

May 2023

The Business of Radioactive Waste

How one Utah uranium mill on the doorstep of Bears Ears National Monument became America's cheapest radioactive waste dump



GRAND CANYON
TRUST

DOM SMITH, ECOFLIGHT

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On December 2, 2021, the EPA found that the White Mesa Mill had significant amounts of radioactive wastes sitting in its waste pits that were not covered with liquid (as required by EPA rules). The EPA estimated that these uncovered wastes were emitting 10 times more radon—a cancer-causing gas—than covered material. The EPA called this violation “egregious” and deemed the mill “unacceptable for the receipt of off-site wastes” from Superfund sites, EPA’s list of contaminated places that are badly polluted and prioritized for cleanup. The EPA barred the mill from accepting Superfund waste, but did not stop the mill from accepting waste from other locations. This August 2021 photo shows the waste pits not adequately covered with liquid. BRUCE GORDON, ECOFLIGHT

ACKNOWLEDGMENTS

This report could not have been written without documents made available to the public by the U.S. Nuclear Regulatory Commission, the U.S. Department of Energy, the U.S. Department of Defense, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the Utah Department of Environmental Quality, the Utah Division of Waste Management and Radiation Control, and numerous other government agencies.

The Grand Canyon Trust is deeply grateful to the journalists, particularly at tribal, state, and local news outlets, who uncovered and documented many facts, details, and testimonies that were instrumental in piecing together the history of various waste streams approved or considered for shipment to the White Mesa Mill.

Each of the wastes described in this report carries its own legacy of contamination, including devastating impacts to people, communities, and the environment. In many cases, local communities across North America and the world, including tribal communities on the Cherokee Nation, the Spokane Indian Reservation, and the Navajo Nation, have organized to advocate for cleanup of radioactive contamination linked to these wastes. The Trust recognizes the community leaders, advocates, and individuals who have devoted their lives to these efforts. In White Mesa, Utah, the Trust expresses support for the longstanding and tireless work of the Ute Mountain Ute Tribe and the White Mesa Concerned Community to protect people, culture, wildlife, water, land, and air from contamination caused by the White Mesa Mill and its alternate feed waste-processing and disposal business. The Trust honors the enormous personal sacrifices made by those who have and continue to put themselves and their families at risk in pursuit of environmental justice.

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WASTE STREAMS

23 TELEDYNE WAH CHANG

Oregon

The dispute over 12 million pounds of waste from the Teledyne Wah Chang Albany Superfund site led to the legal precedent and policy guidance that low-level radioactive waste could be considered “ore,” opening the floodgates for wastes to flow to the White Mesa Mill.

29 HONEYWELL AND ALLIED SIGNAL

Illinois

Hazardous waste was reclassified as “alternate feed” and the White Mesa Mill given carte blanche to receive waste indefinitely, in unlimited quantities, and with a different chemical makeup and higher uranium content than originally approved.

37 COTTER

Nevada

From the Belgian Congo to Missouri, Colorado, Ohio, the Nevada Test Site, and finally to White Mesa, the Cotter concentrate left contamination and a trail of Superfund sites in its wake. Mixed hazardous waste was reclassified as “alternate feed” to allow the White Mesa Mill to accept it.

45 CABOT

Pennsylvania

After promising lower disposal fees compared to a licensed low-level radioactive waste disposal site, the White Mesa Mill received permission to accept unlimited quantities of Cabot waste, an approval that remained an open door more than two decades later.

- 51 ASHLAND 1, ASHLAND 2, LINDE, AND SEAWAY AREA D**
New York
 By offering lower disposal costs, the White Mesa Mill likely pocketed millions to process and dispose of over 600 million pounds of radioactive materials from four Superfund sites contaminated by production of uranium for use in the atom bombs dropped on Japan.
- 59 CAMECO**
Canada
 By sending radioactive waste across international borders to the White Mesa Mill, Cameco set a precedent subsequently used to defend a proposal to accept waste from Europe.
- 65 MALLINCKRODT CHEMICAL, ST. LOUIS**
Missouri
 Despite allegations that the payment the White Mesa Mill owner would receive to accept the St. Louis waste greatly exceeded the value of the uranium it would extract, up to 1.9 million cubic yards of waste were approved for shipment to the mill.
- 73 W.R. GRACE & CO.**
Tennessee
 This low-level radioactive waste was reclassified as “ore” and approved for shipment to the White Mesa Mill for processing and disposal. The high thorium content of this waste stream has been used as a justification to accept other wastes with high thorium content.
- 79 HERITAGE MINERALS**
New Jersey
 Radioactive wastes that were removed from New Jersey’s Pine Barrens to make that area safer, partly in the hope of building a sprawling housing development, have now been buried next to the community of White Mesa.
- 85 MOUNTAIN PASS MINE - MOLYCORP**
California
 Despite serious concerns from the EPA, lead sulfide sludge at Mountain Pass Mine that had been classified as “characteristic hazardous waste” requiring special disposal was redefined as “source material” so that it could be sent to the White Mesa Mill.
- 91 MAYWOOD CHEMICAL WORKS**
New Jersey
 After state regulators in Colorado rebuffed a proposal to ship radioactive Superfund waste to a uranium mill in that state, 1.68 billion pounds of thorium-laden waste tied to high incidences of cancer in New Jersey were approved for shipment to the White Mesa Mill instead.
- 97 FMRI, INC. – FANSTEEL**
Cherokee Nation (Oklahoma)
 After local opposition defeated a proposal to store radioactive waste on-site, up to 64 million pounds of radioactive waste containing uranium and thorium were approved for shipment to the White Mesa Mill.

103 MIDNITE MINE**Spokane Indian Reservation (Washington)**

Radioactive waste from a Superfund site that once produced uranium for nuclear weapons was transported from the Spokane Indian Reservation, where it had contaminated water, to the White Mesa Mill.

111 SEQUOYAH FUELS**Cherokee Nation (Oklahoma)**

After the Cherokee Nation successfully lobbied to have waste from the Sequoyah Fuels facility moved in order to protect Cherokee citizens from radioactive contamination, nearly 22 million pounds of low-level radioactive waste were sent to the White Mesa Mill.

119 SILMET OÜ**Estonia**

A rare earth metals processing plant in Estonia shipped more than 1.4 million pounds of low-level radioactive waste to the White Mesa Mill. The Silmet waste is the first radioactive waste sent from Europe for processing and disposal at the mill.

125 MOFFAT TUNNEL**Colorado**

Contaminated runoff from a railroad tunnel under the Continental Divide is treated to remove uranium and other dangerous contaminants and protect the Fraser River and water users downstream. The resulting radioactive waste is expected to be sent to White Mesa.

131 JAPAN ATOMIC ENERGY AGENCY**Japan**

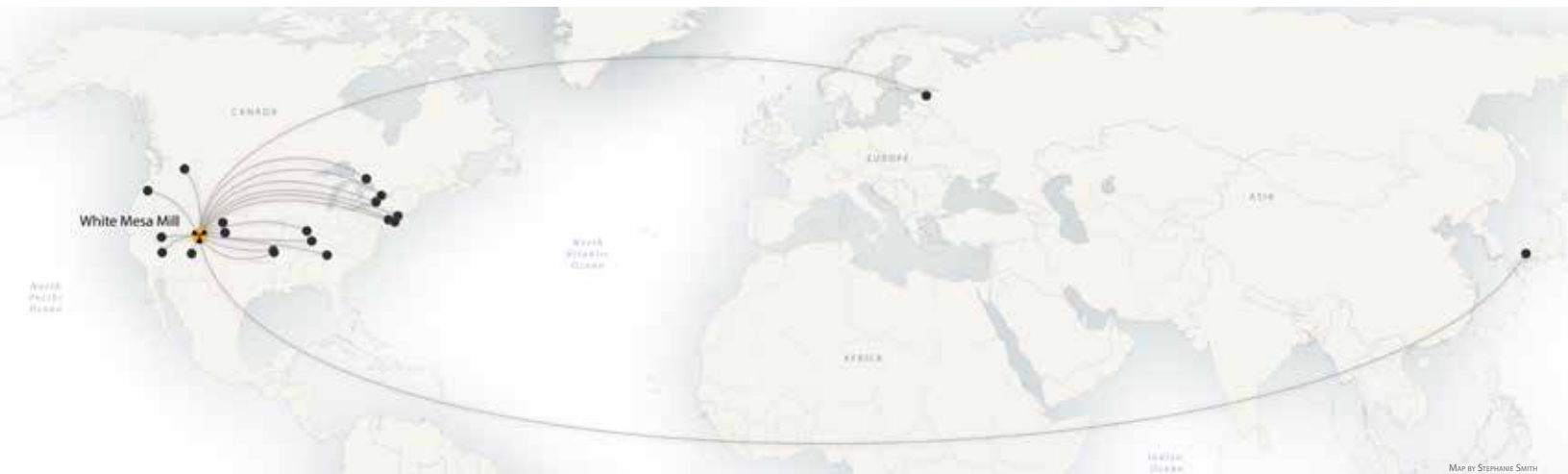
The Japan Atomic Energy Agency seeks to send radioactive materials deemed a threat to public health in Japan to the White Mesa Mill. The mill was paid almost \$6 million to accept waste from Japan in the mid-2000s, without a license amendment.

137 NAVAJO NATION URANIUM MINES**Navajo Nation (Arizona, New Mexico, Utah)**

Hundreds of abandoned uranium mines litter the Navajo Nation, contaminating land and water. The White Mesa Mill owner is pushing to bring waste from the abandoned mines to White Mesa, and secure part of \$1.7 billion in government cleanup funds.

145 CONCLUSION**146 RECOMMENDATIONS****147 APPENDIX: MAJOR STATUTES AND RULES**

- 147 The Atomic Energy Act
- 147 The Uranium Mill Tailings Radiation Control Act of 1978
- 148 NRC's 1995 Guidance on Alternate-Feed Licensing
- 149 In the Matter of International Uranium (USA) Corporation
- 150 Radioactive and Hazardous Waste-Disposal Laws
 - 150 Low-level radioactive wastes
 - 151 Hazardous wastes



CHRONOLOGIES

Wastes streams

The owners of the White Mesa Mill, a conventional uranium mill in southeastern Utah, have applied for numerous amendments to the mill's operating license in order to process and dispose of waste from across North America and the world. Until 2004, the Nuclear Regulatory Commission reviewed and approved such amendments. In 2004, Utah became an "agreement state," taking over responsibility for regulating the mill, including issuing amendments to the mill's license.

1992

Teledyne Wah Chang

LOCATION: Teledyne Wah Chang Albany facility in Millersburg, Oregon

WASTE SOURCE: Zirconium and rare earth metals production, depleted-uranium processing facility

AMENDMENT REQUEST SUBMITTED: January 18, 1989 (600 tons (1.2 million pounds) of waste were shipped to the White Mesa Mill before the mill owner applied for a license amendment¹)

APPROVAL DATE: **June 2, 1992**²

APPROVED BY: Nuclear Regulatory Commission

SUPERFUND SITE³

Status: Materials appear to have been sent back to Teledyne Wah Chang and not ultimately discarded at the White Mesa Mill.

¹ Letter from John S. Hamrick, White Mesa Mill Site Environmental Coordinator, to R. Dale Smith, Director, United States Nuclear Regulatory Commission, Region IV. "Re: Umetco Minerals Corporation SUA-1358; Docket No. 40-8681 White Mesa Mill, Utah." p. 1. January 18, 1989. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1989-01-18-Ltr-from-Umetco-to-NRC-re-Plant-Tests.pdf>. Accessed January 29, 2022.

² Letter from Ramon E. Hall, United States Nuclear Regulatory Commission, to Rick Van Horn, Umetco Minerals Corporation. "Docket No. 40-8681 SUA-1358, Amendment No. 30." June 2, 1992. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1992-06-02-Teledyne-License-Amendment.pdf>. Accessed January 29, 2022.

³ "Superfund Site: Teledyne Wah Chang Albany, OR." United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=1000421>. Accessed January 29, 2022.

1993**Honeywell and Allied Signal**

LOCATION: Allied Signal Corporation facility in Metropolis, Illinois
 WASTE SOURCE: Uranium-conversion facility
 AMENDMENT REQUEST SUBMITTED: June 15, 1993⁴ (1,700 barrels of waste were shipped to the White Mesa Mill before the mill owner applied for a license amendment⁵)
 APPROVAL DATE: **October 1, 1993**⁶
 APPROVED BY: Nuclear Regulatory Commission

*Status: Processed and discarded at the White Mesa Mill; as of 2021, the mill was still licensed to accept this Allied Signal waste.*⁷

1995**Rhone-Poulenc Chemicals**

LOCATION: Rhone-Poulenc Chemicals facility in Freeport, Texas
 WASTE SOURCE: Rare earth element and thorium production facility
 AMENDMENT REQUEST SUBMITTED: January 12, 1995
 APPROVAL DATE: **September 28, 1995**⁸
 APPROVED BY: Nuclear Regulatory Commission

**A detailed account of this alternate feed waste is omitted from this report due to insufficient information.*

*Status: Processed and discarded at the White Mesa Mill.*⁹

1997**Cotter**

LOCATION: Nevada Test Site, about 65 miles northwest of Las Vegas, Nevada
 WASTE SOURCE: Uranium purification and processing

⁴ Letter from W.W. Brice, Umetco Minerals Corporation, to Ramon E. Hall, United States Nuclear Regulatory Commission. "Umetco Minerals Corporation, SUA-1358, Docket No. 408681, White Mesa Mill, Utah. Allied Chemical Company – CaF2 By-product. U.S. NRC Letter of May 5, 1993." June 15, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_06_15_Am_Req_to_Process_CaF2.pdf. Accessed January 29, 2022.

⁵ Letter from E. Ramon Hall, United States Nuclear Regulatory Commission, to W.W. Brice, Umetco Minerals Corporation. "Docket No. 40-8581." p. 1. May 5, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_05_05_Ltr_from_NRC_re_Allied_Waste.pdf. Accessed January 29, 2022.

⁶ Memorandum from Dana C. Ward, United States Nuclear Regulatory Commission. "Amendment 34 to Source Material License SUA-1358, for the White Mesa Mill to Process Allied Material." pp. 1, 4. October 1, 1993. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993-10-01-Memo-re-Am-34-Authorizing-CaF2-Feed.pdf>. Accessed January 29, 2022.

⁷ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Conditions 10.6 and 10.7." p. 10. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

⁸ Letter from Joseph J. Holonich, United States Nuclear Regulatory Commission, to Donald Sparling, Energy Fuels Nuclear. "Subject: Review of Requests to Amend Source Material License SUA-1358 for the White Mesa Mill, Blanding, Utah, License Amendment 41." pp. 1-2. September 28, 1995. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Rhone_Poulenc_License_Amendment_Approval.pdf. Accessed January 29, 2022.

⁹ Denison Mines (USA) Corp. "White Mesa Uranium Mill License Renewal Application, State of Utah Radioactive Materials License No. UT1900479, Vol. 1." p. 28. February 28, 2007. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/02-28-07-RML-WMM-Denison.pdf>. Accessed February 18, 2022.

AMENDMENT REQUEST SUBMITTED: March 5, 1997¹⁰

APPROVAL DATE: **April 2, 1997**¹¹

APPROVED BY: Nuclear Regulatory Commission

**Several sites that processed the Cotter concentrate have become Superfund sites, including the Mound Plant in Miamisburg, Ohio¹² and the Cañon City Mill site in Cañon City, Colorado.¹³*

Status: Processed and discarded at the White Mesa Mill.

Cabot

LOCATION: Cabot Performance Materials facility near Boyertown, Pennsylvania

WASTE SOURCE: Rare earth metals processing plant

AMENDMENT REQUEST SUBMITTED: April 3, 1997

APPROVAL DATE: **August 15, 1997**¹⁴

APPROVED BY: Nuclear Regulatory Commission

Status: Processed and discarded at the White Mesa Mill; as of 2021, the mill was still licensed to accept waste from the Cabot site.¹⁵

1998

Ashland 2 (Tonawanda)

LOCATION: Ashland 2 site near Tonawanda, New York

WASTE SOURCE: Waste from uranium-processing facility

AMENDMENT REQUEST SUBMITTED: May 8, 1998

APPROVAL DATE: **June 23, 1998**¹⁶

APPROVED BY: Nuclear Regulatory Commission

Formerly Utilized Sites Remedial Action Program (FUSRAP) site

Status: Processed and discarded at the White Mesa Mill.

¹⁰ Letter from Shirley Ann Jackson, United States Nuclear Regulatory Commission, to Congressman Eni F.H. Faleomavaega." p. 1. June 26, 1997. <https://www.nrc.gov/docs/ML2014/ML20141G381.pdf>. Accessed January 29, 2022.

¹¹ United States Nuclear Regulatory Commission Atomic Safety and Licensing Board Panel. "Memorandum and Order in the matter of International Uranium (USA) Corporation (White Mesa Mill; Alternate Feed Material) Docket No. 40-8681-MLA." p. 2. July 23, 1997. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997-07-23-Order-Denying-Hearing.pdf>. Accessed January 29, 2022.

¹² "Superfund Site: Mound Plant (USDOE) Miamisburg, OH." United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0504935>. Accessed January 29, 2022.

¹³ "Superfund Site: Lincoln Park Canon City, CO." United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0800115>. Accessed January 29, 2022.

¹⁴ Letter from Joseph J. Holonich, United States Nuclear Regulatory Commission, to Michelle Rehmman, International Uranium (USA) Corporation. "Re: Amendment 4 to Source Material License SUA-1358, International Uranium (USA) Corporation's White Mesa Uranium Mill, Blanding, Utah. U.S Nuclear Regulatory Commission, Materials License SUA-1358, Amendment No. 4." August 15, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/1997_08_15_Ltr_from_J_Holonich_re_Approval_to_Process_Cabot_Feed.pdf. Accessed January 29, 2022.

¹⁵ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.9." p. 10. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

¹⁶ Letter from Joseph J. Holonich, United States Nuclear Regulatory Commission, to Michelle Rehmman, International Uranium (USA) Corporation. "Subject: Amendment 6 to Source Material License Sua-1358, International Uranium (USA) Corporation's White Mesa Uranium Mill, Blanding, Utah." June 23, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_06_23-Ltr_from_J_Holonich_re_Approval_to_Process_Ashland_2_Feed.pdf. Accessed January 29, 2022.

Cameco

LOCATION: Cameco Corporation's Blind River and Port Hope facilities in Ontario, Canada

WASTE SOURCE: Uranium refinery and uranium-conversion plant

AMENDMENT REQUEST SUBMITTED: June 4, 1998

APPROVAL DATE: **October 16, 1998**¹⁷

APPROVED BY: Nuclear Regulatory Commission

*Status: Processed and discarded at the White Mesa Mill; as of 2021, the mill was still licensed to accept this Cameco waste.*¹⁸

1999

Ashland 1 and Seaway Area D (Tonawanda)

LOCATION: Ashland 1 and Seaway Area D sites near Tonawanda, New York

WASTE SOURCE: Waste from uranium-processing facility

AMENDMENT REQUEST SUBMITTED: October 15, 1998.¹⁹

APPROVAL DATE: **February 3, 1999**²⁰

APPROVED BY: Nuclear Regulatory Commission

Both sites are Formerly Utilized Sites Remedial Action Program (FUSRAP) sites

Status: Processed and discarded at the White Mesa Mill.

Mallinckrodt Chemical, St. Louis

LOCATION: Latty Avenue Site in Hazelwood, Missouri; the St. Louis Airport Site in Berkeley, Missouri; and the St. Louis Downtown Site in St. Louis, Missouri

WASTE SOURCE: Uranium-processing facility

AMENDMENT REQUEST SUBMITTED: March 2, 1999

APPROVAL DATE: **July 28, 1999**²¹

APPROVED BY: Nuclear Regulatory Commission

All three sites are Formerly Utilized Sites Remedial Action Program (FUSRAP) sites

Status: Materials appear not to have been sent to the White Mesa Mill.

¹⁷ United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process Cameco Corporation Material." p. 1. October 16, 1998. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/1998-10-16-NRC-Tech-Eval-re-Cameco.pdf>. Accessed January 29, 2022.

¹⁸ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.11." p. 10. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

¹⁹ International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." October 15, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_10_15-Req_to_Am_License-Ashland_1.pdf. Accessed January 29, 2022.

²⁰ Letter from N. King Stablein, United States Nuclear Regulatory Commission, to Michelle Rehmman, International Uranium (USA) Corporation. "Subject: Amendment 10 To Materials License Sua-1358 -- Approval To Receive And Process FUSRAP Materials At International Uranium (USA) Corporation's White Mesa Uranium Mill." February 3, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1999_02_03-Ltr_from_N_Stablein_re_Approval_for_Ashland_1.pdf. Accessed January 29, 2022.

²¹ United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process St. Louis FUSRAP Site Material." p. 1. July 28, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/Technical_eval_report_request_to_process_St_Louis_FUSRAP_material.pdf. Accessed January 29, 2022.

2000**Linde (Tonawanda)**

LOCATION: Linde site near Tonawanda, New York
 WASTE SOURCE: Uranium-processing facility
 AMENDMENT REQUEST SUBMITTED: March 16, 2000²²
 APPROVAL DATE: **July 7, 2000**²³
 APPROVED BY: Nuclear Regulatory Commission
Formerly Utilized Sites Remedial Action Program (FUSRAP) site
Status: Processed and discarded at the White Mesa Mill.

W.R. Grace & Co.

LOCATION: W.R. Grace facility in Chattanooga, Tennessee
 WASTE SOURCE: Monazite sands processing facility that produced uranium and thorium metal, thorium fluoride, and thorium oxide
 AMENDMENT REQUEST SUBMITTED: April 12, 2000.
 APPROVAL DATE: **December 27, 2000**²⁴
 APPROVED BY: Nuclear Regulatory Commission
Status: Materials appear not to have been sent to the White Mesa Mill.

Heritage Minerals

LOCATION: Heritage Minerals Incorporated site near of Lakehurst, New Jersey
 WASTE SOURCE: Sand mining and processing operations
 AMENDMENT REQUEST SUBMITTED: July 5, 2000
 APPROVAL DATE: **December 29, 2000**²⁵
 APPROVED BY: Nuclear Regulatory Commission
Status: Processed and discarded at the White Mesa Mill.

2001**Mountain Pass Mine - Molycorp**

LOCATION: Mountain Pass Mine site on Mountain Pass, Clark Mountains, California
 WASTE SOURCE: Rare earth elements mining
 AMENDMENT REQUEST SUBMITTED: December 19, 2000

²² International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." p. 3. March 16, 2000. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000_03_16-Ltr_from_IUSA_to_NRC_re_Am_Req_for_Linde_FUSRAP.pdf. Accessed January 29, 2022.

²³ Letter from Philip Ting, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (IUSA) Corporation. "Subject: Amendment 14 To Materials License Sua-1358 -- Approval to Receive and Process Alternate Feed Material from the Linde FUSRAP Site at the White Mesa Uranium Mill." July 7, 2000. https://grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000-07-07-License_Amendment_14_Linde.pdf. Accessed January 29, 2022.

²⁴ Letter from Philip Ting, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (IUSA) Corporation. "Subject: Amendment 17 To Materials License Sua-1358 -- Approval to Receive and Process Alternate Feed Material from the W.R. Grace Site at the White Mesa Uranium Mill." December 27, 2000. <https://www.nrc.gov/docs/ML0118/ML011800084.pdf>. Accessed January 29, 2022.

²⁵ Letter from Philip Ting, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (IUSA) Corporation. "Amendment 18 to Materials License Sua-1358 -- Approval to Receive and Process Alternate Feed Material from the Heritage Minerals Site at the White Mesa Uranium Mill." December 29, 2000. <https://www.nrc.gov/docs/ML0234/ML023470315.pdf>. Accessed January 29, 2022.

APPROVAL DATE: **December 11, 2001**²⁶

APPROVED BY: Nuclear Regulatory Commission

*Status: Processed and discarded at the White Mesa Mill; as of 2021, the mill was still licensed to accept Molycorp waste.*²⁷

2002

Maywood Chemical Works

LOCATION: Maywood Chemical Works site near Maywood, New Jersey

WASTE SOURCE: Thorium-processing facility (from monazite sands)

AMENDMENT REQUEST SUBMITTED: June 15, 2001

APPROVAL DATE: **September 23, 2002**²⁸

APPROVED BY: Nuclear Regulatory Commission

SUPERFUND SITE,²⁹ *Formerly Utilized Sites Remedial Action Program (FUSRAP) site*³⁰

Status: Materials appear to have been sent to commercial waste-disposal site(s) instead of to the White Mesa Mill.

2006

FMRI, Inc. - Fansteel

LOCATION: FMRI's Muskogee facility in Muskogee, Oklahoma

WASTE SOURCE: Rare earth metals processing plant

AMENDMENT REQUEST SUBMITTED: March 7, 2005

APPROVAL DATE: **June 13, 2006**³¹

APPROVED BY: State of Utah

*Status: Processed and discarded at the White Mesa Mill; as of 2021, the mill was still licensed to accept Fansteel waste.*³²

²⁶ Letter from Mr. Melvyn Leach, Fuel Cycle Licensing Branch, United States Nuclear Regulatory Commission to Michelle Rehmann, Environmental Manager, International Uranium (IUSA) Corporation. "Amendment 20 to Materials License Sua-1358 -- Approval to Receive and Process Alternate Feed Material from the Molycorp Site at the White Mesa Uranium Mill." December 11, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/NRC_Tech_Eval_Amendment_Request_Molycorp.pdf. Accessed January 29, 2022.

²⁷ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.17." p. 11. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

²⁸ Letter from Daniel Gillen, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (IUSA) Corporation. "Re: Amendment 22 to Materials License Sua-1358 -- Approval to Receive And Process Alternate Feed Material From the Maywood Site at the White Mesa Uranium Mill." September 23, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/2002_09_23_Letter_D_Gillen_re_Approval_Maywood_Feed.pdf. Accessed January 29, 2022.

²⁹ "Superfund Site: Maywood Chemical Co. Maywood/Rochelle Park, NJ." United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0200665>. Accessed January 29, 2022.

³⁰ United States Army Corps of Engineers, Formerly Utilized Sites Remedial Action Program, New York District. "Record of Decision for Soils and Buildings at the FUSRAP Maywood Superfund Site: Maywood, New Jersey." p. 5. August 2003. https://www.grandcanyontrust.org/sites/default/files/resources/2003_08_ROD_Soils_and_Buildings_Maywood.pdf. Accessed January 29, 2022.

³¹ Utah Department of Environmental Quality, Division of Radiation Control 11e.(2) Materials License. June 13, 2006. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2006-06-13-RML-UT-1900479-Am-2.pdf>. Accessed January 25, 2022.

³² Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.19." p. 11. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.



An example of SuperSaks, which are often used to package waste for transport to the White Mesa Mill. U.S. DEPARTMENT OF ENERGY

2014

Midnite Mine

LOCATION: Dawn Mining Company's Midnite Mine site in Wellpinit, Washington

WASTE SOURCE: Uranium mine

AMENDMENT REQUEST SUBMITTED: April 27, 2011

APPROVAL DATE: **July 10, 2014**³³

APPROVED BY: State of Utah

SUPERFUND SITE³⁴

Status: Processed and discarded at the White Mesa Mill; as of July 2021, the mill was still licensed to accept Midnite Mine waste.³⁵ The EPA barred the mill from processing and discarding Superfund site waste in December 2021,³⁶ but walked back the decision on July 18, 2022.³⁷

³³ Utah Department of Environmental Quality, Division of Radiation Control. "License Amendment 7 to Radioactive Materials License Number UT 1900479." pp. 1, 13. July 10, 2014. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2014-07-10-RML-UT-1900479-Am7.pdf>. Accessed January 29, 2022.

³⁴ "Superfund Site: Midnite Mine Wellpinit, WA." United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=1001070>. Accessed January 29, 2022.

³⁵ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.20." p. 11. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

³⁶ United States Environmental Protection Agency, Region 8. Letter from Janice A. Pearson, Branch Chief, RCRA/OPA Enforcement Branch, to Mr. Mark Chalmers, President and CEO, Energy Fuels Resources (USA), Inc. "Re: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Off-Site Policy Unacceptability Notice, White Mesa Mill, Air Quality Approval Order DAQE- AN0112050018-11, Groundwater Discharge Permit No. UGW370004, Radioactive Materials License No. UT1900479." pp. 1-2. December 2, 2021. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WhiteMesaMill-CERCLA-OSR-UnacceptabilityNotice-12-02-2021.pdf>. Accessed January 29, 2022.

³⁷ Letter from Kathleen Becker, regional administrator, United States Environmental Protection Agency, Region 8, to Mark Chalmers, Energy Fuels Resources (USA) Inc. re: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Off-Site Rule Unacceptability Final Determination, White Mesa Mill, Air Quality Approval Order DAQE-AN01 12050018-11, Groundwater Discharge Permit No. UGW370004, Radioactive Materials License No. UT1900479. July 18, 2022. <https://www.grandcanyontrust.org/sites/default/files/resources/EPA-final-White-Mesa-Mill-CERCLA-unsuitability-determination-7-18-22.pdf>. Accessed May 11, 2023.

2018**Sequoyah Fuels**

LOCATION: Sequoyah Fuels Corporation facility in Gore, Oklahoma

WASTE SOURCE: Uranium conversion plant

AMENDMENT REQUEST SUBMITTED: December 15, 2011³⁸

APPROVAL DATE: **February 16, 2018**³⁹

APPROVED BY: State of Utah

Status: Processed and discarded at the White Mesa Mill.

2020**Japan Atomic Energy Agency**

LOCATION: Japan Atomic Energy Agency facilities in Ningyo and Tono, Japan

WASTE SOURCE: Uranium mining, milling, and leaching facilities

AMENDMENT REQUEST SUBMITTED: N/A (On May 19, 2020, the White Mesa Mill owner informed the Utah Division of Waste Management and Radiation Control that it intended to accept and process the Japan Atomic Energy Agency waste)

APPROVAL DATE: N/A (On **July 28, 2020**⁴⁰ the Utah Division of Waste Management and Radiation Control decided the White Mesa Mill did not need a license amendment to accept the waste)

APPROVED BY: State of Utah

Status: From the public record, materials appear not to have been received by the White Mesa Mill yet as of December 2021.

2021**Silmet OÜ**

LOCATION: NPM Silmet OÜ facility in Sillamäe, Estonia

WASTE SOURCE: Rare earth metals processing plant

AMENDMENT REQUEST SUBMITTED: April 18, 2019⁴¹

APPROVAL DATE: **July 27, 2021**⁴²

APPROVED BY: State of Utah

*Status: Shipped to the White Mesa Mill for processing and disposal.*⁴³

³⁸ Letter from Jo Ann Tischler, Denison Mines (USA) Corp., to Rusty Lundberg, Utah Department of Environmental Quality. "Re: Application by Denison Mines (USA) Corp. ("Denison") for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the "Mill") to authorize processing of Sequoyah Fuels Corporation, Inc. ("SFC") alternate feed material (the "Uranium Material")." December 15, 2011. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/SequoyahFuels/2013-10-21-EFR-Ltr-Resp-URS-Questions-Clarification-Req.pdf>. Accessed January 25, 2022.

³⁹ Utah Department of Environmental Quality, Division of Radiation Control. "Radioactive Materials License Number UT1900479, Amendment Final Approval." pp. 9-10. January 19, 2018. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2018-000577.pdf>. Accessed June 29, 2022.

⁴⁰ Letter from Ty L. Howard, Division of Waste Management and Radiation Control, to David C. Frydenlund, Energy Fuels Resources (USA) Inc. "RE: Accepting and Processing Uranium Ore and Equivalent Feed from the Japan Atomic Energy Agency (JAEA) at the White Mesa Mill, Radioactive Material License Number UT 1900479." July 28, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/WMM_DWMRC_Approval_JapanAEAmaterial_28Jul2020.pdf. Accessed January 29, 2022.

⁴¹ Energy Fuels Resources (USA) Inc. "Request to Amend Radioactive Materials License for Processing of Alternate Feed Material from NMP Silmet OU." April 18, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-003761.pdf>. Accessed January 29, 2022.

⁴² Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License Number UT1900479, Amendment No. 10." p. 10. January 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. January 29, 2022.

⁴³ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Inspection Report." Page 3. August 4, 2022. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/InspectionReportWhiteMesaMill-07-26-2022-DRC-2022-023702.pdf>. Accessed May 11, 2023



Radioactive Silmet OÜ waste was shipped from Estonia, across the Atlantic Ocean, to the White Mesa Mill.

Esri, Garmin, FAO, NOAA

Moffat Tunnel

LOCATION: Union Pacific Railroad's Water Treatment Plant in Winter Park, Colorado

WASTE SOURCE: Solids left over from treating water with high levels of uranium

AMENDMENT REQUEST SUBMITTED: December 23, 2019⁴⁴

APPROVAL DATE: **July 27, 2021**⁴⁵

APPROVED BY: State of Utah

Status: Unknown.

Navajo Nation Uranium Mines

LOCATION: Abandoned uranium mines and contaminated sites across the Navajo Nation

WASTE SOURCE: Uranium mining

AMENDMENT REQUEST SUBMITTED: N/A (On March 16, 2020, the White Mesa Mill owner announced a small pilot cleanup project on the Navajo Nation in order to position itself to profit from the cleanup of Cold War era abandoned uranium mines on the Navajo Nation with the aim of securing part of \$1.7 billion in EPA funding⁴⁶)

APPROVAL DATE: N/A

Status: Not yet received.

⁴⁴ Energy Fuels Resources (USA) Inc. Request to Amend Radioactive Materials License for Processing of Alternate Feed Material from Moffat Tunnel. December 23, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-017284.pdf>. Accessed January 25, 2021.

⁴⁵ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.12." p. 11. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

⁴⁶ Energy Fuels Inc. "Energy Fuels Announces 2019 Results." <https://www.energyfuels.com/2020-03-16-Energy-Fuels-Announces-2019-Results>. Accessed January 29, 2022.



The White Mesa Mill.
BRUCE GORDON, ECOFLIGHT

MILL OWNERSHIP

The White Mesa Mill was originally built in the late 1970s and first licensed on March 31, 1980.⁴⁷ It has changed ownership several times.

1980 – 1983

Energy Fuels Nuclear built and operated the mill from the initial start of operations on May 6, 1980 until operations ceased in 1983.

1984 – 1994

Union Carbide Corporation's (UCC) Metals Division, which later became **Umetco Minerals Corporation** (Umetco), a wholly-owned subsidiary of UCC, took over as operator of the mill on January 1, 1984.

1994 – 1997

Energy Fuels Nuclear reassumed ownership of the mill on May 26, 1994.

May 1997 – July 2012

International Uranium (USA) Corporation assumed ownership and became the licensed operator of the mill on May 10, 1997.⁴⁸ International Uranium (USA) Corporation later became **Denison Mines Corps.**

July 2012 – present

Energy Fuels Resources (USA) Inc. headquartered in Lakewood, Colorado, a U.S. subsidiary of Canadian uranium company Energy Fuels Inc. headquartered in Toronto, Canada, purchased Denison in 2012.

⁴⁷ Energy Fuels Resources (USA) Inc. "Reclamation Plan White Mesa Mill, Revision 5.1B." p. 2-1. February 2018. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Report/White_Mesa_Rec_Plan_Rev_5_1B-compressed.pdf. Accessed January 29, 2022.

⁴⁸ Letter from Harold R. Roberts, International Uranium (USA) Corporation, to Michael O. Leavitt, Governor of Utah. "Re: Letters from your office to Great AvikanTMHouse and from Great AvikanTMHouse to your office dated May 23, 1997 and May 24, 1997, respectively, regarding the White Mesa Uranium Mill." p. 1. June 18, 1997. <https://www.nrc.gov/docs/ML1504/ML15041A131.pdf>. Accessed January 29, 2022.

EXECUTIVE SUMMARY

Background

The White Mesa Mill is a conventional uranium mill located a mile from the boundary of Bears Ears National Monument in southeastern Utah and just a few miles north of the Ute Mountain Ute Tribe's small reservation community of White Mesa.

The mill was designed and built in the late 1970s to process uranium ore from small mines across the Colorado Plateau. Uranium deposits on the Colorado Plateau (which includes parts of Arizona, Colorado, New Mexico, and Utah) are relatively low grade and expensive to mine.¹

Beginning in the early 1980s, low uranium prices have often forced the mill to shut down,² prompting the mill's owners to seek alternative sources of revenue. By the late 1980s, the mill had begun seeking out so-called "alternate feeds"³—low-level radioactive wastes from contaminated military and industrial sites across the country that the mill could often charge a fee to process and dispose of. Three decades later, the mill continues to profit from accepting these wastes, extracting small amounts of uranium from them, and dumping the remains into its on-site waste ponds. In effect, the mill operates as a de facto low-cost disposal site for radioactive waste; the alternate feed business earns the mill's current owner \$5 to \$15 million per year.⁴

Regulatory history

The U.S. Nuclear Regulatory Commission (NRC) licensed and regulated the White Mesa Mill until 2004. In order to accept an alternate feed waste, the mill must first obtain an amendment to its operating license. The mill is licensed as a uranium mill, not a low-level radioactive waste disposal facility. The commission routinely reviewed and approved these amendments to the mill's license.

In August 2004, the state of Utah became an "agreement state"⁵ and took over responsibility for regulating the mill. In assuming this authority, records suggest that the state sought to stem the flow of alternate feeds to the mill. Since the late 1980s, the state had expressed concern that the mill's primary motivation for accepting low-level radioactive wastes for a fee was not the stated purpose of extracting small amounts of remnant uranium, but rather to ultimately dispose of the wastes while profiting from the fees.⁶

Despite the state's early opposition to what it called the mill owner's "devious methods" to bring waste to Utah,⁷ Utah regulators have gone on to approve numerous license amendments, allowing new low-level radioactive waste streams to flow to the mill on top of those already approved in the 1990s and early 2000s.

¹ United States Energy Information Administration. "Table 1. U.S. Forward-Cost Uranium Reserves by State, Year-End 2008." U.S. Uranium Reserve Estimates. July 2010. <https://www.eia.gov/uranium/reserves/table1.php>. Accessed January 29, 2022.

² Energy Fuels Resources (USA) Inc. "Reclamation Plan White Mesa Mill, Revision 5.1B." p. 2-2. February 2018. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Report/White_Mesa_Rec_Plan_Rev_5_1B-compressed.pdf. Accessed January 29, 2022.

³ Ibid.

⁴ "Energy Fuels Inc. (UUUU) CEO Mark Chalmers On Q2 2020 Results - Earnings Call Transcript." SeekingAlpha.com. August 29, 2020. <https://seekingalpha.com/article/4366563-energy-fuels-inc-uuuu-ceo-mark-chalmers-on-q2-2020-results-earnings-call-transcript>. Accessed January 29, 2022.

⁵ United States Nuclear Regulatory Commission. "NRC Approved Request by Utah to Amend its Agreement with Agency." Press Release. August 18, 2004. <https://www.nrc.gov/docs/ML0423/ML042310358.pdf>. Accessed January 29, 2022.

⁶ United States Nuclear Regulatory Commission. "Initial Decision in the Matter Of Umetco Minerals Corporation (Source Materials License No. SUA-1358)." Docket No. 40-08681-MLA. pp. 2-3, 7-8. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

⁷ Associated Press. "Mill's Disposal Plan is Called 'Sham.'" Deseret News. August 10, 1991. <https://www.deseret.com/1991/8/10/18935457/mill-s-disposal-plan-is-called-sham>. Accessed January 29, 2022.



Alternate feed sources approved or considered for shipment to the White Mesa Mill. Esri, USGS, FAO, NOAA

Once a license amendment is approved, the mill can sometimes continue to receive waste under that amendment for decades. The state of Utah has allowed the mill to receive shipments of certain wastes indefinitely, in greater quantities, and with higher percentages of radioactive materials than originally permitted in a license amendment.⁸

In several instances, hazardous wastes and mixed hazardous wastes have been reclassified as a legal matter in order to allow the White Mesa Mill to accept them. The state has also approved a licensing protocol that could allow the mill to discard contaminated soil that contains wastes listed by law as hazardous if similar hazardous wastes are already present in the White Mesa Mill's waste ponds at higher concentrations.⁹ Following similar reasoning, the levels of radioactive substances and other toxic materials in a mixture of previously accepted wastes have been used to justify accepting new wastes that contain those materials. This type of precedent-setting has normalized the flow of increasingly contaminated wastes to the White Mesa Mill, dropping the regulatory bar with each successive alternate feed shipment. Contaminated sites have often selected the White Mesa Mill as the destination for their wastes because the mill offers significant cost-savings compared to licensed low-level radioactive waste disposal facilities.

In 2020, the state of Utah agreed to let the mill owner accept and process 135.5 tons (271,000 pounds) of waste from the Japan Atomic Energy Agency with no additional licensing,¹⁰ even though the mill

⁸ Letter from Scott Anderson, Director, Utah Division of Waste Management and Radiation Control, to Amber Reimondo, Energy Program Director, Grand Canyon Trust. "Response to Email." February 23, 2017. [https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2017_02_23-Ltr from S. Anderson to S. Fields re KOH Feed.pdf](https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2017_02_23-Ltr%20from%20S.%20Anderson%20to%20S.%20Fields%20re%20KOH%20Feed.pdf). Accessed January 29, 2022.

⁹ International Uranium (USA) Corporation. "Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Waste. Attachment 3." p. 10. November 16, 1999. [https://www.grandcanyontrust.org/sites/default/files/resources/2000_07_05_Request to Process Heritage Minerals Alt Feed.pdf](https://www.grandcanyontrust.org/sites/default/files/resources/2000_07_05_Request_to_Process_Heritage_Minerals_Alt_Feed.pdf). Accessed January 29, 2022.

¹⁰ Letter from Ty L. Howard, Utah Division of Waste Management and Radiation Control, to David C. Frydenlund, Energy Fuels Resources (USA) Inc. "RE: Accepting and Processing Uranium Ore and Equivalent Feed from the Japan Atomic Energy Agency (JAEA) at the White Mesa Mill, Radioactive Material License Number UT 1900479." July 28, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/WMM_DWMRC_Approval_JapanAEAmaterial_28Jul2020.pdf. Accessed January 29, 2022.

would produce only 0.58 tons of refined uranium from the materials.¹¹ The mill's alternative feed waste "recycling" business has effectively transformed the White Mesa Mill into a low-cost destination for the world's radioactive waste.

Environmental and public health concerns

Water contamination

As of 2021, the White Mesa Mill's waste ponds covered approximately 275 acres with plans to dig more. These waste ponds sit above the nearby White Mesa Ute community's deep drinking-water supply, the Navajo Aquifer,¹² which also supplies drinking water to southeastern Utah and northern Arizona, including a large part of the Navajo Nation. As a result of the mill's alternate feed business, these ponds contain a toxic and radioactive goulash that includes wastes with high levels of thorium, as well as dozens of other contaminants, including a number of heavy metals classified as human carcinogens. Waste streams approved for shipment to the mill have contained arsenic, barium, beryllium, cadmium, cobalt, chromium, lead, mercury, molybdenum, nickel, radium, titanium, and vanadium, among many other substances.

Plumes of contaminants, including nitrate and chloroform,¹³ have been detected in the shallow aquifer that sits between the mill's ponds and the Navajo Aquifer. The mill's oldest waste ponds were originally built to hold wastes from milling natural uranium ore and were lined with a single layer of plastic designed to have a useful life of 15-20 years. A reported leak in at least one of these liners required significant repairs.¹⁴ The newer ponds have been fitted with double liners and leak-detection systems, but those systems have revealed leaks through the top liners, another sign that there may be undetected leaks from the older ponds with single liners.¹⁵ Yet in its fourth decade, the mill continues to dispose of low-level radioactive wastes in two of the oldest ponds that do not have modern liners and leak-detection systems.

Area springs monitored by the Ute Mountain Ute Tribe's Environmental Programs Department show rising levels of acidity.¹⁶ A study published by the U.S. Geological Survey in 2011 found the potential for contaminants to migrate from the mill to the surrounding environment.¹⁷ While scientists are unsure of how far and how fast contaminants from the mill could travel and if leaks could ultimately pose a threat to the Navajo Aquifer, community members in White Mesa remain concerned about potential contamination of their drinking water.¹⁸

¹¹ Letter from David C. Frydenlund, Energy Fuels Resources (USA) Inc., to Ty L. Howard, Division of Waste Management and Radiation Control, Utah Department of Environmental Quality. "Receipt and Processing of Ores and Equivalent Feed Materials from Japan Atomic Energy Agency ("JAEA") at the Energy Fuels Resources (USA) Inc. ("EFRI") White Mesa Mill." Energy Fuels Resources (USA) Inc. pp. 2,4,5. May 19, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_JAEAwaste_5-27-20_EFRI_letter_to_UDWMRC.pdf. Accessed January 29, 2022.

¹² Clifton, Justin, Director. "Half Life: The Story of America's Last Uranium Mill." Grand Canyon Trust. May 6, 2016. <https://www.grandcanyontrust.org/half-life-story-americas-last-uranium-mill-0>. Accessed January 29, 2022.

¹³ Utah Department of Environmental Quality, Division of Radiation Control. "Radioactive Materials License Number UT1900479, Amendment Final Approval." p. 12. April 15, 2020. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2020-006724.pdf>. Accessed January 29, 2022.

¹⁴ Geo-Logic Associates. "Data Review and Evaluation of Groundwater Monitoring, White Mesa Uranium Mill. Blanding, Utah." p. 1-2. August 2015. https://www.grandcanyontrust.org/sites/default/files/resources/e_Geologic_Report_White_Mesa_Uranium_Mill.pdf. Accessed January 29, 2022.

¹⁵ Ibid.

¹⁶ Penrod, Emma. "The water around a Utah uranium mill is growing more pollute." Salt Lake Tribune. October 21, 2018. <https://www.sltrib.com/news/environment/2018/10/21/ute-tribal-members-living/>. Accessed January 29, 2022.

¹⁷ Naftz, D.L., Ranalli, A.J., Rowland, R.C., and Marston, T.M. "Assessment of Potential Migration of Radionuclides and Trace Elements from the White Mesa Uranium Mill to the Ute Mountain Ute Reservation and Surrounding Areas, Southeastern Utah." U.S. Geological Survey Science Investigations Report 2011-5231. p. 68. 2001. <https://pubs.usgs.gov/sir/2011/5231/pdf/sir20115231.pdf>. Accessed January 29, 2022.

¹⁸ Mimiaga, Jim. "White Mesa Mill Accepts Cherokee Nation Radioactive Waste." Durango Herald. December 22, 2018. <https://durangoherald.com/articles/255888>. Accessed January 29, 2022.

Air quality

The mill and its waste pits emit radioactive and toxic air pollutants that can travel off-site, including radon, sulfur dioxide, and nitrogen oxide. The mill owner has reported average radon emissions from mill wastes that exceed the numeric limit established under the Clean Air Act to protect human health.

On December 2, 2021, the U.S. Environmental Protection Agency (EPA) barred the White Mesa Mill from accepting, processing, and discarding waste from Superfund sites, due to an “egregious” violation of air quality regulations. The EPA found that waste discarded in one of the mill’s waste pits had been allowed to dry out, emitting by the agency’s estimates 10 times more cancer-causing radon gas than it would have if covered in liquid.¹⁹

Threats to wildlife

Liquid in the waste ponds attracts wildlife, including birds and deer. According to wildlife data collected by the mill’s owner, evidence of 78 different species was observed on mill property.²⁰

Radioactive spills

On September 29, 1999, a truck carrying alternate feed waste from the Ashland 1 site in Tonawanda, New York, tipped over on Highway 50 near Cisco, Utah, spilling approximately 20,000 pounds of radioactive waste.²¹

Individual license amendments often include estimates of increases in total truck traffic along Utah highways associated with the shipping of a new alternate feed waste, generally ranging between 1 and 5 percent.²² However, there appears to be no public accounting of the cumulative increase in truck traffic volume caused by multiple alternate feed sites shipping waste to the White Mesa Mill concurrently at any given time.

A trail of Superfund and FUSRAP sites

The low-level radioactive wastes approved for shipment to the White Mesa have included materials from some of the most contaminated places in the country, including at least three Superfund sites (Teledyne Wah Chang Albany, Maywood, and Midnite Mine) and at least eight FUSRAP sites (Ashland 1, Ashland 2, Seaway Area D, Linde, Latty Avenue, St. Louis Airport, St. Louis Downtown, Maywood). Although not all of these wastes have ultimately ended up at the mill, government cleanups of these sites have cost taxpayers in the U.S. and Canada billions; some of this taxpayer money has gone to the owners of the White Mesa Mill in the form of waste-disposal fees.”

¹⁹ U.S. Environmental Protection Agency, Region 8. Letter from Janice A. Pearson, Branch Chief, RCRA/OPA Enforcement Branch, to Mr. Mark Chalmers, President and CEO, Energy Fuels Resources (USA), Inc. “Re: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Off- Site Policy Unacceptability Notice, White Mesa Mill, Air Quality Approval Order DAQE- AN0112050018-11, Groundwater Discharge Permit No. UGW370004, Radioactive Materials License No. UT1900479.” pp. 1-2. December 2, 2021. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WhiteMesaMill-CERCLA-OSR-UnacceptabilityNotice-12-02-2021.pdf>. Accessed January 29, 2022.

²⁰ International Uranium (USA) Corp. “Fauna.” Reclamation Plan White Mesa Mill, Revision 3.0. p. 105. July 2000. <https://www.nrc.gov/docs/ml0037/ML003737414.pdf>. Accessed January 29, 2022.

²¹ United States Nuclear Regulatory Commission, Region 4. “Preliminary Notification of Event or Unusual Occurrence.” p. 1. September 30, 1999. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1999-09-30-Notice-Spill-near-Cisco.pdf>. Accessed January 29, 2022.

²² For alternate feed waste from the W.R. Grace site in Chattanooga: “an average of 100 additional trucks per week traveling this route to the mill represents an increased traffic load of only 5 percent.” See: Letter from Michelle R. Rehmann, International Uranium (USA) Corporation, to Thomas H. Essig, Branch Chief, United States Nuclear Regulatory Commission. “Re: Amendment Request to Process an Alternate Feed Material from W.R. Grace at the White Mesa Uranium Mill Source Material License SUA-1358.” Nuclear Regulatory Commission. p. 9. April 12, 2000. <https://www.nrc.gov/docs/ML0037/ML003702665.pdf>. Accessed January 29, 2022.



Community members in White Mesa, on the Ute Mountain Ute Reservation, assemble before a spiritual walk to protest the White Mesa Mill in November 2021. TIM PETERSON

Environmental justice at White Mesa

The White Mesa Ute community is the closest community to the White Mesa Mill and sits down gradient of the mill. Some Ute Mountain Ute tribal members have stopped collecting plants and herbs, gathering willow branches to weave traditional baskets, and hunting deer and rabbits for food in the area around the mill due to fears of contamination. White Mesa is a reservation community and the Ute Mountain Ute Tribe is a sovereign nation. The tribe cannot simply relocate its sovereign power to new territory if its existing territory is made uninhabitable. On August 24, 2021, the Ute Mountain Ute Tribe passed a Tribal Council resolution stating that “...the operations of the White Mesa Mill has had severe health impacts on the residents of White Mesa and should cease entirely...”²³

Uranium mining and milling have disproportionately impacted Native communities in the United States. The White Mesa Mill has compounded that burden on the White Mesa Ute community, including by transferring uranium waste threatening Native American communities on the Spokane Indian Reservation (Midnite Mine alternate feed waste) and the Cherokee Nation (Sequoyah Fuels alternate feed waste) to the White Mesa Mill. The mill owner’s efforts to profit from the cleanup of abandoned uranium mine waste on the Navajo Nation²⁴ would further transfer the burden of that waste to the Ute Mountain Ute community in White Mesa. Environmental justice issues related to the mill extend beyond U.S. borders; the Cameco waste comes from a facility built on former Mississauga First Nation lands. They also extend beyond the uranium industry to other alternate feed wastes shipped to the mill, including radioactive wastes from the FMRI, Inc. - Fansteel metals-processing plant on Cherokee Nation lands bordering the Muscogee (Creek) Nation reservation.

²³ Ute Mountain Ute Tribe Tribal Council. “Resolution No. 2021-135: Opposition to the Proposal by United States National Nuclear Security Administration, Department of Energy to Establish a Strategic Uranium Reserve and Authorization to Submit Comments in Opposition.” August 24, 2021. https://www.grandcanyontrust.org/sites/default/files/resources/UMUT_Resolution2021-135_Opposition_Strategic_Uranium_Reserve.pdf. Accessed January 29, 2022.

²⁴ Energy Fuels Inc. “Energy Fuels Announces 2019 Results.” March 16, 2020. <https://www.energyfuels.com/2020-03-16-Energy-Fuels-Announces-2019-Results>. Accessed January 29, 2022.



White Mesa. BLAKE MCCORD

Transparency issues

This report is a partial accounting of many of the wastes approved or considered for shipment to the White Mesa Mill. There is no easily available location for the public to access a comprehensive list of all the alternate feed wastes that have been discarded at the mill, their composition, or their volume. The public cannot easily review what wastes are currently being sent to the mill, nor the cumulative volume of waste buried on-site. Information about the effects of mixing various radioactive wastes together in the ponds is not readily available to the public, despite concerns raised by the U.S. Environmental Protection Agency.²⁵ Information about if and how much the mill owner has been paid to accept a given waste stream is also not publicly available, except in a few cases.

As of 2011, the White Mesa Mill had recovered over 1.6 million pounds of uranium from alternate feed wastes,²⁶ a small fraction of the hundreds of millions of pounds of low-level radioactive wastes shipped to the mill for processing and disposal. Between June 2002 and May 2003 alone, the mill processed over 272,000 tons (more than half a billion pounds) of alternate feed waste,²⁷ discarding the leftovers in its waste pits. As of December 2021, over 700 million pounds of waste have been shipped to the mill, although the true volume of waste disposed of on-site remains unknown. This volume, and the risk to Utah's environment, water, and the White Mesa Ute community, will continue to grow unless and until the White Mesa Mill is prevented from charging a fee to accept, process, and ultimately dispose of low-level radioactive wastes.

²⁵ Letter from Frank Marcinowski, Director, Radiation Protection Division, United States Environmental Protection Agency to Annette L. Vietti-Cook, Secretary, Rulemakings and Adjudications Staff, United States Nuclear Regulatory Commission. pp. 1-2. January 16, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Marcinowski_Vietti-Cook_Jan_16_2002.pdf. Accessed January 29, 2022.

²⁶ Goggles, D., Larrick, C., Ranalli, A., and Shakespeare, T. "White Mesa Uranium Mill And Wind River UMTRA." p. 7. November 16, 2011. https://www.epa.gov/sites/production/files/2015-10/documents/wed2_6whitemesa.pdf. Accessed January 29, 2022.

²⁷ United States Nuclear Regulatory Commission. "NRC Inspection Report 40-08681/03-001 and Notice of Violation." p. 7. August 25, 2003. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Molycorp/2003-08-25-NRC-Inspection-Report-Molycorp-Processing-Disposal.pdf>. Accessed January 29, 2022.

INTRODUCTION

The “alternate feed” business



...they are bringing in uranium wastes the mill is not equipped to handle safely. – Manuel Heart, Ute Mountain Ute Tribal Chairman

Just west of the highway that connects the red stone monoliths of Monument Valley to the spires and hoodoos of Canyonlands National Park, on the doorstep of Bears Ears National Monument—the ancestral homeland of the Hopi, Navajo, Ute Mountain Ute, Zuni, Ute, and many other tribes—sits a conventional uranium mill with an unconventional business model.

Built on a high-desert bench in southeastern Utah, the White Mesa Mill was designed to process uranium ore from small regional uranium mines across the Colorado Plateau, which includes parts of Arizona, Colorado, New Mexico, and Utah. It began operating in May 1980.¹ Uranium deposits in this region are relatively low-grade, requiring high uranium prices in order to mine and mill them profitably.² Under a normal business model, a uranium mill would purchase uranium ore from miners, or acquire it from mines it owned, and process that ore to produce concentrated uranium powder known as “yellowcake,” which is then shipped elsewhere for further refining into fuel for commercial nuclear reactors.

In the face of low uranium prices, the mill shut down numerous times, beginning in 1983.³ In response, the mill’s owner sought out an alternative source of revenue. The mill would charge fees to accept wastes containing uranium from military and industrial sites, and process those wastes to extract uranium. Doing so, the mill argued, would legally reclassify the leftovers as the sort of material that could be discarded at the mill. The Nuclear Regulatory Commission agreed, declaring these wastes, dubbed “alternate feeds,” to be just another source of uranium.

Before long, the mill began applying for amendments to its operating license in order to process these alternate feed wastes. Beginning in the late 1980s, the mill started accepting low-level radioactive materials from sites contaminated by federal atomic testing activities, as well as highly contaminated industrial and defense sites. The mill extracted remnant uranium from them and dumped the leftovers—at times upward of 99 percent—into massive waste ponds that sit above the region’s deep drinking-water aquifer.

In some cases, contaminated sites paid the mill to accept their unwanted materials; the mill charged less than facilities built specifically to dispose of low-level radioactive waste from other places. Before long, radioactive waste was pouring in from all over North America. As of 2020, the alternate feed business earned the mill’s owner \$5 to \$15 million per year.⁴

¹ Energy Fuels Resources (USA) Inc. “Reclamation Plan White Mesa Mill, Revision 5.1B.” p. 2-1. February 2018. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Report/White_Mesa_Rec_Plan_Rev_5_1B-compressed.pdf. Accessed January 29, 2022.

² United States Energy Information Administration. “Table 1. U.S. Forward-Cost Uranium Reserves by State, Year-End 2008.” U.S. Uranium Reserve Estimates. July 2010. <https://www.eia.gov/uranium/reserves/table1.php>. Accessed January 29, 2022.

³ Energy Fuels Resources (USA) Inc. “Reclamation Plan White Mesa Mill, Revision 5.1B.” pp. 2-1, 2-2. February 2018. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Report/White_Mesa_Rec_Plan_Rev_5_1B-compressed.pdf. Accessed January 29, 2022.

⁴ “Energy Fuels Inc. (UUUU) CEO Mark Chalmers On Q2 2020 Results - Earnings Call Transcript.” SeekingAlpha.com. August 29, 2020. <https://seekingalpha.com/article/4366563-energy-fuels-inc-uuuu-ceo-mark-chalmers-on-q2-2020-results-earnings-call-transcript>. Accessed January 29, 2022.

The White Mesa Ute community



This is our home and the home of our ancestors—we are the caretakers of this land and the waters beneath it. – Yolanda Badback, Ute Mountain Ute, White Mesa Concerned Community Member

A few miles down the road sits the mill's closest neighboring community: the quiet Ute Mountain Ute reservation community of White Mesa, population about 300. Children skateboard and ride bikes, and walk up the side of the highway to the community's gas station, the only place in town to buy a cold drink.

People in White Mesa are intimately tied to the land. Like generations of their ancestors before them, they hunt deer and rabbits for food, visit nearby springs, and gather willow shoots to weave intricate traditional baskets.

A living cultural landscape



Our Navajo traditions teach us to respect the graves of our ancestors. – Lula Katso, Diné (Navajo), Westwater Community Member

The White Mesa Mill was built on the doorstep of one of the richest cultural landscapes in America. Although Bears Ears National Monument was first officially designated in 2016, Native people have called the region home since time immemorial. There are estimated to be over 100,000 cultural and archaeological sites within the national monument alone, and the area remains vital to the cultural and spiritual lives of many Native people today. When it was built, the White Mesa Mill and its waste pits disturbed archaeological sites dating back to the Basketmaker and Ancestral Puebloan civilizations, including pit houses, kivas, and burial sites.



White Mesa, Ute Mountain Ute Reservation, Utah. BLAKE MCCORD

Concerned tribal members have worked to protect the area, opposing the mill and raising concerns about risks to clean air and water, and public health, for decades. In 1994, Navajo and Ute Mountain Ute advocates successfully fended off a plan to bring over 110,000 truckloads of contaminated material from another uranium mill to White Mesa.

But the low-level radioactive wastes—dressed in “alternate feed” clothing—kept coming.

Signs of contamination

“

We see clear signs of leakage and feel it is urgent that the state take action to prevent a catastrophe. – Colin Larrick, Water Quality Specialist, Ute Mountain Ute Tribe



White Mesa farmlands with the mill in the background. BLAKE MCCORD

The White Mesa Mill sits above the Navajo Aquifer, the main source of drinking water for southeastern Utah. While the aquifer is buried deep below the mill’s wastes, the risk of contamination remains a source of worry for local residents. Scientists are uncertain about whether contamination from the mill might reach the aquifer quickly via a hydraulic shortcut like a crack in the rock layers beneath the mill, might take generations, or might never happen at all. While the possibility of contaminating that aquifer remains unknown, the consequences of contamination would be devastating. Communities from White Mesa all the way to Kayenta and Tuba City on the Navajo Nation and the Hopi villages high on the desert mesas of northern Arizona, rely on the Navajo Aquifer. It also feeds area springs and the nearby San Juan River.

The mill's massive waste ponds spread across an area nearly three times the size of the Mall of America.⁵ The oldest three waste pits were lined with a single layer of plastic. If those liners crack, radioactive waste in the pits could leak into shallow groundwater below, and with enough time or a hydraulic shortcut, into the Navajo Aquifer beneath it. There have been documented leaks in several of the pond liners.⁶ Plumes of contaminants, including nitrate and chloroform, have been detected in the groundwater beneath the mill site. The mill also emits radioactive and toxic air pollutants that can travel off-site, including radon, sulfur dioxide, and nitrogen oxide.



The waste pits at the White Mesa Mill cover an area larger than the Mall of America. BRUCE GORDON, ECOFLIGHT

⁵ Letter from Jo Ann Tischler, Director Compliance and Permitting, Denison Mines (USA) Corp., to M. Cheryl Heying, Executive Secretary, Utah Air Quality Board, State of Utah Department of Environmental Quality. "Re: Denison Mines White Mesa Mill Application for Approval of Modification of an Existing Source Under 40 CFR 6107 State of Utah Division of Air Quality Approval Order Number DAQEAN011205000808." (See: Total acreage of impoundment cells in Table 1: Cell Specifications, totaling 273 acres.) April 13, 2010. pp. 5-6. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Report/White_Mesa_Mill_Impoundment_Sizes.pdf. Accessed January 29, 2022.

⁶ Geo-Logic Associates. "Data Review and Evaluation of Groundwater Monitoring, White Mesa Uranium Mill. Blanding, Utah." p. 1-2. August 2015. https://www.grandcanyontrust.org/sites/default/files/resources/e_Geologic_Report_White_Mesa_Uranium_Mill.pdf. Accessed January 29, 2022.

Regulation



The facility has gone from being the North American continent's dry low-level waste disposal facility of choice ... to now being the world's radioactive waste dump. – Scott Clow, environmental programs director, Ute Mountain Ute Tribe

Originally, the Nuclear Regulatory Commission was responsible for overseeing the White Mesa Mill, but the state of Utah wanted more of a say when it came to waste meant to remain there forever. So in 2004, Utah became the sixth so-called “agreement state,” assuming the authority from the commission to regulate the mill and the waste being sent there. The state could now regulate the mill more strictly. But a different story has unfolded.

Over the decades, the White Mesa Mill has changed hands numerous times, but the new owners didn't give up, pushing through amendment after amendment to the mill's license until gradually its business model—selling waste-disposal services—came to look more like a radioactive waste dump than a uranium mill.

To date, radioactive wastes from more than 15 different contaminated sites are known to have been approved for shipment to the mill, and word has gotten out. The mill has effectively transformed itself into a low-cost commercial landfill for low-level radioactive waste, selling waste-disposal services to those with materials they need to unload. From a private company in Europe to the Japan Atomic Energy Agency, around the country and the world, businesses and governments have turned to the White Mesa as the place to send waste they are willing to pay to get rid of.

Impact on Indigenous communities



It is insane to put the waste next to human beings again.

– Norman Begay, Ute Mountain Ute, White Mesa Community Member

Why are they putting these things so close to Indians?

– Lula Katso, Diné (Navajo), Westwater Community Member

Too often, the waste destined for the White Mesa Mill has harmed or threatened Indigenous communities along the way. In 2018, the Cherokee Nation celebrated as 10,000 tons (20 million pounds) of radioactive waste that had plagued its citizens for decades was trucked off to the White Mesa Mill for processing and disposal. Cherokee Nation Secretary of State Chuck Hoskin Jr. called it “a historic day for the Cherokee Nation,” saying “Our lands are safe again, now that we have removed a risk that would have threatened our communities forever.”

Radioactive materials from the Midnite Mine, which have contaminated water on the reservation of the Spokane Tribe of Indians in Washington, have been shipped to the White Mesa Mill, as has waste from the FMRI, Inc. - Fansteel plant on Cherokee Nation lands bordering the Muscogee (Creek) Nation. But with every community that celebrates the lifting of its own radioactive burden, the risk to the Ute Mountain Ute community in White Mesa grows.

In the nearly two decades since the state of Utah took over regulating the mill, radioactive wastes containing not just uranium but also hazardous substances and dangerous heavy metals including arsenic, barium, beryllium, radium, cadmium, chromium, lead, and mercury have been shipped to the White Mesa Mill.

Ute Mountain Ute citizens in White Mesa have stopped hunting deer and rabbits and gathering willow branches near the mill. Each year, they lead a spiritual walk from White Mesa up the highway to the mill turnoff, where they call for the mill to be closed and cleaned up.

Long-term consequences

“

Why can't they listen to us people here that live on this Ute reservation? My people are sick! And they won't listen!

- Thelma Whiskers, Ute Mountain Ute Elder, White Mesa Concerned Community Member

This report details many of the known radioactive wastes destined for the mill, exploring the legal and regulatory twists and turns, and the environmental and human costs and casualties along the way. It traces radioactive materials from the Belgian Congo to the Nevada test site, remnants of the Atomic Era, and contaminated materials that communities across the country and the world have fought to move out of their own backyards.

As the mill pushes to import more and more radioactive wastes from as far away as Europe and Asia, the question of whether a uranium mill should be in the business of disposing of low-level radioactive wastes for a fee looms large. And the state of Utah faces a choice whose consequences for the Ute Mountain Ute Tribe's White Mesa community, the environment, and public health will echo down through the generations.



Members of the White Mesa Concerned Community group lead a spiritual walk to protest the White Mesa Mill in November 2021. TIM PETERSON



TELEDYNE WAH CHANG

Millersburg, Oregon

- ▶ Over 200 workers at the Teledyne Wah Chang site have suffered from cancers, costing taxpayers over \$30 million in compensation and medical bills.
- ▶ In 1989, the state of Utah fought the shipment of radioactive waste from Teledyne Wah Chang to the White Mesa Mill as a sham, arguing that that the mill couldn't make a profit from processing it, but was instead charging a fee to dispose of it.
- ▶ When the state of Utah lost its case in 1992, it opened the floodgates for radioactive waste from contaminated sites around the country to begin flowing to the mill.
- ▶ While hundreds of tons of Teledyne Wah Chang waste were shipped to the White Mesa Mill, it is unclear from public records whether the waste remains there or was returned to the Teledyne Wah Chang site.

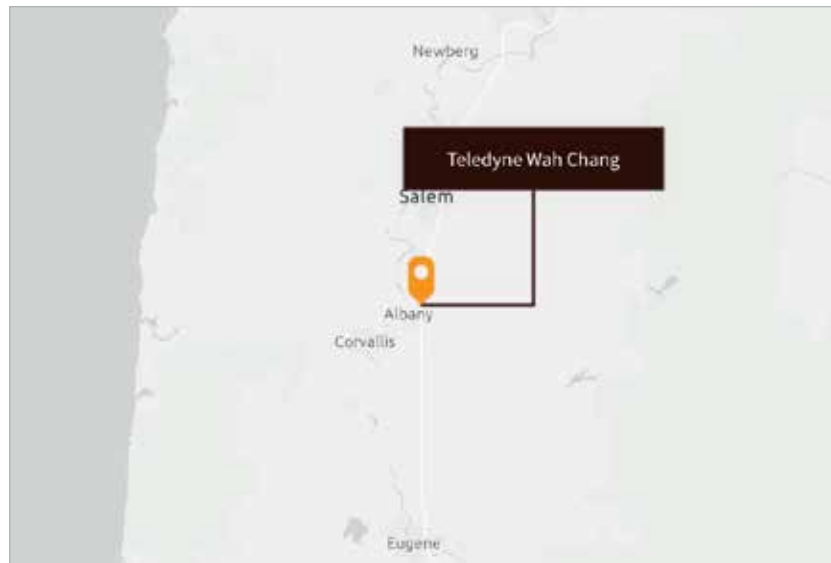
Beginning in the 1980s, when the White Mesa Mill's owner first sought to make a profit by processing wastes containing uranium as "alternate feeds," the state of Utah objected. Under federal law, the only wastes that can be discarded at a uranium mill are those that come from milling ore primarily to extract uranium. That requirement, the state argued, wasn't satisfied when the principal reason for processing an alternate feed was not to extract uranium, but to allow for disposal of the resulting waste at the mill in exchange for a fee.¹ What the mill's owner was doing when it charged those fees, according to the state, was "sham disposal."²

And so the year 1989 marked the beginning of a decade-long battle between the state of Utah and the owner of the White Mesa Mill over the legality of charging fees to discard shipments of radioactive waste at the mill. The fight began over the Teledyne Wah Chang waste, a radioactive sludge generated at a former zirconium production plant located in the rolling, fertile Willamette River Valley of Millersburg, Oregon, between Eugene and Portland.

¹ United States Nuclear Regulatory Commission. "Initial Decision in the Matter of Umetco Minerals Corporation (Source Materials License No. SUA-1358)." Docket No. 40-08681-MLA. p. 2-3, 7-8. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

² Travers, William. "Use of Uranium Mill Tailings Impoundments for the Disposal of Waste Other Than 11(e)(2) Byproduct Material and Reviews of the Applications to Process Material Other Than Natural Uranium Ores." United States Nuclear Regulatory Commission. p. 8. April 8, 1999. https://www.grandcanyontrust.org/sites/default/files/resources/Uranium_Mill_Tailings_Impoundments_Waste_Disposal.pdf. Accessed January 29, 2022.

In the 1940s and 1950s, the U.S. Bureau of Mines began piloting zirconium production at facilities just outside Millersburg.³ Zirconium, a grayish-white lustrous metal, is predominantly used in the nuclear energy industry, including in the cladding that protects nuclear fuel rods.⁴ Originally, the Bureau of Mines experimentally produced zirconium and other metals for defense and nuclear-technology research.⁵ Responding to the needs of the Naval Nuclear Power Program, in 1956, the Atomic Energy Commission contracted with the Wah Chang Corporation to run the Bureau of Mines' zirconium plant and to develop high-purity zirconium for the Navy.⁶ In 1967, Teledyne, Inc. purchased the Wah Chang Corporation facilities, changed its name to "Teledyne Wah Chang Albany," and quickly grew the acquisition to become the world's largest production facility for zirconium and other rare earth metals.⁷ These other rare earth metals are often found in ore that contains naturally occurring radioactive materials such as uranium, thorium, and radium.⁸



Canada, Esri, HERE, Garmin, FAO, NOAA, USGS, BLM, EPA, NPS

Alongside its zirconium and rare earth metal production, Teledyne Wah Chang also took a contract with the Union Carbide Corporation to melt 50,000 pounds of depleted uranium in 1971 and 1972.⁹ The depleted-uranium processing and the buildup of thorium, uranium, and radium resulted in significant contamination at the Teledyne Wah Chang facility.¹⁰ A few decades later, this waste would be sent to the White Mesa Mill, but first it had damage to do in Millersburg.

³ United States Atomic Energy Commission. "Twentieth Semiannual Report, Major Activities in the Atomic Energy Programs, January – June 1956." p. 55. July 1956. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/12th_report_Atomic_Energy_Commission.pdf. Accessed January 29, 2022; National Institute for Occupational Safety and Health. "Special Exposure Cohort Petition Evaluation Report for SEC-00174." Ray Clark, Oak Ridge Associated Universities. p. 15. December 17, 2010. <https://www.stephensstephens.com/wp-content/uploads/2017/03/wahchanger-174-r0.pdf>. Accessed January 29, 2022.

⁴ "Zirconium." Los Alamos National Laboratories: Periodic Table of the Elements. <https://periodic.lanl.gov/40.shtml>. Accessed January 29, 2022.

⁵ National Institute for Occupational Safety and Health. "Special Exposure Cohort Petition Evaluation Report for SEC-00174." Ray Clark, Oak Ridge Associated Universities. p. 15. December 17, 2010. <https://www.stephensstephens.com/wp-content/uploads/2017/03/wahchanger-174-r0.pdf>. Accessed January 29, 2022.

⁶ Ibid.

⁷ Ibid., 15-16.

⁸ Ibid., 16.

⁹ Ibid.

¹⁰ United States Environmental Protection Agency. "Fourth Five-Year Review Report for the Teledyne Wah Chang Superfund Site City of Millersburg Linn County Oregon." United States Environmental Protection Agency Region 10. pp. 3-7, 3-8, ES-2. December 28, 2012. <https://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.aspx?p=3c8062fe-090e-425c-af09-305c50409ba3.pdf&s=WRDCER0315FourthFiveYearReportTeledyneWahChang01012013.pdf>. Accessed January 29, 2022.



Teledyne Wah Chang's facility in 2020.

Exposure to radioactivity and radioactive waste at the Teledyne Wah Chang site took a toll on its workers and the surrounding rivers, lands, and air. Since 2011, under a program that compensates people who suffered from cancer that likely resulted from their work on federal nuclear programs,¹¹ the federal government has paid \$29.8 million in compensation and \$1.8 million in medical bills to former Teledyne Wah Chang workers or their survivors.¹²

Teledyne Wah Chang also mismanaged the toxic and radioactive waste that had built up on its site. The company deposited thousands of yards of toxic solids and sludge in unlined ponds in the Willamette River floodplain.¹³ In the late 1970s and early 1980s, the EPA and the state of Oregon grew increasingly concerned that hazardous materials from these unlined ponds would migrate to soil, surface water, and groundwater, as well as pose a threat to the Willamette River itself.¹⁴ As a result, in 1982, the EPA placed Teledyne Wah Chang on the National Priorities List—a list of contaminated sites across the country that pose the greatest threat to public health and the environment¹⁵—and formally listed it as a Superfund site in 1983.¹⁶

¹¹ Energy Employees Occupational Illness Compensation Program Act of 2000, 42 U.S.C. §§ 7384-7385 (2018). <https://uscode.house.gov/view.xhtml?path=/prelim@title42/chapter84/subchapter16&edition=prelim>. Accessed January 29, 2022.

¹² McIntosh, Don. "On the Hunt for Cancer at Wah Chang." nwLaborPress.org. April 16, 2016. <https://nwlaborpress.org/2015/04/hunt-cancer-wah-chang/>. Accessed January 29, 2022.

¹³ United States Environmental Protection Agency. "Fourth Five-Year Review Report for the Teledyne Wah Chang Superfund Site City of Millersburg Linn County Oregon." United States Environmental Protection Agency Region 10. pp. 3-8, ES-2. December 28, 2012. <https://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.ashx?p=3c8062fe-090e-425c-af09-305c50409ba3.pdf&s=WRDCER0315FourthFiveYearReportTeledyneWahChang01012013.pdf>. Accessed January 29, 2022.

¹⁴ Ibid., ES-2.

¹⁵ "Superfund: National Priorities List (NPL)." United States Environmental Protection Agency. <https://www.epa.gov/superfund/superfund-national-priorities-list-npl>. Accessed January 29, 2022.

¹⁶ Environmental Protection Agency. "Amendment to National Oil and Hazardous Substance Contingency Plan; National Priorities List." 48 Fed. Reg. 40658. September 8, 1983. https://s3.amazonaws.com/archives.federalregister.gov/issue_slice/1983/9/8/40623-40664.pdf. Accessed January 29, 2022.



The Willamette River near Albany, Oregon. [ME2EWE](#)

The V-2 Pond¹⁷ was one of the many ponds on the Teledyne Wah Chang property. This dumpsite operated from 1960 to 1979 and contained radioactive materials.¹⁸ By 1989, the company had transferred the contents of the V-2 pond—millions of pounds of radioactive waste with uranium content ranging from 0.143 percent to 0.37 percent—to cement pads in the ore storage area.¹⁹ The White Mesa Mill entered the picture when Teledyne Wah Chang shipped 600 tons (1.2 million pounds) of V-2 pond waste to the mill for “testing.”²⁰ After the waste arrived, the mill’s owner submitted an application to the U.S. Nuclear Regulatory Commission for permission to accept and process the Teledyne Wah Chang waste.²¹

Even before the mill’s owner filed the application, the state of Utah had expressed concerns to the Nuclear Regulatory Commission about the emerging practice of companies paying the mill to dispose of contaminated waste in the mill’s waste pits.²² The state of Utah’s primary concern was that the mill was not pursuing the waste in order to extract uranium, but rather for the fees that accompanied waste disposal.²³ The director of the Utah Division of Radiation Control at the time told a local journalist:

¹⁷ Garcia, Pete. Memorandum for Docket File No. 40-8681. “Amendment No. 30 to Source Material License SUA-1358 for the White Mesa Mill.” Nuclear Regulatory Commission. p. 1. June 2, 1992. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1992-06-02-NRC_Tech_Eval_re_Teledyne_Wah_Chang.pdf. Accessed January 29, 2022.

¹⁸ Ibid.

¹⁹ Ibid.; Letter from John S. Hamrick, White Mesa Mill Site Environmental Coordinator, to R. Dale Smith, Director, United States Nuclear Regulatory Commission, Region IV. “Umetco Minerals Corporation SUA-1358; Docket No. 40-8681 White Mesa Mill, Utah.” January 18, 1989. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1989-01-18-Ltr-from-Umetco-to-NRC-re-Plant-Tests.pdf>. Accessed January 29, 2022.

²⁰ Letter from John S. Hamrick, White Mesa Mill Site Environmental Coordinator, to R. Dale Smith, Director, United States Nuclear Regulatory Commission, Region IV. “Umetco Minerals Corporation SUA-1358; Docket No. 40-8681 White Mesa Mill, Utah.” January 18, 1989. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1989-01-18-Ltr-from-Umetco-to-NRC-re-Plant-Tests.pdf>. Accessed January 29, 2022.

²¹ Garcia, Pete. Memorandum for Docket File No. 40-8681. “Amendment No. 30 to Source Material License SUA-1358 for the White Mesa Mill.” United States Nuclear Regulatory Commission. p. 1. June 2, 1992. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1992-06-02-NRC_Tech_Eval_re_Teledyne_Wah_Chang.pdf. Accessed January 29, 2022.

²² United States Nuclear Regulatory Commission. “Initial Decision In The Matter Of Umetco Minerals Corporation (Source Materials License No. SUA-1358).” Docket No. 40-08681-MLA. p. 2-3. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

²³ Ibid., 2-3, 7-8.



*Umetco [the mill's then-owner] has never made application to become a disposal site for low-level radioactive wastes, but has tried several devious methods to bring waste into the state of Utah. We will continue to oppose that.*²⁴

– Director of the Utah Division of Radiation Control

From 1989 to 1992, the Nuclear Regulatory Commission grappled with what to do about the state of Utah's concerns and the mill's pending license application.²⁵ Meanwhile, the 600 tons (1.2 million pounds) of Teledyne Wah Chang waste sat on the White Mesa Mill property, pending approval to begin processing.²⁶ The situation prompted the Nuclear Regulatory Commission to issue staff guidance on when and how applications for uranium mills to process materials other than uranium ore should be approved.²⁷ Applying this guidance to the Teledyne Wah Chang waste, the Nuclear Regulatory Commission ultimately approved²⁸ the license amendment in 1992, over the state of Utah's objections.²⁹

In response, Utah requested a hearing before the Nuclear Regulatory Commission's Atomic Safety and Licensing Board, making several arguments.³⁰

First, the state questioned the Nuclear Regulatory Commission's decision to broaden the definition of "uranium ore" to include non-ore bodies, such as the waste from the V-2 Pond. Utah argued that the new definition unreasonably broadened the class of materials considered "ore," specifically undercutting laws intended to regulate facilities processing uranium ore.³¹

Second, it challenged the Nuclear Regulatory Commission's reliance on signed "certifications" from the mill owner to establish that the primary purpose in accepting waste was to extract uranium. The state of Utah argued that, in cases where the mill was being paid to accept the waste, the Nuclear Regulatory Commission had an obligation to look at the financials and make sure that the mill's profit from the deal came from the extracted uranium, not the disposal fee.³² To this end, the state submitted evidence to make the case "that it may have benefitted TWCA [Teledyne Wah Chang Albany] financially to compensate UMETCO [the owner of the White Mesa Mill at the time] to receive the material rather than having to pay higher disposal costs for it as mixed or low-level radioactive waste."³³

²⁴ Associated Press. "Mill's Disposal Plan is Called 'Sham.'" *Deseret News*. August 10, 1991. <https://www.deseret.com/1991/8/10/18935457/mill-s-disposal-plan-is-called-sham>. Accessed January 29, 2022.

²⁵ United States Nuclear Regulatory Commission. "Initial Decision in the Matter of Umetco Minerals Corporation (Source Materials License No. SUA-1358)." Docket No. 40-08681-MLA. p. 3. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

²⁶ Garcia, Pete. Memorandum for Docket File No. 40-8681. "Amendment No. 30 to Source Material License SUA-1358 for the White Mesa Mill." United States Nuclear Regulatory Commission. p. 1. June 2, 1992. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1992-06-02-NRC_Tech_Eval_re_Teledyne_Wah_Chang.pdf. Accessed January 29, 2022.

²⁷ United States Nuclear Regulatory Commission. "Initial Decision in the Matter of Umetco Minerals Corporation (Source Materials License No. SUA-1358)." Docket No. 40-08681-MLA. pp. 3-4. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

²⁸ Letter from Ramon E. Hall, United States Nuclear Regulatory Commission, to Rick Van Horn, Umetco Minerals Corporation. "Docket No. 40-8681 SUA-1358, Amendment No. 30." June 2, 1992. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1992-06-02-Teledyne-License-Amendment.pdf>. Accessed January 29, 2022.

²⁹ United States Nuclear Regulatory Commission. "Initial Decision in the Matter of Umetco Minerals Corporation (Source Materials License No. SUA-1358)." Docket No. 40-08681-MLA. p. 4. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

³⁰ *Ibid.*

³¹ *Ibid.*, 6-7.

³² *Ibid.*, 9-11.

³³ *Ibid.*, 8.

The state of Utah called the attempt to bring a total of 6,000 tons³⁴ (12 million pounds) of waste from the Teledyne Wah Chang facility to the White Mesa Mill “sham” disposal.³⁵

“

*We want to be certain that the mill is not being turned into an unlicensed waste repository.*³⁶

– Former Director of the Utah Bureau of Radiation Control

In April 1993, a Nuclear Regulatory Commission administrative law judge ruled against the state of Utah, permitting the processing of the Teledyne Wah Chang waste.³⁷ But the waste appears to have been ultimately sent back to Oregon without being processed.³⁸

Losing the Teledyne Wah Chang case opened the floodgates; in the years following the legal decision, many more contaminated sites across the United States would ship their radioactive waste to the White Mesa Mill, relying on the legal precedent and policy guidance established as a result of the controversy surrounding the Teledyne Wah Chang waste.

And while the state of Utah has since changed its tune, allowing the White Mesa Mill to accept toxic and radioactive waste without contest, the concern remains that the mill is accepting wastes not for their uranium content, but for the processing fees it receives to dispose of the leftovers in its waste pits.



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

³⁴ “Oregon Firm Halts Shipment of Sludge to Utah.” Deseret News. January 23, 1989. <https://www.deseret.com/1989/1/23/18792456/oregon-firm-halts-shipments-of-sludge-to-utah>. Accessed January 29, 2022.

³⁵ United States Nuclear Regulatory Commission. “Initial Decision in the Matter of Umetco Minerals Corporation (Source Materials License No. SUA-1358).” Docket No. 40-08681-MLA. p. 10. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

³⁶ “Oregon Firm Halts Shipment of Sludge to Utah.” Deseret News. January 23, 1989. <https://www.deseret.com/1989/1/23/18792456/oregon-firm-halts-shipments-of-sludge-to-utah>. Accessed January 29, 2022.

³⁷ United States Nuclear Regulatory Commission. “Initial Decision in the Matter of Umetco Minerals Corporation (Source Materials License No. SUA-1358).” Docket No. 40-08681-MLA. p. 48. April 12, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/Initial-decision-NRC_Atomic_Safety_Licensing_Board.pdf. Accessed January 29, 2022.

³⁸ Sleight, Ken. “More Nuclear Waste Coming...The Need for an EIS and Health Studies.” Canyon Country Zephyr. December 2000-January 2001. <https://www.canyoncountryzephyr.com/oldzephyr/dec2000-jan2001/ken-dec2000-jan2001.html>. Accessed January 29, 2022; “White Mesa Procedures Manual: Monthly Inspection Data,” Umetco Minerals Corp. p. 2. May 31, 1994. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/TeledyneWahChang/1994-06-09-Tailings-Inspection-Form-compressed.pdf>. Accessed January 29, 2022.

HONEYWELL AND ALLIED SIGNAL



Metropolis, Illinois

The feed materials building at Honeywell Metropolis Works. [NCOLLIDA1106](#)

- ▶ Honeywell initially shipped 1,700 barrels of waste to the White Mesa Mill without regulatory permission.
- ▶ In 2011, the EPA discovered 7,500 barrels of illegally stored waste at Honeywell's Metropolis Works site. Honeywell Inc. was fined \$11.8 million for illegally storing hazardous waste.
- ▶ The illegally stored hazardous waste was then reclassified as "alternate feed" that could be disposed of in uranium mill waste pits rather than at a licensed hazardous-waste-disposal facility.
- ▶ At least 69 workers at the Metropolis Works plant developed forms of cancer and many died from the disease.
- ▶ In 2017, workers at the White Mesa Mill discovered leaking barrels of Metropolis Works waste that measured 6 to 10 times higher in uranium content than originally planned.

Honeywell Inc.'s Metropolis Works uranium-conversion facility, in southern Illinois, sits in an agricultural river valley on the banks of the Ohio River.¹ The nearest town, Metropolis, Illinois, is located about one mile east of the plant.² Metropolis, which shares a name with Clark Kent's fictional home in the Superman comic, has embraced its fictional sister city with pride. However, due to the decades-long operations of the Metropolis Works plant, it is uranium, rather than kryptonite, that haunts Metropolis, Illinois and its citizens.

¹ Enercon Services Inc. "Environmental Report Renewal of Source Material License SUB-526 Docket 40-3392 for Honeywell Specialty Materials, Metropolis Works (MTW) Metropolis, Illinois." pp. 1, 53. May 25, 2005. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2005_05_25_Envtl_Report_Renew_of_Lic_SUB-526_Metropolis_Works.pdf. Accessed January 29, 2022.

² Ibid., 55.



Esri, here, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS



Middle: 1965 Metropolis Works uranium-conversion facility.
Bottom: Yellowcake is produced from uranium ore. It must be processed further before it can be made into nuclear fuel. [U.S. NUCLEAR REGULATORY COMMISSION](https://www.nrc.gov)

Starting in 1959, the Metropolis Works facility began converting milled uranium ore, known as “yellowcake,” to uranium hexafluoride through a series of complex chemical reactions.³ This involved powerful toxic chemicals such as hydrogen fluoride, ammonia, sodium hydroxide, potassium hydroxide, hydrogen, fluorine, and sulfuric acid, some of which were superheated to temperatures of up to 1050° F.⁴ The resulting uranium hexafluoride was then shipped off to be enriched and made into nuclear-reactor fuel.⁵

The chemical process and uranium-hexafluoride processing created a significant amount of waste at the Metropolis Works plant.⁶ The need to get rid of two of the plant’s radioactive wastes led Metropolis Works to the White Mesa Mill as a potential disposal site.⁷

The first type of waste, referred to as the “CaF₂ waste,” initially arrived at White Mesa sometime before 1993 without any permits or regulatory permission.⁸ Instead, Metropolis Works simply shipped 1,700 barrels of the calcium fluoride and uranium sludge⁹ to the mill, where they sat on-site and eventually drew the attention of the Nuclear Regulatory Commission (NRC):

³ Ibid., 1-2.

⁴ Ibid., 9-12.

⁵ Ibid., 1.

⁶ Ibid., 13.

⁷ Letter from W.W. Brice, Umetco Minerals Corporation, to Ramon E. Hall, United States Nuclear Regulatory Commission. “Umetco Minerals Corporation, SUA-1358, Docket No. 408681, White Mesa Mill, Utah. Allied Chemical Company – CaF₂ By-product. U.S. NRC Letter of May 5, 1993.” p. 1. June 15, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_06_15_Am_Req_to_Process_CaF2.pdf. Accessed January 29, 2022; Energy Fuels Nuclear, Inc. “Request to Amend Source Material License SUA-1358, Docket No. 40-8681.” p. 2. September 20, 1996. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1996_09_20_Am_Req_to_Process_KOH.pdf. Accessed January 29, 2022.

⁸ Letter from Ramon E. Hall, United States Nuclear Regulatory Commission, to W.W. Brice, Umetco Minerals Corporation. “Docket No. 40-8581.” p. 1. May 5, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_05_05_Ltr_from_NRC_re_Allied_Waste.pdf. Accessed January 29, 2022.

⁹ Letter from W.W. Brice, Umetco Minerals Corporation, to Ramon E. Hall, United States Nuclear Regulatory Commission. “Umetco Minerals Corporation, SUA-1358, Docket No. 408681, White Mesa Mill, Utah. Allied Chemical Company – CaF₂ By-product. U.S. NRC Letter of May 5, 1993.” p. 1. June 15, 1993. (“This material is primarily calcium fluoride but it contains natural uranium as U₃O₈ in quantities that normally exceed two percent.”) https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_06_15_Am_Req_to_Process_CaF2.pdf. Accessed January 29, 2022.



It has come to my attention, that Umetco [the then-owner of the White Mesa Mill] is in the possession of approximately 1700 barrels of waste product from Allied Chemical Company's Metropolis, Illinois operation. We understand that Umetco acquired this material some time ago for the purpose of extracting uranium; however, your NRC license does not authorize such processing. A review of your license and the accompanying docket files indicates that Umetco has neither requested nor received authorization to process this material.¹⁰ – Nuclear Regulatory Commission Director Raymond E. Hall in a letter to the maintenance superintendent of the White Mesa Mill

Following this rebuke, in June 1993, the White Mesa Mill owner applied for an amendment to the mill's operating license to process the CaF₂ waste.¹¹ The license amendment was approved in October 1993 based on an analysis of the CaF₂ waste containing approximately 2 percent uranium.¹²

In 1996, the White Mesa Mill owner applied for another license amendment to process "KOH mud"—a second waste generated by Metropolis Works.¹³ KOH mud consisted of a potassium hydroxide and uranium sludge that had settled out of the Metropolis Works air emissions scrubbing process.¹⁴ The license amendment request, and subsequent approval, assumed that the mill would receive 2,475 tons (nearly 5 million pounds) of the KOH mud containing around 7-10 percent uranium content.¹⁵

A decade then passed before two dramatic events drew new attention to Metropolis Works.

In 2010, Honeywell Inc. attempted to slash healthcare benefits for retired workers.¹⁶ A massive labor dispute broke out, garnering national attention in part due to the prevalence of cancer among former plant workers. Outside the strike grounds, 42 crosses were erected to symbolize the number of former Metropolis Works plant workers who had died of cancer, with 27 additional crosses for those who had survived the disease.¹⁷ The union battle persisted for 13 months, finally ending in victory for the union workers.¹⁸

¹⁰ Letter from Ramon E. Hall, United States Nuclear Regulatory Commission, to W.W. Brice, Umetco Minerals Corporation.

"Docket No. 40-8581." p. 1. May 5, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_05_05_Ltr_from_NRC_re_Allied_Waste.pdf. Accessed January 29, 2022.

¹¹ Letter from W.W. Brice, Umetco Minerals Corporation, to Ramon E. Hall, United States Nuclear Regulatory Commission. "Umetco Minerals Corporation, SUA-1358, Docket No. 408681, White Mesa Mill, Utah. Allied Chemical Company – CaF₂ By-product. U.S. NRC Letter of May 5, 1993." June 15, 1993. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993_06_15_Am_Req_to_Process_CaF2.pdf. Accessed January 29, 2022.

¹² Ibid., 2; Memorandum from Dana C. Ward, United States Nuclear Regulatory Commission. "Amendment 34 to Source Material License SUA-1358, for the White Mesa Mill to Process Allied Material." p. 1. October 1, 1993. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1993-10-01-Memo-re-Am-34-Authorizing-CaF2-Feed.pdf>. Accessed January 29, 2022.

¹³ Energy Fuels Nuclear, Inc. "Request to Amend Source Material License SUA-1358, Docket No. 40-8681." p. 1. September 20, 1996. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1996_09_20_Am_Req_to_Process_KOH.pdf. Accessed January 29, 2022.

¹⁴ United States Department of Justice Office of Public Affairs. "Honeywell Pleads Guilty in Illinois to Illegal Storage of Hazardous Waste, Corporation Sentenced to Pay \$11.8 Million Criminal Fine." March 11, 2011. <https://www.justice.gov/opa/pr/honeywell-pleads-guilty-illinois-illegal-storage-hazardous-waste>. Accessed January 29, 2022.

¹⁵ Letter from Joseph J. Holonich, United States Nuclear Regulatory Commission, to Michelle Rehmann, Energy Fuels Nuclear, Inc. "Amendment 43 to Source Material License SUA-1358, Energy Fuels Nuclear, Inc.'s White Mesa Uranium Mill, Blanding, Utah." p. 1. November 20, 1996. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1996_11_20_NRC_Ltr_re_Am_Req_re_KOH.pdf. Accessed January 29, 2022; United States Nuclear Regulatory Commission. "Technical Evaluation Report for Request to Receive and Process Material from Allied Signal, Inc." November 20, 1996. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/1996_11_20_NRC_Technical_Eval_Report_re_KOH.pdf. Accessed January 29, 2022.

¹⁶ Frosch, Dan. "In Superman's Hometown, a Labor Dispute Over Health." New York Times. August 8, 2010. <https://www.nytimes.com/2010/08/09/us/09metropolis.html>. Accessed January 29, 2022.

¹⁷ Ibid.

¹⁸ Elk, Mike. "Honeywell Lockout Ends in Victory for Union." In These Times. August 10, 2011. <https://inthesetimes.com/article/honeywell-lockout-ends-in-victory-for-union>. Accessed January 29, 2022.



17. The Government and HONEYWELL agree that the following disposition is an appropriate disposition of this case and jointly recommend that the Court impose the following sentence:

- (a) A criminal fine in the amount of \$11,800,000.00 (eleven million eight hundred thousand). HONEYWELL will pay the fine by electronic funds transfer pursuant to instructions to be provided by the Clerk of the Court for the United States District Court for the Southern District of Illinois; and
- (b) A five-year period of probation, the terms of which shall include the following conditions:

Above: Uranium ore concentrate storage at the Metropolis Works facility. [NCOLLIDA1106](#)
Left: 2011 Plea agreement.

About the same time, the EPA had begun a criminal investigation focused on Honeywell's illegally storing drums of radioactive materials.¹⁹ Armed with a warrant, the EPA conducted a search of the site that revealed 7,500 barrels of illegally stored KOH mud, classified as both radioactive and hazardous waste.²⁰ In 2011, Honeywell Inc. pleaded guilty to violating the federal Resource Conservation and Recovery Act and was fined \$11.8 million.²¹ As part of the final plea agreement, Honeywell promised to properly dispose of 9,200 barrels of waste, including the KOH mud, on a set schedule,²² prompting a slew of additional shipments to the White Mesa Mill.

¹⁹ United States Department of Justice, Office of Public Affairs. "Honeywell Pleads Guilty in Illinois to Illegal Storage of Hazardous Waste, Corporation Sentenced to Pay \$11.8 Million Criminal Fine." March 11, 2011. <https://www.justice.gov/opa/pr/honeywell-pleads-guilty-illinois-illegal-storage-hazardous-waste>. Accessed January 29, 2022.

²⁰ Ibid.

²¹ Ibid.

²² United States of America vs. Honeywell International Inc. "Plea Agreement." United States District Court for the Southern District of Illinois. Criminal No. 11-CR-4006-JPG. Attachment A. p. 5-6. March 11, 2011. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2011_03_11_004_Plea_Agreement.pdf. Accessed January 29, 2022.

This is an example of the regulatory gymnastics that allow the White Mesa Mill to dispose of hazardous waste. The EPA investigation and lawsuit turned on the KOH mud being classified as hazardous waste; this is why the monetary penalties for illegal storage were so severe. But when it came time to figure out what to do with the illegally stored barrels, the Nuclear Regulatory Commission determined that the KOH mud qualified as “alternate feed” that could be disposed of in uranium mill waste pits rather than being sent to a hazardous waste disposal facility. And yet uranium mills are not subject to all the rules governing hazardous waste disposal facilities that are meant to protect the environment and public health.



Esri, Garmin, FAO, NOAA, USGS, EPA

In 2013, Metropolis Works received permission to ship barrels of hardened yellowcake attached to metal drum shards to the White Mesa Mill.²³ Notably, the owner of the White Mesa Mill did not apply for a license amendment to process this new material, using instead a “license-to-license transfer”²⁴ that allowed for additional materials to be processed under existing amendments.²⁵ Additional shipments of yellowcake drum shards were approved in 2018, bringing the total amount of this new waste to be processed to 250,000 pounds.²⁶

In 2017, more than two decades after the original approval, shipments of KOH mud from Metropolis Works were still ongoing. In one truckload, White Mesa Mill workers found three leaking barrels containing KOH mud from Metropolis Works.²⁷ The subsequent investigation revealed that the mud contained 61 percent uranium, dramatically exceeding the 7-10 percent uranium content estimated in the license amendment approval.²⁸

²³ Letter from Scott Anderson, Director, Utah Division of Waste Management and Radiation Control, to David Frydenlund, Chief Financial Officer, Energy Fuels Resources (USA) Inc. “Licensee to Licensee Transfer of the Honeywell Yellowcake Drum Shreds.” p. 1. September 25, 2018. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2018_09_25_Ltr_from_DEQ_re_Honeywell.pdf. Accessed January 29, 2022.

²⁴ Ibid.

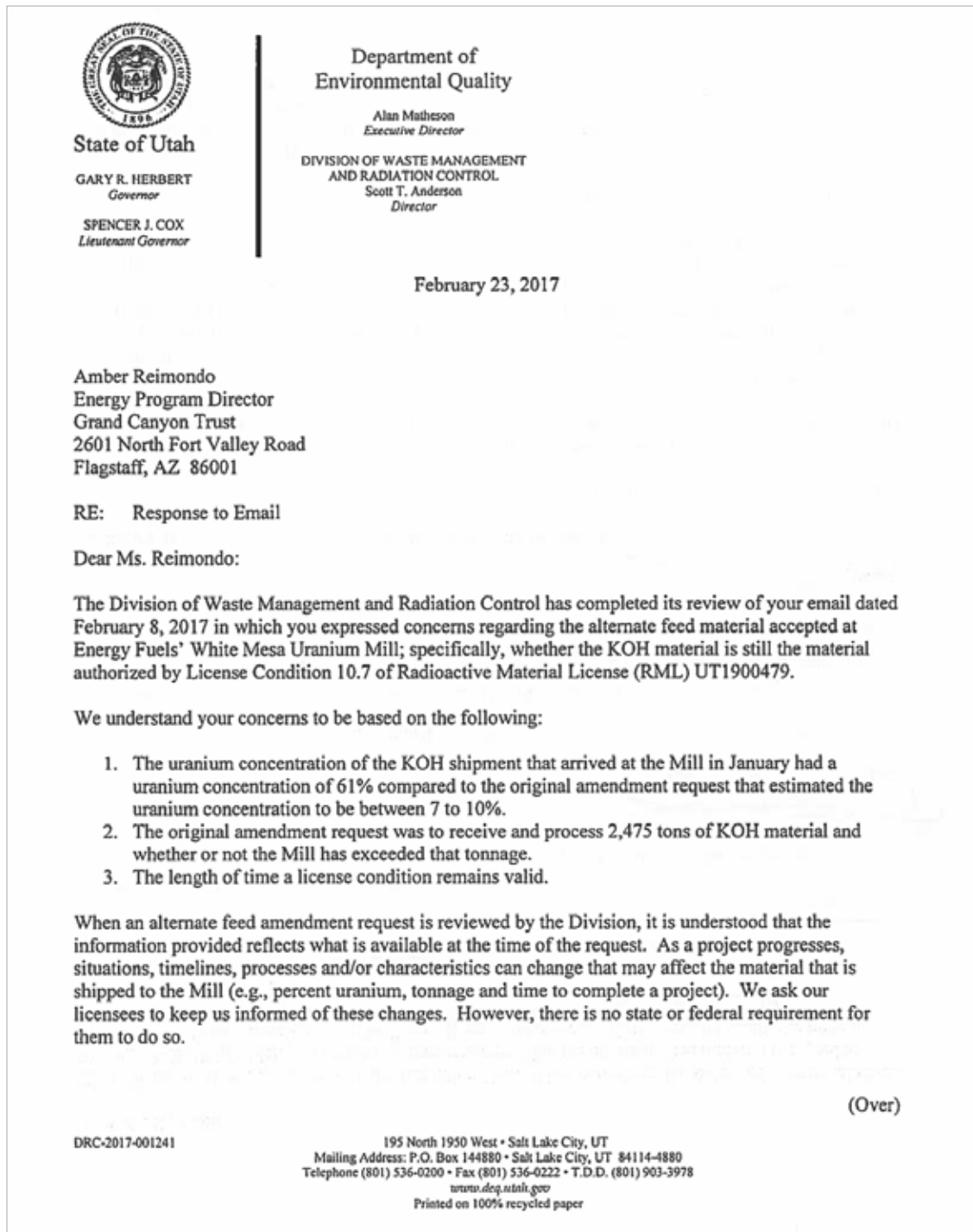
²⁵ Legal Information Institute, Cornell Law School. “Utah Admin. Code R313-19-41 - Transfer of Material.” See: Utah Administrative Code R313-19-41(2)(d). <https://www.law.cornell.edu/regulations/utah/Utah-Admin-Code-R313-19-41>. Accessed January 29, 2022.

²⁶ Letter from Scott Anderson, Director, Utah Division of Waste Management and Radiation Control, to David Frydenlund, Chief Financial Officer, Energy Fuels Resources (USA) Inc. “Licensee to Licensee Transfer of the Honeywell Yellowcake Drum Shreds.” p. 2. September 25, 2018. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2018_09_25_Ltr_from_DEQ_re_Honeywell.pdf. Accessed January 29, 2022.

²⁷ United States Nuclear Regulatory Commission. “Event Notification Report for January 23, 2017: Event No. 52488.” January 13, 2017. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2017/20170123en.html>. Accessed January 29, 2021.

²⁸ Ibid.

The Grand Canyon Trust raised concerns in 2017 about inconsistencies between the 1996 license amendment and the actual contents being shipped to the mill—specifically: the high uranium content, indefinite timeline of shipments, and greater amount of material than originally contemplated.²⁹ The state of Utah responded:



²⁹ Email from Amber Reimondo, Energy Program Director, Grand Canyon Trust, to Phil Goble, Utah Division of Waste Management and Radiation Control. "Follow-up – Honeywell KOH Material Spill." February 8, 2017. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2_8_2017_Follow_up_Honeywell_KOH_Material_Spill.pdf. Accessed January 29, 2022.



When an alternate feed amendment request is reviewed by the Division, it is understood that the information provided reflects what is available at the time of the request. As a project progresses, situations, timelines, processes, and/or characteristics can change that may affect the material that is shipped to the Mill (e.g. percent uranium, tonnage, and time to complete a project). We ask our licensees to keep us informed of these changes. However, there is no state or federal requirement for them to do so...

Even though the KOH material is higher than what was specified in the original approval, the KOH material still meets the definition of alternate feed materials and can still be accepted by the Mill...

License Condition 10.7 does not limit the total number of tons of KOH material that the Mill can receive....³⁰ – Scott Anderson, Director, Utah Division of Waste Management and Radiation Control



Honeywell Inc.'s Metropolis Works uranium-conversion facility, on the banks of the Ohio River.

This response underscores the regulatory inadequacies in the current system. State regulators interpreted the license amendment for the Allied Signal waste liberally, allowing the mill owner to accept waste that is more radioactive than what it originally applied to receive, and in quantities far beyond the scenario originally considered. And regulators allowed these shipments to keep coming to the White Mesa Mill indefinitely.

³⁰ Letter from Scott Anderson, Director, Utah Division of Waste Management and Radiation Control, to Amber Reimondo, Energy Program Director, Grand Canyon Trust. "Response to Email." February 23, 2017. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/AlliedSignal/2017_02_23-Ltr_from_S_Anderson_to_S_Fields_re_KOH_Feed.pdf. Accessed January 29, 2022.

If that precedent holds, after obtaining an initial license amendment, the mill's owner may be able to later accept waste that has a different chemical makeup and higher uranium content, accept more of it than originally planned, and change the timeline from several months to several decades, all without having to obtain a new license amendment. This flawed system prevents the state of Utah from meaningfully protecting Utah's environment and Utahns' health from threats posed by importing radioactive waste to the White Mesa Mill.

Back in Illinois, the Metropolis Works facility faced its own reckoning. In 2018, a group of Metropolis citizens filed a class-action lawsuit against Honeywell, alleging decades of widespread uranium contamination that had damaged property values, human health, and the environment surrounding Metropolis.³¹ In advance of formally filing the lawsuit, radiochemistry testing revealed elevated levels of uranium, plutonium, thorium, and fluoride in areas surrounding the Metropolis Works facility.³² Even as the citizens of Metropolis seek justice for contamination of their hometown, hundreds of thousands of pounds of Metropolis Works' radioactive waste remain in their final resting place in the White Mesa Mill's waste pits. Though the Metropolis Works plant ceased operation in November 2017, "due to the significant challenges of the nuclear industry globally and the oversupply of uranium hexafluoride," in February 2021 Honeywell announced that it plans to restart production in 2023.³³ In December 2022, the U.S. Department of Energy awarded White Mesa Mill owner Energy Fuels Resources \$18.5 million in taxpayer money to supply uranium from the company's inventory held at the Metropolis Works Conversion Facility to the federal strategic uranium reserve.³⁴ Unlike Superman and Kryptonite, residents of Metropolis and White Mesa can't escape to another planet to avoid radioactive contamination.



A Superman statue in Metropolis, Illinois, which shares a name with Clark Kent's fictional home in the comic. [VISTAVISION](#)

³¹ Roger Steward, Sandra Steward, Verna Welch, Savannah Welch, Wanda Sullivan, John Sullivan; Illinois residents, on behalf of themselves individually and all others similarly situated v. Honeywell International Inc. "Class Action Complaint." United States District Court for the Southern District of Illinois, Benton Division. Civil Action Case No.: 18-1124. pp. 1, 6-12. May 15, 2018. <https://www.courtlistener.com/recap/gov.uscourts.ilsd.78643/gov.uscourts.ilsd.78643.1.0.pdf>. Accessed April 6, 2021.

³² Kennedy, Linda. "Lawyers share more findings with Honeywell suit." Metropolis Planet. October 11, 2018. https://www.metropolisplanet.com/news/lawyers-share-more-findings-with-honeywell-suit/article_882c5b0e-cd84-11e8-914e-f318ae171156.html. Accessed January 29, 2022.

³³ Ruch, Amber. "Honeywell to reopen Metropolis, Ill. Plant." KFVS-12 TV (CBS affiliate). February 9, 2021. <https://www.kfvs12.com/2021/02/09/honeywell-reopen-metropolis-ill-plant/>. Accessed January 29, 2022.

³⁴ Energy Fuels Inc. "Energy Fuels Awarded Contract to Sell \$18.5 Million of Uranium to U.S. Uranium Reserve." PR Newswire. December 16, 2022. <https://www.prnewswire.com/news-releases/energy-fuels-awarded-contract-to-sell-18-5-million-of-uranium-to-us-uranium-reserve-301704982.html>. Accessed May 11, 2023

COTTER



Nevada Test Site

Photo adapted from [Sarah Kanouse's photo](#) of the Cotter uranium mill in Cañon City, Colorado.

- ▶ From the Belgian Congo to Missouri, Colorado, Ohio, and the Nevada Test Site, and finally to White Mesa, the Cotter concentrate traces America's nuclear history from the atom bomb to Bears Ears, leaving contamination in its wake everywhere it has traveled.
- ▶ The Cotter concentrate has created a legacy of Superfund cleanup sites across the country.
- ▶ The Cotter concentrate was deemed too toxic for disposal at the Nevada Test Site, one of America's most contaminated nuclear legacy sites.
- ▶ Rather than dispose of the waste in a licensed radioactive-waste dump, it was sent to the White Mesa Mill for processing and disposal as a cost-cutting measure. To make the waste qualify, regulators changed the definition of the material to skirt safe disposal requirements.

In 1996, Norman Begay, a citizen of the Ute Mountain Ute Tribe, learned that a plan was in the works to ship a toxic and radioactive substance called "Cotter concentrate" from the Nevada Test Site to the White Mesa uranium mill, which sat only a few miles from his house in White Mesa, Utah.

Along with Navajo Nation citizen Lula Katso who lived in Westwater, near White Mesa, Begay initiated fierce legal opposition to the shipment of this Cotter concentrate to the White Mesa Mill.



Esri, Garmin, FOA, NOAA

The Cotter concentrate story begins 9,000 miles away in the Belgian Congo more than eight decades earlier, in 1915.¹ There, in the farming province of Katanga, prospectors discovered the highest grade uranium in the world at a place called Shinkolobwe. In the 1940s, only a few years after the first uranium fission reaction and the start of World War II, St. Louis-based Mallinckrodt Chemical Company began buying Shinkolobwe ore. The company became the first industrial-scale producer of uranium and uranium products in the United States.² Shinkolobwe ore processed by Mallinckrodt supplied uranium and plutonium used in the atomic bombs dropped over both Hiroshima and Nagasaki.³

“

*The Cotter Concentrate contains the residue from the original Atomic Bomb, and it therefore has the blood of approximately 1,000,000 human beings on it. Wherever it goes the evil curse it has had upon human life on this planet goes with it. Therefore, I ask for standing in this issue on the basis of the traditional religious beliefs of my people, to insure that such a curse and remembrance not be brought to further desecrate my ancestors and tribal members in sacred Ute lands and burial grounds.*⁴ – Norman Begay, White Mesa Community Member

¹ Energy Fuels Nuclear, Inc. “Revised Amendment Request to Process an Alternate Feed at White Mesa Uranium Mill, Source Material License SUIA-1358, Docket No. 40-8681. Attachment 1.” p. 1. March 5, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_03_05-Rev_Am_Req_to_Process_Cotter_Concentrate-Excerpt_from_ML15034A351.pdf. Accessed January 29, 2022; Zoellner, Tom. “A (Radioactive) Cut in the Earth That Will Not Stay Closed.” *Scientific American*. March 27, 2009. <https://www.scientificamerican.com/article/a-radioactive-cut-that-will-not-stay-closed/>. Accessed January 29, 2022.

² St. Louis Remediation Task Force. “St. Louis Remediation Task Force Report.” p. ES-1. September 1996. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 29, 2022.

³ Zoellner, Tom. “A (Radioactive) Cut in the Earth That Will Not Stay Closed.” *Scientific American*. March 27, 2009. <https://www.scientificamerican.com/article/a-radioactive-cut-that-will-not-stay-closed/>. Accessed January 29, 2022.

⁴ Letter from Norman Begay to Shirley Jackson, United States Nuclear Regulatory Commission. “Petition for Standing.” United States Nuclear Regulatory Commission Docket No. 40-8681-MLA. p. 2. April 30, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_25-Order_re_Substitution_and_Service-ML15042A120.pdf. Accessed January 29, 2022.



Missouri DNR, Esri, here, Garmin, FAO, NOAA, USGS, EPA

Left: *Mallinckrodt Chemical Works, Building No. 51.*
U.S. LIBRARY OF CONGRESS

After World War II ended, the Cold War arms race spurred a uranium production boom. By the time its operations ended in 1966, Mallinckrodt had produced over 100,000 tons (200 million pounds) of purified uranium and left a legacy of contamination that still haunts St. Louis today.⁵ Haul roads and various locations around St. Louis were contaminated when radioactive waste and other materials were trucked and stored in towns like Hazelwood and Berkeley, and at the Lambert-St. Louis International Airport. Radioactive sediment containing thorium, uranium, and radium has been found in Coldwater Creek, which captures runoff from St. Louis's Berkeley Park and then flows into the Missouri River.⁶

In 1968, the Cotter Corporation entered the picture. It purchased some of the waste remaining from Mallinckrodt's St. Louis operations and began to process those materials at its uranium mill in Cañon City, Colorado, attempting to extract remnant uranium and produce yellowcake.⁷ From November 1972 to August 1973, Cotter processed the materials from Mallinckrodt's operations in St. Louis, resulting in 1,251 drums of waste known as Cotter concentrate.⁸ The material inside these drums ranged from a thick sludge to a clay-like consistency; in barrels with higher liquid content, a layer of toxic liquid floated at the top.⁹

Before 1980, including during the time it processed the waste from St. Louis, the Cotter Corporation disposed of tailings and other wastes from uranium processing into unlined ponds. Contaminants such as molybdenum and uranium leached into the groundwater and migrated from its mill to neighboring Lincoln Park, Colorado and nearby local wells.¹⁰ As a result of high contamination levels, in 1984 the EPA

⁵ St. Louis Remediation Task Force. "St. Louis Remediation Task Force Report: Appendix C-1" p. 12. September 1996. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 2, 2022.

⁶ United States Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. "Public Health Assessment for Evaluation of Community Exposures Related to Coldwater Creek, St. Louis Airport/Hazelwood Interim Storage Site (Hiss)/Futura Coatings NPL Site North St. Louis County, Missouri EPA Facility ID: Mod980633176." Agency for Toxic Substances and Disease Registry. p. 19. April 30, 2019. https://www.atsdr.cdc.gov/HAC/pha/coldWaterCreek/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508.pdf. Accessed January 29, 2022.

⁷ Energy Fuels Nuclear, Inc. "Revised Amendment Request to Process an Alternate Feed at White Mesa Uranium Mill, Source Material License SUIA-1358, Docket No. 40-8681. Attachment 1." p. 1. March 5, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_03_05-Rev_Am_Req_to_Process_Cotter_Concentrate-Excerpt_from_ML15034A351.pdf. Accessed January 29, 2022.

⁸ Ibid.

⁹ O'Laughlin, Colleen et al. "Saving Time, Expense, and a Valuable Resource by Recovering Uranium from a Surplus DOE Strategic Material at a Conventional Uranium Mill." WM Symposia, Inc. Waste Management Symposia. p. 3. January 29, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998-29-01-WMSYM_Article_re_Cotter_Concentrate.pdf. Accessed January 29, 2022.

¹⁰ "Superfund Site: Lincoln Park Canon City, CO." United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0800115>. Accessed January 29, 2022; United States Environmental Protection Agency. "Record of Decision: Lincoln Park Study Area – Surface Soils, Lincoln Park Superfund Site, Canon City, Colorado." p. 5-4. January 2002. <https://semsub.epa.gov/work/08/490323.pdf>. Accessed January 29, 2022.

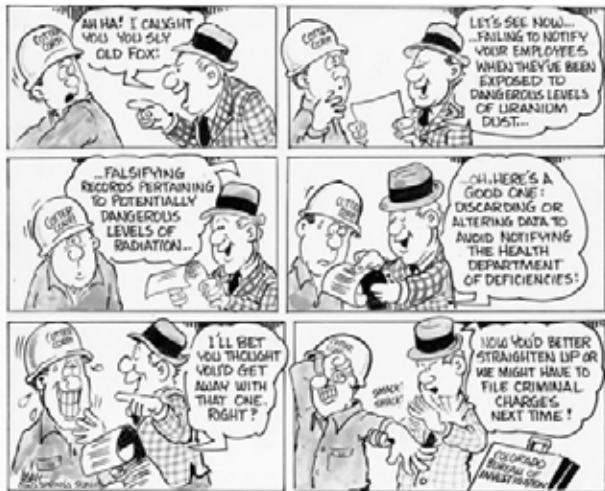


Illustration by Chuck Asay © Pikes Peak Library District, [MSS 0448].

placed the Cañon City Mill site on the Superfund National Priorities List.¹¹ That list consists of contaminated sites across the country that the EPA has determined pose the greatest threat to public health and the environment¹²— essentially the worst of the worst.

The Cotter concentrate sat on-site at the Cañon City Mill until 1975, at which point it was transferred to the Mound Laboratory in Miamisburg, Ohio. There, companies took another crack at recovering remnant radioactive materials, this time thorium-230 and protactinium-231.¹³ In 1989, after the Cotter concentrate had been shipped away, the Mound Laboratory site was listed on the Superfund National Priorities List due to groundwater contamination.¹⁴

“
*My house is 2.4 miles from the EFN/IUSA [White Mesa] mill site. I have relatives who live 100 feet from the fence line that separates our Reservation from the Cotter Concentrate Waste dump. The people are afraid. I am afraid. The reality of what Cotter Concentrate does to people and the environment are [sic] well established in Lincoln Park, Colorado, Miamisburg, Ohio, and St. Louis, Missouri. It is insane to put the waste next to human beings again.*¹⁵ – Norman Begay, White Mesa Community Member

Meanwhile, in 1987, before the Mound Laboratory was designated a Superfund, the Cotter concentrate was sent to the Nevada Test Site for storage in 1,248 55-gallon drums. At that point, the Cotter concentrate weighed about 790,000 pounds, had an average uranium content of 10 percent, and retained “unusually high concentrations of thorium-230 and protactinium-231.”¹⁶

The Department of Energy’s initial plan was to permanently dispose of the Cotter concentrate at the Nevada Test Site. However, in testing the material, the Cotter concentrate’s corrosive nature, selenium content, and the presence of solvents forced the Department of Energy to declare it a mixed hazardous

¹¹ “Superfund Site: Lincoln Park Canon City, CO.” United States Environmental Protection Agency. <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0800115#bkground>. Accessed January 29, 2022.

¹² “Basic (NPL) Information.” United States Environmental Protection Agency. <https://www.epa.gov/superfund/basic-npl-information>. Accessed January 29, 2022.

¹³ O’Laughlin, Colleen et al. “Saving Time, Expense, and a Valuable Resource by Recovering Uranium from a Surplus DOE Strategic Material at a Conventional Uranium Mill.” WM Symposia, Inc. Waste Management Symposia. p. 2. January 29, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998-29-01-WMSYM_Article_re_Cotter_Concentrate.pdf. Accessed January 29, 2022.

¹⁴ United States Department of Energy Legacy Management. “Mound Site, Miamisburg, Ohio Fact Sheet.” United States Department of Energy. September 14, 2009. http://westvalleyctf.org/2011_Materials/07/Mound_fact_sheet.pdf. Accessed January 29, 2022.

¹⁵ Letter from Norman Begay to Administrative Judge Peter Bloch, Presiding Officer, Atomic Safety and Licensing Board Panel. United States Nuclear Regulatory Commission Docket No. 40-8681-MLA. p. 2. June 6, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_25-Order_re_Substitution_and_Service-ML15042A120.pdf. Accessed January 2, 2022.

¹⁶ O’Laughlin, Colleen et al. “Saving Time, Expense, and a Valuable Resource by Recovering Uranium from a Surplus DOE Strategic Material at a Conventional Uranium Mill.” WM Symposia, Inc. Waste Management Symposia. p. 3. January 29, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998-29-01-WMSYM_Article_re_Cotter_Concentrate.pdf. Accessed January 29, 2022.



Esri, Garmin, FAO, NOAA, EPA



Left: Nevada Test Site, Area 5. U.S. GEOLOGICAL SURVEY

waste under the federal Resource Conservation and Recovery Act, meaning that the waste was both hazardous by law and radioactive.¹⁷ The estimated cost of disposal at that time clocked in at \$3.5 million.¹⁸

Seeking a lower-cost disposal alternative, the Department of Energy put out a request for alternative methods of disposal in 1996. Energy Fuels Nuclear Inc. (which was purchased by International Uranium Corporation in 1997) responded with a successful bid to reprocess the Cotter concentrate at the White Mesa Mill. The department then made a decision to reclassify the Cotter concentrate, not as hazardous waste, but as “alternate feed” that could be processed to produce yellowcake.¹⁹ This regulatory transmutation meant that Energy Fuels Nuclear Inc. could process the Cotter concentrate at the White Mesa Mill without complying with requirements imposed by the Resource Conservation and Recovery Act—even though all parties knew that Energy Fuels Nuclear Inc. would dispose of the remnants of the Cotter concentrate on-site in the White Mesa Mill’s waste pits.

¹⁷ Letter from Runore C. Wycoff, Director, Waste Management Division, United States Department of Energy to Michelle Rehmann, Environmental Manager, Energy Fuels Nuclear Inc. “Status of Cotter Concentrate’s Resource Conservation and Recovery Act Designation.” p. 1. January 29, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_03_05-Rev_Am_Req_to_Process_Cotter_Concentrate-Excerpt_from_ML15034A351.pdf. Accessed January 29, 2022.; Letter from Paul J. Liebendorfer, Chief, Bureau of Federal Facilities, Department of Conservation and Natural Resources Division of Environmental Protection to Runore C. Wycoff, Director, Waste Management Division, United States Department of Energy. “Re: Administrative Deadlines for Receipt of Documentation Mandated by the Federal Facilities Compliance Act Consent Order.” p. 2. January 13, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_03_05-Rev_Am_Req_to_Process_Cotter_Concentrate-Excerpt_from_ML15034A351.pdf. Accessed January 29, 2022.

¹⁸ O’Laughlin, Colleen. Project Manager, United States Department of Energy. “Cotter Concentrate Project PPT.” United States Department of Energy. p. 121. April 2, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_25-Order_re_Substitution_and_Service-ML15042A120.pdf. Accessed January 29, 2022.

¹⁹ O’Laughlin, Colleen et al. “Saving Time, Expense, and a Valuable Resource by Recovering Uranium from a Surplus DOE Strategic Material at a Conventional Uranium Mill.” WM Symposia, Inc. Waste Management Symposia. p. 4. January 29, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998-29-01-WMSYM_Article_re_Cotter_Concentrate.pdf. Accessed January 29, 2022.

“

Our Navajo traditions teach us to respect the graves of our ancestors. We are afraid of the bad spirit which our teachings tell us is with the Cotter Concentrate because it killed so many people. These spirits are not free to leave the Cotter Concentrate, but they stay wherever it is and cause our minds to be sick, especially in the night. when we think about these things. All traditional Navajo people feel this way, and even people down across the river are afraid. ...we know that the wastes of the Cotter Concentrate have caused health hazards everywhere they have been. ...we are afraid of the radionuclides and other hazardous wastes that are a part of the Cotter Concentrate. The mill sits on the edge of Westwater Canyon, and the leech fields might drain down into the canyon water and go to the river. ...we believe that allowing the EFN [White Mesa] mill to implement its license is a violation of the Environmental Justice laws. Why are they putting these things so close to Indians?²⁰ – Lula Katso, Diné (Navajo), Westwater Community Member

Ute and Navajo citizens living near White Mesa challenged the Nuclear Regulatory Commission's amendment of Energy Fuels Nuclear Inc.'s license for the White Mesa Mill, which allowed the mill to accept the Cotter concentrate. Norman Begay from White Mesa, Lula Katso from Westwater, and Winston Mason on behalf of the Native American Peoples Historical Foundation's Great Avikan House Project filed requests for hearings.²¹ After protracted battles, the judge denied them the right to participate in the hearings process.

“

As an American Citizen, in a democracy 'by the people' and 'for the people,' I ask for standing with your agency in order that I, my family, and my Ute People be protected by the United States Constitution and dignified with public hearings in this and any other matter affecting our physical, mental, and spiritual rights and well-being.²²
– Norman Begay, White Mesa Community Member

Meanwhile, the Nuclear Regulatory Commission allowed the Cotter concentrate to be transported from the Nevada Test Site to the White Mesa Mill in tractor-trailers. The transportation route followed Highway

²⁰ Letter from Lula Katso to Administrative Judge Peter Bloch, Presiding Officer, Atomic Safety and Licensing Board Panel. "Affidavit of Lula Katso." United States Nuclear Regulatory Commission Docket No. 40-8681-MLA. June 7, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_25-Order_re_Substitution_and_Service-ML15042A120.pdf. Accessed January 29, 2022.

²¹ United States Nuclear Regulatory Commission Staff's Response to the Supplemental Requests for Hearings Filed by (1) The Native American Peoples Historical Foundation, (2) The Westwater Navajo Community, and (3) Norman Begay. In the matter of International Uranium (USA) Corporation (White Mesa Uranium Mill: Alternate Feed Material). Nuclear Regulatory Commission Docket No. 40-8681-MLA. July 11, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_07_10-NRC_Staff_Resp_to_Supp_Req_for_Hearing-ML15041A727.pdf. Accessed January 29, 2022.

²² Letter from Norman Begay to Shirley Jackson, United States Nuclear Regulatory Commission. "Petition for Standing." United States Nuclear Regulatory Commission Docket No. 40-8681-MLA. p. 2. April 30, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_25-Order_re_Substitution_and_Service-ML15042A120.pdf. Accessed January 29, 2022.

95 south to Interstate 15 north into Utah, then east on Interstate 70 to the Highway 191 junction, and south to Blanding, Utah. The Cotter concentrate first arrived at the White Mesa Mill on May 31, 1997, and the mill received its final load of the waste on August 13, 1997.²³

“

They are already bringing the Cotter Concentrate next door to my home, even before you have made your decision....How could America have a law that would allow such injustice?²⁴

– Norman Begay, White Mesa Community Member



Esri, HERE, Garmin, FAO, NOAA, USGS_Bureau of Land Management, EPA, NPS

Despite their exclusion from the hearings and the ongoing shipments of Cotter concentrate to the mill, Native community organizers persevered in their efforts, appealing the judges' decision, and obtaining the support of the Utah Division of Radiation Control for their right to participate in the hearings process.²⁵ Tragically, on February 21, 1998, Norman Begay died in a highway collision while his appeal to participate

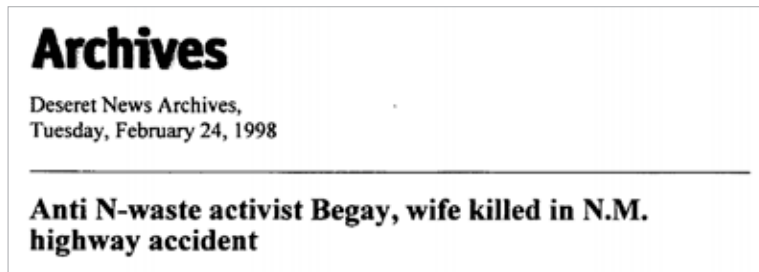
²³ O'Laughlin, Colleen et al. "Saving Time, Expense, and a Valuable Resource by Recovering Uranium from a Surplus DOE Strategic Material at a Conventional Uranium Mill." WM Symposia, Inc. Waste Management Symposia. p. 6. January 29, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998-29-01-WMSYM_Article_re_Cotter_Concentrate.pdf. Accessed January 29, 2022.

²⁴ Letter from Norman Begay to Administrative Judge Peter Bloch, Presiding Officer, Atomic Safety and Licensing Board Panel. United States Nuclear Regulatory Commission Docket No. 40-8681-MLA. p. 2. June 6, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_25-Order_re_Substitution_and_Service-ML15042A120.pdf. Accessed January 29, 2022.

²⁵ Letter from William Sinclair, Director, Utah Division of Radiation Control to Administrative Judge Peter Bloch, Presiding Officer, Atomic Safety and Licensing Board Panel. Nuclear Regulatory Commission Docket No. 40-8681-MLA. May 30, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1997_06_04-Notice_re_Letter_from_State_of_Utah-ML15035A481.pdf. Accessed January 29, 2022.

in the hearings was still pending.²⁶ The Nuclear Regulatory Commission finally denied the community organizers the legal right to participate in the decision-making process in April 1998, long after the last shipment of Cotter concentrate had arrived at the White Mesa Mill²⁷ for processing and final disposal in the mill's waste pits.²⁸

The waste remaining after uranium was recovered from the Cotter concentrate sits in the White Mesa Mill's waste pits today. Just as at the Cañon City mill, the Mound Laboratory, and the St. Louis sites, plumes of contamination have been detected in the shallow groundwater aquifer below the White Mesa Mill.²⁹



²⁶ Memorandum from Joseph J. Holonich, Chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, United States Nuclear Regulatory Commission, to Emile Julian, Chief, Rulemaking and Adjudications Branch, Office of the Secretary, United States Nuclear Regulatory Commission. "New Information Potentially Relevant and Material to Commission Proceedings in the Matter of International Uranium Corporation (White Mesa Uranium Mill)." March 26, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998_03_26-Memo_from_J_Holonich_re_Death_of_N_Begay-ML15034A271.pdf. Accessed January 29, 2022.

²⁷ O'Laughlin, Colleen et al. "Saving Time, Expense, and a Valuable Resource by Recovering Uranium from a Surplus DOE Strategic Material at a Conventional Uranium Mill." WM Symposia, Inc. Waste Management Symposia. p. 6. January 29, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998-29-01-WMSYM_Article_re_Cotter_Concentrate.pdf. Accessed January 29, 2022.

²⁸ Memorandum and Order. "In the matter of International Uranium (USA) Corporation (White Mesa Uranium Mill: Alternate Feed Material). Nuclear Regulatory Commission Docket No. 40-8681-MLA." April 30, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cotter/1998_04_30-Order_re_Standing_-_ML15034A269.pdf. Accessed January 29, 2022.

²⁹ Geo-Logic Associates. "Data Review and Evaluation of Groundwater Monitoring, White Mesa Uranium Mill. Blanding, Utah." p. 26. August 2015. https://www.grandcanyontrust.org/sites/default/files/resources/e_Geologic_Report_White_Mesa_Uranium_Mill.pdf. Accessed January 29, 2022.



- ▶ The Cabot Corporation likely saved millions of dollars by sending its waste to the White Mesa Mill instead of to a low-level radioactive waste disposal facility.
- ▶ 32 million pounds of Cabot waste were originally approved for shipment to the White Mesa Mill, but the mill ultimately accepted and processed millions more, without any additional licensing review.
- ▶ There is no evidence that regulators considered the consequences of adding this additional waste or its effects on the chemical composition in the White Mesa Mill waste pit where it ended up.

In 1978, the Cabot Corporation purchased a facility outside Boyertown, Pennsylvania and began to refine two rare earth metals: tantalum and niobium.¹ Tantalum is a hard, grey metal that resists corrosion,² named for the Greek god Tantalus (the word “tantalyze” comes from the story of Tantalus’s eternal punishment in the underworld) because the scientist who discovered it was apparently “tantalized” by the challenge of dissolving it in acid.³ It is always found near its twin, Niobium, named for Niobe, the Greek goddess of tears and daughter of Tantalus. Niobium is a soft, greyish-white, shiny metal that enhances the strength of steel.⁴ Once refined, these two elements are key components in manufacturing high-strength structural steel for the aerospace industry, and capacitors in electronic devices such as cell phones, flat-screen TVs, and medical devices.⁵



data.pa.gov, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

¹ United States Environmental Protection Agency Region III, Office of Pennsylvania Remediation Land and Chemical Division. “Statement of Basis Global Advanced Metals 650 County Line Road Boyertown, Pennsylvania EPA ID NO. PAD002335545.” p. 2. August 2017. https://www.epa.gov/sites/production/files/2017-08/documents/globaladvancedmetals_sb.pdf. Accessed January 29, 2022.

² “Tantalum.” Los Alamos National Laboratories. <https://periodic.lanl.gov/73.shtml>. Accessed January 29, 2022.

³ Britannica, T. Editors of Encyclopaedia. “Tantalum.” Encyclopedia Britannica. March 1, 2018. <https://www.britannica.com/science/tantalum>. Accessed January 29, 2022.

⁴ “Niobium.” Los Alamos National Laboratories: Periodic Table of the Elements. <https://periodic.lanl.gov/41.shtml>. Accessed January 29, 2022.

⁵ Romero-Freire Ana et al. “Less-Studied Technology-Critical Elements (Nb, Ta, Ga, In, Ge, Te) in the Marine Environment: Review on Their Concentrations in Water and Organisms.” *Front. Mar. Sci.* 6:532. September 11, 2019. <https://www.frontiersin.org/articles/10.3389/fmars.2019.00532/full>. Accessed January 29, 2022.



Left: Tantalum pieces. [IMAGES OF ELEMENTS](#). Right: Niobium crystals. [ARTEM TOPCHII](#)

In the process of refining these two metals, Cabot produced each year slightly fewer than 1,000 tons (2 million pounds) of a solid waste called “presscake,” the compressed remnants of a radioactive mash containing uranium and thorium.⁶

Over the next two decades, Cabot accumulated millions of pounds of presscake, which it stored on-site in concrete and cinder block vaults,⁷ but the waste couldn’t stay there forever. In its attempts to find a way to dispose of this material, Cabot began discussions with International Uranium Corporation about shipping the presscake to the company’s White Mesa Mill for processing to extract the remnant uranium, which was about 0.3 percent of the waste.⁸

In 1997, the Nuclear Regulatory Commission evaluated International Uranium Corporation’s request for an amendment to the White Mesa Mill’s license that would allow the mill to accept Cabot’s presscake.⁹ Nuclear Regulatory Commission staff based its evaluation on a few facts.

First was quantity. The license amendment request was based on a maximum of 16,000 dry tons (approximately 32 million pounds or 1,143 large dump-truck loads) of remnant waste being added to the mill’s waste pits once the presscake was run through the mill.¹⁰

⁶ United States Nuclear Regulatory Commission, Division of Fuel Cycle Safety and Safeguards. “Revised Draft Environmental Assessment for Cabot Supermetals, Cabot Corporation, Boyertown, Pennsylvania.” United States Nuclear Regulatory Commission. p. 5. December 2003. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2003_12_19_Ltr_from_NRC_re_Draft_EA_for_License_Renewal.pdf. Accessed January 29, 2022. Ibid., 1.; United States Nuclear Regulatory Commission. “Technical Evaluation Report Request to Receive and Process Alternate Feed Material. Docket No. 40-86681, License No. SUA-1358.” p. 1. August 15, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/1997_08_15_Ltr_from_J_Holonich_re_Approval_to_Process_Cabot_Feed.pdf. Accessed January 29, 2022.

⁷ United States Nuclear Regulatory Commission, Division of Fuel Cycle Safety and Safeguards. “Cabot’s Response to Agency Requests for Additional Information Regarding ESA and Environmental Issues for Revised Draft Environmental Assessment for Cabot Supermetals, Cabot Corporation, Boyertown, Pennsylvania.” United States Nuclear Regulatory Commission Docket No. 20-6940. p. 3. June 20, 2003. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2003_06_30_Submitted_w_Response_re_Envtl_Issues.pdf. Accessed January 29, 2022.

⁸ United States Nuclear Regulatory Commission. “Technical Evaluation Report Request to Receive and Process Alternate Feed Material. Docket No. 40-86681, License No. SUA-1358.” p. 1. August 15, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/1997_08_15_Ltr_from_J_Holonich_re_Approval_to_Process_Cabot_Feed.pdf. Accessed January 29, 2022.

⁹ United States Nuclear Regulatory Commission. “Technical Evaluation Report Request to Receive and Process Alternate Feed Material. Docket No. 40-86681, License No. SUA-1358.” August 15, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/1997_08_15_Ltr_from_J_Holonich_re_Approval_to_Process_Cabot_Feed.pdf. Accessed January 29, 2022.

¹⁰ Ibid., 5.



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

Second was quality. While the levels of some elements (notably fluorine and carbon) were higher in the presscake than in the waste pits at the White Mesa Mill where the presscake would end up, the Nuclear Regulatory Commission found that, overall, adding 32 million pounds to the giant pit would not raise levels of fluorine and carbon significantly or harm the waste pit's liner. The waste would be diluted by the vast quantity of other waste materials already in the pit.¹¹

Third was truck traffic. Looking at traffic patterns on Utah's Highway 191 in 1996, the Nuclear Regulatory Commission determined that adding 15 trucks a day hauling presscake would only increase the traffic load on Highway 191 by 4 percent.¹²

The Nuclear Regulatory Commission granted the license amendment on August 15, 1997, using the three factors discussed above as part of the justification for its decision.¹³ With this approval in hand, between 1997 and 1998, the Cabot Corporation shipped approximately 18,000 tons (36 million pounds or about 1,286 large dump-truck loads) of radioactive presscake for reprocessing as "alternate feed" at the White Mesa Mill.¹⁴

The mill had been designed and built to process locally mined uranium ore from rock; the presscake was now treated as just an "alternate" source of uranium.

¹¹ Ibid.

¹² Ibid.

¹³ Letter from Joseph J. Holonich, United States Nuclear Regulatory Commission, to Michelle Rehmman, International Uranium (USA) Corporation. "Re: Amendment 4 to Source Material License SUA-1358, International Uranium (USA) Corporation's White Mesa Uranium Mill, Blanding, Utah. U.S Nuclear Regulatory Commission, Materials License SUA-1358, Amendment No. 4." August 15, 1997. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/1997_08_15_Ltr_from_J_Holonich_re_Approval_to_Process_Cabot_Feed.pdf. Accessed January 29, 2022.

¹⁴ United States Nuclear Regulatory Commission, Division of Fuel Cycle Safety and Safeguards. "Revised Draft Environmental Assessment for Cabot Supermetals, Cabot Corporation, Boyertown, Pennsylvania." p. 5. December 2003. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2003_12_19_Ltr_from_NRC_re_Draft_EA_for_License_Renewal.pdf. Accessed January 29, 2022.



Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS



Clive, Utah, off Interstate 80, is home to a licensed low-level radioactive waste disposal facility. GARRETT

Once the initial shipment was complete, Cabot continued its tantalum-processing operations. By the early 2000s, Cabot had accumulated 4,000 more tons (8 million pounds) of presscake on-site in Boyertown.¹⁵ This material too was sent to White Mesa, without any further licensing review.¹⁶ And it appears that trend continued, with shipments ranging from 250–700 tons (500,000-1.4 million pounds) departing for the mill every 18 months on average, at least until 2010.¹⁷

By sending this waste to White Mesa instead of a low-level radioactive waste disposal facility, the cost savings for Cabot were likely sizable. Estimates that Cabot made in the early 2000s of the disposal costs for various radioactive materials it generated suggest that the per-ton expense of using Envirocare (now EnergySolutions), a licensed low-level radioactive waste disposal site in Clive, Utah, an hour's drive west of Salt Lake City, was about \$650.¹⁸

The most recent of those same estimates assert that the per-ton cost of disposal at the White Mesa Mill was about \$298.¹⁹ For context, the total cost of disposing of 20,000 tons (40 million pounds) of radioactive materials at Envirocare using those prices would have been about \$13 million, whereas the total cost of disposal at the mill would have been about \$6 million.

¹⁵ United States Nuclear Regulatory Commission. "Safety Evaluation Report License Renewal Application Cabot Supermetals, Cabot Corporation, Boyertown, Pennsylvania." p. 13. May 25, 2004. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/Safety_Evaluation_Report_License_Renewal_Application_Cabot_Supermetals.pdf. Accessed January 29, 2022.

¹⁶ Ibid.

¹⁷ Oak Ridge National Laboratory. "Evaluation of Activity Concentration Values and Doses due to the Transport of Low Level Radioactive Material." p. 16-17. April 2010. <https://digital.library.unt.edu/ark:/67531/metadc1013449/m1/30/>. Accessed January 29, 2022.

¹⁸ Weston Solutions. "Cabot Supermetals, Inc. 2003 Decommissioning Cost Estimate for the Boyertown, Pennsylvania Site." pp. 27 and Table 11. December 11, 2003. Weston Solutions, Inc. "Supplemental Information for Renewal Application for License Number SBM-0920, Cabot Supermetals - Boyertown, PA." p. 27 and Appendix B. Table 11. March 2004. <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML040610495>. Accessed January 29, 2022. The radioactive wastes for which Envirocare's disposal rates were used in Cabot's cost estimates are listed as "debris" in Table 11 in the foregoing references. This is evident if the rate given in the text of Cabot's 2003 estimates for disposal at Envirocare (\$82/cubic foot) is converted into a rate per metric ton of waste using the estimating methodology described in the text. That is, if the volume of contaminated equipment listed in Table 1 of the 2003 and 2004 cost estimates (24,908 cu. ft.) is reduced by 95% (as described in Section 5.2.1 of the cost estimates) to arrive at an estimated volume of contaminated waste, the total estimated disposal cost for those materials would be \$102,123 (24,908*0.05*\$82), a figure nearly identical to the total disposal cost for "debris" in Table 11, and nearly identical to the figure that results if the disposal cost is calculated by converting into tons the equipment mass estimate in Table 1 and calculating the disposal fee using a rate of \$650/MT (348,115*0.000453592*\$650).

¹⁹ Weston Solutions, Inc. "Supplemental Information for Renewal Application for License Number SBM-0920, Cabot Supermetals - Boyertown, PA." App. H. p. 28. March 2004. <https://www.nrc.gov/docs/ML0408/ML040860633.pdf>. Accessed January 29, 2022.



The White Mesa Mill and its waste ponds. ECOFLIGHT

Unsurprisingly, it was cheaper for Cabot to send radioactive waste to a facility built and licensed four decades ago as a uranium mill, rather than one that has gone through the design and licensing requirements for a low-level radioactive waste repository.

In its filings with the Nuclear Regulatory Commission, Cabot explained its arrangement for shipping presscake and other contaminated wastes to White Mesa:

“

Presscake, ores, and soils and concrete chips that exceeded release criteria would be transported to a licensed uranium mill in the western United States... Unlimited quantities of material may be transferred under this contract. The contract terms are valid for one year with options to extend the contract annually.²⁰

²⁰ Ibid.

5.2.4 Radioactive Waste Transportation and Disposal Cost

Contaminated piping, equipment, and objects that cannot be properly decontaminated or surveyed for surface contamination are assumed to be radioactive waste. These materials would be disposed of at a licensed disposal facility. Rates are provided in Table 11 that were acquired from WESTON proposals that had been completed since January 2001 for disposal of similar materials at Envirocare in Utah. **Presscake, ores, and soils and concrete chips that exceeded release criteria would be transported to a licensed uranium mill in the western United States.** CSM signed a contract with IUC in February 2004 and is listed on the IUC license as a source material supplier. **Unlimited quantities of material may be transferred under this contract.** The contract terms are valid for one year with options to extend the contract annually.

Cabot Nuclear Regulatory Commission Site Preliminary Characterization.

Rather than going through the process of obtaining a new license amendment for this new shipment of presscake, the White Mesa Mill owner accepted this shipment under its old license amendment.²¹

The Nuclear Regulatory Commission never evaluated the environmental and public health impacts of this additional 2004 shipment of waste to Utah as part of a new license amendment. It provided no public process related to the impacts that the 2004 shipment of waste would have on the community and environment near White Mesa. This new deal envisioned shipment of “unlimited quantities” of the material to the mill rather than the 16,000 dry tons (32 million pounds) originally approved.

The consequences of adding additional Cabot waste and its effects on the chemical composition in the waste pit where it ended up—and on the mill’s overall capacity to dispose of millions more pounds of toxic, radioactive waste—were never considered. Additionally, the additional truck traffic in light of new 2004 traffic patterns was never considered.

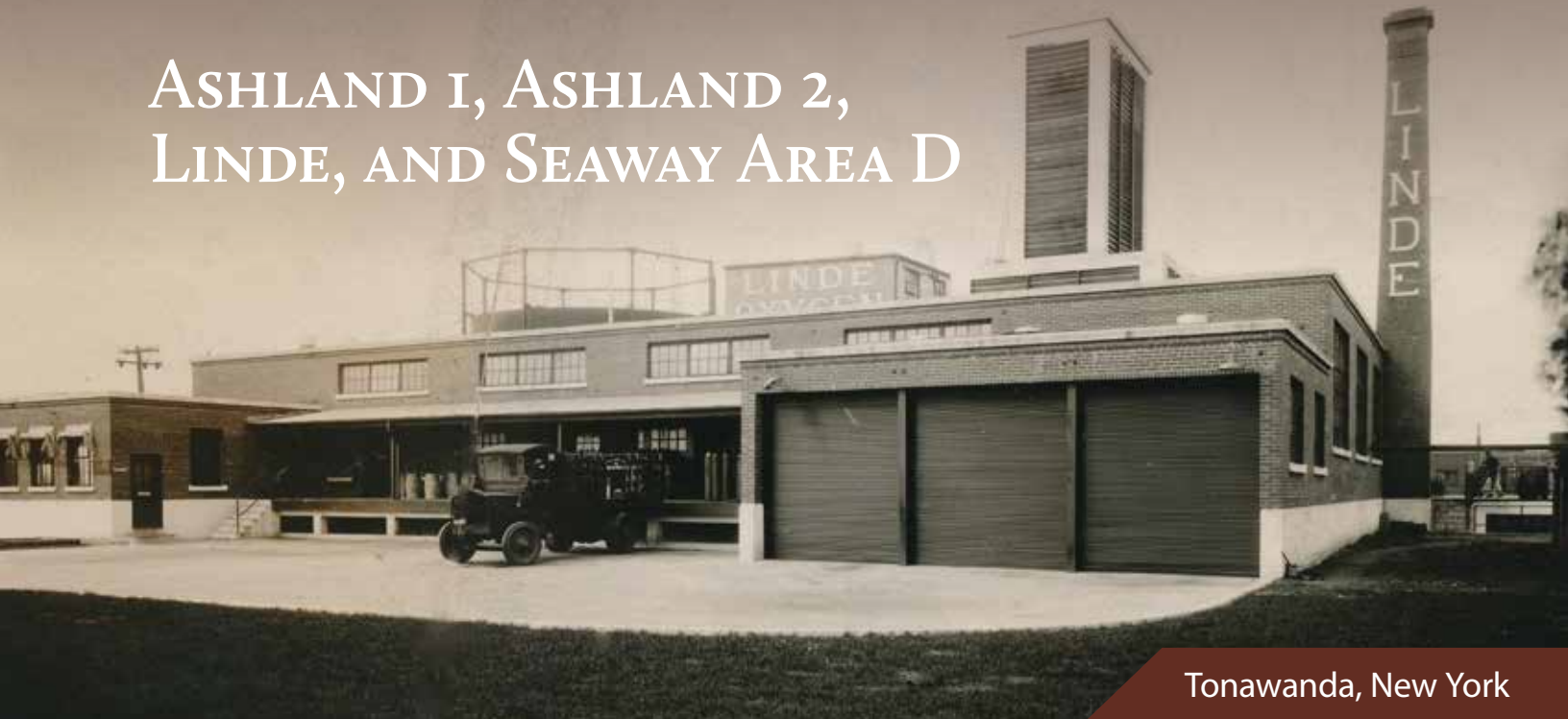
In short, while many of the factors the Nuclear Regulatory Commission used to justify approving the original shipment of presscake from the Cabot facility changed, those changes weren’t considered before more wastes were shipped to White Mesa. The decision was never reviewed and the public was never given the opportunity to consider the public health or environmental impacts of shipping unspecified quantities of presscake—the remnants of which remain in the White Mesa Mill’s waste pits today. Global Advanced Metals acquired Cabot in 2011,²² and, as of 2021, the mill was still licensed to accept waste from the Cabot site.²³

²¹ Utah Division of Radiation Control. “Radioactive Materials License UT 1900479, Amendment. 7.” July 10, 2014. p. 10. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2014-07-10-RML-UT-1900479-Am7.pdf>. Accessed January 29, 2022.

²² Global Advanced Metals. “Global Advanced Metals Acquires Cabot Supermetals.” August 25, 2011. <https://www.globaladvancedmetals.com/global-advanced-metals-acquires-cabot-supermetals>. Accessed January 29, 2022.

²³ Utah Division of Radiation Control. “Radioactive Materials License UT 1900479, Amendment 10. License Condition 10.9.” p. 10. July 27, 2021. https://grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMillLicense1900479Amendment10.pdf. p. 10. Accessed January 29, 2022.

ASHLAND 1, ASHLAND 2, LINDE, AND SEAWAY AREA D



Tonawanda, New York

Linde Air Products Company, Granite City, Illinois. [SIX MILES OF LOCAL HISTORY](#)

- ▶ Part of the Manhattan Project, the Tonawanda, New York sites refined uranium ores for atomic weapons.
- ▶ Years of uranium extraction and improper waste disposal left several sites in Tonawanda contaminated with dangerously high levels of radioactivity.
- ▶ Decades later, when the federal government decided the sites needed to be cleaned up, it chose the White Mesa Mill as one of the sites for disposal of hundreds of millions of pounds of radioactive waste, instead of disposing of it in a low-level radioactive-waste facility.
- ▶ The White Mesa Mill owner collected millions of dollars in fees in exchange for disposing of the Tonawanda waste.
- ▶ A truck carrying radioactive waste from Tonawanda spilled 20,000 pounds of waste along the highway near Cisco, Utah when it overturned in 1999.



Atomic cloud over Nagasaki from Koyagi-jima on August 9, 1945. HIROMICHI MATSUDA

In the race to build the atomic bomb, a top-secret government program known as the Manhattan Project chose a ceramics factory in Tonawanda, New York to refine uranium ores for use in atomic weapons,¹ including the bombs that would eventually be dropped on Hiroshima and Nagasaki.

Tonawanda, a suburb of Buffalo, New York, located along the banks of the Niagara River, was the original territory of the Neutral, Erie, and Wenro nations, later absorbed by the Tonawanda Band of Seneca, now part of the Haudenosaunee Confederacy.² The name Tonawanda is derived from a Tuscarora word meaning “land by the waters” or “swift waters,”³ appropriate for the Niagara River.

¹ International Uranium (USA) Corporation. “Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681.” p. 2. March 16, 2000. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000_03_16-Ltr_from_IUSA_to_NRC_re_Am_Req_for_Linde_FUSRAP.pdf. Accessed January 29, 2022.

² Hauptman, Laurence M. “The Tonawanda Community Early History.” The Tonawanda Senecas’ Heroic Battle against Removal. Albany, N.Y: Excelsior Editions/State University of New York Press, 2011. p.1 https://sunypress.edu/content/download/452489/5505968/version/1/file/9781438435770_imported2_excerpt.pdf. Accessed January 29, 2022.

³ Szczepaniec, Kristin. “Fact Sheet: Indigenous People of Western New York.” Partnership for the Public Good. p. 18. February 2018. https://ppgbuffalo.org/files/documents/data-demographics-history/indigenous_people_in_wny_final.pdf. Accessed January 29, 2022.



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA



The Linde site in Tonawanda, New York. U.S. ARMY CORPS OF ENGINEERS

Uranium production contaminated several sites in Tonawanda with radioactive waste, among them four sites known as Linde, Ashland 1, Ashland 2, and Seaway.⁴ Eventually, some of this waste found a home nearly 2,000 miles away at the White Mesa Mill.

Located next door to an elementary school,⁵ the Linde facility processed more than 28,000 tons (56 million pounds) of ore from 1944 to 1946⁶ from seven different ore sources: four from Africa and three from Colorado.⁷ It also dumped large quantities of radioactive liquid in Tonawanda storm drains and sewers, and into Two Mile Creek (a tributary of the Niagara River) and on-site injection wells.⁸ After extracting the uranium, a solid, gelatinous “filter cake” of waste was left behind.⁹ This waste needed somewhere to go.

⁴ United States Army Corps of Engineers, Buffalo District. “Site Closure Report for the Linde FUSRAP Site.” p. 10. February 20015. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Linde/linde-sitecloseout-2015-02.pdf>. Accessed January 29, 2022.

⁵ Grunwald, Michael. “Nuclear Cleanup’s Fallout.” The Washington Post. April 10, 2000. <https://www.washingtonpost.com/archive/politics/2000/04/10/nuclear-cleanups-fallout/cc856019-7790-4d32-b5e0-2b62574e5fa4/>. Accessed January 29, 2022.

⁶ International Uranium (USA) Corporation. “Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681.” p. 2. March 16, 2000. [https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000_03_16-Ltr from IUSA to NRC re Am Req for Linde FUSRAP.pdf](https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000_03_16-Ltr%20from%20IUSA%20to%20NRC%20re%20Am%20Req%20for%20Linde%20FUSRAP.pdf). Accessed January 29, 2022.

⁷ United States Army Corps of Engineers. “Record of Decision for the Linde Site, Tonawanda, New York.” p. 11. March 2000. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Linde/linde-soils-rod-2000-03.pdf>. Accessed January 29, 2022.

⁸ Rauch, James. “A Chronologic History of the Tonawanda, NY FUSRAP Site. Tonawanda Nuclear Site Info.” <http://www.westvalleyfactsofwny.org/chrono.htm>. Accessed January 29, 2022.

⁹ United States Army Corps of Engineers. “Record of Decision for the Linde Site, Tonawanda, New York.” p. 11. March 2000. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Linde/linde-soils-rod-2000-03.pdf>. Accessed January 29, 2022.



Excavating a test pit in the Seaway FUSRAP site. U.S. ARMY CORPS OF ENGINEERS

The Manhattan Project acquired additional parcels of nearby land to serve as disposal sites, including the 10-acre Ashland 1 property,¹⁰ which served as the principal repository for uranium wastes from the Linde facility's operations.¹¹ Between 1944 and 1946, approximately 8,000 tons (16 million pounds or about 571 large dump-truck loads) of radioactive residues "were spread out over roughly two-thirds of the site to a depth of 1 to 5 feet."¹²

In 1960, the Ashland 1 property was transferred to the Ashland Oil Company.¹³ In 1974, the Ashland Oil Company removed several tons of contaminated, radioactive soils from the Ashland 1 site and transferred them to the nearby 115-acre Ashland 2 site,¹⁴ contaminating that site and a small portion of the abutting "Seaway Area D" site (later treated as a part of the Ashland 1 site).¹⁵ This transfer of waste from Ashland 1 to Ashland 2 continued until 1982.¹⁶

Some of the radioactive residues from Ashland 1 were also moved to the nearby Seaway site, which operated as a landfill within the Seaway Industrial Park.¹⁷ These residues, which contained radium, thorium, and uranium, contaminated a 12-acre area known as Seaway Area A, in the northeast section of the landfill, along with Seaway areas B and C, which covered another seven acres.¹⁸ Portions of these areas were then covered with dirt and trash.¹⁹

¹⁰ United States Department of Energy. "Proposed Plan for the Tonawanda Site." p. 3. November 1993. https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Seaway/SeawayARF/Seaway_01.06_0055_a.pdf. Accessed January 29, 2022.

¹¹ International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." p. 2. October 15, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_10_15-Req_to_Am_License-Ashland_1.pdf. Accessed January 29, 2022.

¹² United States Department of Energy. "Formerly Utilized MED/AEC Sites Remedial Action Program: Radiological Survey of the Ashland Oil Company (Former Haist Property), Tonawanda, New York, Final Report, DOE/WV-0005/4." May 1978. <https://www.osti.gov/servlets/purl/6702664>. Accessed January 30, 2022.

¹³ United States Army Corps of Engineers. "Site Closeout Report for the Ashland 1 (including Seaway Area D), Ashland 2 and Rattlesnake Creek FUSRAP Sites." p. 1. October 2006. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Ashland1/ashland-closeout-report-2006-10.pdf>. Accessed January 30, 2022.

¹⁴ Ibid.

¹⁵ United States Army Corps of Engineers. "Record of Decision for the Seaway Site." p. 2-1. October 2009. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Seaway/seaway-rod-2009-10.pdf>. Accessed January 30, 2022.

¹⁶ For A Clean Tonawanda Site (F.A.C.T.S.). "Comments on Proposed Plan for the Ashland 1 and Ashland 2 Sites." January 20, 1998. <https://www.westvalleyfactsofwny.org/ashcmnts.htm>. Accessed January 30, 2022.

¹⁷ United States Army Corps of Engineers. "Seaway Site News." p. 2. April 2020. https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Seaway/Seaway%20Newsletter%20April%202020_Web_Version.pdf?ver=2020-04-02-083053-600. Accessed January 30, 2022.

¹⁸ Ibid.

¹⁹ Ibid.

Today, the Tonawanda sites are managed under the Formerly Utilized Sites Remedial Action Program (FUSRAP), a program established by the Atomic Energy Commission in 1974 to clean up sites associated with the Manhattan Project.²⁰ The Linde site was designated a FUSRAP site in February 1980, Ashland 1 and Seaway in June 1984, and Ashland 2 in October 1984.²¹ In 1997, the Army Corps of Engineers became responsible for the FUSRAP program.²²

The cleanup of the Tonawanda sites was rife with controversy. Radioactive waste sat on-site for decades, leading to “a corrosive presence in the town psyche. There were angry meetings with screaming politicians. There was talk around town about cancer clusters.”²³

According to the local Buffalo Courier Express, reporting on a New York State Assembly report:

“*Linde Air Products disposed of the radioactively contaminated liquid chemical wastes in shallow underground wells on its property with the knowledge ‘that this method of disposal would further contaminate Linde’s wells and the wells of Linde’s neighbors in the surrounding region.’*”

The report explained that this method of disposal was “selected precisely because the source of underground contamination could not readily be traced back to Linde or the Army.”²⁴

Linde Workers Remember Work on A-Bomb Project
By RICHARD SCHROEDER

Fred J. Santillo remembers the protective clothing, the FBI background checks, the secret congratulations from the U.S. Under-Secretary of War, and the \$3-cent an hour wages.

Virginia F. Doyle remembers the plinking sound of dead birds hitting the metal roof of her prefabricated office, the refining fumes that filled the office and the "industrial allergy" she contracted during her first week of employment.

Thirty-five years after their involvement in the top secret Manhattan project to develop the atomic bomb, these former employees of Union Carbide's Linde Division vividly remember the two years they spent refining uranium ore at the Town of Tonawanda plant.

A State Assembly report on that war project released Feb. 1 has caused renewed interest in them and the other 156 workers who were employed in Linde's former ceramics

Plant on the crash program to develop the bomb.

The report charged that workers may have been exposed to excessive levels of harmful radiation while working on the project, "due to primitive federal standards and inadequate protection."

The Assembly Task Force on Toxic Substances, which issued the report, said both the federal government, which ran the Manhattan Project, and Linde failed to follow up on the health histories of these workers, who

It said "may have been the unwitting casualties of Hiroshima," the Japanese city that was destroyed by America's first atomic bomb. Linde officials are now in the process of formulating plans to contact every one of the 156 workers of the Manhattan Project as part of an extensive health study.

Santillo, a Metrolux driver on disability who lives in the Town of Tonawanda, still has the letter he received the following day from then-Under Secretary of War Robert P. Patterson, which congratulated him for his work in developing the bomb, which Patterson said delivered the death blow to "the War Lords of Japan."

Santillo, in his mid-20s when hired in 1944 for the project, does not regret his involvement in the work that has now been described as hazardous by the state task force.

"How many days was it before the Japanese surrendered after that bomb? It ended it quick. Otherwise we would have had to invade that whole works over there and it would have cost half a million lives. If it saved one American life it was worth it," he said Friday, while sitting in the small kitchen of the modest but well-kept wood-frame home.

Santillo worked closely with uranium ore in the refining process done at Linde, but said he has been in excellent health since then, except for an eye problem and an artery blockage ascribed to correlated and identifiable causes.

"The been so much all my life it's disgusting," he said with a smile.

Santillo remembers the security and health precautions he was subject to while at Linde. "There were MPs and guards all around, and the FBI, they were everywhere in the neighborhood checking you out," he said.

He said he did not know what he was getting into when first hired for the project while sitting in a tavern with an officer of the U.S. Army Corps of Engineers.

The work rules seemed unusual. Workers wore complete outfits supplied by the company, and the clothes were turned in and laundered by company employees every day. The workers were also required to shower thoroughly at the end of each of the day's three shifts, and devices — which Santillo later realized must have been gelignite counters — set off bells if workers left the building with any remains of the uranium wastes on their clothing.

Once every month, workers were

LINDE WORKERS
Continued on Page A-8

The Army Corps of Engineers' cleanup plan “allowed radioactive uranium levels [left after cleanup] at least six and possibly 30 times higher than any other such plan in history; state and federal regulators say they have never seen a weaker proposal.”²⁵

²⁰ United States Department of Energy. “Fact Sheet: Formerly Utilized Sites Remedial Action Program.” May 2020, <https://www.energy.gov/sites/prod/files/2020/05/f74/FUSRAPFactSheet.pdf>. Accessed January 30, 2022.

²¹ United States Army Corps of Engineers. “Site Closeout Report for the Linde FUSRAP Site, Tonawanda, New York.” p. 10. February 2015. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Linde/linde-sitecloseout-2015-02.pdf>. Accessed January 30, 2022.

²² Ibid.

²³ Grunwald, Michael. “Nuclear Cleanup’s Fallout.” The Washington Post. April 10, 2000. <https://www.washingtonpost.com/archive/politics/2000/04/10/nuclear-cleanups-fallout/cc856019-7790-4d32-b5e0-2b62574e5fa4/>. Accessed January 30, 2022.

²⁴ Lynch, David E. “State Report Cites NTN Hazard, Radioactive Dumping Into Wells.” Buffalo Courier Express. January 31, 1981. p.1. <https://nyshistoricnewspapers.org/lccn/sn88074337/1981-01-31/ed-1/>. Accessed January 30, 2022.

²⁵ Ibid.

The Army Corps of Engineers found elevated levels of radionuclides including uranium, radium, and thorium at all the Tonawanda sites,²⁶ exceeding established exposure limits and posing a risk to human health and the environment.²⁷ After the Corps determined that the sites had to be remediated, it settled upon completely excavating and shipping contaminated soils off-site for disposal.²⁸ Enter the White Mesa Mill.



*...processing and disposal of DOE materials as an alternate feed can be accomplished at the [White Mesa] Mill at a cost that is substantially lower than other disposal options. Our experience has shown that doing so can result in cost savings of anywhere from 20 to 80 percent compared to the historical costs of direct disposal... we will take all you have got for \$100 a yard. Just send it on down, dump your trucks, we will take it right now...*²⁹ – Earl Hoellen, President of IUSA, then-owner of the White Mesa Mill, in testimony before the Senate Armed Services Committee

At a charge of \$100 a yard, it is not difficult to see why Mr. Hoellen was eager to have the Army Corps dump its trucks at the mill. Between the Ashland 1 and Ashland 2 sites, the Corps had estimated that about 60,000 cubic yards of material could be sent to the mill, which would translate into disposal fees on the order of \$6 million.³⁰ This price tag likely appealed to the Army Corps as well, since it was about half the over \$12 million it would cost to pay Envirocare, a licensed radioactive waste disposal facility in Utah, to dispose of the waste.³¹

In May 1998, International Uranium Corporation, the then-owner of the White Mesa Mill, applied for permission to receive and process the Ashland 2 waste to recover minuscule amounts of uranium.³² The Nuclear Regulatory Commission approved the request just a month later.³³ Based on International Uranium's own estimates, the amount of recoverable uranium was only 0.001 to 0.06 percent of the actual

²⁶ United States Army Corps of Engineers. "Record of Decision for the Ashland 1 (including Seaway Area D) and Ashland 2 Sites." p. 10. April 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/Record_of_Decision_for_the_Ashland_1_including_Seaway_Area_D_and_Ashland_2_Sites_April_1998.pdf. Accessed January 30, 2022.

²⁷ Ibid., 25-30.

²⁸ Ibid., 41.

²⁹ Letter from Kenneth Alkema, Envirocare of Utah, Inc., to Joseph J. Holonich, United States Nuclear Regulatory Commission. "Re: International Uranium (USA) Corporation's Amendment Request to Process an Alternate Feed at White Mesa Uranium Mill (Source Material License SUA-1358)." p. 4-5. December 1, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_12_01-Ltr_from_Envirocare_to_NRC_re_Ashland_1.pdf. Accessed January 30, 2022.

³⁰ United States Army Corps of Engineers. Value Engineering Proposal for Ashland 1 and Ashland 2. p. 3. November 7, 1997. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998-09-30-IUSACorp-Tonawanda-Hearing-compressed.pdf>. Accessed January 30, 2022.

³¹ Ibid.

³² International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." May 8, 1998. https://uraniumwatch.org/alternatefeed/IUC_WMM_Ashland2Mtl_Application_050898.pdf. Accessed January 30, 2022.

³³ Letter from Joseph J. Holonich, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (USA) Corporation. "Subject: Amendment 6 to Source Material License SUA-1358, International Uranium (USSA) Corporation's White Mesa Uranium Mill, Blanding, Utah." June 23, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_06_23-Ltr_from_J_Holonich_re_Approval_to_Process_Ashland_2_Feed.pdf. Accessed January 29, 2022.

Tomorrow in your Sunday Courier



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Courier EXPRESS

FAIR Partly cloudy, high near 30 low in the teens. Details on Page 31.

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SATURDAY, JANUARY 31, 1981

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In the Area

Area is probed in a two-alarm Delaware Avenue apartment building which threatened 60 lives and did \$30,000 damage. Page 1.

In the Nation

A blizzard of ticker tape showered down on 23 former hostages as they rolled up Broadway to the cheers of thousands. Page 17.

In the World

South African forces raid capital of Mozambique to attack guerrillas. Page 24.

In Sports

The price of Bills-watching is going up again unless fans do their ticket shopping early. Page 8.

State Report Cites TNT Hazard, Radioactive Dumping Into Wells

By DAVID E. LYNCH
WASHINGTON — The U.S. Army's World War II Manhattan Project pumped 21 million gallons of radioactive chemical wastes into the Town of Tonawanda groundwater water system, according to a New York State Assembly report to be released today.

Chemical Waste Services Inc. is possible. The TNT disposal area cited in the report was sold by the federal government in 1966 to a holding company and it eventually became the property of SCA, which has supervised its development into one of the nation's largest disposal centers of toxic chemical wastes.

The LOOW site is now the repository of thousands of tons of radioactive waste left over from the Manhattan project which produced the nation's first atomic bomb. The federal Department of Energy, which supervises the site, has pledged to eventually clean it up.

underground so that it does not today pose a health hazard. However, the investigators took the Army and the Department of Energy to task for failing to "identify the location of the wells or indicate knowledge of their use" by the Army and Linde Air Products, which was a Manhattan Project contractor from 1944 to 1946.

posal would further contaminate Linde's wells and the wells of Linde's neighbors in the surrounding region," the report said. It went on to point out that this method of disposal was "selected precisely because the source of underground contamination could not readily be traced back to Linde or the Army."

B-12 BUFFALO COURIER-EXPRESS, Sunday, February 1, 1981

Excerpts of State Report on U.S. Handling of Toxic Waste



THE FEDERAL CONNECTION: A History of U.S. Military Involvement in the Toxic Contamination of Love Canal and the Niagara Frontier Region

ment, exploitation and despoliation of widespread sections of one of the most beautiful and productive regions of New York State. The Task Force discovered that several federal misdeeds to environmental fully remain in the Niagara and Erie County region — some already a matter of public knowledge and a subject of remedial efforts, and some, shockingly, unknown, and unmeasured.

Manhattan Project Legacy The classic ingredients are all present here (use of the Linde Wells) — the continued use of untested methods and primitive technology until the threat of financial and environmental ruin became a reality, the pressing demand for uninterrupted production, at any cost; and, at every stage, the tightening of the purse strings when it came to providing adequate funds for safe disposal.

York workers were exposed to excessive levels of radiation. In many cases, the workers were not made fully aware of the hazards involved with radioactive substances, partially due to the secrecy of the projects, partially because research on radiation effects had not sufficiently considered long-term effects on human beings.

Conclusion In this position, many of the federal activities within New-York-State and throughout the country have similarly evaded detection and reevaluation by the federal government. There is much evidence to suggest that a serious nationwide problem exists.

The hazards presented are not theoretical; environmental contamination from TNT production wastes, unexploded and undecayed munitions and buried radioactive wastes all pose a clear and present danger to our society.

Good Morning GET RICH BELLYACHE STAIRS Courier EXPRESS



Reaction to Study: Shut Schools, SCA

Proactive meetings, budget limitations, bureaucratic approvals and indifference, the strength of these arguments over fear-mongering — these are the recurring and dominant themes that mark this saga.

Neighbors Calm on Dump Report

The neighbors of the dump site in Tonawanda, N.Y., were calm and confident that the state's report on the dump site was accurate.



At news conference discussing the dumping of radioactive waste in Tonawanda, N.Y., with, from left: Howard Elm Jr., an aide to Senator Edmund M. D'Amarico; State Assemblyman Joseph T. Filippini; Senator Daniel Patrick Moynihan; Assemblyman Henry F. Hon and Senator D. Huebner, and State Attorney General Robert Abrams.

Big Atom Waste Site Reported Found Near Buffalo

By RALPH BLUMENTHAL The Army and a defense contractor dumped more than 37 million gallons of radioactive atomic wastes from the World War II atomic bomb project in shallow wells at Tonawanda, N.Y., near Buffalo, between 1944 and 1946, a New York State toxic waste task force reported yesterday.

Washington read a statement saying that the report was "under review" and that the Army stood for an active finding that it had "no direct involvement" in dumping at Love Canal in Niagara Falls, N.Y.

is now the Linde Division of Union Carbide Corporation, said that "in this date we are unaware of any damage to people or the environment" from work on the atomic bomb project, but that the company would further investigate.

Various press clippings from the 1980s.

waste,³⁴ the rest of which was discarded in giant pits at the White Mesa Mill. In time, over 52,000 tons (104 million pounds) of radiologically contaminated soil was sent from Ashland 2 to the White Mesa Mill³⁵ in 2,460 intermodal containers shipped by rail.³⁶

Next came Ashland 1 (including Seaway D). International Uranium applied for permission to process and dispose of this waste in October 1998, just months after applying for the Ashland 2 waste.³⁷ Again, the Nuclear Regulatory Commission approved, despite objections to the proposal.³⁸ Among the objectors was Envirocare of Utah. Envirocare argued that International Uranium Corporation was procuring the waste not primarily to extract uranium but rather to dispose of it, contravening the commission's requirements.³⁹ Envirocare also argued that the economics proved that the value was in waste disposal, not uranium recovery.⁴⁰ The commission wasn't convinced.

The cleanup of Ashland 1 and Seaway D began in June 1999 and was completed in December 2002.⁴¹ During those years, an astounding 173,000 tons (346 million pounds, or about 12,357 large dump-truck loads) of contaminated materials were shipped to the mill.⁴² On September 29, 1999, a truck carrying Ashland 1 waste tipped over on Highway 50 near Cisco, Utah, spilling approximately 10 tons (20,000 pounds) of radioactive soil that required immediate cleanup.⁴³

Most of the waste from the Linde facility had been transferred to the Ashland 1 and 2 properties, but there were still tons of waste consolidated at the facility.^{44,45} The mill had applied to receive up to 100,000 cubic yards of this waste—mostly radioactive soils⁴⁶—and ultimately received 118,000 tons, ending in 2010.⁴⁷

³⁴ International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." p. 3. May 8, 1998. https://uraniumwatch.org/alternatefeed/IUC_WMM_Ashland2Mtl_Application_050898.pdf. Accessed January 30, 2022.

³⁵ United States Army Corps of Engineers. "Site Closeout Report for the Ashland 1 (Including Seaway Area D), Ashland 2 and Rattlesnake Creek FUSRAP Sites." p. 4. October 2006. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Ashland1/ashland-closeout-report-2006-10.pdf>. Accessed January 29, 2022.

³⁶ United States Army Corps of Engineers. "News Release #99-05, FUSRAP Information Session to be Held and Ashland 2 Site Nearing Completion." February 19, 1999. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Ashland2/2-19-1999.pdf>. Accessed January 30, 2022.

³⁷ International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." October 15, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_10_15-Req_to_Am_License-Ashland_1.pdf. Accessed January 29, 2022.

³⁸ Letter from N. King Stablein, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (USA) Corporation. "Subject: Amendment 10 to Materials License SUA-1358 -- Approval to Receive and Process FUSRAP Materials at International Uranium (USA) Corporation's White Mesa Uranium Mill." February 3, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1999_02_03-Ltr_from_N_Stablein_re_Approval_for_Ashland_1.pdf. Accessed January 29, 2022.

³⁹ Letter from Kenneth Alkema, Envirocare of Utah, Inc., to Joseph J. Holonich, United States Nuclear Regulatory Commission. "Re: International Uranium (USA) Corporation's Amendment Request to Process an Alternate Feed at White Mesa Uranium Mill (Source Material License SUA-1358)." December 1, 1998. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1998_12_01-Ltr_from_Envirocare_to_NRC_re_Ashland_1.pdf. Accessed January 30, 2022.

⁴⁰ *Ibid.*, 4.

⁴¹ United States Army Corps of Engineers. "The Ashland Sites Soils Cleanup – Completed." p. 2. September 2006. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Ashland1/ashland-fs-completion-ceremony-2006-09.pdf>. Accessed January 30, 2022.

⁴² *Ibid.*

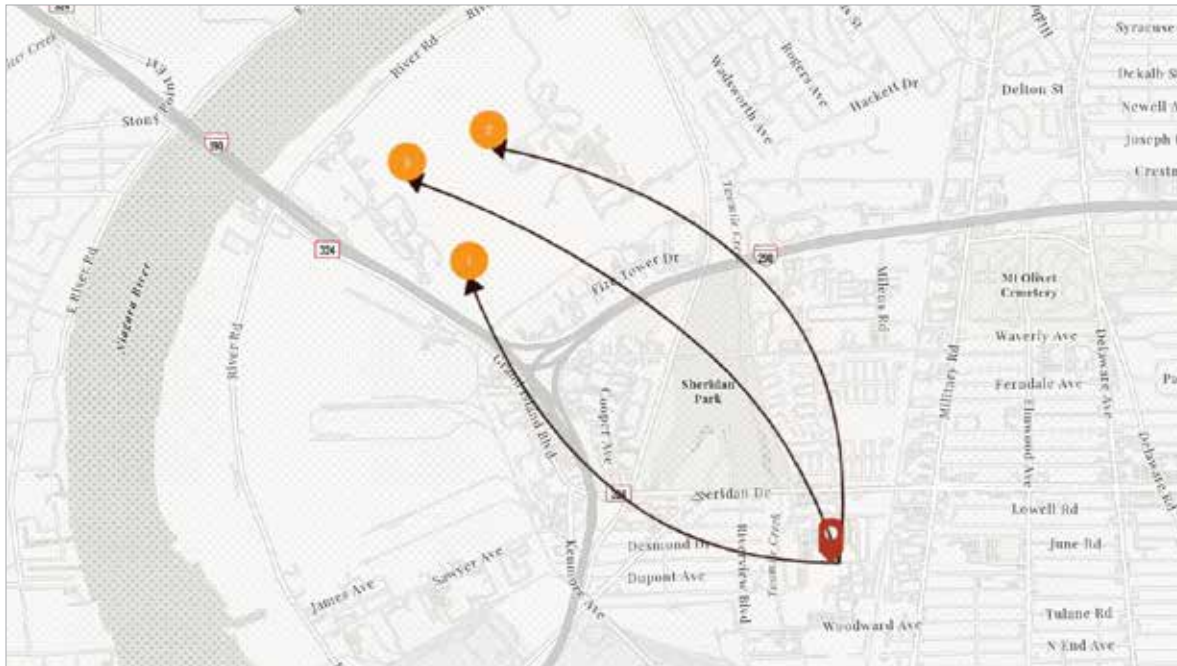
⁴³ United States Nuclear Regulatory Commission, Region 4. "Preliminary Notification of Event or Unusual Occurrence." p. 1. September 30, 1999. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/1999-09-30-Notice-Spill-near-Cisco.pdf>. Accessed January 26, 2022.

⁴⁴ United States Army Corps of Engineers, Formerly Utilized Sites Remedial Action Program. "Seaway Site News." p.2. April 2020. https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Seaway/Seaway%20Newsletter%20April%202020_Web_Version.pdf?ver=2020-04-02-083053-600. Accessed January 30, 2022.

⁴⁵ International Uranium (USA) Corporation. "Request to Amend Source Material License SUA-1358 White Mesa Mill Docket No. 40-8681." p. 1. March 16, 2000. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000_03_16-Ltr_from_IUSA_to_NRC_re_Am_Req_for_Linde_FUSRAP.pdf. Accessed January 29, 2022.

⁴⁶ *Ibid.*, 2.

⁴⁷ United States Army Corps of Engineers. "Site Closeout Report for the Linde FUSRAP Site, Tonawanda, New York." p. 36. February 2015. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Linde/linde-sitecloseout-2015-02.pdf>. Accessed January 30, 2022.



Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

All told, the cost to clean up the Ashland 1 and 2 sites totaled \$92.8 million,⁴⁸ and the Linde facility \$305.4 million.⁴⁹ Millions of this went to compensate the White Mesa Mill for processing the waste and dumping the leftovers in its waste pits.⁵⁰

Almost a decade later, in 2021, the cleanup of the Seaway property remained ongoing.⁵¹ Cleanup plans for the site included capping the waste at Seaway areas A, B, and C, within the landfill, in place, and excavating waste from two more contaminated areas and disposing of it off-site.⁵² In March 2020, the Corps began a 5-year review of the Seaway site cleanup, with future cleanup efforts dependent on funding.⁵³

As of June 2021, over 300,000 tons (600 million pounds or about 21,000 large dump trucks full) of waste from Tonawanda had been shipped to the White Mesa Mill to be processed and discarded.

⁴⁸ United States Army Corps of Engineers. "Site Closeout Report for the Ashland 1 (Including Seaway Area D), Ashland 2 and Rattlesnake Creek FUSRAP Sites." p. 7. October 2006. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Ashland1/ashland-closeout-report-2006-10.pdf>. Accessed January 29, 2022.

⁴⁹ United States Army Corps of Engineers. "Site Closeout Report for the Linde FUSRAP Site, Tonawanda, New York." p. 63. February 2015. <https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Linde/linde-sitecloseout-2015-02.pdf>. Accessed January 30, 2022

⁵⁰ United States Nuclear Regulatory Commission. "In the Matter of International Uranium (USA) Corporation." pp. 9, 14. February 10, 2000. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Tonawanda/2000-02-10-NRC-Order-Tonawanda.pdf>. Accessed January 30, 2022.

⁵¹ United States Army Corps of Engineers, Formerly Utilized Sites Remedial Action Program. "Seaway Site News." pp. 2-3. April 2020. https://www.lrb.usace.army.mil/Portals/45/docs/FUSRAP/Seaway/Seaway%20Newsletter%20April%202020_Web_Version.pdf?ver=2020-04-02-083053-600. Accessed January 30, 2022.

⁵² *Ibid.*, 2.

⁵³ *Ibid.*, 1.



Ontario, Canada

Port Hope Harbor, Lake Ontario. [ROBERT TAYLOR](#)

- ▶ Cameco's Ontario uranium refinery and conversion plant are two of the largest uranium-processing facilities in the world.
- ▶ Cameco was the first company to send radioactive waste across international borders to the White Mesa Mill; this precedent was subsequently used to defend a proposal to send waste from Estonia to the mill.
- ▶ First Nations communities in Canada didn't have a real say in the construction and operation of the Cameco facilities, which were built on ancestral lands.

Cameco is one of the largest uranium companies in the world.¹ In 1998, regulators granted the White Mesa Mill's owner permission to accept radioactive waste shipped by Cameco across international borders from Ontario, Canada.² This approval set a precedent for the use of the White Mesa Mill as a de facto dumpsite for international radioactive waste, provided that the waste contained some uranium that could be extracted by the mill.



Province of Ontario, Esri Canada, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, NRCAN, Parks Canada

Cameco's Blind River Refinery, on the banks of the Mississagi River at its delta with Lake Huron, and its Port Hope Conversion Facility, on the banks of Lake Ontario in the Canadian province of Ontario, are two of the largest and most significant uranium-processing facilities in the world.³ Both facilities are located on the original territory of the Mississauga First Nation.⁴ The Blind River Refinery is sandwiched between

¹ Jamasmie, Cecilia. "World's Top Uranium Miner Cameco Swings to Loss in First Quarter." Mining.com. May 1, 2019. <https://www.mining.com/worlds-top-uranium-miner-cameco-swings-loss-first-quarter/>. Accessed January 30, 2022.

² United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process Cameco Corporation Material." p. 1. October 16, 1998. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/1998-10-16-NRC-Tech-Eval-re-Cameco.pdf>. Accessed January 29, 2022.

³ Cameco. "Business." <https://www.camecofuel.com/business>. Accessed January 30, 2022.; "Blind River Refinery." Camecofuel.com. <https://www.camecofuel.com/business/blind-river-refinery>. Accessed April 29, 2021.; "Port Hope Conversion Facility." Camecofuel.com. <https://www.camecofuel.com/business/port-hope-conversion-facility>. Accessed January 30, 2022.

⁴ "NativeLand.ca - Mississauga." Native. <https://native-land.ca/maps/territories/mississauga/>. Accessed January 30, 2022.



Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada | Geobase, Esri Canada



The Mississauga River near Blind River, Ontario. [INTERNATIONAL JOINT COMMISSION](https://www.ijc.org/)

present-day Mississauga First Nation lands and a provincial nature reserve,⁵ and the Port Hope facility sits about a half hour's drive from present-day Alderville First Nation lands.⁶ Mines across the world ship uranium ore to the Blind River Refinery to be turned into a purified product called uranium trioxide.⁷ The Port Hope Conversion Facility turns that uranium into either uranium dioxide or uranium hexafluoride—precursors to the fuel needed for nuclear reactors.⁸

The location and construction of the Blind River Refinery depended on the agreement and good will of the Mississauga First Nation. The refinery site was carved from Indigenous lands via a land exchange between the plant's original owner, Eldorado Nuclear Ltd., and the Mississauga First Nation. The Nation acquired "three parcels of land in exchange for giving up future land claims against the Eldorado site and

⁵ "Raffinerie d'uranium de Blind River." Google Maps. <https://goo.gl/maps/Yj3sq5wJKqtK1mp68>. Accessed January 30, 2022.

⁶ "Google Directions." Google Maps. <https://www.google.com/maps/dir/Alderville+First+Nation+Reserve,+Alnwick%2FHaldimand,+ON+K0K+2X0,+Canada/Cameco+Corporation,+1+Eldorado+Pl,+Port+Hope,+ON,+Canada/@44.0603535,-78.3420999,11z/data=!3m1!4m14!4m13!1m5!1m1!1s0x89d5e5f4b1f5afc3:0x24789f9f07f5321d12m2!1d-78.0851607!2d44.1728865!1m5!1m1!1s0x89d5c8025fe826bf:0x79ab4fde9f4b5a40!2m2!1d-78.2953497!2d43.943561!3e0>. Accessed January 30, 2022.

⁷ Cameco. "Blind River Refinery." <https://www.camecofuel.com/business/blind-river-refinery>. Accessed January 30, 2022.

⁸ Cameco. "Port Hope Conversion Facility." <https://www.camecofuel.com/business/port-hope-conversion-facility>. Accessed January 30, 2022.

signing a two year permit allowing Eldorado to proceed without intervention from MFN [Mississauga First Nation].⁹ Eldorado Nuclear Ltd.'s vice president wrote a letter to Mississauga's then-chief stating that "a donation of \$15,000 [in Canadian dollars] would be made to the Mississauga Band Recreational Hall Building Fund upon Eldorado receiving site approval from the Atomic Energy Control Board."¹⁰

The then-chief of the Mississauga First Nation was a booster of the plant, telling a reporter

“

*There's only one guy on the reserve who's against Eldorado [the refinery], But if he doesn't stop shooting his mouth off the way he has been, he's going to get clobbered by someone.*¹¹

That attitude may explain the results of a community survey completed in 1984 which found that "[Mississauga First Nation] Band members indicated that they did not have a true 'say' on the refinery's presence."¹² The Nation's members did not see the surge in employment the Nation had anticipated, with just eight of 17 expected positions going to nation citizens.¹³



The Cameco plant in Port Hope, Ontario. [ROBERT TAYLOR](#)



Province of Ontario, County of Huron, Esri Canada, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, NRCAN, Parks Canada

Over the years, contamination associated with the Port Hope Conversion Facility caused significant public controversy in Canada. Cameco's predecessor, Eldorado, generated large quantities of radioactive waste rock and dirt, called "tailings," left over from its uranium and radium refining operations that took place between 1933 and 1988.¹⁴ At various points, the tailings were given away for free and used by residents for building and landscaping materials.¹⁵

⁹ Denomme, Daneen. "Environmental Health Management Practices in Indigenous Communities: a Case Study with Mississauga First Nation." Thesis, 2015. p. 112. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/Thesis-environmental-health-practices-in-Indigenous-communities.pdf>. Accessed January 30, 2022.

¹⁰ Ibid.

¹¹ Vander Doelen, Chris. "Eldorado Has Raised Shrieking Voices On North Shore." Sault Star. February 10, 1981. <https://images.ourontario.ca/BlindRiver/2260839/data?n=4>. Accessed January 30, 2022.

¹² Denomme, Daneen. "Environmental Health Management Practices in Indigenous Communities: a Case Study with Mississauga First Nation." Thesis, 2015. p. 114. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/Thesis-environmental-health-practices-in-Indigenous-communities.pdf>. Accessed January 30, 2022.

¹³ Ibid.

¹⁴ Lee-Shanok, Phillip. "\$1.3B Cleanup of Port Hope Finally Underway After Decades of Massive Planning." April 1, 2018. <https://www.cbc.ca/news/canada/toronto/port-hope-radioactive-waste-cleanup-finally-underway-1.4600654>. Accessed January 30, 2022.

¹⁵ Ibid.

Between 1976 and 1981, radiological surveys identified contamination in surrounding areas and cleanup efforts began in earnest, including at over 400 homes and businesses.¹⁶ More than 100,000 tons (200 million pounds) of contaminated soil were sent to a nearby waste-disposal site and in 1982 the Canadian government established a new federal agency to find a solution and permanently dispose of the radioactive waste.¹⁷ Following that, cleanup actions appear to have been paused until the early 2000s.¹⁸



Uranium tetrafluoride powder. [CHEMOLUNATIC](#)

Meanwhile, the ongoing operations at the Blind River Refinery and the Port Hope Conversion Facility resulted in about two thousand tons (4 million pounds) of radioactive waste accumulating at the two sites by the late 1990s.¹⁹ In June 1998, the White Mesa Mill's owner applied for an amendment to its license in order to accept four separate radioactive waste products that Cameco's Blind River Refinery and Port Hope Conversion Facility had generated.²⁰ The first two waste streams, generated at Port Hope, consisted of 833 tons (1.6 million pounds) of fluoride waste with a 2.5 percent uranium concentration, and 9.9 tons of uranium tetrafluoride filter ash that was nearly 65 percent uranium content.²¹ The Blind River Refinery was the source of the third and fourth waste streams, respectively called "calcined product" and "regeneration

product."²² The calcined product was the dried remnants of the solvent used to purify uranium and represented the single largest amount of waste at 1,069 tons (2.1 million pounds).²³ The regeneration product, totaling 442 tons, took the form of a viscous waxy solid with "significant amounts of natural uranium" that resulted from the use of solvents to purify uranium.²⁴

The White Mesa Mill estimated that it could receive Cameco's existing inventory of wastes in a total of 100 truck shipments from Ontario to the White Mesa Mill, with another approximately 50 loads per year coming from Cameco after that.²⁵ The transport routes from the Blind River Refinery and the Port Hope Conversion Facility were each almost 2,000 miles on interstates and, closer to the mill, county roads.²⁶ In evaluating the impact of this truck traffic, similar to other license amendment requests, neither the White Mesa Mill owner nor the regulators comprehensively evaluated the cumulative impact of all the various waste shipments arriving at the White Mesa Mill from facilities across the country.²⁷

¹⁶ Jafir A. Jaferi, "Canadian Approach to Long-term Management of Historic Low-Level Radioactive Wastes in Port Hope, Ontario." Canadian Nuclear Safety Commission. p. 3. October 2007. https://www.oecd-nea.org/nsd/workshops/fcsafety/proceedings/documents/Session_1_Paper_6.pdf. Accessed January 30, 2022.

¹⁷ Ibid.

¹⁸ Ibid., 4.

¹⁹ International Uranium (IUC) Corporation. "Amendment Request to Process an Alternate Feed at White Mesa Uranium Mill: Source Material License SUA-1358." Table 1-1. June 4, 1998. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/1998-06-04-IUSA-Am-Req-to-Process-Cameco-Alt-Feed.pdf>. Accessed January 30, 2022.

²⁰ Ibid., 1.

²¹ Ibid., Table 1-1, Attachment 1.

²² Ibid., Table 1-1.

²³ Ibid., Table 1-1, Attachment 1.

²⁴ Ibid.

²⁵ Ibid., 3-4.

²⁶ Ibid.

²⁷ Ibid.

Meanwhile, within the mill's waste pits, the mixing of many different types of waste creates a toxic stew whose interactions appear unknown and unstudied in the public record. Years after the Cameco amendment request, the Environmental Protection Agency raised questions about the failure to examine the effects of combining wastes and mixing different types of waste with uranium and thorium by-products at uranium mills.²⁸



Estonian Environment Agency, Esri, HERE, Garmin, FAO, NOAA, USGS

In October 1998, the Nuclear Regulatory Commission granted approval for the White Mesa Mill to accept the Cameco waste streams.²⁹ This decision had ripples that are still being felt decades later. In 2020, faced with a request by the White Mesa Mill to import radioactive waste from the Baltic nation of Estonia, Utah regulators dug up Cameco's old approval to justify allowing the Estonian waste to be imported.³⁰ The Estonian waste was later shipped to the mill for processing and disposal.³¹

And so today, not only do Cameco's wastes still stew in the White Mesa Mill's waste pits, the regulatory system that allowed the Canadian waste to begin arriving in White Mesa in the late 1990s continues to pave the way for regulators to justify using the mill as a dumping ground for international toxic waste shipments from around the world. The mill has processed Cameco wastes as recently as 2017.

What has happened at Port Hope may foreshadow what the Cameco wastes have in store for the White Mesa Mill. After the initial disposal efforts ended in the 1980s, citizens continued to advocate for a more complete cleanup and for more recognition of the threats that radioactivity posed to residents.³² Yet, contamination continued to occur. In 2007, leaks of toxic and radioactive material from the Port Hope Conversion Facility contaminated soil and threatened to seep into nearby Lake Ontario.³³ The Port Hope

²⁸ Letter from Frank Marcinowski, Director, Radiation Protection Division, United States Environmental Protection Agency to Annette L. Vietti-Cook, Secretary, Rulemakings and Adjudications Staff, United States Nuclear Regulatory Commission. pp. 1-2. January 16, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Marcinowski_Vietti-Cook_Jan_16_2002.pdf. Accessed January 29, 2022.

²⁹ United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process Cameco Corporation Material." p. 1. October 16, 1998. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/1998-10-16-NRC-Tech-Eval-re-Cameco.pdf>. Accessed January 29, 2022.

³⁰ Utah Division of Waste Management and Radiation Control. "Technical Evaluation and Environmental Analysis: Silmet Alternate Feed Request." p. 20. April 2020. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cameco/2020-04-Tech-Eval-Environmental-Analysis.pdf>. Accessed January 30, 2022.

³¹ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Inspection Report." Page 3. August 4, 2022. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/InspectionReportWhiteMesaMill-07-26-2022-DRC-2022-023702.pdf>. Accessed May 11, 2023.

³² Aulakh, Raveena. "Port Hope's Nuclear Past Pits Economic Interests Against Health." Toronto Star. April 1, 2011, updated April 8, 2014. https://www.thestar.com/news/gta/2011/04/01/port_hopes_nuclear_past_pits_economic_interests_against_health.html. Accessed January 30, 2022.

³³ Austen, Ian. "Uranium Producer Warns of Lake Ontario Pollution." New York Times. May 22, 2008. <https://www.nytimes.com/2008/05/22/business/worldbusiness/22pollute.html>. Accessed January 30, 2022.

Conversion Facility shut down to address and remediate the leaks.³⁴ In 2018, the Canadian government committed to begin the largest cleanup of radioactive waste in its history at Port Hope³⁵ at an estimated cost of \$1.28 billion (in Canadian dollars) targeted for completion in 2023.³⁶ A similar fate could one day loom over the White Mesa Mill and surrounding communities.



An aerial view of the Cameco uranium-conversion plant.

Uranium Producer Warns of Lake Ontario Pollution



By Ian Austen

May 22, 2008

OTTAWA Cameco, the world's largest uranium producer, has told the Canadian nuclear regulator that its refinery might have leaked uranium, arsenic and fluorides into Lake Ontario.

The plant at Port Hope, Ontario, across the lake from Rochester and down the shore from Toronto, first refined uranium for the Manhattan Project during World War II. It has been temporarily closed since July to remove contaminated soil.

³⁴ Ibid.

³⁵ Lee-Shanok, Phillip. "\$1.3B Cleanup of Port Hope Finally Underway After Decades of Massive Planning." April 1, 2018. <https://www.cbc.ca/news/canada/toronto/port-hope-radioactive-waste-cleanup-finally-underway-1.4600654>. Accessed January 30, 2022.

³⁶ Ibid.

MALLINCKRODT CHEMICAL

St. Louis, Missouri

Adapted photo from the U.S. Library of Congress.

- ▶ Mallinckrodt produced over 200 million pounds of purified natural uranium and left dozens of contaminated sites scattered across the St. Louis metro area.
- ▶ The Missouri Department of Health found high incidences of colon, prostate, kidney, bladder, female breast, childhood brain, and childhood nervous system cancers around the sites.
- ▶ Up to 1,950,000 cubic yards of radioactive waste from St. Louis were approved for processing and final disposal at the White Mesa Mill, but ultimately were not sent there according to the available records.
- ▶ A Utah radioactive-waste-disposal company, Envirocare, protested the White Mesa Mill processing the St. Louis waste, arguing that the mill was operating as a de facto waste dump, creating an unfair economic advantage and threatening the environment.



Esri, Garmin, FAO, NOAA, EPA

Age 69 and still tough as a boot, Ken Sleight—considered by many to be the basis for the character of Seldom Seen in Edward Abbey’s “The Monkey Wrench Gang”—drew a line in the sand when it came to importing radioactive waste to his beloved canyon country. The proposal to bring radioactive waste to the White Mesa uranium mill from three sites contaminated by atomic weapons production in St. Louis, Missouri was no exception.¹

¹ Sleight, Ken. “Notice of Consideration of a License Amendment for International Uranium (USA) Corporation’s White Mesa Uranium Mill and an Opportunity for a Hearing.” Nuclear Regulatory Commission Docket No. 40-8681. June 1, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/1999_06_08_Ken_Sleight_Reg_for_Hearing.pdf. Accessed January 30, 2022.

In 1999, Nuclear Regulatory Commission officials were evaluating a proposal to allow the mill to accept radioactive waste from St. Louis; Ken Sleight, who had guided and outfitted wilderness trips in the region professionally since 1955, wrote to them, requesting to be allowed to participate in the decision-making process:²

“

I have lived in southern Utah most of my life and have directly experienced downwind radioactive fallout from the nuclear bomb testing in Nevada...I and my passengers have occasionally camped near or on old uranium mines tailings during river travel on the Green, Colorado, and San Juan Rivers, unknowing of the dangers. We have drunk from the rivers and wallowed about in the sands of the Green, Colorado, and San Juan Rivers for years unknowing to us that the rivers were heavily contaminated with radionuclides and other chemicals...While at my residence, office, and bookstore in Moab, I was for years exposed to the wind-swept clouds of dust radiating from the Atlas uranium mill tailings at Moab...

*These cumulative amounts of radiation must be taken into account, for my own and others concerns, before adding yet another source of radiation in the form of radioactive material brought in from the St. Louis area.*³ – Ken Sleight

Sleight’s concerns were grounded in hard truths about the toxicity of the St. Louis waste that was to be shipped to the White Mesa Mill. In the 1940s, only a few years after the first uranium fission reaction and the start of World War II, the St. Louis-based Mallinckrodt Chemical Company became the first industrial-scale producer of purified uranium and uranium metal in the United States.⁴ After World War II ended, Mallinckrodt continued operations as the Cold War arms race spurred a uranium mining and production boom.⁵ Much of the uranium that fed this boom was sourced on the Navajo Nation, at great cost to Navajo miners, the Navajo people, and the land itself.⁶

“

*Traditionally, culturally, uranium was something we knew we didn’t want to take out of the ground. When WWII happened the United States, to support their Manhattan Project, needed uranium which ultimately developed the first nuclear bomb. We have a lot of uranium ore here, so naturally, they came here.*⁷ – Oliver Whaley, Executive Director, Navajo Nation Environmental Protection Agency

² Ibid., 1.

³ Ibid., 2.

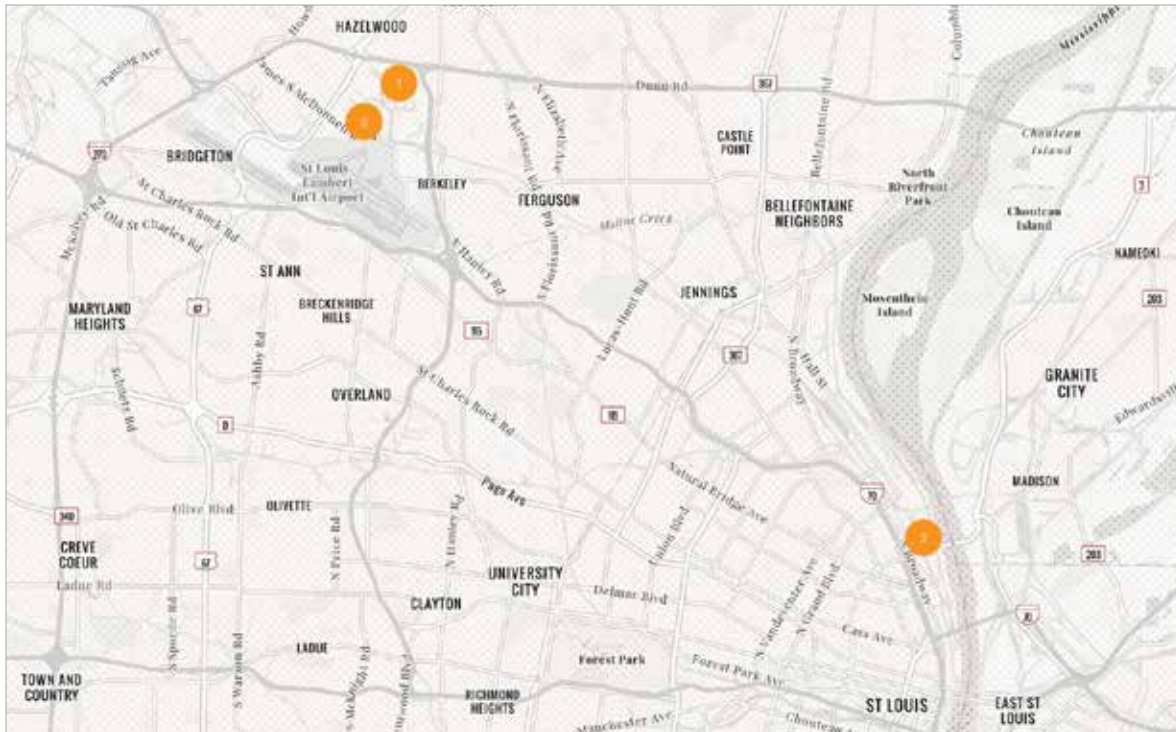
⁴ St. Louis Remediation Task Force. “St. Louis Site Remediation Task Force Report.” September 1996. Appendix C pp. ES-4, II-1. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 29, 2022.

⁵ Ibid., 12, see: “Increased Uranium Production - The Cold War” in “The History of the St. Louis Uranium Processing Plant Radioactive Waste Sites.”

⁶ Krisst, Rima. “A toxic legacy: NNEPA director confirmed, \$220 million cleanup contracts awarded.” Navajo Times. February 18, 2021. <https://navajotimes.com/reznews/a-toxic-legacy-nnepa-director-confirmed-220-million-cleanup-contracts-awarded/>. Accessed January 30, 2022. (“From 1944 to 1986, nearly 30 million tons of uranium ore were extracted from Navajo lands under leases with the Nation for use in supplying the atomic power and weapons arsenal of the U.S. military through the Cold War era.”)

⁷ Scott, Caylee. “For me it’s a matter of time: Navajo Nation residents share dangers, consequences of uranium mines in the area.” 12 News. March 6, 2020.

<https://www.12news.com/article/news/local/arizona/uranium-mines-on-navajo-nation-are-polluting-the-water/75-04f1ef1d-35f5-4988-b11e-19e42ba69e94>. Accessed January 30, 2021.



County of St. Louis, Metro East Park and Rec District, Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

By the time its operations in St. Louis ended in 1957, Mallinckrodt had produced over 100,000 tons (200 million pounds) of purified natural uranium and left a legacy of radioactive contamination that still haunts St. Louis today.⁸ While there are dozens of contaminated sites scattered across the St. Louis metro area, the White Mesa Mill's owner sought permission to dispose of waste from three sites in particular: the Latty Avenue Site, the St. Louis Airport Site, and the St. Louis Downtown Site.

The Latty Avenue Site and the St. Louis Airport Site, located in Hazelwood and Berkeley, Missouri, were used to store toxic and radioactive waste generated by Mallinckrodt.⁹ The St. Louis Downtown Site, in St. Louis proper, housed Mallinckrodt's uranium-processing plants.¹⁰ At the Latty Avenue Site alone, the following were stored: 74,000 tons (148 million pounds) of liquid waste resulting from extraction of uranium from rich ore from the Belgian Congo that still contained approximately 113 tons of uranium; 32,500 tons (65 million pounds) of liquid waste resulting from extraction of uranium from Colorado ore that still contained roughly 48 tons of uranium; and 8,700 tons (17.4 million pounds) of leached barium sulfate containing about seven tons of uranium; and tons of contaminated scrap.¹¹

At the St. Louis Airport Site, the contaminated residues and materials were strewn on open ground, stacked in drums, and buried on the property,¹² including next to Coldwater Creek, which runs adjacent

⁸ St. Louis Remediation Task Force. "St. Louis Remediation Task Force Report." Appendix C. pp. 2, 12. September 1996. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 29, 2022.

⁹ Ibid., II-5, ES-4.

¹⁰ United States Army Corps of Engineers, Formerly Utilized Sites Remedial Action Program. "St. Louis District: St. Louis Downtown Site." <https://www.mvs.usace.army.mil/Missions/FUSRAP/SLDS/>. Accessed January 30, 2022.

¹¹ "St. Louis District: Latty Avenue Properties, Site History." United States Army Corps of Engineers Formerly Utilized Sites Remedial Action Program. <https://www.mvs.usace.army.mil/Missions/FUSRAP/HISS/>. Accessed January 30, 2022; St. Louis Remediation Task Force. "St. Louis Remediation Task Force Report." Appendix C. p. 21. September 1996. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 29, 2022; Johnson, Lacy. "The Fallout." In *The Reckonings: Essays on Justice for the 21st Century*, 160-161. New York, Scribner. 2018.

¹² "St. Louis District: St. Louis Airport Site, Site History." United States Army Corps of Engineers Formerly Utilized Sites Remedial Action Program. <https://www.mvs.usace.army.mil/Missions/FUSRAP/SLAPS/>. Accessed January 30, 2022.



Mallinckrodt Chemical Works. U.S. LIBRARY OF CONGRESS



Stacked drums at the St. Louis Airport Site. U.S. ARMY CORPS OF ENGINEERS

to the St. Louis Airport Site, through North St. Louis County, and is a tributary to the Missouri River.¹³ The storage of these wastes on-site for years contaminated the properties and surrounding neighborhoods with uranium, thorium, radium, and other contaminants that lingered in soil, water, and in debris from contaminated structures that had been demolished.¹⁴

When the United States Department of Health and Human Services conducted a public health assessment of the Coldwater Creek area,¹⁵ it concluded, “Children and adults who regularly played in or around Coldwater Creek or lived in its floodplain for many years in the past (1960s to 1990s) may have been exposed to radiological contaminants.... this exposure could increase the risk of developing lung cancer, bone cancer, or leukemia.”¹⁶

In a review of the cancer incidence data from eight ZIP codes adjacent to Coldwater Creek, the Missouri Department of Health found that the incidence of several types of cancer, including colon, prostate, kidney, bladder, female breast, childhood brain, and childhood nervous system cancer was statistically significantly elevated compared to the Missouri state rates.¹⁷

The cleanup of these toxic sites sent regulators and industry scrambling for suitable disposal sites. Whether the White Mesa Mill qualified was a subject of heated debate.

¹³ St. Louis Remediation Task Force. “St. Louis Remediation Task Force Report.” p. II-8. September 1996. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 29, 2022.

¹⁴ United States Army Corps of Engineers, St. Louis District Office, Formerly Utilized Sites Remedial Action Program. “Record of Decision for the North St. Louis County Sites.” pp. 2-4, 2-22, 2-23, 2-24, 2-25. September 2, 2005. https://www.mvs.usace.army.mil/Portals/54/docs/fusrap/docs/Final_ROD_linked.pdf. Accessed January 30, 2022; St. Louis Remediation Task Force. “St. Louis Remediation Task Force Report.” pp. ES-1, II-8. September 1996. <http://large.stanford.edu/courses/2016/ph241/wolk2/docs/price.pdf>. Accessed January 29, 2022.

¹⁵ United States Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. “Public Health Assessment for Evaluation of Community Exposures Related to Coldwater Creek, St. Louis Airport/Hazelwood Interim Storage Site (Hiss)/Futura Coatings NPL Site North St. Louis County, Missouri EPA Facility ID: Mod980633176.” Agency for Toxic Substances and Disease Registry. April 30, 2019. https://www.atsdr.cdc.gov/HAC/pha/coldWaterCreek/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508.pdf. Accessed January 29, 2022.

¹⁶ *Ibid.*, 46.

¹⁷ *Ibid.*, 7.



*We need to know the rationale in opening a nuclear waste dump in such a spectacular region of our Nation. This canyon country, a very unique and special place, qualifies as a World Heritage Site based on its natural and cultural heritage. Many business firms, dependent on the naturalness and beauty of the region and the tourist trade, would be adversely affected...It would destroy the very thing the outfitters' customers are coming to see and experience. This is our capital resource. For an effective and viable business, I am dependent on the preservation of a clean, beautiful, and untarnished environment.*¹⁸ – Ken Sleight

Sleight wasn't the only one calling foul. Envirocare of Utah (which later became EnergySolutions) also challenged the White Mesa Mill owner's attempt to import the St. Louis waste.¹⁹ Located in Clive, Utah, Envirocare was the first private facility other than a uranium mill in the United States to be licensed by the Nuclear Regulatory Commission to dispose of radioactive waste generated at sites that processed ore to extract uranium or thorium.²⁰

Envirocare's issues arose from the fact that the Nuclear Regulatory Commission was allowing the White Mesa Mill to process the same type of by-product material that Envirocare was licensed to dispose of.²¹ Envirocare protested, arguing that the mill was operating as a de facto waste dump, creating an unfair economic and competitive advantage for IUSA, the company that owned the mill, and threatening the environment.²²



*Although IUSA has certified under oath that the St. Louis material is to be processed primarily for the recovery of uranium, other facts strongly suggest that disposal and not the recovery of uranium is the primary purpose behind IUSA's license amendment request. Indeed the facts demonstrate that the payment IUSA will receive to accept the St. Louis material greatly exceeds the small value of uranium contained within the material.*²³

¹⁸ Sleight, Ken. "Notice of Consideration of a License Amendment for International Uranium (USA) Corporation's White Mesa Uranium Mill and an Opportunity for a Hearing." Nuclear Regulatory Commission Docket No. 40-8681. p. 3. June 1, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/1999_06_08_Ken_Sleight_Req_for_Hearing.pdf. Accessed January 30, 2022.

¹⁹ Envirocare of Utah Inc. "Request for a Hearing In the Matter of International Uranium (USA) Corporation's Amendment to NRC Source Material License SUA-1358." Nuclear Regulatory Commission Docket No. 40-8681. April 26, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/1999_04_26_Envirocare_Request_for_Hearing_re_St_Louis_FUSRAP.pdf. Accessed January 30, 2022.

²⁰ Ibid., 4.

²¹ Ibid.

²² Ibid., 7. (IUSA is attempting to do exactly what NRC's guidance is intended to avoid—"processing [of waste] at a uranium mill primarily to be able to dispose of it in the tailings pile as 11e.(2) byproduct material.")

²³ Ibid., 6-7.

Envirocare further claimed:

“

The criteria set forth [by the Nuclear Regulatory Commission for low-level radioactive waste disposal sites] ...are designed to protect the public against the health and safety dangers posed by byproduct material. If the NRC does not hold IUSA to the same strict standards, there is a risk that IUSA's operation of the White Mesa facility might result in harm to the public health and safety.²⁴



Cleanup at the St. Louis Airport Site. U.S. ARMY CORPS OF ENGINEERS

Despite the combined efforts of Sleight and Envirocare to participate in the decision-making regarding the St. Louis waste, the Nuclear Regulatory Commission refused to consider the substance of their arguments, keeping them out because the commission did not think they would be harmed by the St. Louis waste.²⁵

²⁴ Ibid., 11.

²⁵ United States of America Nuclear Regulatory Commission. "Memorandum and Order (Dismissal of Ken Sleight) In the matter of International Uranium (USA) Corporation." Docket No. 40-8681-MLA-7, ASLBP No. 99-766-06-MLA. June 25, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/1999_06_25_Order_Dismissing_Ken_Sleight_Req_for_Hearing.pdf. Accessed January 30, 2022; United States of America Nuclear Regulatory Commission. "Memorandum and Order (Dismissal of Envirocare) in the Matter of International Uranium (USA) Corporation." Docket No. 40-8681-MLA-7, ASLBP No. 99-766-06-MLA. May 21, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/1999_05_21_Order_Dismissing_Envirocare.pdf. Accessed January 30, 2022.

According to the judge:

“

*In particular, since the disposal of tailings is already authorized under an existing license, the question of possible injury to Mr. Sleight is whether he will be injured because the tailings from the milling authorized by this amendment will be more hazardous than tailings already authorized under the license.*²⁶

The Nuclear Regulatory Commission approved the amendment to allow anywhere between 656,000 and 1,950,000 cubic yards of radioactive waste to be transported from St. Louis for processing and final disposal at the White Mesa Mill, but, from the public record, it appears the waste was never shipped to the mill.²⁷



Cleanup at the St. Louis Airport Site. U.S. ARMY CORPS OF ENGINEERS

²⁶ United States of America Nuclear Regulatory Commission. “Memorandum and Order (Dismissal of Ken Sleight) In the matter of International Uranium (USA) Corporation.” Docket No. 40-8681-MLA-7, ASLBP No. 99-766-06-MLA. p. 2. June 25, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/1999_06_25_Order_Dismissing_Ken_Sleight_Req_for_Hearing.pdf. Accessed January 30, 2022.

²⁷ Utah Department of Environmental Quality, Division of Radiation Control. “Radioactive Materials License UT 1900479 Amendment 7. License Condition 10.13.” p. 10. July 10, 2014. (“The licensee is authorized to receive and process source material from the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) site, in accordance with the statements, representations, and commitments contained in the amendment request to the NRC dated March 2, 1999, and as amended and supplemented by submittals dated June 21, 1999, June 29, 1999 (2), and July 8, 1999...”). <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2014-07-10-RML-UT-1900479-Am7.pdf>. Accessed January 30, 2022; United States Nuclear Regulatory Commission. “Technical Evaluation Report: Request to Receive and Process St. Louis FUSRAP Site Material.” p. 1. July 28, 1999. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/Technical_eval_report_request_to_process_St_Louis_FUSRAP_material.pdf. Accessed January 29, 2022.; Denison Mines (USA) Corp. “White Mesa Uranium Mill License Renewal Application, State of Utah Radioactive Materials License No. UT1900479, Vol. 1.” p. 28. February 28, 2007. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/StLouis/02-28-07-RML-WMM-Denison.pdf>. Accessed January 30, 2022.



- ▶ The site has a history of self-reported contamination of waterways.
- ▶ In 1999, low-level radioactive waste from the site was shipped to a radioactive-waste dump. But in 2000, waste from the site was pronounced “ore” and approved for shipment to the White Mesa uranium mill instead.
- ▶ The material approved for shipment to the mill had very high thorium content, necessitating extraordinary measures for handling. The high thorium content of this waste stream has been used subsequently as a justification to accept other waste streams with high thorium content.
- ▶ Even after remediation, “there is a potential for significant residual contamination” at the W.R. Grace Chattanooga site.

Along the Tennessee River near where Georgia, Alabama, and Tennessee meet at the river’s confluence with South Chickamauga Creek, behind a chain-link fence, lies the W.R. Grace Chattanooga site.¹ In 2020, this industrial campus produced chemical catalysts that helped convert crude oil into gasoline, diesel, and other fuels,² but the giant smiley face beaming out from the side of the plant’s tallest building belies an ominous history stretching back to the Cold War.

Beginning in 1957, the site discharged 50,000 to 100,000 gallons per day of liquid radioactive waste into South Chickamauga Creek,³ which then flowed into the Tennessee River three and a half miles upstream from the city of Chattanooga’s drinking-water intake.

¹ United States Geological Survey, Texas Water Science Center. “USGS - Streamer.” <https://txpub.usgs.gov/DSS/streamer/web/>. Accessed January 30, 2022.

² “Grace in Chattanooga, Tennessee.” Grace.com. <https://grace.com/about-grace/locations/chattanooga/>. Accessed January 26, 2022.

³ Letter from Paul Kruesi, Heavy Minerals, Co., to Director, Division of Civilian Applications, AEC. “Heavy Minerals Co. Letter Concerning Requirements of Amendment to Title 10, Code of Federal Regulations, Part 20 Paragraph 20.403(C).” DOE Office of Legacy Management. p. 3. September 6, 1957. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/Vitro_Corp_of_America_-_TN_04TN_04-4.pdf. Accessed January 30, 2022.



Monazite crystal. [ROBERT M. LAVINSKY](#)

The waste was the by-product of an operation by a consortium of four companies that produced uranium and thorium metal, thorium fluoride, and thorium oxide from radioactive monazite sands, under contract for the Atomic Energy Commission.

After World War II, the U.S. government had transferred control of nuclear science and technology from military to civilian hands. In the early 1960s, the agency leading the charge, the Atomic Energy Commission, launched a research program to study producing nuclear energy from thorium⁴ due to concerns that the world would eventually run out of uranium. The research program ran experiments in nuclear weapons reactors in three states, including at Tennessee's Oak Ridge National Laboratory⁵ on the Clinch River, a major tributary of the Tennessee River 33 river miles upstream for the Chattanooga site.⁶

Thorium, a silvery-white radioactive metal named after Thor, the Norse god of thunder, and three times more abundant than uranium, was a tantalizing prospect as an energy source. But exposure to thorium has also been shown to increase risk of disease and cancer, particularly when thorium dust is inhaled, which can lead to lung and pancreatic cancers. Thorium is stored in bone, and those inhaling thorium dust may also have an increased risk of bone cancer.^{7,8}

After less than a year of thorium production, the plant operators at what would later become the W.R. Grace Chattanooga site realized that their "waste discharge exceed[ed] permissible levels." They notified the Atomic Energy Commission and installed a new large settling pond designed to store liquids and allow solid materials suspended in them to sink down to the bottom, thereby limiting solid waste discharge into the creek.⁹ These ponds would become the source of the radioactive waste shipped to the White Mesa Mill decades later.

Uranium was also a by-product of production, and along with thorium and other waste materials, it was dumped in six sites, including four ponds and a sand-blast area¹⁰ where equipment was cleaned using high-pressure sand near South Chickamauga Creek.

⁴ Alvarez, Robert. "Thorium: the Wonder Fuel That Wasn't." *Bulletin of the Atomic Scientists*. May 11, 2014. <https://thebulletin.org/2014/05/thorium-the-wonder-fuel-that-wasnt/>. Accessed January 30, 2022.

⁵ Paone, James. "Thorium." *Minerals Yearbook Metals and Minerals (except Fuels) 1957.* Year 1957, Volume I, ed. Charles Merrill (Washington, D.C.: Bureau of Mines, 1958). p. 1149. <http://images.library.wisc.edu/EcoNatRes/EFacs2/MineralsYearBk/MinYB1957v1/reference/econatres.minyb1957v1.jpaoone.pdf>. Accessed January 30, 2022.

⁶ United States Geological Survey, Texas Water Science Center. "USGS - Streamer." <https://txpub.usgs.gov/DSS/streamer/web/>. Accessed January 30, 2022.

⁷ "Public Health Statement for Thorium." Agency for Toxic Substances and Disease Registry. October 1990. <https://www.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=121>. Accessed January 30, 2022.

⁸ "Radionuclide Basics: Thorium." United States Environmental Protection Agency. May 29, 2019. <https://www.epa.gov/radiation/radionuclide-basics-thorium>. Accessed January 30, 2022.

⁹ Letter from Paul Kruesi, Heavy Minerals, Co., to Director, Division of Civilian Applications, AEC. "Heavy Minerals Co. Letter Concerning Requirements of Amendment to Title 10, Code of Federal Regulations, Part 20 Paragraph 20.403(C)." DOE Office of Legacy Management. September 6, 1957. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/Vitro_Corp_of_America_-_TN_04TN_04-4.pdf. Accessed January 30, 2022.

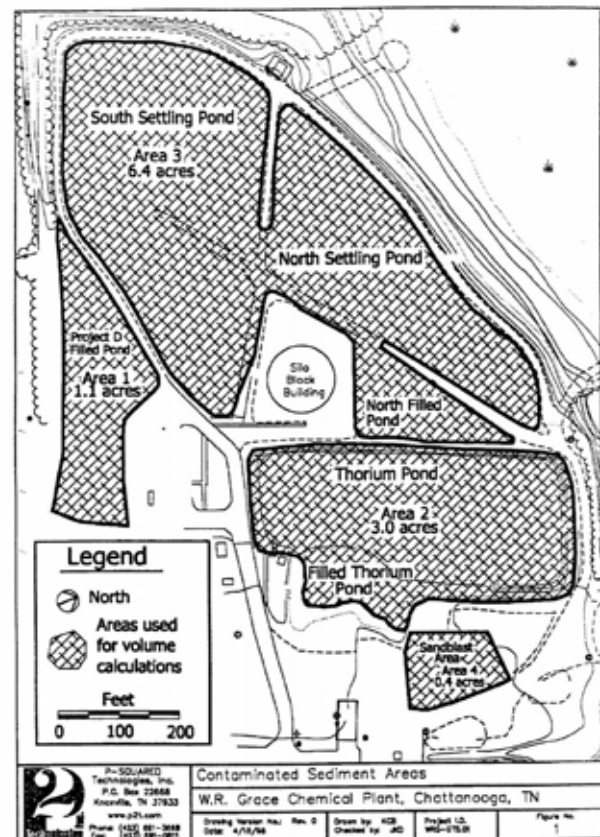
¹⁰ Letter from Rehmann, Michelle, International Uranium (USA) Corporation, to Mr. Thomas H. Essig, Branch Chief, United States Nuclear Regulatory Commission. "Amendment Request to Process an Alternate Feed Material from W.R. Grace at the White Mesa Uranium Mill Source Material License SUA-1358." Nuclear Regulatory Commission. p. 1. April 12, 2000. <https://www.nrc.gov/docs/ML0037/ML003702665.pdf>. Accessed January 29, 2022.

International chemical and materials company W.R. Grace bought the facility in 1965, and thorium extraction continued until 1983,¹¹ though the thorium produced appears not to have been used in government weapons or reactor research after 1968.¹² The last working thorium molten salt research reactor shut down in 1969.¹³

In 1968, the state of Tennessee took over regulating the facility—variously known as Heavy Minerals Company, Vitro Chemical (a subsidiary of Vitro Corporation), Vitro Corp. of America (Tennessee), and the W.R. Grace Chattanooga site—from the U.S. Department of Energy.¹⁴

Because the site was contaminated and had produced radioactive components for the Atomic Energy Commission, the Department of Energy considered it for cleanup under the Formerly Utilized Sites Remedial Action Program (FUSRAP), which cleans up sites that were contaminated by early atomic weapons and energy programs and that meet certain conditions.¹⁵ After the Department of Energy studied records associated with the facility, the Chattanooga site was eliminated from further consideration for remediation on a technicality. Because the facility was licensed by the Atomic Energy Commission to handle nuclear materials prior to 1959 and under license from the state of Tennessee continuously, the Department of Energy made a final determination in 1995 that it did not have the authority to clean up the site, leaving cleanup responsibility to the state of Tennessee.^{16,17}

Waste from another site that would become a FUSRAP site did end up at the Chattanooga site, however, after a W.R. Grace subsidiary called Davidson Chemical acquired a rare earth metals and thorium processing facility in Wayne, New Jersey in 1956. That facility, like the Chattanooga site, produced thorium and rare earth metals from monazite sands, and it shipped “residues” to Chattanooga from 1967 to 1971.¹⁸



W.R. Grace & Co., Chattanooga contaminated areas.

¹¹ Ibid., 1.

¹² Howard, John. “Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities, Appendix A-2, Residual Radioactivity Evaluations for Individual Facilities.” p. 215. 2011. <https://www.cdc.gov/niosh/ocas/pdfs/tbd/rescon/appx-a2-030111.pdf>. Accessed January 30, 2022.

¹³ Mosher, Dave. “A Forgotten War Technology Could Safely Power Earth for Millions of Years. Here’s Why We Aren’t Using It.” Business Insider. February 25, 2017. <https://www.businessinsider.com/thorium-molten-salt-reactors-sorensen-lftr-2017-2>. Accessed January 30, 2022.

¹⁴ Howard, John. “Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities, Appendix A-2, Residual Radioactivity Evaluations for Individual Facilities.” p. 215. 2011. <https://www.cdc.gov/niosh/ocas/pdfs/tbd/rescon/appx-a2-030111.pdf>. Accessed January 30, 2022.

¹⁵ “Considered Sites Overview.” Department of Energy Office of Legacy Management. <https://www.energy.gov/lm/sites/lm-sites/considered-sites>. Accessed January 30, 2022.

¹⁶ Mackenzie, D. “Elimination of Vitro Chemical Co. from the FUSRAP Program (Memorandum).” United States Department of Energy, Office of Legacy Management. June 28, 1990. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/06-28-90-memo-elimination-vitro-FUSRAP.pdf>. Accessed January 30, 2022.

¹⁷ Letter from Waggoner, James to Mayor Gene Roberts. “DOE Letter; Information on the [Vitro] Chemical Company Site.” United States Department of Energy, Office of Legacy Management. January 13, 1995. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/01-13-95-DOE-Letter-Mayor-Roberts.pdf>. Accessed January 30, 2022.

¹⁸ United States Department of Energy. “Radiological Survey of the W. R. Grace Property, Wayne, New Jersey, Final Report.” p. 10. January 1983. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/Radiological-Survey-WRGrace-Wayne-NJ.pdf>. Accessed January 30, 2022.

Under the authority of the state of Tennessee, remediation and cleanup of the six sites on the W.R Grace Chattanooga property began in 1999. A portion of the waste was shipped as low-level radioactive waste to Envirocare of Utah (renamed EnergySolutions), a low-level radioactive waste disposal facility about 75 miles outside Salt Lake City, Utah.

In December 1999, Envirocare's Radioactive Waste Profile Record documented that 2.5 million cubic feet (about 92,600 cubic yards or enough material to fill more than 6,600 dump trucks) of low-level radioactive waste from the W.R Grace Chattanooga site was accepted for disposal.¹⁹ Envirocare's records also detailed that in addition to low-level radioactive waste, the material contained cadmium, mercury, arsenic, chromium, barium, and lead.²⁰

That might have been the end of the road for this radioactive waste, the legacy of an ultimately fruitless search for a viable thorium reactor, if not for an unexpected turn.



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

For unknown reasons, but perhaps as a cost-cutting measure, W.R Grace approached the owner of the White Mesa uranium mill about disposing of the waste there instead. The mill's owner applied for and received a license amendment from the Nuclear Regulatory Commission to receive 3.78 million cubic feet (140,000 cubic yards or enough material to fill about 10,000 dump trucks) of waste from the W.R. Grace Chattanooga site in December 2000.²¹

According to the license amendment: "the primary radioactive contaminants in the [W.R. Grace Chattanooga site] soils are Uranium-238 (U-238), Radium-226 (Ra-226), Radium-228 (Ra-228), Thorium-230 (Th-230), Thorium 232 (Th-232), Potassium-40 (K-40) and their respective decay products."²²

¹⁹ Letter from Rehmann, Michelle R., International Uranium (USA) Corporation, to Mr. Thomas H. Essig, Branch Chief, United States Nuclear Regulatory Commission. "Amendment Request to Process an Alternate Feed Material from W.R. Grace at the White Mesa Uranium Mill Source Material License SUA-1358." p. 22. April 12, 2000. <https://www.nrc.gov/docs/ML0037/ML003702665.pdf>. Accessed January 29, 2022.

²⁰ Ibid., 23.

²¹ Letter from Philip Ting, United States Nuclear Regulatory Commission, to Michelle Rehmann, International Uranium (USA) Corporation. "Amendment 17 To Materials License Sua-1358 -- Approval to Receive And Process Alternate Feed Material from the W.R. Grace Site at the White Mesa Uranium Mill." p. 15. December 27, 2000. <https://www.nrc.gov/docs/ML0118/ML011800084.pdf>. Accessed January 29, 2022.

²² Ibid., 15.

The White Mesa Mill is not licensed as a low-level radioactive-waste disposal facility, but it is licensed to process “ore” primarily to extract uranium. So, after the first batch of material classified as “low-level radioactive waste” went to Envirocare, in a feat of regulatory alchemy, the waste material that W.R. Grace and the state of Tennessee needed to get rid of was determined to be “ore,” when moments before it had been radioactive manufacturing waste.²³



Horses grazing in White Mesa with the uranium mill in the background. BLAKE MCCORD

The plan was to load the waste into shipping containers, place them on rail cars at the W.R. Grace facility in Tennessee, and ship them by train to Utah where 20-25 trucks per day for 12-18 months were estimated to be necessary to transport the waste to the White Mesa Mill.²⁴ In exchange, the owner of the White Mesa Mill would receive a “recycling fee” of some unknown amount to dispose of the W.R. Grace waste in its own waste pits after extracting the uranium.²⁵

Back in Chattanooga, despite the cleanup, “...potential for significant residual contamination” remained at the W.R. Grace site as of June 2020.²⁶

Because the Chattanooga site produced thorium products, the waste stream contained high levels of thorium. To deal with the waste’s high thorium content, White Mesa Mill staff planned to implement special procedures “to potentially contain levels of thorium...over and above those required for conventional ores or other alternate feed materials.” These included limiting the size of the stockpile on-site, continuous air sampling, extraordinary measures for dust suppression, and rotating employees from area to area to reduce potential exposure to thorium.²⁷

²³ Ibid., 15, 18.

²⁴ Ibid., 16.

²⁵ Letter from Rehmann, Michelle R., International Uranium (USA) Corporation to Mr. Thomas H. Essig, Branch Chief, United States Nuclear Regulatory Commission. “Amendment Request to Process an Alternate Feed Material from W.R. Grace at the White Mesa Uranium Mill Source Material License SUA-1358.” p. 15. April 12, 2000. <https://www.nrc.gov/docs/ML0037/ML003702665.pdf>. Accessed January 29, 2022.

²⁶ Howard, John. “Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities, Appendix A-2, Residual Radioactivity Evaluations for Individual Facilities.” p. 215. 2011. <https://www.cdc.gov/niosh/ocas/pdfs/tbd/rescon/appx-a2-030111.pdf>. Accessed January 30, 2022.

²⁷ Letter from Michelle R. Rehmann, International Uranium (USA) Corporation, to Philip Ting, United States Nuclear Regulatory Commission. “Re: Supplemental Information Regarding April 12, 2000 Amendment Request to Process an Alternate Feed Material from W.R.. Grace at the White Mesa Uranium Mill Source Material License SUA-1358.” Attachment 1: International Uranium (USA) Corporation Standard Operating Procedures: High Thorium Content Ore Management. pp. 1-8. December 18, 2000. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/2013-10-21-EFR_Ltr_Resp_to_URS_Questions_and_Clarification_Req-DRC-2013-003468.pdf. Accessed January 30, 2022.

Though the public record indicates that the W.R. Grace material was ultimately not sent to the mill, the licensure of this high-thorium waste was later used to justify accepting other thorium-bearing material like the Sequoyah Fuels waste.²⁸

The W.R. Grace Chattanooga site is one of several Cold War thorium-production facilities owned by companies whose waste products would eventually win approval to find their way to the White Mesa uranium mill on the doorstep of Bears Ears National Monument for processing and disposal. The others include Maywood Chemical Works of Maywood, New Jersey, and Mallinckrodt Chemical Works of St. Louis, Missouri.²⁹

In 2020, the White Mesa Mill's owner inked a deal with a company in Georgia to process uranium and thorium-laden monazite sands, similar to those processed at W.R. Grace Chattanooga, to produce a mixed rare earth element carbonate.³⁰ The state of Utah did not require any additional licensing or public input to re-tool the mill and expand it from a uranium mill into a rare earth processor. As the government sees it, if the monazite sands contain uranium, the mill can extract it under its existing license; the rare earth carbonate is considered a bonus, even if it is the only reason for processing the monazite sands in the first place.³¹

In February 2021, the mill's owner announced it had signed an agreement to ship the completed rare earth carbonate to the NPM Silmet OÜ facility in Sillamäe, Estonia for further refinement,³² the same facility that the mill had sought to accept 660 tons of radioactive waste (left over from processing rare earth metals) from in 2019,³³ and that, by July 2022, had shipped over 1.4 million pounds of waste to the mill.³⁴ Meanwhile whatever thorium and other toxic materials remain after the mill processes the monazite sands will be buried in the White Mesa Mill's waste pits.

²⁸ Letter from Jo Ann Tischler, Energy Fuels Resources (USA) Inc., to Rusty Lundberg, Utah Division of Radiation Control. "White Mesa Uranium Mill - RML UT1900479 December 15, 2011 Request to Amend Radioactive Materials License to Allow Processing of Alternate Feed Materials from Sequoyah Fuels Corporation Response to URS Inc. September 19, 2013 Questions and Clarification Request." Lakewood, CO: Energy Fuels Resources (USA) Inc. p. 2, Table 1. October 21, 2013. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/2013-10-21-EFR_Ltr_Resp_to_URS_Questions_and_Clarification_Req-DRC-2013-003468.pdf. Accessed January 30, 2022

²⁹ Paone, James. "Thorium." "Minerals Yearbook Metals and Minerals (except Fuels) 1957." Year 1957, Volume I, ed. Charles Merrill (Washington, D.C.: Bureau of Mines, 1958). p. 1145-1149. <http://images.library.wisc.edu/EcoNatRes/EFacs2/MineralsYearBk/MinYB1957v1/reference/econatres.minyb1957v1.jpaoone.pdf>. Accessed January 30, 2022.

³⁰ Energy Fuels (USA), Inc. "Energy Fuels Set to Enter Commercial Rare Earth Business in Q1-2021, Producing Materials That Make Many Clean Energy and Advanced Technologies Possible; Webcast on Dec. 15." December 14, 2020. <https://www.energyfuels.com/2020-12-14-Energy-Fuels-Set-to-Enter-Commercial-Rare-Earth-Business-in-Q1-2021-Producing-Materials-That-Make-Many-Clean-Energy-and-Advanced-Technologies-Possible-Webcast-on-Dec-15>. Accessed January 30, 2022.

³¹ Letter from Ty L. Howard, Division of Waste Management and Radiation Control, to David Frydenlund, Chief Financial Officer, General Counsel, and Corporate Secretary, Energy Fuels Resources (USA) Inc.. "Accepting and Processing Uranium Ore from the Chemours Company at the White Mesa Mill Radioactive Material License Number UT 1900479." Utah Division of Waste Management and Radiation Control. September 11, 2020. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WRGRACE/2020-09-11-Ltr-DWMRC-re-Rare-Earth-Processing.pdf>. Accessed January 30, 2022

³² Harmantas, Angela. "Energy Fuels signs deal with Neo Performance Materials to launch rare earths production program in US and Europe." March 2, 2021. <https://www.proactiveinvestors.com/companies/news/942765/energy-fuels-signs-deal-with-neo-performance-materials-to-launch-rare-earths-production-program-in-us-and-europe-942765.html>. Accessed January 30, 2022.

³³ Energy Fuels Resources, Inc. "Request to Amend Radioactive Materials License Energy Fuels Resources (Usa) Inc. White Mesa Uranium Mill San Juan County, Utah and Environmental Report for Processing of Alternate Feed Material from NPM Silmet OU." p.1. April 18, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-003761.pdf>. Accessed January 30, 2022.

³⁴ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Inspection Report." Page 3. August 4, 2022. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/InspectionReportWhiteMesaMill-07-26-2022-DRC-2022-023702.pdf>. Accessed May 11, 2023.



HERITAGE MINERALS

Lakehurst, New Jersey

- ▶ Radioactive wastes that were removed from New Jersey's Pine Barrens to make that area safer, partly in the hope of building a sprawling housing development, have now been buried next to the community of White Mesa.
- ▶ By 2005, over 4,200 tons (8.4 million pounds) of waste from the Heritage Minerals site had been sent to the White Mesa Mill.
- ▶ The original application analyzed the impact of 3,000 tons (6 million pounds) of waste; it did not consider the risks of bringing an additional 1,200 tons (2.4 million pounds) of radioactive materials to the mill.

The legacy left behind by Heritage Minerals Inc.'s mining operations outside of Lakehurst, New Jersey is marked by tragedy. Unraveling this decades-long story reveals drownings, a hotly contested real estate development in the New Jersey suburbs, and the shipment of over 4,200 tons of uranium and thorium-laden radioactive materials to the White Mesa Mill.

For decades, plans to build a mammoth housing development have been thwarted by New Jersey regulators and residents who question the wisdom of building a new neighborhood in and around the radioactive remains of Heritage Minerals' 7,000-acre sand-mining and processing complex. And yet, thanks to the White Mesa Mill's alternate-feed business, some of the radioactive wastes have been hauled off to make that area safer. Those wastes are now buried next to the community of White Mesa.

The story begins in 1973, not far from the shores of the Atlantic Ocean near Lakehurst, New Jersey, where, for almost a decade, ASARCO, Inc. dredged and processed over 12 million cubic yards of sands to recover the titanium mineral ilmenite.¹ Ilmenite, the main ore in titanium, is used to create titanium dioxide, which serves as a pigment or whitening agent in paint.² Ilmenite grains accumulate as heavy metal sands that are characterized by a distinct black color.³ Processing the ilmenite involves excavating and dredging the sands, then removing the heavy minerals.⁴



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

ASARCO's massive dredging operation was so deep that it intercepted the water table, creating 80-foot-deep bodies of water that loosely resemble lakes.⁵ However, unlike your garden-variety natural lakes, these "lakes" present myriad dangers that have proved fatal.

The mining operations created highly unstable banks prone to collapse.⁶ The shoreline drops off almost immediately, plunging unsuspecting swimmers into deep water that is unusually difficult to exit because the banks are so unstable.⁷ Because the "lakes" are fed by deep groundwater, their waters are both very cold and less buoyant.⁸ Nonetheless, the lakes function as an attractive nuisance, tempting swimmers, and have been the site of at least five drowning deaths.⁹ Local law enforcement has tried to prevent trespassing by posting signs and warnings, and even ticketing people.¹⁰

¹ SENES Consultants Limited. "Pathways Analysis and Site-Specific Options for ASARCO/HMI Site." Prepared for H. Hovnanian Industries. p. 2-1 - 2-3. February 2003. https://www.grandcanyontrust.org/sites/default/files/resources/2005_03_04_Enercon_Demolition_Wet_Dry_Buildings.pdf. Accessed January 30, 2022.

² King, Hobart M., Ph.D., RPG. "Ilmenite." Geology.com. <https://geology.com/minerals/ilmenite.shtml>. Accessed January 30, 2022.

³ Ibid.

⁴ Ibid.

⁵ SENES Consultants Limited. "Pathways Analysis and Site-Specific Options for ASARCO/HMI Site." Prepared for H. Hovnanian Industries. p. 2-3. February 2003. https://www.grandcanyontrust.org/sites/default/files/resources/2005_03_04_Enercon_Demolition_Wet_Dry_Buildings.pdf. Accessed January 30, 2022.

⁶ Vosseller, Bob. "Man's Body Recovered from a Manchester Lake." Jersey Shore Online. July 5, 2020. <https://www.jerseyshoreonline.com/manchester/mans-body-recovered-from-a-manchester-lake/>. Accessed January 30, 2022.

⁷ Ibid.

⁸ Ibid.

⁹ Wall, Karen. "Man Drowns in Heritage Minerals Lake: Manchester Police." Patch.com. July 6, 2020. <https://patch.com/new-jersey/manchester-nj/man-drowns-heritage-minerals-lake-manchester-police>. Accessed January 30, 2022.

¹⁰ Ibid.



An aerial view of the Heritage Minerals site and its dangerous “lakes.”

The perils of the site extend to dry land. Decades of dredging and processing ilmenite resulted in by-products—vast waste piles of sand—that accumulated on-site.¹¹ After ASARCO ceased operations due to a diminished market for ilmenite, several companies explored the potential to extract remnant minerals from the leftovers.¹² Heritage Minerals, a subsidiary of a company owned by New Jersey real estate giant the Hovnanian family, took over the approximately 7,000-acre property in 1987 and began reprocessing ASARCO’s waste piles to extract remaining heavy minerals.¹³

Heritage Minerals’ processing of the waste sands resulted in a second round of waste products that contained both thorium and uranium, triggering Nuclear Regulatory Commission licensing requirements for radioactive material.¹⁴ In 1989, the commission cited the company for unlicensed possession of these “monazite sands” due to the high contents of radioactive uranium and thorium.¹⁵ Shortly after acquiring the required license, Heritage Minerals ceased operations and began the decommissioning process

¹¹ International Uranium (USA) Corporation. “Amendment Request to Process an Alternate Feed Material from Heritage Minerals, Inc. at White Mesa Uranium Mill Source Material License No. SUA-1358.” p. 1-2. July 5, 2000. https://www.grandcanyontrust.org/sites/default/files/resources/2000_07_05_Request_to_Process_Heritage_Minerals_Alt_Feed.pdf. Accessed January 29, 2022.

¹² Ibid. p. 2.; ENERCON Services, Inc. “Demolition and Decontamination of Wet and Dry Mill Buildings.” Heritage Minerals, Inc. Prepared for U.S. Nuclear Regulatory Commission. p. 2. March 4, 2005. https://www.grandcanyontrust.org/sites/default/files/resources/2005_03_04_Enercon_Demolition_Wet_Dry_Buildings.pdf. Accessed January 30, 2022.

¹³ United States Nuclear Regulatory Commission, Region 1. “Special Safety Inspection Conducted January 12, 1989. (Report No. 99990001/89-001) of Heritage Minerals, Inc.” p. 3. February 17, 1989. (“The property was purchased by the present owner, the Houson Corporation, which is owned by the Hovnanian family, in 1986. ...From August 1987 to the present operations have been conducted by Heritage Minerals, Inc., which is owned by Houson.”). <https://www.nrc.gov/docs/ML0108/ML010870208.pdf>. Accessed January 30, 2022.

¹⁴ SENES Consultants Limited. “Pathways Analysis and Site-Specific Options for ASARCO/HMI Site.” Prepared for H. Hovnanian Industries. p. 2-3. February 2003. https://www.grandcanyontrust.org/sites/default/files/resources/2005_03_04_Enercon_Demolition_Wet_Dry_Buildings.pdf. Accessed January 30, 2022.

¹⁵ ENERCON Services, Inc. “Demolition and Decontamination of Wet and Dry Mill Buildings.” Heritage Minerals, Inc. Prepared for U.S. Nuclear Regulatory Commission. p. 2. March 4, 2005. https://www.grandcanyontrust.org/sites/default/files/resources/2005_03_04_Enercon_Demolition_Wet_Dry_Buildings.pdf. Accessed January 30, 2022.

required by the commission, including removing all radioactive components of the monazite piles.¹⁶ From there, Heritage Minerals and the White Mesa Mill owners together identified the White Mesa Mill as a suitable site for processing and final disposal of the radioactive monazite materials.¹⁷

In 2000, the White Mesa Mill owner applied for a license amendment to accept and process monazite sands from Heritage Minerals.¹⁸ Notably, in the license amendment, the Nuclear Regulatory Commission analyzed the environmental, public health, and traffic impacts of the mill accepting approximately 3,000 tons (6 million pounds) of waste sands.¹⁹ This license amendment request included the mill's "Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Waste."²⁰ This document recognized that listed hazardous wastes usually could not be licensed as alternate feeds. But it laid out an exception based partly on the idea that, if listed wastes had somehow gotten into the mill's waste ponds in the past, that could lower the bar for future wastes. Specifically, the protocol gave the state leeway to allow the mill to process contaminated soil containing listed hazardous wastes if similar wastes "are already present in the White Mesa Mill's tailings ponds as a result of processing conventional ores or other alternate feed materials in concentrations as least as high as found in the Materials [the contaminated soil from the Heritage Minerals site]."²¹ Under those circumstances, the state could elect to make a risk-based determination that the soil did not pose a threat that justified regulating it as hazardous waste.²²



Esri, here, Garmin, FAO, NOAA, USGS, EPA

¹⁶ *Ibid.*, 2,3.

¹⁷ International Uranium (USA) Corporation. "Amendment Request to Process an Alternate Feed Material from Heritage Minerals, Inc. at White Mesa Uranium Mill Source Material License No. SUA-1358." p. 1-2. July 5, 2000. https://www.grandcanyontrust.org/sites/default/files/resources/2000_07_05_Request_to_Process_Heritage_Minerals_Alt_Feed.pdf. Accessed January 29, 2022.

¹⁸ *Ibid.*

¹⁹ *Ibid.*, 2.

²⁰ International Uranium (USA) Corporation. "Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Waste. Attachment 3." p. 10. November 16, 1999. https://www.grandcanyontrust.org/sites/default/files/resources/2000_07_05_Request_to_Process_Heritage_Minerals_Alt_Feed.pdf. Accessed January 29, 2022.

²¹ *Ibid.*

²² U.S. Environmental Protection Agency. "How is contaminated environmental media regulated under the contained-in policy?" <https://www.epa.gov/hw/frequent-questions-about-hazardous-waste-identification>. Accessed January 30, 2022.

For years after the Lakehurst facility closed, Heritage Minerals sought to have the Nuclear Regulatory Commission terminate its license, declaring the decommissioning process complete.²³ However, due to repeated findings of radioactivity on the site, the commission requested additional cleanup in 2004 and 2005 and kept the site's license active.²⁴



The White Mesa Mill. DOM SMITH, ECOFLIGHT

And so, as is the case with other White Mesa Mill alternate feed amendment requests, the permission to accept the first 3,000 tons of Heritage Minerals waste opened the door to shipping additional wastes to the mill. After the initial shipment, a characterization survey of the Heritage Minerals site revealed “pockets” of radioactive contaminated soils.²⁵ Records indicate these were likely shipped to the White Mesa Mill in 2003, 2004, and 2005.²⁶ By 2005, 4,245 tons (8.49 million pounds) of monazite sands had been shipped to the White Mesa Mill.²⁷ The analysis provided to the state of Utah, and to the general public, did not consider the impact—to the environment, in terms of transportation risk, and to the waste pits themselves—of the additional 1,245 tons (2.49 million pounds) of radioactive materials.²⁸ Nevertheless, these materials were disposed of at the mill.

²³ Letter from Marie Miller, Chief Decommissioning Branch, Division of Nuclear Materials Safety, United States Nuclear Regulatory Commission, to Edele Hovnanian, Sr. Executive Vice President, Hovnanian Industries. “Inspection 04008980/2004001, Heritage Minerals, Inc (HMI), Manchester Township, New Jersey.” p. ii. January 31, 2006. https://www.grandcanyontrust.org/sites/default/files/resources/2006_01_31_NRC_Inspection_HMI.pdf. Accessed January 30, 2022.

²⁴ *Ibid.*, ii, 4-5.

²⁵ Letter from Anthony Thompson, Counsel to Heritage Minerals Inc., to George Pangburn, Division of Nuclear Materials Safety, United States Nuclear Regulatory Commission. “Heritage Minerals, Inc. Response to January 8, 2003 Pre-Decisional Enforcement Conference Summary Letter.” p. 2. March 10, 2003. https://www.grandcanyontrust.org/sites/default/files/resources/2003_03_10_Ltr_from_A_Thompson_re_HMI_Resp_to_Enforcement_Conference.pdf. Accessed January 30, 2022.

²⁶ *Ibid.*, 3; Letter from John F. Lord, Manager of Heritage Minerals Inc., to Marjorie McLaughlin, United States Nuclear Regulatory Commission. “Heritage Minerals Inc. (MRI) Alternate shipped to International Uranium Inc. (IUC) located in Blanding, UT.” p. 1. April 20, 2005. https://www.grandcanyontrust.org/sites/default/files/resources/2005_04_20_Ltr_from_HMI_to_NRC_re_Alternate_Feed_Shipments.pdf. Accessed January 30, 2022.

²⁷ *Ibid.*

²⁸ International Uranium (USA) Corporation. “Amendment Request to Process an Alternate Feed Material from Heritage Minerals, Inc. at White Mesa Uranium Mill Source Material License No. SUA- 1358.” p. 1-2. July 5, 2000. https://www.grandcanyontrust.org/sites/default/files/resources/2000_07_05_Request_to_Process_Heritage_Mineral_Alt_Feed.pdf. Accessed January 29, 2022.

As late as 2006, the commission found that releasing the Heritage Minerals site, which could lead to its redevelopment for suburban housing, could result in residents living on the site being exposed to up to 40 millirems of radiation per year, almost double the accepted standard.²⁹ Yet, in 2008, Nuclear Regulatory Commission staff recommended that the license be terminated despite these levels, grandfathering the site in under older, less rigorous decontamination standards.³⁰

The dose from the residual contamination remaining on the wet mill and dry mill pads was evaluated using RESRAD Build v. 3.22. Input data was obtained from the FSS data provided in the March 2005 license termination request. The resultant maximum dose to an individual standing on or near either pad is 1.6 mrem in the first year after license termination. The dose from the residual contamination remaining within the footprint of the former monazite pile was evaluated using RESRAD v. 6.3. Based on licensee-stated intentions and evaluation of the most common land-use of the surrounding area, the suburban resident scenario was deemed the most likely and most appropriate. Such an individual is impacted by direct radiation from the soil, limited plant ingestion from a personal garden, and soil ingestion. Water pathways are not considered, because municipal water supply is assumed rather than well water. For completeness, and to provide a bounding dose, the resultant dose using a resident farmer scenario was also evaluated. A resident farmer is impacted like the suburban resident, but has additional contributions from increased site-grown food, site-raised animal products, and on-site drinking water. **The highest resultant dose to a suburban resident living within the evaluated area is 40 mrem/year, which exceeds the 25 mrem/yr limit of the LTR.** The highest resultant dose to a resident farmer within the same area is 83 mrem/year. A draft of the NRC staff dose assessment was provided to HMI and NJDEP for comment on September 29, 2005. Comments received from both parties were considered in the final NRC staff dose assessment.

Nuclear Regulatory Commission.

Throughout the decommissioning process, a Hovnanian-owned company conducted a long-running campaign to have the Heritage Minerals property rezoned, proposing to build a large suburban housing development³¹ on the site. One plan would have included a mix of 4,000 apartments, townhomes, and single-family homes, and an additional 40,000 square feet of commercial space.³² A public outcry ensued based in part on the risk of radioactive contamination.³³

In 2018, the New Jersey Department of Environmental Protection denied a key permit, but the project, on the table for over 30 years, may rear its head again.³⁴ Meanwhile, the Heritage Minerals monazite sand waste remains in the White Mesa Mill's waste pits, increasing the burden of radioactive contamination that plagues the mill to this day.

²⁹ Ibid., 10.

³⁰ Memo from Luis A. Reyes, Nuclear Regulatory Commission, Executive Director for Operations, to Nuclear Regulatory Commission Commissioners. "Results of the Staff's Evaluation of Potential Doses to the Public from Material at The Heritage Minerals Inc. Site in Manchester Township, New Jersey." pp. 1-4. July 22, 2008. https://www.grandcanyontrust.org/sites/default/files/resources/2008_07_22_Memo_re_NRC_Staff_Dose_Evaluation_HMI.pdf. Accessed January 30, 2022.

³¹ Strunsky, Steve. "Mega-builder resurrects plans to put up 4,000 homes in Pinelands." NJ Advance Media. January 30, 2019. https://www.nj.com/ocean/2018/02/4000-unit_mini-city_pinelands_quarry.html. Accessed January 30, 2022.

³² Ibid.

³³ Ibid.

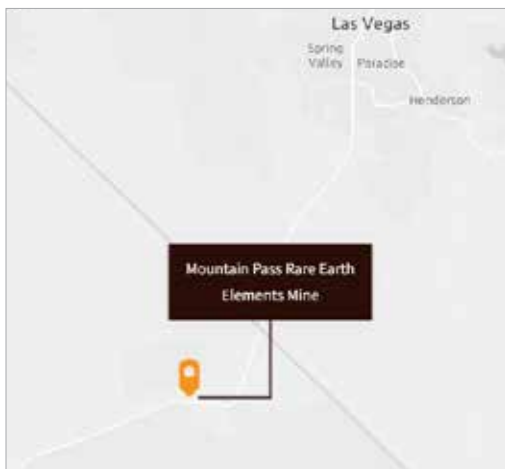
³⁴ Strunsky, Steve. "N.J rejects key permit in controversial 4,000 unit Pinelands housing project." NJ Advance Media. January 29, 2019. https://www.nj.com/news/2018/10/pinelands_panel_rejects_4000-unit_project.html. Accessed January 30, 2022.

MOUNTAIN PASS MINE - MOLYCORP



Molycorp rare earth mine and processing facilities, Mountain Pass, California. [ALANM1](#)

- ▶ A pipeline carrying wastewater from Molycorp’s Mountain Pass Mine in California ruptured in 1996, spilling heavy metals and radioactive water in the Mojave National Preserve.
- ▶ Lead-sulfide sludge at Mountain Pass Mine was classified as “characteristic hazardous waste” requiring special disposal, but was redefined as “source material” so that it could be sent to the White Mesa Mill.
- ▶ In a tangled journey of corporate ownership, bankruptcies, and acquisitions, the Mountain Pass Mine’s former owner, Molycorp, is now part of international metals conglomerate Neo Performance Materials, which also owns NPM Silmet OÜ in Estonia. Radioactive Silmet waste has been shipped to the White Mesa Mill for processing and disposal.



California State Parks, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS

The saga of the Mountain Pass Rare Earth Elements Mine began with an accidental discovery. In 1949, three prospectors were searching for uranium during the Atomic Era boom when they stumbled upon a radioactive vein in a small gold mine on Mountain Pass, in the Clark Mountains of California, near the Nevada border.¹ Not able to identify the type of rock they had found, the prospectors shipped samples to the U.S. Bureau of Mines.² The agency reported back that the Mountain Pass ore contained the rare earth element bastnaesite rather than uranium, along with a trove of other rare earth elements.³

¹ Hewett, D.F. “History of Discovery At Mountain Pass, California.” Rare-Earth Mineral Deposits of the Mountain Pass District, San Bernardino County, California. United States Geological Survey. 1954. p. IV. <https://pubs.usgs.gov/pp/0261/report.pdf>. Accessed January 30, 2022.

² Ibid.

³ Ibid., IV-V.



Bastnasite, one of the first confirmed minerals in the Mountain Pass rare earth discovery. [ROBERT M. LAVINSKY](#)

The 15 naturally occurring minerals⁴ that make up the rare earth elements are integral to many modern-day products, including hard drives, hybrid cars, and catalytic converters.⁵ Deceptively named, rare earth elements are surprisingly common. However, they are rarely found in large enough quantities to make mining profitable, rendering discoveries like the one at Mountain Pass important.⁶



Mountain Pass Mine. MAXAR

In 1950, the Molybdenum Corporation of America, then a molybdenum-mining company, acquired the Mountain Pass claim and dedicated itself to developing out its rare earth element business.⁷ In the 1960s, the advent of color TV screens increased demand for the rare earth element europium, a component of

⁴ Yttrium and scandium are sometimes also added to the list of rare earth elements, bringing the total to 17. See: United States Geological Survey Mineral Resource Program. "The Rare Earth Elements – Vital to Modern Technologies and Lifestyle" Fact Sheet 2014 -3078. United States Geological Survey. p. 1. November 2014. <https://pubs.usgs.gov/fs/2014/3078/pdf/fs2014-3078.pdf>. Accessed January 30, 2022.

⁵ *Ibid.*, 2.

⁶ *Ibid.*, 3.

⁷ Hewett, D.F. "History of Discovery At Mountain Pass, California." Rare-Earth Mineral Deposits of the Mountain Pass District, San Bernardino County, California. United States Geological Survey. 1954. p. IV. <https://pubs.usgs.gov/pp/0261/report.pdf>. Accessed January 30, 2022.

the screens.⁸ By the 1980s, Mountain Pass had grown into a 50-acre open-pit mine that supplied all of the United States' rare earth elements along with about one third of the world's demand.⁹

In 1980, to meet the growing demand for rare earth elements, the company, which had shortened its name to "Molycorp," constructed a 14-mile wastewater pipeline that traveled underground between Mountain Pass and the Ivanpah Dry Lake.¹⁰ California regulators took Molycorp at its word that the pipeline was used solely to transport uncontaminated salty water and allowed the company to directly discharge wastewater onto the dry lakebed, where it evaporated.¹¹ Leaks and spills were given the same lax treatment; Molycorp spilled over 1 million gallons of wastewater over the lifetime of the project.¹²

However, 1996 brought a reckoning. Molycorp ruptured the pipeline during a routine scrubbing process, causing a massive spill and triggering an investigation.¹³ Regulators discovered that the wastewater that Molycorp had been discharging for 15 years wasn't merely highly saline water—instead it contained high levels of heavy metals and radioactive components.¹⁴ Some of the spill occurred within the boundaries of the Mojave National Preserve, which the pipe ran through.¹⁵

San Bernardino County prosecutors brought a civil lawsuit against Molycorp for violating state drinking-water laws.¹⁶ By 1998 and at a cost of over \$3.6 million, the pipeline-spill cleanup had been mostly completed.¹⁷ Molycorp was fined an additional \$410,000 for failing to report hazardous and radioactive waste spills in a timely fashion—or at all.¹⁸ And after permanently closing the wastewater pipeline, the company no longer had a way to dispose of its wastewater.¹⁹ The logistical, legal, and financial hurdles proved insurmountable, and the company announced it was suspending operations in 1998.²⁰

Along with closure, Molycorp also faced the question of what to do with the millions of pounds of waste that had accumulated on the mine site. The company had created three main ponds for its lead waste,²¹ which also contained large quantities of uranium.²² This waste was a result of the rare earth extraction process which used toxic chemicals such as hydrochloric acid, ammonia, and sodium hydrosulfide.²³ In short, Molycorp had a problem: the company's closure plan required it to dispose of 17,750 tons (35.5 million pounds) of uranium-laden lead sludge off-site.²⁴ But who would accept this waste? Before long, Molycorp identified a solution: the White Mesa Mill.

⁸ Gorman, Steve. "California mine digs in for 'green' gold rush." Reuters. August 30, 2009. <https://www.reuters.com/article/environment-mining/feature-california-mine-digs-in-for-green-gold-rush-idUSN2838509920090831>. Accessed January 30, 2022.

⁹ Ibid.

¹⁰ Nystrom, Eric C. "From Neglected Space to Protected Place: An Administrative History of Mojave National Preserve." United States National Park Service. March 2003. Chapter 8. https://www.nps.gov/parkhistory/online_books/voja/adhi/adhi8a.htm. Accessed January 30, 2022.

¹¹ Ibid.

¹² Ibid. See: "Between 1984 and 1993, Molycorp reported over 40 spills from the pipeline, totaling 727,000 gallons" and: "Between July 24 and August 5, 1996, the pipeline released waste into the environment at least 11 times, totaling in excess of 350,000 gallons."

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

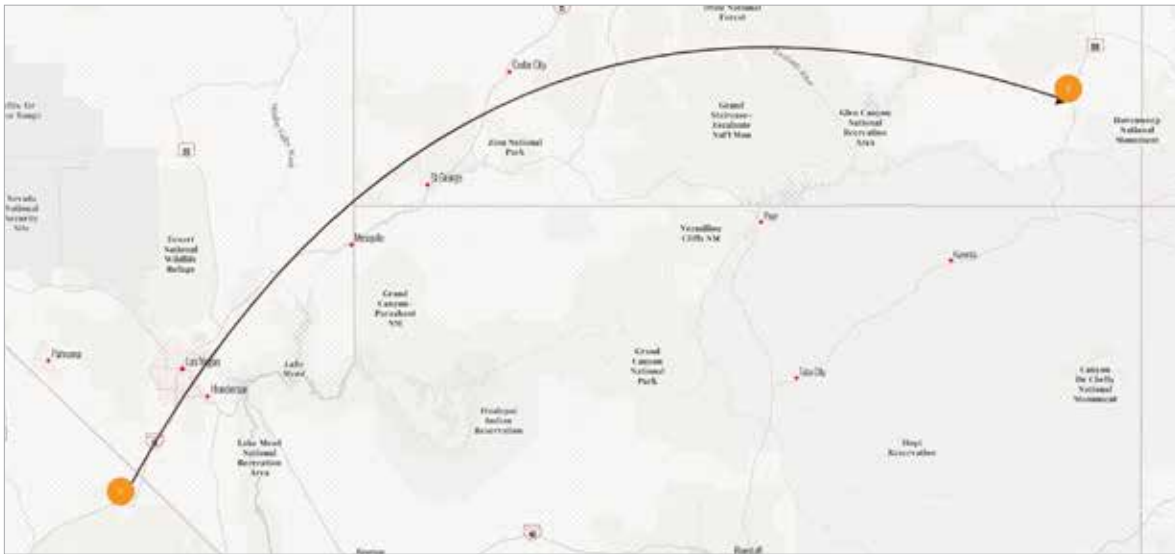
²¹ 408 International Uranium (USA) Corporation. "Request to Amend Source Material License No. SUA-1358, White Mesa Mill, Docket No. 40-8681." p. 2. November 17, 2020. December 19, 2000. https://www.grandcanyontrust.org/sites/default/files/resources/Amendment_Request_Molycorp.pdf. Accessed January 30, 2022.

²² Ibid.

²³ Ibid., 1.

²⁴ Ibid., 2.

In 2000, when the owner of the White Mesa Mill applied to process the lead-sulfide sludge from Molycorp's Mountain Pass facility as an alternate feed, the request caught the attention of the EPA.²⁵ The agency wrote a letter to the Nuclear Regulatory Commission expressing concern about whether and how the requirements for handling "characteristic hazardous waste" might apply to Molycorp's lead sulfide sludge.²⁶ While on-site at Molycorp, the lead sludge was classified as "characteristic hazardous waste" and regulated under the federal Resource Conservation and Recovery Act (RCRA).²⁷ But under the Nuclear Regulatory Commission's policies, if the waste were classified as "source material" (a source of uranium) due to its uranium content, the sludge could be sent to the White Mesa Mill, where a small amount of uranium would be extracted and the leftovers disposed of in the mill's waste pits, rather than at a licensed hazardous-waste disposal site.



Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS

The EPA's comments and intervention triggered industry protests. The mill owner hired a lawyer to write a lengthy letter to the Nuclear Regulatory Commission, contending that the EPA's questions were off base.²⁸ Shortly thereafter, the commission granted the license amendment, opening the door for the Molycorp waste to be disposed of at the White Mesa Mill.²⁹

Despite the commission's approval of the lead-sludge shipments, the EPA was not satisfied that its questions had been resolved. Months later, in comments about a related industry proposal, the EPA cautioned the commission about potential hazards that could result from allowing uranium mills to process materials other than natural ores:

²⁵ Letter from Frank Marcinowski, Director, Radiation Protection Division, United States Environmental Protection Agency, to Mr. William von Till, Fuel Licensing Branch, United States Nuclear Regulatory Commission. February 12, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Marcinowski_to_Von_Till_Feb_12_2001_Molycorp.pdf. Accessed January 30, 2022.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Letter from Anthony Tompkins, Counsel to International Uranium (IUSA) Corporation, to Mr. Melvyn Leach, Fuel Cycle Licensing Branch, United States Nuclear Regulatory Commission. "Re: IUSA's License Amendment to Receive and Process Alternate Feed from the Molycorp site." August 15, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/Thompson_Letter_Molycorp_compressed.pdf. Accessed January 30, 2022.

²⁹ Letter from Mr. Melvyn Leach, Fuel Cycle Licensing Branch, United States Nuclear Regulatory Commission, to Michelle Rehmann, Environmental Manger, International Uranium (IUSA) Corporation. "Amendment 20 to Materials License SUA-1358 -- Approval to Receive and Process Alternate Feed Material from the Molycorp Site at the White Mesa Uranium Mill." December 11, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/NRC_Tech_Eval_Amendment_Request_Molycorp.pdf. Accessed January 29, 2022.



Disposal of materials not physically, chemically, or radiologically similar to the mill tailings in the impoundments ... have the potential of presenting problems for the EPA and the Agreement or Authorized States. As an example of these problems, we noted, among other issues, potential risks from the eventual or potential failure of containment cells; there are no risk assessments on the combination or resultant effects of mixing these different types of wastes with uranium/thorium byproduct/tailings material and impacts on ground water. These concerns also extend to monitoring and sampling for these additional contaminant types, and to ensure that corrective action requirements are met in the event of a release. Since siting and approval of mill tailings impoundments were made based on their usage for a specific type of radioactive waste, the expansion of a facility to incorporate other types of hazardous waste may go well beyond community and State agreements.³⁰

Nonetheless, the following year, the mill processed 11,550 tons (23.1 million pounds) of waste from Molycorp and discarded the remnants at the mill.³¹

The EPA's comments could not have been more relevant for the future of Utah and the communities neighboring the White Mesa Mill. Today, a stew of contaminants is mixing in the mill's waste ponds, but no regulator has completed a comprehensive study of the potential risks of alternate feed wastes intermingling. Each new shipment could potentially create new and different impacts while also compounding existing impacts, including the possibility of chemical reactions that could threaten the integrity of the waste-pits.³² Meanwhile, the mill's license amendment to accept Mountain Pass waste remained active as of 2021, potentially giving the mill the continued ability to accept waste from that mine.³³

That possibility is not idle conjecture. After more than a decade of suspended operation, Molycorp gave the rare earth business another try. In 2011, Molycorp purchased the Estonian rare-metals-processing company Silmet OÜ,³⁴ sourcing rare metals from the reopened Mountain Pass Mine.³⁵ However, by 2015

³⁰ Letter from Frank Marcinowski, Director, Radiation Protection Division, United States Environmental Protection Agency, to Annette L. Vietti-Cook, Secretary, Rulemakings and Adjudications Staff, United States Nuclear Regulatory Commission. pp. 1-2. January 16, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Marcinowski_Vietti-Cook_Jan_16_2002.pdf. Accessed January 29, 2022.

³¹ United States Nuclear Regulatory Commission. "NRC Inspection Report 40-08681/03-001 and Notice of Violation." p. 7. August 25, 2003. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Molycorp/2003-08-25-NRC-Inspection-Report-Molycorp-Processing-Disposal.pdf>. Accessed January 29, 2022.

³² Letter from Frank Marcinowski, Director, Radiation Protection Division, United States Environmental Protection Agency to Annette L. Vietti-Cook, Secretary, Rulemakings and Adjudications Staff, United States Nuclear Regulatory Commission. p. 2. January 16, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Marcinowski_Vietti-Cook_Jan_16_2002.pdf. Accessed January 29, 2022.

³³ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Radioactive Materials License UT 1900479 Am. 10. License Condition 10.17." p. 11. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

³⁴ BusinessWire. "Molycorp Purchases Remaining Shares of European Rare Earth Processing Company." October 24, 2011. <https://www.businesswire.com/news/home/20111024005524/en/Molycorp-Purchases-Remaining-Shares-European-Rare-Earth>. Accessed January 30, 2022.

³⁵ BusinessWire. "Molycorp Acquires Controlling Stake in AS Silmet, Expands Operations to Europe, Doubles Near-Term Rare Earth Oxide Production Capacity." April 4, 2011. <https://www.businesswire.com/news/home/20110404005630/en/Molycorp-Acquires-Controlling-Stake-in-AS-Silmet-Expands-Operations-to-Europe-Doubles-Near-Term-Rare-Earth-Oxide-Production-Capacity>. Accessed January 30, 2022.

From the period June 13, 2002, to May 30, 2003, the licensee processed 272,465 tons of alternate feed material for its source material content, which included the following quantities: (a) 172,830 tons from Ashland-1 site, (b) 11,550 tons from Molycorp site, (c) 78,389 tons from Linde site, (d) 5,775 ton of various feed materials, and (e) 3,921 tons from Heritage site.

Molycorp's 2003 Nuclear Regulatory Commission inspection report.

Molycorp had declared bankruptcy.³⁶ After being purchased by its largest creditor, Oaktree Capital Management, Molycorp was reorganized under the name “Neo Performance Materials” and restarted business in 2016.³⁷

That iteration of the mine too proved short-lived. Molycorp’s bankruptcy ended the company’s ownership of the Mountain Pass Mine.³⁸ In 2017, a group of private equity investors called MP Materials purchased the mine, aiming to revive America’s domestic rare earth industry.³⁹ The investors took the mine public in 2020 and used proceeds to renovate it, aiming to ramp up production by 2022.⁴⁰

Neo Performance Materials has remained intertwined with the White Mesa Mill. In 2020, the company again looked to the White Mesa Mill for waste-disposal services—this time as the final disposal site for a waste from Silmet’s plant in Estonia.⁴¹ Deepening the ties between the two companies, in May 2020, the owner of the White Mesa Mill hired the board chairman of Neo Performance Materials as a rare earth element consultant.⁴² Neo appointed him as its president and CEO a few months later.⁴³

The effort to prevent the mill from accepting Neo Performance Materials’ Silmet waste continued, with a coalition of tribal and environmental voices urging that the Silmet waste not be shipped to White Mesa.⁴⁴ In July 2021, Utah regulators approved the proposal to process and discard the Silmet waste at the White Mesa Mill.⁴⁵ By July 2022, over 1.4 million pounds of Silmet waste had been shipped to the mill.⁴⁶

³⁶ Deveau, Scott and Porter, Kiel. “Neo Performance, carved from remains of bankrupt Molycorp, plans \$235 million IPO.” The Denver Post. November 7, 2017. <https://www.denverpost.com/2017/11/07/neo-performance-molycorp-235-million-ipo/>. Accessed January 30, 2022.

³⁷ Ibid.

³⁸ Ibid.

³⁹ Scheyder, Ernest. “U.S. rare earths miner MP Materials to go public in \$1.47 billion deal.” Reuters. July 15, 2020. <https://www.reuters.com/article/us-mp-materials-ipo/u-s-rare-earth-miner-mp-materials-to-go-public-in-1-47-billion-deal-idUSKCN24G1WT>. Accessed January 30, 2022.

⁴⁰ Ibid.

⁴¹ Podmore, Zak. “Estonia doesn’t want and can’t safely store radioactive powder, so 2,000 drums of it may be coming to southeastern Utah.” The Salt Lake Tribune. June 17, 2020. <https://www.sltrib.com/news/2020/06/16/estonia-doesnt-want-cant/>. Accessed January 30, 2022.

⁴² Energy Fuels. “Energy Fuels Engages Constantine Karayannopoulos & Brock O’Kelley to Assist in Developing U.S. Rare Earth Element Commercial & Technical Strategies; CEO to Discuss Rare Earths at Mining Conference Today.” Cision. May 21, 2020. <https://www.newswire.ca/news-releases/energy-fuels-engages-constantine-karayannopoulos-amp-brock-o-kelley-to-assist-in-developing-u-s-rare-earth-element-commercial-amp-technical-strategies-ceo-to-discuss-rare-earth-at-mining-conference-today-873249338.html>. Accessed January 30, 2022.

⁴³ Neo Performance Materials Inc. “Neo Performance Materials Announces Management and Board Changes.” Cision. July 7, 2020. <https://www.newswire.ca/news-releases/neo-performance-materials-announces-management-and-board-changes-808670379.html>. Accessed January 30, 2022.

⁴⁴ Letter from Kamran Zafar, Field Attorney, Grand Canyon Trust, et al. to Jay Wintrob, Director and CEO, Oaktree Capital Management. July 2, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_to_Oaktree_Capital_Re_Estonian_Waste.pdf. Accessed January 30, 2022.

⁴⁵ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. “Radioactive Materials License UT 1900479 Am. 10. License Condition 10.10.” p. 10. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

⁴⁶ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. “Inspection Report.” Page 3. August 4, 2022. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/InspectionReportWhiteMesaMill-07-26-2022-DRC-2022-023702.pdf>. Accessed May 11, 2023.



MAYWOOD CHEMICAL WORKS

Maywood, New Jersey

STEPHANIE SMITH

- ▶ Radioactive contamination from Maywood Chemical Works extended across three northeastern New Jersey towns, contaminating wells, residences, and recreational areas.
- ▶ A New Jersey study of cancer clusters in ZIP codes near the Maywood site showed that female residents experienced brain and central nervous system cancers at double the national averages.
- ▶ Colorado regulators rejected a proposal to ship radioactive soil from Maywood to the Cotter uranium mill in Cañon City, Colorado.
- ▶ The Nuclear Regulatory Commission issued a license allowing up to 1.68 billion pounds of toxic and radioactive soil to be processed and disposed of at the White Mesa Mill, but the federal agencies responsible for cleaning up the Maywood site ultimately chose to dispose of it at a licensed low-level radioactive waste facility.

Back in the early 2000s, over a billion pounds of low-activity radioactive soil that was contaminated at a site once occupied by the Maywood Chemical Works, a thorium-processing operation 10 miles outside of New York City, had fallen into the hands of the U.S. Army Corps of Engineers to clean up.

A leading candidate to take the contaminated soil was Cotter uranium mill in Cañon City, Colorado.¹ But in Colorado, the Nuclear Regulatory Commission's power to regulate uranium mills had long been taken over by the state.² And Colorado regulators refused to grant the Cañon City mill permission to bury the shipments from Maywood alongside the mill's other wastes.³

¹ "Cotter Uranium Mill." United States Nuclear Regulatory Commission. <https://www.nrc.gov/info-finder/decommissioning/uranium/cotter-uranium-mill.html>. Accessed January 30, 2022.

² "Amendment to Agreement Between the United States Nuclear Regulatory Commission and the State of Colorado for Discontinuance of Certain Commission Regulatory Authority and Responsibility within the State." p. 2. April 20, 1982. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Maywood/1982-04-20-Am-NRC-CO-AEA-Authority.pdf>. Accessed January 30, 2022.

³ Letter from Steve Tarlton, Radiation Management Unit, Colorado Department of Public Health and Environment, to Steve Landau, Cotter Corporation. "Request for Approval for Direct Disposal of Maywood Allotment 1 Soils at the Cotter Cañon City Milling Facility." July 9, 2004. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Maywood/2004-09-21-CDPHE-Ltr-re-Direct-Disposal-Maywood-Soils.pdf>. Accessed January 30, 2022.



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

Across the border in Utah, the story was different. There, the Nuclear Regulatory Commission still held the reins. So when the owner of the White Mesa Mill sought permission to take the soil as an alternate feed, the commission acquiesced, issuing a license allowing up to 840,000 tons (1.68 billion pounds) of toxic and radioactive soil to be shipped to, processed at, and disposed of in giant waste pits at the White Mesa Mill.⁴

How was this waste created? And why did the Nuclear Regulatory Commission approve of its disposal in White Mesa? That's a long story.

Thorium is a slightly radioactive metal that appears luminescent silver in its purest form.⁵ It is found within monazite sands, large beaches of sandy deposits that occur near oceans and streambeds, whose individual grains contain thorium.⁶ To access the thorium and uranium locked within monazite sands, miners scoop up the sands in large quantities and then process them in a hot sulfuric acid bath.⁷ Processed thorium exhibits unusual qualities: when heated until it ignites, thorium burns with a brilliant white light, and it does not melt until reaching a temperature of 1,750 degrees Celsius.⁸ These characteristics made thorium desirable for lighting products.⁹



Left to right: Monazite sand. [GRETARSSON](#); Thorium. [RUI COSTA](#); Corroded thorium. [GREG WEBB, INTERNATIONAL ATOMIC ENERGY AGENCY](#)

⁴ Letter from Michelle R. Rehmann, Environmental Manager, International Uranium (USA) Corp., to Melvyn Leach, Branch Chief, Fuel Licensing Branch, United States Nuclear Regulatory Commission. "Amendment Request to Process an Alternate Feed Material from the Maywood FUSRAP Site at the White Mesa Uranium Mill Source Material License No. SUA-1358." p. 4. June 15, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Rehmann_to_Leach_NRC_Maywood_June%2015_2001.pdf. Accessed January 30, 2022.

⁵ "Thorium." Los Alamos National Laboratories. <https://periodic.lanl.gov/90.shtml>. Accessed January 30, 2022.

⁶ "Monazite." Geology.com. <https://geology.com/minerals/monazite.shtml>. Accessed January 30, 2022.

⁷ Barghusen, John J. and Smutz, M. "Processing of monazite sands" (1957). Ames Laboratory ISC Technical Reports. 178. pp. 3-4.

⁸ <https://dr.lib.iastate.edu/server/api/core/bitstreams/10cffa25-51a0-4350-a10b-f94426fe704c/content>. Accessed January 30, 2022.

⁹ "Thorium." Los Alamos National Laboratories. <https://periodic.lanl.gov/90.shtml>. Accessed January 30, 2022.

⁹ Ibid.

Maywood Chemical Works processed monazite sands for thorium from 1916 to 1956,¹⁰ resulting in large quantities of clay-like waste that contained remnant thorium, as well as uranium.¹¹ Among the company's customers was the U.S. military, which bought thorium for naval munitions before and during World War II and thorium-related compounds for the Manhattan Project,¹² the then top-secret federal government program that developed the atomic bomb. Along with uranium and thorium, the resulting waste from Maywood Chemical Works' operations included arsenic, chromium, nickel, lead, cadmium, beryllium, pesticides, methyl chloride, xylene, toluene, ethyl benzene, and acetone.¹³ The company filled in swampy sections of its property with the toxic and radioactive soil, used it as mulch and fill, and dumped the waste on nearby land where both commercial and residential properties were later built.¹⁴

It was a radiologist searching for radioactive containers that had fallen off a truck in 1980 that led to the discovery of radioactive contamination traced to Maywood Chemical Works.¹⁵ Further studies would eventually reveal that contamination extended off the company's land to some 92 properties in the towns of Maywood, Lodi, and Rochelle Park, including buildings, residences, and recreational areas.^{16,17} Eleven public wells were closed due to groundwater contamination near the Maywood site,¹⁸ and a New Jersey study of cancer clusters in the ZIP codes nearby showed that female residents experienced brain and central nervous system cancers at double the national averages.¹⁹

In the early years, the mayor of Maywood sought federal help addressing the toxic and radioactive contamination problem, including petitioning the Nuclear Regulatory Commission for assistance removing the waste from Maywood.²⁰ From there, a host of federal agencies got involved, including the EPA and the U.S. Department of Energy. The Maywood Chemical Works site was added to the EPA's

¹⁰ Letter from Jonathan P. Carter, General Counsel, Envirocare of Utah, Inc., to James Lieberman, General Counsel, United States Nuclear Regulatory Commission. "Maywood FUSRAP Site and My Letter of February 22, 2001." p. 3. May 16, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/2001_05_16_Letter_J_Carter_re_Maywood_FUSRAP_Site.pdf. Accessed January 30, 2022.

¹¹ United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process Maywood Site Material." p. 3. August 22, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/2002_09_23_Letter_D_Gillen_re_Approval_Maywood_Feed.pdf. Accessed January 29, 2022.

¹² Paris, Albert. "Thorium Cleanup by U.S. Faulted." New York Times. May 20, 1984. <https://www.nytimes.com/1984/05/20/nyregion/thorium-cleanup-by-us-faulted.html>. Accessed January 30, 2022.

¹³ Office of Solid Waste and Emergency Response, Office of Radiation Programs, United States Environmental Protection Agency. "Appendix B: Radioactive Waste and Superfund Site Descriptions." In Assessment of Technologies for the Remediation of Radioactively Contaminated Superfund Sites. United States Environmental Protection Agency. 1990. p. B-3. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Maywood/Assessment_technologies_radiactively_contaminated_superfund_sites.pdf. Accessed April 5, 2021.

¹⁴ Letter from Jonathan P. Carter, General Counsel, Envirocare of Utah, Inc. to James Lieberman, General Counsel, United States Nuclear Regulatory Commission. "Maywood FUSRAP Site and My Letter of February 22, 2001." p. 1. May 16, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/2001_05_16_Letter_J_Carter_re_Maywood_FUSRAP_Site.pdf. Accessed January 30, 2022.

¹⁵ Paris, Albert. "Thorium Cleanup by U.S. Faulted." New York Times. May 20, 1984. <https://www.nytimes.com/1984/05/20/nyregion/thorium-cleanup-by-us-faulted.html>. Accessed January 30, 2022.

¹⁶ Letter from Jonathan P. Carter, General Counsel, Envirocare of Utah Inc. to James Lieberman, General Counsel, United States Nuclear Regulatory Commission. "Maywood FUSRAP Site and My Letter of February 22, 2001." p. 1-2. May 16, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/2001_05_16_Letter_J_Carter_re_Maywood_FUSRAP_Site.pdf. Accessed January 30, 2022.

¹⁷ United States Army Corps of Engineers, New York District. "Fact Sheet - Maywood, NJ Formerly Utilized Sites Remedial Action Program (FUSRAP)." Formerly Utilized Sites Remedial Action Program (FUSRAP). March 5, 2021. <https://www.nan.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/487561/fact-sheet-maywood-nj/>. Accessed January 30, 2022.

¹⁸ Agency for Toxic Substances and Disease Registry, Division of Health Studies. "Cancer Incidence in Three Communities near the Maywood Area Superfund Sites (Bergen County), New Jersey." p. 3. March 1998. https://www.state.nj.us/health/ceohs/documents/eohap/haz_sites/bergen/maywood/maywood_chem_co/maywood_study_3_98.pdf. Accessed January 30, 2022.

¹⁹ *Ibid.*, 1.

²⁰ Letter from Jonathan P. Carter, General Counsel, Envirocare of Utah Inc. to James Lieberman, General Counsel, United States Nuclear Regulatory Commission. "Maywood FUSRAP Site and My Letter of February 22, 2001." p. 2. May 16, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/2001_05_16_Letter_J_Carter_re_Maywood_FUSRAP_Site.pdf. Accessed January 30, 2022.

National Priorities List as a Superfund site in 1983.²¹ Shortly after that, the Department of Energy listed Maywood as part of its Formerly Utilized Site Remedial Action Program, which was created to clean up contamination from the government’s early atomic-energy and weapons-development activities.²²



New York District Commander Mathew Luzzatto touring the Maywood Chemical Superfund Site and watching soil being placed into a railcar.

U.S. ARMY CORPS OF ENGINEERS

Between 1994 and 1996, the Department of Energy shipped 35,000 cubic yards of the contaminated Maywood material to facilities licensed to dispose of low-level radioactive waste.²³ Despite these cleanup efforts, hundreds of millions of pounds of contaminated soil still remained at the Maywood site in the early 2000s (a problem that had not been fully resolved two decades later, as public roads in Lodi were removed to scrape and dispose of contaminated soil as recently as January 2020).^{24,25} At that time, the business of so-called “alternate feed” processing was ramping up at the White Mesa uranium mill. The mill owner decided to make a play for much of the remaining contaminated soil by submitting a

request for a license amendment that would allow the mill to process it, doubtless for a fee.²⁶ At the same time, the Army Corps of Engineers, which had taken over the cleanup from the Department of Energy, was pursuing plans to ship the soil to the Cotter Mill in Cañon City, Colorado.

In 2002, the Cotter Mill won a contract to dispose of 470,000 tons (940 million pounds) of radioactive soil from Maywood.²⁷ Shortly thereafter, Cañon City residents created a nonprofit, Colorado Citizens Against Toxic Waste, to fight the proposal.²⁸ Responding to citizen advocacy, Governor Bill Owens asked the Colorado Department of Public Health and Environment to review the Cotter arrangement.²⁹ Simultaneously, state lawmakers passed a bill, which the governor signed into law, that made public input and environmental reviews a requirement of any deal to bring toxic waste into Colorado.³⁰ Finally, in 2004, the Colorado state health department denied the Cotter uranium mill a key permit—a decision that was upheld in state court after Cotter appealed.³¹ In 2008, the mill abandoned efforts to accept the Maywood waste.³²

²¹ Ibid.

²² Ibid.; United States Army Corps of Engineers, Formerly Utilized Sites Remedial Action Program, New York District. “Record of Decision for Soils and Buildings at the FUSRAP Maywood Superfund Site: Maywood, New Jersey.” p. 5. August 2003. https://www.grandcanyontrust.org/sites/default/files/resources/2003_08_ROD_Soils_and_Buildings_Maywood.pdf. Accessed January 29, 2022.

²³ International Uranium (USA) Corp. “Request to Amend Source Material License No. SUA-1358, White Mesa Mill, Docket No. 40-8681.” p. 3. June 15, 2001. <https://www.nrc.gov/docs/ML0118/ML011860070.pdf>. Accessed January 30, 2022.

²⁴ Cattafi, Kristi. “Lodi streets will be dug up to remove contaminated soil.” NorthJersey.com. December 4, 2019. <https://www.northjersey.com/story/news/bergen/lodi/2019/12/04/maywood-nj-superfund-site-work-lodi-contaminated-soil-removed-2020/2597229001/>. Accessed January 30, 2022.

²⁵ United States Nuclear Regulatory Commission. “Technical Evaluation Report: Request to Receive and Process Maywood Site Material.” p. 1. September 23, 2002. (Proposing to allow the mill to accept 840,00 tons of waste from the Maywood site.) https://www.grandcanyontrust.org/sites/default/files/resources/2002_09_23_Letter_D_Gillen_re_Approval_Maywood_Feed.pdf. Accessed January 29, 2022.

²⁶ Letter from Michelle R. Rehmann, Environmental Manager, International Uranium (USA) Corp., to Melvyn Leach, Branch Chief, Fuel Licensing Branch, United States Nuclear Regulatory Commission. “Amendment Request to Process an Alternate Feed Material from the Maywood FUSRAP Site at the White Mesa Uranium Mill Source Material License No. SUA-1358.” June 15, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Rehmann_to_Leach_NRC_Maywood_June%2015_2001.pdf. Accessed January 30, 2022.

²⁷ Janofsky, Michael. “A Quiet Town Confronts Toxic Dirt.” New York Times. April 6, 2002. <https://www.nytimes.com/2002/04/06/us/a-quiet-town-confronts-toxic-dirt.html>. Accessed January 30, 2022.

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid.

³¹ The Associated Press. “Judge rules against Cotter on N.J. soil.” Denver Post. <https://www.denverpost.com/2007/11/30/judge-rules-against-cotter-on-n-j-soil/>. Accessed January 30, 2022.

³² Ibid.

September 23, 2002

Ms. Michelle Rehmman, Environmental Manager
International Uranium (IUSA) Corporation
Independence Plaza, Suite 950
1050 Seventeenth Street
Denver, Colorado 80265

SUBJECT: AMENDMENT 22 TO MATERIALS LICENSE SUA-1358 -- APPROVAL TO RECEIVE AND PROCESS ALTERNATE FEED MATERIAL FROM THE MAYWOOD SITE AT THE WHITE MESA URANIUM MILL

Dear Ms. Rehmman:

In your letters dated June 15, 2001, June 22, 2001, August 3, 2001, and supplemented by letters dated, November 19, 2001, December 6, 2001, December 10, 2001, March 11, 2002, and July 1, 2002, you asked that we amend your license for the White Mesa uranium mill to permit the receipt and processing of material from the Maywood site, located in Maywood, New Jersey. You propose to receive this material at your White Mesa uranium mill in Blanding, Utah, use this material as alternate feed for the primary purpose of removing the uranium so that it can be reused, and dispose of the process tailings in the mill's tailings pile. You estimate the material amount to be up to 600,000 cubic yards (840,000 tons) with an average uranium content of approximately 0.0018 percent by weight, or greater. However, you have stated in your request that you will only receive materials that are 0.01 percent uranium content or higher. You have determined, based on your review of the Maywood site information and use of your Listed Hazardous Waste Protocol, that this material does not contain listed hazardous waste.

We have determined that your request to receive and process this material as alternate feed is acceptable, and have amended your license accordingly. We have enclosed the amended license and our Technical Evaluation Report that provides our bases for granting the amendment. Our principal criteria for evaluating this request are contained in our guidance entitled, "Guidance on the Use of Uranium Mill Feed Material Other Than Natural Ores". We also ensured that this request complies with our requirements for uranium mills in 10 CFR Part 40, Appendix A.

Agency for Toxic
Substances and
Disease Registry
Division of Health Studies

CANCER INCIDENCE IN THREE COMMUNITIES
NEAR THE MAYWOOD AREA SUPERFUND SITES
(BERGEN COUNTY), NEW JERSEY

MARCH 1998

But the story ended differently when the Nuclear Regulatory Commission was asked whether the contaminated soil could be permanently buried next to White Mesa. By then, the commission had been dependably green-lighting the White Mesa Mill's wastes-to-feed business for over a decade, but this proposal had new thorns. The waste contained only an estimated 0.0018 percent uranium on average,³³ roughly 100 times less than regionally mined ore considered worthwhile to process at the White Mesa Mill.³⁴ In evaluating requests to process waste products as "alternate feed" in order to extract remnant uranium, regulators use a framework to evaluate whether the material qualifies as "ore" and whether it is being sent to the White Mesa Mill primarily to extract the remnant uranium.³⁵ Likely anticipating objections that Maywood waste was being sent to the White Mesa Mill primarily for disposal rather than extraction of minute amounts of uranium, the mill's owner proposed to accept only materials with a uranium content higher than 0.01 percent.³⁶ How much soil would have met that threshold is unclear from the public record, but the licensing documents suggest that it may have been around 200,000 cubic yards.³⁷

³³ United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process Maywood Site Material." p. 4. August 22, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/2002_09_23_Letter_D_Gillen_re_Approval_Maywood_Feed.pdf. Accessed January 29, 2022.

³⁴ United States Nuclear Regulatory Commission. "Final Environmental Statement Related to the Operation of the White Mesa Uranium Project." p. 3-1. May 1979. <https://documents.deq.utah.gov/legacy/businesses/e/energy-fuels-resources-usa/docs/2009/08Aug/FINAL%20ENVIRONMENTAL%20STATEMENT%20MAY%201979.pdf>. Accessed January 30, 2022.

³⁵ *Ibid.*, 3-4.

³⁶ *Ibid.*, 3.

³⁷ United States Nuclear Regulatory Commission. "Technical Evaluation Report: Request to Receive and Process Maywood Site Material." p. 5. September 23, 2002. https://www.grandcanyontrust.org/sites/default/files/resources/2002_09_23_Letter_D_Gillen_re_Approval_Maywood_Feed.pdf. Accessed January 29, 2022.

The trifling amount of uranium in the Maywood waste was a product of the sheer volume of waste that the mill owner proposed to accept—up to 840,000 tons (1.68 billion pounds).³⁸ If transported by rail and truck, between 46 and 86 truckloads a week of toxic and radioactive waste were to be driven from rail stations in Grand Junction, Colorado or Green River, Cisco, or East Carbon, Utah to White Mesa for a period of seven years,³⁹ totaling up to 31,304 truckloads.

In the end, those trucks did not go to White Mesa, so far as can be discerned from the public records, because the Army Corps of Engineers chose to ship the soil to a licensed low-level radioactive waste facility.⁴⁰ Yet the Nuclear Regulatory Commission's license allowing the mill to process the Maywood soil was not without consequence, for that soil remained on the list of alternate feeds used by regulators as a comparison point for future decisions about just how toxic or radioactive an alternate feed may be when qualifying for disposal at the mill.⁴¹

³⁸ *Ibid.*, 1.

³⁹ International Uranium (USA) Corp. "Request to Amend Source Material License No. SUA-1358, White Mesa Mill, Docket No. 40-8681." pp. 14-15. June 15, 2001. <https://www.nrc.gov/docs/ML0118/ML011860070.pdf>. Accessed January 30, 2022.; Letter from Michelle R. Rehmann, Environmental Manager, International Uranium (USA) Corp. to Melvyn Leach, Branch Chief, Fuel Licensing Branch, United States Nuclear Regulatory Commission. "Amendment Request to Process an Alternate Feed Material from the Maywood FUSRAP Site at the White Mesa Uranium Mill Source Material License No. SUA-1358." p. 14. June 15, 2001. https://www.grandcanyontrust.org/sites/default/files/resources/Letter_Rehmann_to_Leach_NRC_Maywood_June%2015_2001.pdf. Accessed January 30, 2022.

⁴⁰ U.S. Army Corps of Engineers, "Record of Decision for Soils and Buildings at the FUSRAP Maywood Superfund Site." p. 63. August 2003. [http://www.fusrapmaywood.com/Docs/Final%20ROD%2022%20Sept%2003%20\(web%20settings\).pdf](http://www.fusrapmaywood.com/Docs/Final%20ROD%2022%20Sept%2003%20(web%20settings).pdf). Accessed January 30, 2022.; Cabrera Services. "Community Relations Plan: FUSRAP Maywood Superfund Site." p. 3-1. November 2013. <http://www.fusrapmaywood.com/Docs/MISS-151.pdf>. Accessed January 30, 2022.

⁴¹ URS Professionals Solutions, LLC. "Safety Evaluation Report for Amendment Request to Process an Alternate Feed (The SFC Uranium Material) at White Mesa Mill from Sequoyah Fuels Corporation, Gore, Oklahoma. Energy Resources (USA) Inc. (EFRI) (Formerly Known as Denison Mines [USA] Corp) White Mesa Uranium Mill, San Juan County, Utah." p. 15. May 1, 2015. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2017-002764.pdf>. Accessed January 30, 2022.

FMRI, INC. - FANSTEEL



Cherokee Nation (Muskogee, Oklahoma)

The banks of the Arkansas River. [NICHOLAS HENDERSON](#)

- ▶ Decades of metals manufacturing left behind toxic waste, including acidic ponds filled with radioactive by-products.
- ▶ Millions of pounds of radioactive sludge were shipped to the White Mesa Mill to be processed and discarded.
- ▶ Some of the most radioactive waste that accumulated at the Fansteel site was sent to the White Mesa Mill for permanent disposal.

Muskogee, Oklahoma—named after the Muscogee (Creek) Nation and once selected to be the capital of the proposed State of Sequoyah¹—is today a town just shy of 40,000 people. Merle Haggard, the iconic American country and western singer, was “proud to be an Okie from Muskogee.”² But one stain on that community pride might be a metals production facility on the edge of town that has left behind a trail of contamination not only in Oklahoma, but also in Utah.

Originally owned and operated by Fansteel, Inc., a manufacturer of specialty metals products, the Fansteel facility is located at 10 Tantalum Place in Muskogee, Oklahoma, on the west bank of the Arkansas River.³ This places the facility within the boundaries of the Cherokee Nation’s reservation, and just outside the boundaries of the neighboring Muscogee (Creek) Nation reservation. Covering 110 acres, the site consists of 15 structures and nine ponds used for waste disposal.⁴ Among the structures are buildings for administration, chemical processing, research and development laboratories, groundwater treatment facilities, ore storage, chemical equipment storage, and more.⁵

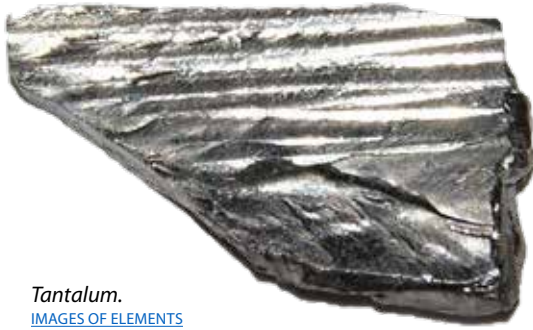
¹ Mize, Richard. “Merle Haggard could’ve sung Muskogee, Sequoyah, USA.” *The Oklahoman*. November 19, 2005. <https://oklahoman.com/article/2920436/merle-haggard-couldve-sung-muskogee-sequoyah-usa>. Accessed January 30, 2022.

² “Okie From Muskogee (Remastered).” YouTube, 2019. <https://www.youtube.com/watch?v=700j-Y8yCGM>. Accessed January 30, 2022.

³ ENERCON Services, Inc., Discussion of Data Gap Investigation of the Former Fansteel Property. p. 1. April 11, 2016. <https://www.nrc.gov/docs/ML1617/ML16172A173.pdf>. Accessed January 30, 2022.

⁴ United States Nuclear Regulatory Commission. “FMRI, Inc. (Fansteel).” <https://www.nrc.gov/info-finder/decommissioning/complex/fmri-fansteel-inc.html>. Accessed January 30, 2022.

⁵ Ibid.



Tantalum.
[IMAGES OF ELEMENTS](#)

As its street address indicates, the facility was a rare earth metals processing plant that produced tantalum metal (a versatile metal used in electronics and medical devices) and columbium oxide (primarily used as an alloy in steel).⁶ Fansteel produced these metals by physically and chemically treating ores and slags delivered from around the world to extract tantalum and columbium.⁷ Slag is the substance left over after a metal has been extracted from natural ore (i.e., smelted), still containing other valuable metals.

There are several ways to extract tantalum and columbium from ore and slag. Fansteel's chosen method was to first pulverize the ores and slags, then digest the pulverized material using hydrofluoric acid.⁸ The acid dissolved the tantalum and columbium, which were then extracted from the acidic solution using an organic solvent. The metals were then separated and converted into their final products.⁹

This process left the operator with a mix of residues referred to as "work in progress" residues or "WIP," which were stored on-site in acidic ponds known as ponds 2, 3, and 5.¹⁰ The Fansteel site produced tantalum and columbium metals this way from 1957 until 1989, when it ceased operations.¹¹

The Nuclear Regulatory Commission licenses and regulates the possession and use of radioactive materials to ensure public health, safety, and the protection of the environment.¹² Because the raw materials used by Fansteel naturally contained uranium and thorium, both "radioactive source materials" as defined by the Commission,¹³ Fansteel was subject to the commission's authority.¹⁴ Once operations ceased, Fansteel was required to begin remediating the site so that it could be decommissioned.¹⁵ Decommissioning meant removing the facility from service and reducing radioactivity to permissible levels so that the property could be released either for unrestricted use or under restricted conditions, the goal being license termination.¹⁶

In 2002, Fansteel filed for bankruptcy. As part of its reorganization plan, the company sought the Nuclear Regulatory Commission's authorization to transfer its radioactive materials license—basically its operating license—to FMRI, Inc., a wholly owned subsidiary of Fansteel that was formed for the sole purpose of decommissioning the site.¹⁷ In December 2003, the commission approved this license transfer and FMRI became responsible for decommissioning the site.¹⁸ As of 2021, Fansteel's duties were limited to providing sufficient funding to FMRI to ensure public health and safety at the site during decommissioning.¹⁹

⁶ United States Nuclear Regulatory Commission. "Fansteel, Inc.'s Answer in Opposition to the Request for Hearing Filed by the State of Oklahoma." p. 3. October 29, 1999. <https://www.nrc.gov/docs/ML9930/ML993090214.pdf>. Accessed January 30, 2022.

⁷ Ibid.

⁸ Ibid.

⁹ Ibid.

¹⁰ Fansteel, Inc. "Decommissioning Plan. Fansteel Inc., Muskogee, Oklahoma Site." Vol. 1. p. 1-1. January 15, 2003. <https://www.nrc.gov/docs/ML0302/ML030240062.pdf>. Accessed January 30, 2022.

¹¹ Letter from FMRI to NRC. February 11, 2011. p. 1. <https://www.nrc.gov/docs/ML1106/ML110610423.pdf>. Accessed January 30, 2022.

¹² "About NRC." United States Nuclear Regulatory Commission. <https://www.nrc.gov/about-nrc.html>. Accessed January 30, 2022.

¹³ 10 C.F.R. § 110.2. (NRC Regulations Title 10, Code of Federal Regulations, § 110.2 Definitions.) <https://www.nrc.gov/reading-rm/doc-collections/cfr/part110/part110-0002.html>. Accessed January 30, 2022.

¹⁴ United States Nuclear Regulatory Commission. "Environmental Assessment and Finding of No Significant Impact for Fansteel Decommissioning Plan." p. 1. <https://www.nrc.gov/docs/ML0330/ML033040204.pdf>. Accessed January 30, 2022.

¹⁵ Ibid.

¹⁶ United States Nuclear Regulatory Commission. "Decommissioning of Nuclear Facilities." <https://www.nrc.gov/waste/decommissioning.html>. Accessed January 30, 2022.

¹⁷ United States Nuclear Regulatory Commission. "FMRI, Inc. (Fansteel)." <https://www.nrc.gov/info-finder/decommissioning/complex/fmri-fansteel-inc.html>. Accessed January 27, 2022.

¹⁸ Ibid.

¹⁹ Ibid.



An aerial view of the FMRI, Inc - Fansteel site. MAXAR

As a condition of site remediation, Fansteel was required to get rid of certain waste residues left over from the facility's production of tantalum and columbium. Originally, Fansteel planned to reprocess its waste on-site and dispose of the residue in a containment cell that it applied to the Nuclear Regulatory Commission for permission to construct.²⁰ Likely due to harsh opposition by the state of Oklahoma and others regarding the potential health and environmental effects of on-site disposal,²¹ this cell was never approved.²²

“

*To tell the truth, if I was in Utah or Nevada, I'd tell Oklahoma to keep its waste - Oklahomans worked at those plants, they were paid well, the state collected taxes from the companies, and Oklahoma can just find a place for the mess. But what to [sic] we care? We only want to get rid of the stuff.*²³

– Columnist David Gerard in the Muskogee Phoenix

The White Mesa Mill, the chosen destination for much of that waste, became integral to Fansteel's remediation and decommissioning process.

²⁰ United States Nuclear Regulatory Commission. "NRC Staff's Response to Fansteel, Inc.'s Appeal from the Presiding Officer's Decision to Grant a Hearing." p. 2. February 2, 2000. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2000-02-02-NRC-Staff-Resp-to-Fansteel-Appeal.pdf>. Accessed January 30, 2022.

²¹ Ibid.

²² "Appendix C –Site Summaries for Current Complex Decommissioning Sites." p. C-15. September 30, 2006. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2006_09_30-Decommissioning_Site_Summaries.pdf. Accessed January 30, 2022.

²³ Gerard, David. "Nobody likes a mess, especially radioactive ones." Muskogee Phoenix. March 2007. <https://okpress.com/news/486924/March-Column-Winner.htm>. Accessed January 30, 2022.



Esri, here, Garmin, FAO, NOAA, USGS, EPA

The decommissioning was planned in four phases.²⁴ The first phase concentrated on the remediation and off-site disposal of the WIP waste (picture bluish sludge) in ponds 2 and 3.²⁵ Part of phase 1 included sending the pond wastes to the White Mesa Mill.

Ponds 2 and 3 may have been chosen for remediation first because the materials they stored had higher levels of radioactivity than other contaminated soils at the facility. A characterization survey done in 1993 found that levels of radiation in ponds 2 and 3 ranged from 360 to 640 picocuries per gram of uranium and 360 to 440 picocuries per gram of thorium.²⁶ To put that into perspective, the other ponds on the site—ponds 5 through 9—had an average concentration range of 14 to 53 picocuries per gram of uranium and 2 to 26 picocuries per gram of thorium.²⁷

Phase 1 was scheduled to begin in September 2004 but did not actually commence until June 2005.²⁸ In March 2005, at the request of FMRI, the then-owner of the White Mesa Mill, International Uranium (USA) Corporation, applied to have certain waste shipped from the FMRI site to the mill for disposal as an “alternate feed” material.²⁹ The waste FMRI wanted to send to the mill included the blue sludge WIP materials stored in ponds 2 and 3 and other radioactive soils, materials, and debris.³⁰ International Uranium applied to process up to 32,000 tons (64 million pounds) of this waste—roughly 1,600 tractor-trailer loads—at the White Mesa Mill.³¹ Utah state regulators approved the request in June 2006.³²

²⁴ FMRI, Inc. “Written Presentation of FMRI, Inc. in Opposition to the Written Presentation of the State of Oklahoma, In the Matter of: FMRI, Inc. (Muskogee, Oklahoma Facility).” p. 21. March 4, 2004. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2004_03_04_Ltr_from_FMRI_re_Written_Presentation.pdf. Accessed January 30, 2022.

²⁵ Ibid.

²⁶ Fansteel, Inc. “Decommissioning Plan. Fansteel Inc., Muskogee, Oklahoma Site.” Vol. 1. pp. 1-2. January 15, 2003. <https://www.nrc.gov/docs/ML0302/ML030240062.pdf>. Accessed January 30, 2022.

²⁷ Ibid.

²⁸ “Appendix C – Site Summaries for Current Complex Decommissioning Sites.” C-16. September 30, 2006. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2006_09_30_Decommissioning_Site_Summaries.pdf. Accessed January 30, 2022.

²⁹ International Uranium Corporation. “Request to Amend Radioactive Material License White Mesa Mill and Environmental Report.” p. 1. March 7, 2005. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2005_03_08_IUSA_Am_Req_re_FMRI_Material_Incomplete.pdf. Accessed January 30, 2022.

³⁰ Ibid., 2.

³¹ Ibid., 3.

³² Utah Department of Environmental Quality, Division of Radiation Control. “11e.(2) Materials License.” pp. 2-14. June 13, 2006. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2006-06-13-RML-UT-1900479-Am-2.pdf>. Accessed January 30, 2022.

How that waste got to the mill is a matter of some conjecture, owing to the lack of public records about the transportation methods ultimately used. But if it was shipped according to FMRI's plan, the residual waste was first bagged on-site in "SuperSaks"—bulk containers made of flexible, woven fabric.³³ Next, the bagged waste was loaded onto 25-cubic-yard intermodal containers, each of which could hold 18 to 21 tons of the bagged waste.³⁴ The intermodal containers were then loaded onto rolloff tractor trailers which either transported the containers from the Fansteel facility to various ports for further rail transport to the White Mesa Mill, or directly to the mill by truck.³⁵



Intermodal containers.

Nobody likes a mess, especially radioactive ones

By David Gerard, Muskogee Phoenix

Well, it's Utah's problem now.

That's what's nice about this mobile world. If we can crate or can something we don't want, we can ship it somewhere else.

Of course, expect complaints. A month ago, somebody in Utah called and asked what kind of waste Muskogee was sending them.

By 2009, all of the residue waste from Pond 3 was excavated, bagged, and shipped to the mill.³⁶ From 2006 to 2009, FMRI estimated that it shipped 13,204 tons of the Pond 3 waste to the mill in 672 individual shipments.³⁷ FMRI began removing materials from Pond 2 in 2011, but operations were temporarily halted several times due to lack of funding or insufficient space to store the waste.³⁸ The process was suspended in December 2011, and again in October 2012, when the storage areas (i.e. on-site buildings) were at capacity with bagged material to be shipped.³⁹ As of September 2020, the cleanup of Pond 2 was again suspended due to insufficient funds, with over fifty 1-ton bags of the waste in on-site buildings awaiting shipment to the mill.⁴⁰ The anticipated completion date for phase 1 had come and gone on March 31, 2006.⁴¹

³³ "Revised Transportation Plan for FMRI, Inc. Phase 1 Remediation Project Muskogee, Oklahoma Facility." September 15, 2015. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2015_09_22_FMRI_Transportation_Plan.pdf. Accessed January 30, 2022.

³⁴ *Ibid.*, 2.

³⁵ *Ibid.*, 1.

³⁶ United States Nuclear Regulatory Commission. "FMRI – NRC Inspection Report 040-07580/2020-001." p. 3. October 2, 2020. <https://www.nrc.gov/docs/ML2028/ML20280A772.pdf>. Accessed January 30, 2022.

³⁷ United States Nuclear Regulatory Commission. "NRC Site Visit at FMRI, Muskogee, Oklahoma." May 9, 2014. <https://www.nrc.gov/docs/ML1413/ML14133A696.pdf>. p. 2. Accessed January 30, 2022.

³⁸ *Ibid.*

³⁹ *Ibid.*

⁴⁰ United States Nuclear Regulatory Commission. "FMRI – NRC Inspection Report 040-07580/2020-001." pp. 3-4. October 2, 2020. <https://www.nrc.gov/docs/ML2028/ML20280A772.pdf>. Accessed January 30, 2022.

⁴¹ FMRI, Inc. "Written Presentation of FMRI, Inc. in Opposition to the Written Presentation of the State of Oklahoma, In the Matter of: FMRI, Inc. (Muskogee, Oklahoma Facility)." p. 21. March 4, 2004. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/2004_03_04_Ltr_from_FMRI_re_Written_Presentation.pdf. Accessed January 30, 2022.

The future for the Fansteel site cleanup looks bleak, with inadequate funding continuing to be an issue. According to the Nuclear Regulatory Commission's 2020 annual report on the decommissioning program, the commission planned to work with the Oklahoma Department of Environmental Quality in 2021 to evaluate funding options for the decommissioning of the Fansteel site.⁴² One option would be to work with the EPA to determine whether the Fansteel site is eligible for cleanup funding as a Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).⁴³

As of December 2020, part of the former Fansteel property was for sale, an effort to raise funding for the still-languishing site cleanup.⁴⁴ The real estate listing noted the property's ideal location along the Arkansas River, adjacent to the Port of Muskogee,⁴⁵ and features an aerial video⁴⁶ of the property. The listing highlights that there are "no environmental issues" with the site.⁴⁷ If that's true, it's because Fansteel didn't try to sell the section of its property with "environmental issues," likely expecting that a buyer would not be found, even after some of those "issues" had been shipped off to White Mesa.

⁴² United States Nuclear Regulatory Commission. "Status of Decommissioning Program, 2020 Annual Report." p. 18. November 30, 2020. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/FMRI/Status_Decommissioning_Program_2020_Annual_Report.pdf. Accessed January 30, 2022.

⁴³ Ibid.

⁴⁴ Hillco Real Estate. "22+ Acre Industrial Property, 10 Tantalum Place Muskogee, OK 74403." <https://www.hilcorealestate.com/properties-for-sale/inventory?propertyId=industrial-ok-muskogee>. Accessed January 30, 2022.; United States Nuclear Regulatory Commission. "FMRI, Inc. (Fansteel)." <https://www.nrc.gov/info-finder/decommissioning/complex/fmri-fansteel-inc.html>. Accessed January 30, 2022.

⁴⁵ Ibid.

⁴⁶ Hillco Real Estate. "90± Acres (Three Parcels) Industrial Property." Vimeo, 2020. <https://vimeo.com/384612044>. Accessed January 30, 2022.

⁴⁷ Hillco Real Estate. "22+ Acre Industrial Property, 10 Tantalum Place Muskogee, OK 74403." <https://www.hilcorealestate.com/properties-for-sale/inventory?propertyId=industrial-ok-muskogee>. Accessed January 30, 2022.



MIDNITE MINE

Spokane Indian Reservation (Washington)

JED CONKLIN, THE
SPOKESMAN-REVIEW

- ▶ Uranium from the Midnite Mine was sold to the federal government for use in nuclear weapons.
- ▶ The Midnite Mine left a legacy of contamination that still haunts the Spokane Indian Reservation today; drinking water and eating fish from nearby creeks are classified as health hazards.
- ▶ When Dawn Mining Company was forced to clean up and dispose of waste from the Midnite Mine site, the company chose the cheapest option: the White Mesa Mill.
- ▶ The waste contains a number of known human carcinogens, including cadmium, chromium, lead.
- ▶ The burden of the Midnite Mine's toxic and radioactive pollution is borne by Indigenous communities at the waste's point of origin and at its final destination.

In 1954, two prospectors, twin brothers and members of the Spokane Tribe of Indians (also known as Sqeliz), discovered rocks with a sparkling green shimmer in the remote and pristine Selkirk Mountains of eastern Washington, on the Spokane Indian Reservation.¹ Their find began a decades-long story of uranium contamination and environmental injustice that still haunts the Spokane Tribe today. The last chapter of that story is currently unfolding on the ancestral lands of the Ute Mountain Ute Tribe (Weenuche and Paiute peoples) in southeastern Utah, more than 1,000 miles away.

Only a year after that initial discovery, Dawn Mining Company, a subsidiary of the mining conglomerate Newmont Corporation, constructed an open-pit uranium mine nearby. This mine, the Midnite Mine, sits fewer than 10 miles from the Spokane Tribe's headquarters in Wellpinit, Washington.² Dawn Mining Company operated the mine from 1954 until 1965, and again from 1969 to 1981,³ employing many tribal citizens to dig up millions of tons of earth to reach the radioactive uranium ore.⁴

¹ Kramer, Becky. "Radioactivity on the Spokane Reservation." Spokesman-Review. June 5, 2011. <https://www.spokesman.com/picture-stories/radioactivity-spokane-reservation/>. Accessed January 30, 2022.

² Denison Mines Corp. "Request to Amend Radioactive Materials License Denison Mines (USA) Corp. White Mesa Uranium Mill San Juan County, Utah and Environmental Report. Attachment 1." Attachment 1. April 2011. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/DawnMiningAltfeedinitialamendmentrequest_4_27_2011.pdf. Accessed January 27, 2022.

³ Ibid., 2.

⁴ Ibid.

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*So many of our people worked at the mines. They did so for survival, to take care of their families and their children. I don't think they knew what uranium does to us and our land.*⁵ – Carol Evans, Former Vice Chairwoman, Spokane Tribal Business Council

All told, approximately 38 million tons of earth were excavated and over 5 million tons of ore extracted.⁶

From there, the company processed the uranium ore into yellowcake—a concentrated uranium powder—at its nearby Dawn Mill in Ford, Washington,⁷ selling it to the Atomic Energy Commission for use in nuclear weapons. The Atomic Energy Commission transferred the yellowcake to the Hanford Site on the Columbia River, which manufactured plutonium used in the atomic bomb dropped on Nagasaki.⁸ In the mine's later years, Dawn Mining Company sold the uranium for nuclear power production, until falling uranium prices forced the company to officially cease operations in 1981.⁹



The Hanford Site. U.S. DEPARTMENT OF ENERGY

The Midnite Mine proved to be an environmental disaster, contaminating surrounding lands and waters and permanently scarring the Spokane Tribe's homelands.

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*Every time you pick up the paper and see that someone has died on the reservation, it's always cancer.*¹⁰ – Lois Stratton, Former Spokane City Councilwoman and Washington State Legislator

⁵ Kramer, Becky. "Spokane Tribe Members want more time to review the Midnite Mine cleanup plan." Spokesman-Review. April 28, 2016. <https://www.spokesman.com/stories/2014/apr/28/spokane-tribe-members-want-more-time-to-review/>. Accessed January 30, 2022.

⁶ URS Corp. "Midnite Mine Feasibility Study Report." p. 1-5, 5-113. September 2005. <https://semspub.epa.gov/work/10/500009634.pdf>. Accessed January 30, 2022.

⁷ Energy Fuels Resources Inc. "Statement of Basis, Radioactive Materials License No. UT 1900470." p. 1. August 2013. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/2013-08-DRC-Statement-of-Basis-RML-Am.pdf>. Accessed January 27, 2022.

⁸ Cornwall, Warren. "Radioactive Remains: The Forgotten Story of the Northwest's Only Uranium Mines." The Seattle Times. February 28, 2008. <https://www.seattletimes.com/pacific-nw-magazine/radioactive-remains-the-forgotten-story-of-the-northwests-only-uranium-mines/>. Accessed January 30, 2022.

⁹ Denison Mines Corp. "Request to Amend Radioactive Materials License Denison Mines (USA) Corp. White Mesa Uranium Mill San Juan County, Utah and Environmental Report." p. 2. April 2011. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/DawnMiningAltFeedinitialamendmentrequest_4_27_2011.pdf. Accessed January 27, 2022.

¹⁰ Thomas, Jake. "Ground Breaking: The Spokane Tribe's first female tribal chair seeks to change a toxic legacy." Inlander. August 12, 2015. <https://www.inlander.com/spokane/ground-breaking/Content?oid=2534840>. Accessed January 30, 2022.

Dawn Mining Company gouged several large holes into the ground and piled massive heaps of the radioactive earth that remained after ore extraction around the mine. Water that came into contact with these piles became contaminated and, in turn, contaminated soils, groundwater, and surface water.¹¹

In 1979, the company constructed a “pond” on the mine site to collect toxic water seeping from the waste-rock piles.¹² But the pond quickly filled up, so the company had to pump water from the pond into an open mining pit to avoid overflow.¹³ Years of pumping water, plus the accumulation of rain and surface-water runoff, resulted in hundreds of millions of gallons of heavily contaminated water, dangerously high in radioactivity and heavy metals, collecting in one of the mine’s pits.¹⁴ Due to the risks that this contaminated water presented to public health and the environment, the Midnite Mine was listed as a Superfund site in May 2000,¹⁵ a designation given to the most contaminated places in the country that the EPA is working to clean up.¹⁶



Lake Roosevelt National Recreation Area.
PHOTO ADAPTED FROM U.S. NATIONAL PARK SERVICE

In a 2010 assessment, the federal Agency for Toxic Substances and Disease Registry classified several activities as public health hazards, including using water from nearby Blue Creek (a tributary of the Spokane and Columbia rivers) for drinking or sweat lodge ceremonies, eating plants or roots that grow in the area, and eating fish from Blue Creek. These activities could expose people to metals and radionuclides.¹⁷

¹¹ Alexander, Rachel. “New Study Shows High Uranium Levels in some Wells in northeastern Washington.” Spokesman-Review. May 17, 2018. <https://www.spokesman.com/stories/2018/may/16/new-study-shows-high-uranium-levels-in-some-wells/>. Accessed January 30, 2022.

¹² URS Corp. “Midnite Mine Feasibility Study Report.” p. 1-6. September 2005. <https://semspub.epa.gov/work/10/500009634.pdf>. Accessed January 30, 2022.

¹³ Ibid.

¹⁴ Apple, Charles. “Midnite: A Spent Uranium Mine.” Spokesman-Review. December 2, 2019. <https://www.spokesman.com/stories/2019/dec/02/midnite-mine-radioactive-uranium-mine/>. Accessed January 30, 2022.

¹⁵ United States Environmental Protection Agency. “National Priorities List for Uncontrolled Hazardous Waste Sites.” Federal Register 65, no. 92, 30482. May 11, 2000. <https://www.govinfo.gov/content/pkg/FR-2000-05-11/pdf/00-11562.pdf>. Accessed January 30, 2022.

¹⁶ “What is Superfund?” United States Environmental Protection Agency. <https://www.epa.gov/superfund/what-superfund>. Accessed January 30, 2022.

¹⁷ Frieden, Thomas R. et al. “Public Health Assessment For Midnite Mine Site, Wellpinit, Stevens County, Washington, EPA Facility Id: Wad980978753.” Agency For Toxic Substances And Disease Registry. p. 1. May 19, 2010. <https://www.atsdr.cdc.gov/HAC/pha/MidniteMineSiteFinal/MM-FinalReleasePHAFINAL05172010ATSdrwebsite.pdf>. Accessed January 30, 2022.

ATSDR's public health conclusions about potential exposures to environmental contaminants at the Midnite Mine site are as follows:

- Exposure to site contaminants (metals or radionuclides) is a public health hazard for individuals who use the mining-affected area for traditional and subsistence activities. This category indicates that long-term exposure to site contaminants could cause harmful health effects. The specific activities associated with these exposures are as follows:
 - drinking water from drainages and seeps in the mining-affected areas;
 - breathing water vapor generated by heating water from drainages and seeps during sweat lodge ceremonies;
 - accidentally ingesting sediments along seeps and drainages in the mining-affected area;
 - eating terrestrial plants and roots in mining-affected area
 - eating aquatic plants from drainages in the mining-affected area or from Blue Creek;
 - eating fish from Blue Creek



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

The water collecting at the Midnite Mine needed to be cleaned up. So, the federal government ordered Dawn Mining to operate a water-treatment plant to drain and treat the water in the open pits before discharging it into nearby creeks and rivers.¹⁸ Yet even after treatment, toxic waste remained. For many years, that waste was disposed of on-site at the Dawn Mill.¹⁹ But under a state license, on-site waste disposal was allowed only until December 31, 2013.²⁰ At that point, Dawn Mining had to find somewhere else to dispose of the water-treatment waste. And here, the stories of the Midnite Mine and the White Mesa Mill intersect.

Dawn Mining Company made the decision to ship the waste to the White Mesa Mill for final disposal. Dawn Mining had considered disposing of the sludge at the Hanford Radioactive Waste Facility in Washington, but noted it was not reasonable or practical to do so due to the enormous expense.²¹ The White Mesa Mill was chosen because it was less expensive (although still costly) and because disposal on-site at the Midnite Mine was not allowed due to the objections of the Spokane Tribe.²²

¹⁸ URS Corp. "Midnite Mine Feasibility Study Report." p. 1-6. September 2005. <https://semspub.epa.gov/work/10/500009634.pdf>. Accessed January 27, 2022.

¹⁹ United States Environmental Protection Agency. "Midnite Mine Superfund Site Spokane Indian Reservation Washington Record of Decision." pp. 2-75. September 2006. <https://semspub.epa.gov/work/10/1218907.pdf>. Accessed January 27, 2022.


²⁰ Letter from Mikel Elsen, State of Washington Department of Health, to Robert Lewis, United States Nuclear Regulatory Commission, (discussing the Washington Department of Health's desire to approve extending sludge disposal through 2013 if the Department of Energy, Nuclear Regulatory Commission, and Northwest Regional Low-Level Radioactive Waste Compact concur). July 22, 2011 <https://www.nrc.gov/docs/ML1121/ML112140144.pdf>. Accessed January 27, 2022.; Letter from Terrence Reis, Division of Materials Safety and State Agreements Office of Federal and State Materials and Environmental Management Programs, to Mikel Elsen, State of Washington Department of Health (discussing the Nuclear Regulatory Commission's concurrence that the sludge disposal could continue through December 31, 2013). August 3, 2011. <https://www.nrc.gov/docs/ML1121/ML112140275.pdf>. Accessed January 27, 2022.

²¹ Letter from Robert E. Nelson, Dawn Mining Company, to Mikel Elsen, State of Washington Department of Health. p. 4. July 5, 2011. <https://www.nrc.gov/docs/ML1121/ML112140168.pdf>. Accessed January 27, 2022.

²² *Ibid.*, 5.

2. LIST ALL KNOWN AND POSSIBLE CHEMICAL COMPONENTS OR HAZARDOUS WASTE CHARACTERISTICS

	(Y)	(N)		(Y)	(N)		(Y)	(N)
a. Listed HW		X	b. "Derived-From" HW		X	c. Toxic		X
d. Cyanides		X	e. Sulfides		X	f. Dioxins		X*
g. Pesticides		X	h. Herbicides		X	i. PCBs		X*
j. Explosives		X*	k. Pyrophorics		X*	l. Solvents		X*
m. Organics		X	n. Phenolics		X*	o. Infectious		X*
p. Ignitable		X	q. Corrosive		X	r. Reactive		X
s. Antimony		X*	t. Beryllium	X		u. Copper	X	
v. Nickel	X		w. Thallium		X*	x. Vanadium		X*
y. Alcohols		X*	z. Arsenic		X	aa. Barium	X	
bb. Cadmium	X		cc. Chromium	X		dd. Lead	X	
ee. Mercury		X	ff. Selenium	X		gg. Silver	X	
hh. Benzene		X	ii. Nitrate	X		jj. Nitrite	X	
kk. Fluoride	X		ll. Oil	X	X	mm. Fuel		X
nn. Chelating Agents		X*	oo. Residue from water treatment	X				
pp. Other Known or Possible Materials or Chemicals	_____							

The chemical component identified above with an X* indicates that the WTP solids were not tested for this component but process knowledge indicates that these components would not be present in the WTP solids.
 Generator or Contractor Initials: 

Top: Chemical components of the Midnite Mine Superfund Site waste, according to the White Mesa Mill owner's application to process the material.

In April 2011, at the request of Dawn Mining Company, the White Mesa Mill applied for permission from the Utah Division of Waste Management and Radiation Control to process and dispose of up to 4,500 dry tons (9 million pounds) of Midnite Mine "alternate feed,"²³—bureaucratic jargon for the radioactive solids left over after the contaminated water is treated, referred to as "filtercake sludge."²⁴ Imagine solid bricks of brown radioactive waste and you wouldn't be far off. This sludge is chock full of hazardous substances and dangerous heavy metals including barium, beryllium, radium, cadmium, chromium, and lead, among others,²⁵ many of which, including cadmium, chromium, and lead, have a high degree of toxicity and are classified as human carcinogens.²⁶ The Midnite Mine waste is dangerous to humans, animals, and the environment. It can release harmful radiation, emit radon, contaminate water, and threaten the health and safety of workers transporting, processing, or disposing of it.



An example of filtercake. [PETER CRAVEN](#)

With the blessing of Utah state regulators, these dangers were trucked from the Spokane Indian Reservation to the doorstep of the Ute Mountain Ute Reservation at White Mesa, and in exchange, disposal fees went to the owner of the White Mesa Mill.²⁷ The 1,200-mile haul route traverses the

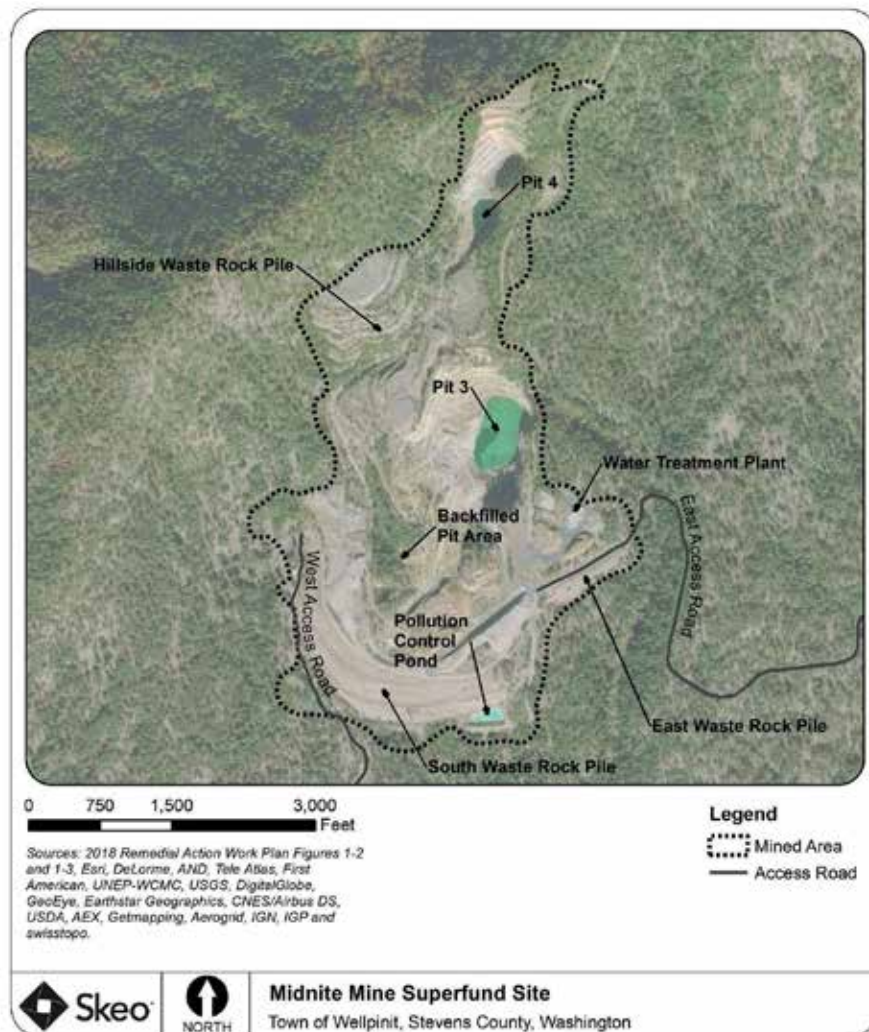
²³ Denison Mines Corp. "Request to Amend Radioactive Materials License Denison Mines (USA) Corp. White Mesa Uranium Mill San Juan County, Utah and Environmental Report." p. 5. April 2011. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/DawnMiningAltfeedinitialamendmentrequest_4_27_2011.pdf. Accessed January 27, 2022.

²⁴ Letter from Robert Nelson, Dawn Mining Company, to Mikel Elsen, State of Washington Department of Health. pp. 1, 15. July 5, 2011. <https://www.nrc.gov/docs/ML1121/ML112140168.pdf>. Accessed January 27, 2022.

²⁵ URS Corp. "Safety Evaluation Report for the Amendment Request to Process an Alternate Feed Material at White Mesa Mill from Dawn Mining Corporation Midnite Mine, Washington State." pp. 18-29. August 9, 2013. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/2013-08-09-DRC-DawnMining-SER.pdf>. Accessed January 27, 2022.

²⁶ Paul B Tchounwou et al. "Heavy Metals Toxicity and the Environment." National Institutes for Health. p. 1. August 2012. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4144270/pdf/nihms414261.pdf>. Accessed January 27, 2022.

²⁷ URS Corp. "Safety Evaluation Report for the Amendment Request to Process an Alternate Feed Material at White Mesa Mill from Dawn Mining Corporation Midnite Mine, Washington State." p. 14. August 9, 2013. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/2013-08-09-DRC-DawnMining-SER.pdf>. Accessed January 27, 2022.



2019 Five-Year Review Report map of Midnite Mine. U.S. ENVIRONMENTAL PROTECTION AGENCY

An estimated 5.3 million tons of ore and proto-ore (i.e. low-grade mineralized rock) and 33 million tons of waste rock were removed from nine pits between 1955 and 1981. All but two of the mine pits have been backfilled. The last two pits to be mined consisted of Pit 3 and Pit 4, these pits were not backfilled and remain open. Several reclaimed waste rock piles remain on the mine property and an estimated 2.4 million tons of ore and proto-ore were stockpiled and currently remain on the Site.

intermountain West, likely passing through Spokane, Missoula, Idaho Falls, Salt Lake City, and the Wasatch Front.²⁸ The trucks also travel through tourist hotspots like Coeur d’Alene and Moab before finally making their way to the White Mesa Mill.²⁹ Based on Dawn Mining Company’s estimates, as of 2020, shipments were to be sent to the mill two to three times per week for the months of April through October, when

²⁸ Letter from JoAnn Tischler, Energy Fuels Resources, to Rusty Lundberg, Utah Division of Radiation Control. “Re: White Mesa Uranium Mill - RML UT1900479 April 27,2011 Request to Amend Radioactive Materials License to Allow Processing of Alternate Feed Materials from Dawn Mining Company’s Midnite Mine Water Treatment Plant (“WTF”) Response to January 22, 2013 and January 23,2013 Utah Division of Radiation Control Requests for Information.” Figure 1. June 14, 2013. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/2013-06-14-%20Ltr-EFR-Responding-DRC-Reqs-for-Info.pdf>. Accessed January 27, 2022. Note: The route for Utah is provided by Energy Fuels, but the remainder of the route through Washington, Montana, and Idaho is not. Assumed route through those states based on the fastest route according to Google Maps.

²⁹ Ibid.



An example of SuperSaks. U.S. DEPARTMENT OF ENERGY

the water treatment plant is active.³⁰ Hundreds of trucks have traveled this route since 2014, when Utah regulators licensed the mill to receive the Midnite Mine's waste.³¹ Forty-three shipments were made during the 2019 season alone.³²

The waste is shipped in "SuperSaks"—bulk containers made of flexible, woven fabric.³³ Once at the mill, the SuperSaks of waste are stored on-site until the waste is processed for its trace uranium content. In 2019, 300 SuperSaks were shipped to and stored at the mill for processing.³⁴

³⁰ Worthington Miller Environmental LLC. "Residuals Management Plan for the Midnite Mine Water Treatment Plant, Revision 16." p. 9. April 2020. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/Residuals_Management_Plan_Rev_16.pdf. Accessed January 30, 2022.

³¹ Utah Department of Environmental Quality. "License Amendment 7 to Radioactive Materials License Number UT 1900479." July 10, 2014. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Cabot/2014-07-10-RML-UT-1900479-Am7.pdf>. Accessed January 30, 2022.

³² Worthington Miller Environmental LLC. "Midnite Mine Monthly Report – May 2019." (5 shipments in May), p. 2. June 10, 2019 <https://semspub.epa.gov/work/10/100155076.pdf>. Accessed January 30, 2022.; "Monthly Report – June 2019." (6 shipments in June), p. 2. July 10, 2019. <https://semspub.epa.gov/work/10/100161021.pdf>. Accessed January 30, 2022.; "Monthly Report – July 2019." (8 shipments in July), p. 2. August 9, 2019, <https://semspub.epa.gov/work/10/100222314.pdf>. Accessed January 30, 2022.; "Monthly Report – August 2019." (6 shipments in August), p.2. September 10, 2019. <https://semspub.epa.gov/work/10/100172217.pdf>. Accessed January 30, 2022.; "Monthly Report – September 2019." (4 shipments in September), p. 2. October 10, 2019. <https://semspub.epa.gov/work/10/100222329.pdf>. Accessed January 30, 2022.; "Monthly Report – October 2019." (9 shipments in October), p. 2. November 8, 2019. <https://semspub.epa.gov/work/10/100222331.pdf>. Accessed January 30, 2022.; "Monthly Report – November 2019." (5 shipments in November), p. 2. December 10, 2019. <https://semspub.epa.gov/work/10/100222340.pdf>. Accessed January 30, 2022.

³³ Worthington Miller Environmental LLC. "Residuals Management Plan for the Midnite Mine Water Treatment Plant, Revision 16." p. 8. April 2020. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Dawn/Residuals_Management_Plan_Rev_16.pdf. Accessed January 30, 2022.

³⁴ Worthington Miller Environmental LLC. "Midnite Mine Monthly Report – May 2019." (35 SuperSaks in May), p. 2. June 10, 2019. <https://semspub.epa.gov/work/10/100155076.pdf>. Accessed December 10, 2021; "Monthly Report – June 2019." (42 SuperSaks in June), p. 2. July 10, 2019. <https://semspub.epa.gov/work/10/100161021.pdf>. Accessed December 10, 2021; "Monthly Report – July 2019." (56 SuperSaks in July), p. 2. August 9, 2019. <https://semspub.epa.gov/work/10/100222314.pdf>. Accessed December 10, 2021; "Monthly Report – August 2019." (42 SuperSaks in August), p. 2. September 10, 2019. <https://semspub.epa.gov/work/10/100172217.pdf>. Accessed January 30, 2022.; "Monthly Report – September 2019." (28 SuperSaks in September), p. 2. October 10, 2019. <https://semspub.epa.gov/work/10/100222329.pdf>. Accessed January 30, 2022.; "Monthly Report – October 2019." (63 SuperSaks in October), p. 2. November 8, 2019. <https://semspub.epa.gov/work/10/100222331.pdf>. Accessed January 30, 2022.; "Monthly Report – November 2019." (34 SuperSaks in November), p.2. December 10, 2019. <https://semspub.epa.gov/work/10/100222340.pdf>. Accessed January 30, 2022.

Shipments continued through at least September 2021.³⁵ Then, on December 2, 2021, the EPA barred the White Mesa Mill from accepting waste from Superfund sites like the Midnite Mine after determining that the mill was not disposing of that waste safely. The EPA cited an “egregious” violation that resulted, by the agency’s estimates, in a tenfold increase in radon emissions from waste discarded in the mill’s pits that was not properly covered.³⁶ In July 2022, the EPA walked back its decision to stop the flow of radioactive Superfund waste to the mill, allowing shipments to resume as long as the processed waste is not discarded in the improperly covered pit.³⁷

Decades after Midnite Mine closed its doors, the federal government still cautioned people not to hunt or gather food in the surrounding areas due to the radioactivity present in berries, plants, fish, and other wildlife.³⁸ Long after the uranium was dug up and trucked away, Dawn Mining is still cleaning up the mess, hundreds of acres of forest are forever lost, and Spokane tribal members continue to suffer health effects.

“

*I watch them die, young and old. I think it’s caused by the radiation.*³⁹

– Harold Campbell, Former Uranium Miner and Volunteer Gravedigger

*They needed that uranium. They needed it for the Cold War. We, the people, were expendable. That was the attitude of the U.S. government.*⁴⁰ – Clyde Lynn, Former Uranium Worker and former Spokane Tribal Judge

The Spokane Tribe and their reservation have been irreversibly scarred by the mine and its waste, but now, the problem has been exported from one tribal community to another, and the Utes of White Mesa will have to live beside that radioactive waste instead.

³⁵ Worthington Miller Environmental LLC. “Midnite Mine Monthly Report – September 2021; Midnite Mine Superfund Site, Spokane Indian Reservation, WA, RD/RA Consent Decree, No. CV-05-020-JLQ.” p. 2. October 6, 2021. <https://semspub.epa.gov/work/10/100364166.pdf>. Accessed January 30, 2022.

³⁶ United States Environmental Protection Agency, Region 8. Letter from Janice A. Pearson, Branch Chief, RCRA/OPA Enforcement Branch, to Mr. Mark Chalmers, President and CEO, Energy Fuels Resources (USA), Inc. “Re: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Off-Site Policy Unacceptability Notice, White Mesa Mill, Air Quality Approval Order DAQE- AN0112050018-11, Groundwater Discharge Permit No. UGW370004, Radioactive Materials License No. UT1900479.” pp. 1-2. December 2, 2021. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/WhiteMesaMill-CERCLA-OSR-UnacceptabilityNotice-12-02-2021.pdf>. Accessed January 29, 2022.

³⁷ Letter from Kathleen Becker, regional administrator, United States Environmental Protection Agency, Region 8, to Mark Chalmers, Energy Fuels Resources (USA) Inc. re: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Off-Site Rule Unacceptability Final Determination, White Mesa Mill, Air Quality Approval Order DAQE-AN01 12050018-11, Groundwater Discharge Permit No. UGW370004, Radioactive Materials License No. UT1900479. July 18, 2022. <https://www.grandcanyontrust.org/sites/default/files/resources/EPA-final-White-Mesa-Mill-CERCLA-unsuitablility-determination-7-18-22.pdf>. Accessed May 11, 2023.

³⁸ Kramer, Becky. “Spokane Tribe Members Worked Gladly in Uranium Mines.” Spokesman-Review. June 5, 2011. <https://www.spokesman.com/stories/2011/jun/05/i-watch-them-die-young-and-old/>. Accessed January 30, 2022.

³⁹ Ibid.

⁴⁰ Ibid.



SEQUOYAH FUELS CORP.
CIMARRON FACILITY
SUBSIDIARY OF KERR MCGEE CORP.

Cherokee Nation (Gore, Oklahoma)

JIMARGO

- ▶ An explosion at the Sequoyah Fuels plant killed and injured workers and closed a nearby highway.
- ▶ The state of Oklahoma licensed treated radioactive by-products of uranium processing at the plant to be used as fertilizer.
- ▶ The Cherokee Nation successfully lobbied to have waste from the Sequoyah Fuels facility moved in order to protect Cherokee citizens from radioactive contamination. The White Mesa Mill became the destination for this waste.

“

[The] Cherokee Nation Attorney General's office and Secretary of Natural Resources office collaborated with the Oklahoma Attorney General's office to undertake this immense task. This material is no longer a ticking time bomb on the banks of two of our most precious natural resources – waterways along the Arkansas and Illinois rivers. Our tribe's natural resources remain protected, and the 41,000 residents of Sequoyah County will no longer be in harm's way. The radioactive waste has been transported to a disposal site in Utah, where the uranium will be recycled and reused.¹ – Cherokee Nation Principal Chief Bill John Baker

¹ Baker, Bill John. "Bill John Baker: Cherokee Nation Celebrates Removal Of Nuclear Waste". Indianz.com. January 11, 2019. <https://www.indianz.com/News/2019/01/11/bill-john-baker-cherokee-nation-celebrat.asp>. Accessed January 30, 2022.



Texas Parks & Wildlife, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

The “ticking time bomb” Chief Baker references included 16,700 tons (33.4 million pounds) of radioactive by-products left behind at the Sequoyah Fuels Corporation uranium-conversion plant,² 10,972 tons (nearly 22 million pounds) of which would ultimately end up at the White Mesa uranium mill in southeastern Utah.³ The Sequoyah Fuels facility is located near the confluence of the Illinois and Arkansas rivers in eastern Oklahoma, on Cherokee Nation lands.⁴ From 1970 to 1993, Sequoyah Fuels, a



Sequoyah Fuels Corp. in 1983. [OKLAHOMA HISTORICAL SOCIETY](https://www.oklahomahistorical.com/)

subsidiary of the Kerr-McGee Corporation, purified and converted concentrated uranium ore (known as “yellowcake”) at the plant, turning it into uranium hexafluoride (a gas used to create nuclear fuel rods), a key step in the nuclear fuel chain necessary to produce nuclear power. From 1987 until 1993, the plant also converted uranium hexafluoride into uranium tetrafluoride; each process created distinct waste streams.⁵

The plant was constructed on a 600-acre site and began production with more than 300 employees,⁶ many of them Cherokee Nation tribal members living nearby in Gore, Oklahoma.⁷ In the 1970s, the Sequoyah Fuels facility was one of only two plants in the United States that converted uranium concentrates to uranium hexafluoride.⁸

² URS Professionals Solutions, LLC. “Safety Evaluation Report for Amendment Request to Process an Alternate Feed (The SFC Uranium Material) at White Mesa Mill from Sequoyah Fuels Corporation, Gore, Oklahoma. Energy Resources (USA) Inc. (EFRI) (Formerly Known as Denison Mines [USA] Corp) White Mesa Uranium Mill, San Juan County, Utah.” p. 1. May 1, 2015. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2017-002764.pdf>. Accessed January 30, 2022.

³ United States Nuclear Regulatory Commission. “Sequoyah Fuels Corporation.” March 24, 2021. <https://www.nrc.gov/info-finder/decommissioning/uranium/sequoyah-fuels-corporation-sfc.html>. Accessed January 30, 2022.

⁴ Brugge, Doug, et al. “The Sequoyah Fuels Release and the Church Rock Spill: Unpublicized Nuclear Releases in American Indian Communities” *American Journal of Public Health*. p. 1596. September, 2007. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1963288/pdf/0971595.pdf>. Accessed January 30, 2022.

⁵ Letter from John H. Ellis, Sequoyah Fuels Corporation, to Larry Camper, Utah Division of Waste Management, referenced re: requesting review of Sequoyah Fuels Corporation’s waste designation. Enclosure 1. p. 5. January 5, 2001. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2002-001002.pdf>. Accessed January 30, 2022.

⁶ Bostian, Kelly. “‘It’s all gone’: Tons of Sequoyah Fuels nuclear waste taken to Utah mill as Cherokee Nation, state officials celebrate” *Tulsa World*. November 30, 2018. https://tulsa-world.com/news/local/its-all-gone-tons-of-sequoyah-fuels-nuclear-waste-taken-to-utah-mill-as-chokeee/article_a232a0dd-8d43-5ea6-a197-f732e079c43d.html. Accessed January 30, 2022.

⁷ Baker, Bill John. “Bill John Baker: Cherokee Nation Celebrates Removal of Nuclear Waste.” *Indianz.com*. January 11, 2019. <https://www.indianz.com/News/2019/01/11/bill-john-baker-chokeee-nation-celebrat.asp>. Accessed January 20, 2022.

⁸ United States Nuclear Regulatory Commission. “Rupture of Model 48Y UFs Cylinder and Release of Uranium Hexafluoride, Vol. 1.” p. 2. January 4, 1986. <https://www.nrc.gov/docs/ml1221/ML12214A415.pdf>. Accessed January 20, 2022.

During its operations, the Sequoyah Fuels facility spilled radioactive materials that contaminated water and soils with varying levels of uranium.⁹ Liquid raffinate waste (a by-product of uranium processing) and sludge that had been leaking into groundwater since at least May 1974 eventually discharged into the Illinois and Arkansas rivers,¹⁰ which run through Cherokee tribal lands.

The problem of dealing with radioactive waste led the Nuclear Regulatory Commission, in the mid-1970s, to give Kerr McGee permission to test the prospect of using treated raffinate as fertilizer.¹¹ The company conducted a chemical analysis and found that the treated raffinate contained “trace amounts of radioactive uranium, radium, thorium, some toxic solvents and at least 18 potentially poisonous heavy metals, including arsenic, lead, mercury, molybdenum, nickel, cobalt, and cadmium.”¹² Nonetheless, the treated raffinate was licensed as fertilizer by the Oklahoma State Department of Agriculture in 1986.¹³ The next year, the company sprayed the raffinate over a 10,000-acre hayfield.¹⁴

Within the area of land sprayed with raffinate, the company grew over 18,000 tons (36 million pounds) of hay, which was then purchased by local ranchers and farmers.¹⁵ More than 1,100 cattle grazed on the property as well, and, in 1987, 350 calves were sold to the public.¹⁶ The meat and milk of livestock that were exposed to and fed the raffinate-sprayed hay were not tested by the state of Oklahoma for radioactivity and heavy metals.¹⁷ Sequoyah Fuels ran “one of the largest waste-to-fertilizer operations in the United States and the only one that recycle[d] radioactive wastes for use in agriculture.”¹⁸

As the raffinate fertilizer program became more visible, groups like Native Americans for a Clean Environment began to push back.¹⁹ They urged the government to stop the program in light of unexplained deaths and birth defects in animals, including the discovery of a nine-legged frog. Sequoyah Fuels repeatedly denied that its raffinate fertilizer program had detrimental impacts to the environment and public health.²⁰

⁹ Letter from John H. Ellis, Sequoyah Fuels Corporation, to Larry Camper, U.S. Nuclear Regulatory Commission, Division of Waste Management, referenced re: requesting review of Sequoyah Fuels Corporation’s waste designation. Enclosure 1. p. 8. January 5, 2001. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2002-001002.pdf>. Accessed June 1, 2021.

¹⁰ Phillips, Richard Hayes. “The Kerr-McGee Uranium Processing Facility Near Gore, Oklahoma: A Case Study in Radioactive Waste Management, Revised and Updated Edition.” p. 2. July 8, 1985. <https://www.nrc.gov/docs/ML2013/ML20135H598.pdf>. Accessed June 1, 2021.

¹¹ Schneider, Keith. “Converted Radioactive Waste Used to Fertilize in Oklahoma”. New York Times. November 16, 1987. <https://www.nytimes.com/1987/11/16/us/converted-radioactive-waste-used-to-fertilize-in-oklahoma.html>. Accessed January 20, 2022.

¹² Schneider, Keith. “Converted Radioactive Waste Used to Fertilize in Oklahoma”. New York Times. November 16, 1987. <https://www.nytimes.com/1987/11/16/us/converted-radioactive-waste-used-to-fertilize-in-oklahoma.html>. Accessed January 20, 2022.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

Nuclear waste may feed cattle

GORE, Okla. (UPI) — In the shadow of one of the country's only two uranium conversion plants, cattle ranch grass fertilized with a chemical byproduct from the plant.

Kerr-McGee Nuclear Corp., operator of the Sequoyah Facility, has a problem — what to do with the 7.2 million gallons of radioactive waste generated at the plant each year?

The solution being tested here may result in more cattle feed for ranchers and put the company, a subsidiary of KerrMcGee Oil Co., in the fertilizer business.

The Sequoyah plant converts refined uranium ore, delivered by an underground pipeline in slurry form from mines in New Mexico, into uranium hexafluoride for processing as nuclear fuel. In the process, large amounts of nitric acid are used to dissolve the ore, known as yellow cake.

The residue from the process, called raffinate, is a watery sludge with a high nitrogen content. Barium chloride is added to the raffinate to reduce radioactivity before it is stored in large concrete-lined holding ponds.

Kerr-McGee scientists say the barium chloride treatment reduces the radioactivity of the raffinate to less than three picocuries per liter. By comparison, the Environmental Protection Agency considers five picocuries per liter safe for drinking water.

"Before 1978, we just neutralized the raffinate and stored it in the ponds," Donna McFarland, Kerr-McGee public relations manager, said. "It's about 75 percent liquid, and it seeps up pretty quickly."

Barnell Brown, Kerr-McGee general manager for manufacturing, said company scientists knew if ammonia was added to the waste liquid, they could create large amounts of the chemical fertilizer ammonium nitrate.

In 1978, Kerr-McGee and Oklahoma State University agriculture experts, with Nuclear Regulatory Commission approval, developed a pilot program of applying the ammonium nitrate produced from the neutralized raffinate to about 300 acres of pasture land near the plant.

"For about five years, we used the fertilizer to grow hay," Mrs. McFarland said. "It really increased the tonnage. Then in 1978, we introduced cattle onto the land to see what effect feeding off the fertilized hay would have. Last November, some of the cattle were slaughtered and they received a clear bill of health."

Dr. E.L. Stair, chief veterinary pathologist at the Oklahoma Animal Disease Diagnostic Laboratory in Stillwater, confirmed the tests.

Dr. Stair said tissue and blood sample from the cattle and a control group near the

plant showed all levels of heavy metals and radioactive substances were normal.

"There was no difference in the cattle raised on the raffinate fertilized hay than cattle raised any place else in the state," Dr. Stair said.

Kerr-McGee, armed with the test data, applied in mid-April to the NRC for permission to expand the test area to 600 acres, William Shelby, the firm's nuclear regulation and control director, said.

"The expanded acreage would allow us to dispose of a lot of the liquid waste," Shelby said. "Eventually, we'd like to be able to market the fertilizer commercially or at least be able to sell the hay."

Since the April application, however, the EPA has decided the process will require an Environmental Impact Statement and further delays are anticipated, Shelby said.

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Sapulpa Daily Herald, July 25, 1980.



Sapulpa Daily Herald, January 6, 1986.

“

What's happened here is that Kerr McGee believes it's found the ultimate in cheap disposal of nuclear wastes.²¹ – Jessie Deer In Water, Chairwoman, Native Americans for a Clean Environment

On January 4, 1986, a few months before the Chernobyl Nuclear Power Plant disaster, a cylinder containing uranium hexafluoride gas, weighing at least 29,500 pounds, ruptured at the Sequoyah Fuels plant.²² The explosion created a toxic cloud that killed one worker and blew into the surrounding area, leading the Oklahoma Highway Patrol to close a major interstate.²³ The accident sent about 25 people to the hospital.²⁴ The cylinder had been grossly overfilled and ruptured while it was being heated.²⁵ The plant closed but reopened that same year, with the Nuclear Regulatory Commission's approval.²⁶

This tragedy prefigured the plant's demise. In August 1990, the Nuclear Regulatory Commission began monitoring the Sequoyah Fuels plant when plant workers discovered water in storage tanks that exceeded federal limits for uranium contamination by 35,000 times. After a string of safety violations that shut down the plant three times in six years, the Nuclear Regulatory Commission finally ordered the plant to close in October 1991, also alleging that information about uranium contamination was withheld by a plant manager.²⁷

In November 1992, Sequoyah Fuels Corporation gave the Nuclear Regulatory Commission notice that it had permanently stopped production at its Gore, Oklahoma plant and that all uranium hexafluoride-tetrafluoride operations would

²¹ Ibid.

²² United States Nuclear Regulatory Commission. "Rupture of Model 48Y UF6 Cylinder and Release of Uranium Hexafluoride, Vol.1." pp. 1, 3-5, 5-2. January 4, 1986. <https://www.nrc.gov/docs/ml1221/ML12214A415.pdf>. Accessed January 20, 2022.

²³ United States Nuclear Regulatory Commission, Ad Hoc Interagency Public Health Assessment Task Force. "Assessment of the Public Health Impact From the Accidental Release of UF6 at the Sequoyah Fuels Corporation Facility at Gore, Oklahoma, Vol. 2." p. 21. March 1986. <https://www.nrc.gov/docs/ML0700/ML070090059.pdf>. Accessed January 20, 2022.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Rowley, Sean. "Sequoyah Fuels legal battle is decades old". Tahlequah Daily Press. December 23, 2017. https://www.tahlequahdaily.com/news/sequoyah-fuels-legal-battle-is-decades-old/article_6d119181-1605-514a-b1b2-383be7226fac.html. Accessed January 20, 2022.

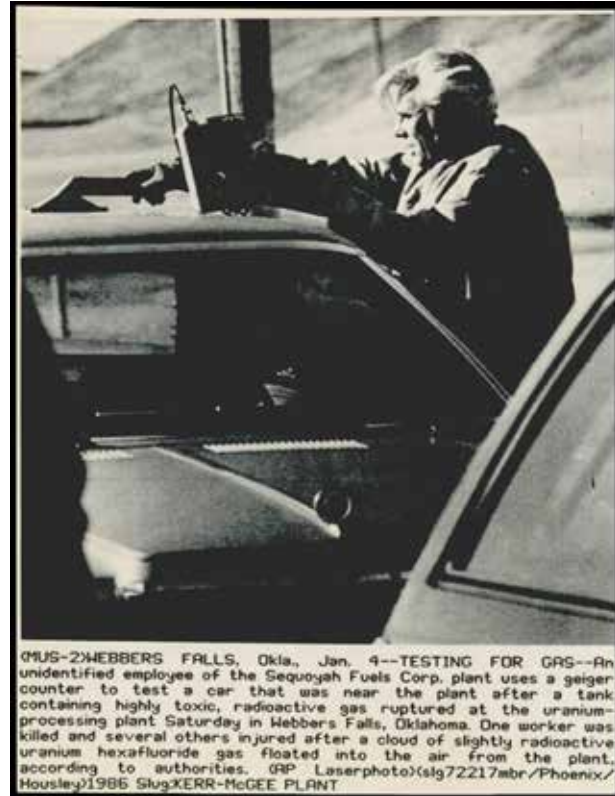
²⁷ "Sequoyah Fuels Close Uranium Plant" The Associated Press. November 23, 1992. <https://apnews.com/article/ae56a8316c4e5cb9ba9bfb25535efb3>. Accessed June 1, 2021.

conclude by July 1993.²⁸ According to the Nuclear Regulatory Commission, some of the “waste and contamination at the site was known to exceed the NRC’s radiological criteria for decommissioning.”²⁹ This exceedance required that the site be remediated.³⁰

In 1998 and 1999, Sequoyah Fuels submitted plans to reduce residual radioactivity at the site.³¹ To aid in decommissioning the site, the Nuclear Regulatory Commission determined in 2002 that the majority of the waste at the site could be classified as “byproduct material defined in Section 11e.(2) of the Atomic Energy Act.”³² Though not apparent at the time, this classification opened a door that would eventually allow shipment of the material to the White Mesa Mill.

In the meantime, a contentious legal conflict erupted among the Cherokee Nation, the state of Oklahoma, and Sequoyah Fuels over how and where to dispose of the site’s radioactive raffinate sludge, and how to address groundwater contamination.³³ Initially, Sequoyah Fuels wanted to bury the raffinate waste on-site. In response, the state of Oklahoma and the Cherokee Nation sued Sequoyah Fuels³⁴ and submitted hearing requests to the Nuclear Regulatory Commission to contest the company’s reclamation plan.³⁵ In 2004, the parties reached a settlement. Sequoyah Fuels agreed to spend as much as \$3.5 million to remove uranium-contaminated sludge.³⁶

For the next decade, Sequoyah Fuels searched for someplace to send the materials. In part, the high levels of thorium and uranium in the waste made it hard to find a low-level radioactive waste disposal facility willing to take it.³⁷ Some of the facilities that were identified but were not ultimately viable included one in Cañon City, Colorado which ceased operations in 2006, and the Pathfinder Company in Wyoming, a



Cleanup crews, called “uranium scrubbers,” test for uranium contamination after the January 4 incident. OKLAHOMA HISTORICAL SOCIETY

²⁸ United States Nuclear Regulatory Commission. “Environmental Impact Statement for the Reclamation of the Sequoyah Fuels Corporation Site in Gore, Oklahoma, Final Report.” p. xix. May 2008. <https://www.nrc.gov/docs/ML0813/ML081300103.pdf>. Accessed January 30, 2022.

²⁹ Ibid., 1-3.

³⁰ Ibid.

³¹ United States Nuclear Regulatory Commission. “Sequoyah Fuels Corporation.” March 24, 2021. <https://www.nrc.gov/info-finder/decommissioning/uranium/sequoyah-fuels-corporation-sfc.html>. Accessed January 20, 2022.

³² Ibid.

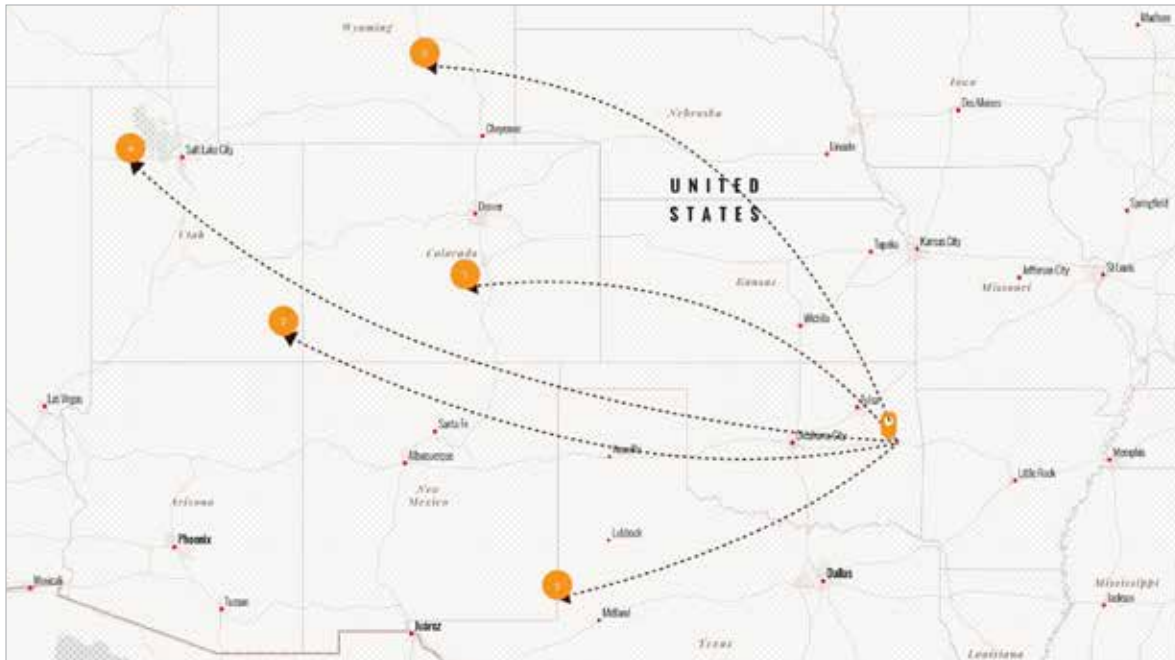
³³ Bostian, Kelly. “It’s all gone: Tons of Sequoyah Fuels nuclear waste taken to Utah mill as Cherokee Nation, state officials celebrate” Tulsa World. November 30, 2018. https://tulsaworld.com/news/local/its-all-gone-tons-of-sequoyah-fuels-nuclear-waste-taken-to-utah-mill-as-choerokee/article_a232a0dd-8d43-5ea6-a197-f732e079c43d.html. Accessed January 30, 2022.

³⁴ United for Oklahoma. “Tribe Helps Drive Nuclear Waste Removal.” <https://www.unitedforoklahoma.com/stories/sequoyah-fuels/>. Accessed January 20, 2022.

³⁵ United States Nuclear Regulatory Commission. “Environmental Impact Statement for the Reclamation of the Sequoyah Fuels Corporation Site in Gore, Oklahoma, Final Report.” p. 1-4. May 2008. <https://www.nrc.gov/docs/ML0813/ML081300103.pdf>. Accessed January 20, 2022.

³⁶ Ibid.

³⁷ Letter from John H. Ellis, Sequoyah Fuels, to Clayton Eubanks, Oklahoma Attorney General’s Office, and Sara Hill, Cherokee Nation Office of the Attorney General. “Re: Sequoyah Fuels Corporation Onsite Disposal.” p. 1. July 24, 2015. <https://www.nrc.gov/docs/ML1522/ML15225A452.pdf>. Accessed January 30, 2022.



Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

former uranium mill and mine, which was unable to accept the material because of the high thorium-230 concentrations.³⁸ The EnergySolutions facility, an hour west of Salt Lake City, Utah, could not take the waste because it had uranium in concentrations greater than the facility was licensed to accept.³⁹ Waste Control Specialists, a hazardous-waste facility in Texas was considered as well, but it could not accept the wastes because it was licensed to dispose of wastes of this nature from only a single site, the Department of Energy's Fernald uranium production facility in Ohio. Waste Control Specialists refused to seek special authorization from the state of Texas to accept the raffinate sludge, despite Sequoyah Fuels' urging.⁴⁰

Sequoyah Fuels had also long been eyeing the White Mesa Mill as a disposal site for the raffinate sludge.⁴¹ The sludge contained not only residual amounts of uranium, but also thorium, arsenic, beryllium, lead, and barium at concentrations higher than in typical uranium mill tailings and uranium ores processed at the mill.⁴² To process and discard it, the mill's owner needed a special license from Utah state regulators. But getting a license was delayed by a years-long process to renew the mill's main operating license.⁴³

So in 2015, Sequoyah Fuels notified the Cherokee Nation and the state of Oklahoma that it could not find a suitable place to send the sludge and that it intended to bury the sludge on site following a plan the Nuclear Regulatory Commission had approved.⁴⁴ Yet the standoff with the Cherokee Nation and the state of Oklahoma continued for two more years before the nation and the state obtained a restraining order

³⁸ Ibid., 1-2.

³⁹ Ibid.

⁴⁰ Ibid., 3.

⁴¹ Ibid., 2.

⁴² URS Professionals Solutions, LLC. "Safety Evaluation Report for Amendment Request to Process An Alternate Feed (the SFC Uranium Material) At The White Mesa Mill From Sequoyah Fuels Corporation, Gore, Oklahoma." p. 1. May 1, 2015. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2017-002764.pdf>. Accessed January 30, 2022.

⁴³ Letter from John H. Ellis, Sequoyah Fuels, to Clayton Eubanks, Oklahoma Attorney General's Office, and Sara Hill, Cherokee Nation Office of the Attorney General. "Re: Sequoyah Fuels Corporation Onsite Disposal." p. 2. July 24, 2015. <https://www.nrc.gov/docs/ML1522/ML15225A452.pdf>. Accessed January 20, 2022.

⁴⁴ Ibid., 1.

to prevent on-site disposal.⁴⁵ After a year of weekly meetings in Tulsa, the impasse was resolved when state regulators in Utah granted the White Mesa Mill permission to accept the Sequoyah Fuels waste.⁴⁶ When Sequoyah Fuels' waste-removal funding then fell short, the state of Oklahoma and the Cherokee Nation added more than \$1 million to make sure that the toxic and radioactive raffinate sludge would be hauled away.⁴⁷

Shipments commenced, and "by December 5, 2018, the last of 12,644 bags containing a total of 10,972 (21.9 million pounds) tons of waste was shipped to the Energy Fuels White Mesa Mill."⁴⁸ After the mill processed the Sequoyah Fuels sludge to extract the uranium—about 1 percent⁴⁹ of the sludge by weight—remaining waste would be permanently disposed of in the mill's waste ponds.⁵⁰

“

*Decommissioning this plant was never enough to satisfy our goals for a clean and safe environment...removal of this highly contaminated waste was our goal all along.*⁵¹ – Sara Hill, Secretary of Natural Resources, Cherokee Nation

Across the United States, tribal lands are disproportionately impacted by the nuclear fuel chain.⁵² And although the Cherokee Nation celebrated the long, hard-won victory to remove the Sequoyah Fuels waste from its tribal lands, the radioactive waste is now housed next door to the Ute Mountain Ute Tribe's White Mesa community, whose reservation is located only a few miles from the White Mesa Mill. The radioactive burden of the Sequoyah Fuels waste has merely shifted from one tribal community to another.

Yolanda Badback, a Ute Mountain Ute tribal member and co-founder of the local advocacy group, White Mesa Concerned Community, which works to protect White Mesa from the mill's pollution, acknowledged that the Cherokee are safer, but drew attention to the potentially hazardous outcomes for her community.⁵³ The community of White Mesa's groundwater is buried deep beneath the mill's waste pits,

⁴⁵ Order Granting Temporary Restraining Order. "State of Oklahoma and Cherokee Nation v. Sequoyah Fuels Corporation." District Court of Sequoyah County. February 9, 2017. <https://theonefeather.com/library/uploads/2017/02/CN-vs-SFC-order-02.09.17.pdf>. Accessed June 1, 2021.

⁴⁶ Bostian, Kelly. "It's all gone: Tons of Sequoyah Fuels nuclear waste taken to Utah mill as Cherokee Nation, state officials celebrate" Tulsa World. November 30, 2018. https://tulsaworld.com/news/local/its-all-gone-tons-of-sequoyah-fuels-nuclear-waste-taken-to-utah-mill-as-chokeee/article_a232a0dd-8d43-5ea6-a197-f732e079c43d.html. Accessed January 30, 2022.

⁴⁷ United for Oklahoma. "Tribe Helps Drive Nuclear Waste Removal." <https://www.unitedforoklahoma.com/stories/sequoyah-fuels/>. Accessed January 20, 2022.

⁴⁸ United States Nuclear Regulatory Commission. "Sequoyah Fuels Corporation." March 24, 2021. <https://www.nrc.gov/info-finder/decommissioning/uranium/sequoyah-fuels-corporation-sfc.html>. Accessed January 20, 2022.

⁴⁹ URS Professionals Solutions, LLC. "Safety Evaluation Report for Amendment Request to Process An Alternate Feed (the SFC Uranium Material) At The White Mesa Mill From Sequoyah Fuels Corporation, Gore, Oklahoma." p. 14. May 1, 2015. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2017-002764.pdf>. Accessed January 30, 2022.

⁵⁰ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Memo re: Inspection of receipt of Sequoyah Fuels Alternate Feed; Radioactive Materials License Number UTI900479 (RML. Energy Fuels Resources, Inc. (EFR) White Mesa Mill, Blanding, Utah." p. 11. April 5, 2018. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/SequoyahFuels/2018-04-05-DWMRC-Inspection-Report-Sequoyah-Fuels-Alternate-Feed.pdf>. Accessed January 30, 2022.

⁵¹ Chastain, Lindsey. "Years in the making: radioactive waste removed from Cherokee Nation." Tulsa World. January 25, 2019. https://tulsaworld.com/community/skiatook/opinion/years-in-the-making-radioactive-waste-removed-from-chokeee-nation/article_aded2af1-77de-53f3-9005-4c7583700ef8.html. Accessed January 20, 2022.

⁵² Public Citizen. "Radioactive Racism: The History of Targeting Native American Communities with High-Level Atomic Waste Dumps." p. 1. <https://www.nirs.org/wp-content/uploads/radwaste/scullvalley/historynativecommunitiesnuclearwaste06142005.pdf>. Accessed January 30, 2022.

⁵³ Mimiaga, Jim. "White Mesa Mill Accepts Cherokee Nation Radioactive Waste." Durango Herald. December 22, 2018. <https://durangoherald.com/articles/255888>. Accessed January 20, 2022.

'It's all gone': Tons of Sequoyah Fuels nuclear waste taken to Utah mill as Cherokee Nation, state officials celebrate

By Kelly Eestian Tulsa World Nov 30, 2018



Esri, here, Garmin, FAO, NOAA, USGS, EPA

and that's a source of worry for residents, regardless of whether contamination might take generations to reach the aquifer or find a much faster pathway. Many Ute Mountain Ute tribal members oppose the White Mesa Mill and continue to advocate for the mill to be closed and cleaned up.⁵⁴

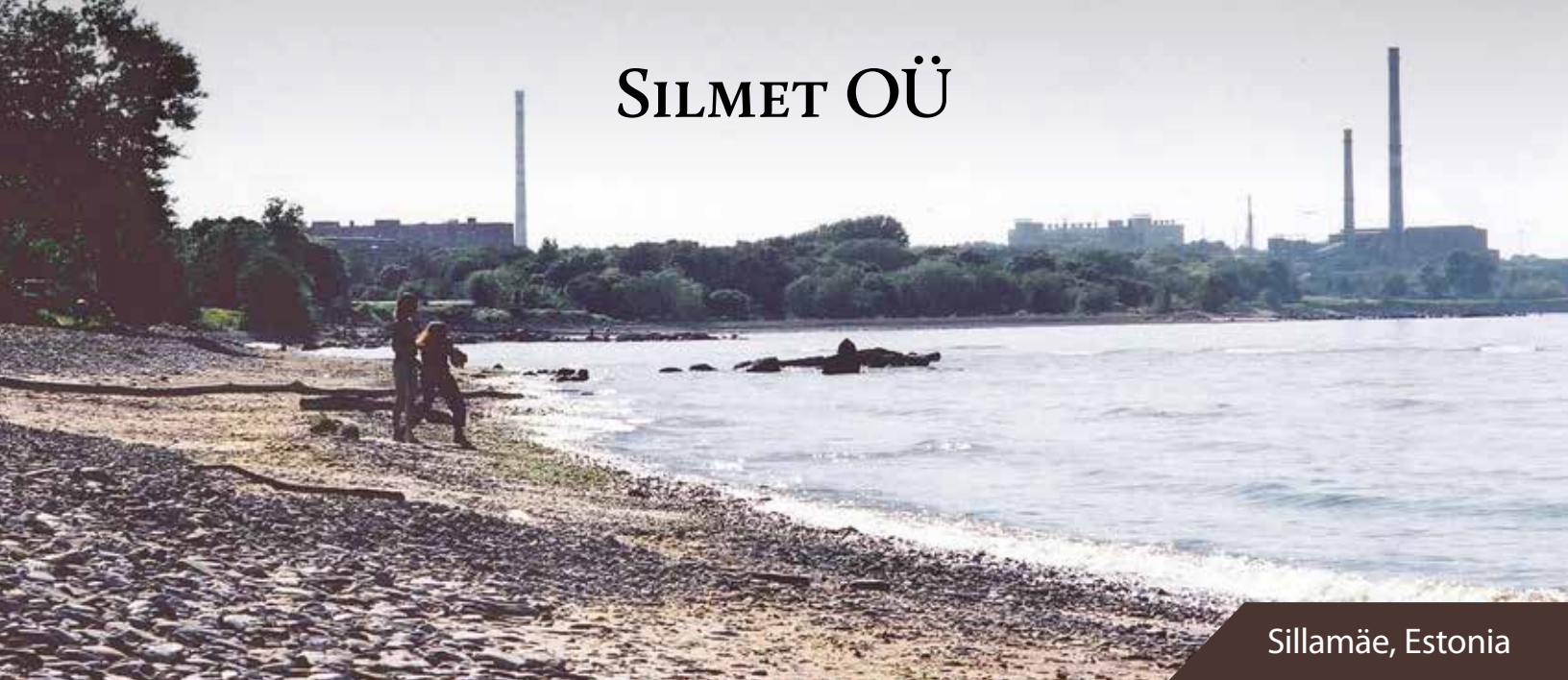
“

*All those trucks driving the waste through this area is disturbing. Our community lives downstream from the mill and those waste ponds, so that has always been a worry because we rely on well water.*⁵⁵ – Yolanda Badback, Ute Mountain Ute, White Mesa Concerned Community Member

⁵⁴ Mimiaga, Jim. "Protestors march to White Mesa uranium mill." The Journal. May 19, 2019. <https://www.the-journal.com/articles/protesters-march-to-white-mesa-uranium-mill/>. Accessed January 20, 2022.

⁵⁵ Mimiaga, Jim. "White Mesa Mill Accepts Cherokee Nation Radioactive Waste." Durango Herald. December 22, 2018. <https://durangoherald.com/articles/255888>. January 20, 2022.

SILMET OÜ



Sillamäe, Estonia

- ▶ The plant that NPM Silmet OÜ now uses as a rare-metals factory once housed a Nazi gasoline enterprise before turning into a Soviet forced-labor facility enriching uranium for weapons.
- ▶ More than 1.4 million pounds of radioactive waste were shipped from the facility to the White Mesa Mill. The Silmet waste is the first radioactive waste sent to the mill from Europe.
- ▶ With a new rare earth elements enterprise in the works in 2021, in addition to accepting radioactive waste from Estonia, the mill could begin shipping rare earth carbonate back to Estonia.



National Land Survey of Finland, Esri, here, Garmin, FAO, NOAA, USGS

Nestled between the coastal Päite Landscape Protection Area and the Udria Landscape Protection Area on the Gulf of Finland in the Baltic Sea, lies the hamlet of Sillamäe, Estonia. About two hours' drive east of the Estonian capital, Tallinn, not far from the Russian border,¹ Sillamäe has a fraught history. From a 19th century resort village,² to a 1920s hub for oil shale mining and processing,³ to a home for Nazi concentration camps during World War II, to a top-secret "closed town" that hosted a Cold War uranium-processing center built by forced prisoner-of-war labor, Sillamäe has weathered many storms.⁴

The town's industrial fortunes have risen and fallen with two enterprises: the local port and an industrial facility now owned by NPM Silmet OÜ. Originally built in 1926 to turn local oil shale into gasoline, the Silmet plant on the seashore was largely destroyed by retreating Soviet forces when the town was occupied by German forces in 1941.⁵ The Nazis rebuilt the plant, but it was destroyed again during World War II. Soviet occupiers rebuilt the facility yet again in 1944, and in addition to oil shale, they began processing uranium at Silmet in 1946.⁶ By 1970, the industrial site was also refining the rare earth elements niobium and tantalum.⁷ In the 1980s, Silmet produced reactor-grade enriched uranium for Soviet nuclear reactors and weapons.⁸

¹ "Google Maps, NPM Silmet OÜ · Kesk 2, Sillamäe, 40231 Ida-Viru maakond, Estonia." Alphabet. <https://goo.gl/maps/9myN453s2aErviW67>. Accessed January 30, 2022.

² "A Soviet-Era Secret Town in Estonia." Atlas Obscura. October 2, 2017. <https://www.atlasobscura.com/places/sillamae>. Accessed January 30, 2022.

³ "About Us. History." NPM SILMET OÜ. <http://www.silmet.ee/>. Accessed January 30, 2022.

⁴ Richter, Darmon. "Sillamäe: Inside a Former Soviet Secret City in Estonia." Deep Baltic. September 24, 2020. <https://deepbaltic.com/2020/09/24/sillamae-inside-a-former-soviet-secret-city-in-estonia/>. Accessed January 30, 2022.

⁵ "About Us. History." NPM SILMET OÜ. <http://www.silmet.ee/>. Accessed January 30, 2022.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.



Port of Sillamäe. [REY2](#)

Uranium production ended in 1990 at Silmet, shortly before Estonian independence from Russia with the fall of the Soviet Union. The state-owned facility then passed to a string of private owners from 1997 until 2011, when it was acquired by Molycorp, a multinational metals producer and owner of the Mountain Pass Rare Earth Metals Mine in the California desert.⁹ Molycorp filed for bankruptcy in 2015, and, after restructuring, a Canada-based multinational chemical-manufacturing company, Neo Performance Materials, emerged as the new owner of Silmet.¹⁰ Until 2020, when a waste-storage problem and the COVID-19 pandemic halted activity, the production of niobium and tantalum was Silmet's primary business,¹¹ and it was one of Europe's largest rare earth processors.¹²

In 2019, in response to a mandate from the Estonian Ministry of Environment to get rid of the waste it had stored on-site, Silmet sought to ship 660 tons (1.3 million pounds) of radioactive waste from rare earth elements processing to the White Mesa Mill.¹³ The plan was for the mill to extract uranium from the waste and bury the leftover thorium and other toxic and radioactive components in the mill's waste pits.¹⁴

Niobium and tantalum production is a messy business, producing numerous toxic and radioactive constituents including uranium, thorium, and their decay products in the waste left over after processing. According to a report delivered at a symposium on radioactive materials, "Production of niobium and tantalum [at Silmet], as well as of rare earths, belongs to work activities involving both potentially significant exposure of workers at the work-place and potential significance with regard to public exposure as a result of wastes and discharges."¹⁵ The public exposure risk was compounded by Silmet's historical waste-disposal methods. From the 1970s until 2004, rare-metals-processing waste was dumped in the plant's uranium-tailings pond, commingling with waste from uranium processing.¹⁶ The pond was

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

¹² "NPM Silmet - Sillamäe linn." www.sillamae.ee. <https://www.sillamae.ee/en/web/eng/molycorp-silmet>. Accessed January 30, 2022.

¹³ Energy Fuels Resources (USA) Inc. "Request to Amend Radioactive Materials License for Processing of Alternate Feed Material from NPM Silmet OU." pp. 1-2. April 18, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-003761.pdf>. Accessed January 30, 2022.

¹⁴ Ibid., 21.

¹⁵ Lust, M. and Realo, E. "NORM Related Production of Rare Earth Metals in Estonia." Proceedings: EU-NORM 1st International Symposium, June 5-8, 2012, Tallinn, Estonia. p. 169. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/EU-NORM-Symposium-5-8-June-2012-Tallinn-Estonia-Proceedings.pdf>. Accessed January 30, 2022.

¹⁶ Ibid., 171.

closed in 2004—after Estonia entered the European Union (EU) and became subject to EU regulations for handling naturally occurring radioactive material (NORM) wastes—and cleaned up by 2008.^{17,18}

After the Silmet plant could no longer dump radioactive waste in the uranium-tailings pond, it adopted a radioactive-waste management system whereby radioactive wastes began to be separated, packaged, and stored in 55-gallon drums on-site.¹⁹ The facility produced about 80 tons of this waste per year, and the waste drums began to pile up, with about 2,000 of them (representing 660 tons) in storage by 2019.²⁰

Silmet was running out of storage space, its license to process and store more waste had expired at the end of January 2019, and the Estonian Ministry of Environment required Silmet to remove and dispose of the radioactive waste.²¹ As a result, the plant was forced to halt niobium and tantalum production, and the Estonian Ministry of Environment refused to allow operations to resume until the waste was removed.²²

According to a local news report, continued “warehousing [of the radioactive waste] is not an alternative,” so Silmet began to look for ways to dispose of the waste. One proposal was to mix the waste with coal ash and use it as buried fill for redevelopment of Sillamäe’s port.²³ That plan failed,²⁴ and with no Estonian or European facility capable of accepting the 2,000 drums of waste, a uranium mill halfway around the globe entered the picture—the White Mesa Mill.

The mill’s owner applied to accept the Estonian waste in April 2019.²⁵ In March 2019, Estonian media announced, “Estonia can escape!” According to a Silmet spokesperson, “Assuming that the processor receives all the necessary additional approvals for its license, Silmet intends to ship all stored production residues to the USA in the second or third quarter of 2020. All processing waste generated in the future will be treated in the same way.”²⁶

Though the White Mesa Mill has accepted uranium ore material that has originated from as far away as present-day Democratic Republic of the Congo, as well as radioactive by-product material from Cameco Corporation’s Port Hope Conversion Facility and Blind River Refinery on the Great Lakes in Ontario, Canada, as of June 2021, no waste had yet come from Europe. News of the mill owner’s plans to import waste from Estonia sparked controversy in Utah and in Estonia.

¹⁷ Ibid., 170-172.

¹⁸ It should be noted that Energy Fuels Resources, the company that owned the White Mesa Mill as of June 2021, used different dates for the tailings cell closure and remediation in its application for a license amendment to accept the Estonian wastes without citation. Given the discrepancy, dates have been taken from published conference proceedings co-authored by a staff member of the Estonian Radiation Safety Department.

¹⁹ Energy Fuels Resources (USA) Inc. “Request to Amend Radioactive Materials License for Processing of Alternate Feed Material from NMP Silmet OU.” p. 4. April 18, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-003761.pdf>. Accessed January 30, 2022.

²⁰ Ibid., 1,4.

²¹ Pau, Aivar. “Estonia can escape! Silmet gave up burying radioactive contamination in Estonia.” Postimees Tehnika. March 15, 2019. <https://majandus24.postimees.ee/6546139/eesti-paaseb-silmet-loobus-radioaktiivse-saasta-eestisse-matmisest>. Translated from Estonian. Accessed January 30, 2022.

²² Energy Fuels Resources (USA) Inc. “Request to Amend Radioactive Materials License for Processing of Alternate Feed Material from NMP Silmet OU.” pp. 1-4. April 18, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-003761.pdf>. Accessed January 30, 2022.

²³ Starkov, Alexey. “What will happen to 500 tons of natural radioactive waste from the Sillamae plant? You can’t just bury.” Delfi, rus.delfi.ee. February 21, 2019. <https://rus.delfi.ee/statja/85393103/cto-zhe-budet-s-500-tonnami-estestvenno-radioaktivnyh-othodov-sillamyaskogo-zavoda-prosto-zahoronit-nelzya>. Translated from Russian. Accessed January 30, 2022.

²⁴ Pau, Aivar. “Estonia can escape! Silmet gave up burying radioactive contamination in Estonia.” Postimees Tehnika. March 15, 2019. <https://tehnika.postimees.ee/6546139/eesti-paaseb-silmet-loobus-radioaktiivse-saasta-eestisse-matmisest>. Translated from Estonian. Accessed January 30, 2022.

²⁵ Energy Fuels Resources (USA) Inc. “Request to Amend Radioactive Materials License for Processing of Alternate Feed Material from NMP Silmet OU.” April 18, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-003761.pdf>. Accessed January 30, 2022.

²⁶ Pau, Aivar. “Estonia can escape! Silmet gave up burying radioactive contamination in Estonia.” Postimees Tehnika. March 15, 2019. <https://majandus24.postimees.ee/6546139/eesti-paaseb-silmet-loobus-radioaktiivse-saasta-eestisse-matmisest>. Translated from Estonian. Accessed January 30, 2022.



Energy Fuels Resources (USA) Inc.
225 Union Blvd. Suite 600
Lakewood, CO, US, 80228
303 974 2140
www.energyfuels.com

DRC-2019-003761

April 18, 2019

SENT VIA OVERNIGHT DELIVERY

Div of Waste Management
and Radiation Control

APR 24 2019

Mr. Ty L. Howard
Director
Division of Waste Management and Radiation Control
Utah Department of Environmental Quality
195 North 1950 West
P.O. Box 144880
Salt Lake City, UT 84114-4880

Re: Application by Energy Fuels Resources (USA) Inc. ("EFRI") for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the "Mill") to authorize processing of NPM Silmet OU ("Silmet") alternate feed material (the "Uranium Material")

Dear Mr. Howard:

We are pleased to enclose with this letter two copies of an application to amend the Mill's Radioactive Materials License No. 1900479 to authorize receipt and processing of the Uranium Material as an alternate feed material primarily for the recovery of uranium and disposal of the resulting tailings in the Mill's tailings impoundments as 11e.(2) byproduct material.

Silmet is licensed to store up to 615 metric tons of uranium material on site at their facility in Estonia. Based on current production rates, Silmet anticipates that limit will be reached by late 2019. EFRI plans to enter into an agreement with Silmet to allow shipment of the uranium material to the Mill as soon as reasonably possible. Please contact us as to the anticipated timeframe required for DWMRC to review this application.

If you should have any questions regarding this amendment application, please contact me.

Yours very truly,

ENERGY FUELS RESOURCES (USA) INC.
Kathy Weinel
Quality Assurance Manager

cc: David Frydenlund
Mark Chalmers
Paul Goranson
Logan Shumway
Terry Slade
Scott Bakken



Esri, Garmin, FAO, NOAA

Opposition galvanized quickly.²⁷ Scott Clow, environmental programs director for the Ute Mountain Ute Tribe, voiced the tribe's opposition to the shipment of foreign waste, saying, "The mill has already become the cheapest alternative for disposal of low-level radioactive waste in North America. Now, it appears that it may become a destination for the materials from around the globe. That is disconcerting and dangerous."²⁸

“

*The tribe does not want these materials to continue to be delivered to their neighborhood, their traditional lands, and stored there forever.*²⁹

– Scott Clow, Environmental Programs Director, Ute Mountain Ute Tribe

Tribal and local governments opposed the shipments too. The San Juan County Commission expressed its concern in a letter urging state regulators to reject the mill owner's application to receive the waste, saying: "The historical environmental injustice endured by the County's indigenous and low-income populations will be exacerbated if the State allows the importation of radioactive wastes to be deposited at the White Mesa Uranium Mill, adjacent to the White Mesa Ute community."³⁰

The Navajo Utah Commission of the Navajo Nation Council also passed a resolution opposing the shipments. The resolution read, in part: "Local community members have concerns about the lack of oversight, safety, and contamination of local groundwater resources on and around the White Mesa Mill... The Navajo Utah Commission is hereby opposing importation of radioactive waste from the country of Estonia in Eastern Europe into the White Mesa Mill near Blanding, Utah."³¹

²⁷ Votel, Missy. "Waste not, want not. White Mesa Mill applies to begin accepting radioactive waste from overseas." Durango Telegraph. June 25, 2020. <https://www.durangotelegraph.com/news/top-stories/waste-not-want-not/>. Accessed January 30, 2022.

²⁸ Mimiaga, Jim. "European company eyes Utah mill for radioactive material." The Cortez Journal. July 1, 2019. <https://www.the-journal.com/articles/european-company-eyes-utah-mill-for-radioactive-material/>. Accessed January 30, 2022.

²⁹ Podmore, Zak. "Estonia doesn't want and can't safely store radioactive powder, so 2,000 drums of it may be coming to southeastern Utah." The Salt Lake Tribune. June 16, 2020. <https://www.sltrib.com/news/2020/06/16/estonia-doesnt-want-cant/>. Accessed January 30, 2022.

³⁰ Letter from Maryboy, Kenneth, San Juan County Commission Chairman, to Ty L. Howard, Division of Waste Management and Radiation Control, Utah Department of Environmental Quality. p. 2. July 2, 2020. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/SJC_White_Mesa_Mill_Letter_7-7-2020.pdf. Accessed January 30, 2022.

³¹ Navajo Utah Commission of the Navajo Nation Council. "Resolution Opposing Importation of Radioactive Waste from the Country of Estonian in Eastern Europe into the White Mesa Mill Near Blanding, Utah. Nucjun-821-20." June 23, 2020. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2020-014328.pdf>. Accessed January 30, 2022.

Nonetheless, in late July 2021, Utah regulators granted permission for the mill to accept the Estonian waste.³² By July 2022, more than 1.4 million pounds of radioactive materials from the Silmet facility had arrived at the White Mesa Mill. But the story does not end there.³³

Seeking to diversify its business beyond uranium, vanadium, and waste processing and disposal, the mill's owner, Energy Fuels Resources, announced in 2020 that it was aiming to enter the rare earth business by producing mixed rare earth carbonate from monazite sands shipped from Chemours Company in Georgia to the White Mesa Mill.³⁴ Energy Fuels Resources also signed a memorandum of understanding to purchase monazite sands³⁵ from a yet-to-be completed mining project in Tennessee.³⁶ In April 2021, Energy Fuels Resources received a \$1.75 million grant from the Department of Energy to complete a rare earth feasibility study,³⁷ and said that it was “also evaluating the potential to develop U.S. separation, metals, alloys, and other downstream REE [rare earth element] capabilities at the White Mesa Mill, or nearby...”³⁸

Because, as of June 2021, the mill could not separate individual metals from the carbonate, another facility was needed to complete the process to produce useable rare earth elements. Where would the rare earth carbonate the White Mesa Mill produced go? Back to Estonia, to Silmet.³⁹

Rare earth elements are used in electric motors and in consumer electronics.⁴⁰ Modern societies run on rare earth elements, but producing them at the White Mesa Mill, near Bears Ears National Monument, raises disturbing implications, if history is a guide. Several of the “alternate feeds” sent to the White Mesa Mill—like the Fansteel and Molycorp wastes—or approved for disposal there without ultimately being shipped—like the Maywood waste—resulted from efforts to clean up the contamination that rare earth processors left behind, a legacy that may foretell the mill's future. And the toxic and radioactive content of rare earth elements processing waste, the sheer volume of that waste that could be added to the White Mesa Mill's waste pits, and its potential impact on groundwater and the nearby White Mesa Ute community were not part of the mill's original licensing, and the public has never had a chance to weigh in.

How does a uranium mill become a de facto commercial landfill for radioactive waste, and then transform into a rare earth elements processor without any new licensing or opportunity for public input? In 2021, the public was witnessing just such a transformation at White Mesa.

³² Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. “Radioactive Materials License UT 1900479 Am. 10. License Condition 10.10.” p. 10. July 27, 2021. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/UtahDRC_WhiteMesaMill_License1900479Amendment10.pdf. Accessed January 29, 2022.

³³ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. “Inspection Report.” Page 3. August 4, 2022. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Silmet/InspectionReportWhiteMesaMill-07-26-2022-DRC-2022-023702.pdf>. Accessed May 11, 2023.

³⁴ “Utah-Based Energy Fuels to Enter Commercial Rare Earth Business in Q1-2021.” Green Car Congress. December 26, 2020. <https://www.greencarcongress.com/2020/12/20201226-ree.html>. Accessed January 30, 2022.

³⁵ “Energy Fuels and Hyperion Sign MOU for the Supply of Monazite to Produce Rare Earth Products.” Pnewswire.com. April 21, 2021. <https://www.prnewswire.com/news-releases/energy-fuels-and-hyperion-sign-mou-for-the-supply-of-monazite-to-produce-rare-earth-products-301273330.html>. Accessed January 30, 2022.

³⁶ “Hyperion Metals Limited: Titan Project Update.” StreetInsider.com. May 5, 2021. <https://www.streetinsider.com/Business+Wire/Hyperion+Metals+Limited%3A%C2%A0Titan+Project+Update/18373022.html>. Accessed January 30, 2022.

³⁷ “Energy Fuels Inc. (UUUU) CEO Mark Chalmers on Q1 2021 Results - Earnings Call Transcript.” Seekingalpha.com. May 17, 2021. <https://seekingalpha.com/article/4429492-energy-fuels-inc-uuuu-ceo-mark-chalmers-on-q1-2021-results-earnings-call-transcript>. Accessed January 30, 2022.

³⁸ “Energy Fuels and Hyperion Sign MOU for the Supply of Monazite to Produce Rare Earth Products.” Pnewswire.com. Energy Fuels Inc. April 21, 2021. <https://www.prnewswire.com/news-releases/energy-fuels-and-hyperion-sign-mou-for-the-supply-of-monazite-to-produce-rare-earth-products-301273330.html>. Accessed January 30, 2022.

³⁹ “Energy Fuels Inc. (UUUU) CEO Mark Chalmers on Q1 2021 Results - Earnings Call Transcript.” Seekingalpha.com. May 17, 2021. <https://seekingalpha.com/article/4429492-energy-fuels-inc-uuuu-ceo-mark-chalmers-on-q1-2021-results-earnings-call-transcript>. Accessed January 30, 2022.

⁴⁰ “REE - Rare Earth Elements and Their Uses.” geology.com. <https://geology.com/articles/rare-earth-elements/>. Accessed January 30, 2022.



MOFFAT TUNNEL

Winter Park, Colorado

Railroad officials inspecting the Moffat Tunnel in 1934. JOSEPH H. FINN

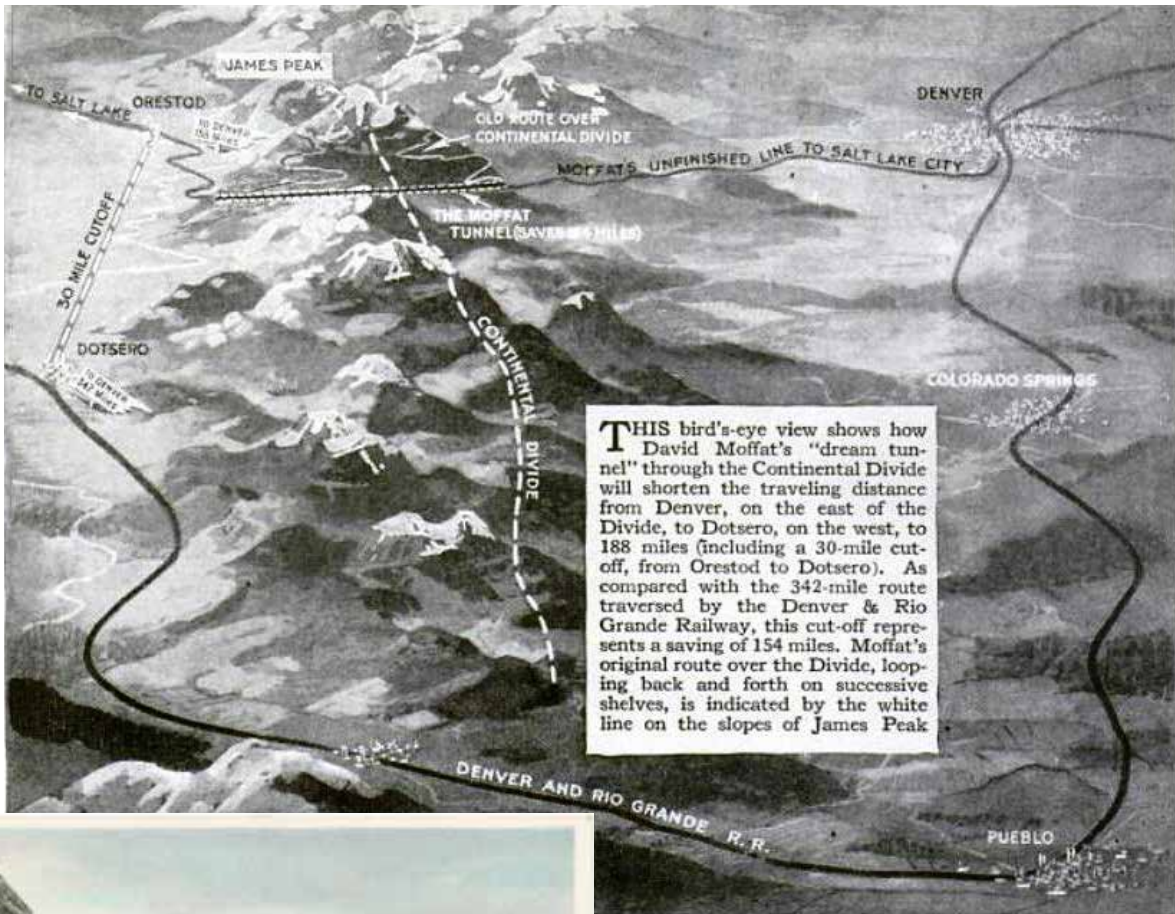
- ▶ For decades, railroad companies allowed water contaminated with radioactive uranium and dangerous heavy metals to flow directly into the Fraser River.
- ▶ In 2021, Utah regulators approved a plan to truck radioactive waste from Union Pacific Railroad's water treatment plant in Colorado to the White Mesa Mill "indefinitely."



County of Douglas, CO, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

In 1927, President Calvin Coolidge pressed a golden telegraph key in the White House in Washington, D.C. that set off a charge of dynamite on the ancestral lands of the Northern Arapaho, Cheyenne, and Ute peoples in Colorado.¹ The explosion blasted out several feet of rock to join the two ends of the Moffat Tunnel, a 6-mile underground train passage running under the Continental Divide through a rocky snow-clad peak

¹ "National Affairs: Moffat Tunnel." Time Magazine. February 28, 1927. Was <http://content.time.com/time/subscriber/article/0,33009,730060,00.html>. Accessed February 12, 2022.; Harris, Kyle. "Winter Park Resort acknowledges it operates on ancestral Indigenous land." Denverite. November 12, 2021. <https://denverite.com/2021/11/12/winter-park-resort-acknowledges-it-operates-on-ancestral-indigenous-land/>. Accessed February 7, 2022.



Top: A 1922 graphic showing the proposed Moffat Tunnel west of Denver.

Left: Historic postcard of Tunnel No. 6, Moffat Road, Colorado. THE NEW YORK PUBLIC LIBRARY

that the Arapaho call "Wolf's Canine."² When it opened the next year, the tunnel sliced more than 170 miles off the train trip from Denver to the West Coast by offering a faster route through the Rocky Mountains.³

² "National Affairs: Moffat Tunnel." Time Magazine. February 28, 1927. <http://content.time.com/time/subscriber/article/0,33009,730060,00.html>. Accessed February 12, 2022.; Associated Press. "Main Bore of Moffat Tunnel is Completed; Blast Clears Way Under Continental Divide." The New York Times. December 11, 1927. <https://timesmachine.nytimes.com/timesmachine/1927/12/11/97141500.html?pageNumber=93>. Accessed February 4, 2022.; B. Travis Wright and Kate Wright. "Rollins Pass." Arcadia Publishing, 2018. pp. 75, 81. https://books.google.com/books?id=9LVTdWAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false. Accessed February 4, 2022.; Center for the Study of Indigenous Languages of the West, University of Colorado, Boulder. "Place Names, Colorado." <https://www.colorado.edu/center/csilw/language-archives/arapaho-word-lists/place-names>. See entry for "hooxee hookute'" or "James Peak and south of there." Accessed February 7, 2022.

³ Associated Press. "Main Bore of Moffat Tunnel is Completed; Blast Clears Way Under Continental Divide." The New York Times. December 11, 1927. <https://timesmachine.nytimes.com/timesmachine/1927/12/11/97141500.html?pageNumber=93>. Accessed February 4, 2022.; B. Travis Wright and Kate Wright. "Rollins Pass." Arcadia Publishing, 2018. pp. 75, 81. https://books.google.com/books?id=9LVTdWAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false. Accessed February 4, 2022.

In the 1930s, Denver got an additional, unexpected benefit from the engineering marvel when the Denver Water Board repurposed a parallel access tunnel used by Moffat Tunnel construction workers to pipe water from the Fraser River over the Continental Divide to supply the city, a system still used today.⁴ But the Moffat Tunnel itself turned out to be a conduit for water too.

Cutting a hole through a mountain meant that groundwater, rain, and snowmelt now seeped in through the tunnel floor and walls via cracks in the rock.⁵ To keep water off the train tracks, workers built channels alongside or underneath the tracks so that runoff flowed out each end of the tunnel, carrying contaminants picked up along the way.⁶ Beginning in the 1920s, contaminated water drained from the tunnel's west end directly into the Fraser River—a tributary to the Colorado River popular with fly fishers—not far from where the Winter Park ski resort sits today.⁷



If you just put a hole in the ground and have water leeching out, it's going to carry the heavy metals you've exposed that have been buried for millennia.⁸

– Kirk Klancke, East Grand Water Quality Board member

The tunnel runoff plunging into the Fraser River at a rate of about 200 gallons a minute was contaminated with radioactive uranium and other metals including mercury and lead, as well as coal dust deposited by train traffic.⁹ This raised enough alarm bells that, by 2008, Colorado regulators issued a permit to the tunnel's operator, Union Pacific Railroad, laying out safety thresholds for contaminants like uranium and lead, as well as requirements for monitoring contaminant levels in the water.¹⁰

⁴ Snyder, Steve. "How the Moffat Tunnel conquered the Great Divide." Denver Water. February 26, 2015. <https://www.denverwater.org/tap/how-the-moffat-tunnel-conquered-the-great-divide>. Accessed February 4, 2022.

⁵ Colorado Department of Public Health & Environment. "Colorado Discharge Permit System (CDPS) Fact Sheet to Permit Number CO0047554: Union Pacific Railroad, Moffat Tunnel West Portal, Grand County." August 31, 2018. p. 3. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 19.) Accessed February 9, 2022.; Union Pacific Railroad. "Letter Enclosing 2016 Compliance Report for Moffat Tunnel Permit CO-09947554. April 22, 2016. p. 1-1. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 20.) Accessed February 9, 2022.

⁶ Ibid.

⁷ Union Pacific Railroad. "Letter Enclosing 2016 Compliance Report for Moffat Tunnel Permit CO-09947554. April 22, 2016. p. 1-1. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 20.) Accessed February 9, 2022.; Fraser River Source Water Protection Partnership. "Source Water Protection Plan, Grand County, Colorado. June 28, 2017." p. 16. https://www.co.grand.co.us/DocumentCenter/View/9794/FraserRiver_SWPP_Final_Public_062817. Accessed February 11, 2022.; Ewert, Jon. "Fraser River Fishery Management Report." Colorado Parks and Wildlife. March 20. pp. 1-2. <https://cpw.state.co.us/thingstodo/Fishery%20Survey%20Summaries/FraserRiver.pdf>. Accessed February 12, 2022.; "Union Pacific Railroad. Dumping Waste Water." Winter Park Times. March 8, 2018. <https://winterparktimes.com/news/4693/>. Accessed February 12, 2022.

⁸ Shell, Hank. "Union Pacific to treat Fraser River discharge." Sky-Hi News. July 3, 2014. <https://www.skyhinews.com/news/union-pacific-to-treat-fraser-river-discharge/>. Accessed February 9, 2022.

⁹ Union Pacific Railroad. "Letter Enclosing 2016 Compliance Report for Moffat Tunnel Permit CO-09947554. April 22, 2016. pp. 1-1, 2-3. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 20.) Accessed February 9, 2022.; Energy Fuels Resources (USA) Inc. "Application by Energy Fuels Resources (USA) Inc. ("EFRI") for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the "Mill") to authorize processing of Union Pacific Railroad ("UPRR"), Moffat Tunnel alternate feed material (the "Uranium Material")." December 23, 2019. p. 2. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-017284.pdf>. Accessed February 9, 2022.

¹⁰ Union Pacific Railroad. "Letter Enclosing 2016 Compliance Report for Moffat Tunnel Permit CO-09947554. April 22, 2016. p. 1-1. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 20.) Accessed February 9, 2022.; Colorado Department of Public Health & Environment, Water Quality Control Division. "Authorization to Discharge Under the Colorado Discharge Permit System, Permit No. CO-0047554." March 20, 2008. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/CO0047554-CDPHERM-WTR-Permit-Moffat-Tunnel-2008.PDF>. Accessed February 9, 2022.

Amid mounting public concern and in order to meet the requirements set out by the Colorado Department of Public Health and Environment, in 2014, Union Pacific Railroad announced it would build a water treatment plant to filter contaminants out of the polluted water before releasing it into the river.¹¹ Local Grand County Commissioner James Newberry called it “a victory for the Fraser River.”¹²

The water treatment plant began running in 2017.¹³ The plant filters out solids, which are then separated into a radioactive clay-like brown sludge called “centrifuge cake” that contains about 0.5 percent uranium.¹⁴ That was enough for Colorado regulators to require Union Pacific Railroad to get a special license simply to possess radioactive materials, but the company then had to find somewhere to send the waste.¹⁵

In the name of public safety, Colorado regulators required the railroad to dispose of the radioactive centrifuge cake off-site.¹⁶ Up until at least 2019, the company sent the centrifuge cake to various waste-disposal facilities.¹⁷ One of the planned disposal sites was the Clean Harbors Deer Trail Landfill, a licensed low-level and hazardous waste landfill about an hour east of Denver.¹⁸ But it appears that it wasn’t long before the company may have begun looking for ways to cut costs. By 2019, it had set its sights on a cheaper place to send the waste: the White Mesa uranium mill.

In December 2019, Energy Fuels Resources, which own the White Mesa Mill, applied for an amendment to its license in order to process and discard the Moffat Tunnel water treatment plant’s waste as “alternate feed”—just another source of uranium.¹⁹ According to that application, Union Pacific Railroad had asked

¹¹ Colorado Department of Public Health & Environment. “Colorado Discharge Permit System (CDPS) Fact Sheet to Permit Number CO0047554: Union Pacific Railroad, Moffat Tunnel West Portal, Grand County.” August 31, 2018. p. 3. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 19.) Accessed February 9, 2022.; Union Pacific Railroad. “Letter Enclosing 2016 Compliance Report for Moffat Tunnel Permit CO-09947554. April 22, 2016. p. 2-2. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_GCT_et_al_Comments_re_Proposed_RML_Amendment_10.pdf. (See Exhibit 20.) Accessed February 9, 2022.; Grand County Board of Commissioners. “Press Release: “Union Pacific Railroad announcement to treat discharge from West Portal of Moffat Tunnel.” June 19, 2014. https://www.co.grand.co.us/DocumentCenter/View/3278/Union-Pacific-Railroad_Moffat-Tunnel-discharge-treatment?bidId=. Accessed February 12, 2022.

¹² Grand County Board of Commissioners. “Press Release: “Union Pacific Railroad announcement to treat discharge from West Portal of Moffat Tunnel.” June 19, 2014. https://www.co.grand.co.us/DocumentCenter/View/3278/Union-Pacific-Railroad_Moffat-Tunnel-discharge-treatment?bidId=. Accessed February 12, 2022.

¹³ Colorado Department of Health & Environment, Water Quality Control Division. “Notice of Violation/Cease and Desist / Clean-up Order Number io-180214-1.” February 14, 2018. p. 1. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/CO0047554-CDPHERM-WTR-Enforcement-Notice-Violation_Cease-Desist-Order-Moffat.PDF. Accessed February 9, 2022.

¹⁴ Energy Fuels Resources (USA) Inc. “Application by Energy Fuels Resources (USA) Inc. (“EFRI”) for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the “Mill”) to authorize processing of Union Pacific Railroad (“UPRR”), Moffat Tunnel alternate feed material (the “Uranium Material”).” December 23, 2019. p. 3 and Attachment 2, p. 2. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-017284.pdf>. Accessed February 9, 2022.

¹⁵ *Ibid.*, 1.

¹⁶ *Ibid.*

¹⁷ *Ibid.*

¹⁸ Letter from Steven L. Preston, Union Pacific Railroad, to Eric Mink, Colorado Department of Public Health and Environment Re: Notice of Violation No. 10-180214-1, Response to Requirements of Paragraph 57- Monthly Operations Reports. July 2, 2019. p. 1. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/COR901441-CDPHERM-WTR-To-WQCD-Enforcement.PDF>. Accessed February 11, 2022.; Colorado Department of Public Health & Environment. “Clean Harbors Deer Trail LLC.” <https://cdphe.colorado.gov/CHDT>. Accessed February 13, 2022.; Clean Harbors. “Deer Trail Landfill Facility.” <https://www.cleanharbors.com/location/deer-trail-landfill-facility>. Accessed February 11, 2022.; “Denver to Clean Harbors Deer Trail Landfill.” Google Maps. <https://www.google.com/maps/dir/Denver,+Colorado/Clean+Harbors+Environmental,+108555+E+U.S,+Colorado+36,+Deer+Trail,+CO+80105/@39.7460349,-104.9311498,9z/data=!3m1!4m1!4m13!1m5!1m1!1s0x876b80aa231f17cf:0x118ef4f8278a36d6!2m2!1d-104.990251!2d39.7392358!1m5!1m1!1s0x876d746b2ba6fe2f:0xa589a16109f66027!2m2!1d-103.7234665!2d39.7547879!3e0>. Accessed February 12, 2022.

¹⁹ Energy Fuels Resources (USA) Inc. “Application by Energy Fuels Resources (USA) Inc. (“EFRI”) for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the “Mill”) to authorize processing of Union Pacific Railroad (“UPRR”), Moffat Tunnel alternate feed material (the “Uranium Material”).” December 23, 2019. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-017284.pdf>. Accessed February 9, 2022.



The west portal of the Moffat Water Tunnel in Winter Park, Colorado. [JEFFREY BEALL](#)



Maxar, Microsoft | Esri Community Maps Contributors, Grand County, CO, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

the mill to make a play for the radioactive centrifuge cake because it would be more “cost-effective” than the off-site disposal facilities the company had been paying to discard the waste.²⁰ In addition to uranium, the application reveals that the waste contains thorium, arsenic, barium, and a host of other contaminants.²¹

²⁰ Ibid., 1-2.

²¹ Ibid., Attachment 2, pp. 3-4.

According to Utah state regulators, the Moffat Tunnel water treatment plant waste is similar to waste the White Mesa Mill has processed from the Midnite Mine Superfund site, which also comes from treating water contaminated with radioactive materials.²² Because the railroad will produce the radioactive centrifuge cake as long as the tunnel remains in use, the mill applied to process and discard the waste indefinitely.²³

It should be noted that the water treatment plant didn't solve the Moffat Tunnel contaminated runoff problem completely. Even after the plant started running, spills and discharges continued to put the Fraser River and water users downstream at risk.²⁴ In 2018, Colorado Regulators cited Union Pacific Railroad for dumping contaminated water into the Fraser River, a violation that cost the company \$10,000 a day.²⁵ The railroad eventually paid \$140,000 in fines.²⁶

In July 2021, the state of Utah approved the mill's application to process waste from the Moffat Tunnel water treatment plant indefinitely.²⁷ Reading the fine print, the amount of waste trucked to White Mesa could reach 20,000 wet tons (40 million pounds), with up to 400,000 pounds expected each year.²⁸ Once it extracts the remnant uranium, the mill will bury the leftovers (likely more than 99 percent of the total volume) in the mill's waste pits.

While this is good news for the community of Winter Park and water users downstream, the Ute Mountain Ute community of White Mesa could ultimately shoulder the burden of millions of pounds of radioactive waste discarded in the White Mesa Mill's waste pits.

²² Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Technical Evaluation and Environmental Analysis, Moffat Tunnel Alternate Feed Request." April 2020. p. 14. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2020-007007.pdf>. February 9, 2022.

²³ Energy Fuels Resources (USA) Inc. "Application by Energy Fuels Resources (USA) Inc. ("EFRI") for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the "Mill") to authorize processing of Union Pacific Railroad ("UPRR"), Moffat Tunnel alternate feed material (the "Uranium Material")." December 23, 2019. p. 3. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-017284.pdf>. Accessed February 9, 2022.

²⁴ Colorado Office of Emergency Preparedness & Response, Department of Public Health & Environment. "Spill Report, Case Number 2018-0093." February 26, 2018. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/CO0047554-CDPHERM-WTR-Spill-Report.PDF>. Accessed February 9, 2022.; Fraser River Source Water Protection Partnership. "Source Water Protection Plan, Grand County, Colorado. June 28, 2017." p. 20. https://www.co.grand.co.us/DocumentCenter/View/9794/FraserRiver_SWPP_Final_Public_062817. Accessed February 13, 2022.

²⁵ Letter from Eric Mink, Colorado Department of Health & Environment, Water Quality Control Division, to The Corporation Company, Registered Agent for Union Pacific Railroad Company "RE: Service of Notice of Violation / Cease and Desist Order / Clean-Up Order, Number: 10-180214-1." February 14, 2018. p. 1. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/CO0047554-CDPHERM-WTR-Enforcement-Notice-Violation_Cease-Desist-Order-Moffat.PDF. Accessed February 9, 2022.

²⁶ Colorado Department of Health & Environment. "Order for Civil Penalty in the Matter of: Union Pacific Railroad Company CDPS Permit No. Co0047554." January 2, 2020. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/CO0047554-CDPHERM-WTR-Enforcement-Order-or-Penalty.PDF>. Accessed February 12, 2022.; Colorado Department of Health & Environment. "Payment Received for Civil/Administrative Penalties (Number IP:200102-1)." January 23, 2020. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/Moffat/CO0047554-CDPHERM-WTR-Enforcement-Penalty-Receipt.pdf>. Accessed February 12, 2022.

²⁷ Utah Department of Environmental Quality, Division of Waste Management and Radiation Control. "Utah Radioactive Material License Number UT 1900479, Amendment Number 10." July 27, 2021. p. 11. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/energy-fuels-white-mesa/DRC-2021-005164.pdf>. Accessed February 9, 2022.

²⁸ Energy Fuels Resources (USA) Inc. "Application by Energy Fuels Resources (USA) Inc. ("EFRI") for an amendment to State of Utah Radioactive Materials License No. 1900479 for the White Mesa Uranium Mill (the "Mill") to authorize processing of Union Pacific Railroad ("UPRR"), Moffat Tunnel alternate feed material (the "Uranium Material")." December 23, 2019. pp. 3, 12. <https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/energy-fuels-white-mesa/DRC-2019-017284.pdf>. Accessed February 9, 2022.

JAPAN ATOMIC ENERGY AGENCY



Ningyo and Tono, Japan

HIROSHI ISHII

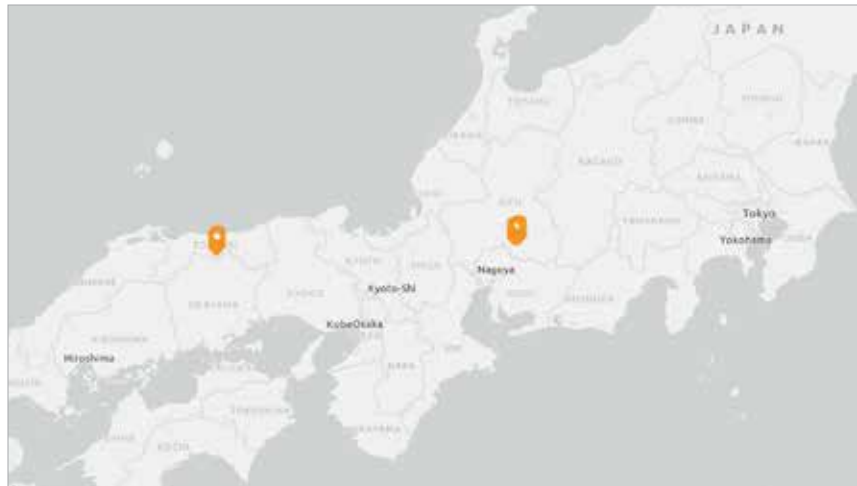
- ▶ Seeking to unload radioactive test ores and materials from government research sites, the Japan Atomic Energy Agency identified the White Mesa Mill, across the Pacific Ocean, as a destination to send its waste for processing and disposal.
- ▶ Without public input, the White Mesa Mill received waste from Japan (and almost \$6 million to process and dispose of it) in the mid-2000s.
- ▶ Japanese regulators argued that cleaning up uranium mining and milling facilities reduced the burden of waste management on future generations of Japanese citizens, effectively shifting the burden to the citizens of the White Mesa Ute community.

When you think of Japan and nuclear energy, among the first things that likely come to mind is the March 2011 meltdown at the Fukushima Daiichi Nuclear Power Plant in Ōkuma, Fukushima Prefecture. That devastating nuclear disaster, on par with the 1986 Chernobyl accident in present-day Ukraine,¹ was the result of a tsunami that followed a major earthquake. A decade later, complete cleanup and decommissioning was still ongoing, and the accident continued to affect the popularity of nuclear power.²

While the Fukushima plant captured headlines, Japan had other longstanding radioactive cleanup needs as well. Japan's research into producing uranium for civilian electrical power, and eventual disposal of high-level radioactive waste (spent nuclear-reactor fuel), contaminated the lesser-known Ningyo-toge

¹ "Comparing Fukushima and Chernobyl." Nuclear Energy Institute. October 1, 2019. <https://www.nei.org/resources/fact-sheets/comparing-fukushima-and-chernobyl/>. Accessed January 30, 2022.

² Parshley, Lois. "Fukushima's tragic legacy—radioactive soil, ongoing leaks, and unanswered questions." National Geographic Online. National Geographic Society. March 10, 2021. <https://www.nationalgeographic.com/environment/article/fukushima-tragic-legacy-radioactive-soil>. Accessed January 30, 2022.



Left: Japan Atomic Energy Agency, [HIROSHI ISHII](#). Right: Left point–Ningyo-toge Mine and Ningyo-toge Environmental. Engineering Center Right points–Tono Geoscience Center and Tono Uranium Mine. Esri, HERE, Garmin, FAO, NOAA, USGS

Environmental Engineering Center (Ningyo) and Tono Geoscience Center (Tono).^{3,4} And that raised a new problem: What should be done with the waste left over from cleaning up those sites?

Japan's nuclear history began in 1893, when uranium was first discovered there.⁵ Uranium deposits were mined in two ore fields on Honshu Island at Ningyo and Tono, both west of Tokyo.⁶ At Ningyo, uranium was mined on a test basis from 1959 to 1987, a research and development mill was operated nearby from 1964 to 1982, and a facility that piled up ore and then leached uranium from it with chemicals ran from 1978 through 1987.⁷ Both the mill and the leaching facility were dismantled,⁸ though cleanup and decommissioning are expected to last until 2060.⁹

A uranium deposit was discovered at Tono in 1964, and mining began there in 1972.¹⁰ Ultimately, producing uranium at Tono proved economically infeasible, but by 1987 the mine was being examined as a possible repository for radioactive waste.¹¹

³ Letter from David C. Frydenlund, Energy Fuels Resources (USA) Inc., to Ty L. Howard, Division of Waste Management and Radiation Control, Utah Department of Environmental Quality. "Receipt and Processing of Ores and Equivalent Feed Materials from Japan Atomic Energy Agency ("JAEA") at the Energy Fuels Resources (USA) Inc. ("EFRI") White Mesa Mill." Energy Fuels Resources (USA) Inc. p. 1. May 19, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_JAEAwaste_5-27-20_EFRI_letter_to_UDWMRC.pdf. Accessed January 29, 2022.

⁴ Sato, Kazuhiko. and Takayuki Tokizawa. "Current Status and Reclamation Plan Of Former Uranium Mining And Milling Facilities At Ningyo-Toge In Japan." Japan Nuclear Cycle Development Institute. WM'03 Conference, February 23-27, 2003, Tucson, AZ. p.2. https://digital.library.unt.edu/ark:/67531/metadc787160/m2/1/high_res_d/825985.pdf. Accessed January 30, 2022.

⁵ Dahlkamp, Franz J. "Chapter 5: Japan." Uranium Deposits of the World: Asia. Springer Science & Business Media, 2009. p. 181. <https://books.google.com/books?id=ShzwRGs5mDYC&lpg=PP1&pg=PA181#v=onepage&q&f=false>. Accessed January 30, 2022.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.

⁹ "Storage uranium Treatment study abroad Ningyo-toge Environmental Technology Center." Sanyo News Digital. sanyonews.jp. November 30, 2020. <https://www.sanyonews.jp/article/1076610>. Translated from Japanese. Accessed January 30, 2022.

¹⁰ "Safety in the Underground Construction and Operation of the Exploratory Studies Facility at Yucca Mountain." National Research Council. Washington, DC: The National Academies Press. pp. 122-123. 1995. <https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/JAEA/Safety-Underground-Construction-Operation-Exploratory-Studies-Yucca-Mountain.pdf>. Accessed January 30, 2022.

¹¹ Ibid., 123.

Tono Geoscience Center carries out a wide range of Geoscientific Research

The Japan Atomic Energy Agency (JAEA) is engaged in a research & development (R&D) program for the safe Geological Disposal of High-Level Radioactive Waste (HLW). HLW is produced after the extraction of re-usable materials from spent nuclear fuel arising from electric power generation using nuclear energy. Nuclear energy provides the base load electrical power for Japan's energy needs.

For the R&D related to Geological Disposal of HLW, Tono Geoscience Center (TGC) has been conducting research into deep underground environments (Geoscientific Research). The aim of this research is to establish methodologies and techniques needed for the characterization of underground environments.

What is the Geological Disposal of HLW?

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graph TD
    A[Uranium mining] --> B[Nuclear Power Reactor]
    B --> C[Spent fuel]
    C --> D[Reprocessing]
    D --> E[Uranium Plutonium]
    D --> F[High-Level Radioactive Waste]
    E --> B
  
```

The spent fuel from nuclear power generation is chemically processed at a fuel reprocessing plant for re-use as new fuel. Uranium and plutonium are recovered and recycled as fuel for the generation of electricity. The cycle shown on the right is known as the "Nuclear Fuel Cycle". Establishment of the "Nuclear Fuel Cycle" is the fundamental policy for nuclear energy development and utilization in Japan.

About the Tono Geoscience Center in Japan. JAPAN ATOMIC ENERGY AGENCY

Both Ningyo¹² and Tono¹³ became research and development centers under the Japanese government's nuclear energy program, eventually consolidating under the umbrella of an independent administrative institution known as the Japan Atomic Energy Agency (JAEA) in 2005.¹⁴ The agency's division of nuclear fuel, which focuses on the decommissioning of nuclear facilities and radioactive-waste management, oversees both Ningyo and Tono.¹⁵ A predecessor agency had enacted reclamation plans for both sites, and a 2003 paper on Ningyo cleanup plans stated repeatedly that: "reclamation of uranium mining and milling facilities is necessary to reduce the burden of the waste management on future generations."¹⁶

That's where the White Mesa uranium mill, in southeast Utah, a mile from Bears Ears National Monument, comes in. One way to reduce the burden for Japanese citizens was to transfer the burden to Utah citizens, namely the nearby White Mesa Ute community.

¹² "Message from the Director of Ningyo-Toge Environmental Engineering Center." 国立研究開発法人日本原子力研究開発機構. Japan Atomic Energy Agency. <https://www.jaea.go.jp/english/04/ningyo/english/message.html>. Accessed January 30, 2022.

¹³ "Outline of the Tono Geoscience Center." Japan Atomic Energy Agency. https://www.jaea.go.jp/04/tono/tgc_e/index_e.html. Accessed January 30, 2022.

¹⁴ "Japan Atomic Energy Agency: Our history." Japan Atomic Energy Agency. <https://www.jaea.go.jp/english/about/history.html>. Accessed January 30, 2022.

¹⁵ "Japan Atomic Energy Agency." Japan Atomic Energy Agency. October 2020. p. 15. https://www.jaea.go.jp/english/about/jaea_pamphlet.pdf. Accessed January 30, 2022.

¹⁶ Sato, Kazuhiko, and Takayuki Tokizawa. "Current Status And Reclamation Plan Of Former Uranium Mining And Milling Facilities At Ningyo-Toge In Japan." Japan Nuclear Cycle Development Institute. WM'03 Conference, February 23-27, 2003, Tucson, AZ. pp. 1,7. https://digital.library.unt.edu/ark:/67531/metadc787160/m2/1/high_res_d/825985.pdf. Accessed January 30, 2022.

In May 2020, the White Mesa Mill's owner notified the state of Utah's Division of Waste Management and Radiation Control that the company planned to receive 136 tons (272,000 pounds) of radioactive materials from two Japan Atomic Energy Agency research facilities: Ningyo and Tono.¹⁷ The materials included natural uranium ores from mines in Japan and other mines around the world that the Japanese agency had tested, as well as uranium-loaded resins, filter-bed sands, and uranium-loaded carbon—materials that concentrated uranium during uranium recovery testing and during the process of removing water from uranium ore at the two facilities.¹⁸



Esri, FAO, NOAA

Of the 136 tons of radioactive materials, approximately 85.4 tons were uranium ores, ore samples, cores, test-hole samples, and spilled ore material and soil scrapings mixed with rock and/or soil from the Japan Atomic Energy Agency.¹⁹ Some of these ores had already made a long journey—Japan originally imported them for testing from as far away as Canada, Brazil, Gabon, and Niger.²⁰ The agency also planned to ship 40.5 tons of uranium-loaded resins and associated filter-bed sands, and about 10.3 tons of uranium-loaded carbon.²¹ These materials had been used to treat uranium-laden water at the sites.

Upon receipt of the materials, the White Mesa Mill must process the ore, resin, carbon, and sands to extract recoverable uranium, before it can dispose of the leftovers in the mill's waste pits. But the waste contains very little uranium by volume. According to the mill's owner, the company would produce only 0.58 tons of yellowcake (the mill's commercial uranium product) from the materials.²² The rest of the material (135.5 tons) would be dumped in massive waste ponds at the mill that sit on ancestral Ute lands, above the deep Navajo Aquifer, the source of drinking water for the nearby White Mesa Ute community, the town of Bluff, Utah, and numerous other communities across southeastern Utah and northern Arizona.²³ Although scientists are uncertain about how far and how fast any contamination caused by the mill might travel, local residents in White Mesa remain concerned about the possibility of groundwater contamination.

¹⁷ Letter from David C. Frydenlund, Energy Fuels Resources (USA) Inc., to Ty L. Howard, Division of Waste Management and Radiation Control, Utah Department of Environmental Quality. "Receipt and Processing of Ores and Equivalent Feed Materials from Japan Atomic Energy Agency ("JAEA") at the Energy Fuels Resources (USA) Inc. ("EFRI") White Mesa Mill." Energy Fuels Resources (USA) Inc. p. 1. May 19, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_JAEAwaste_5-27-20_EFRI_letter_to_UDWMRC.pdf. Accessed January 29, 2022.

¹⁸ Ibid.

¹⁹ Ibid. 2.

²⁰ Ibid., Attachment A.

²¹ Ibid, 10.

²² Ibid., 2,4,5.

²³ Ibid., 7.



Esri, FAO, NOAA

Re: Receipt and Processing of Ores and Equivalent Feed Materials from Japan Atomic Energy Agency (“JAEA”) at the Energy Fuels Resources (USA) Inc. (“EFRI”) White Mesa Mill

Dear Mr. Howard:

This letter is to advise the Utah Division of Waste Management and Radiation Control (“DWMRC”) of EFRI’s plan to receive and process at the White Mesa Mill (the “Mill”) a small quantity (approximately 136 tons) of natural uranium ores and equivalent feed materials (collectively, the “Materials”) from two JAEA uranium test centers, for the recovery of uranium. Because these materials are natural ores and equivalent feed materials, EFRI plans to receive and process these materials under the Mill’s current Radioactive Materials License (“RML”) No. 1900479.

Under the proposed transaction, EFRI would receive the Materials from the following two JAEA uranium recovery and fuel cycle test facilities in Honshu, Japan:

- JAEA Ningyo-toge Environmental Engineering Center (the “Ningyo Center” or “Ningyo”), and
- JAEA Tono Geoscience Center (the “Tono Center” or “Tono”).

A May 19, 2020 letter from the White Mesa Mill’s owner, Energy Fuels Resources, to Utah state regulators, informing them of the company’s intent to process waste from the Japan Atomic Energy Agency.

The mill’s owner claims that it is “recycling” uranium from waste material. But it is doubtful that recovering uranium is the mill’s primary motivation in accepting waste like this. Because the Japan Atomic Energy Agency was motivated to get rid of the material, and because uranium prices were still low in 2021 thanks to the Fukushima meltdown and other market factors, it’s likely that the mill’s owner would receive a substantial payment for accepting the materials.

This wouldn’t be the first time the Japanese government has shipped radioactive waste to the White Mesa Mill and paid the mill’s owner handsomely. In 2004, the Supreme Court of Japan ordered the removal of contaminated soils from Ningyo based on pressure and litigation from Japanese citizens living nearby. Hefty fines were levied against the Japan Atomic Energy Agency for each day the waste remained on-site past a court-imposed deadline.²⁴ In 2005, the agency paid the then-owner of the White Mesa Mill \$5.8 million to process uranium from and permanently dispose of 500 tons (1 million pounds) of contaminated soils.²⁵

²⁴ “Decommissioning Projects – Asia, Japan: former Ningyo-Toge uranium mine.” World Information Service on Energy, Uranium. <https://www.wise-uranium.org/udasi.html#JP>. Accessed January 30, 2022.

²⁵ Fahys, Judy. “Japan sending trainloads of toxins to Utah.” The Salt Lake Tribune. October 5, 2005. <https://archive.sltrib.com/article.php?id=3088194&itype=NGPSID>. Accessed January 30, 2022.

The Salt Lake Tribune noted that “reports from Japan often describe the contaminated soil as waste headed to Utah for disposal.”²⁶ In 2005, the owner of the White Mesa Mill claimed the material was “ore,” not “waste,” and that no special licenses were required,²⁷ a strategy it would repeat when the Japan Atomic Energy Agency came knocking 15 years later.

In 2020, the White Mesa Mill’s owner again claimed it did not need an amendment to its state-issued license (which would trigger a public comment period) to accept a new waste stream from Japan.²⁸ The Utah Division of Waste Management and Radiation Control (DWMRC) agreed with the mill’s owner, saying, “Based on the information provided, the DWMRC concurs that this material is naturally occurring ore and equivalent feed and no additional licensing would be required for the Mill to accept and process this material.”²⁹

As of December 2021, there had been no public notice that the Japan Atomic Energy Agency material had yet been shipped to the mill.

Concerns continue to mount over international waste shipments to the White Mesa Mill. Ute Mountain Ute tribal member Yolanda Badback of the White Mesa Concerned Community group told the Salt Lake Tribune in September 2020, “Estonia, Japan, where will the radioactive waste come from next? Our ancestors’ remains were dug up to build the mill, and burying waste near them impacts us today. We’re concerned about pollution of our well water. We’re concerned about our young ones and our elderly in our Ute community, and our health is affected by the mill. We want the mill shut down and cleaned up, not more waste coming here from all over the world.”³⁰



Ute Mountain Ute Reservation, White Mesa, Utah. BLAKE MCCORD

²⁶ Ibid.

²⁷ Ibid.

²⁸ Letter from David C. Frydenlund, Energy Fuels Resources (USA) Inc., to Ty L. Howard, Division of Waste Management and Radiation Control, Utah Department of Environmental Quality. “Receipt and Processing of Ores and Equivalent Feed Materials from Japan Atomic Energy Agency (“JAEA”) at the Energy Fuels Resources (USA) Inc. (“EFRI”) White Mesa Mill.” p. 1. May 19, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/White_Mesa_Mill_JAEAwaste_5-27-20_EFRI_letter_to_UDWMRC.pdf. Accessed January 29, 2022.

²⁹ Letter from David C. Frydenlund, Energy Fuels Resources (USA) Inc., to Ty L. Howard, Division of Waste Management and Radiation Control, Utah Department of Environmental Quality. “RE: Accepting and Processing Uranium Ore and Equivalent Feed from the Japan Atomic Energy Agency (JAEA) at the White Mesa Mill, Radioactive Material License Number UT 1900479.” Utah Division of Waste Management and Radiation Control. July 28, 2020. https://www.grandcanyontrust.org/sites/default/files/resources/WMM_DWMRC_Approval_JapanAEAmaterial_28Jul2020.pdf. Accessed January 29, 2022.

³⁰ Podmore, Zak. “Radioactive material from Japan is heading to San Juan County.” The Salt Lake Tribune. September 16, 2020. <https://www.sltrib.com/news/2020/09/16/radioactive-material/>. Accessed January 30, 2022.

NAVAJO NATION ABANDONED MINES



Navajo Nation (Arizona, New Mexico, Utah)

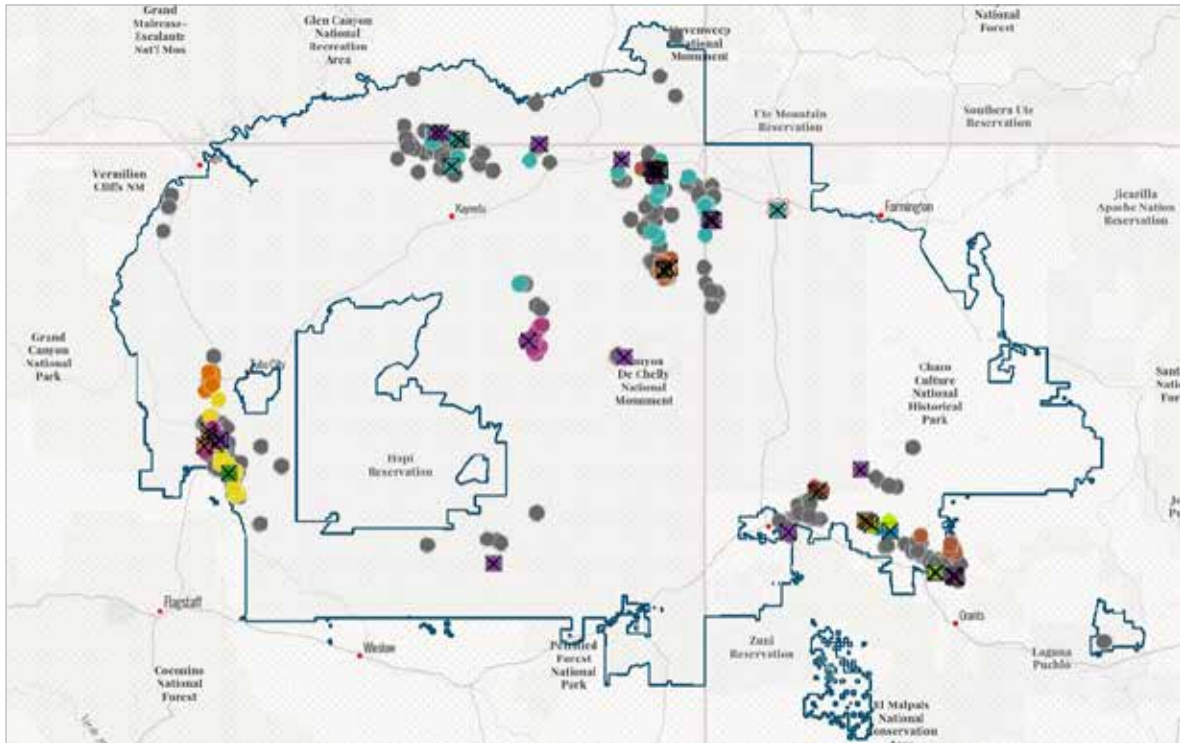
Shiprock, New Mexico. [BEAU ROGERS](#)

- ▶ The largest radioactive spill in U.S. history occurred at a uranium mill in Church Rock, on the Navajo Nation, in 1979.
- ▶ Over 1,100 uranium mines were abandoned on the Navajo Nation, where they contaminate soil and water to this day.
- ▶ One study found that about a quarter of Navajo women tested, as well as some infants, had high levels of uranium in their bodies.



From the 1920s to the early 1970s, uranium ore was mined on the Navajo reservation for the U.S. atomic energy program. The primary purchaser and beneficiary of this mining activity was the U.S. government and the development of uranium resources was entrusted to the Atomic Energy Commission. As a result of this mining, the Navajo Nation has been left with at least 1,104 known abandoned uranium mines and tons of hazardous radioactive uranium mine waste scattered across our lands. Many Navajo people live and work in close proximity to highly contaminated soil, and breathe and drink contaminated air and water. Some residents live within a few hundred feet of highly radioactive wastes. Sheep and livestock—the basis for our subsistence—graze on contaminated vegetation and drink contaminated water. Often, Navajo homes are built with radioactive mine waste rocks and children play daily in the vicinity of mines and on mill tailing piles.¹ – Testimony of the Navajo Nation before the Subcommittee on Oversight and Investigations and the Subcommittee on Native American Affairs, November 4, 1993

¹ Terra Spectra Geomatics, in Cooperation with Navajo Nation Environmental Protection Agency and Navajo Abandoned Mine Lands Reclamation Program. "Abandoned Uranium Mines and the Navajo Nation: Navajo Nation AUM Screening Assessment Report and Atlas with Geospatial Data." p. vii. August 2007. https://www.epa.gov/sites/production/files/2017-01/documents/navajo_nation_aum_screening_assess_report_atlas_geospatial_data-2007-08.pdf. Accessed January 20, 2022.



Abandoned uranium mines on the Navajo Nation. NAVAJO NATION ENVIRONMENTAL PROTECTION AGENCY
Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS | U.S. EPA Region 9 Technology and Data Solutions Center

The Navajo Nation covers over 27,000 square miles across Arizona, New Mexico, and Utah.² Uranium mining and milling have contaminated substantial amounts of land throughout the Navajo Nation and have created four major hotspots—clusters of abandoned uranium mines prioritized for cleanup—near Shiprock and Church Rock, New Mexico, Monument Valley, Utah, and Cameron, Arizona.³

By enacting the Atomic Energy Act of 1946, Congress turned the United States government into the sole buyer of uranium, using pricing incentives to set off a huge mining boom.⁴ But by the late 1950s, with uranium reserves brimming, the government began to curtail its purchases.⁵ The boom became a bust.⁶ Mining companies that could no longer turn a profit commonly walked away, abandoning mines without cleaning them up as would be required today.⁷

Many of the uranium companies responsible for the abandoned mines no longer exist; as a result, the federal government has taken on assessing and cleaning up the mines.⁸ According to research compiled for the U.S.

² Navajo Nation Government. "History." <https://www.navajo-nsn.gov/history.htm>. Accessed January 30, 2022.

³ United States Environmental Protection Agency. "Navajo Nation: Cleaning up Abandoned Uranium Mines, Abandoned Mines Cleanup, Priority Mines." <https://www.epa.gov/navajo-nation-uranium-cleanup/abandoned-mines-cleanup#priority>. Accessed January 30, 2022.

⁴ Abandoned Uranium Mines Working Group. "Annual Stakeholder Report, January 1-December 31, 2020." p. 14. https://www.energy.gov/sites/default/files/2021/02/f82/AUWWMG_Annual%20Stakeholder%20Report%202020%20%28Final%29.pdf. January 30, 2022.

⁵ Kennedy Maize, "Too Dumb to Meter, Part 9." <https://www.powermag.com/too-dumb-to-meter-part-9/>. Accessed January 19, 2022.

⁶ Ibid.

⁷ Abandoned Uranium Mines Working Group. "Annual Stakeholder Report, January 1-December 31, 2020." p. 14-15. https://www.energy.gov/sites/default/files/2021/02/f82/AUWWMG_Annual%20Stakeholder%20Report%202020%20%28Final%29.pdf. January 30, 2022.

⁸ Abandoned Uranium Mines Working Group. "Annual Stakeholder Report, January 1-December 31, 2020." p. 15. https://www.energy.gov/sites/default/files/2021/02/f82/AUWWMG_Annual%20Stakeholder%20Report%202020%20%28Final%29.pdf. January 30, 2022.

Environmental Protection Agency, "...approximately 14% of the uranium used for the United States World War II and Cold War nuclear weapons and energy programs were mined from the Navajo Nation."⁹

According to the Bureau of Land Management, there are about 4,000 uranium mines documented to have actually produced uranium in the United States. But data compiled by the U.S. Environmental Protection Agency (EPA) indicates there are 15,000 mines located in places across 14 western states where uranium is found. Most of these mines are located in Colorado, Utah, New Mexico, Arizona, and Wyoming, and about 75 percent of them are on federal and tribal lands."¹⁰

The uranium mining industry on the Navajo Nation operated from 1944 to 1986,¹¹ with mines in New Mexico operating the longest.¹² The Abandoned Uranium Mines Working Group, a group of federal agencies that includes the U.S. departments of Agriculture, Energy, and Interior, and the EPA, and that works to address the nation's 4,225 defense-related uranium mines,¹³ told Congress that as of 2020, "nearly 11% of AUM [abandoned uranium mine] sites are on tribal lands, and the majority of these are on Navajo Nation land."¹⁴

An estimated 10,000 people worked in the uranium mining industry following World War II into the 1980s.¹⁵ Because large deposits of uranium occur on tribal lands, a large portion of uranium miners were tribal members.¹⁶ As of December 2020, "[m]ore than 600 AUM [abandoned uranium mine] sites or related areas [had] been mapped throughout and within one mile of the Navajo Nation."¹⁷

What the uranium industry left in its wake across the Navajo Nation was not the remains of a tidy business. On July 16, 1979, before six in the morning, the largest radioactive spill in U.S. history occurred when radioactive sludge breached an earthen dam at the United Nuclear Corporation's (a company owned by General Electric) uranium mill on the Navajo Nation in Church Rock, New Mexico.¹⁸ The spill released over 94 million gallons of acidic wastewater and 1,100 tons (2.2 million pounds) of radioactive uranium mill waste into the Rio Puerco River.¹⁹ The Rio Puerco flows west past the New Mexico and Arizona border

⁹ Terra Spectra Geomatics, In Cooperation with Navajo Nation Environmental Protection Agency and Navajo Abandoned Mine Lands Reclamation Program. "Abandoned Uranium Mines and the Navajo Nation: Navajo Nation AUM Screening Assessment Report and Atlas with Geospatial Data." p. vii. August 2007. https://www.epa.gov/sites/production/files/2017-01/documents/navajo_nation_aum_screening_assess_report_atlas_geospatial_data-2007-08.pdf. January 30, 2022.

¹⁰ United States Bureau of Land Management. "About Abandoned Mines-Uranium Mines." https://www.abandonedmines.gov/about_uranium_mines. Accessed January 30, 2022.

¹¹ United States Environmental Protection Agency. "Navajo Nation: Cleaning Up Abandoned Uranium Mines" <https://www.epa.gov/navajo-nation-uranium-cleanup>. Accessed January 30, 2022.

¹² National Research Council. "Health Effects of Exposure to Radon: BEIR VI, Appendix E: Exposures of Miners to Radon Progeny." p. 314. 1999. <https://www.nap.edu/read/5499/chapter/12>. Accessed January 30, 2022.

¹³ U.S. Department of Energy, Office of Legacy Management. "Working Group Addresses Abandoned Uranium Mines." December 28, 2017. <https://www.energy.gov/lm/articles/working-group-addresses-abandoned-uranium-mines>. Accessed January 20, 2022.

¹⁴ Abandoned Uranium Mines Working Group. "Annual Stakeholder Report, January 1-December 31, 2020." p. 15. https://www.energy.gov/sites/default/files/2021/02/f82/AUWMG_Annual%20Stakeholder%20Report%202020%20%28Final%29.pdf. January 20, 2022.

¹⁵ Brugge, Doug, et al. "The Sequoyah Fuels Release and the Church Rock Spill: Unpublicized Nuclear Releases in American Indian Communities." *American Journal of Public Health*. p. 1. September 2007. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1963288/pdf/0971595.pdf>. Accessed January 30, 2022.

¹⁶ Ibid.

¹⁷ Terra Spectra Geomatics, in Cooperation with Navajo Nation Environmental Protection Agency and Navajo Abandoned Mine Lands Reclamation Program. "Abandoned Uranium Mines and the Navajo Nation: Navajo Nation AUM Screening Assessment Report and Atlas with Geospatial Data." p. vii. August 2007. https://www.epa.gov/sites/production/files/2017-01/documents/navajo_nation_aum_screening_assess_report_atlas_geospatial_data-2007-08.pdf. Accessed January 20, 2022.

¹⁸ Public Health Service Center for Disease Control Atlanta, Chronic Diseases Division Bureau of Epidemiology. "Biological Assessment After Uranium Mill Tailings Spill, Church Rock, New Mexico." p. 1. December 24, 1980. <https://www.nrc.gov/docs/ML2015/ML20151N928.pdf>. Accessed January 20, 2022.

¹⁹ DeLemos, Jamie L et al. "Development of risk maps to minimize uranium exposures in the Navajo Churchrock mining district." *Environmental Health*. Vol. 8:29. p. 2. July 9, 2009. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2714847/pdf/1476-069X-8-29.pdf>. Accessed January 20, 2022.



Left: Church Rock, Navajo Nation. [JAMES ST. JOHN](#); Right: Northeast Church Rock Mine. [DOCTRESS NEUTOPIA](#)

and is a tributary to the Little Colorado River which flows into the main stem of the Colorado River²⁰ and through the Grand Canyon, providing water to millions of people downstream, including the cities of Phoenix and Los Angeles.

An astonishing volume of uranium was mined on the Navajo Nation. From 1967 to 1982, about 3.5 million tons (7 billion pounds) of uranium ore was mined out of the Northeast Church Rock uranium mine alone, making it “the second highest producing mine on the Navajo Nation.”²¹ Once mined, the unearthed uranium ore was trucked across the highway (a short distance from Navajo Nation boundaries) to the privately owned United Nuclear Corporation mill.²² Because of the impacts on nearby communities and the large size of the Church Rock mine, it is the highest priority mine for cleanup on the Navajo Nation.²³

For decades, the Navajo people have confronted uranium companies and the U.S. government, demanding accountability and transparency. Before the slow process of regulation began in 1962, few standards and safeguards existed to protect uranium miners from exposure to radiation.²⁴ In 1994, the Advisory Committee on Human Radiation Experiments was created by President Bill Clinton “to investigate reports of possibly unethical experiments funded by the government.”²⁵ The committee’s charge included investigating the government’s observational research of uranium miners who were exposed to radiation while mining uranium for the federal government.²⁶ Many uranium workers were exposed to radon in underground mines that was known at the time to be hazardous to their health. The committee reported that “at least several hundred miners died of lung cancer and surviving miners remain at elevated risk.”²⁷ The mines were not ventilated, nor were the miners informed about the high levels of radioactive contaminants to which they were being exposed, in effect serving as unwitting research subjects for the government.

²⁰ Public Health Service Center for Disease Control Atlanta, Chronic Diseases Division Bureau of Epidemiology. “Biological Assessment After Uranium Mill Tailings Spill, Church Rock, New Mexico.” p. 1. December 24, 1980. <https://www.nrc.gov/docs/ML2015/ML20151N928.pdf>. Accessed January 20, 2022.

²¹ United States Environmental Protection Agency. “Navajo Nation: Cleaning Up Abandoned Uranium Mines, Northeast Church Rock Mine.” <https://www.epa.gov/navajo-nation-uranium-cleanup/northeast-church-rock-mine>. Accessed January 20, 2022.

²² Ibid.

²³ Ibid.

²⁴ Brugge, Doug, and Goble, Rob. “The History of Uranium Mining and the Navajo People.” *American Journal of Public Health*. p. 1410. September 2002. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3222290/pdf/0921410.pdf>. Accessed January 20, 2022.

²⁵ Advisory Committee on Human Radiation Experiments. “Executive Summary and Guide to Final Report.” p. 3. October 24, 1995. <https://www.osti.gov/opennet/servlets/purl/120931/120931.pdf>. Accessed January 20, 2022.

²⁶ Ibid. pp. 12, 29.

²⁷ Ibid. p. 12.



[I]t wasn't until 2003, when the Chapter started the Church Rock Uranium Monitoring Project [CRUMP], that we found out how bad the problem was, and still is, with the assistance of many outside organizations and the agencies which sample our air, water and land...We found high levels of gamma radiation, up to 16 times what is considered normal for the area outside of the [Old Churchrock] mine site, even on my grazing land, which is immediately adjacent to the mine...NRC said it doesn't regulate mine waste. I guess its mandate to protect the public health and safety just doesn't apply to us Navajos. The second major finding of our CRUMP study was that the soils around some of the homes...were also contaminated with high gamma radiation levels and with uranium in amounts of up to 30 times what is considered natural. Two abandoned mines lie on both sides of this community...I don't have enough time to tell you how bad the conditions were for the workers at UNC and how the company was not concerned about the safety of its employees. I will tell you that as a kid, I played on the big piles of ore and mine waste across the road from our home, unaware of the dangers.²⁸ – Larry King, Diné (Navajo), Church Rock Community Member

Exposure to uranium can be linked to lung and bone cancer and other health problems, including autoimmune dysfunction, kidney disease, reproductive dysfunction, and high blood pressure.²⁹ For Navajo communities exposed to uranium, there are also serious psychological and emotional impacts including forced displacement from ancestral land and cultural identity.³⁰ A federally funded study on uranium exposure found that “[a]bout a quarter of Navajo women and some infants [tested] ...had high levels of the radioactive metal in their systems, decades after mining for Cold War weaponry ended on their reservation....”³¹ Long-term cumulative studies are still needed to further assess the adverse health, environmental, social, and economic impacts of uranium mining on the Navajo Nation.

In 2005, the Navajo Nation Council banned uranium mining on the Navajo Nation to prevent further damage to the culture, society, and economy of the Navajo Nation.³² The tribal council also passed the Radioactive Materials Transportation Act of 2012, allowing the Navajo Nation to regulate uranium transportation.³³

²⁸ “Statement of Larry King.” Hearing before the House of Representatives Committee on Oversight and Government Reform: The Health and Environmental Impacts of Uranium Contamination in the Navajo Nation. 110th Congress. October 23, 2007. <https://www.govinfo.gov/content/pkg/CHRG-110hhrg45611/html/CHRG-110hhrg45611.htm>. Accessed January 30, 2022.

²⁹ United States Environmental Protection Agency. “Cleaning Up Abandoned Uranium Mines, Health Effects of Uranium” December, 2014. <https://www.epa.gov/navajo-nation-uranium-cleanup/health-effects-uranium>. Accessed January 30, 2022.

³⁰ New Mexico Health Equity Partnership “Looking Within: A Health Impact Assessment of Uranium Mining” p. 33. April 2015. https://mckinleycommunityplacematters.files.wordpress.com/2014/02/looking-within_hia_final.pdf. Accessed January 30, 2022.

³¹ Hudetz, Mary. “U.S. official: Research finds uranium in Navajo women, babies.” The Associated Press. October 7, 2019. <https://apnews.com/article/334124280ace4b36beb6b8d58c328ae3>. Accessed June 6, 2021

³² Navajo Nation Council. “Resolution Of The Navajo Nation Council, 20th Navajo Nation Council: An Act Relating To Resources And Diné Fundamental Law; Enacting The Diné Natural Resources Protection Act Of 2005; Amending Title 18 Of The Navajo Nation Code.” April 19, 2005. <https://www.nrc.gov/docs/ML0723/ML072340482.pdf>. Accessed June 1, 2021.

³³ Navajo Nation Council. “Resolution Of The Navajo Nation Council, 22nd Navajo Nation Council: An Act Relating To The Law And Order; Resource And Development; And Naabik’iyáti’ Committee; And Radioactive And Related Substances Equipment, Vehicles, Persons And Materials Transportation Act Of 2012: Amending The Navajo Nation Code Title 18, Chapter 12, To Provide For The Protection, Health And Safety Of The Navajo Nation People With Regard To The Transportation Of Radioactive And Related Substances, Equipment, Vehicles, Persons And Materials Over And Across Navajo Nation Land.” February 16, 2012. <https://www.nnols.org/wp-content/uploads/2021/02/CF-18-12.pdf>. Accessed January 28, 2022.



Maxar, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

The first coordinated effort by the federal government to address uranium contamination on the Navajo Nation began in 2008 with a 5-year plan,³⁴ which outlined a strategy for gaining a better understanding of the scope of the problem and addressing the greatest risks first. Additionally, the U.S. EPA “has entered into enforcement agreements and settlements valued at over \$1.7 billion to reduce the highest risks of radiation exposure to the Navajo people.”³⁵ The U.S. EPA will assess and begin the cleanup process at 230 (about 40 percent) of the 523 abandoned uranium mines on the Navajo Nation.³⁶ Determining which abandoned uranium mines are priorities for cleanup is based on “radiation levels, proximity to homes and potential water contamination...” Forty-six “priority mines” were identified by the U.S. EPA and the Navajo Nation Environmental Protection Agency for detailed investigation, and 44 had moved to the assessment phase as of late 2021.³⁷

With so many abandoned uranium mines to deal with, the Navajo Nation asked the U.S. EPA to take the lead on the Northeast Church Rock Mine cleanup.³⁸ In 2006, an estimated 30 families still lived within 1.5 miles of the mine.³⁹ The U.S. EPA developed a cleanup plan to permanently remove 1 million cubic yards of contaminated mine waste, transporting it across the highway to be disposed of at the nearby United Nuclear Corporation mill site,⁴⁰ despite deep lingering concerns from communities still living with the legacy of the devastating Church Rock spill of 1979. The Red Water Pond Road Community Association, a local non-profit whose members include many Navajo families living near the Northeast Church Rock Mine, has expressed opposition to the plan to send the waste to the United Nuclear Corporation mill site

³⁴ United States Environmental Protection Agency. “Health and Environmental Impacts of Uranium Contamination in the Navajo Nation, Five-Year Plan.” pp. 4-5. June 9, 2008.

<https://www.epa.gov/sites/production/files/2016-06/documents/nn-5-year-plan-june-12.pdf>. Accessed January 30, 2022.

³⁵ United States Environmental Protection Agency. “Navajo Nation: Cleaning Up Abandoned Uranium Mines Northeast Church Rock Mine, Priority Mines.” <https://www.epa.gov/navajo-nation-uranium-cleanup/abandoned-mines-cleanup>. Accessed January 30, 2022.

³⁶ Ibid.

³⁷ Ibid.

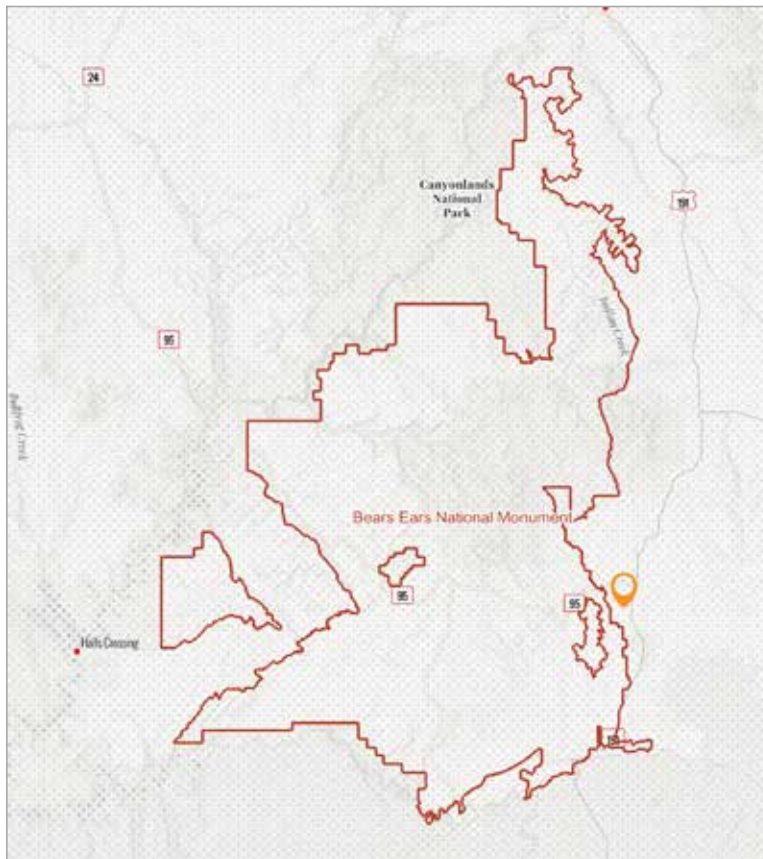
³⁸ United States Environmental Protection Agency. “Navajo Nation: Cleaning Up Abandoned Uranium Mines Northeast Church Rock Mine.” <https://www.epa.gov/navajo-nation-uranium-cleanup/northeast-church-rock-mine>. Accessed January 20, 2022.

³⁹ Ibid.

⁴⁰ Ibid.

and asked that the plan be withdrawn.⁴¹ The community continues to organize to prevent displacement from their traditional homelands and demand proper cleanup of the Northeast Church Rock Mine site.

A licensed facility located off of Navajo tribal trust land has yet to be identified for the remaining highly contaminated Northeast Church Rock Mine waste material.⁴² However, Energy Fuels Resources, the company that owns the White Mesa uranium mill in southeast Utah, a few miles from the Ute Mountain Ute tribal community of White Mesa, is making a strong push for its mill to be selected to process the waste from Navajo Nation abandoned uranium mines.



The White Mesa Mill (represented by the orange pin), sits about a mile east of Bears Ears National Monument. Esri, CGIAR, USGS | Utah AGRC, Esri, HERE, Garmin, SafeGraph, FAO, METI/ NASA, USGS, Bureau of Land Management, EPA, NPS

In March 2020, Energy Fuels announced that it would participate in a small, pilot-scale project on the Navajo Nation to test the prospect of processing and discarding abandoned mine wastes at the White Mesa Mill.⁴³ If Navajo Nation abandoned uranium mine waste material were to be sent to the White Mesa Mill, all remnant waste would be disposed of in the mill's waste pits, a mile from Bears Ears National Monument. The monument is a significant cultural landscape to at least two dozen tribes, including the Navajo Nation. And the White Mesa Mill sits above the deep Navajo Aquifer.⁴⁴ If the aquifer were to be compromised by the mill, there would be significant, long-lasting impacts on the Ute Mountain Ute Tribe and the Navajo Nation, as well as on neighboring non-tribal communities. Many Navajo leaders and advocates oppose

sending the abandoned mine waste to the White Mesa Mill, including uranium researcher Dr. Tommy Rock, a postdoctoral research fellow at Princeton University and a member of the Navajo Nation's Diné Uranium Remediation Advisory Commission.⁴⁵

⁴¹ Red Water Pond Road Community Association. "Preliminary Comments on Waste Consolidation Draft Environmental Impact Statement [License No. NUREG-2243]." May 10, 2021. <http://static1.1.sqspcdn.com/static/f/356082/28439256/1621523899290/RWPRCA+Preliminary+DEIS+Comments+Signed.pdf?token=FsfJF6DveJCPVnw2zJH%2BamIN5zA%3D>. Accessed January 30, 2022.

⁴² United States Environmental Protection Agency. "Navajo Nation: Cleaning Up Abandoned Uranium Mines Northeast Church Rock Mine." <https://www.epa.gov/navajo-nation-uranium-cleanup/northeast-church-rock-mine>. Accessed January 30, 2022.

⁴³ Energy Fuels Inc. "Energy Fuels Announces 2019 Results." March 16, 2020. <https://www.energyfuels.com/2020-03-16-Energy-Fuels-Announces-2019-Results>. Accessed January 29, 2022.

⁴⁴ United States Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards. "Final Environmental Impact Statement related to operation of the White Mesa Uranium Project Energy Fuels Nuclear, Inc. Docket No. 40-8681." pp. 2-32. May 1979. <https://documents.deq.utah.gov/legacy/businesses/e/energy-fuels-resources-usa/docs/2009/08Aug/FINAL%20ENVIRONMENTAL%20STATEMENT%20MAY%201979.pdf>. Accessed January 23, 2022.

⁴⁵ Dr. Tommy Rock, phone call with Talia Boyd, Grand Canyon Trust, March 24, 2021.

Uranium contamination interferes with traditional Navajo lifeways and has had a profound impact on Navajo people. If the Navajo Nation's abandoned uranium mine waste is sent to the White Mesa Mill, the burden of this radioactive legacy will shift to the Ute Mountain Ute White Mesa community. Tribes are sovereign nations; they exercise their sovereign power on their lands. If those lands become contaminated with uranium and tribal members can no longer live there safely, tribes cannot simply move their sovereign power elsewhere.⁴⁶

“

There is a Navajo concept called hózhó. Hózhó is how we live our lives. It means balance, beauty and harmony between us, the Five-Finger people, and nature. When this balance is disturbed, our way of life, our health and our well-being all suffer. The uranium contamination and mining wastes at my home continue to disrupt hózhó. I think it was in the 1960's, when I was only a teenager that strangers arrived. I remember Grandma running to stop them from making roads into the wooded areas. The stakes she drove into the ground did not keep them out. No one ever told her what was happening. The exploratory drilling people had arrived. There was no respect for people living there, and certainly, no respect for Mother Earth.⁴⁷ – Edith Hood, Diné (Navajo), Red Water Pond Road Community Member

⁴⁶ Eichstaedt, Peter H. "If You Poison Us: Uranium and Native Americans." Red Crane Books. p. xi. September 1, 1994. https://www.grandcanyontrust.org/sites/default/files/WhiteMesaAlternateFeeds/NavajoNationAbandonedMines/If_You_Poison_Us_Uranium_And_Native_Americans_page_xi.jpg. Accessed January 30, 2022.

⁴⁷ "Statement of Edith Hood." Hearing before the House of Representatives Committee on Oversight and Government Reform: The Health and Environmental Impacts of Uranium Contamination in the Navajo Nation. 110th Congress. October 23, 2007. <https://www.govinfo.gov/content/pkg/CHRG-110hrg45611/html/CHRG-110hrg45611.htm>. Accessed January 30, 2022.



The Bears Ears buttes, Bears Ears National Monument, west of the White Mesa Mill. TIM PETERSON

CONCLUSION

Combing through government databases and reviewing thousands of pages of documents in order to piece together the information contained in this report took a team of 10 people, including attorneys, policy experts, and cartographers, more than a year, but the resulting picture remains incomplete.

Now in its fourth decade of operation, the White Mesa Mill is fast approaching its third decade of alternate-feed waste processing and disposal. However, exactly just how much alternate-feed waste has accumulated at the White Mesa Mill site, how much continues to arrive daily, and how these various wastes and their toxic and radioactive components are interacting in the mill's waste pits is unclear. A true and public accounting is long overdue.

What is clear is that the cumulative burden of nearly 30 years of amassing low-level radioactive wastes from Superfund, FUSRAP, and other toxic and contaminated military and industrial sites across the nation and the world weighs heavily on the community of White Mesa, and on southeastern Utah. As hundreds of millions of pounds of radioactive waste stew in the mill's massive waste ponds and the mill's owner lobbies to accept even more, the scales of environmental justice are tipping, with a uranium company's pursuit of profit on one side, and public health, clean water, and the fate of White Mesa's Ute Mountain Ute community on the other.

It is time for meaningful regulatory reform. It is time to end a de facto waste-disposal-for-a-fee model that has allowed a uranium mill—one built and licensed with a plan to run for 15 years and then clean up—to turn into a commercial waste-disposal site that gets paid to bury next to the community of White Mesa "alternate feeds" that have often devastated communities and the environment in other places. It is time to require transparency, honor the principles of environmental justice, and stop the flood of radioactive waste to the White Mesa Mill, on the doorstep of the Bears Ears cultural landscape.

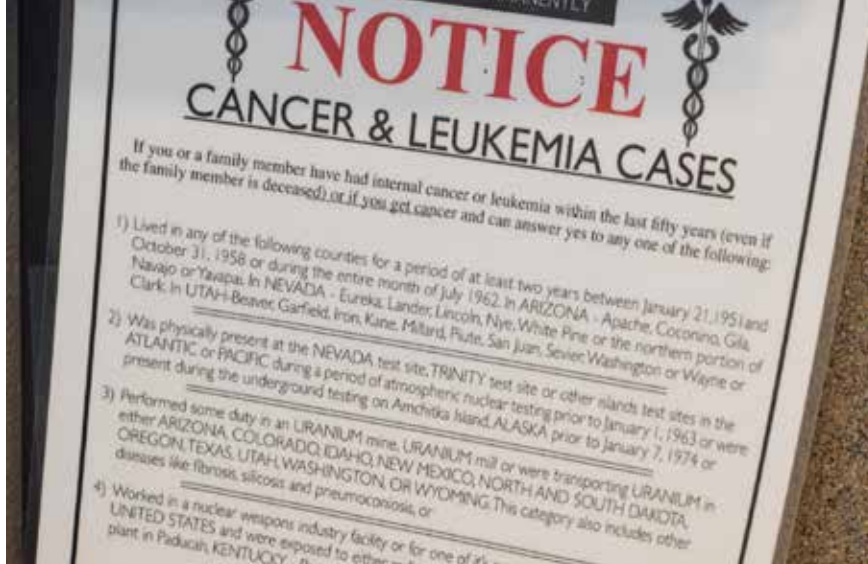
RECOMMENDATIONS

A core problem with allowing the White Mesa Mill to charge fees to mill radioactive and hazardous wastes as alternate feeds is that federal and state regulators treat milling as an act that changes the legal classification of those wastes so that the leftovers—often more than 99% of what arrived at the mill—may be buried with the mill's other wastes. It is only because the mill can dispose of these remaining radioactive wastes that it can demand payment to process alternate feeds, and that means it is able to earn revenues in the radioactive waste-disposal market without complying with the laws that would otherwise govern.

An evenhanded way to address this problem is to amend federal law so that uranium mills that want to compete in the waste-disposal market, rather than the market for making nuclear fuel, must comply with the laws governing commercial radioactive-waste disposal. That solution would not prohibit alternate-feed milling outright, but it would ensure that the White Mesa Mill could charge fees to dispose of third parties' radioactive wastes only by first obtaining the licenses and permits a commercial waste-disposal provider would be required to obtain for the wastes in question. Most likely, this would require the mill to be permitted as a low-level radioactive waste disposal facility, and it could subject the mill to permitting requirements for managing hazardous wastes.



BLAKE MCCORD



Notice on a community bulletin board in White Mesa, Utah. BLAKE MCCORD

APPENDIX: MAJOR STATUTES AND RULES

The Atomic Energy Act

The bedrock statute governing the uranium-milling industry is the Atomic Energy Act. That Act designates uranium and “ores” containing uranium as “source material”¹ and requires a license to receive or transfer source material “after removal from its place of deposit in nature.”² The responsibility for issuing licenses is assigned to the Nuclear Regulatory Commission (NRC).³ The NRC may transfer that power to states that want to assume regulatory responsibility,⁴ a privilege the state of Utah has exercised.⁵

The Uranium Mill Tailings Radiation Control Act of 1978

When initially adopted, the Atomic Energy Act did not regulate the radioactive wastes produced by uranium mills. So in 1978, in the Uranium Mill Tailings Radiation Control Act (UMTRCA), Congress amended the Atomic Energy Act to place uranium-milling wastes under the NRC’s jurisdiction.⁶ To do that, UMTRCA changed the definition of a statutory term called “byproduct material” so that it included “the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.”⁷ This is often called “11e.(2)” byproduct material because this amended definition was added to Section 11e.(2) of the Atomic Energy Act.

¹ 42 U.S.C. § 2014(z). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2014.pdf>. Accessed January 26, 2022.

² 42 U.S.C. § 2092. <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2092.pdf>. Accessed January 26, 2022.

³ 42 U.S.C. § 5841. <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap73-subchapl-sec5841.pdf>. Accessed January 26, 2022. 42 U.S.C. § 2092. <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2092.pdf>. Accessed January 26, 2022.

⁴ 42 U.S.C. § 2021(b). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2021.pdf>. Accessed January 26, 2022.

⁵ “Agreement Between the United States Regulatory Commission and the State of Utah for Discontinuance of Certain Commission Regulatory Authority and Responsibility within the State Pursuant to Section 274 of the Atomic Energy Act of 1954, as Amended.” March 29, 1984. <https://scp.nrc.gov/special/regs/utagreements.pdf>. Accessed January 27, 2022. “Amendment to Agreement Between the United States Nuclear Regulatory Commission and the State of Utah for Discontinuance of Certain Commission Regulatory Authority and Responsibility within the State Pursuant to Section 274 of the Atomic Energy Act of 1954, as Amended.” May 8, 1990. https://scp.nrc.gov/special/regs/ut_frnagreements.pdf. Accessed January 27, 2022. “Amendment to Agreement Between the United States Nuclear Regulatory Commission and the State of Utah for Discontinuance of Certain Commission Regulatory Authority and Responsibility within the State Pursuant to Section 274 of the Atomic Energy Act of 1954, as Amended.” August 15, 2004. https://scp.nrc.gov/special/regs/ut2004_agreements.pdf. Accessed January 27, 2022.

⁶ Uranium Mill Tailings Radiation Control Act of 1978. Pub. L. 95-604. November 8, 1978. <https://www.govinfo.gov/content/pkg/STATUTE-92/pdf/STATUTE-92-Pg3021.pdf>. Accessed January 26, 2022.

⁷ Ibid. 42 U.S.C. § 2014(e)(2). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2014.pdf>. Accessed January 26, 2022.

One important consequence of UMRCA is that uranium-milling wastes cannot be 11e.(2) byproduct material if those wastes result from processing anything other than “ore” or if they result from milling that is not undertaken “primarily” to recover uranium or thorium. And to manage and dispose of radioactive wastes that are not 11e.(2) byproduct material, a mill’s owner would likely be required to comply with a set of waste-disposal laws other than UMRCA, depending on the composition of the wastes in question. It is this feature of UMRCA on which the law governing “alternate feeds” has turned.

“Alternate feeds” is a term the uranium industry and government officials coined to describe radioactive wastes and contaminated soils from which uranium mills can recover uranium for use as nuclear fuel. When uranium mills first sought to earn revenues processing these wastes in the mid- to late-1980s, federal regulators faced the question of whether the wastes counted as ore being processed primarily to extract uranium.⁸ If not, the resulting wastes would not be 11e.(2) byproduct material that could be discarded with other radioactive milling wastes, often called tailings.⁹

In the early 1990s, the staff of the Nuclear Regulatory Commission chose to treat the wastes from processing alternate feeds as 11e.(2) byproduct material under some circumstances. But NRC staff recognized the prospect that uranium mills could abuse this policy:

The possibility of converting [low-level radioactive waste] or mixed [hazardous and low-level] waste can be very attractive to owners of such material. This is because of the high cost of disposing of [low-level waste] and especially of mixed waste. An owner of such material could pay a mill operator substantially less to process it for its uranium content and dispose of the resulting 11e.(2) byproduct material than to dispose of the material as waste at an appropriate facility.¹⁰

The staff consequently recommended that the NRC adopt a licensing policy with restrictions intended, among other outcomes, to prevent uranium mills from accepting payment to sidestep other waste-disposal laws.¹¹

NRC’s 1995 guidance on alternate-feed licensing

In 1995, the NRC issued final guidance generally implementing its staff’s recommendations. The guidance adopted a three-part test for licensing alternate feeds for processing at uranium mills.

First, the guidance recognized that the leftovers from processing wastes containing uranium could not lawfully be discarded at uranium mills unless the wastes being processed were “ore.”¹² So the guidance set out a new definition of that term: “Ore is a natural or native matter that may be mined and treated for the extraction of any of its constituents or *any other matter from which source material is extracted in a licensed uranium or thorium mill.*”¹³ That definition allowed anything that is milled to recover uranium to qualify as ore.

Second, the NRC forbade the processing of wastes that are listed as hazardous under the Resource Conservation and Recovery Act of 1976 (RCRA), the principal federal statute governing the management of hazardous wastes. Hazardous wastes are identified under RCRA in two ways: (1) via lists that the

⁸ James M. Taylor. “Uranium Mill Feed Materials Other than Natural Ores, SECY-91-347.” October 25, 1991. <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20085L538>. Accessed January 26, 2022.

⁹ *Ibid.*, p. 6 (“[I]t is not obvious, from the definition [of 11e.(2) byproduct material] alone, whether wastes produced from processing feed material that is something other than rock mined from the earth meets the definition of 11e.(2) byproduct material.”).

¹⁰ *Ibid.*, p. 9.

¹¹ *Ibid.*, pp. 9–11 (“Material that was processed primarily to convert what would have been [low-level waste] or mixed [hazardous and low-level] waste into 11e.(2) byproduct material does not meet the definition of 11e.(2) byproduct material.”).

¹² 42 U.S.C. § 2014(e)(2). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2014.pdf>. Accessed January 26, 2022.

¹³ Nuclear Regulatory Commission. “Final Position and Guidance on the Use of Uranium Mill Feed Materials Other Than Natural Ores.” 60 Fed. Reg. p. 49,296. September 22, 1995 (emphasis added). <https://www.govinfo.gov/content/pkg/FR-1995-09-22/pdf/95-23531.pdf>. Accessed January 26, 2022.

Environmental Protection Agency (EPA) publishes specifically declaring wastes to be hazardous; and (2) by exhibiting a characteristic that EPA has designated as hazardous. The NRC banned the use of listed wastes as alternate feeds because RCRA would govern the disposal of those wastes even if they were “recycled” or “reclaimed” at a uranium mill, and the NRC wanted “to avoid the complexities of NRC/EPA dual regulation.”¹⁴ But the NRC allowed “characteristic” hazardous wastes to be processed as alternate feeds because EPA has, by rule, exempted from regulation under RCRA characteristic hazardous wastes that are “reclaimed.”¹⁵

Third, the guidance allowed NRC staff to license alternate feeds for processing if the staff was satisfied that the material would be processed primarily for recovery of uranium. Two tests for that purpose were adopted. The first was called the “co-disposal test.” It could be met if the alternate-feed in question could lawfully be discarded directly into a uranium mill’s wastes without prior processing, provided that several other conditions were also fulfilled.¹⁶ The rationale for that test was that a mill operator would have no reason to process that sort of waste except to extract uranium, given that the operator could lawfully choose to discard the waste without processing it.¹⁷ The second test was a certification by the licensee, requiring the mill operator to affirm that the waste would be processed primarily to recover uranium.¹⁸ The 1995 guidance required the mill operator to provide documentation to justify its certification, and the guidance recognized that “financial considerations” could be salient in evaluating the operator’s primary purpose.¹⁹

In the Matter of International Uranium (USA) Corporation

The NRC’s 1995 guidance did not put to rest the outstanding legal questions about alternate-feed processing. Instead, beginning in the early 1990s and lasting for about a decade, regulators in Utah resisted the efforts by the owner of the White Mesa Mill to charge fees for processing radioactive wastes as alternate feeds.

State officials argued that the White Mesa Mill was licensed to dispose only of 11e.(2) byproduct material, which, again, are the wastes generated by extracting uranium from any ore processed “primarily” for its uranium (or in legal jargon, “source material”) content.²⁰ When the mill’s owner charged fees to mill alternate feeds, the state asserted, those feeds were being processed primarily to earn the fees, which could be charged only because the mill could dispose of the leftover wastes.²¹ Those wastes consequently were not byproduct material, the state argued, because they were milled primarily to earn waste-disposal fees, not to extract uranium.²²

The state’s opposition to alternate-feed milling culminated in an administrative decision from the NRC in the year 2000, in which the NRC rejected the state’s interpretation of federal law. In that decision, the NRC disavowed the elements of its 1995 guidance that were intended to curb payment in exchange for

¹⁴ *Ibid.*, pp. 49,296–97.

¹⁵ James M. Taylor. “Uranium Mill Feed Materials Other than Natural Ores, SECY-91-347.” pp. 8–9. October 25, 1991. <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20085L538>. Accessed January 26, 2022.

¹⁶ Nuclear Regulatory Commission. “Final Position and Guidance on the Use of Uranium Mill Feed Materials Other Than Natural Ores.” 60 Fed. Reg. p. 49,297. September 22, 1995 (emphasis added). <https://www.govinfo.gov/content/pkg/FR-1995-09-22/pdf/95-23531.pdf>. Accessed January 26, 2022.

¹⁷ *Ibid.*

¹⁸ *Ibid.*

¹⁹ *Ibid.*

²⁰ 42 U.S.C. § 2014(e)(2). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2014.pdf>. Accessed January 26, 2022.

²¹ State of Utah’s Br. on Appeal of LBP-99-5. In re Int’l Uranium (USA) Corp. (source material license amendment, Ashland 2 material), U.S. Nuclear Regulatory Commission, Docket No. 40-8681-MLA-4. pp. 8–15. May 24, 1999. <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML13234A026>. Accessed January 26, 2022.

²² *Ibid.*

transforming the legal classification of radioactive and hazardous wastes.²³ The NRC instead asserted that the definition of 11e.(2) byproduct material was satisfied so long as the act of processing is completed primarily to extract uranium and not some other substance.²⁴ To defend this position, the NRC borrowed from arguments that its then-chairman had made years earlier as an attorney in private practice in a lawsuit against the NRC on behalf of an industry client who was seeking to limit the cost of cleaning up radioactive contamination in West Chicago.²⁵

The effect of the NRC's decision was to extinguish any question about the economic motives for processing any given alternate feed, and thereby to allow the White Mesa Mill's owner to charge fees for disposing of third parties' radioactive wastes.

In the wake of the NRC's decision, NRC staff revised the agency's policy statements about alternate feeds to conform to the NRC's ruling.²⁶ The upshot was that anything containing uranium that was not a listed hazardous waste could be processed and discarded at the White Mesa mill so long as the mill's owner supplied a simple certification that it is primarily uranium, and not some other substance, that would be recovered by processing the material. These fundamental rules for licensing alternate feeds have not changed since, though the state of Utah has taken over the licensing process.²⁷

Radioactive and hazardous waste-disposal laws

The legal mooring for the White Mesa Mill's alternate-feed business is the decision by federal and state regulators to treat uranium milling as an act that transforms the legal status of uranium-bearing wastes so that no permitting requirements under other waste-disposal laws apply. The rules governing two types of wastes—rules that may be bypassed by milling alternate feeds—are especially salient: (1) low-level radioactive wastes; and (2) hazardous wastes.

Low-level radioactive wastes

The Nuclear Regulatory Commission has defined low-level radioactive waste to include all radioactive wastes that contain uranium or thorium (that is, "source material") or several other specified radioactive substances, provided that the wastes are not high-level radioactive wastes (like wastes resulting from fission in nuclear power plants) or other specifically identified types of radioactive waste, including 11e.(2) byproduct material.²⁸ Low-level wastes are consequently a sweeping category of radioactive wastes, but one that does not include uranium-milling wastes.

The NRC has prescribed complex rules governing land disposal of low-level radioactive wastes and uranium-milling wastes alike, although the agency has adopted a different set of regulations for each

²³ *In re Int'l Uranium (USA) Corp.* 51 NRC 9. pp. 14–16, 19. February 10, 2000. <https://www.nrc.gov/docs/ML0205/ML020560610.pdf>. Accessed January 26, 2022.

²⁴ *Ibid.*, pp. 15–16, 23.

²⁵ Compare *ibid.*, pp. 16–19, with *Kerr-Mcgee Chem. Corp. v. U.S. Nuclear Regulatory Comm'n.* 903 F.2d 1. pp. 5–8. April 27, 1990. <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20055C472>. Accessed January 27, 2022.

²⁶ Nuclear Regulatory Commission, RIS-023. November 30, 2000. <https://www.nrc.gov/reading-rm/doc-collections/gen-comm/reg-issues/2000/ri00023.html>. Accessed January 26, 2022.

²⁷ "Amendment to Agreement Between the United States Nuclear Regulatory Commission and the State of Utah for Discontinuance of Certain Commission Regulatory Authority and Responsibility within the State Pursuant to Section 274 of the Atomic Energy Act of 1954, as Amended." August 15, 2004. https://scp.nrc.gov/special/regs/ut2004_agreements.pdf. Accessed January 27, 2022.

²⁸ 10 C.F.R. § 61.2. <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-sec61-2.pdf>. Accessed January 26, 2022. 42 U.S.C. § 10101(16). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap108-sec10101.pdf>. Accessed January 26, 2022.

type of waste.²⁹ The agency's rules for low-level wastes establish performance standards for land-disposal facilities rather than prescribing specific engineering and construction requirements.³⁰ Because that approach is site specific and allows for flexibility in waste-disposal methods, it is not possible to forecast exactly how disposal of low-level wastes may vary from typical land-disposal methods for uranium-milling wastes. But there are at least two noteworthy distinctions.

First, Congress has authorized and encouraged the use of regional compacts among states to coordinate and restrict how low-level radioactive wastes may be discarded.³¹ Each regional compact may forbid the disposal in regional facilities of wastes originating from states who are not parties to that compact.³² As a result, the compact system empowers states to manage the disposal of low-level wastes, and the states can impose geographical and other restraints on where low-level wastes may be discarded. In practice, the licensure of new disposal sites under the compact system has been exceedingly rare.

Second, the NRC has prescribed minimum standards limiting the physical form and characteristics that all low-level wastes must have before they are discarded on land.³³ These standards, among other requirements, demand that liquids in the wastes be minimized and prescribe packaging requirements for wastes that are not solidified.³⁴ They also have a general requirement that wastes must be treated to reduce non-radiological hazards.³⁵

While other waste-management rules apply to the White Mesa Mill,³⁶ these specific performance standards do not. The site of the White Mesa Mill was also not selected using the compact process or other criteria for low-level waste disposal facilities. And the wastes sent to the mill are not subject to any compact's approval or geographical restraints.

Hazardous wastes

As explained above, the principal statute regulating the management and disposal of hazardous waste is Subtitle C of the Resource Conservation and Recovery Act of 1976, which is part of a broader set of statutory requirements for managing and disposing of solid wastes. In basic terms, RCRA creates a system for identifying which solid wastes qualify as hazardous wastes, tracking those wastes from cradle-to-grave, and regulating generators and transporters of hazardous waste as well as operators of hazardous waste treatment, storage, and disposal facilities.

Congress legislated in RCRA that neither source material nor byproduct material from the nuclear fuel cycle are solid wastes for purposes of RCRA, and consequently, they cannot qualify as regulated hazardous

²⁹ Compare 10 C.F.R. Part 61 (<https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-part61.pdf>. Accessed January 27, 2022.) with 40 C.F.R. Part 40, Appx. A (<https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol1/pdf/CFR-2021-title10-vol1-part40.pdf>. Accessed January 26, 2022.).

³⁰ 10 C.F.R. § 61.7. <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-sec61-7.pdf>. Accessed January 26, 2022. 10 C.F.R. Part 61, Subparts C and D (describing technical requirements for land-disposal facilities). <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-part61.pdf>. Accessed January 26, 2022.

³¹ 42 U.S.C. § 2021d(a). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2021d.pdf>. Accessed January 26, 2022.

³² 42 U.S.C. § 2021d(c). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2021d.pdf>. Accessed January 26, 2022.

³³ 10 C.F.R. § 61.56. <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-sec61-56.pdf>. Accessed January 26, 2022.

³⁴ 10 C.F.R. §§ 61.56(a)(2) and (a)(3). <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-sec61-56.pdf>. Accessed January 26, 2022.

³⁵ 10 C.F.R. § 61.56(a)(8). <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol2/pdf/CFR-2021-title10-vol2-sec61-56.pdf>. Accessed January 26, 2022.

³⁶ 10 C.F.R. Part 40, Appendix A. <https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol1/pdf/CFR-2021-title10-vol1-part40.pdf>. Accessed January 26, 2022.

wastes.³⁷ But when Congress passed the Uranium Mill Tailings Radiation Control Act two years later, it directed the Nuclear Regulatory Commission and Environmental Protection Agency to ensure that the rules for managing and disposing of 11e.(2) byproduct material would be consistent with the requirements for hazardous wastes adopted in RCRA Subtitle C.³⁸

While both agencies have nominally complied with that directive, their rules remain frozen to the hazardous-waste regulations in effect in the early 1980s, despite major changes to RCRA since.³⁹ Among those changes was a 1984 congressional overhaul that included commands to either close or retrofit old hazardous-waste-disposal facilities, to construct new waste-disposal “impoundments” with double liners and leak-detection systems, and to “treat” hazardous waste to reduce its hazards before discarding it on the land.⁴⁰ Neither EPA nor NRC have revisited their uranium-milling regulations to evaluate whether those (or other) Subtitle C requirements should apply to uranium-milling wastes.⁴¹

As a result, the White Mesa Mill still today actively adds radioactive and other dangerous wastes into two “surface impoundments” that do not meet RCRA’s retrofitting and updated technological requirements, for those impoundments lack double liners and a modern leachate-detection system. And none of RCRA’s waste-treatment requirements apply to waste-disposal operations at the mill.

³⁷ 42 U.S.C. § 6903(27). <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap82-subchapl-sec6903.pdf>. Accessed January 26, 2022.

³⁸ See Pub. L. 95-604 §§ 205(a), 206. November 8, 1978. <https://www.govinfo.gov/content/pkg/STATUTE-92/pdf/STATUTE-92-Pg3021.pdf>. Accessed January 26, 2022. 42 U.S.C. § 2114(a) (<https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapVII-sec2114.pdf>. Accessed January 26, 2022.), § 2022(b) (<https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap23-divsnA-subchapl-sec2022.pdf>. Accessed January 26, 2022.).

³⁹ 40 C.F.R. § 192.31 (“References in this subpart to other parts of the Code of Federal Regulations are to those parts as codified on January 1, 1983.”). <https://www.govinfo.gov/content/pkg/CFR-2020-title40-vol27/pdf/CFR-2020-title40-vol27-sec192-31.pdf>. Accessed January 26, 2022. Nuclear Regulatory Commission, “Uranium Mill Tailings Regulations; Ground-Water Protection and Other Issues, 52 Fed. Reg. p. 43,553. November 13, 1987 (conforming to the 1983 version of EPA’s hazardous-waste rules). <https://tile.loc.gov/storage-services/service/ll/fedreg/fr052/fr052219/fr052219.pdf>. Accessed January 26, 2022.

⁴⁰ Pub. L. 98-616 §§ 201(a), 202(a), 215. November 8, 1984. <https://www.govinfo.gov/content/pkg/STATUTE-98/pdf/STATUTE-98-Pg3221.pdf>. Accessed January 26, 2022.

⁴¹ 40 C.F.R. Part 192, Subpart D (reflecting amendments only in 1993 to require deadlines for reclaiming mill impoundments after they cease use). <https://www.govinfo.gov/content/pkg/CFR-2020-title40-vol27/pdf/CFR-2020-title40-vol27-part192.pdf>. Accessed January 26, 2022. Compare 10 C.F.R. Part 40, Appx. A, Criterion 5 (1988) (<https://tile.loc.gov/storage-services/service/ll/cfr/cfr1/98/80/29-T/10/CI/P4/0/cfr1988029-T10CIP40/cfr1988029-T10CIP40.pdf> Accessed January 26, 2022.) with 40 C.F.R. Part 40, Appx. A, Criterion 5 (2021) (<https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol1/pdf/CFR-2021-title10-vol1-part40.pdf>. Accessed January 26, 2022.).



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