

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 63-33334
Exam Date: 7/13/20

1. Current Owner:
ROMAN CATHOLIC DIOCESE OF BOISE 1501 S FEDERAL WAY
STE 400 BOISE ID 83705

2. **SOURCE:**
GROUND WATER

Method of Determination: Permit application, ArcMap, aerial imagery, and USGS topography.

B. OVERLAP REVIEW

1. Other water rights with the same place of use: YES Overlap

Water Right No.	Source	Purpose of Use	Basis
Boise Kuna Irrigation District	Boise River	Irrigation	Decree

Comments: Surface water was no longer available due to development. This right was permitted as primary groundwater use.

2. Other water rights with the same point-of-diversion: NO Overlap

Water Right No.	Source	Purpose of Use	Basis
N/A	N/A	N/A	N/A

Comments: No overlapping POD.

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

GROUND WATER L3 (NE¼ NW¼), Sec. 3, Twp 02N, Rge 01E, B.M. ADA County

Method of Determination: Field exam, aerial imagery, ArcMap.

PLACE OF USE: IRRIGATION

Twp	Rng	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
02N	01E	3					5.5 L3												5.5

Total Acres: 5.5

Method of Determination: Permit application, ArcMap, aerial imagery, and USGS topography

3.

X Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.

X Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.

N/A Aerial Photo Attached (required for irrigation of 10+ acres).

X 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
429043	Grundfos	5	N/A	Grundfos	N/A

D. FLOW MEASUREMENTS

Unable to take flow measurements.

E. FLOW CALCULATIONS

Theoretical Flow Calculation:

$$Q = \frac{8.8 * (\text{Efficiency}) * \text{hp}}{\text{depth to water} + 2.31 * (\text{psi}) + \text{friction}}$$

Booster Horsepower	5
Pumping Level	175
Discharge Pressure	15-30
Rate of Flow (cfs)	0.14 cfs

Sprinkler Calculation:

40 stations

Number of sprinklers that run at one time varies

**See photo of irrigation schedule and irrigation map*

Range = 0.85 gpm to 6.01 gpm

Maximum Diversion Rate = 8 Heads * 6.01 gpm = 48.08 gpm = 0.11 CFS

Irrigation Permit:	0.11 cfs
Theoretical Rate	0.14 cfs
B.U. Standard Allowance:	0.02 cfs x 5.5 ac = 0.11 cfs
Sprinkler Rate	0.11 cfs
B.U. Proof Fee:	\$50 → 0.01 cfs to 0.20 cfs

License Recommendation **0.11 cfs**

F. VOLUME CALCULATIONS

1. Volume Calculations for irrigation:

$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = 5.5 \text{ acres} \times 4.5 \text{ af} = 24.8 \text{ af}$

$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = 0.11 \text{ cfs} \times 260 \text{ days} \times 1.9835 = 56.72 \text{ af}$

$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} = 24.8 \text{ af}$

G. NARRATIVE/REMARKS/COMMENTS

The field exam was conducted July 13, 2020 by Kate Hulse.

The permit was assigned to Roman Catholic Diocese of Boise on February 9, 2010. The proof of beneficial use was submitted April 29, 2020 by Deacon Don Blythe. Current Canyon county taxlot data represent the Roman Catholic Diocese of Boise as the current owner of the land pertinent to the place of use and point of diversion.

The permit authorized 5.5 acres for irrigation, ArcMap tools and aerial imagery were used to verify the area of irrigated lands based on where the permit holder demonstrated as the POU during the field exam. Ground water comes from a well drilled in 2010. The well log gives both the legal description and the GPS coordinates in Degrees-Minutes- Seconds. Both of these methods place the well in Section 03, Township 02 North, Range 01 East, NE 1/4, NW 1/4. The system diverts water using a 5 horsepower pump to a drip irrigation system to irrigate 3 acres Christmas trees, a 0.5 acre garden, and sprinkler irrigation for 2 acres of grass fields and parking islands throughout the property. The pump test recorded on well log suggests the system is capable of 200+ gpm.

A theoretical average flow rate of 0.14 cfs was calculated based on a 5 hp pump set at 175 feet in the well with a range of discharge pressures from 15 to 45 psi. According to the irrigation plan provided by Deacon Don Blythe the POU is irrigated using Rainbird series 5004, Rainbird series 3504, and Rainbird series SAM 1806 ranging from 0.85gpm to 6.01 gpm. The irrigation schedule demonstrates 40 zones, each zone is irrigated from 15-40 minutes per day depending on the season. The maximum sprinkler diversion rate was calculated to be 0.11 CFS using the irrigation plan map and the irrigation schedule.

Based on the rating of the sprinklers, the theoretical rate determined, and observance during the site visit 0.11 cfs will be capable of providing sufficient water for the system's needs.

Mr. Blythe explained that the church plans to eventually developing the Christmas tree farm into an additional field and a gym, he understands that if changing the irrigation use requires more water they will need to apply for an additional water right.

I am recommending a licensed flow rate of 0.11 cfs based on the standard diversion rate of 0.02 cfs per acre. The rate of 0.11 cfs is capable of providing sufficient water for the permit holders system and needs.

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

H. RECOMMENDATIONS**1. Recommended Amounts**

<u>Beneficial Use</u>	<u>Period of Use</u>	<u>Rate of Diversion</u>	<u>Annual Volume</u>
IRRIGATION	03/01 to 11/15	0.11 CFS	24.8 AF

Totals: 0.11 CFS 24.8 AF

2. Recommended Amendments

____ Change P.D. as reflected above ____ Add P.D. as reflected above X None

____ Change P.U. as reflected above ____ Add P.U. as reflected above X None

I. AUTHENTICATION Kate Huelse - Water Resource Agent

Field Examiner's Name Kate Huelse Date 10/9/20

Reviewer Patrick Kelly Date 10-9-2020

System Diagram



The USDA-PSA Aerial Photography Field office asks to be credited in derived products.



POU

Christmas tree farm and garden –
drip irrigation





POU

Grass fields- sprinkler irrigation





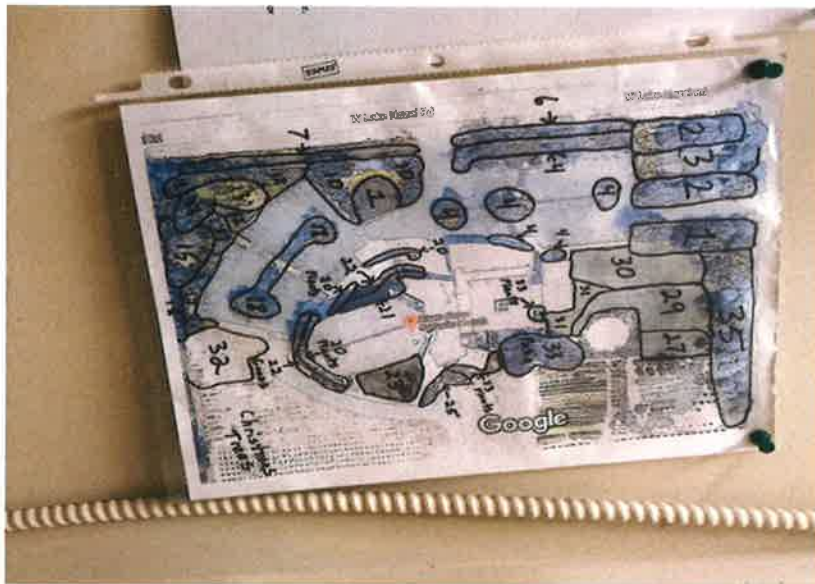
Future irrigation use



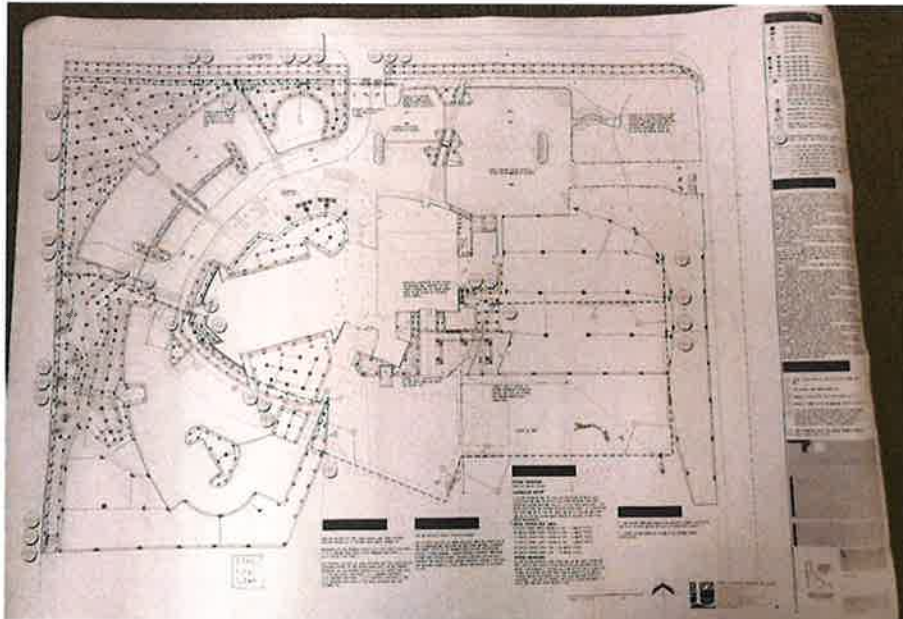
POD

43 32.723 N, 117 19.482 W

Well or Diversion ID No.*	Motor Make	Hp
429043	Grundfos	5



Landscape irrigation map and
Irrigation Schedule



1800™ Series Spray Heads

Industry's Leading Spray Heads

Trusted for over 30 years, 1800 Series Spray Heads have provided unmatched durability, reliability, and performance.

Superior components and features make the 1800 Series Spray Head the spray head of choice for a wide variety of applications.

Features

Co-molded, pressure-activated, multi-functional wiper seal assures positive seal without excess "flow-by" which enables more heads to be installed on the same valve.

- Designed for use with all Rain Bird plastic spray head nozzles – Rotary Nozzles, U-Series, MPR, VAN and XPCN Series.
- Precision controlled flush at pop-down clears debris from unit, assuring positive stem retraction in all soil types.
- Strong stainless steel spring provides reliable stem retraction.
- Ratchet mechanism on all models allows easy nozzle pattern alignment without tools.
- Pre-installed 1800 Pop-Top™ flush plug blocks debris from entering after flushing. Allows for easy nozzle installation.
- Constructed of time-proven UV-resistant plastic and corrosion resistant stainless steel parts, assuring long product life.
- All sprinkler components are removable from the top without special tools, providing for quick and easy flushing and maintenance of the sprinkler.
- Side inlets featured on 1806, 1806PRS, 1812, and 1812PRS models only.
- Five-year trade warranty.

Operating Range

- Spacing: 2.5 to 24 feet (0.8 to 7.3 m)
- Pressure: 15 to 70 psi (1.0 to 4.8 bar)

Specifications

- Flow-by: 0 at 8 psi (0.6 bar) or greater; 0.1 gpm (0.02 m³/h; 0.006 l/s) otherwise

Dimensions/Models

- ½" (15/21) NPT female threaded inlet
- Models and height:
 - 1802:** 4" (10 cm) body height; 2" pop-up height (5 cm)
 - 1803:** 4⅞" (12 cm) body height; 3" pop-up height (7.6 cm)
 - 1804:** 6" (15 cm) body height; 4" pop-up height (10 cm)
 - 1806:** 9⅝" (24 cm) body height; 6" pop-up height (15 cm)
 - 1812:** 16" (40 cm) body height; 12" pop-up height (30 cm)
- Exposed surface diameter: 2¼" (5.7 cm)



How To Specify

1804 - SAM - PRS - P45

Model 1804: 4" (10.2 cm) pop-up height	Optional Feature SAM: Seal-A-Matic™ check valve	Optional Feature PRS: 30psi (2.1 bar) in-stem pressure regulation
		P45: 45psi (3.1 bar) in-stem pressure regulation

Note: SAM feature included with P45 models



PRS



SAM

How To Specify

1804 - SAM-P45 - R13-18Q

Optional Feature SAM: Seal-A-Matic™ check valve P45: 45psi (3.1 bar) in-stem pressure regulation	Nozzle Rotary Nozzle
	Radius Range 13-18' (4.0 – 5.5m) 17-24' (5.2 – 7.3m)
	Pattern F: Full (360°) TQ: Three Quarter (270°) TT: Two Third (240°) H: Half (180°) T: Third (120°) Q: Quarter (90°)

Model
1804: 4" (10.2 cm) pop-up height

Note: Specify sprinkler bodies and nozzles separately.



SAM-PRS



SAM-PRS-P45

4 Series VAN					
0° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
 330° Arc	15	3	0.62	7.23	8.35
	20	3	0.70	8.17	9.43
	25	4	0.80	5.25	6.06
	30	4	0.88	5.78	6.67
 270° Arc	15	3	0.52	7.42	8.57
	20	3	0.58	8.27	9.55
	25	4	0.66	5.29	6.11
	30	4	0.73	5.86	6.77
 180° Arc	15	3	0.32	6.84	7.90
	20	3	0.37	7.91	9.13
	25	4	0.41	4.93	5.69
	30	4	0.45	5.41	6.25
 90° Arc	15	3	0.21	8.98	10.37
	20	3	0.24	10.27	11.86
	25	4	0.26	6.26	7.23
	30	4	0.29	6.98	8.06

4 Series VAN						METRIC
0° Trajectory						
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	■ Precip mm/h	▲ Precip mm/h
 330° Arc	1.0	0.9	0.14	2.3	189	218
	1.5	1.0	0.17	2.8	183	215
	2.0	1.2	0.20	3.3	152	176
	2.1	1.2	0.20	3.3	152	176
 270° Arc	1.0	0.9	0.12	2.0	198	229
	1.5	1.0	0.14	2.3	187	216
	2.0	1.2	0.16	2.7	148	171
	2.1	1.2	0.17	2.8	157	181
 180° Arc	1.0	0.9	0.07	1.2	173	200
	1.5	1.0	0.09	1.5	180	208
	2.0	1.2	0.10	1.7	139	161
	2.1	1.2	0.10	1.7	139	161
 90° Arc	1.0	0.9	0.05	0.8	247	285
	1.5	1.0	0.06	0.9	240	277
	2.0	1.2	0.06	1.1	167	193
	2.1	1.2	0.07	1.1	194	224

Spray Nozzles

6 Series VAN					
0° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
 330° Arc	15	4	0.85	5.58	6.44
	20	5	0.96	4.03	4.65
	25	5	1.09	4.58	5.29
	30	6	1.20	3.50	4.04
 270° Arc	15	4	0.79	6.34	7.32
	20	5	0.88	4.52	5.22
	25	5	1.00	5.13	5.92
	30	6	1.10	3.92	4.53
 180° Arc	15	4	0.42	5.05	5.83
	20	5	0.49	3.77	4.35
	25	5	0.55	4.24	4.90
	30	6	0.60	3.21	3.71
 90° Arc	15	4	0.26	6.26	7.23
	20	5	0.30	4.62	5.33
	25	5	0.34	5.24	6.05
	30	6	0.37	3.96	4.57

6 Series VAN						METRIC
0° Trajectory						
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	■ Precip mm/h	▲ Precip mm/h
 330° Arc	1.0	1.2	0.19	3.2	144	166
	1.5	1.5	0.23	3.8	112	129
	2.0	1.8	0.27	4.5	91	105
	2.1	1.8	0.27	4.5	91	105
 270° Arc	1.0	1.2	0.18	3.0	167	193
	1.5	1.5	0.21	3.5	124	143
	2.0	1.8	0.24	4.1	99	114
	2.1	1.8	0.25	4.2	103	119
 180° Arc	1.0	1.2	0.10	1.6	139	161
	1.5	1.5	0.11	1.9	98	113
	2.0	1.8	0.13	2.2	80	92
	2.1	1.8	0.14	2.3	86	99
 90° Arc	1.0	1.2	0.06	1.0	167	193
	1.5	1.5	0.07	1.2	124	143
	2.0	1.8	0.08	1.4	99	114
	2.1	1.8	0.08	1.4	99	114

Note: Turning the radius reduction screw may be required to achieve catalog radius and flow when the arc is set at less than maximum arc

■ Square spacing based on 50% diameter of throw

▲ Triangular spacing based on 50% diameter of throw

Performance data taken in zero wind conditions

8 Series VAN					
5° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	Precip In/h	Precip In/h
	15	6	1.21	3.53	4.07
	20	7	1.36	2.91	3.36
	25	7	1.55	3.32	3.83
	30	8	1.70	2.79	3.22
	15	6	1.11	3.95	4.55
	20	7	1.24	3.24	3.74
	25	7	1.41	3.69	4.25
	30	8	1.55	3.10	3.58
	15	6	0.84	4.49	5.18
	20	7	0.97	3.81	4.40
	25	7	1.09	4.28	4.94
	30	8	1.19	3.58	4.13
	15	6	0.51	5.46	6.29
	20	7	0.59	4.64	5.35
	25	7	0.66	5.19	5.98
	30	8	0.72	4.33	5.00

8 Series VAN						METRIC
5° Trajectory						
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	Precip mm/h	Precip mm/h
	1.0	1.8	0.27	4.6	91	105
	1.5	2.1	0.32	5.4	79	91
	2.0	2.3	0.38	6.3	78	90
	2.1	2.4	0.39	6.4	74	86
	2.1	2.4	0.39	6.4	74	86
	1.0	1.8	0.25	4.2	103	119
	1.5	2.1	0.30	4.9	91	105
	2.0	2.3	0.34	5.8	86	99
	2.1	2.4	0.35	5.9	81	94
	2.1	2.4	0.35	5.9	81	94
	1.0	1.8	0.19	3.2	117	135
	1.5	2.1	0.23	3.8	104	120
	2.0	2.3	0.26	4.4	98	113
	2.1	2.4	0.27	4.5	94	109
	2.1	2.4	0.27	4.5	94	109
	1.0	1.8	0.12	1.9	148	171
	1.5	2.1	0.14	2.3	127	147
	2.0	2.3	0.16	2.7	121	140
	2.1	2.4	0.16	2.7	111	128
	2.1	2.4	0.16	2.7	111	128

10 Series VAN					
10° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	Precip In/h	Precip In/h
	15	7	1.93	3.80	4.39
	20	8	2.32	3.50	4.04
	25	9	2.52	3.00	3.46
	30	10	2.60	2.50	2.89
	15	7	1.45	3.80	4.39
	20	8	1.75	3.50	4.04
	25	9	1.89	3.00	3.46
	30	10	2.10	2.70	3.12
	15	7	0.97	3.80	4.39
	20	8	1.20	3.50	4.04
	25	9	1.26	3.00	3.46
	30	10	1.45	2.80	3.23
	15	7	0.48	3.80	4.39
	20	8	0.58	3.50	4.04
	25	9	0.63	3.00	3.46
	30	10	0.75	2.90	3.35

10 Series VAN						METRIC
10° Trajectory						
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	Precip mm/h	Precip mm/h
	1.0	2.1	0.44	7.3	96	111
	1.5	2.4	0.53	9.0	89	103
	2.0	2.7	0.57	9.8	76	88
	2.1	3.1	0.59	9.8	63	73
	2.1	3.1	0.59	9.8	63	73
	1.0	2.1	0.33	5.5	96	111
	1.5	2.4	0.4	6.8	89	103
	2.0	2.7	0.43	7.8	76	88
	2.1	3.1	0.48	7.9	68	79
	2.1	3.1	0.48	7.9	68	79
	1.0	2.1	0.22	3.7	96	111
	1.5	2.4	0.27	4.6	89	103
	2.0	2.7	0.29	5.3	76	88
	2.1	3.1	0.33	5.5	71	82
	2.1	3.1	0.33	5.5	71	82
	1.0	2.1	0.11	1.8	96	111
	1.5	2.4	0.13	2.3	89	103
	2.0	2.7	0.14	2.7	76	88
	2.1	3.1	0.17	2.8	73	85
	2.1	3.1	0.17	2.8	73	85

Note: Turning the radius reduction screw may be required to achieve catalog radius and flow when the arc is set at less than maximum arc

■ Square spacing based on 50% diameter of throw

▲ Triangular spacing based on 50% diameter of throw

Performance data taken in zero wind conditions

Specifications

1802, 1803, 1804, 1806 and 1812 Pop-up Full or Part Circle Spray Sprinkler

The sprinkler body, stem, nozzle and screen shall be constructed of heavy-duty, ultra-violet resistant plastic. It shall have a heavy-duty stainless steel retract spring for positive pop-down and a ratcheting system for easy alignment of the pattern. The sprinkler shall have a soft elastomer pressure-activated co-molded wiper seal for cleaning debris from the pop-up stem as it retracts into the case to prevent the sprinkler from sticking up to minimize "flow-by."

The sprinkler shall have a matched precipitation rate (MPR) plastic or brass nozzle with an adjusting screw capable of regulating the radius and flow. The sprinkler shall be capable of housing protective, non-clogging filter screens or pressure compensating screens (PCS) under the nozzle. The screen shall be used in conjunction with the adjusting screw for regulating. The 6" (15 cm) and 12" (30 cm) models shall have both a side and a bottom $\frac{1}{2}$ " (15/21) (FNPT) inlet for ease of installation.

The sprinkler shall have a Pop-Top™ Flush Plug pre-installed. The plug shall prevent debris from clogging the sprinkler during installation and allow for the system to be flushed before nozzle. The plug shall be bright orange in color and constructed of polypropylene material.

1804 SAM, 1806 SAM and 1812 SAM Full or Part Circle Seal-A-Matic™ Pop-up Spray Sprinkler

Optional Feature Specifications:

When so indicated on the design, the 4", 6" or 12" high pop-up spray sprinklers shall also include a Seal-A-Matic (SAM) check valve to prevent low-head drainage of up to 14 feet of head. This feature shall require the use of the bottom inlet only. These units shall be identifiable from the top with "SAM" marking on the cap. The sealing device shall be an integral part of the pop-up stem, removable through the top of the sprinkler, and shall seal against the bottom case inlet. It shall create no more than 1 psi pressure drop at the maximum rated flow.

1804 PRS, 1806 PRS and 1812 PRS Full or Part Circle Pressure Regulating Pop-up Spray Sprinkler

Optional Feature Specifications:

When so indicated on the design, the 4", 6" or 12" high pop-up spray sprinkler shall also include a pressure regulating (PRS) device to prevent high pressure fogging to the nozzle stream. This regulating device shall be an integral part of the pop-up stem, removable through the top of the case. These units shall be identifiable from the top with "PRS" markings on the cap.

The device shall regulate the nozzle pressure to 30 psi for inlet pressures from 35 to 70 psi. Below 35 psi the pressure loss shall not exceed 6 psi.

1804 SAM-PRS, 1806 SAM-PRS and 1812 SAM-PRS Full or Part Circle Seal-A-Matic Pressure Regulating Pop-up Spray Sprinkler

Optional Feature Specifications:

When so indicated on the design, the 4", 6" or 12" high pop-up spray sprinkler shall also include a Seal-A-Matic (SAM) check valve and a pressure regulating (PRS) device. These units shall be identifiable from the top with "SAM-PRS" markings on the cap.

The check valve shall prevent low-head drainage of up to 14 feet of head. The pressure regulating device shall prevent high pressure fogging of the nozzle stream by regulating the nozzle pressure to 30 psi for inlet pressures from 35 to 70 psi. Below 35 psi the pressure loss shall not exceed 6 psi. These models shall utilize the bottom inlet only.

1804 SAM-P45, 1806 SAM-P45, and 1812 SAM-P45 Full or Part Circle Seal-A-Matic Pressure Regulating Pop-up Spray Sprinkler

Optional Feature Specifications:

When so indicated on the design, the 4", 6" or 12" high pop-up spray sprinkler shall also include a Seal-A-Matic (SAM) check valve and a 45 psi pressure regulating (P45) device. These units shall be identifiable from the top with "SAM-PRS-45" markings on the cap.

The check valve shall prevent low-head drainage of up to 14 feet of head. The pressure regulating device shall prevent high pressure misting and undesirable performance of the nozzle stream by regulating the nozzle pressure to 45 psi for inlet pressures from 50 to 70 psi. Below 50 psi the pressure loss shall not exceed 6 psi. These models shall utilize the bottom inlet only.

The sprinkler shall be as manufactured by Rain Bird Corporation, Azusa, California.

Rain Bird Corporation

6991 E. Southpoint Road
Tucson, AZ 85756
Phone: (520) 741-6100
Fax: (520) 741-6522

Rain Bird Technical Services

(800) RAINBIRD (1-800-724-6247)
(U.S. and Canada)

Rain Bird Corporation

970 West Sierra Madre Avenue
Azusa, CA 91702
Phone: (626) 812-3400
Fax: (626) 812-3411

Specification Hotline

800-458-3005 (U.S. and Canada)

Rain Bird International, Inc.

1000 West Sierra Madre Ave.
Azusa, CA 91702
Phone: (626) 963-9311
Fax: (626) 852-7343

The Intelligent Use of Water™
www.rainbird.com

1800 SAM-P45 Series

Meets the needs of spray body applications using Rotary Nozzles regardless of changing elevation or water pressures. Incorporates 1800 Series SAM feature and regulates operating pressure at 45psi (3.1 bar).

- Designed to maximize application efficiency when using Rotary Nozzles.
- Maintains constant outlet pressure at 45psi (3.1 bar) at varying inlet pressures. Maintains constant pressure regardless of nozzle used.
- "SAM-PRS-45" stamped on cap for easy identification and maintenance.
- Five-year trade warranty.

Operating Range

- Spacing: 13 to 24 feet (4.0 to 7.3 m)
- Pressure: 25 to 70 psi (1.7 to 4.8 bar)

Specifications

- Regulates nozzle pressure to an average 45 psi (3.1 bar) with inlet pressures of up to 70 psi (4.8 bar)
- SAM capability: holds up to 14 feet (4.2 m) of head; 6 psi (0.3 bar)
- Flow-by: 0 at 8 psi (0.6 bar) or greater; 0.1 gpm (0.02 m³/h; 0.006 l/s) otherwise
- Installation: bottom inlet only

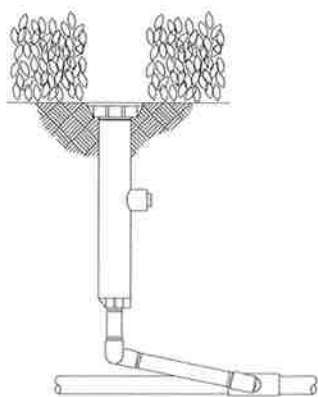
Dimensions

- ½" (15/21) NPT female threaded inlets
- Body height: 1804 SAM-P45 - 6" (15 cm), 1806 SAM-P45 - 9⅝" (24 cm), 1812 SAM-P45 - 16" (40 cm)
- Exposed diameter: 2¼" (5.7 cm)

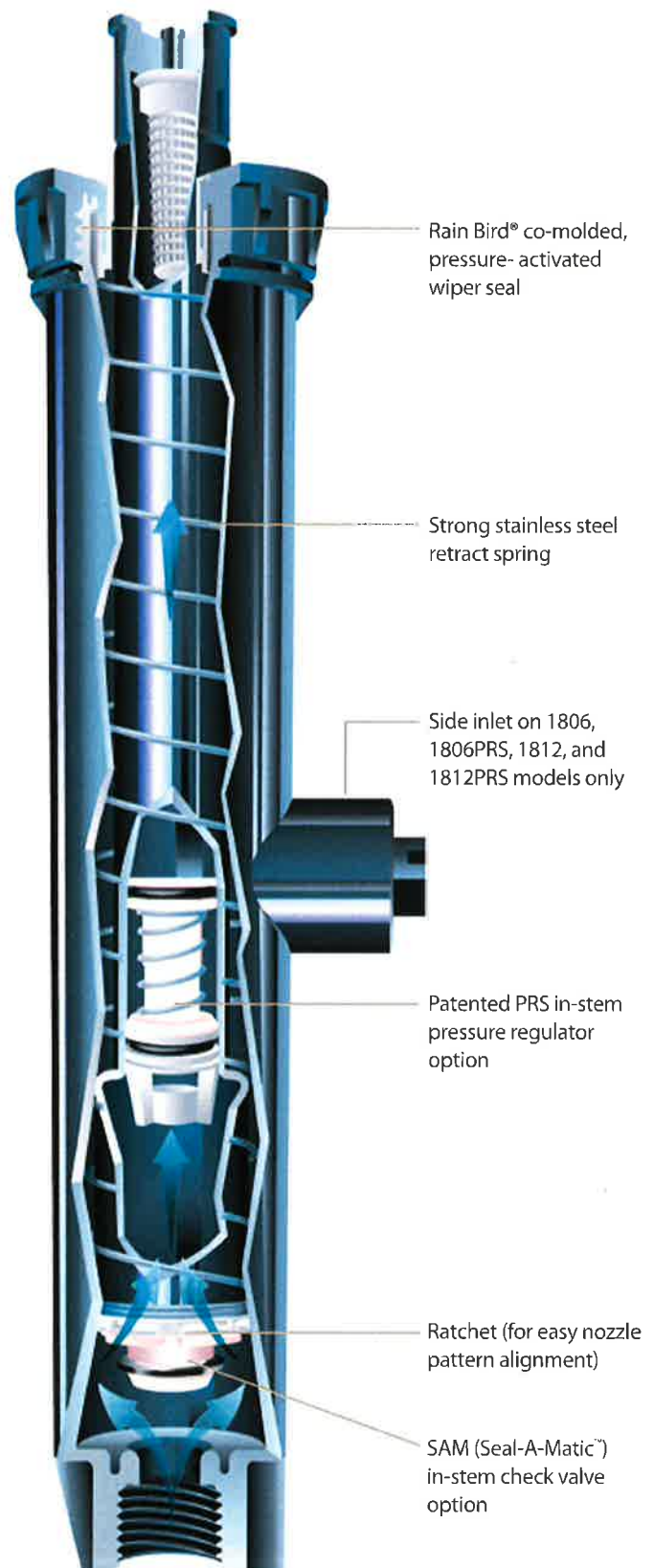
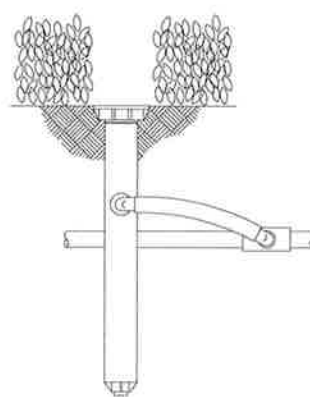
Models

- 1804 SAM-P45: 4" pop-up height (10 cm)
- 1806 SAM-P45: 6" pop-up height (15 cm)
- 1812 SAM-P45: 12" pop-up height (30 cm)

1806 with Swing Joint on Bottom Inlet



1812 with Swing Pipe on Side Inlet



1800° SAM Series

Ideal for use in areas with changing elevations, the 1800 SAM Series offers all 1800 Series features plus:

- Built-in Seal-A-Matic™ (SAM) check valve. Eliminates the need for under-the-head check valves. No parts to be installed at the site.
- Stronger retract spring to accommodate elevation changes up to 14' (4.2 m). One of the strongest springs in the industry.
- Prevents drainage from spray heads at lower elevations. Stops water waste. Ends landscape damage due to flooding and/or erosion.
- Helps retain water in lateral pipes which reduces wear on system components by minimizing water hammer during start-up.
- Designed for use with all Rain Bird plastic spray head nozzles.
- "SAM" stamped on cap for easy identification and maintenance.
- Five-year trade warranty.

Operating Range

- Spacing: 2.5 to 24 feet (0.8 to 7.3 m)
- Pressure: 25 to 70 psi (1.7 to 4.8 bar)

Specifications

- SAM capability: holds up to 14 feet (4.2 m) of head; 6 psi (0.3 bar)
- Flow-by: 0 at 8 psi (0.6 bar) or greater; 0.1 gpm (0.02 m³/h; 0.006 l/s) otherwise
- Installation: bottom inlet only

Dimensions

- ½" (15/21) NPT female threaded inlets
- Body height: 1804 SAM - 6" (15 cm), 1806 SAM - 9⅞" (24 cm), 1812 SAM - 16" (40 cm)
- Exposed surface diameter: 2¼" (5.7 cm)

Models

- 1804 SAM: 4" pop-up height (10 cm)
- 1806 SAM: 6" pop-up height (15 cm)
- 1812 SAM: 12" pop-up height (30 cm)

1800 PRS Series

Designed for areas with high and/or widely fluctuating water pressures, the 1800 PRS Series has all 1800 Series features plus:

- **PATENTED** PRS pressure regulator built into the stem. No parts to be installed at the site. Saves time and money.
- Maintains constant outlet pressure at 30psi (2.1 bar). Spray nozzles perform best at 30psi. Ensures maximum nozzle performance, even with varying inlet pressures. Maintains constant pressure regardless of nozzles used.
- Restricts water loss by up to 70% if nozzle is removed or damaged. Saves water and money. Reduces possibility of accidents and property damage. Recommended for vandal-prone areas.
- Ensures consistent performance throughout zone if nozzle is removed or damaged. Keeps plant life covered by other spray heads properly irrigated.
- Ends misting and fogging caused by high pressure. Stops water waste. Ensures necessary watering occurs in high pressure or wind conditions.
- Designed for use with all Rain Bird plastic spray head nozzles.
- "PRS" stamped on cap for easy identification and maintenance.
- Five-year trade warranty.

Operating Range

- Spacing: 2.5 to 24 feet (0.8 to 7.3 m)
- Pressure: 15 to 70 psi (1 to 5 bar)

Specifications

- Regulates nozzle pressure to an average 30 psi (2.1 bar) with inlet pressures of up to 70 psi (4.8 bar)
- Flow-by: 0 at 8 psi (0.6 bar) or greater; 0.1 gpm (0.02 m³/h; 0.006 l/s) otherwise
- Installation: side or bottom inlet
- Side inlet installation not recommended in freezing climates

Dimensions

- ½" (15/21) NPT female threaded inlets
- Body height: 1804 PRS - 6" (15 cm), 1806 PRS - 9⅞" (24 cm), 1812 PRS - 16" (40 cm)
- Exposed surface diameter: 2¼" (5.7 cm)

Models

- 1804 PRS: 4" pop-up height (10 cm)
- 1806 PRS: 6" pop-up height (15 cm)
- 1812 PRS: 12" pop-up height (30 cm)

1800 SAM-PRS Series

Meets the needs of all spray areas, regardless of changing elevation or water pressures. Incorporates all 1800 Series SAM and PRS features. "SAM-PRS" stamped on the cap for easy identification and maintenance.

Operating Range

- Spacing: 2.5 to 24 feet (0.8 to 7.3 m)
- Pressure: 25 to 70 psi (1.7 to 4.8 bar)

Specifications

- SAM capability: holds up to 14 feet (4.2 m) of head; 6 psi (0.3 bar)
- Flow-by: 0 at 8 psi (0.6 bar) or greater; 0.1 gpm (0.02 m³/h; 0.006 l/s) otherwise
- Installation: bottom inlet only
- Regulates nozzle pressure to an average 30 psi (2.1 bar) with inlet pressures of up to 70 psi (4.8 bar)

Dimensions

- ½" (15/21) NPT female threaded inlets
- Body height: 1804 SAM-PRS - 6" (15 cm), 1806 SAM-PRS - 9⅞" (24 cm), 1812 SAM-PRS - 16" (40 cm)
- Exposed diameter: 2¼" (5.7 cm)

Models

- 1804 SAM-PRS: 4" pop-up height (10 cm)
- 1806 SAM-PRS: 6" pop-up height (15 cm)
- 1812 SAM-PRS: 12" pop-up height (30 cm)

12 Series VAN					
15° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
 360° Arc	15	9	1.56	1.86	2.14
	20	10	1.86	1.79	2.06
	25	11	2.12	1.68	1.95
	30	12	2.36	1.58	1.82
 270° Arc	15	9	1.17	1.86	2.14
	20	10	1.39	1.79	2.06
	25	11	1.59	1.68	1.94
	30	12	1.77	1.58	1.82
 180° Arc	15	9	0.78	1.86	2.14
	20	10	0.93	1.79	2.06
	25	11	1.06	1.68	1.95
	30	12	1.18	1.58	1.82
 90° Arc	15	9	0.39	1.86	2.14
	20	10	0.46	1.79	2.06
	25	11	0.53	1.68	1.95
	30	12	0.59	1.58	1.82

12 Series VAN						METRIC
15° Trajectory						
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	■ Precip mm/h	▲ Precip mm/h
 360° Arc	1.0	2.7	0.35	5.80	48	55
	1.5	3.2	0.44	7.37	43	50
	2.0	3.6	0.52	8.75	41	47
	2.1	3.7	0.54	9.02	40	46
 270° Arc	1.0	2.7	0.26	4.35	48	55
	1.5	3.2	0.33	5.53	43	50
	2.0	3.6	0.39	6.56	41	47
	2.1	3.7	0.41	6.76	40	46
 180° Arc	1.0	2.7	0.17	2.90	48	55
	1.5	3.2	0.22	3.69	43	50
	2.0	3.6	0.26	4.37	41	47
	2.1	3.7	0.27	4.51	40	46
 90° Arc	1.0	2.7	0.09	1.45	48	55
	1.5	3.2	0.11	1.84	43	50
	2.0	3.6	0.13	2.19	41	47
	2.1	3.7	0.14	2.25	40	46

15 Series VAN					
23° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
 360° Arc	15	11	2.60	2.07	2.39
	20	12	3.00	2.01	2.32
	25	14	3.30	1.62	1.87
	30	15	3.70	1.58	1.83
 270° Arc	15	11	1.95	2.07	2.39
	20	12	2.25	2.01	2.32
	25	14	2.48	1.62	1.87
	30	15	2.78	1.58	1.83
 180° Arc	15	11	1.30	2.07	2.39
	20	12	1.50	2.01	2.32
	25	14	1.65	1.62	1.87
	30	15	1.85	1.58	1.83
 90° Arc	15	11	0.65	2.07	2.39
	20	12	0.75	2.01	2.32
	25	14	0.82	1.62	1.87
	30	15	0.92	1.58	1.83

15 Series VAN						METRIC
23° Trajectory						
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	■ Precip mm/h	▲ Precip mm/h
 360° Arc	1.0	3.4	0.60	9.8	52	60
	1.5	3.9	0.72	11.8	47	55
	2.0	4.5	0.84	13.7	41	48
	2.1	4.6	0.84	14.0	40	46
 270° Arc	1.0	3.4	0.45	7.4	52	60
	1.5	3.9	0.54	8.8	47	55
	2.0	4.5	0.63	10.3	41	48
	2.1	4.6	0.63	10.5	40	46
 180° Arc	1.0	3.4	0.30	4.9	52	60
	1.5	3.9	0.36	5.9	47	55
	2.0	4.5	0.42	6.9	41	48
	2.1	4.6	0.42	7.0	40	46
 90° Arc	1.0	3.4	0.15	2.5	52	60
	1.5	3.9	0.18	2.9	47	55
	2.0	4.5	0.21	3.4	41	48
	2.1	4.6	0.21	3.5	40	46

Note: Turning the radius reduction screw may be required to achieve catalog radius and flow when the arc is set at less than maximum arc

■ Square spacing based on 50% diameter of throw

▲ Triangular spacing based on 50% diameter of throw

Performance data taken in zero wind conditions

18 Series VAN					
26° Trajectory					
Nozzle	Pressure psi	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
 360° Arc	15	14	4.21	2.07	2.39
	20	15	4.70	2.01	2.32
	25	17	4.86	1.62	1.87
	30	18	5.32	1.58	1.83
 270° Arc	15	14	3.16	2.07	2.39
	20	15	3.52	2.01	2.32
	25	17	3.65	1.62	1.87
	30	18	3.99	1.58	1.83
 180° Arc	15	14	2.11	2.07	2.39
	20	15	2.35	2.01	2.32
	25	17	2.43	1.62	1.87
	30	18	2.66	1.58	1.83
 90° Arc	15	14	1.05	2.07	2.39
	20	15	1.17	2.01	2.32
	25	17	1.22	1.62	1.87
	30	18	1.33	1.58	1.83

18 Series VAN					METRIC	
26° Trajectory					■	▲
Nozzle	Pressure bar	Radius m	Flow m³/h	Flow l/m	Precip mm/h	Precip mm/h
 360° Arc	1.0	4.3	0.96	15.9	52	60
	1.5	4.8	1.07	18.0	47	55
	2.0	5.4	1.20	19.8	41	48
	2.1	5.5	1.21	20.1	40	46
 270° Arc	1.0	4.3	0.72	12.0	52	60
	1.5	4.8	0.80	13.5	47	55
	2.0	5.4	0.90	14.8	41	48
	2.1	5.5	0.91	15.1	40	46
 180° Arc	1.0	4.3	0.48	8.0	52	60
	1.5	4.8	0.54	9.0	47	55
	2.0	5.4	0.60	9.9	41	48
	2.1	5.5	0.61	10.1	40	46
 90° Arc	1.0	4.3	0.24	4.0	52	60
	1.5	4.8	0.27	4.5	47	55
	2.0	5.4	0.30	5.0	41	48
	2.1	5.5	0.30	5.0	40	46

Note: Turning the radius reduction screw may be required to achieve catalog radius and flow when the arc is set at less than maximum arc

■ Square spacing based on 50% diameter of throw

▲ Triangular spacing based on 50% diameter of throw

Performance data taken in zero wind conditions

BasinSequence	Owner	Source	Use	NENE	NWNE	SWNE	SENE	NENW	RightID
63-10023	SEUFERT, J	GROUND V	DOMESTIC						584807
63-10023	SEUFERT, J	GROUND V	IRRIGATION						584807
63-10023	SEUFERT, J	GROUND V	STOCKWATER						584807
63-10116	LEADBETH	GROUND V	DOMESTIC						57655
63-10149	ANDERSON	GROUND V	DOMESTIC						378766
63-10920	HALLETT, A	GROUND V	IRRIGATION						58429
63-11035	BUFFI, GLE	GROUND V	IRRIGATION						58531
63-11979	PEACOCK, I	GROUND V	IRRIGATION						59378
63-12055	UNITED W, BOISE RIVE	MUNICIPAL		X	X	X	X	X	673280
63-136	BARKER RC	BOISE RIVE	IRRIGATION	X	X	X	X	X	597524
63-1378	BARKER RC	BOISE RIVE	IRRIGATION	X	X	X	X	X	597523
63-15091	WALTZ, DA	GROUND V	DOMESTIC						378819
63-15333	COOK, LOI	GROUND V	DOMESTIC						379947
63-15586	HANSEN, JI	GROUND V	DOMESTIC						377604
63-15817	NEUFELD, I	GROUND V	DOMESTIC						399403
63-15910	KUHNEN, L	GROUND V	DOMESTIC		X				377283
63-15910	KUHNEN, L	GROUND V	STOCKWATER		X				377283
63-16108	THOMPSON	GROUND V	DOMESTIC						377342
63-16333	PEACOCK, I	GROUND V	DOMESTIC						142371
63-16569	YARNOT, P	GROUND V	DOMESTIC						377890
63-16844	BUSS, BARI	GROUND V	DOMESTIC						378220
63-16878	MILLIGIN, I	GROUND V	DOMESTIC						378904
63-17165	BLAIR, RAY	GROUND V	DOMESTIC						379000
63-17178	DAVISON, I	GROUND V	DOMESTIC						379007
63-17405	DRUSS, CL	GROUND V	DOMESTIC						379055
63-17612	EVANS, MI	GROUND V	DOMESTIC						379171
63-17681	MC CLANA	GROUND V	DOMESTIC						142408
63-17711	FRIEDRICH	GROUND V	DOMESTIC						379221
63-17757	BROWN, P.	GROUND V	DOMESTIC						379241
63-17796	HOLLAND, I	GROUND V	DOMESTIC						379275
63-17859	OBERMEYE	GROUND V	DOMESTIC						379316
63-17910	KNIFONG, I	GROUND V	DOMESTIC						379349
63-17940	BATES, LEL	GROUND V	DOMESTIC						379368
63-18071	GAITHER, J	GROUND V	DOMESTIC						379429
63-18075	RUSSELL, B	GROUND V	DOMESTIC						196395
63-18087	EILER, DON	GROUND V	DOMESTIC						380137
63-18116	LAWRENCE	GROUND V	DOMESTIC						380152
63-18116	LAWRENCE	GROUND V	STOCKWATER						380152
63-18142	ELMER, KE	GROUND V	DOMESTIC						146995
63-18170	FISHER, JO	GROUND V	DOMESTIC						380183
63-18198	HOPKINS, I	GROUND V	DOMESTIC						380194
63-18198	HOPKINS, I	GROUND V	STOCKWATER						380194
63-18273	NOBLE, RA	GROUND V	DOMESTIC						147013
63-18273	NOBLE, RA	GROUND V	STOCKWATER						147013
63-18293	DUDLEY, KI	GROUND V	DOMESTIC						196396
63-18978	BINGHAM, I	GROUND V	DOMESTIC						373119
63-18978	BINGHAM, I	GROUND V	STOCKWATER						373119
63-19009	BUFFI, GLE	GROUND V	DOMESTIC						205464
63-19009	BUFFI, GLE	GROUND V	STOCKWATER						205464
63-19253	LEHMAN, I	GROUND V	DOMESTIC						373220
63-19255	DAY, CARO	GROUND V	DOMESTIC						373222
63-19322	MURRAY, I	GROUND V	DOMESTIC						373245
63-19322	MURRAY, I	GROUND V	STOCKWATER						373245
63-19366	BAIRD, DE	GROUND V	DOMESTIC						373269
63-19366	BAIRD, DE	GROUND V	STOCKWATER						373269
63-19410	LING, NICH	GROUND V	DOMESTIC						380314
63-19906	GREENWEI	GROUND V	DOMESTIC	X					378025
63-19913	SHAY, PAU	GROUND V	DOMESTIC						379683
63-19940	HIGGINS, E	GROUND V	DOMESTIC						379698
63-200A	BARKER RC	BOISE RIVE	IRRIGATION	X	X	X	X	X	597526
63-20103	MOORE, BI	GROUND V	DOMESTIC						378385
63-20765	BROWER, I	GROUND V	DOMESTIC						380632
63-20912	PLUSKA, EL	GROUND V	DOMESTIC						381217
63-2106	UNITED ST. FIVEMILE C	IRRIGATION		X	X	X	X	X	598215
63-21656	BAILEY, DA	GROUND V	DOMESTIC						148187
63-22327	CLARKSON	GROUND V	DOMESTIC						194063
63-22327	CLARKSON	GROUND V	STOCKWATER						194063
63-22332	CORNELIU	GROUND V	DOMESTIC	X					210103
63-22332	CORNELIU	GROUND V	STOCKWATER	X					210103
63-22454	EMERY, DA	GROUND V	STOCKWATER						194131
63-22595	KINDRED, I	GROUND V	DOMESTIC						147749
63-22832	STANS, KE	GROUND V	DOMESTIC						147987
63-22832	STANS, KE	GROUND V	STOCKWATER						147987
63-22906	SPIERS, KEI	GROUND V	DOMESTIC						159649
63-23082	WESSELMF	GROUND V	DOMESTIC						158963
63-233K	AMERICAN BOISE RIVE	IRRIGATION		X	X	X	X	X	597461
63-23725	ROBINSON	GROUND V	DOMESTIC						118419
63-2388A	UNITED ST. BOISE RIVE	IRRIGATION		X	X	X	X	X	654421
63-2392F	BOISE PRO WASTE WF	IRRIGATION		X	X	X	X	X	640837
63-251A	UNITED ST. BOISE RIVE	IRRIGATION		X	X	X	X	X	654433
63-26312	HALL, GLEP	GROUND V	DOMESTIC						146452
63-26671	BARKER RC	BOISE RIVE	IRRIGATION			X	X		543708
63-26729	GRAMKOV	GROUND V	DOMESTIC						146000
63-26729	GRAMKOV	GROUND V	STOCKWATER						146000
63-26733	THIER, PAH	GROUND V	DOMESTIC		X				146002
63-26733	THIER, PAH	GROUND V	STOCKWATER		X				146002
63-27071	HOUSE, SJ	GROUND V	DOMESTIC						145370
63-27944	TORRES, PJ	GROUND V	DOMESTIC						127713
63-29724	ROEST, HEI	GROUND V	DOMESTIC		X				194356
63-301A	UNITED ST. BOISE RIVE	IRRIGATION		X	X	X	X	X	651708
63-302A	UNITED ST. BOISE RIVE	IRRIGATION		X	X	X	X	X	654415
63-30383	BAILEY, DA	GROUND V	DOMESTIC						193621
63-30474	BRINKER, J	GROUND V	DOMESTIC						582627
63-31181	PELKOLA, F	GROUND V	DOMESTIC						588655
63-31236	ALTIG, RICI	GROUND V	DOMESTIC						588636
63-31236	ALTIG, RICI	GROUND V	STOCKWATER						588636
63-31769	FRANK, BR	GROUND V	DOMESTIC						571448
63-33251	BOISE PRO INDIAN CR	IRRIGATION		X	X	X	X	X	667763
63-33253	BOISE PRO TENMILE C	IRRIGATION		X	X	X	X	X	667762
63-33334	ROMAN CF	GROUND V	IRRIGATION					5.5	597727
63-372	BARKER RC	BOISE RIVE	IRRIGATION	X	X	X	X	X	670570
63-373A	UNITED ST. BOISE RIVE	IRRIGATION		X	X	X	X	X	654427
63-4301	GOULD, JEI	GROUND V	DOMESTIC						53367
63-5279	ANDERSON	GROUND V	DOMESTIC						378662
63-5279	ANDERSON	GROUND V	STOCKWATER						378662
63-7796	BROWN, K.	GROUND V	DOMESTIC						55327
63-7981	LARSEN, AI	GROUND V	DOMESTIC						55515
63-7983	MERIDIAN	GROUND V	FIRE PROTECTION					X	586339
63-7983	MERIDIAN	GROUND V	IRRIGATION					9	586339

IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

1. WELL TAG NO. D D0058959

Drilling Permit No. **911002-859649**

Water right or injection well # **63-33334**

2. OWNER

Name **Roman Catholic Diocese of Boise**

Address **1501 S. Federal Way**

City **Boise**

State **Id**

Zip **83705**

3. WELL LOCATION:

Twp. **2** North ☒ or South ☐ Rge. **1** East ☒ or West ☐

Sec. **3** NE 1/4 NE 1/4 NW 1/4
10 acres 40 acres 160 acres

Gov't Lot **3** County **Ada**

Lat. **43° 32.723'N** (Deg. and Decimal minutes)

Long. **116° 19.482'W** (Deg. and Decimal minutes)

Address of Well Site **Risen Christ Catholic Community 11511 W.**

Lake Hazel Rd. City **Boise**

Identify exact name of road • Distance to Road or Landmark

Lot _____ Blk. _____ Sub. Name _____

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☒ Irrigation ☐ Thermal ☐ Injection
☐ Other

5. TYPE OF WORK check all that apply (Replacement etc.)

☒ New Well ☐ Replacement well ☐ Modify existing well

☐ Abandonment ☐ Other

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☒ Cable ☐ Other

7. SEALING PROCEDURES

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
3/4 Bentonite	0	80	4150 lbs.	12" Overbore

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
8"	2	218	.250	Steel	☒	☐	☐	☒
5"	213	221	.258	Steel	☐	☒	☐	☒
5"	241	243	.258	Steel	☐	☒	☐	☒

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) **218'**

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method

Manufactured screen ☒ Y ☐ N Type **Johnson**

Method of installation **Pullback**

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
221	231	.020	10'	5"	Stainless	304
231	241	.020	10'	5"	Stainless	304

Length of Headpipe **7.8**

Length of Tailpipe **2.0**

Packer ☒ Y ☐ N Type **8" Rubber K-Packer**

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method
N/A				

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG)

Describe control device

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) _____ Static water level (ft) **75'**

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port

Well test:

Test method:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Pump	Bailer	Air	Flowing artesian
230'	200+	1/2 HR.	☐	☐	☒	☐

Water Quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water	
				Y	N
12"	0	2	Top Soil		☒
	2	5	Hard Pan		☒
	5	31	Gravel		☒
	31	43	Sandy Brown Clay		☒
	43	80	Gravel		☒
8"	80	99	Gravel	☒	
	99	128	Gravel & Sand w/ Clay Streaks	☒	
	128	137	Clay w/ Sand Streaks		☒
	137	145	Sand	☒	
	145	149	Sandy Brown Clay		☒
	149	157	Sand & Gravel	☒	
	157	164	Sandy Brown Clay		☒
	164	176	Red Coarse Sand	☒	
	176	216	Brown Sand & Gravel w/ Clay Streaks	☒	
	216	241	Sand & Gravel	☒	
	241	243	Brown Clay		☒

Completed Depth (Measurable)

243'

Date: Started **8/4/10**

Completed **8/11/10**

14. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name **Dennis Phipps Well Drilling Inc.** Co. No. **332**

*Principal Driller _____ Date **8/13/10**

*Driller _____ Date **8/13/10**

*Operator II _____ Date _____

Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required.

THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Water Right No.: 63-33334
 Reviewer: Kate Huelse
 Date of Review: 9/4/2020

P/D No.:	Scenario 1	Scenario 2	Scenario 3
PUMP HORSEPOWER	5	5	5
BOOSTER HORSEPOWER	0	0	0
PUMPING LEVEL	175	175	175
DISCHARGE PRESSURE	15	25	30
RATE OF FLOW (cfs)	0.15	0.13	0.13 0.14

The above calculates the formula =
$$Q = \frac{8.8 * (\text{Efficiency}) * \text{hp}}{\text{depth to water} + 2.31 * (\text{psi}) + \text{friction}}$$

Assumptions: %70 efficiency.
 No Friction

Examiners Notes:

A 5 hp pump was used and assumed given this is for a small irrigation use. Lift was measured using the well log. A range of discharge pressures were used from the Rain Bird 1800 sprinkler head pressure range of 15-30 psi. Theoretical average flow rate is 0.14 cfs.