MONTHLY REPORT – PROCESS SECTION
MANUFACTURING DIVISION
JUNE 1956
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POWER ASCENSION PROGRAM

1. Fuel Rupture Location System

The six-cyclone prototype of the rupture locating system proposed for natural fuel reactors has been received and is being installed at Savannah River Laboratory for hydraulic testing. Cyclones have now been ordered for the 25-cyclone prototype to be installed in "R" reactor for performance testing during reactor operation.

Design of the automatic device for radiation scanning of banks of cyclones has been completed in the Mechanical Assistance Section at the Savannah River Plant, and the AC photomultiplier circuitry proposed for the detection system is under test in "L" reactor.

2. Increased Pressure of Blanket Gas

An increase in pressure of the blanket gas system to 5 psig is being considered with the objective of increasing the hydraulic (temperature) limits on the reactors. However, in order to avoid lifting the plenum during operation with lightweight enriched loads, the plenum must be fastened to the floor or to the reactor structure. Holding the plenum down by means of the forest structure appears impracticable because of the large forces involved. Study by the Engineering Department has shown that fastening the plenum at its periphery would still permit enough central deflection to cause binding on the semi-permanent sleeves. The proposed method of fastening, therefore, is to install tie bolts in 30 to 50 of the available instrument holes, to tie the plenum to the top shield. The gas pressure required to lift the plenum and shield together would be about 13 psig with a natural load of about 8 psig with an enriched load. A cost estimate has been requested for installation of the tie bolts.

3. Shipment of Mark VIII Slugs to Arco

According to the current forecast for Mark VIII slug loadings, production will cease in early calendar 1958, but with the present four casks the shipments to Arco would continue until early 1961. A project has been submitted to purchase four additional casks of this type, so that shipment may be completed by early 1959. With eight casks in service, the expected maximum inventory of cooled slugs will be three reactor charges, equivalent to about four months production of two reactors.
POWER ASCENSION PROGRAM (Continued)

3. Shipment of Mark VIII Slugs to Arco (Continued)

Slight changes in the cask design are contemplated, to reduce radiation leakage and facilitate handling. The work will be scheduled for cask delivery during the third quarter of FY 1957, in time for the first shipment of slugs.

PRODUCTIVITY IMPROVEMENT PROGRAM

1. Increased Moderator Circulation

Bingham Pump Company's production schedule on the first set of larger moderator circulating pumps now shows the first pump scheduled for shipment in September and the seventh pump in early November 1956. This schedule is about 30 days later than the original quoted schedule for shipment of the seventh pump. Manufacturing techniques appear to be satisfactorily developed to make possible adherence to this schedule.

Shaft seal design of the Bingham pump is different from that now used on the Byron-Jackson pumps only in the method of support of the stationary carbon ring. In the existing B-J pumps this ring is seated on a rubber ring. It was thought that the seal could be improved if the ring were held in better alignment, and a carbon-to-metal back-up was designed into the seal for the Bingham pump. The seal is now undergoing proof-testing under simulated operating conditions. The latest series of tests indicate that absolute flatness of the metal back-up surface and of the back face of the carbon ring play a major role in reducing seal leakage. This development stems from recent experience at SRP.

In connection with the increase in moderator circulation, there will be some alterations to power calculator instrumentation made necessary. New flow meters and transducers will be installed and the reliability of the temperature measuring circuits will be improved. Experience with the existing system has shown the primary source of error to be in changes in system resistance at solder joints, etc. A revised circuit which is self-compensating for these changes has been designed and tested at SRP. Such a system will be made a part of this project.

2. New Fuel Elements

General arrangement drawings covering NFE handling in Building 105-C Assembly Area have been approved. All major equipment changes for the assembly area have been reviewed and only a few of these designs are yet to receive formal approval. Mock-up of equipment for testing prior to final design will be confined to a few tool items only.
2. **New Fuel Elements** (Continued)

All major changes and additions to the disassembly areas have been reviewed, at least in the rough design stage. The principal area which lacks design development is in shipping. Preliminary results of the sub-criticality tests at SRL confirm the previous calculations that with suitable configuration, which would be a hexagonal array very nearly close packed, as few as 18 to 20 un-irradiated Mark VI elements would be critical. Further tests are in progress to determine the required spacing between stacks for single-file stacks of ten elements each, since this arrangement may permit safe loading of 50 to 60 elements per cask.

Calculations relating to heat removal from a cask containing 60 Mark VI-A elements irradiated at 2000 MW to 40% burnout indicate that water in the cask would boil even with the cask immersed in water. However, it appears from limited observations with present LMF casks that actual temperatures are much lower than predicted. In view of the importance of this design feature, further observations of the existing LMF casks are planned.

**REACTOR DESIGN STUDY**

Evaluation cost estimates have been completed for two reactor buildings of 105-C design in one area to compare with the cost of two separate reactor areas. Also, cost estimates are essentially complete of a reactor area containing two reactors in one building. Active work is now directed toward more extensive redesign of the reactor in Phase III of this study.
SAVANNAH RIVER PLANT
SEPARATIONS PLANTS - 200 AREAS

"A" LINE

1. 221-F "A" Line - Bulk Handling S8-1021

Installation of the bulk handling equipment is now 99% complete. Oxide leakage at the end bearings of the new screw conveyor is delaying start-up. Delivery of the continuous sampler has been delayed but arrangements have been made to borrow one so trial runs may start early in July.

A work request has been authorized to provide funds for Engineering to study changes to this equipment to increase the net load from 5 to 6 tons per container.

WASTE DISPOSAL

1. 241-F - Additional Low Level Waste Storage - S8-1030

The scope of work for this project was based on storing either fresh low level wastes from 221 Building or accumulated low level wastes transferred from existing storage. Such design criteria as tank operating temperature, solution specific gravity and activity were specified for that concept of operation. Subsequently, the concept of additional waste concentration, from 35 to 70% solids in the tank farm, was advanced and it now appears that a review of design criteria is required to determine the adequacy of the present proposed design for the revised operating concept.

The Engineering Department will review the new tank design considering the following:

a. Wastes to be stored will have been evaporated to about 70% solids (Specific Gravity 1.8).

b. The temperature at which wastes will be introduced to the storage tank will be about 275°F. This may result in a bulk tank temperature of about 200°F.

c. The rate of concentrated waste addition to the storage tank will be about 2700#/hr.

d. Only low level wastes and decayed high level wastes will be concentrated.

AED will advise concerning the specific activity of wastes to be processed so that shielding calculations can be checked. A radiation level of 25 MR/hr above the tanks can be tolerated.
1. 241-F - Additional Low Level Waste Storage-88-1030 (Continued)

As previously reported, it is feasible structurally to install an "in-tank" evaporator by suspending it from the dome of the new tanks. It has now been determined that it is desirable and economically justifiable to have the large central tank opening (approximately 8-foot diameter) whether it is used for installing the "in-tank" evaporator or not. An opening this size will reduce construction costs for the installation and removal of concrete forms and shoring. The large central opening will be included in the new tank design.

2. 242-F - Waste Tank Farm Evaporation

The Griscom-Russell "bent tube" model evaporator installation was inspected during the month. At the time, automatic operation had been maintained successfully for about a week feeding simulated low level waste at 30% solids and evaporating to 70% solids. The rated capacity of this evaporator is 400,000 BTU/hr.

A few minor design changes were discussed and the future program outlined. After the recommended changes are made and satisfactory operation is again demonstrated, freeze-up problems will be simulated and means compatible with the remote operation necessary in this service will be sought to resume operation after such a freeze-up. Following this demonstration the evaporation of simulated tank #1 waste will be started.

As yet, scaling of the evaporator tubes has not occurred. Since bottoms and process condensate are reconstituted for reuse and the amount of feed is small, however, this test at Griscom-Russell is not considered a demonstration of the scaling characteristics of low level waste. Foaming has been encountered, but only during evaporator start-up. After about 50% solids concentration is reached, foaming subsides.

Engineering has been requested to include in their cost evaluation for an "in-tank" evaporator, shielding of the condenser and the condensate receivers for radiation protection in the event that inadvertent foam-over contaminates this equipment.

3. 241-H - Waste Pumps

Testing of the first waste pump at TNX is continuing. The pump has been run about 160 hours continuously, plus 400 on-off cycles which is equivalent to about a year's operation. No defects have appeared to date. A cast iron test impeller designed to give a more nearly ideal curve has been ordered.
WASTE DISPOSAL (continued)

3. 241-H - Waste Pumps (Continued)

When it is received, the life testing at TNX will be terminated. The pump will be disassembled and inspected for wear. It will then be reassembled, and tests on the new impeller will be run by the Engineering Department.

TRITIUM SEPARATION

1. 232-H - Rehabilitation

Drawings have been approved covering the piping diagrams, the air monitoring, and the gas sampling arrangement. It has been agreed that space will be left for the addition of booster pumps or other pumps to increase the capacity of the first line to the limit of the existing diffuser capacity, assuming that the current furnace capacity limitation may be eliminated in the future. This would approximately double its rated capacity. Facilities to accomplish the capacity increase will not be provided at present since they would delay completion of the line.

2. 232-H - Second Line

A scope of work covering a high capacity second line for 232-H has been prepared at SRP. It assumes that a high capacity diffuser will be used and is sized to allow maximum forecast plant production of tritium to be processed in one line. The use of such a large capacity line will be evaluated and compared with operation of all three lines with such modification as may be required for moderate increases in their capacity.

3. Building 234-H

The prototype oil-actuated mercury compressor has been fabricated and installed at the Mechanical Development Laboratory. Test operation is scheduled to begin the first week of July to demonstrate operability of the machine. The diaphragm type compressor being built by Pressure Products Industries is expected to be complete the week of July 9.

The building frame has been completed and installation of under-floor ducts and pipes is in progress. The concrete finish was inspected and it has been agreed that only minor additional finishing will be required to obtain a surface suitable for painting.
INCREASED CAPACITY

1. 221-F and Related Facilities

All flowsheets and diagrams have been approved by the AED and returned to the Engineering Department with comments.

A temporary "hold" has been placed on the installation of the third dissolver and its associated off-gas system. These facilities are to be designed and AED notified at least two weeks before the latest date that construction must proceed to maintain the project schedule. This action was taken since under present production forecasts the third slug dissolver may not be required prior to the time when new long element dissolvers are needed.

The Engineering Department has been requested to study an alternate type of continuous canyon evaporator in which the de-entrainment column and the reboiler are an integral unit to eliminate the large flanged joints in the present design. Savings from the simplified design are estimated to offset the costs of abandoning the present design and the redesigned unit is expected to facilitate maintenance since it can be handled with existing type lifting yokes and simplified jumper arrangement.

A meeting was held with plant Operating and Engineering Construction personnel to define the radiation levels and condition of equipment in various sections of the area as it will be turned over to Construction for relocation or modification. A list of equipment which can be relocated to avoid the purchase of new equipment was also developed.

2. "B" Line

A letter summarizing the basis for design and the estimated cost of the proposed new "B" Line was issued June 18. Design work is continuing pending a decision on the proposal submitted.
SAVANNAH RIVER PLANT
REACTOR FUELS FABRICATION - 300 AREA

INCREASED PRODUCTIVITY PROGRAM

1. Extended Surface Enriched Elements - Mark VI Program
   
a. General
   
   Part I of the project covering design and construction of facilities in the 300-M Area for fabrication of extended surface enriched uranium fuel tubes and lithium aluminum target slugs has now been approved by the Atomic Energy Commission. The authorized $5,000,000 is intended to cover the cost of design, procurement of critical equipment and partial installation of facilities particularly needed for interim production of Mark VI assemblies prior to completion of the final production operations. It is anticipated that the construction cost estimate will be completed and ready for release to AED by September 1. Current scheduling calls for approval of the Part II by November 1.

   Engineering has been requested to proceed with a study of additions and/or modifications to Buildings 320 and 321-M necessary for conversion to production of Mark VI-A fuel assemblies. This conversion involves manufacture of two ribbed fuel and one unribbed target tubes, all by coextrusion cladding, whereas, the Mark VI fuel element is comprised of one unribbed coextruded fuel tube containing a single column of target slugs.

   b. Fuel Facility - Building 321-M

   General arrangement drawings for Building 321-M have been formally approved. Detailing of equipment and piping arrangements in individual areas is progressing with particular emphasis on location of equipment foundations and sub-floor piping and electrical work in effort to firm up the floor slab design. Concrete footing details have already been released to the Field for preliminary construction.

   Prior to the tube drawing operation required to finally size the extruded fuel tubes it is necessary to "point" the extrusion for its attachment to the drawing fixture. Successful demonstration of the point formed on both smooth and ribbed fuel tubes by a Stevens and Bullivant fixed head rotary pointing machine has resulted in agreement to procure one of these machines for Building 321.
INCREASED PRODUCTIVITY PROGRAM (Continued)

1. (b) Fuel Facility - Building 321-M (Continued)

Preliminary information on the over-all problem of straightening of unribbed fuel tubes and 12-foot extruded LiAl rods indicates that a two-roll rotary straightener may be the most effective device for both operations. Present plans call for testing of SRP elements on this type straightener in the near future. Successful adaptation of roller straightening to ribbed fuel tubes does not appear promising, however.

c. Target Facility - Building 320-M

A design data report detailing additional equipment requirements for expansion of LiAl slug production facilities in Building 320-M has been received from SRP and forwarded to Engineering. Similar information on the Building 320-M analytical laboratory wing expansion has also been received from SRP.

General agreement has been reached on the location of both existing and new equipment within the present building area and on general arrangement of the furnace room expansion. Final detailing of the new furnace and auxiliary equipment layouts awaits receipt of approved drawings from National Research Corporation and Stokes Machine Company.

With some minor revisions the existing air conditioning equipment in the final slug machining area should adequately serve the expanded processing room requirements. To insure continuity of operation, one of the two existing 100 HP units serving the laboratory wing will be piped in as a standby supply of 40°F chilled water for the slug processing area. Laboratory requirements originally served by this 100 HP unit will be furnished in the future by 45°F chilled water obtained from the central refrigeration plant, Building 789.

2. Extended Surface Natural Uranium Elements

a. Extrusion Cladding Facilities - Building 773-A

Engineering is currently completing equipment design for the extrusion cladding press. Design of the material handling equipment is scheduled for completion the end of July. Procurement of all limiting equipment is essentially complete with the exception of that for material handling which is presently being designed. Delivery of the majority of the equipment is scheduled by early September. Drawings for
INCREASED PRODUCTIVITY PROGRAM (Continued)

2. (a) Extrusion Cladding Facilities - Building 773-A (Continued)

Field fabrication of auxiliary equipment have been issued. Construction work on this facility is scheduled to begin in early July and to be complete in October.

b. Pneumatic Pressing Facilities - Prototype Autoclave - Building T-1001

Engineering is currently comparing three alternate systems for the fluid pressure bonding of Mark V and Mark III fuel elements. The systems under study are as follows:

(1) Preheating the fuel element prior to transfer to a cold wall autoclave equipped with gas circulation and internal electrical heaters.

(2) Preheating the fuel element prior to transfer to a cold wall autoclave containing internal electrical heaters and a hot reservoir but without gas circulation.

(3) Preheating the fuel element within the autoclave proper using a hot reservoir.

c. Mark VII Hot Pressing Facilities - Building 313-M

Work Request No. 50207 has been authorized early in June for $5,000 to prepare preliminary designs and an evaluation estimate of facilities in Building 313-M for hot pressing Mark VII fuel elements. Preliminary layout of the facility has been prepared utilizing present 313-M cleaning and inspection equipment wherever applicable. The new equipment necessary for the installation has been determined and an estimate is currently being prepared. Scheduled completion of the evaluation estimate is in early July.

3. Consolidated Metallurgical Control Laboratory

The general arrangement of laboratory modules within the 50' x 120' Butler Building, which will house these facilities, has been firmed up. It is anticipated that preliminary construction work on Building 322-M will start sometime during August of this year.

GENERAL

Vertical Salt Bath Installation - Building T-1001

Check-out and run-in of equipment by Construction is currently in progress. It is anticipated that turnover to SRL will take place by the middle of July.
DANA PLANT

1. GS Unit Bubble Cap Tray Replacement Program

Installation of a total of 230 replacement Type 304 stainless steel bubble tray assemblies in Unit 201 has been successfully completed and the unit is again in operation. All necessary material is now on hand, including a complete set of experimental sieve trays for one first stage tower pair, for partial retraying of Unit 202 during July.

2. Gas Generation Plant Scrubber Blistering

Three blisters, ranging from circular to oval in shape and from roughly 3 to 20 square inches in area, were observed during inspection of the Gas Generation plant scrubber-cooler. The height of the blisters above the general scrubber wall surface was approximately 1/8". Minimum sound wall thickness measured in the affected areas was 0.31" compared with a design thickness of 0.56".

All three blisters were vented by drilling completely through the vessel wall, then plugged by inserting a shielded stainless steel pipe plug into the holes from the outside. The RV setting has been reduced in proportion to the reduction in sound wall thickness. Condition of the blistered areas will be carefully examined during next year's test and inspection program.
A supplement to the Power Contract was executed providing for the pur-
chase of an additional 65,000 KW of power from the Utility. The sup-
pplement also provides for the erection of a new tie-line from Urquhart
Station to the Savannah River Plant.

A drawing was approved for the new bridge on Road No. 3 where it crosses
the 100-C Area effluent stream. The new bridge is being installed on
Project No. S8-1035 - "Increased River Water Flows" to replace the exist-
ing culvert structure which had inadequate capacity to carry the increased
effluent.

A meeting was held with AEC to review the design and Order-of-Magnitude
Estimate for the proposed additional High Level Caves facilities at the
Main Technical Laboratory, Building 773-A. The OME cost of the additional
facilities is $1,500,000. The Part I of this project (S8-1051) is cir-
culating for du Pont approval. Design is approximately 30% complete.
Architectural and elevation drawings have been reviewed and returned with
comments to the Engineering Department for revision and submittal for
final approval.

Construction is continuing on the Engineering Assistance Facility, Build-
ing 723-A. The exterior of the building is essentially complete. Con-
cealed wiring and piping are essentially complete and interior partitions
are approximately 95% complete.

A request was received from the Technical Division to prepare design and
estimates for two (2) intermediate level chemistry cells and one (1) mini-
mixer cell to be installed in the basement of the Main Technical Laboratory,
Building 773-A. Basic data for use in preparing a Design Data Report is
being prepared. No assistance has been requested as yet from the Engineer-
ing Department.

Arrangements have been made with ORNL to conduct tests of various manu-
ufacturer's paints in an attempt to develop a lower cost alternate for
Amercoat. Consideration will also be given to relaxing the rigid surface
preparation now specified for Amercoat.

100 AREA UTILITIES

A meeting was held with AEC to discuss progress to date on the study of
evaporative cooling for additional cooling water to the 100 Areas. Eval-
uations were presented covering the installation of cooling towers versus
a cooling pond on Lower Three Runs Creek. Subsequent to the meeting the
Engineering Department was requested by AED to prepare an evaluation esti-
mate for a cooling pond to be located on Tinker Creek just above its junc-
tion with Upper Three Runs. The Tinker Creek pond would provide a larger
and deeper reservoir than the previously evaluated Lower Three Runs site.
100 AREA UTILITIES (Continued)

The installation of new 25-1/4" impellers in the 190 Building pumps is continuing with seven (7) already installed in L Area, six (6) in P Area, six (6) in R Area and four (4) in K Area. Six more impellers have been received from the vendor and are being installed. The larger impellers provide the additional head required for pumping cooling water to the twelve heat exchangers now in series arrangement in the R, P, L, and K Areas. A strike at the Vendor's plant delayed shipment of these impellers and it is now estimated that eight (8) impellers will be installed in each of the 100 Areas, except C Area, by the end of July. The eight (8) impellers for C Area are scheduled for delivery July 21, 1956, but will not be installed until the modified butterfly valves are installed about September 1, 1956.

600 AREA UTILITIES

Installation of the new 38" impeller in the No. 7 pump in Building 681-LG has been completed. The No. 7 motor has been received and is now being installed. Check-out and run-in of the motor and pump are scheduled for July 5, 1956. This is the first installation, as a prototype, for the revamping of the 681-LG and 3G pump houses as related to the Productivity Improvement Program.

900 AREA UTILITIES

A report was presented by the Engineering Department on the additional water hammer protection required on the river water pipe lines to handle the increased water requirements in connection with the Productivity Improvement Program. The report included a description of alternate plans and discussion of the more feasible alternates.

PROJECT AND WORK REQUEST AUTHORIZATIONS

The following projects and work requests were approved and/or authorized during the month:

Savannah River Plant

<table>
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<tr>
<td>S8-1013-II</td>
<td>Additional Breathing Air Packs Bldgs. 411-1D, 412-1D and 413-D</td>
<td>$6,400</td>
<td>Total Parts 1&amp;2 Reduction $41,300</td>
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<td>S8-1044-I</td>
<td>Additional Manufacturing Facilities (LMF&amp;T) 300-M Area</td>
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<td>S8-1045</td>
<td>Dry Chemical Facility, 773-A</td>
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<td>S8-1047</td>
<td>Carrying Account for Future Projects</td>
<td>6,000,000</td>
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<td>S8-1050</td>
<td>Secondary Road Bridges &amp; Culvert Crossings, Bldg. 603-G</td>
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<td>S8-3007</td>
<td>Automatic Radio Repair Facility Bldg. 722-A</td>
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PROJECT AND WORK REQUEST AUTHORIZATIONS (Continued)

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<tr>
<td>S8-3022</td>
<td>Additional Ventilation Facilities Bldg. 313-M</td>
<td>$8,500</td>
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<td>S8-3023</td>
<td>Additional Lighting for Bldg. 678-G</td>
<td>$9,300</td>
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<td>S9-1027</td>
<td>Replacement of Existing Chlorine Facilities, Bldgs. 183-1R &amp; 183-4PLKC</td>
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<td>S9-1037</td>
<td>Replacement of General Purpose Gas Masks</td>
<td>$20,500</td>
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<td>S9-1041</td>
<td>Install Pure Steam Facility, Bldg. 105-R,P,L,K,C</td>
<td>$40,000</td>
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<td>S9-1043</td>
<td>Additional Filter Boats &quot;B&quot; Lines, Bldg. 221-F and H</td>
<td>$82,000</td>
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<td>S9-1046</td>
<td>Procure Additional Shipping Casks 100 Area</td>
<td>$52,000</td>
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<td>S9-3543</td>
<td>Facilities for Loading &amp; Unloading Trucks, Bldg. 313-M</td>
<td>$5,600</td>
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<td>S9-3533</td>
<td>Thermocouple Instrument Rods, Bldgs. R,P,L,K,C</td>
<td>$18,000</td>
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DANA PLANT

C-55-II Allocation of Funds for Small Projects 58,170 Total Parts 1&2 Year Ending September 30, 1955 Reduction $133,830

WORK REQUESTS

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<tr>
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<td>25924 V</td>
<td>Handling NFE 100 Areas</td>
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<td>50080 V</td>
<td>Extrusion Design</td>
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<td>50117-II</td>
<td>Fluid Flow Test Program</td>
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<td>50142-II</td>
<td>Inspection of Tubes for 100 Area Condensers</td>
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<td>50162-II</td>
<td>NFE (LM) Billet Welding</td>
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<td>50170-II</td>
<td>Prototype Retort Furnace</td>
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<td>50178-II</td>
<td>NFE (LM) Casting Fixture</td>
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<td>50204</td>
<td>Mechanized Coining Press - 320-M</td>
<td>$4,500</td>
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<tr>
<td>50205</td>
<td>Completion of Facilities - Process Line 2, Bldg. 232-H</td>
<td>$35,000</td>
</tr>
<tr>
<td>50206</td>
<td>Rod Deburring and Coding Table 320-M</td>
<td>$5,600</td>
</tr>
<tr>
<td>50207</td>
<td>Manufacturing Mark VII</td>
<td>$5,000</td>
</tr>
<tr>
<td>50209</td>
<td>Run-Out Table &amp; Feeder Mechanism</td>
<td>$15,000</td>
</tr>
<tr>
<td>50210</td>
<td>&quot;F&quot; Area Through-Put Studies</td>
<td>$75,000</td>
</tr>
<tr>
<td>50214</td>
<td>Bulk Handling Capacity 221-F &quot;A&quot; Line</td>
<td>$800</td>
</tr>
</tbody>
</table>

"P" Work Order - PWO-1 (S8-1041) Air Conditioning for Offices, All Areas, $100,000, was approved during the month.