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MONTHLY REPORT - PROCESS SECTION

MANUFACTURING DIVISION

JANUARY 1956



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FEBRUARY 15, 1956

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SAVANNAH RIVER PLANT

100 AREA - REACTORS

POWER ASCENSION PROGRAM

1, Mark VII Fuel

Plans are continuing for exposure of a core load of hollow slugs in the R-10 reactor charge. ALCOA has had difficulty in extruding and drawing the special Q-foils for these large diameter slugs and so had resorted to broaching the ribs to size in the case of 93 Q-foils. In the meantime, the extrusion dies have been improved to the point where the remaining 321 required appear to be capable of production by extrusion and drawing.

Seven Q-foils of hollow slugs were discharged at the end of R-8 reactor cycle. In the disassembly basin, these slugs did not discharge freely when the Q-foil was up-ended with the unloader, primarily due to the small diameter of rib circle employed in the special Q-foils used for R-8 and R-9 tests of these slugs. Also, the broached rib surfaces tend to be more rough than in drawn tubes. During an attempt to free one slug from a Q-foil, it was damaged to an extent that the bottom end of the can was pried away from the core. Observation of the first 18 hollow slugs indicates more warp and diameter and length increases than with solid slugs,

2. Series Installation of Heat Exchangers

Preliminary steps toward installation of the six additional exchangers in 105 R, P, L and K, arranged in series with the six current exchangers, will be taken in the February shutdown of 105 P, but completion of the installation is being deferred until the March reactor discharge. Expansion joints for piping are on hand for 105 P and additional joints have been procured for R, L and K. Larger pump impellers for four 190 Buildings are on order to preserve the same cooling water flow through the exchanger shells with two in series. Impeller deliveries are scheduled to begin in April.

The current schedule for this work is:

<u>Reactor</u>	<u>Preliminary Changes</u>	<u>Final Installation of Exchangers</u>	<u>Delivery of 190 Pump Impellers</u>
P	2/5/56	3/14/56	4/15/56
R	4/10/56	5/16/56	6/15/56
L	3/21/56	4/24/56	5/25/56
K	2/19/56	4/3/56	5/4/56

POWER ASCENSION PROGRAM (Continued)

3. Fuel Rupture Locator

On the basis of laboratory test results on facilities for locating suspected ruptures of fuel elements, cyclones of about 0.4 inch inside diameter have been chosen in preference to ordinary settling chambers which would have to be six inches or more in diameter for desired performance. The system now being designed has two arrays of 300 cyclones each, on opposite sides of the outside of the reactor pin room at -40' elevation. Each array is subdivided into groups of 50 cyclones discharging to a subheader, with the six subheaders combining into one manifold. The combined flow of about 80 gpm from the 300 cyclones is then pumped to the suction of the moderator circulating pumps. There is provision for flushing out accumulated solids from each group of 50 cyclones at any time by remote operation of valves in the subheaders.

A prototype with perhaps 25 units is planned for hydraulic testing in the shop and later testing in a reactor installation. To locate a rupture, a manually positioned instrument or "apple picker" is planned to be used. The arrangement is, however, adaptable to automatic scanning by mechanical and electrical means.

PRODUCTIVITY IMPROVEMENT STUDIES

1. NFE Studies

Facilities for handling new fuel elements in the reactor areas are now in preliminary design prior to developing an Order-of-Magnitude Estimate to be used in a Part I Authorization Request. The fuel element of first interest is the Mark VI to be charged into C reactor shortly after fuel installation of new pumps in early 1957. Assembly area changes required for the conversion of 105-C consist primarily of tilting and hoisting equipment and additional monorails for handling between assembly operations.

The major modifications required in the disassembly areas include:

- (1) Equipment for disassembly of the elements and disposal of scrap,
- (2) Facilities for handling and storage of the long elements, using the existing monorail system to the maximum practicable extent.
- (3) Casks for shipping.
- (4) Larger transfer pits.
- (5) Larger cranes for the heavier casks.

## PRODUCTIVITY IMPROVEMENT STUDIES (Continued)

### 2. Increased Moderator Circulation

Under the authorized Part I Authorization Request S8-1022 for 105 C, the first Bingham pump of high capacity is being manufactured. Shrinkage cracks in the first casting have been verified in an X-radiograph following the original gamma photographs, resulting in decision to cast another casing. This may result in a small set-back in delivery schedule,

Flow of moderator to the septifoils has been studied and has been found capable of increase to about 10,000 gpm by increasing piping sizes, thereby enabling additional means of alleviating hot zones in the moderator. Performance of reactor elements in high flows of moderator near the reactor tank outlets is being studied by Technical Division.

An Order-of-Magnitude Estimate of cost of increased circulation facilities in R, P, L and K is essentially complete, and a Part I Authorization Request will be submitted in February,

## NEW FACILITIES FOR INCREASED PRODUCTION

### 1. Twin Unit Studies

Under this engineering study for design of new reactor capacity, cost estimating has begun on "Phase 1", which essentially duplicates the design of Area 100 C. Assembly and purification facilities are shared by two reactors placed in adjacent buildings.

Building design studies are under way in connection with "Phase 2", wherein the two reactors share all supporting facilities in one building structure. Cooling water requirements for this case have been estimated.

## DISASSEMBLY AREA

### 1. LMF and 88 Shipment

Scheduled completion dates for LMF casks are now February 27 for the first two casks and March 26 for the remaining two.

In accordance with a request from Arco, it is planned to provide 100 tote boxes for LMF slugs in addition to the 75 already purchased. This will permit Arco to accumulate a reasonable number of slugs for processing without excessive handling. The tote boxes will also be useful at SRP in connection with the spiking program.

DISASSEMBLY AREA (continued)

Tests at SRP confirmed that Type 88 slugs can be handled in the casks originally provided for 5Y3 slugs, with radiation levels of 100 - 150 mr/hr at the surface and 15 - 25 mr/hr at three feet. The shipping weight per slug is less than half as much as with the ORNL Scrup casks previously scheduled for use. A shipment of twelve casks, totalling about 1700 slugs, has been made to ORNL. It is planned to continue shipping the remaining slugs in this manner.

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SAVANNAH RIVER PLANT

SEPARATIONS PLANTS - 200 AREA

GENERAL

The processing of short-cooled metal has increased the activity release to the vent systems in both areas. Preliminary results indicate that in H Area the caustic scrubber, installed as a late design change, is effective in reducing the iodine released to the stack. A similar scrubber is available for F Area but has not been installed to date.

Air-jet syphons, designed to return decanted solvent to the source mixer-settler, have been installed in H Area and are effectively reducing the quantity of solvent which must be purged to rerun.

Tritium separation has progressed satisfactorily and throughput increased following authorization to operate the thermal column at pressures above atmospheric. Deficiencies in the decanner and thermal column wire centering are being followed to provide a basis for revisions to H Area equipment.

SEPARATIONS PLANTS

1. 221-F and H - Acid Recovery from High Activity Waste

The remotely insertable run tank decanter for the F Area acid recovery test has been installed. The remaining piping changes are ready for installation and actual start-up of acid evaporation is scheduled for the week of February 6.

Design work on the H Area system is again under way and expected to be complete by mid-February. Construction will be released as soon as successful operation is assured by results from the F Area test.

2. 221-H - Solvent System

Design of the continuous washing and third solvent system is essentially complete for the canyon building with the exception of the continuous washer cores. Delivery of tanks and pumps for the outside areas is being expedited insofar as possible without premium payment.

One pump will be substituted for a jet on an existing continuous washer in the canyon as soon as it becomes available. Actual separation of the three systems is still expected by mid-year.

SEPARATIONS PLANTS (Continued)

3. 221-H - Rerun Station

Design of the revised rerun station for H Area is essentially complete and drawings are being released to the Field for construction.

4. 221-F - Gang Valve Corridor Temperature Control

Design has been completed for additional refrigeration to reduce F Area canyon gang valve corridor temperatures. Procurement and construction will be expedited so that installation will be complete before summer.

B-LINE

1. 221-H - Product Recovery

General arrangement and piping diagram drawings of the 221-H B-Line product facilities have been approved. Alcohol product recovery facilities were deleted from the scope because of uncertainty for this portion of the process. Studies have been made at SRP to determine means of increasing F Area recovery capacity in an effort to avoid installation of the H Area facilities.

A-LINE

1. 221-F "A"-Line - Bulk Handling

AEC and AED approval has been given the Part II of this project. Construction is now estimated to be complete in May and is to be integrated with other shutdown work involving the installation of a new deeper denitrator pot and equipment additions to the oxide handling facilities.

WASTE DISPOSAL

1. 241-F - Additional Waste Storage

AED approval has been given the Part I S-8 project papers for additional low level waste storage facilities. Vendor quotations for tank fabrication and erection have been received and are being reviewed.

Details of the proposed installation are being reviewed to permit writing a scope for firm design and the construction cost estimate.

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## WASTE DISPOSAL (Continued)

### 2. 241-H - Waste Pumping

The first waste pump fabricated by the Wilmington Shops has been shipped to SRP 717-F Shops for assembly. After preliminary testing at the 717-F Shops the pump will be installed in a test facility at TNX, where complete performance tests will be made, and as much running time as possible will be accumulated prior to plant use.

## TRITIUM PROCESSING

### 1. 232-F - Extraction Furnaces

The redesigned extra machinery extraction furnaces have been released for fabrication by the National Research Corporation. The new pedestals for the furnaces will be fabricated by the National Research Corporation to unify the responsibility for the two parts. Two furnaces and their pedestals are still scheduled for delivery by March 31.

### 2. 232-H - Rehabilitation

The Engineering Department has revised the order-of-magnitude estimate to take into account revised requirements for cleaning and reconditioning of the stored process equipment. A Part I project is being prepared based upon completion of the building as originally designed. Any major revisions will be covered in later parts as firm scopes become available.

Minor revisions to the service wing of the building have been requested to make unused locker rooms available for additional office and storage space. The mass spectrometers have also been relocated from the control room to an individual room in the balcony above the process lines. This move will shorten the sampling lines, reduce the possibility of control room contamination in case of leakage from the mass spectrometers, and provide more operating and maintenance space in both the control and mass spectrometer rooms.

Building drawings are being released to the Field for completion of the process area essentially as originally designed. Cement asbestos board is to be substituted for the originally intended metal wall panels in the operating areas. The roadways and fences around the building have been revised to shorten the interconnecting line to Building 234-H.

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TRITIUM PROCESSING (Continued)

3. Julep

An order-of-magnitude estimate for this facility will be available by mid-February. Building location and arrangement have been revised and firm design of the building shell should start in February. Every effort is being made to expedite design to meet the requested start-up date.

Drawings submitted by the customer are being reviewed and comments will be forwarded by February 15. Arrangements are being made to contact potential fabricators.

INCREASED CAPACITY


1. 221-F - Increased Throughput

Approval drawings have been signed and returned to the Engineering Department for all new canyon equipment and for all major flow diagrams with the exception of the third level feed gallery and the cold feed preparation area.

Design of a new cold feed preparation area (Building 222) to be located east of the cold chemical storage area in Building 211-F has been initiated. The new building will permit receipt of carload lots of solid and liquid chemicals, provide for storage and shipment of these materials to H Area and alleviate the materials handling problem previously associated with this operation when it was located in the canyon building.

The third level feed tank gallery is being revised to eliminate its use on solvent and water streams being used continuously in the canyon. The tankage released by this move will be re-allocated as necessary to eliminate short cycle times.

The solvent recovery systems have been revised to reduce the number of continuous solvent washers in the canyon from six to four. The second stage washer on the second product and metal cycle solvent will be located in the 211 Area as is being done for H Area.

  
SAVANNAH RIVER PLANT  
REACTOR FUELS FABRICATION - 300 AREA

INCREASED PRODUCTIVITY PROGRAM

1. Extended Surface Enriched Elements - Mark VI Program

a. Fuel Production

A general Engineering scope of work covering design of the enriched tubular fuel production facility was issued to the Estimating Section and Engineering specialist groups in mid-January. Current Engineering efforts are being directed toward completion of the order-of-magnitude estimate by the goal date of March 5.

Criticality and health physics monitoring requirements associated with handling of enriched uranium have been reviewed. Present plans call for provision of a simple stationary sampling manifold which will permit periodic checking of airborne activity level throughout the building. The need for building modifications to provide in-process inventory storage space requested by SRP is currently under study,

Additional Metallurgical Laboratory space and equipment will be required to meet auxiliary quality control requirements associated with continually increasing power levels in the five existing 100 Area reactors, regardless of the type of fuel elements produced in the 300 Area. For this reason, it is planned to incorporate the new laboratory facility into the Mark VI fuel building project, since it appears more certain that this project will be carried through to completion at the earliest practical date,

b. Target Slug Production

Preparation of the general engineering scope of work covering installation of additional equipment and expansion of existing Building 320-M for production of Mark VI target slugs is essentially complete. Current work is being directed toward firming up specifications and arrangement of a second vacuum melting furnace and associated vacuum outgassing equipment. On the basis of preliminary information received from National Research Company, installation of an improved type furnace appears practical from the standpoint of price and delivery. SRP has also independently conducted a preliminary investigation into a new type vacuum furnace being marketed by Consolidated.

[REDACTED]

INCREASED PRODUCTIVITY PROGRAM (Continued)

2. Extended Surface Natural Uranium Elements - Mark III Program

Engineering activity this month has been geared to completion of the order-of-magnitude estimate by the goal date of February 20. Primary attention is currently being focused on materials handling and special machine development problems.

GENERAL

1. Hollow Uranium Slugs - Mark VII Program

Processing of Mark VII slugs for the R-9 reactor loading was completed during the third week in January. A total of slightly more than 1100 each of the Sylvania hot-pressed and SRP Alsi-dipped assemblies were completed and shipped to the 100 Area for this loading, although only 960 slugs of each type were actually loaded into the reactor. To date, SRP has received approximately 8,000 hot-pressed Mark VII slugs from Sylvania to be processed for the scheduled core loading in R-10. Approximately 6,000 Alsi-dipped assemblies have been canned for R-10 and were also in final processing or inspection stages at month-end.

Considerable concern has been expressed recently over the magnitude and possible effects of stress concentration in the bore of Mark VII cores. The over-all problem is under active investigation at SRP.

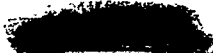
Redesign of a polystyrene finished product shipping tray for Mark VII slugs has been completed by Engineering. The tracings have been forwarded to SRP for procurement of the new trays.

2. Vertical Salt Bath Installation - Building T-1001

A construction-cost-estimate on installation of the vertical salt bath equipment in the pneumatic pressing building has been received from Engineering. Preparation of a Part II of the IRO authorizing this installation will be necessary to cover an over-run of approximately \$25,000, which resulted principally from a change in scope required to minimize transfer time involved in the quenching operation.

3. Equipment Capacity Manual

The 300 Area section of the Equipment Capacity Manual has been approved by SRP, authorized in Wilmington and is now ready for final issue.

  
HEAVY WATER

DANA PLANT

1. Experimental Sieve Tray Installation

Specifications for the proposed experimental sieve tray installation in the first stage of one Dana GS unit have been reviewed by Engineering Research Laboratory. Agreement has been reached between Dana and the Engineering Department and preparation of the final report is under way at ERL. Requests for quotations on sufficient experimental sieve trays for one tower pair have been issued to several vendors and Dana is currently awaiting firm price information.

SAVANNAH RIVER PLANT - 400 AREA

1. Equipment Capacity Manual

The 400 Area section of the Equipment Capacity Manual has been approved at SRP and authorized in Wilmington. It is currently ready for final issue.

GENERAL

1. Purchase of Additional Stainless Steel Drums

The project for procurement of an additional 1500 fifty-five gallon Type 304 stainless steel drums has been approved in Wilmington and is currently awaiting SRP approval and final AEC authorization.

SAVANNAH RIVER PLANT

UTILITIES AND GENERAL SERVICES

ADMINISTRATIVE, TECHNICAL, AND GENERAL SERVICES

A meeting was held with the South Carolina Electric and Gas Co. on January 9, at which time a proposed contract for additional electrical power required for the Productivity Improvement Program was firmed at an initial 20 MW becoming 40 MW in June, 1957 and increasing to 65 MW in January, 1958. This contract will supersede the present supplementary contract for 20 MW the first six months and 10 MW the second six months of the year. When these increases are added to the original contract for 30 MW, the total purchased power ultimately becomes 95 MW. This quantity of purchased power, together with existing plant generation, will be adequate to supply the requirements associated with the Productivity Improvement Program based on the expansion of the river water system to its optimum capacity. The reduction to 95 MW from the requirement of 120 MW previously stated was due to the decision to commit power only for the 100 Area cooling water supply program now clearly defined. Design studies have been started for an additional transmission line from the utility's Urquhart Station to SRP. Copies of the contract draft were transmitted to the AEC-SROO on January 26.

A meeting was held with the AEC on January 11 to review the problem of contracting for stoker coal for SRP. A three month contract form which incorporated terms and conditions which should be acceptable to most of the suppliers was approved by the AEC on a six month trial basis. Price adjustments will be made on the basis of monthly weighted average analyses. Contract offers are now being secured for the months of April, May, and June, 1956.

Agreement has been reached with Technical Division and the Design Division of the Engineering Department on arrangement, building size, location, etc., for the High Level Caves Addition on the Main Technical Laboratory, Building 773-A.

Architectural plan drawings for the Engineering Assistance Facility Building 723-A were approved. Design is proceeding based on the relocation of a TC structure (approximately 20,000 sq. ft.) to be erected east of the existing Instrument Shop Building 722-A.

Field work has started on the office and shops addition to Building 704-H (PWO 6018-H) and the F Area offices and regulated shops and change room (PWP 6021-F). Completion for both the above work items is scheduled for September 1, 1956, with office occupancy during May, 1956.

A meeting was held with the AEC to review start and target completion dates for those projects included in the AEC Productivity Improvement Program. Copies of a revised schedule of the projects showing the above have been sent to AEC.

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ADMINISTRATIVE, TECHNICAL, AND GENERAL SERVICES (Continued)

Additional funds have been received from AEC for design studies as follows:

1. Directive 32(SR) Additional Cooling Flow, SRP, \$100,000 increase, total now \$250,000.
2. Directive 92(SR) Improvements to Separations Facilities, SRP, \$400,000 increase, total now \$900,000,
3. Directive 119(SR) Improvements to Reactor Complex, 100 Areas, \$150,000 total (no previous authorization of funds).

The following projects and Work Requests were authorized during the month:

Savannah River Plant

- Project S8-1021-2 - Bulk Handling Facilities, Bldg. 221-F "A"-Line, \$40,000 increase (total now \$87,000).
- S8-2016-2 - Replace Resistance Furnace B-3, Bldg. 313-M, \$8,200 reduction (total now \$10,100)
- S8-3014 - Installation of Office Partitions in Wings "C", "D" and "E-3", Bldg. 703-A, \$7,300.
- S9-3503-2 - Installation of Argonne-Type Model B Manipulators in Cave No. 3, Bldg. 773-A, \$5,450 increase (total now \$17,900).
- S9-3508 - Portable Cover-Frames for Turbogenerators, Bldgs. 184-R, P, L, K, \$6,950,
- S9-3511 - Modification of Hydraulic Facilities at CMX, Bldg. 679-G, \$7,200.
- S9-3512 - Spare Vessel Vent Exhauster for 292-1 F and H, \$6,100.
- S9-3513 - Replace Tie Cable Between Transformer Rooms No. 1 & 4, Bldg. 105-L, \$8,000.
- S9-3515 - Revisions to Disassembly Transfer Area, Bldgs. 105-R, P, L, K, C, \$15,900.
- S9-3516 - Replacement of Scalers with Ratemeters, Bldgs. 281-4 and 6 F and H, \$15,500.
- S9-3517 - Transfer Jet for E.U. Evaporator, Bldg. 221-F, \$5,200.
- S9-3518 - Rod Disassembly Machine Modifications EP320-321, Bldgs. 105-R, P, L, K, C, \$8,500.
- S9-3523 - Install Prototype Impeller, Bldg. 681-1 or 3G, \$19,000.

- Engr. Wk. Request 25899-IV - 100, 500, 600 and 900 Areas - Additional Cooling Water Supply, \$30,000 (total now \$100,000).
- 25900-IV - 100 Area - Increased Flow Cooling Water, \$30,000 (total now \$75,000).
- 25924-II - Handling NFE - 100 Area, \$60,000 (total now \$100,000).

[REDACTED]

Engr. Wk, Request - 25933-V - "F" Area Through-put Changes, \$350,000,  
(total now \$700,000)

- 50020-II- Evaluate Waste Concentration Alternatives,  
\$20,000 (total now \$40,000)
- 50067-II- ESD Assistance - Bldgs. 211-F&H, 221-F  
A-Line, \$1,000 (total now \$4,000)
- 50124 - ESLMT Facility Study - 300-M, \$25,000
- 50125 - Seepage Basin Investigation, \$3,700
- 50126 - Water, Waste and Weather Group Assistance,  
\$3,000
- 50127 - Evaluate Alternate Material for No. 1 Fur-  
nace, \$1,000
- 50132 - Water Consultation, \$5,000
- 50133 - Materials Handling Consultation, \$2,500
- 50134 - Increased Gas Plenum Pressure, \$15,000,  
(total now \$150,000)
- 50135 - 100, 500, 600 and 900 Areas - Additional  
Cooling Water Supply, Evaporative Cooling,  
\$50,000

#### 100, 600 AND 900 AREA UTILITIES

Engineering was requested to revise the scope of work for the increased 100 Area cooling water facilities to provide flexibility in the river water system so as to distribute the increased capacity to all five 100 Areas selectively as desired. It may be necessary to increase the number of flow metering installations on the normal and emergency river water supply lines, modify anchors in the effluent lines in 100 R, P, L Areas, and possibly do some work to structures along the effluent streams from 100 R, P, L. Areas. The Order-of-Magnitude and Part I Estimates are being revised to reflect these changes.

Engineering was requested to prepare an Evaluation Estimate for a cooling pond of minimum construction to compare its cost with cooling towers, which are also under study, as a means of providing additional cooling water for the 100 Areas above that presently planned from the river water system. It was also requested that an estimate, preliminary to a project, be prepared covering a small test pond to determine pond cooling characteristics and the feasibility of inexpensive construction methods.

Project S9-3523 was authorized for the purchase of a larger impeller for one river water pump and the reconditioning of the rotor from the existing 3000HP motor driving this pump to permit the motor's operation at the increased load (approximately 3600 HP) and to determine pump characteristics with the larger impeller. Identical work will be required on the remaining 15 river water pumps to supply the additional cooling water to the 100 Areas. It is planned to run a test on this initial installation to verify the previous engineering analysis that the modified pump and motor will operate satisfactorily. This test will permit required design corrections for the modification of all the pumps and motors in the extremely unlikely event that difficulties are experienced with this initial installation.

200 AREA UTILITIES

A meeting was held at SRP on January 11 between Engineering and AED to discuss Engineering's proposed changes to the July, 1955 scope of work for the power facilities associated with 200-F Area increased throughput. The following major items were among those agreed upon. Two additional "H" units and one additional "S" unit will be required for the boiler feed make-up demineralization facilities as compared to the three "H" units and two "S" units originally planned. One additional cooling water return pump at Building 281-2F will be required as compared to the two originally planned. Cooling tower make-up requirements in excess of the 1000 gpm provided from the Building 241-F well water system will be supplied directly from the service water well system, thereby eliminating repumping through the present connection to the service water distribution system. Design of the new cooling towers will be on the basis of a 16°F rise in the process cooling water, as confirmed by experience, instead of the present design of 40°F. On this basis, the six existing cooling tower cells will be up-rated from 2500 gpm each to 2875 gpm, thus providing savings of 2250 gpm in the new installation.

DANA UTILITIES

Recommendations for alterations to the Dana boilers were received from the boiler vendor, Combustion Engineering, Inc., and forwarded to the Dana Plant. The major items are the installation of eight additional steam cross-over tubes between the middle and west drums, and substitution of the screen internals in the steam washers. These recommendations are the result of inspection and review by the vendor which was prompted by the boiler tube failures which occurred in three instances in two of the boilers during December, 1955.