

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT VICINITY PROPERTY PROGRAM

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ABSTRACT

The Department of Energy Uranium Mill Tailings Remedial Action (UMTRA) Grand Junction Project Vicinity Property Program is a \$165 million program for the removal and disposal of uranium mill tailings that were used in the construction of approximately 4,000 residences, commercial buildings, and institutional facilities in the City of Grand Junction and surrounding Mesa County, Colorado.

This paper discusses the UMTRA Vicinity Property Program and the economic benefits of this program for the City of Grand Junction and Mesa County, Colorado. The Bureau of Reclamation Economic Assessment Model (BREAM) was used to estimate the increases in employment and increases in personal income in Mesa County that result from the Vicinity Property Program. The effects of program-related changes in income and taxable expenditures on local and state tax revenue are also presented.

INTRODUCTION

For over 45 years, the U. S. Department of Energy (DOE) and its predecessor organizations, the Atomic Energy Commission (AEC) and the Energy Research and Development Administration (ERDA), have played an important role in the history and economic well-being of the City of Grand Junction and Mesa County, Colorado.

Mesa County encompasses an area of 3300 square miles in west-central Colorado adjacent to the Utah border; and has a population of approximately 82,000 people. The City of Grand Junction is the heart of Mesa County, with a population of over 30,000. As the largest Colorado city on the Western Slope of the Rocky Mountains, Grand Junction is a regional trade center for Western Colorado/Eastern Utah; is a hub for highway, rail, and air transportation; and provides an entry to many of Colorado's outstanding ski resorts.

The County has a diversified economy based on agriculture, manufacturing, and recreation. Over the years, the region has also been a center for energy exploration, development, and mining. However, during the last 10 years, the City and County experienced an economic "boom and bust" from the energy industry. From 1977 through 1981, coal production, uranium exploration and mining, and oil shale development in Mesa County and the surrounding area experienced unprecedented growth. However, in 1982, oil shale development stopped, coal production decreased as energy prices declined, uranium demand experienced a rapid reversal and unemployment in Mesa County began to

rise. The unemployment rate in Mesa County increased from approximately 6.3% in 1981 to 11.7% in 1984.

The Department of Energy's Grand Junction Office has shared the area's uranium fortunes since the early 1940's.

During the early part of World War II, a young second lieutenant by the name of Frank Leahy was sent to Grand Junction with a set of sealed secret orders which he was to open after he had checked into a local hotel. When Frank opened his orders, he found his mission was to find uranium for the Manhattan Project the building of the atomic bomb that ended World War II. Frank's orders gave him the authority to go to any base commander in the United States and get their full support for anything he needed. After World War II, the Colorado Raw Materials Office was established in Grand Junction to carry out the AEC's domestic uranium program; and, ex-Lt. Frank Leahy was the first manager of the Grand Junction office.

During the 1950's, 60's, and 70's, many activities were carried out by the Grand Junction Office that included research and development, exploration, the building and operating of a pilot uranium mill, and managing the AEC's uranium materials program. The Grand Junction Office

established a leasing program whereby the AEC leased public lands to private companies for the exploration and mining of uranium. About \$60 million in royalties have been collected to date from these leases. Another major program from the uranium mining era was the National Uranium

Resource Evaluation (NURE) Program, that was launched in 1974. Under the NURE program, extensive geologic studies to identify and evaluate geologic environments favorable to uranium were carried out by geologists from the Grand Junction Office on a nationwide basis.

The decrease in the demand for uranium in the early 1980's resulted in a decline in exploration and mining programs and employment at the Grand Junction Office dropped from a peak of 642 in 1980 to 243 in 1984.

While the decline in uranium demand threatened the operations of the Grand Junction Office in the early 1980's, it was the residual waste products of the uranium milling process that provided the base program to sustain the office into the 1990's. In 1982, the Department of Energy assigned responsibility for a new program to the Grand Junction Office The Vicinity Property Program of the Uranium Mill Tailings Remedial Action (UMTRA) Project. The program provides for the removal of uranium mill tailings that were used in construction on properties in the vicinity of uranium mill sites.

By 1984, remedial action construction activity in the Vicinity Property Program began and employment at the Grand Junction Projects Office began to grow to meet the increase in new construction projects in the Program. The UMTRA Vicinity Property Program established a new long-term base program at the Grand Junction Projects Office that would sustain the Office into the 1990's.

THE URANIUM MILL TAILINGS REMEDIAL ACTION (UMTRA) PROJECT

Background

In November 1978, Congress enacted the "Uranium Mill Tailings Radiation Control Act of 1978 (Public Law 95-604) that established the Uranium Mill Tailings Remedial Action (UMTRA) Project; and delegated the responsibility for conducting the remedial actions to the Department of Energy. The project set up two separate programs: (1) the disposition of mill tailings at 24 inactive uranium processing site locations, and (2) the cleanup of properties that are in the vicinity of those mill sites that were contaminated as a result of erosion of the tailings piles or from the deliberate use of tailings in construction. The legislation provides that the cost of the program is shared 90 percent federal funds and 10 percent state funds.

The UMTRA Vicinity Property Program included an original listing of approximately 8,000 possibly contaminated properties. As a result of detailed radiological surveys, it was determined that just over 4000 of those properties contained uranium mill tailings in excess of the U.S. Environmental Protection Agency's (EPA) standards and would require remedial action under the UMTRA

Vicinity Property Program. Approximately 3900 of those 4000 properties are located in Mesa County, Colorado.

The responsibility for the entire Uranium Mill Tailing Remedial Action Project was originally assigned to the Department of Energy's Albuquerque Operations Office. In 1982, DOE assigned the responsibility for the UMTRA Vicinity Property Program for Mesa County, Colorado and Edgemont, South Dakota to the Grand Junction Projects Office. The UMTRA Project Office in Albuquerque has Jacobs Engineering Group as the Technical Assistance Contractor and Morrison-Knudsen as the Remedial Action Contractor for the mill site cleanup program. The DOE Remedial Action Contractor at the Grand Junction Projects Office for the Vicinity Property Program is UNC Geotech, with all site work on the vicinity properties being done by local construction subcontractors.

UMTRA Vicinity Property Remedial Action Process

The objective of the UMTRA Vicinity Property Program is to reduce or eliminate human exposure to radon that may be present as the result of using uranium mill tailings in construction.

An independent radiological inclusion survey is conducted by the Oak Ridge National Laboratory. A property identified as containing uranium mill tailings in excess of EPA standards is included in the UMTRA Vicinity Property Program. If levels on a property do not exceed EPA standards, the property is excluded from the UMTRA Program, and the property owner is so notified.

Once a property is included in the Vicinity Property Program, the Remedial Action Contractor is assigned responsibility for managing the remedial action process and for assuring that contamination levels at the property are mitigated to comply with EPA standards.

The remedial action process includes the preparation of a written Radiological and Engineering Assessment (REA), complete with a remedial construction design; a contractual Remedial Action Agreement (RAA) between the property owners, the Department of Energy and the State of Colorado; a competitively solicited subcontract for performing the remedial action construction; and the verification and certification of the completed remedial action.

After the uranium mill tailings have been removed and the property is restored to a condition similar to that which existed prior to remedial action, the property is inspected by all parties involved. Owners indicate their approval of the final condition by signing a "Notice of Final Inspection."

Once the remedial action construction is completed, a radiological survey is conducted of the exterior of the buildings or facilities and soil samples are taken before back filling to verify that radium-in-soil concentrations are below

EPA standards. Air monitors are installed in structures to verify that radon levels have been mitigated to below the limits specified by the EPA.

After final inspection and follow-up monitoring, the Property Completion Report is produced by the Remedial Action Contractor. The report documents the effectiveness of the remedial action and demonstrates that the property is in compliance with the applicable EPA standards. Once the Completion Report is approved by the Department of Energy (DOE), a Certification of Decontamination letter is distributed by DOE to the property owners, the State of Colorado, and others, as appropriate.

The vicinity property remedial action projects include single family residences, office buildings, recreation facilities, and complex commercial properties, such as bowling lanes, gasoline stations or race track. The construction can range from the simple removal of minor tailings deposits from a vacant lot or sidewalk or driveway bedding to major activities involving building foundations and internal structures. The more complex projects may require moving families out of their homes into temporary quarters, the temporary relocation of businesses, or the suspension of commercial operations until the remedial action work on a property is completed. The administration of the remedial action process by the Department of Energy and the Remedial Action Contractor is directed toward minimizing whatever social and economic impacts that may result from the temporary disruption to the personal and business affairs of the Mesa County citizens involved in the UMTRA Vicinity Property Program.

The UMTRA Vicinity Property Program

The UMTRA Vicinity Property Program construction activities in Grand Junction and Mesa County grew slowly during the first two years 26 projects were completed in 1984, and 93 projects were completed in 1985. In 1986, the number of remedial actions completed increased to 397, and in 1987, construction activities reached what is considered an optimum level for the program approximately 800 properties completed per year. This annual level of activity must be continued into 1991, if the program is to be completed in compliance with the original Uranium Mill Tailings Radiation Control Act of 1978.

The completion of over 800 remedial action projects per year requires an effective construction management program. A total of 800 properties per year requires that over 150 projects be in progress at any one time, 15 to 20 local subcontracted construction companies at work, and an average of 3 to 4 project starts and completions every day.

The total Grand Junction Vicinity Property Program in Mesa County is expected to cost approximately \$165 million (in 1987 dollars) through 1992. Since 1984, \$53.5 million has

been spent on the Grand Junction Vicinity Property Program, including \$23.3 million in 1987.

While the economic benefits of \$23 million going into the community are readily apparent, there is one very important benefit of the mill tailings program to the Mesa County economy that should not be overlooked. The UMTRA Vicinity Property Program represents 55 to 60% of the total program funding received by the DOE Grand Junction Projects Office. However, without the mill tailings program, the other 10 programs that make up the remaining 40 to 45% of the work at Grand Junction would most likely be assigned to other DOE offices. The Vicinity Property mill tailings program is currently the critical program in keeping the DOE Office open in Grand Junction and critical to maintaining \$15 to \$20 million per year from other government programs that are and will be performed through the Grand Junction Projects Office.

Since Vicinity Property Program construction activities began in 1984, employment at the Grand Junction Projects Office has more than doubled. Current employment is more than 550 persons. This makes the DOE Grand Junction Projects Office the fourth largest employer in Mesa County. The average employment during 1987 was approximately 500 employees, with 390 assigned to or supporting the Vicinity Property Program. Twenty-eight construction subcontractors were contracted for the mill tailings program, employing an average of 130 construction workers on those projects. Additionally during 1987, DOE and their subcontractors expended approximately \$9.8 million on goods and services. Similar levels of employment, subcontracted construction activities, and purchased goods and services are planned for the Grand Junction Projects Office and the Vicinity Properties Program in Mesa County through 1991.

THE ECONOMIC BENEFITS OF THE UMTRA VICINITY PROPERTY PROGRAM

The Bureau of Reclamation Economic Assessment Model (BREAM)

The economic benefits of the Vicinity Property Program on Mesa County can be measured in terms of estimated increases in employment and increases in personal income in the County that result from the direct labor and the purchase of program-related goods and services. In addition, the effects of program-related changes in income and taxable expenditures on local and state tax revenue can also be measured.

The Bureau of Reclamation Economic Assessment Model (BREAM) was used to estimate the employment and labor income benefits to Mesa County. The BREAM is an economic/demographic simulation model that analyzes the impact of various assumptions and scenarios on the population, employment, and income of a region. The roots of the model can be traced to the Susquehanna River Basin

Model developed by Battelle Memorial Institute which tied the economic and demographic components together via feedback loops.

Three submodels make up the fundamental structure of the BREAM. The demographic submodel accounts for population characteristics such as births, deaths, and the age/sex composition of the area. The demographic submodel determines the supply of labor from labor force participation rates and the "survived" population. The economic submodel determines labor demand utilizing an economic base approach to estimate total employment. The labor force submodel reconciles model/estimates of labor supply and labor demand. Once labor market equilibrium is achieved, employment-migration is completed. The process results in the appropriate levels of population, employment, and income for the county being modeled.

Two additional components have been included in the model. A construction worker submodel which determines the geographic source (local/non-local) and the residential choice of construction workers related to specified projects, and a community allocation submodel that produces community-specific population projections and impacts.

Study Approach and Assumptions

The BREAM historical baseline was updated, taking into account the 1977 to 1981 energy "boom" and the post-1982 decline in energy resource development.

The present BREAM model of Mesa County utilizes data from the 1970 Census; 1965-1977 data from the Bureau of Economic Analysis; U.S. Commerce Department County Business Patterns; and Colorado Departments of Health, Labor and Employment, and Mines. The last year of hard data input to the model was set at 1977 since uranium, coal, and oil shale development had not yet significantly impacted the region.

From 1977 through 1981, energy development in the region surrounding, and including Mesa County, was continuous and growing. In 1982, however, the oil shale development stopped, uranium development began a quick decline, and coal production began to decline.

Because of the 1977-1982 energy development, immigration of workers and service employees was significant over the period. There are indications that many of the new immigrants were single or newly married couples without children, which is reasonable since the "baby boom" generation would have been a major element of a mobile work force at the time. For this reason, no data from the 1980 Census of Population was used as input to the model. Had the 1980 Census data been used, the long-term projection would have been skewed in that it would have shown a smaller family size than would be expected following the energy development decline.

Because of the "baby boom" effect and because the demographic mixture changed again following the energy development decline, the 1970 Census and other 1965-1977 information was used as a base for the model. Once the energy development out-migration was completed and the County returned to stability, it was assumed that the basic demographic and employment assumptions from the 1970-1977 period would more closely apply than those of 1980.

The initial computer runs of the model were made to create a long-term historical scenario without energy development. The basic assumption was that energy development would be an increase to this historical run, and that after the decline in energy development, the counties involved would be reduced to near historical trends.

The energy resources development scenario was assembled using data from the various oil shale company environmental impact statements and adding the data to the historical scenario. By assembling the two scenarios separately, energy development could be dropped from the model's economic structure without affecting the initial historical scenario significantly in the years beyond the development decline.

The validity of the approach and assumptions was verified by comparing the modeled population and unemployment rates for 1978 through 1987, with data from the City of Grand Junction, Mesa County, and the State of Colorado.

Government employees, DOE and contractor personnel associated with the Vicinity Property Program are included in the historical baseline since programs at the DOE Grand Junction Office have been continuous for nearly 40 years. It is assumed that the increase in employment at DOE has offset the declines in other government employment in the County over the period of the study.

The Vicinity Property Program construction labor and expenditures and the value of the goods and services purchased by the Grand Junction Office were added to the historical baseline.

The difference between the historical baseline, less the program-related government workers, and the BREAM run which included all program-related labor and expenditures is the total contribution of the Grand Junction Vicinity Property Program on the employment and personal income of Mesa County.

The projected tax revenues related to the economic change generated by the Vicinity Property Program were calculated based on the change in employment in each of Mesa County's economic sectors. The change in employment calculated by BREAM was multiplied by the average wage in the economic sector to determine the change in personal income. The tax bracket for that sector and the

TABLE I

DOE Grand Junction Projects Office Employment and Personal Income
Benefits to Mesa County 1984-1991

Calendar Year	GRJVP Program Expenditures (\$ in Millions)	Grand Junction Projects Office Total Expenditures (\$ in Millions)	Total Employment Change In Mesa County	Increase In Personal Income In Mesa County (\$ Millions)
1984	\$ 6.0	\$ 10.3	688	\$ 18.9
1985	\$10.1	\$ 16.7	925	\$ 26.5
1986	\$14.1	\$ 22.3	1,087	\$ 31.9
1987	<u>\$23.3</u>	<u>\$ 36.3</u>	<u>1,446</u>	<u>\$ 44.7</u>
SUBTOTAL	\$ 53.5	\$ 85.6	4,146	\$122.0
1988	\$ 31.9	\$ 54.6	1,672	\$ 54.3
1989	\$ 35.8	\$ 64.2	1,885	\$ 62.7
1990	\$ 26.1	\$ 57.0	1,756	\$ 57.9
1991	<u>\$ 12.2</u>	<u>\$ 50.0</u>	<u>1,492</u>	<u>\$ 47.3</u>
TOTAL	<u>\$159.5</u>	<u>\$311.4</u>	<u>10,951</u>	<u>\$344.2</u>

TABLE II

Estimated Tax Revenue Attributed to the DOE Grand Junction
Projects Office (1987 \$'s in Thousands)

Calendar Year	GRJVP Program Only		GJPO All Programs		Total Federal Income Tax
	Total Increase In State Taxes	Total Increase In Local Taxes	Total Increase In State Taxes	Total Increase In Local Taxes	
1984	\$ 850.1	\$ 874.7	\$ 1,041.1	\$ 1,072.9	\$ 1,588.4
1985	1,216.4	1,244.0	1,444.5	1,480.1	2,237.7
1986	1,471.6	1,501.3	1,726.3	1,764.9	2,689.6
1987	2,112.4	2,144.8	2,446.2	2,494.1	3,838.7
1988	2,470.6	2,393.9	2,828.2	2,740.1	4,999.2
1989	2,814.7	2,683.8	3,211.3	3,061.6	5,870.5
1990	2,552.9	2,433.3	2,991.3	2,897.4	5,289.9
1991	<u>2,134.5</u>	<u>2,184.3</u>	<u>2,540.5</u>	<u>2,604.2</u>	<u>3,932.4</u>
	\$15,623.2	\$15,460.1	\$18,229.4	\$18,115.3	\$30,446.4

corresponding tax rates were obtained from the Colorado Tax Profile Study 1982 by Reuben A. Zubrow and Dean C. Coddington, (1) and Individual Income Tax Returns Filed in Fiscal Year 1985/86 by the Colorado Department of Revenue Office of Tax Analysis (2). The given tax rates were multiplied times the estimated income in the sector to obtain the estimated tax revenue.

Study Results

The economic benefits of the Grand Junction Vicinity Property Program (GRJVP) for Mesa County as determined by the BREAM program are shown in Table I.

In 1987, the DOE Grand Junction Projects Office expended more than \$36 million, including \$23.3 million on the Grand Junction Vicinity Property Program. That expenditure provided support for 1,446 jobs and an increase in personal income in Mesa County of approximately \$45 million in 1987. Since 1984, as a result of the UMTRA Grand Junction Vicinity Property Program, the DOE Grand Junction Projects Office has provided to Mesa County over 4,100 man-years of employment and an increase in personal income of \$122 million. Over the next four years, the BREAM study shows that the Vicinity Property Program will provide another 6,800 man-years of employment and over \$220 million in additional personal income for Mesa County.

The projected tax revenue related to the economic benefits of the Grand Junction Vicinity Property Program is shown in Table II.

In 1987, activities of the DOE Grand Junction Projects Office generated an increase of \$2,446,200 in State tax revenue, and \$2,494,100 in local tax revenue, and \$3,838,700 in Federal income tax revenue.

CONCLUSION

The UMTRA Vicinity Property Program is removing potential radiation hazards from approximately 4,000 properties in Grand Junction, Mesa County, Colorado. In addition, the Vicinity Property Program and the DOE Grand Junction Projects Office is providing the City of Grand Junction and Mesa County with significant economic benefits:

- The Grand Junction Projects Office is the fourth largest Mesa County employer.
- Support for more than 1400 jobs.
- Over \$44 million increase in personal income in 1987.
- Approximately \$2.5 million in state tax revenue in 1987.
- Over \$2.4 million in local tax revenue in 1987.

REFERENCES

Work performed under the auspices of the U.S. Department of Energy, DOE Contract No. DE-AC07-86ID12584.

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