

**Monitoring and Quality Assurance Plan  
For Stormwater Discharge**

**City of Caldwell**

**NPDES Permit No. IDS-028118**

**Revision 1**

**March 2012**

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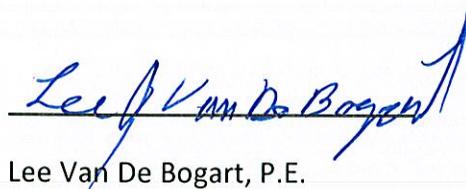
# Monitoring and Quality Assurance Plan For Stormwater Discharge City of Caldwell

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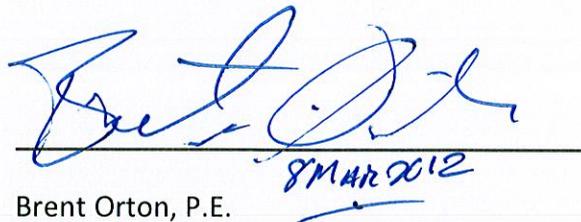
Plans Approvals:



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Lee Van De Bogart, P.E.

City of Caldwell, Project Engineer



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Brent Orton, P.E.

City of Caldwell, Public Works Director

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USEPA NPDES Compliance Unit

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Idaho Department of Environmental Quality

## Distribution List

Lee Van De Bogart	City of Caldwell, Idaho
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NPDES Compliance Unit	USEPA Storm Water Program
Boise Regional Office	Idaho Department of Environmental Quality

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Acronyms and Abbreviations

IDEQ	Idaho Department of Environmental Quality
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
SWPE	Storm Water Project Engineer
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SRM	Standard Reference Material
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

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## Introduction

The City of Caldwell will conduct monitoring and sampling on one stormwater outfall discharging to each of the following water bodies: Indian Creek, Mason Creek, and the Boise River. The outfalls will be monitored for Flow, Total Suspended Solids, Total Phosphorous, Total Nitrogen, and E. Coli. The samples periods are March-April, May-June, July-August, and September-October. If samples cannot be collected due to lack of rainfall in these periods, samples may be collected in other months as necessary to meet the minimum of four (4) samples per year. Samples will be grab, and will be taken manually. The sampling should occur within the first 120 minutes (2 hours) of a storm event. Storm event time starts after 0.02 "of rainfall has occurred. Samples will be handled and chain-of-custody procedures followed consistent with the guidelines contained in USEPA Guidance for Quality Assurance Project Plans (EPA/600/R-98/018February, 1998) and EPA requirements for quality assurance project plans EPA-QA/R - 5 (EPA/240/b-01/003, March 2001) The monitoring is to start December 21,2011.

## Pre-storm Mobilization

This section describes the chain of events that must take place prior to water quality sampling of a storm event at any of the Caldwell, Idaho stormwater monitoring sites. One of the objects of the City of Caldwell's SWMP is to monitor three outfalls a minimum of four times per year starting in December 2011, with the first monitoring event to be in the March-April time period.

Storms will be considered for sampling if they are forecast by the National Weather Service in Boise with a 50% or greater confidence to produce a minimum of 0.10 inches of rain in a 24-hour period. (See figure 5- rainfall forecast storm monitoring.) Further, the storm must have been preceded by a 72-hour dry period of a maximum of 0.02 inch of rain. The city has three rain gauges plus the airport's rain gauge to monitor rain events. The city's rain gauges have the ability to send e-mail alerts within one minute of the start of a rain event. (See figure 6 & 7- rainfall event monitoring.)

Weather conditions will be monitored daily except weekends and holidays ( the lab is closed at these times and samples cannot be run)by the Storm Water Project Engineer (SWPE). If a forecast suggests that a storm satisfies the selection criteria, the SWPE will mobilize the Field Team for station set-up and monitoring. The SWPE will decide based upon the size, certainty, and timing of the storm whether monitoring of the event will be conducted.

It is the intent of this project to sample four storms within the City of Caldwell that meet the criteria listed above. However, due to the short time frame for monitoring at the site these criteria may be adjusted if weather conditions dictate, in order to reach the overall goal of monitoring four storm events.

## **Field Team Preparation**

Mobilization of the Field Team will be made as soon as possible after a storm is selected for monitoring. The Field Team will assemble at SWPE office with the necessary equipment for monitoring.

The Field Team Leader must complete the sampling Equipment Checklist before leaving the office. This check confirms that all equipment is available and in proper working order.

Prior to arriving at the outfalls, the Field Team must purchase ice for the grab Sample coolers.

The SWPE is responsible for making sure that all necessary bottles are available prior to the event. This may involve contacting the analytical laboratory and making arrangements for bottle delivery to the SWPE office.

## **Monitoring Locations**

The locations of the three monitored MS4 outfalls within the City of Caldwell MS4 area are shown in Figure 1-Out fall Monitoring Locations. A total of around 430 outfalls are associated with the City's MS4.

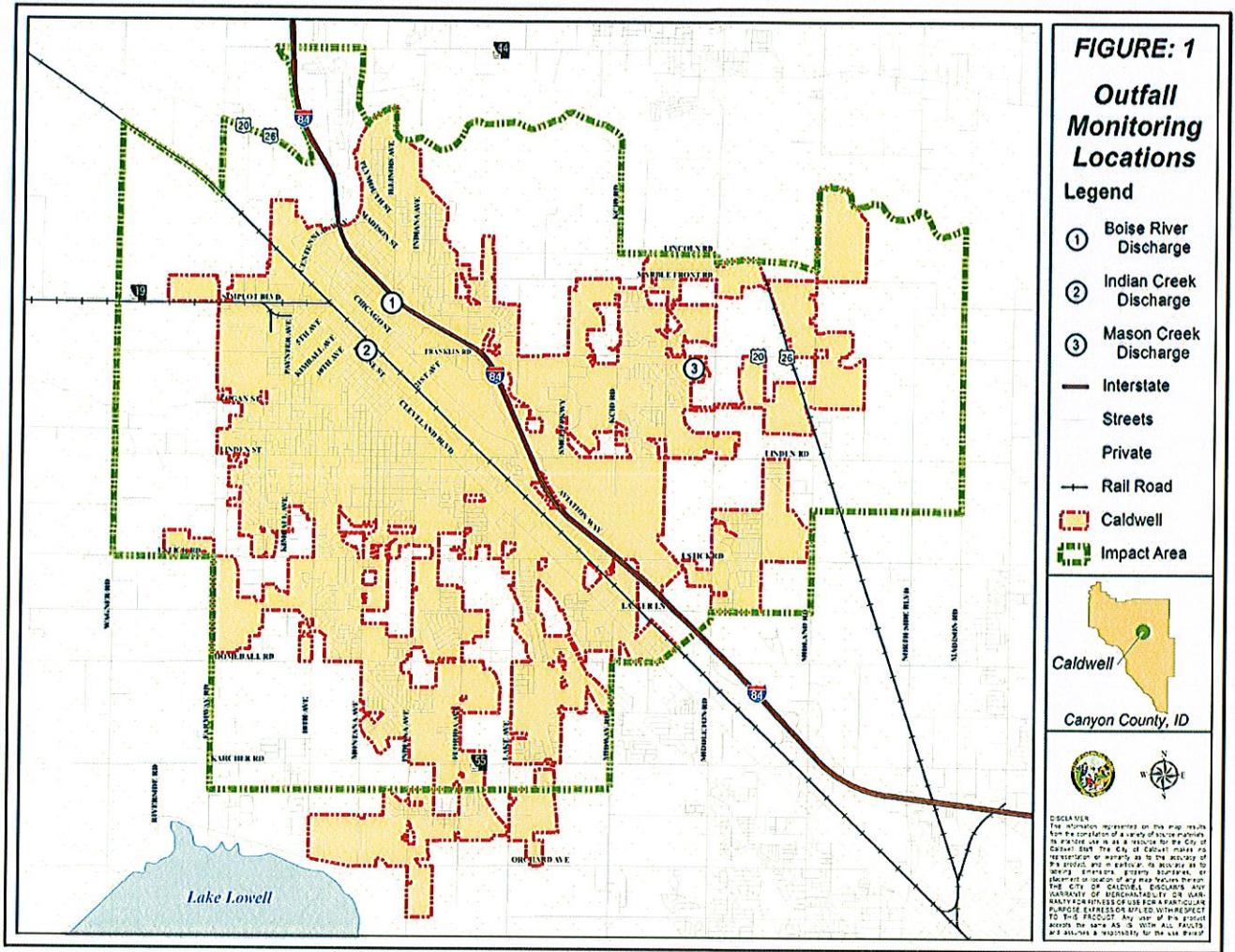


Figure 1- Outfall Monitoring Locations

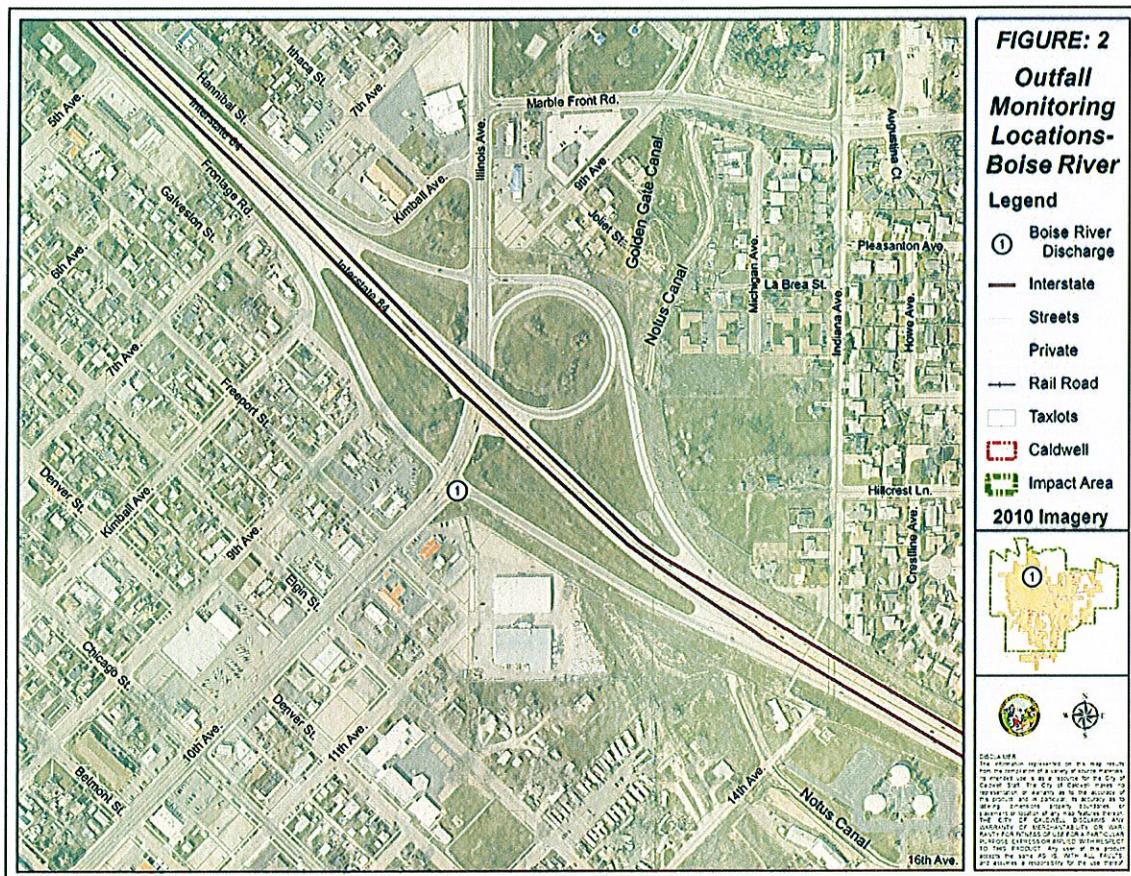


Figure 2-Outfall Monitoring Location-Boise River

Boise River Outfall- Boise River has 7 outfalls. Several of these outfalls experience continuous Irrigation water discharge between April and October, and have been eliminated from monitoring, even though they drain a large area. The outfall selected for monitoring is located along the north side of Chicago Street in Whittenberger Park. The outfall has a flap valve and is partly under water, so actual samples will be taken from an upstream manhole located at 10<sup>th</sup> and the freeway. This storm water basin contains the area from the west I-84 freeway exit on Centennial Way to the top of the railroad overpass

on Centennial Way. This drainage has the least BMP's implemented, and for that reason will better represent areas that have not had BMP's implemented. See figure 2.

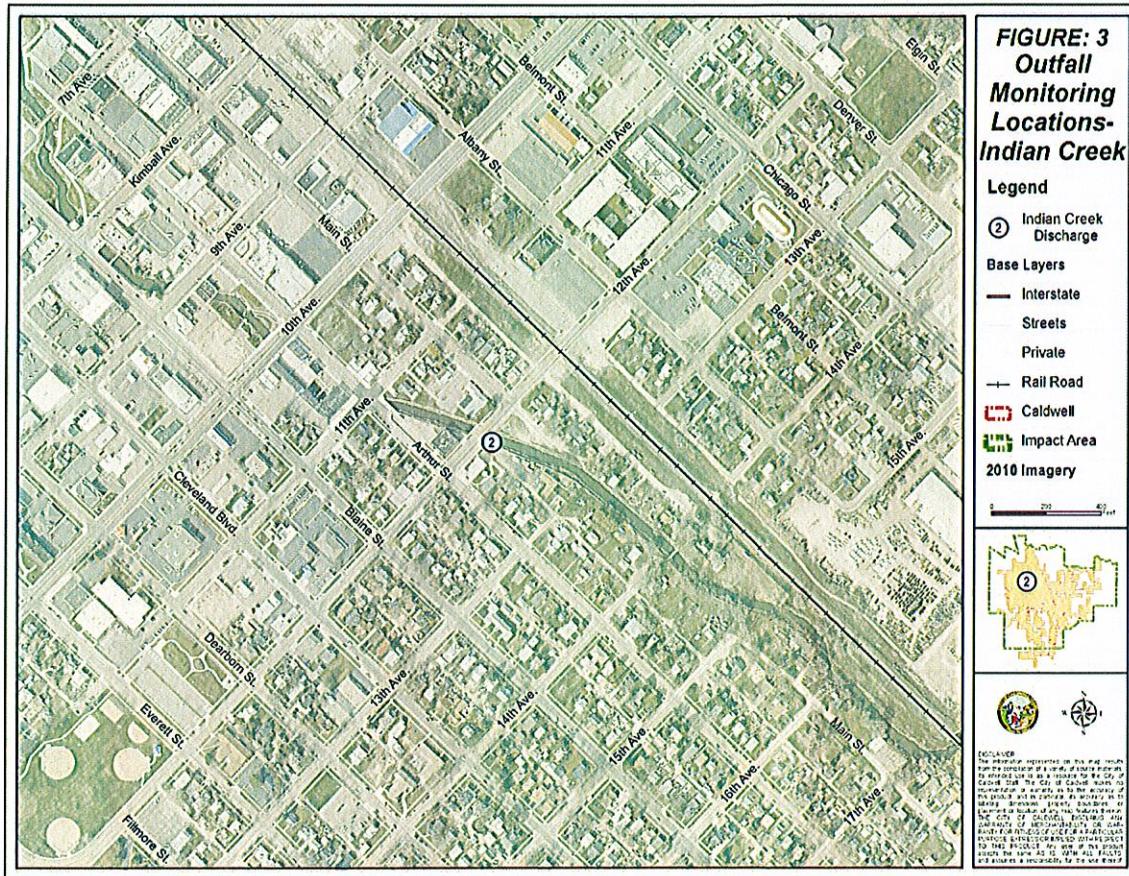


Figure 3-outfall Monitoring Location-Indian Creek

Indian Creek outfall- This outfall is on 12<sup>th</sup> Avenue between Main and Arthur Street. This storm sewer basin contains the area to the southwest along 12<sup>th</sup> avenue to Cleveland Boulevard and the streets' drainage to the southeast of 12<sup>th</sup> avenue. See figure 3. This drainage has a Sand & Grease trap only, and will, for that reason, represent those areas with minimal BMP's.

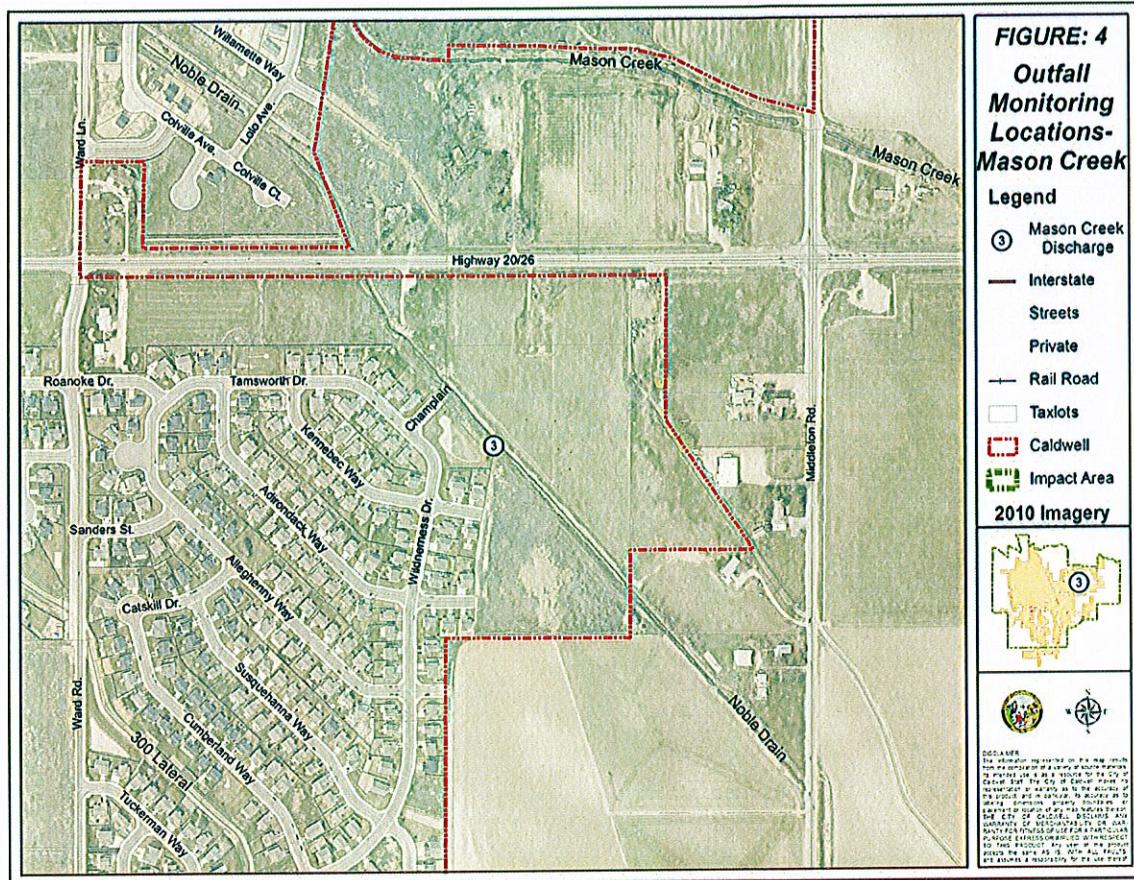


Figure 4-Outfall Monitoring Location-Mason Creek

Mason Creek outfall- This outfall is located in Delaware Park Subdivision. See figure 4. This is a fairly typical example of one of the newer subdivisions that has been built in Caldwell. This outfall has been designed in accordance with the 2006 Caldwell Municipal Stormwater Management Manual. This will be used to represent those areas that are designed to incorporate a detention pond consistent with the 2006 Caldwell Municipal Stormwater Management Manual standards.

Monitoring Requirements

Table 1 Monitoring Requirements										
Analysis	Units	container (1)	Preservative (2)	Holding Time (3)	Analytical Methods	Container Size	Samples per event per outfall (4)	Quantat Analytical Limit detection	Precision	Accuracy
Flow	cfs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/L	P, G	Cool, 4°C	7 Days	SM 2540D	500 mL	1	4 criteria	±20%	±20%
Total Phosphorus	mg/L	P, G	Cool, 4°C	28 Days	EPA 355.4	500 mL	1	0.01 criteria	±20%	±20%
Total Nitrogen	mg/L	P, G	Cool, 4°C	28 Days	EPA 351.2	500 mL	1	0.5 criteria	±20%	±20%
E. Coli	cfu/100 mL	P, G	Cool, 4°C	30 Hours	SM 9222 D	250 mL	1	1 criteria	±20%	±20%
Notes										
1	Polyethylene (P) or Glass (G)									
2	Sample preservation will be performed by the laboratory prior to testing as required.									
3	Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.									
4	Once a year one of the sites will have an additional QC samples submitted for testing. The QC samples will include field blanks using Milli-Q deionized water. The QC samples submitted locations will alternate between outfalls.									

## Laboratory Contract

Laboratory water quality analyzes for the MS4 discharge sampling will be performed by Analytical Laboratories, Inc. (AL), an EPA and State Certified Laboratory located in Boise, Idaho.

Laboratory: Analytical Laboratories, Inc.  
Address: 1804 North 33<sup>rd</sup> Street, Boise, Idaho 83703  
Phone: (208) 342-5515 or 1-800-574-5773  
Contact: Sandy Koch

## Field Procedures

The field activities are generally conducted by 2-person Field Team. Sample containers for laboratory delivery are labeled in indelible ink with the following information:

City of Caldwell  
Stormwater Discharge Monitoring  
Location ID  
Date and time

Water quality samples are collected in properly preserved bottles supplied by the laboratory, and stored on ice until delivery to AL. Water quality samples are picked up by laboratory personnel within 24 hours of collection. Formal chain-of-custody documentation is maintained for all samples sent to AL.

Outfall descriptions, physical indicator, and certain field measurements are recorded electronically using tablet PCs or handheld data collection platforms such as a Trimble GPS enabled data collector unit.

Water samples are generally collected using a 1-L sample bottle or long-handled dipper. The Field Team will be instructed to make safety the highest priority. Safety vest are worn at all times when outside the vehicle. Road signs, stop/slow paddles, and traffic cones are utilized as needed. Sampling will stop during hazardous weather condition like lightning storms.

## Sampling Handling and Custody

Samples are the physical evidence collected from the monitoring; these samples must have their possession traceable from the time the samples are collected to final lab results.

Field documents including sample custody seals, and chain-of-custody records will be obtained from the laboratory. Chain-of-custody procedures will be used to maintain and document sample collection and possession. After each sample is taken, the appropriate chain-of-custody form will be completed. The SWPE will be responsible for retaining and tracking the chain-of-custody documents.

## Qualification and Training

### Laboratory Quality Control

Analytical Laboratories, Inc. (AL) operates under comprehensive Quality Assurance (QA) and Quality Control (QC) Plans. Laboratory check standards, matrix spikes, analytical duplication, and blanks are analyzed in accordance with AL Quality Assurance Program. All QC results are reported to SWPE along with sample data. Laboratory data reduction, review, assessment and reporting are performed according to the AL Quality Assurance Program.

### Field Quality Control

AL will prepare field blanks using Milli-Q Deionized water. The Field QC will be a standard 5% duplication rate. A minimum of one set of Field QC samples will be submitted per year.

The Field Team will receive proper training on sample collection and recording from AL personnel prior to starting monitoring with yearly refreshers.

## Recordkeeping

**Retention of records** The SWPE will retain records and copies of all information, including all monitoring, calibration, and maintenance records and all original strip chart recordings for any continuous monitoring instrumentation, copies of all reports required by its MS4 permit, a copy of the NPDES permit, and records of all data used to complete the application for the MS4 permit for a period of at least five years from the start of sampling or for the term of the MS4 permit, whichever is longer.

**Availability of records** The SWPE will submit the records to EPA and IDEQ only when such information is requested. The SWPE will retain all records comprising the SWMP required by this permit at the Department of Engineering office. Electronic copies will be available for viewing on the Laserfiche file system at the Department of Engineering office. The originals documents may be viewed during

normal business hours and copies can be obtained through an official request for information from the City of Caldwell.

## Reporting Requirements

**Storm Water Discharge Monitoring Report** The first report on Storm Water Monitoring is for the December 21, 2011 to December 21, 2012 time period, and must be reported in the Annual Report due March 21, 2013. A similar report covering the same period over subsequent years shall be part of the Annual report from that time forward. The report must include:

- a) Dates of sample collection and analysis:
- b) Results of analytical samples collected:
- c) Location of sample collection:
- d) For the months sampled, estimates of the wet weather monthly average pollutant loads for each pollutant of concern at each sample location: and
- e) By monitoring outfalls with different levels of BMP's the city will be able to determine how upgrades to the existing storm sewer system will decrease the pollutant load. An annual cumulative estimate of pollutant loading for each parameter at each sample location, and an overall estimate of the contribution of pollutants from all storm water emanating from the city's MS4 area will be calculated.

Forecast For Lat/Lon: 43.6740/-116.6810 (Elev. 2391 ft)  
Caldwell ID

Custom Weather Forecast Table

Change Table Font Size Increase Decrease

	Tue Nov 09	Wed Nov 10	Thu Nov 11	Fri Nov 12	Sat Nov 13	Sun Nov 14	Mon Nov 15
Weather	Likely Rain Rain Snow	Chance Rain Showers and Snow	High 49 Low 30	High 49 Low 30	High 51 Low 28	High 52 Low 30	Slight Chance Rain and Snow Showers
Daily-Temp	High 48 Low 28	High 47 Low 33	High 49 Low 30	High 49 Low 30	High 51 Low 28	High 52 Low 30	High 48 Low 31
Chance of Precip	0% 5%	0% 5%	5% 0%	10% 10%	10% 10%	10% 10%	20% 20%
Precip	0.00" 0.00"	0.02" 0.01"	0.00" 0.00"	0.00" 0.00"	0.00" 0.00"	0.00" 0.00"	0.00" 0.00"
12-hr Snow	0"	0"	0"	0"	0"	0"	0"
Total	0"	0"	0"	0"	0"	0"	0"
6-Hour Temp	5am 11am 5pm 11pm 34 44 45 37	11am 5pm 11pm 43 44 35 31	5am 11am 5pm 11pm 42 46 34 30	5am 11am 5pm 11pm 44 46 34 30	5am 11am 5pm 11pm 43 48 35 29	5am 11am 5pm 11pm 46 50 37 31	5am 11am 5pm 11pm 42 45 35 32
Cloudiness	24% 42% 92% 98%	97% 92%	34% 34% 14% 18%	34% 34% 60% 60%	38% 38% 44% 44%	54% 54% 59% 59%	54% 54% 61% 61%
Dewpoint	22 27 27 29	30 30	28 31 29 29	32 32 30 30	30 30 31 27	34 34 31 30	28 31 29 30
Relative Humidity	63% 50% 49% 73%	89% 89%	89% 65% 50% 82%	87% 62% 56% 85%	91% 60% 48% 85%	93% 65% 53% 78%	93% 57% 58% 77%
Wind	S S SE SE E	NW NW N S E SE	N S E SE W	W NW NW NW	NW NW NW S	W NW NW NW	NW NW N S
Snow Level (ft)	2 5 7 6	5 6 3	1 2 2 6	3 3 6 5	3 3 3 1	1 3 7 6	5 2 2 1
	2996396934173266	3183 3959	43544165331147154715	4294429446194619	4698469838023802	3799379940254025	5424542451575157

Figure 5- Forecast Storm Monitoring

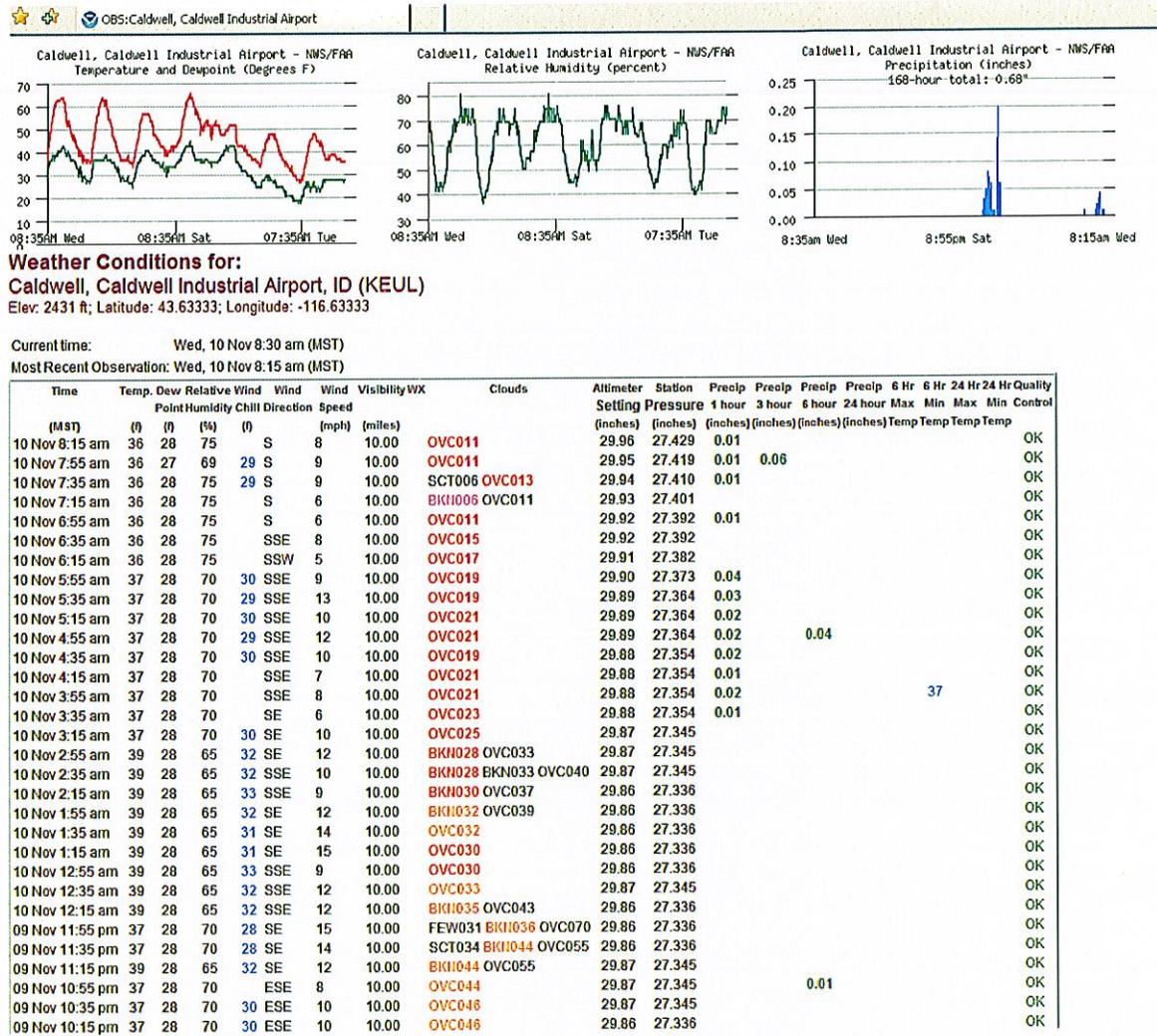


Figure 6- Rainfall Event Monitoring

Fire station 2 2/15/12

Date	Time	Temp	Hi	Low	Out	Hum	Dew	Wind	Wind	Wind	Hi	Hi	Hi	Wind	Heat	TEW	Rain
		Out	Temp	Temp	Temp	Hum	Pt.	Speed	Dir	Run	Speed	Dir	Dir	Chill	Index	Index	Bar
2/15/12	2:00a	31.9	31.6	31.4	85	30.2	5.0	NW	2.00	14.0	NW	24.2	31.4	24.1	23.982	0.00	
2/15/12	2:15a	31.7	31.7	31.5	94	30.2	3.0	NNW	2.00	15.0	NW	24.5	31.6	24.1	23.987	0.00	
2/15/12	2:30a	31.9	32.0	31.7	92	29.8	3.0	NW	2.00	14.0	NW	24.7	31.0	24.6	23.999	0.00	
2/15/12	2:45a	31.0	32.0	31.6	91	29.3	8.0	EW	2.00	13.0	NW	24.4	31.5	24.3	30.004	0.00	
2/15/12	2:00a	31.1	31.8	31.1	91	28.8	9.0	WNW	2.25	13.0	NW	23.2	30.9	23.0	30.014	0.00	
2/15/12	3:15a	31.4	31.4	31.1	90	28.3	9.0	W	2.25	13.0	NW	23.5	31.2	23.3	30.013	0.00	
2/15/12	3:30a	31.0	31.4	31.0	89	28.1	9.0	WN	2.25	14.0	NW	23.0	30.3	22.8	30.007	0.00	
2/15/12	3:45a	30.2	31.0	30.3	88	27.1	9.0	W	2.25	14.0	NW	22.0	30.0	21.8	30.014	0.00	
2/15/12	4:00a	29.7	30.2	29.7	88	26.6	9.0	WNW	2.25	14.0	NW	21.4	29.5	21.2	30.021	0.00	
2/15/12	4:15a	29.6	29.7	29.5	96	26.5	9.0	WNW	2.25	14.0	WNW	21.3	29.4	21.1	30.020	0.00	
2/15/12	4:30a	29.8	29.9	29.6	95	26.1	9.0	W	2.25	14.0	WNW	21.6	29.6	21.4	30.027	0.00	
2/15/12	4:45a	29.4	29.4	29.4	95	25.7	9.0	W	2.25	16.0	WNW	21.1	29.2	20.9	30.024	0.00	
2/15/12	5:00a	29.2	29.4	29.2	85	25.5	9.0	W	2.25	14.0	NW	20.8	29.0	20.6	30.044	0.00	
2/15/12	5:15a	28.7	29.2	28.7	85	25.0	8.0	W	2.00	13.0	NW	20.3	28.5	20.6	30.055	0.00	
2/15/12	5:30a	28.5	28.7	28.5	86	24.8	8.0	W	2.00	12.0	WNW	20.6	28.3	20.4	30.067	0.00	
2/15/12	5:45a	28.3	28.5	28.2	86	24.6	8.0	NW	2.00	12.0	WNW	20.3	28.1	20.1	30.075	0.00	
2/15/12	6:00a	28.4	28.5	28.3	86	24.7	8.0	NW	2.00	12.0	NW	20.5	28.2	20.3	30.078	0.00	
2/15/12	6:15a	28.5	28.5	28.3	86	24.8	8.0	NW	2.00	14.0	NW	20.6	28.3	20.4	30.081	0.00	
2/15/12	6:30a	28.7	28.5	28.3	85	24.5	9.0	NW	2.25	16.0	NW	19.8	28.2	18.6	30.086	0.00	
2/15/12	6:45a	28.7	28.7	28.5	83	24.2	9.0	NW	2.25	14.0	NW	20.2	28.5	20.0	30.089	0.00	
2/15/12	7:00a	28.6	28.7	28.5	83	24.1	9.0	NW	2.25	14.0	NW	20.1	28.4	19.9	30.100	0.00	
2/15/12	7:15a	28.4	28.6	28.3	83	23.9	9.0	NW	2.25	14.0	NW	19.8	28.2	19.6	30.111	0.00	
2/15/12	7:30a	27.9	28.4	27.9	83	23.4	8.0	NW	2.00	13.0	WNW	19.5	27.7	19.7	30.122	0.00	
2/15/12	7:45a	27.5	27.9	27.5	83	23.0	8.0	NW	2.00	12.0	NW	19.4	27.3	19.2	30.134	0.00	
2/15/12	8:00a	27.4	27.5	27.1	84	23.2	7.0	NW	1.75	10.0	WNW	20.0	27.2	19.8	30.140	0.00	
2/15/12	8:15a	27.4	27.5	27.2	84	23.2	7.0	WNW	1.75	10.0	WNW	20.3	27.2	19.8	30.147	0.00	
2/15/12	8:30a	26.1	28.3	27.4	82	23.5	8.0	WNW	2.00	11.0	WNW	21.5	28.0	20.0	30.155	0.00	
2/15/12	8:45a	30.3	30.3	30.3	78	24.6	10.0	NW	2.50	16.0	NW	22.5	30.0	21.3	30.162	0.00	
2/15/12	9:00a	31.0	31.0	30.2	79	25.4	10.0	NW	2.50	16.0	NW	22.5	30.7	22.2	30.168	0.00	
2/15/12	9:15a	31.2	31.2	31.0	79	25.4	10.0	NW	2.50	16.0	NW	22.7	30.9	22.4	30.173	0.00	
2/15/12	9:30a	31.7	31.7	31.2	77	26.1	12.0	WNW	3.00	16.0	WNW	23.4	31.4	23.1	30.186	0.00	
2/15/12	9:45a	32.5	32.5	31.7	77	26.1	12.0	WNW	3.00	16.0	WNW	23.4	32.1	23.0	30.194	0.00	
2/15/12	10:00a	33.3	33.3	32.5	77	26.9	12.0	WNW	3.00	18.0	WNW	24.4	32.9	24.0	30.202	0.00	
2/15/12	10:15a	34.3	34.3	34.3	75	27.2	10.0	NW	2.50	19.0	WNW	26.6	33.8	26.1	30.203	0.00	
2/15/12	10:30a	35.1	35.1	34.3	75	28.0	11.0	NW	2.75	18.0	NW	27.1	34.7	26.7	30.208	0.00	
2/15/12	10:45a	35.9	35.9	35.1	75	28.7	10.0	NW	2.50	16.0	WNW	28.6	35.5	28.2	30.208	0.00	
2/15/12	11:00a	36.6	36.6	36.0	74	29.1	12.0	NW	3.00	18.0	NW	28.6	36.2	28.2	30.210	0.00	
2/15/12	11:15a	37.3	37.3	36.6	72	29.1	12.0	NW	3.00	18.0	NW	28.6	36.8	28.9	30.209	0.00	
2/15/12	11:30a	38.3	38.3	37.3	72	30.1	11.0	NW	2.75	18.0	NW	31.1	37.8	30.6	30.207	0.00	
2/15/12	11:45a	38.6	38.7	38.3	69	30.3	11.0	NW	2.75	19.0	WNW	31.5	38.0	30.9	30.211	0.00	
2/15/12	12:00a	39.0	39.0	38.4	70	30.0	13.0	NW	3.25	22.0	WNW	31.2	38.4	30.6	30.218	0.00	
2/15/12	12:15a	39.8	39.8	39.0	67	29.7	11.0	NW	2.75	19.0	NW	33.0	39.1	32.3	30.219	0.00	
2/15/12	12:30a	40.4	40.4	39.7	68	30.7	12.0	NW	3.00	19.0	NW	33.3	39.8	32.7	30.222	0.00	

Figure 7- Rainfall Event Monitoring City station