H D O - 2245

**Cover Sheet for a Hanford
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**Prepared for the U.S. Department of Energy
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**Pacific Northwest Laboratory
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HDC-2243

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CG-NMP-1 6-27-94

By J. E. Sainly 7-1-94Verified By Jerri Maly 7-28-94

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3. OH Greager
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36 Pages

Richland, Washington
June 28, 1951

A. B. Greninger
Nucleonics Department
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HDC-2241, Copy #154

HDC-2239, Copy #154

HDC-2244, Copy #154

HDC-2242, Copy #154

HDC-2243, Copy #154

Users of this document may
obtain prints H-1-3208 and
H-1-3207 from Engineering
File.

EXPANSION OF HANFORD WORKS FACILITIES

This document incorporates the individual studies prepared by the Power and Mechanical Division-HDC-2241, Reactor Division-HDC-2239, Project Engineering Division-HDC-2244, Principal Engineer- and HDC-2242, and the Engineering and Construction Services Division-HDC-2243, each outlining the proposed course of action and requirements for that facet of the contemplated work in which they are primarily interested. The information from this group of reports has been recapitulated and consolidated with additional information from the Manufacturing Divisions to form the substance of a letter to the Atomic Energy Commission over the signature of G. R. Prout.

Briefly, the more significant facts are as follows:

a) Cost Estimate

105 Building facilities
Balance of 100 Area facilities
Construction equipment
Village Additions
200 Area Modifications

TOTAL

\$160,818,000

- b) The over-all schedule for design and construction, assuming availability of graphite and reasonably satisfactory procurement of materials and equipment, is twenty-one months. To this must be added a sufficient period to develop the scope of work and obtain the necessary architect-engineer contracts.

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JUL 30 1956

\$63,500,000
74,318,000
3,888,000
10,000,000
1,020,000

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- 2 -

- c) Large quantities of controlled material items are involved as indicated below.

Carbon Steel	47,336 tons
Stainless Steel	488,000 lbs.
Cast Iron	40,000 tons
Lead	150 tons
Copper	796,000 lbs.
Aluminum	352,000 lbs.

In addition, procurement difficulties will be encountered in obtaining equipment such as transformers, switchgear, electric motors (up to 3500 HP), blowers, gun barrels, "B" blocks, stainless steel tanks, instruments, etc.

- d) The graphite picture is entirely uncertain and will very likely necessitate reactivation of the Morganton site of Union Carbide and Carbon.
- e) A sizeable village expansion will be required including over 500 houses, a new school, office and hospital additions, and telephone and transportation expansions.
- f) A substantial number of units of construction equipment must be procured to accomplish the proposed construction program.
- g) The North Richland Construction Camp facilities are adequate to handle the anticipated manpower requirements of 37,000 man-months, peak 3700 workers.
- h) It would be most desirable if construction could be started in January 1952 as this would establish an overall construction manpower curve which would continue at relatively constant level through 1953 because of the phasing with work currently authorized. Start of construction beyond this date produces a definite valley in the curve.
- i) It is obvious that significant gains could be made by writing addenda to purchase orders now extant for C-431 materials and equipment. Any such gains might well be off-set by the graphite problem.

The reports were based on site location at Coyote Rapids as indicated in the plot plan attached to HDC-2241 and essential duplication of facilities now authorized for the C-Area. No major expansion of the separations facilities will be required as long as power levels are not increased beyond 4250 MW. Above this level, increases in uranium and plutonium will necessitate the construction of an additional separations unit.

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J. S. Parker
J. S. Parker, Assistant Manager
ENGINEERING AND CONSTRUCTION DIVISION

ON

COYOTE RAPIDS SITE

JUNE 27, 1951

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I GENERAL DESCRIPTION

This report discusses the feasibility of designing and building two 100 Areas at the Coyote Rapids site on the Columbia River. For the purposes of this report these areas have been designated as 100-X and 100-Y. This report is designated as "Part A" and covers all facilities and services exclusive of the 105 reactor buildings. Each plant would be capable of supplying 62,000 g.p.m. of process water to its 105 Building at 525 psi measured at the top of the front face risers. The design would permit the future expansion necessary to increase the process flow from 62,000 to 80,000 g.p.m. with no change in final pressure. Structural design will be in accordance with INDC 4661. Included herein are:

1. Description of the site and facilities to be provided.
2. Assumption on which report is based.
3. Construction cost estimate.
4. Design, procurement and construction schedule.
5. Manpower curves for both design and construction.
6. Table of critical material requirements.
7. Plot plan and a map showing the location of the new facilities together with the access roads and railroads, area power supply, and the tie-in to the export water system.

II A. SITE LOCATION

The plant site, located at Coyote Rapids is midway between 100-B and 100-D Areas and approximately three miles from each. The topography is reasonably suited for the proposed facilities. Since there is a strip of low ground bordering the river, it will be necessary to locate the plant back from the river approximately 1600 feet in order to gain sufficient elevation for plant drainage and reactor effluent disposal. The site seems to be reasonably suited for several different plant layouts.

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II A. SITE LOCATION (Continued)

However, the time allowed for this report did not permit an extended examination of all alternates. A plot plan, Drawing No. H-1-3207, is attached and appears to present one arrangement which is well adapted to the terrain and provides ready access for roads, railroads and power supply from the 230 KV loop.

III GENERAL DESCRIPTION OF MAJOR FACILITIES

The proposed 100 Areas would be fundamentally similar to the proposed installation at 100-C. No raw water reservoirs would be provided. The following major facilities would be included:

A. 181 Pump House

This pump house would be common to both 100 Areas and structurally similar to existing 181 Buildings. Housed in this structure would be electrically driven vertical pumps, a separate group for supplying raw water to each of the filter plants; steam driven pumps for emergency raw water supply; and both electrical and steam driven pumps for export water service.

B. 183 Filter Plants

Two filter plants would be constructed, one for each 100 Area. Raw water would be delivered to the filter plants from the 181 Pump House through underground steel lines. Each filter plant would consist of the following: chemical storage and handling systems, head house, flash mixers, flocculation and sedimentation basins, filters, pump room, and steel clearwalls. Each filter plant would have an initial capacity of 62,000 g.p.m. plus that required for other filtered water services.

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B. 183 Filter Plants (Continued)

Provision would be made in the design for enlarging the plants to permit the process flow to be increased from 62,000 to 80,000 g.p.m.

Housed in the 183 pump room would be process water pumps, backwash pumps, power house supply pumps, fire and sanitary pumps and pumps for supplying filtered water to other area buildings.

C. 190 Building

The process pump house would be essentially a duplicate of that being provided for Project C-431. Ten pumping units would be installed, each having a capacity of 8,000 g.p.m. at total dynamic head of 1260 feet. These pump sets would be designed for normal operation on electrical power with turbine drives for starting, and providing shut-down flow. Provision would be made for the future installation of two additional identical pump sets. Process water would be delivered from the 190 Building to the 105 Reactor through two concrete tunnels, each containing three process water lines.

D. 107-C Retention Basins

Two retention basins, each having a capacity of 9,000,000 gallons would be provided to handle the effluent from each of the 105 Reactors. An emergency crib would be provided for each set of retention basins.

E. 187 Elevated Storage Tanks

Two elevated filtered water storage tanks would be erected for each 105 Building, each having a capacity of 300,000 gallons. Their water surfaces, when full, would be at an elevation sufficient to provide a static pressure of 55 psi at the tops of the front face risers in the 105 Buildings.

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F. 184 Power House

This building would be common to both areas and have a steam capacity of approximately 400,000 lbs. per hour. In addition to the steam generators, two turbine driven electrical generators, having an approximate capacity of 750 KVA each, would be installed for supplying emergency power to the area buildings.

G. 151 Substation

This electrical substation would supply both areas. It is estimated that the power required for these two new areas would be 85,000 KVA. Inasmuch as more than 75% of the electrical load is centered in the two 190 Process Pump Houses, the substation has been located, as shown on Drawing No. H-1-3207, between these two buildings. The substation would be fed by two taps from the 230 KV loop and power would be distributed throughout the area at 13.8 KV. Four 30,000 KVA transformers would be installed and so arranged that one unit could be disconnected for servicing without interrupting operation in either area.

H. 1700 Service Buildings

For the purpose of this report, it has been assumed that the 1700 Buildings similar to those constructed at 100-H would be required. We have, therefore, shown on the proposed plot plan and provided in our estimate, for the following buildings:

1701 Gate House	1717 Combined Shops
1704 Supervisor's Office	1719 First Aid
1709 Fire Station	1720 Patrol Headquarters
1713 Storage Building	1722 General Shops
1715 Oil and Tank Storage	1734 Cylinder Storage
1716 Automotive Repair Shop	

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IV COST ESTIMATE AND SCHEDULES

Accompanying this report are the following tables and charts:

1. Project cost estimate
2. A design, construction, and procurement schedule
3. Manpower forecast of design, construction and inspection forces
4. Table showing critical material requirements.

The cost estimate, schedules, and charts have been based on the following assumptions:

1. Initial process flow of 62,000 GPM at 525 psi at the top of the 105 reactor front face risers, with provisions in original design and construction to permit the flow to be later increased to 80,000 GPM with no change in riser pressure.
2. The 181 Pump House, 184 Power House, 151 Electrical Substation, and 1700 Service Buildings would serve both areas.
3. Labor, material and equipment costs are based on current data.
4. Construction completion requires 18 months with a six-day work week.
5. Existing CPFF contracts with construction sub-contractor and Architect-Engineer would be extended.
6. Design would start a minimum of three months in advance of construction.
7. The timing of the authorization of the project would be such that those purchase orders now placed for Project C-431, could have the specified quantities increased.

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NEW PRODUCTION FACILITIES
COYOTE RAPIDS SITE
PART A

HDC-2245

~~HDC-2241~~

PROJECT COST ESTIMATE

	<u>LABOR</u>	<u>MATERIAL</u>	<u>TOTAL</u>
1. SITE PREPARATION	\$ 155,000	\$ 10,000	\$ 165,000
2. TEMPORARY FACILITIES	900,000	450,000	1,350,000
3. STRUCTURES AND EQUIPMENT			
A. (1) 181 PUMPHOUSE	1,170,000	1,200,000	2,370,000
B. (2) 183 FILTER PLANTS	7,500,000	9,500,000	17,000,000
C. (2) 190 PROCESS PUMP HOUSES	3,850,000	7,420,000	11,270,000
D. (2) SETS OF 187 ELEVATED STORAGE TANKS	40,000	400,000	440,000
E. (1) 184 POWERHOUSE	1,350,000	2,150,000	3,500,000
F. (1) 151 ELECTRICAL SUBSTATION	640,000	2,020,000	2,660,000
G. (2) SETS OF 107 RETENTION BASINS	370,000	1,360,000	1,730,000
H. (1) GROUP OF 1700 SERIES SERVICE BUILDINGS	696,000	603,000	1,299,000
SUB-TOTAL STRUCTURES & EQUIPMENT	16,671,000	25,113,000	41,784,000
4. OUTSIDE FACILITIES INCLUDING SEWERS, WATER, STEAM, ELECTRICAL LINES, ROADS & RAILROADS	3,380,000	4,730,000	8,110,000
5. HEAVY EQUIPMENT CHARGES		2,566,000	2,566,000
6. SUB-TOTAL DIRECT CONSTRUCTION COSTS	20,051,000	32,409,000	52,460,000
7. CONTINGENCIES (15% OF ITEM 6)	2,949,000	4,891,000	7,840,000
8. TOTAL DIRECT CONSTRUCTION COST	\$ 23,000,000	\$ 37,300,000	60,300,000
9. TOTAL ENGINEERING COST			3,115,000
10. DISTRIBUTIVES			11,200,000
11. TOTAL PROJECT COST			\$ 74,615,000

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NEW PRODUCTION FACILITIES
COYOTE RAPIDS SITE
PART A

HDC-2245
~~HDC-2242~~

TABLE OF CRITICAL MATERIALS & EQUIPMENT

Reinforcing Steel	7500 Tons
Structural Steel	4200 Tons
Steel Pipe	9000 Tons
Steel Plate	14000 Tons
Rail & Track	1000 Tons
Interlocking Steel Piling	200 Tons
Galvanized Sheet Steel	50 Tons
Steel Wire	<u>30</u> Tons
Total Estimated Carbon Steel Requirements	35980 Tons
Cast Iron Pressure Pipe	1600 Tons
Copper Transmission Cable	490000 lbs.
Copper Pipe & Tubing	50000 lbs.
Copper Bus Bar	40000 lbs.
Copper Rod	10000 lbs.
Copper Sheet	<u>30000</u> lbs.
Total Estimated Copper Requirements	620000 lbs.
Aluminum Wire (Electrical Transmission)	26000 lbs.
Measurement & Control Instruments	\$425,000
Scientific Instruments	15,000
Power Steam Boilers	1,000,000
Electric Motors 3500 H.P.	1,200,000
Electric Motors 1000 H.P.	90,000
Electric Motors 200 H.P. & Under	50,000

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TABLE OF CRITICAL MATERIALS & EQUIPMENT

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Power Transformers	\$1,650,000
Switchgear	1,500,000
Pumps	1,150,000
Speed Increasers	150,000
Fluid Drives	750,000
Flywheels	400,000
Steam Turbines	425,000
Turbo Generators	150,000
Valves	1,800,000
Overhead Cranes	200,000
Conveyors	175,000
Ventilation Equipment	150,000

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Maudsley Research Laboratory
 New Research Laboratory
 George Davis Site - Part 6
 6. 27. 81
 J. M. Kelly
 2. 2. 81

2.25 2.20 2.15 2.10 2.05 2.00 1.95 1.90 1.85 1.80 1.75 1.70 1.65 1.60 1.55 1.50 1.45 1.40 1.35 1.30 1.25 1.20 1.15 1.10 1.05 1.00 0.95 0.90 0.85 0.80 0.75 0.70 0.65 0.60 0.55 0.50 0.45 0.40 0.35 0.30 0.25 0.20 0.15 0.10 0.05 0.00

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The image shows a document page with a grid-like structure, possibly a form or a ledger. The text is heavily obscured by noise and artifacts, making it largely illegible. Some faint, repeating text is visible, possibly "Design", "Planning", and "Comparison". There are also some numbers and dates, such as "1940", "1941", and "1942". The overall appearance is that of a very old and poorly preserved document.

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Construction Sp. f. 1000 Design

Construction & Construction
Two Toping

Design - Preliminary Construction Schedule

New Preliminary Preliminary

Construction Preliminary Preliminary

6.27.57

Design 1000

Design

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~~HDC-2239~~

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June 27, 1951

This document consists of
12 Pages No. 12 of 12
1 Copy. Series

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DESIGN REPORT ON TWO NEW REACTORS

Chen
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JUL 30 1956

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Prepared by

H. E. Grants

Approved by

W. N. Nifon

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DESIGN REPORT ON NEW REACTOR PRODUCTION FACILITIES

I. GENERAL DESCRIPTION AND BACKGROUND

This preliminary study has been made at the request of the Atomic Energy Commission. All specific estimates contained herein are approximate, since the limited time available did not permit a detailed study to be made. These estimates are all based on the assumption that these facilities will be built at Hanford on a site already surveyed.

The facilities described herein consist of two reactors located in the same area and served by a common 115 Gas Building. These facilities will be essentially the same as in the new "C" Area. The water plants and service facilities for this area are described in a proposal submitted by the Power and Mechanical Division.

II. RELATIONSHIP TO OTHER PROJECTS

This new project, if properly timed, will dovetail into Project C-431 and will provide maximum effective utilization of construction manpower and engineering and administrative personnel.

The schedule contained herein is based upon the assumption that if these facilities are required, a directive will be received not later than April, 1952. Receipt of the directive after this date will cause an extension in the construction schedule of at least one month due to the need to re-establish part of the construction and engineering groups that will have been dispersed upon the completion of their activities on the C-431 Project.

These two facilities should be scheduled in close sequence with Project C-431-B for maximum over-all efficiency and shortest construction time. The procurement of critical items such as structural steel and shield components could be expedited by having the present vendors produce parts for the new facilities in sequence with those for "C".

III. TIME REQUIRED TO ACCOMPLISH WORK AFTER AUTHORIZATION

The first of the two reactors and gas building will be physically complete 17 months after receipt of the directive. The second facility could be completed 22 months after receipt of the directive. The earliest that the first reactor could be completed is December 1, 1952, which is dictated by such limitations as procurement of critical construction items, and the construction schedule for the C-431 Project.

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III. (Continued)

The design schedule will be significantly shorter than that for C-431-B because of the few changes that will have to be made. A new gas building will have to be designed and certain changes may be made to facilitate construction or to reduce cost. However, the basic design of the reactor will be essentially that of "C".

Procurement could be initiated more rapidly than was accomplished for the 431-B Project because most of the requisitions can be reissued for these two new facilities. A detailed construction schedule is attached.

IV. COST ESTIMATES

The following is a summary of the total cost estimate for the two reactors:

A. Design	\$ 2,000,000
B. Special Graphite Procurement	2,000,000 *
C. Total Construction Cost	60,000,000
D. 115-B Gas Building	<u>1,500,000</u>
Total	\$65,500,000

* Item B above is the estimated cost of reactivating the Morganton plant. The actual cost of the graphite is included in item C.

V. MANPOWER REQUIREMENTS

The average peak construction manpower requirements for these two reactors staggered as shown on the attached force curves is 1,800, which will exist for a period of five months.

The total number of E&C direct personnel that will be required is 120, which includes administrative, technical, drafting, clerical, and stenographic.

VI. CRITICAL MATERIALS

The following is a list of only those materials for which procurement will be critical. This is based on present procurement procedures, priorities, and material availability. The quantities shown are for two reactors and a 115-B Building.

A. Carbon Steel

Plate	7,300 tons
Reinforcing bar	150
Structural shapes	1,500
Pipe	250
Punchings	1,600
Tubing (gun barrels)	340
Low manganese (3X balls)	<u>154</u>
Total	11,294 tons

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VI. CRITICAL MATERIALS (cont'd)

B. Stainless Steel

Tubing and pipe	70 tons
Clad low carbon	30
Boron-stainless castings	35
Castings (valves)	<u>25</u>
Total	160 tons

C. Cast Iron Pig
(thermal blocks and donuts) 2,400 tonsD. Lead Pig 130 tonsE. Copper

Copper wire (copper content)	100 tons
Copper tubing ($\frac{1}{4}$ " diameter)	800,000 feet
Copper-constantan thermocouple wire	1,700,000 feet

F. Aluminum

Castings - nozzles	85 tons
Process tube material	68 tons
Tubing - various sizes	<u>10 tons</u>
Total	163 tons

G. Miscellaneous

Chromel - Alumel thermocouple wire	120,000 feet
------------------------------------	--------------

VII. CRITICAL PROCUREMENT ITEMS

The following are those items which will be critical in terms of procurement time required under present circumstances. The quantities shown are for two reactors and a 113-B Building.

A. Special

Graphite - 3500 tons of purified grade

This will probably be the most critical item because of the time required to put the Morgantown plant of the Union Carbide and Chemical Corp. into operation. The availability of raw materials is also a factor.

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VII. CRITICAL PROCUREMENT ITEMS (cont'd)

B. Mechanical Equipment

Adjustable speed gas blowers	10 req'd.
Vertical rod winches	94
Charging and discharging elevators	4
Gun Barrels - Manufacturing	9,000

C. Structural

Structural steel fabrication
Shield "B" blocks, side laminations and component parts

D. Electrical

Thirty horizontal rod drive units
Unit substation and switchgear

E. Hydraulic

24" check valves	12
54" motorized gate valves	4
Inlet and outlet nozzles - Manufacture	9,000
Process tubes - extrusions	5,000

VIII. MAJOR EQUIPMENT REQUIREMENTS

This is based on starting second reactor five months after the first unit.

A. Excavation

8 carry-alls with tractors
3 push dozers
1 road patrol

If soil conditions do not permit the use of this type of equipment, the following will be required.

1	-	3½	Cubic Yard shovel
1	-	2	" " dragline, with drag and clam bucket
4	-	12	" " bottom dump Euclids
3	-	8	" " end dump Euclids

B. Structural

2 cranes (1201 Lira or equal) with 130 beam (including jib)
3 1½ cubic yard cranes
2 truck cranes
2 2½ T. trucks
2 65 T. trucks
2 pumpcrete pumps 8" - 1000' pipe
2 one cubic yard bottom dump buckets
10 concrete vibrators (gas)
3 500 CFM compressors } including mechanical installation use
2 315 CFM compressors }

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C. Mechanical

75 welding machines, 300 amp.
2 10 T. elect. low lifts
3 mules, elect.
2 degreasers

D. Transportation

8 Sedans

24 Pickups

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ESTIMATED FORCE REQUIREMENT BASED ON 48 HOUR WEEK

ESTIMATED
WORKING
FORCE

2200

2000

1800

1600

1400

1200

1000

800

600

400

200

0

NOTE: THIS CURVE INCLUDES ALL
DIRECT LABOR (ACCOUNTS
100-700 INCLUSIVE)

105X + 105Y

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TOTAL FORCE BOTH FACILITIES

ELAPSED TIME — MONTHS

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

ESTIMATED FORCE REQUIREMENT BASED ON 48 HOUR WEEK

ESTIMATED
WORKING
FORCE
1100

			2	3	4	5	6	7
1	TEMPORARY CONSTRUCTION AND SITE WORK	105 X 105 Y						
2	SUBSTRUCTURE	105 X 105 Y						
3	SUPERSTRUCTURE	105 X 105 Y						
4	PROCESS UNIT	105 X 105 Y						
5	POWER AND LIGHTING	105 X 105 Y						
6	HEATING AND VENTILATING	105 X 105 Y						
7	EQUIPMENT	105 X 105 Y						
8	PIPING	105 X 105 Y						
9	INSTRUMENTATION	105 X 105 Y						
10	ACCEPTANCE TESTS & CLEAN UP	105 X 105 Y						

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105X & 105Y
CONSTRUCTION SCHEDULE

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100 AREAS EXPANSION PROPOSAL

SUPPORTING FACILITIES & PERSONNEL REQUIREMENTS

The plant manpower forecast, a part of this section, includes personnel required for the 100 Area expansion proposal and associated expansion requirements superimposed on the manpower forecast given in Document HW-21217, titled "Village Housing - Plant Manpower Forecasts", dated May 29, 1951. In addition, the personnel requirements of Divisions affected by construction programs were adjusted to cover the construction period for the 100 Area Expansion Proposal. Curve No. 1, indicates the total G. E. Plant Forces when considering a slug exposure time of 600 MWD while Curve No. 2 indicates the total G. E. Plant Force when considering a 400 MWD slug exposure period.

The housing requirements were based on applying an .8 factor to G.E. personnel required to operate the expanded facilities. The cost of the housing addition was derived from a unit cost of \$16,000 which includes water, sewage, roads and electrical facilities. Both the area and village telephone exchanges would also have to be expanded.

A new grade school would have to be provided to handle the increased village population. Further, it was contemplated that a 12 bed expansion to the hospital would be necessary.

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100 AREA EXPANSION PROPOSAL

SUPPORTING FACILITIES AND PERSONNEL REQUIREMENTS

I. Cost

	Curve No. 1 600 MWD Level	Curve No. 2 400 MWD Level
Housing Addition Incl. Roads, Water, Sewage and Electrical Facilities	\$ 8,320,000	\$ 9,360,000
Telephone Expansion	140,000	155,000
Office Addition	100,000	100,000
Schools	1,250,000	1,500,000
Hospital Addition	50,000	50,000
Plant Buses	140,000	160,000
TOTAL	\$10,000,000	\$11,325,000

II. Personnel - The totals include personnel required on a permanent basis for 100 Area Expansion Proposal

Area	Curve No. 1 600 MWD Level	Curve No. 2 400 MWD Level
100	515	515
200	70	70
300	45	125
700	17	20
TOTAL	647	730

III. Housing Requirements - A factor of .8 applied to the personnel forecast will provide sufficient housing for G. E. Personnel as well as for personnel of groups which generally expand with a plant personnel increase including schools, churches, facilities, and Government Agencies.

	Curve No. 1 600 MWD Level	Curve No. 2 400 MWD Level
Additional Housing Requirement	520	585
Additional Housing Cost	\$ 8,320,000	\$ 9,360,000

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G. E. PLANT FORCE — EMPLOYMENT FORECASTS

PERSONNEL REQUIREMENTS ON A 5-DAY WEEK BASIS

100 AREA EXPANSION PROPOSAL

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~~DOC-2242~~

Richland, Washington
June 27, 1951/

This document consists of
 15 Pages No. 15 of
 15 Copies. Serial No. 15

TO: J. S. Parker

FROM: J. M. Frame

SUBJECT: DESIGN AND CONSTRUCTION PROGRAM FOR SEPARATION AREAS IN CONJUNCTION WITH PROPOSED INCREASE IN PILE OUTPUT

Introduction

A survey of each of the major processing facilities in the Separations Areas has indicated that under the most optimistic assumptions as to the potential capacity of each facility, it will be possible to process the forecast pile output without the construction of new major facilities. This assumes the continued operation of the "E" and "T" Areas at their present peak capacity.

The economics of operating two Bismuth Phosphate plants plus the Metal Recovery Plant as compared with the construction and operation of a new facility, similar in nature to Redox, is not considered in this report.

Certain modifications are required to the existing facilities in order to achieve their maximum potential capacity. These modifications are listed below; all have been included in the Manufacturing Divisions Budget for Fiscal '52 - '53. It is not considered necessary to construct new waste storage facilities as a direct result of the proposed increase in production rate. (HOC-2240)

Necessary Revisions to Separations Facilities

1. 200 North Area Storage Basins.
- a. Reinforce Monorail System Budget Item B-832 Est. Cost \$2,000,000.
in 212 P&R.
- b. Provide Additional Yokes and Budget Item B-1915 Est. Cost \$54,000.
Trolleys for 212 P&R
2. Redox Production Plant * Budget Item B-2033 Budget Est. \$2,000,000.
Present Est. \$ 625,000.
- a. Revise - Product Removal Cage
- b. By-pass Cross-Over Oxidizer
- c. Replace four (4) Plutonium Tanks
- d. Replace Condensate Evaporator
- e. Re-pipe Uranium Concentrators
- f. Replace Second and Third Plutonium Cycle Columns
- g. Re-pack IB Column with 3/4" packing in top section
- h. Replace IA Column

* Breakdown of work does not correspond with that shown in budget.

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3. Purification Building

- a. Convert Cell I to St'd. Cell Budget Item G-1910 Est. Cost \$50,000.
 b. Equip. Cell 5 for Waste Budget Item B-1911 Est. Cost \$30,000.
 Handling

4. Raw Materials Storage Areas Budget Item B-1894 Est. Cost \$190,000.

- a. Provide Additional Storage Tanks
 for Caustic and Nitric Acid.

SUMMARIZED PROJECT DATA

I. Design Schedule (from approval date)

Budget Item	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		5th Quarter	
	Man Day	% Comp	Man Day	% Comp	Man Day	% Comp	Man Day	% Comp	Man Day	% Comp
B-832	12	100%								
B-1915			12	100%						
B-2033	500	100%								
B-1910	35	100%								
B-1911	22	100%								
B-1894	130	100%								

II. Construction Schedule (from approval date)

B-832	24	20%	96	100%						
B-1915								460	100%	
B-2033								1000	100%	
B-1910			400	67%	200	100%				
B-1911	170	30%	170	100%						
B-1894			1000	43%	1300	100%				

III. Manpower Requirements

	On Site		Off Site	
	Man Days-Peak		Man Weeks-Peak	
a. Engineering	850	8	--	
b. Drafting	575	8	--	
c. Construction	4,820	64	(cannot occur before 1st Quarter Fiscal '53)	

IV. Heavy Equipment Requirements

TOTAL - \$11,500.

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V. Critical Materials

Budget Item	Stainless Steel	Steel	Copper	Copper Alloys
B-832	15 Ton	15 Ton	100 lb.	
B-1915	15 Ton	15 Ton	100 lb.	
B-2033	30 Ton	10 Ton	200 lb.	
B-1910	2 Ton	1 Ton	100 lb.	
B-1911	2 Ton	1 Ton	100 lb.	
B-1894	50 Ton	20 Ton	100 lb.	
TOTAL	84 Ton	62 Ton	700 lb.	100 lb.

VI. Critical Procurement Items

Budget Item	Stainless Steel	Motors
B-632		
B-1915		
B-2033	30 Ton	(Fractional H.P. 5(TWNC) (Explosion Proof
B-1910		
B-1911	2 Ton	
B-1894	2 Ton	
	50 Ton	
		3-10 H.P. TWNC

III. Rough Breakdown of Project Costs

A. Direct Costs	
a. Land and Land Right	
b. Non-Structural Improvements to Land	
c. Utilities	
d. Buildings and Structures	\$125,000
e. Installed Equipment	\$425,000
f. Demolition and Removal	\$ 15,000
B. Engineering Design & Inspection	
including Plans & Specifications	\$ 75,000
C. General and Administrative Costs	
	\$250,000
D. Contingencies	\$130,000
E. Uninstalled Equipment	

TVIOI

\$1,020,000.

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 Date 1/1/52
 By [Signature]
 For [Signature]

NORTH RICHLAND CONSTRUCTION CAMP
 HOUSING FACILITIES FOR
 CONSTRUCTION FORCE
 INCLUDING LIMITED NUMBER OF GENERAL ELECTRIC EMPLOYEES
 FOR CURRENTLY AUTHORIZED PROJECTS
 AND FOR PROJECTS 100-X, 100-Y, AND 105-X AND 105-Y

- Assumptions:
- 1) Requirements of presently authorized projects recognized and provided for.
 - 2) Start of Field Construction of 100-X, 100-Y, 105-X, and 105-Y is January 1, 1952.
 - 3) 100-X and 100-Y require 18 months to complete.
 - 4) 105-X and 105-Y require 16 months to complete.
 - 5) Indicated requirements for separation facilities are so small, no account taken thereof herein.
 - 6) No provision made for accommodating Architect-Engineer Forces in North Richland Construction Camp.

Total

Forecast:

Force Forecasts of Construction Workers, Excluding Architect-Engineer Forces for 100-X, 100-Y, 105-X, and 105-Y, furnished by the respective Engineering and Construction Line Divisions when superimposed on the current Construction Force Forecast result in a total forecast, a copy of which is attached.

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Housing:

The impact of the above total Construction Force Forecast upon North Richland Housing Facilities is:

Date	Total, Barracks		Total, Trailer Space	
	Capacity	Occupancy	Capacity	Occupancy
7-1-51	2460	2081	2135	1637
8-1-51	2460	2050	2135	1610
9-1-51	2460	1995	2135	1562
10-1-51	2460	1921	2135	1499
11-1-51	2460	1891	2135	1474
12-1-51	2460	1866	2135	1452
1-1-52	2460	1845	2135	1520
2-1-52	2430	1866	2135	1538
3-1-52	2430	1803	2135	1484
4-1-52	2430	1782	2135	1466

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<u>Date</u>	<u>Total, Barracks</u>		<u>Total, Trailer Space</u>	
	<u>Capacity</u>	<u>Occupancy</u>	<u>Capacity</u>	<u>Occupancy</u>
5-1-52	2480	1740	2135	1430
6-1-52	2480	1698	2135	1394
7-1-52	2480	1732	2135	1466
8-1-52	2480	1816	2135	1538
9-1-52	2480	1711	2135	1448
10-1-52	2480	1669	2135	1412
11-1-52	2480	1711	2135	1448
12-1-52	2480	1690	2135	1430
1-1-53	2480	1543	2135	1304
2-1-53	2480	1312	2135	1106
3-1-53	2480	1165	2135	980
4-1-53	2480	955	2135	800
5-1-53	2480	640	2135	530
6-1-53	2480	451	2135	368
7-1-53	2480	378	2135	305

Bremerton Houses: The 201 North Richland Houses are presently occupied and are deemed adequate.

Conclusion: From the above table it appears that Barracks and Trailer Space Capacity is adequate.

ENGINEERING AND CONSTRUCTION SERVICES
DIVISION
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Enc. See Dmd
WAB, 10-12-52

(PRELIMINARY STUDY)

CONC. PRESENT CONSTRUCTION PROGRAM, 100-A 10-1-52, 100-A 10-1-52
(RESOURCES ARCHITECT-ENGINEER CORP. FOR 100-A 10-1-52, 100-A 10-1-52)

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ESTIMATE OF
NEW CONSTRUCTION EQUIPMENT
INCLUDING LIGHT AND HEAVY CONSTRUCTION EQUIPMENT
AND GENERAL SERVICE VEHICLES
REQUIRED BY
100-X, 100-Y, 105-X AND 105-Y

Assumptions:

- 1) Construction Schedules of Current Projects, and 100-X, 100-Y, 105-X, and 105-Y are as per attached chart.
- 2) Present Equipment (Approximately 2500-units) is deemed adequate for current projects; however, it is anticipated that a substantial portion of present Heavy Construction Equipment will be worn-out and unsuitable for efficient operation upon completion of current projects.
- 3) Based upon estimates furnished by the respective E&C Line Divisions, adjusted to conform with past project experience, the peak requirement of Construction Equipment for 100-X, 100-Y, 105-X and 105-Y, (excluding Separation Facilities) will be about 2000-units.
- 4) About 650-units presently assigned to current projects, will upon release be assigned to the new work, which will along with 1350 new units meet the requirements.
- 5) The requirement of 1350 new units results from:
 - A) Peak requirements during the overlap of schedules of current construction work and Projects 100-X, 100-Y, 105-X and 105-Y.
 - B) Replacement of equipment worn-out by the time of completion of current projects.
- 6) All work involved on Projects 100-X, 100-Y, 105-X and 105-Y to be CPFF..
- 7) Present Shop Equipment is adequate; however, special study of this requirement is warranted.

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ESTIMATED REQUIREMENTS.

100-X, 100-Y,	1000 New Units, Acquisition Cost, including freight	\$ 7,150,000
105-X & 105-Y	350 New Units, Acquisition Cost, including freight	\$ 2,448,000
Seven buses for operations, New,	Acquisition Cost	\$ 85,000
Total Acquisition Cost, New Equipment, including freight		\$ 9,683,000

Note:

The above estimated cost of \$9,683,000 is Acquisition Cost, and it is not to be regarded as Usage Costs to Projects.

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CONFIDENTIAL SCHEDULE

INDICATED PROJECTS

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EX-15-D/H
WAT/JUNE 27, 1951

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