PALOS VERDES LANDFILL
REMEDIAL INVESTIGATION REPORT

APPENDIX E.8

SAN JOSE CREEK
WATER QUALITY LABORATORIES
QUALITY ASSURANCE DOCUMENT

QUALITY ASSURANCE DOCUMENT OF THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY LABORATORY SECTION

1965 South Workman Mill Road
Whittier, California 90601
June, 1989

This Quality Assurance Document has been reviewed by the Technical Services/Laboratory Section staff. The signatures below indicate that the plan is being accepted and that the contents shall be implemented in the Laboratory Section's daily activities.

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INTRODUCTION

The County Sanitation Districts of Los Angeles County serve approximately four million people in over seventy cities of the County. They operate water reclamation plants and sanitary landfills at several locations in L. A. County. The analytical support services relating to the operation of the Districts' facilities are provided by the Districts' Laboratory Section. The Laboratory Section also provides technical support to the Districts' Industrial Waste Section and to the L. A. County District Attorney's Hazardous Waste Strike Force.

Monitoring the validity and quality of data produced in the Section's laboratories is the responsibility of the Quality Assurance Group. Analytical methods and data generated have to meet stringent requirements of the California State Water Resources Control Board, California Department of Health Services and EPA as set forth in the Clean Water Act and the Resource Conservation and Recovery Act (RCRA). The Laboratory's Quality Assurance Group, therefore, strives to maintain an on-going program designed to accomplish the requisites set forth by EPA in order to comply with NPDES permits and by the California Department of Health Services for laboratory certification requirements.

This quality assurance plan was prepared by the County Sanitation Districts of Los Angeles County, Laboratory Section, in order to achieve the ultimate goal of generating the quality of data necessary to meet the needs of the Districts' laboratories and the requirements of different regulatory agencies (WQCB , DOHS, EPA) for compliance purposes. It encompasses all phases of the laboratories' activities, starting from sample collection to data reporting.

previous experience in water quality laboratories. Laboratory technicians work in the same three branches of science noted above. The minimum entry requirements are an AA degree or twelve college units in the specific science. Many of the technicians have more college education and wide experience in the field. Most have four-year college degrees in the science field. Laboratory supervisors and managers also have a minimum of a Bachelor's degree (most have advanced degrees) in chemistry or microbiology plus experience in the environmental field.

7. The Laboratory Services subsection includes the Treatment Plant Laboratories Group, Sample Collection and Control Group and Supply Services (Stockroom). (Figure 2).

   7.1 The Treatment Plant Laboratories (TPLs) consist of Long Beach, Los Coyotes, Whittier Narrows, San Jose Creek, Pomona, Saugus-Newhall, Valencia and Lancaster/Palmdale. (Figure 3).

   7.2 All the plants are primarily concerned with process control of the water reclamation plants. Additional duties of the TPLs include daily, weekly, bi-weekly, monthly, and semi-annual monitoring pursuant to NPDES discharge permits. Each laboratory has one or two technicians and is staffed seven days per week.

   7.3 Sampling personnel, a senior laboratory technician, two laboratory technicians, a laboratory attendant assigned to log in samples, and two laboratory attendants who wash glassware and deliver samples and supplies, are also under the jurisdiction of the TPL group.

8. The SJCWQL subsection includes separate groups involved in: chemistry, microbiology, biology, and methods evaluation and quality assurance. The supervisor of each group reports to the Supervisor of SJCWQL. (Figure 4).

   8.1 The analytical chemistry work is subdivided into a Wet Chemistry group and an Instrumental chemistry group. There is an additional analytical group assigned to the night shift. Each of these is staffed by two to four chemists and three to five technicians under the direction of a Laboratory Supervisor. These groups perform all chemical analyses required for monthly NPDES permit monitoring of the inland Water Reclamation Plants (WRPs). In addition, they analyze industrial wastes, ocean sediment samples, groundwater, hazardous wastes, and other special samples as required. These groups also perform weekly, semi-annual and annual analyses of the San Gabriel River.

   8.2 The Microbiology group at SJCWQL does some routine monitoring, but is primarily concerned with process

9.1.1 Process Control carries out the daily monitoring required for the 370 MGD Joint Water Pollution Control Plant (JWPCP), which is an advanced primary treatment and partial secondary treatment (220 MGD of UNOX pure oxygen activated sludge secondary treatment) facility. Process Control operates 365 days/year and is staffed with two senior laboratory technicians, five laboratory technicians, four part-time technicians, and two laboratory attendants. Tests performed are the same as those performed at the inland plant laboratories, in most cases. Most data generated by Process Control is not logged-in, but is entered into a different database, designated TDJ (Technical Database for JWPCP). (See Appendix II for a description of TDJ).

9.1.2 Wet Chemistry carries out traditional chemical analyses that are not required on a daily basis (e.g. cyanide, fluoride, total hardness, etc.). They also set up complex, non-routine analytical procedures. Wet Chemistry has one senior chemist and two laboratory technicians.

9.1.3 Metals analyzes liquid and solid samples for a variety of metals using atomic absorption spectrophotometry, with an emphasis on hydride generation analysis of arsenic, selenium, and antimony. The Metals sub-group is staffed with one chemist and two laboratory technicians.

9.2 The Organics/Instrumentation Group is responsible for the pesticide analysis of sewage, sediments, fish, sludge, and well waters. The group also carries out the Districts' monitoring for toxic and related air pollutants. Chromatography is utilized to monitor for halocarbons, aromatics, sulfur compounds, and permanent gases in air and gas samples from sanitary landfills and wastewater treatment facilitates. The group has three chemists, one senior laboratory technician, and three laboratory technicians.

9.3 The Research Group is responsible for development of new analytical methods in response to District needs. The group is also responsible for running the Kratos GC/MS that is currently used for air and gas monitoring. Most of their recent methods development work has been in the area of air toxics monitoring. The group is headed by a Research Chemist II and also consists of a Research Chemist I and two senior chemists.

9.4 The Microbiology Group carries out the legally required monitoring of ocean shore and nearshore samples for total coliform. In addition, special studies that require

1.1.5 Establishing acceptable performance limits for both precision and accuracy and constructing control charts for all analytes determined in the laboratories.

1.1.6 Documenting corrective action performed by the analysts when analysis of duplicates and spikes is out of control.

1.1.7 Having an on-going interlaboratory quality control program by the preparation and distribution of QA reference standards, split samples and blind samples, where feasible.

1.1.8 Performing periodic audits of the Laboratory Section's QA program and examining its effectiveness.

1.1.9 Making necessary changes in the program to continually improve the quality of data that the laboratories generate.

2. Sampling Procedures and Chain of Custody, including Sample Control and Sample Flow

2.1 Sample chain of custody employed varies from facility to facility within the Section. At each laboratory, it is specifically tailored to produce efficient sample handling and to insure sample integrity.

2.2 There are sample receiving stations at the San Jose Creek and Joint Water Pollution Control Plant Water Quality Laboratories.

2.3 Special instructions for sample collection, the correct types of sample bottles, methods of sample preservation if needed, and holding periods are given to sample collection personnel and analysts. (Tables 1-A and 1-B).

2.4 Sample request forms, sample tags and labels, and other sample tracking documentation are included during sample submittal. Samples of these forms are attached.

2.5 Treatment Plant Laboratories

2.5.1 Routine composite samples are collected in refrigerated automatic samplers.

2.5.2 Each sampler contains six buckets on a platform which rotates 60 degrees every four hours.

2.5.3 There is pump-driven or gravity flow through the sampler constantly to keep lines clear.

record, distinguishing one day's sample from that of another day. (See Appendix 2 for description of TDJ database.)

2.6.6 Analyses of all routine samples are done the day the samples are brought into the laboratory, and most of the samples are discarded that day. Any samples that need to be saved are poured into appropriate sample containers, labeled, and placed in the laboratory walk-in refrigerator for storage.

2.6.7 Composite samples that require more extensive testing (e.g. monthly NPDES permit monitoring) are logged-in to the LABDATA database by a designated laboratory attendant. Each sample is given a unique log number starting with JW, followed by five digits. (For the year 1989, log number JW60001 was the first sample.)

2.6.8 Additional non-routine samples are collected by engineering aides and others and are submitted to the laboratory for various analyses. The samples are accompanied by sample request sheets or memos indicating analyses desired. These samples are also logged-in to the LABDATA database by the laboratory attendant.

2.7 San Jose Creek Water Quality Laboratory (SJCWQL)

2.7.1 A wide variety of samples enters the SJCWQL.

2.7.2 Monthly plant samples for permit monitoring are taken in the usual fashion by the TPL technician.

2.7.3 These samples, in addition to daily samples, are carried to the TPL. The samples are taken to the sample log-in station and given to one of the sample receiving lab attendants.

2.7.4 The samples are assigned ID numbers and are electronically logged in. A description of the Laboratory Section's LABDATA data system is found in the Appendix section of this document.

2.7.5 At treatment plants not staffed by a sample log-in lab attendant, the person who collects the samples transports the samples to SJCWQL, where they are logged in and assigned ID numbers.

2.7.6 Samples are also brought to SJCWQL by industrial waste inspectors, monitoring crews, law enforcement officers, and health inspectors.

sample containers by selecting bottles at random, adding nanopure water and submitting them to be analyzed for constituents that are requested when using the container for sampling.

3.5 Suitable containers for sample collection are glass or polyethylene bottles and jars and glass vials with Teflon-lined caps for some samples collected for organic analyses.

3.6 Preservation techniques can be utilized for some samples to retard the chemical and biological changes that inevitably continue after the sample is removed from the source.

3.7 Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, and (3) reduce volatility of constituents.

3.8 Preservation methods are generally limited to pH control, chemical addition and refrigeration. Tables 1-A and 1-B show the various collection procedures, containers, and preservatives that may be used to retard changes in samples, and holding periods.

4. Sources of Standards and Reagents

4.1 The use of reagent grade or better quality reagent chemicals is emphasized. Sources of chemicals and reagents are Fisher, Eastman Kodak, Baker and other reputable manufacturers.

4.2 Chemicals and reagents are purchased through a single centralized stockroom supervised by the Laboratory Services Supervisor.

4.3 Storeroom personnel utilize an inventory system for reagents and chemicals which are stored and issued on a "first in, first out" rotating basis.

4.4 A record is kept of each reagent indicating chemical name, descriptive information, maximum stock level, and amount in stock. Inventory records are adjusted as goods are received or issued.

4.5 Certain materials are routinely subjected to raw materials QA testing. Trace metals contamination of acids are verified by testing individual lots before acceptance. Organic solvents used for extraction and analysis are tested for contamination before use.

traceable to NBS, are maintained at nearly constant temperature. A number is assigned to each thermometer, and a record of all calibrated thermometers and their assignments or distribution, is kept in a logbook. All thermometers issued are fitted with numbered tags and provided with the correction sheet. These include thermometers used for ovens, incubators, water baths, effluent/sampling, and refrigerator thermometers.

5.3.4 Ovens, incubators, refrigerators, pH meters and other ancillary equipment are provided with record sheets where daily monitoring of temperature and calibration is entered. Adjustments to temperature are made when necessary. Completed sheets are sent monthly to the QA group where they are tabulated and monitored for compliance with required temperature tolerances.

5.3.5 Colorimeters are calibrated for wavelength and absorbance by the issuance of a primary standard.

6. Measurements/Analyses

6.1 The County Sanitation Districts of L. A. County has an in-house laboratory manual titled "Laboratory Section Procedures for the Characterization of Water and Wastes" prepared for use in District's laboratories. The manual is edited and updated by the QA group.

6.2 All procedures used routinely for wastewater and hazardous waste analyses, and some non-routine analyses, are included in the manual.

6.3 Approved references are used. These include:

6.3.1 Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985.

6.3.2 EPA Methods for Chemical Analyses of Water and Wastes, Rev. 1983.

6.3.3 SW-846 - Test Methods for Evaluating Solid Waste Physical/ Chemical Methods, 3rd edition, 1986.

6.3.4 Federal Register 40 CFR Part 136, Oct. 26, 1984, Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act.

6.3.5 Title 22, Div. 4, Ch 30, California Administrative Code, "Criteria for Identification of Hazardous and Extremely Hazardous Wastes", 1985.

(as for routine process control samples at the TPLs).

7.4.1 At SJCWQL and JWPCP WQL, computerized logbooks are kept showing sample identity and time. Collector name is recorded on the request sheet and analyst name is recorded on bench sheets.

7.4.2 In the TPLs, the collector is the same as the analyst and his name appears on the bench sheet. This bench sheet, preprinted with routine sample identification, serves the function of a logbook. The samples are taken from the same source at the same time daily; exceptions are noted on the bench sheet.

7.4.3 All research programs are recorded in detail in bound research notebooks issued to project scientists for that purpose. Hazardous crime evidence analyses are recorded in separate bound notebooks issued for that purpose.

7.4.4 Bench results are recorded by analysts in all laboratories on pre-printed forms. Some books are designed specifically for the analyses performed at that bench. Others are of general format adaptable to a variety of analyses. In either case, the analyst enters all pertinent information directly into the book.

7.4.5 Bench sheets in the TPLs, designed specifically for each laboratory, are completed by the technician.

7.5 Calculation of results are clearly outlined and units of analysis and reporting are included in the "Calculations" section of each procedure with the recommended number of significant figures. With some instruments equipped with on-line processing systems or are interfaced with micro-computers, programs are available which are used to automatically do calculations to the desired reporting units. Where computer capabilities are not available, calculations are done manually with the aid of electronic calculators to the desired units. Results from the bench sheets, after calculations, are transferred to the on-line computerized report sheet via a CRT/keyboard, when samples are electronically logged in, and the bench sheet turned in to the Supervisor. At the JWPCP WQL, bench books are used. Bench books are customized bench sheets that are bound together for each test. The books are kept where the tests are performed; when full they are filed by test. At the TPLs, the laboratory technician transfers his results, after calculations, to the MSO and files the bench sheet.

every run. For some tests, calibration check standards are used to check the calibration curve. These solutions have a concentration mid-point of the calibration curve and prepared from chemicals that are of a different lot than that used for the the calibration standards. For most constituents, the relative response of the calibration check standard should not vary by more than 5% or 10% from the calibration standards; for organic constituents, like BNAs, the deviation allowed is 30%.

8.1.5 For some analyses for organics, surrogate standards are added to every sample, duplicates and spikes, and blanks. Acceptance limits are established for these surrogates.

8.1.6 For GC/MS analysis, several QC self-checks are utilized: a) establishment of 4 to 6 points initial calibration curve and calculations of response factors; b) mass calibration done once a month; c) Tuning to meet ion abundance criteria, resolution and peak symmetry; d) daily check standard to compare the relative response to the initial calibration curve; % deviation should not vary by 30%; e) the use of internal standards; f) the use of duplicates, matrix spikes and matrix spiked duplicates; f) the use of QC check recovery standards; g) and the use of blanks.

8.2 Interlaboratory quality control

8.2.1 Quality control samples in the form of reference standards are issued to all laboratories by the QA group. These are either prepared in-house or are obtained from EPA or purchased from NBS. These can either be aqueous solutions of constituents prepared from pure chemicals, or organic compounds prepared from neat chemicals reconstituted in the appropriate solvents. Constituents include, but are not limited to, metals, solids (dissolved, suspended, total), pH, ammonia, phenols, cyanide and others requiring wet tests, PCBs, VOCs, pesticides, BNAs, and others. The standards are contained in sealed glass ampuls. The standards are distributed to the laboratories once every three months per constituent or mixture. The results are sent to the QA group on special forms. The QA group tabulates the results and sends summary reports.

8.2.2 There are reference standards that are issued monthly. These include BOD standards and MF

9.1.2 For wastewater, initial limits for some parameters as established by EPA according to Federal Register 40CFR Part 136 were used. These parameters are: priority pollutants (base, acid and neutral extractables), organochlorine pesticides and PCBs, purgeable aromatics, polynuclear aromatic hydrocarbons, purgeable halocarbons, acrolein and acrylonitrile, chlorinated hydrocarbons and chlorophenols. For other tests, which include those done by wet tests, and metals, initial limits used were a relative percent difference (RPD) of 25% for precision and 100 +/- 25% for accuracy.

9.1.3 For hazardous waste samples, acceptance criteria for organic parameters are established in the following manner:

9.1.4 A representative sample is used as a check sample. At least four aliquots of the unspiked check sample are analyzed. A spiking solution containing all compounds of interest and surrogate standards is then added to at least four other aliquots of the sample, the concentration of the spike set at two times the level in the unspiked sample or ten times the detection limit. The spiked samples are then analyzed. Control limits are established based on the results of these analyses.

9.1.5 The laboratories have demonstrated the capability to analyze these parameters and have passed the criteria established.

9.1.6 As an on-going quality control program and to establish the laboratories' own limits, duplicates and matrix spikes and/or duplicate matrix spikes, one for every batch or every ten samples, are run to assess precision and accuracy. The average relative percent difference, average % recovery and standard deviation are statistically calculated and these are used in the establishment of control limits and construction of control charts for each laboratory.

9.1.7 For the construction of the Precision control chart, data from at least 20 duplicate measurements are collected. The difference between duplicates, the average of the duplicates and relative percent difference (mathematically expressed as the difference between duplicates divided by the average of the duplicates x 100) are calculated. From these data, the average RPD is used to set the control limits using the

results are obtained. This may include a QA chemist working at the bench with the analyst to evaluate and correct any analytical problems. (See Section 10 for details).

9.2.3 Results of split samples are statistically analyzed and limits set at the 95% confidence interval. Any result outside the limits is considered an outlier. Follow-up for corrective action is done as above.

9.2.4 Assessment of precision and accuracy for coliform testing is done by means of interlaboratory MF coliform standards distributed by the QA group.

9.2.5 Precision criteria for coliform analysis is established by following the procedure described in Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985. Data to calculate the precision criteria are randomly selected from an entire data set using a computer random number program. All statistical calculations are performed using log (10) transformed data. Duplicate 50 mL MF standard samples are analyzed for coliform bacteria. After transforming the duplicate counts to the base 10 logarithm, the difference between the transformed values is taken, the average calculated, and the acceptance limit established by multiplying the average by 3.267. Performance of each laboratory for precision is evaluated when results of the monthly coliform standard sample are submitted to the QA group. Any result outside the precision criterion is considered an outlier.

9.2.6 Accuracy limits are established using the "test for outliers" described in the EPA Microbiological Methods Manual. The data are transformed to log (10) and the average of the set of logarithms (from 10 laboratories) and the standard deviation are calculated. The Extreme T value is then calculated by taking the absolute difference between the extreme value from the mean and the mean, and dividing the result by the standard deviation of the logs. A critical T value is determined for the data set at 1% significance level. This value is taken from a table found in ASTM Part 31, p.24 (1981) and is dependent upon the number of data used. If the calculated extreme T value is greater than the Critical T, the data point is considered an outlier.

9.2.7 Tables 2 and 3 show Quality Criteria for analyses in the Districts' laboratories.

10.4 Repeat analysis is performed whenever the proper analytical methodology is not used.

10.5 When results of duplicate and spike analyses and reference samples analyses are questionable or are outside the acceptance limits, a system is used to resolve the problem.

10.5.1 The supervisor is notified and corrective action initiated.

10.5.2 Analysis of samples is stopped and the following course of action is followed.

10.5.3 Data entry and calculations are reviewed and examined for transcription errors.

10.5.4 Reagents and standards are checked to see if they were prepared correctly and that they have not exceeded their recommended shelf lives.

10.5.5 The equipment is examined for proper performance. The calibration and maintenance record is reviewed.

10.5.6 The methodology used is reviewed to make sure that it was properly applied.

10.5.7 Sampling and sample handling are checked to verify that the sample was collected properly, that there was no irregularity and that recommended preservation and holding times were observed.

10.5.8 An error resolution form is checked off and given to the supervisor for review. This form is then submitted with the control chart to the QA group.

10.6 After all the steps from 10.5.1 to 10.5.8 are examined and corrective action is taken, if something wrong is found, the QA group sends a QA reference sample for analysis. If the result for the QA check sample is acceptable, the DUP/SPIKE sample is re-analyzed. If the same result is obtained with the repeat analysis, matrix interference is the probable cause of the discrepancy. Results for the sample batch is reported with an accompanying explanation of possible matrix interference.

10.7 If the results for the DUP/SPIKE sample improve and are in control, the sample batch run with the initial DUP/SPIKE sample is re-analyzed. If circumstances such as insufficient sample and exceedance of holding period exists, the first results are reported accompanied by a

and adopt something that may prove better.

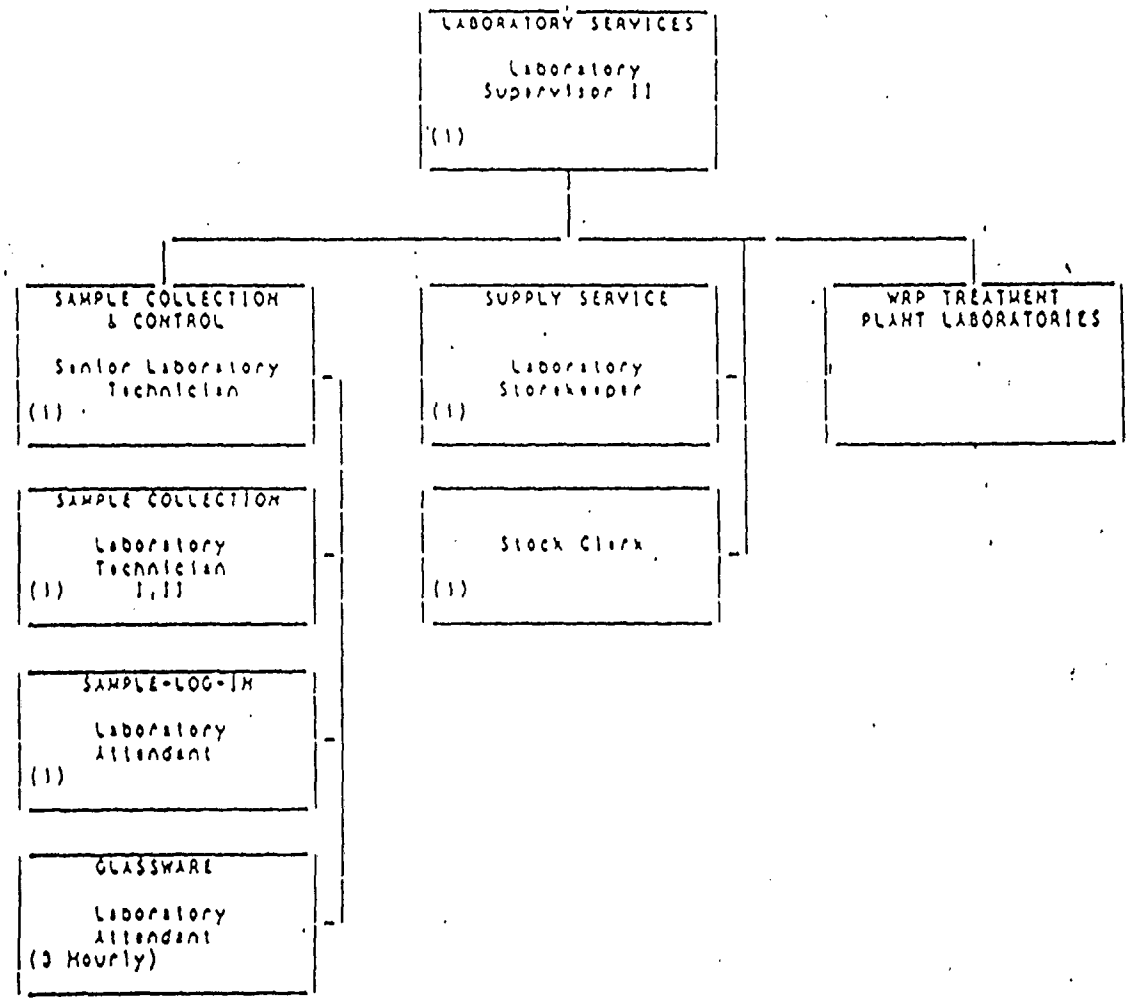
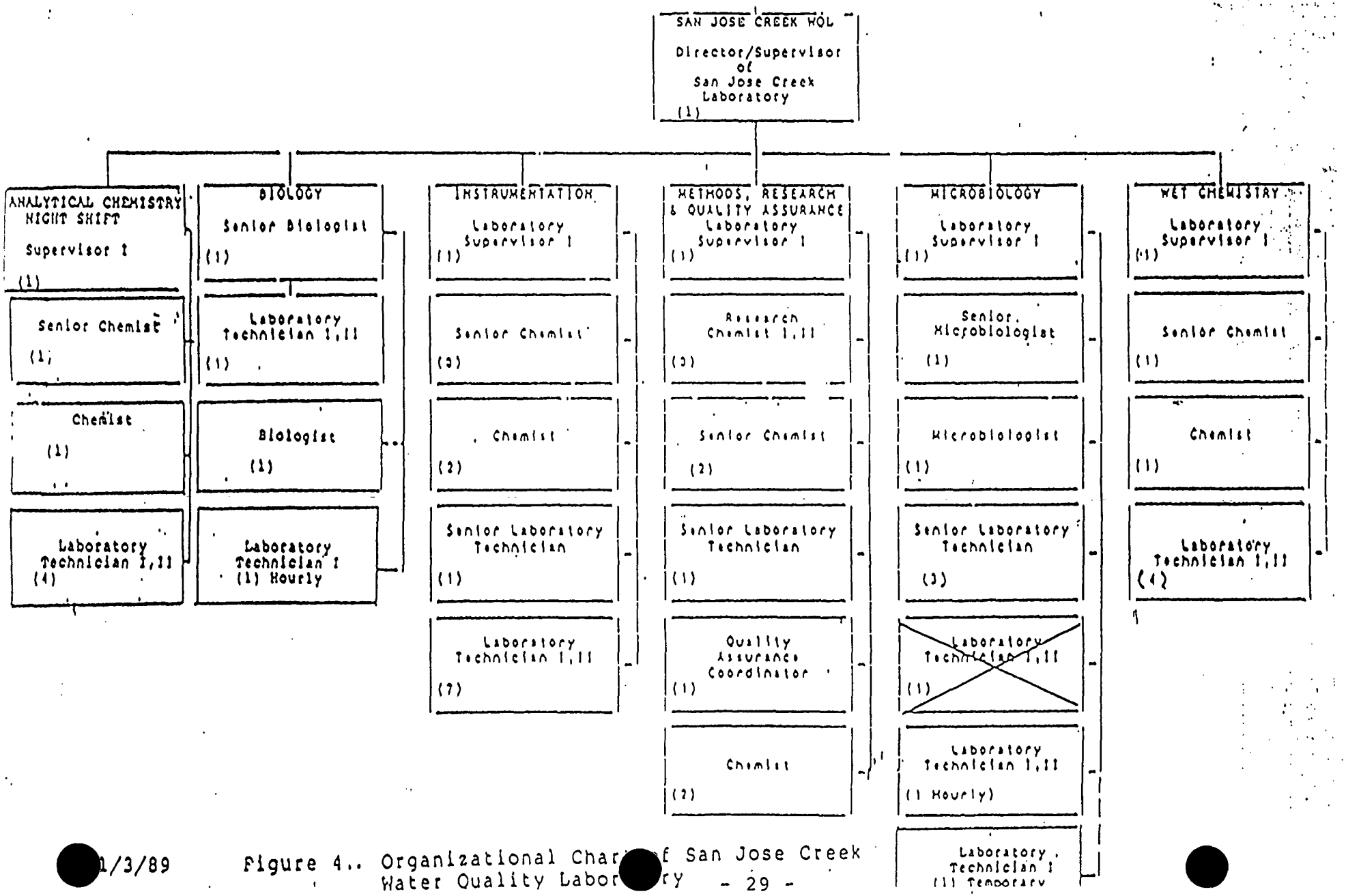


Figure 2. Organizational Chart of the Laboratory Services Sub-section



1/3/89 Figure 4.. Organizational Char[illegible] San Jose Creek Water Quality Labor[illegible]ry

TABLE 1-A. REQUIRED CONTAINERS, PRESERVATION TECHNIQUES AND HOLDING TIMES FOR WASTEWATER ANALYSIS

Parameter	Container	Preservative	Holding Period (max)
Bacterial Tests			
Coliform, fecal and total	P, G	Cool, 4°C 0.008% bisulfite	6 hours
Fecal strepto-cocci	P,G	Cool, 4°C 0.008% bisulfite	6 hours
Alkalinity	P, G	Cool, 4°C	14 days
Acidity	P, G	Cool, 4°C	14 days
Ammonia	P, G	Cool, 4°C H_2SO_4	28 days
BOD	P, G	Cool, 4°C	48 hours
COD	P, G	Cool, 4°C H_2SO_4 pH <2	28 days
Chloride	P, G	None required	28 days
Chlorine, total residual	P, G	None required	Analyze immediately
Color	P, G	Cool, 4°C	48 hours
Cyanide, amenable to chlorination	P, G	Cool, 4°C, NaOH pH >12 ascorbic acid	14 days
Fluoride	P	None required	28 days
Hardness	P, G	HNO_3/ H_2SO_4 to pH <2	6 months
Hydrogen ion (pH)	P, G	None required	Analyze immediately
Kjeldahl and organic nitrogen	P, G	Cool, 4°C, H_2SO_4 to pH <2	28 days
Chromium VI	P, G	Cool, 4°C	24 hours
Mercury	P, G	HNO_3 to pH <2	28 days

TABLE 1-A. REQUIRED CONTAINERS, PRESERVATION TECHNIQUES AND HOLDING TIMES FOR WASTEWATER ANALYSIS (Cont'd)

Parameter	Container	Preservative	Holding Period (max)
Silica	P	Cool, 4°C	28 days
Specific conductance	P	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C, add zinc acetate/NaOH to pH >9	7 days
Sulfite	P, G	None required	Analyze immediately
Surfactants	P, G	Cool, 4°C	48 hours
Temperature	P, G	None requireD	Immediately
Turbidity	P, G	Cool, 4°C	48 hours
Purgeable-Halocarbons	G,Teflon-lined cap	Cool, 4°C, 0.008% bisulfite	14 days
Purgeable-Aromatics	G,Teflon-lined cap	Cool, 4°C, bisulfite HCl to pH <2	14 days
Acrolein/Acrylonitrile	G,Teflon-lined cap	Cool, 4°C, bisulfite adjust pH to 4-5	14 days
Phenols	G,Teflon-lined cap	Cool, 4°C, 0.008% bisulfite	7 days until extr. 40 days after extr.
Benzidines	G,Teflon-lined cap	Cool, 4°C, 0.008% bisulfite	7 days until extr.
Phthalate esters	G,Teflon-lined cap	Cool, 4°C	7 days until extr. 40 days after extr.
Nitrosamines	G,Teflon-lined cap	Cool, 4°C, store in dark	40 days after extr.
PCBs, Acrylonitrile	G,Teflon-lined cap	Cool, 4°C,	40 days after extr.
Nitroaromatics and Isophorone	G,Teflon-lined cap	Cool, 4°C, store in dark	40 days after extr.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY
LABORATORY SECTION

TABLE 1-B. INSTRUCTIONS FOR SAMPLE COLLECTION, PRESERVATION AND HOLDING PERIODS OF HAZARDOUS WASTE SAMPLES

Parameter	Reference and Method No.	Collection	Preservation	Holding Period
1. Fluoride	C 340.2	Collect samples in polyethylene bottles, although glass containers may also be used. Rinse bottle with portion of sample.	Test for Cl_2. If positive, add just enough $Na_2S_2O_3$ to dechlorinate	Analyze as soon as possible.
2. Barium, Beryllium Cadmium, Total Chromium, Cobalt, Copper, Lead, Molybdenum, Nickel, Silver, Vanadium, Zinc	B 6010	Collect samples using glass or plastic containers that have been thoroughly washed with detergent, rinsed with tap water, acid-treated, then rinsed with Type II water.	Acidify aqueous samples to pH <2 with HNO_3. Filter sample if dissolved and suspended metals are desired. Refrigerate non-aqueous samples.	Analyze non-aqueous samples as soon as possible. Aqueous samples should be analyzed within 40 days.
3. Antimony	A 7041	Samples can be collected using glass or plastic containers (polyethylene, polypropylene, FEP-fluorocarbon) that have been thoroughly washed with detergent & rinsed with tap & distilled water & acid-treated then rinsed with Type II water.	Acidify aqueous samples to pH <2 with HNO_3. Refrigerate non-aqueous samples.	Analyze as soon as possible.
4. Arsenic	A 7060	Same as for 7041-Antimony. Special containers (Teflon lined screw cap vials) have to be used if	Acidify aqueous samples to pH <2 with HNO_3. Refrigerate non-aqueous samples.	Analyze as soon as possible.

TABLE 1-B. INSTRUCTIONS FOR SAMPLE COLLECTION, PRESERVATION AND HOLDING TIMES OF HAZARDOUS WASTE SAMPLES
(Cont'd)

Parameter	Reference and Method No.	Collection	Preservation	Holding Period
9. (cont'd)		entrapped in it. Solid & semi-solid samples are to be taken in the same way. Maintain hermetic seal on sample bottle until time of analysis.	sampling site, fill with sample just to overflowing, seal the bottle and shake vigorously for one minute.	
0. Non-Halogenated Volatile Organics	A 8015	Same as for 8010-Halogenated Volatile Organics.	Same as for 8010-Halogenated Volatile Organics.	Same as for 8010.
1. Aromatic Volatile Organics	A 8020	Same as for 8010 - Halogenated Volatile Organics.	Same as for 8010. For non-sterile samples containing aromatic hydrocarbons, sterilize by adding free Cl_2 or by adjusting pH <2 with 1:1 HCl. If 2,3-benzofuran and styrene are to be determined in chlorinated water, dechlorinate with $Na_2S_2O_3$ (1 mg/ppm of free Cl_2), then adjust to pH 2 with 1:1 HCl. Do the same to blanks.	No longer than 4 hours for non-sterile samples. Analyze within 14 days of collection.
2. Acrolein, Acrylonitrile & Acetonitrile	A 8030	Same as for 8010 - Halogenated Volatile Organics.	Same as for 8010.	Same as for 8010.
3. Organochlorine Pesticides & PCB's	A 8080	Grab samples should be collected in glass containers. Composite samples	Ice or refrigerate from time of collection until	Extract within 7 days and analyze

TABLE 1-B. INSTRUCTIONS FOR SAMPLE COLLECTION, PRESERVATION AND HOLDING TIMES OF HAZARDOUS WASTE SAMPLES
(cont'd)

Parameter	Reference and Method No.	Collection	Preservation	Holding Period
6. (cont'd)				complete-30 days of collect-ion.
7. Base, Neutral & Acid-Extractable Organics	A 8270	Grab samples must be collected in glass containers having Teflon-lined screw caps. Sampling equipment must be free of oil & other potential sources of contamination.	Ice or refrigerate at 4°C from the time of collection until extraction.	Extract within 14 days of collect-ion & complete-ly analyze within 40 days of extract-ion.
8. Polynuclear Aromatic Hydrocarbons	A 8270	Same as for 8080-Organochlorine Pesticides and PCB's	Same as for 8080	Extract within 7 days & complete-ly analyze within 30 days of collect-ion.
9. Cyanide	A 9010	Collect samples in plastic or glass bottles of 1 liter or larger capacity. Thoroughly clean bottles to remove soluble materials.	Test sample for oxidizing agents with KI-starch paper If test is positive (blue color formation) add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on indicator paper Add an	Analyze as soon as possible.

Chemical Methods, United States Environmental Protection Agency, Office of Solid Wastes, 1984.

C – Methods for Chemical Analysis of Water and Wastes, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, Rev. 1983.

TABLE 2. ACCURACY (AS % RECOVERY) AND PRECISION (AS RELATIVE PERCENT DIFFERENCE, RPD) ACCEPTANCE LIMITS FOR WASTEWATER ANALYSIS
(Cont'd)

PARAMETER	REFERENCE AND METHOD NUMBER	% RECOVERY	RPD
Magnesium	A 200.7 A 242.1	77 - 117 81 - 113	3 8
Mercaptan	E D213	68 - 117	18
Nonionic Detergents	G Colorimetric	57 - 125	34
Nitrate Nitrogen	A 353.3, B 418C	74 - 128	19
Nitrite Nitrogen	A 354.1, B 419	73 - 120	5
Oil and Grease	A 413.1	79 - 109	21
Total Organic Carbon	B 505	80 - 120	15
pH	B 423	+/- 0.4 pH units	2
Phenols	A 420.1	76 - 114	30
o-Phosphate	B 424F	83 - 116	10
Total Phosphate	B 424C, B 424F	83 - 114	10
Potassium	B 322B	78 - 118	8
Total Residue (Solids)	B 209A	91 - 110	14
Filterable Residue (TDS)	B 209B	86 - 115	5
Nonfilterable Residue (TSS)	A 160.2, B 209C	90 - 109	21

TABLE 2. ACCURACY (AS % RECOVERY) AND PRECISION (AS RELATIVE PERCENT DIFFERENCE, RPD) ACCEPTANCE LIMITS FOR WASTEWATER ANALYSIS (Cont'd)

PARAMETER	REFERENCE AND METHOD NUMBER	% RECOVERY	RPD
Beryllium	A 200.7 A 210.1	68 - 97 73 - 133	8 3
Cadmium	A 200.7 A 213.1	76 - 132 85 - 124	12 25
Chromium(VI)	E 307B	80 - 113	6
Total Chromium	A 200.7 A 218.1	78 - 123 74 - 131	9 8
Cobalt	A 200.7 A 219.1	72 - 124 75 - 125	10 25
Copper	A 200.7 A 220.1	79 - 117 85 - 122	9 8
Iron	A 200.7 A 236.1	65 - 136 76 - 114	8 8
Lead	A 200.7 and A 239.1 A 239.2	79 - 130 75 - 125	11 25
Lithium	A 200.7	83 - 117	6
Manganese	A 200.7 A 243.1	73 - 117 80 - 131	9 8
Mercury	A 245.1	68 - 126	17
Molybdenum	A 200.7 A 246.1	75 - 125 75 - 125	25 25
Nickel	A 200.7 A 249.1	80 - 124 86 - 126	9 8
Selenium	A 270.2 B 303E	75 - 125 74 - 125	25 16
Silver	A 200.7 A 272.1	72 - 124 67 - 130	10 8

TABLE 2. ACCURACY (AS % RECOVERY) AND PRECISION (AS RELATIVE PERCENT DIFFERENCE, RPD) ACCEPTANCE LIMITS FOR WASTEWATER ANALYSIS
(Cont'd)

PARAMETER	% RECOVERY	RPD
BNAs - BASE, NEUTRAL, AND ACID EXTRACTABLE COMPONENTS (Method 625)		
Acenaphthene	49 - 111	15
1,4-Dichlorobenzene	38 - 98	13
2,4-Dinitrotoluene	44 - 117	16
Pyrene	43 - 107	18
2-Chlorophenol	56 - 104	23
1,2,4-Trichlorobenzene	35 - 106	15
4-Nitrophenol	27 - 156	22
4-Chloro-3-methylphenol	54 - 121	18
Pentachlorophenol	12 - 145	32
Phenol	60 - 104	24
N-Nitroso-di-propylamine	53 - 107	18

TABLE 3. ACCURACY (AS % RECOVERY) AND PRECISION (AS RELATIVE PERCENT DIFFERENCE, RPD) ACCEPTANCE LIMITS FOR HAZARDOUS WASTE ANALYSIS

INORGANICS AND CHARACTERISTICS

PARAMETER	LIQUID			SOLID		
	METHOD NO	% REC	RPD	METHOD NO	% REC	RPD
*Cyanide	9010	87-107	11	9010	87-107(b)	11(b)
*Fluoride	340.2	71-117	5	340.2	71-117(b)	5(b)
*Antimony	7041	49-129(a)	18(a)	7041	49-129	18
*Arsenic	7060	90-118(a)	16	7060	90-118	19
*Barium	6010	75-121	18	6010	75-121(b)	18(b)
*Cadmium	6010	88-112	9(a)	6010	83-107	9
Chromium	6010	88-114	14	6010	81-117	8
*Chromium, hexavalent	7196	78-116	7	7196	78-116(b)	7(b)
Copper	6010	83-117	18	6010	77-122	4
Lead	6010	83-111	13	6010	81-113	14
Mercury	7470	76-120	17	7471	69-113	8
Nickel	6010	81-111	11	6010	82-102	9
Selenium	7740	82-114(a)	10	7741	82-114	12
*Silver	6010	89-119	15	6010	89-119(b)	15(b)
*Thallium	7841	38-148(a)	20(c)	7841	38-148	20(c)
Zinc	6010	84-116	20	6010	83-115	6
pH	9040	5 (d)	0.4	9045	5 (d)	0.4(b)
Flashpoint	1010	5 (d)	5	1010	5 (d)	5(b)

* Insufficient data to establish separate criteria;
a. Limits from solids analyses
b. Limits from liquids analyses
c. Arbitrarily assigned until enough data are collected
d. % Error {(True Value QA Check-Observed Value)/(True Value) x 100}

REFERENCES

1. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, EPA-600/4-83-004.

2. Quality Assurance for Environmental Measurements, J.K. Taylor and T.W. Stanley, Eds., 1983.

3. Industrial Hygiene Laboratory Quality Control, NIOSH, U.S. Dept. of Health and Human Services.

4. Test Methods for Evaluating Solid Waste, EPA SW-846, 3rd Edition, Nov., 1986.

5. Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985.

To further demonstrate electronic features such as data Verification and Approval, selecting choice 2 with the correct user ID from Figure 1 leads to Figure 5, the menu for test result processing. Once in this realm, access to the choices here is limited by the USER ID employed to get to this point. Analysts access #1-3 only; Supervisors, #1-5; Laboratory Directors and their designated backups have access to #1-6. Supervisors select #4 or #5 to review and verify data entries. This is done by checking analyst bench sheet results with data entered into LABDATA, and then electronically removing a "flag" (*) from the report to verify that it has been checked. Only the Lab Directors or (in their absence) the designated backups may approve a final lab report electronically. A batch program provides a list of sample log numbers for which all data have been verified by supervisors. Selection of Choice 6, Figure 5, leads to the screen represented by Figure 6. Data are reviewed, footnotes and "notes to the user" are reviewed, and a visual check is made that all verification flags have been removed. The Lab Director then enters his/her initials and updates the file. A daily batch program queues all sample files which have been approved that day, and prints out final reports, including the initials and date of approval.

```
FUNCTION MENU          TECHNICAL DATA - LOGIN DATA SYSTEM          05/08/
-------------------------: SAMPLE REQUEST PROCESSING ----------------------

        Enter the number of the appropriate choice : 1 <===
                                          Job No. : SJ    00000 <===
                                             Year : 89 <===



        1: ADD

        2: CHANGE

        3: DISPLAY

        4: DELETE

-------------------------------------------------------------------------------

Type in information and hit <ENTER> key

PF: 2=Process Menu 9=Sign Off Clear=End
```

Figure 2. Sample Request Processing

```
FUNCTION CHANGE          SJC WQL SAMPLE REQUEST                  05/08/8
-------------------------------------------------------------------------

 B JOB NO.:  SJO72647

  1: 101          2: 707          3: 708          4: 709          5: 712

  6: 714          7: 718          8: 724          9:             10:

 11:             12:             13:             14:             15:

 16:             17:             18:             19:             20:

 21:             22:             23:             24:             25:

 26:             27:             28:             29:             30:

 31:             32:             33:             34:             35:

 36:             37:             38:             39:             40:

NOTES TO ANALYST: 3/14/89

-------------------------------------------------------------------------

Type in information and hit <ENTER> key

Enter "D" under delete column to delete record adjacent to it

PF: 2=Process Menu 3=Function Menu 7=Backward 8=Primary Screen 9=Sign Off
```

Figure 4. SJCWQL Sample Request

```
APPROVE                    SJC WQL TEST RESULT ENTRY                    05/08/8
-------------------------------------------------------------------------------
LAB JOB NO.:      SJU72647
CHARGE NO.     1: TS14905BI03      2: TS00000B000      3: TS00000B000
REQUESTED BY:     M. NELLOR
GRAB SAMPLE DATE AND TIME:              03/14/89  11:40
SAMPLE LOCATION:  1 - WN   - FSED   TYPE: SEC       VOLUME:    1.00 LITER
DESCRIPTION:      WN WRP SECONDARY GRAB,   SEC. CHANNEL
RPT APPROVED BY:  RB                  RPT COMPLETION DATE: 03/27/89
===============================================================================
                                          TEST      VERIFY NEW  FOOT
   TEST      DESCRIPTION                SIGN .RESULT  CODE  UNIT NOTE   UNIT
   ****  ************************** ************ ****  **** **** ***********
1: 101 - PH                                  7.6                    PH
 : 707 - ALUMINUM                      <     .62                    MG/L AL
3: 708 - CADMIUM                       <     .02                    MG/L CD
4: 709 - TOTAL CHROMIUM                <     .06                    MG/L CR
5: 712 - COPPER                        <     .04                    MG/L CU
6: 714 - LEAD                          <     .48                    MG/L PB
7: 718 - NICKEL                        <     .06                    MG/L NI
-------------------------------------------------------------------------------
Type in information and hit <ENTER> key.

PF: 2=Process Menu 3=Function Menu 5=Forward 8=Notes To User(N) 9=Sign Off
```

Figure 6. SJCWQL Test Result Entry

day that contains all data entered into the database during that day. The senior laboratory technician in the Process Control sub-group reviews this report and checks any unusual data entries. When the senior laboratory technician has verified the data, Operations is called and told that they can run their program which uses the new data to generate a multi-page report that is used for making plant changes and for operational control.

Final data approval is done by the Inorganics Group Supervisor and the Supervisor of the JWPCP Laboratory. The Inorganics Group Supervisor prints out a 50-page report of data each month, reviews this data, and then passes it on to the Supervisor of the JWPCP Laboratory for final approval.

TEST FIELDS JWPCP OPERATIONAL DATA 08/10/89

TEST DESCRIPTION (Page 01)

Test	Default unit	Description
101	PH	PH
103	NTU	TURBIDITY
111	DEG.F.	TEMPERATURE
151	MG/L	SUSPENDED SOLIDS
152	%	VOLATILE SUSPENDED SOLIDS
153	%	TOTAL SOLIDS
154	%	VOLATILE TOTAL SOLIDS
155	MG/L	TOTAL DISSOLVED SOLIDS
156	ML/L	SETTLEABLE SOLIDS
162	ML	SLUDGE VOLUME (CYLINDER)
163	ML	SLUDGE VOLUME-SETTLEOMETER
164	ML/G	SLUDGE VOLUME INDEX
165	L	SAMPLE VOLUME
166	MGD	TOTAL DAILY FLOW
167	MGD	INSTANTANEOUS FLOW
201	MG/L N	AMMONIA NITROGEN
253	MG/L S	THIOSULFATE
281	PPM V/V	HYDROGEN SULFIDE
302	MG/L CL	CHLORINE RESIDUAL
305	MG/L	TOTAL ALKALINITY (AS CACO3)
330	% V/V	PERMANENT GASES, TOTAL
331	% V/V	AIR (O2 + AR + N2)
335	% V/V	METHANE (CH4)
336	% V/V	CARBON DIOXIDE (CO2)
338	BTU	HEATING VALUE OF GAS
349	COL/0.1L	TOTAL COLIFORM (MF)
350	MPN/0.1L	TOTAL COLIFORM (MPN)
351	MPN/0.1L	FECAL COLIFORM (MPN)
356	COL/0.1L	FECAL COLIFORM (MF)
357	COL/0.1L	ENTEROCOCCUS
401	MG/L O	TOTAL BOD
402	MG/L O	SOLUBLE BOD
403	MG/L O	TOTAL COD
404	MG/L O	SOLUBLE COD
408	MG/L	OIL & GREASE
638	MG/L HAC	VOLATILE ACIDS

Figure 2. TDJ Test Codes and Default Units--Complete List

```
PROCESS MENU                JWPCP OPERATIONAL DATA                08/10/89
-------------------------------------------------------------------------

          Desired process number: 3   <===

          If process 5 chosen, enter comment date: 08/09/89   <===

                    Number              Process
                    ------    --------------------------

                      1       Result data entry by test
                      2       Result data entry by sample
                      3       Database accessing
                      4       Operational data entry
                      5       Comment record
                      6       Supervisory maintenance


------------------------------ M E S S A G E S ---------------------------
Type in information then hit <ENTER> key.

  : 1=Help 9=Sign-Off Clear=End
```

Figure 4. TDJ Primary Menu

```
SAMPLE CHOICE              JWPCP OPERATIONAL DATA                    08/10/89
-------------------------- RESULT DATA ENTRY BY SAMPLE ------------------------

                Desired function number: 1    <===
                Sample number:          <===
                Sample date: 08/09/89    <===

                Both functions can apply to an existing sample only.

                    Number              Function
                    ------              --------

                      1                 Update
                      2                 Display


------------------------------ M E S S A G E S --------------------------------
Type in information then hit <ENTER> key.

  : 1=Help 2=Process Menu 9=Sign-Off Clear=End
```

Figure 6. TDJ - Result Data Entry by Sample

```
  FUNCTION ADD/CHANGE          JWPCP OPERATIONAL DATA                    08/10/89
---------------------------------- COMMENT RECORD ------------------------------
 DATE OF COMMENT: 08/09/89

     TWO SAMPLES WERE TAKEN FROM DIGESTER R AGAIN TODAY.  THE REPORTED RESULTS
ARE OF THE SAMPLE TAKEN FROM THE THIEF HOLE (NORMAL LOCATION.)  THE RESULTS OF
THE SAMPLE FROM THE DIGESTER RUNOFF ARE: PH = 6.85; V.A. = 16; ALKALINITY =
2160.




------------------------------- M E S S A G E S ------------------------------
Press PF12 to change record or hit <ENTER>.

   2=Process Menu 9=Sign-off 12=Update File CLEAR=End Transaction
```

Figure 8. TDJ - Comment Record Menu

A3

LACSD QUALITY ASSURANCE

ERROR RESOLUTION

WHEN: The results are in control but questionable, or,
The result is out of control

Indicate on the checklist below actions taken to correct the situation.

CHECK LIST:

SAMPLING _____

SAMPLE HANDLING _____

ANALYTICAL PROCEDURE

CALCULATIONS _____

DATA _____

REAGENTS _____

EQUIPMENT _____

CALIBRATION _____

MAINTENANCE _____

METHODOLOGY _____

SPIKED SAMPLE NO. 33788 DATE 3/18/92

Other Sample Nos. in Set 33753, 33787, 33789

ANALYST'S SIGNATURE [signature] DATE 3/18/92

SUPERVISOR'S SIGNATURE [signature] DATE 7/23/92

ACTION TAKEN QA was out of control. RPD=25.0%, Rec=80.0%
Sample value flooded spike, reset with 20 ml sample
Volume. Reset QA was in control RPD=4.3%, Rec=103.3%

QA FORM 88/7

San Jose Creek Water Quality Laboratory
Atomic Absorption-Emission
Work Sheet

STD (PPM)	ABS
Blank	0
0.030	0.11
0.020	0.079
0.050	0.155
0.070	0.185

Analyst Name Maria Pang

Date 3/18/92

As

	Sample Identification	Job Number	Test	Average Photometer Reading	Corrected Value ( )	Factor	Conc ( )	
1		Blank	✓0.030	0.001	1/5			
2		33672		Hi, 0.038, 0.030	1/5, 1/20, 1/25	X	0.755 0.745	0.75
3		Blank	~~✓0.035~~ .0.032	0.001	1/5			
4		E 33399		0.007, 0.004	1/5, 1/10	X	0.030 0.035	0.030
5		Blank		0.001	1/5			
6		X 33674	~~✓0.026~~ Az, Ac ✓0.030	0.028, Lt Yellow, ~~0.048~~, 0.052	1/100 1/5, 1/20, 1/50	2.29	2.6 2.8 2.7	61.4 mg/kg
7		Blank	~~Reset~~	0.000				
8		E 33511		Green color 0.004, Lt Yellow, 0.004	1/20, 1/5, 1/25	X	0.08 0.10	0.09
9		33525		-0.001	1/5	X		<0.030
10		Blank	~~✓0.027~~ ~~0.000~~ Az	0.000	1/5			
11		E 33753	✓0.029	0.002	1/5	X		<0.030
12		33754		0.002	1/5			<0.030
13		33787		0.003	1/5			<0.030
14	Reset with 20 ml Sample	33788 1/5		~~0.008~~ ~~0.016~~, ~~0.013~~, 0.010	1/25 1/5, 1/10, 1/20		0.20 0.20	0.20
15	out of control RPD = 25.0%	33788 S1		~~0.035~~, 0.018	1/5, 1/20			0.36
16	Rec = 80.0% Sample value flooded	33788 S2		~~0.036~~, 0.014, ~~0.014~~ 0.014	1/5, 1/20, 1/20			0.28
17	spike	33789	✓0.028	0.014, 0.007	1/5, 1/10	↓	0.07 0.07	0.070
18		QA	Theoret. 0.100	0.021,	1/5			0.105 OK
19			✓0.031					
20								

Notes:

Flooded spike, reset with 20 ml

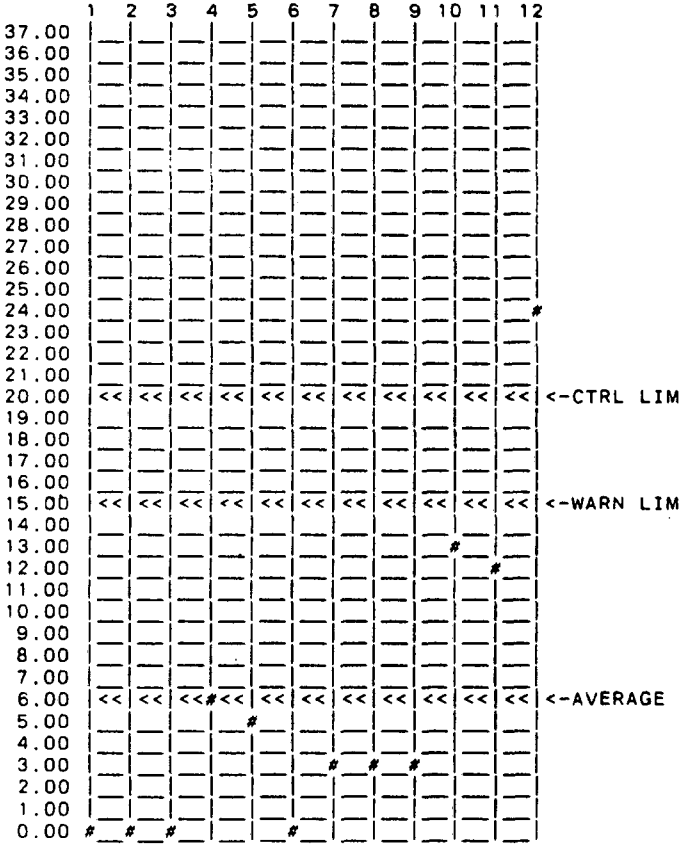
ASs1 CONTROL CHART for Arsenic (705) Procedure: GFA Sample type: All 05/15/89 SJCWQL

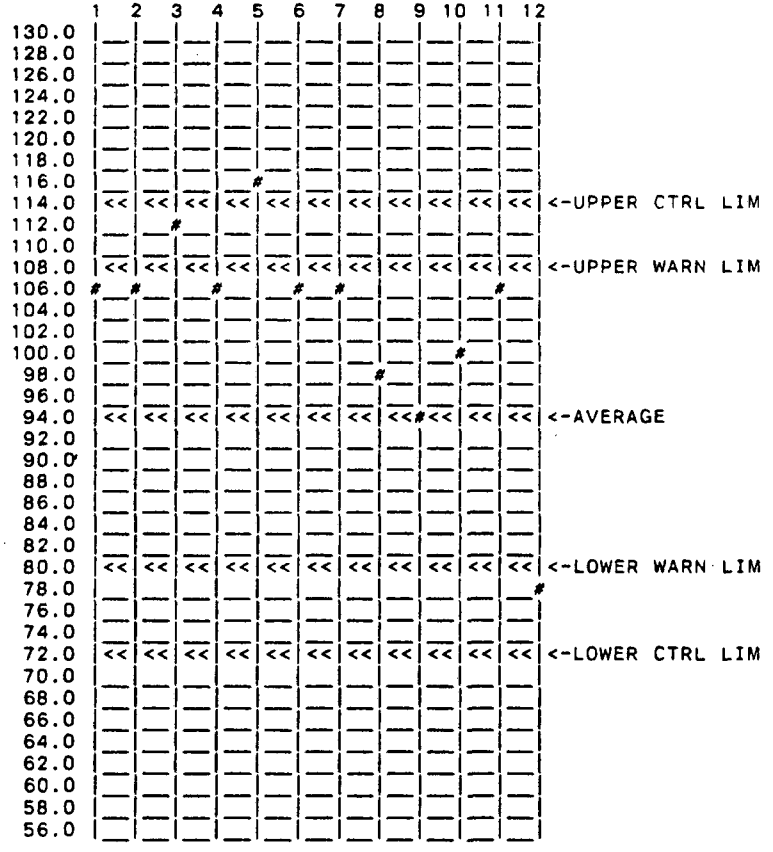
	1	2	3	4	5	6	7	8	9	10	11	12
JOB #	27803	27796	28392	30446	31025	30800	30882	31205	32170	32832	32938	33788
DATE	12.13.91	12.23.91	12.31.91	01.21.91	01.30.92	01.30.92	01.30.92	02.05.92	02.27.92	03.05.92	03.10.92	03.18.92
SPIKE1 MG/L	0.16	0.16	0.17	0.28	0.17	8	5	0.725	3.5	0.16	0.15	0.36
SPIKE2 MG/L	0.16	0.16	0.17	0.3	0.18	8	5.2	0.75	3.625	0.14	0.17	0.28
AVE. MG/L	0.16	0.16	0.17	0.29	0.175	8	5.1	0.7375	3.5625	0.15	0.16	0.32
DIFFERENCE	0.000	0.000	0.000	0.020	0.010	0.000	0.200	0.025	0.125	0.020	0.020	0.080
REL %DIFF(RPD)	0.0%	0.0%	0.0%	6.9%	5.7%	0.0%	3.9%	3.4%	3.5%	13.3%	12.5%	25.0%
SPIKE1 UG	8	8	8.5	14	8.5	8	10	7.25	7	8	7.5	18
SPIKE2 UG	8	8	8.5	15	9	8	10.4	7.5	7.25	7	8.5	14
AVE. UG	8	8	8.5	14.5	8.75	8	10.2	7.375	7.125	7.5	8	16
SAMPLE UG	0	0	0	6.5	0	0	2.2	0	0	0	0	10
SPK ADD UG	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
% RECOVERY	106.7%	106.7%	113.3%	106.7%	116.7%	106.7%	106.7%	98.3%	95.0%	100.0%	106.7%	80.0%
PRECISION FLAG	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OVER
ACCURACY FLAG	OK	OK	WARN	OK	OVER	OK	OK	OK	OK	OK	OK	WARN
ml	50	50	50	50	50	1	2	10	2	50	50	50
sample mg/l	<.030	<.030	<.030	0.13	<.030	<1.5	1.1	<0.15	<.75	<.030	<.030	0.2

COMMENTS:

PRECISION CHART (plot RPD)
AVE RPD: 6.32 CONTROL LIMIT: 20.6
STD DEV: 0 WARNING LIMIT: 15.8
N: 32 CHART INCREMENT: 1

ACCURACY CHART (Plot % Recovery) LOWER UPPER
AVE % RECOV: 94.7 CONTROL LIMITS: 73.7 115.7
STD DEV: 6.99 WARNING LIMITS: 80.7 108.7
CHART BOTTOM #: 56 CHART INCREMENT: 2





San Jose Creek Water Quality Laboratory
Atomic Absorption-Emission
Work Sheet

STD (PPm)	ABS
Blank	0
0.030	0.108
0.020	0.080
0.050	0.164
0.070	0.195

Analyst Name: Maria Pang

Date: 3/31/92

As

	Sample Identification	Job Number	Test	Average Photometer Reading	Corrected Value ( )	Factor	Conc ( )	
1		Blank	✓0.029	0.001	1/5			
2		X 33890		0.007 0.033 High Blk, 0.041, 0.038	1/5, 1/10, 1/25	1.929	0.815 0.945 0.985	25 mg/kg
3		Blank	✓0.028	0.001	1/5			
4		R 34212		0.001	1/5	X		<0.030
5		34130		0.000	1/5	X		<0.030
6		Blank	✓0.030	0.000	1/5			
7	RPD= 4.3% Rec=103.3%	Reset 33788 5/6		0.011, 0.008, 0.004	1/5, 1/10, 1/20	X/2.5	0.2 0.2	0.2
8	#5-0.75ml	3378851		0.023	1/10	↓		0.575
9		3378852		0.024	1/10	↓		0.600
10		Blank	✓0.031	0.000	1/5			
11		33524		0.002	1/5	X		<0.030
12		33962		-0.001	1/5	X		<0.030
13		Blank	✓0.028	0.000	1/5			
14		E 34103		-0.001	1/5	X		<0.030
15		Blank		0.000	1/5			
16		34474		0.002	1/5	X		<0.030
17		34507		0.003	1/5	↓		<0.030
18		34502		0.001	1/5	↓		<0.030
19		Blank						
20								

Notes:

ASs1 CONTROL CHART for Arsenic (705) Procedure: GFA Sample type: All 05/15/89 SJCWQL

	1	2	3	4	5	6	7	8	9	10	11	12
JOB #	27803	27796	28392	30446	31025	30800	30882	31205	32170	32832	32938	33788
DATE	12.13.91	12.23.91	12.31.91	01.21.91	01.30.92	01.30.92	01.30.92	02.05.92	02.27.92	03.05.92	03.10.92	03.31.92
SPIKE1 MG/L	0.16	0.16	0.17	0.28	0.17	8	5	0.725	3.5	0.16	0.15	0.575
SPIKE2 MG/L	0.16	0.16	0.17	0.3	0.18	8	5.2	0.75	3.625	0.14	0.17	0.6
AVE. MG/L	0.16	0.16	0.17	0.29	0.175	8	5.1	0.7375	3.5625	0.15	0.16	0.5875
DIFFERENCE	0.000	0.000	0.000	0.020	0.010	0.000	0.200	0.025	0.125	0.020	0.020	0.025
REL %DIFF(RPD)	0.0%	0.0%	0.0%	6.9%	5.7%	0.0%	3.9%	3.4%	3.5%	13.3%	12.5%	4.3%
SPIKE1 UG	8	8	8.5	14	8.5	8	10	7.25	7	8	7.5	11.5
SPIKE2 UG	8	8	8.5	15	9	8	10.4	7.5	7.25	7	8.5	12
AVE. UG	8	8	8.5	14.5	8.75	8	10.2	7.375	7.125	7.5	8	11.75
SAMPLE UG	0	0	0	6.5	0	0	2.2	0	0	0	0	4
SPK ADD UG	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
% RECOVERY	106.7%	106.7%	113.3%	106.7%	116.7%	106.7%	106.7%	98.3%	95.0%	100.0%	106.7%	103.3%
PRECISION FLAG	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
ACCURACY FLAG	OK	OK	WARN	OK	OVER	OK	OK	OK	OK	OK	OK	OK
ml	50	50	50	50	50	1	2	10	2	50	50	20
sample mg/l	<.030	<.030	<.030	0.13	<.030	<1.5	1.1	<0.15	<.75	<.030	<.030	0.2

COMMENTS:

PRECISION CHART (plot RPD)
AVE RPD: 6.32 CONTROL LIMIT: 20.6
STD DEV: 0 WARNING LIMIT: 15.8
N: 32 CHART INCREMENT: 1

ACCURACY CHART (Plot % Recovery) LOWER UPPER
AVE % RECOV: 94.7 CONTROL LIMITS: 73.7 115.7
STD DEV: 6.99 WARNING LIMITS: 80.7 108.7
CHART BOTTOM #: 56 CHART INCREMENT: 2