



**SUBSIDENCE INVESTIGATION
BRIDGEWATER
WELD COUNTY ROADS 8 and 5
ERIE, COLORADO**

Prepared For:

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Project No. CT15,114-130

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EXECUTIVE SUMMARY

We have investigated subsurface conditions and developed opinions regarding mine subsidence risk for the Bridgewater property. The property consists of portions of the south half of Section 8, all of Section 17, and the east half of Section 18, Township 1 North, Range 68 West in Erie, Colorado (Fig. 1). The property is underlain by the Northwestern Mine, Boulder Valley (old) Mine, Boulder Valley (new) Mine, Clayton Mine and an Unknown mine. The mines operated between 1883 and 1946 and are located under areas planned for development.

Mine conditions beneath the Clayton and Boulder Valley (new) mines and near the Boulder Valley (old) were explored by drilling twenty-two borings to depths up to 300 feet. The floor of the likely mined coal seam was found at depths ranging from 102 to 250 feet. We reviewed an investigation of the areas underlain by the Northwestern, Boulder Valley (old) and Unknown mines completed by Western Environmental and Ecology, Inc. (WEE)¹. Our analysis and review indicate the risk of future subsidence propagating to the surface is low for areas where the thickness of bedrock above the mined coal seam is greater than 90 feet. The majority of the property is categorized as low subsidence potential. Some areas of shallow mining and areas around the six mapped shafts are categorized as severe subsidence potential.

Based upon our analysis and review, we believe residential or commercial construction is feasible in areas rated as low subsidence potential. We believe the risk of caving or trough subsidence affecting overlying development in these areas is low. WEE recommended some low risk areas undermined by shallower mines should have foundation length restrictions and strain isolation trenches.

Development in mined areas rated as severe is not recommended without mitigation. Mitigation would involve an extensive drilling and grouting program.

¹ Western Environment and Ecology, Inc., "Mine Subsidence Investigation, Community Development Group LLC, Northfield Development, Section 18, Township 1 North, Range 68 West, Erie, Colorado," September 5, 1999



SCOPE

This report presents the results of our Subsidence Investigation for the Bridgewater Property in Erie, Colorado (Fig. 1). The purpose of this investigation was to evaluate the condition and extent of mining and analyze the risk of subsidence for the portions of the site underlain or near five abandoned coal mines at various locations. This report includes the results of our historical research, field investigation, discussions of the extent of mining, subsidence mechanisms, and engineering analyses of subsidence risk. A discussion of mitigation methods is also included. Our investigation was performed in general conformance with our Proposal No. DN 10-0567 dated September 14, 2010.

HISTORICAL RESEARCH

Mining began in the Boulder-Weld coal field in the late 1800's, continuing until as recently at 1975. We researched available Mine maps and previous studies from the Colorado Geological Survey (CGS). Existing information indicates the Northwestern Mine, Boulder Valley (old) Mine, an Unknown mine, Boulder Valley (new) Mine and the Clayton Mine are beneath portions of the Bridgewater property (Fig. 1). A summary of the mining operations at each mine is presented below.

Northwestern Mine

The Northwestern Mine operated between 1892 and 1907 with a reported production of 54,193 tons of extracted coal. Coal was mined through a main shaft located on the northeast portion of the mine. An air shaft was located approximately 125 feet west of the main shaft (Fig. 2). The coal seam ranged between 5 to 8 feet thick.



Boulder Valley (old) Mine

The Boulder Valley (old) Mine is northwest of the Northwest Mine. The mine operated from 1883 to 1885, and again from 1890 to 1895. The reported coal production was 35,813 tons during the first operating period. No records could be found documenting production during the second five year operating period. Coal was mined through a main shaft located on the western edge of the mine. An air shaft was located approximately 180 feet southeast of the main shaft (Fig. 2). The coal seam ranged between 5 to 7 feet thick.

Unknown Mine

Two shafts are mapped to the north of the Boulder Valley (old) Mine (Fig. 2). There are no mine maps or production records filed with the Colorado Division of Mines for this mine. Collapse features at the surface were previously documented, and the estimated depth to the mine was 40 to 50 feet.

Boulder Valley (new) Mine

The Boulder Valley (new) Mine underlies the eastern portion of Section 17. The mine operated from 1917 to 1946 with a reported coal production of 3,518,912 tons. Coal was mined through a main shaft located south of Bridgewater in Section 20. The coal seam thickness ranged from 4 to 11 feet thick, with an average seam thickness of 8 feet.

Clayton Mine

The Clayton Mine underlies the southeastern portion of Section 8. The mine operated from 1920 to 1942. The reported coal production was 3,333,225 tons. Coal was mined through a main shaft located east of Bridgewater in Section 16. The coal seam ranged between 6.5 to 9 feet thick, with an average seam thickness of 8 feet.



Mining Methods

The mines are classified as modified room and pillar operations. Air shafts were typically excavated vertically near the entry shaft and possibly at other locations depending upon the size of the mine. Once the entry and air shafts penetrated the mineable coal layer, haulways were cut parallel and perpendicular to the strike of the seam. Rooms typically 15 to 20 feet wide and 100 to 300 feet long were cut with pillars approximately 15 to 40 feet wide between rooms for support. Typically about 30 to 60 percent extraction was achieved by room and pillar mining.

Upon completion of the room and pillar operation, pillars were partially or fully removed using retreat mining techniques. Typically, 15 to 25-foot wide sections of support pillars were removed leaving “stump” pillars. After retreat mining, the remaining pillars and roof coal were shaved, resulting in 75 to 85 percent extraction in a given panel. However, barrier pillars left to protect haulways resulted in overall extraction on the order of 50 to 70 percent.

INVESTIGATION

Our investigation was developed to evaluate the potential for surface subsidence resulting from abandoned underground coal mining. After reviewing available information the investigation plan was developed to:

1. Obtain geologic data on lithology and stratigraphy of the mine overburden;
2. Review the previous WEE subsidence evaluation for the Northwest, Boulder Valley (old) and Unknown mines;
3. Explore mine conditions for the Clayton and Boulder Valley (new): mine locations, depth to mining, seam thickness, mine extraction, voids and rubble zones;
4. Analyze subsidence potential; and
5. Formulate recommendations for development.



Twenty-one exploratory borings were drilled in the area of the Clayton and Boulder Valley (new) mines and one boring near the Boulder Valley (old) mine using rotary drilling techniques. Drilling was conducted by Precision Sampling of Colorado Springs, Colorado. The location of exploratory borings is shown on Figs. 1 and 2. Boring logs are shown on Figs. 4 through 6 and a summary of conditions found is presented in Table 1.

SUBSURFACE CONDITIONS

Bedrock of the Laramie Formation is present under the overburden soils and consists of claystone, shale and scattered beds of sandstone and lignite. The Laramie Formation produced economically important beds of coal. Locations of coal deposits are controlled by faulting. Mining within these coal beds has been documented in surrounding areas.

Surficial Soils

The alluvium consists of clayey sands and gravels with occasional clays. The depth of alluvium varied from six to seventeen feet at our boring locations.

Neither the natural alluvium nor future site grading fill have strength sufficient to mitigate subsidence if deeper movement occurs. Experience indicates that alluvium tends to flow into mine voids and will not arch to resist subsidence forces. For analysis purposes, the strengths of the surficial soils is assumed to be nil.

Bedrock

The surficial soils are underlain by bedrock consisting of interbedded claystone (shale), siltstone, and fine-grained sandstone. The stratigraphy of the bedrock was erratic across the site. The bedrock above the coal seam consisted of siltstone/claystone and shale of varying thickness.



MINE CONDITIONS

A general picture of the subsurface was developed by researching available mine records and previous geologic and geotechnical studies. Field exploration by our firm was performed to better define the subsurface conditions and subsidence hazard primarily in the east part of Bridgewater. We relied on the WEE evaluation for the west area.

The depth of mining reported on existing mine maps appears to be fairly accurate. We found a 6 to 8 feet thick coal seam, which would have been the likely mineable seam, at depths ranging from 102 to 250 feet. Additional thinner seams (coal riders) were also found; the relative thinness and poor quality coal lead us to believe mining of these seams was not done. The results of our borings showed the overbearing bedrock to be intact.

The thickness of bedrock above the mined seam ranged from 90 to 231 feet. The 90 foot thickness was in boring TH-22, which is in the shallower area near the Boulder Valley (old) and Northwest Mines. The bedrock thickness above the Boulder Valley (new) and Clayton Mines ranged from 139 to 231 feet. Six of our twenty-two borings encountered mine workings. No open void was encountered in those six borings indicating roof contact was made by the bulked rubble.

The locations of the mined areas were estimated considering the mine maps, drilling results, and geologic conditions. An accurate extent of mining cannot be determined without a more extensive drilling program than was conducted for this investigation. Mine maps can be inaccurate due to pillar robbing or surveying discrepancies.

SUBSIDENCE MECHANISMS

When coal is mined underground, the rock overlying the extraction is stressed and will subside into the extraction. The occurrence of subsidence and the mechanisms by which the overburden rock is distressed and displaced depends upon physical properties of the overburden, coal and floor materials, the



size of individual extractions and extraction ratios achieved. Subsidence may be caused as a result of failure of the mine roof, coal pillars or mine floor materials. Subsidence may take the form of sinkholes or a chimney-type cave, a gently sagging or trough-type subsidence, or settlement of backfill materials in entry or air shafts. The following paragraphs discuss potential subsidence mechanisms.

Caving Subsidence

Subsidence can produce sinkholes or depressions at the ground surface by caving of materials overlying comparatively shallow mine working. Caving occurs as the roof over an opening begins to fracture and collapse into the space where the extraction has occurred. This process continues until the space is either occupied by debris or the caving continues to the surface. Caving is more common over room and pillar operations. The depth to mining is important when determining whether or not the subsidence feature will reach the surface. Also important are the thickness of the extraction and bulking and strength characteristics of the overburden rock.

The size of sinkholes caused by caving is controlled by the geometry of the mine and properties of the overburden. The depth of the sinkholes depends on the depth to mining, thickness of the extraction, and bulking properties of the overburden. The areal extent of surface depressions is largely controlled by the size of the mine opening. Research has found that sinkholes typically are circular or elliptical in shape and usually not larger than the size of the extraction causing them.

Trough Subsidence

Trough-type subsidence is a sagging of the overburden triggered when large extraction ratios and panel sizes are achieved, both in areas of room and pillar mining and longwall mining. This generally occurs as a caving of the immediate roof followed by sagging of overlying strata. Trough-type subsidence is the common mechanism over longwall mines in the United States and Europe.

However, troughs which develop over partial extractions differ greatly from those



which occur over longwall mining. Oravec (1977) found the magnitude of surface subsidence above partial extractions is considerably smaller than subsidence which develops over total extraction mines. The presence of internal barriers and the low width to depth ratios helps reduce the magnitude of surface displacement.

Trough-type subsidence over room and pillar mining will be localized as compared to the area-wide troughs developed by longwall mining. As with sinkholes, the depth and areal extent of troughs will depend on the depth to mining, physical properties of the overburden, and extraction ratios achieved. The shape of depressions will be irregular due to the presence of remnant pillars. Like longwall mining, subsidence over retreat mining will develop rapidly due to recompression of rubble or re-orientation of beds which have sagged.

Shaft Collapse

The subsidence hazard associated with entry or air shafts is high because of the potential sudden and significant nature of movement. Although small in area, shafts can be dangerous because of the haphazard way in which they were backfilled in the past. Typically, shafts were filled with debris left over from the mining operation, including timbers, mine waste, and trash. Over a period of time, the debris plugged in the shaft can loosen and settle, leading to dramatic subsidence at the surface.

EVALUATION OF SUBSIDENCE POTENTIAL

Our investigation furthered the understanding of the subsidence potential at Bridgewater by providing detailed information regarding the existing subsurface conditions and mine locations. Our analysis was intended to determine a minimum bedrock thickness above the coal seam beyond which caving subsidence would not be expected to reach the surface. We used two analysis methods which included mine geometry and bulking factor. We also reviewed the strain analysis done by WEE for the shallower mines beneath the eastern portion of Section 18.



Mine Geometry

One method of evaluating whether caving subsidence will propagate to the surface can be addressed through the mine geometry. The critical dimensions affecting subsidence are the thickness of cover or overburden height (H) and the extraction thickness (h). Piggot and Eynon (1977) suggest subsidence will not propagate to the ground surface over room and pillar workings where the overburden to extraction thickness ratio (H/h) exceeds 10. The overburden alluvium is primarily clayey sands and sandy clays and possesses very little strength to prevent caving, therefore, only the bedrock thickness was considered in our evaluation. Using a coal seam extraction thickness of 8 feet, caving is not expected to propagate through more than 80 feet of bedrock.

Bulking Factor

Caving of the roof above a mine can continue until the extraction and collapse area is filled with broken and bulked rock or the caving reaches the surface. The height to which caving can occur is based on the coal seam thickness and the bulking of the collapsed rock. The increase in the volume of the collapsed rock is referred to in terms of its “Bulking Factor” (Piggot and Eynon, 1977). The Bulking Factor is defined as the original extraction height minus any remaining void divided by the height of the rubble zone above the mine roof. Typical bulking factors for this coal strata range from 30% to 50% (Piggot 1997). Assuming a conical shaped collapse with a conservative Bulking Factor of 40%, as measured from old mine maps, results in a collapse height of 60 feet. Applying a factor of safety of 1.5 results in a bedrock thickness of 90 feet.

$$H = 3h/B \text{ for conical collapse}$$

H = Collapse height above mined coal seam roof.

B = Bulking Factor (0.40)

h = Original extraction thickness (8.0 feet)



Strain Analysis

WEE performed a Mine Subsidence Investigation for a portion of Section 18 (report dated September 5, 1999). Since portions of the Boulder Valley (old) and Northwestern Mines are mapped to extend into the western portion of Section 17, we reviewed the evaluation performed by WEE. The strain analysis performed was adapted from the United Kingdom National Coal Board and was developed for long wall mining operations. Based on their strain evaluation, WEE provided different classifications for the portion of Section 18 included in the Bridgewater development. These include unrestricted development, development with a maximum foundation length, and no development. We have incorporated those recommendations into our evaluation of subsidence potential.

Subsidence Potential

As discussed previously, analysis methods included mine geometry, bulking factors and evaluation of historical events. Analysis results are summarized below.

Our investigation and analysis indicates there is risk of caving subsidence reaching the surface in areas where the bedrock above the coal seam is less than 90 feet thick. Undermined areas with a bedrock thickness in excess of 90 feet are judged to have a low risk of caving subsidence. This is a conservative choice based upon the two methods used. A map showing estimated areas of low and severe subsidence potential is presented on Fig. 3.

Mine Geometry	80 foot bedrock thickness
Bulking Factor	90 foot bedrock thickness

Considering the nature of sinkhole subsidence, we believe the potential damage to building, roadways and utilities are likely to be high in severe risk areas (areas with less than 90 feet of bedrock cover). (see p.12) The surface effects of subsidence can result in property damage from vertical settlement,



horizontal ground strain, and tilt or rotation. Severe ground movements from sinkhole subsidence can destroy building foundations and disrupt utilities.

Our study of the available mine maps and investigations at the site indicate there are no shafts within Sections 8 and 17. There are six mapped shafts located in Section 18. Shaft collapse does pose a risk, and the hazard associated with shafts should be considered high. We recommend a 100 foot radius be extended from the location of the shafts, and these areas be classified as “severe” subsidence potential. The current development plan for Bridgewater accounts for these six shafts by classifying the areas as open space. There is also mention of an unknown shallow mine below the western portion of Section 8 under property owned by others. We recommend no structures be placed within 100 feet of the western property boundary of Bridgewater in Section 8.

DEVELOPMENT CONSIDERATIONS AND MITIGATION ALTERNATIVES

We have provided four classifications of subsidence potential for Bridgewater (Fig. 3). The following is a discussion of development and/or mitigation alternatives for the identified risk areas.

Low Subsidence Potential (Unrestricted Development)

Due to the depth to mining and the thickness of bedrock above the mine levels, the subsidence risk for the majority of Bridgewater is judged low. We believe residential or commercial construction is feasible in areas rated as low risk. No extraordinary restrictions or special building requirements are necessary. Typical building code requirements for foundation walls to be reinforced to simply span a minimum of 15 feet should apply.

There is a small probability that unmapped air shafts exist. Considering the information available, we believe the risk of this condition occurring and causing a future subsidence event is small, but not eliminated. Grading above the mined areas should be observed to attempt to identify any unknown shafts to



reduce the risk as much as possible. If a shaft is found, or a subsidence event occurs in the future then filling and grouting would be required.

Low Subsidence Potential (Maximum Foundation Length)

We believe residential or commercial construction is feasible in these areas provided buildings have a maximum foundation length of either 60 feet or 80 feet, depending on the depth and condition of the mines (see Fig. 3). In addition to the maximum foundation length, a strain isolation trench should be constructed around the perimeter of the foundation.

In areas where bedrock is near the minimum thickness of 90 feet, such as in PA-III, the bedrock should not be disturbed during construction, such as during site grading, basement construction, utility installation or deep subexcavation. Any excavation into the bedrock surface will decrease the bedrock thickness and could change the subsidence potential from low to severe. If development approaches the severe risk zone additional drilling should be performed to verify adequate bedrock thickness, and site grading plans should be reviewed.

PA-III is currently one of the lower elevated portions of the property as noted on p.10. Due to the shallower mine depth and surrounding site topography, this area should be planned for fill, rather than cuts. We understand fills up to 20 feet are being considered in this area which would facilitate utility and building construction.

Mapping indicates that the western portion of Section 17 may be underlain by the Boulder Valley (old) and Northwestern Mines. We have shown the recommendations provided by WEE and applied them to the overall Bridgewater development plan (Fig. 3). We adjusted the eastern limit of the “maximum foundation length of 60 feet” zone to extend 100 feet beyond the mapped mine limits. We believe this is a conservative assessment. Additional drilling in this area should be considered once site grading plans are prepared to further define this limit.



Severe Subsidence Potential

We do not recommend buildings, roads or major utilities be constructed over areas mapped as severe risk. Shaft areas should be avoided (100 foot radius) or mitigated as discussed below.

To mitigate the mine areas rated severe would require extensive void filling with grout. The procedure is relatively expensive. Avoidance of the severe risk area is considered the primary alternative.

Shaft Areas

There are six mapped shaft on the site, and records are unclear as to their exact location and closure status. The mapped shaft areas are currently planned for open space. If development occurs within 100 feet of a mapped shaft, the condition of the shaft should be evaluated. Depending on the condition found, full depth compaction grouting may be required. The grout would be intended to fill voids and compact the backfill material. Concrete plugs or slabs at the ground surface are not recommended since overburden soils could flow into the shaft areas if they subside.

LIMITATIONS

Our investigation was planned to obtain a level of information necessary to perform an analysis and evaluation of the subsidence hazard. Our conclusions regarding the risk of future subsidence were based on our investigation and analysis, review of available mine records, previous studies and our experience. There is no method, to our knowledge, of eliminating all risk of subsidence effects. If additional data becomes available concerning unreported mining or additional subsidence features develop in the area, we should be contacted to evaluate the situation.



We believe this investigation was conducted with that level of skill and care ordinarily used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made. We appreciate the opportunity to provide this service. If we can further explain our opinions and conclusions as contained in this report, please contact us.

CTL | THOMPSON, INC.

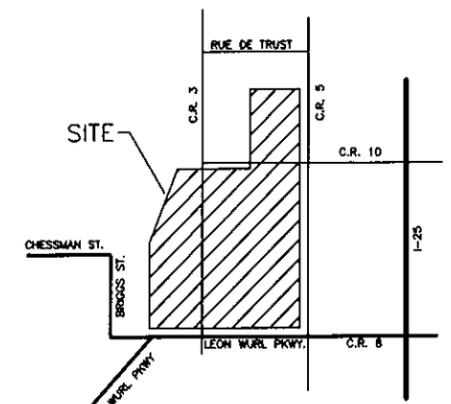
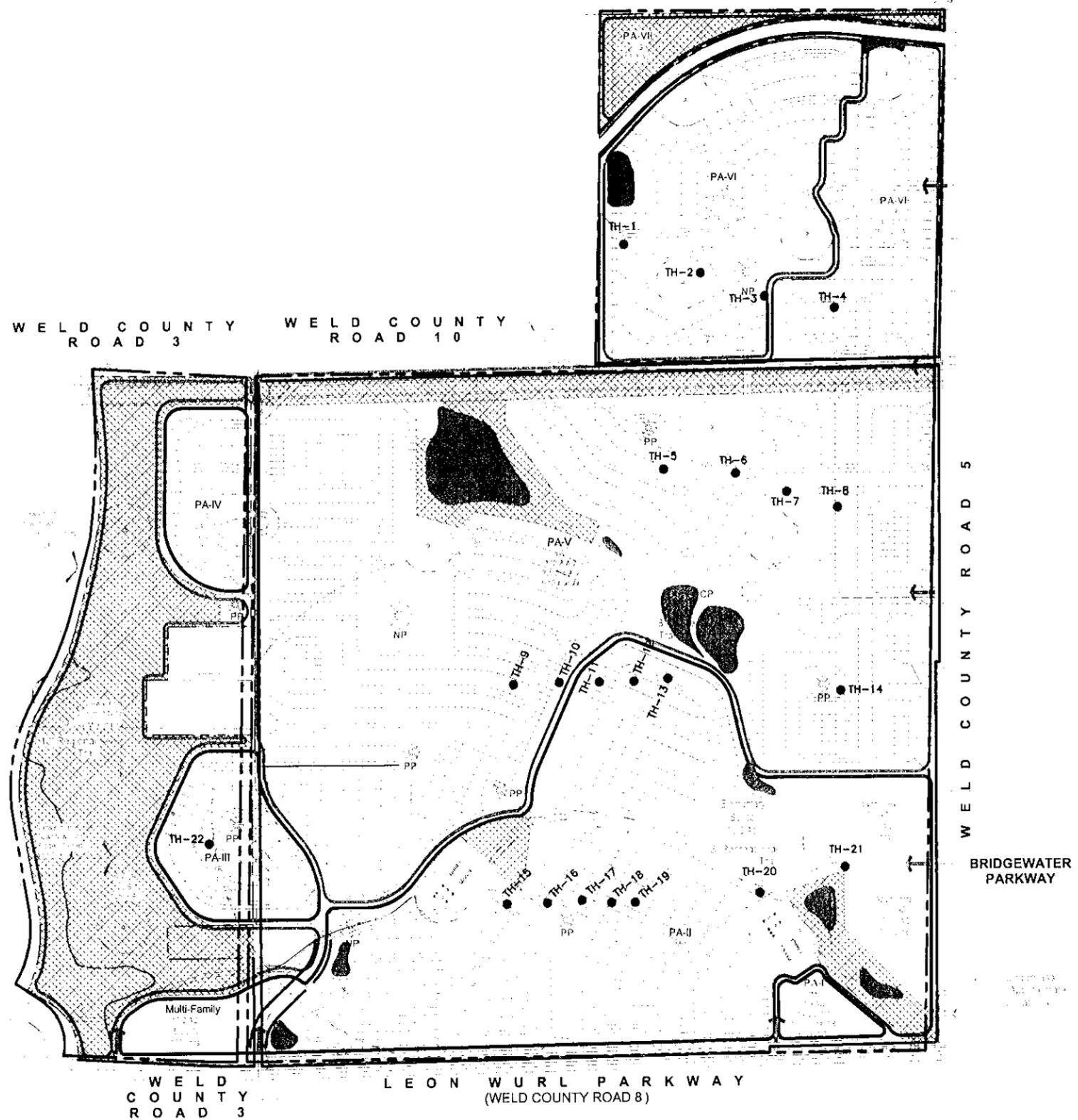
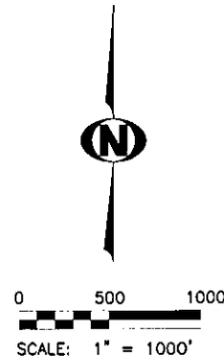


Damon B. Thomas, P.E.
Materials Division Manager

DBT:RMM/dbt/hh
(7 copies sent)

Reviewed by:

Ronald M. McOmber, P.E, D.GE
Chairman & CEO



VICINITY MAP
NOT TO SCALE

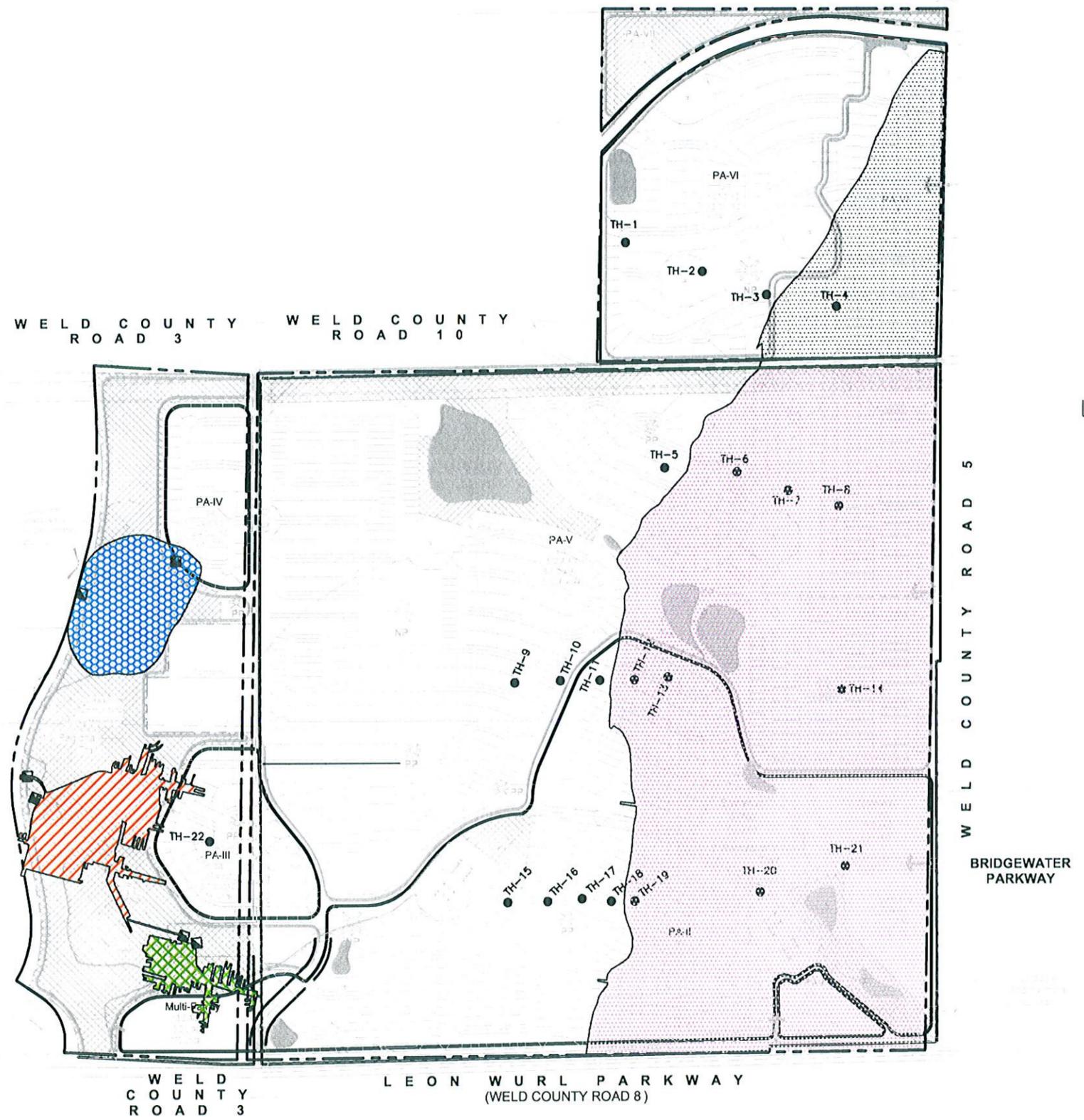
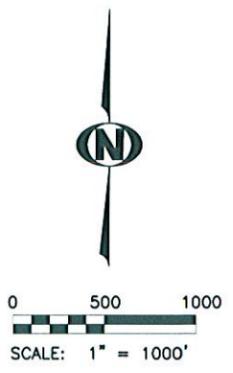
LEGEND:

- TH-1 INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING

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Locations of
Exploratory
Borings

Fig. 1



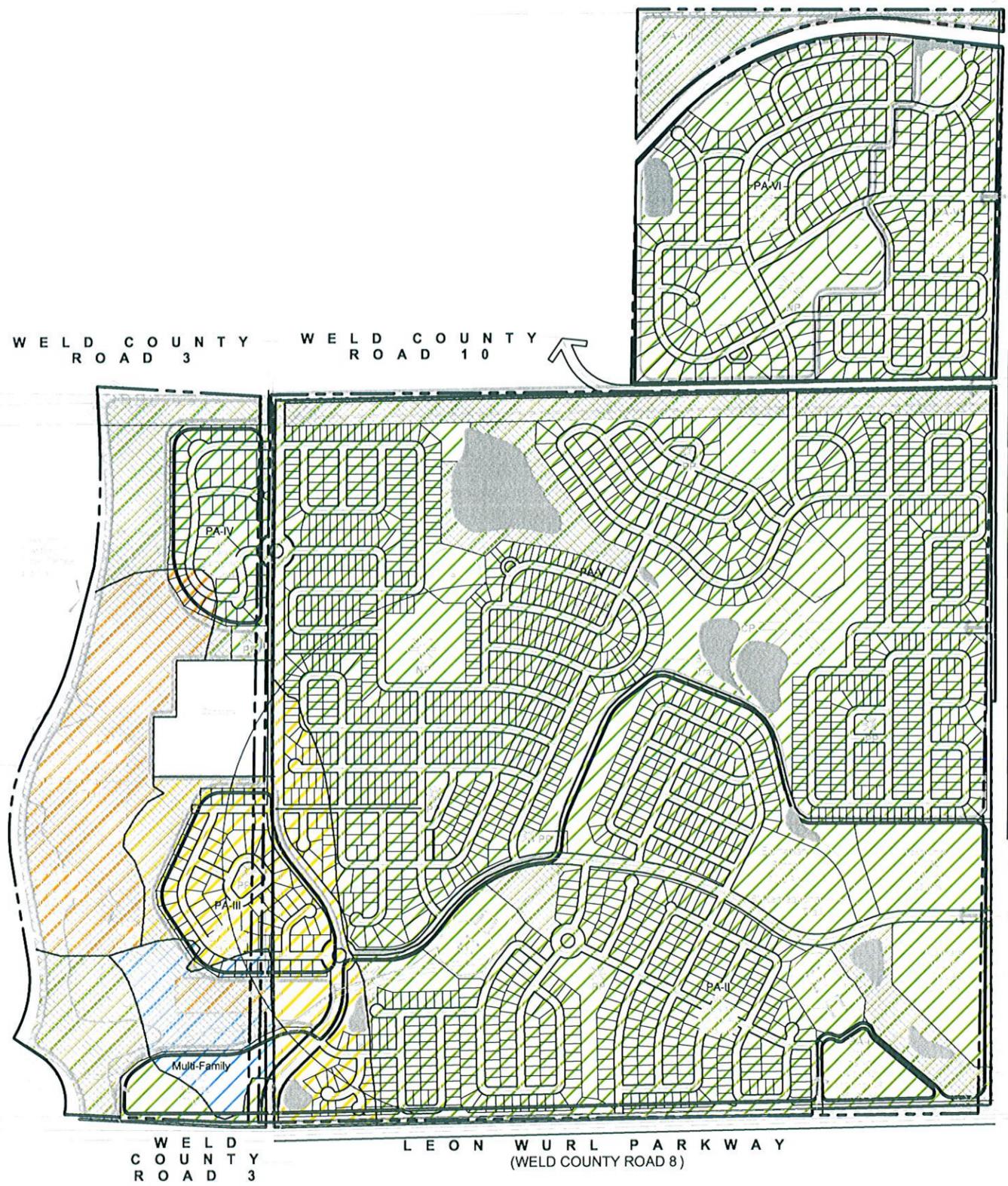
- LEGEND:
- CLAYTON MINE
 - BOULDER VALLEY MINE (OLD)
 - BOULDER VALLEY MINE (NEW)
 - NORTHWEST MINE
 - UNKNOWN MINE
 - INDICATES SHAFT

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Approximate
Mine
Locations



0 500 1000
SCALE: 1" = 1000'

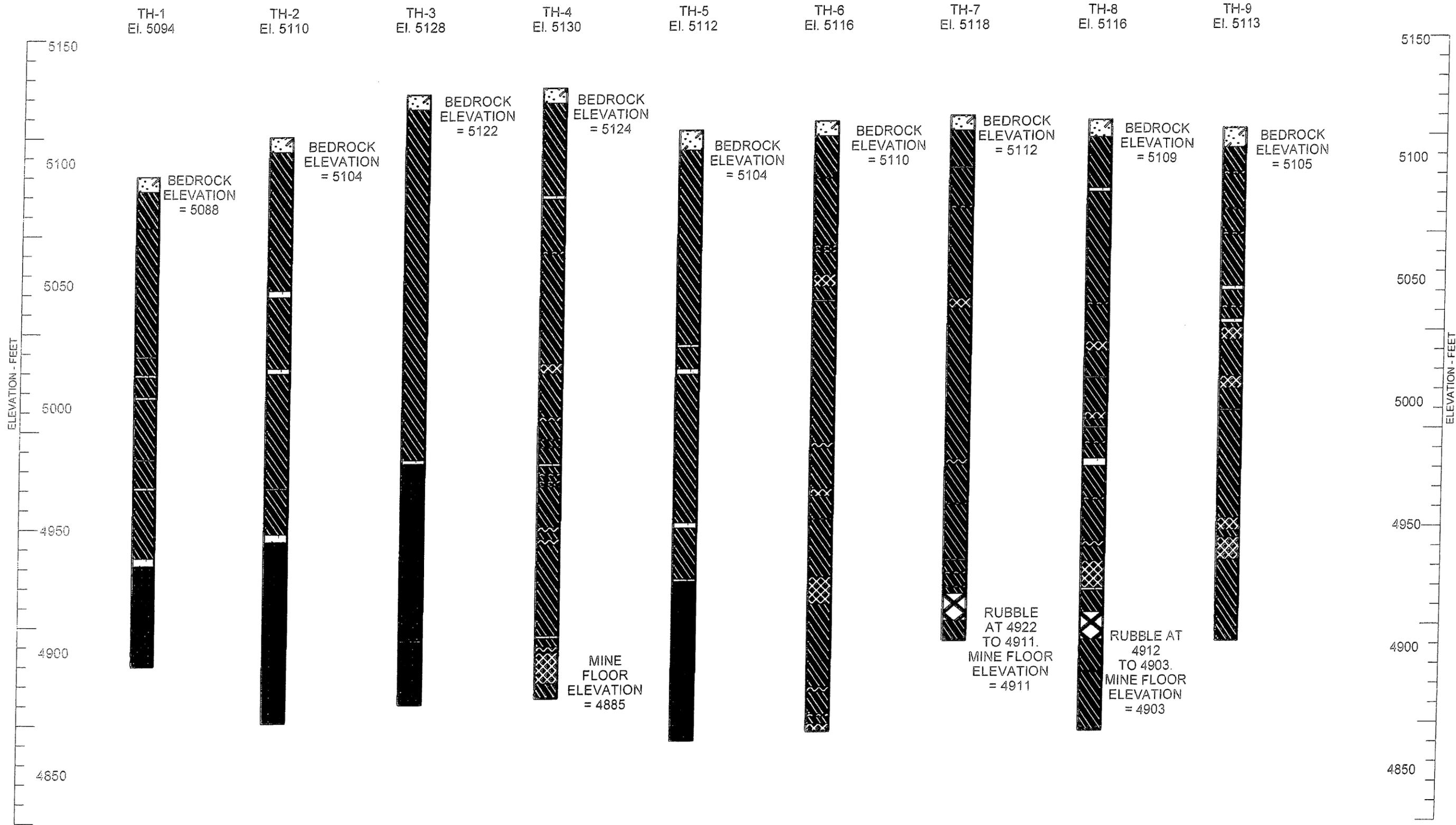
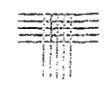


LEGEND:

-  SEVERE SUBSIDENCE POTENTIAL (NO DEVELOPMENT)
-  LOW SUBSIDENCE POTENTIAL (MAXIMUM FOUNDATION LENGTH 60 FEET)
-  LOW SUBSIDENCE POTENTIAL (MAXIMUM FOUNDATION LENGTH 80 FEET)
-  LOW SUBSIDENCE POTENTIAL (UNRESTRICTED DEVELOPMENT)

NOTE: THIS FIGURE WAS PREPARED BASED ON OUR ELEVATION FOR THE CLAYTON AND BOULDER VALLEY (NEW) MINE AREAS. THE SUBSIDENCE POTENTIAL SHOWN FOR THE BOULDER VALLEY (OLD), NORTHWEST AND UNKNOWN MINES IS BASED ON A STUDY BY WESTERN ENVIRONMENT AND ECOLOGY.

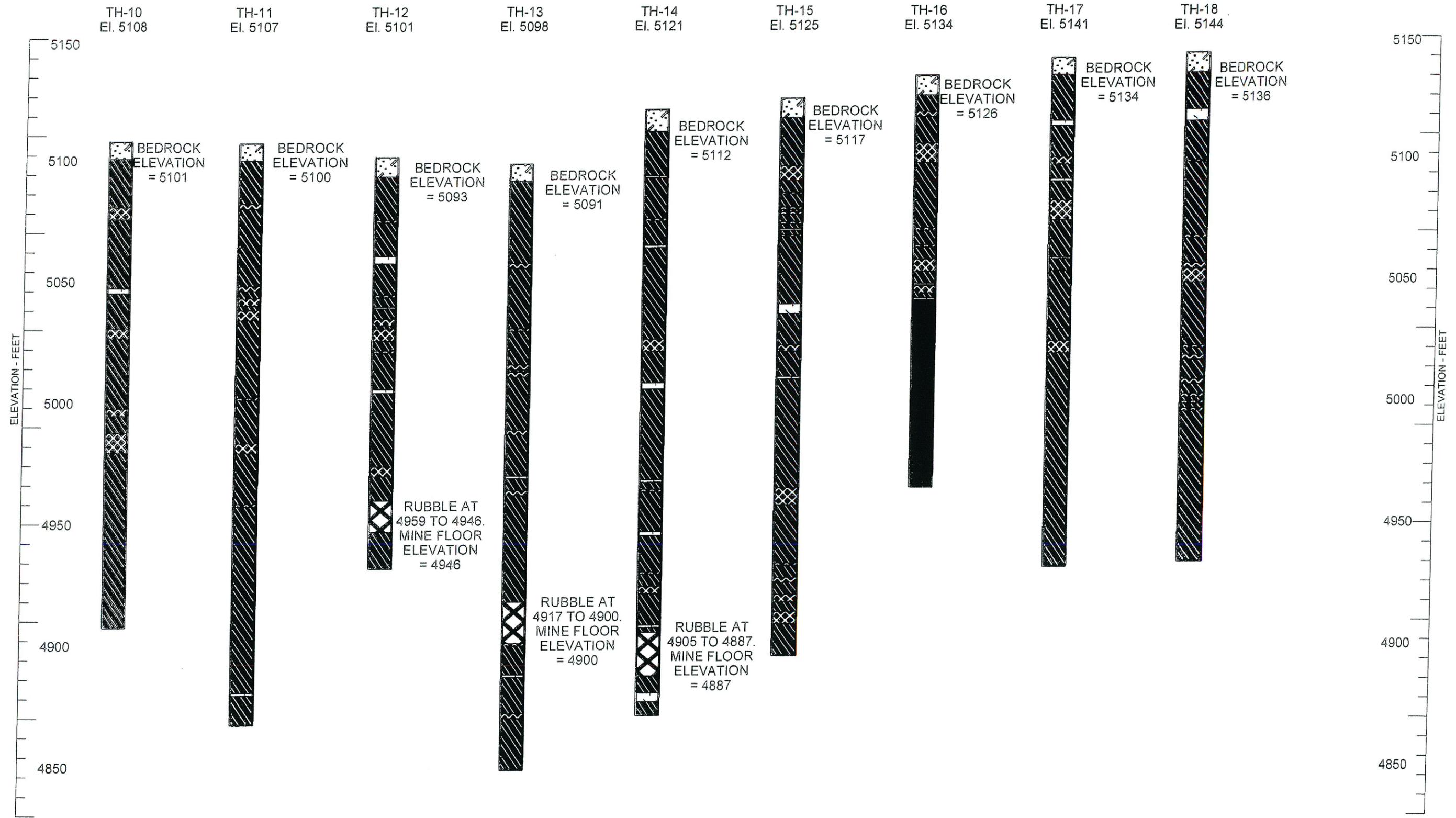
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Summary Logs of Exploratory Borings

FIG. 4

LOGS BY ELEVATION 11X17 CT15114-130 GINT LOGDATA.GPJ CTLMAIN.GDT 10/8/10



Summary Logs of Exploratory Borings

FIG. 5

LOGS BY ELEVATION 11X17 CT15114-130 GINT LOGDATA.GPJ CTLMAN.GDT 10/12/10

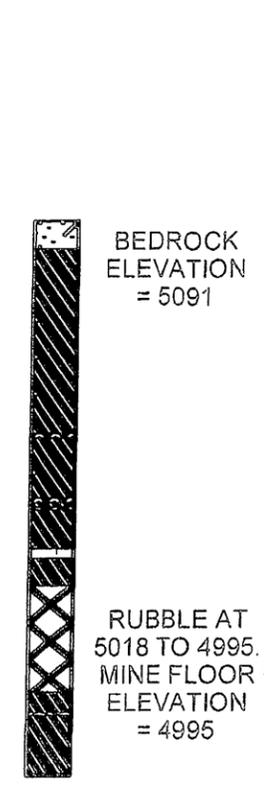
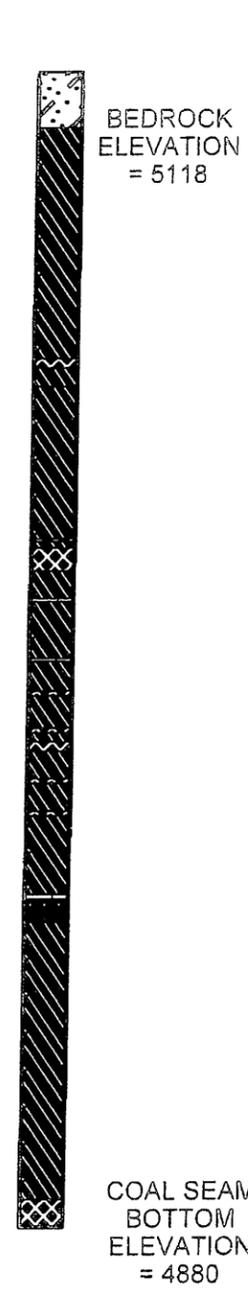
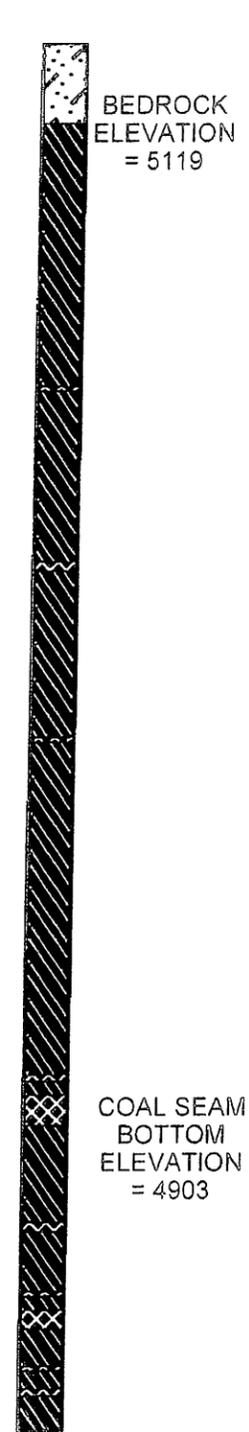
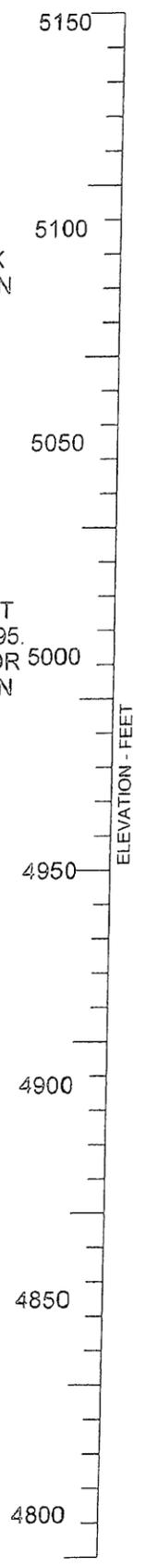


TH-19
El. 5143

TH-20
El. 5136

TH-21
El. 5130

TH-22
El. 5097



LEGEND:

- SAND, SILTY TO CLAYEY, MOIST, MEDIUM DENSE, LIGHT BROWN (SC)
- SILTSTONE, CLAYSTONE, MINOR SANDSTONE, PARTLY ORGANIC, MOIST TO VERY MOIST, FIRM TO HARD, GREY, BROWN, RUST, YELLOW
- SANDSTONE, WITH SILTSTONE, SLIGHTLY MOIST TO MOIST, HARD, LIGHT GRAY TO GRAY
- SANDSTONE, CEMENTED, VERY HARD, MOIST, GREY, BROWN
- COAL, SOFT TO MEDIUM DENSE, MOIST TO WET, DARK BROWN TO BLACK
- RUBBLE ZONE FROM MINE WORKINGS

NOTES:

1. THE BORINGS WERE DRILLED BETWEEN SEPTEMBER 16 AND OCTOBER 6, 2010 USING 3 7/8-INCH AIR ROTARY SUPPLEMENTED WITH WATER AND A TRACK-MOUNTED BOART-LONGYEAR MODEL DB-540 DRILL RIG.
2. GROUND WATER WAS ENCOUNTERED DURING DRILLING AT VARIOUS LEVELS. DEPTHS TO WATER TABLE WAS NOT DETERMINED DUE TO DRILLING METHOD.
3. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS IN THIS REPORT.

LOGS BY ELEVATION WITH LEGEND-11X17 CT15114-130 GINT LOGDATA.GPJ CTLMAN.GDT 10/12/10

Summary Logs of Exploratory Borings

FIG. 6



APPENDIX A
DRILL LOG SUMMARY

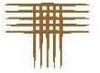


TABLE I
SUMMARY OF EXPLORATORY DRILLING
Bridgewater
CTL | T Project No. CT15,114-130

Boring No.	Boring Elevation	Bedrock Elevation	Void Elevation	Void Thickness	Rubble Elevation	Rubble Thickness	Floor Elevation	Depth to Floor	Bedrock Thickness	Total Depth Drilled	Comments
TH-1	5094	5088	-	-	-	-	-	-	-	200	No Seam Found
TH-2	5110	5104	-	-	-	-	-	-	-	240	No Seam Found
TH-3	5128	5122	-	-	-	-	-	-	-	250	No Seam Found
TH-4	5130	5124	-	-	-	-	4885	245	231	250	Coal Encountered
TH-5	5112	5104	-	-	-	-	-	-	-	250	No Seam Found
TH-6	5116	5110	-	-	-	-	-	-	-	250	No Seam Found
TH-7	5118	5112	-	-	4922	11	4911	207	193	215	Rubble Encountered
TH-8	5116	5109	-	-	4912	9	4903	213	198	250	Rubble Encountered
TH-9	5113	5105	-	-	-	-	-	-	-	210	No Seam Found
TH-10	5108	5101	-	-	-	-	-	-	-	200	No Seam Found
TH-11	5107	5100	-	-	-	-	-	-	-	240	No Seam Found
TH-12	5101	5093	-	-	4959	13	4946	155	139	170	Rubble Encountered
TH-13	5098	5091	-	-	4917	17	4900	198	183	250	Rubble Encountered
TH-14	5121	5112	-	-	4905	18	4887	234	217	250	Rubble Encountered
TH-15	5125	5117	-	-	-	-	-	-	-	230	No Seam Found
TH-16	5134	5126	-	-	-	-	-	-	-	170	No Seam Found
TH-17	5141	5134	-	-	-	-	-	-	-	210	No Seam Found
TH-18	5144	5136	-	-	-	-	-	-	-	210	No Seam Found
TH-19	5142	5134	-	-	-	-	-	-	-	250	No Seam Found
TH-20	5136	5119	-	-	-	-	4903	233	208	300	Coal Encountered
TH-21	5130	5118	-	-	-	-	4880	250	230	250	Coal Encountered
TH-22	5097	5091	-	-	5018	23	4995	102	90	120	Rubble Encountered