ENTERED

Allen, Pam, NMENV

From: Maestas, Ricardo, NMENV
Sent: Thursday, October 01, 2015 9:47 AM
To: Allen, Pam, NMENV
Subject: FW: Document Request
Attachments: Mine Vent Plan Rev 38.pdf; Mine Vent Plan_54W001W.pdf; Mine Vent Plan_54Z001W1 (2).pdf; Mine Vent Plan_54Z001W2.pdf

From: George Basabilvazo [mailto:george.basabilvazo@cbfo.doe.gov]
Sent: Wednesday, March 11, 2015 10:57 AM
To: Maestas, Ricardo, NMENV; Smith, Coleman, NMENV; Roberts, Kathryn, NMENV; Chavez, Rick - RES (Rick.Chavez@wipp.ws); rfkehrman@plateautel.net; Sisk-Scott, Charlotte - WSMS (charlotte.sisk-scott@wipp.ws); Anthony Stone
Subject: Document Request

Attached is the document you requested during our WIPP Nitrate Salt Conference calls (i.e., the next revision to the WIPP Mine Ventilation Plan).

If you have questions please contact me.

Best regards,

George T. Basabilvazo
Director, Environmental Protection Division
DOE/Carlsbad Field Office
P.O. Box 3090
Carlsbad, New Mexico 88221
Ph: (575) 234-7488
Cell: (575) 706-0083

CBFO:EPD:GTB:MN:15-1445:UFC 5486.00

150314

ISSUED

Effective Date: 02/17/15

00CD-0001
Revision 38

WIPP Mine Ventilation Plan

Cognizant Section: Mine Engineering

Approved by: John Swailes

A URS-led partnership with B&W and AREVA

WIPP Mine Ventilation Plan Change History			
Date	**Revision Number**	**ECO Number**	**Description of Change**
04/30/00	6	9548, Add 2	• Additional description added to Working Face Ventilation section to differentiate between an advancing section and a retreating one. Operating limits set in the Safety Considerations section pertaining to the Spendrup 1120-70 fans uses on the working section. Appendix E added to provide auxiliary ventilation design information.
08/03/00	7	9548, Add 3	• Minor Clarifications, update of Table 2 for Diesel Equipment, Revision of all system drawings to depict completion of Panel 2 and installation of all necessary ventilation control devices.
03/08/01	8	10028	• Removal of 100-75-50 Rule and disallow excessive idling of Diesel Equipment in preparation of new ruling on Diesel Particulate Matter regulations under 30 CFR §57.5060 through §57.5075. Update operator information to reflect new WTS staff. Changes are highlighted
8/22/01	9	10238	• Clarification as to the use of brattice cloth during the waste emplacement process in the Disposal Area. Minor changes to Table 2 for Diesel Equipment. Changes to project personnel.
12/10/01	10	10330	• Removal of the 60 foot per minute rule. Changes to project personnel. Changes to requirements for use of ducting.
06/19/02	11	No ECO	• Document reformatted and changes made. Document controlled in QMIS.
07/16/02	12	No ECO	• Editorial change to add piece of equipment to Table 2, Underground Diesel equipment.
03/12/03	13	10692	• Revision to underground diesel equipment list. Updates to 54-W-001-W and 54-Z-001-W drawings. Change Westinghouse to Washington. Add a reference. Minor editorial changes.
07/08/03	14	10756	• Revision to airflow path, routing air through • S-2180 instead of S-1600.

WIPP Mine Ventilation Plan Change History			
Date	**Revision Number**	**ECO Number**	**Description of Change**
12/16/03	15	10836	• Removal of U/G booster fans, bulkheads, and vent reversal mode per ECP-1-VU00-009.
01/14/04	16	10935	• Correction to manufacturer name, Table 2.
07/29/04	17	11069	• Editorial change to page 1, page 15, and Table 2 and references on page 18. Replaced maps 54-W-001-W, 54-Z-001-W, and 54-W-013-W.
01/27/05	18	11198	• Panel 3 has been added to the waste disposal ventilation circuit. This change was incorporated into the semiannual update of the MVP.
06/28/05	19	11319	• Incorporate drawing revisions
01/11/06	20	11428	• Incorporate drawing revisions, update references and Table 2.
05/10/06	21	11543	• Complete rewrite, incorporate drawing revisions.
12/18/06	22	11687	• Incorporate new diesel equipment to the equipment list and update the current and future mine footprint layouts.
07/18/07	23	11820	• Updating drawings associated with the plan and updating the diesel equipment list.
09/14/07	24	11858	• Correction to description of equipment 52-H-127, Table 2.
04/01/08	25	11992	• Addition of Equipment in Table 2 and corrected Eng. Model number on 2 pieces of equipment.
12/17/08	26	12157 Add. 1	• Addition of new diesel equipment and update current and planned maps of the U/G. • Correct 74-U-129 cfm
06/10/09	27	12334	• Remove 5 pieces of equipment and add in one new piece of equipment to Table 2 – Underground Diesel Equipment list.
12/17/09	28	12470	• Updated to show current underground diesel equipment, a current mine map, and a map showing the projected mine layout in December 2010.

WIPP Mine Ventilation Plan Change History			
Date	**Revision Number**	**ECO Number**	**Description of Change**
06/21/10	29	12600	• Update to show current footprint and current diesel equipment.
12/31/10	30	12742	• Updated drawings, no change to document text. Updated 54-W-001-W (Appendix A) and 54-Z-001-W (Appendix B) are available in the EFR.
06/13/11	31	12858	• Updated to show current footprint and current diesel equipment.
12/06/11	32	12962	• Updated to show current footprint and current diesel equipment.
07/02/12	33	13058	• Updated to removed a "1" from Equipment #74-U-139 on Table 2 and in Step 8.3.1 change isolation doors to control doors
11/19/12	34	No ECO	• Editorial changes in accordance with MD 1.1.
03/12/13	35	13179	• Updated Figure 1.
11/15/13	36	13326	• Updated Table 2 – Underground Diesel Equipment.
12/02/14	37	13494	• Updated to address changes to current and projected ventilation configurations related to February 2014 fire and radiation release events.
02/17/15	38	13569	• Added in Appendix B reference to design drawing 54-Z-001-W2. Updated Table 2. Added section 7.1. Added in Appendix D "Nominal airflow 30,000 - 50,000 CFM" to typical face ventilation scenarios.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The Waste Isolation Pilot Plant (WIPP) was authorized by Congress (Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 [Public Law 96-164]) to provide "a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission."

To fulfill this mission, the U.S. Department of Energy (DOE) constructed a full-scale facility to demonstrate both technical and operational principles for the permanent isolation of transuranic waste. The WIPP disposal facility horizon, which includes construction (mining) and experimental and waste disposal areas, is located approximately 2,150 feet below the surface in the Salado Formation, a thick sequence of evaporites that are predominantly halite.

The WIPP underground ventilation system consists of three intake vertical shafts, interconnecting drifts and cross-cuts. Bulkheads, airlocks, and salt pillars separate the drifts. The drifts are connected to an exhaust shaft that connects to the main surface fans.

2.0 PURPOSE STATEMENT

This plan satisfies the requirements for a mine ventilation plan as required by Title 30 Code of Federal Regulations (CFR) §57.8520, "Ventilation Plan," and the "New Mexico Safety Code for All Mines." It is based on current plans, conditions, and assumptions concerning the operation of WIPP. This document will be revised at least annually to reflect any ventilation system changes.

3.0 THE MINE NAME AND OPERATOR

Name:	Waste Isolation Pilot Plant
Address:	P.O. Box 2078 Carlsbad, NM 88221-2078
Telephone Number:	(575) 234-7200
Emergency Number:	(575) 234-8111
Name of Owner:	U.S. Department of Energy
Name of Operator:	Nuclear Waste Partnership LLC (NWP)

4.0 CURRENT MINE MAP

See Appendix A for a current mine map showing the following:

1) Direction and quantity of principal air flows.

2) Locations of seals used to isolate abandoned workings.

3) Locations of areas withdrawn from the ventilation system.

4) Locations of all main, booster and auxiliary fans not shown on the Typical Face Ventilation Drawings.

5) Locations of air regulators and stoppings and ventilation doors not shown on the Typical Face Ventilation Drawings.

6) Locations of overcasts, undercasts and other airway crossover devices not shown on the Typical Face Ventilation Drawings.

7) Locations of known oil or gas wells.

8) Locations of known underground mine openings adjacent to the mine.

9) Locations of permanent underground shops, diesel fuel storage depots, oil fuel storage depots, hoist rooms, compressors, battery charging stations and explosive storage facilities. Permanent facilities are defined in 30 CFR Part 57.8520 as those facilities intended to exist for one year or more.

5.0 ONE-YEAR PROJECTION MINE MAP

See Appendix B for a mine map showing significant changes in the ventilation system projected for one year.

6.0 MINE VENTILATION FANS

6.1 Mine Fans and Exhaust Filter Building (EFB) Fans

A total of six surface ventilation fans (e.g., three main fans and three filtration fans) supply airflow to the underground. The main fans are 700A, 700B, and 700C. The filtration fans are 860A, 860B, and 860C. The main fans and filtration fans are located on the surface of the WIPP facility atop the Exhaust Shaft (ES), and are operated in various configurations to provide the necessary airflow to the underground. Table 1, Fan Specifications, lists the physical and operating data of these fans. The fan curves are located in Appendix C.

Due to a radioactive particulate release in February, 2014, the main fans (700A, B, and C) have been locked out and will remain inoperable indefinitely. The WIPP underground is currently being operated in Filtration Mode. Filtration Mode consists of one 860 fan operating at a nominal 60,000 cubic feet per minute (cfm). The exhaust air from the underground is pulled by the fan through the exhaust shaft to duct on the surface. The air flows through the duct to two parallel HEPA filter assemblies located in the Exhaust Filter Building (EFB) on surface where the radioactive particles are removed from the air stream. The filtered air is then exhausted through the fan and the exhaust duct to atmosphere.

Table 1 - Fan Specifications

	MAIN VENTILATION FANS		**EFB FANS**
Equipment No.	41-B-700A 41-B-700B	41-B-700C	41-B860A 41-B860B 41-B860C
Manufacturer	Chicago Blower	TLT Babcock	Novenco
Model	D/1910A	14144AC/1665/0 CW (Rbr=117)	BC/542
Type	Centrifugal	Centrifugal	Centrifugal
Size (diameter - inches)	94.375	94.5	56 1/8
Speed (rpm*)	710	710	1180
Static Pressure (in. w.g.*)	12.5	9.65	13
Air Quantity (scfm*)	212,500	212,500	70400 (acfm*)
Efficiency (percent)	N/A	TBD	83.3
Blade Type	Airfoil	Airfoil	Airfoil
Motor HP	600	600	235
Voltage (v)	4160	4160	460
Inlet Vanes/range	Yes - 0-90 Deg.	Yes - 0-105	Yes - 0-90
Wheel Blade Setting	Fixed	Fixed	Fixed

* Abbreviations

rpm - revolutions per minute
in. w.g. - inches water gauge
scfm - standard cubic feet of air per minute
acfm - actual cubic feet of air per minute

6.2 Face Ventilation Fans

Diagrams showing the typical working face ventilation are found in Appendix D. One or two 100-HP Spendrup 1120-70 fans (in series as necessary) are used with ventilation ducting to exhaust the dead-end working faces. The fan curve and a fan pressure table are located in Appendix C. The face ventilation fans generally exhaust 50,000 cfm from the working area.

7.0 NUMBER AND TYPE OF INTERNAL COMBUSTION ENGINES USED UNDERGROUND

Table 2 lists the internal combustion engines used underground, along with the make and model of the unit, type of engine, make and model of the engine, brake horsepower rating of the engine, and the approval number.

Ventilation requirements for engines that do not have an MSHA Certificate number are calculated based on the VU00 System Design Description requirement of 125 cfm per brake-horsepower.

WIPP Equip #	Manufacturer	Description	Model	Eng. Model	HP	MSHA CFM	MSHA Cert #
54-W-002	JOHN DEERE	WATER SPRAY VEHICLE	2030/HD 300 SPRAYER	3TNV76-X4VU	22.1	2,800	TIER 4
52-H-005A	TAYLOR	FORKLIFT (41T)	TY-820L	F10L413FW	231	20,000	24/D92
52-H-007C	TOYOTA	FORKLIFT (6T)	5FD70	14Z	94	11,800	Pre 7/5/2001
52-H-008A	GETMAN	CH TRANSPORTER	A-64	F5L413FW	128	10,000	24/D116-0
52-H-008B	GETMAN	CH TRANSPORTER	A-64	F5L413FW	128	10,000	24/D116-0
52-H-008C	GETMAN	CH TRANSPORTER	A-64	BF4M2012C	138	6,500	07-ENA04003
52-H-033	TOYOTA	FORKLIFT (6T)	5FD70	14Z	94	11,800	TIER 1
52-H-035	HOIST LIFT TRUCK	FORKLIFT (13T)	P260	QSB6.7	160	6,500	07-ENA060010-1
52-H-125	TAYLOR	FORKLIFT (20T)	TYO-400S	F8L413FW	185	16,000	24/D92-0
52-H-126	TOYOTA	FORKLIFT (7.5T)	5FD70	12Z	94	11,800	Pre 7/5/2001
52-H-127	TOYOTA	FORKLIFT	7FDU80	13Z	80	10,000	TIER 2
74-G-089	IR	AIR COMPRESSOR	250 CFM	F5L912W	68	6,500	24/D92
74-G-147	IR	PORTABLE AIR COMPRESSOR	P260WIR/2005/A	41R18T	86	11,000	TIER 2
74-GE-001	YANMAR/ HITACHI	SANITATION TRAILER	L6O AE-DE	81L	10	1,500	Pre 7/5/2001
74-H-014	PRIME MOVER	SKID STEER	L-1300	QVD	40	5,000	Pre 7/5/2001
74-H-026	TOYOTA	FORKLIFT(4T)	02-5FD35	11Z	81	10,000	Pre 7/5/2001

WIPP Equip #	Manufacturer	Description	Model	Eng. Model	HP	MSHA CFM	MSHA Cert #
74-H-027	TOYOTA	FORKLIFT(4T)	02-5FD35	11Z	81	10,000	Pre 7/5/2001
74-H-034	TOYOTA	FORKLIFT (6T)	7FDU70	13Z	89	11,200	TIER 2
74-H-042	BOB CAT	SKID STEER	S750	V3800	85	10,625	iT4
RENTAL	BOB CAT	SKID STEER	S570	V2601-DITE3B-BC-2	75.1	9,375	iT4
RENTAL	BOB CAT	SKID STEER	S570	V2601-DITE3B-BC-2	75.1	9,375	iT4
74-H-035	TOYOTA	FORKLIFT (4-T)	5FD35	13Z	89	11,200	TIER 2
74-H-036	TOYOTA	4-TON FORKLIFT	5FD35	13Z	89	11,200	TIER 2
74-H-039	GENIE	BOOM MAN LIFT	Z34-34/22IC	D-1105	23.5	3,000	TIER 2
74-PE-001	YANMAR	PORT. GEN	6121002	LA SERIES 40544	9	1,200	Pre 7/5/2001
74-PE-003	YAMAHA	PORTABLE GENERATOR	EDL65005	ZB600-EGL	13.5	1,700	TIER 1
74-Q-014	SCAT/I.E.S.	FIRE/RESCUE TRUCK	K-60B	F3L912W	34	4,000	24/D100-0
74-U-002-A	EIMCO	LHD	913	3304PC	110	10,700	24/D92
74-U-002-C	Sandvik EJC	LOADER LHD	EJC-145	N0635H32	190	12,000	7E-B080-0
74-U-003	GETMAN	LUBE TRUCK	A-64	F6L912W	82	7,500	24/D92
74-U-004	GETMAN	LUBE TRUCK	A-64	BF4M2012C	138	6,500	07-ENA04003
74-U-006-A	EIMCO	HAUL TRUCK	985-T15	F8L413FW	185	16,000	24/D92-0
74-U-006-B	EIMCO	HAUL TRUCK	985-T15	F8L413FW	185	16,000	24/D92-0
74-U-008	GETMAN	SCISSOR LIFT	A-64	F6L912W	82	7,500	24/D102-0
74-U-023	KUBOTA	TRACTOR	L-245DT	DH1101-A	25	2,000	24/D108-0
74-U-039	EIMCO	LHD	913	F6L413FW	139	12,000	24/D92-0
74-U-040	BOBCAT	SKID STEER LOADER	S160	V2003M-DI-T	56	3,000	07-ENA060001
74-U-114	GETMAN	SCISSOR LIFT	A-64	F6L912W	82	7,500	24/D102-0
74-U-115	FLETCHER	SCALER	SV-4D	F6L912W	82	7,500	24/D102-0
74-U-116	JLG	MANLIFT	34HA	F2L1101	28	2,500	24/D107-0
74-U-117	EIMCO	LHD	EJC-130	3304PCT	165	33,000	24/D54-56
74-U-123	ATLAS COPCO	CRAWLER DRILL	264-DC	F3L1011F	44	3,000	7E-B014-0
74-U-127	FLETCHER	SEAL CUTTER	5V-40	BF6M1013CP	255	12,000	7E-B007-0
74-U-128	FLETCHER	ROOF BOLTER	3024AD	QSB3.9	120	6,500	7E-B084
74-U-129	GETMAN	HAUL TRUCK	1248	OM904LA	174	7,500	7E-B098
74-U-130	GETMAN	HAUL TRUCK	1248	OM904LA	174	7,500	7E-B098
74-U-131	FLETCHER	ROOF BOLTER	3124AD	QSB 4.5	130	6,000	07-ENA070016
74-U-132	KUBOTA	UTILITY TRACTOR	L4240 HST	V2203	42	2,500	7E-B071
74-U-133	KUBOTA	UTILITY TRACTOR	L4240 HST	V2203	42	2,500	7E-B071
74-U-137	FLETCHER	ROOF BOLTER	3020N-AD	QSB-4.5	130	6,000	07-ENA070006
74-U-138	SANDVIK	4 YD. LHD	LH307	OM906LA	207	6,000	7E-B083

WIPP Equip #	Manufacturer	Description	Model	Eng. Model	HP	MSHA CFM	MSHA Cert #
74-U-139	ATLAS COPCO	CRAWLER DRILL	U4	D2011L03	46	5,800	TIER 3
74-U-603	SIMMONS	BOOM LIFT TRUCK	32/216	F2L1011	28	1,500	7E-B062
74-U-606	GETMAN	SCISSOR LIFT	A-64	OM904LA	174	7,500	7E-B098
74-U-608	GENIE	BOOM MAN LIFT	Z-34/22IC	D1105-E3B	24.8	1,000	07-ENA110011
74-U-611	GENIE	SCISSOR LIFT	GS2669RT	D1105	24.5	1,000	07-ENA110011
74-U-612	TAYLOR-DUNN	TOW TRUCK	TD-50C	B3.3	65	8,125	iT4
74-UE-042	GETMAN	HAUL TRUCK	1248-13	F6L413FW	139	12,000	24/D92-0
74-UE-043	GETMAN	HAUL TRUCK	1248-13	F6L413FW	139	12,000	24/D92-0
74-UE-045	GETMAN	HAUL TRUCK	1248-13	OM904LA	174	7,500	7E-B098
74-UE-060	GETMAN	CRANE TRUCK	A-64	F6L912FW	82	7,500	24/D102-0
74-UE-067	NEVADA	GENERATOR	NGSDZM190	BF12L413PW	316	50,000	24/D120-0
74-W-009	MILLER	WELDER	250	D622	16.5	2,100	TIER 2
74-W-011	MILLER BOBCAT	WELDER/ GENERATOR	250 DIESEL	D722	16.5	2,100	TIER 2
74-W-012	KUBOTA	GENERATOR	GL 7000	Z482-EBG	10.9	2,200	07-ENA110017
74-W-013	LINE POWER	GENERATOR	300KWGEN	CURSOR 13TE3X	371	46,375	TIER 3
74-W-014	WACKER	TAMPING MACHINE	VP2050Y	L48V6-VWK	4.4	1,000	TIER 2
75-H-031	SIMON	MANLIFT	32/21G	F2L1011	28	1,500	7E-B062
74-U-144	CATEPILLAR	COMPRESSOR FOR SODA BLASTER	Sullair 200H	S4S-DTDPB	74	9,250	TIER 4

7.1 Minimum Ventilation Requirements

The MSHA certified rating for each piece of equipment shall be used to determine flow rate requirements. If the certification is not available, 125 CFM/BHP shall be provided. Air flow requirements for diesel equipment can be found in Table 2 - Underground Diesel Equipment of the WIPP Mine Ventilation Plan. One hundred percent CFM for each piece of operating diesel equipment in a work area shall be provided. For example, if generator 74-W-013 and haul truck 74-UE-042 are both operating in the same work area, the required flow is the sum of 20,000 CFM and 12,000 CFM for a total of 32,000 CFM for that work area.

8.0 VENTILATION SYSTEM DESCRIPTION

The WIPP underground ventilation system consists of three vertical intake shafts, interconnecting drifts and cross-cuts. Bulkheads, airlocks, and salt pillars separate the drifts. They are connected to a common exhaust, which connects to the main surface fans. Figure 1, WIPP in Perspective, shows the relationship between the surface, shafts, and the underground repository. The airflow patterns and ventilation control devices are shown on Appendix A, Drawing No. 54-W-001-W (current revision). The four shafts are:

- Air Intake Shaft (AIS)
- Salt handling Shaft (SHS)
- Waste Shaft (WS)
- Exhaust Shaft (ES)

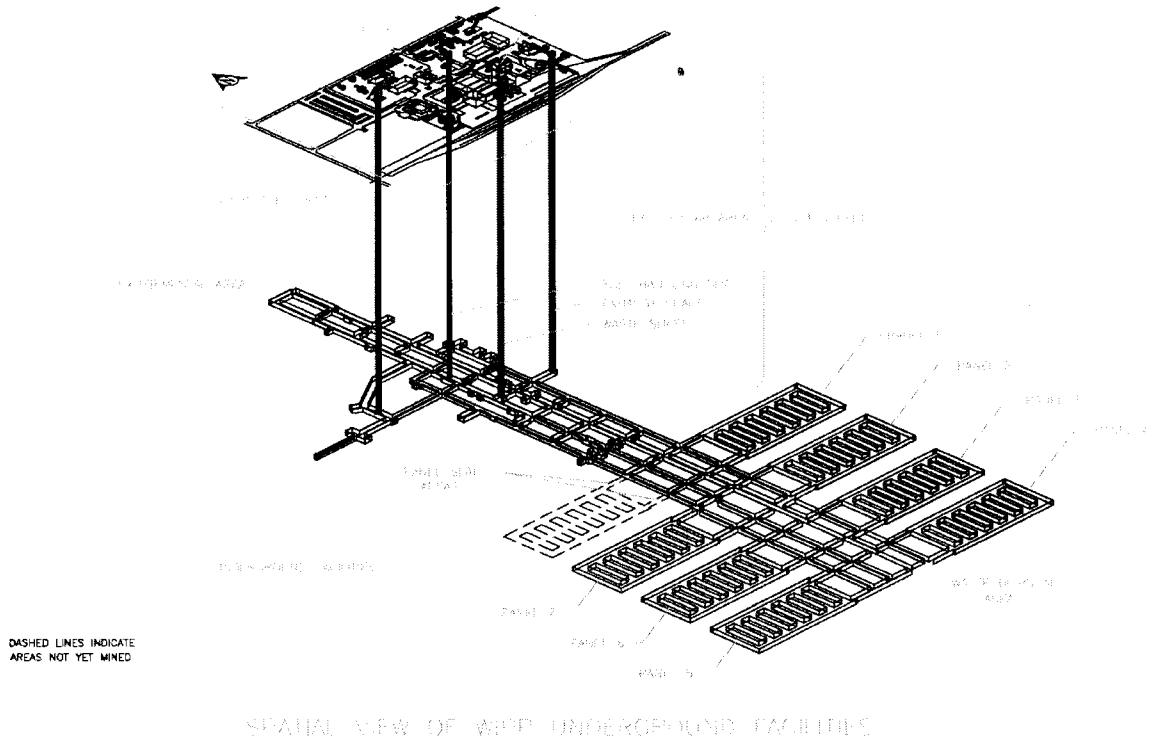


Figure 1, WIPP in Perspective

8.1 Ventilation System Description and Configurations

The three intake shafts supply air to the repository level, consisting of four separate air splits, and it is discharged through a common exhaust shaft.

- The North Ventilation Circuit receives intake air from the Air Intake Shaft (AIS) and is used to ventilate the North Area, which includes materials storage, an experimental area, and the underground diesel maintenance shop.

- The Construction Ventilation Circuit receives intake air from both the AIS and the Salt Shaft (SS). The air travels south in W30 to the construction (mining) panel where it is used to ventilate the mining face.

- The Waste Handling Ventilation Circuit receives intake air that is split off the Construction Ventilation Circuit through a regulator at S1000/E20. The air travels south in E140 to the disposal panel.

- The Waste Shaft Station Ventilation Circuit receives intake air from the Waste Shaft. The air ventilates the waste shaft station area, then is exhausted to the east in S400, directly to the Exhaust Shaft (ES).

8.2 Filtration Mode Ventilation

The WIPP site experienced a radioactive particulate release in February 2014. The ventilation system shifted to Filtration Mode at that time. The ventilation system has remained and will continue to remain in Filtration Mode for the foreseeable future.

Filtration Mode consists of the following:

- One 860 filtration fan operating in conjunction with a High Efficiency Particulate Air (HEPA) filtration system located in the Exhaust Filter Building. The main fans and bypass plenum to the 860 fans are isolated. Two HEPA filters at 100 percent capacity each work with one 860 fan to provide 60,000 cfm in this mode.

- The 74-B-336 bulkhead door (E300/S350) is closed. This closes off the exhaust path for the North Ventilation Circuit. Any air movement in the North Ventilation Circuit is via leakage through bulkheads.

- The 74-B-313 regulators (S1000/E20) are closed. This prevents air from splitting off of the Construction Ventilation Circuit to ventilate the Waste Handling Ventilation Circuit. Any air movement in the Waste Handling Ventilation Circuit is via leakage through bulkheads from W30 to E140.

- The construction split regulator (74-B-707 at W170/S2000) is closed. This closes off the exhaust path for the Construction Ventilation Circuit. Any air movement in the Construction Circuit is via leakage through bulkheads to the Waste Handling Ventilation Circuit.

- The 74-B-308 regulator (S400/E280) remains open, allowing intake air from the Waste Handling Shaft to traverse across the waste shaft station and exhaust directly to the Exhaust Shaft.

Limited air flow in the underground limits the number of pieces of diesel equipment that may be operated at any one time. When diesel equipment is used for recovery work in the underground, regulators and bulkheads may be opened or closed as needed to move the limited air flow in the underground to specific work areas and/or ventilation circuits.

8.3 Additional Ventilation Control Features

8.3.1 Shaft Control Doors

The Salt Shaft, Waste Shaft and Air Intake Shaft are equipped with control doors. These doors may be closed as a means of controlling the spread of fire, smoke, or toxic gases.

8.3.2 Diesel Generator Operation

In the event of either a total or isolated power loss to WIPP which affects the filtration fans, WIPP is equipped with two backup diesel generators. One of these generators may be brought on-line within approximately 30 minutes of a power failure to restore filtration ventilation to the underground.

9.0 REFERENCES

Public Law 96-164, *Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980*

Title 30 CFR Part 57, "Safety and Health Standards Underground Metal and Nonmetal Mines"

WIPP System Design Description, *VU00 Underground Ventilation* (current revision)

New Mexico Mine Safety Code for All Mines

"An Overview of Diesel Particulate Exposures and Control Technology in the U.S. Mining Industry," Robert A. Haney and George P. Saseen, Mine Safety and Health Administration along with Robert W. Waytulonis, U.S. Bureau of Mines, Proceedings of the 2nd International Conference on Health of Miners, Pittsburgh, PA, November, 1995

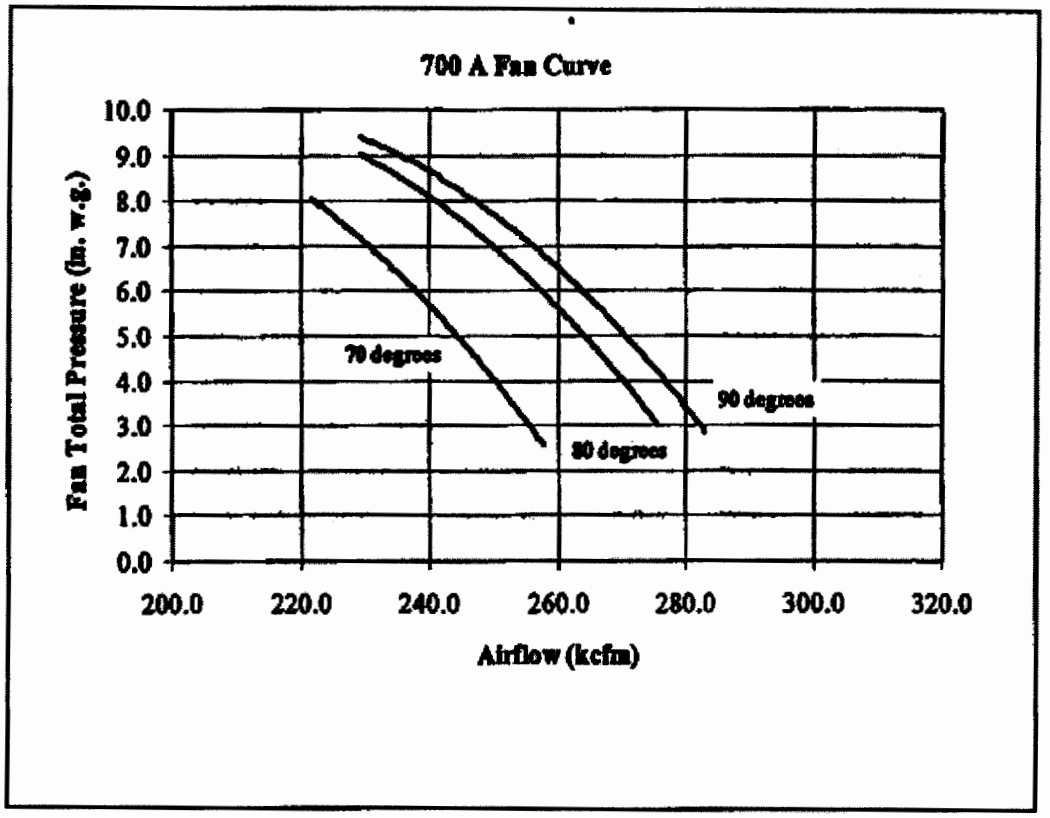
Appendix A – Drawing of Current Underground Mine Ventilation System (Drawing No. 54-W-001-W)

This drawing is available in the Engineering File Room.

Appendix B – Drawings of Proposed Changes to Underground Ventilation System (Drawing No. 54-Z-001-W1 and Drawing No. 54-Z-001-W2)

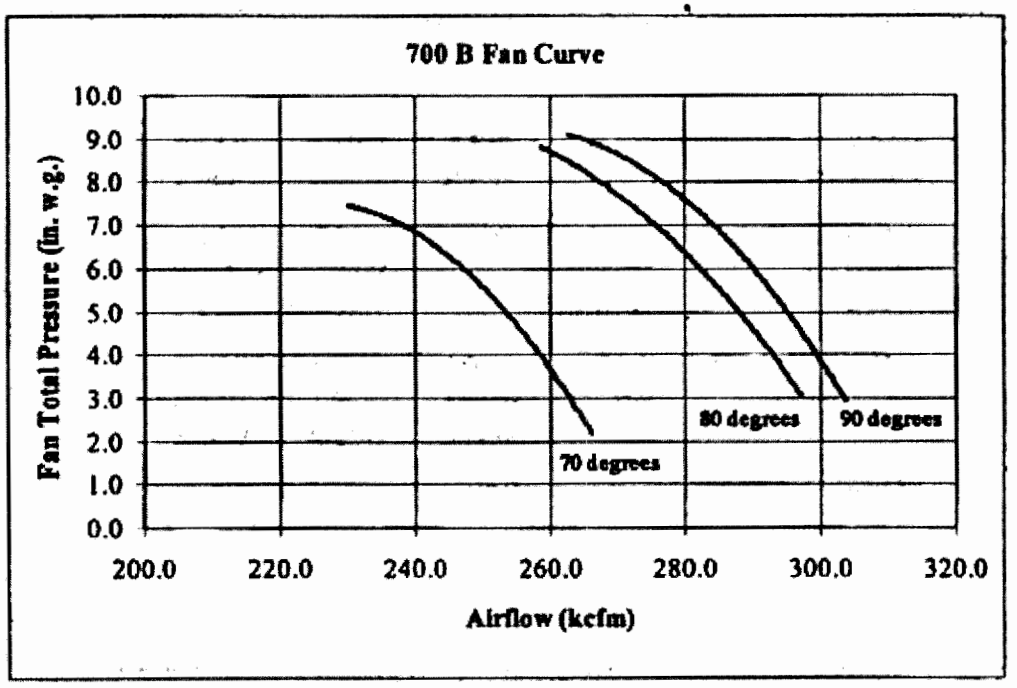
These drawings are available in the Engineering File Room.

Appendix C – Fan Curves



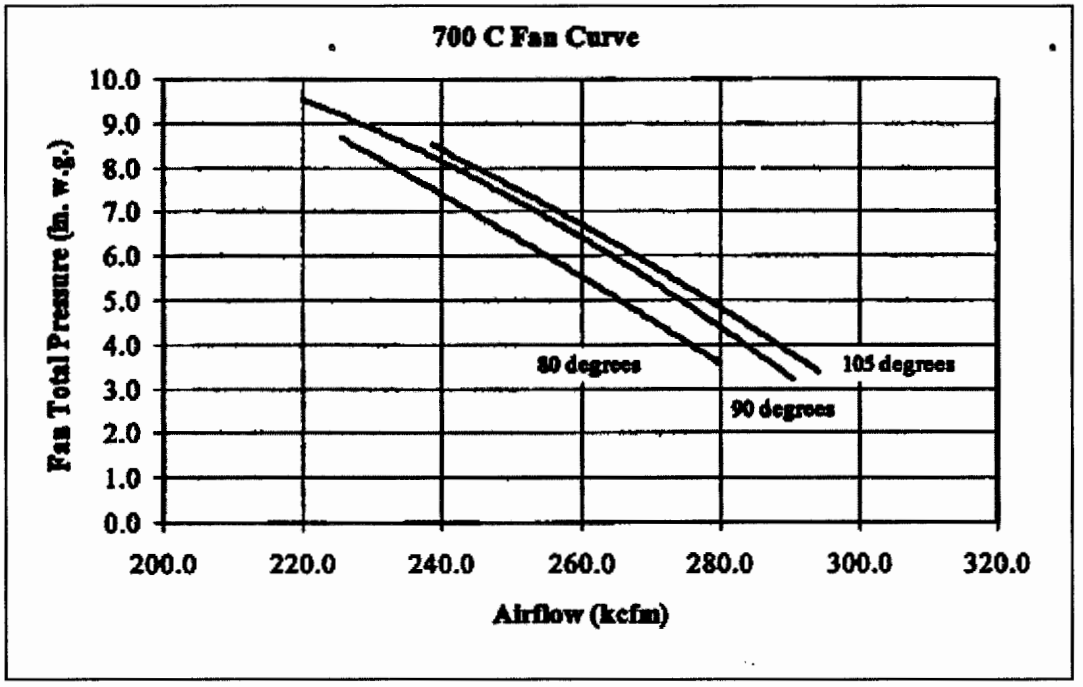
Fan 700A

Appendix C – Fan Curves (continued)



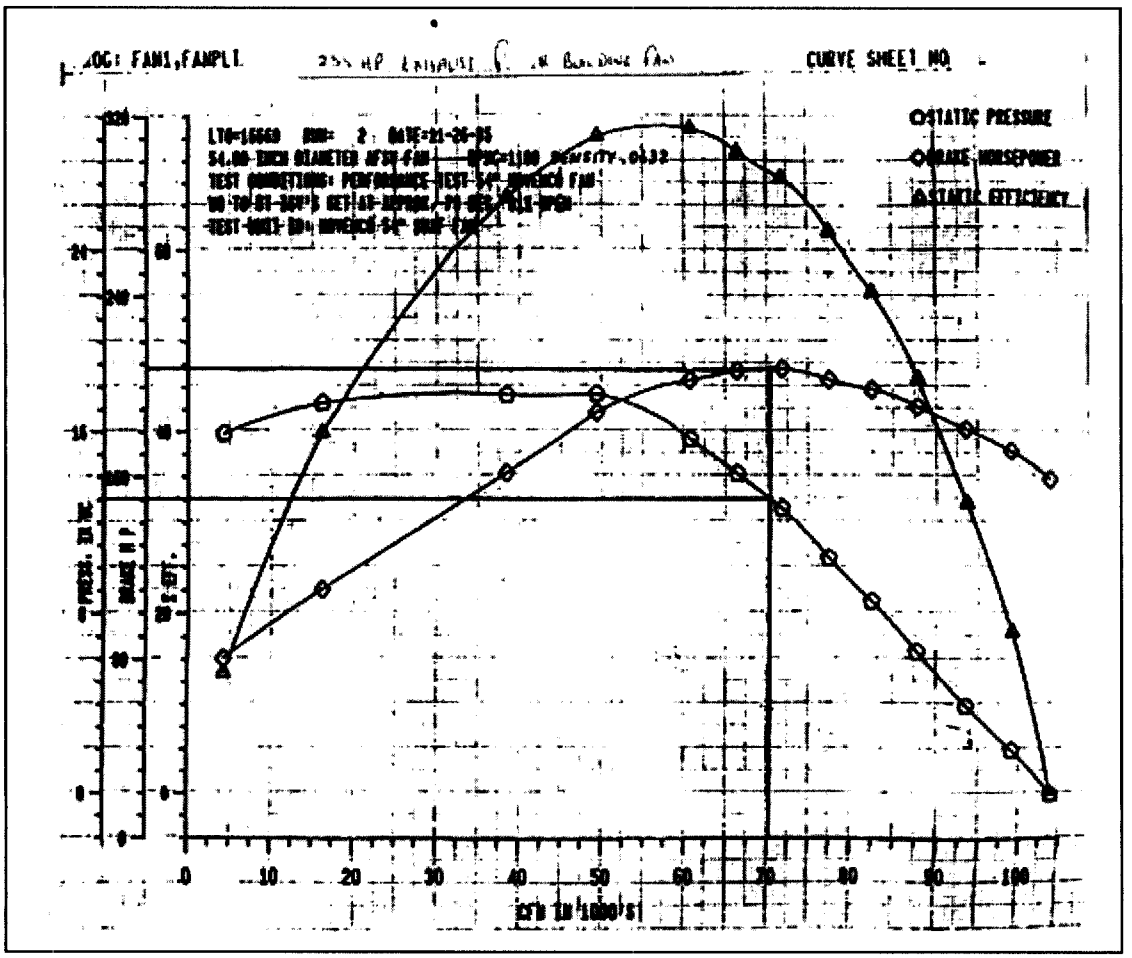
Fan 700B

Appendix C – Fan Curves (continued)



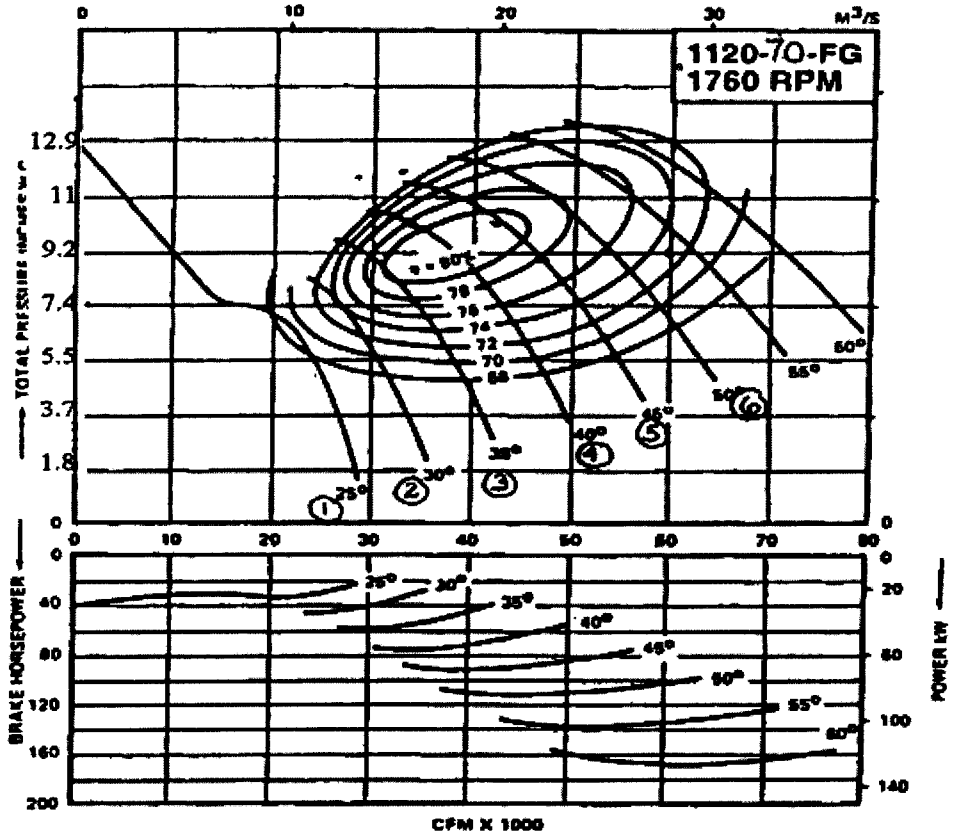
Fan 700C

Appendix C – Fan Curves (continued)



Filtration Fan(s) Curve

Appendix C – Fan Curves (continued)



⊛ - BLADE SETTING

PERFORMANCE AT DENSITY OF 0.069 LB./FT.³

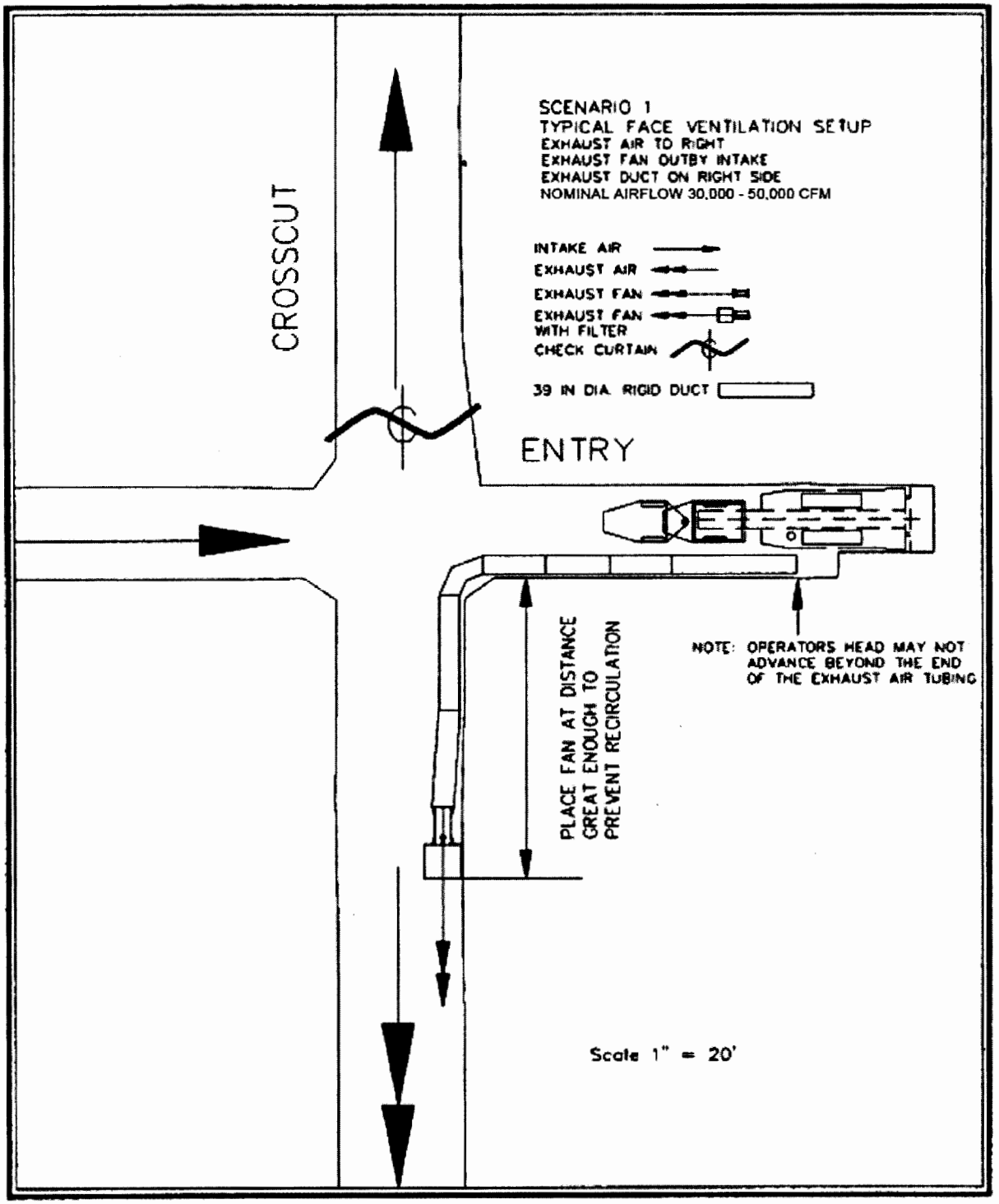
Auxiliary Mine Fan for Mining: Spendrup Model 1120-70

Appendix C – Fan Curves (continued)

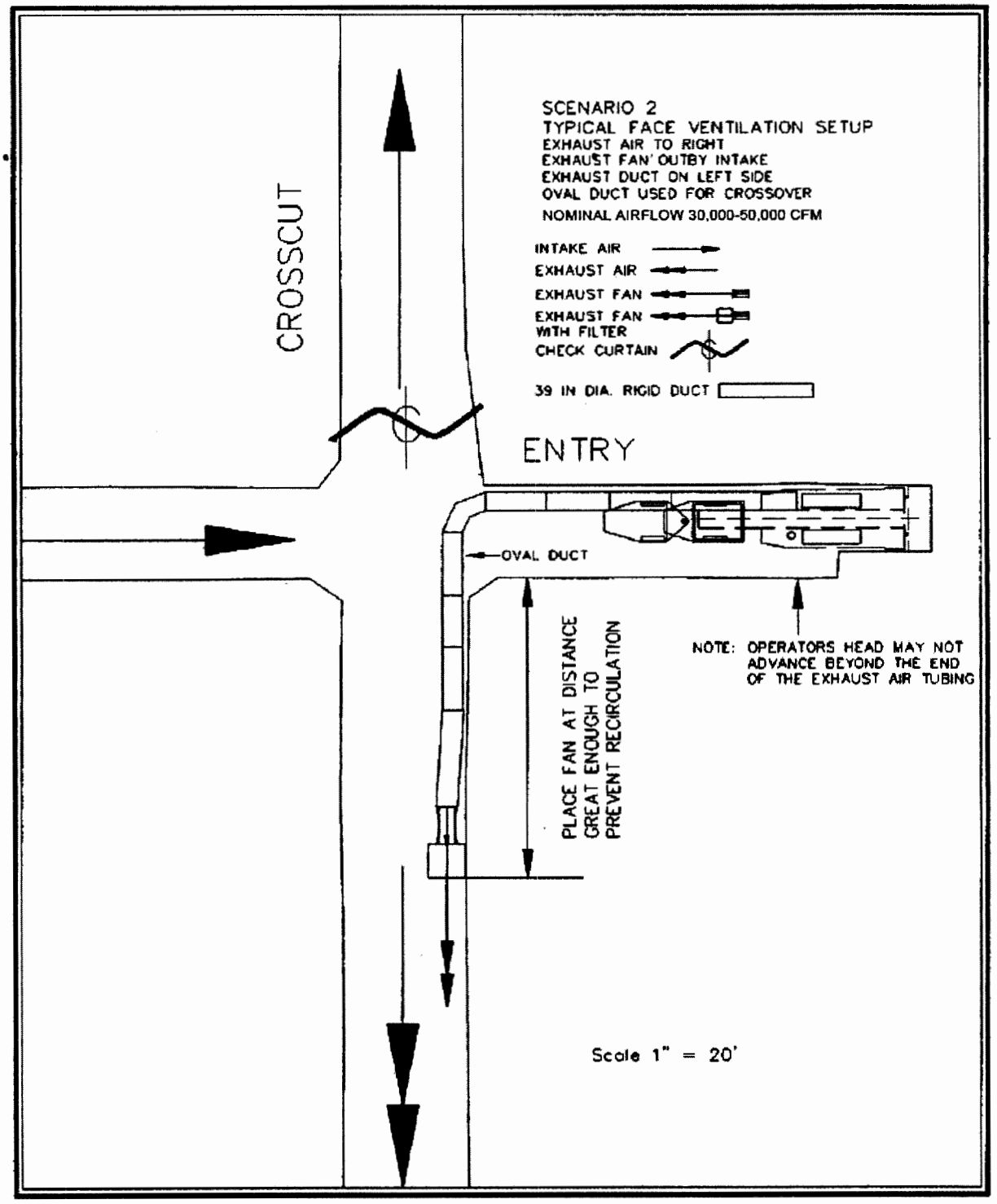
Fan Pressures for a Spendrup 1120-70 FG							
Quantity	Velocity Pressure	Blade Setting 3		Blade Setting 4		Blade Setting 5	
Q (cfm)	H_V (in W.G.)	H_T	H_S	H_T	H_S	H_T	H_S
20000	0.22	Undef.	Undef.	Undef.	Undef.	Undef.	Undef.
25000	0.35	Undef.	Undef.	Undef.	Undef.	Undef.	Undef.
30000	0.50	9.0 ***	8.50	10.55	10.05	Undef.	Undef.
35000	0.68	7.00	6.32	10.0 ***	9.32	11.48	10.80
39000	0.84	4.96	4.12	9.1	9.16	11.0 ***	10.16
40000	0.89	4.46	3.57	8.66	7.77	10.73	9.84
45000	1.12	Undef.	Undef.	6.04	4.92	9.65	8.53
50000	1.39	Undef.	Undef.	3.5	2.11	7.76	6.37
55000	1.68	Undef.	Undef.	Undef.	Undef.	5.40	3.72
58000	1.87	Undef.	Undef.	Undef.	Undef.	4.15	2.28

***** Do not exceed these Total Pressure values.**

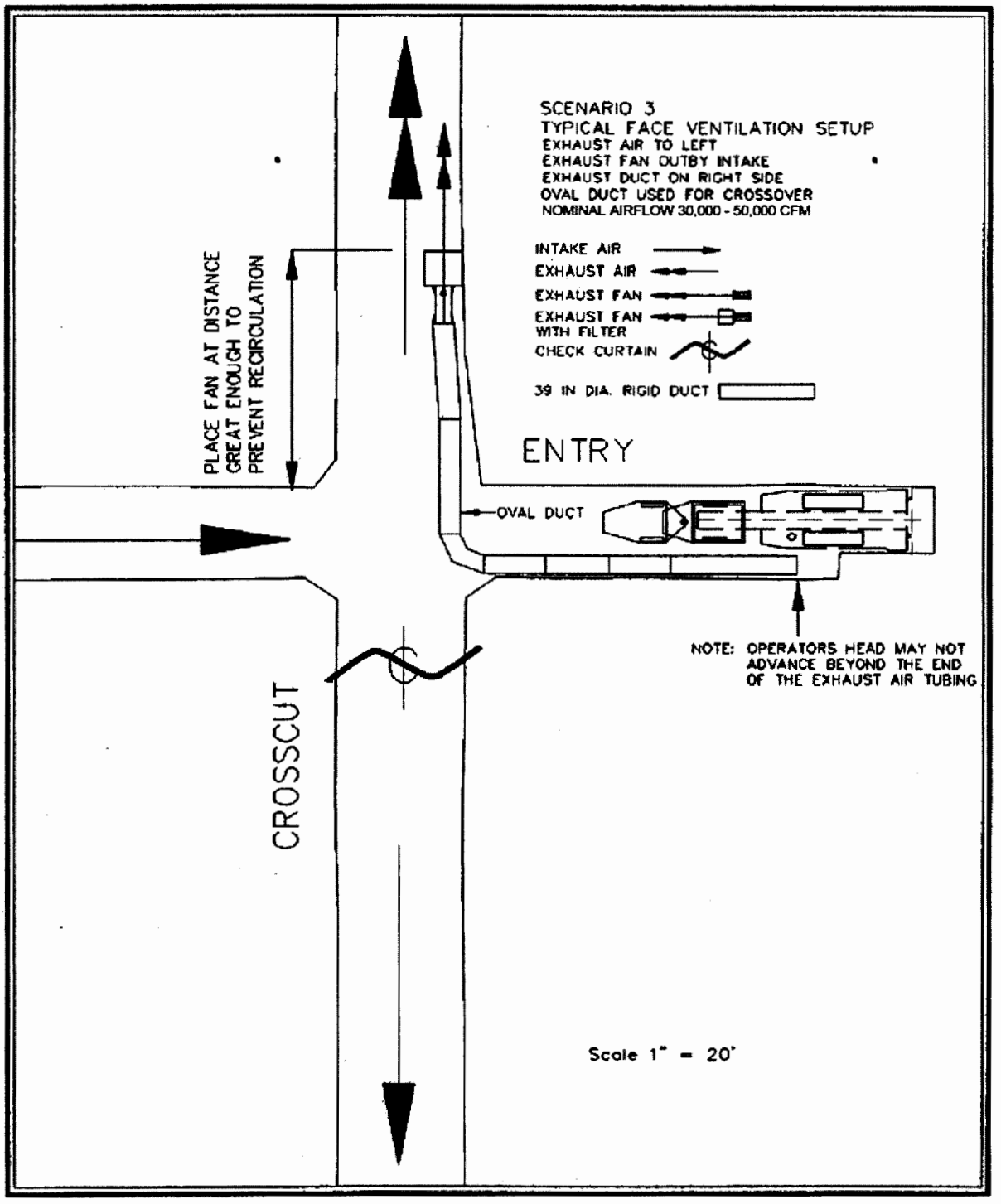
Appendix D – Typical Face Ventilation Scenarios



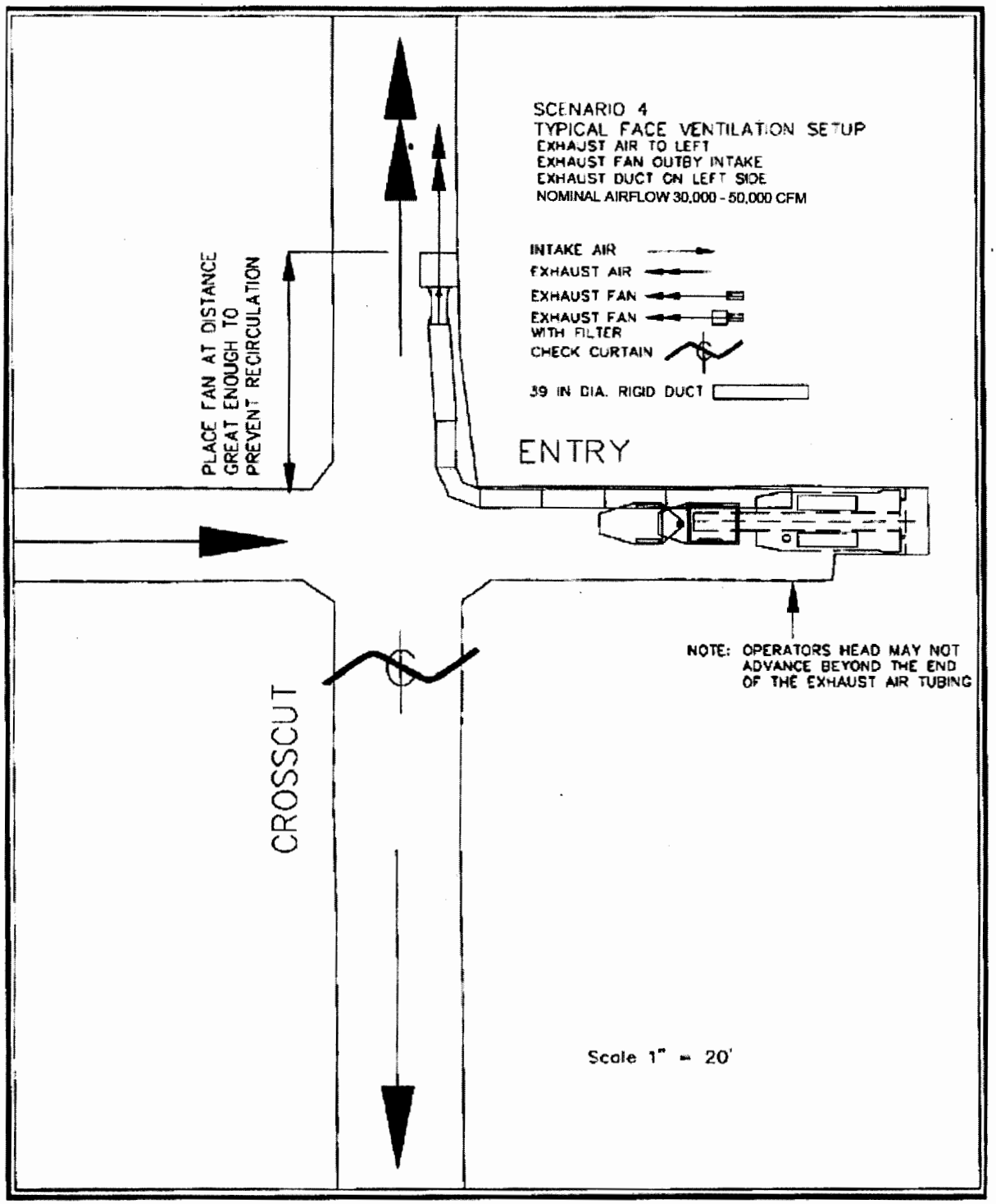
Appendix D – Typical Face Ventilation Scenarios (continued)



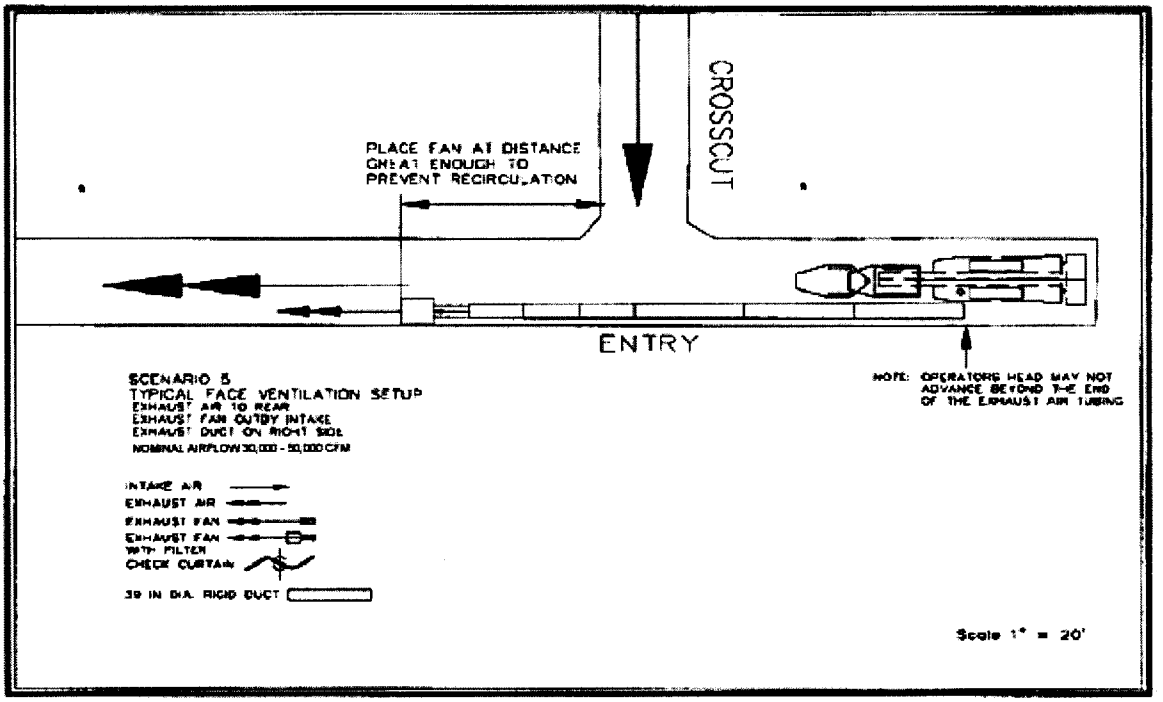
Appendix D – Typical Face Ventilation Scenarios (continued)

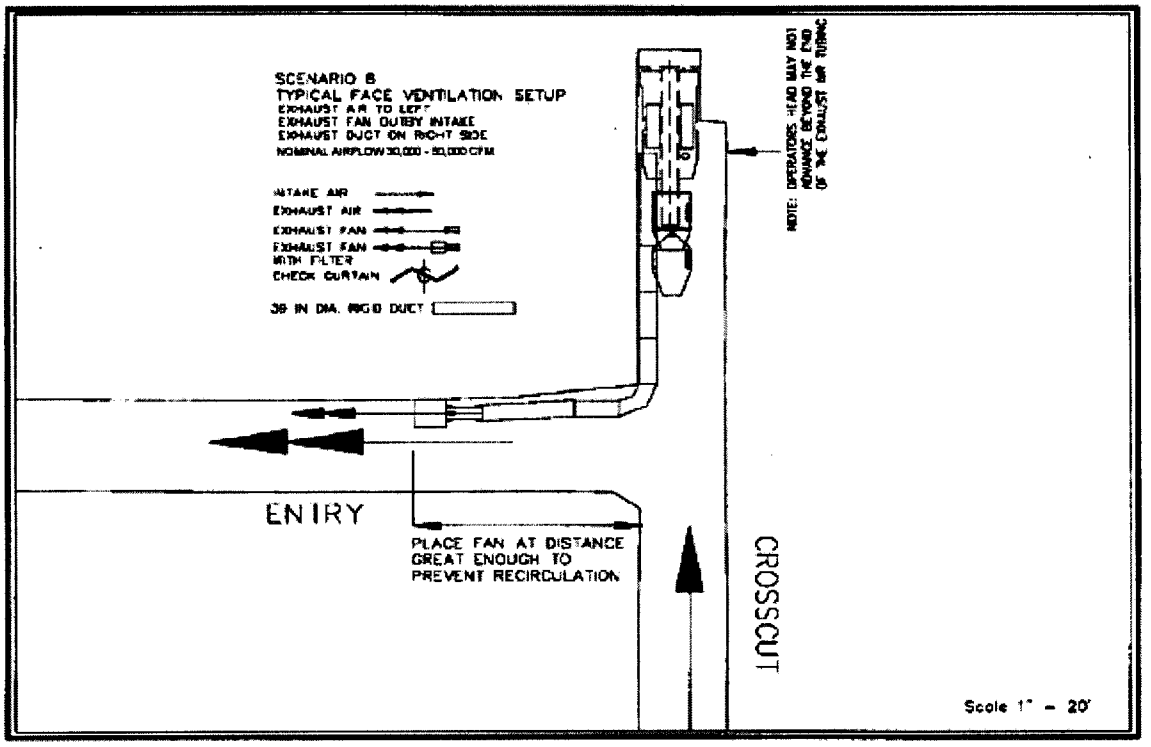


Appendix D – Typical Face Ventilation Scenarios (continued)

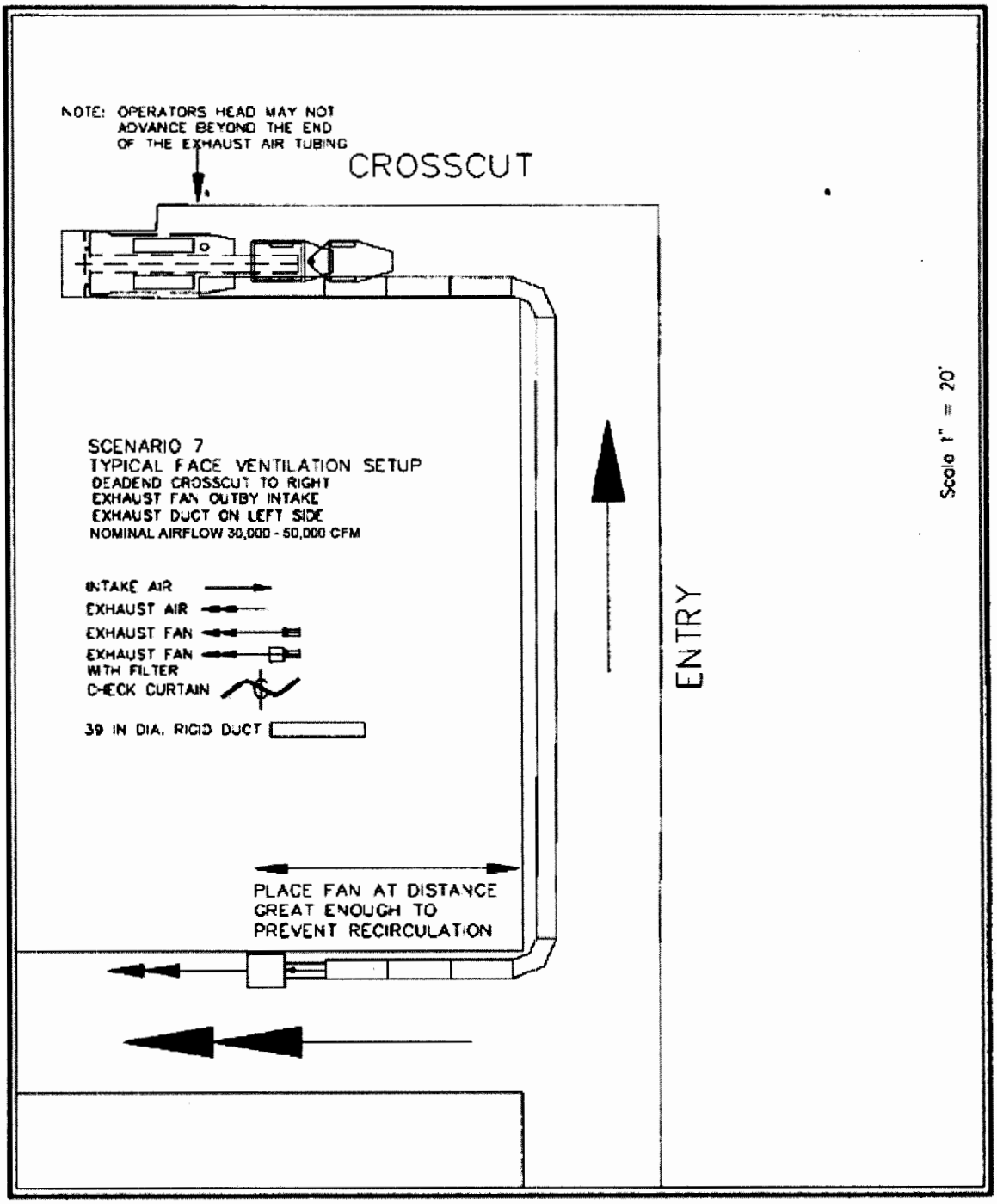


Appendix D – Typical Face Ventilation Scenarios (continued)





Appendix D – Typical Face Ventilation Scenarios (continued)



Calculating Losses

Dynamic Losses

The pressure loss in each fitting, inlet and outlet must be calculated separately and is based on the velocity pressure of air at that point in the system.

Velocity pressure $Pv = \left(\frac{V}{4005} \right)^2$

$$\Delta H = C \left(\frac{V}{4005} \right)^2 \left(\frac{\rho}{075} \right)$$

Friction Losses

Friction loss curves, which are provided in this brochure, are designed to give the pressure loss due to friction in the duct. The curves are based on the following formula:

$$\Delta H = \left(\frac{K L O Q^2}{5\,2\,A^3} \right) \left(\frac{\rho}{075} \right)$$

For all equations, the definitions are:

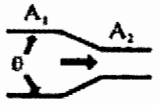
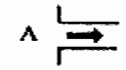
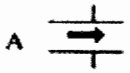
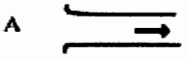
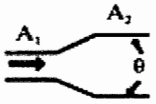
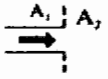
ΔH = pressure loss in in. w.g.
C = loss coefficient
V = air velocity in feet/minute
L = length in feet
O = perimeter in feet
Q = air quantity in 100,000 cfm
(60,000 cfm would be .60)
ρ = air density (.075 for standard air) in lb/ft^3

A = area of duct in square feet
K = the friction factor for the material
(Fiberglass duct is 11.7;
Steel duct is 12;
Cassette duct is 15;
Lay flat duct is 18;
Flexible suction duct is 27)

Reprinted with Permission from Schauenburg Flexadux Corporation, USA

Appendix E – Auxiliary Ventilation System Design/Installation Considerations (cont.)

Loss coefficients for area changes

Gradual Contraction		θ 30° 45° 60°	C_2 0.02 0.04 0.07
Equal Area Transformation		$A_1 = A_2$ θ ≤ 14°	C 0.15
Flanged Entrance		A = ∞	C 0.34
Duct Entrance		A = ∞	C 0.85
Formed Entrance		A = ∞	C 0.03
Gradual Expansion		θ 5° 7° 10° 20° 30° 40°	C_1 0.17 0.22 0.28 0.45 0.59 0.73
Abrupt Exit		A_2 = ∞ A_1/A_2 = 0.0	1.00

Note: A "C" with a subscript indicates the cross-section at which velocity is calculated.

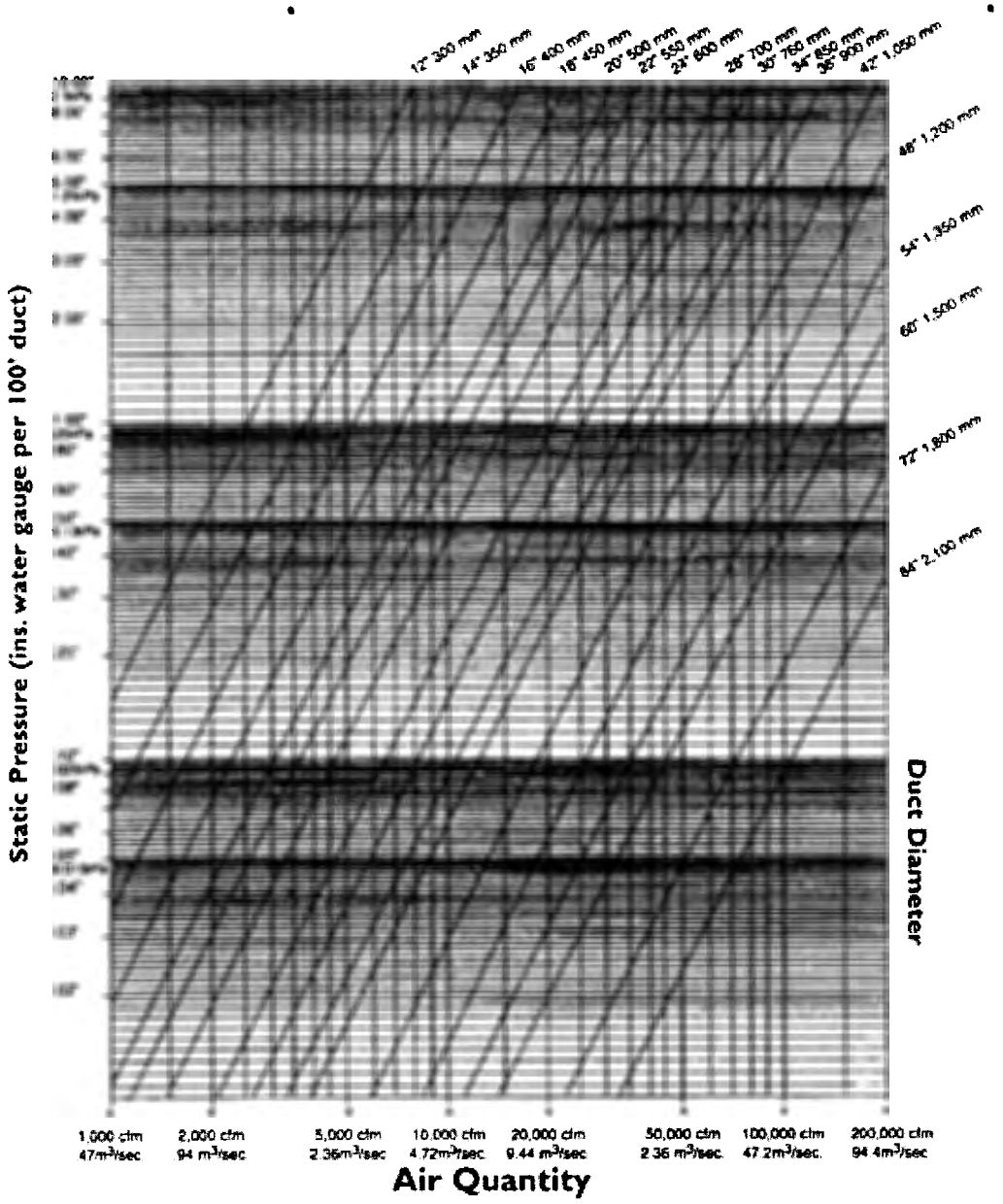
Loss coefficients for elbows

N°		Rectangular or round, with or without vanes	(N/90) times value for similar 90° elbow	
90° Round Section		Miter R/D = 0.5 0.75 1.0 1.5 2.0	1.30 0.90 0.45 0.33 0.24 0.19	65 23 17 12 10

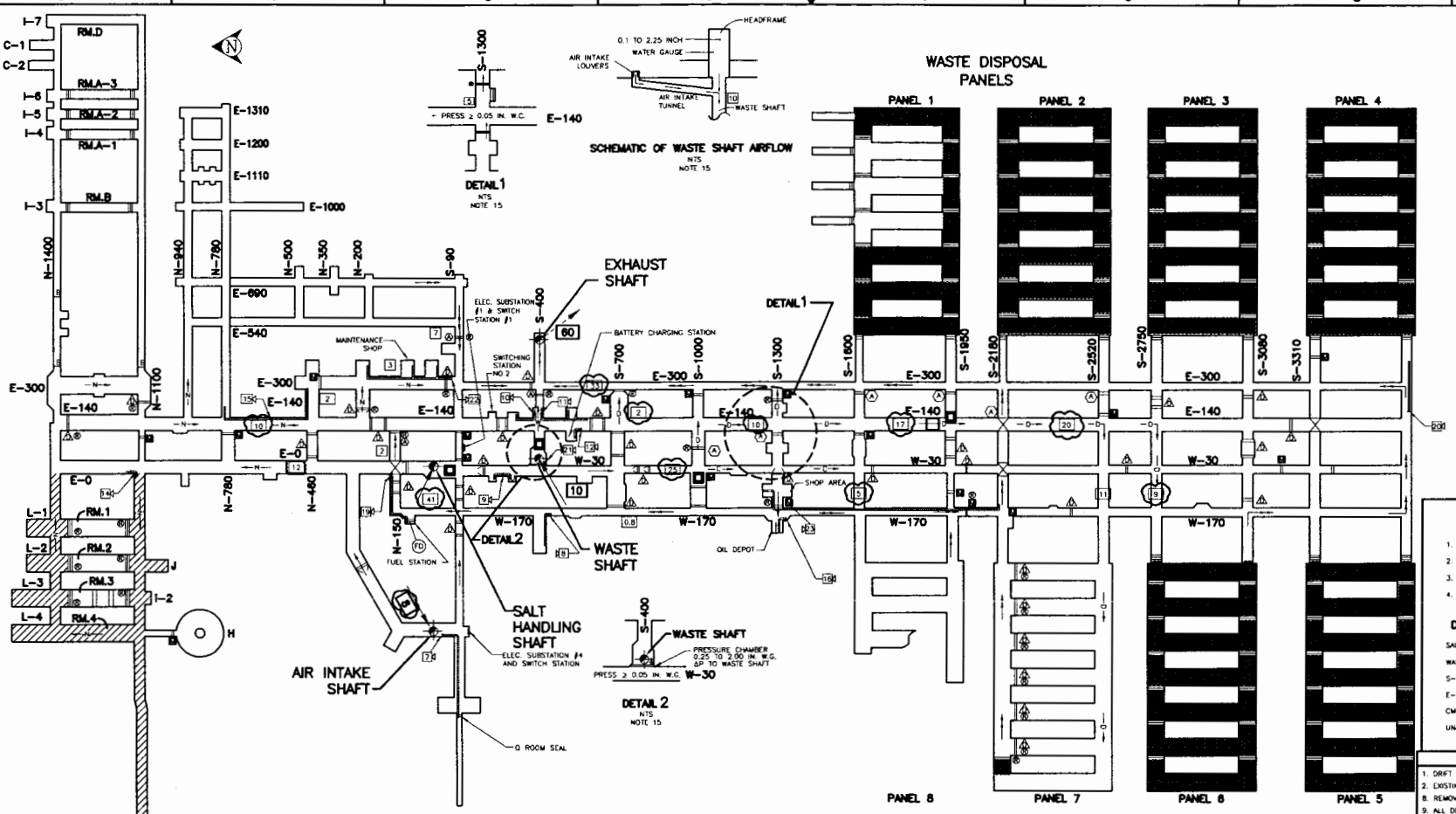
Reprinted with Permission from Schauenburg Flexadux Corporation, USA

Appendix E – Auxiliary Ventilation System Design/Installation Considerations (cont.)

Fiberglass duct friction loss chart



Reprinted with Permission from Schauenburg Flexadux Corporation, USA



LOCATION OF ASSEMBLY AREAS

1. SALT SHAFT BOTTOM
2. WASTE SHAFT BOTTOM
3. S-1000 (W-30/W-170) TOOL CRIB
4. E-140/S-1920

DIAL PHONE EXTENSION NUMBERS

SALT SHAFT BOTTOM	8574
WASTE SHAFT BOTTOM	8448
S-1000 TOOL CRIB	8220
E-140/S-1920	8915
CMR EMERGENCY NUMBER	8111
UNDERGROUND FACILITY OPERATOR	8553

NOTES

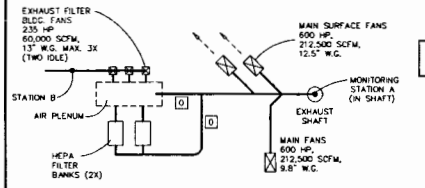
1. DRIFT WIDTHS NOT TO SCALE, ENLARGED 2X FOR CLARITY.
2. EXISTING EXCAVATION REFLECTS STATUS AS OF 09/03/14.
8. REMOVED
9. ALL DESIGNATED ASSEMBLY AREAS ARE EQUIPPED WITH A DIAL PHONE, PAGER PHONE, AND MINER'S AID STATION. EXTENSION NUMBERS FOR DIAL PHONES ARE PROVIDED UNDER HEADING "LOCATION OF ASSEMBLY AREAS".
10. REMOVED
11. DRAWING WAS REVED FROM AA TO BB. THERE ARE NO REV'S IN BETWEEN. THE CORRECT REVISION PROCESS WILL BE FOLLOWED FROM HERE ON. BC,BD,BE ETC..
12. REMOVED
13. REMOVED
14. AIRFLOWS ARE NOMINAL AS OF THE 2014 FILTRATION MODE BASE CASE COMPUTER MODEL.UNDERGROUND FACILITY OPS HAS THE AUTHOURIZATION TO RECONFIGURE THE UNDERGROUND AIRFLOWS TO SUPPORT OPERATIONAL NEEDS.
15. TAKEN FROM DRAWING 54-W-002-W PER ECO 10330.
16. THIS DRAWING AUTOMATICALLY REFLECTS THE LATEST APPROVED REVISION OF DRAWING 54-W-013-W THROUGH AUTOCAD XREF. XREF AUTOMATICALLY MERGES TWO OR MORE ELECTRONIC FILES AS FOREGROUND AND BACKGROUND; IN THIS CASE, AS SYSTEM INFORMATION AND MINE BASE MAP.
17. REMOVED

AUXILIARY VENTILATION FAN REGISTER

ID	EQUIPMENT NUMBER	LOCATION	CFM X1000	MOTOR (HP)	DUCT SIZE (IN)	STATUS
7	74-B-100	W-620, S-90 Q ROOM	22	50	30 ROUND	ACTIVE
8	74-B-020B	W-170, S-350	20	25	30 ROUND	NORMALLY IDLE
9	74-B-061	W-30, S-250 EMER. VEH. STATION	2.5	0.75	24 ROUND	NORMALLY IDLE
10	74-B-080	S-400, E-160 NORTH RIB	5	3.0	30 ROUND	ACTIVE
11	74-B-040	S-400, E-160 SOUTH RIB	30	10	45 OVAL	ACTIVE
12	74-B-032	E-140, S-550	7	3.0	24 OVAL	INACTIVE
14	74-B-092	E-0, N-1100	10	10	24 ROUND	ACTIVE
15	74-B-091	E-140, N-820	8	10	30 ROUND	ACTIVE
16	74-B-095	W-170, S-1300 OIL STORAGE	7.5	3	24 ROUND	ACTIVE
18	NOT USED					
19	74-B-127	N-150 AT O.C. NO. 2 FUEL BAY	~	2.0	24 ROUND	ACTIVE
20	74-B-097	S3650, E200	20	10	36 ROUND	NORMALLY IDLE
21	74-B-052B	WASTE SHAFT SUMP	5	5	18 ROUND	NORMALLY IDLE
22	74-B-025	S-300 MAINT. SHOP	17	50	42 OVAL	NORMALLY IDLE
23	74-B-020	W-70, S-1300 SHOP AREA	15	15	30 ROUND 36 ROUND	NORMALLY IDLE

LEGEND

- INTAKE SUPPLY AIR
- RETURN AIR
- WASTE HANDLING AIR
- NORTH AREA AIR
- CONSTRUCTION AIR
- DISPOSAL AIR
- BARRICADE
- BULKHEAD
- NORMALLY OPEN
- UNPASSABLE BULKHEAD (PROHIBITED AREA)
- EMERGENCY BARRICADED AREA
- AIRFLOW IN KCFM ONE 860 FAN FILTRATION MODE NOTE 14
- ASSEMBLY AREA
- VENTILATION DUCT
- WASTE DRUMS
- BULKHEAD W/MANDOOR AIRLOCK
- MANDOOR
- VEHICLE DOOR W/MAN DOOR (TWO DOORS FORM AN AIRLOCK)
- REGULATOR
- FIRE DOOR
- CHECK CURTAIN
- CRIBSET
- VERTICAL SHAFT
- OVERCAST
- FAN
- EXISTING EXCAVATION
- BACKFILL SALT AREA



SURFACE LOCATED PRIMARY MINE FAN & CONTROL SCHEMATIC

INDEX CODE NUMBER				
SYSTEM	WBS	DWG TYPE	CL	VENDOR
VU00	54	U0125	25	44

THIS DRAWING IS UP-TO-DATE AND LATEST REVISION VERIFIED WITH THE FOLLOWING OUTSTANDING ENGINEERING CHANGE ORDERS:

SIGNATURE AND DATE:

THIS DRAWING OBSOLETE FIVE DAYS FROM THIS DATE.

REV	ISSUE DESCRIPTION	DFTR	CHKR	COG	EPE WCR	ECO
		DATE	DATE	DATE	DATE	WO
EE	REVISED PER ECO	AA 02/10/15	BB 02/18/15	JC 02/18/15	BD 02/18/15	13569
ED	REVISED PER ECO	AA 01/05/14	BB 11/28/14	BCC 01/29/14	BC 11/26/14	13494

THIS DRAWING CREATED BY ENGINEERING CHANGE ORDER (ECO): 2300 WO: N/A

DFTR: R. MAYNARD 12/5/90
CHKR: T.ALSTON 12/06/90
COG: LLOOMIS 12/06/90
CM: M.LUCAS 1/13/90
DM: B.ALLEN 12/06/90
QA: R.YOUNGMAN 1/11/90
SFTY: D.RIPLEY 1/09/90
DOE: JACK GILBERT 1/17/90

U.S. DEPARTMENT OF ENERGY

NWP Nuclear Waste Partnership LLC
A Wholly-owned Partnership with BWXT and AMEC
Waste Isolation Pilot Plant — Carlsbad, New Mexico

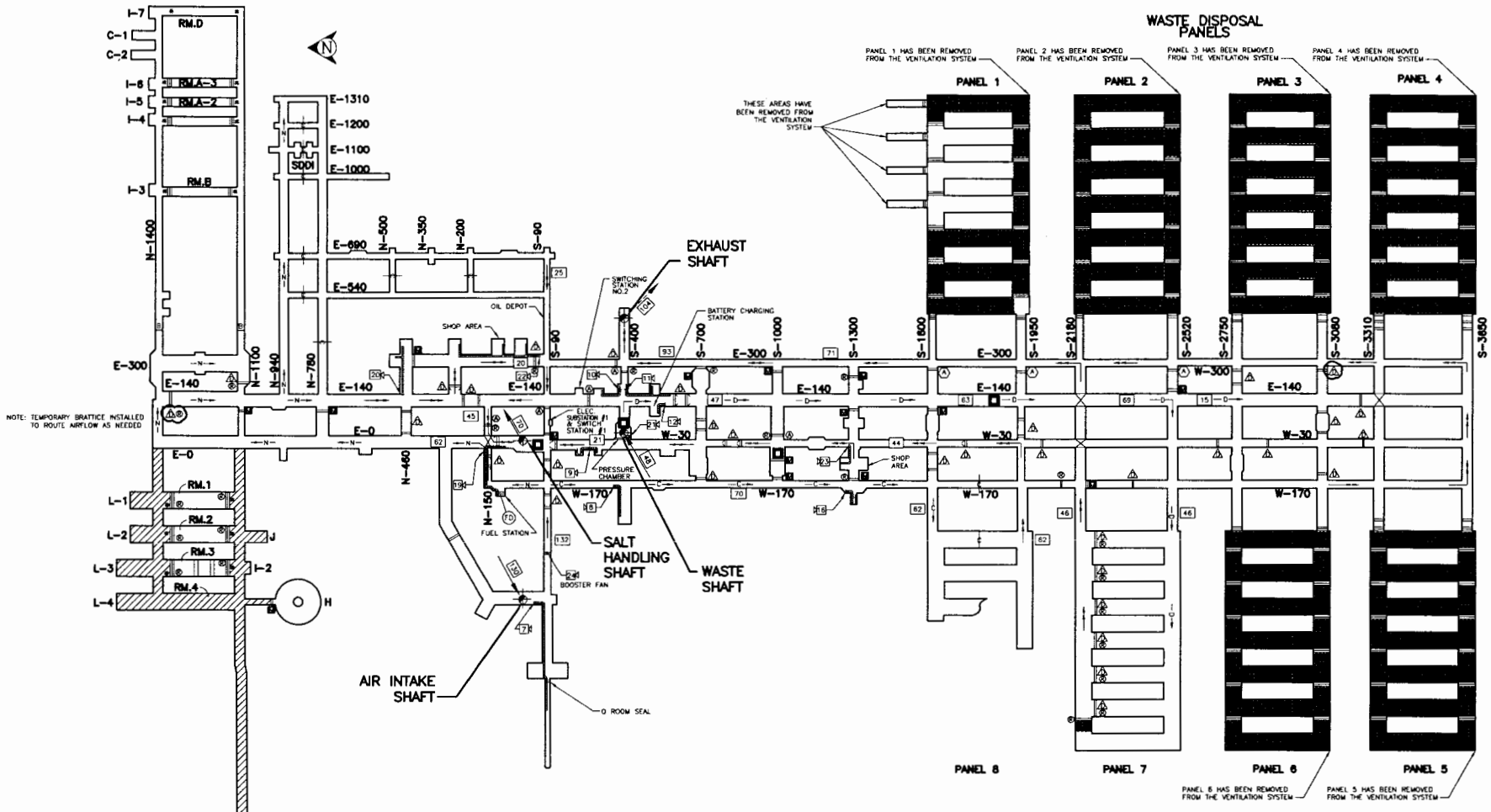
UNDERGROUND MINE VENTILATION SYSTEM

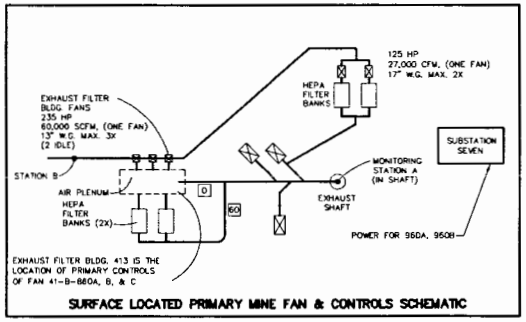
SCALE: 1"=150'
INTERPRET DWG PER ANSI Y14.5

SIZE	SYS	DWG NO	REV
E	VU00	54-W-001-W	EE

THIS DRAWING TAKEN FROM: N/A
VENDOR: N/A

54-Z-001-W1





SURFACE LOCATED PRIMARY MINE FAN & CONTROLS SCHEMATIC

LEGEND

- INTAKE SUPPLY AIR
- RETURN AIR
- WASTE HANDLING AIR
- NORTH AREA AIR
- CONSTRUCTION AIR
- DISPOSAL AIR
- TEMPORARY BULKHEAD
- BULKHEAD
- NORMALLY OPEN
- UNPASSABLE BULKHEAD (PROHIBITED AREA)
- EB EMERGENCY BARRICADE
- 100 / 100 AIRFLOW IN KCFM TWO OF 3 MINE FANS ONE MINE FAN
- WASTE DRUMS
- CHECK CURTAIN
- A BULKHEAD W/MANDOOR AIRLOCK
- MANDOOR
- VEHICLE DOOR W/MAN DOOR (TWO DOORS FORM AN AIRLOCK)
- REGULATOR
- FD FIRE DOOR
- CRIBSET
- VERTICAL SHAFT
- OVERCAST
- FAN
- EXISTING EXCAVATION
- PROPOSED EXCAVATION
- BACKFILL AREA
- ASSEMBLY AREA
- VENTILATION DUCT
- B BARRICADE

NOTES

1. DRIFT WIDTHS NOT TO SCALE, ENLARGED 2X FOR CLARITY.
2. EXCAVATION REFLECTS PROPOSED STATUS AS OF 09/02/14.
3. AIRFLOWS ARE NOMINAL AS OF THE MOST RECENT TEST & BALANCE COMPUTER CORRELATED MODEL. UNDERGROUND FACILITY OPS HAS THE AUTHORIZATION TO RECONFIGURE THE UNDERGROUND AIRFLOWS TO SUPPORT OPERATIONAL NEEDS.
4. ONE 860 FAN IN PARALLEL OPERATION WITH TWO INTERIM VENTILATION FANS WILL PRODUCE 114 KKCFM THROUGH THE DISPOSAL SIDE OF THE SYSTEM. THE UG BOOSTER FAN WILL ADD ANOTHER 130 KCFM THROUGH THE CONSTRUCTION AND NORTH SPLITS OF THE UG VENT SYSTEM.

		AA	BB	CC	DD		
AW	REVISED PER ECO	10/10/95	02/18/15	02/18/15	02/26/15	13569	N/A
AV	REVISED PER ECO/FD	AA	BB	BCC	FS		
		10/28/14	11/26/14	11/26/14	11/28/14	13494	N/A
REV	ISSUE DESCRIPTION	DFTR	CHKR	COG	DFTG MGR	ECO	WO
		DATE	DATE	DATE	DATE		

THIS DRAWING CREATED BY ENGINEERING CHANGE ORDER (ECO): 7754 WO: N/A

DFTR: B. HICKS 6/8/95
CHKR: B. BEEMAN 7/13/95
COG: K. MCDANIEL 7/13/95
CM C.N.: CHAMRA 7/13/95
OA: H.R. LEOS 7/13/95
SFTY: D. RIPLEY 7/13/95
APPD: J. UPTEGROVE 7/13/95
DM: E.G. ENDES 7/13/95

SCALE: 1"=150'
INTERPRET DNC PER ANSI Y14.5

U.S. DEPARTMENT OF ENERGY
Nuclear Waste Partnership LLC
A URS-led Partnership with B&W and AREVA
Waste Isolation Pilot Plant Carlsbad, New Mexico

PROPOSED CHANGES TO UNDERGROUND MINE VENTILATION SYSTEM INTERIM & SUPPLEMENTAL VENTILATION NO WASTE HANDLING

CLASS	SYS	DWG NO	REV
E	VU00	54-Z-001-W1	AW

THIS DRAWING TAKEN FROM: 54-W-001-W REV. BG
VENDOR: MTS

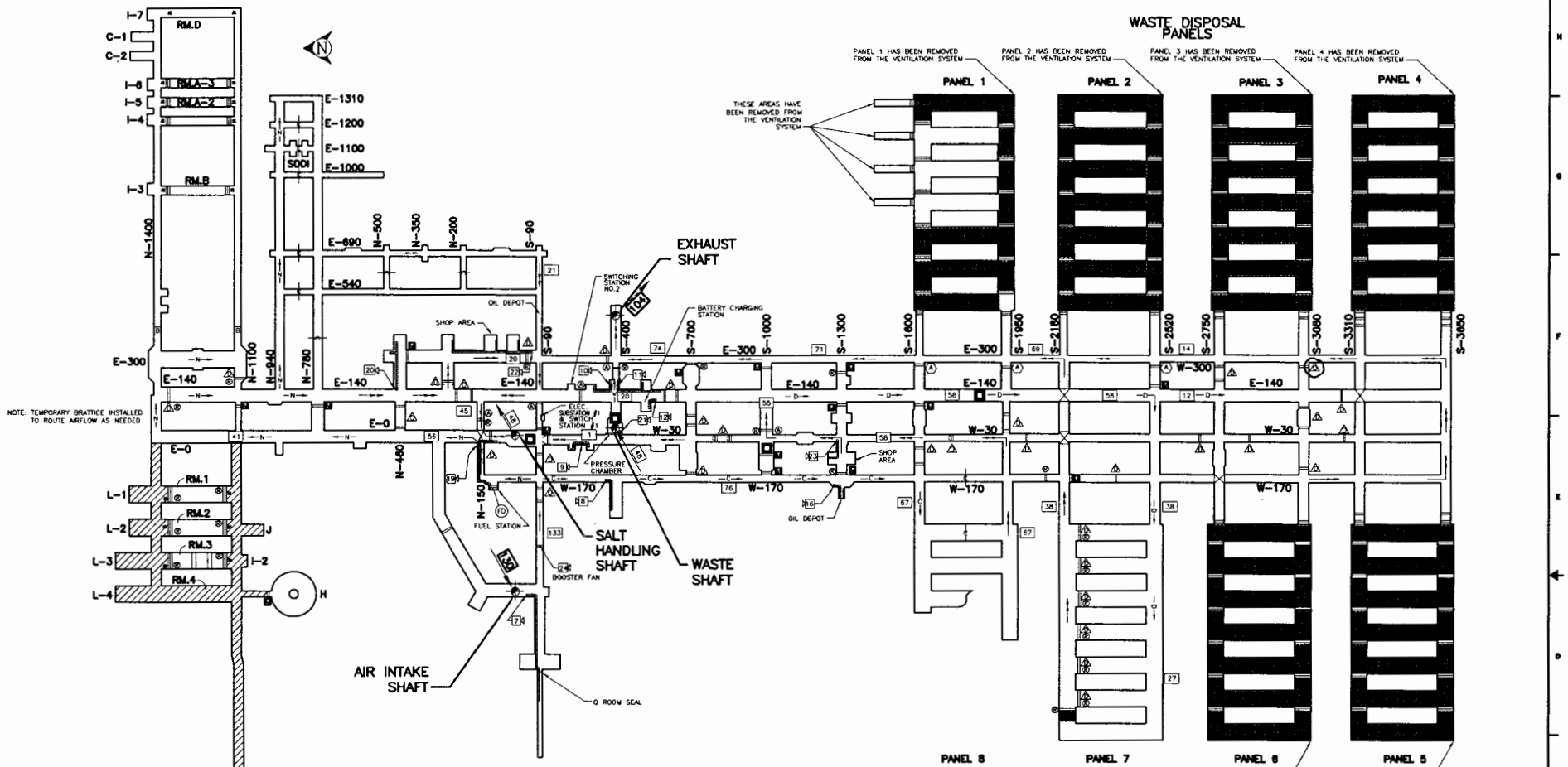
INDEX CODE NUMBER					
SYSTEM	WBE	DWG TYPE	CL	VENDOR	
VU00	54	U0125	251	144	

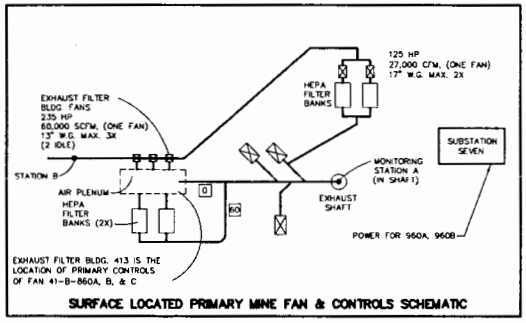
THIS DRAWING IS UP-TO-DATE AND LATEST REVISION VERIFIED WITH THE FOLLOWING OUTSTANDING ENGINEERING CHANGE ORDERS:

SIGNATURE AND DATE:

THIS DRAWING OBSOLETE FIVE DAYS FROM THIS DATE

54-Z-001-W2





SURFACE LOCATED PRIMARY MINE FAN & CONTROLS SCHEMATIC

LEGEND

- INTAKE SUPPLY AIR
- RETURN AIR
- WASTE HANDLING AIR
- NORTH AREA AIR
- CONSTRUCTION AIR
- DISPOSAL AIR
- TEMPORARY BULKHEAD
- BULKHEAD
- NORMALLY OPEN
- UNPASSABLE BULKHEAD (PROHIBITED AREA)
- B BARRICADE
- EB EMERGENCY BARRICADE
- 100 / 100 AIRFLOW IN KCFM TWO OF 3 MINE FANS ONE MINE FAN
- WASTE DRUMS
- CHECK CURTAIN
- (A) BULKHEAD W/MANDOOR AIRLOCK
- (B) MANDOOR
- (A) VEHICLE DOOR W/MAN DOOR (TWO DOORS FORM AN AIRLOCK)
- REGULATOR
- (FD) FIRE DOOR
- CRIBSET
- VERTICAL SHAFT
- OVERCAST
- FAN
- EXISTING EXCAVATION
- PROPOSED EXCAVATION
- BACKFILL AREA
- ASSEMBLY AREA
- VENTILATION DUCT
- B BARRICADE

NOTES

1. DRIFT WIDTHS NOT TO SCALE, ENLARGED 2X FOR CLARITY.
2. EXCAVATION REFLECTS PROPOSED STATUS AS OF 09/02/14.
3. AIRFLOWS ARE NOMINAL AS OF THE MOST RECENT TEST & BALANCE COMPUTER CORRELATED MODEL. UNDERGROUND FACILITY OPS HAS THE AUTHORIZATION TO RECONFIGURE THE UNDERGROUND AIRFLOWS TO SUPPORT OPERATIONAL NEEDS.
4. ONE 860 FAN IN PARALLEL OPERATION WITH TWO INTERIM VENTILATION FANS WILL PRODUCE 114 AKCFM THROUGH THE DISPOSAL SIDE OF THE SYSTEM. THE UG BOOSTER FAN WILL PROVIDE FRESH AIR TO THE WASTE DISPOSAL CIRCUIT.

INDEX CODE NUMBER					
SYSTEM	WBE	DWG TYPE	CL	VENDOR	
VU00	54	U0125	25	144	

THIS DRAWING IS UP-TO-DATE AND LATEST REVISION VERIFIED WITH THE FOLLOWING OUTSTANDING ENGINEERING CHANGE ORDERS:

SIGNATURE AND DATE:

THIS DRAWING OBSOLETE FIVE DAYS FROM THIS DATE

REV	REVISED PER ECO	AA	BB	JB	BB	13569	N/A
		09/10/14	09/16/14	09/16/14	09/16/14		
REV	ISSUE DESCRIPTION	DFTR	CHKR	COG	DFTG MGR	ECO	WO
		DATE	DATE	DATE	DATE		

THIS DRAWING CREATED BY ENGINEERING CHANGE ORDER (ECO): 13484 WO: N/A

DFTR: A.ANAYA 10/22/14
CHKR: R.ROJO 11/28/14
COG: R.CARRASCO 11/28/14
CM: R.CARRASCO 11/28/14
DM: R.SEXTON 11/28/14

U.S. DEPARTMENT OF ENERGY

NWP Nuclear Waste Partnership LLC
A URS-led Partnership with Babcock and Wilcox
Waste Isolation Pilot Carlsbad, New Mexico

PROPOSED CHANGES TO UNDERGROUND MINE VENTILATION SYSTEM INTERIM & SUPPLEMENTAL VENTILATION WASTE HANDLING MODE

SCALE 1"=150'
INTERPRET DWG PER ANSI Y14.5

SYS VU00 | DWG NO 54-Z-001-W2 | REV A

THIS DRAWING TAKEN FROM: VENDOR: