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## Fwd: Alton Coal Development Response to Swell Factor Analysis, Division Order-15A

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Daron Haddock <daronhaddock@utah.gov>

Wed, Apr 1, 2015 at 7:20 AM

To: Suzanne Steab <suzannesteab@utah.gov>, OGMCOAL DNR <ogmcoal@utah.gov>, Cheryl Parker <cherylparker@utah.gov>

Here is ACD's response to Division Order 15A.

----- Forwarded message -----

From: **Dragoo, Denise** <ddragoo@swlaw.com>

Date: Tue, Mar 31, 2015 at 10:49 PM

Subject: Alton Coal Development Response to Swell Factor Analysis, Division Order-15A

To: Dana Dean <danadean@utah.gov>

Cc: Daron Haddock <daronhaddock@utah.gov>, Steve Alder <stevealder@utah.gov>

Dana, on behalf of Alton Coal Development, LLC, attached is our response to the Division's Technical Analysis dated March 18, 2015 regarding the swell factor calculations for the Coal Hollow Mine, Permit No. C/025/0005. ACD is confident of the results provided in the GEM Engineering Report dated January 15, 2015. While ACD believes that the Modified Proctor ASTM procedure used by GEM Engineering is appropriate, we requested GEM to repeat its analysis using the Standard Proctor ASTM procedure. Those results are contained in their March 31, 2015 report attached herein to our letter. The swell factor analysis is used by ACD in their response to the Division Order and in their bond calculations for the MRP. Thanks, Denise

Denise A. Dragoo

Snell & Wilmer L.L.P.

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Snell & Wilmer

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Daron R. Haddock

Coal Program Manager  
Utah Division of Oil, Gas & Mining  
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 **ACD Response on Swell Factor Analysis\_21290725\_1.PDF**  
1476K

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LAS VEGAS  
LOS ANGELES  
LOS CABOS  
ORANGE COUNTY  
PHOENIX  
RENO  
SALT LAKE CITY  
TUCSON

March 31, 2015

Dana Dean  
Associate Director  
Utah Division of Oil, Gas & Mining  
1594 West North Temple  
Salt Lake City, Utah 84116

Re: Response to Division Order and Technical Memorandum re: Swell Factor, Coal Hollow Mine, Permit No. C/025/00005

Dear Associate Director Dean:

On behalf of Alton Coal Development, LLC (“ACD”), we hereby respond to the Technical Memorandum dated March 18, 2015, wherein the Division incorrectly refuses to accept newly-acquired data and calculations of swell factor and Proctor density for backfill material at the Coal Hollow Mine. ACD is confident that these data are reliable, and will use them in its contemporaneous reclamation of the mine and associated bond calculations. ACD also relies on this new data and swell factor calculations in its response to Division Order-15A.

#### GENERAL COMMENTS

ACD has obtained soil properties data, including Modified Proctor Tests, on samples from the spoils stockpiles that will be used for backfill at the Coal Hollow Mine. The data from these samples replace pre-mining data from composite surrogate samples created in the laboratory from drill cores. These new data prove that the pre-mining estimates are unreliable for current operational purposes because they greatly overestimate the swell factor of backfill material. ACD will use the newer data from actual backfill material for all future operational and design calculations involving backfill and excess spoil placement.

The Division’s Technical Memorandum to “Internal File” dated March 18, 2015 improperly rejects the newly-acquired data. The rejection is based upon a badly-flawed engineering analysis. This analysis failed to recognize that swell factors in the Coal Hollow Mining and Reclamation Plan ( MRP) were estimates, based upon analysis of artificially-created

composite samples meant to approximate actual mine spoil<sup>1</sup> (because at that time, no actual mine spoil had been produced.) The MRP's approach then estimated spoil volumes using a midpoint among swell factors for the separate soil types identified; viz. silty sand, clay, and shale.<sup>2</sup> Apart from identifying estimated swell factors, the MRP also reports the results of Standard Proctor tests on the composite samples used as surrogates for mine spoil and backfill material.<sup>3</sup>

The information provided with the GEM Engineering, Inc. report to ACD, dated January 15, 2015, improves the reliability of data underlying backfill compaction in two important ways. First, it provides Proctor analysis on samples of actual backfill material, from which the operator can accurately determine when backfill or excess spoil has been compacted to the 85% of maximum density required by the Reclamation Plan. Second, it replaces "book value" swell factors, based on soil classification, with measured swell factors, again obtained from samples of actual backfill material. Use of the GEM Engineering data will result in a more densely-compacted fill. Using the estimated maximum density, fill derived from shale would be considered to be 85% compacted when field density measurements were 92.1 pounds/cubic foot (pcf). Using the newly-acquired data, 85% compaction of shale samples would require a field measurement of 95.2 pcf. To reach 85% compaction, fill derived from alluvium would have required a field density of 93.8 pcf using the estimates from the MRP, while requiring 107.5 pcf using the newer data. In both cases, the newer data requires higher density to achieve 85% compaction.

## SPECIFIC RESPONSES TO DIVISION COMMENTS

The following numbered sections set forth ACD's specific responses to the criticisms numbered 1 through 5 in the Division's Technical Memorandum.

1. As described above, the swell factors derived from the new GEM Engineering report are more representative of backfill material than the "book values" provided in the MRP derived from pre-mining composites of drill core material. In addition, ACD disagrees that the

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<sup>1</sup> See Taylor Geo-Engineering, LLC, Slope Stability Analysis for Proposed Excess Spoil Structure & Sediment Impoundments at 1-2, 4 and Appx. B (found as Appendix 5-1 to the MRP) (Hereinafter "Appx. 5-1").

<sup>2</sup> MRP at 5-72 & 5-73; Appx. 5-1 at 8.

<sup>3</sup> Proctor test results in the MRP are unrelated to the MRP swell factors, which are drawn from standard construction tables based upon the engineering classification of soil. The Proctor test is used to facilitate field evaluation of soil compaction by identifying the dry density corresponding to an optimum level of compaction. Field dry density measurements can then be correlated to the degree of compaction when placing fill material. At the Coal Hollow Mine, backfill material is to be compacted to 85% of the optimum value identified in Proctor tests.

Dana Dean

March 31, 2015

Page 3

Proctor Test, whether Standard<sup>4</sup> or Modified, is a useful measure of whether a sample is representative. It would be a gross error to reject a field-collected sample based upon a measured parameter that differed from an artificially-prepared composite. In any event, the MRP maximum densities derived from Standard Proctor tests on shale (composites of weathered and fresh material) ranged from 99.5 to 108.4 pcf (Appx 5-1, appx. C, Table 1). The newer maximum density, using the Modified Proctor test on actual shale-derived fill material, was 112.0 pcf. (A Standard Proctor Test on the same material returned a maximum density of 107.2 pcf.) In sum, nothing from the Proctor tests indicates that the newer measurements are from a material that is significantly different from the earlier approximations. Good engineering practice requires ACD to use the newer data.

2. ACD knows of no rule that requires submitting field notes to DOGM when also providing laboratory test results. As is normal procedure, the field notes contain the information (sampler's name, date, time, etc.) which the Division incorrectly claims is missing from the laboratory results. A map showing sample locations is attached.

3. The sample identified as "Tropic" in the GEM Engineering report is a "shale" sample. It corresponds to material removed from below the alluvium/Tropic Shale boundary and placed in stockpile. As such, it is a mixture of weathered and fresh shale. This material corresponds to the composite shale samples, created from borehole samples, designated as CH-1-3 and CH-5-48 and CH-5-98 in Appendix 5-1 of the MRP. The Peterson Hydrologic drill logs of Boring Nos. CH-01-05, CH-01-05, and CH-03-05 show that the lower horizons, below the alluvium, are comprised of weathered shale, and the weathering products of shale, including clay.<sup>5</sup>

4. The Modified Proctor Tests used procedure D (ASTM D 1557, as noted in the upper-right corner of the laboratory reports.) The Division should refer to the published ASTM method for the details it requests.

5. ACD agrees that the alluvium sample analyzed by GEM was incorrectly classified as sandy gravel. GEM Engineering has corrected this error in the attached report. GEM notes that the calculated swell factors and maximum densities are unaffected by this mislabeling. None of the swell factors or maximum densities relied upon this classification.

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<sup>4</sup> ACD disagrees that the Modified Proctor tests in the GEM Engineering report are inappropriate. Nevertheless, ACD asked GEM to repeat the Proctor tests using the Standard procedure. The results of the Standard Proctor Tests are contained in the attached Gem Engineering Report dated March 31, 2015.

<sup>5</sup> Appx. 5-1 at appx. B; see also Appx. 5-1 at 3 ("The sediments are underlain by highly weathered shale (fat clay, CH) and slightly to moderately weathered shale, which was documented by others to a depth of 41 feet.")

Dana Dean  
March 31, 2015  
Page 4

In summary, ACD has now obtained reliable measures of swell factor and maximum compacted density for the material it will use as backfill during reclamation. ACD intends to use this data as it proceeds with reclamation, as it predicts the costs of reclamation and as it is responsive to the Division Order. We appreciate your reconsideration of this matter.

Sincerely,

Snell & Wilmer

*/s/ Denise A. Dragoo*

Denise A. Dragoo

DAD:mkm

Enclosures

Cc: Daron Haddock

Steve Alder, Esq

March 31, 2015

**Alton Coal Development  
463 North 100 West  
Cedar City, UT 84721****Attention: Andrew Christensen**

Subject: Tropic Shale and Alluvium - Shrinkage and Expansion Factors(revised)  
Coal Hollow Project  
Cedar City, Utah

**OVERVIEW**

At your request, we have performed field and laboratory testing to evaluate the shrinkage and expansion factors at the subject project. Nuclear density tests were performed to assess the density of the undisturbed native, loose stock piles and compacted stockpiles of the tropic shale and the sandy gravel alluvium at various locations at the subject site. Please see the following summary of test results below and the attached soil classifications and maximum density tests for the requested analysis at the subject site. As your request, standard proctors (ASTM D698) were performed in stead of modified proctors. We were unaware that standard proctors were utilized at this site. However, the proctor values were not utilized in calculation shrink/swell percentages given in the report. Therefore the proctor value does not impact on the shrink swell factor given but in this case can be utilized to compare soil types.

ASTM sampling and testing methods were utilized during the performance of this investigation.

**SHRINKAGE AND EXPANSION - SUMMARY OF TEST RESULTS**

<b>Material Type</b>	<b>Test Type</b>	<b>Average Dry Density</b>	<b>Shrinkage/Expansion</b>
Tropic Shale (CH) Native	Nuclear Density	96.3 pcf	--
Tropic Shale (CH) Loose	Nuclear Density	84.8 pcf	11.9 % - Expansion
Tropic Shale (CH) Compacted	Nuclear Density	107.2 pcf	11.3 % - Shrinkage
Alluvium (SM) Native	Nuclear Density	95.6 pcf	--
Alluvium (SM) Loose	Nuclear Density	88.7 pcf	7.2 % - Expansion
Alluvium (SM) Compacted	Nuclear Density	114.2 pcf	16.3 % - Shrinkage

### **Maximum Density Test Summary ASTM D698 - Method (D)**

<b>Sample Location</b>	<b>Soil Classification / Description</b>	<b>Maximum Dry Density (pcf)</b>	<b>Optimum Moisture (%)</b>
Tropic Shale (CH)	Silty Clay (CH)	103.5	14.5
Alluvium (SM)	Silty Sand w/gravel	119.0	8.5

Sieve analysis for the two materials listed above are attached.

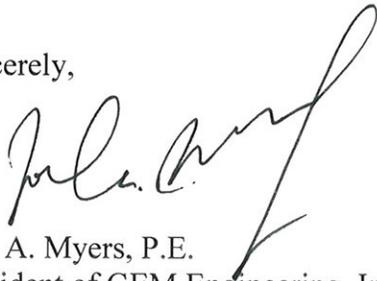
#### LIMITATIONS

These services have been performed according to generally accepted engineering practices that exist at this time. No warranty, expressed or implied, is provided.

If you should have any questions concerning this letter or require any additional services, please contact us at your convenience.

We appreciate the opportunity to be of continued service to you. Let us know if you have any questions concerning the data contained within this report.

Sincerely,



Joel A. Myers, P.E.  
President of GEM Engineering, Inc.



ENC: Sieve Analysis

# Sieve Analysis of Fine and Coarse Aggregates

(Test Methods: ASTM C136, C117, AASHTO T27, T11)

Client:	Alton Coal Development		
Project Name:	Alton Coal Mine		
Sample Location:	On site stock pile	Sample Depth:	0
Sample Depth:	0	Date Sampled:	12/30/14

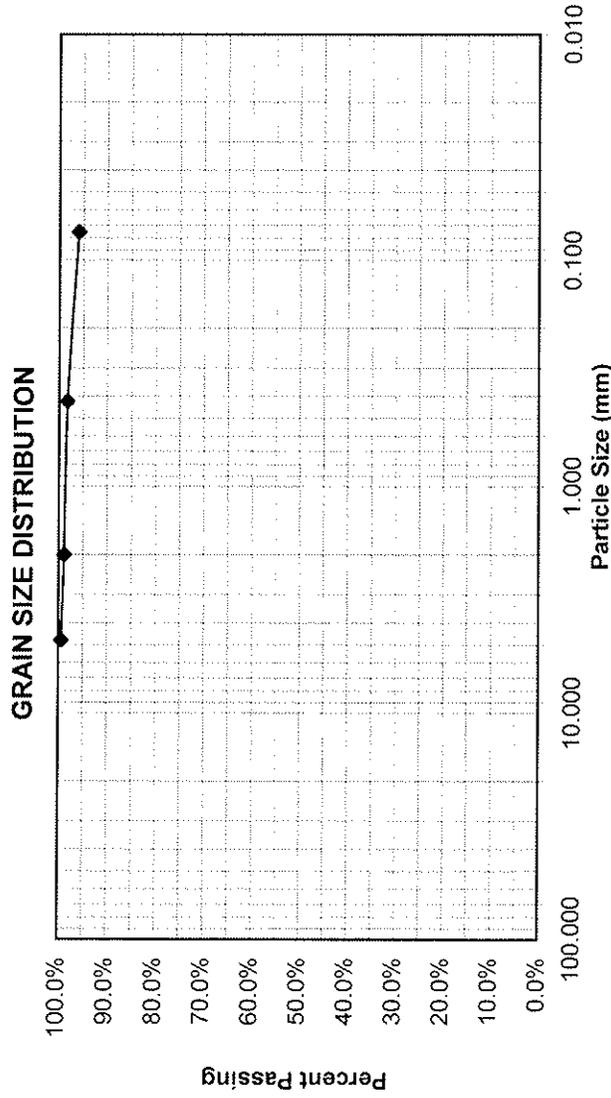
Soil Classification: **CH**

Average Liquid Limit: **112**

Plastic Limit: **29**

Plasticity Index: **83**

Sieve size	Percent (%) Passing
No. 4	99.5%
No. 10	98.9%
No. 40	98.3%
No. 200	96.0%



REMARKS:

**GEM ENGINEERING, INC.**

485 North Aviation Way ♦ Cedar City, UT 84721  
 Phone (435) 867-6478 ♦ Fax (435) 867-4372  
 www.gemengineeringinc.com

Reviewed by:

# Sieve Analysis of Fine and Coarse Aggregates

(Test Methods: ASTM C136, C117, AASHTO T27, T11)

Client:	Alton Coal Development		
Project Name:	Alton Coal Mine		
Sample Location:	On site stock pile	Sample Depth:	0
Sample Depth:	0	Date Sampled:	12/30/14

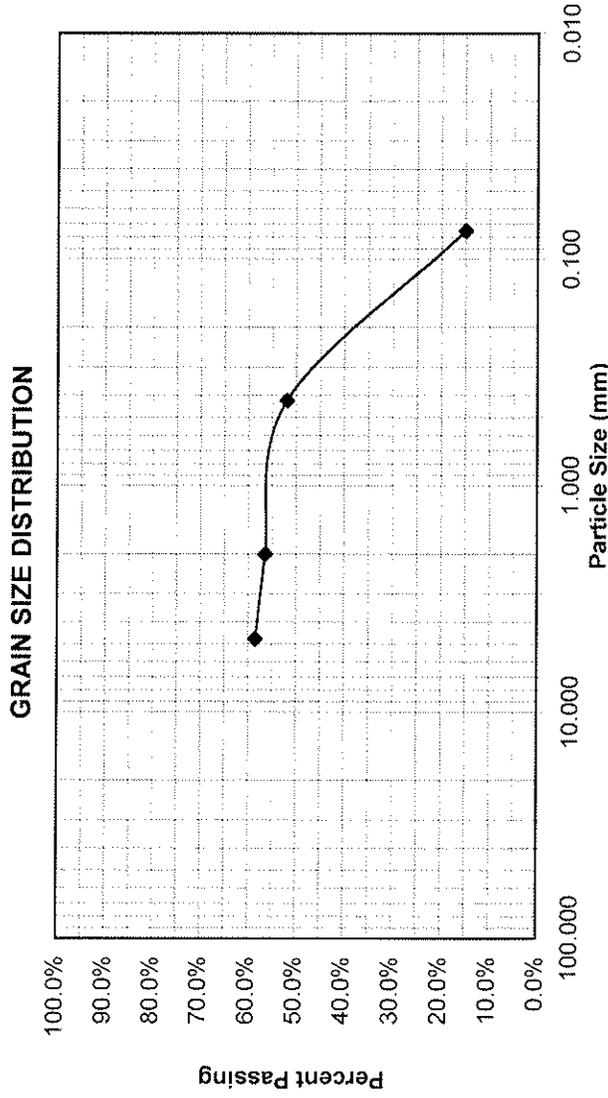
Soil Classification: **SM**

Average Liquid Limit: **NP**

Plastic Limit: **NP**

Plasticity Index: **NP**

Sieve size	Percent (%) Passing
No. 4	58.4%
No. 10	56.4%
No. 40	51.9%
No. 200	15.0%

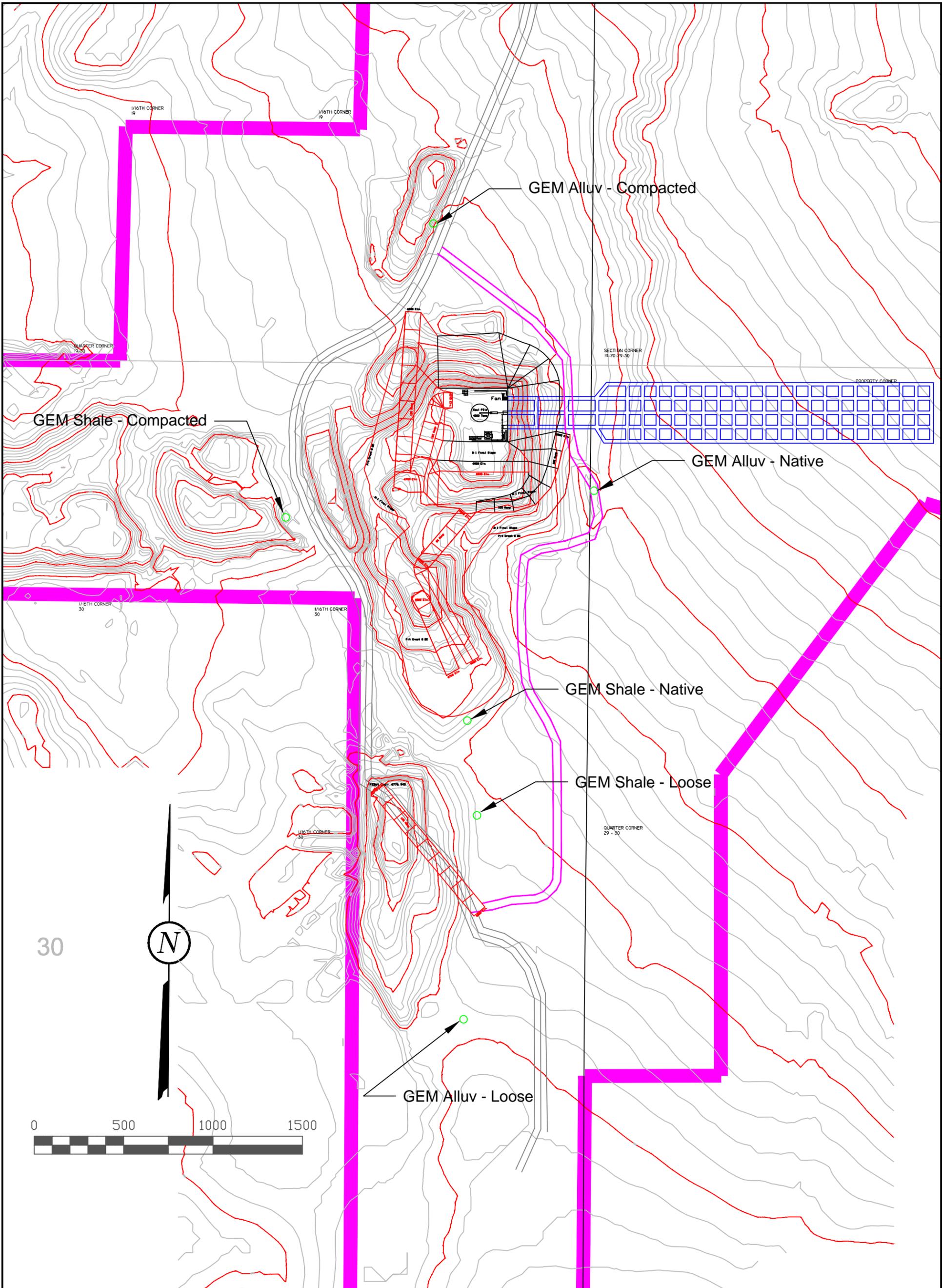


REMARKS:

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Reviewed by:



**LEGEND:**

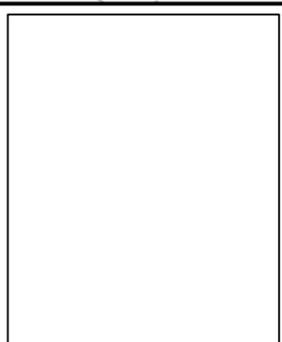
	PERMIT BOUNDARY
	PRIVATE COAL OWNERSHIP
	COAL LINE BOUNDARY
	COAL RECOVERY
	SECTION LINE
	FOUND SECTION CORNER
	FOUND PROPERTY CORNER

DRAWN BY:	xx
DRAWING:	XX
JOB NUMBER:	XX

CHECKED BY:	xx
DATE:	xx
SCALE:	1" = 500'
SHEET	

REVISIONS	
DATE:	BY:
xxx	xx

3/31/2015  
**GEM Shrink/Swell  
 Sample Locations**  
 Overview  
 COAL HOLLOW  
 PROJECT  
 ALTON, UTAH  
 DRAWING: xxx




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