Operations Application for
Wastewater Treatment Plant Effluent
Injection Well

GASPARILLA ISLAND WATER ASSOCIATION, INC. Wastewater Treatment Plant

Lee County, Florida

Prepared by

CH2M HILL

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO CONSTRUCT/OPERATE/ABANDON CLASS I, III, OR V INJECTION WELL SYSTEMS

PART I. Directions

A. All applicable items must be completed in full in order to avoid delay in processing this application. Where attached sheets or other technical documentation are utilized in lieu of the blank space provided, indicate appropriate cross-reference in the space and provide copies to the department in accordance with (C) below. Where certain items do not appear applicable to the project, indicate N/A in the appropriate spaces. When this form is used in conjunction with DER Form 17-1.205(1), duplicative information requests need to be completed only once.

B. All information is to be typed or printed in ink.

C. Four (4) copies of this application and four (4) copies of supporting information such as plans, reports, drawings and other documents shall be submitted to the appropriate District/Subdistrict office. An engineering report is also required to be submitted to support this application pursuant to the applicable sections of Florida Administrative Code Rule 17-28. The attached lists* shall be used to determine completeness of supporting data submitted or previously received. A check for the application fee in accordance with Florida Administrative Code Rule 17-4.05 made payable to the Department shall accompany the application.

D. For projects involving construction, this application is to be accompanied by four (4) sets of engineering drawings, specifications and design data as prepared by a Professional Engineer registered in Florida, where required by Chapter 471, Florida Statutes.

E. Attach 8 1/2" x 11" USGS site location map indicating township, range and section and latitude/longitude for the project.

PART II. General Information

A. Applicant: Name Gasparilla Island Water Association, Inc. WWTP Title NA

Address Box 326

City Boca Grande Zip 33921

Telephone Number (813) 964-2423

B. Project Status: [ ] New [X] Existing

[ ] Modification (specify) _____

*"Engineering and Hydrogeologic Data Required for Support of Application to Construct, Operate and Abandon Class I, III, or V Injection Wells"

C. Well Type:

( ) Exploratory Well (X) Test/Injection Well

D. Type of Permit Application:

( ) Class I Exploratory Well Construction and Testing Permit

( ) Class I Test/Injection Well Construction and Testing Permit

(X) Class I Well Operating Permit

( ) Class I Well Plugging and Abandonment Permit

( ) Class III Well Construction/Operation/Plugging and Abandonment Permit

( ) Class V well Construction Permit

( ) Class V Well Operating Permit

( ) Class V Well Plugging and Abandonment Permit

E. Facility Identification:

Name: Gasparilla Island Water Association, Inc. WWTP

Facility Location: Street: Box 326

City: Boca Grande County: Lee

SIC Code: _____

F. Proposed facility located on Indian Lands: Yes_____ No X

G. Well Identification:

Well No. 1 of 1 Wells
(total #)

Purpose (Proposed Use): Injection of Treated Wastewater Effluent

Well Location: Latitude: 26, 45' 24" Longitude 82, 15' 36"

(attach separate sheet, if necessary, for multiple wells.)

Subpart B. General Projection Description:

(1) Describe the nature, extent and schedule of the injection well project. Refe to existing and/or future pollution control facilities, expected improvement in performance of the facilities and state whether the project will result i- full compliance with the requirements of Chapter 403, Florida Statutes, an all rules and regulations of the Department. Attach additional sheet(s) i necessary or cross-reference the engineering report.

See Attachment No. 1

PART III Statement by Applicant and Engineer

A. Applicant

I, the owner/authorized representative* of Gasparilla Island Water Association, Inc. WWTP, certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I understand that this certification also applies to all subsequent reports submitted pursuant to this permit. Where construction is involved, I agree to retain the design engineer, or other professional engineer registered in Florida, to provide inspection of construction in accordance with Florida Administrative Code Rule 17-28.34(1)(c).

Darrell Polk
Signed

April 2, 1992
Date

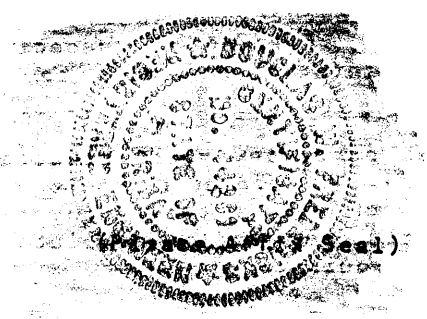
Darrel Polk, General Manager
Name and Title (Please Type)

(813)964-2423
Telephone Number

*Attach a Letter of Authorization.

B. Professional Engineer Registered in Florida

This is to certify that the engineering features of this injection well have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgement, that the well, when properly maintained and operated, will discharge the effluent in compliance with all applicable statutes of the State of Florida and the rules and regulations of the Department. It is also agreed that the undersigned will furnish the applicant a set of instructions for proper maintenance and operation of the well.



Signed:

Douglas W. Fredericks, P.E.
Name (Please Type)

CH2M HILL Southeast, Inc.
Company Name (Please Type)

2701 N. Rocky Point Dr., Ste. 800
Mailing Address (Please Type)

FLORIDA REGISTRATION NUMBER 44261 Date: April 2, 1992 Phone No. (813)281-0777

ENGINEERING AND HYDROLOGIC DATA REQUIRED FOR SUPPORT OF APPLICATION TO CONSTRUCT, OPERATE, AND ABANDON CLASS I, III, OR V INJECTION WELL SYSTEMS

The following information shall be provided for each type of permit application.

(A) CLASS I EXPLORATORY WELL CONSTRUCTION AND TESTING PERMIT NA

(1) Conceptual plan of the injection project. Include number of injection wells proposed injection zone, nature and volume of injection fluid, and propose monitoring program.

(2) Preliminary Area of Review Study. Include the proposed radius of the area o review with justification for that radius. Provide a map showing the loca tion of the proposed injection well or well field area for which a permit sought and the applicable area of review. Within the area of review, the m. must show the number or name, and location of all producing wells, injectio wells, abandoned wells, dry holes, surfacebodies of water, springs, publi water systems, mines (surface and subsurface), quarries, water wells a other pertinent surface features including residences and roads. The m should also show faults, if known or suspected. Only information of publi record and pertinent information known to the applicant is required to be in cluded on this map.

(3) Proposed other uses of the exploratory well.

(4) Drilling and testing plan for the exploratory well. The drilling plan m specify the proposed drilling program, sampling, coring, and testing proc dures.

(5) Abandonment Plan.

(B) CLASS I TEST/INJECTION WELL CONSTRUCTION AND TESTING PERMIT NA

(1) A map showing the location of the proposed injection wells or well field are for which a permit is sought and the applicable area of review. Within th area of review, the map must show the number or name, and location of al producing wells, injection wells, abandoned wells, dry holes, surface bodie of water, springs, public water systems, mines (surface and subsurface) quarries, water wells and other pertinent surface features including resi dences and roads. The map should also show faults, if known or suspected. Only information of public record and pertinent information known to th applicant is required to be included on this map.

(2) A tabulation of data on all wells within the area of review which penetrat into the proposed injection zone, confining zone, or proposed monitorin zone. Such data shall include a description of each well's type, construc tion, data drilled, location, depth, record of plugging and/or completion and any additional information the Department may require.

(3) Maps and cross sections indicating the general vertical and lateral limit within the area of review of all underground sources of drinking water, their position relative to the injection formation and the direction of water move ment, where known, in each underground source of drinking water which may b affected by the proposed injection.

(4) Maps and cross sections detailing the hydrology and geologic structures of the local area.

(5) Generalized maps and cross sections illustrating the regional geologic setting.

(6) Proposed operating data.

a. Average and maximum daily rate and volume of the fluid to be injected;
b. Average and maximum injection pressure; and,
c. Source and an anlysis of the chemical, physical, radiological and biological characteristics of injection fluids.

(7) Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the injection zone.

(8) Proposed stimulation program.

(9) Proposed injection procedure.

(10) Engineering drawings of the surface and subsurface construction details of the system.

(11) Contingency plans to cope with all shut-ins or well failures, so as to protect the quality of the waters of the State as defined in Florida Administrative Code Rule 17-3, including alternate or emergency discharge provisions.

(12) Plans (including maps) and proposed monitoring data to be reported for meeting the monitoring requirements in Florida Administrative Code Rule 17-28.25.

(13) For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under Florida Administrative Code Rule 17-28.13(5).

(14) Construction procedures including a cementing and casing program, logging procedures, deviation checks, proposed methods for isolating drilling fluids from surficial aquifers, proposed blowout protection (if necessary), and a drilling, testing and coring program.

(15) A certification that the applicant has ensured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by Florida Administrative Code Rule 17-28.27(9).

(C) **CLASS I INJECTION WELL OPERATING PERMIT**

(1) A report shall be submitted with each application for a Class I well operation permit, which shall include, but not be limited to, the following information:

a. Results of the information obtained under the construction permit described in (B)-CLASS I TEST/INJECTION WELL CONSTRUCTION AND TESTING PERMIT, including:

1. All available logging and testing program data and construction data on the well or well field; See Attachment No. 2, Section Entitled: Well Construction and Testing, and Well Operations
2. A satisfactory demonstration of mechanical integrity for all new wells pursuant to Florida Administrative Code Rule 17-28.13(6)(b);

Attachment NO. 3

3. The actual operating data, including injection pressures versus pumping rates where feasible, or the anticipated maximum pressure and flow rate at which the permittee will operate, if approved by the Department;

See Attachment No. 4

4. The actual injection procedure;

See Attachment No. 5

5. The compatibility of injected waste with fluids in the injection zone and minerals in both the injection zone and the confining zone; and,

See Attachment No. 2, Section Entitled: Potential Impacts of Injecti

6. The status of corrective action on defective wells in the area of review. NA

b. Record drawings, based upon inspections by the engineer or persons under his direct supervision, with all deviations noted;

Original construction contract drawings are presented in Attach

c. Certification of completion submitted by the engineer of record;

See Attachment No. 7

d. If requested by the Department, operation manual including emergency procedures;

NA

e. Proposed monitoring program and data to be submitted;

See Attachment No. 8

f. Proof that the existence of the well has been recorded on the surveyor's plan at the county courthouse.

See Attachment No. 9

g. Proposed plugging and abandonment plan pursuant to Florida Administrative Code Rule 17-28.27(2).

See Attachment No. 2, Section Entitled: Injection Well Plugging and Abandonment Plan

(D) CLASS I WELL PLUGGING AND ABANDONMENT PERMIT

(1) The reasons for abandonment. NA

(2) A proposed plan for plugging and abandonment describing the preferred and alternate methods, and justification for use.

a. The type and number of plugs to be used;

b. The placement of each plug including the elevation of the top and bottom;

c. The type and grade and quantity of cement or any other approved plugging material to be used;

d. The method for placement of the plugs.

(3) The procedure to be used to meet the requirements of Rule 17-28.27.

(E) CLASS III WELL CONSTRUCTION/OPERATION/PLUGGING AND ABANDONMENT PERMIT

NA

Construction Phase

(1) A map showing the location of the proposed injection wells or well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water systems, mines (surface and subsurface), quarries, water wells and other pertinent surface features including residences and roads. The map should also show faults, if known or suspected. Only information of public record and pertinent information known to t applicant is required to be included on this map.

(2) A tabulation of data on all wells within the area of review which penetrate into the proposed injection zone, confining zone, or proposed monitoring zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Department may required.

(3) Maps and cross sections indicating the general vertical and lateral limits within the area of review of all underground sources of drinking water, their position relative to the injection formation and the direction of water movement, where known, in each underground source of drinking water which may be affected by the proposed injection.

(4) Maps and cross sections detailing the hydrology and geologic structures of the local area.

(5) Generalized maps and cross sections illustrating the regional geologic setting.

(6) Proposed operating data:

a. Average and maximum daily rate and volume of the fluid to be injected;

b. Average and maximum injection pressure; and,

c. Source and an analysis of the chemical, physical, radiological and biological characteristics of injection fluids, including any additives.

(7) Proposed formation testing program to obtain an analysis of the chemical, physical and radiological characteristics of and other information on the injection zone.

(8) Proposed stimulation program.

(9) Proposed injection procedure.

(10) Engineering drawings of the surface and subsurface construction details of the system.

(11) Contingency plans to cope with all shut-ins or well failures or catastrophic collapse, so as to protect the quality of the waters of the state as defined in Florida Administrative Code Rule 17-3, including alternate or emergency discharge provisions.

(12) Plans (including maps) and proposed monitoring data to be reported for meeting the monitoring requirements in Florida Administrative Code Rule 17-28.25.

(13) For wells within the area of review which penetrate the injection zone but are not properly completed or plugged, the corrective action proposed to be taken under Florida Administrative Code Rule 17-28.13(5).

(14) Construction procedures including a cementing and casing program, logging procedures, deviation checks, proposed methods for isolating drilling fluids form surficial aquifers, and a drilling, testing and coring program.

(15) A certificate that the applicant has ensured, through a performance bond or other appropriate means, the resources necessary to close, plug or abandon the well as required by Florida Administrative Code Rule 17-28.27(9).

(16) Expected changes in pressure, native fluid displacement, direction of mo. ment of injection fluid.

(17) A proposed monitoring plan, which includes a plan for detecting migration o fluids into underground sources of drinking water, a plan to detect wate quality violation in the monitoring wells, and the proposed monitoring dat to be submitted.

Operation Phase

(1) The following information shall be provided to the Department prior to grant. ing approval for the operation of the well or well field:

a. All available logging and testing program data and construction data o the well or well field;

b. A satisfactory demonstration of mechanical integrity for all new well pursuant to Florida Administrative Code Rule 17-28.13(6)(b);

c. The actual operating data, including injection pressure versus pumpin rate where feasible, or the anticipated maximum pressure and flow rate a which the permittee will operate, if approved by the Department;

d. The results of the formation testing program;

e. The actual injection procedure;

f. The status of corrective action on defective wells in the area of review.

Plugging and Abandonment Phase

(1) The justification for abandonment.

(2) A proposed plan for plugging and abandonment describing the preferred and al ternate methods.

a. The type and number of plugs to be used;

b. The placement of each plug including the elevation of the top and bottom;

c. The type and grade and quantity of cement or any other approved pluggin material to be used;

d. The method for placement of the plugs.

(3) The procedure to be used to meet the requirements of Florida Administrative Code Rule 17-28.27.

(F) CLASS V WELL CONSTRUCTION PERMIT. This form should be used for Class V well instead of Form 17-1.209(1) when there is a need for a Technial Advisory Committee and an engineering report.) NA

(1) Type and number of proposed Class V Wells:

Wells Receiving Domestic Waste _____ Salt-water Intrusion Barrier Wells _____

Cooling Water Return Flow Wells, Open-looped System _____ Subsidence Control Wells _____

Sand Backfill Wells _____

Experimental Technology Wells _____

Radioactive Waste Disposal Wells* _____

Other non-hazardous Industrial or Commercial Disposal Wells (explain) _____

Wells used to inject spent brine after halogen recovery _____

Borehole Slurry Mining Wells _____

Other (explain) _____

*Provided the concentrations of the waste do not exceed drinking water standards contained in Chapter 17-22, F.A.C.

(2) Project Description:

a. Description and use of proposed injection system;

b. Nature and volume of injected fluid (The Department may require an analysis (including bacteriological analysis) in accordance with Florida Administrative Code Rule 17-4.27(2)(c));

c. Proposed pretreatment.

(3) Water well contractor's name, title, state license number, address, phone number and signature.

(4) Well Design and Construction Details. (For multi-casing configurations or unusual construction provisions, an elevation drawing of the proposed well should be attached.)

a. Proposed total depth;

b. Proposed depth and type of casing(s);

c. Diameter of well;

d. Cement type, depth, thickness;

e. Injection pumps (if applicable):_____gpm @____psi
Controls:_____
_____
_____

(5) Water Supply Wells - When required by Florida Administrative Code Rule 17-4.27, attach a map section showing the locations of all water supply wells within a one (1) mile radius of the proposed well. The well depths and casing depths should be included. When required by Rule 17-4.27(2)(g), results of bacteriological examinations of water from all water supply wells within one (1) mile and drilled to approximate depth of proposed well should be attached.

(6) Area of Review (may be required at Department's discretion).

Include the proposed radius of the area of review with justification for that radius. Provide a map showing the location of the proposed injection well or well field area for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, public water systems, mines (surface and

subsurface), quarries, water wells and other pertinent surface featur including residences and roads. The map should also show faults, if known suspected. Only information of public record and pertinent information kno to the applicant is required to be included on this map.

(G) **CLASS V WELL OPERATION PERMIT** (Final report of the construction that includ the following information may be submitted with the application to operate.)

NA

(1) Permit Number of Class V Construction Permit: _____

(2) Owner's Name: _____

(3) Type of Well: _____

(4) Construction and Testing Summary:

a. Actual Dimensions:

Diameter _____ inches; Well Depth _____ feet; Casing Depth _____ feet.

_____ _____ _____

_____ _____ _____

b. Results of Initial Testing.

(5) Proposed Operating Data:

a. Injection Rate (GPM);

b. Description of injected waste;

c. Injection pressure and pump controls.

(6) Proposed Monitoring Plan (If any):

a. Number of monitoring wells;

b. Depth(s);

c. Parameters;

d. Frequency of sampling;

e. Instrumentation (if applicable) Flow _____

Pressure _____

(H) **CLASS V WELL PLUGGING AND ABANDONMENT PERMIT** NA

(1) Permit number of Class V construction or operating permit.

(2) Type of well.

(3) Proposed plugging procedures, plans and specifications.

(4) Reasons for abandonment.

ATTACHMENT NO. 1

GENERAL PROJECT DESCRIPTION

General Project Description

The Gasparilla Island Water Association, Inc. Wastewater Treatment Plant (WWTP) provides secondary treatment to municipal wastewater. The WWTP makes use of the following processes: screening, grit removal, contact stabilization, clarification, filtration, and disinfection through chlorination. The plant was built in two phases, Phase I was a 0.275 mgd package treatment plant and Phase II was an 0.43 mgd expansion. The current rated capacity of the plant is 0.705 mgd and the plant has an equalization basin to aid in handling peak flows. Effluent is currently reused through golf course irrigation, but, as a backup, can be disposed of through deep well injection. Both reuse and disposal systems are adequately sized to serve the current design flow of the plant.

The regulations in FAC 17-600.440(5) state that high level disinfection and a total suspended solids concentration of less than 5 mg/l are required for effluent to be reclaimed through golf course irrigation. FAC 17-610.463 further requires continuous monitoring of turbidity following filtration but prior to chlorination as well as the continuous monitoring of chlorine residual downstream of chlorine contact basins.

To be in compliance with the regulations for reclaimed water, several modifications will be made to the WWTP. These modifications will allow WWTP personnel at the plant to continuously monitor the turbidity downstream of the filters as well as the chlorine residual downstream of the chlorine contact basins. Additionally, since the literature has documented correlation between turbidity and TSS, an online turbidimeter will also permit indirect monitoring of the TSS in the effluent.

When effluent meets the requirements described above for reuse, the effluent will be routed to a storage pond for eventual irrigation at the golf course. When effluent does not meet the stated criteria it will disposed through deep well injection. Operations protocol are being developed to aide the operations staff in troubleshooting the treatment processes with regards to effluent quality as it relates to effluent disposal/reuse.

ATTACHMENT NO. 2

CONSTRUCTION AND TESTING OF THE INJECTION AND MONITORING WELLS AT THE GASPARILLA ISLAND WATER ASSOCIATION, INC. WASTEWATER TREATMENT PLANT

BOCA GRANDE, FLORIDA

MARCH, 1986

Note: Due to its bulky nature, Appendix B **Geophysical Logs** has not been included in this document, however, copies will be made available upon request.

CONSTRUCTION AND TESTING OF THE INJECTION AND MONITOR WELLS AT THE GASPARILLA ISLAND WATER ASSOCIATION, INC. WASTEWATER TREATMENT PLANT BOCA GRANDE, FLORIDA

March 1986

Prepared by:
Geraghty & Miller, Ground Water Engineers, Inc.
2700 PGA Boulevard, Suite 104
Palm Beach Gardens, Florida 33410

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ACKNOWLEDGEMENTS

The combined efforts of many individuals were instrumental in the successful completion of the project. These people, some of whom are members of the Technical Advisory Group, are on the staffs of the Gasparilla Island Water Association, Inc., the Florida Department of Environmental Regulation, the U. S. Environmental Protection Agency, the U. S. Geological Survey, the South Florida Water Management District, Bennett and Bishop Engineers, Alsay Incorporated, and Geraghty & Miller, Inc. Thanks are extended to each of the following individuals for their assistance and cooperation.

GASPARILLA ISLAND WATER ASSOCIATION, INC.

Darrell Polk
Marvin Haber
M. O. Petersen

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Vincent N. Mele
Marianne Korosy

U. S. ENVIRONMENTAL PROTECTION AGENCY

William Taylor

U. S. GEOLOGICAL SURVEY

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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John Marsh
Peter L. Palmer
Roger Robinet
William A. Rueckert
James A. Wheatley

CONSTRUCTION AND TESTING OF THE INJECTION AND MONITOR WELLS AT THE GASPARILLA ISLAND WATER ASSOCIATION, INC. WASTEWATER TREATMENT PLANT BOCA GRANDE, FLORIDA

INTRODUCTION

During February 1984, the Gasparilla Island Water Association, Inc. (GIWA), contracted Geraghty & Miller, Inc., to determine the feasibility of constructing an injection well to dispose up to 812,000 gallons per day of treated wastewater at times of peak load. Wastewater is used currently to irrigate the Gasparilla Inn Golf Course; the wastewater treatment plant is located within the property of the Gasparilla Inn and is surrounded by the golf course. All alternatives to a disposal well were considered in detail and determined to be economically unfeasible.

Upon review of the existing hydrogeologic literature, use of an injection well was determined to be feasible. Specifications for construction and an application for permit to construct the injection well were prepared and submitted to the FDER (Florida Department of Environmental Regulation) during May 1984. Bids for construction were opened during August 1984. In September 1984, Alsay Incorporated was contracted to construct an injection and monitor well and construction work began during the first week of November 1984. The location of the injection well is adjacent to the wastewater treatment plant.

Irrigation of the golf course is and will continue to be the primary use of wastewater even as the injection well is used.

The injection well specifications contained provisions for drilling, construction and testing of a 6-inch-diameter well that was to have a total depth less than 1500 feet. Data from drilling and testing of the pilot hole revealed that no sufficiently permeable zones are present above that depth and the borehole was extended to a depth of 1926 feet; the top of the injection zone occurs at a depth of about 1742 feet. The monitor well taps the first relatively permeable zone above the injection zone at depths between 340 and 360 feet. The monitor zone contains water having greater than 10,000 milligrams per liter of dissolved solids. Alsay Incorporated completed construction and testing of the injection and monitor wells in January 1985.

This report documents the results of the testing programs and contains discussions of the well drilling and construction, the capability of the injection well to accept effluent, the integrity of the confining sequence, and a statement of probable impact due to operation of the injection well. Recommendations regarding future data collection, well operation, and injectivity testing also are provided. In addition, copies of the various geophysical logs, geologic logs (samples and cores), laboratory reports of chemical analyses of water samples, and results of inclination surveys, pressure tests, and core tests are provided.

FINDINGS

1. Evaluation of the various data shows that the injection well is properly constructed and can be used for the disposal of treated effluent at the design rate.

2. The data confirm the presence of a viable injection zone and that it is highly transmissive and saturated with salty water.

3. The top of the injection zone occurs at a depth of 1742 feet below pad level; the bottom of the zone occurs at a depth of approximately 1845 feet.

4. The injection zone has a high transmissivity which is estimated to be 480,000 gpd/ft (gallons per day per foot) or greater. Pumping at a rate of 812,000 gpd (gallons per day) into the well will cause a bottom-hole pressure build-up of about 2 feet.

5. Salty water having a total dissolved solids concentration in excess of 10,000 mgl (milligrams per liter) was shown to be present in all zones tested and probably extends up to a depth of about 10 feet below ground level.

6. The interval between approximately 360 and 1742 feet serves as a confining sequence.

7. From laboratory core tests, the average vertical permeability of the confining sequence was determined to be 0.000028 centimeters per second. Based on straddle-packer tests, the average horizontal permeability of the confining sequence was determined to be 0.000042 centimeters per second. Based on an average vertical permeability, an average effective porosity estimated to be 0.18, and the difference in fluid densities, a travel time of 797 years would be needed for effluent to move from the injection zone, through the confining sequence, and into the monitor zone above 360 feet.

8. It was estimated that injected water will migrate within the injection zone a distance less than 2.55 miles during the first 50 years of well operation.

RECOMMENDATIONS

1. Records of the injection pressure, injection rate, and daily cumulative volume disposed should be collected throughout the operational life of the injection well. The records should be maintained in perpetuity.

2. Water samples from the monitor well should be analyzed for specific parameters during the operational life of the injection well. Water levels also should be measured. The specific parameters for analysis and the schedule of sampling, analysis and measurements is outlined in the text.

WELL CONSTRUCTION AND TESTING

Data Collection

A variety of techniques and equipment was used to collect the information necessary to construct the injection and monitor wells and to meet criteria established to insure the safe disposal of effluent. A description of each follows, along with comments on its applications.

The project staff maintained a detailed daily log describing items relating to the construction and testing of the well and recording time spent on various work tasks (inclination surveys, geophysical logging, pumping tests, and related incidents). Materials used in construction, time spent on contract items, and footages drilled were recorded in a separate log, referred to as a Construction Log. Copies of the daily log were furnished on a weekly basis to the members of the Technical Advisory Committee (TAC) and to representatives of the Gasparilla Island Water Association, Inc. (GIWA).

Samples of the rock cuttings were collected from the injection well during all drilling operations. Times required for the cuttings to circulate from the bottom of the hole to the sampling station (lag times) were computed periodically to insure that accurate sample depths were recorded. The samples were washed, dried, and examined microscopically by a Geraghty & Miller geologist and a lithologic log

was prepared. A copy of the log is contained in Appendix A. A set of samples from the injection well was furnished to the Florida Bureau of Geology by the drilling contractor in accordance with permit conditions. Except where noted otherwise, all depth measurements stated in this report are referenced to the level of the drilling pad (elevation +8.0 feet NGVD).

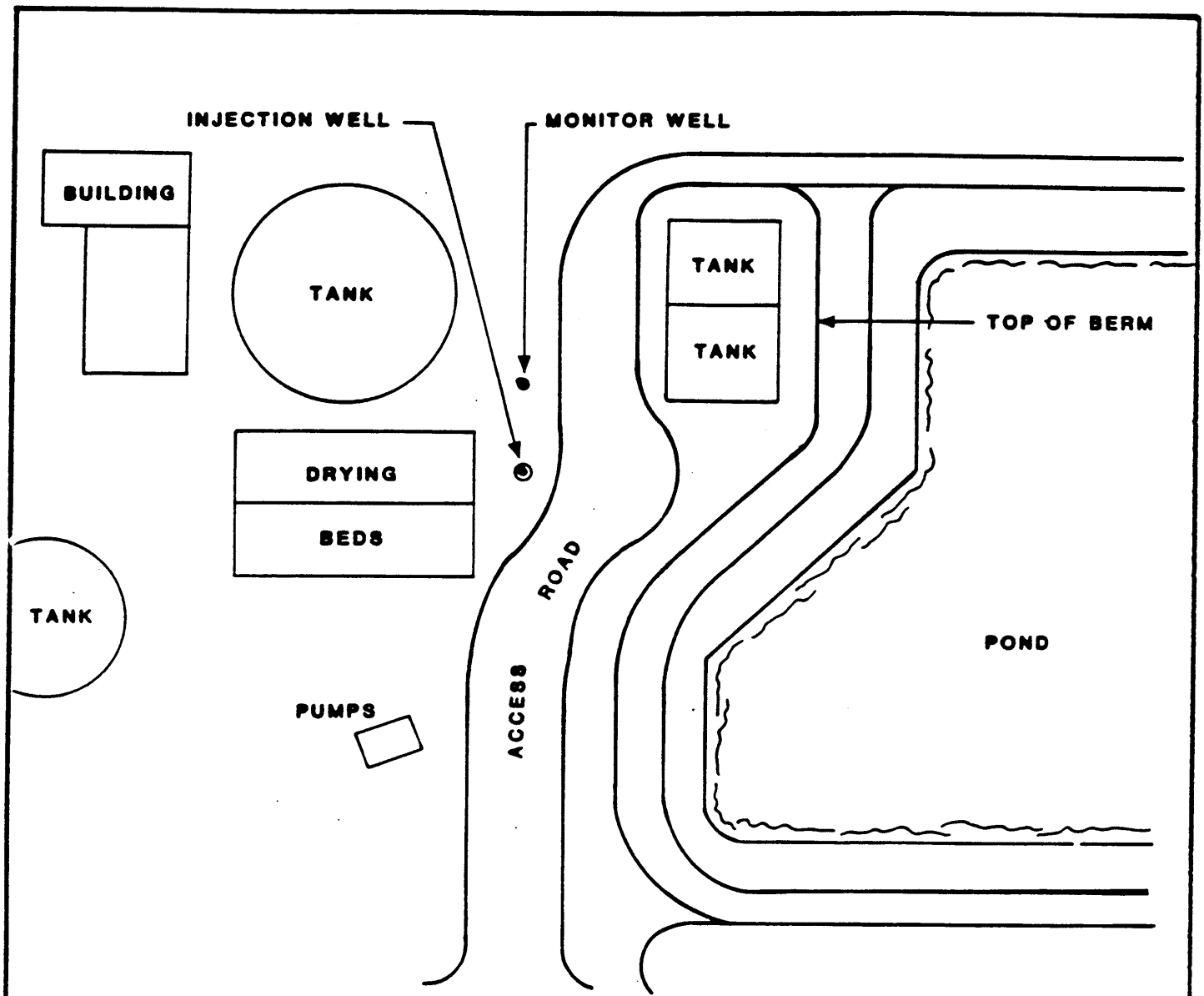
Cores were collected during the drilling operations; five vertical intervals were cored within the confining zone. A ten-foot-long, 4-inch-diameter core barrel and diamond bit was used. Portions of the cores were sent to a testing laboratory where they were tested to determine their vertical permeability and porosity. Core descriptions are contained within the geologic log (Appendix A).

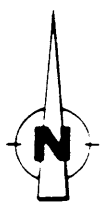
A suite of geophysical logs was run in the pilot hole to obtain data on the injection zone and the confining sequence. Dual-induction (shallow, medium, and deep investigation tools), sonic and variable density, temperature, caliper, single-point (electric), 16-inch and 64-inch normal (electric), 6-foot lateral (electric), fluid resistivity and gamma ray logs were made. The dual-induction and sonic logs were most useful to differentiate between the limestone of the confining sequence and dolomite of the injection zone. Following cementing of the 6-inch-diameter casing, a cement bond log and television survey were performed. Copies of the various logs are contained in Appendix B. Copies of the videotapes were provided to members of the TAC as requested.

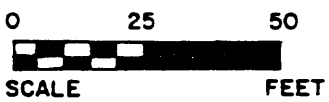
Injection-Well Drilling and Construction

This section describes, chronologically, the construction of the injection well. Selected details of well construction and testing are shown on Plate 1. A site plan is shown on Figure 1. As the well was drilled, cuttings of the sediments were collected at 10-foot intervals and at formation changes. As noted previously, five cores were taken from within the confining sequence. Inclination surveys of the drilled hole were taken at approximately 60-foot intervals as drilling proceeded. A pressure test was conducted on the cemented-in-place 6-inch-diameter casing.

Construction of the shell rock/plastic lined drilling pad began on November 1, 1984, and was complete on November 7. Also, during this period, a 24-inch-diameter pit casing was vibrated into place to a depth of 40 feet below pad level at the location of the injection well. At the monitor well location, a 12-inch-diameter casing was vibrated into place, also to a depth of 40 feet. Two chloride monitor wells were installed at locations about 100 feet north and 100 feet south of the injection well. These wells are 1-1/4-inch-diameter and tap the sediments between three and six feet below ground level. These shallow wells were constructed to detect any spills from the drilling pad that may have entered the shallow sediments. Chloride concentrations of samples from these wells generally varied from 2000 to 3000 milligrams per liter during the course of injection-well construction; no shallow ground-water degradation was indicated.







PREPARED FOR
GASPARILLA ISLAND
WATER ASSOCIATION, INC.

TITLE
LOCATIONS OF THE INJECTION AND MONITOR WELLS ON THE SITE OF THE WASTEWATER TREATMENT PLANT

COMPILED BY P. JAKOB	GERAGHTY & MILLER	DATE JULY 1985
DRAWN BY Y. DIMICK	Ground Water Engineers, Inc.	REVISED FEB. 1986
CHECKED BY P. PALMER	SCALE AS SHOWN	FIGURE 1

P779861

Drilling of the injection well began on November 8 with a 22-inch-diameter bit; considerable drilling fluid (bentonite) was lost in the zone just below 76 feet in depth. In an attempt to prevent further loss of drilling fluid, the contractor added and vibrated an additional 36 feet of 24-inch-diameter casing; hard sandstone at a level of 76 feet below pad prevented further downward vibration. Drilling began again on November 14 and proceeded slowly; the pit casing was extended to 80 feet by hammering with the rig.

Drilling with the 22-inch bit terminated at 126 feet on November 15. The 16-inch-diameter casing (wall thickness of 0.375-inch) was set in place to a depth of 121 feet and cemented in five stages beginning on November 16. Cement was pumped into the bottom of the pressurized casing and rose in the annulus to a level of 95 feet in the first stage; the first stage consisted of 170 sacks (214.2 cubic feet) of neat cement (ASTM Type II). The second stage of 50 sacks (63 cubic feet) also was tagged at 95 feet; the third stage of 50 sacks (63 cubic feet) was tagged at 90 feet; the fourth stage of 40 sacks (50.4 cubic feet) was tagged at 80 feet; the fifth stage of 40 sacks (50.4 cubic feet) was tagged at 32 feet. Cementing was completed on November 19. The uppermost portion of the annulus was not cemented at this time. Later on November 19, the cement inside the casing was tagged at 107 feet and drilling began with a 16-inch-diameter bit. Mud-rotary drilling with the 16-inch bit was continued to a depth of 180 feet. At this depth, reverse-air drilling began with a 7-7/8-inch-diameter bit--the pilot hole diameter.

The pilot hole was drilled to 900 feet deep by December 3, 1985. Rock cores, each four inches in diameter and ten feet long, were drilled beginning at depths of 450, 500, 550, 600, and 650 feet. The hole originally was intended to terminate at 900 feet. Because of the apparent lack of a suitable injection zone, the hole was drilled to 1057 feet before geophysical surveys were run. Dual induction, sonic, caliper, gamma ray, and temperature logs were run on December 4. The logs confirmed that no injection zone is present at depths shallower than 1057 feet.

Pilot hole drilling continued on December 8 and reached a depth of 1926 feet on December 18. Above the intended 1500-foot maximum depth, there were no signs that an injection zone is present and drilling thus continued below this depth. Based on the hard dolomite cuttings produced and the presence of cavities as evidenced by sudden drops of the drill string, the injection zone was tentatively identified between a depth of 1742 feet and 1926 feet--the greatest depth drilled with the pilot hole. Geophysical logs of the borehole were run on December 19; these included the dual induction, sonic, temperature, fluid resistivity, flowmeter, 16-inch and 64-inch normal, 6-foot lateral, single-point electric, spontaneous potential, gamma ray, and caliper logs.

Inclination surveys were conducted in both the pilot hole and reamed hole at 60-foot intervals. All inclination surveys and adjacent

surveys (higher and lower) indicated that the inclinations were well within the established limits of one degree for an individual survey, and one-half degree for successive adjacent surveys.

Beginning on December 28, 1985, straddle-packer pumping tests were conducted in the pilot hole within the following depth intervals: 311-362; 679-730; 1058-1109; 1217-1268; and 1492-1543 feet. Water samples from several intervals were collected for selected analyses. A single-packer injection test also was conducted with the packer set at a depth of 1710 feet following withdrawal of a water sample from the injection zone. Salty water from a nearby waterway was pumped into the injection zone during this test. Generally, the duration of the tests were two hours of pumping or injection, followed by two hours of recovery. Plots of the recovery portions of the packer tests are presented in Appendix C and discussed in a subsequent portion of this report.

Reaming of the pilot hole with a 16-inch-diameter bit began on January 6. The ream was made to a depth of 1710 feet. In preparation for casing installation and cementing, gravel was placed within the injection zone and a 11.34-cubic-foot cement plug was placed on top of the gravel. The top of the plug was tagged at 1703 feet. A caliper log was run in the reamed hole after the cement plug had cured.

Casing installation began on January 11, 1985. The casing installed has a nominal six-inch-diameter and has a wall thickness of

0.432-inch. As butt-welded joints of casing were lowered into the borehole, centralizers were welded at locations 20 feet above the bottom of the casing; at 60, 100, and 140 feet above the bottom; at 200-foot intervals above 140 feet from bottom; and at 20 feet below pad level. Each centralizer consisted of four steel bands radiating at 0, 90, 180, and 270 degrees, respectively, from a constant cardinal direction. The bottom of the casing was set at a depth of 1702 feet.

Cementing of the 6-inch casing began on January 12, 1985. Cement was pumped into the water-filled and pressurized casing and rose in the well annulus during the first stage of cementing. Thereafter, cement was installed at the bottom of the annulus using a tremie pipe. The first stage consisted of 1318.5 cubic feet; of this, 252.0 cubic feet was neat cement placed at the bottom portion of the annulus. The remaining 1066.5 cubic feet was a 12 percent cement-gel mixture. The first stage was tagged at 1143 feet below pad. The level of actual cement fill in the first stage was 71 percent of the theoretical level of fill based on a comparison of the caliper log and the outside casing diameter. Stage 2 consisted of 1659 cubic feet of cement and consisted of a 12 percent gel mixture. Stage 2 was tagged at 740 feet below pad level and the level of actual cement fill was 51 percent of the theoretical level of fill. Stage 3 consisted of 1422 cubic feet of cement in a mixture with 12 percent gel and 0.5 pound per sack of Flocele. Stage 3 was tagged at 200 feet below pad level. The actual fill was 58 percent of the theoretical fill. Stage 4 consisted of 367.4 cubic feet of cement mixed with 12 percent gel and 0.5 pound per

sack of Flocele. The actual fill was 36 percent of the theoretical fill. Stage 4 was tagged at 101 feet below pad level--inside the 16-inch-diameter casing. Stage 5, the final stage, consisted of the gel and Flocele mixture with a volume of 113.8 cubic feet. This stage filled the annulus of the 6-inch-diameter casing up to pad level.

The relatively small percentages of actual fill compared to the theoretical fill result from limitations of the caliper logs used to make the calculations. These percentages are not uncommon. The three-arm caliper-log probe is not capable of detecting minor wash-out zones or providing a highly accurate borehole diameter, especially in a borehole that may not be circular in cross section. The Stage 4 fill-up percentage (36 percent) is particularly low because of a major wash-out or cavity zone between 124 and 130 feet below pad level (see caliper log, Appendix B).

The final stage of cement was completed on January 15, 1985. A pressure test on the cemented casing was conducted on January 17. The test was successfully completed as the casing held a constant 150 psi for a period of one hour. The cement plug at the bottom of the casing was drilled out and the gravel in the injection zone was removed by January 22, 1985. On January 29, a cement bond log and temperature log of the injection well were run; these logs are described immediately below because of their importance regarding well construction. Other geophysical logs are described in subsequent sections.

The CBL (cement bond log) is included in Appendix B; also shown on the CBL is the VDL (variable density log), a useful complement to the CBL. These logs indicate the quality of the cement/casing/formation bond by the degree of signal attenuation; generally, a well-bonded cementing installation results in a high attenuation.

The CBL log of the injection well shows a generally low amplitude indicative of quality bonding between the cement and the casing. Signal strength ranges from near zero to 25 millivolts--one half the scale of the log. The average amplitude is between 5 and 10 millivolts. It may be noted that the CBL log bears some relationship to the caliper log, wherein lower amplitudes (on the CBL) correlate with smaller borehole diameters. In such cases, the formation, because of its nearness to the center of the hole, helps provide signal attenuation.

The VDL log, shown in the series of light and dark bands on the right-hand side of the log, indicates generally good bonding between the cement and the formation. The "formation" signal indicating this bonding is particularly strong in the intervals from 320 to 450 feet, 600 to 670 feet, 730 to 1010 feet, 1050 to 1460 feet, and from 1620 to 1660 feet in depth. In other portions of the log, the signal is present but its definition is less pronounced, probably indicating signal attenuation in the formation. In summary, the CBL and VDL logs indicate cement bonding to the casing and formation that is judged to be good.

The temperature log, in theory, can be used to show fluid flow through channels behind the casing as (1) anomalies wherein the geothermal gradient is not depicted as it occurs naturally, or (2) anomalies where formation water influences the temperature inside the cased and cemented well where the cement should insulate the well casing. The temperature log run in the open hole shows a very slight geothermal gradient as the temperature rises from 92.8 degrees F at 100 feet, to 93.2 degrees F at 1700 feet (the temperature log run earlier in the pilot hole to a depth of 1057 feet indicated somewhat lower temperatures). The temperature log run in the cased and cemented well in the same interval shows variation essentially between 91 degrees F and 95.8 degrees F; the slightly higher temperature range is due to the heat generated by the casing cement. Generally, the temperature rises with greater depth. The greatest temperatures appear to correlate with the greatest thicknesses of the cement in the annulus; thus a greater heat flow is generated. Aside from the thickness of the cement, there is no apparent correlation between variations in the temperature log and other well/hydrogeologic information. Indeed, one of the intervals in the log having a relatively low temperature in the temperature log that might be erroneously construed to represent the lack of cement behind the casing, is shown on the VDL log to have superior cement bonding qualities. This zone lies between 1200 to 1300 feet in depth. In conclusion, the temperature log does not indicate the presence of channeling behind the casing nor is it well suited to do so.

An 8-hour injection test was conducted on February 2. Well-head pressure, injection zone pressure, monitor-well water levels, the injection rate, and water quality of the injected water were monitored during and after the injection test. On February 5, a color-television survey was conducted in the injection well. The cement pad around the injection well was poured, the well head completed, and all substantive work by the Contractor was completed on February 8, 1985.

Monitor-Well Construction

On January 23, 1985, the drill rig was moved to the monitor-well location. The monitor well was constructed by the mud-rotary method using a nominal 11-inch-diameter bit. Because drilling at a depth of about 60 feet failed to produce cuttings at the surface, the 12-inch-diameter casing was extended to a total depth of 74 feet below pad level. Approximately 39 sacks of drilling mud were lost to the formation between 74 and 93 feet. Drilling progressed without cuttings returns below 93 feet and to a depth of 184 feet. Cuttings and existing fluid in the hole were apparently consumed in the zone between 93 and about 130 feet, based on previous observations made in the adjacent injection well. Returns of cuttings and mud began at 295 feet. The well was completed to its total depth of 370 feet on January 26, 1985.

The monitor well was competed by installing a 2-inch-diameter PVC (schedule 80) casing and well screen. The well screen was set between depths of 340 and 360 feet below pad level, and gravel packed. The casing and screen were disinfected with a chlorine solution before installation. The well annulus was cemented from the top of the gravel pack (at 335 feet) to 3 feet below pad level with ASTM Type II cement, mixed with Flocele and gilsonite. A total of 235 cubic feet of cement was installed in three stages. After the cement cured, the well was developed for 25 hours by pumping. Development was complete on January 31, 1985.

A sample from the monitor well was withdrawn on February 5 by M. P. Brown & Associates, Inc., for a scan of priority pollutants and other selected parameters. The results of this scan are shown in Appendix D. Of 185 chemical parameters analyzed, only one unexpected anomaly occurred. A minor concentration of the pesticide Tedion was detected; no explanation for this anomaly can be offered. The water generally is similar to seawater in its composition. The well head, including the cement pad, was completed on February 8, 1985. A diagram of the monitor well is shown on Plate 1.

Hydrogeologic Setting

Information on the hydrogeology of the project area was assembled from various sources prior to establishing the injection well design. By far the best source of information on conditions from land surface to

a depth of 600 feet below grade was developed from a well constructed by the Seaboard Airline Railroad Company in 1965 (from the files of Bennett & Bishop Engineers) at a location about 2 miles south of the GIWA sewage treatment plant. Sediments that lie above 600 feet belong to the Miocene series and include the Hawthorn Formation and Tampa Limestone. Data developed during the construction of that well indicated that a series of water-yielding zones (limestones) is interbedded with aquitards (dense marly limestones) and confining layers (clays). These various layers are typically less than 20 feet thick, although a few are as thick as 40 feet. None of the water-yielding strata was indicated to have sufficient permeability to serve as an injection zone.

The water quality in the uppermost 600 feet was reported to vary from "fresh" within perhaps 6 feet of land surface to saline at depths greater than 400 feet. Based on the chloride analyses, the TDS (total dissolved solids) concentration at 200 feet was estimated to be 25,000 mgl (milligrams per liter); at 350 feet, 8,000 mgl; and at 400 feet, greater than 30,000 mgl. The TDS of ground water at depths greater than 400 feet was indicated to be consistently greater than 30,000 mgl. These TDS concentrations were shown later to be less than those encountered in the GIWA injection well.

Conditions at depths greater than 600 feet were described by Puri and Winston ("Geologic Framework of the High Transmissivity Zones in South Florida", Florida Bureau of Geology, Special Publication No.20, 1974)

at a well on the mainland about 8 miles northeast of the GIWA site. This well is referred to as "Vanderbilt 1". Between depths of 700 and 1000 feet, over 200 feet of sediments are indicated to have a high permeability and were judged possibly to be suitable for an injection zone. This interval (700 to 1000 feet) corresponds to the Suwannee Formation of the Oligocene series. The original design of the GIWA well anticipated use of this zone as the first-choice injection zone. The Vanderbilt 1 well lies approximately parallel to the structural strike of sediments compared to the GIWA site; thus, no depth correction is necessary to correlate data from the subject well and the GIWA site. Also, at the Vanderbilt 1 well, highly permeable zones are indicated to be present in the lower part of the Ocala Limestone and upper part of the Avon Park Limestone, both of the Eocene series. The depth of this zone is from about 1300 feet to 1500 feet. The design of the GIWA well included this zone as an alternative injection zone in the event the zone above 1000 feet was determined to be unsuitable for injection.

An electric log on the Vanderbilt 1 well and neutron and gamma ray logs on the California Company No. 1 well, located about 5 miles offshore to the southwest of the GIWA site, suggested that a deeper zone also has promise as an injection zone. This zone lies between about 1700 feet and 1900 feet and was ultimately incorporated as the injection zone.

Generally, the geologic formation boundaries encountered during well construction appear to be approximately at depths as described in the cited literature. The rock composition, however, varied. The dominant rock encountered down to the top of the injection zone was limestone; the injection zone consists entirely of dolomite. The geologic log of the injection well is shown in Appendix A.

Unconsolidated sand and shell are present from pad level to about 60 feet below pad. Sandy and shelly limestone layers, often containing clay, are found in white, gray, green, and tan colors to a depth of 310 feet. The clay content and correlation with the gamma ray log suggest that the interval from 60 to 310 feet is the Hawthorn Formation. The loss of drill cuttings occurred at several depths within this interval--between 90 and 129 feet, 157 and 173 feet, and 276 and 282 feet. At least the uppermost of these zones is highly permeable.

The interval from 310 feet to 1027 feet consists of brown and gray limestone, with occasional layers of bluish, yellowish, and green coloration; it appears to correspond with the Tampa Limestone and the underlying Suwannee Limestone. The limestone sequence contains sand, shells, marl, and clay in varying amounts. The permeability of this interval is low, based on the inspection of drill cuttings; this was verified by laboratory analyses of cores and packer tests described below. Within this interval at the location of the Vanderbilt 1 well, the rock is indicated to be dolomitic limestone having zones of high

permeability; only minor evidence of dolomitic limestone was present in the zone from 760 to 1027 feet in the GIWA well.

From 1027 to 1742 feet below pad level, the limestone sequence continues but with considerably more dolomitic limestone and several intervals where dolomite dominates. This sequence includes the Ocala Limestone and the Avon Park Limestone. The limestone contains sand in only a small interval from 1420 to 1478 and contains no shells. Micrite and clay are present in various concentrations in approximately half of the entire interval. The rock cuttings indicate that the sequence has a low permeability; occasional vuggy and fossiliferous rock apparently do not provide significant permeability to this sequence as determined by the straddle packer tests.

From a depth of 1742 feet to about 1845 feet, the rock is very hard, brown dolomite, extensively affected by dissolution apparently along fractures ~~traces;~~ this is the injection zone. Drilling in this zone was very difficult due to the hardness of the rock and rugosity of the rock at the face of the bit. From 1845 to the total well depth of 1928 feet, similar dolomite is present but solution cavities are not extensively present. The injection zone is highly permeable and extensive as it correlates depthwise with indications on geophysical logs of the Vanderbilt 1 well and the California Company No. 1 well.

Geophysical logs, including the dual induction, sonic, gamma ray, caliper, and temperature log, were run after the pilot hole was

drilled to a depth of 1057 feet below pad. These logs are presented in Appendix B. The dual induction log shows moderate activity from the bottom of the pit casing at 120 feet to 770 feet, and is generally indicative of interbedded strata of limestone and clays. Below 770 feet, the lithology is indicated by the logs to be uniform in composition as supported by the homogeneous limestone cuttings produced during well drilling. The signal response on the sonic log is similar to that of the dual induction log. The interbedded nature of strata in the upper part of the hole also is shown on the gamma ray log; in particular, the high gamma activity from about 140 feet to 280 feet apparently deliniates the Hawthorn Formation. Below a depth of 740 feet, the gamma ray log shows very low activity, at least to a depth of 960 feet. The caliper log shows that the rock is relatively soft; drilling with a 7-7/8-inch-diameter bit produced a borehole diameter that varied from 9 to 16-1/2 inches, and averaged about 13 inches. Three notable wash-out zones in the borehole are shown at depths of 163 feet, 348 feet, and 377 feet; these are no more than a few feet in vertical extent and again indicate interbedding of relatively thin layers having variable hardness. The temperature log shows that the temperature increases with depth. Below the pit casing at 120 feet, the temperature is 88.5 degrees F (Fahrenheit); it increases to 89.5 degrees F at about 500 feet, 90 degrees F at 920 feet, and 90.5 degrees F at 1050 feet. The greatest rate of change in temperature below the pit casing occurs in the zone below 820 feet.

The geophysical logs along with the cuttings produced during drilling depicted a relatively non-permeable lithology between depths of 650 feet and 900 feet. The anticipated dolomitic limestone in the Suwannee Limestone was shown to be a uniformly consistent limestone, free of any indications of high permeability as predicted based on the Vanderbilt 1 well. No "cycle-skipping" was shown in the dual induction or sonic logs. Based on an assessment of the cuttings and the geophysical logs, it was decided to continue drilling the pilot hole to locate an injection zone in strata beneath the Suwannee Limestone.

Upon the completion of pilot-hole drilling to a depth of 1926 feet, another suite of geophysical logs was run to further define information gained during drilling. The logs included the dual induction, sonic, caliper, gamma ray, spontaneous potential, single-point electric, temperature, flow meter, fluid conductivity, and the 16-inch and 64-inch normal logs. The diameter variations within the borehole are reflected in the signal response on many of the geophysical logs including the dual induction, sonic, gamma ray, flow meter, the single-point electric, and the 16-inch and 64-inch normal logs; comparison of these logs with the caliper log demonstrates this phenomena. Portions of these logs exclusive of the uppermost 1057 feet of the borehole are briefly described in the following text. The logs are presented in Appendix B.

The dual induction log shows little activity from 1057 to 1730 feet below pad and indicates relatively uniform electrical properties of the formations encountered. At about 1730 feet and below, all three traces on the log strongly respond to the fractures and solution cavities in the hard dolomite of the injection zone. The medium-induction, deep-induction, and spherically-focused traces rise in amplitude in several discreet zones such that the full scale amplitude is approached. These wide-ranging traces indicate that the fractures and cavities extend laterally into the formation to considerable distances from the borehole. The sonic-log trace responds to subsurface conditions in much the same manner as the dual induction log. From a depth of 1730 feet to approximately 1860 feet, repeated cycle-skipping is shown; this indicates the highly variable nature of signal-reflecting surfaces within the injection zone and also shows considerable lateral extension of these surfaces from the borehole wall.

The gamma ray log shows relatively little activity below the depth of 1057 feet. The injection zone (below about 1740 feet) produces a somewhat higher gamma radiation; this is believed to be due to the relatively small diameter of the borehole in this zone and the fact that the detector is closer to the source of radiation--the formation. Both the spontaneous potential and the single-point resistivity traces are nearly featureless down to a depth of 1740 feet. At that depth, they respond to the high permeability of the dolomite, the electrical

properties of the dolomite (verses the overlying limestone), and the smaller borehole diameter within the dolomite.

The caliper log below 1057 feet shows borehole diameters that range from bit size (7-7/8 inches) to 22 inches; the average is about 17 inches above the injection zone. Generally, the diameters are small where the rock is hard. Below a depth of about 1740, the borehole has the approximate diameter of the drill bit. Within the injection zone, several large "spikes" are shown on the log; these depict solution cavities, perhaps along fracture traces. There are no significant spikes below a depth of 1845 feet.

The fluid resistivity log shows that the salinity of water in the borehole increases with respect to depth. This log indicates that water from the injection zone has electrical properties similar to sea water. The salinity of water near the bottom of the pit casing was less saline due to mixing with relatively fresher water from the intervening borehole (generally above 400 feet in depth) and probably fresh water that was introduced into the borehole, such that its salinity is about one-half that of sea water.

The temperature log taken in the open borehole shows that the water temperature in the injection zone is about 93.6 degrees F; the temperature becomes slightly less at shallower depths such that the temperature near the bottom of the pit casing is about 92.8 degrees F.

The 16-inch and 64-inch normal electric logs generally are similar to the single-point electric log, thus confirming the location of the injection zone relative to the confining sequence.

Taken together, the geophysical logs show that the injection zone extends from depths of about 1730 feet to about 1860 feet and that the injection zone contains saline water, at higher temperatures and under higher pressure than ground water at lesser depths. Based on the geophysical logs, intervals within the confining sequence were selected for packer testing.

Confining Sequence

Competency of the confining sequence to contain injected effluent within the injection zone was tested by laboratory analyses on rock cores and straddle-packer pumping tests conducted in the pilot hole. Rock cores were extracted ahead of the pilot-hole drill bit at intervals from 450 to 460, 500 to 510, 550 to 560, 600 to 610, and 650 to 660 feet below pad level. Straddle-packer pumping tests were conducted on intervals from 311 to 362, 679 to 730, 1058 to 1109, 1218 to 1269 feet, and 1492 to 1543 feet below pad level.

Sections of the 10-foot cores were sent to a laboratory to be tested for their vertical permeability and porosity. The results of these tests are presented on Table 1. The permeabilities range from

TABLE 1

RESULTS OF CORE TESTING*

Core Depth Interval (in feet below pad)	Vertical Permeability (in centimeters per second)	Porosity
454.19 - 455.67	0.000047	0.350
490.0 - 491.0	0.000072	0.373
558.5 - 560.0	0.000020	0.398
602.9 - 603.9	0.0000020	0.370
652.0 - 653.4	0.000000026	0.352

* performed by Professional Services Industries, Inc., Clearwater, Florida

0.000072 to 0.000000026 cm/sec (centimeters per second) and average 0.000028 cm/sec. The porosity of the samples ranges from 0.350 to 0.398 and averages 0.369. The rock analyzed in the cores was light gray, marly and clayey limestone. The more permeable of the cores contain a minor percentage of shell fragments and contain very small vugs.

The recovery data from the straddle-packer pumping tests were analyzed using the semi-logarithmic method devised by Cooper and Jacob (Walton, 1970; Groundwater Resource Evaluation, McGraw-Hill). The results of analyses are shown on Table 2. Plots of the recovery portions of each test are provided in Appendix C. Straddle-packer tests conducted in the confining sequence showed that the permeabilities range from 0.000093 to 0.0000097 cm/sec and averaged 0.000042 cm/sec. While these values are measures of the horizontal permeabilities, they are very close to the values for vertical permeabilities measured on the core samples.

The results of the straddle-packer test conducted between 311 and 362 feet below pad level are not included in the results cited in the text above. This zone was selected for the monitor zone; it is the first "permeable" zone above the injection zone. The horizontal permeability measured in this zone is 0.0006 cm/sec; this value is more than one order of magnitude greater than permeability values measured in the confining sequence.

TABLE 2

RESULTS OF STRADDLE PACKER TESTS

Straddle packer.

Test Number	Interval Tested (feet below pad)	Average Horizontal Permeability (centimeters per second)
8	311 - 362	0.00060
7	679 - 730	0.000093
5C	1058 - 1109	0.000011
4A	1218 - 1269	0.0000097
3	1492 - 1543	0.000051

Water samples were withdrawn during three straddle-packer pumping tests. These samples were analyzed with results as shown on Table 3. In all cases, including the monitor zone, the samples are similar to sea water in chemical composition.

Injection Zone

The injection zone was identified between depths of 1742 and 1845 feet below pad level. A water sample was taken from the injection zone using a single packer set at the approximate depth of 1710 feet and a short-term injection test was performed and verified the viability of the zone. An eight-hour injection test was conducted after the well casing was installed; this test is described below. Finally, a color television survey was performed that provided visual evidence of fractures and solution cavities that lend a high permeability to this zone.

The water sample pumped from the injection zone prior to the short-term single-packer injection test was analyzed with the following results: pH, 7.6; total dissolved solids, 36,104 mgl (milligrams per liter); specific conductance, 37000 umhos/cm (micromhos per centimeter); sodium, 9464 mgl; and chloride, 18,982 mgl. The chemical character of injection-zone water, like water in the confining sequence, is similar to that of sea water.

TABLE 3

RESULTS OF ANALYSES
OF SAMPLES COLLECTED DURING STRADDLE-PACKER
PUMPING TESTS

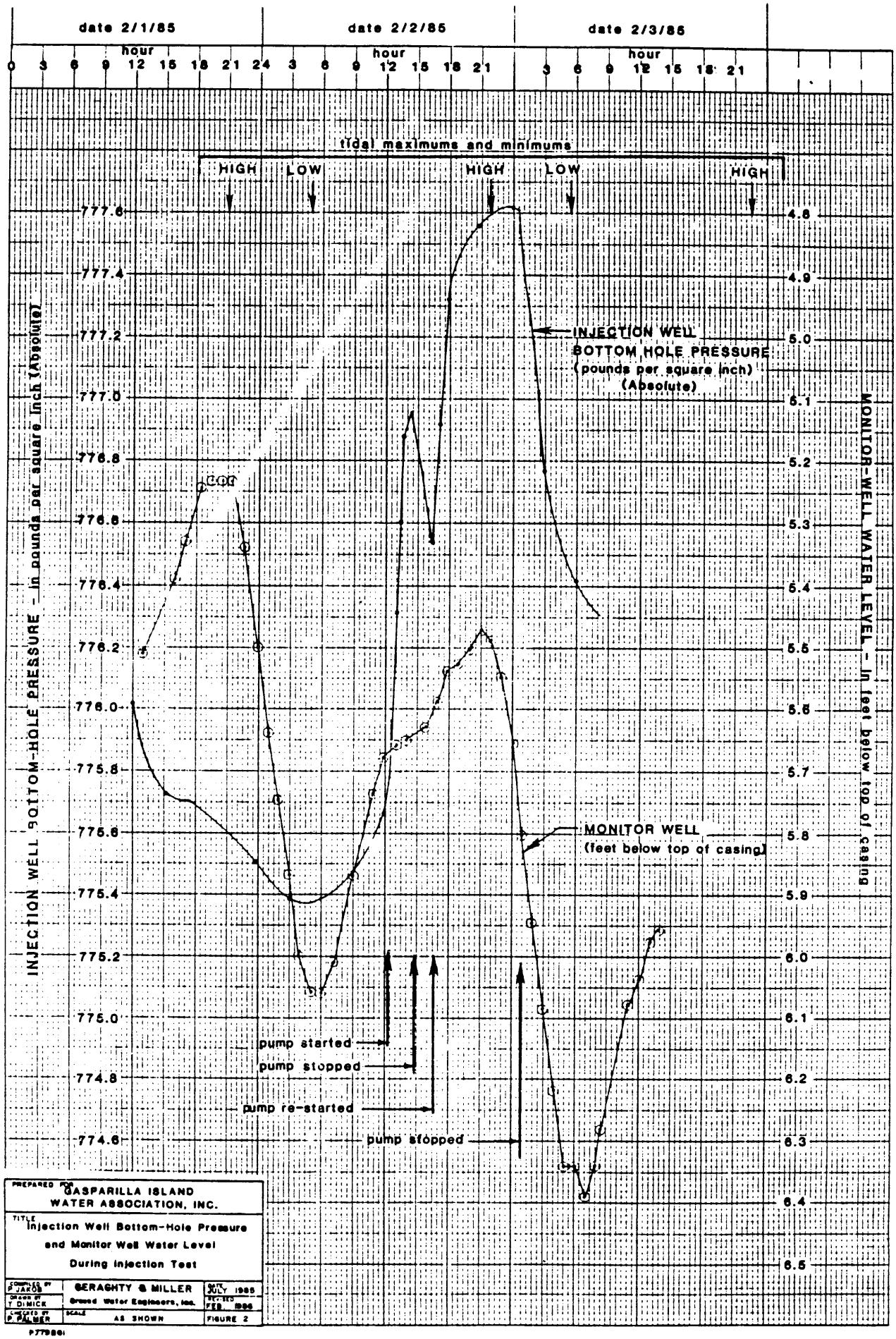
	Straddle-Packer Setting Interval in feet below pad level		
	311-362	1058-1109	1492-1543
pH	7.2	7.1	7.3
total dissolved solids (a)	34,998	36,360	37,240
specific conductance (b)	35,500	37,000	34,900
sodium (a)	9,655	9,591	10,109
chloride (a)	17,997	19,487	16,076

(a) expressed in milligrams per liter

(b) expressed in micromhos per centimeter

The injection test was conducted after the well casing was installed and cemented and the monitor well was completed and developed. Saline water was pumped from the waterway west of the well site and injected into the well at an average rate of 560 gpm (gallons per minute). A flow meter was installed between the main pump and the injection well; a pressure gauge was installed on the well head; and bottom-hole (at a depth of 1705 feet below pad level) pressures and temperatures were measured with an instrument provided by TAM International. Bottom-hole pressures, temperatures, pressure at the well head on the injection well, and water levels in the monitor well were measured 24 hours before the injection test. On February 2, 1985, the pump was started and water was injected for a period of four hours before the flow meter ceased to function. The flow meter was repaired and after a period of two hours, the test was started again. The test was conducted for eight hours then terminated as it became apparent no further useful data would be developed.

Figure 2 shows the bottom-hole pressure on the injection well and water levels in the monitor well during the test. This figure shows the dominant influence of marine tides on pressures in the injection zone and the monitor zone. The water level in the monitor zone is closely correlated with marine tides, as the high and low tidal levels coincide with high and low water levels in the monitor well. There is no apparent effect on water levels in the monitor zone caused by


date 2/1/85
date 2/2/85
date 2/3/85
hour
0 3 6 9 12 15 18 21 24 3 6 9 12 15 18 21 3 6 9 12 15 18 21
tidal maximums and minimums
HIGH
LOW
HIGH
LOW
HIGH
INJECTION WELL BOTTOM-HOLE PRESSURE - in pounds per square inch (Absolute)
777.6
777.4
777.2
777.0
776.8
776.6
776.4
776.2
776.0
775.8
775.6
775.4
775.2
775.0
774.8
774.6
INJECTION WELL BOTTOM HOLE PRESSURE (pounds per square inch) (Absolute)
MONITOR WELL (feet below top of casing)
MONITOR-WELL WATER LEVEL - in feet below top of casing
4.8
4.9
5.0
5.1
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6.0
6.1
6.2
6.3
6.4
6.5
pump started
pump stopped
pump re-started
pump stopped
PREPARED FOR GASPARILLA ISLAND WATER ASSOCIATION, INC.
TITLE Injection Well Bottom-Hole Pressure and Monitor Well Water Level During Injection Test
COMPILED BY P JAKOB
DRAWN BY T DIMICK
CHECKED BY P PALMER
GERAGHTY & MILLER Ground Water Engineers, Inc.
SCALE AS SHOWN
DATE JULY 1985 REVISED FEB 1986
FIGURE 2
P77986

injection. The pressure in the well bottom displays a general correlation with the marine tides; peaks are both ahead and behind the peaks on the marine tidal cycle.

The effect on the bottom-hole pressure of injecting at a rate of 560 gpm is to increase that pressure by approximately one psi (pound per square inch), or 2.3 feet of water. Tidal influences on the pressure in the injection zone cannot be entirely separated from the influence of injection during the test. Accordingly, the injection capacity of the well can only be estimated. Based on the reasonably certain increase in bottom-hole pressure due to injection (one psi), the injection capacity of the well is approximately 240 gpm/ft (gallons per minute per foot of increase in water pressure). This estimate is based on the relationship between the specific capacity (injection capacity) of a well and the transmissivity of the aquifer being tapped; this can be stated: injection capacity in gpm/ft x 2000 = transmissivity in gpd/ft (gallons per day per foot). On this basis, the transmissivity of the injection zone is estimated to be at least 480,000 gpd/ft. This estimate does not reflect a well-loss factor and therefore is considered to be a minimum value. This transmissivity is very high relative to most water-supply aquifers in Florida and more than sufficiently high for an injection zone.

The well-head pressure also varied in accordance with the tidal influence. Before beginning the eight-hour test when the well

contained salty water from the nearby waterway, the well-head pressure was about 8.0 feet (of water) above pad level; the highest well-head pressure attained during the test was about 65.6 feet of pressure when the bottom-hole pressure was about 2.3 feet (1 psi) higher than at the beginning of the test. The net increase in well-head pressure due to pipe friction and water density differences was therefore 55.3 feet (65.6 feet - 8.0 feet - 2.3 feet = 55.3 feet).

The color television survey showed that the inside of the well casing is sound and has no visual anomalies; the survey also indicated that the injection zone contains solution cavities and fractures within the interval from 1743 feet to 1845 feet below pad level. Within this interval are about 17 zones containing obvious cavities that range in size (height) from one to eight feet. These features are very valuable because they provide large openings that cannot easily be plugged by any suspended matter in the injected effluent (the effluent will be filtered prior to injection). In summary, the high transmissivity and large openings in the injection zone are very well suited for long-term injection of effluent.

POTENTIAL IMPACTS OF INJECTION

Treated wastewater will be injected into strata of the Lake City Limestone that lies isolated from overlying strata by greater than 1300 feet of limestone, marl, and clay--the confining sequence. The

natural water in the injection zone and that in the confining sequence has chemical characteristics similar to that of sea water and thus has little potential to serve as a drinking water source. Furthermore, the injection zone and confining sequence are areally extensive. There are no known or suspected wells that tap the Lake City Limestone within tens of miles of the injection zone.

Before injection, wastewater will be treated, chlorinated, and filtered, rendering harmless any bacteria or virus that it may contain. It therefore would be treatable to potable standards if later withdrawn from the injection zone. The average rate of injection will rise from 50,000 gpd (gallons per day) during the second year of operations (1986), by 50,000 gpd increments, up to 450,000 gpd during the tenth year of operation. The average rate of injection will remain at 450,000 gpd during following years. At 812,000 gpd, the maximum design injection rate, the velocity of flow through the well casing will be 7.6 feet per second. During the first 50 years of operation, a total volume of 7,390,000,000 gallons will be injected.

The potential distance of off-site migration after 50 years of operation was calculated based on a method suggested by the South Florida Water Management District and described by Seaburn and Robinson, Inc. (1982, Comprehensive Monitoring Program of Deep Well Injection, Pinellas County, Florida). The "inverted-cone model"

described in that document is based on the following formula: $R = (3V/\pi \quad Hp)^{1/2}$, where R = radius of the leading edge of injected fluid from the well; V = the total volume of water injected; H = thickness of the injection zone; and p = effective porosity of the injection zone. These factors are evaluated in the subject case as follows: V = 988,000,000 cubic feet (or, 7,390,000,000 gallons), H = 104 feet, and p = 0.05. The radius of the leading edge, R, was evaluated based on these factors as 2.55 miles. The leading edge therefore would approach the southern end of Gasparilla Island but would be about 8 miles or more from the nearest point on the mainland after 50 years of well operation.

The porosity (p) of 0.05 used above is believed to be at the low end of the range of possible porosity of the injection zone. There is no readily available method of determining this porosity. If a higher, more realistic porosity were used in the analysis, the radius of the leading edge would be smaller.

The potential velocity of upward movement of injected wastes was estimated using the formula: $V = (P \times dh)/m \times p$, where V = velocity, P = vertical permeability of the confining sequence, dh = the difference in head between the injection zone and monitor zone--the driving force, and p = effective porosity of the confining sequence. The average vertical permeability (P) based on packer-test analyses (more conservative than core analyses) is 0.000042 cm/sec.; the

confining sequence thickness (m) measured from the injection zone to the monitor zone is 1381 feet; the head difference (dh) was estimated not to exceed 10 feet; and the effective porosity (p) was estimated to be 0.18, which is half of that measured in core samples. Based on these factors, the velocity of upward movement of injected water is evaluated to be 87 feet per 50 years. Thus, injected water could not reach the monitor zone for 797 years.

In summary, the injected water will migrate only small distances both horizontally and vertically from its point of discharge into the injection zone during a period of 50 years. These migration distances are much less than would be required before injected water affected any existing or potential points of withdrawal from the Lake City Limestone or overlying strata.

WELL OPERATIONS

When the injection well is operating during long-term injection testing and over its operational life, a variety of data has been and will be collected to satisfy statutory/permit requirements and to assist in managing the system. Information is collected from the injection and monitor wells. This section discusses the basic requirements for data collection to aid in permit compliance during the initial testing period (FDER Permit VC36-87746, as modified on March 22, 1985), guidelines for collecting that data, and procedures for performing periodic injectivity tests.

Injection-Well Data Collection

Records of the injection pressure, injection rate and cumulative volume disposed are being collected from the well on a daily basis; this began with the start of injection. Values of injection pressure and rate are recorded on a daily basis for monthly submission to the FDER. Also monthly average, maximum and minimum values for injection pressure, injection rate and volumes are reported to the FDER. Measurements of the injection pressure and rate occurring at the same time are recorded so that correlations between these two values can be made. This information should be maintained permanently. Data generated during the first four months of injection, beginning in September 1985, are presented in Appendix E.

Monitor-Well Data Collection

The purpose of monitor-well data collection is to detect changes in water quality and water levels in the monitor zone that could be attributed to the injection of treated effluent. The parameters established by the FDER for analysis are the pH (field), specific conductivity (field), chloride, ammonia, total nitrogen, total organic carbon, and specific gravity. These parameters are being analyzed monthly for the duration of the long-term test period. In addition to water-quality determinations, daily water-level measurements are made in the monitor well.

After initial (long-term) testing, quarterly water samples and water-level measurements should be taken. Sample analyses should be made of the same parameters cited above. At least three well volumes (about 180 gallons of water) should be pumped from the monitor well before a sample is taken. Water-level measurements should be made in the monitor well prior to any pumping to extract a water sample.

Injectivity Testing

Injectivity is defined as the injection rate expressed as gallons per minute per foot (of water pressure) or psi of injection pressure. A well's injectivity is a function of (1) friction loss in the casing, (2) the bottom-hole driving pressure, and (3) the density differential between fresh, treated effluent and saline ground water. The latter is a constant. Friction loss in the casing and bottom-hole driving pressure can vary as the pipe ages and scale builds up and as a result of the plugging on the face of the borehole with particulate matter. Generally, pressures build slowly with respect to time (for a given pumping rate) as the pipe "ages." Similarly, plugging with solids can cause a gradual pressure build-up with respect to time; this is not expected because the injected water will be filtered.

A well's injectivity can be used as a measure of a well's changing efficiency. The data currently being collected on the injection well can be used to continuously assess the well's injectivity. The injectivity is calculated by dividing the injection rate by the

injection pressure (well-head pressure minus the static or non-pumping pressure). The result is expressed as gallons per minute per foot of pressure (or psi).

At some time in the future, it may be desirable (if plugging is suspected) to determine the cause of a loss of efficiency and whether friction loss in the casing or losses arising from plugging are responsible. This can be accomplished by measuring bottom-hole pressures for a range in injection rates. The bottom-hole pressure measurements can be obtained using the same type of wireline pressure measuring and surface recording device used during the initial testing of the well. The head of the injection well is designed to be used with a tool known as a stripper head or lubricator that permits a wireline tool to be installed in the well while it is operating under pressure. Both well head and bottom-hole pressures are measured. The difference between these pressures is attributable to pipe friction thus making it possible to distinguish between friction loss in the casing and bottom-hole driving pressure for the well. The procedure need only be repeated in the future if it appears to be necessary.

INJECTION-WELL PLUGGING AND ABANDONMENT PLAN

Section 28.27(2) of Chapter 17-28 requires that "an application for an Underground Injection Control permit shall be required to submit a plan for plugging and abandonment." The DER can order the plugging of an injection well when it has been abandoned or has been "determined

to be a threat to the waters of the State." Additionally, a P&A (plugging and abandonment) plan should be included in the Operation and Maintenance manual for the treatment facility so that it can be implemented promptly in the unlikely event it is ever needed. The objective of the P&A plan is to effectively plug or seal the borehole through the confining bed to prevent any possibility of upward migration of injected treated effluent and the interchange of ground waters of different qualities. The program described in this section accomplishes this objective.

In the event that the GIWA injection well has to be abandoned, two obstacles will have to be overcome before the well can be plugged successfully. Because the well will be under pressure (about 30 psi), fluid with weight material (drilling mud) will have to be added to suppress the tendency to flow, permitting the well head to be opened to allow access for tools. Also, a bridge plug will have to be set at the base of the casing to prevent the loss of cement downhole.

The well will be plugged with a combination of neat, ASTM Type II cement and a mixture of crushed limestone and "mud" made with Zeogel - a trade name for a drilling fluid blend made with attapulgite (a clay that does not floc when exposed to salt water). The plugging program will require the services of a qualified contractor and equipment capable of installing drill pipe to a depth of approximately 1700

feet, pumping neat cement, and mixing and pumping drilling fluid to suppress flow, as well as the capability to provide some form of blow-out prevention equipment.

The initial step in the program will be to mix a solution of weight material and pump it into the well to suppress flow. Sufficient weight material should be added to the well to depress the fluid level to approximately 20 feet below pad level, or deeper if the Contractor so desires. A supply of mixed drilling fluid should be kept on-site as weight material will have to be added periodically to maintain the desired fluid level in the well. Following the addition of the weight material, the well-head valve could then be removed to permit easy access into the well. The blow-out preventer would be installed at this time.

The bridge plug will consist of 2-inch-diameter threaded casing and two cement baskets assembled on location and lowered into the well on a string of drill pipe. A careful tally of pipe lengths should be kept to permit setting the tool with the cement baskets about 5 feet above the bottom of the 6-inch casing. The 2-inch-diameter casing will have a bottom plug and two sets of left-handed threaded couplings at levels about 80 and 140 feet above the bottom of the 6-inch-diameter well casing.

The cement baskets will be expanded and set by adding about three cubic feet of crushed limestone to the well and allowing it to settle. A mixture of neat, ASTM Type II cement is then pumped into the hole through the drill pipe and the cement ports above the limestone fill. The quantity of cement pumped should be equivalent to the volume of slurry required to fill the casing from the top of the crushed limestone to one foot below the lowermost left-hand threaded coupling.

The cement is allowed to set for 24 hours, then it is "tagged" with a wire line to determine if fill-up has been achieved. If not, additional crushed limestone is added and another stage of cement is added (a single stage of cement usually is sufficient to build the first portion of the bridge plug). A strain of no more than 1000 pounds above drill string weight should be exerted. If no movement occurs (other than pipe stretching), the plug is deemed set and the Contractor can proceed with disconnecting the assembly by rotating and "backing off" the drill pipe (right-hand rotation will unscrew the pipe from the left-hand threaded couplings). Then two successive small stages of no more than 100 feet of cement fill-up are pumped.

The remainder of the casing is then filled up to within 50 feet of the pad level with the mixture of crushed limestone and the Zeogel drilling mud. The Zeogel should be mixed to a weight of 10 pounds per gallon. All ASTM Type II cement slurries should be neat and mixed

with 5.2 gallons of water per sack to produce a slurry yield of 1.18 cubic feet per sack and a weight of 15.6 pounds per gallon.

The cost of the plugging and abandonment program as described above is estimated to be $28,000 in early 1986.

Respectfully submitted,
GERAGHTY & MILLER
GROUND WATER ENGINEERS, INC.

Paul G. Jakob
Senior Scientist

Peter L. Palmer, P.E.
Associate

March 1986

APPENDIX A

Geologic Log of Injection Well

Geologic Log
Injection Well
Gasparilla Island Water Association, Inc.
Boca Grande, Florida

Sample Description	Depth Interval (feet)	Thickness (feet)
No Sample	0 - 10	10
SANDY SHELL - Shell, 75%, large to small fragments; Sand, 20%, quartz, clear, white and dark brown, medium- to fine-grained, sub-rounded; Clay, 5%, gray, plastic.	10 - 30	20
SHELL - Shell, 90%, large to small fragments; Sand, 10%, quartz, white and gray, medium-grained, sub-rounded; Clay, trace.	30 - 60	30
SANDY SHELLY LIMESTONE - Limestone, 70%, light gray, tan, and pale green, moderately hard; Shell, 20%, large to small fragments; Sand, 10%, quartz, clear, gray, and dark brown, medium- to coarse-grained, well sorted, rounded to sub-rounded grains.	60 - 90	30
No Cuttings Returned - Lost Circulation	90 - 129	39
SANDY LIMESTONE - Limestone, 75%, dark gray, light and dark green; Sand, 25%, quartz, fine-grained, rounded grains, well sorted, well cemented.	129 - 143	14
SANDY LIMESTONE AND CLAY - Clay, 50%, olive green; Limestone, 40%, light gray and green; Sand, 10%, quartz, fine-grained, rounded grains, well sorted.	143 - 157	14
No Cuttings Returned - Lost Circulation	157 - 173	16
SANDY LIMESTONE - Limestone, 60%, white, light gray and olive green; Sand, 20%, quartz, white and light gray, medium-grained, well cemented; Shell, 10%, white, large to small fragments; Clay, 10%, green.	173 - 184	11

SANDY LIMESTONE AND CLAY - Limestone, 50%, white and olive gray; Clay, 40%, white; Sand, 10%, phosphatic, black, fine-grained, well rounded; Shell, trace.	184 - 228	44
SANDY SHELLY LIMESTONE AND CLAY - Limestone, 45%, white and light gray; Clay, 40%, light gray; Sand, 10%, phosphatic, white, gray and black, fine- to medium-grained, rounded; Shell, 5%, fragments.	228 - 276	48
No Cuttings Returned - Lost Circulation	276 - 282	6
CLAY AND SANDY LIMESTONE - Clay, 50%, white; Limestone, 25%, light gray and buff tan, moderately hard, possible solution cavities; Sand, 15%, phosphatic, gray, fine-grained; Shell, 10%, white, medium to small fragments.	282 - 310	28
LIMESTONE - Limestone, 85%, white , light gray, and pale yellowish brown, moderately hard; Clay, 10%, gray; Shell, 5%, broken fragments.	310 - 394	84
SANDY LIMESTONE -Limestone, 85%, yellowish brown, moderately hard; Sand, 15%, phosphatic, black, fine-grained, round grains.	394 - 450	56
CORED INTERVAL: LIMESTONE - Limestone, 80%, yellowish brown and light gray, vugular in zones; Shell, 20%, large to small fragments.	450 - 460	10
LIMESTONE - Limestone, 75%, pale yellowish brown and light gray, well compacted; Shell, 25%, bleached fragments; Clay, trace, white.	460 - 490	30
CORED INTERVAL: LIMESTONE - Limestone, 85%, light gray and yellowish brown; Shell, 15%, white fragments.	490 - 500	10
LIMESTONE - Limestone, 80%, light gray; Shell, 20%, white, small broken fragments.	500 - 535	35

MARLY CLAY - Clay, 90%, white, sticky, well compacted; Marl, 10%, white.	535 - 550	15
CORED INTERVAL: CLAYEY LIMESTONE - Limestone, 70%, white and yellowish brown, vuggy; Clay, 30%, light gray, fossiliferous.	550 - 560	10
LIMESTONE - Limestone, 100%, pale bluish gray and buff tan, moderately hard, fossiliferous in zones.	560 - 580	20
SANDY LIMESTONE - Limestone, 75%, white and gray, soft, Sand, 25%, quartz, light gray, medium-grained.	580 - 600	20
CORED INTERVAL: LIMESTONE AND CLAY - Limestone, 60%, light gray; Clay, 40%, gray.	600 - 610	10
LIMESTONE - Limestone, 75%, pale bluish gray and dark yellowish brown, soft to moderately hard; Shell, 15%, light gray; Clay, 10%, white and light gray, plastic; Marl, trace, white.	610 - 650	40
CORED INTERVAL: CLAYEY LIMESTONE - Limestone, 60%, granular texture; Clay, 40%, white; Marl, trace, white.	650 - 660	10
MARLY LIMESTONE AND CLAY (Interbedded) - Limestone, 45%, gray, white and green; Clay, 45%, light gray to white, plastic; Sand, 5%, black, fine-grained, rounded; Marl, 5%, white; Shell, trace, black and white, fine fragments.	660 - 704	44
LIMESTONE - 100%, white and light gray, friable; Sand, trace, black, fine-grained, rounded.	704 - 710	6
LIMESTONE AND CLAY - Limestone, 50%, light gray and white; Clay, 50%, light gray, plastic; Sand, trace, black, rounded, fine-grained.	710 - 750	40

CLAY - Clay, 100%, white, plastic, dense.	750 - 760	10
LIMESTONE - Limestone, 100%, dolomitic, white and dark gray, friable, granular texture.	760 - 1027	267
LIMESTONE AND MICRITE (interbedded) - Limestone, 50%, yellowish gray, granular texture; Micrite, 50%, dark gray.	1027 - 1309	282
DOLOMITE - Dolomite, 100%, dark yellowish tan, slightly vuggy texture, hard, crystalline.	1309 - 1325	16
LIMESTONE - Limestone, 100%, white, partially dolomitized (dolomite yellowish tan, vuggy), partially fossiliferous.	1325 - 1335	10
DOLOMITE AND LIMESTONE (Interbedded) - Limestone, 50%, tan to white; Dolomite, 50%, tan to white and dark gray, granular texture; Fossil fragments, trace; Marl, trace.	1335 - 1420	85
SANDY LIMESTONE AND DOLOMITE (Interbedded) - Limestone, 40%, yellowish gray and white; Sand, 40%, fine-grained, rounded; Dolomite, 20%, yellowish gray, medium-grained texture.	1420 - 1478	58
DOLOMITE AND LIMESTONE (Interbedded) - Dolomite, 50%, dusky red, coarse-grained; Limestone, 50%, yellowish gray, medium-grained texture.	1478 - 1489	11
LIMESTONE - Limestone, 60%, pale orange, fine- to medium-grained texture; Micrite, 30%, white; Dolomite, 10%, grayish red to gray, slightly vuggy.	1489 - 1541	52
LIMESTONE - Limestone, 100%, pale yellowish orange, soft, granular texture.	1541 - 1551	10
LIMESTONE - Limestone, 90%, pale yellowish brown, granular texture; Dolomite, 10%, light brown, fine granular texture, moderately hard.	1551 - 1557	6

CLAY - Clay, 100%, pale yellowish brown, sticky.	1557 - 1559	2
LIMESTONE AND CLAY (Interbedded) - Limestone, 80%, pale yellowish brown, granular texture; Clay, 20%, light gray.	1559 - 1600	41
LIMESTONE - Limestone, 90%, tan to yellowish brown, granular texture, soft; Micrite cement, 10%, dusky brown and dark gray.	1600 - 1742	142
DOLOMITE - Dolomite, 100%, dusky yellowish brown to dusky brown, crystalline, hard, some calcite filled surfaces, extensive dissolution features.	1742 - 1928+	186
TOTAL DEPTH	1928	

APPENDIX B

Geophysical Logs

APPENDIX D

Analysis of Monitor Well Sample

Professional Service Industries, Inc.
Analytical Services Division

Atsay, Inc.
P.O. Box 6650
Lake Worth, FL 33466-6650

March 15, 1985
Proj. No. 27-385-53019
Re: Gasparilla Country Club

Attention: Mr. Ed St.Onge

LABORATORY REPORT

FLORIDA LOW-LEVEL VOLATILE ORGANIC CONTAMINANTS

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Trichloroethylene	BDL	3
Tetrachloroethylene	BDL	3
Carbon Tetrachloride	BDL	3
Vinyl Chloride	BDL	1
1,1,1-Trichloroethane	BDL	10
1,2-Dichloroethane	BDL	3
Benzene	BDL	1
Ethylene Dibromide	BDL	0.02

BDL = Below Detection Limit

Date Sampled: 2/05/85
Date Rec'd.: 2/05/85
Sampled By Client

Steven G. Packard
Manager, Chemical Laboratory

Professional Service Industries, Inc.
Analytical Services Division

Alsay, Inc.
P.O. Box 6650
Lake Worth, FL 33466-6650

March 15, 1985
Proj. No. 27-385-53019
Re: Gasparilla Country Club

Attention: Mr. Ed St.Onge

LABORATORY REPORT

PURGEABLES: FLORIDA SOC's

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Acrolein	BDL	10
Acrylonitrile	BDL	10
Bromodichloromethane	BDL	10
Bromoform	BDL	10
Bromomethane	BDL	10
Chlorobenzene	BDL	10
Chloroethane	BDL	10
2-Chloroethylvinyl ether	BDL	10
Chloroform	BDL	10
Chloromethane	BDL	10
Dibromochloromethane	BDL	10
Dichlorodifluoromethane	BDL	100
1,1-Dichloroethane	BDL	10
1,1-Dichloroethene	BDL	10

Steven G. Packard
Manager, Chemical Laboratory

Professional Service Industries, Inc.
Analytical Services Division

Alsay, Inc.
P.O. Box 6650
Lake Worth, FL 33466-6650

March 15, 1985
Proj. No. 27-385-53019
Re: Gasparilla Country Club

Attention: Mr. Ed St.Onge

LABORATORY REPORT

PURGEABLES: FLORIDA SOC's (cont.)

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
trans-1,3-Dichloropropene	BDL	10
1,2-Dichloroethene	BDL	10
1,2-Dichloropropane	BDL	10
cis-1,3-Dichloropropene	BDL	10
Ethylbenzene	BDL	10
Methylene chloride	BDL	10
1,1,2-Trichloroethane	BDL	10
Trichlorofluoromethane	BDL	10
Toluene	BDL	10
Xylene	BDL	400
Styrene	BDL	400
Dichlorobenzene	BDL	10
1,2-Dibromo-3-Chloropropane	BDL	100
1,1,2,2-Tetrachloroethane	BDL	3

Steven G. Packard
Manager, Chemical Laboratory

Professional Service Industries, Inc.
Analytical Services Division

Alsay, Inc.
P.O. Box 6650
Lake Worth, FL 33466-6650

March 15, 1985
Proj. No. 27-385-53019
Re: Gasparilla Country Club

Attention: Mr. Ed St.Onge

LABORATORY REPORT

PESTICIDES AND PCB's: FLORIDA SOC's

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Aldrin	BDL	10
Alpha-BHC	BDL	10
Beta-BHC	BDL	10
Gamma-BHC	BDL	10
Delta-BHC	BDL	10
Chlordane	BDL	500
4,4'-DDD	BDL	10
4,4'-DDE	BDL	10
4,4'-DDT	BDL	10
Dieldrin	BDL	10
Endosulfan I	BDL	10
Endosulfan II	BDL	10
Endosulfan Sulfate	BDL	10
Ethion	BDL	10
Trithion	BDL	10
o,p-DDT	BDL	1
o,p-DDE	BDL	1
o,p-DDD	BDL	1
Tedion	3	1

Steven G. Packard
Manager, Chemical Laboratory

Professional Service Industries, Inc.
Analytical Services Division

Alsay, Inc.
P.O. Box 6650
Lake Worth, FL 33466-6650

Attention: Mr. Ed St.Onge

March 15, 1985
Proj. No. 27-385-53019
Re: Gasparilla Country Club

LABORATORY REPORT

PESTICIDES AND PCB's (cont.): FLORIDA SOC's

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Endrin Aldehyde	BDL	10
Heptachlor	BDL	10
Heptachlor Epoxide	BDL	10
Toxaphene	BDL	500
PCB-1016	BDL	200
PCB-1221	BDL	200
PCB-1232	BDL	200
PCB-1242	BDL	200
PCB-1248	BDL	200
PCB-1254	BDL	200
PCB-1260	BDL	200
Aldicarb	*	----
Diazinon	BDL	5
Malathion	BDL	1
Parathion	BDL	1
Guthion	BDL	10
Kelthane	BDL	5

*None Detected

Steven G. Packard
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Analytical Services Division

Alsay, Inc.
P.O. Box 6650
Lake Worth, FL 33466-6650

March 15, 1985
Proj. No. 27-385-53019
Re: Gasparilla Country Club

Attention: Mr. Ed St.Onge

LABORATORY REPORT

BASE/NEUTRAL EXTRACTABLES: FLORIDA SOC's

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Acenaphthene	BDL	10
Acenaphthylene	BDL	10
Anthracene	BDL	10
Benzo(a)anthracene	BDL	10
Benzo(b)fluoranthene	BDL	10
Benzo(k)fluoranthene	BDL	10
Benzo(a)pyrene	BDL	10
Benzo(g,h,i)perylene	BDL	10
Benzidine	BDL	10
Bis(2-chloroethyl)ether	BDL	10
Bis(2-chloroethoxy)methane	BDL	10
Bis(2-ethylhexyl)phthalate	BDL	10
Bis(2-chloroisopropyl)ether	BDL	10
4-Bromophenyl phenyl ether	BDL	10
Butyl benzyl phthalate	BDL	10
2-Chloronaphthalene	BDL	10
4-Chlorophenyl phenyl ether	BDL	10
Chrysene	BDL	10

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LABORATORY REPORT

BASE/NEUTRAL EXTRACTABLES: FLORIDA SOC's (cont.)

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Dibenzo(a,h)anthracene	BDL	10
Di-n-butylphthalate	BDL	10
1,3-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
3,3-Dichlorobenzidine	BDL	10
Diethylphthalate	BDL	10
Dimethylphthalate	BDL	10
2,4-Dinitrotoluene	BDL	10
2,6-Dinitrotoluene	BDL	10
Dioctylphthalate	BDL	10
1,2-Diphenylhydrazine	BDL	10
Fluoranthene	BDL	10
Fluorene	BDL	10
Hexachlorobenzene	BDL	10
Hexachlorobutadiene	BDL	10
Hexachloroethane	BDL	10
Hexachlorocyclopentadiene	BDL	10

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LABORATORY REPORT

BASE/NEUTRAL EXTRACTABLES: FLORIDA SOC's (cont.)

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
Indeno(1,2,3-cd)pyrene	BDL	10
Isophorone	BDL	10
Naphthalene	BDL	10
Nitrobenzene	BDL	10
N-Nitrosodimethylamine	BDL	10
N-Nitrosodi-n-propylamine	BDL	10
N-Nitrosodiphenylamine	BDL	10
Phenanthrene	BDL	10
Pyrene	BDL	10
2,3,7,8-Tetrachlorodibenzo-p-dioxin	NEG	—
1,2,4-Trichlorobenzene	BDL	10

NEG - negative

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LABORATORY REPORT

ACID EXTRACTABLES: FLORIDA SOC's

PARAMETER	SAMPLE DESCRIPTION (ug/l) GCC Well #1	DETECTION LIMIT ppb (ug/l)
2-Chlorophenol	BDL	10
2,4-Dichlorophenol	BDL	10
2,4-Dimethylphenol	BDL	10
2,4-Dinitrophenol	BDL	10
2-Methyl-4,6-Dinitrophenol	BDL	10
4-Nitrophenol	BDL	10
Phenol	BDL	10
2,4,6-Trichlorophenol	BDL	10

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LABORATORY REPORT

Parameter / Sample Description		GCC Well #1			
Primary DW Parameters					
Arsenic	mg/l	< 0.01			
Barium	mg/l	< 0.1			
Cadmium	mg/l	< 0.005			
Chromium	mg/l	< 0.05			
Fluoride	mg/l	0.47			
Lead	mg/l	< 0.005			
Mercury	mg/l	< 0.0005			
Nitrate	mg/l N	0.05			
Selenium	mg/l	< 0.005			
Silver	mg/l	< 0.01			
Sodium	mg/l	9300			

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LABORATORY REPORT

Parameter / Sample Description		GCC Well #1			
Endrin	ug/l	< 0.1			
Lindane	ug/l	< 0.1			
Methoxychlor	ug/l	< 1			
Toxaphene	ug/l	< 1			
2,4 - D	ug/l	< 1			
2,4,5 - TP Silvex	ug/l	< 1			
Total Trihalomethanes	ug/l	< 40			
Total Coliforms	Counts/100 ml	< 1*			

*Significant numbers of non-coliform bacteria present

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LABORATORY REPORT

Parameter / Sample Description		GCC Well #1			
Turbidity	NTU	7.4			
Temperature	^{o}C	30			
pH	Units	6.2			
Specific Conductance	Umhos/cm	21,000			
Radionuclides					
Gross Alpha	pCi/l	< 2			
Gross Beta	pCi/l	16 ± 6			
Radium 226	pCi/l	< 0.6			
Radium 228	pCi/l	< 1			
Gamma Scan					
Cobalt 60	pCi/l	2.49 ± 0.42			
Zirconium-Niobium-95	pCi/l	3.64 ± 0.65			

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LABORATORY REPORT

Parameter \ Sample Description		GCC Well #1			
econdary DW Parameters					
Chloride	mg/l	16,000			
olor	PCU	3			
opper	mg/l	0.05			
orrosivity (Langelier) @ 20°C		+0.3			
oaming Agents	mg/l	<0.01			
on	mg/l	0.61			
anganese	mg/l	0.08			
dor	TON	NOO			
lfate	mg/l	2,300			
tal Dissolved Solids	mg/l	34,100			
inc	mg/l	0.01			

N - Threshold Odor Number
O - No Odor Observed

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LABORATORY REPORT

Parameter / Sample Description		GCC Well #1			
Potassium	mg/l	270			
Calcium	mg/l	260			
Thallium	mg/l	< 0.1			
Magnesium	mg/l	276			
Cyanide	mg/l	< 0.01			
Beryllium	mg/l	< 0.005			
Phenols	mg/l	< 0.005			
Nitrite	mg/l N	< 0.01			
Hydrogen Sulfide	mg/l	0.5			
Total Hardness	mg/l	6400			
Hydroxide Alkalinity	mg/l as $CaCO_3$	0			
BiCarbonate Alkalinity	mg/l as $CaCO_3$	120			
Carbonate Alkalinity	mg/l as $CaCO_3$	0			

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LABORATORY REPORT

Parameter / Sample Description		GCC Well #1			
Carbon Dioxide	mg/l	13			
Ammonia Nitrogen	mg/l N	0.2			
Organic Nitrogen	mg/l N	< 0.1			
Total Nitrogen	mg/l N	0.2			
Total Phosphorus	mg/l P	0.05			
Non-Carbonate Hardness	mg/l as $CaCO_3$	6300			
Antimony	mg/l	< 0.1			
Nickel	mg/l	0.9			

Steven G. Packard
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APPENDIX E

Injection Well Operating Data

September 1985

DATE	FLOWMETER READING	GALLONS INJECTED (Thous.)	FLOW IN GPM	INJECTION PRESSURE	pH	CONDUCTANCE IN PPM	CHLORIDES IN mg/l	AMMONIA IN mg/l	TOTAL N	TOC	SPECIFIC GRAVITY	MON. WELL LEVEL
1	0	0	0									
2	0	0	0									
3	0	0	0									
4	0	0	0									
5	0	0	0	18psi [illegible]								
6	275	275	595	44psi								22"
7	325	50	556	44psi								22"
8	325	0	0	18psi [illegible]								22"
9	449	124	626	44psi	7.0	3700	1,380	.05	12.05	15.5	1.02	22"
10	597	148	632	45psi								20"
11	717	120	645	44psi								18½"
12	862	145	636	44psi								19½"
13	1005	143	554	44psi								19"
14	1151	146	608	45psi								21½"
15	1159	8	444	44psi								25½
16	1159	0	0	17psi [illegible]	7.4	4100	1454	.33	9.36	15.7	0.999	28"
17	1159	0	0	17psi [illegible]								28"
18	1159	0	0	17psi [illegible]								
19	1159	0	0	17psi [illegible]								
20	1159	0	0	17psi [illegible]								
21	1159	0	0	17psi [illegible]								
22	1159	0	0	17psi [illegible]								
23	1159	0	0	17psi [illegible]								
24	1159	0	0	17psi [illegible]	8.2	4100						
25	1159	0	0	17psi [illegible]								
26	1159	0	0	17psi [illegible]								
27	1161	2	0	44psi								
28	1161	0	0	17psi [illegible]								
29	1161	0	0	17psi [illegible]								
30	1161	0	0	17psi [illegible]								
31					7.2	4300						
TOTAL	XXXXXX	1,161	XXXX	XXXXX	XX	XXXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX
AVG.	XXXXXX	38.7	176.5	18.5psi	XX	XXXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX
MAX.	XXXXXX	275	645	44psi	XX	XXXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX
MIN.	XXXXXX	0	444	17psi	XX	XXXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX

October 1985

INJECTION WELL MONITORING

DATE	FLOWMETER READING	GALLONS INJECTED (Thous.)	FLOW IN GPM	INJECTION PRESSURE	pH	CONDUCTANCE IN PPM	CHLORIDES IN mg/l	AMMONIA IN mg/l	TOTAL N	TOC	SPECIFIC GRAVITY	MON. WELL LEVEL
1	1161	0	0	17psi OFF								24"
2	1161	0	0	17psi OFF								22 1/2"
3	1161	0	0	17psi OFF								21 1/2
4	1161	0	0	17psi OFF								24"
5	1161	0	0	17psi OFF								23 1/2
6	1161	0	0	17psi OFF								22"
7	1161	0	0	17psi OFF	7.4	4200						22"
8	1691	530	631	44 psi								19"
9	1692	1	0	44 psi	7.3	3200	1200	0.50	7.80	10.7	1002	20 1/4"
10	1692	0	0	17psi OFF								20"
11	1718	26	619	44 psi								20"
12	1718	0	0	18psi OFF								22"
13	1718	0	0	18psi OFF								22"
14	1728	10	556	44psi	7.8	3600						24"
15	1838	110	611	45 psi			1260	0.31	6.64	21.5	1001	25 1/2"
16	2225	387	626	44 psi								26 1/4"
17	2404	179	635	44 psi								27"
18	2565	161	624	44 psi								24 1/2"
19	2668	103	613	44 psi								23 1/2"
20	2843	175	634	44 psi								20"
21	3036	193	619	44 psi	7.2	3600						17"
22	3231	195	613	46 psi								17"
23	3418	187	624	45 psi								17"
24	3418	0	0	17psi OFF								19"
25	3434	16	628	44psi								20 1/4"
26	3434	0	0	17psi OFF								20 1/4"
27	3434	0	0	17psi OFF								20"
28	3434	0	0	17psi OFF	7.6	4300						18 1/2"
29	3454	20	630	44 psi								21"
30	3639	185	629	45 psi								19"
31	3745	106	631	45 psi								16"
TOTAL	XXXXX	2,584	XXXX	XXXX	XX	XXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX
AVG.	XXXXX	83.35	320.09	32 psi	XX	XXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX
MAX.	XXXXX	530	634	45 psi	XX	XXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX
MIN.	XXXXX	0	556	17 psi	XX	XXXX	XXXX	XXXX	XXX	XXX	XXXX	XXXX

November 1985

GASPARILLA ISLAND WATER ASSOCIATION, INC.
INJECTION WELL REPORT

Effluent Analysis-Injection Well # 5236X11879

DATE	FLOWMETER READING	GALLONS INJECTED (Thous.)	FLOW IN GPM	INJECTION PRESSURE	PH	CONDUCTANCE IN PPM	CHLORIDES IN mg/l	AMMONIA IN mg/l	TOTAL N	TOC	SPECIFIC GRAVITY
1	4122	377	628	44 psi	7.5	4800					
2	4536	414	627	45 psi							
3	4864	328	614	45 psi							
4	5143	279	628	46 psi							
5	5212	69	1.05	45 psi							
6	5212	0	C	18 psi shut down							
7	5212	C	C	18 psi shut down							
8	5212	0	C	18 psi shut down							
9	5267	55	627	44 psi	7.8	4800					
10	5319	52	577	44 psi							
11	5486	167	619	45 psi							
12	5552	66	611	45 psi							
13	5585	33	611	44 psi			1735	.82	7.37	38.6	1.003
14	5585	C	0	17 psi shut down							
15	5630	45	577	44 psi	8.0	4800					
16	5685	55	655	44 psi							
17	5722	37	613	44 psi							
18	5737	15	625	48 psi							
19	5858	121	593	48 psi							
20	6045	187	611	46 psi							
21	6245	200	617	44 psi							
22	6465	220	611	48 psi	8.0	4300					
23	6660	195	613	46 psi							
24	6862	202	601	48 psi							
25	7061	199	603	48 psi							
26	7125	64	593	48 psi							
27	7167	42	636	48 psi							
28	7167	0	0	17 psi shut down							
29	7167	C	0	17 psi shut down							
30	7167	C	C	17 psi shut down							
31											
TOTAL	XXXXXXX	3,422	14,095	1,173	XXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXXX	XXXXXX
AVG.	XXXXXXX	114	470	39 psi	XXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXXX	XXXXXX
MAX.	XXXXXXX	414	655	48 psi	XXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXXX	XXXXXX
MIN.	XXXXXXX	0	0	17 psi shut down	XXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXXXX	XXXXXXX

GASPARILLA ISLAND WATER ASSOCIATION, INC.

INJECTION MONITORING WELL REPORT

INJECTION MONITORING WELL #_____ MONTH November 1985

DATE	WATER ELEVATION	TIDES
1	9.88	
2	9.38	
3	9.29	
4	9.63	
5	9.13	
6	9.21	
7	9.46	
8	9.42	
9	9.38	
10	9.29	
11	9.08	
12	9.08	
13	8.79	
14	8.63	
15	8.71	
16	8.79	
17	8.63	
18	8.75	
19	9.13	
20	9.63	
21	9.79	
22	9.33	
23	9.13	
24	9.08	
25	9.04	
26	8.96	
27	9.04	
28	8.88	
29	8.79	
30	8.63	
31		

GASPARILLA ISLAND WATER ASSOCIATION, INC.
INJECTION WELL REPORT

Effluent Analysis-Injection Well # 5236X11879

Month - December 1985

DATE	FLOWMETER READING	GALLONS INJECTED (Thous.)	FLOW IN GPM	INJECTION PRESSURE	PH	CONDUCTANCE IN PPM	CHLORIDES IN mg/l	AMMONIA IN mg/l	TOTAL N	TOC	SPECIFIC GRAVITY
1	7167	0	0	17 ps. Shut off							
2	7167	0	0	17 psi. Shut down							
3	7766	599	609	48 psi							
4	8114	348	617	48 psi							
5	8174	60	6.95	48 psi							
6	8174	0	0	17 psi. Shut down	7.2	3700	1420	4.50	6.24	10.0	1.020
7	8174	0	0	17 psi. Shut down							
8	8174	0	0	17 psi. Shut down							
9	8174	0	0	17 psi. Shut down							
10	8488	314	588	48 psi.							
11	8494	6	605	41 psi							
12	8551	57	6.33	46 psi							
13	8551	0	0	17 psi. Shut down							
14	8568	17	567	48 psi.							
15	8616	48	571	48 psi.							
16	8981	165	582	48 psi.							
17	8977	196	594	46 psi	7.4	4200					
18	9154	177	602	48 psi							
19	9201	47	560	48 psi.							
20	9201	0	0	17 psi. Shut down							
21	9218	17	567	48 psi							
22	4359	141	588	48 psi							
23	9564	205	610	48 psi							
24	9657	93	596	48 psi							
25	9684	27	563	48 psi							
26	4793	109	556	48 psi							
27	10,025	232	556	47 psi							
28	10,263	238	592	47 psi.							
29	10,441	178	571	48 psi							
30	10,721	280	576	48 psi.							
31	10,776	55	593	48 psi							
TOTAL	XXXXXX	3,609	13,596	1,232	XXXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXX	XXXXX
AVG.	XXXXXX	116	438	40 psi	XXXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXX	XXXXX
MAX.	XXXXXX	599	633	48 psi	XXXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXX	XXXXX
MIN.	XXXXXX	0	0	17 ps. (Shut down)	XXXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXXX	XXXXX	XXXXX

GASPARILLA ISLAND WATER ASSOCIATION, INC.

INJECTION MONITORING WELL REPORT

INJECTION MONITORING WELL #_____ MONTH December 1985

DATE	WATER ELEVATION	TIDES
1	8.88	
2	8.96	
3	8.54	Elevation Checked at 8:30 a.m - Tide High at 3:03 a.m
4	8.71	Elevation Checked at 8:30 a.m Tide High at 4:10 a.m
5	9.00	Elevation Checked at 8:30 a.m High Tide at 5:37 a.m
6	8.92	Elevation checked at 8:45 a.m Tide High at 7:23 a.m
7	8.71	Elevation Checked at 8:45 a.m. Tide High at 9:07 a.m
8	8.96	Elevation checked at 8:45 a.m. High Tide at 10:45 a.m.
9	8.79	Elevation checked at 8:30 a.m. High Tide 12:23 p.m.
10	8.63	Elevation checked at 8:30 a.m. Low 5:21 a.m - High 10:20 p.m
11	8.54	Elevation Checked at 8:30 a.m Low 1:07 a.m - High 11:05 p.m
12	8.79	Elevation Checked at 8:50 a.m. Low 5:56 a.m - High 11:45 p.m
13	8:54	Elevation checked at 10:00 a.m. Low 7:30 a.m
14	8.21	Elevation checked at 8:00 a.m. High 12:31 a.m - Low 8:30 a.m
15	8.04	Elevation checked at 8:45 a.m. High 1:24 a.m - Low 9:19 a.m
16	8.13	Elevation Checked at 11:00 a.m. High 2:23 a.m - Low 9:19 a.m
17	8.46	Elevation Checked at 8:45 a.m. High 3:25 a.m. - Low 10:51 a.m
18	8.50	Elevation checked at 9:00 a.m. High 4:41 a.m. - Low 11:33 a.m.
19	8.50	Elevation checked at 8:15 a.m. High 6:10 a.m Low 12:09 p.m
20	8.38	Elevation check at 9:00 a.m. High 7:53 - Low at 1:30 a.m
21	8.42	Elevation checked at 8:30 a.m. High 9:36 a.m - Low 2:39 a.m
22	8.21	Elevation Checked at 8:30 a.m. Low 3:30 a.m High 4:36 a.m
23	8.38	Elevation checked at 8:15 a.m. Low 4:15 a.m - High 12:30 p.m
24	8.67	Elevation checked at 9:00 a.m Low 4:51 a.m
25	8.42	Elevation checked at 8:30 a.m Low 5:36 a.m
26	7.71	Elevation checked at 8:30 a.m. Low 6:13 a.m
27	7.79	Elevation checked at 8:30 a.m Low 6:50 a.m
28	8.13	Elevation checked at 8:30 a.m. Low 7:25 a.m
29	7.79	Elevation checked at 8:30 Low 8:04 a.m
30	8.33	Elevation checked at 8:00 a.m Low 8:39 a.m.
31	8.08	Elevation checked at 8:00 a.m. Low 9:18 a.m.

ATTACHMENT NO. 3

MECHANICAL INTEGRITY TESTS

AUGUST, 1990

ENVIROCORP

ENVIROCORP SERVICES & TECHNOLOGY, INC.

MECHANICAL INTEGRITY TESTS

BISHOP & ASSOCIATES
SARASOTA, FLORIDA

MECHANICAL INTEGRITY TESTS

BISHOP & ASSOCIATES
SARASOTA, FLORIDA

ENVIROCORP PROJECT NO. 70-1524

FOR ADDITIONAL INFORMATION CONTACT:

DONALD L. HINNERS
(713) 880-4640

AUGUST, 1990

PREPARED BY:

ENVIROCORP SERVICES & TECHNOLOGY, INC.
HOUSTON, TEXAS

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3.4 RADIOACTIVE TRACER SURVEY 4

4.0 CONCLUSION 6

APPENDICES

APPENDIX A: TEMPERATURE SURVEY LOG

APPENDIX B: RADIOACTIVE TRACER LOG

1.0 INTRODUCTION

Envirocorp Services & Technology, Inc. (Envirocorp) was contacted by Bishop & Associates to perform the mechanical integrity tests (MITs) on the disposal well associated with the Gasparilla Island Water Association's (GIWA) sewage treatment plant in Boca Grande on Gasparilla Island. These tests were performed as required under the Florida Administrative Code (FAC) Parts 17-28.130(6) and 17-28.250(1). These tests included:

1. Casing Pressure Test
2. Borehole Video Survey
3. Temperature Survey
4. Radioactive Tracer (RAT) Survey

All tests were conducted during August of 1990 and witnessed by the Department of Environmental Regulations (DER), as required.

2.0 CHRONOLOGY OF EVENTS

2.1 Casing Pressure Test

As there was a good deal of scale to be expected on the 6-5/8 inch, 32 pound per foot (ppf) casing, it was decided to first enter the well with a casing scraper. This would assure both a clean hole, in which to set the inflatable packer, and a better view of the casing body for the downhole camera.

On August 1, 1990 the well was killed with 52.5 barrels of 8.9 ppg brine water. The wellhead was removed and the casing scraper was started in the hole. The first six joints required the use of a 150-pound hammer to work through the scale. Tubing free fall was not experienced until the 11th joint. The scraper reached bottom on August 2, 1990 and the last two joints of tubing were rotated and reciprocated several times on the way out of the hole to assure a clean casing body for the packer seat. The tubing and casing scraper were then pulled out of the hole.

On August 3, 1990 the Baski inflatable packer was picked up, a 1/4 inch high pressure line attached, and all was run in the hole. Upon reaching the packer setting depth of 1683 feet, measured from the top face of the lower flange, a landing joint, with special couplings and outlets, was picked up. All piping was secured and a preliminary test was attempted. There were several leaks found that required welding. A welder was secured for the morning of August 5, 1990 and all leaks were repaired. These leaks were associated with the test equipment and not with the disposal well itself.

A preliminary pressure test in the late morning of August 5, 1990 indicated no leaks. Mr. Vince Mele of the Florida DER was contacted and on location that afternoon.

The casing was pressured up and the following test results were recorded from a calibrated pressure gauge:

TIME (military)	PRESSURE (psig)	ELAPSED TIME (min)
1334	150.50	0
1339	151.00	5
1344	151.00	10
1349	151.00	15
1354	151.00	20
1359	151.00	25
1404	151.00	30
1409	150.50	35
1414	150.25	40
1419	150.00	45
1424	150.00	50
1429	149.75	55
1434	149.75	60

With this test successfully concluded, the packer was deflated and started out of the hole. The packer was successfully removed from the hole the following day and the drilling rig released.

2.2 Borehole Video Survey

On the morning of August 7, 1990 a black and white video camera was lowered into the wellbore. Overall, the casing appeared in very good shape, with the marks made by the scraper quite apparent. The scraper had done an excellent job of removing the scale and any other growths that were attached to the casing wall. The lowest depth reached by the scraper was 1690 feet, with the casing shoe found at 1711 feet (all depths measured from ground level). The bottom of the hole was found at 1907 feet. The survey was concluded at 1240 hours. A copy of the video survey will be submitted under separate cover to the Florida DER for their files.

2.3 Temperature Survey

A temperature survey with both an absolute and differential curve was conducted upon completion of the borehole video survey. Temperature was logged from surface to total depth (TD). The bottom of the hole was found at 1901 feet and the casing shoe at 1707 feet (measured from ground level).

The temperature survey (Appendix A) had no anomalies that would indicate a casing leak.

2.4 Radioactive Tracer Survey

This test was witnessed by Joe Haberfeld and Vince Mele, both with the Florida DER. A background gamma ray log was run from TD to 702 feet. The RAT tool was made up so as to have a detector 10 feet above the ejector port and 8 feet below the ejector port.

The tool was first set at 1708 feet, one foot below the casing shoe. A slug of Iodine 131, equal to one microcurie, was ejected and tool response monitored for 30 minutes. Downward migration of the iodine was noticed after 12 minutes. After 30 minutes, the tool was moved down and up the hole to check for vertical migration. None was found.

The well was flushed with 600 gallons of water. The tool was reset at 1708 feet and the test repeated. The second test indicated downward migration after approximately 9-1/2 minutes and upward migration after about 14 minutes. The migration in both directions was probably due to the instability of the fluid column, sometimes found immediately after cessation of pumping. When the 30-minute test was concluded, the tool was again moved down and up the hole. The remnants of the slug ejected during the first test were found at 1780 feet.

The well was flushed with 3000+ gallons of water and a constant pumping rate downhole of 5.8 to 6.0 gallons per minute (gpm) was established. This equates to a velocity of 4.4 to 4.6 feet per minute inside the 6-5/8 inch casing.

For the dynamic portion of the RAT test, the tool was positioned such that the ejector port was set 5 feet inside the casing at 1702 feet. One microcurie of Iodine 131 was ejected and tool response monitored for 20 minutes. The actual time required for the radioactive material to pass the upper detector was calculated to be 15 to 15.6 minutes.

After holding the tool stationary at 1702 feet for 20 minutes, the logging tool was moved downhole to locate the slug and establish a flow profile. As indicated on the RAT log (Appendix B), both the upper and lower detectors indicated the boundaries of the slug. The tool was then moved back up the hole to a point 100 feet above the casing shoe, 1607 feet, to ascertain that no radioactive material migrated up the casing annulus.

At this point, the well was again flushed with 3000+ gallons of water and the dynamic test repeated. The well was flushed again with 3000+ gallons and a background gamma ray log run from TD to 1207 feet.

Upon completion of this test, the remaining Iodine 131 was dumped in the injection zone and the equipment was rigged down. The general area of work was checked for radiation.

3.0 TEST RESULTS

3.1 Casing Pressure Test

A successful pressure test, as defined by the Florida DER, was performed with an initial pressure of 150.5 psig. One hour later, the pressure had declined to 149.75 psig. This is a decline of 0.75 psig, or 0.5%, in one hour's time. The gauge used to monitor this test was a USG Test Gauge with a 4 inch face and subdivided into one-psi divisions. The gauge was calibrated on July 27, 1990. Mr. Vince Mele of the Florida DER witnessed this test.

3.2 Borehole Video Survey

A black and white video survey of the 6-5/8 inch casing, as well as the entire open hole, was performed with no problems. Measured from ground level, the casing shoe was found at 1711 feet and the bottom TD found at 1907 feet. As stated earlier, a copy of this video tape, in VHS format, is being submitted under separate cover to the Florida DER for their files.

3.3 Temperature Survey

At the time the temperature survey was performed, the well had not been pumped into for a period in excess of 48 hours. There were no significant anomalies noticed in the cased portion of the hole on either the absolute (Track A) or differential (Track B) temperature curves. Beginning at approximately 1610 feet, the "dome effect" caused by the injection of cool fluids can be noticed, as indicated on the temperature survey log (Appendix A). In the open hole portion of the log, it appears that a majority of the injected fluid is entering the formation between the casing shoe (1707 feet) and 1770 feet. There also appears to be some injectate entering the formation between 1814 feet and 1846 feet. Mr. Joe Haberfeld of the Florida DER witnessed this log.

3.4 Radioactive Tracer Survey

These logging runs were witnessed by Mr. Vince Mele and Mr. Joe Haberfeld of the Florida DER.

A copy of the RAT log is presented as Appendix B. For the purpose of clarity and simplified discussion, individual portions of the RAT log have been labeled as Log A, Log B, etc. The curves generated by the two detectors have also been labeled as Track A (lower detector) and Track B (upper detector). These individual portions of the RAT log and curves are discussed below:

An initial background gamma ray/casing collar log was run from TD to 699 feet (Log A). This included a repeat section from 1881 to 1547 feet (Log B). Log C illustrates the first static RAT test with the tool stationary at 1708 feet (one foot below the casing shoe) and the logging unit on time drive. Track A (lower detector) indicates a migration of the radioactive fluid reaching the detector approximately 12 minutes from the time of injection. Track B (upper detector) recorded no indication of radioactive material. Log D is a profile of the slug as the logging tool was passed through the Iodine 131 slug. The peak of the slug was at 1705 feet.

Log E portrays the gamma ray reading after flushing the well with 600 gallons of water. Both detectors recorded a slight increase over the background count just below the shoe.

Log F is a recording of the second static radioactive test. Again, the logging is recorded on time drive and indicates slug movement passing the downhole detector in 9-1/2 minutes and passing the upper detector in 14 minutes. This dispersion phenomena can probably best be explained when the short time periods between flushing and testing are considered. This "yo-yoing" effect in the water column was exaggerated by injection rates in excess of 600 gallons per minute and the exceptional permeability of the aquifer.

Log G defined the iodine slug after the static wait period, indicating a peak at 1705 feet. Additionally, Track A appears to be picking up remnants of the first iodine slug at 1840 to 1850 feet.

Log H is an additional gamma ray log run after pumping 3000+ gallons of water. There were still indications of residual radioactive material at the casing shoe.

The first dynamic test was performed and illustrated as Log I. Track A indicates a response beginning about 12-1/2 minutes from injection. Track B indicates no radioactive response. After the 20-minute waiting period, three passes (Logs J, K, and L) were made through the iodine slug to define its entry into the formation. Log J is Pass No. 3. Log K is Pass No. 2. Log L is Pass No. 1. It appears that the aquifer is accepting the fluid beginning about ± 1715 feet.

The well was flushed and a gamma ray log (Log M) performed. Nothing unusual was noticed.

The second dynamic test was performed and is illustrated as Log N. Track A again recorded a response approximately 14 minutes from injection, while the upper detector recorded no response during the 20-minute test. A single-flow profile was performed (Log O) after the stationary time period was over, again indicating the formation taking fluid at ± 1715 feet.

Log P is the baseline gamma ray survey (TD to 1200 feet) performed after all tests were concluded. Once again it is apparent that the injected fluid is entering the formation around ± 1720 feet.

All RAT tests indicated proper flow of injected fluids with no fluid migration in the casing/hole annulus.

4.0 CONCLUSION

From the results of all tests conducted on the subject well from August 5, 1990 through August 7, 1990, this well must be considered mechanically sound and meeting the requirements established by the FAC 17-28.130(6) and 17-28.250(1).

APPENDICES

APPENDIX A

TEMPERATURE SURVEY LOG

APPENDIX B

RADIOACTIVE TRACER LOG

Gulf Coast Well Analysis

APPENDIX A

DIFFERENTIAL TEMPERATURE LOG

FILING NO

COMPANY GASPARILLO ISLAND WATER ASSOCIATION

WELL G.I.W.A. INJECTION WELL # 1

FIELD GASPARILLO ISLAND

COUNTY LEE STATE FLORIDA

LOCATION

LAT. 82, 15'36"
LOG. 26, 45'24"

SEC 4 TWP 43 S RGE 20 E

OTHER SERVICES

R.A.T.

PERMANENT DATUM P/D ELEV N.A.
LOG MEASURED FROM P/D 0.0 FT ABOVE PERM DATUM
DRILLING MEASURED FROM PAD

ELEV KB N.A.
DF N.A.
GL N.A.

Date	AUG 7, 1990		
Run No.	ONE		
Type Log	R.A.T.		
Depth-Driller	N.A.		
Depth-Logger	1902		
Bottom logged interval	1900		
Top logged interval	SURF.		
Type fluid in hole	WASTE WATER		
Max rec. temp., deg. F.	85.2°F		
Operating rig time	MAST		
Recorded by	JOHNSON		
Witnessed by	MR. HANNERS		

Bore-Hole Record

Run No	Bit	From	To

Tubing Record

Size	Wgt.	From	To

Casing Record

Size	Wgt.	From	To
5.5	N.A.	SURF.	1709

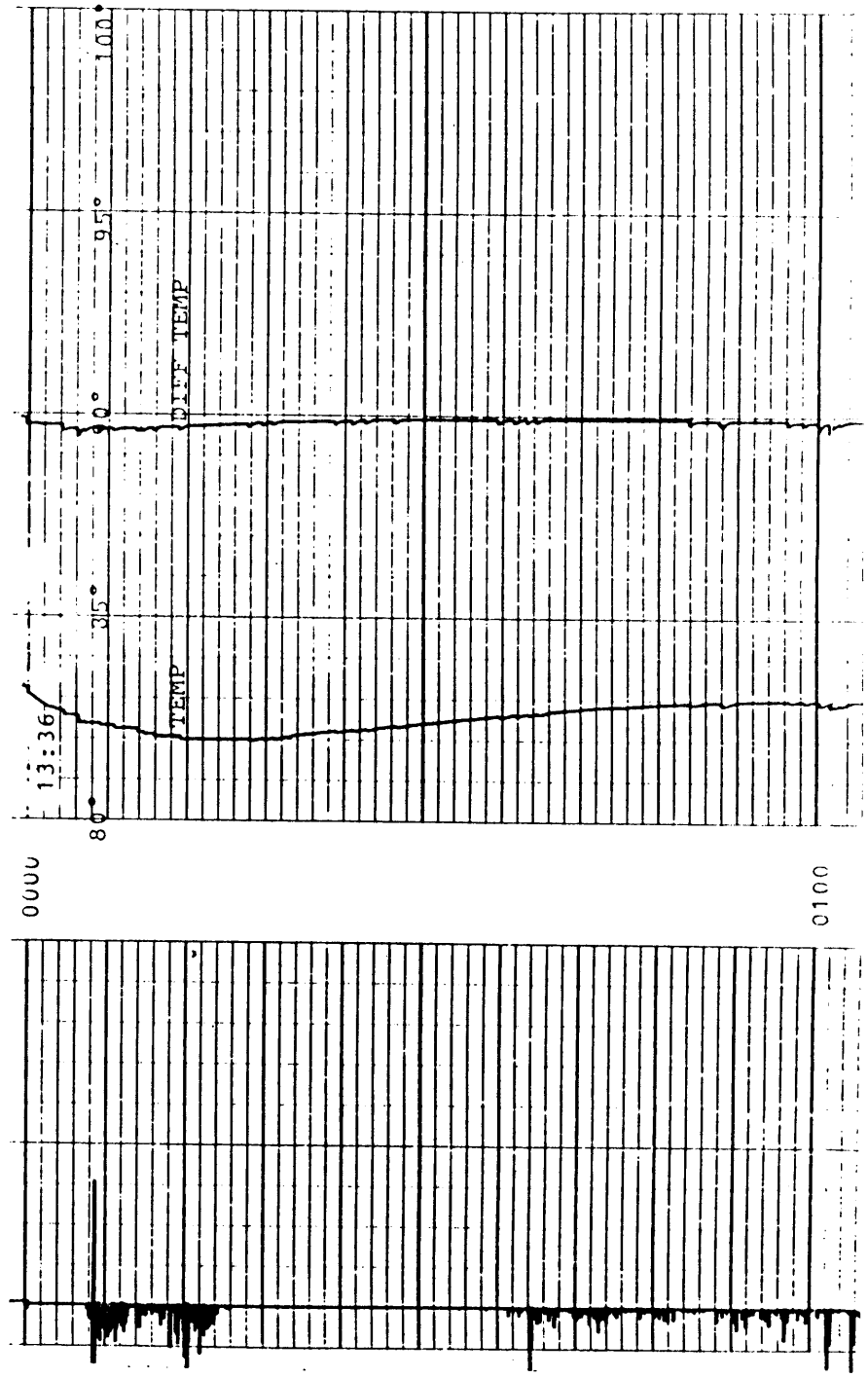
Liner

Size	Wgt.	From	To

NOTICE: All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

Gulf Coast Well Analysis

Form 110-H



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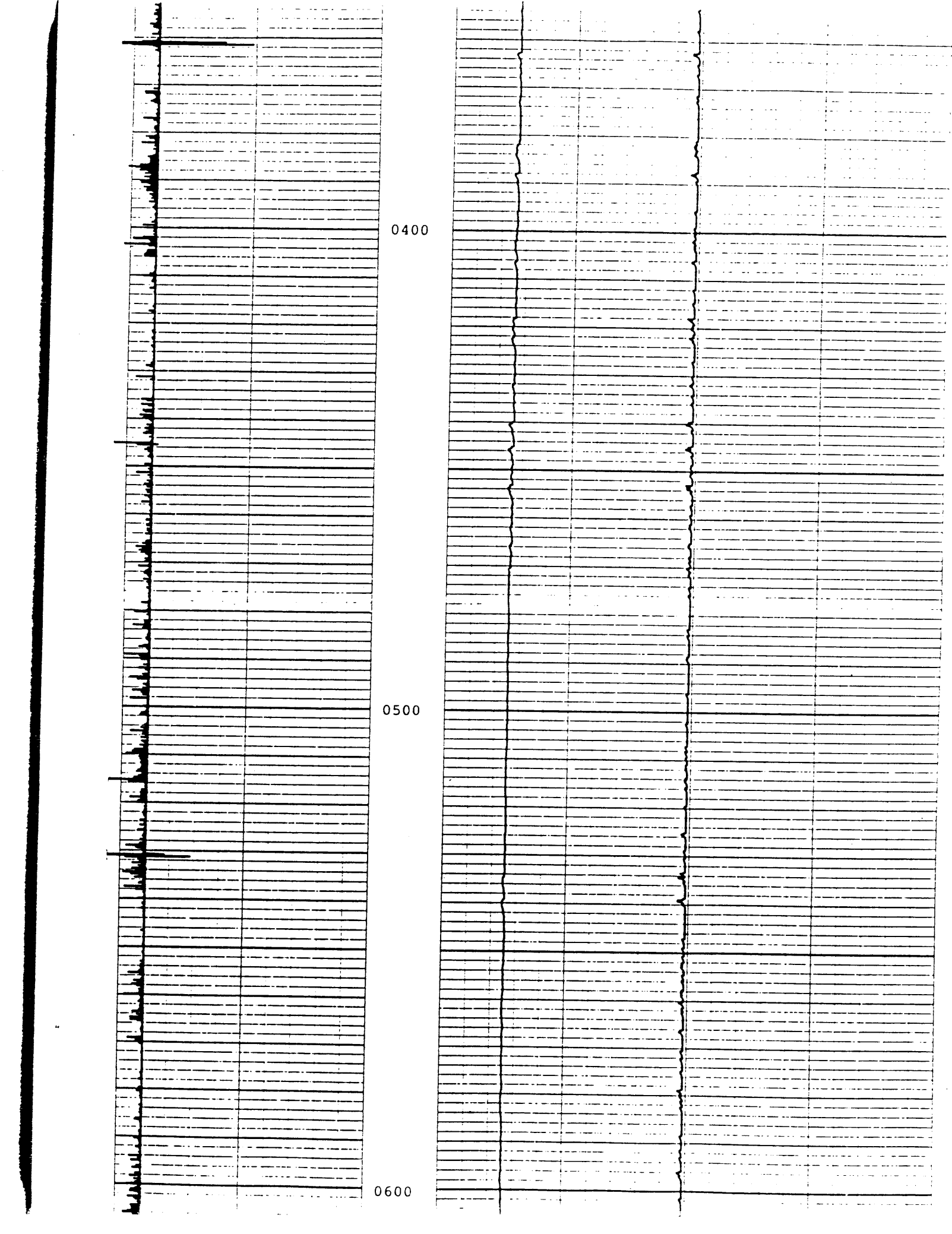
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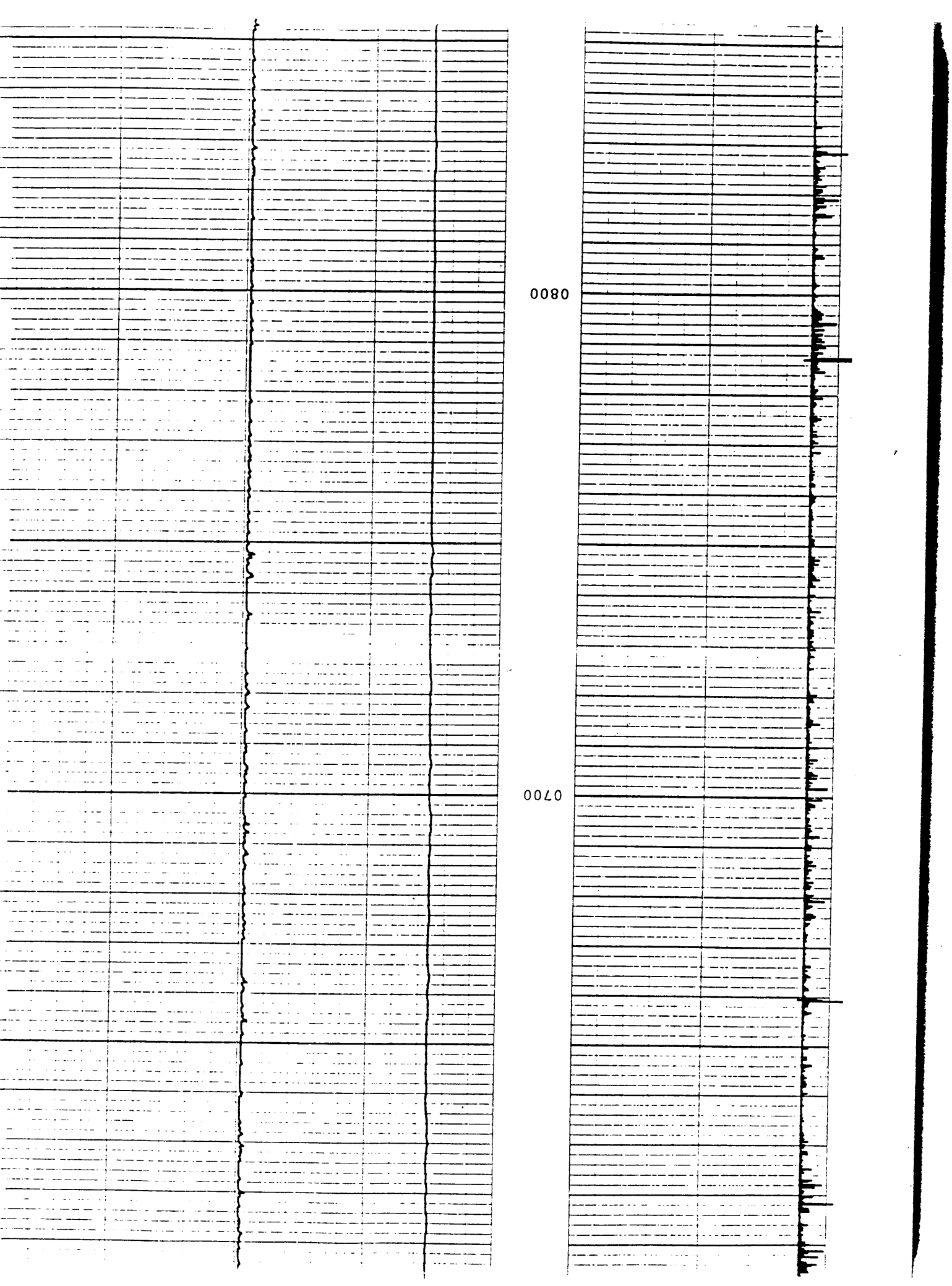
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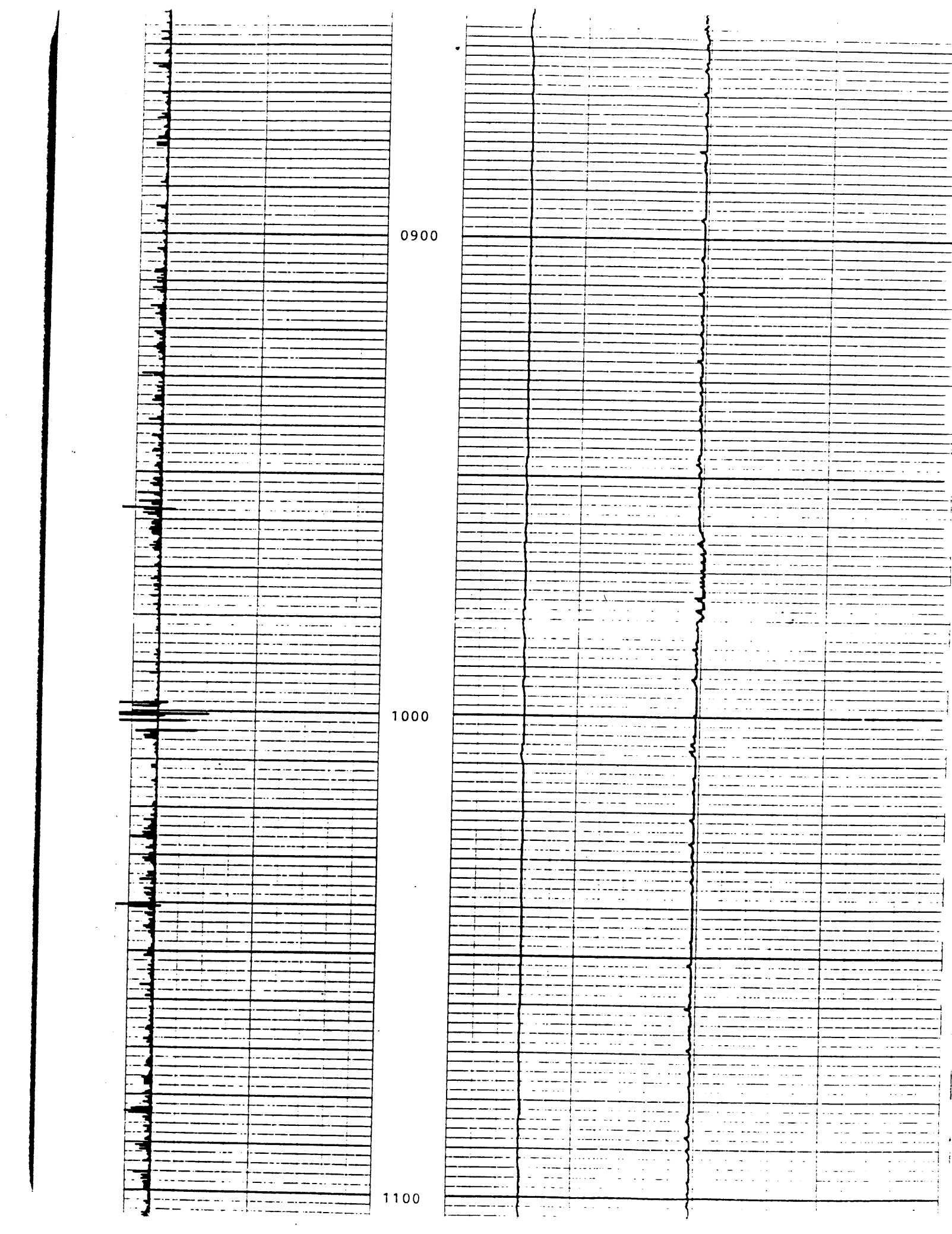
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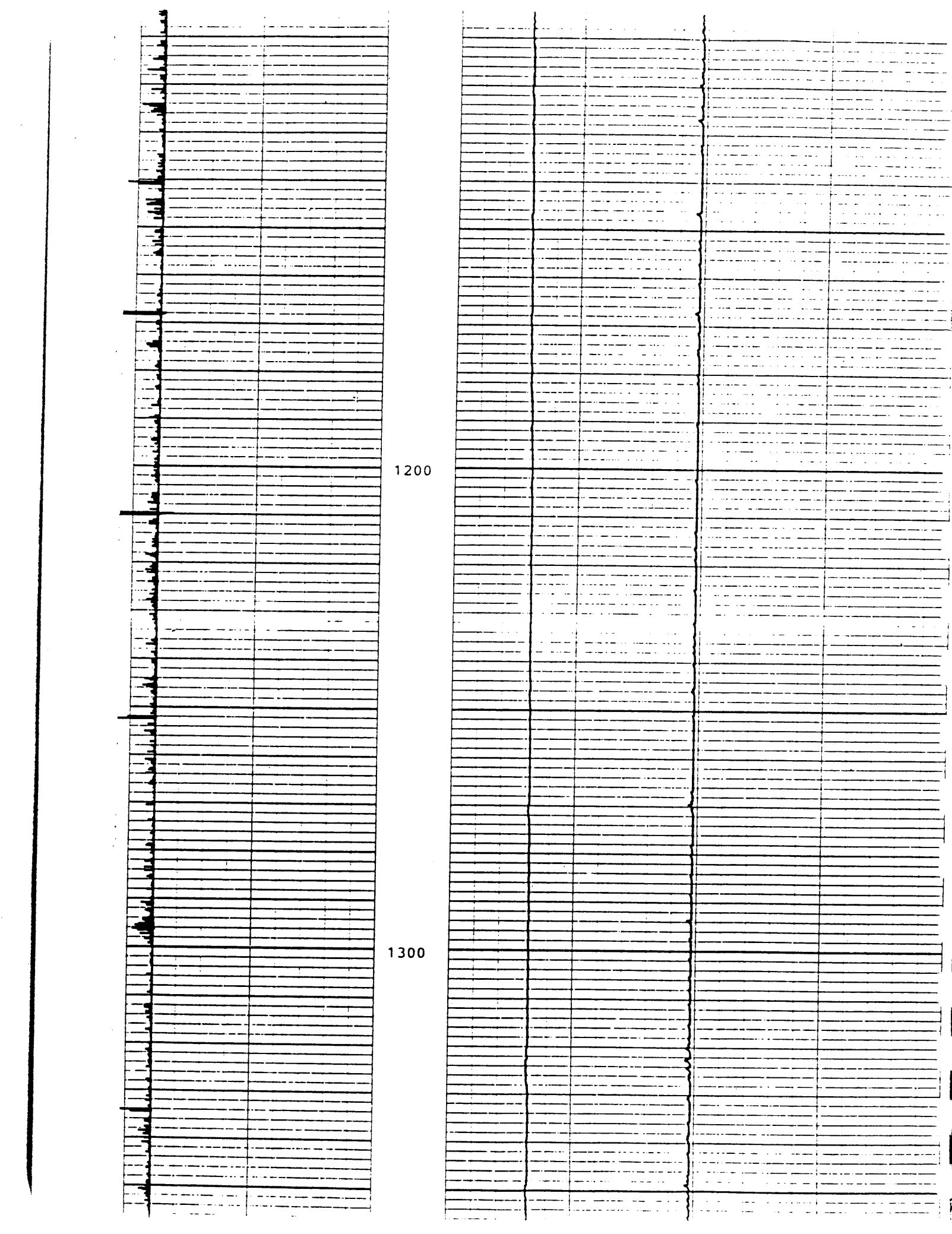
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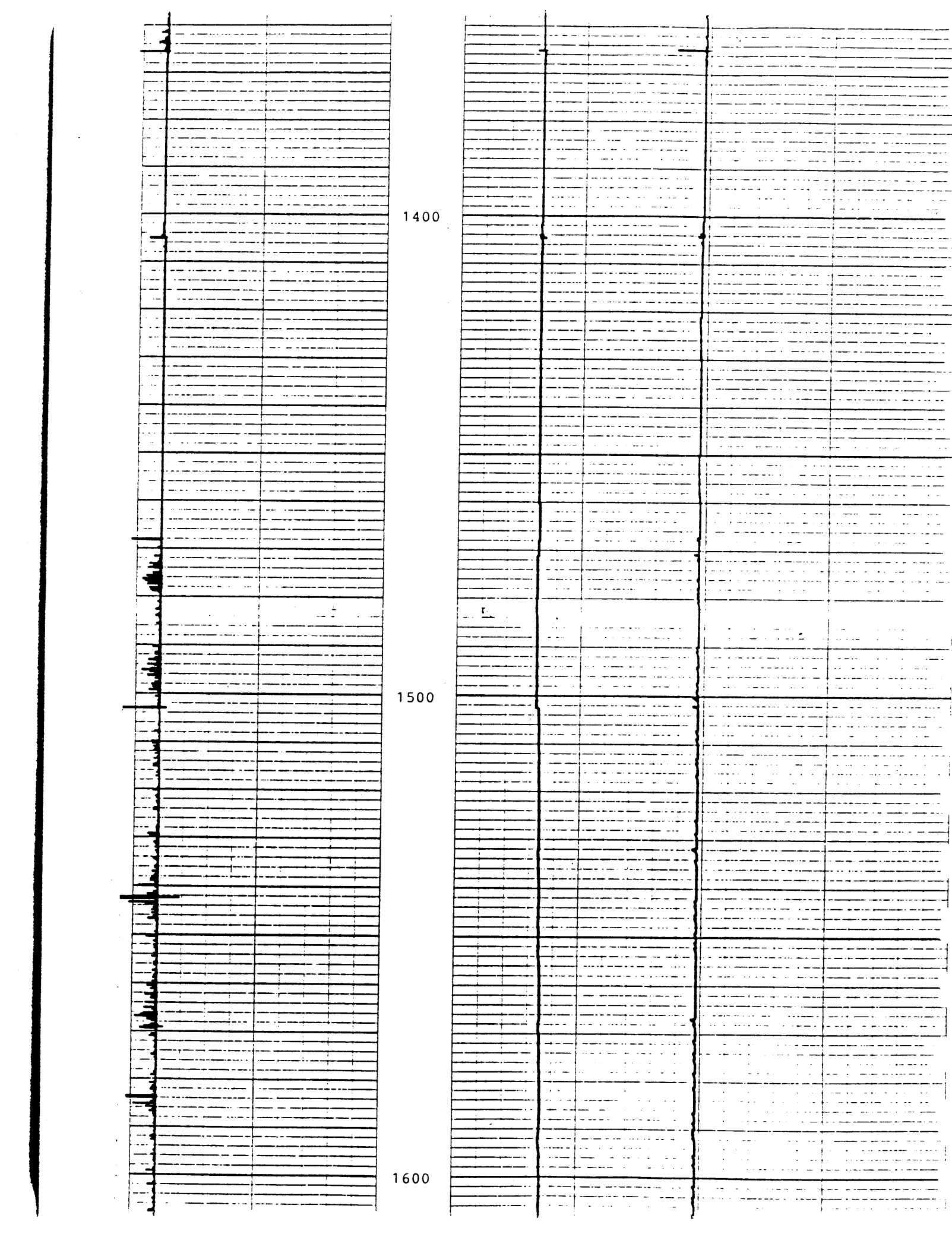
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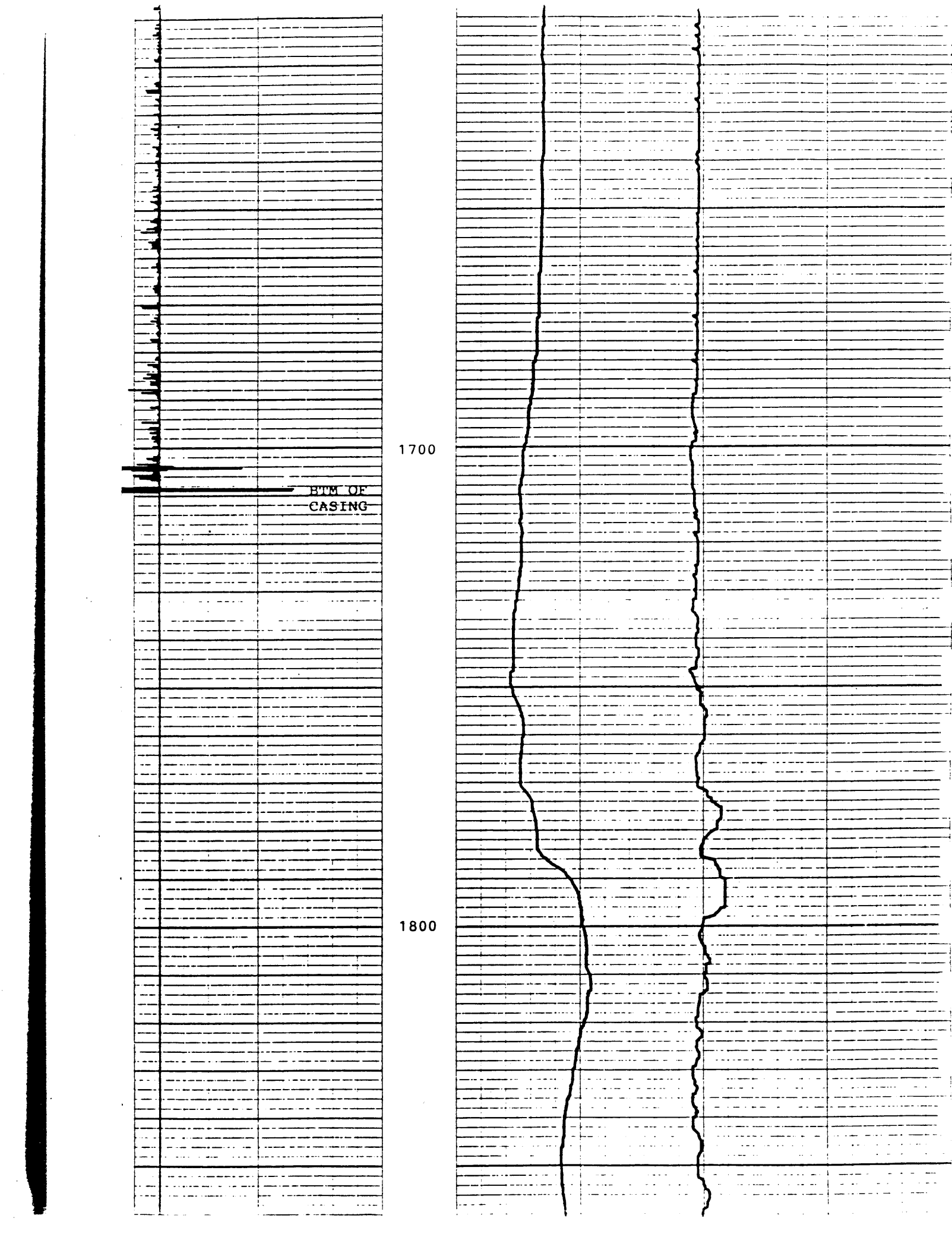
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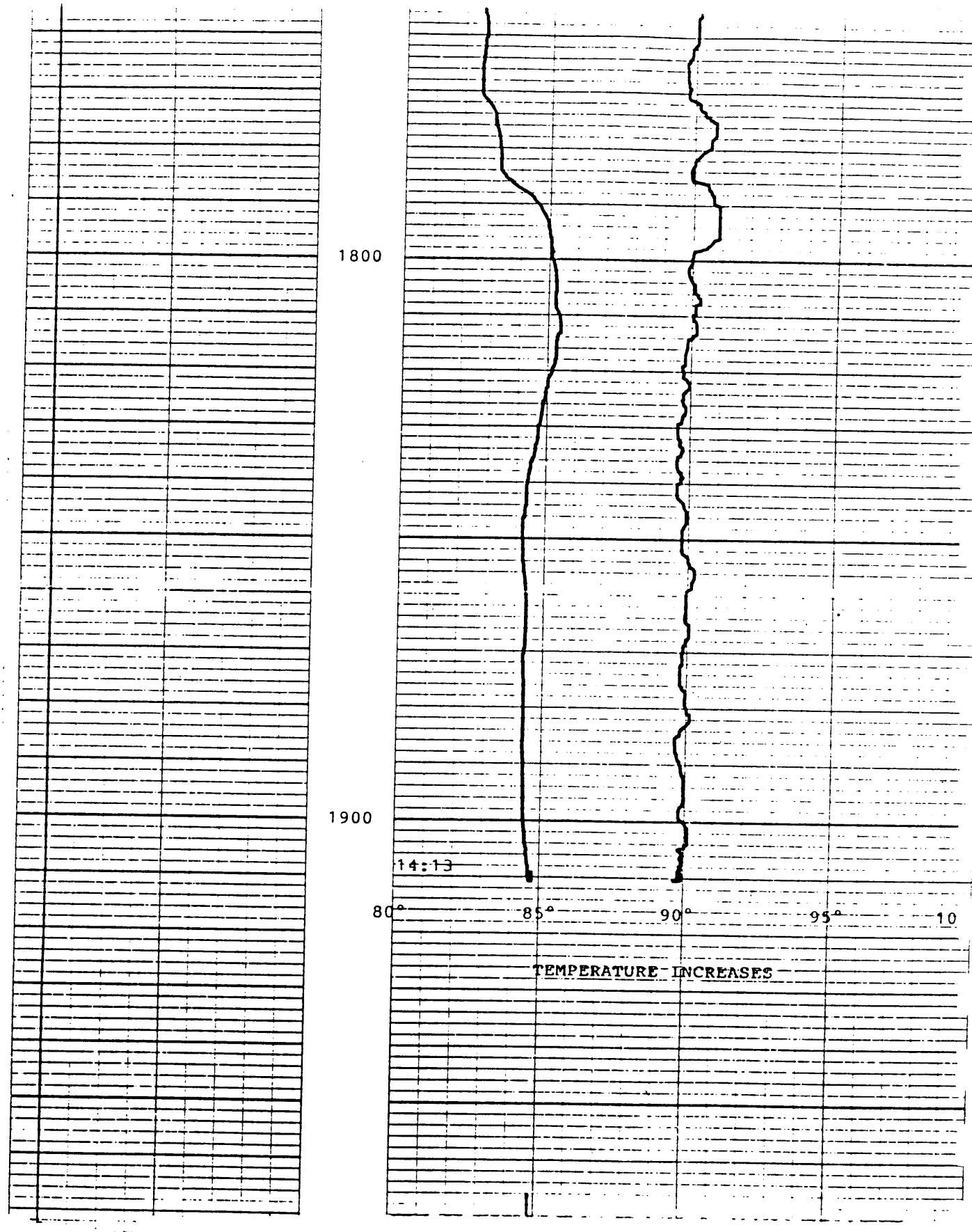
BTM OF
CASING
1800


1800
1900
14:13
80°
85°
90°
95°
10
TEMPERATURE INCREASES

APPENDIX B

Gulf Coast Well Analysis

RADIOACTIVE TRACER LOG

MECHANICAL INTEGRITY TEST

FILING NO. _____

COMPANY GASPARILLO ISLAND WATER ASSOCIATION

WELL G.I.W.A. INJECTION WELL # 1

FIELD GASPARILLO ISLAND

COUNTY LEE STATE FLORIDA

LOCATION: LAT. 82, 15'36" LOG. 26, 45'24"

SEC. 4 TWP. 43 S RGE. 20 E

OTHER SERVICES: DIFF. TEMP.

PERMANENT DATUM: PAD ELEV.: N.A.

LOG MEASURED FROM PAD 0.0 FT. ABOVE PERM. DATUM

DRILLING MEASURED FROM PAD

ELEV. K.B. N.A. D.F. N.A. G.L. N.A.

Date	AUG 7, 1990
Run No.	ONE
Type Log	R.A.T.
Depth-Driller	N.A.
Depth-Logger	1902
Bottom logged interval	1900
Top logged interval	700
Type fluid in hole	WASTE WATER
Max rec. temp., deg. F.	85.2°F
Operating rig time	MAST
Recorded by	JOHNSON
Witnessed by	MR. HINNERS

Bore-Hole Record			Casing Record			Tubing Record			Liner		
Run No.	Bit	From	To	Size	Wgt.	From	To	Size	Wgt.	From	To
				1.5	N.A.	SURFACE	1709				

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Gulf Coast Well Analysis

THIS HEADING AND LOG CONFORMS TO API RP 33

EQUIPMENT DATA

Gamma Ray		Neutron	
Run No.	ONE	Run No.	
Tool Model No.	CRC	Log Type	
Diameter	1.5"	Tool Model No.	
Detector Model No.	G-1	Diameter	
Type	GEIGER	Detector Model No.	
Length	12"	Type	
Distance to N. Source		Length	
		Source Model No.	
General		Serial No.	
Hoist Truck No.	P-101	Spacing	
Instrument Truck No.	P-101	Type	
Tool Serial No.	1326 & 1327	Strength	
District	PEARLAND TX		

LOGGING DATA

General				Gamma Ray			Neutron			
Run No.	Depths From	Depths To	Speed Ft/Min.	T.C. Sec.	Sens. Settings	Zero Div. L or R	API G.R. Units per Log Div.	T.C. Sec.	Sens. Settings	Zero Div. L or R	API N. Units per Log Div.
1	1901	700	30	2	200/10	2-L					
1	1885	684	30	2	200/100	2-L					

Reference Literature: TOP DETECTOR TO INJECTOR = 8'
INJECTOR TO CCL = 3'
CCL TO BOTTOM DETECTOR = 5'

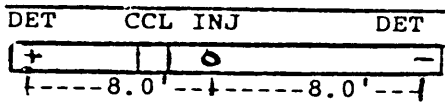
Remarks: RADIOACTIVE TRACER LOG INDICATES THAT ALL FLUID IS GOING INTO DISPOSAL ZONE AT THIS TIME. NO INDICATION OF FLUID MIGRATION UP HOLE BEHIND CASING.

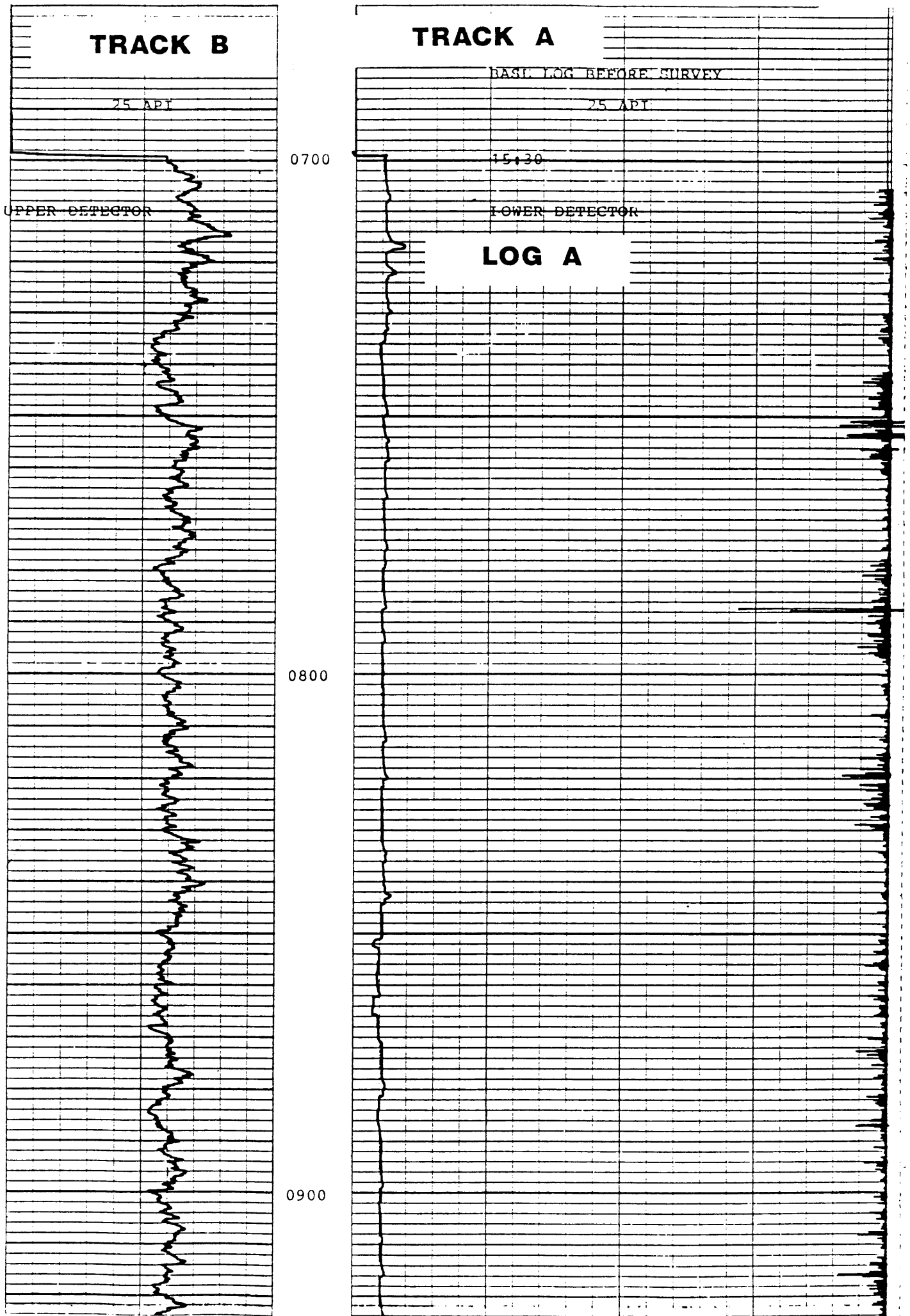
Fold Here

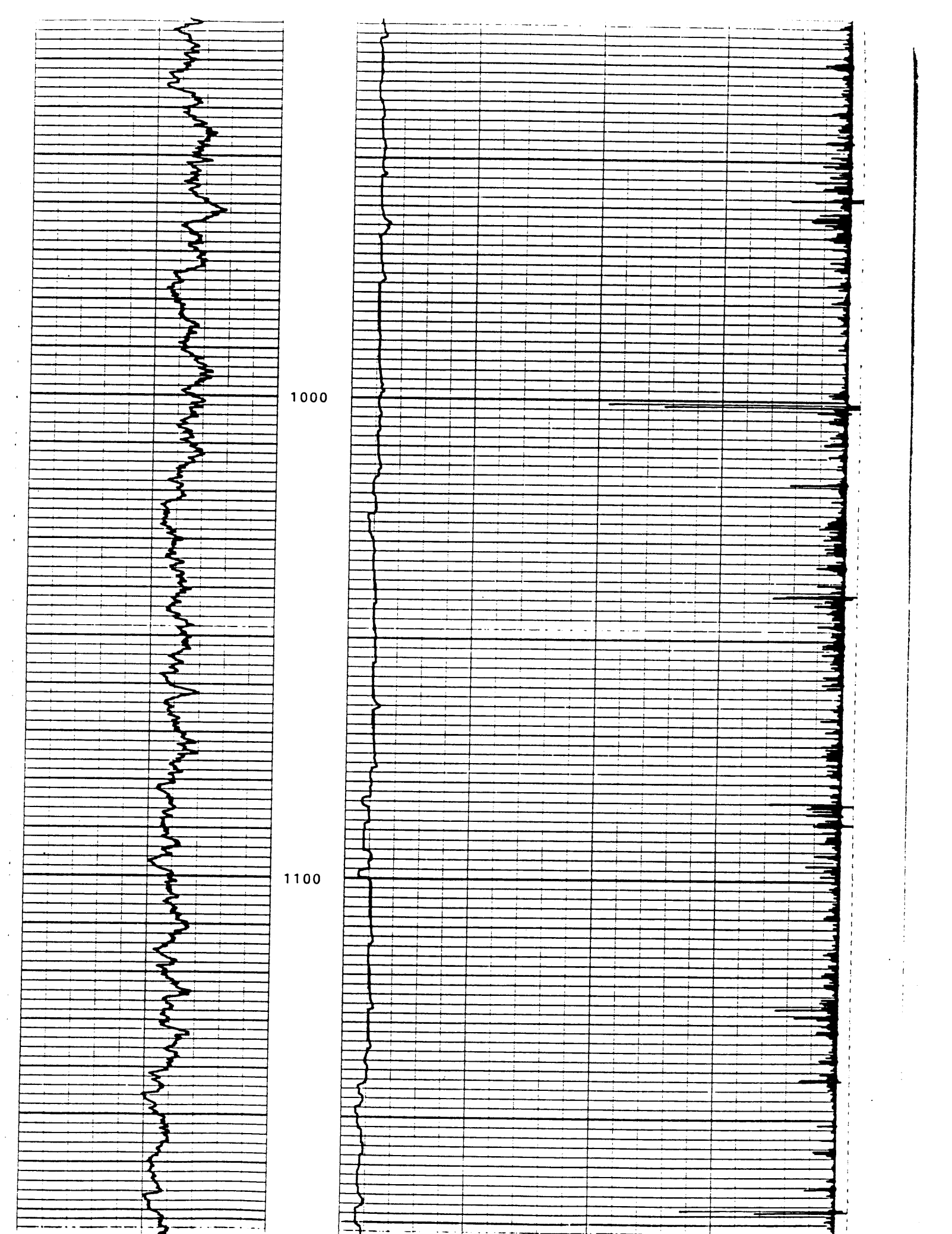
GAMMA RAY	DEPTHS	NEUTRON
API GAMMA-RAY UNITS		API NEUTRON UNITS

RADIOACTIVE TRACER LOG SUMMARY SHEET

Run	Time		Depth		Rate	TC	Description
1	14:40	15:30	1893	700	30'/m	2	BASE & REPEAT GAMMA RAY LOG
2	16:20	16:50		1708	STAT.	1	TOP DETECTOR @ 1700 LOWER DETECTOR @ 1716 INJ. @ 1708
3	16:54	17:02	1850	1600	30'/m	2	PASS # 1 ON 1st SLUG PEAK 1705
4	17:05	17:10	1750	1650	30'/m	2	LOGGED AFTER PUMPING 600 GALS
5	17:15	17:45		1708	STAT	1	TOP DETECTOR @ 1700 LOWER DETECTOR @ 1716 INJ. @ 1708
6	17:48	17:56	1850	1600	30'/m	2	PASS # 1 ON 2nd SLUG PEAK 1705
7	18:00	18:05		1750	STAT.	1	DETECTOR @ 1750 PUMPED 600 GALS.
8	18:07	18:11	1750	1650	30'/m	2	LOGGED AFTER PUMPING 3000 GALS
9	18:24	18:44		1702	5.8 GPM STAT	1	TOP DETECTOR @ 1694 LOWER DETECTOR @ 1710 INJ @ 1702
10	18:46	18:53	1850	1600	30'/m	2	PASS # 1 AFTER 3rd SLUG PEAK 1738
11	18:58	19:01	1850	1650	30'/m	2	PASS # 2 AFTER 3rd SLUG PEAK 1748
12	19:03	19:07	1800	1650	30'/m	2	PASS # 3 AFTER 3rd SLUG PEAK 1750
13	19:17	19:23	1800	1650	30'/m	2	LOGGED AFTER PUMPING 3000 GALS
14	19:27	19:47		1702	5.8 GPM STAT	1	TOP DETECTOR @ 1694 LOWER DETECTOR @ 1710 INJ @ 1702
15	19:50	19:59	1850	1600	30'/m	2	PASS # 1 ON 4th SULG PEAK 1736
16	20:03	20:23	1901	1200	30'/m	2	FINAL BASE LOG PEAK @ 1750




TRACK B
25 API
UPPER DETECTOR
0700
0800
0900
TRACK A
BASIC LOG BEFORE SURVEY
25 API
15:30
LOWER DETECTOR
LOG A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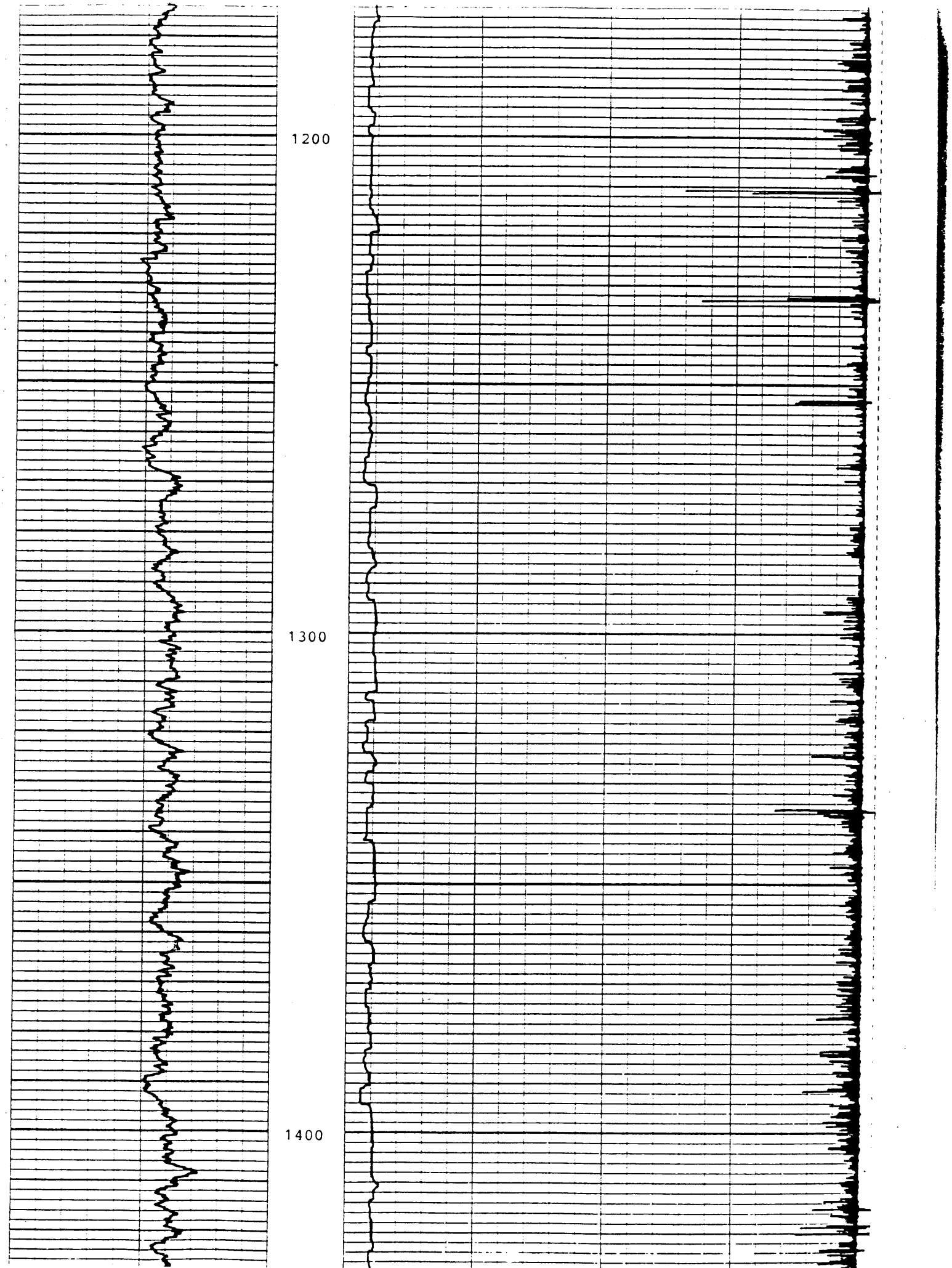
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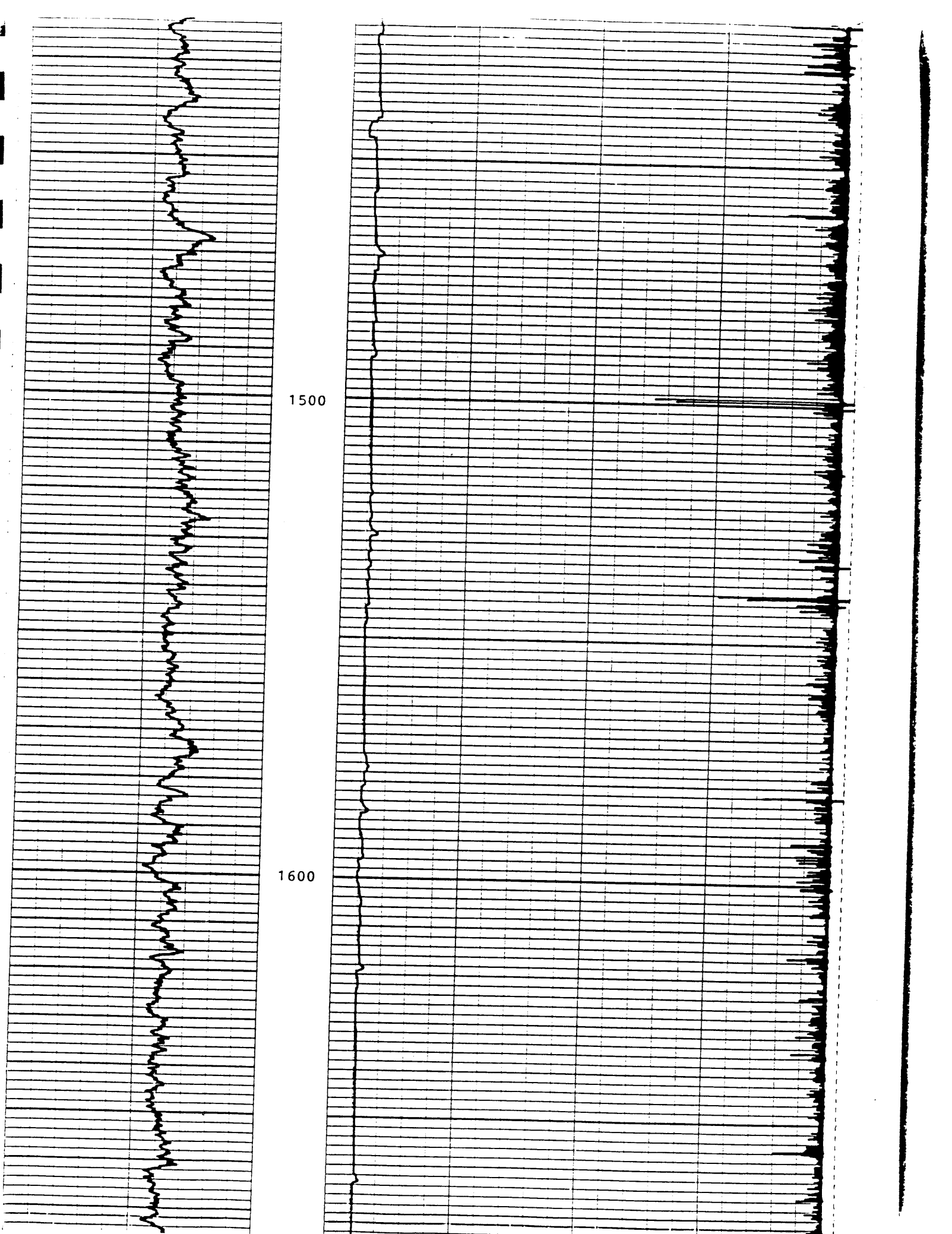
1400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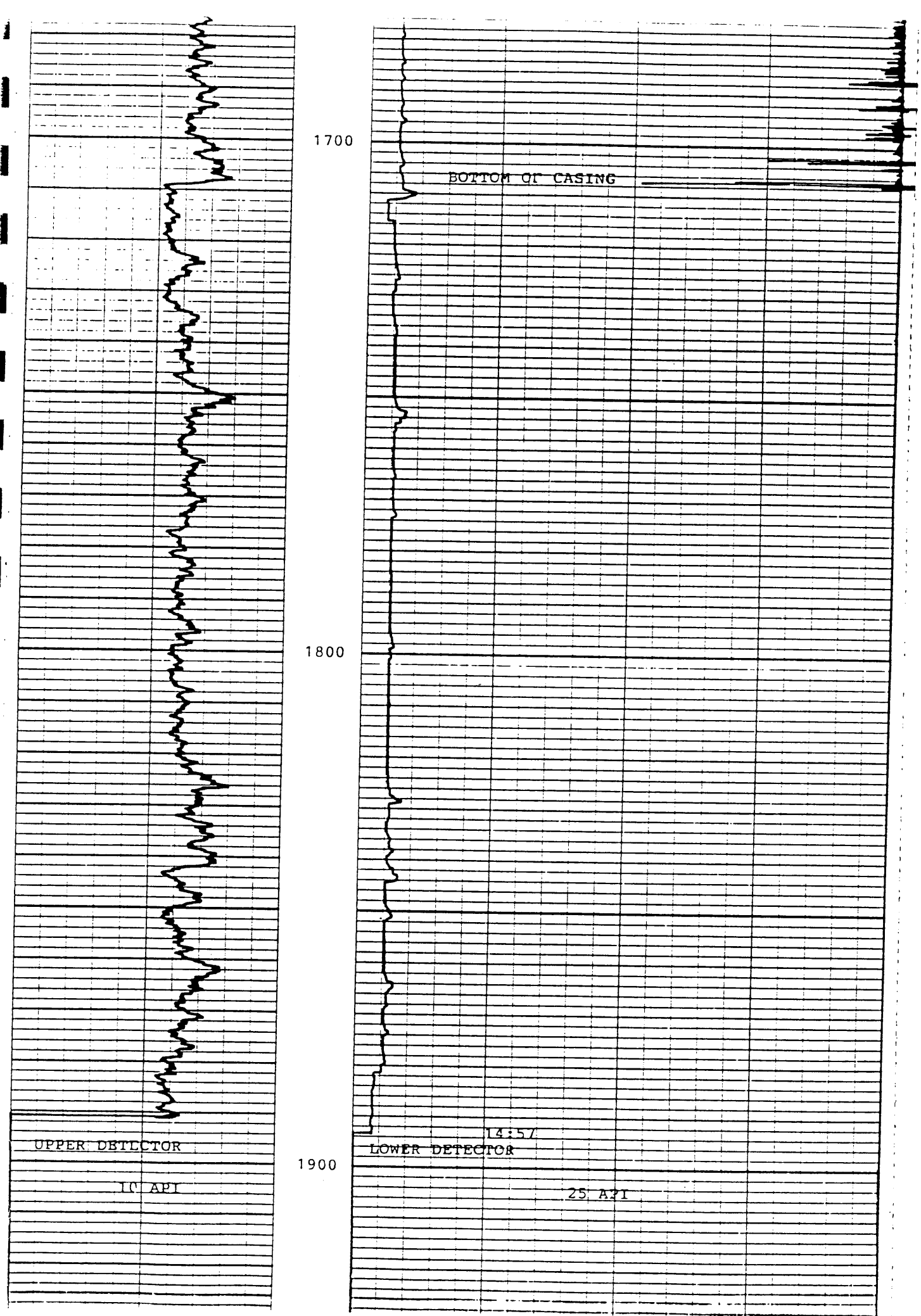
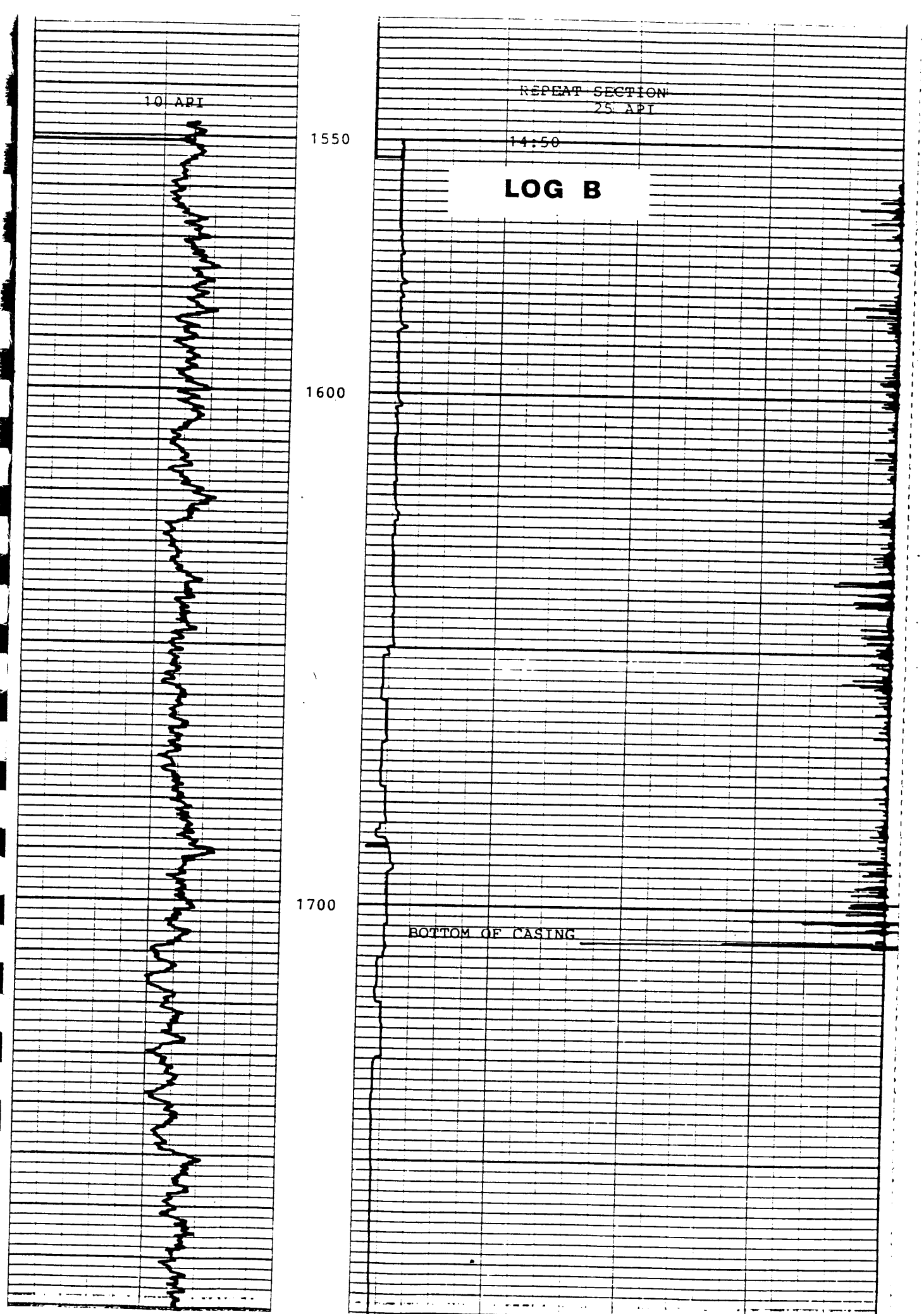
1600


1700
BOTTOM OF CASING
1800
14:57
UPPER DETECTOR
LOWER DETECTOR
1900
10 API
25 API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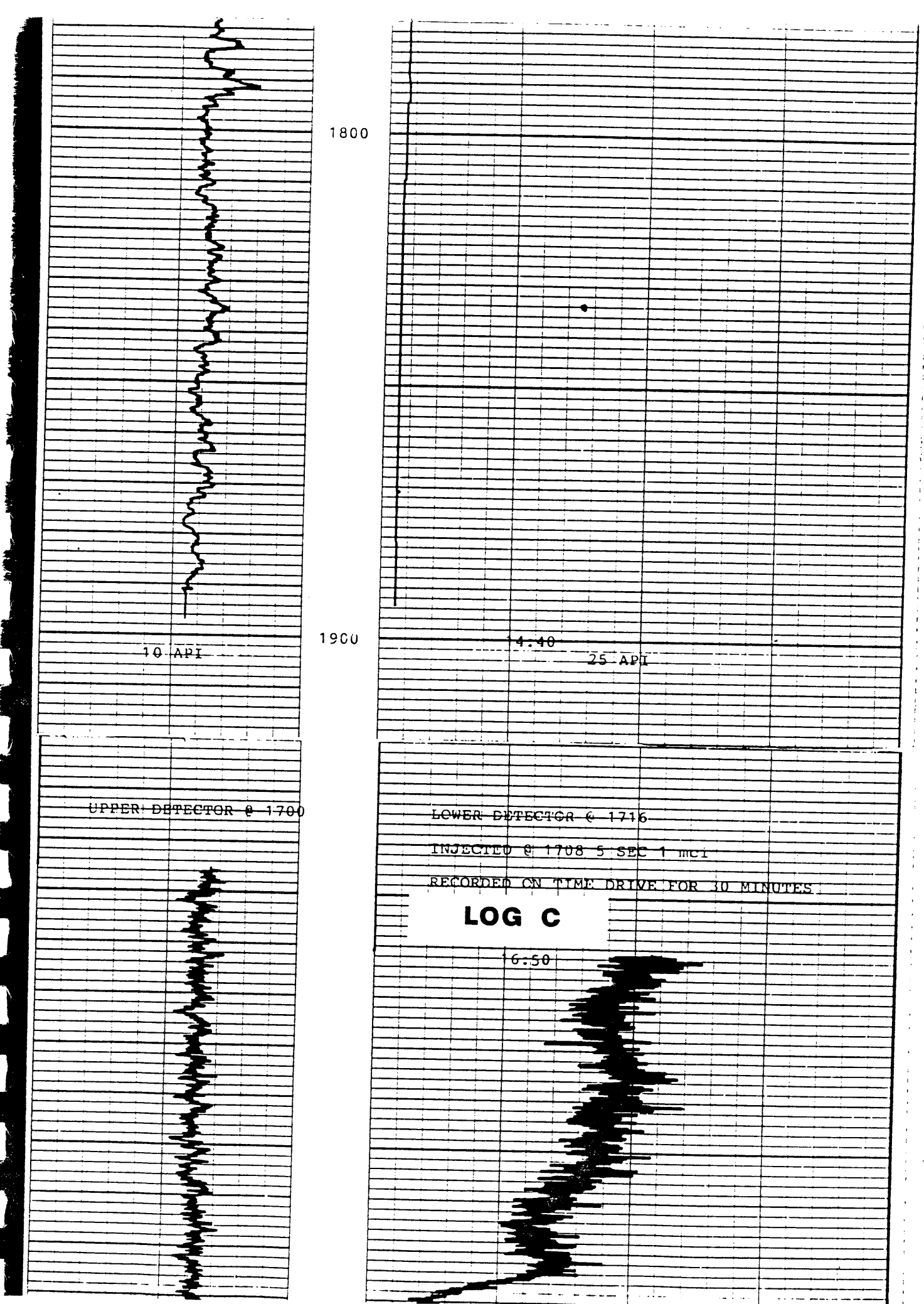
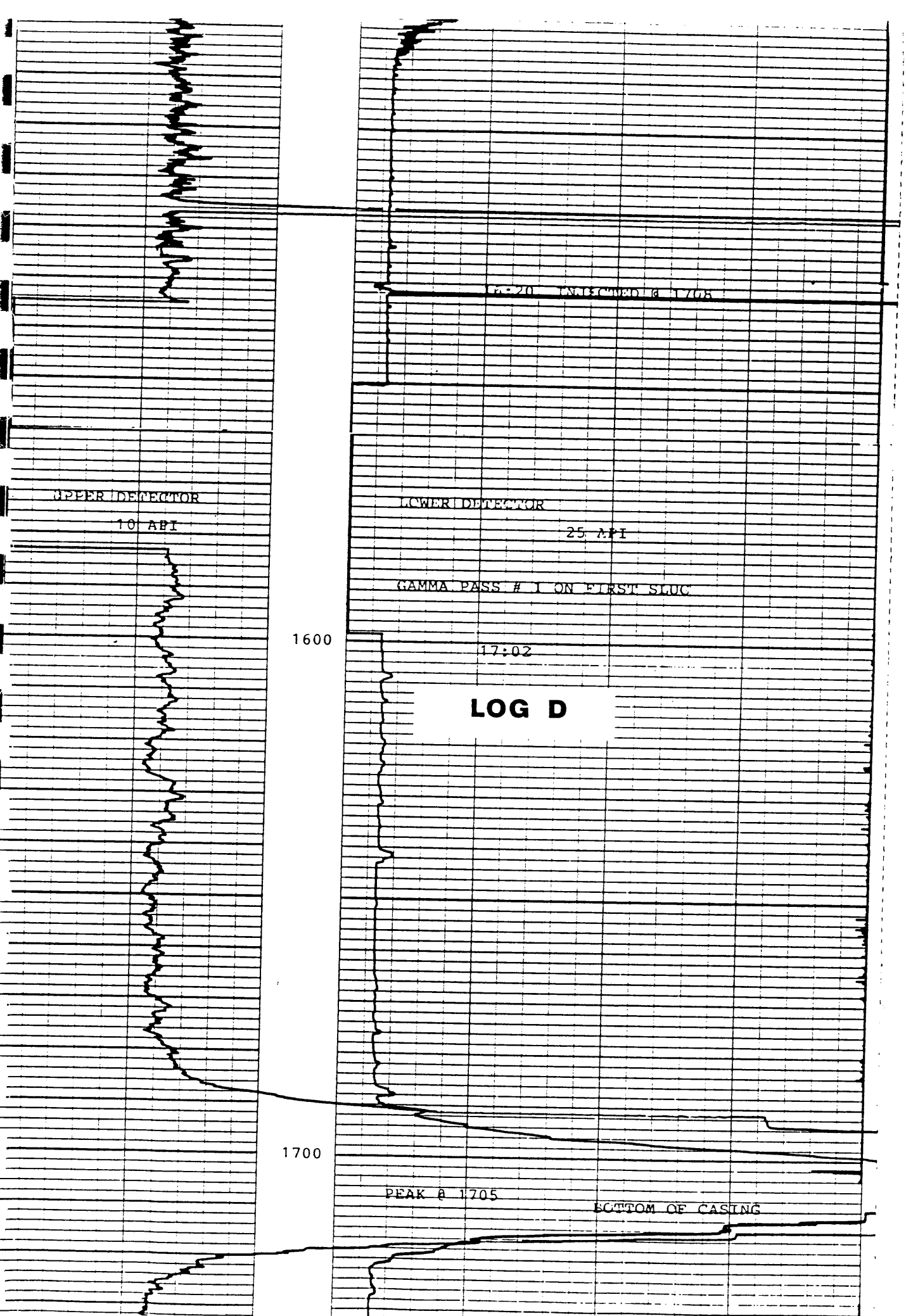
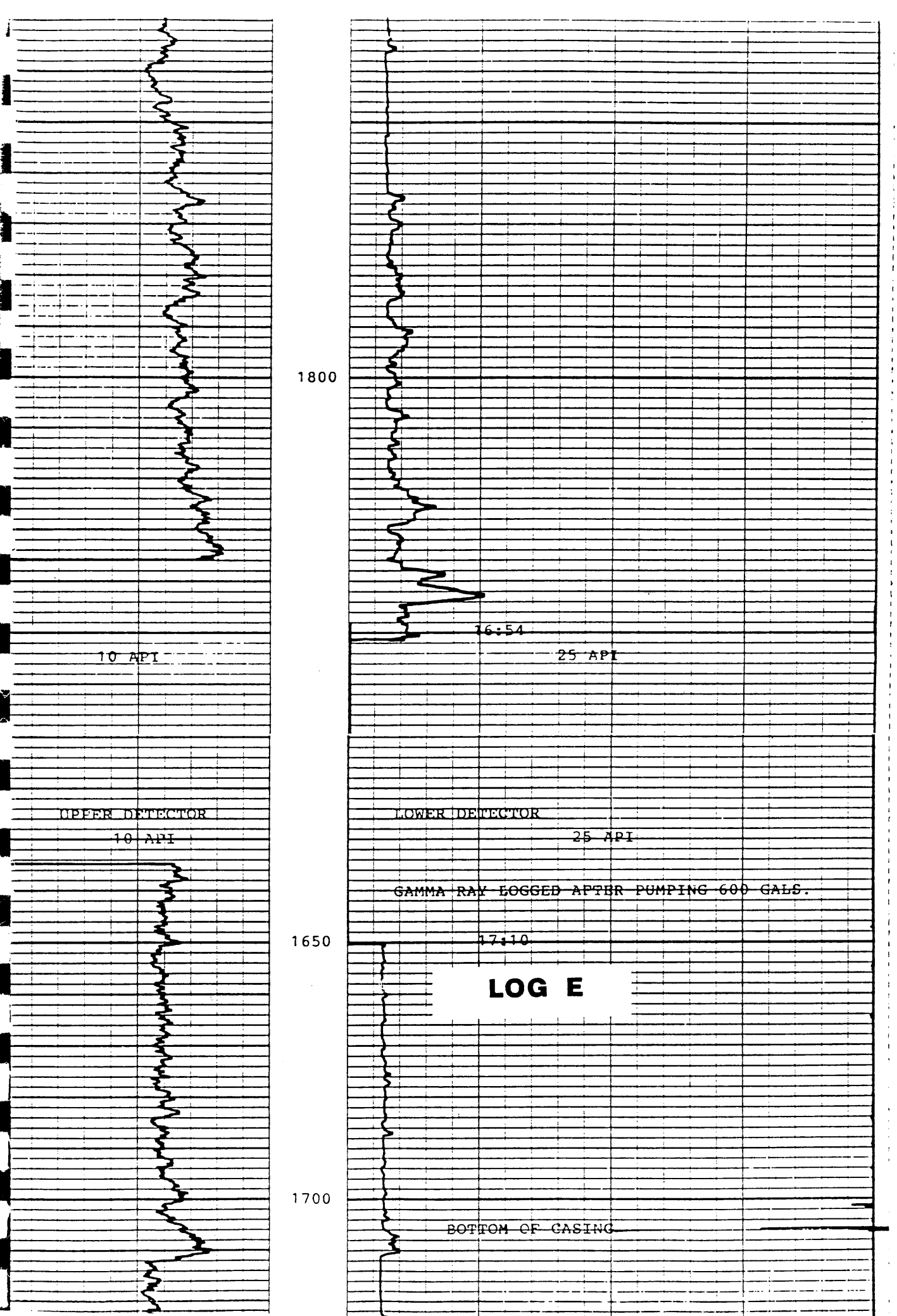
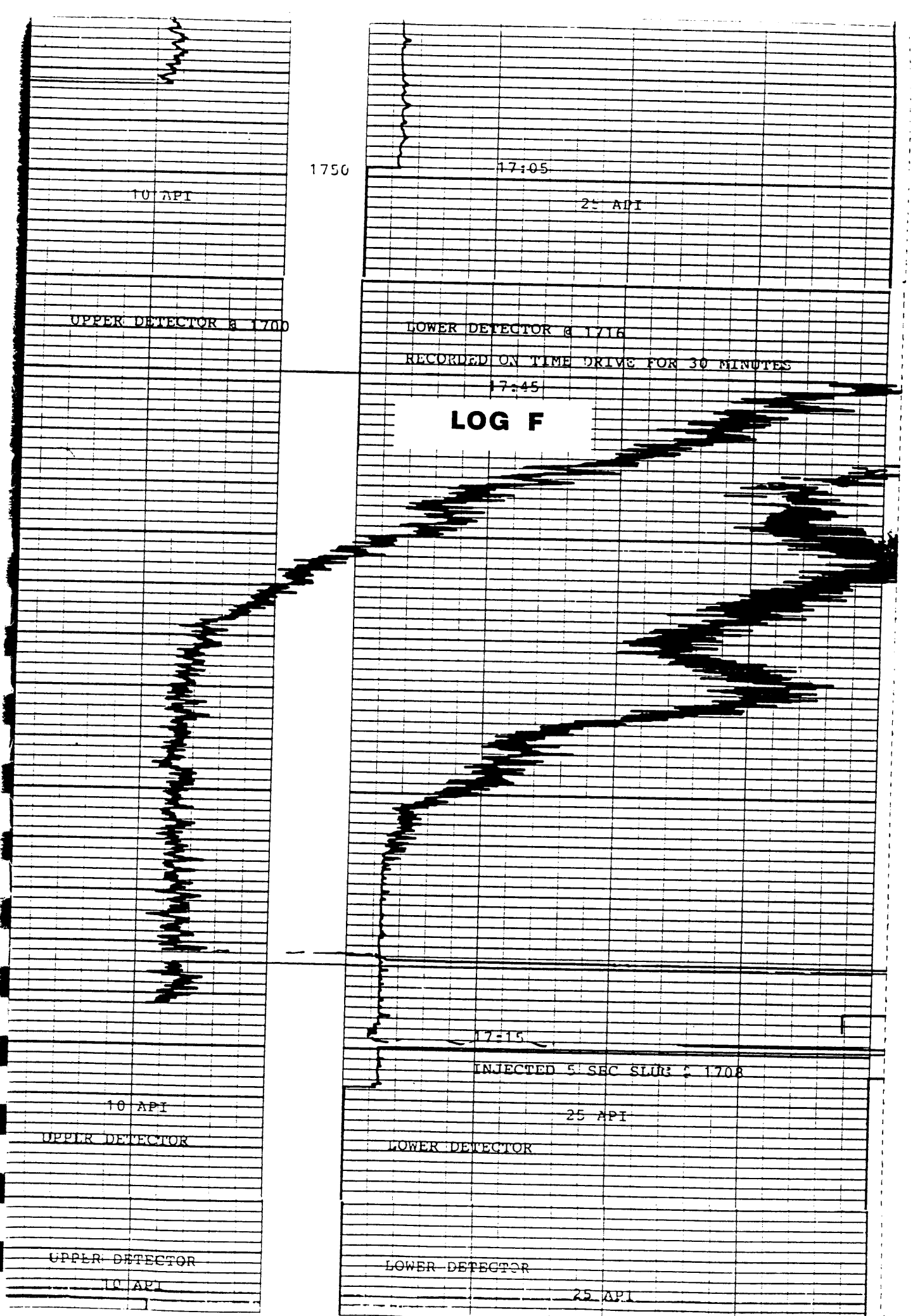
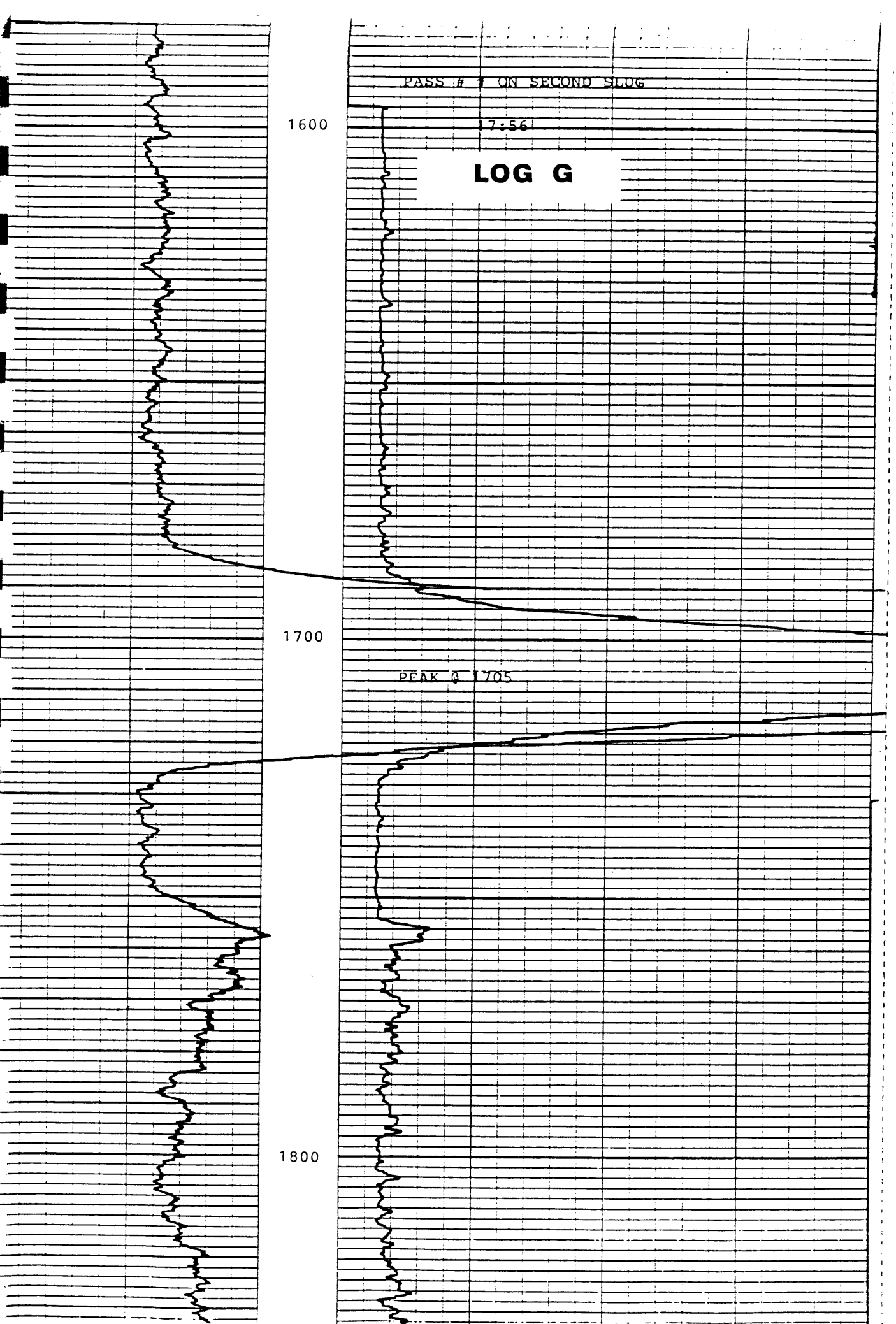
1600
1700
REPEAT SECTION
25 API
14:50
LOG B
BOTTOM OF CASING

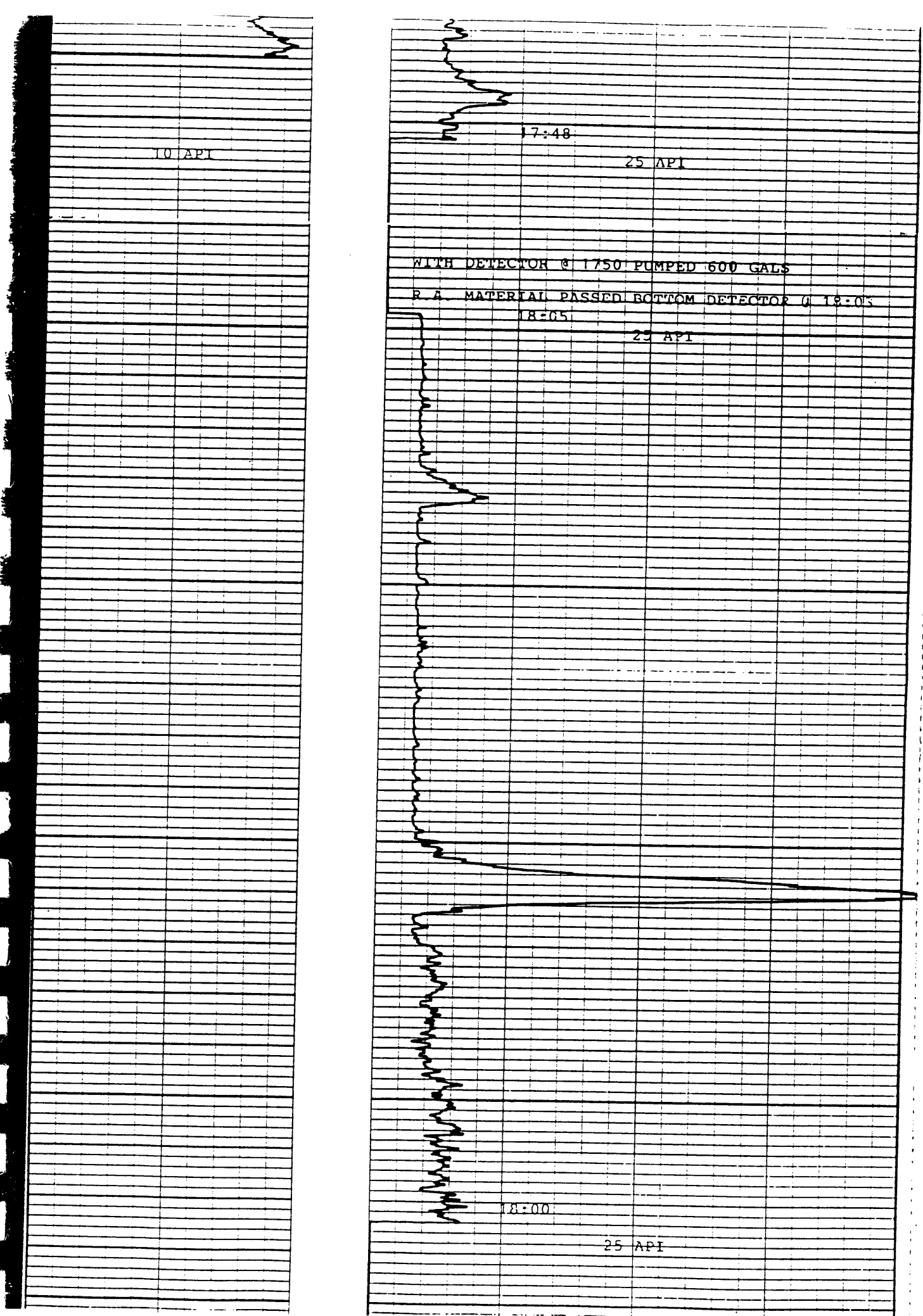

1800
1900
10 API
14.40
25 API
UPPER DETECTOR @ 1700
LOWER DETECTOR @ 1716
INJECTED @ 1708 5 SEC 1 mci
RECORDED ON TIME DRIVE FOR 30 MINUTES
LOG C
16.50

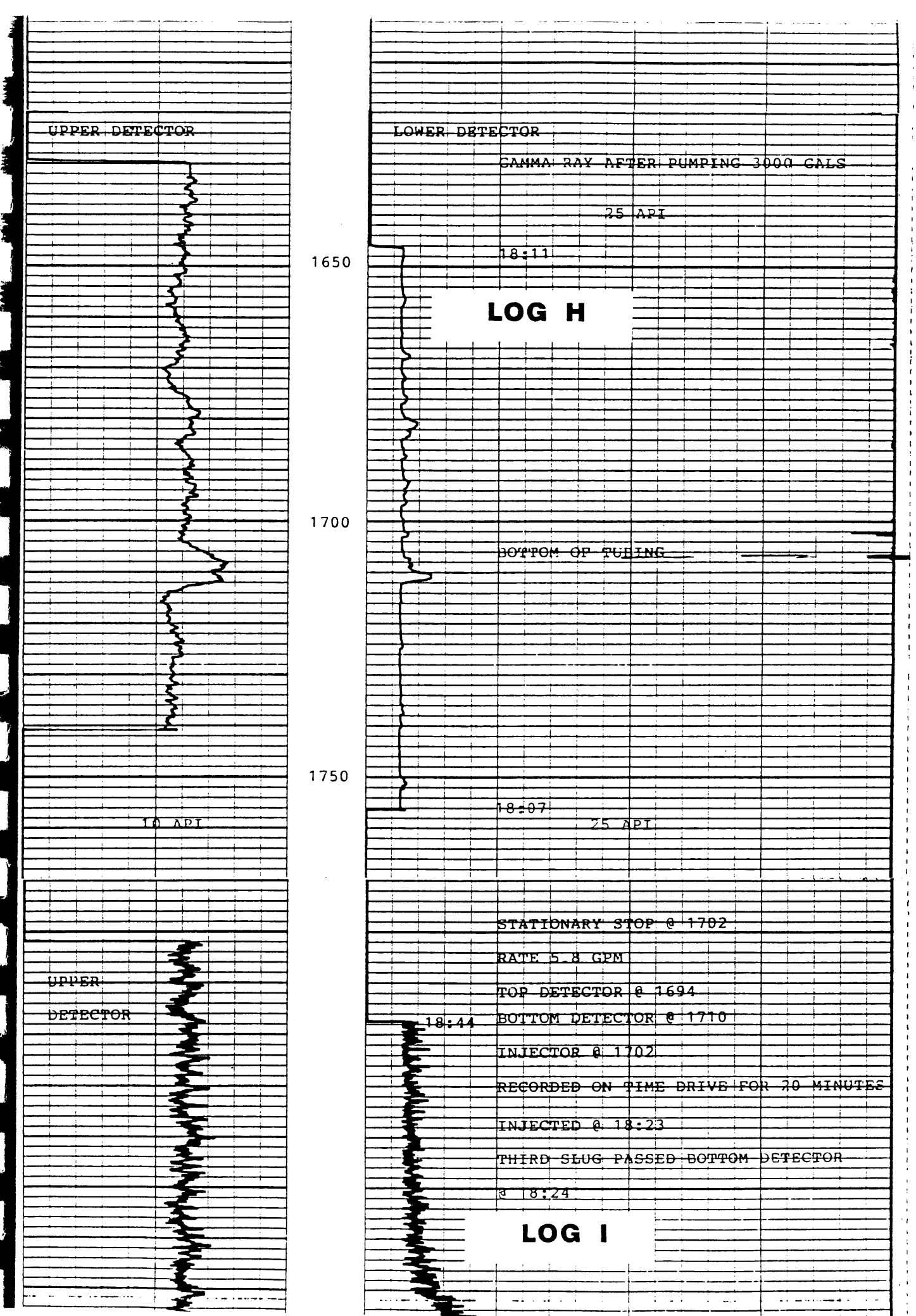

UPPER DETECTOR
10 API
LOWER DETECTOR
25 API
GAMMA PASS # 1 ON FIRST SLUG
17:02
LOG D
1600
1700
PEAK @ 1705
BOTTOM OF CASING

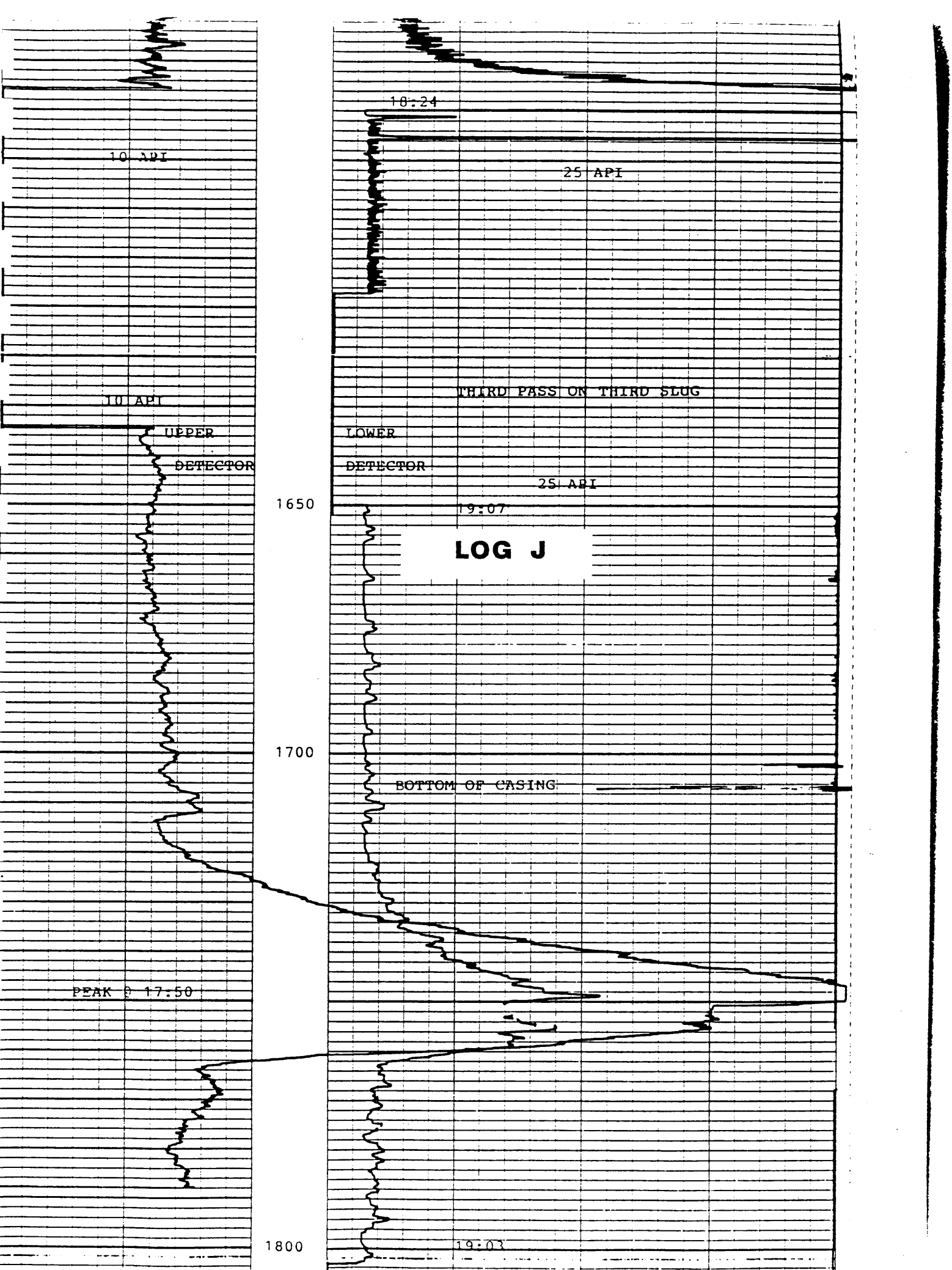

1800
16:54
10 API
25 API
UPPER DETECTOR
10 API
LOWER DETECTOR
25 API
GAMMA RAY LOGGED AFTER PUMPING 600 GALS.
1650
17:10
LOG E
1700
BOTTOM OF CASING

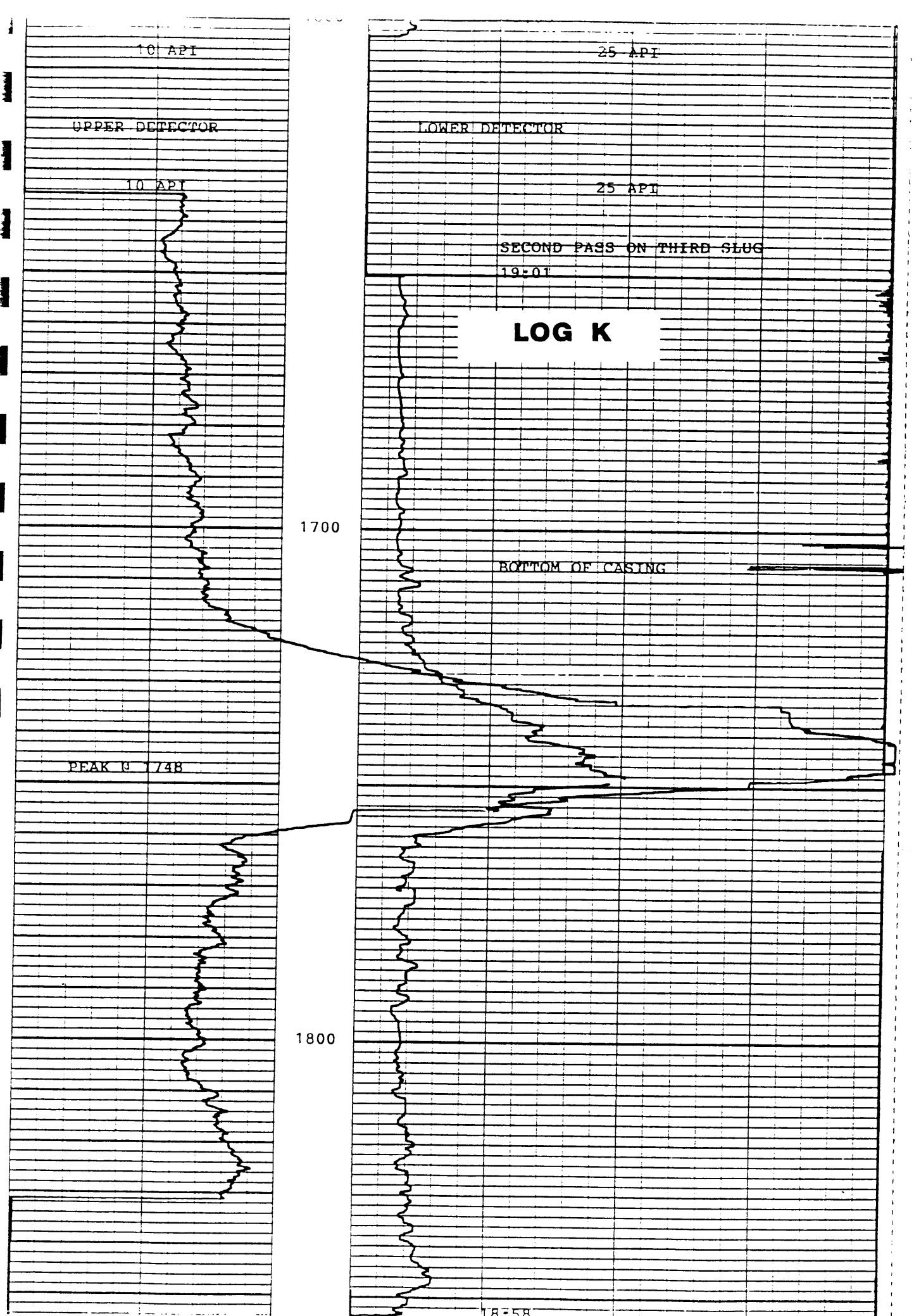

1750
17:05
10 API
25 API
UPPER DETECTOR @ 1700
LOWER DETECTOR @ 1716
RECORDED ON TIME DRIVE FOR 30 MINUTES
17:45
LOG F
17:15
INJECTED 5 SEC SLUG @ 1708
10 API
UPPER DETECTOR
25 API
LOWER DETECTOR
UPPER DETECTOR
10 API
LOWER DETECTOR
25 API

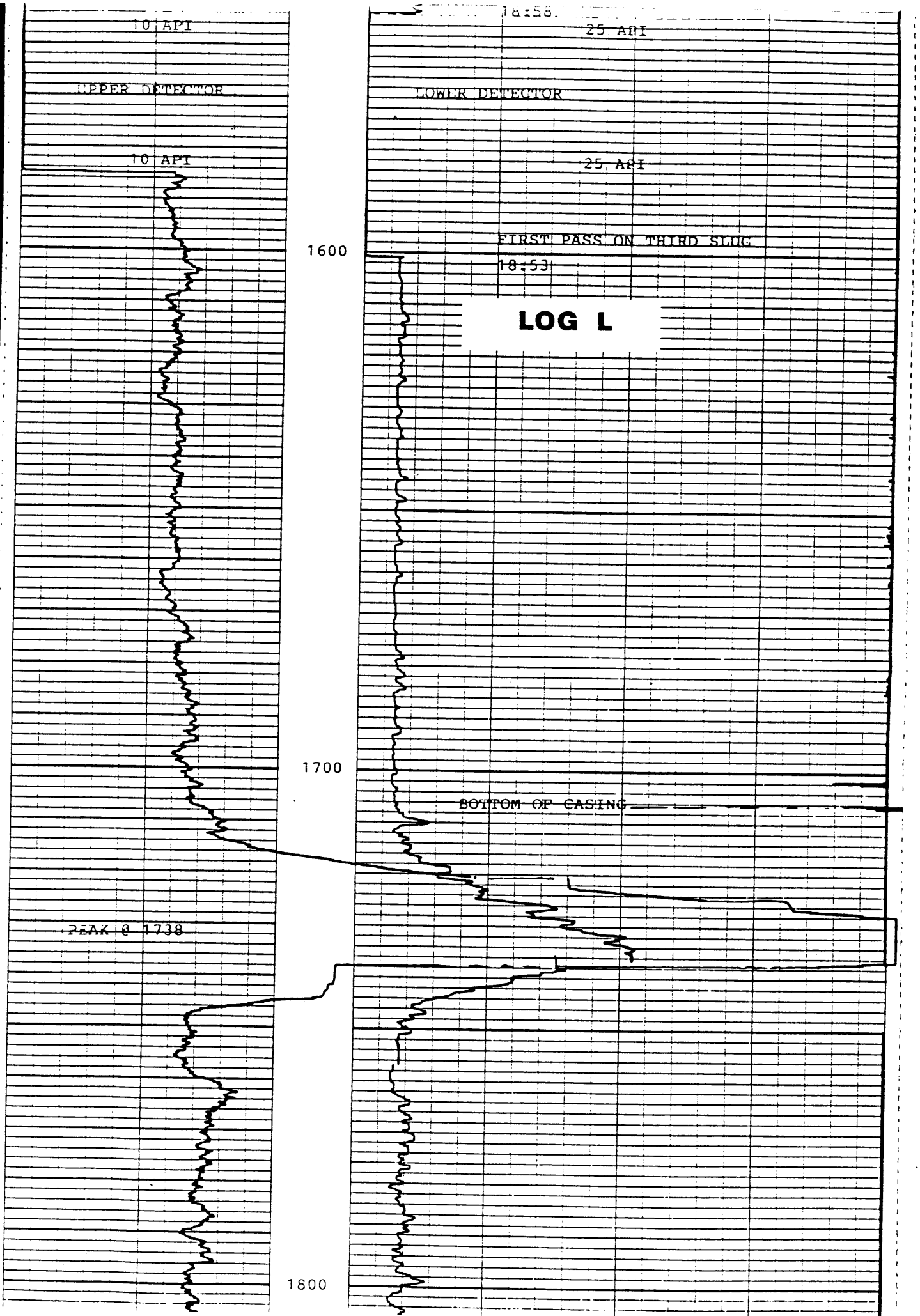

PASS # 1 ON SECOND SLUG
17:56
LOG G
1600
1700
PEAK Q 1705
1800

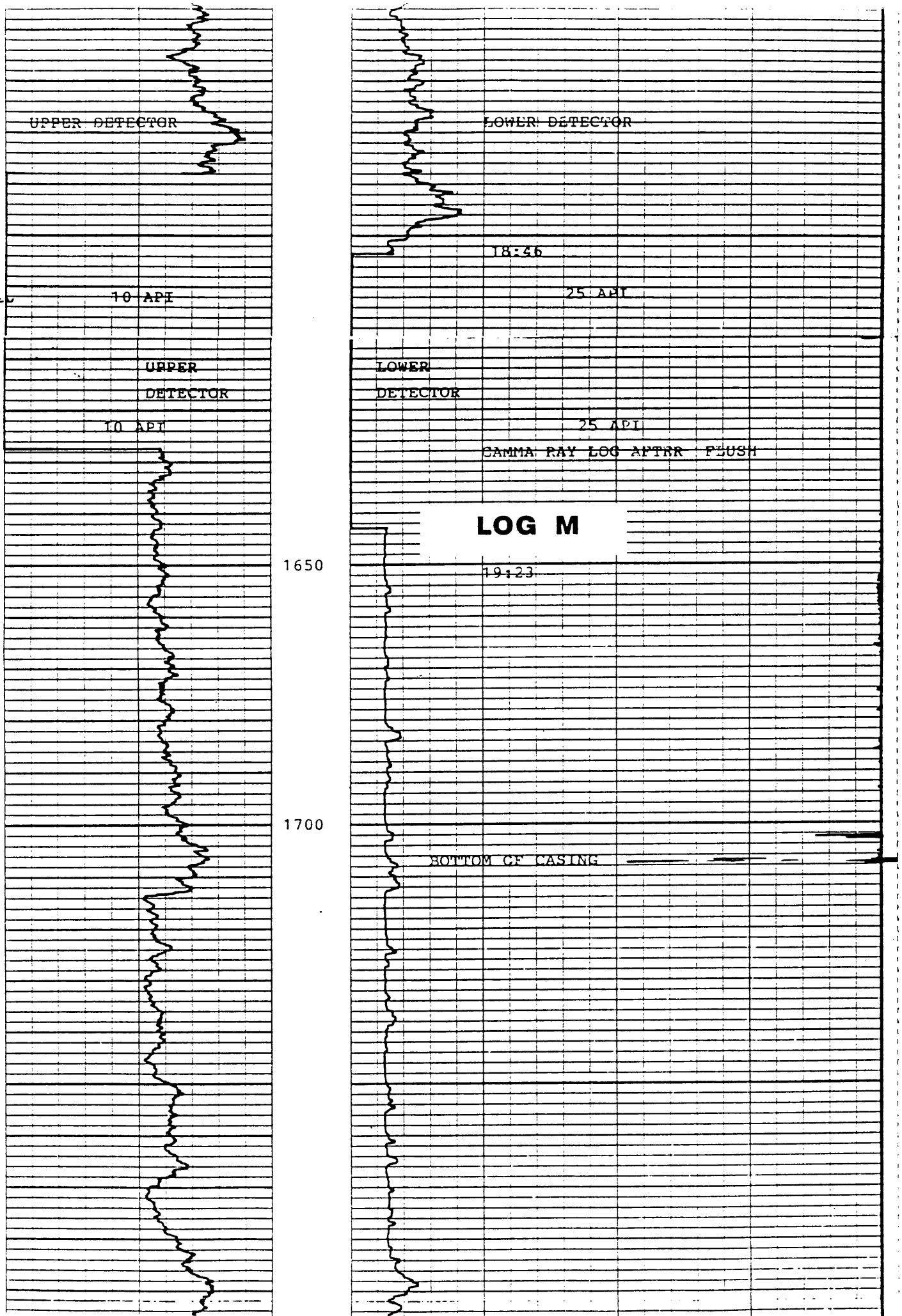

10 API
17:48
25 API
WITH DETECTOR @ 1750 PUMPED 600 GALS
R.A. MATERIAL PASSED BOTTOM DETECTOR @ 18:05
18:05
29 API
18:00
25 API

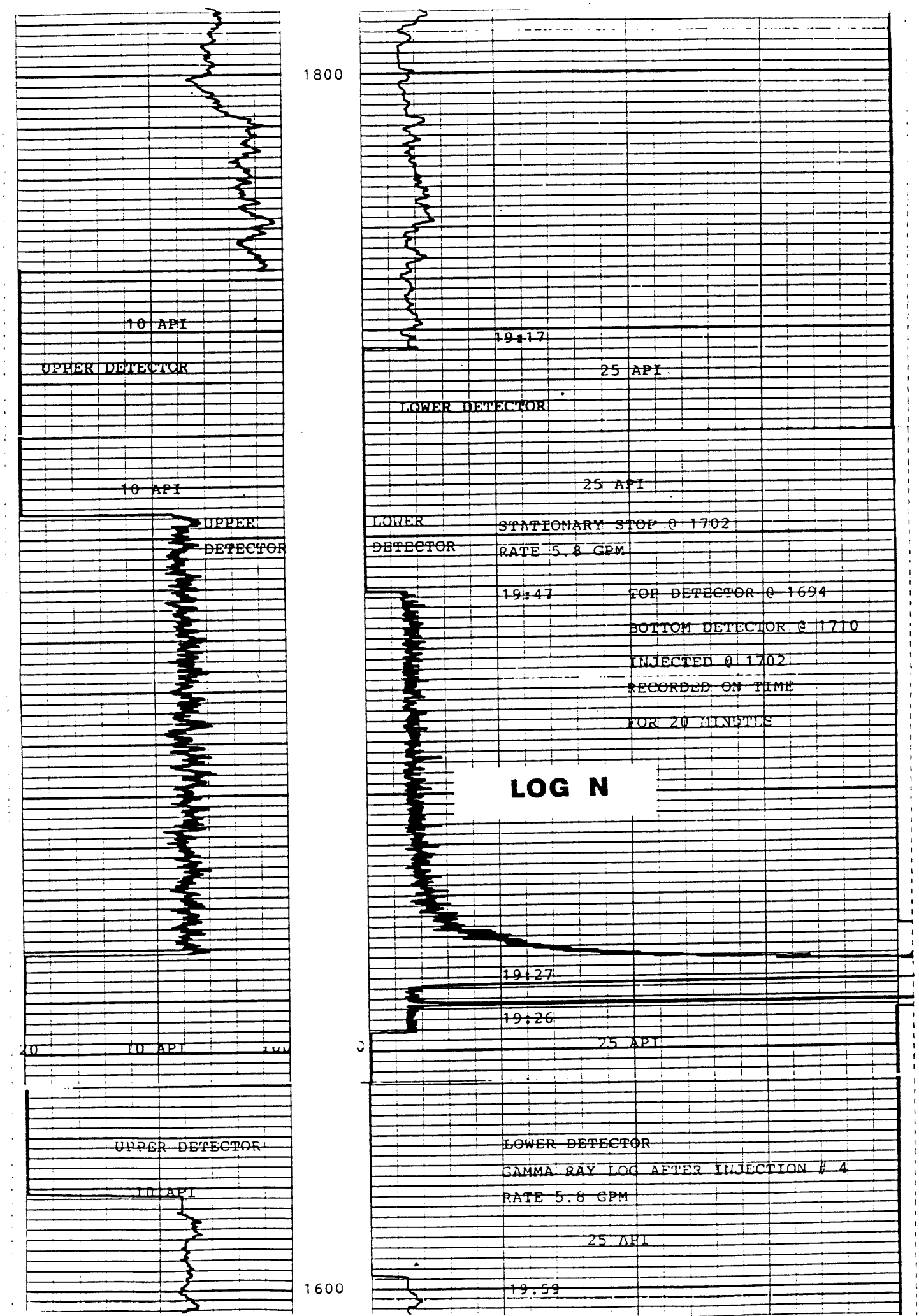

UPPER DETECTOR
LOWER DETECTOR
GAMMA RAY AFTER PUMPING 3000 GALS
25 API
18:11
1650
LOG H
1700
BOTTOM OF TUBING
1750
18:07
25 API
10 API
STATIONARY STOP @ 1702
RATE 5.8 GPM
TOP DETECTOR @ 1694
BOTTOM DETECTOR @ 1710
INJECTOR @ 1702
RECORDED ON TIME DRIVE FOR 70 MINUTES
INJECTED @ 18:23
THIRD SLUG PASSED BOTTOM DETECTOR
@ 18:24
UPPER
DETECTOR
18:44
LOG I

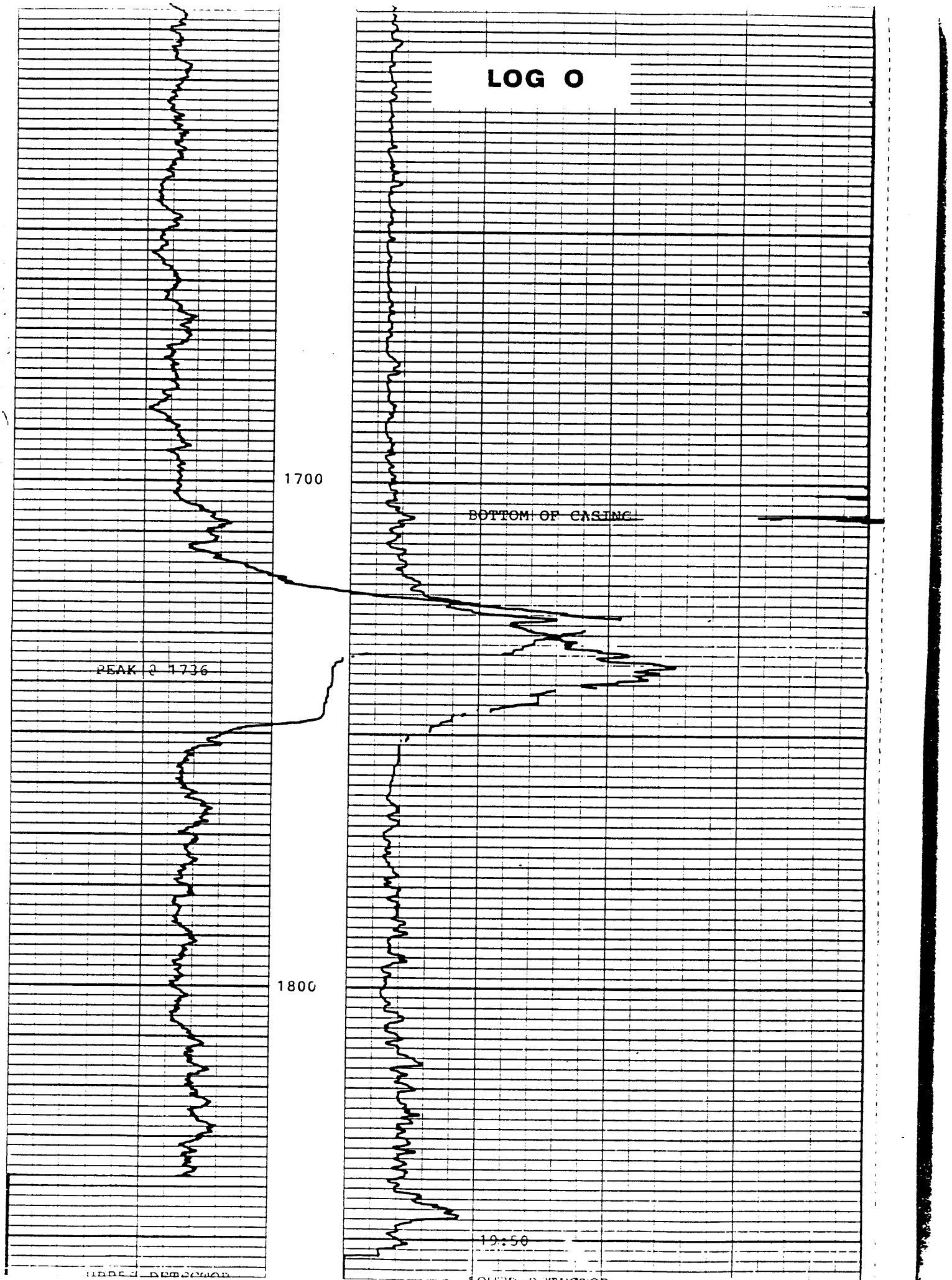

18:24
10 API
25 API
THIRD PASS ON THIRD SLUG
10 API
UPPER
DETECTOR
LOWER
DETECTOR
25 API
1650
19:07
LOG J
1700
BOTTOM OF CASING
PEAK @ 17:50
1800
19:03

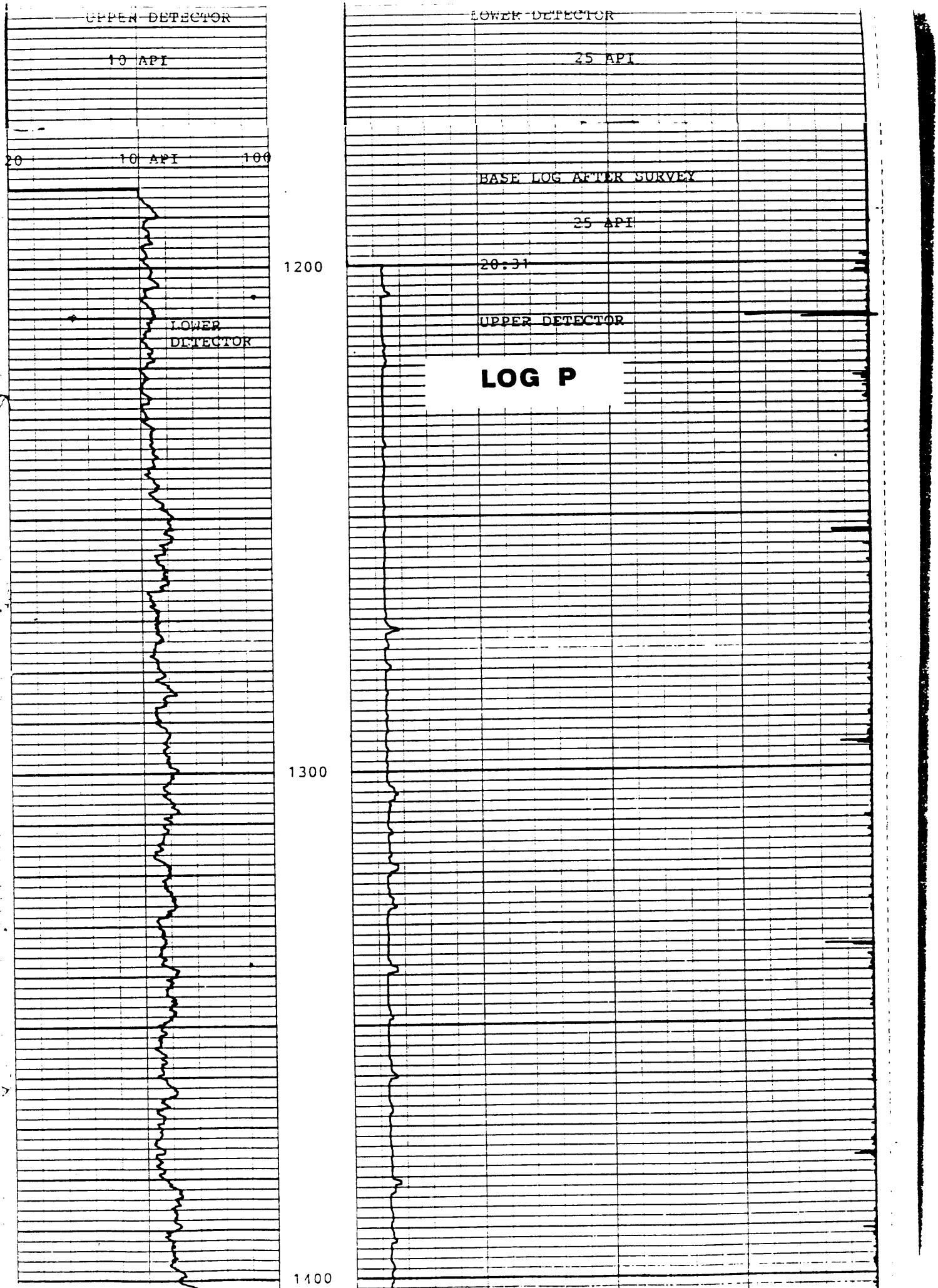

10 API
UPPER DETECTOR
10 API
25 API
LOWER DETECTOR
25 API
SECOND PASS ON THIRD SLUG
19:01
LOG K
1700
BOTTOM OF CASING
PEAK @ 1748
1800
18:58

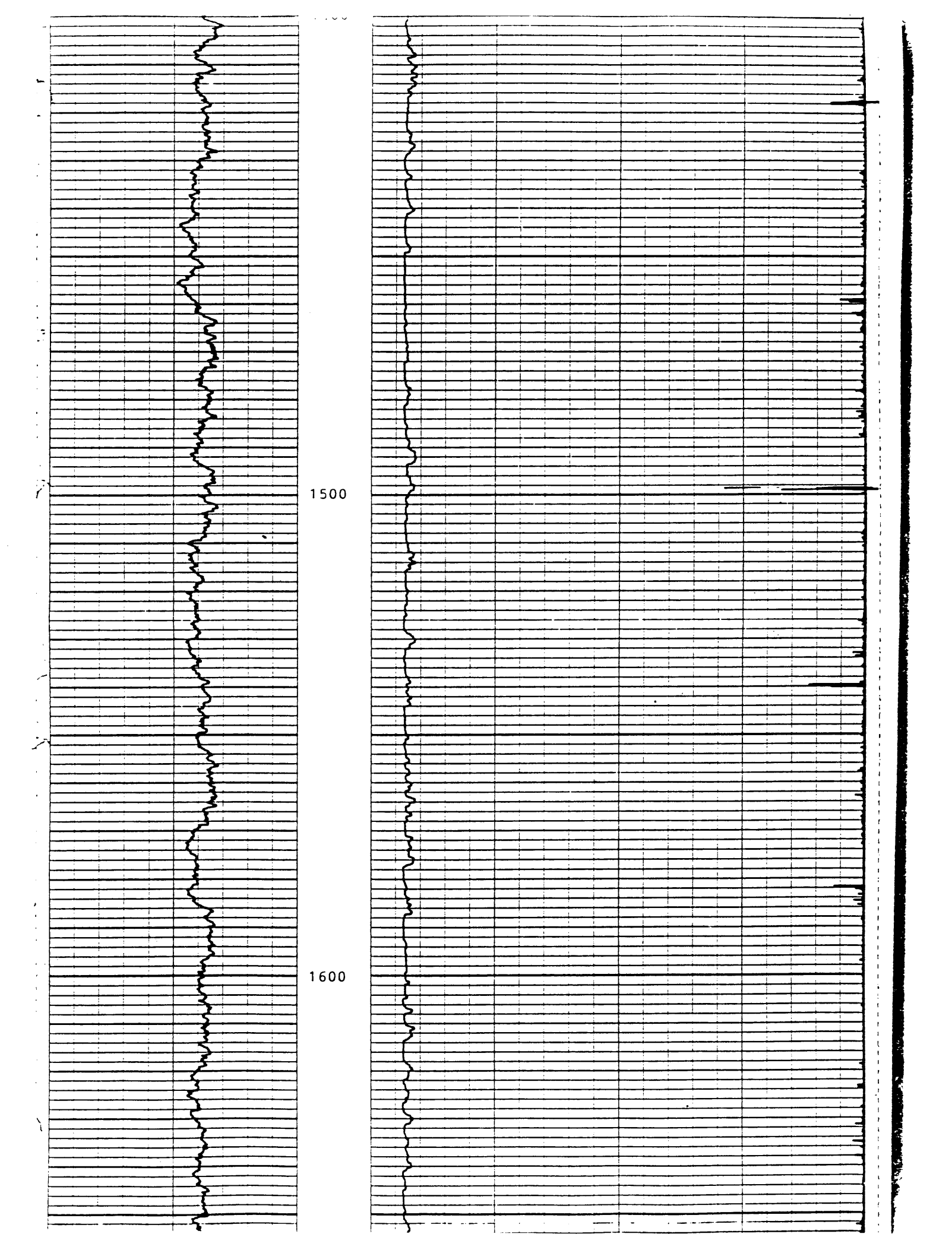

10 API
UPPER DETECTOR
10 API
1600
1700
PEAK @ 1738
1800
18:58
25 API
LOWER DETECTOR
25 API
FIRST PASS ON THIRD SLUG
18:53
LOG L
BOTTOM OF CASING

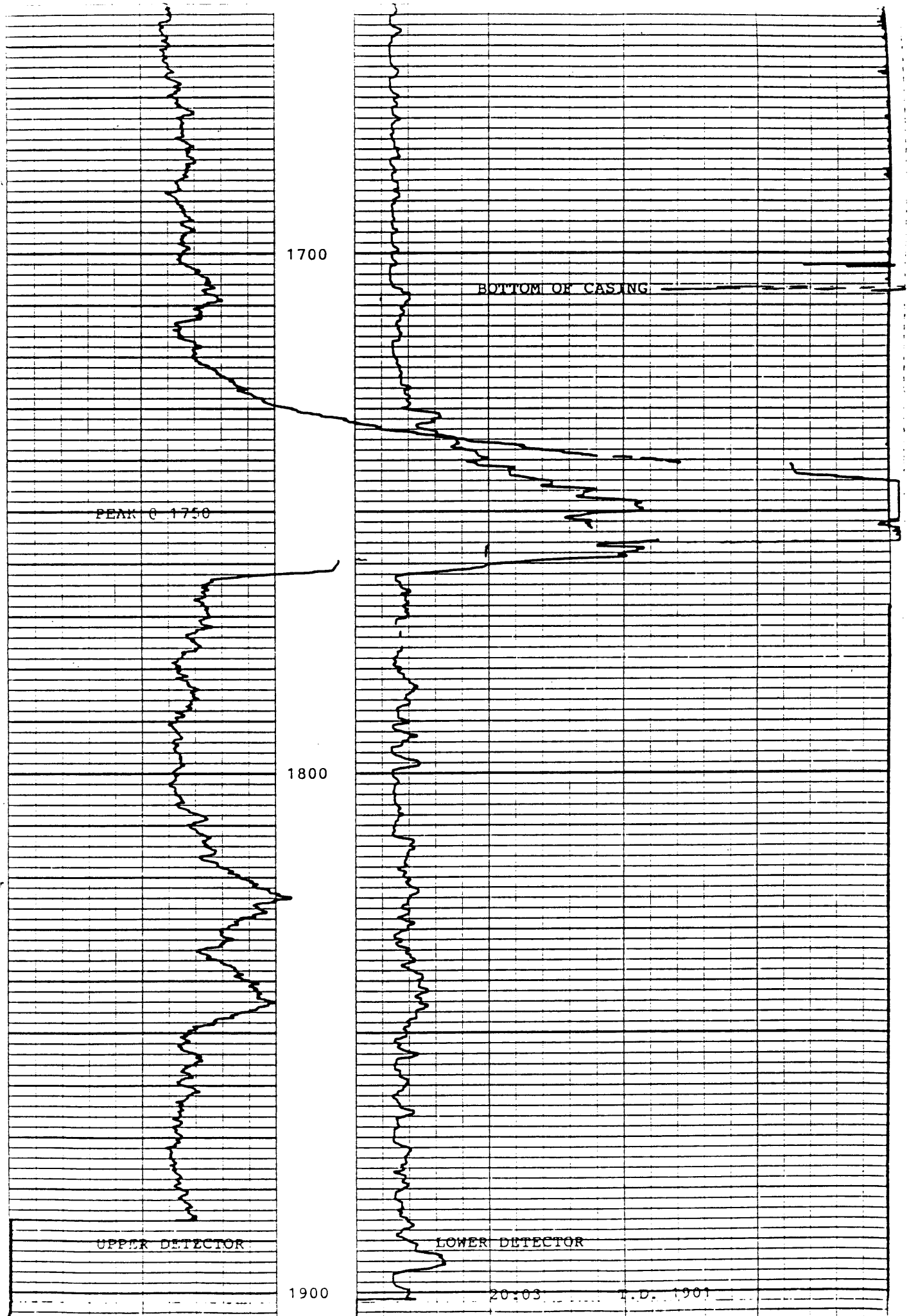

UPPER DETECTOR
LOWER DETECTOR
18:46
10 API
25 API
UPPER
DETECTOR
LOWER
DETECTOR
10 API
25 API
GAMMA RAY LOG AFTER FLUSH
LOG M
1650
19:23
1700
BOTTOM OF CASING

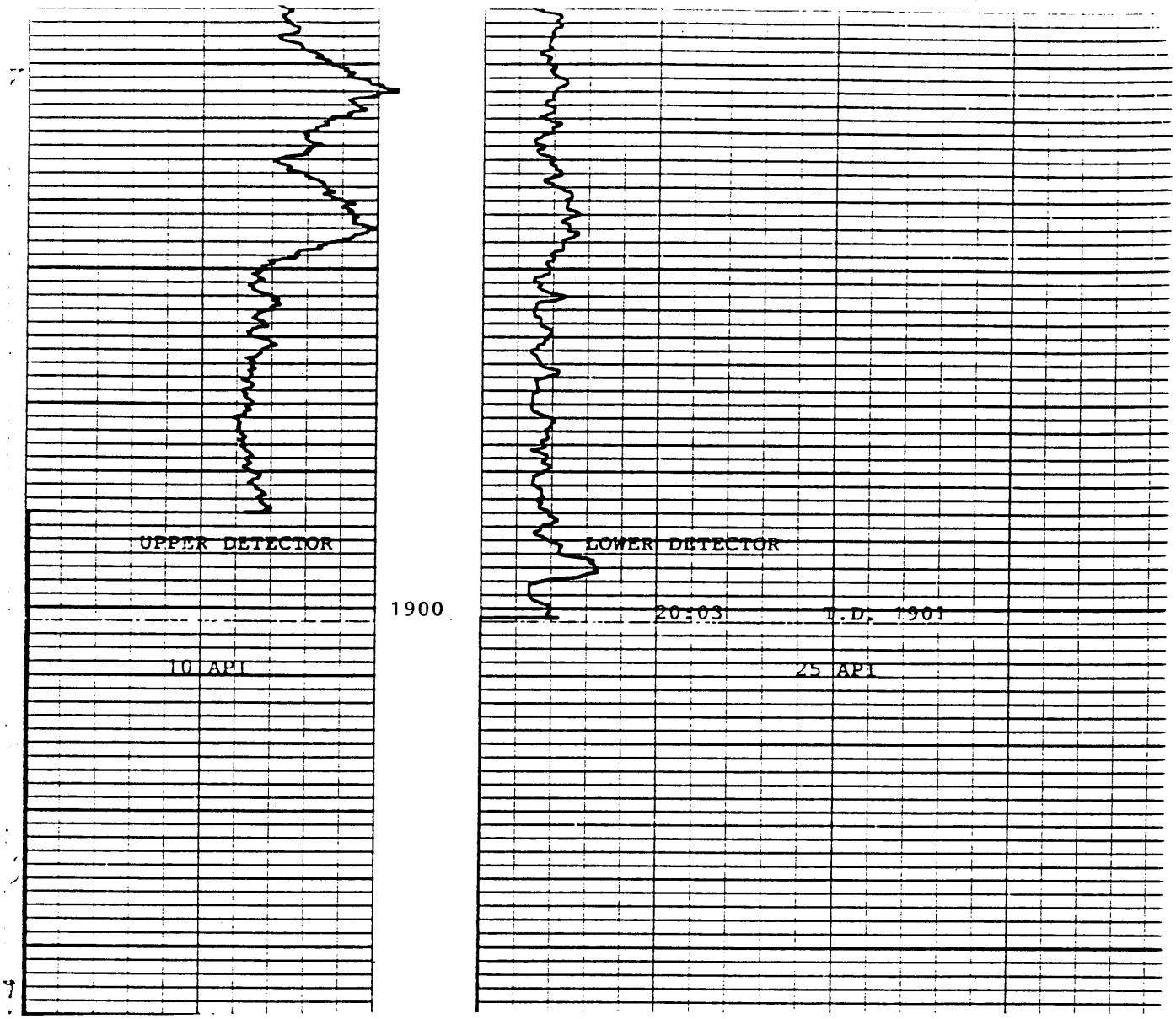

1800
10 API
UPPER DETECTOR
10 API
UPPER
DETECTOR
19:17
25 API
LOWER DETECTOR
25 API
LOWER
DETECTOR
STATIONARY STOP @ 1702
RATE 5.8 GPM
19:47
TOP DETECTOR @ 1694
BOTTOM DETECTOR @ 1710
INJECTED @ 1702
RECORDED ON TIME
FOR 20 MINUTES
LOG N
19:27
19:26
10 API
25 API
UPPER DETECTOR
10 API
LOWER DETECTOR
GAMMA RAY LOG AFTER INJECTION # 4
RATE 5.8 GPM
25 API
1600
19:59


LOG O
1700
BOTTOM OF CASING
PEAK @ 1736
1800
19:50


UPPER DETECTOR
10 API
20
10 API
100
LOWER DETECTOR
1200
1300
1400
LOWER DETECTOR
25 API
BASE LOG AFTER SURVEY
25 API
20:31
UPPER DETECTOR
LOG P


1500
1600


1700
BOTTOM OF CASING
PEAK @ 1750
1800
UPPER DETECTOR
LOWER DETECTOR
1900
20:03
T.D. 1901


UPPER DETECTOR
1900
10 API
LOWER DETECTOR
20:03
T.D. 1901
25 API

ATTACHMENT NO. 4

PRESENTATION OF INJECTION WELL OPERATIONAL DATA

Presentation of Injection Well Operational Data

The effluent disposal system at the Gasparilla Island Water Association, Inc., WWTP consists of one injection well and one monitoring well. The injection well is a six-inch diameter well extending to 1,926 feet and it is screened between 1,742 and 1,845 feet below the concrete pad. The monitoring well at the site is a two-inch, schedule 80 PVC well extending to 370 feet below the concrete pad. This well is screened between 340 and 360 feet below the pad level.

WWTP personnel routinely record operational data on both the effluent disposal and monitoring wells. Each day, the injection well totalizer reading is recorded to determine the amount of effluent injected over the past 24 hours. The average and maximum injection rate and the injection pump pressure are also recorded. The water level in the monitoring well is recorded daily along with the local times corresponding to high and low tides.

In additional to the operational data described above, monthly water quality data is also collected. The effluent injected is tested for chloride and specific conductivity. Water in the monitoring well is tested for fecal coliforms, BOD, chloride, and specific conductance.

Following are photocopies of the data sheets detailing the information described above for the two year period from January, 1990 through December, 1991.

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH January YEAR 1990

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	9:30am	2429	347,000	540		58			7.38	4:43pm	9:05am
2	9:00am	2734	305,000	540		58			7.08	3:23am	9:37am
3	9:00am	3018	284,000	540		58			7.42	4:39am	10:05am
4	9:00am	3021	3,000	540		18			7.71	6:15am	10:27am
5	8:30am	3021	0	0		18			7.71	8:51am	10:25am
6	8:45am	3021	0	0		17			7.88	7:40pm	2:35am
7	8:45am	3229	208,000	540		17			7.79	8:33pm	3:44am
8	8:15am	3463	234,000	540		58			7.75	9:31pm	4:47am
9	8:30am	3694	231,000	540		58			7.50	10:29pm	5:39am
10	8:30am	3920	226,000	540		58			7.46	11:26pm	6:24am
11	9:00am	3975	55,000	540		58			7.50	---	7:05am
12	8:30am	3975	0	0		17			7.58	3:57pm	7:40am
13	8:30am	3975	0	0		17			7.20	3:56pm	8:09am
14	9:00am	3975	0	0		17			7.33	1:52am	8:37am
15	8:30am	4069	94,000	540		58			7.63	2:45am	9:02am
16	8:45am	4331	262,000	540		58			7.75	3:41am	9:20am
17	8:15am	4331	0	0	0	17	17	17	7.83	4:46am	9:39am
18	8:30am	4331	0	0	0	17	17	17	7.96	6:09am	10:00am
19	8:30am	4331	0	0	0	17	17	17	7.88	8:11am	10:05am
20	9:00am	4331	0	0	0	17	17	17	8.00	7:10pm	2:02am
21	8:45am	4331	0	0	0	17	17	17	7.92	8:02pm	3:04am
22	8:30am	4331	0	0	0	17	17	17	7.79	8:59pm	4:02am
23	8:30am	4331	0	0	0	17	17	17	7.71	9:46pm	4:52am
24	9:00am	4582	251,000	545	560	58	58	58	7.75	10:35pm	5:27am
25	9:00am	4582	0	0	0	17	17	17	7.75	11:21pm	6:04am
26	8:30am	4592	10	550	560	58	58	58	7.33	2:30pm	6:35am
27	8:40am	4592	0	0	0	17	17	17	7.29	2:35pm	7:01am
28	9:25am	4592	0	0	0	17	17	17	7.50	2:50pm	7:29am
29	8:30am	4592	0	0	0	17	17	17	7.75	3:05pm	7:54am
30	8:30am	4821	229,000	540	550	58	58	58	7.71	3:30pm	8:16am
31	8:30am	5073	252,000	540	550	58	58	58	7.67	3:33am	8:38am
TOTAL			2,991,000								
AVERAGE			199,000	541	555	58	58	58	7.63		
MAXIMUM			347,000	550	560	58	58	58	8.00		
MINIMUM			3,000	540	550	58	58	58	7.08		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
1/25/90	<1	3.80	18,954	61,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
1/25/90	2,200	590

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM /PSI

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Patrick L. Godwin, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH FEBRUARY YEAR 1990

			Injection Well Data						Monitor Well Data		
				Flow Rate		Injection Pres.				Times of Tidal Extremes	
Date	Time	Flowmeter Reading (gallons)	Volume Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Water Level (NGVD)	High	Low
1	8:30	5073	0	0	0	17	17	17	7.79	4:47AM	8:52AM
2	8:30	5073	0	0	0	17	17	17	7.75	6:52AM	8:38AM
3	8:45	5083	10,000	540	560	58	58	58	7.88	6:04PM	1:04AM
4	8:45	5083	0	0	0	17	17	17	7.88	7:09PM	2:33AM
5	8:45	5215	132,000	540	560	58	58	58	7.58	8:25PM	3:46AM
6	8:45	5477	262,000	540	560	58	58	58	7.63	9:37PM	4:44AM
7	8:45	5477	0	0	0	17	17	17	7.68	10:45PM	5:32AM
8	8:45	5594	117,000	540	560	58	58	58	7.50	2:32PM	6:10AM
9	8:45	5861	267,000	540	560	58	58	58	7.67	2:23PM	6:42AM
10	8:30	5874	13,000	540	560	58	58	58	7.75	2:25PM	7:05AM
11	8:45	5874	0	0	0	17	17	17	7.83	2:33PM	7:27AM
12	8:45	6160	286,000	540	560	58	58	58	7.42	2:44PM	7:45AM
13	8:30	6479	319,000	540	560	58	58	58	7.75	2:59PM	8:00AM
14	8:30	6530	51,000	540	560	58	58	58	7.79	3:25PM	8:17AM
15	8:30	6530	0	0	0	17	17	17	8.08	4:27AM	8:32AM
16	8:30	6782	252,000	540	560	58	58	58	8.04	5:48AM	8:40AM
17	8:30	6828	46,000	540	560	58	58	58	7.96	5:15PM	---
18	8:45	6828	0	0	0	17	17	17	7.92	6:15PM	1:16AM
19	8:30	7165	337,000	540	550	58	58	58	8.00	7:27PM	2:35AM
20	8:30	7509	344,000	540	550	58	58	58	7.92	8:39PM	3:39AM
21	8:30	7821	312,000	540	550	58	58	58	7.75	9:38PM	4:24AM
22	8:30	7906	85,000	540	550	58	58	58	7.98	1:14PM	5:00AM
23	8:30	7906	0	0	0	17	17	17	8.17	1:12PM	5:32AM
24	8:45	8277	371,000	540	550	58	58	58	7.50	1:14PM	5:57AM
25	10:30	8654	377,000	540	550	58	58	58	7.67	1:25PM	6:22AM
26	8:30	8949	295,000	540	550	58	58	58	7.48	1:37PM	6:44AM
27	8:45	9270	321,000	540	550	58	58	58	7.71	1:59PM	7:02AM
28	8:30	9581	311,000	540	550	58	58	58	8.13	2:24PM	7:17AM
29											
30											
31											
TOTAL			4,508,000								
AVERAGE			225,000	540	556	58	58	58	7.79		
MAXIMUM			377,000	540	560	58	58	58	8.17		
MINIMUM			10,000	540	550	58	58	58	7.42		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
2/2/90	<1	3.6	18,901	44,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
2/2/90	2,050	590

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM ___/PSI___

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Patrick L. Godwin, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH MARCH YEAR 1990

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal	
		Reading	Injected	Av.	Max.	Av.	Max.	Min.	Level	Extremes	
Date	Time	(gallons)	(gallons)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(NGVD)	High	Low
1	8:45	9695	114,000	530	550	58	58	58	8.42	2:56PM	7:31AM
2	8:45	9695	0	0	0	17	17	17	8.54	3:32PM	7:19AM
3	8:45	9931	236,000	530	550	58	58	58	8.79	4:18PM	- --
4	8:45	10297	366,000	530	550	58	58	58	8.46	5:26PM	12:55AM
5	9:00	10669	372,000	530	550	58	58	58	8.35	6:59PM	2:26AM
6	8:30	11019	350,000	530	550	58	58	58	8.35	8:35PM	3:33AM
7	8:45	11019	0	0	0	17	17	17	8.29	1:08PM	4:24AM
8	8:30	11351	332,000	530	550	58	58	58	8.15	1:01PM	5:02AM
9	9:00	11690	339,000	530	550	58	58	58	8.25	12:59PM	5:35AM
10	8:30	11690	0	0	0	16	16	16	8.29	1:03PM	5:59AM
11	8:30	11690	0	0	0	16	16	16	8.29	1:10PM	6:17AM
12	8:30	11690	0	0	0	17	17	17	8.29	1:20PM	6:29AM
13	8:30	12061	371,000	540	550	58	58	58	8.29	1:35PM	6:44AM
14	8:30	12429	368,000	540	550	58	58	58	8.46	1:53PM	6:56AM
15	8:30	12570	141,000	540	550	58	58	58	8.52	2:19PM	7:08AM
16	8:45	12570	0	0	0	16	16	16	8.52	2:51PM	7:19AM
17	8:45	12570	0	0	0	16	16	16	8.50	3:30PM	7:17AM
18	9:00	12570	0	0	0	16	16	16	7.92	4:22PM	- --
19	8:45	12570	0	0	0	16	16	16	8.13	5:31PM	12:36AM
20	8:45	12960	390,000	540	550	58	58	58	8.00	6:54PM	1:57AM
21	8:45	13347	387,000	540	550	58	58	58	7.63	8:13PM	2:50AM
22	8:45	13425	78,000	540	550	58	58	58	7.85	11:46AM	3:36AM
23	9:00	13498	73,000	540	550	58	58	58	7.83	11:57AM	4:15AM
24	9:00	13498	0	0	0	16	16	16	7.88	11:51AM	4:42AM
25	9:00	13498	0	0	0	16	16	16	8.08	12:02PM	5:05AM
26	8:30	13886	388,000	540	550	58	58	58	7.90	12:16PM	5:29AM
27	8:30	14277	391,000	540	550	58	58	58	7.96	12:37PM	5:47AM
28	8:30	14277	0	0	0	16	16	16	7.96	1:02PM	6:02AM
29	8:45	14277	0	0	0	16	16	16	8.29	1:35PM	6:11AM
30	8:30	14277	0	0	0	16	16	16	8.02	2:11PM	6:01AM
31	8:45	14277	0	0	0	17	17	17	7.96	2:54PM	- --
TOTAL			4,696,000								
AVERAGE			294,000	536	550	58	58	58	8.20		
MAXIMUM			391,000	540	550	58	58	58	8.79		
MINIMUM			73,000	530	550	58	58	58	7.63		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
3/9/90	<1	1.1	13,227	19,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
3/9/90	1,500	460

RESULT OF SPECIFIC INJECTIVITY TEST

Date 3/8/90 GPM 550/PSI 58

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

4-11-90

Patrick L. Godwin, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH APRIL YEAR 1990

		Injection Well Data							Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal	
		Reading	Injected	Av.	Max.	Av.	Max.	Min.	Level	Extremes	
Date	Time	(gallons)	(gallons)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(NGVD)	High	Low
1	9:00AM	14722	445,000	540	550	57	57	57	7.96	4:52PM	12:11AM
2	8:30AM	15075	353,000	540	550	58	58	58	7.92	6:11PM	1:38AM
3	8:30AM	15420	345,000	540	550	58	58	58	8.13	8:01PM	2:57AM
4	8:30AM	15734	314,000	540	550	58	58	58	7.83	12:38PM	3:56AM
5	8:30AM	15734	0,000	0	0	16	16	16	8.00	12:31PM	4:41AM
6	8:30AM	15734	0,000	0	0	17	17	17	8.06	12:34PM	5:13AM
7	9:00AM	15734	0,000	0	0	17	17	17	8.08	12:42PM	5:38AM
8	9:00AM	15734	0,000	0	0	17	17	17	7.92	12:53PM	6:03AM
9	9:00AM	15051	317,000	540	550	58	58	58	7.92	1:01PM	6:18AM
10	9:00AM	16346	295,000	540	550	58	58	58	8.13	1:19PM	6:27AM
11	8:30AM	16346	0,000	0	0	16	16	16	8.25	1:37PM	6:38AM
12	8:30AM	16346	0,000	0	0	16	16	16	7.88	2:01PM	6:50AM
13	8:30AM	16346	0,000	0	0	16	16	16	7.83	2:31PM	7:01AM
14	9:00AM	16346	0,000	0	0	16	16	16	8.04	3:09PM	7:10AM
15	9:00AM	16346	0,000	0	0	16	16	16	8.25	3:51PM	11:41PM
16	8:30AM	16346	0,000	0	0	16	16	16	8.13	4:46PM	---
17	8:30AM	16346	0,000	0	0	16	16	16	8.10	5:52PM	12:52AM
18	8:30AM	16346	0,000	0	0	16	16	16	8.04	7:18PM	1:58AM
19	8:30AM	16346	0,000	0	0	16	16	16	7.81	11:13AM	2:51AM
20	8:30AM	16346	0,000	0	0	16	16	16	7.75	11:19AM	3:55AM
21	8:45AM	16346	0,000	0	0	16	16	16	7.92	11:27AM	4:11AM
22	8:45AM	16346	0,000	0	0	16	16	16	8.00	11:41AM	4:41AM
23	8:30AM	16346	0,000	0	0	16	16	16	8.13	11:58AM	5:07AM
24	8:30AM	16357	11,000	540	550	58	58	58	8.08	12:20PM	5:26AM
25	8:30AM	16357	0,000	0	0	16	16	16	7.96	12:46PM	5:37AM
26	8:30AM	16357	0,000	0	0	16	16	16	8.02	1:19PM	5:42AM
27	8:00AM	16357	0,000	0	0	16	16	16	8.02	2:09PM	9:43PM
28	9:00AM	16357	0,000	0	0	16	16	16	8.13	2:44PM	10:46PM
29	9:00AM	16357	0,000	0	0	16	16	16	7.91	3:37PM	11:57PM
30	9:00AM	16357	0,000	0	0	16	16	16	7.83	4:40PM	---
31											
TOTAL			2,080,000								
AVERAGE			297,000	540	550	58	58	58	7.77		
MAXIMUM			445,000	540	550	58	58	58	8.25		
MINIMUM			11,000	540	550	57	57	57	7.75		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
4-11-90	<1	2.7	10,497	36,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
4-11-90	1,700	340

RESULT OF SPECIFIC INJECTIVITY TEST

Date GPM____/PSI___

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Patrick L. Godwin, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH MAY YEAR 1990

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal	
		Reading	Injected	Av.	Max.	Av.	Max.	Min.	Level	Extremes	
Date	Time	(gallons)	(gallons)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(NGVD)	High	Low
1	9:00AM	16357	0,000	0	0	16	16	16	7.83	6:09PM	1:07AM
2	8:30AM	16357	0,000	0	0	16	16	16	7.84	11:00AM	2:07AM
3	8:30AM	16357	0,000	0	0	16	16	16	7.88	10:55AM	2:57AM
4	8:30AM	16369	12,000	540	550	58	58	58	7.83	11:08AM	3:35AM
5	10:00AM	16369	0,000	0	0	16	16	16	7.83	11:21AM	4:07AM
6	8:30AM	16369	0,000	0	0	16	16	16	7.96	11:36AM	4:35AM
7	9:00AM	16369	0,000	0	0	16	16	16	7.83	11:51PM	4:51AM
8	8:45AM	16369	0,000	0	0	16	16	16	7.79	12:09PM	5:05AM
9	8:45AM	16369	0,000	0	0	16	16	16	8.02	12:31PM	5:20AM
10	8:30AM	16369	0,000	0	0	16	16	16	8.08	12:56PM	5:26AM
11	8:30AM	16384	15,000	540	550	58	58	58	7.67	1:27PM	5:40AM
12	8:45AM	16384	0,000	0	0	16	16	16	7.63	2:03PM	9:31PM
13	8:45AM	16384	0,000	0	0	16	16	16	7.79	2:43PM	10:17PM
14	8:30AM	16384	0,000	0	0	16	16	16	7.63	3:29PM	11:11PM
15	8:30AM	16384	0,000	0	0	16	16	16	7.73	4:21PM	11:41PM
16	8:30AM	16384	0,000	0	0	16	16	16	7.75	5:27PM	12:04AM
17	8:30AM	16384	0,000	0	0	16	16	16	7.79	9:20AM	12:56AM
18	8:30AM	16384	0,000	0	0	16	16	16	7.83	9:33AM	1:42AM
19	9:00AM	16384	0,000	0	0	16	16	16	7.92	9:52AM	2:22AM
20	9:00AM	16384	0,000	0	0	16	16	16	8.08	10:14AM	2:57AM
21	9:00AM	16384	0,000	0	0	16	16	16	8.13	10:39AM	3:26AM
22	8:30AM	16384	0,000	0	0	16	16	16	8.33	11:08PM	3:48AM
23	8:30AM	16384	0,000	0	0	16	16	16	8.21	11:39PM	3:56AM
24	9:30AM	16384	0,000	0	0	16	16	16	8.33	12:17PM	7:54PM
25	8:30AM	16384	0,000	0	0	16	16	16	8.17	1:00PM	8:48PM
26	8:15AM	16384	0,000	0	0	16	16	16	8.08	1:47PM	9:41PM
27	8:15AM	16632	248,000	540	550	58	58	58	8.25	2:37PM	10:37PM
28	8:15AM	16996	364,000	540	550	58	58	58	8.25	3:35PM	11:29PM
29	8:30AM	17324	328,000	540	550	58	58	58	8.21	4:41PM	
30	8:30AM	17556	232,000	540	550	58	58	58	8.21	8:53AM	11:14PM
31	8:30AM	17682	126,000	540	550	58	58	58	8.21	8:59AM	1:01AM
TOTAL			1,325,000								
AVERAGE			189,000	540	550	58	58	58	7.97		
MAXIMUM			364,000	540	550	58	58	58	8.33		
MINIMUM			12,000	540	550	58	58	58	7.63		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
5-10-90	<1	3.40	10,497	41,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
5-10-90	2,400	630

RESULT OF SPECIFIC INJECTIVITY TEST

Date GPM____/PSI___

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Patrick L. Godwin, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH JUNE YEAR 1990

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal	
		Reading	Injected	Av.	Max.	Av.	Max.	Min.	Level	Extremes	
Date	Time	(gallons)	(gallons)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(NGVD)	High	Low
1	9:00AM	17682	0,000	0	0	16	16	16	8.17	9:21AM	2:43AM
2	8:45AM	17682	0,000	0	0	16	16	16	8.17	9:43AM	3:19AM
3	9:15AM	17682	0,000	0	0	16	16	16	8.33	10:10AM	3:47AM
4	8:30AM	17682	0,000	0	0	16	16	16	8.42	10:34AM	4:16AM
5	8:00AM	17682	0,000	0	0	16	16	16	8.50	11:02AM	4:34AM
6	8:30AM	17682	0,000	0	0	16	16	16	8.54	11:31AM	4:50AM
7	8:00AM	17682	0,000	0	0	16	16	16	8.38	12:03AM	8:27PM
8	8:00AM	17682	0,000	0	0	16	16	16	8.38	12:35PM	9:05PM
9	8:30AM	17682	0,000	0	0	16	16	16	8:46	1:14PM	9:42PM
10	8:30AM	17682	0,000	0	0	16	16	16	8.46	1:52PM	10:18PM
11	8:30AM	17682	0,000	0	0	16	16	16	8.42	2:33PM	10:57PM
12	8:00AM	17682	0,000	0	0	16	16	16	8.38	3:20PM	11:32PM
13	8:00AM	17682	0,000	0	0	16	16	16	8.33	6:43AM	9:53AM
14	8:00AM	17682	0,000	0	0	16	16	16	8.38	7:08AM	11:31AM
15	8:00AM	17714	32,000	540	550	58	58	58	8.54	7:35AM	1:08PM
16	8:30AM	17714	0,000	0	0	16	16	16	8.56	8:01AM	2:45PM
17	8:45AM	17714	0,000	0	0	16	16	16	8.58	8:33AM	4:06PM
18	7:45AM	17714	0,000	0	0	16	16	16	8.63	9:12AM	2:31AM
19	9:00AM	17714	0,000	0	0	16	16	16	8.79	9:47AM	2:46AM
20	8:00AM	17714	0,000	0	0	16	16	16	8.83	10:30AM	7:14PM
21	8:30AM	17714	0,000	0	0	16	16	16	8.79	11:19AM	8:09PM
22	8:00AM	17717	3,000	540	550	58	58	58	8.56	12:08PM	9:01PM
23	9:15AM	17717	0,000	0	0	16	16	16	8.67	1:00PM	9:47PM
24	9:00AM	17717	0,000	0	0	16	16	16	8.54	1:52PM	10:30PM
25	7:45AM	17717	0,000	0	0	16	16	16	8.31	2:45PM	11:09PM
26	10:00AM	17717	0,000	0	0	16	16	16	8.46	6:24AM	8:58AM
27	8:00AM	17717	0,000	0	0	16	16	16	8.33	6:31AM	10:35AM
28	8:00AM	17717	0,000	0	0	16	16	16	8.38	6:48AM	12:06PM
29	8:00AM	17717	0,000	0	0	16	16	16	8.44	7:13AM	1:35PM
30	8:15AM	17717	0,000	0	0	16	16	16	8.50	7:45AM	3:02PM
31											
TOTAL			35,000								
AVERAGE			18,000	540	550	58	58	58	8.48		
MAXIMUM			32,000	540	550	58	58	58	8.83		
MINIMUM			3,000	540	550	58	58	58	8.17		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
6-14-90	<1	1.35	20,993	41,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
6-14-90	2,300	850

RESULT OF SPECIFIC INJECTIVITY TEST

Date 6-14-90 GPM 530/PSI 59

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Gary Christenson
Gary J. Christenson, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
CASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH JULY YEAR 1990

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal	
		Reading	Injected	Av.	Max.	Av.	Max.	Min.	Level	Extremes	
Date	Time	(gallons)	(gallons)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(NGVD)	High	Low
1	8:30AM	17955	238,000	540	540	58	58	58	8.58	8:24AM	12:42AM
2	8:00AM	18224	269,000	540	550	58	58	58	8.87	9:03AM	1:11AM
3	8:00AM	18481	257,000	540	550	58	58	58	8.79	9:42AM	5:12PM
4	8:30AM	18713	232,000	540	540	58	58	58	8.83	10:27AM	6:00PM
5	8:00AM	18952	239,000	540	550	58	58	58	8.71	11:09AM	6:45PM
6	8:00AM	19003	051,000	540	550	58	58	58	8.75	11:51AM	7:22PM
7	8:30AM	19003	0,000	0	0	16	16	16	8.71	12:30PM	7:57PM
8	8:30AM	19003	0,000	0	0	16	16	16	8.71	1:09PM	8:25PM
9	8:30AM	19003	0,000	0	0	16	16	16	8:54	4:18AM	5:58AM
10	8:00AM	19003	0,000	0	0	16	16	16	8.47	4:33AM	7:04AM
11	8:00AM	19003	0,000	0	0	16	16	16	8.45	4:48AM	8:07AM
12	8:30AM	19003	0,000	0	0	16	16	16	8.54	5:12AM	9:14AM
13	8:00AM	19003	0,000	0	0	16	16	16	8.67	5:37AM	10:27AM
14	8:30AM	19245	242,000	540	550	58	58	58	8.38	6:09AM	11:50AM
15	9:00AM	19514	269,000	540	550	58	58	58	8.75	6:41AM	1:19PM
16	8:00AM	19738	224,000	540	550	58	58	58	8.87	7:23AM	2:52PM
17	8:30AM	19944	206,000	540	550	58	58	58	8.96	8:13AM	4:11PM
18	8:00AM	20164	220,000	540	550	58	58	58	9.08	9:13AM	5:23PM
19	8:00AM	20164	0,000	0	0	16	16	16	9.04	10:18AM	6:19PM
20	8:00AM	20164	0,000	0	0	16	16	16	9.13	11:21AM	7:10PM
21	8:30AM	20404	240,000	540	550	58	58	58	9.08	12:16PM	7:54PM
22	8:45AM	20658	254,000	540	550	58	58	58	9.10	1:12PM	8:30PM
23	8:30AM	20658	0,000	0	0	16	16	16	8.85	2:01PM	6:23AM
24	8:00AM	20658	0,000	0	0	16	16	16	8.83	2:50PM	7:26AM
25	8:00AM	20658	0,000	0	0	16	16	16	8.87	4:34AM	8:29AM
26	8:15AM	20658	0,000	0	0	16	16	16	8.90	4:49AM	9:33AM
27	8:00AM	20658	0,000	0	0	16	16	16	9.02	5:14AM	10:34AM
28	8:00AM	20658	0,000	0	0	16	16	16	9.08	5:39AM	11:50AM
29	8:00AM	20658	0,000	0	0	16	16	16	9.25	6:18AM	12:05AM
30	8:00AM	20658	0,000	0	0	16	16	16	9.25	7:01AM	2:31PM
31	8:00AM	20658	0,000	0	0	16	16	16	9.23	8:00AM	3:50PM
TOTAL			2,941,000								
AVERAGE			226,000	540	550	58	58	58	8.86		
MAXIMUM			269,000	540	550	58	58	58	9.25		
MINIMUM			51,000	540	550	58	58	58	8.45		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
8-01-90	<1	3.80	14,803	22,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
8-01-90	1,150	580

RESULT OF SPECIFIC INJECTIVITY TEST

Date n/a GPM___/PSI___ .

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Gary J. Christenson, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH AUGUST YEAR 1990

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	8:00AM	20658	0,000	0	0	16	16	16	9.22	9:04AM	4:56PM
2	8:30AM	20658	0,000	0	0	16	16	16	9.08	10:07AM	5:47PM
3	8:00AM	20658	0,000	0	0	16	16	16	9.13	11:00AM	6:28PM
4	8:00AM	20658	0,000	0	0	16	16	16	9.21	11:46AM	7:00PM
5	8:00AM	20658	0,000	0	0	16	16	16	9.21	12:36PM	4:46AM
6	8:00AM	20658	0,000	0	0	18	18	18	8.94	1:07PM	5:39AM
7	8:00AM	20677	19,000	540	550	58	58	58	8.90	1:49PM	6:31AM
8	8:00AM	20716	39,000	540	550	58	58	58	8.87	2:31PM	7:21AM
9	8:00AM	20716	0,000	0	0	16	16	16	8.87	3:16PM	8:14AM
10	7:45AM	20716	0,000	0	0	16	16	16	8.97	3:55AM	9:13AM
11	8:30AM	20716	0,000	0	0	16	16	16	8.89	4:21AM	10:15AM
12	8:30AM	20716	0,000	0	0	16	16	16	9.02	4:53AM	11:31AM
13	8:00AM	20716	0,000	0	0	16	16	16	9.29	5:35AM	12:57PM
14	8:00AM	20716	0,000	0	0	16	16	16	9.46	6:27AM	2:42PM
15	8:00AM	20716	0,000	0	0	16	16	16	9.50	7:41AM	4:12PM
16	8:00AM	20716	0,000	0	0	16	16	16	9.51	9:06AM	5:19PM
17	8:00AM	20732	16,000	540	550	42	42	42	9.56	10:27AM	6:12PM
18	8:30AM	20732	0,000	0	0	16	16	16	9.54	11:36AM	6:55PM
19	8:45AM	20732	0,000	0	0	16	16	16	9.50	12:31PM	5:05AM
20	8:30AM	20732	0,000	0	0	16	16	16	9.38	1:24PM	6:05AM
21	8:00AM	20732	0,000	0	0	16	16	16	9.13	2:06PM	6:53AM
22	8:00AM	20732	0,000	0	0	16	16	16	9.04	2:52PM	7:40AM
23	8:00AM	20732	0,000	0	0	16	16	16	9.13	3:36PM	8:26AM
24	8:30AM	20732	0,000	0	0	16	16	16	9.08	3:29AM	9:12AM
25	8:30AM	20732	0,000	0	0	16	16	16	9.17	3:51AM	10:01AM
26	9:00AM	20732	0,000	0	0	16	16	16	9.17	4:23AM	11:00AM
27	8:00AM	20732	0,000	0	0	16	16	16	9.33	5:02AM	12:09AM
28	8:00AM	20732	0,000	0	0	16	16	16	9.46	5:55AM	1:39PM
29	8:00AM	20732	0,000	0	0	16	16	16	9.58	7:05AM	3:11PM
30	8:00AM	20732	0,000	0	0	16	16	16	9.61	8:29AM	4:22PM
31	8:00AM	20732	0,000	0	0	16	16	16	9.63	9:46AM	5:11PM.
TOTAL			74,000								
AVERAGE			25,000	540	550	53	53	53	9.24		
MAXIMUM			39,000	540	550	58	58	58	9.63		
MINIMUM			16,000	540	550	42	42	42	8.87		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
8-16-90	<1	3.10	19,994	24,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
08-16-90	1,250	660

RESULT OF SPECIFIC INJECTIVITY TEST

Date n/a GPM /PSI

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Gary Christenson

Gary J. Christenson, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
CASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH SEPTEMBER YEAR 1990

		Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	8:00AM	20732	0,000	0	0	16	16	16	9.57	10:49AM	3:14AM
2	8:30AM	20732	0,000	0	0	16	16	16	9.44	11:37AM	4:21AM
3	8:00AM	20732	0,000	0	0	16	16	16	9.38	12:23PM	5:10AM
4	8:00AM	20732	0,000	0	0	16	16	16	9.21	1:05PM	5:55AM
5	8:00AM	20732	0,000	0	0	16	16	16	9.04	1:51PM	6:39AM
6	8:00AM	20732	0,000	0	0	18	18	18	9.04	2:37PM	7:23AM
7	8:00AM	20955	223,000	600	650	44	44	44	9.04	3:27PM	8:14AM
8	8:00AM	21173	218,000	600	650	44	44	44	9.00	2:50AM	9:04AM
9	8:00AM	21203	30,000	600	650	44	44	44	9.13	3:18AM	10:05AM
10	8:30AM	21203	0,000	0	0	16	16	16	9.21	3:57AM	11:19AM
11	8:00AM	21203	0,000	0	0	16	16	16	9.33	4:30AM	12:48PM
12	8:00AM	21203	0,000	0	0	16	16	16	9.50	5:47AM	2:31PM
13	8:00AM	21229	26,000	600	650	44	44	44	9.57	7:22AM	3:55PM
14	8:30AM	21229	0,000	0	0	16	16	16	9.52	9:12AM	4:55PM
15	8:30AM	21229	0,000	0	0	16	16	16	9.48	10:42AM	3:36AM
16	8:15AM	21229	0,000	0	0	16	16	16	9.40	11:47AM	4:47AM
17	7:45AM	21229	0,000	0	0	16	16	16	9.08	12:43PM	5:40AM
18	7:30AM	21229	0,000	0	0	16	16	16	8.79	1:29PM	6:19AM
19	7:30AM	21229	0,000	0	0	16	16	16	8.75	2:14PM	6:58AM
20	8:30AM	21229	0,000	0	0	16	16	16	8.75	2:56PM	7:33AM
21	7:30AM	21229	0,000	0	0	16	16	16	8.83	3:39PM	8:11AM
22	8:00AM	21391	162,000	600	650	44	44	44	8.75	4:25PM	8:50AM
23	8:00AM	21391	0,000	0	0	16	16	16	8.96	2:48AM	9:35AM
24	7:30AM	21391	0,000	0	0	16	16	16	8.96	3:21AM	10:24AM
25	7:30AM	21391	0,000	0	0	16	16	16	8.96	4:03AM	11:33AM
26	7:30AM	21391	0,000	0	0	16	16	16	9.23	5:02AM	12:55PM
27	8:00AM	21391	0,000	0	0	16	16	16	9.19	6:18AM	2:19PM
28	7:30AM	21391	0,000	0	0	16	16	16	9.20	7:51AM	3:26PM
29	8:00AM	21391	0,000	0	0	16	16	16	9.23	9:17AM	2:11AM
30	7:30AM	21391	0,000	0	0	16	16	16	9.17	10:26AM	3:32AM
31											
TOTAL			659,000								
AVERAGE			131,000	600	650	44	44	44	9.16		
MAXIMUM			223,000	600	650	44	44	44	9.57		
MINIMUM			26,000	600	650	44	44	44	8.75		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
9-12-90	<1	2.25	17,994	21,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
09-12-90	1,350	610

RESULT OF SPECIFIC INJECTIVITY TEST

Date 10-17-90 GPM 600 /PSI 44

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Gary J. Christenson

Gary J. Christenson, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
CASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH OCTOBER YEAR 1990

		Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	7:30AM	21391	0,000	0	0	16	16	16	8.96	11:22PM	4:25AM
2	8:45AM	21391	0,000	0	0	16	16	16	8.92	12:17PM	5:11AM
3	9:00AM	21391	0,000	0	0	16	16	16	9.00	1:06PM	5:53AM
4	7:30AM	21391	0,000	0	0	16	16	16	8.58	1:58PM	6:36AM
5	8:30AM	21391	0,000	0	0	16	16	16	8.46	2:51PM	7:21AM
6	8:30AM	21391	0,000	0	0	16	16	16	8.42	3:51PM	8:10AM
7	8:30AM	21391	0,000	0	0	16	16	16	8.50	1:58AM	9:02AM
8	8:30AM	21391	0,000	0	0	16	16	16	8.58	2:37AM	10:01AM
9	8:30AM	21391	0,000	0	0	16	16	16	8.87	3:19AM	11:15AM
10	8:30AM	21391	0,000	0	0	16	16	16	9.29	4:15AM	12:39PM
11	8:30AM	21391	0,000	0	0	16	16	16	9.71	5:34AM	2:07PM
12	7:30AM	21567	176,000	600	650	45	45	45	9.42	7:27AM	3:14PM
13	8:30AM	21716	149,000	600	650	45	45	45	9.21	9:20AM	2:47AM
14	8:30AM	21916	200,000	600	650	44	44	44	9.17	10:47AM	4:08AM
15	8:30AM	22112	196,000	600	650	44	44	44	8.96	11:52AM	4:56AM
16	8:30AM	22112	0,000	0	0	16	16	16	8.79	12:51PM	5:40AM
17	8:30AM	22112	0,000	0	0	16	16	16	8.79	1:42PM	6:17AM
18	8:30AM	22112	0,000	0	0	16	16	16	8.67	2:27PM	6:49AM
19	8:30AM	22112	0,000	0	0	16	16	16	8.58	3:10PM	7:23AM
20	8:30AM	22112	0,000	0	0	16	16	16	8.54	3:56PM	7:56AM
21	8:30AM	22112	0,000	0	0	16	16	16	8.46	4:43PM	8:35AM
22	8:30AM	22112	0,000	0	0	16	16	16	8.71	2:04AM	9:17AM
23	8:30AM	22112	0,000	0	0	16	16	16	8.79	2:42AM	10:08AM
24	8:30AM	22112	0,000	0	0	16	16	16	8.92	3:29AM	11:08AM
25	8:00AM	22112	0,000	0	0	16	16	16	9.00	4:27AM	12:14PM
26	8:00AM	22112	0,000	0	0	16	16	16	8.63	5:36AM	1:17PM
27	8:00AM	22112	0,000	0	0	16	16	16	8.83	7:09AM	2:17PM
28	8:00AM	22112	0,000	0	0	16	16	16	8.75	7:39AM	1:58PM
29	8:00AM	22112	0,000	0	0	16	16	16	8.75	8:59AM	2:22AM
30	8:30AM	22112	0,000	0	0	16	16	16	8.58	10:13AM	3:17AM
31	8:30AM	22112	0,000	0	0	16	16	16	8.33	11:20AM	4:03AM
TOTAL			721,000								
AVERAGE			180,000	600	650	45	45	45	8.82		
MAXIMUM			200,000	600	650	45	45	45	9.71		
MINIMUM			149,000	600	650	44	44	44	8.42		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
10-11-90	<1	2.00	20,494	28,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
10-11-90	1,700	650

RESULT OF SPECIFIC INJECTIVITY TEST

Date GPM /PSI

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Gary J. Christenson

Gary J. Christenson, Lead Operator

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH NOVEMBER YEAR 1990

			Injection Well Data						Monitor Well Data		
				Flow Rate		Injection Pres.				Times of Tidal Extremes	
Date	Time	Flowmeter Reading (gallons)	Volume Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Water Level (NGVD)	High	Low
1	0630	22112	0	0	0	16	16	16	8.29	12:23 PM	4:48 AM
2	0830	"	0	0	0	16	16	16	8.08	1:30 PM	5:31 AM
3	0800	"	0	0	0	16	16	16	7.83	2:40 PM	6:19 AM
4	0900	"	0	0	0	16	16	16	7.92		7:11 AM
5	0705	"	0	0	0	16	16	16	7.92	12:27 AM	8:05 AM
6	0710	"	0	0	0	16	16	16	8.25	1:13 AM	9:05 AM
7	0710	"	0	0	0	16	16	16	8.21	2:04 AM	10:08 AM
8	0705	"	0	0	0	16	16	16	8.25	3:06 AM	11:15 AM
9	0815	"	0	0	0	16	16	16	8.54	4:33 AM	12:15 PM
10	0815	"	0	0	0	16	16	16	8.33	6:22 AM	1:11 PM
11	0705	"	0	0	0	16	16	16	7.75	8:53 AM	1:53 AM
12	0705	"	0	0	0	16	16	16	7.92	9:45 AM	2:58 AM
13	0705	"	0	0	0	16	16	16	8.29	11:02 AM	3:51 AM
14	0705	"	0	0	0	16	16	16	7.92	12:06 PM	4:30 AM
15	0705	22112	0	0	0	16	16	16	8.08	1:08 PM	5:08 AM
16	0710	"	0	0	0	16	16	16	8.25	2:00 PM	5:14 AM
17	0710	"	0	0	0	16	16	16	8.21	11:32 PM	6:16 AM
18	0705	"	0	0	0	16	16	16	8.21		6:51 AM
19	0710	"	0	0	0	16	16	16	8.29	12:04 AM	7:29 AM
20	0705	"	0	0	0	16	16	16	8.50	12:43 AM	8:08 AM
21	0815	"	0	0	0	16	16	16	8.29	1:23 AM	8:53 AM
22	0705	"	0	0	0	16	16	16	8.13	2:12 AM	9:39 AM
23	0710	"	0	0	0	16	16	16	8.21	3:04 AM	10:25 AM
24	0815	"	0	0	0	16	16	16	8.50	4:10 AM	11:11 AM
25	0705	"	0	0	0	16	16	16	8.33	5:29 AM	11:57 AM
26	0705	"	0	0	0	16	16	16	8.29	7:04 AM	12:35 PM
27	0705	"	0	0	0	16	16	16	8.21	8:42 AM	2:00 AM
28	0705	"	0	0	0	16	16	16	8.29	10:17 AM	3:01 AM
29	0705	"	0	0	0	16	16	16	8.33	11:51 AM	3:53 AM
30	0805	22112	0	0	0	16	16	16	7.83	10:52 PM	4:43 AM
31											
TOTAL			0	0	0	480	480	480	245.53		
AVERAGE			0	0	0	16	16	16	8.18		
MAXIMUM			0	0	0	16	16	16	8.54		
MINIMUM			0	0	0	16	16	16	7.75		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
11-15-90	< 1	2.05	18,394	28,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
11-15-90	1,900	650

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans 12-11-90

TROY J. EVANS C-7819

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH DECEMBER YEAR 1990

Date	Time	Flowmeter Reading (gallons)	Injection Well Data: Volume Injected (gallons)	Flow Rate Av. (gpm)	Flow Rate Max. (gpm)	Injection Pres. Av. (psi)	Injection Pres. Max. (psi)	Injection Pres. Min. (psi)	Monitor Well Data: Water Level (NGVD)	Times of Tidal Extremes High	Times of Tidal Extremes Low
1	0805	22112	0	0	0	16	16	16	8.17	10:41 PM	5:35 AM
2	0755	"	0	0	0	16	16	16	8.04	11:27 PM	6:24 AM
3	0802	"	0	0	0	16	16	16	8.33		7:16 AM
4	0810	"	0	0	0	16	16	16	8.21	12:18 AM	8:07 AM
5	0805	"	0	0	0	16	16	16	8.54	1:10 AM	8:58 AM
6	0805	"	0	0	0	16	16	16	8.13	2:06 AM	9:45 AM
7	0805	"	0	0	0	16	16	16	8.92	3:11 AM	10:30 AM
8	0805	"	0	0	0	16	16	16	8.63	4:31 AM	11:13 AM
9	0802	"	0	0	0	16	16	16	8.13	6:04 AM	11:50 AM
10	0803	"	0	0	0	16	16	16	8.33	7:57 AM	12:25 PM
11	0805	"	0	0	0	16	16	16	8.42	9:50 AM	2:23 AM
12	0802	"	0	0	0	16	16	16	8.46	11:31 AM	3:29 AM
13	0800	"	0	0	0	16	16	16	8.25	12:29 PM	4:16 AM
14	0800	"	0	0	0	16	16	16	8.21	10:03 PM	4:56 AM
15	0801	22112	0	0	0	16	16	16	8.13	10:35 PM	5:38 AM
16	0759	"	0	0	0	16	16	16	8.06	11:15 PM	6:14 AM
17	0802	"	0	0	0	16	16	16	8.17	11:54 PM	6:50 AM
18	0800	"	0	0	0	16	16	16	8.25		7:25 AM
19	0802	"	0	0	0	16	16	16	8.29	4:19 PM	7:57 AM
20	0801	"	0	0	0	16	16	16	8.21	1:18 AM	8:29 AM
21	0750	"	0	0	0	16	16	16	8.13	2:00 AM	9:02 AM
22	0750	"	0	0	0	16	16	16	7.75	2:52 AM	9:37 AM
23	0801	"	0	0	0	16	16	16	7.83	3:49 AM	10:09 AM
24	0801	"	0	0	0	16	16	16	8.25	5:05 AM	10:38 AM
25	0755	"	0	0	0	16	16	16	8.13	6:43 AM	11:06 AM
26	0801	"	0	0	0	16	16	16	8.29	8:42 PM	11:27 AM
27	0801	"	0	0	0	16	16	16	8.25	8:03 PM	2:46 AM
28	0802	"	0	0	0	16	16	16	8.17	8:49 PM	3:49 AM
29	0803	22499	387,000	590	650	42	42	42	7.96	9:37 PM	4:47 AM
30	0800	22846	347,000	590	650	44	44	44	7.92	10:33 PM	5:40 AM
31	0802	"	0	0	0	16	16	16	7.75	11:35 PM	6:29 AM
TOTAL			734,000	1180	1300	8.6	86	86	254.33		
AVERAGE			367,000	590	650	43	43	43	8.20		
MAXIMUM			387,000	590	650	44	44	44	8.92		
MINIMUM			347,000	590	650	42	42	42	7.75		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
12-13-90	< 1	1.75	17,694	28,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
12-13-90	1,450	620

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans 1-8-91
TROY J. EVANS 7917

File

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH JANUARY YEAR 1991

Date	Time	Flowmeter Reading (gallons)	Injection Well Data: Volume Injected (gallons)	Flow Rate Av. (gpm)	Flow Rate Max. (gpm)	Injection Pres. Av. (psi)	Injection Pres. Max. (psi)	Injection Pres. Min. (psi)	Monitor Well Data: Water Level (NGVD)	Times of Tidal Extremes High	Times of Tidal Extremes Low
1	0802	22846	0	0	0	16	16	16	7.79	—	7:15 AM
2	0802	228446	160,000	590	650	44	44	44	8.00	12:30 AM	7:54 AM
3	0803	23006	323,000	590	650	44	44	44	8.08	1:22 AM	8:23 AM
4	0804	23329	242,000	590	650	44	44	44	8.26	2:21 AM	9:02 AM
5	0802	23571	265,000	580	650	44	44	44	8.29	3:17 AM	9:31 AM
6	0802	23836	240,000	590	660	44	44	44	8.25	4:26 AM	9:56 AM
7	0800	24076	245,000	590	660	44	44	44	8.50	5:50 AM	10:17 AM
8	0802	24321	252,000	590	660	44	44	44	8.54	7:42 AM	10:36 AM
9	0803	24573	219,000	580	650	44	44	44	8.33	7:24 PM	2:01 AM
10	0801	24792	249,000	580	650	43	43	43	8.17	8:10 PM	3:07 AM
11	0801	25041	0	0	0	16	16	16	8.46	8:59 PM	3:57 AM
12	0801	25041	274,000	610	680	45	45	45	8.38	9:47 PM	4:45 AM
13	0801	25315	251,000	600	680	45	45	45	8.17	10:32 PM	5:29 AM
14	0802	25566	247,000	600	670	45	45	45	8.25	11:14 PM	6:14 AM
15	0803	25813	385,000	600	680	45	45	45	8.25	2:47 PM	6:35 AM
16	0800	26198	472,000	600	670	44	44	44	8.54	2:49 PM	7:01 AM
17	0802	26670	341,000	600	680	45	45	45	8.21	12:32 AM	7:25 AM
18	0800	27011	308,000	610	680	45	45	45	8.25	1:14 AM	7:50 AM
19	0801	27319	321,000	600	680	45	45	45	8.58	1:50 AM	8:15 AM
20	0800	27640	303,000	600	670	45	45	45	8.96	2:45 AM	8:38 AM
21	0801	27943	318,000	600	680	45	45	45	8.75	3:40 AM	9:03 AM
22	0802	28261	269,000	610	680	45	45	45	8.63	4:55 AM	9:21 AM
23	0803	28530	181,000	600	680	45	45	45	8.67	6:49 AM	9:26 AM
24	0802	28711	0	0	0	16	16	16	8.87	6:27 PM	1:20 AM
25	0801	28711	0	0	0	16	16	16	8.75	7:27 PM	2:38 AM
26	0802	28711	259,000	580	660	44	44	44	8.63	8:37 PM	3:50 AM
27	0803	29006	295,000	580	650	44	44	44	8.63	9:45 PM	4:47 AM
28	0803	29211	325,000	580	650	44	44	44	8.67	10:51 PM	5:37 AM
29	0804	29606	321,000	580	650	44	44	44	8.67	2:44 PM	6:19 AM
30	0801	29927	331,000	590	650	44	44	44	8.92	2:42 PM	6:54 AM
31	0802	30258	0	0	0	16	16	16	8.71	12:38 AM	7:23 AM
TOTAL			7,376,000	15420	17270	1154	1154	1154	262.15		
AVERAGE			283,692	593	664	44	44	44	8.46	* STRONG TIDE	
MAXIMUM			472,000	610	680	45	45	45	8.96		
MINIMUM			160,000	580	650	43	43	43	7.79		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
1-10-91	< 1	2.10	17,120	25,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
1-10-91	1,200	510

RESULT OF SPECIFIC INJECTIVITY TEST

Date 1-26-91 GPM 620 /PSI 44

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans 2-8-91

TROY J. EVANS 7819

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH FEBRUARY YEAR 1991

			Injection Well Data							Monitor Well Data	
				Flow Rate		Injection Pres.				Times of Tidal Extremes	
Date	Time	Flowmeter Reading (gallons)	Volume Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Water Level (NGVD)	High	Low
1	0800	30258	291,000	580	650	44	44	44	8.54	1:31A	7:51A
2	0800	30549	312,000	580	650	44	44	44	8.04	2:23A	8:13A
3	0801	30861	0	0	0	16	16	16	8.21	3:13A	8:31A
4	0802	30861	0	0	0	16	16	16	8.96	4:16A	8:46A
5	0801	30861	0	0	0	16	16	16	9.04	5:33A	8:55A
6	0800	30861	0	0	0	16	16	16	9.21	5:28P	
7	0803	30861	0	0	0	16	16	16	9.17	6:25P	1:20A
8	0800	30861	0	0	0	16	16	16	9.00	7:31P	2:32A
9	0801	30861	0	0	0	16	16	16	8.79	8:39P	3:38A
10	0801	30861	322,000	590	660	44	44	44	8.75	9:38P	4:28A
11	0800	31183	315,000	590	660	44	44	44	8.92	1:34P	5:06A
12	0801	31498	0	0	0	16	16	16	8.38	1:30P	5:38A
13	0801	31498	0	0	0	16	16	16	8.87	131P	6:04A
14	0802	31498	0	0	0	16	16	16	9.04	1:39P	6:25A
15	0800	31498	0	0	0	16	16	16	9.00	1:47P	6:43A
16	0801	31498	0	0	0	16	16	16	8.17	2:05P	7:05A
17	0802	31498	0	0	0	16	16	16	8.34	2:23P	7:23A
18	0800	31498	279,000	580	650	44	44	44	8.38	2:48P	7:43A
19	0801	31777	368,000	580	650	44	44	44	8.42	3:24P	8:00A
20	0800	32145	0	0	0	16	16	16	8.38	4:00P	8:02A
21	0800	32145	0	0	0	16	16	16	8.29	4:46P	
22	0801	32145	0	0	0	16	16	16	8.17	5:49P	1:04A
23	0800	32145	0	0	0	16	16	16	8.21	7:15P	*2:33A
24	0801	32145	0	0	0	16	16	16	8.08	8:44P	*3:40A
25	0803	32145	0	0	0	16	16	16	8.29	1:29P	*4:34A
26	0800	32145	332,000	580	650	44	44	44	8.17	1:15P	*6:16A
27	0759	32477	309,000	590	660	44	44	44	7.96	1:20P	*5:51A
28	0802	32786	313,000	590	660	44	44	44	8.29	1:26P	6:17A
29											
30											
31											
TOTAL			2,841,000	5260	5890	396	396	396	239.07	* STRONG TIDE	
AVERAGE			315,667	584	654	44	44	44	8.54		
MAXIMUM			368,000	590	660	44	44	44	9.21		
MINIMUM			279,000	580	650	44	44	44	7.96		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
2-8-91	< 1	1.90	18,120	26,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
2-8-91	1,250	520

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans 3-11-91

TROY J. EVANS 7819

F.12

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH MARCH YEAR 1991

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	0800	33099	325,000	580	650	44	44	44	8.33	1:39P	6:38A
2	0802	33424	351,000	580	650	44	44	44	8.58	1:51P	6:56A
3	0801	33775	375,000	580	650	44	44	44	9.25	2:09P	7:09A
4	0802	34150	376,000	580	650	44	44	44	8.79	2:38P	7:23A
5	0803	34526	385,000	580	650	44	44	44	8.46	3:06P	7:35A
6	0800	34911	368,000	580	650	44	44	44	8.75	3:42P	7:39A
7	0801	35279	339,000	590	660	45	45	45	8.96	4:32P	—
8	0802	35618	87,000	590	660	45	45	45	8.92	5:37P	12:32A
9	0801	35705	0	0	0	16	16	16	8.87	6:56P	1:54A
10	0802	35705	0	0	0	16	16	16	8.75	8:09P	2:58A
11	0801	35705	338,000	590	660	45	45	45	8.54	12:12P	3:47A
12	0802	36043	322,000	590	660	45	45	45	8.79	12:09P	4:23A
13	0800	36365	322,000	580	650	44	44	44	9.21	12:15P	4:51A
14	0802	36687	0	0	0	16	16	16	9.00	12:20P	5:13A
15	0802	36687	0	0	0	16	16	16	8.96	12:32P	5:31A
16	0801	36687	0	0	0	16	16	16	8.71	12:43P	5:53A
17	0801	36687	423,000	580	650	44	44	44	8.96	1:05P	6:08A
18	0800	37110	369,000	580	650	44	44	44	9.21	1:26P	6:25A
19	0800	37479	347,000	590	660	45	45	45	9.08	1:59P	6:39A
20	0801	37826	368,000	590	660	45	45	45	8.92	2:34P	6:45A
21	0802	38194	333,000	580	650	45	45	45	9.08	3:17P	11:15P
22	0801	38527	0	0	0	16	16	16	9.04	4:13P	—
23	0930	38527	0	0	0	16	16	16	8.50	5:36P	12:47A
24	0830	38527	0	0	0	16	16	16	8.42	7:22P	2:11A
25	0801	38527	0	0	0	16	16	16	8.96	11:56A	3:10A
26	0803	38527	0	0	0	16	16	16	9.00	11:50A	3:36A
27	0801	38527	0	0	0	16	16	16	9.00	11:58A	4:33A
28	0801	38527	0	0	0	16	16	16	9.08	12:09P	5:04A
29	0800	38527	192,000	580	650	44	44	44	9.33	12:21P	5:27A
30	0801	38719	0	0	0	16	16	16	9.25	12:34P	5:42A
31	0800	38719	0	0	0	16	16	16	9.25	12:52P	5:55A
TOTAL			5,620,000	9920	11,110	755	755	755	275.95		
AVERAGE			330,000	584	654	44	44	44	8.90		
MAXIMUM			423,000	590	660	45	45	45	9.33		
MINIMUM			87,000	580	650	44	44	44	8.33		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
3-14-91	<1	1.35	18,640	34,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
3-14-91	1,450	500

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans 4-8-91

TROY J. EVANS 7819

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

File

MONTH [illegible] YEAR [illegible]

Date	Time	Flowmeter Reading (gallons)	Injection Well Data: Volume Injected (gallons)	Flow Rate Av. (gpm)	Flow Rate Max. (gpm)	Injection Pres. Av. (psi)	Injection Pres. Max. (psi)	Injection Pres. Min. (psi)	Monitor Well Data: Water Level (NGVD)	Times of Tidal Extremes High	Times of Tidal Extremes Low
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44	44	44	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44	44	44	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44	44	44	[illegible]	2:11 PM	[illegible]
4	[illegible]	39594	[illegible]	0	[illegible]	16	16	16	[illegible]	[illegible]	[illegible]
5	[illegible]	39594	[illegible]	0	[illegible]	16	16	16	[illegible]	[illegible]	[illegible]
6	0810	39594		0	0	16	16	16	8.[illegible]	4:55PM	
7	0830	39594	0	0	0	16	16	16	8.46	7:15PM	[illegible]
8	0801	39594	0	0	0	16	16	16	8.79	11:30AM	[illegible]
9	0801	39594	0	0	0	16	16	16	8.79	11:37AM	[illegible]
10	0801	39594	0	0	0	16	16	16	8.93	11:45AM	[illegible]
11	0801	39594	0	0	0	16	16	16	8.96	11:56AM	[illegible]
12	0801	39594	0	0	0	16	16	16	8.87	12:09PM	5:16AM
13	0801	39594	0	0	0	16	16	16	8.85	12:29PM	[illegible]
14	0801	39594	0	0	0	16	16	16	8.96	12:45PM	[illegible]
15	0801	39594	0	0	0	16	16	16	9.04	1:11PM	[illegible]
16	0801	39594	0	0	0	16	16	16	9.17	1:40PM	[illegible]
17	0800	39594	0	0	0	16	16	16	9.21	2:17PM	[illegible]
18	0801	39594	[illegible]	[illegible]	[illegible]	44	44	44	9.19	3:01PM	[illegible]
19	0801	39943	[illegible]	[illegible]	[illegible]	44	44	44	9.04	3:54PM	
20	0800	[illegible]	[illegible]	[illegible]	[illegible]	44	44	44	[illegible]	4:59PM	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.96	6:35PM	[illegible]
22	[illegible]	[illegible]	0	0	[illegible]	16	[illegible]	[illegible]	[illegible]	11:17AM	[illegible]
23	[illegible]	[illegible]	0	0	0	16	16	16	[illegible]	11:27AM	[illegible]
24	0815	40829	0	0	[illegible]	16	16	16	9.17	[illegible]	[illegible]
25	0801	40829	0	0	0	16	16	16	9.08	11:45AM	[illegible]
26	[illegible]	40829	0	0	0	16	16	16	9.17	12:52PM	[illegible]
27	[illegible]	40829	0	0	0	16	16	16	9.04	[illegible] PM	[illegible]
28	0802	40829	0	0	0	16	16	16	8.79	12:40PM	[illegible]
29	0801	40829	0	0	0	16	16	16	8.87	1:02PM	[illegible]
30	0801	40829	0	0	0	16	16	16	8.52	[illegible] PM	[illegible]
31											
TOTAL			2,110,000	4030	4520	309	309	309	267.54		
AVERAGE			301,429	576	646	44	44	44	8.92		
MAXIMUM			365,000	520	650	45	45	45	9.27		
MINIMUM			175,000	570	640	44	44	44	8.46		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
4-5-91	<1	2.40	18,294	37,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
4-5-91	1,600	520

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM______/PSI______

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

[illegible signature] 7819 5-9-91

[illegible]

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH MAY YEAR 1991

Date	Time	Flowmeter Reading (gallons)	Injection Well Data: Volume Injected (gallons)	Flow Rate Av. (gpm)	Flow Rate Max. (gpm)	Injection Pres. Av. (psi)	Injection Pres. Max. (psi)	Injection Pres. Min. (psi)	Monitor Well Data: Water Level (NGVD)	Times of Tidal Extremes High	Times of Tidal Extremes Low
1	0801	40829	0	0	0	16	16	16	8.96	2:05PM	6:22AM
2	0800	40829	0	0	0	16	16	16	9.04	2:44PM	10:10PM
3	0800	40829	0	0	0	16	16	16	8.67	3:26PM	11:06PM
4	0800	40829	0	0	0	16	16	16	8.63	4:20PM	---
5	0830	40829	0	0	0	16	16	16	8.67	5:22PM	12:02AM
6	0800	40829	0	0	0	16	16	16	8.58	9:43AM	12:59AM
7	0800	40829	0	0	0	16	16	16	8.54	9:54AM	1:48AM
8	0800	40829	0	0	0	16	16	16	8.50	10:09AM	2:31AM
9	0800	40829	0	0	0	16	16	16	8.58	10:28AM	3:05AM
10	0800	40829	0	0	0	16	16	16	8.63	10:47AM	3:38AM
11	0800	40829	0	0	0	16	16	16	8.63	11:09AM	4:05AM
12	0801	40829	0	0	0	16	16	16	8.63	11:31AM	4:23AM
13	0805	40829	0	0	0	16	16	16	8.67	12:03PM	4:39AM
14	0800	40829	0	0	0	16	16	16	8.77	12:38PM	4:53AM
15	0800	40829	0	0	0	16	16	16	8.79	1:17PM	5:51PM
16	0800	40829	0	0	0	16	16	16	8.67	2:05PM	9:49PM
17	0802	40829	0	0	0	16	16	16	8.54	2:55PM	10:47PM
18	0801	40829	320,000	580	650	45	45	45	8.50	3:54PM	11:47PM
19	0801	41149	324,000	580	650	45	45	45	8.63	5:05PM	---
20	0801	41473	330,000	580	650	45	45	45	8.67	9:19AM	12:43A
21	0801	41803	307,000	590	650	45	45	45	8.63	9:34AM	1:32A
22	0801	42110	316,000	580	650	45	45	45	9.13	9:56AM	2:16A
23	0802	42426	300,000	580	650	45	45	45	9.04	10:20AM	2:54A
24	0803	42726	265,000	580	650	45	45	45	8.96	10:45AM	3:26A
25	0810	42991	325,000	580	650	45	45	45	9.00	11:13AM	3:52A
26	0805	43366	376,000	580	650	45	45	45	9.17	11:39AM	4:13A
27	0801	43742	344,000	580	650	45	45	45	8.96	12:08PM	4:25A
28	0801	44086	310,000	570	660	46	46	46	8.92	12:35PM	7:56P
29	0800	44396	232,000	580	650	46	46	46	8.87	1:11PM	8:34P
30	0800	44628	230,000	580	650	46	46	46	8.92	1:47PM	9:13P
31	0801	44856	270,000	580	650	46	46	46	8.96	2:29PM	9:53P
TOTAL			4,277,000	8140	9110	634	634	634	272.08		
AVERAGE			307,071	581	651	45	45	45	8.78		
MAXIMUM			376,000	590	660	46	46	46	9.17		
MINIMUM			230,000	580	650	45	45	45	8.50		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
5-16-91	<1	1.20	22,493	40,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
5-16-91	2,250	680

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans C7819

TROY J. EVANS LEAD OPERATOR

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH JUNE YEAR 1991

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	0800	45128	250,000	590	660	47	47	47	8.87	3:08P	10:28P
2	0800	45378	0	0	0	16	16	16	8.96	3:52P	11:14P
3	0800	45378	0	0	0	16	16	16	9.04	7:16A	9:37A
4	0801	45378	0	0	0	16	16	16	9.08	7:44A	11:18A
5	0800	45378	221,000	580	650	47	47	47	9.13	8:12A	12:28A
6	0800	45599	232,000	580	650	46	46	46	9.17	8:39A	1:04A
7	0800	45831	237,000	580	650	46	46	46	9.08	9:09A	1:39A
8	0800	46068	0	0	0	16	16	16	9.04	9:38A	2:09A
9	0800	46068	0	0	0	16	16	16	9.13	10:13A	2:31A
10	0801	46068	0	0	0	16	16	16	9.13	10:49A	6:16P *
11	0800	46068	241,000	580	650	46	46	46	9.08	11:35A	7:08P *
12	0800	46309	0	0	0	16	16	16	9.13	12:19P *	8:03P *
13	0801	46309	0	0	0	16	16	16	9.00	1:10P *	8:47P *
14	0800	46309	0	0	0	16	16	16	8.96	2:05P *	9:41P *
15	0800	46309	0	0	0	16	16	16	8.87	3:00P	10:26P
16	0800	46309	0	0	0	16	16	16	8.87	6:43A	8:25A
17	0800	46309	0	0	0	16	16	16	8.92	7:02A	10:18A
18	0801	46309	196,000	580	650	46	46	46	8.96	7:27A	12:06P
19	0801	46505	189,000	580	650	47	47	47	9.04	7:58A	12:21A
20	0801	46694	0	0	0	16	16	16	8.96	8:33A	12:56A
21	0801	46694	0	0	0	16	16	16	9.00	9:09A	1:28A
22	0801	46694	0	0	0	16	16	16	8.96	9:48A	1:53A
23	0800	46694	260,000	580	650	47	47	47	9.17	10:27A	5:55P
24	0800	46954	0	0	0	16	16	16	9.13	11:06A	6:37P
25	0801	46954	0	0	0	16	16	16	9.08	11:45A	7:15P
26	0800	46954	0	0	0	16	16	16	9.13	12:24P	7:52P
27	0800	46954	0	0	0	16	16	16	9.04	1:02P	8:24P
28	0800	46954	196,000	580	650	47	47	47	8.87	1:42P	8:56P
29	0800	47150	225,000	580	650	47	47	47	8.96	3:02P	6:28A
30	0800	47375	226,000	580	650	47	47	47	9.00	3:02P	7:28A
31											
TOTAL			2,473,000	6390	7160	513	513	513	270.76		
AVERAGE			224,818	580.9	650.9	46.6	46.6	46.6	9.03		
MAXIMUM			260,000	590	660	47	47	47	9.17		
MINIMUM			189,000	580	650	46	46	46	8.87		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
6-6-91	< 1	1.50	19,500	28,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
6-6-91	1,550	610

RESULT OF SPECIFIC INJECTIVITY TEST

Date 6-1-91 GPM 630 /PSI 47

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans July 10, 1991

TROY J. EVANS 7819 LEAD OPERATOR

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH JULY YEAR 1991

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	0800	47601	0	0	0	16	16	16	9.13	5:17 A	9:33A
2	0801	47601	300,000	580	650	47	47	47	9.13	5:44A	10:45A
3	0800	47901	277,000	580	650	47	47	47	9.17	6:14A	12:01P
4	0800	48180	295,000	580	650	47	47	47	9.29	6:44A	12:19A
5	0800	48475	341,000	580	650	47	47	47	9.25	7:21A	12:48A
6	0800	48816	346,000	580	650	47	47	47	9.33	8:02A	1:06A
7	0800	49162	334,000	580	650	47	47	47	9.33	8:48A	1:18A
8	0801	49496	210,000	590	670	49	49	49	9.33	9:37A	6:24P
★9	0800	49706	197,000	580	650	50	50	50	9.42	10:32A	7:22P
10	0800	49903	0	0	0	19	19	19	9.42	11:29A*	8:13P
11	0801	49903	0	0	0	19	19	19	9.35	12:25P*	8:59P
12	0801	49903	0	0	0	19	19	19	9.17	1:21P*	9:38P
13	0800	49903	0	0	0	19	19	19	9.08	2:13P	7:30A
14	0800	49903	0	0	0	19	19	19	9.06	4:48A	8:48A
15	0801	49963	209,000	580	650	50	50	50	9.04	5:03A	10:05A
16	0800	50112	159,000	580	650	50	50	50	9.00	5:28A	11:19A
17	0800	50271	0	0	0	19	19	19	9.08	5:57A	12:35P
18	0801	50271	0	0	0	19	19	19	9.29	6:34A	12:06A
19	0801	50271	0	0	0	19	19	19	9.29	7:17A	12:24A
20	0801	50271	0	0	0	19	19	19	9.25	8:07A	12:33A
21	0800	50271	0	0	0	19	19	19	9.29	9:03A	5:45P
22	0800	50271	0	0	0	19	19	19	9.25	9:59A	6:40P
23	0800	50271	0	0	0	19	19	19	9.29	10:55A	7:25P
24	0801	50271	0	0	0	19	19	19	9.34	11:40A	8:01P
25	0801	50271	239,000	550	630	50	50	50	9.33	12:22P	5:25A
26	0800	50510	217,000	550	630	50	50	50	9.21	1:00P	6:15A
27	0800	50727	227,000	550	630	50	50	50	9.10	1:36P	7:05A
28	0800	50954	224,000	570	650	50	50	50	9.11	2:14P	7:51A
29	0800	51178	0	0	0	19	19	19	9.14	3:42A	8:44A
30	0800	51178	219,000	570	650	50	50	50	9.17	4:00A	9:33A
31	0800	51397	266,000	570	650	50	50	50	9.24	4:27A	10:29A
TOTAL			4,062,000	9170	10360	781	781	781	285.88	* STRONG TIDE	
AVERAGE			253,875	573	648	49	49	49	9.22		
MAXIMUM			346,000	590	670	50	50	50	9.42		
MINIMUM			159,000	550	630	47	47	47	9.00		

★ - ON 7-9-91 - HAD METERS CALIBRATED, COPY ENCLOSED.

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
7-3-91	< 1	0.95	19,993	34,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
7-3-91	1,600	580

RESULT OF SPECIFIC INJECTIVITY TEST

Date 7-31-91 GPM 611 /PSI 50

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans AUGUST 9, 1991
TROY J. EVANS C-7819

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OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH AUGUST YEAR 1991

Date	Time	Flowmeter Reading (gallons)	Injection Well Data: Volume Injected (gallons)	Flow Rate Av. (gpm)	Flow Rate Max. (gpm)	Injection Pres. Av. (psi)	Injection Pres. Max. (psi)	Injection Pres. Min. (psi)	Monitor Well Data: Water Level (NGVD)	Times of Tidal Extremes High	Times of Tidal Extremes Low
1	0800	51663	250,000	570	650	50	50	50	9.28	4:39A	11:17A
2	0800	51913	280,000	580	650	50	50	50	9.29	5:13A	12:33P
3	0801	52193	283,000	580	650	51	51	51	9.25	5:52A	1:59P
4	0800	52476	232,000	580	650	51	51	51	9.42	6:45A	3:38P
5	0800	52708	0	0	0	19	19	19	9.50	7:51A	5:02P
6	0800	52708	0	0	0	19	19	19	9.43	7:07A	6:07P
7	0800	52708	230,000	570	650	51	51	51	9.42	10:19A	7:02P
8	0804	52938	216,000	570	650	51	51	51	9.44	11:26A	9:45P
9	0800	53154	221,000	570	650	51	51	51	9.32	12:22P	5:48A
10	0800	53375	222,000	570	650	51	51	51	9.17	1:17P	6:54A
11	0800	53597	0	0	0	19	19	19	9.02	2:58P	7:54A
12	0800	53597	0	0	0	19	19	19	8.96	3:12P	8:50A
13	0801	53597	0	0	0	19	19	19	8.96	3:31P	9:54A
14	0800	53597	0	0	0	19	19	19	9.13	3:56A	10:54A
15	0801	53597	0	0	0	19	19	19	9.18	4:24A	11:54A
16	0801	53597	0	0	0	19	19	19	9.25	5:00A	1:00P
17	0801	53597	0	0	0	19	19	19	9.13	5:48A	2:22P
18	0800	53597	0	0	0	19	19	19	9.43	6:53A	3:52P
19	0801	53597	0	0	0	19	19	19	9.46	8:10A	5:02P
20	0801	53597	0	0	0	19	19	19	9.54	9:28A	5:58P
21	0801	53597	0	0	0	19	19	19	9.38	10:30A	3:36A
22	0800	53597	0	0	0	19	19	19	9.33	11:19A	4:46A
23	0800	53597	234,000	560	630	50	50	50	9.38	12:02P	5:39A
24	0800	53831	248,000	560	640	50	50	50	9.25	12:40P	6:21A
25	0800	54079	266,000	560	640	50	50	50	9.10	1:15P	7:00A
26	0801	54345	98,000	560	640	50	50	50	8.96	1:54P	7:42A
27	0800	54443	133,000	570	650	52	52	52	9.00	2:16A	8:25A
28	0800	54576	363,000	570	650	51	51	51	9.00	2:36A	9:10A
29	0800	54939	325,000	570	650	52	52	52	9.03	3:03A	10:01A
30	0800	55264	390,000	570	650	51	51	51	9.28	3:35A	10:58A
31	0800	55654	307,000	570	650	52	52	52	9.42	4:10A	12:10P
TOTAL			4,298,000	9680	11000	864	864	864	286.68		
AVERAGE			252,824	569	647	51	51	51	9.25		
MAXIMUM			390,000	580	650	52	52	52	9.54		
MINIMUM			98,000	560	630	50	50	50	8.96		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
8-8-91	<1	1.60	17,994	20,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
8-8-91	1,350	580

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans 9-10-91
TROY J EVANS 07819

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OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH SEPTEMBER YEAR 1991

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	0800	55961	282,000	570	650	52	52	52	9.42	5:15A	1:00P
2	0800	56243	267,000	570	650	52	52	52	9.58	6:15A	2:42P
3	0800	56510	220,000	550	630	50	50	50	9.67	7:46A	4:02P
4	0800	56730	247,000	570	640	52	52	52	9.71	9:24A	5:02P
5	0800	56977	242,000	570	650	52	52	52	9.67	10:47A	3:26A
6	0800	57219	195,000	560	630	51	51	51	9.50	11:53A	4:43A
7	0800	57414	210,000	570	650	52	52	52	9.28	12:50P	5:43A
8	0800	57624	190,000	560	650	51	51	51	9.24	1:44P	6:33A
9	0801	57814	210,000	560	640	52	52	52	9.17	2:33P	7:19A
10	0800	58029	194,000	570	650	52	52	52	9.19	2:15A	8:01A
11	0800	58223	196,000	570	650	52	52	52	9.25	2:37A	8:47A
12	0800	58419	205,000	570	650	52	52	52	9.38	3:02A	9:33A
13	0800	58624	52,000	570	650	52	52	52	9.46	3:34A	10:32A
14	0800	58676	0	0	0	19	19	19	9.54	4:13A	11:33A
15	0800	58676	0	0	0	19	19	19	9.50	5:06A	12:53P
16	0800	58676	0	0	0	19	19	19	9.60	6:15A	2:22P
17	0801	58676	0	0	0	19	19	19	9.54	7:48A	3:34P
18	0800	58676	0	0	0	19	19	19	9.58	9:18A	1:39A
19	0800	58676	0	0	0	19	19	19	9.46	10:23A	3:14A
20	0800	58676	168,000	570	650	53	53	53	9.29	11:22A	4:14A
21	0800	58844	199,000	570	650	53	53	53	9.28	12:08P	5:00A
22	0801	59043	173,000	570	650	52	52	52	9.08	12:51P	5:39A
23	0800	59216	195,000	560	640	52	52	52	8.96	1:28P	6:16A
24	0801	59411	220,000	570	650	53	53	53	8.92	2:12P	6:54A
25	0800	59631	257,000	560	650	52	52	52	9.06	2:58P	7:33A
26	0800	57888	285,000	570	650	53	53	53	9.13	1:54A	8:19A
27	0800	60173	263,000	570	650	53	53	53	9.02	2:22A	9:07A
28	0800	60436	218,000	570	650	53	53	53	8.96	2:59A	10:06A
29	0800	60654	215,000	560	650	53	53	53	9.04	3:43A	11:19A
30	0800	60869	0	0	0	19	19	19	9.17	4:37A	12:49P
31											
TOTAL			4,903,000								
AVERAGE			163,000	567	647	52	52	52	9.33		
MAXIMUM			285,000	570	650	53	53	53	9.71		
MINIMUM			0,000	550	630	50	50	50	8.92		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
9-12-91	<1	1.30	19,990	28,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
9-12-91	1,450	580

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans C 7819

TROY J. EVANS

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OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH OCTOBER YEAR 1991

			Injection Well Data						Monitor Well Data		
		Flowmeter	Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	0800	60869	0	0	0	19	19	19	9.42	5:53A	2:18P
2	0800	60869	10,000	560	640	52	52	52	9.81	7:43A	3:31P
3	0801	60879	261,000	560	650	53	53	53	9.63	9:33A	2:49A
4	0800	61140	245,000	560	650	53	53	53	9.40	10:59A	4:11A
5	0800	61385	232,000	560	650	53	53	53	9.34	12:04P	5:08A
6	0800	61617	225,000	560	650	53	53	53	9.21	1:07P	5:53A
7	0800	61842	210,000	560	650	53	53	53	8.79	1:59P	6:33A
8	0800	62052	178,000	560	650	53	53	53	8.71	2:49P	7:15A
9	0800	62230	205,000	560	650	53	53	53	8.83	3:38P	7:53A
10	0800	62435	0	0	0	19	19	19	8.97	1:41A	8:32A
11	0815	62435	0	0	0	19	19	19	9.08	2:10A	9:14A
12	0800	62435	0	0	0	19	19	19	9.13	2:45A	10:03A
13	0800	62435	0	0	0	19	19	19	9.33	3:28A	11:01A
14	0800	62435	0	0	0	19	19	19	9.38	4:24A	12:10P
15	0800	62435	227,000	560	650	53	53	53	9.67	5:36A	1:23P
16	0800	62662	194,000	560	650	53	53	53	9.50	7:04A	2:27P
17	0800	62856	0	0	0	19	19	19	9.29	8:39A	1:50A
18	0800	62856	0	0	0	19	19	19	9.21	9:54A	3:10A
19	0800	62856	0	0	0	19	19	19	9.17	11:00A	4:03A
20	0800	62856	0	0	0	19	19	19	9.21	11:56A	4:49A
21	0800	62856	0	0	0	19	19	19	9.08	12:48P	5:32A
22	0800	62856	0	0	0	19	19	19	8.96	1:37P	6:07A
23	0800	62856	0	0	0	19	19	19	8.79	2:30P	6:46A
24	0800	62856	0	0	0	19	19	19	8.74	3:23P	7:28A
25	0800	62856	0	0	0	19	19	19	8.75	1:09A	8:17A
26	0800	62956	0	0	0	19	19	19	8.83	1:47A	9:09A
27	0800	62856	0	0	0	19	19	19	8.87	1:30A	9:08A
28	0800	62856	224,000	560	650	53	53	53	9.08	2:19A	10:16A
29	0800	63080	200,000	560	650	53	53	53	9.13	3:25A	11:29A
30	0800	63280	0	0	0	19	19	19	9.10	4:51A	12:36P
31	0800	63280	0	0	0	19	19	19	9.33	6:48A	1:32P
TOTAL			2,411,000	6720	7790	635	635	635	283.74		
AVERAGE			77,774	560	649	53	53	53	9.15		
MAXIMUM			261,000	560	650	53	53	53	9.81		
MINIMUM			10,000	560	640	52	52	52	8.71		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
10-3-91	<1	2.65	18,700	47,500

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
10-3-91	2150	513

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans LEAD OPERATOR
TROY G. EVANS C 7819

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
GASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH NOVEMBER YEAR 1991

			Injection Well Data						Monitor Well Data		
				Flow Rate		Injection Pres.				Times of Tidal Extremes	
Date	Time	Flowmeter Reading (gallons)	Volume Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Water Level (NGVD)	High	Low
1	0800	63280	0	0	0	19	19	19	9.46	9:38A	2:11A
2	0800	63280	0	0	0	19	19	19	9.42	10:07A	3:17A
3	0800	63280	0	0	0	19	19	19	9.00	11:22A	4:07A
4	0800	63280	218,000	560	650	53	53	53	8.73	12:31P	4:51A
5	0800	63498	234,000	560	650	52	52	52	8.56	1:27P	5:31A
6	0800	63732	0	0	0	19	19	19	8.58	2:22P	6:09A
7	0800	63732	0	0	0	19	19	19	8.54	3:17P	6:45A
8	0800	63732	0	0	0	19	19	19	8.53	12:01A	7:22A
9	0800	63732	0	0	0	19	19	19	8.50	12:39A	8:02A
10	0800	63732	0	0	0	19	19	19	8.54	1:18A	8:49A
11	0800	63732	0	0	0	19	19	19	8.71	2:04A	9:35A
12	0801	63732	0	0	0	19	19	19	8.63	2:58A	10:28A
13	0800	63732	0	0	0	19	19	19	8.67	4:01A	11:18A
14	0801	63732	0	0	0	19	19	19	8.83	5:23A	12:07P
15	0800	63732	0	0	0	19	19	19	8.83	6:49A	12:50P
16	0800	63732	0	0	0	19	19	19	8.75	8:15A	1:50A
17	0800	63732	0	0	0	18	18	18	8.71	9:34A	2:42A
18	0800	63732	0	0	0	18	18	18	8.65	10:51A	3:31A
19	0801	63732	0	0	0	18	18	18	8.46	12:02P	4:18A
20	0800	63732	0	0	0	18	18	18	8.29	1:08P	5:01A
21	0800	63732	0	0	0	18	18	18	8.00	11:06P	*5:44A
22	0800	63732	0	0	0	18	18	18	8.08	11:45P	*6:32A
23	0800	63732	0	0	0	18	18	18	7.79		*7:20A
24	0800	63732	0	0	0	18	18	18	7.75	12:31A	*8:13A
25	0800	63732	0	0	0	18	18	18	7.63	1:22A	*9:05A
26	0800	63732	0	0	0	18	18	18	7.75	2:21A	9:58A
27	0800	63732	0	0	0	18	18	18	8.17	3:30A	10:48A
28	0800	63732	0	0	0	18	18	18	8.15	4:59A	11:37A
29	0800	63732	0	0	0	18	18	18	8.38	6:47A	12:41A
30	0800	63732	54,000	560	670	53	53	53	8.46	8:43A	2:05A
31	12-1-91	63786									
TOTAL			506,000	1680	1970	158	158	158	254.55	* STRONG TIDE	
AVERAGE			16,867	560	657	53	53	53	8.49		
MAXIMUM			234,000	560	670	53	53	53	9.46		
MINIMUM			54,000	560	650	52	52	52	7.63		

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	CBOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
11-7-91	<1	2.20	17,555	39,800

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
11-7-91	2,500	517

RESULT OF SPECIFIC INJECTIVITY TEST

Date 11-4-91 GPM 606 /PSI 53

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans

TROY J. EVANS 7819 LEAD OPERATOR

OPERATIONS DATA REPORT
INJECTION WELL AND MONITOR WELL
CASPARILLA ISLAND WATER ASSOCIATION, INC.

MONTH DECEMBER YEAR 1991

			Injection Well Data						Monitor Well Data		
			Volume	Flow Rate		Injection Pres.			Water	Times of Tidal Extremes	
Date	Time	Flowmeter Reading (gallons)	Injected (gallons)	Av. (gpm)	Max. (gpm)	Av. (psi)	Max. (psi)	Min. (psi)	Level (NGVD)	High	Low
1	0800	63786	257,000	560	650	53	53	53	8.43	10:27A	3:56A
2	0800	64045	235,000	560	650	53	53	53	8.33	12:03P	4:51A
3	0800	64295	218,000	560	650	52	52	52	5.42	10:03P	4:47A
4	0800	64493	0	0	0	18	18	18	7.79	10:31P	5:27A
5	0801	64493	0	0	0	18	18	18	7.71	11:57P	*6:04A
6	0801	64493	0	0	0	18	18	18	7.83	11:45P	*6:42A
7	0800	64493	0	0	0	18	18	18	7.92		7:15A
8	0800	64493	0	0	0	18	18	18	7.83	12:23A	7:53A
9	0800	64493	0	0	0	18	18	18	8.00	1:08A	8:27A
10	0800	64493	0	0	0	18	18	18	8.04	1:51A	9:05A
11	0800	64493	0	0	0	18	18	18	8.04	2:43A	9:40A
12	0800	64493	0	0	0	18	18	18	8.08	3:40A	10:16A
13	0800	64493	0	0	0	18	18	18	8.25	4:44A	10:51A
14	0800	64493	0	0	0	17	17	17	8.17	6:03A	11:26A
15	0800	64493	0	0	0	17	17	17	8.04	7:39A	11:55A
16	0800	64493	0	0	0	17	17	17	7.63	9:31A	2:15A
17	0801	64493	0	0	0	17	17	17	7.79	8:37P	3:12A
18	0800	64493	0	0	0	17	17	17	7.75	9:20P	4:08A
19	0800	64493	0	0	0	17	17	17	7.39	10:02P	*4:56A
20	0800	64493	0	0	0	17	17	17	7.35	10:50P	*5:45A
21	0800	64493	0	0	0	17	17	17	7.55	11:42P	*6:34A
22	0800	64493	0	0	0	17	17	17	7.51		*7:20A
23	0801	64493	0	0	0	17	17	17	7.71	12:35A	*8:03A
24	0800	64493	0	0	0	17	17	17	7.96	1:30A	*8:45A
25	0800	64493	0	0	0	17	17	17	7.88	2:29A	9:23A
26	0800	64493	0	0	0	17	17	17	8.02	3:38A	9:59A
27	0800	64493	0	0	0	17	17	17	8.13	4:59A	10:29A
28	0800	64493	348,000	560	650	53	53	53	8.08	6:44A	12:19A
29	0801	64841	356,000	560	650	53	53	53	8.06	9:00A	1:41A
30	0800	65197	314,000	560	650	53	53	53	7.92	8:07P	2:50A
31	0801	65511	485,000	570	660	53	53	53	7.73	8:49P	3:48A
TOTAL			2,210,000	3730	4560	370	370	370			
AVERAGE			71,290	561	651	53	53	53			
MAXIMUM			485,000	570	660	53	53	53			
MINIMUM			218,000	560	650	52	52	52			

RESULTS OF MONITOR-WELL SAMPLE ANALYSES

Date of Sampling	Fecal Coliform (count per 100 ml)	BOD 5-day (mg/l)	Chloride (mg/l)	Specific Conductance (umhos)
12-5-91	4.1	1.65	23,550	39,000

RESULTS OF SAMPLE ANALYSES ON WATER BEING INJECTED INTO INJECTION WELL

Date of Sampling	Specific Conductance (umhos)	Chloride (mg/l)
12-5-91	1,800	563

RESULT OF SPECIFIC INJECTIVITY TEST

Date N/A GPM_____/PSI_____

I certify that I am familiar with the information contained in this report, and that to the best of my knowledge and belief such information is true, complete and accurate.

Troy J. Evans

TROY J. EVANS 07819

ATTACHMENT NO. 5

INJECTION PROCEDURES

The following procedures must be followed during deep well injection:

- All valves downstream of any injection pump must be open before the pump is turned on
- Before leaving the site operators must check to ensure that pumps are operating normally and the valve positions are proper
- Prior to servicing any equipment, the power to the equipment must be shut off and the proper caution signs must be posted as appropriate
- Any malfunction or trouble must be reported to the supervisor

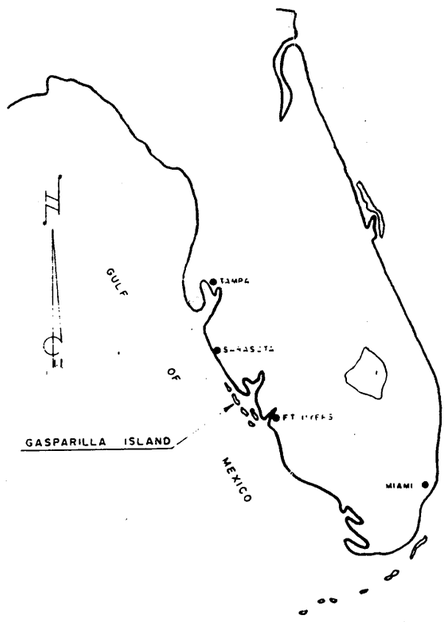
ATTACHMENT NO. 6

ORIGINAL INJECTION WELL CONSTRUCTION CONTRACT DRAWINGS

GASPARILLA ISLAND
WATER ASSOCIATION, INC.

EFFLUENT DISPOSAL SYSTEM
AND
INJECTION WELL PROGRAM

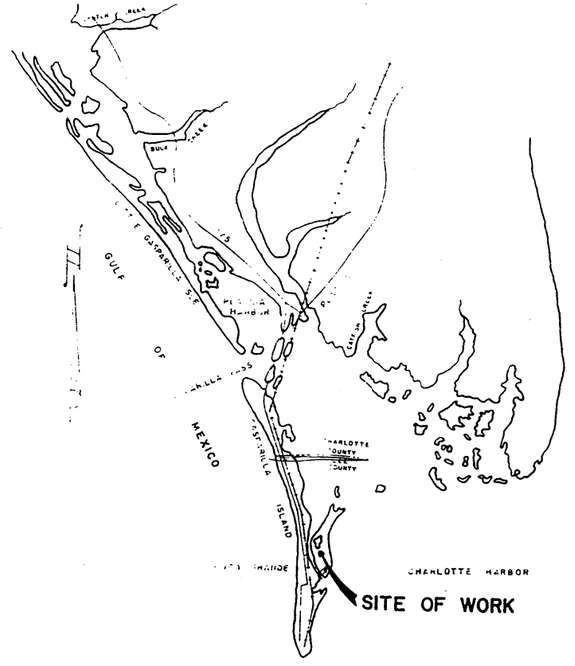
BENNETT & BISHOP, INC.
Consulting Engineers & Surveyors
Sarasota, Florida



LOCATION MAP

INDEX

DRWG. NO.	DESCRIPTION
309-021 . . .	AERIAL SITE PLAN
309-022 . . .	MONITORING WELL LOCATION
309-023 . . .	SITE PLAN
309-024 . . .	EFFLUENT INJECTION SITE WORK



VICINITY MAP

BID SET
BY
DATE JUL 25

340

GASPARILLA ROAD

CHARLOTTE HARBOR & NORTHERN R.R.

A

BENNETT & BISHOP

N

340

GASPARILLA ROAD

345

CHARLOTTE HARBOR & NORTHERN R.R.

CHLORINATION & BACKWASH

BACKFILL IRRIGATION TANK

INJECTION WELL

EXISTING & POSSIBLE FUTURE WELL LOCATIONS

B

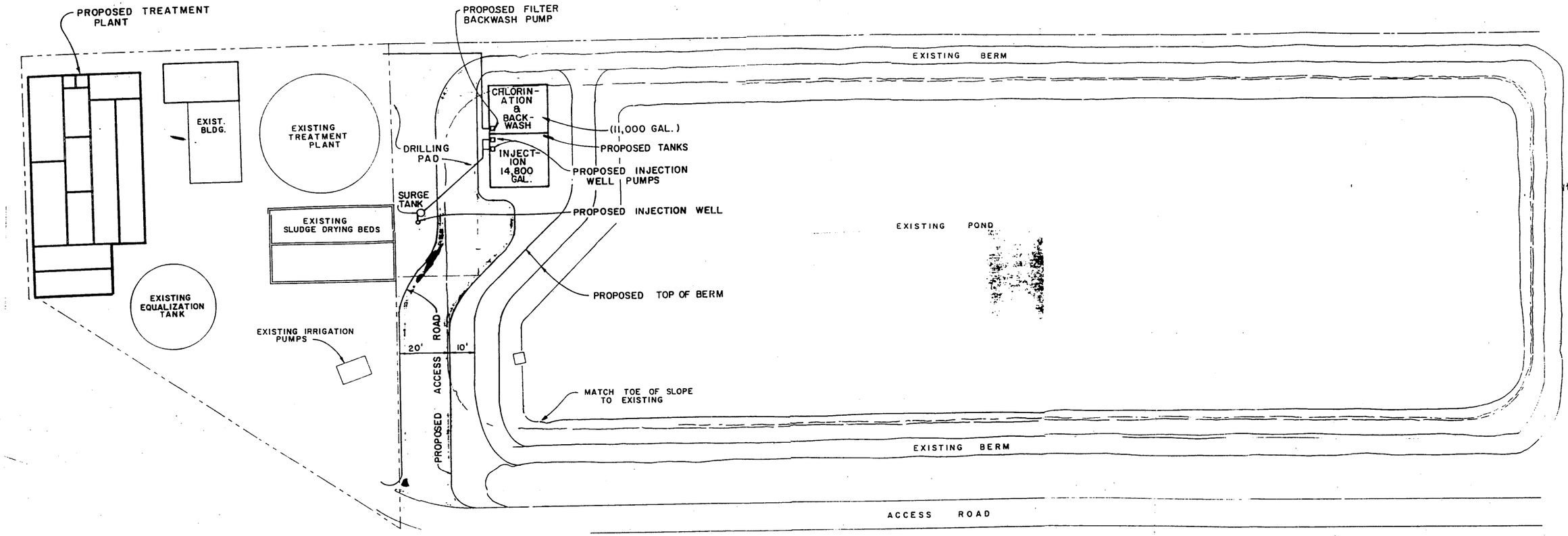
N

EXHIBIT "A"

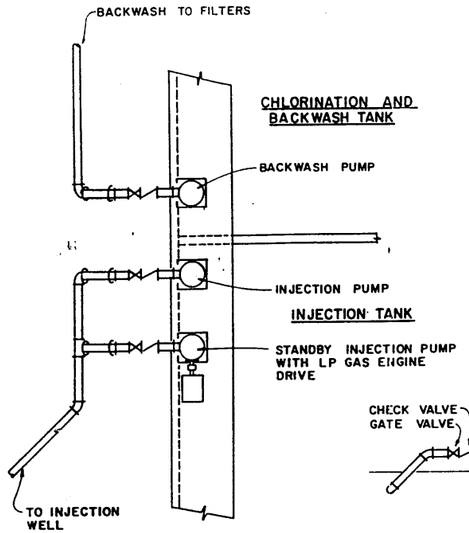
GASPARILLA ISLAND WATER ASSOCIATION

EFFLUENT DISPOSAL SYSTEM
AERIAL SITE PLAN

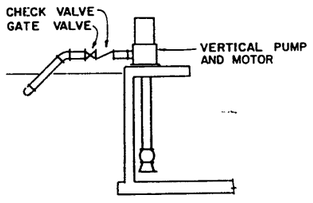
309-021



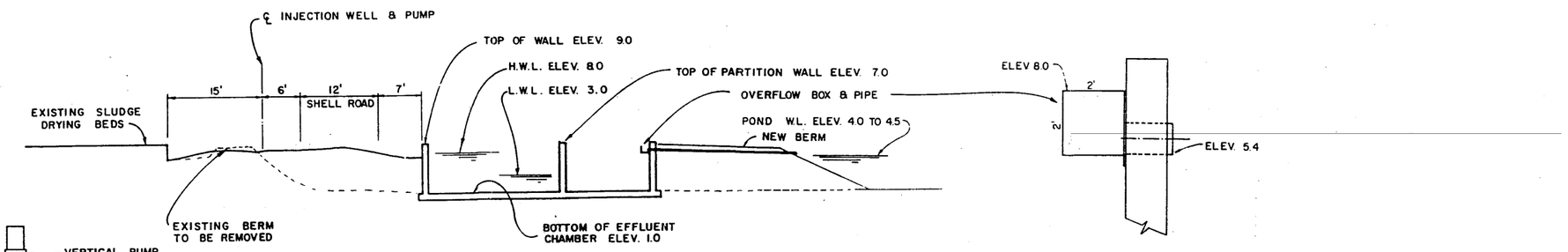
SITE PLAN



EFFLUENT PUMP PLAN



TYPICAL PUMP SECTION



PROFILE

STORAGE POND DATA

POND VOLUME BETWEEN MAXIMUM NORMAL WATER LEVEL (ELEV. 4.5) AND OVERFLOW (ELEV. 6.3) = 1.0 MILLION GALS.

POND VOLUME BETWEEN MINIMUM NORMAL WATER LEVEL (ELEV. 4.0) AND 2.5 ELEVATION = 600,000 GALS.

EXHIBIT "B"

BENNETT & BISHOP
CONSULTING ENGINEERS & SURVEYORS SARASOTA FLORIDA

APPROVED BY

DESCRIPTION BY DATE

DATE 4-9-84
SCALE 1"=20'
DESIGN
DRAWN WEM
CHECK
APPROVED

EFFLUENT INJECTION WELL
FOR
GASPARILLA ISLAND WATER ASSOCIATION, INC.
BOCA GRANDE, FLORIDA

SITE PLAN

DWG. NO.
309-023

ATTACHMENT NO. 7

CERTIFICATION OF COMPLETION

Engineers
Planners
Economists
Scientists

April 1, 1992

TPA33494.C0.15

Mr. Vince Nealy
Department of Environmental Regulation
2295 Victoria Avenue Suite 362
Ft. Meyers, Florida 33901

Dear Mr. Nealy;

Subject: Letter Certifying Completion of Injection Well For Effluent Disposal

In 1984, the Gasparilla Island Water Association Inc. (GIWA) contracted for the design and construction of an injection well for the disposal of treated domestic wastewater treatment plant (WWTP) effluent and one monitoring well. Record drawings for the injection well and the accompanying monitoring well are dated April, 1984.

Operating permit number DO36-121561 has been issued by the State of Florida to operate the WWTP and the injection well indicating that the construction of the injection well is complete. Also mechanical integrity tests have been performed for the injection well; the results of which are presented in Attachment No. 3. A site visit to the WWTP by CH2M HILL personnel indicated that the injection process was functioning normally. Therefore, we believe that the construction of the injection well at the GIWA WWTP is complete.

Sincerely,

CH2M HILL

Doug Fredericks, P.E.
Project Manager

CH2M HILL Gainesville Office 7201 N.W. 11th Place, Gainesville, FL 32605-3158 904.331.2442
P.O. Box 147009, Gainesville, FL 32614-7009 FAX. 904.331.5320

ATTACHMENT NO. 8

PROPOSED MONITORING PROGRAM

Proposed Monitoring Program

The following table outlines the proposed monitoring program for the WWTP effluent disposal injection system. It indicates a recommended schedule of operational and water quality data that should be collected for the monitoring and injection wells. The parameters listed include all those required as indicated in FAC 17-601.700(4) Figure 3 as well as chloride and specific conductivity.

Data/Parameter	Frequency		
	Daily	Monthly	Quarterly
Monitoring Well:			
Water Level	X		
Specific Conductance		X	
Chloride		X	
TDS		X	
Fecal Coliforms		X	
BOD		X	
Nitrate		X	
Total Kjeldahl Nitrogen (TKN)		X	
Total Phosphorus (TP)		X	
Injection Well:			
Specific Conductance		X	
Chloride		X	
TDS		X	
Nitrate		X	
Total Kjeldahl Nitrogen (TKN)		X	
Total Phosphorus (TP)		X	
Specific Injectivity			X

Note: previously GIWA did not analyze for TDS, Nitrate, TKN, or TP, however, these parameters will be added for compliance with current regulations.

ATTACHMENT NO. 9

PROOF OF DOCUMENTATION OF INJECTION WELL
LOCATION ON SURVEYOR'S PLAN

$9.00

2240775

AFFIDAVIT

STATE OF FLORIDA
LEE COUNTY

BEFORE ME, the undersigned officer, personally appeared DARRELL POLK, who, after being by me duly sworn, deposed:

1. My name is Darrell Polk, and I am general manager of Gasparilla Island Water Association, Inc. (GIWA).

2. GIWA is the owner of an injection well as shown on the attached print of survey (marked Exhibit A).

3. The lands upon which the said well is situated are held by GIWA under a 60-year lease dated June 10, 1970, from Gasparilla Inn, Inc., said lease being for a term of 60 years from the date thereof, and being recorded in Official Records Book 606 at page 699 and in Official Records Book 606 at page 706 of the public records of Lee County, Florida. GIWA has fully and completely performed its obligations under the said lease, which permits use of the land for an injection well.

4. This affidavit is made to show compliance by GIWA with the Florida Administrative Code, Chapter 17-28.34.

IN WITNESS WHEREOF, I hereunto set my hand and seal this 6th day of March, 1987.

Darrell Polk (seal)
Darrell Polk

SWORN TO AND SUBSCRIBED before me this 6th day of March, 1987.

Patsy A. Crawford
Notary Public
My commission expires:

Notary Public, State of Florida at Large
My Commission Expires March 24, 1990

OFF REC 1903 PG 1230

RECORD VERIFIED - CHARLIE GREEN, CLERK
BY: B. ROSINE, D.C.

This Instrument Was Prepared By
LEO WOTITZKY OF
WOTITZKY, WOTITZKY, WILKINS, FROHLICH & JONES
Attorneys at Law
201 W. Marion Ave., Punta Gorda, FL 33950 - 4477

EXHIBIT A

SKETCH OF SURVEY SHOWING THE LOCATION OF 2 WELLS ON BOCA GRANDE

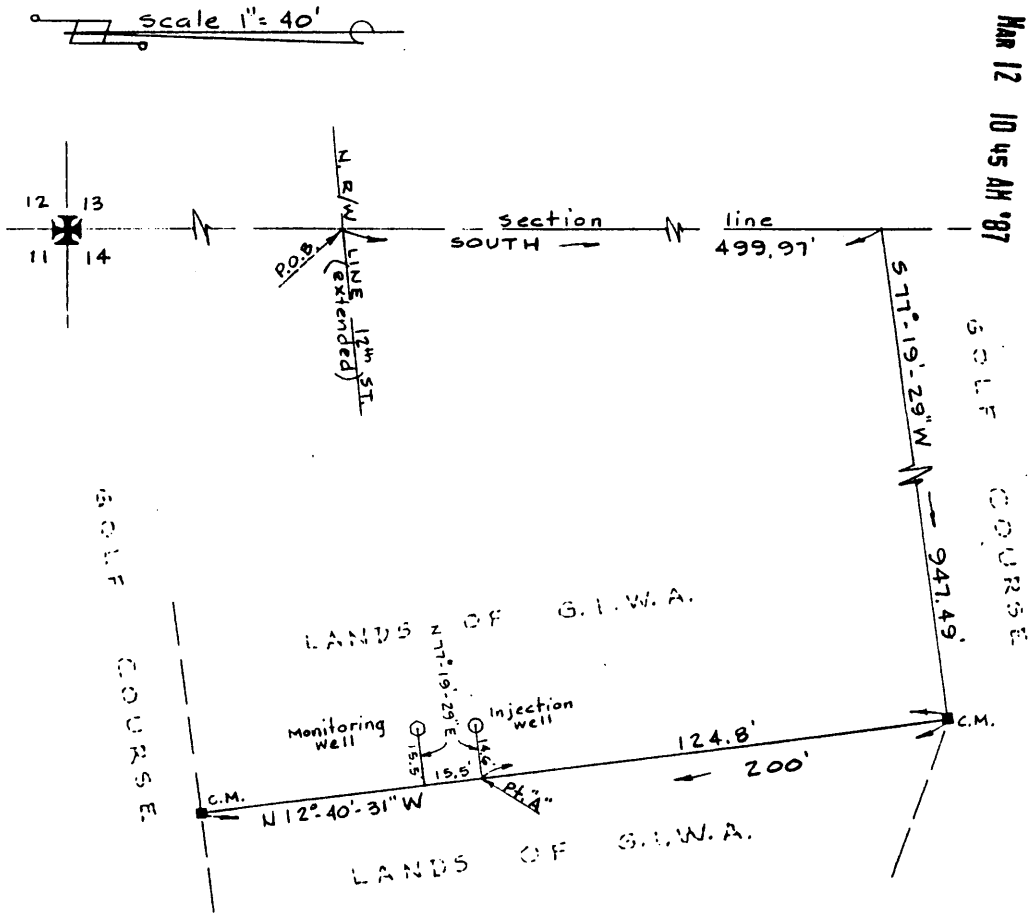
gin at the intersection of the North right-of-way line of 12th Street (50' right-of-way as shown on the revised Plat of Boca Grande recorded in Plat Book 7, Page 1A, Public Records of Lee County, Florida) extended easterly and the East line of Section 14, Township 43 South, Range 20 East; thence South along said section line, 499.97'; thence South 77°19'29" West, 947.49'; thence North 12°40'31" West, 124.8' to Point "A"; thence North 77°19'29" East, 14.6' to the center of an injection well and the Point of Termination. Thence, re-beginning at Point "A"; run North 12°40'31 West, 15.5'; thence North 77°19'29" East, 15.5' to the center of a monitoring well and the Point of Termination.

FOR: Gasparilla Island Water Association, Inc.

NOTE:

1. Bearings and description are based in part on a survey dated May 28, 1970 prepared by Archie B. Brown, Fla. RLS No. 746.

William F. Bishop & Associates, Inc.
Consulting Engineers & Surveyors
4509 Bee Ridge Road
Sarasota, Florida 33583



WE HEREBY CERTIFY: That this survey was made under our responsible direction and supervision, is a correct representation of the land surveyed, that the permanent reference monuments and permanent control points have been set and/or found and that the survey data and monumentation complies with Chapter 177 of the Florida Statutes and Chapter 21 HH-6 of the Florida Administrative Code.

William F. Bishop & Associates, Inc.

BY David H. Kellogg
David H. Kellogg
Reg. Land Surveyor
Fla. Certificate No. 1629

DAVID H. KELLOGG 1629 REGISTERED FLORIDA LAND SURVEYOR

2-11-87	SURVEY	GIWA-0022	DHK