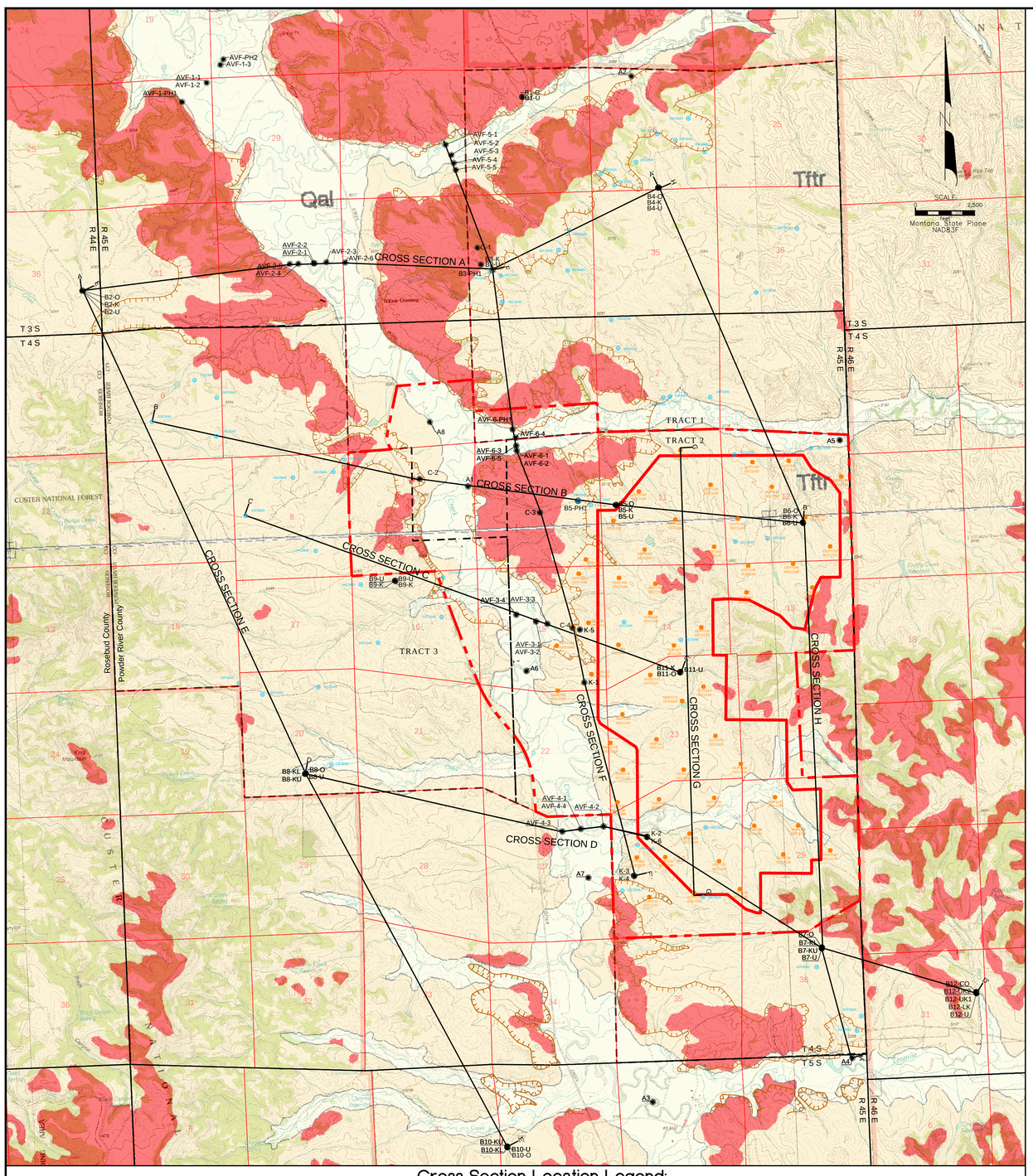
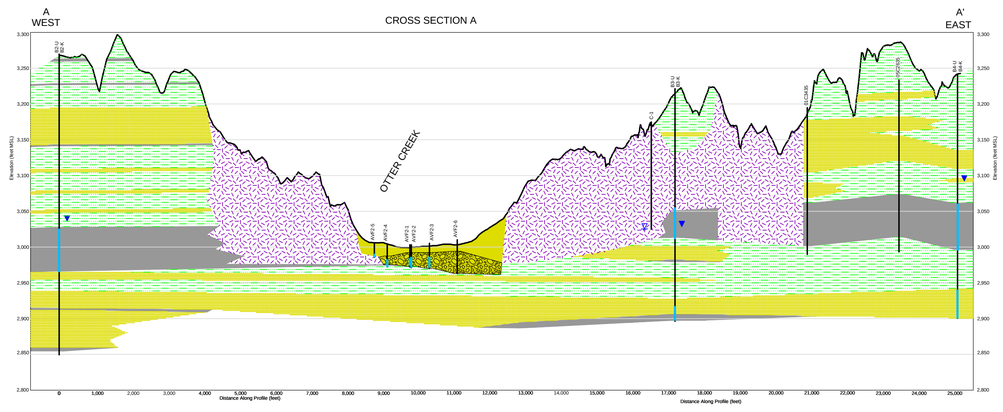


Cross Section Location Legend:

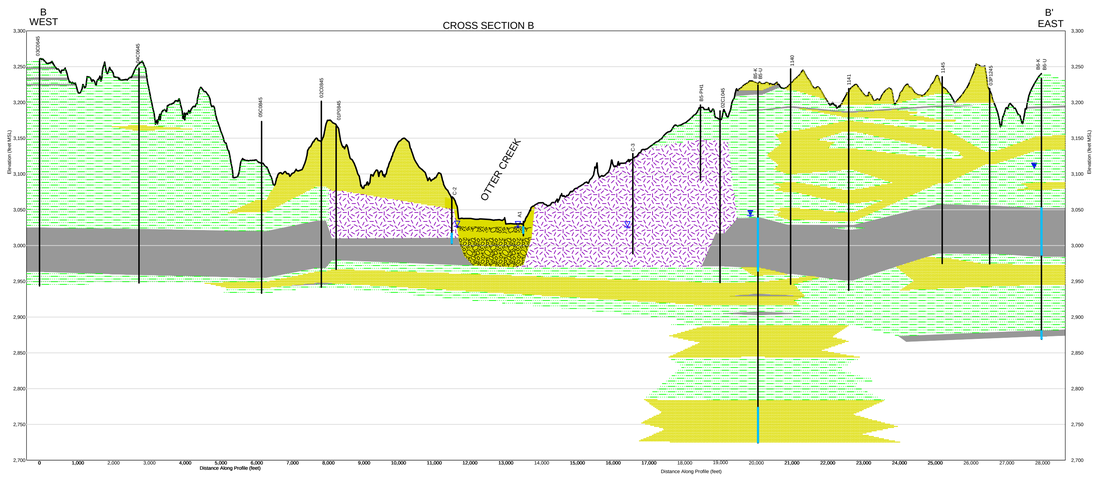
Clinker (MBMG 428 & 431)	QTcl
Tongue River Member of the Fort Union Formation (MBMG 428 & 431)	Tftr
Alluvium of Modern Channels & Flood Plains (MBMG 428 & 431)	Qal
Alluvium of Alluvial Terrace Deposits (MBMG 428 & 431)	Qat

- Mining Area
- Mine Permit Boundary
- Tract Boundary
- Township Lines
- Section Lines
- Clinker Burn Line (Arch)
- Cross Section Line (A – A')
- 2004 Drill Hole (MT)
- 2011 Core Hole (Arch)
- Monitoring Well

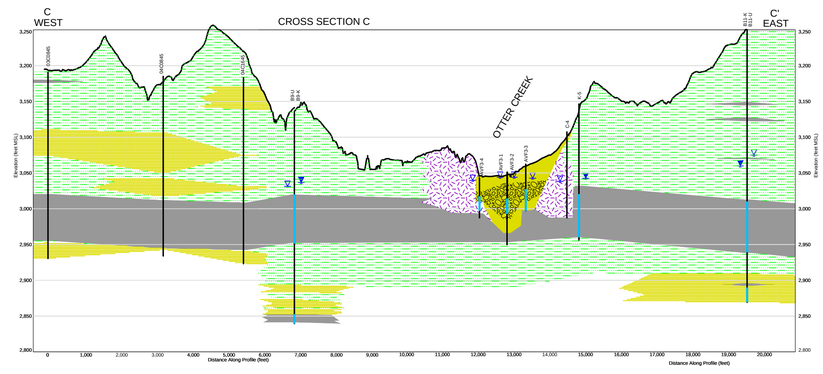
CROSS SECTION A



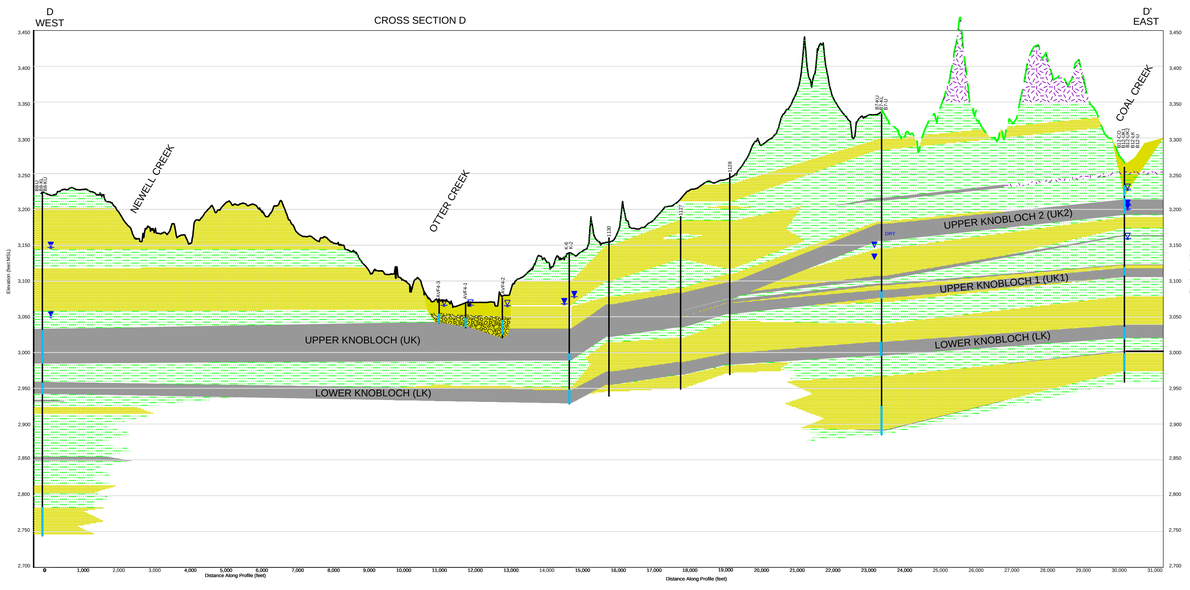
CROSS SECTION B



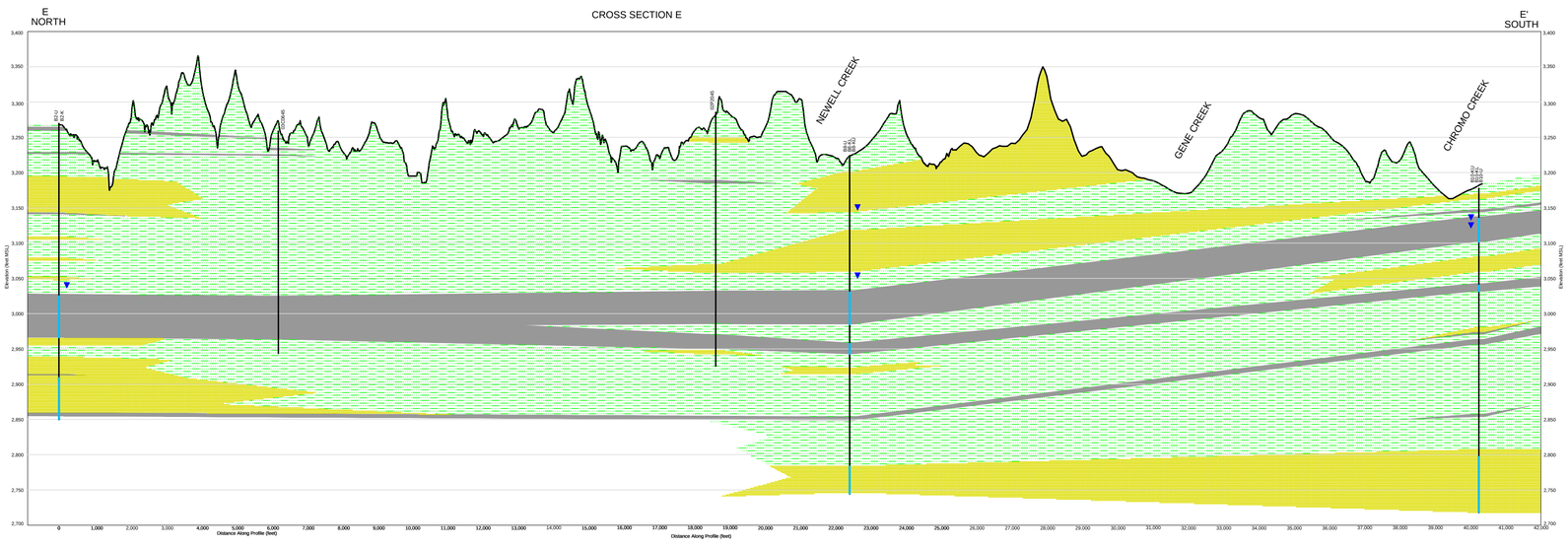
CROSS SECTION C



CROSS SECTION D



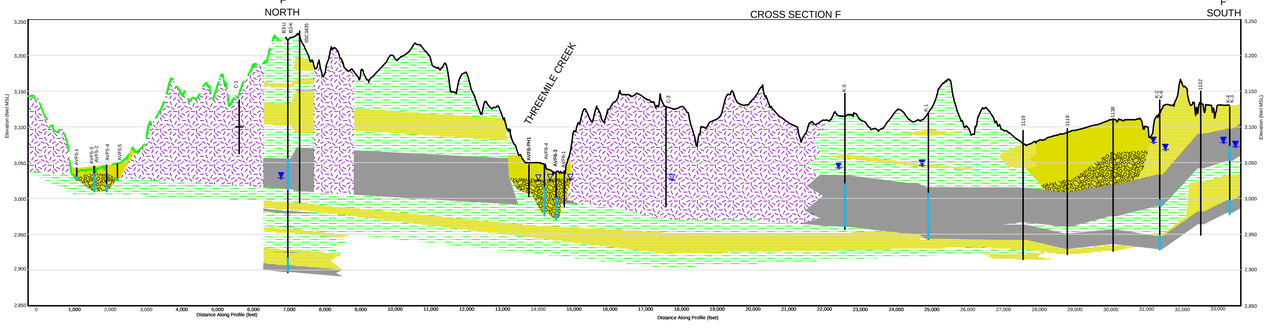
CROSS SECTION E



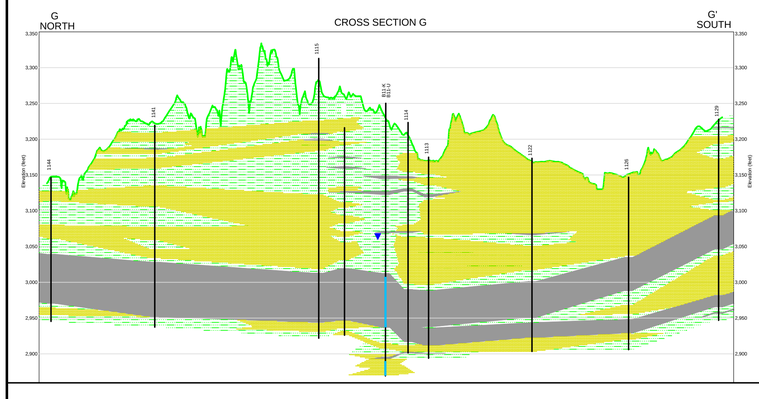
Sys-tem	Series	Formation and member	Altitude (feet above sea level)	
Tertiary	Paleocene	Fort Union Formation — Tongue River Member	4200	KING MOUNTAIN
			4000	Clinker of Anderson coal
				Dietz coal (4± feet thick)
			3800	Canyon coal (3± feet thick)
				Wall coal (3± feet thick)
			3600	Pawnee coal (9± feet thick)
				Local coal (2± feet thick)
			3400	Local coal (3± feet thick)
				Cache coal (3 to 6 feet thick)
				Local coal (2± feet thick)
				Local coal (2± feet thick)
			3200	Sawyer "1" coal (0 to 4 feet thick)
				Sawyer "2" coal (0 to 3 feet thick)
				OTTER CREEK Alluvium
			3000	Knobloch coal (40 to 70 feet thick)
			2800	Flowers–Goodale coal (7 to 21 feet thick)
			2600	Terrett coal? (4 to 8 feet thick)
		Includes lower sandstone of the Tongue River Member		
		Lebo Shale Member — Includes middle sandstones of the Tongue River Member	2400	Mostly shale with local sandstone lenses, and thin coal seams less than 1 foot thick
		Tullock Member	2200	Mostly sandstone with some shale beds, and coal beds generally less than 5 feet thick
			2000	
Cretaceous	Upper Cretaceous	Hell Creek Formation	1800	Mostly shale in upper part, sandstone in lower part

Adapted from Neal E. McClymonds, 1984, POTENTIAL EFFECTS OF SURFACE COAL MINING ON THE HYDROLOGY OF THE WEST OTTER AREA, ASHLAND AND BIRNEY-BROADUS COAL FIELDS, SOUTHEASTERN MONTANA; U.S.

CROSS SECTION F



CROSS SECTION G



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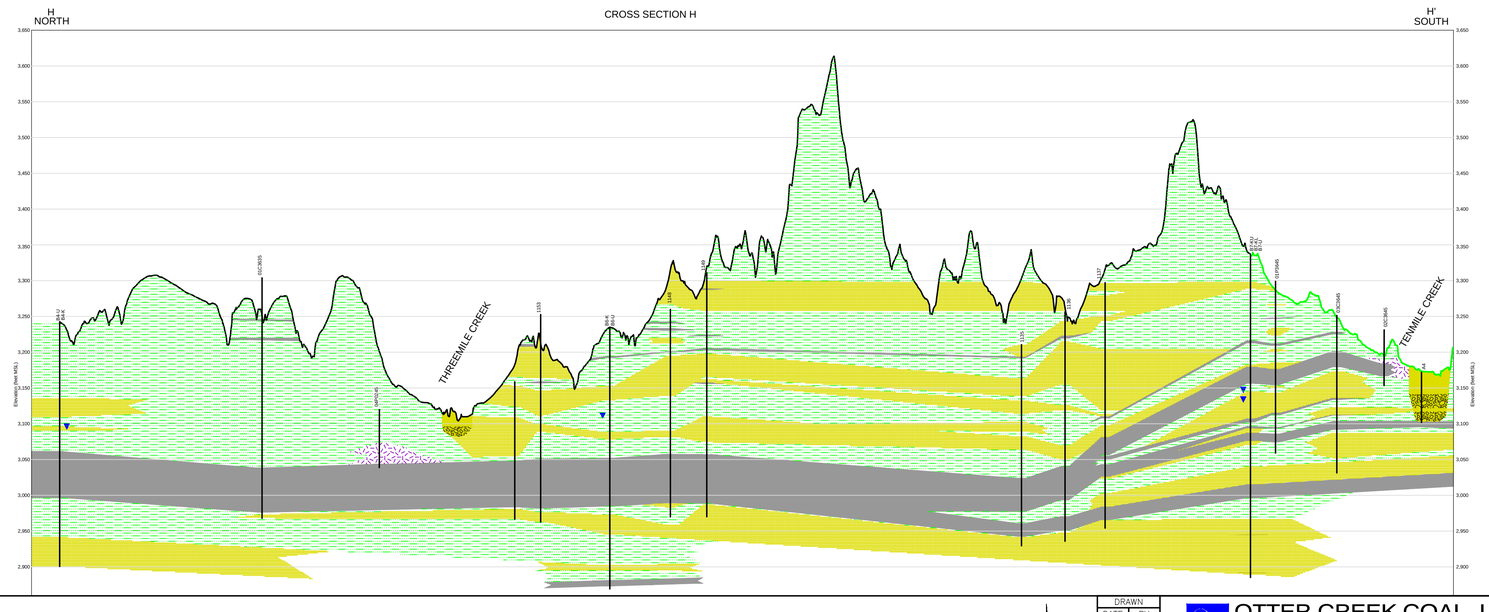

Cross Section Legend:

- Coal
- Unconsolidated Sediment (Alluvium/Colluvium)
- Gravel
- Siltstone/Shale/Mudstone
- Clinker
- Sandstone
- Alluvial, Clinker, or Underburden Groundwater Elevation (March 2012)
- Knobloch Groundwater Elevation (March 2012)

20X Vertical Exaggeration (1"=100')

SCALE 2,000 Feet 1"=2,000' Montana State Plane NAD83 US Feet

Hydrometrics, Inc.
Consulting Scientists and Engineers

DRAWN	
DATE	BY
6/20/12	JAR
REVISED	
DATE	BY
APPROVED	
DATE	BY

OTTER CREEK COAL, LLC
P.O. BOX 7152 Billings, Mt. 59103

Otter Creek Mine
Permit ID: C2012018

Geologic Cross Sections

FILE NAME: MAP16_GEOLOGIC_CROSS_SECTIONS_R1_2014.DWG
LAYOUT: MAP 16
Path: I:\LAND PROJECTS\OTRCR\DWG\MINE PERMIT