



OVERVIEW OF URANIUM RECOVERY ACTIVITIES

NMA/NRC Uranium Recovery Workshop

Robert A. Nelson, Chief
Uranium Processing Section, NRC

May 18, 2004

May 2004

1

SIGNIFICANT ACCOMPLISHMENTS SINCE LAST WORKSHOP

- Issued Standard Review Plans
 - NUREG-1569
 - NUREG-1620, Rev. 1
- Commission approved staff recommendations on deferring ground-water regulation at ISLs (SECY-03-0186)
- Issued draft Regulatory Issues Summary (RIS) 2004-02

May 2004

2

SIGNIFICANT ACCOMPLISHMENTS SINCE LAST WORKSHOP Contd.

- Closed over 50 licensing actions
- Closed 2 of our 5 oldest cases
- Resolution of disposal of Fernald waste at Envirocare
- Completed all licensing actions for Utah licensees
- Downloaded & prepared files for transfer to Utah

May 2004

3

ONGOING/PLANNED ACTIVITIES

- Final version of RIS 2004-02
- Revision to UR Non-Common Performance Indicators for IMPEP
- Hearing regarding HRI license
- Pore volume study
- Licensing reviews
- Title I reviews

May 2004

4

CHALLENGES

- Responding to budget pressure
- Maintaining adequate technical expertise
- Retaining a surge capacity



NRC Activities for Controlling the Disposition of Solid Materials

**Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission**

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Range of Solid Material

- No radioactivity, or very small amount, from licensed operations
 - No, or limited, contact with radioactive materials
- Appreciable amounts of radioactivity
 - Kept separate
 - Licensed disposal

2

Current Approach

- Case-by-case review
- Radiation survey
- Release, if guidelines are met

3

NRC Goal: Protection of Public Health and Safety

- Review existing approach
 - Existing approach protects public health
 - Improve to make more consistent
- Evaluate alternatives
 - Invite public input
 - Rulemaking and NEPA processes

4

Preliminary Alternatives

- Allow release to any disposition path after a radiation survey confirms that release criterion has been met
- Limit disposition pathways
 - Restrict to EPA regulated landfill disposal
 - Conditional uses of material (i.e. roadbeds, reuse of tools)
 - Case-by-case requests by licensees
- Disposal in licensed LLW disposal site

5

Information Gathering

- Stakeholders:
 - Metals and cement industries; citizen groups and individuals; licensees; Federal/State/local agencies; Tribal governments; scientific organizations; solid waste industry
- National Academies Study
 - 3 information gathering meetings open to the public – 2001
- May 21-22, 2003 workshop
- September 10, 2003 public meeting with NEI

6

Technical Information

- **Technical studies**
 - Modeling could be based on NUREG-1640, which has undergone peer review and public comment
 - NUREG-1640 contains values for some media and various landfills
- **Input from scientific organizations**
 - 1 mrem/yr criterion is protective of health and safety according to NCRP, ICRP, NAS, ANSI
- **Input from international efforts**
 - IAEA's draft DS-161, which promotes general clearance for unrestricted uses, could promote trade consistency

7

Information Gathered

- **Diverse views on unrestricted use**
 - Health considerations
 - Economic issues
- **Restricted Uses**
 - Questions about applying and/or enforcing generically
 - NRC could outline process
- **Landfill disposal**
 - Siting, modeling, costs, regulatory authority
 - Conditions on releases

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Public Comments

- **Scoping Summary Report** - contains a concise summary of the public comments received regarding the alternatives and environmental impacts the GEIS should address
- **NUREG/CR-6682, Supplement 1** ("Summary and Categorization of Public Comments on Controlling the Disposition of Solid Materials") - provides a digest of the public comment letters and e-mails (over 2,600) received

9

Current Actions

- Rule Language development
- Statement of Considerations preparation
- Generic Environmental Impact Statement development
- Regulatory Analysis development
- Regulatory Guidance preparation

10

Rulemaking Website and Contacts

- Website: www.nrc.gov/materials.html (under “Key Topics,” link to “Controlling the Disposition of Solid Materials”)
- Frank Cardile, Lead Project Manager for Rulemaking
 - (301) 415-6185
 - FPC@nrc.gov
- Phyllis Sobel, Lead Project Manager for GEIS
 - (301) 415-6714
 - PAS@nrc.gov
- Charlotte Abrams
 - (301) 415-7293
 - CEA2@nrc.gov

Overview UR Inspections Activities

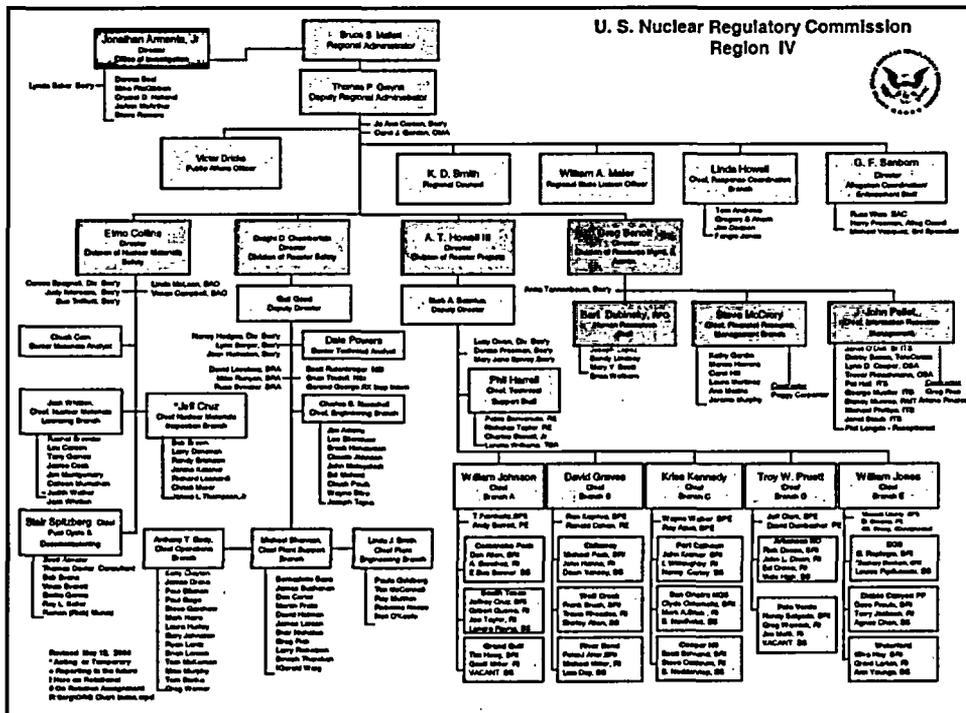
Denver, CO
May 18-19, 2004



Jack E. Whitten, Chief

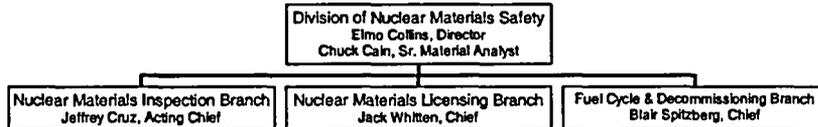
Nuclear Materials Licensing Branch, DNMS-RIV

JEW1@NRC.GOV (817) 860-8197



DNMS ORGANIZATION: NMLB

ORGANIZATION CHART: DIVISION OF NUCLEAR MATERIALS SAFETY



Outline

- Inspection planning process
- Focus of inspections
- Types of inspections
- Recent inspection findings

Focus of Inspections

risk informed, performance based, compliance based

Inspections focus on risk significant activities such as:

- **Yellowcake Dryer Operations**
- **Decommissioning & Reclamation**
 - Focus on facility demolition & dismantlement
 - Tailings & Pond Construction & Maintenance
- **Routine Operations**
- **11e.(2) Disposal**

§ 40§.36 Financial assurance and recordkeeping for decommissioning

- Except for licenses authorizing the receipt, possession, and use of source material for uranium or thorium milling, or byproduct material at sites formerly associated with such milling, for which financial assurance requirements are set forth in appendix A of this part, criteria for providing financial assurance for decommissioning are as follows:
- (f) Each person licensed under this part shall keep records of information important to the decommissioning of a facility in an identified location until the site is released for unrestricted use. Information the Commission considers important to decommissioning consists of--

§ 40§.36 Financial assurance and recordkeeping for decommissioning

- (1) Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records must include any known information on identification of involved nuclides, quantities, forms, and concentrations.

Overall

- We noted good cooperation from licensees.
- Licensees have been prepared for inspections.
- Problems identified have been few and effectively corrected.
- Licensee management has been supportive of their staff to implement quality programs.

The National Mining Association's White Paper Regarding the *Direct Disposal* of Non-11e.(2) Materials at Licensed 11e.(2) Disposal Facilities

Prepared for National Mining Association/Nuclear Regulatory
Commission Conference (Denver, Colorado)

Prepared by:
Anthony J. Thompson, Esq.
Christopher S. Pugsley, Esq.
Law Offices Of Anthony J. Thompson, P.C.



Introduction

- **Commission Strategic Re-Baselining Initiative (SARI):**
 - There are large quantities of uranium and thorium-contaminated with characteristics *similar* to those of mill tailings, it may be cost-effective to dispose of such waste at existing mill tailings sites



NMA/FCFF Response

- Joint NMA/FCFF White Paper on *Direct Disposal of Non-11e.(2) Materials*
- Submitted to NRC In May, 2004
- Copies Submitted to Environmental Protection Agency (EPA) and Department of Energy (DOE) for Review



Non-11e.(2) White Paper Approach

- **NMA/FCFF White Paper Discusses:**
 - History of Low Level Radioactive Waste (LLRW) Disposal
 - Low Level Waste Policy Act & Amendments
 - Regulatory Programs
 - Regional Compacts
 - UMTRCA (Part 40)
 - 10 CFR Part 61
 - Nuclear Regulatory Commission Guidance
 - Pre-1995 Guidance
 - 1995 Guidance
 - NMA 1998 White Paper
 - Recent Developments



Non-11e.(2) White Paper Approach

- **NMA/FCFF White Paper Discusses:**
 - **NRC/EPA Generic Uranium Milling Assessments**
 - NRC Generic Environmental Impact Statement (GEIS)
 - EPA Final Environmental Impact Statement (FEIS)
 - **Potential Site-Specific Issues**
 - Groundwater
 - Transportation
 - Stockpiling
 - Performance-Based License Conditions
 - **Candidate Materials for *Direct Disposal***



Non-11e.(2) White Paper Topics

- **History of LLRW Disposal**
 - **Low Level Waste Policy Act & Amendments**
 - Facilitate Development of Regional Compact Disposal Sites
 - Failed to Develop Any Disposal Sites
 - **10 CFR Part 61**
 - Definitions of LLRW



Non-11e.(2) White Paper Topics

- **Regulatory Programs:**

- **Regional Compacts (LLRW)**
 - LLRW Disposal Facilities for "In-State" Waste
 - Utilize Existing Facilities and New Sites
- **10 CFR Part 61 (LLRW)**
 - 100 Year Active Maintenance (Institutional Controls)
 - 500 Year Class "C"
- **UMTRCA (11e.(2) Byproduct Material)**
 - Passive Controls
 - 200-1,000 Year Closure Period



Non-11e.(2) White Paper Topics

- **NRC Regulatory Guidance**

- **Pre-1995 Guidance**
 - Response to Licensee Requests for Direct Disposal
 - Requests Include Wide Range of Materials
 - Wastes From De-Watering Underground Mines
 - Side-Stream or Secondary Process Wastes
 - Formerly Utilized Site Remedial Action Plan (FUSRAP) Wastes
 - NORM or TENORM



Non-11e.(2) White Paper Topics

- **NRC Regulatory Guidance**

- **1995 Direct Disposal Guidance Includes Numerous Requirements Such As:**

- Licensing Under Part 40
- NO RCRA or EPA-Regulated Waste
- Special Nuclear and 11e.(1) Byproduct Material Only With Compelling Reasons
- Concurrence from DOE and/or Resident State



Non-11e.(2) White Paper Topics

- **NRC Generic Uranium Milling Site Assessment (GEIS):**

- **Evaluates Various Factors at Uranium Milling (11e.(2) Disposal) Sites:**

- Radionuclide Concentrations
- Design Criteria
- Surface Stabilization
- Groundwater
- Other Potential Environmental Impacts



Non-11e.(2) White Paper Topics

- **EPA Generic Uranium Milling Site Assessment (FEIS):**

- Evaluates Factors Similar to Those in The NRC GEIS
- Provides Technical Bases for UMTRCA-Mandated EPA Generally Applicable Standards for 11e.(2) Facilities



Non-11e.(2) White Paper Topics

- **Potential Site-Specific Issues:**

- Groundwater Impacts
 - Site-Specific Geologic and Hydrogeologic Assessment
- Transportation
 - Transport Containers
 - Occupational Exposure
- Stockpiling
 - Windblown Constituents
- Performance-Based License Condition
 - Viability at NRC



Non-11e.(2) White Paper Topics

- **Ultimate Goals:**
- **Propose Generic Waste Acceptance Criteria for Categories of Candidate Materials**
- **Develop Practical Assumptions on Which Licensees May Base *Direct Disposal* License Amendment Request(s) Without Additional Site-Specific Modeling**



Candidate Materials

- **Practical “Upper Bound” Radionuclide Activity Assumption:**
 - Waste Materials Based on an Assumption of 1% U3O8 “High-Quality” Uranium Ore (see GEIS p. A. 12-13)
 - 93% Recovery Efficiency of Uranium
 - Licensed or Licensable Disposal Capacity



Candidate Materials

- **Source Material:**
 - **Wastes Contaminated with Natural Uranium/Thorium**
 - Mineral Processing and FUSRAP Wastes
 - AEA Materials
 - **Wastes Contaminated with Depleted Uranium**
 - DOE and Private Licensee Stockpiles
 - AEA Materials



Candidate Materials

- **Wastes Containing Special Nuclear Material:**
 - **Fuel Cycle Facility Wastes/Stockpiles**
 - LEU Contaminated Materials
 - **Transportation**
 - No Criticality Issues
 - Transport Containers
 - **Emplacement & Long-Term Disposal**
 - No Criticality Issues
 - Solubility (Potential Migration)
 - Low Radium and Low Radon Emissions



Candidate Materials

- **NORM/TENORM:**
 - Mining and Mineral Process Wastes
 - EPA and CRCPD Agree 11e.(2) Impoundments Should Be Viable Disposition Pathways
 - Radium Primary Constituent of Concern



Candidate Materials

- **Low Activity Mixed Wastes (LAMW):**
 - Contain Both Radiological and Non-Radiological (Hazardous Constituents)
 - Potential Dual or Overlapping Jurisdiction Concerns
 - NRC Radiological
 - EPA Non-Radiological
 - Hazardous Constituents Anticipated in 11e.(2) Byproduct Material
 - 10 CFR Part 40, Appendix A, Criterion 13



Fundamental Conclusions

- Existing Jurisdictional/Political “Hurdles” Should Not Be an Impediment to Direct Disposal
 - Disposition Pathways Should Be Based on Risk and Not Jurisdictional/Political Obstacles
- Many Candidate Waste Streams Are *Similar* to 11e.(2) Byproduct Material
- Let The Regulatory “Marketplace” Dictate Final Disposition Pathway for Non-11e.(2) Materials



Practical Implications

- **EPA’s Recent Advanced Notice of Public Rulemaking (ANPR):**
 - Implement an Integrated Approach to Disposal of LAMW and Low Activity Radioactive Waste (LARW)
 - Develop Waste Activity Assumptions for Disposition Pathways



EPA ANPR Disposition Pathways

- RCRA Subtitle D Facilities
- RCRA Subtitle C Facilities
- Low-Level Waste Disposal Facilities (Part 61)
- 11e.(2) Disposal Facilities



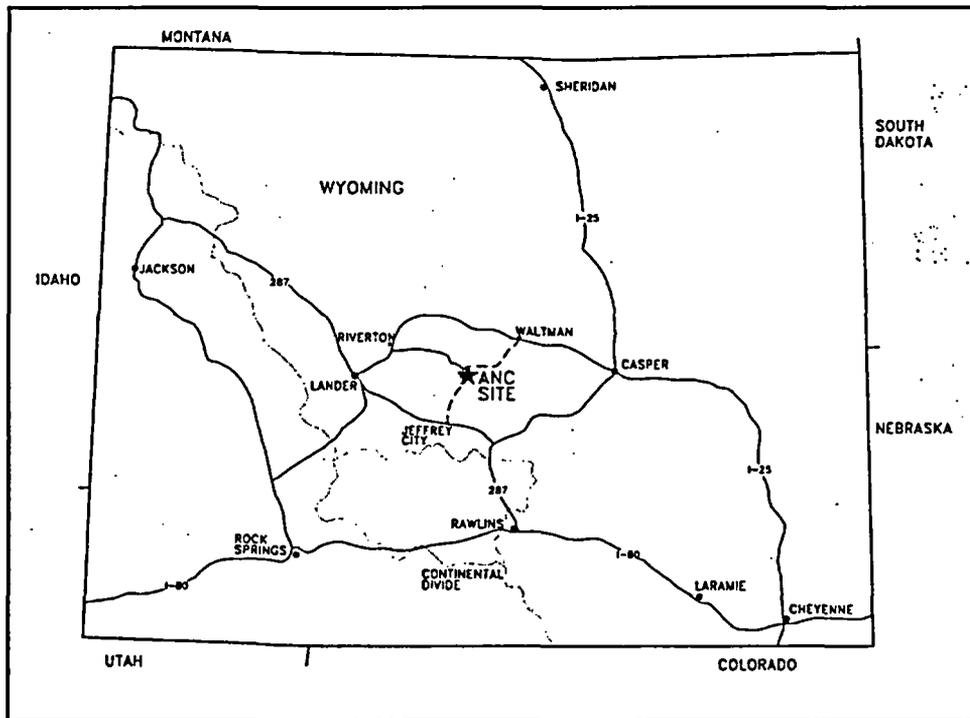
Conclusion

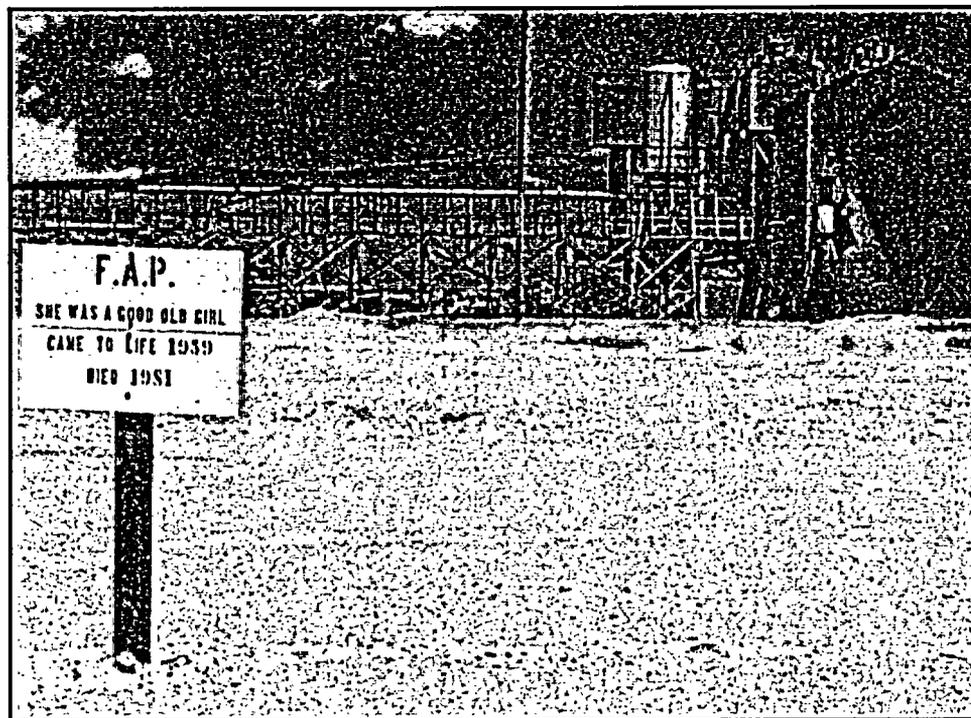
- NMA/FCFF Submit That NRC and EPA Should Support a Coordinated Approach to *Allowing* 11e.(2) Disposal Facilities to Be a Viable Disposition Pathway for Non-11e.(2) Waste Materials

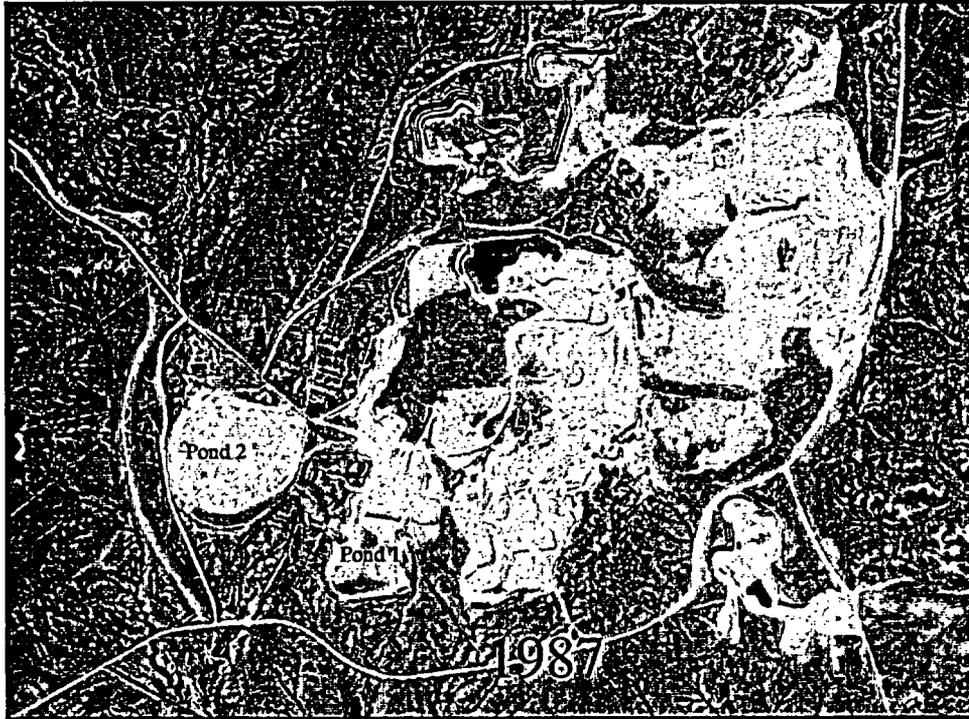


STATUS REPORT
AMERICAN NUCLEAR PROJECT
GAS HILLS - WYOMING

Mark Moxley
Wyoming DEQ-LQD
May 18, 2004



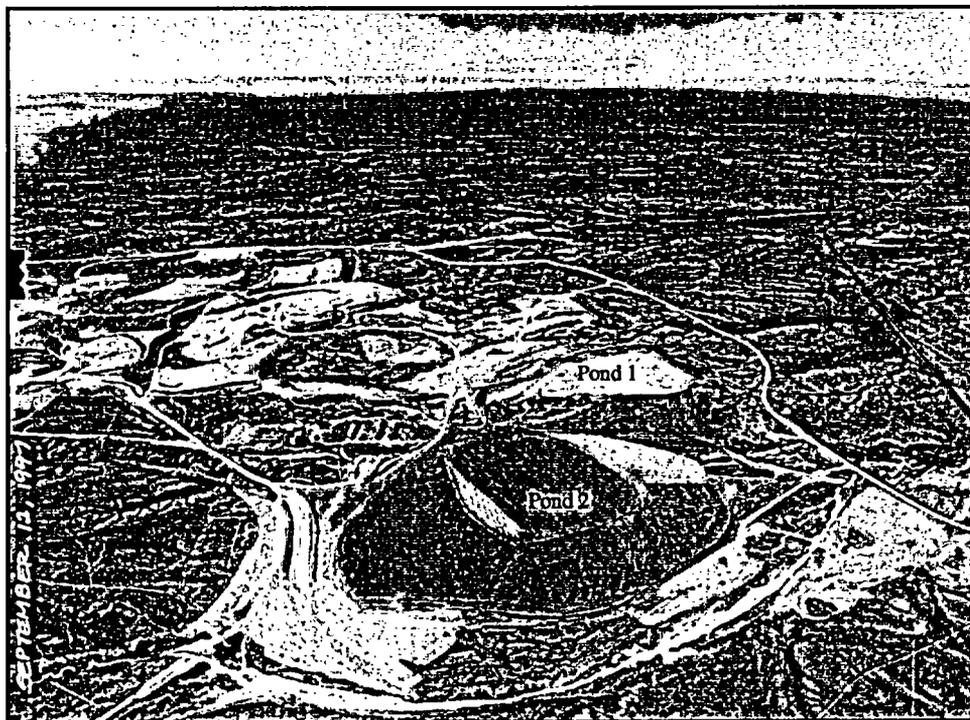
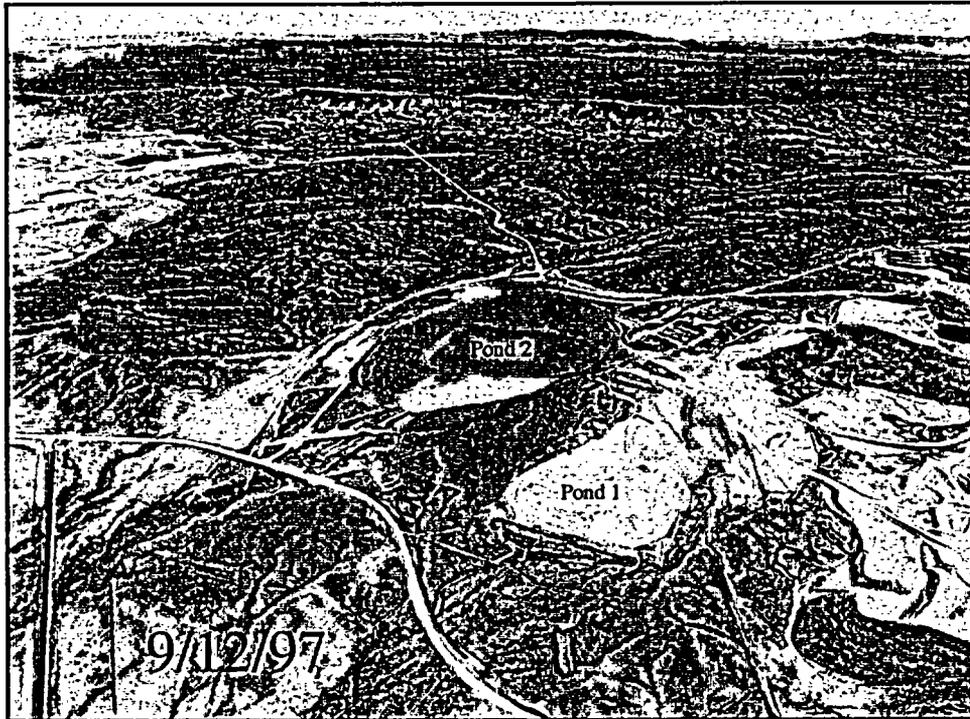


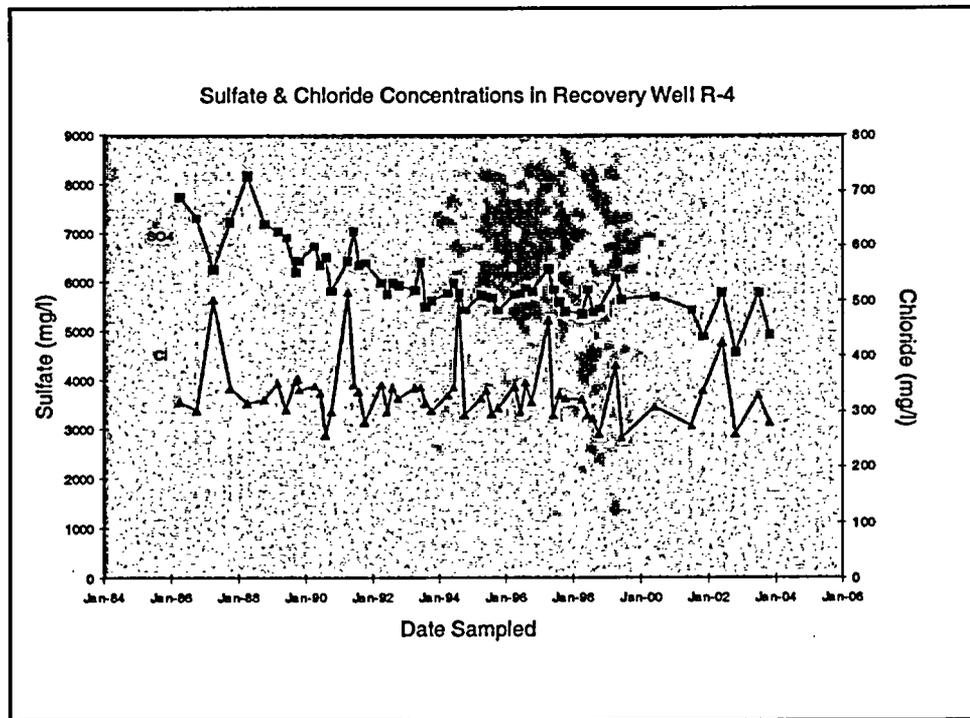
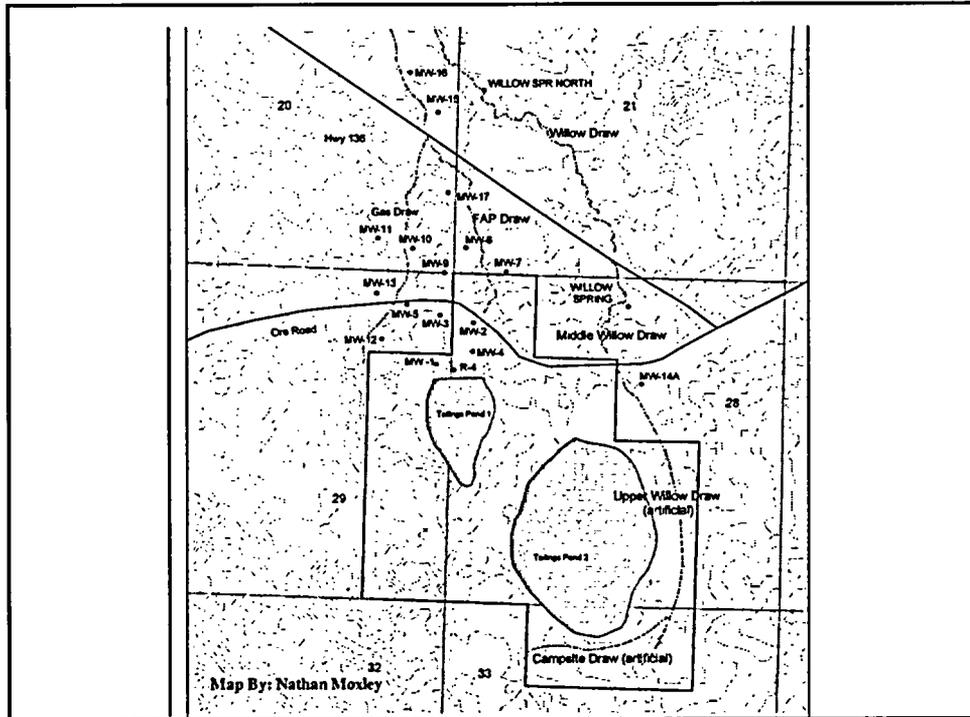


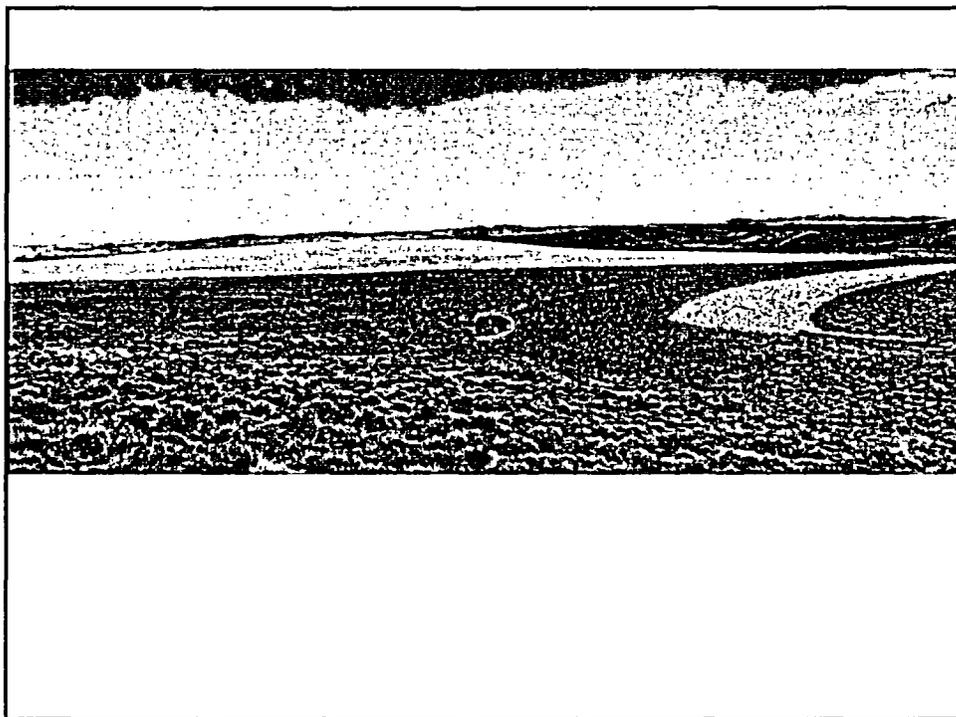
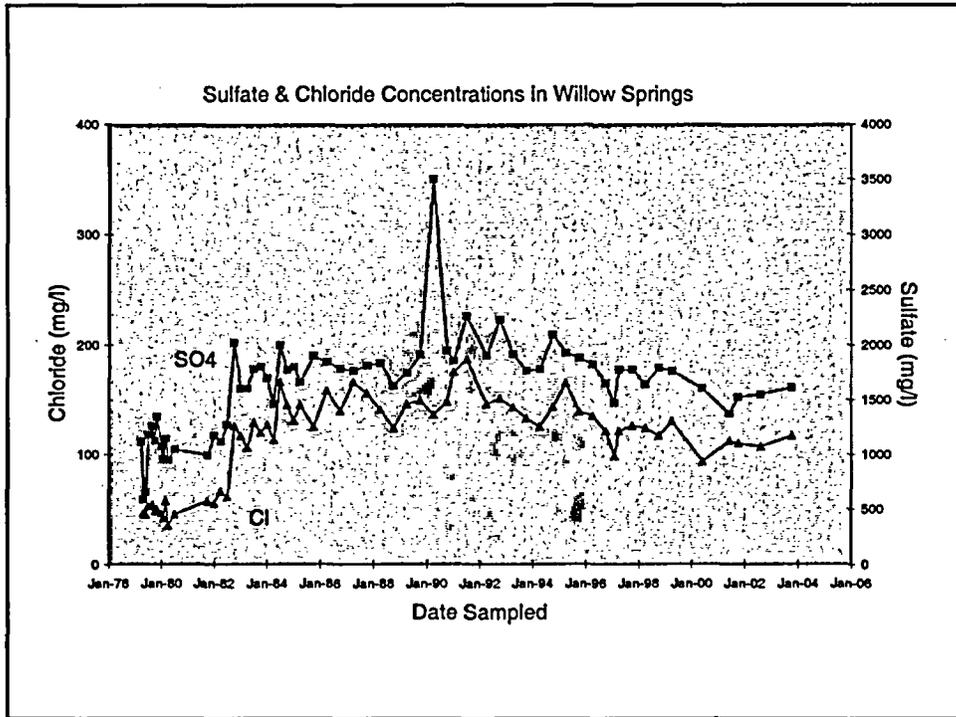
WDEQ - ANC PROJECT FUNDING SUMMARY

Total Bond / Financial Assurance	3,242
Surety	865
CD's	150
GNMA's	2,183
LOC	25
Total Bond Collected	3,242
Other Funding: ANC Title X	388
DEQ Title X	1,228
Total Receipts to Date	4,858
Total Expenditures to Date	3,530
Current Balance Available	1,328

All \$ in Thousands







**AN UPDATE ON THE WYOMING DEQ
AMERICAN NUCLEAR TAILINGS RECLAMATION PROJECT**
Presented by: Mark Moxley, WDEQ-LQD District Supervisor
May 18, 2004

Site History

The American Nuclear Corporation (ANC) uranium mill tailings site (formerly operated by Federal-American Partners) is located in the Gas Hills, approximately 45 miles east of Riverton, Wyoming. The ANC site consists of two uranium tailings piles; Pond #1 which is approximately 40 acres in size, and Pond #2 which is approximately 80 acres in size, and the adjoining millsite. In addition, ANC was also responsible for the cleanup of the nearby Bullrush heap leach site which was operated in the 1960's by Western Nuclear, Inc. The property on which the heap was located was acquired by Federal-American Partners (FAP), and subsequently transferred to ANC.

The FAP/ANC tailings are "co-mingled" (mixed private and federal tailings) and therefore the site closure work qualifies for reimbursement under Title X of the Energy Policy Act. Approximately 36.7 % of the mill's production was contracted to the Atomic Energy Commission, therefore the federal share of the ANC tailings is 36.7%. Much of the private production was contracted to the Tennessee Valley Authority (TVA).

The FAP/ANC mill, one of three in the Gas Hills, operated from 1960 through 1982. The Wyoming Environmental Quality Act was adopted in 1973, establishing the Wyoming Department of Environmental Quality (WDEQ). This act required the permitting and bonding of all mining operations, including associated milling operations. The FAP operations were issued a permit by WDEQ in 1975. Operations ceased in 1982. The permit was transferred to ANC in 1984 and they commenced closure activities. The Willow Springs Draw diversion was constructed to the east of tailings pile #2 in 1984. After the tailings ponds had dried, they were reshaped and an interim cover was placed on both tailings piles in 1988. The mill was decommissioned and the debris was buried on the south side of tailings pond #2 in 1989.

The U.S. Nuclear Regulatory Commission (NRC) approved ANC's tailings closure/reclamation plan in 1984. The reclamation bond, held by WDEQ, was based on this old NRC-approved plan which only provided for a vegetation cover over the tailings. The NRC requested that ANC reevaluate the 1984 closure plan based on its August, 1990 Staff Technical Position (STP). ANC submitted a revised plan in March, 1992. NRC responded with review comments in March, 1994, outlining numerous technical deficiencies in ANC's revised plan.

ANC notified WDEQ in May, 1994 that they lacked the funds to continue operating. ANC forfeited their reclamation performance bond in October, 1994. The WDEQ, Land Quality Division (LQD) assumed responsibility for designing and implementing a closure plan. All of the design and closure work must be funded with the forfeited reclamation performance bond, approximately \$3,200,000, plus DOE Title X reimbursements.

Status of American Nuclear Corporation

Following the forfeiture of the reclamation bond, ANC continued to operate on a limited basis. The one remaining corporate officer worked with WDEQ and the NRC to resolve a number of issues that have been critical to the success of the project. ANC owns the property on which the tailings and millsite are located and the company continues to pay the property taxes. ANC also holds the NRC license for the site (# SUA-667) which WDEQ did not want to assume. This could potentially expose the State to obligations above and beyond what could be covered by the available bond monies. It was therefore advantageous for the State for ANC to remain viable.

ANC was eligible for Title X reimbursements due to the fact that the company had incurred expenses for reclamation and monitoring at the site. ANC was agreeable to distributing most of these funds to WDEQ, unfortunately a contractual agreement with TVA required that TVA also receive a share of the funds. In the end, WDEQ received approximately \$388,000 from ANC's Title X reimbursements.

Redesign of the Reclamation Plan

The redesign of the ANC reclamation plan was primarily directed at responding to the NRC's letter of March 11, 1994 which outlined technical deficiencies in ANC's 1992 revised reclamation plan. ANC had submitted the revised reclamation plan in response to NRC's *8/90 Final Staff Technical Position on Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites*. The WDEQ's approach to the redesign was to work closely with NRC staff to insure that their concerns were integrated into the design.

LQD solicited proposals from consultants in April, 1995 to begin the process of revising the 1984 reclamation plan. A.V.I. Professional Corporation (AVI), in association with Shepherd Miller, Inc. (SMI), was awarded the contract to complete the necessary site investigation and design work. Before design work began, staff from NRC, LQD, ANC, AVI and SMI met to consider and agree on reasonable approaches for addressing NRC's technical concerns within the available budget.

The reclamation work at the ANC site was designed to be conducted in three phases due to several factors, including: overall funding constraints, the need to collect Title X monies, the need to achieve consolidation of the tailings "slimes" in Pond No.1, and the need to resolve groundwater issues. The three phases were designed as follows:

- Phase 1 - Cleanup and relocation of Bullrush Heap materials to tailings pond no.1.
- Phase 2 - Reclamation of Tailings Pond No.2.
- Phase 3 - Reclamation of Tailings Pond No.1.

The reclamation design for Phase I of the project (Bullrush Heap Cleanup) was submitted to NRC in August, 1995. This plan addressed the cleanup and relocation of the Bullrush Heap material to Tailings Pond No.1. Placement of this material, along with additional interim cover,

was designed to accelerate the consolidation of the tailings.

A preliminary reclamation design for Phases II (Pond #2) and III (Pond #1) was submitted to the NRC in November, 1995. NRC staff review identified concerns relative to the radiologic, geotechnical and erosion control elements of the plan. LQD's consultants subsequently conducted detailed analyses on soils, embankment stability, tailings settlement and cover stability, radon barrier design, flood analyses, and diversion designs and produced a site investigation report, reclamation designs, and cost analyses. These analyses were incorporated into the final design submitted to NRC in April, 1996. The revised plan made significant improvement on the old 1984 plan in terms of radon control and long-term erosional stability. Two rounds of revisions were submitted to NRC before the plan for tailings pond no.2 was finally approved in February, 1998 (three months after the reclamation of pond no.2 was completed). Areas not included in NRC's approval (groundwater, windblown tailings cleanup and pond no.1 reclamation) will be addressed in future submittals.

Description of the Work Completed To Date:

Phase I was initiated in October, 1995 and completed in January, 1996. The work consisted of relocating Bullrush Heap Leach material (approx. 125,000 CY) to Tailings Pond #1, placing interim cover (approx. 50,000 CY), and constructing interim drainage features. A final report for Phase I was submitted to NRC on March 8, 1996.

Phase II was initiated in June, 1996 and completed in October, 1997. The work consisted of the reclamation of Tailings Pond #2. A substantial portion of the windblown tailings (WBT) on the site were picked up and placed on the tailings. A minimum of 6 feet of compacted cover (approximately 1.2 million CY) was placed over the tailings. The required radon flux test (LAACC test) was performed prior to placement of rock cover. A total of 115 charcoal canisters were placed on the tailings cap. The measured radon flux was at or below 0.5 pCi/m²s for all but 9 of the canisters. The maximum measurement was 1.8 pCi/m²s. Following the completion of the LAACC test, the pond area (107 acres) was covered with 75,000 CY of rock. The Campsite Draw diversion was also constructed and revegetation work was completed around the perimeter of the tailings.

Groundwater monitoring has been on-going since WDEQ took over the project. The groundwater contamination at the site exists primarily in the shallow alluvial aquifer. The groundwater gradient is to the north northwest. There were 12 monitoring wells located north of the tailings when WDEQ took over the project. In addition, ANC has historically monitored a spring (Willow Spring) located approximately ½ mile north of tailings pond no.2. Data indicates that the contamination extends northward at least ½ mile, impacting most of the wells and Willow Spring. Most of the wells and the springs, still meet livestock water quality standards. WDEQ installed four additional wells in April, 2002 to better define the extent of the contamination.

The groundwater corrective action program consists of pumping from a groundwater recovery well (R-4) located at the downstream toe of the tailings dam on pond no.1. This well has been pumped since 1986. It is operated for 5-6 months annually and it pumps to a

sprinkler/evaporation system located on pond no.1. The well is controlled by a level switch so it pumps intermittently, cycling on and off at 5-7 minute intervals. A flow meter records the volume of water that is pumped. This has been between 300,000 to 400,000 gallons per season. Significant improvement has been noted in the quality of the water recovered from this well. A thorough evaluation of the groundwater will occur later this year and an ACL application will be submitted to NRC.

Phase III will consist of reclamation of Tailings Pond #1. This work is now projected for 2005. This delay is dictated by two main factors: the need to achieve settlement and consolidation of tailings slimes and the need to adequately characterize the groundwater regime and resolve groundwater contamination issues. It is now anticipated that final designs for Pond #1 reclamation will be submitted to the NRC in 2004.

Regulatory Authorizations:

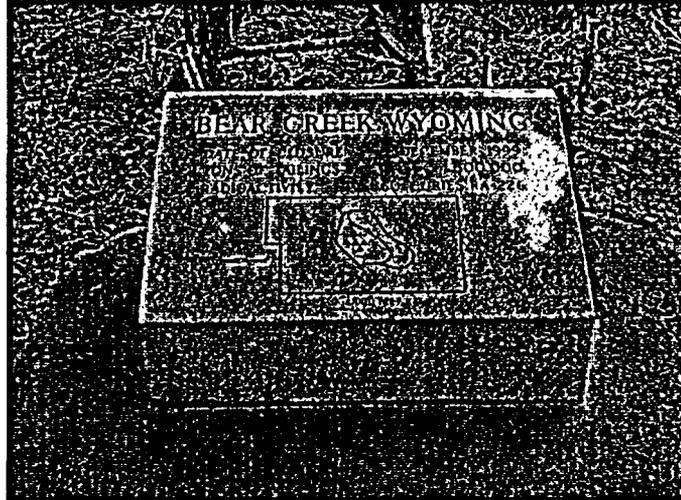
The WDEQ's reclamation work at the American Nuclear site is conducted pursuant to four primary regulatory authorizations:

- Wyoming Environmental Quality Act, W.S. § 35-11-403 (a)(iii).
- Wyoming DEQ-LQD Permit to Mine No. 352C, issued to ANC
- USNRC Source Material License No. SUA-667, issued to ANC
- USNRC Confirmatory Order for Reclamation of American Nuclear Corporation's Gas Hills, Wyoming Site, Docket No. 40-4492, issued to and accepted by WDEQ

The WDEQ has regulatory jurisdiction over the ANC site under the authority of the Wyoming Environmental Quality Act and Mine Permit #352C issued thereunder. The mine permit was issued on June 30, 1975 to Federal-American Partners, ANC's predecessor. WDEQ assumed the responsibility for reclamation of the site when ANC became insolvent and their reclamation bond was forfeited by the Wyoming Environmental Quality Council in 1994.

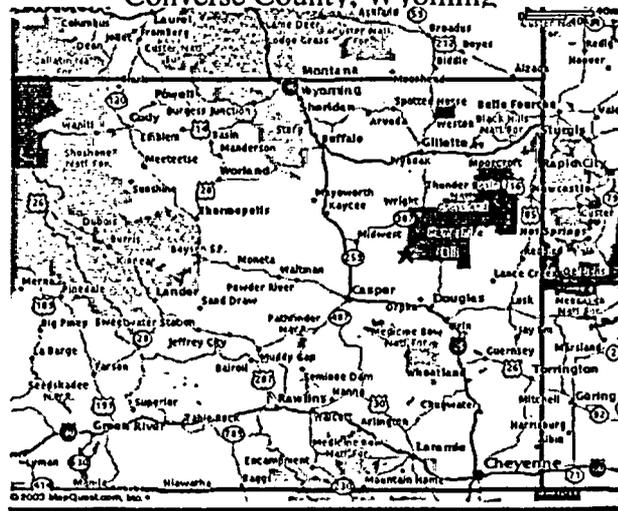
All of WDEQ's efforts and expenditures relative to the ANC project are directed at reclamation of the site. These expenses fall into three basic categories: DEQ Project Administration, Contract Design/Engineering and Contract Reclamation. The forfeited bond funds and DOE Title X reimbursements are the only sources of funding for the project. These funds are designated exclusively for reclamation purposes pursuant to W.S. § 35-11-24.

Ernie Scott
Manager Mining Operations
Anadarko Petroleum Corporation



Location

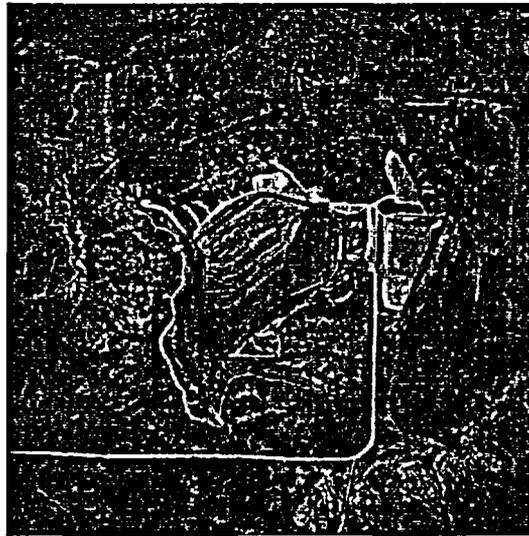
Converse County, Wyoming

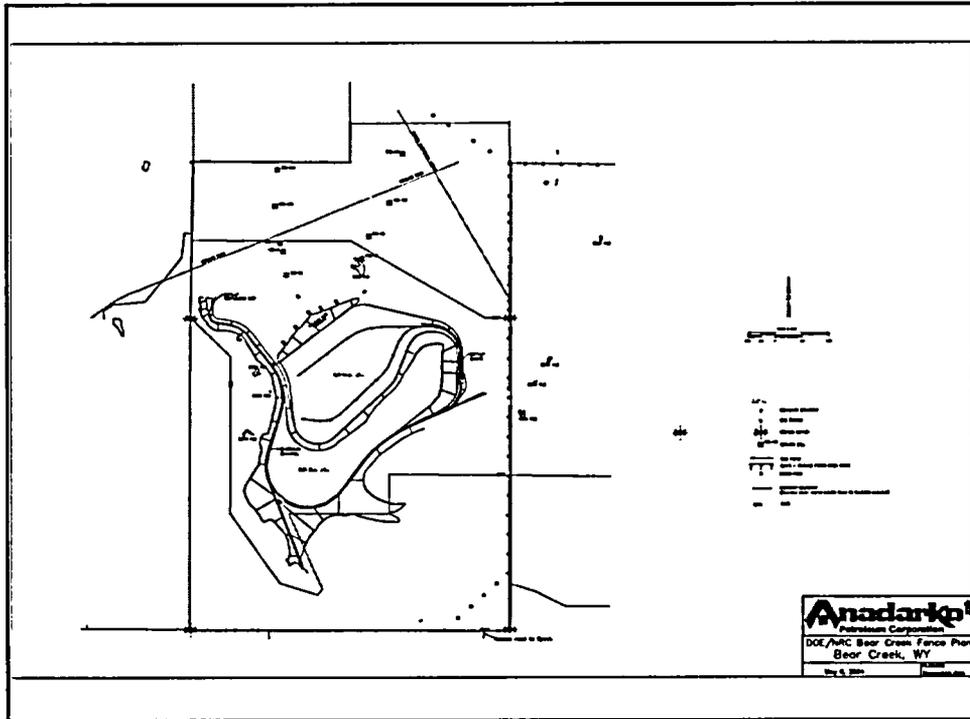


Site History

- Mine opened in 1976
- Mill operational in 1977
- Final mine reclamation started July 1985
- Five pits reclaimed
 - 35 million cubic yards of backfill
- Mine reclamation completed in 1988
- Tailings reclamation started in 1997
- Tailings reclamation completed in 1999
- Closure Cost \$48 million & counting

Tailings & Mill Area Fall 1999





Current Status

- Long-term care area 1000 acres in Section 9 & 16
- Section 9 ownership
 - BLM surface & minerals
 - 25 acres
 - Anadarko surface & minerals
 - Patented mill site claims
 - 95 acres
 - Purchased from Hardy Ranch
 - 240 acres

Current Status

- Section 16 ownership
 - Anadarko surface
 - 640 acres purchased at auction 2003
 - State of Wyoming minerals
 - coal lease held by Bear Creek Uranium
 - oil & gas lease held by Black Diamond Energy

Issues

- Acquisition of Section 16 mineral estate
 - Land swap proposal under consideration by State Lands staff
- ROW's/Easements
 - PacificCorp power line
 - Woods Petroleum natural gas pipeline
 - Qwest telephone line
- Reasonableness of ACE review

The Challenge

- Cooperative effort Operators-State-NRC-DOE & ACE
 - Common goal-expeditious transfer of safe environmentally sound site to DOE
- DOE must step up to the plate
 - Provide guidance to ACE
 - Identify areas where exceptions to ACE policy/procedure may be warranted
 - ROW's/Easements outside tailings cell
 - Monitor well water rights
 - Oil & gas leases ? Directional/horizontal drilling

Land Acquisition and Transfer Issues

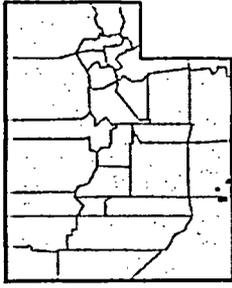
Rio Algom's Lisbon Uranium Mill Tailings Site

NMA/NRC Uranium Recovery Workshop
May 18-19, 2004
Denver, Colorado

Pat Winmill & Mike Malmquist
Parsons Behle & Latimer



Lisbon Uranium Mill Location Map



Moab,
Utah

Lisbon Mill
Tailings Site


Rio Algom Mining LLC
04-05-04

Lisbon Site History

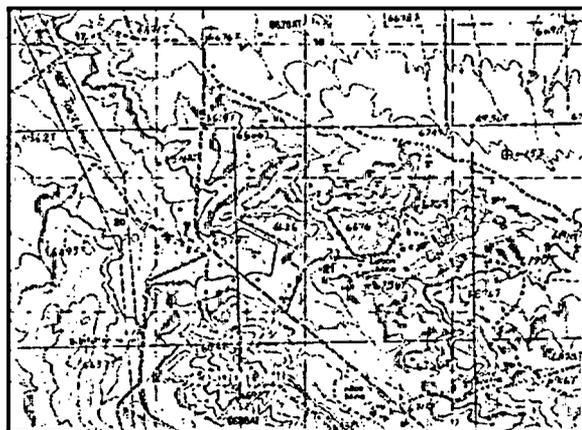
- The Lisbon mine and mill were developed by Rio Algom Limited, and subsequently transferred to Rio Algom Mining Company (RAM).
- The mine and mill operated from 1972 - 1984, with toll milling thereafter until 1988.
- The mill had an operating capacity of 750 tpd.
- During ops., mill employed 250 employees & processed over 18M lbs. of U3O8.
- The site has a significant plume of tailings seepage into the uppermost aquifer. The CAP has been active since 1990 & recovered 606 Mmgals of contaminated water.
- Tailings dewatering and capping was completed in 1995.
- The mill was demolished and disposed into the toe of the upper dam in 1996.
- NRC approved completion of site decommissioning in 2001.
- NRC approved RAM's ACL application, and termination of the CAP, in May of 2004.


Rio Algom Mining LLC
04-05-04

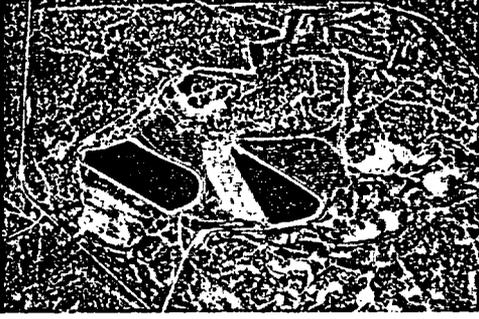
Lisbon Ownership History

- Site developed by Rio Algom Ltd.
- Site transferred from Rio Algom Limited to Rio Algom Mining (RAM) in 1989.
- RAM acquired by Biliiron in 2000.
- Biliiron was merged with BHP in July 2001, creating BHP Biliiron, the current owner.

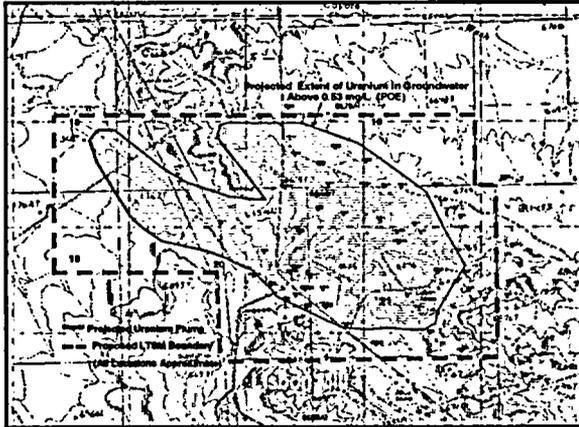

Rio Algom Mining LLC
04-05-04



Partially Reclaimed Site




Rio Algom Mining LLC
04-05-04



Identifying Interests & Finding Owners

- Company Land Records
- Preliminary Title Report — Identify ownership interests
- County/State Real Estate Tax Records — Name and address of current taxpayer



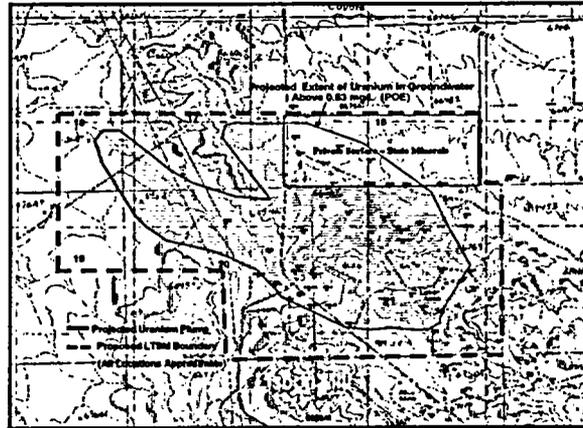
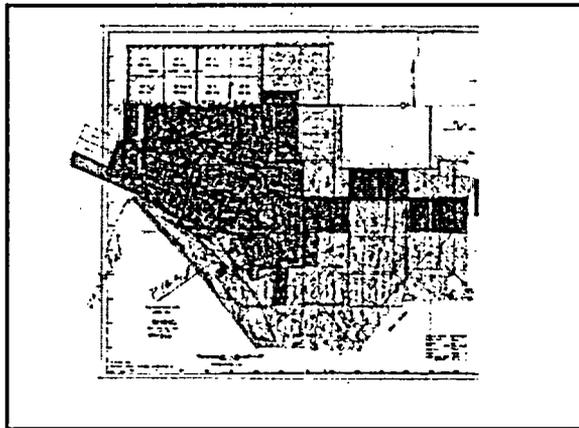
Company Land Records

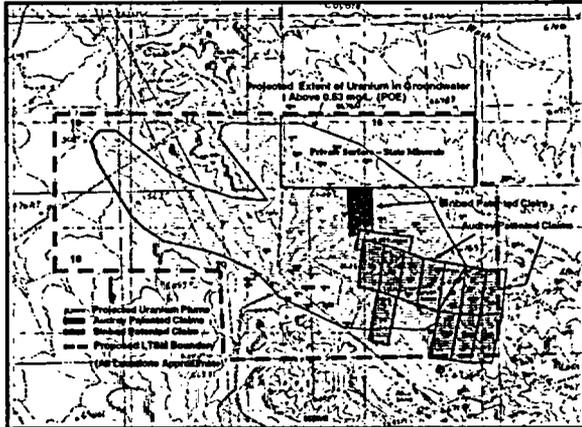
- Issues
 - Passage of Time
 - Changed Ownership/Institutional Memory
 - Focus on CAP and NRC Licensing Issues



Preliminary Title Report

- Issues
 - Accuracy
 - Doesn't give current addresses
 - Unrecorded interests





Audrey Patented Claims

- 1/4 Undivided Interest: Rio Algom
- 3/4 Undivided Interest: ? (Multiple Owners)



Sleuthing-

- Tax records
 - Interests not assessed
 - outdated
- Current resident at last known address
- A-1 Bank
- Lawyers listed on documents
- Probable family members from chain of title
- Internet Searches for Name

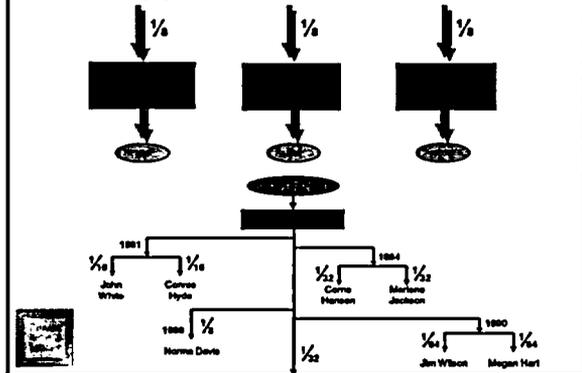


The Outstanding 3/4ths Interest Held by:

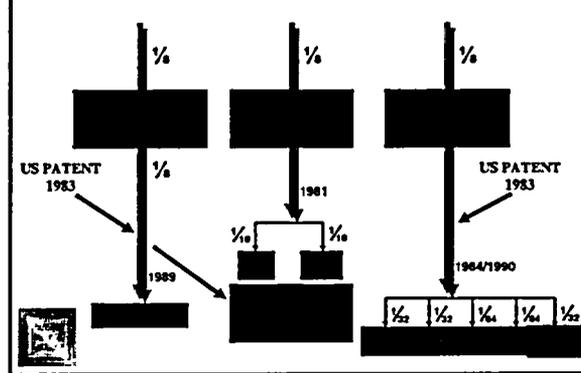
Mary White Trust	1/8th
Peter White	1/8th
Norma Davis Trust	1/8th
Dan Smith Trust	1/8th
Jan Blair	23/224ths
Jan Blair, Custodian	1/112th 1/112th
Jean Blair	1/112
Pat Blair	1/112
Jon Blair	1/112
Johanna Johnson	1/16th
David Johnson	1/112th



Apparent Chain of Title



Result Of Curative Deeds



Probates

- Norma Davis 1/8th interest
 - Died 5 years ago, a will but no Utah probate; two surviving sons (1/16th interest each)
- Jim Wilson 1/64th interest
 - No will; family trust, but did not include this asset; surviving spouse
- John White 1/16th Interest
 - No will; surviving spouse
- Megan Hart 1/64th interest
 - Died in Canada 2 years ago, a will but no Utah probate; residuary clause naming 3 surviving children (1/192nd interest each)



Community Property Issues

- Owners in Texas, Wisconsin and California, and Idaho
- Legal Analysis
 - Conflict of Laws -- Situs of Property or Domicile?
 - Marital or Separate Property?
- Avoided by Asking Spouses to Sign



Documenting the Transactions

- 25 Letters Offering to Purchase, explaining
 - 9 trust problems
 - 6 probate problems
 - 8 community property problems
- 25 Purchase and Sale Agreements
- 22 Deeds
- 22 Checks
- 22 closings



Time Line

- 6/03 Began property analysis
- 7/03 Requested additional documents from title company
- 8/03 Received additional documents
- 9/03 Formulated the offer and drafted Offer Letters & Purchase and Sale Agreements
- 10/03 to 11/03 Tracked down missing owners and contacted A-1
- 12/03 Offer Letters Sent



Time Line Continued

- 1/04 to 2/04 Tracked down more missing owners; one probate finished
- 11/03 to 3/04 getting A-1 curative deed
- 3/04 3 Closings
- 4/04 14 Closings
- 5/04 2 Closings; 3 probates pending



Outstanding Issues

- Small Defects
 - Potential claimants of small fractional interests
 - No addresses
 - Common names
 - Age of documents suggests claimants may be deceased



Obtaining 3rd Party Interests

- Concerns:
 - Interest holders might refuse to sell and/or demand exorbitant price
 - RAM has no clear condemnation authority
 - Protracted negotiation -- delay
 - If RAM couldn't acquire, DOE might question RAM's "serious efforts"
 - Transfer could be indefinitely delayed



"Offer Letter" Approach

- Provide Detailed Information:
 - Regulatory status of site
 - Tailings and plume, and potential liability
 - Possibility of Federal condemnation
 - Lack of economic reserves
- Credibility



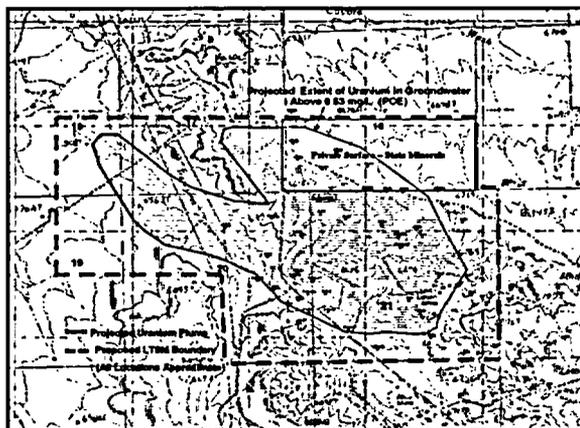
"Offer Letter" Approach

- Inducements:
 - Generous offering price & terms
 - Full indemnity
 - Specter of federal condemnation (lower price) or Licensee status
 - Limited-time offer



"Offer Letter" Approach

- Keep NRC & DOE in Loop
- Obtain Pre-review of Offer Letters
- Provide Copy of Offer Letters
- Demonstrate "Serious Efforts"



State-owned Mineral Estate (So. ½ Sec. 16)

- School & Institutional Trust Lands Administration – Ongoing Negotiation
- Factors:
 - Area does not contain tailings (plume only)
 - Good evidence (drill logs) of non-mineral character
 - Oil & gas potential, if any, is deep (10,000'±)
 - Utah Law:

"Except as otherwise prohibited by the Jones Act of January 25, 1927, 43 U.S.C. Sections 870-871, mineral interests in trust lands may be exchanged for mineral interests of comparable value or otherwise disposed of, if their retention would create a liability exceeding their value."





Alternate Concentration Limits - Status

William vonTill

Senior Project Manager/Hydrogeologist

Office of Nuclear Material Safety and Safeguards
Division of Fuel Cycle Safety and Safeguards
Fuel Cycle Facilities Branch
Uranium Processing Section

May 2004

1

ALTERNATE CONCENTRATION LIMITS

REGULATORY FRAMEWORK:

10 CFR Part 40, Appendix A, Criterion 5B6

Licensee can submit ACLs that present no significant hazard and must provide the basis for any proposed limits including consideration of practicable corrective actions, that limits are as low as reasonably achievable, and information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded.

May 2004

2

NRC Guidance:

NRC Guidance used for ACL reviews: NUREG-1620 Section 4.3 and appendix K (4.4.3. for models)

Point of Compliance

Point of Exposure

Risk informed/Risk based

NEPA Evaluation - Environmental Assessment - State/Indian Tribe consultation

May 2004

3

ACL Applications - Approved

- Arco Bluewater
- Exxon
- Bear Creek
- Petrotomics
- L-Bar
- Umetco
- Pathfinder Lucky Mc
- Rio Algom – Lisbon (Pending)
- Title I sites - Canonsburg, Old Rifle

May 2004

4

ACL Applications

Under NRC Review:

- WNI Split Rock - Land acquisition and institutional control issues
- PMC - Shirley Basin - Surface water issues
State/EPA/F & W Comments
- Rio Algom - Ambrosia Lake - Review by NRC contractor - Exposure assessment issues
- Title I sites - New Rifle - Non-human potential impact issues

May 2004

5

Lessons Learned

- Characterize contamination fully
- State/EPA/Indian Tribe issues
- Impact to surface waters
- Models - Calibration, account for uncertainty, send input files
- Post-remediation monitoring program
- Off-site contamination
- Water rights, mineral rights, land ownership

May 2004

6

Site Review Status - Issues

- Split Rock Site: Status
 - Off-site contamination
 - “good faith” effort to acquire land
 - Licensee supplemental modeling
 - Comments from the Wyoming DEQ
 - Comments from the DOE
 - WNI attempting to acquire land or institutional controls
 - Staff drafting environmental assessment. Land issues need resolution first.

May 2004

7

Site Review Status - Issues (Contd.)

- Pathfinder Mines Shirley Basin Site: Status
 - Groundwater seepage into surface water
 - Comments from EPA/State/ Fish & Wildlife on potential surface water impacts
 - Stream survey to assess risk to water quality and non-human life
 - Long-term surface water monitoring after groundwater pumping ceases
 - Resolve comments from EPA/State/ Fish & Wildlife
 - Final Environmental Assessment

May 2004

8

Site Review Status - Issues (Contd.)

- Rio Algom Ambrosia Lake Site: Status
 - Review by NRC contractor
 - Complicated site characteristics
 - State issues
 - Other sources of contamination (background)
 - Modeling issues

May 2004

9

Other Sites with Groundwater Issues

- UNC Churchrock
 - Superfund site - EPA
 - State and Navajo involvement
 - Off-site contamination
 - Potential institutional controls
- Homestake
 - Superfund site - EPA - State involvement
 - Complex hydrogeology - multiple aquifers
 - Comprehensive active corrective action on-going
 - Alternate water supply

May 2004

10

Other Groundwater Sites

- Sequoyah Fuels Site
 - Transfer to 11.e(2) site (UMTRCA)
 - Complex hydrogeology - multiple aquifers
 - Groundwater monitoring plan- Reclamation Plan - GW Corrective action plan (interim groundwater recovery on-going)
 - Issues with Cherokee Nation and State
 - EPA involvement

May 2004

11

Other Sites with Groundwater Issues (contd.)

- Riverton Title I site - Natural flushing
 - Indian Tribe issues with institutional controls and alternate water supply
 - State involvement
 - Site characterization issues
- Shiprock Title I - Active Remediation
 - Navajo and Hopi issues
- Lakeview, Gunnison, Naturita, Monument Valley, Durango, Green River

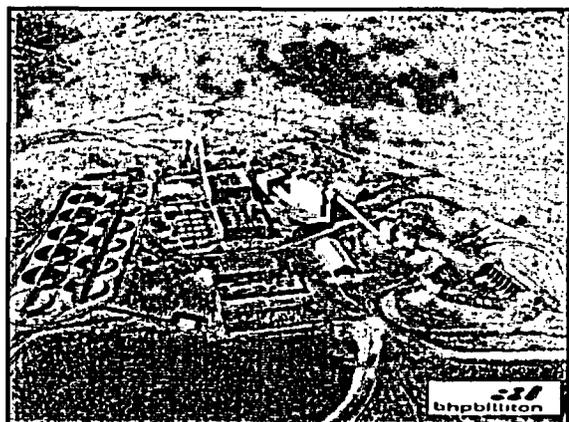
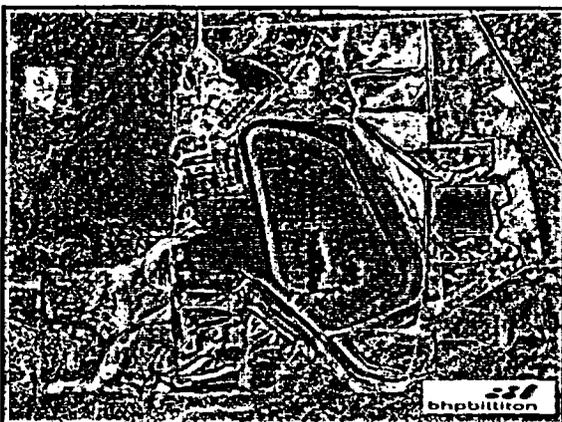
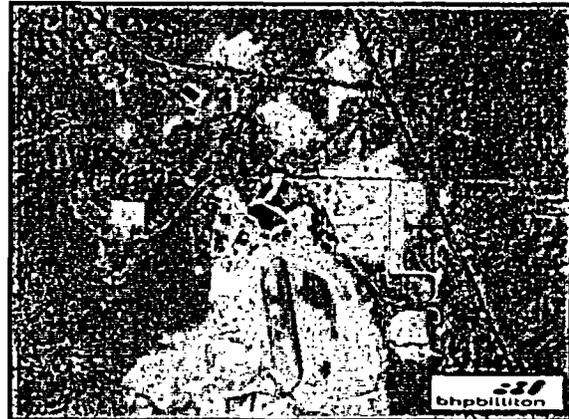
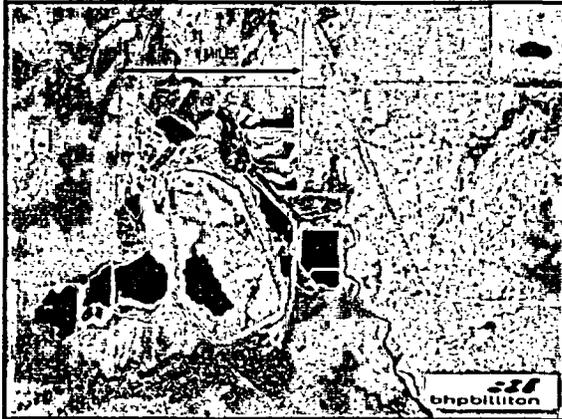
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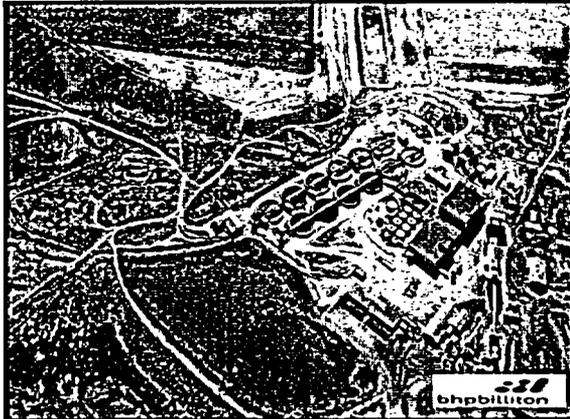
12



**RIO ALGOM MINING LLC
AMBROSIA LAKE OPERATION
MILL DEMOLITION PROJECT**

PROJECT MANAGEMENT - RIO ALGOM MINING LLC
PRIME CONTRACTOR - CLEVELAND WRECKING COMPANY
ABATEMENT CONTRACTOR - PROJECT DEVELOPMENT GROUP





**Who is responsible for independent contractors on your mine site?
MINE OPERATOR
OR
INDEPENDENT CONTRACTOR**

"Production-operators are subject to all provisions of the Act, and to all standards and regulations applicable to their mining operations."

"This overall compliance responsibility includes assuring compliance by independent contractors with the Act and with applicable standards and regulations."

MSHA Program Policy Manual, Vol. III, 45-1

**RIO ALGOM MINING LLC
DEMOLITION CONTRACTOR SELECTION PROCESS**

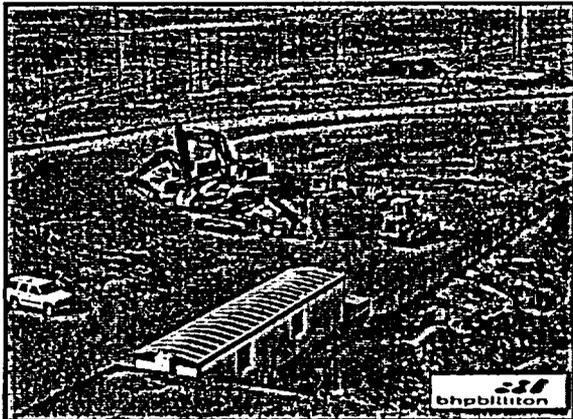
- **PROVIDE CONTRACTOR WITH ALL HSEC REQUIREMENTS**
COMMITMENT TO COMPLIANCE
TERMINATION FOR NON-COMPLIANCE
- **DEVELOPMENT OF SITE SPECIFIC HEALTH AND SAFETY PLAN**
APPROVED BY SITE MANAGEMENT
FULL TIME HSEC REPRESENTATIVE ON SITE
- **ENSURE APPROPRIATE TRAINING PROGRAM**
INCLUDE HSEC ELEMENTS
COORDINATE SCHEDULING/RESPONSIBILITIES

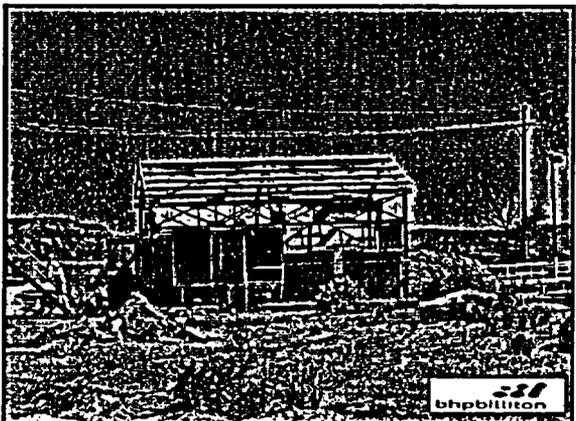
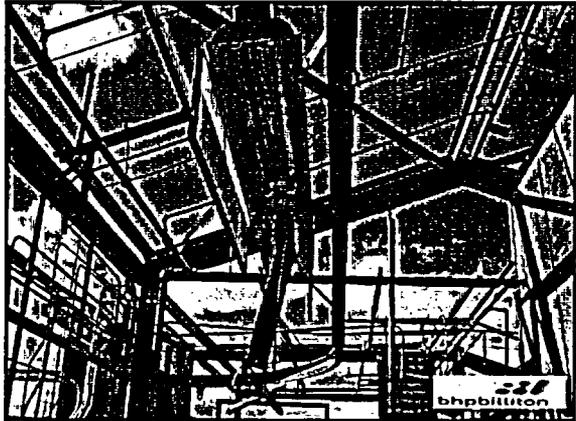
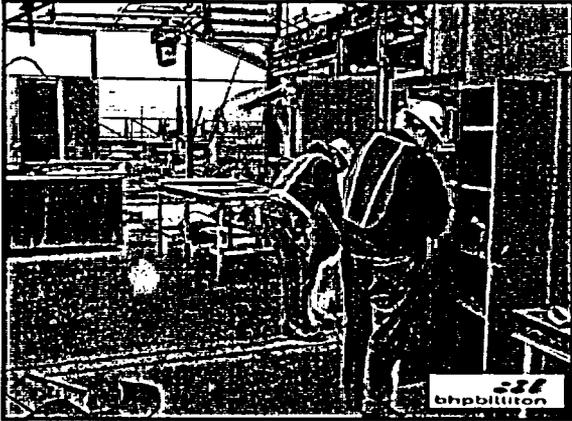
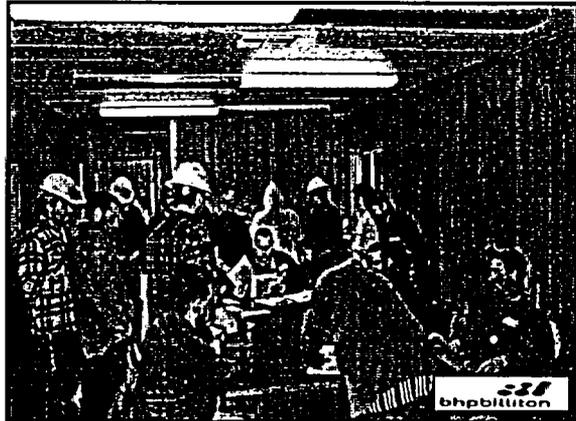
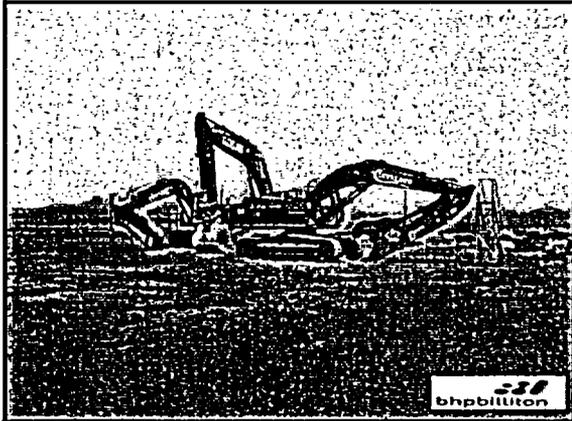
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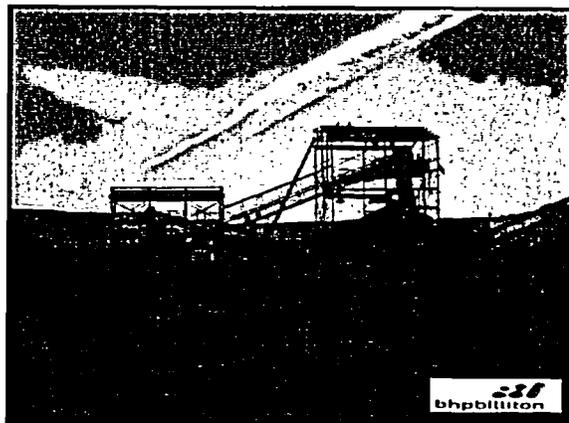
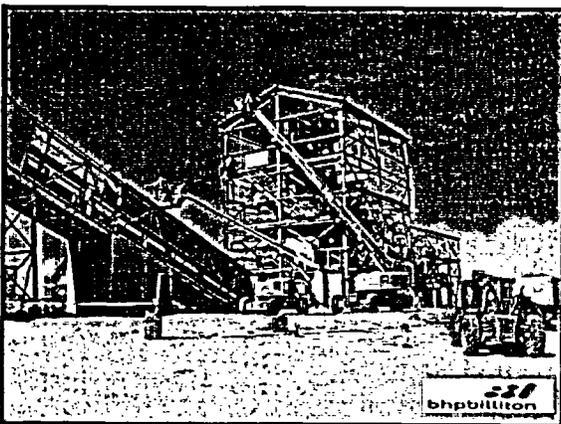
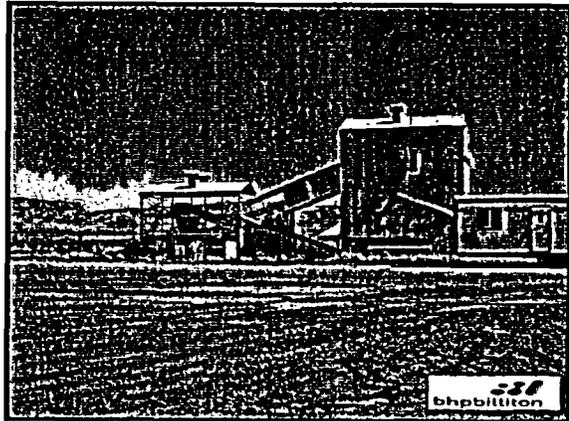
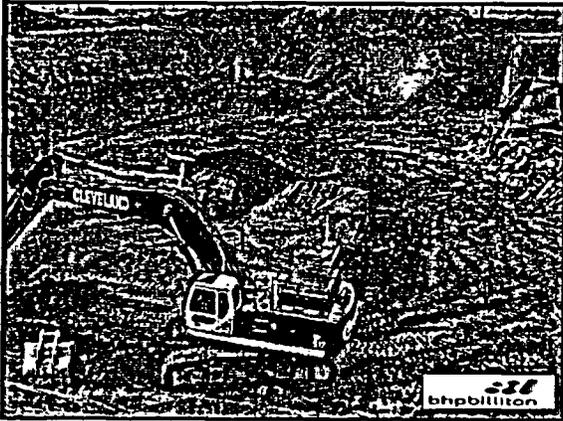
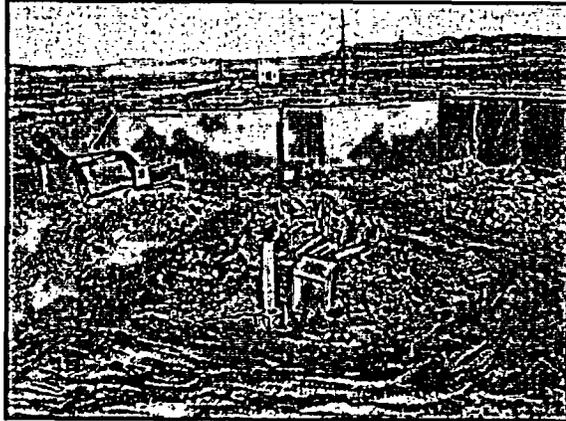
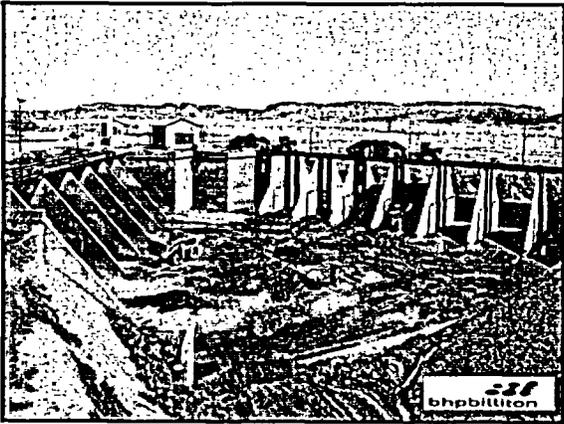
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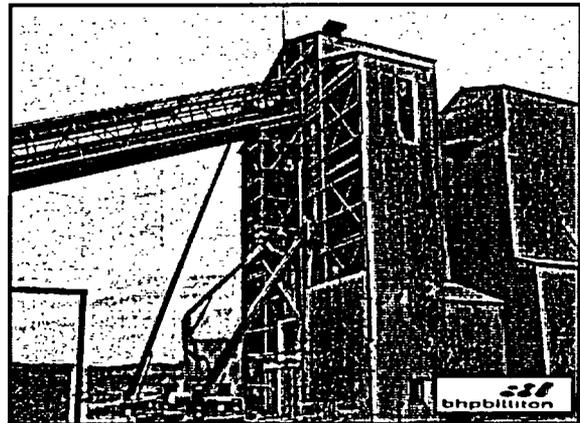
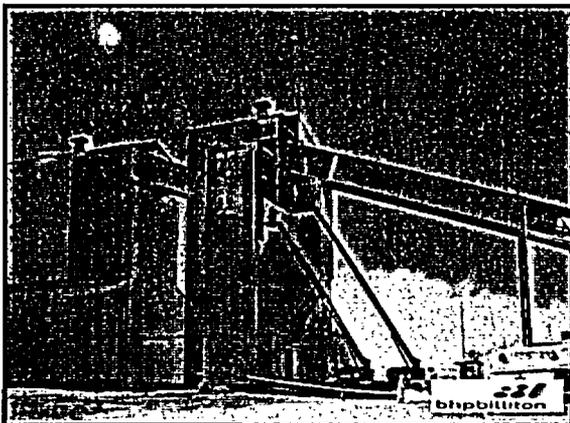
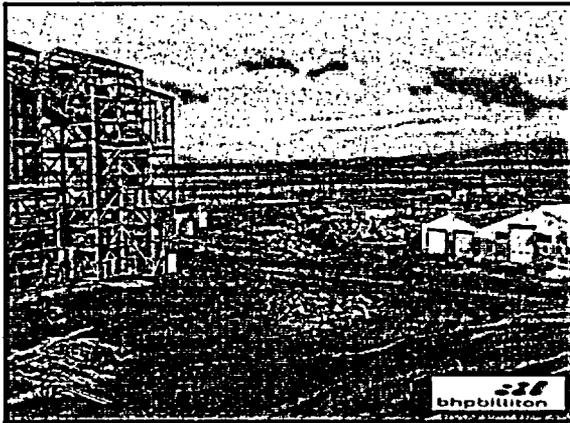
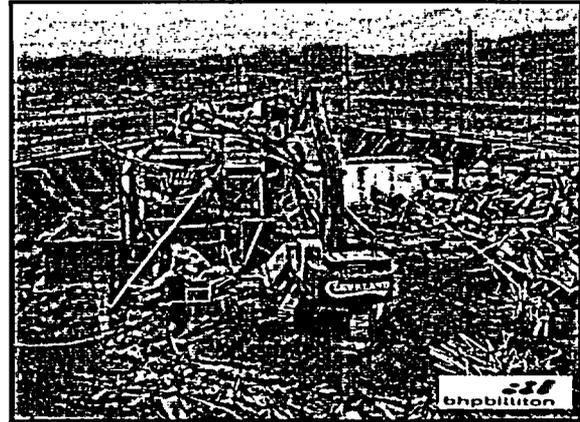
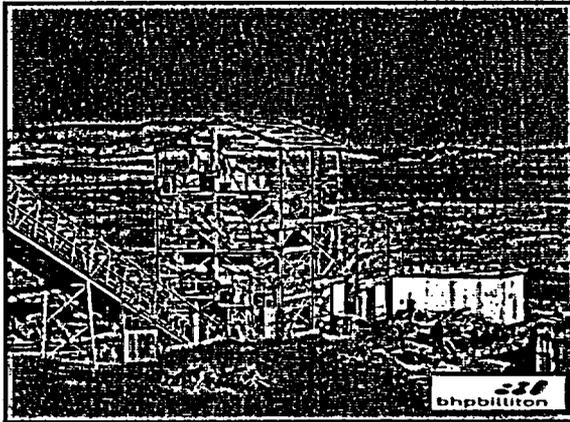
- **DAILY MEETINGS**
HSEC ISSUES/CONCERNS
MANAGEMENT/PRODUCTION
- **HSEC MONITORING PROGRAM**
CLEARLY OUTLINE RESPONSIBILITIES
EQUIPMENT/PPE RESPONSIBILITIES
HAZMAT RESPONSIBILITIES
- **HSEC MONITORING & PERFORMANCE**
ACCESS TO HSEC DOCUMENTATION
ASSESSMENT OF HSEC PERFORMANCE

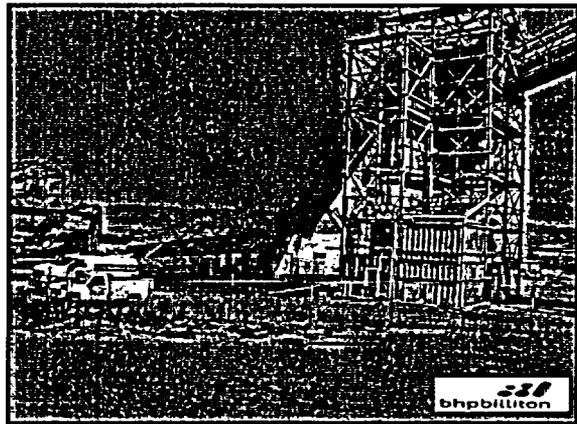
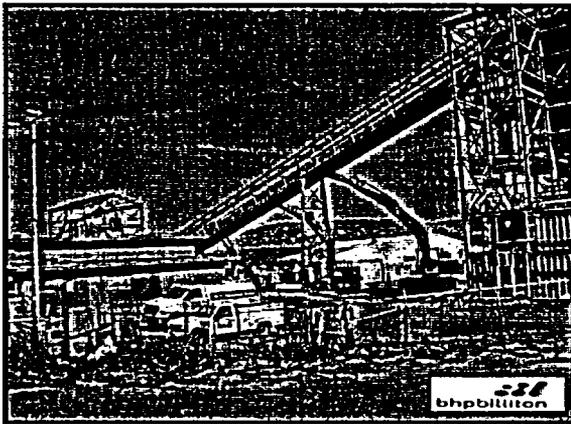
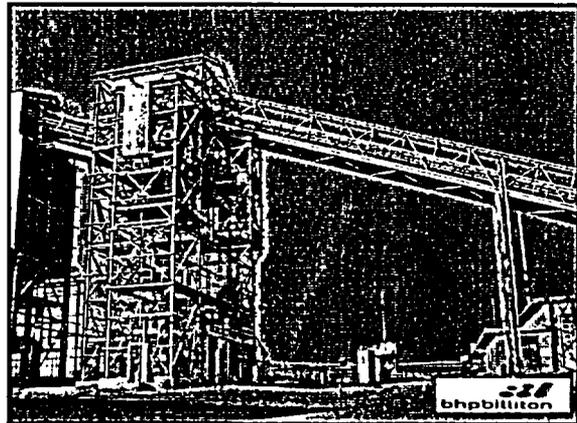
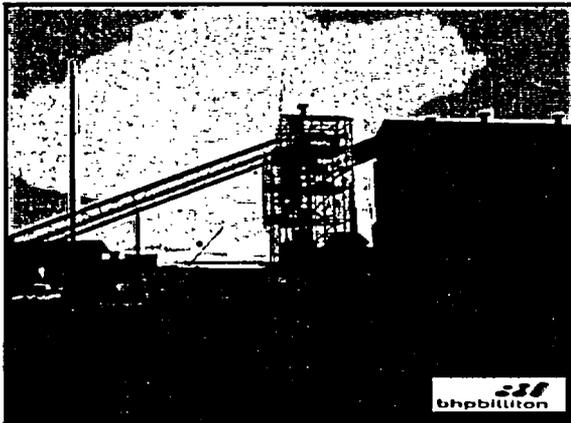
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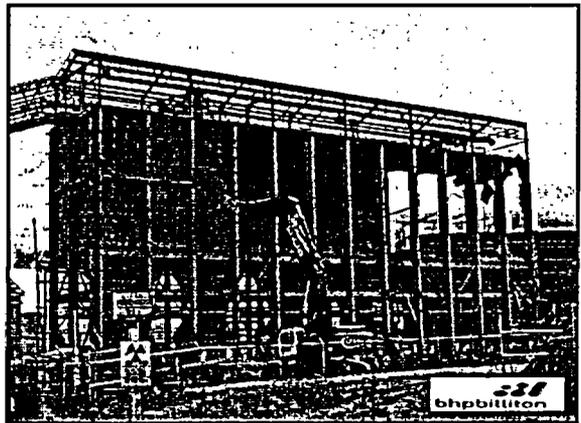
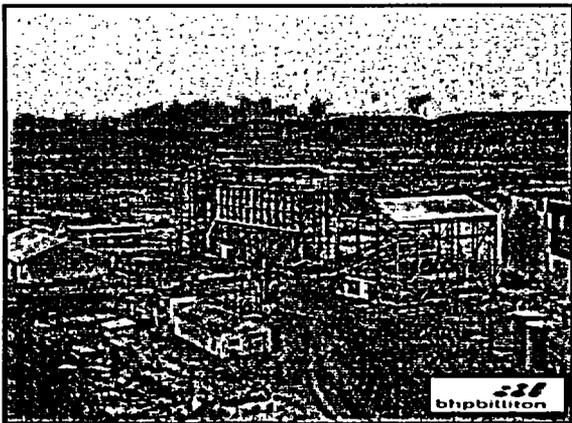
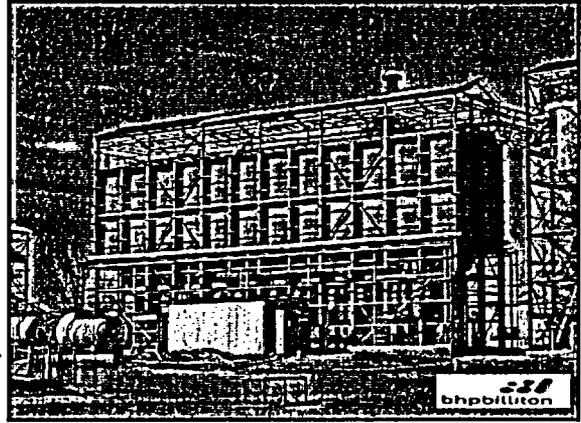
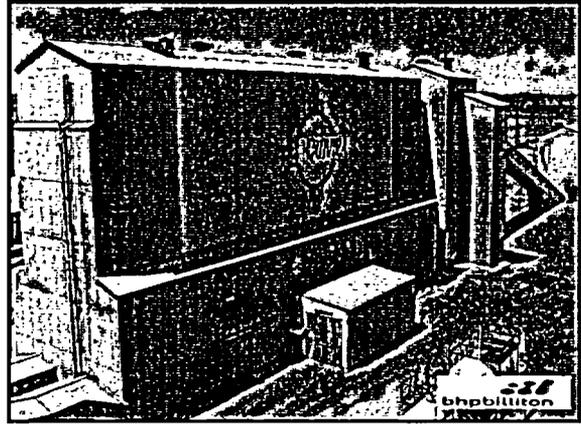
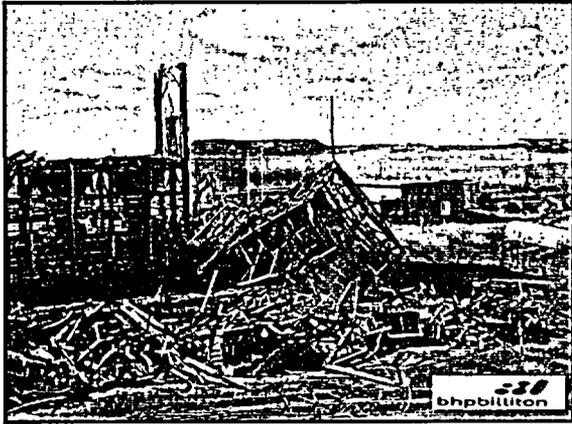


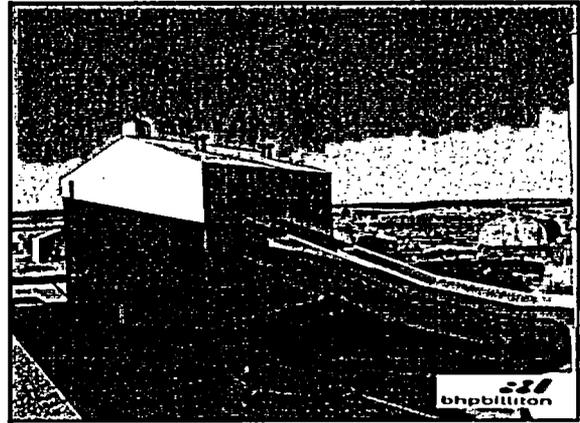
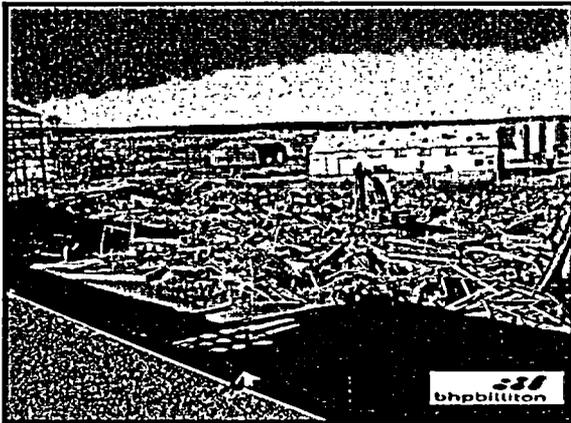
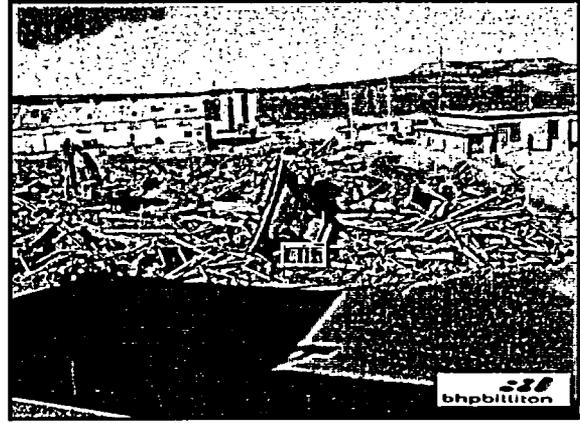
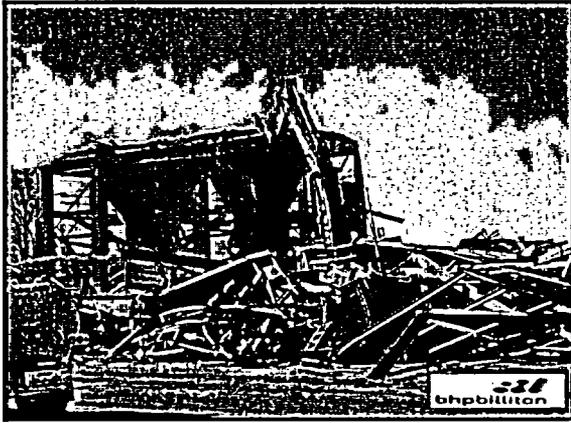
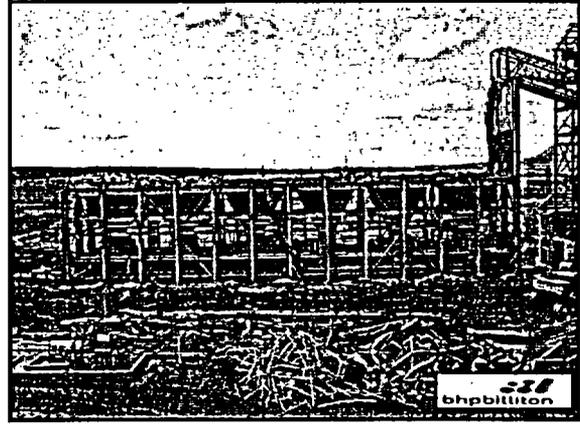
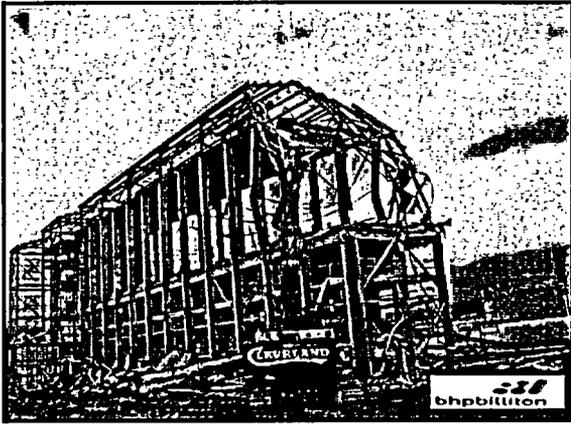


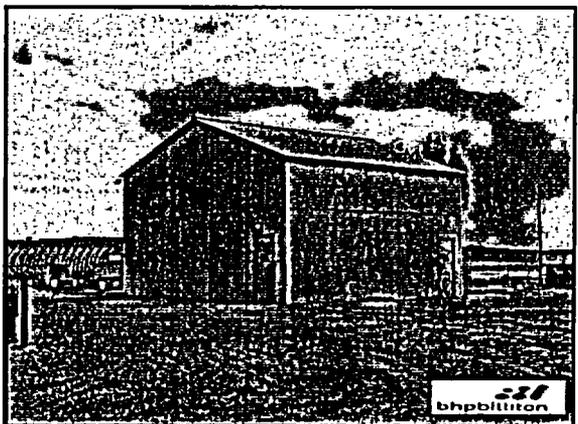
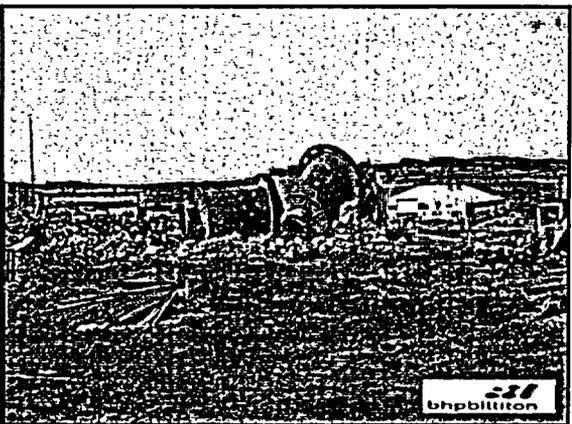
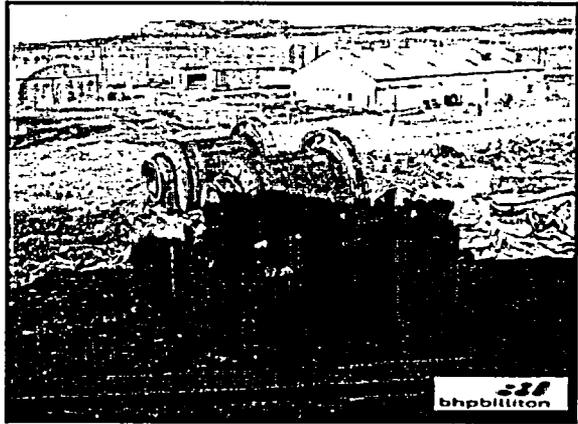
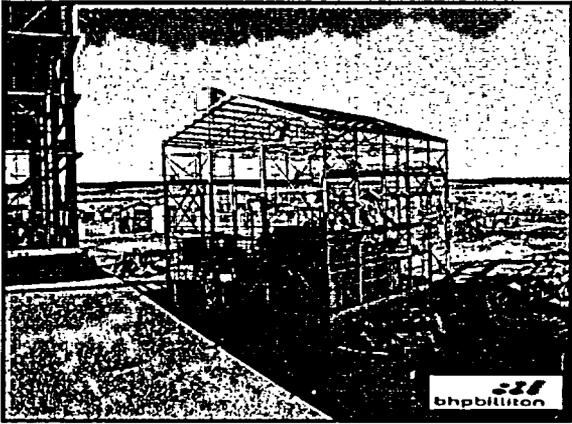
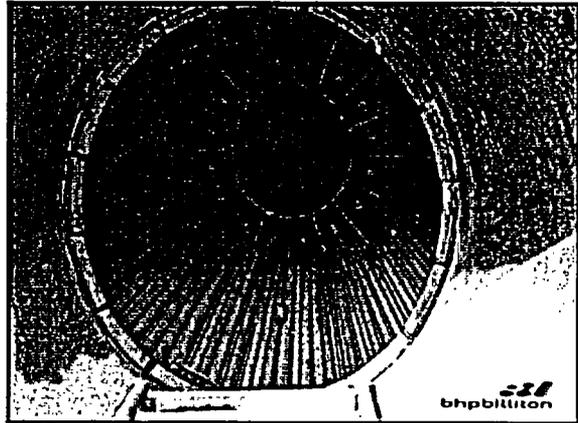
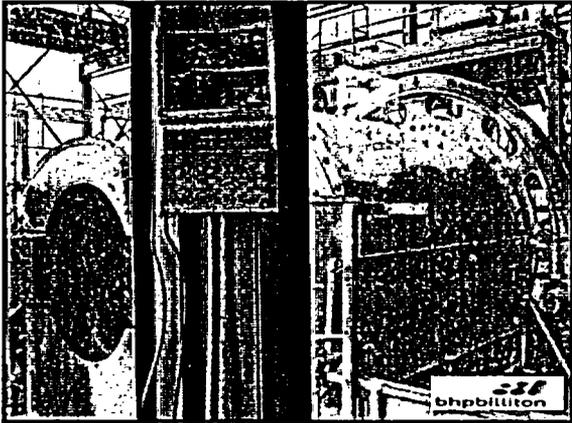


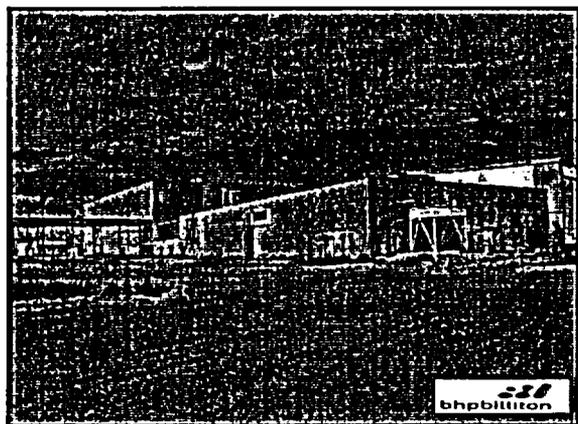
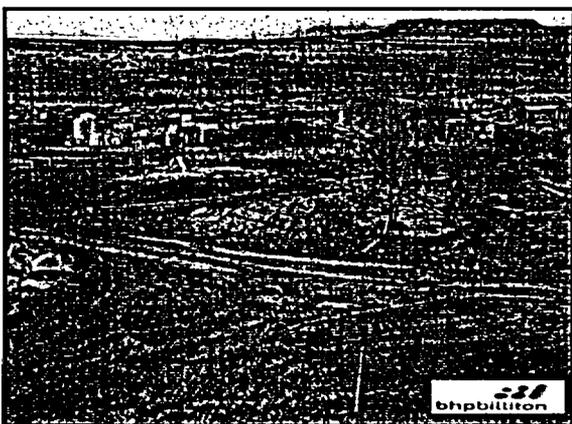
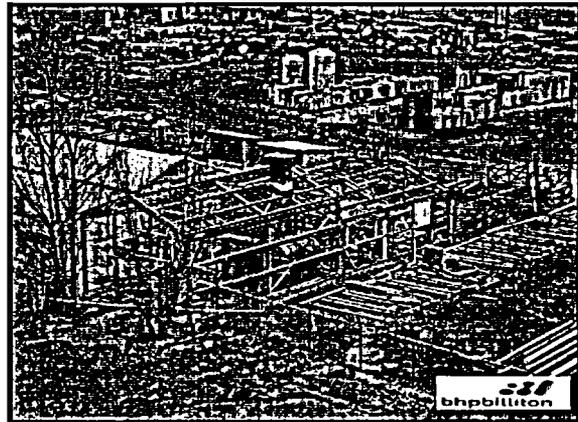
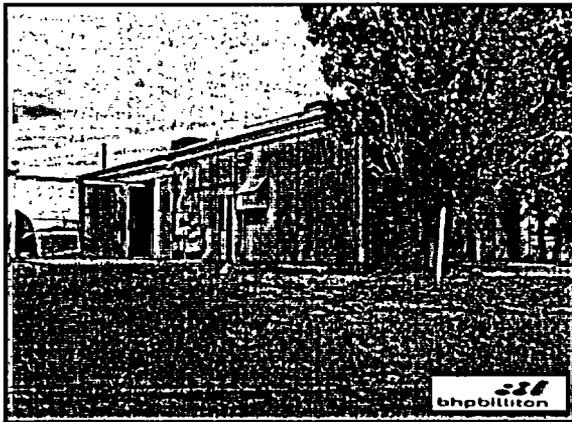
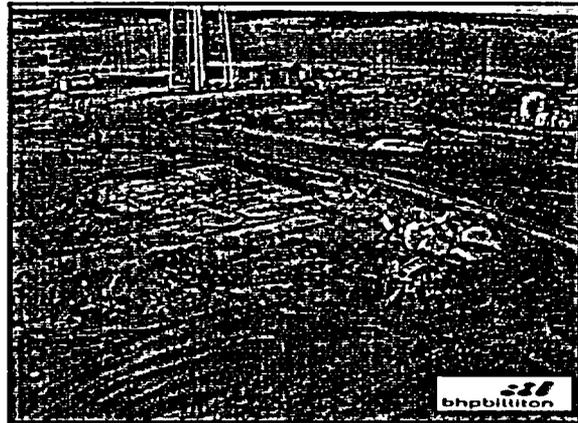
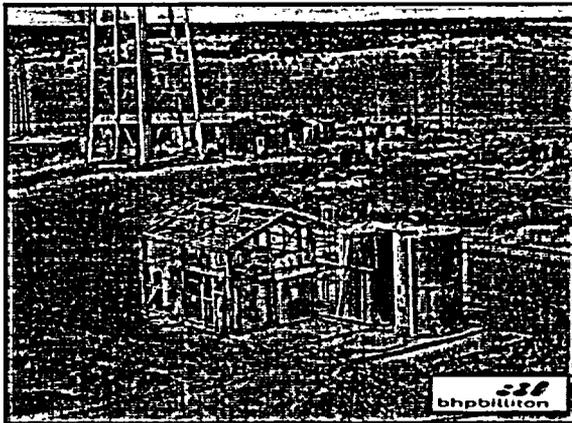


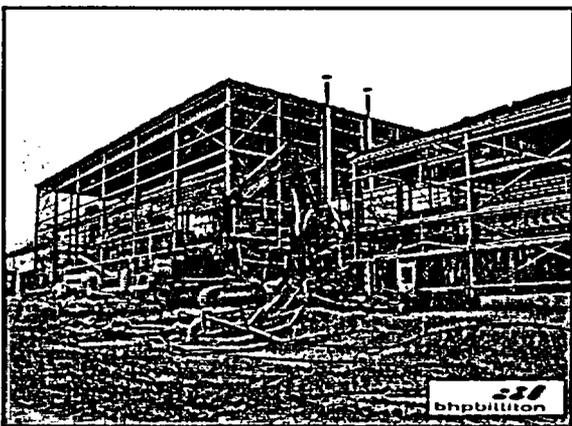
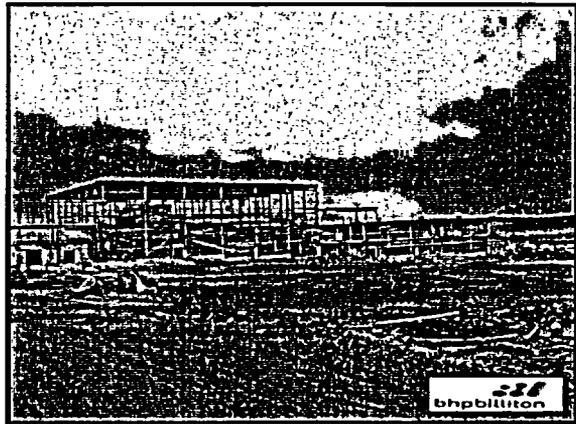
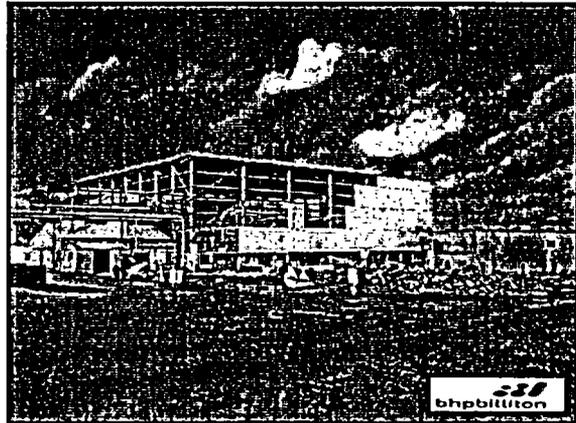
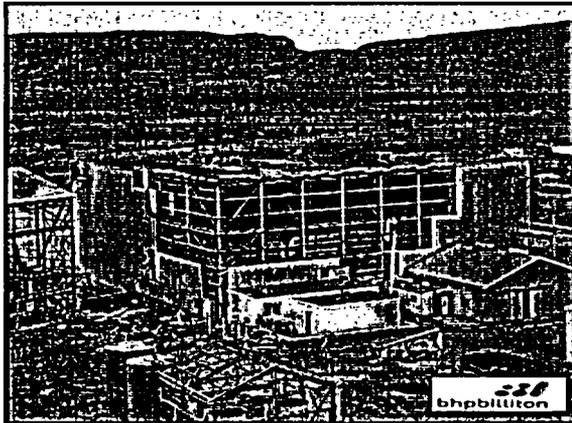


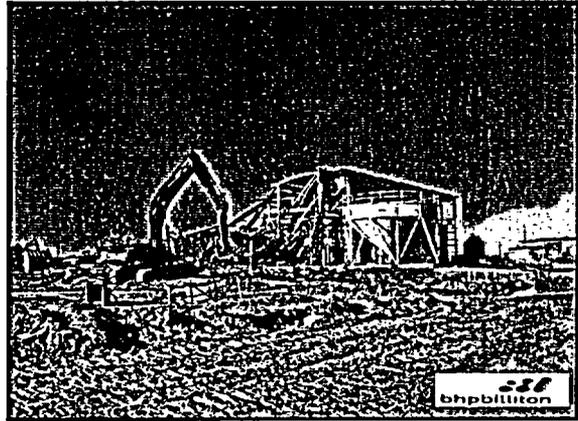
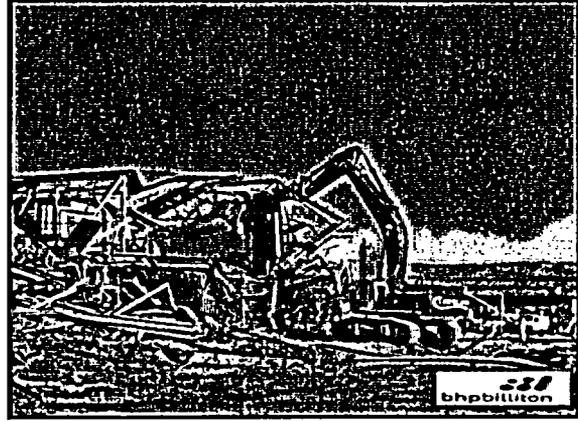
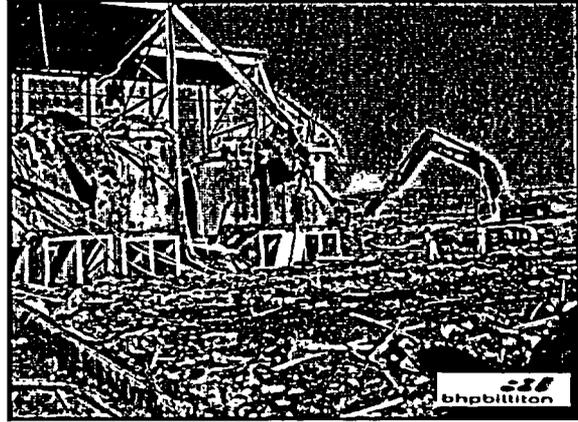
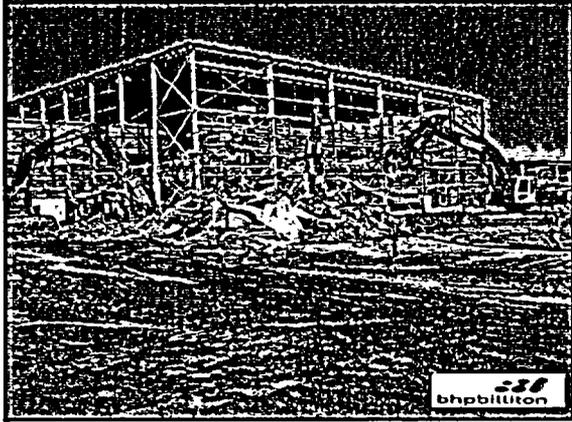


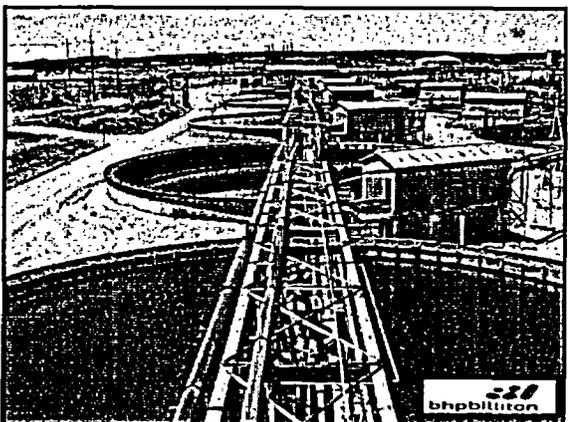
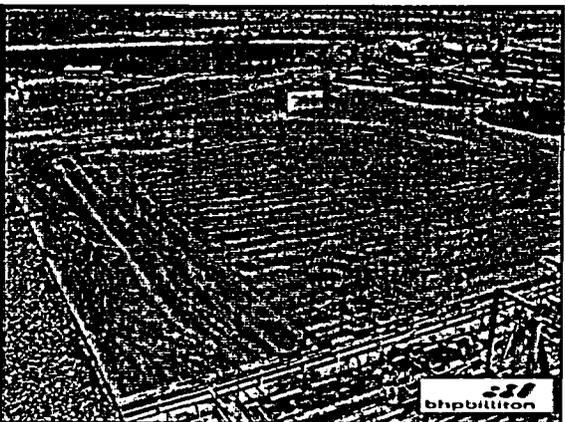
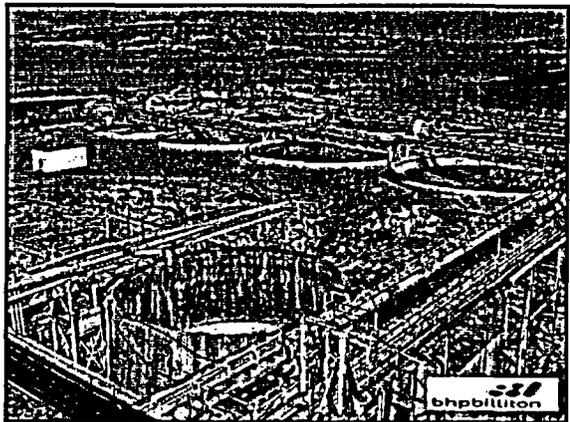
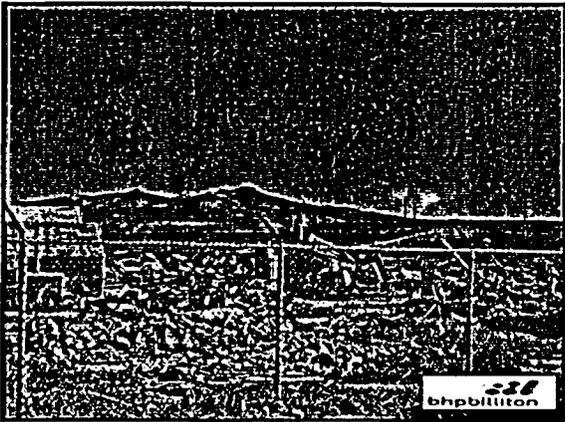
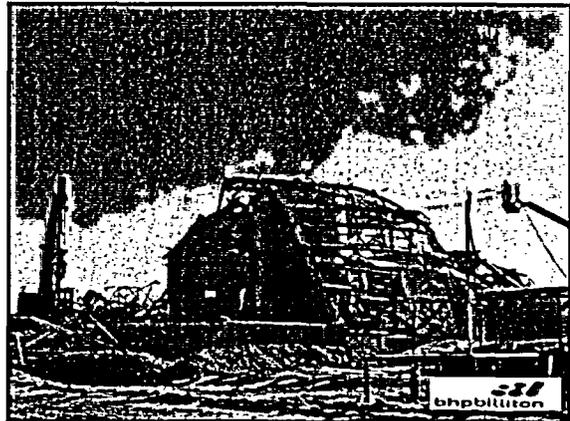


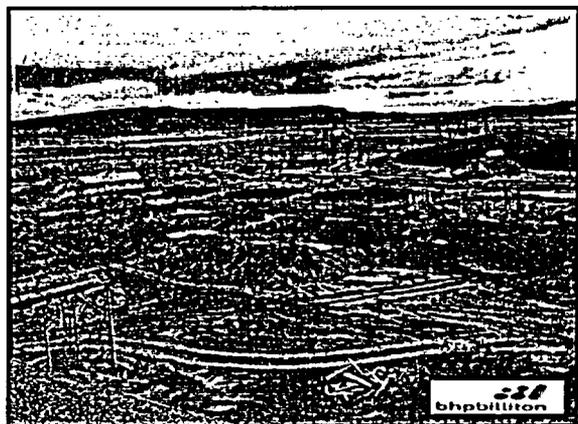
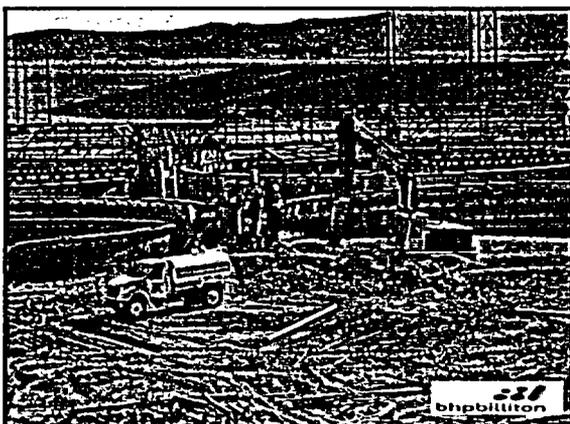
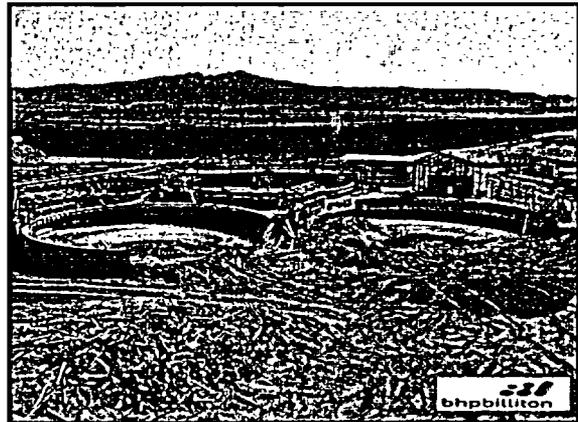
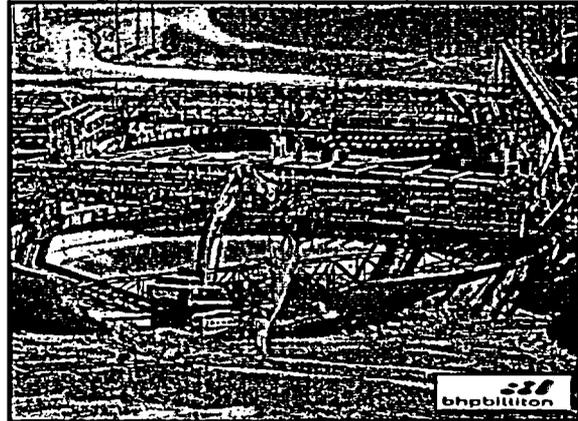
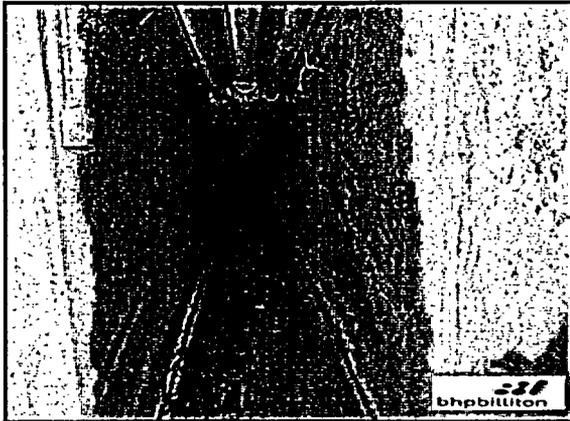


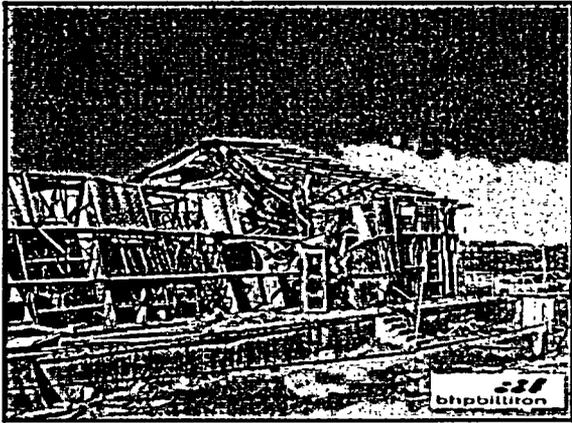
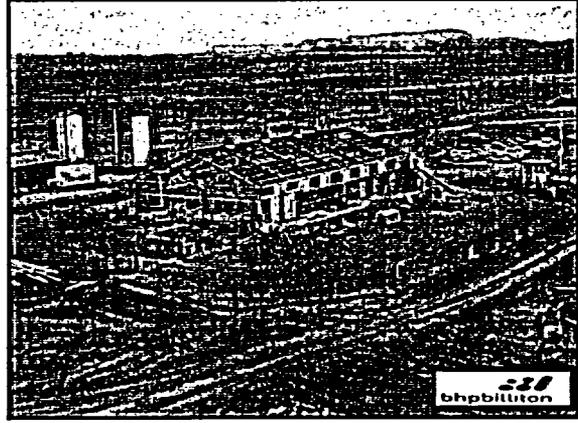
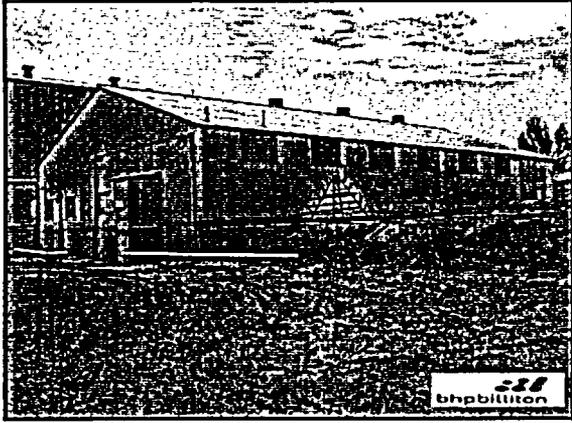
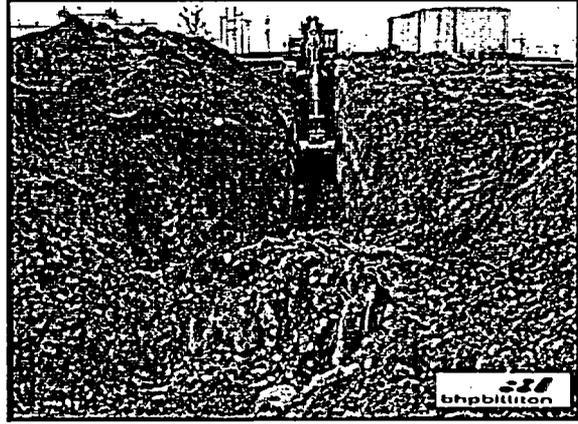
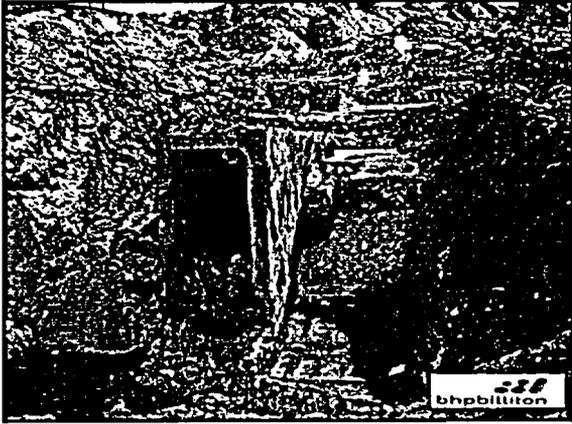


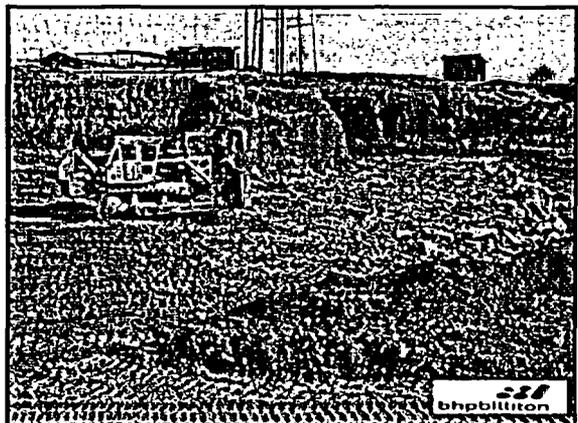
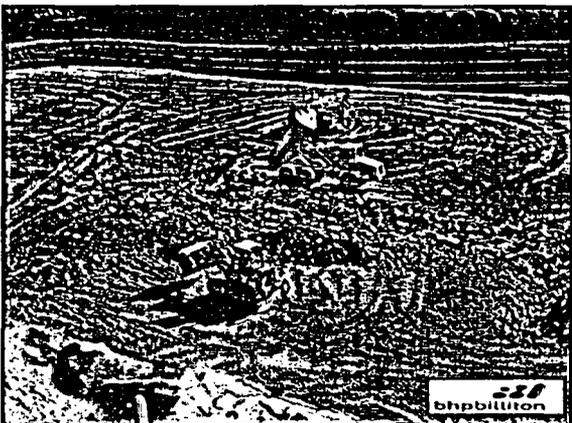
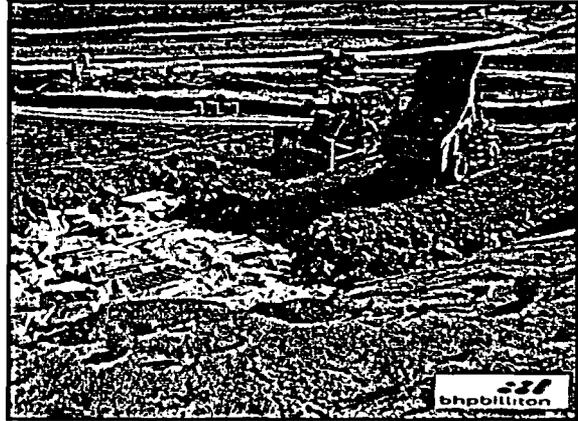
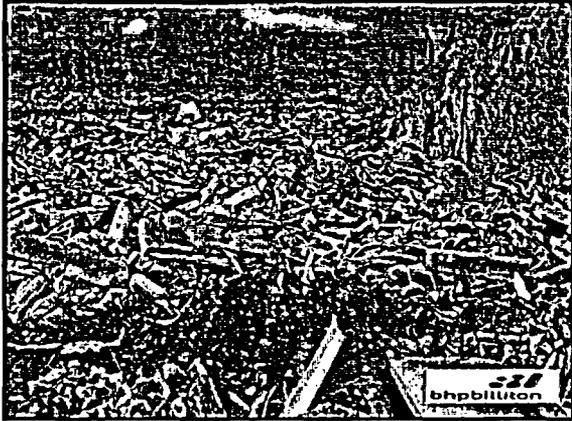
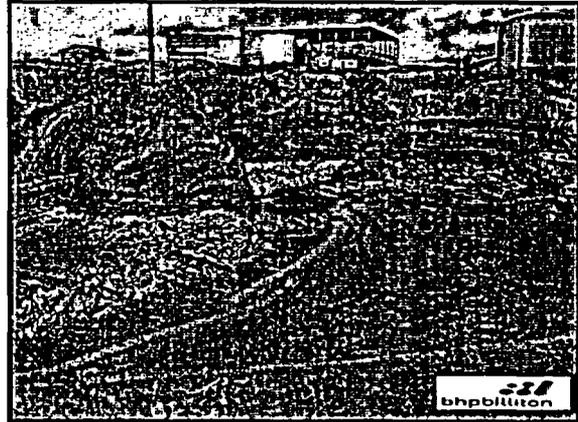
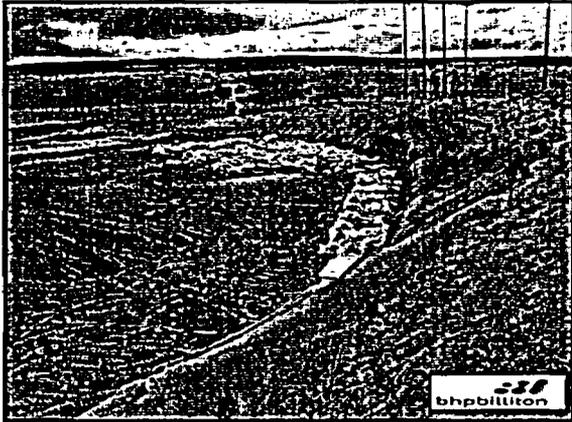


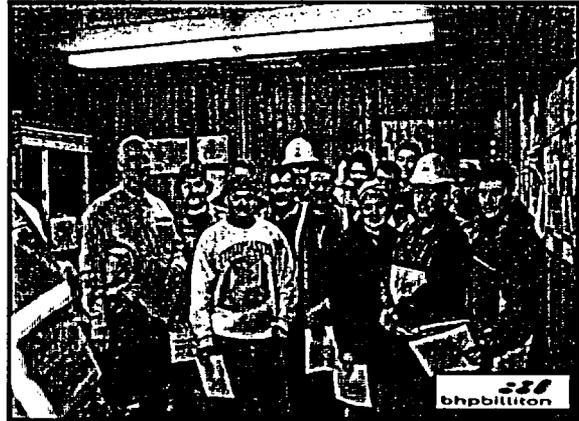
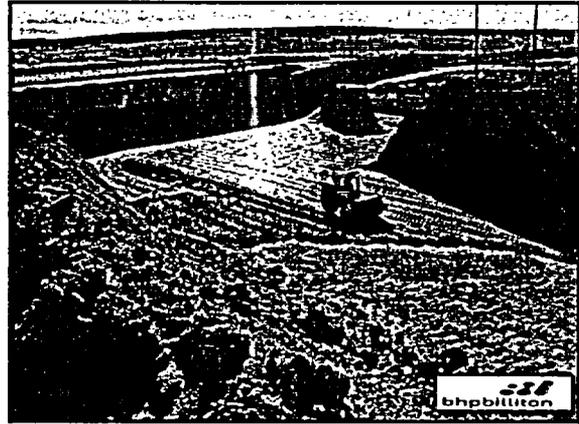
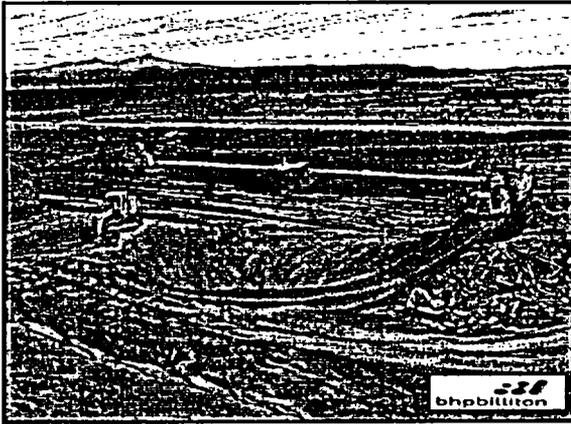












bhpbilliton

**RIO ALGOM MINING LLC
AMBROSIA LAKE OPERATION
MILL DEMOLITION PROJECT**

CONTRACTOR EMPLOYEES ON SITE	22
DAYS TO COMPLETE ABATEMENT PHASE	42
DAYS TO COMPLETE ABOVE GRADE DEMOLITION	39
DAYS TO COMPLETE BELOW GRADE DEMOLITION	06
PERSON-HOURS SPENT ON PROJECT	12,000
COST TO COMPLETE PROJECT	2.2 M
QUANTITY OF MATERIAL DISPOSED (YD ³)	81,700
QUANTITY OF TRANSITE PANELS (FT ²)	302,000
REPORTABLE INCIDENTS/INJURIES	0





Improving Radioactive Waste Management: An Overview of EPA's Low Activity Waste Effort

U.S. Environmental Protection Agency
Radiation Protection Division

Presentation to the
National Mining Association /
Nuclear Regulatory Commission
Uranium Recovery Workshop
May 18, 2004



Presentation Overview

- EPA's Advance Notice of Proposed Rulemaking (ANPR)
- Environmental and Economic Concerns
- Regulatory Context
- Discussion of ANPR
- Stakeholder Context and Reactions
- Next Steps



What is the ANPR?

- Goal is to solicit public comment and information on a wide variety of low activity radioactive waste disposal issues
- Is not a proposed rule, but presents broad concepts and asks many questions
- Does not affect existing regulations or programs
- Provides a vehicle for public dialogue to help guide EPA in determining next steps

3



Environmental and Economic Concerns

- Inefficient waste disposal?
 - Efficiency discouraged by limited disposal options, dual and inconsistent regulation
- Prolonged storage?
 - Some waste stored on site by generators
- Excessive transportation?
 - Long transportation routes to the few current disposal sites
- Inappropriate regulation?
 - Some wastes inconsistently or not regulated at all for radioactivity
- Inefficiency in case-by-case examination?
 - Opportunities for generic technical and/or regulatory consideration

4



EPA's Approach

- Consider waste from its physical, chemical and radiological properties
 - Apply consistent methods to evaluate the risks of radioactive material, regardless of origin
- Identify additional options appropriate to potential risks of disposal
- Target lower-activity wastes as suited to such additional destinations
- Implement additional disposal options in a way that
 - Maintains appropriate and protective regulatory controls
 - Provides Other Fed Agencies, States and the public appropriate avenues for oversight, participation and input

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Improve Regulatory Context

- Radioactive waste disposal is governed by a fragmented and inconsistent system:
 - Low-Level Waste
 - Only 3 sites operating (SC, WA, UT)
 - Capacity limited and will become more so
 - Type of waste accepted limited (e.g., mixed waste)
 - Compacts established to develop additional sites
 - Uranium/Thorium Mill Tailings (large volumes)
 - NRC decision removed certain legacy tailings from regulatory system (e.g., FUSRAP)
 - Technologically Enhanced Naturally Occurring Radioactive Material (large volumes)
 - No Federal, inconsistent State regulation
 - Existing disposal practices may warrant additional scrutiny (e.g., land spreading, uncontrolled burial)

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Elements of EPA's ANPR

- Introduces concept of "low activity"
 - No current statutory or regulatory definition
- Focuses on radiation content rather than origin
 - Evaluate safety for the material in question
- Articulates potential universe of "low activity"
 - Mixed waste, TENORM, Low-level waste, Uranium or thorium ore processing waste, NRC exempt or "unimportant quantities"
 - Could include DOE waste as well as commercial

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Elements of the ANPR (cont.)

- Discusses methods and modeling to be used to define "low activity" waste
- Identifies hazardous waste landfills as potential destinations for "low activity" waste
- Discusses regulatory and non-regulatory mechanisms
- Asks many questions in all areas

8



Defining “Low-Activity”

- Risk modeling is primary way to limit amount of radioactivity in disposal cell
 - Long-term performance of unit
 - Post-closure site use
 - Facility worker exposures
- Risk modeling is same type of analysis used to judge safety of LLW facilities
 - Projected performance, not design, is key factor
 - Behavior based on chemical characteristics
- Other supporting criteria can be applied
 - “sum of fractions”, activity/volume caps, waste form



Hazardous Waste Landfills

- Have explicit design and engineering requirements, robust regulatory framework
- Are designed to contain chemicals that present significant risk to public health
- Have been used for radioactive material
 - Examples: TENORM, Uranium mill tailings
 - Case by case consideration
- ANPR asks for comment on other types of waste disposal facilities (e.g., solid waste landfills)



Making it Safe

- Demonstrate protectiveness by evaluating RCRA engineering/technology with performance modeling
- Adopt same standards of protectiveness that are applied in other radiation applications and for other pollutants
- Apply other measures common to radioactive waste disposal as necessary to increase confidence

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Potential Approaches

- Regulatory proposal could
 - Identify waste concentration levels based on risk management criteria with additional conditions as appropriate
 - Describe implementation scheme (general license, specific license, exemption, other?)
- Non-regulatory guidance / technical reports could
 - Provide information and technical analysis of disposal options and highlight "best practices"
 - Provide risk information and waste acceptance criteria across a spectrum of considerations
 - Enhance case-by-case decision making
 - Enhance public participation opportunities

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Major Uncertainties

- Waste
 - Knowledge and characterization of eligible waste
- Oversight and Adoption
 - Need & level of NRC oversight not clear
 - Level of State support/adoption not clear
- Incentives
 - Generator and Disposal Facility interest in changing practices
 - "Markets" for low-activity waste
 - Other Generator / Disposal Issues (e.g., liability)
- Compact, State and Public acceptance



Public Comment Period Recently Closed

- As of 5/10, 370+ comments in docket
 - See www.epa.gov/edocket
 - Select "View Open Dockets"
 - Docket # OAR-2003-0095
 - Select pdf icon if present
- Large majority are private citizens opposing "deregulation"
- Numerous comments from a host of stakeholders – States, Compacts, Generators, Waste management facilities, industry, etc.



Initial Perceptions and Reactions

- Action is deregulatory and less protective (environmental groups)
- Concern existing management practices will be cast in negative light (DOE, USACE)
- Support for concept and approach, unclear on need and implementation; interest in coordinated Federal approach (States)
- Status quo discourages the efficient disposal of material (waste generators)
- Interest in exploring further, key is State and public “buy-in” (subset of RCRA-C operators)

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Next Steps

- Absorb and Communicate Public Input
 - Analyze public comments
 - Continue stakeholder interaction
 - Continue discussions, conferences, etc.
 - Coordinate with other Agencies, States
 - Engage interested public
- Communicate out developing themes, refinements of “the problem(s)”

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Next Steps (cont'd)

- **Develop Spectrum of Options**
 - Regulatory
 - Non-Regulatory
 - Supplementing not substituting for existing system
- **Integrate Activities within Existing System**
 - Broad goals in multi-faceted context
 - Emphasize risk basis for management rather than origin
 - Recognize and Navigate Federal and State Authorities
 - Technical basis necessary but not sufficient
 - Public participation and acceptability

Uranium Drinking Water Standard and its Impact on States

May 19,2004

NMA Challenge to Uranium MCL

- NMA felt EPA had inadequately evaluated the costs and benefits of the Uranium MCL
- SDWA requires EPA to analyze the quantifiable and nonquantifiable health risk reduction benefits associated with any MCL that is being considered and each alternative level that is being considered

NMA's Argument

- NMA specifically raised the issue that some states are required by law to adopt MCLs as a groundwater protection and cleanup standards
- Other states, though not required by law, frequently chose to adopt MCLs as groundwater protection and cleanup standards

Recent Developments

- Some states are moving to adopt the Uranium MCL (30 micrograms/liter) as a groundwater standard
 - New Mexico considering even lower standard of 7 ppb
 - Wyoming conducts meetings on 30 micrograms/liter
 - Utah proposes 30 micrograms/liter

Other Issues

- NMA specifically raised the issue of creation of new wastes from treating drinking water to meet standard
- NMA asserted that EPA failed to adequately account for costs of treatment of new wastes
- NMA also argued that EPA failed to consider risks to workers handling these newly created wastes or to the public from disposal of those wastes

New Wastes will be Created

- States determining how to proceed with treatment to meet MCL
- Treatment costs may lead to Congressional action
- Treatment facilities may have to pursue NRC licenses or exemption



EPA Uranium Drinking Water Standard and its Impact on States

The New Mexico Experience

Paul Goranson
Rio Algom Mining LLC



“Tunnel vision, a classic administrative disease, arises when an agency ...effectively carries the single-minded pursuit of a single goal too far, to the point where it brings about more harm than good...A former EPA administrator put the problem succinctly when he noted that 95 percent of the toxic material could be removed from waste sites within a few months, but years were spent trying to remove the last little bit. Removing that last little bit an involve limited technological choice, high cost, devotion of considerable agency resources, large legal fees, and endless argument.”

– U.S. Supreme Court Justice Stephen Breyer, *Breaking the Vicious Circle: Toward Effective Risk Assessment* at 11 (1993) (emphasis added); Opening statement of the New Mexico Mining Association’s Closing Brief to the New Mexico Water Quality Control Commission Hearings on the proposed uranium standard.



Uranium Groundwater Standards in New Mexico

- ❖ The current standards for uranium in groundwater is as follows:
 - ❖ Existing concentrations at the site prior to initiating the permitted activity or conditions at the enactment of the WQA.
 - ❖ The numeric standard found in 20.6.2.3103 NMAC, currently 5 mg/L.
- ❖ The GWQB is proposing to reduce the numeric standard to 7 μ g/L.



Uranium Groundwater Standards in New Mexico

- ❖ Complicating the application of the proposed standard is the method GWQB enforces compliance.
 - ❖ All waters within the State of NM with TDS concentrations < 10,000 mg/L are drinking water.
 - ❖ Compliance with the standards in 20.6.2.3103 is required in all areas of drinking water.
 - ❖ Access and reasonable use is not a significant factor in this enforcement, (e.g. the waters under a tailings impoundment with institutional controls is considered potential drinking water)



Basis of the Proposed U Standard

- ❖ In 2001, GWQB commissioned a toxicology assessment for uranium in NM groundwaters.
- ❖ The promulgation of the Federal MCL (30 $\mu\text{g/L}$) was pending.
- ❖ The toxicology report recommended a reduced standard of 7 $\mu\text{g/L}$ based on limited animal studies only.
- ❖ A proposed rule reducing the U standard from 5 mg/L to 7 $\mu\text{g/L}$ was introduced by the GWQB in 2001.
- ❖ Minimal stakeholder involvement was made by GWQB



NMMA Challenges to the GWQB

- ❖ Toxicology report was not peer reviewed.
- ❖ WQA requires other factors, in addition to health.
 - ❖ Cost Benefit
 - ❖ Technical infeasibility
- ❖ GWQB did not consider impacts on other industries, (e.g. Municipalities, other mining, oil & gas)
- ❖ There are no members of the public “at risk” to drinking water contaminated by facilities regulated by this regulation.
- ❖ The population at greatest risk, private water wells, are exempt from this standard.



Impacts of the U standard

- ❖ Low numeric standard creates issues with detection.
- ❖ Any dischargers who exceed $7 \mu\text{g/L}$ U will become permittees, including communities who treat to meet the Federal MCL and discharge sewage.
- ❖ Creates many new permittees, including mines, O&G, and etc.
- ❖ Approved closure plans at uranium recovery facilities will re-assessed using the new standard.
 - ❖ Creates uncertainty to reach closure for these sites.
 - ❖ Places creates significant burden on permittees to meet discharge limits under NPDES and NRC release limits and not exceed the numeric standard.



WQCC Hearings

- ❖ Hearings before the WQCC started in Sept. 2003
- ❖ NMED (GWQB) and their expert witnesses provided testimony in support of the rulemaking
- ❖ ENDAUM, anti-uranium mining group, testified in support of the NMED rule.
- ❖ NMMA, LANL, County of Santa Fe, and other industry witnesses testified against the rulemaking.



WQCC Hearings

- ❖ GWQB staff acknowledged that cost-benefit and technical infeasibility consideration was minimal.
- ❖ GWQB staff acknowledged that there were no drinking water sources that were impacted by permitted sites.
- ❖ NMMA requested that all parties go back and work out a reasonable approach for the new standard.



WQCC Hearing Outcomes

- ❖ Closing briefs were filed in May, 2004
- ❖ Decision pending Commission vote.
- ❖ Timing is uncertain.
- ❖ Based on the role of the WQCC, the numeric standard can be changed on their decision.
- ❖ Through the hearing process, the Federal MCL became the standard of discussion.



Deferring Active Regulation of Groundwater Protection at *In Situ* Leach Uranium Extraction Facilities

Ron C. Linton
U. S. Nuclear Regulatory Commission

May 2004

1

BACKGROUND

• July 26, 2000

- Staff Requirements Memorandum (SRM) SECY 99-0013)
- Commission reaffirmed NRC's authority to regulate all waste waters from ISL facilities as 11e.(2) byproduct material
- Commission recognized that dual regulation of ground-water protection at ISL facilities would exist between the NRC and the EPA or EPA-authorized States

May 2004

2

BACKGROUND Contd. (July 26, 2000)

- Commission approved that the staff continue discussions with EPA and the appropriate EPA-authorized States to:

“determine the extent the NRC can rely on the EPA Underground Injection Control (UIC) program for ground-water protection issues, thereby potentially minimizing NRC review of ground-water protection issues at ISL facilities”

May 2004

3

BACKGROUND Contd. (July 26, 2000)

- Commission directed the staff to include in those discussions appropriate methods for implementing any agreements, including Memoranda of Understanding (MOUs) or language, in a new 10 CFR Part 41.

May 2004

4

BACKGROUND Contd.

• October 10 & November 29, 2000

- Staff held meetings with EPA at NRC Headquarters

• May 29, 2001

- SRM SECY 01-0026 - Staff discontinued development of a new Part 41

May 2004

5

BACKGROUND Contd.

• June 2001

- The NRC staff held closed meetings with non-Agreement State regulators and other Federal regulators during the annual Uranium Recovery Workshop.

May 2004

6

BACKGROUND Contd.

- February 5, 2002
 - Standard Review Plan for ISL Uranium Extraction License Applications, NUREG-1569
 - Issued for public comment by Notice in the Federal Register

May 2004

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BACKGROUND Contd.

- June 2002
 - The NRC staff held closed meetings with non-Agreement State regulators and other Federal regulators during the annual Uranium Recovery Workshop

May 2004

8

BACKGROUND Contd. (June 2002)

NRC staff proposed that:

1. NRC would retain its authority provided by the Atomic Energy Act of 1954, as amended, to regulate ground-water protection at ISLs.

May 2004

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BACKGROUND Contd. (June 2002)

2. NRC would defer active regulation of ground-water protection at ISL operations to a non-Agreement State authorized to administer the EPA's UIC program at ISL facilities, if the State entered into an MOU with the NRC.

May 2004

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BACKGROUND Contd. (June 2002)

- 3a. ISL facilities in Agreement States authorized to administer EPA's UIC Program would not be impacted by this proposal (ex. Texas)
- 3b. Agreement States not authorized to administer EPA's UIC program could choose to pursue an individual agreement with EPA for reducing or eliminating dual regulation of ground-water protection (ex. Colorado)

(At present, no ISL uranium facilities are licensed in an Agreement State that is not a UIC EPA authorized State.)

May 2004

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BACKGROUND Contd.

- June 2003
 - The NRC staff held closed meetings with non-Agreement State regulators and other Federal regulators during the annual Uranium Recovery Workshop and provided a copy of the strawman MOU to the States.
 - ISL Standard Review Plan, NUREG-1569, was issued in final form

May 2004

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BACKGROUND Contd.

- July 24, August 9, & October 18, 2003
 - The staff received letters from Nebraska, Wyoming, and the National Mining Association supporting the pursuit of this proposal.

May 2004

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BACKGROUND Contd.

- October 29, 2003
 - SECY-03-0186, OPTIONS AND RECOMMENDATIONS FOR NRC DEFERRING ACTIVE REGULATION OF GROUND-WATER PROTECTION AT *IN SITU* LEACH URANIUM EXTRACTION FACILITIES
 - sent to the commission ML031210874

May 2004

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BACKGROUND Contd.

- November 19, 2003
 - SRM SECY-03-0186 - Commission approved Option 2a.
 1. develop a Regulatory Issue Summary (RIS) to Inform the public about this proposal
 2. develop a MOU with each appropriate State
 3. management to ensure the development of MOUs involves minimum resource expenditures by the States and the NRC.

May 2004

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Schedule

- Purpose:
 - To derive the dates for completing actions directed by the Commission (i.e., develop RIS to inform the public and then proceed to develop an MOU with each State)

May 2004

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Schedule Contd.

• Action	• Dates
– Initiate contact with States via letter	– 12/03 – Completed 12/29/03
– Kick-off meeting W/ States	– 01/04 – Completed 01/29/04
– Develop Draft RIS	– 01/04 – 02/04 – Completed 02/23/04

May 2004

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Schedule Contd.

• Action	• Dates
– Publish Draft RIS for Comment	– 03/04 – Completed 03/05/04
– RIS Comment Period (30 days)	– 03/04 - 04/04 – Completed 04/05/04
– Address RIS comments & Finalize	– 04/04 - 05/04

May 2004

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Schedule Contd.

- | • Action | • Dates |
|--|-----------------|
| - Develop methodology and outline for adequacy reviews | - 04/04 – 05/04 |
| - Conduct initial adequacy reviews | - 06/04 – 09/04 |
| - Document initial findings & Inform States | - 10/04 – 11/04 |

May 2004

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Schedule Contd.

- | • Action | • Dates |
|--|-----------------|
| - State(s) implement findings, as required | - 11/04 – 02/05 |
| - Finalize adequacy reviews | - 02/05 – 03/05 |
| - Develop draft MOUs | - 06/04 – 03/05 |

May 2004

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Schedule Contd.

- | • Action | • Dates |
|----------------------------------|-----------------|
| - States review final draft MOUs | - 03/05 – 04/05 |
| - Resolve final MOU comments | - 04/05 – 05/05 |
| - Finalize MOUs | - 05/05 – 06/05 |

May 2004

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Schedule Contd.

- | • Action | • Dates |
|---------------------|-----------------|
| - Inform Commission | - 06/05 |
| - Execute MOUs | - 07/05 – 08/05 |

May 2004

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Summary

- Reducing the dual regulation of groundwater has been in the process for a considerable amount of time
- Hopefully the process will move along quicker than the proposed schedule
- Any questions or comments

May 2004

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Progress on the Draft Report:
Consideration of Geochemical Issues in Ground
Water Restoration at Uranium *In-Situ* Leach
Mining Facilities

NMA/NRC Uranium Recovery Workshop

Diana Diaz
U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

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- The Office of Research (RES), NRC
- The Office of Nuclear Material Safety and Safeguards (NMSS), NRC

Agenda

- Background
- Scope of Work
- Status & Progress
- Future Activities

May 2004

3

Background

- 10 CFR Part 40, Appendix A, Criterion 5
 - Ground water protection standards
- NUREG-1569, Section 6.1
 - Guidance: ground water quality restoration
- 10 CFR Part 40, Appendix A, Criterion 9
 - Financial surety for decontamination and decommissioning
- NUREG-1569, Section 6.5
 - Guidance: financial assurance

May 2004

4

Background

- Activities to be covered by surety include ground water restoration among others.
- One major cost of ground water restoration is related to the volume of water (i.e., pore volumes) pumped or recirculated through the ore zone.
- A proven pore volume estimation methodology (PVEM) is not available to the NRC.
- Few geochemical models of ground water restoration process exist in the literature.

May 2004

5

Scope of Work

- NRC staff identified the need to develop a project addressing PVEM.
- Serve as guidance to review pore volume calculations and surety requirements.
- Staff from RES and NMSS started to develop a preliminary PVEM.
 - The work didn't include geochemical processes.
- NMSS, through RES, contracted USGS to provide the geochemical information.

May 2004

6

Scope of Work

- The USGS project was divided into the following phases:
 - Assess technical issues and developed approaches
 - Integrate the geochemical approach into PVEM
 - The preliminary PVEM NRC staff developed is being used as a baseline
 - Test integrated methodology using field data

May 2004

7

Status & Progress

- USGS provided the 1st draft of the report in July 2003. The purpose of the report :
 - Geochemistry relevant to ground water quality restoration
 - Focused on U, Se, As, V
- PHREEQC computer code
- Ground water restoration effort
 - Groundwater sweep
 - Reverse osmosis with re-injection
- Database to test integrated methodology: Ruth ISL facility

May 2004

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Status & Progress

- Topics covered in the draft report include:
 - Geochemical characteristics of U roll front deposits (for WY Basins, TX Coastal plains)
 - Aqueous geochemical reactions during ISL operations
 - Ground water restoration & modeling
 - Reactive transport simulations
 - 1 pore volume → ground water sweep
 - Additional pore volumes → reverse osmosis
 - Aquifer parameters modified
 - Two simulations → adding H₂S

May 2004

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Status & Progress

- NRC staff reviewed the draft report and provided comments to USGS.
 - Preferable to carry out more pore volumes
 - Additional studies of the groundwater stabilization phase

May 2004

10

Future Activities

- USGS is addressing NRC comments
- A report will be issued in July 2004
- Potential briefing at a public meeting

May 2004

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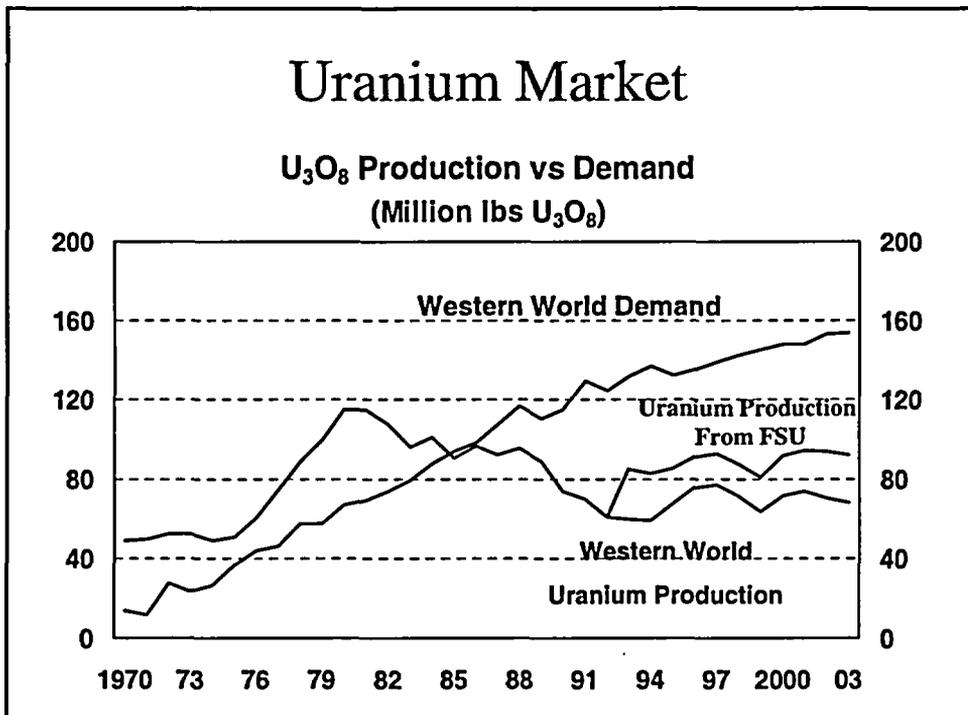
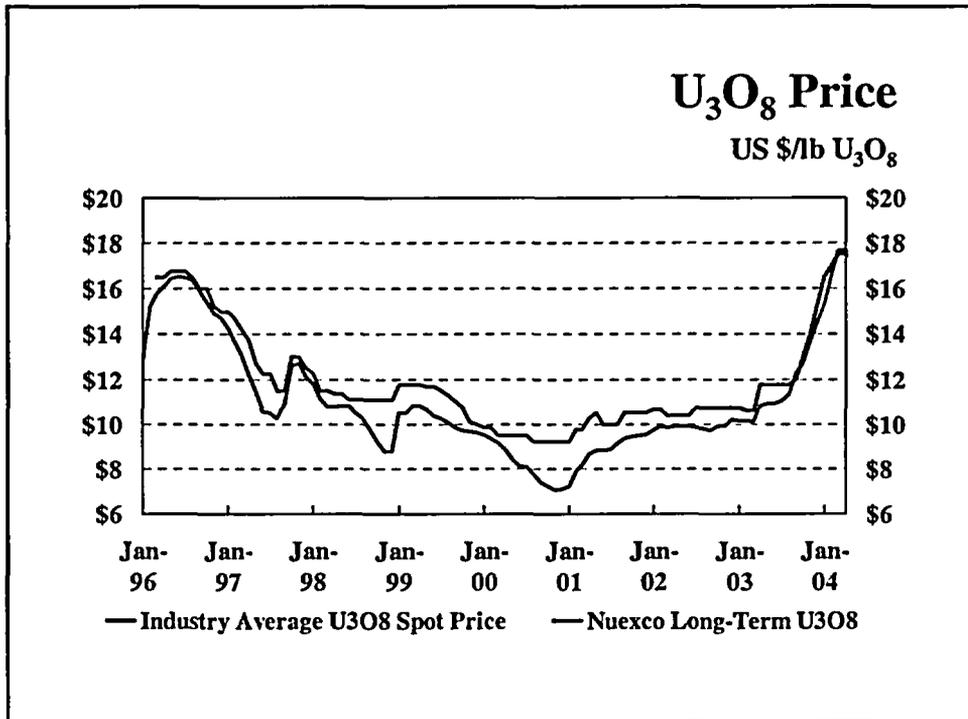
**THE NATIONAL MINING ASSOCIATION (NMA)
NUCLEAR REGULATORY COMMISSION (NRC)
URANIUM RECOVERY WORKSHOP**

**May 18-19, 2004
Executive Tower Hotel, Denver, Colorado**



**URANIUM
CONSUMPTION, SUPPLY
AND
PRODUCTION UPDATE**

**Fletcher T. Newton
President & CEO
Power Resources, Inc.**



Uranium Market

1996 Planned Production

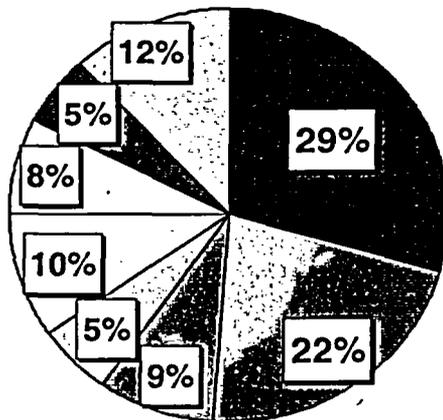
2004 Planned Production

Source: UxC

Uranium Market

92 million lbs U_3O_8

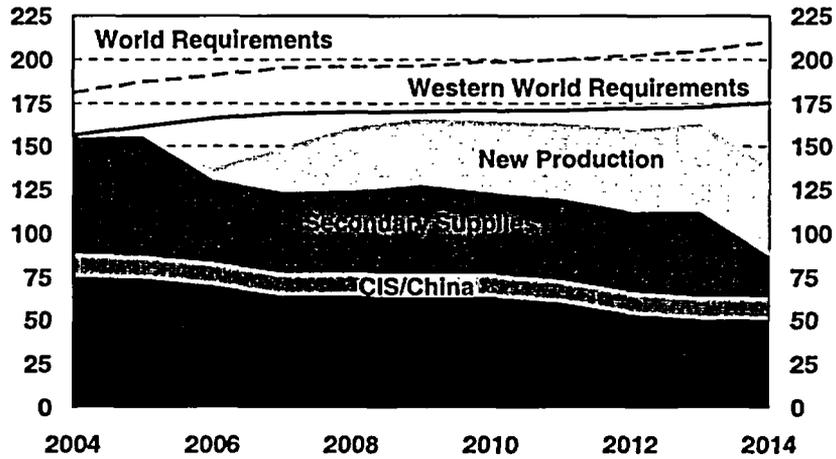
2003 Estimated World Uranium Production



- Canada
- ▣ Australia
- ▣ Niger
- Namibia
- Kazakh
- Russia
- Uzbek
- Other

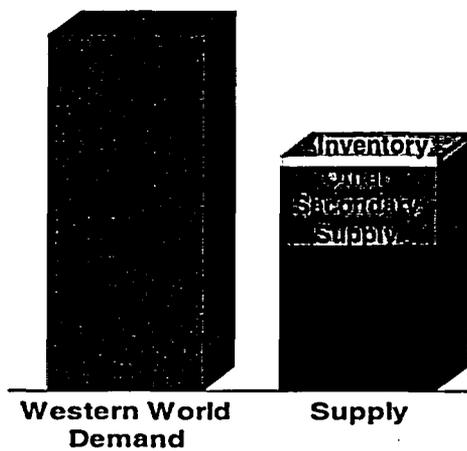
U₃O₈ Supply/Demand

Million lbs U₃O₈

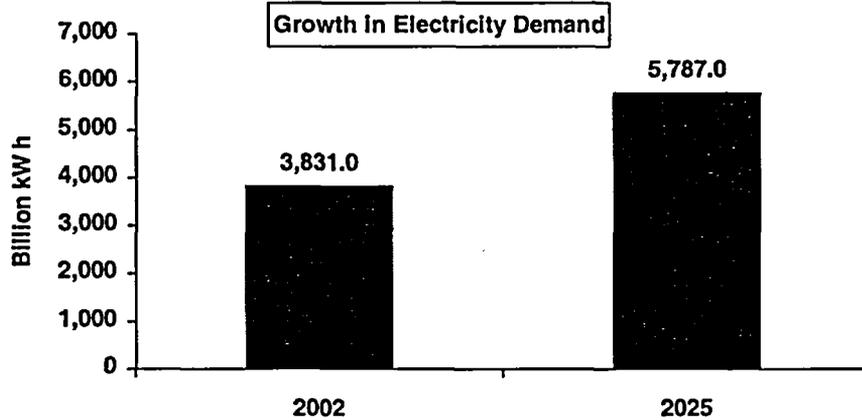


U₃O₈ Supply/Demand

2004-2020

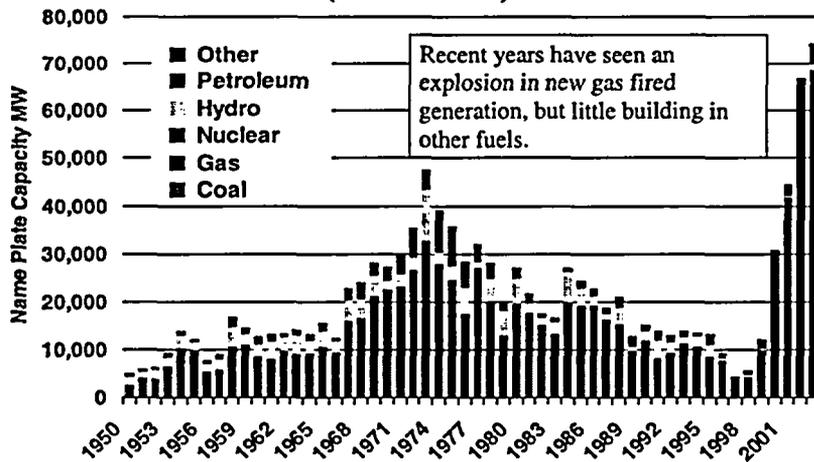


U.S. Needs 50 Percent More Electricity By 2025



Source: EIA Annual Energy Outlook - Updated 05/04

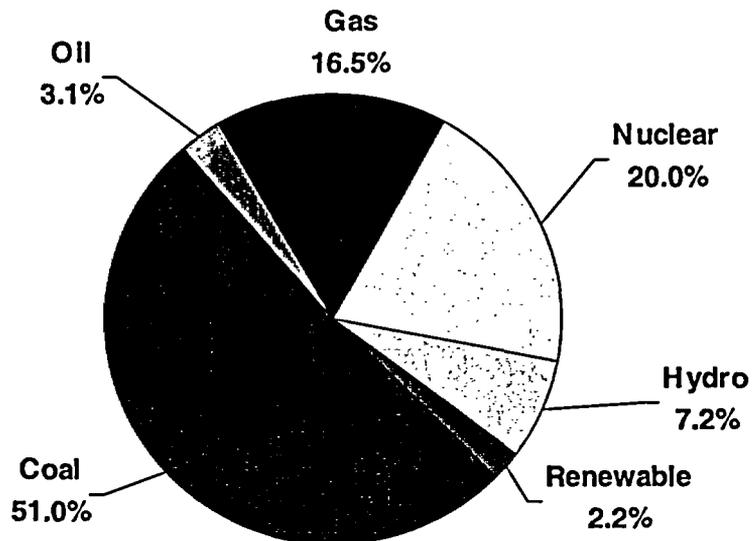
Capacity Brought on Line by Fuel Type (1950-2002)



Source: RDI PowerDat database. Last updated 9/15/03.



Share of Total US Electricity Generation by Fuel (2003)



Source: EIA Updated 04/04



US Electricity Generation Fuel Shares (1973 vs 2003¹)

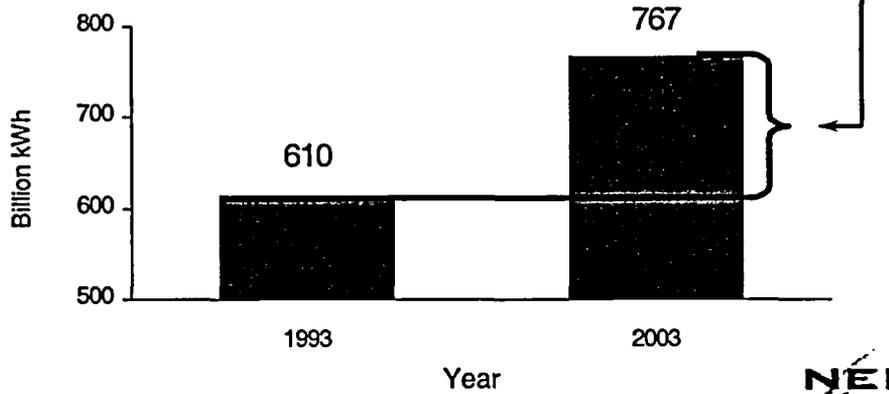
Fuel Type	1973	2003
Nuclear	4.5%	20.0%
Coal	45.6%	51.0%
Oil	16.9%	3.1%
Gas	18.3%	16.5%
Hydro	14.6%	7.2%
Other	0.1%	2.2%

¹Includes utility and non-utility generation
Source: EIA - Updated 04/04



Nuclear Plant Output: Growth During the Last 10 Years

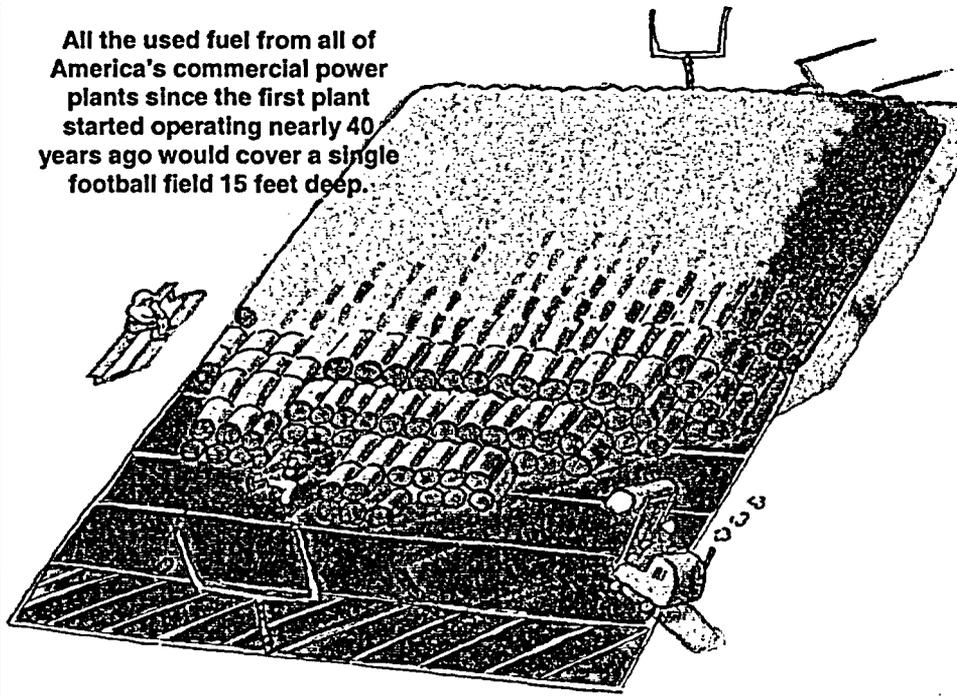
Equivalent to 19 new 1,000-megawatt power plants



Source: NRC - Updated 04/04

NEI

All the used fuel from all of
America's commercial power
plants since the first plant
started operating nearly 40
years ago would cover a single
football field 15 feet deep.

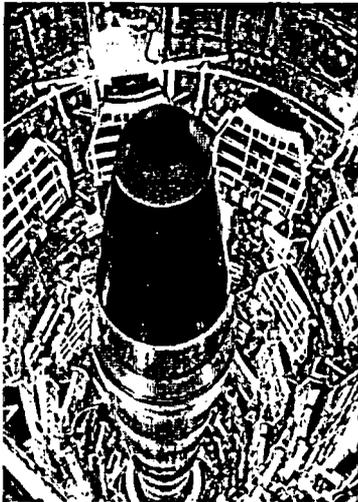


MECHANICS of High Enriched Uranium ("HEU") AGREEMENT

- Russia takes weapons grade metallic HEU (> 90% U²³⁵) and converts the material to low-enriched UF₆ ("LEU") that contains 4.5% U²³⁵.
- Technobexport (the commercial arm of Russia's Ministry of Atomic Energy) sometimes called Tenex, ships the LEU to the United States Enrichment Corporation ("USEC") at Paducah, Kentucky.
- USEC gives back to Tenex at Paducah natural (i.e., un-enriched UF₆) thereby only purchasing the enrichment services (SWU's) contained in the LEU received from Tenex.
- Tenex sells a portion of the natural UF₆ (known as the "HEU feed") to the "consortium," consisting of Cameco, Cogema (Areva), and Nukem. The remaining HEU feed is shipped back to Russia for use in further downblending or delivery into existing contracts in Russia and the former Soviet-bloc states.
- In November 2003, Tenex terminated its agency agreement with Global Nuclear Services and Supply ("GNSS"), effective December 31, 2003. GNSS has sold its allotment of HEU feed only through 2007. Therefore, GNSS' share of HEU feed for the period 2008-2013 (a quantity ranging between approximately 12,000 to 16,000 MTU as UF₆, containing approximately 30 to 40 million pounds U₃O₈ equivalent has been removed from the market).

2003 Update - HEU Feed

Overview of the HEU Feed Deal



The Megatons to Megawatts program is a unique, commercially financed government-industry partnership in which bomb-grade uranium from dismantled Russian nuclear warheads is being recycled into fuel used by American power plants to produce electricity.

By 2013, when the program is completed, 500 metric tons of Russian nuclear warhead material (the equivalent of 20,000 warheads) will have been recycled into enough fuel to power the entire United States for about two years.

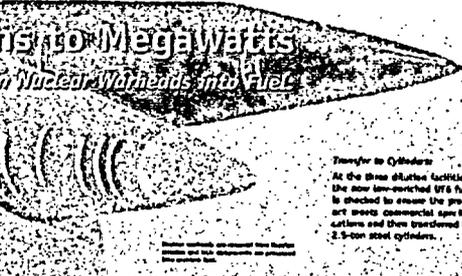
The program celebrated the 10th anniversary in February 2004 with the elimination of an estimated 200 tons of Russian weapons-grade uranium -- equivalent to 8,000 nuclear weapons. Better still, this material is being recycled into fuel for U.S. nuclear power plants, enough to power a large U.S. city for nearly 300 years.

Megatons to Megawatts

Turning Russian Nuclear Warhead into Fuel

Step by Step

Disassembly
The components of Russian nuclear warheads are disassembled into their constituent parts. The highly enriched uranium (HEU) warheads are broken up into small pieces, and the uranium is separated from the rest of the warhead components from shipping and tactical nuclear warheads.

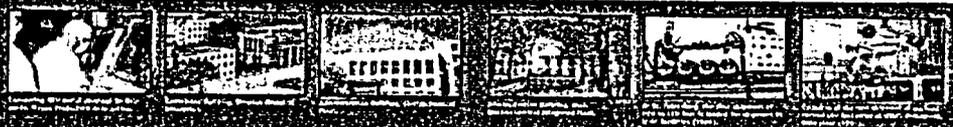


HEU warheads are disassembled into their constituent parts.

Transfer to Cylinders
At the three dilution facilities, the now low-enriched UFG fuel is checked to ensure the product meets commercial specifications and then transferred to 2.5-ton steel cylinders.

Shipment to St. Petersburg
The uranium fuel is enclosed in shipping containers and sent to a collection point in St. Petersburg. USEC takes possession of the fuel containers in St. Petersburg and they are shipped to USEC's facilities in the United States.

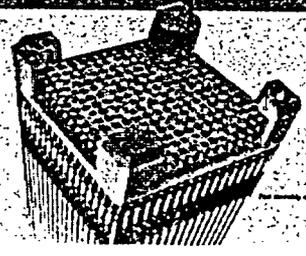
Arrival at USEC
At USEC's facilities (originally the Portsmouth plant but now the Paducah plant), the LEU is tested again to ensure that it meets appropriate commercial and customer specifications. If necessary, the enrichment level of the uranium fuel can be further adjusted to meet utility customers' needs.



Disassembly
At the Siberian Chemical Enterprises (SChE) (formerly Tomsk-7) in Seversk and the Mayak Production Association (MPA) near Oznegsk, the HEU warhead components are machined into metal shavings. The shavings are then heated and converted to an HEU oxide and any contaminants are chemically removed.

Fluorination
At SChE and the Electrochemical Plant (ECP) near Tomskensk, the HEU oxide is converted to highly enriched uranium hexafluoride (UFG), a compound that becomes a gas when heated.

Dilution
At SChE, ECP and the Ural Electrochemical Integrated Plant (UEIP) near Ekaterinburg, the highly enriched UFG is introduced into a gaseous process stream. There, it mixes with other materials and is diluted to less than 5 percent concentration of the fissionable uranium-235 isotope, a level too low to be of any military value but ideal for producing electric power.



Shipment to Fabricators
Based on customer instructions, USEC ships the LEU fuel to fabricators (Global Nuclear Fuel, Framatome or Westinghouse), who convert the LEU into uranium oxide pellets and fabricate them into fuel assemblies. The assemblies are then shipped to USEC's utility customers as a source of fuel for their nuclear reactors.

In greater confidence that the LEU fuel from Russia is securely stored from national sources, the U.S. Department of Energy and the Federal Nuclear Security Administration submitted to IAEA remaining material, through the program, all amount of the HEU in UFG process in the plants listed since an agreement.

The New DOE Office of Legacy Management and What This Means to You

**Donna Bergman-Tabbert
Director, Office of Land and Site Management**

**2004 NRC/NMA Workshop
May 18–19, 2004
Denver, Colorado**



Legacy Management Mission

- **Mission**
 - **To manage the Department's post-closure responsibilities and ensure the future protection of human health and the environment**

Legacy Management Goals

- **Goals**
 - **Long-Term Surveillance and Maintenance**
 - **Protect human health and the environment through effective and efficient long-term surveillance and maintenance**
 - **Land and Asset Management**
 - **Manage legacy land and assets, emphasizing safety, reuse, and disposition**

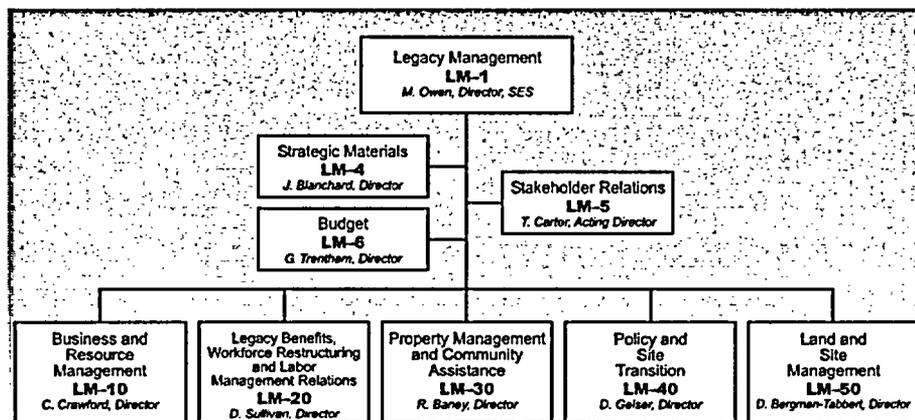
3

Legacy Management Goals

- **Goals (continued)**
 - **Work Force Restructuring and Benefits Management**
 - **Support an effective and efficient work force structured to accomplish departmental missions and ensure worker pension and medical benefits**
 - **Records and Information Management**
 - **Preserve, protect, and provide access to legacy records and information**

4

Office of Legacy Management



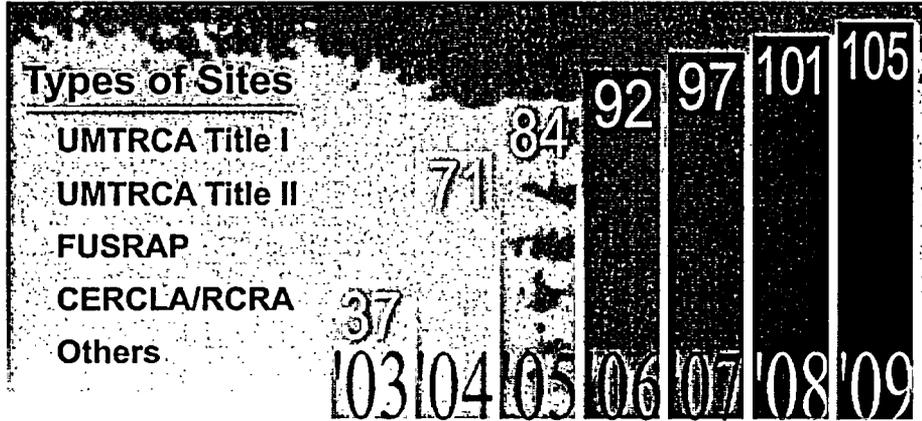
5

Office of Land and Site Management (LM-50)

- Implement long-term surveillance and maintenance projects at sites under LM responsibility
- Ensure sustained protection of human health and the environment
- Manage transition of UMTRCA Title II sites to LM

6

Projected Numbers of Sites in Legacy Management



7

Legacy Management Sites as of 2010



8

DOE Points of Contact for Title II Sites

Points of Contact	Site Locations
Art Kleinrath, LM-50 (970) 248-6037 art.kleinrath@gjo.doe.gov	Washington and Wyoming
Michael Tucker, LM-50 (970) 248-6004 michael.tucker@gjo.doe.gov	Colorado and Utah
Jon Sink, LM-50 (970) 248-6016 jon.sink@gjo.doe.gov	New Mexico
Louis McGee, LM-50 (304) 285-4116 lmcgee@netl.doe.gov	Texas
Steve Schiesswohl, LM-30 (303) 966-6601 steve.schiesswohl@rf.doe.gov	Real Property Specialist

9

Status of Title II Site Transfers to DOE

- **Bear Creek, Wyoming**
 - Awaiting resolution of mineral rights issue and then real property transfer; all other work complete
- **L-Bar, New Mexico**
 - Awaiting final real property transfer; all other work complete
- **Petrotomics (Shirley Basin South), Wyoming**
 - Awaiting final real property transfer; all other work complete

10

Status of Title II Site Transfers to DOE (continued)

- **Durita, Colorado**
 - NRC awaiting state submittal of final reclamation evaluation/approval report
 - First draft of *Long-Term Surveillance Plan* complete
 - All site construction complete
 - Real property transfer effort started
- **Lucky Mc, Wyoming**
 - Real property transfer discussions initiated
 - First draft of *Long-Term Surveillance Plan* scheduled for completion by end of calendar year 2004

11

Status of Title II Site Transfers to DOE (continued)

- **DOE will have completed first draft of a *Long-Term Surveillance Plan* by close of fiscal year 2004 for the following sites**
 - Rio Algom Lisbon Valley, Utah
 - Exxon Highlands, Wyoming
 - Umetco Gas Hills, Wyoming
 - Plateau Resources Shootaring Canyon, Utah
 - Chevron Panna Maria, Texas

12



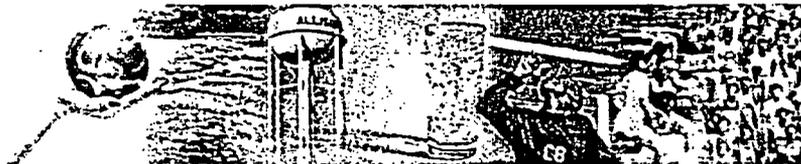
EPA Office of Ground Water and Drinking Water's Drinking Water Mapping Application (DWMA)

*A National Framework for Analyzing
Hydrogeologic Environments:
With a Focus on UIC Issues*



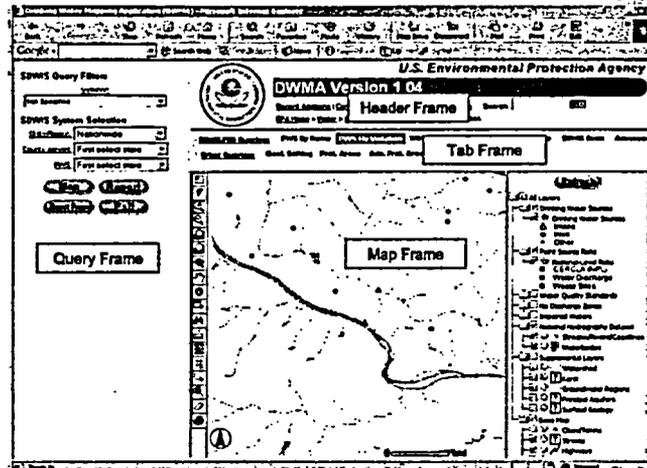
DWMA Overview

- Identifies potential risks to surface water and groundwater used for public drinking water
- Currently provides desktop mapping, query, analysis, and reporting functions for key drinking water layers
- Generates query driven maps, graphics, and reports at a variety of spatial scales
- A secure Web-based geospatial intra-net application
- Built with ArcIMS, ArcSDE, Oracle



Web Interface

- Combines queries and maps
- National and local scale queries



ERTI

EPA United States
Environmental Protection Agency

Data Sources

- Drinking water sources (intakes and wells)
 - Source water protection areas
 - Point sources of contamination including wastewater dischargers, hazardous waste disposal sites, & Superfund sites
 - Non-point sources of contamination including fertilizer use, herbicide use, and animal wastes
 - Surface waters represented by the NHD (National Hydrography Dataset)
 - Groundwater represented by USGS digital map products (aquifers) and digitized overlays from paper reports (groundwater atlases and water supply reports)
- ■ UIC Class I well locations

ERTI

EPA United States
Environmental Protection Agency

DWMA Hydrogeologic Reference System

- Information on principal aquifers and regional geology from standard USGS sources
- GIS overlays with information on UIC wells and drinking water wells
- Overlays for a variety of other environmental data layers
- Work in process to define queries for particular ground water management concerns



Hydrogeologic Reference System

U.S. Environmental Protection Agency
DWMA Version 1.04

Record Address | Contact Us | Home | Features | Usage | Search

RTA Home • Home • Ground Water and Drinking Water • DWMA

DWMA PWS Database
 PWS By Name
 PWS By Population
 WQS
 Point Source
 Nonpoint Source
 SDWA's Basin
 Advanced

Direct Discharge
 Geol. Settings
 Prot. Areas
 Adv. Prot. Areas
 RCRA
 CERCLA

No queries are currently available for the Geology Reference tab.

Layers

- Drinking Water Sources
- UIC Wells
- Point Source Data
- National-Level Data
 - CERCLA (PLU)
 - Water Discharge
 - Waste Sites
- Protection Areas (PA)
- Florida Geologic Survey
- Geologic Map of the State of FL
- Ground Water Atlas of the US
- Todd (1983) Ground Water Resources
- USGS National Water Summary
- Health Action Partners
- Cross Sections
- National Hydrography Dataset
 - Streams, Rivers, Canals, etc.
 - Waterbodies
- Supplemental Layers
 - Watershed
 - Land
 - Metropolitan Region

Plot: 1394425_41_736473_35 - Image: 258 x 258 - Scale factor: 228.74949278951



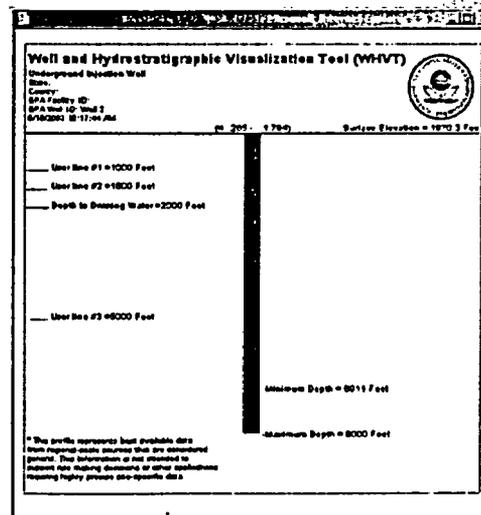
DWMA Well Visualization Tool

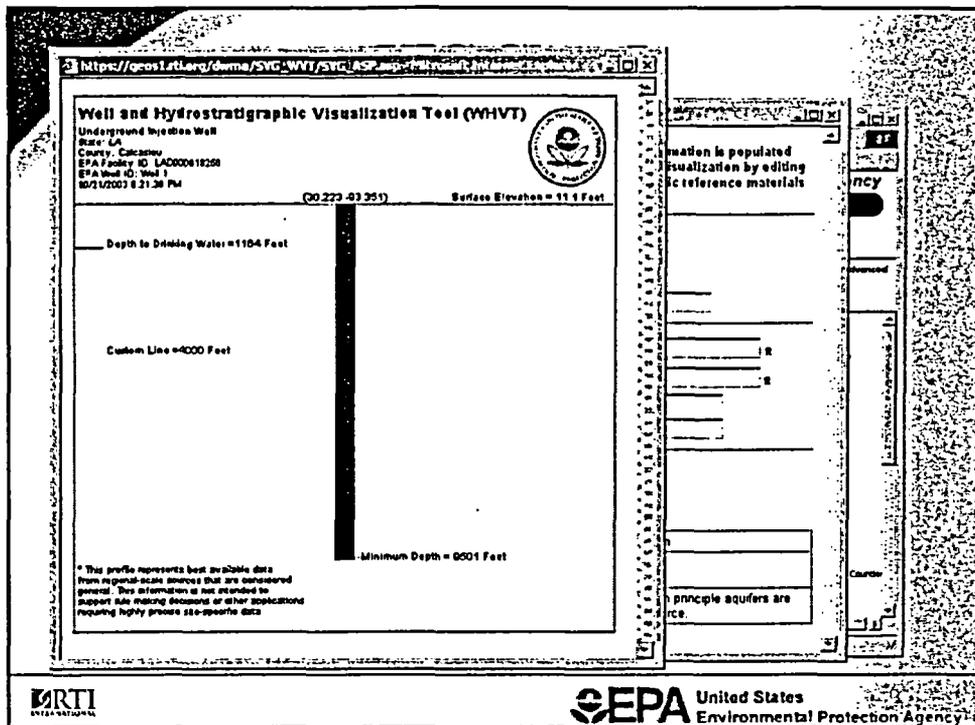
- In addition to views at the land surface, tools are under development to provide 2D and 3D geological cross-sections
- For the UIC program, helps document ways that risks are minimized for underground sources of drinking water
- Provides site specific background information for technical specialists
- Helps program managers to illustrate policy options for different regions and geological settings



Well Visualization Tool: UIC Applications

- Generate custom well profile by clicking on a well
- Show existing or user-defined depths of interest (e.g., depth to drinking water above an injection well)
- Planned enhancements include geology, cross sections, water supply wells and monitoring wells





DWMA Overview

- Identifies potential risks to surface water and groundwater used for public drinking water
- Currently provides desktop mapping, query, analysis, and reporting functions for key drinking water layers
- Generates query driven maps, graphics, and reports at a variety of spatial scales
- A secure Web-based geospatial intra-net application
- Built with ArcIMS, ArcSDE, Oracle

RTI International | EPA United States Environmental Protection Agency

Data base entry form

Aquifer Exemption Database (AQEX)

LIC Permit #/Ref. ID/File No.:

Select Region and State from pull-down list EPA Region: State: (DO NOT TYPE IN THIS FIELD)

County: #FIPS Code 1 (DO NOT TYPE IN THIS FIELD)

Additional County: #FIPS Code 2 (DO NOT TYPE IN THIS FIELD)

Additional County: #FIPS Code 3 (DO NOT TYPE IN THIS FIELD)

Name of Originating Agency:

Entity Granted Exemption:

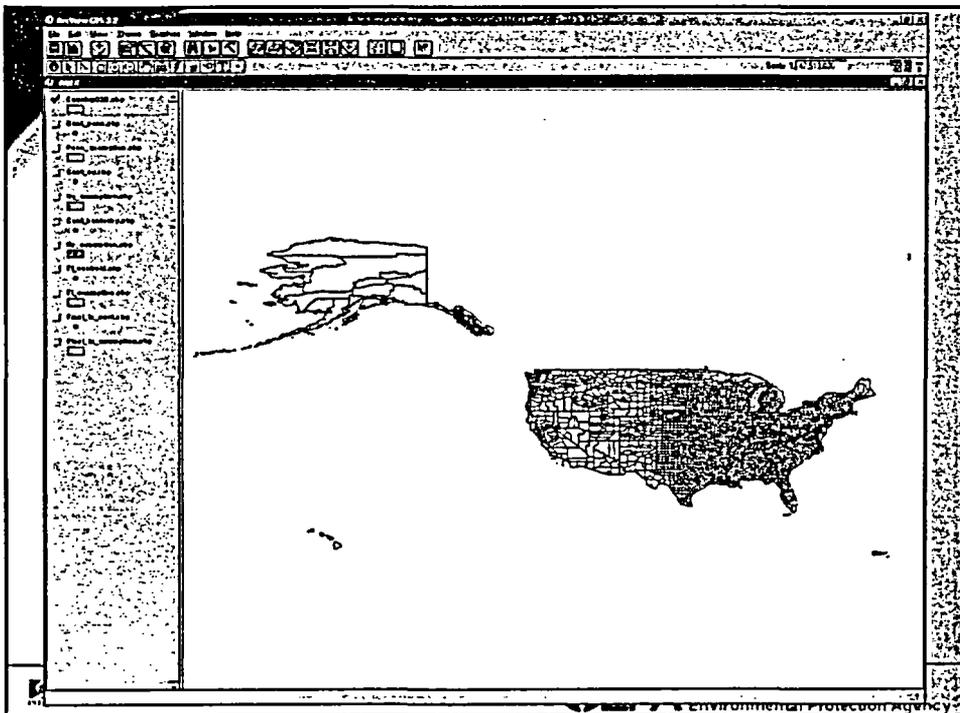
Street Address:

City, State, Zip Code:

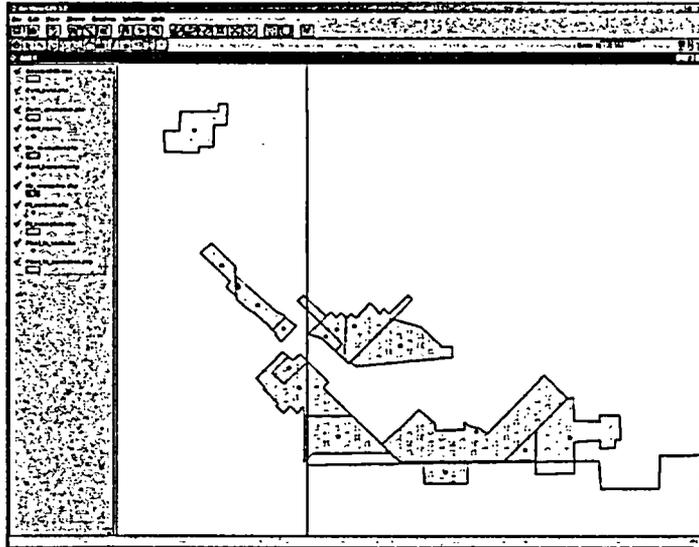
Indian Nation? Name of Indian Nation:

Exemption Type: Date Exemption Granted (MM/DD/YYYY):

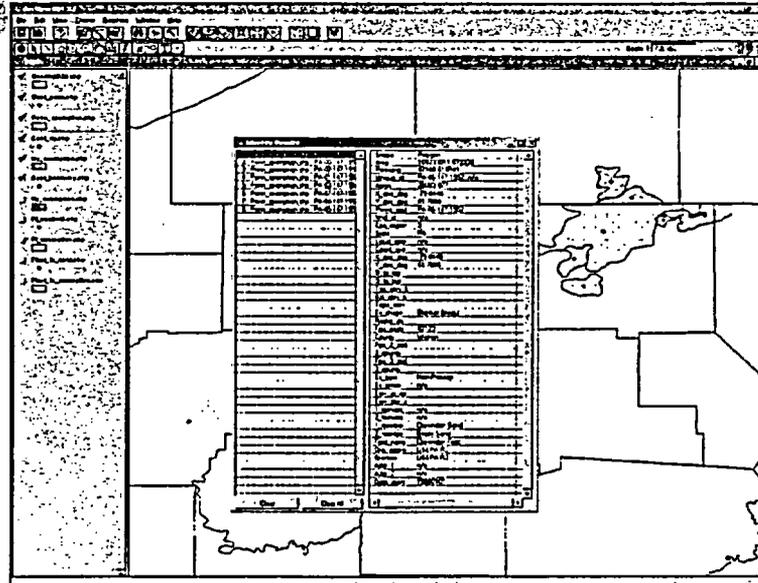
Exemption Criteria:



Polygons with centroids



Polygon and Data



Typical information for the exemptions

Attributes of final_exemption.shp

UR ID	UR ID	UR ID	UR ID	UR ID	UR ID
UR02827-001a n/a	-97.7776	27.4424	UR02827-001a	n/a	
UR02827-001 n/a	-97.7999	27.4560	UR02827-001	n/a	
UR02463-001a n/a	-98.8414	27.4635	UR02463-001a	n/a	
UR02156-001a n/a	-98.7824	27.4374	UR02156-001a	n/a	
UR02156-001b n/a	-98.7718	27.4394	UR02156-001b	n/a	
SU50501 Area 1	-104.1432	31.6268	SU50501	Area 1	
SU50501 Area 2	-104.2296	31.6035	SU50501	Area 2	
UR02381-001a n/a	-97.9906	28.1750	UR02381-001a	n/a	
UR02463NW of Brun Fault n/a	-98.8294	27.4517	UR02463NW of Brun Fault	n/a	
UR02463SE of Brun Fault n/a	-98.8141	27.4375	UR02463SE of Brun Fault	n/a	
UR02914-001 n/a	-98.7174	27.3503	UR02914-001	n/a	
UR01941-001a n/a	-98.8108	27.4139	UR01941-001a	n/a	
UR02154-001 n/a	-98.2218	28.2767	UR02154-001	n/a	
UR01949-001 n/a	-98.0539	28.4813	UR01949-001	n/a	
UR02108-001 n/a	-98.0636	28.4635	UR02108-001	n/a	
UR01890-001a n/a	-98.1921	28.2254	UR01890-001a	n/a	
UR01890-001 n/a	-98.2127	28.2437	UR01890-001	n/a	
UR01941-001 n/a	-98.8046	27.4020	UR01941-001	n/a	
UR02368-001 n/a	-98.1930	28.2853	UR02368-001	n/a	
UR02185-001 n/a	-98.7440	27.4374	UR02185-001	n/a	
UR02312-001 n/a	-98.7869	27.4333	UR02312-001	n/a	
UR02441-001 n/a	-98.6440	27.3711	UR02441-001	n/a	
UR02430-001 n/a	-98.6714	27.3638	UR02430-001	n/a	
SU50505 n/a	-94.6343	29.8520	SU50505	n/a	
SU50506 n/a	-95.9054	29.2789	SU50506	n/a	
SU50502 n/a	-102.7641	31.0684	SU50502	n/a	
SU50504 n/a	-102.8471	30.9869	SU50504	n/a	
SU50503 n/a	-96.3452	30.4673	SU50503	n/a	





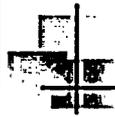
NRC / Utah Agreement State Application: Progress and Current Status

NRC / NMA Workshop
Denver, CO
May 19, 2004

05/26/2004

Agreement State Application

1



Introduction

- Progress Since June, 2003
- Current Status
- Lessons Learned

05/26/2004

Agreement State Application

2



Progress

- 6/27/03 – NRC Comments on State Application

- 7/18/03 – DRC Revised Final Application
 - Radioactive Materials License
 - State Groundwater Discharge Permit

05/26/2004

Agreement State Application

3



Progress – cont'd

- 8/27/03 – NRC Federal Register Notice
 - State GW Program is Protective
 - Request for Comments on Alternative Standards for Groundwater Protection

05/26/2004

Agreement State Application

4



Progress – cont'd

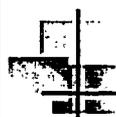
- 10/24/03 NRC Federal Register Notice
 - NRC amends ADAMS system
 - Extends comment period to 11/24/03.

- 12/23/03 – State Letter to NRC
 - Discuss transition issues
 - Discuss staffing needs

05/26/2004

Agreement State Application

5



Progress – cont'd

- 1/7/04 – Meeting with Rio Algom (SLC)
 - Discuss GW remediation needs
 - Discuss License transfer process
 - Follow-up conference call with NRC on 1/15/04.

05/26/2004

Agreement State Application

6



Progress – cont'd

- 2/6/04 – NRC Assessment: State Application
 - Authority / Supporting Legislation
 - Environmental Assessments
 - Regulations
 - Organizational Relationships within State
 - Personnel / Functions to be Covered
 - Instrumentation

05/26/2004

Agreement State Application

7



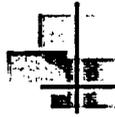
Progress – cont'd

- 2/12/04 – NRC Federal Register Notice
 - Organization and Personnel
 - Legislation and Regulations
 - Evaluation of License Applications
 - Inspections and Enforcement
 - Regulatory Administration
 - Cooperation with Other Agencies
 - **Utah Program meets NRC requirements**
 - Repeat FR Notices: 2/19, 2/25, and 3/4/04

05/26/2004

Agreement State Application

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Progress – cont'd

- 2/10-13/04 – Meetings with IUC (SLC)
 - Negotiate State GW Permit Content.
 - Negotiate Statement of Basis.
 - Determine information needs and schedule.

05/26/2004

Agreement State Application

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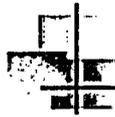
Progress – cont'd

- 3/15/04 - Comment Period Expired
 - 3 Comments Received
 - 1 Citizen,
 - U.S. FWS, and
 - IUC

05/26/2004

Agreement State Application

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Current Status

- State GW Permit for IUC
 - Permit prepared.
 - Statement of Basis in process.
 - Public comment period to begin soon.

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Current Status – cont'd

- NRC Staff Paper
 - In preparation – Comments Resolved
 - Delivery to Commission – 6/1/04

- 2 Decisions Before Commission
 - Alternate GW Standards
 - Approve Agreement

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Lessons Learned

- Process is lengthy and iterative

05/26/2004

Agreement State Application

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***CHANGES TO THE REGULATIONS FOR
SAFE TRANSPORT OF RADIOACTIVE
MATERIALS***

**NMA/NRC URANIUM RECOVERY
WORKSHOP
DENVER, COLORADO**

MAY 19, 2004

U.S. NRC / DOT RULEMAKING

- ◆ **January 26, 2004 Fed. Reg. (69 FR 3632, 3698)**
- ◆ **Effective October 1, 2004**
- ◆ **Objective: Harmonization with IAEA TS-R-1**
- ◆ **Ambiguities and adverse effect on 'alternate feedstock' materials**

New Definition of "Radioactive Material"

- ◆ **Current: 70 Bq/g (2000 pCi/g) as total specific activity**
- ◆ **New: Radionuclide – Specific exemption concentrations**
- ◆ **U-nat, Th-nat = 1.0 Bq/g; Ra-226 = 10 Bq/g**
- ◆ **Exceeding activity concentration AND consignment activity limit = Class 7 (Radioactive)**

Why Radionuclide Specific Exemption Values?

- ◆ **70 Bq/g = technology-based standard**
- ◆ **ICRP 60, later IAEA BSS 115 "trivial dose" exemption = 1 mrem/yr**
- ◆ **EC transportation model for 20 radionuclides: 70 Bq/g > 1 mrem/yr**
- ◆ **Exemption concentrations reduced for some (but not all) radionuclides**

Limitation of Scope of Regulation

The regulations do not apply to:

Natural material and ores containing naturally occurring radionuclides which are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in § 173.436.

Origins of IAEA Exemption Language

- ◆ **1 Bq/g would extend regulation to vast quantities of mineral ores and products**
- ◆ **Bias against "intentional" use of radionuclides, e.g., fuel cycle**
- ◆ **"10 x" exemption = compromise**
- ◆ **Not available to materials "intended to be used" for radionuclide content**

Problems with new “radioactive material” definition

- ◆ **“Intent-based” test for whether a material is radioactive**
- ◆ **Unrelated to level of hazard presented during transportation**
- ◆ **Materials destined for “alternate feedstock” may become Class 7**
- ◆ **Consider: 3 Bq/g U-nat waste for disposal = non-radioactive**
- ◆ **Same material as alternate feed = radioactive**

What is “Natural Material?”

- ◆ **DOT: cement, coal, fertilizers, gypsum, residues from mining, smelting**
- ◆ **Processed minerals = natural materials (provided not processed for rad content)**
- ◆ **How much processing before no longer “natural?”**
- ◆ **What about equilibrium?**

Other issues

- ◆ **For materials not in equilibrium, how does §173.436 footnote (b) apply?**
- ◆ **"Mixture rule" of §173.433?**
- ◆ **Must a generator assess all radionuclide activity concentration in its material?**
- ◆ **Availability of gamma-spec / alpha spec in lieu of complete isotopic analysis?**

Going Forward

- ◆ **DOT / NRC rules must be consistent with but not necessarily identical to IAEA TS-R-1 (49 USC 5120)**
- ◆ **Remove "intent-based" determination of radioactive for domestic US transportation**
- ◆ **NRC/DOT soliciting input on TS-R-1 (69 Fed. Reg. 25656, May 7); comments by June 7**
- ◆ **Guidance needed from DOT/NRC on scope of natural materials**
- ◆ **Stakeholders need to be more proactive with respect to IAEA – what happens in Vienna ultimately affects US regulations**

Changes to the Regulations for Safe Transport of Radioactive Materials

Charles T. Simmons¹

I. Introduction

On October 1, 2004, certain changes in the U.S. regulations governing the transportation of radioactive materials will become effective. (See: 69 Fed. Reg. 3632, 3698, January 26, 2004.) This paper is not intended to be an exhaustive analysis of all relevant changes, but will take a critical look at the provisions for exemption that will likely affect – in an adverse manner – the types of low-activity materials being transported for uranium recovery. This paper also discusses how this situation came about and how it may further evolve in the future. A discussion of the International Atomic Energy Agency rulemaking activities and the need for improved interaction with affected stakeholders is included.

II. Changes to the definition of “radioactive” material.

A. Background

Persons who transport or offer materials for transportation are responsible for the proper classification of those materials under U.S. NRC and DOT rules, set forth at 10 C.F.R. Part 71 and 49 C.F.R. Part 173, respectively. Both regulatory agencies have authority over the transportation of radioactive materials – NRC’s rules govern the transportation of radioactive material under NRC’s jurisdiction pursuant to the Atomic Energy Act of 1954 (42 U.S.C. 2011, et seq; “AEA”), whereas DOT’s rules apply to non-AEA radioactive material. Both agencies’ rules are intended to be symmetrical, and to be generally harmonized with the Basic Safety Standards for Transportation of Radioactive Material published by the International Atomic Energy Agency (“IAEA”). But it is the DOT, and not NRC, that (with the exception of fissile materials) defines what is “radioactive material” for transportation purposes.²

For many years, the threshold for a material to be regulated as “Class 7 (radioactive) material” was 70 Bq/g (0.002 μ Ci/g), based on the *total specific activity* of the material being transported. This is a standard that – like the NRC Part 40 0.05% uranium and thorium threshold for licensable “source material” – is a technology-based standard and unrelated to protection of human health.³ The 70 Bq/g standard was relatively easy to

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² See: MOU between NRC and DOT, 44 Fed. Reg. 38690, July 2, 1979. “The DOT (in consultation with the NRC) will develop safety standards for the classification of radioactive materials...”

³ There is some anecdotal information that 2000 pCi/g was established to prevent photographic film transported in the same consignment from fogging.

understand and implement, and has served in non-transportation programs as a waste acceptance criterion at some RCRA Subtitle “C” disposal facilities.⁴

In 1996, the IAEA revised its existing transportation standard (Safety Series No. 6) as the ST-1 (renamed TS-R-1 in 2000) “Regulations for the Safe Transport of Radioactive Material,” which dramatically changed the manner in which radioactive materials were defined. TS-R-1 defines “radioactive material”—and thresholds for regulation as such—based on radionuclide-specific activity concentration thresholds for regulation instead of the more generic 70 Bq/g total specific activity threshold. In the case of natural uranium and thorium, the TS-R-1 exemption concentrations are 1.0 Bq/g. [DOT’s new rule adopts these exempt material activity concentrations and exempt consignment activity limits for radionuclides in 49 C.F.R. 173.436.] This change represents a dramatic downward adjustment in activity concentration of natural radionuclides that are exempt from classification as radioactive material for transportation purposes.

B. How were the IAEA exemption values derived?

In the early 1990s, IAEA embarked on a course of re-defining the transportation classification of “radioactive material” based on the modeled dose received by transportation workers and members of the public under a variety of scenarios. This was prompted by the IAEA’s Basic Safety Standards for Protection Against Ionizing Radiation 115 (“BSS 115”), first published in 1994, which set thresholds for allowable worker and public exposures based on International Commission on Radiological Protection Publication 60 (“ICRP 60”). Because BSS 115 applies to all workers and members of the public, IAEA re-visited the transportation regulations with the BSS guidelines in mind. Under the BSS, the concept of “exemption from regulatory control” is interpreted to mean that a practice will not result in an individual annual dose exceeding 10 μ Sv (1 mrem). Relying heavily on modeling done by the European Commission for 20 commonly transported radionuclides,⁵ the IAEA concluded that doses exceeding 1.0 mSv/yr (100 mrem/yr) could be expected under the 70 Bq/g exemption for Ra-226, Th-232 and U-238, and that, in general, exemption values should be reduced to more closely approximate the BSS criterion for exemption. For the natural radionuclides of interest in uranium recovery, namely U-238, Th-232 and Ra-226, the transportation exemption values were established at 1.0 Bq/g. [DOT’s preamble to the final rule suggests that lowering the regulatory threshold does not result in approaching the 1 mrem/yr “trivial dose” envisioned by IAEA: “the proposed exemption activity concentration levels would be reduced from about 0.5 mSv (50 mrem) to about 0.23 mSv (23 mrem)...” 69 Fed. Reg. at p. 3635.]

C. IAEA Exemption of “Natural Materials and Ores.”

IAEA became aware that lowering the exemption threshold for natural radionuclides

⁴ See: State of Idaho Permit No. IDD073114654 at page C-17c.

⁵ Commission of the European Communities, *Radiation Protection 65: Principles and Methods for Establishing Concentrations and Quantities (Exemption values) Below which Reporting is not Required in the European Directive*, Doc.XI-028/93 (1993).

could unintentionally increase the variety of materials in transportation that become regulated as “radioactive” through comments of interested parties⁶, and took affirmative steps to limit the scope of TS-R-1. However, the limitations on the scope of TS-R-1 are ambiguous, and biased against fuel cycle activities, and these defects have carried over to the new U.S. rules. A brief review of IAEA’s 1996 supporting documentation is needed in order to comprehend the intent of its drafters.

The IAEA expert Working Group that drafted the exemption language of TS-R-1 Paragraph 107 sought to exclude natural materials and ores from the classes of materials to be regulated as “radioactive” for transportation purposes. Paragraph 107, limiting the scope of TS-R-1, provides:

107. The Regulations do not apply to:

* * *

(e) natural material and ores containing naturally occurring radionuclides which are not intended to be processed for use of these radionuclides provided the activity concentration of the material does not exceed 10 times the values specified in paras 401-406.

Paragraph 107(e) emphasizes that natural materials and ores that are not part of the nuclear fuel cycle or otherwise processed for their radionuclide content are outside the scope of the regulation. Because most minerals and natural materials contain detectable concentrations of natural radionuclides, the universe of materials that could be considered to be technically “radioactive” -- and potentially subject to regulation -- is very large.

Paragraph 107(e) also expanded the exemption beyond ores to include ores and *natural materials* containing natural radionuclides. There are many materials of natural mineral origin that could not be strictly construed to be “ores,” but rather are products made from ores.

Notwithstanding the plain language of Paragraph 107(e), the practical application of this Paragraph remains ambiguous. Referring to Paragraphs 401-406 of TS-R-1, the exemption values for natural uranium (“U-nat”) is 1 Bq/g, and according to Paragraph 107, mineral ores and natural materials would be excluded from the scope of ST-1 provided the specific activity was below 10 Bq/g. While the Table listing for natural U refers to footnote (b), which in turn summarizes the decay progeny for natural radionuclides, it is not entirely clear from the language in Paragraph 107 or footnote (b) whether it is the specific activity of the *parent nuclide* or the total specific activity of the sum of all nuclides in the U decay sequence that is to be considered in determining whether a material is outside the scope of TS-R-1. The same is true for natural thorium.

⁶ See: *Comments on International Atomic Energy Agency Fourth Draft of Safety Series No. 6* (Feb. 19, 1996).

Fortunately, the record of TS-R-1's development and subsequent documentation from IAEA make this clarification; unfortunately, the availability of these materials has been very limited and Paragraph 107(e), on its face, is ambiguous.

The Report From the Special Working Group on Exemption clarified that:

The factor 10 was selected taking the following considerations into account:

- the exemption values refer to the activity of the parent radionuclide, if daughter products are involved

Notwithstanding the omission of this important clarification, IAEA's subsequent *DRAFT ADVISORY MATERIAL FOR THE REGULATIONS FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIAL (1996 Edition) IAEA Safety Standards Series No. ST-2* (Feb. 19, 1999) [later finalized as TS-G-1.1] makes it clear that the exemptions of Para. 107 are determined on the basis of *parent* U-238 nuclide activity. The *Advisory Material* was published because "it became increasingly evident that, while the provisions of the [IAEA] Regulations might be essentially clear and unambiguous, nevertheless they would often also be highly technical in nature and unavoidably complex." *Id.* at page 2. The TS-G-1.1 guidance provided the following important clarifications to Section 107, as follows:

107.4. The scope of the Regulations includes consideration of those natural materials or ores which form part of the nuclear fuel cycle or which will be processed in order to use their radioactive properties. The Regulations do not apply to other ores which may contain naturally occurring radionuclides, but whose usefulness does not lie in the fissile, fertile or radioactive properties of those nuclides, provided that the activity concentration does not exceed 10 times the exempt activity concentration values. In addition, the Regulations do not apply to natural materials and ores containing naturally occurring radionuclides which have been processed (up to 10 times the exempt activity concentration values) where the physical and/or chemical processing was not for the purpose of extracting radionuclides, e.g. washed sands and tailings from alumina refining. ***Were this not the case, the Regulations would have to be applied to enormous quantities of material that present a very low hazard.*** However, there are ores in nature where the activity concentration is much higher than the exemption values. The regular transport of these ores may require consideration of radiation protection measures. Hence, a factor of 10 times the exemption values for activity concentration was chosen as providing an appropriate balance between the radiological protection concerns and the practical inconvenience of regulating large quantities of material with low activity concentrations of naturally occurring radionuclides.

TS-G-1.1 (emphasis supplied). It should further be noted that TS-G-1.1 includes the following important clarification:

401.8. It must be emphasized that, in the case of decay chains, the values in Table I columns 4 and 5 of the Regulations relate to the activity or activity concentration of the parent nuclide.

Thus, the IAEA's explanatory materials for TS-R-1 are relevant in clarifying the limitations on the scope of the regulation and should be considered important interpretive guidance on new NRC and DOT "harmonized" rules. IAEA was clearly aware that the TS-R-1 regulations could be applied to broad classes of minerals and natural materials and sought to provide appropriate relief from over-regulation of useful minerals and natural products in commerce.

The preamble to DOT's final rule (69 Fed. Reg. 3632, 3636, January 26, 2004) differs slightly from TS-G-1.1 and clarifies the Department's limitations on the scope of regulation follow TS-R-1:

The radioactive material transport regulations are intended to apply to natural materials or ores that form part of the nuclear fuel cycle, or that will be processed in order to utilize their radioactive properties. They do not apply to other natural materials or ores that may contain small amounts of naturally occurring radionuclides, when those materials or ores are to be used because of some other physical or chemical characteristics, provided that their activity concentration does not exceed 10 times the activity concentration in the table in § 173.436. The regulations also do not apply to natural materials and ores containing naturally occurring radionuclides when these have been subjected to physical or chemical processing, when the processing was not for the purpose of extracting radionuclides, again provided that their activity concentration does not exceed 10 times the activity concentration in the table in § 173.436. Examples of such materials are cement, coal, fertilizers, non-radioactive metals, gypsum, residues from mining and melting processes, etc.

Thus, insofar as "natural materials" and "ores" are concerned, the new DOT and NRC rules exempt these materials from classification as radioactive for transportation purposes, provided:

- The material does not exceed 10 Bq/g U-238 and Th-232 (assuming equilibrium); and
- The material *is not intended to be processed for use of its nuclides.*

III. Problems with the new "radioactive material" definition.

A. "Intent-based" definition of radioactive material.

For the first time in regulations governing the transportation of hazardous materials, DOT (and NRC) have introduced an "intent-based" test for describing whether a material is hazardous (Class 7 (radioactive)) or not. Consider a mineral ore or ore residue that

contains 5 Bq/g of natural uranium, in equilibrium with its progeny. Under new 49 CFR 173.401, the material is not “radioactive” because its uranium activity content is below 10 times the activity concentration for exempt material set forth in the 173.436 table, or 10 Bq/g.

On the other hand, if this same material at 5 Bq/g of natural uranium were being transported for use as “alternate feedstock” at a uranium recovery facility, it would become “radioactive material” for transportation purposes, and regulated as Class 7 (radioactive) if the total activity of the consignment exceed 1,000 Bq.⁷

We are hard pressed to see where the intended use of a natural material or ore bears any relationship to the level of hazard (or lack thereof) presented during transportation. In our opinion, the intent-based determination of Class 7 status is a relic of the anti-nuclear bias of the drafters of TS-R-1 that has carried over into U.S. regulations as an additional burden on persons who wish to transport materials for use as alternate feedstock.

Moreover, we do not see any legal constraint on DOT (and NRC) from removing the “intent-based” test insofar as domestic U.S. transportation is concerned. The Hazardous Materials Transportation Uniform Safety Act of 1990, Pub. L. 103-272 (108 Stat. 759) does not require DOT standards to be identical to IAEA’s. Rather, DOT may exercise its discretion in rejecting IAEA standards it deems unnecessary or inappropriate, pursuant to 49 U.S.C. Section 5120:

(2) Consultation.--The Secretary may consult with interested agencies to assure that, to the extent practicable, regulations issued by the Secretary pursuant to this section shall be consistent with standards adopted by international bodies applicable to the transportation of hazardous materials. *Nothing in this subsection shall require the Secretary to issue a standard identical to a standard adopted by an international body, if the Secretary determines the standard to be unnecessary or unsafe, nor shall the Secretary be prohibited from establishing safety requirements that are more stringent than those included in a standard adopted by an international body, if the Secretary determines that such requirements are necessary in the public interest.*

Id. (emphasis supplied). Accordingly, there is no statutory mandate compelling DOT rules to be identical to IAEA’s, and it is strongly recommended that a domestic exclusion be sought from the “intent-based” definition of Class 7 (radioactive) materials.

B. What are “Natural Materials?”

DOT’s final rule confirms that materials that are “natural materials” – in addition to ores – can invoke the 10-times-exemption value regulatory threshold (the “10x exemption”).

⁷ 49 CFR 173.403 provides “Radioactive Material means any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in the table in 173.436 or values derived according to the instructions in 173.433.”

DOT also clarifies that the “natural materials” definition extends to “cement, coal, fertilizers, non-radioactive metals, gypsum, residues from mining and melting processes, etc.” containing naturally occurring radionuclides provided that “benefits lie in their non-radiological qualities” (69 Fed. Reg. at p. 3655). Chemical and/or physical “processing” minerals does not necessarily remove them from the exemption (69 Fed. Reg. at p. 3636). This presumably includes crushing, grinding, calcining, leaching, etc. However, the regulations do not clarify how much processing can take place before a substance of mineral origin is no longer “natural.” The exemption would be unavailable, for example, for tailings from uranium milling, because these materials have been processed for their radionuclide content. Rare earths processing residues, on the other hand, would be considered under the natural materials exemption.

Another potentially problematic aspect of the “natural materials” exemption is the role of radionuclide equilibrium in deciding whether a material is “natural” and whether the “10x” exemption applies. While we do not see anything in DOT’s and NRC’s rule to clarify that secular equilibrium is the touchstone of being “natural,” we have seen regulators in other countries distinguish “natural” from “artificial” materials based on equilibrium of decay progeny. [Example: Netherlands officials asserted a ZrO_2 ore was “artificial” due to disequilibrium in Th-decay progeny.] At this juncture there is no clear guidance from either IAEA or U.S. authorities on how to determine whether a material is natural.

Further, because mineral residues of the type that might be amenable for alternate feedstock have been processed – chemically, thermally, or both – it would not be unexpected to find U-238 and Th-232 decay equilibria disrupted. In such case, the materials need to be assessed against exempt concentration values as a “mixture” of radionuclides pursuant to 48 CFR 173.433. To do so requires more detailed and time consuming analysis of individual radionuclide activity concentrations in order to determine whether the exemption applies. Another complication is added by the interpretation of footnote (b) to table 173.436, which lists decay progeny of selected isotopes. If limited information on isotopic content is known – say U-238, Ra-226, Po-210 – can footnote (b) be invoked to apply the exempt concentration limits for these isotopes?

In the past, gross alpha counting and/or gamma-spectroscopy was typically used to determine whether a material fell below the 70 Bq/g total activity limit. Under the new radionuclide specific thresholds for regulation, more detailed analysis is required to confirm whether a material is exempt. We believe that for materials amenable for use as alternative feedstock, a simplified gross counting technique should be made available to confirm whether such materials fall within the 10x exemption. This would greatly simplify classifying large volumes or low activity content material.

III. Conclusions and Recommendations

Changes in the U.S. regulations governing transportation of radioactive materials will profoundly affect the classification of materials as “radioactive” for transportation

purposes. Materials currently exempt from transportation as Class 7 (radioactive) could, after October 1, 2004, become subject to the packaging, labeling, shipping paper, and security requirements now incumbent on all hazardous materials. Moreover, The IAEA has recently initiated the review cycle for the 2007 edition of TS- R-1. The IAEA's review process calls for Member States and International Organizations to provide proposed changes to the IAEA by July 15, 2004. The objective is publication of revised regulations in 2007, nominally to become effective worldwide in 2009. For the reasons discussed above, the new DOT and NRC rules intended to harmonize U.S. transportation law with TS-R-1 are problematic, we recommend persons who are affected by these rules consider the following:

- The intent-based determination of whether the 10x exemption applies unfairly penalizes materials useful as alternate feedstock and bears no reasonable relationship to the level of hazard presented during transportation. A domestic U.S. exclusion from this provision should be sought.
- NRC and DOT have solicited input from interested parties on recommended changes to TS-R-1 in light of IAEA's upcoming review (69 Fed. Reg. 25656, May 7, 2004). These agencies would like to hear by June 7, 2004 of recommended changes to TS-R-1. Elimination of the "intent-based" classification of materials should be a top priority.
- Further clarification of the scope of "natural materials" is desirable. Guidance is needed to clarify that mineral process residues that are not in equilibrium are still "natural materials." Minimally, DOT should clarify how footnote (b) to 173.436 applies to mixtures of natural radionuclides.
- Simplified application of the 10x exemption is desirable. Gross counting methods should be available to determine whether a mineral meets the exemption.
- Stakeholders in the minerals industries need to be more proactive in understanding the IAEA regulatory process and the role played by NRC and DOT at IAEA. What happens at IAEA ultimately will affect the shape of national regulations.



Overview of NRC Staff Analysis of License Termination Rule Issues and Options for Resolving the Institutional Control Issue

NMA/NRC Uranium Recovery Workshop

Robert A. Nelson, Chief
Uranium Processing Section, NRC

May 19, 2004

May 2004

1

Purpose:

- Inform NMA about recent NRC decommissioning policy decisions and explain the relationship to UMTRCA sites

May 2004

2

Presentation Outline

- Background
- Institutional Control Issue
- Approved Options
- Relationship to UMTRCA Sites

May 2004

3

Background

- License Termination Rule (LTR) in 10 CFR 20 Subpart E finalized in 1997
 - Radiological criteria for termination of NRC licensed sites
 - Does not apply to uranium recovery facilities under 10 CFR 40, App. A
 - Staff and licensee experience identified implementation issues

May 2004

4

Background Contd.

- Commission direction
 - Analyze implementation issues
 - Recommend options to the Commission
 - Emphasize resolving institutional control issues for restricting future site use

May 2004

5

Background Contd.

- Staff analyzed nine issues
 - Institutional controls
 - Relationship between LTR and other release limits
 - Unimportant quantities
 - Separate U/Th standard
 - On-site disposal
 - Controlling disposition of solid materials

May 2004

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Background Contd.

- Realistic exposure scenarios
- Measures to prevent future legacy sites (complex and costly cleanups)
 - Changes to financial assurance
 - Changes to licensee operations
- Intentional mixing
- Results publicly available in SECY-03-0069 and SECY-04-0035

May 2004

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Institutional Control Issue

- Background on LTR license termination options
 - Unrestricted use, restricted use, or alternate criteria
 - Commission prefers unrestricted use
 - Restricted use and alternate criteria could be used in rare cases
 - Institutional controls required for restricted use and alternate criteria

May 2004

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Institutional Control Issue Contd.

- Issues: Difficulties arranging institutional controls
 - Governments (DOE, States) and Tribes unwilling to accept ownership of private sites
 - Lack of independent third party and long-term continuity
 - Long-term effectiveness of institutional controls
 - Unclear flexibility of existing LTR risk-informed graded approach to institutional controls

May 2004

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Commission Approved Options

- Clarify the LTR risk-informed, graded approach for institutional controls
 - Lower risk: legally enforceable (deed restrictions)
 - Higher risk: legally enforceable and durable (government ownership or control)
- New institutional control options involving NRC

May 2004

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Commission Approved Options Contd.

- NRC monitoring and enforcing after license termination
 - Under legal agreement and deed restriction
 - Includes written NRC authority
 - Concept derived from Commission approved approach for UMTRCA sites
 - Private property in the vicinity of DOE UMTRCA sites
 - DOE could monitor and enforce restrictions under a deed restriction
 - Approach new to NRC and untested
 - Viability depends on local jurisdiction

May 2004

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Commission Approved Options Contd.

- NRC long-term control possession-only license after remediation
 - Remediation but no license termination
 - License conditions act as the institutional controls
 - Modified from NRC's general license for long-term care of mill tailings sites
- Options are being tested at two sites

May 2004

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Relationship to UMTRCA Sites

- Options do not apply to UMTRCA sites
- Deed restriction option is similar to mill tailings vicinity property approach
- Exchange implementation lessons

May 2004

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Current Issues in Financial Assurance for Uranium Recovery Licensees

Prepared for National Mining Association/Nuclear Regulatory Commission Conference (Denver, Colorado)

Prepared by:

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Introduction

- 10 CFR Part 40, Appendix A Criteria Requires Uranium Recovery Licensees (Conventional & *In Situ Leach* (ISL) to:
 - Post Appropriate Financial Assurance Using NRC-Approved Financial Instruments (Criterion 10)
 - Post Financial Assurance Adequate for an *Independent Contractor* to Complete Remediation (Criterion 9)



Introduction

- 10 CFR Part 40, Appendix A Financial Assurance Requirements Generally Interpreted by:
 - NRC Guidance Documents:
 - NUREGs (Sample Templates)
 - Branch Technical Positions (BTPs)
 - Subpart L Litigation & Previous Licensee Submissions



New Issues for Part 40 Licensees

- 10 CFR Part 40, Appendix A, Criterion 9:
 - Conventional and ISL Uranium Recovery Licensees Must Post Financial Assurance Using NRC-Approved Financial Instruments Such As:
 - Surety Bond
 - Letter of Credit
 - Certificate of Deposit
 - Combination of the Above



New Issues for Part 40 Licensees

- **NRC Guidance Documents Also Permit the Use of:**
 - Parent Company Guarantees (PCGs)
 - NUREG-1727: *NMSS Decommissioning Standard Review Plan*



New Issues for Part 40 Licensees

- **Parent Company Guarantees Are Financial Instruments That Permit:**
 - Parent Companies to “Guarantee” Their Subsidiaries’ Financial Assurance Responsibilities
 - Parent Companies Are Required to:
 - Directly Fund Remediation Activities; or
 - Submit Such Funds Into an NRC-Approved Standby Trust Fund



Recent NRC Guidance on PCGs

- Until 2003-2004, NRC Guidance Documents Did Not Permit Part 40 Uranium Recovery Licensees to Use PCGs:
 - Branch Technical Position
 - Depressed Uranium Market Leads to:
 - No Parent Company Guarantees



Changed Circumstances

- **New Factors Leading to Change of Circumstances:**
 - September 11, 2001 Creates Severe Impacts on Commercial Surety Market
 - Commercial Surety Providers Avoid Environmental Remediation Commitments
 - Uranium Spot-Market Prices Reach \$17/lb.



“Forced” New Alternatives

- **Part 40 Licensees Forced to Pursue New Alternatives to Surety Bonds:**
 - Surety Providers Require Up to 100% Collateral for New Surety Bonds and Letters of Credit
 - Surety Providers Refuse to Issue New or Renew Existing Surety Bonds



Parent Guarantee Requirements

- **NRC-Approved Parent Guarantee Requirements Include:**
 - Satisfy One of Two Financial Tests
 - Asset Ratios
 - Bond Rating (Moody's or Standard & Poor's)
 - Submit Parent Guarantee Agreement
 - Financial Certifications from Chief Financial Officer & Licensee President



Licensee Developments

- **Western Nuclear, Inc. (WNI), Split Rock, Wyoming Facility**
 - Recently Obtained Parent (Phelps Dodge Corporation) (PDC) Guarantee for Financial Assurance
 - PDC Satisfies Financial Test II for Bond Rating



“Independent Contractor” Requirements

- **10 CFR Part 40, Appendix A, Criterion 9 Requires That:**
 - “the licensee’s cost estimates must take into account total costs that would be incurred if an *independent contractor* were hired to perform the decommissioning and reclamation work.”



Issues for Independent Contractor Remediation

- **Issue:** What Does Remediation By An Independent Contractor Under 10 CFR Part 40, Appendix A, Criterion 9 Actually Mean?



Potential Interpretations

- **Potential Answers:** Licensees Must Post Financial Assurance Sufficient to:
 - (1) Repurchase *All* Site Equipment and Supply *All* New, Untrained Site Personnel
 - (2) Utilize *All or Some* Existing Site Equipment and Some Existing Trained Site Personnel



Description of Interpretations

- **Answer #1:** Repurchase *All or Some* Site Equipment and Supply *All or Some* New, Untrained Site Personnel
 - Under This Interpretation, Licensees Must Post Financial Assurance Sufficient to:
 - Complete Decommissioning Activities
 - Decontaminate and/or Dispose & Re-Purchase All *Stationary* Equipment Such As:
 - Ion-Exchange Columns
 - Groundwater Restoration Equipment (Wells, Pipes)
 - Decontaminate and/or Re-Purchase All *Portable* Equipment
 - Front-end Loaders
 - Replace All Site Personnel With New, Untrained Personnel
 - One Worker Per Task (No Multiple Hats)



Description of Interpretations

- **Answer #2:** Utilize *All or Some* Existing Site Equipment and Existing Trained Site Personnel
 - Under This Interpretation, Licensees Must Post Financial Assurance Sufficient to:
 - Complete Decommissioning Activities
 - Fund Independent Contractors' Use of:
 - Existing Site *Stationary & Portable* Equipment
 - Portions or All of Existing Site Personnel



NRC Guidance & Interpretations

- **NRC Guidance Is Unclear On The Proper Interpretation:**

- NUREG-1569 *Standard Review Plan for In Situ Leach Uranium Recovery Facilities* Presents Two Divergent Viewpoints:

- p. 6-26 *Evaluation Findings*: "The applicant has based the assumptions for financial surety analysis on site conditions, including experiences with *generally accepted industry practices...*"
- Appendix C, p. C-5: "Equipment owned by the licensee and the availability of licensee staff should not be considered in the estimate..."



NRC Guidance and Interpretations

- **Additional NRC Statements:**

- NUREG-1569

- Appendix C, p. C-3: "The water treatment equipment used during the uranium recovery phase...is *generally suitable* for the restoration phase."
- Appendix C, p. C-3: "Replacement costs of some water treatment equipment may need to be included in the surety *if the equipment used for restoration is near the end of its serviceable life.*"



HRI Litigation Interpretations

- **Hydro Resources, Inc. (HRI) Crownpoint Uranium Project**
- Atomic Safety and Licensing Board Panel (ASLBP) Interpretation on Section 8 Litigation:
 - Financial Assurance by An Independent Contractor Must Include:
 - Replacement Costs for *All Major* Site Equipment
 - Costs For Site Employees Not Wearing "Multiple Hats" (No Multi-Tasking)



ASLBP Interpretation

- **Results If ASLBP Interpretation Is Upheld:**
 - ISL Licensees Will Be Required to Post Significantly Increased Financial Assurance to Cover:
 - Removal and Re-Deployment of Well-field Equipment
 - Removal, Decontamination, Disposal, and Re-Installation of Process Equipment
 - Replacement of *Movable* Equipment
 - Replacement of Site Personnel and Retraining of New Site Personnel



HRI's Position on Appeal

- **HRI's Proposed Financial Assurance Satisfies NRC Requirements:**
 - Financial Assurance Includes Additional 20% Figure for Unforeseen Contingencies
 - Uses Same or Similar Model to Those Proposed by Other ISL Licensees
 - Multi-Tasking Employees
 - Assumes Use of *Stationary* Equipment
 - NRC Mandatory Annual Surety Updates Addresses Replacement of Malfunctioning or Broken Site Equipment



Final Results

- The Commission Has Extended Review of HRI's Appeal Until May 19, 2004
- The Commission Potentially May:
 - Reject HRI's Appeal Outright
 - Accept HRI's Appeal for Review
 - Request Further Briefing
 - Decide the Issues on the Merits

