NRC FORM 195
(2-76)

U.S. NUCLEAR REGULATORY COMMISSI[ON]

DOCKET NUMBER
50-269/270/287

FILE NUMBER

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TO:	FROM:	DATE OF DOCUMENT
Mr. E. G. Case	Duke Power Company Charlotte, North Carolina William O. Parker	9/2/77 DATE RECEIVED 9/6/77

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DESCRIPTION

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APPENDIX I DISTRIBUTION AFTER ISSUANCE OF A LICENSE

ACKNOWLEDGED

PLANT NAME: Oconee 1-2-3 (1-P)

DIST PER S. SHEPPARD 9/9/77

ENCLOSURE

Consists of information furnished in response to NRC staff questions concerning applicant's Appendix I submitted on June 4, 1976 re the Turbine Building Exhaust System.......... with attached drawings..........

see drawings

(10-P)

RJL 9/9/77 1 ENCL.

SAFETY — FOR ACTION/INFORMATION

BRANCH CHIEF: 5 (5) LTR.	SCHWENCER		
~~PROJECT MANAGER: LTR.~~			
~~LIC. ASST:~~			

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DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

September 2, 1977

File Cy

Regulatory

RECEIVED
SEP 6 1977
U.S. NUCLEAR REGULATORY COMMISSION
Mail Section

Mr. E. G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. A. Schwencer, Chief
Operating Reactors Branch # 1

Re: Oconee Nuclear Station
Docket Nos. 50-269,-270,-287

Dear Sir:

The attached information is in response to questions from your staff concerning the Oconee Nuclear Station Appendix I submitted on June 4, 1976.

Very truly yours,

William O. Parker

RLG/mlr
Attachment

7725 20023

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON 10CFR50 APPENDIX I

1. Question - Provide the description of the Turbine Building Exhaust System, including flow rate, velocity, height above grade, height above and relative location to adjacent structures, relative temperature difference between exhaust effluent and ambient air, and size and shape of the flow orifice.

Response - Details of the Turbine Building Exhaust System fans for each unit are as follows:

Unit - 1

1. a) Height of Fans 1A through 1D above grade = 91 ft - 6 inches.
   b) Height of Fans 1F through 1I above grade = 60 ft - 9 inches.
   c) Height of Fan 1E above grade = 43 ft - 6 inches.

2. Expected average temperature difference between gaseous effluent and ambient air = $(115^{o} - 95^{o}) = 20^{o}F$, (all fans).

3. a) Flow Rate, Fans 1A through 1D = 69,000 CFM Each
   b) Flow Rate, Fans 1E through 1I = 58,000 CFM Each

4. a) Exit Velocity, Fans 1A through 1D = 1940 FPM
   b) Exit Velocity, Fans 1E through 1I = 2440 FPM

5. Size and Shape of Flow Orifice:
   a) Fans 1A through 1D - 80 3/4" diameter, round.
   b) Fans 1E through 1I - 66" diameter, round.

6. Height above and location relative to adjacent structures (all fans):
   Note: All fans are arranged "in-line," running North - South. All locations given are from the center of this line; i. e., center of Turbine Building, Unit 1, North - South dimension. See attached drawings for additional details.
   a) 4' East of Unit 1 & 2 Auxiliary Building and 30 feet above it.
   b) 45' East of Unit-1 Reactor Building and 99 ft below it.
   c) 225' NE of Unit-2 Reactor Building and 99 ft below it.
   d) 450' NNE of Unit-3 Reactor Building and 99 ft below it.
   e) 225' SE of Administration Building and 64 ft above it.
   f) 185' SW of Service Building and 62 ft above it.

Unit - 2

1. a) Height of Fans 2A through 2D above grade = 91 ft - 6 inches.
   b) Height of Fans 2E through 21 above grade = 60 ft - 9 inches.
   c) Height of Fans 2J and 2K above grade = 43 ft - 6 inches.

2. Expected average temperature difference between gaseous effluent and ambient air = $(115^{o} - 95^{o}) = 20\ ^{o}F$, (all fans).

3 a) Flow Rate, Fans 2A through 2D = 69,000 CFM Each
  b) Flow Rate, Fans 2E through 2K = 58,000 CFM Each

4. a) Exit Velocity, Fans 2A through 2D = 1940 FPM
   b) Exit Velocity, Fans 2E through 2K = 2440 FPM

5. Size and Shape of Flow Orifice:

   a) Fans 2A through 2D - 80 3/4" diameter, round.
   b) Fans 2E through 2K - 66" diameter, round.

6. Height above and location relative to adjacent structures (all fans):
   Note: All fans are arranged "in-line," running north - south. All locations given are from the center of this line; i.e., center of Turbine Building, Unit 2, North-South dimension. See attached drawing for additional details.

   a) 4' East of Unit 1 and 2, Auxiliary Building and 30 ft. above it.
   b) 225' and SE of Unit 1, Reactor Building and 99 ft below it.
   c) 45' East of Unit 2, Reactor Building and 99 ft below it.
   d) 225' NE of Unit 3, Reactor Building and 99 ft below it.
   e) 470' SE of Administration Building and 64 ft above it.
   f) 435' SW of Service Building and 62 ft above it.

Unit - 3

1. a) Height of Fans 3A through 3D above grade = 91 ft - 6 inches.
   b) Height of Fans 3E through 3I above grade = 60 ft - 9 inches.
   c) Height of Fan 3J above grade = 43 ft - 6 inches.

2. Expected average temperature difference between gaseous effluent and ambient air = (115^{o} - 95^{o}F, (all fans).

3. a) Flow Rate, Fans 3A through 3D = 69,000 CFM Each
   b) Flow Rate, Fans 3E through 3J = 58,000 CFM Each

4. a) Exit Velocity, Fans 3A through 3D = 1940 FPM
   b) Exit Velocity, Fans 3E through 3J = 2440 FPM

5. Size and Shape of Flow Orifice:

   a) Fans 3A through 3D - 80 3/4" diameter, round.
   b) Fans 3E through 3J - 66" diameter, round.

6. Height above and location relative to adjacent structures (all fans):
   Note: All fans are arranged "in-line," running North-South. All locations given are from the center of this line; i.e., center of Turbine Building, Unit 3, North-South dimension. See attached drawing for additional details.

   a) 4' East of Unit 3, Auxiliary Building and 30 ft above it.
   b) 45' East of Unit 3, Reactor Building and 99 ft below it.
   c) 225' SE of Unit 2, Reactor Building and 99 ft below it.
   d) 450' SSE of Unit 1, Reactor Building and 99 ft below it.
   e) 720' SSE of Administration Building and 64 ft above it.
   f) 685' SSW of Service Building and 62 ft above it.

2. Question - Indicate if each effluent release point is equipped with diffusers or spreaders.

Response - There are no spreaders or diffusers installed at the effluent release points.

3.a Question - The onsite meteorological measurements program does not meet the recommendations of Regulatory Guide 1.23 with respect to elevations and exposure of sensors. Wind speed and direction are not measured at the 10 meter level "because of inadequate exposure near the ground" presumably caused by "20 meter trees near the tower base." The lower temperature sensor used for the measurement of vertical temperature gradient is located only 1.5 meters above the ground, which would bias the resultant atmospheric stability distribution towards extremely unstable and extremely stable conditions. The effect of this bias on estimates of atmospheric diffusion and deposition from partially elevated releases is not clear. The measurement of vertical temperature gradient would also be affected by "20 meter trees near the tower base." The present location of the meteorological tower may not provide representative data for an assessment of atmospheric transport and diffusion characteristics at and near the plant site.

To allow us to proceed with our Appendix 1 evaluation:

a) Discuss the rationale for the present location of onsite meteorological tower with respect to the representation of atmospheric transport and diffusion characteristics (wing speed, wind direction, and vertical temperature gradient) at and near the site.

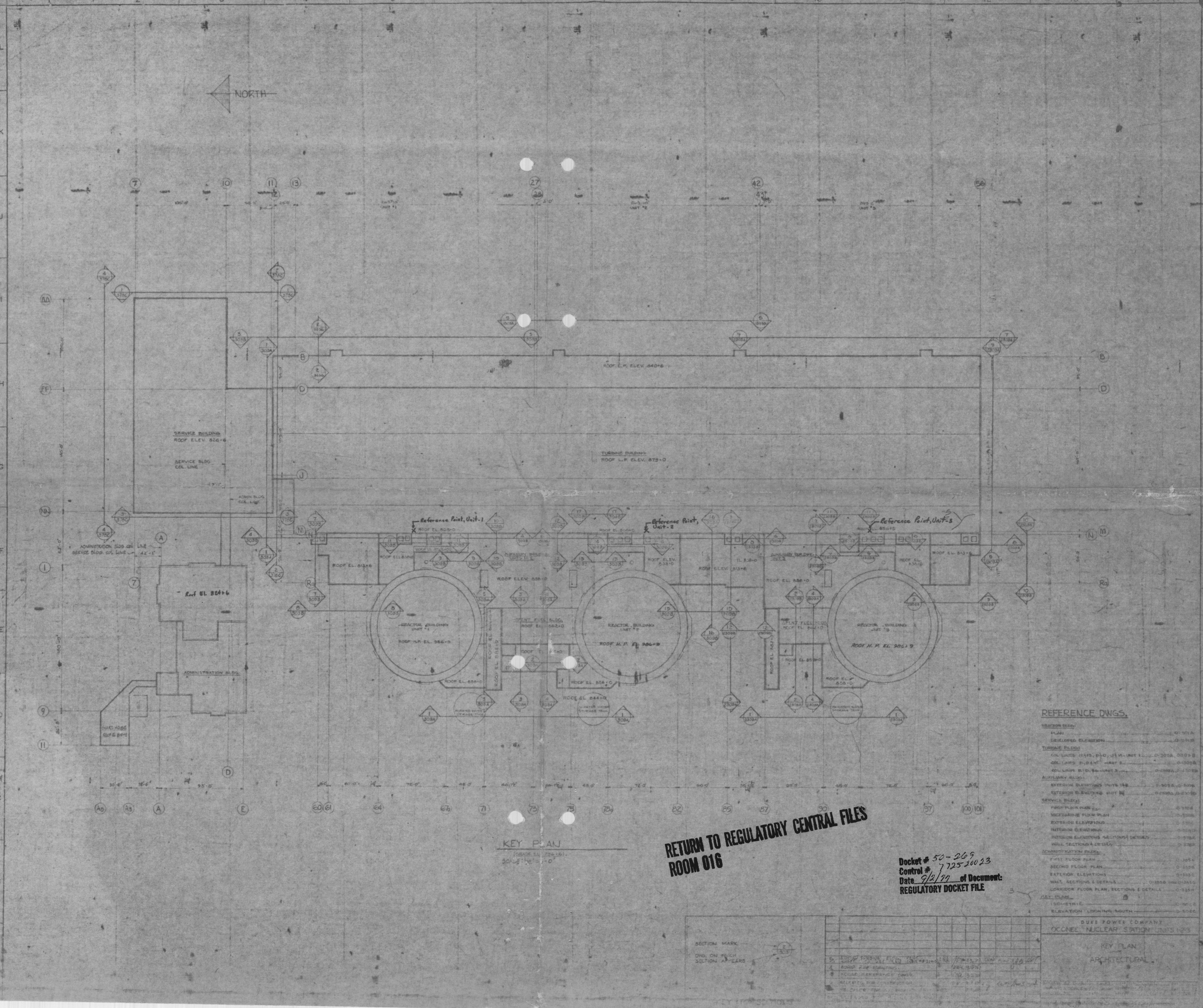
Response - The tower location for the measurement of wind direction, speed and vertical temperature gradient does not conform to present NRC guidelines in some respects. Specifically, guidelines suggest that 1) tower elevation be the same as plant grade; 2) upper sensors be the same elevation as release height; and 3) "care should be taken to locate the stations at positions where the measurements will accurately represent the overall site meteorology ..." (Safety Guide 1.23). With regard to points 1) and 2), the higher elevation of tower base, 20 meters above grade, coupled with a lower tower height of 46 meters against a vent height of 60 meters, have a compensating effect, suggesting an appropriate estimate of wind direction and speed for vent releases. Inasmuch as low level flow direction cannot be adequately represented by a 10 meter sensor during general gravity flow conditions, all low level input is derived from sensors atop the tower. Wind speed is adjusted by a power law relationship in accordance with evaluation in Oconee SER, Units 2 and 3. Addressing point 3), on the basis of undulating terrain surrounding the plant this location is taken as reasonably representative of topography in the vicinity of the plant with respect to wind direction and vertical temperature gradient. See Oconee FSAR, Figure 2.2. Thus, in all respects, the present tower location is representative of site meteorology.

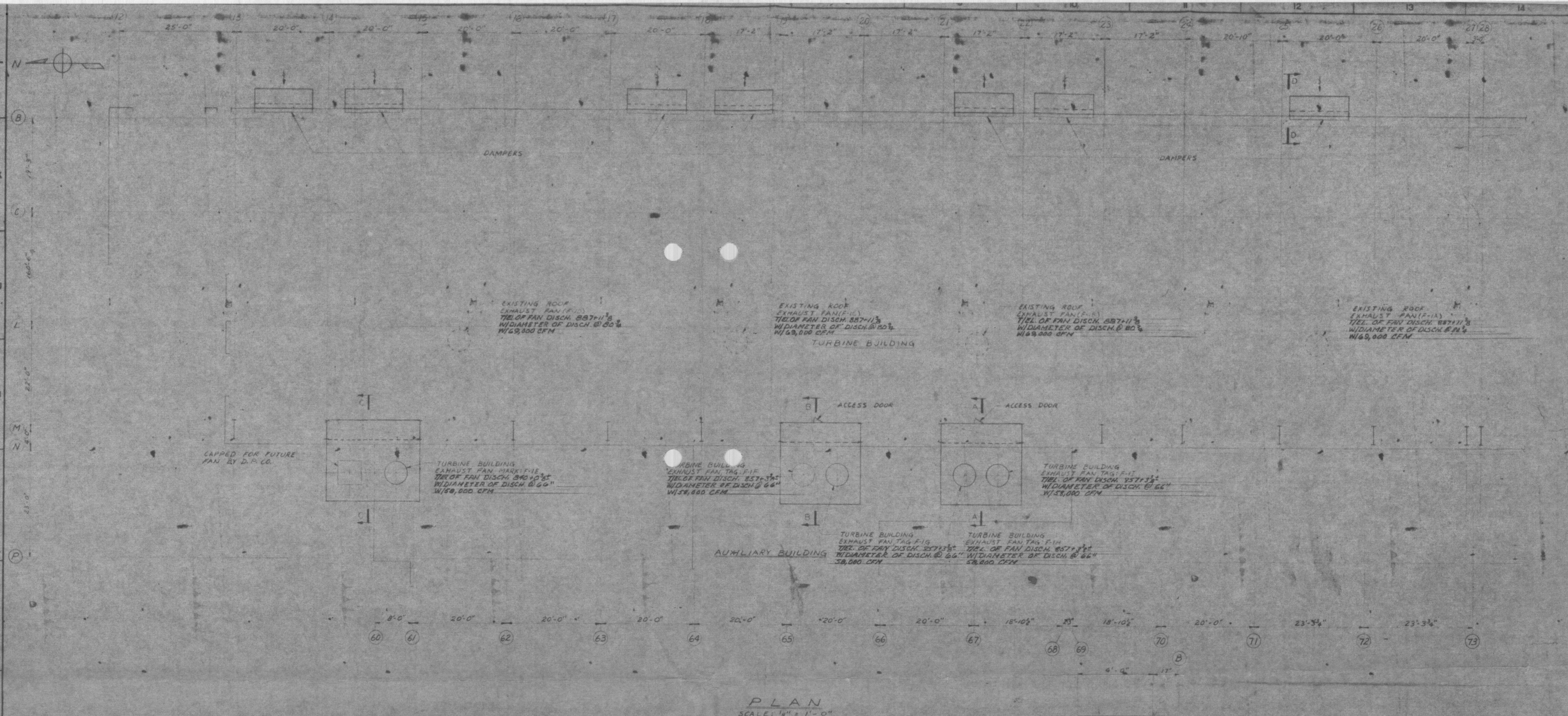
3.b Question - Assess the impact of using the 1.5 meter level for the lower sensor for measuring vertical temperature gradient on estimates of atmospheric diffusion and deposition, particularly from partially elevated releases. Also, identify the surface characteristics immediately below the 1.5 meter temperature sensor.

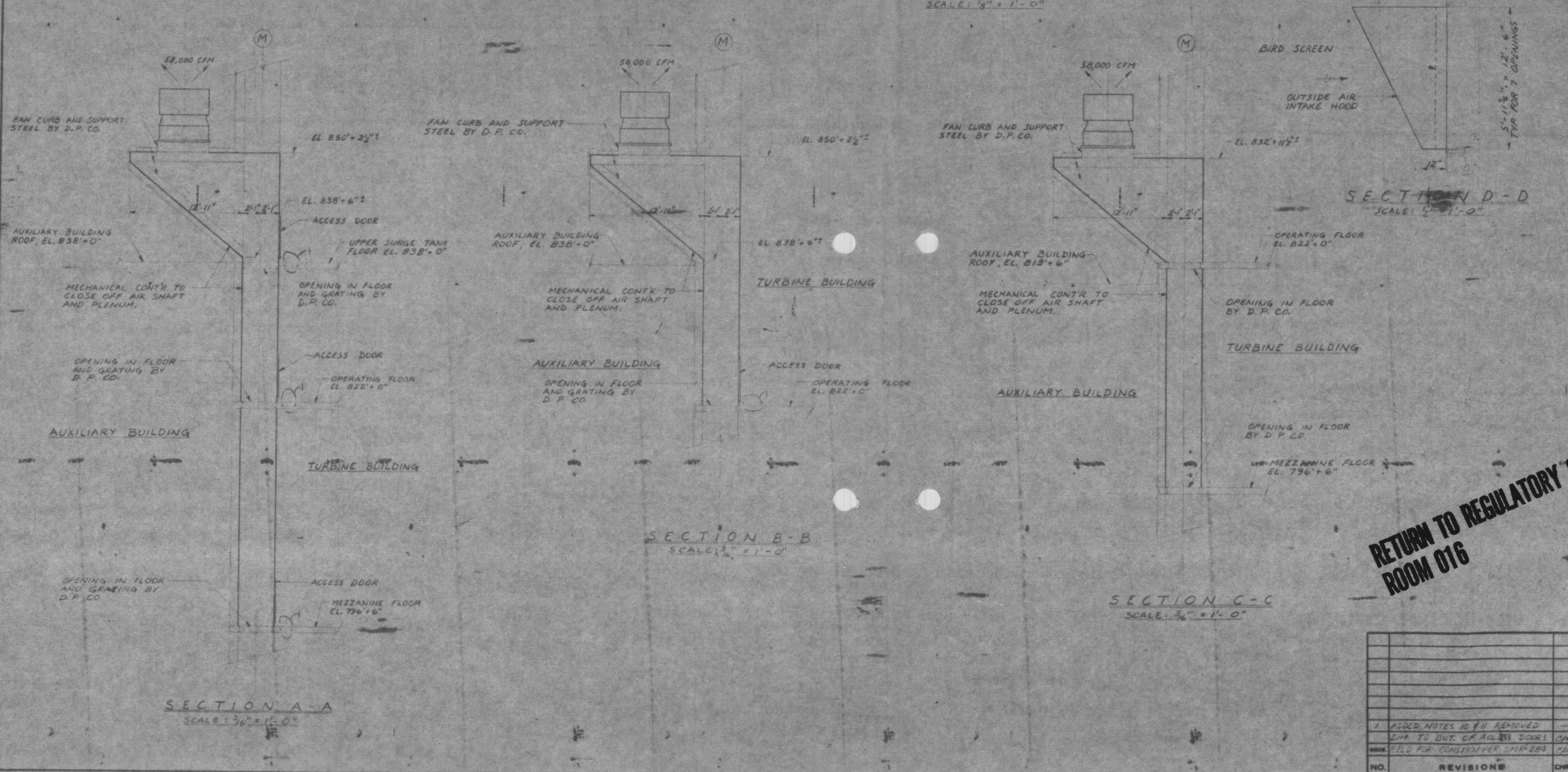
Response - The surface immediately below the 1.5 meter temperature sensor can be characterized as a grassy area. The effect on vertical temperature gradient from the positioning at 1.5 meters is to introduce some uncertainty where partially elevated releases are concerned. Consequently, this level is being moved to 10 meters above the ground (this action was taken independently of the present discussion). With respect to the limits in uncertainty in delta temperature from the present arrangement, we offer the following: The bias toward more very unstable lapses during the day is seen in the occurrence of intense lapse conditions in the existing data. We suspect, however, in view of the observation of Class A rates much of the day at other lake sites in the Duke Power service area, that the total number of Class A conditions will not change appreciably with lower sensor at 10 meters. The effect of the 20 meter trees on unstable lapse rates should not be significant. These trees are not sufficiently dense to constitute a canopy and their effect can be disregarded during well-mixed conditions. The bias toward more stable profiles at night does not readily appear in the strength of inversions typical at the Oconee site. This condition is not unexpected as the 20 meter trees to some extent should provide radiative exchange tending to hold temperatures up near the ground. Assuming the effect of the trees is to alter the temperature profile below 20 meters toward a less stable rate, the measured gradient with 1.5 meter sensor could be slightly less stable or slightly more stable than a gradient measured with a 10 meter sensor. At any rate, no pronounced bias toward anomalously stable conditions is expected in the existing data.

3.c Question - Discuss the effect of "20 meter trees near the tower base" on the measurement of vertical temperature gradient.

Please see paragraph 3b above.


NORTH
SERVICE BUILDING
ROOF ELEV. 826-6
SERVICE BLDG. COL. LINE
ADMIN BLDG. COL. LINE
TURBINE BUILDING
ROOF L.P. ELEV. 875-0
ROOF L.P. ELEV. 840-6
Reference Point, Unit-1
Reference Point, Unit-2
Reference Point, Unit-3
Roof EL 824-6
ADMINISTRATION BLDG.
REACTOR BUILDING UNIT #1
REACTOR BUILDING UNIT #2
REACTOR BUILDING UNIT #3
ROOF H.P. EL. 986-9
ROOF H.P. EL. 986-9
ROOF ELEV. 858-0
KEY PLAN
REFERENCE DWGS.
REACTOR BLDG:
PLAN — O-301A
DEVELOPED ELEVATION — O-301B
TURBINE BLDG:
AUXILIARY BLDG:
SERVICE BLDG:
FIRST FLOOR PLAN
MEZZANINE FLOOR PLAN
EXTERIOR ELEVATIONS
INTERIOR ELEVATIONS
INTERIOR ELEVATIONS SECTIONS & DETAILS
WALL SECTIONS & DETAILS
ADMINISTRATION BLDG:
FIRST FLOOR PLAN — O-385A
SECOND FLOOR PLAN — O-385B
EXTERIOR ELEVATIONS — O-385C
WALL SECTIONS & DETAILS
CORRIDOR FLOOR PLAN, SECTIONS & DETAILS — O-385H
KEY PLAN
ISOMETRIC — O-302B
ELEVATION LOOKING SOUTH — O-302C
SECTION MARK
DWG. ON WHICH SECTION APPEARS
ADDED ROOF ELEVATIONS.
ADDED REFERENCE DWGS.
RELEASED FOR CONSTRUCTION
DUKE POWER COMPANY
OCONEE NUCLEAR STATION UNITS 1-2-3
KEY PLAN
ARCHITECTURAL





NOTES

1. FANS TO BE CRYSTAL-AIRE MODEL S-UBB-6015 TD UPBLAST VENTILATORS W/GRAVITY DAMPERS, 58000 CFM @ 1/2" S.P., 460/3/60 15 HP. MOTOR.
2. FANS TO BE FURNISHED BY MECHANICAL CONTRACTOR. FANS TO BE SET BY D.P. CO. UNDER SUPERVISION OF MECHANICAL CONTRACTOR.
3. MECHANICAL CONTRACTOR TO PROVIDE AN EASEMENT AROUND ALL CABLE THAT PENETRATE AIR SHAFT WALLS. EASEMENT TO BE OPEN AT BOTH ENDS.
4. MECHANICAL CONTRACTOR TO SEAL AIR TIGHT AROUND ALL PIPES PENETRATING AIR SHAFT WALLS. METHOD OF SEALING MUST ALLOW FOR NORMAL MOVEMENT OF PIPE.
5. AIR SHAFTS TO BE CONSTRUCTED IN ACCORDANCE WITH LATEST EDITION OF SMACNA HIGH VELOCITY DUCT CONSTRUCTION STANDARDS.
6. MECHANICAL CONTRACTOR TO PROVIDE ACCESS DOORS AS INDICATED. DOORS TO BE 24" x 60" SINGLE LEAF DESIGN, CONSTRUCTED OF 16-GAGE GALV. STEEL. DOORS SHALL BE HINGED AND GASKETED. HANDLES TO BE 2-WAY TYPE HEAVY DUTY, 260 VENTLOK OR EQUAL.
7. MECHANICAL CONTRACTOR TO DISCONNECT MOTOR OPERATORS FROM INTAKE DAMPERS IN WALL AT B-LINE OF TURBINE BUILDING AND REPLACE WITH MANUAL OPERATOR WITH LOCK OPEN AND LOCK CLOSE POSITIONS.
8. OUTSIDE AIR INTAKE HOODS TO BE CONSTRUCTED OF 16-GAGE GALV. STEEL IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA HIGH VELOCITY DUCT CONSTRUCTION STANDARDS. MECHANICAL CONTRACTOR TO VERIFY OPENING DIMENSIONS IN FIELD.
9. REFERENCE DRAWINGS:
   ARCHITECTUAL - O-2303C
   STEEL - O-124A & O-124B
10. MECHANICAL CONTRACTOR TO PROVIDE ADDITIONAL ACCESS DOORS AS DIRECTED BY D.P. CO. CONSTRUCTION ENGINEER.
11. D.P. CO. CONSTRUCTION TO PROVIDE GRATING AS REQU... FOR ACCESS.

NO.	REVISIONS	CHKD	APPR	DATE	CIVIL	ELEC.	MECH.
1.	ADDED NOTES 10 & 11. REMOVED	—	—	—	—	—	—
	DIM. TO BOT. OF ACCESS DOORS	CPA	HAS	6/18/75	PB	WET	
ORIG.	REL'D FOR CONSTR'N PER SMR-284	CPA	HAS	5/6/75	PB	WET	

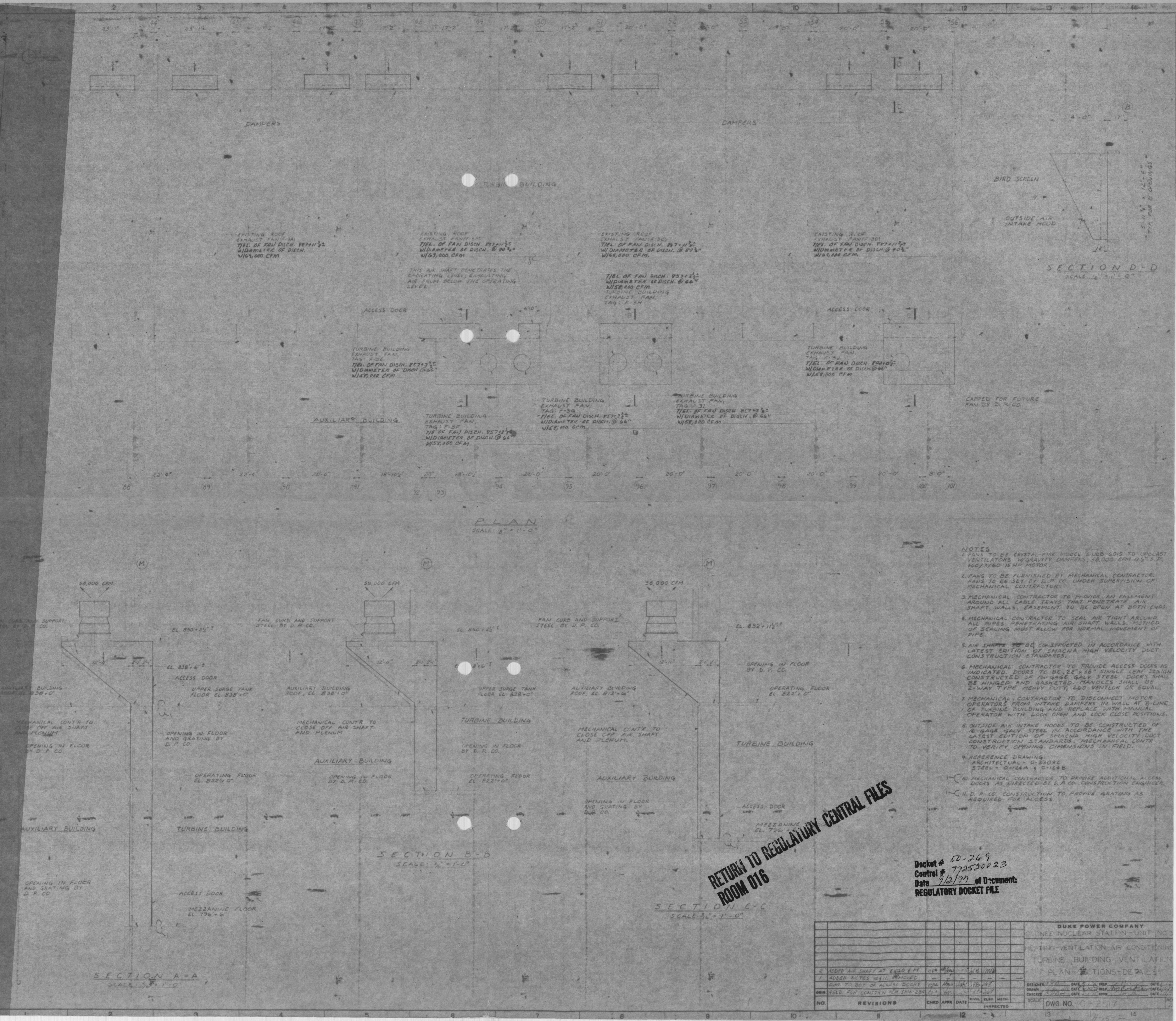
DUKE POWER COMPANY
OCONEE NUCLEAR STATION UNIT NO. 1

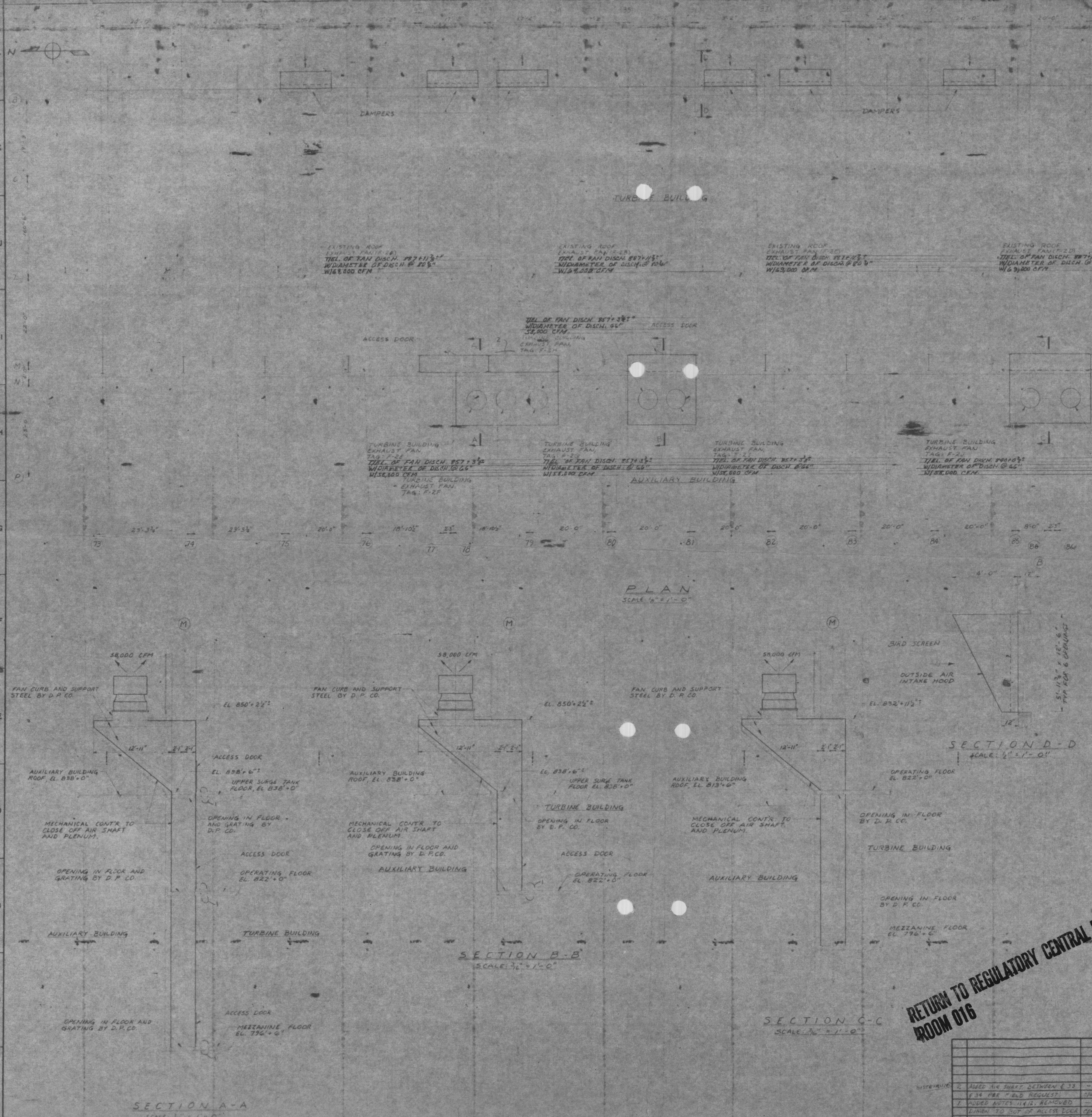
HEATING-VENTILATION-AIR CONDITIONING
TURBINE BUILDING VENTILATION
PLAN-SECTIONS-DETAILS

DESIGNER [illegible] DATE [illegible] INSP [illegible] DATE [illegible]
DRAWN [illegible] DATE 4/14/75 INSP [illegible] DATE 5/6/75
CHECKED [illegible] DATE [illegible] APPR [illegible] DATE [illegible]

SCALE | DWG. NO. O-517 | REV. 1

I-7-3


DAMPERS
DAMPERS
TURBINE BUILDING
BIRD SCREEN
OUTSIDE AIR INTAKE HOOD
SECTION D-D
EXISTING ROOF EXHAUST FAN
T/EL. OF FAN DISCH. 857'-11 1/2"
W/DIAMETER OF DISCH.
W/69,000 CFM
THIS AIR SHAFT PENETRATES THE OPERATING LEVEL. EXHAUSTING AIR FROM BELOW THE OPERATING LEVEL
ACCESS DOOR
TURBINE BUILDING EXHAUST FAN
W/58,000 CFM
AUXILIARY BUILDING
CAPPED FOR FUTURE FAN BY D.P. CO.
PLAN
58,000 CFM
FAN CURB AND SUPPORT STEEL BY D. P. CO.
UPPER SURGE TANK FLOOR EL 838'-0"
AUXILIARY BUILDING ROOF, EL 838'-0"
MECHANICAL CONTR TO CLOSE OFF AIR SHAFT AND PLENUM
OPENING IN FLOOR AND GRATING BY D. P. CO.
OPERATING FLOOR EL 822'-0"
OPENING IN FLOOR BY D. P. CO.
MEZZANINE FLOOR EL 796'-6"
TURBINE BUILDING
AUXILIARY BUILDING
SECTION A-A
SECTION B-B
SECTION C-C
NOTES
1. FANS TO BE CRYSTAL-AIRE MODEL S-UBB-6015 TD UPBLAST VENTILATORS W/GRAVITY DAMPERS, 58,000 CFM @ 1/2" S.P., 460/3/60 15 HP MOTOR.
2. FANS TO BE FURNISHED BY MECHANICAL CONTRACTOR. FANS TO BE SET BY D. P. CO. UNDER SUPERVISION OF MECHANICAL CONTRACTOR.
3. MECHANICAL CONTRACTOR TO PROVIDE AN EASEMENT AROUND ALL CABLE TRAYS THAT PENETRATE AIR SHAFT WALLS. EASEMENT TO BE OPEN AT BOTH ENDS.
4. MECHANICAL CONTRACTOR TO SEAL AIR TIGHT AROUND ALL PIPES PENETRATING AIR SHAFT WALLS. METHOD OF SEALING MUST ALLOW FOR NORMAL MOVEMENT OF PIPE.
5. AIR SHAFTS TO BE CONSTRUCTED IN ACCORDANCE WITH LATEST EDITION OF SMACNA HIGH VELOCITY DUCT CONSTRUCTION STANDARDS.
6. MECHANICAL CONTRACTOR TO PROVIDE ACCESS DOORS AS INDICATED. DOORS TO BE 22" x 68" SINGLE LEAF DESIGN CONSTRUCTED OF 16-GAGE GALV. STEEL. DOORS SHALL BE HINGED AND GASKETED. HANDLES SHALL BE 2-WAY TYPE HEAVY DUTY, 260 VENTLOK OR EQUAL.
7. MECHANICAL CONTRACTOR TO DISCONNECT MOTOR OPERATORS FROM INTAKE DAMPERS IN WALL AT B-LINE OF TURBINE BUILDING AND REPLACE WITH MANUAL OPERATOR WITH LOCK OPEN AND LOCK CLOSE POSITIONS.
8. OUTSIDE AIR INTAKE HOODS TO BE CONSTRUCTED OF 16-GAGE GALV. STEEL IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA HIGH VELOCITY DUCT CONSTRUCTION STANDARDS. MECHANICAL CONTR. TO VERIFY OPENING DIMENSIONS IN FIELD.
9. REFERENCE DRAWING:
ARCHITECTUAL - 0-2303C
STEEL - 0-124A & 0-124B
10. MECHANICAL CONTRACTOR TO PROVIDE ADDITIONAL ACCESS DOORS AS DIRECTED BY D. P. CO. CONSTRUCTION ENGINEER
11. D. P. CO. CONSTRUCTION TO PROVIDE GRATING AS REQUIRED FOR ACCESS.
RETURN TO REGULATORY CENTRAL FILES ROOM 016
Docket # 50-269
Control # 7725200023
Date 9/2/77 of Document:
REGULATORY DOCKET FILE
2. ADDED AIR SHAFT AT E-50 & M
1. ADDED NOTES 10 & 11. REMOVED DIM. TO BOT. OF ACCESS DOORS
ORIG. REL'D FOR CONSTR'N PER SMK-284
NO. REVISIONS CHKD APPR DATE CIVIL ELEC. MECH. INSPECTED
DUKE POWER COMPANY
OCONEE NUCLEAR STATION - UNIT NO. 3
HEATING - VENTILATION - AIR CONDITIONING
TURBINE BUILDING VENTILATION
PLAN - SECTIONS - DETAILS
DESIGNER DATE INSP DATE
DRAWN DATE INSP DATE
CHECKED DATE APPR DATE
SCALE
DWG. NO. O-2517



NOTES

1. FANS TO BE CRYSTAL-AIRE MODEL S-UBB-6015 TD UPBLAST VENTILATORS W/GRAVITY DAMPERS, 58,000 CFM @ 1/2" S.P. 460/3/60 15 H.P. MOTOR.
2. FANS TO BE FURNISHED BY MECHANICAL CONTRACTOR. FANS TO BE SET BY D. P. CO. UNDER SUPERVISION OF MECHANICAL CONTRACTOR.
3. MECHANICAL CONTRACTOR TO PROVIDE AN EASEMENT AROUND ALL CABLE TRAYS THAT PENETRATE AIR SHAFT WALLS. EASEMENT TO BE OPEN AT BOTH ENDS.
4. MECHANICAL CONTRACTOR TO SEAL AIR TIGHT AROUND ALL PIPES PENETRATING AIR SHAFT WALLS. METHOD OF SEALING MUST ALLOW FOR NORMAL MOVEMENT OF PIPE.
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7. FAN TAGGED F-2K ORIGINALLY TAGGED F-1J. MECHANICAL CONTRACTOR TO CHANGE TAGGING IN FIELD.
8. MECHANICAL CONTRACTOR TO DISCONNECT MOTOR OPERATORS FROM EXISTING AIR INTAKE DAMPERS IN WALL AT B-LINE OF TURBINE BUILDING AND REPLACE WITH MANUAL OPERATOR WITH LOCK OPEN AND LOCK CLOSE POSITIONS.
9. OUTSIDE AIR INTAKE HOODS TO BE CONSTRUCTED OF 16-GAGE GALV. STEEL IN ACCORDANCE WITH LATEST EDITION OF SMACNA HIGH VELOCITY DUCT CONSTRUCTION STANDARDS. MECHANICAL CONTRACTOR TO VERIFY OPENING DIMENSIONS IN FIELD.
10. REFERENCE DRAWINGS: ARCHITECTUAL - O-2303C; STEEL - O-124A & O-124B
11. MECHANICAL CONTRACTOR TO PROVIDE ADDITIONAL ACCESS DOORS AS DIRECTED BY D. P. CO. CONSTRUCTION ENGINEER.
12. D. P. CO. CONSTRUCTION TO PROVIDE GRATING AS REQUIRED FOR ACCESS.

NO.	REVISIONS	CHKD	APPR	DATE	CIVIL	ELEC.	MECH.
2	ADDED AIR SHAFT BETWEEN ℄ 33	–	–	–	–	–	–
	℄ 34 PER FIELD REQUEST	CPA	HGS	6/30/75			
1	ADDED NOTES 11 & 12. REMOVED	–	–	–	–	–	–
	DIMEN. TO BOT OF ACCESS DOOR	CPA	HGS	4/8/75	VB	WT	
ORIG.	RELD FOR CONSTRN PER SMR-284						

DUKE POWER COMPANY
OCONEE NUCLEAR STATION - UNIT
HEATING - VENTILATION - AIR CONDITIONING
TURBINE BUILDING VENTILATION
PLAN - SECTIONS - DETAILS

DESIGNER / DRAWN / CHECKED / INSP / APPR / DATE

DWG. NO. O-1517 REV 2