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SECURITY INFORMATION

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(Reactors Research and
Power)

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REACTOR OPERATIONS DIVISION

MONTHLY REPORT

R. W. Fowell

WO 20516

December, 1951

CLASSIFICATION CANCELLED
DATE <u>9-21-56</u>
For The Atomic Energy Commission
<u>H. F. Canell</u>
Chief, Declassification Branch <u>FC</u>

~~RESTRICTED DATA~~

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BROOKHAVEN NATIONAL LABORATORY
Upton, N.Y.

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MONTHLY SUMMARY OF OPERATION

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December, 1951

Day 471- 501

Minimum Loading for Month	684.5 Channels (52699.656 Kg)
Maximum Loading for Month	687 Channels (52892.131 Kg)
MWD of Reactor Operation to Date	5251.090
MWD of Reactor Operations for Month	499.932
Average MW/Hr	16.12
Hours of Operation	570.09
%Down Time	23.3
Average MW/hr of Operation	21.04
Maximum power level	28.5
Electric Energy Consumed by Cooling Water Pumps	152,950 KWH
Electric Energy Consumed by Cooling Fans	2,515,600 KWH
Total Electric Energy Consumed in Cooling Reactor	2,668,550 KWH
Cartridges Charged during Month	0
Cartridges Discharged during Month	5

Discharge Date	Reason	Cart.No.	Channel No.	Date Charged	Final Test	Disp.
12-19-51	Leak	2034 A	D5-10 N	8-24-50	12-30-48	Canal
"	*	2161 A	D5-10 S	8-24-50	1-10-49	"
12-29-51	Leak	1274	B0-1 N	8-18-50	12-21-48	"
"	*	1496	B0-1 S	8-18-50	1-19-49	"
12-22-51	Leak	1594	D2-4 S	8-18-50	1-4-49	"

A- Air Thermocouple * Good cartridge discharged to remove leaking N. Cartridge

Metal Inventory	Cart.	Slugs
Uncanned		34611
Tested Good	6	198
Rejects	123	4059
Pile	1370	45210
Canal	87	2871

NOTE: See Power Level Plot on next page.

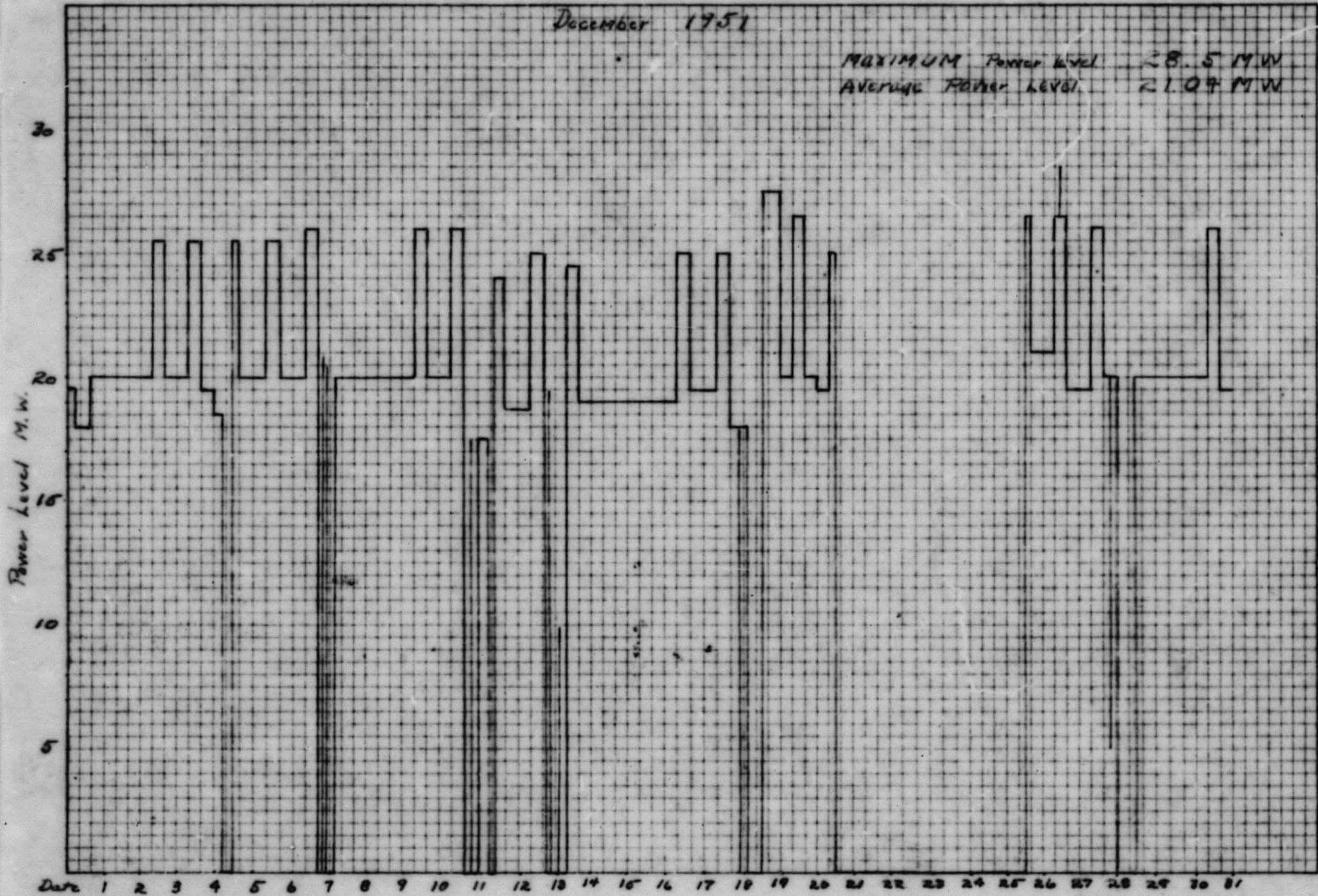
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KEUFFEL & ESSER CO., N. Y. NO. 888-4
10 x 10 to the inch.
All lines about thickness
MADE IN U. S. A.

December 1951

MAXIMUM Power Level 28.5 MW
AVERAGE Power Level 21.09 MW



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1. Down Time Analysis

For the purpose of analyzing the causes of curtailed operations during the month, the down time of the reactor has been charged as follows:

Holiday Shutdown	107.80 hr.
Exponential Facility	16.34 hr.
Biology	12.68 hr.
Operations	11.72 hr.
Katcoff	6.00 hr.
McReynolds	5.90 hr.
California Research	5.43 hr.
Medical	5.04 hr.
Sailor	2.00 hr.
Church	1.00 hr.

173.91 hrs.

The Laboratory was officially closed from Noon, Friday, December 21, 1951 thru Christmas Day. Since few people wished to conduct research during this period the reactor was shutdown. Full reactor crews worked thru this period except for December 24 and 25, on which days a stand-by crew of one man per shift was scheduled in.

During the shutdown period the permanent shield for the Biologists thermal column was installed. This work occupied the crews full time for twenty four hours. When this facility is completed the biologists will be able to expose their specimens without interrupting the operation of the reactor.

During the remainder of this Holiday down time, a fuel unit was discharged from D-2-4-S; both plenum chambers were scanned for irregularities, and a special slug was charged for the Hot Lab Group on Tellurium separation.

During the month the Operations Division was charged a total of 11.72 hours for discharging two leaking fuel units, (in addition to the one already mentioned.). This will be discussed in more detail under the Helium System.

Use of the Biology facility required 12.68 hours, and work on the Exponential pile in position T-17 on top of the pile required 16.34 hours down time. In practically all cases this down time was scheduled after 1700 on Tuesdays and Fridays. The remainder of the down time, with the exception of one patient treatment on December 13th, was scheduled for the regular Wednesday morning shutdown.

Excluding the curtailed operations for Christmas Holidays, the reactor operated 89.7% of the month as compared with 92.4% for the previous month.

11. Reactivity

There were no significant changes in reactivity. The discharging of five fuel units during the month resulted in a small reduction in excess reactivity. Excess reactivity during normal operations is valued at 150-200 inhours.

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III. Helium System

On December 19, 1951 the fuel unit in North end of Channel D-10-5 was discharged because it had developed a Helium leak, which was considered to be intolerable. There were no indications that any fission products escaped from the leak. The fuel unit in the south end of this channel was necessarily discharged in this operation, altho it did not leak.

On December 23, 1951 the fuel unit in the south end of Channel D-2-4 was discharged because its leak rate was considered too great. Again, there was no indication that any fission products had escaped.

The fuel unit in the north end of B-0-1 was discharged on December 29th for the same reasons discussed above. Again, the fuel unit in the south end of the channel was discharged, altho it did not leak.

It should be noted that during the last six months there have been six units with leaks great enough to warrant discharge; five of these leaks were in north end of channel. Since there were no fission products lost from the fuel units it is suspected that these leaks may have been in the capillary tubes. The difficulty of forming the expansion loop in the capillary tube at the north end of the channel may be a contributing factor to this seemingly high incidence of north leaks.

No new tolerable leakers were located during the month. There has been essentially no change in the leak rates of the forty-seven known leakers in the pile.

IV. Canal

Activity of the canal water remained at about 1×10^{-9} curies per cc all month. Visibility deteriorated somewhat during the latter part of the month, apparently due to the growth of bacteria which were not removed by the filters.

V. General Maintenance

All general maintenance problems encountered during the month were routine in nature. Vibration measurements taken on the 1500 HP motor-fan units indicated no change.

Specific gravity and cell voltage readings taken on the two 250 volt battery banks in Bldg. 704 indicated that one half of each bank had dropped below normal. An investigation revealed that the Cyclotron group had been drawing an excessively large current at 125 volts without the knowledge of the Reactor Operations Division. Several days of continuous charging were required to raise the batteries to their normal charge level.

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VI. Instrument Maintenance

Ion Chamber Trip Circuits

A new high level trip circuit has been devised which has "suppressed zero" action. Tests indicate that use of this circuit would improve the accuracy of the trip setting about a factor of ten. Some parts which are subject to frequent failure would also be eliminated. It is planned to rebuild the present trip equipment accordingly.

Neutron Counting (Scaler) System.

This system has been eliminated.

Instrument Power System

During the annual overhaul of Inverter No. 2 the exciter commutator was found to be out of round with a run-out of .004 inches and one of the sliprings had a deep groove. The rotor was removed and turned in the lathe. Both motor bearings were replaced.

Ion Chamber Development

The adjustable gamma-compensated neutron chamber is in the final stages of assembly.

A neutron chamber has been designed which should give good gamma compensation without adjustment provided the flux gradient is along the chamber axis. Such a chamber is being built.

Still another neutron chamber has been suggested which should give good gamma compensation in any flux gradient.

Critical Test Facility

Work has been done on the preliminary specifications and cost estimate of the instrument system.

VII. Safety

There were no physical injuries to members of the operating staff reported during the month.

Exposures in excess of the daily tolerance of 50 mr were reported for five persons during the month. There were no exposures in excess of the weekly tolerance of 300mr.

December - 1951

A. Experimental Holes

1. Research work is continuing at the following experimental holes:
 - E-22 Crystal spectrometer- Sailor (RS&E Dept.)
 - E-41 Solid State Studies- McReynolds (Physics Dept.)
 - E-44 Neutron Mirror Experiment-Harvey & Hughes (Physics)
 - E-45 Furnace containing special Sample- Naval Reactor Division,
(Argonne National Laboratory)
 - E-46 Slow Neutron Chopper- Hughes & Palovsky (Physics)
 - W-12 Assigned to Hughes of Physics Dept. for Velocity Selector
(Inactive)
 - W-14 Neutron Diffraction- Cohn and McReynolds (Physics)
 - W-15 Assigned to Coor of Physics Dept. (Inactive)
 - W-16 Gamma Ray Studies- Motz (Physics)
 - W-31 Neutron Diffraction- Weiss (Watertown Arsenal)
 - W-33 Double Crystal spectrometer- Hastings and Corliss (Chemistry)
 - W-34 Argon Irradiation- Katcoff (Chemistry)
 - W-36 Neutron Spectrometer- Weiss (Watertown Arsenal)
McReynolds (Physics Dept.)
 - W-51 Assigned to E. der Mateosian of Physics Dept. (Inactive this
month.)
 - W-53 Testing crystals with Neutrons- Bernstein (Electronics)
 - W-54 Gamma Ray Studies- E. Church (Physics)
 - W-56 Assigned to der Mateosian- Physics Dept. (Inactive)
2. The only Experimental Equipment removed during the month was at E-23 where a special shield plug was removed and a regular plug was replaced for McReynolds.
3. In E-11 a new type neutron thermopile was installed where it will be tested for the Brown Instrument Co. by the Reactor Instrument Group.

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B. Top of File

- T-6 Biology installed permanent shielding at the thermal column.
- T-9 Medical Department made one patient irradiation during the month using the Medical facility.
- T-17 Several runs were made by Materials Testing Exponential Experiment.
- T-19 Shielding group continued measurements at their facility.

C. Irradiations

1. Bottling Machine- Irradiations in the bottling machine showed a decrease of 14, from last month's total of 72.
2. Pneumatic Tubes- Irradiations in pneumatic tubes during the month totaled 87, an increase of 39 over previous month.
3. Experimental Holes- Four experimental holes were used for service irradiations.

E-13 Installed cobalt for long term irradiation for Biology Dept

W-36 Special samples are being irradiated for KAPL (...C.Judd)

W-34 Argon is being irradiated for Katcoff of Chemistry Dept.

E-30 Piston rings were irradiated for California Research Corp.
Richmond Calif.

4. Newson Holes

The following Newson holes are being used for irradiations:

C-2-3-S Cobalt-Biology Dept.	B-6- $\frac{1}{2}$ Cobalt-Manowitz-Reactor
D-1-5 $\frac{1}{2}$ " Manowitz-Reactor	A-9-4 $\frac{1}{2}$ Uranium Chips-Tucker & Stang-Reactor
C-2-3-N " - " "	B-1-4 $\frac{1}{2}$ Graphite-Gurinsky-Reactor
A-8-6 $\frac{1}{2}$ Tantalum- " "	B-0-4 $\frac{1}{2}$ Graphite-Gurinsky-Reactor
B-0-6- $\frac{1}{2}$ Cobalt- " "	

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IRRADIATIONS BY MATERIALS

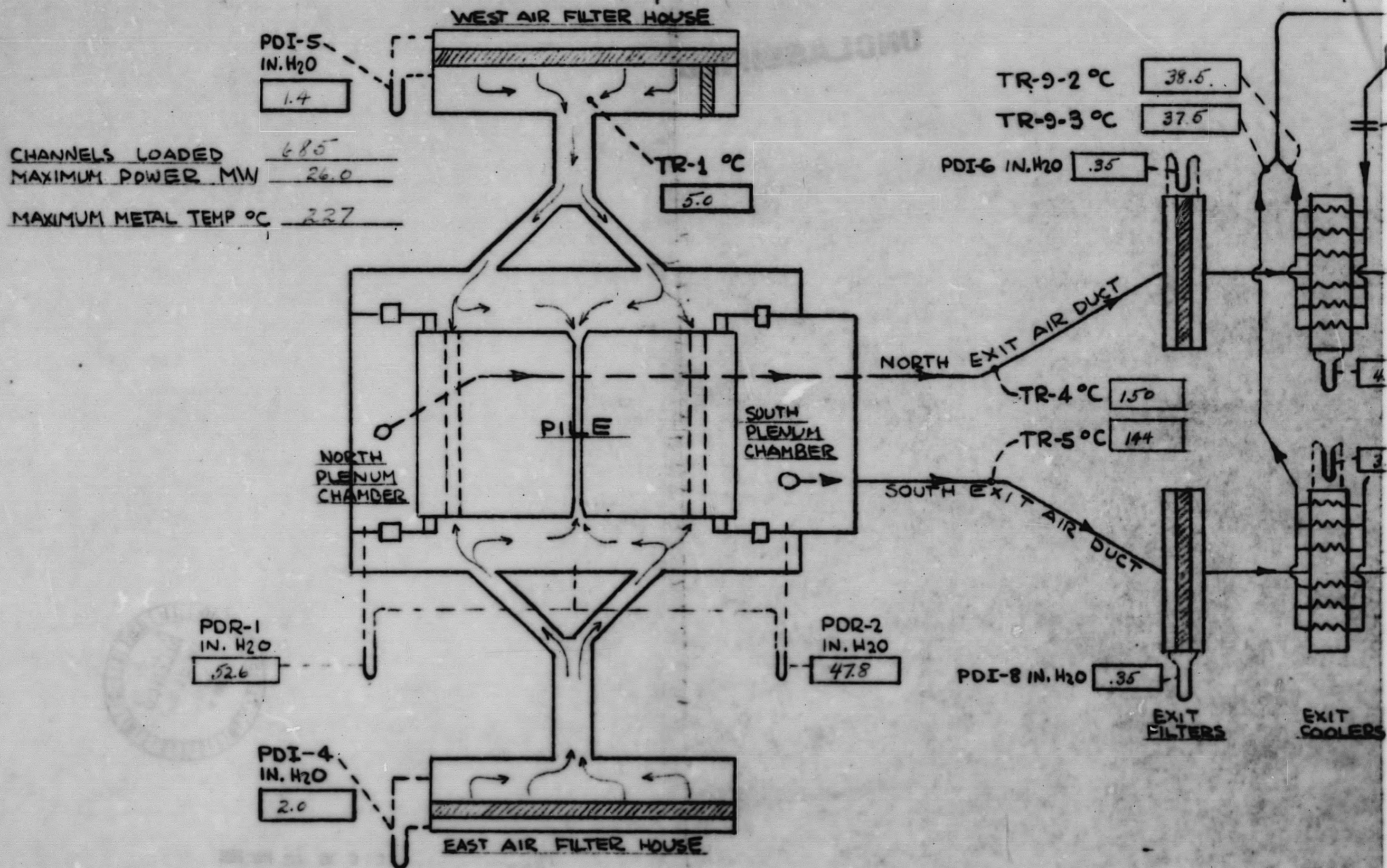
December, 1951

Aluminum	4	Potassium	16
Argon	3	Rubidium	1
Bismuth	5	Scandium	1
Bromine	3	Selenium	2
Cadmium	11	Silicon(Quartz)	16
Carbon	1	Sodium	27
Chlorine	14	Tellurium	5
Chromium	3	Tin	1
Cobalt	2	Titanium	18
Copper	3	Tungsten	1
Erbium	2	Uranium	15
Gold	31		
Indium	2		
Iodine	5	Styrofoam	1
Molybdenum	3		

IRRADIATIONS BY DEPARTMENT

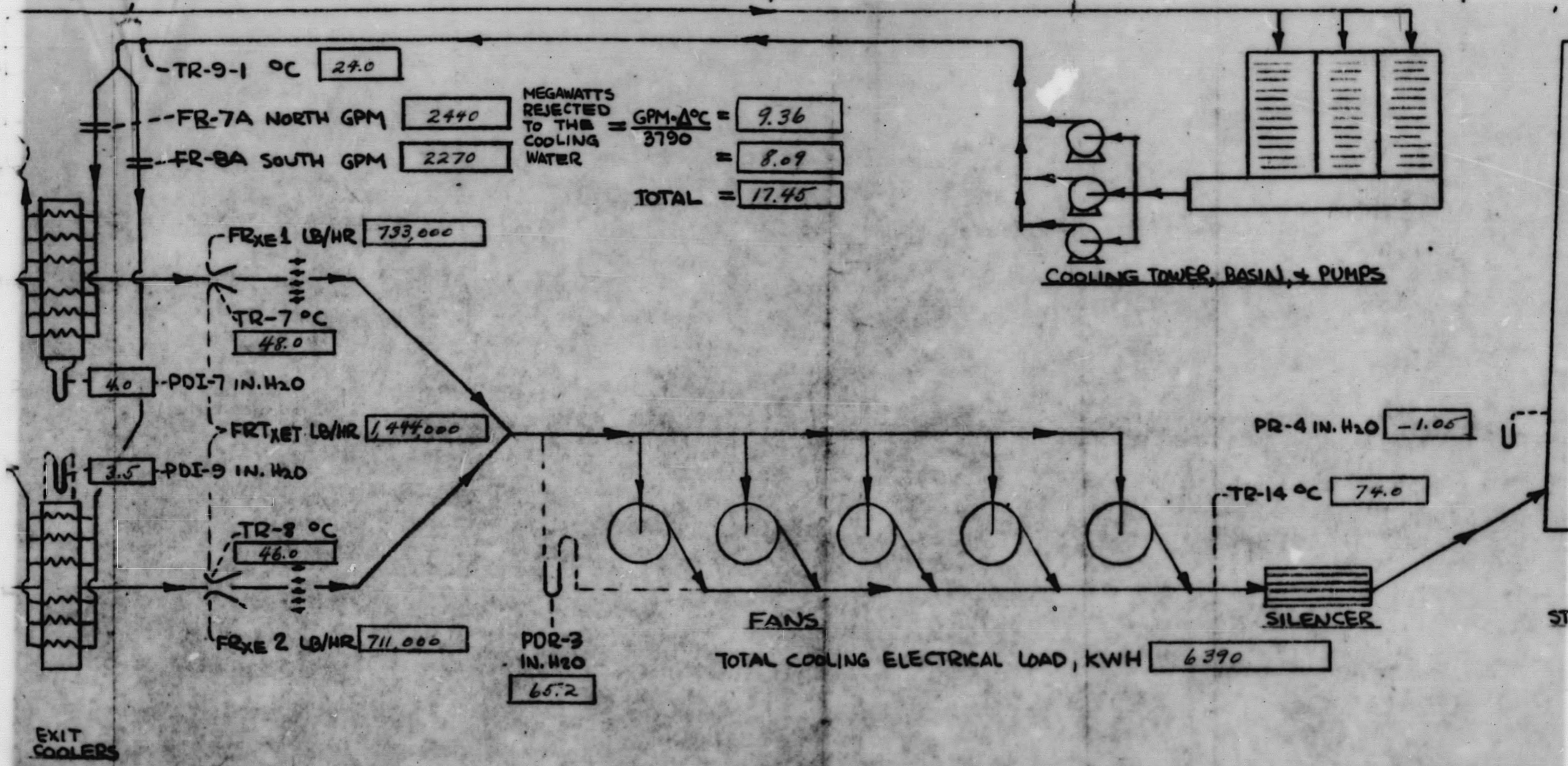
December- 1951

<u>Department</u>	<u>Bottling Machine</u>	<u>Pneumatic Tube</u>	<u>Nowson Holes</u>	<u>Experi. Holes</u>	<u>Total</u>
Physics	12	38			50
Reactor	9	11	1		21
Medical	10	11			21
Chemistry	1	27			28
Biology				1	1
<u>Outside</u>					26
Vets Hosp, N.Y.C	5				
Sloen Kettering, N.Y.C.	5				
AEC-New Brunswick	1				
Abbott Lab.-N.Chicago, Ill.	6				
Harvard Med. School	5				
Dr. Ramsey-Harvard U.	2				
Syracuse U.	1				
New England Center Hosp., Boston, Mass	1				
	<u>58</u>	<u>87</u>	<u>1</u>	<u>1</u>	<u>147</u>



KEY TO INSTRUMENT SYMBOLS

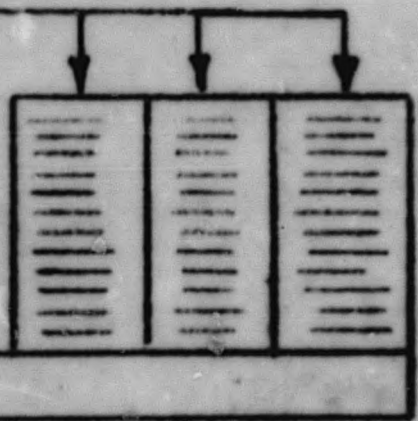
P: PRESSURE	T: TEMPERATURE
F: FLOW	I: INDICATOR
R: RECORD	D: DIFFERENTIAL



BROOKHAVEN NUCLEAR REACTOR

PROCESS CONDITIONS SUMMARY SHEET

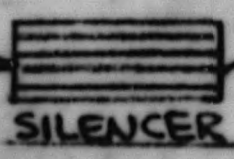
DATA ON THIS SHEET REPRESENT PROCESS CONDITIONS FOR: - 0930 Day #561 12-31-51



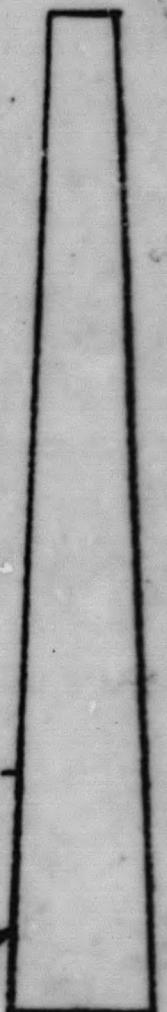
3 BASINS, 4 PUMPS

PR-4 IN. H₂O -1.05

TR-14 °C 74.0



SILENCER



STACK

190

RY SHEET

0930 Day #507 12-31-51

END