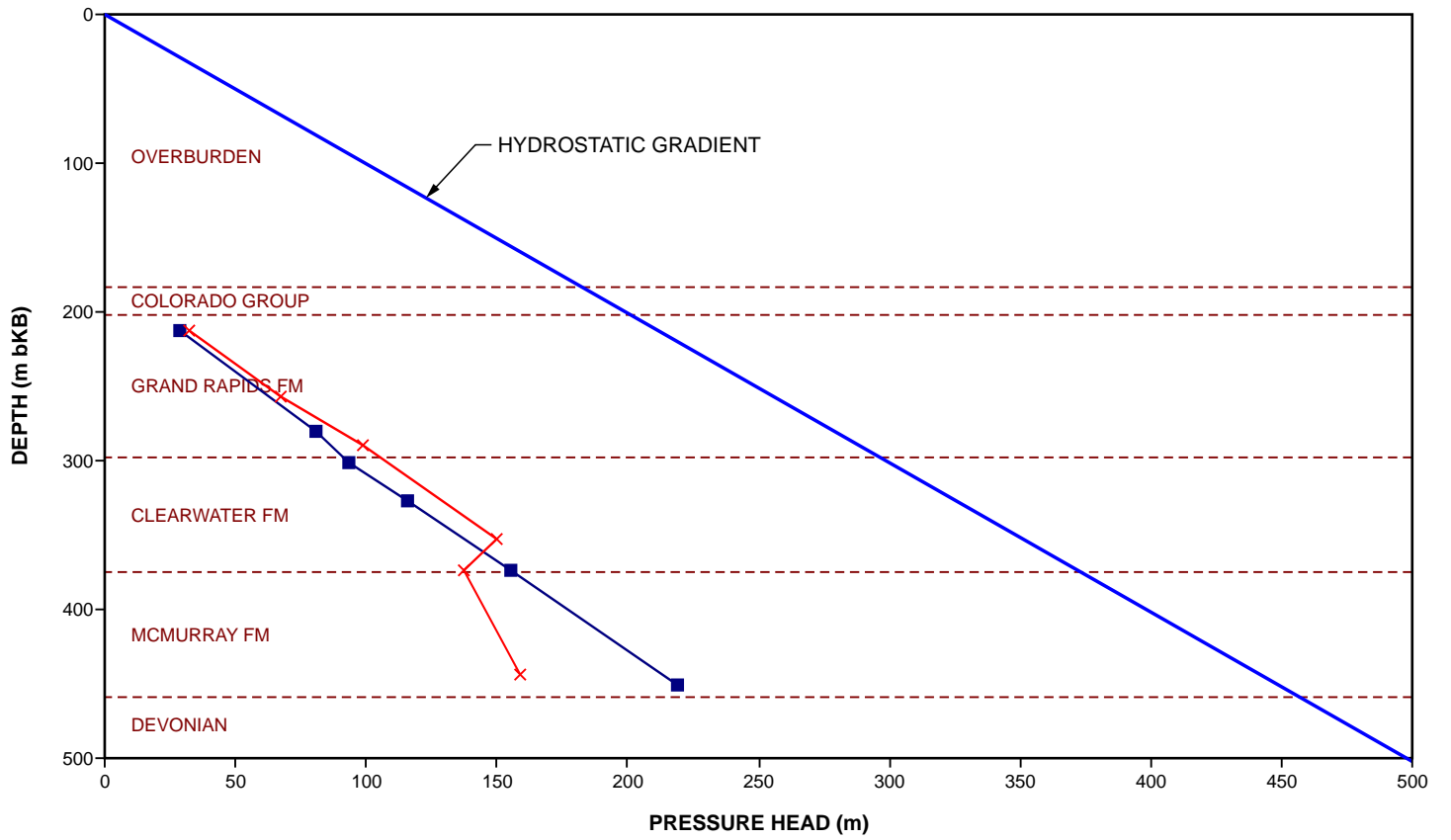
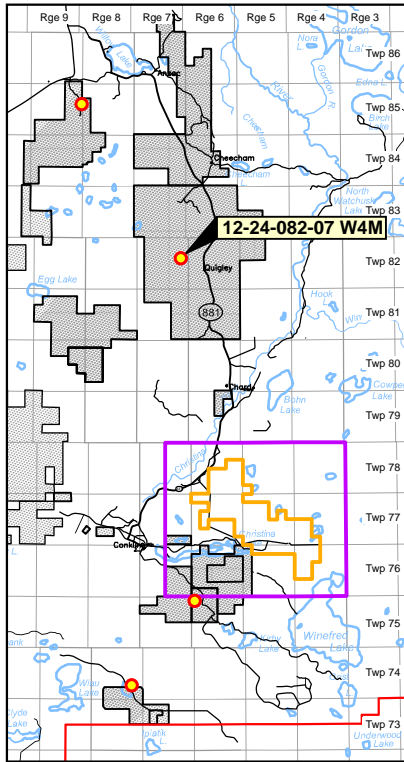
PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
<b>SIMULATED vs INTERPRETED HYDRAULIC HEADS</b>					
 MEG ENERGY CORP.	PROJECT		04-1334-001.6100	FILE No. 3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-45</b>	
	REVIEW	RP	31/01/08		



**LEGEND**


- — OBSERVED PRESSURES
- × — SIMULATED PRESSURES

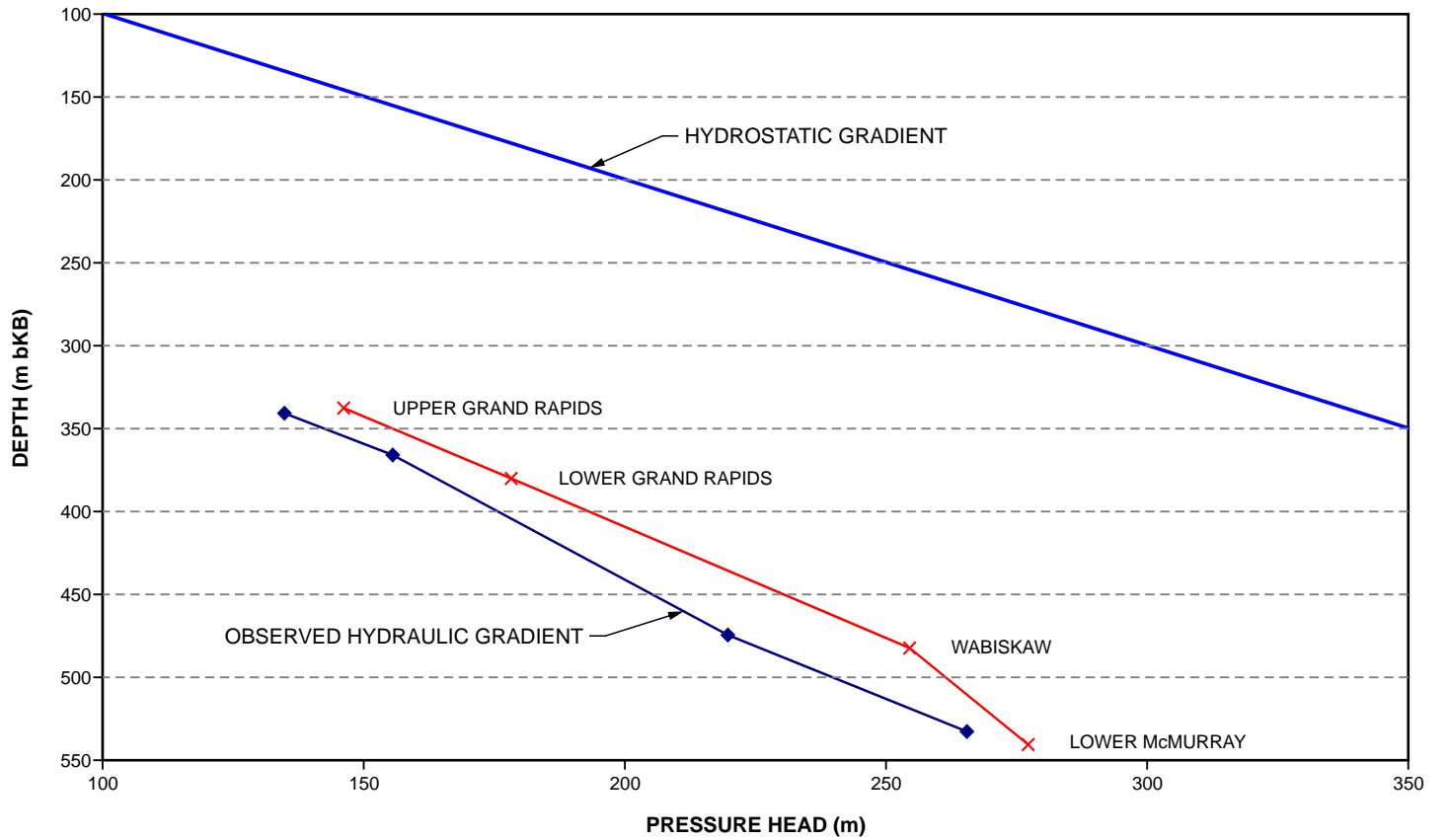
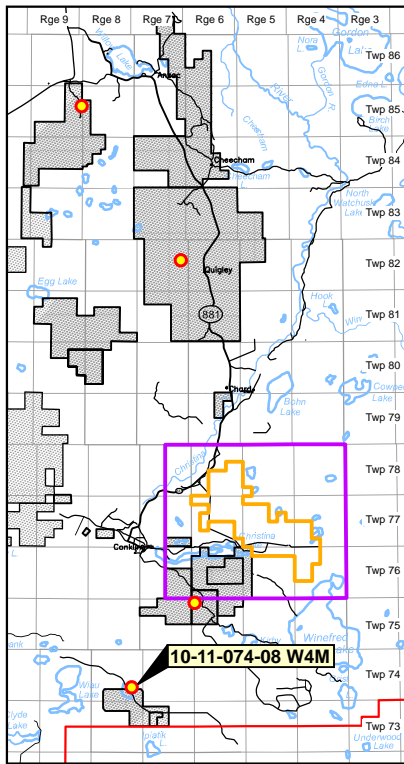
PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
<b>OBSERVATION SITE 10 (9-24-085-09 W4M) PRESSURE vs DEPTH PLOT</b>					
 MEG ENERGY CORP.	PROJECT	04-1334-001.6100	FILE No.	3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-46</b>	
	REVIEW	RP	31/01/08		



**LEGEND**


- OBSERVED PRESSURES
- × SIMULATED PRESSURES

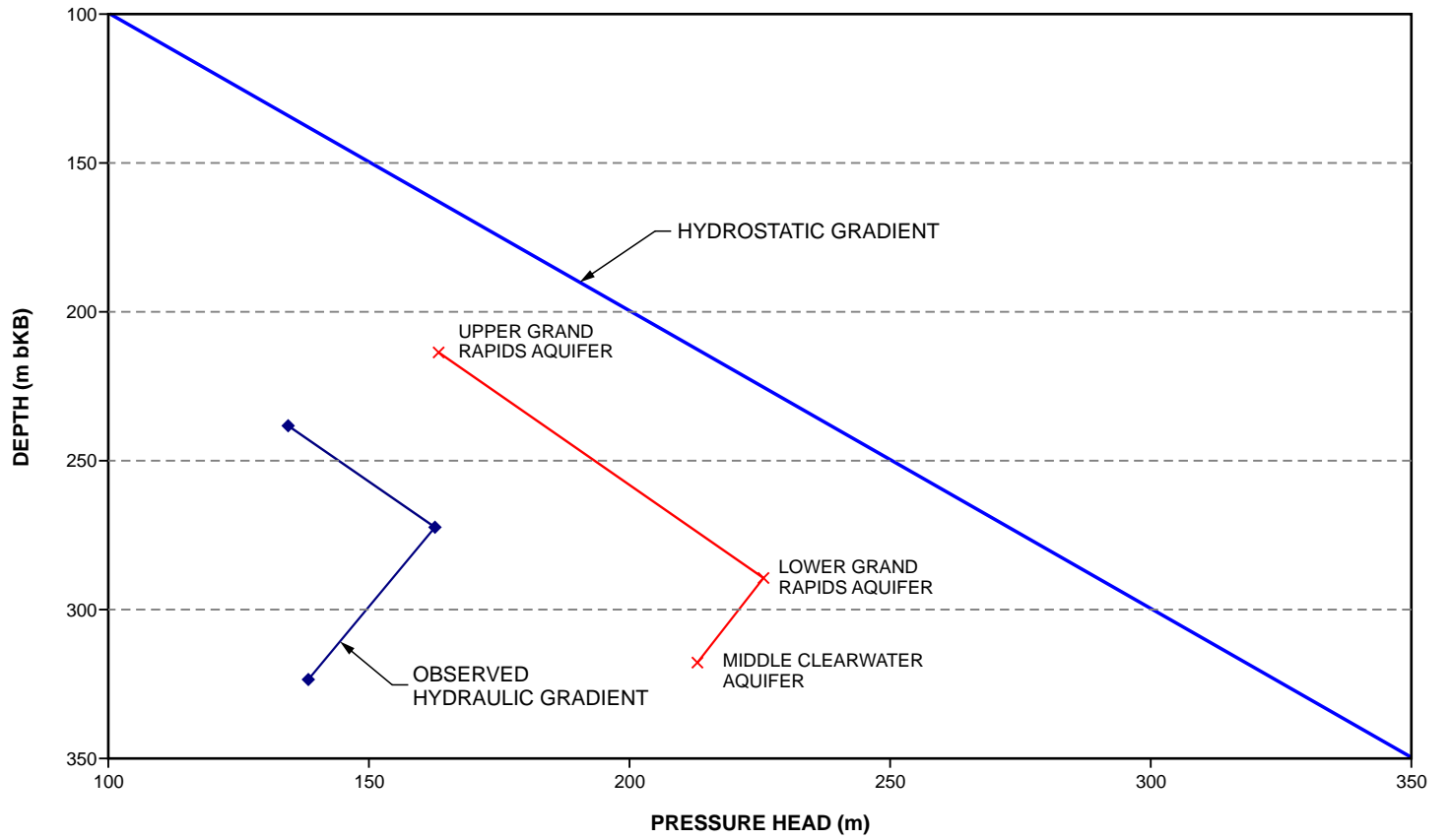
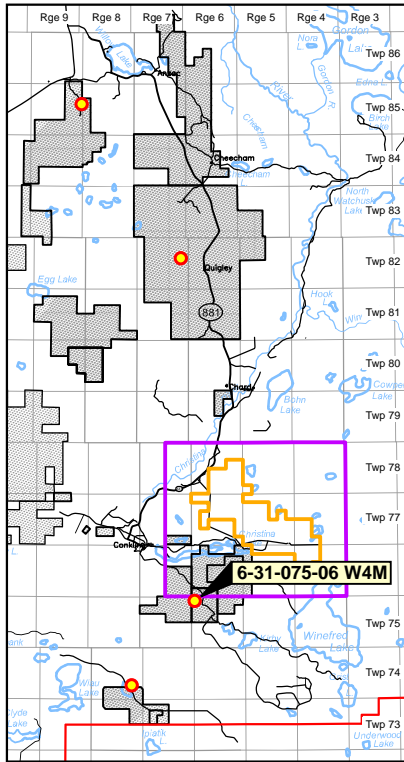
PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
12-24-082-7 W4M PIEZOMETER PRESSURE vs DEPTH PLOT					
 MEG ENERGY CORP.	PROJECT	04-1334-001.6100	FILE No.	3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-47</b>	
	REVIEW	RP	31/01/08		



**LEGEND**


- ◆ MEASURED PRESSURES
- ✕ SIMULATED PRESSURES

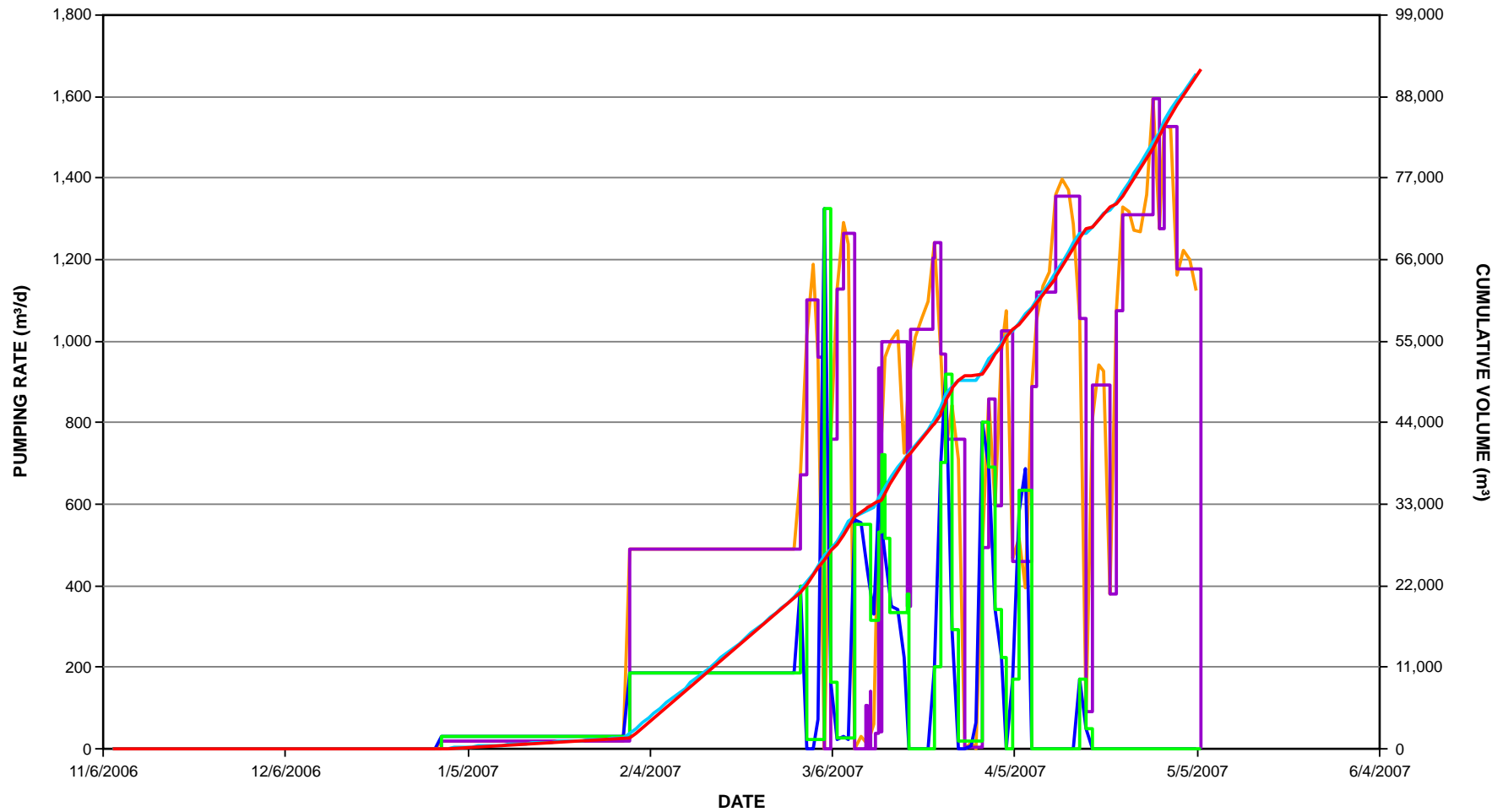
PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
<b>100/10-11-074-08 W4M PRESSURE vs DEPTH PLOT</b>					
 MEG ENERGY CORP.	PROJECT	04-1334-001.6100	FILE No.	3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-48</b>	
	REVIEW	RP	31/01/08		



**LEGEND**


- ◆ MEASURED PRESSURES
- ✕ SIMULATED PRESSURES

PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
<b>1AA/06-31-075-06 W4M PRESSURE vs DEPTH PLOT</b>					
 MEG ENERGY CORP.	PROJECT	04-1334-001.6100	FILE No.	3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-49</b>	
	REVIEW	RP	31/01/08		

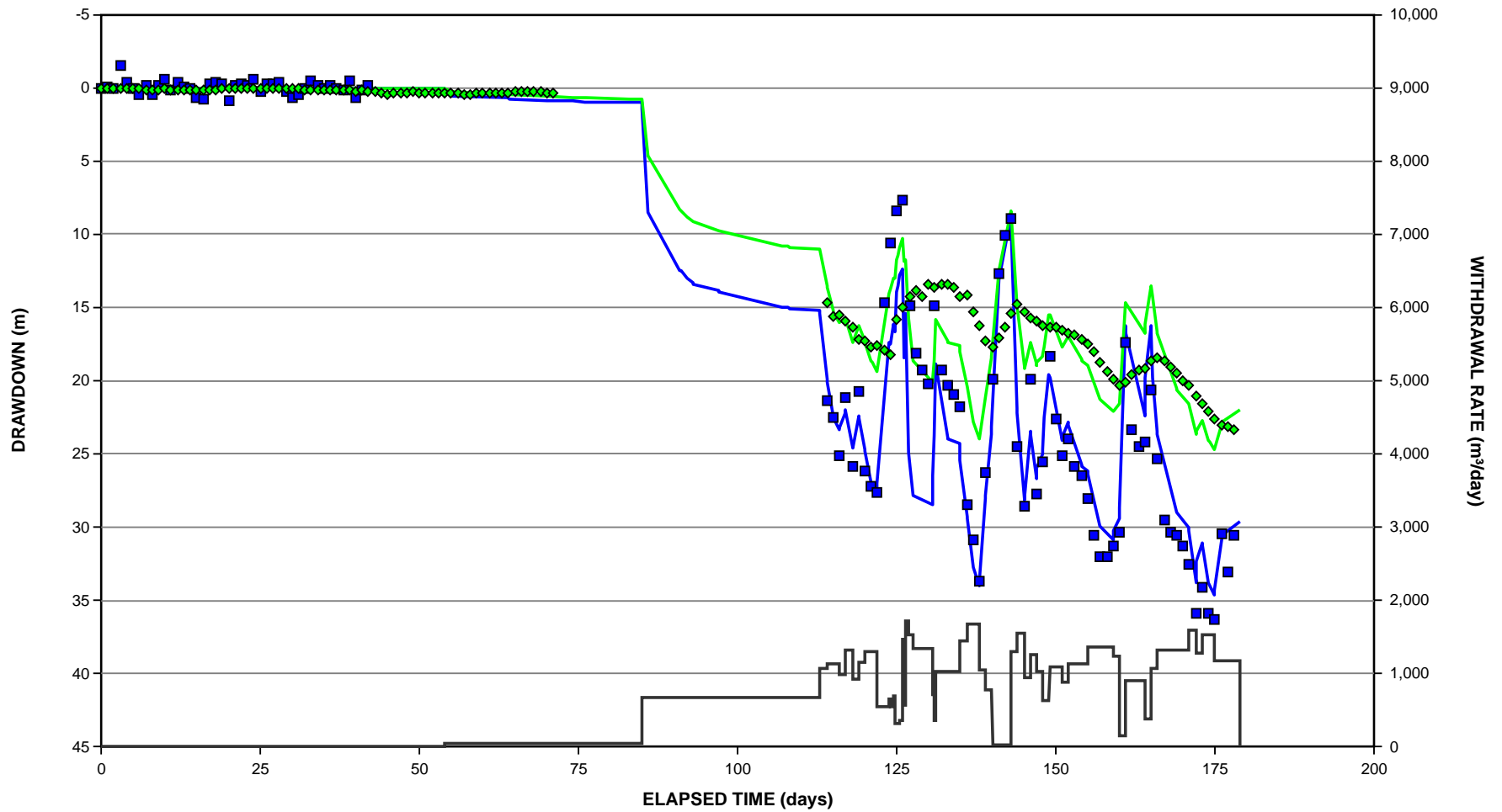


**LEGEND**

- PUMPING RATE WSW 8-16 (MEASURED)
- PUMPING RATE WSW 8-16 (SIMULATED)
- PUMPING RATE WSW 2-16 (MEASURED)
- PUMPING RATE WSW 2-16 (SIMULATED)
- CUMULATIVE VOLUME (MEASURED)
- CUMULATIVE VOLUME (SIMULATED)


PROJECT					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
TITLE					
<b>TRANSIENT CALIBRATION GROUNDWATER WITHDRAWAL SCHEDULE UPPER CLEARWATER AQUIFER</b>					
 MEG ENERGY CORP.	PROJECT		04-1334-001.6100	FILE No. 3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-50</b>	
	REVIEW	RP	31/01/08		

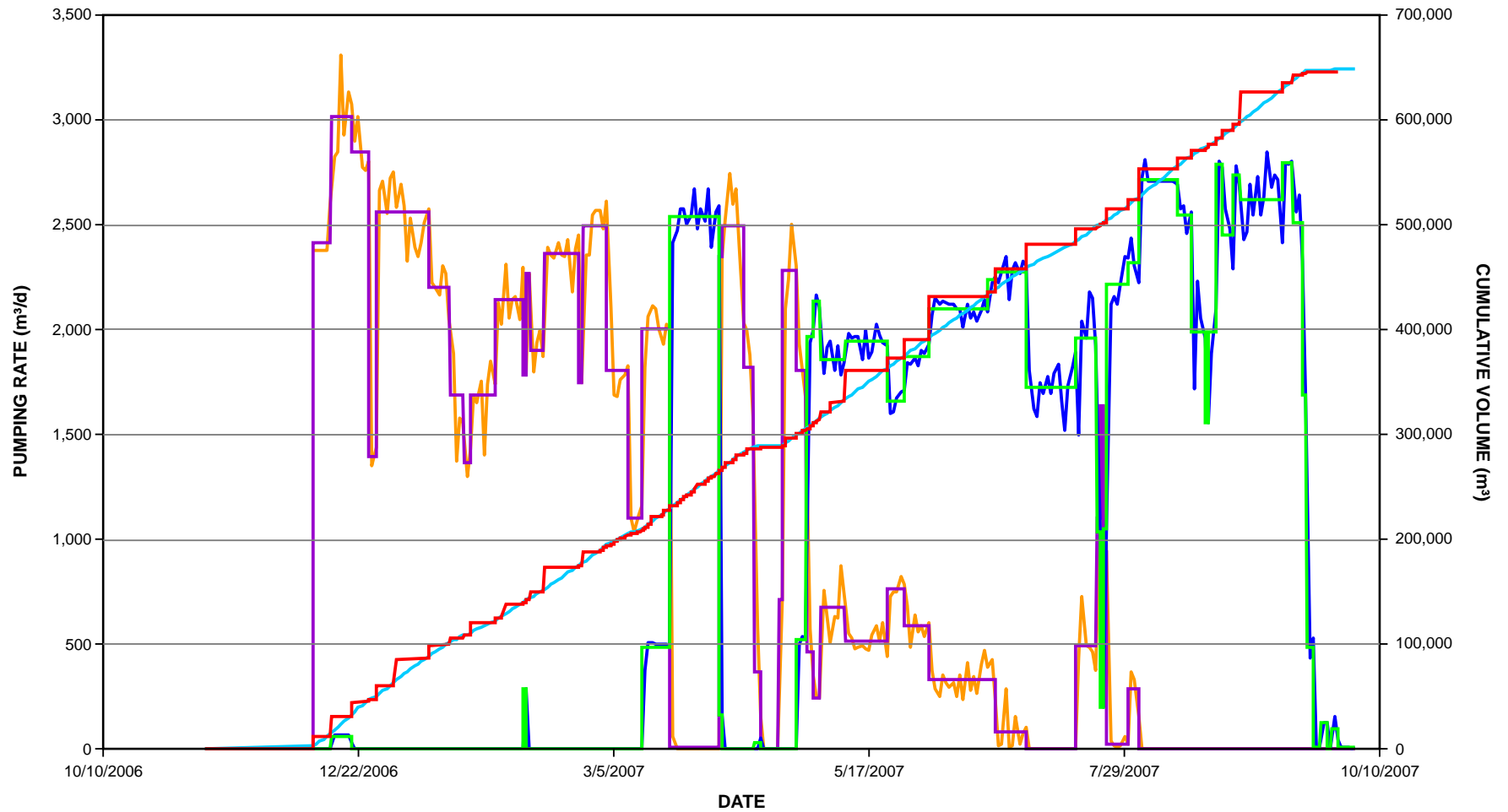




**LEGEND**


- VWP 7-16 (OBSERVED)
- VWP 7-16 (SIMULATED)
- ◆ VWP 10-16 (OBSERVED)
- VWP 10-16 (SIMULATED)
- TOTAL WITHDRAWAL RATE

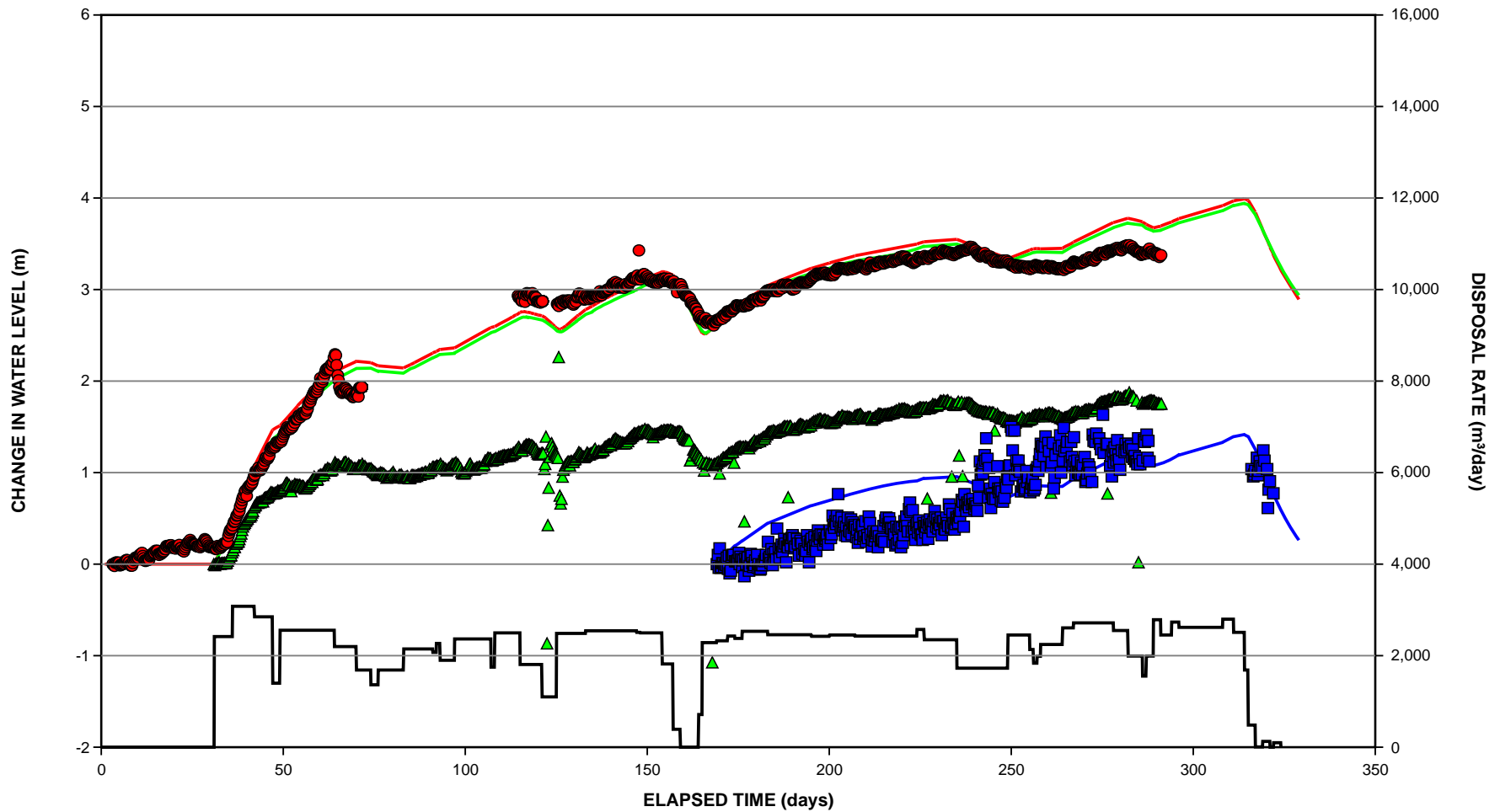
PROJECT <b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>					
TITLE <b>TRANSIENT CALIBRATION SIMULATED DRAWDOWN vs TIME UPPER CLEARWATER AQUIFER</b>					
 MEG ENERGY CORP.	PROJECT		04-1334-001.6100	FILE No. 3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-51</b>	
	REVIEW	RP	31/01/08		



**LEGEND**


- DISPOSAL RATE WDW 15-35B (MEASURED)
- DISPOSAL RATE WDW 15-35B (SIMULATED)
- DISPOSAL RATE WDW 15-35C (MEASURED)
- DISPOSAL RATE WDW 15-35C (SIMULATED)
- CUMULATIVE VOLUME (MEASURED)
- CUMULATIVE VOLUME (SIMULATED)

<b>PROJECT</b>					
CHRISTINA LAKE REGIONAL PROJECT - PHASE 3					
<b>TITLE</b>					
<b>TRANSIENT CALIBRATION WASTEWATER DISPOSAL SCHEDULE BASAL MCMURRAY AQUIFER</b>					
 MEG ENERGY CORP.	PROJECT		04-1334-001.6100	FILE No. 3459-MA_2-07.cdr	
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN
	CADD	GDE	18/12/07	REV.	0
	CHECK	GM	31/01/08	<b>FIGURE B-52</b>	
	REVIEW	RP	31/01/08		



**LEGEND**

- ▲ VWP 2-33 (OBSERVED)
- VWP 2-33 (SIMULATED)
- VWP 10-33 (OBSERVED)
- VWP 10-33 (SIMULATED)
- VWP 16-28 (OBSERVED)
- VWP 16-28 (SIMULATED)
- TOTAL DISPOSAL RATE

PROJECT <b>CHRISTINA LAKE REGIONAL PROJECT - PHASE 3</b>						
TITLE <b>TRANSIENT CALIBRATION SIMULATED CHANGE IN WATER LEVEL MCMURRAY AQUIFER</b>						
 MEG ENERGY CORP.	PROJECT 04-1334-001.6100		FILE No. 3459-MA_2-07.cdr			
	DESIGN	MAL	14/12/07	SCALE	AS SHOWN	REV. 0
	CADD	GDE	18/12/07	<b>FIGURE B-53</b>		
	CHECK	GM	31/01/08			
	REVIEW	RP	31/01/08			