

NRC and Powertech Sidebar Meeting

Technical Report

Request for Additional Information

December 23rd

Submitted RAI response

February 8th

NRC Phone call to discuss problems

February 18th

Q & A clarification submitted

March 7th

Received NRC comments on
106 deficiencies

April 7-8th

Public meeting to discuss key
issues

May 6th

Letter re-stated 4 issues of concern

June 29th

Revised RAI response scheduled

Revised Plan

- New Consulting Task Force
 - WWC Engineering – Prepare Response
 - Petrotek – Hydrogeology
 - ERG – Radiological
 - IML – Meteorology
- Clarify questions with PM-PM meetings
- Redo and revise all responses

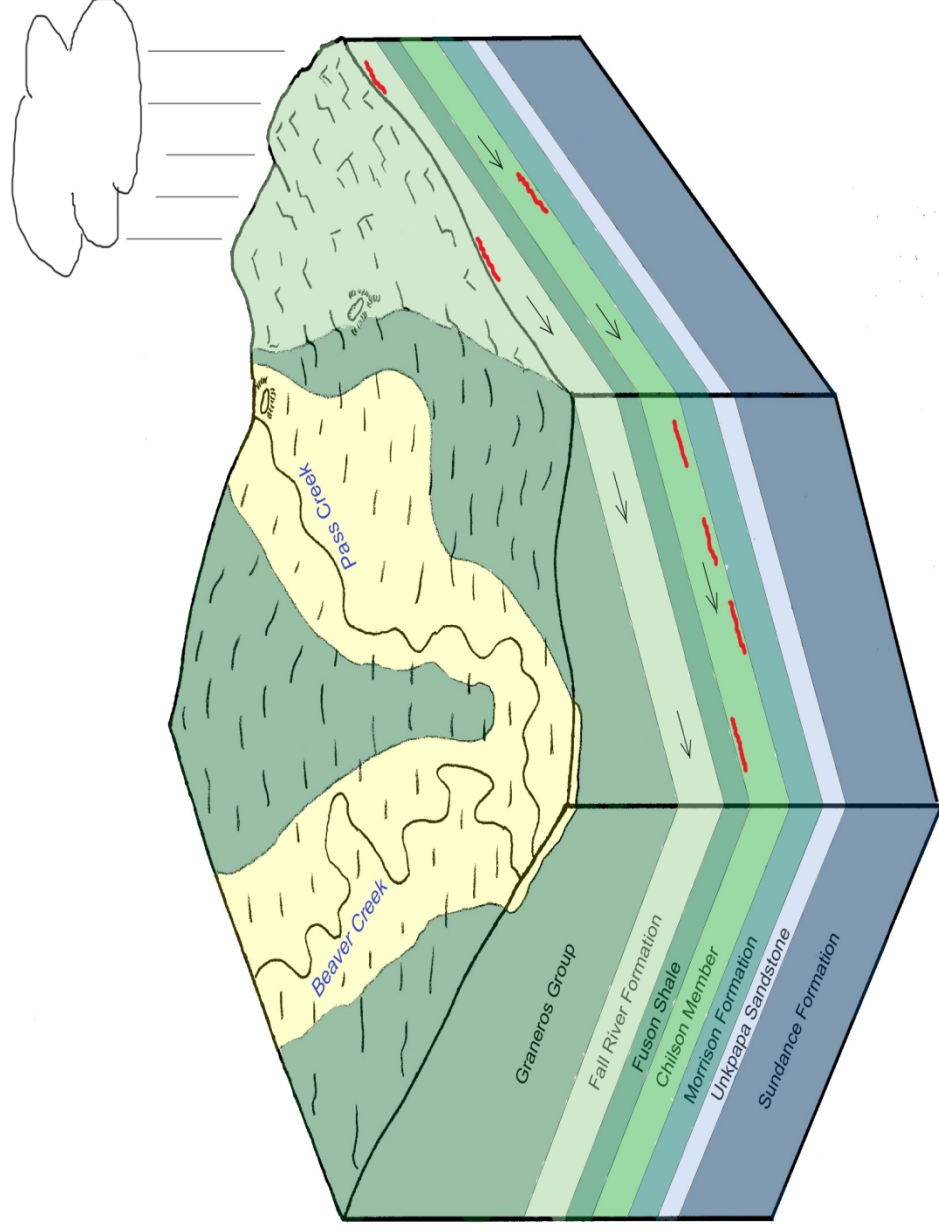
FOUR ISSUES OF CONCERN

- Potential for unplugged drill holes to contaminate surface water
- Potential of underground mine workings to influence well fields
- Potential for inadequate hydraulic containment of production fluids
- Potential for inadequate hydraulic containment due to possible breccia pipes

Excellent Project

- Dewey - Burdock is top uranium project in US
- Thick confining aquitards above and below
- Good permeability for flow solutions and control monitoring
- High Grade deposit with large identified potential

Dewey-Burdock Project Block Diagram



Preparation of RAI Response by WWVC Engineering

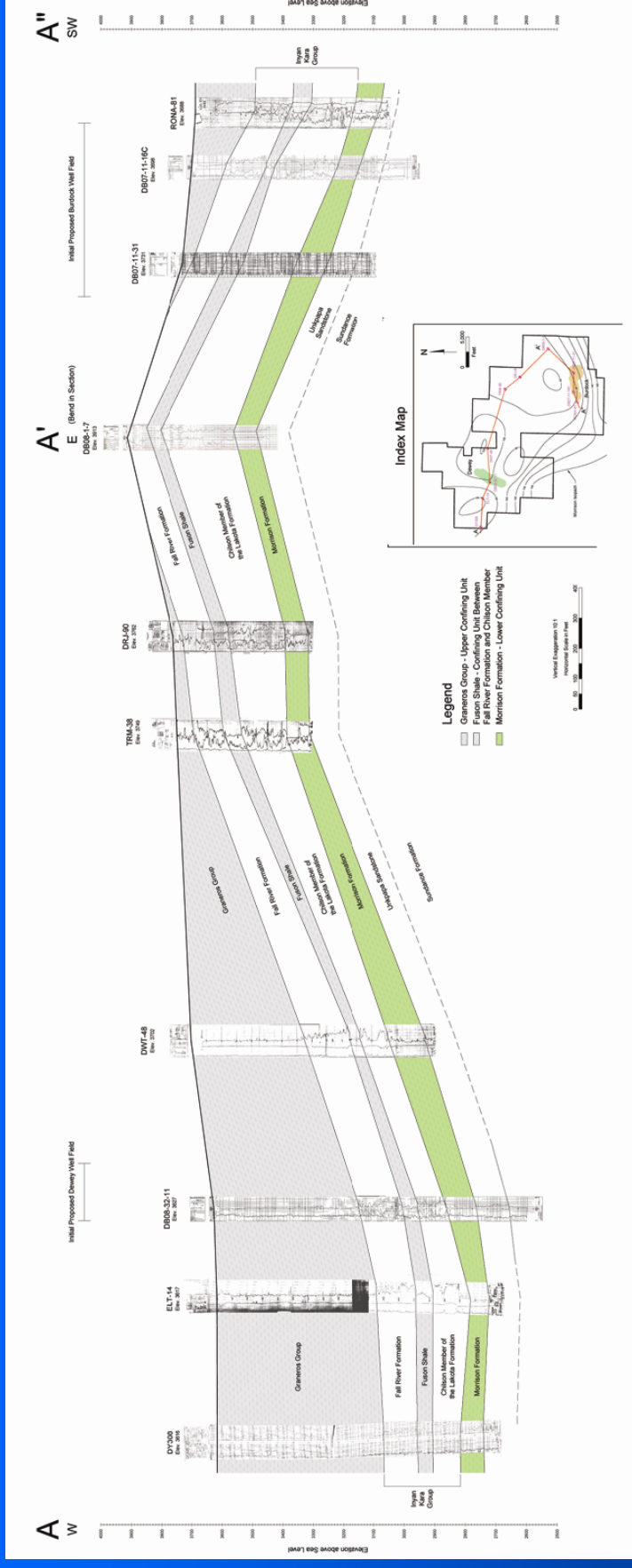
- On schedule for submittal on June 29
- Responses directly address the four issues
- Incorporate discussion from April 7-8 meeting
- Complete package

Objectives for the Revised RAI Response Package

- Stand-alone Document
 - First priority is answering the question
 - Avoid cross references to ER, Supplemental Report, etc.
 - Include many revised TR appendices, figures & exhibits
- Easy to Use
 - Clear and concise format
 - Consistent nomenclature
 - Adobe PDF format meeting NRC requirements for electronic submittal
- Clearly Indicate How the TR will be Revised

Confinement

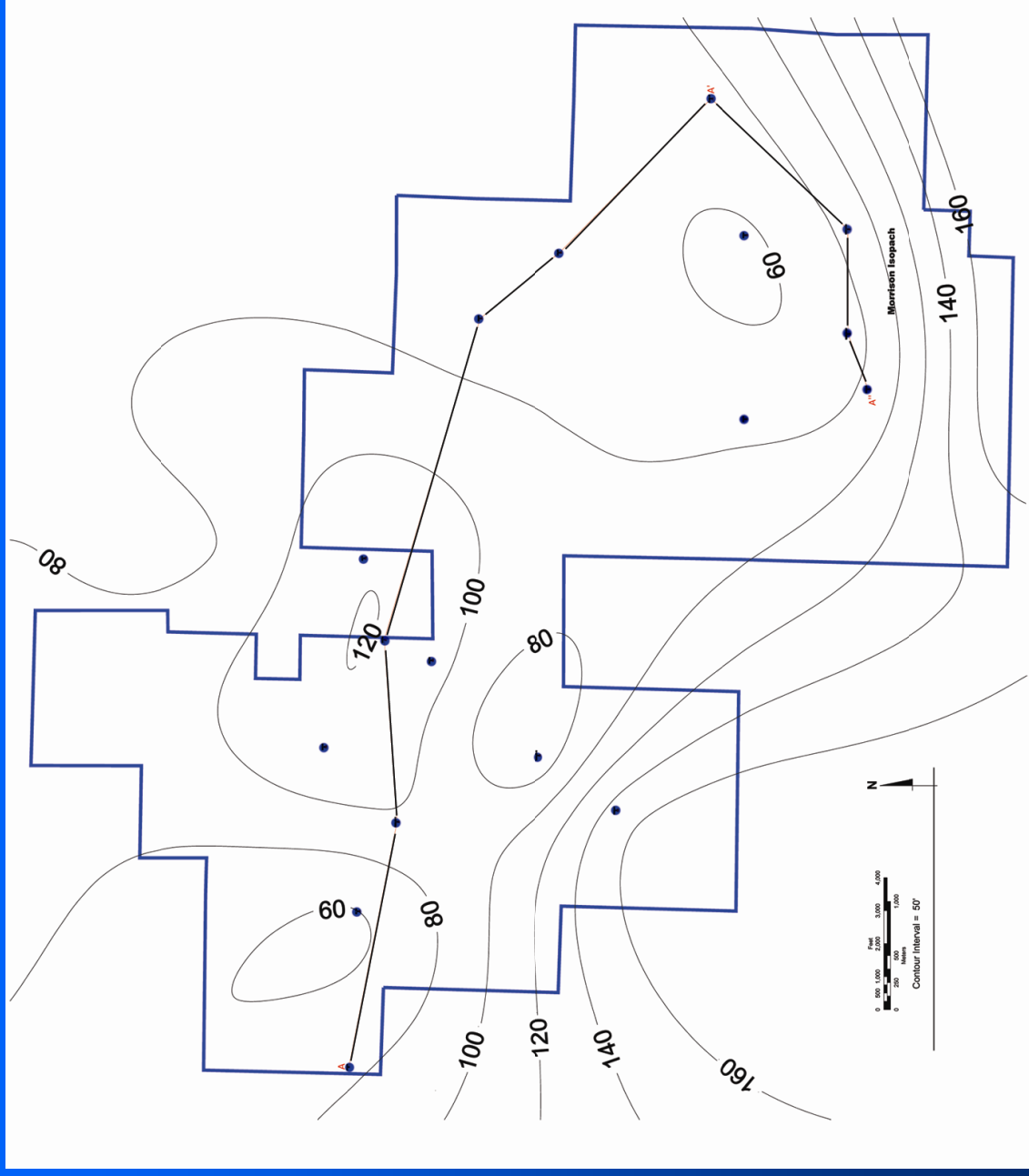
Containment of Production Fluids



Upper Confining Unit – Graneros Group – 0 to 500 feet thick
 Internal Confining Unit – Fuson Shale – 20 to 80 feet thick
 Lower Confining Unit – Morrison Formation – 60-140 feet thick
 Project-wide, 10-mile cross section

Isopach of Morrison Formation

All drill holes that
penetrated full
section of
Morrison
Continuous
deposition
Consistent with
regional
interpretations



Geologic Nomenclature - Fuson Shale

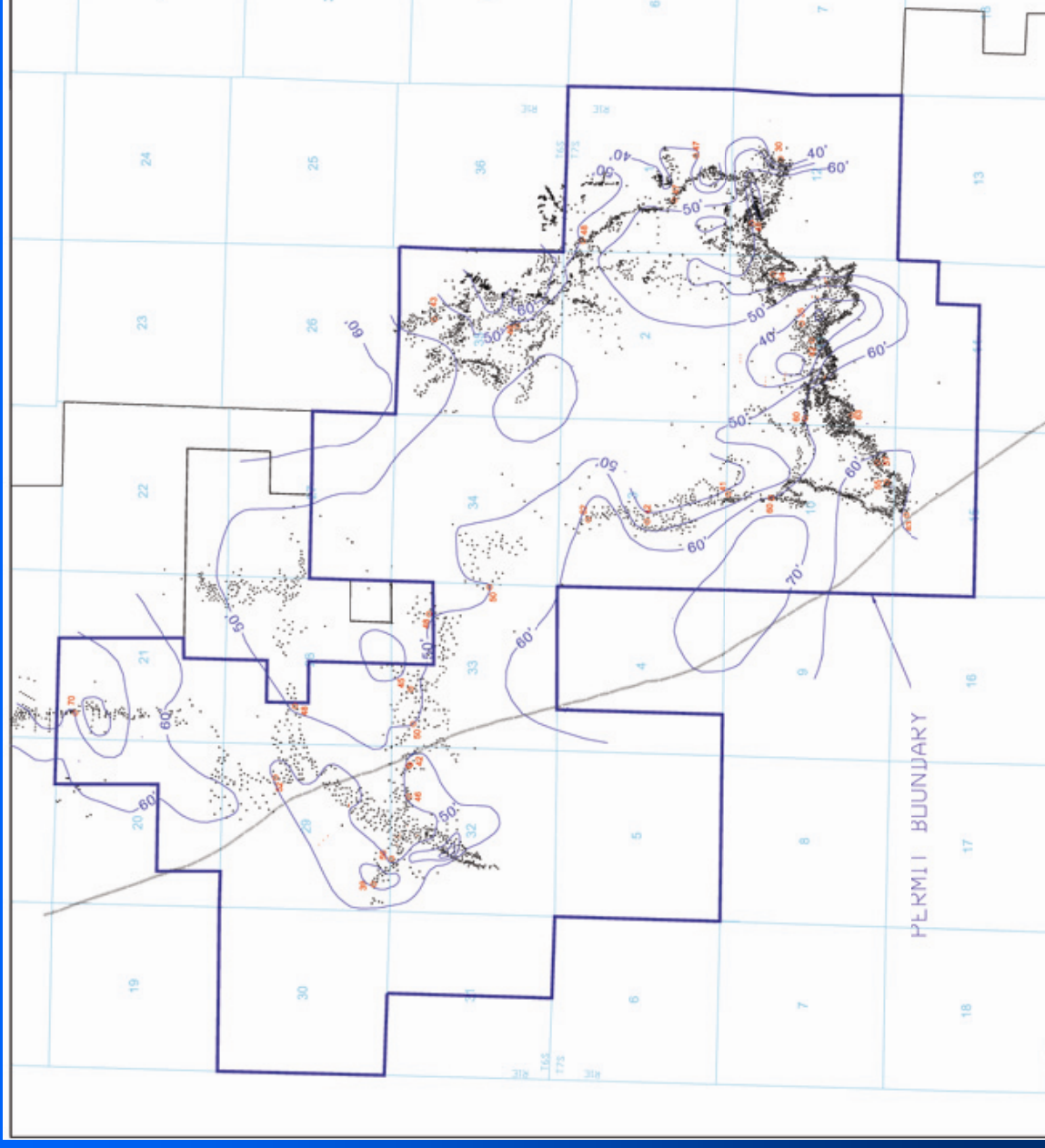
- Geologic nomenclature varies around the country
i.e., Lower Cretaceous.....
- Fuson Shale – Driscoll - low permeability mudstones and clays, containing some thin fine-grained sands
- Fuson Member – USGS – includes upper and lower sandy facies with the mudstones and clays
- Powertech maps and presents the Fuson Shale as a continuous confining unit throughout the project area

Fuson Shale in Bennett Canyon East of Project Boundary



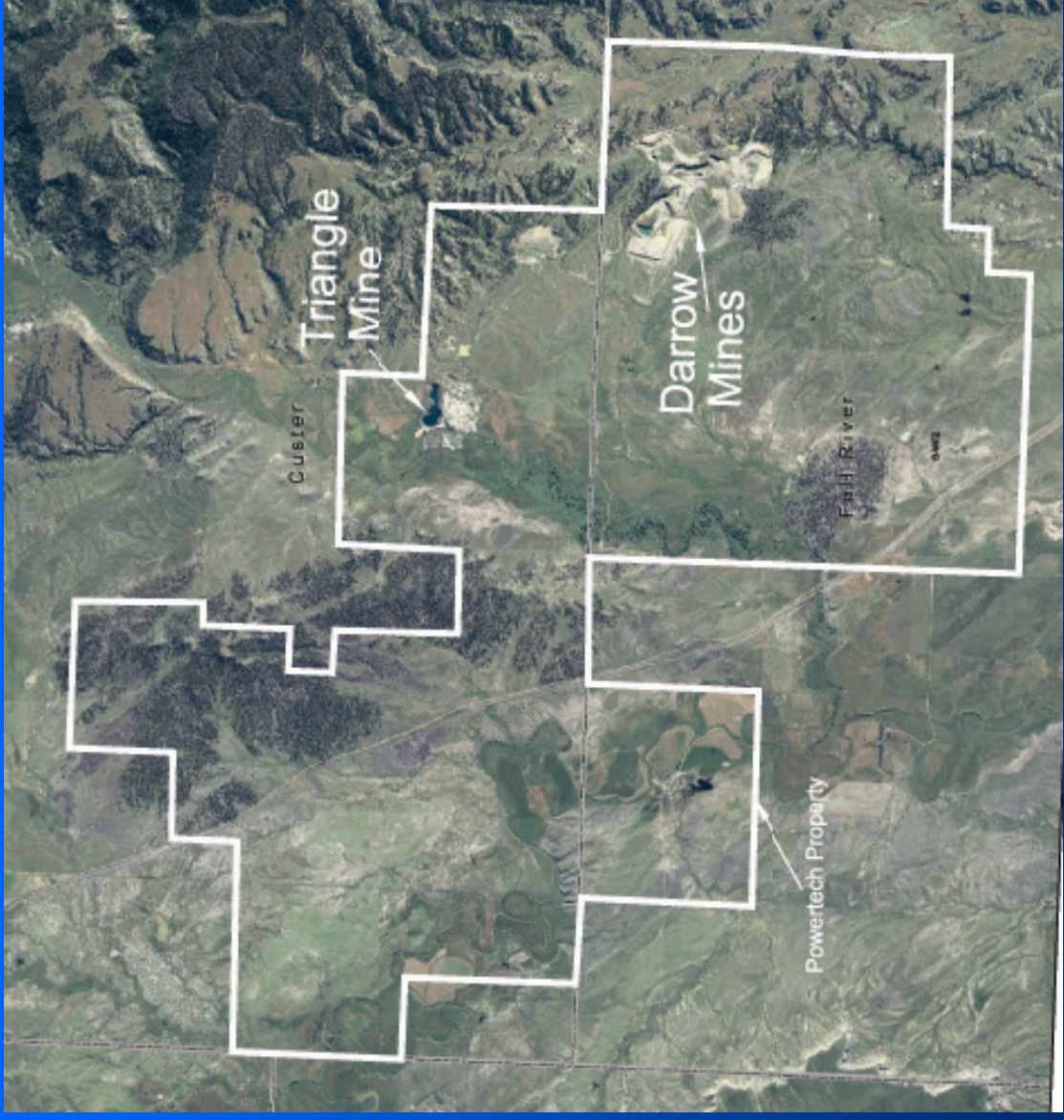
Isopach of Fuson Shale

- Over 1000 data points
- Thickness never less than 20 feet



Underground Mine Workings

Historic Surface Mines



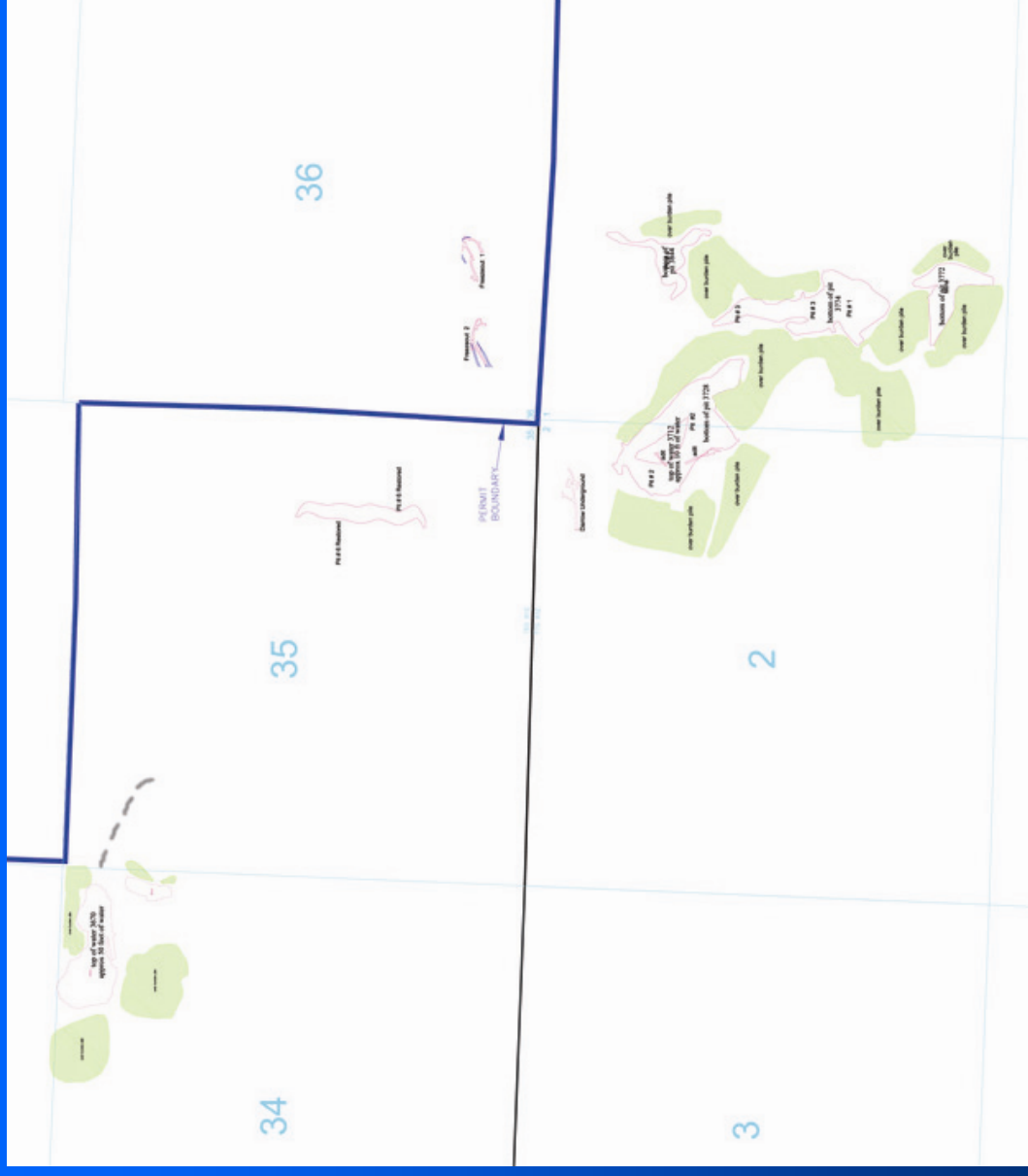
First mining in district
were declines
following mineralized
outcrops

Underground working
associated with and
extensions to surface
mines

Underground mines in
unsaturated Fall
River sands -
Maximum depth of 90
feet

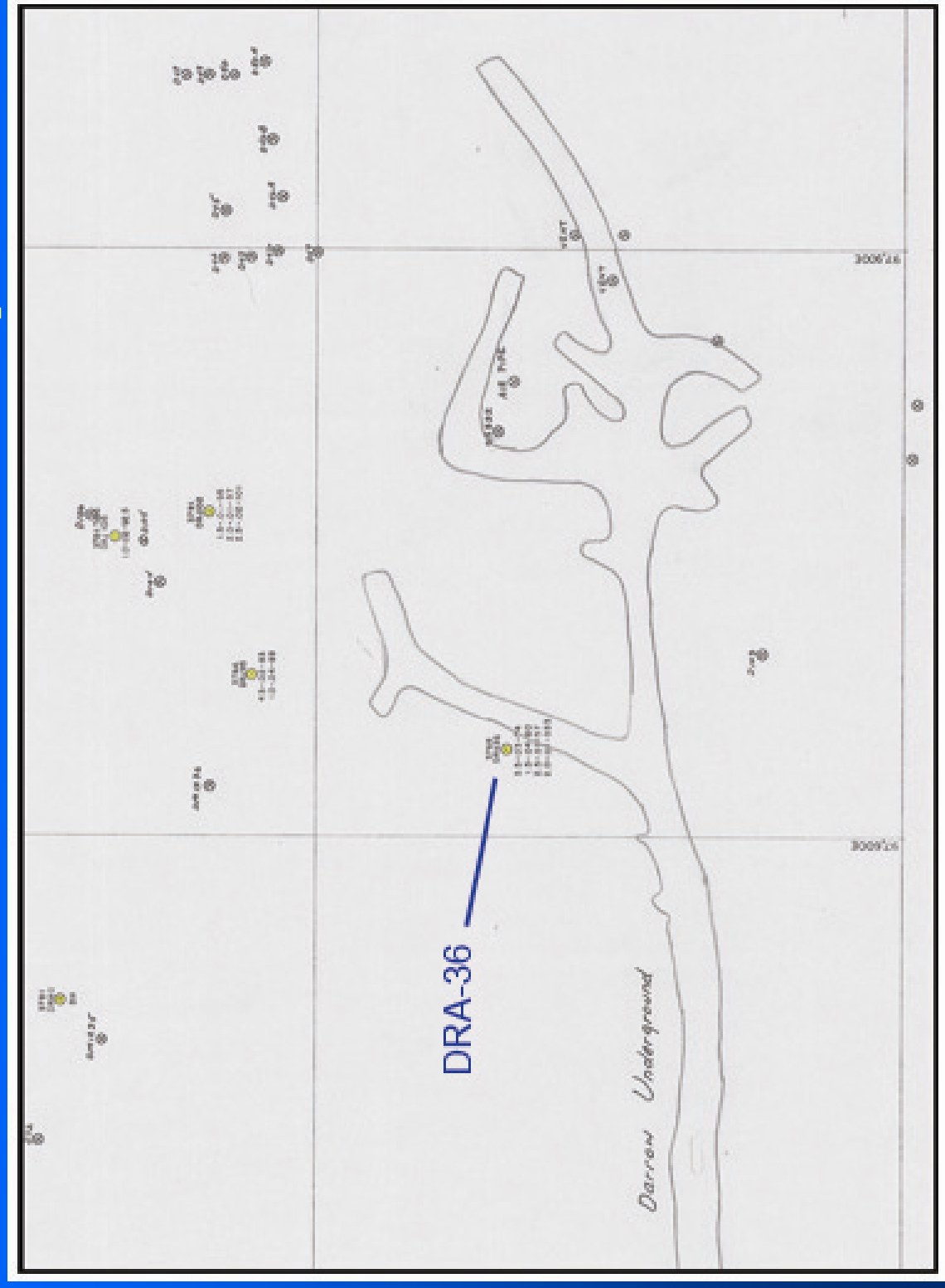
Closest Fall River ISR
operations at 1 mile

Surface & Underground Mines



Underground Workings – 4 declines and 2 adits

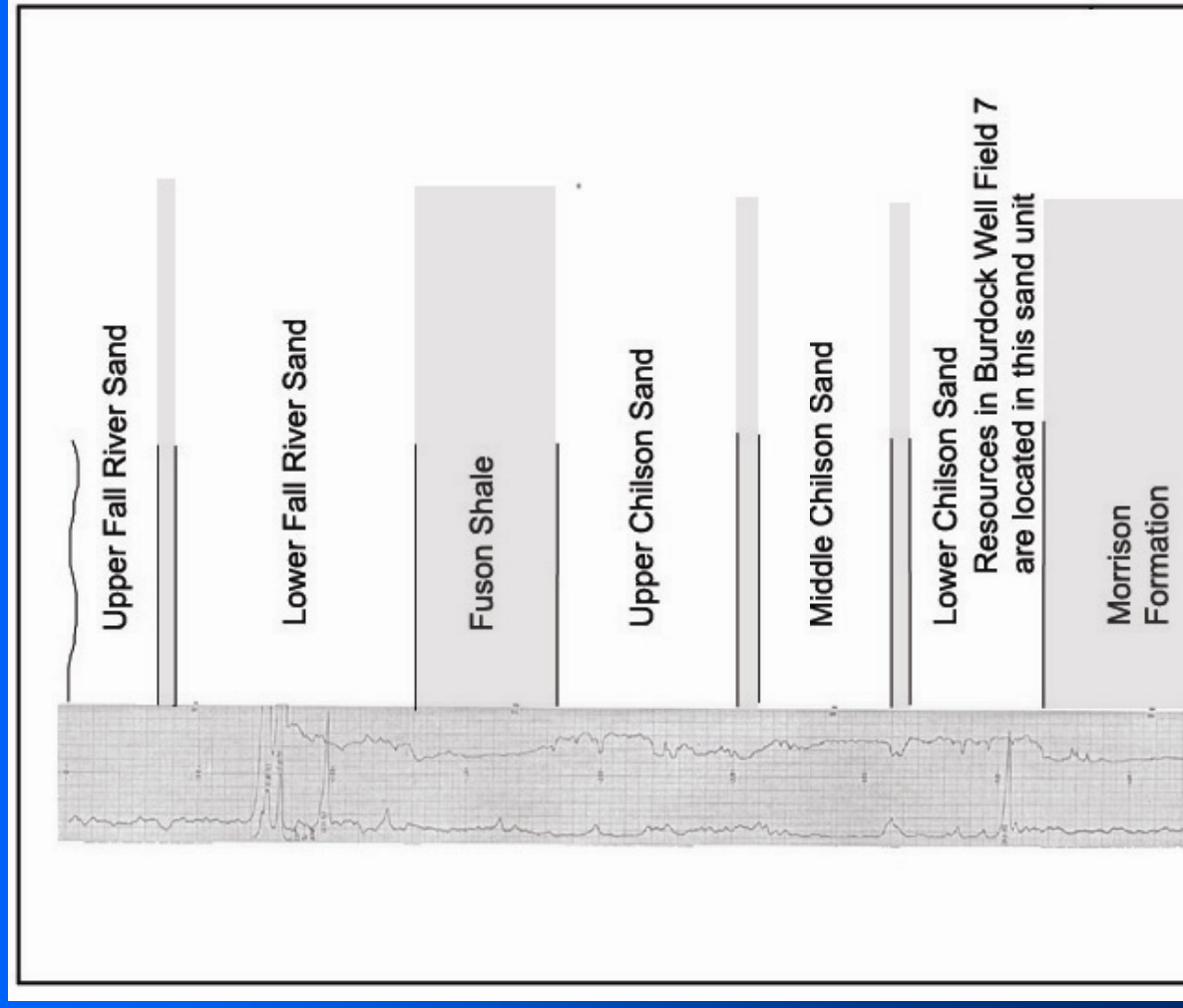
Darrow Underground Mine TVA Drill Hole Map



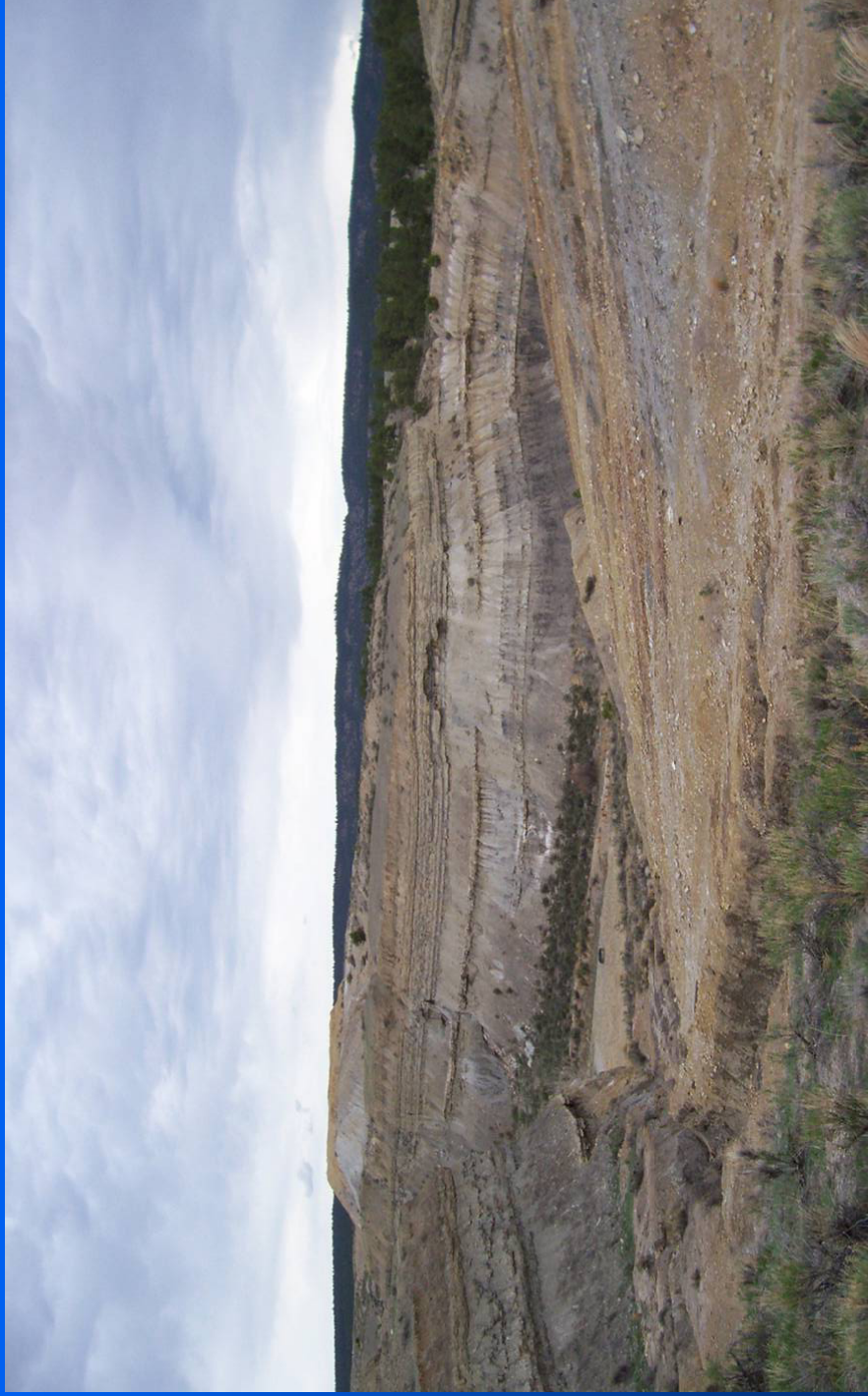
Darrow Underground Mine

DRA-36

- Historically mined horizon - 80 feet below ground surface
- Equivalent to Powertech's F12 interval
- Historically mined horizon 50 feet above the Fuson Shale
- Fuson Shale is 50 feet thick
- Integrity of the Fuson Shale has not been compromised
- Proposed well field in Lower Chilson Sand, 280 feet below the historically mined horizon



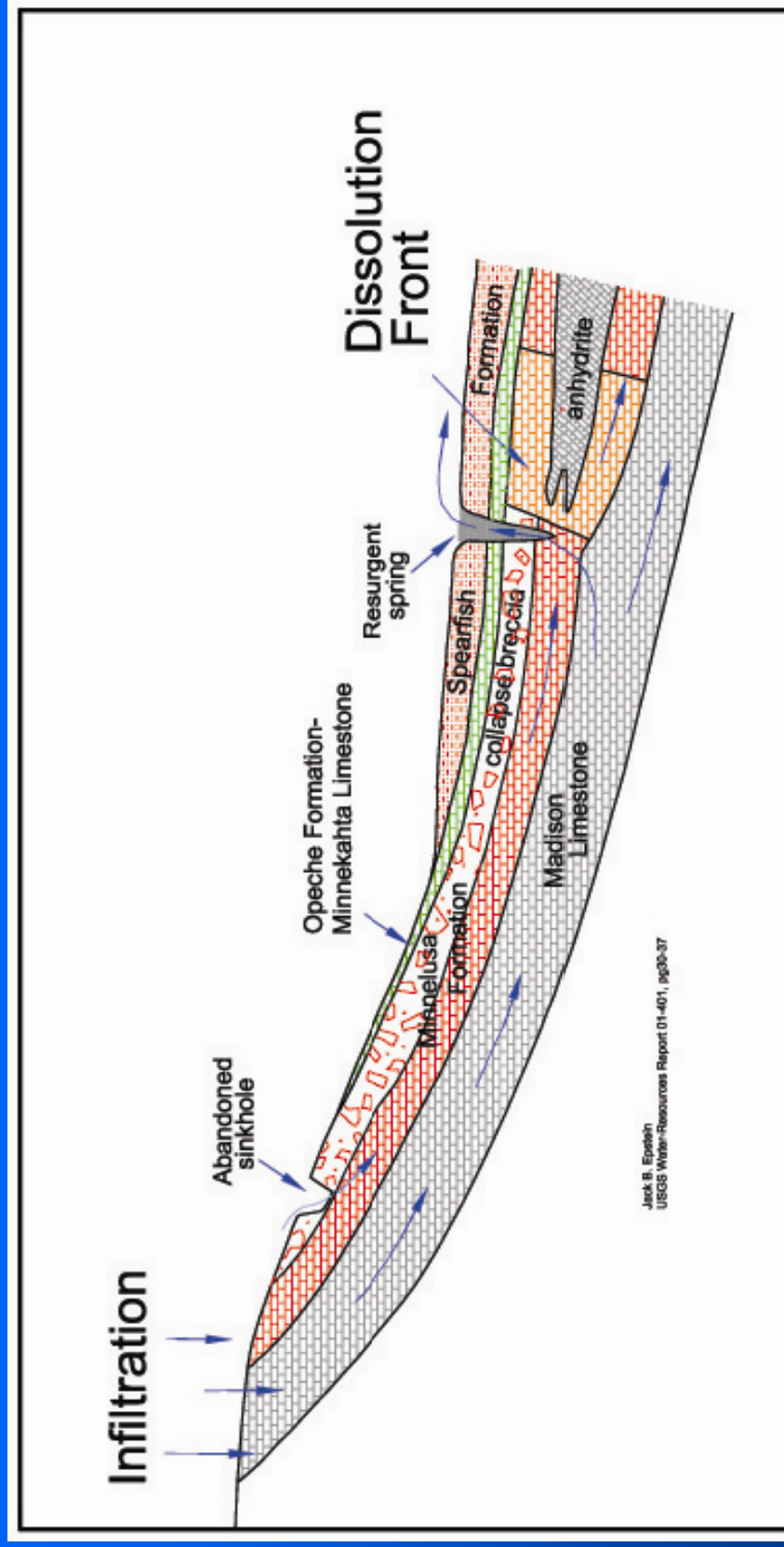
Adits & Open Pit Mines



Adit - horizontal tunnel

Breccia Pipes

Black Hills Breccia Pipes



Breccia pipes rooted in the Permian Minnelusa Formation
Dissolution of anhydrite and gypsum causes collapse structures
Aerial extent of dissolution is limited - few miles down-gradient from outcrop

[illegible]

- [illegible]

Black Hills Breccia Pipes

Water Chemistry and Temperature

- Gott theorized that breccia pipes brought calcium sulfate type water into Inyan Kara
- Powertech baseline sampling show that sodium sulfate type water in the Inyan Kara
- Gott cited a geothermal gradient of 1.5 ° C/100 ft for Inyan Kara water, as opposed to a predicted average of 0.9 ° C/100 ft
- Gott stated “water probably has been heated in deeper aquifers and then has ascended to the Inyan Kara”
- Powertech baseline wells show a geothermal gradient of 0.75 ° C/100 ft – one-half of that reported by Gott

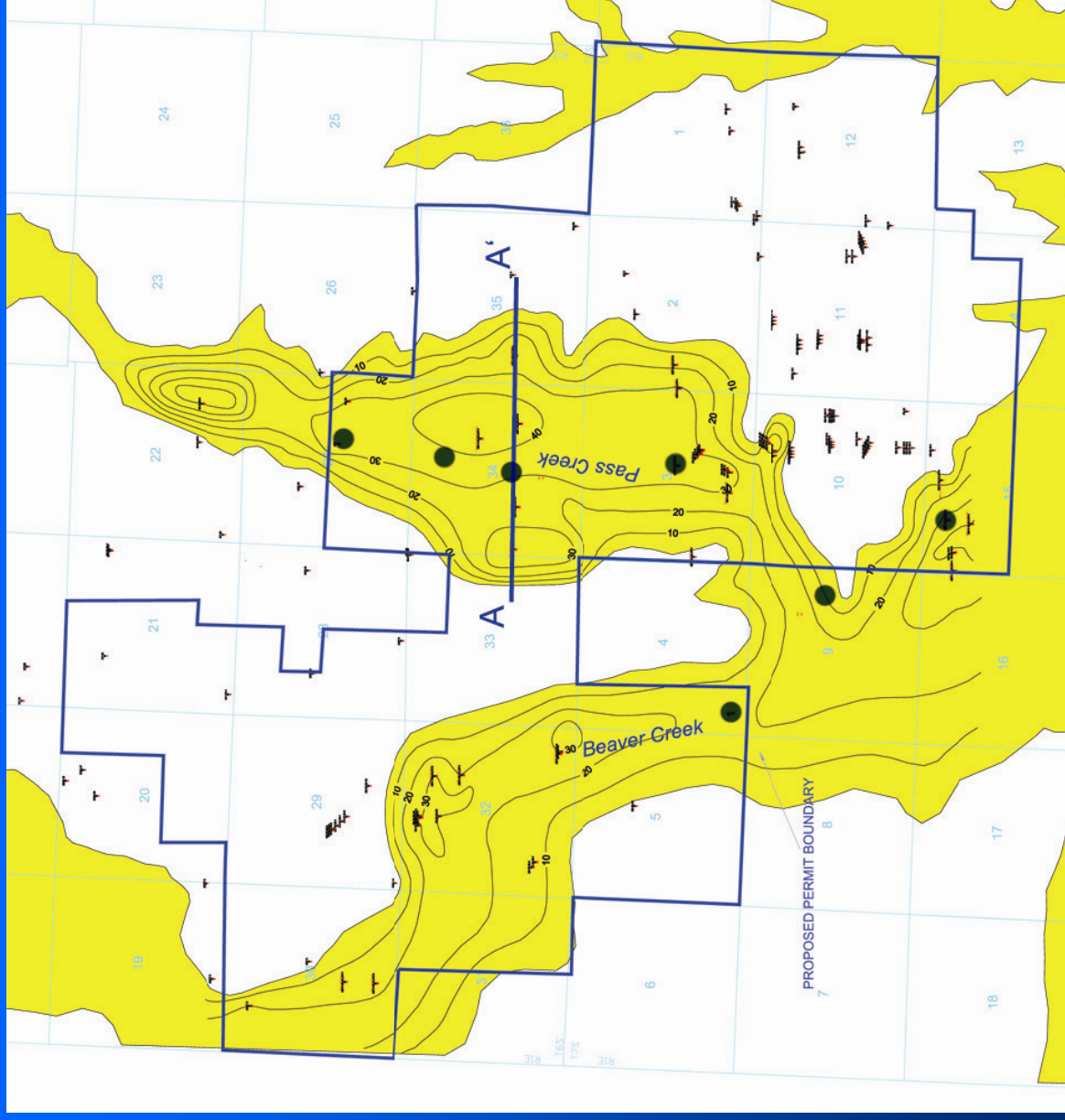
Breccia Pipes in Project Boundary

- No breccia pipes were mapped inside project boundary by Gott or others.
- Powertech finds no evidence of breccia pipes in drilling or surface investigations.
- No supporting evidence of breccia pipes within project boundary.

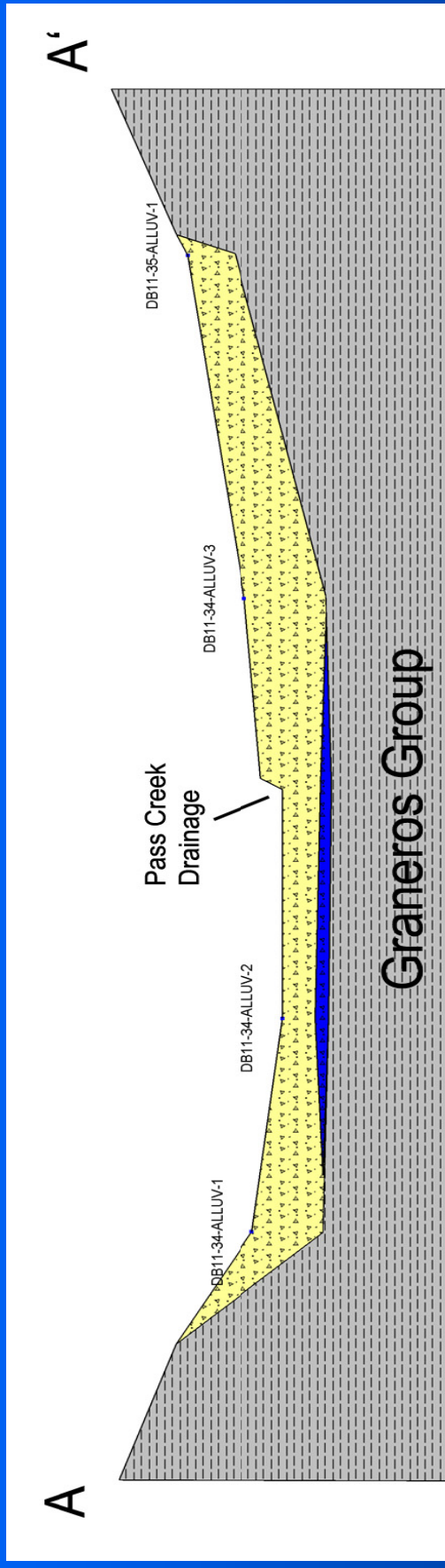
Surface Water and Alluvium

Surface Alluvium

Historic holes & 19
new bore holes
Characterize extent,
depth, thickness,
saturation
3 of 19 new bore
holes developed
into wells
Monitoring system
for baseline and
operations

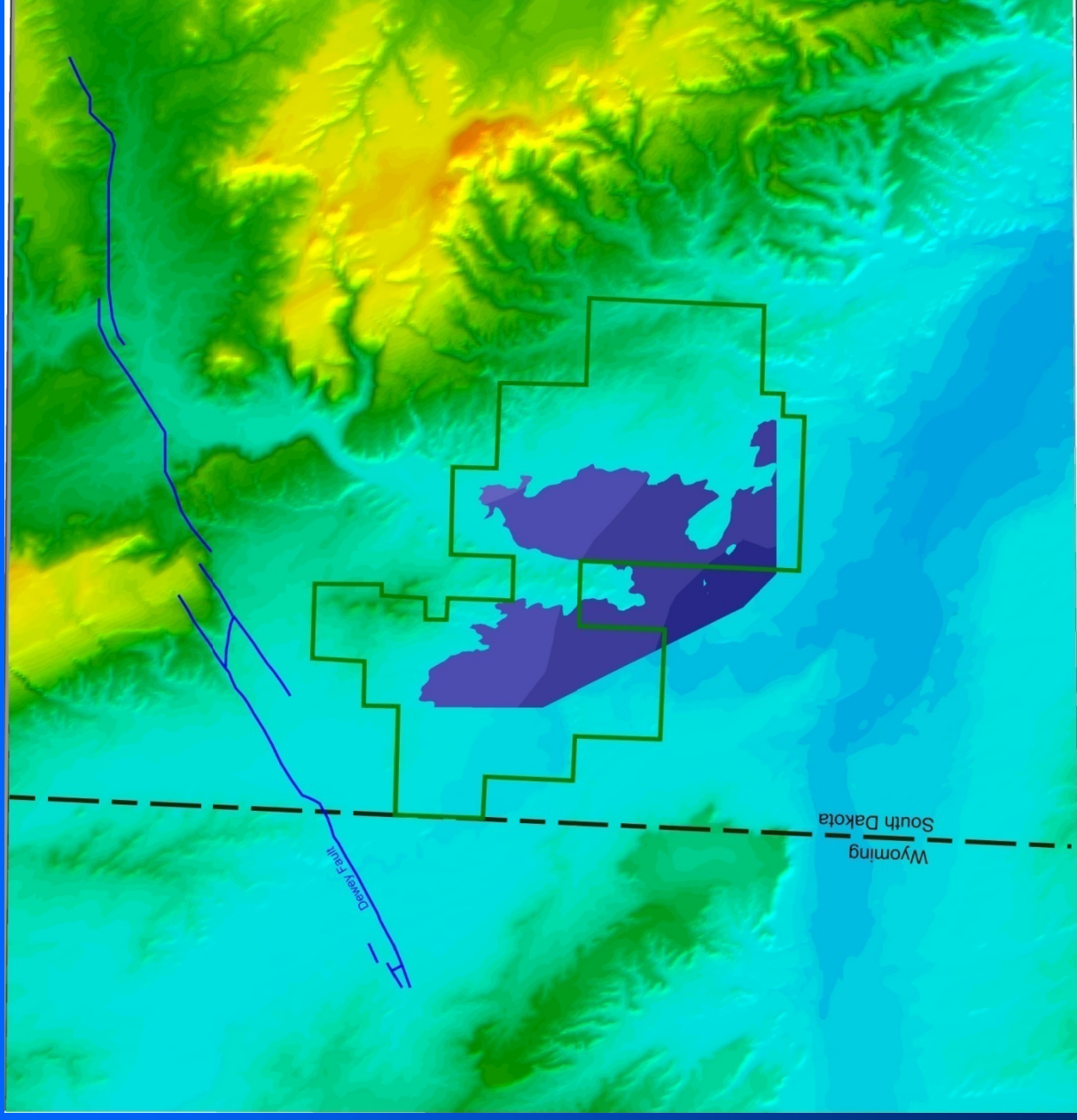


Surface Alluvium

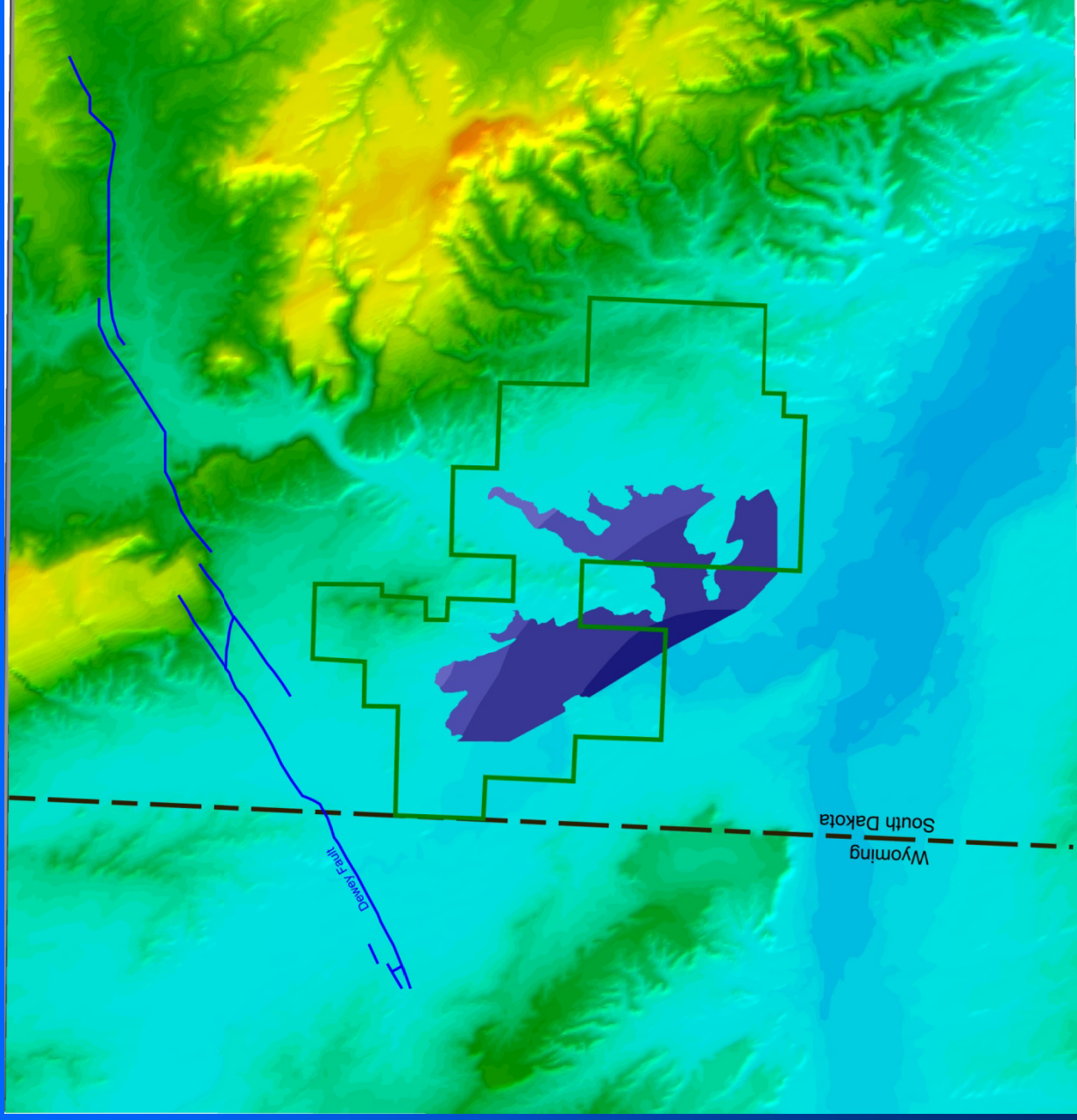


- Minimal saturation within alluvium
- Static water levels 30 feet below Pass Creek
- Alluvium below Beaver Creek unsaturated
- Alluvium rests upon Graneros Confining Unit

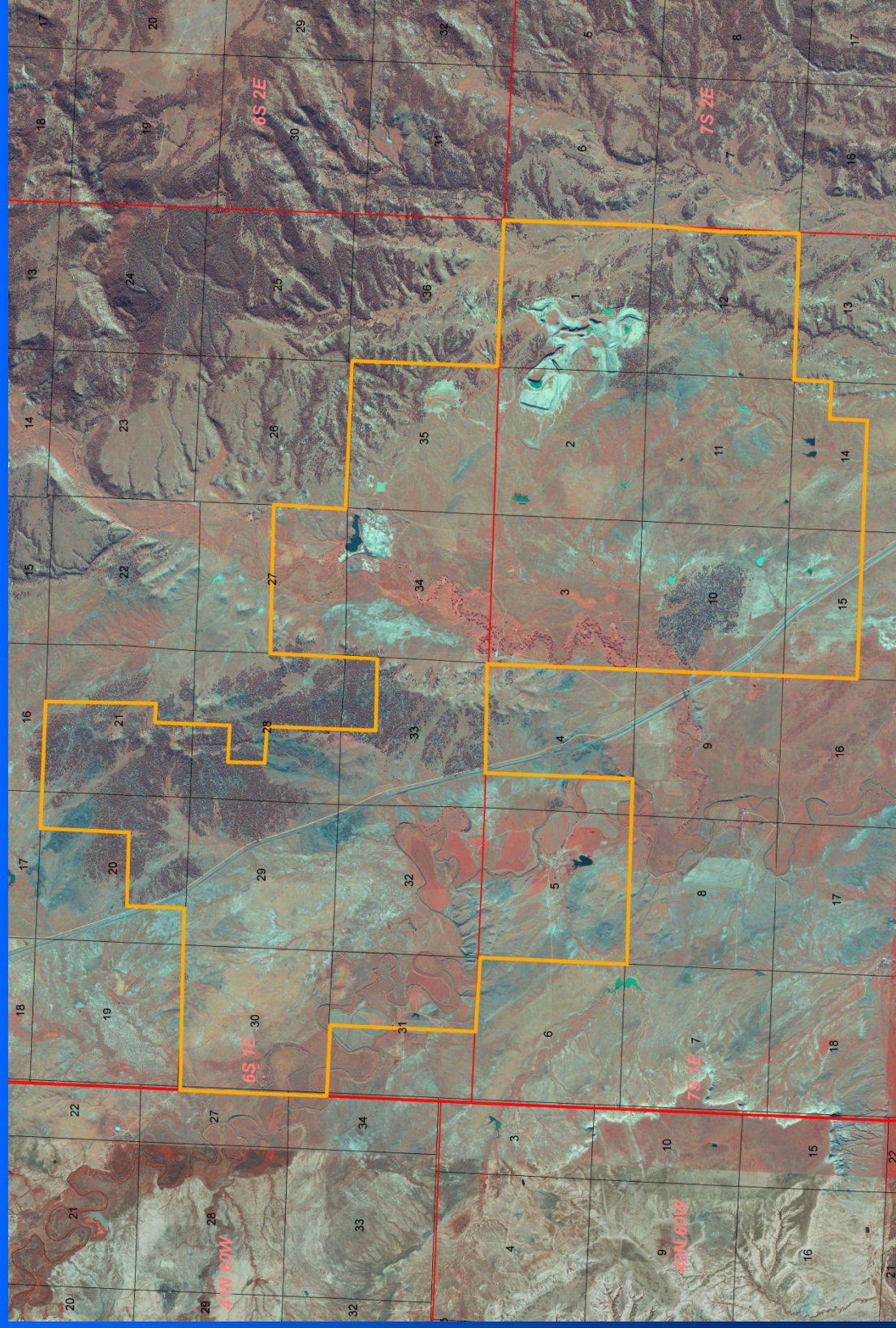
DEM & Fall River Potentiometric Surface



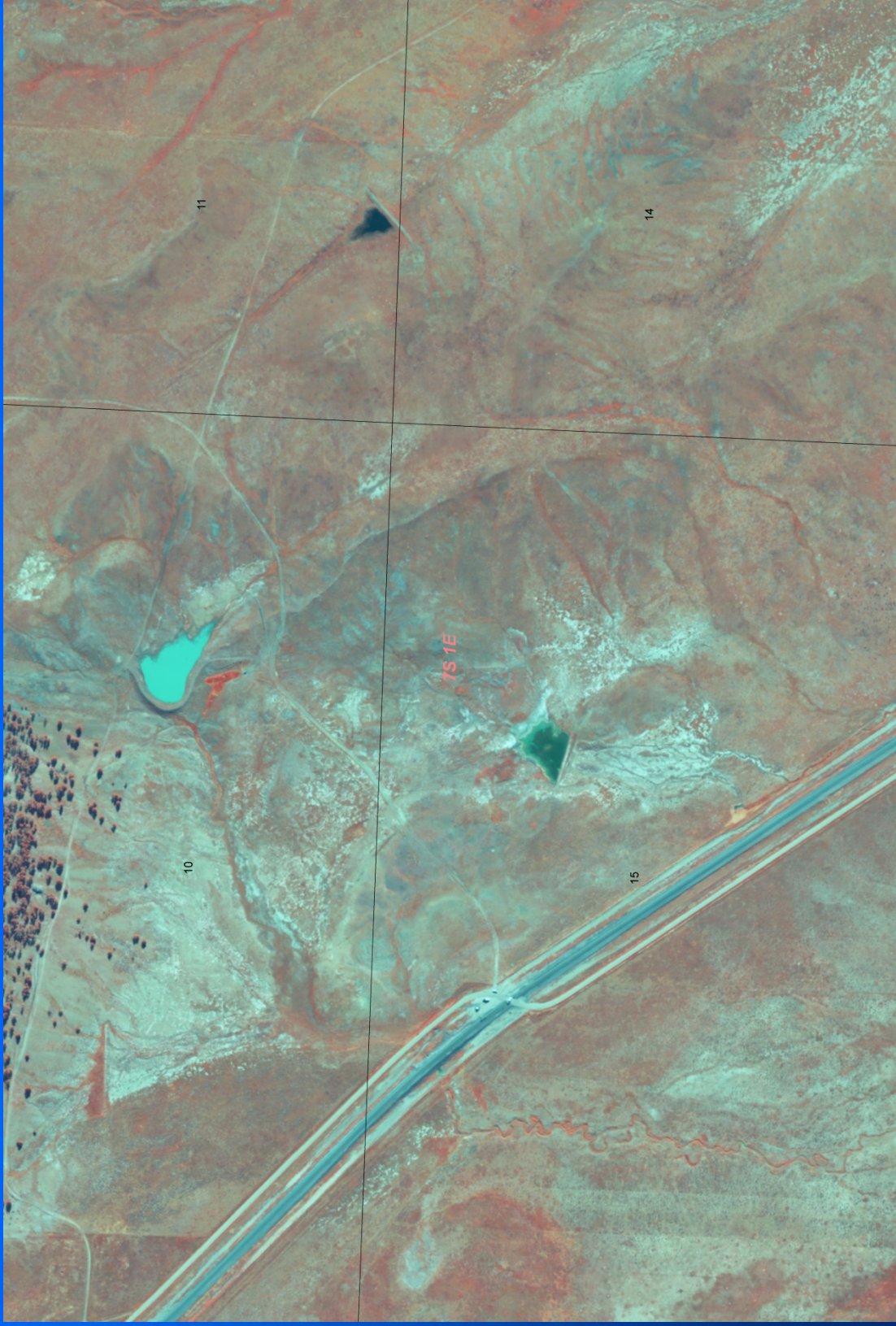
DEM & Chilson Potentiometric Surface



DEWEY-BURDOCK PROJECT AREA -- CLEAR INFRARED IMAGE



Alkali Area Near Burdock



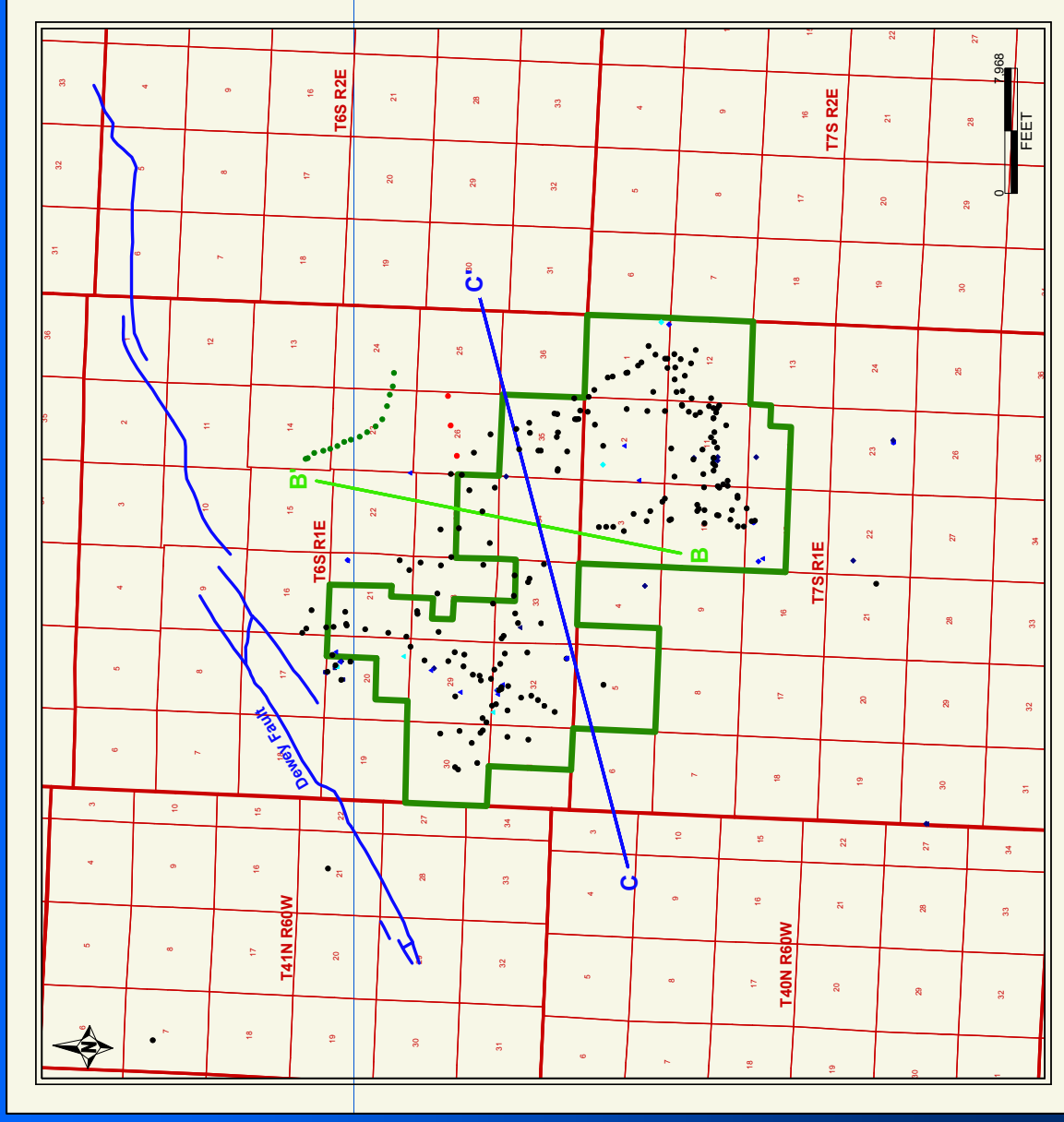
Alkali Area Near Burdock



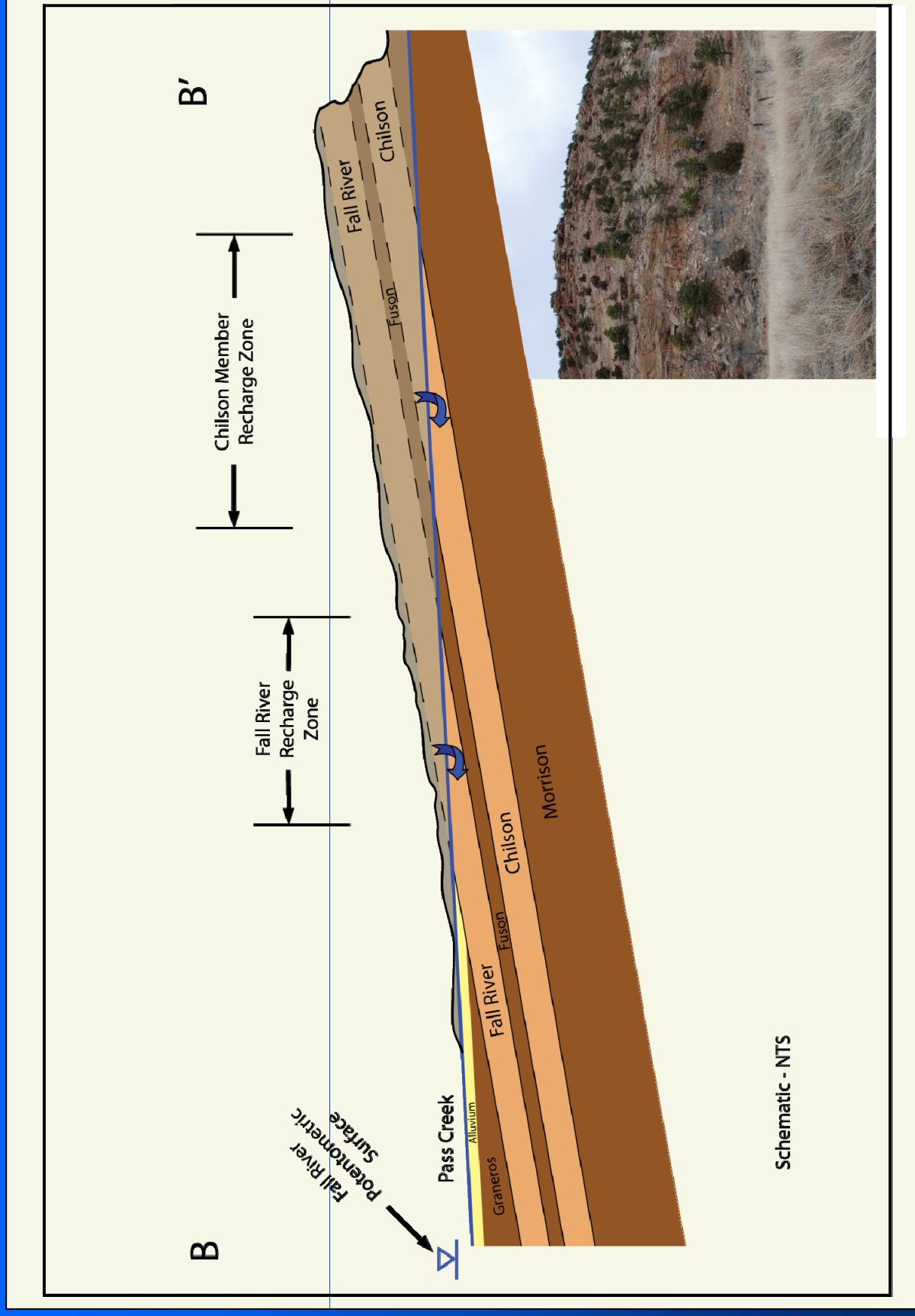
Springs near the Town of Dewey North of Project Boundary



Schematic Cross Sections B-B' and C-C' Location Map



Schematic Cross Section B-B'



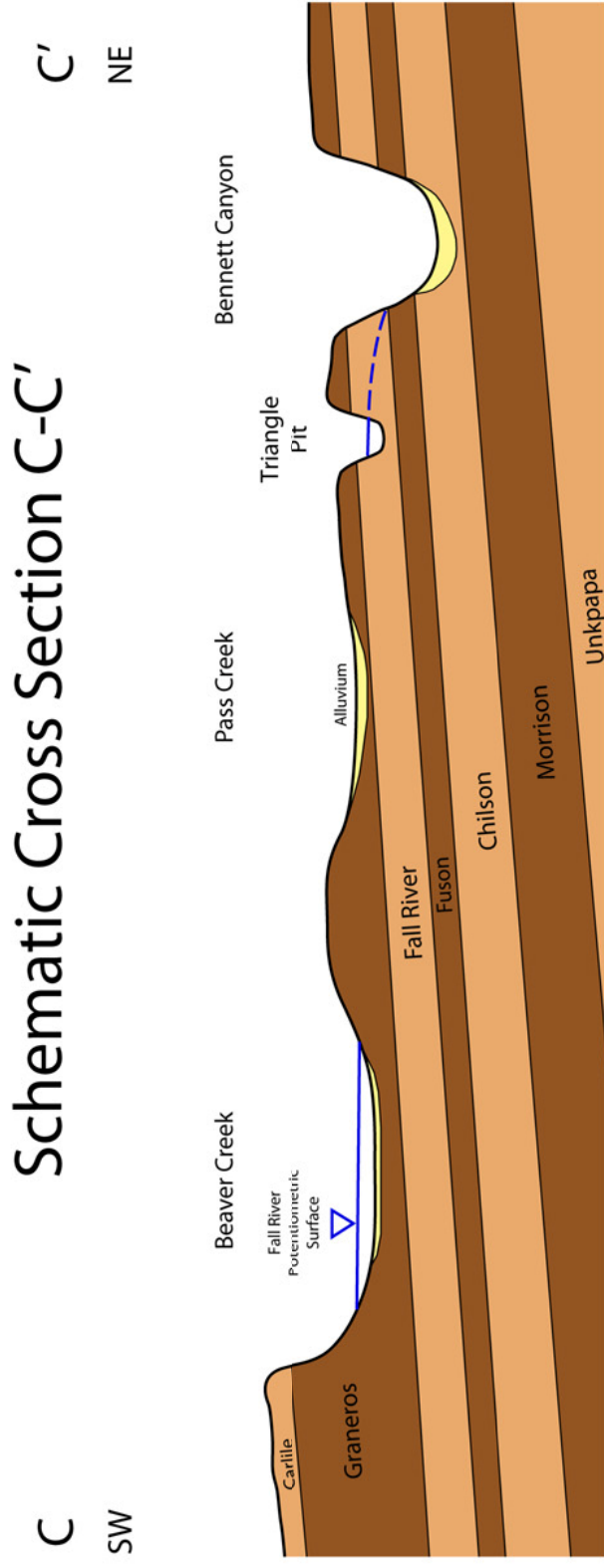
Pass Creek – Looking Upstream Recharge Zone Northeast of Project Boundary



Pass Creek – Downstream Recharge Zone Northeast of Project Boundary



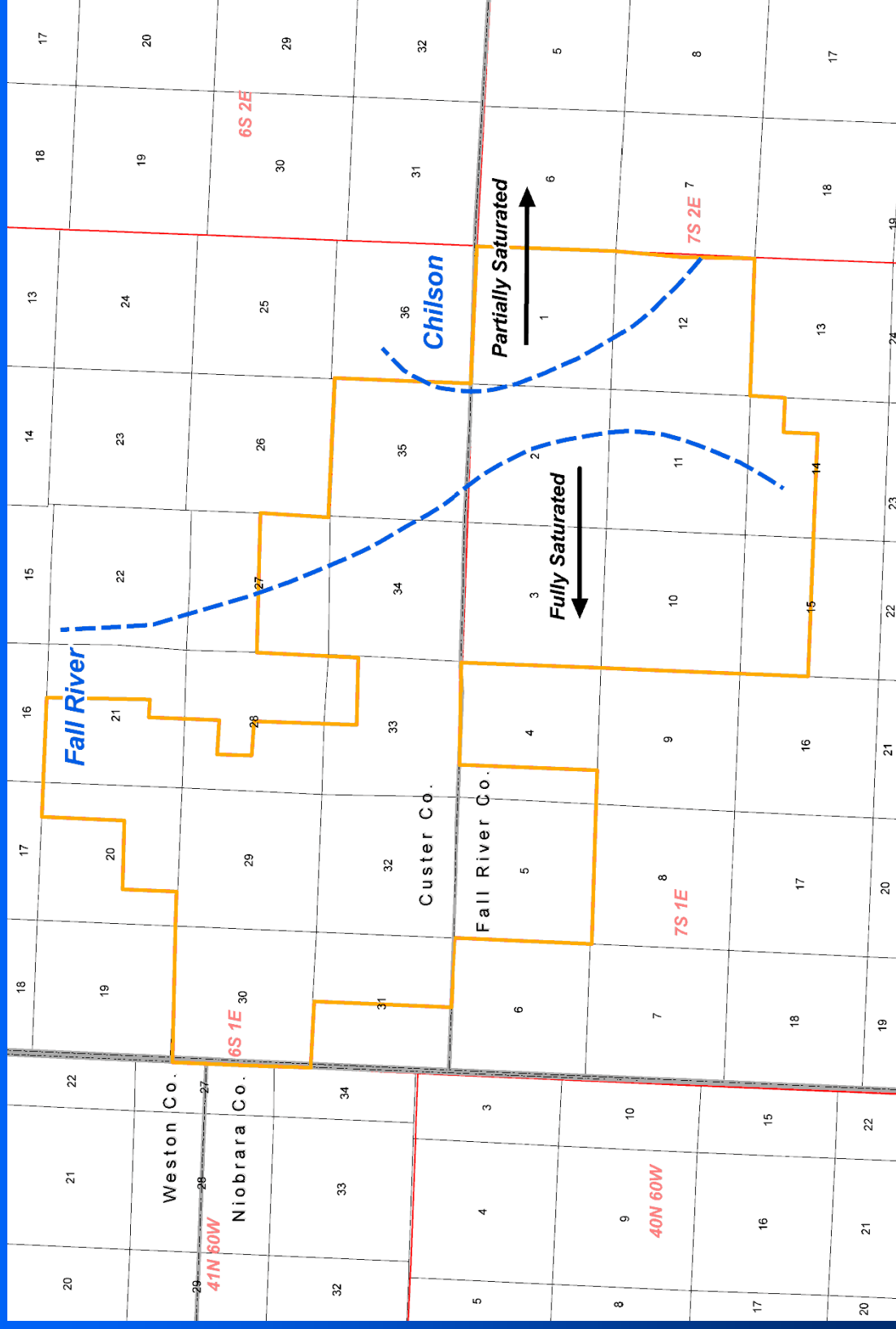
Schematic Cross Section B-B'



Schematic - NTS

LIMITS OF FULL SATURATION

Fall River & Chilson



Dewey-Burdock Model Objectives (I)

Regional Groundwater Flow Model

- Better define recharge/discharge boundaries
- Evaluate Regional Flow
- Assess Water Budget
 - available and sustainable resources
- Assess Hypothetical Communication Pathways
 - Abandoned boreholes
 - Breccia Pipes

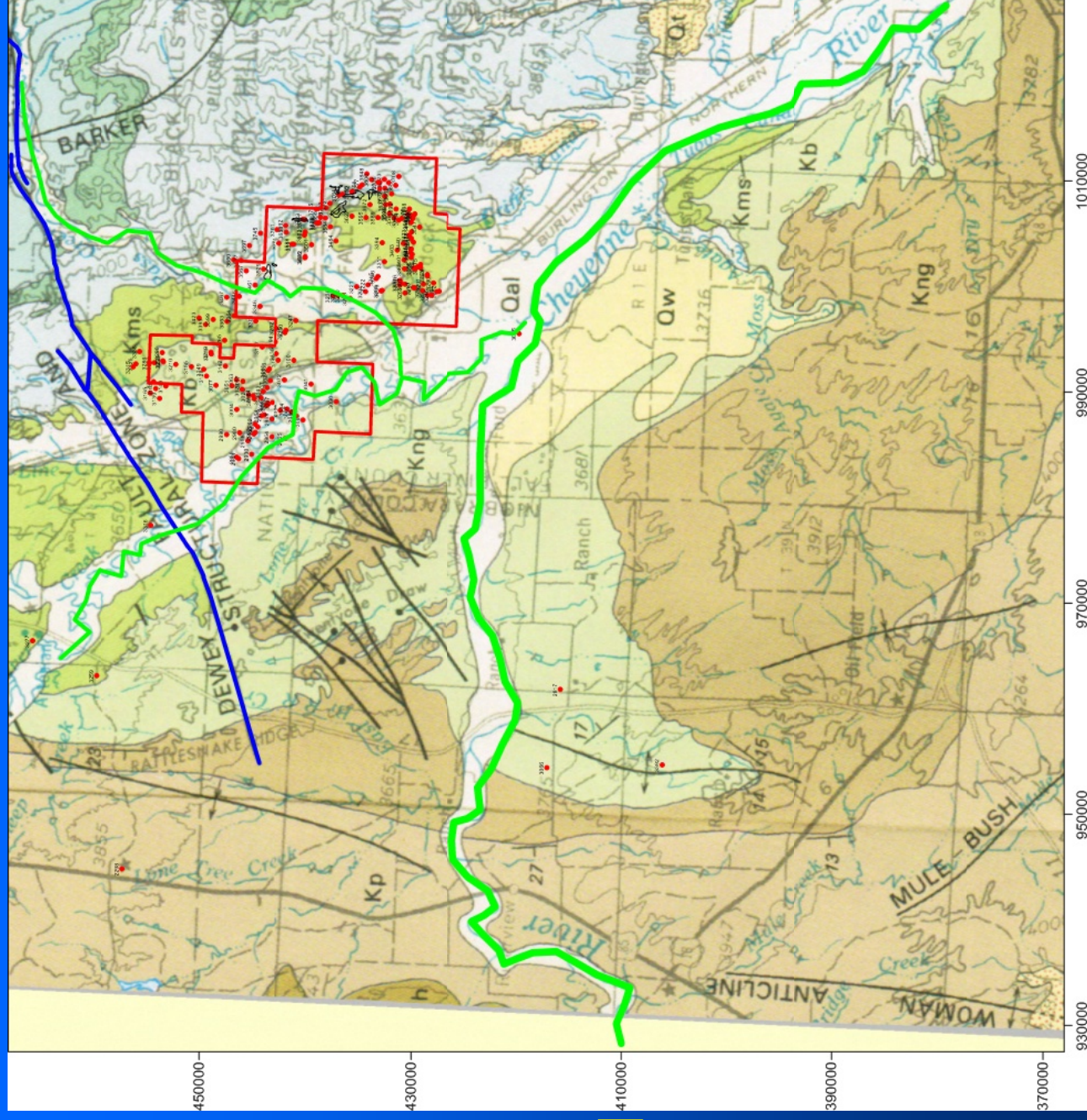
Dewey-Burdock Model Objectives (II)

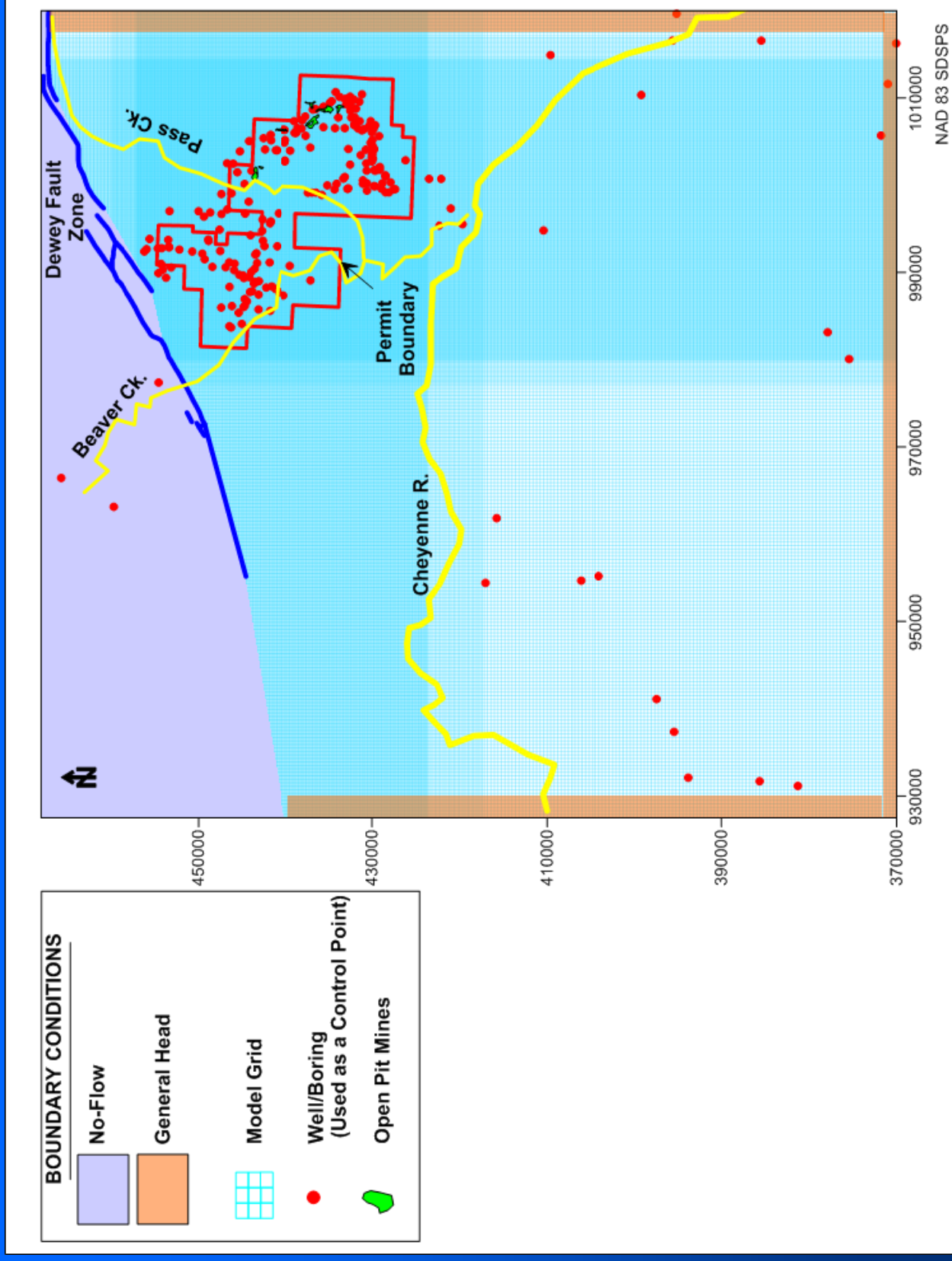
Well Field Scale Model

- Monitor Ring Spacing
- Hydrologic Test Design
- Well field Design/Balance (Well Field Flare)
- Hydraulic Response to ISR Operations
- Excursion Detection and Recovery
- Potential Long-Term Impacts to Water Resources
- What if Scenarios:
 - Abandoned boreholes/ Breccia pipes

Dewey-Burdock Model Domain

Geology Superimposed

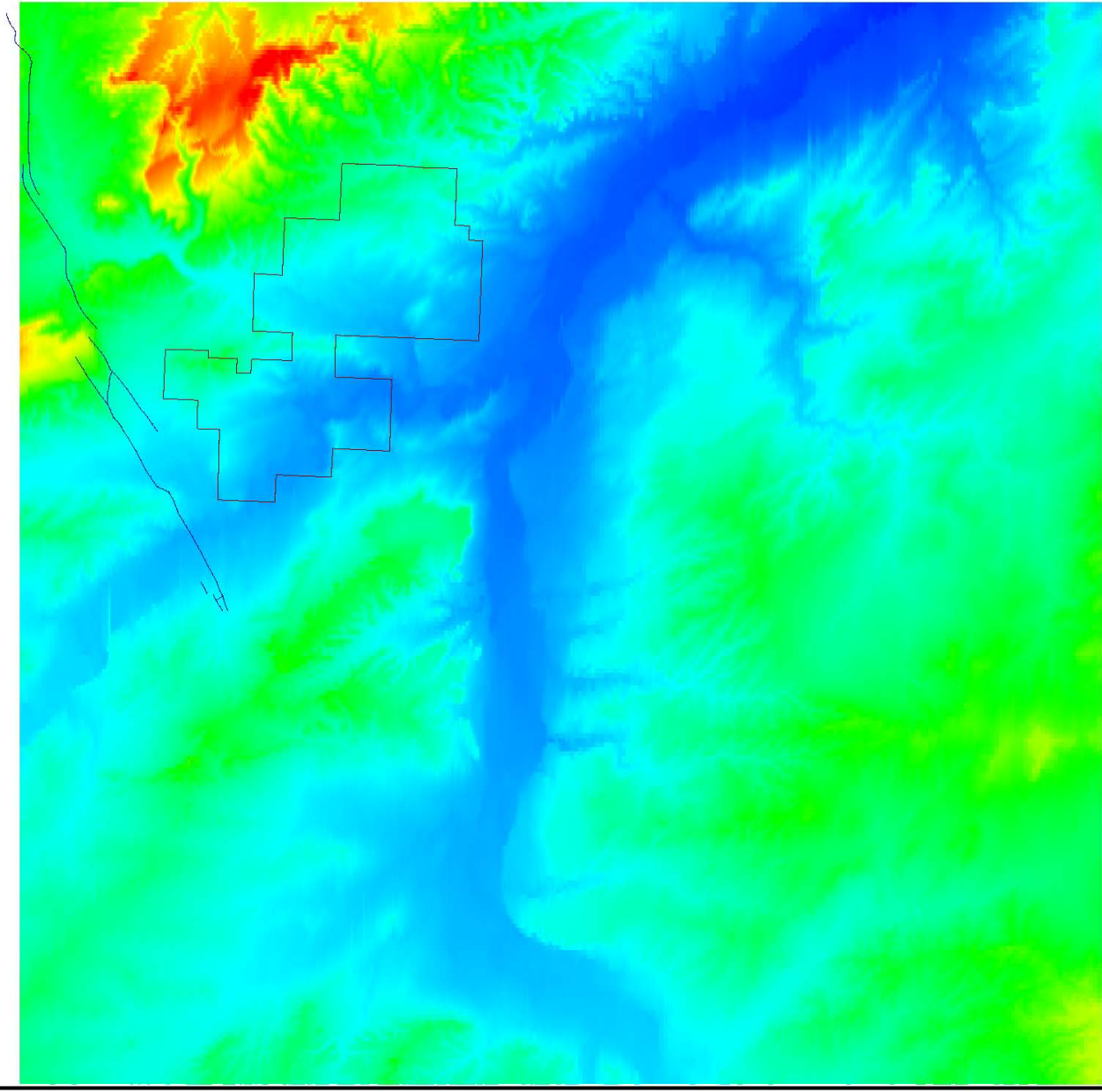


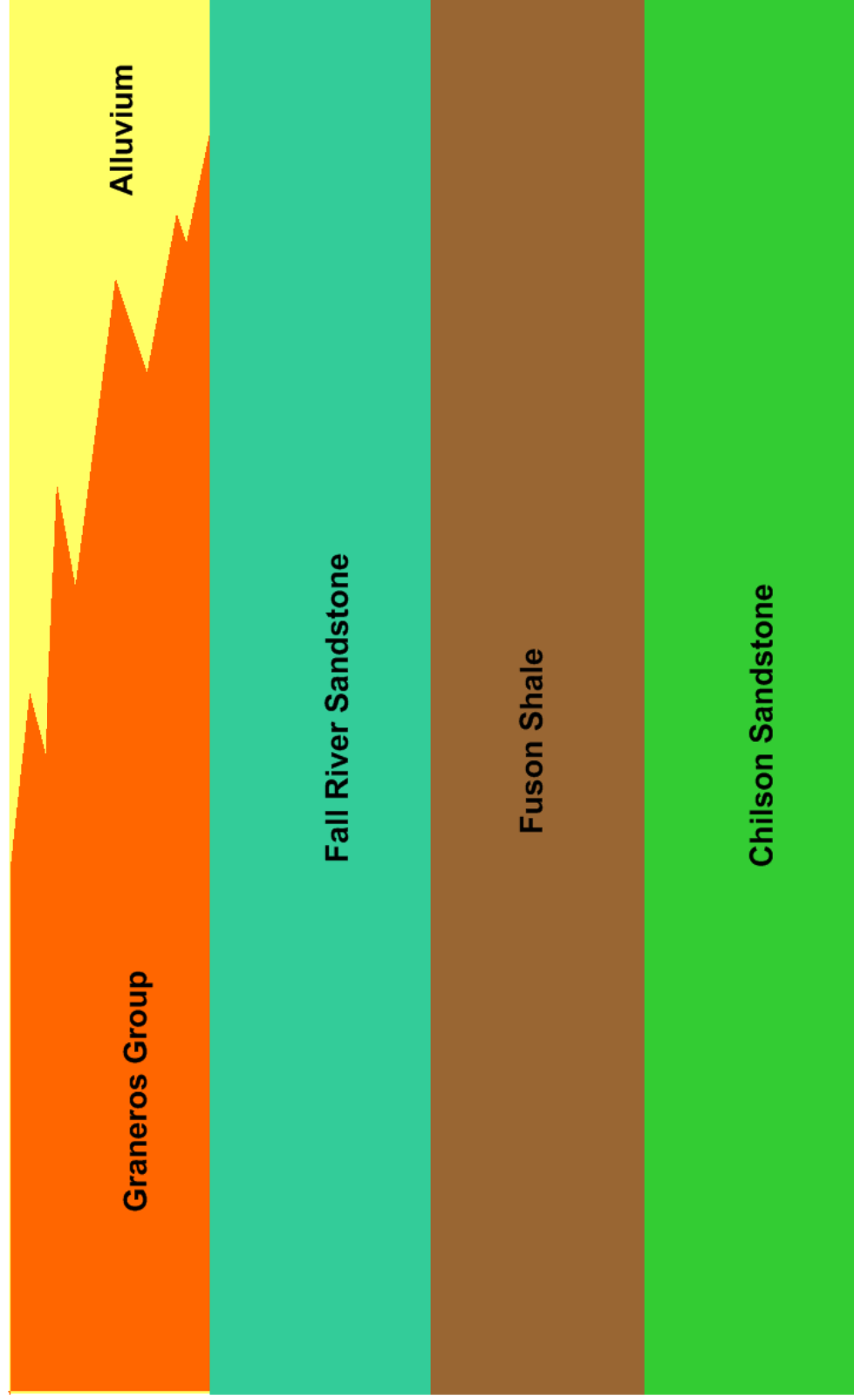


Dewey-Burdock Model Boundary Conditions

Dewey- Burdock Model

Top of Upper Layer (Ground Surface)





Dewey-Burdock Model Layers