COMMISSION BRIEFING SLIDES/EXHIBITS

BRIEFING ON DECOMMISSIONING

ACTIVITIES AND STATUS

OCTOBER 13, 2004

Molycorp

OCTOBER 2004

MOLYCORP EXPERIENCE IN DECOMMISSIONING

1. OVERVIEW

Molycorp

Molycorp is a producer of specialty metals and metallic compounds. Molycorp has extracted metals and metallic compounds from ore concentrates at two facilities in Pennsylvania. Some contained low concentrations of uranium and thorium, enough to require an NRC materials license.

Molycorp has mining operations in Questa, New Mexico, Mountain Pass, California, and has a joint venture in a niobium (aka columbium) mine in Brazil.

York Site Decommissioning

Molycorp's site near York, Pennsylvania has been decommissioned under the NRC's Site Decommissioning Management Plan (SDMP). Recently, the NRC staff acknowledged completion of decommissioning for unrestricted use and terminated the license.

Washington Site Decommissioning

Molycorp's Washington Facility is located about 35 miles southwest of Pittsburgh, Pennsylvania. This facility is being decommissioned under the NRC SDMP in a phased approach.

Corporate Responsibility

Molycorp's philosophy is to do the *Right Thing* for the community and our stakeholders. That is, Molycorp intends to do what is socially and environmentally responsible based on the use of good science and sound engineering through a collaborative process with the regulatory authorities and community.

2. YORK SITE DECOMMISSIONING EXPERIENCE

Experience at York Site

Some ore concentrates processed at the York site contained minor amounts of natural uranium series and thorium series nuclides. Considering the complexity of the site, with land and structures to be decommissioned, the York site was listed and was decommissioned under the SDMP.

During remediation, unsuspected conditions were encountered. Relative to initial estimates, the amount of waste material shipped to disposal off-site was greater by ten-fold. Material of unknown origin was also found near the site boundary to be trending on or off-site.

The regulatory agencies allowed temporary cessation of remediation for Molycorp to assess remediation experience. Results were that:

- The initial characterization survey had been inadequate.
- As decommissioning progressed it became evident that some soil below the soil radioactivity concentration release criterion had been shipped to regulated disposal off-site.
- With NRC staff acceptance, Molycorp revised excavation and final status survey strategies to complete site remediation.
- The AAR method contained within the approved decommissioning plan was selected to evaluate remaining areas requiring excavation. This method accounts for potential exposures from subsurface as well as distributed residues as opposed to point by point assessments.
- Soil containing radioactivity concentration well below unrestricted release limit was returned to excavation cavities as backfill material.
- Molycorp performed radiological dose modeling to confirm acceptable potential exposure for material of unknown origin trending offsite under road and rail embankments. Molycorp, NRC staff, and State DEP staff agreed on the method of resolution.
- The NRC project manager facilitated a Memorandum of Understanding between Molycorp, the NRC, and the State of Pennsylvania providing that State radiation technicians could provide confirmatory survey support with Oak Ridge Institute of Science and Technology oversight in order to speed confirmatory surveys.
- Accommodated State request to excavate a trench in area of site to address expressed concerns of contamination. This was beyond required characterization effort.
- Molycorp agreed to perform post-confirmatory sampling excavation in area of site rather than addressing through surface averaging with adjacent survey units.
- Decommissioning is complete and acceptable to the NRC staff and the State of Pennsylvania Department of Environmental Protection.

Molycorp is also seeking liability relief under Pennsylvania Act 2 (brownfield) legislation to return the York property to beneficial commercial and or industrial use.

Lessons Learned At York

Experience gained while decommissioning the York facility provided many lessons that are applicable to ongoing decommissioning at Molycorp's Washington facility. Among valuable lessons learned at York are:

1. Good characterization is worthwhile to plan decommissioning. It enables planners to have confidence in developing a decommissioning plan and in estimating time and costs to implement it.
2. While there were some bumps in the road, relations among Molycorp, NRC, and PADEP staffs were cooperative and positive. Molycorp wants this spirit to carry on to decommissioning at our Washington site.
3. Excavation cavities must await independent survey to confirm compliance. While waiting, open cavities sometimes accumulated water, in turn impeding confirmatory survey. An arrangement with the NRC or the PADEP to minimize delay of

confirmation and backfilling an excavation cavity would be helpful. Such an arrangement was worked out with NRC at York to expedite confirmatory procedures to accommodate timely release of survey units where public safety concerns existed.

Whereas the NRC might have ORISE perform a confirmatory survey, the NRC, the State of Pennsylvania, and Molycorp were able to cooperate to enable the State PADEP to do some confirmatory sampling and surveying. That reduced travel logistics and time to confirm compliance in order to reduce delay before backfilling excavation cavities.

4. The NRC staff worked with Molycorp to adjust the decommissioning plan implementation to unexpected circumstances. A large volume of soil that was excavated was well below the maximum radioactivity concentration acceptable for unrestricted release. NRC, the State, and Molycorp worked to resolve the management of that soil by developing a procedure to return below criteria soil to an excavation cavity.

3. Washington Site Decommissioning Planning and Progress

Washington Site History

Industrial operations at the Washington site pre-date the 1900's. Nearby, a prominent process in early years was coal gasification to supply gas to a glass factory near the site. The predecessor to Molycorp acquired the original site in 1916. About 20 acres of the 73 acre Washington site were used for manufacturing operations at some time.

Molycorp has extracted metals and metallic compounds from ore concentrates on the Washington site. Among the products were molybdenum, tungsten, columbium, boron, and other rare earth metals and their compounds. Some ore concentrates received as feed materials contained low concentrations of natural uranium and thorium series radionuclides. The uranium and thorium series tended to deposit in the slags from the high temperature reduction processes. Those slags tend to be relatively insoluble.

Remedial Action

The Washington Site had natural uranium and thorium series material residues in buildings and soil on-site, and is considered a complex site, it was listed for decommissioning under the SDMP. In response, Molycorp has submitted to the NRC:

- A plan for site characterization
- A site characterization report
- A decommissioning plan in accordance with the SDMP
- An environmental report

Molycorp is decommissioning the Washington facility in logical phases and has already done a lot of clean-up on the site.

- Residues in eight surface impoundments were removed during June 1995.
- In 1996, Molycorp excavated about 4000 cubic yards of thorium-bearing slag. In 2000, that slag was disposed at Envirocare in Utah.

- In 2000 and 2001, a slag pile of about 10,000 cubic yards was disposed by shipment to Envirocare in Utah.
- In 2002, 21 buildings were decommissioned, demolished, and disposed. This included all above-ground structures except the guardhouse and weigh scales. Wastes were shipped to appropriate waste disposal facilities.

Based on lessons learned at York, Molycorp requested and was granted time to do additional characterization of the Washington site. Subsequent to the characterization effort, Molycorp developed an integrated site closure plan that incorporates both radiological and non-radiological remediation at the site.

Molycorp is continuing to decommission its Washington site, with regulation and oversight by the NRC, the EPA, and the State of Pennsylvania. We want the spirit of cooperation developed thus far with the NRC and PADEP staffs to continue as we decommission our Washington site.

4. OBSERVATIONS TO FACILITATE DECOMMISSIONING

Major Costs of Decommissioning Land

Major costs of decommissioning land are time and resources used to:

1. Develop and obtain approval of a decommissioning plan.
2. Perform final radiation status surveys and obtain approval.
3. Dispose of waste at a regulated facility offsite. Fostering competition by encouraging additional disposal opportunities would be helpful. (Note: Senator Domenicci (NM) has recently expressed the need to have more low level sites in the U.S.)
   a. The process of disposing of unimportant concentration source material in regulated sites, including WCS in Texas and USEcology in Idaho has been safe and cost-effective.
   b. Acceptance of disposal of source material, byproduct material, and of uranium posing no criticality risk into a uranium mill tailings impoundment would be helpful. We would encourage the Commission to consider this as a disposal option.
   c. Due to the high cost related with transportation, it would be helpful to have acceptable disposal sites in the Eastern United States where they would be in closer proximity to many of the decommissioning sites.

Ability to Apply NRC-approved Options

Flexibility to apply NRC-approved options is desirable, for instance, to do final status surveys on an SDMP site in accordance with the MARSSIM. A key to effectively managing project related decommissioning costs is ability of the licensee to select the appropriate "tools" from approved guidance documents. For example, at our Washington site, it would be desirable to be able to apply MARSSIM final status survey methodology with existing concentration based clean-up criteria. MARSSIM statistical-based surveys are in line with the current thinking on best practices and provide the benefit of clearing areas in a timely

manner with reduced analytical costs, in contrast with sampling methodology applied earlier in SDMP clean-ups.

Constructive working relationships need to be in place to work through any issue that might compromise the flexibility of a licensee to use appropriate "tools" that have been previously accepted by the NRC. For instance, water management and flooding issues may be important during excavation activities. If so, Molycorp will need to work out arrangements with NRC and the State in advance to minimize time and effort associated with confirmatory sampling.

Realistic Environmental Modeling

The NRC has moved toward acceptance of realistic radiological modeling. It might be helpful if the NRC staff would work with states and licensees to improve consensus on radiological modeling.

Cooperation

It would be beneficial for Molycorp, the NRC, and the Pennsylvania DEP to build upon positive working relationships established at York. Frequent constructive meetings with NRC and State to work through tactical and operational issues associated with implementation of decommissioning are helpful. Dan Gillen and the NRC staff and the DEP should be commended on taking practical, solutions oriented approach in working through decommissioning issues with licensees. Dan and his staff have been open for discussion and very approachable. Not always in agreement but through use of sound science and technical-based discussions we reached workable solutions.

Molycorp's "SDMP" Sites

Ray Cherniske
Manager Remediation Sites
Questa, NM

Molycorp Background

- Pennsylvania Processing Sites
  - Status
- Current Operations
- Corporate Responsibility

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York, PA Reflections

- Unsuspected Conditions Encountered
- Assessment Conducted
- DP Implementation Adjusted

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York, PA Reflections

Positives

- Soil Averaging – AAR Methodology
- Over Excavated Material as Fill
- Offsite Dose Modeling
- State Involvement

What's Left

- Act 2 – Brownsfield Legislation

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Washington, PA
Translate Lessons Learned

- Supplemental Characterization
  - Use existing DP
  - Utilize AAR method
- Constructive Working Relationships
  - NRC
  - State
  - Molycorp

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Washington, PA
Translate Lessons Learned

- Flexibility Applying Decommissioning Tools
  - Survey Approach
    - Timely confirmatory surveys
  - Realistic Site Models
  - Soil mixing
- Disposal Options

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October 13, 2004

Presentation materials for the NRC Commissioners' briefing on

Decontamination and Decommissioning Activities in Pennsylvania

Presented by - David J. Allard, CHP, Director

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http://www.dep.state.pa.us search key word "radiation"

http://www.dep.state.pa.us/dep/deputate/airwaste/rp/rp.htm

Attachment: Complete "Decontamination and Decommissioning Activities in Pennsylvania" ppt presentation*

* Note: The actual presentation will not include all slides in this handout; only key slides will be used to profile example sites for this briefing.

Decontamination and Decommissioning Activities in Pennsylvania

David J. Allard, CHP

Presented at the
NRC Decommissioning Briefing
October 13, 2004

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Acknowledgements:

Robert Maiers, PE, and all the DEP & BRP staff that work on these sites!

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Pennsylvania D&D Background

- Pennsylvania industry has historically used radioactive materials and generated waste in a wide variety of applications.
- Some of these early activities have resulted in sites with contaminated equipment, structures and buildings or sites with large volumes of contaminated soil, slag and contaminated groundwater.

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Major Pennsylvania D&D Site Groupings

- NRC Site Decommissioning Management Plan (SDMP) Sites; now "Complex Sites" (14)
- State Radium Decommissioning Sites (3)
- Reactor and Navy Nuclear Sites (5)
- Formerly Utilized Site Remedial Action Plan (FUSRAP) Sites (3)
- The Uranium Mill Tailings Radiation Control Act (UMTRCA) Sites (2)
- Unlicensed STPs Requiring Decontamination (2)

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Example Sites for Briefing

- Complex sites overview
- Safety Light Corp. (US Radium)
- Quehanna
- Reactor sites
- UMTRCA / Radium sites
- FUSRAP sites
- Flannery building
- Two contaminated STPs

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"Complex" D&D / SDMP Sites in PA

(* Removed from SDMP list)

- Safety Light Corp
- B&W SLDA
- B&W Parks Township*
- B&W Apollo*
- Molycorp York*
- Molycorp Washington
- Budd Company*
- Pesses/Metcoa *
- Whittaker Corp
- Quehanna
- Waltz Mill
- Schott Glass *
- Cabot Boyertown *, Revere*, Reading

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Safety Light Corporation

- Safety Light Corporation's NRC (-08) tritium license renewal is the subject an ASLB hearing request by DEP/BRP.
- DEP/BRP must respectfully refrain from commenting in detail on the SLC site due to pending litigation with NRC.
- We can note SLC (the former US Radium) is also a DEP/BRP NARM licensee for onsite radium-226 contamination
- EPA has proposed listing SLC on the NPL

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Safety Light Facility

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B&W Parks Township

- Located next to B&W SLDA
- Composed of 3 buildings and adjacent property
- Predominate radionuclides Am-241, Pu-241, Co-60, Cs-137, uranium
- Waste volume estimated at 43,000 ft^3 of LLRW and small amount of > Class C
- Cost estimate $7 million to decommission
- D&D completed, license terminated

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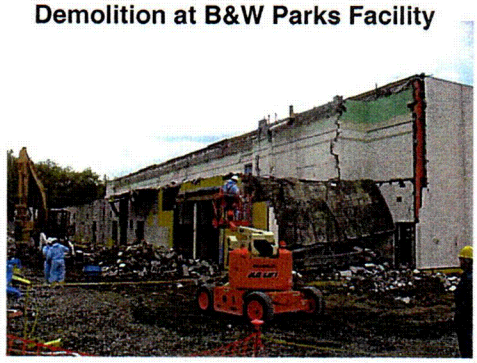
Demolition at B&W Parks Facility



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B&W Shallow Land Disposal Area (SLDA)

- Consists of ten waste disposal trenches
- Waste consists of enriched uranium, thorium, americium, plutonium, and chemicals (e.g., TCE)
- Waste volume estimated at 700,000 ft^3
- Remediation costs range from $8 million to $60 million depending on which remediation option is chosen

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B&W Shallow Land Disposal Area (SLDA) cont.

- Congressional action requires US Army Corps of Engineers (USACE) to determine appropriate response actions and initiate remediation activities under FUSRAP
- $5 million appropriated for USACE to begin activities, e.g., Preliminary Assessment completed

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C01

Former Parks Facility and Adjacent Shallow Land Disposal Area

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B&W Apollo

- Used as fuel fabricating facility from 1957 to 1983
- Extensive characterization and decontamination performed from 1984 to 1992
- Decommissioning activities performed from 1992 to 1995
- License terminated and removed from SDMP in April 1997
- Site still the subject of ongoing litigation by locals residents for alleged health impact

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Molycorp, Washington

- Produced metals from ores containing Th and U
- Resulted in concentrated wastes
- Waste volume estimated at 120,000 yd^3
- Licensee previously proposed onsite disposal cell and "restricted release"
- Licensee changed D-Plan to remediate to "unrestricted release" criteria

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Molycorp Washington Facility

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Molycorp, York

- Formerly produced rare earth chemicals from materials containing Th and U
- Production activities ceased in 1992
- Characterization indicated primarily surface contamination
- Contrary to characterization, large areas of contamination down to bedrock
- NRC license recently terminated

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Molycorp York Pit Excavation

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C02

Whittaker Corporation

- Metal production operations generated waste containing Th and U
- Contamination consists mainly of slag mixed with rubble and other waste
- Volume of slag estimated at 29,700 m^3
- Innovative metal recovery planned
- D&D activities expected to begin shortly

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Whittaker Slag Pile

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Quehanna

- In late 1950's Curtis-Wright used for research in nucleonics, metallurgy; included a pool-type research reactor; donated to Penn State
- In early / mid-1960's research reactor was dismantled, hot cells used by Martin-Marietta to manufacture SNAP generators using Sr-90
- M-M had license for 6 MCi of Sr-90!!
- Large Co-60 irradiator was installed in pool
- PermaGrain business failure in 2002; EPA recently removed 90,000 curies of Co-60

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Quehanna cont.

- Facility is now owned by Commonwealth of Pennsylvania
- Portions of the facility were contaminated with Sr-90, and ~ 2,000 Ci of old Co-60 sealed sources were stored in two hot cells
- Much D&D has been completed
- Hot cell 4 interior dismantled by robot
- Hot cell complex structure w/ minor Sr-90 contamination was diamond wire cut

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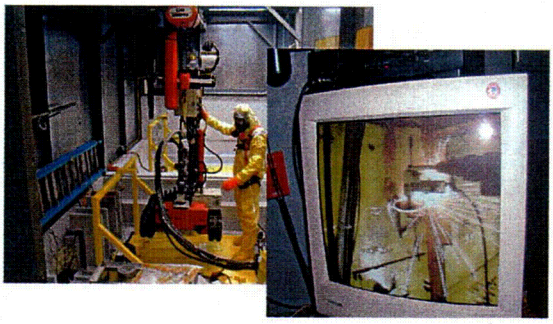
Robot Used for Hot Cell 4 –



Quehanna Hot Cells

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C03

Waltz Mill

- Licensed activities include possession only license for test reactor
- Most contamination attributed to fuel failure in test reactor that occurred in April 1960
- Contaminated buildings and former lagoons (soil and GW contaminated)
- Soil remediation complete, GW quality greatly improved

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Waltz Mill TR-2 and Support Buildings

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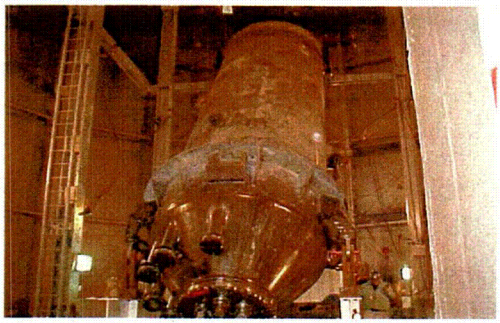
TR-2 Reactor Tank Removal



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Cabot Corp Reading

- Processed ores containing U and Th
- Process resulted in slag containing concentrated levels of U and Th
- Pennsylvania has documented concerns with exposure scenarios, and that site is poorly characterized
- Licensee proposes leaving waste on site and terminating license with an unrestricted release
- Environmental Justice area?

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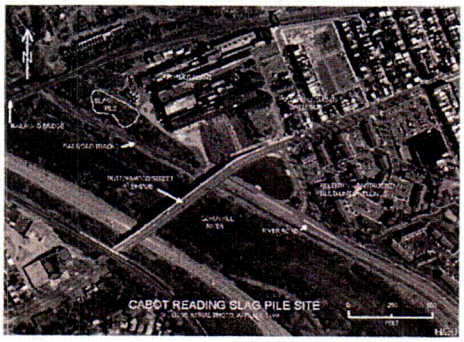
Cabot Reading Aerial Photo



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Cabot Reading Slag Disposal

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Pennsylvania Reactor and Federal Facility D&D

- Three Mile Island Unit 2 (PWR)
- Shippingport Atomic Power Station (PWR)
- Saxton Experimental Reactor (PWR)
- Peach Bottom Atomic Power Station Unit 1 (HTGR)
- Navy's Bettis Atomic Power Laboratory

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Three Mile Island Unit 2

- Post-accident cleanup of Unit 2 began in August 1979 and ended in December 1993
- Approximately 100 tons of damaged fuel removed to INEL, approximately 1% of fuel and debris remain in vessel
- Total cost of cleanup $973 million
- Final decommissioning deferred until Unit 1 is ready to be decommissioned

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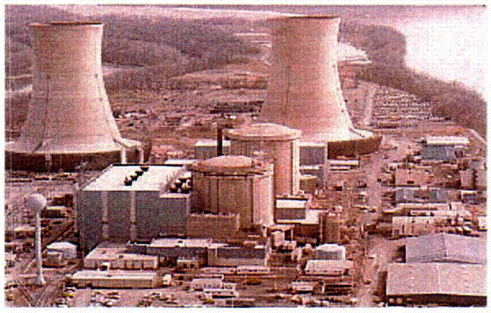
Three Mile Island Nuclear Power Station



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Shippingport Atomic Power Station

- 1957 PWR demo plant, converted in 1977 to a light water breeder, operated until 1982
- Shippingport was the nation's first large-scale nuclear power plant decommissioning project
- The decommissioning project provided relevant information for decommissioning PWRs throughout the world
- Decommissioning completed in June 1989 at a cost of $91.3 million

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Shippingport Atomic Power Station

Shippingport Atomic Power Station

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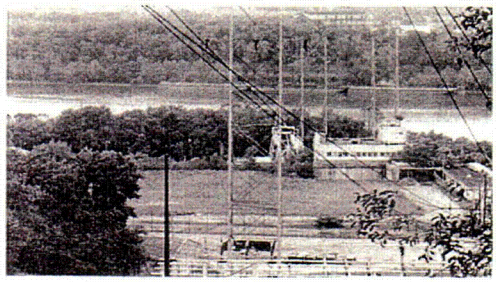
Shippingport After Decommissioning



Shippingport Site Today

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Saxton Experimental Reactor

- Completed in 1962 for research, testing and demonstration of nuclear power production
- Pressurized water reactor rated at 35 MW(t) powering an old coal-fired plant
- Operated until 1972, fuel shipped to Savannah River Site
- Total decommissioning cost estimated at over $50 million
- ANS Historical Marker recently placed on the site
- License termination expected in 2005

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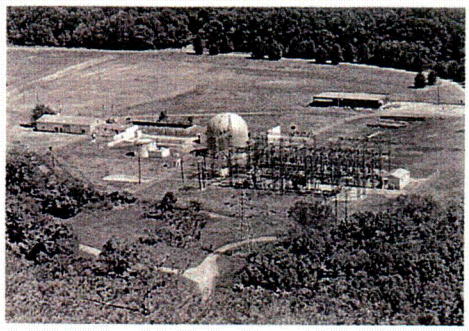
Saxton Facility



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Peach Bottom Atomic Power Station Unit 1

- A prototype high temperature gas-cooled reactor
- Operated from March 1966 to October 1974
- Decommissioning work began in January 1976 and ended February 1978
- Fuel was removed, and now the plant is in monitored "safe-store" condition

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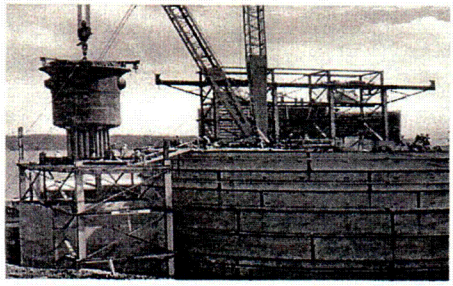
Peach Bottom Unit 1 Reactor Installation 3/26/64



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Formerly Utilized Site Remedial Action Plan (FUSRAP) Sites

- DOE program shifted to Army Corps of Engineers by Congress
- Aliquippa Forge Site
  - **In 1940's used for a uranium-rolling operation**
  - **DOE started cleanup in 1988, completed 1994**
  - **Waste shipped to Hanford, Washington**
- C.H. Schnoor
  - **Provided uranium metal fabrication services for Manhattan Project in the 1940's**
  - **DOE began and completed cleanup in 1994**
- Superbolt facility (former Superior Steel)?

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Uranium Mill Tailings Radiation Control Act (UMTRCA), old Radium-226 Processing and Other Sites

- Canonsburg disposal cell
- Burrell disposal cell (Blairsville, PA)
- Sellersville
- Lansdowne
- Austin Avenue
- Flannery Building (Parkvale Bank)
- Others?

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Canonsburg (Standard Chemical)

- Facility used for extraction of radium from carnotite ore from 1911 to 1942
- From 1942 to 1957 operations turned to recovery of uranium from ores and scrap
- Between 1984 and 1986, approx. 172,000 yd^3 of contaminated soil and materials stabilized in on-site disposal cell by DOE

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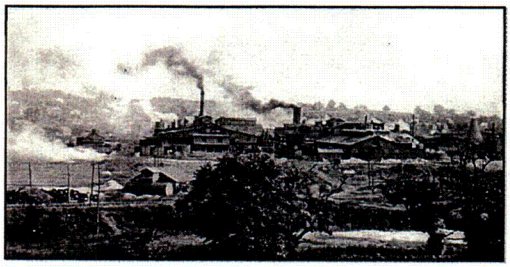
Standard Chemical Facility



Circa 1921

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Canonsburg's circa 1978 Documentary Film

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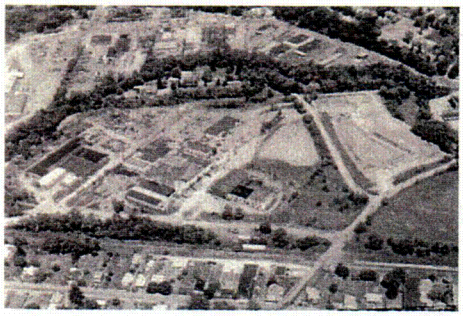
Canonsburg Site Before Remediation



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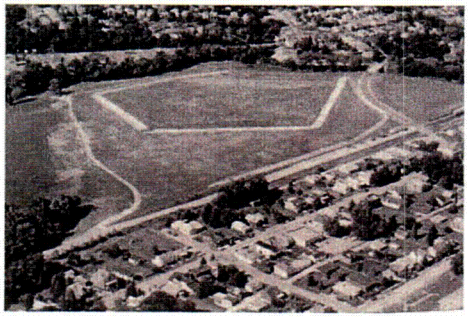
Canonsburg Cell After Remediation



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Canonsburg Disposal Cell

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Parkvale Bank (Flannery Building)

- Refined radium from the Canonsburg facility concentrates; first commercial production of radium in the U.S.; produced ~ 180 g Ra-226
- Madame Curie likely visited to tour radium production operations in early 1920's
- Building decontaminations c1960 and c1970 neglected drains, vents, sewer lines and other inaccessible floor / ceiling areas
- Contamination detected c1998; final cleanup action taken under BRP license

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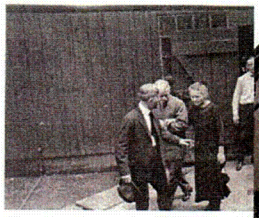
Flannery Building



Marie Curie at Standard Chemical Facility c1920

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Sellersville

- Site included an inactive landfill used by several manufacturing companies, including the c1915 *Radium Company of America*
- DEP performed a cleanup in 1996-97
- Approximately 6,400 yd^3 of radium contaminated soil sent to Envirocare
- Total cost of cleanup over $6 million

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Sellersville Landfill Remediation

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Lansdowne

- From 1924-1944 a physics professor operated a radium source processing laboratory in the basement of a duplex
- Contamination spread to both sides of the house and adjacent properties
- Placed on EPA NPL in 1985
- EPA completed cleanup in 1991 at a cost of $11.6 million

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Austin Avenue

- Centered around properties near a radium refining facility
- Involved same principle as in the Lansdowne site
- Tailings from the refining facility were discovered in 40 houses on Austin Avenue (in the Philadelphia area)

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Sewage Treatment Plants Requiring Decontamination

- Kiski Valley Water Pollution Control Authority (KVWPCA)
- Royersford Wastewater Treatment Facility (RWTF)

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Kiski Valley Water Pollution Control Authority (KVWPCA)

- Received effluents from nearby B&W Apollo nuclear fuel fabrication facilities
- Sludge ash lagoon contains ~ 9,000 m^3 of contaminated ash and is located within floodplain
- After nearly 10 years of evaluation, NRC dose assessment indicates unrestricted release is acceptable

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KVWPCA Sludge Ash Lagoon

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Royersford Wastewater Treatment Facility (RWTF)

- Received effluent containing Co-60, Cs-137, and other fission products from local nuclear laundry
- Radioactive materials were reconcentrated in the sewage sludge
- Contaminated sludge land-applied in past, and pumped to reed beds for volume reduction
- Sludge is now sent to RCRA D landfills
- Nuclear laundry responsible for reed bed under NRC regulations?

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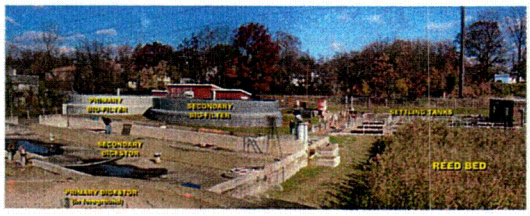
RWTF – plant systems



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RWTF Reed Bed

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Conclusions

- Pennsylvania has a wealth of experience in a wide variety of decommissioning projects
- Pennsylvania has decommissioning experience as a licensee as well as being a regulator
- Pennsylvania has worked closely with NRC, other federal agencies and licensees on D&D projects

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Comments and Concerns

- Some regulatory inconsistencies noted in NRC Headquarters and Regions
- LTR offers greater flexibility to licensees, but is more challenging for state regulators
- Large discrepancies between characterization and actual conditions may result in inefficient or incomplete decommissioning
- Use of limited exposure scenarios to achieve unrestricted release (e.g., industrial, trespasser)

62

Thank you.

Questions?

63

Decontamination and Decommissioning Activities in Pennsylvania

David J. Allard, CHP

Presented at the

NRC Decommissioning Briefing
October 13, 2004

1

PA Dept. of Environmental Protection

Bureau of Radiation Protection (BRP)

P.O. Box 8469

Harrisburg, PA 17105-8469

Tel: 717-787-2480

http://www.dep.state.pa.us

Acknowledgements:

Robert Maiers, PE, and all the DEP & BRP staff that work on these sites!

2

Pennsylvania D&D Background

- Pennsylvania industry has historically used radioactive materials and generated waste in a wide variety of applications.
- Some of these early activities have resulted in sites with contaminated equipment, structures and buildings or sites with large volumes of contaminated soil, slag and contaminated groundwater.

3

Major Pennsylvania D&D Site Groupings

- **NRC Site Decommissioning Management Plan (SDMP) Sites; now "Complex Sites" (14)**
- **State Radium Decommissioning Sites (3)**
- **Reactor and Navy Nuclear Sites (5)**
- **Formerly Utilized Site Remedial Action Plan (FUSRAP) Sites (3)**
- **The Uranium Mill Tailings Radiation Control Act (UMTRCA) Sites (2)**
- **Unlicensed STPs Requiring Decontamination (2)**

4

Example Sites for Briefing

- Complex sites overview
- Safety Light Corp. (US Radium)
- Quehanna
- Reactor sites
- UMTRCA / Radium sites
- FUSRAP sites
- Flannery building
- Two contaminated STPs

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"Complex" D&D / SDMP Sites in PA

(* Removed from SDMP list)

- Safety Light Corp
- B&W SLDA
- B&W Parks Township*
- B&W Apollo*
- Molycorp York*
- Molycorp Washington
- Budd Company*
- Pesses/Metcoa *
- Whittaker Corp
- Quehanna
- Waltz Mill
- Schott Glass *
- Cabot Boyertown *, Revere*, Reading

6

Safety Light Corporation

- Safety Light Corporation's NRC (-08) tritium license renewal is the subject an ASLB hearing request by DEP/BRP.
- DEP/BRP must respectfully refrain from commenting in detail on the SLC site due to pending litigation with NRC.
- We can note SLC (the former US Radium) is also a DEP/BRP NARM licensee for onsite radium-226 contamination
- EPA has proposed listing SLC on the NPL

7

Safety Light Facility

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Quehanna

- In late 1950's Curtis-Wright used for research in nucleonics, metallurgy; included a pool-type research reactor; donated to Penn State
- In early / mid-1960's research reactor was dismantled, hot cells used by Martin-Marietta to manufacture SNAP generators using Sr-90
- M-M had license for 6 MCi of Sr-90!!
- Large Co-60 irradiator was installed in pool
- PermaGrain business failure in 2002; EPA recently removed 90,000 curies of Co-60

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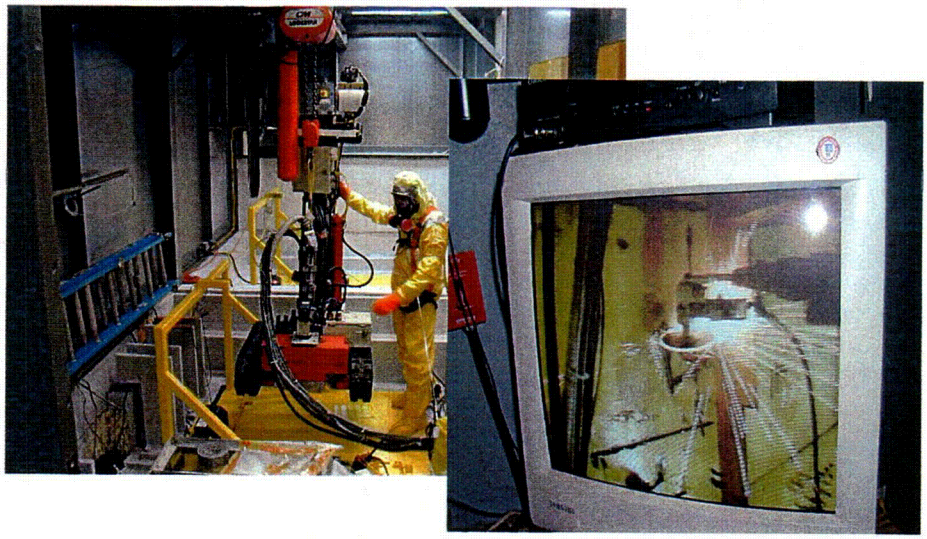
Quehanna cont.

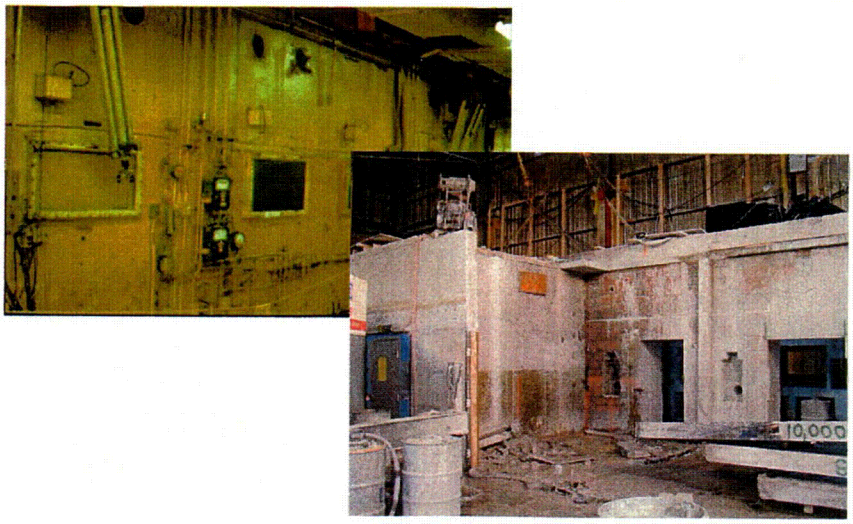
- Facility is now owned by Commonwealth of Pennsylvania
- Portions of the facility were contaminated with Sr-90, and ~ 2,000 Ci of old Co-60 sealed sources were stored in two hot cells
- Much D&D has been completed
- Hot cell 4 interior dismantled by robot
- Hot cell complex structure w/ minor Sr-90 contamination was diamond wire cut

10

Robot Used for Hot Cell 4 –



Quehanna Hot Cells



12

Cabot Corp Reading

- Processed ores containing U and Th
- Process resulted in slag containing concentrated levels of U and Th
- Pennsylvania has documented concerns with exposure scenarios, and that site is poorly characterized
- Licensee proposes leaving waste on site and terminating license with an unrestricted release
- Environmental Justice area?

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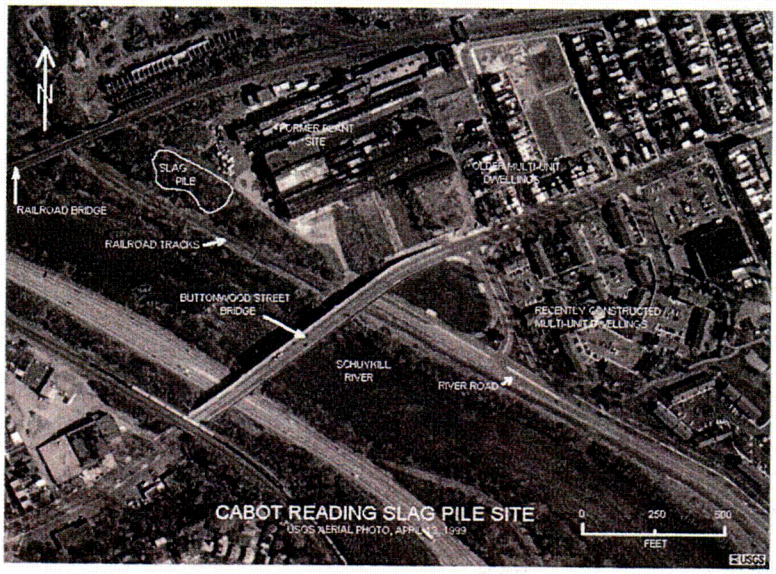
Cabot Reading Aerial Photo



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Cabot Reading Slag Disposal

Figure 7. Cabot-Reading site, May 1987. Waste slag being deposited on the slag dump which borders the side of the Cabot-Reading site facing the Schuylkill River. Compare with Figure 9 which was taken in October 1987

Figure 8. Cabot-Reading site, May 1987. View of the slag dump from the rim of the steep embankment. Note the large 0.5 to 1.0 m (2 ft to 3 ft) blocks of slag

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Pennsylvania Reactor and Federal Facility D&D

- Three Mile Island Unit 2 (PWR)
- Shippingport Atomic Power Station (PWR)
- Saxton Experimental Reactor (PWR)
- Peach Bottom Atomic Power Station Unit 1 (HTGR)
- Navy's Bettis Atomic Power Laboratory

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Formerly Utilized Site Remedial Action Plan (FUSRAP) Sites

- DOE program shifted to Army Corps of Engineers by Congress
- Aliquippa Forge Site
  - **In 1940's used for a uranium-rolling operation**
  - **DOE started cleanup in 1988, completed 1994**
  - **Waste shipped to Hanford, Washington**
- C.H. Schnoor
  - **Provided uranium metal fabrication services for Manhattan Project in the 1940's**
  - **DOE began and completed cleanup in 1994**
- Superbolt facility (former Superior Steel)?

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Uranium Mill Tailings Radiation Control Act (UMTRCA), old Radium-226 Processing and Other Sites

- Canonsburg disposal cell
- Burrell disposal cell (Blairsville, PA)
- Sellersville
- Lansdowne
- Austin Avenue
- Flannery Building (Parkvale Bank)
- Others?

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Parkvale Bank (Flannery Building)

- Refined radium from the Canonsburg facility concentrates; first commercial production of radium in the U.S.; produced ~ 180 g Ra-226
- Madame Curie likely visited to tour radium production operations in early 1920's
- Building decontaminations c1960 and c1970 neglected drains, vents, sewer lines and other inaccessible floor / ceiling areas
- Contamination detected c1998; final cleanup action taken under BRP license

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Flannery Building

Marie Curie at Standard Chemical Facility c1920

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Sewage Treatment Plants Requiring Decontamination

- Kiski Valley Water Pollution Control Authority (KVWPCA)
- Royersford Wastewater Treatment Facility (RWTF)

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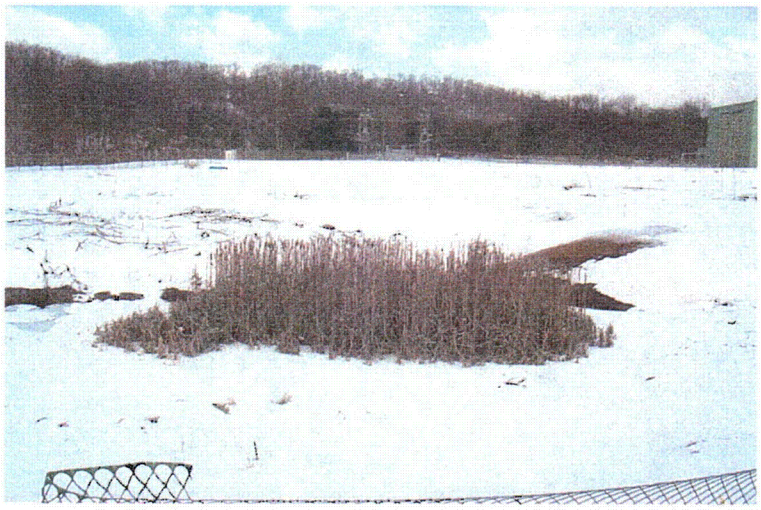
Kiski Valley Water Pollution Control Authority (KVWPCA)

- Received effluents from nearby B&W Apollo nuclear fuel fabrication facilities
- Sludge ash lagoon contains ~ 9,000 m^3 of contaminated ash and is located within floodplain
- After nearly 10 years of evaluation, NRC dose assessment indicates unrestricted release is acceptable

22

KVWPCA Sludge Ash Lagoon



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Royersford Wastewater Treatment Facility (RWTF)

- Received effluent containing Co-60, Cs-137, and other fission products from local nuclear laundry
- Radioactive materials were reconcentrated in the sewage sludge
- Contaminated sludge land-applied in past, and pumped to reed beds for volume reduction
- Sludge is now sent to RCRA D landfills
- Nuclear laundry responsible for reed bed under NRC regulations?

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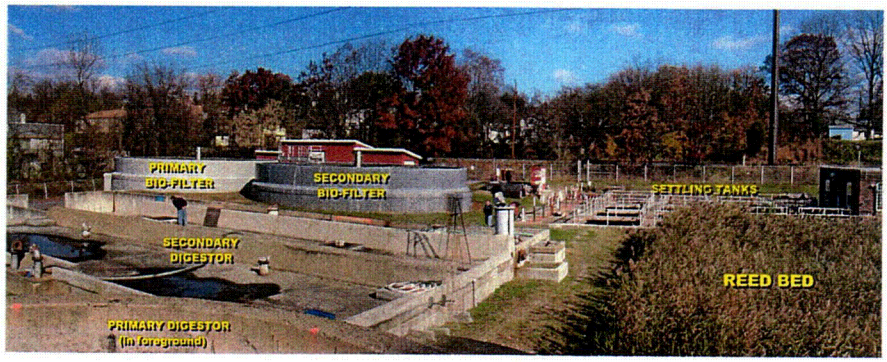
RWTF – plant systems



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RWTF Reed Bed

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Conclusions

- Pennsylvania has a wealth of experience in a wide variety of decommissioning projects
- Pennsylvania has decommissioning experience as a licensee as well as being a regulator
- Pennsylvania has worked closely with NRC, other federal agencies and licensees on D&D projects

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Comments and Concerns

- Some regulatory inconsistencies noted in NRC Headquarters and Regions
- LTR offers greater flexibility to licensees, but is more challenging for state regulators
- Large discrepancies between characterization and actual conditions may result in inefficient or incomplete decommissioning
- Use of limited exposure scenarios to achieve unrestricted release (e.g., industrial, trespasser)

28

Thank you.

Questions?

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Briefing to the Commissioners of the U.S. Nuclear Regulatory Commission

by:
David G. Culberson, Chairman
Fuel Cycle Facilities Forum

Purpose:

- Overview of Fuel Cycle Facilities Forum (FCFF)
- Recent accomplishments
- Decommissioning issues of importance to fuel cycle facilities

Overview of the Fuel Cycle Facilities Forum (FCFF)

- SNM and source material licensees (fuel processors and specialty metal refiners)
- Decommissioning focus
- Sites/facilities that require special NRC consideration (those "few difficult sites")
- Industry advocate for decommissioning
- Resource to NRC staff

Accomplishments

- Excellent working relationship with NRC
- *White Papers* on key D&D issues:
  - *Phased approach to decommissioning*
  - *Direct disposal of non-11e(2) material in Mill tailings impoundments*
- Forum for sharing industry D&D experience, lessons learned, obstacles, and issues
- 16 years history representing industry on most challenging D&D issues
- Submitted comments on numerous proposed rulemaking and guidance initiatives

Issues of Importance to Fuel Cycle Facilities

- Additional cost-effective *disposal options*
- *Flexibility* in applying criteria and guidance for interim cleanup and partial site release
- *Consistency* among and between State agencies and NRC
- Increased assurance of *finality*
- *Prioritization* of site-specific information required for decommissioning planning

Issues of Importance to Fuel Cycle Facilities

- *Continuation of workshops and tabletop exercises* to share implementation experience, lessons learned, obstacles, and alternative solutions
- *Improved efficiency* in the development, approval, and implementation of FSS's and site/facility release
- Additional NRC guidance regarding S&S, emergency planning, and NCS required during decommissioning

Briefing to the Commissioners

of the

U.S. Nuclear Regulatory Commission

October 13, 2004

Presented at:
The Commission's Conference Room
NRC Headquarters
One White Flint North
11555 Rockville Pike
Rockville, MD

Presented by:

David G. Culberson, Chairman
Fuel Cycle Facilities Forum

Briefing to the Commissioners of the U.S. Nuclear Regulatory Commission
October 13, 2004
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Fuel Cycle Facilities Forum

What is the Fuel Cycle Facilities Forum?

The *Fuel Cycle Facilities Forum (FCFF)* is a consortium of licensees whose purpose is to provide a forum for addressing technical and regulatory issues that affect the decommissioning of fuel cycle facilities and specialty metal refiners whose feed ore contains source material. The *FCFF* represents a broad range of source and special nuclear material licensees, including many who are actively involved in the remediation and/or decommissioning of portions of their sites. The *FCFF* represents fuel cycle licensees at public workshops and meetings, seeks to involve the fuel cycle industry in the rulemaking and draft regulatory guidance development process by offering comments on issues that will impact industry, and facilitates communication between affected licensees and the NRC.

To a large extent, the facilities represented by the *FCFF* are of a size and/or complexity as to frequently require special NRC consideration in regard to decommissioning. This not only applies to final decommissioning for license termination, but also to decommissioning required to meet the Timeliness Rule requirements for separate buildings or outdoor areas during the period when licensed operations will continue (i.e., "partial" decommissioning). For fuel cycle licensees, the major costs and challenges of decommissioning are time and resources associated with disposal of solid wastes (primarily soil and building debris), preparation and review of decommissioning plans and procedures, development and approval of release criteria, and final status surveys. Hence, these tend to be the primary issues addressed by the FCFF.

The *FCFF* strives to focus its efforts solely on these and other decommissioning issues, thereby enabling the group to be more effective and to maintain an active and loyal following of member companies. The *FCFF* has been effective in achieving real results for the

industry, has been a successful and effective advocacy group for licensees who are undergoing decommissioning, and has been an effective facilitator for communication and interaction between NRC and the fuel cycle industry on important decommissioning issues. The *FCFF* focuses its efforts largely on *implementation* issues, which has enabled the group to be an effective sounding board for the NRC on rulemaking, guidance and inspection issues.

What are some of the notable recent accomplishments of the FCFF?

1. One of the most noteworthy accomplishments of the *FCFF* over its 16-year history has been the establishment of an excellent working relationship with the decommissioning and waste management staffs of the NRC. This has led to open and constructive dialogue between the NRC and the fuel cycle industry on many important issues, has enabled both the NRC and industry to make meaningful progress on decommissioning fronts, has led to more streamlined efforts (and presumably cost savings) for both NRC and industry, and has led to a better understanding of the issues impacting regulators and licensees. In recent years, the *FCFF* has observed improvements in the manner in which the staff interacts with stakeholder groups on decommissioning matters, and specifically the manner in which the agency has supported, encouraged and involved fuel cycle representatives on important issues affecting that industry. As result, there is evidence that the feedback and comments of the fuel cycle industry have been genuinely been accepted and considered by the staff, as evidenced by overall improvements in the rulemaking, licensing, and inspection processes. The Decommissioning and Waste Management staffs continue to seek the input and involvement of the FCFF, specific fuel cycle licensees and this industry's experts on emerging issues affecting decommissioning, and the FCFF would encourage the Commission to continue and support that practice.
2. Discussions with NRC Waste Management Division staff during an industry-led tabletop exercise in February 2001 led to a consensus that some of the obstacles that have previously prevented timely start and completion of decommissioning could be eliminated, or mitigated by applying a *phased* (streamlined) performance-based, risk-

informed approach to decommissioning. This was summarized in a Draft *White Paper*[1], submitted to the NRC in May 2001, which summarizes the key aspects and issues of such an approach, and the preliminary conclusions by those in attendance. Need to establish specific guidance to implement a "phased approach" to decommissioning.

3. For over 8 years, the *FCFF* and the *National Mining Association (NMA)*[2] *Uranium Environmental Subcommittee* have been discussing the benefits of utilizing existing uranium mill tailings impoundments for the disposal of certain fuel cycle materials that are chemically, physically and radiologically similar to the material already in the impoundment. In response to the Environmental Protection Agency's (EPA's) Advance Notice of Proposed Rulemaking (ANPR) titled *Approaches to an Integrated Framework for Management and Disposal of Low-Activity Radioactive Waste*, the FCFF and the NMA recently jointly submitted a White Paper to NRC, *White Paper on Direct Disposal of Non-11e.(2) Byproduct Materials in Uranium Mill Tailings Impoundments,* that espouses the merits of disposal of non-11e(2) materials in Mill tailings impoundments. The White Paper provides a complete and compelling regulatory basis for the option and proposes generic acceptance criteria for acceptance of certain non11e2 materials. Several licensees, including fuel cycle and uranium mining/milling, have expressed an interest in pursuing such an approach but need assistance from NRC in determining the best path forward.

4. The identification and sharing of decommissioning experiences, lessons learned, obstacles, and stakeholder issues continues to be principle focus and success of the FCFF. The FCFF has successfully developed and nurtured an environment of candor, trust and confidence among its member companies in matters pertaining to decommissioning, and thus has successfully garnered the support of its member companies and the NRC for over 16 years.

[1] White Paper Discussion: *Phased Approach to the Decommissioning of Fuel Cycle Facilities*. Prepared by the Fuel Cycle Facilities Forum. May 2001.

[2] The *National Mining Association (NMA)* represents producers of most of America's coal, metals, industrial and agricultural minerals; manufacturers of mining and mineral processing machinery and supplies; transporters; financial and engineering firms; and other businesses related to coal and hardrock mining. NMA has member companies who are NRC licensees with uranium mill tailings facilities.

What are the issues of greatest concern to fuel cycle facilities?

- There is an urgent need for additional cost-effective disposal alternatives for high-volume, low-activity bulk decommissioning wastes. One excellent example of a technically sound, safe, and cost-effective alternative that has been identified by the FCFF and the NMA is the use of uranium mill tailings impoundments for fuel cycle decommissioning wastes. The FCFF and NMA have identified several existing uranium mining and milling sites that have sufficient capacity to accept most, if not all of the anticipated decommissioning waste generated by fuel cycle facilities for the foreseeable future, and several fuel cycle licensees have expressed an interest in utilizing this alternative under the proper regulatory controls and framework. Other viable examples of disposal alternatives include: use of RCRA Subtitle C landfills, as addressed in EPA's ANPR; the conditional use provisions of NRC's rulemaking for Controlling the Disposition of Solid Materials; and, allowing unrestricted release of inherently safe sources, as contained in the rulemaking for Controlling the Disposition of Solid Materials. Further, without diminishing environmental protection, the costs of solid waste disposal for fuel cycle licensees may be controlled more effectively by allowing near-background radionuclide concentration in soil to be returned to an excavation cavity, by allowing near-background radionuclide concentration in soil or building debris to be disposed in an EPA Class C landfill or an industrial waste landfill, and by enabling additional disposal facilities, which would promote economic competition. It is worth noting that licensees that do not belong to the Rocky Mountain, Northwest or Atlantic Compacts will not be able to dispose of Class B/C LLW after 2008. Although fuel cycle facilities primarily generate Class A waste, this will affect all license that wish to dispose of sealed sources (since EOU can't accept these sources).
- There is a need for more *flexibility* in applying decommissioning guidance when addressing interim site cleanup, partial site remediation, or partial site release when a facility operating license will not being terminated and the area/facility will not be released for unrestricted use. The current definition of *"decommissioning"* as contained in the NRC's regulations is overly prescriptive for those situations. Based on recent

favorable discussions between the FCFF and NRC, a *phased* (streamlined) performance-based, risk-informed approach to decommissioning, which would allows many decommissioning-related activities to be conducted under an operating license, makes sense. Specific NRC guidance for implementing such an approach would be useful.

- There is a need for continued NRC attention to *consistency* in application of decommissioning requirements and guidance, particularly among Agreement and Non-Agreement State regulatory agencies and between individual licensees. Fuel cycle licensees have encountered inconsistencies in the regulatory process among State agencies (both Agreement States and Non-Agreement States), between State agencies and the NRC, and within the NRC, in areas such as decommissioning planning, cleanup criteria, timeliness, and grandfathering. It is worth noting that not all Agreement States have adopted a License Termination Rule that incorporates a 25 mrem/year dose standard, thus it is important that consensus between licensee and regulatory agencies be reached early in the process regarding development of cleanup criteria.

- With respect to fuel cycle facilities, the establishment of the MOU between NRC and EPA concerning residual radioactivity levels at sites undergoing decommissioning has not resolved the issue of *finality*. The FCFF anticipates that the majority of fuel cycle facilities will most likely be included on the MOU action list even though they can demonstrate that they meet the 25 mrem per year dose standard. This leaves a number of fuel cycle facilities with difficult decisions as to how and when to proceed with decommissioning, since there is a perceived real possibility (and likelihood?) that the licensee cannot reach finality *even if* they meet restrictive NRC criteria. Some licensees are already faced with the dilemma of choosing between delaying cleanup until finality can be assured, versus proceeding with a costly cleanup effort under a perceived risk that there is no end in sight.

- The NMSS Decommissioning Standard Review Plan has largely removed the uncertainty of what the NRC staff expects to review and that a licensee should address in their decommissioning plan. The staff and licensees now have enough experience with the guidance to work toward prioritizing what is likely to be needed in a plan for a given site.

Prioritizing to include material of substantial importance to a given site, instead of developing content for *all* items on the planning and review checklist, could help make both preparation and review of a decommissioning plan more efficient, take less time, and cost less.

- Workshops that the NRC has sponsored and tabletop exercises that the FCFF has sponsored have been useful to examine lessons learned and implementation of NRC regulations and regulatory guidance and the FCFF encourages the continued use of both. With the experience gained experience in implementing the decommissioning regulations and guidance, it would be useful to have a *focused workshop-like forum* to share decommissioning experiences and lessons learned to date, and to learn of pertinent NRC guidance on problematic issues. Prospective participants could be licensees, the FCFF, the NRC, NEI, EPRI, State agencies, and the NRC confirmatory survey contractor, ORISE. A workshop concerning quality assurance in final status surveys, data management, and reporting could be useful to enable all stakeholders to improve knowledge of expectations and confidence in final status surveys. Workshops to air regulatory development and licensee experience have been useful during development of the decommissioning regulation and of implementation guidance documents. Continued public discussion and opportunity for feedback during development of such guidance documents as the *Multi-agency Radiation Survey and Analysis of the Subsurface* manual or of the *Multi-agency Radiation Survey of Material and Equipment* manual could be useful.

- The FCFF has found that performing final radiation status surveys, preparing the reports, confirmatory surveys, and Agency review prominently consume time and resources of both licensee and regulatory agencies. Some effort to improve efficiencies of interaction between agencies and licensee could be useful. In addition, when excavation cavities are open, improved coordination between NRC staff, NRC confirmatory survey contractor (ORISE), the State environmental protection agency, and the licensee is needed for confirmatory surveillance and to minimize time a cavity must remain open.

- Additional specific NRC guidance is needed regarding required security, safeguards, emergency planning and nuclear criticality safety controls when decommissioning involves large quantities of low concentration of enriched uranium.

For further information concerning the FCFF, contact:

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2004 DECOMMISSIONING PROGRAM BRIEFING

Daniel Gillen

Div. of Waste Mgnt. & Environmental Protection

Office of Nuclear Material Safety & Safeguards

Introduction

- Decommissioning Program
- Evolution of Program
- Accomplishments
- Specific Commission Interests
  - West Valley Demonstration Project
  - EPA Memorandum of Understanding
- On the Horizon
- Challenges

NRC's Decommissioning Program

- Office of Nuclear Material Safety and Safeguards
  - Division of Waste Management and Environmental Protection
  - Division of Fuel Cycle Safety and Safeguards
- Office of Nuclear Reactor Regulation
- Regions
- Office of Research

Catalysts for Program Change

- Fiscal Constraints
- Timeliness Concerns
- Strategic Goals
- License Termination Rule Implementation Difficulties
- Self Assessments

Evolution of Scope

- Power Reactor Transfers
- Elimination of the Site Decommissioning Management Plan
- Comprehensive Decommissioning Program
- Monitoring/Support Role

Evolution of Framework

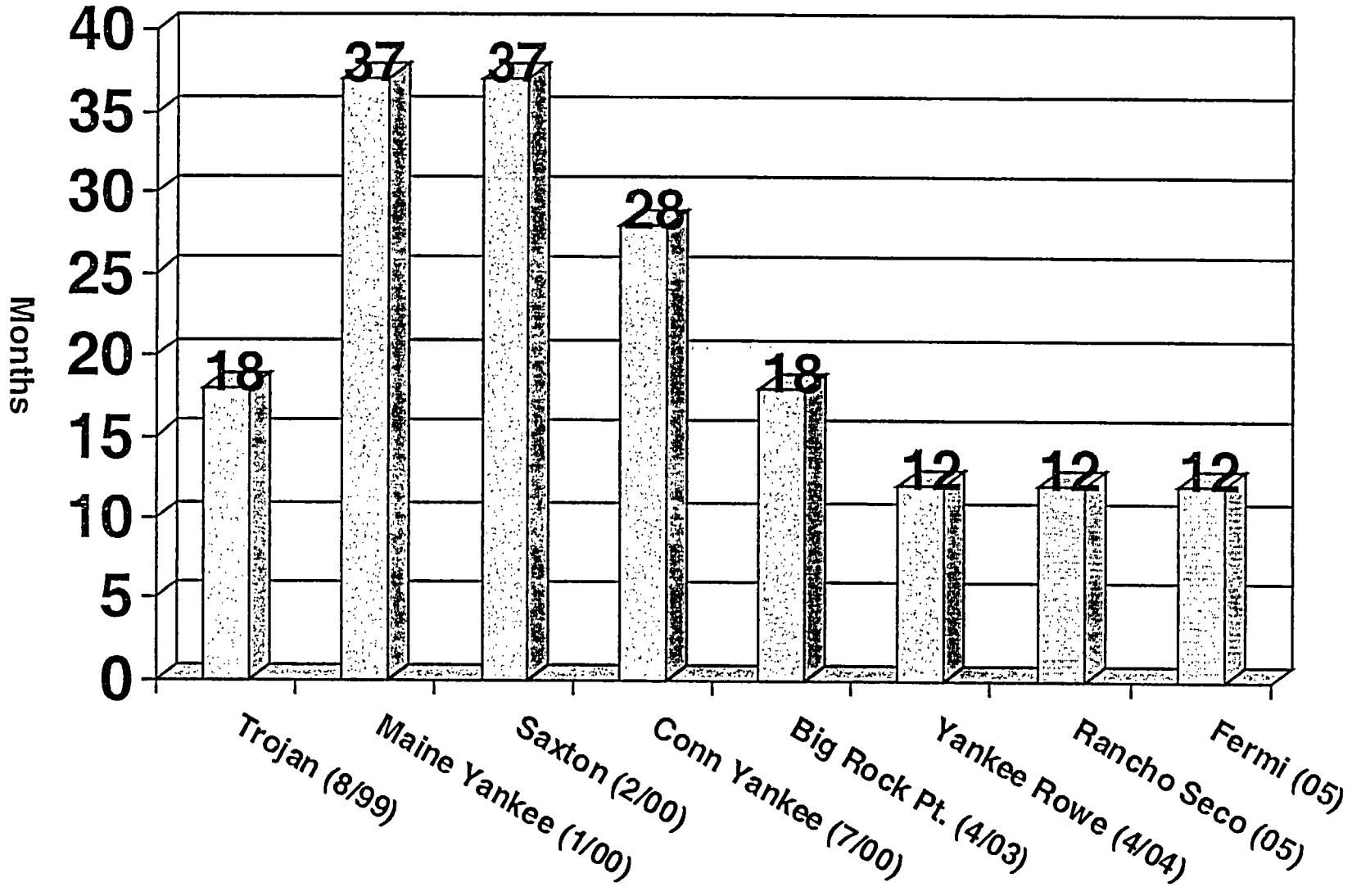
- **License Termination Rule**
- **2003 Financial Assurance Rulemaking**
- **NUREG 1757** Consolidated NMSS Decommissioning Guidance 3 vols.
- **NUREG 1700** SRP for Evaluating NRC License Termination Plans

Evolution of Process

- 90-day Acceptance reviews
- "Proactive" Interactions
- Realistic Scenarios
- Focused Inspections

LTP Approval Rates

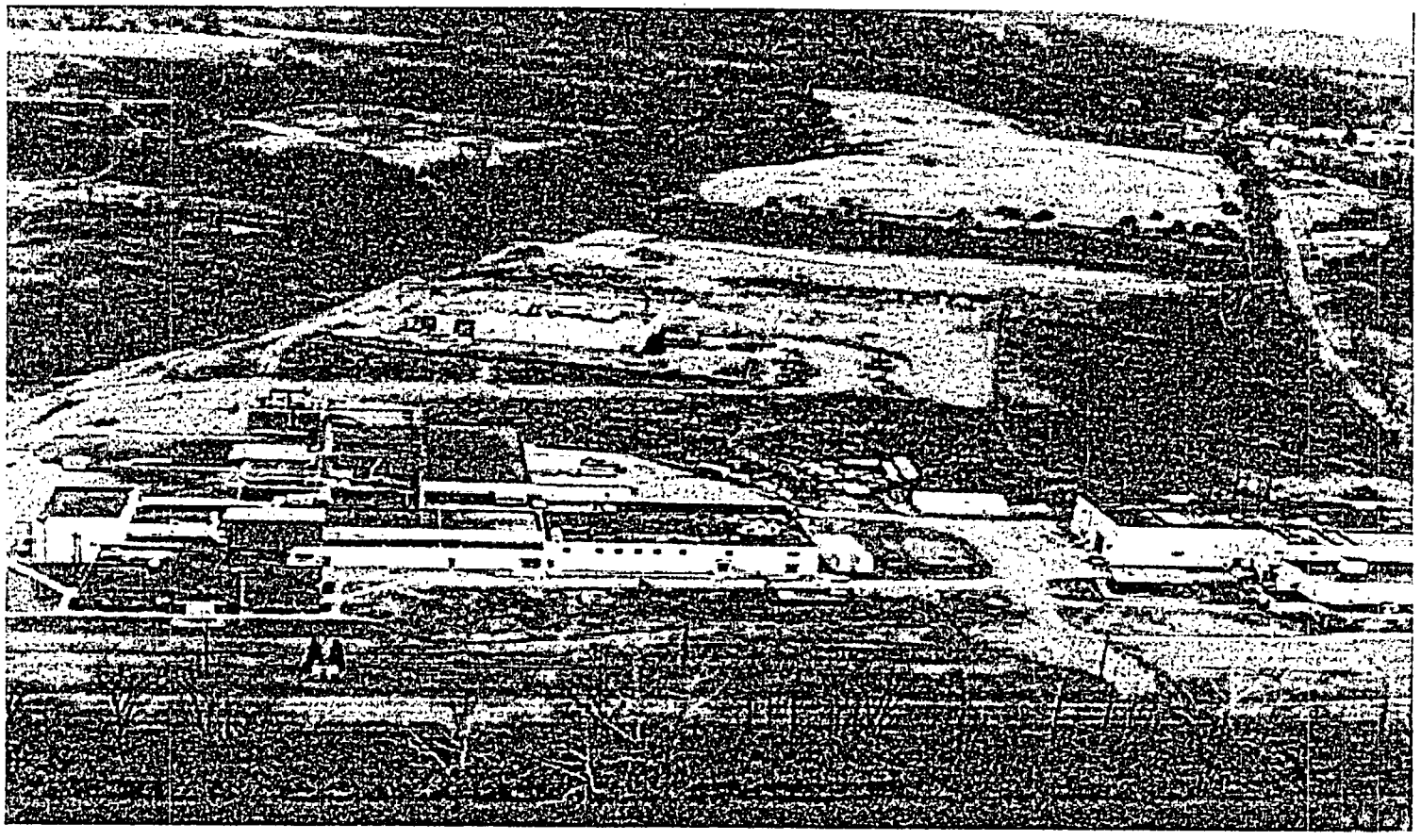
Site (LTP submitted)



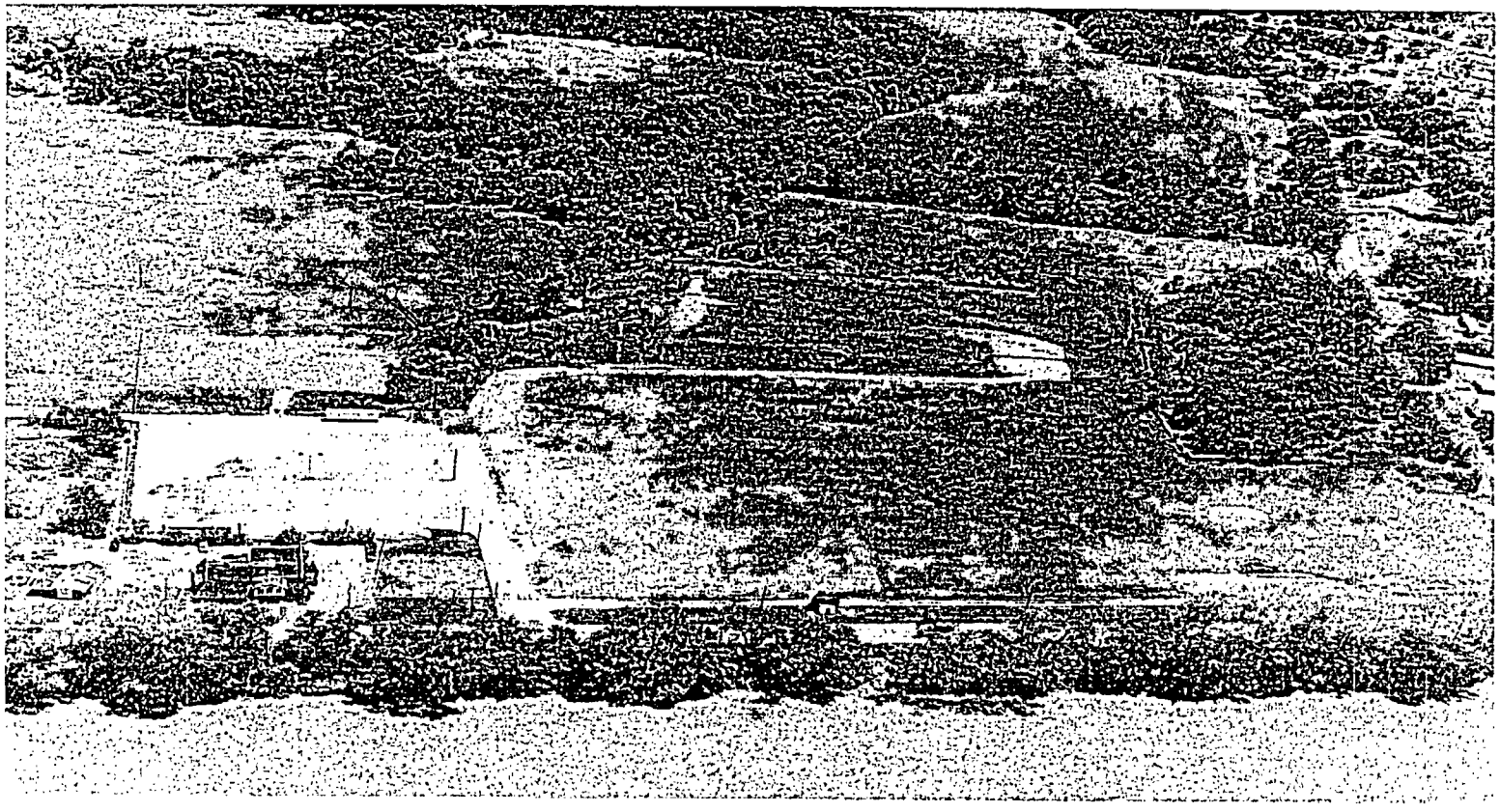
Site Specific Accomplishments

- 5 Decommissioning Plan/License Termination Plan Acceptance Reviews
- 1 Decommissioning Plan Review
- 2 Final Status Survey Reviews
- 20 Licensing Actions
- 2 Sites Terminated

Parks Township site - 1995



Parks Township site - 2004



Programmatic Accomplishments

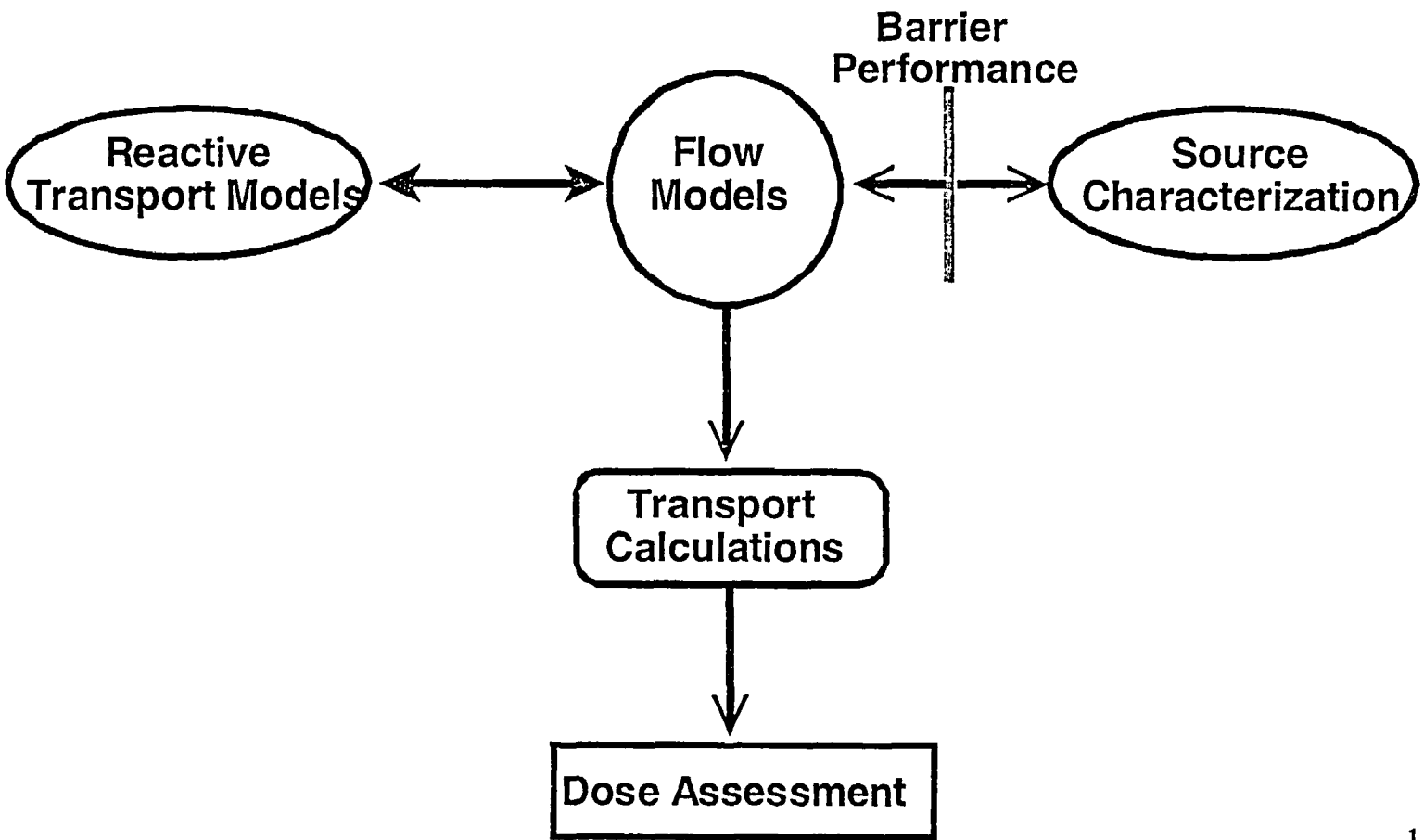
- Comprehensive Decommissioning Program
- License Termination Rule Analysis Recommendations
- Mixing Policy
- Program Evaluation
- International Activities

Innovative Approaches

- Kiski Valley Water Pollution Control Authority
- Fansteel
- Shieldalloy
- Jefferson Proving Ground

Radionuclide Transport Research in Support of Decommissioning

Accomplishment: More realistic analyses of doses from residual radioactivity to reduce conservatism in license termination reviews.



Accomplishments - Regions

- 4 Decommissioning Plan Acceptance Reviews
- 9 Final Status Survey Reviews
- 96 Inspections
- 30 Licensing Actions
- 2 Sites Terminated

West Valley

- Policy Statement
- Dept. of Energy/New York State Energy Research and Development Authority: Differing Interests
- Schedules/Future Activities

EPA/NRC MOU

- Criteria for Consultation
- Site–Specific Consultation Continues
- Revising Guidance
- Outreach Efforts
- Future Activities

On the Horizon

- Continue Implementation of License Termination Rule Recommendations
- Implement Program Improvement Plan
- Communication Strategy
- 2006 Office of Management and Budget Performance Assessment Rating Tool Evaluation

Challenges

- **Sites: Safetylight, Fansteel, West Valley, Non-licensees**
- **Issues: Restricted Use, Soil Mixing, Multiple Regulators**
- **Resources: Estimating Resources Given the Uncertainty of Licensee Plans**

Summary

- **Decommissioning Program Continues to Mature**
  - **Improvements and Efficiencies**
  - **Complex Sites**
  - **Technical/policy Issues**
  - **Increased Flexibility**
  - **Program Improvements**