

Nuclear perseverance

Despite the failure of Cape Keraudren's nuclear-blasted harbor plan, Australia pushes on toward the atomic age

by William A. Scholes

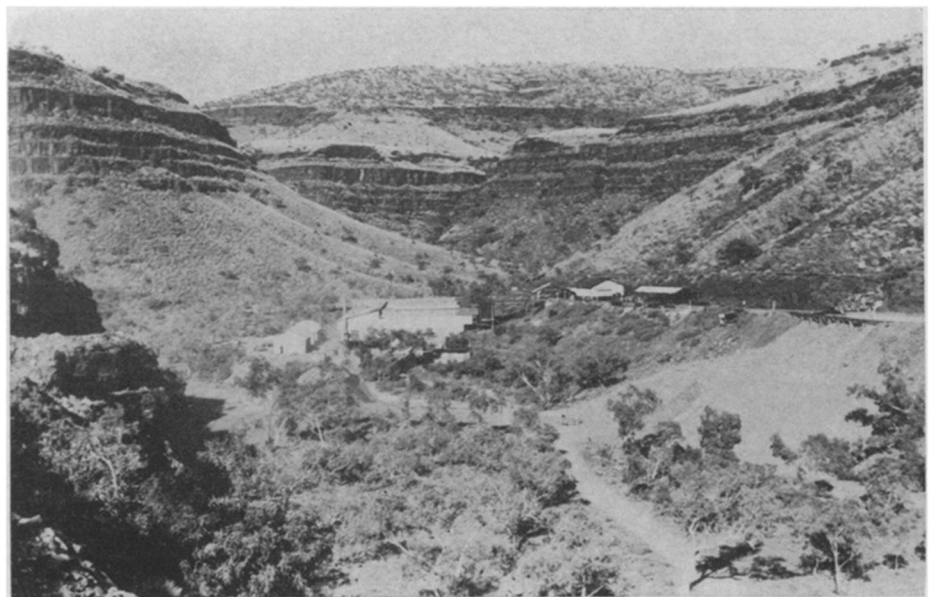
Australia, the subcontinent noted more for sheep, koalas, kangaroos, desert and bushmen than for industry and technology, is straining to enter the atomic age.

Although certainly not an underdeveloped nation, Australia is still begging for settlers and has a long way to go before it can be considered an industrial giant. To keep up with the times, as well as for the nation's economy, Government officials and private enterprise are pushing hard for the use of atomic energy. Nuclear engineering, nuclear mining and atomic power plants are three of the areas being emphasized, but not without internal opposition, especially from conservative labor forces.

The fledgling Australian nuclear effort got off to a bad start with a non-event: the Cape Keraudren project (SN: 2/15, p. 159). First proposed in 1966, the idea was to use five 200-kiloton nuclear explosives buried offshore to blast a harbor in northwest Australia for the shipment of iron from the vast deposits locked away in that region. A feasibility study was set to begin, and all systems seemed go. But the props to the project were yanked out when the Japanese, the major customer for the ore, withdrew because they felt the Australian price for the ore was too high.

Not willing to give up the tremendous iron deposits, industry has come up with another nuclear proposal: to extract the ore itself with nuclear explosives.

Called the Wittenoom Plan, for the Wittenoom Gorge, it entails placing three to five 10-kiloton charges 800 feet down, or 450 feet below the ore body, at intervals along its length. Vertical shafts would be sunk through the ore



Photos: Australian News Bureau

Wittenoom Gorge: Underground may be the site of nuclear blasts.

body to place the charges. The shafts would be sunk about 6,000 feet away from the cliff edge of the outcrop, then sealed and the charges exploded.

The explosions should be of sufficient strength to shatter 45 million tons of ore, with further charges to be detonated later if more are needed. The blasts would be designed to leave the surface intact. The ore would be removed through a horizontal shaft by conveyor belt.

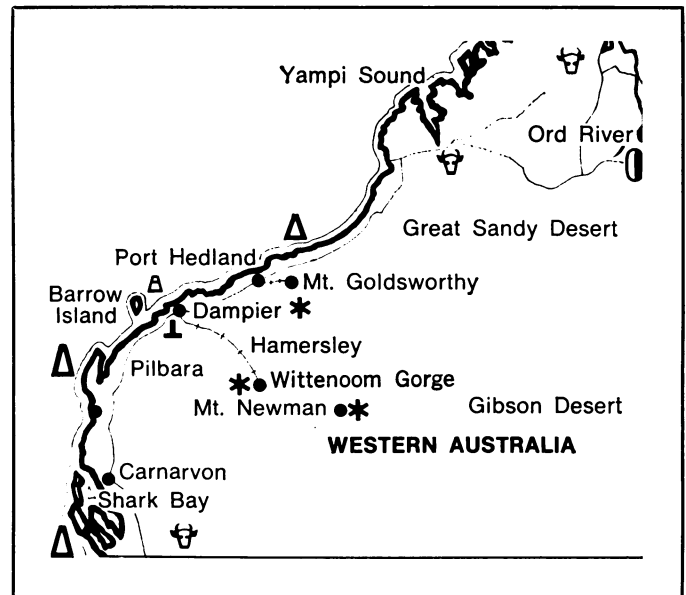
After the initial blasts, however, nothing would be done for a period of two to six months because of radioactivity. After that period, about 85 percent of the radioactivity should have collected in a glassy melt resulting from the heat having made the rock molten, according to the plan. The remaining 15 percent should be spread

throughout the rest of the ore body, which would have to be tested for safety.

But scientists doubt that the 15 percent will even reach the ore body itself; instead, they believe, most will be trapped in bedrock.

The base of the ore body would be tested by drilling holes down into it and lowering geiger counters. If safe, the horizontal shaft would be drilled for getting the ore out. It is expected that conventional mining techniques could be used then, since the ore would be in shattered pieces about the size of a man's head. If the pieces are too big, a primary crusher would be assembled below the ore body and the chunks gravity-fed to it.

This mining process is called block caving. Another method, not ideal for



Iron deposits (asterisks) in northwest Australia.

deep deposits like Australia's, is the overburden removal method, in which the nuclear force blasts off the rock covering an ore body. Although technically considered feasible by the U.S. Atomic Energy Commission, it has the inherent drawback of releasing radioactivity into the atmosphere.

A third technique, which the AEC is investigating with Kennecott Copper Co., involves first blasting with nuclear explosives and then leaching out the metal with a chemical solution (SN: 2/10/68, p. 134). A joint feasibility study by the AEC, Kennecott and the Bureau of Mines has been concluded and the next move is up to Kennecott.

The projected site is Safford, Ariz., 150 miles northeast of Tucson. The AEC says the only reason it is looking into copper instead of iron is that the first proposal came from Kennecott rather than an iron-mining firm.

Of the Australian plan to use block caving, Carl R. Gerber, assistant director for program development of the division of peaceful nuclear explosives at the AEC, says, "It sounds plausible." He adds, though, that in addition to technical questions, the economic question must also be considered: how costly nuclear explosives would be in relation to the profit.

The blasting operation is estimated to cost \$3 million, a large portion going into safety devices and methods. According to the publication AUSTRALIAN MINER, "One of the safety measures which will have to be carried out before the operation can be commenced is a series of seismographic tests to determine the effects of the shock wave. To do this, charges of dynamite will be exploded at selected spots and the path of the shock waves will be traced."

Hanwright Co., the firm responsible for the Wittenoom Plan, estimates that shipments to Japan of the 45 million tons freed in the single blast series would go on for 15 years.

Hanwright has its plans so far advanced that it has undertaken what is virtually a feasibility study. Hanwright will collaborate with Gulf General Atomic, San Diego, Calif., to carry out further work, including implementation of safety precautions. Dr. Edward Teller, principal developer of the hydrogen bomb and now associate director of physics at Lawrence Radiation Laboratory, Livermore, Calif., has been named an adviser on the nuclear project.

In addition to technical, health and economic problems facing the Wittenoom Plan, there is the obstacle of Australia's changing political climate as evidenced by last month's elections. Prime Minister John Grey Gorton's Liberal-Country Coalition long favored a progressive nuclear program, despite

growing opposition from the Labor Party.

An illustration of how far apart the two parties are can be seen by their views on the building of a 500-megawatt nuclear power station at Jervis Bay in southwest Australia. Of the project Prime Minister Gorton says, "We believe that Australia will make increasing use of atomic power in the years ahead, and that the time for this nation to enter the atomic age has now arrived."

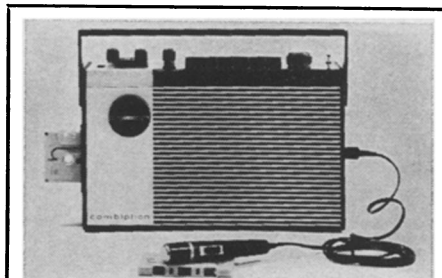
On the other hand, Labor's Gough E. Whitlam criticized the Government's decision to build the plant, at least not without first developing a national fuel policy that would include fossil fuels. "Just building a power station is not a plan for the nuclear age," he says.

Although the future of the Wittenoom Plan and the power station are hazy, one thing working in their favor is Australia's nuclear fuel situation. The Jervis Bay plant, for example, which would cost about \$131 million, could operate on uranium obtained from the country's own natural supplies. Australia is actually rich in uranium and a giant uranium search is presently under way in west Australia. (SN: 8/30, p. 168). A number of mineral and mining companies are spending millions of dollars annually to find it. From the limited information that has trickled or leaked out, it has been learned that a number of the temporary reserves and mineral claims are in the Durack mountain range in the remote Kimberleys, a plateau region in the northwest.

One company, Planet Gold-Pacific Island Mines, has discovered a deposit containing 2.2 pounds of uranium per ton of ore there. J. G. Fuller, managing director of Planet, one of several national and international companies in the search, describes the area as "a tremendous prospect."

Not all of Australia's uranium is in the west. Its existence in south Australia has been known for a long time. It was discovered in 1949, in the Northern Territory, and after 1952 further discoveries were made in south, east and north.

Whatever the outcome of the search, most observers on the scene believe it will be several years before nuclear mining for minerals becomes a practical proposition in western Australia. The future of nuclear engineering for construction purposes such as dams, harbors and water reservoirs is even less sure. A lot depends on the future public and Government attitudes toward the use of nuclear explosives, attitudes in no small way affected by the Cape Keraudren fiasco, which has left a scar and created a negative attitude among many persons toward such projects. □



This picture actually shows the European model 845. All US 1969 models are equipped with US dials, extended FM/SW/LW bands, SW vernier and other extras. Carrying handle, microphone and 1 cassette are included.

Today, professional people are pressed hard to utilize their valuable time.

A tape recorder has become the tool to preserve ideas and thoughts instantly. The **AKKORD COMBIPHONE 843**, the only top quality AUTOMATIC cassette recorder and AM/FM/SW/LW radio, (22 transistors, 10 diodes, 19 tuned circuits) does all these anywhere at home, in the car, (6-12V. bracket optional), and as a portable.

This versatile unit, made in W. Germany, is now available in US at the very reasonable price of **\$169.50**

Order directly from the Importer,
AKKORD Radio Products
P.O. Box 38, Upland, Calif. 91786
Write for free brochures and order information.



WHEN IS A PEN MORE THAN A PEN? WHEN IT LIGHTS AS IT WRITES LIKE

LUMIwriter

Who needs it?

DOCTORS
for writing in darkened wards

THEATRE GOERS
for making program notes

MILITARY MEN
for briefings & de-briefings

MEN-ABOUT TOWN
For signing checks in dim bistros

MIDNIGHT THINKERS
for those middle-of-the-night inspirations

GIFT GIVERS
who need a bright idea

EVERYONE
who doesn't want to be left in the dark!

Please send me _____ black LUMI-WRITERS with 4 spare refills at \$4.90 each. (Or 3 for \$14, 6 for \$27, 12 for \$50.) I enclose \$_____, plus \$1 post. & ins. Calif. residents add 5%. Refund within 10 days if not delighted. SN-1101

NAME _____

ADDRESS _____

ZIP _____

584 Washington St.,
San Francisco, 94111 **haverhill's**