Uranium Recovery Program at the NRC

Larry W. Camper, CEP, Director

Division of Waste Management and Environmental Protection

Office of Federal and State Materials and Environmental Management Programs

NRC Mission

- To license and regulate the nation's civilian use of byproduct, source, and special nuclear materials in order to ensure the adequate protection of public health and safety, promote the common defense and security, and to protect the environment.


Performance Assessment
Environmental Review
Division of Waste Management and Environmental Protection
Uranium Recovery
Low Level Waste
Decommissioning
International Support

Uranium Recovery Licensing Branch

- Bill von Till - Chief – Hydrogeologist
- Steve Cohen – Team Leader – Hydrogeologist
- Ron Linton – Senior Hydrogeologist
- Tom Lancaster – Hydrogeologist
- Elise Striz – Hydrogeologist
- Ron Burrows – Senior Health Physicist (HP)
- Doug Mandeville – Geotechnical Engineer
- Tanya Oxenberg – Health Physicist
- Jim Webb – Health Physicist
- Betty Garrett – Licensing Assistant
- HP's from other Branches, inspectors in TX

Environmental Review Branch

- Kevin Hsueh - Chief
- Alan Bjornsen – Geology
- Jennifer Davis – Cultural Resources
- Diana Diaz-Toro – Chemical Engineering
- Nathan Goodman – Ecology
- Kellee Jamerson – Environmental Science
- Stephen Lamont – Chemistry
- Asimios Malliakos – Physics/Nuclear Engineering
- Johari Moore – Health Physicist
- Tarsha Moon – Licensing Assistant
- James Park – Geological Sciences
- Jean Trefethen – Biology/Chemistry
- Ashley Waldron – Biological Sciences/Ecology
- Antoinette Walker-Smith – Licensing Assistant
- Haimanot Yilma – Chemical Engineering

National Academy of Sciences

- "*The United States federal government has only limited recent experience regulating conventional uranium processing and reclamation of uranium mining and processing facilities."* (pg 179 and 209 of pre publication report)
- *"In addition, the United States experience in uranium mining, processing, and reclamation over the past two decades has been limited, with little conventional uranium mining activity in the United States since the late 1980s."* (pg 186 of pre publication report)
- *"The U.S. NRC has a more robust approach to public participation in licensing a uranium processing facility, but there are no guarantees that pre licensing public meetings or hearings will be held in the vicinity of the proposed facility, except in the event that an EIS (rather than simply an environmental assessment) is undertaken."* (pg 209 of pre publication report)
- *"At present, there are gaps in legal and regulatory coverage for activities involved in uranium mining, processing, reclamation, and long-term stewardship."* (page 208 pre publication report)

Uranium Recovery Status

- Oversight of 3 operating in-situ recovery sites, one conventional mill, multiple licensed sites
- Three sites recently licensed
- Reviewing eight applications for new sites, renewal of existing sites, or expansion of sites
- Upcoming potential applications is estimated at 16 to include conventional and heap leach sites

NRC Anticipated Applications

Major Uranium Recovery Licensing Applications							
Company	Site Under Consideration	Design	Estimated Application Date	Date Accepted	State	Status	Letter of Intent
Fiscal 2007 Applications							
Cameco (Crow Butte Resources)	North Trend	ISR - Expansion	Received June 2007	8/28/2007	NE	Tech Review Ongoing	None
Fiscal 2009 Applications							
Powertech Uranium Corporation	Dewey Burdock	ISR - New	Resubmitted 8/09	Oct-09	SD	Tech Review Ongoing	*01/26/07*
Fiscal 2011 Applications							
Strata Energy, Inc.	Ross	ISR - New	Rec. January 2011	Jun-11	WY	Tech Review Ongoing	*01/08/10*
Fiscal 2012 Applications							
Uranium One	Ludeman	ISR - Expansion	Rec. December 2011	May-12	WY	Tech Review Ongoing	*11/28/11*
Lost Creek ISR, LLC	Lost Creek	Dryer-Expansion	Rec. January 2012	Mar-12	WY	Tech Review Ongoing	*01/06/10*
Cameco (Crow Butte Resources)	Marsland	ISR - Expansion	Rec. June 2012		NE		*11/09/10*
Cameco (Crow Butte Resources)	Three Crow	ISR - Expansion	Rec. 08/10, Resubmit 08/12		NE	Review Deferred	*01/11/10*
AUC LLC	Reno Creek	ISR - New	Jul-12		WY	Pre-Sub Audit 11/11	*11/03/10*
Uranium One	Allemand-Ross	ISR-Expansion	TBD		WY		*10/08/10*
Uranium Company of Nevada, LLC	Apex Mill	Conv. - New	TBD		NV		*11/11/10*
Fiscal 2013 Applications							
Uranerz Energy Corp.	Jane Dough	ISR-Expansion	Nov-12		WY		*10/07/11*
Lost Creek ISR, LLC	Lost Creek	KM-Horizon Exp.	Dec-12		WY		*03/29/12*
Strathmore Minerals Corporation	Roca Honda	Conv. - New	Jan-13		NM		*11/19/10*
Titan Uranium USA, Inc.	Sheep Mountain	Heap Leach - New	Jan-13		WY	Pre-Sub Audit 10/11	*11/11/10*
Strathmore Minerals Corporation	Gas Hills	Heap Leach - New	Feb-13		WY		*02/08/12*
Neutron Energy	Juan Tafoya	Conv. - New	Jun-13		NM		*03/02/12*
Uranium One	Jab and Antelope	ISR - New	Rec. 07/08, Resume FY 13		WY	Review Deferred	*05/31/07*
Cameco (Power Resources, Inc.)	Ruby Ranch	ISR - Expansion	FY 2013		WY		*01/14/10*
Rio Grande Resources	Mt. Taylor	Conv. - New	TBD		NM		*11/10/10*
Uranium Energy Corporation	Grants Ridge	Heap Leach - New	TBD		NM		*01/15/10*
Fiscal 2014 Applications							
Oregon Energy, LLC	Aurora Uranium Project	Conv. - New	Dec. 2013		OR		*04/03/12*
UR-Energy Corp.	Lost Soldier	ISR - Expansion	FY14		WY		*11/01/10*
The Bootheel Project LLC	Bootheel	ISR-New (Satellite)	FY14		WY		*08/09/10*
Other Major Licensing Actions							
Cameco (Crow Butte Resources)	Crawford, NE	ISR - Lic. Renew.	Received Dec. 2007		NE	Draft License Issued	
Uranium One	Willow Creek	ISR - Lic. Renew.	Received May 2008		WY	Tech Review Ongoing	
Cameco (Power Resources, Inc.)	Smith Ranch/Highland	ISR - Lic. Renew.	Feb-12		WY	Acc. Review Ongoing	
Hydro Resources, Inc.	Crownpoint	ISR - Lic. Renew.	Rec. 8/02, on hold until 2012		NM	Pre-Sub Audit 07/12	
Kennecott Uranium	Sweetwater Mill	Conv - Lic. Renew.	Oct-14		WY		
Cameco (Power Resources, Inc.)	North Butte	ISR - Ops Plan	Feb-12		WY	Inc.w/Smith R. renewal	*09/09/10*
Cameco (Power Resources, Inc.)	Gas Hills	ISR - Ops Plan	Feb-12		WY	Inc.w/Smith R. renewal	*09/09/10*
Cameco (Power Resources, Inc.)	Ruth	ISR - Ops Plan	FY 2022		WY		*09/09/10*
				No. of New Facility Applications =		**13**	
				No. of Restart/Expansion Applications =		**10**	
				No. of Other Actions		**8**	
				Total No. of Licensing Actions		**31**	

Uranium Recovery Decommissioning

- Overview of Title I and II sites
- Reclamation, decommissioning, and long-term oversight
- Title I sites (DOE) – 21 sites
- Title II sites – 11 sites
  - Six sites transferred to DOE for long term care

Environmental Review Laws and Regulations

- National Environmental Policy Act of 1969 (NEPA)
- Implementing Regulations
  - CEQ Regulations: 40 CFR Part 1500
  - NRC Regulations: 10 CFR Part 51
- Court Decisions
- Related Federal Laws

EIS Process

- Publish Notice of Intent
- Scoping Comment Period
- Scoping Report
- Draft EIS prepared
- Draft EIS Public Comment Period
- Final EIS Prepared
- Decision

Environmental Resource Areas

- Air Quality
- Ecological Resources
- Geology & Soils
- Historic & Cultural Resources
- Land Use
- Noise
- Public and Occupational Health
- Socioeconomics
- Transportation
- Visual & Scenic Resources
- Water Resources

Uranium Recovery Regulations and Operations of Conventional Mills

William von Till
Chief
Uranium Recovery Licensing Branch
Division of Waste Management and Environmental Protection

Uranium Recovery Regulations

- Atomic Energy Act of 1954
- Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA)
  - Title I - inactive uranium mill tailings piles
  - Title II - uranium recovery facilities licensed by NRC
- National Environmental Policy Act of 1969

Uranium Recovery

- What is Regulated:
  - Milling – any activity that produces byproduct material (10 CFR 40.4).
  - Byproduct Material – tailings or wastes produced by the extraction or concentration of U or Th for its source material content
  - NRC DOES NOT Regulate MINING
  - Types of Milling – Conventional, Heap Leach, in-situ recovery

Uranium Recovery Regulations

Title II

- Regulated under 10 CFR Part 40
- Materials Regulated:
  - Source Material (ores and product)
  - 11e.(2) Byproduct Material (Uranium Mill Tailings)
- Uranium Recovery Regulations are in 10 CFR 40, Appendix A
- EPA Standards – 40 CFR 192 Subparts D & E.

NRC's Regulatory Oversight

- Mission of safety, security, and environmental protection
- Robust licensing and oversight program
- Over 30 years of experience with oversight and reclamation of mills
- Experts in groundwater, engineering, and radiation protection
- Recently issued three new licenses

NRC's Regulatory Oversight, cont'd

- Legacy sites
- Improvements since UMTRCA
- Importance of tailings management
- Liners
- Groundwater monitoring
- Stringent reclamation and financial assurance criteria

Guidance Documents for Conventional Mills

- NUREG-1620, Revision 1, Conventional Mill Reclamation Plans
- Developing Standard Review Plan for the Review of Conventional and Heap Leach Applications
- Key Regulatory Guides
  - Regulatory Guide 3.5, Rev. 1, Standard Format and Content of License Applications for Uranium Mills
  - Regulatory Guide 3.11, Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities
  - Regulatory Guide 3.8, Rev. 2, Preparation of Environmental Reports for Uranium Mills

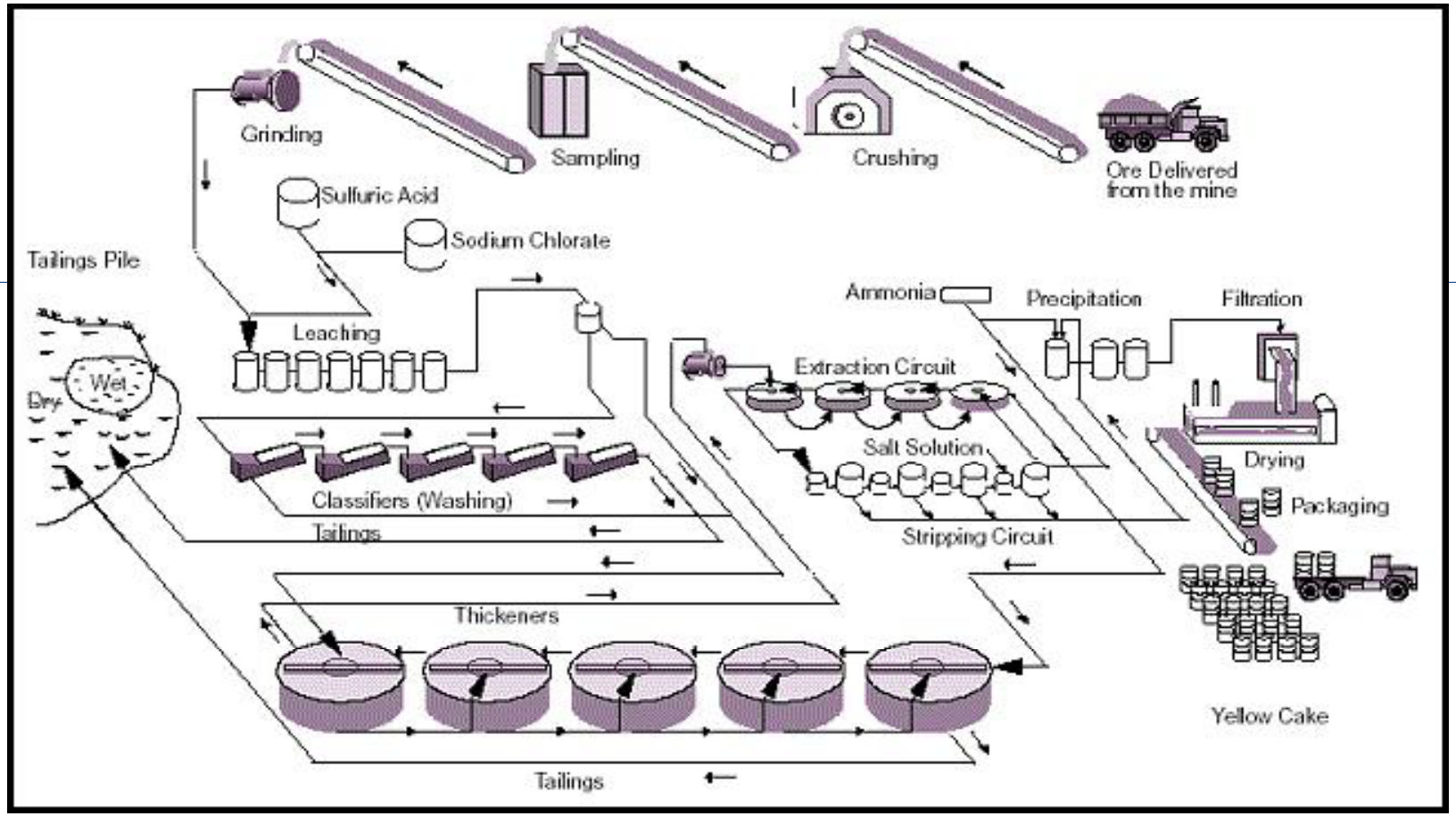
NRC Review Process for Virginia Uranium Application

- Pre-licensing Meetings, public meetings
- Acceptance review
- Notice of opportunity for hearing
- EIS Scoping meetings
- Safety/Technical review
- Environmental review - EIS
- Draft EIS for Public Comment
- Licensing Decision
- Inspections

Draft Standard Review Plan for Conventional Uranium Mill and Heap Leach Facilities

- Proposed Activities
- Site Characterization
- Description and Design of Proposed Facility
- Management
- Operational Environmental Monitoring
- Radiation Safety Controls and Monitoring
- Reclamation and Decommissioning Plan
- Accidents

Typical Conventional Uranium Mill Facility Process


Grinding
Sampling
Crushing
Ore Delivered from the mine
Sulfuric Acid
Sodium Chlorate
Tailings Pile
Ammonia
Precipitation
Filtration
Leaching
Extraction Circuit
Wet
Dry
Salt Solution
Drying
Classifiers (Washing)
Packaging
Tailings
Stripping Circuit
Thickeners
Yellow Cake
Tailings

Uranium Mill

Source - WMA

Mill and Tailings Site
White Mesa, Blanding, Utah

Mill Facility
White Mesa, Blanding, Utah

Tailings Disposal

Source - WMA

Liners

East Coast Example

- http://www.lm.doe.gov/Canonsburg/Sites.aspx

Canonsburg Site

Source - DOE

Canonsburg

Comments from UWG web page

- Financial Assurance
  - Requirements contained in 10 CFR 40, Appendix A, Criterion 9
  - Arrangements must be established prior to operations to assure that sufficient funds will be available for decontamination and decommissioning of the mill site and reclamation of tailings
  - Assume a third party performs the work

Comments from UWG web page

- Liner Systems
  - Requirements contained in 10 CFR 40, Appendix A, Criterion 5
  - Regulations require a liner system and a method to dewater tailings
  - Liner required to function through the closure period

Comments from UWG web page

- Design Criteria
  - Requirements contained in 10 CFR 40, Appendix A, Criterion 4
  - Regulation requires minimization of upstream rainfall catchment area
  - Regulations require consideration of seismic events in the design
  - Staff also considers slope stability and settlement in its evaluation of an impoundment

Comments from UWG web page

- Non-Operational Status
  - NRC focus is on safety of operations
  - NRC has observed conventional mills in non-operational status
  - Licensee still required to follow regulations and license conditions

Comments from UWG web page

- Monitoring around mill facilities
  - Collection of baseline data for at least one year prior to construction required by 10 CFR Part 40, Appendix A, Criterion 7
  - Soil, ground water, air, vegetation
  - Monitoring continues during operations

Comments from UWG web page

- Tailings Cleanup levels
  - Limit radon flux to 20 pCi/m2s per criterion 6
  - Radium cleanup levels: 5pCi/g of Ra-226 in upper 15 cm of soil and 15 pCi/g of Ra-226 in lower 15 cm of soil

OVERVIEW OF NRC'S PROCESS FOR AMENDING VIRGINIA'S AGREEMENT

Duncan White
Division of Materials Safety and State Agreements
Office of Federal and State Materials and
Environmental Management Programs
August 2, 2012

What Radioactive Materials Does Virginia Regulate?

- Virginia has assumed regulatory authority over the following combination of the categories:
  - Radioactive materials as defined in Section 11e of the Act.
    - Byproduct (11e1)
    - NARM (11e3)
    - Discrete Sources (11e4)
  - Source materials
  - Special nuclear materials in quantities not sufficient to form a critical mass
- To assume authority over Section 11e2 materials (mill tailings), the Commonwealth will need to amend its Agreement with NRC
- Few Agreement States have 11e2 authority
  - Four active uranium mill programs (CO, TX, UT, and WA)

Unique Aspects of 11e2 Agreements

- Federal Legislation
  - Additional requirements in Section 274o of Atomic Energy Act
  - Applicable requirements of the Uranium Mill Tailings Radiation Control Act (UMTRCA)
- State laws must authorize the regulation of uranium and thorium recovery facilities including:
  - Disposal of mill tailings including financial arrangements
  - Hearing requirements
  - Written environmental assessments
  - Termination requirements
  - Reservation of authority to NRC under UMTRCA
- State Regulations
  - Equivalent to Part 40, Part 40 Appendix A, 10 CFR 150.31 and 10 CFR 150.32
- Staffing – additional expertise needed due to the complexity of the licenses to address unique requirements of the licensing and inspection of 11e2 material

Agreement State Procedure, SA-700 "Processing an Agreement"

- Provides guidance on information to include in request to amend the 274b Agreement
- Same overall process used when amending an agreement, including time line and key stages in the processing
- Provides guidance to NRC staff
  - Formal procedural steps for responding to a Governor's request for an Agreement or Amendment
  - Criteria for evaluating Commonwealth's proposed Agreement materials program,
- http://nrc-stp.ornl.gov/procedures/sa700.pdf

Initial Steps

- Governor's Letter of Intent
  - Shows State's commitment to Amending Agreement
- State Actions Prior to Submittal of Draft Application
  - Legislation adopted
  - Compatible Regulations issued
  - Hiring and Training of Staff
  - Funding for Program
  - Program Procedures in place

Key Stages in Formal Process

- Submit Draft Application for NRC Review
- Address NRC Comments
- Submit Formal Application from Governor
- Publish Application in *Federal Register* for Public Comment for Four Consecutive Weeks
- NRC Staff prepares Comment Resolution, Analysis and Recommendations on Application to Commission
- Commission Approves Amended Agreement
- Effective Date of Agreement

Critical Issues for Processing an Amendment

- Commonwealth funds program start-up and implementation
  - NRC only funds formal training
- Overall process likely to take 3 years
  - Utah took 2.5 years, most staff already in place
  - Formal process takes one year
- Seamless transition from NRC to Commonwealth
- NRC will not sign Agreement until all aspects of uranium mill program is in place

Integrated Materials Performance Evaluation Program (IMPEP)

- Process NRC follows to evaluate performance of Agreement State programs
- Process and evaluation criteria outlined in Management Directive 5.6 and various FSME Procedures
- Review conducted every 4 years
- Review conducted by NRC and Agreement State technical staff
- Senior management review and approval of program evaluation done at a public meeting
- Reports and procedures are public documents: http://nrc-stp.ornl.gov/

Questions?

http://hitchhikersguidetotheoutdoors.wordpress.com/tag/virginia/ - accessed 3/16/12