REVIEW OF APPROVED ALTERNATE CONCENTRATION LIMIT APPLICATIONS AT UMTRCA TITLE II SITES

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PRESENTATION TOPICS

Review of Title II Sites with ACLs

- Sites, States, Jurisdictions
- Range of Constituents addressed & ACL values
- Bases for demonstrating ACLs as ALARA

Review of Regulations and Guidance

- 10 CFR 40 Appendix A
- Guidance
  - NUREG-1620
  - NUREG/BR-0058
  - NUREG-1757
  - NUREG-1530

Presentation Objectives

- Present an overview of existing ACLs for Title II uranium mill sites
- Disseminate information regarding existing administrative record of approved ACLs
- Summarize NRC regulation and guidance regarding ALARA as it applies to groundwater corrective actions and ACLs

Review of Title II Sites with ACLs

- 10 Title II uranium mill sites with ACLs
  - 1 in Colorado – Agreement State
    - Uravan
  - 3 in New Mexico – NRC
    - Ambrosia Lake
    - Bluewater
    - L-Bar
  - 1 in Utah – Agreement State
    - Lisbon Valley (granted by NRC)
  - 5 in Wyoming – Agreement State (recently with NRC)
    - Bear Creek (granted by NRC)
    - Lucky MC (granted by NRC)
    - Gas Hills (granted by NRC)
    - Shirley Basin South (granted by NRC)
    - Split Rock (granted by NRC and WDEQ)

Review of Title II Sites with ACLs

Title II Uranium Mill Site with ACLs

Site	State	Regulatory Authority	License Number	NRC Docket No.	Owner	ACL Aplication Initiated - Approved
Ambrosia Lake	NM	NRC	SUA-1473	40-8905	Rio Algom Mining Co. BHP Mining Company	6/11/2001 - 2/24/2006
Bluewater	NM	NRC	SUA-1470	40-8902	Anaconda Minerals Atlantic Richfield Company	5/10/1989 - 2/22/1996
Bear Creek	WY	NRC (until 2018) WDEQ (Current)	SUA-1310	40-8452	Anadarko Petroleum Corp.	2/28/1997 - 6/30/1997 11/28/2011 - 2/27/2013
Gas Hills	WY	NRC (until 2018) WDEQ (Current)	SUA-648	40-0299	Union Carbide Umetco Minerals Corp.	2/18/1999 - 3/29/2002
L-BAR	NM	NRC	SUA-1472	40-8904	Kennecott Energy Sohio Western Mining Co.	9/28/1998 - 5/21/1999
Lisbon Valley	UT	NRC (unitl 2004) UDNR/DWMRC (Current)	SUA-1119 UT1900481	40-8084	Rio Algom Mining Co. BHP Mining Company	5/22/2002 - 5/11/2005
Pathfinder-Lucky MC	WY	NRC (until 2018) WDEQ (Current)	SUA-672	40-2259	Pathfinder Areva	12/21/2000-12/22/2002
Shirley Basin South	WY	NRC (until 2018) WDEQ (Current)	SUA-551	40-6659	Petrotomics	09/10/1996-10/6/1998
Split Rock	WY	NRC (until 2018) WDEQ (Current)	SUA-0056 WYSUA-0056	40-1162	Western Nuclear Inc. Freeport-McMoRan Inc.	10/29/1999 - 9/28/2006; 12/01/2008 - 2/24/2010 5/1/2019 - 12/11/2019
Uravan	CO	Agreement State EPA-CERCLA	660-02	NA	Union Carbide Umetco Minerals Corp.	3/31/2003-6/1/2018

Review of Title II Sites with ACLs

- ACL Guidance has evolved only slightly from the 1996 ACL guidance to the current guidance in NUREG-1620 (2003), which itself is now 20 years old.

- Durations for review and approval of ACL applications has increased since the late 1980's
  - With the exception of the first application at Bluewater, applications of the 1990's were approved in 1 to 2 years.
  - Applications since 2001 have taken between 3 and 7 years.

- Increased level of requested technical detail supporting ACL applications has been observed in request for information (RAIs) over the past two decades.

- Groundwater flow and transport modeling tools have become more sophisticated and more complex over the past two decades; this change has likely contributed to increased RAIs and extended review times.

Review of Title II Sites with ACLs

- Wide range of bases by which ACLs were developed
  - Most ACLs supported by groundwater flow and transport modeling and historical GW data sets
  - 3 sites used **multiple methods** for developing ACLs for different aquifers or areas at same site
    - Ambrosia Lake, Bluewater, Split Rock
  - 4 sites based ACLs on **maximum predicted POC** concentrations
    - Ambrosia Lake, Bear Creek, L-Bar, Lucky MC
  - 3 sites based ACLs on the 95% Upper confidence interval of **historical POC data**
    - Gas Hills, Lisbon Valley, Shirley Basin South,
  - 2 sites based ACLs on **maximum non-POC** well concentration from specified period
    - Ambrosia Lake, Split Rock
  - 2 sites based ACLs on **maximum POC concentrations to not exceed protective limit at POE**
    - Ambrosia Lake (Bedrock Aquifer), Uravan
    - Used concept of **Attenuation Factor** to calculate ACL value just at protective POE value

Review of Title II Sites with ACLs

Constituent	Units	Ambrosia Lake	Bluewater	Bear Creek	Gas Hills	L-Bar	Lisbon Valley	Pathfinder - Lucky MC	Split Rock	Shirley Basin South	Uravan
		Stds (Bedrock / Alluvium)	Stds (Bedrock / Alluvium)	Stds	Stds	Stds	Stds	Stds	Stds	Stds	Stds
Al	mg/L								37 (Lic)		7.9 **(ACL)**
As	mg/L				1.36 (SW)- 1.80 **(W)**		2.63 **(ACL)**	0.05 (Lic)	0.05 (Lic)		
Be	mg/L			0.01 (Lic)	1.64(W) - 1.70 **(SW)**			0.07 **(ACL)**	0.01 (Lic)		
Cd	mg/L			0.01 (Lic)				0.02 **(ACL)**	0.01 (Lic)	0.079 **(ACL)**	0.26 **(ACL)**
Cl	mg/L	7,110 **(ACL)**				1,127 (AAS)					
Cr	mg/L			0.05 (Lic)				0.05 (Lic)		1.83 **(ACL)**	
NH3	mg/L								0.61 - 0.84 **(ACL)**		6,900 **(ACL)**
F	mg/L								4.0 (Lic)		
Fe	mg/L										130 **(ACL)**
Mn	mg/L								35 - 225 **(ACL)**		130 **(ACL)**
Mo	mg/L	176 **(ACL)**	0.10 / NA **(ACL)**	0.02 (Lic)			58.43 **(ACL)**		0.22 - 0.66 **(ACL)**		
Ni	mg/L	0.12 - 0.37 / 6.8 - 98 **(ACL)**		3.8 **(ACL)**	9.34 (SW) - 13.0 **(W)**			0.85 **(ACL)**	0.05 (Lic)	6.15 **(ACL)**	21 **(ACL)**
NO3	mg/L					1,180 (AAS)			350 - 500 **(ACL)**		
NO3+NO2	mg/L	351 **(ACL)**									1,360 **(ACL)**
Pb	mg/L								0.05 (Lic)	0.05 (Lic)	
Sb	mg/L								0.006 (Lic)		
Se	mg/L	49 **(ACL)**	0.05 / 0.05 **(ACL)**	0.025 **(ACL)**	0.161(W) - 0.53 **(SW)**	6 **(ACL)**	0.175 **(ACL)**	1.1 **(ACL)**	0.05 - 0.3 **(ACL)**	0.023 **(ACL)**	0.5 **(ACL)**
SO4	mg/L	12,000 **(ACL)**				13,110 (AAS)					32,500 **(ACL)**
U	mg/L	0.25 - 0.81 / 1.6 - 23 **(ACL)**	0.44 /2.15 **(ACL)**	3.0 **(ACL)**	11.9 (W)- 34.1 **(SW)**	13 **(ACL)**	101 .58 **(ACL)**	1.7 **(ACL)**	3.4 - 4.8 **(ACL)**	9.2 **(ACL)**	5.5 **(ACL)**
Adj. Gross Alpha	pCi/L	8,402 **(ACL)**			3,338 - 6,223 **(ACL)**						
Pb-210	pCi/L	13 - 57 / 1,274 **(ACL)**			35.4(W) - 46.7 **(SW)**						
Ra-226+228	pCi/L	41 / 218 - 3,167 **(ACL)**		46 **(ACL)**	250(W) - 353 **(SW)**	11.01 (Lic)		7.5 **(ACL)**	7.2 - 19.9 **(ACL)**		
Ra-226										91.3 **(ACL)**	
Radium 228										25.7 **(ACL)**	
Th-230	pCi/L	139 - 869 / 945 - 13,627 **(ACL)**		2.6 **(ACL)**	44.8 (SW)- 57.4 **(W)**	3.12 (Lic)		13.2 (Lic)	0.95 (Lic)	2409 **(ACL)**	8,200 **(ACL)**
TDS	mg/L	25,100 **(ACL)**				20,165 (AAS)					

AAS = New Mexico Alternate Abatement Standards

Review of Title II Sites with ACLs

- **Groundwater Corrective Action Plans**
  - Scopes of GW CAPs varied by site, hydrogeologic conditions
  - Contaminant source control methods cited
    - Minimizing free tailings water on tailings surface
    - Tailings toe drains
    - Tailings dewatering with wells and/or wicks (vertical band drains)
    - Cap and cover tailings
  - Groundwater Restoration methods cited
    - Primarily “pump and treat”
    - Groundwater recovery
      - Wells, Trenches/drains, freshwater “sweeps”
  - Water Treatment/Management
    - Re-use in mills
    - Evaporation on tailings or in evaporation ponds
    - Deep well injection
    - BaCl/Lime addition, settling, filtering
    - Re-injection (fresh water sweep)
    - Reverse Osmosis/Ion Exchange (IX/RO)

Review of Title II Sites with ACLs

- **Groundwater Correction Action Plans (continued)**
  - Volume of water not consistently identified in applications
  - **Duration**
    - 9 years (L-Bar & Uravan) to 22 years (Ambrosia Lake, Lisbon Valley & Lucky MC)
  - **Source control**
    - Decant water removal, toe drains and wells in tailings
    - Very limited data
    - 5.9 MG (L-Bar) to 199MG (Lucky MC)
  - **Groundwater Restoration**
    - Wells and trenches used for collection
    - 21.4MG (L-Bar) to 856MG (Ambrosia Lake)

Review of Title II Sites with ACLs

- **Bases for demonstrating ACL as ALARA**
  - Bases provided in applications varied widely and were typically general in nature
  - Basis addressed in Technical Evaluation Reports were either absent or similarly general in nature
  - Generally concurring that the proposed ACLs were ALARA without specifically identifying criteria or how ALARA was demonstrated.
  - Most applications addressed benefit of restoration in terms of past mass and volumes recovered and general terms regarding restoration of access to groundwater.
  - Only one application (Split Rock) provided a monetized value of the pre-contaminated water resource.
  - Two application pre-dated the 1996 ACL guidance (Bluewater, Shirley Basin South)
  - Only a few applications quantified the benefit of avoided dose from groundwater restoration (e.g., Ambrosia Lake, Gas Hills)

Review of ALARA Basis in Regulation and Guidance

- 10 CFR 40 Appendix A
  - Criterion 5
    - 5A(1) - The primary groundwater protection standard is a design standard for surface impoundments
    - 5B(1) - Secondary groundwater protection standard: Hazardous constituents entering the groundwater must not exceed the specified concentration limits in the uppermost aquifer **beyond the point of compliance** during the compliance period.
    - 5B(2) - A constituent becomes a hazardous constituent **only** when the constituent meets all three of the following tests:
      - The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;
      - The constituent has been detected in the groundwater in the uppermost aquifer; and
      - The constituent is listed in Criterion 13.

Review of ALARA Basis in Regulation and Guidance

- 10 CFR 40 Appendix A
  - Criterion 5
    - 5B(5) - At the point of compliance, the concentration of a hazardous constituent must not exceed:
      - higher of background or the values given in the table in paragraph 5C; or
      - ACLs established by the Commission.
    - 5B(6) – meeting background or drinking water limits may not be "***practically achievable***" at a specific site. May apply for ACLs provided:
      - ACLs will not pose a substantial present or potential hazard to human health or the environment
      - ACLs are as low as reasonably achievable after considering practicable corrective actions (includes existing GW CAP)

Review of ALARA Basis in Regulation and Guidance

- 10 CFR 40 Appendix A
  - Criterion 5
    - 5C – Maximum groundwater concentration limits
      - Not entirely consistent with 40 CFR 141 (As, Cd, Cr, Pb, Se)
    - 5D – GW CAP
      - **Objective:** return hazardous constituent concentration levels in groundwater to the concentration levels set as standards (higher of Table 5C or background).
      - Must address removing or treating in place
      - "*The Commission will determine when the licensee may terminate corrective action measures* ***based on data*** *from the* ***groundwater monitoring program and other information*** *that* ***provide reasonable assurance*** *that the groundwater protection standard will not be exceeded.*"
        - These are the data provided in an ACL application

Review of ALARA Basis in Regulation and Guidance

- NUREG-1620 (NRC, 2003)
  - Chapter 4 (Protecting Water Resources), Section 4.3.3.3 (Corrective Action Assessment)
    - 4 Steps
      1. Alternatives (past, current, and future alternatives evaluated)
      2. Assessment of Benefits (direct and indirect)
      3. Assessment of Costs
      4. ALARA Analysis

Review of ALARA Basis in Regulation and Guidance

- NUREG-1620 (NRC, 2003) Section 4.3.3.3 (Corrective Action Assessment)
  - **Step 1. Alternatives**
    - "*A **complete range of realistic and reasonable corrective action alternatives** for achieving compliance with the ground-water standards currently in the license and the proposed alternate concentration limit is described and evaluated.*"
    - Both passive and active or sequences of both
  - "*For **past and current corrective actions**, site-specific operational and monitoring data should be included to **show the effectiveness of those measures.***" [emphasis added]
    - Present data, no metrics or criteria for minimum degree of efficacy
  - "*The **suitability of a corrective action** should be determined strictly on the technical and engineering information needed to design and implement a particular measure. The **economic constraints** for implementing a particular measure **should not be used to eliminate a corrective action method from the evaluation.**"*
    - Applies to screening of alternative technologies and development of alternatives, not to selection of proposed action.

Review of ALARA Basis in Regulation and Guidance

- NUREG-1620 (NRC, 2003) Section 4.3.3.3 (Corrective Action Assessment)
  - **Step 2 Benefits** (Direct and Indirect)
  - Direct benefits:
    - Current and projected groundwater resource value
      - based on water rights, availability of alternate water supplies, and **forecasted water use demands**
      - "*…is generally equal to* ***the cost of a*** *domestic or* ***municipal drinking water supply*** *or* ***the cost of water supplied from an alternate source*** *to replace the contaminated resource."* [emphasis added]
  - Indirect benefits
    - avoidance of adverse health effects from exposure to contaminated water (avoided dose),
    - prevention of land value depreciation, and
    - other benefits accrued from performing the corrective action, including timeliness of remediation.

Review of ALARA Basis in Regulation and Guidance

- NUREG-1620 (NRC, 2003) Section 4.3.3.3 (Corrective Action Assessment)
  - **Step 3 Costs** (Direct and Indirect)
    - Capital costs for designing, and constructing the alternative;
    - Operation and maintenance costs;
    - Costs associated with demonstrating compliance with the standards;
    - Decommissioning costs

Review of ALARA Basis in Regulation and Guidance

- NUREG-1620 (NRC, 2003) Section 4.3.3.3 (Corrective Action Assessment)
  - **Step 4 ALARA Demonstration**
    - Direct and indirect benefits of each corrective action;
    - costs of performing each corrective action; and
    - determination whether any of the evaluated corrective action alternatives will reduce contaminant levels **below the proposed alternate concentration limit**, considering the **benefits and costs** of implementing the alternative.
    - "**A proposed alternate concentration limit** is considered as low as is reasonably achievable **if** the comparison of **the costs** to achieve the target concentrations **lower than the alternate concentration limit** are **far in excess of the value of the resource and the benefits** associated with performing the corrective action alternative." [emphasis added]
      - No definition of "far in excess" in NUREG-1620;
      - NUREG-1757 Vol.2, Rev.2, Appendix N.6 provides a basis for "prohibitively expensive" per 10 CFR 20.1403(e)(2)(i).

Review of ALARA Basis in Regulation and Guidance

- **NUREG-1620 Summary**
  - No criteria or basis in regulation or guidance as to a minimum degree of efficacy a groundwater CAP must have before an ACL application may be submitted and accepted for technical review.
  - Assessment of current groundwater CAP and alternative actions, including ACLs, are evaluated within the four-step process identified in NUREG-1620.
  - No guidance on how to calculate the ACL values themselves.
    - ACLs as proposed are ALARA if costs are far in excess of (e.g., 10x) the value of the water resource and benefits of alternative actions to further reduce concentrations at the POE, ACLs are not the lowest possible values.

Review of ALARA Basis in Regulation and Guidance

NUREG/BR-0058 (Regulatory Analysis Guidelines of NRC)

- Cost/Benefit analysis guidance
  - Rev. 4. Current (NRC, 2004); Rev. 5, Draft for Comment (NRC, 2017)
  - "*Estimated values and impacts* ***should be expressed in monetary terms whenever possible***" [emphasis added]
  - "*In order to place all values and impacts on a common basis, a conversion factor is needed that reflects the monetary worth of a unit of radiation exposure.* ***The currently recommended value for this dollar conversion factor is $2000 per person-rem***" [emphasis added]
    - NUREG-1530 has updated this value in Rev.1, 2022.
  - Recommends present-worth calculations be presented using both 3 percent and 7 percent real discount rates
    - 3 percent rate ≈ real rate of return on long-term government debt, savings.
    - 7 percent rate ≈ marginal pretax real rate of return on private sector investments
      - "*is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector.*"

Review of ALARA Basis in Regulation and Guidance

- NUREG-1757 (Decommissioning Guidance; Characterization, Survey, and Determination of Radiological Criteria), Vol. 2, Rev. 2 (NRC, 2022)
  - Section 6, ALARA Analysis
  - *"The NRC staff should review the ALARA portion of the DP* ***without assessing the technical accuracy or completeness*** *of the information contained therein, which it should determine during the detailed technical review."* [emphasis added]
  - Areas of Review: "*Information submitted should include*
    - *(1) a cost-benefit analysis (or qualitative arguments) demonstrating that the applicable ALARA requirement(s) for the licensee's preferred decommissioning option will be met and*
    - *(2) a description of the licensee's preferred method for showing compliance with the ALARA requirement at the time of decommissioning."*
  - "*…an ALARA evaluation for restricted use should follow guidance described in Appendix N of this NUREG-1757, Volume 2.*"

Review of ALARA Basis in Regulation and Guidance

- NUREG-1757 (Decommissioning Guidance; Characterization, Survey, and Determination of Radiological Criteria) Vol. 2, Rev. 2 (continued)
  - "*…an ALARA evaluation for restricted use should follow guidance described in Appendix N of this NUREG-1757, Volume 2.*"
  - Five different possible benefits:
    - (1) collective dose averted,
    - (2) regulatory costs avoided,
    - (3) changes in land values,
    - (4) esthetics, and
    - (5) reduction in public opposition.
  - Numerical estimates will generally only be available for the first three benefits, if they are appropriate.
  - Prohibitively expensive definition for the cost of averted dose

Review of ALARA Basis in Regulation and Guidance

- NUREG-1757 (Decommissioning Guidance; Characterization, Survey, and Determination of Radiological Criteria) Vol. 2, Rev. 2 (continued)
  - Cost-benefit test for reasonable use of restricted release for decommissioning
    - "*The NRC expects licensees to make **every reasonable effort to achieve unrestricted release**. Specifically, the requirement calls for a licensee seeking to use restricted release to analyze whether it would be **cost-beneficial** to remove enough radioactive contamination from the site so that doses to the public are no higher than 0.25 mSv/y (25 mrem/y) without reliance on restricted release controls.*" [emphasis added]

Review of ALARA Basis in Regulation and Guidance

- NUREG-1757 (Decommissioning Guidance; Characterization, Survey, and Determination of Radiological Criteria) Vol. 2, Rev. 2 (continued)
  - "*There are generally two alternative analyses that may be used to weigh the costs and benefits of removing radioactive contamination:*
    - *(1) compare the potential benefits to the potential costs that are typically evaluated in an ALARA analysis, or*
    - *(2) consider the net public and environmental harm as a cost and compare those costs against the health and environment related benefits of removing radioactive contamination.*"

Review of ALARA Basis in Regulation and Guidance

- NUREG-1757 (Decommissioning Guidance; Characterization, Survey, and Determination of Radiological Criteria) Vol. 2, Rev. 2
  - Appendix N
    - Benefit of averted dose (B_{AD}) Equation N-1
      - $B_{AD} = V_{AD} \times PW(AD_{collective})$
        - PW ($AD_{collective}$) = Present worth of a future collective averted dose
        - V_{AD} = Value of averted dose ($/person-rem) (per NUREG/BR-0058 and NUREG-1530; $2,600 to $7,800 per person-rem, base case = $5,200 per person-rem in 2014 dollars)
    - N.6 Demonstration of "Prohibitively Expensive"
      - "*For a "prohibitively expensive" assessment, this value should be multiplied times 10 prior to being used as V_{AD} in the analysis.*"
      - When the 10 x the benefits of alternative to reduce concentrations to levels below the proposed ACLs (10 x B_{AD}) is less than the cost to implement the alternative, then the alternative can reasonably be considered prohibitively expensive.

Review of ALARA Basis in Regulation and Guidance

- NUREG-1530, Rev. 1 (NRC, 2022)
  - Calculation of dollar value of per person-rem avoided dose (2014 dollars)
  - "*…the NRC staff recommends varying the dollar per person-rem conversion factor by plus or minus 50 percent. This results in a range of conversion factors with a low value of $2,600 per person-rem and a high value of $7,800 per person-rem.*"
  - "*…the base case computations in a regulatory analysis will use the recommended best estimate dollar conversion factor of $5,200 per person-rem, and apply the low and high estimates in illustrating sensitivity and uncertainty in the range and direction of the impacts.*"
  - Base case conversion factor is $5,200 in 2014 dollars, roughly $6,250 in 2022 dollars.
  - Reasonable basis for value of avoided dose (V_{AD})

Review of ALARA Basis in Regulation and Guidance Summary

- There is no specific guidance as to how to calculate ACLs.
- ACLs have been approved as ALARA when developed using a variety of methods
  - The approved ACLs are not necessarily the lowest possible or likely values at or beyond the POC (Ambrosia Lake, Split Rock, Uravan).
  - They necessarily must have some conservatism to encompass uncertainty in transport to provide the requisite “reasonable assurance” of protection at the POE.
- Regulation and guidance identify that all alternatives, including the existing GW CAP, are evaluated by comparing costs and benefits within the process identified in NUREG-1620.
  - We find no other basis, process or method identified in regulation or guidance for evaluating if a current GW CAP should continue or be terminated.
  - Current and past GW CAP performance must be presented but we find no criteria or standards of a minimum level of efficacy identified in regulation or guidance.

Review of ALARA Basis in Regulation and Guidance Summary

- The primary monetized benefits of groundwater restoration are:
  - value of the pre-contaminated groundwater resources, based on the cost to replace the current and projected water use demand,
  - present worth value of averted dose from aquifer restoration.
- NUREG-1757, Vol.2 , Rev.2, Appendix N provides:
  - a method for calculating the monetized benefit value of averted does (B_{AD}),
  - a basis for demonstrating an alternative is “prohibitively expensive” (Section N.6)
    - when costs are > 10 x V_{AD} x PW($AD_{collective}$)
- NUREG-1530 provides conversion factors for the value of avoided dose (V_{AD})
- NURGE/BR-0058 provides guidance on discount rates to be used in calculating present worth value of avoided dose
- NUREG-1620, Chapter 4.3.3.3 provides acceptance criteria for assessment of groundwater corrective action alternatives (including current GW CAP).
  - Costs may be reasonably considered “far in excess” of benefits when greater than 10 times benefit of averted dose.

Accession No.s & References for Admin Record (from Licenses, TERs and RODs)

Site	ACL Licensing Submittals
Ambrosia Lake SUA-1473 40-8905	2/15/2000 (Bedrock ACL application; ML003687843) 7/21/2000 (Modeling & Feasibility; ML003737960) Supplements: 5/21/2001 (Alluvial ACL application; ML011690068) 4/11/2003 (RAI Responses; ML031080523) 8/12/2003 (not on ADAMS) 7/29/2004 (ML060040250, ML041950418 (Meeting Notes) BMH025509) 7/7/2005 (ML051990088) 12/7/2005 (ML053480214) 2/24/2006 (Approval, TER; ML060590024)
Bluewater SUA-1470 40-8902	5/10/1989 (CAP & ACL Application; ML20247R810) 8/9/1989 (Revised CAP & ACL Application; ML20247R803) 6/20/1990 (ACL Appl. ; ML20055F398, ML20055F402) 8/27/1991 (ACL Appl.; ML20082T159) 4/25/1995 (ACL Appl. supersedes previous; ML20100H916, ML20083A017, ML20092C121) 2/22/1996 (ACL Approval/TER; ML20100H916)
Bear Creek SUA-1310 40-8452	2/28/1997 (CAP & ACL Application; not on ADAMS) 6/30/1997 (ACL and CAP Approval; not on ADAMS) 11/28/2011 (ACL update, new model; ML12046A858) 2/2013 (Revised Final EA; ML12145A264) 2/27/2013 (ACL approval; ML12145A471)
Gas Hills SUA-648 40-0299	2/18/1999 (ACL Application; not on ADAMS) 4/17/2000 (NRC RAIs; ML003696238) 5/11/2001 (RAI responses; ML011440258) 5/18/2001 (ML011450405; ML011490184; ML011490147; ML011450325) 7/3/2001 (not on ADAMS) 12/3/2001 (ML020020133; ML020020229) 2/11/2002 (not on ADAMS) 3/4/2002 (Appdx. M of ACL; ML020670532) 3/29/2002 (ACL Approval/TER; ML021070805) 6/17/2005 (ACL Rev Appl. for Pb-210; ML051780369) 1/6/2006 (Email-Gecochem Supplement; ML060130581) 1/10/2006 (Email-Gecochem Supplement; ML060130586) 1/24/2006 (Email-Gecochem Supplement; ML060760418) 3/9/2006 (Email-Gecochem Supplement; ML060820192) 3/20/2006 (Email-Gecochem Supplement; ML060820189) 3/24/2006 (NRC Approval/TER; ML060380681; ML060830530)
L-BAR SUA-1472 40-8904	ACL application 8/24/1998 (ACL application; ML20151S129) 8/28/1998 (ACL application Ltr; ML20151S123) Supplements: 10/26/1998 (RAI Responses; ML20155A295 11/25/1998 (RAI Responses; ML20155A295) 3/2/1999 (RAI responses; ML20207E160) 3/3/1999 (GW Report; ML20207G935) 5/21/1999 (NRC Approval/TER; ML092400289)
Lisbon Valley SUA-1119 40-8084 UT1900481	3/31/1989 (GW CAP) 3/1/2001 (ACL Aplication) 5/22/2002 (ACL application Ltr) 10/10/2003 RAI repsonses 1/20/2004 (Long-Term GW Monitoprign Plan) 2/19/2004 (Exposure Assessment) 4/20/2004 (ACL Approval, Amendment 66, NRC EA) 4/23/2004 EA- FONSI in FR 5/11/2004 (ACL Approval/TER) ***(Not Found in NRC ADAMS, douments proivided by Licensee)***

Site	ACL Licensing Submittals
Pathfinder-Lucky MC SUA-672 40-2259	12/21/2000 (ACL application; ML010250146) October 26, 2001 ACL RAI (ML013020389; ML023510318) 1/11/2002 (ACL page changes; ML023510318; ML023510605) 8/9/2002 (Page change; ML022280014) 11/4/2002 (Page changes; ML023160530) 12/20/2002 (NRC Approval/TER; ML023570130) ***(From WDEQ database/Most not found in NRC ADAMS)***
Shirley Basin South SUA-551 40-6659	9/10/1996 (ACL Application; ML20117L336) 6/20/1997 (ACL Revision; ML081230121) 10/30/1997 (ACL Revision; ML081230123) 12/4/1997 (ACL Revision; No Accession No. found) 3/9/1998 (RAI Reponses; ML080950430, ML080950432) 3/9/1998 (RAI Responses; ML080950432) 3/19/1998 (RAI Reponses; No Accession No. found) 7/16/1998 (RAI Reponses; No Accession No. found) 9/25/1998 (NRC EA; ML081010011) 9/28/1998 (RAI Reponses; No Accession No. found) 10/6/1998 (NRC Approval/TER; ML201545605)
SPLIT ROCK SUA-0056 40-1162 WYSUA-0056	10/29/1999 (ACL Application; ML003672392,ML003672396, ML003672400, ML003672396) Supplements: 12/31/1999 (GW Report; ML003672396; ML003672400;)ML003672619 1/17/2000 (RAI Response; ML003676128) 2/27/2000 (RAI Response; ML003686985) 2/28/2000 (RAI Response; ML003687478) 2/1/2001 (RAI Response; ML010380246) 5/28/2002 (RAI Response; ML021710273) 7/23/2002 (RAI Response; ML022110059) 9/9/2002 (RAI Response; ML022560163) 3/7/2003 (RAI Response; ML030760336) 5/24/2004 (RAI Response; ML041490156) 2/10/2005 (RAI Response; ML051220100) 3/2/2005 (RAI Response; ML050690064) 3/20/2006 (Copies of Deeds; ML060930593) 8/1/2006 (LTCB Figure; ML062550304) 9/28/2006 (Approval/TER; ML062910216) Revision of Standards (Cr, Se) 12/1/2008 (Change GW Moniting; ML083380453) 2/7/2009 (ML090430285) 3/9/2009 (Update GW Mon. Stds; ML090750922) 2/24/2010 (Approval/TER; ML062910216) Revision to Standards (Se) 5/1/2019 (Request revision to Se ACL; ML20093A769) 12/11/2019 (WDEQ approval; ML20093A745)
URAVAN 660-02 (Colorado)	7/10/2003 ACL Application (EPA Doc. ID: 1888153) 2/29/2008 Compliance Report CR-430-3. Remedial Activities for Groundwater. (EPA Doc. ID: 1888089) 10/9/2017 Final Remedial Investigation (EPA ID: 100001775; 100001776; 100001777; 100001778) 10/10/2017 Final Focused Feasibility Study Report, Uravan Uranium Superfund Site (EPA Doc. ID: 100001779) 6/1/2018 EPA ROD (EPA Doc. ID: 100001779)

QUESTIONS?