

Quality Manual

SVL ANALYTICAL, INC.
P.O. Box 929
One Government Gulch
Kellogg, Idaho 83837
208-784-1258
FAX 208-783-0891
Effective Date: January 2011

Wayne R. Sorensen
President and CEO
Wayne R. Sorensen

DEC 17, 2010
Date

John R. Kern
Laboratory Director
John R. Kern

12-17-2010
Date

Michael Desmarais
Quality Assurance Manager
Michael Desmarais

12-17-2010
Date

Kirby L. Gray
Technical Director
Kirby L. Gray

12-17-2010
Date

Technical Director
Nan S. Wilson

Date

Danny Sevy
Supervisor Inorganic Instrument Department
Danny Sevy

12/29/2010
Date

Daniel K. Gingrich II
Supervisor Classical Chemistry Department
Daniel K. Gingrich II

12/27/10
Date

Table of Contents

1.0	Quality Policy Statement	4
2.0	Organization and Structure	5
2.1	Organization Chart	6
2.2	Employee List	7
2.3	Key Employee Resumes	8
3.0	Job Descriptions	8
3.1	Laboratory Director	8
3.2	Systems Manager	8
3.3	Department Supervisor	8
3.4	Quality Assurance Manager (QAM)	8
3.5	Document Control Officer (DCO)	9
3.6	Sample Control Officer (SCO)	9
3.7	Technical Director	9
4.0	Approved Laboratory Signatories	9
5.0	Records and Document Control	9
5.1	Standard Operating Procedures (SOPs)	9
5.2	Quality Manual (QM)	9
5.3	Analytical Data	10
5.4	Training Records	10
5.5	Performance Evaluation Samples	10
5.6	External and Internal Audits	10
5.7	Corrective Action Reports (CARs)	10
5.8	Laboratory Logbooks	10
5.9	Chain of Custody	10
5.10	Analytical Reports	11
5.11	Backup and Storage of Electronic Data	11
6.0	Traceability of Measurements	11
6.1	Chemicals and Reagents	11
6.2	Water	12
7.0	Test Methods	12
7.1	Analysis Performed by SVL	12
7.2	References	15
8.0	New Work	16
8.1	Sample Acceptance policy	16
9.0	Calibration	18
9.1	Thermometers	18
9.2	Balances	18
9.3	Balance Weights	18
9.4	Micropipets	18
9.5	Repipettors	19
9.6	Refrigerators	19
9.7	Ovens	19
9.8	Inductively Coupled Plasma Mass Spectrometer (ICPMS)	19
9.9	Inductively Coupled Plasma Spectrometer (ICP)	19
9.10	Graphite Furnace Atomic Absorption Spectrometer (GFAA)	20

9.11	Mercury Analyzer (CVAA)	20
9.12	Flame Atomic Absorption Spectrometer (FLAA)	20
9.13	Ion Chromatograph (IC)	20
9.14	Flow-Injection Auto Analyzer (FIA)	21
9.15	Total Organic Carbon Analyzer (TOC)	21
9.16	UV/Visible Spectrophotometer (UV/VIS)	21
9.17	LECO Carbon/Sulfur Analyzer	22
9.18	pH and Ion Selective Electrode Meters (ISE)	22
9.19	Class A Glassware	22
10.0	Sampling, Sample Receiving, and Sample Storage	22
10.1	Sampling	22
10.2	Sample Receiving and Storage	26
10.3	Sub-sampling	27
10.4	Sample Disposal	27
11.0	Equipment and Instruments	27
12.0	Facilities	30
13.0	Standard Operating Procedures	31
13.1	Deviations	34
14.0	Quality Control	34
14.1	Quality Control Parameters	34
14.2	Control Charts	37
14.3	Acceptance Limits	38
14.4	General Frequency of Quality Control Checks	38
14.5	Maintenance	39
14.6	Uncertainty of Measurement	39
15.0	Corrective Action	39
15.1	Preventative Action	40
16.0	Complaints	40
17.0	Training	41
18.0	Ethics and Confidentiality	42
19.0	Data Review	44
19.1	Electronic Signatures	44
19.2	Data Review Flow Chart	45
20.0	Reporting	46
21.0	Audits and Verification Practices	46
21.1	Performance Testing Program	46
21.2	Internal System Audits	46
21.3	Reference Materials	47
21.4	Internal Quality Control Schemes	47
21.5	Data Audits	47
22.0	Management Review	48
23.0	Subcontracting and Purchasing	48
24.0	Transfer of Analytical Reports, Records and Samples	49
25.0	Glossary	50
26.0	Certifications	56
27.0	Quality Manual Releases	66
	Appendix 1 Resumes	57

1.0 QUALITY POLICY STATEMENT

SVL Analytical, Inc. (SVL) recognizes that an effective quality system is paramount to providing analytical data that is scientifically meaningful, legally defensible, technically accurate, and based upon the highest ethical standards. To reinforce the above objectives, SVL has committed itself to follow and be in compliance with the NELAC Standards.

The emphasis of SVL's Quality Manual (QM) is to define control procedures for receipt, handling, and storage of samples; preparation and storage of standards; calibration and maintenance of analytical equipment; performance of analytical methods; customer service; and the generation, review, and reporting of analytical data.

At SVL, quality assurance begins with the definition of Data Quality Objectives (DQO) and continues on through data reporting. Control procedures are defined for every step of the program as detailed in SVL's Standard Operating Procedures (SOPs). SVL realizes that without these controls in all phases of the analytical process, data may become suspect and hence of less value to our clients. Therefore, SVL is committed to providing data of the highest quality, usability, and defensibility for every project undertaken. SVL personnel concerned with any aspect of environmental testing are required to familiarize themselves with all quality documentation (including this manual) used at SVL and they are required to comply with all policies and procedures outlined therein.

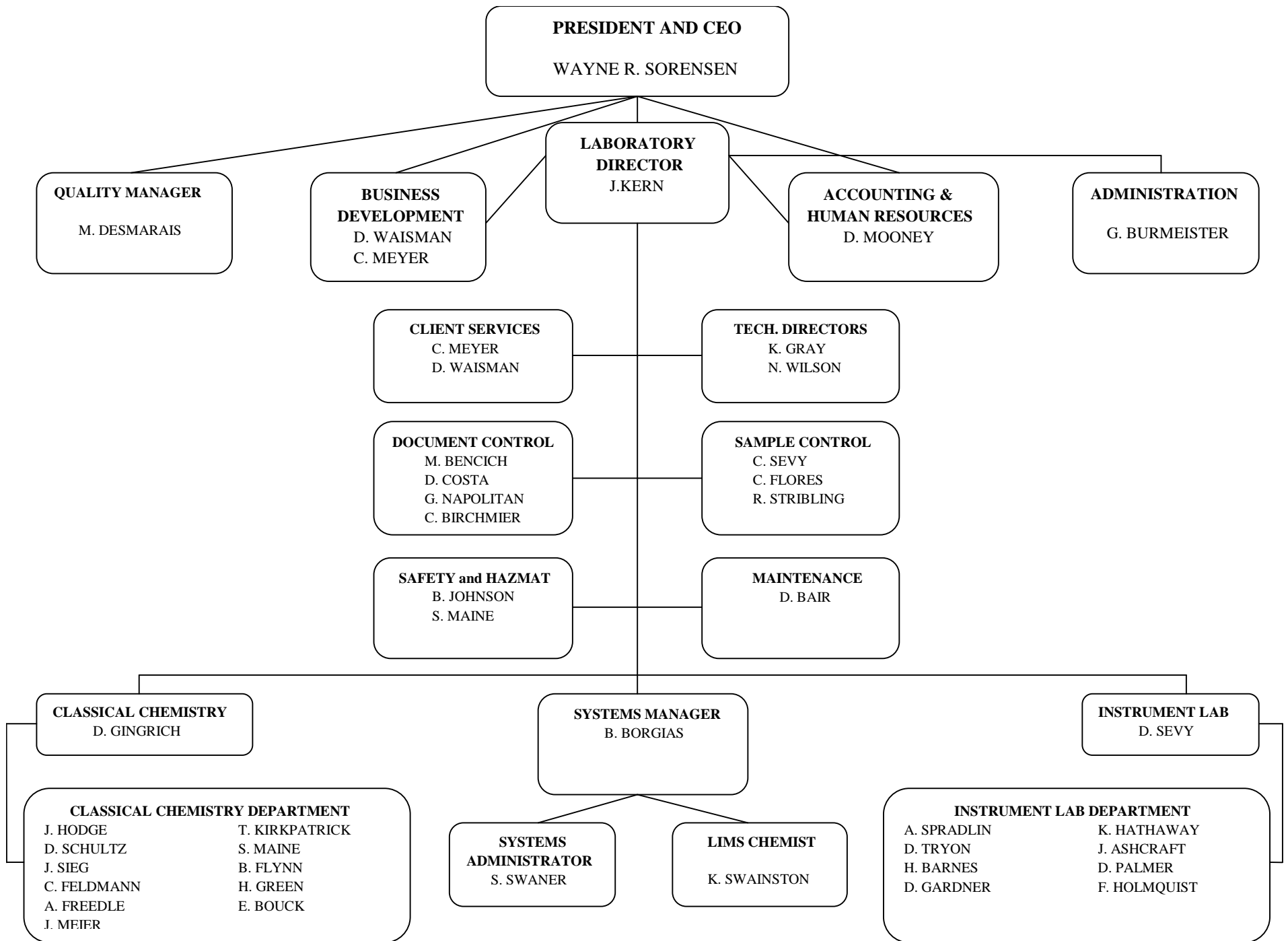
SVL's Management ensures that this QM complies with all applicable NELAC Quality System Standards and sees that it is reviewed annually and revised as needed. Evidence of signatory approval by senior management of this QM and SVL SOPs are available in PDF format by request.

SVL's commitment to client confidentiality (including national security concerns) and their proprietary rights is paramount to all operations conducted within its quality system; as such, a signed confidentiality statement is maintained in each employees personnel file.

After reading this document employees are required to sign a signature page. By signing, the employee confirms that they have read, understood and will comply with the Quality Manual and the NELAC Standards it is based upon.

2.0 ORGANIZATION AND STRUCTURE

The organizational structure of SVL follows a traditional scheme of management with a few modifications. The President/CEO is at the top of the chain of command followed immediately by the Laboratory Director, Quality Assurance Manager, Business Development and Accounting/Human Resources. The following supervisors/departments are managed under the Laboratory Director: Business Development, Accounting/Human Resources, Administration, Maintenance, Technical Directors, Document Control Office, Client Services, Safety and HAZMAT, Classical Chemistry, Instrument Lab and Systems Manager. The Systems Administrator and LIMS Chemist report to the Systems Manager. The Classical Department reports to the Classical Department Supervisor. The Instrument Lab Department reports to the Instrument Lab Supervisor.



2.2 Employee List

Position	Employee	Degree	Years of Lab Experience
President and CEO	Wayne Sorensen	BS 1962	43
Laboratory Director	John R. Kern	MS 1982	27
Business Development/Safety Officer	Blake Johnson	PhD 1971	25
Systems Manager	Brandan A. Borgias	PhD 1985	29
Document Control Officer	Melba Bencich		29
Client Services Manager	G. Christine Meyer		31
Business Development Manager	Dave Waisman	MS 1985	16
Technical Director	Kirby L. Gray	BS 1972	25
Technical Director	Nan Wilson	BS 1996	14
Supervisor Inorganic Instrument	Danny Sevy		22
Supervisor Classical Chemistry	Daniel K. Gingrich II	BS 2008	3
Systems Administrator	Scott Swaner		7
LIMS Chemist	Kale Swainston	BS 1998	7
Accounting and Human Resources	Donella Mooney		19
Quality Assurance Manager	Michael Desmarais	BS 1995	13
ICP Spectroscopist	Anne L. Spradlin	BA 1983	24
IC Chemist	Felicia Holmquist	BS 2008	2
ICP Analyst	David Tryon		6
ICP and ICP-MS Chemist	Dianne Gardner	BA 1987	6
ICP-MS and GFAA Analyst	Kevin Hathaway		22
CVAA Analyst	Judy Ashcraft		40
Chemist	Theresa Kirkpatrick	BS 2006	3
Chemist	Brian Flynn	MS 2003	4
Chemist	Jim Hodge		43
Chemist	Charles Feldmann	BA 2007	4
Chemist/HAZMAT Coordinator	Sherry Maine	MS 2004	9
Chemist	Heather Green	BS 2009	2
Analyst	Anita Guzman-Freedle	BS 1979	2
Analyst	Dean Palmer	BS 1979	11
Analyst	Eric Bouck		2
Analyst	Debbie Schultz		8
Analyst	Heidi Barnes		7
Analyst	Jennifer Sieg		3
Bucking Room	Jerry Meier		1
Sample Control Officer	Crystal Sevy		7
Sample Receiving	Cindy Flores		8
Sample Receiving	Robin Stribling		4
Document Control	Dianne Costa		3
Document Control	Gerri Napolitan		4
Document Control	Candace Birchmier		1
Maintenance	Dan Bair		3
Receptionist	Gloria Burmeister		7

2.3 Key Employee Resumes

See Appendix 1

3.0 JOB DESCRIPTIONS

3.1 Laboratory Director

The Laboratory Director supervises day-to-day operations of the laboratory. Responsible for monitoring standards of performance in quality control and quality assurance, and for monitoring the validity of the analyses performed and data generated in the laboratory. The Laboratory Director holds a weekly staff meeting to discuss client and technical issues.

3.2 Systems Manager

The Systems Manager supervises operations of the Information Technology groups. The Systems Manager uses Excel, Crystal Reports and other database programs to develop and maintain client reports and electronic data deliverables. Element is the laboratory's LIMS and the Systems Manager works with the LIMS Chemist to make sure that Element meets the needs of SVL. The Systems Manager is responsible for the development of IS/IT protocols.

3.3 Department Supervisor

Department supervisors conduct the day-to-day operations of our analytical departments. They are responsible for department safety and analyst training. They are also responsible for review of out-going analytical data.

3.4 Quality Assurance Manager (QAM)

The QAM is responsible for implementation of the quality system. The QAM manages the performance evaluation sample program and conducts laboratory audits. The QAM obtains and maintains laboratory accreditations, reviews and approves SOPs, and conducts staff training in integrity and quality systems.

3.5 Document Control Officer (DCO)

DCO is responsible for the generation and the retention of analytical reports and records, including but not limited to Chains-of-Custody and sample shipping documents. DCO is also responsible for delivering electronic data deliverables.

3.6 Sample Control Officer (SCO)

SCO is responsible for sample receipt, job creation/verification, sample storage and sample disposal.

3.7 Technical Director

Technical Directors provide technical support to laboratory staff and provide final reviews of analytical data packages.

4.0 APPROVED LABORATORY SIGNATORIES

The Laboratory Director John Kern, Systems Manager Brandan Borgias, Technical Director Kirby Gray, and Nan Wilson, Department Supervisors Daniel Gingrich and Danny Sevy are approved laboratory signatories for analytical reports. QAM Michael Desmarais has report generation privileges.

5.0 RECORDS AND DOCUMENT CONTROL

5.1 Standard Operating Procedures (SOPs)

The QAM retains the master copies of SOPs. Electronic copies are available on the laboratory's computer network. Signed and dated SOPs are available by request in PDF format. All SOPs are scheduled for review each year. Electronic copies are available on the laboratory network on the date of the QAM's review with the effective date two weeks after that date. When a revision is created, the previous version is removed from the master file and electronic database, with a hard copy retained for the SOP archive file.

5.2 Quality Manual (QM)

The QAM retains the master copy of the QM. The QM is scheduled for review annually or when revisions are needed. Management may make hard copies available to Accrediting Authorities, laboratory staff and

clients as needed; otherwise, the QM is available in electronic format. A signed and dated QM is available by request in PDF format. When a revision is created, previous versions are removed from use, and a copy is retained in the QM archive file.

5.3 Analytical Data

The Document Control Officer (DCO) retains analytical data, including calibration records and quality control, for five years, unless a longer period is required by contract.

5.4 Training Records

The QAM maintains records of analyst training and proficiency; ref, SOP SVL 1010.

5.5 Performance Evaluation Samples

The QAM maintains records of analysis of performance evaluation samples and the reports associated with the analyses.

5.6 External and Internal Audits

The QAM retains records of external and internal audits.

5.7 Corrective Action Reports

Are kept electronically and filed by hardcopy.

5.8 Laboratory Logbooks

SVL controls the issue, use, and closure of laboratory logbooks. The process is described in SOP SVL 2017. Examples of logbooks may include: the conductivity of laboratory water, preparation of reagents and standards, preparation of samples, calibration of balances, calibration of micropipets, volumetric pipets, repipettors, maintenance of instruments, and temperatures of ovens and refrigerators. The QAM assigns and archives logbooks.

5.9 Chain of Custody (COC)

The DCO is in charge of COC retention; they are currently held for five years, unless a longer time is required by contract. Sample log-in and job creation are maintained in SVL's LIMS. COCs are scanned into PDF format, which can be accessed through Element.

5.10 Analytical Reports

The DCO retains photocopies of analytical reports for five years, unless a longer time is required by contract. Copies of CLP-like and regular reports are saved as PDF files; the files are backed up and archived for five years. Archived analytical reports are stored in a secured environment to protect them from damage.

5.11 Backup and Storage of Electronic Data

5.11.1 Electronic Data Collection: Currently the backup server is protected with an administrative password, which is changed every 6 months; it is in control of the Systems Administrator; ref, SOPs SVL 2020 and 2021.

5.11.2 Archives of Electronic Data: Data files that reside on the SVL file servers are backed up on a daily basis and kept onsite for 90 days: a full backup of the data files residing on the server is done monthly and sent to an offsite storage facility for 5 years. All software used to recover data files is also stored at the offsite facility.

5.11.3 Offsite Backup Storage: A secure offsite facility is maintained to house the electronic data collected by the current backup system.

6.0 TRACEABILITY OF MEASUREMENTS

6.1 Chemicals and Reagents

SVL uses reagent grade or better chemicals. Some equivalent grades are “VWR Omni-Trace”, “Fisher Trace Metals”, “Baker Instra-Analyzed”, “Baker A.C.S.”, “Baker Analyzed”, “Fisher A.C.S.”, and “Fisher Certified”. SVL requires a certificate of analysis or purity, for stock standards. Upon receipt, all chemicals are labeled and entered into SVL’s LIMS.

SVL records the preparation of reagents and standards in controlled logbooks or electronically in the LIMS. The initials of the preparer, the date prepared, the lot number and amount of stock materials, the final volume, the matrix, and the expiration date are all recorded. A label is created within the LIMS and is attached to all aliquots of the standard.

Preparation instructions are included in the SOPs for standards and reagents used in the analytical methods. SVL labels containers of

prepared reagents and standards with their contents, a unique reference number, date prepared, disposal (expiration) date and a perceived hazard warning. Every aliquot is assigned a unique identifier.

SVL routinely obtains reference standards from commercial sources. These standards are used to check and document the concentration of calibration standards and validate method QC requirements.

SVL stores reagents and standards separately from samples.

6.2 Water

The primary reagent water in the laboratory is furnished by a reverse osmosis system followed by a micropore filter with an ion-exchange resin cartridge. This satisfies the specifications of ASTM Type II water. When Type I (16.67 MΩ-cm) water is required, SVL inserts a four-cartridge ion-exchange system into the line. SVL measures and records the resistivity of the laboratory water each weekday.

7.0 TEST METHODS

7.1 Analyses Performed by SVL

SVL routinely performs the following analytical methods.

ANALYTE	METHOD	TECHNIQUE
Aluminum	EPA 200.7, SW846 6010B	ICP
Antimony	EPA 200.7, SW846 6010B	ICP
Antimony	EPA 200.8, SW846 6020	ICPMS
Arsenic	EPA 200.7, SW846 6010B	ICP
Arsenic	EPA 200.8, SW846 6020	ICPMS
Barium	EPA 200.7, SW846 6010B	ICP
Barium	EPA 200.8, SW846 6020	ICPMS
Beryllium	EPA 200.7, SW846 6010B	ICP
Beryllium	EPA 200.8, SW846 6020	ICPMS
Boron	EPA 200.7, SW846 6010B	ICP
Boron	EPA 200.8, SW846 6020	ICPMS
Cadmium	EPA 200.7, SW846 6010B	ICP
Cadmium	EPA 200.8, SW846 6020	ICPMS
Calcium	EPA 200.7, SW846 6010B	ICP
Chromium	EPA 200.7, SW846 6010B	ICP
Chromium	EPA 200.8, SW846 6020	ICPMS
Chromium, Hexavalent	SM 3500 CR B , D	Colorimetry
Cobalt	EPA 200.7, SW846 6010B	ICP
Cobalt	EPA 200.8, SW846 6020	ICPMS

ANALYTE	METHOD	TECHNIQUE
Copper	EPA 200.7, SW846 6010B	ICP
Copper	EPA 200.8, SW846 6020	ICPMS
Gallium	EPA 200.7, SW846 6010	ICP
Gold	EPA 231.2	GFAA
Iron	EPA 200.7, SW846 6010B	ICP
Lanthanum	EPA 200.7, SW846 6010B	ICP
Lead	EPA 200.7, SW846 6010B	ICP
Lead	EPA 200.8, SW846 6020	ICPMS
Lithium	EPA 200.7, SW846 6010B	ICP
Magnesium	EPA 200.7, SW846 6010B	ICP
Manganese	EPA 200.7, SW846 6010B	ICP
Manganese	EPA 200.8, SW846 6020	ICPMS
Mercury	EPA 245.1, SW846 7470A, 7471A	CVAA
Molybdenum	EPA 200.7, SW846 6010B	ICP
Molybdenum	EPA 200.8, SW846 6020	ICPMS
Nickel	EPA 200.7, SW846 6010B	ICP
Nickel	EPA 200.8, SW846 6020	ICPMS
Potassium	EPA 200.7, SW846 6010B	ICP
Scandium	EPA 200.7, SW846 6010B	ICP
Selenium	SM 3114C	Hydride AA
Selenium	EPA 200.7, SW846 6010B	ICP
Selenium	EPA 200.8, SW846 6020	ICPMS
Silica	EPA 200.7	ICP
Silicon	SW846 6010B	ICP
Silver	EPA 200.7, SW846 6010B	ICP
Silver	EPA 200.8, SW846 6020	ICPMS
Sodium	EPA 200.7, SW846 6010B	ICP
Strontium	EPA 200.7, SW846 6010B	ICP
Thallium	EPA 200.7, SW846 6010B	ICP
Thallium	EPA 200.8, SW846 6020	ICPMS
Tin	EPA 200.7, SW846 6010B	ICP
Titanium	EPA 200.7, SW846 6010B	ICP
Uranium	EPA 200.8	ICPMS
Vanadium	EPA 200.7, SW846 6010B	ICP
Vanadium	EPA 200.8, SW846 6020	ICPMS
Zinc	EPA 200.7, SW846 6010B	ICP
Zinc	EPA 200.8, SW846 6020	ICPMS
Acidity	SM 2310 B	Automated Titration
Alkalinity	SM 2320 B	Automated Titration
Ammonia	EPA 350.1	Automated Colorimetry
Bromide	EPA 300.0	Ion Chromatography
Chemical Oxygen Demand	EPA 410.4	Colorimetry
Chloride	EPA 300.0	Ion Chromatography
Color	SM 2120 B	Colorimetry
Conductivity	EPA 120.1	Wheatstone Bridge
Corrosivity	SM 2330 B	Langelier Index
Cyanide, Total	EPA 335.4, SW 846 9012 A&B	Automated Colorimetry
Cyanide, Free	SW-846 EPA 9213	Ion Specific Electrode
Cyanide, WAD	SM 4500 CN I	Automated Colorimetry

ANALYTE	METHOD	TECHNIQUE
Cyanide, Available	OIA 1677	Amperometry
Dissolved Organic Carbon	SM 5310 B	Combustion
Fluoride	EPA 300.0	Ion Chromatography
Hardness	SM 2340B, Ca as CaCO ₃ by 200.7	ICP Sum
Ignitability	SW846 1010A	Pensky-Martin
Nitrate	EPA 300.0	Ion Chromatography
Nitrate	EPA 353.2	Automated Colorimetry
Nitrate + Nitrite	EPA 353.2	Automated Colorimetry
Nitrate + Nitrite	EPA 300.0	Ion Chromatography
Nitrite	EPA 300.0	Ion Chromatography
Nitrite	EPA 353.2	Automated Colorimetry
Odor	SM 2150B	Sniff Panel
ortho-Phosphate	SM 4500 P E	Colorimetry
pH (aqueous)	SM 4500-H ⁺ B	Electrometric
pH (soil)	EPA 9045C, EPA 9045D	Electrometric
Paste pH	ASA Monograph 9	Electrometric
Phosphate, Total	SM 4500 P E	Persulfate Digestion
Residue, Filterable (TDS)	SM 2540 C	Gravimetric
Residue, Non Filterable (TSS)	SM 2540 D	Gravimetric
Specific Conductance	EPA 120.1, SM 2510 B	Wheatstone Bridge
Sulfate	EPA 300.0	Ion Chromatography
Sulfide	SM 4500 S ⁻² F	Titrimetric
Surfactants (MBAS)	SM 5540 C	Colorimetry
Total Nitrogen	D 5176-91	Combustion
Total Solids	SM 2540 B	Gravimetric
Total Kjeldahl Nitrogen	EPA 351.2	Colorimetry
Total Organic Carbon	SM 5310 B	Combustion
Total Volatile Solids	EPA 160.4	Gravimetric
Turbidity	EPA 180.1	Nephelometric
TCLP (Toxicity Characteristic Leaching)	SW846 1311	Extraction
SPLP (Synthetic Precipitation Leaching)	SW846 1312	Extraction
STLC (Soluble Threshold Limit Concentration)		Extraction
MWMP (Meteoric Water Mobility)	ASTM E2242-02	Extraction
CA-WET (California Waste Extraction Test)		Extraction
CEC (Cation Exchange Capacity)	SW846 9081, 9080	
Textural Analysis (Particle Size)	ASA "Methods of Soil Analysis" Number 9, Part 1	
Specific Gravity		Displacement
TOM/TOC	USDA, HB60(24)	
ANP (Acid Neutralization Potential)	Titration	ANP (Acid Neutralization Potential)

ANALYTE	METHOD	ANALYTE
ABA (Acid Base Account)	ASTM E1915-05	ABA (Acid Base Account)
Total Sulfur + Sulfur Forms		ASTM E1915-05
Total Carbon		ASTM E1915-05
Arsenic Speciation	K.S. Subramanian et al.	GFAA
Iron Speciation	HACH-8146	Colorimetry
Gradation		Sieving
Loss on Ignition	Soil & Plant Analysis Council	Gravimetric
Percent Silica	ASTM 2795	Colorimetry
Tot Suspended Particulates	40CFR 50, App B amend 12/6/82	Gravimetric
Flash Point	SW-846 1010, ASTM D93-80	Pensky-Martin

7.2 References

2003 NELAC Standard

Methods for Chemical Analysis of Water and Wastes, revised March 1983, EPA-600/4-79-020.

Methods for the Determination of Metals in Environmental Samples Supplement I, EPA/600/R-94/111, May 1994

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW 846), Third Edition, Update III, December 1996.

Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992

Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995

Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1999

ASTM Book of Standards, part 31

Soil Testing and Plant Analysis, 3rd Edition, Soil Sciences Society of America, 1990

American Society of Agronomy, "Methods of Soil Analysis" Number 9, Parts 1 and 2

U.S. Department of Agriculture, Handbook #60

TNI Standard

U.S. Department of the Interior, Bureau of Reclamation, Procedure for Determining Moisture, Ash, and Organic Content of Soil, USBR 5430-89

Manual for the Certification of Laboratories Analyzing Drinking Water, Fifth Edition

8.0 NEW WORK

The Business Development group discusses new work with clients before the work is received. If the work being requested involves tests not usually performed by SVL, the project is discussed with Department Supervisors to determine if the work can be accepted. Quotes and projects are logged so that there is no confusion about what is expected by the client. If work is received that does not adhere to the guidelines put forth in the quote or project, the client will be contacted for clarification. Occasionally SVL receives a work order with no prior notification that requests unusual tests, or tests to be conducted in a time frame not suitable for the work requested. When this occurs, the SCO reviews the job with the Laboratory Director, Client Services and/or Department Supervisors to determine if the work can or should be accepted. Routine work from established clients normally is not reviewed with the clients before jobs are set up, unless there is a problem with sample integrity or information on the COC.

SVL reviews and makes available in LIMS, the parameters associated with a client's project (work order memos shall be attached when special instructions are involved). A schedule is accessible for the work that has been received; this allows the staff to plan workloads and to track jobs. A Laboratory/Technical Director or Client Services member shall review all work orders. Adjustments to work schedules and staff deployment are made based upon the workload. Department Supervisors keep equipment and supplies on hand for routine work and for many non-routine tests as well.

8.1 Sample Acceptance Policy

8.1.1 Samples received at SVL will be accepted for testing if the following criteria are met at the time of sample receipt:

A proper SVL or client COC will accompany the sample shipment and must be completed in full (unless a project number is specified and is on file with SVL), including but not limited to; the client's name, address, phone/fax numbers, contact person, unique sample identification of individual samples, sample locations (if applicable), date and time of collection, collector's name, preservative type, sample matrix, filtered or unfiltered, number of bottles, analytes and/or tests to be performed, method of analysis, and any comments concerning sample specifics or QC requirements.

The use of correct sample containers (with proper preservation) for the sample matrices collected and ensuring that sufficient sample volume is provided for the tests requested (including extra volumes for QC requirements).

Accurate labeling of sample bottles using coded, water resistant labels and permanent ink, with said labels being cross referenced with information contained in the COC.

Adherence to holding time requirements as required by test or method requested.

8.1.2 In the event that a sample is received in non-compliance with this policy, the sample in question will be segregated and the client notified by telephone or email. The client may direct SVL to continue on with analysis of the non-conforming sample(s). Non-conformity will be noted on the Sample Receipt/Chain of Custody and within the Final Report; ref, SOP SVL 2001.

8.1.3 New clients will be informed of this policy through Client Services or Sample Receiving. They will be provided with a copy of the QM (hard copy or electronically) or a hand out on sample acceptance (located in SVL's waiting room or in Sample Receiving).

Current clients will receive a copy of the sample acceptance policy if they bring in samples that do not meet SVL's requirements.

9.0 CALIBRATION

9.1 Thermometers

Calibrating thermometers is described in SOP SVL 1004.

Quality Control Services calibrates SVL's NIST-certified thermometers.

SVL calibrates in-house liquid-in-glass thermometers against a NIST-certified thermometer annually. Digital thermometers are calibrated against a NIST certified thermometer quarterly. The IR gun is calibrated against a NIST certified thermometer quarterly. The calibrated thermometers are labeled with the appropriate correction factor.

9.2 Balances

Servicing and calibrating balances is described in SOP SVL 1025.

Quality Control Services calibrates SVL's balances.

SVL checks the calibration of a balance before each day of use with at least two weights traceable to a NIST traceable standard. For analytical balances, the measured weight must agree with the certified weight within 0.1%. Balances that fail the criterion are checked with Class-1 weights. If they fail again, they are removed from service.

9.3 Balance Weights

Calibrating balance weights is described in SOP SVL 1025.

Quality Control Services calibrates SVL's set of Class-1 weights, with Reference Standards Traceable to NIST.

SVL uses Class-1 weights to certify the Class-4 weights used for the daily calibration of balances.

9.4 Micropipets

The calibration of micropipets is described in SOP SVL 1026.

SVL checks the calibration of variable-volume micropipets each day of use. Fixed-volume micropipets are checked quarterly. The mean of three measured volumes must agree with the expected value within 3%. Micropipets that fail this criterion are repaired or removed from service.

9.5 Repipettors

The calibration of repipettors is described in SOP SVL 1026.

SVL checks the calibration of repipettors quarterly. The measured volume must agree with the expected value within 3%. Repipettors that fail this criterion are repaired or removed from service.

9.6 Refrigerators

SVL records the temperature of sample, standard, and reagent storage refrigerators each weekday. The process is described in SOP SVL 2004. The temperature must meet the 0-6°C as described in SOP SVL 2001. If a temperature is outside this criterion, the temperature is recorded again after one hour. If the temperature is still outside the acceptance range, samples, standards, and reagents are transferred to alternate refrigerators or coolers.

9.7 Ovens

SVL records the temperature of ovens every day that the oven is in use. The required temperature of each oven is stated in the applicable SOPs.

9.8 Inductively Coupled Plasma Mass Spectrometer (ICP-MS)

SVL calibrates its ICP-MS in accordance with EPA methods 200.8 and 6020 a tune standard analysis is performed prior to calibration. Five calibration standards and a calibration blank are analyzed at the beginning of a sequence. The software creates a linear calibration curve that must have a correlation coefficient of at least 0.995. An Initial Calibration Verification (ICV) from a secondary source follows to verify the calibration. An Initial Calibration Blank (ICB) indicates the system is clean. A Reporting Limit Check Standard (RLCS) indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. Analysis of a Continuing Calibration Verification (CCV) and a Continuing Calibration Blank (CCB) follow after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4111.

9.9 Inductively Coupled Plasma Spectrometer (ICP)

SVL calibrates ICPs in accordance with EPA methods 200.7 and 6010B. A single calibration standard and a calibration blank are analyzed at the beginning of a sequence. A standard at the reporting limit is analyzed to verify that the instrument will detect a response at that level. An ICV

from a secondary source follows to verify the calibration. An ICB indicates the system is clean. An RLCS (in this case called a CRI) indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. Analysis of a CCV and a CCB follow after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4102.

9.10 Graphite Furnace Atomic Absorption Spectrometer (GFAA)

SVL calibrates its GFAA in accordance with EPA method 231.2 for gold and K.S. Subramanian et al. for arsenic speciation. Three calibration standards and a calibration blank are analyzed at the beginning of a sequence. Perkin-Elmer instruments create a linear calibration curve that must have a correlation coefficient of at least 0.995. An ICV from a secondary source follows to verify the calibration. An ICB indicates the system is clean. An RLCS indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. Analysis of a CCV and a CCB follow after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4115.

9.11 Mercury Analyzer (CVAA)

SVL calibrates its CVAA in accordance with EPA methods 245.1, 7470A, and 7471A. Six calibration standards and a calibration blank are analyzed at the beginning of a sequence. The instrument creates a linear calibration curve that must have a correlation coefficient of at least 0.995. An ICV from a secondary source follows to verify the calibration. An Initial Calibration Blank (ICB) indicates the system is clean. An RLCS indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. Analysis of a CCV and a CCB follow after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4010.

9.12 Flame Atomic Absorption Spectrometer (FLAA)

SVL calibrates FLAAs in accordance with analytical method requirements.

9.13 Ion Chromatograph (IC)

SVL calibrates ICs in accordance with EPA method 300.0. Five calibration standards and a calibration blank are analyzed. The instrument creates a quadratic calibration curve that must have a correlation coefficient of at least 0.995. An ICV from a secondary source follows to verify the calibration. An ICB indicates the system is clean.

An RLCS indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. A CCV and a CCB

follow after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4122.

9.14 Flow-Injection Auto Analyzer (FIA)

SVL calibrates FIAs in accordance with EPA methods 335.4 (Total Cyanide), 350.1 (Ammonia), 351.2 TKN, 353.2 (Nitrate and Nitrite), 9012 A&B (Total Cyanide), and Standard Methods 4500-CN-I (WAD Cyanide), and method OI 1677 (Amperometric Cyanide). A minimum of five calibration standards and a calibration blank are analyzed at the beginning of each analytical sequence. The instrument software creates a linear or quadratic calibration curve that must have a correlation coefficient of at least 0.995. A Laboratory Control Sample (LCS) and an ICV from a secondary source verifies the calibration curve. An ICB indicates the system is clean. An RLCS indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. Analysis of a CCV and a CCB follow after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOPs SVL 4012, SVL 4045, SVL 4099, SVL 4048, SVL 4075, and SVL 4101.

9.15 Total Organic Carbon Analyzer (TOC)

SVL calibrates TOC analyzers in accordance with SM 5310 B. Six calibration standards for total carbon are analyzed and a linear curve is constructed, the curve must have a correlation coefficient of at least 0.995. An ICV from a secondary source verifies the calibration curve. An ICB indicates the system is clean. An RLCS indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. A CCV and CCB are analyzed at the beginning of each analytical sequence, after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4116.

9.16 UV/Visible Spectrophotometers (UV/VIS)

SVL calibrates its UV/Visible spectrophotometer in accordance with the applicable published methods. A minimum of three calibration standards and a calibration blank are analyzed at the beginning of each analytical sequence. The calibration curve must have a correlation coefficient of at least 0.995. A CCV and CCB are analyzed at the beginning of each analytical sequence, after every ten samples and at the

end of the analytical sequence. The acceptance criteria are defined in the applicable SOPs.

9.17 LECO Carbon/Sulfur Analyzer

Total Sulfur and Total Carbon are determined from analysis of a small aliquot of crushed sample using a LECO furnace. In addition, organic and inorganic carbon and pyrolysis loss and residual sulfur may be determined by roasting a sample, analyzing it by LECO, and calculating the difference between the pre and post roast carbon and sulfur values. Three sets of three calibration standards for carbon and sulfur are analyzed to prepare a calibration curve that must have a correlation coefficient of at least 0.995. An RLCS indicates that the results derived at the reporting limit can be recovered within our acceptance criteria. A CCV and CCB are analyzed at the beginning of each analytical sequence, after every ten samples and at the end of the analytical sequence. The acceptance criteria are defined in SOP SVL 4097.

9.18 pH and Ion Selective Electrode Meters (ISE)

SVL calibrates pH and ISE meters in accordance with the applicable published methods. For TKN, SVL uses an Excel spreadsheet to create a calibration curve of potential (mV) versus log of concentration.

9.19 Class A Glassware

Class A glassware is verified, assigned a unique identifier and logged in upon receipt as described in SOP SVL 1026.

10.0 SAMPLING, SAMPLE RECEIVING, AND STORAGE

10.1 Sampling

SVL does not conduct sampling. Sampling procedures and contamination in the field are beyond SVL's control. SVL recommends the following procedures to its clients.

Sample preservation is critical for sample integrity. Chemical and biological reactions may occur that begin to change some chemical species upon sample collection. Unfortunately, for most samples, immediate analysis is neither economically feasible nor logistically possible. Although no chemical preservative exists that is valid for every

parameter, SVL strongly recommends the preservation methods, container type, sample size and estimated maximum holding times for collection of water and wastewater samples summarized in Table 1. Solid samples are best preserved by cooling the sample to a range between 0- 6°C.

Table 1

Analysis	Volume Required (mL)	Container	Preservative	Holding Time
Color	50	P,G	Cool to ≤ 6 °C	48 Hours
Conductance	100	P,G	Cool to ≤ 6°C	28 Days
Hardness	100	P,G	HNO ₃ to pH<2	6 Months
Odor	300	G only	Cool to ≤ 6°C	24 Hours
pH	25	P,G	None Required	* ASAP
Temperature	1000	P,G	None Required	* ASAP
Turbidity	100	P,G	Cool to ≤ 6 °C	48 Hours
Filterable Residue (TDS)	100	P,G	Cool to ≤ 6 °C	7 Days
Non-Filterable Residue (TSS)	100	P,G	Cool to ≤ 6 °C	7 Days
Total Residue	100	P,G	Cool to ≤ 6 °C	7 Days
Volatile Residue	100	P,G	Cool to ≤ 6 °C	7 Days
Settleable Matter	1000	P,G	Cool to ≤ 6 °C	48 Hours
Dissolved Metals	200	P,G	Filter on site; HNO ₃ to pH<2	6 Months
Total Metals	100	P,G	HNO ₃ to pH<2	6 Months
Chromium (VI)	200	P,G	Cool to ≤ 6 °C	24 Hours
Mercury, Dissolved	100	P,G	Filter; HNO ₃ to pH<2	28 Days
Mercury, Total	100	P,G	HNO ₃ to pH<2	28 Days
Acidity	100	P,G	Cool to ≤ 6 °C	14 Days
Alkalinity	100	P,G	Cool to ≤ 6 °C	14 Days
Bromide	100	P,G	None Required	28 Days
Chloride	50	P,G	None Required	28 Days
Cyanide	500	P,G	Cool to ≤ 6 °C; NaOH to pH>12	14 Days
Fluoride	300	P	None Required	28 Days
Ammonia	400	P,G	Cool to ≤ 6 °C H ₂ SO ₄ to pH<2	28 Days
Total Kjeldahl Nitrogen	500	P,G	Cool to ≤ 6 °C H ₂ SO ₄ to pH<2	28 Days
Nitrate plus Nitrite	100	P,G	Cool to ≤ 6 °C H ₂ SO ₄ to pH<2	28 Days

Analysis	Volume Required (mL)	Container	Preservative	Holding Time
Nitrate	100	P,G	Cool to ≤ 6 °C	48 Hours
Nitrite	50	P,G	Cool to ≤ 6 °C	48 Hours
Ortho-Phosphate Dissolved	50	P,G	Filter on site; Cool to ≤ 6 °C	48 Hours
Total Phosphate	50	P,G	Cool to ≤ 6 °C; H ₂ SO ₄ to pH<2	28 Days
Total Dissolved Phosphate	50	P,G	Filter on site; Cool to ≤ 6 °C; H ₂ SO ₄ to pH<2	28 Days
Silica	50	P only	Cool to ≤ 6 °C	28 Days
Sulfate	50	P,G	Cool to ≤ 6 °C	28 Days
Sulfide	500	P,G	Cool to ≤ 6 °C add 2 mL zinc acetate plus NaOH to pH>9	7 Days
COD	50	P,G	Cool to ≤ 6 °C H ₂ SO ₄ to pH<2	28 Days
Total Organic Carbon	25	40 mL amber vials	Cool to ≤ 6 °C H ₂ SO ₄ to pH<2	28 Days
Phenolics	500	G only	Cool to ≤ 6 °C H ₂ SO ₄ to pH<2	28 Days
MBAS	400	P,G	Cool to ≤ 6 °C	48 Hours

* pH and temperature should be measured in the field whenever possible. They are subject to rapid change. Measurements of pH and temperature made in the laboratory will almost always be out of holding time.

SVL has formed alliances with other laboratories for the analysis of organic parameters. The recommended containers and preservatives are

Analysis	Amount Required	Container	Preservative	Holding Time Until Extraction	Holding Time After Extraction Until Analysis
Mercury, Low Level***					
524.2 (Volatile Organic Compounds)	3x40mL vials	G,T	Cool to ≤ 6 °C; HCl to pH<2	14 days	NA
608 (Pesticides and/or PCBs)	3 L	amber G,T	Cool to ≤ 6 °C	7 days	40 days
624 (Volatile Organic Compounds)	3x40mL vials	G,T	Cool to ≤ 6 °C; HCl to pH<2	14 days	NA
625 (Semi-volatile Organic Compounds)	3 L	amber G,T	Cool to ≤ 6 °C	7 days	40 days
1664 Hexane Extractable Materials	2L	G only	Cool to ≤ 6 °C H ₂ SO ₄ or HCl to pH<2	28 days	NA

Analysis	Amount Required	Container	Preservative	Holding Time Until Extraction	Holding Time After Extraction Until Analysis
Mercury, Low Level***					
8081A (Pesticides)	8 oz (soil) 1L (aqueous)	amber G,T	Cool to ≤ 6 °C	14 days 7 days	40 days
8082 (PCBs)	8 oz (soil) 1 L (aqueous)	G,T	Cool to ≤ 6 °C	14 days 7 days	40 days
8260B (Volatile Organic Compounds)	4 oz (soil) 3x40mL (aq)	G,T	Cool to ≤ 6 °C; HCl to pH<2	14 days	NA
8270C (Semi-volatile Organic Compounds)	8 oz (soil) 1 L (aqueous)	amber G,T	Cool to ≤ 6 °C	14 days	40 days
8015 (TPH-Gasoline)	4 oz (soil) 3x40 mL (aq)	amber G,T	Cool to ≤ 6 °C; HCl to pH<2	14 days	35 days
8015AZ ****	8 oz (soil)	G,T	Cool to ≤ 6 °C	48 hours	14 days for extraction and analysis
8260BAZ****	4 oz (soil)	G,T	Cool to ≤ 6 °C	48 hours	NA
8015 (TPH-Diesel Motor Oil)	1 L (aq) 8 oz (soil)	amber G,T	Cool to ≤ 6 °C: HCl to pH<2	14 days	40 days

*** Call for sampling and hold time requirements.

**** TPH 8015AZ and 8260AZ (soils) have a 48 hour hold time before extraction.

10.1 Sampling Cont'd

Field blanks allow for identification of systematic and random sample contamination that may result from the sampling equipment, storage containers, sampling agents, or chemicals added to preserve samples. Field blanks consist of a sample container of distilled or deionized water with the appropriate chemical preservative. Preservation, filtration, storage, handling, and analysis are performed as if the field blanks were samples. To achieve accurate and meaningful data, field blank containers should be filled with analyte-free water and the appropriate preservative at the sampling site.

Sources of sample contamination include unclean sample containers and filters; impure solvents and reagents; and use of cleaning products inappropriate for the proposed analysis. Hair, tobacco smoke, and dust also are appreciable sources of contamination, so sampling should be conducted in as careful a manner as possible.

Before filtering samples for dissolved parameters, the filter paper should be rinsed with de-ionized or distilled water and with a small portion of

sample. The filtration apparatus should also be rinsed with de-ionized or distilled water between samples. Handle filter paper only on the edge, using appropriate forceps (plastic for trace metals analysis).

Use the proper sample container for the parameter specified. Samples for trace metals analysis must not come into contact with any metallic surface; samples for organic analysis must not come into contact with any plastic surface.

Sampling personnel should complete a COC form that documents sample identification, sampling date and time, matrix type, number of sample containers, type of preservation, whether samples have been filtered, and the parameters to be analyzed.

10.2 Sample Receiving and Storage

SOPs SVL 2001, SVL 2003, and SVL 2004 describe sample receiving, job creation, and sample storage, respectively.

SVL takes a temperature reading from the sample shipping containers (coolers) upon receipt and opening. Each sample is checked for visible damage and the presence of an intact custody seal (if required). SVL gives each group of samples a unique job number (e.g., " W1E0027"). Sample ID's are automatically assigned a serial number suffix (-01 thru -99) appended to the Work Order number they belong to. The Work Order number is auto-generated by the LIMS and follows the format WYAnnnn. Where Y is the last digit of the year, A corresponds to the month in which the Work Order was created (A=Jan., B=Feb....L=Dec), and nnnn is a serial number for the Work Order in a particular month. Individual sample containers are assigned a designator (A, B, C ...) and these are tracked in the LIMS so the particular container used for an analysis can be tracked. For an example "W1E0027-03 D" would be the fourth container for the third sample in the 27th Work Order of May 2011.

This job number remains with the samples throughout the analytical process. Each sample is assigned a unique, sequential identification number. Samples are labeled with a bar code (containing both the sample and job numbers) before storing the sample under the proper preservation requirements.

Samples that require refrigeration are stored in walk-in coolers (which are kept between 0°C and 6°C), except during times of sample preparation or analysis. Samples that do not require refrigeration are stored in an ambient temperature storage room. The laboratory does

not refrigerate soil samples that were received without refrigeration. Samples are retained by SVL for a minimum of 30 days (or longer if required by the client) after a data report has been issued to the client. At the end of the specified period, samples are returned to the client or discarded in an appropriate manner (see SOPs SVL 1001 and 1008).

Sample custodians, technicians and analysts use the custody log feature of the LIMS to track sample movement during receipt, preparation, analysis and disposal. SVL personnel are responsible for logging the samples into their custody. They then assume accountability for the sample(s). When use of the sample is complete, personnel must scan samples back into the appropriate home location or another employee may assume custody by scanning/logging the sample into their custody via the LIMS.

10.3 Sub-sampling

Sub-sampling is described in SOP SVL 2018.

10.4 Sample Disposal and Hazardous Waste

Procedures for sample disposal are described in SOP SVL 1001. Disposal procedures follow federal and state regulatory requirements. SVL's hazardous waste program is described in SOP SVL 1008.

11.0 EQUIPMENT AND INSTRUMENTS

SVL uses the following instruments to generate analytical data and to calibrate other instruments.

11.1 SVL performs instrument maintenance as recommended by the manufacturer. SVL maintains service contracts with vendors for its major analytical instrumentation. Maintenance logbooks are kept to provide a record of major and minor repairs; as well as, preventative maintenance.

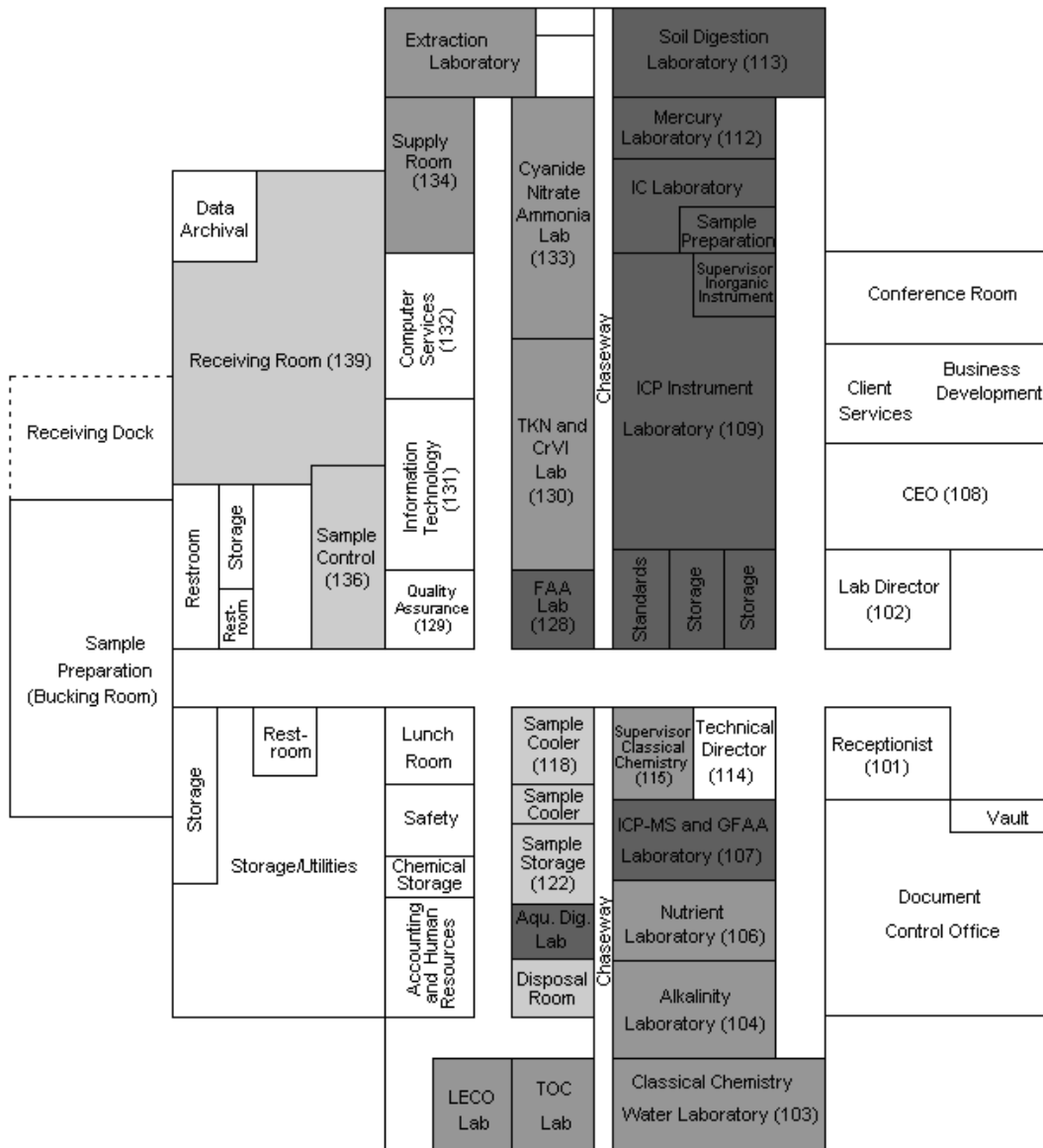
11.2 The analysts and supervisors will determine if a repair has created a need to update instrument MDLs, linear ranges, calibrations etc.

INSTRUMENT	MANUFACTURER	MODEL	SERIAL NUMBER
Spectrometer (ICP-MS)	Perkin-Elmer	ELAN 5000	W0660402
Spectrometer (ICP) Optima 1	Perkin-Elmer	Optima 4300	077N0061602
Spectrometer (ICP) Optima 5	Perkin-Elmer	Optima 5300	077N5011902

INSTRUMENT	MANUFACTURER	MODEL	SERIAL NUMBER
Spectrometer (ICP) Optima 6	Perkin-Elmer	Optima 5300	077N6062101
Spectrometer (ICP) Optima 7	Perkin-Elmer	Optima 5300	077C8011601
Spectrometer (ICP) Optima 8	Perkin-Elmer	Optima 7300	077C9031902
Atomic Absorption Spectrometer with Graphite Furnace	Perkin-Elmer	Analyst 600	601S3090501
Atomic Absorption Spectrometer with Vapor Generation Assembly	Varian	AA 55B	EL03048142
Mercury Analyzer with Autosampler	CETAC	M-6000A	029907MAS
Mercury Analyzer with Autosampler	CETAC	M-7500	110801QTA
11 Digestor Blocks	Environmental Express	Hot Block	
Ion Chromatograph	Dionex	ICS90	4090417
Ion Chromatograph	Dionex	ICS900	08041118
Ion Chromatograph	Dionex	ICS90	04090417
Ion Chromatograph	Dionex	ICS900-C	09040981
Automated Flow Analyzer	Alpkem	FS3000	843-1604-758
Automated Flow Analyzer	Astoria Pacific	2-A	200220
Flow Analyzer Autosampler	Astoria Pacific	111	070903A130
2 Micro Distillation Units	Lachat	ID 001	A2000-828 and 081100001017
3 MIDI Distillation Units	BSL		
2 Ammonia Distillation Units	Andrews Glass		
Ammonia/N analyzer	Astoria Pacific	A2	200104
Automated Flow Analyzer	Alpkem	Alpkem TKN	As. # INS0036HW
Block Digestor	Westco Scientific	Easy Digest 40/20	As. # INS0030HW
Auto Titrator with Autosampler	Metrohm	Titrimo 809 Titrimo	
Auto Titrator with Autosampler	Metrohm	Titrimo 809 Titrimo	18090010-07108
UV/Visible Spectrophotometer	Genesys	10	205G261004
UV/Visible Spectrophotometer	Genesys	20	3SGN243026
Turbidimeter	Hach	2100	95041453
COD Reactor	VELP Scientifica	ECO 25	101448
COD Reactor	VELP Scientifica	ECO 25	171440
pH/Ion Meter	Corning	450	001246
pH/Ion Meter	Corning	150	2173
pH Meter	Accumet	AB15	AB92314557
pH Meter	Beckman		224148
pH Meter	Beckman	11 pH Meter	0224055
pH Meter	Thermo	Orion 2 Star	B06039
pH Meter	Thermo	Orion 320	019525
Dissecting Microscope	Nikon	104	
Polarizing Microscope	Nikon	106	
Centrifuge	Beckman	GS-6 Centrifuge	
Flashpoint detector	Precision Scientific	74537	108A-2

INSTRUMENT	MANUFACTURER	MODEL	SERIAL NUMBER
Conductance Meter	Fisher	AB30	AB 92315548
Conductance Meter	Orion	115	002176
Elemental Analyzer	LECO	SC632	3208
Carbon/Nitrogen Analyzer (TOC)	Shimadzu	TOC-VCSH-N	37401162
Semi-Micro Balance	Mettler	AE-240	K89952
Semi-Micro Balance	Mettler	AE-240	G43270
Filter Balance	Mettler	AJ100	N09817
Analytical Balance	Mettler	PJ 360	F89531
Analytical Balance	Mettler	PJ 360	G49684
Analytical Balance	Mettler	PB30	A04506
Analytical Balance	Mettler	PJ360	F39533
Analytical Balance	Mettler	BB 240	L96134
Analytical Balance	Ohaus	EOF110	F2221120252601
Analytical Balance	Ohaus	AR2140 Adventurer	H2131203121033P
Analytical Balance	Ohaus	AR1530 Adventurer	1203200181P
Analytical Balance	Ohaus	N1D110 Navigator	1122352966
Analytical Balance	Ohaus	AS 513	8028301193
Analytical Balance	Leco	050	329
IR Thermometer	Control Company	36934-180	101839552
IR Thermometer	Control Company	15-077-57	90724477
Thermometer	HBI	68°C to 86°C	4B1321
Thermometer	Ertco	-20°C to 110°C	5283
Thermometer	HB	-10° C to 225°C	M49178

12.0 FACILITIES



- Inorganic Instrument Department
- Sample Control
- Classical Chemistry Department
- Administrative, Accounting, QA, Computer, Documents and Other

12.1 SVL is an analytical laboratory specializing in the performance of tests and methods used in the characterization of environmental and mining samples. Since 1972, SVL has analyzed water, soil, sediment, sludge, oil, paint, rock, animal tissue, vegetation, air filters, and various other sample types. SVL occupies a modern 25,000 square foot laboratory facility architecturally designed and specifically organized to ensure efficient operation and meet the needs of a large capacity analytical laboratory. Building access, security and safety features have been carefully considered. Access through the outside laboratory entrance and to internal areas is limited to laboratory staff and other essential personnel. Visitors are escorted during their stay at SVL.

13.0 STANDARD OPERATING PROCEDURES

SVL performs work in accordance with the requirements of its SOPs. SVL's SOPs are listed below and describe all aspects of its work performance including Safety and Quality Assurance (1000 Series), Sample and Document Management (2000 Series) and Inorganic Analysis (4000 Series).

SOP NUMBER	DESCRIPTION
SVL 1001	SAMPLE DISPOSAL
SVL 1002	WRITING AND REVISING STANDARD OPERATING PROCEDURES
SVL 1004	CALIBRATING THERMOMETERS
SVL 1005	INTERNAL QUALITY ASSURANCE AUDITS
SVL 1007	SOIL STERILIZATION
SVL 1008	DISPOSAL OF HAZARDOUS WASTE
SVL 1010	TRAINING
SVL 1011	PERFORMING AN MDL STUDY
SVL 1015	PROCUREMENT, RECEIVING, AND SUBCONTRACTING
SVL 1017	RECORDS RETENTION AND PROTECTION
SVL 1019	CORRECTIVE ACTION
SVL 1020	CALIBRATION FOR ANALYTICAL METHODS
SVL 1021	MANUAL INTEGRATION
SVL 1023	SOFTWARE VERIFICATION
SVL 1025	CALIBRATING BALANCES
SVL 1026	CALIBRATING MICROPIPETS, REPIPETTORS, AND GLASSWARE
SVL 1027	CLIENT SERVICES
SVL 1028	CALCULATIONS FOR ANALYTICAL METHODS
SVL 1029	PERFORMANCE TESTING SAMPLES
SVL 1030	INITIAL, PERIODIC AND AFTER-MAINTENANCE CHECKS

SOP NUMBER	DESCRIPTION
SVL 1031	COMPUTER AND INFORMATION SECURITY POLICY
SVL 1032	CHEMICAL REAGENTS, PREPARED STANDARDS, AND QC SOLUTIONS
SVL 1033	ACCEPTANCE LIMITS AND TRENDING
SVL 2001	SAMPLE RECEIVING
SVL 2003	SVL JOB CREATION
SVL 2004	SAMPLE STORAGE AND SECURITY
SVL 2006	DATA CORRECTIONS
SVL 2007	CASE FILE ASSEMBLY
SVL 2009	DATA REVIEW
SVL 2013	DATA PACKAGE PRODUCTION
SVL 2015	LEVEL 3 – CLP DATA PACKAGE
SVL 2017	LOGBOOK CONTROL
SVL 2018	PREPARATION AND SUBSAMPLING OF EARTH, ROCK, AND TISSUE SAMPLES
SVL 2019	REANALYSIS PROCEDURES
SVL 2020	COMPUTER-RESIDENT SAMPLE DATA CONTROL
SVL 2021	DATA BACKUP AND RESTORE
SVL 2022	SAMPLE RECEIVING – FOREIGN SOILS
SVL 4010	EPA 245.1, SW-846 7470A and 7471A; DETERMINATION OF MERCURY (CVAA)
SVL 4012	EPA 335.4, SM 4500 CN E and SW-846 9012B; TOTAL CYANIDE BY MICRODIST™ and MIDI DISTILLATION FOLLOWED BY AUTOMATED COLORIMETRY
SVL 4013	GLASSWARE WASHING FOR CLASSICAL CHEMISTRY
SVL 4021	FILTER DIGESTION
SVL 4022	PERCENT SOLIDS/ PERCENT MOISTURE
SVL 4024	SM 2120 B; COLOR
SVL 4025	EPA 120.1 and SM 2510 B; CONDUCTIVITY
SVL 4026	EPA 180.1; TURBIDITY
SVL 4028	SM 4500 ^{H+} B; pH
SVL 4029	SPECIFIC GRAVITY
SVL 4031	SM 2310 B; ACIDITY
SVL 4032	SM 4500 S ²⁻ F; SULFIDES BY TITRATION
SVL 4034	SM 2540 C and SM 2540 D; TOTAL DISSOLVED SOLIDS AND SUSPENDED SOLIDS
SVL 4035	SM 2540 B and EPA 160.4; TOTAL AND VOLATILE SOLIDS
SVL 4037	SM 5540 C; METHYLENE BLUE ACTIVE SUBSTANCES
SVL 4040	SM 4500 P E; TOTAL PHOSPHORUS (AQUEOUS SAMPLES)
SVL 4042	SM 4500 P E; ORTHO-PHOSPHATE (AS P)
SVL 4043	EPA 410.4; CHEMICAL OXYGEN DEMAND
SVL 4044	TOTAL ORGANIC MATTER
SVL 4045	EPA 351.2; TOTAL KJELDAHL NITROGEN
SVL 4048	EPA 353.2; NITRATE/NITRITE AS N: AUTOMATED CADMIUM RE REDUCTION

SOP NUMBER	DESCRIPTION
SVL 4049	SW-846 9081; CATION EXCHANGE CAPACITY
SVL 4056	SW-846 9213; FREE CYANIDE BY SW-846 9213
SVL 4060	LOSS ON IGNITION (SVL METHOD)
SVL 4061	DETERMINATION OF ACID GENERATION POTENTIAL (AGP), ACID NEUTRALIZATION POTENTIAL (ANP), AND ACID-BASE ACCOUNT (ABA)
SVL 4065	METEORIC WATER MOBILITY EXTRACTION
SVL 4068	SW-846 1312; SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP)
SVL 4070	TOTAL SUSPENDED PARTICULATES
SVL 4075	SM 4500 CN I; WAD CYANIDE BY MIDI DISTILLATION FOLLOWED BY SEMI-AUTOMATED COLORIMETRY
SVL 4078	EPA METHOD 3020A; SAMPLE DIGESTION FOR TOTAL METALS IN AQUEOUS SAMPLES FOR ICP-MS
SVL 4079	EPA METHOD 3010A; SAMPLE DIGESTION FOR TOTAL METALS IN AQUEOUS SAMPLES FOR ICP
SVL 4080	EPA METHOD 3005A; SAMPLE DIGESTION FOR TOTAL RECOVERABLE METALS IN AQUEOUS SAMPLES FOR ICP
SVL 4082	ARSENIC SPECIATION As(III) AND As(V)
SVL 4084	SM 2320 B; DETERMINATION OF ALKALINITY AND pH USING THE AUTOTITRATOR
SVL 4093	CASSETTE FILTER DIGESTION
SVL 4094	EPA METHOD 3050B; SAMPLE DIGESTION FOR METALS IN SOILS
SVL 4095	SW-846 1010; FLASHPOINT DETERMINATION (PENSKEY-MARTENS CLOSED TESTER)
SVL 4096	SW-846 9045 C and 90045 D; pH DETERMINATION FOR SOILS
SVL 4097	ASTM 1915-05; TOTAL SULFUR, TOTAL CARBON
SVL 4099	EPA 350.1; AMMONIA BY SEMI-AUTOMATED COLORIMETRY
SVL 4101	OIA 1677; ANALYSIS OF AVAILABLE CYANIDE BY FLOW INJECTION AND AMPEROMETRY
SVL 4102	EPA 200.7 and SW-846 6010B; ANALYSIS OF METALS BY METHODS 6010B AND 200.7 USING THE PERKIN-ELM OPTIMA ICP
SVL 4105	SM 3114 B; SELENIUM BY HYDRIDE
SVL 4106	METHOD 200.2; SAMPLE DIGESTION FOR TOTAL RECOVERABLE METALS IN AQUEOUS SAMPLES BY ICP AND ICP-MS
SVL 4107	40 CFR 136 Appendix C Section 9.3; SAMPLE DIGESTION FOR TOTAL METALS IN AQUEOUS SAMPLES BY ICP AND ICP-MS
SVL 4108	SAMPLE PREPARATION FOR DISSOLVED AND POTENTIALLY DISSOLVED METALS IN AQUEOUS SAMPLES
SVL 4111	EPA METHOD 200.8; ANALYSIS OF METALS BY ICP-MS
SVL 4112	SW-846 6020; ANALYSIS OF METALS BY ICP-MS
SVL 4114	SW-846 1311; TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
SVL 4116	SM 5310 B; TOTAL ORGANIC CARBON
SVL 4118	CALIFORNIA WASTE EXTRACTION TEST (CA-WET)
SVL 4119	PREPARATION OF QC SOLUTIONS FOR METALS ANALYSIS
SVL 4120	ASTM D-5176; TOTAL NITROGEN
SVL 4121	SM 2150 B; DETERMINATION OF THRESHOLD ODOR NUMBER (TON)

SOP NUMBER	DESCRIPTION
SVL 4122	EPA 300.0; INORGANIC ANIONS BY ION CHROMATOGRAPHY USING THE DIONEX DX100 AND ICS-90
SVL 4123	ASTM D-2795 and D-3682-78 SOLID SILICA

13.1 Deviations

Occasionally, a deviation from an SOP is required to generate an accurate result for a given test or client. This may occur when a client specifically requires a modification, or when the sample matrix interferes with the analysis. The Laboratory Director or a Department Supervisor may authorize a deviation. The analyst documents details of the deviation from the SOP on the instrument raw data printout or the job bench sheet with a notation in the work order memo in Element.

14.0 QUALITY CONTROL

14.1 Quality Control Parameters

SVL uses a number of quality control parameters to validate calibration, and to measure contamination, accuracy, and precision. Each SVL SOP defines the parameters required for the method being used.

14.1.1 Blanks

Method Blank Is an aliquot of analyte-free water that is put through all the steps of a specific method along with the samples. It is sometimes called a Laboratory Reagent Blank.

Calibration Blank The zero-concentration standard analyzed as part of a calibration curve.

Field Blank Randomly selected sample container that is filled with analyte-free water and the appropriate chemical preservative in the field.

Trip Blank Is a specific type of field blank. A trip blank is not opened in the field. It is a check on sample contamination from the time the container is sealed at the lab or supplier. It is used to verify the container's integrity during

sample transport and the container's time on site (it should always be with sampling group).

The acceptance criterion for a blank may be set by the published method, by client Data Quality Objectives (DQOs), or by historical statistics. In the absence of these directives, the acceptance criterion may default to less than the reporting limit.

14.1.2 Matrix Spike

Is an aliquot of sample to which a known amount of analyte has been added prior to sample preparation or digestion. It is a measure of the effect of the sample matrix on the analytical method. It is sometimes called the "Laboratory Fortified Matrix".

The recovery is calculated by:

$$\% \text{ Recovery} = 100 \times (MS - S) / SA$$

Where the MS = Spiked Sample Result

S = Sample Result

SA = Spike Added

Acceptance criteria for the matrix spike recovery may be determined by the published method, by client DQOs, or set between 70-80 to 120-130%. For those methods without guidelines the QA Manager will set default limits for the acceptance range. Individual SOPs will have the recovery range acceptance requirements. There are no requirements if the concentration of the analyte in the original sample is greater than five times the concentration of the spike.

14.1.3 Analytical Spike or Post-Digestion Spike

Is an aliquot of sample to which a known amount of analyte has been added after sample preparation. It is a measure of the effect of the matrix on a digestate or extract.

14.1.4 Laboratory Control Sample (LCS)

Is a solution or material of known concentration that is added to an analyte free matrix and then analyzed to evaluate the recovery and accuracy of a method. It is sometimes called a Laboratory Fortified Blank.

Acceptance criteria for the LCS recovery may be determined by the published method, by the manufacturer of the standard, by client DQOs or the QA Manager will set default limits.

14.1.5 Sample Duplicate

A second similar aliquot of a sample treated exactly the same through preparation and analysis. The Relative Percent Difference (RPD) between the values of the duplicates is a measure of the precision of the analytical method.

$$RPD = 100 \times | S - D | / [(S + D)/2]$$

The acceptance criterion for the RPD is usually set at 20%, if the concentration in the sample is greater than five times the reporting limit. There is no acceptance criterion if the sample concentration is less than five times the reporting limit.

14.1.6 Matrix Spike Duplicate (MSD)

A second similar aliquot that is spiked, it is treated exactly the same as the first matrix spike (MS) through preparation and analysis. The RPD between the recovery values is a measure of the precision of the analytical method.

$$RPD = 100 \times | MSD - MS | / [(MSD + MS) / 2]$$

14.1.7 Interference Check Sample (ICS)

A sample with known concentrations of elements used to determine if the inter-element correction factors are valid.

14.1.8 Initial Calibration Verification (ICV)

A standard made from a second source from the calibration standards. It is analyzed immediately after the calibration to determine the validity of the calibration standards.

14.1.9 Continuing Calibration Verification (CCV)

A calibration standard (primary or secondary source) analyzed after every ten samples, and at the end of an analytical sequence to verify that the calibration is still valid.

14.1.10 Reporting Limit Check Standard (RLCS)

A check standard that is constructed out of either a primary or secondary source made up at same concentration as the reporting limit. An acceptance range of +/- 30% for single analyte methods and +/- 50% for multi-analyte methods was made the default. RLCS results are batched as a Standard Reference Material (SRM) which can be pulled into Element for control charting purposes. This standard is also known as a Contract Required Detection Limit Verification Standard (CRI).

14.1.11 Initial Calibration Blank (ICB)

A matrix matched deionized water sample ran to prove the system is clean with no carry-over.

14.1.12 Continuing Calibration Blank (CCB)

A matrix matched deionized water sample ran to prove the system is clean with no carry-over.

14.1.13 Serial Dilution

Dilute a sample by a minimum of five fold (1+4). Agreement within 10% between the concentration for the undiluted sample and five times the concentration for the diluted sample indicates the absence of interferences.

14.1.14 Quality Control Sample (QCS)

A solution of method analytes of known concentrations which is used to fortify an aliquot of blank solution or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards.

14.1.15 Instrument Performance Check (IPC)

A solution of method analytes, used to evaluate the performance of an instrument system with respect to a defined set of method criteria.

14.2 Control Charts

SVL utilizes Element, to provide its personnel with the up to the minute ability to trend inputted QC results. It is recommended that analysts and technicians regularly consult trending charts to provide themselves with real time information. By trending an analysis, the analyst or

technician can look at a current or past snapshot of QC recoveries and possibly determine when prep procedures or QC samples were done incorrectly or used contaminated or expired components. Trending can also be used to show when an instrument's components begin to degrade or fail.

The process is defined in SOP SVL 1033. RLCSs, prep blanks, LCSs, duplicates and matrix spikes are tracked. A standard \bar{X} bar control chart is used to plot results. Upper and lower warning limits of $\pm 2s$ (where s equals standard deviation) and upper and lower control limits of $\pm 3s$ are calculated using at least 20 measurements (if possible) in a 6 month period.

14.3 Acceptance Limits

Acceptance limits for quality control parameter recoveries may be set by published analytical methods, DQOs or be default limits set by the QA Manager. Individual SOPs will provide the accepted recoveries for each method. Acceptance limits are also outlined in SOP SVL 1033.

14.4 General Frequency of Quality Control Checks

For those methods that do not have published QC requirements, SVL will use the following QC and frequency if applicable per batch of 20 samples:

Initial Calibration Verification once per calibration.

Initial Calibration Blank once per calibration.

Reporting Limit Check Standards at a frequency of 1 per analytical run.

Method or Instrument Blanks at a frequency of 5%.

Laboratory Fortified Blank or LCS at a frequency of 5%.

Duplicates at a frequency of 10%.

Matrix Fortified Samples at a frequency of 10%.

Continuing Calibration Verification every ten samples.

Continuing Calibration Blank every ten samples.

14.5 Maintenance

SVL breaks maintenance down into the following categories: initial maintenance, periodic maintenance, and after-maintenance performance checks; as well as the requirements for filling out maintenance logbooks can be found in SOP SVL 1030. Initial checks can be either checks performed during instrument setup or daily checks performed before the start of operations. Periodic checks are those checks that are performed on set time intervals (i.e. weekly, monthly, biannually, etc). After-maintenance checks are done after repairs have been completed or when an instrument has been moved to a new location, this is done in order to document acceptable ongoing instrument performance.

14.6 Uncertainty of Measurement

SVL uses control charting as a means of determining when selected parameters are out of control. Warning and unacceptable control limits are defined at 2 and 3 sigma, respectively. See 14.2 and SOP SVL 1033.

Almost all approved methods used at SVL contain a section related to precision and bias. Random uncertainties that are systemic cannot be determined statistically and can only be estimated by a trained analyst. Uncertainty represents a bias associated with analytical measurements. The presence and magnitude of bias can be determined by assessment of SVL's control sample results.

SVL reports out data to 3 significant numbers, with the number of decimal places determined by the sensitivity of the method.

15.0 CORRECTIVE ACTION

The SVL Corrective Action Program is defined in SOP SVL 1019.

When a QC parameter fails acceptance criteria during the course of analysis, the analyst or supervisor resolves the problem before reporting data. The Supervisor may arrange for service or repair of instrumentation, if needed.

Any employee may initiate a Corrective Action Report (CAR) to support the quality system. Typical reasons are the need for an SOP revision, overdue MDL study, overdue training, incorrect data reduction or review, improper instrument calibration, or use of an incorrect analytical method.

If there is a non-acceptable result in a Performance Test Sample, the QAM documents the failure as a CAR and works with the analysts and supervisors to

discover the root cause. If there are findings from an internal or external audit, the QAM issues a CAR to appropriate staff members so they can prepare a corrective action plan.

15.1 Preventative Action

A “preventative action” is a pro-active process for dealing with a problem before it happens. It is taken to eliminate the cause of an undesirable situation in order to prevent its occurrence rather than a reaction to the identification of a problem or nonconformity. These actions are taken to reduce the probability that a potential problem will occur. They may also include contingencies to reduce the seriousness should a future problem occur. Subjects for “preventative action” may be implemented to address a weakness in the quality system that is not yet causing nonconformities and can be initiated internally or externally (client complaints). The focus for preventative actions should be to avoid creating nonconformities, but may also lead to improved laboratory efficiencies.

SVL uses the CAR template to document ideas, plans or actions whether developed internally or externally. These reports are audited at a future date to ensure that the changes sought have been implemented and are effective.

16.0 COMPLAINTS

The Client Services Department strives to resolve all complaints from clients regarding analytical reports or service. Client Services contacts the appropriate Director, or Department Supervisor to investigate and resolve issues. Actions may include reanalysis of samples, explanations surrounding technical issues or lab procedures.

16.1 Reanalysis, whether requested by a client or SVL personnel must have justification. The reasoning behind the justification requirement is to provide a baseline level under which the reanalysis can be compared and to provide a means of tracking quality within the lab. Reanalysis performed in order to “result hunt” is not conducted by SVL, but re-analysis performed to confirm a possible error on the part of SVL or by any of the sample custodians listed on the chain of custody is valid. SVL will report out both values for a re-analysis if the sample results are scientifically indistinguishable and the client requests the new result or another report, such data will be accompanied by a case narrative or data qualifier. SVL will issue a corrected report with only the re-analysis

values if it can be determined that an error has occurred on the part of SVL (when this occurs a CAR must be generated). Re-analysis requested on a method that has multiple analytes shall result in the sample being re-analyzed for all of the analytes originally requested (the other analytes may not be re-reported if it is shown that they are scientifically indistinguishable from one another). Work Order memos will be established when a client requests a reanalysis and may be updated throughout the reanalysis. Case narratives will be written up to explain any discrepancies between the original test and any re-analysis conducted. Samples that are re-analyzed in-house will have the reason for the request clearly identified on the re-analysis request form. Whether internal or external, the re-analysis request form must be filled out completely to assist with historical data re-construction and to assist in writing up case narratives or CARs. See SOP SVL 2019.

17.0 TRAINING

SVL conducts annual training in legal and ethical responsibilities for all staff members. SVL provides training sessions that are developed in order to provide staff members with tools in an ever changing environment. New employees will be given various types of training as soon as possible after their hire date.

SVL Management and Supervisors train staff members in laboratory safety. At a minimum this consists of an annual review of the Chemical Hygiene Plan. It also includes seminars on important safety issues throughout the year.

Staff members also receive training in the quality system and QM. At a minimum this consists of an annual review of the QM.

Department Supervisors ensure that staff is adequately trained to perform the analyses assigned to them. The process is defined in SOP SVL 1010. Training includes, as appropriate, quality control requirements, instrument operation, instrument maintenance, software operation, reading the published method, reading the applicable SVL SOPs, successful analysis of a performance evaluation sample, and completion of the Initial Demonstration of Capability (IDOC). When an IDOC is not defined by the analytical method, the QAM will create default criteria outlined in the training summary forms and included in the personnel files. Upon completion of training, a Demonstration of Capabilities Certificate is placed within their personal file.

SVL Management defines the required elements for training for analytical methods. A Supervisor or a fully trained analyst provides training, when

possible. If no fully trained analyst exists, an analyst may learn a new analysis by reading the appropriate method and instrument manual, then performing an IDOC.

During the training period, an analyst may produce data for clients under the supervision of a fully trained analyst. The Department Supervisor or a fully trained analyst must review and sign all trainee work produced.

17.1 To document continued proficiency, an analyst must perform one of the following tasks annually:

17.1.1 Successfully analyze a blind performance sample.

17.1.2 Complete another IDOC.

17.1.3 Successfully analyze a blank and four separately prepared LCSs.

17.2 Analysts and technicians who do not successfully complete a DOC within a year must complete an IDOC before being re-certified for a method.

18.0 ETHICS AND CONFIDENTIALITY

18.1 SVL is committed to providing its clients with accurate and defensible data and meeting all client requirements for data quality and integrity. To achieve our commitment, and as a condition for employment with SVL, all employees agree to follow SVL's policy regarding ethics and data integrity characterized but not limited to the items listed below.

18.1.1 All reported data, including dates and times, shall represent actual values obtained and are not modified or manipulated in any manner for which allowances have not been made for in the referenced method.

18.1.2 There will be no misrepresentation of another analyst's identity.

18.1.3 Altering the contents of logbooks and/or data sheets to misrepresent data is prohibited.

18.1.4 Altering any operating procedures or QC to make data "fit" is prohibited.

18.1.5 Failing to comply with SOPs without proper documentation and approval from the Laboratory Director and/or QAM is prohibited.

18.1.6 Any attempt to misrepresent data or events as they actually occur in the course of data production, review or reporting is prohibited.

18.1.7 Deleting files, whether electronic or hard copy of raw data that was used in a reported value is prohibited.

18.1.8 Engaging or being a party to any practice that ultimately misrepresents data or narratives in any way is prohibited.

18.2 SVL has established a zero-tolerance policy for improper, unethical, or illegal activities. Improper actions are defined as unapproved deviations from contract-specific or method-specific analytical practices. They may be intentional or unintentional. Unethical or illegal actions are defined as the deliberate falsification of analytical or quality assurance results where failed method or contractual requirements are made to appear acceptable. Some examples of improper, unethical, or illegal practices are listed below:

18.2.1 Improper use of manual integrations to meet calibration or method quality control criteria.

18.2.2 Intentional misrepresentation of the date or time of analysis.

18.2.3 Falsification of results to meet method requirements.

18.2.4 Reporting results without analysis.

18.2.5 Selective exclusion of data to meet quality control criteria (dropping calibration points).

18.2.6 Unwarranted manipulation of computer software.

18.2.7 Improper alteration of analytical conditions (changing voltages or run times).

18.2.8 Misrepresentation of quality control samples (not preparing them as samples).

18.2.9 Intentionally reporting results from one sample for those of another.

18.2.10 Reporting calibration or quality control data not linked to the reported samples.

18.3 Confidentiality

SVL's commitment to client confidentiality (including national security concerns) and any associated proprietary rights comes first and foremost. We understand the nature of doing business in a litigious society and will seek to protect our client's interest in all aspects of our work.

19.0 DATA REVIEW

SVL uses a three-tier system for data review via the LIMS. The first level is conducted by the analyst, the second level by a peer or supervisor, the third by a signatory, DCO, Technical Director or the Laboratory Director. Reviews take place upon the review of raw data or within the LIMS (which uses a system of locks to assure data is secure from accidental corruption). The process is governed by SOP SVL 2009.

In the case that erroneous data does leave the lab, the Laboratory Director or Client Services will contact the affected clients as soon as all of the facts are available. SVL will work with the clients in seeking a new or alternative strategy to meet the client's needs.

19.1 Electronic Signatures

For all levels of review up to the final review Element provides an audit trail of who has uploaded and reviewed results. Employees are directed to log in and out of computers so that they are identified when conducting data uploads or reviews, it is not permissible to use another employee's password or misrepresent an analyst or reviewer by not logging in to a computer system under the correct username and password (see SOP SVL1031).

The electronic signature affixed to the Final Report will be assigned by the Document Control Office dependent upon which reviewer signed the Work Order Review Checklist.

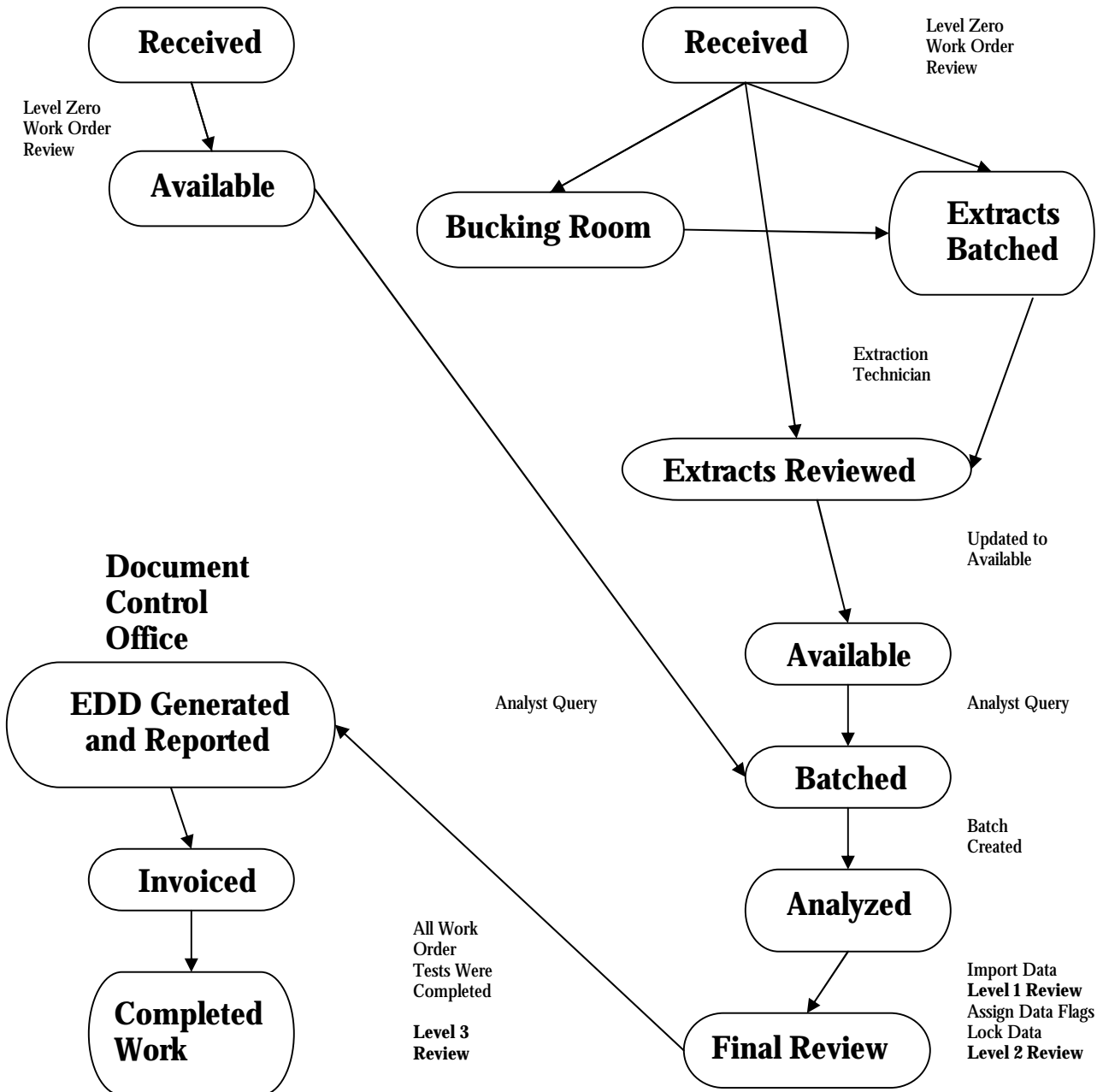
19.2 Data Review Flow Chart

Work Order Status

Samples are logged in, tests assigned and updated to "Available"

Analysis Status

Samples that need extraction before they can be updated to "Available"



20.0 REPORTING

SVL has a single standard report format for nearly all results (SVL_Sample) generated by Element. This includes a case narrative, sample report and QC report.

Reports are also available in a number of routine and custom hardcopy formats. Electronic Data Deliverables (EDD) can be provided in ASCII, spreadsheet, and database formats, including EQWin, GIS/Key, and EnviroData Solutions. If a client has a specific format, we are usually able to provide data that will merge with their preferred format.

Data that will be used to create EPA CLP-like deliverable packages may be done in Element or can be loaded into a third party data review and reporting system MARRS that will generate the forms required to complete a data package. SVL has the capability of providing a hardcopy and EDD format. EDDs are available in standard EPA CLP formats, as well as popular spreadsheet and database files.

21.0 AUDITS AND VERIFICATION PRACTICES

21.1 Performance Testing Program

SVL participates in two WS, two SOIL, and two WP Performance Testing (PT) Studies each year. SVL uses the second WP Study to meet the DMRQA requirements of our clients. The PT samples are logged in as single-blinds and ran as if they were normal samples in all aspects.

21.2 Internal System Audits

The QAM conducts a minimum of one internal system audit per year. The audit provides an overview of the implementation of procedures and policies set forth in the laboratory's Quality Manual and SOPs; ref, SOP SVL 1005. System audits (that may be limited in scope) may be undertaken at any time in response to external audits, CARs, or at the request of the Laboratory Director.

The QAM prepares an internal audit plan based on information garnered from previous audits both internal and external, CARs, method changes, new instrumentation and requests or complaints from clients. The internal audit plan may define participating auditors, any applicable documents, the audit schedule, and scope of laboratory activities to be

audited. The QAM may use written checklists and/or quizzes to assess the analyst's knowledge of the QM, methods and current SVL SOPs.

The QAM will interview the analyst(s) and conduct reviews of records, logbooks, and data packages.

At the close of the audit, a post-audit meeting is held to discuss the audit findings. The auditor or Laboratory Director can close a finding during this discussion if the laboratory staff can satisfactorily demonstrate that the finding is inappropriate or easily remedied.

The QAM will deliver the report to the President, Laboratory Director and Technical Director. After review the report will be released to all of the parties involved. The report will contain at a minimum the following parameters: Date and location of the audit, personnel involved in the audit, laboratory operations audited, any minor or major findings that require corrective action (major findings require the issuance of a CAR) and the auditor's summation.

21.3 Reference Materials

SVL uses second source verification for all calibrated methods. Companies like ERA, High Purity, Fisher, Baker (to name a few) provide second source or standards from separate lots when verification is needed.

21.4 Internal Quality Control Schemes

SVL has instituted a Reporting Limit Check Standard to verify recovery at the Reporting Limit; this check has been instituted for SDWA, CWA and Solid Waste programs. SVL has also instituted a calibration curve verification policy where calibration standard recoveries are fitted back into the curve. A standard at the reporting level must be within 30% of the true value and the remaining standards must be within 10% of their true values. Any exception to this rule will be outlined in the appropriate SOP.

21.3 Data Audits

The QAM performs a data audit of several data packages each year. Data audits can also be triggered by audits, CARs or requests from the Laboratory Director. The purpose behind the data audits is to alert the QAM to any errors, chronic problems or trends that may be developing.

22.0 MANAGEMENT REVIEW

The Management of SVL conducts a review of the adequacy of the quality system weekly. The reviews take into account reports from supervisory personnel, Client Services, Technical Directors, Document Control Officer, Systems Manager, LIMS Chemist, Quality Assurance Manager and President. Recent internal audits, external audits, the results of PT samples, changes to the volume or type of work undertaken, feedback from clients, instrumentation issues, personnel issues and CARs are a few of the items discussed.. Conclusions or action items are addressed; any changes are then incorporated into revisions to the QM and SOPs; as well as, providing direction for day-to-day operations. Notes from these meetings are kept in an electronic file located on our network.

23.0 SUBCONTRACTING AND PURCHASING

Prior to subcontracting work to another laboratory, the Laboratory Director or Client Services ensures that the subcontracted laboratory is NELAP accredited, or is certified by the appropriate state (for the tests being subcontracted). Management also verifies that the laboratory has an active Quality Assurance Program (QAP) that meets SVL's and the client's DQOs (Client Services will maintain a file that indicates the client's request were met). This may be accomplished by obtaining a copy of the subcontracting laboratory's QAP, or equivalent document. The Laboratory Director or Client Services advises the client that the work is being subcontracted. The Sample Custodian will verify that the subcontracting lab received the proper samples, which were assigned the correct tests.

SVL maintains a vendor file which contains the vendors approved to supply products to SVL.

SVL ensures that purchase orders contain the required technical and quality specifications prior to release. If a catalog specifies technical and quality criteria (like the grade or purity), reference to a catalog number is deemed satisfactory.

SVL tests reagents and standards prior to analyzing samples and reporting data. New reagents will be used in a laboratory blank; if the QC requirements are met then those reagents are deemed to be acceptable. Standards will be diluted so as to fit into the current linear range of the instrument and prepared as a laboratory fortified blank to ensure that the standard is of sufficient quality and passes the grade and purity criteria as put forth by the manufacturer (SOP SVL 1015).

24.0 TRANSFER OF ANALYTICAL REPORTS, RECORDS and SAMPLES

In the event that SVL Analytical, Inc. (SVL) goes out of business or there occurs a transfer of ownership, the following plans will apply.

All current clients and past clients going back 5 years, longer if bound by contract, will be contacted by registered mail, return receipt requested, at their current or last known address, and made aware of the permanent closure or transfer of ownership of SVL.

Clients will be requested to respond in writing by return mail, fax or email within 10 business days with the instructions as to the final disposition (in the case of closure) or as to how they wish to proceed with the new ownership concerning their reports, records and/or samples, including work that is in progress.

Options for the client may include complete transfer of all reports, records and samples to their business location, or, complete destruction of all documents and samples. SVL does not take ownership of client samples at any time or under any circumstances, and title to all reports, records and samples resides with the client. SVL will not be responsible for disposal of hazardous materials.

Methods of reports and records transfer may be by hard copy purge file, hard copy reports only, or by electronic data deliverables (EDD) for all date accessible records stored in SVL's database. No customized EDDs will be available.

Should a client decide to stay with the new ownership, any business relationship between the two parties will constitute a new relationship independent of any involvement by SVL. The maintenance of reports and records, and the completion of the work in progress (but not completed by SVL) shall be under the sole control of the new owner. SVL will be relinquished from any and all responsibilities concerning the business relationship between the parties.

25.0 GLOSSARY

Acceptance Criteria: Specified limits placed upon characteristics of an item, process, or service defined in required documents.

Accuracy: The degree of agreement of a measured value with the true or expected value of the quantity of concern.

Acid Base Accounting (ABA): The Acid-Base Account is determined by calculation from the ANP and AGP results. The Acid-Base Account may be reported as the ABA, Acid Base Potential (ABP), or Net Neutralizing Potential (NNP) at a client's request.

Acid Generating Potential (AGP): The acid generating potential is established by determining three sulfur content numbers, the "Total Sulfur", "Non-Extractable Sulfur", and "Non-Sulfate Sulfur" or "Non-Sulfate Sulfur-HCL". Total Sulfur is determined from analysis of a 0.2 g aliquot taken from a sample that has undergone a 200 mesh screening. Non-Extractable Sulfur is determined after digestion with 2N nitric acid, then filtered, and analyzed by a LECO analyzer. Non-Sulfate Sulfur is determined after digestion with hot water, then filtered, and analyzed by a LECO analyzer. Non-Sulfate Sulfur-HCL is determined after digestion with a 2:3 HCL solution, then filtered, and analyzed by a LECO analyzer.

Acid Neutralizing Potential (ANP): The amount of neutralizing bases, including carbonates, present in overburden materials is found by treating a sample with a known excess of standardized hydrochloric acid. The sample and acid are heated to insure that the reaction between the acid and the neutralizers goes to completion. The calcium carbonate equivalent of the sample is obtained by determining the amount of unconsumed acid by titration with standardized sodium hydroxide.

Aliquot: A portion of a sample.

Alkalinity: A measure of the acid-neutralizing ability of the sample.

Analytical Spike: An aliquot of sample to which a known amount of analyte has been added after sample preparation. It is a measure of the effect of the matrix of a digest or extract. It is sometimes known as a post-digestion spike.

Batch: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same reagents. For SVL's purposes not to exceed more than 20 samples.

Bias: A systematic error inherent in a method or caused by some idiosyncrasy of the measurement system. Temperature effects, extraction efficiencies,

contamination, mechanical losses, and calibration errors create bias. Bias may be either positive or negative.

Blank: An artificial sample designed to monitor the introduction of contamination into the process. For aqueous samples, reagent water is used as a blank matrix.

Blind Sample: A sample submitted for analysis whose concentration is unknown to the analyst.

Buffers: Solutions of a weak acid and a salt of the acid or weak base and a salt of the base that are capable of maintaining pH on addition of acid or base.

Calibration: Comparison of an instrument response with a standard or a certified instrument. Commonly it is performed with a set of known standards plotted versus a response.

Calibration Blank: See Section 14.0 Quality Control.

Calibration Curve: Graphical plot of instrument response against amount of analyte in standards. Most often gives a straight line result.

Completeness: The percentage of measurements that meet quality control acceptance criteria for requested determinations. Percentage completeness is defined by client DQOs.

Continuing Calibration Verification (CCV): See Section 14.0 Quality Control.

Continuing Calibration Blank (CCB): See Section 14.0 Quality Control.

Contract Laboratory Program (CLP): EPA program defined by a Statement of Work (SOW).

Control Chart: A graphical plot of test results with respect to time or sequence of measurement, together with limits within which they are expected to lie when the system is in a state of statistical control.

Custody Log: A system for tracking samples from the time they enter the lab until a final report is generated.

Digestion: Solubilizing of metal analytes through heating with a variety of acids or oxidizers.

Dissolved Analytes: An aqueous sample that has been passed through a 45 μm filter. The filtered portion is then run for dissolved analysis.

Double Blind Sample: A sample known by the submitter but submitted to an analyst in such a way that its identification as a check sample is unknown.

Duplicate Sample: See Section 14.0 Quality Control.

Extraction: The process of removing analytes through the addition of acids or water from a solid/semi-solid matrix. SVL performs TCLP, SPLP, CA-WET and Meteoric Waste Mobility extractions.

Field Blank: See Section 14.0 Quality Control.

Field Duplicate: Duplicate samples obtained in the field and analyzed in the lab to assess field precision in sampling.

Hardness: Dissolved metal content of water, expressed as calcium carbonate.

Homogeneity: The degree to which a property or substance is evenly distributed throughout a material.

Initial Calibration Verification (ICV): See Section 14.0 Quality Control.

Instrument Detection Limit (IDL): The smallest concentration detectable on a specific instrument. It is statistically determined by analysis of at least seven replicates of a blank that has not been digested.

Interference Check Sample (ICS): A sample with known concentrations of elements used to determine if the inter-element correction factors of the ICP are accurate.

Inter-element Correction Factor (IECs): The effect one element has on other elements due to wavelength overlap. These effects are accounted for and subtracted out resulting in a less biased result.

Internal Standard: Pure analyte(s) added to a sample, extract, or standard solution in known amount(s) and used to measure the relative responses of other method analytes that are components of the same sample or solution. The internal standard must be an analyte that is not in the sample.

Initial Calibration Blank (ICB): See Section 14.0 Quality Control.

Instrument Performance Check (IPC) Solution: A solution of method analytes, used to evaluate the performance of the instrument system with respect to a defined set of method criteria. The CCV or LCS may fit this criteria.

Laboratory Control Sample (LCS): See Section 14.0 Quality Control.

Laboratory Fortified Blank (LFB): Another term for a laboratory control sample.

Laboratory Fortified Matrix (LFM): Another term for a matrix spike.

Laboratory Reagent Blank (LRB): Another term for a method blank.

Langlier's Index: An analytical measure of the corrosivity of water.

Limit(s) of Detection (LOD): A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility.

Limit(s) of Quantitation (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence.

Linear Calibration Range (LCR): The concentration range over which the instrument response to analyte is linear.

Linear Dynamic Range (LDR): The concentration range over which the instrument response to analyte is linear.

Manual Integration

Material Safety Data Sheet: Written information provided by vendors concerning a chemical's toxicity, health hazards, physical properties, fire and reactivity data including storage, spill and handling precautions.

Matrix: The substrate of a test sample.

Matrix Spike (MS): See Section 14.0 Quality Control.

Matrix Spike Duplicate (MSD): See Section 14.0 Quality Control.

Maximum Contaminant Levels: Regulatory action levels for primary drinking water analytes.

Mean: The sum of all observations divided by the number of observations.

Method: A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order they are to be performed.

Method Blank: See Section 14.0 Quality Control.

Method of Standard Addition: Is commonly used to determine the concentration of an analyte that is a complex matrix. The matrix may contain other components that interfere with the analytical signal causing inaccuracy in the determined concentration. Known concentrations are added to a volume of sample to develop a curve based upon the interferences from that sample, so that a reliable concentration can be derived for the sample.

Method Detection Limit (MDL): The smallest concentration detectable on an instrument with 99% certainty by a specific method. It is statistically determined by analysis of seven replicates of a low-level standard, prepared in the same way as a sample.

NTU: Nephelometric turbidity unit.

Performance Test (PT) Sample: A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within the specified acceptance criteria.

pH: The negative log of activity of the hydrogen atom.

PQL: Practical quantitation levels.

Precision: The degree of agreement of independent measurements under specified conditions.

Quality Assurance: A system of activities used to ensure defined standards of quality.

Quality Control: A system for verifying and maintaining the desired level of accuracy and precision of an analytical method.

Quality Control Sample (QCS): A solution of method analytes of known concentrations which is used to fortify an aliquot of LRB or sample matrix. The QCS is prepared from a secondary source. The ICV fits this criteria.

Relative Standard Deviation (%RSD): The Standard Deviation divided by the Mean and multiplied by 100.

Relative Percent Difference (%RPD): The difference between two values divided by the average of the values, expressed as a percent.

Reporting Limit (RL): The smallest concentration usually reported for an analyte. It is usually at least three times the Method Detection Limit.

Reporting Limit Check Standard (RLCS): See Section 14.0 Quality Control.

Residues: Remainder after removal of water or other liquids, see solids and total solids.

Retention Time: Elapsed time between injection of sample to elution on the chromatogram.

Run Logs: A log book for each instrument listing consecutively what was run, when, by whom, and what file name the raw data is filed under.

Serial Dilution: See Section 14.0 Quality Control.

Standard Operating Procedure (SOP): A written procedure that defines a laboratory operation or analytical method.

Sub-sample: A portion taken from a sample.

Standard Deviation: Is the positive square root of the variance. A measure of the average spread around the mean.

Titration: Any number of methods for determining volumetrically the concentration of a desired substance in solution by adding a standard solution of known volume and strength until the reaction is complete, usually as indicated by a change in color due to an indicator.

Total Metals: Follow the digestive method outlined in 40 CFR 136 Appendix C Section 9.3. Results are reported as “total metals”.

Total Recoverable Metals: Follow the digestive method outlined in 40 CFR 136 Appendix C Section 9.4. Results are reported as “total metals”. This is SVL’s default total metals method unless both total and total recoverable metals are requested.

Traceability: The ability to trace the history, application, or location of an entity (e.g., standard, reagent, sample). SVL tracks the entities from the moment it enters the premises until the time it is disposed of.

Trip Blank: See Section 14.0 Quality Control.

Tuning Solution: A solution which is used to correct instrument performance prior to calibration and sample analysis.

Variance: The value approached by the average of the sum of the squares of deviations of individual measurements from the mean. Mathematically, it may be expressed as:

$$\frac{\sum (X_i - m)^2}{n} \rightarrow s^2 \text{ as } n \rightarrow \infty$$

Ordinarily, only its estimate s^2 can be known.

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n - 1}$$

25.0 CERTIFICATIONS

SVL maintains certification for analysis of drinking water in the following states:

Arizona
Florida
Idaho
Nevada
Washington

SVL maintains certification for analysis of environmental samples in the following states:

Arizona
California
Florida
Nevada
Washington

NELAC Certification Awarded – Primary Accreditation Florida

25.1 Copies of the Scopes of Accreditation can be located at www.svl.net.

WAYNE R. SORENSEN**PROFESSIONAL EXPERIENCE:****SVL Analytical, Inc. - Kellogg, ID 1991- Present**

President / CEO - Administers company policies and formulates business strategies.

SVL Analytical, Inc. - Kellogg, ID 1987-1991

Laboratory Director: Responsible for all analytical and operational activities of the laboratory; supervised personnel

SVL Analytical, Inc. - Kellogg, ID 1973-1987

Analytical Chemist: Analyzed soils and water for metals by flame atomic absorption and graphite furnace (7000 methods), for mercury by cold vapor atomic absorption (methods 7470 and 7471); for cyanide (method 9012), fluoride (method 340.2), phosphate (method 365.2), pH (method 150.1), turbidity (method 180.1), and conductivity (120.1); analyzed soils and house dusts for lead, arsenic, cadmium; analyzed hi-vol filters for metals by flame atomic absorption; performed baseline study analyses for permitting mine sites; conducted analysis for Remedial Investigation and Feasibility Study for Bunker Hill Superfund Site..

The Bunker Hill Company - Kellogg, ID October 1969-April 1973

Supervised a large integrated mine, mill and smelter analytical laboratory and trained personnel.

Kennecott Copper, Ray Mines Division March 1968-October 1969

Chief Chemist: Supervised an assay lab, trained assayers for new analytical methods and conducted applied research.

Kennecott Copper, Western Mining Division Research Center May 1965-March 1968

Analytical Chemist: Analytical methods development and applied metallurgical research on copper.

EDUCATION:**Utah State University - Logan, UT 1958-1962**

B.S. Chemistry (minor: mathematics, physics)

Salt Lake Trade Tech - Salt Lake City, UT 1965

Basic Industrial Statistics

John R. Kern

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID October 2007 - present

Laboratory Director: Manage and direct the activities of the laboratory; establish ethical norms; evaluates personnel performance; conduct QA/QC reviews of incoming work and completed reports; work with the QA Manager to evaluate compliance with SOPs and methods.

P3 Scientific - Oakdale, MN September 2005 - April 2007

Laboratory Manager – Chemistry: Management and operation of a laboratory at a cGMP/GLP compliant CRO, providing analytical (organic and inorganic analysis) and microbial services to the chemical industry.

Arena Pharmaceuticals, - Inc. San Diego, CA January 2003 - August 2005

Associate Director, Analytical Chemistry – Pharmaceutical Development: Direct the analytical chemistry laboratory within the pharmaceutical development unit at a start-up biotech/pharmaceutical company.

LC Resources - McMinnville, OR 1991 - 2003

Laboratory Director: Started and built up a contract research laboratory specializing in HPLC and LC/MS/MS services for the pharmaceutical and chemical industries. Oversaw the growth of the lab from 2 to 20 employees, with annual sales of over 3 million. Directly responsible for the day-to-day operation of the lab including project management, experimental design, preparation of proposals, client interface, contracts, budget, oversight of QA and QC departments, SOP and protocol preparation. This position involved extensive interaction with major pharmaceutical companies in negotiating contracts, planned studies, allocating resources, report preparation, and discussing technical issues. Experience was also gained in the direction of projects involving analysis of a wide variety of pharmaceutical products from OTC to complex proteins, and drugs in biological matrices.

Syntex USA, Inc. – Palo Alto, CA 1984 - 1991

Senior Chemist: Development of analytical methods for the analysis of active pharmaceutical ingredients (AIP) and determining release specifications. Prepared analytical sections for IND and NDA applications. Supervised laboratory staff and project team membership.

EDUCATION:

Montana State University - 1982

M.S. Chemistry

Eastern Michigan University - 1978

B.S. Biochemistry

Professional Memberships:

American Chemical Society since 1980

American Association of Pharmaceutical Scientist since 1998

Professional Honors:

Syntex Research Fellow, University of Illinois, 1984

Research on chiral separations under the direction of Dr. William Pirkle

Publications:

See attached

KIRBY L. GRAY

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID Dec. 2004-present

Technical Director - Conducts QA/QC reviews of commercial and EPA (ILMO5.4) incoming work and completed reports; supervises laboratory activities related thereto; primary contact with EPA (SMO); verifies SDGs, and responsible for MARRS (electronic data deliverable system) in coordination with DCO prior to reporting.

SVL Analytical, Inc. - Kellogg, ID March 1987-2004

Inorganic Instrumental Chemistry Department Supervisor -- Responsible for sample analysis by ICP, GFAA, FLAA, IC and CVAA.

Radersburg Mining Co. - Toston, MT September 1986-March 1987

Chemist: -- Responsible for fire assay, FLAA, and sample preparation.

IDHW, State of Idaho - Kellogg, ID August 1986

Environmental Technician: -- Operated X-ray fluorescence meter and collected soil samples.

Sunshine Mining Co. - Kellogg, ID May 1984-May 1986

Chemist -- Responsible for fire assay, FLAA, and classical chemistry.

The Bunker Hill Co. - Kellogg, ID May 1972-May 1982

Material Recovery Supervisor -- Responsible for operation and maintenance of water treatment plant, sulfuric acid plant, baghouse, cadmium refinery, and electric reverberatory furnace at a lead smelter.

EDUCATION:

University of Idaho - Moscow, ID Sept 1968-May 1972

B.S. Geological Engineering

North Idaho College-Coeur d'Alene, ID Sept 1966-June 1968

Engineering major

NAN WILSON

PROFESSIONAL EXPERIENCE:

SVL ANALYTICAL, INC., Kellogg, ID March 2003 - Present

Technical Director October 2007 – present: Conducts QA/QC reviews of incoming work and completed reports, supervises laboratory activities.

Laboratory Director October 2006—October 2007: Manage and direct the activities of the laboratory; establish ethical norms; evaluates personnel performance; conduct QA/QC reviews of incoming work and completed reports; work with the QA department to evaluate compliance with SOPs and methods.

QA Coordinator April 2006-October 2006: maintain Quality Systems, draft & approve SOPs, coordinate Quality System Audits, coordinate PT testing.

QA Chemist September 2004 – March 2006: maintain Quality Systems, draft SOPs, assisted with Quality System Audits.

Safety Director September 2004-October 2006: maintain Chemical Hygiene Plan, coordinate safety training and record keeping.

Organics Department Chemist March 2003-August 2004: Analyzes samples for volatile organic compounds by GC.

LC Resources—McMinnville, OR September 1997-January 2003

Manager, Pharmaceutical Analysis January 2001-January 2003: Supervised HPLC method development; coordinated work for chemists and technicians; directed method validation; wrote SOPs and validated protocols; prepared client reports; trained chemists and technicians on SOPs and computer software; presented data and reports; responsible for client contact; administered Millennium32 chromatography software

Chemist September 1997-January 2001: Developed HPLC methods for pharmaceuticals; operated, calibrated, and maintained HPLC, UV/Vis, pH meters, balances, pipettes; wrote client reports; administered Millennium32 chromatography software

EDUCATION:

Willamette University—Salem, OR 1992-1996

B.A. Chemistry and Russian

Simferopol State University—Simferopol, Ukraine 1995

Semester abroad

PUBLICATIONS:

Provided upon request

MICHAEL S. DESMARAIS

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID Oct. 2006 - Present

Quality Assurance Manager -- Coordinates and develops quality assurance and training programs for the laboratory, maintains laboratory accreditations, writes standard operating procedures, reviews data, conducts audits, performs root cause analysis.

SVL Analytical, Inc. - Kellogg, ID June 2004 – Oct. 2006

Chemist Inorganic Instrument Department – Responsible for analysis of samples for trace metals by EPA methods 200.7 and 6010B. Interprets and reports data.

SVL Analytical, Inc. - Kellogg, ID April 2004 – June 2004

Chemist Organic Chemistry Department – Responsible for analysis of samples for pesticides and PCBs by EPA methods 608, 8081A, and 8082. Interprets and reports data.

U.S. Army Engineer District-Alaska – Umiat, AK May 2003 - Sept. 2003

Alaska Dept. Environmental Conservation approved field chemist. Established field laboratory, developed and implemented QA/QC under USACE and ADEC requirements. Surveyed, sampled and tested soils and waters under a Total Environmental Restoration Contract (TERC).

North Creek Analytical Oct. 1997 - Dec. 2002

Senior Metals Chemist and Health/Safety Officer - Developed, revised and implemented safety and HAZMAT procedures. Developed and documented standard operating procedures. Maintained analytical instrumentation and analyzed samples for trace metals (ICP, AA and GFAA) and BTEX/GRO.

EDUCATION:

Eastern Washington University – Cheney, WA 1996-1997

Graduate coursework in Hydrology and Fisheries.

Washington State University – Pullman, WA August 1993-June 1995

B.S. in Physical Science (emphasis in Chemistry, Geology, and Environmental Science).

Yakima Valley Community College 1991

A.A.

PUBLICATIONS:

Desmarais, M.S. and Hills J.W., "A Simple Thermal Pump for In-the-Field Supercritical Fluid Extraction", Analytical Letters, 28 (14), 2575-2583 (1995)

Dunham, D.C., Desmarais, M.S., Breid T., and Hills, J.W. "Carbon Dioxide Supercritical Fluid Extraction with On-line Fluorescence Detection, Analytical Letters, 28 (14), 2561-2574 (1995)

Daniel K. Gingrich II

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID March 2010 - Present

Classical Chemistry Department Supervisor -- Supervises the staff and operation of SVL's TDS, Nutrient, TKN, cyanide, NOX/NH₄, Leco, and extraction labs. Ensures that EPA and Standard Method methods are correctly used, including EPA SOW ILM05.4. Approves lab data prior to entry into Element (LIMS) and submission to DCO for reporting.

SVL Analytical, Inc. - Kellogg, ID July 2008 - February 2010

Classical Chemistry Analyst - Performs analysis and interpretation of the following methods: SM 4500 PE, SM 4500 S² F, SM 5540 C, SM 5310 B, EPA 350.1, EPA 353.2, EPA 410.4 and total cyanide by EPA SOW ILM05.4. Interprets data and up loads to Element (LIMS).

University of Idaho - Moscow, ID Aug. 2006 - May 2008

Research — Worked performing DNA analysis. Purified proteins in order to raise antibodies. Conducted presentations in department meetings.

Coeur d'Alene Cellars - Coeur d'Alene, ID Oct. 2005 - June 2006

Tested wine for pH, total and titratable acidity, sulfur dioxide and ethanol concentration.

EDUCATION:

University Of Idaho - Moscow, ID 2008

B.S. Microbiology

North Idaho College - Coeur d'Alene, ID 2006

A.A. Biology

DANNY J. SEVY

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID Dec 2004-present

Instrument Department Supervisor – Supervises staff and operation of SVL's ICP-AES, ICP-MS, CVAA, GFAA, FLAA, and IC labs and their respective sample preparation labs. Ensures that EPA and Standard Method methods are correctly used, including EPA SOW ILMO5.4. Approves lab data in Element (LIMS) prior to submission to DCO for reporting.

SVL Analytical, Inc. - Kellogg, ID 1996-2004

Inorganic Instrument Operator -- Performs metals analysis by ICP and IC.

SVL Analytical, Inc. - Kellogg, ID 1994-1996

Classical Chemistry Analyst -- Performed classical Wet Chemistry analyses on water and soil sample, including the preparation and analysis of cyanide and nitrate/nitrite (as N) tests for soil and water samples.

SVL Analytical, Inc. - Kellogg, ID 1988-1994

Instrument Operator -- Analyzed samples using Cold Vapor Atomic Absorption and Ion Chromatography

SVL Analytical, Inc. - Kellogg, ID 1987-1988

Laboratory Technician -- Performed inorganic sample preparation and operated CVAA and GFAA instruments.

EDUCATION:

Perkin Elmer April 2008

Inorganic Workshop Series

Perkin Elmer July 2004

ICP-MS with Elan Software & Elan DRC Accessory Training Course

Perkin Elmer November 2001

Optima Instrument Series with ICP WinLab Software

OI Corporation January 2001

Operation of FS-3000 Auto-analyzer

North Idaho College - Coeur d' Alene, ID 1989-1990

Chemistry and Mathematics courses

CRYSTAL SEVY

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID

2006-Present

Sample Receiving Department Supervisor— Supervises SVL's sample receiving staff and is Sample Custodian for samples received under EPA SOW ILMO5.4. Responsible for setting up Work Orders within Element (LIMS), case narratives and point of contact with clients and their representatives. Works closely with SVL's Client Services and Technical Director to ensure that projects are setup and priced correctly.

SVL Analytical, Inc. - Kellogg, ID

1996-2006

Sample Receiver—Verifies sample temperature, integrity and security on receipt; creates laboratory jobs; ensures proper sample storage prior to analysis supervises sample disposal; ships sample containers to clients.

MELBA BENCICH

PROFESSIONAL EXPERIENCE:

SVL Analytical, Inc. - Kellogg, ID, February 1988 - Present

Document Control Manager – Supervises data reporting using Element (LIMS) for commercial clients and SDG reporting for EPA's CLP SOW ILMO5.4.

Shoshone Insurance – Kellogg, ID, 1984 – 1988

Duties included accounting, customer service relations and updating manuals

Travel People – Coeur d' Alene, ID, 1982 – 1984

Travel Consultant

Farmer's Insurance – Kellogg, ID 1982-1984

Duties included accounting, customer service relations and updating manuals

The Bunker Hill Company – Kellogg, ID, 1974 – 1981

Data Control Analyst

EDUCATION:

North Idaho College – Coeur d' Alene, ID, 1967 – 1968

General studies

International Correspondence School, 1980

Mathematics

27.0 Quality Manual Releases

Date
January 2010
January 2011