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PROCESS DESIGN SECTION STATUS REPORT FOR OCTOBER 1961

By

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ABSTRACT

This report summarizes the accomplishments of the Process Design Section of the Chemical Technology Division during the month of October 1961. The five major projects discussed are Transuranium, Volatility, Power Reactor Fuel Processing, Waste Studies, and Fuel Cycle Development. A number of smaller programs are reviewed under the section on Miscellaneous Projects, and project engineering accomplishments and status are reviewed in the last section.

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1.0 TRANSURANIUM PROGRAM
(W. E. Unger)

1.1 Transuranium Laboratory, Bldg. 7920 (B. F. Bottenfield, E. J. Breeding, G. B. Berry)

The Transuranium Facility criteria, revised to scope the job at approximately $8,000,000, were transmitted to the Architect-Engineer, Catalytic Construction Company, at a meeting in Philadelphia on October 4-5, 1961. At that time, Catalytic suggested that a rough cost estimate be made by them to determine whether the facility had been scoped approximately correctly. Their cost estimate was completed on October 30, at which time the estimate and the design criteria were discussed at a meeting in Phildaelphia. It appears that the facility, if designed and built within the confines of the present criteria, can be built for $8,000,000, based upon ORNL participation costs, and over-all engineering and contingency costs as put forth in the Construction Data Sheet which were submitted to the AEC in Washington in early October.

Completion of the conceptual design study by Catalytic is currently scheduled at December 15, 1961; it is intended that Title I design be initiated by January 1, 1962, if captial funds are made available by that date.

1.2 Special Mechanical Equipment Design (F. L. Hannon)

Intercell Conveyor. Conceptual design is in progress on the following items for the intercell conveyor: (1) relocation of the drive mechanism on the top of the housing rather than on the bottom; (2) conveyor housing assembly details, including joint design, housing support, etc. Descriptions of the conveyor housing and component installations are being prepared. Fabrication of the automated port closure is continuing, and fabrication has begun on the canister removal device. The drive clutch adaptors have been installed.

Equipment Removal System. Detail design of the doors for the transfer case and the cubicle hatch have been completed, and fabrication is in progress. Detail design is progressing on other transfer case components including guides, tracks, and associated items.

Cell Cubicle. An informational drawing was prepared to clarify the Architect-Engineer and ORNL responsibilities in design of the cubicle. Preliminary drawings have been prepared to show general arrangement, layout, and a proposed design for cell mockup of the Transuranium Facility.

1.3 Process Equipment Design (W. D. Burch, O. O. Yarbro)

Equipment flowsheets for the chemical process cells were revised to conform with changes in the cell bank design. The following flowsheets were issued:

E-46000	TrU Equipment Flowsheet, Cell No. 5
E-46001	TrU Equipment Flowsheet, Cell No. 6
D-46002	TrU Equipment Flowsheet, Cell No. 7

The only significant process change in the flowsheets was the location of the dissolver in the cubicle instead of the tank pit. This change will simplify the target charging system and allow a convenient means of recycling reject pellets to the dissolver.

1.4 Process Studies (J. E. Bigelow)

Solvent Extraction. The ORACLE program for calculating solvent extraction problems was revised and rewritten to incorporate stage efficiencies less than 1. It will now correctly calculate problems which involve constant distribution coefficients and constant Murphree efficiencies, although a different efficiency is allowed in the extraction and scrubbing section. By proper choice of input variables, a stripping column or extraction column without scrub can be calculated. The program can be used by making any one of three possible specifications about each end of the column. The program was designed to accept more than the minimum number of specifications and select the most restrictive set. This last feature has not yet been "de-bugged."

Target Fabrication. A stand-in powder for preparing actinide-oxide-aluminum pressed pellets was needed. Lanthanide oxide powders from various sources were obtained for comparison. By visual observation, a commercially obtained mixed rare earth oxide powder had the least desirable physical properties (dusted badly, agglomerated badly). A cerium oxide powder prepared by the Chemical Development Section, using the urea hydrolysis technique, appeared to have the best properties (relatively free flowing, less dust). Table 1 shows the information obtained so far on five powders tested.

The commercial mixed oxide was chosen for pellet pressing development because, ultimately, the actinide oxide is to be prepared remotely in the presence of considerable radiation and it is desirable to evaluate the worst material.

Radiation Resistance in Plastics. Information on radiation damage to a number of plastic and rubber compounds was assembled to determine what materials best combined radiation stability with resistance to chemicals in the TrU process. Table 2 presents data on the more promising materials.

1.5 Transuranium Shielding Studies (J. P. Nichols)

Accurate results for the shielding effectiveness of the 54-in. magnetite wall and of the 54-in. windows are now available.

A mockup of the TrU 54-in. window was tested in its full length at the LTSF on

Table 1. Properties of Various Lanthanide Oxide Powders

	Average[1] Crystallite Size, microns	Particle[2] Size Range, microns	Surface Area, m^2/g
Mixed rare earth oxides, as received	0.0107	0.025-1.25	10.5
Mixed rare earth oxides, fired to 1000°C	0.0156	0.025-1.0	17.1
Gd_2O_3, as received	0.0362	0.025-1.2	5.4
CeO_2, prepared by oxalate precipitation	0.0920	0.02-2.3	4.2
CeO_2, prepared by urea hydrolysis	0.0844	0.02-0.5	4.1

[1] By x-ray analysis.

[2] By electron micrographs.

Table 2. Plastics and Rubbers Potentially Applicable to TrU Usage

	Exposure Resulting in Significant Damage, watt-hr/g
A. Container and Tubing Materials	
1. Glass-fiber reinforced epoxy resins	20
2. Acrylic butadiene styrene	> 0.25
3. Allyl diglycol carbonate	0.25
4. Polyethylene	0.25
B. Gasket and Booting Materials	
1. Acrylic nitriles	0.4
2. Hypalon	0.1
3. Neoprene	0.1

October 26; the design is shown in ORNL drawing D-SK-701-51, R-1. The surface dose for a fifth cycle rod (3×10^{12} n/sec) and 1 g of irradiated Cf (1.05×10^{13} n/sec) located 2 ft from the inside face will be 1 and 3.5 mrem/hr, respectively. These tests concluded the TrU experimental work at the LTSF.

The neutron attenuation in the 54-in. magnetite concrete shield was calculated as a function of water content using Renupak, a theoretically exact moments method code. For a source of 3×10^{12} n/sec located 2 ft from the inside face, the surface dose rate is 1, 5, and 50 mrem/hr for water contents of 12.2, 6.1, and 3.0 lbs/cu ft. The dose rate for a water content of 12.2 lbs/cu ft agrees well with extrapolations of experimental data.

Continued effort on Transuranium shielding studies will include correlation and presentation of the vast amount of LTSF data and further development work on the Renupak and Niobe codes.

1.6 Solvent Extraction Facility, Bldg. 4507 (F. L. Peishel)

A report entitled "Preliminary Design Criteria for Cells 3 and 4 in Building 4507" was issued as ORNL CF-61-10-15. This report also contains preliminary chemical and equipment flowsheets for the proposed equipment to be installed in these cells.

A detailed review of this report by the chemical development group directly involved resulted in several major changes. Equipment installed will consist of one two-unit bank of mixer-settlers instead of two banks. This procedure will require cleaning of the equipment prior to the next step in the cycle but will save considerable money and simplify the cell design. The same cleanup philosophy will be used for surge tanks. Equipment removal and replacement will be done by utilizing a hoist and standard or slightly modified bagout techniques instead of the Transuranium Facility transfer box technique.

Drawings E-45800 and E-45801, "Chemical and Equipment Flowsheets," published with the "Preliminary Design Criteria" are being revised to reflect the decrease in equipment. Engineering flowsheets are being developed to establish detailed equipment design, allow commencement of procurement, and provide a basis for a cost estimate.

2.0 VOLATILITY PROGRAM
(R. P. Milford)

2.1 Assistance from BMI and Metallurgy Division

Additional results in BMI's study of the oxidation resistance of coated and uncoated HyMu 80 at 700°C were received after 624 hr exposure and are as shown below:

Specimen Description**	Weight Change, g	
	187 hr*	624 hr
Bare HyMu 80	+0.008	+0.0127
Aluminum-coated HyMu 80	+0.020	+0.0365
Chromallized HyMu 80	0.000	-0.0002

* Reported previously.
**Specimen size, 2.5 x 0.5 x 0.1 in. (~wt, 20g)

The test of the corrosion resistance of HyMu 80 and INOR-8 to 37.0-50.5-12.5 mole % LiF-NaF-BeF_2 at 650°C while dissolving Zircaloy 2 with HF was completed. Corrosion was severe, and the specimens necked-down at the interface. Preliminary examination by micrometer measurements gave the maximum corrosion rates as follows:

	Corrosion rate, mils/month (Based on micrometer readings)
HyMu 80 (heat treated)	72
HyMu 80 (as received)	76
HyMu 80 (heat treated and welded)	88
INOR-8	110

The Zircaloy 2 dissolution rate was higher than usual, but the exact value has not yet been reported.

Metallurgy Personnel Change. A. P. Litman has concluded his liaison work between the Metallurgy and Chemical Technology Divisions. Future contacts will be with Messrs. T. M. Kegley, Jr., and R. S. Crouse.

Memo and Report Status. A. P. Litman's ORNL-TM report on VPP hydrofluorinator and fluorinator corrosion is still being held for review by Metallurgy Division supervision.

3.0 POWER REACTOR FUEL PROCESSING
(E. L. Nicholson)

3.1 Darex Flowsheet Studies (E. L. Nicholson)

Flowsheet studies were started to determine the feasibility of designing a Darex pilot plant for the Idaho Chemical Processing Plant that could demonstrate either batch or continuous Darex processing. The basic equipment previously designed for the Bldg. 3019 pilot plant was rearranged, extra vessels in the aqua regia preparation system were deleted, and continuous chloride removal equipment was added. The

latter consists of an airlift feed system which takes dissolver product from the feed adjustment tank to a chloride stripper tower in which the chloride is removed by either NO_2 sparging or 15.8 M HNO_3 vapor stripping. Stripper column bottoms are continuously evaporated to remove excess nitric acid and then diluted in a geometrically safe tank to a critically safe feed concentration prior to transfer to geometrically unsafe equipment for sampling and possibly to a solids removal step if required. A nitric acid fractionator tower was shown for vapors from the continuous feed evaporator but would be required only with the NO_2 stripping system.

A preliminary material balance flowsheet, E-45975, "Batch Darex Flowsheet for APPR Using 90% HNO_3," was prepared for this system and forwarded to ICPP for comment. This flowsheet was based on recent experiments by F. G. Kitts that showed that a 90% HNO_3 batch flowsheet would remove the chloride to acceptable levels in the feed without generating a dilute acid throwaway stream. Performance was equivalent to the previous 95% HNO_3 batch flowsheet. Additional flowsheet studies were in progress at the end of the month for continuous APPR processing, Darex-Thorex batch processing for Consolidated Edison fuel, and continuous Yankee Atomic Darex in the above system. The continuous flowsheets are being prepared only for the 15.8 M HNO_3 vapor stripping method for chloride removal. Preliminary experimental results with NO_2 stripping indicate that it may be feasible. Promising possibilities for either hydrating the silica prior to chloride removal or complexing it so it does not rapidly plug the continuous chloride removal equipment have been found and are to be investigated experimentally.

3.2 Mechanical Processing of Fuels (W. F. Schaffer, Jr.)

Segmenting Cell Activities. The preparatory work for the removal of the equipment from the segmenting cell, cell decontamination, and cell restoration is proceeding much slower than expected because of lack of available manpower and the difficulty of removing residual NaK from the dejacketing equipment. The major portion of the month was spent in flushing the trough of the dejacketing machine and the dump tank with Bayol D and mineral oil and collecting the NaK in settling bottles. Due to the danger of an NaK-oil fire or explosion, no effort was made to begin decontaminating procedures using steam, water, and decontaminating reagents until the bulk of the NaK was removed from the cell. The amount of NaK collected and reacted during the mechanical processing of the SRE fuel corresponded quite closely with the amount calculated for the total amount of fuel processed. In spite of periodic cleanup of equipment by oil flushing during hot operations, approximately 1 gal of NaK was collected during the final cleanup operation; this amount is equivalent to about 22% of the total volume of NaK collected during hot operations. The NaK collected during the cleanup operation was placed in a polyethylene bottle and metal container and removed from the cell for burial.

The dump tank was filled with mineral oil, disconnected from the dejacketing machine trough, and manual valves were closed to prevent inadvertent entry of water

during the subsequent decontamination operations. Steam cleaning of the dejacketing equipment was started; in spite of the repeated flushing to remove NaK, considerable amounts were still held up in the equipment. Numerous fires occurred in the collet and trough sections of the equipment; larger blazes were controlled by addition of powdered graphite to the fire. Steam cleaning of the machine was completed on the last day of the month. During the cleanup period, the mechanical pressure screw and its trough were removed from the dejacketing machine and the main trough was remotely disconnected from the support stand.

Craft work is scheduled to start during the week of November 6, and in the following period the equipment will be removed from the cell as rapidly as possible consistent with decontamination procedures and activity levels. No health physics survey of the cell has been made during the past month; this will be done prior to opening the cell to the craft personnel. Gas masks and hoods will be required in addition to usual protective clothing during this decontamination period because of the possibility of plutonium contamination from the decomposition of the slugs in the incident reported last month.

Dissolution of selected specimens of the stainless steel jackets in titanium equipment using the Darex process was started in Cell B-2 during the latter part of the month. Difficulty has been experienced in obtaining complete dissolution of the jackets without increasing the amount of dissolving solution over that required for cold dissolution. Subsequent runs will be tried with an increased chloride content in the dissolving solution. Eleven specimens will be dissolved and analyzed for uranium, plutonium, carbon, cobalt, chloride, acid, chromium, iron, and for various fission product elements.

Shipment of Fuel to Savannah River for Processing. A prototype fuel canister was shipped to Savannah River for examination by SRP personnel. A report was received from them indicating that the canister was satisfactory and acceptable for shipment and handling of the fuel. A bid was received for the procurement of the canisters at a unit price of $26.75, or a total of $1,738.75, for the 65 canisters required. A sample is scheduled for delivery November 13, and shipment of the rest of the canisters will start about December 8.

The design of the carrier required to ship fuel canisters and fuel to Savannah River was completed. The carrier will be constructed of stainless steel and should be suitable for other uses at the Laboratory following completion of the SRE fuel delivery to SRP. Excellent cooperation was received from the procurement section of the ORNL shops in placing an order for outside fabrication when the ORNL shops were not able to meet our required delivery date. Placement of the order and shipment of critical material to the vendor for fabrication in Knoxville were completed in only two days.

A bid of $1,050 was received for the cask plus the shipping skid. The shipping skid was later eliminated from the bid, due to a change in the tie-down criteria and

the trailer specified for the Savannah River shipment; a price reduction of $150 was made. A new shipping rack and tie-down assembly is now being designed and will be completed within the next week. No delay or appreciable change in cost is expected as a result of this change. The cask is scheduled to be filled with lead at ORNL during the latter part of November.

Chop and Leach Program. Progress on the chop and leach program was delayed approximately two to three weeks because of lack of scheduled manpower. The basic electrical control circuit for the conveyor and leacher installation is now almost complete. The leacher has still not been installed in the cell, pending completion of the spray wash-down tests and feeding studies with the new drive unit.

Additional changes have been made in both the electrical and the hydraulic systems for the shear to improve the feeding and gaging operations. The shear is currently being set up to test the effect of shearing against the flat side of the bundle rather than across the diagonal as in previous studies. If this method shows promise and presents no adverse effects, the feeding and gaging problems may be simplified. The feeding and gaging problem has been complicated in shearing a fuel bundle with closely spaced rows of ferrules. An abrupt shape change in the bundle cross section occurs, which is not completely compensated by the current solid metal inner gag design. The fuel bundle will not feed past the inner gag unless the gag is partially retracted. Complete retraction (by hydraulic pressure) of the gag is undesirable, particularly during the shearing of the end section when the tubes are loose and would tend to rearrange or drop through the shear in lengths greater than compatible with the conveyor-leacher system. A design modification is proposed to reduce the force required to retract the gag by use of an auxiliary spring; sufficient frictional force will be retained on the gag to hold the loose tubes, but the reduced force should allow the bundle to feed past the gag with the force applied by the feed cylinder. A rubber or plastic faced gag may accommodate the abrupt change in shape; however, an all-steel gag is favored for the longer service life in the radiation field.

Recent changes are being incorporated on drawings prior to new design work on the electrical circuits for Phases II and III of the program.

In order to approximate more closely the condition of spent fuel elements and to study their behavior during processing in the shear-conveyor-leacher complex, it will be necessary to develop a prototype fuel whose properties are similar to those of irradiated fuel. Carburized stainless steel elements may simulate the mechanical properties of highly irradiated fuel elements and will be made as the first approach to this problem. The fixture and muffle are now complete and ready for assembly. The first carburization run is scheduled for November 1.

4.0 WASTE STUDIES
(J. O. Blomeke)

4.1 Plant Waste Improvement Studies (F. N. Browder)

A report is being prepared which compares the major proposals for improving the ORNL liquid waste systems, particularly the low-level process waste system.

Late in September, Laboratory management reviewed and approved the Preliminary Proposal for the project "Improvements to Radioactive Liquid Waste System, ORNL," which includes the intermediate-level waste evaporator, the high-level waste storage tanks and the Melton Valley waste collection systems. The introduction and justification were rewritten to avoid the implication that the $1.7 million project would result in achieving environmental MPC_w levels (10^{-7} microcuries per cc) in the creek behind White Oak Dam and that no funds for a low-level treatment plant would be requested at this time. The proposal was then sent to the AEC on October 10.

On October 5 a group of engineers from the AEC Oak Ridge Operations Office visited the Laboratory to discuss in detail the entire ORNL waste management picture, including current methods and proposed improvements. On October 26 Mr. Walter Belter and Mr. Harold Bernard of Washington AEC visited the Laboratory to discuss the same subjects. Both the local and Washington AEC visitors seemed to have a better understanding of the problems and the improvement proposals after the discussions and expressed general approval of the approach being taken by the Laboratory on these problems.

4.2 Ion Exchange Pilot Plant (W. R. Whitson)

The inner cone which was installed in the clarifier of the low-level waste ion exchange pilot plant, Bldg. 2528, did not function as expected and was removed. The increase in hardness and turbidity of the effluent overflowing the clarifier and the inability to maintain an adequate sludge blanket, even at one-half the design flowrates, made the use of the cone impractical when compared to the results obtained with the flow-diverting baffle as originally designed. Removal of the cone reduced the hardness and turbidity by a factor of 5 and permitted more flexibility in surges and flowrates. The 1-1/2-in. Schedule 40 carbon steel pipe between the flocculator and the clarifier was replaced with a 2-in.-i.d., caustic-resistant, steel-reinforced rubber hose to reduce line resistance and prevent the "floc" from breaking up into smaller particles.

The two Permutit pressure filters were loaded, one with sand and the other with anthracite, and placed on-stream to "polish" the clarifier effluent. Initial tests indicate that filtration times of 40-50 hr duration can be expected before excessive pressure drops will require backwashing of these units dependent upon the total hardness in the effluent leaving the clarifier.

Difficulties in filtering the sludge from the bottom of the clarifier with the rotary drum vacuum filter have been encountered and the operation of this unit has not proven very satisfactory at this time. Various thicknesses of precoat material on the filter cloth have been tried, using Johns-Manville Celite No. 512 and Standard Super-Cel. It appears that a precoat approximately 1/16-in. thick is more desirable than a thicker coat. Various volume ratios of filter-aid to sludge have been tried with little or no effect on filtering efficiencies.

The sludge forms a slick slimy layer on the precoat material, restricting the passage of filtrate through the sludge, and eventually forms a layer of sludge that is practically impervious to water flow. More tests will be conducted in an effort to find suitable conditions under which the filter can operate sufficiently to be used in this process, since containment of this unit is no problem.

All work orders pertaining to building modifications, installation of process equipment, and instrumentation were closed October 31, 1961.

4.3 Pot Calcination Hot Cell Facility (H. O. Weeren)

During the month of October a preliminary layout of the vessels for the small-scale pot calciner experiment was worked out, the design of some of the vessels was finalized, and procurement was started for some equipment items. A report describing the objectives and procedures of the proposed experiment has been written.

4.4 Pot Calcination Pilot Plant (J. M. Holmes, E. J. Frederick)

Pot Calcination Process Design. The TBP-25 flowsheets for the ICPP waste calcination pilot plant have been completed and forwarded to the Phillips design group. The High Sulfate Purex and the Darex flowsheets are currently in preparation. Preliminary calculations have also been made on the TBP-25, High Sulfate Purex and Darex flowsheets to determine which flowsheet gives the maximum feed, solids, acid product and condensate volumes, and the maximum system flow rates, in order to give the Phillips design group a basis for vessel sizing. The results of these calculations have been forwarded to the ICPP.

The addition of organics at a concentration of 1 ml/liter of TBP-25 waste has produced severe foaming problems during Unit Operations pilot plant tests. Organics used were dibutyl phosphate and monobutyl phosphate. Laboratory beaker tests indicate that both SAG-470 and Dow Corning Anti Foam A silicon additive apparently work satisfactorily at or near the solution boiling temperature. However, as the solution is concentrated to about one-third its original volume, the additives volatilize and foaming re-occurs. Contacts with Union Carbide Silicon Division indicate that no additive will work satisfactorily at the temperatures required in the process and that mechanical defoaming methods will be required to control this problem.

A letter was written to J. A. Buckham of the Phillips Petroleum Company at Arco, Idaho, requesting that samples of TBP-25 waste from the ICPP waste storage tanks be tested for their foaming properties. The first test on a 15-ml sample taken from tank WM-185 showed no appreciable foaming when evaporated to dryness in a 50-ml graduate. A control sample containing simulated TBP-25 waste doctored with DBP produced considerable quantities of foam. Further foam tests will be run on waste solutions from the remainder of the waste tanks and on fresh waste solution from the waste evaporator during the current operating period.

Analyses of organics such as TBP, DBP, and MBP present in the waste tanks at the production sites are not available. However, recent data from Savannah River indicate that their phosphate concentration is 0.02 M and that this probably came from TBP. In addition, W. S. Jacober of SRL indicated that they have found sufficient CO_2 in their waste tank off-gases to establish that the decomposition of organics was occurring in the tanks. Hanford (HW-58970) indicates that their phosphate concentration is less than 0.02 M; possibly around 0.01 M and as much as 120 ppm of TBP and organic diluent is reported in tank farm condensates. ICPP waste tank analyses on hand do not indicate any phosphate but they are considering procedures for analyzing for organics directly.

Discussions were held between ORNL, ICPP, and BNL personnel at Brookhaven National Laboratory concerning the status of the BNL Rotary Calciner which has been proposed for installation in the ICPP waste calcination pilot plant. Problems discussed included calciner caking, calciner rotary seal design, off-gas solids de-entrainment, calciner condensate slurry recycle, and solids receiver level instrument design. It was concluded that at least a year's development time will be required before design of a unit for testing at the ICPP can be started. Present plans call for space to be provided in the ICPP calciner cell for future installation of the BNL rotary calciner.

Lockheed Mechanical Subcontract. A meeting was held between ORNL and Lockheed Nuclear Products personnel to discuss the pot calcination mechanical test program in which they are engaged under subcontract to ORNL. The seal welding program was discussed in detail. In addition, the completed drawings for the furnace dolly, lifting hook, and furnace mockup were reviewed. These drawings have been sent out for bid with a bid closing date of November 10, 1961. Construction should start during November 1961.

Five weld specimens were shipped to Lockheed covering three types of seal weld design. These specimens will be welded after all weld parameters have been established on test pieces similar in design to the test specimens. A specification is under preparation for the welding and pressure test procedures to be used on the weld specimens.

The design phase of the program at ORNL should be completed towards the end of November 1961. Equipment drawings still to be completed include the calcination pot, pot filling station, filling station support structure, and equipment control diagrams. Bid invitations for the pot and filling station will be issued upon completion of these drawings.

5.0 FUEL CYCLE DEVELOPMENT
(A. R. Irvine, B. B. Klima, E. M. Shank)

Approval and funding of the BNL Kilorod program by the AEC was granted to ORNL in October. Design of facilities for the project were begun immediately.

Additional plans have been made concerning the size and nature of the Cell 3, Building 3019, cubicle to house the sol-gel oxide preparation equipment. The cubicle will be 6 ft square by 8 ft high, with the bottom and front sides shielded by steel and the other sides shielded by concrete. Engineering and Mechanical Division will do the detailed equipment design; a completion date of February 1, 1962, is anticipated.

Of the process assumptions previously made, the one concerning direct mixing of uranyl nitrate with thoria sol has been deemed insufficiently developed; therefore, means will be provided to perform ammonium diuranate precipitation in the cubicle. An existing Chemical Development Section procedure for this step appears to be sufficiently simple for use in the process. The other favorable assumptions previously made appear to be quite sound; consequently, it is anticipated that the thoria sol will be prepared in advance in Building 4501 and that only one small furnace will be needed for calcination of the oxide.

Several schemes of solvent extraction plant operation are being worked out to determine which method will result in minimum cost and operational effort. The schemes range from the use of 2.5% TBP with minimal column changes to 30% TBP with replacement of the extraction and strip columns. This work will be completed and the selection made within the next month.

6.0 MISCELLANEOUS PROJECTS

6.1 Safety and Containment

Building 4507 Containment (A. M. Rom). All containment changes to Building 4507 are now completed and the work order covering this work was closed October 31.

Building 3508 Containment (B. F. Bottenfield). The Title II design and final cost estimate for the proposed modifications to Building 3508 to meet ORNL containment standards have been completed. The estimated cost of the project is $36,300, including engineering. These funds have had Policy Committee approval for several months.

The scope of the job will be reviewed by Chemical Technology and Radiation Safety and Control to determine if the job is scoped properly to meet current ORNL standards, after which construction will be initiated as soon as manpower is available. ORNL craftsmen will be utilized because of the necessity to reduce to an absolute minimum the amount of time during which the building will be inoperable.

The designed modifications include upgrading and readjustment of basic ventilation patterns in the laboratories, change room, and attic area, upgrading of the ventilation system for the open glove boxes in the Analytical Laboratory, relocation of a cold laboratory sink, installation of an emergency system for shutting off the building ventilation supply in case of pressurization of the laboratory areas, provisions for measuring ventilation air flows and filter pressure drops on all exhaust systems, and connection of exhaust fans to a proposed diesel-powered emergency power supply.

Building 3505 Canal (F. E. Harrington). A transfer jet was installed to discharge the Metal Recovery Canal water to intermediate level waste tank W-5. The canal is extremely dirty and radioactive; and the cleanout scheduled for late December is going to require considerable effort.

A work order was issued to replace the "chicken wire" fence enclosing the canal with a permanent cyclone fence. A sketch of the location of the new fence location was prepared, approved by J. C. Bresee, and given to G. E. Pierce of the Engineering Department.

Filters for Buildings 4501, 4505 and 4507 (W. G. Stockdale). The installation of instruments on subject filter was completed October 15, 1961. This completes the project. A project report will be issued.

Filters for 3019, Analytical Facility (W. G. Stockdale). This installation was completed in October 1961. A project report will be issued.

Sample Gallery Ventilation, Building 3019 (W. G. Stockdale). Preliminary design of a ventilation system, which would contain both supply and exhaust filters for the Building 3019 sample gallery has been completed by the Engineering Department. The estimated cost is $10,000. The proposal is now being reviewed by Pilot Plant personnel.

Room 211 Renovation, Building 3019 (P. L. Robertson). Renovation of Room 211 at Building 3019 for use as a Pu development laboratory was completed and this space is ready to be turned over for operation.

An estimate was made for similar alterations to one of the laboratories used by Chemical Development C in Wing 2 Annex of Building 4500.

6.2 Fuel Processing Studies for Reactor Division

AHBR Chemical Plant Cost Estimate (F. E. Harrington). The drawings listed below outline the chemical plant facilities required to close the fuel cycle for the two reactor complexes reported in SL-1875.

ORNL-LR-62378	Fig. 1	Reactor-Chemical Plant Circuit
E-45679	Fig. 2	Feed Preparation Section
E-45770	Fig. 3	Solvent Extraction Section
E-45771	Fig. 4	Product Preparation Section
E-45950	Fig. 5	Makeup Area Schematic and Layout
E-45951	Fig. 6	Layout Plant A
E-45953	Fig. 7	Layout Plant B
D-45952	Fig. 8	Property Plat

The chemical requirements are outlined in Figs. 2, 3, and 4. The canyon layout for the major process equipment is shown in Figs. 6 and 7. An analytical laboratory containing 6550 sq ft is provided for in both cases.

All major process equipment has been described in an equipment list relating the numbered blocks in Figs. 2, 3, and 4 to material of construction, capacity, number of items, design basis, and dimensions.

This study is now 55% complete. A preliminary estimate for the capital investment for both plants is now finished. Completion of the study will require an official estimate and the writing of the formal report.

MSCR Chemical Plant Study (R. P. Milford). Work was begun on the conceptual design and cost estimate of a plant to remove fission products, recover the uranium, and remove the Pa from a 1000 Mw_e Molten Salt Converter Reactor now being studied by the Reactor Division as a part of the Thorium Utilization Program. The proposed process will consist of drawing off a side stream at an as yet undetermined rate, removal of the uranium by fluorination, storage of the waste salt to allow the Pa^{233} to decay to U^{233}, refluorination to recover the U^{233}, discarding the waste salt, converting the combined UF_6 stream to UF_4 and recycling it back to the reactor in a fresh salt melt. The principal effort thus far was devoted to establishing ground rules, limits of feasibility, and starting to develop some cost estimating information based on VPP experience.

6.3 Assistance to Chemical Development (A. M. Rom)

Plasma Jet. Fabrication and assembly of Monel equipment to be used with the plasma jet was continued. The Monel will be conditioned with fluorine or other oxidizing agents prior to actual use.

4507 Optics. Shop fabrication proceeded and work was about 75% complete at the end of the month. Difficulty in obtaining a required ball bearing assembly because of a supplier strike caused some delay.

Purex IWW Carrier. Preparation of construction drawings was finished and a set was sent to Hanford for comment.

Gas Solid Reactions. Preliminary design work on the hydrochlorination reaction vessel was continued. Orders for Nichrome V and Haynes 25 were placed to be used in construction of the reaction vessel and auxiliary equipment.

6.4 Eurochemic Assistance Program (E. M. Shank)

One transmittal letter listing 24 documents was sent. Two letters requesting information were received from R. J. Sloat. Two Eurochemic-originated documents were reproduced but not distributed. R. Rometsch, Research Director of the Eurochemic Company, visited the Laboratory on October 26 and October 27.

6.5 HRLAL, Building 2026, Title II Design (W. R. Winsbro)

The completion date for Title II design has been advanced from November 11, 1961, to December 3, 1961. It now appears that the final design will consist of some 75 drawings and 60 specifications. ORNL review of "For Approval" prints and specifications is continuing; the current completion status is as follows:

Drawing Review	90%
Specification Review	40%

6.6 Pa-U Program (B. B. Klima)

Design, fabrication, and installation of the equipment to reprocess irradiated protactinium has been completed and the equipment has been turned over to the operating personnel. This installation includes a containment box in Cell 3, Building 4507, where the protactinium capsule will be dissolved and passed through two ion exchange columns. All of these items of processing equipment are fabricated from polyethylene. Entrance and exit of supplies and equipment to the cell will be through a glove box which is located on top of the cell.

The protactinium solution is precipitated and calcined in twin lead-shielded glove boxes in Laboratory 1 of Building 3508. The powder will be pelleted and encapsulated and the cans welded in inspected also in Laboratory 1.

Preparation of a design report for the facility, its processing equipment, and the accessories will be prepared in the near future.

6.7 Fuel Shipping Study (L. B. Shappert)

Preparations for the low-height Stresscoat drop tests of the model shipping casks are in their final stage. The Stresscoat material is now on hand. The five smallest casks (1.5 tons) have been taken to the University of Tennessee, along with the suspension cables and release mechanism, where the drops will be made and the results analyzed. The casks will be coated both inside and out to determine the area and direction of high stress.

Mr. D. W. McLenegan and Mr. W. Smith visited from Hanford to discuss our drop test program. They were shown the casks and the movies of the weight dropping which was done last summer. They inquired as to the possibility of our testing models of their casks which would be supplied by Hanford. They were informed that the cost would probably run about $250/day exclusive of the analysis of the data and that we would consider their proposal very seriously. The testing could be conducted concurrently with our own tests as soon as the new drop pad is completed. This is scheduled some time after the first of the year (January, 1962).

A Minneapolis-Honeywell Visicorder, a high-speed read-out device capable of recording transients, has been purchased and received.

A new drop pad capable of withstanding a 6-ton weight dropped 20 feet is being designed. Corings are being taken to determine rock formations close enough to the surface to put the concrete base on.

6.8 CANE Project (J. W. Landry)

During October the CANE sequenced sampler equipment and instrumentation was assembled and tested at ORNL. The equipment and recording instruments worked satisfactorily; the timing instrumentation was very sensitive to the effect of spurious electrical effects and considerable debugging was required. Warren Fogg of Frankford Arsenal spent considerable time at the Laboratory arming and disarming the explosive valves.

7.0 PROJECT ENGINEERING

7.1 Process Design Section Drafting Room Status (J. H. Manney)

A list of the 57 drawings started during October 1961 is given in Table 3. In addition 33 drawings started earlier proceeded to the check print stage and 26 to approved status. In October, 18 sketches and 128 illustrations were prepared.

A breakdown of drafting time during October by cost accounts is as follows:

Acct. No.	Man Hours	% of Total	Acct. No.	Man Hours	% of Total
3370-1	68	3.8	3370-108	649	36.5
3370-20	1.5	0.1	3370-109	16	0.9
3370-22	120	6.7	3370-113	40	2.3
3370-30	177	9.9	3370-123	128.5	7.2
3370-33	84	4.7	3370-128	144	8.1
3370-34	110.5	6.2	3370-133	78	4.4
3370-56	2	0.1	3290-00	64	3.6
3370-57	24	1.3	3632-00	40	2.3
3370-73	18	1.0	4435-72	16	6.9
			TOTAL	1780.5	100.0

There were 20.5 hours of overtime worked in October.

7.2 Engineering and Instrument Department Assistance

A summary of drawings prepared during October in the Engineering and Instrument Departments is given in Table 4.

7.3 Material Purchase Status

Table 5 gives a listing of all outstanding purchase requisitions (except instruments) as of November 1, 1961.

7.4 Work Order Status

Table 6 presents a listing of all outstanding work orders as of November 1, 1961, for which the Process Design Section is responsible.

H. E. Goeller, Chief
Process Design Section
Chemical Technology Division

Table 3. Summary of Drawings Started in the PDS Drafting Room During October, 1961

Job No.	Drawing No.	Rev.	Title	Date Started
504	D-45762		IWW Carrier Assembly	10/11/61
	D-45764		IWW Carrier - Tank Details	10/3/61
	D-45765		IWW Carrier - Sub-Assembly & Details of Top Section	10/10/61
	D-45766		IWW Carrier - Sub-Assembly & Details of Bottom Section	10/11/61
	C-45772	1	Mark VII PRFR Fuel Rod Holder	10/17/61
	C-45782	2	PRFR UC Capsules Series "A"	10/3/61
605	E-45788		Waste Calcination Pilot Plant ICPP Continuous Pot Calcination - TBP-25 Waste	9/29/61
	E-45789		Waste Calcination Pilot Plant - Material - Energy Balance Flowsheet Batch Operation TBP-25 Waste	10/17/61
604	E-45790		Low Level Pilot Plant Engineering Flowsheet No. 1	10/25/61
	E-45791		Low Level Pilot Plant Engineering Flowsheet No. 2	10/31/61
700	E-34147	1	Alpha Glove Box - Mark IV - Assembly & Details	10/24/61
	D-34331	1	Alpha Glove Box - Mark V	10/26/61
701	E-34248		TrU - Lab Typical Tank Pit Layout & Plan	10/4/61
	D-45798		TrU Process Facility 12 Unit Gang Disconnect Assembly & Details	10/2/61
	D-45799		TrU Process Facility 4 Unit Gang Disconnect Assembly & Details	10/11/61
	D-45956		TrU Development Proposed Location & Layout for TrU Cell Mock-up	10/24/61
	E-46000		TrU Process Facility Flowsheet Cell No. 5	10/9/61
	E-46001		TrU Process Facility Flowsheet Cell No. 6	10/11/61
	E-46002		TrU Process Facility Flowsheet Cell No. 7	10/11/61
	E-46003		TrU Process Facility Single Unit Disconnect Assembly & Details	10/23/61
	E-46004		Post Irradiation Carrier	10/24/61
702	C-34302	2	Filter Mounting for Alpha Containment Box	10/20/61
	D-44677		Stationary Ring for Rapid Change Boot Cartridge Assembly 2" Lead Tandem Cave	10/20/61
	D-45668	2	PaU Program Cell No. 3 Interim Closure Details Sh. No. 1	9/27/61

Table 3, Continued

Job No.	Drawing No.	Rev.	Title	Date Started
702, continued	D-45676	2	PaU Program Cell No. 3 Interim Closure Details Sh. No. 5	9/28/61
	E-45689	3	PaU Program Cell No. 3 Processing Box - Back Elevation	9/27/61
	D-45698	1	PaU Program Cell No. 3 Piping Incell Interim Piping	10/3/61
	D-45704	2	PaU Program Main & Auxiliary Panelboards	10/16/61
	D-45705	1	PaU Program Panelboard Wiring Diagram	10/16/61
	D-45706	2	PaU Program Electrical Schematic	10/11/61
	C-45707	1	PaU Program Roof Area Piping & Equipment Layout	10/4/61
	D-45708	1	Furnace Modifications Calciner	10/2/61
	C-45709	1	Gas Scrubber	10/4/61
	D-45718		PaU Program Cell No. 3 Interim Closure Details Sh. No. 7	10/3/61
	C-45719		PaU Program Pa Pellet Capsule	10/10/61
	E-45800		TrU Development Am-Cm Recovery Chemical & Equipment Flowsheet	10/2/61
	E-45801		TrU Development Americium-241 Target Processing Chemical & Equip. Flowsheet	10/3/61
Misc.				
-1	D-45756		Plasma Jet Gas Feed Apparatus	10/17/61
-30	D-45773		Pot Calciner Experiment Flowsheet	10/10/61
	C-45775		Condenser	10/31/61
	D-45776		Feed Tank	10/16/61
	C-45777		Condensate Catch Tank	10/16/61
	D-45778		Transfer Tank	10/18/61
	C-45779		Seal Pot	10/31/61
	C-45783		Scrub Liquor Catch Tank	10/13/61
	D-45954		Layout for Pot Calcination Experiment	10/17/61
-56	D-34536	3	Lab 259-D Exhaust System	10/2/61
-128	D-45787		Thorium Utilization - Detail Sheet No. 1 for ThO_2 Firing	10/17/61
	D-45955		Thorium Utilization - Detail Sheet No. 2 for ThO_2 Firing	10/23/61

Table 3, Continued

Job No.	Drawing No.	Rev.	Title	Date Started
-133	D-45785	2	Cradle for Pu-Al Alloy Shipping Cask	9/28/61
4435-72	E-45769		AHBR Chem. Plant Fig. 2 Section I Feed Preparation	10/12/61
	E-45770		AHBR Chem. Plant Fig. 3 Section II Solvent Extraction	10/12/61
	E-45771		AHBR Chem. Plant Fig. 7 Section III Products Section	10/13/61
	E-45950		AHBR Chem. Plant Fig. 4 Section V Flow Schematic & Layout Plant "A"	10/13/61
	E-45951		AHBR Chem. Plant Fig. 6 Layout Plant "A"	10/16/61
	D-45952		AHBR Chem. Plant Fig. 8 Property Plate	10/18/61
	D-45953		AHBR Chem. Plant Layout Plant "B"	10/23/61

Table 4. Summary of Drawing Progress in Engineering and Instrument Departments for Month of October, 1961

Bldg. No.	W. O. No.	Dwg. No.	Rev.	Title	Transmittal Date
3026-D	A-70579-13D	D-42961	0	Shipping Carrier for SRE Fuel Cannister Assembly	10/18/61
		D-42962	0	Shipping Carrier Detail Sheet No. 1	10/18/61
		D-42963	0	Shipping Carrier Detail Sheet No. 2	10/18/61
3508	A-70499-13D	D-44972	0	Boot Assembly	10/24/61
		D-44973		Boot Details	10/24/61
		D-44974		Sealed Manipulator Tong Type A & B Details	10/24/61
		D-47110		Sealed Manipulator Tong Type A & B Assembly	10/24/61
		D-50402		Decapper Assembly	10/24/61
		D-50403		Decapper Detail Sh. No. 1	10/24/61
		D-50404		Decapper Detail Sh. No. 2	10/24/61
		D-50405		Decapper Head Sub-Assembly "A"	10/24/61
		D-50406		Decapper Head Sub-Assembly "A" Detail Sh. No. 1	10/24/61
		D-50407		Decapper Head Sub-Assembly "A" Detail Sh. No. 2	10/24/61

Table 4, Continued

Bldg. No.	W. O. No.	Dwg. No.	Rev.	Title	Transmittal Date
4505	A-70442-11	D-43847	1	Mock-Up Conveyor Chain Drain Simulator, Sub-Assembly D & Details	10/4/61
		D-43870		Mock-Up Port Closure Assemby	10/4/61
		D-43871		Mock-Up Port Closure Detail Sh. No. 1	10/4/61
		D-43872		Mock-Up Port Closure Detail Sh. No. 2	10/4/61
		D-43873		Mock-Up Port Closure Detail Sh. No. 3	10/4/61
		D-43874		Mock-Up Port Closure Detail Sh. No. 4	10/4/61
		D-43875		Mock-Up Port Closure Detail Sh. No. 5	10/4/61
		D-43876		Mock-Up Port Closure Detail Sh. No. 6	10/4/61
		D-43877		Mock-Up Canister & Canister Cover Assembly - Model II	10/4/61
		D-43878		Mock-Up Canister & Canister Cover Assembly - Model II Detail Sh. No. 1	10/4/61
		D-43879		Mock-Up Canister & Canister Cover Assembly - Model II Detail Sh. No. 2	10/4/61
		D-43880		Mock-Up Canister Removal Fixture Assembly	10/19/61
		D-43881		Mock-Up Canister Removal Fixture Detail Sh. No. 1	10/19/61
	A-01491-11	D-45626		Drip Pan & Wall Brace Installation & Details	10/16/61
Off Area	A-01484-11	D-43406		Lifting Hook for Pot Calciner Detail Sh. No. 1	10/11/61
		D-43407		Lifting Hook for Pot Calciner	10/11/61
		D-43408		Furnace Dolly Assembly	10/11/61
		D-43409		Furnace Dolly Detail Sh. No. 1	10/11/61
		D-43410		Furnace Dolly Detail Sh. No. 2	10/11/61
		D-43411		Furnace Dolly Detail Sh. No. 3	10/11/61
		D-43412		Furnace Dolly Detail Sh. No. 4	10/11/61
		D-45500		Proposed Cap Design "A" Test Assembly & Details	10/11/61
		D-45501		Proposed Cap Design "B" Test Assembly & Details	10/11/61
		D-45503		Proposed Cap Design "C" Test Assembly & Details	10/11/61
		D-45630		Furnace Mock-Up Detail Sh. No. 1	10/11/61
		D-45631		Furnace Mock-Up Detail Sh. No. 2	10/11/61
		D-45633		Furnace Mock-Up Assembly	10/11/61

Table 4, Continued

Bldg. No.	W. O. No.	Dwg. No.	Rev.	Title	Transmittal Date
3019	A-20458-12	Q-2052-0		Instrumentation Drawing Index	10/23/61
		Q-2052-1	6	VPP N_2 Control Panel Front Layout	10/9/61
		Q-2052-10	4	VPP Main Transmitter Rack Panel Layout	10/9/61
		Q-2052-20	3	VPP Graphic FV-2 Panel Front Layout	10/9/61
		Q-2052-24	3	VPP Graphic Panel Symbols	10/9/61
		Q-2052-25	2	VPP Graphic Panel Symbols	10/9/61
		Q-2052-26	2	VPP Graphic Panel Symbols	10/9/61
		Q-2052-29	3	VPP Penthouse Piping	10/9/61
		Q-2052-30A	3	VPP Instrument Locations & T.C. Conduit	10/9/61
		Q-2052-30B	2	VPP Instrument Locations & T.C. Conduit	10/9/61
		Q-2052-31A	2	VPP Instrument Locations & T.C. Conduit	10/9/61
		Q-2052-31B	4	VPP Instrument Locations & T.C. Conduit	10/9/61
		Q-2052-33A	4	VPP Instrument Locations & T.C. Conduit	10/9/61
		Q-2052-33B	2	VPP Instrument Power & Control Wiring	10/9/61
		Q-2052-34	2	VPP Instrument Power & Control Wiring	10/9/61
		Q-2052-37	3	VPP Rear Graphic Panel FV-2	10/9/61
		Q-2052-39	1	VPP Instrument Piping Cell No. 2 Plan Views	10/9/61
		Q-2052-40	2	VPP Instrument Cell No. 2 North & East Wall	10/9/61
		Q-2052-46	4	VPP Rear Graphic Panel FV-2 Wiring	10/9/61
		Q-2052-56	2	VPP Cell No. 1 T/C Location (E-E)	10/9/61
		Q-2052-68	3	Transmitter Rack Front, Rear & Mounting Details	10/9/61
		Q-2052-71	3	VPP HF-FV-1000 Scrubber System	10/9/61
		Q-2052-73	1	VPP Scram System	10/9/61
		Q-2187-1	1	VPP - Block Diagram	10/11/61
		Q-2187-2	1	VPP - PC-105 Programmer Functional Schematic	10/11/61
		Q-2187-3	1	VPP - ES-105 Encoder Selector Functional Schematic	10/11/61
		Q-2187-4	1	VPP - GB-100 Punch Adapter Schematic	10/11/61
		Q-2187-5	1	VPP - Teletype Tape Punch Schematic	10/11/61
		Q-2187-6	1	VPP - Control Chassis K-155 Schematic	10/11/61
		Q-2187-7	1	VPP - DC-104 Digital Clock Schematic	10/11/61
		Q-2187-8	1	VPP - Light Bank LB-105 Schematic	10/11/61
		Q-2187-9	1	VPP - Plug Board Connections for PC-105	10/11/61

Table 4, Continued

Bldg. No.	W. O. No.	Dwg. No.	Rev.	Title	Transmittal Date
3019 (continued)	A-20458-12	Q-2187-10	1	VPP - Cu-102 Control Unit & SP-101 Pressure Scanner Wiring Diagrams	10/11/61
		Q-2187-11	1	VPP - Installation Cu-102 Control Unit & SP-101A Pressure Scanner	10/11/61
		Q-2187-12	1	VPP - SS-100 Solid State Stepping Switch Schematic	10/11/61
		Q-2187-13	1	VPP - SA-103 Pressure Scanner Adapter Schematic	10/11/61
		Q-2187-14	1	VPP - Encoder Selectro ES-105 Schematic	10/11/61
		Q-2187-15	1	VPP - PC-105 Programmer Schematic	10/11/61
		Q-2187-16	0	VPP - Teletype Reader Cabinet Modifications (Ass'y)	10/11/61
		Q-2187-17	0	VPP - Teletype Reader Cabinet Modifications (Details)	10/11/61

Table 5. Purchase Requisition Status November 1, 1961

Job No.	Purchase Req. No.	Date Issued	Description
Miscellaneous			
-59	D-0014	3/29/61	U Jet tests and explosive valve tests
4507	D-0043	5/26/61	Periscope alterations
-59	D-0069	8/16/61	Field costs, Gnome test
-20	D-0073	9/1/61	Fabricate 2 Pyroceram vessels
-113	D-0075	9/18/61	Rent on Visicorder
-20	D-0077	9/20/61	Tube furnace
-108	D-0078	9/22/61	Cyrogenics disconnect for testing
-59	D-0080*	10/3/61	Brass O Seal Connector
702	D-0081*	10/3/61	150' Glass Lined 8" Iron Pipe
-59	D-0082	10/4/61	6 Reuse Kits for Conax Valves
500	D-0083	10/5/61	Nichrome V Sheet & Rod
500	D-0084	10/5/61	Nichrome V Tubing
500	D-0085	10/5/61	Haynes 25 Sheet & Rod
500	D-0086	10/5/61	Haynes 25 Tubing
500	D-0087	10/5/61	Nichrome 75 Sheet
-59	D-0088*	10/6/61	Brass Swagelok Connector
3420-44	D-0089	10/17/61	3/8" & 1/2" Cast Bronze Ball Valves
3420-44	D-0090	10/17/61	2-SS 3/8" Bar Stock Ball Valve
	D-0092	10/30/61	BeCu Bellows
	D-0093	10/30/61	2 Brass Swagelok Connectors
Waste - Calcination Pilot Plant			
605	G-1003	6/7/61	Lockheed subcontract
605	G-1004	10/12/61	16 SS Unions
605	G-1005	10/12/61	2 Sigmamotor Pumps
605	G-1006	10/12/61	200' Typhon Tubing
605	G-1007	10/16/61	Mockup Fabrication
Power Reactor Fuel Processing - Mechanical			
510	D-6265	9/26/61	65 Canisters
511	D-6266*	10/16/61	4 Way 3/4" Hydraulic Valve
511	D-6267	10/26/61	Fabrication of Screw Drive Trap Door
Transuranium - 3508			
702	D-6621	9/15/61	11 Hardened steel shafts
Oxygen 17 Pilot Plant			
3420-44	D-6816	10/26/61	8 Brass Socket Tube Welds
3420-44	D-6817	10/30/61	SS Ball Valve

Table 5, Continued

Job No.	Purchase Req. No.	Date Issued	Description
Volatility			
404	D-7019	6/29/61	INOR-8 pipe and tubing
404	D-7020	6/26/61	INOR-8 sheet and plate
Transuranium - 4507			
702	G-9729	8/7/61	Teflon air-operated valve
-123	G-9753*	10/5/61	3/4" Brass Ratchet Wrench
-123	G-9754*	10/5/61	500' Polyethylene Tubing, 64" Circum.
-123	G-9755*	10/5/61	2' Pure Gum Gooch Tubing
-123	G-9756*	10/12/61	4 Hydraulic Hose Connectors
-123	G-9757*	10/12/61	4-28 Watt Solenoids
-123	G-9758*	10/12/61	500' Polyethylene Tubing
-123	G-9759*	10/12/61	2 Electric Switches
-123	G-9760	10/24/61	500' - 33" Polyethylene Tubing
703	G-9761	10/27/61	8 - 0 - 0.1" Water Vacuum Gages
-123	G-9762	10/30/61	4 All Purpose Fingers

* Issued and completed in October 1961.

Table Work Order Status November 1, 1961

Job Number	Job Order Number	Charge Number	Engr.	Date Issued	Cost Estimate	Description	% Comp
3019	A-01546-11	337053-125	WGS	7/24/61		Ventilation System for Sample Gallery	
3019C	A-93249-01	329090	WGS	6/29/60	9,100	Hot Analytical Cell and Hood Vent Filters, Titles I, II, and III	
3019C	A-93249-02	329090	WGS	6/29/60	2,600	Hot Analytical Cell and Hood Vent Filters, ORNL Participation	
3019C	A-93249-03	329090	WGS	6/29/60	1,500	Hot Analytical Cell and Hood Vent Filters, I & C Division Participation	
3019C	A-93249-04	329090	WGS	6/29/60	82,600	Hot Analytical Cell and Hood Vent Filters, Lump-sum Contract, Hixon Construction Co.	
3505	A-70570-11	337053-132	HBG	7/26/61	15,000	Loading of U-233 Carriers	
3505	A-70570-12	337065-132	FEH	8/4/61	1,500	Install Jet and Line from 3505 Canal to W-5	
4507C	A-01362-11	337053-20	AMR	6/15/60	10,115	Temporary Containment Changes for Cell 2	
4507	A-01559-11	337053-133	AMR	8/31/61	1,900	Final Adjustments for 4507 Containment	
4507C	A-93114-02	337090-01	AMR	7/29/60	11,300	4507 Containment Changes, ORNL Participation	
4507C	A-93114-03	337090-01	AMR	7/29/60	106,000	4507 Containment Changes, CPFF Contract	
4507C	A-93114-04	337090-01	AMR	7/29/60	21,000	4507 Containment Changes, Detection Instruments	
4507C	A-93114-05	337090-01	AMR	7/29/60	5,000	4507 Containment Changes, Title II Engineering	
General Division Programs							
-1	A-01549-11	337053-1	WGS	8/4/61		Design and Estimate for Off-gas Filter Portable Shield	
-1	A-41624-41 & 61	337053-01	PLR	7/16/59	10,000	General Equipment Repair and Storage for Re-use	
Cane Project							
-59	A-01545-11	337053-59	JWL	7/24/61	7,318	Fabricate Gnome Sampler Vessels	
-59	A-20475-11	337053-59	JWL	3/16/61	6,508	Fabricate Instrumentation for Gnome Sequenced Sampler	
-59	A-20484-11	337053-59	JWL	4/14/61	5,000	Design and Fabricate Transistorized Timer	
Fuel Shipping Study							
-113	A-01499-11	337053-113	LBS	5/5/61	15,000	Fabricate Three Carrier Models for Drop Test	
-113	A-01570-11	337053-113	LBS	9/20/61	5,000	Assistance to B. L. Greenstreet (Y-12) on Cask Drop Tests	
Pa-U Program							
-123	A-70499-11*	337053-123	BBK	5/26/61	18,900	Fabrication and Installation of Pa Process Equipment, 4507 Mockup	
-123	A-93483-01*	337092-123	BBK	5/29/61	34,900	Install Sealed Glove Box and Equipment, Lab 1, Bldg. 3508	
-123	A-93687-01	337092-123	BBK	7/21/61	6,875	Convert Model 6 Manipulators in 4507 Mockup for Heavy-duty Service	
Homogeneous Reactor Program							
304	A-20345-11	337053-109	BFB	5/18/60	3,707	Instruments for Spectrophotometric Fuel Analysis Loop	
Volatility Program							
404	A-01533-11	337053-73	RPM	6/28/61		Assistance to BMI on VPP Corrosion Tests	
Power Reactor Fuel Processing							
500	A-20428-11	337053-22	ARI	11/30/60	580	Instrumentation for Experimental Flowmeter Test	
503	A-70447-11	337053-133	ELN	1/16/61	100,000	Modification of Immi Equipment for Pu-Al Processing	
503	A-93553-01	337092-133	ELN	3/7/61	3,350	Fabricate Accessories for Pu-Al Carrier	
506	A-01528-11	337053-132	WRWh	6/27/61	1,765	Install Glove Box Sampling Station, 3019	
506	A-93636-01	337092-132	WRWh	5/19/61	4,730	Install and Type U-233 Storage Tank	
506	A-93636-03	337092-132	WRWh	7/10/61	2,850	Install 6-in. Lead Shield Around U-233 Storage Tank	
510	A-01418-11	337053-106	WFS	9/2/60	14,113	Final Design Items, Segmenting Facility	
510	A-93762-01	337092-106	WFS	10/13/61	5,100	Fabricate Carrier for Declad SRE Fuel	
511	A-01448-11	337053-106	WFS	12/14/60	18,234	Fabrication of Inclined Conveyor	
511	A-01491-11	337053-107	WFS	4/19/61	12,000	Design of 250-ton Shear Auxiliary Equipment	
511	A-20556-11	337053-107	WFS	9/22/61	1,000	Preliminary Study of Leacher Position Indicator	
511	A-93174-01	337092-106	WFS		171,600	Procure 250-ton Shear from Birdsboro Corporation	
511	A-93174-03,04,05	337093-106	WFS	6/2/60	3,360	Design Auxiliaries for 250-ton Shear	
Waste Program							
603	A-23534-10	363290-00	FEH			Design of Tank and Evaporator	

(Continued)

Table 4, Continued

Job Number	Job Order Number	Charge Number	Engr	Date Issued	Cost Estimate		Description	% Comp
Waste Program (Continued)								
604	A-70455-12*	337053-34	JOB	2/28/61	10,000	Procure and	[illegible]ll Instruments for Ion Exchange Pilot Plant	
604	A-70455-13* - 14*	337053-34	JOB	3/30/61	2,000	Decontamin	[illegible] Used Equipment for Ion Exchange Pilot Plant	
605	A-01484-11	337053-34	JOB	3/27/61	18,500	Design Po	[illegible] for Calciner Pilot Plant	
605	A-01547-11	337053-30	HOW	7/26/61	19,300	Fabricate	[illegible]stall Pot Calcination Hot Cell Unit	
605	A-01558-11	337053-33	JOB	8/28/61	1,980	Fabricate	[illegible]eter and Controlled Rate Steam Jet	
605	A-01571-11*	337053-34	JOB	10/5/61	1,200	Fabricate	[illegible]ment for Evaluation by Lockheed	
Transuranium Facility								
7511	A-01550-11	337053-108	WDB	8/8/61	2,000	Design Revi	[illegible] of TrU Concepts	
7511	A-70489-61	337053-108	WEU	4/25/61		Architect-	[illegible]eer Design Assistance, TrU Mechanical Equipment	
7511	A-70397-14	337053-28	BFB	12/12/60	39,500	Fabricate	Install Mockup of Intercell Conveyor	
702	A-01582-11	337053-108	WEU	10/24/61	5,000	Conceptual	[illegible]n & Estimate for Pu Target Fabrication Equipment	
702	A-70397-13*	337053-28	BBK	7/15/60	4,950	Design and	[illegible]ll Instruments for Transuranium Cell 3 Glove Box	
702	A-70397-16	337053-28	BBK	5/26/61	18,900	Modify Cell	[illegible]ldg. 4507, and Install TrU SOX	
702	A-70397-17*	337053-28	BBK	5/26/61	28,100	Fabricate	Install TrU SOX Equipment, 4507 Mockup	
702	A-70397-18*	337053-28	BBK	5/26/61	5,400	Instrumen	Design and Installation, TrU SOX, 4507 Mockup	
702	A-70442-11,-12,-15,16	337053-108	BFB	8/21/61	25,000	Fabricate	[illegible] of TrU Carrier and Alpha Container	

C - Work Orders Concerned with Containment.

* - Request for Close-out Submitted.

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