

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 45-14421
Exam Date: 8/27/2018

1. Current Owner:
CHAD MANDERSCHIED
PO BOX 27
ALBION ID 83311
(208) 673-6474
2. Accompanied by: Chad Manderscheid
Phone No: (208) 673-6474
Address: 424 West Market St
Albion, ID 83311
Relationship to Permit Holder: The Permit Holder

3. **SOURCE:**
GROUND WATER

TRIBUTARY:

B. OVERLAP REVIEW

1. Other water rights with the same place of use: Within City of Albion's municipal service area.
2. Other water rights with the same point-of-diversion: None

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

GROUND WATER L3 (NE $\frac{1}{4}$ NW $\frac{1}{4}$) Sec. 6, Twp 12S, Rge 25E, B.M. CASSIA County

Method of Determination: On-site inspection; GPS location and aerial imagery.

2.

PLACE OF USE: COOLING

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
12S	25E	6					X L 3												

PLACE OF USE: HEATING

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
12S	25E	6					X L 3												

Method of Determination: On-site inspection; GPS location and aerial imagery.

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.

Well or Diversion ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
D0060650		1			

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

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
None						

2. Measurements: No measurement required per IDAPA 37.03.02 Beneficial Use Examination Rules as the permitted flow rate of 0.10 cfs falls below the 0.24 cfs or greater flow rate amount requiring measurement.

E. FLOW

_____ Additional Computation Sheets Attached

CALCULATIONS

Measured Method: Theoretical Yield:

$$Q = \frac{8.8 \times (Hp) \times (Eff)}{H}$$

Where:

Hp = 1.0 Hp

Eff = Efficiency = 70% assumed

H = Total Head = pumping level + (2.31 x system pressure)

Assume pumping level of 25.4' (based on Well Drillers Report)

Envision ND072 Specifications indicate the system operates at a low pressure range (1.0 to 7.8 psi)

$$Q = \frac{8.8 \times (1Hp) \times (0.7)}{25.4 + (2.31 \times 7.8 \text{ psi})} = 0.14 \text{ cfs}$$

According to the specification manual for the two Envision NDV072 heat pumps the maximum flow rate for these units is 24.0 gpm; so, $24.0 \text{ gpm} \times 2 = 48.0 \text{ gpm}$; $48.0 \text{ gpm} / 448.83 \text{ gpm} = 0.107 \text{ cfs}$.

Based on the Theoretical Yield Equation 0.1 cfs can be produced at the well and appears to fall within the required operating parameters indicated in the specifications for the installed heat pumps system and is within the parameters required for operation of the system according to Envision ND072 Specifications for the heat pumps (Attachments #1 & #2).

1. Volume Calculations for Irrigation: None

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

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

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} =$$

2. Volume Calculations for Other Uses: Heating/Cooling

(0.1 cfs) 174 avg days $\leq$ freezing in Albion* (0.50 avg system operation time ^) $1.9835 \text{ acre feet per day} = 17.26 \text{ AF}$

(0.1 cfs) 191 avg days $>$ freezing in Albion* (0.125 avg system operation time ^) $1.9835 \text{ acre feet per day} = 4.73 \text{ AF}$

$17.26 \text{ AF} + 4.73 \text{ AF} = 21.995 \text{ AF}$ rounded to **22.0 AF**

* Based on graph of weather averages for Albion (<https://usclimatedata.com/albion/idaho/united-stses/usid0280>)

^ Based on information provided by permit holder

G. NARRATIVE/REMARKS/COMMENTS

On August 27, 2018, Corey Skinner, Allison Inouye and I met with Mr. Chad Manderscheid at the Albion Bed & Breakfast to perform the field exam. Upon arrival Mrs. Manderscheid informed us that Mr. Manderscheid was on his way back to the property. While waiting, we decided to walk the exterior grounds and locate the power panel, well site and injection well. We noted a lockable device on the power panel; took pictures of and recorded GPS locations for both the well and the injection well (see Attached photos). When Mr. Manderscheid arrived, he took us inside and down into the basement and showed us the heat pumps. I recorded the model numbers off of the units (NDV072G101NTR0AN) in order to locate a specification manual for the two heat pumps when I returned to the office.

Back at the office I located and downloaded the specification manual for the two Envision ND072G heat pumps (see attachments #1 & #2 for relevant specifications).

On 8/31/2018, I called Mr. Manderscheid to discuss how and when the system actually operates. He indicated on days when the temperature is $\leq 32^\circ$ Fahrenheit, the system (including the pump in the well) operates approximately 50% of the time. He also indicated that on days when the temperature is $> 32^\circ$ Fahrenheit, on average, the system generally runs approximately one-eighth of the time (12.5%) for heating and cooling. He also indicated that he has installed R-50 insulation in the attic; installed storm doors and double paned windows to greatly increase the insulation efficiency of this old school that has been transformed into a bed and breakfast.

I then located climate data for Albion ID and estimated the average number of days above and below freezing based on the Albion Climate Graph (Attachment #3). Using that data, I calculated the volume based on the pump running 50% of the time using estimates of days at or below freezing and running 12.5% of the time for estimated number of days above freezing (See E.2. Volume Calculations for Other Uses above).

Have conditions of permit approval been met? X Yes No

H. RECOMMENDATIONS**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	0.10 CFS	22.0 AF
COOLING	01/01 to 12/31	0.10 CFS	22.0 AF
	<u>Totals:</u>	0.100 CFS	22.0 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 ☒ None

I. AUTHENTICATION

Field Examiner's Name  Date 9-5-2018

Reviewer _____ Date _____



Figure 1: The Albion Bed & Breakfast



Figure 2: Production Well



Figure 3: Injection Well

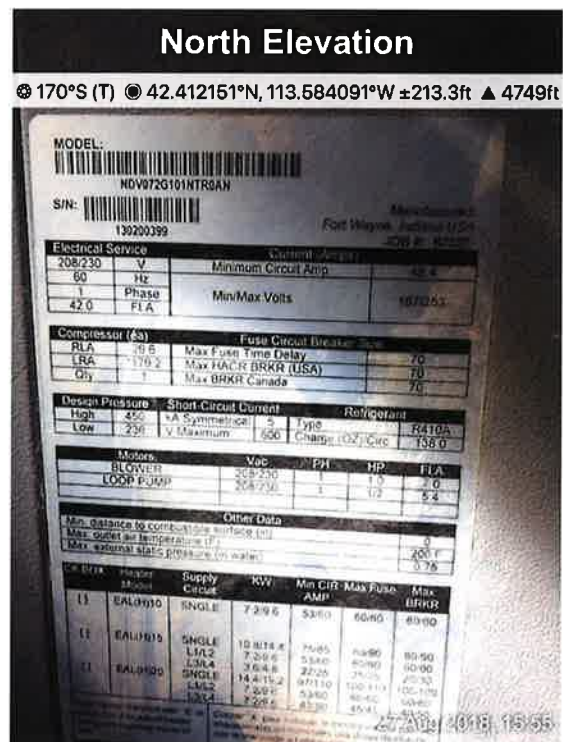


Figure 4: Tag on Heat Pump

System Diagram 45-14421



Field Exam 45-14421

ND072 - Performance Data

Low Speed ECM (1700 cfm)

EWT °F	Flow Rate gpm	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F								
		Pressure Drop		Airflow cfm	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC MBtu/h	Airflow cfm	TC MBtu/h	SC MBtu/h	S/T Ratio	Power kW	HR MBtu/h	EER	HWC MBtu/h	
		psi	ft/hd																
20	10.0	2.4	5.5	Operation not recommended											Operation not recommended				
	13.0	3.6	8.2																
	16.0	5.0	11.6	1400	32.4	3.36	21.0	91.4	2.83	6.0									
				1700	34.0	3.40	22.4	88.5	2.93	5.4									
30	10.0	2.3	5.3	Operation not recommended							Operation not recommended								
	13.0	3.5	8.0	1400	36.2	3.38	24.7	93.9	3.14	6.1	1400	55.1	33.7	0.61	1.82	61.3	30.3	—	
				1700	38.0	3.42	26.3	90.7	3.25	5.6	1700	57.0	38.7	0.68	1.94	63.6	29.4	—	
	16.0	4.9	11.3	1400	37.8	3.38	26.2	95.0	3.28	6.3	1400	55.2	33.6	0.61	1.75	61.2	31.6	—	
1700				39.6	3.42	27.9	91.6	3.39	5.7	1700	56.8	38.6	0.68	1.88	63.2	30.2	—		
40	10.0	2.2	5.1	Operation not recommended							Operation not recommended								
	13.0	3.4	7.8	1400	42.6	3.48	30.7	98.1	3.58	6.5	1400	57.7	35.7	0.62	2.00	64.5	28.9	—	
				1700	44.4	3.49	32.5	94.2	3.73	5.9	1700	59.5	40.8	0.68	2.12	66.7	28.1	—	
	16.0	4.7	11.0	1400	44.1	3.49	32.1	99.1	3.70	6.7	1400	57.8	35.6	0.62	1.93	64.4	29.9	—	
1700				46.0	3.50	34.1	95.1	3.85	6.1	1700	59.5	40.7	0.68	2.06	66.5	28.9	—		
50	10.0	2.1	4.9	1400	47.6	3.52	35.6	101.5	3.96	6.8	1400	59.7	37.3	0.62	2.30	67.6	25.9	2.3	
				1700	49.7	3.48	37.8	97.1	4.18	6.3	1700	61.6	42.2	0.69	2.42	69.8	25.4	2.4	
	13.0	3.3	7.5	1400	48.3	3.56	36.1	101.9	3.98	7.0	1400	59.9	37.6	0.63	2.22	67.5	26.9	2.1	
				1700	50.2	3.54	38.2	97.4	4.16	6.4	1700	61.7	42.7	0.69	2.34	69.7	26.4	2.3	
60	10.0	2.1	4.8	1400	49.7	3.58	37.5	102.9	4.07	7.2	1400	60.0	37.6	0.63	2.16	67.4	27.7	2.0	
				1700	51.8	3.56	39.7	98.2	4.27	6.6	1700	61.9	42.7	0.69	2.28	69.6	27.1	2.2	
	13.0	3.2	7.3	1400	52.9	3.63	40.5	105.0	4.27	7.5	1400	58.0	36.8	0.63	2.53	66.6	22.9	3.2	
				1700	55.1	3.56	43.0	100.0	4.54	6.9	1700	59.7	41.5	0.70	2.64	68.7	22.6	3.4	
70	10.0	2.0	4.6	1400	54.4	3.67	41.9	106.0	4.34	7.7	1400	58.2	37.1	0.64	2.45	66.6	23.8	3.0	
				1700	56.5	3.61	44.2	100.8	4.60	7.1	1700	60.0	42.0	0.70	2.56	68.7	23.4	3.2	
	13.0	3.0	7.0	1400	55.6	3.71	43.0	106.8	4.40	7.9	1400	58.5	37.2	0.64	2.40	66.7	24.4	2.8	
				1700	57.9	3.64	45.4	101.5	4.66	7.3	1700	60.3	42.1	0.70	2.50	68.8	24.1	3.1	
80	10.0	1.9	4.5	1400	58.4	3.76	45.5	108.6	4.54	8.3	1400	57.6	37.3	0.65	2.83	67.2	20.4	4.5	
				1700	60.7	3.65	48.3	103.1	4.87	7.7	1700	59.2	42.0	0.71	2.94	69.3	20.2	4.8	
	13.0	3.0	7.0	1400	60.6	3.80	47.6	110.1	4.67	8.5	1400	57.9	37.8	0.65	2.74	67.3	21.2	4.2	
				1700	62.9	3.69	50.3	104.3	5.00	7.9	1700	59.6	42.5	0.71	2.85	69.3	20.9	4.5	
90	10.0	1.9	4.3	1400	61.7	3.86	48.5	110.8	4.69	8.8	1400	58.2	38.0	0.65	2.70	67.5	21.6	3.9	
				1700	64.0	3.75	51.3	104.9	5.01	8.1	1700	60.1	42.7	0.71	2.79	69.6	21.5	4.3	
	13.0	2.8	6.6	1400	62.9	3.86	49.7	111.6	4.77	9.2	1400	54.9	36.5	0.66	3.15	65.7	17.4	6.2	
				1700	65.2	3.72	52.5	105.5	5.13	8.5	1700	56.6	40.8	0.72	3.24	67.7	17.5	6.6	
100	10.0	1.8	4.2	1400	66.2	3.91	52.8	113.8	4.97	9.5	1400	55.4	36.9	0.67	3.07	65.9	18.0	5.8	
				1700	68.5	3.75	55.8	107.3	5.36	8.8	1700	57.0	41.3	0.72	3.16	67.8	18.0	6.3	
	13.0	2.9	6.8	1400	66.9	3.96	53.4	114.3	4.95	9.8	1400	55.8	37.1	0.67	3.02	66.1	18.5	5.4	
				1700	69.2	3.81	56.2	107.7	5.32	9.1	1700	57.5	41.5	0.72	3.11	68.1	18.5	6.0	
110	10.0	1.7	4.0	1400	67.5	3.97	53.9	114.6	4.98	10.3	1400	50.7	34.7	0.68	3.50	62.7	14.5	8.3	
				1700	69.7	3.81	56.7	108.0	5.37	9.5	1700	52.3	38.5	0.74	3.57	64.5	14.6	8.8	
	13.0	2.6	6.1	1400	71.9	4.03	58.1	117.5	5.23	10.6	1400	51.2	35.0	0.68	3.43	62.9	14.9	7.7	
				1700	74.3	3.83	61.2	110.4	5.69	9.8	1700	52.8	39.0	0.74	3.50	64.8	15.1	8.4	
120	10.0	1.7	3.8	1400	72.3	4.08	58.4	117.8	5.19	11.0	1400	51.8	35.3	0.68	3.37	63.3	15.3	7.2	
				1700	74.6	3.90	61.3	110.6	5.60	10.2	1700	53.4	39.3	0.74	3.45	65.1	15.5	8.0	
	13.0	2.5	5.8	Operation not recommended							Operation not recommended								
											Operation not recommended								
130	10.0	1.7	3.8	Operation not recommended							Operation not recommended								
											Operation not recommended								
	13.0	2.5	5.8	1400	40.8	31.9	0.78	4.88	57.5	8.4	15.8	1400	40.8	31.9	0.78	4.88	57.5	8.4	15.8
				1700	42.3	34.9	0.83	4.86	58.9	8.7	17.1	1400	41.7	32.5	0.78	4.80	58.0	8.7	14.6
16.0	3.6	8.2	1400	42.8	35.5	0.83	4.79	59.2	8.9	16.3	1400	42.8	35.5	0.83	4.79	59.2	8.9	16.3	
			1700	44.3	37.0	0.88	4.77	60.4	9.2	16.8	1400	43.7	36.6	0.88	4.75	60.4	9.2	17.2	

10/1/10

Pressure Drop

Single Speed

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
009	1.5	1.9	1.8	1.7	1.6	1.5
	2.0	3.5	3.4	3.2	3.1	3.0
	3.0	6.9	6.5	6.3	6.0	5.7
	4.0	12.0	11.4	11.0	10.8	10.5
012	1.5	0.3	0.3	0.3	0.3	0.3
	2.5	1.0	1.0	1.0	1.0	1.0
	3.5	1.7	1.7	1.7	1.6	1.6
	4.5	2.5	2.4	2.4	2.4	2.3
015	2.0	0.6	0.6	0.6	0.6	0.6
	3.0	1.6	1.6	1.6	1.6	1.6
	4.0	2.6	2.6	2.6	2.6	2.5
	5.0	3.7	3.7	3.6	3.6	3.5
018	3.0	1.6	1.6	1.5	1.5	1.4
	4.0	2.9	2.9	2.8	2.8	2.7
	5.0	4.2	4.2	4.1	4.0	3.9
	6.0	6.0	5.8	5.7	5.6	5.5
022	3.0	0.9	0.9	0.8	0.7	0.7
	4.5	1.7	1.6	1.5	1.4	1.3
	6.0	2.8	2.7	2.5	2.3	2.2
	8.0	4.7	4.4	4.1	3.9	3.6
030	4.0	1.5	1.4	1.3	1.2	1.1
	6.0	3.0	2.8	2.7	2.5	2.3
	8.0	5.1	4.8	4.5	4.2	3.9
	10.0	7.7	7.2	6.8	6.3	5.8
036	5.0	1.0	1.0	0.9	0.8	0.8
	7.0	2.1	1.9	1.8	1.7	1.6
	9.0	3.6	3.3	3.0	2.8	2.6
	12.0	6.3	5.9	5.5	5.1	4.8
042	5.0	0.8	0.7	0.7	0.7	0.6
	8.0	2.1	2.1	1.9	1.8	1.7
	11.0	4.2	4.1	3.8	3.5	3.3
	14.0	7.6	6.7	6.3	5.8	5.4
048	6.0	1.1	1.0	1.0	0.9	0.8
	9.0	2.3	2.1	2.0	1.9	1.7
	12.0	3.9	3.7	3.4	3.2	3.0
	16.0	6.7	6.3	5.9	5.5	5.1
060	9.0	2.4	2.2	2.1	2.0	1.8
	12.0	3.9	3.6	3.4	3.2	2.9
	15.0	5.7	5.3	5.0	4.7	4.3
	20.0	9.5	8.9	8.3	7.8	7.2
070	12.0	3.0	2.8	2.6	2.4	2.2
	15.0	4.4	4.0	3.8	3.5	3.3
	18.0	6.0	5.5	5.1	4.8	4.4
	24.0	9.7	9.1	8.5	7.9	7.3

10/1/10

Valve	GPM	Cv	Pressure Drop (psi)
1/2 in.	1.5	9.6	0.02
	2.0	9.7	0.04
	3.0	9.9	0.09
	4.0	10.1	0.16
1/2 in.	1.5	9.6	0.02
	2.5	9.8	0.06
	3.5	10.0	0.12
	4.5	10.2	0.19
3/4 in.	2.0	9.7	0.04
	3.0	9.9	0.09
	4.0	10.1	0.16
	5.0	10.4	0.23
3/4 in.	3.0	9.9	0.09
	4.0	10.1	0.16
	5.0	10.4	0.23
	6.0	10.6	0.32
3/4 in.	3.0	9.9	0.09
	4.5	10.2	0.19
	6.0	10.6	0.32
	8.0	11.0	0.53
3/4 in.	4.0	10.1	0.16
	6.0	10.6	0.32
	8.0	11.0	0.53
	10.0	11.5	0.76
1 in.	5.0	15.9	0.10
	7.0	16.6	0.23
	9.0	17.2	0.41
	12.0	17.9	0.61
1 in.	5.0	15.9	0.10
	8.0	16.6	0.23
	11.0	17.2	0.41
	14.0	17.9	0.61
1 in.	6.0	16.1	0.14
	9.0	16.8	0.29
	12.0	17.4	0.47
	16.0	18.3	0.76
1 in.	9.0	16.8	0.29
	12.0	17.4	0.47
	15.0	18.1	0.69
	20.0	19.2	1.09
1 in.	12.0	17.4	0.47
	15.0	18.1	0.69
	18.0	18.7	0.92
	24.0	20.1	1.43

10/1/10

Dual Capacity

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
026	4.0	1.4	1.3	1.2	1.1	1.0
	6.0	2.8	2.6	2.4	2.3	2.1
	8.0	4.7	4.4	4.1	3.8	3.5
	10.0	7.0	6.6	6.2	5.8	5.3
038	5.0	1.2	1.2	1.1	1.0	1.0
	7.0	2.2	2.1	1.9	1.8	1.7
	9.0	3.4	3.2	3.0	2.8	2.6
	11.0	4.9	4.6	4.3	4	3.7
049	6.0	1.2	1.2	1.1	1.0	1.0
	9.0	2.4	2.2	2.1	2.0	1.8
	12.0	3.9	3.6	3.4	3.2	2.9
	15.0	5.7	5.3	5	4.7	4.3
064	8.0	1.8	1.7	1.6	1.4	1.3
	12.0	3.8	3.5	3.3	3.0	2.8
	16.0	6.5	6.0	5.6	5.2	4.8
	20.0	9.7	9.1	8.5	8.0	7.4
072	12.0	3.2	3.0	2.8	2.6	2.4
	15.0	4.5	4.2	4.0	3.7	3.4
	18.0	6.0	5.7	5.3	4.9	4.6
	21.0	7.8	7.3	6.8	6.4	5.9

10/1/10

Valve	GPM	Cv	Pressure Drop (psi)
3/4 in.	4.0	10.1	0.16
	6.0	10.6	0.32
	8.0	11.0	0.53
	10.0	11.5	0.76
3/4 in.	5.0	10.4	0.23
	7.0	10.8	0.42
	9.0	11.2	0.64
	12.0	11.9	1.02
1 in.	6.0	16.1	0.14
	9.0	16.8	0.29
	12.0	17.4	0.47
	15.0	18.1	0.69
1 in.	9.0	16.8	0.29
	12.0	17.4	0.47
	16.0	18.3	0.76
	20.0	19.2	1.09
1 in.	12.0	17.4	0.47
	15.0	18.1	0.69
	18.0	18.7	0.92
	24.0	20.1	1.43

10/1/10

Climate Albion - Idaho

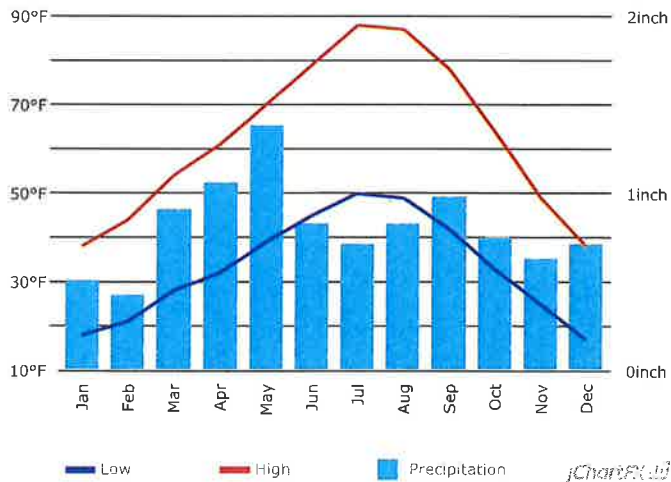
°C | °F

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	38	44	54	61	70	79
Average low in °F:	18	21	28	32	39	45
Av. precipitation in inch:	0.51	0.43	0.91	1.06	1.38	0.83
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-
Average snowfall in inch:	4	1	1	1	0	0
	Jul	Aug	Sep	Oct	Nov	Dec
Average high in °F:	88	87	78	64	49	38
Average low in °F:	50	49	42	33	25	17
Av. precipitation in inch:	0.71	0.83	0.98	0.75	0.63	0.71
Days with precipitation:	-	-	-	-	-	-
Hours of sunshine:	-	-	-	-	-	-
Average snowfall in inch:	0	0	0	0	1	2

Albion weather averages

Annual high temperature:	62.5°F
Annual low temperature:	33.3°F
Average temperature:	47.9°F
Average annual precipitation - rainfall:	9.73 inch
Days per year with precipitation - rainfall:	-
Annual hours of sunshine:	-
Av. annual snowfall:	10 inch

Albion Climate Graph - Idaho Climate Chart



Climate data for malta aviation, Longitude: -113.335, Latitude: 42.3019
Average weather Albion, ID - 83311 - 1981-2010 normals

Jan: January, Feb: February, Mar: March, Apr: April, May: May, Jun: June, Jul: July, Aug: August, Sep: September, Oct: October, Nov: November, Dec: December

[Climograph of Albion on your website](#)