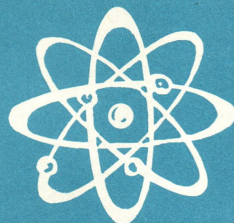


AEC



UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

No. F-261
Tel. 973-3335 or
973-3446

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PRELIMINARY REPORT RECOMMENDS FURTHER STUDY OF CONCEPT OF USING NUCLEAR EXPLOSIVES TO EXCAVATE RAILWAY-HIGHWAY CUT

A technical feasibility study recommending further evaluation of the practicability, safety and costs of conducting a series of nuclear explosions to open a two-mile railway and highway pass through the Bristol Mountains in California, has been submitted to the U.S. Atomic Energy Commission, the State of California Division of Highways, and the Atchison, Topeka and Santa Fe Railway Company.

The report was prepared jointly by staff personnel of the Railway, the Highway group and the AEC's San Francisco Operations Office. The AEC's Lawrence Radiation Laboratory, at Livermore, provided technical assistance. The report recommends a more detailed study costing about \$330,000 for engineering and public safety evaluation of a site in the Mojave Desert about eleven miles north of Amboy, California.

The joint group concluded that the application of nuclear explosives to blast such a cut through the Bristol Mountains for railway and highway use would be technically feasible. According to the report, it appears initially also that such a project could be conducted without endangering public health and safety. However, any decision on safety would be subject to much more detailed and exhaustive studies, such as studies of the seismologic, meteorologic, hydrologic, and geologic conditions of the area; and evaluation of predicted blast, shock and radiation effects.

The study resulted from plans of the Santa Fe to re-align its route between Goffs and Ash Hill to eliminate 15 miles of trackage and reduce grade and curve problems to speed up transcontinental service. Preliminary investigations by the railroad indicated a line through the Bristol Mountains, but such a route would have required a tunnel through a large mountain or a detour to the south, both of which would have been uneconomic. In seeking a less expensive solution, the Santa Fe expressed interest to the AEC in the possibility of using nuclear explosives to make the cut.

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The California State Division of Highways in turn was contacted as to the possibility of relocating the future alignment of Interstate Highway 40 (U.S. Highway 66). The Santa Fe's proposed line runs about one mile south of the future highway location recently adopted by the California Highway Commission.

As visualized in the preliminary review, about 22 nuclear detonations, totaling 1,730 kilotons, would be detonated in series, half of them at a time, to accomplish the removal of earth and rocks from the cut. An additional 100-kiloton explosion would be considered to excavate a sump to provide drainage for the area. About 68 million cubic yards of earth would be removed, creating a cut about two miles long and ranging in depth from 100 to more than 350 feet, and having an average bottom width of 325 feet. Such a cut would permit construction at the bottom of a double track railway and a four-lane divided highway capable of being expanded later to eight lanes.

The study has been designated "Carryall" and is one of several feasibility studies being considered by the Atomic Energy Commission under its Plowshare Program for developing the peaceful uses of nuclear explosives. No excavation projects have been authorized under this program, although a 100-kiloton cratering experiment, Sedan, was conducted in 1962 at the Nevada Test Site, and a scientific experiment, Gnome, involving underground detonation of a nuclear explosive of about 3 kilotons, was conducted near Carlsbad, New Mexico, in 1961, as part of the Plowshare Program.

Nuclear weapons effects cratering experiments also have been conducted at the AEC's Nevada Test Site, and have contributed valuable data to the Plowshare excavation program. In addition, experimental cratering work has been carried out in recent years with conventional explosives to obtain data required in nuclear projects.

The development of nuclear devices especially designed for civilian uses continues at the Lawrence Radiation Laboratory, which is operated for the AEC by the University of California. The principal objective of this development work is cheaper devices producing a minimum of radioactivity.

The report estimates that cost of the sections of railroad and highway re-alignments affected by the nuclear excavation would be \$21,722,000 by conventional methods: \$14,552,000 for the railroad and \$7,170,000 for the highway.

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The portion of the railroad re-alignment covered by the study is about 4 1/2 miles and for the highway about 18 miles. Excluding charges for the nuclear devices the cost for achieving a joint re-alignment using nuclear explosives would be \$13,765,000. The charges for the required nuclear devices are not estimated in the report because of uncertainties as to how much the charges may be reduced by development work.

The study will be reviewed carefully within the AEC.

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