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OAK RIDGE NATIONAL LABORATORY

Oak Ridge, Tennessee

TECHNICAL DIVISION

Section III

ATMOSPHERIC CONTAMINATION SURVEY

OAK RIDGE NATIONAL LABORATORY

DECLASSIFIED

Per Letter Instructions Of
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by

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Atmospheric Contamination Survey, Oak Ridge National Laboratory

1.0 Abstract

1.1 This report summarizes data collected by the Technical Division Design Section on the problem of reducing the particulate and gaseous activity being discharged into the atmosphere at Oak Ridge National Laboratory. This report deals only with that air being discharged from buildings in the "restricted area" and does not include air from the pile. It has been found that, at present, a total volume of 365,165 cubic feet per minute of exhaust air is being discharged to the surrounding area. It is hoped that this volume can be substantially reduced and decontaminated to a point where a health hazard no longer exists. Discussion of means of reducing the exhaust air volume, methods of decontamination, and possible combined building ventilation systems are presented in detail herein.

2.0 The Contaminated Waste Gas Problem at Oak Ridge National Laboratory

2.1 Purpose

The discharge of air and waste gases contaminated with radioactivity from the research, development, and processing facilities into the atmosphere presents a serious hazard to the personnel at Oak Ridge National Laboratory. The seriousness of the hazard has been presented by the Health Physics Division, and the urgency for a program of investigation and correction has been postulated by the Atomic Energy Commission. To provide a basis for the design of air cleaning facilities and to determine the major contributing sources of air decontamination a laboratory wide survey of gas handling facilities is underway. This report summarizes the data collected during the first stages of this investigation. Proposals for and actual installation of air cleaning facilities are discussed.

2.2 Scope

C. N. Rucker has outlined in a letter to the Atomic Energy Commission the following sources of air-borne activity at Oak Ridge National Laboratory:

105 Building	(Pile Building)
205 "	(Separation Building)
706-C "	(Isotope Building)
706-D "	(Rala Building)
706-A "	(Chemistry)
706-B "	(Physics)
706-HB "	(Solvent Column Building)

Tank Farm Area
Retention Pond Area
White Oak Creek (Above and below present dam)
Burial Grounds
Incinerator and Burning Pits
Hot Salvage Areas
General Laboratory Area which has developed a contamination level which is above normal background.

In addition to the above listed sources of activity, several other buildings are known offenders. These are as follows:

101-B Building	(Rolling Mill)
204 "	(Isotope Building)
706-G "	(Radium Source Building)
New Isotope Area	

The following table lists the buildings and their air discharge volumes that are, at present, included in this study.

TABLE I

Building No.	Total Air Discharged*
101-B	166
105	9535
204	18000
205	23400
706-A	144790
706-C	29084
706-D	25805
706-G	600
706-HB	32785
New Isotope Area (includes expan.)	81000
TOTAL	365165

*Actual and rated capacity - not reduced flows.

The air-borne activity can be divided into two categories. First, radioactive gases which are dispersed in ventilating air. The second is the particulate activity of entrained dusts and particles.

2.3 Requirements for Cleaning Facilities

The requirements for the cleaning facilities are: (1) the removal of all particles down to 0.1 micron and (2) the removal of iodine down to 0.045 mg/liter (limits of analytical accuracy). The requirements for the removal of argon and kyptron will be determined at a later date.

3.0 Air Disposal Facilities and Contamination

3.1 Existing Facilities and Capacities

Table II summarizes the air volumes exhausted from each building included in the survey. For each source, the possible contaminats and any existing permanent decontamination equipment are also itemized.

TABLE II

EXHAUST FACILITIES, VOLUMES, AND CONTAMINANTS

UILDING NO. AND USE	VOLUME c.f.m.	DISCHARGE FACILITY	POSSIBLE CONTAMINANTS	PERMENANT DECONTAMINATION FACILITIES
101-B ranium eduction Hood	166	Hood and individual fan discharged to atmosphere.	Uranium duct 3.1 mgs. U per reduction heat lasting for 15 min. U can be of 95% enrichment.	None
105- Hoods 7	9,535	Discharged through individual fans to short roof stacks.	Unknown. No data available.	None
204 entilation	3,000	16" duct from Bldg. 204 to 205 fans and stacks.	Pu, U, fission products, in small quantities. No data available.	None
Hood	15,000	Hood to individual fan and stack discharged to atmosphere.	Unknown	None
205 Cell entilation cells.	16,000	Duct running to fans at the 205 Bldg. stack.	Unknown.	None
oods-6	6,400	Discharged through individual fans to short roof stacks. These hoods serve the analytical laboratories in Bldg. 205.	Unknown. No data available.	None
ff-gas Lines	300	4" Stainless Steel line from 205 to a jet at the 205 stack.	Small, Hexone.	None
issolver	100	4" Stainless Steel line from dissolver to a jet at the 205 stack.	NO_2	Reflux condenser and scrubber.

TABLE II- -(con't)

BUILDING NO. AND USE	VOLUME c.f.m.	DISCHARGE FACILITY	POSSIBLE CONTAMINANTS	PERMENANT DECONTAMINATION FACILITIES
706-A Hoods and all Vents, 65 Hoods.	144,740	Air is discharged from hoods through individual fans to short stacks on the roof of 706-A. Stack level 30 ft. above ground.	Almost anything. No data available.	None
Semi-Works Dissolver Off-gas Line	50	Dissolver off-gases are pulled through a steam jet & discharged to the atmosphere.	Entrained U & Pu, fission produce activity. No data available. NO inactive (No data) NO_2 inactive (No data)	Reflux condenser on dissolver.
Process Vessel Vents	No positive flow provided	Vented to atmosphere through roof.	Entrained fission products, U & Pu in very small quantities. (No data.)	None
706-C Hood Vents 16 hoods	21,590	Individual fans for hoods discharging to short stacks directly above the roof.	Unknown. No data available.	None
Cell Vents. 2 Banks 4 cell ea.	7,394	Individual fans for banks discharging to short stacks directly above the roof.	Unknown. No data available.	None
Dissolver & Process Off-gas Lines.	100	Two 2" SS lines each with a booster jet of 50 cfm capacity. Dissolver line ties into 706-D dissolver line or to the 706-D off-gas line. The off-gas line ties into the 4" 706-D off-gas line after the Spencer blowers.	I^{131} and other contributors not now known. Data not complete.	Scrubber on I^{131} process equipment dissolver.

TABLE II - -(con't)

BUILDING NO. AND USE	VOLUME c.f.m.	DISCHARGE FACILITY	POSSIBLE CONTAMINANTS	PERMENANT DECONTAMINATION FACILITIES
706-D Cell vent system 2 cells	15,000	Duct from cells to a Size 8 type S C Buffalo Forge exhaust fan of 15,000 cfm capacity throttled down to 3,000 cfm. Fan discharges into a short stack 50' high and 30" diameter.	General fission products, uranium, etc. during a Rala run may be carried either as gases or as particles. Total Activity in Line as measured by: Gamma / Beta Cyclone sampler: 133 MC / 169 MC CWS#6 paper sampler: 15,000 MC / (Not determined) Apparent half-life: 6 to 8 days Measured 4 days after run	No permanent facility. Temporary Deep Pocket AAF FG#50 & Chem.Corp. #6 filters installed, Jan.1, 1949.
Hood Vents 3 hoods	10,600	Individual fans for hoods discharging to short stacks directly above the roof.	Unknown. No data available.	None
Process Vessel Off-Gas Line	140	4" black iron exhaust line from 706-D to Spencer turbo blowers in 706-DA. A 4" line runs from these blowers to the 205 cell vent duct at the south-east corner of Bldg. 205 & from there, as part of 205 cell exhaust to the 205 stack.	Small quantities of all activities listed for the 706-D dissolver line. Sampled before FG-50 Filter Gamma / Beta Cyclone sampler: 176 MC / 90 CWS#6 paper sampler: 1170 MC / (Not determined) Apparent half-life: 6 to 8 days Measured 6 days after run	No permanent facility. Temporary Deep Pocket AAF FG#50 filter installed Nov.,1948.
Dissolver Off-gas Line (During Rala run)	65	2" SS line running from 706-D to a SS steam jet at the 205 Bldg.	I^{131} Xe^{133} Kr^{85} NO Inactive NO_2 Inactive Possible entrained mist containing mixed fission spectra. Sampled before FG-50 Filter Gamma / Beta Cyclone sampler: 220 MC / Unknown CWS#6 paper sample: 139 MC Apparent half-life: 6 to 8 days Measured 5 days after run	Packed caustic scrubber using 4 gpm of 5% NaOH, plus temporary AAF Deep Pocket FG#50 filter installed in Dec., 1948

TABLE II - -(con't)

BUILDING NO. AND USE	VOLUME c.f.m.	DISCHARGE FACILITY	POSSIBLE CONTAMINANTS	PERMENANT DECONTAMINATION FACILITIES
706-G	600	205 Stack	Ra., Be (Building not operating.)	None
706-HB Cells-6	28,880	Cells vent through eight axial flow fans to individual stacks on roof. Stack height: 60' above ground level.	Unknown (Building not in operation.)	None
Hoods-4	3,860	Individual fans for hoods discharging to short stacks directly above the roof.	Unknown (Building not in operation.)	None
Dissolver & Process Vessel Off-gas lines.	45 (neglecting steam.)	Both off-gas systems are provided with jets that discharge to the atmosphere approximately 50' above the ground.	Unknown (Building not in operation.)	Dissolver will be equipped with reflux condenser.
Waste Tank Vents 20 Tanks	No forced circulation.	All Waste tanks are vented to the atmosphere at ground level. During periods of transfer (by steam jet) and agitation (by air sparger).	Fission products, organic vapors, entrained U or Pu in small quantities. No data available.	None
Combustible	Unknown	Products of combustion are discharged to atmosphere through a stack approximately 30' high.	Unknown.	None
TOTAL - - -	284,165			

3.2 Facilities Under Construction

To handle the ventilation air and the off-gas from the new isotope area, a brick stack is being constructed N. of the 706-A building. This stack will have the following dimensions: height, 250 feet; base diameter, OD, 15 feet; top diameter, ID, 8 feet 6 inches. The volume of air from the isotope area, both that under construction and that proposed for future expansion, will not approach the capacity of the stack. Consequently, this stack will have the required capacity to carry the air discharged from the other surrounding buildings.

3.3 Individual Facilities Requiring Decontamination

The facilities in each building that require decontamination or consideration are individually described in Tables III through IX. A short description of the opening through which air enters the facility is given for convenience in determining the volume required for any face velocity. The column headed "Present Air Flow" gives the volumes through the hoods or cells at the time of the survey. In all instances, except for building 706-A, these figures were determined from fan ratings.

For use as a reference, the floor plan for each building listed in Tables III through IX is given in the appendix. The location of the facilities that require air handling are labeled with numbers that correspond to the room and hood numbers listed in the tables.

3.31 Building 101-B

There is a total discharge from the uranium reduction area in Building 101-B of 166 cubic feet per minute. Indications are that considerable activity is being carried up the stack. This activity, from heats in which U_3O_5 is reduced to form 1500 grams of a 25% uranium aluminum alloy, occurs in the greatest intensity during the ten minute charging period. Once melted the activity falls to 10% of its highest value for the remainder of the heat. There are two reduction heats per day with a time of one hour per heat.

3.32 Building 105

Table III lists the hoods that are located in Building 105. Other air that is discharged to the atmosphere from this building is handled by the pile decontamination equipment. The hoods given are those existing at the present and are not necessarily in use, nor do they all handle radioactive material. It is noted that some hoods have a higher face velocity than 100 feet per minute, some lower.

3.33 Building 205

Table IV lists the hoods and cells located in Building 205. Recommendations are omitted pending a discussion by the Radiation Hazards Committee on hood face velocities and general ventilation requirements.

3.34 Building 706-A

Table V lists the hoods located in Building 706-A. From a study of the hoods listed, it is readily seen that in the majority of cases the velocity in the face opening of the hoods is below 100 linear feet per minute. In some cases, it is less than 50 linear feet per minute. This condition should be corrected at the earliest possible moment. These values are actual measurements.

A ventilation study of the hoods in Building 706-A was made by Mr. W. H. Bauman upon the suggestion of Mr. G. R. Patterson, Health Physics Representative. Velocity measurements were made with the direct reading Alnor Velometer (swinging vane anemometer). This instrument has an accuracy of 3% of full scale readings; hence, for velocities below 100 feet per minute the error is + or - 10%.

3.35 Building 706-C

Table VI lists the hoods and cells located in Building 706-C. In some instances, the only ventilation of the rooms in which the hoods or cells are located is through the exhaust facility listed.

3.36 Building 706-D

Table VII lists the hoods and cells located in Building 706-D. The air flow through the cell has been reduced from 15,000 cubic feet per minute to 2,500 cubic feet per minute. No operating difficulties have been encountered during two Rala runs at this reduced air flow. A suction pressure of 1" of water is maintained by the exhaust fan on these cells during operation.

3.37 Building 706-HB

Table VIII lists the hoods and cells and exhaust air volumes from Building 706-HB. This is a newly constructed building and operating information is not available.

3.38 New Isotope Area

Table IX lists the proposed air flows in the buildings within the isotope area that is under construction. It should be pointed out that the design volumes have been corrected by employing use factors consistent with operations. This information was supplied by A. F. Rupp of the Operations Division.

TABLE III

BUILDING 105

ROOM	HOOD NUMBER	DESCRIPTION	PRESENT AIR FLOW
			c.f.m.
101	1	Face Opening - 13.5 Sq. Ft.	1940
104	1	Face Opening - 13.5 Sq. Ft.	1135
106	1	Face Opening - 13.5 Sq. Ft.	1135
	2	2 hoods-one blower-Total Face Opening 18 Sq. Ft.	2250
201	1	Face Opening - 13.5 Sq. Ft.	1135
206	1	Face Opening - 13.5 Sq. Ft.	1940
		TOTAL	9535

TABLE IV

BUILDING 205

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
Radiochemical Analysis, Large	1	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 28" x 28.5" (798 Sq. In.) (5.54 Sq.ft.)		554
	2	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 28" x 28.5" (798 Sq. In.) (5.54 Sq.ft.)		554
	3	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 28" x 28.5" (798 Sq. In.) (5.54 Sq.ft.)		554
	4	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 28" x 28.5" (798 Sq. In.) (5.54 Sq.ft.)	4000	554
	5	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 28" x 28.5" (798 Sq. In.) (5.54 Sq.ft.)		554
	6	Small hood - no door Opening: 26" x 27" (702 Sq. In.) (488 Sq. ft.)		488
	7	Single corner hood-wood and glass construction. Single vertical sliding door. Opening : 28" x 28.5" (798 Sq. In.) (5.54 Sq.ft.)		554
Radiochemical Analysis, Small	1	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 27.5" x 29" (798 Sq. In.) (5.54 Sq.ft.)		554
	2	Single corner hood-wood and glass construction. Single vertical sliding door. Opening: 36" x 41" (1476 Sq. In.) (10.25 Sq.ft.)	1200	1025

TABLE IV - - -(con't)

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
Sample Storage	1	Hood built through wall to outside for storage. No door. Opening: 37" x 32" (1184 Sq. In.) (8.22 Sq. ft.)	___	822
	2	Lead constructed hood for storage. No doors. Part of front shielded by lead bricks. Opening: 38" x 15" (570 Sq. In.) (3.96 Sq.ft.)	___	396
	3	Lead constructed hood for storage. No doors. Part of front shielded by lead bricks. Opening: 53" x 38" (2014 Sq. In.) (13.99 Sq.ft.)	___	1399
Pilot Plant Control Laboratory	1	Single hood with vertical sliding door (1). Glass and wood const. Opening: 38.5" x 31" (1194 Sq. In.) (8.29 Sq. ft.)	800	829
	2	Double hood with vertical sliding doors (2). Glass and wood const. Opening: Ea. 38.5" x 34" (1309 Sq.In.) (9.09 Sq.ft.)	1000	829
	3	Double hood with vertical sliding doors (2). Glass and wood const. Opening: Ea.24.5" x 29"(711 Sq. In.) (4.94 Sq.ft.)	1200	829
	4	Small hoods suspended over laboratory desk. Four located over center table, two over west table. Opening: Ea.18" x 18"(324 Sq. In.) (2.25 Sq.ft.)	___	225
	5	Small hoods suspended over laboratory desk. Four located over center table, two over west table. Opening: Ea.18" x 18"(324 Sq. In.) (2.25 Sq.ft.)	___	225

TABLE IV - - -(con't)

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
	6	Small hoods suspended over laboratory desk. Four located over center table, two over west table. Opening: Ea.18" x 18"(324 Sq. In.) (2.25 Sq.ft.)	—	225
	7	Small hoods suspended over laboratory desk. Four located over center table, two over west table. Opening: Ea.18" x 18" (324 Sq. In.) (2.25 Sq.ft.)	—	225
	8	Small hoods suspended over laboratory desk. Four located over center table, two over west table. Opening: Ea.18" x 18" (324 Sq. In.) (2.25 Sq.ft.)	—	225
	9	Small hoods suspended over laboratory desk. Four located over center table, two over west table. Opening: Ea.18" x 18"(324 Sq. In.) (2.25 Sq.ft.)	—	225
10	1		1500	
11	2		1800	
12	3		2200	
13	4		2200	
14	5		2200	
15	6 & 7		2700	
Pilot Plant Control Laboratory		Ventilation from Pilot Plant Control Laboratory	2200	
		TOTAL - - - - - - - -	23,000	

* Design Air flow based on 100 linear feet per minute through face opening.

TABLE V

BUILDING 706-A

ROOM NUMBER	HOOD NUMBER	HOOD LOCATION	HOOD OPENING inches	AIR cfm	REMARKS (Numbers-Ave. Velocity Linear feet per min.)
1	1	Northeast Corner		1,000	
	2	South Wall		30,000	
2	1	South Wall		7,500	
	2	South Wall		7,500	
	3	South Wall		7,500	
	4	South Wall		7,500	
6 & 8	1	East Wall	29 x 22	700	150
	2	North Wall	38 x 24	600	95
			38 x 34	650	70
	3	Center of Room			50
					Canopy over Lab. Bench
	4	South Wall	38 x 35	600	70
			38 x 35	600	60
9	1	North Wall	34 x 11	250	90
15	1	North Wall	33 x 30	400	60
			33 x 17	250	60
	2	West Wall	38 x 35	460	50
			38 x 35	460	50
			38 x 35	460	50
	3	South Wall		2,000	50
					Large Canopy - Front Open
16	1	South Wall-(E. Corner)	44 x 32	700	75
			43 x 32	930	95
	2	South Wall-(W. Corner)	44 x 32	700	70
			44 x 23	500	70
	3	North Wall	44 x 30	700	75
			44 x 30	700	70

TABLE V - - -(con't)

ROOM NUMBER	HOOD NUMBER	HOOD LOCATION	HOOD OPENING inches	AIR cfm	REMARKS (Numbers-Ave. Velocity Linear feet per min.)
21	1	West Wall-(N. Corner)	38 x 18	760	Sliding Panels 160
	2	West Wall-(S. Corner)	38 x 28	1200	Sliding Panels 165
	3	East Wall-(S. Corner)	40 x 32	1350	Sliding Panels 150
	4	East Wall-(N. Corner)		15000	Canopy Hood-Sides-Front Open
	5	North Wall	120 x 12	2600	Drop Panels 260
22	1	West Wall-(N. Corner)	32 x 28	310	50
			32 x 28	310	50
	2	West Wall-(S. Corner)	32 x 28	400	65
			32 x 28	600	100
	3	South Wall	34 x 33	600	75
			34 x 33	500	60
	4	South Wall-(E. Corner)	63 x 40	1050	Folding Panels. 60
	5	East Wall-(N. Corner)	55 x 32	600	50
25	1	East Wall-(S. Corner)	38 x 30	700	90
	2	East Wall-(N. Corner)	31 x 30	330	50
			31 x 30	330	50
	3	West Wall	30 x 29	550	90
			30 x 29	500	80
27	1	East Wall-(S. Corner)	38 x 31	575	70
			38 x 31	650	80
	2	East Wall-(N. Corner)	30 x 29	900	150
			30 x 29	900	150 (opening half blocked)
	3	West Wall	30 x 28	960	165
			30 x 28	1150	195 Quarter Blocked
31	1	East Wall-(S. Corner)	30 x 28	450	60
	2	East Wall-(N. Corner)	29 x 29	450	75
			29 x 29	525	90
	3	West Wall	33 x 12	275	100 (Hoods pratically open.)
			33 x 12	250	85

TABLE V - - -(con 't)

ROOM NUMBER	HOOD NUMBER	HOOD LOCATION	HOOD OPENING inches	AIR cfm	REMARKS (Numbers-Ave. Velocity Linear feet per min.)
32	1	West Wall-(N. Corner)			Hood Closed
	2	West Wall-(S. Corner)	33 x 29	465	70
			33 x 29	400	60
	3	East Wall	33 x 27	450	70
			33 x 27	500	80
33 & 35	1	East Wall-(S. Corner)	37 x 35	550	60
			38 x 33	600	70
	2	East Wall-(Center)	29 x 24	450	90
			29 x 24	450	95
			29 x 24	400	80
	3	East Wall-(N. Corner)	35 x 26	530	85
	4	South Wall	33 x 10	550	Partially Open 235
	5	West Wall-(S. Corner)	39 x 27	450	60
	6	Adjacent to Hood 5	38 x 26	400	60
34	1	West Wall-(N. Corner)	38 x 28	650	85
			38 x 28	800	Approx. 1/3 Blocked 110
	2	West Wall-(S. Conrer)	29 x 22	450	100
			29 x 22	530	120
	3	East Wall	31 x 28	350	55
			31 x 28	400	70
45	1	East Wall	33 x 27	1050	170
			33 x 27	1000	160
55	1	Center of Room		1000	

TABLE V - - -(con't)

ROOM NUMBER	HOOD NUMBER	HOOD LOCATION	HOOD OPENING inches	AIR cfm	REMARKS (Numbers-Ave. Velocity Linear feet per min.)
54 & 56	1	North Wall-(E. Corner)			Hood Fronts Locked
	2	North Wall (Center)	38 x 29	380	<50
			38 x 29	380	<50
			38 x 29	380	<50
			38 x 29	380	<50
	3	North Wall-(W. Corner)	75 x 41	1070	<50
			75 x 41		Closed
	4	North Wall-(E. Corner)			Double Hood-Panels Will Not Open
	5	West Wall	45 x 21	1310	200
					Contamination & Closed (2 Panels)
	6	Center Room-(W. Hood)	38 x 30	390	<50
			38 x 30	390	<50
			38 x 30	390	<50
	7	Center Room-(E. Hood)	38 x 24	300	<50
			38 x 26	350	<50
					Panel Will Not Open
57	1	East Wall-(S. Corner)	38 x 30	560	70
			38 x 30	560	70
	2	East Wall-(N. Corner)	30 x 25	450	85
			30 x 25	470	90
	3	West Wall	33 x 27	560	90
			33 x 27	620	100
61	1	East Wall			Radiation
62	1	West Wall	38 x 35	880	95
			38 x 24	400	Partially Open 65
63	1	East Wall	38 x 34	630	70
			38 x 34	500	55

TABLE V - - -(con't)

ROOM NUMBER	HOOD NUMBER	HOOD LOCATION	HOOD OPENING inches	AIR cfm	REMARKS (Numbers-Ave. Velocity Linear feet per min.)
64	1	West Wall	38 x 31	550	65
			38 x 31	575	70
65	1	North Wall	———	——	Cabinet Type Hood Fully Open
	2	Center	———	1000	110
67	1	South Wall	38 x 34	550	60
			38 x 34	675	75
69	1	South Wall	37 x 27	550	80
			37 x 27	——	Blocked Off ———
71	1	South Wall-(W. Corner)	38 x 32	420	50
			38 x 32	550	65
	2	South Wall (Center)	33 x 24	——	Out of Order
			33 x 24	——	Out of Order ———
	3	South Wall-(E. Corner)	32 x 29	580	90
			32 x 29	480	75
	4	North Wall	30 x 26	480	90
			30 x 26	580	105
73	1	West Wall	38 x 34	450	<50
			38 x 34	670	75
	2	South Wall	32 x 31	500	75
			32 x 31	500	70
74	1	North Wall	38 x 29	765	100
			38 x 9	250	Partially Open 100
	2	Toward South Wall	———	——	<50 "California Type Hood"

TABLE V - - -(con't)

ROOM NUMBER	HOOD NUMBER	HOOD LOCATION	HOOD OPENING inches	AIR cfm	REMARKS (Numbers-Ave. Velocity Linear feet per min.)
76	1	South Wall	72 x 35	875	Open Front-No 50 Panel
78	1	East Wall	———	400	
84	1	South Wall	50 x 27	470	50
86	1	South Wall	38 x 29	380	<50
	2	Center of Room	38 x 29	380	<50
			———	1000	
			TOTAL - - -	144,740	

TABLE VI

BUILDING 706-C

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
I (Cell Block)	1	Open Hood - 1 long door - Equipment for experiments. 84" X 45" (3780 sq. in.)(26.25 sq.ft.)	2500	2625
	2	Open Hood - 1 long door - Equipment for experiments. 84" x 45" (3780 sq. in.)	2500	2625
	3	Open Hood - No door - 1/2 contains wooden type "dry box" - no enclosed stack to hood stack. Other half empty. 84" x 84" (7056 sq. in.)	3600	4900
	4	Hot Sink - No door 57" x 47" (2679 sq. in.)	2000	1860
II (Cell Block) (Small Room)	5	High radiation - Storage - behind barricade No cover - room ventilation through open doorway 86" x 36" (3096 sq. in.)	2100	2150
III (Cell No.1)	6	Inclosed "dry box" - Cell No. 1	865	———
IV (Cell No.3)	7	Open Hood - Cell No. 3 - swinging door - only ventilation 41" x 38" (2) 1558 sq. in./door	865	1082/door
V (Main Work Room)	8	Hot Sink - one door 65" x 41" 2665 sq. in.	2100	1851
VI (Cell No.2)	9	Cell No. 2 - small-open hood - double doors 42" x 38" (2) 1596 sq. in./door	865	1108/door
VII (Cell No.4)	10	Cell No. 4 - large-one duct - only ventilation entrance. 132" x 62" 8184 sq. in.	865	5682

TABLE VI - - -(con't)

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
VIII (Chemical Lab)	11	Hood - double doors 40" x 36" (2) 1440 sq. in./door	865	865
	12	Hood - double doors 40" x 36" (2) 1440 sq. in./door	865	1000
V (Main Working Room)	13	Bank No. 1 - 4 cells 25" x 25" (4) (625 sq. in./door)	3697	434/door
	14	Bank No. 2 - 4 cells 25" x 25" (4) (625 sq. in./door)	3697	434/door
IX (Chemistry Laboratory)	15	Hood-double doors 36" x 36" (2) (1296 sq. in./door)	800	879/door
	16	Hood - double doors 36" x 36" (2) (1296 sq. in./door)	800	879/door
		TOTAL	28,984	

* Design Air flow based on 100 linear feet per minute through face opening.

TABLE VII

BUILDING 706-D

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
North and South Laboratories (Hot)		Concrete walls to Lab - swinging door to main entrance to both North and South Labs. Labyrinth passageways.		
	1	Single vertical sliding door hood wood and glass construction. Opening: 45" x 35" (1575 sq. in.) (10.9 sq. ft.)		1090
Note: Hoods, 1 2, 3 and 4 are in South Lab.	2	Open vent. between hoods 1 and 3 No dimensions.	4200	——
	3	Single vertical sliding door hood-wood and glass construction. Opening: 45" x 45" (1575 sq. in.) (10.9 sq. ft.)		1090
	4	Small sheet metal hood - addition to regular design of laboratory. No door. Opening: 25" x 17" (425 sq. in.) (2.95 sq. ft.)		295
Note: Hoods 5,6 & 7 are in North Lab.	5	Small hood - lead brick front for shielding - No door. Opening (does not include space occupied by lead brick) 6" x 27" (162 sq. in.) (1.13 sq. ft.)		113
North & South Labs.	6	Single opening - no door. Opening: 46" x 42" (1932 sq. in.) (13.42 sq. ft.)	4200	1342
	7	Two barrier frames with shielding on front sides partially to top of frame. Each frame has shielding to different heights. No sides or tops. Front Openings- 21-1/2" x 58"(1247 sq.in.)(8.7 sq.ft.) 11" x 57"(627 sq. in.)(4.4 sq.ft.)		No estimate

TABLE VII (con't) 706-D

ROOM	CELL OR HOOD NO.	DESCRIPTION	PRESENT AIR FLOW c.f.m.	DESIGN * AIR FLOW c.f.m.
Analytical Laboratory	1	Single hood with vertical sliding door. Glass and wood const. Opening: 40" x 47" (1880 sq. in.) (13.06 sq. ft.)	2200	1306
	2	Double hood with vertical sliding doors (2). Glass and wood const. Opening: Ea. 39" x 33" (1287 sq. in.) (8.94 sq. ft.)		1788
3rd floor	1	Double hood with vertical sliding doors (2). Glass and wood const. Opening: Ea. 39" X 33" (1287 sq. in.) (8.94 sq. ft.)		1788
1st floor	A & B	Rala Cells	15,000	Reduced to 3000 cfm Dec. 1948
		TOTAL - - - -	25,600	

* Design Air flow based on 100 linear feet per minute through face opening.

TABLE VIII

BUILDING 706-HB

CELL OR HOOD NUMBER	LOCATION	PRESENT AIR FLOW cfm
Cell A, Column B	East Column, East Fan	3610
Cell A, Column B	East Column, West Fan	3610
Cell B, Column B	East Column	3610
Cell C, Column B	East Column	3610
Cell A, Column A	West Column, East Fan	3610
Cell A, Column A	West Column, West Fan	3610
Cell B, Column A	West Column	3610
Cell C, Column A	West Column	3610
Hood No. 1	South Wall, East Hood	910
Hood No. 2	South Wall, West Hood	1130
Hood No. 3	West Wall, South Hood	910
Hood No. 4	West Wall, North Hood	910
	TOTAL	32,740

TABLE IX

NEW ISOTOPE AREA

BUILDING	LOCATION	HOOD FACE AREA SQ. FT.	AIR FLOW c.f.m.	USE FACTOR	c.f.m. CORRECTED	ROOM VOLUME cu.ft.	AIR CHANGES per hour
Analytical	Storage	150	15,000	0.10	1500	———	———
Analytical	Shipping	16	1,600	1.00	1600	32,400	5.7
Analytical	Cold Lab.	40	4,000	0.25	1000	7,200	8.3
Analytical	Decont.Area	20	2,000	1.00	2000	9,500	12.6
Analytical	Anal. Lab.	190	19,000	0.25	4700	30,000	9.4
Process Bldg. A		100	10,000	0.25	2500	10,500	14.3
Process Bldg. B		100	10,000	0.25	2500	10,500	14.3
Process Bldg. C		126	12,600	0.25	3140	10,500	18.0
Process Bldg. D		106	10,600	0.25	2650	10,500	15.1
Process Bldg. E		106	10,600	0.25	2650	10,500	15.1
Process Bldg. F		60	6,000	0.25	1500	26,250	3.4
		TOTAL	101,400		25,740		

NOTE: Air changes per hour includes only air going out through ventilating system.
Extra air may be exhausted through reflief louvers.
Hot off-gas line will carry 500 cfm.

For expansion - 20,000 c.f.m. ventilating air
250 c.f.m. hot off-gas
Original estimate of discharged air 81,000 cfm (80,000 ventilation, 1,000 off-gas)
Information from A. F. Rupp, Operating Division

4.0 Air Cleaning Systems

4.1 Types of Air Cleaning Equipment

During the past six months several systems for removing particulate air-borne activity have been under consideration. The three methods, now in use or being studied, include air filtration with deep bed and paper filters, cyclone separation, and electrostatic precipitation. The only method now in actual use is air filtration, which is accomplished by passing the air to be decontaminated through a roughing filter containing two 1/2 inch layers of FG-50 Filterdown, and then through finishing filters, which are CWS #6 paper filters.

The method of cyclone separation has not been considered for cleaning the air from any building or area with the exception of the pile cooling air. A discussion of this has been presented by H. E. Goeller and F. L. Culler in a report entitled Preliminary Design Report-Cyclone Building for Building 105 Exhaust Air Cleaning System. Because of the satisfactory performance of the pile exhaust air filters, the installation of cyclone precipitators has been cancelled. The relative advantages of electrostatic precipitation for removing air-borne activity will be fully discussed in a forecoming report by F. C. McCullough, tentative entitled General Report on Electrostatic Precipitator Problem. This report, which deals with precipitators manufactured by various companies, discusses relative advantages and proposed efficiencies.

4.11 Air Filtration

Information concerning the various types of air filters has not been presented in a report. To summarize the information available on filters now in use, Table X & XI are presented. This data has been collected from various members of the Technical Division.

4.2 Proposed Cleaning Systems

Originally the proposed system for decontaminating the air consisted primarily of electrostatic precipitators backed by American Air Filters and Chemical Warfare Service filters. Scrubbers would be installed in the off-gas lines before the gas is introduced into the main equipment. Drawing TD 858 is a flow diagram of the proposed layout. At present, the decision as to the type of decontamination equipment to be installed is awaiting operating data on the filters in the pile exit air system, results from temporary filters installed on lines from Building 706-D, and the results from samples of exit air being taken from various air discharge lines.

From the geographical location of the various buildings in the survey, the installation of several decontamination areas appears to be more advisable and economical than the installation of one main area. These areas would be located on available terrain adjacent to the buildings to be serviced. As a first proposal, three areas are under consideration. These areas, the buildings they serve, and their order of importance, are presented in Table XII.

TABLE X

AMERICAN AIR FILTER DATA

Dimensions: Face 2'3" x 2'3" Depth - 3'

Rating per 5 pocket frame: 1000 cubic feet per minute

Effective area per 5 pocket frame: 60 Sq. Ft.

Weight per 5 pocket frame: 250 pounds

	F.G #50	F.G. #25
Thickness of Sample tested, Single Layer	1/2"	1/2"
Density of media, oz/cu.ft.	0.5	0.5
Fibre diameter, microns	1.25	2.75
Discoloration efficiency, atmospheric dust	85 + %	70%
Media velocity, Deep Bed Frame, F.P.M.	20	20
Initial Resistance at 20 F.P.M.	0.46	0.11"
Initial Resistance in P.L.Frame at 35 F.P.M.	0.56	0.35" *

* Estimated

DATA ON FRAMES IN USE IN PILE
F.G.#50

Initial Resistance of F.G#50 Media in Deep Bed Filters

Media Velocity Ft. Per Min.	Single Layer inches of water	Double Layer inches of water
20	0.46	0.94
30	0.70	1.42
40	0.95	1.88

TABLE XI

CHEMICAL WARFARE SERVICE PAPER FILTERS, TYPE #6 DATA

Dimensions: Face 2' x 2' Thickness 11-1/2"

Effective Area: 164 Sq. Ft.

Rating: 600 cubic feet per minute

Weight: 46 pounds

Air resistance in inches of water: Min. 0.83" Max. 1.1"
(Tested by face velocity of 150 feet/min.)

Penetration Test, % penetration: Min. 0.0026% Max. 0.020%
(Methelene blue * Test medium)

Max. Allowable Temperature 160°F

* Methelene blue has average particle diameter of 0.8 Micron. Varies from 0.2 micron to 4 micron.

TABLE XII

Area No.	Proposed Location	Buildings Served
1.	N of 706-D	New Isotope Area 706-C 706-D
2.	N of 205	105 (hoods only) 204 205 706-G
3.	S. of 706-A	706-A 706-HB

Building 101-B will probably be served by individual cleaning equipment.

In some instances, such as the hoods in Building 706-A, it might be advantageous to treat each hood or a group of hoods with individual filters instead of the building in its entirety. This is particularly true where the future life of the building is short.

4.3 Estimated Cost

Comparable and approximate cost for the various types of air cleaning equipment are presented below. The majority of the figures are based on estimates from various vendors on equipment for handling 120,000 cubic feet per minute at S.T.P. It should be pointed out that the cost of equipment for smaller air volumes will probably be higher than the values given, while those for larger flows will be less. The costs given are on a basis of 20,000 cubic feet per minute, except where noted, for convenience in extrapolating to various sized decontamination units.

TABLE XIII

COST OF EQUIPMENT
20,000 cfm
(Does not include cost of building)

	Average
American Air Filters F.G. #50 Single Thickness	$2,352.00(1)
American Air Filters F.G. #25 Single Thickness	1,968.00(2)
Chemical Warfare Service #6	2,397.50(3)
Cyclones	3,000.00
Electrostatic Precipitators - 2 in Series 99.9% Eff.	50,000.00(4)
Electrostatic Precipitators - Single 85% Eff.	3,000.00

(1) Based on cost of $117.60 per filter
(2) Based on cost of 98.40 per filter
(3) Based on cost of 68.50 per filter
(4) Includes cost of building to house equipment but not shielding.

Of general interest is the approximate total cost of $400,000 for the filter building with a capacity of 120,000 cubic feet per minute. This building is roughly 60' x 73' x 31', and has walls of reinforced concrete one foot thick designed for an operating temperature of 225° F. The cost of this installation was high because accerlerated construction with large amounts of overtime.

5.0 Temporary Air Cleaning Systems

5.1 Building 706-D Dissolver and Off-gas Lines

Filter units were installed in the dissolver and off-gas lines between Building 706-D and the 205 Stack. Both units consisted of one 5 pocket American Air Filter with two 1/2 inch layers of F.G. #50 as the filter media. The capacity of each unit is 1000 cubic feet per minute. Section II of the Technical Division is obtaining operating information as to efficiencies of removal of air-borne activity and pressure drops across the units. This information will be published by Section II when sufficient data is obtained.

5.2 Building 706-D Cell Ventilation

A temporary installation of a filter unit in the ventilation line from the RaLa cell in building 706-D was completed in January of 1949. This unit consists of four Deep Pocket American Air Filters backed up by six Chemical Warfare Service #6 filters. The capacity of the unit is 3600 cubic feet per minute. This is a reduction from 15,000 cubic feet per minute, made by the Operations group to reduce the cost of installing temporary filters. Operating data is being obtained by Section II of the Technical Division.

6.0 Discussion

6.1 Future Program

The future program of the Design Section, Technical Division, will be directed towards reviewing and evaluating from a design standpoint, data and recommendations of the Radiation Hazards Committee on sources of contamination and various types of air cleaning equipment. As soon as it is practical, the results of the above will be translated into proposed decontamination area designs and returned to the Committee for approval.

6.2 Recommendations

It is recommended that further study into the overall problem, with specific emphasis on individual sources, be continued until such time as enough facts are available for a firm basis for a design. In addition, standards for hood and cell design for Oak Ridge National Laboratory should be outlined for new construction. This should include air requirements for both new construction and for those now in existance. An attempt should be made to reduce the volume

of air now being discharged into the atmosphere without reducing the efficiency of the equipment in use or increasing the health hazard to personnel. On the other hand, those hoods and cells which are now operating below the minimum requirements set by the Activity Hazards Committee should have an increased air flow.

It may be possible in certain buildings to decrease the amount of air from hoods by decreasing or limiting the use of the hoods. This can be accomplished by designating certain hoods for use with radioactive material, others for normal chemical use. This method will probably require montering by supervision to ensure strict observance of the designated use.

A final recommendation is the experimental investigation into the efficiencies of various types of decontamination equipment as it applies to the particular problem at Oak Ridge National Laboratory. This has already been started, and it is suggested that this program be expanded in the future.

W. G. Stockdale

W. G. Stockdale

WGS:mtw

List of Reference Reports

1. CF No. 48-5-359 Conference on Decontamination of Exhaust Air, Held At A.E.C. Building, Oak Ridge, May 6, 1948, by A. F. Rupp

2. CF No. 48-9-158 Oak Ridge National Laboratory Waste Disposal, September 20, 1948, by Stuart McLain

3. CF No. 48-9-146 Waste Disposal Design Data, September 20, 1948, by Stuart McLain

4. CF No. 48-9-254 First Weekly Progress Report on ORNL Waste Disposal, September 27, 1948, by Stuart McLain

5. CF No. 48-10-49 Second Weekly Progress Report on ORNL Waste Disposal, October 4, 1948, by Stuart McLain

6. CF No. 48-10-132 Third Weekly Progress Report on ORNL Waste Disposal, October 11, 1948, by Stuart McLain

7. CF No. 48-10-236 Fourth Weekly Progress Report on ORNL Waste Disposal, October 18, 1948, by Stuart McLain

8. CF No. 48-10-320 Fifth Weekly Progress Report on ORNL Waste Disposal, October 25, 1948, by Stuart McLain

9. CF No. 48-11-17 Sixth Weekly Progress Report on ORNL Waste Disposal, November 1, 1948, by Stuart McLain

10. CF No. 48-11-108 Seventh Weekly Progress Report on ORNL Waste Disposal, November 8, 1948, by Stuart McLain

11. CF No. 48-11-163 Eighth Weekly Progress Report on ORNL Waste Disposal, November 15, 1948, by Stuart McLain

12. CF No. 48-11-244 Ninth Weekly Progress Report on ORNL Waste Disposal, November 22, 1948, by Stuart McLain

13. CF No. 48-11-293 Tenth Weekly Progress Report on ORNL Waste Disposal, November 29, 1948, by C. E. Winters

14. CF No. 48-12-79 Eleventh Weekly Progress Report on ORNL Waste Disposal, December 6, 1948, by C. E. Winters

15. CF No. 48-12-203 Twelfth Weekly Progress Report on ORNL Waste Disposal, December 21, 1948, by C. E. Winters

16. CF No. 48-12-104 Radiation Hazard Measurements for the Period November 26 to December 3, 1948, by C. P. Coughlin and S. E. Beall, December 7, 1948

List of Reference Reports (Cont.)

17. CF No. 48-11-289 Waste Disposal Report for the Period November 12 to November 26, 1948, by C. E. Winters, November 26, 1948

18. CF No. 48-11-252 The Removal of Smoke Particles Below One (1) Micron, November 24, 1948, by J. W. Gost

19. ORNL 215 Technical Division Report for Quarter Ending November 30, 1948

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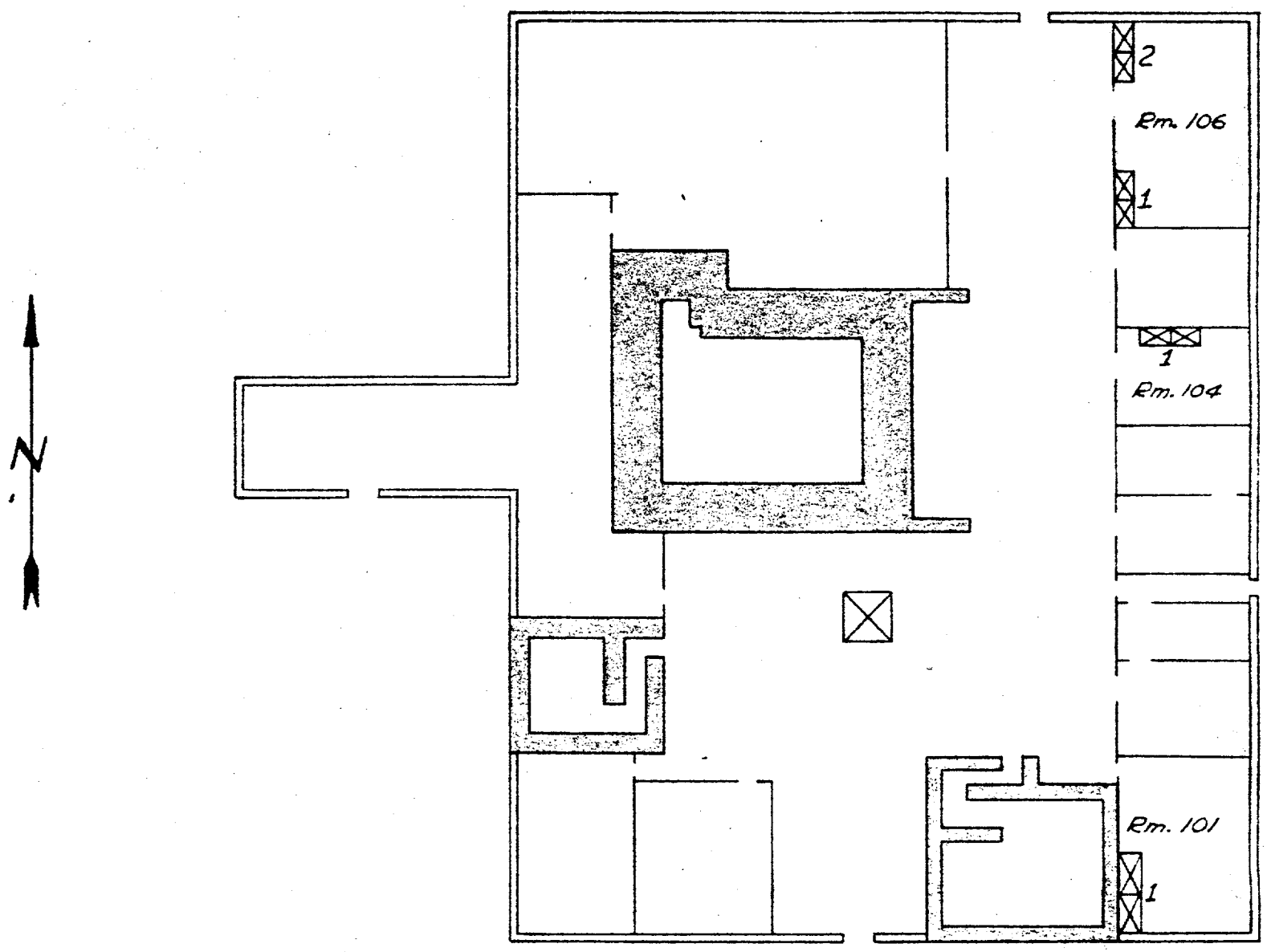
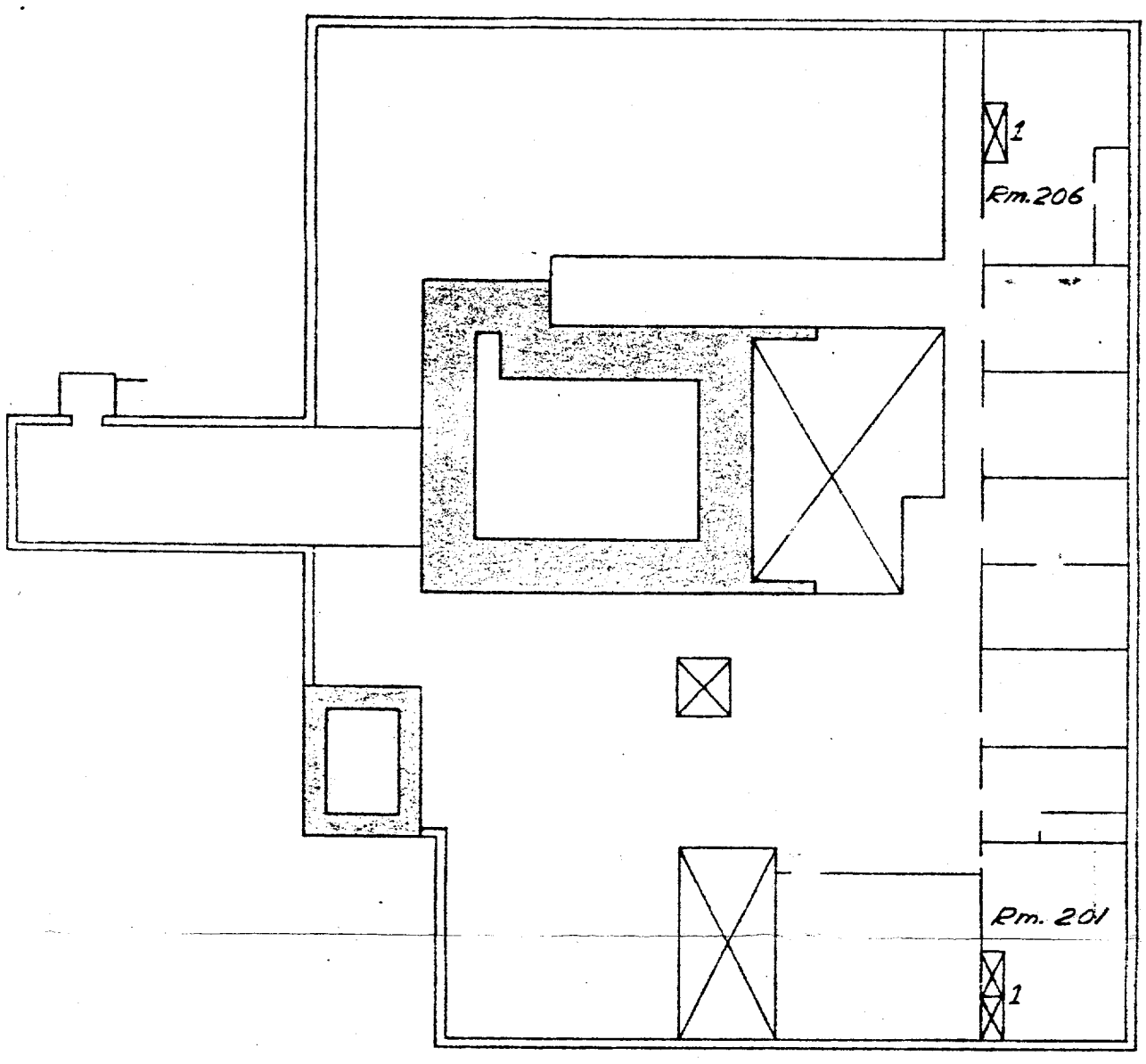
TD-784



1st. Floor

AIR FLOW STUDY -

Room No.	Hood No.	Hood Location	Hood Open'g Sq. Ft.	Air CFM
101	1	SW Corner	13½	1940
104	1	N Wall	13½	1135
106	1	SW Corner	13½	1135
	2	NW Corner	18	2250
206	1	SW Corner	13½	1135
301	1	W Wall	13½	1940



2ND. FLOOR

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APPD.	DATE

OAK RIDGE NATIONAL LABORATORY

TECHNICAL DIV.—P.O. BOX P.—OAK RIDGE, TENN.

BLDG. 105
LOCATION OF HOODS

DRAWN BY	DATE	SCALE No Scale
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CHECKED BY	DATE	DRAWING NO. TD-784 — REV.

REV. NO.	REVISION	APPD.	DATE

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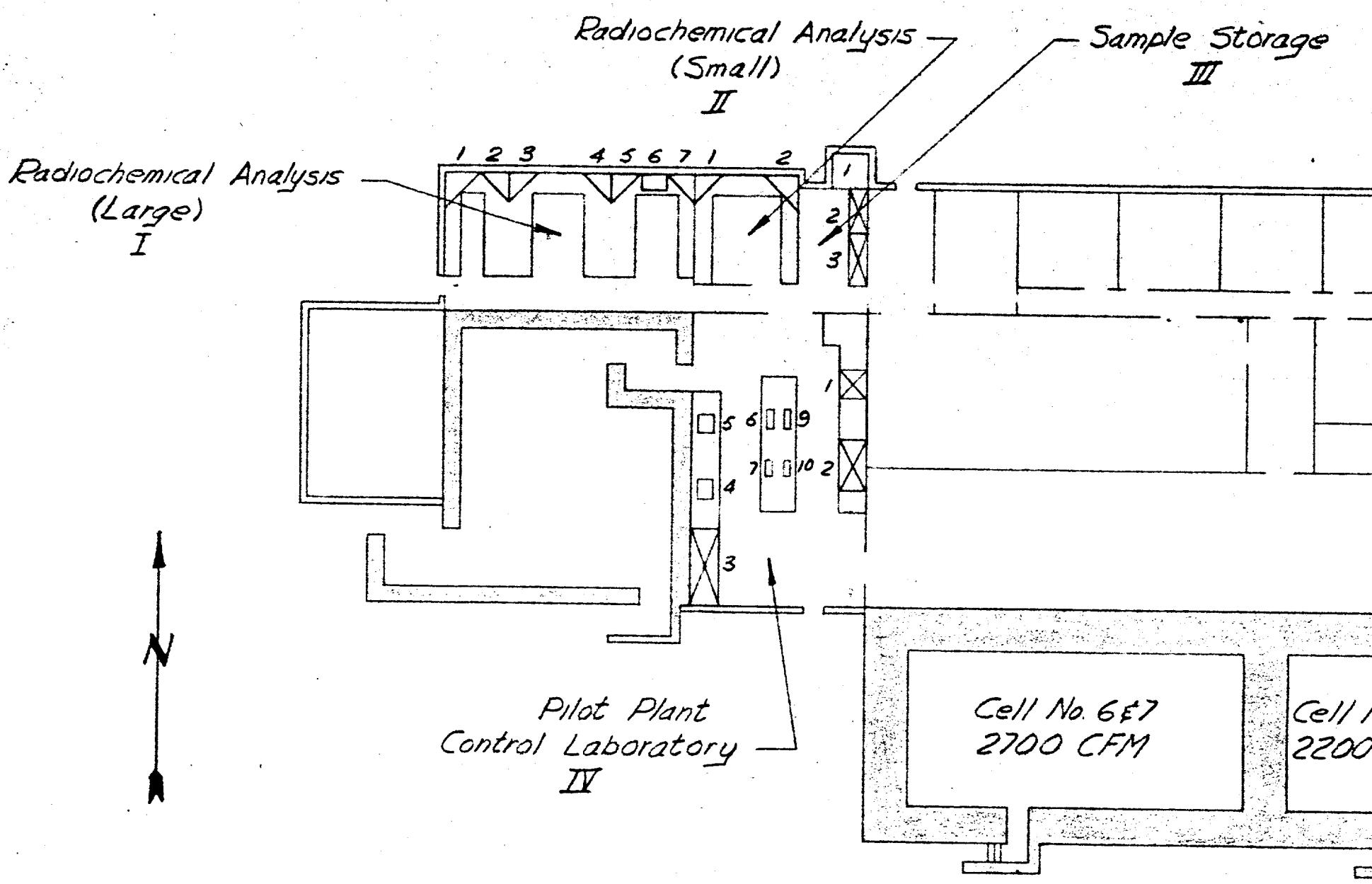
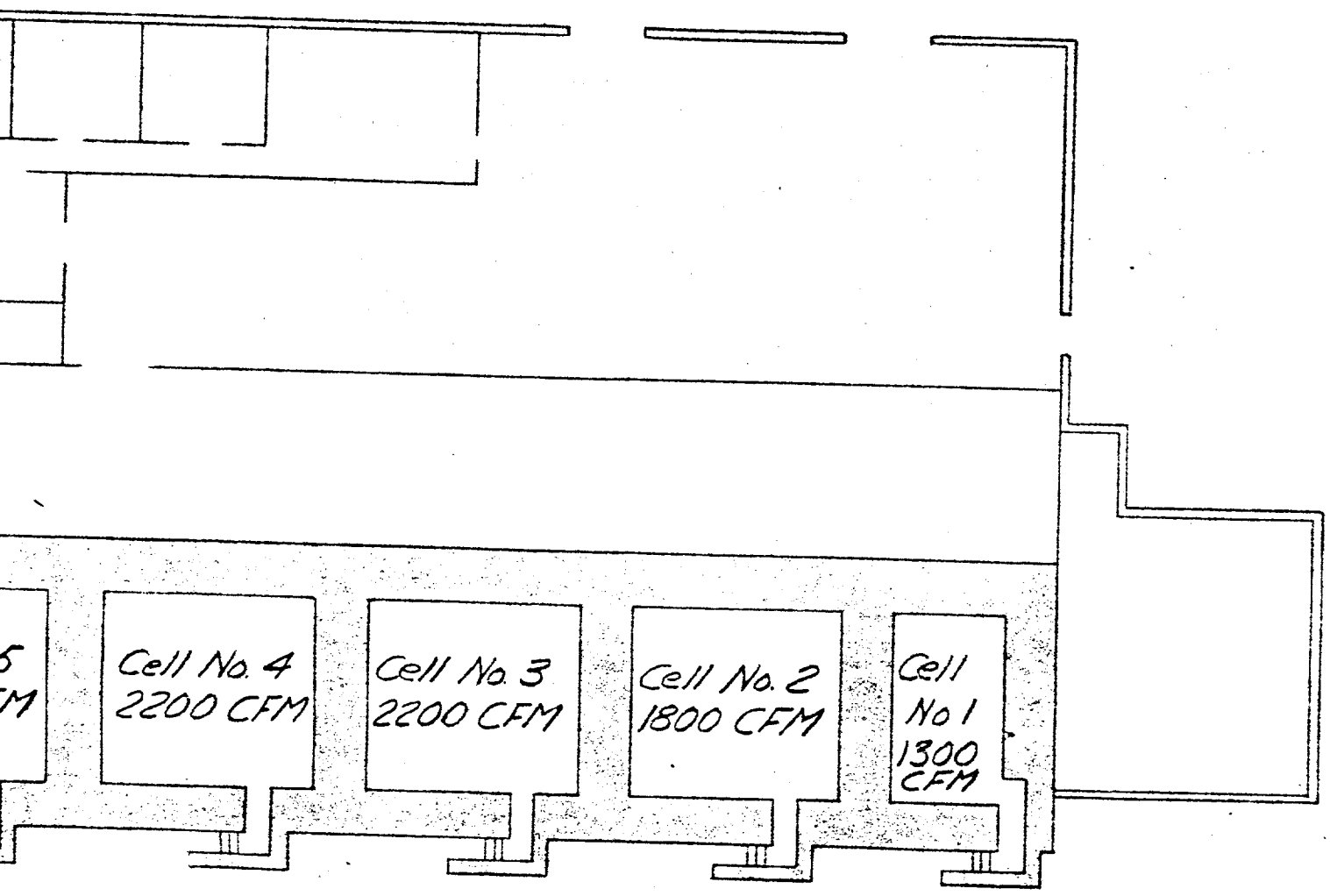
TD-781



AIR FLOW STUDY-

Room No.	Hood No.	Hood Location	Hood Open'g Inches	Air CFM
I	1	N. Wall	28 x 28½	
	2	N. Wall	28 x 28½	
	3	N. Wall	28 x 28½	
	4	N. Wall	28 x 28½	4000
	5	N. Wall	28 x 28½	
	6	N. Wall	26 x 27	
	7	N. Wall	28 x 28½	
II	1	N. Wall	27½ x 29	1200
	2	N. Wall	36 x 41	
III	1	N. Wall	37 x 32	—
	2	E. Wall	38 x 15	—

Room No.	Hood No.	Hood Location	Hood Open'g Inches	Air CFM
III	3	E. Wall	53 x 38	—
IV	1	E. Wall	38½ x 31	800
	2	E. Wall	38½ x 34	1000
	3	S.W. Corner	24½ x 29	1200
	4	W. Lab Table	18 x 18	—
	5	W. Lab Table	18 x 18	—
	6	Center Lab Table	18 x 18	—
	7	Center Lab Table	18 x 18	—
	8	Center Lab Table	18 x 18	—
	9	Center Lab Table	18 x 18	—
		Room Ventilation	—	2200



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REV. NO.	REVISION	APPD.	DATE

OAK RIDGE NATIONAL LABORATORY

TECHNICAL DIV.—P.O. BOX P.—OAK RIDGE, TENN.

BLDG. 205
LOCATION OF HOODS
AND CELLS

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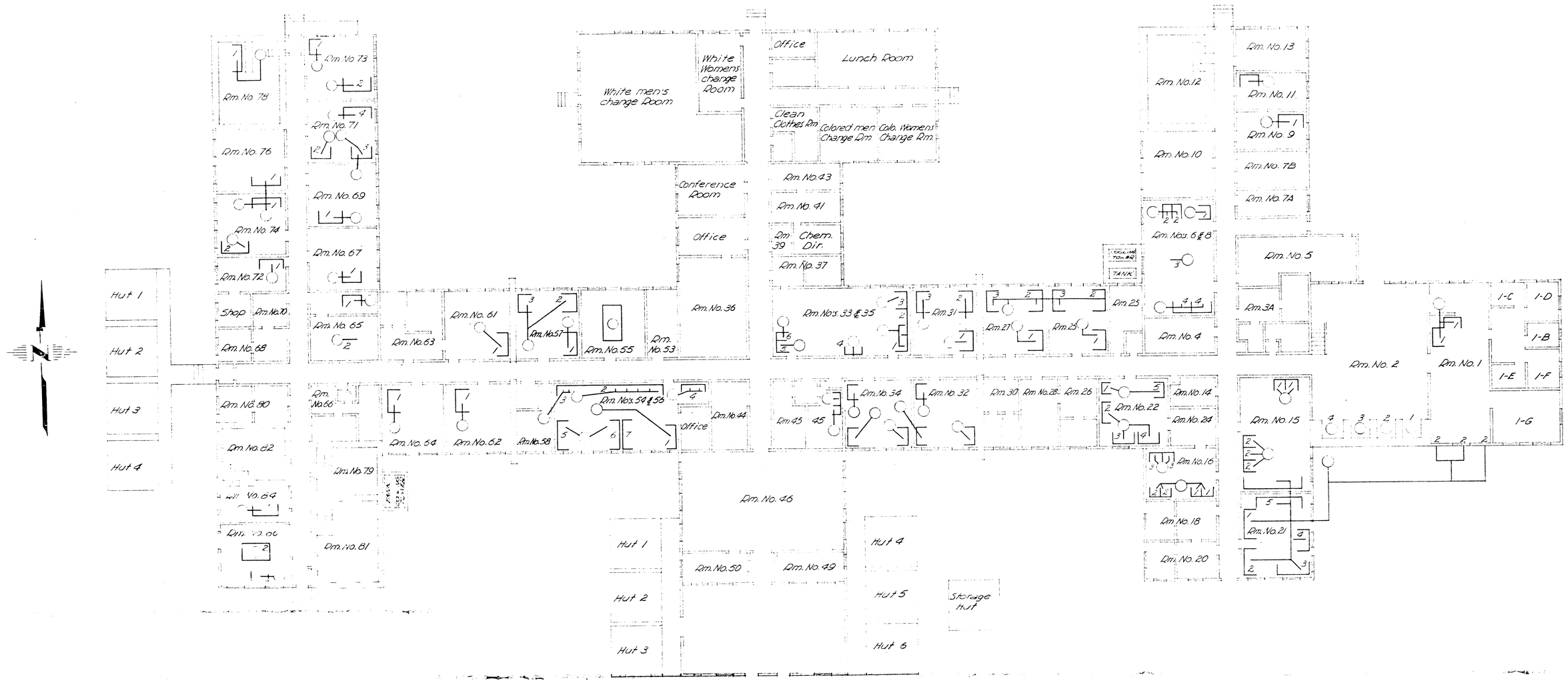
TD-853



AIR FLOW STUDY

Room No.	Hood No.	Hood Location	Hood Dimensions Inches	Air CFM
1	1	N.E. Corner	[illegible]	[illegible]
	2	South Wall	[illegible]	[illegible]
2	1	South Wall	[illegible]	750
	2	"	[illegible]	750
	3	"	[illegible]	[illegible]
	4	"	[illegible]	7500
2 & C	1	East Wall	[illegible]	[illegible]
	2	North Wall	[illegible]	[illegible]
	3	Center of Room	[illegible]	[illegible]
	4	South Wall	38 x 35	400
			35 x 30	300
9	1	North Wall	30 x [illegible]	[illegible]
15	1	North Wall	[illegible]	[illegible]
			33 x 7	150
	2	West Wall	38 x 35	400
			38 x 35	400
			38 x 35	400
	3	South Wall		2000
16	1	South Wall (E Cor.)	44 x 32	700
			43 x 32	930
	2	South Wall (W Cor)	44 x 32	700
			44 x 23	500
	3	North Wall	44 x 30	700
			44 x 30	700
21	1	West Wall (N Cor)	38 x 18	760
	2	" " (S Cor)	38 x 28	1000
	3	East Wall (E Cor)	43 x 32	1350
	4	" " (N Cor)		15,000
	5	North Wall	120 x 12	2400
22	1	West Wall (N Cor)	32 x 23	310
			32 x 23	310
	2	West Wall (S Cor)	32 x 28	400
			32 x 28	400
	3	South Wall	32 x 32	400
			32 x 33	500
	4	South Wall (E Cor)	63 x 30	1050
	5	East Wall (N Cor)	55 x 32	600
25	1	East Wall (S Cor)	38 x 30	700
	2	" " (N Cor)	31 x 30	330
			31 x 30	330
	3	West Wall	30 x 20	550
			30 x 20	500
27	1	West Wall (S Cor)	35 x 31	575
			35 x 31	450

Room No.	Hood No.	Hood Location	Hood Dimensions Inches	Air CFM
3	2	[illegible]	[illegible]	[illegible]
		West Wall	[illegible]	[illegible]
		Center of Room	[illegible]	[illegible]
			[illegible]	[illegible]
	4	West Wall	[illegible]	[illegible]
	5	West Wall	[illegible]	225
	6	West Wall	[illegible]	275
			[illegible]	250
30		West Wall (N Cor)	33 x 29	465
	2	" " (S Cor)	33 x 29	400
	3	East Wall	33 x 27	480
			33 x 27	500
33 & 35	1	East Wall (S Cor)	[illegible] x 35	550
			38 x 33	600
	2	East Wall (Center)	29 x 24	450
			29 x 24	450
			29 x 24	400
	3	East Wall (N Cor)	35 x 26	530
	4	South Wall	33 x 10	550
	5	West Wall (S Cor)	39 x 27	450
	6	Adjacent to Hood 5	39 x 26	400
34	1	West Wall (N Cor)	33 x 28	650
			38 x 28	800
	2	West Wall (S Cor)	29 x 22	450
			29 x 22	530
	3	East Wall	31 x 28	550
			31 x 28	400
45	1	East Wall	33 x 27	1050
			33 x 27	1000
55	1	Center of Room		1000
54 & 56	1	North Wall (E Cor)	38 x 29	580
	2	" " Center	38 x 29	580
			38 x 29	580
			38 x 29	580
	3	North Wall (W Cor)	75 x 41	1070
			75 x 41	
	4	North Wall (E Cor)		
	5	West Wall	45 x 21	1810
	6	Center Rm. (Hood)	38 x 30	900
			38 x 30	900

Room No.	Hood No.	Hood Location	Hood Dimensions Inches	Air CFM
54 & 56	6	Center Rm. (Hood)	38 x 30	900
	7	Center Rm. (E Hood)	38 x 24	300
			38 x 26	350
57	1	East Wall (S Cor)	38 x 30	560
			38 x 30	560
	2	East Wall (N Cor)	30 x 25	350
			30 x 25	470
	3	West Wall	33 x 21	560
			33 x 27	620
61	1	East Wall		
62	1	West Wall	38 x 35	880
			38 x 24	400
63	1	East Wall	38 x 34	630
			38 x 34	400
64	1	West Wall	38 x 31	550
			38 x 31	575
65	1	North Wall		
	2	Center		1000
67	1	South Wall	38 x 34	550
			38 x 34	675
69	1	South Wall	37 x 27	550
			37 x 27	
71	1	South Wall (W Cor)	38 x 32	420
			38 x 32	550
	2	South Wall (Cen)	33 x 24	
			33 x 24	
	3	South Wall (E Cor)	32 x 29	580
			32 x 29	480
	4	North Wall	30 x 26	490
			30 x 26	590
73	1	West Wall	38 x 34	450
			38 x 34	670
	2	South Wall	32 x 31	500
			32 x 31	500
74	1	North Wall	38 x 29	765
			38 x 9	250
	2	Toward So. Wall		
76	1	South Wall	72 x 35	975
78	1	East Wall		400
84	1	South Wall	30 x 27	470
86	1	South Wall	38 x 29	380
			38 x 29	380
	2	Center of Room		1000

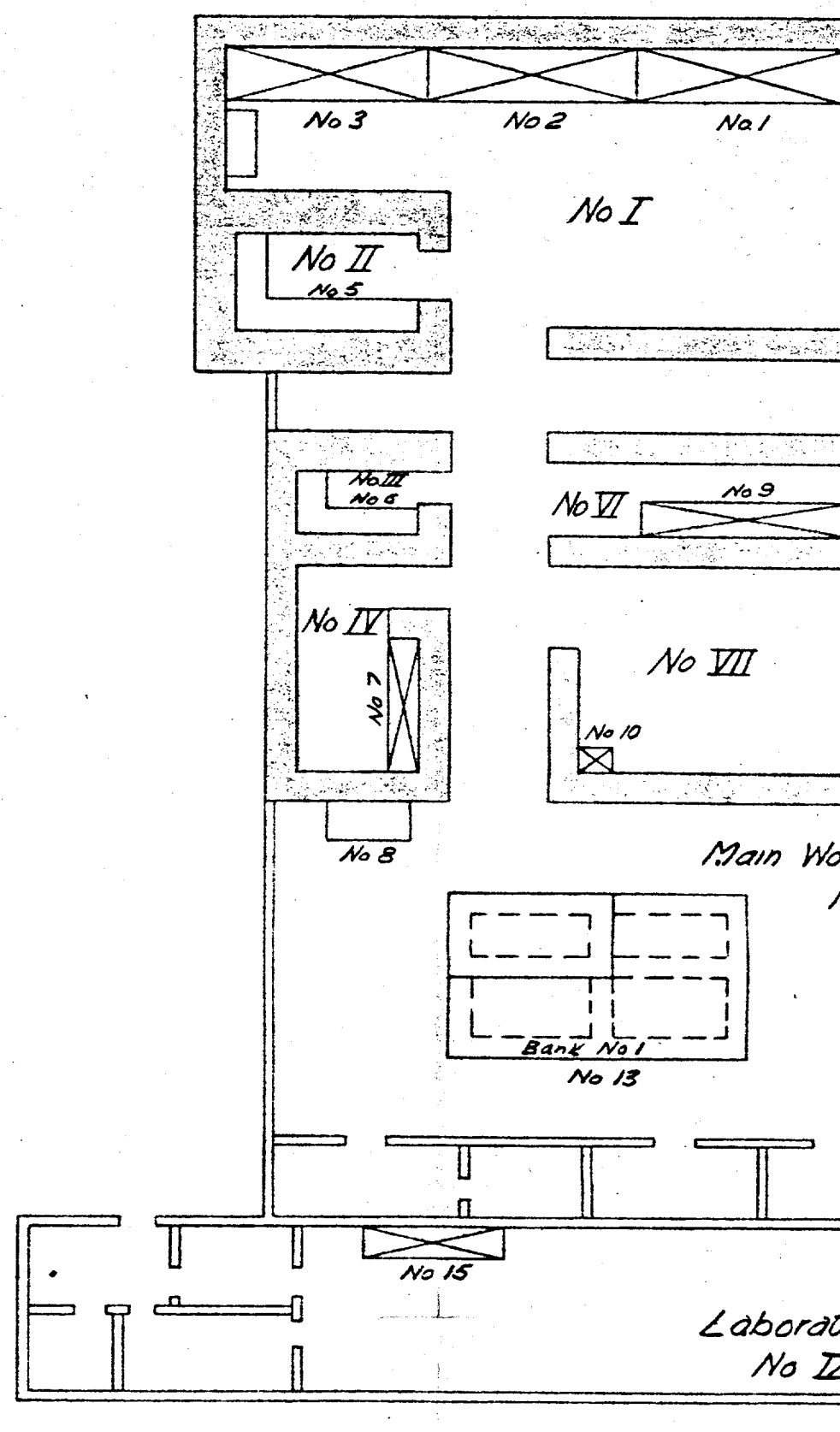
APPD.	DATE	OAK RIDGE NATIONAL LABORATORY
		TECHNICAL DIV. — P.O. BOX — OAK RIDGE, TENN.
		BLDG. 706A HOOD VENTILATION SYSTEM
		DRAWN BY C.W. Day — DATE 11-9-48 — SCALE 1/16" = 1'-0"
		CHECKED BY — DATE — DRAWING NO. TD-853 — REV.

REV NO.	REVISION	APPD	DATE

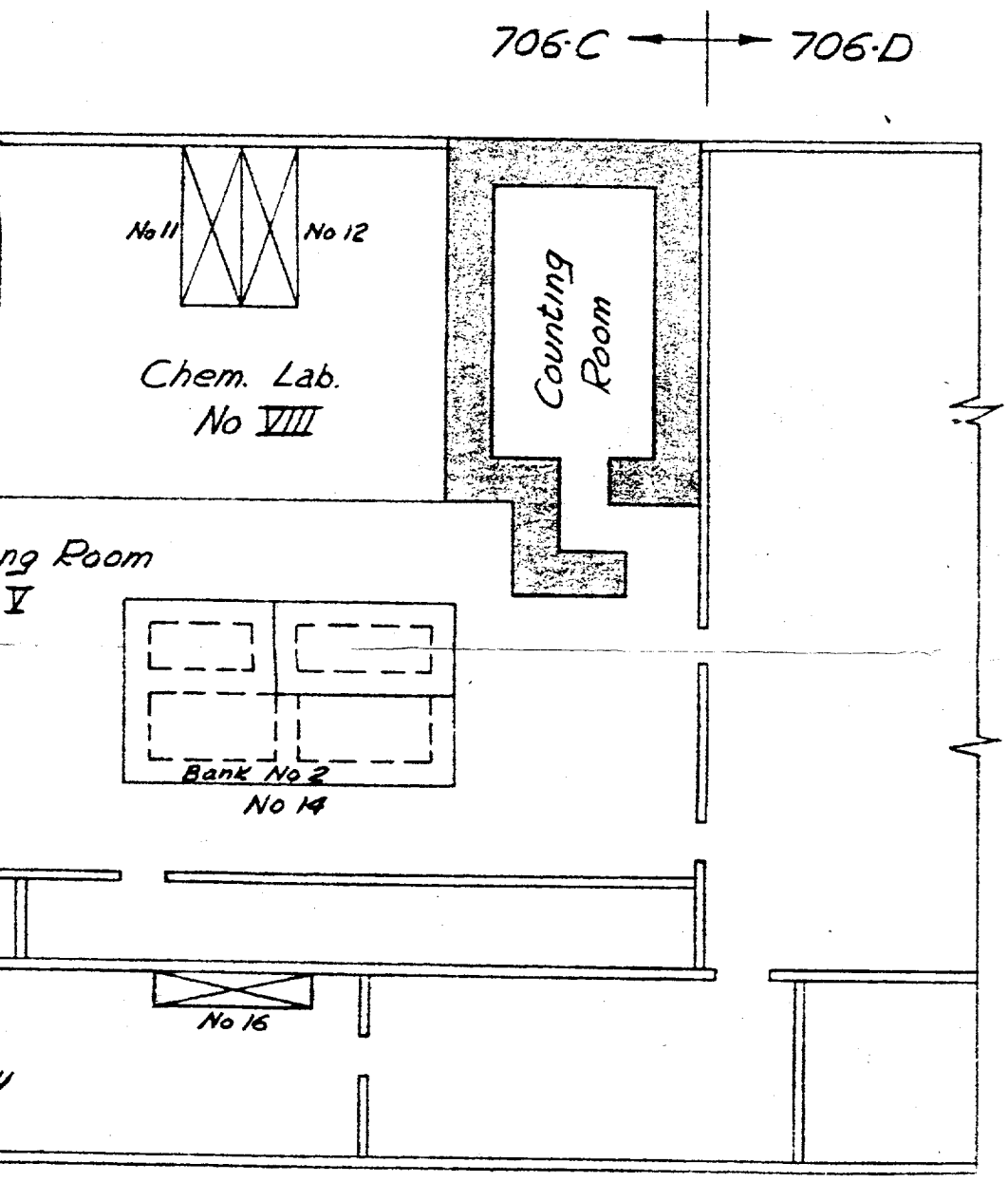
1288

RESTRICTED

TD-782



AIR FLOW STUDY-									
Room No	Hood No	Hood Location	Hood Openg Inches	Air CFM	Room No	Hood No	Hood Location	Hood Openg Inches	Air CFM
I	1	N.E. Corner	84 x 45	2500	VI	9	S. Wall	42 x 38	865
	2	N. Wall Center	84 x 45	2500	VII	10(1)	S.W. Corner	132 x 62	865
	3	N.W. Corner	84 x 84	3600	VIII	11	W. Hood	40 x 36	865
	4	W. Wall	57 x 47	2000		12	E Hood	40 x 36	865
II	5	Room Doorway	86 x 36	2100	V	13	Cell Bank No 1 (4)	25 x 25 (ea)	3697
III	6	Inclosed Dry Box	—	865		14	Cell Bank No 2 (4)	25 x 25 (ea)	3697
IV	7	E. Wall	41 x 38	865	IX	15	N.W. Corner	36 x 36	800
V	8	N.W. Corner	65 x 41	2100		16	N.E. Corner	36 x 36	800



Ref. Dwg. TD-835

RESTRICTED

DO NOT SCALE THIS DRAWING.

APPD.	DATE

REV. NO.	REVISION	APPD.	DATE

OAK RIDGE NATIONAL LABORATORY

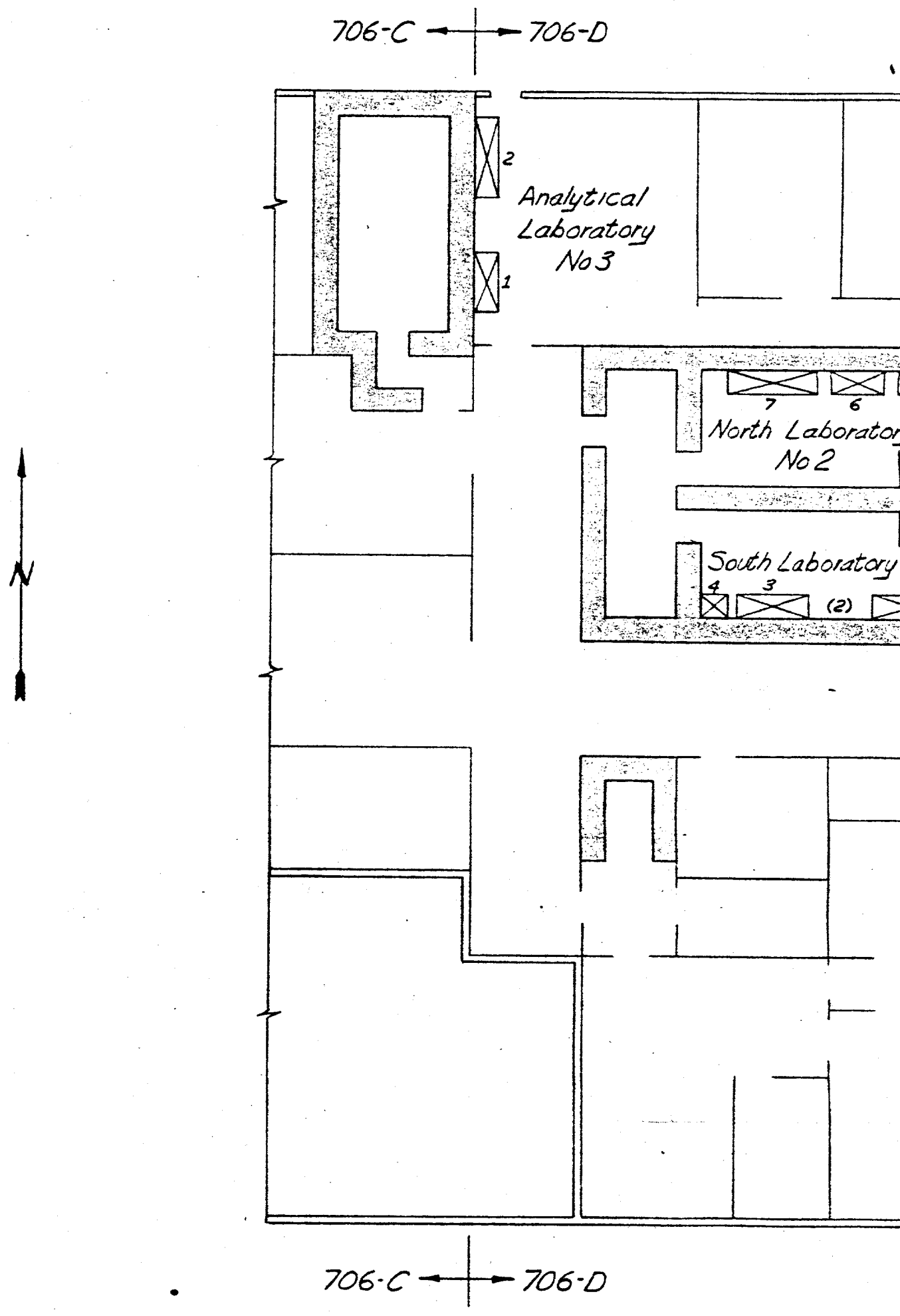
TECHNICAL DIV. — P.O. BOX P. — OAK RIDGE, TENN.

BLDG. 706-C
LOCATION OF HOODS
AND CELLS

DRAWN BY	DATE	SCALE No Scale	
JER	1-28-49	DRAWING NO.	REV.
CHECKED BY	DATE	TD-782	

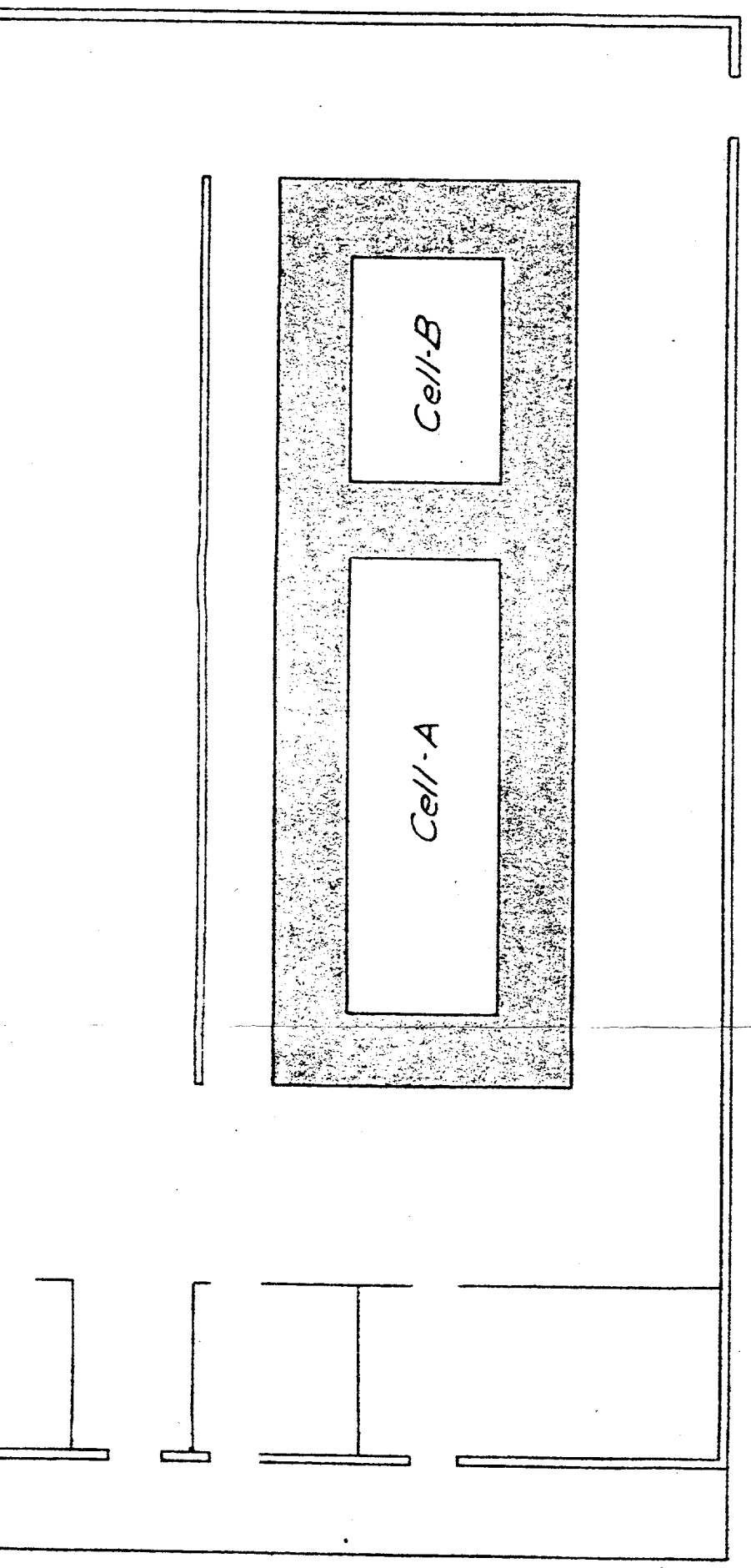
RESTRICTED

TD-783



AIR FLOW STUDY-

Room No	Hood No	Hood Location	Hood Open'g Inches	Air CFM	Room No	Hood No	Hood Location	Hood Open'g Inches	Air CFM
1	1	S. Wall; E. End	45 x 35		3	1	W. Wall; South	40 x 47	2200
	2	S. Wall; E. Center	Open	4200		2	W. Wall; North	39 x 33	
	3	S. Wall; W. Center	45 x 45		3rd Fl.	1*	N.W. Corner		
	4	S. Wall; W. End	25 x 17		Cells	A & B	E. End Bldg.	—	15000
2	5	N. Wall; E. End	6 x 27						
	6	N. Wall; Center	46 x 42	4200					
	7	N. Wall; W. End	11½ x 57 21½ x 58		*	Not	Shown on Drawing		



Ref. Dwg. TD-835

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APPD.	DATE

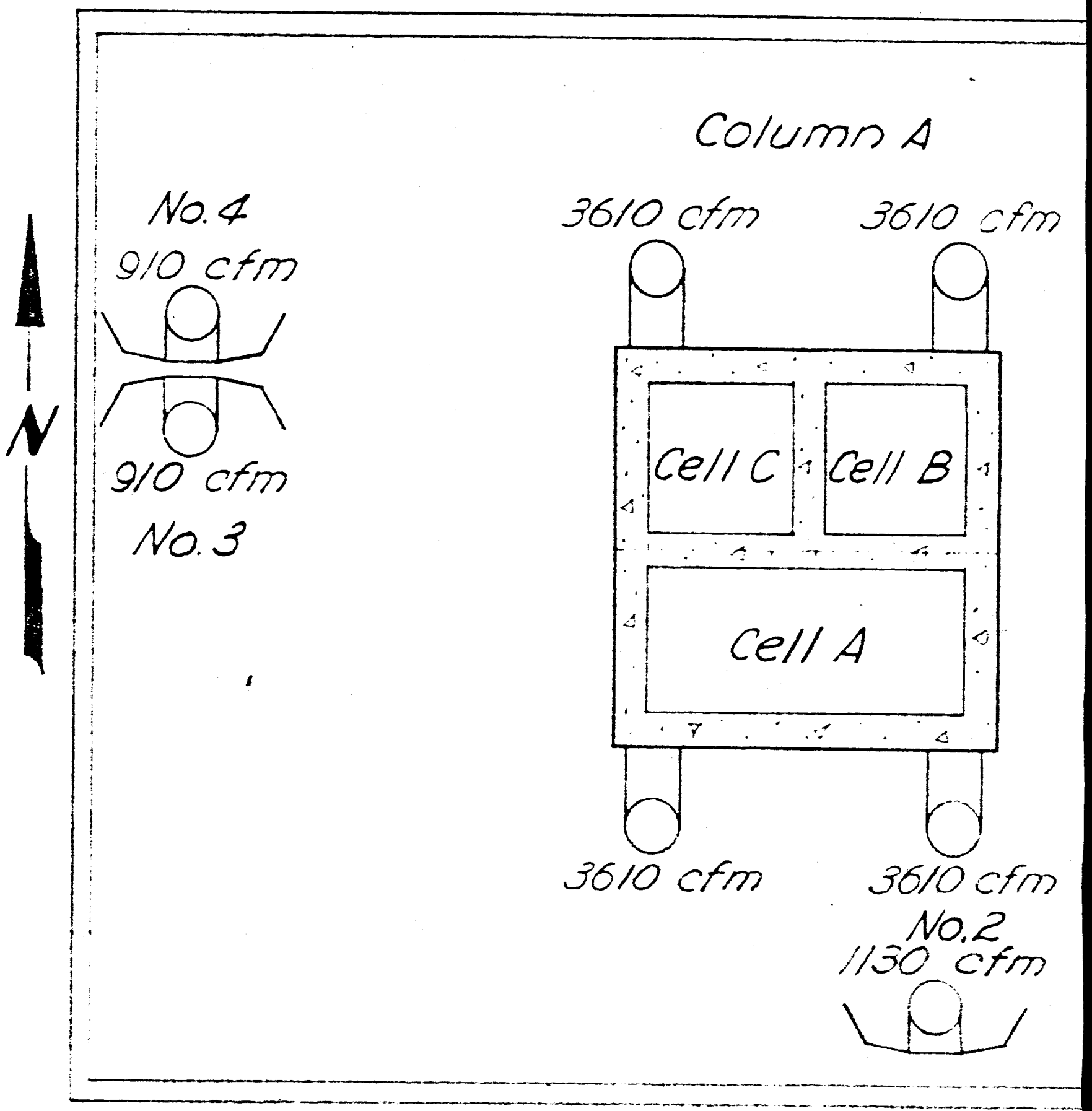
REV. NO.	REVISION	APPD.	DATE

OAK RIDGE NATIONAL LABORATORY

TECHNICAL DIV. — P.O. BOX P. — OAK RIDGE, TENN.

BLDG. 706-D
LOCATION OF HOODS
AND CELLS

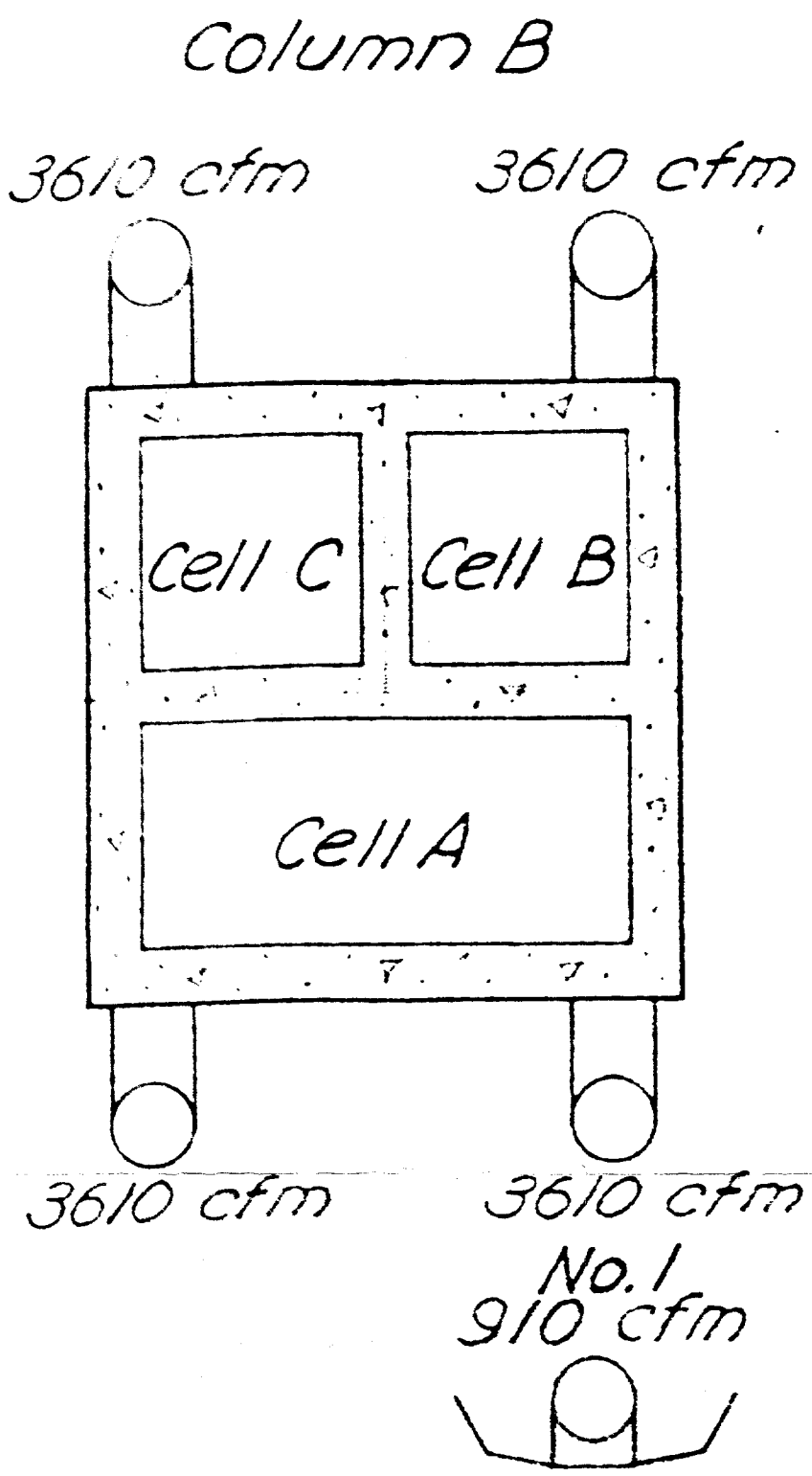
DRAWN BY	DATE	SCALE No Scale
JEP	1-28-49	
CHECKED BY	DATE	DRAWING NO. TD-783 — REV.



Total hood exhaust	3860 cfm
Total cell exhaust	28880 cfm
Total Bldg. exhaust	32740 cfm

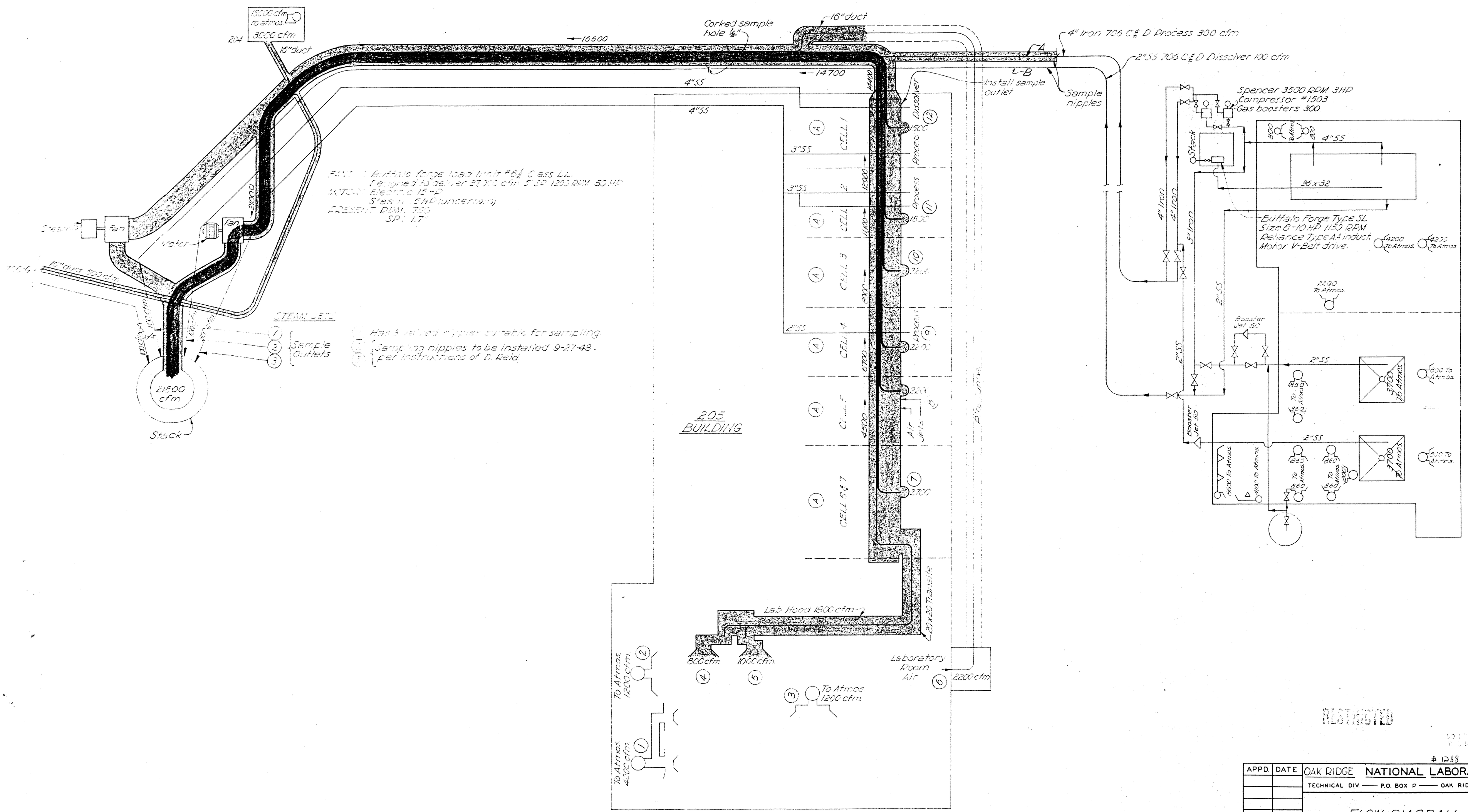
REV. NO.	REVISION	APPD.	DATE

APP



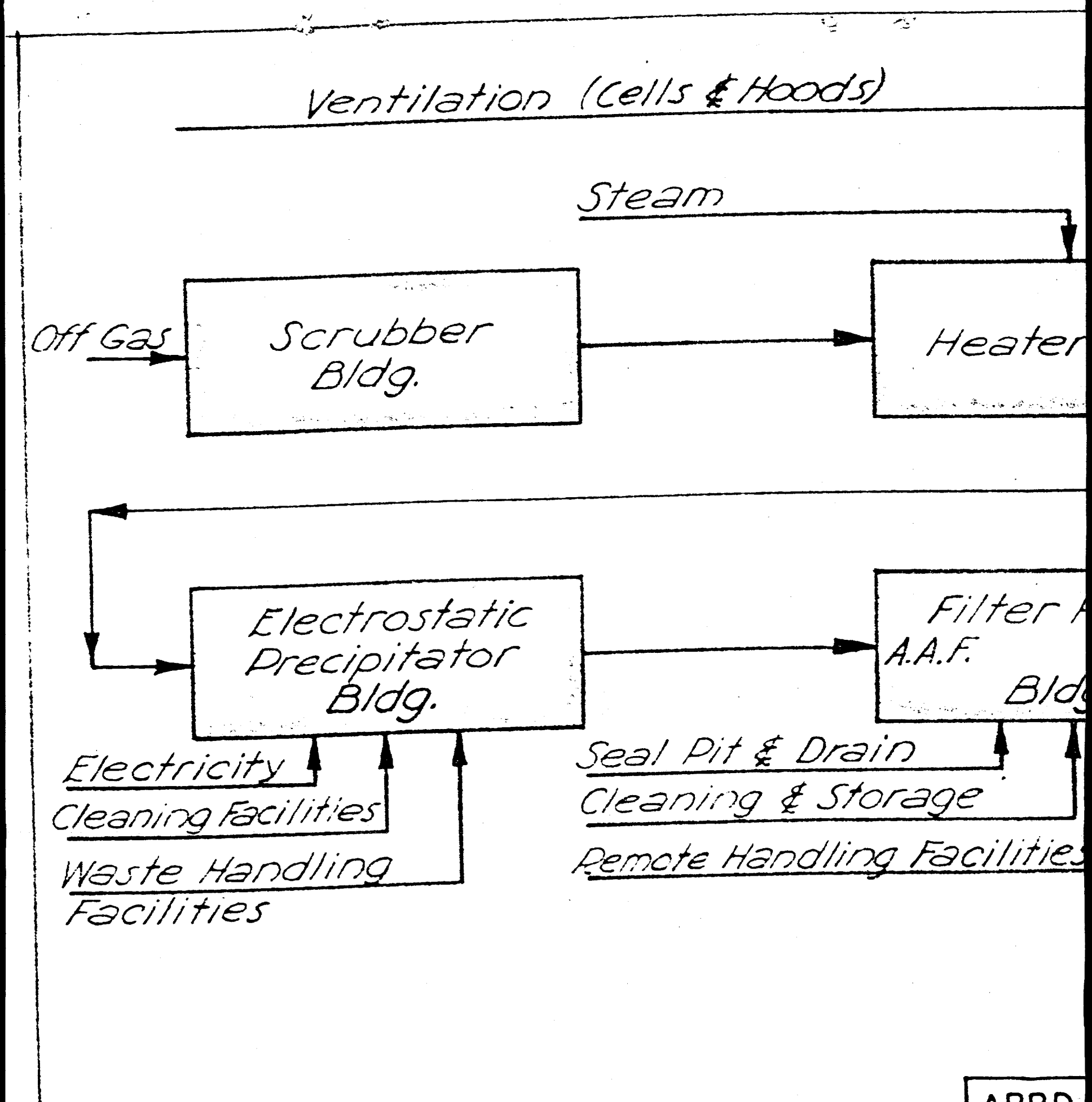
D.	DATE	OAK RIDGE NATIONAL LABORATORY TECHNICAL DIV. — P.O. BOX P — OAK RIDGE, TENN.		
		BLDG. 706HB CELL & HOOD EXHAUST SYSTEM		
		DRAWN BY C.W. Day	DATE 11-5-48	SCALE NONE
		CHECKED BY	DATE	DRAWING NO. TD-857 / REV.

TD-535

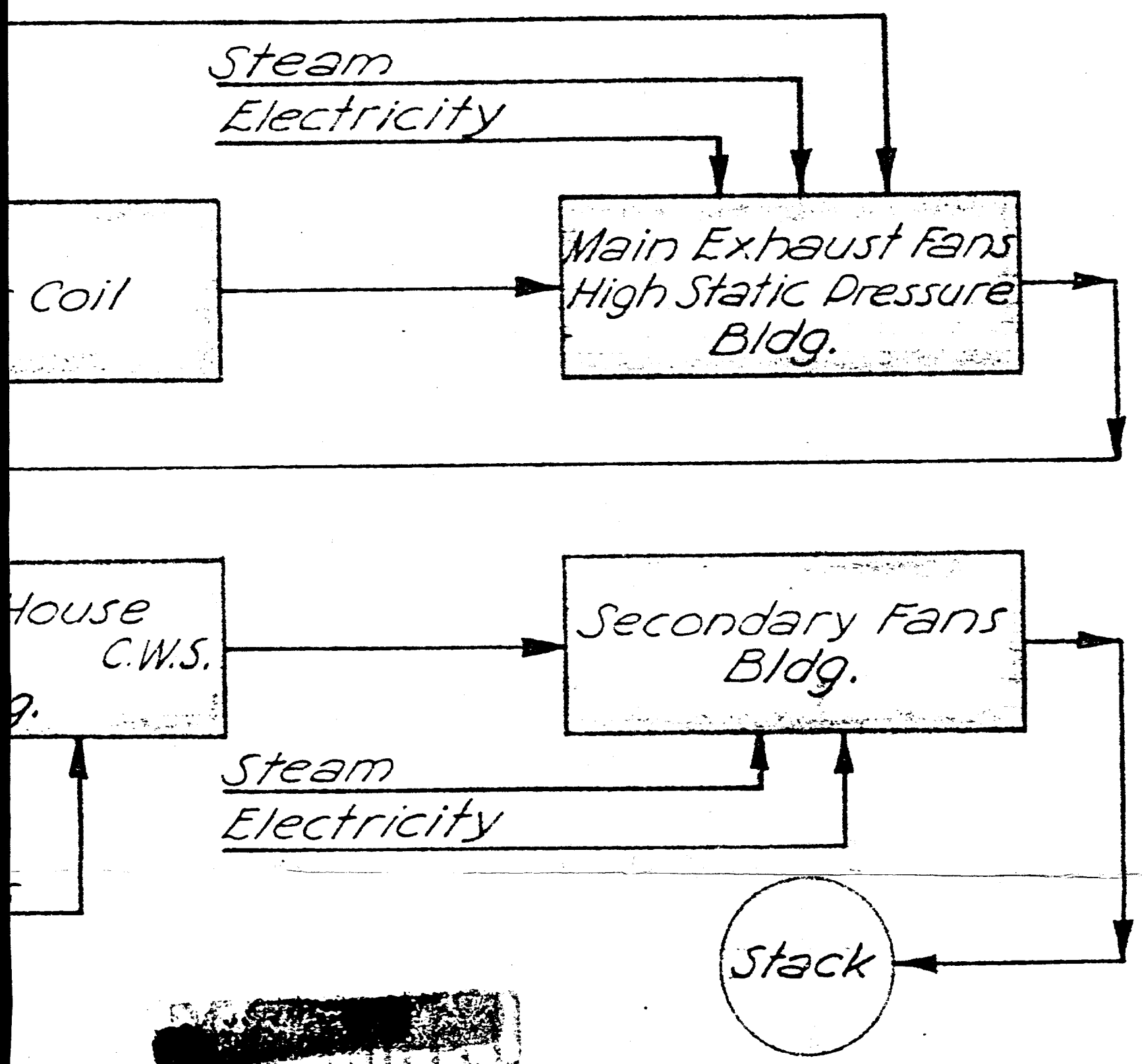


APPD.	DATE	OAK RIDGE NATIONAL LABORATORY TECHNICAL DIV. — P.O. BOX P — OAK RIDGE, TENN.		
		FLOW DIAGRAM 205 RADIOCHEMICAL OFFGAS DISPOSAL SYSTEM		
		DRAWN BY C.W. Day	DATE 9-30-48	SCALE None
		CHECKED BY	DATE	DRAWING NO. TD-535 REV.

REV. NO.	REVISION	APPD.	DATE



REV. NO.	REVISION	APPD.	DATE	APPD.



[redacted]

DATE	OAK RIDGE NATIONAL LABORATORY TECHNICAL DIV. —— P.O. BOX P —— OAK RIDGE, TENN.		
	FLOW DIAGRAM DECONTAMINATION EQUIPMENT		
	DRAWN BY C.W. Day	DATE 11-5-48	SCALE
	CHECKED BY	DATE	DRAWING NO. TD-858 / REV.