Grand Junction and the Manhattan Project*

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Abstract

The carnotite deposits in the Salt Wash Member of the Morrison Formation in southwestern Colorado and southeastern Utah had been mined for radium, vanadium and minor uranium since the 1910's. During vanadium mining, the uranium in the ores was discarded in the mill tailings. The Manhattan Project was the code name of the project to develop an atomic bomb during World War II, and under the direction of the Army's Manhattan Engineer District (MED). After making a survey of nine vanadium mills in December 1942, the MED concluded that the tailings were the best source of domestic uranium. Grand Junction became the center of this secret operation. By 1946, 2,698,000 pounds of uranium oxide had been produced from Colorado Plateau material. This represented 14 percent of the total uranium acquired by the entire project. A civilian geological contractor, based in Grand Junction, evaluated the uranium resources of the Salt Wash Member of the Morrison Formation for the MED. On January 1, 1947, all functions and facilities of the MED became the new U.S. Atomic Energy Commission, with domestic uranium procurement headquarters in Grand Junction.

References

Burwell, B., 1946, Construction, operation, and maintenance report of uranium sludge plants operated by United States Vanadium Corporation in the Colorado area: U.S. Vanadium Corp. report to the MED, Declassified by DOE 2000, National Archives, Denver, CO, Record Group 434-00-051. 231 p.

Leahy, P.C., 1993, How it all started: Talk to DOE and former AEC employees, Grand Junction, Colorado, Copy of DVD in Chenoweth’s personal files.


Merritt, Capt. P.L., 1942, Present and prospective supplies of uranium-bearing material: MED internal memorandum, Declassified by the AEC 1961, National Archives, Denver, CO, Record Group 434-00-261, 14 p.

Photo, no date, Uravan plant: located in the National Archives, College Park, MD, no record group available.

Photo, 1944, MED staff, Grand Junction, CO in AEC historic photos, National Archives, Denver, CO., Record Group 434-99-201.

GRAND JUNCTION
and the
MANHATTAN PROJECT
Secret Domestic Uranium Production
During World War II

William Chenoweth
Geologic Consultant
CARNOTITE

$K_2(UO_2)_2V_2O_8 \cdot 3H_2O$
## CARNOTITE MINING

S.W.CO, S.E.U.T, N.E.AZ, N.W.NM
Salt Wash Mbr., Morrison Fm.

<table>
<thead>
<tr>
<th>Years</th>
<th>Tons of Ore</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910-1923</td>
<td>67,000</td>
<td>Radium, Some Vanadium, Some Uranium</td>
</tr>
<tr>
<td>1924-1935</td>
<td>8,000</td>
<td>Vanadium, Some Uranium, Some Radium</td>
</tr>
<tr>
<td>1936-1947</td>
<td>1,318,000</td>
<td>Vanadium, Some Uranium</td>
</tr>
</tbody>
</table>

Fischer (1968)
MANHATTAN PROJECT

- Code name for the development of an atomic bomb.
- Army’s Manhattan Engineer District (MED).
- Determined a domestic source of uranium was in the tailings at Western Vanadium mills.
- December 1942 – Survey of nine vanadium mills.

Blanding, UT  Placerville, CO
Durango, CO  Rifle, CO
Gateway, CO  Slickrock, CO
Monticello, UT  Uravan, CO
Naturita, CO

- 1,085,875 pounds of “available material” ($U_3O_8$)

Merritt (1942)
NGR 434-00-261
GRAND JUNCTION, COLORADO

• March 23, 1943 – 2nd Lt. Philip C. Leahy arrives in GJ.

Orders: “Call Blair Burwell at this number and he will tell you what needs to be done.”

Letter: To whom it may concern
If this officer needs help, please assist.
Brigadier General L.R. Groves

• Established the Colorado Area Engineers Office, NE Corner, 3rd and Main

Leahy (1993)
GREEN SLUDGE PLANTS

- Built by Stearns-Roger Manufacturing Co.
- Operated by U.S. Vanadium Corp. 1943-1945

DURANGO, CO (110 tpd)
- Metal Reserve Tailings
- U.S. Vanadium Tailings
- Blanding Mines Tailings

URAVAN, CO
- WAA Plant (300 tpd)
- U.S. Vanadium Tailings
- WSP Plant (300 tpd)
  - Naturita Tailings
  - Gateway Tailings
  - Placerville Tailings
  - Other Tailings

Sludge Shipped to Grand Junction

Burwell (1946)
WSP PLANT – URAVAN, CIRCA 1944

National Archives
GJ REFINERY

- Leased a 55.7 acre site along the Gunnison River. Contained a railroad spur and a gravel pit.
- August 14, 1943 purchased site from Mr. L.H. Hall for $10,000.00 for Project X.
- Stearns-Roger constructed a plant operated by U.S. Vanadium 1943-1946.
- Processed green sludge from Uravan and Durango and other miscellaneous uranium-bearing materials. Rated at 18 dry tons per day.
- Plant removed excess vanadium from the sludge.
- Uranium concentrate (15% U₃O₈, 1.10% V₂O₅) shipped to Linde Air Products Co. at Tonawanda, NY to produce black oxide.

Burwell (1946)
FLOW SHEETS OF MED PLANTS

Lundquist & Lake (1955)
TRANSPORTATION DIVISION

- Located at 640 Struthers Avenue
- 34 trucks
- Staff
  - 1 Foreman
  - 4 Mechanics
  - 2 Tire Men
  - 2 Parts Men
  - 2 Lubrication Men
- Trucks hauled supplies to plants at Durango and Uravan. Brought drums of green sludge to Grand Junction.

Burwell (1946)
STAFF, COLORADO AREA ENGINEERS OFFICE, CIRCA 1944

NRG-434-99-201
VANADIUM MILLS WITH URANIUM CIRCUITS

- MONTICELLO, UTAH
  Metals Reserve 1943-1944
  VCA 1944-1945

- NATURITA, COLORADO
  VCA 1943-1945

  Produced a 45-50% $\text{U}_3\text{O}_8$ and 25% $\text{V}_2\text{O}_5$ sludge.

  Shipped to Vitro Manufacturing Co., Canonsburg, PA.

Manhattan District Engineer (1948)
MOAB STOCKPILE

• Howard Balsley – ore buyer for Vitro Manufacturing Co.

• Carnotite ore averaging 1.50% $\text{U}_3\text{O}_8$.

• March 1945, MED purchased stockpile for $71,880.00

• Contained 52,000 pounds $\text{U}_3\text{O}_8$.

• Hauled to Grand Junction for processing.

Leahy (1993)
TELEGRAM
JULY 17, 1945

"MED'S mission has been accomplished."
General Groves

Leahy (1993)
### MANHATTAN ENGINEER DISTRICT
### DOMESTIC URANIUM PROCUREMENT

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>POUNDS U$_3$O$_8$</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Vanadium Corp.</td>
<td>1,782,000</td>
<td>$941,800</td>
</tr>
<tr>
<td>Vanadium Corp. Amer.</td>
<td>460,000</td>
<td>692,350</td>
</tr>
<tr>
<td>Metals Reserve Co.</td>
<td>270,000</td>
<td>216,300</td>
</tr>
<tr>
<td>Vitro Manufacturing Co.</td>
<td>52,000</td>
<td>71,880</td>
</tr>
<tr>
<td>Others</td>
<td>134,000</td>
<td>150,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,698,000</strong></td>
<td><strong>$2,072,330</strong></td>
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</tbody>
</table>

(Avg. Cost Per Pound U$_3$O$_8$ – 77 cents)

Manhattan District Engineers (1948)
## MANHATTAN ENGINEER DISTRICT
### URANIUM PROCUREMENT

<table>
<thead>
<tr>
<th>AREA</th>
<th>POUNDS $U_3O_8$</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLORADO PLATEAU</td>
<td>2,698,000</td>
<td>$2,072,330</td>
</tr>
<tr>
<td>PORT RADIUM MINE</td>
<td>2,274,000</td>
<td>5,082,300</td>
</tr>
<tr>
<td>SHINKOLOBWE MINE</td>
<td>13,966,000</td>
<td>19,381,600</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>18,938,000</strong></td>
<td><strong>$26,536,230</strong></td>
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</table>

*(Avg. Cost Per Pound $U_3O_8$ - $1.40)*

Manhattan District Engineers (1948)
UNION MINES DEVELOPMENT CORP.
GRAND JUNCTION FIELD OFFICE

Goal: To Appraise the Uranium Resources of the Colorado Plateau.

Areas Investigated

- Salt Wash Mbr., Morrison Fm. – All known outcrops.
- Glen Canyon and Entrada Ss. – Areas of roscocelite deposits.
- Chinle Fm. – Temple Mt. UT Area.

By February 1, 1944, the office had 48 geologists in 11 field parties and a small administrative staff.
### Colorado Plateau Ore Reserves

#### As of 1946

<table>
<thead>
<tr>
<th>State</th>
<th>Tons of Ore</th>
<th>%SOQ</th>
<th>Pounds SOQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>2,629,963</td>
<td>0.24</td>
<td>12,370,826</td>
</tr>
<tr>
<td>Utah</td>
<td>1,334,295</td>
<td>0.14</td>
<td>3,679,311</td>
</tr>
<tr>
<td>Arizona</td>
<td>157,570</td>
<td>0.14</td>
<td>441,135</td>
</tr>
<tr>
<td>New Mexico</td>
<td>3,300</td>
<td>0.14</td>
<td>9,240</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,125,128</strong></td>
<td><strong>0.20</strong></td>
<td><strong>16,500,512</strong></td>
</tr>
</tbody>
</table>

Geologic Potential – An additional 4,000,000 pounds.

SOQ – Code for $U_3O_8$

Webber (1947)
JANUARY 1, 1947

All Functions and Facilities of the Manhattan Engineer District Were Transferred to the Newly Created U.S. Atomic Energy Commission