

## V. ALTERNATIVES

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This section includes a discussion of four general alternatives for the management of waste generated at the Savannah River Plant. Specific options are then discussed for Alternative 4, the present waste management plan, for the following areas: releases of radioactive materials, storage of high-level liquid waste, storage of radioactive solid waste, and releases of nonradioactive materials.

The purpose of waste management operations at SRP (in accordance with ERDA policies described in Section II and detailed in ERDA Manual Chapters 0510,<sup>1</sup> 0511,<sup>2</sup> and 0524<sup>3</sup>) is to minimize releases to the environment, to contain all wastes on the plantsite wherever practical, and to reduce the sources of these wastes.

The range of options for the overall management of SRP wastes is covered by the following alternatives:

- *Alternative 1* - Store no additional radioactive waste onsite.
- *Alternative 2* - Store no radioactive waste onsite and return waste management areas to their pre-plant condition.
- *Alternative 3* - Indefinitely continue present waste management practices without additional improvements.
- *Alternative 4* - Improve waste management practices in accordance with ERDA policies and standards.

### A. ALTERNATIVE 1 - STORE NO ADDITIONAL RADIOACTIVE WASTE ONSITE

This alternative would involve either: 1) shutdown of all operations at SRP, 2) processing SRP-irradiated fuel and targets at another site and shipments offsite of wastes generated by other SRP activities, or 3) shipment of all wastes offsite as they are generated, with the exception of low-level liquid wastes that could be released to plant streams under existing ERDA standards and limits. Wastes currently stored at SRP would remain.

#### 1. SHUTDOWN OF PRODUCTION OPERATIONS

Shutdown of all operations at SRP would halt the supply of nuclear materials required for the Nation's defense efforts. Evaluation of the need for these materials is beyond the scope

of this environmental statement, which is restricted to waste management operations. A basic assumption in the preparation of this statement is that production of these materials is necessary.

## 2. PROCESSING IRRADIATED FUELS AT ANOTHER SITE

No other site with existing facilities could process all of the fuel and targets from SRP reactors. Depleted uranium used to produce  $^{239}\text{Pu}$  could be processed at the Hanford Purex Plant;<sup>4</sup> the volume of waste generated there would not differ significantly from the volume at SRP. Fully enriched uranium and stainless-steel-clad fuel can be processed at Idaho Chemical Processing Plant (ICPP),<sup>5</sup> but not in the amounts that would result from adding the SRP load to the existing load at ICPP. SRP is the only site presently equipped to handle: 1) mixtures of enriched uranium and plutonium; 2)  $^{238}\text{Pu}$  recovery and purification from irradiated  $^{237}\text{Np}$ ; and 3) tritium recovery from irradiated lithium. Even with irradiated fuels processed at another site, some wastes that would require offsite storage would be generated by SRP activities such as reactor operations.

## 3. SHIPPING ALL NEWLY GENERATED WASTES TO AN OFFSITE FACILITY FOR PROCESSING AND STORAGE (EXCEPT LOW-LEVEL LIQUID WASTE)

Shipment of liquid wastes offsite as they are generated (about 3 million gallons per year before evaporation) is contrary to present ERDA policy, which prohibits shipments of liquid radioactive waste. Facilities to convert liquid wastes to solid material before transportation would be expensive (estimated at \$15 to \$40 per gallon of presently stored waste for conversion and \$0.50 to \$1.50 per gallon of presently stored waste for transportation). Solid wastes are presently generated at the rate of about 10,000 cubic meters annually. Shipment of the large volumes of wastes generated each year would be expensive, would add the risk of transportation accidents, and would result in potential adverse effects at some other storage site that would be comparable to those at SRP.

## B. ALTERNATIVE 2 — STORE NO RADIOACTIVE WASTE ONSITE AND RESTORE WASTE MANAGEMENT AREAS TO THEIR PRE-PLANT CONDITION

In addition to the considerations described above, this alternative would require the shipment offsite of approximately 21 million gallons of existing high-level liquid waste and approximately 250,000  $\text{m}^3$  of existing solid waste with the attendant high cost of conversion to a solid form and shipment, potential adverse effects of transportation accidents, and storage at other sites with environmental effects similar to those described for SRP in this statement.

Restoration of waste management areas to their pre-plant condition may not be practical, considering both technical and economic aspects. However, at such time that waste storage facilities, such as waste tanks, are taken out of service, residual activities can be removed or immobilized in such a way that potential adverse effects are minimized. Exhumation of waste in the burial ground would be required for this alternative.

#### C. ALTERNATIVE 3 — INDEFINITELY CONTINUE PRESENT WASTE MANAGEMENT PRACTICES WITHOUT ADDITIONAL IMPROVEMENTS

This alternative implies that all plant effluents and stored wastes will continue to be managed by methods based solely on current technology. Thus, it would be similar to the management of wastes for 1976-1977, but it would not include additional improvements based on prior experience or development work, nor would development work and design changes continue in the future. This alternative would result in lower total costs (if future costs are discounted) than an alternative that might include continued improvements because it would postpone capital costs until the needs were imminent. However, it would result in higher costs per year over the long term. For example, the continued storage of high-level liquid waste indefinitely would require a regular schedule of tank construction to provide storage for additional waste from production operations and to replace tanks that reach their life expectancy; however, eventual solidification of these wastes might result in lower yearly costs (as well as lower potential hazard) once the large capital investments in conversion and storage facilities were made.

This alternative would not meet ERDA guidelines<sup>2</sup> aimed at eventually providing waste that is more inert and better contained than at present, and it is not consistent with the objectives of lowest practical releases and best available technology.

#### D. ALTERNATIVE 4 — IMPROVE WASTE MANAGEMENT PRACTICES IN ACCORDANCE WITH ERDA POLICIES AND STANDARDS

This alternative is the base case described in this environmental statement. It involves regular assessment of current practices and continued improvement of waste volume reduction and storage techniques.<sup>6</sup> Specific options under this base case are discussed in the following categories: Radioactive releases, high-level liquid waste storage, radioactive solid waste storage, and nonradioactive releases.

These specific options include primarily equipment improvements or process changes that would reduce adverse environmental effects and released materials. They include those scheduled or budgeted for installation or incorporation in the processes and those that have been provided but not fully evaluated, those that are being studied but for which the feasibility has not been established, and those that have been considered but not adopted. Estimated costs and benefits of these specific options are compared in Section IX. Expected release reductions resulting from the options are based on 1975 emissions.

## 1. RADIOACTIVE RELEASES

### RADIOACTIVE RELEASES TO THE ATMOSPHERE

#### Tritium

As described in Section III, tritium releases to the atmosphere in 1975 were calculated to result in 96 man-rem, or 83% of the 100-km population dose from SRP releases. The tritium releases were about 47% from the tritium processing facilities in the 200-H separations area, 52% from the reactor areas, and 1% from the heavy water production area.

#### *Scheduled, Budgeted, or Recently Completed Improvements*

*Tritium Absorption Equipment, 232-H.* Improved absorption equipment was installed in 232-H in September 1975 to reduce tritium releases. This system is currently being evaluated.

*Tritium Release Control Facilities, 400-D D<sub>2</sub>O Rework Unit.* Equipment for enclosing and venting heavy water drum-handling facilities through a refrigeration system was recently completed. This vent system permits better measurement of tritium releases as well as a reduction in the amount released. Performance of the system is now being evaluated.

*Tritium Confinement System, 234-H.* The tritium processing facilities in 234-H include processes that confine elemental tritium at elevated pressures. This process equipment is enclosed in ventilated cabinets, and the ventilation air is released to the atmosphere through a 200-ft stack. Equipment will be provided to reduce the amount of tritium that escapes to the ventilation air in the event of a leak in the process equipment, and to collect the ventilation air during a limited period immediately following any release to the cabinet air for subsequent tritium recovery.

### *Alternatives Under Study*

*Reduced Losses of Tritiated D<sub>2</sub>O in 100-P, K, C.* Vacuum breakers in the reactor D<sub>2</sub>O coolant systems are a source of tritium release. Plastic covers have been installed on these, and appear to be successfully reducing this source of tritium release. A FY-1978 project has been prepared to replace the vacuum breakers with rupture disks to further reduce tritium release.

*Tritium Removal from D<sub>2</sub>O by Methods Other than Replacement or Distillation.* The possible applications at SRP of processes for removing tritium from heavy water are under current study. The most promising process at present combines catalytic isotopic exchange and electrolysis. The tritium-rich fraction could be retained for storage or processed to provide supplemental feed material for the tritium processing facility.

*Tritium Absorption, 234-H.* An improved tritium absorption system for Building 234-H similar to that installed in 232-H in September 1975, is under study.

*Tritium Confinement System, 232-H.* A tritium confinement system similar to that scheduled for installation in 234-H is under study for 232-H.

*Improved Flushing of Tritiated D<sub>2</sub>O from Miscellaneous Discharged Components, 100-P, K, and C.* A system is being studied for providing H<sub>2</sub>O flushing of those components not now flushed as they are being discharged from the reactor. This could result in a modest reduction of tritium released to the atmosphere.

### *Alternatives Studied but Not Adopted*

*Tritium Recovery from Stack Gas, 200-H.* A stack gas recovery unit for the tritium processing facilities has been considered. In 1973, 1974, and 1975, releases\* from the tritium facilities were reduced by a number of improvements to about 58%, 41%, and 27%, respectively, of the 1972 releases. Consequently, the further reductions estimated to be gained by a stack gas recovery unit are not as great as originally thought. For this reason, installation of this unit is not currently being planned. Similar expenditures are rather being recommended to limit large, short-term releases from process equipment failures and to provide better control of releases at the source.

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\* Excluding accidental releases of 479,000 Ci of tritium on May 2, 1975 and 182,000 Ci of tritium on December 31, 1975.

*Tritium Removal from D<sub>2</sub>O by Distillation or Replacement.*  
Removal of tritium from reactor D<sub>2</sub>O coolant is one way to significantly reduce tritium releases from reactor operations both to the atmosphere and to effluent streams. Estimates of tritium removal by distillation or periodic replacement of reactor coolant with newly produced heavy water indicate an annual operating cost of about \$60,000,000 in addition to the initial capital costs. These costs were concluded to be prohibitively high in relation to the maximum possible reduction in the 100-km population dose.

## Noble Gases

### *Scheduled, Budgeted, or Recently Completed Improvements*

*Improved Fuel Element Extrusion, 300-M.* The short-lived krypton and xenon isotopes released in 1975 from the reactor helium blanket gas systems contributed about 0.4% of the dose to a 100-km population from SRP releases. Installation of improved extrusion facilities (scheduled for completion in 1976) in the 300-M fuel fabrication area is expected to reduce the instances of cladding disruption in enriched uranium fuel. These facilities should result in decreased release of the Kr-Xe isotopes from the reactors during irradiation of the fuel.

*Argon-41 Retention for Decay, 100-P, K, C.* <sup>41</sup>Ar released by the SRP reactors in 1975 was about 8% of the total dose to the 100-km population. Activation of argon in the air around the reactors is being reduced by absorbing more neutrons in blanket assemblies around the reactor cores. A project submitted for funding during FY-1977 includes provision for reducing <sup>41</sup>Ar emissions by drawing the air from the space surrounding the reactor into a delay tank or other space to permit decay before release from the stack.

### *Alternatives Studied but Not Adopted*

*Recovery of <sup>85</sup>Kr, 200 Areas.* The 520,000 Ci of <sup>85</sup>Kr released from the separations areas dissolving operations in 1975 resulted in a calculated 0.4 man-rem dose to the 100-km population. Because of this very small dose contribution, there are no plans for an active research program aimed at <sup>85</sup>Kr removal from effluent gases evolved during fuel reprocessing. Pertinent research and development at other sites will be followed for possible application at SRP.

*Delay Volume for Kr-Xe, 100-P, K, and C.* A proposed system to recycle reactor blanket gas to reduce the need for periodic venting and thus limit the release of short-lived fission-product

noble gases, is no longer considered necessary. Improved procedural control over blanket gas venting, together with improvements in fuel cladding integrity are now judged to be adequate in limiting the Kr-Xe releases to the lowest practicable values.

## Particulates

### *Alternatives Under Study*

*Degraded Solvent Incineration, Burial Ground.* In past years, degraded solvent (kerosene-tributylphosphate) from the separations areas solvent extraction processes has been burned under conditions carefully controlled to minimize emission of radioactive particulates. This practice was discontinued because of regulations on smoke density. Improved incineration equipment is being evaluated for possible future use; in the meantime, the solvent is stored in tanks in the burial ground.

## RADIOACTIVE RELEASES TO PLANT STREAMS

### Tritium

Tritium releases to plant streams in 1975 resulted in a calculated population dose (based on actual water analyses) of about 15.5 man-rem to downstream users of Savannah River water: 12.2 man-rem from the reactor areas, 0.6 man-rem from the heavy water reprocessing facility, and 2.7 man-rem from the tritium migrating from the 200-F and 200-H seepage basins and the 50-million-gallon basin in 100-K Area.

### *Alternatives Under Study*

*Improved Flushing of Tritiated D<sub>2</sub>O from Miscellaneous Discharged Components, 100-P, K, and C.* The flushing of additional components, described previously for atmospheric releases, would also result in a modest reduction in the amount of tritiated heavy water transferred to the fuel and target storage basins and ultimately released to effluent streams.

*Alternate Discharge to Reactor Seepage Basins.* Routing aqueous wastes to seepage basins would delay tritium releases to the streams and permit some decay of the tritium. A proposal to route appropriate effluents from the reactor areas (100-P and 100-C) to existing or new seepage basins is currently being evaluated.

*Scheduled, Budgeted, or Recently Completed Improvements*

*Improved Fuel Element Extrusion, 300-M.* Fuel cladding improvements, discussed previously, should also result in smaller quantities of fission products in reactor storage basin water. This will cause lower releases to the streams and decreased processing and storage requirements in the separations areas.

RADIOACTIVE RELEASES TO SEEPAGE BASINS

Alternatives Under Study

*Reduce Releases by Improved Process Control*

Some alternative methods of reducing activity in individual components of the seepage basins feed streams are being considered and may be adopted on the basis of cost-benefit studies. Under investigation are diversion of some seepage basin feed streams for reuse in the process, and separation of some fission products from seepage basin feed streams by chemical techniques. Further detailed study of the various systems is needed because the simplest method of reducing activity, namely re-evaporation of all seepage basin feeds, is very expensive and has little effect on calculated total offsite dose (present offsite dose is primarily from tritium releases; tritium in low concentrations cannot be separated from large quantities of water by any practical current technique). A preliminary estimate of the capital cost of evaporation facilities of sufficient capacity for the separations area is \$13,000,000, to which must be added costs of waste storage tanks for the concentrated chemical wastes (approximately 350,000 lb/yr of chemicals presently are sent to the separations seepage basins). Further study of this specific approach to treating seepage basin feed streams (evaporation) is not justified in view of the expense and the small potential benefit with respect to offsite effects.

An alternative under study is the provision of a water treatment facility similar to those at some ERDA sites. The waste water would be chemically treated to cause flocculation which would remove the bulk of the radioactivity; most of that remaining would be removed by ion-exchange. Tritium content of the waste would not be significantly reduced.

The continuing program to isolate, treat, or divert sources of activity in seepage basin feed, with continued use of the basins for various waste solutions, will minimize effects on natural water on the site. Additionally, this program will assist in achievement of the ERDA goal of discontinued use of seepage basins for disposal

of radioactive wastes.<sup>2</sup> The long-range goal of minimum residual effect after plant abandonment may be attained by later treatment or removal of the basin soil to the burial ground to ensure that future vegetative cover cannot accumulate undesirable levels of residual activity.

### Alternatives Studied but Not Adopted

#### *Elimination of Seepage Basins or Direct Discharge to Streams if Within Guidelines*

The amount of activity sent to seepage basins has decreased steadily and was about 27 Ci of total beta-gamma activity (excluding tritium) in 1975. Most of this activity was relatively short-lived and will not accumulate in the ground; long-lived radioisotopes include about 7 Ci of  $^{137}\text{Cs}$ , 0.8 Ci of  $^{90}\text{Sr}$ , and 0.2 Ci of  $^{238}\text{Pu}$ ,  $^{239}\text{Pu}$ . With natural water flow in onplant streams plus reactor cooling water that is discharged to some streams, all activity now sent to seepage basins could be sent directly to streams and would be within concentration limits specified by ERDAM 0524<sup>3</sup> before the public zone (the Savannah River) is reached. Direct discharge to streams is permissible but would not minimize the potential doses to water users. The residence time for water between the seepage basins and flowing streams does allow some decay of tritium, equivalent to about one man-rem/yr in population dose to the downstream water users. The increased fission product activities would contribute about 0.2 man-rem/yr if released to streams, and would also concentrate in algae, insects, sediments, and fish. Doses from these concentrations are not significant at current levels, but it is preferable for activity to decay in the ground rather than to be available in organic materials. Continued use of seepage basins will not lead to further accumulations of activity in the soil, except for the small amounts of plutonium discussed below, if present programs to reduce activity in the seepage basin feed continue. Short-lived radioactivity does not accumulate, and reductions in  $^{90}\text{Sr}$  and  $^{137}\text{Cs}$  sent to the basins is bringing the inventory of these two long-lived nuclides almost to steady-state (current input is balanced by decay).

Calculations and samples indicate that plutonium concentrations in soil will not become excessive. The total plutonium sent to the basins to date, distributed over the area of the basin bottoms at only 1-inch penetration into the soil, would have an average concentration less than 10 nCi/g, which is cited as a control limit in ERDAM 0511<sup>2</sup> for transuranium-contaminated waste material. This limit in turn is based on levels of  $^{226}\text{Ra}$  found in natural ore deposits. Laboratory data on distribution of plutonium between solution and soil are in agreement with soil samples which indicate actual plutonium penetration of the order of about 8 inches, and average concentration of the order of 1 nCi plutonium/g of soil.

The goal at SRP is continued reduction of radionuclides sent to seepage basins to the lowest practical levels rather than elimination of the use of such basins to dispose of miscellaneous solutions. The alternative of direct release of these solutions to streams is not recommended because total population dose always will be less with seepage basins than without, at any contamination level above background in the effluent water.

## 2. HIGH-LEVEL LIQUID WASTE STORAGE

### ALTERNATIVES UNDER STUDY

Options to the present programs of managing liquid wastes include abandonment of existing wastes in place, indefinite continuation of present practices, upgrading existing liquid storage facilities, and solidifying wastes for final storage. The goal of ERDA is to convert all retained radioactive waste products to stable forms stored in isolation so as to offer minimum potential for transport and dispersion to the biosphere. Research and development programs at SRL aimed at developing technology to accomplish this goal are described in Appendix I.

### ALTERNATIVES STUDIED BUT NOT ADOPTED

#### Storage of Acidic Solutions

At some domestic and foreign sites, high-level liquid wastes have been stored as acid solutions in stainless steel tanks instead of as basic (alkaline) solutions in carbon steel tanks (the present SRP mode). Suggestions that SRP convert to acid storage for future waste rest on two points: stainless steel tanks containing acid waste might be less likely to fail, and acid waste should be simpler to convert to some final solid form satisfactory for shipment offsite or eventual disposal if smaller amounts of soluble salts are present. (Sodium nitrate is generated in the present SRP method of neutralizing nitric acid with sodium hydroxide.)

Acid storage in the sense presented does not apply to many SRP process streams because they are generated alkaline (solvent washes, scrubbers to remove acid vapors, and cladding removal for aluminum-clad fuel). Converting these process streams to acid would increase the volume and salt content. Some other streams are corrosive in acid form, and their long-term storage in stainless steel is questionable. In these cases, storage as alkaline solutions is a preferred mode. Properly designed and fabricated carbon steel tanks resist corrosion from alkaline

solutions as well as or better than stainless steel tanks containing the same solutions in acid form, and they cost about half as much. The consideration of the acid waste alternative is primarily an economic question based on cost-benefit considerations. Studies made on the conversion of SRP wastes to acid form concluded that the operation of a dual acid and alkaline storage system would be required and could not be economically justified. A GAO report<sup>7</sup> concluded "It appears that conversion from the present salt caking process to a calcining process at either Richland or Savannah River is impractical at this time." No further study of conversion to acidic storage is anticipated.

### 3. SOLID RADIOACTIVE WASTE STORAGE

The choices in storage techniques for solid wastes range from simple trench burial regardless of activity level to encapsulation in multiple, monitored containers for all potentially contaminated materials. Effects of some varied storage conditions and SRP efforts to meet the goals of the ERDA guidance documents<sup>1,2,3</sup> are discussed below. A

#### ALTERNATIVES UNDER STUDY

##### Alpha Decontamination and Disassembly Facility

One of the methods under study to reduce the volume of TRU wastes being placed in storage is decontamination. This study includes facilities for the disassembly and cutting-up or compaction of contaminated noncombustible alpha wastes. Wastes would be decontaminated by high-pressure jets, agitated baths, or ultrasonic techniques. Liquid wastes would be evaporated prior to storage.

##### Incinerator for Alpha Wastes

Incineration of combustible TRU solid waste, in order to reduce the volume being stored and to convert the waste to a more inert form, is being studied. This facility will include equipment for preparing the waste for incineration, incineration, encapsulation of the ash, and off-gas handling equipment.

##### Incinerator for Beta-Gamma Wastes

Incineration of combustible beta-gamma wastes, similar to that described for alpha wastes, is under study.

## Storage in Concrete-Lined Trenches



All waste contaminated with fission products and activation products could be stored in concrete-lined trenches instead of earthen trenches. This variation is being considered as an alternative way to maintain wastes in a dry condition, to provide additional monitoring, and to improve retrievability if required.

## Increased Segregation by Type of Waste

Specific methods to achieve more segregation and containment include volume reduction, elimination of combustibles, resistance to fire and water, and protective systems.<sup>6</sup> Few of the methods could be implemented without considerable development work. Cost-benefit studies have been made and are continuing in order to identify those improvements that are warranted. (See Appendix I.)

## ALTERNATIVES STUDIED BUT NOT ADOPTED

### Retrievable Storage Discontinued

The simplest operating practice would be trench burial of all wastes with no segregation or containment, with abandonment of the retrievability option. The savings in material and labor for burial operations would be appreciable over a period of time, but the potential for greater contamination of the site and decreased retrievability is contrary to the ERDA goals and criteria.

## 4. NONRADIOACTIVE RELEASES

### NONRADIOACTIVE RELEASES TO THE ATMOSPHERE

#### Scheduled, Budgeted, or Recently Completed Improvements

#### *Electrostatic Precipitators and Dust Collectors for Power Plants*

Fly ash emissions from the 484-D powerhouses are now controlled by electrostatic precipitators installed in November 1975. Particulate emissions from the remaining SRP powerhouses, which are all much smaller than 484-D, will be reduced by improved cyclone separators. A prototype installation in A-Area (784-A), scheduled to be in operation during 1977, will permit determination of whether one or two stages of separators are needed on the remaining boilers to meet regulations.



### *Degreasers*

Degreasers are used to clean metal surfaces in several areas of the plant, principally the fuel fabrication area (300 Area) and the reactor areas (100 areas). Use of degreasers results in a certain amount of degreasing solvent being volatilized to the air. Trichloroethylene has been replaced with perchloroethylene in the 100 and 300 Areas, and equipment installation is scheduled in other areas to reduce releases to the atmosphere of photochemically reactive hydrocarbons. The performance of the equipment systems is being evaluated.

### *H<sub>2</sub>S Flare System Improvements, 400-D*

Modifications were recently completed to the flare tower in 400-D to reduce H<sub>2</sub>S releases. The pilot ignition systems for flame were improved, and a flame detector was provided to assure burning of H<sub>2</sub>S. The effect of these changes is being evaluated.

### *H<sub>2</sub>S Monitoring, 400-D*

H<sub>2</sub>S is used to extract heavy water from river water. The waste water from this process is stripped with steam to remove residual H<sub>2</sub>S before discharge to Beaver Dam Creek. A project was authorized in 1976 to install portable H<sub>2</sub>S monitors near the outfall to Beaver Dam Creek to monitor H<sub>2</sub>S releases to the atmosphere.

## Alternatives Studied but Not Adopted

### *Power Production*

Alternatives to coal-fired power plants are oil, natural gas; purchased power, and nuclear power. In view of the limited supplies of oil and natural gas, these alternatives are no longer feasible even though both methods would reduce atmospheric releases of various pollutants. Power is purchased presently when necessary or when available for less than SRP production costs. Replacement of existing power facilities by a nuclear power facility would be uneconomical in view of the small size necessary to meet the needs of SRP. The present course of reducing emissions from the existing facilities (electrostatic precipitators and cyclone separators) is the most economical way to proceed.

### *NO<sub>x</sub> Releases*

Additional techniques or processes for reduction of NO<sub>x</sub> emissions have been considered in the past. The fuel fabrication area has greatly reduced NO<sub>x</sub> emissions from acid cleaning processes. There are no active plans to further minimize NO<sub>x</sub> releases from the separations areas or powerhouses. The predominance of NO in the off-gas from U-Al dissolving in H Area precludes a simple water scrubbing facility because NO is only sparingly soluble in water. More-complete utilization of the acid absorber and thus improved recovery of NO<sub>2</sub> from the uranium dissolving and denitration operations would require extensive process and equipment modifications. Because the location of this facility permits extensive atmospheric dispersion within the SRP perimeter, the expense of such modifications does not appear justified.

### NONRADIOACTIVE RELEASES TO PLANT STREAMS

#### Scheduled, Budgeted, or Recently Completed Improvements

##### *New Ash Basin, 400-D*

Most of the ash from the powerhouses is transported by water sluicing, or by truck, to storage areas. The water-filled ash basins at D, P, K, F, and H Areas discharge a clear effluent (<30 ppm suspended solids) as long as sufficient holdup volume is maintained. Gradual filling of the basins with ash requires that ash be removed periodically; this removal was recently completed at H Area and is in progress at P, K, and F Areas. At D Area, where pulverized coal is burned, the ash is extremely fine and expensive to remove. A new basin at D Area is scheduled for construction in 1976.

##### *H<sub>2</sub>S Monitoring, 400-D*

As described above under "Nonradioactive Releases to the Atmosphere," residual H<sub>2</sub>S is stripped from the 400-D waste water discharge to Beaver Dam Creek. A sensitive detector for H<sub>2</sub>S was installed in the discharge line to the creek in 1974. It alerts operating personnel of increased H<sub>2</sub>S concentration in the discharge, but does not measure the concentration. A project was authorized in 1976 to install a monitor to record H<sub>2</sub>S concentrations.

## Alternatives Under Study

### *Corrosion Inhibitors*

Corrosion inhibitors presently used in closed-loop cooling systems contain chromium. This element is toxic to aquatic life under certain conditions. Less-toxic materials for preventing corrosion are being studied to determine if they are suitable replacements for chromium-containing corrosion inhibitors.

## Alternatives Studied but Not Adopted

### *Chemical Discharges*

Chemicals discharged to seepage basins and flowing streams are discussed in Section II.A and tabulated in Appendix B. Many of these chemicals are discharged from the water treatment plants after use in purification or use for prevention of algae growth. Alternative methods for water treatment are not economically feasible, and no clearly adverse environmental effects are caused by present methods. Routine analysis and reporting of water quality in plant streams was initiated in June 1973.

### *Cooling Towers and Ponds for Thermal Effluents, 100-K, C*

Alternatives to the release of hot water to onsite streams include cooling towers and cooling ponds. Because of the small effects on the Savannah River of present operating activities (Appendix B), the estimated construction costs, and the estimated increased operating costs, continued operations in the present mode are planned.

## E. REFERENCES

1. ERDA Manual Chapter 0510, "Prevention, Control and Abatement of Air and Water Pollution." (September 27, 1974).
2. ERDA Manual Chapter 0511, "Radioactive Waste Management." (September 19, 1973).
3. ERDA Manual Chapter 0524, "Standards for Radiation Protection." (April 8, 1975).
4. *Final Environmental Statement, Waste Management Operations, Hanford Reservation.* USERDA Document ERDA-1538. (December, 1975).
5. *Draft Environmental Statement, Waste Management Operations, Idaho National Engineering Laboratory.* USERDA Document ERDA-1536. (June, 1976).
6. *Integrated Radioactive Waste Management Plan - Savannah River Plant.* Report SRO-TWM-76-1, Savannah River Operations Office, Aiken, SC (1976).
7. *Isolating High-Level Radioactive Waste from the Environment: Achievement, Problems, and Uncertainties.* General Accounting Office (GAO) report to Congress, p 24 (December 18, 1974).
8. *Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.* USAEC Report LA-5645 (1974).