MASTER

ENERGY CONSERVATION PROGRAM
ATLANTIC RICHFIELD HANFORD COMPANY
RICHLAND, WASHINGTON

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Slide 1 The Atlantic Richfield Hanford Company (ARHCO), as a prime contractor to the Energy Research and Development Administration (ERDA), is charged with the operation of the fuels reprocessing and waste management facilities on the Hanford reservation. The reservation is located in southeast Washington State and comprises an area of some 600 square miles of semi-arid lands. The Columbia River forms the north and east boundaries of the project as shown on the next slide.

Slide 2 The operating facilities for which ARHCO has responsibility are located some twenty-eight miles from Richland. In addition to operation of the separations and waste management programs, ARHCO operates services and servicing facilities for the entire project; plant railroad (160 miles), bus system, transportation fleet, purchasing and stores, patrol, fire protection, and all utilities.

Slide 3 Single Line Layout The energy requirements for operation of the fuels reprocessing and waste management facilities are supplied by two steam plants with a total capacity of 720,000 pounds/hour steam at 225 psig and by a 230 kilovolt transmission system powered from the Bonneville Power Administration (BPA) Midway Station. The transmission system serves all of the so-called outer areas. The facilities along the river are the reactor areas that are presently shut down, with the exception of N Reactor which is operated in dual mode for plutonium production and production of steam for power generation in the Washington Public Power Supply System generators. The power, 850 megawatts, is fed into the Pacific Northwest power grid via the BPA system.

Slide 4 This slide shows a portion of the 230 kv transmission line and some of our wide open spaces.

Slide 5 This is the switchyard of the 251 substation servicing ARHCO facilities. Electrical power for the operating areas in the vicinity of Richland is provided by a 115 kv system from another BPA substation located in Richland.

All of this by way of introduction and to give you an indication of the magnitude of the Hanford operation.

With respect to the ARHCO energy conservation program, there are several energy consumption factors which the Company is reporting and which are not under our control. As an example, ARHCO has the responsibility for administering and fueling a fleet of approximately 1,400 pieces of automotive equipment ranging in size from sedans to buses and heavy equipment. The fleet logs about 8.5 million miles per year. Serious attempts are being made to reduce mileage and to economize on fuel consumption. This equipment is operated by all contractors. In our fuel conservation effort,

small compacts are being purchased for use on plant and smaller vehicles are being utilized in bus service where possible.

Production of steam for process use and space heating accounts for the largest single bloc of energy consumed in ARHCO facilities. At the present time, the majority of the steam produced for process use is used in the waste management program. To illustrate how this energy is expended, I have brought a series of slides which, in greatly simplified form, show the primary activities of the program.

Slide 6 This slide shows the flow of high-level waste from the fuels reprocessing plant (Purex) through the B Plant complex. (Explain fuel cycle.)
(high level)

(Ad lib from the slide)

Slide 7 This is a view of the interior of the Purex Canyon (similar to the large structure shown on the previous slide).

(Short ad lib)

High-level waste is also fed to the waste processing facilities from underground tanks containing previously produced Purex wastes.

Following separation of cesium and strontium from the high-level wastes, the wastes will eventually be concentrated in evaporator-crystallizer units and pumped to other underground tanks where a solid salt cake is formed upon cooling.

Slide 8 This slide shows one of the two waste-evaporator buildings and an adjacent tank farm.

Slide 9 This is a cutaway model of the evaporator-crystallizer unit. The design boil-off rate is 40 gallons/minute although higher rates are attainable, dependent on the feed material.

These operations, as you can appreciate, are energy intensive, even discounting electrical power consumed in material transfer by pumps to and from the underground tanks, frequently at considerable distances.

It would appear that I have been trying to justify large energy expenditures rather than addressing the problems of energy conservation. Not so, really! Just showing, to a degree, what the extent of our problems in this area are.

In our energy conservation program at Hanford, we have reached the point of diminishing returns, as I am sure you have in your efforts. Our thermostats have been turned down (or up, in summer), lighting intensities have been studied and reduced where appropriate, and others of the more readily obtainable reductions in energy consumption have been realized. We are continuing to work in these areas, but returns are minimal. If

further energy savings are to be achieved, we are faced with the necessity for expenditure of capital dollars on retrofit projects. Each project must present a reasonable payout, considered to be three to five years.

We have explored a number of potential retrofit programs to the point where preliminary engineering studies have been made. As must be anticipated, not all of those considered can be adopted because, first, excessively long payout periods are indicated, or, second, the programs were not feasible for technical reasons. On the other hand, program ideas have surfaced which do show promise.

Examples of these are:

Installation of metal halide high intensity lighting in high-bay canyons, shops and warehouses in place of incandescent lighting. Retrofit programs are considered in four locations. The energy saving would be approximately 40 percent, at a capital cost of some \$300,000. Present consumption figures are not available since the points of usage are not now metered.

Installation of steam and electrical meters at high usage points across the plant. This work is in progress and may, through analysis of energy consumption data, lead to possible future retrofit programs.

Conversion of a once-through HVAC system to provide recycle of heated (or cooled) air as a means of conserving energy. Preliminary studies indicated a longer than anticipated payout, but the potential is such that a more detailed engineering analysis will be made.

Our steam plants have, traditionally, been operated at near peak performance. Stack gas analyzers are used to assure minimum free oxygen and firing of the boilers is adjusted to maintain the minimum ratios. Operating efficiency studies of each of the two steam plants by outside consultants are scheduled shortly. It is hoped that suggestions relative to operating modes will result in increased efficiency and, hence, lower energy consumption per pound of steam produced. Incidentally, our older units are seventy-five years old!

Wintertime temperatures have been reduced in operating buildings which are normally unoccupied to effect a saving in steam used for heating. Simultaneously, air flows have been reduced to acceptable minimums, another energy conservation factor.

At the present time, the emergency electrical generators and the emergency raw water pumps at the 284-E and 284-W steam plants are powered by steam turbines. A sufficient head of steam must be maintained at all times, over and above normal operating loads, in the eventuality that electrical power may be lost through a failure on the BPA system or on

the 230 kv system within the plant. Requirements, under present operating conditions for steam, call for the operation of two boilers in each area to provide for the normal load of 50,000 pounds/hour to 80,000 pounds/hour plus the emergency load of approximately 60,000 pounds/hour in event of power failure. The net effect of this mode of operation is that neither of the on-line boilers in each of the steam plants can be operating at top efficiency during the spring, summer and fall months. We are proposing to ERDA that diesel drives substituted for the existing steam turbine drives on the emergency generators and the raw pumps in each of the steam plants. A direct saving in coal usage would accrue at a low cost in diesel fuel for driving the emergency backup systems. More efficient operation of the on-line boilers would be possible also. An engineering study will be necessary to evaluate the proposal.

Last
slide

These items give an indication of the direction of our energy conservation effort. We have been requested by ERDA to come up with additional proposals which will also require capital funding extending through fiscal year 1978. Contrasted to the financial situation within ARCO and Atlantic Richfield Company, we, at Hanford, are at the mercy of Congress and the Office of Management and Budget for dollars of a capital nature for any given project. Our position is that a project may be delayed by a period of one to three years before it may be brought to fruition.

The ERDA energy conservation goal is zero energy growth. This is to be attained in the face of growing activity in all phases of the operation of the Hanford complex.