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OAK RIDGE NATIONAL LABORATORY

STATUS AND PROGRESS REPORT

July, 1952

AEC RESEARCH AND DEVELOPMENT REPORT

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OAK RIDGE NATIONAL LABORATORY

STATUS AND PROGRESS REPORT

July, 1952

J. P. Lane

Date Issued: AUG 7 1952

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OAK RIDGE NATIONAL LABORATORY

STATUS AND PROGRESS REPORT

July, 1952

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OAK RIDGE NATIONAL LABORATORY

STATUS AND PROGRESS REPORT

July, 1952

PROGRAM 2000 - SOURCE AND FISSIONABLE MATERIALS

Purex Process (AEC Activity 2803.2)

A satisfactory uranium product has now been obtained in the pilot plant by a sodium nitrite pretreatment of the uranium feed to the second cycle. This pretreatment removed the ruthenium which previously limited the decontamination.

The substitution of NO_2 gas for sodium nitrite as a plutonium oxidant as well as for ruthenium removal appears feasible from chemical tests, and the pilot plant evaluation is in progress. This will provide a fission product stream nearly free of inert salts.

Several runs have been made through the radioactive off-gas equipment and removal of practically all krypton and xenon in dissolver gases has been achieved.

Metal Recovery (AEC Activity 2802.2)

A special dissolving of a single channel of slugs from a Hanford pile has been completed. The purpose of the project is to make a careful mass analysis of the plutonium, uranium, and fission gases and to compare these data with the heat generated by this single channel.

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HOMOGENEOUS REACTOR PROJECT

Homogeneous Reactor Experiment (AEC Activity 4103.10)

Following completion of the critical experiments at the end of June, the first two weeks of July were devoted to making revisions and modifications to prepare the HRE for operation at higher power levels. After leak testing showed the system to be tight, operation was resumed at the milliwatt power level. The power level was then increased by a factor of 50 and the reactor operated for about 8 hours before a leak developed in a threaded pipe joint where it could not be detected by either the pressure leak detection system or by monitrons because of the very low activity level. Some of the U^{235} in solution thereby escaped from the fuel system into the waste handling system. The remainder of the month has been spent in recovering the U^{235} from the waste system, mainly the evaporator, and obtaining a material balance.

Controls and Instrumentation (AEC Activity 4109.2)

The Densitrol system of measuring specific gravity of uranyl sulfate solutions is being tested in the HRE mock-up. The fuel taken from the high pressure 250°C stream is cooled to about 46°C and its specific gravity is measured at 100 psi utilizing a glass plummet with a soft iron core which enables movement of the plummet to be detected by a microformer. The position relative to the liquid and the microformer is converted into specific gravity reading over a scale of 1.0330-1.0530 (equivalent to 25.99-40.93 g U/l).

Concentration of the soup has been varied from 40.80 g U/l to 26.96 g U/l and the Densitrol instrument has responded to within 0.20 g U/l, on the basis of analytical determinations of the concentration of the fuel. The Densitrol has frequently indicated more consistent values of concentration than those obtained by chemical analyses, probably due to difficulties in obtaining good samples for the analyses. To date, tests indicate the Densitrol system to be very practical and useful. A pressurized metal plummet will be substituted for the glass plummet in the next tests.

Dynamic Corrosion Studies (AEC Activity 4109.4)

A loop containing 300 g U/l UO_2F_2 solution with 8 mol percent excess UO_3 has been operated for approximately 400 hours at 250°C. It has been found that at this temperature no more than about 8 mol percent UO_3 will remain in solution when the concentration is 300 g U/l. Preliminary data on corrosion in this loop compare quite favorably with corresponding data from 300 g U/l UO_2SO_4 loops.

The first Westinghouse 100A pump with a stainless steel stator diaphragm replacing the original Inconel has been placed in service in uranyl sulfate, 100 g U/l.

Tests with 300 g U/l UO_2SO_4 at 100°C have now run for more than 2000 hours. Corrosion rates of stainless steels 304, 309sCb, 316, 321, 347 and Carpenter 20 in this medium continue well below 0.5 mil per year.

The construction of a loop containing major components of titanium is nearly complete.

Homogeneous Reactor Fuel Reprocessing (AEC Activity 4109.81)

Better recovery of plutonium was effected by a new flow sheet using acid solvent extraction and scrub steps. Treatment of neptunium with sodium nitrate puts it into the Np^{+5} state from which the uranium and plutonium can be readily separated.

Boiling Reactor Studies (AEC Activity 4112.1)

Conceptual design of a 1000 MW boiling reactor for producing plutonium and power has been started. It is hoped that by developing an actual reactor design it will be possible to determine the major problems associated with such a reactor system.

Slurry Pumping Studies (AEC Activity 4112.1)

The 100-gpm slurry pumping loop is operating at 250°C with a 200 g U/l UO_3 slurry. Although the bearings of the Westinghouse 100A pump are running in slurry, no erosion has been observed. Evidence to date indicates that the UO_3 slurry particles are not as hard as the materials of construction of the pump and loop, and consequently the particles themselves wear rather than eroding the loop.

HR Fuel and Blanket Studies (AEC Activity 4112.31)

Corrosion rates for 250 g U/l as a $UO_3 \cdot H_2O$ slurry in water contained in untreated 347 stainless steel at 250°C are as follows:

Irradiated in a flux of 10^{11}	0.6 mils per year
Bench tests	0.5 mils per year

Distilled water gave a corrosion rate of 0.3 mils per year during bench tests.

AIRCRAFT NUCLEAR PROPULSION PROJECT

Aircraft Reactor Experiment (AEC Activity 4401.1A)

The reactor floor mounting frame, helium fans, and space coolers have been installed in the various reactor pits in the ARE building. Steel superstructure is also being installed. Liquid level indicators, rotometers, and vapor traps compatible with the vapor pressure of the zirconium fuel have been designed.

ANP Experimental Engineering (AEC Activity 4401.1)

Test work indicates that three-ply Inconel bellows (each ply .009" thick) will be very satisfactory for a valve stem seal operating in 1500°F fluorides. Two such bellows have been tested for periods approaching 1000 hours without bellows failure. One of these bellows was terminated for examination, which showed that the fluorides had penetrated only one ply of the three-ply bellows. Further testing at 1500°F continues.

The development of packed seals for valve stems continued with emphasis being placed on high melting point glass as the seal lubricant. Such a seal has run for more than 500 hours without failure.

Tests have continued to determine whether a fluoride plug can be removed from pipes similar to the ARE core fluid circuit without rupturing pipes. The test has been cycled between temperatures 460°C to 560°C at heat rates varying from 10°C/hr to 40°C/hr for approximately 4 weeks with no indication of damage to the pipe. Further tests will be conducted to simulate more closely ARE conditions.

ANP Critical Experiments (AEC Activity 4401.2)

The preliminary critical assembly of the ARE mock-up is underway. Hexagonal blocks of BeO have been stacked into a vertical right cylinder 36 inches high and 47 inches in diameter. The simulated fuel consists of a dry powder pack 66% by weight ZrO_2, 24% NaF and 10% graphite to which enough enriched U^{235} density of 0.16 g/cc, all contained in 1 1/4" stainless steel tubes. These fuel tubes will be inserted step-wise in holes in the BeO matrix until the system becomes critical. All associated control equipment has been installed and tested. The calculated required loading with 5% excess $\Delta k/k$ is about 7 kg U^{235}.

Various measurements have been completed on the Direct Cycle Aircraft Reactor critical assemblies. Fission rate and neutron flux distribution, neutron reflector properties of various thickness of iron and simulated water, the effect of various types of control rods, and the temperature coefficients have been measured.

ANP Radiation Damage (AEC Activity 4401.4)

Preliminary analytical and metallographic tests indicate that the zirconium fuels for the ARE are satisfactory so far as radiation damage is concerned. Equipment is now being fabricated for the fuel capsule tests in the MTR.

ANP Reactor Chemistry (AEC Activity 4401.5)

For start-up of a reactor the following compositions were established:

Barren Material:	$NaZrF_5$ (m.p. 510°C)
Uranium Concentrate:	NaF, 50 mol %, ZrF_4, 25 mol % UF_4, 25 mol % (m.p. 610°C)

The foregoing compositions can be combined to produce the 4 mol % UF_4 fuel without forming mixtures melting above 610°C. The fuel mixture 50% NaF: 46% ZrF_4: 4% UF_4 (mol basis) has a vapor pressure of 8 mm at 800°C.

Apparatus for treating 50-pound batches of fuel with hydrogen and HF has been successfully operated. The production of ZrF_4 at a satisfactory rate has also been achieved.

ANP Metallurgy (AEC Activity 4401.5)

The technique of solid phase bonding is being used in the study of high temperature solid fuel elements. Various combinations of stainless steels, nickel, molybdenum, and iron as cover plates have been sintered at high temperature to achieve a bond to the fuel bearing core. Methods of preparing spherical particles of uranium alloys for the cores are being studied.

Additional tests on the effect of a hydrogen atmosphere on hydroxides contained in metals have been made. Mass transfer effects were not observed in a "seesaw" furnace test in which a nickel capsule filled with NaOH was alternated between temperatures of 550°C and 750°C nor in an Inconel thermal connection loop test in which KOH was circulated for 330 hours at 700°C.

The B_4C-Fe slugs for the ARE safety rods and the Al_2O_3-B_4C inserts for the ARE control rods have been hot pressed and canned in Inconel.

The addition of 0.5% zirconium metal to the (Na-K-Li-U)Fx fuel reduced the corrosion in the hot portion of an Inconel thermal connection loop to .5 mil after a 500 hour test at 1500°F. Additions of this type will be tried on the fuels containing zirconium fluorides.

Shielding Research (AEC Activity 4401.7)

Experiments have been carried out in the Lid Tank to determine the effect of large air ducts on the penetration of neutrons through the reactor shield for the X-1 aircraft. The duct configuration can be visualized as the annular space between two large top-shaped surfaces. Indications are that this type of duct, while better from a hydrodynamic point of view than one made up of many wavy pipes, nevertheless lets through more neutrons. On the whole the design appears promising.

The Bulk Shielding Facility is currently engaged in absolute power calibration of the reactor which will, incidentally, also measure the heat release per fission. Measurements designed to simulate divided shield

geometry including air scattering have been carried out; these indicate that previous shield designs may have been optimistic. Since these results are not understood on the basis of subsequent analysis they will be repeated in the near future. The repetition will be made much more significant since it is now permissible to operate the reactor at 100 KW instead of 10 KW, so that extrapolations will no longer be necessary.

Reactor Physics (AEC Activity 4401.7)

Calculations are underway for the ARE critical experiment. Consideration is being given to problems such as the effect of reflector savings, absorption of neutrons in structural materials, uranium self-shielding factor and the density of fuel after the tubes are loaded.

GENERAL REACTOR RESEARCH

General Reactor Radiation Damage (AEC Activity 4540)

The program of irradiating elastomers and plastics has continued by irradiating in the X-10 pile some of the more radiation resistant materials when wrapped in cadmium. This increases the energy absorbed by factors of three to six. A polystyrene sample irradiated to 2.5×10^{10} r showed about a 2% weight gain. Asbestos filled phenolic had a weight decrease of about 3%. Polyvinyl carbazole, and aniline formaldehyde were also irradiated; all four materials showed little change during their exposure. Further tests will be made to determine the significance of the slight changes in weight.

CP-5 Reactor Fuel Elements (AEC Activity 10200)

The first loading of fuel assemblies for the Argonne CP-5 reactor have been fabricated and shipped to the reactor site.

PROGRAM 5000 - PHYSICAL RESEARCH

REACTOR OPERATIONS

The total accumulated KWH for X-10 pile operations during July were 2,472,626 averaging 3550 KW per operating hour. Pile down time was 6.4% as compared with 12.1% in June.

The total accumulated KWH for LITR operations during July were 742,930 averaging 1430 KW per operating hour. Down time was 30.2% as compared with 9.9% in June.

PRODUCTION OF ISOTOPES

Radioisotope Production (AEC Activity 5111)

Radioisotope	Millicuries Shipped
I^{131}	34,678
P^{32}	7,444
Co^{60}	67,550
C^{14}	126
H^{3}	13,500

The total number of millicuries shipped during July was 126,066 and the number of radioisotope shipments was 839. A 1200 curie Co^{60} source was shipped to ORINS.

Stable Isotope Production (AEC Activity 5121)

The calutron tank time during the month of July was devoted to the collection of chlorine, neodymium, and germanium isotopes, and to the continuation of controlled collection experiments. Overall production innage for the four calutrons was 954 hours with an integrated output of 1,364 ma hours for the Alpha channels and 40,918 ma hours for the Beta channels. Outage time was 34.0% as compared with 27.6% during June.

Trial collection runs, using a newly designed grid type source, produced Li^{6} of 94.5% purity.

Chemical processing refinement was conducted on isotopes of boron, nickel, and lithium. Chemical services were supplied to the calutrons for the separation of isotopes of neodymium, chlorine, and lithium.

Research on the separation of rare earths by liquid-liquid extraction continued. The quantity of 90% gadolinium oxide on hand now exceeds 1 kilogram.

There were 22 stable isotope shipments during July.

PHYSICS

High Voltage Program (AEC Activity 5211)

Further work on the reactions $He^3 \begin{pmatrix} He^3, & He^5 \\ & He^4, n \\ & He^4 \end{pmatrix} \begin{matrix} H^1 \\ H^1 \\ H^2 \end{matrix}$ has indicated that the break-up ratio is not dependent on the bombarding energy. A continued study of the spectra of protons from the reaction $He^3 \begin{pmatrix} He^3, & Li^5 \\ He^4, & H^1 \end{pmatrix} \begin{matrix} H^1 \\ H^1 \end{matrix}$ with improved energy resolution fails to show evidence for the formation of Li^5 even in its ground state. The spectra observed however, is not that expected for three body break-up.

Theoretical Physics (AEC Activity 5211)

The Auger effect has been set up with complete accuracy for any element and sub-shells in such a form that it may be transferred to the ORNL computing machine when it is available. The Auger effect refers to the ejection of atomic electrons following the event in which one of the tightly bound electrons have been ejected from the atom. The latter event occurs by means of nuclear processes such as internal conversion and orbital electron capture. With the purpose of studying these nuclear processes it is important to have a fairly accurate and quantative theory of the Auger effect. Previous calculations have been inadequate because of the complexity of the problem. This is the kind of problem that can be solved by taking advantage of modern high speed computing machines.

The 86-Inch Cyclotron (AEC Activity 5261)

The 86-inch cyclotron is now in operation on a modified schedule consisting of three shifts per day, five days per week. The time is allotted to nuclear physics, radiation damage, cyclotron improvements, and to developing new applications for the cyclotron. A small amount of time is now available for bombardments for outside groups.

During a recent record isotope production run, the cyclotron was operated with a one-milliampere proton beam on a bismuth target for a continuous 32-hour period (100% innage). Altogether, this run totaled 160,000 μa-hrs and yielded an estimated 1.5 curies of Po^{208}.

Three zinc targets have been bombarded to produce gallium 67 for ORINS.

63-Inch Cyclotron Physics and Operations (AEC Activity 5261)

Carbon, nitrogen, and oxygen targets were bombarded with the internal nitrogen beam at the maximum cyclotron radius. In the carbon target a 115 minute half-life and a 15 hour half-life were found. The former is assigned to F^{18} and the latter to Na^{24}. No other half-lives between one

minute and one day were observed in the carbon targets. Nitrogen bombarded in the form of TaN exhibited a 10 minute half-life ascribed to N^{13}. Since the TaN targets used were not definitely free from impurities, it is not possible to say yet what other activities may be found in nitrogen targets. Oxygen, bombarded in the form of CuO and TiO_2 exhibited a 2.4 minute activity due to F^{18}. Chemical identification of these radioactive elements is now in progress.

Special Separations (AEC Activity 5261)

In an initial calutron run two grams of 90.6% thorium 230 (ionium) were separated from 10% feed material. For this two-mass-unit separation of thorium isotopes the enrichment factor was 87.

Isotope Analysis Methods Laboratory (AEC Activity 5261)

Nuclear magnetic resonance results on Se^{77} in H_2Se give $\nu_{Se^{77}}/\nu_{D_2} = 1.2421 \pm 0.0001$.

A chemical effect was found in H_2Se versus H_2SeO_3, the resonance in H_2SeO_3 being at higher frequency by 0.15%.

Measurements on the microwave rotational spectra of vinyl acetylene have been extended to include transition groups $J = 2 \longrightarrow 3$ at 27,000 mc, $J = 1 \longrightarrow 2$ at 18,000 mc, and $J = 3 \longrightarrow 4$ at 36,000 mc.

Mass Spectrometer Laboratory (AEC Activity 5261)

A series of tests have been made on 347 stainless steel in an attempt to understand the nature of active and passive surfaces. Investigations have been carried out over the temperature range of 100°C to 1400°C. Examination of samples pretreated in an oxygen atmosphere reveal that some oxygen appears on the surface as Cr_2O_3 but no evidence was found that oxygen is chemisorbed. Very strong evidence was found that chromium is preferentially distilled from the surface as the metal is heated. Tests have also been made on samples pretreated with 10% H_2SO_4-D_2O solution to determine what part the hydrogen dissolved in the metal plays in corrosion.

Directly heated ovens drawn from thin tantalum sheet have been developed for heating samples up to at least 2600°C. A recently designed radiation heated oven has proven to be satisfactory up to 1400°C. These ovens will be used for highly refractory materials such as the oxides of uranium.

CHEMISTRY

Chemistry of the Solid State (AEC Activity 5311)

Further experiments pertaining to the solubility of metals in melts of halide salts have been made. In the system, sodium metal-sodium chloride,

a rapid increase from a very small solubility near the melting point of the salt to an amount of 20 mole percent 200°C above it was found. Present studies, using the concept of ionic coordination and its changes with temperature, are directed towards an attempt of reconciling this apparent discrepancy with results on alkaline earth metals and their halides, and with a recent theory of such solutions.

Radio-Organic Chemistry (AEC Activity 5311)

A study of various solvents for extracting uranium is underway. Carbon tetrachloride solutions of dibutyl butylphosphonate, butyl dibutylphosphinate, and tributyl phosphine oxide have been compared with tributyl phosphate, whose solvent extraction properties are fairly well known. Dibutyl butylphosphonate and tributyl phosphate were similar but butyl dibutylphosphinate and tributyl phosphine oxide exhibited considerably improved uranium extraction properties. The latter two were able to extract uranium from its nitrate, chloride, fluoride, and sulfate salts.

Chemistry of Uranium Raw Materials (AEC Activity 5361)

Extraction of a nitric acid solution of leached zone material with di(2-ethylhexyl) phosphinic acid followed by stripping into aqueous 6% HF has yielded strip solutions containing 2.25 grams uranium per liter, representing a selective concentration of the uranium across the system by a factor of 32.

Fusion of leached zone ore with a small excess of ammonium sulfate, followed by a water leach, has given nearly complete dissolution of the aluminum and phosphate in the ore. The sulfate can be recycled.

The $(NH_4)_2CO_3$ treatment of lignite ash will extract molybdenum which can probably be recovered as a marketable by-product.

Thorex (AEC Activity 5361)

The physical properties of the various chemicals required for the Thorex process have been studied for the purpose of developing the design criteria for the pilot plant. Undesirable impurities such as dibutyl and monobutyl phosphates have been removed from the tributyl phosphate solvent by treating with $Ca(OH)_2$. Effort has been placed on purifying synthetic feeds prepared from metal grade thorium nitrate, especially in removing phosphorous and silicon compounds.

An experimental program to provide information for the design of U^{233} processing plants free from nuclear hazards is underway. Solutions of uranyl nitrate will be added to paraffin enclosed containers of various diameters in order to measure the minimum critical mass of U^{233} in cylindrical geometry with hydrogenous moderator and reflector.

METALLURGY

Thermal Cycling of Uranium (AEC Activity 10200)

Thermal cycling of water-cooled alpha-rolled uranium rods at 8 cps with a 20 % duty cycle and an average power input of 15 KW/cu in produced no elongation. When higher temperatures and greater temperature fluctuations are obtained by the use of a slower cycling rate and cooling with helium, marked elongation can be produced. With the minimum temperature held at $\sim 100^{\circ}C$ elongation occurs when the maximum temperature exceeds $\sim 250^{\circ}C$; when the maximum was $\sim 500^{\circ}C$ an elongation of 18% was observed.

Failure due to thermal stressing, without elongation, results when water-cooled uranium rods are subjected to a power input exceeding 25 KW/cu in. at 400 cpm and 33% duty cycle. The rods become badly splintered.

PROGRAM 6000 - BIOLOGY AND MEDICINE

BIOLOGY

Cytogenetics (AEC Activity 6400)

A careful analysis of the function of oxygen on sensitizing cells to X-rays was made on several organisms. The number of chromosome breaks produced by X-rays increases with increased oxygen tension. It was questioned whether the oxygen was responsible for the breaks themselves or whether the oxygen was decreasing the probability for joining of chromosome pieces. The evidence seems to point to a reduction of joining of broken pieces in the presence of oxygen. This is based on experiments done with maize as well as experiments done with mutations in *Drosophila*.

Radiation Bacteriology (AEC Activity 6400)

It has been reported that bacteria will recover to a considerable degree from X-ray exposure if they are incubated at sub-optimum temperatures for a number of hours. This recovery will take place only in the presence of meat or yeast extract. A careful analysis was made of the nutritional factors in yeast extract which are responsible for this recovery. One of the factors found is a nucleic acid derivative with a maximum absorption of ultra violet light at 2600 Å. The other factor is one or several amino acids which have a maximum absorption at 2750 Å. These factors will only work in combination but not when used separately. Further analysis is in progress to identify these.

BIOPHYSICS

Physics of Nuclear Radiations (AEC Activity 6510)

An improved method of reading nuclear track films used for monitoring neutron exposure has been developed. It consists of observing the film through the microscopes at the lower magnification of 440^{x} instead of the usual 950^{x} and checking a film area considerably larger than that previously used. This new technique will permit statistically more reliable monitoring of neutron exposure to personnel.

PROGRAM 9000 - RESEARCH FACILITIES

Research Laboratory Building #4500

Final inspection was made on July 22, 1952, and the building was accepted by ORNL from John A. Johnson Company. Form F-3 (final completing form) has been signed. John F. Humphrey Company completed the installation of hoods on July 30, 1952. All contractors are through in the building. ORNL forces continue to move in equipment and to make minor revisions to the building.

Gas Decontamination Facilities for Building #4500 and #4501

The Nicholson Company's portion of this job is 75% complete. The Kaminer-Helgarsen's portion is complete. All concrete work is finished. ORNL's forces are preparing foundations for the installation of fans and filters.

Conversion of Jones Construction Camp (Central Shops Building #7012)

Concrete foundations, pier footings, and piers are complete. Piping for utilities is underway. Crushed rock filling is complete and ready for pouring of the concrete floor slab.

Stripping and Alterations of Building #9204-1 (for HRP)

The chemical laboratory has been completed. The installation of steel grate floors and stairways continues.

Argonne Cell Building #3029

A cell for handling special radioisotope preparations has been completed except for the installation of the mechanical "hands".

RADIOISOTOPE SALES

Sales	May	June
Transfers within AEC	$ 10.75	$ 7,256.00
Cash Sales	7,631.25	8,616.17
Foreign	1,684.05	5,004.25
Cancer Program (Free)	40,285.50	39,899.56
Technical Cooperation Plan	435.00	200.00
Total Sales and Transfers FY 1952 to Date	1,044,766.46	1,162,738.84
Total Cancer Program (Free) to Date	1,378,816.08	1,418,715.64
Technical Cooperation Plan (Shipment to Date)	14,952.55	15,152.55

GROSS OPERATING COSTS
(Including X-10 & Y-12)

(a)	Actual Cost for June 1952	2,580,610.00	
	Actual Plant and Equipment Cost	899,766.00	
	Construction Program "H"	136,141.00	
	Total Operating and Construction Cost for June 1952		3,616,517.00
(b)	Estimated Operating Cost for July 1952		2,800,000.00
(c)	Actual Accumulative FY 1952 Operating Cost through June 1952	28,154,862.00	
	Actual Accumulative FY 1952 Plant and Equipment Cost through June 1952	5,077,210.00	
	Actual Accumulative FY 1952 Construction Program "H" Cost through June 1952	610,730.00	
	Total Accumulative FY 1952 Operating, Construction, and Plant and Equipment Cost through June 1952		33,842,802.00
(d)	Estimated Operating Cost FY 1953 through July 1952		2,800,000.00

PERSONNEL SUMMARY

	Number of Employees July, 1952	New Hires July	Terminations July
Administration	78	0	1
Operations*	119	2	1
Engineering, Shops and Mechanical	911	14	5
Laboratory and Research	1587	29	11
Protection	182	1	1
Service	396	3	1
Total	3273	49	20

* Includes Electrical Distribution and Steam Plant as well as the Operations Division.