From: <GCorcoran@Geosyntec.com>
To: <DRUPP@utah.gov>, <hroberts@denisonmines.com>, <Ssnyder@denisonmines.com...
CC: <JCox@Geosyntec.com>, <LMORTON@utah.gov>
Date: 7/2/08 5:42 PM
Subject: RE: DUSA Cell 4A Construction: Two Items noted.
Attachments: Slimes Drain Drainage.070208.pdf

Dave,
I have revised the calculations presented in the Analysis of Slimes Drain included in the Cell 4A Interrogatories. The original calculation was based on an area for flow to pass into the strip composite of 14 inches per foot of length (12 inches across the top and two sides at 1 inch each). This calculation, using the maximum liquid depth resulted in a drainage time of approximately 5.5 years.
The sand bag coverage issue likely only impacts a discreet amount of the sides of the strip composite (probably much less than 10%). However, taking a conservative approach, I assumed that all two inches of the sides of the entire strip composite is not available for flow. Incorporating the 12 inches per foot of length flow area into the maximum liquid level model calculation results in a drainage time of approximately 6.4 years (see attached), an increase of approximately 0.9 years. Given that the relationship is linear, one can interpolate between 5.5 and 6.4 years to estimate the impact of the percentage of strip composite sides that are not covered by sand bags. If this value is 10%, one can estimate that the drainage time would be approximately 5.6 years (0.9 years x 10% + 5.5 years).
We believe that this minor change meets the design intent.
Please let us know if you have additional comments, and confirm that this addresses your concerns.
Regards,
Greg

From: Dave Rupp [mailto:DRUPP@utah.gov]
Sent: Wednesday, July 02, 2008 1:54 PM
To: hroberts@denisonmines.com; Ssnyder@denisonmines.com; Greg Corcoran
Cc: Jim Cox; Jephory McMichen; Loren Morton
Subject: RE: DUSA Cell 4A Construction: Two Items noted.

Greg,
Thanks for your response. As I view section C-5 of the drawings, the sandbags drape over the both edges of the strip-drain, and preclude access to the edge and top of the strip-drain by the tailings. This will be a criterion we will use in inspecting for conformance to the existing plans.
The first photograph DRC sent on 6-25-08 regarding this problem shows six openings through the sandbags to the strip-drain surfaces. It appears that if the existing bags are only centered with respect to the strip-drain, the coverage will not achieve conformance to the drawing section C-5.
The design intent was to fully protect the strip-drain from clogging. Therefore, DUSA needs to make the necessary adjustments to conform to the drawings, or submit an alternative design proposal to accomplish the design intent. - -

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>>> <GCorcoran@Geosyntec.com> 7/1/2008 1:50 PM >>>
Dave,
Over the past few days, the contractor has repositioned sand bags over the slimes drain to address this issue, and bring the installation into compliance with the design drawings and specifications. We believe this fully addresses your earlier concerns.
Please let us know if you have additional comments, and confirm that this addresses your concerns.
Regards,
Greg

From: Dave Rupp [mailto:DRUPP@utah.gov]
Sent: Tuesday, July 01, 2008 6:41 AM
To: hroberts@denisonmines.com; Ssnyder@denisonmines.com; Greg Corcoran
Cc: Jim Cox; Jephory McMichen; Loren Morton
Subject: RE: DUSA Cell 4A Construction: Two Items noted.

Greg,
I am fine with your explanation of the waves in the geomembrane and strip-drain.

However, regarding the overfilled sandbags creating incomplete coverage over the strip-drains, DUSA needs to either:
1). Provide revised calculations showing the new time required for completion of the drainage of the tailings through the slimes drain, at the time of cell closure. This is critical, given the existing configuration which departs from the approved design, in which

portions of the strip-drain would now be compromised by invasion of the strip-drains by slimes material, and the corresponding reduction of flow into the collection pipe, or
2). Provide proposed design or field construction adjustments to prevent this problem, with corresponding calculations as necessary to demonstrate the effectiveness of the adjustments.

We cannot agree with your claim that when the cell is loaded the sandbags will settle and the problem may resolve itself, because there will be no practical means available to verify this claim. Without such verification DUSA has an obligation to prevent the problem now.

Please be advised that the As-built Report cannot be approved without prior resolution of this construction problem. - -

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>>> <GCorcoran@Geosyntec.com> 6/25/2008 1:30 PM >>>
Dave,
The waves in the geomembrane are a result of expanding geomembrane (thermal expansion due to increasing daytime temperatures) and the "plastic memory" in the underlying geonet. The plastic memory results from the manufacturing process, which uses an extrusion process consisting of extruding molten plastic through counter-rotating, round dies. As the plastic geonet is formed, it exits the die as a round column. As the plastic net cools in the column, the plastic develops a slight "memory" of this shape. After the column is cut and laid flat to form the geonet rolls, the geonet "remembers" that it was once a column or tube shape and when laid flat exhibits some minor curling of the edges. This is not detrimental to the geonet, but just creates minor curling of the edges that are easily laid flat with a small normal load on the surface.
The waves will lay down once the sand bags are put in place between the header pipe and the lateral. The filling of the cell with liquids will provide a relatively uniform liner system temperature, thereby reducing the thermal expansion due to elevated daytime air temperature. The material in the cell, whether liquid or solid, will also provide ballast that will get the waves to lay down, especially the underlying geonet with its "plastic memory". Remember that the slimes drain system will not be operated until the cell is filled with tailings.
The section on the drawings does show that the sand bag drapes over the strip composite. However, some of the sandbags were overfilled and leave a small gap at the sides of the strip composite. We do not believe that this causes any problems with the intent of the slimes drain design. Furthermore, we believe that the sand bags will settle in a bit more once the liquid loading is in the cell. The sand bags were designed to provide a sand layer that would act as a filtration layer in addition to the filter geotextile on the strip composite. The bags themselves were only required as a means to get the sand on top of the strip composite. In addition, the sand in the sand bags will convey liquid to the header pipe as the bags are placed in a continuous line.
Please let us know if you have additional comments, and confirm that this addresses your concerns.
Regards,
Greg

From: Dave Rupp [mailto:DRUPP@utah.gov]
Sent: Wednesday, June 25, 2008 8:08 AM
To: hroberts@denisonmines.com; Ssnyder@denisonmines.com
Cc: Greg Corcoran; Jephory McMichen; Loren Morton
Subject: DUSA Cell 4A Construction: Two Items noted.

Harold/Steve:
On a site visit last Friday, I had two items of concern I wanted to point out for your resolution.
The main one is the covering by the sand bags on the strip drains. Incomplete covering of the drains is seen now, and does not conform to the drawings, which show the bags completely covering the drains. On site I spoke with Messrs. D.Turk of DUSA and J.McMichen of GeoSyntec regarding this.
The other item is the inconsistent grade of the last few feet of some of the strip-drains near their connection to the herring backbone interceptor piping. The is grade waving, which if left would impede the flow from the strip-drain into the piping.
These items are illustrated in the attached photos. These items will need to be resolved prior to DRC final acceptance. Please contact me if you have questions. - -
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TABLE 3
White Mesa Mill
Cell 4A Slimes Drain
Maximum Liquid Depth

Permeability (cm/sec)	Permeability (ft/min)	Drainage Path Length (ft.)	Thickness (VF)	Q (cfm/ft)	Volume of Liquid (CF/ft)	Time to Dewater (min/VF/ft)	Time to Dewater (days/VF/ft)	Total Flow Rate (gpm)	Volume Removed (gal)	Pipe Limitation (days)
3.31E-04	6.51E-04	46.3	39	5.49E-04	11	20,049	13.92	113.07	2,266,966	0.18
3.31E-04	6.51E-04	45.8	38	5.40E-04	11	20,354	14.13	111.38	2,266,966	
3.31E-04	6.51E-04	45.4	37	5.31E-04	11	20,722	14.39	109.40	2,266,966	
3.31E-04	6.51E-04	45.0	36	5.21E-04	11	21,110	14.66	107.39	2,266,966	
3.31E-04	6.51E-04	44.6	35	5.11E-04	11	21,520	14.94	105.34	2,266,966	
3.31E-04	6.51E-04	44.2	34	5.01E-04	11	21,954	15.25	103.26	2,266,966	
3.31E-04	6.51E-04	43.8	33	4.91E-04	11	22,415	15.57	101.14	2,266,966	
3.31E-04	6.51E-04	43.5	32	4.79E-04	11	22,957	15.94	98.75	2,266,966	
3.31E-04	6.51E-04	43.2	31	4.67E-04	11	23,534	16.34	96.33	2,266,966	
3.31E-04	6.51E-04	43.0	30	4.54E-04	11	24,206	16.81	93.65	2,266,966	
3.31E-04	6.51E-04	42.8	29	4.41E-04	11	24,924	17.31	90.96	2,266,966	
3.31E-04	6.51E-04	42.6	28	4.28E-04	11	25,694	17.84	88.23	2,266,966	
3.31E-04	6.51E-04	42.4	27	4.15E-04	11	26,520	18.42	85.48	2,266,966	
3.31E-04	6.51E-04	42.3	26	4.00E-04	11	27,475	19.08	82.51	2,266,966	
3.31E-04	6.51E-04	42.2	25	3.86E-04	11	28,507	19.80	79.52	2,266,966	
3.31E-04	6.51E-04	42.1	24	3.71E-04	11	29,624	20.57	76.52	2,266,966	
3.31E-04	6.51E-04	42.1	23	3.56E-04	11	30,912	21.47	73.34	2,266,966	
3.31E-04	6.51E-04	42.1	22	3.40E-04	11	32,317	22.44	70.15	2,266,966	
3.31E-04	6.51E-04	42.1	21	3.25E-04	11	33,856	23.51	66.96	2,266,966	
3.31E-04	6.51E-04	42.2	20	3.09E-04	11	35,633	24.75	63.62	2,266,966	
3.31E-04	6.51E-04	42.3	19	2.93E-04	11	37,598	26.11	60.30	2,266,966	
3.31E-04	6.51E-04	42.5	18	2.76E-04	11	39,874	27.69	56.85	2,266,966	
3.31E-04	6.51E-04	42.6	17	2.60E-04	11	42,319	29.39	53.57	2,266,966	
3.31E-04	6.51E-04	42.8	16	2.43E-04	11	45,175	31.37	50.18	2,266,966	
3.31E-04	6.51E-04	43.1	15	2.27E-04	11	48,524	33.70	46.72	2,266,966	
3.31E-04	6.51E-04	43.3	14	2.11E-04	11	52,231	36.27	43.40	2,266,966	
3.31E-04	6.51E-04	43.6	13	1.94E-04	11	56,639	39.33	40.02	2,266,966	
3.31E-04	6.51E-04	44.0	12	1.78E-04	11	61,922	43.00	36.61	2,266,966	
3.31E-04	6.51E-04	44.3	11	1.62E-04	11	68,012	47.23	33.33	2,266,966	
3.31E-04	6.51E-04	44.7	10	1.46E-04	11	75,488	52.42	30.03	2,266,966	
3.31E-04	6.51E-04	45.1	9	1.30E-04	11	84,626	58.77	26.79	2,266,966	
3.31E-04	6.51E-04	45.6	8	1.14E-04	11	96,260	66.85	23.55	2,266,966	
3.31E-04	6.51E-04	46.0	7	9.91E-05	11	110,977	77.07	20.43	2,266,966	
3.31E-04	6.51E-04	46.5	6	8.40E-05	11	130,880	90.89	17.32	2,266,966	
3.31E-04	6.51E-04	47.1	5	6.91E-05	11	159,083	110.47	14.25	2,266,966	
3.31E-04	6.51E-04	47.6	4	5.47E-05	11	200,964	139.56	11.28	2,266,966	
3.31E-04	6.51E-04	48.2	3	4.05E-05	11	271,330	188.42	8.36	2,266,966	
3.31E-04	6.51E-04	48.8	2	2.67E-05	11	412,062	286.15	5.50	2,266,966	
3.31E-04	6.51E-04	49.4	1	1.32E-05	11	834,256	579.34	2.72	2,266,966	
						days	**2,321.18**		**88,411,655**	**0.18**
						years	**6.36**			

Average Soil Porosity	0.22	
Geomean Soil Permeability	3.31E-04	cm/sec
Distance Between Drains	50	ft
Thickness of Unit	1	ft
Maximum Depth	39	ft
Length of Strip Drain	27,550	ft