

Olympic Valley Monitoring Plan and Database

*Prepared for:
Olympic Valley Groundwater
Management Plan Implementation Group*



Prepared by:

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ABBREVIATIONS

CDPH.....	California Department of Public Health
CHAMPS.....	Chemical Application Management Program
GMP	Groundwater Management Plan
QC.....	quality control
RSC.....	Resort at Squaw Creek
SOC	synthetic organic compound
SVMWC.....	Squaw Valley Mutual Water Company
SVPSD	Squaw Valley Public Service District
VOC.....	volatile organic compound

SECTION 1

BACKGROUND AND SCOPE

Element 1.2 of the Olympic Valley Groundwater Management Plan (GMP) calls for coordinating existing groundwater monitoring plans in Olympic Valley. Implementing Element 1.2 was identified as a high priority action in the 2007 Olympic Valley Groundwater Basin Annual Review and Report. This report presents the integrated monitoring plan and database for Olympic Valley that has been developed to meet the requirements of the GMP.

The goals of the project are to put an appropriate level of existing groundwater level, well construction, groundwater pumping, and groundwater quality data into a single database; and to develop a formal coordinated monitoring plan for collecting high quality data useful for managing groundwater in Olympic Valley.

Section 2 of this report presents a groundwater monitoring plan for Olympic Valley and Section 3 contains a description of the Olympic Valley Groundwater Database that was developed to store groundwater related data.

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SECTION 2 MONITORING PLAN

The monitoring plan coordinates the schedules and methodologies for collecting groundwater level and groundwater production data. This will facilitate groundwater management by ensuring that complete, accurate and up-to-date groundwater data are available for the Valley. The schedules for collecting groundwater quality data will not be changed. These groundwater quality monitoring schedules are driven by regulations, including municipal water supply well regulations from the California Department of Public Health (CDPH), and groundwater sampling requirements for the meadow monitoring wells under the CHAMPS program.

Components of the monitoring plan include identifying wells in which groundwater level and production data will be collected on a routine basis, and specifying a methodology for data collection to ensure consistency.

2.1 GROUNDWATER LEVEL MONITORING

Groundwater level measurements help establish basin conditions including the amount of groundwater in storage, groundwater flow direction and hydraulic gradients. Much of the Basin's management and operation relies on accurate groundwater level data.

2.1.1 WELL LOCATIONS

Groundwater levels are currently monitored at all active municipal production wells, and at dedicated monitoring wells operated by the Resort at Squaw Creek (RSC) and SVPSD. Figure 1 shows the locations of the municipal production wells and dedicated monitoring wells in Olympic Valley that have been included as groundwater level monitoring locations in the monitoring plan.

A few wells in the Valley are used for irrigation and/or snowmaking. The Resort at Squaw Creek has three wells: RSC wells 18-1, 18-2 and 18-3R; the PlumpJack Inn has one well; and Ski Corp has three wells near the Squaw Kids Children's Center and one near Squaw Valley Lodge. All these wells have either no, or very limited, historical groundwater level data. The three RSC wells, the PlumpJack well, and one Ski Corp well are included as monitoring locations that should have data loggers installed in the future (Table 1).

Groundwater level data have been collected by responsible parties at a number of leaking underground fuel tank sites in the Valley. As these fuel-site wells are considered temporary monitoring features, they are not included in the monitoring plan.

2.1.2 REFERENCE POINT ELEVATION

Groundwater levels in wells should be measured relative to an established reference point, which allows for the groundwater's true elevation to be calculated. This reference point is usually identified by the well installer, using a permanent marker for PVC wells, or by notching the top of casing with a chisel for steel wells. By convention, this marking is usually placed on the north side of the top of casing. If no mark is apparent, the person performing the measurements should take groundwater level measurements from the north side of the top of casing and note this procedure on the field data sheet.

For wells with data loggers, the reference point elevation is needed as well as the depth of the transducer below the reference point. These two pieces of information must be noted and entered into the software setup of the transducers.

To be useful for establishing groundwater elevations consistent with previous studies in the Valley, the reference point should be tied in with the NGVD29 (National Geodetic Vertical Datum 1929). All reference point elevations should be surveyed by a California registered surveyor. As survey data are obtained, the database must be updated to reflect these improved elevation data. It is also recommended that some wells that have been surveyed previously, be resurveyed for quality control (QC) purposes.

2.1.3 MONITORING FREQUENCY

All groundwater level measurements should be taken on the **first day of each month**. For production wells that might be pumping at the time the measurement is to be taken on the first of the month, the groundwater level measurement must be measured on the next day the well is **not pumping**. Recording true static levels is vital for collecting high quality groundwater level data. Using pumping levels or partially recovered levels will result in erroneously low levels being used for reporting purposes and for analysis.

A groundwater level monitoring schedule has been developed for each well in the monitoring plan (Table 1). The schedule includes the frequency of hand measurements of depth to water, and retrieval of data from loggers where they are installed. The methodologies for collecting groundwater levels are included in the following sections.

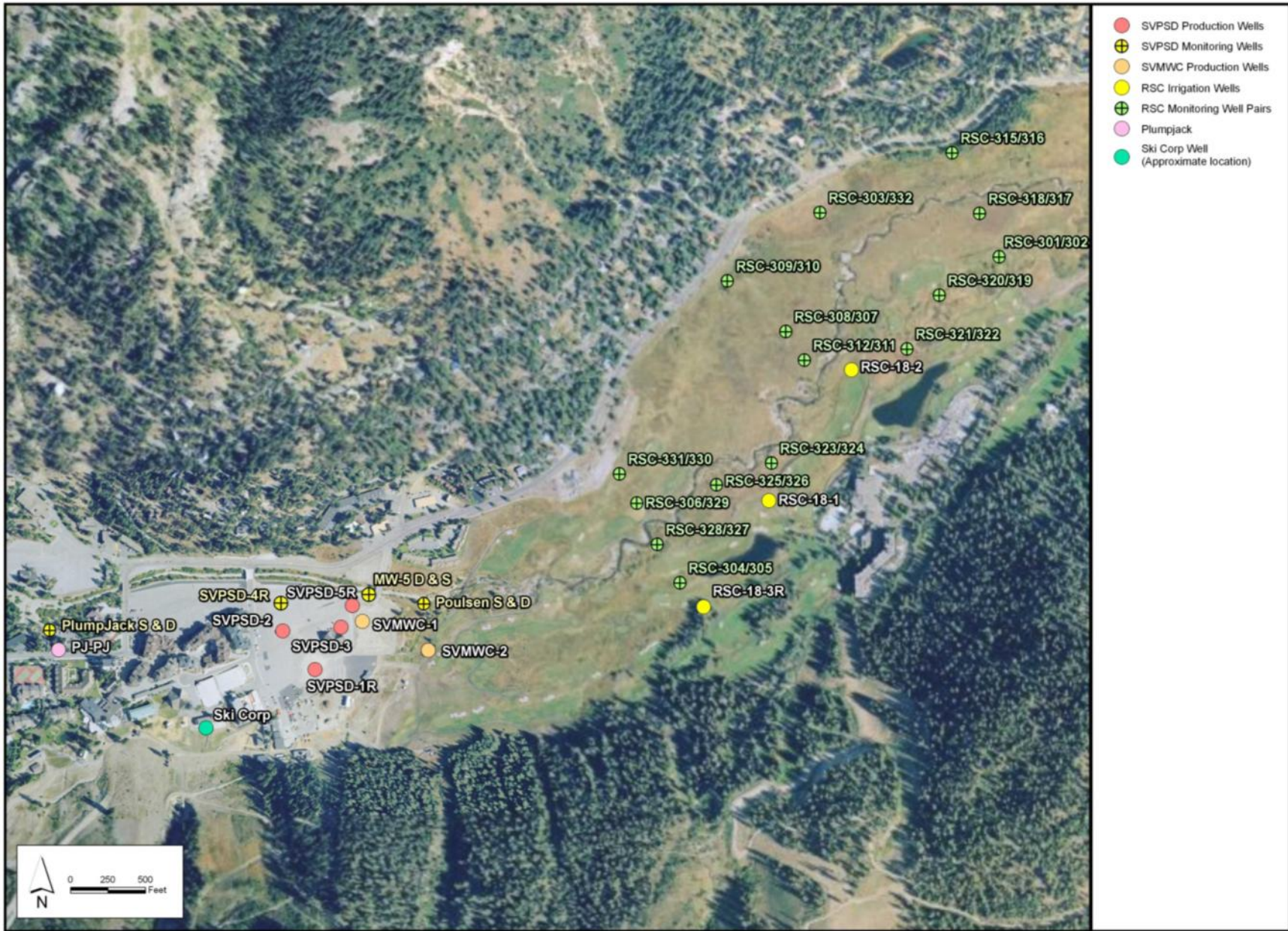


Figure 1: Olympic Valley Groundwater Level Monitoring Locations

Table 1: Groundwater Level Monitoring Schedule

Well Name	Owner	Database ID	Well Type	Groundwater Level Monitoring		
				Current Method	Schedule	Action
PlumpJack	PlumpJack/Squaw Valley Inn	PJ-PJ	Prod	Not measured	1st of month	Install data logger
18-1	Resort at Squaw Creek	RSC-18-1	Prod	Not measured	1st of month	Install data logger
18-2	Resort at Squaw Creek	RSC-18-2	Prod	Not measured	1st of month	Install data logger
18-3R	Resort at Squaw Creek	RSC-18-3R	Prod	Not measured	1st of month	Install data logger
301	Resort at Squaw Creek	RSC-301	Mon	Sounder	1st of month	-
302	Resort at Squaw Creek	RSC-302	Mon	Sounder	1st of month	-
303	Resort at Squaw Creek	RSC-303	Mon	Sounder	1st of month	-
304	Resort at Squaw Creek	RSC-304	Mon	Sounder	1st of month	-
305	Resort at Squaw Creek	RSC-305	Mon	Sounder	1st of month	-
306	Resort at Squaw Creek	RSC-306	Mon	Sounder	1st of month	-
307	Resort at Squaw Creek	RSC-307	Mon	Sounder	1st of month	-
308	Resort at Squaw Creek	RSC-308	Mon	Sounder	1st of month	-
309	Resort at Squaw Creek	RSC-309	Mon	Sounder	1st of month	-
310	Resort at Squaw Creek	RSC-310	Mon	Sounder	1st of month	-
311	Resort at Squaw Creek	RSC-311	Mon	Sounder	1st of month	Install data logger ¹
312	Resort at Squaw Creek	RSC-312	Mon	Sounder	1st of month	Install data logger ¹
315	Resort at Squaw Creek	RSC-315	Mon	Sounder	1st of month	-
316	Resort at Squaw Creek	RSC-316	Mon	Sounder	1st of month	-
317	Resort at Squaw Creek	RSC-317	Mon	Sounder	1st of month	Install data logger ¹
318	Resort at Squaw Creek	RSC-318	Mon	Sounder	1st of month	Install data logger ¹
319	Resort at Squaw Creek	RSC-319	Mon	Sounder	1st of month	-
320	Resort at Squaw Creek	RSC-320	Mon	Sounder	1st of month	-
321	Resort at Squaw Creek	RSC-321	Mon	Sounder	1st of month	-
322	Resort at Squaw Creek	RSC-322	Mon	Sounder	1st of month	-
323	Resort at Squaw Creek	RSC-323	Mon	Sounder	1st of month	-
324	Resort at Squaw Creek	RSC-324	Mon	Sounder	1st of month	Install data logger ¹

Well Name	Owner	Database ID	Well Type	Groundwater Level Monitoring		
				Current Method	Schedule	Action
325	Resort at Squaw Creek	RSC-325	Mon	Sounder	1st of month	-
326	Resort at Squaw Creek	RSC-326	Mon	Sounder	1st of month	-
327	Resort at Squaw Creek	RSC-327	Mon	Sounder	1st of month	Install data logger ¹
328	Resort at Squaw Creek	RSC-328	Mon	Sounder	1st of month	Install data logger ¹
329	Resort at Squaw Creek	RSC-329	Mon	Sounder	1st of month	-
330	Resort at Squaw Creek	RSC-330	Mon	Sounder	1st of month	-
331	Resort at Squaw Creek	RSC-331	Mon	Sounder	1st of month	-
332	Resort at Squaw Creek	RSC-332	Mon	Sounder	1st of month	-
333	Resort at Squaw Creek	RSC-333	Mon	Sounder	1st of month	-
334	Resort at Squaw Creek	RSC-334	Mon	Sounder	1st of month	-
335	Resort at Squaw Creek	RSC-335	Mon	Sounder	1st of month	-
Ski Corp 1	Ski Corp	SC-1	Prod	Unknown	1st of month	Install data logger
SVMWC #1	SVMWC	SVMWC-1	Prod	Sounder	1st of month	-
SVMWC #2	SVMWC	SVMWC-2	Prod	Sounder	1st of month	Install data logger
SVPSD #1R	SVPSD	SVPSD-1R	Prod	SCADA	1st of month	-
SVPSD #2	SVPSD	SVPSD-2	Prod	SCADA	1st of month	-
SVPSD #3	SVPSD	SVPSD-3	Prod	SCADA	1st of month	-
SVPSD #4R	SVPSD	SVPSD-4R	Mon	Data logger	1st of month	-
SVPSD #5R	SVPSD	SVPSD-5R	Prod	SCADA	1st of month	-
MW-5D	SVPSD	SVPSD-5D	Mon	Data logger	1st of month	-
MW-5S	SVPSD	SVPSD-5S	Mon	Data logger	1st of month	-
PlumpJack Deep	SVPSD	SVPSD-PlumpJackD	Mon	Sounder	1st of month	Install data logger ¹
PlumpJack Shallow	SVPSD	SVPSD-PlumpJackS	Mon	Sounder	1st of month	Install data logger ¹
Poulsen Deep	SVPSD	SVPSD-PoulsenD	Mon	Data logger	1st of month	-
Poulsen Shallow	SVPSD	SVPSD-PoulsenS	Mon	Data logger	1st of month	-

¹ Data logger purchased as part of the AB303 Aquifer Stream Interaction Study
Mon = monitoring; Prod = production

2.1.4 METHODOLOGY

Groundwater level measurements can be taken manually by sounder or by an automatic recording device such as a data logger. A number of SVPSD wells in the Valley already have data loggers installed and operating (Table 1).

2.1.4.1 DATA LOGGERS

DESCRIPTION OF DATA LOGGERS

The use of the term “data logger” in this monitoring plan refers collectively to a submersible pressure transducer (pressure-sensing device) and its electronic data logger (digital data recorder). Pressure transducers, typically installed at a fixed depth in a well, sense the change in pressure against a membrane. Pressure changes occur in response to changes in the height of water above the transducer, and thus in the weight of the water column in the well. Detailed information on the use of submersible pressure transducers in water resources investigations can be found at:

<http://pubs.usgs.gov/twri/twri8a3/pdf/twri8-a3.pdf>

Monitoring wells that do not currently have data loggers should be equipped with dedicated loggers to ensure accurate, consistent measurements requiring minimal time and effort to collect. Additionally, data loggers will continue to record groundwater levels in winter when overlying snow limits access to wells. Table 1 identifies monitoring wells which are currently equipped with data loggers or will have data loggers installed soon.

SVPSD’s active production wells already have data loggers installed as part of their SCADA system. Production and irrigation wells owned by SVMWC, PlumpJack Squaw Valley Inn, RSC, and Ski Corp should be equipped with data loggers within the next year as indicated in Table 1. In the meantime, groundwater levels in these wells should continue to be measured by hand (sounder) on the first day of each month.

Currently two different types of data loggers have been installed by SVPSD. Four production wells linked to the District’s SCADA system have Telog data loggers, and five SVPSD monitoring wells have Mini-Diver data loggers. For ease of use, size, memory, and cost effectiveness, it is recommended that future wells requiring loggers be equipped with Mini-Divers.

NOTES ON USE, MAINTENANCE AND CALIBRATION OF DATA LOGGERS

- Use the data logger history sheet provided in Appendix A each time data is downloaded from the data logger or the data logger is disturbed/removed from the well.
- Ensure that pressure transducer equipment is properly maintained and calibrated according to the manufacturer's instructions.
- Perform routine checks each time a transducer is installed or removed from a well, and conduct maintenance on an as-needed basis. Routine checks and maintenance activities include the following:
 - Check/change batteries
 - Check cables and steel wires
 - Check attachment of cable to well is secure
 - Keep equipment clean and work area uncluttered
 - Wipe cable and transducers with a clean cloth during removal from well
 - Disconnect components and package appropriately for transport and storage.
- When the data logger is attached to a laptop with the Diver-Office software, check the battery status. Diver loggers have an internal power supply that should last 8-10 years. If the battery is close to depletion, the logger should be replaced.
- If a data logger is removed from a well, handle it with care, making sure not to drop it on the ground.
- Do not allow any of the cables to knot or kink. If removing the cables from a well, coil the cables up neatly and do not stand on them.
- Prior to data logger download or removal, measure the groundwater level using a sounder. Record the depth to water, date and time on the data logger history sheet, and compare it with a data logger measurement at approximately the same time.

The Diver data loggers are factory calibrated according with a predefined procedure prior to delivery.

Detailed instructions on how to download data from the Diver data loggers are provided in Appendix B, along with instructions on how to import the data into the Olympic Valley Database.

2.1.4.2 MANUAL GROUNDWATER LEVEL MEASUREMENTS

Where groundwater levels are measured manually, one of the following methods can be used:

- Electronic Water Level Indicators or Sounder – These types of instruments consist of a spool of dual conductor wire, a probe attached to the end, and an indicator. When the probe comes in contact with water, the circuit is closed and a meter light and/or audible buzzer attached to the spool will signal contact. The depth to water should be measured in relation to the reference elevation discussed earlier. Measurements should be made and recorded to the nearest 0.01 foot.
- Other Methods – There are other types of water level indicators and recorders available, such as weighted steel tape, chalked tape, sliding float method and air line pressure method.

Devices used to measure groundwater levels should be calibrated annually against a steel surveyor's chain. These devices should be calibrated to 0.01 foot per 10 feet of length. Before each use, these devices should be prepared according to the manufacturer's instructions (if appropriate) and checked for obvious damage. All calibration and maintenance data should be documented.

The form included in Appendix C should be used for manual soundings of depth to water.

2.2 GROUNDWATER PRODUCTION MONITORING

All groundwater production from municipal and irrigation wells with flow meters are to be reported monthly. Data from the flow meters shall be recorded on the last day of each month. The production for each month is calculated as the difference between the flow meter reading on the last day of the month and the last day of the previous month. The production volume is recorded in gallons. The form in Appendix D is to be completed for all production wells each month, even if a particular well has not been used during the month.

Figure 2 shows the location of the production wells, and Table 2 lists the wells and provides details on whether they are metered.



Figure 2: Olympic Valley Groundwater Production Monitoring Locations

Table 2: Current Production Wells in Olympic Valley

Well	Owner	Database ID	Metered
PlumpJack Production	PlumpJack/Squaw Valley Inn	PJ-PJ	no
18-1	Resort at Squaw Creek	RSC-18-1	combined meter
18-2		RSC-18-2	
18-3R		RSC-18-3R	
Well 1R	Squaw Valley Public Service District	SVPSD-1R	yes
Well 2		SVPSD-2	yes
Well 3		SVPSD-3	yes
Well 5R		SVPSD-5R	yes
Well 1	Squaw Valley Mutual Water Company	SVMWC-1	yes
Well 2		SVMWC-2	yes
198205	Ski Corp	SC-1	no
198206		SC-2	no
198207		SC-3	no
198208		SC-4	no

Any new production wells installed in Olympic Valley will be included as part of this monitoring plan, and will therefore require a water meter be installed and monthly reporting of groundwater production.

The Resort at Squaw Creek pumps irrigation and snowmaking water from three wells (18-1, 18-2, and 18-3R) into storage ponds. Currently, all water used by RSC is pumped out of these ponds and passes through a single flow meter. We recommend that individual flow meters be installed at each wellhead. As per Item 3.8 of the Water and Sewer Service Agreement between SVPSD and the RSC, "Developer shall at it expense install telemetry systems and well head meters at all of its irrigation wells...". This condition will be effective only after Phase II of the development begins. If possible, meters should be installed as soon as is practical.

2.3 GROUNDWATER QUALITY

For purposes of this monitoring plan, the parameters and schedules for water quality sampling and testing will not be changed from the current monitoring required by CDPH for municipal water supply wells, and for the meadow monitoring wells under the CHAMPS program.

The CDPH monitoring schedules for public water supply wells are provided on their website. As of February 2010, the schedules for the public water supply wells in the Olympic Valley can be found at:

<http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Monitoringschedule/LassenDistrict02.pdf>

Table 3 summarizes CDPH’s schedule and constituents for the SVPSD and SVMWC municipal water supply wells.

Table 3: Public Water Supply Well Water Quality Schedule

	SVPSD-1	SVPSD-2	SVPSD-3	SVPSD-5R	SVMWC-1	SVMWC-2
Nitrate (as NO ₃)	1 year	1 year	1 year	1 year	1 year	1 year
Nitrate (as N)	3 years	3 years	3 years	3 years	3 years	3 years
Inorganics	3 years	9 years	9 years	9 years	9 years	9 years
Asbestos	Waived	Waived	9 years	Waived	Waived	Waived
Perchlorate	3 years	3 years	3 years	3 years	3 years	3 years
Gross Alpha	9 years	9 years	9 years	9 years	9 years	9 years
Radium 228	3 months	3 months	3 months	3 months	3 months	3 months
Regulated SOC	Waived	Waived	Waived	Waived	Waived	Waived
Regulated VOC	6 years	6 years	6 years	6 years	6 years	6 years
GM&P	3 - 9 years*	9 years	9 years	9 years	9 years	9 years
Manganese	3 months	9 years	9 years	9 years	9 years	9 years

Notes: VOC = volatile organic compound, SOC = synthetic organic compound, GM&P = General Mineral and General Physical, * = schedule for different constituents ranges from 3 to 9 years

The irrigation wells owned by the RSC and PlumpJack are not currently monitored for groundwater quality, and are therefore not part of the groundwater quality monitoring plan. However, as per the Water and Sewer Service Agreement between SVPSD and the RSC, Well 18-3R will be tested every six months for the first two years after Phase II of the development has been completed. After the first two years, sampling will take place annually for the next three years, and thereafter, every other year for the next ten years. Well 18-3R will therefore be added to the groundwater quality monitoring system when sampling of that well is initiated.

As per the Waste Discharge Requirements for the Resort at Squaw Creek, selected monitoring wells are sampled monthly from May through October. The wells sampled include: SVPSD-5S, RSC-305, RSC-306, RSC-322, and RSC-301. Constituents currently analyzed include: dissolved nitrite nitrogen, dissolved nitrate nitrogen, dissolved kjeldahl nitrogen, dissolved total phosphorous, dissolved orthophosphate, pH, temperature, and electrical conductivity.

No other monitoring wells, other than the abovementioned wells, are included for water quality monitoring as part of this monitoring plan.

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SECTION 3

GROUNDWATER DATABASE

The groundwater database is designed to coordinate groundwater data from various entities in Olympic Valley. Entities with groundwater data that are incorporated in the database include SPSD, SVMWC, Squaw Valley Ski Corporation, RSC, and PlumpJack Squaw Valley Inn. The database is not an exhaustive repository of groundwater data in the Valley, but rather coordinates specific data that assist with groundwater management. Each entity in Olympic Valley will continue to be responsible for their own data collection and forwarding the data using the appropriate forms (Appendices C and D) to the SPSD, who will be responsible for maintaining the database.

The database holds various data of importance to groundwater management, and has been designed with the following five main data categories (data tables):

- Well location, including reference point elevations;
- Well construction;
- Groundwater levels;
- Groundwater production; and
- Groundwater quality.

Fields in each data table are standard groundwater fields that are used routinely in similar databases. Queries for extracting data from the data tables are incorporated into the database to facilitate data review and export.

The first stage of database design was establishing appropriate fields for each table, including primary key (unique identifier) fields where possible. The second stage of the database's development was compiling all readily available data from HydroMetrics WRI's archives of historical data from the Valley. These data were supplemented with data from SPSD, SVMWC and RSC, which were mostly supplied in electronic format. Publicly available data from the California Department of Public Health (CDPH) for public water supply well water quality were also incorporated into the database.

Quality control (QC) is an important aspect of the database construction. Where possible, checks have been built into the database to flag data that appear anomalous within a specified range.

The structures of each of the five main data tables are documented in the following sections. Instructions for accessing and updating the database are provided in Appendix E.

3.1 WELL LOCATIONS

Basic details about the location and status of each well in Olympic Valley are included in this database table (Table 4). Attributes in this table include well owner, well coordinates, current status, well use (municipal, irrigation, etc), and reference point elevation. Each well is given a unique identifier that combines the owner name with the local well number. This is necessary as both SVPSD and SVMWC have wells named Well 1 and Well 2. Surveyed coordinates and reference point elevations are used where available.

Table 4: Well Data Table (tbl_WELL)

Field	Data Type	Description
ID	Text	Unique well name
WellName	Text	Well name
WellOwner	Text	Well owner
Easting	Number	Easting (X) in State Plane 1983 Zone II
Northing	Number	Northing (Y) in State Plane 1983 Zone II
CoordSource	Text	Source of coordinate data
WellUse	Text	Current well use
WellStatus	Text	Well status
StatusDate	Date/Time	Date status reported
RefPtElev1	Number	Current reference point elevation, feet above sea level
RefPtElev2	Number	Previous reference point elevation, feet above sea level
RefPtChangeDate	Date/Time	Date the reference point changed
RefPtDescrip	Text	Description of where reference point is located
RefPtSurvey	Text	How reference point elevation was obtained
RefPt1_Datum	Text	Datum of the current reference point
DataLoggerNo	Text	Data logger serial number, if installed

3.2 WELL CONSTRUCTION

All well logs available in reports and files from West Yost Associates, Eco:Logic Engineering, Kleinfelder & Associates, and HydroMetrics WRI were reviewed for well construction information. The year the well was constructed; depth of the well; and all

well casing, screen, gravel pack, and sealing information are contained in the well construction table (Table 5). This table should be updated if the well's construction is altered at any time, for example, if a sleeve is inserted. The last field "Notes" should be used to record any information on rehabilitation or any other pertinent aspect of the well's construction.

Table 5: Well Construction Table (tbl_CONSTRUCTION)

Field	Data Type	Description
ID	Text	Unique well name
YearConstruct	Number	Year well was constructed
Driller	Text	Drill company who completed the well
DrillType	Text	Drilling method
LogAvailable	Yes/No	Is the drillers or consultant log available for the well
DrillDepth	Number	Depth well is drilled to (feet)
CompleteDepth	Number	Depth well has casing/screen to (feet)
CondDepth	Number	Conductor casing depth (feet)
CondMaterial	Text	Conductor casing material type
CondDiam	Number	Diameter of conductor casing (inch)
CondSealType	Text	Type of material used for the conductor casing seal
CasingMaterial	Text	Blank casing material type
CasingDiam	Number	Casing diameter (inches)
CasingThick	Text	Casing thickness (inches)
ScreenType	Text	Screen type
Screen1Material	Text	Uppermost screen material type
Screen2Material	Text	2nd screen material type
Screen3Material	Text	3rd screen material type
Screen4Material	Text	4th screen material type
Screen5Material	Text	5th screen material type
Screen6Material	Text	6th screen material type
Screen1Opening	Number	Uppermost screen opening size (inches)
Screen2Opening	Number	2nd screen opening size (inches)
Screen3Opening	Number	3rd screen opening size (inches)
Screen4Opening	Number	4th screen opening size (inches)
Screen5Opening	Number	5th screen opening size (inches)
Screen6Opening	Number	6th screen opening size (inches)
BotCasing1Dep	Number	Depth to the bottom of the 1st section of blank casing (feet)
BotScreen1Dep	Number	Depth to the bottom of the 1st section of screen (feet)

Field	Data Type	Description
BotCasing2Dep	Number	Depth to the bottom of the 2nd section of blank casing (feet)
BotScreen2Dep	Number	Depth to the bottom of the 2nd section of screen (feet)
BotCasing3Dep	Number	Depth to the bottom of the 3rd section of blank casing (feet)
BotScreen3Dep	Number	Depth to the bottom of the 3rd section of screen (feet)
BotCasing4Dep	Number	Depth to the bottom of the 4th section of blank casing (feet)
BotScreen4Dep	Number	Depth to the bottom of the 4th section of screen (feet)
BotCasing5Dep	Number	Depth to the bottom of the 5th section of blank casing (feet)
BotScreen5Dep	Number	Depth to the bottom of the 5th section of screen (feet)
BotCasing6Dep	Number	Depth to the bottom of the 6th section of blank casing (feet)
BotScreen6Dep	Number	Depth to the bottom of the 6th section of screen (feet)
BotCasing7Dep	Number	depth to the bottom of the 7th section of blank casing
FilterPackType	Text	Type of filter material - include size
FilterFromDep	Number	Depth at which filter pack starts (feet)
FilterToDep	Number	Depth at which filter pack ends (feet)
SanitSealType	Text	Sanitary seal materials
SanSealToDep	Number	Depth to which sanitary seal extends (feet)
Notes	Memo	Notes
DateEntered	Date/Time	Date construction data entered

3.3 GROUNDWATER LEVELS

Groundwater levels for all wells are to be collected as per the monitoring plan outlined in Section 2.1. The primary purpose of the groundwater level data table (Table 6) is to store monthly depth to water data. Other fields include how the measurement was taken and whether the well was pumping or not.

Table 6: Groundwater Level Table (tbl_GWL)

Field	Data Type	Description
GWL_ID	AutoNumber	Unique record number assigned automatically
ID	Text	Unique well name
Date	Date	Date on which level was measured
Time	Time	Time at which measurement taken
DepthToWater	Number	Depth to water from reference point (feet)
MeasureMethod	Text	Method used to measure groundwater level
MeasureBy	Text	Person who took the measurements
Status	Text	Pumping or static level
DateEntered	Date/Time	Date data entered into database

3.4 GROUNDWATER PRODUCTION

The groundwater production data table stores the beginning and ending meter readings, and monthly volume pumped (Table 7). Monthly production data are to be recorded on the field production form provided in Appendix D; and then the data on the form is entered manually into the database. Units must be in gallons.

Table 7: Groundwater Production Table (tbl_PROD)

Field	Data Type	Description
ID	Text	Unique well name
Month	Date/Time	Production month
MeterReadFirst	Number	Meter reading on the first day of the month
MeterReadLast	Text	Meter reading on the last day of the month
ProdVol	Number	Monthly volume pumped (last day – first day meter reading)
Units	Text	Production units (should be in gallons)
ProdSource	Date/Time	Source of data
Comments	Text	Comments

3.5 GROUNDWATER QUALITY

The water quality portion of the database is stored in one table that contains groundwater quality data (Table 8), and one related table that lists constituents with a unique STORET number (Table 9). Because there are non-unique ways constituents can be named, a STORET number is assigned in the groundwater quality table to each record in place of a recognizable constituent. STORET numbers were developed by the US EPA as part of their "STORage and RETrieval" system, an electronic data system for water quality monitoring. Each STORET number is unique and represents a specific constituent. The database links the StoretNum field in both tables.

The main data table is the groundwater quality table (Table 8), which contains the date and resultant concentration for each constituent tested. The STORET number is part of the table and it identifies the constituent. The groundwater quality table is a shortened version of the CDPH database. The STORET table is a lookup table that lists a unique STORET number for each constituent which may also have pseudonyms (Table 9). The STORET table is provided with the database and requires no input from the database user.

Results of water quality testing are entered into the groundwater quality data table (tbl_GWQ). When entering data, a dropdown list is provided where the STORET number is listed along with the constituent name. Selecting the constituent name will enter the STORET number into the database without having to know the STORET number. More details on this are provided in Appendix E.

Table 8: Groundwater Quality Table (tbl_GWQ)

Field	Data Type	Description
ID	Text	Unique well name
SampLabel	Text	Text written on sample label to identify the sample
SampDate	Date	Date sample was taken
SampTime	Time	Time sample was taken
LabName	Text	Laboratory that did the analysis
AnalysisDate	Date	Date analysis took place
StoretNum	Text	Unique number for chemical/parameter (from tbl_STORET)
Xmod	Text	modifier for finding (" $<$ " means not detected. "F" means false positive not confirmed with two or more follow-up samples)
Result	Number	Numerical result of analysis

Table 9: STORET Table (lut_STORETNUM)

Field	Data Type	Description
StoretNum	Text	U.S. EPA STORET number for chemical/parameter
Chemical	Text	Name of chemical/parameter
AKA1	Text	First also known as for chemical name
AKA2	Text	Second also known as for chemical name
CLS	Text	Class for chemical
ReportCode	Text	Reporting code for chemical for regulatory monitoring Compliance tracking
ReportUnit	Text	Reporting units for chemical
MCL	Number	Maximum contaminant level or enforceable drinking water standard
MDL	Number	Method detection level or detection level for purposes of reporting
RCL	Number	Reporting Contaminant level
RPHL	Number	Recommended public health level

3.6 OTHER DATABASE OBJECTS

Apart from the data tables described in the preceding sections, the database comprises a number of queries, forms, reports and macros that work together to make the database user-friendly for those who do not have database experience. Without these other objects, more advanced database knowledge would be needed to query and view selected data. It is important that these other objects are not inadvertently edited or changed as this will impact the operation of the database. The five data tables (Wells, Construction, Groundwater Levels, Production, and Groundwater Quality) are the only objects within the database that will change as data are added, deleted or edited.

3.7 DATABASE UPDATES

For the database to be successful and useful, it will need to be updated regularly. It is recommended that the database be updated twice a year: at the beginning of October, and in May, or whenever access to the wells is possible.

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SECTION 4 REFERENCES

California Regional Water Quality Control Board, Lahontan Region. 2009. *Monitoring and reporting program no. R6T-2009-(proposed) updated waste discharge requirements for the Resort at Squaw Creek, Placer County.*

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APPENDIX A: DATA LOGGER HISTORY SHEET

Data Logger History Sheet

Date	Time	Well	Diver Type / Serial No.	Sounded Depth to Water, ft	Battery Check	Factory Calibration Date	Download Y/N	Comments and Notes on Maintenance

APPENDIX B: DATA LOGGER DOWNLOAD INSTRUCTIONS

Diver Data Logger Download

The way in which a Diver is downloaded depends on the way in which the Diver is installed in the monitoring well. Typically all SVPSD wells are installed with a diver connected to a Diver Data Cable (DDC). There are also instructions for wells that may be hanging by a steel cable.

Diver Hanging by DDC



Figure B-1:
DDC interface
cable attached
to Diver

A Diver suspended from a Diver Data Cable (DDC) can be left hanging in the well (Figure B-1). This Diver can be read out with a Diver-Mate via a DDC interface cable:

1. Unscrew the protective cap from the end of the DDC.
2. Connect the Diver-Mate to the DDC (Figure B-2). The Diver-Mate will recognize it is connected to a DDC and will start reading the data (yellow DATA LED blinking). If no Diver is connected to the DDC the error LED will light up after ± 10 seconds.



Figure B-2: Diver-mate

Disconnecting the Diver-Mate from the DDC cable will stop the yellow LED from blinking and will also stop the data download from the Diver.

3. The green LED (OK) appears when the download is successfully completed. The red LED (ERROR) will be turned on:
 - If an error occurred during data download or
 - If the Diver-Mate is disconnected during reading or
 - If no Diver is connected to the DDC or
 - If the miniSD card is not inserted in the Diver-Mate.
4. Unscrew the DDC's interface cable and replace the protective cap on the DDC.
5. Keep the cap on the Diver-Mate when it is not in use to assure that it is waterproof.
6. To download data from the Diver-Mate to a PC first remove the cap.
7. Insert the miniSD card into a PC or alternatively connect the Diver-Mate to a PC using the USB cable. The connected miniSD card or the Diver-Mate will act as a USB-memory stick. If the Diver-Mate is connected to a PC the yellow LED will appear. This indicates that the PC has recognized the unit as a portable disk.
8. Either copy the files as you would files on a USB-memory stick or use Diver-Office to manage the data on the Diver-Mate. The data can easily be copied to your PC, deleted from the Diver-Mate if desired and exported to CSV files¹.

¹ Settings for the Diver must be done in Diver-Office.

9. Make sure the Diver-Mate is charged. This can be achieved by connecting it to a PC using the supplied USB-cable. It takes approximately 9 hours to charge a completely empty battery.
10. To import files downloaded from the Diver-Mate into Diver-Office: click **Import** → **Diver Data**, and browse to the location where the files were downloaded from the Diver-Mate. Make sure selected file type is DAT.
11. Select file or multiple files by holding down the Ctrl key while clicking on the files.
12. Clicking on OK will bring the files into Diver-Office.

The only way to STOP, START or reprogram a Diver is to connect it directly to a PC (laptop or mobilePC) with Diver-Office software and the optical reader (Figure B-3). After data is downloaded, evaluate if there is enough space on the logger to store data until the next download, if there is not enough space, the logger needs to be stopped and restarted. Stopping and restarting a Diver deletes all the data on the logger to provide space for new data.

Diver Hanging by Steel Cable



Figure B-4:
Diver on Steel Cable

A Diver hanging in the monitoring well suspended from a steel cable (Figure B-4) must first be removed from the monitoring well before it can be read out. The Diver is read out with the help of an optical readout unit (Figure B-3) or a Diver-Mate with a short Diver Data Cable (DDC) cable attached (Figure B-1). Downloading data from a Diver data logger using an optical readout unit involves the following:

1. Connect the readout unit to your Pocket PC or computer (PC) via the USB port. The required drivers and Diver-Office should already be loaded on your PC. The drivers are automatically installed using Diver software (Diver-Office or Diver-Pocket). The software can be downloaded from www.swstechnology.com.
2. Unscrew the Diver's suspension eye.
3. Insert the Diver upside down into the readout unit (Figure B-2).
4. To download the data recorded by the Diver click the **Data** icon on your PC. During the data download the progress is indicated by a progress bar. Once the data has been downloaded it will be exported if this option is selected in the Project Settings. Subsequently, the program will jump to the tree view where the downloaded time series will be selected and a graph/table of the data will be shown.



Figure B-3:
Optical readout unit

For the option of the Diver-Mate with a short DDC cable attached follow instruction provided above under **Diver Hanging by DDC**.

Notes on Using Diver-Office

Complete information about Diver-Office software is included in the help file accompanying the Diver-Office software.

Project Settings

Selecting **Project** → **Settings** allows the user to modify the following:

1. Set project folder – all files will be saved to this location
2. Default Export Settings – CSV only should be checked
3. Export on Download – should be checked
4. Project Time Settings – check Computer Time
5. Vertical Reference Datum – set to National Geodetic Vertical Datum 1929

Diver Settings

Information about the data logger placed in a well can be viewed and modified by selecting **View** → **Diver** or clicking on the **Diver** icon (Diver must be connected to the PC for this to work). This window will provide the Diver status such as either **STARTED** or **STOPPED**. If you use future start, the status can also be **FUTURE START**. It also shows the amount of space left (Samples taken) and battery left.

Important to note when in Diver Settings window:

- If anything is changed, such as Record Interval, you need to click on the **Program** icon to update the settings. Failure to do so will not save your changes to the Diver.
- The Actual Data window shows the current reading for the Diver.
- If the **Stop** icon is clicked, be aware that once you click to confirm stopping the Diver recording, all data on the logger will be lost on restart. It is therefore important to make sure the data is correctly downloaded from the Diver after it has been stopped, and before restarting it again for redeployment in the well.

When restarting the Diver (**Start** icon), a window will appear telling you how much time you have until the logger is full. Make a note of this on the form provided in Appendix A: Data Logger History Sheet

Prepare Diver Data for Import into Database

There are three basic steps for preparing Diver data for import into the database:

1. Select the data you want to compensate or export by applying a filter.
2. Ensure data is barometrically compensated.
3. Export to comma delimited file (CSV).

1 While running Diver-Office, click on the **Data** icon to open data dialog (shown below).

2 **8** **1**

BaroComp Export Delete Help

Filter

Regular Monitoring Points Barometric Monitoring Points

Uncompensated

Partly Compensated

Compensated

Filter time series starting from:

1/ 1/1990 12:00:00 AM to 4/16/2010 2:30:19 PM

Apply Reset

Monitoring Point	Start Date & Time	End Date & Time	Download Date & Time
<input type="checkbox"/> 5s5dstillingwell	6/3/2009 11:15:00 AM	6/22/2009 2:15:00 PM	6/26/2009 4:13:27 PM
<input type="checkbox"/> 5s5dstillingwell	6/22/2009 3:00:00 PM	6/25/2009 3:30:00 PM	6/26/2009 4:15:09 PM
<input type="checkbox"/> 5s5dstillingwell	3/25/2010 9:36:59 AM	3/25/2010 9:36:59 AM	3/25/2010 9:33:13 AM
<input type="checkbox"/> barometer	6/16/2009 4:00:00 PM	6/22/2009 4:00:00 PM	6/26/2009 4:13:28 PM
<input type="checkbox"/> barometer	6/22/2009 4:10:00 PM	6/25/2009 2:25:00 PM	6/26/2009 4:15:09 PM
<input type="checkbox"/> eastbridgedeeppank	6/3/2009 11:15:00 AM	6/22/2009 1:45:00 PM	6/26/2009 4:13:28 PM
<input type="checkbox"/> eastbridgedeeppank	6/22/2009 2:00:00 PM	6/25/2009 3:10:00 PM	6/26/2009 4:15:09 PM
<input type="checkbox"/> eastbridgedeeppstream	6/3/2009 11:15:00 AM	6/22/2009 1:30:00 PM	6/26/2009 4:13:28 PM
<input type="checkbox"/> eastbridgedeeppstream	6/22/2009 2:00:00 PM	6/25/2009 3:15:00 PM	6/26/2009 4:15:09 PM
<input type="checkbox"/> eastbridgeshallow	6/3/2009 11:15:00 AM	6/22/2009 1:30:00 PM	6/26/2009 4:13:28 PM
<input type="checkbox"/> eastbridgeshallow	6/22/2009 2:00:00 PM	6/25/2009 3:15:00 PM	6/26/2009 4:15:09 PM
<input type="checkbox"/> ebridgestillingwell	6/3/2009 11:30:00 AM	6/22/2009 1:30:00 PM	6/26/2009 4:13:28 PM
<input type="checkbox"/> ebridgestillingwell	6/22/2009 2:00:00 PM	6/25/2009 3:45:00 PM	6/26/2009 4:15:09 PM
<input type="checkbox"/> stream5s5d	6/3/2009 11:15:00 AM	6/22/2009 2:15:00 PM	6/26/2009 4:13:28 PM

Select All

Close

The Data dialog contains a toolbar at the top. Below is a description of each toolbar button:

- **Barometric Compensation** button opens the barometric compensation dialog from which you can perform barometric compensation on selected time series data. All groundwater level data must be barometrically compensated before it is imported into the database.
- **Export Data** button allows you to export selected time series data to MON, CSV and/or NITG file types.
- **Delete Data** button allows you to delete selected time series data from the current project.
- **Help** button opens the Diver-Office help document.

Filtering Time Series Data

By default, the Data dialog will show all the time series data that exists in the current Diver-Office project. However, you can filter the time series data by monitoring point type, barometric compensation status and/or by start/download time.

To filter the time series data by barometric compensation status, enable/disable the checkbox(es) beside the desired barometric compensation status, *e.g.*, Uncompensated, Partly Compensated, and Compensated. For example, if you would only like to see all the time series that have been compensated, select the **Compensated** checkbox, and unselect the Uncompensated and Partly Compensated checkbox.

To filter the time series data by start/download time, specify the desired start and end time in the respective text boxes.

To apply the filter, click the **Apply** button.

All the time series data that satisfy the filter criteria will be displayed in the display window below.

To reset the time and date filter criteria, click the Reset button.

Barometrically Compensate Data

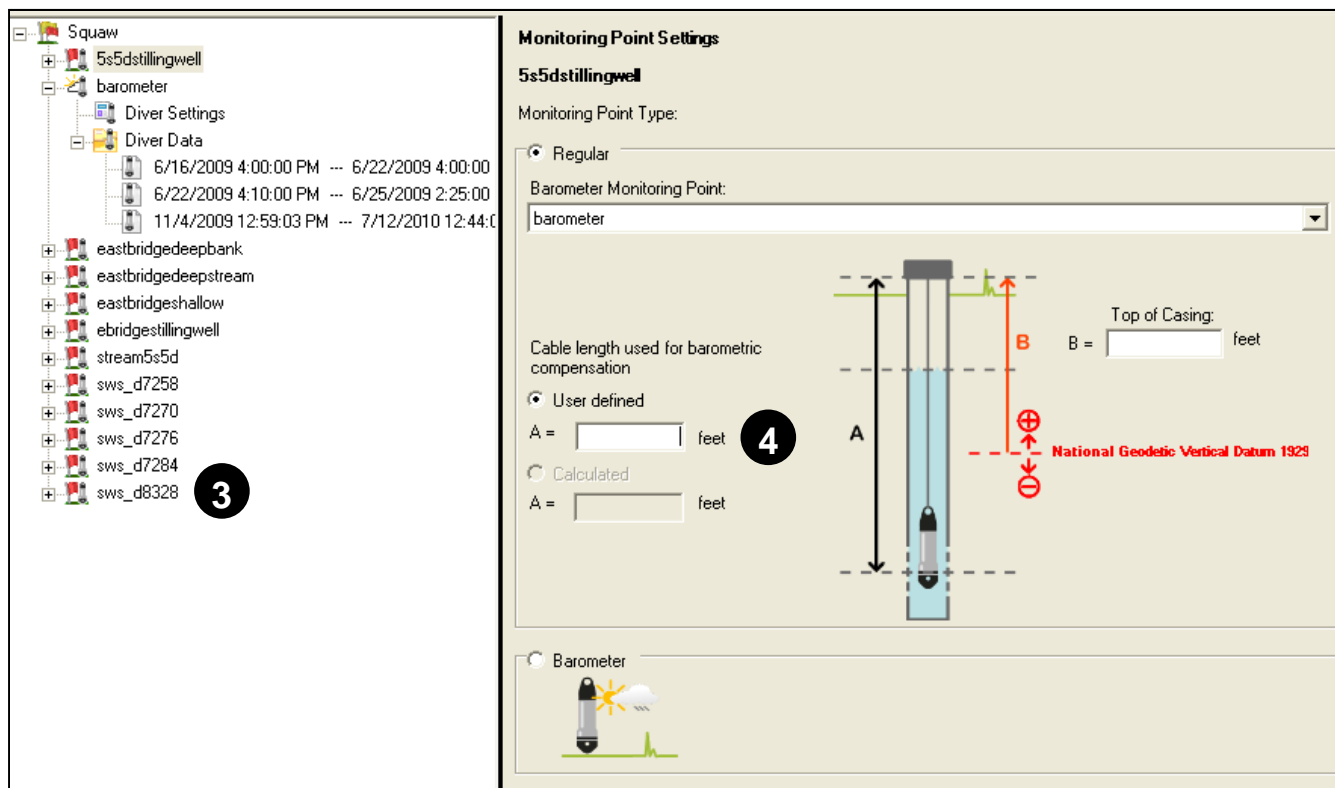
A Diver measures the groundwater level with a highly accurate pressure sensor that measures an absolute pressure. This pressure is equal to the 'weight' of the water column above the measuring instrument plus the prevailing air pressure. Subtracting these air pressure measurements from the absolute pressure measurement 'compensates' for air pressure variations.

The barometric compensation process uses linear interpolation for air pressure values if they are not measured at the same time as the groundwater level. The sampling interval of the barometer does not have to be the same as the Diver measurements it

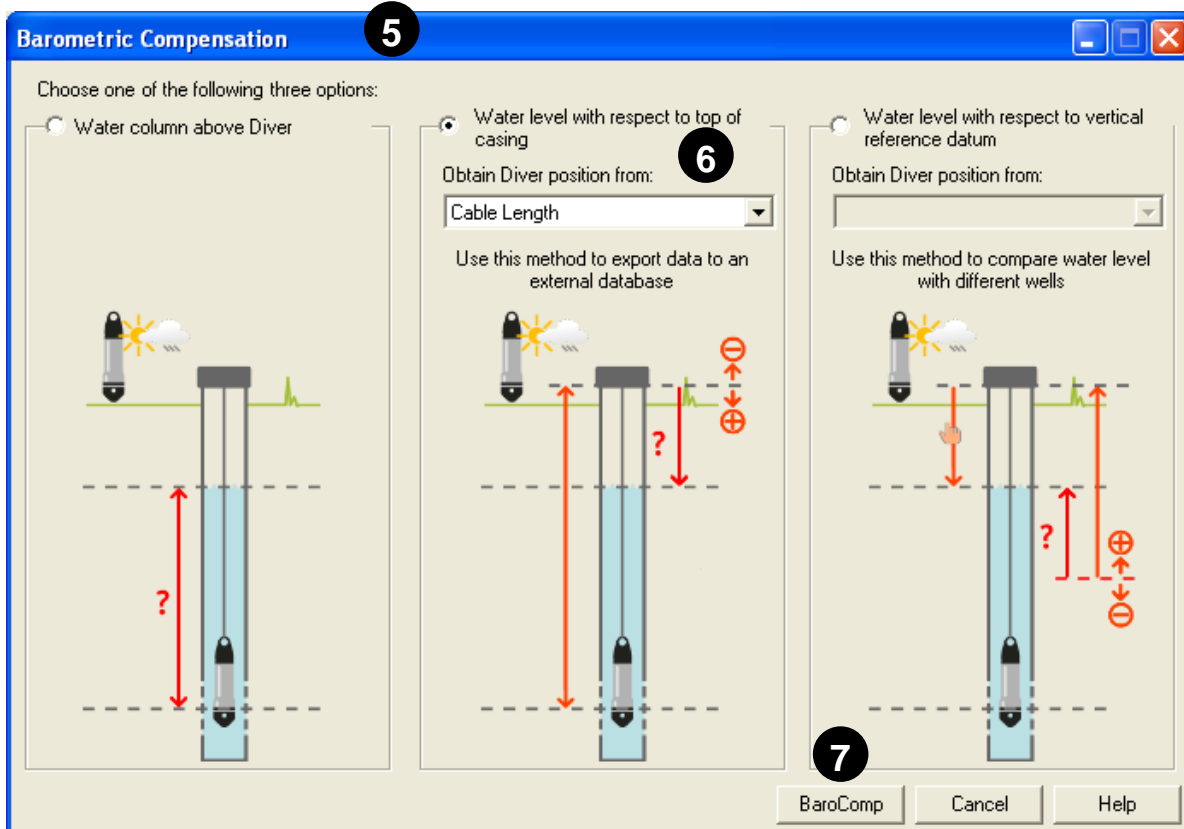
compensates. It only has to register the variations in the atmospheric pressure; a measurement with a fixed sampling speed of 1 per 30 minutes is usually good enough. Divers measure the groundwater level with respect to the Diver itself, i.e., the water column height above the Diver. However, Diver-Office allows you to express groundwater levels with respect to an external reference, e.g., vertical reference datum, top of well casing. For purposes of the database, groundwater levels will be expressed relative to the top of casing.

Procedure to compensate data:

1. Ensure that the Diver has the correct cable length entered in its Monitoring Point Settings. To see the settings, click on the Diver on the left pane. **3**



2. Only the cable length should be entered. **4**
3. Ensure that the Baro-Diver (barometer in Poulsen Shallow) data has also been uploaded to Diver-Office, and covers the same time period as the Diver data.
4. Click on the Data icon to bring up the Data window as shown on **1**
5. Filter uncompensated data for the wells and time period needed.
6. Click on the BaroComp button
7. The Barometric Compensation window will open **5**

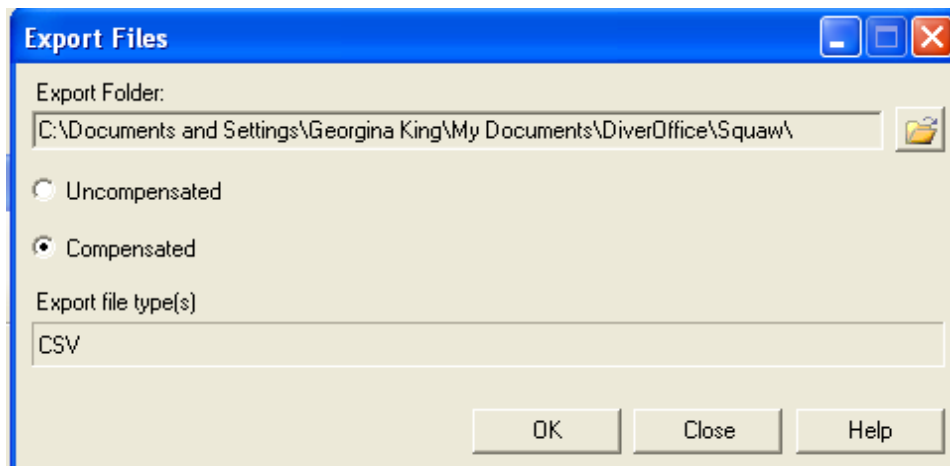


8. Select the middle option, "Water level with respect to top of casing", and select Cable Length from the pulldown box. **6**
9. Click BaroComp to compensate the data **7**

All data to be imported into the database from Diver loggers is to be compensated for barometric changes. The compensation will ensure that the depth to water is imported into the database, and not the depth of water above the logger.

Exporting Time Series Data

You can export time series data from the Data dialog by selecting the checkbox(es) beside the desired time series, and then clicking the Export icon from the toolbar. 



The Export Folder is the destination folder in which all exported data is stored on your computer. By default, the folder is set to the Diver-Office project folder. You can change the export folder by clicking on the **Open** button and selecting a new destination folder. When data is exported, it is always saved in a corresponding subfolder, e.g., MON, CSV and DAT, based on the exported file types.

You can export the time series data in either uncompensated form or compensated form, by selecting the appropriate option. For purposes of entering the data into the Olympic Valley database, the compensated selection must be made.

Click the OK button to export the data. The data will be exported in the file formats specified in the Project Settings. The data must be in **CSV** format to import correctly into the database.

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APPENDIX C: MONTHLY GROUNDWATER LEVEL FORM

Groundwater Levels Recorded in 2010

Details	
Agency	
Person recording	
	Take measurements on 1st Day of Each Month, or next day when well is off

		Well Names				
Month	Day					
Jan-2010						
Feb-2010						
Mar-2010						
Apr-2010						
May-2010						
Jun-2010						
Jul-2010						
Aug-2010						
Sep-2010						
Oct-2010						
Nov-2010						
Dec-2010						

Enter Depth to Groundwater, recorded in feet from reference point

APPENDIX D: MONTHLY PRODUCTION FORM

Monthly Groundwater Production

Details		
Agency		
Person recording		
Well Name		
	Meter Reading (gallons)	Monthly Volume Current Month - Prev Month)
Last Day of Dec		—
Last Day of Jan		
Last Day of Feb		
Last Day of Mar		
Last Day of Apr		
Last Day of May		
Last Day of Jun		
Last Day of Jul		
Last Day of Aug		
Last Day of Sep		
Last Day of Oct		
Last Day of Nov		
Last Day of Dec		

Year

	Meter Reading (gallons)	Monthly Volume Current Month - Prev Month)
		—

	Meter Reading (gallons)	Monthly Volume Current Month - Prev Month)
		—

APPENDIX E: DATABASE INSTRUCTIONS

OPENING WINDOW (MAIN SWITCHBOARD)

The opening window, or main switchboard, of the database contains clickable buttons to all the functions available to the database user. The buttons are grouped into four categories: Groundwater Levels, Production, Quality, and Wells.

For each category, there is an option to view the chart of a selected well, and thereafter to export the data to Excel, print the chart, or exit the chart. Buttons related to adding data to the database are either for manual entry of data, or electronic importation of SVPSD's SCADA or Diver logger data.

The screenshot shows the main switchboard of the Olympic Valley Groundwater Database. The interface is organized into four main categories, each with a 'Click button to view:' column and a 'Click button to add data:' column. The categories are Groundwater Levels, Production, Quality, and Wells. The 'Well Details' button is highlighted with a dashed border.

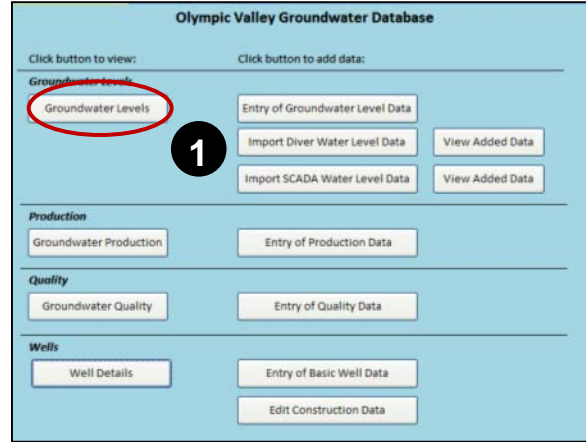
Olympic Valley Groundwater Database	
Click button to view:	Click button to add data:
Groundwater Levels	
Groundwater Levels	Entry of Groundwater Level Data
	Import Diver Water Level Data
	View Added Data
	Import SCADA Water Level Data
	View Added Data
Production	
Groundwater Production	Entry of Production Data
Quality	
Groundwater Quality	Entry of Quality Data
Wells	
Well Details	Entry of Basic Well Data
	Edit Construction Data

The following sections of this appendix provide step-by-step directions for each button in the opening window.

GROUNDWATER LEVELS

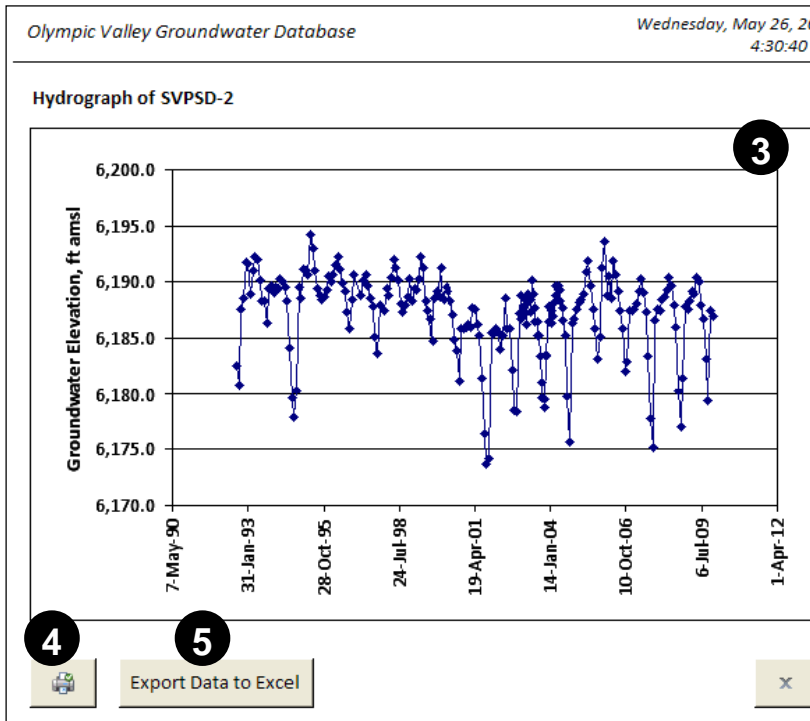
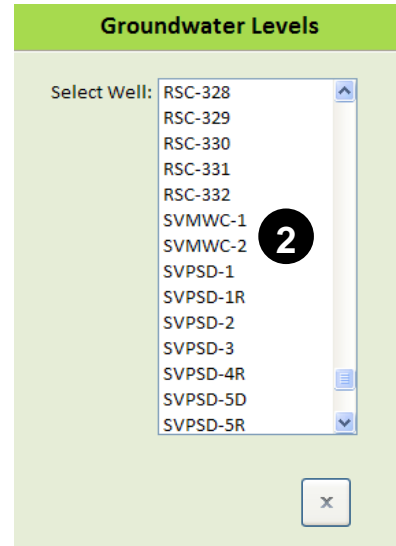
VIEW GROUNDWATER LEVEL DATA

1 Clicking the first button in the groundwater level section of the opening window will bring up a window that lists all wells in the database with groundwater level data.



2 Clicking on a well in this list will bring up that particular well's groundwater level chart (hydrograph).

3 Once in the chart view, there will be options to print the chart or to export the data to Excel.



4 Clicking this button will print the chart.

6

5 Clicking this button will export the selected well's data to Excel. When the dialog box comes up for where to save the file, make sure the right folder is selected and that a file name is entered that will easily identify the well.

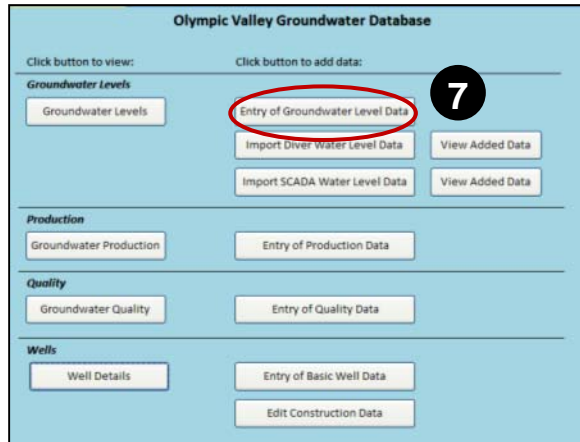
Clicking this button will close the chart.

ADD GROUNDWATER LEVEL DATA

6

The middle column of buttons in the groundwater level section are used to add data to the database.

7 Clicking on the *Entry of Groundwater Level Data* button opens the Groundwater Level Data Form shown below. This option for adding data to the database is used if there is no data logger installed in the well or if the data logger is not operating.



Groundwater levels are hand measured at the well with a sounder and recorded on the Field Groundwater Level Form (Appendix C). The field form will be used as the data source for entering in the data to the database form below.

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- 8 Select a well from the pulldown list.
- 9 Enter the date the groundwater level was measured by clicking on the interactive calendar.
- 10 Time of measurement should be recorded in the format HH:MM AM/PM.
- 11 Enter the depth to water in feet.
- 12 Select the water level measurement method from the pulldown list.
- 13 Enter the name of the person who measured the groundwater level in the field.
- 14 Select the well pumping status at the time the level measurement was taken.
- 15 No need to enter anything. The current date will automatically be inserted

here.

Clicking the *Previous Record* button will move to the previous groundwater level entry.

Clicking the *Add Next Record* button will bring up a new record with blank fields.

18 Clicking the *Delete Record* button will delete the current record.

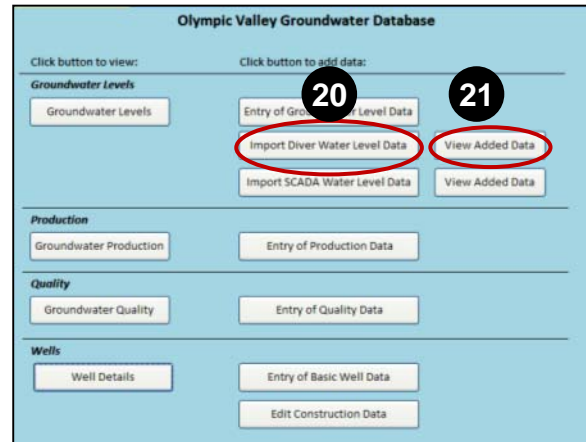
19 Clicking the *Close* button will close the form.

Note: the groundwater level data entered should be collected on the first day of each month, or on the next day after the well is turned off, should it be pumping on the first day of the month.

To import logger data into the database, two options have been provided: one for importing groundwater level data recorded by a Diver data logger, and the other for groundwater level data recorded by SVPSD’s SCADA system.

- 20 Click this button to import Diver data.

Once the *Import Diver Water level Data* button has been clicked, you will need to browse to where the Diver downloaded CSV file is located. After clicking OK the CSV file will be opened in MS Excel and reformatted automatically. At this point a window will pop up asking if you want to finalize the import. This gives you a chance to exit before data is imported to the database, in the event that you mistakenly chose the wrong file.

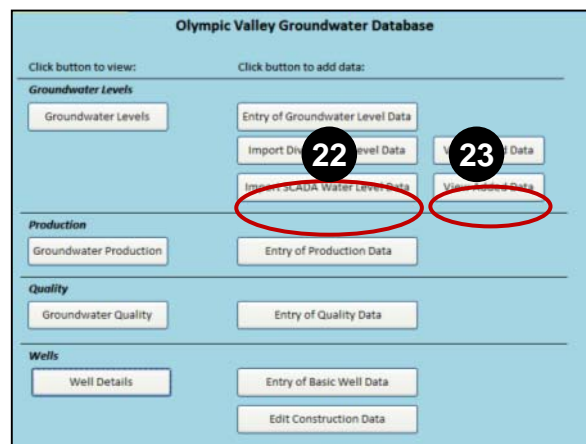


If you click “Yes”, Excel will close and you will see activity at the bottom of the Access ribbon that shows it is running a query while it imports the data into the relevant database table (tbl_GWL). This may take some time, so please be patient. A window announcing successful import of Diver data and removal of duplicates will appear to conclude the import.

- 21 Click this button to view a report of recently added groundwater level data using the Diver import button.

- 22 Click this button to import SVPSD SCADA data into the database.

Once the *Import SCADA Water level Data* button has been clicked, you will need to browse to where the SCADA Excel file is located. After selecting the file and clicking OK, the file will be opened in MS Excel. It will be reformatted automatically, Excel will close and you will see activity in the bottom ribbon that



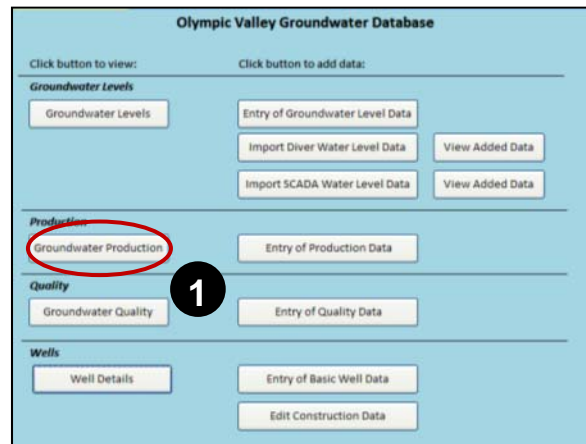
Access is processing while it imports the data into the relevant database table (tbl_GWL). A window announcing a successful import will appear to conclude the import.

- 23 Click this button to view a report of recently added groundwater level data using the SCADA import button.

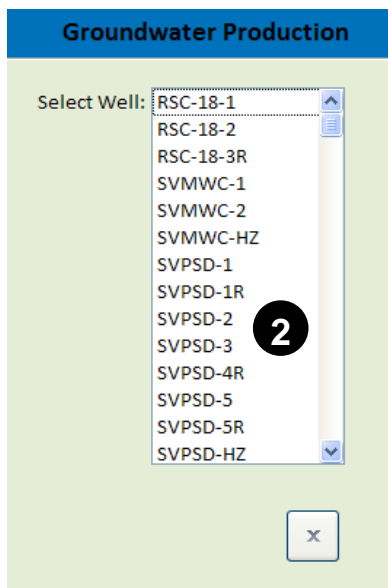
PRODUCTION

VIEW PRODUCTION DATA

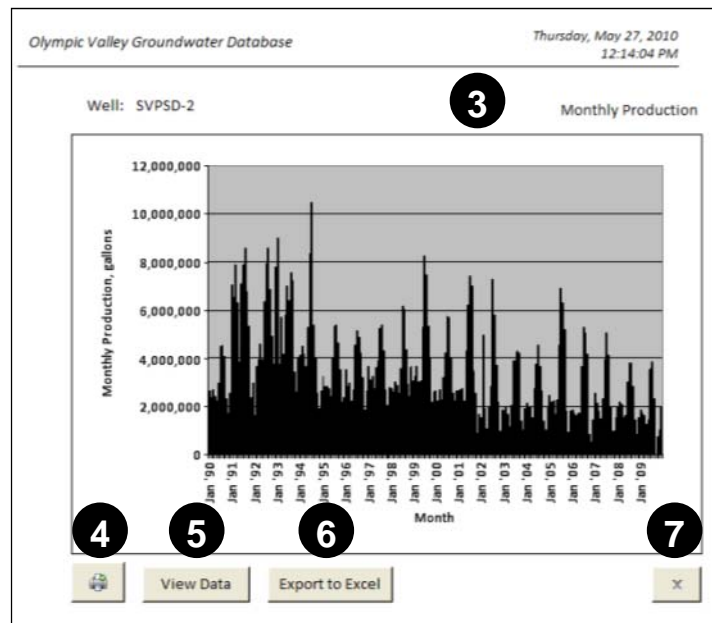
- 1 Clicking the first button under the production section of the opening window will bring up a window that lists all wells in the database with production data.



- 2 Clicking on a well in this list will bring up that particular well's production chart or hydrograph.



- 3 Once in the chart view, there will be options to print the chart, view the monthly values, or to export the data to Excel.

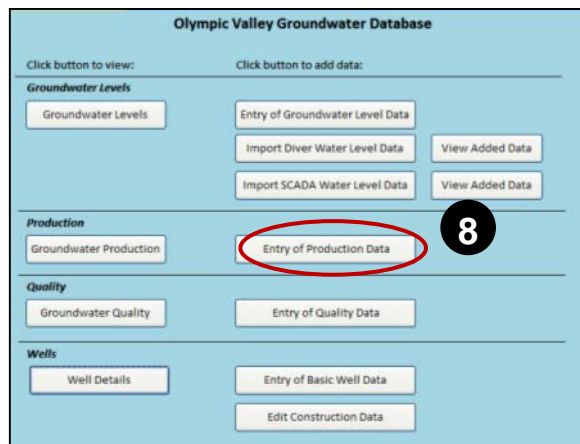


- 4 Clicking this button will print the chart.
- 5 Clicking this button will display the selected well's groundwater production data. To close the query, click on the X (close) at the level of the qry_SelectWell_Prod tab.
- 6 Clicking this button will export the selected well's production data to Excel. When the dialog box comes up for where to save the file, make sure the right folder is selected and that a file name is entered that will easily identify the well.
- 7 Clicking this button will close the chart.

ADD PRODUCTION DATA

The middle button in the production section is used to add production data to the database.

8 Clicking the *Entry of Production Data* button will open the Monthly Groundwater Production Form. This is the only option for adding monthly production data to the database. Groundwater production is recorded from the flow meter for each well in the field Groundwater Production Form (Appendix D). The field form will be used as the data source for entering in the data into the database.



Monthly Groundwater Production

Well Name: 9

Month & Year: 10 MMM-YYYY

Meter Reading 1st Day of Month: 11

Meter Reading Last Day of Month: 12

Volume: 13

Units: 14

Comments: 15

Click in this box to get calculated volume, if meter readings have been entered

Add Next Month for Same Well 16

Add New Well 17

Close 18

Delete Record 19

- 9 Select a well from the pulldown list.
- 10 Enter the month and year in the format MMM-YYYY, e.g., AUG-2010. An interactive calendar is not available, as the field only stores month and year.
- 11 Enter in the meter reading for the first day of the month (same as last day of previous month). This field may automatically be filled, if the record was added using the *Add Next Month for Same Well* button (see below).
- 12 Enter the last day of the month meter reading.
- 13 After entering **Meter Reading 1st Day of Month** and **Meter Reading Last Day of Month** boxes, clicking in the Volume box will automatically calculate the volume pumped for that month by subtracting the first day of the month meter reading from the last day of the month reading. Units must be in gallons.

If the meter has tripped over to start at zero again, it is possible to edit the volume amount by making your own calculation and overwriting the automatically calculated value. Note: after entering in a new volume

number, do not click in the Volume box as this will trigger the calculation that you are trying to overwrite.

- 14 Make sure all reading are in gallons. This field should be automatically filled in.
- 15 Enter any relevant comments.
- 16 Click this button to add a new record for the same well as you were previously working on. The well name and Meter Reading 1st Day of Month field will be automatically completed based on the previous record. All that is needed is the meter reading from the last day of the month.
- 17 Click this button to add a blank record for a new well.
- 18 Clicking the *Close* button will close the form.
- 19 Clicking the *Delete Record* button will delete the current record.

QUALITY

VIEW GROUNDWATER QUALITY DATA

- 1 Clicking the first button in the quality section of the opening window will bring up a window that lists all wells in the database with groundwater quality data.
- 2 Clicking on a well in this list will populate the list on the right side of the form with available chemicals for that well.

The screenshot displays the 'Olympic Valley Groundwater Database' interface. It is divided into two main columns: 'Click button to view:' and 'Click button to add data:'. The 'Quality' section is highlighted with a red circle and a '1' in a black circle. The 'Quality' section contains a button labeled 'Groundwater Quality' and an 'Entry of Quality Data' button. Other sections include 'Groundwater Levels' with buttons for 'Groundwater Levels', 'Entry of Groundwater Level Data', 'Import Diver Water Level Data', 'View Added Data', and 'Import SCADA Water Level Data'; 'Production' with 'Groundwater Production' and 'Entry of Production Data'; and 'Wells' with 'Well Details', 'Entry of Basic Well Data', and 'Edit Construction Data'.

- 3 Clicking this button will close the form.

Groundwater Quality

Select Well

- RSC-330
- RSC-331
- SVMWC-1
- SVMWC-2
- SVPSD-1
- SVPSD-1R
- SVPSD-2**
- SVPSD-3
- SVPSD-4R
- SVPSD-5
- SVPSD-5R
- SVPSD-5S
- SVPSD-6

Chemical

- SOURCE TEMPERATURE C
- SPECIFIC CONDUCTANCE
- STANDARD PLATE COUNT
- STYRENE
- SULFATE
- TERT-AMYL-METHYL ETHER
- TERT-BUTYL ALCOHOL
- TERT-BUTYLBENZENE
- TETRACHLOROETHYLENE
- THALLIUM
- TOLUENE
- TOTAL DISSOLVED SOLIDS**
- TOTAL SOLIDS (GRAVIMETRIC)
- TOTAL TRIHALOMETHANES

3

First select well and then chemical

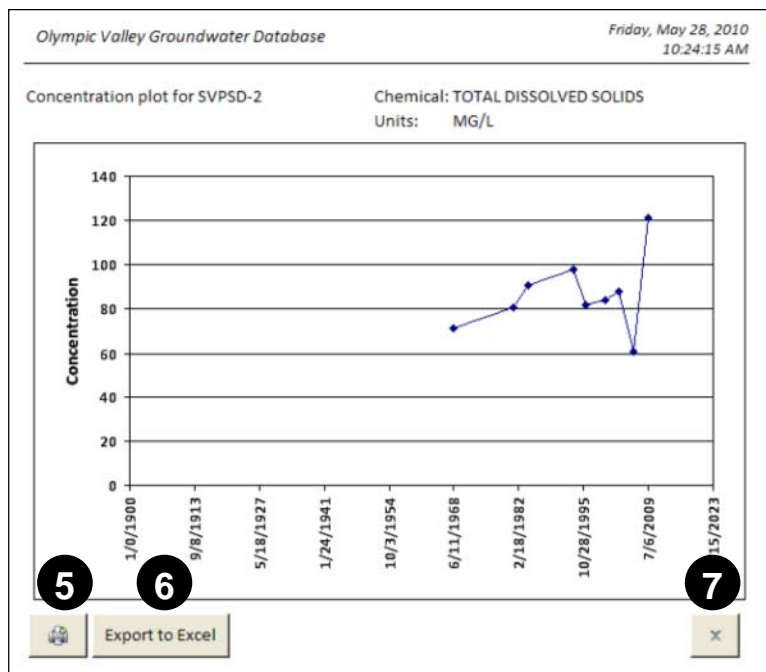
4

4 After a well and chemical have been selected, click on this button to view the chart. Once in the chart view, there will be options to print the chart, view the monthly values, or to export the data to Excel.

5 Clicking this button will print the chart.

6 Clicking this button will export the selected well's data to Excel. When the dialog box comes up for where to save the file, make sure the right folder is selected and that a file name is entered that will easily identify the well.

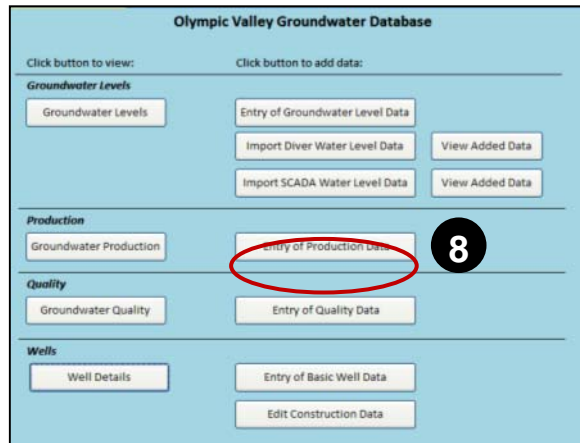
7 Clicking this button will close the chart.



ADD QUALITY DATA

The middle button in the quality section is used to add groundwater quality data to the database.

8 Clicking the *Entry of Quality Data* button will open the Groundwater Quality Form. This is the only option for adding groundwater quality data to the database.



The screenshot shows the 'Groundwater Quality' form. It has a blue header with a menu icon and the title 'Groundwater Quality'. The form contains several input fields and buttons:

- Well Name:** A dropdown menu with a circled '9' next to it.
- Sample Date:** A date picker with a circled '10' next to it.
- Sample Time:** A time picker with a circled '11' next to it. The format is 'HH:MM PM'.
- Laboratory Name:** A dropdown menu with a circled '12' next to it.
- Analysis Date:** A date picker with a circled '13' next to it.
- STORET Number:** A dropdown menu with a circled '14' next to it.
- Modifier (i.e. non-detect =<):** A dropdown menu with a circled '15' next to it.
- Result:** A text input field with a circled '16' next to it.

On the right side of the form, there are four buttons: 'Previous Record', 'Add Next Record', 'Delete Record', and 'Close'. Below the form, there is a note: 'Unit must be in Units will automatically be shown here depending on the constituent or STORET selected above'.

- 9** Select a well from the pulldown list.
- 10** Enter the date the groundwater was sampled by clicking on the interactive calendar.
- 11** Time the sample was taken should be recorded in the format HH:MM AM/PM.

- 12 Enter the name of the laboratory that analyzed the water sample.
- 13 Enter the date the sample was analyzed by the laboratory.
- 14 Select the name of the constituent from the pulldown list. This will automatically enter the STORET number into the database, and not the chemical name.
- 15 If the result of the analysis is non-detect, enter "<" in this field. If the laboratory reported the result as a J-value, enter "J". Leave the field blank if the laboratory did not include any flags on the result.
- 16 Enter the concentration or result of the analysis. If the value was non-detect, enter the detection limit.

BASIC WELL DATA

VIEW WELL DETAILS

- 1 Clicking the first button under the well section of the opening window will bring up a window that lists all wells in the database.
- 2 Clicking on a well in this list will bring up a report that summarizes the well's location and construction details.
- 3 Well details report.
- 4 Clicking this button will print the report.
- 5 Clicking this button will close the report.

Olympic Valley Groundwater Database

Click button to view: Click button to add data:

Groundwater Levels

Groundwater Levels Entry of Groundwater Level Data

Import Diver Water Level Data View Added Data

Import SCADA Water Level Data View Added Data

Production

Groundwater Production Entry of Production Data

Quality

Groundwater Quality Entry of Quality Data

Wells

Well Details Entry of Basic Well Data

 Edit Construction Data

Well Details

Select Well: PJ

RSC-18-1

RSC-18-2

RSC-18-3R

RSC-301

RSC-302

RSC-303

RSC-304

RSC-305

RSC-306


RSC-307

RSC-308

RSC-309

RSC-310

X




Well Details 3


Monday, August 09, 2010
11:25:35 AM

<p>Unique well name: SVPSD-1R</p> <p>Well Name: SVPSD #1R</p> <p>Well Owner: Squaw Valley Public Service District</p> <p>Easting (X) in State Plane 1983 Zone II: 7062904.942</p> <p>Northing (Y) in State Plane 1983 Zone II: 2202493.241</p> <p>Source of Coordinate Data: Survey</p> <p>Current Well Use: Public water supply</p> <p>Well Status: Active</p> <p>Date status reported: 1/21/2010</p> <p>Reference Point Elevation, feet above sea level: 6202.2</p> <p>Previous Ref Pt Elev, ft asl</p> <p>Date of Ref Pt Change:</p> <p>Description of Where Reference Point is Located: ground level</p> <p>How Reference Point Elevation was Obtained: Survey</p> <p>Current Ref Pt Datum:</p> <p>If a Data Logger is Installed, What is its Serial Number:</p> <p>Year Constructed: 2004</p> <p>Driller:</p> <p>Drilling Method: rotary</p> <p>Is a Log Available?: No</p> <p>Total Drilled Depth, ft: 125</p> <p>Completed Well Depth: 125</p> <p>Conductor Depth, ft:</p> <p>Conductor Material:</p> <p>Conductir Diameter, inch:</p>	<p>Annular Seal Type:</p> <p>Blank Casing Type: 304 stainless steel</p> <p>Blank Casing Diameter, inch: 16.625</p> <p>Blank Casing Thickness, inch: 0.25</p> <p>Screen Type: continuous slot wire</p> <p>Filter Pack Type: 8 x 16 mesh</p> <p>Filter Pack From Depth: 70</p> <p>Filter Pack To Depth: 125</p> <p>Sanitary Seal Type: cement grout</p> <p>Sanitary Seal To Depth: 70</p> <p>Notes:</p>
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4



5



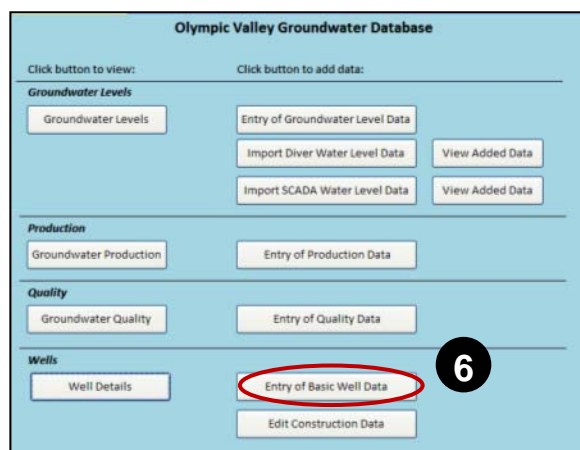
	Depth to Bottom, feet bgl	Screen Material	Screen Slot Size, inches
1st Blank Casing:	75		
1st Screen:	115	304 stainless s	
2nd Blank Casing:	125		
2nd Screen:			
3rd Blank Casing:			
3rd Screen:			
4th Blank Casing:			
4th Screen:			
5th Blank Casing:			
5th Screen:			
6th Blank Casing:			
6th Screen:			
7th Blank Casing:			

Top
Bottom

ADD WELL DETAILS

6 Clicking the *Entry of Basic Well Data* button in the well section of the opening window will open up a form called Data Entry for Basic Well Data.

The form can be used to enter basic data for both existing and new wells.



Data Entry for Basic Well Data

Unique well name:	SVPSD-5S	7
Well name:	MW-5S	8
Well owner:	Squaw Valley Public Service District	9
Easting (X) in State Plane 1983 Zone II:	7063217.934	10
Northing (Y) in State Plane 1983 Zone II:	2202984.66	11
Source of coordinate data:	Survey	12
Current well use:	Monitoring	13
Well Status:	Active	14
Date status reported:	8/10/2009	15
Reference point elevation, feet above sea level:	6197.951	16
Previous reference point elevation, ft above sea level	6197.75	17
Date reference point changed:		18
Description of where reference point is located:		19
How reference point elevation was obtained:	Survey	20
Current reference point datum	NAVD 29	21
If a data logger is installed, what is its serial number:	D7258	22

23 Add Record Find Record Edit

24 Delete Record 25 27

Is Construction Data Available for this well?: Yes

28 Add Construction Data 29 View Construction Data

30 Close

26

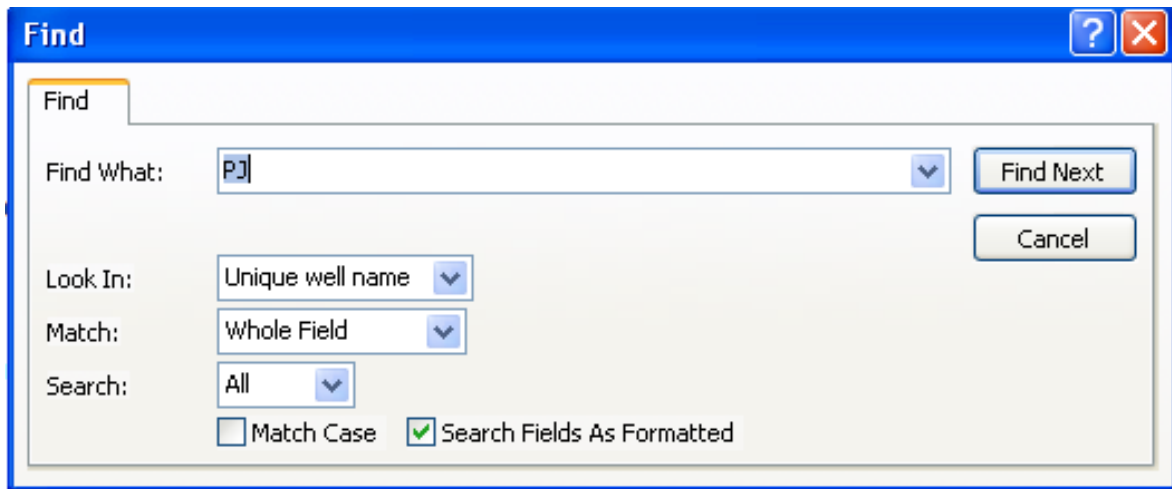
cord: 55 of 61 No Filter Search

7 Enter a unique well name that no other well in the database will have. The first part should have the name of the owner, e.g., SVPSD, and the second part should identify the well, e.g., 8: the unique well name would be SVPSD-8.

8 The full well name is added in this field.

- 9 Enter the well owner's name.
- 10 Enter the X coordinate, or Easting, in State Plane NAD 1983 Zone II (feet).
- 11 Enter the Y coordinate, or Northing, in State Plane NAD 1983 Zone II (feet).
- 12 Using the pulldown list, select the method of determining the coordinates.
- 13 Using the pulldown list, select current well use, such as, production, irrigation or monitoring.
- 14 Using the pulldown list, select the well's current status, such as, active, destroyed, or inactive.
- 15 If the well status changed, enter date of status change.
- 16 Enter the well's current reference point elevation, in feet NGVD 29.
- 17 If there is a previous reference point elevation for the well, enter it here.
- 18 Enter the date the reference point elevation changed to the current one.
- 19 Enter a description of where the current reference point is located. For example, north side of the inner PVC casing.
- 20 Using the pulldown list, enter how the current reference point elevation was obtained.
- 21 Enter the current reference point's datum, e.g., NAVD 29.
- 22 Enter the data logger serial number, if one is installed in the well.
- 23 Clicking the *Add Record* button will open a blank record that can be used for adding a new well.
- 24 Clicking the *Delete Record* button will delete the current record.

- 25 To find a particular well or record, click *Find Record*. This will open the following window:



The image shows a 'Find' dialog box with the following fields and options:

- Find What:** A text input field containing 'P3'.
- Look In:** A dropdown menu showing 'Unique well name'.
- Match:** A dropdown menu showing 'Whole Field'.
- Search:** A dropdown menu showing 'All'.
- Match Case:** An unchecked checkbox.
- Search Fields As Formatted:** A checked checkbox.
- Buttons:** 'Find Next' and 'Cancel' buttons are located on the right side.

Either use the pulldown or type in the name of the well you are looking for, and select the database field in the **Look In** box. Check other relevant options and click on the *Find Next* button.

- 26 Another way to search for record is to use the record scroll tools at the bottom of the window.

- 27 To edit a record, the *Edit* button needs to be clicked. This should prevent unintended editing of records.

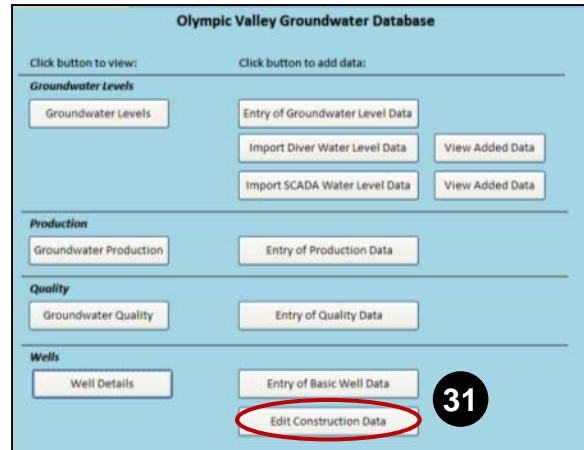
- 28 Click this to add construction information for a well. The form called Data Entry of Well Construction Data will be opened. The button may be grayed out if construction data has already been entered.

- 29 Click this to view construction information for a well. The form called Data Entry of Well Construction Data will be opened. The button may be grayed out if construction data has not already been entered.

- 30 Clicking this button will close the form.

31 Another way to get to the Data Entry of Well Construction Data form to click the *Edit Construction Data* button.

32 Use the record scroll tools at the bottom of the window to search for the well you want to edit.



Data Entry of Well Construction Data

ID:	<input type="text" value="RSC-18-1"/>	33	1st Blank Casing:	<input type="text" value="45"/>	54	Screen Material:	<input type="text" value="stainless"/>	67	Screen Slot Size, inches:	<input type="text" value="0.08"/>	73	Top
Construction Year:	<input type="text" value="1989"/>	34	1st Screen:	<input type="text" value="60"/>	55							
Driller:	<input type="text"/>	35	2nd Blank Casing:	<input type="text" value="81"/>	56							
Drilling Method:	<input type="text" value="rotary"/>	36	2nd Screen:	<input type="text" value="96"/>	57							
Is Log Available:	<input type="text" value="Yes"/>	37	3rd Blank Casing:	<input type="text" value="97"/>	58							
Total Drill Depth, ft:	<input type="text" value="102"/>	38	3rd Screen:	<input type="text"/>	59							
Completed Well Depth, ft:	<input type="text" value="102"/>	39	4th Blank Casing:	<input type="text"/>	60							
Depth of Conductor, ft bgl:	<input type="text"/>	40	4th Screen:	<input type="text"/>	61							
Conductor Material Type:	<input type="text"/>	41	5th Blank Casing:	<input type="text"/>	62							
Conductor Diameter, inch:	<input type="text"/>	42	5th Screen:	<input type="text"/>	63							
Conductor Casing Seal Type:	<input type="text"/>	43	6th Blank Casing:	<input type="text"/>	64							
Blank Casing Material Type:	<input type="text" value="steel"/>	44	6th Screen:	<input type="text"/>	65							
Blank Casing Diameter, inch:	<input type="text" value="12"/>	45	7th Blank Casing:	<input type="text"/>	66							Bottom
Casing Thickness, inch:	<input type="text"/>	46										
Screen Type:	<input type="text" value="continuous"/>	47										
Filter Pack Type:	<input type="text" value="Bird's eye"/>	48										
Filter Pack From Depth:	<input type="text" value="35"/>	49										
Filter Pack To Depth:	<input type="text" value="102"/>	50										
Sanitary Seal Type:	<input type="text" value="concrete"/>	51										
Sanitary Seal Depth:	<input type="text" value="35"/>	52										
Notes:	<input type="text"/>	53										

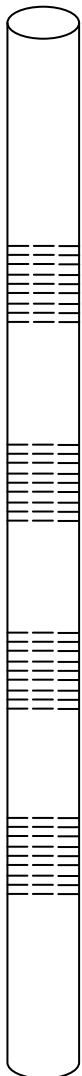
79

80

Record: 1 of 56 Unfiltered Search

- 33 The well's ID will automatically be filled in. Do not change it.
- 34 Enter the year of construction. Use the format YYYY.
- 35 Enter the name of the drilling company who drilled the well.
- 36 Enter the drilling method used to drill the well.
- 37 Indicate whether a well log is available.
- 38 Enter the depth below ground level that the well was drilled to, in feet.
- 39 Enter the depth below ground level that the well was completed to, in feet. Completion depth is the lowest depth of well casing or screen.
- 40 If the well has a conductor casing, enter the depth to which the conductor casing was set, in feet. Otherwise leave blank.
- 41 If the well has a conductor casing, enter the conductor casing material type. Otherwise leave blank.
- 42 If the well has a conductor casing, enter the conductor casing diameter, in inches. Otherwise leave blank.
- 43 Enter the conductor casing seal type, such as neat cement, bentonite grout, etc.
- 44 Enter the blank casing material type.
- 45 Enter the blank casing diameter, in inches.
- 46 Enter the casing thickness, in inches.
- 47 Enter the screen type, such as wire wrap, slotted, etc.
- 48 Enter the type of filter or gravel pack used in the well, such as 12x20, etc.
- 49 Enter the depth at which the filter pack starts, in feet (top of filter pack).

- 50 Enter the depth at which the filter pack ends, in feet (bottom of filter pack).
- 51 Enter the materials used in the sanitary seal, such as neat cement, bentonite grout, etc.
- 52 Enter the depth to which the sanitary seal extends, in feet.
- 53 Enter any notes relevant to the well's construction.



Well schematic

- 54 Enter the depth to the bottom of the uppermost blank casing, in feet.
- 55 Enter the depth to the bottom of the uppermost screen, in feet.
- 56 Enter the depth to the bottom of the second blank casing, in feet.
- 57 Enter the depth to the bottom of the second screen, in feet.
- 58 Enter the depth to the bottom of the third blank casing, in feet.
- 59 Enter the depth to the bottom of the third screen, in feet.
- 60 Enter the depth to the bottom of the fourth blank casing, in feet.
- 61 Enter the depth to the bottom of the fourth screen, in feet.

This continues in the same sequence from 62 to 66 for subsequent blank casings and screens.

- 67 Enter the screen material type for the uppermost screen.
- 68 through 72 Enter the screen material types for subsequent screen.

- 73 Enter the screen slot size for the uppermost screen, in inches.
- 74 through 78 Enter the screen material types for subsequent screen.
- 79 Clicking this will allow you to edit well construction data.
- 80 Clicking this button will close the well construction form.

Important reminders regarding the Entry of Basic Well Data form include:

- A unique well name must be assigned to new wells. The first part should indicate the well owner followed by a hyphen and the well number. For example, if SVMWC drilled a new well named Well 5, the unique name would be SVMWC-5. All the other tables are linked to this field. If there is already a well with a designation that you are attempting to enter, it will not accept it.
- Coordinates and reference point elevation data should be obtained from a survey carried out by a California registered surveyor, using NGVD29 (National Geodetic Vertical Datum 1929) and California State Plane, Zone 2 coordinates.
- Well use and status should be updated when appropriate.
- When a well has a data logger installed, its serial number should be noted. If the data logger is changed for another one at a later date, the data must be updated with the new logger serial number.