Exhibit H

RRD INTERNATIONAL CORP

Geotechnical & Environmental Consulting for Mining & Mineral Processing

1 December 2011

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P.O. Box 128
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Re: Review of Containment and Closure Issues
Denison USA / White Mesa Uranium Mill
Relicensing Application, Revision 5.0, Sept 2011

Dear Ms. Hawkins,

This letter presents the findings of a focused review of the above referenced documents and resulting recommendations. This letter is divided into three parts:

1. Liner for the new cell for demolition debris
2. Liner systems, Cells 1, 2 and 3
3. Closure and financial surety

Each section is designed to "stand alone" but there are common themes. The reference citations are provided at the end of each section.

1.0 Liner for new cell for demolition debris

A thin (12" thick) compacted clay liner does not appear to be either best practice or a reasonable level of containment for several reasons. Thin clay liners are (1) unreliable in general, (2) unsuitable for disposal of any wastes other than clean construction & demolition debris, and (3) not in compliance with industry or regulatory standards.

1.1. Thin clay liners are unreliable

The most authoritive study on the actual performance of compacted clay liners evaluated 85 full-scale installations, comparing actual field hydraulic conductivity ("permeability" or "k" herein) to predicted performance from laboratory permeability test results. A key result of this study was that poor correlation exists between laboratory and field permeability and that this lack of correlation increases dramatically for liners thinner than 24 inches (Benson, 1999). Another important research paper (Koerner, 2006) cites the inability to maintain moisture in the compacted clay in the long-term as a key factor in degradation of performance. This is pronounced in arid and semi-arid sites (such as Southern Utah) where the underlying natural soils and overlying waste will be substantially drier than the clay. This moisture gradient causes water to migrate out of the clay, causing shrinkage and related cracking. Many studies, including Benson (1999), Albright (2006) and Maine DEP (2005), show that drying dramatically increases permeability - by up to 4 orders of magnitude - and this effect is worse for thin liners.

The most recent comprehensive study on clay field performance focused on caps, which are affected by drying as well as other environmental factors. This study (Benson, 2007) found that the in-service performance will generally be two to three orders of magnitude worse (i.e., higher permeability) than short-term testing predicts, as illustrated in Figure 1.1. This follows on earlier research on compacted clay liners, which had similar results, as shown in Figures 1.2 and 1.3 (Benson, 1999).

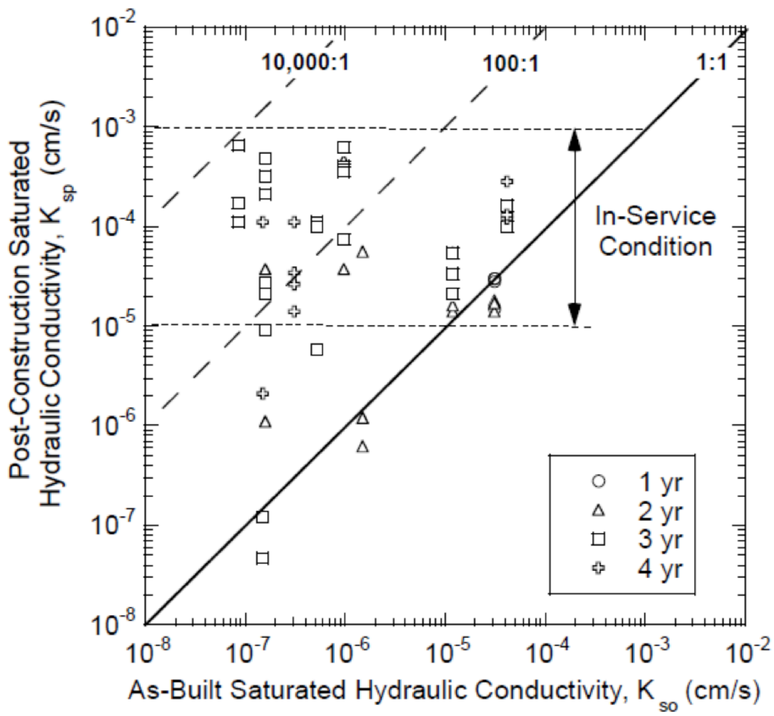

Figure 1.1: Short- and Long-Term Permeability of Clay Caps (Benson, 2007)

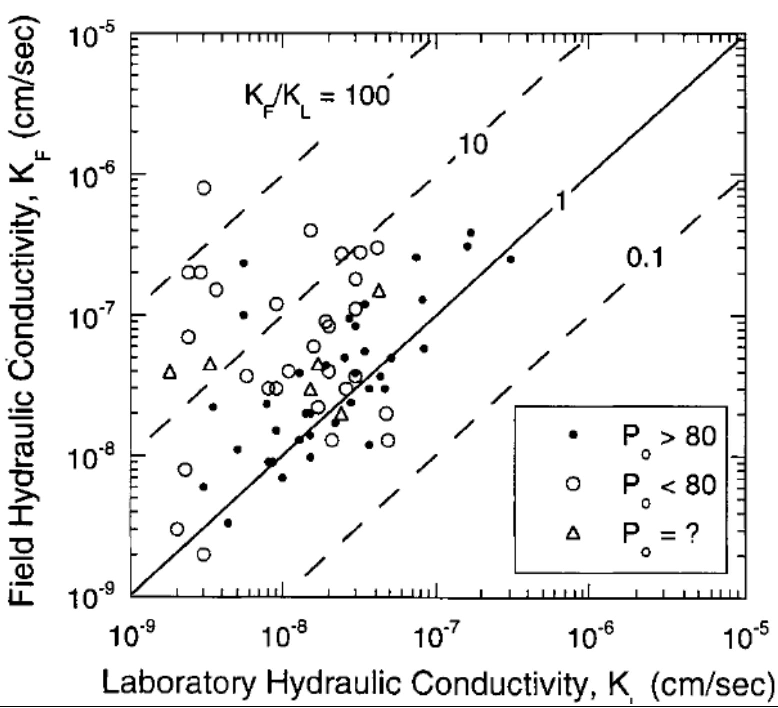

Figure 1.2: Field vs. laboratory permeability of compacted clay liners (Benson, 1999)

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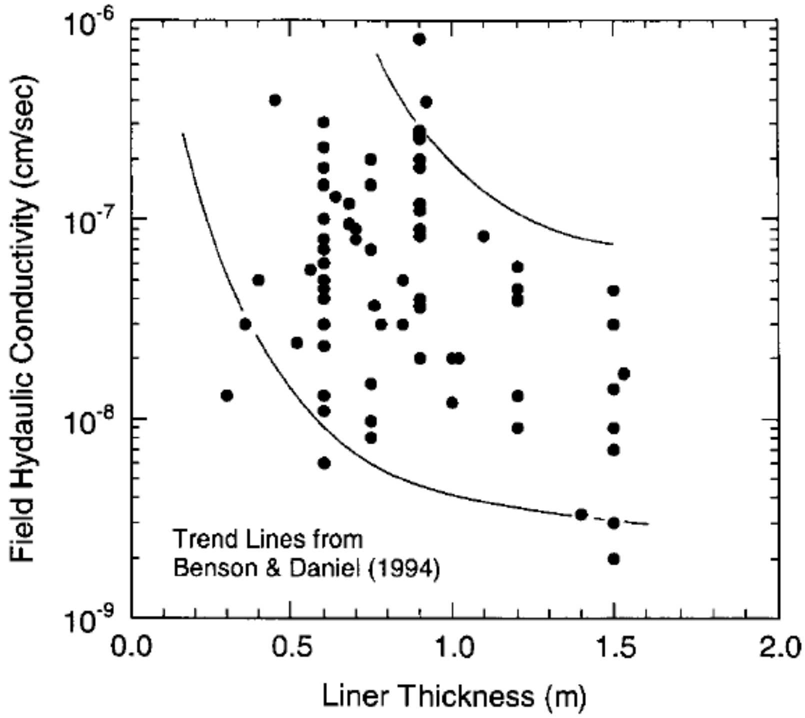

Figure 1.3: Field permeability vs. compacted clay liner thickness (Benson, 1999)

1.2. Unsuitable for uranium mill demolition debris

Given that the debris will include random pieces of plastic liner from Cell 1, pieces of concrete and reinforcing steel of various sizes from dust to intact structures, and soil related with and contaminated by these components, it will be effectively impossible to fully clean the debris. Any expectation that this will be accomplished is not based on industry experience or any collaborating evidence. Any attempt to fully decontaminate the debris would produce a vast quantity of liquid and semi-solid wastes not currently provided for in the closure plan. Such an approach would require a decontamination facility, evaporation ponds for the wash water, and a sludge disposal cell (double lined, similar to the tailings cells) for disposal of the cleaning residues.

1.3. Regulatory and industry standards

Industry standard practice is to dispose of the plant demolition materials in the tailings facility (Energy Information Admin, 1995; USDOE Fact Sheet, Monticello, 1995). Based on the latest DRC-approved tailings cells (4a and 4b) at White Mesa, the accepted standard for tailings in Utah is a double liner consisting of a 60-mil thick high density polyethylene (HDPE) liner over a synthetic drainage layer over another 60-mil HDPE liner over a geosynthetic clay liner. Given the lack of water in the demolition debris, the top liner and drain layer could be omitted for the demolition disposal cell (assuming it cannot be used for any liquids).

Non-radioactive wastes are regulated by the USEPA Resource Conservation and Recovery Act, either Subtitle C (hazardous wastes) or D (municipal solid wastes, MSW). The least of these prescriptive standards requires at least a 60-mil HDPE over 24” of clay (k<1x10-7 cm/s); under no conditions is a single 12-inch compacted clay liner acceptable. Any potentially radioactive waste, even of the lowest levels, should be considered as higher-risk than MSW and thus require a higher level of containment.

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1.4 References

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Benson, C. H., Sawangsuriya, A., Trzebiatowski, B., and Albright, W. H., "Post-construction changed in the hydraulic properties of water balance cover soils," DRI Alternative Cover Assessment Program (2007)

Energy Information Administration, "Decommissioning of U.S. uranium production facilities," office of Coal, Nuclear, Electrical and Alternative Fuels, U.S. Dept. of Energy, Washington, D.C, Feb. (1995)

Fact Sheet, "Monticello remedial action project vicinity property cleanup process," US Dept. of Energy, Nov. (1995)

Koerner, R. M., "The uselessness of compacted clay liners in the closure (i.e., capping) of landfills," GRI White Paper #10, Geosynthetic Institute and Drexel University, Jan. (2006)

Maine DEP, "Implementation of a sealed double ring infiltrometer to evaluate the long-term hydraulic performance of the barrier soil layer component of a composite landfill cover system in Norridgewock, Maine," Bureau of Reclamation and Waste Management, Solid Waste Engineering Unit, Dept. of Environmental Protection, May (2005)

2.0 Liner system, Cells 1, 2 and 3

The existing liner system in the original three cells is a 30-mil thick polyvinyl chloride (PVC) geomembrane over a drainage layer. This liner system is inadequate for uranium mill tailings containment for a variety of reasons, as summarized below.

2.1. The system did not meet industry standards at the time of installation

Weak cyanide mill tailings from gold and silver operations would generally be considered as a lower-level waste than uranium mill tailings. By the early 1980s, a number of these tailings impoundments in the USA were using containment systems equal to or more advanced than that used in cells 1-3. Examples include: Paradise Peak, Nevada; Jamestown, California; and Ridgeway, North Carolina. There seems to be no other examples of contemporaneous tailings facilities using 30 mil PVC. The incompatibility of PVC resins and plasticizers with organic solvents, as discussed in a following subsection, was also well known by 1979.

Further and more importantly, modern containment engineering was born in the mid 1980s. Before then, there was very little engineering involved and essentially no inspection or quality control during construction. A number of practitioners made a business in the late 1980s of replacing containment systems installed in the early 1980s. A surprising percentage of those systems failed completely or simply performed very badly due to combinations of poor quality materials, poor installation practices, and lack of engineering inspection during installation. As an example, the Palo Verde Nuclear Generating Station (Arizona), built in the mid 1980s, finished relining all of its containment facilities in 2010. Many of the mines in Nevada (where most geomembrane liners were used circa 1980) either abandoned those early facilities or completely reconstructed them. This also happened in South Dakota at three of the gold mines built circa 1985, including the Golden Reward and Annie Creek mines.

2.2. PVC is not compatible with acidic wastes

PVC geomembranes have limited tolerance of acidic (low pH) wastes and are generally not recommended for such containments, and PVC is only rarely used in such applications (Smith, 2004). PVC geomembranes are more flexible than PVC pipe to a great extent because of plasticizers added to the base resins. Acids, solvents and other chemicals extract these plasticizers, causing the geomembrane to become brittle, losing critical flexibility and therefore tolerance for settlement, movement of the wastes, planar and normal shear forces, and so forth (see Photo 2.1). As the Table 2.1

and Photo 2.1 show, PVC can have a strong negative reaction to acidic wastes, losing 94% of the seam strength and 75% of flexibility (i.e., elongation at break) in as little as 2 months. Importantly, there is no collaborating data to support a thin PVC liner in an acidic environment for over 30 years (Thiel, 2003). This data gap should be filled before any such installation is allowed to continue in service.

Table 2.1: PVC Aging Test Results (% change from original) (Smith, 2004)

Immersion Time (Days)	Tensile Strength @ Break	Elongation at Break	Puncture	Tear	Seam Shear Elongation
30	31/27	-58/-74	129	119/122	-90
60	62/40	-71/-75	120	122/110	-94
120	54/54	-66/-76	130	107/112	-86

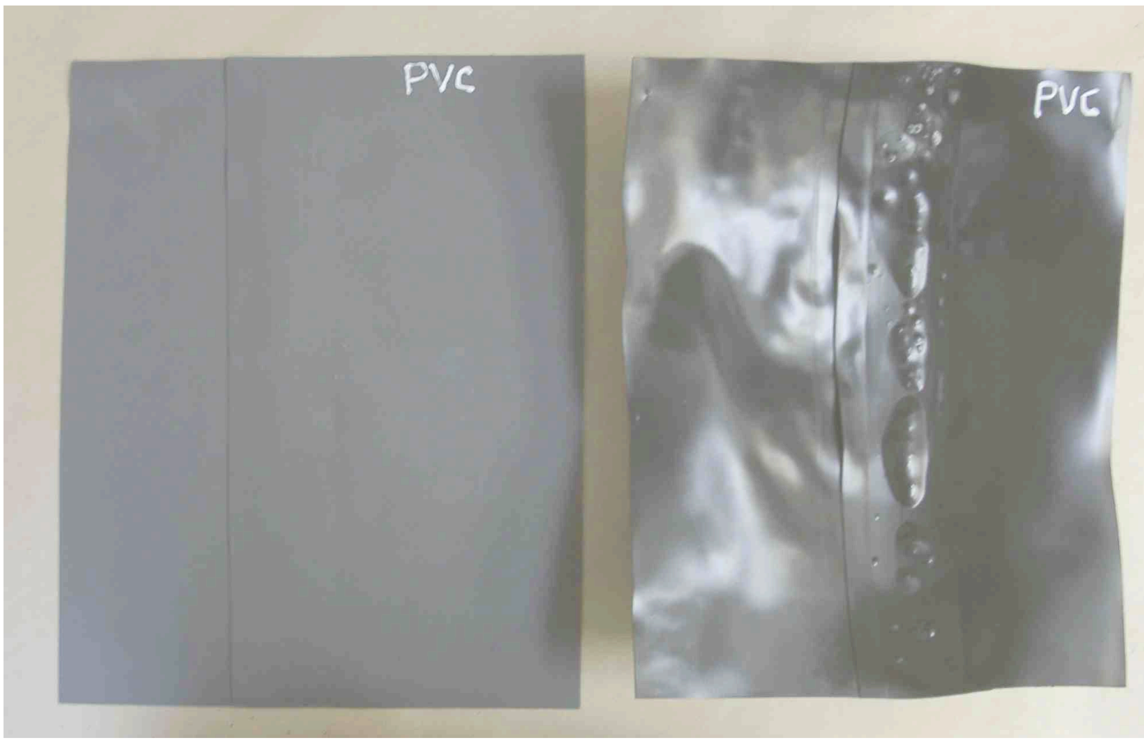

Photo 2.1: 30 mil PVC seam, before acid exposure (left) & after 60 days (right) (Smith, 2004)

2.3. PVC is not compatible with the alternative feed wastes

The alternative feed wastes, and therefore the tailings solutions, contain these organic solvents: benzene, carbon tetrachloride, chloroform, methylene chloride and naphthalene. All of these are aggressive to PVC resin and generally more aggressive to the plasticizers commonly used to make PVC geomembranes flexible. Three industry sources were considered for the compatibility of PVC resin with these chemicals and those are summarized in Table 2.2. Plasticizers and the other additives are also (and often more) susceptible to attack and leaching by solvents, but each plasticizer is unique and thus it is impossible to know how that component of the geomembranes used at White Mesa will react with specific compatibility testing. However, broad conclusions can be drawn about the base PVC resin, and the performance of the geomembrane will likely be worse than predicted from the resin alone.

Dissolution of the base resin will mobilize PVC into the groundwater; monitoring results show elevated (above background) levels of vinyl chlorides. This supports the conclusions that (i) the geomembranes are being attacked chemically, and (ii) they have exceeded their service life.

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Table 2.2: PVC compatibility data

Chemical	Source		
	Harmsco	Spilltech	Cole-Palmer
Benzene	NC	B (for <1%)	C[1]
Carbon tetrachloride	C	C	D
Chloroform	NC	X	D
Methylene chloride	NC	not rated	D
Naphthalene	NC	X	D
Ranking key	C=compatible NC=not compatible	A=little to minor effect B=minor to moderate effect C=severe effect X=no test data, likely to have severe effect	C=fair D=severe effect 1=to 72°f
Notes: PVC base resin without plasticizer or other additives. The plasticizer agent(s) is unknown but likely to have more serious incompatibility issues than the base resin.			

<u>2.4. The useful life was less than 30 years</u>

The tailings cells were put in service as early as 1979, 32 years ago. There is limited research on the useful life of thin PVC geomembranes in containment applications because they have rarely been used as such and are not used in modern containments. One authoritive study, recently updated, suggests a useful life (defined as a loss of 50% of physical properties) for PVC geomembranes of 18 to 32 years depending on geomembrane thickness, cover conditions, and resin formulation (Koerner, 2011). This is for non-acid installations and therefore over-predicts useful life in a chemically aggressive environment. Considering the service life without regard to the aggressive chemicals, a multi-industry study of geomembrane performance measured plasticizer loss from thin PVC geomembranes at 10 sites over 22 years. Figure 2.1 shows that plasticizer loss reached 50% in less than 20 years. Useful life is generally taken as loss of 50% of physical properties, and plasticizer is one of the key properties of flexible geomembranes.

A literature search on manufacturer warranties for PVC geomembranes did not produce a single example of a warranty for a liner produced circa 1979 of longer than 20 years. Modern PVC liners are of much better quality, though modern warranties are for no longer than 25 years. In the author's experience it is uncommon for a PVC geomembrane to carry any warranty when exposed for prolonged periods to non-compatible chemicals, especially organic solvents.

The mining industry has broadly avoided thin PVC geomembranes for acid tailings containment. A search of the literature did not find a single other example of a 30-mil (or thinner) PVC geomembrane used in an acidic mill tailings impoundment or for containment of organic solvents. Experience at White Mesa suggests that these liners have exceeded their useful life. There is considerable evidence of containment failure (nitrate and chloride plumes below Cell 1, a uranium seep to the east) and Denison elected a much more robust system (double 60-mil HDPE) for the new tailings cells. The lack of a reliable monitoring system (Denison's own study, submitted as Vol. 4 of the original relicensing application, predicts nominally 250 years for a leak to be detected by the monitoring wells) compounds the problem by given false "negative" results.

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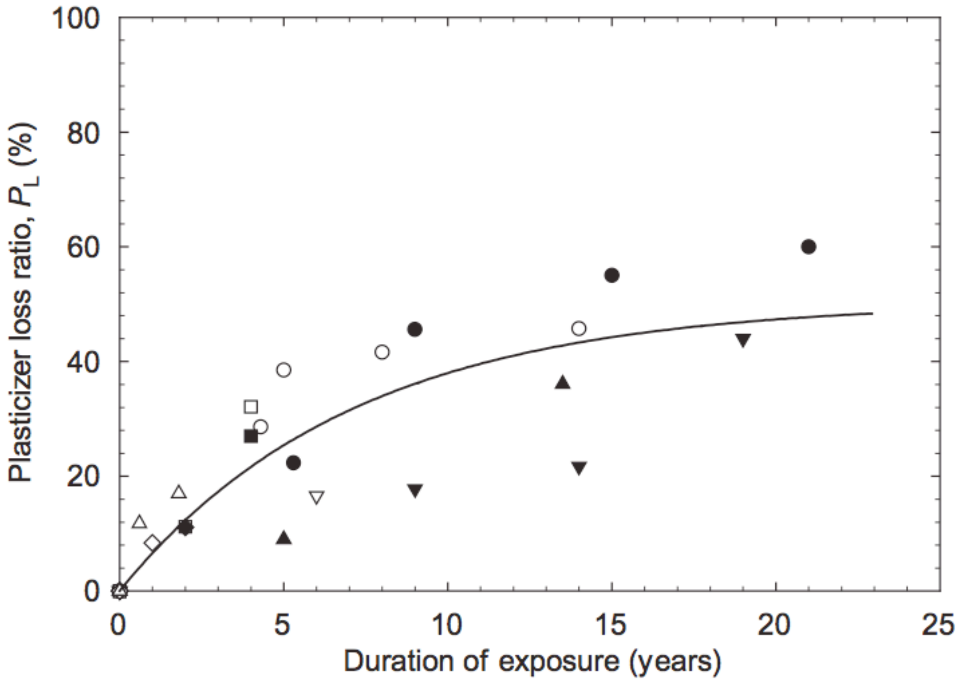

Figure 2.1: Plastisicer loss in thin PVC geomembrane canal liners (below water level) in Western USA (1966-2004) (Stark, 2005)

2.5. Temporary caps for Cells 1, 2 and 3 inappropriate

Given that the liners in the first three cells have passed their useful life, and given that there is important evidence of groundwater contamination at the site, these cells should be taken out of service and put into final closure as soon as possible. Temporary caps will allow continued infiltration of rainwater, and continued, even incidental, disposal of wastes will add to the total contaminate load available to seep through the liner system. There is also no good reason to defer final closure of these cells and the standard in the industry. The standard "encouraged" by all other regulatory entities where the author has experience, from Nevada and Arizona to Peru and Chile, is to maximize concurrent closure. This provides a variety of advantages, including:

- Reducing environmental footprint and contamination risk annually;
- Reducing the liability that may be transferred to the agency at abandonment;
- Full-scale verification of the closure concept and optimization of that design based on field experience; and
- Better cash flow management by the owner and a reduced likelihood that the owner will not be able to fund the full closure.

2.5. References

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Stark, T. D., Choi, H. and Diebel, P. W., "Influence of plasticizer molecular weight on plasticizer retention in PVC geomembranes," Geosynthetics International, V. 12, No. 1. (2005)

Thiel, R. and Smith, M. E., "State of the practice review of heap leach pad design issues," GRI, Dec. (2003)

3.0 Closure and financial surety

3.1. Review of the Denison closure plan

Time is insufficient for a full, detailed review of the closure plan, and thus, the focus herein will be on the capping systems and how they compare to the Monticello cap. Monticello is an important reference project because it is nearby and in a similar climate, geologic and social-economic setting. Monticello was also closed by a government agency and thus presents the methods (and costs) that would most likely be applied to White Mesa in the event of an owner walk-away. Table 3.1 compares the components of the two projects' tailings cell caps.

Table 3.1: Comparison of capping systems at Monticello and White Mesa

Cap Component	Monticello Thickness	White Mesa Thickness
Vegetation	inches	inches
Erosion control	0.67 ft	0.5 ft
Water storage/frost protection	4.83 ft	3.5 ft
Biotic intrusion (gravel)	1.00	none
Geotextile	~100 mil	none
Capillary break (sand)	1.17 ft	none
HDPE geomembrane liner	60 mil	none
Radon barrier (compacted clay)	2.00 ft	5.0 ft
TOTAL	9.67 ft	9.0 ft

The White Mesa cap omits several important components used at Monticello, listed and discussed below. All of these missing components should be included in the White Mesa caps.

- Biotic intrusion layer: this is both standard practice on closure caps and needed to prevent deep burrowing animals from penetrating the cap.
- Geotextile & capillary break: for a +200 year closure design, as required by law and industry practice, a water storage layer must be isolated from the balance of the system with a capillary break. Without said break, the water stored in the upper layer will be drawn into the radon barriers through the capillary action of the soils. Clayey soils can develop capillary suctions approaching 1 atmosphere and 15-foot draws are commonly seen in the field.
- HDPE geomembrane: without this barrier, any seepage that penetrates the water storage layer will be available to mobilize contaminates from the waste and affect the radon barrier. The standard of care for uranium mill tailings caps is to include both a water balance cap and a low permeability caps. There is ample research showing that compacted soil barriers fail to meet design standards in the majority of cases, and they do so by a wide margin, producing field permeability several orders of magnitude higher than predicted (Benson, 2007), as shown in Figure 3.1.

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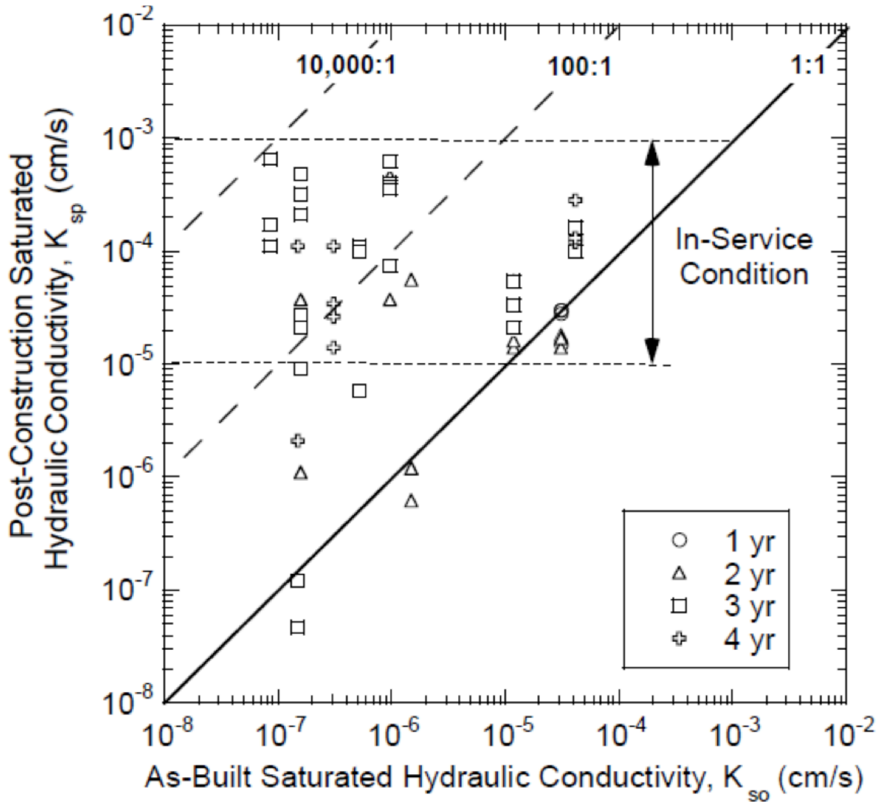

Figure 3.1: Long-term cap performance v. as-built permeability (Benson, 2007)

3. 2. Review of the White Mesa closure cost estimate

3.2.1 A review of cost estimating methods

Cost estimating can be divided into three broad categories, each commonly used in the industry and each having an important role. These are:

- Benchmarking: costs from other sites are adapted to the target site to give guidance on total costs. The more sites studied and the more directly applicable those sites, the more accurate a benchmarking estimate can be. With a modest level of effort a cost estimate of +/-50% accuracy can be developed, and the author has had success with developing better than +/-15% estimates from robust benchmarking efforts. An example of the benchmarking approach is developing a first order estimate for a new home. If homes in your target neighborhood are selling for an average of $150 per square foot, that is a reasonable starting price for the home you are considering, with adjustments for site-specific features (e.g., in-ground pools, 3-car garages, deferred maintenance, etc);
- Built-up estimates: these are cost estimates developed by "building up" the costs from line-items, generally following the engineered design. This is the most common method and this is what Denison has submitted as its closure cost estimate. A built-up estimate can be done at a wide-range of accuracies, typically ranging from +/-10% for a very detailed design supported by very accurate cost estimating and usually supporting contractor bids, to +/-50% for a conceptual design or a most advanced design for a distant future installation. These accuracies apply only to the considered closure actions; for example, if groundwater remediation is not considered in the design the accuracy percentage would be before adding possible groundwater remediation costs.
- Bid-supported cost estimates: this is a process where the detailed design is put out to contractor bids where firm pricing is obtained for all major components (or the entire project). These estimates are generally very accurate (+/-15% or better) to the extent they include all

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required closure actions. Bid-supported estimates are generally only applicable when a detailed design has been completed and the project is within a year or two of construction.

Built-up estimates can be performed at a range of accuracies depending on (i) the level of engineering, and (ii) the reliability of the unit costs. A closure plan prepared years before closure actions are to start should be considered no better than "conceptual" and that generally suggests an accuracy of +/-50% to +/-30%. This is in part because cost estimates generally (almost universally) decline in accuracy as the forecast period increases (Lazenby, 2010). Most built-up costs will have four basic inputs:

- Direct costs (labor, equipment and materials to perform the construction including mobilization and demobilization);
- Indirect costs (project and company overhead, insurance, bonds, profit, etc) which commonly run 35% to 50% of direct costs;
- Owner's costs (the cost of the owner's team to administer the project, including bidding and awarding the construction contracts, hiring a project management or construction management team, performing design changes during construction, and so forth). Owner's costs generally run 10% to 25% of the direct costs; and
- Contingency, which is reflective of the level of design and the risk of unknowns. The most common contingency used in the mining industry is 15 to 20% of the subtotal of the other three categories of costs (and, as discussed below, this is almost always inadequate). Larger contingencies are appropriate when either the design is conceptual (as in the case of most closure plans) or the site is subject to significant uncertainties (such as the extent of contamination in need of remediation).

Most cost estimates do not recognize inflation or cost escalation and as such should be cited in terms of the year the estimate was based (e.g., 2010 dollars). The estimate must then be escalated to the time period in which the work will be completed, using forward-looking inflation factors appropriate for the region. Common escalation factors are 3.0 to 5.0% per year (Zuzulokc, 2004). The failure to recognize inflation in cost estimates looking out 10 to 15 years in the future creates a strong built-in bias to underestimate costs; all other factors being correct, the actual cost will be 151% to 198% of the estimate assuming there is no serious inflation. Some agencies fail to do this or presume that bond amounts can be adjusted later, but that's not always the case. The most common scenario when a bond is "called" is because the owner went into an economic downturn, and just like it's impossible to get a home mortgage when one's wages are declining, it's hard to renew and especially to increase bonds when a company is in financial trouble.

Even detailed built-up cost estimates, supported by detailed engineering and claimed to contain high levels of accuracy, are generally too low. A study issued by the well-respected engineering and project management firm Pincock, Allan and Holt in 2000 made the following disturbing observations (PAH, 2000).

- "*It is rare, not the norm, for the actual project capital cost to be within 10 percent of the feasibility study capital estimate*."[Including contingency.]
- "*Within the 21 projects, only three came in under the feasibility study cost estimate*."
- "*Site earthworks are often underestimated*." [Closure costs are heavily earthworks.]
- After escalating the estimates for the time between the estimate and actual construction at 3.5% annually, 11 of the 21 projects considered came in at 118% of the estimated cost (and those estimates included contingencies), 3 came in at 137%. The 9 projects in North America averaged 124% of estimate.
- Smaller projects (i.e.,, under about $200 million) performed by smaller mining companies are most likely to have higher cost over-runs.
- Other important areas that are either omitted or underestimated include owner's costs, working capital, freight, environmental, duties and taxes.

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In another study of cost overruns, those researchers analyzed 63 mining projects and found that the mean actual cost was 125% of the estimate (including contingency) and that the maximum cost was 214% of the estimate (including contingency). Nearly 70% (44) of the 63 projects underestimated the cost (Bertisen, 2008).

Several other studies, summarized in a mining industry blog (Caldwell, 2007), reached two important conclusions:

- o The average actual closure cost in Australian mining (not uranium specific) is 6.8 times the average estimate; and
- o Total US mining closure liability is up to $12 billion more than the bonded total.

In short, when a mining estimate is prepared for public purposes, such as closure bonding, a much more robust estimating method is needed to ensure adequate funding. Such robustness should include:

- o Higher unit rates to recognize the inherently more expensive delivery method;
- o Full recognition of indirect and agency costs; and
- o Significantly larger contingencies than traditionally used in mining.

3.2.2 Cost benchmarking

In 2010 the author completed a broad benchmarking study of the mining industry for cost to construct both heap leach pad liner systems and closure caps. The heap leach liner costs were determined for 37 phases of recent projects, either constructed or in advanced stages of design. The closure cost was developed as a "typical" for tailings and mine waste in semi-arid sites, using data from a dozen sites and several parallel studies. The results of these benchmarking studies are summarized in Table 3.2.

The Table 3.2 values can be factored to provide an estimate for a uranium mill tailings (UMT) capping system. Considering gross volumes, a UMT cap is typically about 3m thick or three times that considered in Table 3.2. But some of those layers are relatively cheap (i.e., random fill) and thus the factored cost would be less than three times. The primary "expensive" component in the table, the geomembrane liner, is about 20% of that total cost. Removing that, tripling the remaining costs, and then adding it back produces a factored cost of 260% of the 1 m thick system's cost, or $91/m2 ($369,000/ac); $84.5/m2 ($342,292/ac) without the geomembrane. This compares well with the other benchmarked sites, as the following discussion will demonstrate, and the author's personal experience.

Table 3.2: Benchmarked Leach Pad Costs (Smith, 2011a & Smith, 2012)

Case	Cost in 2010 dollars (USD per square meter)
Base liner systems:	
Mean (26 sites/37 phases) excluding drain gravel & pipe network (4 layers, ~1 m thick)	$29
Range	$16 to $59
Standard deviation	$9.49
Mean cost with drain gravel	$40
Capping system (non uranium mining):	
Conventional system, mean cost North America (4 layers, ~1m thick)	$35
Factored costs to ~3m UMT capping system	$91

Two authoritive sources for mine closure costs are AFCEE (undated) and Dwyer (1998). In a broad survey of industry practices they found the following range of capping costs for tailings and waste dumps (but not considering the more robust requirements of uranium mill tailings). The mid-value of these two ranges, $75/m2, is consistent with the factored Smith estimate of $91/m2.

- o AFCEE: $36 to $97/m2 or $145,828 to $392,926/ac (ET and capillary barriers, plus synthetic liners at the upper end)
- o Dwyer: $72 to $96/m2 or $291,657 to $388,876/ac (ET and capillary barriers only)

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During the heyday of US uranium mining, there were over 50 operating conventional mills. All but one of those, White Mesa, is now shut down with varying degrees of attention to closure. The US DOE has published reports (DOE, 1995 & Robinson, 2004) on at least 43 of those sites, including both Title I and II sites (10 C.F.R. Part 40), detailing the closure costs, surety levels and other issues. Most of the closure liability comes from securing the tailings storage facilities and addressing control of radon emissions and contamination to groundwater, surface water, and land (principally dust). In some cases, tailings have been completely relocated, such as at Monticello, Utah. In others, the tailings were secured on site. About a third of these 43 sites are still the subject of on-going active controls and, to some extent, dispute about whether the sites are secured (Smith, 2010). Table 3.3 summarizes the costs at those 43 US sites. Key take-aways from these studies are the median and average closure costs per permitted acre: $350,000 and $600,000, respectively. The most directly relevant site is Monticello, with a closure cost of $1,400,000 per acre and a total cost of $520 million (2010 dollars).

Table 3.3: Uranium Mill Closures in the USA (U.S. DOE, 1995 & Robinson, 2004)

Facility	Permitted Site Area (ac)	Surety as of 1994 ($M)	Total Closure & Remediation Costs (2010 Dollars)	
			($M)	($M/permit acre)
Sites with Costs >$100M				
Grand Junction, Co	56		952	17.0
Moab, Ut	439	12.1	720	1.6
Monticello, Ut	380		520	1.4
Old & New Rifle, Co	55		223	4.0
Salt Lake, Ut	128		177	1.4
Naturita, Co	63		162	2.6
Durango, Co	120		130	1.1
Maybell, Co	316		122	0.39
Gunnison, Co	90		111	1.2
Falls City, Tx	593	12.7	108	0.18
Mexican Hat, Ut	235		105	0.45
Average of Sites >$100M	225	12.4	302	1.35
Average of 43 Sites	180	18.9	107	0.60
Median of 43 Sites	146	15.5	47	0.35

A German study of the 14 major uranium-producing countries and the associated closure costs was completed over a decade ago. That study considered mines producing a total of 63% of the world's uranium and as such should be considered statistically relevant. Part of the findings of that study include: "*The accumulated and estimated costs for the decommissioning and rehabilitation of the uranium-producing plants referred to in this study amount to about US $3.7 billion (cost basis: 1993). The resulting specific rehabilitation costs are US $1.25 per lb of U3O8 and US $2.20 per tonne of tailings. Omitting plants which produce/produced uranium as by-product of gold and copper production, the specific cost per tonne of milling doubles to nearly US $4.00.*" (Wise Uranium, 2002). In a study of the DOE remediation projects, Robinson (2004) also calculated U.S. closure costs on a per-short-ton (st) of tailings basis. He found that "*UMTRAP costs ranged from $18 [per short ton] at Mexican Hat and $19 at Monument Valley to $149 at Canonsburg and $122 at Lowman Idaho and $123 at Naturita. The average (mean) cost of UMTRAP project activities is $73 per ton of tailings*."

Escalating the German costs to 2010 dollars (at 3.0% annually) the average closure cost is $6.61 per metric tonne ($5.95/st) of tailings. Escalating the Robinson study costs at the same rate produces a low of $22.14 and a mean of $89.78/st ($24 and $108 per metric tonne, respectively). Taking the German costs as the lower-bound and for an average depth of tailings equivalent to 10 to 15 tonnes per square meter (typical values for the industry), that equates to $66.10 to $99.15/m2 or a mid-range value of $83/m2. This compares well to the other per-square-meter benchmarks.

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Another approach is to apply the per-tonne (or per-ton) costs directly, which first requires estimating the tailing tonnage. The mill has been operating for nominally 30 years, with much of the 1990s intermittently, and is planned to operate indefinitely into the future; for the purposes of this estimate 2020 has been taken as the closure date. Using the mill throughput of 2,000 tons per day (tpd) as authorized by Permit No. UGW3700A4 the following should be a reasonable estimate of the total tons which will require closure:

2,000 tpd x 365 x 15 years x 90% (historic, normal years) =	9,855,000 tons
2,000 tpd x 365 x 15 years x 50% (historic, intermittent years) =	5,475,000 tons
2,000 tpd x 365 x 8 years x 90% (2011 to 2020) =	5,913,000 tons
TOTAL	21,243,000 tons

Appling the lowest of the estimates, from the German study, produces:

21,243,000 tons x $5.95/st = $126,395,850
(before escalation to the (unknown) closure date)

This estimate is within 2% of the escalated costs based on acreage (Table 3.2). Using the lowest case history from the US DOE numbers (Robinson, 2004) produces an estimated closure cost (non-escalated) of:

21,243,000 tons x $22.14/st = $470,320,020

This latter value may seem high but is in fact aligned with the larger of the U.S. closures including Monticello ($520 million). The most expensive 11 sites had a mean cost (2010 dollars) of $302 million. In other words, when groundwater and other remedial actions are fully considered, there is a very real possibility of the total closure liability will approach half a billion dollars. With the current surety scheme, nearly all of this will be unfunded.

To summarize, the references reviewed considered a total of at least 110 sites worldwide, with most of those in the USA. Over half were uranium mill sites. These are summarized in Table 3.4. One conclusion that must be drawn is that a closure cost estimate significantly lower than $402,000 per acre or $100 million total must be viewed with suspicion. Denison's latest estimate is $17.7 million or approximately $78,000 per acre of tailings. This per-acre rate is 19% of the average benchmarked cost, 13% of the average closure cost for all US UMTs and 6% of the cost for Monticello.

Table 3.4: Summary of benchmarking data on closure costs

Source	No. of Sites Considered	Closure Cost		Comments
		Total, US$	US$/acre	
US DOE 1995	43 sites	$107m	$600k	Per "permitted acre", all UMT sites
Germany/Wise Uranium 2002	14 countries		$336k	Sites total 63% of world uranium production, all UMT sites
AFCEE & Dwyer 1998	>10 sites		$303k	Non escalated costs, non UMT sites
Smith 2011a, 2012 factored	40 sites		$369k	Non UMT sites
Average	>110 sites		$402k	Not weighted

Notes:
1. Costs per acre are per are of tailings capping unless otherwise noted.
2. Costs are in 2010 dollars except for AFCEE & Dwyer, where the costs have not been escalated.

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3.2.3 Built-up estimates for closure bonding

The purpose of a closure cost estimate, from a permitting and regulatory view, is to ensure that sufficient funds exist to properly close and secure the site in the event that the owner walks away. In an industry-supported initiative to standardize closure guarantees, a model agreement has been prepared and includes this language: "(a) *The mine closure guarantee shall be in an amount calculated to be necessary to implement the Closure Plan should the Company fail to implement the Closure Plan…."* (MMDA, 2011). Given this, the method of preparing the cost estimate must assume that the project will be under government management and that government-contracting rules apply. This was even recognized by International Uranium (USA) Corporation (Surmejer, 1999). This means that:

- The cost-efficiencies available to the mining company cannot be recognized;
- An engineering, procurement and construction management (EPCM) firm with governmental experience and a high bonding capacity will be used;
- Prevailing wage (Davis-Bacon Act) rules apply;
- All work will be contracted to public-works qualified construction companies with applicable overhead and other indirect cost factors;
- The cost estimate must have reasonable consideration for unforeseeable circumstances, including unexpected contamination;
- Agency required insurance, bonding, health and safety, independent inspection, and other rules will apply;
- Costs must be escalated to the dates closure is planned; and
- Agency oversight costs must be recognized.

3.2.4 White Mesa mill reclamation cost estimate, Sept. 2011, Rev. 5.0

The Denison estimate fails to meet the criteria set forth in the preceding section on a variety of grounds, as summarized below.

Equivalent earthworks unit cost: The Denison estimate does not use rates per cubic yard of earthworks, but its costs can be converted using conventional engineering estimate methods. Taking the Denison direct costs of $12,620,391 and dividing it by the MWH earthworks quantities (their Table 3.3-4) of 3,724,000 cubic yards produces an average cost of $3.39/cu. yards. Anyone familiar with public works construction will recognize this as unrealistically low. This is also below the average costs for private works construction on mine sites. The author is the peer reviewer for a major tailings dam in Peru and the lowest unit rate (direct costs only) on that job, in low-cost Peru, is US $5.00 per cubic yard and that is for mass grading of a multi-million cubic yard fill. All specialized work is much more expensive.

Labor hourly rates: The direct labor rates used are significantly lower than prevailing wage and do not include fringe benefits as required. A sampling of rates used by Denison and the applicable regulatory rates are presented in Table 3.5. The White Mesa rates average 44% of the prevailing wages. Based on the detailed costs for Cell 3 and assuming those are representative of the entire closure, labor represents 19.3% of the total costs. Thus, total costs should be increased by 44% x 19.3% = 8.5%.

Table 3.5: Labor rates (per hour)

Labor Category	White Mesa Rate (total)	Prevailing Wage Rate direct + fringe (note 1)
Laborer	$12.51	$17.61 + $4.94
Mechanic	$16.77	$35.10 + $12.49
Equipment operator	$18.16 to $20.65	$25.17 + $14.41

Notes:
1. According to General Decision Number: UT100073 09/30/2011 UT73 for San Juan County, Utah, adopted 9/30/2011 (includes some older rates).

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Equipment hourly rates: Hourly rates were provided by a local equipment leasing company. The rates include a nominal 50% discount for hours after 40 per week, and the assumption has been that a 50-hour work-week is average, producing an average rate less than the straight rental rate. However, the corresponding labor rates do not reflect any overtime multiplier as required by prevailing wage rules. This means that either (i) the equipment rates are too low or (ii) the labor rates need to be adjusted for overtime. Public works projects tend to limit overtime because of the high hourly rate penalty and thus the safe assumption is no overtime. This increases equipment rates by 11%. The price used in the equipment cost calculations is $2.332 per gallon, representing the 12-month "off-road use" cost for 2010. The commercial price in Sept. 2011 for off-road use was $2.97/gallon. Thus, the rate used is about $0.65/gal lower than the current market price, or 27.9%. Based on the built-up equipment unit rates, fuel is 10.6% of the total hourly rate and thus the hourly rates should be increased by 27.9% x 10.6% = 3.0%. Combining the equipment overtime and fuel adjustments, the equipment hourly rates should be increased by 11% + 3% = 14%. Using the Cell 3 cost details as representative of the entire project as an approximation, equipment costs are 78.8% of the total closure costs. Thus, the closure costs should be increased by 14% x 78.8% = 11%.

Quantities (labor and equipment hours): The benchmarked costs are vastly higher than the costs produced from Denison's quantity estimates, suggesting the quantities are unrealistically low. The quantity estimates were prepared by Denison, not by an independent party or registered engineer. The basis for the quantity estimates is provided in the hand-written notes following the cost tables; these suggest a traditional mining view on economies of scale, which are not available to a public works project. Without having a full peer review of the quantity estimates it is not possible to estimate an adjustment.

Quality control: The "Notes & Assumptions" section of the cost estimates for the tailings cell says "*Quality control contractor is assumed to be necessary for duration of material placement plus 20% for reporting*." The costs applied total about $0.014 per square foot. This is 30% to 50% of industry standard. The cost basis uses $62 per hour, which is far below prevailing industry rates and especially excludes any allowance for overtime or engineering supervision. As a reference, one of the largest firms in the mine construction quality control business is Ausenco Vector (www.ausenco.com). Their average quality control project hourly rate for a prevailing wage (public works) job in the USA is $125 per hour (2011). Quality control represents 4.8% of the total closure costs for the tailings cell, and doubling QC costs will increase the total cost by 4.8%.

Cell dewatering costs: A unit rate of $0.48/hour has been used with no basis. The same quantity of hours is used for each cell, though they vary in size, retained water and efficiency of the dewatering system. Dewatering has two stages for cost-estimating purposes: that performed during the active operating life of the mine and that performed afterwards. An approach based on a nominal cost per hour or cost per gallon may be logical during the operating life, since there is a core staff already on site along with the equipment, infrastructure and administration systems. However, once operations have ceased there will be no support. Thereafter, the dewatering program will be operated by a contractor at a significantly higher unit cost.

Supporting quotes: Supporting price information is provided for some of the relatively minor costs (e.g., road haulage of rip rap from the borrow source 7 miles from the site, rental rates for a gravel screen, and so forth). None of these "quotes" (some are as informal as telephone notes) suggest that the vendor understands that he or she is quoting a public works project with the applicable contracting, insurance and prevailing wage criteria.

Remediation costs: There is no provision for any currently unknown contamination. It is unlikely that the extent of surface or groundwater contamination is currently fully known and providing no such provision is irresponsible.

Indirect costs:

- Profit: 10% is allowed and this is reasonable.
- Contingency: 15% is allowed and is too low for the level of design and the lack of supporting

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fixed price bids. Considering the findings of the prior section on industry experience with cost estimates versus actual costs, a contingency of 35% is recommended.

- License & bonding: 2.0% is reasonable for a private-works project but is much lower than seen on public works projects.
- UDEQ contract administration: 4.0% is allowed. This item is equivalent to "owner's costs" for conventional cost estimating, which run from 10% to 25%, with 12% to 15% being typical.
- Detailed engineering, procurement and construction management (EPCM) has been omitted and typically runs about 12% for non-government projects and is higher for those.

Long-term care fund: At current deposit interest rates a fund of $809,376 provides an annual cash flow of $8,100. This provides for no on-site care and is unlikely to provide for the mandatory report filings. A more reasonable provision is $100,000 per year, at least for the decades immediately following closure.

Cost escalation: Costs have been estimated using a range of base dollars from 2007 to 2010. None have been escalated to the date of closure. Assuming an escalation rate of 3.5%, costs will escalate from the date of the cost estimate (nominally 2009) to the completion of closure by 36% for 10 years and 92% for 20 years. However, the closure plan sets no dates for closure and Dension USA has implied to the author that they intend to be in production for a very long time. Given this, a more significant escalation period should be considered.

3.2.5 More probable closure cost

A reasonable range of closure costs can be estimated by approaching the costs from two directions: adjusting the Denison cost estimate for the line-item corrections discussed in the prior section, and applying the benchmarked costs to the White Mesa closure areas. Tables 3.6 and 3.7 summarize the results of those two approaches. This creates a large range, from $36 million to $126 million in 2010 dollars, or $51 million to $169 million escalated to 2020 dollars. This excludes the US DOE per-ton-based estimate of $470 million.

The adjusted Denison estimate excludes allowances for groundwater and off-site soil remediation, which is a very optimistic assumption for a site with known contaminate plumes, known off-site contamination (i.e., Big Sage survey results), low-quality and post-service-life containment systems, and a 32-year operating life (to date). More likely, at least some remediation will be required and a liberal allowance for those costs should be included in the financial surety (and thus in the cost estimate) to protect the people of Utah from the potentially substantial financial liability. The Denison estimate also includes a capping system that is significantly less protective than the Monticello standard and a demolition debris cell that has a very poor quality liner. Both of those should be corrected and will increase the cost; for example, adding a 60-mil HDPE liner will add about $26,000 per acre or $6 million total and upgrading the demolition cell to a high quality composite liner will add about $1 million.

The benchmarked cost of $91 million includes an allowance for site remediation based on the average work required at the 43 documented sites. Groundwater remediation alone could use much of the $55 million difference. As reference projects, both the Pierina gold mine (owner: Barrick) and Tintaya copper mine (owner: Xstrata, formerly BHP) in Peru have water remediation costs of $40 and $60 million, respectively (2007 dollars); neither are uranium sites, neither have particularly unusual groundwater issues, both have the advantages of very low costs, and both are very remote sites with no nearby communities or water users.

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Table 3.6: Adjusted closure cost estimated (using Denison estimate as basis)

Total direct costs (from Denison):	**$12,620,391**
Adjustments:	
Labor rates (increase total direct by 8.5%)	$1,072,733
Equipment unit rates (increase total direct by 11%)	$1,388,243
Fuel: add $0.65/gal (including in equipment adjustment)	incl
Quantities (unknown adjustment)	unknown
Quality control (increase total direct rate by 4.8%)	$605,779
Cell dewatering (no rationale provided)	unknown
Adjusted direct costs:	**$15,687,146**
Indirect Costs:	
Profit, 10%	$1,568,715
Contingency, 35%	$5,490,501
License & bonding, 5%	$784,357
UDEQ contract administration, 15%	$2,353,072
EPCM, 12%	$1,882,458
Contractors floater	$82,250
Auto & GL Insurance	$284,600
Long-term care fund (based on annual cost of $100,000 and 1.2% deposit rate)	$8,333,333
Environmental remediation costs	unknown
TOTAL before remediation costs	**$36,466,431**

Notes:
1. Excludes any remediation costs such as groundwater treatment.
2. Excludes upgrading capping systems to meet Montecello standard.
3. Quantities unverified.

Table 3.7: Closure cost from benchmarking data with escalation

Cell	Area (acres)	Capping Costs (2010 USD)	Comments
Cell 1	55	-0-	To be removed
Cell 2	65	$26,130,000	
Cell 3	70	$28,140,000	
Cell 4A	40	$16,080,000	
Cell 4B	40	$16,080,000	
Demolition debris	12	$4,840,000	Excludes cost for constructing cell
TOTAL	282 ac incl. Cell 1 227 ac excl. Cell 1	$91,254,000	85% of the average cost for 43 UMT sites ($107 million)
	Escalated to 2012	$97,753,566	Escalated @ 3.5%/year
	Escalated to 2020	**$128,722,779**	
Per-ton estimates:	German study (mean)	$126,395,850	Not escalated
	US DOE (lower bound)	$470,320,020	

Notes:
1. Capping rate of $402,000 per acre used from benchmarking data.

A key purpose of benchmarking costs is to check the validity of a built-up cost estimate. The benchmark estimate is within 15% of the average for all 43 of the documented US uranium mill closures and thus checks well with industry experience. The author has used benchmarking to verify built-up costs on over 100 sites; this has never produced a variance of greater than 50% and generally the values are within 25%. In the current case, the benchmarked cost is 2.5 times higher than the adjusted Denison estimate and 5 times higher than the unadjusted Denison estimate, suggesting that either the quantities are drastically in error or the cost estimate has omitted important components, or both. Importantly, neither the adjusted Denison nor the benchmarked cost estimates have been escalated for inflation to the anticipated closure date. That should be done in determining financial

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surety levels. Common industry escalation rates are 3% to 5% annually and a firm set of milestones should be tied to the final estimate and surety amount.

3.3. References

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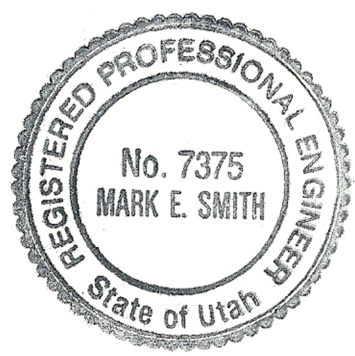
Closing Comments
This work was completed in support of the review of the White Mesa / Denison USA relicensing application, revision 5.0, dated Sept. 2011. It is based on a focused review of the closure plan, cost estimates, and related documents and relies extensively on the information developed and provided by Denison USA as well as the author's industry experience.

Best Regards,
RRD INTERNATIONAL CORP



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