

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 63-32242

Exam Date: 7/26/2012

1. Current Owner: MISSION AVIATION FELLOWSHIP
PO BOX 47
NAMPA ID 83653
2. Accompanied by: Thomas (Tom) Howard, facilities development manager. Phone No: (208) 498-0618
and
Ken Hucklebridge, base ops manager and the preferred contact going forward. Phone No: (208) 498-0800
Address: Mission Aviation Fellowship is organized under the laws of California. It is in goodstanding with the IDSOS as C162611.
The office building/POU is located at 112 N Pilatus Ln, Nampa, ID 83687
Relationship to Permit Holder: Mr. Howard and Mr. Hucklebridge are employees at Mission Aviation Fellowship (MAF).

3. SOURCE
GROUND WATER

TRIBUTARY**B. OVERLAP REVIEW**

1. Other water rights with the same place of use: none
2. Other water rights with the same point of diversion: none

C. DIVERSION AND DELIVERY SYSTEM1. LOCATION OF POINT(S) OF DIVERSION

GROUND WATER

SW1/4SE1/4NE1/4 Sec. 24, Twp 03N, Rge 02W, B.M. CANYON County

Method of Determination:

The locations of the production and injection wells were documented by comparison with aerial photography. GPS coordinates of both wells were also recorded during the site visit.

2.

PLACE OF USE: HEATING and COOLING

Twp Rge Sec	NE				NW				SW				SE				Totals
03N 02W 24	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
				X													

Method of Determination:

The POU was documented by comparison with aerial photography and confirmed by the site visit. The same system supplies heating and cooling to the main office building only.

3.

- ☒ Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.
- ☒ Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.
- ☒ Aerial Photo Attached (required for irrigation of 10+ acres).
- ☒ Photo of Diversion and System Attached

4.

<u>Well or</u> <u>Diversion ID No.*</u>	<u>Motor Make</u>	<u>Hp</u>	<u>Motor Serial No.</u>	<u>Pump Make</u>	<u>Pump Serial No. or</u> <u>Discharge Size</u>
	Franklin Electric	15HP		Berkeley	4 inch discharge pipe
		<u>Heat Exchanger Make</u>	<u>Heat Exchanger Serial No.</u>		
		Bell&Gossett	968399-01	196 gpm through 2 inch ports	

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

<u>Measurement</u> <u>Equipment</u>	<u>Type</u>	<u>Make</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Size</u>	<u>Calib. Date</u>

2.

Measurements:

No flow measurement was taken. The heat exchanger is capable of flows in a wide range. An instantaneous measurement would not have been an indication of the maximum diversion. During the site visit, readings of the temperatures upstream and downstream of the heat exchanger were recorded and the motor hours were interrogated from the ABB controller of the well pump motor.

E. FLOW CALCULATIONS

_____Additional Computation Sheets Attached

Measured Method:

No flow measurement was taken.

For non-consumptive uses such as this one, any instantaneous reading is unlikely to be an indicator of the maximum diversion utilized by the system.

The permit holder did not have documentation on the well construction and was not able to provide specifications for the well pump, or the heat exchanger that had been installed.

After several inquiries, I found the equipment suppliers for this project. Design or performance specifications for the well motor, well pump and heat exchanger were provided to me at my request.

The heat exchanger is rated to handle 196 gpm or 0.43 cfs with a nozzle velocity of 20 fps. The factory will allow up to 25 fps which translates to 240 gpm (0.53 cfs) through the 2 inch nozzle.

IDWR's record of the production well shows this well is capable of delivering 300 gpm.

The well pump specifications were for a Berkeley pump rated for 220 gpm at 220 TDH. (attachment)

The well pump motor is a 15 HP Franklin motor. At the time the time of the exam it was operating at less than 90%.

The 4 inch PVC supply pipeline from the well to the mechanical room can provide 240 gpm at low pressure and 5 fps velocity.

The well pump and motor do not operate continuously. A variable frequency drive controller on the well pump motor provides water at a rate that the heat exchanger requires.

The well, well pump, system piping and the heat exchanger can divert and use more water than I am recommending. They can also divert less. The well pump motor was not operating at its rated horse power during the field exam.

I have no evidence that the system exceeded the rated flow for the heat exchanger which is 0.43 cfs. This is the rate I recommend for the license.

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation: Not applicable

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$$

2. Volume Calculations for Other Uses:

Cooling Use

On 7/12/2012 I requested historical use records. Mr. Howard responded by email with information from an interrogation of the ABB controller on the well pump motor. I used that data to determine the volume of water used. I equated motor hours to Pump hours in this case. On 7/12/2012 the totalized motor hours were 7373 hours.

On the morning of the field exam 7/26/2012, the totalized motor hours were 7552, an additional 179 hours. Between these dates Boise WSFO calculated 231 Cooling Degree Days (CDD).¹ This equates to ~ 0.77 pump hr/CDD. The calculation is: 179 pump hours / 231 CDD.

I assumed that the pump provided the heat exchanger's rated flowrate, which is 196 gpm or 0.43 cfs. 196 gpm is 0.0355 AF/hr. The volume of water used per CDD would be: 0.77 pump hr/CDD x 0.0355 AF/hr = 0.0275 AF/CDD
66 gpm = .14 cfs

To accommodate a hotter than average year I used the 90th percentile for CDD at the Boise WSFO. (Mean + 1 x S.D. = 806.65+183.77 = 990.42 CDD). The cooling volume would be 0.0275 AF/CDD x 990.42 CDD = 27.24 AF.

According to Mr. Howard's query of the VFD controller, the well pump has worked approximately 1212 hr/yr. At 196 gpm per pump hour, this is approximately 43.03 AF/yr. If 27.24 AF are used in cooling, 15.78 AF would remain for heating use.

Heating Use

I did not witness the heat exchanger in heating mode. However, I assumed that the flowrate for heating would also be the heat exchanger's rated 196 gpm or 0.43 cfs

I calculated a space heating volume based on an adaptation of an ASHRAE method for estimating heat energy use. The equation is: Vol = (HL x HDD x hr/day x Cd)/(deltaT1 x K x C x deltaT2). I used climate information from Boise (KBOI 101022), the nearest weather station to the POU.

The following parameters values were used:

HL = 293,945 BTU/hr, the design heating load provided by Otto Gabiola (Tikker Engineering) in an attachment to the application for permit.

HDD = 5761.61 (90% HDD base 65 at KBOI Co op station 101022)

24 hr/day

Cd = 0.60

Delta T1 = 72 degrees F, the design temp provided in heating load design by Otto Gabiola (Tikker Engineering) in an attachment to the application for permit

K = 0.9

C = 2720000 (constant to correct for units)

Delta T2 = range 7-9 (source water temp 58 deg F minus estimated discharge temp deg F)

A spreadsheet showing the calculations is attached. This method estimated the volume of water for heating use at 15.9 AF if the source temperature dropped 9 degrees F across the heat exchanger. This volume is reasonably close to the 15.8 AF derived above

The 90% annual HDD would not occur in the same year as the 90% CDD. This system has been in place and operational since 2007 during some of the warmest years in the record. Therefore I am comfortable recommending a heating volume of 15.8 AF.

G. NARRATIVE/REMARKS/COMMENTS

Water for landscape irrigation and domestic uses that were found on the property are provided by the City of Nampa.

If the production well has a tag, it is not visible. Drilling permit/well log for D00464-28 is presumed to be correct for this well. The permit holder did not have a copy of any of the well driller's reports. We provided copies from our records.

The same system provides both heating and cooling to the main office building. The other buildings on the property have

¹ The Nampa Co-op weather stations do not provide the daily climate summaries needed for this calculation.

other means for climate control.

The office building water loop is a closed loop. The source water is supplied by groundwater from a single production well, and is an open loop. The ground water loop is a "pump and dump" scheme. The water in the two loops do not come in contact. The interface between them is a plate and frame type heat exchanger. The hydronic schematic provided with the permit application is a fair representation of the as-built piping. The well pump is controlled by a variable frequency drive (VFD) not shown in the schematic.

4-inch diameter PVC pipe conveys the ground water from the well to the mechanical room which is located in the attic above the main floor of the building.

The port openings on the heat exchanger are 2-inch diameter so the 4 inch supply pipe is necked down to 2 inches just upstream of the heat exchanger. The 4-inch supply pipe can easily handle the flow required by the heat exchanger.

The ABB variable frequency drive provides only the water that the heat exchanger can process. At the time of our site visit the ABB controller's home screen showed the motor operating at 30%.

Climate control is provided by 24 heat pumps, supplying 6 zones on the building side of the heat exchanger. According to the load design table, they can provide a total of 946.8 MBTU in cooling or 878 MBTU in heating. The building has a 35,666 square ft footprint.

Beneficial use of the water for cooling was confirmed at the time of the exam. Readings were taken from thermometers mounted on the ground water loop piping before and after the heat exchanger. The source side water temperature increased from 58 to 69 degrees F across the exchanger.

Temperatures across the exchanger on the building loop side were available but I did not record them. The fluid in the building loop was not pure water. Without knowledge of the viscosity, temperatures differences for the building side would not have provided any meaningful information.

There were no pressure gages across the exchanger.

A backup water supply for the system is City of Nampa water and access is plumbed in. According to Mission Aviation Fellowship personnel, it has never been used.

The injection well is authorized by UIC permit # 63-W-207-001. This well has two tags: D00425-82 and D00467-32, which correspond to two well driller's reports and logs on this well. The well was initially drilled on 5/23/2006 and then deepened on 7/6/2006.

Have conditions of permit approval been met? ☐ Yes ☒ No

Condition 3 on the permit states that the water bearing zone to be appropriated is 60-200 ft. The production well was drilled to 297 ft and screened between 215 ft and 297 ft. This depth is different that the permit had authorized. However, since this permit was issued the Department's understanding of groundwater in the area has changed. A contemporary permit for a groundwater use in this area would not be conditioned with this type of restriction. The other conditions have been met. I recommend that a license be issued.

H. RECOMMENDATIONS

The recommendations are not limited by the exam fee.

1. Recommended Amounts

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
HEATING	01/01 to 12/31	0.430 CFS	15.8 AF
COOLING	01/01 to 12/31	0.430 CFS	27.2 AF
	<u>Totals:</u>	0.430 CFS	43.0 AF

2. Recommended Amendments

☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☒ None

☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

I. AUTHENTICATION

Field Examiner's Name Michelle Hall Date 8/17/2012
Reviewer _____ Date _____

Sterling Method $V = (HL * DD * 24 * Cd) / (\Delta T1 * k * C * \Delta T2)$

Parameter	Explanation								
V	heat value of the fuel ASHRAE or annual volume Sterling								
HL	peak heating load in BTU/hr								generally, design peak load is used see memo 24 for estimate
DD	annual heating degree days								usually 65 deg F Base
24	24 hrs/day								
Cd	correction factor; for standard construction choose from ASHRAE fig 1								for heating DD in range 4000-7000, Cd= 0.6
deltaT1	design indoor temp minus design outdoor temp								
k	correction factor to account for losses. Use .90								.9 is a fully-condensing boiler
C	constant to correct for units								for Volume in AF use C =2.72x10^6 BTU/AF-deg F
deltaT2	temp of incoming water minus temp of outgoing								
HL(BTU/hr)		293945							Tikker Engineering design heating load
DD		6223.02							90% at Boise WSFO
hr/day		24							
Cd		0.6							
delta t1		75							Tikker Engineering design temps
k		0.9							
C		2720000							
delta t2		7							Heat exchanger specs show 7 degree difference.
Volume(AF/yr)		20.50							if delta t2 =7
		17.93							if delta t2 =8
		15.94							if delta t2 =9
		14.35							if delta t2=10

1 1/2"	.75 PCF	4.2
2"	.75 PCF	5.6
2 1/2"	.75 PCF	6.0



**MISSION
AVIATION
FELLOWSHIP**

Howard Lane
Nampa, Idaho

LOAD CALCULATION SUMMARY FORM				
ZONE	EQUIPMENT	SF	COOLING LOAD W/ FRESH AIR (MBH)	HEATING LOAD W/ FRESH AIR (MBH)
1	HEAT PUMPS	8836	185.2	206.8
2	HEAT PUMPS	3480	62.9	75.4
3	HEAT PUMPS	8836	203.0	206.8
4	HEAT PUMPS	3140	118.4	92.2
5	HEAT PUMPS	6395	262.6	206.8
6	HEAT PUMPS	3140	114.7	90.0

9°F — WINTER OUTDOOR AIR DESIGN TEMPERATURE
96°F — SUMMER OUTDOOR AIR DESIGN TEMPERATURE

LOAD CALCULATIONS HAVE BEEN DETERMINED IN ACCORDANCE WITH THE
PROCEDURES DESCRIBED IN CHAPTER 28 OF THE 1997 ASHRAE HANDBOOK
OF FUNDAMENTALS.

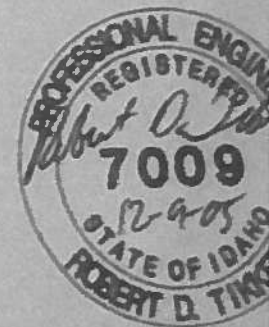


photo of load schedule from engineering drawings MAF

BOISE WSFO AIRPORT, IDAHO**Monthly Total Heating Degree Days****(101022)****Base Temperature = 65 F**

File last updated on Jul 11, 2012

*** Note *** Provisional Data *** After Year/Month 201207

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc.,

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not
sum (or average) to the long-term annual value.

Months with 5 missing days or less use mean for missing day(s)

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR (S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1940	991.00	756.50	602.00	448.00	155.50	55.00	1.50	0.00	153.00	331.00	885.00	922.00	5300.50
1941	985.00	715.00	607.00	447.00	234.50	122.50	0.00	26.50	223.00	436.50	688.00	930.50	5415.50
1942	1377.50	937.00	767.00	400.50	380.50	149.50	2.00	37.00	104.50	397.50	759.50	978.00	6290.50
1943	1142.00	814.00	777.50	333.00	344.00	137.00	14.00	20.00	36.50	369.00	748.00	997.00	5732.00
1944	1239.00	897.50	827.00	483.50	222.50	167.50	8.00	1.50	128.50	223.00	789.50	1114.50	6102.00
1945	1019.00	767.50	774.00	570.00	263.50	170.50	0.00	15.50	227.00	303.50	760.50	1060.50	5931.50
1946	1115.00	874.50	658.50	402.50	230.50	58.50	2.50	4.50	165.00	616.00	818.00	892.50	5838.00
1947	1293.50	754.50	623.50	469.50	144.00	127.50	0.00	9.50	137.50	315.50	866.50	1043.50	5785.00
1948	992.00	955.50	840.00	508.50	301.00	44.00	7.00	16.00	156.50	394.50	841.00	1225.50	6281.50
1949	1695.00	961.00	677.00	347.50	172.00	71.50	3.00	1.00	90.50	574.50	612.00	1052.50	6257.50
1950	1230.00	833.50	781.00	524.00	339.00	118.00	10.50	9.00	146.50	265.00	672.00	892.50	5821.00
1951	1114.50	789.50	864.50	431.00	262.00	113.00	1.00	23.50	93.50	490.50	790.50	1164.00	6137.50
1952	1190.00	1003.00	876.00	383.00	240.00	92.00	13.00	8.00	66.00	252.50	900.00	960.00	5983.50
1953	744.00	802.00	701.50	567.00	402.50	176.50	2.00	15.00	82.50	380.00	590.50	1045.50	5509.00
1954	883.50	733.00	796.50	454.00	208.00	178.50	13.50	42.00	150.00	438.00	644.50	1069.00	5610.50
1955	1287.00	1059.00	893.00	629.50	360.50	72.00	46.50	0.00	195.00	370.00	884.00	920.00	6716.50
1956	978.00	1092.50	715.00	434.50	231.00	96.50	12.00	34.00	100.00	465.00	891.00	1065.50	6115.00
1957	1350.00	855.00	706.50	490.50	229.50	83.00	5.00	6.00	78.50	480.00	858.00	949.50	6091.50
1958	1039.50	639.00	754.50	517.00	123.50	74.00	2.50	3.00	148.50	306.00	743.00	881.00	5231.50
1959	905.50	780.50	744.00	430.00	392.00	46.00	13.50	16.00	219.00	477.50	908.50	1149.50	6082.00
1960	1273.00	912.00	685.50	480.50	336.00	25.50	0.00	68.50	66.00	387.50	734.00	1071.00	6039.50
1961	996.00	666.50	638.50	508.00	240.00	15.00	0.00	0.00	246.00	493.50	839.50	1059.00	5702.00
1962	1361.50	918.00	820.00	385.00	280.50	87.50	8.50	34.00	57.00	375.00	709.50	917.50	5954.00
1963	1293.50	607.00	644.00	503.50	168.50	128.00	3.50	2.00	23.00	257.00	640.00	1144.00	5414.00
1964	1209.00	1121.00	852.00	591.00	327.50	131.00	0.00	63.50	172.00	375.50	843.00	926.00	6611.50
1965	958.00	787.50	802.50	443.00	325.00	84.50	7.50	31.50	238.50	274.00	620.50	1083.50	5656.00
1966	1010.50	889.00	676.00	475.00	176.00	101.00	8.00	18.50	69.00	483.00	660.00	1047.00	5613.00
1967	893.00	748.50	714.50	635.00	286.50	84.00	0.00	0.00	51.00	442.00	730.00	1154.00	5738.50
1968	1102.00	695.50	592.50	563.50	239.50	60.00	0.00	61.50	123.50	390.00	691.50	926.50	5446.00
1969	952.50	806.00	696.50	435.50	152.00	78.50	4.00	13.50	95.50	593.50	760.00	942.50	5530.00
1970	894.00	666.50	732.50	635.50	253.50	80.00	0.00	0.00	244.50	542.00	656.50	976.50	5681.50
1971	964.00	771.00	769.50	473.50	183.50	81.50	11.50	6.00	214.50	498.00	759.50	1078.50	5811.00

1972	1057.00	826.50	604.50	550.50	197.50	47.00	11.50	0.50	225.50	412.00	736.50	1276.50	5945.50
1973	1063.00	716.50	682.00	477.50	189.00	95.50	4.50	14.00	106.00	392.00	699.00	825.00	5264.00
1974	1105.50	736.00	695.50	459.00	311.00	44.00	10.50	11.50	55.50	397.50	699.00	988.00	5513.00
1975	1142.00	787.00	730.00	615.00	282.50	80.00	7.00	23.00	76.50	404.00	766.50	1042.00	5955.50
1976	1019.00	894.50	865.00	531.50	196.00	136.00	3.50	40.00	80.00	441.50	725.50	1106.50	6039.00
1977	1425.50	876.00	780.50	347.00	362.00	8.50	9.50	35.00	150.00	367.50	762.00	861.00	5984.50
1978	868.00	751.00	508.00	495.00	336.50	76.50	5.50	41.00	179.00	377.00	849.00	1178.50	5665.00
1979	1513.00	861.00	675.50	490.50	248.00	73.50	5.00	2.50	29.00	333.50	910.00	906.50	6048.00
1980	1076.50	731.50	742.50	375.50	265.00	136.50	0.00	42.00	109.50	417.00	756.50	991.00	5643.50
1981	965.50	789.00	638.00	441.50	323.00	104.00	15.50	5.50	139.50	506.50	631.00	920.50	5479.50
1982	1240.00	981.00	735.00	594.00	317.00	88.00	29.50	2.50	188.00	438.50	870.50	1038.50	6522.50
1983	905.00	657.50	631.50	539.00	315.50	87.00	39.00	0.00	150.50	348.00	690.50	1296.50	5660.00
1984	1358.50	1011.00	717.50	572.50	335.50	167.00	0.00	8.00	209.50	566.00	777.50	1305.50	7028.50
1985	1422.00	1099.00	902.00	404.50	231.00	56.00	0.00	28.50	267.00	515.50	1121.50	1625.00	7672.00
1986	1104.00	672.50	528.00	503.00	285.50	16.00	37.00	2.50	266.00	385.50	739.50	1148.50	5688.00
1987	1155.50	768.50	644.50	293.00	146.50	42.50	25.50	21.00	88.00	313.00	729.50	997.00	5224.50
1988	1206.50	790.00	695.00	368.00	265.00	62.00	4.00	6.50	164.50	183.00	730.00	1178.50	5653.00
1989	1250.50	1171.50	662.50	364.50	284.50	33.00	0.00	31.00	103.00	427.50	768.00	1073.50	6169.50
1990	957.00	865.00	642.50	312.00	294.50	85.00	6.00	10.50	28.50	439.50	716.00	1453.50	5810.00
1991	1259.00	656.50	682.00	501.50	313.00	105.50	0.00	0.00	58.50	415.50	829.00	1034.50	5855.00
1992	988.00	665.50	498.50	315.50	95.00	55.50	7.00	40.50	122.50	348.50	915.50	1132.00	5184.00
1993	1248.50	1013.00	723.00	507.00	143.50	160.00	57.00	47.50	128.50	375.00	966.50	983.00	6352.50
1994	1000.50	849.00	586.00	385.50	153.00	66.50	10.00	1.50	36.50	455.50	974.50	1074.50	5593.00
1995	893.00	659.50	664.50	505.50	263.50	115.00	5.50	25.00	90.50	491.50	619.00	991.50	5324.00
1996	1007.50	866.50	645.00	452.50	301.00	58.00	1.00	7.00	167.50	410.50	711.50	890.00	5518.00
1997	1020.50	789.50	607.50	482.50	133.00	45.00	18.50	0.00	64.00	417.00	661.50	1050.00	5289.00
1998	810.50	694.00	644.00	459.00	277.50	89.00	0.00	0.00	53.00	417.50	641.00	1064.00	5149.50
1999	921.00	785.50	659.00	526.00	318.00	97.00	8.50	14.00	105.00	333.50	544.00	1026.00	5337.50
2000	956.50	677.50	671.00	324.50	183.50	43.50	4.00	0.00	132.50	398.00	970.00	1052.50	5413.50
2001	1173.00	873.00	594.00	511.00	195.50	72.50	6.50	0.00	24.00	363.00	631.50	1063.50	5507.50
2002	1037.50	868.50	753.50	436.50	240.00	66.00	0.00	4.00	99.00	483.00	731.00	858.00	5577.00
2003	816.00	788.00	575.50	469.00	267.00	28.00	0.00	0.00	73.50	262.00	819.50	862.00	4960.50
2004	1134.50	872.00	521.00	336.00	213.50	48.00	0.00	11.50	99.00	361.00	804.50	918.50	5319.50
2005	999.50	788.50	599.00	436.00	191.00	105.50	0.50	3.00	110.00	352.00	825.50	1099.50	5510.00
2006	886.50	847.50	704.00	398.50	195.50	10.00	0.00	10.50	108.50	428.00	650.00	1032.50	5271.50
2007	1110.50	731.00	517.00	403.00	145.50	40.00	0.00	0.00	105.50	405.50	723.50	1010.00	5191.50
2008	1115.00	840.50	749.00	552.00	185.00	101.00	0.00	7.50	50.50	369.50	643.00	1039.50	5652.50
2009	1045.50	786.50	724.00	439.00	191.00	25.50	0.00	15.50	41.50	512.50	708.50	1186.50	5676.00
2010	856.50	692.50	630.00	486.00	363.50	54.50	4.00	21.50	47.50	274.50	782.00	930.00	5142.50
2011	1033.00	826.00	646.50	563.50	302.50	94.50	0.00	0.00	12.00	344.00	749.50	1045.50	5617.00
2012	935.00	772.00	554.50	335.50	0.00z	68.00	0.00w	0.00z	0.00z	0.00z	0.00z	0.00z	2665.00

Period of Record Statistics

MEAN	1089.86	821.04	693.68	465.18	250.85	83.51	7.45	15.58	120.10	401.10	762.12	1044.37	5761.61
S.D.	180.34	122.28	94.77	82.80	72.99	41.64	11.11	16.94	65.45	86.97	105.93	136.14	461.41
SKREW	0.76	0.76	0.15	-0.01	0.01	0.45	2.55	1.24	0.50	0.06	0.65	1.49	1.34
MAX	1695.00	1171.50	902.00	635.50	402.50	178.50	57.00	68.50	267.00	616.00	1121.50	1625.00	7672.00
MIN	744.00	607.00	498.50	293.00	95.00	8.50	0.00	0.00	12.00	183.00	544.00	825.00	4960.50
NO YRS	73	73	73	73	72	73	72	72	72	72	72	72	72

BOISE WSFO AIRPORT, IDAHO**Monthly Total Cooling Degree Days****(101022)****Base Temperature = 65 F**

File last updated on Jul 11, 2012

*** Note *** Provisional Data *** After Year/Month 201207

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc.,

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not
sum (or average) to the long-term annual value.

Months with 5 missing days or less use mean for missing day(s)

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR (S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1940	0.00	0.00	0.00	0.00	40.50	192.50	308.00	284.50	97.00	0.00	0.00	0.00	922.50
1941	0.00	0.00	0.00	0.00	31.50	59.50	324.00	209.50	10.00	0.00	0.00	0.00	634.50
1942	0.00	0.00	0.00	3.50	7.50	22.50	332.50	282.00	50.50	10.50	0.00	0.00	709.00
1943	0.00	0.00	0.00	3.50	3.00	36.00	271.00	203.00	85.00	25.00	0.00	0.00	626.50
1944	0.00	0.00	0.00	0.00	23.50	40.00	233.00	178.00	90.50	5.00	0.00	0.00	570.00
1945	0.00	0.00	0.00	1.00	4.50	54.50	306.00	276.50	75.00	1.00	0.00	0.00	718.50
1946	0.00	0.00	0.00	8.00	3.00	69.50	309.00	260.50	45.50	0.00	0.00	0.00	695.50
1947	0.00	0.00	0.00	0.00	58.50	30.00	312.50	233.00	73.00	10.00	0.00	0.00	717.00
1948	0.00	0.00	0.00	0.00	31.50	90.00	172.50	183.00	62.50	1.00	0.00	0.00	540.50
1949	0.00	0.00	0.00	0.00	62.50	91.50	294.50	269.00	109.00	0.00	0.00	0.00	826.50
1950	0.00	0.00	0.00	0.00	0.00	76.00	266.50	246.00	90.50	12.50	0.00	0.00	691.50
1951	0.00	0.00	0.00	0.00	7.00	32.50	332.00	247.50	52.50	2.00	0.00	0.00	673.50
1952	0.00	0.00	0.00	7.00	9.50	66.50	277.00	251.50	76.00	1.00	0.00	0.00	688.50
1953	0.00	0.00	0.00	0.00	4.00	6.50	282.50	217.00	111.00	3.00	0.00	0.00	624.00
1954	0.00	0.00	0.00	0.00	50.00	68.50	333.50	142.00	45.50	0.00	0.00	0.00	639.50
1955	0.00	0.00	0.00	0.00	6.50	120.50	240.50	297.50	118.50	6.50	0.00	0.00	790.00
1956	0.00	0.00	0.00	0.00	58.00	82.50	326.00	179.50	74.00	1.00	0.00	0.00	721.00
1957	0.00	0.00	0.00	1.50	18.00	113.00	257.50	182.50	86.50	0.00	0.00	0.00	659.00
1958	0.00	0.00	0.00	0.00	101.50	104.50	282.50	339.50	58.00	4.00	0.00	0.00	890.00
1959	0.00	0.00	0.00	0.00	11.00	154.00	354.00	171.50	61.00	0.00	0.00	0.00	751.50
1960	0.00	0.00	0.00	0.00	8.50	141.50	485.50	192.00	95.00	3.50	0.00	0.00	926.00
1961	0.00	0.00	0.00	0.00	18.50	250.00	348.50	397.00	10.50	0.00	0.00	0.00	1024.50
1962	0.00	0.00	0.00	6.00	0.00	101.00	232.00	210.50	62.50	4.00	0.00	0.00	616.00
1963	0.00	0.00	0.00	0.00	39.50	94.00	225.50	263.50	200.50	34.00	0.00	0.00	857.00
1964	0.00	0.00	0.00	0.00	19.00	55.50	305.50	192.50	8.50	0.00	0.00	0.00	581.00
1965	0.00	0.00	0.00	0.00	12.00	73.50	265.00	221.50	1.50	6.50	0.00	0.00	580.00
1966	0.00	0.00	0.00	0.00	65.00	100.00	263.00	237.00	105.00	0.00	0.00	0.00	770.00
1967	0.00	0.00	0.00	0.00	22.00	115.00	416.50	404.00	159.50	0.00	0.00	0.00	1117.00
1968	0.00	0.00	0.00	2.50	17.00	144.50	381.50	177.00	62.00	0.00	0.00	0.00	784.50
1969	0.00	0.00	0.00	0.00	29.50	115.50	250.00	244.00	70.50	0.00	0.00	0.00	709.50
1970	0.00	0.00	0.00	0.00	21.50	196.00	349.50	333.00	28.00	0.00	0.00	0.00	928.00
1971	0.00	0.00	0.00	0.00	28.00	76.50	312.00	427.00	38.50	1.50	0.00	0.00	883.50

1972	0.00	0.00	0.00	0.00	60.50	124.00	274.50	295.00	37.00	0.00	0.00	0.00	791.00
1973	0.00	0.00	0.00	0.00	48.00	172.50	331.50	261.00	48.50	1.00	0.00	0.00	862.50
1974	0.00	0.00	0.00	0.00	12.50	245.50	282.50	219.50	65.50	0.00	0.00	0.00	825.50
1975	0.00	0.00	0.00	0.00	9.00	60.50	420.00	178.00	92.00	10.50	0.00	0.00	770.00
1976	0.00	0.00	0.00	0.00	17.00	63.50	254.50	124.00	52.00	1.50	0.00	0.00	512.50
1977	0.00	0.00	0.00	18.50	10.00	164.00	249.00	300.00	59.00	0.00	0.00	0.00	800.50
1978	0.00	0.00	0.50	0.00	5.50	60.00	248.50	192.00	69.50	0.00	0.00	0.00	576.00
1979	0.00	0.00	0.00	0.00	24.00	125.00	286.50	193.00	98.50	2.50	0.00	0.00	729.50
1980	0.00	0.00	0.00	2.50	24.00	64.00	244.00	110.00	35.50	2.00	0.00	0.00	482.00
1981	0.00	0.00	0.00	0.50	2.50	49.50	200.00	289.00	98.00	0.00	0.00	0.00	639.50
1982	0.00	0.00	0.00	0.00	2.00	111.00	189.00	239.50	48.50	0.00	0.00	0.00	590.00
1983	0.00	0.00	0.00	0.00	52.00	48.50	174.00	307.50	24.50	0.00	0.00	0.00	606.50
1984	0.00	0.00	0.00	0.00	18.00	66.50	284.50	332.00	60.00	2.00	0.00	0.00	763.00
1985	0.00	0.00	0.00	1.50	27.00	121.00	394.00	158.50	3.50	0.00	0.00	0.00	705.50
1986	0.00	0.00	0.00	1.00	100.50	227.00	179.50	340.50	35.50	0.00	0.00	0.00	884.00
1987	0.00	0.00	0.00	22.50	60.00	197.00	217.50	176.00	106.50	0.00	0.00	0.00	779.50
1988	0.00	0.00	0.00	0.00	43.50	233.00	302.00	208.50	64.50	23.00	0.00	0.00	874.50
1989	0.00	0.00	0.00	6.00	14.00	135.50	370.00	184.50	52.00	0.00	0.00	0.00	762.00
1990	0.00	0.00	0.00	3.00	4.50	141.50	351.50	288.00	175.00	5.50	0.00	0.00	969.00
1991	0.00	0.00	0.00	0.00	0.00	34.50	331.50	358.50	80.50	5.50	0.00	0.00	810.50
1992	0.00	0.00	0.00	10.50	71.00	199.50	203.50	315.50	73.50	19.50	0.00	0.00	893.00
1993	0.00	0.00	0.00	0.00	83.00	66.00	57.50	158.00	69.00	7.00	0.00	0.00	440.50
1994	0.00	0.00	0.00	14.00	28.00	152.00	380.00	345.50	90.50	0.00	0.00	0.00	1010.00
1995	0.00	0.00	0.00	0.00	11.00	80.00	264.50	216.50	112.00	0.00	0.00	0.00	684.00
1996	0.00	0.00	0.00	0.00	4.00	107.50	365.00	308.50	70.00	20.00	0.00	0.00	875.00
1997	0.00	0.00	0.00	0.00	68.50	74.00	258.00	326.50	145.00	13.00	0.00	0.00	885.00
1998	0.00	0.00	0.00	4.00	8.00	39.00	440.50	363.00	195.50	3.00	0.00	0.00	1053.00
1999	0.00	0.00	0.00	0.00	30.50	137.00	277.00	327.50	75.50	1.00	0.00	0.00	848.50
2000	0.00	0.00	0.00	3.00	19.50	151.00	346.50	337.00	71.00	1.50	0.00	0.00	929.50
2001	0.00	0.00	0.00	3.50	83.00	142.00	295.50	424.50	125.00	6.50	0.00	0.00	1080.00
2002	0.00	0.00	0.00	0.00	58.00	203.00	453.50	187.00	102.50	0.00	0.00	0.00	1004.00
2003	0.00	0.00	0.00	0.00	73.00	167.50	481.50	382.50	125.00	46.50	0.00	0.00	1276.00
2004	0.00	0.00	0.00	0.00	17.50	176.50	402.00	317.50	58.00	5.00	0.00	0.00	976.50
2005	0.00	0.00	0.00	0.00	17.50	86.50	412.50	367.00	59.50	1.50	0.00	0.00	944.50
2006	0.00	0.00	0.00	0.00	70.50	189.50	511.00	289.00	120.50	0.00	0.00	0.00	1180.50
2007	0.00	0.00	0.00	4.00	66.50	206.00	560.00	325.50	96.50	1.00	0.00	0.00	1259.50
2008	0.00	0.00	0.00	0.00	44.00	164.00	392.00	346.00	82.00	14.00	0.00	0.00	1042.00
2009	0.00	0.00	0.00	6.00	85.50	109.50	419.00	330.00	208.50	0.00	0.00	0.00	1158.50
2010	0.00	0.00	0.00	1.00	9.00	93.00	338.00	296.50	125.50	27.50	0.00	0.00	890.50
2011	0.00	0.00	0.00	0.00	8.50	72.00	327.50	415.50	203.00	22.00	0.00	0.00	1048.50
2012	0.00	0.00	0.00	25.00	0.00z	131.50	109.50w	0.00z	0.00z	0.00z	0.00z	0.00z	156.50

Period of Record Statistics

MEAN	0.00	0.00	0.01	2.18	30.60	111.84	311.38	265.09	80.94	5.20	0.00	0.00	806.65
S.D.	0.00	0.00	0.06	4.94	27.02	58.50	86.18	77.35	45.55	9.01	0.00	0.00	183.77
SKEW	0.00	0.00	8.37	3.10	0.90	0.50	0.29	0.17	0.92	2.45	0.00	0.00	0.43
MAX	0.00	0.00	0.50	25.00	101.50	250.00	560.00	427.00	208.50	46.50	0.00	0.00	1276.00
MIN	0.00	0.00	0.00	0.00	0.00	6.50	57.50	110.00	1.50	0.00	0.00	0.00	440.50
NO YRS	73	73	73	73	72	73	72	72	72	72	72	72	72

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - <http://www.ncdc.noaa.gov>.

Climatological Report (Daily)

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CDUS45 KBOI 270933
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CLIMATE REPORT
NATIONAL WEATHER SERVICE BOISE ID
333 AM MDT FRI JUL 27 2012

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...THE BOISE ID CLIMATE SUMMARY FOR JULY 26 2012...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1878 TO 2012

WEATHER ITEM	OBSERVED VALUE	TIME (LST)	RECORD VALUE	YEAR	NORMAL VALUE	DEPARTURE FROM NORMAL	LAST YEAR
.....							
TEMPERATURE (F)							
YESTERDAY							
MAXIMUM	101	543 PM	105	1978	93	8	85
MINIMUM	69	559 AM	41	1894	62	7	60
AVERAGE	85				78	7	73
PRECIPITATION (IN)							
YESTERDAY	0.00		0.44	1913	0.01	-0.01	0.00
MONTH TO DATE	0.07				0.28	-0.21	0.01
SINCE OCT 1	11.34				10.86	0.48	13.91
SINCE JAN 1	8.86				7.21	1.65	7.91
SNOWFALL (IN)							
YESTERDAY	0.0		0.0	2006	0.0	0.0	0.0
MONTH TO DATE	0.0				0.0	0.0	0.0
SINCE OCT 1	8.6				19.2	-10.6	21.8
SINCE JUL 1	0.0				0.0	0.0	0.0
SNOW DEPTH	0						
DEGREE DAYS							
HEATING							
YESTERDAY	0				0	0	0
MONTH TO DATE	0				4	-4	0

SINCE JUN 1	64	68	4	89
SINCE JUL 1	0	4	-4	0

COOLING

YESTERDAY	20	13	7	8
MONTH TO DATE	433	278	155	268
SINCE JUN 1	573	417	156	343
SINCE JAN 1	632	461	171	353

.....

WIND (MPH)

HIGHEST WIND SPEED	20	HIGHEST WIND DIRECTION	SE (130)
HIGHEST GUST SPEED	24	HIGHEST GUST DIRECTION	SE (140)
AVERAGE WIND SPEED	7.6		

SKY COVER

POSSIBLE SUNSHINE MM
AVERAGE SKY COVER 0.0

WEATHER CONDITIONS

THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
NO SIGNIFICANT WEATHER WAS OBSERVED.

RELATIVE HUMIDITY (PERCENT)

HIGHEST	35	400 AM
LOWEST	9	400 PM
AVERAGE	22	

.....

THE BOISE ID CLIMATE NORMALS FOR TODAY

	NORMAL	RECORD	YEAR
MAXIMUM TEMPERATURE (F)	93	108	1975
			1934
MINIMUM TEMPERATURE (F)	62	46	1918

SUNRISE AND SUNSET

JULY 27 2012.....	SUNRISE	630 AM MDT	SUNSET	913 PM MDT
JULY 28 2012.....	SUNRISE	631 AM MDT	SUNSET	911 PM MDT

- INDICATES NEGATIVE NUMBERS.
R INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T INDICATES TRACE AMOUNT.

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - <http://www.ncdc.noaa.gov>.

Climatological Report (Daily)

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CDUS45 KBOI 130934
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CLIMATE REPORT
NATIONAL WEATHER SERVICE BOISE ID
334 AM MDT FRI JUL 13 2012

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...THE BOISE ID CLIMATE SUMMARY FOR JULY 12 2012...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1878 TO 2012

WEATHER ITEM	OBSERVED VALUE	TIME (LST)	RECORD VALUE	YEAR	NORMAL VALUE	DEPARTURE FROM NORMAL	LAST YEAR
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TEMPERATURE (F)

YESTERDAY

MAXIMUM	108	403 PM	111	1898	91	17	95
MINIMUM	73	354 AM	41	1893	60	13	60
AVERAGE	91				76	15	78

PRECIPITATION (IN)

YESTERDAY	0.00	0.45	1975	0.01	-0.01	0.00
MONTH TO DATE	0.04			0.15	-0.11	T
SINCE OCT 1	11.31			10.73	0.58	13.90
SINCE JAN 1	8.83			7.08	1.75	7.90

SNOWFALL (IN)

YESTERDAY	0.0	0.0	2006	0.0	0.0	0.0
MONTH TO DATE	0.0			0.0	0.0	0.0
SINCE OCT 1	8.6			19.2	-10.6	21.8
SINCE JUL 1	0.0			0.0	0.0	0.0
SNOW DEPTH	0					

DEGREE DAYS

HEATING

YESTERDAY	0	0	0
MONTH TO DATE	0	4	-4

SINCE JUN 1	64	68	±	89
SINCE JUL 1	0	4	-4	0

COOLING

YESTERDAY	26	11	15	13
MONTH TO DATE	202	111	91	126
SINCE JUN 1	342	250	92	201
SINCE JAN 1	401	294	107	211

.....

WIND (MPH)

HIGHEST WIND SPEED	16	HIGHEST WIND DIRECTION	S (170)
HIGHEST GUST SPEED	21	HIGHEST GUST DIRECTION	S (160)
AVERAGE WIND SPEED	6.6		

SKY COVER

POSSIBLE SUNSHINE MM
AVERAGE SKY COVER 0.0

WEATHER CONDITIONS

THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
HAZE

RELATIVE HUMIDITY (PERCENT)

HIGHEST	38	400 AM
LOWEST	7	400 PM
AVERAGE	23	

.....

THE BOISE ID CLIMATE NORMALS FOR TODAY

	NORMAL	RECORD	YEAR
MAXIMUM TEMPERATURE (F)	91	110	2002
MINIMUM TEMPERATURE (F)	60	43	1993
			1892
			1888

SUNRISE AND SUNSET

JULY 13 2012.....	SUNRISE	616 AM MDT	SUNSET	925 PM MDT
JULY 14 2012.....	SUNRISE	617 AM MDT	SUNSET	924 PM MDT

- INDICATES NEGATIVE NUMBERS.
R INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T INDICATES TRACE AMOUNT.



IDAHO SECRETARY OF STATE

Viewing Business Entity

Ben Ysursa, Secretary of State

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MISSION AVIATION FELLOWSHIP

PO BOX 47
 NAMPA, ID 83653

Type of Business: CORPORATION, GENERAL NON PROFIT

Status: GOODSTANDING, ANREPT SENT 03 Jul 2012

State of Origin: CALIFORNIA

Date of 22 Sep 2005

Origination/Authorization:

Initial Registered Agent: ROY HAGLUND
 112 N PILATUS LN
 NAMPA, ID 83687

Organizational ID / Filing Number: C162611

Number of Authorized Stock Shares:

Date of Last Annual Report: 12 Jul 2012

Original Filing:

Filed 22 Sep 2005 CERTIFICATE OF
 AUTHORITY

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 REPORT

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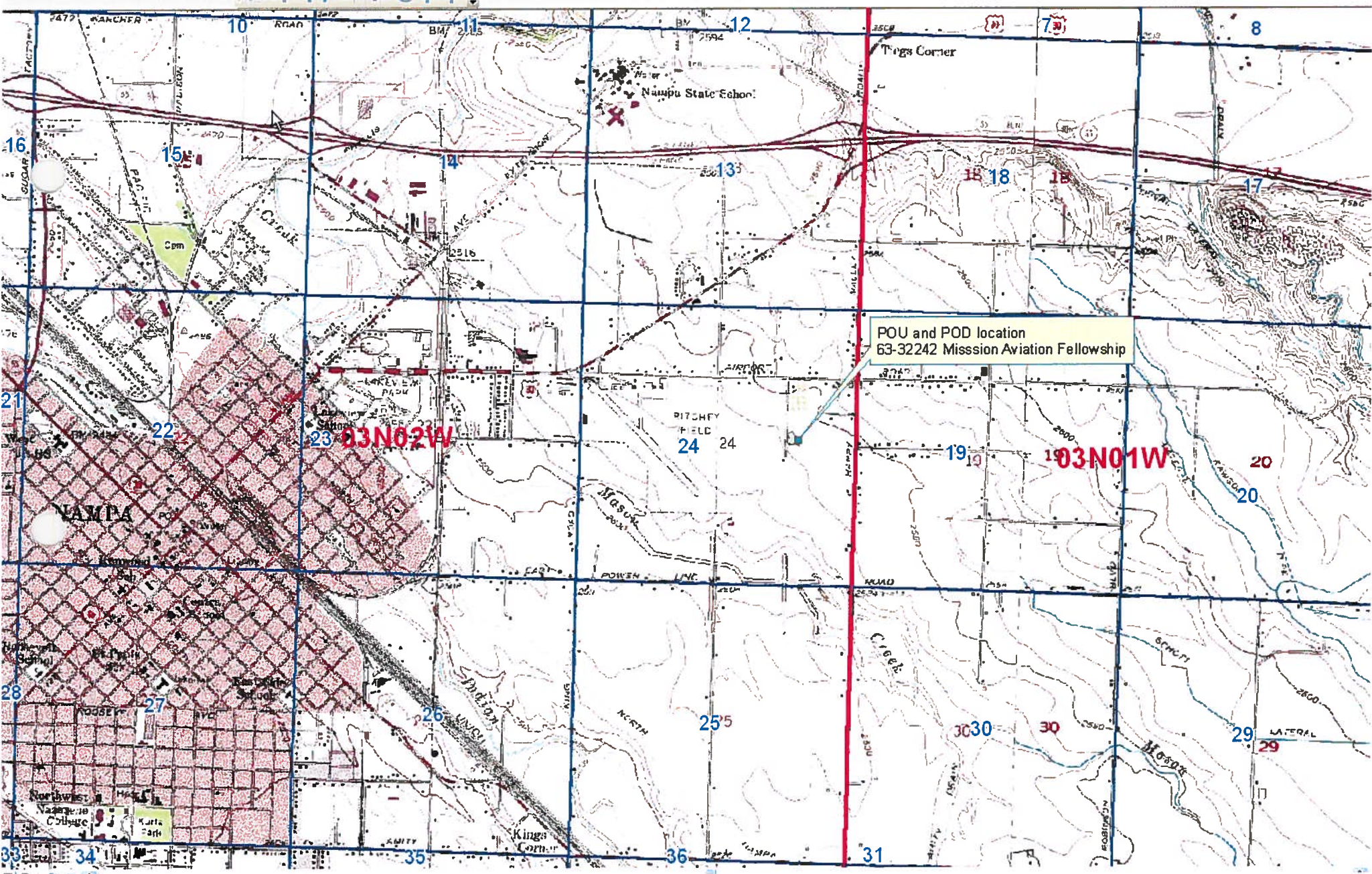
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Comments, questions or suggestions can be emailed to: sosinfo@sos.idaho.gov

No. C 162611	Due no later than Sep 30, 2012 Annual Report Form		2. Registered Agent and Address (NO PO BOX)			
Return to: SECRETARY OF STATE 700 WEST JEFFERSON PO BOX 83720 BOISE, ID 83720-0080 NO FILING FEE IF RECEIVED BY DUE DATE	1. Mailing Address: Correct in this box if needed. MISSION AVIATION FELLOWSHIP ROY HAGLUND PO BOX 47 NAMPA ID 83653		ROY HAGLUND 112 N PILATUS LN NAMPA ID 83687			
			3. <u>New</u> Registered Agent Signature:*			
4. Corporations: Enter Names and Business Addresses of President, Secretary, and Directors. Treasurer (optional).						
Office Held	Name	Street or PO Address	City	State	Country	Postal Code
PRESIDENT	JOHN BOYD	112 N PILATUS LANE	NAMPA	ID	USA	83687
TREASURER	WILLIAM SOUTHWORTH	112 N PILATUS LANE	NAMPA	ID	USA	83687
SECRETARY	ROY HAGLUND	112 N PILATUS LANE	NAMPA	ID	USA	83687
5. Organized Under the Laws of: CA C 162611		6. Annual Report must be signed.* Signature: Roy Haglund Name (type or print): Roy Haglund Date: 07/12/2012 Title: Secretary				
Processed 07/12/2012		* Electronically provided signatures are accepted as original signatures.				







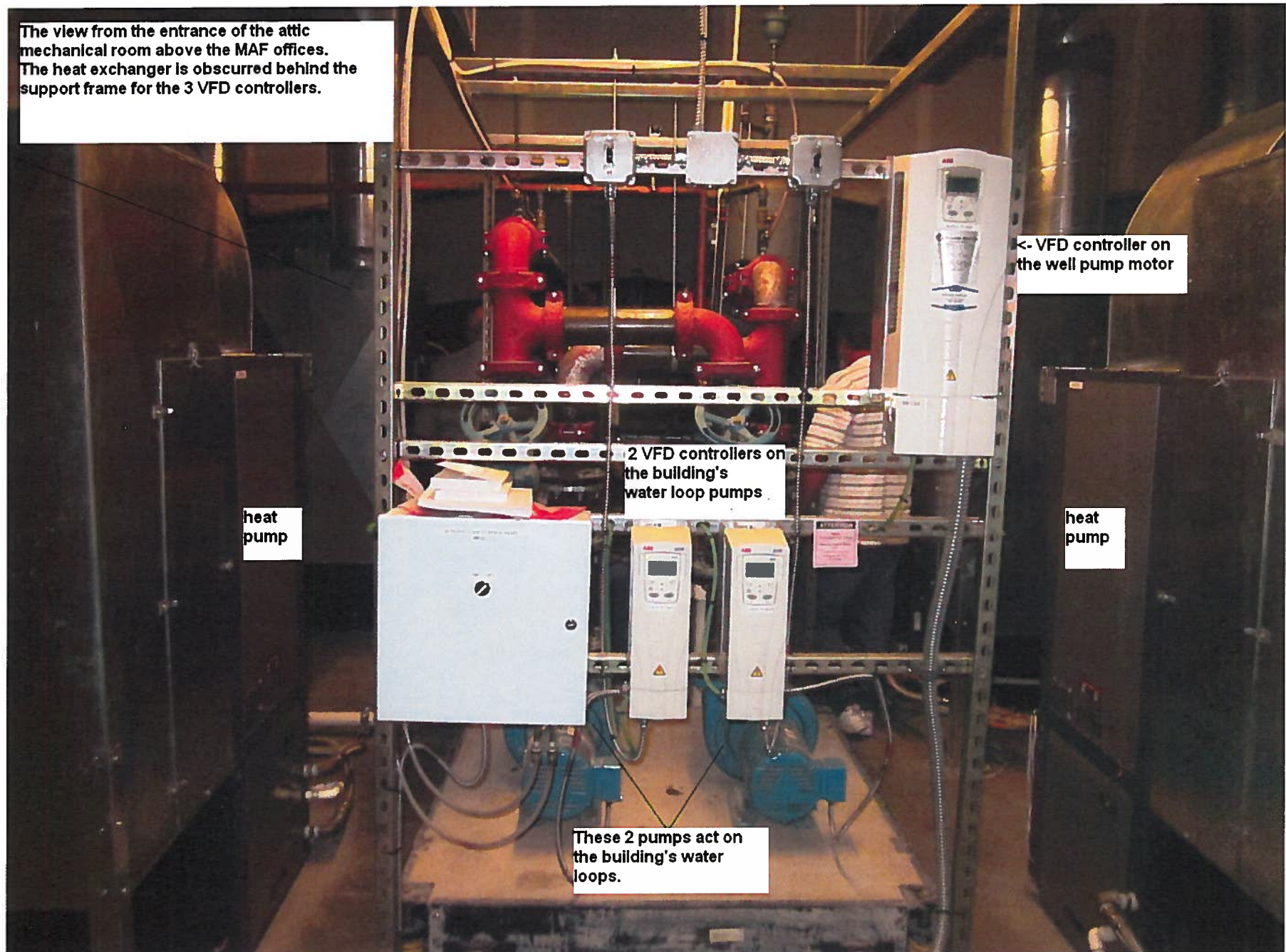
Mission Aviation Fellowship office building
POU 63-32242

The attic mechanical
room is located here.

The diversion piping enters
the building and rises to
the attic in this room.

<- production well
POD

The view from the entrance of the attic mechanical room above the MAF offices. The heat exchanger is obscured behind the support frame for the 3 VFD controllers.



<- VFD controller on the well pump motor

2 VFD controllers on the building's water loop pumps

heat pump

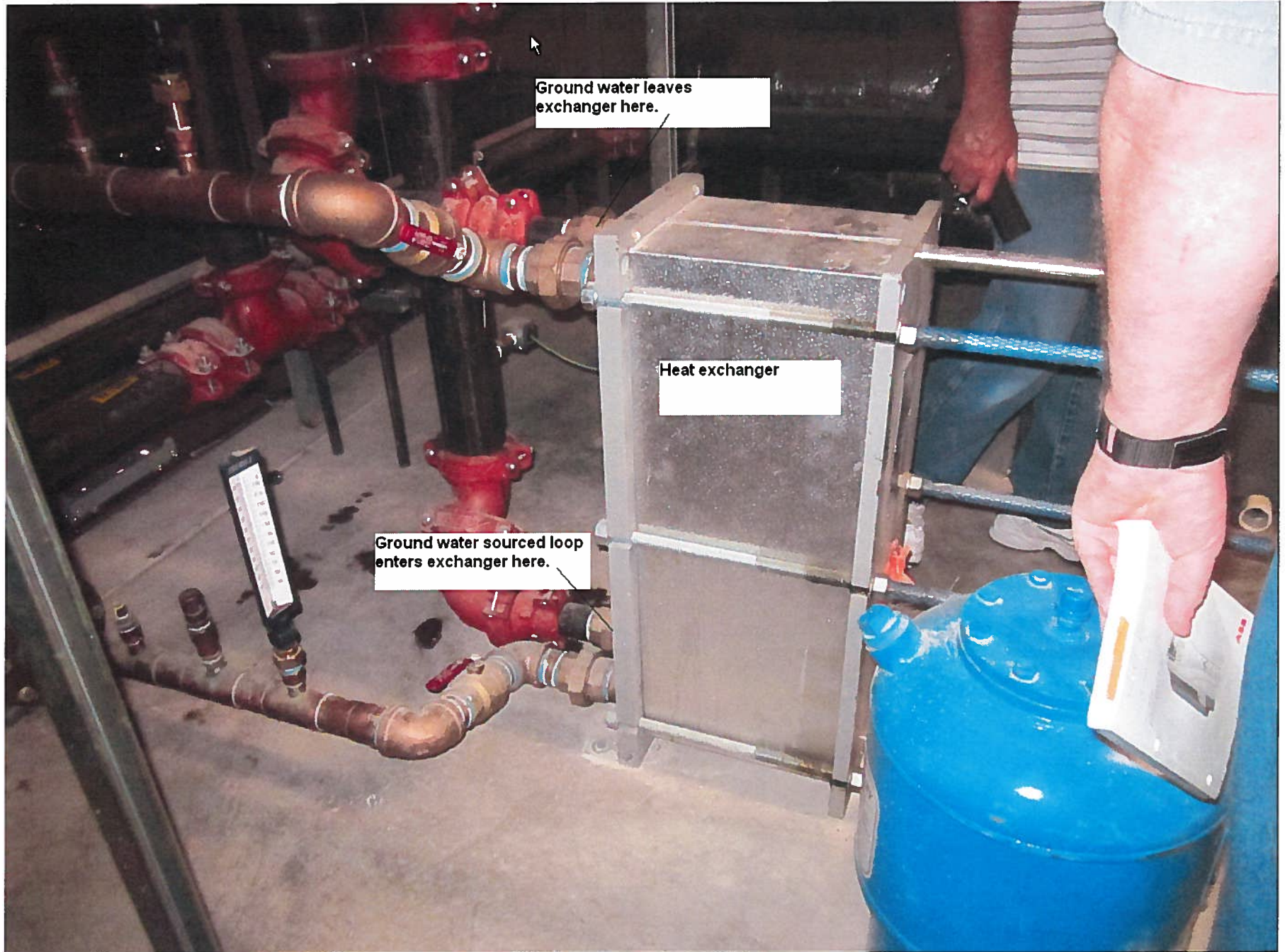
heat pump

These 2 pumps act on the building's water loops.

This is a view of the attic mechanical room facing the entrance. The photographer is standing near the plate and frame heat exchanger.



The heat exchanger is located just outside of view.



Ground water leaves
exchanger here.

Heat exchanger

Ground water sourced loop
enters exchanger here.

from body in

to body

Mission Aviation Fellowship office building
POU for 63-32242

MAF airplane hanger ->

<- Injection well



The accompanying CD contains all the photos and the GPS waypoints taken during the 7/26/2012 site visit to the Mission Aviation Fellowship facility.