

4850L Ventilation

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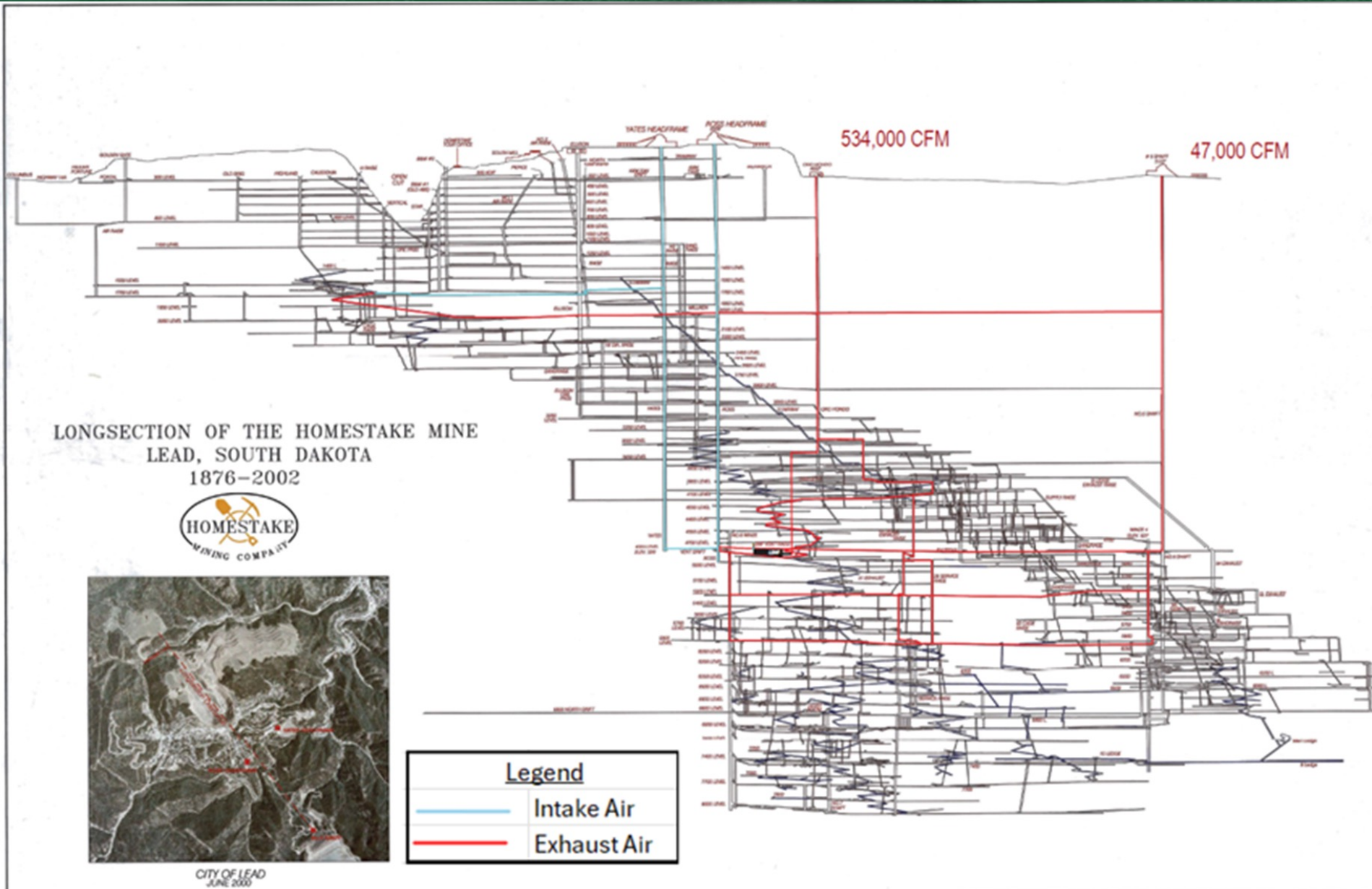
Overview

- Current Ventilation System
- LBNF Ventilation Requirement
- SURF Capabilities

Current Ventilation System

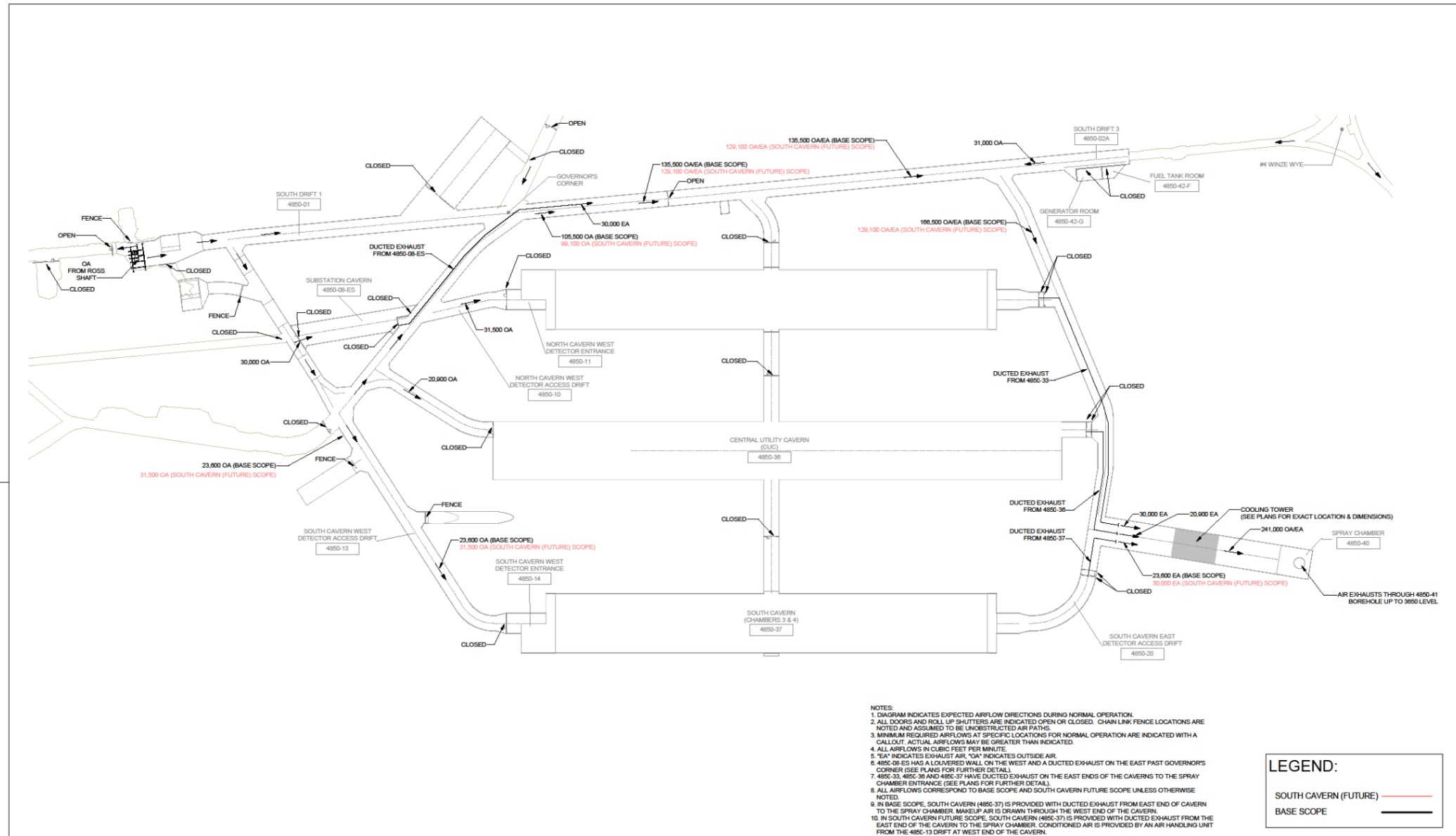
- Two Intake Shafts
 - Ross/Yates
- Two Exhaust Shafts
 - Oro Hondo/#5 Shaft
- ~12 Primary Ventilation Levels from the 300L – 5000L

Cross-Section Ventilation



Total of 63 underground levels down to 8000L (2.4 km or 1.5 mi)
For scale horizontal length = ~3.2 miles
Drill holes extend ~11,000 (actual = 10,800 feet below surface!

LBNF Ventilation

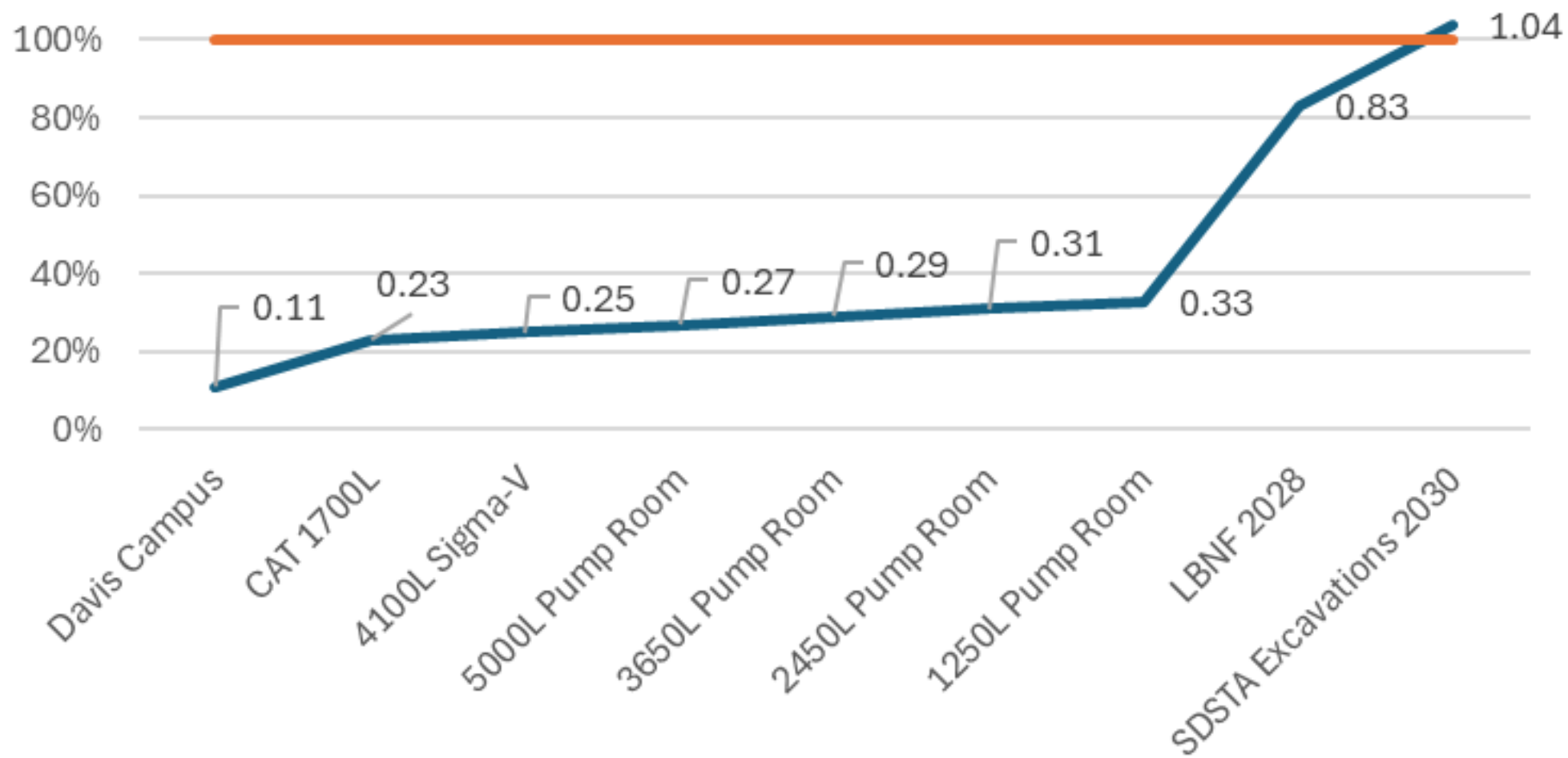


E1 Chiller Plant Load Summary



Item	Serving	Component	Design	Loads at AUP	Det 1 Fill	Det 1 Oper	Det 1 Oper / Det 2 Fill	Det 1 Oper / Det 2 Oper	Det 1 Oper / Det 2 Oper / Det 3 Fill	Det 1 Oper / Det 2 Oper / Det 3 Oper	Det 1 Oper / Det 2 Oper / Det 3 Oper / Det 4 Fill	Det 1 Oper / Det 2 Oper / Det 3 Oper / Det 4 Oper
FD VE Update - Option 1												
Chiller Plant												
	All loads in kW	Chiller Plant Cooling Capacity	7,091	7,091	7,091	7,091	7,091	7,091	7,091	7,091	7,091	7,091
1	4850-33	AHU-01	806	-	806	806	806	806	806	806	806	806
2	4850-36-CM	AHU-02	32	32	32	32	32	32	32	32	32	32
3	4850-36-ER, 4850-36-EER	AHU-03	169	169	169	169	169	169	169	169	169	169
4	4850-36, 4850-16, 4850-17	AHU-04	503	503	503	503	503	503	503	503	503	503
5	4850-37	AHU-05	806	-	-	-	-	-	806	806	806	806
6	4850-36-CR	AHU-06	41	41	41	41	41	41	41	41	41	41
6a	4850-36, 4850-16, 4850-17	AHU-07	129	-	102	26	102	26	129	102	129	102
6b	4850-36-UPS	AHU-08	54	54	54	54	54	54	54	54	54	54
		Sum of CF loads	2,542	800	1,709	1,632	1,709	1,632	2,542	2,515	2,542	2,515
		Chiller Plant Cooling Capacity (ex CF)	4,549	6,291	5,382	5,459	5,382	5,459	4,549	4,576	4,549	4,576
7	4850-33 (Waterside)	Detector rack load	480	-	-	240	240	480	480	480	480	480
8	4850-36 (N2 Boost Compressors)	N2 Boost Compressor load	-	-	-	-	-	-	-	-	-	-
9a	4850-33 (Waterside)	DAQ rack load	250	-	-	125	125	250	250	250	250	250
9b	4850-37 (Waterside)	DAQ rack load	250	-	-	-	-	-	125	125	250	250
10	4850-37 (Waterside)	Detector rack load	480	-	-	-	-	-	240	240	480	480
		Sum of Exp loads	1,460	-	-	365	365	730	730	1,095	1,095	1,460
		Chiller Plant Cooling Capacity (available)	3,089	6,291	5,382	5,094	5,017	4,729	3,819	3,481	3,454	3,116
Reheat												
11	4850-33 (Reheat)	AHU-01	230	-	230	230	230	230	230	230	230	230
12	4850-37 (Reheat)	AHU-05	230	-	-	-	-	-	230	230	230	230
		Sum of reheat required	460	-	230	230	230	230	460	460	460	460
4850L Nitrogen System												
13	4850-36 (N2VE)	4850L Nitrogen System load	3,000	-	2,550	1,275	2,550	1,275	3,000	2,550	3,000	2,550
Option 1 - 4850L Nitrogen System load served by 42F cooling water												
14	4850-36 (N2VE)	N2VE cooling water at 42 F load	3,000	-	2,550	1,275	2,550	1,275	3,000	2,550	3,000	2,550
		Sum of N2VE chiller plant loads	3,000	-	2,550	1,275	2,550	1,275	3,000	2,550	3,000	2,550
Cooling Tower (241,000 CFM / 70F WBT / 3795 GPM / 15F Range)												
15		Cooling Tower Capacity	8,337	8,337	8,337	8,337	8,337	8,337	8,337	8,337	8,337	8,337
		Chiller Plant Cooling Capacity (available)	89	6,291	2,832	3,819	2,467	3,454	819	931	454	566
		Cooling Tower Capacity (available)	105	7,397	3,330	4,490	2,901	4,061	963	1,095	534	665
Chiller Utilization & Maintenance Load Shed Summary												
Chiller Capacity			4843200 Btu/h		1418 kW							
Chiller Heat Rejection			5694750 Btu/h		1667 kW							
Chiller load (kW)			7,002	800	4,259	3,272	4,624	3,637	6,272	6,160	6,637	6,525
Chiller load (RT)			1,993	228	1,212	931	1,318	1,035	1,785	1,753	1,889	1,857
5 chillers capacity - 403 ton chillers (RT)			2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018
5 chillers capacity (utilization %)			99%	11%	60%	46%	65%	51%	68%	87%	94%	92%
# of chillers operating - normal operation			1	4	3	4	3	5	5	5	5	5
Load % per chiller			56%	75%	77%	82%	85%	88%	87%	94%	92%	92%
CW flowrate (gpm)			759	3,036	2,277	3,036	2,277	3,795	3,795	3,795	3,795	3,795
SCWP % flowrate (sized for 100% of flow)			20%	80%	60%	80%	60%	100%	100%	100%	100%	100%
# of chillers operating - maintenance mode			1	2	2	2	2	2	2	2	2	2
Load shed required (RT)			-	406	125	510	229	979	947	1,063	1,051	1,051
Load shed required (kW)			-	1,427	440	1,792	805	3,440	3,328	3,805	3,693	3,693
Load shed required (%)			-	33%	13%	39%	22%	55%	54%	57%	57%	57%
Load % per chiller			57%	100%	100%	100%	100%	100%	100%	100%	100%	100%
CW flowrate (gpm)			759	1518	1518	1518	1518	1518	1518	1518	1518	1518
SCWP % flowrate (sized for 100% of flow)			20%	40%	40%	40%	40%	40%	40%	40%	40%	40%

SURF Ventilation Demand



Solution #1 Automated Regulators

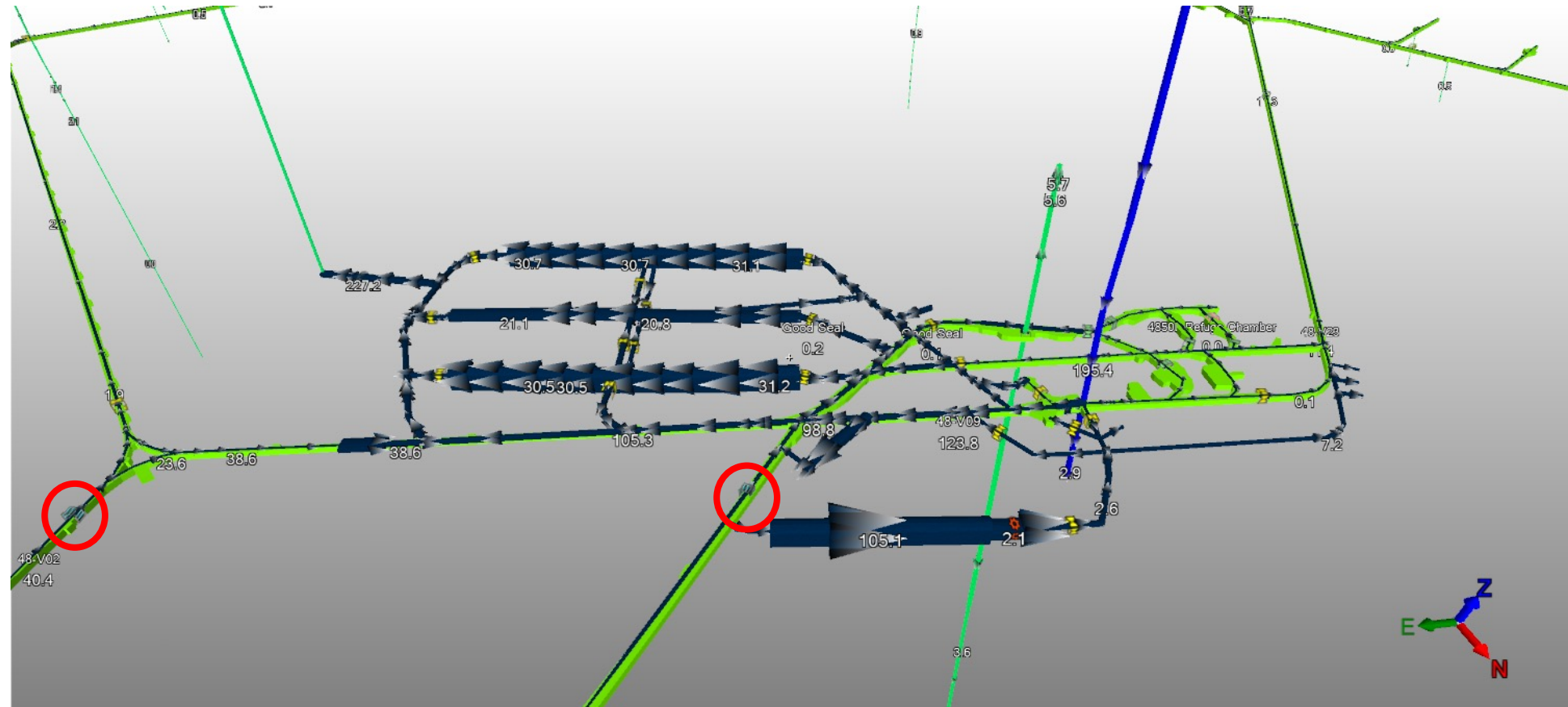
- Install a drive thru automated regulator in the West and East Drifts

Pros:

Meets airflow Requirements in South Drift

Cons:

- Limits airflow through Yates/Davis Campus
 - Davis Requirement 53 KCFM
 - Higher Radon Levels
 - Ross Shaft Heater Issues?
- Imbalance of Intake shafts creates difficulty to respond to safety hazards
- Lowers Spray Chamber Total Volume



Questions?

