EXHIBIT I

DEQ/DMME URANIUM STUDY:

ASSESSMENT OF FINANCIAL ASSURANCE MECHANISMS

Uranium Study:
Assessment of Financial Assurance Mechanisms

Commonwealth of Virginia
Department of Environmental Quality
Department of Mines, Minerals and Energy

Date: October, 2012

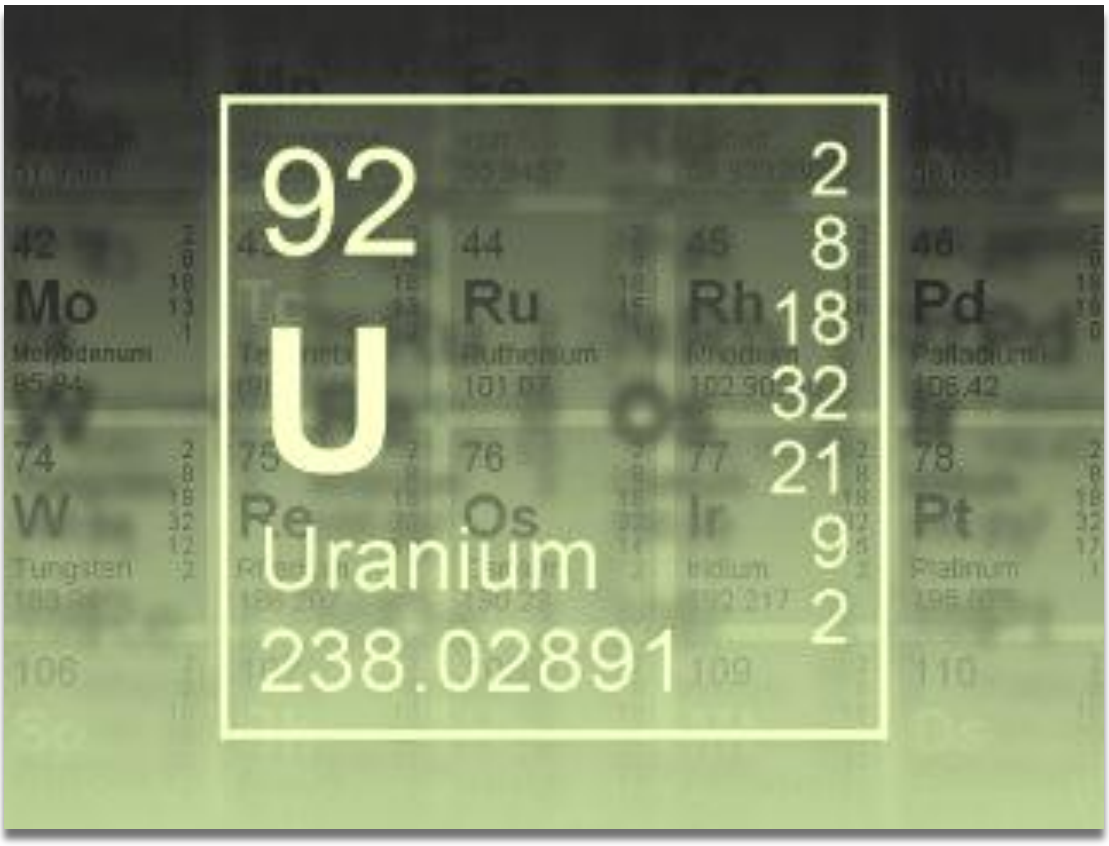

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Table of Contents

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ABBREVIATIONS

CD	Control Division
CDPHE	Colorado Department of Public Health and Environment
CO&A	Consent Order and Agreement
DOE	Department of Energy
DEQ	Department of Environmental Quality
DRMS	Division of Reclamation, Mining and Safety
ISR	In Situ Recovery
LOC	Letter of Credit
LQD	Land Quality Division
MLRA	Mined Land Reclamation Act
MLRB	Mined Land Reclamation Board
NRC	Nuclear Regulatory Commission
PDEP	Pennsylvania Department of Environmental Protection
QA	Quality Assurance
RCB	Radiation Control Board
UDEQ	Utah Department of Environmental Quality
UMTRCA	Uranium Mill Tailings Radiation Control Act
UWG	Uranium Working Group
WDEQ	Wyoming Department of Environmental Quality

EXECUTIVE SUMMARY

ES 1.0 INTRODUCTION

This report is developed in response to the requirements of Work Task B.2.j identified in the Virginia Department of Environmental Quality (DEQ) contract No. EP8811027, that was awarded on May 21, 2012. Work Task B.2.j required the identification and analysis of life span financial assurance mechanisms. The information within this report is intended to assist the Uranium Working Group in developing a scientific policy analysis related to potential future uranium mining and milling in the Commonwealth of Virginia (Virginia). This report does not provide specific recommendations regarding the question of whether or not uranium mining and milling can be safely practiced in Virginia.

ES 1.1 Purpose and Objectives

The purpose of the Report is to respond to the Work Task B.2.j requirement in Contract EP881027. The objective of the report is to increase the Uranium Working Group (UWG)'s understanding of the financial assurance mechanisms for uranium mines and mills. This was accomplished through a review of existing uranium mining and milling regulatory programs and other reports concerning this issue. This effort gives specific considerations for the Commonwealth that are relevant to the existing and potential future regulatory framework in Virginia.

ES 2.0 SUMMARY OF POINTS FOR CONSIDERATION

Critical components for a strong financial assurance program were developed based on the review of national, international, and other state programs and studies. The following points for consideration are not intended to suggest a preferred approach to financial assurance for potential future uranium mining and milling regulation. Rather, they are intended to assist Virginia in scoping a conceptual regulatory framework that might be appropriate should the General Assembly decide to lift the existing moratorium.

- A requirement for contemporaneous reclamation/timely decommissioning should be included in any regulatory program for uranium mining and milling as this reduces the reclamation liability and risk to the Commonwealth.
- The financial assurance should be based on the actual costs of a third party conducting the reclamation or decommissioning.
    - The costs should be based on the actual disturbances and projected disturbances for the next year.

  - The costs should include such items as:
    - pre-reclamation investigation and stabilization;
    - an independent firm to design the final reclamation project;
    - contractor profit, overhead, mobilization and demobilization;
    - an independent firm to manage the final reclamation project;
    - on-site monitoring programs during and after completion of the final reclamation project until reclamation has been deemed successful (includes such items as utilities and groundwater sampling);
    - site security during the final reclamation project and liability insurance cost during the final reclamation project and until reclamation has been deemed successful;
    - agency administration and accounting during all phases of design and reclamation; and
    - an amount to cover unknowns.

- An annual update of the actual disturbance and required financial assurance should include:
  - documentation of types and areas disturbed, such as requiring annual low level ortho-rectified aerial survey; and
  - a public notice and comment process provided with the annual financial assurance update.
- A final closure plan should be included with the initial permit or license application and:
  - should be updated for mining permits whenever the operations plan changes;
  - should require a revised closure plan at the termination of mining or justify why one is not required;
  - should include a final closure plan for mills and mill tailings as required by the U.S. Nuclear Regulatory Commission (NRC); and
  - should include a process for public notice and comment.

- Well defined standards for successful completion of reclamation requirements and release of the financial assurance should include:
  - an adequate monitoring period to evaluate the stability of the reclamation; and
  - a process for public participation.

- Financial assurance instruments should be of a type and format approved by the Commonwealth to be legally sound.
- The financial assurance instruments should be liquid and assessable such that they may be easily and quickly converted to cash.
- Provisions for other financial assurance mechanisms should address:
    - possible long-term, mining-related mitigation, such as perpetual treatment of acid mine or acid rock drainage, including capital life and replacement costs;
    - the amount required to be paid to either the Commonwealth or the Department of Energy (DOE) for long-term stewardship for mills;
    - impacts from catastrophic events, including the following to address these impacts:
        - corporate general environmental liability insurance;
        - state managed funds such as a sinking fund or other special accounts funded by a mining fee.

1.0 INTRODUCTION

A financial assurance mechanism is crucial to ensuring that decommissioning and reclamation of uranium mining and milling operations is completed in accordance with state and federal requirements without the use of citizen tax dollars. Even corporations with the best intentions cannot complete the reclamation of a site if financial conditions leave them without the funds to cover the reclamation costs. Laws and regulations may require reclamation, but in the end it is the financial assurance mechanisms that guarantee the completion of reclamation activities. The financial assurance mechanism must therefore be robust, up to date, and legally sound to protect the citizens of the Commonwealth.

This report reviews the general components of financial assurances, including the process, the different types of financial assurance mechanisms with their strengths and weaknesses, and the methods for developing the assurance amounts. Financial assurance for mining operations is routinely called a 'reclamation performance bond.' This report also covers other financial assurance mechanisms that address impacts other than normal site reclamation. Financial assurance requirements from the federal government, different states, and international sources were reviewed as part of this subtask. While any uranium mining and milling program in Virginia would need authorization from the General Assembly and have its own statutes and regulations, existing financial assurance mechanisms in Virginia's coal and mineral mining programs were also reviewed as a point of reference. Finally, points for consideration are provided to assist the UWG in developing additional regulations, standards, and guidance should they decide to lift the moratorium on uranium mining.

The purpose of this report is to respond to the Work Task B.2.j requirement in Contract EP881027. The objective of this report is to increase the UWG's understanding of financial assurance mechanisms in a range of state and federal regulatory programs and international standards. This will be done through a comprehensive review of uranium mining and milling regulatory programs and documentation, with specific recommendations that are applicable to the existing and potential future regulatory framework within the Commonwealth.

2.0 GENERAL COMPONENTS OF FINANCIAL ASSURANCE

An owner or operator of any uranium mine and/or mill requiring a permit or license is required to establish financial assurance to cover the cost of decommissioning, reclamation, closure, post-closure care and any corrective actions that may be required. Financial assurance is typically calculated based on the regulatory authority hiring a third party to conduct the activities of reclamation and closure. The initial amount of financial assurance required is based on the cost estimate of closure and post-closure care submitted to and approved by the regulatory authority as part of the permit/license application. These cost estimates are typically updated on an annual basis as part of the operator's annual report to the regulatory authority. The updates take into account inflation and any changes made in the design of the facility or its operation that may create an upward or downward closure/post closure maintenance cost. If the financial assurance is forfeited, the funds are transferred to the regulatory authority to be used to fund reclamation of the site.

Several components should be taken into consideration when developing a financial assurance for a mining and milling project.

- Funds should be in a reasonably liquid form so that they can be readily transferred into cash; the operator's personal property or equipment should not be used for assurance as their value could quickly diminish or disappear completely in the event of a default or bankruptcy.
- Funds should be readily accessible, payable only to the regulatory authority (or authorities), dedicated to the project reclamation and only released at the request of the regulatory authority.
- The regulatory authority should have the statutory authorization to receive forfeited financial assurance mechanisms and to use them for reclamation.
- Potential financial assurance providers should be pre-screened to assure they have the financial capacity to pay the financial assurance amount should the operator forfeit the financial assurance mechanism.
- The public should be given notice and an opportunity to comment prior to accepting the initial financial assurance mechanism and prior to final mechanism release.
- The financial assurance mechanism should not be used to release the operator from its reclamation responsibilities nor should it allow for a regulator's reduced oversight of the operation; the financial assurance mechanism acts as a guarantee to the public to prevent the public from having to pay for the cost of reclamation should the operator default.

Although the need for financial assurance is clear, choosing the best form of assurance requires careful consideration. Policies that meet environmental objectives should also be compatible with a healthy investment climate and be financially efficient. By working together, stakeholders can help ensure that the right financial assurance tools are used and, ultimately, the long-term environmental performance of mining and milling operations are enhanced.

2.1 Financial Assurance Process

2.1.1 Purpose and Objective

The primary purpose of financial assurance is to make sure that there will be sufficient funds to cover the cost of final site decommissioning, reclamation, and closure, as well as any post-closure monitoring and maintenance resulting from temporary or early site closure. Proper site decommissioning and closure activities reduce the risk of water and soil contamination as a result of the operation, prevent subsequent degradation of the land and water resources and return the affected land to its appropriate pre-mining use(s). The ideal goal would be to perform reclamation and restoration activities contemporaneously with mining so that the rate of reclamation keeps pace with the rate of mining activities, thereby reducing the amount of reclamation work needing to be accomplished at the end of the mining period and reducing the overall cost of final reclamation.

2.1.2 Role of Permitee/Licensee

During the project design and planning stages, the operator should take closure and post-closure activities into consideration by developing a detailed and comprehensive decommissioning and reclamation plan that covers the life of the operation, from pre-construction through final decommissioning, reclamation and site closure. The plans should include appropriate post-closure monitoring and maintenance that may be required to reduce emissions and other related impacts until decommissioning is approved and the site is released by the regulatory authority. Estimated costs associated with these activities should be calculated as conservatively as possible and assume that all work will be performed by a third party for and on behalf of the regulatory authority holding the reclamation financial assurance mechanism. Annual financial assurance updates should reflect any changes in the inflation rate as well as any site specific operational changes that may influence the cost of final decommissioning and reclamation.

2.1.3 Role of Regulatory Authority

The primary role of the regulatory agency is to ensure that there is an appropriate mechanism in place that will ensure that funds are available to complete decommissioning and reclamation activities in the event that a permittee/licensee becomes unwilling or unable to complete the required reclamation activities. The agency must receive the financial assurance instrument prior to issuance of the permit or license. The agency must ensure that the financial assurance

instrument remains acceptable through assessment and approval of routine updates provided by the operator.

2.1.4 Role of Public

The primary role of the public is to comment on the adequacy of the financial assurance cost estimate and mechanism during the formal public comment period prior to the regulatory authority's acceptance of the operator's financial assurance at the time of permit/license issuance. In many instances, the public also has an opportunity to again review and comment on the adequacy of the financial assurance prior to final mechanism release at the end of the project.

2.1.5 Financial Assurance Mechanism Release Process

After the operator has met all of the reclamation requirements of the approved permit or license, the regulatory authority may release the financial assurance. The permittee/licensee may request release of the financial assurance mechanism on all or a portion of the permit/license area or increment the mechanism release as incremental reclamation is completed. The reclamation requirements include, but are not limited to: the backfilling of open pits; sealing of underground workings and shafts; decommissioning and removal of processing plants and related surface structures; reclamation of refuse and waste rock disposal/storage areas; stabilization and reclamation of tailings impoundments; and long-term water treatment of acid rock drainage or other forms of leachate seepage.

Request by the operator for financial assurance mechanism release is an administrative process, subject to public notice and an opportunity for public objections. Although the actual mechanism release procedure may vary from state to state, federal regulations (42 CFR 3809 and 43 CFR 3809) provide that up to 60% of the financial assurance mechanism may be released once the regulatory authority has determined that the operator has successfully completed backfilling, regrading, establishment of drainage control, and stabilization and detoxification of leaching solutions, heaps, tailings and/or similar facilities. The remainder of the financial assurance mechanism may be released when the regulatory authority has determined that reclamation has been successfully completed, including revegetation of disturbed areas, and that any remaining effluent discharges from the permit/license area meet applicable effluent criteria for at least one year without treatment. The financial assurance mechanism cannot be released as long as there are discharges from the area that do not meet the federal effluent discharge criteria. Final financial assurance mechanism release for mill sites does not occur until the site is transferred to either the Commonwealth or the federal government for long-term care and surveillance.

2.1.6 Financial Assurance Mechanism Forfeiture Process

When an operator is unable or unwilling to complete the reclamation of a site, the regulatory authority has the ability to initiate forfeiture of the financial assurance mechanism. The basis for forfeiture is normally enumerated in the statutes or regulations. The process is formal, with the

regulatory authority required to give notification to the operator and, if appropriate, the issuer of the financial assurance mechanism. The operator then has the opportunity to contest the forfeiture through an administrative hearing. If forfeiture is granted, the funds are deposited in a special account to be used by the regulatory authority for reclamation of the site.

2.2 Types of Financial Assurance Mechanisms

2.2.1 Letters of Credit

An irrevocable letter of credit (LOC), also known as a bank guarantee, is an unconditional agreement between a bank and an operator to provide funds to a third party on demand. In this case, the third party is the relevant regulatory authority. A LOC includes the terms and conditions of the agreement between the proponent and the agency, with reference to the rehabilitation program and the agreed-upon costs. Any changes to the LOC require the consent of all parties involved.

To obtain a LOC, the operator has to demonstrate to the bank that provisions have been made for the reclamation of the site and that it has sufficient funds or liquidity to cover the costs. A LOC is typically issued for a year and automatically renewed annually following a review of reclamation requirements and costs. If the bank, for any reason, decides not to renew a LOC, they are typically required to notify the regulatory agency 120 days prior to the renewal date. If the operator fails to provide an acceptable alternative form of financial assurance mechanism prior to the renewal date, the agency may then request payment for the full outstanding amount of the LOC.

Advantages of a LOC include:

- an inexpensive set-up, with no capital tied up;
- depending on the relationship between the operator and the bank, there may be a relatively modest cash outflow from the operator to maintain the LOC;
- fewer administrative requirements; and
- choice of bank by the regulatory authority to minimize the risk of failure on the part of weak banks.

Disadvantages of a LOC include:

- the provider (bank) may fail; and
- obtaining a LOC may reduce the overall borrowing power of the mining company as banks may require collateral for the LOC.

2.2.2 Surety Bonds

A surety bond—also known as a payment bond or a performance bond—is an agreement between a surety company and an operator to provide funds to a third party under certain circumstances. In this instance, the third party is the relevant regulatory authority. A surety bond includes the terms and conditions of the agreement between the operator and the regulatory authority with reference to reclamation plans and programs, agreed-upon costs, and conditions for the release of the bond. Any changes to a surety bond require the consent of all parties involved.

A surety bond is issued by a surety company, ideally one that is licensed under the relevant legislation. Normally the legislation will require the surety company be listed with the U.S. Department of Treasury on its Circular 570. The Circular will list the maximum each surety can guarantee under one bond, and the states where the surety is licensed. It is issued for a specific time period and can be renewed for further time periods based on a credit review of the proponent. During this process, the amount of a surety bond can be increased or decreased depending on the amendments to the reclamation program. If a surety bond is not renewed, and the operator fails to provide an acceptable alternative form of surety, then the government has the option of drawing the full amount. The operator should be responsible for all fees and charges associated with a surety bond. The cost of a surety bond is based on the credit worthiness of the company seeking the surety bond.

The regulatory authority must ensure that a surety bond is unconditional and not invalidated by any action or failure of the operator to act in accordance with the terms of the bond or applicable regulations.

Advantages of a surety bond:

- they may be low cost; and
- they require that no capital be tied up.

Disadvantages of a surety bond:

- the company issuing the bond may fail over the long term; and
- the rating of the mining company determines the cost of the bond, which will be substantially higher for smaller companies, especially those without proven track records.

2.2.3 Cash Deposits

Cash deposits can be in the form of cash, a bank draft, or a certified check. The funds are placed in a dedicated account of the state treasury. In some cases, they are placed in a dedicated

account under the management of the financial institution. The regulatory authority holds signatory authority. Another form of cash deposit is a certificate of deposit (CD) written in the favor of the regulatory authority. Nominal fees are typically charged for setting up a CD account, but the money earns interest that accrues to the CD but is reported to the IRS on the mining company's federal ID number.

Advantages of cash deposits:

- the cash funds are readily available when needed for reclamation and closure;
- it can be used by smaller companies that may not meet other financial assurance criteria imposed by the financial institution;
- there is generally high public acceptance because of the visibility of the guarantee; and
- treasury securities can be traded with minimal risk of liquidity.

Disadvantages of cash deposits:

- significant capital can be tied up for the duration of the mine life, especially for large projects;
- cash is more vulnerable to fraud or theft; and
- some regulatory authorities may be tempted to use the deposited funds for purposes other than securing the reclamation and closure of the mining or milling project.

2.2.4 Trust Funds

A trust fund is an agreement between three parties. One party (the Grantor – mining company) transfers assets to a Trust that a second party (the Trustee – normally a bank) holds and administers for the benefit of a third party (the Beneficiary - in this case the regulatory authority). It can also be called a mining reclamation trust, a qualifying environmental trust, or a cash trust fund. Accompanying the trust fund, there should be a signed agreement between the mining company and the regulatory authority, administered by the trust company stipulating the mining company's responsibility with regard to the trust. This agreement typically states that the trust fund is for providing security for the reclamation costs of a particular site, specifies the total amount required, and outlines the schedule of payments. Trust fund contributions are typically a series of payments scheduled over a specific time period and are typically called an incrementally funded trust fund. A percentage of the total may be required as an initial deposit to lower the risk of insufficient funds if the project is abandoned before adequate payments are made.

Advantages of a trust fund:

- trust funds typically have a high public acceptance; and
- trust funds may appreciate in value over time, depending on market trends.

Disadvantages of a trust fund:

- the fund may lose value if risky assets have been purchased; and
- in the event of premature project cessation, the fund may not have enough value accumulated to pay for the necessary reclamation activities; the trust fund management and administration consumes some of the value and income in the form of fees.

2.2.5 Corporate Financial Test and Corporate Guarantees

A Corporate Financial Test allows a company to self bond if they are able to pass certain financial tests that measure the financial strength of the company. Normally, one of two tests must be met. The first test includes measuring several financial ratios. The second test relies on a subset of the financial ratios as well as examining the company's public bond ratings. Other criteria include having a minimum tangible net worth, minimum value of fixed assets in the United States, and require several years of annual financial statements audited by an accredited accounting firm.

A Corporate Guarantee is where the operator cannot meet the Corporate Financial Test and a separate corporation usually the parent of the operator guarantees the performance of the operator. The Corporate Guarantee has to meet the same requirements as for the Corporate Financial Test.

These types of financial assurance are not commonly accepted by permitting authorities because of the public perception that a self-guarantee is not really much of a guarantee, since it is primarily based on the assets of the company and there is not a third party to guarantee the performance.

Advantages of a corporate financial test/corporate guarantee:

- it does not tie up any of the mining company's capital;
- it is simple to administrate; and
- there is public availability of the annual statements produced by the independent accounting firm.

Disadvantages of a corporate financial test/corporate guarantee:

- there is always a risk that a company will fail, regardless of their size or financial health at the beginning of the mining project;
- annual reports and financial statements can easily be manipulated by unscrupulous operators (i.e., accounting scandals); and
- there has been a lack of public acceptance of this type of financial assurance mechanism.

2.2.6 Other Financial Assurance Mechanisms

Depending on the individual state or federal government entity, other lesser used types of financial assurance mechanisms may be approved. These lesser known types of instruments may include but may not be limited to:

- insurance policies;
- escrow accounts;
- lines of credit;
- external sinking fund;
- deeds of trust; and
- salvage credit.

2.3 Methods for development of Financial Assurance Estimates

2.3.1 States

2.3.1.1 Wyoming

Wyoming's Environmental Quality Act (EQA) at W.S. § 35-11-406(b)(vi) authorizes the Land Quality Division (LQD) Administrator of the Wyoming Department of Environmental Quality (WDEQ) to require of the mining operator (including In Situ Recovery [ISR] operations) to provide an estimate of the total cost for reclaiming all of the proposed affected lands and ground water as provided in the mine application during the first year of operation. W.S. § 35-11-417 through 423 provide additional requirements for financial assurance of mining projects. The cost estimate must include costs of a third party contractor performing the reclamation activities on behalf of the state (W.S. § 35-11-417(c)(i)). The reclamation cost estimate must be reviewed and revised on an annual basis throughout the life of the mine to account for inflation and increased amounts of affected lands and waters (W.S. § 35-11-417(c)(ii)). W.S. § 35-11-417(d) authorizes the promulgation of regulations for a self bonding program. Upon completion of reclamation,

75% of the total bond amount may be released upon recommendation of the LQD Administrator to the WDEQ Director (W.S. § 35-11-417(e)). The EQA allows for the use of cash or securities in lieu of a bond (W.S. § 35-11-418). W.S § 35-11-419 and 420 provide the requirements for bond cancellation and substitution, and W.S. § 35-11-421, 422, and 424 describe bond forfeiture proceedings. W.S. § 35-11-423 provides the requirements for releasing bonds.

Chapters 6 and 12 of the LQD non-coal rules and regulations provide the requirements for self bonding and letters of credit, respectively. The primary financial assurance mechanisms allowed by the State of Wyoming include:

- letter of credit;
- surety bond;
- self bonding (corporate financial test/corporate guarantee);
- cash;
- certificate of deposit; and
- U.S. Government funds or securities.

Since Wyoming is not an NRC Agreement State, they do not regulate uranium milling facilities and therefore do not have bonding requirements for them.

2.3.1.2 Colorado

For non-coal mines within the State of Colorado, the Mined Land Reclamation Act (MLRA) at Title 34, Article 32, Section 117 authorizes the Mined Land Reclamation Board (MLRB) to require financial assurance for all mining projects. Section 118 of the Act empowers the Board to require forfeiture of the financial assurance instrument under certain circumstances and provides the process for forfeiture.

The Division of Reclamation, Mining and Safety (DRMS) is the lead state agency responsible for administering the MLRA, including financial assurance. The Colorado Code of Regulations (CCR) at 2 CCR 407-1 provides the rules and regulations for hard rock mining within the state of Colorado. Specifically, Rule 4 addresses performance warranties and financial warranties (i.e., financial assurance). The cost estimates must be based on current real costs if performed by an independent contractor and updated on an annual basis. The cost estimates must be approved by the DRMS. The types of financial assurance allowed in the rule include:

- cash bond consisting of cash or certified funds assigned to the state;
- cash escrow account consisting of either U.S. Treasury securities, certificates of deposit, repurchase obligations, money market funds, or other instruments as approved by the MLRB;
- surety bonds;
- irrevocable letters of credit;
- certificates of deposit;
- deeds of Trust encumbering real or personal property and creating a first lien in favor of the State;
- self insurance;
- salvage credit of project related fixtures and equipment, excluding rolling stock; and
- negotiable U.S. Government bonds.

Under the Colorado Radiation Control Act (CRS 25-11-101, *et seq*, as well as an agreement between the governor of Colorado and the NRC, the Colorado Department of Public Health and Environment (CDPHE) regulates uranium milling and ISR operations. CDPHE regulations at 6 CCR 1007-1 Part 3, Section 3.9.5 provide the financial assurance requirements for uranium mills and ISR projects. The cost estimates must be based on current real costs if performed by an independent contractor and updated on an annual basis. The cost estimates must be approved by the CDPHE. Acceptable financial assurance methods include:

- cash deposits;
- trust;
- escrow account;
- U.S. Government funds or securities;
- certificate of deposit;
- surety bond;
- irrevocable letter of credit or line of credit;
- parent company guarantee;
- external sinking fund; and
- self guarantee.

2.3.1.3 Utah

Utah's Mined Land Reclamation Act, enacted in 1975 (UCA 40-8) requires a financial assurance mechanism for all small and large mining operations. It describes how the reclamation cost will be established, the types of financial assurance instruments that are acceptable, and the procedures for bond forfeiture and release. The promulgation of mining rules and regulations (UAC R6470) occurred in 1988 with several revisions since then. The Division of Oil, Gas and Mining, within the Department of Natural Resources, is the lead agency for administering the MLRA and enforcing the Minerals Regulatory Program rules and regulations. The rules at R647-3 and R647-4 describe financial assurance requirements for both small (less than 5 disturbed acres) and large mining operations (greater than 5 disturbed acres), respectively. The financial assurance requirements for both types of mining operations are very similar. The agency provides the reclamation estimate for the financial assurance based on information provided by the operator. The agency conducts periodic reviews of the financial assurance rather than annually as is common in other states. For small mines, the reviews are no more frequent than three-year intervals (R647-3-111-6.12), while for large mines, the review frequency is no more than five-year intervals (R647-4-113-6.12).

The acceptable financial assurance instruments are the same for small and large mines, are similar to the other states reviewed, and include:

- surety bond;
- certificate of deposit;
- cash;
- irrevocable letter of credit;
- escrow account; and
- self-bonding agreement (if the operator can show sufficient financial strength).

Under the Utah Radiation Control Act (Utah Code Title 19, Chapter 3) as well as an agreement between the governor of Utah and the NRC, the authority to make rules to protect the public and environment from significant sources of radiation, including the regulation of uranium milling activities, is given to Department of Environmental Quality's (UDEQ) Radiation Control Board (RCB). The rules affecting uranium milling licensing are provided in the Utah Administrative Code, Rule 313. The Division of Radiation Control administers and enforces the radiation protection rules and regulations. Rule R313-22-35 provides the financial assurance requirements for all specific radiation control licenses, including those for uranium mills and mill tailings facilities as specified in Rule R313-24. Rule R313-22-35 requires applicants for a specific license to either submit a decommissioning funding plan or a certification that financial assurance has been obtained and provided in an appropriate amount as described in the

regulation. The decommissioning funding plan (Rule R313-22-35(5)) must contain a cost estimate for decommissioning and a description of the method of assuring that funds will be available for decommissioning. The cost estimates must be revised and adjusted at intervals not to exceed three years. The plan must contain a certification by the licensee that financial assurance has been provided, and the operator must provide a signed original of the financial instrument.

The types of financial assurance mechanisms allowed for uranium mills by Rule R313-22-35(6) include the following:

- prepayment of the full decommissioning cost liquid assets prior to start of operation into an account outside the licensee's control, which may be in the form of a trust, escrow account, government funds, certificate of deposit, or government securities;
- surety bond;
- insurance policy; and
- external sinking fund.

In the event that the licensee is a Federal, State or local government entity, financial assurance can be a statement of intent containing a cost estimate for decommissioning or a predetermined amount, as described in the Table within Rule R313-22-35(4) and based on the possession quantity of licensed material in sealed or unsealed form. In the event that a governmental entity is assuming custody and ownership of a mill and/or tailings site, the financial assurance will consist of an arrangement deemed acceptable by the State and the governmental entity (Rule R313-22-35(6)(d) and (e)).

2.3.2 NRC

The U.S. Nuclear Regulatory Commission (NRC) requires under Criteria 9 and 10 of 10 CFR Part 40, Appendix A, that its licensees supply sufficient cost information for the NRC to verify that the financial assurance accounts are adequate to cover all necessary decommissioning activities required under the license. Cost estimates are submitted to NRC with the initial license application or reclamation plan. Cost estimates are calculated on the basis of completion of all activities by a third party. Unit costs, calculations, references, assumptions on equipment, and operator efficiencies are provided.

Licensees are required to adjust cost estimates annually to account for inflation and changes in reclamation plans. The annual submissions are in the form of requests for amendment to licenses.

Licensees must submit revised sureties incorporating adjustments to the cost estimates for inflation 90 days before each anniversary of the effective dates of the financial assurance instruments (typically on an annual basis). The adjustments are made using the inflation rate

indicated by the change in the Consumer Price Index (CPI) published by the U.S. Department of Labor, Bureau of Labor Statistics.

2.3.2.1 Changes in Plans

All revisions to the operations or reclamation plans must be thoroughly documented, and cost estimates (with the basis) must be detailed for NRC review and approval.

All costs (unit and total) must be estimated on the basis of independent third party contractor costs (including overhead and profit in unit costs or as a percentage of the total). Equipment owned by the licensees and the availability of licensee staff should not be considered in the estimate to reduce cost calculations. All costs must be based on current year dollars. The NRC staff review may include a comparison of unit cost estimates with standard construction cost guides and discussions with appropriate State or local authorities (e.g., highway cost construction). The licensees provide supporting information or the basis for selection of the unit cost figures used in their estimates.

At a minimum, all cost estimates for unrestricted or restricted release of a site must meet all nine of the following conditions:

- the cost estimate meets the applicable regulatory requirements in 10 CFR 40.36(d), 40.42(e), and 40.42(g)(4)(v);
- the cost estimate is based on documented and reasonable assumptions;
- the unit cost factors used in the cost estimate are reasonable and consistent with NRC cost estimation reference documents;
- the cost estimate includes costs for labor, equipment and supplies, overhead and contractor profit, sampling and laboratory analysis, and miscellaneous expenses (e.g., license fees, insurance, and taxes);
- the cost estimate applies a contingency factor of at least 25 percent to the sum of all estimated costs;
- the cost estimate does not take credit for (a) any salvage value that might be realized from the sale of potential assets during or after decommissioning or (b) reduced taxes that might result from payment of decommissioning costs or site control and maintenance costs;
- the means identified for adjusting the cost estimate and associated funding level over the life of the facility and any storage or surveillance period is adequate;
- the cost estimate reflects decommissioning under appropriate facility conditions; and

- the cost estimate includes costs for all major decommissioning and site control and maintenance activities, including (a) planning and preparation, (b) decontamination and/or dismantling of facility components, (c) packaging, shipment, and disposal of radioactive wastes, (d) a final radiation survey, (e) restoration of contaminated areas on facility grounds (if necessary), and (f) site stabilization and long-term surveillance (if necessary).

2.3.3 International (Canada/International/World Bank)

The amount of the financial assurance in Canada is determined similar to the three states reviewed for this report. The operator initially submits an estimate which is then reviewed and revised by the provisional government. The final amount is based on negotiations between the two parties. The amount is reviewed every five years. Senior mining companies who operate several mines are considered to be of a lower risk than junior mining companies which may only have one mine.

The World Bank Report (Sassoon, 2009) recommends that whichever method of establishing a financial assurance mechanism is chosen, the details should be based on site specific conditions. Any guidelines or models should only be a starting point. All mines in New South Wales and more complex mines in Victoria are required to use a cost estimate tool developed by two consulting companies. The tool utilizes Microsoft Excel and provides a general guide in calculating an appropriate estimate. The World Bank Report recommends at a minimum the amount should be based on third-party costs and include all administrative, maintenance, monitoring, engineering redesign, inflation and a contingency.

3.0 CRITICAL COMPONENTS OF FINANCIAL ASSURANCE

3.1 Importance of Contemporaneous Reclamation and Timely Decommissioning

Contemporaneous reclamation and timely decommissioning are not directly related to financial assurance mechanisms but they can have a large impact on the amount of the assurance. Contemporaneous reclamation is the process of reclaiming an area as soon as it is no longer needed to support mining operations. The sooner an area is reclaimed, the smaller is the size of the financial assurance. While this is beneficial to the operator, it also reduces the risk to the Commonwealth. Any financial assurance has some level of risk, and generally, the smaller the financial assurance, the smaller the risk.

3.1.1 Contemporaneous Reclamation for Mining

The type of mining dictates how contemporaneous reclamation can be applied to a site. Large area mines such as the western coal mines are examples of how contemporaneous reclamation can be an ongoing process: a defined seam or seams of a commodity is removed and the overburden material above the commodity is placed in the mined-out void In general, the faster the mine moves across the landscape, the faster reclamation should occur.

In large open pit mines, such as copper mines, contemporaneous reclamation is evaluated differently. Normally these pits cannot or will not be backfilled because as mining continues, the pits become larger and/or deeper. These types of mining operations will have waste dumps – piles of rock that is not ore. These piles have a designed capacity, and as soon as the capacity is reached, contemporaneous reclamation requires them to be reclaimed.

Underground mining has less opportunity for contemporaneous reclamation because many of the surface disturbances are for the life of the operation and cannot be reclaimed until the mining is completed. Although limited, contemporaneous reclamation must still be applied and any facility or disturbance that is no longer required must be reclaimed as soon as possible.

3.1.2 Timely Decommissioning for Mills

The NRC has standards requiring timely decommissioning of mills and mill tailings. The timely decommissioning requirements serve to minimize the potential for releases of radiological contaminants through windblown means. 10 CFR Part 40, Appendix A, Criterion 6A requires that for impoundments containing uranium byproduct materials, the final radon barrier must be completed as expeditiously as practicable considering technological feasibility after the pile or impoundment ceases operation in accordance with a written, NRC-approved reclamation plan. The placement of erosion protection barriers or other features necessary for long-term control of the tailings must also be completed in a timely manner in accordance with a written, NRC-approved reclamation plan.

3.2 Actual Costs of Reclamation

A financial assurance mechanism can only be effective if the actual cost for a third party to conduct the reclamation is included in the estimate which sets the assurance amount. If the amount of the assurance is significantly less than the actual cost to reclaim the disturbance, some operators may make a business decision to forfeit the assurance rather than spend significantly more to conduct the reclamation. Alternative assurance mechanisms such as bond pools are not recommended, as their costs to an operator are less than the cost to reclaim the site. Additionally, one or two large forfeitures may render the pool insolvent.

Third party costs are also critical, as an operator's costs of conducting reclamation will almost always be less than a third party's. An operator is established on the site, has intimate knowledge of the site, and may have lower equipment owning and operating costs. A third party will require mobilization, and there will be some level of unfamiliarity with the site which translates to higher risk and costs to cover those risks.

3.2.1 Actual Disturbance/Impacts and Projections for the Next Year

The financial assurance should be based on reclaiming the actual disturbance or impacts. A detailed mine plan and reclamation plan in the permit or license will help identify what needs to be reclaimed and how it will be reclaimed. The need for a detailed mine plan is especially true for the initial financial assurance amount as it will be totally based on the projected disturbances contained in the permit or license. However, regardless of what is in the permit or license, the actual site conditions will dictate what needs to be included in the reclamation cost estimate. Cost estimates must include a detailed itemized listing of all existing disturbances and impacts. The estimate must also include what disturbances are projected until the next review period. A detailed mine plan is important to be able to project those disturbances.

It is inappropriate to include in the estimate all probable impacts. However, many references for calculating the reclamation estimate include an amount for unknowns (i.e., contingency), usually based on a percentage of the total estimate. Additionally, if an unexpected event occurs which results in an impact or disturbance not anticipated in the permit or license, those costs should be added to the estimate no later than the next scheduled update.

Costs should be included for those areas that have been reclaimed but not yet approved as meeting standards for the work completed. An example is an area that physically has topsoil applied but the regulatory authority has not yet agreed that the work has met regulatory or permit requirements. Until the work is approved by the regulatory authority, the cost of completing the work must be maintained in the financial assurance amount.

3.2.1.1 Items Unique to Uranium mining

Uranium mining is similar to other types of mining, and the reclamation is also similar. There are, however, a few unique features that require additional consideration and additional costs. Waste rock may contain radiological constituents and other non-radiological constituents, such as sulfates, vanadium, iron, etc., which may require special handling and reclamation. Similarly, ore pads may also require special handling and reclamation. Uranium mines often have special protective measures for the workers, and some of the measures will apply to reclamation of the site. Uranium mines also require special environmental monitoring which would be continued during reclamation. These special items will need to be reflected in the estimate.

3.2.1.2 Items Unique to Uranium Milling

The actual cost estimates for financial assurances for uranium milling facilities generally may include the following:

- Mill Site Decommissioning - This includes dismantling, decontamination and/or disposal of all structures and equipment. This also includes excavation and burial of contaminated earth (in the vicinity of the mill site, ore storage area, access roads around the perimeter of the tailings disposal site, and evaporation pond residues), as well as reclamation of disturbed areas created by the above cleanup activities.
- Mill Site Ground-Water Restoration - A major concern in the termination of a mill license is the restoration of aquifers that have been contaminated by the operation of a tailings impoundment. As this concern is added to the site specific reclamation plans, the licensee should include these costs in its financial assurance mechanism until the licensee is released from further ground-water restoration activities, including sampling analysis and well-plugging costs.
- In Situ Recovery (ISR) Site Ground-Water Restoration - In most cases, ground-water restoration consists of ground water sweeping and water treatment with partial reinjection. The water treatment equipment used during the uranium recovery phase of the operation is generally suitable for the restoration phase. The capital cost of this equipment is usually absorbed during the initial stages of the operation, leaving only the costs of operation, maintenance and replacement filters for the restoration phase. However, if additional or replacement equipment will be required for restoration, associated costs should be included.
- Interim Stabilization of the Tailings during Drying – Mill decommissioning cost estimates should consider any costs associated with placement of soil, chemical spraying, snow fences or other control measures over dry tailings to minimize dusting or dispersal of particulates.

- Tailings Impoundment Area Reclamation – Mill decommissioning cost estimates should consider earthwork costs necessary to:
  - re-contour the tailings in order to prepare for cover placement;
  - place cover materials;
  - re-vegetate and/or place riprap;
  - construct diversion channels or other measures required for long-term stability.

- Radiological Survey – Mill decommissioning cost estimates should consider costs for gamma surveys and soil samples for radium in areas to be released for unrestricted use. Soils around the mill building, tailings piles, well-fields, evaporation ponds, and process buildings should be analyzed for radium content. A gamma survey of all areas should be made before release for unrestricted use. All equipment released for unrestricted use should be surveyed and records maintained.

- Project Management and Miscellaneous Costs – Cost estimates should include estimated costs associated with project management, engineering changes, mobilization costs, legal expenses, power costs during reclamation, and quality control radiological safety costs.

- Labor and Equipment Overhead, Contractor Profit - Overhead costs for labor and equipment and contractor profit may be calculated as separate items or loaded into hourly rates. I f included in hourly rates, the unit costs should identify the percentages applied for each area.

- Long-Term Surveillance and Control (for Mills Only) - Criterion 10 of Appendix A to 10 CFR Part 40 specifies a minimum of $250,000 in 1978 Dollars ($880,280 in 2012 Dollars) for a long-term surveillance and control fund. This fund covers the cost of government agency site inspection, monitoring, and control measures, if necessary.

  Canada has a similar program for long-term surveillance and control. In 2007, Saskatchewan instituted the Reclaimed Industrial Sites Act and The Reclaimed Industrial Sites Regulations to establish and enforce the Institutional Control Program (ICP). The ICP implements the process for the long term monitoring and maintenance of sites when mining/milling activities have ended, where remediation has been completed and approved; and for the process of transfer of the site to provincial responsibility. The two primary components of the ICP are the Institutional Control Registry and the Institutional Control funds. The Institutional Control funds consist of the Monitoring and Maintenance Fund and the Unforeseen Events Fund. The Registry will maintain a formal record of closed sites, manage the funding, and perform any required monitoring and maintenance work.

- Contingency – Mills are required to include a contingency amount in the total cost estimate for the final site closure. NRC considers a 15 percent engineering contingency to be an acceptable minimum amount. Additionally, the licensee should include a 10 percent minimum contingency for contract administration, in the event the licensee defaults, and the State or Federal Government is required to administer a contract to carry out the licensee's reclamation and decommissioning responsibility.

3.2.2 Monitoring Costs Through the End of Reclamation Success

In the event a financial assurance mechanism is forfeited, monitoring will still be required. Monitoring costs during the period of decommissioning and reclamation and evaluation of reclamation success can be significant, and the costs must be included in the estimate. Uranium mills will have specialized monitoring or special analysis in addition to the normal monitoring associated with mining. A detailed monitoring plan in the permit or license is critical to understanding the monitoring requirements and the costs associated with monitoring.

3.2.3 Third Party Contractor

It is critical the estimate of actual costs of reclamation be based on the hiring of an independent third party to conduct the reclamation activities. The estimate should include all costs associated with this effort. Mine operators often claim they can do the work cheaper than for what the regulatory agency sets the financial assurance amount. While this may be true, if the financial assurance mechanism is forfeited, the operator will not be doing the reclamation. It is also likely that any equipment owned by the operator will not be available for use in reclaiming the site. The operator may also have included salvage value of the equipment and facilities in their assumptions. Many regulatory authorities do not allow salvage value to be included in financial assurance estimates due to the fluctuation in demand and prices. Wyoming, by policy, does not allow the inclusion of salvage value in financial assurance estimates, while Colorado has regulations allowing salvage value.

The operator should submit an estimate based on a third party using sound engineering principles. References such as Equipment Watch; InfoMine USA, Inc.: Mine and Mill Equipment Cost Estimators Guide (Infomine, 2012); Caterpillar Handbook; U.S. Department of Interior, Office of Surface Mining Reclamation and Enforcement: Directive TSR-1; and Wyoming Department of Environmental Quality, Land Quality Division: Guideline 12: Standardized Reclamation Performance and Format and Cost Calculation Methods may be used to assist in the calculation of the estimate. The estimate should also include costs for the items discussed below.

- Preconstruction investigation and stabilization - An abandoned site may need stabilization activities that do not directly contribute to the final reclamation. This item addresses all field work necessary to document and mitigate dangerous and/or

quickly deteriorating conditions, such as slumping highwalls or drainage problems. Any assessment under this item will be based upon the regulatory authority's knowledge of specific site conditions and the length of time between cessation/forfeiture and initiation of the final reclamation project. When necessary, reference sources place this cost at 1 to 2 percent.

- Costs for an independent firm to design the final reclamation project - This may be based on a percentage of the total estimate or for very large projects on a set amount.
- Contractor profit, overhead, mobilization and demobilization costs- Some equipment cost reference guides do not include these costs. Assorted references place these items from 8 to 15 percent of the total financial assurance amount.
- Costs for an independent firm to manage the final reclamation project - The regulatory authority normally does not have resources to manage forfeiture site reclamation. It is prudent to include the cost of hiring an independent firm for this effort. The cost varies with the size of the project and the Office of Surface Mining's Directive has a sliding scale that is useful for this item.
- Costs for on-site monitoring programs during and after completion of the final reclamation project until reclamation has been deemed successful (includes such items as utilities and groundwater sampling) - Costs of this item will vary depending upon specific permit commitments. Non-uranium mines use a range of 1/2 to 2 percent.
- Costs for site security during the final reclamation project and liability insurance cost during the final reclamation project and until reclamation has been deemed successful - This may be expressed as either a percentage or a set amount based on an estimated cost per year for the number of years until reclamation success is approved by the regulatory authority.
- Long-term administration and accounting costs - This may be expressed as a percentage of the total or a sliding scale based on project size.
- Unknown Costs - This item covers situations or impacts that may not be known until reclamation is initiated. References place this cost at 2 to 5 percent of the total financial assurance amount.

3.2.3.1 Annual Update

The cost of reclaiming a mine site generally increases each year as the disturbance grows. There have been attempts to predict the maximum disturbance for the life of an operation and base the amount of the financial assurance on those conditions. With this system, an inflation adjustment has to be made periodically to ensure the amount of the financial assurance increases with

inflation. Approved changes in the operation and unanticipated conditions will also require changes to the financial assurance amount.

Many regulatory authorities now require the financial assurance amount to be routinely updated, with some authorities requiring an annual update. The World Bank recommends that mine closure requirements be reviewed annually and the closure amount adjusted to reflect any changes. An annual update addresses the concern of covering all life cycle costs as all disturbances are captured each year and costs to address those disturbances through the end of reclamation success are included in the financial assurance estimate. The regulatory authority has the ability to set the financial assurance amount even if the operator submits the annual estimate. Failure to submit a required increase in the financial assurance amount results in a possible Cease and Desist Order suspending operations until the required increase is submitted and approved.

The NRC requires annual updates of the financial assurance for its mill and ISR licensees, and the requirement is specifically written into each license. Failure to submit any required increase is grounds for enforcement action.

3.2.3.2 Public Process

Most states involve the public in the initial permit approval process where the initial financial assurance amount is set. Fewer states involve the public when increasing the financial assurance amount during a periodic review process. Some states require a public process when all or part of the financial assurance amount is released.

NRC only specifically notices new applications and major amendments. An annual financial assurance update is considered a minor amendment and does not require public notice. The public will only be aware of annual financial assurance updates if they are monitoring licensee actions in the public document system (i.e., ADAMS).

3.2.4 Final Closure Plan

It is critical that the original permit application address final reclamation of the site. The mining and reclamation plans are inter-related, and as such, they cannot be planned independently nor can the development of the reclamation plan or final closure plan be delayed until after mining is completed. It is standard practice for state regulatory authorities to require a reclamation plan (a final closure plan) as part of the initial permitting process. It is also standard practice for the state regulatory authority to require a revision to the reclamation plan if there are changes to the mining plan during the life of the operation that impacts the final reclamation plan. The regulatory authority may require a revision to the final closure plan if the mining operations terminate prior to completing all mining as proposed in the approved permit. Early termination of mining may make the approved reclamation plan impossible or difficult to achieve. The three

states reviewed do not mandate the submittal of a Final Closure Plan at the end of operations unless other changes impact the currently approved reclamation plan.

NRC requires a general plan for closure/decommissioning at the time of license application, in order to ensure that the applicant has an acceptable closure plan before starting operations. Once a licensee decides to close operations, they are required to submit a detailed reclamation/decommissioning plan (major amendment) for NRC review and approval.

3.2.4.1 Public Process

The three western states reviewed (Wyoming, Colorado, Utah) have provisions for public notice and opportunity for a hearing for significant changes to the approved permit including changes to the reclamation plan. An updated reclamation plan submitted at the time of termination of mining may or may not constitute a significant revision, and there may not be public notice of a new plan. The NRC considers the closure/decommissioning plan a major amendment and requires their public notice process to be followed, including publication in the Federal Register.

3.3 Full and Partial Release Process

There are three critical components to either partial or full release of the financial assurance:

- well defined and understood standards for successful reclamation and process for release;
- an adequate monitoring period to determine that the site is stable and the standards continue to be achieved; and
- public participation.

3.3.1 Reclamation Success Standards and Process

The operator, the regulatory authority, the public, and the financial assurance mechanism providers need to know and understand what constitutes reclamation success. The success standards need to be measurable either directly or indirectly. Without clear standards, the operator will not know what steps need to be taken to achieve success, and the evaluation may be based on arbitrary actions. The public, for example, will have expectations of how clean surface and groundwater should be after mining. These expectations have to be based on defined standards to be realistic. The process for release of the financial assurance mechanism should be clear with defined time frames for submittal, evaluation and public input. The willingness of financial assurance providers to underwrite financial assurance mechanisms is in part based on the regulatory authority's reclamation success standards. The financial assurance providers are more willing to provide services in states that have well defined standards and a clear process for the termination of reclamation liability.

3.3.2 Adequate Monitoring Period

Ideally, a reclaimed site will be stable and productive now and into the future. Erosion on the site will be comparable to the surrounding area. The quality and quantity of the surface water flowing through the site will be similar to what it was before mining and milling occurred. The groundwater quantity and quality will also be similar. Some media such as air quality, surface water, or surface erosion will demonstrate stability in a short period of time. Other media such as groundwater quantity and/or may take decades to fully recover to pre-mining levels.

Too short of a demonstration period may result in reclamation liability release before site conditions have stabilized, resulting in soil, water or air changes to the point that the success standards are no longer being met. An indefinite demonstration period would make it extremely difficult for the operator to secure a financial assurance mechanism. The task is to find a period of time that will adequately demonstrate that the media is stable or shows strong evidence that it is trending towards ultimate stability.

Another component to consider in relinquishing the bond is verifying that the reclamation construction was completed in accordance with the appropriate quality assurance (QA) requirements. The construction QA documentation should provide an additional assurance that the reclamation construction is of sufficient quality to meet the reclamation design period requirements.

The Office of Surface Mining has a minimum demonstration period of five years in the East and Midwest, with a ten year period in the West. The difference recognizes the relative ease of establishing an adequate vegetation community in the East and Midwest due to the amount of precipitation. Groundwater quantity is deemed acceptable if monitoring demonstrates a trend which verifies pre-mining modeling predictions.

For non-coal mines, Wyoming has a minimum of five years for demonstration that reclamation standards have been met. This period may be extended if monitoring data indicates variability or lack of a trend toward reclamation standards. Colorado also has a minimum of five years. Utah requires the financial assurance mechanism to be maintained until the State determines that reclamation has been successfully completed.

3.3.3 Public Process

The purpose of a financial assurance mechanism is to ensure the disturbed area will be reclaimed and the public will not be impacted by environmental degradation of the site nor be required to spend public funds to reclaim the site. To have a transparent process and because it relates to their protection and interests, the public should have a role in the release of any financial assurance. Public involvement in the release of the financial assurance is mixed in the three states reviewed.

The Office of Surface Mining requires public notice when all or part of the financial assurance is released for coal mines. Some states involve the public for non-coal mines, and others do not. Wyoming and Utah do not require notification of the public regarding a pending release of the financial assurance. Occasionally, Wyoming will require surface-owner approval of final release. Colorado, depending on the type of operation, will either notify the landowners of the area within the permit or require the operator to initiate public notice with opportunity of filing objections and a hearing.

The release of the mechanism for mills occurs at the time the NRC or an Agreement State terminates the license and in some cases transfers the tailings site to the DOE for long-term care. This action is considered a major licensing action with public notice.

3.4 Sound Financial Assurance Instruments

Several issues relate to having sound financial assurance instruments. These include: being payable only to the regulatory authority; being withdrawn only with the regulatory authority's approval; and having healthy guarantors. Obviously, cash deposited with the Commonwealth used as financial assurance is the most sound, providing there are strict provisions to prevent it being used for other purposes. Irrevocable Letters of Credit are commonly used as financial assurance instruments and are as sound as the bank issuing the letter. Surety bonds are also commonly used, and like Letters of Credit, they are as sound as company issuing the surety bond.

3.4.1 Liquid and Assessable Financial Assurance Instruments

The World Bank recommends that all financial assurance be reasonably in liquid form. Some forms of financial assurance are more liquid than others. Cash is the most liquid and personal property or mine equipment the least liquid. Some entities do not allow personal property or mine equipment to be used as financial assurance because of the time and uncertainty of the value of the property. There is also concern that property and equipment may be moved out of the jurisdiction of the regulatory authority.

There have been cases where the financial assurance has been required to be composed of several parts: a very liquid, easily assessable, part to allow the regulatory authority to quickly address immediate needs, such as site security and safety issues, while formal forfeiture proceedings of less liquid financial assurance mechanisms, as well as the hiring of a third party contractor, occurs.

3.5 Other considerations

3.5.1 Possible Long-term Mining Related Mitigation

Occasionally, an unanticipated event occurs which cannot be mitigated or reclaimed within the normal life span of the mine. These events may require perpetual treatment, such as treating acid rock drainage. Since these events are not planned as part of the mine permit, the financial assurance covering the mine will not have the cost of mitigation or treatment included in the amount. Financial assurance providers have been reluctant to cover such items because there is no release possible, or it may only be possible in the distant future.

The Pennsylvania Department of Environmental Protection (PDEP) has adopted provisions for the establishment of trust funds with a third party trustee. The main purpose of the trust fund is to generate sufficient income to cover the cost of treatment into the future. The trustee would make disbursements, at the direction of the PDEP, to fund continued treatment. Each trust fund typically consists of two documents, a Consent Order and Agreement (CO&A) between the Responsible Party and the PDEP and a Trust Agreement or Participation Agreement between the Responsible Party and the Trustee.

While not directly a financial assurance mechanism, environmental covenants could be used as a tool to address long term impacts to a mine site caused by unanticipated events which are not readily remediated. Land use restrictions regarding the long-term use of all or a portion of the mining area may be required to protect isolation barriers or encapsulation structures. These covenants could also be used to address concerns regarding long-term groundwater monitoring to ensure the efficacy of mine waste isolation. Such covenants are not normally used in mining regulatory programs but are more common in other environmental programs. The Virginia DEQ Uniform Environmental Covenants Act Regulation could be used as a model to address such events if necessary. The covenants would restrict certain activity on the property and/or require certain monitoring and maintenance actions be conducted if necessary.

3.5.2 Long-term Stewardship for Mills

Uranium processing sites addressed by Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA) are those that were active when the act was passed in 1978. These sites were/are commercially owned and regulated under a license or permit from the NRC or an agreement state. For license termination, the owner conducts an NRC- or State-approved reclamation of any on-site radioactive waste remaining from uranium ore-processing operations. UMTRCA requires the DOE, or the State if it so chooses, to accept title to a site for long-term custody and care. No State has yet chosen to accept title to a site. DOE administers Title II sites under the provisions of a general NRC license granted under 10 CFR Part 40.28, "General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites." DOE's Legacy Management Office currently manages six UMTRCA Title II sites. The number will increase as ongoing site reclamations are completed.

The site owner must also include in its cost estimate full funding for the DOE inspections and, if necessary, ongoing maintenance. Criterion 10 of Appendix A to 10 CFR Part 40 requires that a minimum charge of $250,000 (1978 dollars) ($880,280 in 2012 dollars) to cover the costs of long-term surveillance be paid by each mill operator to the general treasury of the United States or to an appropriate State agency prior to the termination of a uranium or thorium mill license. This amount is adjusted each year for inflation. To ensure these funds will be available at the time of closure, the NRC requires the amount to be included in a mechanism. Normally this is included with the mechanism for the mill, but the operator may elect to have a separate mechanism for this item.

Criterion 12 of Appendix A indicates that the final disposition of tailings, residual radioactive material, or wastes at milling sites should be such that ongoing active maintenance is not necessary to preserve isolation. As a minimum, annual site inspections must be conducted by the government agency responsible for long-term care of the disposal site to confirm its integrity and to determine the need, if any, for maintenance and/or monitoring. These measures include, but are not limited to, repairing or replacing fencing, and limited long-term groundwater monitoring to confirm that no groundwater problems exist at the site.

Results of the inspections for all the sites under the licensee's jurisdiction will be reported to the NRC annually within 90 days of the last site inspection in that calendar year. Any site where unusual damage or disruption is discovered during the inspection, however, will require a preliminary site inspection report to be submitted within 60 days. On the basis of a site-specific evaluation, the NRC may require more frequent site inspections if necessary due to the features of a particular disposal site. In this case, a preliminary inspection report is required to be submitted within 60 days following each inspection.

If site surveillance or control requirements at a particular site are determined, on the basis of a site-specific evaluation, to be significantly greater than those specified in Criterion 12 (e.g., if fencing is determined to be necessary), variance in funding requirements may be specified by the NRC. In any case, the total charge to cover the costs of long-term surveillance must be such that, with an assumed 1 percent annual real interest rate, the collected funds will yield interest in an amount sufficient to cover the annual costs of site surveillance. The total charge will be adjusted annually prior to actual payment to recognize inflation. The inflation rate to be used is that indicated by the change in the Consumer Price Index published by the U.S. Department of Labor, Bureau of Labor Statistics.

3.5.3 Impacts from Catastrophic Events

3.5.3.1 Coverage by Mine or Mill Financial Assurance Instruments

Impacts from catastrophic events are not typically covered by the financial assurance mechanism for reclamation, as that instrument is a performance guarantee that the operator will complete the

reclamation according to a preapproved plan. Unanticipated events that are not catastrophic may be added to a financial assurance mechanism for reclamation once it is discovered, but this type of financial assurance instrument is not meant for catastrophic events.

3.5.3.2 Alternative Mechanisms

Corporate General Environmental Liability Insurance

Environmental or pollution liability insurance typically protects the insured against unanticipated losses associated with unknown events or conditions, including cleanup costs and third-party property damage or bodily injury claims. There are insurers that provide liability insurance for accidents or unanticipated events that result in environmental damage. These companies often will conduct audits or recommend companies that perform environmental risk audits in an effort to lower environmental risk for their clients. There are limits on the amount of financial costs and not all catastrophic events are covered.

State Managed Fund Such as a Sinking Fund or Other Special Accounts Funded by a Fee

Since there are limits on the amount that corporate environmental liability insurance will cover in a policy, alternative means may be required to provide additional protection to the public. These alternatives may include, but not limited to, a sinking fund or unit levy, where a mining fee is placed into a fund to address impacts that are not covered by the financial assurance mechanism for reclamation or the mining company's liability insurance policy.

3.5.3.3 Management of Financial Assurance

The NRC sureties and long-term maintenance funds for uranium mills in non-agreement states are typically deposited into the general U.S. Treasury. Once deposited into the Treasury, these funds are not dedicated explicitly for management of uranium mills that have been transferred to the long-term custodian (U.S. Department of Energy) but rather are subject to Congressional annual budget appropriations. Ensuring that any surety funds or long-term maintenance funds are not deposited into the general State or Federal treasury but rather are deposited into separate "lock box" accounts which are not subject to budgetary or political constraints may provide additional assurance of long-term protection.

4.0 POINTS FOR CONSIDERATION

The critical components for financial assurance mechanisms discussed above should be part of any regulatory program for uranium mining and milling. Uranium mining and milling have many unique features and issues that if uranium mining is allowed in the Commonwealth a new financial assurance program specific to uranium mining and milling should be considered. Financial assurance mechanisms will reduce the risk to the citizens of the Commonwealth, but they cannot eliminate all risk. The points for consideration discussed below can serve to lower this risk.

1) Contemporaneous Reclamation/Decommissioning

Consideration should be given to developing standards for uranium mine and mill decommissioning. The different methods of uranium mining should have unique standards similar to what is currently in the coal regulatory program.

2) Actual Cost of Reclamation

Consider a requirement that any financial assurance include the actual costs of completing reclamation and decommissioning. These costs should:

- be based on the actual disturbance and those disturbances projected for the next twelve months;
- cover all monitoring costs through the end of the demonstration of satisfactory reclamation;
- be based on having a third party contractor perform the reclamation;
- be reviewed annually or at least periodically to ensure all disturbances are included and costs are updated;
- be available for public review and comment during the annual/periodic review;
- be based on an up-to-date reclamation plan;
- consider requiring a final closure plan prior to termination of mining or at least requiring a demonstration that a new closure plan is not required; and
- consider requiring public notice and comment of the final closure plan or the demonstration that one is not required.

3) Full and Partial Release Process

Consider developing a process for partial and full release of the financial assurance. This would include:

- clear and specific reclamation standards;
- an adequate time period to monitor and assess the success of reclamation; and
- a process that allows public notice and comment of the release.

4) Sound Financial Instruments

Consider developing standardized forms approved by the appropriate Commonwealth legal department that all operators must use for financial assurance instruments.

Consider depositing surety funds or long-term maintenance funds into separate "lock box" accounts which are not subject to budgetary or political constraints.

5) Liquid Financial Instruments

Consider allowing only financial assurance instruments that are considered liquid as described by the World Bank report. Also consider a portion of the financial assurance to be very liquid (i.e., cash deposits) to allow funds to be immediately available to allow a response by the Commonwealth to hazardous site conditions or security concerns in the event of forfeiture of the mechanism.

6) Possible long-term Mining Related Mitigation

Consider developing a program to address long-term or perpetual mitigation of unexpected impacts resulting from mining. The program could include the types of financial assurance mechanisms, such as a trust, to fund the mitigation and the types of entities which would administer the trust.

7) Covenants and Land Use Restrictions

Consider developing a program that includes covenants and land use restrictions to protect encapsulated or other engineered barriers to prevent accidental release of harmful or toxic materials. The covenants could also require certain monitoring and maintenance activities be conducted protect the site and prevent long-term offsite impacts.

8) Long-term Stewardship for Mills

Consider developing a program that specifically addresses the process for the required transfer of uranium mill tailings to the Commonwealth or the U.S. Department of Energy. This program

could include a defined financial assurance instrument to cover the amount of funds required to be transferred with the property and define who would hold the financial assurance instrument.

9) Impacts from Catastrophic Events

- Consider developing a program separate from the financial assurance mechanism for reclamation to address impacts from catastrophic events.
- Consider reviewing existing corporate liability insurance requirements for appropriate coverage.
- Consider developing a Commonwealth managed fund such as a sinking fund or other special account funded by a fee on mining to cover impacts not addressed by liability insurance.

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