REQUEST FOR PROPOSAL
TO PROVIDE
PROFESSIONAL ENGINEERING SERVICES FOR

Well 22 Comprehensive Site Assessment and Hydrogeologic Services for Well Drilling and Construction Support

Water Resources Department
5812 Arbor Road
Lakewood, CA 90713

Release Date
April 13, 2023

Proposal Deadline:
2:00 P.M. May 11, 2023

Project Contact:
Derwin Dy, P.E. – Assistant Director
ddy@lakewoodcity.org
(562) 866-9771 ext. 2703

CITY OF LAKEWOOD

REQUEST FOR PROPOSALS

RFP NO. DWR 23-01

NOTICE IS HEREBY GIVEN THAT THE City of Lakewood will receive proposals for:

CONSULTING SERVICES FOR WATER WELL #22 COMPREHENSIVE SITE ASSESSMENT AND HYDROLOGIC SERVICES FOR WELL DRILLING AND CONSTRUCTION SUPPORT

The terms Consultant, Proposer, and Contractor may be used interchangeably in this solicitation and shall refer exclusively to the person, company, or corporation with whom the city enters into a contract because of this solicitation.

Each proposal must be submitted to:

City of Lakewood
City Clerk's Office
5050 Clark Avenue
Lakewood, CA 90712
Attention: Department of Water Resources

in a **SEALED ENVELOPE**, no later than **2 PM, on Thursday, May 11, 2023**.

It is the policy of the City of Lakewood to receive, but not to open, any RFP which is received late. Such RFP's are rejected and returned to the consultant unopened.

DATED THIS 13th DAY OF APRIL 2023

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Derwin Dy, P.E.
Assistant Director of Water Resources
City of Lakewood

INTRODUCTION

The City of Lakewood Water Resources Department (City) is soliciting proposals from qualified and experienced firms interested in providing professional engineering services to perform a Comprehensive Site Assessment for the existing Well 22 site to determine the best and highest use for the City's water operations. The work includes evaluation of the existing well site and facilities, the city's long-term water operational needs and provide complete engineering services for the following:

1. Comprehensive site assessment to determine best and highest use of existing Well 22 site including cost benefit analysis of existing 2.5 MG concrete reservoir for repair work vs. new reservoir construction.

2. Hydrogeologic Services for Drilling and Construction Support for a replacement well onsite with maximum sustained pumping capacity.

This request for proposal (RFP) contains project description, scope of work, elements of proposal, selection process, general terms and conditions, and the city's template for contract agreement.

The intent of the RFP is to solicit a concise proposal to provide the services described within this RFP including engineering services and construction support for the above referenced project within the City of Lakewood.

Tentative Schedule

The City has established the following target dates for evaluation and scheduling purposes. The following dates are tentative, non-binding, and are subject to change without prior notice.

RFP Release ..... April 13, 2023
Pre-proposal Meeting (**5812 Arbor Road, Lakewood, CA 90713**).....10 AM April 26, 2023
Deadline for Proposers to Submit Questions ..... 4 PM May 2, 2023
Anticipated Deadline for City to Respond to Questions..... 4 PM May 5, 2023
Proposals due and receive by .....2 PM May 11, 2023
Recommend City Council to approve award (tentative)..... June 13, 2023

PROJECT DESCRIPTION

The city of Lakewood plans to conduct a Comprehensive Site Assessment for the existing Well 22 site located at the Southwest corner of Candlewood Street and Downey Avenue in the City of Lakewood to determine the best and highest use of the existing site for the city's long-term water operations. Well 22 was installed in 1996 with a design flow rate of 3,000 gpm, however, due to sand intrusion, the city had to operate at reduced flow. Following an investigation in 2011, it was determined that the filter pack installed was the incorrect size. A 12-inch diameter well liner with smaller diameter filter pack was installed in July 2012. The sanding issue was reduced and Well 22 was placed back into service in November 2012 with the average pumping capacity of 800 gpm.

In February 2023, Well 22 was placed on standby after experiencing elevated levels of arsenic. Historical water quality also indicated taste and odor issues. Well 22 Standby status will remain active until the completion of the city's Comprehensive Site Assessment for further direction.

At Well 22 site, there exists a 2.5 MG partially buried concrete reservoir constructed in 1954. Repairs to the reservoir had been on-going in the past leading to a culminated discovery in 2017 that existing leaks in the reservoir were un-fixable. The City had since by-passed the reservoir and delivered water from Well 22 directly into the distribution system until February 2023 when Well 22 experienced elevated water quality issues causing the City to place it on standby.

The work for this RFP includes detailed engineering analysis of the existing well site and its facilities, evaluation of the city's long-term water operational needs and providing engineering recommendation(s) for the best and highest use of the site including services for the following:

1. Cost benefit analysis of existing 2.5 MG concrete reservoir for repair work to resume operation vs. construction of a new reservoir including engineer's estimate of probably construction costs
2. Hydrogeologic Services for Drilling and Construction of a replacement well onsite with the maximum sustained pumping capacity.

The city is soliciting a well- qualified and experienced firm to provide the comprehensive assessment and hydrogeologic services for the work described herein.

1.0 SCOPE OF WORK

The scope of work for the city's Well 22 Comprehensive Site Assessment and Hydrogeologic Services for Well Drilling and Construction Support includes the following tasks:

Task 1 – Project Management - Consultant's fee for Project Management, including the time and cost of meetings with the city and other parties, shall be included within the fees for other tasks:

A. Project Schedule

Consultant shall submit an initial schedule with the critical milestones for the major tasks involved in the Project. The schedule shall be updated and submitted monthly, or more often, as required by the city.

B. Meetings

Consultant's representative and the city shall meet not less than once a month and may be up to twice a month during critical design stage(s) to discuss the progress of the work including schedules, budgets, and overall status of the Project.

The Consultant shall be accompanied by appropriate specialty staff or principals, or appropriate subcontractor's representatives necessary to conduct the meetings with the city. Consultant shall prepare the agenda for each meeting, record the minutes of

all meetings, and submit a copy of the minutes to the city for review within five (5) working days after each meeting, and before distribution.

C. Monthly Project Status Report
Consultant shall submit to the city with its invoice, on a monthly basis, an accurate accountability of work effort rendered by Consultant and a continuous appraising and monitoring of both work progress and financial conditions (Monthly Project Status Report).

Task 2 - Preliminary Engineering Services

A. Site Investigation, As-Built & Record Drawings Research, Engineering Analysis
Consultant shall meet with City staff to identify background information and to ensure incorporation of city staff suggestions, recommendations, directions and other requirements into the project. City's Project Manager will provide Consultant with all available record including existing plans, studies, historical accounts and any relevant information to aid in the evaluation and analysis of the project. Consultant to review all available records and information provided under this task and perform all necessary investigations to provide a professional recommendation for best and highest use of existing site.

B. Utility Research and Notification
Consultant shall research all utility records and identify all utilities within the project limits. The information obtained shall be clearly delineated on the project base map. Concurrent with preliminary design, certified utility information requests will be sent by Consultant to each utility company requesting verification of location, size and depth of facilities within the project limits.

Task 3 – Comprehensive Site Assessment

A. Preliminary Report
Consultant shall provide the required engineering services to establish criteria, analyze, perform and make recommendations for the best and highest use of site for the City's long-term water operational needs. Preliminary report shall include summary of findings, consultant's professional recommendation(s), including design layout, anticipated permit requirements, water treatment requirements including piloting potential treatment system as necessary, recommended implementation sequence and schedule and engineering cost estimate for planning purposes.

Deliverables: draft Comprehensive Site Assessment Report including project background, findings and recommendations. Consultant shall prepare to present draft Report to City's Water Resources Committee as requested.

B. Final Report

Consultant shall provide Final Comprehensive Site Assessment Report summarizing project findings and recommendations. Final report shall include recommended sequence for project implementation, preliminary design with site layout(s), and final construction cost estimate. Consultant shall prepare to present Final Report to Water Resources Committee and City Council as requested.

Task 4– Hydrogeologic Assessment

A. Pre-Design Report

Consultant shall provide the required engineering services to establish criteria, analyze, perform and make recommendations on the Project design and layout, which shall include, but not be limited to the following:

1) Evaluate the hydrogeology and potential water quality of the proposed new well using existing water well logs, water quality and geological reports available from the city, outside agencies, and all other necessary data.
2) Investigate proposed site conditions; surrounding area; existing water system operation, surrounding active production wells; and surrounding potential contaminating activities.
3) Identify right-of-way lines, property lines, existing and proposed easements of a permanent or temporary nature.
4) Review locations of existing utilities such as water lines, sanitary sewers, storm drains, manholes, existing production wells, underground or overhead telephone, fiber optic or power lines that may impact the specific location of the proposed well and its appurtenances.
5) Identify potential site constraints with respect to existing substructures if any during drilling and the preferred standard industry practice to drill, construct, develop, discharge, operate and maintain the proposed potable water well and facility. Review adequacy of space to provide for layout of baker tanks, sound walls (if necessary), rigs and other necessary equipment within the construction area.
6) Conduct geotechnical work as applicable, including field explorations and laboratory tests, corrosion, and seismic investigations to assess the general conditions of the project site area and to provide final design recommendations.
7) Identify any permits or clearances from all required agencies to drill, construct, develop, discharge, operate and maintain the proposed water well and facility.
8) Review traffic concerns if any with city.
9) Consider the construction methods, maintenance, and operation requirements for the wellhead and related facilities, and determine primary and secondary drill holes for the well at the Project site.
10) Perform site reconnaissance, review available driller logs, spinner logs and water quality reports of the existing Well 22.
11) Using the above criteria, Consultant shall perform a site layout analysis. Consultant shall review, analyze, and confirm or revise city's proposed site location, conceptual design and facilities layout plan. The Consultant shall work with city to agree on or make necessary modifications and prepare relevant documents, and to

make recommendations on the design. Consultant shall summarize all findings in a Pre-Design Report, which shall include the following:

i. An analysis of proposed design alternatives including, but not limited to, site layout plans showing location of well head; conceptual piping layout; tie-in to existing transmission main, and well flush discharge to a baker tank.

ii. The proposed drilling method, expected well capacity, water quality, cased depth, annular seal depth, and horsepower requirements; standard and special requirements necessary to drill, operate, and maintain the well; the proposed well design (casing diameter, screen type, gravel pack, locations of perforated intervals).

iii. A design and construction schedule for drilling of the new well, demonstrating how the various Project activities and milestones will be achieved.

iv. An estimate of the total construction cost of the Project.

v. A list of required equipment – type and size and any utility or street improvements necessary to serve the new well.

vi. A table of the required permits and clearances from the various affected agencies, and the time required to obtain each one.

12) Consultant shall submit a draft copy of the Pre-Design report for city's review. In conformance with city's recommendations and upon mutual agreement of modifications deemed necessary by city and Consultant, Consultant shall reevaluate, revise, and finalize the report. The final copy of the Pre-Design Report shall include a final layout of the site including civil, architectural, structural, mechanical, electrical, and control features, and shall be in sufficient detail to facilitate the final engineering for the Project.

Deliverables: Consultant shall submit the following for City review, comment, approval, or use:

Hydrogeologic Assessment

- DRAFT Technical Memorandum — 1 PDF and 3 copies
- FINAL Technical Memorandum — 1 PDF, and 3 copies plus a digital copy in MS Word

Preliminary Design Report

- Site plan and well layout — 1 PDF and 3 copies
- Draft Report (75% completion) — 1 PDF and 3 copies
- Final Draft Report (95% completion) — 1 PDF and 3 copies
- Final Report (100% completion) — 1 PDF and 3 bound copies

Provide an electronic copy of the Final Report on USB Drive including all text, tables, graphs, figures, exhibits, plates, photographs, renderings, site plans, elevations, and drawings.

Consultant's compensation shall include all costs of printing, plotting, binding, and reproducing all required documents and submittals. These costs shall be included within each sub-task. Consultant shall perform routine and final check prior to sending any submittal to City, to ensure accuracy, conformance, and integrity of all documents. Consultant shall perform quality assurance/quality control checks on all submittals made to City. City will not accept for review any documents that are not reviewed and signed by the Consultant's responsible personnel to certify accuracy and completeness of the submittal.

Task 5 – Drinking Water Source Assessment and Protection Report

This task includes preparation of a Drinking Water Source Assessment and Protection (DWSAP) report compliant with Section 11672.60 of the California Health and Safety Code. The Consultant shall provide an electronic and hard copies for the City to submit to the State Water Resources Control Board (SWRCB) Drinking Water Program (previously CDPH) as part of the permit requirement. The DWSAP assessment will include:

1. Delineation of the area around a drinking water source through which contaminants might move and reach that drinking water supply;
2. Inventory of possible contaminating activities (PCAs) that might lead to the release of microbiological or chemical contaminants within the delineated area;
3. Determination of the PCAs to which the drinking water source is most vulnerable;
4. Review the proposed well operating condition to develop estimates of the area of influence to include the 2, 5, or 10-year protection zones as defined in Section 6.2.5 of the DWSAP

Program dated January 1999[1] and potential buffer groundwater zones. The data collection will include the following sources:

1. Existing available geologic and hydrogeologic data;
2. The proposed well construction design;
3. Potential and known contaminating activities within the vicinity as inventoried by Environmental Data Resources (EDR);
4. Geotracker data for sites identified by EDR; and
5. Groundwater quality data from existing wells in the vicinity.

Upon completion of the draft DWSAP report, the Consultant will meet with the City to review initial draft findings. Upon receipt and incorporation of the City's comments, the

[1] Drinking Water Source Assessment and Protection)DWSAP) Program, January 1999, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwsapguidance/DWSAP_document.pdf

preliminary DWSAP report will be submitted to State Water Resources Control Board (SWRCB). After approval by SWRCB, the preliminary DWSAP report will be finalized and submitted to SWRCB.

Deliverables

- One (1) electronic copy and Three (3) hard copies of the EDR report
- One (1) electronic copy of Draft DWSAP report for City review
- One (1) electronic copy of the Final DWSAP report
- Three (3) hard copies of Final DWSAP report submittal to SWRCB

Task 6 – Prepare Final Design and Bid Documents for Well Drilling

A. Construction Documents

After City review and approval of the finalized preliminary design, Consultant shall prepare final technical specifications and plans for public bid, as follows:

1) Technical Specifications
    - Well Drilling Facilities
    - General site requirements
    - Material & Equipment
    - Required permits and regulatory requirements (includes State and local)
    - Wastewater discharge requirements and compliance
    - Construction survey
    - Parking and traffic control
    - Quality control and testing
    - Project Record Documents and Contract Closeout
    - Restoration of the Site
    - Mobilization and Demobilization
    - Dust Control
    - Temporary Surface Casing
    - Conductor Casing and Sanitary Seal
    - Drilling Fluid(s)
    - Pilot Hole Drilling
    - Pilot Hole Reaming
    - Pilot Hole Plugging
    - Geophysical Logging of Pilot hole
    - Aquifer Zone Isolation Tests
    - Caliper Log
    - Conceptual Well Design
    - Stainless steel Well Casing, Sounding Tube and Gravel Tube
    - Gravel Envelope
    - Cement Grout Annular Seal
    - Alignment Test
    - Well Development
    - Flow Meter Survey

- Aquifer Tests
- Video Camera Survey
- Well Disinfection
- Water Quality Testing
- Wellhead Completion/Capping
- Well Destruction of Existing Well 22
- Others as required

2) Final Plans/Design Drawings
   - Cover Sheet on City Standard Title Block with Project Title, Location & Vicinity Maps and Construction Notes
   - Design Drawing
   - Detail Sheet
   - 60% Submittal (3 sets of full size and 3 sets of half sized plans)
   - 90% Submittal (3 sets of full size and 3 sets of half sized plans, technical specs and cost estimate)
   - 100% Submittal (2 sets of full size plans, technical specs and cost estimate)
   - Final drawings shall be signed and stamped by a Civil Engineer licensed in CA State and shall include 1 USB copy in PDF format. Cost estimate and Technical Specifications shall be in MS Word.

Consultant shall prepare the final engineer's construction cost estimate in the same order and quantities as the proposal contained in the bid documents. Consultant shall prepare the estimate in MS Excel and submit it to City with the final plans and specifications. Consultant shall submit to City the following for review, comment, approval, or use:

Deliverables: Well Drilling, Plans Specifications & Estimate

- 60% submittal, 3 sets of plans.
- 90% submittal, 3 sets of plans, technical specifications and cost estimate.
- 100% submittal, 3 sets of plans (full size), technical specifications and cost estimate.

B. Bidding Services

Assist with contractor's questions and Addenda during bid process. Assume 10 questions, 2 Addenda and City preparation of final Addendum submittal. Participate in Pre-Bid meeting.

C. Engineer's Estimate

Provide City with an estimate of probable cost for drilling, construction, testing, and all required services to complete drilling.

Task 7 – New Well 22B Drilling

A. Well 22B Drilling – Construction Administration

Consultant shall provide inspection, hydrogeologic analysis and recommendations during the Well 22B drilling and development construction phase, including, but not be limited to:

1) Provide consulting hydrogeologist and, as necessary, resident engineer, who will observe the contractor's construction progress, provide on-site geological sampling and formation analysis during construction operations, progress reports, quality assurance and assistance in achieving conformance with the contract plans and specifications, and construction phase photographs.
2) Provide engineering and consultation services, as required, and coordinate with City; Division of Drinking Water, LA County Department of Public Works, Regional Water Quality Control Board; and other City staff in construction contract management.
3) Review and adjust progress pay estimates prepared and submitted by the contractor for conformance with the contract documents.
4) Prepare supplementary sketches and details as required to resolve field construction problems that may be encountered.
5) Maintain daily construction progress reports and project logs of the progress of the construction work.
6) Secure record information from the construction contractor and prepare the "as constructed" corrections to the original drawings and specifications.
7) Provide field observation of and hydrogeologic services for the following during construction:
    - Installation of the conductor casing and sanitary seal;
    - Pilot or test hole well drilling construction. Provide observation services, retrieve soil samples, prepare soil classification and visual logs;
    - All discharges to storm drain, street or recharge basin;
    - Performing geophysical logs and caliper logs;
    - Zone isolation tests (assume a minimum of 6);
    - Reaming of the well hole;
    - Placement of well casing, screens or perforations, and plug, if required;
    - Placement of gravel pack and concrete annular well seal;
    - Well development, aquifer testing, and depth-specific water-quality sampling in all screened intervals;
    - Step-drawdown, Constant rate test, & Recovery
    - Final well design
    - Well disinfection;
    - Plumbness and alignment survey
    - Video log of "as constructed" well; and
    - Construction of temporary cap.
    - Aquifer pumping test analysis and recommendation for pump setting, design discharge rate, and estimated drawdown conditions.

8) Obtain, review and test soil samples for grain size distribution.
9) Analyze test hole drilling data and recommend locations and type of perforations, the quantity and quality of water expected from each perforated zone, annular seal depth, and cased depth.
10) Conduct and review water quality analyses (including general mineral and physical, inorganic, organic, radioactivity, and microbiological) expeditiously to avoid any undue delays to the construction contractor.
11) Review and recommend type of gravel pack and screens, and casing pipe.
12) Set up, recommend, and interpret results of well development pump tests. Recommend long term sustainable well production rate with predicted static water levels (high and low), specific capacity and predicted long term decline in specific capacity.
13) Recommend type, capacity, and location (i.e., bowl depth setting) of final pumping equipment.
14) Provide any additional hydrogeologic work as deemed necessary for the development and test pumping of the well.
15) Provide permit compliance documentation, follow up, and support for all permits and clearances required during the new well drilling, construction, testing and development.
16) Provide final completion support for the well drilling and development construction phase, including final acceptance testing, support, and sign off.
17) Prepare a report (Final Construction Report) summarizing all findings, analyses, recommendations, and test results during the drilling, construction, testing and development. The report shall include all logs, drawings, test results, graphs, final well video log on USB Drive, etc.

18) The Consultant shall prepare and submit reports and data to the City representative to inform City of project development for the well. The reports and data submitted to City shall be as follows:
    - Daily submittals during the pilot or test hole drilling, aquifer water sampling, etc.
    - Submittals shall include the following:
        i. A copy of the daily construction progress reports, project logs, and inspection hours.
        ii. A summary of the construction progress of the prior reporting period.

Deliverables: Consultant's compensation shall include all costs of printing, plotting, binding, and reproducing all required documents and submittals. These costs shall be included within each sub-task. Consultant shall perform routine and final check prior to sending any submittal to City, to ensure accuracy, conformance, and integrity of all documents. Consultant shall perform quality assurance/quality control checks on all submittals made to City. City will not accept for review any documents that are not reviewed and signed by the Consultant's responsible personnel to certify accuracy and completeness of the submittal.

Consultant shall submit to City the following:

Well Drilling Report

- 2 copies of Well's geophysical and caliper logs
- 2 copies of Well's soil classification profile and driller's log
- 1 copy of Daily, twice a week and bi-weekly construction progress reports
- 1 set of prints plus Construction progress photographs indicating scope (digital copy on USB Drive) of work and critical elements, and date identified
- 2 copies of Any sketches necessary during the construction phase to interpret or modify contract plan and specification concepts requiring City approval
- 2 copies plus Final Construction Report
- 1 electric PDF copy (plus USB Drive of final well video log)

Task 8 - Permitting

Consultant shall complete and submit all necessary permit applications and obtain the permits as required for the well drilling project, including but not limited to the following (fees applicable to permit applications will be paid for by City):

1. Local Agency Well Construction
2. City of Lakewood
3. State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW)
4. California Department of Water Resources (DWR) Bulletin 74-90 Well Standards
5. Los Angeles Regional Water Quality Control Board State Water Resources Control Board for NPDES
6. LA County Health Department
7. LA County Flood Control District (LACFCD)
8. AWWA Standards for Water Wells A100
9. CEQA (to be completed by the City)

2.0 ELEMENTS OF PROPOSAL

The proposal shall be signed by an official authorized to bind the firm and must contain a statement to the effect that the proposal is valid for ninety (90) days. Proposal information shall be submitted in two (2) envelopes as follows:

1. The first envelope, clearly identified as "Technical Proposal" shall be limited to 15 pages excluding cover letter, resumes, and pre-printed materials and contain the following information:

   A. Introductory letter, firm name, address, and telephone number; contact person, and table of contents.

B. A clear and concise response as to why the City of Lakewood should select your firm for this work.

C. Statement of qualifications of Design Project Team.

D. A detailed description of similar projects successfully completed by the proposed Design Project Team in the last five years. Relevant experience illustrating the proposed Project Team's capabilities, which must include description of work, performed for other public agencies specifically managed by the designated Project Manager. Include a list of clients for which your firm has completed similar work. Include project design start and completion dates, engineer's estimate and final construction cost. Cite only specific projects of a similar nature to the project described herein. Include the name, telephone number, and email address of a contact person for each client who can verify the information provided.

E. Provide a brief narrative indicating the management structure of your firm, the tenure of management, and ownership of the firm.

F. Resume of the Project Manager that will be assigned to work as the "lead person" on this design project who will be the City's main liaison. This individual must be a licensed civil engineer. Include a detailed description of the assigned Project Manager's experience and specifically identify the last ten design projects he/she managed. Describe his/her availability and percentage of time allocated to this project.

G. Firm personnel experience - A list of the Design team personnel who will actually be assigned to perform substantial amounts of the design work on this project. Provide a resume and experience record for each person, including years of experience, education and anticipated amount of time each will actually work on this project.

H. Sub-consultant personnel experience - Names and addresses of any outside sub-consultants, associates and contractors who you are proposing to be involved with on this project. Include each proposed company's experience and qualifications as described in G above for firm's personnel.

I. A detailed proposed scope-of-work and methodology consisting of individual tasks for the design project. This scope-of-work will be used as a basis later for project deliverables and invoice payments.

J. Project Schedule – A proposed time schedule and a method of assuring that the time schedule is met, including the name of the person responsible for the time schedule. Please include two weeks of review time for each project deliverable due to the City.

K. Documentation of no personal or organizational conflicts of interest with City of Lakewood interests.

2. The second envelope which must be sealed, clearly identified as "Cost Proposal" shall contain the following information:

   A. The "not-to-exceed" cost proposal should break down the various elements of cost for the project into individual tasks. The cost break down shall at the very minimum reflect the tasks and sub-tasks as described in this Request for Proposal. All fees and expenses should be incorporated into the cost proposal with all blue printing, photocopying, travel and miscellaneous costs, estimated to be accrued during the life of the contract included into the personnel's hourly rates. Also, include any escalation or inflation factors anticipated into hourly rates. No increase in fees will be allowed during the life of the contract. Extension of the contract will be a basis for renegotiation of fees.

   B. The Consultant shall identify the number of technical and professional personnel hours (project manager and key professionals) for each task or sub-task. Payment for services is anticipated to be based on man-hours and fee schedule (personnel rate).

NOTE: Please be sure to place the fees proposal in a separate sealed envelope from the "Technical Proposal" so that an evaluation of the proposal based on merit only may be completed.

3.0 CONSULTANT SELECTION PROCESS

A panel of the City Water and Public Works staff members will review the submitted proposals based on the evaluation factors noted below. Proposals will be evaluated primarily on the demonstrated ability of the project design team members who will actually perform substantial amounts of the work on our project.

Proposals will be evaluated based on the following criteria:

1. Firm experience/reputation/workload - Experience of the firm in similar work and record of successful results of that work. Also considered will be the firm's ability to take on additional work, demonstrated understanding of the City's goals and purpose

for this project, specific management approach and how the firm proposes to achieve the project's time goals, how well the firm's organizational structure shows sufficient depth for its present workload, and the firm's ability to offer the breadth and quality of services required for the project. **(25 points)**

2. Experience of the specific design personnel assigned to the design project team - A firm provides the resources but the individuals assigned to a project is a true reflection as to the final quality of the project. The City of Lakewood will give considerable weight to the individual qualifications and experience of the project team members who will actually do most of the design work on this project. Considerations will include qualifications of key personnel, project team member's individual experience and other qualifications, project manager's experience, sub-consultant's individual experience and other qualifications. **(25 points)**

3. Response to the project objectives outlined in this RFP – including demonstrated understanding of scope of project. **(15 points)**

4. Adherence to proposal format. **(10 points)**

5. Schedule - The proposed schedule for performing the work for the project. The selected firm should be ready to start work immediately after the design contract is awarded by City Council and a Notice-To-Proceed is issued. **(25 points)**

Proposers may be invited to participate in an oral interview with members of the Selection Committee. The Project Manager must represent the firm at this interview. A contract may be negotiated for the project for the extent of services to be rendered and for the method of compensation. If agreement is not reached on the project, negotiations will be terminated. Negotiations may then be undertaken with the review panel's second choice for that project. When agreement is reached with the Consultant, a contract for the work will be prepared in final form, executed by the Consultant and submitted to the City Council for approval and execution.

4.0 PROPOSAL EVALUATION SCHEDULE

The City shall utilize the following planning chart for the timetable and process of evaluating engineering proposals:

- Proposals due and received by: **May 11, 2023 by 2:00PM** PST
- Recommend Council to approve Award: **June 13, 2023**
- Notice to Proceed: **July 10, 2023 (Tentatively)**

5.0 GENERAL TERMS AND CONDITIONS

This request for proposal does not commit the City of Lakewood to approve an Agreement, to pay any costs incurred in the preparation of a response to this proposal request, or to procure or contract for services or supplies. Respondents shall not offer any gratuities, favors, or anything of monetary value to any officer, employee, or agent of the City that have influence in the selection of the Consultant for the purpose of influencing favorable disposition toward either their proposal packages or any other packages.

The Consultant shall carry General Liability Insurance, with minimum limits of $1,000,000 for each occurrence and $2,000,000 in the aggregate, combined single limit, naming the City, City Council and each of its members, and the officers and employees of the City, as additionally insured for purposes of the contract, such coverage not to be canceled unless a 30-day written notice is first given to the City.

The selected firm shall maintain in full force and effect at all times during the term of the agreement, professional liability insurance in the amount of Two Million Dollars ($2,000,000) which shall provide coverage for any damages or losses suffered by the City as a result of any error or omission or neglect by the Consultant which arises out of the professional services required by the Agreement.

The City reserves the right to accept or reject any and all proposals, waive any defects or irregularity, modify the proposal terms or the selection process or negotiate a contract, along with a revised Scope of Services, schedule and fees with the selected Consultant. The City reserves the right to eliminate or add tasks identified in the Scope of Work with a corresponding reduction or increase in the fee. The City reserves the right to separate the work into various projects and negotiate and award each project to different consultants. At its sole discretion, the City may choose to award the design contract to any proposer that it deems in the best interest of the City. The recommended proposal will be presented to the City Council for approval.

6.0 CONTRACT BETWEEN CONSULTANT AND CITY

The City will prepare a contract for implementation between the successful Consultant and the City. See **Attachment 3** for a sample of the City's contract agreement. Please indicate in your proposal any exceptions taken to the requirements of the agreement.

Late Proposals

It is the Consultant's sole responsibility to ensure that proposals are received at the City office prior to the scheduled closing time specified in this RFP. Proposals will not be accepted after the deadline.

Withdrawal of Proposals
Consultants may be withdrawn if written notification of withdrawal of the proposal is signed by an authorized representative of the proposer and received at the City office prior to the closing time for receipt of proposals. Proposals cannot be changed or withdrawn after the time designated for receipt.

Rejection of Proposals
The City reserves the right to reject any and all proposals received in response to this RFP and to waive any informality in any proposal if it is determined to be in the best interest of the City to do so.

Proposal Validity Period
Submission of a proposal will signify the proposer's agreement that the proposal, and contents thereof, are valid for ninety (90) days following the submission of the proposal and shall become part of the contract that is negotiated with the successful consultant.

Site Inspection
Proposers are urged to make site visits and examinations to become thoroughly familiar with the conditions affecting their proposal. Failure to make such investigations will not constitute grounds for additional claims or for extension of time under the contract and will not relieve the Consultant of the responsibility for meeting all requirements of the RFP.

Documents To Be Construed Together
The RFP, proposal and all documents incorporated by reference in a contract entered into between the Consultant and the City, and all modifications of said documents, shall be construed together as one document.

Extra Work or Materials
The City shall have the right to make alterations, eliminations and additions in the work. Exercise of such right shall in no way void the contract. The value of such extra work shall be agreed upon by the City and the Consultant.

News Releases
News releases pertaining to the award of any contract resulting from this RFP shall not be made without prior approval of the City. The City's name shall not appear on customer lists, advertising or other materials used to promote the Consultant's services without prior written approval of the City.

PROPOSER'S EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION In accordance with Subchapter VI of the Civil Rights Act of 1964, 42 USC Sections 2000e through 2000e- l 7, Section 504 of the Rehabilitation Act of 1975, the Food Stamp Act of 1977, the Welfare and Institutions Code Section 1000, Americans with Disability Act of 1990, California Department of Social Services Manual of Policies and Procedures Division 21, the Contractor, supplier, or vendor certifies and agrees that all persons employed by such firm, its affiliates, subsidiaries, or holding companies are and will be treated equally by the firm without regard to or because of race, creed, color, national origin, political affiliation, marital status, age, disability, or sex and in compliance with all anti-discrimination laws of the United States of America and the State of California.

Prior to the commencement of work, the selected proposer certifies its compliance with equal employment opportunity law and will:

1. Have a written policy statement prohibiting discrimination in all phases of employment

2. Conduct periodic self-analysis or utilization analysis of its work force

3. Have a system for determining if its employment practices are discriminatory against protected groups.

4. Where problem areas are identified in employment practices, the proposer will have a system for taking reasonable corrective action, which includes the establishment of goals and timetables.

CONSENT TO COMPLY BY:

Proposer Name: _____

Proposer Official Title: _____

Official's Signature: _____

Date: _____

PROPOSER'S CERTIFICATION OF NO CONFLICT OF INTEREST The City shall not contract with, and shall reject any proposals submitted by, the persons or entities specified below, unless the Lakewood City Council finds that special circumstances exist which justify the approval of such contract:

1. Employees of the City or of agencies for which members of the Lakewood City Council is the governing body;

2. Profit-making firms or businesses in which persons described in number one serve as officers, principles, partners, or major shareholders;

3. Persons who, within the immediately preceding 12 months, came within the provisions of number 1, and who:

   a. Were employed in positions of substantial responsibility in the area of service to be performed by the contract; or
   b. Participated in any way in developing the proposal or its service specifications; and

Profit-making firms or businesses in which former employee(s), described in number 3, serve as officers, principles, partners, or major shareholders.

CERTIFICATION BY:

Proposer Name: _____

Proposer Official Title: _____

Official's Signature: _____

Date: _____

Five (5) copies of the complete proposals including an electronic PDF copy in a flash drive must be received by the date and time specified in Section 4.0 of this RFP. Deliver or mail proposals to:

Hand or Mail Deliveries:

City of Lakewood
City Clerk's Office
5050 Clark Avenue
Lakewood, CA 90712
Attn.: **Derwin Dy, P.E. – Assistant Director of Water Resources**

ATTACHMENTS

Attachment 1: Existing Well 22 Design Report & Related Documents
Attachment 2: Existing 2.5MG Reservoir Design Report & Related Documents
Attachment 3: Sample City Contract Agreement

-END-

Attachment 1

Existing Well 22 Drilling Report

City Of Lakewood Well 22

Results Of Drilling, Testing, &

Recommended Pump Design

HDR Engineering, Inc.

October 31, 1996

By:

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

THIS REPORT IS RENDERED TO HDR ENGINEERING, INC. AND THE CITY OF LAKEWOOD AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. ALL CALCULATIONS WERE PERFORMED USING ACCEPTED PROFESSIONAL STANDARDS.

AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

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CITY OF LAKEWOOD WELL 22

RESULTS OF DRILLING, TESTING AND RECOMMENDED PUMP DESIGN

1.0 EXECUTIVE SUMMARY

A new water supply well was recently completed in the City of Lakewood, Los Angeles County, California (see Figure 1). The new well, Well 22, is located approximately 200 feet west of Downey Avenue and 80 feet south of Candlewood Street and will be used by the City for municipal water supply purposes.

The well was drilled by Layne-Western Company, Inc., McCalla Division, using a Challenger 280 reverse rotary drilling rig. A 36 in. ID surface conductor casing was installed and cemented in place from the surface to a depth of 75 feet. The 17 1/2 in. diameter pilot borehole was drilled to a total depth of 1,340 feet. Materials encountered during drilling consisted of primarily medium to fine grained sands and gravel interbedded with layers of silt and clay.

As this location was "unproven" in terms of both yield and water quality, it was necessary to test selected aquifer zones before specifying the completion intervals. Potential aquifers were selected for zone testing based on both borehole cuttings and results from geophysical borehole logs. Five zones were selected with depths ranging from 450 to 1,230 feet. Samples of formation water were obtained from each zone and analyzed by APCL Laboratory in Pomona for general mineral, physical and arsenic properties. Among other things Results showed color ranging from 1 to 3 color units and total dissolved solids (TDS) from 167 to 297 mg/L. An odor unit of 1 was measured for all five zones. These values are below the Maximum Contamination Levels (MCLs) for these constituents (e.g. 15 color units, 500 mg/L TDS and 3 odor units). High iron concentrations (0.4 - 5.8 mg/L) were measured in four of the zones, however it is believed that these high concentrations reflected suspended solids in the samples. Water quality analyses from the 24-hour constant rate testing showed an iron concentration of 0.17 mg/L, well below the 0.3 mg/L MCL.

The well was completed to a total depth of 1,080 feet. Completion included enlarging the 17 1/2 in. diameter pilot borehole to 28 in. diameter to a depth of 1,090 feet and installing 18 in. ID casing and horizontal louver shutter screen. The screened sections were placed between depths of 440 and 1,060 feet, with two blank sections from 570 to 610 feet and 780 to 890 feet. A 20 foot blank casing was placed from 1,060 to 1,080 feet as a sediment trap. An artificial filter pack was installed between the casing and screen and the enlarged borehole from 390 feet to 800 feet and from 890 to 1,080 feet.

An annular cement seal was placed from 385 feet to the surface to isolate shallow aquifers and to act as a sanitary seal. Another annular seal (bentonite) was placed from 800 to 865 ft as a prudent measure to protect the well from possible future contamination from lower zones.[1] (Plate 1 shows the well casing design, lithologic and geophysical logs).

Pumping test results showed that the well has an excellent yield and a good specific capacity (33 gpm/ft). Step drawdown and constant rate pumping tests showed high well efficiencies and transmissivities typically in the 80,000 to 100,000 gpd/ft range. Storativities reflected the confined to semi-confined aquifer systems.

1 Although aquifer zone testing did not show undesirable water quality in the completion interval of the well, it is generally accepted that deeper aquifers in the Central Plain of both Los Angeles and Orange County may contain high color and odor.

Based on the pumping test results, the recommended pump discharge rate and setting are as follows:

Discharge Rate:	3,000 gpm
Static Water Level Depth:	90 ft
Design Drawdown (extrapolated to 1-yr)[2]:	115 ft
Estimated Allowance For Unknown Effects And Seasonal Changes In Regional Water Level	50 ft
Total Dynamic Head (Total Lift To Surface -- does not include system pressure)[3]	255 feet
Recommended Pump Setting (pump intake)	360 feet

At the end of the 24-hour constant rate pumping test, samples of formation water were taken by City personnel and analyzed by Truesdail Laboratories, Inc. for full Title 22 analyses. Results showed that iron was 0.17 mg/L, and total dissolved solids (TDS) was 205 mg/L. These values are below the Maximum Contamination Levels of 0.3 mg/L and 500 mg/L, respectively. Concentration of all other general minerals, inorganic chemicals and radioactivity analyses are also below the MCLs.

2 The drawdown at the end of the 24-hr constant rate test was 91 ft. To be conservative in designing the long-term pumping level, the 24-hr semi-logarithmic "trend" was extrapolated to 1-yr.

3 Historic fluctuations of water levels in nearby wells have been as much as 60 feet during the time period of 1981 to the present. This time interval includes the drought cycle which ended in 1992.

After the 24-hour constant rate pumping test was complete, and recovery measurements were taken, a flowmeter survey (i.e. "spinner" survey) was performed. Results show all screened sections contributing water to the well with the majority being produced from the shallower zones (i.e. between 440 ft and 780 ft depths).

Following the flowmeter survey, a down-hole video log was run as a permanent record of the construction condition of the well. The well was disinfected following removal of the test pump using 159 gallons of 12% sodium hypochlorite solution.

A plumbness and alignment survey was run to measure the verticality of the well. Results showed a maximum deviation in the North-South plane of 8.31 in. at a depth of 810 ft. The maximum deviation in the East-West plane was 9.43 in. occurring at a depth of 920 ft. The maximum deviation is within the limits defined by the technical specifications which allows for no more than 6 in. of deviation per 100 feet of depth.

2.0 INTRODUCTION

2.1 Background

A new water supply well was recently completed in the City of Lakewood, Los Angeles County, California (see Figure 1). The new well, Well 22, is located approximately 200 feet west of Downey Avenue and 80 feet south of Candlewood Street and will be used by the City for municipal water supply purposes.

2.2 Purpose And Scope

This report summarizes results of construction and testing of the City of Lakewood's new Well 22. The scope of work summarized in this report includes detailed accounts of all construction, testing and analyses. The work also includes final well design and completion details and recommendations for optimum discharge rate and pump setting.

2.3 General Hydrogeology Of The Wellsite

The City of Lakewood is located in the Central Basin of the Coastal Plain of Los Angeles County. The project area is underlain by water-bearing consolidated and semi-consolidated upper Pliocene to Recent marine and non-marine sedimentary deposits. Three major water-bearing formations, Recent Alluvium, Lakewood Formation, and San Pedro Formation, occur in the region. Each formation contains several aquifers with conditions ranging from unconfined to confined aquifers.

3.0 WELL CONSTRUCTION

3.1 Conductor Casing, Drilling, Logging And Aquifer Zone Testing

A 36 in. ID surface conductor casing was installed and cemented in place from the surface to a depth of 75 feet. Below this depth, a 17 1/2 in. diameter pilot hole was drilled using a reverse circulation hydraulic rotary drill rig. The pilot bore drilling began on July 16, 1996 and was completed to a depth of 1,340 feet on July 19, 1996. Table 1 summarizes all well construction data.

Formations logged during drilling of the pilot borehole consisted of coarse to fine sand with minor gravel interbedded with layers of silt and clay. The overall average drilling rate was approximately 19 ft/hr.

A suite of geophysical borehole logs were run by Welenco and included:

(1) 16-in. and 64-in. Normal Resistivity,
(2) Guard Resistivity,
(3) Point Resistivity,
(4) Spontaneous Potential (SP),
(5) Gamma Ray,
(6) Sonic (Acoustic),
(7) Variable Density, and
(8) Caliper Log.

Appendix A contains a chronology of the well construction, development, and pumping tests. Appendix B shows a detailed lithologic description of materials encountered during drilling. Appendix C contains the geophysical borehole logs including the caliper survey and the spinner survey (flowmeter survey). Appendix D contains individual mechanical grading analyses of all formation samples tested. Figure 2 shows a composite plot of mechanical grading analyses of samples from the unconsolidated sand and gravel aquifers. Mean grain diameters for aquifer

materials range from 0.415 mm to 0.775 mm; uniformity coefficients range from 2.1 to 3.9; and Masch-Denny hydraulic conductivities range from 280 gpd/ft^2 to 1,298 gpd/ft^2.

Appendix E contains GEOSCIENCE's personnel field notes for well construction, development, and pumping tests.

3.2 Aquifer Zone Testing For Yield And Water Quality

Following pilot bore drilling and logging, five intervals were selected for zone testing to determine yield and water quality of potential completion intervals. Testing was accomplished by attaching an 8 in. diameter well screen (21 feet in length) to the end of the drill string. Starting with the lowermost zone (Zone 1), the 21 ft test screen is placed opposite the zone to be tested within the 17 1/2 in. pilot borehole. After filling the borehole up to the bottom of the test zone, gravel pack was added to the annular space between the 17 1/2 in. borehole and the 8 in. zone test screen. A bentonite (impermeable material) seal was placed above and below the zone in order to isolate the test zone from other aquifers.

The test zone was initially developed using airlift pumping with final development using a submersible pump placed within the 6 in. ID drill pipe (above the test screen). After development, the test zone was pumped at a discharge rate in excess of 200 gpm or the highest rate the aquifer could yield for a period of at least 6 hours. Water samples were collected for water quality analysis at the end of each pumping period and analyzed by APCL laboratory for general mineral, general physical and arsenic properties.

Sequential testing of all zones was performed by raising the zone test tool up to the next zone to be tested and then the backfilling, graveling and development sequence was repeated.[4]

---

4 Note: following completion of a specific zone, the 8 in. test screen tool was pulled to the surface and any sediments which had accumulated inside the tool, as well as in the perforations, were removed before proceeding to the next zone.

The zone test procedure used is summarized as follows:

Selective Aquifer Zone Testing For Water Quality

1. The borehole was backfilled to approximately 10 feet below the zone to be tested.

2. A 10 in. diameter by 21 feet long slotted test screen was placed opposite the test zone.

3. A gravel filter pack was placed in the annular space between the 10 in. test screen and the 17 1/2 in. borehole, and was brought to 10 feet above the top of the test screen.

4. A 10 feet bentonite seal was placed on top of the gravel pack material.

5. The test zone was developed using airlift pumping as well as a submersible pump.

6. The zone was pumped for a minimum of 6 hours after development at a rate of over 200 gpm or highest rate if 200 gpm could not be achieved using a submersible pump.

7. Water level measurements and average discharge rates were recorded, and water samples were taken for water quality analyses,

8. Upon completion of each test, the test screen tool was brought to the surface, cleaned and placed opposite the next zone to be tested.

3.2.1 Aquifer Zone Test Results

Water quality analyses of each zone were performed and included general minerals, general physical, and arsenic. Results show the water from all five zones to be well under the MCLs for the constituents tested except iron. Color (true) were below the MCL of 15 color units, and varied from 1 color unit in Zones No. 4 & No. 5, to 3 color units in Zone No. 1 (deepest zone tested). TDS concentrations were also below the 500 mg/L MCL and ranged from 167 mg/L in Zone No. 5, to 297 mg/L in Zone No. 4. Odor for all five zones was measured as 1 odor unit which is below the MCL of 3 odor units, although a slight odor was detected from field observations. High iron concentrations (0.4 - 5.8 mg/L) were measured in four of the zones, however it is believed that these high concentrations reflected suspended solids in the samples. Water quality analyses from the 24-hour constant rate test showed an iron concentration of 0.17 mg/L, well below the 0.3 mg/L MCL.

The results of the aquifer zone tests are summarized in the following table:

Well 22 Aquifer Zone Test Results

Zone No.	Interval Tested (ft)	Average Discharge Rate (gpm)	Color (color unit)	Odor (odor unit)	Total Dissolved Solids (mg/L)	Arsenic (µg/L)	Iron (mg/L)	Turbidity (unit)
1	1,210-1,230	75	3	1	264	7	2.2	319
2	1,030-1,050	227	1.5	1	199	11	5.8	3,230
3	905-925	97	2	1	201	29	1.2	413
4	620-640	267	1	1	297	10	0.42	866
5	450-470	236	1	1	167	7	ND	351

3.3 Casing And Screen Design

Due to the low yield and potential water quality problems in Zone No. 1, the well was completed to a depth of 1,080 feet (including 20 feet of blank casing at the bottom of the well as a sediment trap). The 17 1/2 in. pilot borehole was backfilled from 1,340 to 1,080 with bentonite. After the pilot bore was enlarged from 17 1/2 to 28 in. in diameter, a caliper log was run before placement of the casing and screen. 18 in. ID copper-bearing Roscoe Moss Company horizontal louver shutter screen (Ful-Flo pattern with 0.070 in. openings) was placed from 440 to 1,060 feet with two blank casing sections from 570 to 610 feet and 780 to 890 feet. 18 in. ID spiral welded copper-bearing blank casing was placed above the screen from the surface to a depth of 440 ft. From 1,060 feet to 1,080 feet blank casing was placed to serve as a sediment trap at the bottom of the well (see Figure 3, and Plate 1). A 2 in. diameter sounding tube was attached to the blank casing at 420 feet as a "stilling well" for obtaining accurate water level measurements.

3.4 Filter Pack And Annular Seal

The artificial filter pack was supplied by Valley Sand And Gravel Company and consisted of a 6 x 12 blend (see Figure 4). The filter pack was designed using a pack/aquifer ratio of 4 to 6 times the finest aquifer materials. The filter pack was placed in the annular space between the 28 in. borehole and the 18 in. diameter casing and screen from the total depth of 1,080 feet to 390 feet, using a tremie pipe and circulated with water. Two 3 in. diameter gravel feed pipes were installed to depth of 875 feet and 395 feet respectively (extending 10 feet below the annular seal) to allow for "topping up" of the filter pack if necessary.

A bentonite annular seal was placed between 800 and 865 feet for the future possible isolation of the deep zone. Above the filter pack a 5 feet layer of Lonestar #3 silica sand was placed (to prevent the bentonite and cement slurry from invading the top of the filter pack), followed by an annular seal to the surface. Installation of the seal was accomplished in two lifts to avoid collapse of the casing. Annular seal material consisting of a 10 sack cement-sand slurry mix was placed using positive displacement by pumping through a tremie pipe from 385 feet to 162 feet. The remaining

portion of the annular seal, from 162 feet to the surface, was pumped into the well the following morning after allowing the initial placement to "set up".

3.5 Well Development

The well was initially developed using an airlift swabbing tool to remove the majority of colloidal and fine sediments and to consolidate the filter pack material. Final development was conducted between August 26 and September 30, 1996 using a vertical hollow shaft turbine pump. Most of the development pumping consisted of pumping the well until sand concentration reached a minimum threshold. At this time the discharge rate was either increased slightly or the well "surged". Typical lengths of constant pumping times during development rarely exceeded several hours. However, towards the end of development, the well was pumped for 5 hours at a maximum discharge rate of 3,500 gpm

During the development pumping, the discharge rate, drawdown, and sand concentration were closely monitored. Discharge was measured using a propeller meter. Water levels were measured using an electrical sounder and an airline.[5] Sand concentration was measured using a Rossum centrifugal tester. When specific capacity (discharge rate/drawdown) approached a maximum and sand concentration approached a minimum, well development was considered complete. Appendix F contains contractor's daily notes that summarize well development results.

Well development for Well 22 was tedious to say the least. Due to the abundance of fine sand aquifers, development time was longer than typically required for most wells. However, in these types of fine-grained formations, there is no short cut to proper development. By the end of the development period, sand concentrations were within the design specifications for ppm sand.

5 During development, water levels measured from the 2 in. sounding tube matched those measured from inside the casing, as well as the airline measurements.

Following removal of the test pump, on 31-October-96 the well was disinfected using 159 gallons of a 12% sodium hypochlorite solution.

3.6 Plumbness And Alignment

A deviation (plumbness and alignment) survey was conducted by Layne-Western on 23-October-96. Results show that deviation occurs in the North-South plane a maximum of 8.31 in. at 810 feet in depth, and in the East-West plane a maximum of 9.43 in. at 920 feet in depth. The deviation that occurs in Well 22 is within the limits defined by the technical specifications which allows no more than 6 in. of deviation per 100 feet of depth (see Table 2).

4.0 PUMPING TEST ANALYSIS PROCEDURES AND RESULTS

4.1 Data Collection And Correction

After development pumping, two separate pumping tests were conducted. A step-drawdown test was run to determine specific capacity and well efficiency relationships. A 24-hour constant rate test was conducted to obtain data from which to calculate aquifer transmissivity and storativity.

During both tests, water level, discharge rate, sand content and water temperature were closely monitored (see Appendix G). The field procedure for these tests followed the American Society for Testing and Materials (ASTM) (1994) standard test method D 4050.

4.2 Basic Assumptions Used In Analysis Of Pumping Test Data

The purpose of a pumping test is to obtain field data, which when substituted into an equation or set of equations, will yield estimates of well and aquifer properties. As certain assumptions have

been used to derive these equations, it is important to observe or control these factors during the test. These assumptions and conditions are:

- The aquifer material is assumed to consist of porous media and with flow velocities being laminar and obeying Darcy's law.
- The aquifer is considered to be homogeneous, isotropic of infinite areal extent and constant thickness throughout.
- Water is released from (or added to) internal aquifer storage instantaneously upon change in water level.
- No storage occurs in the semi-confining layers of leaky aquifers.
- The storage in the well is negligible.
- The pumping well penetrates the entire aquifer and receives water from the entire thickness by horizontal flow.
- The slope of the water table or piezometric surface is assumed to be flat during the test with no natural (or other) recharge occurring which would affect test results.
- The pumping rate is assumed constant during the entire time period of pumping in a constant rate test -- and constant during each discharge step in a variable-rate test.

4.3 Pumping Test Data Analysis Methods

4.3.1 Step-Drawdown Test Method

The purpose of the step-drawdown test is to determine formation loss, well loss, and well efficiency needed for the pump design. For a pumping well, the total drawdown in the well is

composed of both laminar and turbulent head loss components. Laminar losses generally occur away from the borehole where approach velocities are low, while turbulent losses are confined to the area in and around the immediate vicinity of the well screen and within the well bore. The total drawdown in a pumping well may be expressed as:

$$s_w = BQ + CQ^2 \qquad \text{"Drawdown In A Pumping Well"} \qquad (1)$$

where:

s_w = Total drawdown measured in the well, [ft]
B = Formation or aquifer loss coefficient, [ft/gpm] and
Q = Discharge rate of the well, [gpm]
C = Well loss coefficient, [ft/gpm^2].

The first and second term in equation (1) are referred to as aquifer loss[6] (BQ) and well loss[7] (CQ^2), respectively. Formation or aquifer loss and well loss coefficients may be determined from step-drawdown testing. The test procedure involves operating the well at multiple (at least three) discharge rates with each "step" being a fraction of the maximum discharge. Analysis of the step-drawdown data requires plotting the "specific drawdown" (s_w/Q) for each step against discharge rate. The formation loss coefficient (B) is the Y-intercept of the best fit straight line through the specific drawdown data points. The slope of the line is equal to the well loss coefficient (C).

Well Efficiency (E) is defined as the ratio of the formation (i.e. aquifer loss) component (BQ) to the total drawdown measured in the well (s_w) and is expressed as a percent:

6 Aquifer loss is the head loss measured at the interface between the aquifer and the filter pack. The magnitude of the aquifer loss can be found from consideration of radial flow into the well and can be calculated, for example, using Jacob's equation.

7 Well losses are turbulent flow losses which are head losses associated with the entrance of water into and through the well screen as well as those losses incurred as the flow moves axially towards the pump intake. These losses vary as the square of the velocity.

$$E = 100\frac{BQ}{s_w} = \frac{100}{1 + CQ/B} \qquad \text{"Well Efficiency"} \qquad (2)$$

where:

E = Well Efficiency, [%]

B = Formation or aquifer loss coefficient, [ft/gpm] and

Q = Discharge rate of the well, [gpm]

s_w = Total drawdown measured in the well, [ft]

C = Well loss coefficient, [ft/gpm^2].

4.3.2 Constant Rate Test Methods

Calculation of aquifer parameters from pumping test data is based on analytical solutions of the basic differential equation of ground water flow which can be derived from fundamental laws of physics. One of the most widely used solutions of this equation for non-steady radial flow to artesian wells is the "Theis Equation":

$$s(r,t) = \frac{114.6Q}{T}W(u) \qquad \text{"Theis Equation"} \qquad (3)$$

where:

s(r,t) = Drawdown in the vicinity of an artesian well, [ft]

r = Distance from pumping well, [ft]

Q = Discharge rate of pumping well, [gpm]

T = Transmissivity of aquifer, [gpd/ft]

W(u) = "Well function of Theis"

u = $1.87 \times r^2 \times S / (T \times t)$

where

S = Storativity, [fraction] and

t = Time after pumping started, [days].

Jacob's Straight-Line Method (Modified Theis Non-Equilibrium Method)

According to Jacob (1950), for small values of "u" ($u < 0.05$), the Theis equation may be approximated by Jacob's equation:

$$s(r,t) = \frac{264Q}{T}\log\left(\frac{0.3\,Tt}{r^2S}\right) \qquad \text{"Jacob's Equation"} \qquad (4)$$

Jacob's equation is valid for use for most hydrogeological problems of practical interest, is easier to use than the Theis equation, and involves a simple graphical procedure to calculate transmissivity and storativity. This method (D 4105) is summarized by the ASTM (1994).

Transmissivity (T, in gpd/ft) can be calculated as:

$$T = \frac{264Q}{\Delta s} \qquad (5)$$

where:

Q = Pumping rate, [gpm]

Δs = Change in drawdown over one log cycle of time, [ft].

Storativity can be calculated as:

$$S = \frac{0.3Tt_0}{r^2} \qquad (6)$$

where:

T = Transmissivity, [gpd/ft]

t_0 = Time at the zero-drawdown intercept, [days] and

r = Radial distance from the pumping well, [ft].

Jacob's Straight-Line Method Applied To Recovery

The procedure used for recovery data analysis is identical to that used during the pumping cycle except that time is measured after the pump has stopped and "calculated recovery" is used instead of drawdown. Calculated recovery is the difference between the extrapolated time-drawdown curve and the residual drawdown. Residual drawdown is the difference between the static water level and depth to water after the pump is stopped.

Theis Recovery Method (ASTM D 5269)

According to Cooper and Jacob (1946), for large values of time, t, and small values of radius, r, the Theis equation for residual drawdown[8] can be reduced to:

$$s' = \frac{264Q}{T} \log\left[\frac{t}{t'}\right] \qquad (7)$$

where:

- s' = Residual Drawdown [ft]
- Q = Pumping rate, [gpm]
- T = Transmissivity, [gpd/ft]
- t = Time after pumping began, [min] and
- t' = Time after pumping cease following pumping, [min].

8 Residual drawdown is the difference between the projected pre-pumping water-level trend and the water level in a well after pumping has stopped.

The method uses a semi-log plot of recovery ratio t/t' vs. residual drawdown, s'. The transmissivity in gpd/ft is calculated as:

$$T = \frac{264Q}{\Delta s'} \qquad (8)$$

where:

Q = Discharge rate, [gpm] and

$\Delta s'$ = Change in residual drawdown over one log cycle of t/t', [ft].

4.4 Pumping Test Data Analysis And Results For Well 22

4.4.1 Step-Drawdown Pumping Test

A step-drawdown test was performed on September 27, 1996, with discharge rates of approximately 1,066, 2,018 and 3,056 gpm, respectively, for the three steps. Figure 5 is a step-drawdown plot and shows the time-drawdown curve for each step. The specific drawdown for each step is shown in the following table:

Step m	Discharge Rate Q_m [gpm]	Incremental Drawdown δ_m [ft]	Drawdown s_m [ft]	Specific Drawdown $(s/Q)_m$ [ft/gpm]
1	1,066	29.0	29.0	0.02720
2	2,018	26.0	55.0	0.02725
3	3,056	34.0	89.0	0.02912

Figure 6 (specific drawdown plot) shows the relationship between specific drawdown and discharge rate. Results showed a formation loss coefficient (B) of 0.025862 ft/gpm and a well loss coefficient (C) of 0.00000097662 ft/gpm^2.

Figure 7 shows the specific capacity and efficiency diagram that may be used to estimate well drawdown and well efficiency at discharge rates up to 3,500 gpm. Calculation of drawdown and well efficiency may also be made using equations (1) and (2).

4.4.2 Constant Rate Pumping Test

Following recovery from the step-drawdown test, a 24-hour constant rate pumping test was run beginning on September 30, 1996. Figure 8 shows a plot of the 24-hour constant rate pumping test and recovery. Depth to static water level at the start of the test was 90.34 feet and the rate selected for the test was 3,001 gpm. The well had no difficulty in sustaining this rate with 9 feet of drawdown per log cycle. The Jacob's straight-line method was used to analyze the time drawdown data and results yield a transmissivity of 88,000 gpd/ft (see Figure 8). The Theis recovery analysis of time-residual drawdown data yield a transmissivity of 79,200 gpd/ft (see Figure 9). The Jacob's straight-line method applied to recovery was also used to analyze the recovery data and results yield a transmissivity of 83,400 gpd/ft (see Figure 10).

During the 24 hour constant rate test, water levels in the nearby observation wells (USGS Monitoring Wells 1, 2, 3, 4, 5 and 6) were also monitored. Transmissivity and storativity values calculated from analyses of interference with USGS Well 1 (screened between 989 ft and 1,009 ft) were found to range between 45,300 - 48,600 gpd/ft and 0.000987, respectively (see table on next page and Figures 11 and 12). The transmissivity and storativity values calculated from analyses of interference with USGS Well 2 (screened between 640 ft and 660 ft) ranged between 99,000 - 102,900 gpd/ft and 0.00234, respectively (see table on next page and Figures 13 and 14). The transmissivity and storativity values calculated from analyses of interference with USGS Well 3 (screened between 450 ft and 470 ft) are 121,900 gpd/ft and 0.00069, respectively (see table on next page and Figures 15 and 16).

In summary, based on the 24 hour constant rate test, the transmissivity values in the vicinity of Well 22 and for various aquifers ranged from 45,300 gpd/ft to 121,900 gpd/ft. Storativity values ranged from 0.00069 to 0.00234 reflecting confined to semi-confined conditions.

The following table summarizes results of transmissivity and storativity obtained from constant rate pumping test analyses:

Summary Of Aquifer Tests

Well No.	Methods	Transmissivity [gpd/ft]	Storativity
Lakewood Well 22	Jacob's Straight-Line	88,000	-
	Theis Recovery	79,200	-
	Jacob's Straight-Line Applied to Recovery	83,400	-
USGS Well 1	Theis Recovery	45,300	-
	Jacob's Straight-Line Applied to Recovery	48,600	0.000987
USGS Well 2	Theis Recovery	99,000	-
	Jacob's Straight-Line Applied to Recovery	102,900	0.00234
USGS Well 3	Theis Recovery	121,900	-
	Jacob's Straight-Line Applied to Recovery	121,900	0.00069

Following the constant rate pump test, a flowmeter (spinner) survey was conducted at a pumping rate of 3,100 gpm. Data from the spinner survey were analyzed and converted to flow rates at various depths (Figures 17 and 18).

5.0 DESIGN DISCHARGE RATE, TOTAL LIFT AND PUMP SETTING

A pumping rate of 3,000 gpm is recommended for the well. At this rate, a long-term drawdown of approximately 115 feet should be expected with a total lift of 255 feet (allowing for 50 feet of unknown effects and seasonal fluctuations in water levels). The long term drawdown was calculated as the drawdown expected after one year of continuous pumping and was based on extrapolation of the semi-logarithmic trend from the constant rate pumping test data (Figure 19).

The intake of the production pump should be set at 360 feet below land surface in the blank section. The following table summarizes the recommended design:

Recommended Design - Well 22

Parameter	Short Term	Long Term
Design Pumping Rate	3,000 gpm	3,000 gpm
Design Drawdown	91 ft	115 ft*
Design Well Efficiency	90%	NA
Pump Setting	360 ft	360 ft
Static Water Level Depth**	90 ft	90 ft
Est. Allowance for Unknown Effects and Regional Lowering of Water Levels***	20 ft	50 ft
Total Lift to Surface	**201 ft**	**255 ft**

* Estimated drawdown after one year of pumping.

** This is the static water level before the constant rate pump test. It is not the fully recovered static water level due to the long well development time . Eight days after the constant rate pump test, the static water level was recovered to a depth of 73 ft. However, this water level (90 ft) is more appropriate for pump design since this well is going to be running most of the time.

*** Historic fluctuations in the water level of nearby wells (approximately one mile away) have been as great as 60 feet during the period of 1980 to the present. This time period includes the drought cycle which ended in 1992.

6.0 GROUND WATER QUALITY

Water samples were collected at the end of the 24 hour constant rate pumping test, and were submitted for full Title 22 analyses. The analytical results are presented in Appendix H.

Chemical analyses of these ground water samples suggest the water to be sodium and bicarbonate in character (see Figure 20), with a total hardness value of 84.7 mg/L and a total dissolved solids

value of 205 mg/L. The iron concentration is 0.17 mg/L and arsenic concentration is 5.3 mg/L. The concentration of all general minerals, inorganic chemicals and radioactivity analyses are below State MCLs (maximum contaminant levels).

7.0 REFERENCES

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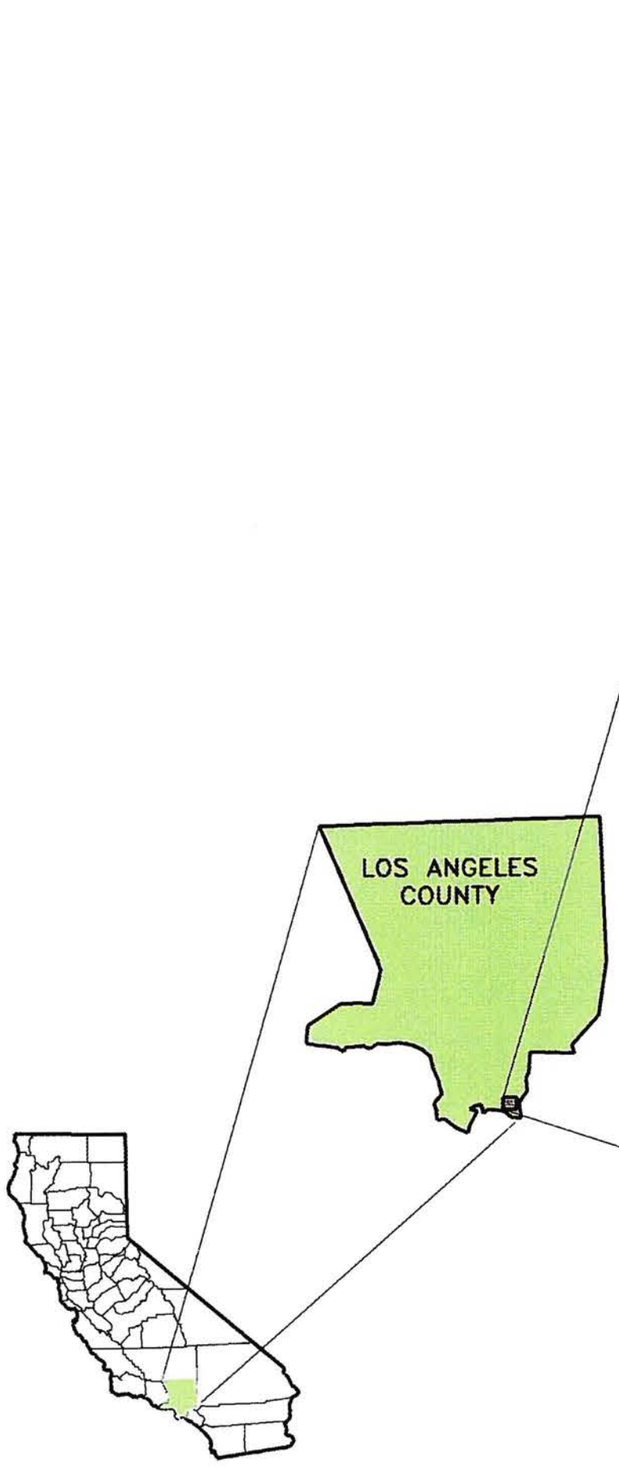
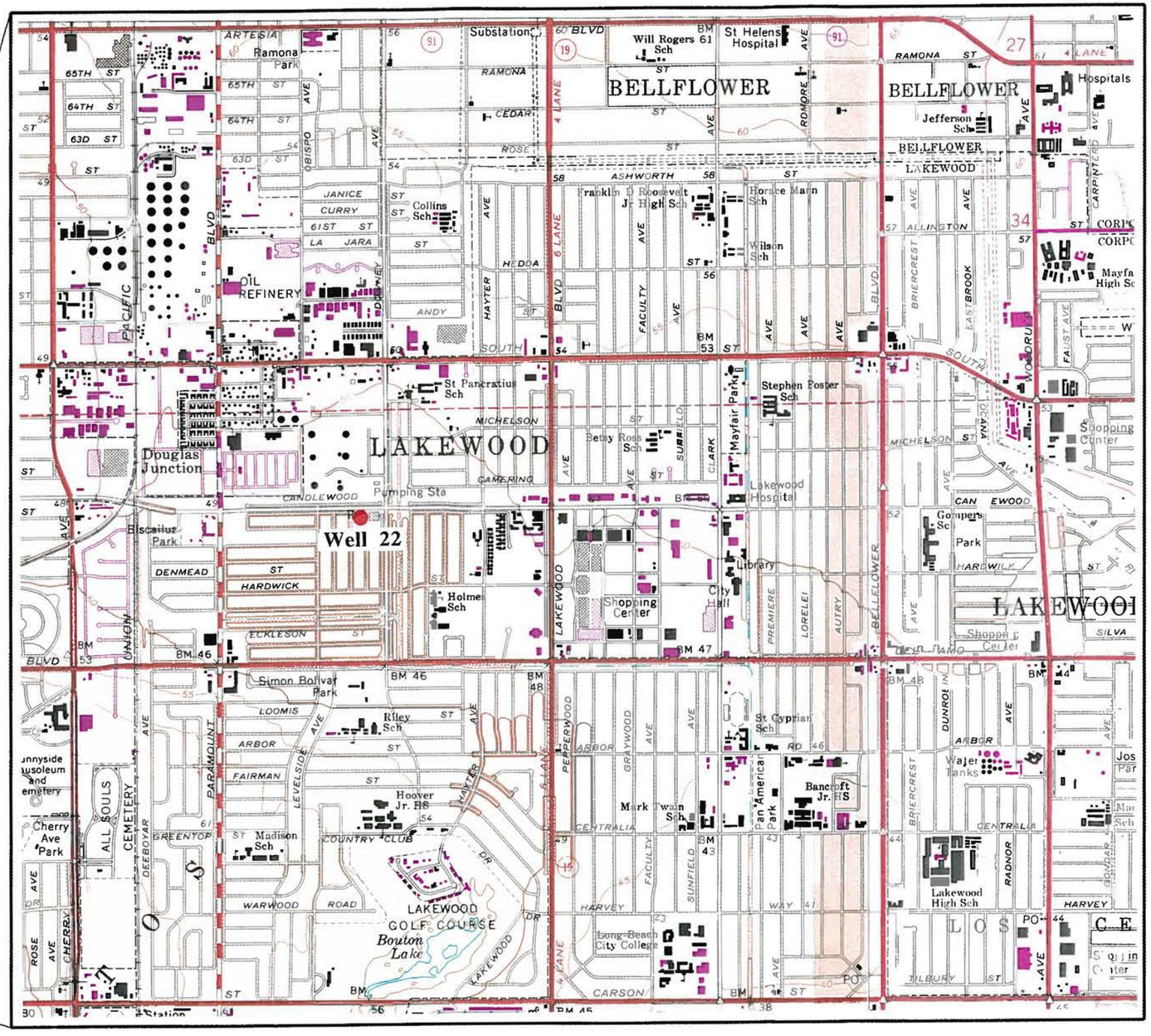
FIGURES





GEOSCIENCE
Support Services Incorporated
P.O. Box 220 Claremont, CA 91711 (909) 920-0707

CITY OF LAKEWOOD

GENERAL LOCATION
LAKEWOOD WELL 22

Drawn:	PLP		
Checked:	WT		
Approved:			
Date:	29-OCT-96		

Figure 1

JN 12300

LAKEWOOD\WELL22\LOCAMAP

MECHANICAL GRADING ANALYSIS

Lakewood Well 22

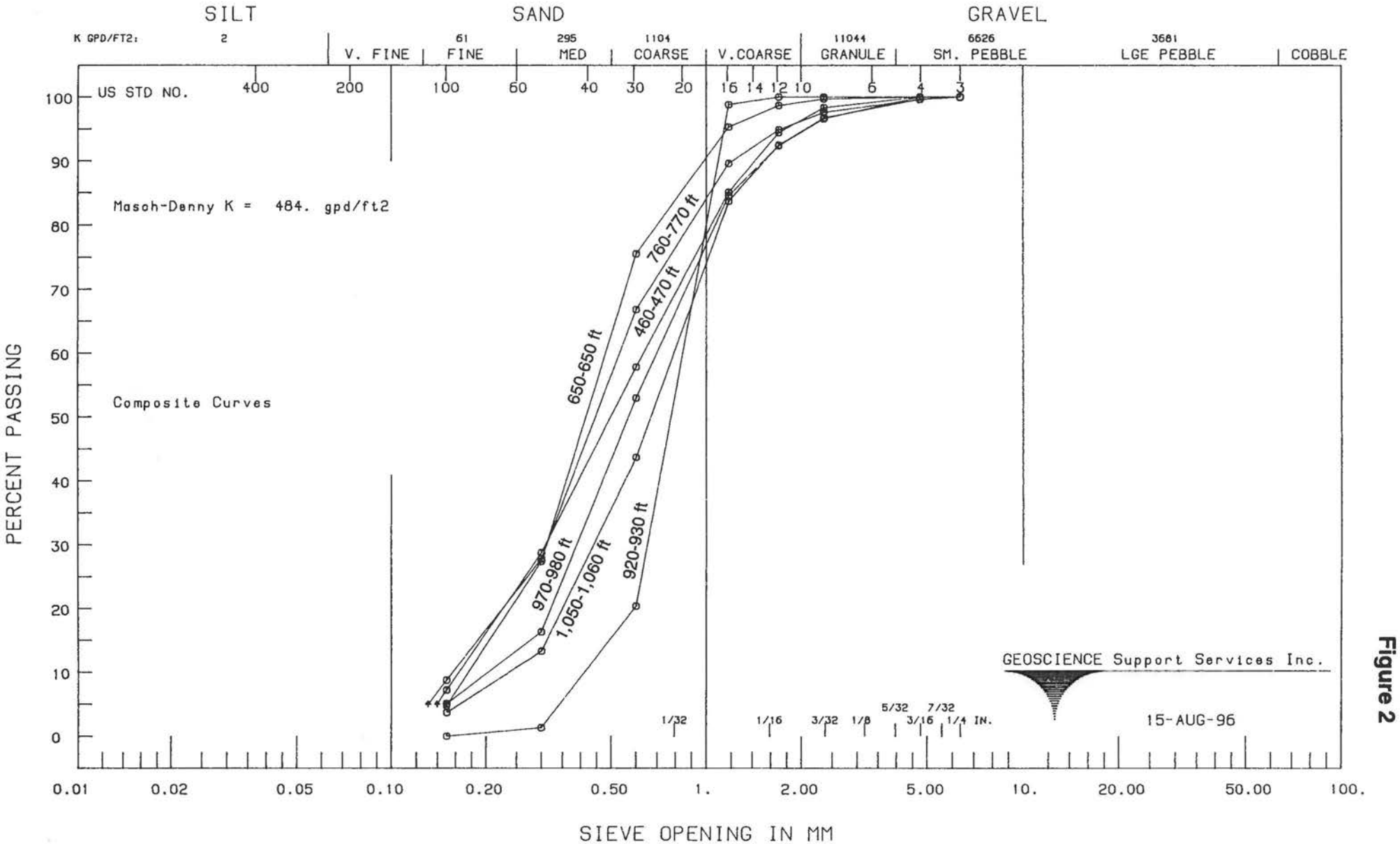
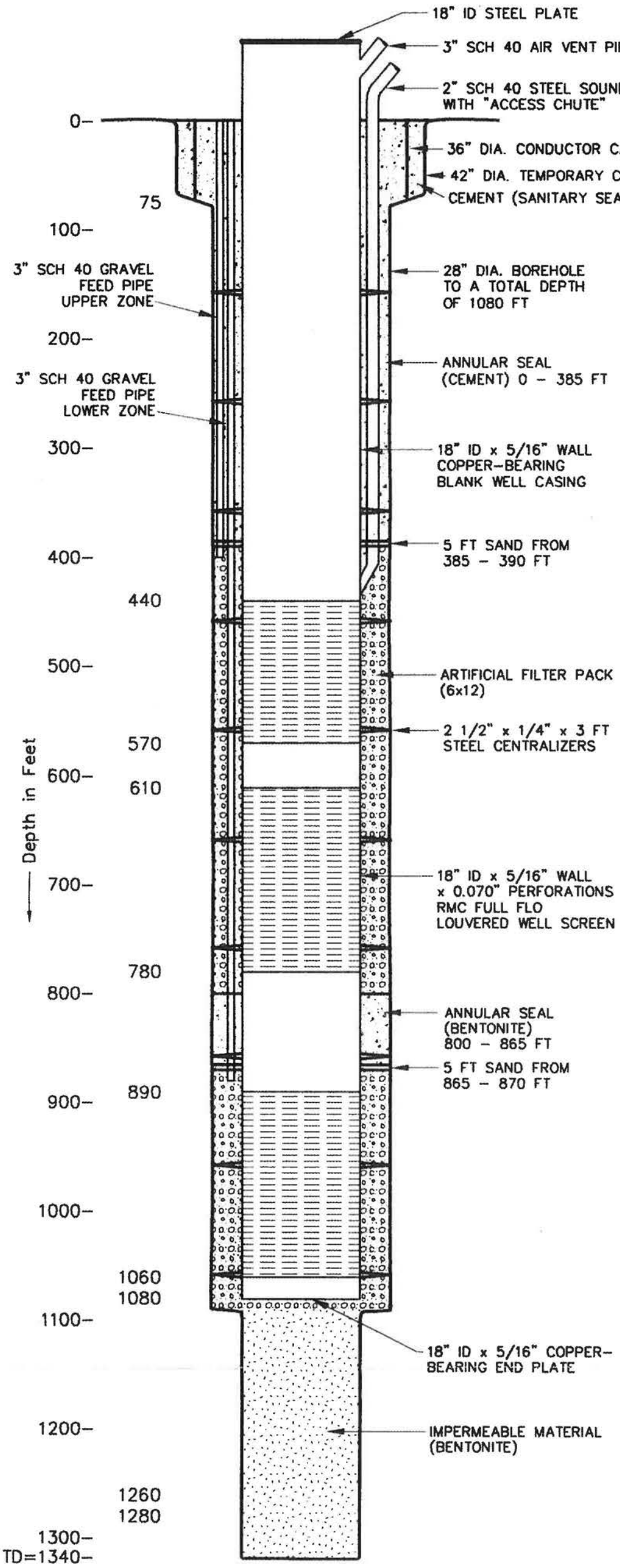


Figure 2



WELL CROSS SECTION

Gravel Pack

Valley Sand & Gravel 6x12 Gravel Pack

U.S. Std. Sieve	Opening, in.	Microns	% Passing
4	0.187	4.750	100
6	0.132	3.350	93.2
7	0.111	2.800	69.1
8	0.093	2.362	44.8
10	0.078	2.000	22.4
12	0.065	1.700	6.9
14	0.055	1.400	0.7
16	0.047	1.180	0.0

Borehole Diameter

Interval, ft From	Interval, ft To	Diameter, in.
0	75	42 Conductor
75	1340	17 1/2 Pilot
75	1090	28 Reamed

Casing and Screen Schedule

Interval, ft From	Interval, ft To	Diameter, in. I.D.	Diameter, in. O.D.	Thickness in.	Slot Size in.	Casing Type
0	75	36	36 5/8	5/16		Conductor
0	440	18	18 5/8	5/16		Blank
440	570	18	18 5/8	5/16	0.070	Screen
570	610	18	18 5/8	5/16		Blank
610	780	18	18 5/8	5/16	0.070	Screen
780	890	18	18 5/8	5/16		Blank
890	1060	18	18 5/8	5/16	0.070	Screen
1060	1080	18	18 5/8	5/16		Blank

Figure 3

JN 12300

Drawn: PLP

Checked: W. T.

Approved:

Date: 15-OCT-96

CITY OF LAKEWOOD

WELL 22
AS BUILT DRAWING

GEOSCIENCE
Support Services Incorporated
P.O. Box 220 Claremont, CA 91711 (909) 920-0707

LAKEWOOD\WELL22AB

MECHANICAL GRADING ANALYSIS

Valley Sand & Gravel 6x12

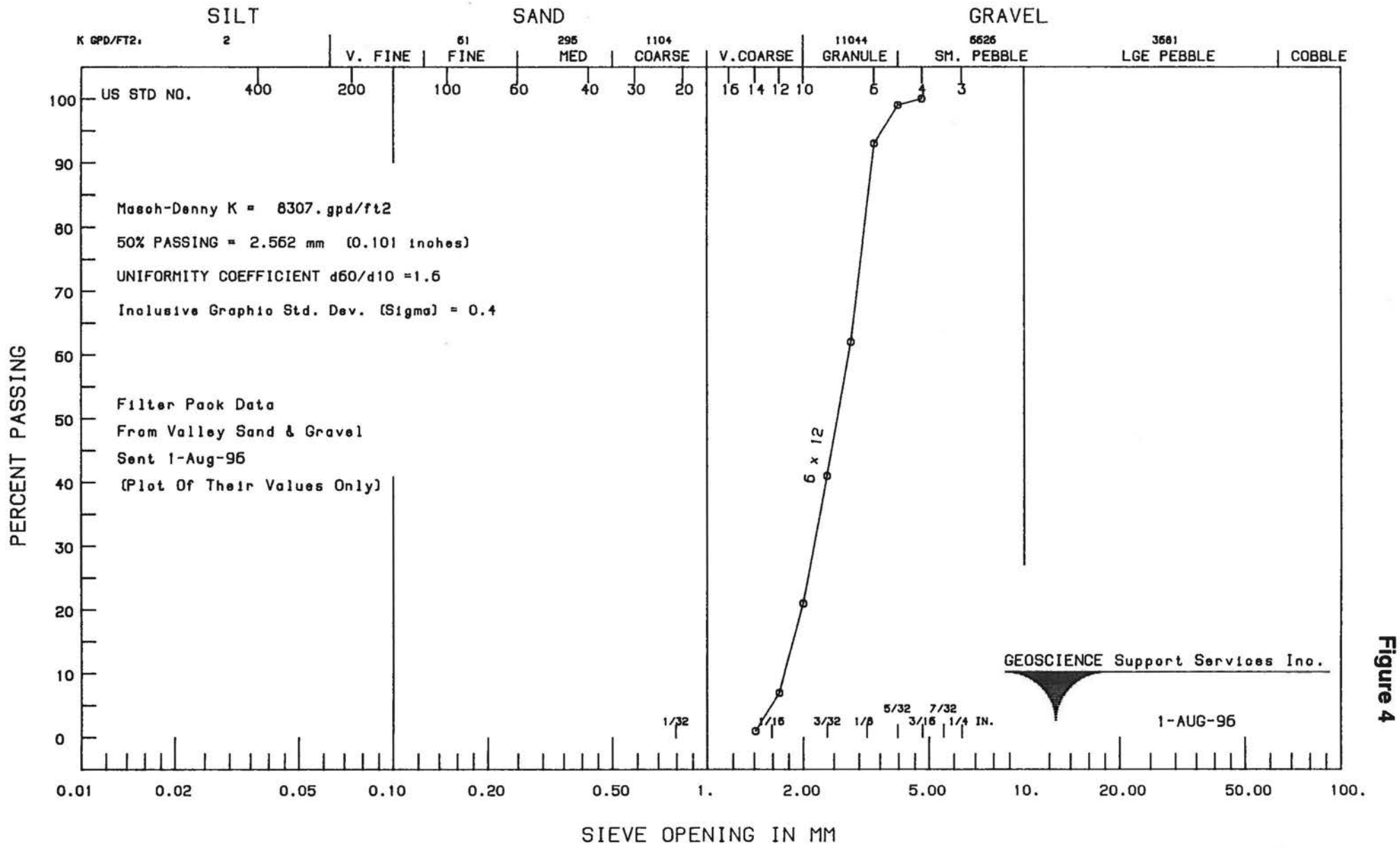


Figure 4

STEP DRAWDOWN TEST
CITY OF LAKEWOOD WEL 22

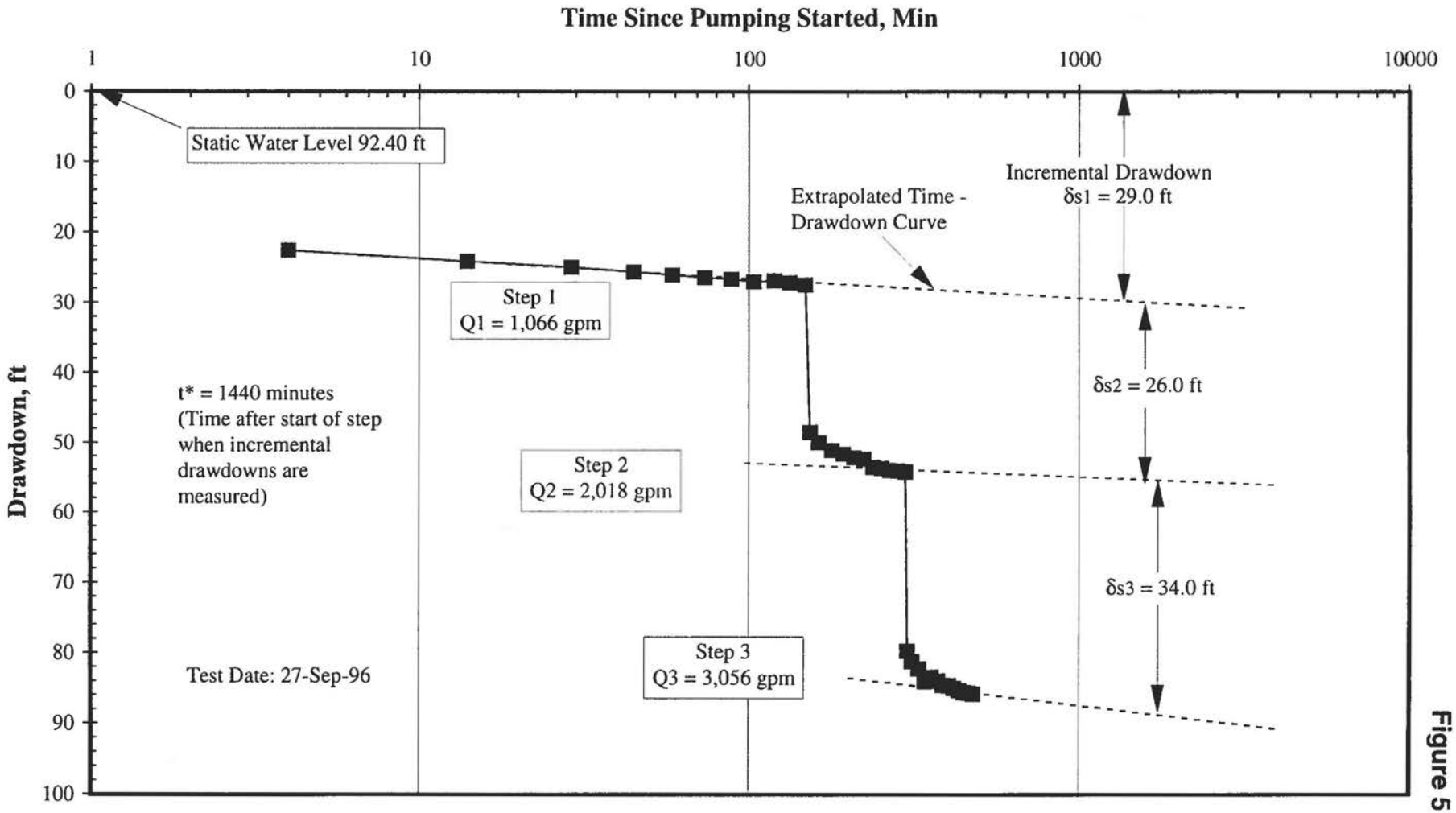


Figure 5

SPECIFIC DRAWDOWN PLOT
CITY OF LAKEWOOD WELL 22

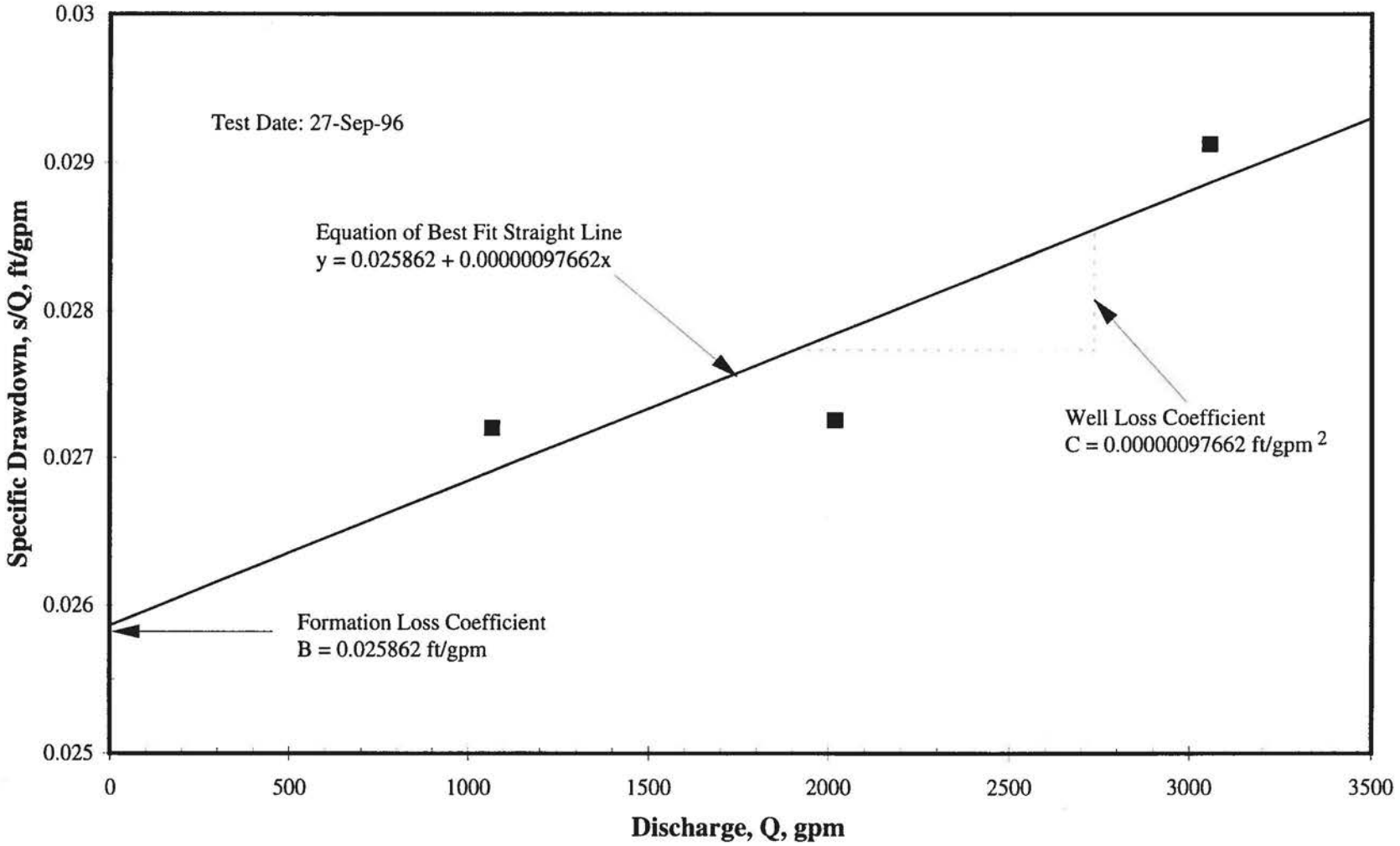


Figure 6

SPECIFIC CAPACITY AND EFFICIENCY DIAGRAM
CITY OF LAKEWOOD WELL 22

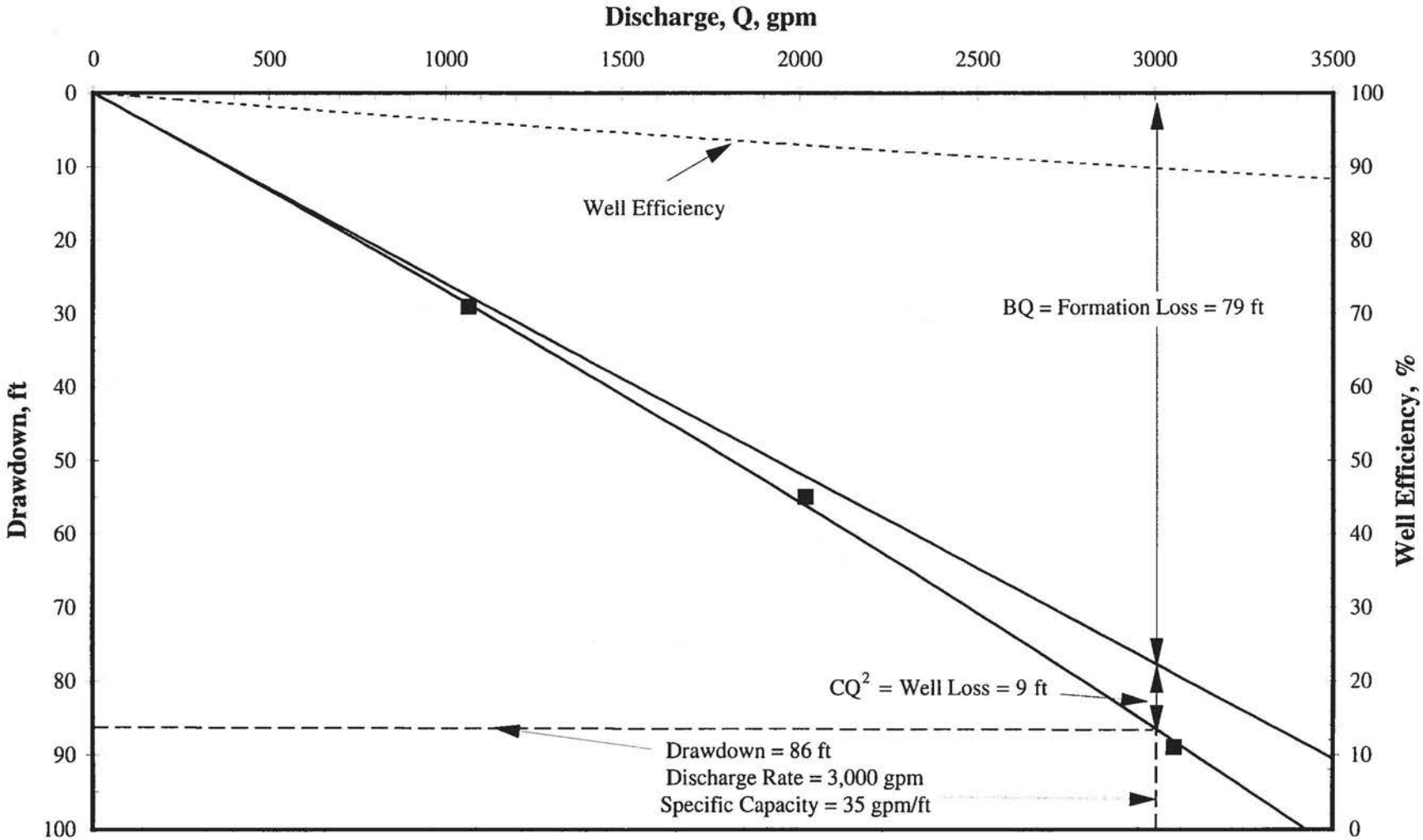


Figure 7

24 HOUR CONSTANT RATE TEST
CITY OF LAKEWOOD WELL 22

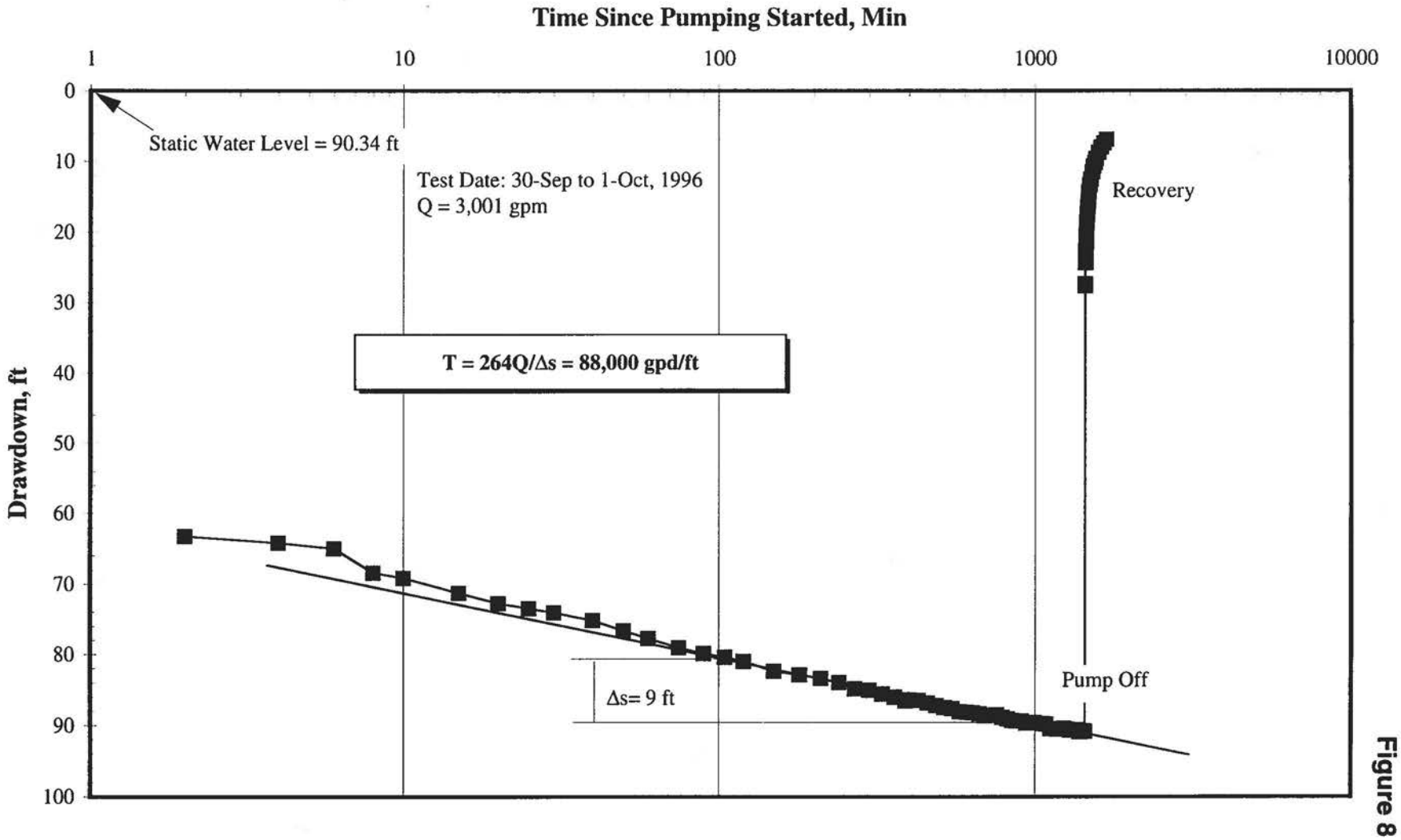


Figure 8

THEIS RECOVERY METHOD
CITY OF LAKEWOOD WELL 22

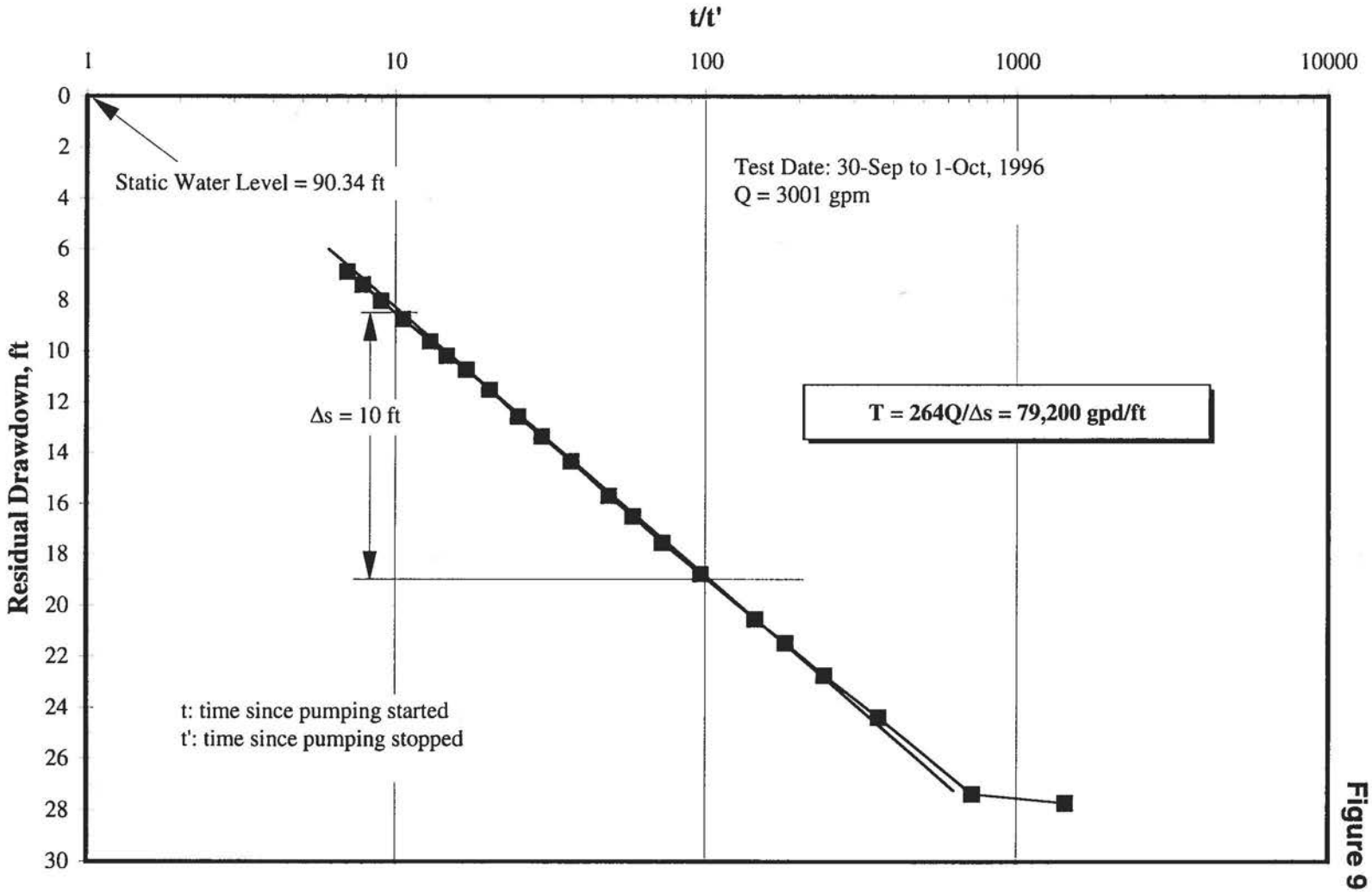


Figure 9

CALCULATED RECOVERY ANALYSIS
CITY OF LAKEWOOD WELL 22

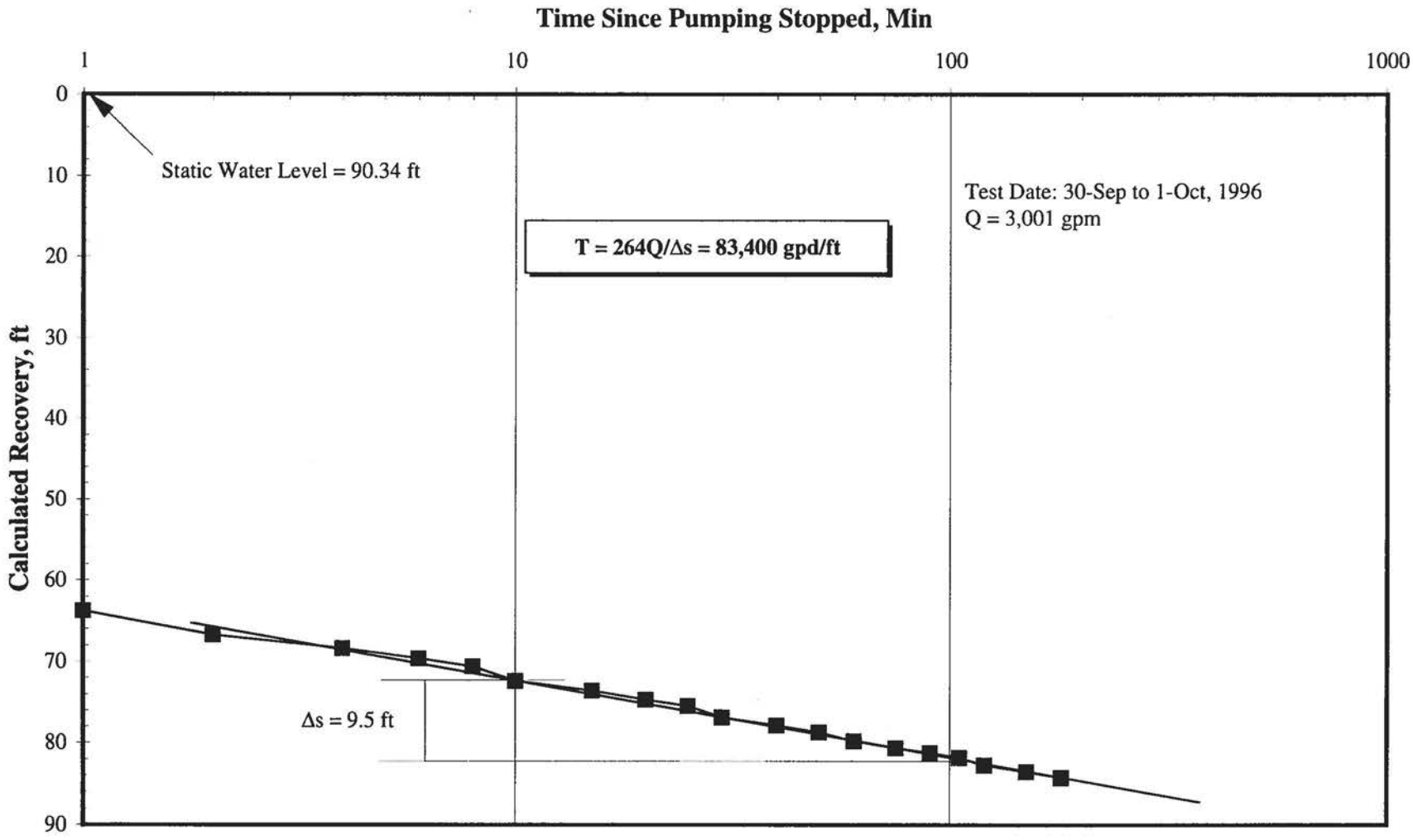


Figure 10

THEIS RECOVERY METHOD
OBSERVATION WELL - USGS MONITORING WELL 1 (1,009 ft)

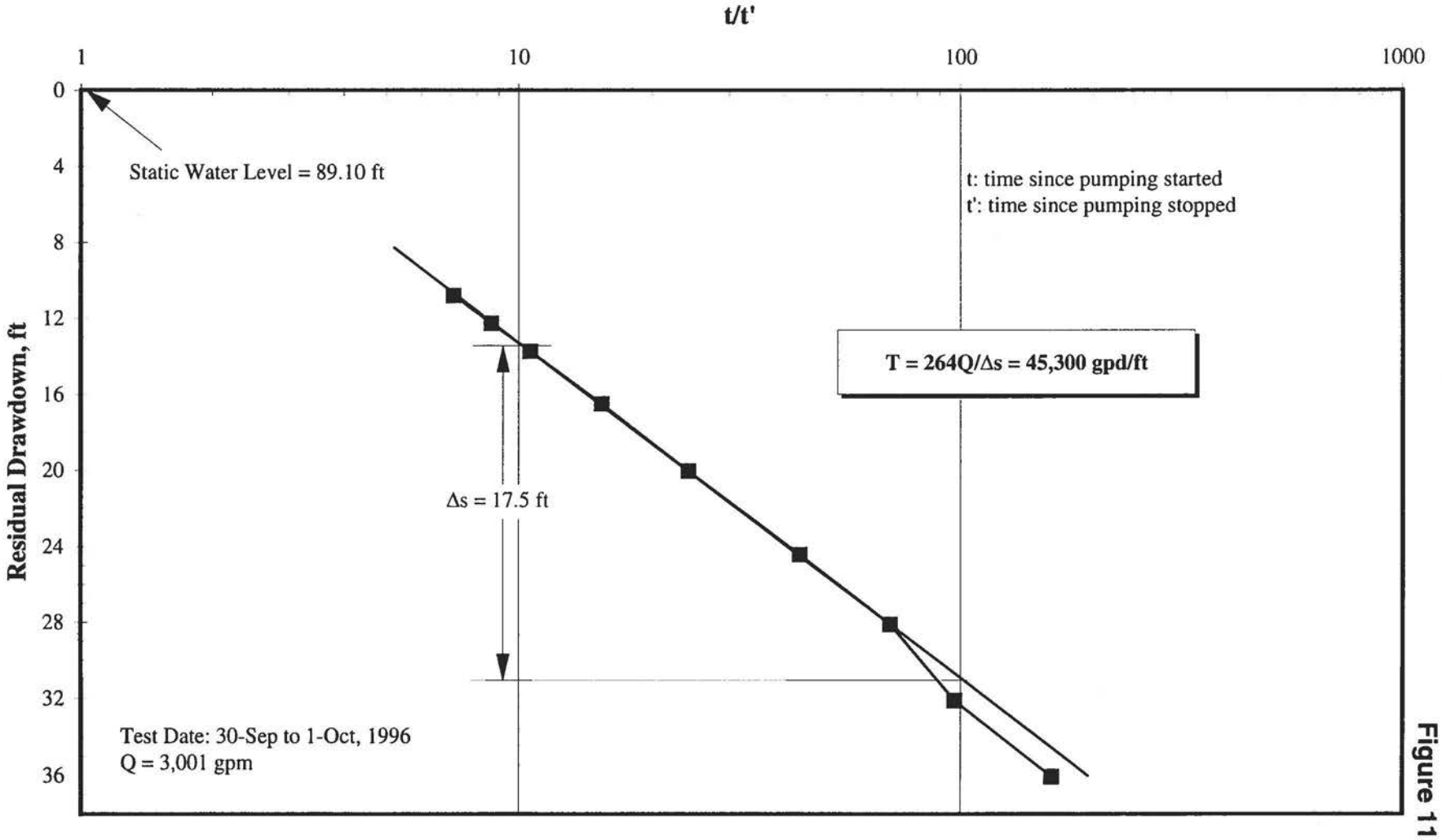


Figure 11

CALCULATED RECOVERY ANALYSIS
OBSERVATION WELL - USGS MONITORING WELL 1 (1,009 ft)

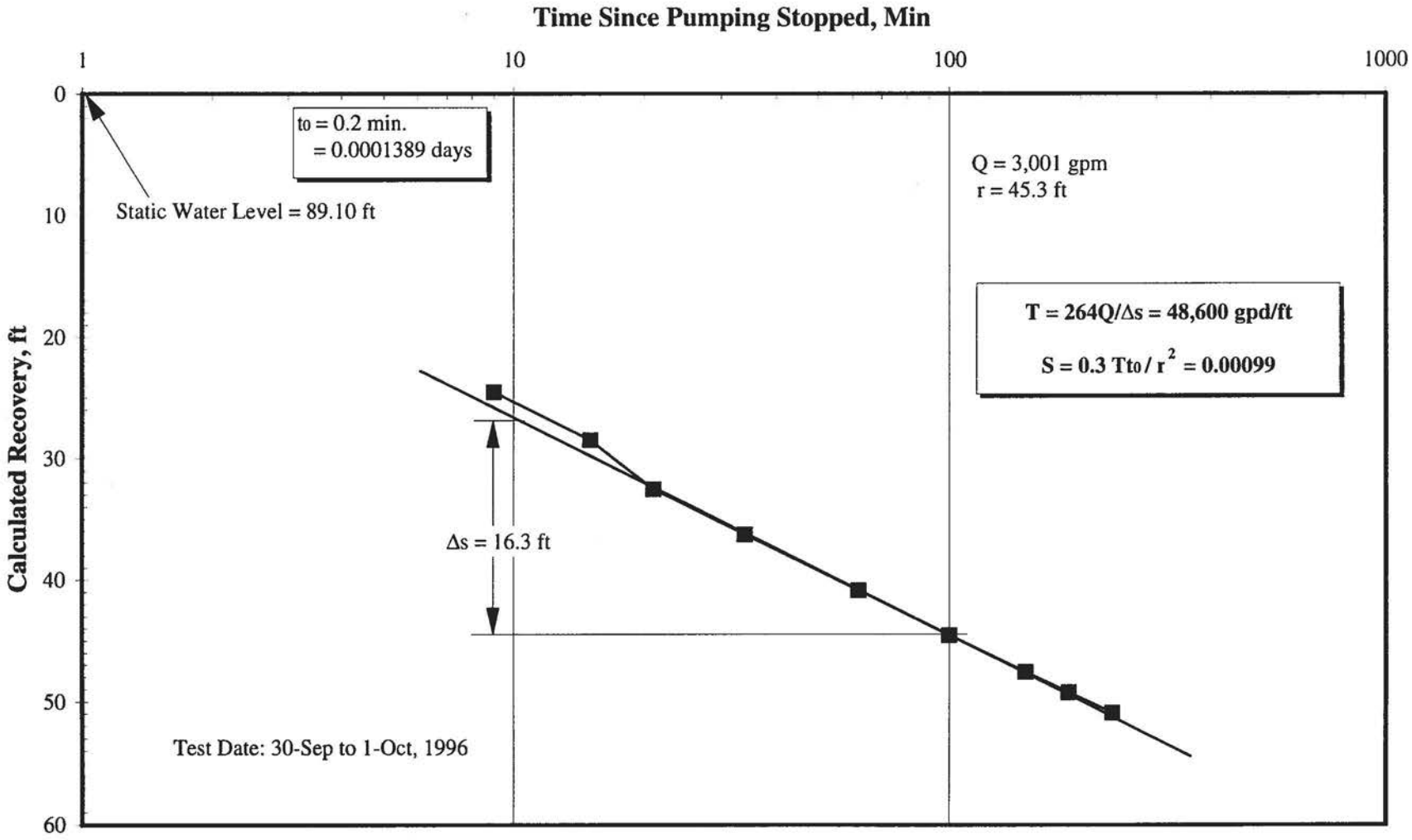


Figure 12

THEIS RECOVERY METHOD
OBSERVATION WELL - USGS MONITORING WELL 2 (660 ft)

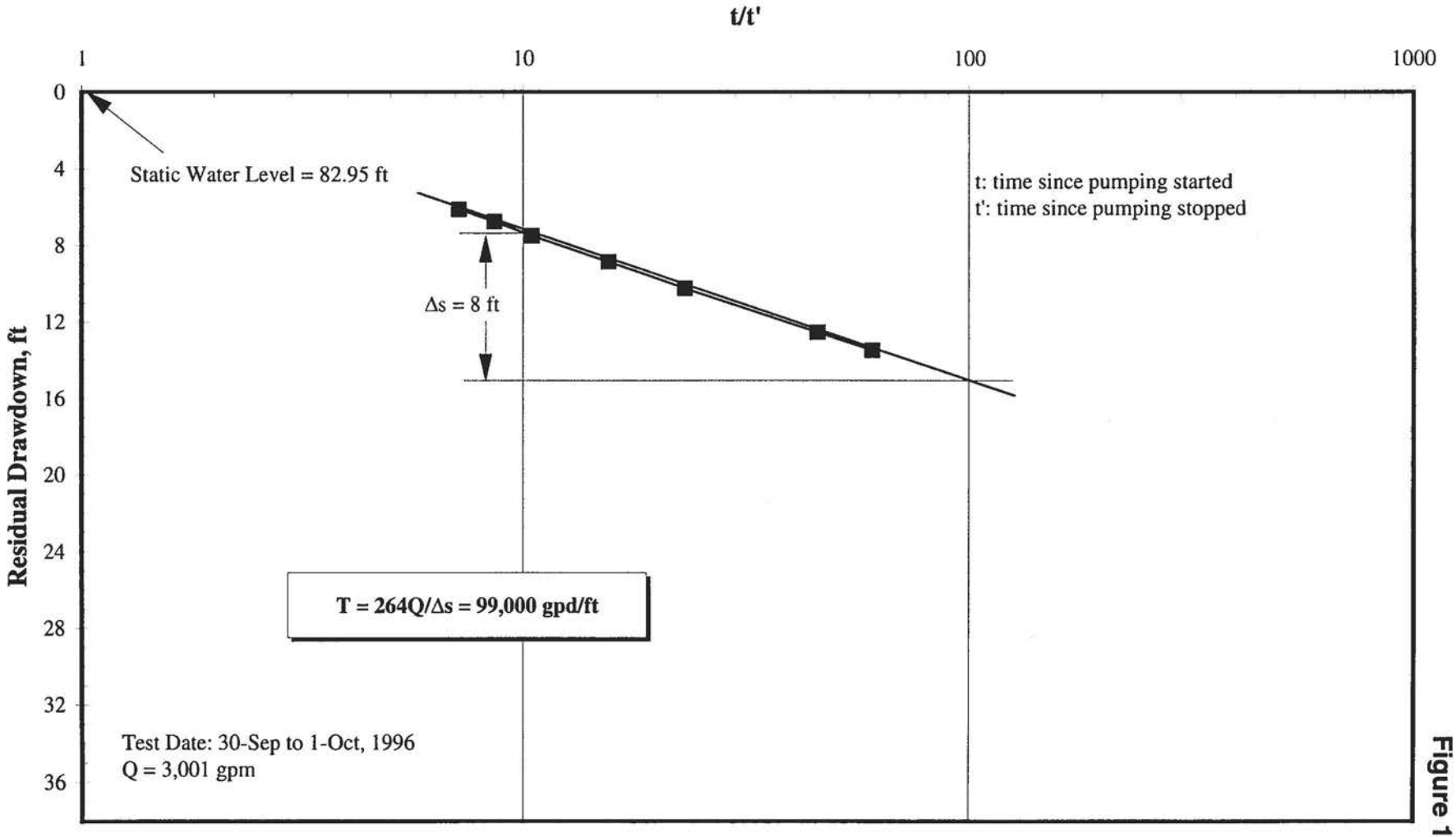


Figure 13

CALCULATED RECOVERY ANALYSIS
OBSERVATION WELL - USGS MONITORING WELL 2 (660 ft)

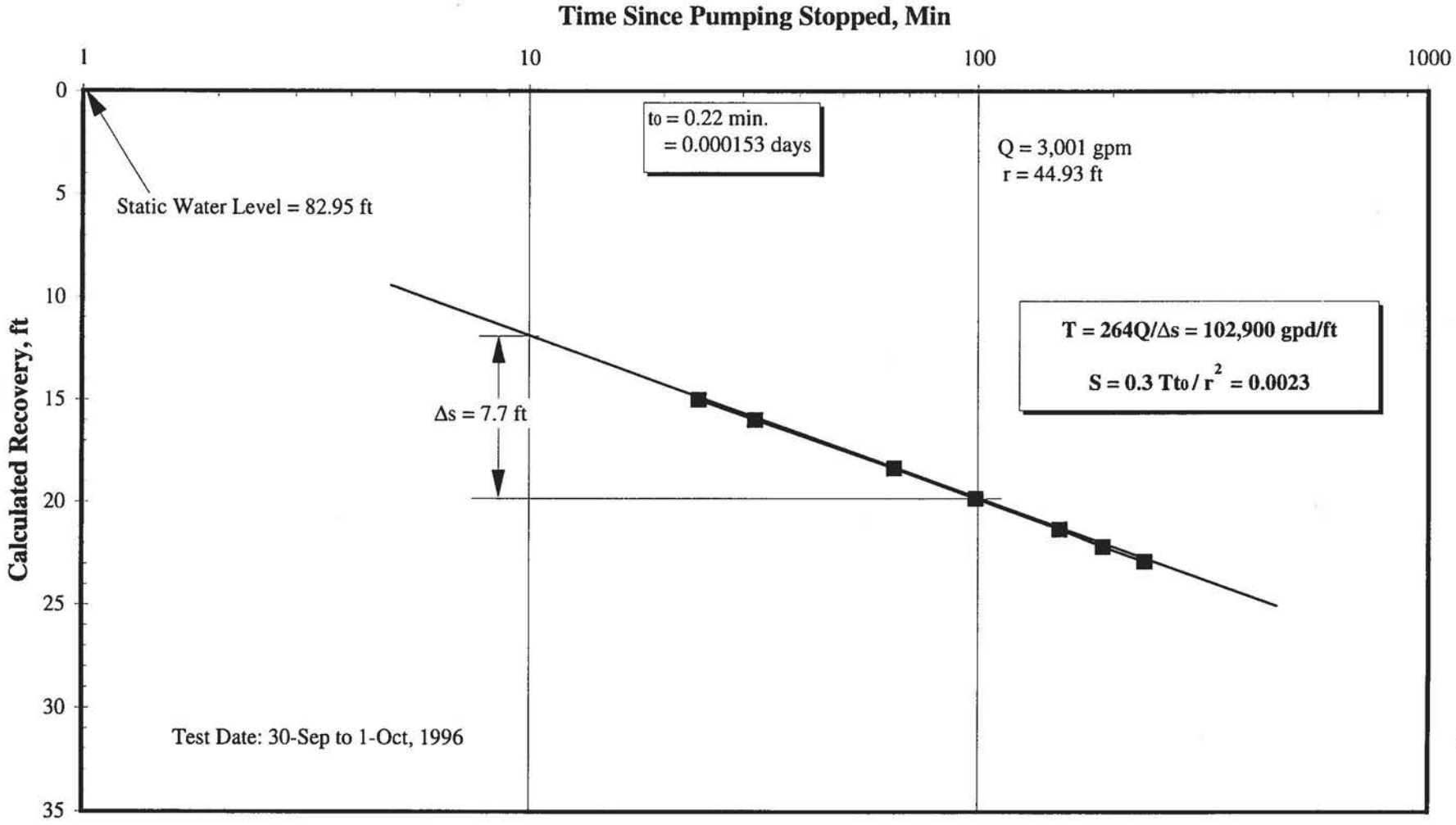


Figure 14

THEIS RECOVERY METHOD
OBSERVATION WELL - USGS MONITORING WELL 3 (470 ft)

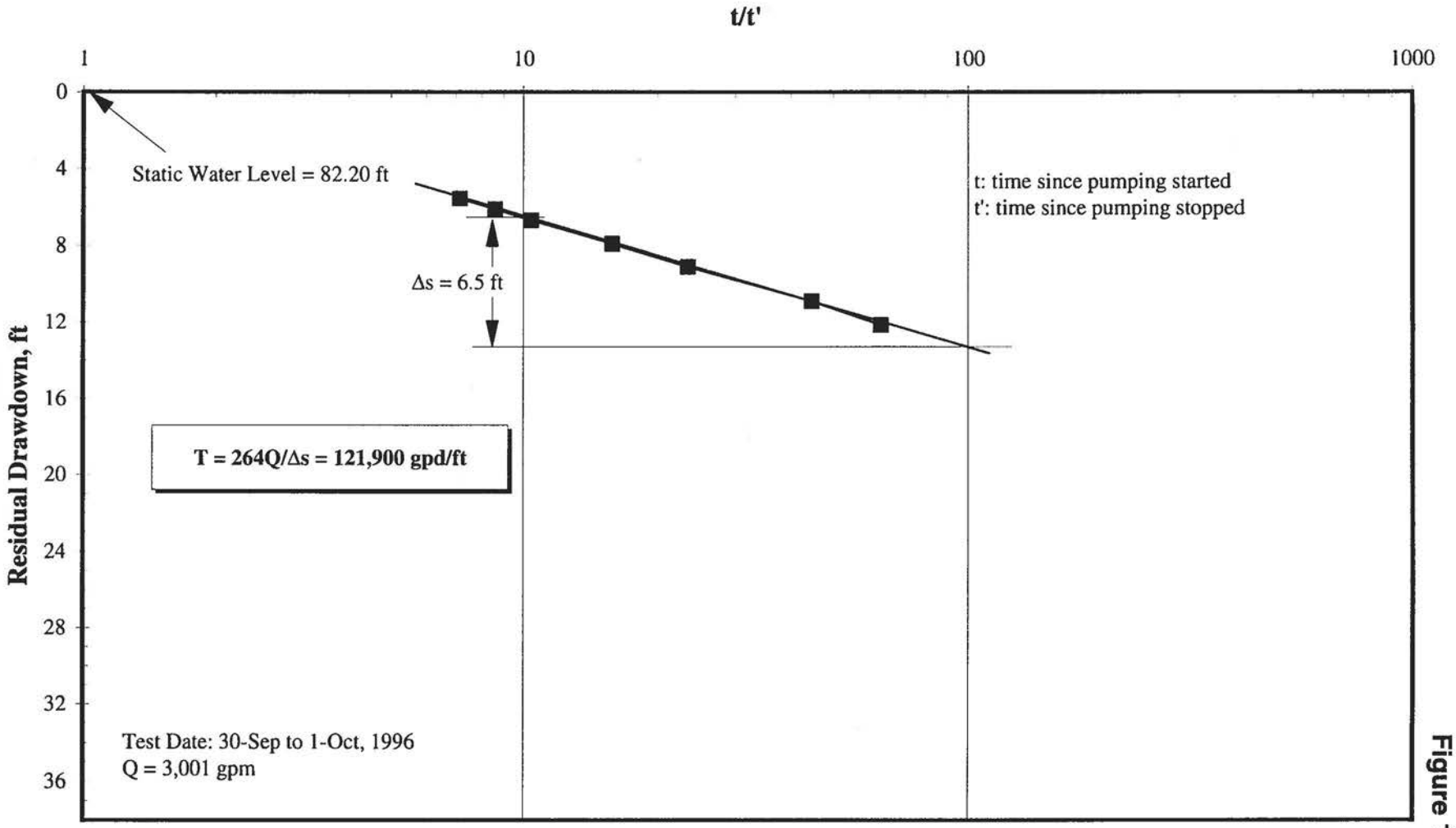


Figure 15

CALCULATED RECOVERY ANALYSIS
OBSERVATION WELL - USGS MONITORING WELL 3 (470 ft)

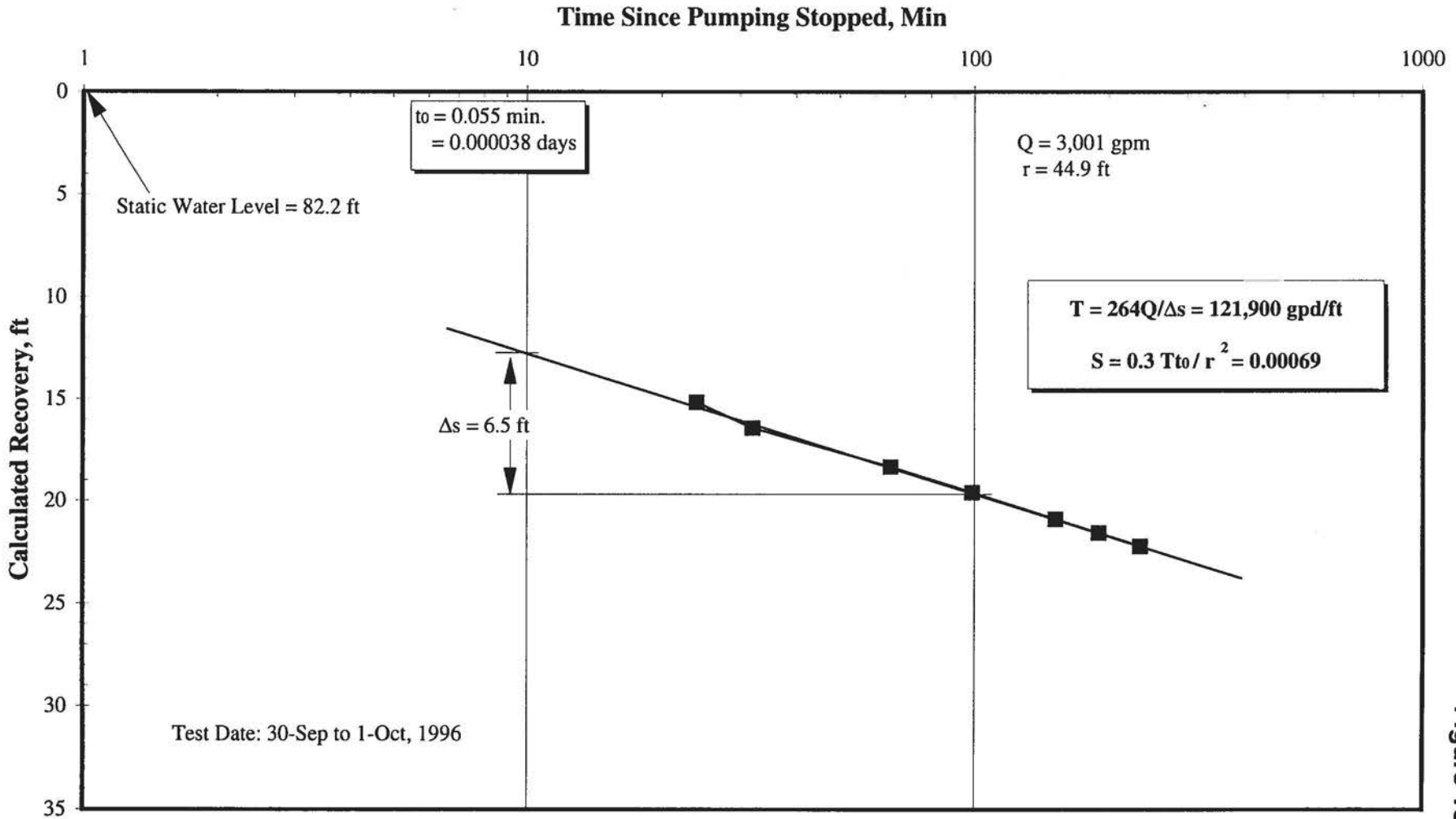


Figure 16

FLOW RATE AT VARIOUS DEPTHS OF LAKEWOOD WELL 22

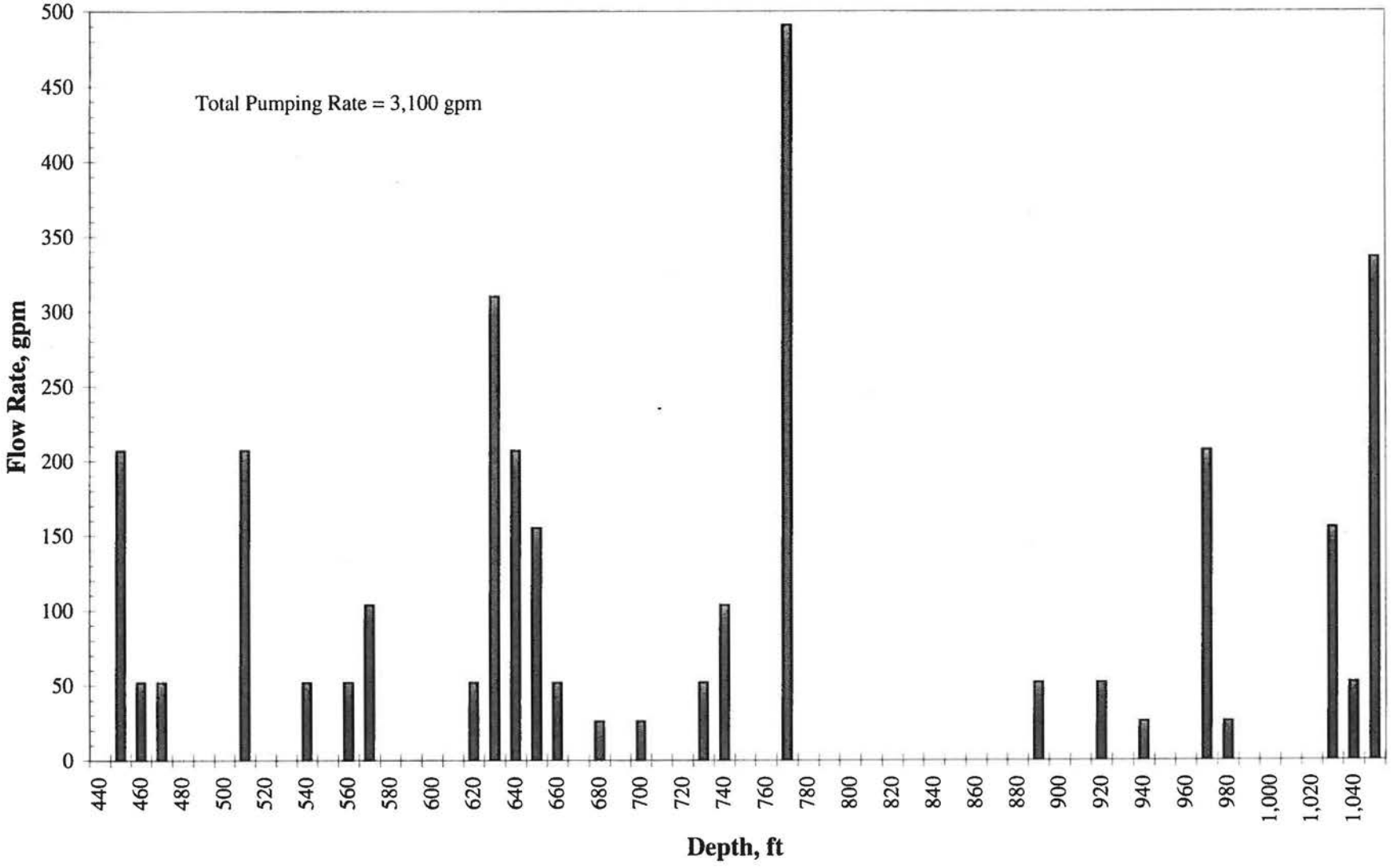
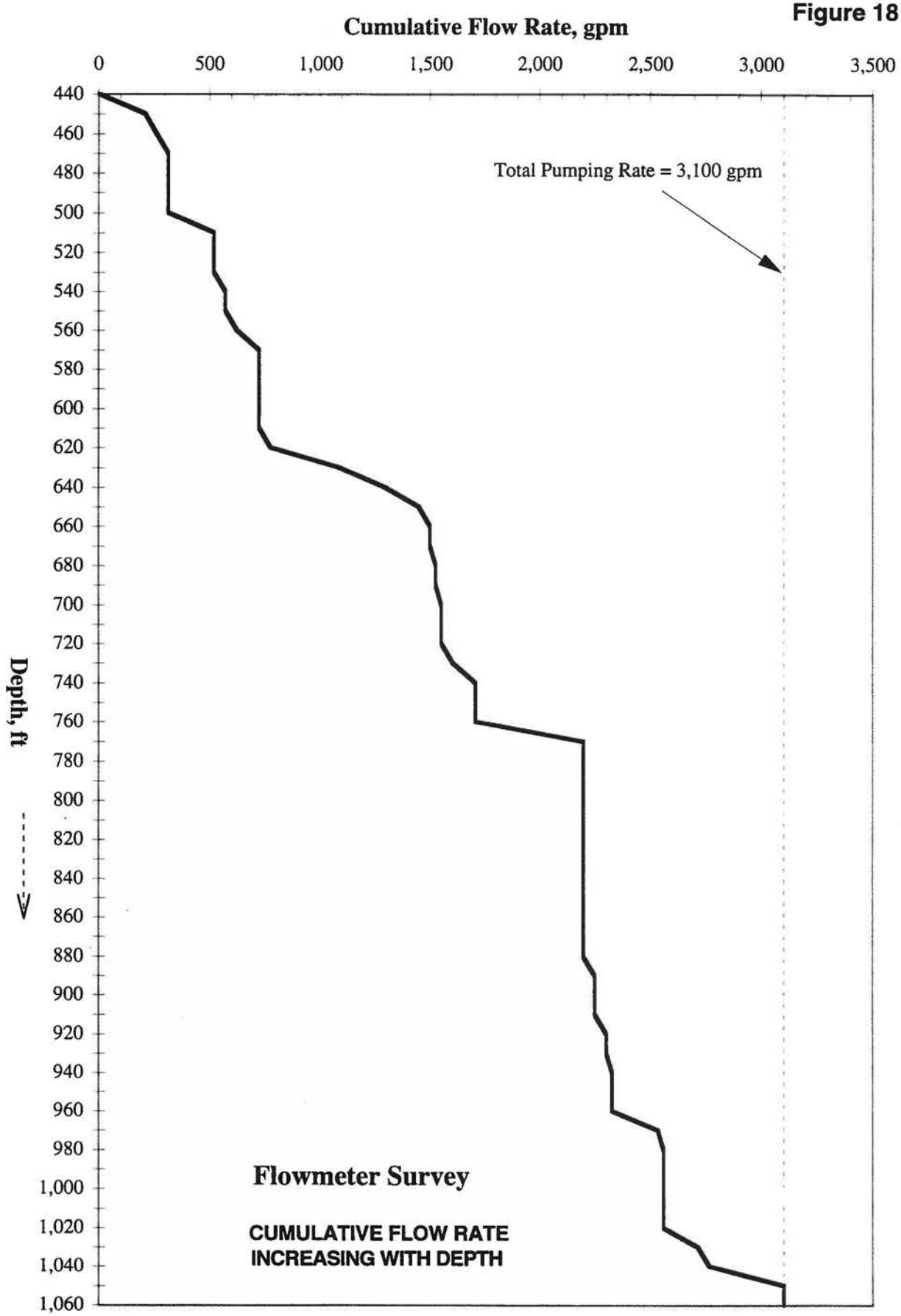


Figure 17

Figure 18


Cumulative Flow Rate, gpm
0
500
1,000
1,500
2,000
2,500
3,000
3,500
Depth, ft
440
460
480
500
520
540
560
580
600
620
640
660
680
700
720
740
760
780
800
820
840
860
880
900
920
940
960
980
1,000
1,020
1,040
1,060
Total Pumping Rate = 3,100 gpm
Flowmeter Survey
CUMULATIVE FLOW RATE
INCREASING WITH DEPTH

ONE YEAR DRAWDOWN EXTRAPOLATION FOR LAKEWOOD WELL 22

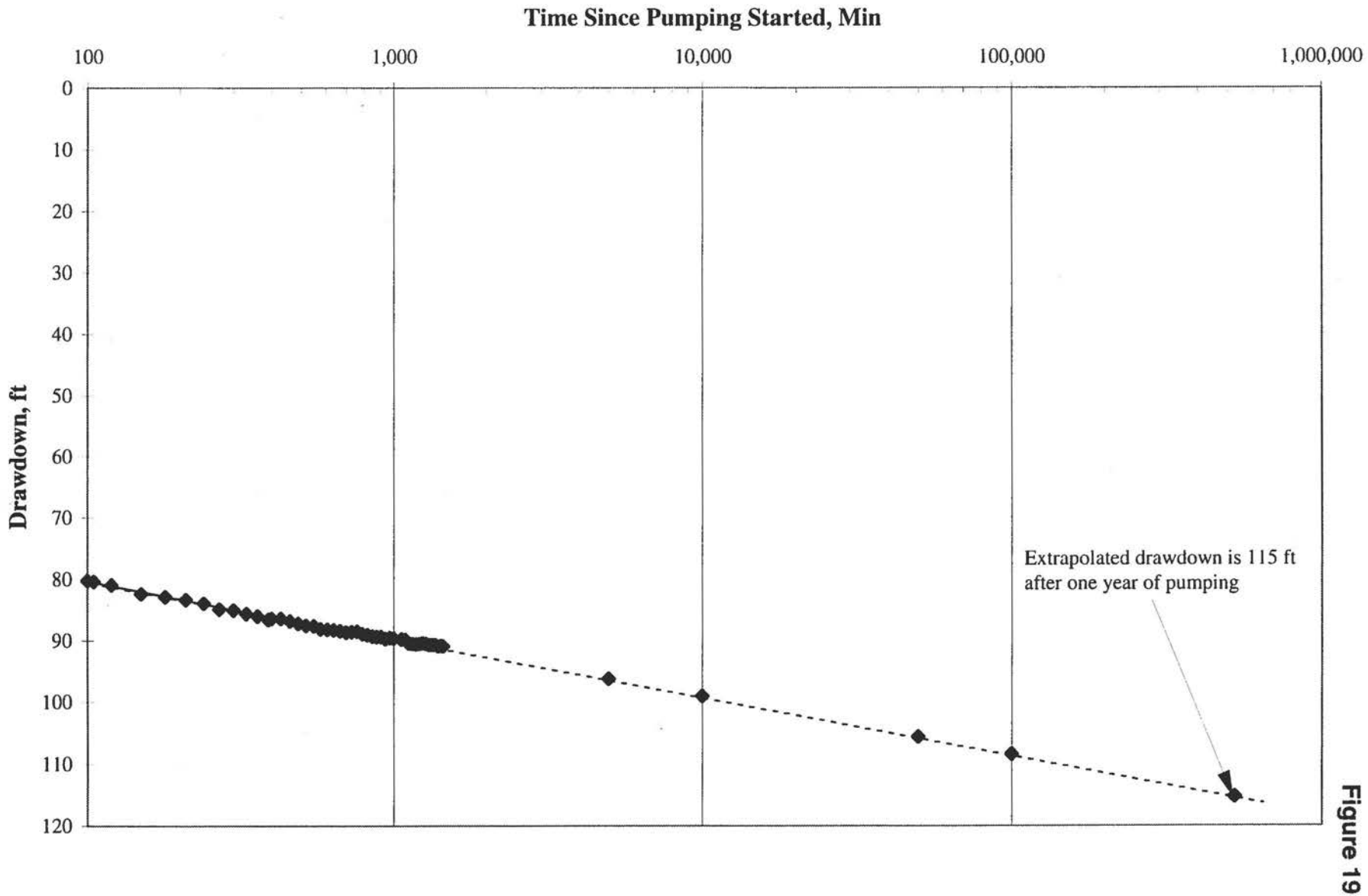


Figure 19

31-Oct-96

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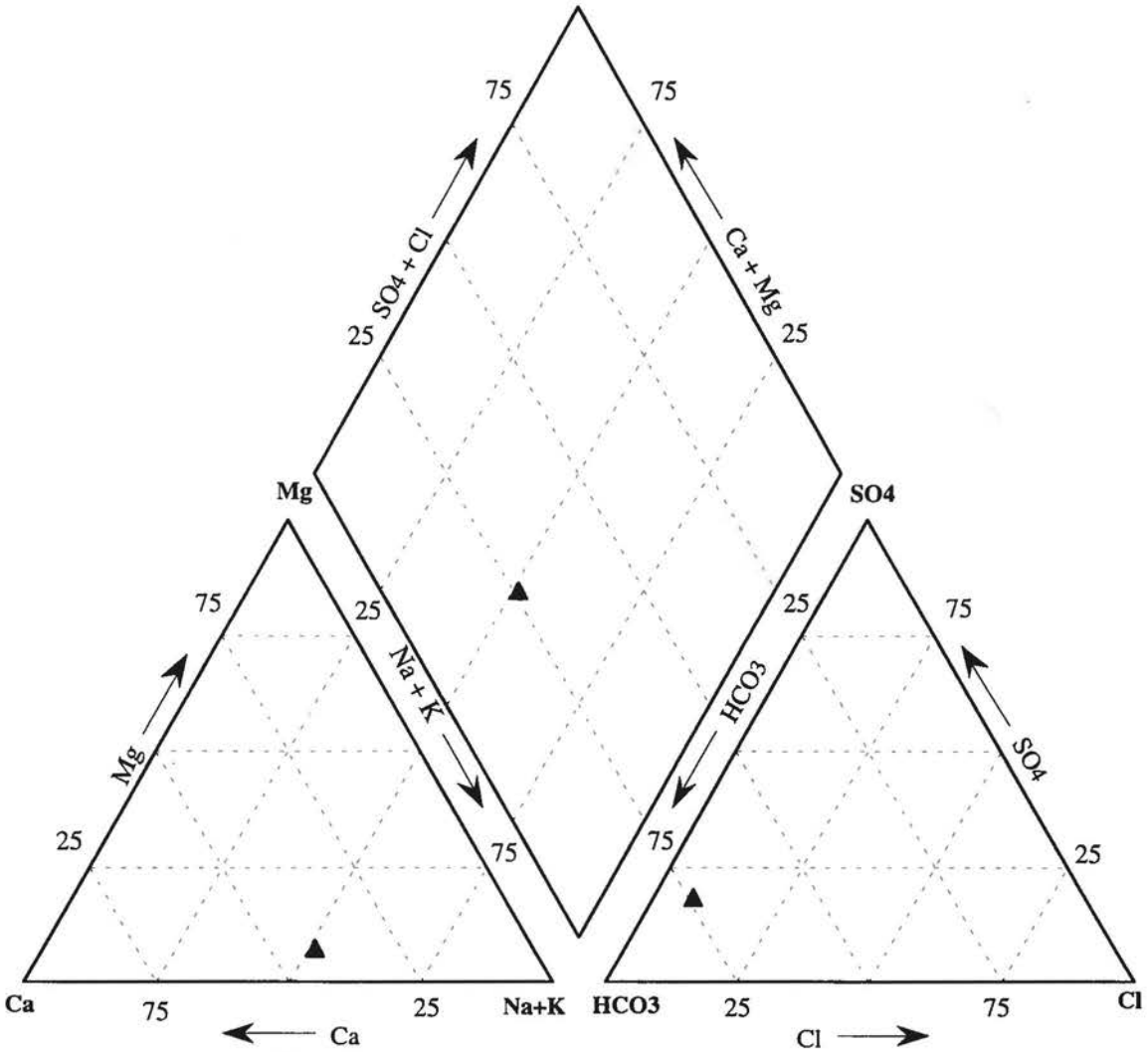
TRILINEAR DIAGRAM - CITY OF LAKEWOOD WELL 22



TABLES

TABLE 1 -- CONSTRUCTION DETAILS SUMMARY FOR CITY OF LAKEWOOD WELL 22

General Information

Owner Well No.: Well 22	Latitude: 33° 51' 13"	Hydrologic Unit: Los Angeles Basin
State Well Number: 4S/12W-5	Longitude: 118° 09' 05"	Geological Setting: alluvium deposits
Well Owner: City of Lakewood	Land Surface Elevation: 49 ft, amsl	Use of Water: Municipal
Owner Address: 5050 N. Clark Avenue	Well Location: 200 ft west of Downey Ave,	
Lakewood, CA 90712	80 ft south of Candlewood St.	

Drilling Equipment

Drilling Rig Type: Challenger 280 Reverse Rotary	Mud Reservoir Type: above ground contained pit
Pilot Borehole Bit Size/Type: 17 1/2 inch mill-tooth tricone / 17 1/2 inch button	Mud Additives: enhanced bentonite gel on pilot hole only
Reamed Borehole Bit Size/Type: 28 inch mill-tooth roller cone	Method of Cutting Recovery: from splitter box

Conductor Casing And Sanitary Seal

Conductor Casing ID: 36 in.	Conductor Borehole Diameter: 42 in.	Sanitary Seal Depth: 75 ft
Wall Thickness: 5/16 in.	Start Date of Conductor Borehole: 14-Jul-96	Composition of Sanitary Seal: 10 sack sand cement
Casing Length: 75 ft.	Completion Date of Conductor Borehole: 15-Jul-96	Date of Seal Placement: 15-Jul-96
Casing Material: low carbon steel.	Date Conductor Casing Set: 15-Jul-96	Witness of Seal Placement: Michael Lui of LACDHS

Borehole Drilling And Logging

Pilot Borehole Diameter: 17 1/2 in.	Reamed Borehole Diameter: 28 in.	Geophysical Logs Run:		
Start Date of Pilot Borehole: 16-Jul-96	Start Date of Borehole Reaming: 01-Aug-96	16/64 Normal	Gamma Ray	Variable Density
Completion Date of Pilot Borehole: 19-Jul-96	Completion Date of Borehole Reaming: 05-Aug-96	Guard Resistivity	Point Resistivity	Caliper
Total Depth of Pilot Borehole: 1,340 ft	Total Depth of Reamed Borehole: 1,090 ft	SP	Sonic (Acoustic)	

Casing, Screen, And Gravel Filter Pack

Start Date of Casing and Screen Inst.: 7-Aug-96	Completion Date of Casing and Screen Inst.: 7-Aug-96	Completed Depth: 1,080 ft
Casing ID: 18 inches	Screen ID: 18 inches	Filter Pack: Valley Sand & Gravel 6 x 12
Casing Wall Thickness: 5/16 in.	Screen Wall Thickness: 5/16 in.	Method of Placement: Fluid circulation through tremie
Casing Type: Roscoe Moss ASTM A-139	Screen Type: RMC Ful- Flo Louver with .070" slot	Start Date of Filter Pack Placement: 7-Aug-96
Casing Material: 0.2% Copper-Bearing	Screen Material: 0.2% Copper-Bearing	Completion Date of Filter Pack Placement: 8-Aug-96
Cased Intervals: 0-440 ft, 570-610 ft, 780-890 ft, 1,060-1,080 ft	Screened Intervals: 440-570 ft, 610-780 ft, 890-1,060 ft	Aquifer Seals: 0-385 ft (cement), 800-865 ft (bentonite)

Table 1

DEVIATION SURVEY DATA - CITY OF LAKEWOOD WELL 22

Depth [ft]	Deflection North-South [in.]	Deflection East-West [in.]	Depth [ft]	Deflection North-South [in.]	Deflection East-West [in.]
10	0.02	0.11	280	3.29	2.19
20	0.00	0.00	290	3.78	1.89
30	0.48	0.14	300	3.91	2.34
40	0.30	0.12	310	3.95	2.37
50	0.36	0.07	320	3.74	2.08
60	0.43	0.00	330	4.29	1.71
70	0.59	0.29	340	4.42	1.76
80	0.78	0.55	350	4.54	1.81
90	1.11	0.49	360	4.67	2.33
100	1.37	0.41	370	4.80	2.88
110	1.64	0.44	380	4.43	2.46
120	1.94	0.64	390	4.04	3.03
130	1.92	0.70	400	4.14	3.10
140	2.06	0.75	410	4.24	3.18
150	2.20	1.00	420	4.34	3.26
160	2.13	1.27	430	4.45	2.78
170	2.48	1.58	440	5.12	3.41
180	2.38	1.90	450	5.81	3.49
190	2.76	2.01	460	5.35	3.56
200	2.64	2.11	470	5.46	4.25
210	2.76	2.21	480	6.19	4.33
220	2.89	2.31	490	6.32	5.06
230	2.72	1.81	500	6.89	5.16
240	3.14	1.88	510	6.58	5.26
250	3.27	1.63	520	6.70	5.36
260	3.40	2.04	530	6.85	5.46
270	3.53	1.76	540	6.26	5.56

Table 2

DEVIATION SURVEY DATA - CITY OF LAKEWOOD WELL 22

Depth [ft]	Deflection North-South [in.]	Deflection East-West [in.]	Depth [ft]	Deflection North-South [in.]	Deflection East-West [in.]
550	7.08	5.67	800	8.21	7.18
560	7.12	5.70	810	8.31	7.27
570	6.60	5.87	820	7.36	7.36
580	6.72	5.22	830	6.38	7.45
590	6.07	5.31	840	6.46	8.61
600	6.95	5.40	850	6.54	8.72
610	7.05	5.49	860	6.61	8.81
620	7.18	6.38	870	6.69	8.93
630	7.29	6.48	880	6.76	9.02
640	7.40	5.76	890	5.70	9.12
650	7.52	6.68	900	5.76	9.22
660	6.78	5.94	910	5.83	9.33
670	6.89	6.89	920	5.89	9.43
680	6.11	6.11	930	5.95	8.34
690	7.09	6.20	940	6.02	8.42
700	7.19	7.19	950	6.08	8.51
710	7.29	6.38	960	6.14	8.6
720	7.39	6.43	970	6.21	8.69
730	7.50	5.62	980	6.27	8.78
740	7.60	5.10	990	6.33	8.87
750	7.76	6.74	1000	7.68	8.96
760	7.80	6.82	1010	7.76	9.05
770	7.90	6.91	1020	7.83	9.14
780	8.00	7.00	1030	7.9	9.22
790	7.09	7.09			

Table 2

Source: Layne-Western Company - McCalla Division

APPENDIX A

Chronology For Construction Of City Of Lakewood Well 22

CHRONOLOGY OF CITY OF LAKEWOOD WELL 22

14-Jul-96 A 42 inch temporary conductor has been set to 80 ft. Layne plumbed in the water line and set up drilling rig.

15-Jul-96 The 42 inch borehole for conductor was reamed to 75 ft.

15-Jul-96 The 36 inch ID x 5/16 inch wall copper-bearing steel conductor was welded and set to 75 ft and cemented using 9 yds of 10 sack (sand and cement) mix. It was completed at 4:30 PM.

16-Jul-96 Drilling began at 10:00 PM on the 17 1/2 inch pilot borehole. Fresh water was used on the pilot hole. Formation samples were taken at 10 ft intervals.

17-Jul-96 The pilot borehole was drilled to 500 ft by 5:00 PM. Samples of the formation were taken at 10 ft intervals.

18-Jul-96 The pilot borehole was drilled to 900 ft by 5:00 PM. Samples of the formation were taken at 10 ft intervals.

19-Jul-96 The pilot borehole was drilled to 1,280 ft by 10:00 AM. Samples show sand mixed with some clay. After a discussion among Terry Smith (Layne), James Glancy (City of Lakewood), and personnel from GEOSCIENCE, the pilot borehole was continuously drilled to a depth of 1,340 ft when clay material become dominant. The pilot borehole was terminated at 1,340 ft. Geophysical borehole logs were completed including 16/64 normal, guard resistivity, SP, point, gamma ray, and acoustic with VDL. Five intervals were selected for aquifer zone testing.

20-Jul-96 Due to a blockage in the well, the zone test tool could not be sent to the designed depth interval (1,210 - 1,230 ft). Drillers had to redrill the block portion of the hole with some additive to condition the borehole wall.

24-Jul-96 The 17 1/2 inch borehole was cleaned to 1,250 ft and the zone test tool was set at the first zone interval (1,210-1,230 ft). The well was airlifted and then pumped from Zone No. 1 (1,210-1,230 ft) for 6 hours at an average rate of 60 gpm. Samples for water quality testing were collected. The zone test tool was pulled to the surface for cleaning.

25-Jul-96 The well was pumped from Zone No. 2 (1,030-1,050 ft) for 6 hours at an average rate of 227 gpm. Samples were taken for water quality analysis. Again, the zone test tool was pulled to the surface for cleaning before being set in the next zone for testing.

26-Jul-96 The well was pumped from Zone No. 3 (905-925 ft) for 6 hours at an average rate of 97 gpm. Samples were taken for water quality analysis. The zone test tool was pulled to the surface for cleaning before being set in the next zone.

27-Jul-96 The well was pumped from Zone No. 4 (620-640 ft) at a rate of 267 gpm over 6 hours. Water quality samples were collected and the tools were pulled for cleaning.

28-Jul-96 Zone No. 5 (450-470 ft) was pumped at a rate of 243 gpm. Water quality samples were again taken before shutting off the pump.

30-Jul-96 Water quality data was received from the lab (APCLaboratory in Chino, CA).

31-Jul-96 The recommended well design was submitted by GEOSCIENCE. Mechanical grading analyses were run by GEOSCIENCE on selected borehole samples. Valley Sand and Gravel 6 x 12 was recommended.

2-Aug-96 Layne began reaming the 28 inch borehole and reached a depth of 200 ft at 11:59 PM. The first load of Valley Sand and Gravel filter pack material was delivered to the site.

3-Aug-96 The 28 inch borehole was reamed to a depth of 444 ft by 11:59 PM. Two more loads of Valley Sand and Gravel filter pack material was delivered to the site and samples of the filter pack material were taken for sieve analysis.

4-Aug-96 The 28 inch borehole was reamed to a depth of 684 ft by 11:59 PM.

5-Aug-96 The 28 inch borehole was reamed to a depth of 924 ft by 11:59 PM. One more load of filter pack material was delivered to the site and the filter pack materials were sampled for sieve analysis by GEOSCIENCE.

6-Aug-96 The 28 inch borehole was reamed to a depth of 1,094 ft by 2:30 AM. Some casing and screen were delivered to the site and were field checked and confirmed for type, size and quantity. The casing was made up of 18 inch ID by 5/16 inch wall copper-bearing spiral welded material as manufactured by the Roscoe Moss Company. The screen consisted of the same material with 0.070 inch openings in the Ful-Flo horizontal louver pattern. Welenco ran a caliper log on the completed reamed borehole to a depth of 1,084 ft.

7-Aug-96 The gravel pack was sampled, analyzed and approved. The installations of casing and screen were started at 3:00 AM following the recommended intervals and finished at 12:30 PM. Filter pack placement was started at 2:00 PM and the first zone (1,090-870) was finished at 4:00 PM. 5 feet of sand was put on top of filter pack and the bentonite seal (from 800 to 865 ft) was placed above the sand. The second zone of filter pack was placed from 390 to 800 ft.

8-Aug-96 The first lift of cement was completed from 385 ft to 162 ft.

9-Aug-96 The second lift of cement was completed from 162 ft to near ground surface. The top of the cement was left at 7 ft below the ground surface. Casing was cut off to 2 ft above ground surface. Airlift swabbing began at 1:30 PM.

10-Aug-96 Airlift swabbing continued.

11-Aug-96 Airlift swabbing continued.

12-Aug-96 Airlift swabbing continued. Layne reported that 25 feet of sediments were found accumulated at the bottom of the well and the water is still cloudy. According to the specifications, 70 hours of airlift swabbing was recommended. An additional 48 hours of airlift swabbing is needed. After reviewing the situation, the City approved the additional 48 hours of airlifting development.

13-Aug-96 25 feet of sediments were removed from the bottom of the well and airlift swabbing continued.

14-Aug-96 Initial development by airlift swabbing was completed.

15-Aug-96 The drilling rig was disassembled.

16-Aug-96 The drilling rig was disassembled

19-Aug-96 The drilling rig was moved out of the site.

22-Aug-96 Layne set their test pump and engine.

23-Aug-96 Layne set their test pump and engine.

26-Aug-96 Pump development began. Discharge rates varied between 500 gpm and 1,000 gpm. Sand content ranged from 60.0 ppm to 338 ppm.

27-Aug-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. Discharge rates varied between 150 gpm and 1,350 gpm. Sand content ranged from 7.6 ppm to 379 ppm.

28-Aug-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. Discharge rates varied between 225 gpm and 1,500 gpm. Sand content ranged from 42.4 ppm to 400 ppm.

29-Aug-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. Discharge rates varied between 300 gpm and 2,000 gpm. Sand content ranged from 20.8 ppm to 435 ppm.

30-Aug-96 Pump development continued. The discharge rate varied between 200 gpm and 1,500 gpm. Sand content ranged from 3.8 ppm to 314 ppm. 150 hours of additional pump development time was recommended by GEOSCIENCE and approved by the City.

3-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 200 gpm and 2,100 gpm. Sand content ranged from 9.1 ppm to 318 ppm.

4-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 225 gpm and 1,000 gpm. Sand content ranged from 10.6 ppm to 500 ppm.

5-Sep-96 The pump intake was lifted from 440 ft to 360 ft below ground surface.

6-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 200 gpm and 800 gpm. Sand content ranged from 13.8 ppm to 227 ppm. Starting at 11:00 AM, the discharge rate was set at 400 gpm and surge was conducted when the sand content was below 20 ppm.

9-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 400 gpm and 550 gpm. Sand content ranged from 18.3 ppm to 220 ppm. The discharge rate was increased to 550 gpm at 3:45 PM.

10-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 400 gpm and 850 gpm. Sand content ranged from 19.3 ppm to 261 ppm. The discharge rate was increased at 150 gpm intervals.

11-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 850 gpm and 1,000 gpm. Sand content ranged from 13.3 ppm to 341 ppm.

12-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 1,000 gpm and 1,500 gpm. Sand content ranged from 94.6 ppm to 367 ppm. The discharge rate was increased at 100 gpm intervals.

13-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 1,500 gpm and 2,000 gpm. Sand content ranged from 64.4 ppm to 307 ppm. The discharge rate was increased at 100 gpm intervals.

16-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 2,000 gpm and 2,200 gpm. Sand content ranged from 71.9 ppm to 390 ppm. Discharge rate was increased at 100 gpm intervals.

17-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 2,200 gpm and 3,000 gpm. Sand content ranged from 49.5 ppm to 371 ppm. The discharge rate was increased at 100 gpm intervals.

18-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 2,000 gpm and 3,000 gpm. Sand content ranged from 34.1 ppm to 310 ppm. The discharge rate was increased at 200 gpm intervals.

19-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 1,000 gpm and 3,510 gpm. Sand content ranged from 21.7 ppm to 246 ppm. The discharge rate was increased at 500 gpm intervals.

20-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander. The discharge rate varied between 1,500 gpm and 3,500 gpm. Sand content ranged from 64.4 ppm to 307 ppm. The discharge rate was increased at 100 gpm intervals.

23-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander.

24-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander.

25-Sep-96 Pump development continued. Sand content was monitored every 15 minutes using the Rossum Sander.

26-Sep-96 Development with the test pump was completed.

27-Sep-96 Step drawdown test was run from 9:00 AM to 5:00 PM. The pumping rates were 1,066 gpm, 2,018 gpm and 3,056 gpm.

30-Sep-96 The 24-hour constant rate test began at 10:21 AM. The pumping rate was set at 3,300 gpm.

1-Oct-96 The Constant rate test was completed at 10:22 AM. The average discharge rate over the 24 hour interval was 3,001 gpm. Water quality samples were taken. Recovery measurements were taken for 4 hours. A Spinner survey was run at 2:30 PM.

2-Oct-96 Layne began removing their test pump and engine; a steel plate was welded to the top of the well casing.

4-Oct-96 Layne bailed out 30 ft of sediments accumulated at the bottom of the well.

9-Oct-96 Layne ran video camera survey.

16-Oct-96 Layne reran video camera survey.

23-Oct-96 Layne performed deviation survey.

29-Oct-96 Layne completed well head as designed.

31-Oct-96 Well 22 was disinfected using 159 gallons of 12% sodium hypochlorite.

APPENDIX B

Lithologic Log

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
0 to 80																																No Sample
80 to 90	16	Light Gray					•	•		•			•	•					•	•				•	•	•			•			ML	Sandy silt with clay
90 to 100	16	Light Gray					•	•		•			•	•					•	•				•	•	•			•			ML	Sandy silt with minor clay
100 to 110	16	Light Gray					•	•		•			•	•					•	•				•	•	•			•			CH	Silty clay with a few gravels (~15 mm in diameter)
110 to 120	17	Light Gray					•	•		•			•	•					•	•				•	•	•						CH	Silty clay with a few gravels (~18 mm in diameter)
120 to 130	17	Dark Gray						•	•				•						•	•					•	•			•			CL	Fine clay
130 to 140	16	Dark Gray					•	•		•			•						•	•				•	•	•			•			GP/SP	Sand and gravel with minor clay
140 to 150	17	Greenish Gray					•	•		•			•						•	•				•	•	•			•			GP/SP	Medium grain sand with minor silt and a few gravels
150 to 160	17	Light Gray					•			•			•						•	•				•	•	•			•			SW	Medium to coarse sand

Note: Unless otherwise noted, formation materials are alluvium deposits.

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
160 to 170	16	Light Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Medium to fine sand with silty clay
170 to 180	15	Light Gray					•			•			•	•					•	•				•	•				•			SW	Medium to coarse sand
180 to 190	10	Light Gray					•	•		•				•	•				•	•				•	•	•			•			GW/SP	Fine sand to silty sand with a few gravels
190 to 200	10	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			MH	Sandy silt with >50% dark gray clay
200 to 210	10	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Medium to fine sand with minor silty clay
210 to 220	10	Light Gray					•		•				•						•	•				•	•	•			•			SW	Medium sand
220 to 230	10	Light Gray					•			•			•	•					•	•				•	•	•			•			GW/SW	Medium to coarse sand with a few gravels
230 to 240	10	Olive Gray					•		•				•						•	•				•	•	•			•			SW	Medium sand
240 to 250	10	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CH/GW	Silty clay with a few gravels (<10 mm)

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
250 to 260	10	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand with silty clay and a few gravels
260 to 270	10	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand and silty clay with a few gravels
280 to 290	10	Light Gray					•			•			•	•					•	•				•	•	•			•			GW/SW	Coarse sand and gravel
290 to 300	10	Light Gray					•			•			•	•					•	•				•	•	•			•			SW	Coarse sand
300 to 310	10	Greenish Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand and silty clay
310 to 320	10	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			CH	Silty clay with a few gravels
320 to 330	14	Olive Gray						•		•				•				•		•				•	•	•			•			CL	Fine clay
330 to 340	15	Light Gray					•	•		•				•					•	•				•	•	•			•			CH/GW	Silty clay with a few gravels
340 to 350	14	Light Gray to Yellowish orange					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand and silty clay

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
350 to 360	15	Light Gray					•			•			•	•					•	•				•	•	•			•			SW	Medium to coarse sand
360 to 370	14	Greenish Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand with clay (<20%)
370 to 380	14	Greenish Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine to medium sand with minor clay
380 to 390	14	Greenish Gray						•		•				•					•	•				•	•	•			•			CL	Silty clay
390 to 400	14	Olive Gray						•		•				•					•	•				•	•	•			•			CH	Clay
400 to 410	14	Olive Gray						•		•				•					•	•				•	•	•			•			CH	Clay and silty clay
410 to 420	14	Olive Gray						•		•			•	•					•	•				•	•	•			•			CL	Silty clay
420 to 430	15	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some fine sand
430 to 440	15	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some gravel

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
440 to 450	15	Olive Gray					•			•				•					•	•				•	•	•			•			SW	Medium sand
450 to 460	15	Olive Gray					•			•			•	•					•	•				•	•	•			•			SW	Fine to medium sand
460 to 470	15	Olive Gray					•			•			•	•					•	•				•	•	•			•		•	SW	Fine to medium sand
470 to 480	15	Olive Gray					•			•				•					•	•				•	•	•			•			SW	Fine sand
480 to 490	15	Olive Gray					•			•			•	•					•	•				•	•	•			•			SP	Coarse sand and gravel with some clay
490 to 500	15	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SW	Fine sand with minor clay
500 to 510	15	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Silty clay with some fine sand
510 to 520	20	Greenish Gray					•			•				•					•	•				•	•	•			•			SW	Fine sand
520 to 530	19	Greenish Gray					•			•				•					•	•				•	•	•			•			SW	Fine sand

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
530 to 540	19	Dark						•	•					•					•	•				•	•	•			•			CH	Clay
540 to 550	19	Dark						•	•					•				•		•				•	•	•			•			CH	Clay
550 to 560	19	Dark					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand with minor clay
560 to 570	19	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand and silty clay
570 to 580	19	Light Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Medium sand and clay with some gravel
580 to 590	19	Light Gray					•	•		•				•					•	•				•	•	•			•			CL	Sandy clay
590 to 600	19	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some fine sand
600 to 610	19	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some fine sand
610 to 620	19	Dark Gray						•		•				•					•	•				•	•	•			•			CH	Clay

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
620 to 630	19	Light Gray					•			•				•					•	•				•	•	•			•			SW	Medium sand
630 to 640	19	Light Gray					•			•				•					•	•				•	•	•			•			SW	Coarse to very coarse sand
640 to 650	19	Light Gray					•			•				•					•	•				•	•	•			•		•	SW	Medium to coarse sand
650 to 660	19	Light Gray					•			•				•					•	•				•	•	•			•			SW	Medium to coarse sand
660 to 670	19	Greenish Gray					•			•			•	•					•	•				•	•	•			•			SP	Medium sand with some gravel
670 to 680	19	Greenish Gray					•			•				•					•	•				•	•	•			•			SP	Fine to medium sand
680 to 690	19	Greenish Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Medium to fine sand with some silty clay
690 to 700	19	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some fine sand
700 to 710	19	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some fine sand

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
710 to 720	19	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand with clay and a few gravel
720 to 730	19	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand with <20% clay
730 to 740	19	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Silty sand with some gravel
740 to 750	25	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some silty sand
750 to 760	25	Dark Gray						•		•			•	•					•	•				•	•	•			•			CH	Clay
760 to 770	25	Olive Gray					•			•			•	•					•	•				•	•	•			•		•	SP	Medium sand with some gravel
770 to 780	25	Olive Gray					•			•			•	•					•	•				•	•	•			•			SP	Medium to coarse sand and gravel
780 to 790	25	Dark Gray						•		•				•					•	•				•	•	•			•			CH	Clay
790 to 800	25	Dark Gray					•	•		•		•	•						•	•				•	•	•			•			CL	Clay with some fine sand and sea shells

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
800 to 810	25	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some fine sand
810 to 820	25	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			SP	Fine sand and silty clay
820 to 830	25	Light Gray & yellowish orange					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with some silty sand
830 to 840	25	Dark Gray					•	•		•				•					•	•				•	•	•			•			CL	Clay with some silt
840 to 850	25	Olive Gray						•		•				•					•	•				•	•	•			•			CL	Clay with abundant sea shells
850 to 860	25	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with silty sand with some sea shells
860 to 870	25	Dark Gray						•		•				•					•	•				•	•	•			•			CH	Clay
870 to 880	25	Dark Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay with minor fine sand
880 to 890	25	Dark Gray						•		•				•				•		•				•	•	•			•			CH	Sticky clay

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
890 to 900	25	Olive Gray					•	•		•				•				•		•				•	•	•			•			CL	Silty clay with some fine sand
900 to 910	25	Olive Gray					•	•		•			•	•					•	•				•	•	•			•			CL	Clay and fine sand with some sea shells
910 to 920	25	Dark Gray					•	•		•				•					•				•	•	•	•			•			CL	Clay with some fine sand
920 to 930	25	Greenish Gray					•			•				•				•	•			•		•	•	•			•		•	SP	Fine sand with some hard clay
930 to 940	25	Dark Gray						•	•					•				•				•		•	•	•			•			CH	Clay
940 to 950	25	Greenish Gray					•	•		•			•						•			•		•	•	•			•			CL	Clay with some fine sand
950 to 960	25	Greenish Gray					•	•		•			•					•	•			•		•	•	•			•			CL	Silty clay with some fine sand
960 to 970	25	Olive Gray						•		•			•						•			•		•	•	•			•			CH	Sticky clay
970 to 980	25	Olive Gray					•	•		•			•	•					•				•	•	•	•			•		•	SP	Medium to fine sand with 20% clay

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
980 to 990	25	Light Gray					•	•		•			•	•					•				•	•	•	•			•			SP	Fine to medium sand with 10% clay
990 to 1,000	25	Olive Gray					•	•		•			•	•					•				•	•	•	•			•			SP	Fine sand with 40% clay
1,000 to 1,010	25	Olive Gray					•	•		•			•	•					•				•	•	•	•			•			CL	Sticky clay with some fine sand
1,010 to 1,020	25	Greenish Gray					•			•				•					•			•		•	•	•			•			CL	Clay with some fine sand
1,020 to 1,030	23	Greenish Gray					•	•		•			•						•			•		•	•	•			•			CL	Clay with 10% sand
1,030 to 1,040	23	Greenish Gray						•		•				•					•			•		•	•	•			•			CL	Clay with a few sea shells
1,040 to 1,050	23	Light Gray					•			•			•						•				•	•	•	•			•			SP	Medium to coarse sand
1,050 to 1,060	23	Light Gray					•	•		•			•						•				•	•	•	•			•		•	SP	Medium to coarse sand with some clay
1,060 to 1,070	23	Greenish Gray					•	•		•				•					•				•	•	•	•			•			SP	Fine to medium sand with <10% clay

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
1,070 to 1,080	24	Greenish Gray					•	•		•			•	•					•				•	•	•	•			•			SP	Fine sand with some clay
1,080 to 1,090	24	Greenish Gray					•	•		•			•	•					•				•	•	•	•			•			SP	Fine to medium sand with <10% clay
1,090 to 1,100	24	Greenish Gray					•			•		•	•						•				•	•	•	•			•			GW/SW	Medium sand with some gravels
1,100 to 1,110	24	Greenish Gray					•	•		•			•						•				•	•	•	•			•			CL	Clay with some fine sand
1,110 to 1,120	24	Greenish Gray					•	•		•				•				•				•		•	•	•			•			CL	Silty clay with fine sand
1,120 to 1,130	24	Greenish Gray					•			•				•				•				•		•	•	•			•			CL	Silty clay
1,130 to 1,140	24	Dark Gray					•		•					•				•				•		•	•	•			•			CH	Clay
1,140 to 1,150	24	Dark Gray					•		•					•				•				•		•	•	•			•			CH	Clay
1,150 to 1,160	24	Dark Gray						•	•					•			•					•		•	•	•			•			CH	Sticky clay

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
1,160 to 1,170	24	Dark Gray						•	•					•					•			•		•	•	•			•			CL	Clay with some sea shells
1,170 to 1,180	24	Dark Gray					•	•		•				•					•			•		•	•	•			•			CL	Silty clay with some fine sand and sea shells
1,180 to 1,190	24	Olive Gray					•			•				•					•			•		•	•	•			•			SP	Fine sand with some clay
1,190 to 1,200	24	Dark Gray						•	•					•					•			•		•	•	•			•			CH	Clay
1,200 to 1,210	24	Dark Gray and Brown						•	•					•					•			•		•	•	•			•			CH	Dark gray and brown clay
1,210 to 1,220	24	Greenish Gray					•	•		•			•						•			•		•	•	•			•			GW/SP	Sand and gravel with some clay
1,220 to 1,230	24	Greenish Gray					•			•			•						•				•	•	•	•			•			SW	Fine sand
1,230 to 1,240	24	Greenish Gray					•	•		•				•					•				•	•	•	•			•			SP	Fine sand with <10% clay
1,240 to 1,250	24	Olive Gray					•	•		•				•					•				•	•	•	•			•			CL	Silty clay to dark fine clay with some sand

Appendix B

LITHOLOGIC LOG

GSS Job Number: 12300 Well Number/Name: City Of Lakewood Well 22

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content			Particle Dist.			Sorting			Grain Shape				Plasticity				Cement ation				Mineral Composition						Alteration Visible	Grading Analysis	Rock Type (USCS Group)	Comments
			Dry	Moist	Saturated	Cobbles	Sand & Gravel	Silt & Clay	Well	Medium	Poor	Angular	Sub-Angular	Sub-Rounded	Rounded	High	Medium	Low	None	None	Weak	Moderate	Strong	Quartz	Feldspar	Mica	Amphibole	Evaporites	Other				
1,250 to 1,260	24	Greenish Gray					•	•		•				•					•				•	•	•	•			•			SP	Fine sand with some clay
1,260 to 1,270	24	Greenish Gray					•			•				•					•				•	•	•	•			•			SW	Fine sand
1,270 to 1,280	24	Greenish Gray					•	•		•			•						•				•	•	•	•			•			SP	Fine to medium sand with 10% clay
1,280 to 1,290	24	Greenish Gray					•	•		•			•						•				•	•	•	•			•			SP	Medium sand with 10% clay
1,290 to 1,300	24	Greenish Gray					•		•				•						•				•	•	•	•			•			SW	Medium sand
1,300 to 1,310	24	Greenish Gray					•	•		•			•						•			•		•	•	•			•			SP	Fine to medium sand with 5% clay
1,310 to 1,320	24	Greenish Gray					•			•			•						•			•		•	•	•			•			SP	Fine sand with 20% clay
1,320 to 1,330	24	Greenish Gray					•			•			•						•			•		•	•	•			•			SP	Fine sand with 30% clay
1,330 to 1,340	24	Greenish Gray					•			•			•						•			•		•	•	•			•			SP	Fine sand with some silty clay

Appendix B

APPENDIX C

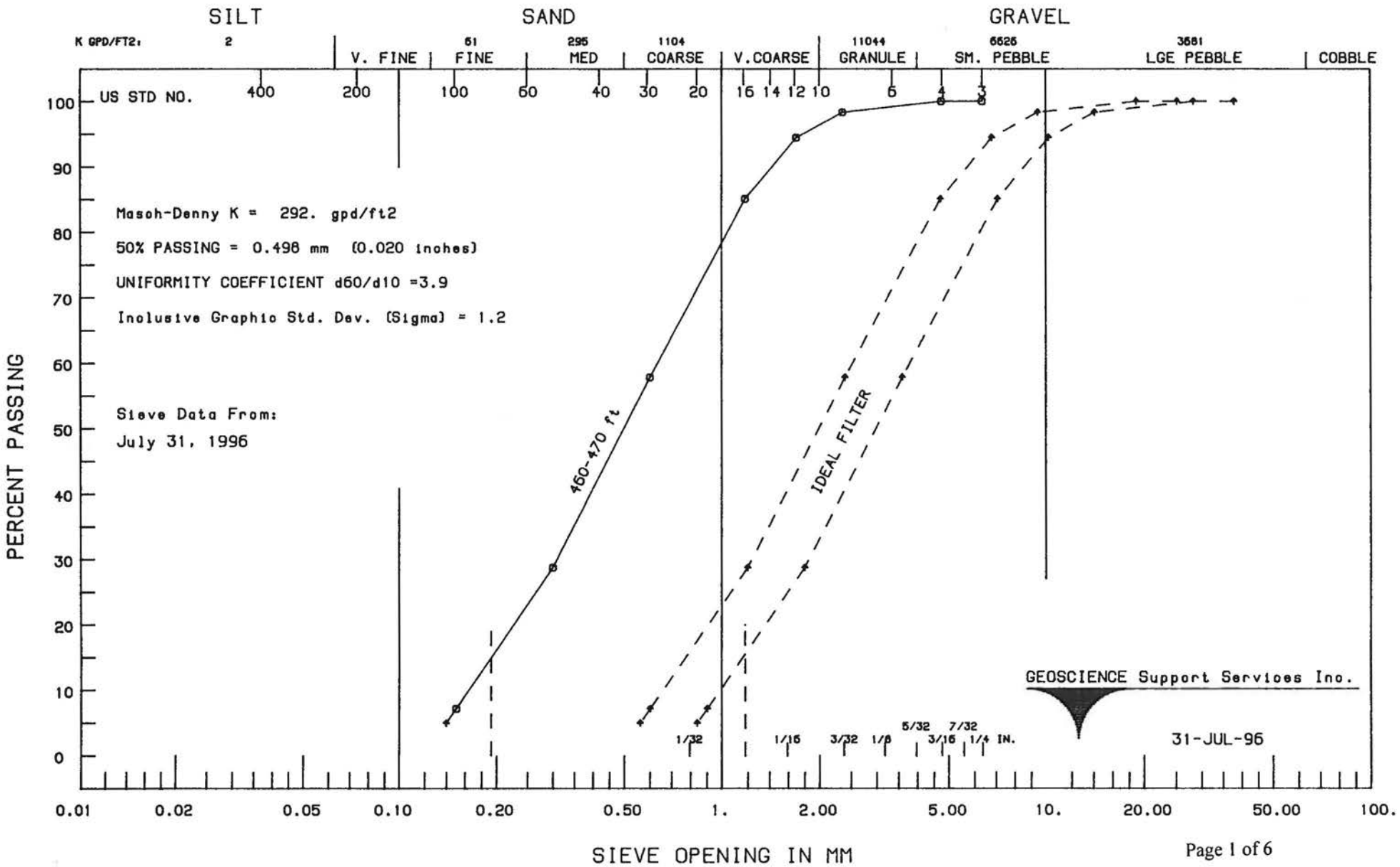
Geophysical Logs

APPENDIX D

Mechanical Grading Analyses

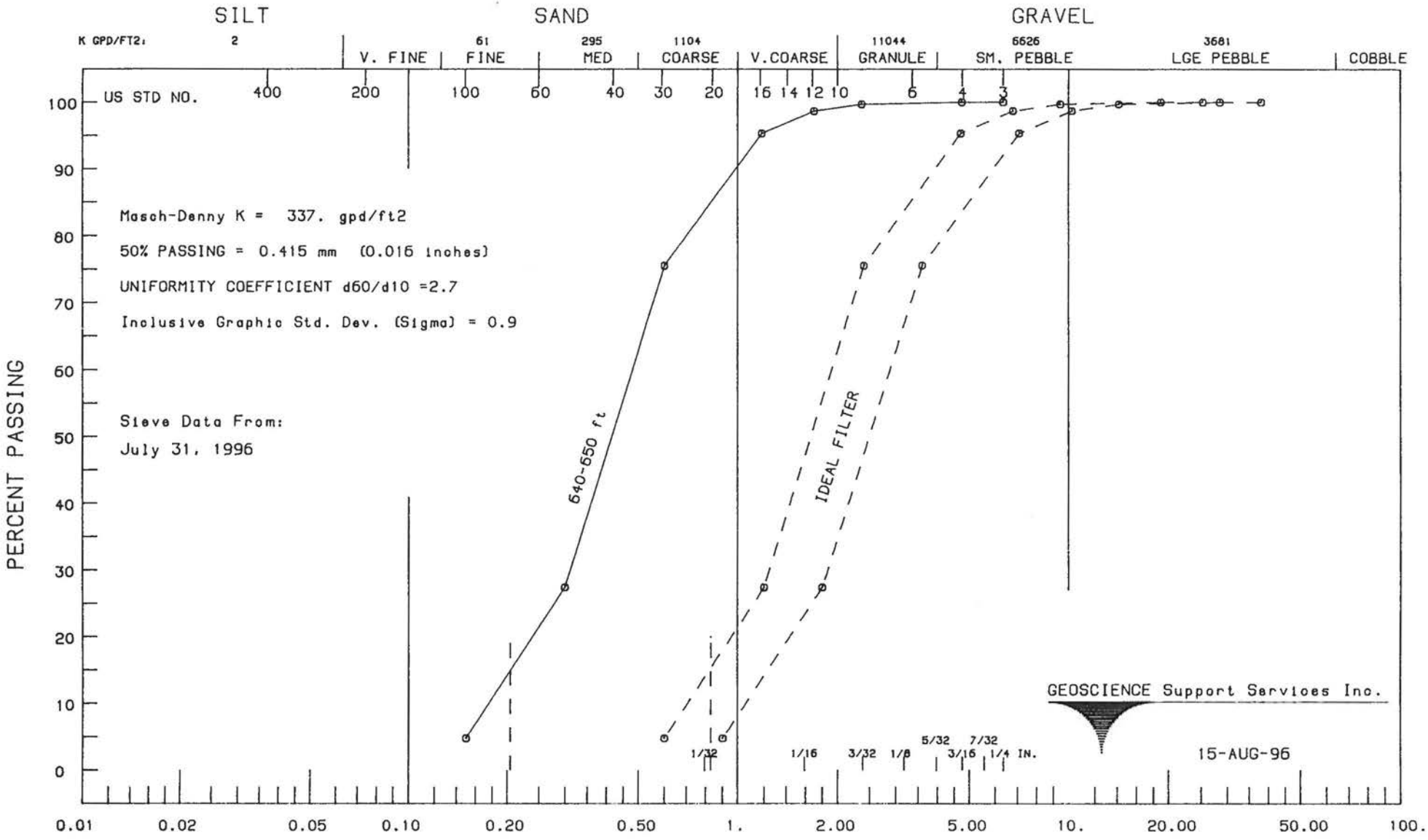
MECHANICAL GRADING ANALYSIS

Lakewood Well 22, 460-470 ft



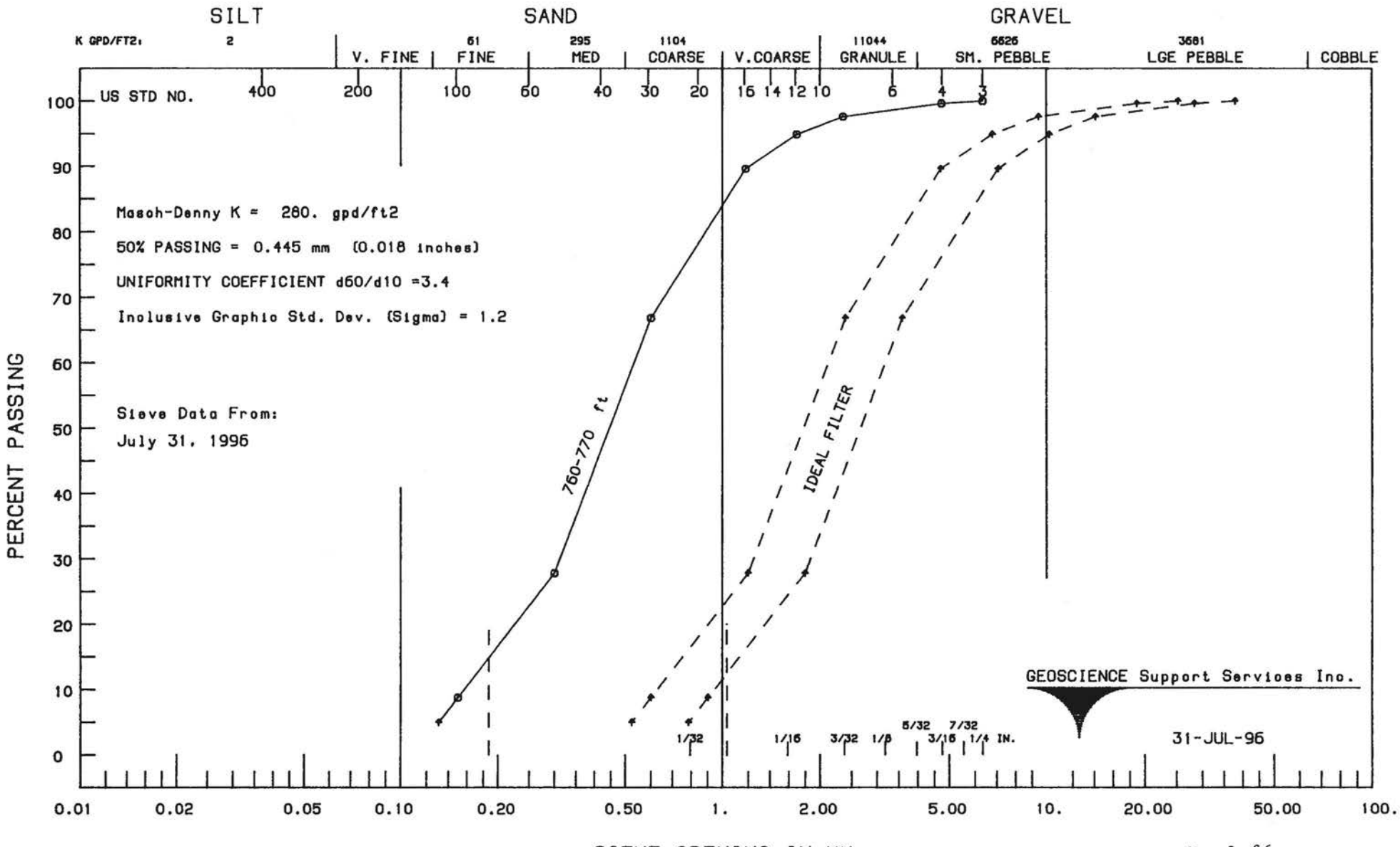
MECHANICAL GRADING ANALYSIS

Lakewood Well 22, 640-650 ft



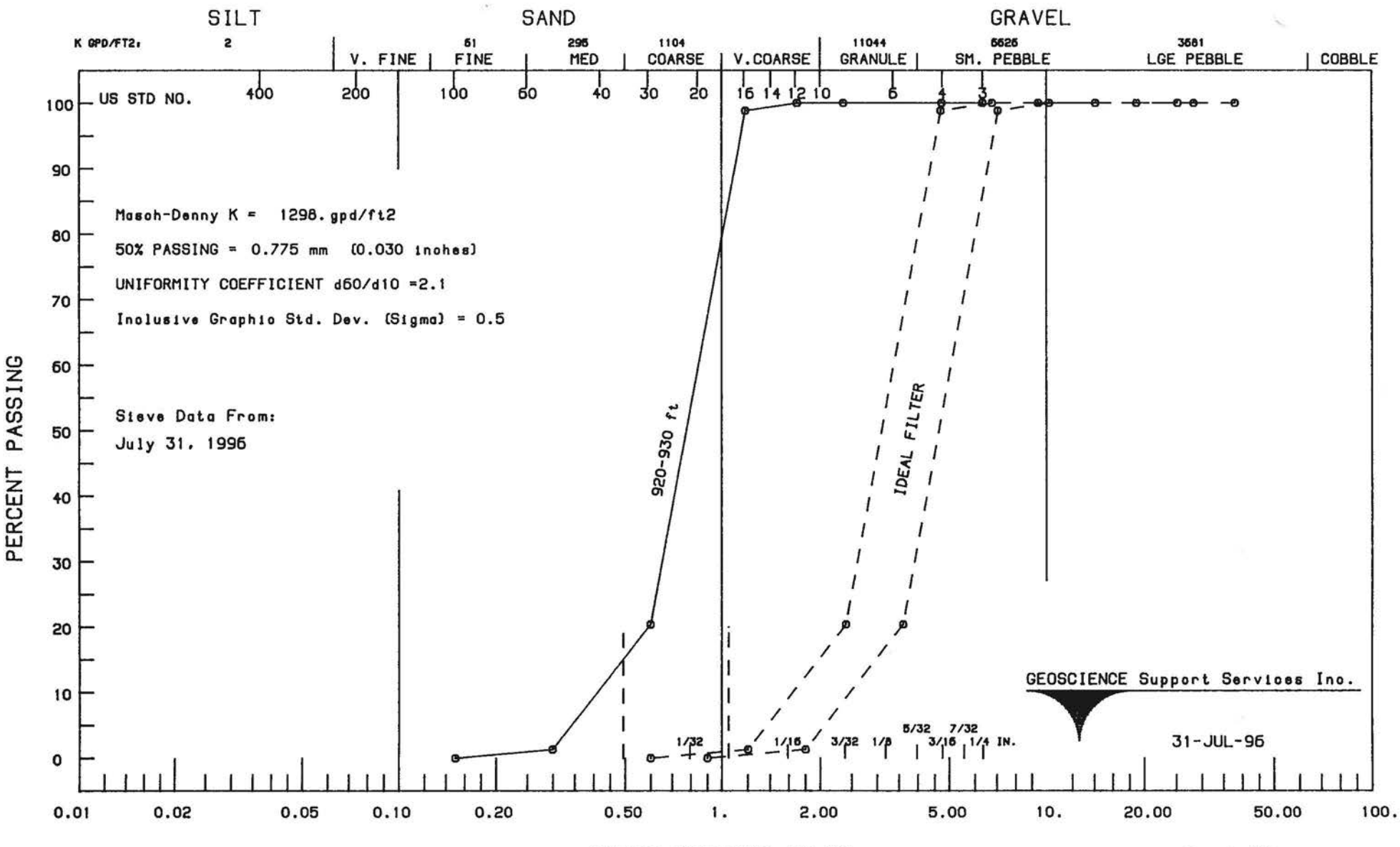
MECHANICAL GRADING ANALYSIS

Lakewood Well 22, 760-770 ft



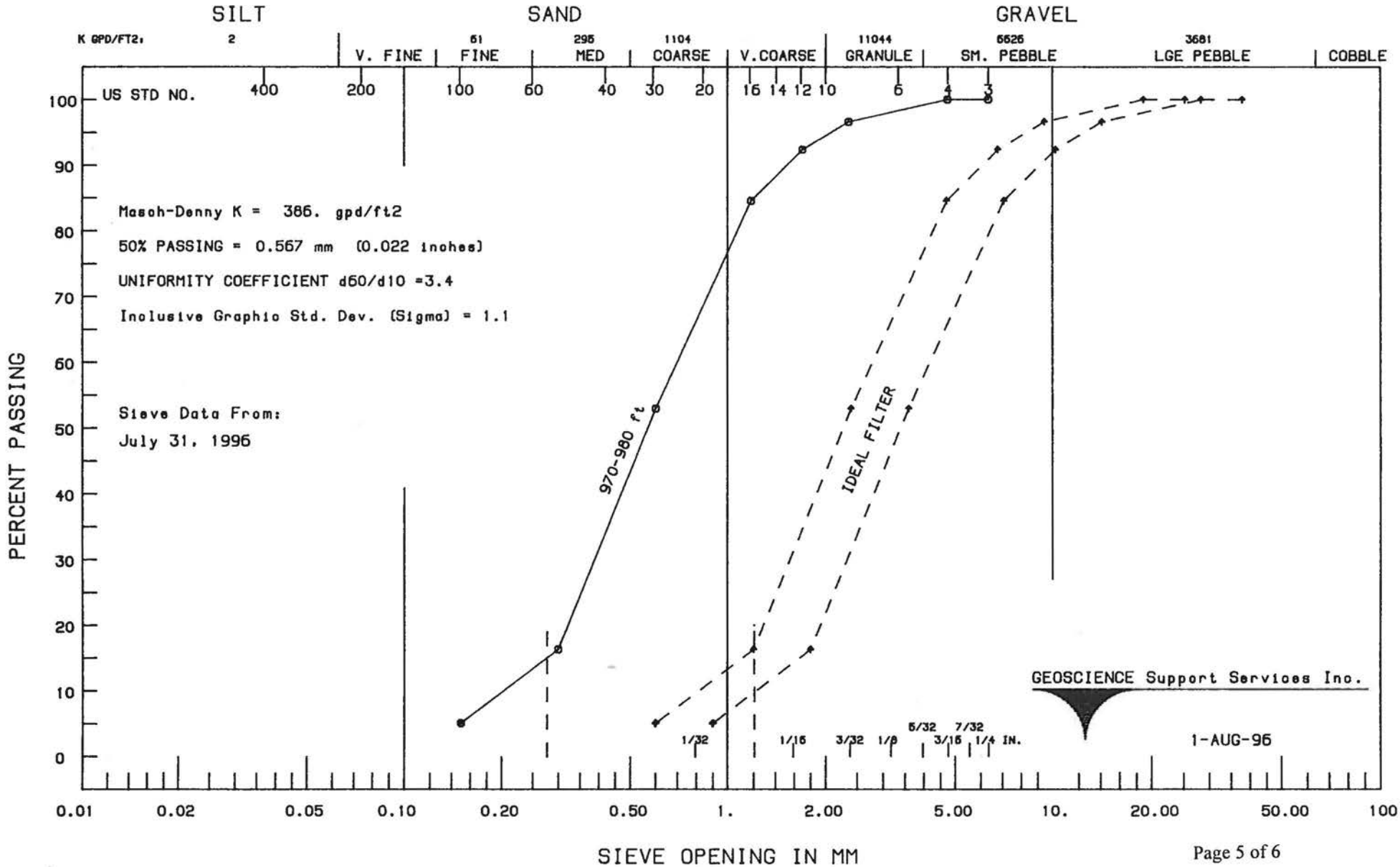
MECHANICAL GRADING ANALYSIS

Lakewood Well 22, 920-930 ft



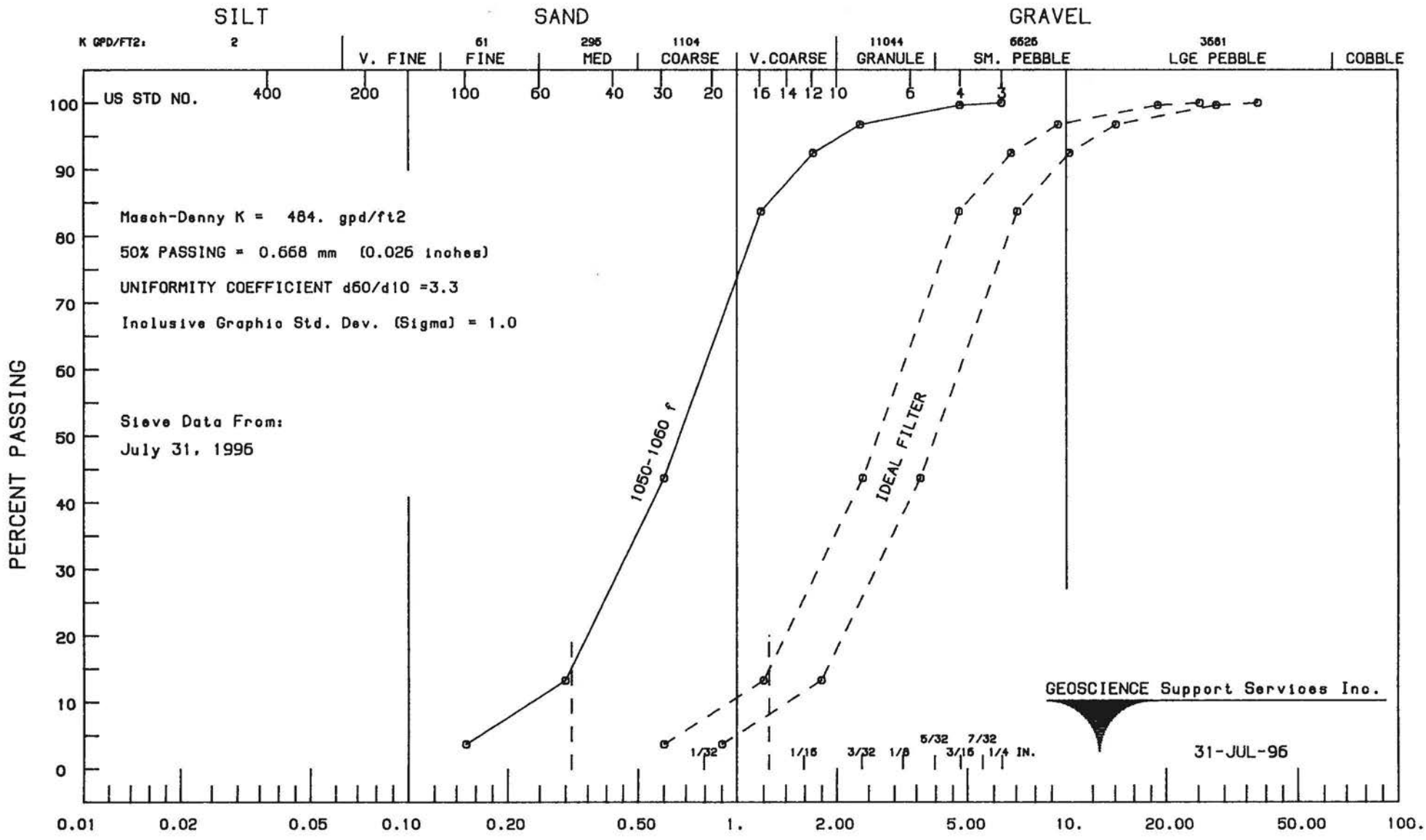
MECHANICAL GRADING ANALYSIS

Lakewood Well 22, 970-980 ft



MECHANICAL GRADING ANALYSIS

Lakewood Well 22, 1050-1060 ft



APPENDIX E

GEOSCIENCE's Field Notes

DAILY FIELD NOTES

Sheet 1 of 1
Date : 15-Jul-96
Time Arrived : 08:30
Time Left : 17:00

Logged by : Weixing Tong GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:00 Arrive at site
Drillers started drilling for conductor casing yesterday (7/14/96) to depth of 80 ft.
10:30 Set and field weld 36" x 75' conductor casing.
13:30 Cement slurry operator arrives at the site and gets ready for cement seal.
14:00 Mr. Mike Lui from LA County Department of Health Service comes to the site for inspection.
14:30 Mr. Mike Land from USGS comes to the site for water level measurements of USGS monitoring wells.
16:00 Cement Truck arrives at site. Cement is poured into conductor annulus between 42" temperary casing and 36" conductor casing.
16:30 Finish pouring cement slurry into the conductor annulus.
17:00 Leave the site.

Water level measurements in USGS monitoring wells:

Well Depth	Depth to water [ft]
1009 ft	65.29
660 ft	62.87
470 ft	68.79
300 ft	60.87
160 ft	49.88
90 ft	26.07

DAILY FIELD NOTES

Sheet 1 of 1
Date : 17-Jul-96
Time Arrived : 09:00
Time Left : 11:00

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:00 Arrive at site
Drillers started drilling the pilot borehole this morning and current depth is 300 ft.
09:30 Start doing lithology logging.
11:00 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 18-Jul-96
Time Arrived : 09:00
Time Left : 11:00

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:00 Arrive at site
Drillers have drilled the pilot borehole to depth of 800 ft.
09:30 Start doing lithology logging.
11:00 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 19-Jul-96
Time Arrived : 10:00
Time Left : 17:10

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:00 Arrive at site
Drillers have drilled the pilot borehole to depth of 1,280 ft.
10:30 Start doing lithology logging.
12:30 The borehole is drilled to depth of 1,340 ft. Samples show fine sand and clay.
Stop drilling. Total depth for pilot borehole is 1,340 ft.
13:20 Pull out air pipe.
13:40 Pull out drilling pipe.
15:15 Finish pulling out drilling pipe and bit.
15:20 Geophysical log truck from Welenco Co. arrives.
15:30 Start geophysical logging.
17:00 Finish ressistivity log and gamma log.
17:10 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 20-Jul-96
Time Arrived : 11:30
Time Left : 12:30

Logged by : Weixing Tong GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

11:30 Arrive at site
Prepare aquifer zone test design and schedule.
Pick up the sample bottles from the City's personnel.
12:30 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 24-Jul-96
Time Arrived 13:00/23:30
Time Left : 17:00/00:30

Logged by : Weixing Tong GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

13:00 Arrive at site
Drillers are pumping water from first zone (airlift). Water is dirty and has light odor. Discharge rate is 40 gpm.

14:00 Lower the pump intake and restart pump. Discharge rate increases to 60 gpm. More discharge would break the suction.

17:00 Leave the site.

23:30 Arrive at site.
Conduct field measurements for water samples from Zone 1 (1,210 - 1,230 ft)

Temperature	Ph	TDS
27.9 C	7.6	440
27.8 C	8.2	180
27.8 C	8.3	180
27.9 C	8.3	180

Water has no smell, slightly cloudy and some fine sand.
Discharge rate is 75 gpm.

00:20 Collect water samples for analysis.

00:30 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 25-Jul-96
Time Arrived : 23:10
Time Left : 24:00

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division — Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : — Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

23:10 Arrive at site
Drillers are pumping water from Zone No. 2.
Conduct field measurements for water sample from Zone 3 (1,030 - 1,050 ft)

Temperature	Ph	TDS
26.5 C	8.1	190
26.7 C	8.2	180
26.8 C	8.2	180

Water has slight sulfate smell, slightly cloudy and some fine sand.
Discharge rate is 227 gpm.

23:40 Collect water samples for analysis
24:00 Leave the site.

DAILY FIELD NOTES

Logged by : Weixing Tong

GSS Project Number : 12300

Date : 26-Jul-96
Time Arrived : 22:50
Time Left : 23:30

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division — Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : — Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

22:50 Arrive at site
Drillers are pumping water from Zone No. 3.
Conduct field measurements for water sample from Zone 3 (905 - 925 ft)

Temperature	Ph	TDS
26.9 C	7.9	170
26.7 C	8.5	130
26.7 C	8.6	130
26.6 C	8.6	130

Water has slight odor but better than Zone No. 2. Color is slightly milky and some fine sand.
Discharge rate is 97 gpm.

23:20 Collect water samples for analysis.
23:30 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 27-Jul-96
Time Arrived : 23:00
Time Left : 23:50

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division — Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : — Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

23:00 Arrive at site
Drillers are pumping water from Zone No. 4.
Conduct field measurements for water sample from Zone 4 (620 - 640 ft)

Temperature	Ph	TDS
23.7 C	7.9	190
23.2 C	8.2	170
23.3 C	8.2	170
23.3 C	8.3	170

Water has no smell, slightly cloudy and some fine sand.
Discharge rate is 267 gpm.

23:40 Collect water samples for analysis.
23:50 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 28-Jul-96
Time Arrived : 23:30
Time Left : 24:10

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division — Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : — Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

23:30 Arrive at site
Drillers are pumping water from Zone No. 5.
Conduct field measurements for water sample from Zone 5 (450 - 470 ft)

Temperature	Ph	TDS
22.2 C	7.6	200
22.0 C	8.0	190
22.0 C	8.0	190
21.9 C	8.1	190

Water has no smell, clean and some fine sand.
Discharge rate is 236 gpm.

23:50 Collect water samples for analysis.
24:10 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 30-Jul-96
Time Arrived : 14:30
Time Left : 15:00

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

14:30 Arrive at site
Drillers are waiting for screen, casing and gravel pack design.
Take all sample bags to the Jeep in order to drive back to the office to perform sieve analysis.
15:00 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1

Logged by : Weixing Tong

GSS Project Number : 12300

Date : 06-Aug-96
Time Arrived : 20:30
Time Left : 22:00

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division — Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : — Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

20:30 Arrive at wellsite
Inspect Roscoe Moss Company's screen and casing.
22:00 Leave wellsite.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 07-Aug-96
Time Arrived : 09:00
Time Left : 18:00

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:00 Arrive at site
Drillers started installing screen and casing at 3:00.
09:20 Drillers Weld 2" sound tube opening to casing.
13:00 Drillers finish installing screen and casing.
14:30 Pump gravel pack into bottom of well (1,090 ft)
14:50 Pour gravel pack to depth of 1,063 ft.
15:00 Pull up 60 ft gravel feed pipe and fill up depth of 1,001 - 1,063 ft.
15:10 Fill up depth between 1001 to 940 ft.
15:30 Fill up depth between 940 - 876 ft.
16:00 Sound the gravel level at 865 ft.
17:00 Pump benseal mixed with gravel into well for annular seal. First pour fill upto depth of 850 ft.
18:00 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 12-Aug-96
Time Arrived : 10:30
Time Left : 11:30

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:30 Arrive at site
The well started airlifting at 18:00 on 9-Aug-96, and has been swabbed and airlifted for 56 hours.
The water is relatively clean when it is steadily pumping but becomes cloudy while it is swabbing.
The driller reports that 25 feet of sediment accumulated at the bottom of the well.
The driller is currently swabbing a section of 750-790 ft.
Airlifting was designed for 70 hours. It seems that more swabbing and airlifting time (40 - 48 hours) is needed to clean the sediments and swab one more time. Additional time needs City's approval for change order.
The discharge rate is estimated at approximately 300 gpm.
11:30 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 13-Aug-96
Time Arrived : 09:00
Time Left : 10:10

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☒ Well Construction. Drilling Contractor : Layne-Western Co., McCalla Division Rig Type : Challenger 280

☐ Pump Test. Pumping Contractor : Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:00 Arrive at site
The driller is bailing out the sediments in the last section of the well.

10:05 Stopped bailing. Pulled out the drilling pipes.
Driller will put the swab tool on the drilling pipe and swab from the bottom of the well to the top.

10:10 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 26-Aug-96
Time Arrived : 10:00
Time Left : 11:10

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:00 Arrive at site
Pumper, Ron Weber, from Layne-Western is setting pump and started pumping 5 min. ago. The water is clear for 10 min. followed by 1 min. of dark brownish color and several minutes of dark gray.
11:00 Discharge rate is increased to 700 gpm and drawdown is 33 ft.
11:10 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 04-Sep-96
Time Arrived : 15:00
Time Left : 15:50

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

15:00 Weixing Tong and Diane Smith arrive at site
Discharge rate is at 1,000 gpm and sand content is 386 ppm. The sand content increases when dischage rate changes. The pump intake was set at 440 ft, right at the top of the first screen. It is recommended that the pump intake be lifted to 360 ft.

15:50 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 06-Sep-96
Time Arrived : 11:30
Time Left : 15:40

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

11:30 Weixing Tong and Diane Smith arrive at site.
Dennis Williams, Meridee Williams and James Glancy were at the site with Ron Weber.
The pump intake was lifted to 360 ft.
Discharge rate is at 400 gpm.
Dennis recommends that we pump at 400 gpm until sand content is below 20 ppm and surge once, surge more after the sand content is below 20 ppm. When the sand content decreases below 20 ppm after one surge, increase the discharge rate by 150 gpm.

15:40 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 09-Sep-96
Time Arrived : 11:30
Time Left : 16:15

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

11:30 Arrive at site.
Discharge rate is at 400 gpm. When we first started pumping, it took two hours for the sand content decreases from 159 ppm to 20.8 ppm.

12:15 Surge once. Sand content increases to 220 ppm and it takes one hour and 15 minutes for sand content to decrease below 18.9 ppm.

13:30 Surge once. Sand content increases to 171 ppm and it takes one hour for sand content to decrease below 18.9 ppm.

14:30 Surge once. Sand content increases to 174 ppm and it takes one hour for sand content to decrease below 22.7 ppm.

15:30 Discharge rate is increased to 550 gpm and sand content increases to 75.7 within 30 min.
Total depth of the well is measured at 1,050 ft, indicating 30 ft of sediments accumulated at the bottom of the well.

16:15 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 10-Sep-96
Time Arrived : 10:00
Time Left : 16:15

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:00 Arrive at site.
Discharge rate is at 400 gpm. Sand content is 170 ppm and decreases to 20 ppm within two hours.

10:15 Discharge rate increases to 550 gpm. Sand content increases to 79 ppm and it takes one hour and 45 minutes for sand content to decrease below 20 ppm.

12:00 Surge once. Sand content increases to 261 ppm and it takes two hours for sand content to decrease to 22.7 ppm.

14:00 Discharge rate is increased to 700 gpm and sand content increases to 170 within 30 min.

16:00 Sand content decreases to 45.4 ppm. Discharge rate is increased to 850 gpm.

16:15 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 11-Sep-96
Time Arrived : 09:00
Time Left : 16:30

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:00 Arrive at site.
Discharge rate is at 850 gpm. Sand content decreases from 341 ppm to 40 ppm within 3.5 hours.

12:00 Surge once. Sand content decreases to 53 ppm within two hours.

14:00 Surge one more time. Sand content decreases to 51.1 ppm within one hour.

15:00 Discharge rate is increased to 1,000 gpm.

16:30 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 12-Sep-96
Time Arrived : 10:15
Time Left : 12:50

Logged by : Weixing Tong GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:15 Arrive at site.
Discharge rate is 1,000 gpm. Sand content decreases from 340 ppm to 110 ppm within two hours.

11:00 Discharge rate is increased to 1,100 gpm. Sand content is 97 ppm.

11:15 Discharge rate is increased to 1,200 gpm. Sand content is 250 ppm.

12:15 Sand content has decreased to 106 ppm.

12:15 Discharge rate is increased to 1,300 gpm. Sand content is at 94.6 ppm.

12:45 Sand content is up to 190 ppm.

12:50 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 18-Sep-96
Time Arrived : 10:00
Time Left : 13:20

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

10:00 Arrive at site.
Discharge rate is at 2,000 gpm. Sand content is 53.0 ppm.

10:15 Discharge rate is increased to 2,200 gpm. Sand content is 97 ppm.

11:15 Sand content is 43.9 ppm. Discharge rate is increased to 2,400 gpm.

11:30 Bill Provence arrives.

13:00 Sand content is down to 62.1 ppm. Discharge rate is increased to 2,600 gpm.

13:20 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 27-Sep-96
Time Arrived : 08:30
Time Left : 17:02

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

08:30 Arrive at site.
Prepare for step drawdown pump test.

09:00 Start pumping at 1,000 gpm.
Static water level is 92.4 ft.
Sand content is 18.4 ppm after 15 min of pumping and drops to 3.2 ppm after 30 min. Specific capacity is between 48 - 39 gpm/ft.

11:30 Increase pump rate to 2,000 gpm.
Sand content increases to 35 ppm and drops to 7 ppm.

14:00 Increase pump rate to 3,000 gpm.
Sand content increases to 70.7 ppm after 5 min. and drops to 14.3 ppm after 2 hours and 15 min. of pumping.

17:00 Shutdown the pump.

17:02 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 30-Sep-96
Time Arrived : 09:30
Time Left : 17:30

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:30 Arrive at site.
Take water level measurements on 6 USGS wells and Well 22 - verify all levels w/ 2nd reading.

10:21 Start constant rate test at 3,000 gpm.

15:30 Speak w/ Dennis Williams regarding the status of the test, observation well response, etc.

17:30 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 1-Oct-96
Time Arrived : 09:20
Time Left : 17:20

Logged by : Weixing Tong GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☒ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☐ Other.

NOTES

09:20 Arrive at site.
Take water level measurements in all wells, testing went smoothly during the night, predictable drawdown in all wells.

10:22 Recovery test began.

13:00 Layne's pump rig onsite, Baker Tank truck picking up tank.

14:00 Welenco onsite for Spinner Survey.

14:22 End of recovery test.

14:30 Running in spinner tool, hooking up engine drive line and discharge pipeline.

15:30 Start engine, run at 3,000 gpm for 15 min. before starting first downrun.

16:00 All screens seem to be contributing water, bottom of the well is at 1,054 ft (top of fill).

16:30 Finish 2nd downrun, chose 12 locations for one minute stop counts.
Jim Glancy, Tom Charles, Bruce Burris and Vicki Francis arrive on site.

17:00 Completed stop counts - out of the hole w/ tool at 17:15.

17:15 Making copies of Spinner Survey.

17:20 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 09-Oct-96
Time Arrived : 09:10
Time Left : 10:40

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☐ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☒ Other.

NOTES

09:20 Arrive at site. Tom Charles is at the site.
Layne's video camera van arrived on site and started taping the well.
Layne's rig is taking sound barriers off.
Downhole camera has a problem focusing. At the bottom part of the well, the water is cloudy. Larry Bonadurer is going to run another survey later. Larry gives a copy of the tape to GEOSCIENCE.
Static water level recovered to 73 ft.

10:40 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 18-Oct-96
Time Arrived : 09:50
Time Left : 12:50

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☐ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☒ Other. Alignment Survey

NOTES

09:50 Arrive at site.

10:00 Layne's workers start to set up rig for alignment survey.

10:30 Cage is sent to 400 ft.
Layne's workers leave to call for detailed instruction, whether to survey 400 ft or the entire well.

10:40 Talk to Dennis and Diane and confirm that the survey should be finished in entire well.

11:00 Layne's workers continue to send down the cage.

11:20 The cable is used up and the cage is pulled up.

11:40 Layne's workers leave to buy measuring tape.

12:25 The workers come back and start deviation survey from 0 - 40 ft. Deviation is measured every 100 ft.

12:45 The cage is sent to 660 - 700 ft and the cable is used up. Stop the survey.

12:50 Leave the site.

DAILY FIELD NOTES

Sheet 1 of 1
Date : 23-Oct-96
Time Arrived : 09:30
Time Left : 10:30

Logged by : Weixing Tong

GSS Project Number : 12300

GSS Project Name : City of Lakewood Production Well 22

Project Location : Intersection of Downey Ave. and Candlewood St.

☐ Well Construction. Drilling Contractor : Rig Type :

☐ Pump Test. Pumping Contractor : Layne-Western Co., McCalla Division Pump Type :

☐ Site Reconnaissance.

☒ Other. Alignment Survey

NOTES

09:30 Arrive at site.
Layne's video van is at site (Don Lewison and a helper).
Layne's workers are setting up the cage.

10:00 Start the survey.
Static water level is 67.5 ft.

10:30 Leave the site.

APPENDIX F

Contractor's Daily Notes

1 - Driller's Daily Notes

2 - Pumper's Daily Notes

APPENDIX F - 1

Driller's Daily Notes

WELL NO. 22

API WELL

CONTRACTOR Layne Western #80

Layne Western
SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOL PUSHER

WT. PT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DIST. | COUNTY Orange | STATE CA.

LAST CASING, TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	DEPTH TO CSG. SHOE	SET AT

WIRE LINE RECORD — REEL NO. — SIZE — NO. LINES — FT. SLIPPED — FT. CUT OFF — PRESENT LENGTH — TOOLS OR TRIPS SINCE LAST CUT — CUMULATIVE TOOLS OR TRIPS

DRILLING CREW PAYROLL DATA — DATE 9 14 96 — 66-2359 — WELL NAME & NO. — COMPANY Lakewood — TOOL PUSHER Larry Lisle — RIG NO. #80

DISTRIBUTION — HOURS

	NIGHT	DAY
DRILLING		
REAMING		
CIRCULATING		
DRILLING MUD SURVEY		
TRIPPING		
LOGGING		
RUNNING & CEMENTING CASING		
CEMENTING		
WAITING ON B.O.P.		
WELDING		
TESTING		
RIG REPAIRS		
OTHER		
TOTAL		

NIGHT TOUR

DRILLING ASSEMBLY

NO.		FT.
Bit	42	5
	28	4
17½	DC	4
9 10½	DC	968
10 9⅛	DC	933
10 9⅛	DC	2325
	OH	
STANDS DP		FT.
SINGLES DP		FT.
KELLY DOWN		FT.
TOTAL		FT.

WT. OF STRING — LBS.

REMARKS

DRILLER

BIT RECORD

BIT NO.	42		
SIZE	17½		
IADC CODE			
MFG			
TYPE			
SER. NO.			
JETS 1/32" / TFA in²			
DEPTH OUT	60		
DEPTH IN	35		
TOTAL FTG			
TOTAL HRS			

CUTTING STRUCTURE: INNER | OUTER | BALL CONE | LOCATION

BEARINGS/SEALS | GAGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC. SEC.			
PV/YP			
GELS			
WL CC's			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE

FROM	TO	NO. & SIZE CODES	CODE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000's	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM	METHOD USED FOR D.P.
35	60			Sand, gravel									
60	76			Sand, clay									

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	11			Ream 40" 35-76
11	12			Trip out

CREW	SOC. SEC. NO.	NAME	HRS.
DRILLER		Drew M. Brew	12
DRILLER		Jeff Frost	12
DRILLER			12
FIREMAN		Mike Griffith	
FLRMAN			
FLRMAN			
FLRMAN			
CRANE SUPT.			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO. OF DAYS — SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DRILLING ASSEMBLY

NO.		FT.
Bit	42	4
	28	4
17½	DC	4
Sub		4
1 9⅝	DC	958
10 9⅛	DC	1953
	OH	
STANDS DP		FT.
SINGLES DP		FT.
KELLY DOWN		FT.
TOTAL		FT.

WT. OF STRING — LBS.

REMARKS

DRILLER

BIT RECORD

BIT NO.	1		
SIZE	12¼		
IADC CODE			
MFG			
TYPE			
SER. NO.			
JETS 1/32" / TFA in²			
DEPTH OUT	10		
DEPTH IN	10		
TOTAL FTG	—		
TOTAL HRS			

CUTTING STRUCTURE: INNER | OUTER | BALL CONE | LOCATION

BEARINGS/SEALS | GAGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC. SEC.			
PV/YP			
GELS			
WL CC's			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT.	TYPE	AMT.

FOOTAGE

FROM	TO	NO. & SIZE CODES	CODE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000's	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM	METHOD USED FOR D.P.

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
6	8			Hook up Vista Deck missing pump
8	12			Ream 42 & had problems

CREW	SOC. SEC. NO.	NAME	HRS.
DRILLER		Ernesto Rivera	6
DRILLER		Mike Thomas	6
DRILLER		Keith Paul	6
FIREMAN			
FLRMAN			
FLRMAN			
FLRMAN			
CRANE SUPT.			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO. OF DAYS — SINCE LAST LOST TIME ACCIDENT

IADC - API OFFICIAL DAILY DRILLING REPORT FORM

APPROVED — APPROVED

FORM 2T-4

PRINTED IN U.S.A.

IADC - API OFFICIAL DAILY DRILLING REPORT FORM

APPROVED — APPROVED

No. 363613

IADC - API OFFICIAL DAILY DRILLING REPORT FORM

APPROVED — APPROVED

No. 363613

. 363614

DAILY DRILLING REPORT — REPORT NO

LEASE: Lakewood — WELL NO: 32 — API WELL NUMBER — WATER DEPTH — DATE: 7-15-96

OPERATOR: LEKAWOOD — CONTRACTOR: Layne Western — RIG NO: 280

SIGNATURE OF OPERATOR'S REPRESENTATIVE: Layne Western — SIGNATURE OF CONTRACTOR'S TOOL PUSHER

FIELD OR DIST. — COUNTY: Orange — STATE: Ca

WIRE LINE RECORD — REEL NO.

DRILLING CREW PAYROLL DATA — DATE 7-15-96 — WELL NAME & NO. 32 — COMPANY LAKEWOOD — TOOL PUSHER Larry Welch — REG. NO. 68.2359

SIZE	WT. / FT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

LAST CASING, TUBING, OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	DEPTH CSG. SHOE	SET AT

WIRE LINE RECORD: SIZE | NO. LINES | FT. SLIPPED | FT. CUT OFF | PRESENT LENGTH | TOTAL OR TRIPS SINCE LAST CUT | CUMULATIVE TOTAL OR TRIPS

TIME DISTRIBUTION — HOURS

OPERATION	NIGHT	DAY
UP AND DOWN		
ACTUAL		
RIG		
RIG REPAIR		
CIRCULATE RIG		
AIR RIG		
CUT OFF DRLG LINE		
DEVIATION SURVEY		
WIRE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
CORE BARREL		
1020 CEMENT		
RIG REPAIR		
OTHER		
A. PERFORATE		
B. TRIP TIME		
C. TREATING		
D. REAMING		
E. TESTING		
F. ABSENT		
G.		

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

CONTR. G.P.
OPR. G.P.
TOP
MUDDY
DAYS
STAND BY
MUD COST

NIGHT TOUR

BIT NO. 1

DRILLING ASSEMBLY (OD and Length of each)

BIT	1/2	5 FT
	28	4
	17 1/2	41
	10 7/8	968
	10 5/8	1963
	10 5/8	23
		FT
STANDS DP		FT
SINGLES DP		FT
KELLY DOWN		FT
TOTAL		FT

WT. OF STRING: LBS

BIT RECORD: BIT NO. 1 | SIZE | IADC CODE | MFG | TYPE | SER. NO. | JETS 32nds / TFA in² | DEPTH OUT | DEPTH IN | TOTAL FTG | TOTAL HRS

CUTTING STRUCTURE: INNER | OUTER | BIT CHAR | LOCATION | BEARING/SEALS | GAGE | OTHER BIT CHAR | REASON PULLED

MUD RECORD: TIME | WEIGHT | PRESSURE GRADIENT | VISC. SEC. | PV / YP | GELS | WL - CC's | pH | SOLIDS %

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT

REMARKS

DRILLER

BIT NO. 2

DRILLING ASSEMBLY (OD and Length of each)

BIT		FT
		FT
		FT
		FT
		FT
		FT
		FT
STANDS DP		FT
SINGLES DP		FT
KELLY DOWN		FT
TOTAL		FT

WT. OF STRING: LBS

BIT RECORD: BIT NO. 2 | SIZE | IADC CODE | MFG | TYPE | SER. NO. | JETS 32nds / TFA in² | DEPTH OUT | DEPTH IN | TOTAL FTG | TOTAL HRS

CUTTING STRUCTURE: INNER | OUTER | BIT CHAR | LOCATION | BEARING/SEALS | GAGE | OTHER BIT CHAR | REASON PULLED

MUD RECORD: TIME | WEIGHT | PRESSURE GRADIENT | VISC. SEC. | PV / YP | GELS | WL - CC's | pH | SOLIDS %

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT

REMARKS

DRILLER

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

FOOTAGE | CORE NO. | CORE FOOTAGE | FORMATION (SHOW CORE RECOVERY) | ROTARY RPM | WT. ON BIT 1000's | PUMP PRESS. | PUMP NO. LINER SIZE | PUMP NO. L.P.M. | PUMP NO. LINER SIZE | PUMP NO. L.P.M. | TOTAL HOURS ON JOINT | MINUTES PER FOOT

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:01	12:15		7	Rerig Equipt
12:15	2:15		3	Reaming
2:15	3:15		5	CIRCULATE
3:16	4:00			Pull up Joints Leave caller hang
4:00	5:00			go back into hole
5:00	7:00			Pull up tools move rig
7:00	8:00			wait for crane & conductor
8:00	12:00			Set Conductor

NIGHT TOUR 12 P.M. 12 A.M.

CREW	SOC. SEC. NO.	NAME	HRS.	HOURS ON THIS TOUR: WITNESS	HOURS ON THIS TOUR: YES OR PUSH
DRILLER		Ernesto Rivas	12		
DRILLMAN		Mike Ray Thomas	12		
DRILLMAN		Keith Paul	12		
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					
CRANE SUPT					
MECHANIC					
WELDER					
RIGABOUT					
RIGABOUT					
TRAINEE					

NO. OF DAYS — SINCE LAST LOST TIME ACCIDENT

DAY TOUR

BIT NO. 2

DRILLING ASSEMBLY (OD and Length of each)

BIT		FT
		FT
		FT
		FT
		FT
		FT
		FT
STANDS DP		FT
SINGLES DP		FT
KELLY DOWN		FT
TOTAL		FT

WT. OF STRING: LBS

BIT RECORD: BIT NO. 2 | SIZE | IADC CODE | MFG | TYPE | SER. NO. | JETS 32nds / TFA in² | DEPTH OUT | DEPTH IN | TOTAL FTG | TOTAL HRS

CUTTING STRUCTURE: INNER | OUTER | BIT CHAR | LOCATION | BEARING/SEALS | GAGE | OTHER BIT CHAR | REASON PULLED

MUD RECORD: TIME | WEIGHT | PRESSURE GRADIENT | VISC. SEC. | PV / YP | GELS | WL - CC's | pH | SOLIDS %

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT

REMARKS

DRILLER

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

FOOTAGE | CORE NO. | CORE FOOTAGE | FORMATION (SHOW CORE RECOVERY) | ROTARY RPM | WT. ON BIT 1000's | PUMP PRESS. | PUMP NO. LINER SIZE | PUMP NO. L.P.M. | PUMP NO. LINER SIZE | PUMP NO. L.P.M. | TOTAL HOURS ON JOINT | MINUTES PER FOOT

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00				Finish conductor & run 2" for cement & wait for cement

DAY TOUR 12 A.M. 12 P.M.

CREW	SOC. SEC. NO.	NAME	HRS.	HOURS ON THIS TOUR: WITNESS	HOURS ON THIS TOUR: YES OR PUSH
DRILLER		Bryn Mabray	12		
DRILLMAN		Vesse Frost	12		
DRILLMAN		Mike Griffith	12		
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					
CRANE SUPT					
MECHANIC					
WELDER					
RIGABOUT					
RIGABOUT					
TRAINEE					

NO. OF DAYS — SINCE LAST LOST TIME ACCIDENT

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No. 363614

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No. 363614

363615

DAILY DRILLING REPORT

REPORT NO.

LEASE: Lakewood	WELL NO.: 22	API WELL NUMBER	WATER DEPTH	DATE: 7.18.96
OPERATOR: Layne Western		CONTRACTOR: Layne Western		RIG NO.: 280m
SIGNATURE OF OPERATOR'S REPRESENTATIVE		SIGNATURE OF CONTRACTOR'S TOOL PUSHER		

FIELD OR DIST.

COUNTY: Orange

STATE: Ca

LAST CASING, TUBING OR LINER: SIZE / MAKE / WT. & GR. / NO. JOINTS / FEET / KB TO CSG. HD. / SET AT

WIRE LINE RECORD: SIZE / NO. LINES / FT. SLIPPED / FT. CUT OFF / PRESENT LENGTH / TON MI. OR TRIPS SINCE LAST CUT / CUMULATIVE TON MI. OR TRIPS

SIZE / WT. FT. / GRADE / TOOL JT O.D. / TYPE THREAD / STRING NO. / PUMP NO. / PUMP MANUFACTURER / TYPE / STROKE LENGTH

NIGHT TOUR

DRILLING ASSEMBLY

NO.	DRILLING ASSEMBLY	
	17½ B	3.0 FT
	Sub	1.0
1	10 5/8 OD	9.68 FT
2	10 5/8 OD	19.53
3	10 5/8 OD	23.35
4	10 5/8 OD	20.68 FT
	Kelly OD	5.00 FT
		82.24
	STANDS DP	80 FT
	SINGLES DP	FT
	KELLY DOWN	10 FT
	TOTAL	172 FT
	WT. OF STRING	LBS.

BIT RECORD

BIT NO.	1
SIZE	17½
IADC CODE	
MFG.	
TYPE	mill
SER. NO.	
JETS 1/32" / TFA in²	
DEPTH OUT	121
DEPTH IN	80
TOTAL FTG	91
TOTAL HRS	5½

REMARKS: 31 Drill Pipe stands

FOOTAGE FROM: 80

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	6:30		1	cut contractor. move rig, setup mission pump, move trailer., ~~[illegible]~~ Break 42, 28, 17½, put on 17½ & trip into 80' & C.s
6:30	12		2	Drill 17½ 80 - 121

DAY TOUR

DRILLING ASSEMBLY

NO.	DRILLING ASSEMBLY	
1	BIT 17½	3.00 FT
	Sub	1
1	10 5/8 OD	9.68 FT
	10 5/8 OD	19.63 FT
	10 5/8 OD	23.36 FT
	10 5/8 OD	20.68 FT
	Kelly OD	5.00 FT
		82.24
	STANDS DP	200 FT
	SINGLES DP	20 FT
	KELLY DOWN 20	221 FT
	TOTAL 3-	302 FT
	WT. OF STRING	LBS.

BIT RECORD

BIT NO.	2
SIZE	17½
IADC CODE	
MFG.	
TYPE	mill
SER. NO.	
JETS 1/32" / TFA in²	
DEPTH OUT	[illegible]
DEPTH IN	220
TOTAL FTG	150
TOTAL HRS	16

REMARKS

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		2	~~[illegible]~~ DRILL Actual
12:30	12:40			Service Equipment
12:40				DRILL 17½ Bit 181 - 321

DRILLING CREW PAYROLL DATA

DATE: 7.18.96

WELL NAME & NO.: Lakewood 22   6t.2359

COMPANY: LakeWood

TOOL PUSHER: Larry Welch   RIG NO.: 280m

NIGHT TOUR 12:00 P.M. 12:00 A.M.

CREW	SOC. SEC. NO.	NAME	HRS.
DRILLER		Dave McGrew	12
DERRICKMAN		Jeff Frost	12
MOTORMAN		Mike Griffitz	12
FIREMAN			
FLOORMAN			
FLOORMAN			
FLOORMAN			
CRANE SUPT.			
MECHANIC			
WELDER			
ROUSTABOUT			
ROUSTABOUT			
TRAINEE			

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

7.17.96 DAY TOUR 12:00 A.M. 12:00 P.M.

CREW	SOC. SEC. NO.	NAME	HRS.
DRILLER		Ernesto Rivas	12
DERRICKMAN		MIKE RAY Thomas	13
MOTORMAN		Keith Paul	12
FIREMAN			
FLOORMAN			
FLOORMAN			
FLOORMAN			
CRANE SUPT.			
MECHANIC		7.17.96	
WELDER			
ROUSTABOUT			
ROUSTABOUT			
TRAINEE			

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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No. 363615

No. 363615

363616

DAILY DRILLING REPORT REPORT NO

Lakewood | 22 | API WELL NUMBER | WATER DEPTH | DATE 7-17-96

ATOR

CONTRACTOR Layne Western | RIG NO 280m

TURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOL PUSHER

FIELD OR DIST | COUNTY Orange | STATE Ca

WIRE LINE RECORD

DRILLING CREW PAYROLL DATA 68.2359

DATE 7-17-96

WELL NAME & NO. 22

COMPANY Lakewood

TOOL PUSHER Larry Wilch RIG NO 280m

NIGHT TOUR 12:00 P.M. 12:00 A.M.

CREW	NO.	NAME	HRS.
DRILLER		Bruce McCrael	12
DRILLMAN		Jeff Frost	12
DRILLMAN		Mike Griffith	12
FIREMAN			
FLRMAN			
FLRMAN			
FLRMAN			
CRANE SUPT.			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR ____ A.M. ____ P.M.

CREW	NO.	NAME	HRS.
DRILLER			
DRILLMAN			
DRILLMAN			
FIREMAN			
FLRMAN			
FLRMAN			
FLRMAN			
CRANE SUPT			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

HOURS DISTRIBUTION — HOURS

OPERATION	NIGHT	DAY
TRIP AND TRIP DOWN		
DRL ACTUAL		
REAMING		
CIRC		
CIRCULATION MUD & CIRCULATE		
SURVEY		
LOCATE RIG		
RIG UP & RIG DOWN		
CUT OFF DRLG LINE		
DEVIATION SURVEY		
WIRE LINE LOGS		
CASING & CEMENT		
DRILL CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRL STEM TEST		
RIG BACK		
SQUEEZE CEMENT		
PLUGS		
REPAIR RIG		
OTHER		
A. PERF'R'TN		
B. TOO TRIPS		
C. TREATING		
D. SHOOTING		
E. TESTING		
F. ADDITNL		
G.		

DAY WORK TIME SUMMARY (OFFICE USE ONLY)

CONTR. D.P.

DPS. D.P.

DP

ANCHOR

DAY WORK

DAYS

CUM

ACTIVE

DRG HRS

MUD COST

NIGHT TOUR

NO.	DRILLING ASSEMBLY (to end of run)	
	BIT	1
	9 3/4	1
	10 3/8	91.8
	10 3/8	195.5
	10 3/8	233.5
	12 3/8	326.8
Lead		5
		5224
	STANDS OF	400
	SINGLES	20
	BELLY DOWN	10
	TOTAL	510
	WT OF STRING	LBS

BIT RECORD

BIT NO.	1
SIZE	12 1/4
IADC CODE	
MFG	
TYPE	
SER NO	
JETS 1/32 /TFA in²	
DEPTH OUT	510
DEPTH IN	80
TOTAL FTG	430
TOTAL HRS	29 1/2

CUTTING STRUCTURE: INNER (1) | OUTER (2) | DULL CHAR (3) | LOCATION (4) | BEARINGS/SEALS (5) | GAGE (6) | OTHER DULL CHAR (7) | REASON PULLED (8)

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
VISC SEC	
PV YP	
GELS	
WL CC's	
pH	
SOLIDS %	

MUD & CHEMICALS ADDED

TYPE	AMT	TYPE	AMT

REMARKS

DRILLER

DAY TOUR

NO.	DRILLING ASSEMBLY (to end of run)	
	BIT	
	STANDS OF	
	SINGLES	
	BELLY DOWN	
	TOTAL	
	WT OF STRING	LBS

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MFG	
TYPE	
SER NO	
JETS 1/32 /TFA in²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG	
TOTAL HRS	

CUTTING STRUCTURE: INNER (1) | OUTER (2) | DULL CHAR (3) | LOCATION (4) | BEARINGS/SEALS (5) | GAGE (6) | OTHER DULL CHAR (7) | REASON PULLED (8)

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
VISC SEC	
PV YP	
GELS	
WL CC's	
pH	
SOLIDS %	

MUD & CHEMICALS ADDED

TYPE	AMT	TYPE	AMT

REMARKS

DRILLER

NIGHT TOUR

FOOTAGE | FORMATION (SHOW CORE RECOVERY) | ROTARY RPM | WT ON BIT 1000# | PUMP PRESS | PUMP NO. LINER SIZE | PUMP NO. S.P.M. | PUMP NO. LINER SIZE | PUMP NO. S.P.M. | TOTAL GPM | METHOD MUD GEL-S PAR SL-P

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	VERT DISP	DEPTH	DEV	DIR	TVD	VERT DISP	DEPTH	DEV	DIR	TVD	VERT DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equip
12:30	2:00		2	Drill 12 1/4 321 - 510

DAY TOUR

FOOTAGE | FORMATION (SHOW CORE RECOVERY) | ROTARY RPM | WT ON BIT 1000# | PUMP PRESS | PUMP NO. LINER SIZE | PUMP NO. S.P.M. | PUMP NO. LINER SIZE | PUMP NO. S.P.M. | TOTAL GPM | METHOD MUD GEL-S PAR SL-P

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	VERT DISP	DEPTH	DEV	DIR	TVD	VERT DISP	DEPTH	DEV	DIR	TVD	VERT DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS

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363617

DAILY DRILLING REPORT REPORT NO

WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
22			7-18-96

CONTRACTOR: Layne Western 280m RIG NO.

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOL PUSHER

FIELD OR DIST. COUNTY Orange STATE Ca

LAST CASING TUBING OR LINER: SIZE | BASE | WT & GR | NO JOINTS | FEET | REG TO CSG NO | SET AT

WIRE LINE RECORD REEL NO.
SIZE | NO. LINES | FT SLIPPED
FT CUT OFF | PRESENT LENGTH
TON MI OR TRIPS SINCE LAST CUT
CUMULATIVE TON MI OR TRIPS

DRILLING CREW PATROL DATA
DATE 7-18-96
WELL NAME & NO. 22
COMPANY Lakewood
TOOL PUSHER Leroy Welch RIG NO 280m

68.23.59

	WT. PT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

DRILLING CREW DISTRIBUTION — HOURS

OPERATION	NIGHT	DAY
ACTUAL		

NIGHT TOUR

DRILLING ASSEMBLY

NO.			
1	BIT 17½	3	00 FT
	SUB	1	00
	20 6¼ DC	9	08 FT
	10 6¼ DC	93	53 FT
	10 5¼ DC	93	35 FT
	10 5¼ DC	92	68 FT
	DC		FT
Kelly		5	00
		827	24
	STANDS OF		FT
	SINGLES OF		FT
	KELLY DOWN		FT
	TOTAL		FT

WT OF STRING LBS

BIT RECORD

BIT NO.	
SIZE	17½
IADC CODE	
MFG.	
TYPE	Mill
SER. NO.	
JETS 1/32" / TFA in²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG.	
TOTAL HRS.	

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION | BEARINGS/SEALS | GAGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
VISC SEC	
PV YP	
GELS	
WL CC'S	
pH	
SOLIDS %	

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT.

REMARKS

DRILLER

FOOTAGE

FROM	TO	NO. S CORE C.	CORE NO.	FORMATION (FROM CORE RECOVERY)	ROTARY RPM	WT ON BIT 1000s	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL GPM	METHOD USED (DC=1 PDM=2)

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		2	Drill 737-741
12:30	1:00		7	Service Equip
1	12		2	Drill 741-1021

NIGHT TOUR 12:00 A.M. 12.00 A.M.

CREW	SOC. SEC. NO.		
DRILLER		Bryce McGraw	12
DRILLMAN		Jeff Frost	12
NITEMAN		Mike Griffith	10
FIREMAN			
FLRMAN			
FLRMAN			
FLRMAN			
CRANE OPR			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DRILLING ASSEMBLY

NO.			
1	BIT 17½	3	00 FT
	SUB	1	00
	10 5¼ DC	94	68 FT
	10 5¼ DC	19	53 FT
	10 5¼ DC	23	35 FT
	10 5¼ DC	28	68 FT
	DC		FT
Kelly		5	00
		827	24
	STANDS OF	6	48 FT
	SINGLES OF	2	20 FT
	KELLY DOWN	1	15 FT
	TOTAL	737	FT

WT OF STRING LBS

BIT RECORD

BIT NO.	
SIZE	17½
IADC CODE	
MFG.	
TYPE	Mill
SER. NO.	
JETS 1/32" / TFA in²	737
DEPTH OUT	0356
DEPTH IN	80
TOTAL FTG.	737
TOTAL HRS.	41

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION | BEARINGS/SEALS | GAGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
VISC SEC	
PV YP	
GELS	
WL CC'S	
pH	
SOLIDS %	

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT.

REMARKS

DRILLER

FOOTAGE

FROM	TO	NO. S CORE C.	CORE NO.	FORMATION (FROM CORE RECOVERY)	ROTARY RPM	WT ON BIT 1000s	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL GPM	METHOD USED (DC=1 PDM=2)

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		2	Drill 17½ 520-520
12:30	12:40		7	Service Rigging
12:40	12:00		2	Drill 17½ 520-737

DAY TOUR 12:00 A.M. 12.00 A.M.

CREW	SOC. SEC. NO.		
DRILLER		Ernesto Rivera	12
DRILLMAN		MIKE RAY THOMAS	12
NITEMAN		Keith Paul	12
FIREMAN			
FLRMAN			
FLRMAN		Pat	
FLRMAN			
CRANE OPR			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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i3618

DAILY DRILLING REPORT REPORT NO.

Kettleman	WELL NO 22	API WELL NUMBER	WATER DEPTH	DATE 7-19-96
E OF OPERATOR'S REPRESENTATIVE		CONTRACTOR Cayn Westen		RIG NO 280m
		SIGNATURE OF CONTRACTOR'S TOOL PUSHER		

FIELD OR DIST. COUNTY Orange STATE C.

DRILLING CREW PAYROLL DATA

DATE 7-19-96

WELL NAME & NO. 22

COMPANY Lakewood

TOOL PUSHER Larry Hill

RIG NO. 280m

68.2359)

NIGHT TOUR

NIGHT TOUR 12:00 P.M. 12:00 A.M.

NO	DRILLING ASSEMBLY	FT
	BIT Sub	1.00
	10 5/8 OD	9.68
	10 5/8 OD	19.53
	10 5/8 OD	23.35
	10 5/8 SW	20.68
	Kelly	5.00
		82.24
	STANDS DP	1240
	KELLY DOWN	20
	TOTAL	1341

BIT RECORD	
BIT NO	
SIZE	17½
IADC CODE	
TYPE	mill

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	12:30			Drill 1326 1340
12:30	330			Circ trip out wait for E-Log
330	7			E-Log & ~~go get trailer~~
7	8			Drive to Chino
8	9:30			& Service trailer
9:30	10			Drive to the site
10	12			set up to run test

CREW	NAME	HRS	
DRILLER	Bruce McGraw	12	a
DERRICKMAN	Jeff Frost	12	a

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DAY TOUR 12 A.M. 12

NO	DRILLING ASSEMBLY	FT
1	BIT 17½	3.00
	Sub	1
	10 5/8 OD	9.68
	10 5/8 OD	19.83
	10 5/8 OD	23.35
	10 5/8 OD	20.68
	Kelly	5.00
		82.24
	STANDS DP	1200
	SINGLES DP	20
	KELLY DOWN	20
	TOTAL	1320

BIT RECORD	
BIT NO	1
SIZE	17½
IADC CODE	
TYPE	mill
DEPTH OUT	1320

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:15		7	Service Equipment
12:15	12:00		2	DRILLING 17½ 1021 = 1301 1341

CREW	NAME	HRS
DRILLER	Ernesto [illegible]	12
DERRICKMAN	Alfie Ray Thomas	12
MOTORMAN	Keith [illegible]	12

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No. 363618

No. 363618

363619

DAILY DRILLING REPORT — REPORT NO

Lakewood Calaway | WELL NO. 22 | API WELL NUMBER | WATER DEPTH | DATE 7-20-96

OR

CONTRACTOR

URE OF OPERATOR'S REPRESENTATIVE

LAYNE Western
SIGNATURE OF CONTRACTOR'S TOOL PUSHER

RIG NO 2820

ID	WT. PT.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DIST. | COUNTY ORANGE | STATE CA

CASING, TUBING OR LINER	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	REC. IN CSG. NO.	WT AT

WIRE LINE RECORD — REEL NO.
SIZE | NO. LINES | FT. SLIPPED
FT. CUT OFF | PRESENT LENGTH
TON MI OR TRIPS SINCE LAST CUT
CUMULATIVE TON MI OR TRIPS

DRILLING CREW PAYROLL DATA
DATE 7-20-96 — 65.459
WELL NAME & NO. 22
COMPANY LAYNE Western
TOOL PUSHER LARRY Welch — RIG NO. 2820

NIGHT TOUR 12:00 P.M. 12:00 A.M.

CREW	SOC. SEC. NO.	NAME	HRS.	INJURED ON THIS TOUR: INITIAL	YES OR NOT
DRILLER		Bruce McGraw	12		
DERRICK		Jeff Frost	12		
MTRMAN					
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ASTABOUT					
ASTABOUT					
TRAINEE					

NO. OF DAYS | SINCE LAST LOST TIME ACCIDENT

DAY TOUR 12:00 A.M. 12 P.M.

CREW	SOC. SEC. NO.	NAME	HRS.	INJURED ON THIS TOUR: INITIAL	YES OR NOT
DRILLER		Ernesto Rivera	12½		
DERRICK		MIKE RAY THOMAS	12		
MTRMAN		Keith Pearl	6½		
FIREMAN					
FLRMAN					
FLRMAN					
FLRMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ASTABOUT					
ASTABOUT					
TRAINEE					

NO. OF DAYS | SINCE LAST LOST TIME ACCIDENT

E DISTRIBUTION — HOURS

OPERATION	NIGHT	DAY
AND JOINT		
ACTUAL		
NG		
TION MUD VLATE		
CATE RIG		
R RIG		
PP NG LINE		
TION SURVEY		
LINE LOGS		
ASING & CEMENT		
ON CEMENT		
E UP B.O.P.		
B.O.P.		
STEM TEST		
RACE		
EZE CEMENT		
ND		
WORK		
A. PERF'R'TN		
B. TOG TRIPS		
C. TREATING		
D. SHADDING		
E. TESTING		
F. ADDT'NL		
G.		
CONTR. D.P.		
OPS. D.P.		
TO TP		
STANDBY		
M. DAY WORK		

DAY WORK TIME SHEET SIGNED BY OPERATOR'S REP. | CONTR. REP.

DAYS
ULATIVE ATING HRS.
AL AND COST

NO.	DRILLING ASSEMBLY (All and all time)		
	BIT		FT
		OD	FT
		OD	FT
		OD	FT
		OD	FT
		OD	FT
	STANDS DP		FT
	SINGLES DP		FT
	KELLY DOWN		FT
	TOTAL		FT
	WT. OF STRING		LBS

BIT RECORD

BIT NO.			
SIZE			
IADC CODE			
MFG			
TYPE			
SER. NO.			
JETS 1/32" /TFA in²			
DEPTH OUT			
DEPTH IN			
TOTAL FTG			
TOTAL HRS			

CUTTING STRUCTURE

INNER 1	OUTER 2	DULL CHAR 3	LOCATION 4
BEARINGS/SEALS 5	GAGE 6	OTHER DULL CHAR 7	REASON PULLED 8

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC. SEC.			
PV YP			
GELS			
WL CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT	TYPE	AMT

REMARKS

DRILLER

NIGHT TOUR

NO.	DRILLING ASSEMBLY (All and all time)		
	BIT		FT
		OD	FT
		OD	FT
		OD	FT
		OD	FT
		OD	FT
	STANDS DP		FT
	SINGLES DP		FT
	KELLY DOWN		FT
	TOTAL		FT
	WT. OF STRING		LBS

BIT RECORD

BIT NO.			
SIZE			
IADC CODE			
MFG			
TYPE			
SER. NO.			
JETS 1/32" /TFA in²			
DEPTH OUT			
DEPTH IN			
TOTAL FTG			
TOTAL HRS			

CUTTING STRUCTURE

INNER 1	OUTER 2	DULL CHAR 3	LOCATION 4
BEARINGS/SEALS 5	GAGE 6	OTHER DULL CHAR 7	REASON PULLED 8

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
VISC. SEC.			
PV YP			
GELS			
WL CC'S			
pH			
SOLIDS %			

MUD & CHEMICALS ADDED

TYPE	AMT	TYPE	AMT

REMARKS

DRILLER

DAY TOUR

FOOTAGE

FROM	TO	DR. D Rec. B CORE. C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM	METHOD DRILL DOG-D PAR DR-P

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	6			Finish tripping in. 1230 run cable & start grabbing & had problem with Bridging at 920
6	12			Trip out - trip pipe more

FOOTAGE

FROM	TO	DR. D Rec. B CORE. C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY RPM	WT. ON BIT 1000#	PUMP PRESS	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	PUMP NO. LINER SIZE	PUMP NO. S.P.M.	TOTAL GPM	METHOD DRILL DOG-D PAR DR-P

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
10:30	12:00			Driven Truck Chine shop to JOB Site
12:00	5:00		20	Clean tank water watch
5:00	8:00		20	move collers aboard Ben Scool and
			20	Rig pool Out Zone tool in hole.
8:00	1000			wait for Zone tool Schedule
1000	12		6	trip in Zone tool 0 to 960 ft
12:00	12:30			water watch

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APPROVED — APPROVED — No. 363619

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APPROVED — APPROVED — No. 363619

363620

DAILY DRILLING REPORT REPORT NO.

FOR Lake Wood | WELL NO. 22 | API WELL NUMBER | WATER DEPTH | DATE 7-21-96

CONTRACTOR Layne Western | RIG NO. 280M

SIGNATURE OF OPERATOR'S REPRESENTATIVE | SIGNATURE OF CONTRACTOR'S TOOL PUSHER

SIZE	WT. PF.	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR UNIT | COUNTY Orange | STATE Cal

	SIZE	MAKE	WT. & GR.	NO. JOINTS	FEET	MD TO CSG. SHOE	SET AT
LAST CASING, TUBING OR LINER							

WIRE LINE RECORD — WIRE NO.
SIZE | NO. LINES | FT. SLIPPED | FT. CUT OFF | PRESENT LENGTH
TOH W. OR TRIPS SINCE LAST CUT
CUMULATIVE TOH W. OR TRIPS

DRILLING CREW PAYROLL DATA
DATE 7-21-1996
WELL NAME & NO. 22
COMPANY Layne Western
TOOL PUSHER Larry Weiss | RIG NO. 280 M

NE DISTRIBUTION — HOURS

OPERATION	NIGHT	DAY
AND DOWN		
ACTUAL		
NG		
S		
TION MUD SA. ATE		
CATE RIG		
R RIG		
PP NING LINE		
TION SURVEY		
LING LOGS		
ASING & CEMENT		
DH CEMENT		
E UP B.O.P.		
B.O.P.		
STEM TEST		
BACK		
ESS CEMENT		
NG		
NDER		
A. PERF'R'TN		
B. TRIPS		
C. TREATING		
D. SHADDING		
E. TESTING		
F. ADDITN'L		
G.		
DAY WORK TIME SUMMARY (OFFICE USE ONLY)		
CONTR. D.P.		
OPR. D.P.		
LTP		
ANDBY		
DAY WORK		
DAYS WORK ATIVE ING HRS.		
MUD ONLY		

Instrument Association of Drilling Contractors

NO. | DRILLING ASSEMBLY

DP	5½	1 00
	5½	968 FT
	10 3/8 OD	933.1
	10 3/8 OD	233.1
	Coll OD	50.1
		50
		61.56
STAND UP		FT
SINGLES		FT
KELLY DOWN		FT
TOTAL		FT

WT. OF STRING LBS.

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MFG	
TYPE	
SER. NO.	
JETS 32nds /IN.²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG	
TOTAL HRS.	

CUTTING STRUCTURE: INNER | OUTER | BALL CAGE | LOCATION
BEARINGS/SEALS | GAUGE | OTHER DULL CHAR. | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
VISC.-SEC.	
PV YP	
GELS	
WL -CC'S	
pH	
SOL. NON %	

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT

REMARKS

DRILLER

NIGHT TOUR

NO. | DRILLING ASSEMBLY

DP	FT
	FT
	FT
	FT
	FT
	FT
STAND UP	FT
SINGLES	FT
KELLY DOWN	FT
TOTAL	FT

WT. OF STRING LBS.

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MFG	
TYPE	
SER. NO.	
JETS 32nds /IN.²	
DEPTH OUT	
DEPTH IN	
TOTAL FTG	
TOTAL HRS.	

CUTTING STRUCTURE: INNER | OUTER | BALL CAGE | LOCATION
BEARINGS/SEALS | GAUGE | OTHER DULL CHAR. | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
VISC. SEC.	
PV YP	
GELS	
WL -CC'S	
pH	
SOL. NON %	

MUD & CHEMICALS ADDED: TYPE | AMT. | TYPE | AMT

REMARKS

DRILLER

DAY TOUR

FOOTAGE | CORE NO. | CORE RECOVERY | FORMATION (SHOW CORE RECOVERY) | ROTARY RPM | WT. ON BIT | PUMP PRESS | PUMP NO. (LINER, SPM) | PUMP NO. (LINER, SPM) | TOTAL GPM | METHOD USED

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	5			pull zone tool free
5	12			take zone, PT take Load collars
				on trip into 100
				Recem 100 - 440

NIGHT TOUR 12:00 P.M. 12:00 A.M.

CREW	SOC. SEC. NO.	NAME	HRS.
DRILLER		Bruce L McGraw	12
DRILLMAN		Jeff Frost	12
NITEMAN			
FIREMAN			
FLRMAN			
FLRMAN			
CRANE SUPT			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO. OF DAYS | SINCE LAST LOST TIME ACCIDENT

FOOTAGE | CORE NO. | CORE RECOVERY | FORMATION (SHOW CORE RECOVERY) | ROTARY RPM | WT. ON BIT | PUMP PRESS | PUMP NO. (LINER, SPM) | PUMP NO. (LINER, SPM) | TOTAL GPM | METHOD USED

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:15		7	Service equipment
12:15	12:00		20	try to free DP & zone tool to 550'

DAY TOUR 12 A.M. 12 P.M.

CREW	SOC. SEC. NO.	NAME	HRS.
DRILLER		Ernesto Bruno	12
DRILLMAN		Mike Del Barrio	12
NITEMAN		Keith Bird	12
FIREMAN			
FLRMAN			
FLRMAN			
FLRMAN			
CRANE SUPT			
MECHANIC			
WELDER			
RSTABOUT			
RSTABOUT			
TRAINEE			

NO. OF DAYS | SINCE LAST LOST TIME ACCIDENT

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.028090

DAILY DRILLING REPORT REPORT NO.

LEASE: Lakewood | WELL NO. 22 | API WELL NUMBER | WATER DEPTH | DATE 7-25-96

OPERATOR | CONTRACTOR Logan Western | RIG NO. 280m

NATURE OF OPERATOR'S REPRESENTATIVE | SIGNATURE OF CONTRACTOR'S TOOLPUSHER

SIZE	WEIGHT	GRADE	TOOL JOINT	TYPE THREAD	STRING NO	PUMP NO	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DISTRICT | COUNTY LA | STATE CA

LAST CASING TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO JOINTS	LENGTH	PKR ID TOOL NO	SET AT

WIRE LINE RECORD NO. | SIZE | NO. LINES | LENGTH DROPPED | LENGTH CUT OFF | PRESENT LENGTH | AT LAST TRIPS SPACE OUT | CUMULATIVE AT LAST CUT OFF | CUMULATIVE AT LAST TRIPS

DRILLING CREW PAYROLL DATA

DATE 7-25-96 | GW-2359

WELL NAME & NO. 22

COMPANY Lakewood

TOOLPUSHER Larry Welch RIG NO. 280m

TIME DISTRIBUTION – HOURS

OPERATION	NIGHT	DAY
RIG UP AND TEAR DOWN		
DRILL ACTUAL		
REAMING		
CORING		
CONDITION MUD & CIRCULATE		
TRIPS		
WORK ATTEMPTED		
REPAIR RIG		
SLIP AND CUT DRILLING LINE		
DEVIATION SURVEY		
WIRE LINE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
PLUG BACK		
SQUEEZE CEMENT		
FISHING		
OTHER WORK		
A. PERFORATING		
B. TUBING TAPS		
C. CIRCULATING		
D. DIVERTING		
E. TESTING		
F.		
G.		
H.		
SLIP		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

AS W/ CONTR D.P.	
AS W/ OPR D.P.	
AS WITHOUT D.P.	
AS STANDBY	
AS DAYWORK	
LN DAYS SPUD TO RATIG RELEASE	
TOTAL MUD COST	

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
	BIT	
	ST	
	DC	
	MS	
	SS	
	HT	
	STANDS D.P.	
	SINGLES D.P.	
	KELLY DOWN	
	TOTAL	

WT. UP STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUF. ACTUAL NO.	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: ROW | OUTER | DULL CHAR | LOCATION | BEARINGS/SEALS | GAUGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED: TYPE | AMOUNT | TYPE | AMOUNT

REMARKS

DRILLER

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
	BIT	
	ST	
	DC	
	MS	
	SS	
	HT	
	STANDS D.P.	
	SINGLES D.P.	
	KELLY DOWN	
	TOTAL	

WT. UP STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUF. ACTUAL NO.	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: ROW | OUTER | DULL CHAR | LOCATION | BEARINGS/SEALS | GAUGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED: TYPE | AMOUNT | TYPE | AMOUNT

REMARKS

DRILLER

NIGHT TOUR

DEPTH INTERVAL: FROM | TO | DRILLED BEARING CORED C | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO. LINER SIZE | SPM | PUMP NO. LINER SIZE | SPM | TOTAL PUMP OUTPUT | METHOD DRILLED SINGLE PARALLEL COMPOUND

DEVIATION RECORD: DEPTH | DEV | DIR | TVD | HORIZ DISP | DEPTH | DEV | DIR | TVD | HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
10 00	2			Drift Zone B 2 1010-1050
2	330			Run pull fishing & run sub
330	530		B	run sub
530	5 30			Wait for meter Hlwky
5 30	12		E	run sub

DAY TOUR

DEPTH INTERVAL: FROM | TO | DRILLED BEARING CORED C | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO. LINER SIZE | SPM | PUMP NO. LINER SIZE | SPM | TOTAL PUMP OUTPUT | METHOD DRILLED SINGLE PARALLEL COMPOUND

DEVIATION RECORD: DEPTH | DEV | DIR | TVD | HORIZ DISP | DEPTH | DEV | DIR | TVD | HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		E	finish pump zone 1 pull sub : 2:1
12 30	4:30		E	trip out pipe to Zone tool, clean it
4:30	5:30			Sct. to gravel 1060
5:30	8:00		6	trip pipe into hole to Zone # 2
8:00	10:30			set the seal 1006
10:30	12:00			Airlift

NIGHT TOUR

FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	YES OR NOT
DRILLER		Bruce McGee	12		
DRILLERMAN		Jeff Frost	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHOP					
MECHANIC					
WELDER					
HOUSEMOVER					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	YES OR NOT
DRILLER		Ernesto Rivera	12		
DRILLERMAN		MIKE RAY Thomas	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
CRANE SHOP					
MECHANIC					
WELDER					
HOUSEMOVER					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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No. DRILLER

o.028087

DAILY DRILLING REPORT REPORT NO.

LEASE	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Lake wood	22			7-22-96

OPERATOR

SIGNATURE OF OPERATOR'S REPRESENTATIVE

CONTRACTOR Layne Western — RIG NO.

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

7280 M

FIELD OR WILDCAT — COUNTY ORANGE — STATE — LOCATION

WIRE LINE RECORD — SIZE — NO. LINES — LENGTH (FEET) — PRESENT LENGTH

DRILLING CREW PAYROLL DATA

DATE 7-22-1996

WELL NAME & NO 22

COMPANY LAKE WESTERN

TOOLPUSHER LARRY WELCH — PHONE 250 61

TIME DISTRIBUTION - HOURS

CODE - OPERATION	NIGHT	DAY
PICK UP AND LAY DOWN		
DRILL ACTUAL		
REAMING		
CORING		
CIRCULATE AND CONDITION		
TRIPS		
TERMINATE RIG		
RIG REPAIRS		
DEVIATION SURVEY		
WIRE LINE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
PLUG BACK		
SQUEEZE CEMENT		
OTHER		
AIR WORK		
A PENETRATION		
B TUBING TRIPS		
C TREATING		
D SWABBING		
E TESTING		
F		
G		
H		
I.B.		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

a. ON CENTER D.P.	
b. ON OPEN D.P.	
c. WITHDRAW D.P.	
d. STANDBY	
e. DAYWORK	
f. DAYS SPUD	
g. CUMULATIVE TIME HOURS	
MUD COST	
MUD USED	

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
1	BIT 8 1/2	3.00
5	SUB	1.00
1	10 5/8	9.68
2	10 3/4	19.83
3	10 3/4	1335
	STANDS DP	
	SINGLES DP	5.00
	KELLY DOWN	41.56
	TOTAL	1356

WT OF STRING

REMARKS

BIT RECORD

BIT NO	1
SIZE	17 1/2
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: MAIN — OUTER — DULL CHAR — LOCATION

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED: TYPE — AMOUNT — TYPE — AMOUNT

DEPTH INTERVAL

FROM	TO	DRILL BEAM CORE	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	SPM	PUMP NO. LINER SIZE	SPM	TOTAL PUMP OUTPUT	METHOD PUR SINGLE P PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	N/S DISP	E/W DISP	DEPTH	DEV	DIR	TVD	N/S DISP	E/W DISP

TIME FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATION IN SEQUENCE AND REMARKS
12:00	1		3	mix mud + Circ
1	12:00			Drlg 780 - 1100

NIGHT TOUR

FROM 12:00 A TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	PLANNED ON THIS TOUR INITIAL	YES OR NOT
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CHAIN SLIPS					
WELDER					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
THANKS					

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
1	BIT 8 1/2	3.00
1	SUB	1.00
10518		9.68
12 6/8		19.83
12 6/8		23.35
Kelly		5.00
		61.56
	STANDS DP	680
	SINGLES DP	20
	KELLY DOWN	
	TOTAL	780

WT OF STRING

REMARKS

BIT RECORD

BIT NO	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: MAIN — OUTER — DULL CHAR — LOCATION

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED: TYPE — AMOUNT — TYPE — AMOUNT

DEPTH INTERVAL

FROM	TO	DRILL BEAM CORE	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	SPM	PUMP NO. LINER SIZE	SPM	TOTAL PUMP OUTPUT	METHOD PUR SINGLE P PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	N/S DISP	E/W DISP	DEPTH	DEV	DIR	TVD	N/S DISP	E/W DISP

TIME FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATION IN SEQUENCE AND REMARKS
12:00	12:15		7	Service Equipment
12:15	8:00		2	Ramming 440 to 780
8:00	11:30			WAIT on Mud.
11:30	12:00		5	Mix 6 Bag Mud

DAY TOUR

FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	PLANNED ON THIS TOUR INITIAL	YES OR NOT
DRILLER		Ernesto Rivas	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CHAIN SLIPS					
WELDER					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
THANKS					

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).028088

DAILY DRILLING REPORT — REPORT NO.

LEASE	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Pike west	22			7-23-96

OPERATOR

CONTRACTOR: RANIC Western — RIG NO.: 10m

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

P SIZE	WEIGHT	GRADE	THD JT I.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DISTRICT — COUNTY: Owyhee — STATE/COUNTY: Id

LAST CASING, TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO. JOINTS	LENGTH	HOLE OR CASING NO.	SEAT

WIRE LINE RECORD — WELL NO. — SIZE — NO. LINES — LENGTH SPOOLED — PRESENT LENGTH — FERRULE DEPTH — AT END OF TRIPS SINCE LAST CUT — LOCATION OF MARKER(S)

DRILLING CREW PAYROLL DATA

DATE 7-23-96

WELL NAME & NO. 22

COMPANY Cross Timbers

TOOLPUSHER Larry Welch RIG NO. 10m

TIME DISTRIBUTION – HOURS

OPERATION	NIGHT	DAY
RIG UP AND TEAR DOWN		
REPAIR ACTUAL		
RIG SERVICE		
DRILLING		
CIRCULATE AND CONDITION MUD		
TRIPS		
LUBRICATE RIG		
WASH PIPE		
CUT DRILLING LINE		
DEVIATION SURVEY		
WIRE LINE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
PLUG BACK		
SQUEEZE CEMENT		
FISHING		
JUNK IN HOLE		
A PERFORATING		
B TUBING TRIPS		
C REAMING		
D BOWSPRING		
E TESTING		
F		
G		
H		
M.B.		

BAYWORK TIME SUMMARY (OFFICE USE ONLY)

No. OF CUMTR. D.P.	
No. OF OPR. D.P.	
No. WITHOUT D.P.	
No. STANDBY	
No. BAYWORK	
TOTAL DAYS WORKED	
CUMULATIVE DRILLING HOURS	
TOTAL MUD COST	
TOTAL MUD LOST	

DRILLING ASSEMBLY (All out of hole)

NO.	ITEM	LENGTH
	BIT	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

REMARKS

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION

MEASURED DEPTH | GAGE | DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

NIGHT TOUR

DEPTH INTERVAL

FROM	TO	DRILL B BEAR & CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	TOTAL PUMP OUTPUT	METHOD RUN SINGLE S PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	8			set to gravel & Gravel zone tool to 1197 set seal 1197-1185 A.I.S.I. 1210-1230
8	12			

NIGHT TOUR — FROM 12:00 TO 12:00

CREW	EMPL ID NO.	NAME	HRS	INITIAL	HOURS ON THIS TOUR YES OR NO?
DRILLER		Bruce McGee	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN					
PIPEMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SURF					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DRILLING ASSEMBLY (All out of hole)

NO.	ITEM	LENGTH
1	Bit 17½	3.00
1	Pump	30.00
	10 3/4 LW	9.68
	10 3/4 LW	1953
	10 3/4 LW	25.55
	Kelly	5.00
		61.56
	STANDS ___ D.P.	1160
	SINGLES ___ D.P.	20
	KELLY DOWN	12.60
	TOTAL	1260

WT. OF STRING

REMARKS

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION

MEASURED DEPTH | GAGE | DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DAY TOUR

DEPTH INTERVAL

FROM	TO	DRILL B BEAR & CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	TOTAL PUMP OUTPUT	METHOD RUN SINGLE S PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equipment
12:30	7:30		3	Reaming 1100 ft to 1260 t.d.
7:30	9:00		6	trip out
9:00	12:00		6	t.i.h. wo c to 1230

DAY TOUR — FROM 12 TO 12

CREW	EMPL ID NO.	NAME	HRS	INITIAL	HOURS ON THIS TOUR YES OR NO?
DRILLER		Creigh Rose	12		
DERRICKMAN		Mike Stevens	12		
MOTORMAN		Keith Hall	12		
PIPEMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SURF					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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028089

DAILY DRILLING REPORT — REPORT NO.

OPERATOR	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
AKF Wood	22			7-24-1986

CONTRACTOR: Layne Western — RIG NO. 282 #1

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

FIELD OR DISTRICT — COUNTY: Orange — STATE/COUNTRY: CA

WIRE LINE RECORD

DRILLING CREW PAYROLL DATA

DATE: 7-24-1986

WELL NAME & NO: 22

COMPANY: Layne Western

TOOL PUSHER: Earl Welch — RIG NO. 282 #1

TIME DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
RIG UP AND DERRICK		
RIG ACTUAL		
REPAIR		
RIG SERVICE		
DRILLING MUD CHANGE		
UPS		
DRILL STEM TEST		
PARTING		
DEVIATION SURVEY		
WIRE LINE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
PICK UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
LAY BACK		
CORE & CORE ANALYSIS		
SQUEEZE CEMENT		
REMARKS		

DRILLING ASSEMBLY (all and all four)

NO	ITEM	LENGTH
	BIT	
	STANDS ... DP	
	SINGLES ... DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

REMARKS

BIT RECORD

BIT NO			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO			
JETS			
TFA			
DEPTH OUT			
DEPTH IN			
TOTAL DRILLED			
TOTAL HOURS			
CUTTING STRUCTURE: INNER			
CUTTING STRUCTURE: OUTER			
CUTTING STRUCTURE: DULL CHAR			
CUTTING STRUCTURE: LOCATION			

MUD RECORD

TIME	
WEIGHT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DRILLING ASSEMBLY (all and all four)

NO	ITEM	LENGTH
	BIT	
	STANDS ... DP	
	SINGLES ... DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

REMARKS

BIT RECORD

BIT NO			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO			
JETS			
TFA			
DEPTH OUT			
DEPTH IN			
TOTAL DRILLED			
TOTAL HOURS			
CUTTING STRUCTURE: INNER			
CUTTING STRUCTURE: OUTER			
CUTTING STRUCTURE: DULL CHAR			
CUTTING STRUCTURE: LOCATION			

MUD RECORD

TIME	
WEIGHT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

A PERFORATING	
B TUBING TRIPS	
C TREATING	
D BREAKDOWN	
E TESTING	
F	
G	
H	
I	
J	
K W/ CONTR D/P	
L W/ OPR D/P	
M W/ HEAT D/P	
N STANDBY	
O DAYWORK	
P DAYS SPUD	
Q ESTIMATIVE DRLG HRS	
R MUD COST	
S MUD COST	

DEPTH INTERVAL — FROM / TO

DRILL BIT / REAM BIT / CORE BIT

CORE NO.

FORMATION (SHOW CORE RECOVERY)

ROTARY TABLE SPEED

WT ON BIT

PUMP PRESSURE

PUMP NO — LINER SIZE / SPM / LINER SIZE / SPM

TOTAL PUMP OUTPUT

METHOD USED — BIT / REAM BIT / CORE BIT

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

RIGHT TOUR

TIME FROM	TIME TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	2:30		B	pull air-line & run 5-5 into pipe tub
2:30	12		B	run 5-5

DAY TOUR

TIME FROM	TIME TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	5:30		2C	Airlift well on Zone #1
5:30	6:30		2C	Pull 5" pipe to drill drain, screen hole to clean out, change out to 10", change out to 6" screen
6:30	12:00		2C	Wait on Drain BAKER tank

NIGHT TOUR — FROM 12:00 TO 12:00

CREW	EMPL ID NO.	NAME	HRS	HOURS ON THIS TOUR: INITIAL	YES OR NO?
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Frost	12		
MUDMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

DAY TOUR — FROM 12 TO 12

CREW	EMPL ID NO	NAME	HRS	HOURS ON THIS TOUR: INITIAL	YES OR NO?
DRILLER		Ernesto Sisa	12		
DERRICKMAN		Mike Ray Thomas	12		
MUDMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CHANGE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NET OR DAYS SPENT LAST FOR THIS ACTIVITY

28091

DAILY DRILLING REPORT REPORT NO.

WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Lakewood 22			7-26-96

CONTRACTOR Layne Western — RIG NO. 280m

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

URE OF OPERATOR'S REPRESENTATIVE

WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR CENTRAL — COUNTY — STATE

LAST CASING TURING OR LINER: SIZE | WEIGHT | NAME | GRADE & GRADE | NO. JOINTS | LENGTH | TOP TO SHOE NO. | SET AT

WIRE LINE RECORD — WELL NO. — SIZE — NO. LINES — LENGTH SPOOLED — LENGTH CUT OFF — PRESENT LENGTH — AS ON GET TRIPS SINCE LAST CUT — CUMULATIVE WEAR ON TRIPS

DISTRIBUTION – HOURS

	NIGHT	DAY
RIG UP AND DOWN		
DRILLING ACTUAL		
REAMING		
CIRCULATE MUD & CONDITION		
TRIPPING		
CORING		
CUT OFF DRILL LINE		
SURVEY		
WIRE LINE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
PLUG BACK		
SQUEEZE CEMENT		
FISHING		
REPAIR RIG		
OTHER		
PUMP CHANGE		
TUBING TRIPS		
TREATING		
REWORKING		
TESTING		
DAYWORK TIME SUMMARY (OFFICE USE ONLY)		
W/ OUTER D.P.		
W/ DPE D.P.		
W/ WITHOUT D.P.		
STANDBY		
DAYWORK		
DAYS SPUD		
DAYS TIMD HOURS		
MUD COST		
MUD COST		

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
	BIT	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE

INNER	OUTER	DULL CHAR	LOCATION

MUD RECORD

TIME	
WEIGHT	
PIN SHAKING GRADIENT	
FUNNEL VISCOSITY	
PVYP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

NIGHT TOUR

DEPTH INTERVAL FROM	DEPTH INTERVAL TO	DRILL'D REAM'D CORE'D	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD MUD GAGED & PARALLEL P COMPOUND Z

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP

TIME FROM	TIME TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	3			Airlift well zone #3
3	4:30		E	pull airline & run sub
4:30	11:30		6	run sub in zone #3 905-925
11:30	12:00			shut down pump – [illegible]

DRILLING CREW PAYROLL DATA

DATE 7.26.96 — 65.2359

WELL NAME & NO. 22

COMPANY Lakewood

TOOLPUSHER Larry Welch RIG NO. 280

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS.	INJURED ON THIS TOUR? INITIAL	YES OR NOT
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Ezell	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
THANKS					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
	BIT	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE

INNER	OUTER	DULL CHAR	LOCATION

MUD RECORD

TIME	
WEIGHT	
PIN SHAKING GRADIENT	
FUNNEL VISCOSITY	
PVYP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

DAY TOUR

DEPTH INTERVAL FROM	DEPTH INTERVAL TO	DRILL'D REAM'D CORE'D	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD MUD GAGED & PARALLEL P COMPOUND Z

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP	DEPTH	DEV	DIR	TVD	HORZ DISP

TIME FROM	TIME TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	1:00		E	Finish pump Zone #2 1038–1052
1:00	4:00		6	Trip out pipe clean Zone tool.
4:00	6:00		6	trip pipe into hole to Zone #3 905–925
6:00	8:00			Set Seal 888 ft
8:00	12:00			Airlift Zone #3 905–925

DRILLING CREW PAYROLL DATA

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS.	INJURED ON THIS TOUR? INITIAL	YES OR NOT
DRILLER		Ernesto Rivas	12		
DERRICKMAN		MIKE RAY THAME	12		
MOTORMAN		Keith pearl	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
THANKS					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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028092

DAILY DRILLING REPORT — REPORT NO.

LSE: LATIE WOOD — WELL NO.: 22 — API WELL NUMBER — WATER DEPTH — DATE: 1-21-96

ERATOR — CONTRACTOR: LAYNE CHRIST — RIG NO.: 280

NATURE OF OPERATOR'S REPRESENTATIVE — SIGNATURE OF CONTRACTOR'S TOOLPUSHER

FIELD OR DISTRICT — COUNTY: KERN — STATE: CAL

LAST CASING, TUBING OR LINER: SIZE | MAKE | WEIGHT & GRADE | NO. JOINTS | LENGTH | THD. TO FLD. NO. | SET AT

WIRE LINE RECORD: SIZE | NO. LINES | LENGTH SPOOLED | PRESENT LENGTH | ELEVATION OF KB | AS ABOVE TOPS WERE LAST CUT | IF NOT ALL OF THESE WERE LAST CUT, GIVE ALTERNATIVE MEASUREMENTS

SIZE	WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PURPOSE	DRIFT DIAM.	TYPE	CUMUL. LENGTH

TIME DISTRIBUTION – HOURS

OPERATION	NIGHT	DAY
TRIP AND CLEAN HOLE		
DRILL ACTUAL		
REAMING		
CORING		
CIRCULATE AND CONDITION MUD		
SURVEY		
WIRE LINE LOGS		
RUN CASING & CEMENT		
WAIT ON CEMENT		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
PLUG BACK		
REPAIR RIG		
FISHING		
DIR. WORK		
A PERFORATING		
B TUBING THPS		
C TREATING		
D SWABBING		
E TESTING		
F		
G		
H		
ALS		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

RIG W/ CONTR D.P.	
RIG W/ OPR D.P.	
RIG WITHOUT D.P.	
RIG STANDBY	
TAL DAYWORK	
OF DAYS AS MUD	
RATION TATION COSTS	
LY MUD COST	
AL MUD COST	

DRILLING ASSEMBLY (All end of tour)

NO	ITEM	LENGTH
	BIT	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO.		
SIZE		
IADC CODE		
MANUFACTURER		
TYPE		
SERIAL NO.		
JETS		
TFA		
DEPTH OUT		
DEPTH IN		
TOTAL DRILLED		
TOTAL HOURS		

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION | BEARINGS/SEALS | GAUGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED: TYPE | AMOUNT | TYPE | AMOUNT

REMARKS

DRILLING ASSEMBLY (All end of tour)

NO	ITEM	LENGTH
	BIT	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO.		
SIZE		
IADC CODE		
MANUFACTURER		
TYPE		
SERIAL NO.		
JETS		
TFA		
DEPTH OUT		
DEPTH IN		
TOTAL DRILLED		
TOTAL HOURS		

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION | BEARINGS/SEALS | GAUGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED: TYPE | AMOUNT | TYPE | AMOUNT

REMARKS: 227 GPM

DRILLER

DEPTH INTERVAL / FORMATION

FROM	TO	DRILL STEM TEST NO.	CORE NO.	FORMATION (BRIEF CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD USED TO CONTROL DEVIATION

DEVIATION RECORD

DEPTH	DEV.	DIR.	TVD	COURSE LENGTH	DEPTH	DEV.	DIR.	TVD	COURSE DISP.	DEPTH	DEV.	DIR.	TVD	COURSE DISP.

TIME FROM	TIME TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS, DESCRIPTIONS & REMARKS
0100	1130		B	AIRLIFT ZONE 4 - TRY TO CLEAN UP ZONE
1130	2130		B	PULL AIR LINE RUN IN PUMP TO 240'
2130	1130		E	PUMP TEST
1130	0100		B	PULL PUMP

DEPTH INTERVAL / FORMATION

FROM	TO	DRILL STEM TEST NO.	CORE NO.	FORMATION (BRIEF CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD USED TO CONTROL DEVIATION

DEVIATION RECORD

DEPTH	DEV.	DIR.	TVD	COURSE LENGTH	DEPTH	DEV.	DIR.	TVD	COURSE DISP.	DEPTH	DEV.	DIR.	TVD	COURSE DISP.

TIME FROM	TIME TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS, DESCRIPTIONS & REMARKS
1200	300		6	PULL UP PIPE TO TRY TOOL WAS CLOSED
[illegible]	[illegible]			TRY TO [illegible] PIPE INTO [illegible] TO 640 FT
300	730		20	CIRCULATE AROUND TOOL 865 TO 610
[illegible]	[illegible]			TRY TO GO TO ZONE #4
730	1200			AIRLIFT

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DRILLING CREW PAYROLL DATA

DATE 1-22-96

WELL NAME & NO. 22 LATIE WOOD

COMPANY LAYNE CHRIST

TOOLPUSHER LARRY W. RIG NO. 280

NIGHT TOUR — FROM 12:00 NOON TO 12:00 MID.

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	HAZARD ON THIS TOUR? YES OR NOT
DRILLER		DENNY HAHN	12		
DERRICKMAN		JEFF FROST	12		
MUDMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

DAY TOUR — FROM 12:00 NOON TO 12:00 MID.

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	HAZARD ON THIS TOUR? YES OR NOT
DRILLER		CASEY RINGS	12		
DERRICKMAN		MIKE [illegible]	12		
MUDMAN		KEITH [illegible]	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

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028093

DAILY DRILLING REPORT REPORT NO.

	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Lake Wood	22			7-28-46

CONTRACTOR: Layn Wichita — RIG NO.: 2562 Int

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

FIELD OR DISTRICT: — COUNTY: Cravens — STATE: Okla

WIRE LINE RECORD — SIZE — NO. LINES — LENGTH SLIPPED — LENGTH CUT OFF — PRESENT LENGTH — MEASURED TRIPS SINCE LAST CUT — CUMULATIVE MILES ON LINE TO-DATE

	SIZE	MAKE	WEIGHT & GRADE	NO. JOINTS	LENGTH	HOW TO CSG. NO.	SET AT
LAST CASING TUBING OR LINER							

DRILLING CREW PAYROLL DATA

DATE 7-28-1946

WELL NAME & NO 22

COMPANY Layn Wichita

TOOLPUSHER Lewis

DISTRIBUTION – HOURS

OPERATION	NIGHT	DAY
DRILLING		
REAMING		
CORING		
CIRCULATING		
TRIPPING		
RIG REPAIR		
DEVIATION SURVEY		
WIRE LOGS		
RUNNING & CEMENTING CASING		
CEMENT PLUGS		
DRILL STEM TEST		
FISHING		
REAMING CEMENT		
LOST CIRCULATION		
WAITING ON CEMENT		
WAITING ON WATER		
WAITING ON MUD		
MIXING MUD		
CONDITION MUD & CIRCULATE		
SHOOTING		
CLEANING MUD PITS		
OTHER		
TOTAL		

DRILLING ASSEMBLY (All out of hole)

NO.	ITEM	LENGTH
	Bit	
		OD
		OD
		OD
		OD
		OD
		OD
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. UP STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE	INNER	OUTER	DULL CHAR.	LOCATION
REAMING				

MUD RECORD

TIME	
WEIGHT	
PSI SQUIB GRADIENT	
FUNNEL VISCOSITY	
PUMP	
GEL STRENGTH	
FILTRATE	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

RIGHT TOUR

DEPTH INTERVAL / FORMATION

FROM	TO	DRILL'D READ'R CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD DRILLED SINGLE & PARALLEL P. COMPOUND P.

DEVIATION RECORD

DEPTH	DEV.	DIR.	TVD	HORIZ. DISP.	DEPTH	DEV.	DIR.	TVD	HORIZ. DISP.	DEPTH	DEV.	DIR.	TVD	HORIZ. DISP.

TIME START FROM	TIME STOP TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	1:30	1½	7C	GRAVEL UP ZONE TOOL - SET BENTONITE SEAL
1:30	3:00	1½		AIR LIFT - ZONE #5
3:00	3:30		B	PULL AIR LINE + RUN IN PUMP
3:30	12:00		E	Pump test Zone #5 2

NIGHT TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	INJURED ON THIS TOUR? YES OR NO
DRILLER		Denny Hutto	12		
DRILLERMAN		Jeff Frost	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT ___

DRILLING ASSEMBLY (All out of hole)

NO.	ITEM	LENGTH
	Bit	
		OD
		OD
		OD
		OD
		OD
		OD
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. UP STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE	INNER	OUTER	DULL CHAR.	LOCATION
REAMING				

MUD RECORD

TIME	
WEIGHT	
PSI SQUIB GRADIENT	
FUNNEL VISCOSITY	
PUMP	
GEL STRENGTH	
FILTRATE	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DAY TOUR

DEPTH INTERVAL / FORMATION

FROM	TO	DRILL'D READ'R CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD DRILLED SINGLE & PARALLEL P. COMPOUND P.

DEVIATION RECORD

DEPTH	DEV.	DIR.	TVD	HORIZ. DISP.	DEPTH	DEV.	DIR.	TVD	HORIZ. DISP.	DEPTH	DEV.	DIR.	TVD	HORIZ. DISP.

TIME START FROM	TIME STOP TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	5:00		6	trips out pipe
5:00	5:00		20	Brace on hole to 540
5:00	7:00		20	wait on Brace
7:00	10:00		6	run pipe & zone tool into hole 420
10:00	11:00		8C	pul shoot ground test 452 ft Zone #5
11:00	12:00		20	wait on brace

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	INJURED ON THIS TOUR? YES OR NO
DRILLER		Ernest Ryles	12		no
DRILLERMAN		Mac Ray Thomas	12		no
MOTORMAN		Kelly Paul	12		no
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SHIFT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT ___

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028094

DAILY DRILLING REPORT REPORT NO.

LEASE	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
AKE Wood	27			7-29-96
OPERATOR		CONTRACTOR		RIG NO.
		Layne Western		28CM

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

NO.	WEIGHT	GRADE	TOOL JOINT	TYPE THREAD	STRING NO.	PURPOSE	FLUID MAINTAINED THROUGH	TYPE	LENGTH

FIELD OR DISTRICT | COUNTY: ORANGE | STATE: CA

CASING, TUBING OR LINER	SIZE	WEIGHT	GRADE	NO. JOINTS	LENGTH	DEPTH SET	TOP OF LINER

WIRE LINE RECORD — SIZE | NO. LINES | LENGTH SHIPPED | PRESENT LENGTH

DRILLING CREW PAYROLL DATA — 68-2559

DATE 7-29-1996

WELL NAME & NO. 27

COMPANY Layne Western

TOOLPUSHER Lenny Welch

TIME DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
A TRIP AND LAY DOWN		
WELL ACTUAL		
REAMING		
DRILLING		
CIRCULATE MUD CONDITION		
SURVEYS		
DRILLING LINE		
DEVIATION SURVEY		
RE-LINE LOGS		
CASING & CEMENT		
WELL CEMENT		
TEST BOP		
TRIP BOP		
DST STEM TEST		
PLUG BACK		
SQUEEZE CEMENT		
PERFS		
K WORK		
A PERFORATING		
B TUBING TRIPS		
C TREATING		
D SWABBING		
E TESTING		
F		
G		
H		
I		
DAYWORK TIME SUMMARY (OFFICE USE ONLY)		
1 W/ CONTR D/P		
2 W/ OPR D/P		
3 W/ HWT/HWT D/P		
4 STANDBY		
DAYWORK		
DATE SPUD		
CUMULATIVE ROTATING HOURS		
MUD COST		
MUD COST		

DRILLING ASSEMBLY (All one of line)

NO	ITEM	LENGTH
	Bit	
	STANDS ___ DP	
	SINGLES ___ DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

BIT RECORD

BIT NO	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE

ROWS	OUTER	DULL CHAR	LOCATION
INNER ROWS	GAGE	OTHER DULL CHAR	REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PPG SETTING GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

DEPTH INTERVAL

FROM	TO	DRILL BEAM CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD USED SINGLE & PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG — NIGHT TOUR

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:00			Water work.

NIGHT TOUR — FROM 12:00 TO 12:00

CREW	EMPL ID NO	NAME	HRS	INJURIES ON THIS TOUR: INITIAL	YES OR NO?
DRILLER		Bill McBay	12		
DERRICKMAN					
MOTORMAN					
FIRE MAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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DEPTH INTERVAL

FROM	TO	DRILL BEAM CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD USED SINGLE & PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG — DAY TOUR

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equipt
12:30	3:00		6	trips out pipe [illegible]
3:00	12:00		20	[illegible] water work

DAY TOUR — FROM 12 TO 12

CREW	EMPL ID NO	NAME	HRS	INJURIES ON THIS TOUR: INITIAL	YES OR NO?
DRILLER		Ernesto Ruiz	12		
DERRICKMAN		MURRAY THOMAS	10		
MOTORMAN		Keith Pearl	10		
FIRE MAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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APPROVED APPROVED No. 028094

28095

DAILY DRILLING REPORT REPORT NO.

	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Lakewood	22			7-30-96

OR

CONTRACTOR: Layne Western RIG NO. #80m

URE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

FIELD OR DISTRICT COUNTY STATE/PROVINCE

WIRE LINE RECORD WELL NO

WEIGHT	GRADE	TOOL JT I.D.	TYPE THREAD	STRING NO.

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

LAST CASING TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO JOINTS	LENGTH	HOW TO LOG NO	SEAT

WIRE LINE RECORD	SIZE	NO LINES	LENGTH SPOOLED
	LENGTH OUT OF	PRESENT LENGTH	

ALL RUN TRIPS SINCE LAST CUT

LINER ACTIVITY ON RUN TRIPS

DRILLING CREW PAYROLL DATA 68.235q

DATE 7-30-96

WELL NAME & NO 22

COMPANY Lakewood

TOOLPUSHER Larry Welch RIG NO. 280m

DISTRIBUTION - HOURS

	NIGHT	DAY

DRILLING ASSEMBLY (all and of tour)

NO.	ITEM	LENGTH
	bit	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT OF STRING

BIT RECORD

BIT NO			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO			
JETS			
TFA			
DEPTH OUT			
DEPTH IN			
TOTAL DRILLED			
TOTAL HOURS			

CUTTING STRUCTURE	INNER	OUTER	DULL CHAR	LOCATION
MEASURED WEAR				

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

MUD & CHEMICALS ADDED	TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

RIGHT TOUR

DEPTH INTERVAL FROM	TO	DRILL (D) REAM (R) CORE (C)	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	TOTAL PUMP OUTPUT	METHOD RUN SINGLE (S) PARALLEL (P) COMPOUND (C)

DEVIATION RECORD	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:00			Waterwater. Watch

DAY TOUR

DEPTH INTERVAL FROM	TO	DRILL (D) REAM (R) CORE (C)	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	PUMP NO. LINER SIZE	PUMP NO. B.P.M.	TOTAL PUMP OUTPUT	METHOD RUN SINGLE (S) PARALLEL (P) COMPOUND (C)

DEVIATION RECORD	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	5:00			Water Watch
5:00	12:00			Clean trash, load pipe, put collars on the trailer, & water watch.

RIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL ID NO.	NAME	HRS.	INITIAL	PLANNED ON THIS TOUR YES OR NO?
DRILLER		Bruce McBride	12		
DERRICKMAN					
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR FROM ___ TO ___

CREW	EMPL ID NO.	NAME	HRS.	INITIAL	PLANNED ON THIS TOUR YES OR NO?
DRILLER		Ernesto Rivas	7		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

COMTR D.P.	
OPR. D.P.	
WITHOUT D.P.	
STANDBY	
DAYWORK	
MUD PLUG	
DRIVE PIPE HOURS	
MUD COST	
MUD COST	

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028096

DAILY DRILLING REPORT REPORT NO.

	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Lakewood	2-L			7-31-96

OPERATOR

CONTRACTOR Cuyo Western RIG NO 980

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

SIZE	WEIGHT	GRADE	TOOL JOINT	FEET THIS RUN	STRING NO

IN STRING	PUMP MANUFACTURER	TYPE	LINER SIZE

CASING: C.A

CASING TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NET FEET	LENGTH	PIPE TALLY LOG NO.	SEAL

WIRE LINE RECORD

SIZE	NO LINES	LENGTH SPOOLED

LENGTH OF TRIP | PRESENT LENGTH

LENGTH AND SIZE LAST CUT

CUMULATIVE WEAR ON TRIPS

DRILLING CREW PAYROLL DATA

DATE 7 31 96 GF 2350

WELL NAME & NO 2-L

COMPANY Lakewood Drilling

TOOLPUSHER Larry Walker RIG NO 980

TIME DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
RIG UP AND TEAR DOWN		
RIG ACTIVITY		
DRILLING		
REAMING		
CIRC & CONDITION MUD		
TRIPS		
SURVEY		
WIRE LINE LOGS		
RUNNING & CEMENTING CASING		
WAIT ON CEMENT		
TEST B.O.P.		
DRILL STEM TEST		
LOST CIRC.		
REPAIR RIG		
CUT DRILLING LINE		
DEVIATION SURVEY		
WIRE LINE LOGS		
RUNNING & CEMENTING CASING		
WAIT ON CEMENT		
TEST B.O.P.		
DRILL STEM TEST		
LOST CIRC.		
REPAIR RIG		
CUT DRILLING LINE		
A PLUG AND ABD		
B TUBING TIMES		
C TREATING		
D RAN CASING		
E TESTING		
F		
G		
H		
I		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

1 W/ CONTR D.P.	
2 W/ OPR. D.P.	
3 WITHOUT D.P.	
4 STANDBY	
DAYWORK	
DAYS SPUD	
CUMULATIVE DRILLING HOURS	
MUD COST	
MUD COST	

DRILLING ASSEMBLY (All end of tour)

NO.	ITEM	LENGTH
1	BIT 17½	3.00
	SUB	1.00
	10 4/8 ST 8	9.48
	10 5/8 ST 8	19.83
	10 5/8 ST 8	23.35
	10 5/8 ST 8	20.68
	Kelly ST 8	6.00
		83.34
	STANDS DP	400
	SINGLES DP	20
	KELLY DOWN	420
	TOTAL	503

WT OF STRING

REMARKS

DRILLER

BIT RECORD

BIT NO	1
SIZE	17½
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
IFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE	INNER	OUTER	DULL CHAR	LOCATION
BEARINGS SEALS	GAGE	OTHER DULL CHAR	REASON PULLED	

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DEPTH INTERVAL

FROM	TO	DRILL D REAM R CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO LINER SIZE	PUMP NO SPM	PUMP NO LINER SIZE	PUMP NO SPM	TOTAL PUMP OUTPUT	METHOD RUN SINGLE S PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

NIGHT TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATION IN SEQUENCE AND REMARKS
12:00	12:00		3	Reamn 17½ 521 - 900

NIGHT TOUR FROM 12:00 TO 12:00 (24 HRS)

CREW	EMPL ID NO.	NAME	HRS	INITIAL
DRILLER		Bruce McBride	12	
DERRICKMAN		Jeff Frost	12	
MOTORMAN		George Hollars	12	
FIREMAN		Terry		
FLOORMAN				
FLOORMAN				
FLOORMAN				
LEASE SUPT				
WELDER				
ROUSTABOUT				
ROUSTABOUT				
TRAINEE				

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

DRILLING ASSEMBLY (All end of tour)

NO.	ITEM	LENGTH
1	BIT 17½	3.00
	SUB	1.00
	10 4/8 ST 8	9.48
	10 5/8 ST 8	19.83
	10 5/8 ST 8	23.35
	10 5/8 ST 8	20.68
	Kelly ST 8	6.00
		83.34
	STANDS DP	400
	SINGLES DP	20
	KELLY DOWN	420
	TOTAL	503

WT OF STRING

REMARKS

DRILLER

BIT RECORD

BIT NO	1
SIZE	17½
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
IFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE	INNER	OUTER	DULL CHAR	LOCATION
BEARINGS SEALS	GAGE	OTHER DULL CHAR	REASON PULLED	

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DEPTH INTERVAL

FROM	TO	DRILL D REAM R CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO LINER SIZE	PUMP NO SPM	PUMP NO LINER SIZE	PUMP NO SPM	TOTAL PUMP OUTPUT	METHOD RUN SINGLE S PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

DAY TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATION IN SEQUENCE AND REMARKS
12:00	6:00		20	waited much
6:00	6:30		7	Seans Equipt.
6:30	8:00		6	trips pipe into hole to 400 ft.
8:00	9:00		3	Reaming Mix MUD
9:00	12:00		3	Reaming 400 - 521

DAY TOUR FROM 12 6 TO 12:00 (18 HRS)

CREW	EMPL ID NO.	NAME	HRS	INITIAL
DRILLER		Ernesto Rivas	6	
DERRICKMAN		Keith Paul	6	
MOTORMAN		Miki RAj Thomas	12	
FIREMAN				
FLOORMAN				
FLOORMAN				
FLOORMAN				
LEASE SUPT				
WELDER				
ROUSTABOUT				
ROUSTABOUT				
TRAINEE				

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

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028097

DAILY DRILLING REPORT REPORT NO

OPERATOR	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
KE wood 69	22			8-01-96

CONTRACTOR: Layne Western — RIG NO. 2880 M

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

SIZE	WEIGHT	GRADE	THREAD	TYPE THREAD	STRING NO	PUMP NO	PUMP MAKE & TYPE	TYPE	STROKE LENGTH

FIELD OR DISTRICT — COUNTY La A — STATE / COUNTRY Ca

LAST CASING TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO JOINTS	LENGTH	DEPTH TO CSG SHO	SET AT

WIRE LINE RECORD — WIRE NO — SIZE — NO LINES — LENGTH SLIPPED — LENGTH CUT OFF — PRESENT LENGTH — WEAR SINCE TRIPS SINCE LAST CUT — CUMULATIVE WEAR OR TRIPS

DRILLING CREW PAYROLL DATA

DATE 8-01-1996

WELL NAME & NO 22

COMPANY Layne Western

TOOLPUSHER Leroy Welch RIG NO 2880 M

NIGHT TOUR — FROM 12:00 TO _____

CREW	EMPL ID NO	NAME	HRS	INITIAL	INJURED ON THIS TOUR? YES OR NO?
DRILLER		Bruce McGraw	6		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Chris Hallon	24		
FIREMAN		Jelly			
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPR					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR — FROM 12 TO 12

CREW	EMPL ID NO	NAME	HRS	INITIAL	INJURED ON THIS TOUR? YES OR NO?
DRILLER		Ernesto Ruiz	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPR					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

HOUR DISTRIBUTION — HOURS

OPERATION	NIGHT	DAY
RIG UP AND DOWN		
DRILL ACTUAL		
REAM		
CIRC		
CIRCULATE MUD CLEAN		
TRIPS		
WIRE LINE SURVEY		
SURVEY		
CORING & CORE ANALYSIS		
CEMENT		
TEST B.O.P.		
DRILL STEM TEST		
REPAIR RIG		
REPAIR SURFACE EQUIPMENT		
REPAIR DOWN HOLE		
DRILLING OPERATIONS		
CIRC FOR TRIPS		
REAMING		
WASHING		
FISHING		
OTHER		
WORK		

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
	BIT	
		OD
		OD
		OD
		OD
		OD
	STANDS DP	
	SINGLES DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

BIT RECORD

BIT NO	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
IFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: INNER	OUTER	DULL CHAR	LOCATION

BEARINGS/SEALS — GAUGE — OTHER (DULL CHAR) — REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

ENGINEER

DEPTH INTERVAL / FORMATION (SHOW CORE RECOVERY)

FROM	TO	DRILL BIT NO	DRILL BEAR NO	CORE NO	FORMATION	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO LINER SIZE	PUMP NO SPM	PUMP NO LINER SIZE	PUMP NO SPM	TOTAL PUMP OUTPUT	METHOD RUN SINGLE PARALLEL COMPOUND

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

RIGHT TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	6		17	make roll off & set up to pump
				set kelly trip out pipe & more tubing
6:00	12:00		20	Lay down welch

DAY TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	6:00		3	Reaming 400 to 1,110
6 00	8:00		6	trips out pipe
8 00	12:00		D	~~trip out pipe to 1063~~ trip tubing into hole and clean mud tank

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
1	Bit 17½	360
	Sub	812
	10 5/8 OD	9.68
	10 5/8 OD	19.53
	10 5/8 OD	23.35
	10 5/8 OD	20.68
	Kelly OD	5 00
		82.24
	STANDS DP	1.000
	SINGLES DP	20
	KELLY DOWN	10
	TOTAL	1.110

WT OF STRING

BIT RECORD

BIT NO	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO	
JETS	
IFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE: INNER	OUTER	DULL CHAR	LOCATION

BEARINGS/SEALS — GAUGE — OTHER (DULL CHAR) — REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

ENGINEER

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28098

DAILY DRILLING REPORT REPORT NO.

OR: wood cy	WELL NO.: 22	API WELL NUMBER	WATER DEPTH	DATE: 8 02 96
URE OF OPERATOR'S REPRESENTATIVE		CONTRACTOR: Layne Western SIGNATURE OF CONTRACTOR'S TOOLPUSHER		RIG NO.: 280 m

COUNTY: L A	STATE: ca			
LAST CASING TUBING OR LINER				

WIRE LINE RECORD

DRILLING CREW PAYROLL DATA

DATE 8-02-1996
WELL NAME & NO 22
COMPANY Layne western
TOOLPUSHER Larry welch RIG NO 280 m

NIGHT TOUR

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
	bit 40	
	30	70
1	10 5/8	968
2	10 5/8	1933
3	10 5/8	2335
4	10 5/8	2018
	5	500
		8824
	STANDS __ DP	
	SINGLES __ DP	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO	1	
SIZE	28	
IADC CODE		
MANUFACTURER		
TYPE	mill	
SERIAL NO		
JETS		
TFA		
DEPTH OUT	200	
DEPTH IN	83	
TOTAL DRILLED	117	
TOTAL HOURS	10½	

MUD RECORD

TIME, WEIGHT, PRESSURE GRADIENT, FUNNEL VISCOSITY, PV/YP, GEL STRENGTH, FLUID LOSS, pH, SOLIDS

MUD & CHEMICALS ADDED: TYPE AMOUNT TYPE AMOUNT

REMARKS

DEPTH INTERVAL / FORMATION (SHOW CORE RECOVERY)

DEVIATION RECORD

TIME FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	1:30			Break 17½ put on add 17½ trip out to 83'
1:30	12:00		3	Ream 28" 83 - 200 ft

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	INJURED ON THIS TOUR? YES OR NO
DRILLER		Bruce McBrew	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Terry Hellem	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

NO ITEM LENGTH

BIT

STANDS __ DP
SINGLES __ DP
KELLY DOWN
TOTAL
WT. OF STRING

BIT RECORD

BIT NO	1	
SIZE	28	
IADC CODE		
MANUFACTURER		
TYPE	mill	
SERIAL NO		
JETS		
TFA		
DEPTH OUT		
DEPTH IN		
TOTAL DRILLED		
TOTAL HOURS		

MUD RECORD

TIME, WEIGHT, PRESSURE GRADIENT, FUNNEL VISCOSITY, PV/YP, GEL STRENGTH, FLUID LOSS, pH, SOLIDS

MUD & CHEMICALS ADDED: TYPE AMOUNT TYPE AMOUNT

REMARKS

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

DEPTH INTERVAL / FORMATION (SHOW CORE RECOVERY)

DEVIATION RECORD

TIME FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	6:00		20	water watch
6:00	12:00			water watch

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	INJURED ON THIS TOUR? YES OR NO
DRILLER		Ernesto Rivas	6		
DERRICKMAN		Mike Ray Thomas	6		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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28099

DAILY DRILLING REPORT REPORT NO.

WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Kz wood cy 22			8-03-96

CONTRACTOR: Layne western RIG NO. 2822

OR

URE OF OPERATOR'S REPRESENTATIVE SIGNATURE OF CONTRACTOR'S TOOLPUSHER

WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DISTRICT COUNTY L.A STATE / COUNTRY Ca

LAST CASING RUNNING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO. JOINTS	LENGTH	PKR OR CSG SHOE NO.	SET AT

WIRE LINE RECORD WELL NO. SIZE NO. LINES LENGTH SLIPPED LENGTH CUT OFF PRESENT LENGTH AS AFTER TRIPS WAS LAST CUT CUMULATIVE WIRE OR TRIPS

DRILLING CREW PAYROLL DATA

DATE 8-3-1996

WELL NAME & NO. 22-

COMPANY Layne western

TOOLPUSHER Larry welch RIG NO. 2822 Kz

DAYS DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
DRILLING AND REAMING		
TRIPPING ACTUAL		
RIG REPAIR		
CIRCULATION MUD CONDITIONING		
WAITING ON CEMENT		
SURVEY		
LOST CIRCULATION		
RUNNING & CEMENTING CASING		
CUT OFF CASING		
NIPPLE UP B.O.P.		
TEST B.O.P.		
DRILL STEM TEST		
BACK REAMING		
FREEZE LINE		
FISHING		
WORK ON RIG		
PLUG BACK		
TUBING STRING		
PERFORATING		
SWABBING		
TESTING		
DAYWORK TIME BUREAU (OFFICE USE ONLY)		
W/ LINER D.P.		
W/ DRILL PIPE D.P.		
W/ OUT D.P.		
STANDBY		
DAYWORK		
DAYS SPUD		
ACTIVE DRILLING HRS.		
MUD COST		
MUD CUM		

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
	WT 28	40
	17½	3
	10⅝ (4)	968
	10⅝ (3)	1953
	10⅝ (2)	2335
	10⅝ (1)	2068
	Lg Sta	5
		55.24
	STANDS ___ DP	
	SINGLES ___ DP	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO.	28
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	444
DEPTH IN	82
TOTAL DRILLED	362
TOTAL HOURS	32.5

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION | BEARING SEAL | GAUGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

NIGHT TOUR

DEPTH INTERVAL FROM	TO	DRILL B READ B CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	SPM	PUMP NO. LINER SIZE	SPM	TOTAL PUMP OUTPUT	METHOD DRILLED SINGLE P. PARALLEL P. COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	+N/-S DISP	DEPTH	DEV	DIR	TVD	+N/-S DISP	DEPTH	DEV	DIR	TVD	+N/-S DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	6			Ream 28" 324-364
6	6:30			Service Equip
6:30	12			Ream 364-444

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	WAS OUT OF TIME TOUR? YES OR NO
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Jerry Hallen	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAVELER					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
1	BIT 28"	4
1	17½	3
82	6⅞ (5)	968
	10⅝ (4)	1953
	10⅝ (3)	2336
	10⅝ (2)	2068
	Kelly	50
		15 21
	STANDS ___ DP	240
	SINGLES ___ DP	20
	KELLY DOWN	20
	TOTAL	325

WT. OF STRING

BIT RECORD

BIT NO.	28
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	Hull
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	325
DEPTH IN	82
TOTAL DRILLED	243
TOTAL HOURS	21

CUTTING STRUCTURE: INNER | OUTER | DULL CHAR | LOCATION | BEARING SEAL | GAUGE | OTHER DULL CHAR | REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

DAY TOUR

DEPTH INTERVAL FROM	TO	DRILL B READ B CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	SPM	PUMP NO. LINER SIZE	SPM	TOTAL PUMP OUTPUT	METHOD DRILLED SINGLE P. PARALLEL P. COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	+N/-S DISP	DEPTH	DEV	DIR	TVD	+N/-S DISP	DEPTH	DEV	DIR	TVD	+N/-S DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	1:00		3	Reaming 28" Bit 200 to 220 ft
1:00	2:00		7	Service Equipt
2:00	12:00		3	Reaming 28" Bit 220 - 320 ft

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	WAS OUT OF TIME TOUR? YES OR NO
DRILLER		Francis Ruiz	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAVELER					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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028100

DAILY DRILLING REPORT REPORT NO.

	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Kewood	22			8.4.96

ATOR

TURE OF OPERATOR'S REPRESENTATIVE

CONTRACTOR: Layne Western — RIG NO. 280

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

	WEIGHT	GRADE	TOOL JOINT OD	TYPE THREAD	STRING NO

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR DISTRICT | COUNTY A | STATE/COUNTRY Ca

LAST CASING TUBING OR LINER

SIZE	NAME	WEIGHT & GRADE	PUP JOINTS	LENGTH	PUP TO CSG. HD	SET AT

WIRE LINE RECORD PULL NO.

SIZE | NO. LINES | LENGTH SLIPPED | LENGTH CUT OFF | PRESENT LENGTH

MEASURED TRIPS SINCE LAST CUT

CUMULATIVE MEASURED TRIPS

DRILLING CREW PAYROLL DATA

DATE 8 4 96 — 6P. 2359

WELL NAME & NO. 22

COMPANY Lakewood

TOOLPUSHER Larry Hall — RIG NO. 280

TIME DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
ND AND		
L ACTUAL		
ANG		
NG		
ATA IN MUD		
R RATE		
S		
R RATE AVG		
AR NO		
LOG		
L SURVEY		
TAIN SURVEY		
E LOG		
RAGE/CEMENT		
UNCEMENT		
E UP BOP		
BOP		
L STEM TEST		
N BACK		
ELEASE RIG		
NG		
WORK		
PERFORATING		
TUBING TYPE		
TREATING		
SWABBING		
TESTING		
DAYWORK TIME SUMMARY (OFFICE USE ONLY)		
W/ CONTR DP		
W/ OWN DP		
W/WITHOUT DP		
STANDBY		
DAYWORK		
DATE SPUD		
RELATIVE ENGINEERING HOURS		
MUD LOST		
MUD COST		

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
1	BIT 28	4.00
2	17½	3.00
1	10 5/8	9.68
2	10 5/8	19.53
3	10 5/8	23.35
4	10 5/8	19.65
(Collar)	Sub	5'
		84.24
	STABILIZER	5.85
	SHOCK SUB	
	KELLY DOWN	11.00
	TOTAL	654 705

WT. OF STRING

BIT RECORD

BIT NO.	28	17½
SIZE		
IADC CODE		
MANUFACTURER		
TYPE	mill	mill
SERIAL NO.		
JETS		
TFA		
DEPTH OUT	564	
DEPTH IN	83	83
TOTAL DRILLED	481	
TOTAL HOURS	5.7	

CUTTING STRUCTURE

INNER	OUTER	DULL CHAR	LOCATION
IN WEAR SEALS	GAUGE	OTHER DULL CHAR	REASON PULLED

MUD RECORD

TIME			
WEIGHT			
VISCOSITY GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DEPTH INTERVAL

FROM	TO	DRILL & REAM & CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD RUN SINGLE & PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	12			Ream 28" 564-664

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

RIGHT TOUR — FROM 12 A TO 12 P

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	YES OR NO?
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Jerry Hallam	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
	BIT 28	4.00
	17½	3.00
	10 5/8	9.68
	10 5/8	19.62
	10 5/8	23.35
	10 5/8	20.65
	Kelly	5'
		85.29
	STABILIZER	1.40
	SHOCK SUB	20
	KELLY DOWN	20
	TOTAL	565

WT. OF STRING

BIT RECORD

BIT NO.	28	17½
SIZE		
IADC CODE		
MANUFACTURER		
TYPE	mill	
SERIAL NO.		
JETS		
TFA		
DEPTH OUT	564	564
DEPTH IN	83	83
TOTAL DRILLED	481	
TOTAL HOURS	4.5	

CUTTING STRUCTURE

INNER	OUTER	DULL CHAR	LOCATION
IN WEAR SEALS	GAUGE	OTHER DULL CHAR	REASON PULLED

MUD RECORD

TIME			
WEIGHT			
VISCOSITY GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DEPTH INTERVAL

FROM	TO	DRILL & REAM & CORE C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD RUN SINGLE & PARALLEL P COMPOUND C

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Servis Equipt
12:30	12:00		3	Reaming 26" Bit 444 to 564

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR — FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	YES OR NO?
DRILLER		Ernesto Rivas	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

028101

DAILY DRILLING REPORT REPORT NO.

SE: AKE Weed	WELL NO.: 22	API WELL NUMBER:	WATER DEPTH:	DATE: 8-5-96
RATOR:		CONTRACTOR: Layne Western		RIG NO.: 280
IATURE OF OPERATOR'S REPRESENTATIVE:		SIGNATURE OF CONTRACTOR'S TOOLPUSHER:		

FIELD OR DISTRICT: COUNTY: LA STATE / COUNTRY: Ca

WIRE LINE RECORD REEL NO

NIGHT TOUR

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
1	BIT 28	4^{00}
2	17½	3^{0}
1	9 5/8 DC	968
2	10 5/8 DC	1953
3	10 5/8 DC	2335
4	10 5/8 DC	2016
	Kelly 5^{0}	5^{0}
		85.24
	STANDS DP	820
	SINGLES DP	820
	KELLY DOWN	20
	TOTAL	925

WT OF STRING

BIT RECORD

BIT NO	1	28
SIZE	28	
IADC CODE	111	110
MANUFACTURER		
TYPE	mill	
SERIAL NO		
JETS		
TFA		
DEPTH OUT	925	
DEPTH IN	83	
TOTAL DRILLED	842	
TOTAL HOURS	80	

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP	/	/	/
GEL STRENGTH	/	/	/
FLUID LOSS			
pH			
SOLIDS			

REMARKS

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12^{00}	12^{30}		7	Service Equip
12^{30}	12		3	Ream 28" 804 - 924

DRILLING CREW PAYROLL DATA

DATE 8-5-1996

WELL NAME & NO 22

COMPANY Layne Western

TOOLPUSHER Larry Welch RIG NO 280

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	INJURED ON THIS TOUR?
DRILLER		Bruce Mcbrid	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Jerry Hallen	12		

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
	BIT 28	4^{02}
	17½	3^{00}
	10 5/8 DC	9.68
	10 5/8 DC	19.63
	10 5/8 DC	23.85
	10 5/8 DC	20.16
	Kelly DC	5^{00}
		85.24
	STANDS DP	685
	SINGLES DP	20
	KELLY DOWN	20
	TOTAL	805

WT OF STRING

BIT RECORD

BIT NO	1	1
SIZE	17½	28"
IADC CODE	111	111
MANUFACTURER		
TYPE	mill	
SERIAL NO		
JETS		
TFA	804	
DEPTH OUT	804	
DEPTH IN	83	
TOTAL DRILLED	721	
TOTAL HOURS	684	

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP	/	/	/
GEL STRENGTH	/	/	/
FLUID LOSS			
pH			
SOLIDS			

REMARKS

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Servis Equimt
12:30	12:00		3	Reaming 684 to 804

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	INJURED ON THIS TOUR?
DRILLER		Ernssto Rivas	12		
DERRICKMAN		Mike Raj Thomas	12		
MOTORMAN		Keith paul	12		

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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No. 028101

:8102

DAILY DRILLING REPORT   REPORT NO.

kewood OR	WELL NO. 22	API WELL NUMBER	WATER DEPTH	DATE 8-6-96
JRE OF OPERATOR'S REPRESENTATIVE		CONTRACTOR Layne Western SIGNATURE OF CONTRACTOR'S TOOLPUSHER		RIG NO. 280m

FIELD OR DISTRICT   COUNTY L.A   STATE/COUNTRY Ca

WIRE LINE RECORD

NIGHT TOUR

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
1	Bit 28	40
	17 1/2	30
	10 5/8 DC	1.68
	10 5/8 DC	1953
	10 5/8 DC	2335
	10 5/8 DC	2068
	Kelly DC	5
		85.24

BIT RECORD

BIT NO	1	
SIZE	28	
IADC CODE	| | |	| | |
MANUFACTURER		
TYPE	mill	
SERIAL NO		
JETS		
TFA		
DEPTH OUT		
DEPTH IN	83	
TOTAL DRILLED		←
TOTAL HOURS		

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY	/	/	/
PV/YP	/	/	/
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	230			Ream 28 1044 - 1094
230	12			Circ & trip out & Run caliper, make pipe, ~~[illegible]~~ run tubing, 3'

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

NO	ITEM	LENGTH
1	Bit 28"	4.00
2	17 1/2	3.00
1	10 5/8 DC	9.60
2	10 5/8 DC	19.53
3	10 5/8 DC	23.35
4	10 5/8 DC	20.60
	Kelly 5" DC	5.00
		85.24
	STANDS DP	92
	SINGLES DP	20
	KELLY DOWN	20
	TOTAL	1095

BIT RECORD

BIT NO	1	2
SIZE	28	17 1/2
IADC CODE	| | |	| | |
MANUFACTURER		
TYPE	mill	
SERIAL NO		
JETS		
TFA		
DEPTH OUT	1094	
DEPTH IN	83	
TOTAL DRILLED	[illegible]	
TOTAL HOURS	[illegible]	

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY	/	/	/
PV/YP	/	/	/
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equipment
12:30	12:00		3	Reaming 28" 924 to 1044

DRILLING CREW PAYROLL DATA

DATE 8-6-96   68.2359

WELL NAME & NO 22

COMPANY Lakewood

TOOLPUSHER Larry Walsh   RIG NO 280m

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	YES OR NOT
DRILLER		Bruce McGrew	12		
DERRICKMAN		Jeff Flask	12		
MOTORMAN		Jerry Hallam	12		

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	YES OR NOT
DRILLER		Ernesto Rivas	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith Bowl	12		

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:8103

DAILY DRILLING REPORT REPORT NO.

WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
SF wood co 22			8-6 1996

CONTRACTOR: Layne western RIG NO. 28 mi

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MAKE & MODEL	TYPE	STROKE LENGTH

FIELD OR DISTANCE COUNTY: LA STATE / COUNTRY: La

LAST CASING / TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO. JOINTS	LENGTH	PUMP TO CSG. NO.	SET AT

WIRE LINE RECORD REEL NO.

SIZE | NO. LINES | LENGTH SLIPPED | LENGTH CUT OFF | PRESENT LENGTH

AS WHEN TIME'S WAS LAST CUT

LEAKAGE / AIR OR TRIPS

DRILLING CREW PAYROLL DATA

DATE 8-7-1996

WELL NAME & NO. 22

COMPANY Layne western

TOOLPUSHER Larry welch RIG NO 28 mi

DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
RIG DOWN		
ACTUAL		
NON MUD RATE		
RATE $/HR		
DRILLING		
TRIP BURST		
SURVEY		
LOGS		
CASING & CEMENT		
CEMENT		
B UP B O P		
B O P		
STEM TEST		
BACK		
FISHING		
REAMING		
WORK		
PERFORATING		
TUBING TRIPS		
TREATING		
SWABBING		
TESTING		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

W QUINTA D P	
W OPR D P	
W/WITHOUT D P	
STANDBY	
DAYWORK	
DAYS SPUD	
ATIVE	
MUD COST	
MUD COST	

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
	BIT	
	STANDS ... DP	
	SINGLES ... DP	
	KELLY DOWN	
	TOTAL	

WT. OF STRING

BIT RECORD

BIT NO.			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO.			
JETS			
IFA			
DEPTH OUT			
DEPTH IN			
TOTAL DRILLED			
TOTAL HOURS			

CUTTING STRUCTURE

MAKER	OUTER	DULL CHAR.	LOCATION
MFG'S GRADE	GAGE	OTHER DULL CHAR.	REASON PULLED

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

DRILLER

DEPTH INTERVAL / DEVIATION RECORD

FROM	TO	DRILL'D DEEPENED CORED	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD USED SINGLE / PARALLEL / COMPOUND

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	2			Run Casing & Land off
2	12			Run 2 gravel 1090-408

NIGHT TOUR

DEPTH INTERVAL / DEVIATION RECORD

FROM	TO	DRILL'D DEEPENED CORED	CORE NO.	FORMATION (SHOW CORE RECOVERY)	ROTARY TABLE SPEED	WT. ON BIT	PUMP PRESSURE	PUMP NO. LINER SIZE	PUMP NO. SPM	PUMP NO. LINER SIZE	PUMP NO. SPM	TOTAL PUMP OUTPUT	METHOD USED SINGLE / PARALLEL / COMPOUND

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
[illegible]				[illegible]
[illegible]				[illegible]
12.00	3:00		B	Finish Run tubing 3"
3:00	11:00		12	Run Casing 1080 ft to 40 ft

DAY TOUR

NIGHT TOUR — FROM 12 PM TO 12 AM

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	LEAVING ON THIS TOUR? YES OR NOT
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Jerry Hallen	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
THAWER					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR — FROM 12 PM TO 12 AM

CREW	EMPL. ID NO.	NAME	HRS.	INITIAL	LEAVING ON THIS TOUR? YES OR NOT
DRILLER		Ernesto Rivera	12		
DERRICKMAN		Mike Ray Holmes	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
THAWER					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

28104

DAILY DRILLING REPORT REPORT NO.

WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
22			8-8-1996

OPERATOR: Wood

CONTRACTOR: Larry Watson RIG NO. 985 #1

SIGNATURE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

WEIGHT	GRADE	TOOL JOINT OD	TYPE THREAD	STRING NO

PUMP NO	PUMP MAKE & MODEL	TYPE	STROKE LENGTH

FIELD OR DISTRICT | COUNTY: Lea | STATE: NM

LAST CASING TUBING OR LINER	SIZE	WEIGHT & GRADE	NO JOINTS	LENGTH	DEPTH TO CSG HD	SEAT

WIRE LINE RECORD RIG NO

SIZE | NO LINES | LENGTH SKIPPED | LENGTH CUT OFF | PRESENT LENGTH | NO LINES THIS SINCE LAST CUT | CUMULATIVE NO LINES THIS TOUR

DRILLING CREW PAYROLL DATA

DATE 8-8-1996

WELL NAME & NO 22

COMPANY Larry Watson

TOOLPUSHER Larry Welch RIG NO 985 #1

DISTRIBUTION - HOURS

OPERATION	NIGHT	DAY
RIG UP & TEAR DOWN		
DRLG ACTUAL		
DRLG RATE		
RE-DRLG		
SAND SEPARATOR		
REAMING		
TRIPPING		
BOP DRILL		
STEM TEST		
BAILING		
FISHING		
WL		
WAIT ON CEMENT		
PERFORATING		
TURNAROUND TIME		
TREATING		
SWABBING		
TESTING		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

	DP	DC
IN HOLE		
WITHOUT		
STANDBY		

DAYWORK

LAND MOVE

ACTIVE AUTHORIZED

NON-CONST

MUD COST

DRILLING ASSEMBLY (All end of tour)

NO	ITEM	LENGTH
	BIT	
	STANDS DP	
	SINGLES DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

REMARKS

BIT RECORD

BIT NO				
SIZE				
IADC CODE				
MANUFACTURER				
TYPE				
SERIAL NO				
JETS				
TFA				
DEPTH OUT				
DEPTH IN				
TOTAL DRILLED				
TOTAL HOURS				
CUTTING STRUCTURE INNER				
CUTTING STRUCTURE OUTER				
CUTTING STRUCTURE DULL CHAR				
CUTTING STRUCTURE LOCATION				
BEARING SEALS				
GAUGE				
OTHER DULL CHAR				
REASON PULLED				

MUD RECORD

TIME				
WEIGHT				
PRESSURE GRADIENT				
FUNNEL VISCOSITY				
PV/YP				
GEL STRENGTH				
FLUID LOSS				
pH				
SOLIDS				

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

NIGHT TOUR

DEPTH INTERVAL | DRILL REAM CORE | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO LINER SIZE | PUMP NO SPM | PUMP NO LINER SIZE | PUMP NO SPM | TOTAL PUMP OUTPUT | METHOD RUN SINGLE & PARALLEL P COMPOUND C

FROM	TO													

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME FROM	TIME TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS, DESCRIPTIONS & REMARKS
12:00	6			Sound hole & clean p s tk
6	12			Water watch

DRILLING ASSEMBLY (All end of tour)

NO	ITEM	LENGTH
	BIT	
	STANDS DP	
	SINGLES DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

REMARKS

BIT RECORD

BIT NO				
SIZE				
IADC CODE				
MANUFACTURER				
TYPE				
SERIAL NO				
JETS				
TFA				
DEPTH OUT				
DEPTH IN				
TOTAL DRILLED				
TOTAL HOURS				
CUTTING STRUCTURE INNER				
CUTTING STRUCTURE OUTER				
CUTTING STRUCTURE DULL CHAR				
CUTTING STRUCTURE LOCATION				
BEARING SEALS				
GAUGE				
OTHER DULL CHAR				
REASON PULLED				

MUD RECORD

TIME				
WEIGHT				
PRESSURE GRADIENT				
FUNNEL VISCOSITY				
PV/YP				
GEL STRENGTH				
FLUID LOSS				
pH				
SOLIDS				

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DAY TOUR

DEPTH INTERVAL | DRILL REAM CORE | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO LINER SIZE | PUMP NO SPM | PUMP NO LINER SIZE | PUMP NO SPM | TOTAL PUMP OUTPUT | METHOD RUN SINGLE & PARALLEL P COMPOUND C

FROM	TO													

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME FROM	TIME TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS, DESCRIPTIONS & REMARKS
12:00	6:00		17	finish Gravel Pack to 390 put Sand to 385
6:00	6:00		20	Clean the location
6:00	9:30		13	WAIT on cement
9:30	11:30			Pump cement 385 to 240
11:30	12			Pull pipe

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL ID NO.	NAME	HRS.	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Brian McGrew	6		
DERRICKMAN		Jeff Frost	6		
MOTORMAN		Terry Hallen	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CHAIN SLIPP					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR FROM 12 TO 12

CREW	EMPL ID NO	NAME	HRS.	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Ernesto Rios	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CHAIN SLIPP					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO OF DAYS SINCE LAST LOST TIME ACCIDENT

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28105

DAILY DRILLING REPORT REPORT NO.

	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
TKE wood	22			8-9-19 94

CONTRACTOR: Layne Western RIG NO.: 880

TURE OF OPERATOR'S REPRESENTATIVE SIGNATURE OF CONTRACTOR'S TOOLPUSHER

FIELD OR DISTRICT | COUNTY: Lea | STATE / COUNTRY: NM

WIRE LINE RECORD

DRILLING CREW PAYROLL DATA

DATE 8-9-1994

WELL NAME & NO. 22

COMPANY Layne western

TOOLPUSHER Libby welch RIG NO. 880

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	INCURRED ON THIS TOUR? YES OR NOT
DRILLER		Bruce M. Blew	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Jerry Hollon	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPR					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	INCURRED ON THIS TOUR? YES OR NOT
DRILLER		Ernesto Rios	12		
DERRICKMAN		Keith grant	6		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPR					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

NO.	WEIGHT	GRADE	TOOL JOINT ID	TYPE THREAD	STRING NO.

PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

DRILLING ASSEMBLY (At end of tour)

NO.	ITEM	LENGTH
	BIT	
	STANDS ___ DP	
	SINGLES ___ DP	
	KELLY DOWN	
	TOTAL	

WT OF STRING

REMARKS

BIT RECORD

BIT NO.			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO.			
JETS			
TFA			
DEPTH OUT			
DEPTH IN			
TOTAL DRILLED			
TOTAL HOURS			
CUTTING STRUCTURE: INNER			
CUTTING STRUCTURE: OUTER			
CUTTING STRUCTURE: DULL CHAR			
CUTTING STRUCTURE: LOCATION			
BEARINGS/SEALS			
GAGE			
OTHER DULL CHAR			
REASON PULLED			

MUD RECORD

TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

DEPTH INTERVAL | DRILL BEAR & CONE C | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO. LINER SIZE | SPM | PUMP NO. LINER SIZE | SPM | TOTAL PUMP OUTPUT | METHOD RUN SINGLE & PARALLEL P. COMPOUND C

FROM	TO															

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30			Wait for giant
				cut conductor & casing & 3" guide tubing, move trailers, Fill & Grout in Grout tyam, valved collers & trp in to Lub, Break BIT swbt drift 440.
12:30	12:00			

DEPTH INTERVAL | DRILL BEAR & CONE C | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO. LINER SIZE | SPM | PUMP NO. LINER SIZE | SPM | TOTAL PUMP OUTPUT | METHOD RUN SINGLE & PARALLEL P. COMPOUND C

FROM	TO															

DEVIATION RECORD

DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP	DEPTH	DEV	DIR	TVD	HORIZ DISP

TIME LOG

FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	9:00		20	water watch
9:00	11:00			finish pump cement O
11:00	12:00		B	pull ~~pipe~~ tubing

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

HRS CLIENT DP	
HRS OPR DP	
HRS WITHOUT DP	
HRS STANDBY	
DAYWORK	
DATE SPUD	
RELEASE TURNKEY	
MUD COST	
MUD COST	

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28106

DAILY DRILLING REPORT REPORT NO.

KE wood TOR	WELL NO. 22	API WELL NUMBER	WATER DEPTH	DATE 8-10-96
TURE OF OPERATOR'S REPRESENTATIVE		CONTRACTOR LAYNE western SIGNATURE OF CONTRACTOR'S TOOLPUSHER		RIG NO. 280m

COUNTY LA

STATE COUNTRY CA

WIRE LINE RECORD

DRILLING CREW PAYROLL DATA

DATE 8-10-1996

WELL NAME & NO 22

COMPANY LAYNE westes

TOOLPUSHER LARRY welch RIG NO 280 A-7

NIGHT TOUR

TIME LOG FROM	TO	ELAPSED TIME	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12		Swebt Airlift 560 – 710

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	YES OR NOT
DRILLER		Bru McGinn	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPR					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

DAY TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12.30		7	Service Equipment
12:30	12:00		D	swebt Airlift 440 to 560

DAY TOUR FROM 12 TO 12.

CREW	EMPL. ID NO	NAME	HRS	INITIAL	YES OR NOT
DRILLER		Ernesto Rivas	12		
DERRICKMAN			0		
MOTORMAN		Keith paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE OPR					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

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028107

DAILY DRILLING REPORT REPORT NO.

Lakewood	WELL NO. 22	API WELL NUMBER	WATER DEPTH	DATE 8-11-96
RATOR		CONTRACTOR Layne Western		RIG NO. 280m
ATURE OF OPERATOR'S REPRESENTATIVE		SIGNATURE OF CONTRACTOR'S TOOLPUSHER		

FIELD OR DISTRICT | COUNTY L.A | STATE Ca

WIRE LINE RECORD

NIGHT TOUR

DEPTH INTERVAL FROM TO | DRILLED, REAMED, CORED | CORE NO. | FORMATION (SHOW CORE RECOVERY) | ROTARY TABLE SPEED | WT ON BIT | PUMP PRESSURE | PUMP NO. LINER SIZE SPM | TOTAL PUMP OUTPUT | METHOD

DEVIATION RECORD: DEPTH | DEV | DIR | TVD | HORIZ DISP

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	12a		D	Swab Airlift 950 · 1040
				1040 ·

DAY TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equiment
12:30	12:00		D	swab + Airlift 950 ft 750

DRILLING CREW PAYROLL DATA

DATE 8 11 96 68·2359

WELL NAME & NO. 22

COMPANY Lakewood

TOOLPUSHER Larry Welch RIG NO. 280m

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Bruce McBride	12		
DERRICKMAN		Jeff. Frost	6		
MOTORMAN		Jerry E Hallen	12		

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Ernesto Rivas	12		
DERRICKMAN		Keith paul	12		

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3108 ·

DAILY DRILLING REPORT

REPORT NO.

Kewood	WELL NO. 22	API WELL NUMBER	WATER DEPTH	DATE 8·12·96
E OF OPERATOR'S REPRESENTATIVE		CONTRACTOR Layne Western SIGNATURE OF CONTRACTOR'S TOOLPUSHER		RIG NO. 280m

FIELD OR DISTRICT

COUNTY L.A

STATE Ca

WIRE LINE RECORD

LAST CASING TUBING OR LINER

NIGHT TOUR

DRILLING ASSEMBLY (At end of tour)

BIT RECORD

MUD RECORD

DEPTH INTERVAL

FORMATION (SHOW CORE RECOVERY)

DEVIATION RECORD

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	10			Swab & Airlift 750 - 440
10	12			Trip out : Break off Swab & trip in open ~~end~~ to clean out Bottom Fill
				68 ½ Swab & Airlift

DAY TOUR

DRILLING ASSEMBLY (At end of tour)

BIT RECORD

MUD RECORD

DEPTH INTERVAL

FORMATION (SHOW CORE RECOVERY)

DEVIATION RECORD

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equimt
12:30			D	SWABBING Airlift 950 ft to 750

REMARKS

DRILLING CREW PAYROLL DATA

6f·2359

DATE 8·12 96

WELL NAME & NO 22

COMPANY Lakewood

TOOLPUSHER Larry Welch

RIG No. 280m

NIGHT TOUR FROM 12:00 TO 12:00

CREW	EMPL. ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Bruce McGraw	12		
DERRICKMAN		Jeff Ernst	6		
MOTORMAN		Jerry Hallam	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Ernesto Rivas	12		
DERRICKMAN		Keith paul	12		
MOTORMAN					
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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:109

DAILY DRILLING REPORT REPORT NO.

WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
Icewood 22			8-13-96

CONTRACTOR Layne Western — RIG NO. 280m

OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.	PUMP NO.	PUMP MANUFACTURER	TYPE	STROKE LENGTH

FIELD OR CONTRACT — COUNTY L.A. — STATE CA

LAST CASING TUBING OR LINER	NO.	NAME	WEIGHT & GRADE	NO. JOINTS	LENGTH	TOP TO CSG HD	SETAT

WIRE LINE RECORD — HOLE NO. — BHA — NO. LINES — LENGTH MEASURED — LENGTH CUT OFF — PIPE SLIPPED LENGTH — ALL OPEN TIME SPACE OUT — CUMULATIVE WIRE ON TRIPS

DRILLING CREW PAYROLL DATA

DATE 8-13-96 — 6F-2359

WELL NAME & NO. 22

COMPANY Calselwood

TOOLPUSHER Larry Welch — PHONE NO. 280m

TRIBUTION – HOURS

	NIGHT	DAY
SURVEY		
LOGS		
EMENT		
BOP		
MISC		
CLEANUP		
DRILLING		
WORK TIME SUMMARY (OFFICE USE ONLY)		
UNITS D.P.		
HWDP		
JAR D.P.		
SUBBY		
ENGINE		
COST		
COST		

DRILLING ASSEMBLY (all and all tours)

NO.	ITEM	LENGTH
	BIT	
	STANDS ___ D.P.	
	SINGLES ___ D.P.	
	KELLY DOWN	
	TOTAL	

WT. UP STRING

BIT RECORD

BIT NO.	
SIZE	
IADC CODE	
MANUFACTURER	
TYPE	
SERIAL NO.	
JETS	
TFA	
DEPTH OUT	
DEPTH IN	
TOTAL DRILLED	
TOTAL HOURS	

CUTTING STRUCTURE			
INNER	OUTER	DULL CHAR	LOCATION
REVERSED SEALS	GAGE	OTHER DULL CHAR	REASON PULLED

MUD RECORD

TIME	
WEIGHT	
PRESSURE GRADIENT	
FUNNEL VISCOSITY	
PV/YP	
GEL STRENGTH	
FLUID LOSS	
pH	
SOLIDS	

MUD & CHEMICALS ADDED

TYPE	AMOUNT	TYPE	AMOUNT

REMARKS

ENGINEER

RIGHT TOUR

DEPTH INTERVAL: FROM / TO — DRILL D REAM B CORE C — CORE NO. — FORMATION (SHOW CORE RECOVERY) — ROTARY TABLE SPEED — WT ON BIT — PUMP PRESSURE — PUMP NO. LINER SIZE / S.P.M. — PUMP NO. LINER SIZE / S.P.M. — TOTAL PUMP OUTPUT — METHOD USED (SINGLE & PARALLEL P COMPOUND C)

DEVIATION RECORD: DEPTH / DEV. / DIR. / TVD / HORIZ DISP. (×2)

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	1			Finish trip in, 1030. Start drlg 1060. 910
1	12			89 1/2

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	IN AVRED ON THIS TOUR? YES OR NOT
DRILLER		Bruce McGrail	12		
DERRICKMAN		Jeff Frost	12		
MOTORMAN		Jerry Hallen	8		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR

DEPTH INTERVAL: FROM / TO — DRILL D REAM B CORE C — CORE NO. — FORMATION (SHOW CORE RECOVERY) — ROTARY TABLE SPEED — WT ON BIT — PUMP PRESSURE — PUMP NO. LINER SIZE / S.P.M. — PUMP NO. LINER SIZE / S.P.M. — TOTAL PUMP OUTPUT — METHOD USED (SINGLE & PARALLEL P COMPOUND C)

DEVIATION RECORD: DEPTH / DEV. / DIR. / TVD / HORIZ DISP. (×2)

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	12:30		7	Service Equipment
12:30	10:00		6	Rein out fill on hole
~~10:00~~	~~12:00~~		~~6~~	~~Trip out 1080 ft~~
10:00	12:00		6	trip out 1080 ft
11:00	12:00		6	trip into 640 ft

88

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

CREW	EMPL. ID NO.	NAME	HRS	INITIAL	IN AVRED ON THIS TOUR? YES OR NOT
DRILLER		Ernesto Ruvas	12		
DERRICKMAN		Mike Ray Thomas	12		
MOTORMAN		Keith Paul	12		
FIREMAN					
FLOORMAN					
FLOORMAN					
FLOORMAN					
CRANE SUPT.					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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DAILY DRILLING REPORT **REPORT NO.**

wood	WELL NO. 22	API WELL NUMBER	WATER DEPTH	DATE 8-14-96
IE OF OPERATOR'S REPRESENTATIVE		CONTRACTOR Layne Western SIGNATURE OF CONTRACTOR'S TOOLPUSHER		RIG NO. 280 m

COUNTY L A STATE CA

DRILLING ASSEMBLY (At end of tour) | **BIT RECORD** | **MUD RECORD**

NIGHT TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12	~~7~~ 10			Swab & Airlift 670
10	12			Trip out & Shut down

DAY TOUR

TIME LOG FROM	TO	ELAPSED TIME	CODE NO.	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
12:00	1:00		D	SWABBING + AirLift
1:00	1:16		7	Service Equipmt
1:15	12:00		D	SwaBBING + AirLift 750 ft to 670

101

DRILLING CREW PAYROLL DATA

DATE 8-14-96
WELL NAME & NO. 22
COMPANY LAYNE Western
TOOLPUSHER LARRY Welch RIG NO. 280 m

NIGHT TOUR FROM TO

CREW	EMPL. ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Bruce M[illegible]	12		
DERRICKMAN		Jeff E[illegible]	12		

DAY TOUR FROM 12 TO 12

CREW	EMPL. ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Ernesto Rivas	12		
DERRICKMAN		Mike Ray Thomas	[illegible]	10	
MOTORMAN		Keith Paul	12		

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28111

DAILY DRILLING REPORT REPORT NO.

OR	WELL NO.	API WELL NUMBER	WATER DEPTH	DATE
F wood Cey	22			8-15-1996

CONTRACTOR: LAyne western

RIG NO.: 280m

RE OF OPERATOR'S REPRESENTATIVE

SIGNATURE OF CONTRACTOR'S TOOLPUSHER

DRILLING ASSEMBLY (At end of tour)

BIT RECORD

MUD RECORD

DEPTH INTERVAL / FORMATION (SHOW CORE RECOVERY)

DEVIATION RECORD

NIGHT TOUR

DAY TOUR

TIME FROM	TO	ELAPSED TIME	CORE NO	DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS
6:00	6:00		1	Rig Down

DRILLING CREW PAYROLL DATA

DATE 8-15-1996

WELL NAME & NO. 22

COMPANY LAyne western

TOOLPUSHER Larry welch RIG NO. 280m

NIGHT TOUR FROM TO

CREW	EMPL ID NO	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

DAY TOUR FROM 6 TO

CREW	EMPL ID NO.	NAME	HRS	INJURED ON THIS TOUR? INITIAL	YES OR NO?
DRILLER		Ernesto Rivers	13		
DERRICKMAN		Keith paul	12		
MOTORMAN		Jef frost	12		
FIREMAN		J[illegible] Hallan	12		
FLOORMAN		[illegible]	12		
FLOORMAN					
FLOORMAN					
CHANGE SUPT					
MECHANIC					
WELDER					
ROUSTABOUT					
ROUSTABOUT					
TRAINEE					

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT

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APPENDIX F - 2

Pumper's Daily Notes

MCCALLA BROS. PUMP AND DRILLING INC.

DATE 8-26-96 JOB NO. 68-2359 PAGE 1

Chino SERVICE CENTER

CUSTOMER: Lakewood HOURS PUMP DAY 8 TOTAL HOURS 8 TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 75' BOWL USED ____

327'

TIME	P.F.M	G.F.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
10:00	START						
:15	606.3	500	101.25'	26.25'	625	19.0	sl. Cldy
:33	338	500	101.75'	26.75'	625	18.7	sl. Cldy
:45	70.1	500	101.25'	26.25'	625	19.0	Clearing
11:00	71.9	500	101.25'	26.25'	625	19.0	Clear Q↑
:15	204	650	111'	36'	650	18.1	Cloudy
:30	284	650	110.5'	35.5'	650	18.3	Cldy
:45	288	600	109.75'	34.75'	625	17.3	Cldy
12:00	186	600	110.5'	35.5'	625	16.9	sl. Cldy
:15	163	600	110.5'	35.5'	625	16.9	sl. Cldy
:30	155	600	110.5'	35.5'	625	16.9	sl. Cldy
:45	117	600	109.75'	34.75'	625	17.3	sl. Cldy
1:00	114	600	110.5'	35.5'	625	16.9	Clearing Q↑
:15	133	850	119.75'	44.75'	775	19.0	Cldy
:30	137	850	119.75'	44.75'	775	19.0	Cldy
:45	106	850	119.75'	44.75'	775	19.0	Cldy
2:00	125	850	120.25'	45.25'	775	18.8	sl. Cldy
:15	110	850	120.25'	45.25'	775	18.8	Cldy
:30	60.6	850	120.25'	45.25'	775	18.8	sl. Cldy - Q↑
:45	159	1000	133'	58'	750	17.2	Cloudy
3:00	121	1000	134'	59'	750	16.9	Cldy
:15	148	1000	134'	59'	750	16.9	Cldy
:30	121	1000	134.75'	59.75'	750	16.7	Cldy
:45	148	1000	134.75'	59.75'	750	16.7	Cldy
4:00	129	1000	134.75'	59.75'	750	16.7	Cldy
:15	110	1000	134.75'	59.75'	750	16.7	Cldy
:30	120	1000	134.75'	59.75'	750	16.7	Cldy -5x1
:34	Resume pumping - 15 min pumping cycle						
:49	102	500	105.75'	30.75'	625	16.3	Cloudy
5:04	239	500	105.25'	30.25'	625	16.5	Clearing
:19	90.9	500	104'	29'	625	17.2	Clear + Q↑
:34	129	750	113.25'	38.25'	650	19.6	sl. Cloudy
:49	121	750	114.5'	39.5'	650	19.0	sl. Cldy
6:04	102	750	115'	40'	650	18.8	
	Shutdown						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 8-27-96

PAGE 2

Chmo SERVICE CENTER

CUSTOMER LAKEWOOD

HOURS PUMP DAY 9 1/2

TOTAL HOURS 17 1/2

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 76.5' BOWL USED ____

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
9:30	start - 15 min pumping cycles						
:45	90.9	300	90.25'	13.75'	600	21.8	CLEAR
10:00	60.6	300	90.25'	13.75'	600	21.8	CLR
:15	75.7	275	88.5'	12'	600	22.9	CLR Q↓
:30	26.5	150	84'	7.5'	600	20	CLR
:45	7.6	150	83.25	6.75'	600	22.2	CLR -Q↑
11:00	7.6	250	87.25	10.75	600	23.3	CLR Q↑
:15	19.0	400	93.75'	17.25'	600	23.2	CLR
:30	37.9	400	93.75'	17.25'	600	23.2	CLR
:45	56.8	400	94.25	17.75'	600	22.5	CLR
12:00	36.0	400	94.25	17.75'	600	22.5	CLR -Q↑
:15	76.2	550	100.5'	24'	625	22.9	sl. cldy
:30	117	550	100.5'	24'	625	22.9	sl. cldy
:45	87.1	550	101.25'	24.75'	625	22.2	CLEARing Q↑
1:00	174	700	107'	30.5'	650	23.0	sl. cldy
:15	220	700	108.75	32.25'	650	21.7	sl. cldy
:45	115	700	108.25	31.75	650	22.0	CLR -Q↑
2:00	186	900	119'	42.5'	775	21.2	Cldy
:15	170	900	119.75	43.25'	775	20.8	sl Cldy
:30	215	900	120.25	43.75	775	20.6	CLEARing
:45	102	900	119.75	43.25'	775	20.8	CLEARing
3:00	140	900	119.75	43.25'	775	20.8	CLEAR -Q↑
:15	246	1100	130	53.5'	750	20.6	Cldy
:30	193	1100	130	53.5'	750	20.6	sl. cldy
:45	223	1100	130	53.5'	750	20.6	sl. cldy
4:00	185	1100	130	53.5'	750	20.6	sl. cldy
:15	170	1100	130	53.5'	750	20.6	CLEARing -Q↑
:30	322	1350	144.5'	68'	800	19.9	Cloudy
:45	379	1350	144.5'	68'	800	19.9	Cldy
5:00	284	1350	145.75	69.25'	800	19.5	Cldy
:15	329	1350	146.25'	69.75	800	19.4	Cldy
:30	257	1350	146.75'	70.25'	800	19.2	Cldy
:45	133	1350	146.75'	70.25	800	19.2	Cldy
6:00	220	1350	146.75'	70.25'	800	19.2	Cldy
:15	163	1350	148	71.5'	800	18.9	Cldy -Q↓
:30	117	700	118'	41.5'	675	16.9	sl. cldy
:45	12.5	700	118'	41.5'	675	16.9	CLEARing
7:00	17.0	700	118'	41.5'	675	16.9	CLEAR
	shut down						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 8-28-96 PAGE 3

Chino SERVICE CENTER

CUSTOMER Lakewood HOURS PUMP DAY 10 1/2

TOTAL HOURS 28

TESTED BY L. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 75.5' BOWL USED ____

329'

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:00	START -	15 mn pumping cycle					
:15	42.4	225	85.75	10.25	575	22.0	CLR - QT
:30	68.1	425	94.5'	19'	600	22.4	CLEARing - QT
:45	79.5	600	100.25	24.75	625	24.2	SL. CLdy - QT
9:00	303	775	110.75	35.25	675	22.0	CLdy
:15	379	775	111.25	35.75	675	21.7	CLdy
:30	254	775	111.75	36.25	675	21.4	SL.CLdy - SX1
:46	204	325	93.5'	18'	575	18.1	CLdy
10:01	129	325	93.5'	18'	575	18.1	SL.CLdy - SX1
:17	227	325	92.25'	16.75'	575	19.4	CLdy
:32	147	325	92.75	17.25'	575	18.8	CLEARing - SX1
:48	209	325	92.75'	17.25'	575	18.8	CLdy
11:03	95.4	325	93.5'	18'	575	18.1	CLEARing - QT
:18	133	425	97.5	22'	600	19.3	CLEARing - QT
:33	1606	600	102.5	27'	650	22.2	SL.CLdy - QT
:48	250	800	111.75'	36.25'	675	22.1	CLOUDY
12:03	321	775	111.75	36.25'	675	21.4	SL.CLdy - QT
:18	400	1000	121'	45.5'	700	22.0	CLOUDY
:33	300	975	121'	45.5'	700	21.4	SL.CLdy
:48	333	975	121'	45.5'	700	21.4	SL.CLdy
1:03	265	950	120.5'	45'	700	21.1	CLEARing
:18	261	950	120.5'	45'	700	21.1	CLEARing
:33	216	950	120.5'	45'	700	21.1	CLEARing
:48	144	950	120.5'	45'	700	21.1	CLEAR - QT
2:03	348	1250	133.25'	57.75	800	21.6	CLdy
:18	352	1200	133.75'	58.25'	800	20.6	SL.CLdy
:33	283	1200	134.5'	59'	800	20.3	SL.CLdy
:48	193	1200	134.5'	59'	800	20.3	SL.CLdy
3:15	118	1200	134.5'	59'	800	20.3	CLEARing
:30	208	1200	135'	59.5'	800	20.2	SL.CLdy
:45	167	1200	135'	59.5'	800	20.2	CLEARing - QT
4:00	2416	1400	143.5'	68'	850	20.6	SL.CLdy
:15	231	1400	144.25'	68.75	850	20.4	SL.CLdy
:30	220	1400	144.25'	68.75	850	20.4	SL.CLdy
:45	201	1400	144.25'	68.75'	850	20.4	SL.CLdy
5:00	201	1400	144.25'	68.75	850	20.4	SL.CLdy - QT
:30	103	1500	148.75'	73.25	875	20.5	SL.CLdy
:45	174	1500	148.75'	73.25'	875	20.5	SL.CLdy
6:00	159	1500	148.75'	73.25'	875	20.5	SL.CLdy
:15	121	1500	148.75'	73.25'	875	20.5	CLEARing
:30	42.4	1500	148.75'	73.25'	875	20.5	CLEARing
	Shutdown						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 8-29-96

PAGE 4

Chino SERVICE CENTER

CUSTOMER LAKEWOOD

HOURS PUMP DAY 10

TOTAL HOURS 38

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 77.25 BOWL USED ____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:30	START						
:45	110	300	88.75'	11.5'	575	26.1	Cloudy
9:00	20.8	300	90'	12.75'	575	23.5	CLEARING - Q↑
:15	60.6	600	99.75	22.5	625	26.7	Sl. Cldy
:30	121	575	100.25	23'	625	25.0	Sl. Cldy
10:00	122	575	100.25'	23'	625	25.0	CLEARING - Q↑
:15	246	900	114.25	37	700	24.3	Cloudy
:30	201	900	116'	38.75	700	23.2	Cldy
:45	144	900	116.5	39.25'	700	22.9	Sl. Cldy
11:00	163	875	116.5'	39.25	700	22.3	Sl. Cldy
:15	133	875	116.5'	39.25	700	22.3	CLEARING
:30	151	875	116.5	39.25'	700	22.3	CLR - Q↑
:45	428	1200	129.75'	52.5'	775	22.9	Cldy
12:00	435	1200	130.25'	53'	775	22.6	Cldy
:15	322	1175	131'	53.75'	775	21.9	Sl. Cldy
:30	227	1175	131'	53.75	775	21.9	CLEARING
:45	235	1175	131'	53.75'	775	21.9	CLEARING
1:00	197	1175	131.5'	54.25'	775	21.7	CLEARING
:15	133	1175	131.5'	54.25'	775	21.7	CLEAR - Q↑
:30	318	1600	147'	69.75'	900	22.9	Cldy
:45	208	1600	148.25'	71'	900	22.5	Cldy
2:00	159	1550	146.5'	69.25	875	22.4	Sl. Cldy
:15	133	1550	146.5'	69.25	875	22.4	CLEARING - Q↑
:45	102	1800	157'	79.75'	950	22.6	Cloudy
3:00	208	1800	158'	80.75'	950	22.3	Cldy
:15	235	1775	158'	80.75	950	22.0	Cldy
:30	235	1775	158'	80.75	950	22.0	Cldy
:45	242	1775	158.5'	81.25	950	21.8	Cldy
4:00	163	1775	158.5'	81.25	950	21.8	Cldy
:15	125	1775	159.25	82'	950	21.6	Sl. Cldy
:30	90.9	1775	159.25	82'	950	21.6	Sl. Cdy - Q↑
:45	155	2000	169.5'	82.25	1000	24.3	Cloudy
5:00	148	2000	169.5'	82.25'	1000	24.3	Cldy
:15	159	2000	169.5'	82.25'	1000	24.3	Cloudy
:30	133	2000	169.5'	82.25'	1000	24.3	Cloudy
:45	87.1	2000	169'	81.75'	1000	24.5	Cloudy
6:00	133	2000	169'	81.75'	1000	24.5	Cloudy
:15	94.6	2000	169.5'	82.25'	1000	24.3	Cldy
:30	83.9	2000	169.5'	82.25'	1000	24.3	Cldy Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

DATE 8-30-96 JOB NO. 68-2359 PAGE 5

Chino SERVICE CENTER

CUSTOMER: LAKEWOOD HOURS PUMP DAY 16
TOTAL HOURS 48
TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 78.25' BOWL USED ____

TIME	P.F.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
7:45	START						
8:00	88.3	300	90'	11.75	575	25.5	Cldy
:15	26.5	300	90.5'	12.25	575	24.5	CLEARING
:30	42.4	300	90.5'	12.25	575	24.5	CLEAR - QT
:45	65.2	600	100.25'	22'	650	27.3	Sl. Cldy
9:00	108.1	600	100.25'	22'	650	27.3	CLR ' QT
:15	155	900	113'	34.75	700	25.9	Sl. Cldy
:30	79.5	900	114.75'	36.5'	700	24.7	Sl. Cldy
:45	71.9	900	115.25'	37'	700	24.3	CLEARING - QT
10:00	125	1200	123.5'	45.25	800	26.5	Sl. Cldy
:15	106	1200	124'	45.75'	800	26.2	Sl. Cldy
:30	92.8	1200	125'	46.75'	800	25.7	CLEARING
:45	114	1200	125'	46.75'	800	25.7	Sl. Cldy
11:00	121	1200	125'	46.75'	800	25.7	CLEARING - QT
:15	276	1500	136	57.75	850	26.0	Cldy
:30	314	1500	137.25	59'	875	25.4	Sl. Cldy
:45	235	1500	137.25'	59'	875	25.4	Sl. Cldy
12:00	303	1500	137.25'	59'	875	25.4	CLEARING
:15	106	1500	138.5'	60.25	875	24.9	CLEAR '
:30	159	1500	139'	60.75	875	24.7	Sl. Cldy
:45	173	1500	139.5'	61.25	875	24.5	CLEARING
1:00	133	1500	139'	60.75	875	24.7	CLR - SX1
:15	119	200	96.75	18.5'	575	10.8	Sl. Cldy
:30	108.1	200	95'	16.75	575	11.9	CLR
:45	11.4	200	93.5'	15.25	575	13.1	CLR
2:00	3.8	200	92.25'	14'	575	14.3	CLR - QT
:15	24.6	400	98'	19.75'	600	20.3	Sl. Cldy
:30	17.8	400	98'	19.75'	600	20.3	CLEARING
:45	19.1	400	98'	19.75'	600	20.3	CLEARING
3:00	11.0	400	98'	19.75'	600	20.3	CLEAR
:15	7.95	400	98'	19.75	600	20.3	CLR - QT
:30	54.9	600	100.25	22'	650	27.3	CLEARING
:45	62.4	600	103.75'	25.5	650	23.5	Sl. Cldy
4:00	42.4	600	105'	26.75'	650	22.4	CLEARING
:15	37.9	600	105.5'	27.25'	650	22.0	CLEAR
:30	15.1	600	105.5'	27.25'	650	22.0	CLR
:45	11.4	600	105.5'	27.25'	650	22.0	CLR - QT
5:00	159	800	113'	34.75'	725	23.0	Cloudy
:15	83.3	800	113'	34.75'	725	23.0	Sl. Cldy
:30	71.9	800	114.75'	36.5'	725	21.9	CLEARING
:45	50.4	800	114.75'	36.5	725	21.9	CLEARING

MCCALLA BROS. PUMP AND DRILLING INC.

DATE 9-3-96 JOB NO. 68-2359 PAGE 6

Chino SERVICE CENTER

CUSTOMER: LAKEWOOD HOURS PUMP DAY 9 1/2 TOTAL HOURS 57 1/2 TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 76' BOWL USED ____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:30	START						57162
:45	57	300	86.5	10.5'	575	28.6	EXTR. Cldy
9:00	129	300	87'	11'	575	27.3	sl. Cldy
:15	71.9	300	87.5'	11.5'	575	26.1	CLEARING
:30	34.1	300	87'	11'	575	27.3	CLEAR
:45	15.1	300	87'	11'	575	27.3	CLEAR
10:00	22.7	300	87'	11'	575	27.3	CLR - Q ↑
:15	204	600	97.5'	21.5'	600	27.9	Cldy
:30	140	600	98'	22'	600	27.3	sl. Cldy
:45	71.9	600	99.25'	23.25'	600	25.8	CLEAR
11:00	56.8	600	85.5'	22.5'	600	26.7	CLR
:15	47.3	600	85.5'	22.5'	600	26.7	CLR
:30	30.3	600	99.25'	23.25'	600	25.8	CLR - Q ↑
:45	208	900	110	34'	700	26.5	Cloudy
12:00	170	900	111.25	35.25'	700	25.5	sl. Cldy
:15	90.9	900	111.75'	35.75'	700	25.2	CLR - Q ↑
:30	201	1200	121	45'	800	26.7	sl. Cldy
:45	182	1200	120	44'	800	27.3	Clearing
1:00	148	1200	121'	45'	800	26.7	Clearing
:15	170	1200	121'	45'	800	26.7	CLR - Q ↑
:30	204	1500	129.25'	53.25'	850	28.2	sl. Cldy
:45	182	1500	129.75'	53.75'	850	27.9	Clearing
2:00	133	1500	130.25'	54.25'	850	27.6	CLR - Q ↑
:15	246	1800	140.25'	64.25'	925	28.0	sl. Cldy
:30	212	1800	141.25'	65.25'	925	27.6	sl. Cldy
:45	170	1800	142'	66'	925	27.3	Clearing
3:00	140	1800	142.5'	66.5'	925	27.1	Clearing - Q ↑
:15	186	2100	148.75'	72.75'	1025	28.9	sl. Cldy
:30	318	2100	154.5'	78.5'	1025	26.8	sl. Cldy
:45	211	2100	155.75'	79.75'	1025	26.3	sl. Cldy
4:00	151	2100	156.25'	80.25'	1025	26.2	sl. Cldy - SX1
:15	102	175	98.5	22.5'	575	7.8	sl. Cldy
:30	54.9	200	95.75	19.75'	575	10.1	Clearing - SX1
:45	37.5	200	92.25'	16.25'	575	12.3	Clearing
5:00	17.0	200	91.75	15.75'	575	12.7	CLR - SX1
:15	18.9	200	90.0	14'	575	14.3	CLEARING
:30	8.3	200	89.25	13.25'	575	15.1	CLR - SX1
:45	16.3	200	88.75	12.75'	575	15.7	CLR
6:00	9.1	200	87.5	11.5'	575	17.4	CLR Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-4-96

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Chino SERVICE CENTER

CUSTOMER: LAKEwood

HOURS PUMP DAY 9

TOTAL HOURS 166.5

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 75' BOWL USED _____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
9:15	START - 15 min pumping cycle						
:30	23.3	275	84.75'	9.75'	575	28.2	CLEARING
:45	10.6	275	86.5'	11.5'	575	23.9	CLR - SX2
10:03	34.1	250	84'	9'	575	27.8	Cldy
:18	30.3	225	84'	9'	575	25.0	CLEARING - SX2
:35	45.4	225	84'	9'	575	25.0	EXTR. Cldy
:50	25.4	250	85.75	10.75	575	23.3	CLEARING - SX2
11:08	41.6	225	84'	9'	575	25.0	EXTR. Cldy
:23	18.9	225	84'	9'	575	25.0	CLEARING - SX2
:41	64.0	225	84'	9'	575	25.0	EXTR. Cldy
:56	26.5	225	84'	9'	575	25.0	CLEARING - SX1
12:13	121	525	94'	19'	600	27.6	Cloudy
:28	144	525	94'	19'	600	27.6	SL Cldy - SX1
:44	159	525	94.5	19.5'	600	26.9	Cldy
:59	79.5	525	95'	20'	600	26.3	CLEARING
1:14	66.3	525	95.75'	20.75'	600	25.3	CLEARING - SX2
:32	322	525	95.75'	20.75'	600	25.3	Cloudy
:47	310	525	95.75'	20.75'	600	25.3	SL Cldy
2:02	170	500	95.75'	20.75	600	24.1	CLEARING
:17	106	500	95.75'	20.75'	600	24.1	CLEARING - SX2
:34	299	525	95.75	20.75'	600	25.3	SL Cldy - Q↑
:49	500	1000	110.75	35.75	675	28.0	Cldy
3:04	386	1000	111.25	36.25	675	27.6	Cldy
:19	329	975	111.25	36.25	675	26.9	Cldy
:34	242	975	111.75	36.75	675	26.5	CLEARING
:49	204	975	111.75	36.75	675	26.5	CLEAR
4:04	265	975	112.5	37.5	675	26.0	CLR
:19	138	975	113'	38'	675	25.7	CLR
:34	112	975	113.5	38.5'	675	25.3	CLR
:49	90.8	975	113.5'	38.5'	675	25.3	CLR
5:04	69.6	975	113.5'	38.5'	675	25.3	CLR
:19	53.0	975	113.5'	38.5'	675	25.3	CLR
	Shut down						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-6-96

PAGE 8

Chino SERVICE CENTER

CUSTOMER: Lakewood

HOURS PUMP DAY 8

TOTAL HOURS 74.5

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 76' BOWL USED ____

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:30	START						
:45	36.4	200	84'	8'	575	25.0	Cloudy
9:00	30.6	200	84.75'	8.75'	575	22.9	CLR-AR - Q ↑
:15	19.7	400	91.5'	15.5'	400	25.8	Sl. Cldy - Q ↑
:30	75.7	600	96.75'	20.75'	625	28.9	Sl. Cldy
:45	64.4	600	97.5'	21.5'	625	27.9	CLEAR
10:00	34.1	600	97.5'	21.5'	625	27.9	CLR - Q ↑
:15	116	800	104.25'	28.25'	700	28.3	CLEARING
:30	76	800	105'	29'	700	27.6	CLEAR
:45	189	800	105'	29'	700	27.6	Cloudy
:49	147	800			700		Sl. Cldy SX1
:52	RESUME	pumping					
11:00	227	400	94.5'	18.5'	575	21.6	Cloudy 58400 cu ft
:15	80.4	400	93.5'	17.5'	575	22.9	Sl. Cldy
:30	47.3	400	02 93.5'	17.5'	575	22.9	CLR
:40	17.9	400	93.5'	17.5'	575	22.9	CLR
:50	13.8	400	93'	17'	575	23.5	CLR - SX 2
:57	RESUME	pumping					
12:12	186	400	93.5'	17.5'	575	22.9	Cloudy
:27	94.6	400	93.5'	17.5'	575	22.9	Sl. Cldy
:42	56.8	400	93'	17'	575	23.3	CLEARING
:57	41.6	400	93'	17'	575	23.3	CLEAR
1:12	45.4	400	92.25'	16.25'	575	24.6	CLR
:27	30.7	400	92.25'	16.25'	575	24.6	CLR
:42	30.3	400	92.25'	16.25'	575	24.6	CLR
:57	26.5	400	92.25'	16.25'	575	24.6	CLR
2:12	20.1	400	91.5'	15.5'	575	25.8	CLR SX1
:14	RESUME	pumping					
:29	157	400	93.5'	17.5'	575	22.9	Cloudy
:44	45.9	400	93'	17'	575	23.3	CLR
:59	24.5	400	93.5'	17.5'	575	22.9	CLR
3:14	26.5	400	93.5'	17.5'	575	22.9	CLR - SX1
:16	RESUME	pumping					
:31	136	400	93.5'	17.5'	575	22.9	Cloudy
:46	60.6	400	93.5'	17.5'	575	22.9	CLEARING
4:01	30.3	400	93.5'	17.5'	575	22.9	CLEAR
:16	27.6	400	94'	18'	575	22.2	CLR
:31	30.3	400	94'	18'	575	22.2	CLR
	Shut down						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359
PAGE 9

DATE 9-9-96

Chino SERVICE CENTER

CUSTOMER Lakewood

HOURS PUMP DAY 8
TOTAL HOURS 82.5
TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 76.5 BOWL USED ____

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
10:15	START						1050' T.D
:30	159	400	90.5'	14'	600	28.6	EXTR. Cldy
:45	189	400	91.5'	15'	600	26.7	Cloudy
11:00	90.9	400	92.25'	15.75'	600	25.4	CLEARING
:15	49.2	400	92.25'	15.75'	600	25.4	CLR
:30	39.8	400	92.25'	15.75'	600	25.4	CLR
:45	28.4	400	92.25'	15.75'	600	25.4	CLR
12:00	27.6	400	92.25'	15.75'	600	25.4	CLR
:15	20.8	400	92.25'	15.75'	600	25.4	CLR SX1
:30	220	400	92.75'	16.25'	600	24.6	EXTR. Cldy
:45	75.7	400	92.75'	16.25'	600	24.6	CLEARING
1:00	32.2	400	92.75'	16.25'	600	24.6	CLR
:15	21.2	400	92.75'	16.25'	600	24.6	CLR
:30	18.3	400	93.5'	17'	600	23.5	CLR - SX1
:45	171	400	92.25'	15.75'	600	25.4	Cloudy
2:00	60.6	400	92.25'	15.75'	600	25.4	CLEARING
:15	30.3	400	92.25'	15.75'	600	25.4	CLR
:30	18.9	400	92.75'	16.25'	600	24.6	CLR SX1
:45	174	400	93.5'	17'	600	23.5	EXTR. Cldy
3:00	102	400	92.75'	16.25'	600	24.6	SL. Cldy
:15	47.3	400	93.5'	17'	600	23.5	CLEAR
:30	22.7	400	93.5'	17'	600	23.5	CLR - Q↑
:45	64.4	550	96.75'	20.25'	600	27.2	SL. Cldy
4:00	75.7	550	97.5'	21'	600	26.2	CLR
:15	49.2	550	97.5'	21'	600	26.2	CLR
:30	39.8	550	97.5'	21'	600	26.2	CLR
:45	45.4	550	97.5'	21'	600	26.2	CLR
5:00	49.2	550	97.5'	21'	600	26.2	CLR - SX1
:15	216	550	96.75'	20.25'	600	27.2	Cloudy
:30	133	550	96.75'	20.25'	600	27.2	Cloudy
:45	87.1	550	96.75'	20.25'	600	27.2	CLEARING
6:00	64.4	550	96.75'	20.25'	600	27.2	CLEARING
:15	49.3	550	96.75'	20.25'	600	27.2	CLEAR
:30	42.4	550	96.75'	20.25'	600	27.2	CLR
	Shutdown						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-10-96 PAGE 10

Chino SERVICE CENTER

CUSTOMER: Lakewood HOURS PUMP DAY 9 1/2

TOTAL HOURS 9 1/2

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 75' BOWL USED ____

TIME	P.F.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:15	START						
:30	62.4	400	88.25'	13.25'	575	30.2	EXTR. Cloudy
:45	212	400	89.25	14.25'	575	28.1	Cloudy
9:00	125	400	89.25'	14.25	575	28.1	SL. Cldy
:15	56.8	400	90'	15'	575	26.7	CLEARING
:30	53.0	400	91'	16'	575	25.0	CLEAR
:45	54.9	400	91.5'	16.5'	575	24.2	CLR
10:00	26.5	400	91.5'	16.5'	575	24.2	CLR
:15	16.3	400	91.5'	16.5'	575	24.2	CLR - Q↑
:30	79.5	550	96.75'	21.75'	600	25.3	SL. Cldy
:45	79.5	550	96.75'	21.75'	600	25.3	CLEARING
11:00	49.2	550	96.75'	21.75'	600	25.3	CLR
:15	34.1	550	96.75'	21.75'	600	25.3	CLR
:30	30.3	550	96.25'	21.25'	600	25.9	CLR
:45	26.5	550	96.25'	21.25	600	25.9	CLR
12:00	19.3	550	96.75	21.75'	600	25.3	CLR SX1
:15	261	550	97.5'	22.5'	600	24.4	Cloudy
:30	170	550	97.5'	22.5'	600	24.4	SL. Cloudy
:45	71.9	550	97.5'	22.5'	600	24.4	CLEARING
1:00	56.8	550	98'	23'	600	23.9	CLEAR
:15	43.5	550	98'	23'	600	23.9	CLR
:30	37.9	550	98'	23'	600	23.9	CLR
:45	28.4	550	98.5'	23.5'	600	23.4	CLR
2:00	22.7	550	98.5'	23.5'	600	23.4	CLR - Q↑
:15	114	700	102'	27'	625	25.9	SL. Cldy
:30	170	700	103.25'	28.25'	625	24.8	CLEARING
:45	133	700	102.5'	27.5'	625	25.5	CLEARING
3:00	106	700	102.5'	27.5'	625	25.5	CLR
:15	75.7	700	102.5'	27.5'	625	25.5	CLR
:30	56.8	700	102.5'	27.5'	625	25.5	CLR
:45	160.6	700	102'	27'	625	25.9	CLR
4:00	45.4	700	102.5'	27.5'	625	25.5	CLR - Q↑
:15	102	850	107.25	32.25'	650	26.4	Cloudy
:30	212	850	107.25'	32.25'	650	26.4	SL. Cldy
:45	124	850	107.75'	32.75'	650	26.0	CLEARING
5:00	110	850	107.75	32.75'	650	26.0	CLEARING
:15	110	850	107.75	32.75	650	26.0	CLEARING
:30	98.4	850	107.75	32.75	650	26.0	CLEAR
:45	87.1	850	107.75	32.75	650	26.0	CLR shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-11-96

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Chino SERVICE CENTER

CUSTOMER Lakewood #22

HOURS PUMP DAY 8 3/4

TOTAL HOURS 993/4

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 74. BOWL USED _____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:30	start						
:45	341	850	102.5'	28.5'	650	29.8	Cloudy
9:00	231	850	104.25'	30.25'	650	28.1	Cldy
:15	136	850	105'	31'	650	27.4	Cldy
:30	121	850	106'	32'	650	26.6	Clearing
:45	110	850	107.25'	33.25'	650	25.6	Clearing
10:00	81.3	850	106.75	32.75'	650	26.0	Clearing
:15	135	850	107.25'	33.25'	650	25.6	Cloudy
:30	151	850	107.25'	33.25'	650	25.6	Sl. Cldy
:45	87.1	850	107.75'	33.75'	650	25.2	Clearing
11:00	83.3	850	108.5'	34.5'	650	24.6	Clear
:15	56.8	850	107.75'	33.75'	650	25.2	Clr
:30	47.3	850	107.75'	33.75'	650	25.2	Clr
:45	39.8	850	108.5'	34.5'	650	24.6	Clr
12:00	41.6	850	108.5'	34.5'	650	24.6	Clr -SX1
:02	Resume	pumping					
:15	331	850	108.5'	34.5'	650	24.6	Cloudy
:30	250	850	108.5'	34.5'	650	24.6	Sl. Cloudy
:45	133	850	108.5'	34.5'	650	24.6	Clearing
1:00	94.6	850	109'	35'	650	24.3	Clear
:15	88.3	850	109'	35'	650	24.3	Clr
:30	64.4	850	109'	35'	650	24.3	Clr
:45	64.4	850	109'	35'	650	24.3	Clr
2:00	53.0	850	109'	35'	650	24.3	Clr -SX1
:01	Resume	pumping					
:15	310	850	108.5	34.5	650	24.6	Cloudy
:30	140	850	107.75	33.75	650	25.2	Clearing
:45	79.5	850	108.5'	34.5'	650	24.6	Clr
3:00	51.1	850	108.5'	34.5'	650	24.6	Clr -Q1
:15	295	1000	115.25	41.25'	700	24.2	Cloudy
:30	208	1000	116	42'	700	23.8	Sl. Cldy
:45	140	1000	116'	42'	700	23.8	Clearing
4:00	102	1000	116.5'	42.5	700	23.5	Clear
:15	75.7	1000	116.5'	42.5	700	23.5	Clr
:30	87.1	1000	116.5'	42.5'	700	23.5	Clr
:45	64.4	1000	116.5'	42.5'	700	23.5	Clr -SX1
:46	Resume	pumping					
5:00	249	1000	114.75	40.75'	700	24.5	Extr cldy
:15	242	1000	115.25'	41.25'	700	24.2	Sl. Cldy

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-11-96

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Chino SERVICE CENTER

CUSTOMER: Lakewood #22

HOURS PUMP DAY 1 1/4

TOTAL HOURS 101

TESTED BY R. Webber

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 74' BOWL USED _____

TIME	P.F.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
5:30	261	1000	114.25'	40.25'	700	24.8	SL. Cldy
1:45	189	1000	114.75'	40.75'	700	24.5	SL. Cldy
6:00	148	1000	114.75'	40.75'	700	24.5	CLEARING
1:15	98.4	1000	115.25'	41.25'	700	24.2	CLEARING
1:30	84.8	1000	115.25'	41.25'	700	24.2	CLEAR
	Shutdown						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-12-96 PAGE 13

Chino SERVICE CENTER

CUSTOMER Lakewood #22 HOURS PUMP DAY 9 1/2

TOTAL HOURS 110 1/2

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 75' BOWL USED ____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:15	Start						
:30	367	1000	107.75'	32.75'	700	30.5	Extr. Cldy
:45	303	1000	110.75'	35.75'	700	28.0	Cldy
9:00	265	1000	110.75	35.75'	700	28.0	Cldy
:15	341	1000	111.25'	36.25	700	27.6	Cldy
:30	165	1000	111.75'	36.75'	700	27.2	Sl. Cldy
:45	136	1000	113'	38'	700	26.3	Clearing
10:00	170	1000	113'	38'	700	26.3	Sl. Cldy
:15	151	1000	113.5'	38.5'	700	26.0	Sl. Cldy
:30	117	1000	113.5'	38.5'	700	26.0	Clearing
:45	79.5	1000	113'	38'	700	26.3	Clear -Q↑
11:00	98.4	1100	116.5'	41.5'	725	26.5	Clearing -Q↑
:15	201	1200	120	45	725	26.7	Cldy
:30	250	1200	120.5	45.5	725	26.4	Sl. Cldy
:45	170	1200	121'	46'	725	26.1	Clearing
12:00	140	1200	121.75'	46.75'	725	25.7	Clearing
:15	106	1200	121'	46'	725	26.1	Clearing
:30	94.6	1200	121.75'	46.75'	725	25.7	Clr -Q↑
:45	182	1300	125'	50'	750	26.0	Sl. Cldy
1:00	151	1300	125.75'	50.75'	750	25.6	Clearing
:15	155	1300	125.75'	50.75'	775	25.6	Clearing
:30	133	1300	125.75'	50.75'	775	25.6	Clearing
:45	140	1300	125.75'	50.75'	775	25.6	Clearing
2:00	148	1300	126.25'	51.25'	775	25.4	Clr
:15	125	1300	125.75'	50.75	775	25.6	Clr
:30	114	1300	125.75'	50.75'	775	25.6	Clr
:45	94.6	1300	125.75'	50.75	775	25.6	Clr -Q↑
3:00	167	1400	129.75'	54.75'	800	25.6	Sl. Cldy
:15	155	1400	129.75'	54.75'	800	25.6	Sl. Cldy
:30	140	1400	129.75'	54.75	800	25.6	Clearing
:45	167	1400	130.25'	55.25'	800	25.3	Clearing
4:00	151	1400	130.25'	55.25'	800	25.3	Clr
:15	96.5	1400	130.25'	55.25'	800	25.3	Clr -Q↑
:30	117	1500	133.25'	58.25'	825	25.8	Clearing
:45	125	1500	133.25'	58.25'	825	25.8	Clearing
5:00	114	1500	133.75'	58.75	825	25.5	Clr
:15	110	1500	133.75'	58.75'	825	25.5	Clr
:30	136	1500	133.75'	58.75'	825	25.5	Clr
:45	102	1500	133.75'	58.75'	825	25.5	Clr Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-13-96 PAGE 14

Chino SERVICE CENTER

CUSTOMER Lakewood #22 HOURS PUMP DAY 10

TOTAL HOURS 120½

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 78' BOWL USED _____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:00	START						
:15	307	1500	124'	46	825	32.6	Cloudy
:30	261	1500	125.75'	47.75'	825	31.4	Cldy
:45	189	1500	127'	49'	825	30.6	Cldy
9:00	186	1500	128'	50	825	30.0	Cldy
:15	170	1500	128.5'	50.5'	825	29.7	Sl. Cldy
:30	114	1500	129.25	51.25'	825	29.3	Clearing
:45	114	1500	129.75	51.75'	825	29.0	Clr
10:00	123	1500	129.75	51.75'	825	29.0	Clr
:15	100	1500	130.25	52.25'	825	28.7	Clr - Qt
:30	83.3	1600	133.75'	55.75'	850	28.7	Clear
:45	64.4	1600	133.75'	55.75	850	28.7	Clr - Qt
11:00	133	1700	136'	58'	875	29.3	Clearing
:15	83.3	1700	137.25'	59.25'	875	28.7	Clr - Qt
:30	148	1800	140.75'	62.75'	925	28.7	Sl. Cldy
:45	163	1800	140.75'	62.75'	925	28.7	Cloudy
12:00	174	1800	141.25	63.25'	925	28.5	Cldy
:15	159	1800	142'	64'	925	28.1	Sl. Cldy
:30	177	1800	142.5'	64.5'	925	27.9	Sl. Cldy
:45	170	1800	142.5'	64.5'	925	27.9	Clearing
1:00	208	1800	142'	64'	925	28.1	Sl. Cldy - Qt
:15	106	1700	139.5	61.5'	925	27.6	Clearing
:30	94.6	1700	138.5	60.5'	925	28.1	Clr - Qt
:45	159	1750	140.25'	62.25'	925	28.1	Sl. Cldy
2:00	129	1750	140.75	62.75'	925	27.9	Clearing
:15	108	1750	140.25'	62.25'	925	28.1	Clr
:30	98.4	1750	140.25'	62.25'	925	28.1	Clr - Qt
:45	83.3	1800	142.5'	64.5	925	27.9	Clr
3:00	80.4	1800	142'	64'	925	28.1	Clr - Qt
:15	183	1900	144.25'	66.25'	950	28.7	Sl. Cldy
:30	148	1900	144.75'	66.75'	950	28.5	Clr
:45	103	1900	145.25'	67.25'	950	28.3	Clearing
4:00	70.7	1900	145.25'	67.25'	950	28.3	Clr Qt
:15	90.9	2000	148.25	70.25'	1000	28.5	Clearing
:30	98.4	2000	148.75'	70.75'	1000	28.3	Clearing
:45	96.5	2000	148.75'	70.75'	1000	28.3	Sl. Cldy
5:00	110	2000	147.5	71.5'	1000	28.0	Clearing
:15	87.1	2000	148.75'	70.75	1000	28.3	Clearing
:30	125	2000	149.5'	71.5'	1000	28.0	Clearing
:45	110	2000	149.5'	71.5'	1000	28.0	Sl. Cldy
6:00	106	2000	149.5'	71.5'	1000	28.0	Clearing

Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-16-96

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Chino SERVICE CENTER

CUSTOMER Lakewood #22

HOURS PUMP DAY 9

TOTAL HOURS 129½

TESTED BY R.WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 79.5 BOWL USED _____

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
9:15	Start						
:30	390	2000	137.25'	57.75'	975	34.6	Cloudy
:45	268	2000	140.25'	60.75'	975	32.9	Cldy
10:00	243	2000	140.75'	61.25'	975	32.7	Sl.Cldy
:15	216	2000	141.25'	61.75'	975	32.4	Cldy
:30	295	2000	142'	62.5'	975	32.0	Cldy
:45	231	2000	143'	63.5'	975	31.5	Cldy
11:00	155	2000	143.5'	64'	975	31.3	Sl.Cldy
:15	121	2000	144.25'	64.75'	1000	30.9	CLEARING
:30	129	2000	144.75'	65.25	1000	30.7	CLEARING
:45	103	2000	146	66.5	1000	30.1	CLR - 5X1
12:00	455	2000	144.25'	64.75'	1000	30.9	Cloudy
:15	201	2000	144.25'	64.75'	1000	30.9	Sl. Cldy
:30	136	2000	144.75'	65.25'	1000	30.7	Sl.Cldy
:45	127	2000	145.5'	66'	1000	30.3	Cldy
1:00	116	2000	146'	66.5'	1000	30.1	Sl.Cldy
:15	75.7	2000	146'	66.5'	1000	30.1	CLR 5X1
:30	209	2000	144.75'	65.25'	1000	30.7	Cldy
:45	220	2000	146'	66.5'	1000	30.1	Cldy
2:00	174	2000	145.5'	66'	1000	30.3	Sl.Cldy
:15	218	2000	145.5'	66'	1000	30.3	Sl.Cldy
:30	199	2000	146	66.5'	1000	30.1	CLEARING
:45	95.0	2000	146.5'	67'	1000	29.9	CLEARING
3:00	110	2000	146'	66.5'	1000	30.1	CLEARING
:15	98.4	2000	146'	66.5'	1000	30.1	CLR - Q↑
:30	129	2100	150'	70.5'	1025	29.8	Sl.Cldy
:45	208	2100	150.5'	71'	1025	29.6	Sl.Cldy
4:00	174	2100	150.5'	71'	1025	29.6	CLEARING
:15	117	2100	151'	71.5'	1025	29.4	CLEARING
:30	85.2	2100	150.5'	71'	1025	29.6	CLR - Q↑
:45	117	2200	152.25'	72.75'	1050	30.2	CLEARING
5:00	94.6	2200	152.25'	72.75'	1050	30.2	CLEAR
:15	83.3	2200	152.75'	73.25'	1050	30.0	CLR
:30	71.9	2200	152.25'	72.75	1050	30.2	CLR
:45	102	2200	152.75'	73.25	1050	30.0	CLR
6:00	87.7	2200	153.5'	74'	1050	29.7	CLR
:15	92.2	2200	153.5'	74'	1050	29.7	CLR
	Shutdown						

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-17-96

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Chino

SERVICE CENTER

CUSTOMER: LAKEWOOD #27

HOURS PUMP DAY 10

TOTAL HOURS 139½

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 80' BOWL USED _____

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:15	START						
:30	371	2200	142'	62'	1025	35.5	EXTR. Cldy
:45	314	2200	144.25'	64.25'	1025	34.2	Cldy
9:00	216	2200	146'	66'	1025	33.3	Cldy
:15	174	2200	148.25'	68.25'	1025	32.2	Sl. Cldy
:30	132	2200	148.75'	68.75'	1025	32.0	CLEARING
:45	98.9	2200	149.5'	69.5'	1025	31.7	CLR - Q↑
10:00	104	2300	152.75'	72.75'	1050	31.6	CLEARING
:15	98.6	2300	153.5'	73.5'	1050	31.3	CLEARING - Q↑
:30	106	2400	157.5'	77.5'	1100	31.0	CLEARING
:45	108	2400	158'	78'	1100	30.8	CLEAR
11:00	140	2400	158'	78'	1100	30.8	Sl. Cldy
:15	125	2400	158.5'	78.5'	1100	30.6	CLEARING
:30	102	2400	159'	79'	1100	30.4	CLR
:45	49.5	2400	159.75'	79.75'	1100	30.1	CLR - Q↑
12:00	68.1	2500	163.75'	83.75'	1150	29.9	CLEARING
:15	87.1	2500	165'	85'	1150	29.4	CLEARING
:30	102	2500	165'	85'	1150	29.4	CLR
:45	83.3	2500	165'	85'	1150	29.4	CLR - Q↑
1:00	129	2600	169'	89'	1200	29.2	Sl. Cldy
:15	87.1	2600	170.25'	90.25'	1200	28.8	CLRing
:30	77.6	2600	170.25'	90.25'	1200	28.8	CLEARING
:45	102	2600	170.75'	90.75'	1200	28.7	CLEARING
2:00	94.2	2600	171.25'	91.25'	1200	28.5	Sl. Cldy Q↑
:15	114	2700	174.75'	94.75'	1250	28.5	Sl. Cldy
:30	114	2700	175.5'	95.5'	1250	28.3	CLEARING
:45	98.9	2700	176'	96'	1250	28.1	CLEAR
3:00	75.7	2700	176.5'	96.5'	1250	28.0	CLEARING
:15	87.1	2700	176.5'	96.5'	1250	28.0	CLEARING - Q↑
:30	85.2	2800	179.5'	99.5'	1300	28.1	Sl. Cldy
:45	73.1	2800	177.75'	97.75'	1300	28.6	CLEARING
4:00	64.4	2800	178.25'	98.25'	1300	28.5	CLEARING
:15	53.0	2800	178.25'	98.25'	1300	28.5	CLR - Q↑
:30	62.1	2900	181.25'	101.25'	1300	28.6	Sl. Cldy
:45	62.5	2900	181.25'	101.25'	1300	28.6	Sl. Cldy
5:00	75.7	2900	181.25'	101.25'	1300	28.6	Sl. Cldy - Q↑
:15	100.3	3000	187	107'	1350	28.0	Sl. Cldy
:30	106	3000	188'	108'	1350	27.8	Sl. Cldy
:45	106	3000	188.75'	108.75'	1350	27.6	Cloudy
6:00	84.1	3000	188.75'	108.75'	1350	27.6	Sl. Cldy
:15	90.1	3000	189.25'	109.25'	1350	27.5	CLEARING

Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-18-96

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China SERVICE CENTER

CUSTOMER: Lakewood #22

HOURS PUMP DAY 9

TOTAL HOURS 129½ 148½

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 85' BOWL USED _____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:15	START						
:30	310	2000	138.5'	53.5'	975	37.4	Cldy
:45	140	2000	140.75'	55.75'	1000	35.9	Sl. Cldy
9:00	87.1	2000	140.75'	55.75'	975	35.9	CLEARING
:15	54.9	2000	142'	57'	975	35.1	CLR
:30	34.1	2000	143'	58'	975	34.5	CLR
:45	73.8	2000	144.25'	59.25'	975	33.8	CLEARING
10:00	53.0	2000	144.25'	59.25'	975	33.8	CLR
:15	58.5	2000	144.25'	59.25'	975	33.8	CLEARING - CQ↑
:30	75.6	2200	150.5'	65.5	1050	33.6	CLEARING
:45	68	2200	151'	66'	1050	33.3	CLR
11:00	54.8	2200	151'	66'	1050	33.3	CLR
:15	43.9	2200	151'	66'	1050	33.3	CLR - CQ↑
:30	73.1	2400	157.5'	72.5'	1100	33.1	CLEARING
:45	73.1	2400	158'	73'	1100	32.9	CLEAR
12:00	58.5	2400	158.5'	73.5'	1100	32.7	CLR
:15	67	2400	159.25'	74.25'	1100	32.3	CLR
:30	85.1	2400	159.25'	74.25'	1100	32.3	CLR
:45	65.8	2400	159.25'	74.25'	1100	32.3	CLR
1:00	62.1	2400	159.75'	74.75'	1100	32.1	CLR - CQ↑
:15	135	2600	166'	81'	1200	32.1	Sl. Cldy
:30	106	2600	166'	81'	1200	32.1	CLEARING
:45	76.7	2600	166'	81'	1200	32.1	CLEARING
2:00	43.9	2600	166.75'	81.75'	1200	31.8	CLR - CQ↑
:15	54.8	2800	172.5'	87.5'	1300	32.0	CLEARING
:30	58.5	2800	173'	88'	1300	31.8	CLR
:45	68.1	2800	173'	88'	1300	31.8	CLR
3:00	69.4	2800	173'	88'	1300	31.8	CLR
:15	66.3	2800	173'	88'	1300	31.8	CLR
:30	49.2	2800	173.75'	88.75'	1300	31.5	CLR - CQ↑
:45	83.3	3000	180'	95'	1350	31.6	Sl. Cldy
4:00	79.5	3000	181.25'	96.25'	1350	31.2	CLEARING
:15	83.3	3000	181.25'	96.25'	1350	31.2	CLEARING
:30	68.1	3000	181.25'	96.25'	1350	31.2	CLR
:45	79.5	3000	181.25'	96.25'	1350	31.2	CLR
5:00	81.4	3000	181.75'	96.75'	1350	31.0	CLR
:15	73.6	3000	181.75'	96.75'	1350	31.0	CLR

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359
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DATE 9-19-96

Chino SERVICE CENTER

CUSTOMER LAKEwood #22 HOURS PUMP DAY 9 1/4
TOTAL HOURS 157.3/4
TESTED BY R. WEBBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 87' BOWL USED ____

	TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
	8:45	START							
	9:00	102	1000	113'	26'	700	38.5	Cldy	
	:15	246	1000	115.25'	28.25'	700	35.4	Sl. Cldy	
	:30	94.6	1000	116'	29'	700	34.5	CLEARING	
	:45	75.7	1000	116.5'	29.5'	700	33.8	CLEARING	
	10:00	21.7	1000	116.5'	29.5'	700	33.8	CLR -15x1	
		FUEL FILTERS - Shutdown							
	10:15	START							
	:30	205	1000	115.25'	28.25'	700	35.4	Cloudy	
	:45	71.9	1000	116.5'	29.5'	725	33.8	Sl. Cldy	
◊	11:00	41.6	1000	116.5'	29.5'	725	33.8	CLEARING - QT↑	
	:15	216	1500	128.5	41.5'	850	36.1	Sl. Cldy	
	:30	125	1500	129.25'	42.25'	850	35.5	CLEARING	
	:45	64.4	1500	129.75'	42.75'	850	35.1	CLEARING	
X	12:00	51.1	1500	130.25'	43.25'	850	34.7	CLEARING - QT↑	
	:15	151	2000	142.5'	55.5'	1000	36.0	Cldy	
	:30	79.5	2000	143'	56'	1000	35.7	CLEARING	
	:45	75.7	2000	144.25'	57.25'	1000	34.9	CLEARING	
X	1:00	60.6	2000	144.25'	57.25'	1000	34.9	CLR - QT↑	
	:15	182	2500	158.5'	71.5'	1150	35.0	Cldy	
	:30	125	2500	159.75'	72.75'	1150	34.4	CLEARING	
	:45	90.9	2500	160.5'	73.5'	1150	34.0	CLR	
X	2:00	56.8	2500	161'	74'	1150	33.8	CLR - QT↑	
	:15	119	3000	176.5'	89.5'	1325	33.5	Sl. Cldy	
	:30	106	3000	177'	90'	1325	33.3	CLEARING	
	:45	110	3000	177.75'	90.75'	1325	33.1	CLR	
X	3:00	110	3000	178.75	91.75'	1325	32.7	CLR - QT↑	
	:15	136	3162	181.25'	94.25'	1350	33.5	CLR	68953
	:30	208	3170	181.25'	94.25	1350	33.6	CLEARING	16.6
	:45	178	3165	181.75'	94.75'	1350	33.4	CLEARING	80.1
	4:00	124	3160	181.75'	94.75'	1350	33.4	CLEARING	143.5
	:15	133	3165	182.25'	95.25'	1350	33.2	CLR	207
	:30	91.3	3145	182.25'	95.25'	1350	33.0	CLR	70.1
	:45	136	3155	182.25'	95.25'	1350	33.1	CLR	333.4
X	5:00	98.4	3145	182.25'	95.25'	1350	33.0	CLR - QT↑	396.5
X	:15	71.9	3240	184.5'	97.5	1375	33.2	CLEARING - QT↑	461.5
X	:30	94.6	3340	187.5'	100.5	1400	33.3	CLEARING - QT↑	528.5
	:45	136	3485	192	105'	1450	33.2	Sl. Cldy	98.4
	6:00	133	3500	193.75	106.75	1450	32.8	Sl. Cldy	668.6
	:15	125	3510	195'	108'	1450	32.5	CLEARING	739

Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-20-96 PAGE 19

Chino SERVICE CENTER

CUSTOMER Lakewood HOURS PUMP DAY 9 3/4

TOTAL HOURS 167.1/2

TESTED BY

DISCH PIPE ORIFICE DIA STATIC LEVEL 86.5' BOWL USED

Airline = 329'

TIME	P.F.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
8:00	START							
:15	151	1500	124.5'	38.0	850	39.5	cldy	
:30	424	1500	126.25	39.75	850	37.7	slcldy	
:45	102.5	1500	128.03	41.53	850	36.1	slcldy.	
9:00	53.1	1500	127.45	4095	850	36.6	clear	
:15	35.3	1500	127.56	41.10	850	36.5	Clear Q4	
:30	70.6	2000	138.42	51.9	1000	38.5	slcldy	
:45	162.5	2000	140.15	53.10	1000	37.3	cldy	
10:00	84.9	2000	140.73	57.2	1000	34.9	slcldy	
:15	49.5	2000	141.31	54.8	1000	36.5	cldy Q9	
:30	148.4	2500	155.98	69.48	1150	35.98	slcldy	
:45	70.66	2500	157.48	70.98	1150	35.22	clearing	
11:00	42.4	2500	158.30	71.79	1150	34.8	clearing	
:15	38.8	2500	154.21	72.71	1150	34.4	clearing Q4	
:30	95.4	3000	172.50	85.99	1325	34.88	slcldy	311.8
:45	134.3	3011	174.23	87.73	1325	34.33	slcldy	77.2
12:00	77.7	3011	174.23	87.73	1325	34.33	slcldy	432.6
:15	28.4	3035	175.5'	89'	1325	34.1	clearing	93.5
:30	53.0	2990	175.5'	89	1325	33.6	clearing -Q↑	655
:45	64.4	3175	180.5'	94'	1375	33.8	sl.cldy	617.2
1:00	68.1	3185	181.25'	94.75	1375	33.6	CIR	81.1
:15	37.0	3180	181.75	95.25	1375	33.4	CIR -Q↑	744.9
:30	37.9	3400	189.25	102.75'	1450	33.1	clearing	813
:45	34.1	3425	190.5	104	1450	32.9	sl.cldy	81.7
2:00	54.9	3445	192	105.5'	1475	32.7	clearing	950.8
:16	39.8	3450	193	107.25	1475	32.2	clearing	24.6
:30	44.2	3450	193.25	106.75'	1475	32.3	clearing	89.2
:45	41.6	3475	194.5	107.5'	1500	32.3	CIR	158.9
3:00	41.6	3475	194.5	107.5	1500	32.3	CIR -Q↓	228.6
:15	316.6	3000	181.75	95.25	1325	31.5	CIR	
:30	38.4	3000	181.25	94.75	1325	31.7	CIR	
:45	39.8	3000	181.25	94.75	1325	31.7	CIR	
4:00	30.3	3000	180.5	94'	1325	31.9	CIR	
:15	24.6	3000	180.5'	94'	1325	31.9	CIR	
:30	25.6	3000	180.5'	94'	1325	31.9	CIR -Q↓	
:45	17.0	2500	166.75	80.25	1150	31.2	CIR	
5:00	11.4	2500	166	79.5	1150	31.4	CIR	
:15	11.4	2500	166	79.5'	1150	31.4	CIR	
:30	11.7	2500	165.5	79'	1150	31.6	CIR	
:45	10.6	2500	165.5'	79'	1150	31.6	CIR.	

Shutdown

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-23-96

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Chino SERVICE CENTER

CUSTOMER: LAKEWOOD #22

HOURS PUMP DAY 9 1/2

TOTAL HOURS 177

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 87.5 BOWL USED ____

TIME	P.F.M	G.F.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:45	START						
9:00	106	2000	135'	47.5'	1000	42.1	CLEARING
:15	25.6	2000	137.75'	50.25'	1000	39.8	CIR
:30	9.5	2000	139.5'	52'	1000	38.5	CIR
:45	14.8	2000	140.25'	52.75'	1000	37.9	CIR
10:00	11.4	2000	140.75'	53.25'	1000	37.6	CIR
:15	10.4	2000	141.25'	53.75'	1000	37.2	CIR - Q↑
:30	47.5	2500	156.5'	69'	1125	36.2	SL. CLDY
:45	34.7	2500	157.5'	70'	1125	35.7	CLEARING
11:00	25.6	2500	158'	70.5'	1125	35.5	CLEARING
:15	20.1	2500	158.5'	71'	1125	35.2	CIR
:30	15.7	2500	158.5'	71'	1125	35.2	CIR
:45	14.6	2500	158.5'	71'	1125	35.2	CIR
12:00	11.7	2500	159.25'	71.75'	1125	34.8	CIR - Q↑
:15	40.2	3000	172.5'	85'	1300	35.3	CLEARING
:30	36.6	3000	173'	85.5'	1300	35.1	CLEARING
:45	29.3	3000	173.75'	86.25'	1300	34.8	CIR
1:00	24.6	3000	174.25'	86.75'	1300	34.6	CIR
:15	26.1	3000	174.25'	86.75'	1300	34.6	CIR
:30	30.3	3000	174.75'	87.25'	1300	34.4	CIR Q↑
:45	39.8	3240	181.25'	93.75'	1375	34.6	CIR
2:00	41.6	3230	181.25'	93.75'	1375	34.5	CLEARING
:15	32.9	3220	182.25'	94.75'	1375	34.0	CIR
:30	29.2	3225	182.75'	95.25'	1375	33.9	CIR
:45	19.0	3220	183.5'	96'	1375	33.5	CIR
3:00	20.0	3220	183.5'	96'	1375	33.5	CIR - Q↓
:15	13.5	3000	178.25'	90.75'	1325	33.1	CIR
:30	11.4	3000	177.75	90.25'	1325	33.2	CIR
:45	10.3	3000	177.25	89.75'	1325	33.4	CIR Q↓
4:00	3.8	2000	150'	62.5'	1025	32.0	CIR
:15	1.5	2000	150'	62.5'	1025	32.0	CIR - SX1
:30	53.0	2000	147'	59.5'	1025	33.6	SL. CLDY
:45	17.8	2000	147'	59.5'	1025	33.6	CIR
5:00	10.9	2000	147'	59.5'	1025	33.6	CIR
:15	10.2	2000	147'	59.5'	1025	33.6	CIR - SX1
:30	73.4	2000	146.5'	59'	1025	33.9	CIR
:45	23.1	2000	146.5'	59'	1025	33.9	CIR
6:00	10.4	2000	146.5'	59'	1025	33.9	CIR
:15	6.1	2000	147'	59.5'	1025	33.6	CIR SHUTDOWN

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-24-96 PAGE 21

Chmo SERVICE CENTER

CUSTOMER: LAKEWOOD #22 HOURS PUMP DAY 10

TOTAL HOURS 187

TESTED BY R. WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 87.5 BOWL USED ____

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
8:00	START						
:15	137	2500	147.75'	60.25'	1125	41.5	Cloudy
:30	43.5	2500	150.5'	63'	1125	39.7	CLEARING
:45	20.1	2500	153.5'	66	1125	37.9	CLR
9:00	13.9	2500	154'	66.5'	1125	37.6	CLR
:15	8.3	2500	155.25'	67.75'	1125	36.9	CLR
:30	8.3	2500	155.75'	68.25'	1125	36.6	CLR - S X 1
:45	110	2500	154.5'	67'	1125	37.3	SL.CLDY
10:00	26.1	2500	155.75'	68.25'	1125	36.6	CLEARING
:15	14.3	2500	157'	69.5'	1125	36.0	CLR
:30	14.4	2500	157.5'	70	1125	35.7	CLR -SX1
:45	110	2500	157'	69.5'	1125	36.0	SL.CLDY
11:00	41.6	2500	158'	70.5'	1125	35.5	CLR
:15	23.0	2500	158.5'	71'	1125	35.2	CLR
:30	19.0	2500	159.25'	71.75'	1125	34.8	CLR
:45	40.2	2500	159.75'	72.25'	1125	34.6	CLR
12:00	32.9	2500	159.75'	72.25'	1125	34.6	CLR
:15	70.7	2500	159.75'	72.25'	1125	34.6	CLEARING
:30	68.1	2500	159.75'	72.25'	1125	34.6	CLR
:45	84.1	2500	159.75'	72.25	1125	34.6	CLR - S X 1
1:00	183.5	2500	157.75'	72.25	1125	34.6	SL.CLDY
:15	68.9	2500	160.5'	73'	1125	34.2	CLEARING
:30	58.9	2500	160.5'	73'	1125	34.2	CLR
:45	40.2	2500	160.5'	73'	1125	34.2	CLR
2:00	32.9	2500	160.5'	73'	1125	34.2	CLR - QT
:15	75.7	3000	176'	88.5'	1325	33.9	CLEARING
:30	34.3	3000	177'	89.5'	1325	33.5	CLR
:45	36.0	3000	177'	89.5'	1325	33.5	CLR
3:00	28.4	3000	177'	89.5'	1325	33.5	CLR
:15	27.6	3000	177'	89.5'	1325	33.5	CLR
:30	28.4	3000	176.5'	89'	1325	33.7	CLR
:45	23.9	3000	176.5'	89'	1325	33.7	CLR - Q ↑
4:00	68.1	3575	190.5	103'	1475	34.7	CLEARING
:15	65.8	3540	189.75	102.25'	1475	34.6	CLEARING
:30	62.1	3540	190.5'	103'	1475	34.4	CLEARING
:45	49.3	3540	191'	103.5'	1475	34.2	CLR
5:00	49.2	3540	191.5'	104'	1475	34.0	CLR
:15	41.6	3540	191.5'	104	1475	34.0	CLR
:30	41.6	3540	191.5'	104	1475	34.0	CLR -QV
:45	28.4	3000	179.5'	92'	1325	32.6	CLR
6:00	25.4	3000	178.75	91.75'	1325	32.7	CLR - Shut down

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72
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86

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 9-25-96

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Chino SERVICE CENTER

CUSTOMER: Lakewood #22

HOURS PUMP DAY 10

TOTAL HOURS 197

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 88' BOWL USED _____

TIME	P.F.M	G.F.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
8:30	START							
:45	57.4	3000	160.5'	72.5'	1250	41.4	CLEARING	
9:00	69.4	3000	1103.75'	75.75'	1250	39.6	CLEARING	
:15	40.2	3000	165.5'	77.5'	1250	38.7	CLEAR	
:30	41.6	3000	1166'	78'	1250	38.5	CLR	
:45	36.0	3000	167.25'	79.25	1250	37.9	CLR	
10:00	25.6	3000	168.5'	80.5'	1250	37.3	CLR	
:15	24.7	3000	169.5'	81.5'	1275	36.8	CLR	
:30	26.5	3000	171.25'	83.25'	1275	36.0	CLR	
:45	25.4	3000	172'	84	1275	35.7	CLR	
11:15	19.2	3000	172.5'	84.5'	1275	35.5	CLR	
:30	15.9	3000	172.5'	84.5'	1275	35.5	CLR	
:45	16.4	3000	174.25'	86.25'	1300	34.8	CLR	
12:00	16.3	3000	175.5'	87.5'	1300	34.3	CLR	
:15	15.0	3000	175.5	87.5'	1300	34.3	CLR	
:30	12.8	3000	175.5'	87.5'	1300	34.3	CLR	
:45	14.6	3000	175.5'	87.5'	1300	34.3	CLR	
1:00	17.0	3000	175.5'	87.5'	1300	34.3	CLR - QT	052.5
:15	23.8	3186	180.5'	92.5'	1375	34.4	CLR	116.4
:30	24.9	3271	181.25'	93.25'	1375	35.1	CLR	182
:45	38.9	3241	181.75'	93.75'	1375	34.6	CLR	247
2:00	39.3	3236	182.25'	94.25'	1375	34.3	CLR	311.9
:15	27.4	3236	182.25'	94.25'	1375	34.3	CLR	376.8
:30	21.2	3226	182.25'	94.25'	1375	34.2	CLR	441.5
:45	19.0	3221	182.25'	94.25'	1375	34.2	CLR	506.1
3:00	23.8	3216	182.25'	94.25'	1375	34.1	CLR - QT	706
:15	31.1	3470	189.75'	101.75'	1475	34.1	CLR	640.2
:30	29.2	3470	189.75'	101.75'	1475	34.1	CLR	709.8
:45	23.8	3480	190.5'	102.5'	1475	34.0	CLR	779.6
4:00	21.9	3490	190.5'	102.5'	1475	34.0	CLR	849.6
:15	21.9	3485	190.5'	102.5'	1475	34.0	CLR	919.5
:30	21.9	3485	191'	103'	1475	33.8	CLR	989.4
:45	25.6	3470	191'	103'	1475	33.7	CLR	059
5:00	22.3	3485	191'	103	1475	33.8	CLR	128.9
:15	21.9	3485	191.5'	103.5'	1475	33.7	CLR	198.8
:30	22.1	3475	191.5'	103.5'	1475	33.6	CLR - QT	68.5
:45	18.9	3000	180'	91.5'	1325	32.8	CLR	
6:00	15.9	3000	180'	91.5'	1325	32.8	CLR	
:15	14.6	3000	180'	91.5'	1325	32.8	CLR	
:30	14.4	3000	180'	91.5	1325	32.8	CLR	Shut down

MCCALLA BROS. PUMP AND DRILLING INC.

DATE 9-26-91 JOB NO. 63-25-57

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Chino SERVICE CENTER

CUSTOMER Lake Wood GC HOURS PUMP DAY 10

TOTAL HOURS 207

TESTED BY R. Hoffman

DISCH PIPE ORIFICE DIA STATIC LEVEL 90' BOWL USED

TIME	P.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
3:00	START							
:15	13.3	3000	161.5'	71.5'	1300	42.0	CLEANING	
:30	41.6	3000	166'	76'	1300	40.0	CIR	
:45	31.4	3000	166	76	1300	39.5	CIR	
4:00	29.5	3000	167.25'	77.25'	1300	38.8	CIR	
:15	24.3	3000	169'	79'	1300	38.0	CIR	
:30	26.5	3000	170.75'	80.75'	1300	37.2	CIR - Q↑	451.2
:45	36.0	3276	178.75	88.75	1375	36.9	CIR	919.4
10:00	36.6	3276	179.5'	89.5'	1375	36.6	CIR	985.6
:15	35.3	3271	179.5'	89.5'	1375	36.5	CIR	951.2
:30	18.4	3256	179.5'	89.5'	1375	36.4	CIR	1116.5
:45	13.4	3256	179.5'	89.5'	1375	36.4	CIR	181.3
11:00	15.6	3251	180'	90'	1375	36.1	CIR	247
:15	13.3	3251	180.5'	90.5'	1375	35.9	CIR	312.2
:30	32.2	3256	181.25'	91.25'	1375	35.7	CIR - Q↑	377.5
:45	41.6	3575	187.75'	97.75'	1475	35.2	CIR	148
12:00	62.1	3540	190.5'	100.5'	1475	35.2	CIR	513
:15	71.9	3540	191'	101'	1475	35.0	CIR	579
:30	49.2	3535	191'	101'	1475	35.0	CIR	645.8
:45	42.0	3535	191'	101'	1475	35.0	CIR	731.8
1:00	58.5	3535	191	101'	1475	35.0	CIR	802.7
:15	34.1	3520	191'	101'	1475	34.9	CIR	72.3
:30	18.9	3525	191.5'	101.5'	1475	34.7	CIR	944
:45	23.8	3525	192'	102	1475	34.6	CIR	014.7
2:00	18.3	3530	192'	102'	1475	34.6	CIR	85.5
:15	18.3	3530	192.75'	102.75	1475	34.4	CIR	156.3
:30	15.5	3520	192.75'	102.75	1475	34.3	CIR	226.9
:45	13.9	3510	193.25'	103.25'	1475	34.0	CIR	297.3
3:00	11.3	3505	193.25'	103.25'	1475	33.9	CIR	367.6
:15	11.0	3510	193.25'	103.25'	1475	34.0	CIR	438
:30	27.6	3500	193.25'	103.25'	1475	33.9	CIR	508.2
:45	22.7	3505	193.25'	103.25	1475	33.9	CIR	578.5
4:00	46.6	3500	192.75'	102.75	1475	34.1	CIR	1,48.7
:15	25.6	3500	193.25'	103.25	1475	33.9	CIR	718.9
:30	19.6	3495	193.25	103.25'	1475	33.8	CIR	789
:45	29.2	3500	193.75	103.75	1475	33.7	CIR - Q↓	859.2
5:00	17.7	3000	180'	90'	1325	33.3	CIR	
:15	14.6	3000	179.5'	89.5'	1325	33.5	CIR	
:30	14.6	3000	179.5'	89.5'	1325	33.5	CIR	
:45	14.8	3000	178.75'	88.75'	1325	33.8	CIR	
6:00	14.8	3000	178.75	88.75'	1325	33.8	CIR - Shutdown	

MCCALLA BROS. PUMP AND DRILLING INC.

DATE 9-27-96 JOB NO. 68-2359
PAGE 24

Chino SERVICE CENTER

CUSTOMER: Lakewood #22 HOURS PUMP DAY 8
TOTAL HOURS 215
TESTED BY R. WEBER

DISCH PIPE 10" ORIFICE DIA ____ STATIC LEVEL 92.40 BOWL USED ____

Step test

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
9:01	START						@1139.6 X748	
:05	13.3	1085	115.02	22.62'	700	48.0	C/R	45.4
:15	18.4	1085'	116.58	24.18	725	44.9	C/R	59.9
:30	3.2	1062	117.37	24.97	725	42.5	C/R	81.2
:46	1.7	1075	118.08	25.68	725	41.9	C/R	204.2
10:00	0.9	1074	118.53	26.13	725	41.1	C/R	24.3
:15	0.57	1067	118.88	26.48	725	40.3	C/R	45.7
:30	0.46	1072	119.12	26.72	725	40.1	C/R	67.2
:45	0.37	1082	119.43	27.03	725	40.0	C/R	89.9
11:01	0.27	1075	119.32	26.92	725	39.9	C/R	311.9
:15	0.27	1068	119.59	27.19	725	39.3	C/R	331.9
:30	0.18	1072	119.89	27.49	725	39.0	C/R - Q↑	353.4
:35	35.3	1974	140.93	48.53	975	40.7	C/R	66.6
:45	23.0	2012	142.44	50.04	975	40.2	C/R	93.5
12:00	14.6	2020	143.53	51.13	975	39.5	C/R	434
:15	7.7	2005	144.09'	51.66	975	38.8	C/R	74.2
:30	7.3	2005	144.60	52.20	975	38.4	C/R	514.4
:45	6.8	1999	144.79	52.39	975	38.2	C/R - Adj Q↑	54.5
1:00	7.7	2030	145.98	53.58	975	37.9	C/R	95.2
:15	7.7	2035	146.16	53.76	975	37.9	C/R	6336
:30	7.9	2035	146.47	54.07	975	37.6	C/R	76.8
:45	7.3	2030	146.55'	54.15'	975	37.5	C/R	717.5
2:00	7.3	2020	146.69	54.29'	975	37.2	C/R - Q↑	58
:05	70.7	2992	172.15'	79.75	1300	37.5	Clearing	778
:15	66.9	3089	173.62	81.22	1325	38.0	C/R	819.3
:30	34.0	3071	174.72	82.32	1325	37.3	C/R	80.9
:45	25.6	3067	176.48	84.08	1325	36.5	C/R	942.4
3:00	32.9	3062	175.90	8350	1325	36.7	C/R	82003.8
:15	29.2	3052	176.39	83.99	1325	36.3	C/R	65
:30	18.3	3062	176.98	8458	1325	36.2	C/R	126.4
:45	18.3	3047	177.08	84.68	1325	36.0	C/R	87.5
4:00	18.3	3062	177.45	85.05	1325	36.0	C/R	248.9
:15	14.3	3052	177.75'	85.35	1325	35.8	C/R	310.1
:30	15.9	3052	178.00	85.60	1325	35.7	C/R	71.3
:45	14.1	3047	178.06	85.66	1325	35.6	C/R	432.4
5:00	14.4	3052	178.24	85.84	1325	35.6	C/R	93.6
	Shutdown							

MCCALLA BROS. PUMP AND DRILLING INC.

DATE 9-30-96 JOB NO. 68-2359 PAGE 25

Chino SERVICE CENTER

CUSTOMER: Lakewood #22 HOURS PUMP DAY 14 1/2 TOTAL HOURS 229 1/2

TESTED BY R. WEBER

DISCH PIPE _____ ORIFICE DIA _____ STATIC LEVEL 90.35' BOWL USED _____

Constant flow test

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS
10:21	start						BZ 497.2
:23	148	3029	153.67'	63.32	1300	47.8	Cloudy 505.3
:26	119	2917	155.38	65.03	1300	44.9	SL. Cldy QT 17
:30	53	2954	159.54	69.19	1300	42.7	SL. Cldy 32.8
:35	48.2	2992	161.68	71.33	1300	41.9	Clearing 52.8
:45	26.5	2992	163.91	73.56	1300	40.7	Clearing 92.8
11:00	33.4	2967	165.58	75.23	1300	39.4	CLR - QT 652.3
:15	25.6	2977	167.45'	77.10	1300	38.6	CLR 712
:30	20.1	2977	168.78	78.43	1300	38.0	CLR 771.7
:45	17.3	3002	170.05'	79.70	1300	37.7	CLR 831.9
12:00	14.0	2992	170.68	80.33	1300	37.2	CLR 891.9
:15	11.0	2987	171.10	80.75	1300	37.0	CLR 951.8
:30	10.6	2992	171.76	81.41	1300	36.8	CLR 83011.8
:45	15.1	2997	172.46	82.11	1300	36.5	CLR 71.9
1:00	22.7	2997	172.97	82.62	1300	36.3	CLR 132
:30	18.0	3002	173.44	83.09	1300	36.1	CLR 252.4
2:00	15.6	2990	173.88	83.53	1300	35.8	CLR 372.3
:30	13.5	2994	174.58	84.23	1300	35.5	CLR 492.4
3:00	12.6	3004	175.29	84.94	1300	35.4	CLR 612.9
:30	16.2	2994	175.61	85.26	1300	35.1	CLR 733
4:00	9.0	3002	176.04	85.69'	1300	34.9	CLR 853.4
:30	9.0	2999	176.42	86.07'	1300	34.8	CLR 973.7
5:00	12.6	3004	176.81	86.46	1300	34.7	CLR 83094.2
:30	9.3	2994	176.83	86.48	1300	34.6	CLR 214.3
6:00	7.4	2994	177.21	86.86	1300	34.5	CLR 334.4
6:30	10.1	2989	177.59	87.24	1300	33.1	CLR 451.1
7:00	8.6	2907	177.91	87.56	1300	33.2	CLR 567.7
:30	7.9	3011	178	87.65	1300	34.36	CLR 688.5
8:00	10.6	3004	178.45	88.1	1300	34.10	CLR 809
:30	8.6	3009	178.55	88.2	1300	34.1	CLR 929.7
9:00	8.6	2996	178.62	88.27	1300	33.9	CLR 50.1
:30	4.4	3004	178.78	88.43	1300	33.9	CLR 170.6
10:00	6.7	2996	179.07	88.72	1300	33.8	CLR 290.8
:30	6.0	2996	178.98	88.63	1300	33.8	CLR 411.
11:00	5.3	2994	178.93	88.58	1300	33.8	CLR 531.1
:30	5.3	2992	179.26	88.91	1300	33.6	CLR 651.1
12:00	5.8	2999	179.49	89.14	1300	33.6	CLR 779.4
:30	5.1	2989	179.73	89.38	1300	33.4	CLR 891.3
1:00	3.8	2999	179.81	89.46	1300	33.5	CLR 11.6

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359

DATE 10-1-96 PAGE 26

Chino SERVICE CENTER

CUSTOMER LAKEWOOD #22 HOURS PUMP DAY 9 1/2

TOTAL HOURS 239

TESTED BY Jose WEBER

DISCH PIPE ____ ORIFICE DIA ____ STATIC LEVEL 90.35 BOWL USED ____

TIME	F.P.M	G.F.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
								11.6
1:30	3.18	2994	179.75	89.4	1300	33.5	CIR	131.7
2:00	4.4	2996	180.07	89.7	1300	33.4	CIR	251.9
:30	4.6	2992	179.97	89.6	1300	33.4	CIR	371.9
3:00	3.5	2987	180'	89.65	1300	33.3	CIR	491.7
:30	MISSED				1300		CIR	
4:00	4.0	2984	180.14	89.79	1300	33.5	CIR	731.1
:30	3.9	3000	180.25	89.9	1300	33.5	CIR	852.
5:00	2.6	3005	180.60	90.51	1300	33.2	CIR	972.2
:30	2.5	3001	180.53	90.53	1300	33.1	CIR	92.6
6:00	3.5	3001	180.92	90.57	1300	33.1	CIR	217.
:30	3.1	2992	180.91	90.56	1300	33.0	CIR	337
7:00	3.1	2997	180.79	90.44	1300	33.1	CIR	453.2
:30	7.5	2994	180.93	90.58	1300	33.1	CIR	573.3
8:00	8.1	3004	181.07	90.72	1300	33.1	CIR	693.5
:30	7.2	2997	181.06	90.71	1300	33.0	CIR	813.7
9:00	5.9	2999	181.04	90.69	1300	33.1	CIR	934
10:00	5.5	2992	181.20	90.85'	1300	32.9	CIR	174
:20	8.3	2988	181.17	90.82	1300	32.9	CIR	253.9

MCCALLA BROS. PUMP AND DRILLING INC.

JOB NO. 68-2359
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DATE 10-1-96

Chino SERVICE CENTER

CUSTOMER Larewood #22

HOURS PUMP DAY 1 1/2
TOTAL HOURS 231 (total)
TESTED BY
BOWL USED

DISCH PIPE ORIFICE DIA STATIC LEVEL

Spinner test

TIME	F.P.M	G.P.M.	PMPING LEVEL	DRAW DOWN	ENGINE R.P.M.	S.C.	REMARKS	
3:34							88277	
:40	151	3154			1300		Sl. Cldy	302.3
:46	58.9	3079			1300		Clearing	27
4:00	23.9	3045			1300		C/R	84
:15	20.1	3037			1300		C/R	444.9
:30	14.3	3022			1300		C/R	505.5
:45	11.7	3022			1300		C/R	66.1
:52	12.9	3035			1300		C/R	94.5

APPENDIX G

Pumping Test Data

1 - Step Drawdown Pumping Test Data

2 - 24-hour Constant Rate Pumping Test Data

APPENDIX G - 1

Step Drawdown Pumping Test Data

GEOSCIENCE Support Services Incorporated
Ground Water Resources Development
TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: City of Lakewood Well 22
Test Date: 9/27/96
Circle Well Type: (Pumping) Observation (r = ft)
Circle Test Type: (Step Drawdown) Constant Rate Recovery Development
Static Water Level Depth: 92.40 ft Reference Point Elevation: 0.45 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gals)	Remarks & other data
9:01 AM	0	0	92.4	0				81,139.60	Step 1-discharge clr.
9:05 AM	4	4	115.0	22.62	1,085	13.30		81,145.40	
9:15 AM	14	14	116.6	24.2	1,085	18.40		81,159.90	
9:30 AM	29	29	117.4	24.97	1,062	3.20		81,181.20	
9:46 AM	45	45	118.1	25.68	1,075	1.70		81,204.20	
10:00 AM	59	59	118.5	26.1	1,074	0.90		81,224.30	
10:15 AM	74	74	118.9	26.5	1,067	0.57		81,245.70	
10:30 AM	89	89	119.1	26.7	1,072	0.46		81,267.20	
10:45 AM	104	104	119.4	27.0	1,082	0.37		81,288.90	
11:01 AM	120	120	119.3	26.9	1,075	0.27		81,311.90	
11:15 AM	134	134	119.6	27.2	1,068	0.27		81,331.90	
11:30 AM	149	149	119.9	27.5	1,072	0.18		81,353.40	Avg. Q1 = 1,066 gpm
11:35 AM	5	154	140.9	48.5	1,974	35.30		81,366.60	Step 2-discharge clr.
11:45 AM	15	164	142.4	50.0	2,012	23.00		81,393.50	
12:00 PM	30	179	143.5	51.1	2,020	14.60		81,439.00	
12:15 PM	45	194	144.1	51.7	2,005	7.70		81,474.20	
12:30 PM	60	209	144.6	52.2	2,005	7.30		81,514.40	
12:45 PM	75	224	144.8	52.4	1,999	6.80		81,554.50	
1:00 PM	90	239	146.0	53.6	2,030	7.70		81,595.20	
1:15 PM	105	254	146.2	53.8	2,035	7.70		81,636.00	
1:30 PM	120	269	146.5	54.1	2,035	7.90		81,676.80	
1:45 PM	135	284	146.6	54.2	2,030	7.30		81,717.50	
2:00 PM	150	299	146.7	54.3	2,020	7.30		81,758.00	Avg. Q2 = 2,018 gpm
2:05 PM	5	304	172.2	79.8	2,992	70.70		81,778.00	Step 3-discharge clr.
2:15 PM	15	314	173.6	81.2	3,089	66.90		81,819.30	
2:30 PM	30	329	174.7	82.3	3,071	34.00		81,880.90	
2:45 PM	45	344	176.5	84.1	3,067	25.60		81,942.40	
3:00 PM	60	359	175.9	83.5	3,062	32.90		82,003.80	
3:15 PM	75	374	176.4	84.0	3,052	29.20		82,065.00	
3:30 PM	90	389	177.0	84.6	3,062	18.30		82,126.40	
3:45 PM	105	404	177.1	84.7	3,047	18.30		82,187.50	

GEOSCIENCE Support Services Incorporated
Ground Water Resources Development
TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: City of Lakewood Well 22
Test Date: 9/27/96

Circle Well Type: (Pumping) Observation (r = ft)
Circle Test Type: (Step Drawdown) Constant Rate Recovery Development
Static Water Level Depth: 92.40 ft Reference Point Elevation: 0.45 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gals)	Remarks & other data
4:00 PM	120	419	177.5	85.1	3,062	18.30		82,248.90	
4:15 PM	135	434	177.8	85.4	3,052	14.30		82,310.10	
4:30 PM	150	449	178.0	85.6	3,052	15.90		82,391.30	
4:45 PM	165	464	178.1	85.7	3,047	14.10		82,423.40	
5:00 PM	180	479	178.2	85.8	3,052	14.40		82,493.60	Avg. Q3 = 3,056 gpm

APPENDIX G - 2

24-hour Constant Rate Pumping Test Data

GEOSCIENCE Support Services Incorporated
Ground Water Resources Development
TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: City of Lakewood Well 22
Test Date: 9/30-10/1, 1996
Circle Well Type: (Pumping) Observation (r = ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth 90.34 ft Reference Point Elevation: 0.45 ft above ground

Time of Day	Time, min Step	Time, min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
10:21 AM	0	0	90.34					82,495.00	start pumping
10:23 AM	2	2	153.61	63.27	3,150			82,505.30	
10:25 AM	4	4	154.55	64.21	2,875	148		82,517.00	
10:27 AM	6	6	155.38	65.04	2,962	119		82,532.80	
10:29 AM	8	8	158.82	68.48	2,962	53			
10:31 AM	10	10	159.54	69.20	2,962	48.2			
11:36 AM	15	15	161.68	71.34	3,030			82,553.00	
11:41 AM	20	20	163.14	72.80	2,866	26.5		82,574.50	
11:46 AM	25	25	163.91	73.57	3,000			82,594.50	
11:51 AM	30	30	164.46	74.12	2,775			82,613.00	
11:01 AM	40	40	165.58	75.24	3,000	33.4		82,653.00	
11:11 AM	50	50	167.06	76.72	3,000	25.6		82,693.00	
11:21 AM	60	60	168.10	77.76	3,000	20.1		82,733.00	
11:36 AM	75	75	169.41	79.07	3,000	17.3		82,793.00	
11:51 AM	90	90	170.28	79.94	3,000	14		82,853.00	
12:06 PM	105	105	170.78	80.44	3,000	11		82,913.00	
12:21 PM	120	120	171.34	81.00	3,000	10.6		82,973.00	
12:51 PM	150	150	172.75	82.41	3,000	15.1			
1:21 PM	180	180	173.28	82.94	3,000	22.7		83,213.00	
1:51 PM	210	210	173.76	83.42	3,000	15.6		83,333.00	
2:21 PM	240	240	174.34	84.00	3,000	13.5		83,453.00	
2:51 PM	270	270	175.25	84.91	3,000	12.6		83,573.00	
3:21 PM	300	300	175.47	85.13	3,000	16.2		83,693.00	
3:51 PM	330	330	176.00	85.66	3,000	9		83,813.00	
4:21 PM	360	360	176.41	86.07	3,000	9		83,933.00	
4:51 PM	390	390	176.96	86.62	3,000	12.6		84,053.00	
5:00 PM	399	399	176.81	86.47	3,025	9.3		84,094.00	
5:30 PM	429	429	176.83	86.49	3,000	7.4		84,214.00	
6:00 PM	459	459	177.21	86.87	3,000	10.1		84,334.00	
6:30 PM	489	489	177.59	87.25	3,000	8.6		84,453.00	
7:00 PM	519	519	177.91	87.57	2,875	7.9		84,568.00	

GEOSCIENCE Support Services Incorporated
Ground Water Resources Development
TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: City of Lakewood Well 22
Test Date: 9/30-10/1, 1996

Circle Well Type: (Pumping) Observation (r = ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth 90.34 ft Reference Point Elevation: 0.45 ft above ground

Time of Day	Time, min Step	Time, min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
7:30 PM	549	549	178.00	87.66	3,000	7.9		84,688.00	
8:00 PM	579	579	178.45	88.11	3,025	10.6		84,809.00	
8:30 PM	609	609	178.55	88.21	3,025	8.6		84,930.00	
9:00 PM	639	639	178.62	88.28	3,000	8.6		85,050.00	
9:30 PM	669	669	178.78	88.44	3,004	4.4		85,171.00	
10:00 PM	699	699	179.07	88.73	3,000	6.7		85,291.00	
10:30 PM	729	729	178.98	88.64	3,000	6		85,411.00	
11:00 PM	759	759	178.93	88.59	3,000	5.3		85,531.00	
11:30 PM	789	789	179.26	88.92	3,000	5.3		85,651.00	
12:00 AM	819	819	179.49	89.15	3,000	5.8		85,771.00	
12:30 AM	849	849	179.73	89.39	3,000	5.1		85,891.00	
1:00 AM	879	879	179.81	89.47	3,025	3.8		86,012.00	
1:30 AM	909	909	179.75	89.41	3,000	3.18		86,132.00	
2:00 AM	939	939	180.07	89.73	3,000	4.4		86,252.00	
2:30 AM	969	969	179.97	89.63	3,000	4.6		86,372.00	
3:00 AM	999	999	180.00	89.66	3,000	3.5		86,492.00	
4:00 AM	1059	1059	180.14	89.80	3,000	4		86,731.00	
4:30 AM	1089	1089	180.25	89.91	3,025	3.8		86,852.00	
5:00 AM	1119	1119	180.86	90.52	3,000	2.6		86,972.00	
5:30 AM	1149	1149	180.88	90.54	3,025	2.5		87,093.00	
6:00 AM	1179	1179	180.97	90.63	3,100	3.5		87,217.00	
6:30 AM	1209	1209	180.91	90.57	3,000	3.1		87,337.00	
7:00 AM	1239	1239	180.79	90.45	3,000	3.1		87,453.00	
7:30 AM	1269	1269	180.93	90.59	3,000	7.5		87,573.00	
8:00 AM	1299	1299	181.07	90.73	3,000	8.1		87,693.00	
8:30 AM	1329	1329	181.06	90.72	3,000	7.2		87,813.00	
9:00 AM	1359	1359	181.04	90.70	3,025	5.9		87,934.00	
9:30 AM	1389	1389	181.29	90.95	3,025				
10:00 AM	1419	1419	181.20	90.86	3,000	5.5		88,174.00	
10:22 AM	1441	1441	181.28	90.94	3,000	8.3		88,262.00	pump off
10:23 AM	1	1442	118.08	27.74					Avg. Q = 3,001 gpm

GEOSCIENCE Support Services Incorporated
Ground Water Resources Development
TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: City of Lakewood Well 22
Test Date: 9/30-10/1, 1996
Circle Well Type: (Pumping) Observation (r = ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 90.34 ft Reference Point Elevation: 0.45 ft above ground

Time of Day	Time, min Step	Time, min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
10:24 AM	2	1443	117.73	27.39					
10:26 AM	4	1445	114.75	24.41					
10:28 AM	6	1447	113.11	22.77					
10:30 AM	8	1449	111.83	21.49					
10:32 AM	10	1451	110.89	20.55					
10:37 AM	15	1456	109.12	18.78					
10:42 AM	20	1461	107.89	17.55					
10:47 AM	25	1466	106.84	16.50					
10:52 AM	30	1471	106.03	15.69					
11:02 AM	40	1481	104.69	14.35					
11:12 AM	50	1491	103.70	13.36					
11:22 AM	60	1501	102.91	12.57					
11:35 AM	75	1516	101.86	11.52					
11:52 AM	90	1531	101.07	10.73					
12:07 PM	105	1546	100.52	10.18					
12:22 PM	120	1561	99.97	9.63					
12:52 PM	150	1591	99.08	8.74					
1:22 PM	180	1621	98.36	8.02					
1:52 PM	210	1651	97.74	7.40					
2:22 PM	240	1681	97.23	6.89					

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: USGS Monitoring Well 1 (screened between 989 ft and 1,009 ft)
Test Date: 9/30-10/1,1996
Circle Well Type: Pumping (Observation) (r = 45.3 ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 89.1 ft Reference Point Elevation: 1.9 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
9:45:00 AM	24	24	89.10						
10:54:00 AM	33	33	123.06	33.96					22 pump on, Q = 3,000 gpm
11:26:00 AM	65	65	128.89	39.79					
12:15:00 PM	114	114	133.27	44.17					
13:09:00 PM	167	167	136.11	47.01					
13:55:00 PM	214	214	137.70	48.60					
15:03:00 PM	282	282	139.64	50.54					
15:57:00 PM	336	336	140.83	51.73					
17:01:00 PM	400	400	141.93	52.83					
19:00:00 PM	519	519	143.54	54.44					
21:00:00 PM	639	639	145.05	55.95					
23:00:00 PM	759	759	145.75	56.65					
1:00:00 AM	879	879	146.58	57.48					
3:00:00 AM	999	999	146.93	57.83					
5:00:00 AM	1119	1119	148.09	58.99					
7:00:00 AM	1239	1239	148.45	59.35					
9:00:00 AM	1359	1359	148.91	59.81					
9:34:00 AM	1393	1393	148.98	59.88					
10:18:00 AM	1437	1437	149.10	60.00					
10:31:00 AM	9	1450	125.18	36.08					Recovery Test
10:37:00 AM	15	1456	121.24	32.14					
10:43:00 AM	21	1462	117.24	28.14					
10:56:00 AM	34	1475	113.56	24.46					
11:24:00 AM	62	1503	109.14	20.04					
12:02:00 AM	100	1541	105.61	16.51					
12:52:00 AM	150	1591	102.84	13.74					
13:30:00 AM	188	1629	101.37	12.27					
14:19:00 AM	236	1677	99.91	10.81					

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: USGS Monitoring Well 2 (screened between 640 ft and 660 ft)
Test Date: 9/30-10/1,1996
Circle Well Type: Pumping (Observation) (r = 44.9 ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 83.0 Reference Point Elevation: 1.8 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
9:50:00 AM	31	31	82.95						
10:57:00 AM	36	36	99.35	16.4					22 pump on, Q = 3,000 gpm
11:32:00 AM	71	71	101.65	18.7					
12:09:00 PM	108	108	103.19	20.24					
13:02:00 PM	161	161	104.57	21.62					
14:00:00 PM	219	219	105.47	22.52					
15:01:00 PM	280	280	106.32	23.37					
16:01:00 PM	340	340	106.95	24.00					
16:56:00 PM	395	395	107.46	24.51					
19:00:00 PM	519	519	108.42	25.47					
21:00:00 PM	639	639	109.00	26.05					
23:00:00 PM	759	759	109.43	26.48					
1:00:00 AM	879	879	110.00	27.05					
3:00:00 AM	999	999	110.38	27.43					
5:00:00 AM	1119	1119	110.75	27.80					
7:00:00 AM	1239	1239	110.96	28.01					
9:00:00 AM	1359	1359	111.22	28.27					
9:38:00 AM	1397	1397	111.30	28.35					
10:16:00 AM	1435	1435	111.34	28.39					
10:46:00 AM	24	1465	96.44	13.49					Recovery Test
10:54:00 AM	32	1473	95.49	12.54					
11:29:00 AM	65	1506	93.20	10.25					
12:01:00 AM	99	1540	91.82	8.87					
12:54:00 AM	152	1593	90.46	7.51					
13:32:00 AM	190	1631	89.70	6.75					
14:18:00 AM	235	1676	89.08	6.13					

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: USGS Monitoring Well 3 (screened between 450 ft and 470 ft)
Test Date: 9/30-10/1,1996
Circle Well Type: Pumping (Observation) (r = 44.9 ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 82.2 Reference Point Elevation: 1.8 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
9:56:00 AM	35	35	82.20						
11:06:00 AM	45	45	99.81	17.61					22 pump on, Q = 3,000 gpm
11:29:00 AM	68	68	101.41	19.21					
12:12:00 PM	111	111	102.54	20.34					
13:00:00 PM	159	159	103.59	21.39					
13:56:00 PM	216	216	104.32	22.12					
14:59:00 PM	278	278	105.08	22.88					
16:02:00 PM	341	341	105.64	23.44					
16:58:00 PM	397	397	106.05	23.85					
19:00:00 PM	519	519	107.00	24.80					
21:00:00 PM	639	639	107.59	25.39					
23:00:00 PM	759	759	107.86	25.66					
1:00:00 AM	879	879	108.30	26.10					
3:00:00 AM	999	999	108.61	26.41					
5:00:00 AM	1119	1119	109.05	26.85					
7:00:00 AM	1239	1239	109.25	27.05					
9:00:00 AM	1359	1359	109.49	27.29					
9:36:00 AM	1395	1395	109.52	27.32					
10:15:00 AM	1434	1434	109.60	27.40					
10:45:00 AM	23	1464	94.37	12.17					Recovery Test
10:55:00 AM	33	1474	93.12	10.92					
11:26:00 AM	64	1505	91.30	9.1					
11:59:00 AM	97	1538	90.11	7.91					
12:55:00 AM	153	1594	88.91	6.71					
13:31:00 AM	189	1630	88.31	6.11					
14:17:00 AM	234	1675	87.77	5.57					

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: USGS Monitoring Well 4 (screened between 280 ft and 300 ft)
Test Date: 9/30-10/1,1996
Circle Well Type: Pumping (Observation) (r = 45.3 ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 65.1 Reference Point Elevation: 1.9 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
9:53:00 AM			65.05						
11:08:00 AM	47	47	64.93	-0.12					22 pump on, Q = 3,000 gpm
11:34:00 AM	73	73	64.93	-0.12					
12:17:00 PM	116	116	64.93	-0.12					
13:05:00 PM	164	164	64.93	-0.12					
13:58:00 PM	217	217	64.93	-0.12					
14:57:00 PM	276	276	64.93	-0.12					
15:55:00 PM	338	338	64.93	-0.12					
16:55:00 PM	394	394	64.93	-0.12					
0:00:00 AM	819	819	64.90	-0.15					
9:00:00 AM	1359	1359	64.95	-0.10					
9:39:00 AM	1398	1398	64.93	-0.12					
10:17:00 AM	1435	1435	64.93	-0.12					
11:27:00 AM	65	1506	65.24	0.19					Recovery Test
11:58:00 AM	96	1537	65.24	0.19					
12:57:00 AM	155	1596	65.24	0.19					
13:33:00 AM	191	1632	65.24	0.19					
14:16:00 AM	234	1674	65.28	0.23					

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: USGS Monitoring Well 5 (screened between 140 ft and 160 ft)
Test Date: 9/30-10/1,1996
Circle Well Type: Pumping (Observation) (r = 51.1 ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 28.0 Reference Point Elevation: 1.5 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
9:57:00 AM			28.00						
11:03:00 AM	42	47	27.51	-0.49					22 pump on, Q = 3,000 gpm
11:38:00 AM	77	73	27.51	-0.49					
12:19:00 PM	118	116	27.51	-0.49					
12:57:00 PM	156	164	27.51	-0.49					
14:03:00 PM	222	217	27.51	-0.49					
14:54:00 PM	273	276	27.51	-0.49					
16:04:00 PM	343	338	27.51	-0.49					
16:53:00 PM	392	394	27.51	-0.49					
0:00:00 AM	819	819	27.49	-0.51					
9:00:00 AM	1359	1359	27.72	-0.28					
9:43:00 AM	1402	1398	27.78	-0.22					
10:20:00 AM	1438	1435	27.78	-0.22					
11:30:00 AM	68	1509	28.25	0.25					Recovery Test
11:55:00 AM	93	1534	28.25	0.25					
12:59:00 AM	157	1598	28.25	0.25					
13:27:00 AM	185	1626	28.25	0.25					
14:14:00 AM	232	1673	28.25	0.25					

GEOSCIENCE Support Services Incorporated

Ground Water Resources Development

TEL: (909) 920-0707
FAX: (909) 920-0403

PUMPING TEST DATA SHEET

Well Name / Number: USGS Monitoring Well 6 (screened between 70 ft and 90 ft)
Test Date: 9/30-10/1,1996
Circle Well Type: Pumping (Observation) (r = 51.1 ft)
Circle Test Type: Step Drawdown (Constant Rate) (Recovery) Development
Static Water Level Depth: 28.0 Reference Point Elevation: 1.5 ft above ground

Time of Day	Time min Step	Time min Total	Depth to Water (ft)	Draw-down (ft)	Pumping Rate (gpm)	Sand Content (ppm)	Air-line (ft)	Totalizer (1,000 gal)	Remarks & other data
9:58:00 AM			52.40						
10:59:00 AM	38	38	52.40	0.00					22 pump on, Q = 3,000 gpm
11:41:00 AM	80	80	52.40	0.00					
12:17:00 PM	116	116	52.40	0.00					
12:59:00 PM	158	158	52.38	-0.02					
14:01:00 PM	220	220	52.38	-0.02					
14:56:00 PM	275	275	52.38	-0.02					
16:03:00 PM	342	342	52.38	-0.02					
16:54:00 PM	393	393	52.38	-0.02					
0:00:00 AM	819	819	52.29	-0.11					
9:00:00 AM	1359	1359	52.37	-0.03					
9:41:00 AM	1400	1400	52.38	-0.02					
10:19:00 AM	1437	1437	52.38	-0.02					
11:29:00 AM	67	1508	52.86	0.46					Recovery Test
11:56:00 AM	94	1535	52.86	0.46					
12:58:00 AM	156	1597	52.89	0.49					
13:28:00 AM	186	1627	52.91	0.51					
14:15:00 AM	233	1674	52.91	0.51					

APPENDIX H

Ground Water Quality Data

1 - Water Quality Data For Aquifer Zone Tests

2 - Water Quality Data For Title 22 Analysis

APPENDIX H - 1

Water Quality Data For Aquifer Zone Tests

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino, CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:
GEOSCIENCE Support Services, Inc.
Attention: Johnson Yeh
1326 Monte Vista, Ste# 3
Upland, CA 91786
Tel: (909)920-0707 Fax: (909)920-0403

Service ID #: 801-963349
Collected by: Weixing Tong
Collected on: 07/25/96
Sample description:
Well Water
Project: Production Well 22; Job#: 12300

Received : 07/25/96
Tested : 7/25-26/96
Reported : 07/26/96

Analysis of Well Water

801-963349 Page 1 of 1

Component Analyzed	Method	Unit	PQL	Concentration WELL 22, ZONE 1 96-3349-1
Color, true	110.2	Color Unit	1	3
Odor,	140.1	Odor Unit	1	1
Turbidity	180.1	NTU	0.1	319
Alkalinity	310.1	mg-$CaCO_3$/L	2	164
Bicarbonate	SM2330B	mg-$CaCO_3$/L	2	160
Carbonate	SM2330B	mg/L	2	4
Chloride Cl^-	325.3	mg/L	1	16
Hardness by Titration	130.1	mg$CaCO_3$/L	1	30
Surfactants (MBAS)	425.1	mg/L	0.1	N.D.
pH	150.1/9040	pH unit	0.01	8.35
Electric Conductivity	120.1	μs/L	1	337
Nitrate (NO_3^--N) by ISE	SM4500	mg/L	0.5	N.D.
Sulfate (SO_4^{--})	375.4	mg/L	2	N.D.
Solids, Total Dissolved (TDS)	160.1	mg/L	10	264
Calcium, Ca, by ICP	200.7/6010	mg/L	0.02	9.9
Copper, Cu, by ICP	200.7/6010	mg/L	0.01	0.06
Iron, by ICP	200.7/6010	mg/L	0.02	2.2
Magnesium, Mg, by ICP	200.7/6010	mg/L	0.05	1.5
Manganese, by ICP	200.7/6010	mg/L	0.002	0.031
Potassium, K, by ICP	200.7/6010	mg/L	0.2	2.4
Sodium, Na, by ICP	200.7/6010	mg/L	0.05	70
Zinc, Zn, by ICP	200.7/6010	mg/L	0.005	0.098
Arsenic, Total, by ICP	200.7/6010	mg/L	0.006	0.007

PQL : Practical Quantitation Limit
SM : Standard Methods for Examination of Water and Waste Water, 17th edition.
N.D. : Not Detected or less than the quantitation limit.

Respectfully submitted,

Dominic Lau
Laboratory Director
Applied P & Ch Laboratory

CADHS ELAP CERTIFICATION NUMBER 1431

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino, CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:
GEOSCIENCE Support Services, Inc.
Attention: Weixing Tong
1326 Monte Vista, Ste# 3
Upland, CA 91786
Tel: (909)920-0707 Fax: (909)920-0403

Service ID #: 801-963367 Received : 07/26/96
Collected by: Weixing Tong Tested : 7/26-29/96
Collected on: 07/25/96 Reported : 07/29/96
Sample description:
Well Water from City of Lakewood
Projct: Production Well 22; Job#: 12300

Analysis of Well Water

801-963367 Page 1 of 1

Component Analyzed	Method	Unit	PQL	Concentration WELL 22 ZONE 2 96-3367-1
Color (true)	110.2	Color Unit	1	1.5
Odor	140.1	Odor Unit	1	1
Turbidity	180.1	NTU	0.1	3,230
Alkalinity	310.1	$mgCaCO_3/L$	2	149
Bicarbonate	SM2330B	$mgCaCO_3/L$	2	145
Carbonate	SM2330B	mg/L	2	4
Chloride Cl^-	325.3	mg/L	1	30
Hardness by Titration	130.1	$mgCaCO_3/L$	1	58
Nitrate (NO_3^--N) by ISE	SM4500	mg/L	0.5	0.6
Surfactants (MBAS)	425.1	mg/L	0.1	N.D.
pH	150.1/9040	pH unit	0.01	8.31
Electric Conductivity	120.1	$\mu S/cm$	1	362
Sulfate (SO_4^{--})	375.4	mg/L	2	3
Solids, Total Dissolved (TDS)	160.1	mg/L	10	199
Calcium, Ca	215.1	mg/L	0.02	13
Copper, Cu	200.7	mg/L	0.01	0.05
Iron	236.1	mg/L	0.1	5.8
Magnesium, Mg	242.1	mg/L	0.005	3.1
Manganese	243.1	mg/L	0.02	0.083
Potassium, K	258.1	mg/L	0.01	2.0
Sodium, Na	273.1	mg/L	0.005	55
Zinc, Zn	200.7	mg/L	0.005	0.043
Arsenic	200.7	mg/L	0.006	0.011

PQL : Practical Quantitation Limit
SM : Standard Methods for Examination of Water and Waste Water.
N.D. : Not Detected or less than the quantitation limit.

Respectfully submitted,

Dominic Lau
Laboratory Director
Applied P & Ch Laboratory

CADHS ELAP CERTIFICATION NUMBER 1431

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino, CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:
GEOSCIENCE Support Services, Inc.
Attention: Weixing Tong
1326 Monte Vista, Ste# 3
Upland, CA 91786
Tel: (909)920-0707 Fax: (909)920-0403

Service ID #: 801-963387 Received : 07/29/96
Collected by: Weixing Tong Tested : 7/29-30/96
Collected on: 07/26-28/96 Reported : 07/30/96
Sample description:
Well Water from City of Lakewood
Project: Production Well 22

Analysis of Water

801-963387 Page 1 of 1

Component Analyzed	Method	Unit	PQL	Concentration Well 22 Zone 3 96-3387-1	Well 22 Zone 4 96-3387-2	Well 22 Zone 5 96-3387-3
Color (true)	110.2	Color Unit	1	2	1	1
Odor	140.1	Odor Unit	1	1	1	1
Turbidity	180.1	NTU	0.1	413	866	351
Alkalinity	310.1	$mgCaCO_3/L$	2	99	136	153
Bicarbonate	SM2330B	$mgCaCO_3/L$	2	95	132	149
Carbonate	SM2330B	mg/L	2	4	4	4
Chloride Cl^-	325.3	mg/L	1	11	9	17
Hardness by Titration	130.1	$mgCaCO_3/L$	1	22	78	116
Nitrate (NO_3^--N) by ISE	SM4500	mg/L	0.5	0.6	0.7	0.6
Surfactants (MBAS)	425.1	mg/L	0.1	N.D.	N.D.	N.D.
pH	150.1/9040	pH unit	0.01	8.56	8.27	8.10
Electric Conductivity	120.1	$\mu S/cm$	1	268	323	380
Sulfate (SO_4^{--})	375.4	mg/L	2	13	18	17
Solids, Total Dissolved (TDS)	160.1	mg/L	10	201	297	167
Calcium, Ca	200.7	mg/L	0.02	8.8	26	41
Copper, Cu	200.7	mg/L	0.01	N.D.	N.D.	N.D.
Iron, Fe	200.7	mg/L	0.02	1.2	0.42	N.D.
Magnesium, Mg	200.7	mg/L	0.05	0.76	3.3	5.1
Manganese	200.7	mg/L	0.002	0.02	0.017	0.028
Potassium, K	200.7	mg/L	0.2	1.3	2.6	2.6
Sodium, Na	200.7	mg/L	0.05	44	40	31
Zinc, Zn	200.7	mg/L	0.005	0.010	0.005	N.D.
Arsenic	200.7	mg/L	0.006	0.029	0.010	0.007

PQL : Practical Quantitation Limit
SM : Standard Methods for Examination of Water and Waste Water.
N.D. : Not Detected or less than the quantitation limit.

Respectfully submitted,

Dominic Lau
Laboratory Director
Applied P & Ch Laboratory

CADHS ELAP CERTIFICATION NUMBER 1431

APPENDIX H - 2

Water Quality Data For Title 22 Analysis

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA

EX

GENERAL MINERAL & PHYSICAL, & INORGANIC ANALYSIS (4/95)

Date of Report: 10/24/96 Sample ID No. 94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/14

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

User ID: 4th Station Number:
Date/Time of Sample: |96|10|01|1000| YY MM DD TTTT
Laboratory Code: 9469 YY MM DD
Date Analysis Completed: |96|10|14|
Submitted by:_____ Phone #:_____

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
	mg/L	Total Hardness (as CaCO3)	00900	84.7	
	mg/L	Calcium (Ca)	00916	28.2	
	mg/L	Magnesium (Mg)	00927	3.1	
	mg/L	Sodium (NA)	00929	39.2	
	mg/L	Potassium (K)	00937	2.0	
Total Cations		Meq/L Value: 3.4			
	mg/L	Total Alkalinity (AS CaCO3)	00410	137	
	mg/L	Hydroxide (OH)	71830	< 1	
	mg/L	Carbonate (CO3)	00445	< 1	
	mg/L	Bicarbonate (HCO3)	00440	167	
*	mg/L+	Sulfate (SO4)	00945	32.8	0.5
*	mg/L+	Chloride (Cl)	00940	10.0	
45	mg/L	Nitrate (as NO3)	71850	ND	2.0
**	mg/L	Fluoride (F) Temp. Depend.	00951	0.27	0.1
Total Anions		Meq/L Value: 3.7			
	Std.Units+	PH (Laboratory)	00403	7.6	
***	umho/cm+	Specific Conductance (E.C.)	00095	312	
****	mg/L+	Total Filterable Residue at 180C (TDS)	70300	205	
	Units	Apparent Color (Unfiltered)	00081	3.0	
	TON	Odor Threshold at 60 C	00086	< 1	
	NTU	Lab Turbidity	82079	0.35	
0.5	mg/L+	MBAS	38260	< 0.04	

* 250-500-600 ** 1.4-2.4 *** 900-1600-2200 **** 500-1000-1500

INORGANIC CHEMICALS

94038

MCL	REPORTING UNITS	CHEMICAL	ENTRY #	ANALYSES RESULTS	DLR
1000	ug/L	Aluminum (Al)	01105	130	50.0
6	ug/L	Antimony	01097	ND	6.0
50	ug/L	Arsenic (As)	01002	5.3	2.0
1000	ug/L	Barium (Ba)	01007	ND	100.0
4	ug/L	Beryllium	01012	ND	1.0
5	ug/L	Cadmium (Cd)	01027	ND	1.0
50	ug/L	Chromium (Total Cr)	01034	ND	10.0
1000	ug/L+	Copper (Cu)	01042	ND	50.0
300	ug/L+	Iron (Fe)	01045	170	100.0
	ug/L	Lead (Pb)	01051	ND	5.0
50	ug/L+	Manganese (Mn)	01055	ND	30.0
2	ug/L	Mercury (Hg)	71900	ND	1.0
100	ug/L	Nickel	01067	ND	10.0
50	ug/L	Selenium (Se)	01147	ND	5.0
100	ug/L+	Silver (Ag)	01077	ND	10.0
2	ug/L	Thallium	01059	ND	1.0
5000	ug/L	Zinc (Zn)	01092	ND	50.0
		ADDITIONAL ANALYSES			
1000	ug/L	Nitrite as Nitrogen(N)	00620	ND	400
200	ug/L	Cyanide	01291	ND	100.0

+ Indicates Secondary Drinking Water Standards

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA
ORGANIC CHEMICAL ANALYSIS (3/96)

EX

Date of Report: 10/24/96 Sample ID No.94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 | Date/Time Sample Received @ Lab: 96/10/01/0000 | Date Analyses Completed: 96/10/01

System Name: CITY OF LAKEWOOD
System Number: 1910239
Name or Number of Sample Source: WELL 22

* User ID: 4th Station Number:
* Date/Time of Sample: |96|10|01|1000| (YY MM DD TTTT)
* Laboratory Code: 9469
* Date Analysis Completed: |96|10|01| (YY MM DD)
* Submitted by:_____ Phone #:_____

REGULATED ORGANIC CHEMICALS Neg Def No. 502.2

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
502.2	Bromodichloromethane	32101	ND		0.5
502.2	Bromoform	32104	ND		0.5
502.2	Chloroform (Trichloromethane)	32106	ND		0.5
502.2	Dibromochloromethane	32105	ND		0.5
502.2	Total Trihalomethanes (THM'S/ TTHM)	82080	ND	100	0.5
502.2	Benzene	34030	ND	1	0.5
502.2	Carbon Tetrachloride	32102	ND	.5	0.5
502.2	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5
502.2	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
502.2	1,1-Dichloroethane (1,1-DCA)	34496	ND	5	0.5
502.2	1,2-Dichloroethane (1,2-DCA)	34531	ND	.5	0.5
502.2	1,1-Dichloroethylene (1,1-DCE)	34501	ND	6	0.5
502.2	cis-1,2-Dichloroethylene (c-1,2-DCE)	77093	ND	6	0.5
502.2	trans-1,2-Dichloroethylene (t-1,2-DCE)	34546	ND	10	0.5
502.2	Dichloromethane (Methylene Chloride)	34423	ND	5	0.5
502.2	1,2-Dichloropropane	34541	ND	5	0.5
502.2	Total 1,3-Dichloropropene	34561	ND	.5	0.5
502.2	Ethyl Benzene	34371	ND	700	0.5
502.2	Monochlorobenzene (Chlorobenzene)	34301	ND	70	0.5
502.2	Styrene	77128	ND	100	0.5
502.2	1,1,2,2-Tetrachloroethane	34516	ND	1	0.5
502.2	Tetrachloroethylene (PCE)	34475	ND	5	0.5
502.2	Toluene	34010	ND	150	0.5
502.2	1,2,4-Trichlorobenzene	34551	ND	70	0.5
502.2	1,1,1-Trichloroethane (1,1,1-TCA)	34506	ND	200	0.5
502.2	1,1,2-Trichloroethane (1,1,2-TCA)	34511	ND	5	0.5
502.2	Trichloroethylene (TCE)	39180	ND	5	0.5
502.2	Trichlorofluoromethane (FREON 11)	34488	ND	150	5.0
502.2	Trichlorotrifluoroethane (FREON 113)	81611	ND	1200	10.0
502.2	Vinyl Chloride (VC)	39175	ND	.5	0.5

REGULATED ORGANIC CHEMICALS CONTINUED 94038

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
502.2	m,p-Xylene	A-014	ND		0.5
502.2	o-Xylene	77135	ND		0.5
502.2	Total Xylenes (m,p, & o)	81551	ND	1750	0.5
	UNREGULATED ORGANIC CHEMICALS				
502.2	Bromobenzene	81555	ND		0.5
502.2	Bromochloromethane	A-012	ND		0.5
502.2	Bromomethane (Methyl Bromide)	34413	ND		0.5
502.2	n-Butylbenzene	A-010	ND		0.5
502.2	sec-Butylbenzene	77350	ND		0.5
502.2	tert-Butylbenzene	77353	ND		0.5
502.2	Chloroethane	34311	ND		0.5
502.2	Chloromethane (Methyl Chloride)	34418	ND		0.5
502.2	2-Chlorotoluene	A-008	ND		0.5
502.2	4-Chlorotoluene	A-009	ND		0.5
502.2	Dibromomethane	77596	ND		0.5
502.2	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5
502.2	Dichlorodifluoromethane	34668	ND		1.0
502.2	1,3-Dichloropropane	77173	ND		0.5
502.2	2,2-Dichloropropane	77170	ND		0.5
502.2	1,1-Dichloropropene	77168	ND		0.5
502.2	Hexachlorobutadiene	34391	ND		0.5
502.2	Isopropylbenzene (Cumene)	77223	ND		0.5
502.2	p-Isopropyltoluene	A-011	ND		0.5
502.2	Methyl tert-Butyl Ether (MTBE)	A-030	ND		1.0
502.2	Naphthalene	34696	ND		0.5
502.2	n-Propylbenzene	77224	ND		0.5
502.2	1,1,1,2-Tetrachloroethane	77562	ND		0.5
502.2	1,2,3-Trichlorobenzene	77613	ND		0.5
502.2	1,2,3-Trichloropropane	77443	ND		0.5
502.2	1,2,4-Trimethylbenzene	77222	ND		0.5
502.2	1,3,5-Trimethylbenzene	77226	ND		0.5

Laboratory comments and description of any additional compounds found:

ETBE (502.2) ND<5.0 ug/L

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA

EX

ORGANIC CHEMICAL ANALYSIS (3/96)

Date of Report: 10/24/96 Sample ID No. 94038
Laboratory Signature Lab
Name: FGL (FRUIT GROWERS LAB) - SANTA PAULA Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/14

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

User ID: 4TH Station Number:
Date/Time of Sample: |96|10|01|1000| YY MM DD TTTT
Laboratory Code: 5867 YY MM DD
Date Analysis Completed: |96|10|14|
Submitted by:_____ Phone #:_____

PAGE 1 OF 1 REGULATED ORGANIC CHEMICALS Neg Def No. 531.1

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
531.1	Carbofuran (FURADAN)	81405	ND	18	5.0
549	Diquat	78885	ND	20	4.0
548	Endothall	38926	ND	100	45.0
547	Glyphosate	79743	ND	700	25.0
531.1	Oxamyl (Vydate)	38865	ND	200	20.0
	UNREGULATED ORGANIC CHEMICALS				
531.1	Aldicarb (TEMIK)	39053	ND		3.0
531.1	Aldicarb Sulfone	A-020	ND		4.0
531.1	Aldicarb Sulfoxide	A-019	ND		3.0
531.1	Carbaryl (Sevin)	77700	ND		5.0
531.1	3-Hydroxycarbofuran	A-021	ND		3.0
531.1	Methomyl	39051	ND		2.0

EX

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA
ORGANIC CHEMICAL ANALYSIS (3/96)

Date of Report: 10/29/96 Sample ID No.94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/10

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

* User ID: 4TH Station Number:
* Date/Time of Sample: |96|10|01|1000| YY MM DD TTTT Laboratory Code: 9469
* Date Analysis Completed: |96|10|10| YY MM DD
* Submitted by:_____ Phone #:_____

PAGE 1 OF 1 REGULATED ORGANIC CHEMICALS Neg Def No. 515.1

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
515.1	Bentazon (BASAGRAN)	38710	ND	18	2.0
515.1	2,4-D	39730	ND	70	10.0
515.1	2,4,5-TP (SILVEX)	39045	ND	50	1.0
515.1	Dalapon	38432	ND	200	10.0
515.1	Dinoseb (DNBP)	81287	ND	7	2.0
515.1	Pentachlorophenol (PCP)	39032	ND	1	0.2
515.1	Picloram	39720	ND	500	1.0
	UNREGULATED ORGANIC CHEMICALS				
515.1	Dicamba (BANVEL)	82052	ND		1.5

EX

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA
ORGANIC CHEMICAL ANALYSIS (3/96)

Date of Report: 10/24/96 Sample ID No: 94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler: Eric Rogers Employed By: City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/09

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

* User ID: 4TH Station Number: *
* Date/Time of Sample: |96|10|01|1000| YY MM DD TTTT Laboratory Code: 9469 *
* YY MM DD *
* Date Analysis Completed: |96|10|09| *
* Submitted by:_____ Phone #:_____ *

PAGE 1 OF 1 REGULATED ORGANIC CHEMICALS Neg Def No. 508

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
508	Endrin	39390	ND	2	0.10
508	Lindane (gamma-BHC)	39340	ND	.2	0.20
508	Methoxychlor	39480	ND	40	10.0
508	Toxaphene	39400	ND	3	1.0
508	Chlordane	39350	ND	.1	0.1
508	Heptachlor	39410	ND	.01	0.01
508	Heptachlor Epoxide	39420	ND	.01	0.01
508	Polychlorinated Biphenyls (Total PCB's)	39516	ND	.5	0.5
	UNREGULATED ORGANIC CHEMICALS				
508	Aldrin	39330	ND		0.075
508	Dieldrin	39380	ND		0.02

TRUESDAIL LABORATORIES, INC EX
14201 FRANKLIN AVENUE
TUSTIN, CA
ORGANIC CHEMICAL ANALYSIS (3/96)

Date of Report: 10/25/96 Sample ID No.94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/22

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

User ID: 4TH Station Number:
Date/Time of Sample: |96|10|01|1000| YY MM DD TTTT Laboratory Code: 9469
Date Analysis Completed: |96|10|22| YY MM DD
Submitted by:_____ Phone #:_____

PAGE 1 OF 1 REGULATED ORGANIC CHEMICALS Neg Def No. 507

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
507	Atrazine (AATREX)	39033	ND	3	1.0
507	Molinate (ORDRAM)	82199	ND	20	2.0
507	Simazine (PRINCEP)	39055	ND	4	1.0
507	Thiobencarb (BOLERO)	A-001	ND	70	1.0
507	Alachlor (ALANEX)	77825	ND	2	1.0
	UNREGULATED ORGANIC CHEMICALS				
507	Bromacil (HYVAR)	82198	ND		10.0
507	Butachlor	77860	ND		0.38
507	Diazinon	39570	ND		0.25
507	Metolachlor	39356	ND		
507	Metribuzin	81408	ND		
507	Prometryn (CAPAROL)	39057	ND		2.0
507	Propachlor	38533	ND		0.5

EX

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA

BASE, NEUTRALS, AND ACIDS ORGANIC ANALYSIS (4/95)

Date of Report: 10/25/96 Sample ID No.94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/25

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

User ID: 4TH Station Number:
Date/Time of Sample: |96|10|01|1000| YY MM DD TTTT
Laboratory Code: 9469 YY MM DD
Date Analysis Completed: |96|10|25|
Submitted by:_____ Phone #:_____

Neg Def No. 525

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
525	Acenaphthene	34205	ND		5.0
525	Acenaphthylene	34200	ND		5.0
525	Anthracene	34220	ND		5.0
525	Aldrin	39330	ND		0.075
525	Benzo (a) Anthracene	34526	ND		10.0
525	Benzo (b) Fluoranthene	34230	ND		10.0
525	Benzo (k) Fluoranthene	34242	ND		10.0
525	Benzo (a) Pyrene	34247	ND	.2	0.10
525	Benzo (ghi) Perylene	34521	ND		10.0
525	Benzyl Butyl Phthalate	34292	ND		10.0
	beta-BHC	39338			0.05
	delta-BHC	34259			0.05
525	bis (2-Chloroethyl) Ether	34273	ND		5.0
525	bis (2-ChloroethoXy) Methane	34278	ND		5.0
525	bis (2-Chloroisopropyl) Ether	34283	ND		5.0
525	4-Bromophenyl Phenyl Ether	34636	ND		5.0
	Chlordane	39350		0.1	0.1
525	2-Chloronaphthalene	34581	ND		5.0
525	4-Chlorophenyl Phenyl Ether	34641	ND		5.0
525	Chrysene	34320	ND		5.0
525	Diethylhexylphthalate (DEHP)	39100	ND	4	3.0
	4,4'-DDD	39310			0.02
	4,4'-DDE	39320			0.01

 BASE, NEUTRALS, AND ACIDS ORGANIC ANALYSIS 94038

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
	4,4'-DDT	39300			0.02
525	Dibenzo (a,h) Anthracene	34556	ND		5.0
525	di-n-Butylphthalate	39110	ND		5.0
525	1,2-Dichlorobenzene (o-DCB)	34536	ND	600	0.5
525	1,3-Dichlorobenzene (m-DCB)	34566	ND		0.5
525	1,4-Dichlorobenzene (p-DCB)	34571	ND	5	0.5
525	3,3-Dichlorobenzidine	34631	ND		20.0
	Dieldrin	39380			0.02
525	Diethylphthalate	34336	ND		5.0
525	Dimethylphthalate	34341	ND		5.0
525	2,4-Dinitrotoluene	34611	ND		5.0
525	2,6-Dinitrotoluene	34626	ND		5.0
525	di-n-Octylphthalate	34596	ND		5.0
	Endosulfan Sulfate	34351			0.05
	Endrin Aldehyde	34366			0.05
525	Fluoranthene	34376	ND		5.0
525	Fluorene	34381	ND		5.0
	Heptachlor	39410		.01	0.01
	Heptachlor Epoxide	39420		.01	0.01
525	Hexachlorobenzene	39700	ND	1	0.5
525	Hexachlorobutadiene	34391	ND		0.5
525	Hexachloroethane	34396	ND		5.0
525	Indeno (1,2,3-cd) Pyrene	34403	ND		10.0
525	Isophorone	34408	ND		10.0
525	Naphthalene	34696	ND		0.5
525	Nitrobenzene	34447	ND		5.0
525	N-Nitrosodi-n-Propylamine	34428	ND		5.0
	PCB-1016	34671		.5	0.5
	PCB-1221	39488		.5	0.5
	PCB-1232	39492		.5	0.5
	PCB-1242	39496		.5	0.5
	PCB-1248	39500		.5	0.5
	PCB-1254	39504		.5	0.5
	PCB-1260	39508		.5	0.5
525	Phenanthrene	34461	ND		5.0
525	Pyrene	34469	ND		5.0
	Toxaphene	39400		3	1.0
525	1,2,4-Trichlorobenzene	34551	ND		0.5
	ACID EXTRACTABLES				
525	4-Chloro-3-Methylphenol	34452	ND		5.0
525	2-Chlorophenol	34586	ND		5.0
525	2,4-Dichlorophenol	34601	ND		5.0
525	2,4-Dimethylphenol	34606	ND		5.0
525	2,4-Dinitrophenol	34616	ND		5.0
525	2-Methyl-4,6-Dinitrophenol	34657	ND		5.0
525	2-Nitrophenol	34591	ND		5.0
525	4-Nitrophenol	34646	ND		5.0
525	Pentachlorophenol (PCP)	39032	ND	1	0.20
525	Phenol (Carbolic Acid)	34694	ND		5.0
525	2,4,6-Trichlorophenol	34621	ND		5.0

 BASE, NEUTRALS, AND ACIDS ORGANIC ANALYSIS 94038

ADDITIONAL EXTRACTABLE PARAMETERS

TEST METHOD	CHEMICAL ALL CHEMICALS REPORTED ug/L	ENTRY #	ANALYSES RESULTS	MCL ug/L	DLR ug/L
525	Benzidine	39120	ND		5.0
	alpha-BHC	39337			0.01
	gamma-BHC (Lindane)	39340		2	0.20
	Endosulfan I	34361			0.01
	Endosulfan II	34356			0.01
	Endrin	39390		2	0.10
525	Hexachlorocyclopentadiene	34386	ND	50	1.0
525	N-Nitrosodimethylamine	34438	ND		5.0
525	N-Nitrosodiphenylamine	34433	ND		5.0

Laboratory comments and description of any additional compounds found:

EX

TRUESDAIL LABORATORIES, INC
14201 FRANKLIN AVENUE
TUSTIN, CA
RADIOACTIVITY ANALYSIS (4/95)

Date of Report: 10/25/96 Sample ID No.94038
Laboratory Signature Lab
Name: TRUESDAIL LABS Director:
Name of Sampler:Eric Rogers Employed By:City of Lakewood
Date/Time Sample Collected: 96/10/01/1000 Date/Time Sample Received @ Lab: 96/10/01/0000 Date Analyses Completed: 96/10/13

System Name: CITY OF LAKEWOOD System Number: 1910239
Name or Number of Sample Source: WELL 22

* User ID: 4TH Station Number:
* Date/Time of Sample: |96|10|01|1000| (YY MM DD TTTT) Laboratory Code: 9469 (YY MM DD)
* Date Analysis Completed: |96|10|13|
* Submitted by:_____ Phone #:_____

MCL	REPORT UNITS	CHEMICAL	STORET CODE	ANALYSES RESULTS	DLR
15	pCi/l	Total Alpha	01501	0.82	
	pCi/l	Total Alpha Counting Error	01502	1.10	
50	pCi/l	Total Beta	03501	- 0.23	4.0
	pCi/l	Total Beta Counting Error	03502	2.35	
20	pCi/l	Natural Uranium	28012		2.0
	pCi/l	Natural Uranium Counting Error	A-028		
	pCi/l	Total Radium 226	09501		.5
	pCi/l	Total Radium 226 Counting Error	09502		
	pCi/l	Total Radium 228	11501		.5
	pCi/l	Total Radium 228 Counting Error	11502		
5	pCi/l	Ra 226 + Ra 228	11503		
	pCi/l	Ra 226 + Ra 228 Counting Error	11504		
	pCi/l	Total Radon 222	82303		100.0
	pCi/l	Total Radon 222 Counting Error	82302		
20000	pCi/l	Total Tritium	07000		1.0
	pCi/l	Total Tritium Counting Error	07001		
8	pCi/l	Total Strontium 90	13501		2.0
	pCi/l	Total Strontium 90 Counting Error	13502		

Attachment 2

Existing 2.5 MG Reservoir

CANDLEWOOD STREET

AVENUE

DOWNEY

78.0'

40.0'

BENCH MARK ON SIDE OF POWER POLE. SMALL RR SPIKE ELEV. TOP OF SPIKE = 51.120 (BM. NEAR THIS POINT)

Δ = 1°14'21"
R = 1460'
L = 31.58'

N. 89°38'15" E. 251.38'

255.0'

N. 89°08'24" W. 205.06'

135.0'

855.0'

6" ø TEST HOLE

AVERAGE GROUND ELEV. = 49.41 HT. EAVES = 52.41

4" T.C. DRAIN

ELEV. TOP FLOOR AT EAST-NORTH & SOUTH WALLS = 36.71

SURFACE

SILTY SOIL 1.5'+

SANDY CLAY 3.5'+

HARDER CLAY 8.0'+

BLUE CLAY TO DEPTS OF 300' PLUS 30.0'+

EXPLORATION HOLES

6" ø TEST HOLE

178.13'

N. 0°05'07" E.

180.0'

141.34'

6" T.C. DRAIN

EL. 35.41

1-0 SLOPE

24'ø SUMP

6" T.C. DRAIN

RESERVOIR

6" T.C. DRAIN

354.00'

154.66'

161.34'

30.0'

R=82.0'
Δ=30°48'30"
L=90.00'

N. 82°28'07" E.

178.84'

82.0'

82.0'

PLOT PLAN

SCALE 1" = 20'-0"

NORTH

LEGAL DISC

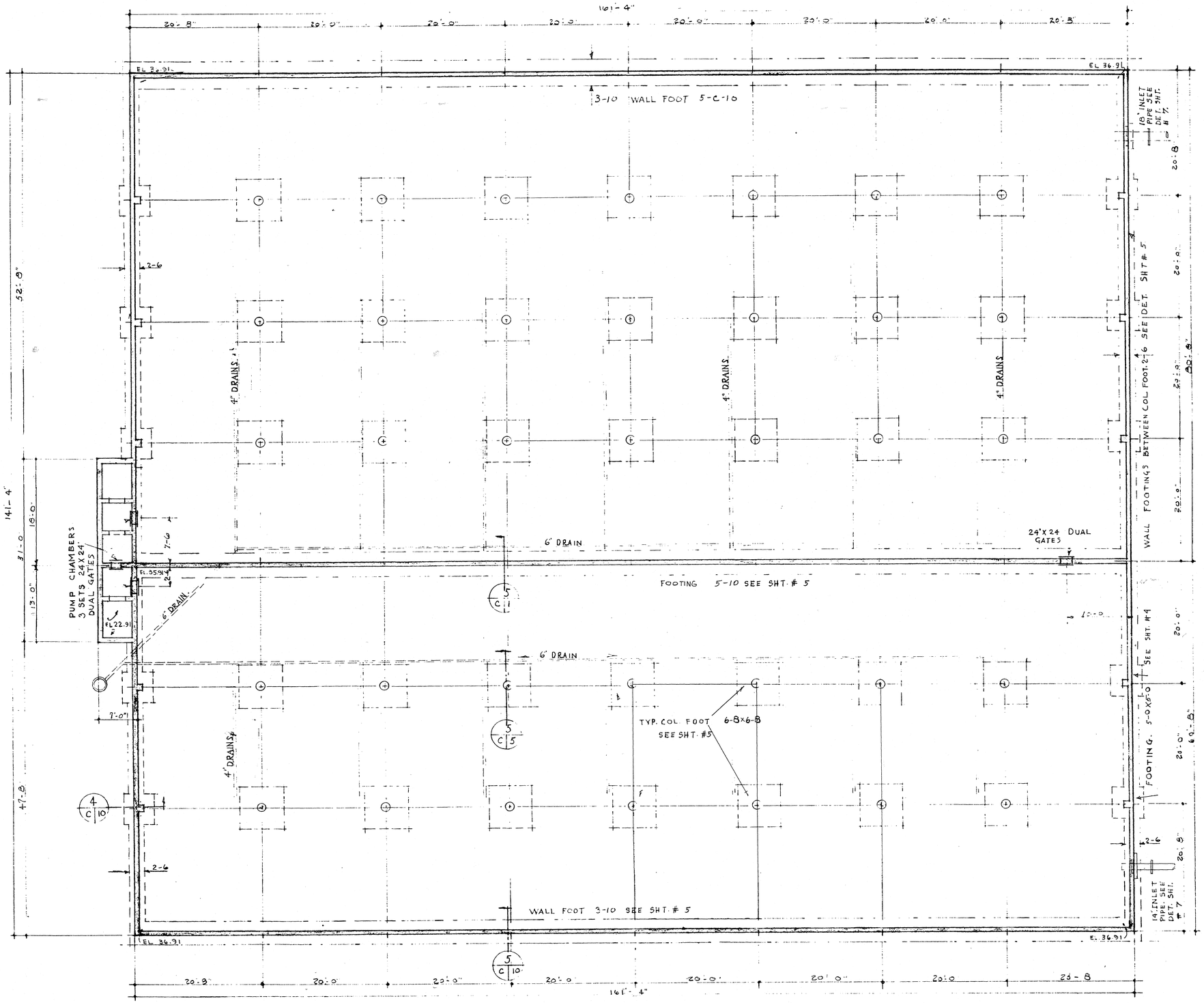
LOT - 316
TRACT - 17226

DOMESTIC WATER RESERVOIR

CONSIST OF 8 SHEETS

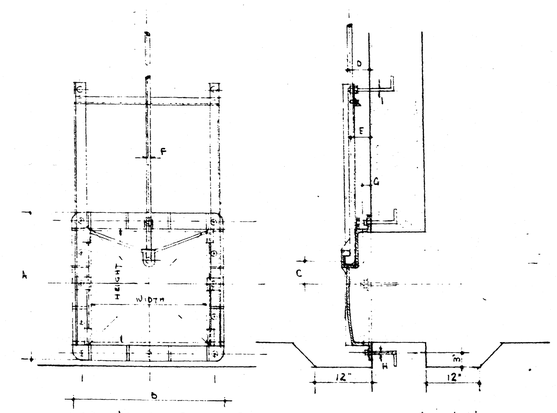
OWNER	LAKEWOOD WATER & POWER CO.
ADDRESS	5045 ECORSE LANE LAKEWOOD, CALIF.
JOB NO.	1277
CHECKED	VDH
DRAWN BY	ROM L
ARCHITECT	HILDEBRAND & SHELLEY
ADDRESS	VERNON D. HILDEBRAND & ASSOC. 3801 E. COLORADO ST. LONG BEACH, CALIF.
DATE	7-29-57
SHEET NO.	PLOT PLAN

3-33



· · RESERVOIR · FOUNDATION · PLAN · ·

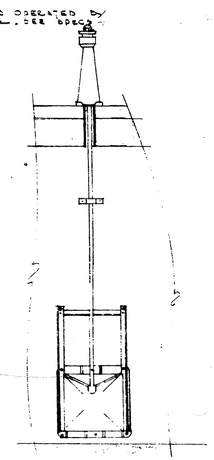
SCALE 1/8" = 1'-0"

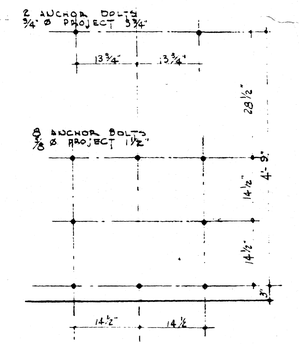


· MOD. NO. 173 · SLIDE · GATE · · SECTION ON ℄ ·

· · GATE · DETAILS · ·

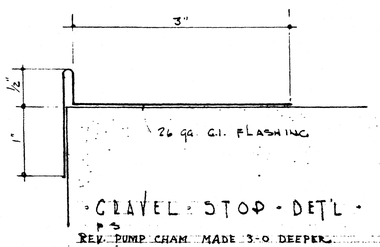
WIDTH INCHES	HEIGHT INCHES	AREA SQ. FT	A	B	C	D	E	F	G	H	I
24	24	4.00	32	32	0	33¼	3¾	1⅛	0	⅜	¾





· BOLT · SPACING · 24" x 24" · GATE · ·

· ELEVATION ·

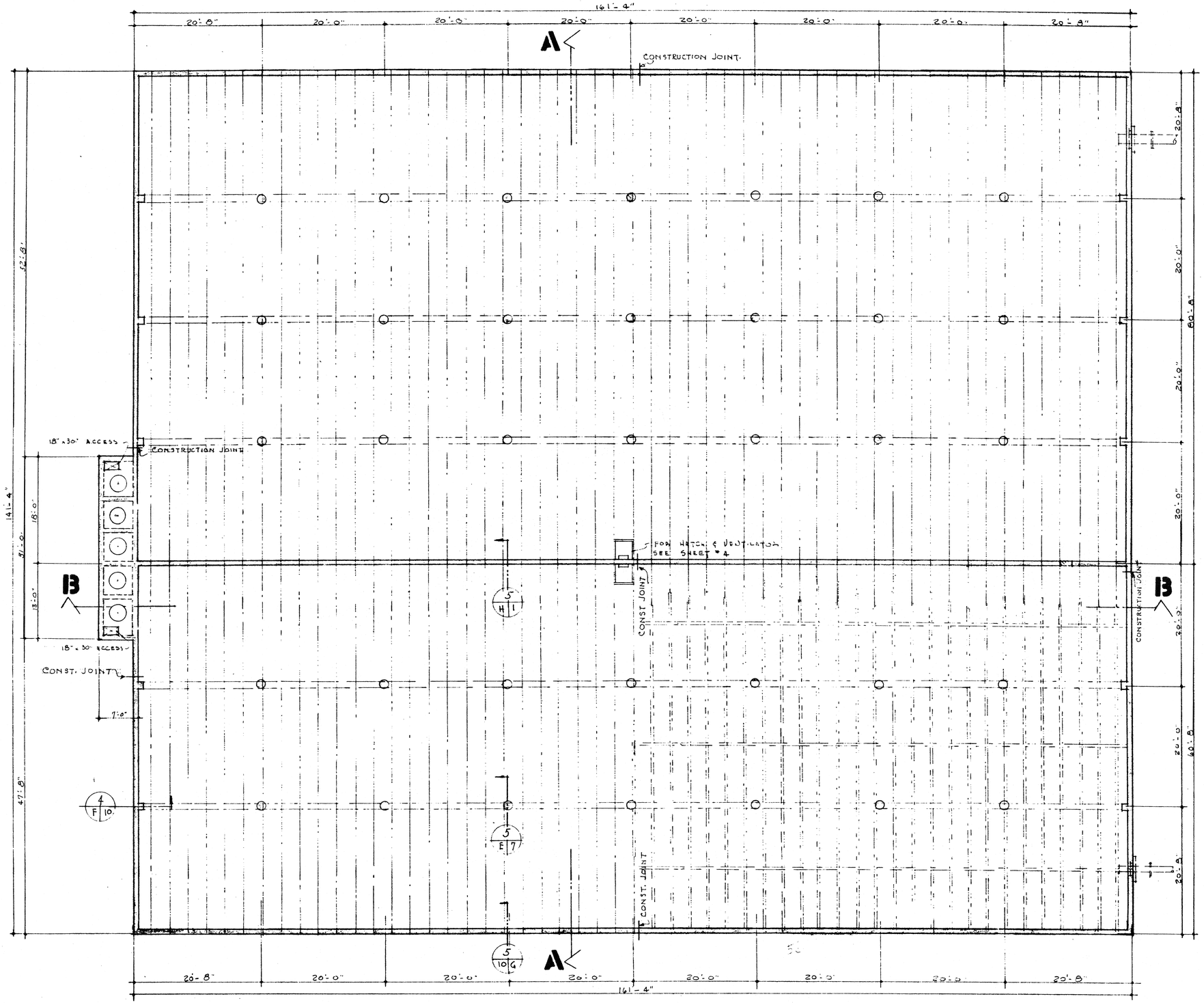


· GRAVEL · STOP · DET'L ·

REV. PUMP CHAM. MADE 3-0 DEEPER.

NORTH

OWNER LAKEWOOD WATER & POWER		REVISED 12-12-51
ADDRESS JOB ADDRESS		
JOB NO 1277	HEDDEN & SHELLEY · VERN O. HEDDEN ENG. 2256 3401 E. COLORADO ST. LONG BEACH 90814	DATE 8-23-51
CHECKED		SHEET NO 2
DRAWN BY ZOLL	FOUNDATION ·	OF

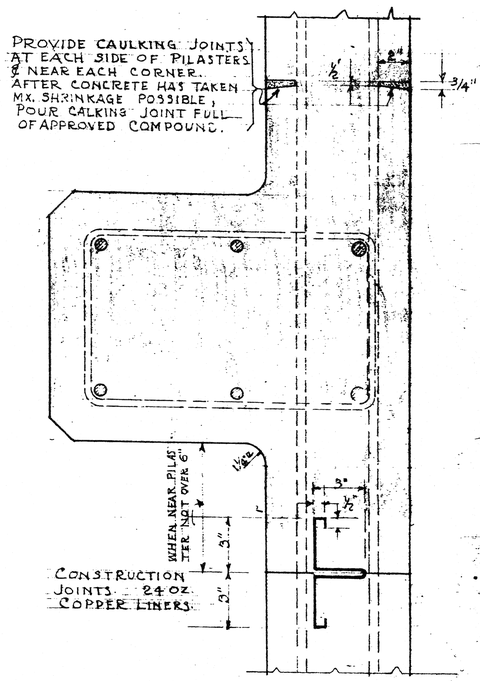


NORTH

RESERVOIR · COVER · FRAMING ·

SCALE 1/8" = 1'-0"

NOTE PLACE VERT. BARS NEARER FACE OF WALL.



DETAILS OF WALL JOINTS

DETAIL SHRINKAGE JOINTS AT CORNERS & PILASTERS SHOW CONSTRUCTION JOINTS & DETAILS.

OWNER LAKEWOOD WATER & POWER		REVISED 12-22-51
ADDRESS 2565 E. CARSON ST. JOB ADDRESS 5257 E. Downey Av.		
JOB NO 1277	HEDDEN & SWELLEY	DATE 8-29-51
CHECKED V.D.H.	1st Fl. D. Hedden Eng. 8234 3801 E. Colorado St. Long Beach 90791	SHEET NO 3 OF
DRAWN BY 2009 C.	FRAMING	

10. 9. 8. 7. 6. 5. 4. 3. 2. 1.

20'-8"

4'-0" - 2 pc #7 @

BEND 1-10 BARS OVER 3'-6"

EL. 52-41

G1-1.7

G1-2 - 15'-0"
G1-3 - 10'-0"

BEND 1 BARS DOWN 4'-0"

W-10

10-12

W-11

W-10-15'-6"

W-11-15'-3" - 4 pc #6 ⌀

W-12-24 HOOPS

NOTE:
HEAVY STEEL & HAND RAIL LOCATING DETAILS FURNISHED LATER.

4'-8 CURB

TYP. ROOF SLAB

RUNGS SET IN CONCRETE WALL

INTERIOR ELEVATION
SCALE 1/2" = 1'-0"

REDEAT

ACCESS HOLE

PLAN
SCALE 1/2" = 1'-0"

NOTE:
ELLIOTT TUDENA 2" AT GIRDER
SLAB THICKENS 2" AT GIRDER

SHEET METAL CHANNEL

2" 2 1/2"

20" x 20" x 2" AIR FILTER

10"

NOTE:
THIS DOUBLE TO LIFT OFF TO PROVIDE ACCESS TO MANHOLE

PLAN
SCALE 3/8" = 1'-0"

20" x 20" x 2" SPUN GLASS OR ROCK WOOL REMOVABLE FILTER.

LOUVRED TO LOW

CLEAT W/ 1/2" Ø BRASS BOLT

#2 @ 12" CTRS COPPER

#2 @

#2 @ 8" CTRS

3"

CONC. FOOTING

SECTION AT ℄
SCALE 3/8" = 1'-0"

EL. 52.41

EL. 36.91

EL. 35.91

EL. 22.91

6" GRAVEL FILL

4" Ø DRAIN

6" Ø DRAIN

24" Ø PIPE

MIN. 5'-0"

TENT

SECTION A-A LOOKING WEST

REVISION 1
10-19-51 SEC. X-Y, & WAKE PUMP CHAMBERS 3-0 DEEPER.

[F-6]

NORTH EL. 36.91

6" CRUSHED AUU GRAVEL BLANKET FROM EXTERIOR FOOTG TO EXTERIOR FOOTING

[F-5]

20" 20" 20"

5'-0"

DETAIL END GIRDER
SCALE 3/4" = 1'-0"

16"

#2 Ø HOOPS 24 CR. "H"

2" REINFORCED CONC. REMOVABLE LID

SECTION X-X

SECTION B-B LOOKING NORTH
SCALE 3/8" = 1'-0"

OWNER	LAKEWOOD WATER & POWER								REVISED 10-19-51	
ADDRESS / JOB ADDRESS	2965 E. CARSON / 5257 DOWNEY AVE.									
JOB NO 1277	HEDIEN & SHELLEY								DATE 8-20-51	
CHECKED VDH	VERN D. HEDIEN ENG. 5225 E. COLORADO ST. LONG BEACH 90771								SHEET NO 4	
DRAWN BY ZOOTZ	DETAILS & SECTIONS									
10.	9.	8.	7.	6.	5.	4.	3.	2.	1.	

NOTE ..
STEEL IN JOIST TO BE TYPICAL

TOP OF WALL EL. 52.41

2'-0"

2-#5 ø BARS EA. JOIST [J-1]

J3 & OR J6

2-#4 ø BARS @ BRIDGING [J-7]

EL. 51.368

2-#5 ø EA. JOIST [J-2]

SEE DETAIL (5/F7)

3'-6"

AT CONC. JOISTS EXTEND 2-#5 ø VERT. WALL STEEL INTO TOP OF JOIST. (1) BAR TO LAP BENT BAR OF JOIST 24" ONE BAR #4 TO HAVE 5'-0 HORIZONTAL.

[W-7]
[W-4]

NAT GRADE EL 49.41

NAT. GRADE

W-2 = 2-0
W 3 = 5-0
W 7 = 3-0

W 4
W 2 & 3
2 #1 & 2
15'-7"
4'-0"
4'-0"

FOR NORTH & SOUTH #5 1-2-3-4
FOR EAST & WEST #6-7

2-#7 ø CONT
2-#7 ø

3½"
10"
2"
20"

1-#5 ø BAR TOP & BOTTOM

#3 ø STIR. SEE DETL (5/A8)

1½"
3-F7 ø CONT
1½" 12" 1½"

..TYPICAL GIRDER SECTION..
SCALE 1½" = 1'-0"

BARS AT THIS POINT EQ #5 ø BARS 6" OC

2"

#5 ø BARS @ 12" OC [W-1] NORTH & SOUTH ENDS

#5 ø BARS @ 12" OC [W-2] NORTH & SOUTH ENDS

..TYPICAL EXTER. WALL STEEL..

6-#5 ø BARS CONT [Co-1]

#2 ø TIES @ 8" OC [Co-2]

NOTE ..
OCTAGON ALTERNATE FORM

1½" 12" 1½"

..PLAN OF TYPICAL COLUMN..
SCALE 1½" = 1'-0"

COLUMN 12" ø
SEE DETL (5/D7)

HIGH POINT AT CENTER 53.410
SLOPE (4) WAYS

4'-0"

NAT. GRADE EL 49.41

SOUTH END 16.5'
NORTH END 15.50'
CENTER

TO FLOOR

A
b
C

CV-1-9-4"
CV-2-14-5"
CV-5-5"

#5 ø BARS @ 8" OC

30"

#5 ø BAR @ 3½" VERT.

#4 ø BAR CONT @ 12" OC HORIZONTAL [Co 4]

NOTE ..
12" DROP FROM SOUTH TO NORTH AT CENTER ONLY. HIGH SIDE = 36.91
LOW SIDE = 35.91

..REINFORCING STEEL SCHEME..

W3 DOWELS #5 - AT EACH VERT BAR

DRY TAMP 1-6

EL. 36.91

6"x6"x10-10 WIRE MESH

1'-0"
2'-3"
6"
8"

#4 ø-6" OC [F-8]

#3 ø @ 6" OC [F-7]

8"

1'-6"
2'-4"
3'-10"

..SECTION EXTERIOR WALL..
NORTH & SOUTH WALL FOOTINGS

Typ. Ext. Wall

[F-9] #4 CONT.
[F-10] #3 ø 6" O.C.

6" CRUSHER RUN GRAVEL BLANKET FOR EXTERIOR FOOTING TO INTERIOR FOOTING

2'-6"

..PLAN OF TYPICAL COLUMN..

NOTE ..
SEE FOUNDATION PLAN FOR ELEV'S BOTTOM OF RESERVOIR

[F-4]

24"

#4 BARS @ 8" OC [F-3] BOTHWAYS

6" 6"
3'-4" 3'-4"

..TYPICAL COLUMN DETAIL..

#4 ø BARS @ 8" OC [F-1]

#5 ø BARS @ 8" OC [F-2]

6" 6"
2'-11" 2'-11"

..SECTION INTERIOR WALL..

EAST & WEST WALL FOOTINGS

..WALLS & FOUNDATION DETAILS..
SCALE 3/4" = 1'-0"

4-5/8 CONT.
HOOPS ½"-18 ø
CONST. JOINT
W 7
W 6
W-13
12"
12"

HEADER

DETAIL JUNCTION EAST & WEST WALLS TO ROOF.

STIRRUPS #2 ø -15" OC. [J-8]

2½"
10"
12½"

2-#5 ø BARS

5½" 30" 5½" 30" 5½" 30" 5½"

J3 & J6 #3 ø TIE STIRRUPS & SUPPORT MESH

MESH ..
3"x3" - #14-14 = .02
4"x4" - 13-13 = .020
6"x6" - 10-10 = .029
.8 CU.FT. PER SQ FT FLOOR

..TYPICAL JOIST DETAIL..

2-#7 ø CONTINUOUS LONG LENGTHS SPLICE [G1-12]

G1-7

#7 ø CONT LONG LENGTHS [G1-6]

6" 6" 9" 12" 15" 15" 15" 15"

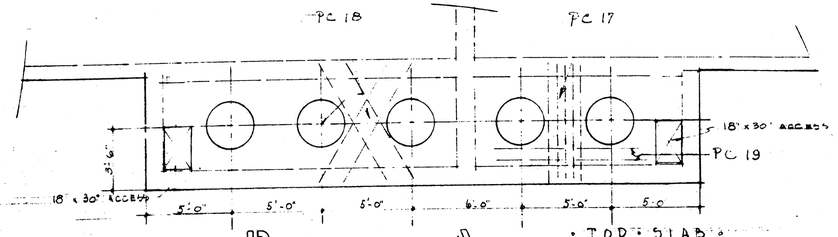
#3 ø STIR SPACING [G1-13]

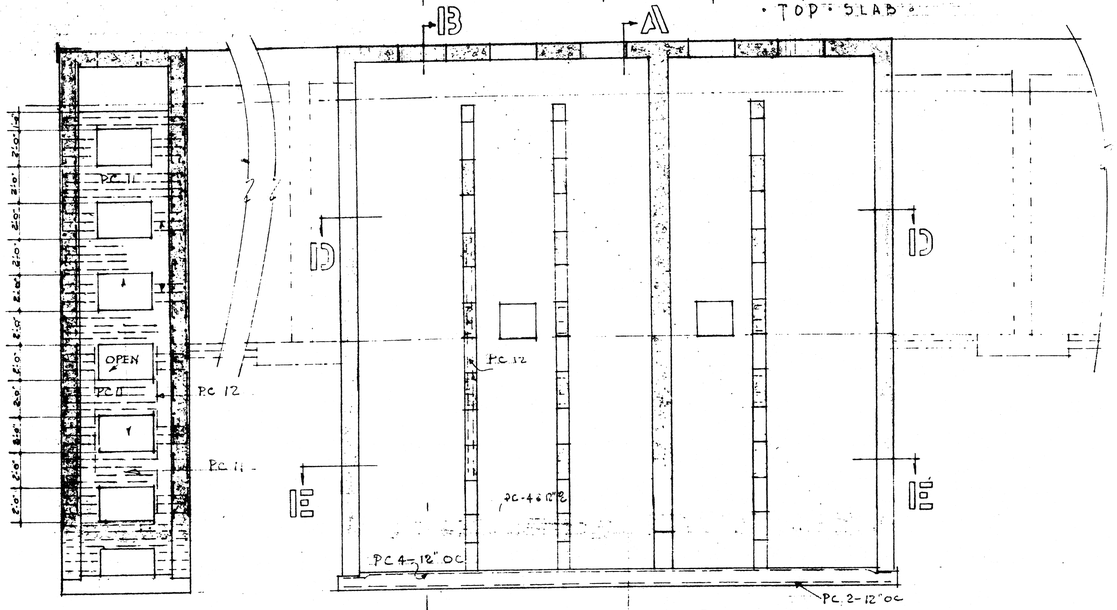
..TYPICAL GIRDER DETAIL..
SCALE 3/4" = 1'-0"

12-14-51 REVISIONS
REMOVE DETAILS FOR PRECASTING WALLS.
CHANGE LOWER END VERT. WALL STEEL.
ADD DOWELS AT BOTTOM OF EXT. WALL.
ADD DETAIL JUNCTION EAST & WEST WALLS TO ROOF SLAB.
SHOW ROOF JOISTS 5½" SOFFIT - 35½" O.C.

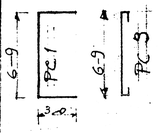
OWNER	LAKEWOOD WATER & POWER
ADDRESS JOB ADDRESS	
JOB NO	1277
CHECKED	VDH
DRAWN	JCP & C.
	HEDDEN & SHELLEY
	VELN D. HEDDEN, ENG #2256 1981 EAST SEVENTH ST. LONG BEACH 75-1-45
	DETAILS
REVISED	
DATE	8-29-51
DWG NO	5
OF	8

10. 9. 8. 7. 6. 5. 4. 3. 2. 1.

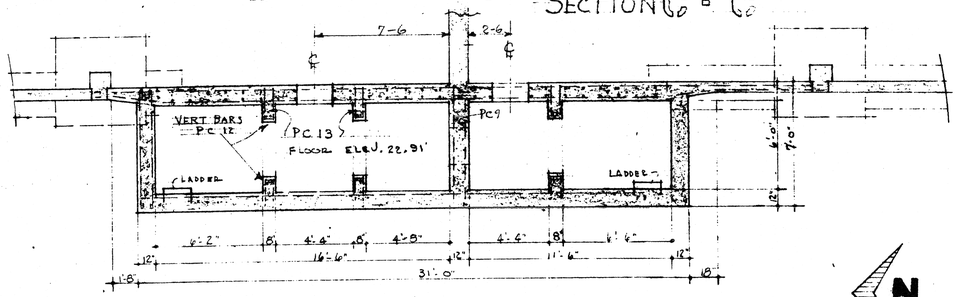




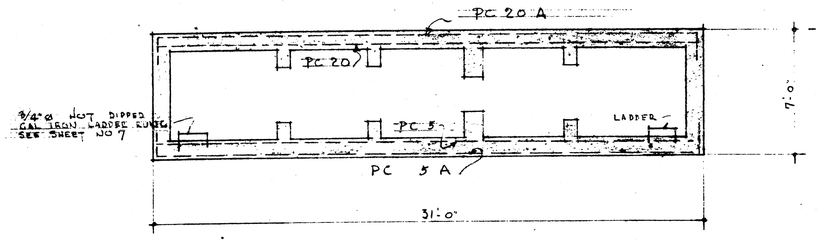
SEC B-B



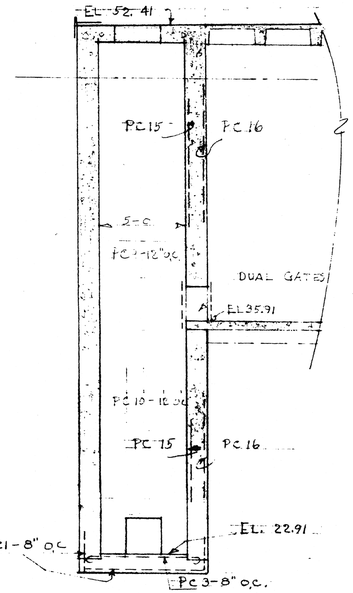
SECTION C-C



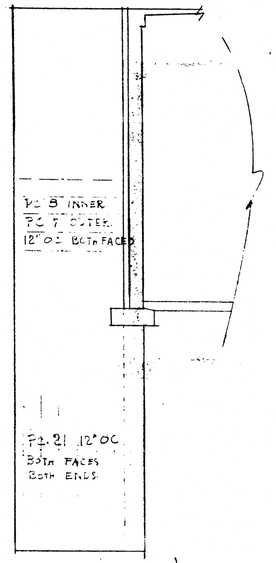
PLAN AT D-D



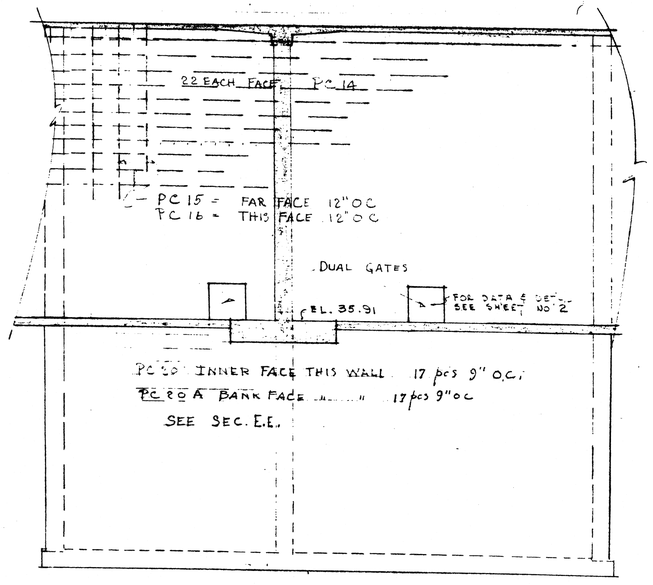
PLAN AT E-E



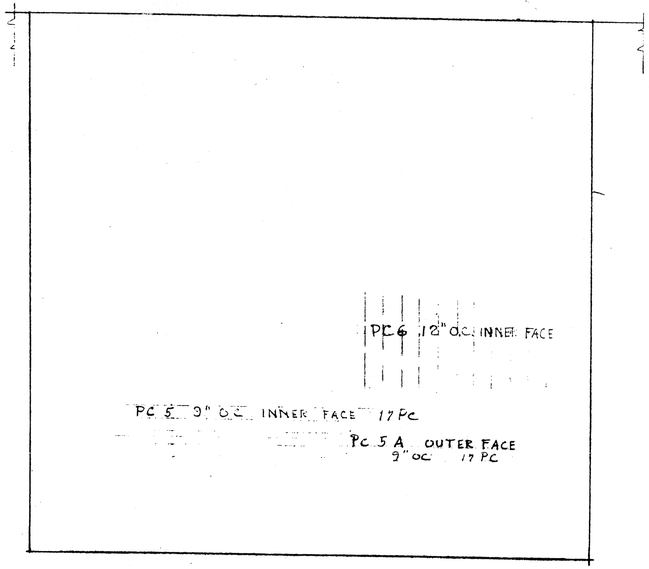
SEC A-A



SOUTH ELEVATION
NORTH SIMILAR



EAST ELEVATION.



WEST ELEVATION

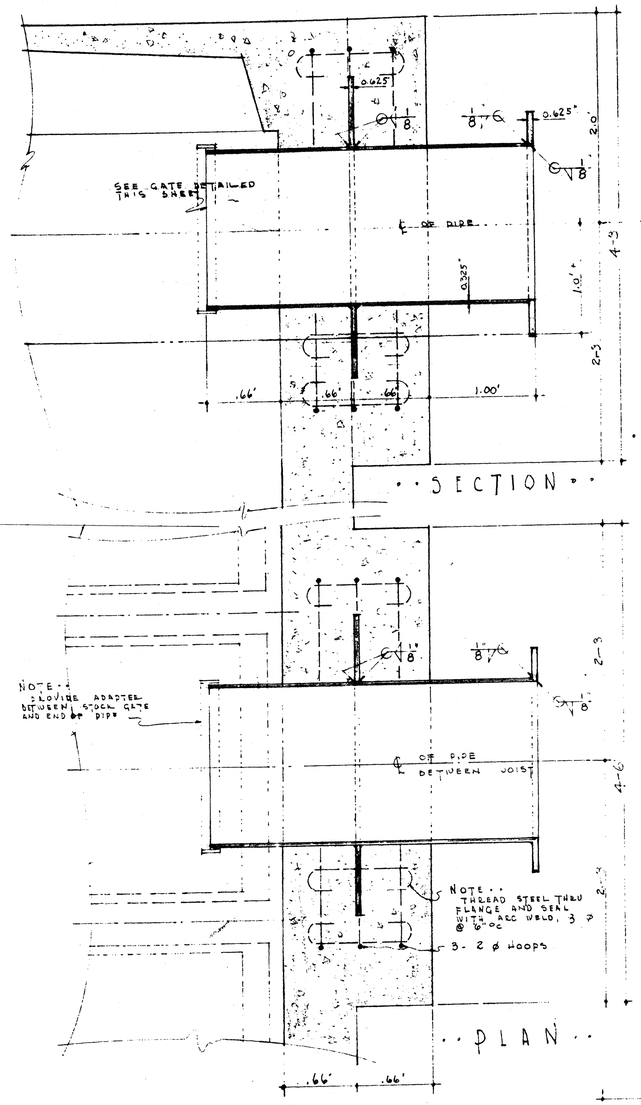
NOTE THIS SHEET REVISED TO PROVIDE THREE FT. ADDITIONAL DEPTH IN PUMP CHAMBERS.
-VERN D HEDDEN. 12-12-51.

OWNER LAKEWOOD WATER & POWER	REVISED 12-12-51
ADDRESS 2965 E CARSON ST. JOB ADDRESS 5257 DOWNEY AVE.	
JOB NO 1277	HEDDEN & SHELLEY
CHECKED	VERN D HEDDEN ENG. # 2286 3401 E. COLORADO ST. LONG BEACH 900791
DRAWN BY JOHN C	PUMP CHAMBER

DATE 8 29 51
SHEET NO. 6 OF 8

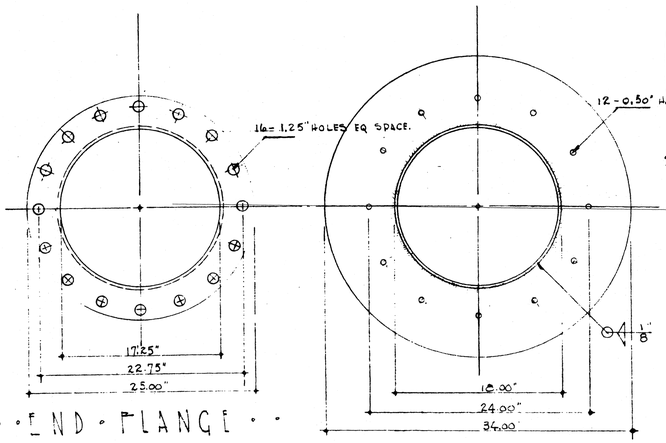
10. 9. 8. 7. 6. 5. 4. 3. 2. 1.

I H G F E D C B A

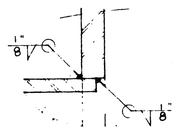


· · SECTION · ·

· · PLAN · ·



· · END · FLANGE · · · · CENTER · FLANGE · ·

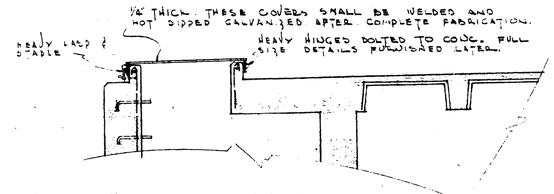


· · TYPICAL · WELDING · END · FLANGE · ·

SCALE 1/2" = 1"

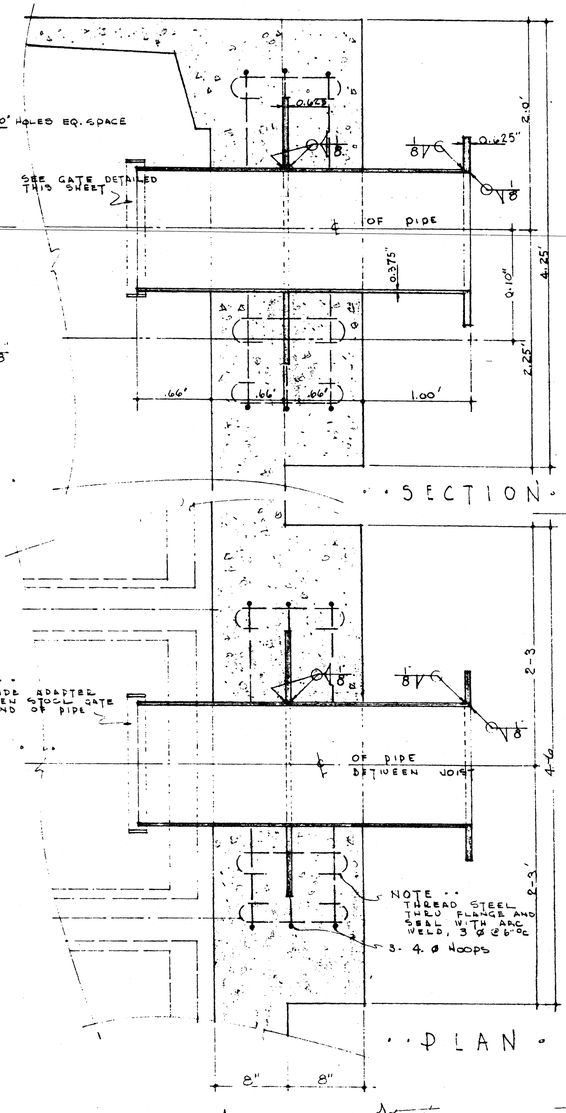
· · DETAILS · 18"ø · INLET · PIPE · ·

SCALE 1½" = 1'-0"



· · SECTION · THRU · ACCESS · ·

SCALE 1/2" = 1'-0"

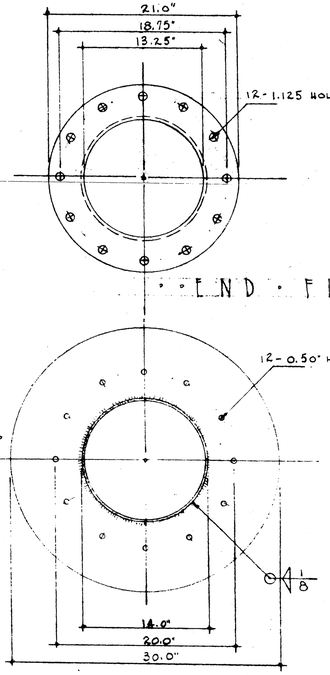


· · SECTION · ·

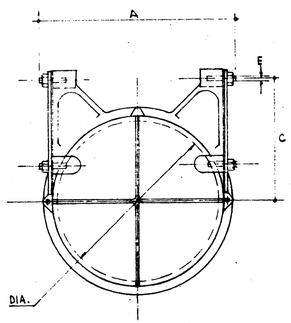
· · PLAN · ·

· · DETAILS · 14"ø · INLET · PIPE · ·

SCALE 1½" = 1'-0"



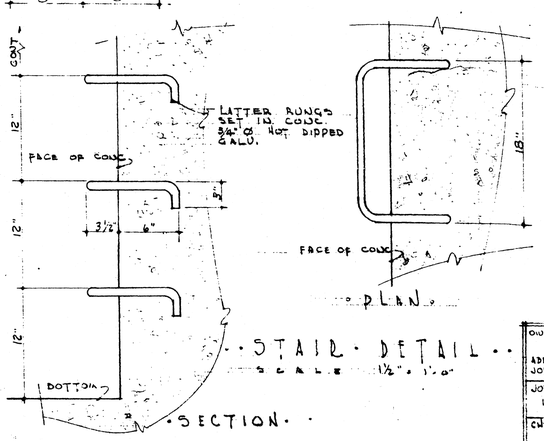
· · END · FLANGE · · · · CENTER · FLANGE · ·



· · MOD. NO. 100 GATE · · · · SECTION ON ℄ · ·

DIA.	A	B	C	D	E	F
15"	17⅜"	1⅜	10⅝"	17¾"	½"	2 1/16"
18"	22⅛	2"	12⅝"	21 1/8"	¾"	2 1/16"

· · MANUFACTURED · · CALIFORNIA · CORRUGATED · CULVERT · CO. · · LOS ANGELES AND BERKELEY



· · STAIR · DETAIL · · · · SECTION · ·

SCALE 1½" = 1'-0"

OWNER	LAKEWOOD WATER & POWER
ADDRESS JOB ADDRESS	
JOB NO	1277
CHECKED	
DRAWN BY	JOH
· HEDDEN · & · SHELLEY ·	
JOHN D. HEDDEN ENG # 2256 1931 EAST SEVENTH LONG BEACH 731565	
REVISED	
DATE	8-29-58
SHEET NO	7
OF	8

10. 9. 8. 7. 6. 5. 4. 3. 2. 1.

A B C D E F

REINFORCING STEEL SCHEDULE

PORTION OF WORK		SUB. PORT.	BAR SYMBOL		NO. BARS 1 PORT.	TOT. NO	SIZE	LENGTH	TYPES		REMARKS
PUMP CHAMBER	x	BOTTOM SLAB	1	PC 1	41	41	#5	12-9			
	0	d°	2	PC 2	7	7	5	35-0"			
	x	d°	3	PC 3		41	4	8-3			
	0	d°	4	PC 4		7	4	28-6			
		WEST WALL	5	PC 5		35	4	32-8	HOR. @ 9" O.C.		
	x	d°	6	PC 6	3/15=2 3/16		4		VERT.	LOWER 15-0 UPPER 16-0	
	x	Z END WALLS	7	PC 7	30	60	4	12-6	HOR. OUTER		
	x	d°	8	PC 8	30	60	4	7-6	HOR. INNER		
	x	CENTER WALL	9	PC 9	57	57	4	7-6	HOR.	DOWELS 3'-0" #4	
	x	d°	10	#C 10	11/15 14/16 A		4	26-0	VERT. (2 MATS	LOWER 15-0 UPPER 16-4	
HOR	x	S. BRACING FLR.	11	PC 11	26	78	4	7-9	HOR.		
	x	d°	12	PC 12	3/15=2 3/16 A	12	4		VERT.	LOW 15-0 UP. 16-4	
	x	d°	13	PC 13	54	162	4	3-8	HOR. STIRRUPS		
	0	EAST WALL	14	PC 14	42	42	4	41-0	HOR. 2 MATS	41-0	
	x	d°	15	PC 15	2 3/15 2 3/16 A		4		VERT. INNER MAT	LOW 15-0 UP. 16-4	
	x	d°	16	PC 16	27/15 27/16 A		4		VERT. EASTERLY MAT	LOW 15-0	
	0	TOP	17	PC 17	5	25	5	6-6	HOR. TEE JOISTS	6-6	
	0	d°	18	PC 18	4	20	5	7-6	HOR. DIAG.		
	0	d°	19	PC 19	4	4	5	2@ 25-4 2@ 30-0	LONG		
	0	d°	20	PC 20	15	15	4	29-0"	HOR.	29-9	
	x	E. WALL BELOW FLR.	20	#C 20	15	28	4		VERT.	LOW 15-0 UP 16-4	
		VERT. END WALLS	21	PC 21	14	28	4			5-4	
FOOTINGS		CENTER WALL	22	F-1		240	4			30-0	
		3°	23	F-2		47	4	30-0		6-2	
35		COL. FOOT	24	F-3	20	700	4	6-2			
		COL. DOWEL	25	F-4	6	210	5	3-6		4-6	
10		COL. & END GIRD	26	F-5	14	140	4	4-6			
		DOWELS	27	F-6	4	40	5	3-6			
WALL FOOT		No. & So. SIDES	28	F-7	4 @	640	3	3-4	TEE/WEBS @ 2'0"	3-4	
0°		d°	29	F-8	7 LONGITUD.	83	4	30-0	LONG. 7 BARS CONT.		
0°		E. & W. SIDES	30	F-9		400	3	2-0	TEE/WEBS @ 2'0"	2-0	
		3°	31	F-10		41	4	30-0	4 BARS CONT.	30-0	
COLUMNS			32	Col.	6	210	5	16-0	JACKETS TO BE CAUGHT TAKEN UP AT BOTTOM		
		3°	33	Col-2	26	850	2	2-10	ADJUST HOOPS TO		
WALL SIDE AT ENDS JOISTS		NORTHERLY &	34	W-1		324	5	15-10			
		SOUTHERLY	35	W-2		202	5	18-9	DENT	15-6-4"	
			36	W-3		108	5	21-9	4"		
			37	W-4		108	5	8-6			
		HOR.	38	W5&W8	26		5	22-0	(MAKE 540 PCS. 30' LONG	= 16200 lin. ft.	
			39							15-6-4"	
		EASTERLY &	40	W-6		244	5	15-10			
		WESTERLY	41	W-7		244	5	18-9			
			42	W13	400		2	2-10	STIRRUPS TOP WALL 7"X10"	2-3" - 4"	
		SET @ PIER & COL	43	W-9	4	1120	5	2-7"			
			44	W-10	2	20	6	18-5		15-3	
			45	W-11	4	40	6	15-3		15-3	
			46	W-2	24	240	3	4-8	HOOPS 8"X16"		
CENTER WALL			47	CW-1		300	5	17-6	VERT.	STAGGERED [SEE NOTE]	
			48	CW-2		810	5	14-9		14-9	
			49	CW-3		540	5	9-9		9-9	
			50	CW-4	34	272	5	22-0		20-0	
			51								
GIRDERS		ENDS 10	52	G1-1	1	10	7	27-6	BENT		
			53	G1-2	1	10	7	29-0		25-0 1'-0	
			54	G1-3	1	10	7	19-0	STR. BACK BOT.	18-0 1'-0	
			55	G1-4	1	5	7	37-0		34-0 1'-0	
			56	G1-5	1	5	7	10-0		9-0 1'-0	
			57	G1-6	1	45	7	44-0		44-0	
			58	G1-7	1	30	7	33-0	BENT		
EAST		END GIRDER	59	G-8	1	5	7	18-0	TOP STR.		
EAST			60	G1-9	1	5	7	36-0	d°		
EAST & WEST			61	G1-10	2	10	7	20-0	d°		
WEST			62	G1-11	1	5	7	36-0	d°		
			63	G1-12	1	30	7	44-0		44-0	
		STIRRUPS	64	G1-13	16	640	3	5-0	STIRRUPS 9" - 17"		
ROOF JOIST 108		END JOIST	65	J-1	1	108	5	26-2	TRUSS		
			66	J-2	1	108	5	20-6	BOTTOM STR.	20-6	
			67	J-3	1	108	3	12-6	TOP TO SUPPORT MESH	12-6	
324		REGULAR JOIST	68	J-4	1	324	5	29-6	TRUSS	29-6	
			69	J-5	1	324	5	20-6	BOTTOM STR.	21-0	
			70	J-6		324	3	12-6	TOP TO SUPPORT MESH		
			71	J-7	2	84	4	30-0	FOR BRACING	30-0	
		STIRRUPS	72	J-8	11	4200	2	2-8			
			73								

NOTE BARS #5A DET WEST ELEV. SHT #6
ADD 17 #4 BARS HOOK BOTH ENDS 1'-30-1
BARS #20A DET EE SHT #6
ADD 17 #4 BARS SAME AS #5A

20A	1-6	29-9	1-6

ADD 15 PCS. #20A #49

CHANGE FROM #5 TO #4

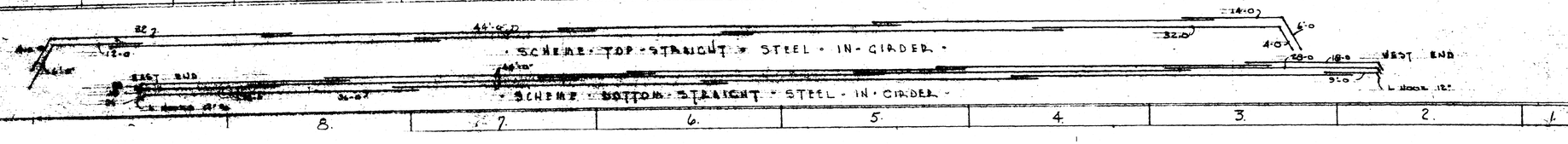
DOWELS, POUR IN PLACE

3-0	6-9	3-0																	
3-0	27-6	3-0																	
6-9																			
27-6																			
30-9																			
3-0	6-9	3-0																	
6-9																			
6-9																			
6-9																			
1-8	STIRRUP 4"	1-8																	
16-9		1-6																	
3-0																			
3-0																			
2-0	4-0	5½"	6-4	4"	4-0	4	WALL BETWEEN JOIST ENDS												
5-0	4-0	5½"	6-11	4"	4-0	4	THESE RODS AT ROOF JOIST FOR TOP OF WALL AT ROOF JOIST HOR. BARS 12" O.C. ± DET.												
5-0	4-6						SAME AS 101												
(CHANGE FROM 2-0) → 3-0	4-0	5½"					d° W2												
15-3	3-6						THE ITEM FORMELY HERE IS NOW IN ITEMS #34-35												
							OUTSIDE FACE GIRDER DIERS												
							CENTER & INSIDE FACE GIRDER DIERS												
							HOOPS 8" O.C.												
							TOPS THESE BARS BENT IN PLACE												
4-0	1-11	10-0	1-4	8-6															
							5 TO WEST - SEE SCHEME												
							5 TO EAST - d°												
							EAST END - d°												
							WEST END d°												
							STRAIGHT, BOTTOM												
9'-6"	1-11	10-0	1-4	8-6			EAST ENDS												
12-0	6-0																		
32-0	4-0																		
14-0	6-0																		
32-0	4-0																		
8"	5'-0"	9¼"	10-0	6½"	8'-0														
	9-0	9¼"	10-0	6½	8'-0														

REVISIONS
12-12 MAKE PUMP CHAMBERS 3-0 DEEPER
CHANGE ALL "PC" ITEMS EXCEPT 2-4
14-17-18-19 ADD #20A.
CHANGE W1-2-3-4-5-7-8
ADD WALL DOWELS
ADD 400 STIRRUPS TOP OF EXT WALL

KEY TO REINFORCING BAR SIZES										
BAR NUMBER	#2	3	4	5	6	7	8	9	10	11
BAR SIZE	¼	⅜	½	⅝	¾	⅞	1"	1⅛	1¼"	1⅜

NOTE — IN ADDITION TO THE STEEL NOTED ABOVE PROVIDE (1/2) ONE-HALF TON OF STEEL, SIZE AND LENGTHS DETERMINED BY CONTRACTOR.



OWNER: LAKEWOOD WATER & POWER
ADDRESS
JOB ADDRESS
JOB NO 1277
HEDDEN & SHELLEY
CHECKED VDH
DRAWN JDS
SHEET 8
OF

· P L O T · P L A N ·

S C A L E 1" = 20'-0

SECTION Y · Y
SPILLWAY UNDER SIDEWALK ℄ TO CURB.
SCALE 1" = 1'-0"

· S E C T I O N · Z · Z ·

S C A L E ½" = 1'-0"

· P L A N · SCALE ½" = 1'-0"

· D E T A I L · O F · S P I L L W A Y ·

S C A L E NOTED

· S E C T I O N · A · A ·

· S E C T I O N · B · B ·

· E L E V A T I O N ·

· L I D · C O N S T R U C T I O N ·

S C A L E 3/8" = 1"

· E L E V A T I O N ·

· S E C T I O N · X · X ·

· D E T A I L · O F · S P I L L W A Y ·

S C A L E 1" = 1'-0"

· D E T A I L · O F · C L O S U R E · F O R · E M E R G E N C Y · O V E R F L O W ·

OWNER LAKEWOOD WATER & POWER ADDRESS 1. 1998 CARSON 2. 5207 E. DOWNEY AVE		REVISED
JOB NO. 1277	HEDDEN & SHELLEY WERN D. HEDDEN REG. No. 2026	DATE 1-9-52
CHECKED U.D.H.	3401 E. COLORADO ST. LONG BEACH 90-0131	SHEET NO. 9
DRAWN BY U.D.H.	EMERGENCY OVERFLOW	OF 9

Attachment 3

Sample City Contract Agreement

CITY OF LAKEWOOD
PROFESSIONAL SERVICES AGREEMENT

This Professional Services Agreement ("Agreement") is made and effective as of _____ (the "Effective Date"), by and between the City of Lakewood, a California municipal corporation, (the "City") and _____ ("Consultant"). In consideration of the mutual covenants and conditions set forth herein, the parties agree as follows:

1. TERM

This Agreement shall commence on the Effective Date, and shall remain and continue in effect until _____, and may be renewed by City with the concurrence of Contractor for any successive one or two-year term, unless sooner terminated pursuant to the provisions of this Agreement.

2. SERVICES

Consultant shall perform the services described and set forth in Consultant's Proposal attached hereto as Exhibit A ("Services"), incorporated herein as though set forth in full.

3. PERFORMANCE

Consultant shall at all times faithfully, competently and to the best of Consultant's ability, experience, and talent, perform all tasks described herein. Consultant shall employ, at a minimum, generally accepted standards and practices utilized by persons engaged in providing similar services as are required of Consultant under this Agreement.

4. CITY MANAGEMENT

The City Manager or designee shall represent the City in all matters pertaining to the administration of this Agreement.

5. PAYMENT

A. The City agrees to pay Consultant for Services satisfactorily performed in accordance with the fees set forth in Exhibit A, in an amount not to exceed $_____.

B. Consultant shall not be compensated for any services rendered in connection with its performance of this Agreement which are in addition to those set forth herein, unless such additional services are authorized in advance and in writing by the City Manager or designee. Consultant shall be compensated for any additional services in the amounts and in the manner as agreed to in writing by the City and Consultant at the time the City's written authorization is given to Consultant for the performance of said services.

C. Consultant will submit invoices monthly for actual Services performed. Payment shall be made within thirty (30) days of receipt of each invoice as to all non-disputed fees. If the City disputes any of Consultant's Services or fees, it shall give written notice to Consultant within thirty (30) days of receipt of an invoice of any disputed fees set forth on the invoice. Any final payment under this Agreement shall be made within forty-five (45) days of receipt of an invoice therefor.

6. SUSPENSION OR TERMINATION OF AGREEMENT WITHOUT CAUSE

A. The City may at any time, for any reason, without cause, suspend or terminate this Agreement, or any portion hereof, by giving at least thirty (30) days prior written notice to Contractor. Upon receipt of said notice, Consultant shall immediately cease all Services under this Agreement, unless the notice provides otherwise. If the City suspends or terminates a portion of this Agreement, such suspension or termination shall not make void or invalidate the remainder of this Agreement.

B. In the event this Agreement is terminated pursuant to this section, the City shall pay to Consultant the actual value of the Services performed up to the time of termination, unless the City disputes any of the Services performed or fees. Upon termination of the Agreement pursuant to this section, Consultant will submit an invoice to the City pursuant to Section 5.

7. DEFAULT OF CONSULTANT

If the City determines that Consultant is in default in the performance of any of the terms or conditions of this Agreement, the City shall serve Consultant a written notice of the default. Consultant shall have seven (7) days after service of said notice to cure the default. In the event that Consultant fails to cure the default within such period of time or fails to present the City with a written plan for the diligent cure of default if such default cannot be cured within seven days, the City shall have the right, notwithstanding any other provision of this Agreement, to terminate this Agreement without further notice and without prejudice to any other remedy to which it may be entitled at law, in equity or under this Agreement. The City shall also have the right to offset against the amount of any fees due to Consultant any costs incurred by the City as a result of Consultant's default.

8. OWNERSHIP OF DOCUMENTS

A. Consultant shall maintain complete and accurate records with respect to tasks, costs, expenses, receipts, and other such information required by the City that relate to the performance of Services under this Agreement. Consultant shall maintain adequate records of Services provided in sufficient detail to permit an evaluation of Services. All such records shall be maintained in accordance with generally accepted accounting principles and shall be clearly identified and readily accessible. Consultant shall provide free access to the representatives of the City

or its designees at reasonable times to such books and records; shall give the City the right to examine and audit said books and records; shall permit the City to make transcripts or copies therefrom as necessary; and shall allow inspection of all Services, data, documents, proceedings, and activities related to this Agreement. Such records, together with supporting documents, shall be maintained for a period of three (3) years after receipt of final payment.

B. Upon completion of, or in the event of termination or suspension of this Agreement, all original documents, designs, drawings, maps, models, computer files, surveys, notes, and other documents prepared in the course of providing the Services shall become the sole property of the City and may be used, reused, or otherwise disposed of by the City without the permission of Consultant. With respect to computer files, Consultant shall make available to the City, at the Consultant's office and upon reasonable written request by the City, the necessary computer software and hardware for purposes of accessing, compiling, transferring, copying and/or printing computer files. Consultant hereby grants to the City all right, title, and interest, including any copyright, in and to the documents, designs, drawings, maps, models, computer files, surveys, notes, and other documents prepared by Consultant in the course of providing the Services under this Agreement.

9. INDEMNIFICATION AND DEFENSE

A. Indemnity.

To the fullest extent permitted by law, Consultant shall indemnify and hold harmless the City and any and all of its officials, officers, employees, agents, and/or volunteers (“Indemnified Parties”) from and against any and all losses, liabilities, damages, costs and expenses, including attorney’s fees and costs, caused in whole or in part by the acts, errors, or omissions of Consultant, its officers, agents, employees, subcontractors, or subConsultants (or any agency or individual that Consultant shall bear the legal liability thereof) in the performance of Services under this Agreement.

B. Duty to Defend.

In the event the City, its officials, officers, employees, agents, and/or volunteers are made a party to any claim, action, lawsuit, or other adversarial proceeding (“Action”) arising from the performance of the Services under this Agreement, whether or not Consultant is named in such Action, and upon demand by the City, Consultant shall defend the City at Consultant’s sole cost, or at the City’s option, to reimburse the City for its costs of defense, including reasonable attorney’s fees and costs incurred in the defense.

C. Payment by the City for Services is not a condition precedent to enforcement of this section. Consultant’s duty to defend, indemnify, and hold harmless the City shall not extend to the City’s sole or active negligence. In the event of any dispute

between Consultant and the City as to whether liability arises from the sole or active negligence of the City or its officials, officers, employees, agents, and/or volunteers, Consultant will be obligated to pay for the City's defense until such time as a final judgment has been entered adjudicating the City as solely or actively negligent. Consultant will not be entitled in the absence of such a determination to any reimbursement of defense costs including, but not limited to, attorney's fees, expert fees and costs of litigation.

10. INSURANCE

Consultant shall maintain prior to the beginning of and for the duration of this Agreement insurance coverage as specified in Exhibit B attached hereto and made a part of this Agreement.

11. INDEPENDENT CONSULTANT

A. Consultant is and shall at all times remain as to the City a wholly independent Consultant and/or independent contractor. The personnel performing the services under this Agreement on behalf of Consultant shall at all times be under Consultant's exclusive direction and control. Neither the City nor any of its officers, employees, or agents shall have control over the conduct of Consultant or any of Consultant's officers, employees, agents, subcontractors, or subConsultants, except as set forth in this Agreement. Consultant shall not at any time or in any manner represent that Consultant or any of Consultant's officers, employees, agents, subcontractors, or subConsultants are in any manner officers, employees, or agents of the City. Consultant shall not incur or have the power to incur any debt, obligation, or liability whatever against the City, or bind the City in any manner.

B. No employee benefits shall be available to Consultant in connection with the performance of this Agreement. Except for the fees paid to Consultant as provided in the Agreement, the City shall not pay salaries, wages, or other compensation to Consultant for performing services hereunder for the City. The City shall not be liable for compensation or indemnification to Consultant for injury or sickness arising out of performing services hereunder. Consultant shall secure, at its sole expense, and be responsible for any and all payment of Income Tax, Social Security, State Disability Insurance Compensation, Unemployment Compensation, and other payroll deductions for Consultant and its officers, agents, and employees, and all business licenses, if any are required, in connection with the services to be performed hereunder. Consultant shall indemnify and hold the City harmless from any and all taxes, assessments, penalties, and interest asserted against the City by reason of the independent Consultant relationship created by this Agreement. Consultant further agrees to indemnify and hold the City harmless from any failure of Consultant to comply with the applicable worker's compensation laws. The City shall have the right to offset against the amount of any fees due to Consultant under this Agreement as

a result of Consultant's failure to promptly pay to the City any reimbursement or indemnification arising under this paragraph.

C. In the event that Consultant or any employee, agent, subcontractor, or subConsultant of Consultant providing Services under this Agreement claims or is determined by a court of competent jurisdiction or the California Public Employees Retirement System (PERS) to be eligible for enrollment in PERS as an employee of the City, Consultant shall indemnify, defend, and hold harmless the City for the payment of any employee and/or employer contributions for PERS benefits on behalf of Consultant or its employees, agents, subcontractors, or subConsultants, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of the City.

D. Notwithstanding any other agency, state or federal policy, rule, regulation, law or ordinance to the contrary, Consultant and any of its employees, agents, subcontractors, and subConsultants providing service under this Agreement shall not qualify for or become entitled to, and hereby agree to waive any claims to, any compensation, benefit, or any incident of employment by the City, including but not limited to eligibility to enroll in PERS as an employee of the City and entitlement to any contribution to be paid by City for employer contribution and/or employee contributions for PERS benefits.

12. LEGAL RESPONSIBILITIES

Consultant shall keep itself informed of State and Federal laws and regulations which in any manner affect those employed by it or in any way affect the performance of Services pursuant to this Agreement. Consultant shall at all times observe and comply with all such laws and regulations. The City and its officials, officers, employees, and agents, shall not be liable at law or in equity occasioned by failure of Consultant to comply with this Section.

13. UNDUE INFLUENCE

Consultant declares and warrants that no undue influence or pressure was used against or in concert with any officer or employee of the City in connection with the award, terms or implementation of this Agreement, including any method of coercion, confidential financial arrangement, or financial inducement. No officer or employee of the City has or will receive compensation, directly or indirectly, from Consultant, or from any officer, employee or agent of Consultant, in connection with this Agreement or any Services to be conducted as a result of this Agreement. Violation of this section shall be a material breach of this Agreement entitling the City to any and all remedies at law or in equity.

14. NO BENEFIT TO ARISE TO LOCAL EMPLOYEES

No member, officer, or employee of the City, or their designees or agents, and no public official who exercises authority over or responsibilities with respect to the Services during his/her tenure or for one year thereafter, shall have any interest, direct or indirect, in any Agreement or sub-agreement, or the proceeds thereof, for Services to be performed under this Agreement.

15. RELEASE OF INFORMATION/CONFLICTS OF INTEREST

A. All information gained by Consultant in performance of this Agreement shall be considered confidential and shall not be released by Consultant without the City's prior written authorization, unless the information is clearly public. Consultant, its officers, employees, agents, subcontractors, or subConsultants, shall not without written authorization from the City Manager or designee, or unless requested by the City's attorney, voluntarily provide declarations, letters of support, testimony at depositions, response to interrogatories, or other information concerning the Services performed under this Agreement or relating to the City. Response to a subpoena or court order shall not be considered "voluntary" provided Consultant gives the City notice of such court order or subpoena.

B. Consultant shall promptly notify the City should Consultant, its officers, employees, agents, subcontractors, and/or subConsultants be served with any summons, complaint, notice of deposition, request for documents, interrogatories, request for admissions, or other discovery request ("Discovery"), court order, or subpoena from any person or party regarding this Agreement and the Services performed hereunder or the City, unless the City is a party to any lawsuit, arbitration, or administrative proceeding connected to such Discovery, or unless Consultant is prohibited by law from informing the City of such Discovery. The City retains the right, but has no obligation, to represent Consultant and/or be present at any deposition, hearing, or similar proceeding as allowed by law. Unless the City is a party to the lawsuit, arbitration, or administrative proceeding and is adverse to Consultant in such proceeding, Consultant agrees to cooperate fully with the City and to provide the opportunity to review any response to discovery requests provided by Consultant. However, the City's right to review any such response does not imply or mean the right by the City to control, direct, or rewrite said response, or that the City has an obligation to review any such response or verifies any response it has reviewed.

16. NOTICES

Any notices which either party may desire to give to the other party under this Agreement must be in writing and may be given either by (i) personal service, (ii) delivery by a reputable document delivery service, such as but not limited to, Federal Express, which provides a receipt showing date and time of delivery, or (iii) mail by the United States Postal Service, certified mail, postage prepaid, return receipt requested, addressed to the address of the party as set forth below or at any other address as that party may later designate by notice:

To the City: City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712
Attention: Director of Water Resources

To Consultant: _____
_____
_____
Attention: _____

17. ASSIGNMENT

Consultant shall not assign the performance of this Agreement, nor any part thereof, nor any monies due hereunder, without prior written consent of the City. Before retaining or contracting with any subcontractor or subConsultant for any services under this Agreement, Consultant shall provide the City with the identity of the proposed subcontractor or subConsultant, a copy of the proposed written contract between Consultant and such subcontractor or subConsultant which shall include and indemnity provision similar to the one provided herein and identifying the City as an indemnified party, or an incorporation of the indemnity provision provided herein, and proof that such proposed subcontractor or subConsultant carries insurance at least equal to that required by this Agreement or obtain a written waiver from the City for such insurance.

18. LICENSES

At all times during the term of this Agreement, Consultant shall have in full force and effect all licenses required of it by law for the performance of the Services described in this Agreement.

19. GOVERNING LAW

The City and Consultant understand and agree that the laws of the State of California shall govern the rights, obligations, duties, and liabilities of the parties to this Agreement and also govern the interpretation of this Agreement. Any litigation concerning this Agreement shall take place in the municipal, superior, or federal district court with jurisdiction over the City.

20. ENTIRE AGREEMENT

This Agreement contains the entire understanding between the parties relating to the obligations of the parties described in this Agreement. All prior or contemporaneous agreements, understandings, representations, and statements, oral or written and pertaining to the subject of this Agreement or with respect to the terms and conditions of this Agreement shall be of no further force or effect. Each party is entering into this Agreement based solely upon the representations set forth herein and upon each party's own independent investigation of any and all facts such party deems material.

21. AMENDMENTS

Any amendments to this Agreement must be in writing and executed by the parties hereto, or their respective successors and assigns, in order to be valid.

22. ATTORNEYS' FEES

In the event that litigation is brought by any party in connection with this Agreement, the prevailing party shall be entitled to recover from the opposing party all costs and expenses, including reasonable attorneys' fees, incurred by the prevailing party in the exercise of any of its rights or remedies hereunder or the enforcement of any of the terms, conditions, or provisions hereof.

23. CONSTRUCTION

The parties hereto have participated jointly in the negotiation and drafting of this Agreement. In the event an ambiguity or question of intent or interpretation arises with respect to this Agreement, this Agreement shall be construed as if drafted jointly by the parties and in accordance with its fair meaning. There shall be no presumption or burden of proof favoring or disfavoring any party by virtue of the authorship of any of the provisions of this Agreement.

24. WAIVER

The delay or failure of any party at any time to require performance or compliance by the other of any of its obligations or agreements shall in no way be deemed a waiver of those rights to require such performance or compliance. No waiver of any provision of this Agreement shall be effective unless in writing and signed by a duly authorized representative of the party against whom enforcement of a waiver is sought. The waiver of any right or remedy in respect to any occurrence or event shall not be deemed a waiver of any right or remedy in respect to any other occurrence or event, nor shall any waiver constitute a continuing waiver.

25. SEVERABILITY

If any provision of this Agreement is determined by a court of competent jurisdiction to be unenforceable in any circumstance, such determination shall not affect the validity or enforceability of the remaining terms and provisions hereof or of the offending provision in any other circumstance. Notwithstanding the foregoing, if the value of this Agreement, based upon the substantial benefit of the bargain for any party, is materially impaired, which determination made by the presiding court or arbitrator of competent jurisdiction shall be binding, then both parties agree to substitute such provision(s) through good faith negotiations.

26. COUNTERPARTS

This Agreement may be executed in one or more counterparts, each of which shall be deemed an original. All counterparts shall be construed together and shall constitute one agreement.

27. AUTHORITY TO EXECUTE THIS AGREEMENT

The persons executing this Agreement on behalf of the parties warrant and represent that they have the authority to execute this Agreement on behalf of said parties and have the authority to bind the parties to the provisions of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the Effective Date.

[If Consultant is a corporation, two signatures are required: Signature 1 – the Chairperson of the Board, the President, or any Vice President; Signature 2 – the Secretary, any Assistant Secretary, the Chief Financial Officer, or any Assistant Treasurer (Corp. Code § 313).]

CITY OF LAKEWOOD

_____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

CONSULTANT

_____

CONSULTANT

_____

Attachments:

	Exhibit A	Consultant's Proposal
	Exhibit B	Insurance Requirements

EXHIBIT A

CONSULTANT'S PROPOSAL

EXHIBIT B

INSURANCE REQUIREMENTS

Without limiting Consultant's indemnification of the City, and prior to commencement of Services, Consultant shall obtain, provide, and maintain at its own expense during the term of this Agreement, policies of insurance of the type and amounts described below and in a form satisfactory to the City. If the Consultant maintains higher limits than the minimum limits shown below, the City requires and shall be entitled to coverage for the higher limits maintained by Consultant. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City.

General liability insurance. Consultant shall maintain commercial general liability insurance with coverage at least as broad as Insurance Services Office form CG 00 01, in an amount not less than $1,000,000 per occurrence, $2,000,000 general aggregate, for bodily injury, personal injury, and property damage. The policy must include contractual liability that has not been amended. Any endorsement restricting standard ISO "insured contract" language will not be accepted.

Automobile liability insurance. Consultant shall maintain automobile insurance at least as broad as Insurance Services Office form CA 00 01 covering bodily injury and property damage for all activities of the Consultant arising out of or in connection with Work to be performed under this Agreement, including coverage for any owned, hired, non-owned or rented vehicles, in an amount not less than $1,000,000 combined single limit for each accident.

Consultant shall submit to the City, along with the certificate of insurance, a Waiver of Subrogation endorsement in favor of the City, its officers, agents, employees, and volunteers.

Umbrella or excess liability insurance. Consultant shall obtain and maintain an umbrella or excess liability insurance policy with limits that will provide bodily injury, personal injury and property damage liability coverage at least as broad as the primary coverages set forth above, including commercial general liability, automobile liability, and employer's liability. Such policy or policies shall include the following terms and conditions:

- A drop-down feature requiring the policy to respond if any primary insurance that would otherwise have applied proves to be uncollectible in whole or in part for any reason;
- Pay on behalf of wording as opposed to reimbursement;
- Concurrency of effective dates with primary policies;
- Policies shall "follow form" to the underlying primary policies; and

- Insureds under primary policies shall also be insureds under the umbrella or excess policies.

Other provisions or requirements

Proof of insurance. Consultant shall provide certificates of insurance to the City as evidence of the insurance coverage required herein, along with a waiver of subrogation endorsement for workers' compensation. Insurance certificates and endorsements must be approved by the City's Risk Manager prior to commencement of performance. Current certification of insurance shall be kept on file with the City at all times during the term of this Agreement. The City reserves the right to require complete, certified copies of all required insurance policies at any time.

Duration of coverage. Consultant shall procure and maintain for the duration of the Agreement insurance against claims for injuries to persons or damages to property, which may arise from or in connection with the performance of the Services hereunder by Consultant, or Consultant's agents, representatives, employees, subcontractors, or subConsultants.

Primary/noncontributing. Coverage provided by Consultant shall be primary and any insurance or self-insurance procured or maintained by the City shall not be required to contribute with it. The limits of insurance required herein may be satisfied by a combination of primary and umbrella or excess insurance. Any umbrella or excess insurance shall contain or be endorsed to contain a provision that such coverage shall also apply on a primary and non-contributory basis for the benefit of the City before the City's own insurance or self-insurance shall be called upon to protect it as a named insured.

The City's rights of enforcement. In the event any policy of insurance required under this Agreement does not comply with these specifications or is canceled and not replaced, the City has the right but not the duty to obtain the insurance it deems necessary and any premium paid by the City will be promptly reimbursed by Consultant or the City will withhold amounts sufficient to pay premium from Consultant payments. In the alternative, the City may immediately terminate this Agreement.

Acceptable insurers. All insurance policies shall be issued by an insurance company currently authorized by the Insurance Commissioner to transact business of insurance or is on the List of Approved Surplus Line Insurers in the State of California, with an assigned policyholders' Rating of A- (or higher) and Financial Size Category Class VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by the City's Risk Manager.

Waiver of subrogation. All insurance coverage maintained or procured pursuant to this Agreement shall be endorsed to waive subrogation against the City, its elected or appointed officers, agents, officials, employees and volunteers or shall specifically allow Consultant or others providing insurance evidence in compliance with these specifications

to waive their right of recovery prior to a loss. Consultant hereby waives its own right of recovery against the City, and shall require similar written express waivers and insurance clauses from each of its subcontractors or subConsultants.

Enforcement of Agreement provisions (non estoppel). Consultant acknowledges and agrees that any actual or alleged failure on the part of the City to inform Consultant of non-compliance with any requirement imposes no additional obligations on the City nor does it waive any rights hereunder.

Requirements not limiting. Requirements of specific coverage features or limits contained in this Agreement are not intended as a limitation on coverage, limits or other requirements, or a waiver of any coverage normally provided by any insurance. Specific reference to a given coverage feature is for purposes of clarification only as it pertains to a given issue and is not intended by any party or insured to be all inclusive, or to the exclusion of other coverage, or a waiver of any type.

Notice of cancellation. Consultant agrees to oblige its insurance agent or broker and insurers to provide to the City with a thirty (30) day notice of cancellation (except for nonpayment for which a ten (10) day notice is required) or nonrenewal of coverage for each required coverage.

Additional insured status. General liability policies shall provide or be endorsed to provide that the City and its officers, officials, employees, agents, and volunteers shall be additional insureds under such policies. This provision shall also apply to any excess/umbrella liability policies.

Prohibition of undisclosed coverage limitations. None of the coverages required herein will be in compliance with these requirements if they include any limiting endorsement of any kind that has not been first submitted to the City and approved of in writing.

Separation of insureds. A severability of interests provision must apply for all additional insureds ensuring that Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policy(ies) shall not contain any cross-liability exclusions.

Pass through clause. Consultant agrees to ensure that its subcontractors or subConsultants, and any other party involved with the Services who is brought onto or involved in the Services by Consultant, provide the same minimum insurance coverage and endorsements required of Consultant. Consultant agrees to monitor and review all such coverage and assumes all responsibility for ensuring that such coverage is provided in conformity with the requirements of this section. Consultant agrees that upon request, all agreements with Consultants, subcontractors, subConsultants, and others engaged in the Services will be submitted to the City review.

The City's right to revise specifications. The City reserves the right at any time during the term of the Agreement to change the amounts and types of insurance required by giving Consultant ninety (90) days advance written notice of such change. If such change results in substantial additional cost to Consultant, the City and Consultant may renegotiate Consultant's compensation or come to some other agreement to address the additional cost.

Self-insured retentions. Any self-insured retentions must be declared to and approved by the City. The City reserves the right to require that self-insured retentions be eliminated, lowered, or replaced by a deductible. Self-insurance will not be considered to comply with these specifications unless approved by the City.

Timely notice of claims. Consultant shall give the City prompt and timely notice of claims made or suits instituted that arise out of or result from Consultant's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies.

Additional insurance. Consultant shall also procure and maintain, at its own cost and expense, any additional kinds of insurance, which in its own judgment may be necessary for its proper protection and prosecution of the Services.