

APPENDIX A

LAKE CONROE DAM RELIEF WELLS REHABILITATION

CSP NO. 19-0012

SUPPLEMENTAL INFORMATION PACKET

- PROJECT LIMITS EXHIBIT
- CONROE DAM RECORD DRAWINGS, FREESE NICHOLS ENDRESS CONSULTING ENGINEERS, DATED 04/04/1972, (CO 12 SHEETS 1-3)
- TABLE 1: RELIEF WELL INSPECTION SUMMARY DATA
- TABLE 2: WATER QUALITY TEST RESULTS
- RELIEF WELL INSPECTION REPORT
- WATER QUALITY TESTING REPORT PREPARED BY EASTEX ENVIRONMENTAL LABS, DATED DECEMBER 14, 2018
- RELIEF WELL PILOT STUDY FINAL REPORT PREPARED BY TERRAFIRMA EARTH TECHNOLOGIES, LTD., DATED JUNE 11, 2018
- RELIEF WELL INSPECTION VIDEOS FROM PILOT STUDY WILL BE MADE AVAILABLE UPON REQUEST

Non-potable water source located at west end of dam outside project limits shown. Coordinate with Owner's Representative on use and access.

Lake Conroe

Potable Water Source
Lake Conroe
Maintenance Facility

SJRA Access Road

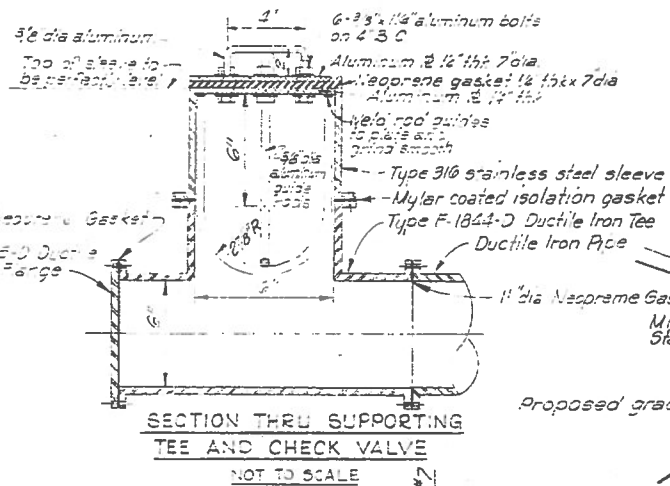
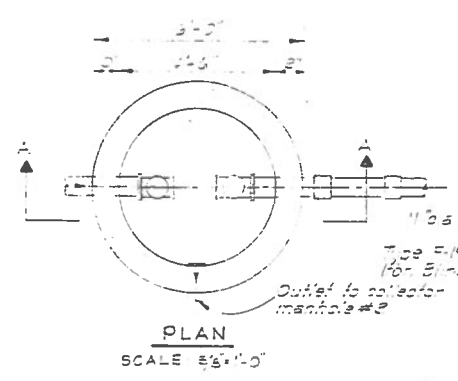
- Rehabilitated Relief Wells
- Relief Wells to be Rehabilitated
- ▭ Project Limits

Note: Contractor shall submit all proposed laydown areas and chemical storage locations to Owner's Representative for approval prior to mobilization.

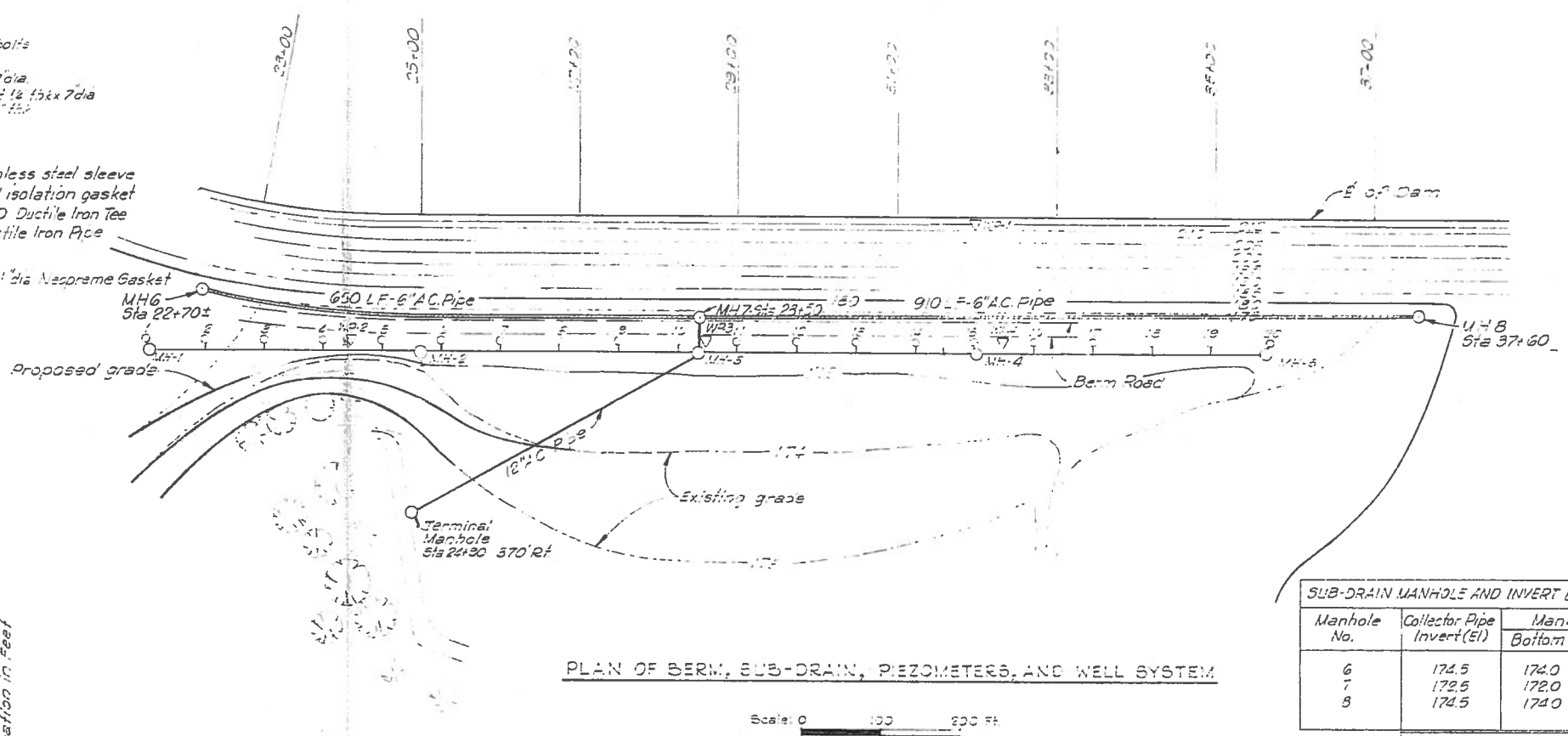
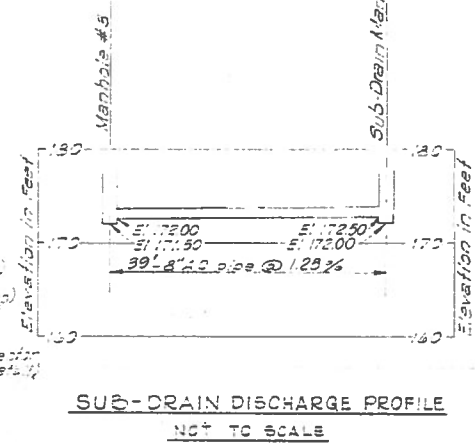
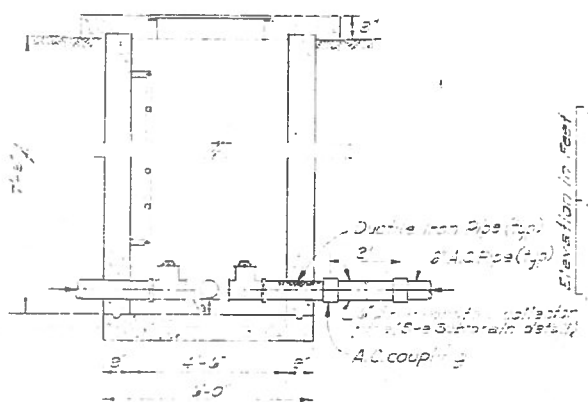
CSP No. 19-0012 Lake Conroe Dam Relief Wells Rehabilitation



Path: \\SJRAGIS01\GIS_Data\Requests\TechnicalServicesID_Hilderbrand\Lake Conroe Dam Relief Wells Rehabilitation\Lake Conroe Dam Relief Wells Rehabilitation UPDATE.aprx



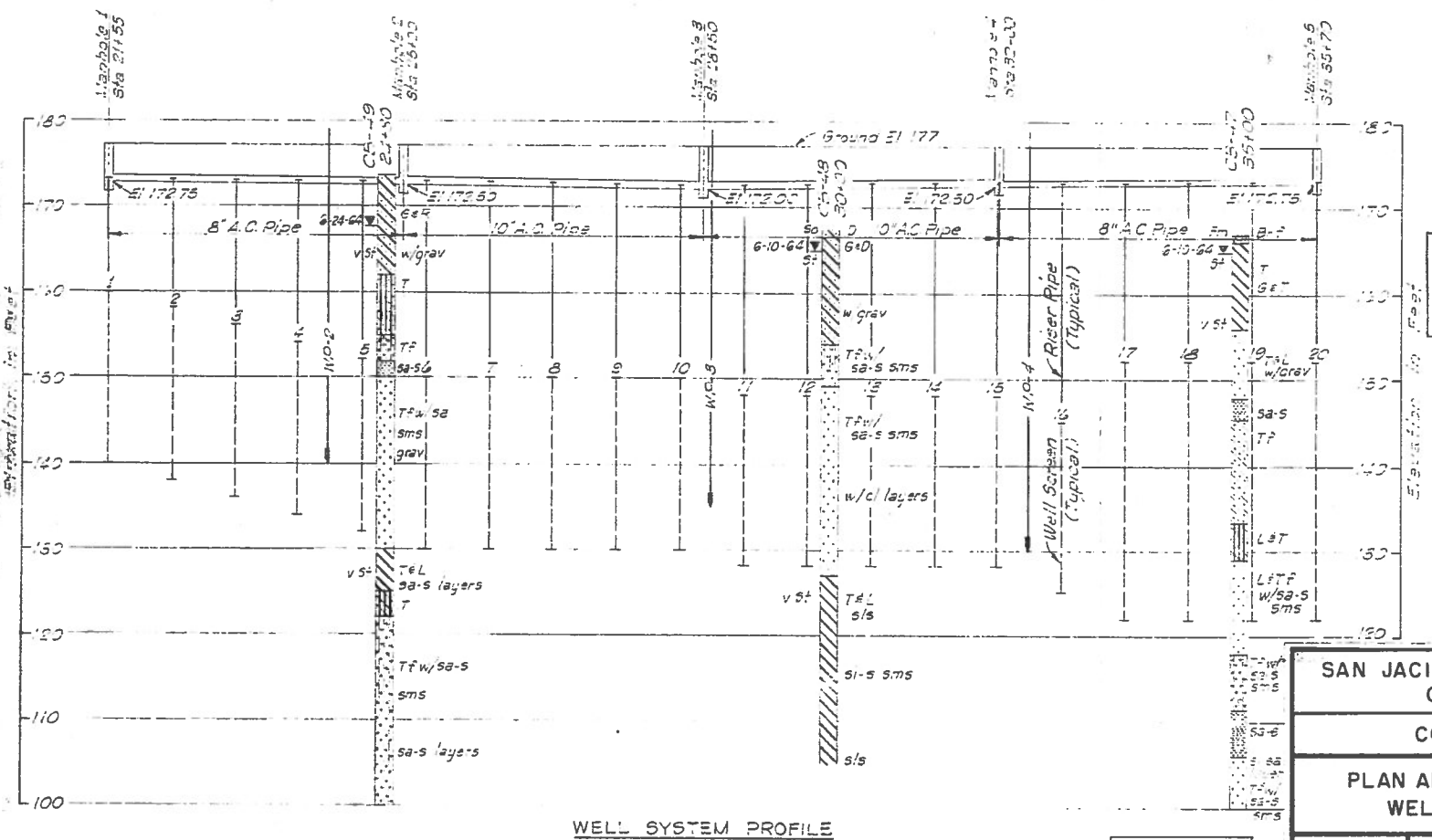
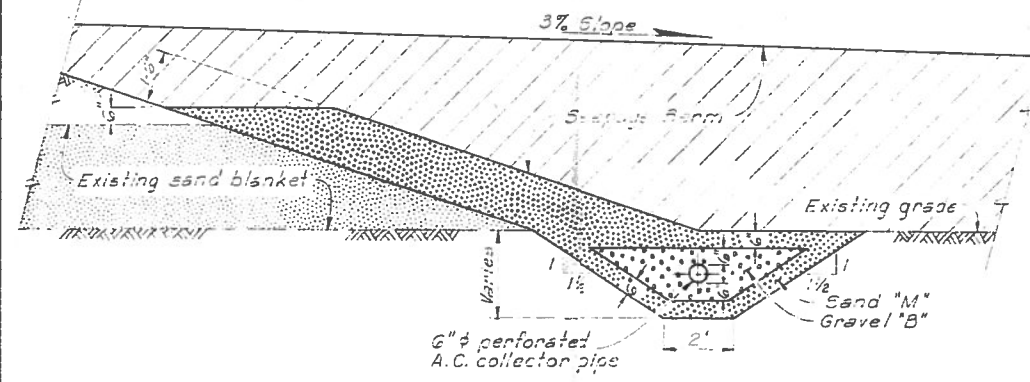
Refer to detail of manhole and cover



Scale: 0 100 200 FT

| Manhole No. | Collector Pipe Invert (Ei) | Manhole (Ei) | |
|-------------|----------------------------|--------------|-------|
| | | Bottom | Top |
| 6 | 174.5 | 174.0 | 180.0 |
| 7 | 172.5 | 172.0 | 180.0 |
| 8 | 174.5 | 174.0 | 180.0 |

| Station | Invert Elevation |
|---------|------------------|
| 22+70 | 174.50 |
| 25+00 | 173.00 |
| 28+50 | 172.50 |
| 35+00 | 173.80 |
| 37+60 | 174.50 |



TEXAS WATER DEVELOPMENT BOARD
APPROVED: *R. A. Thompson, III*
Principal Engineer
Data and Technical Review

TEXAS WATER DEVELOPMENT BOARD
5/24/72 APPROVED
REVIEWED BY: *[Signature]* APPROVED BY: *[Signature]*

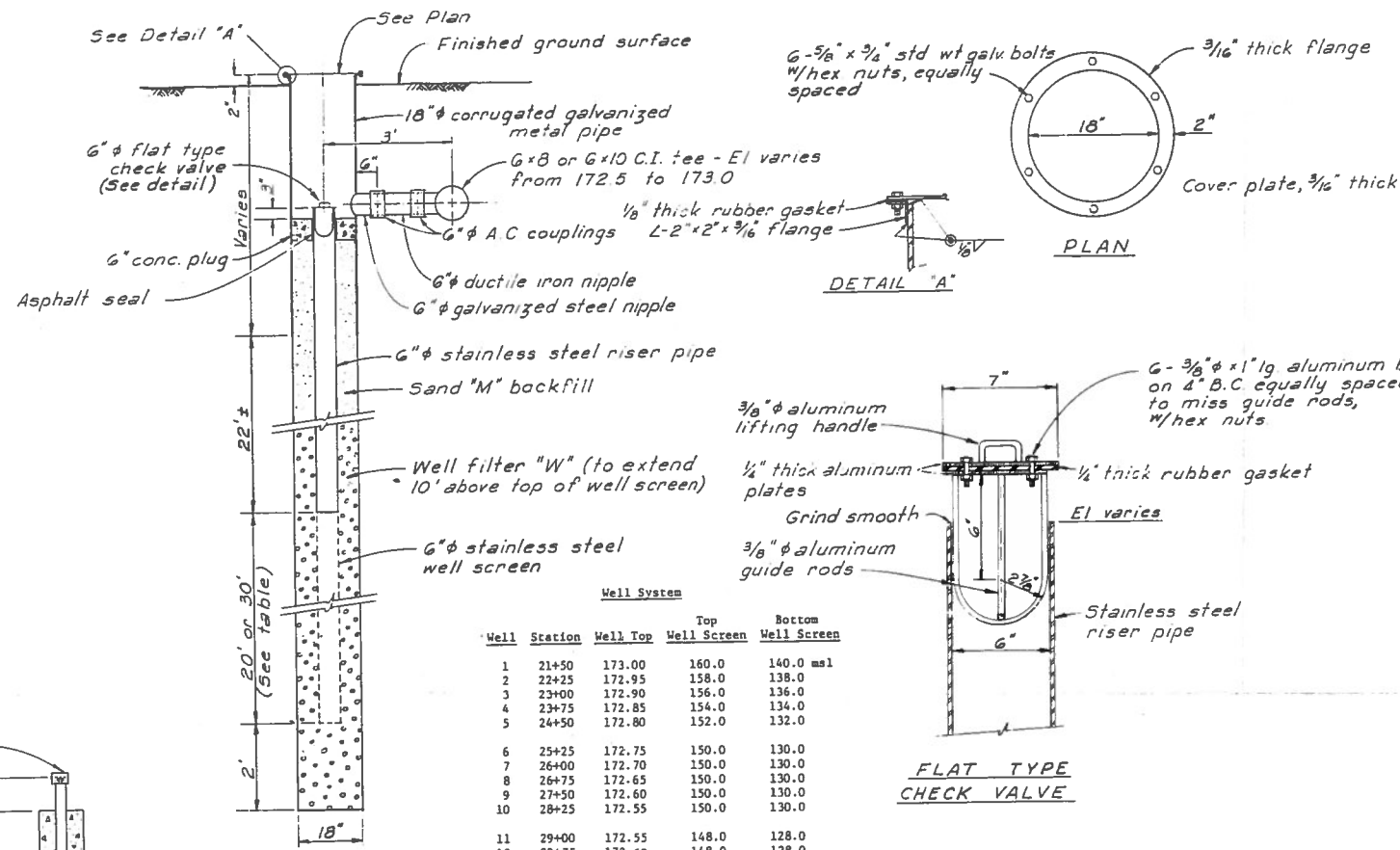
RECEIVED
MAY 30 1972
TEXAS WATER DEVELOPMENT BOARD



SAN JACINTO RIVER AUTHORITY
CONROE, TEXAS
CONROE DAM
PLAN AND PROFILE OF RELIEF
WELLS AND SUB-DRAIN

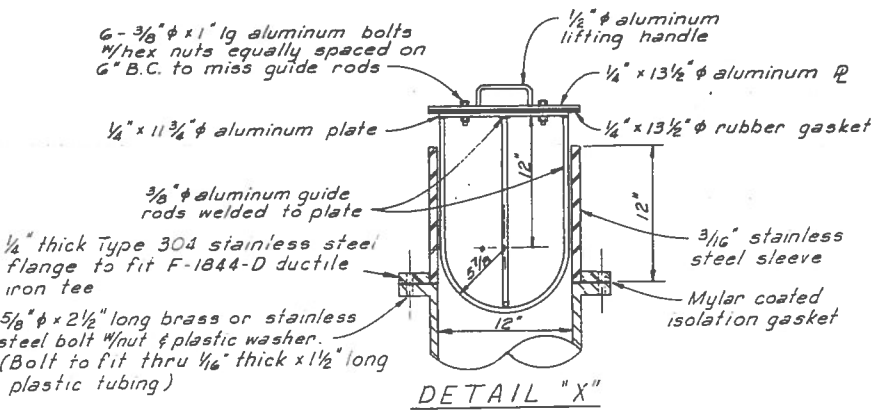
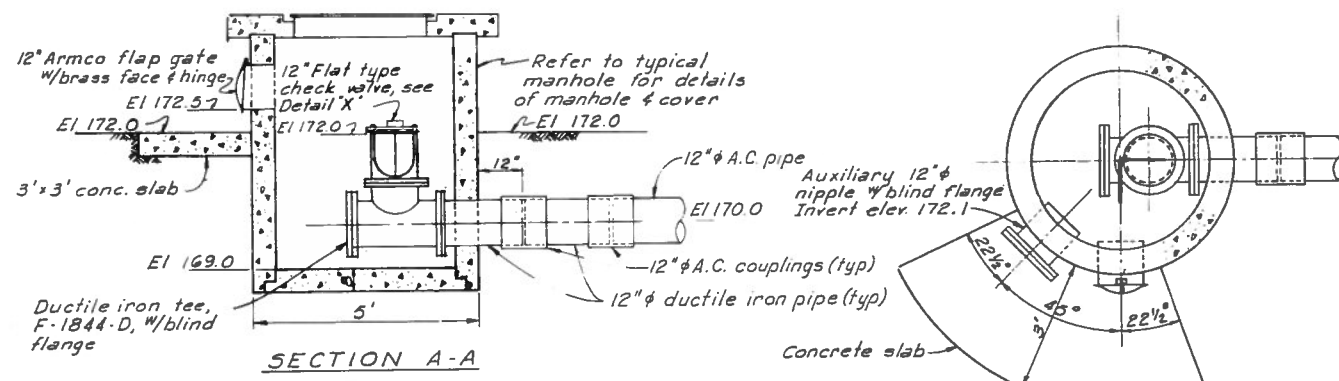
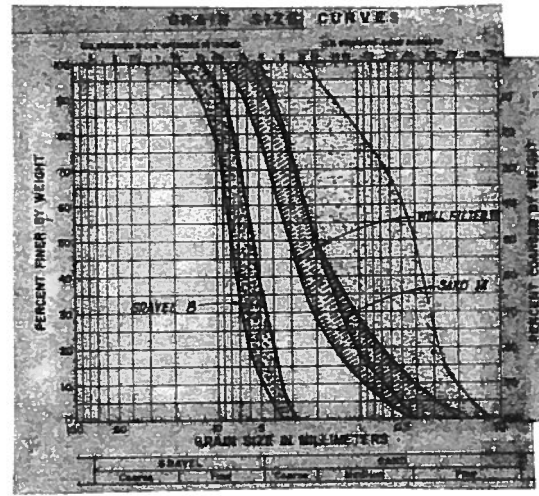
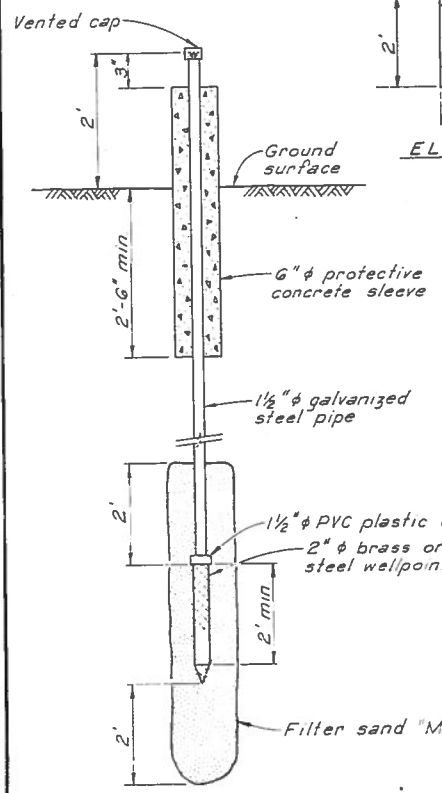
CHANGE ORDER
NO. 12
SHT. 1 OF 3

DESIGNED: MCLELLAND
DRAWN: ENG'RS
TRACED: INC.
CHECKED: 1-20-72
FREESE, NICHOLS & ENDRESS
CONSULTING ENGINEERS
FORT WORTH, TEXAS
DATE: 4. 4. 72
SCALE: AS SHOWN
CO 12
SHT. 1 OF 3

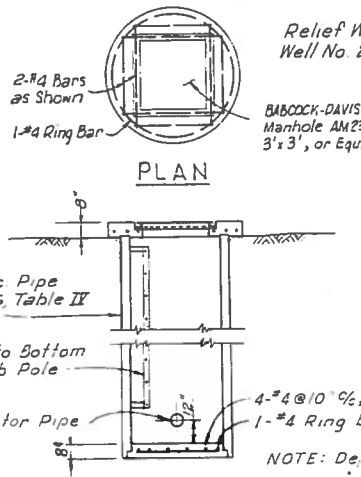


Well System

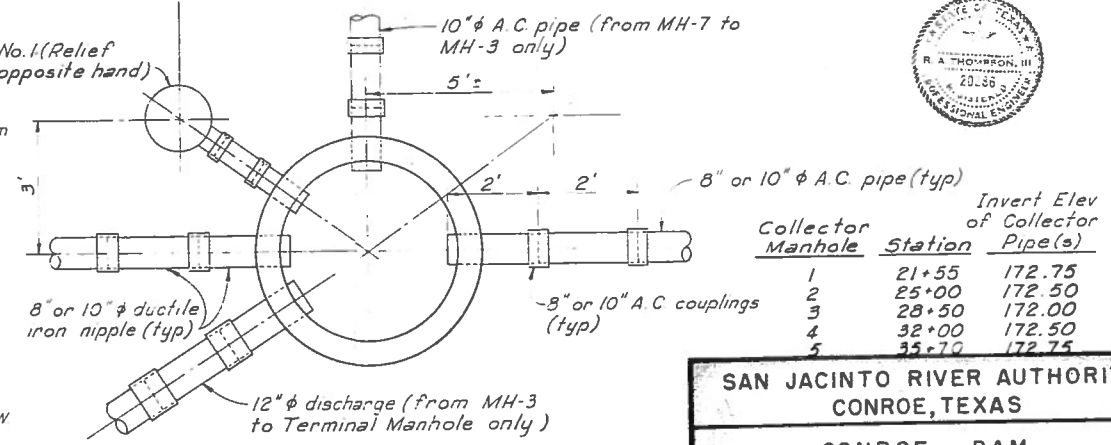
| Well | Station | Well Top | Well Screen | Bottom Well Screen |
|------|---------|----------|-------------|--------------------|
| 1 | 21+50 | 173.00 | 160.0 | 140.0 msl |
| 2 | 22+25 | 172.95 | 158.0 | 138.0 |
| 3 | 23+00 | 172.90 | 156.0 | 136.0 |
| 4 | 23+75 | 172.85 | 154.0 | 134.0 |
| 5 | 24+50 | 172.80 | 152.0 | 132.0 |
| 6 | 25+25 | 172.75 | 150.0 | 130.0 |
| 7 | 26+00 | 172.70 | 150.0 | 130.0 |
| 8 | 26+75 | 172.65 | 150.0 | 130.0 |
| 9 | 27+50 | 172.60 | 150.0 | 130.0 |
| 10 | 28+25 | 172.55 | 150.0 | 130.0 |
| 11 | 29+00 | 172.55 | 148.0 | 128.0 |
| 12 | 29+75 | 172.60 | 148.0 | 128.0 |
| 13 | 30+50 | 172.65 | 148.0 | 128.0 |
| 14 | 31+25 | 172.70 | 148.0 | 128.0 |
| 15 | 32+00 | 172.75 | 148.0 | 128.0 |
| 16 | 32+75 | 172.80 | 145.0 | 125.0 |
| 17 | 33+50 | 172.85 | 152.0 | 122.0 |
| 18 | 34+25 | 172.90 | 152.0 | 122.0 |
| 19 | 35+00 | 172.95 | 152.0 | 122.0 |
| 20 | 35+75 | 173.00 | 152.0 | 122.0 |



TERMINAL MANHOLE DETAILS



SECTIONS
TYPICAL MANHOLE



PLAN OF TYPICAL COLLECTOR MANHOLE

| Collector Manhole | Station | Invert Elev. of Collector Pipe(s) |
|-------------------|---------|-----------------------------------|
| 1 | 21+55 | 172.75 |
| 2 | 25+00 | 172.50 |
| 3 | 28+50 | 172.00 |
| 4 | 32+00 | 172.50 |
| 5 | 35+75 | 172.75 |

SAN JACINTO RIVER AUTHORITY
CONROE, TEXAS

CONROE DAM

RELIEF WELL SYSTEM DETAILS

DESIGNED: McCLELLAND, DORRIS, ENGINEERS, INC.
CHECKED: 1-20-72

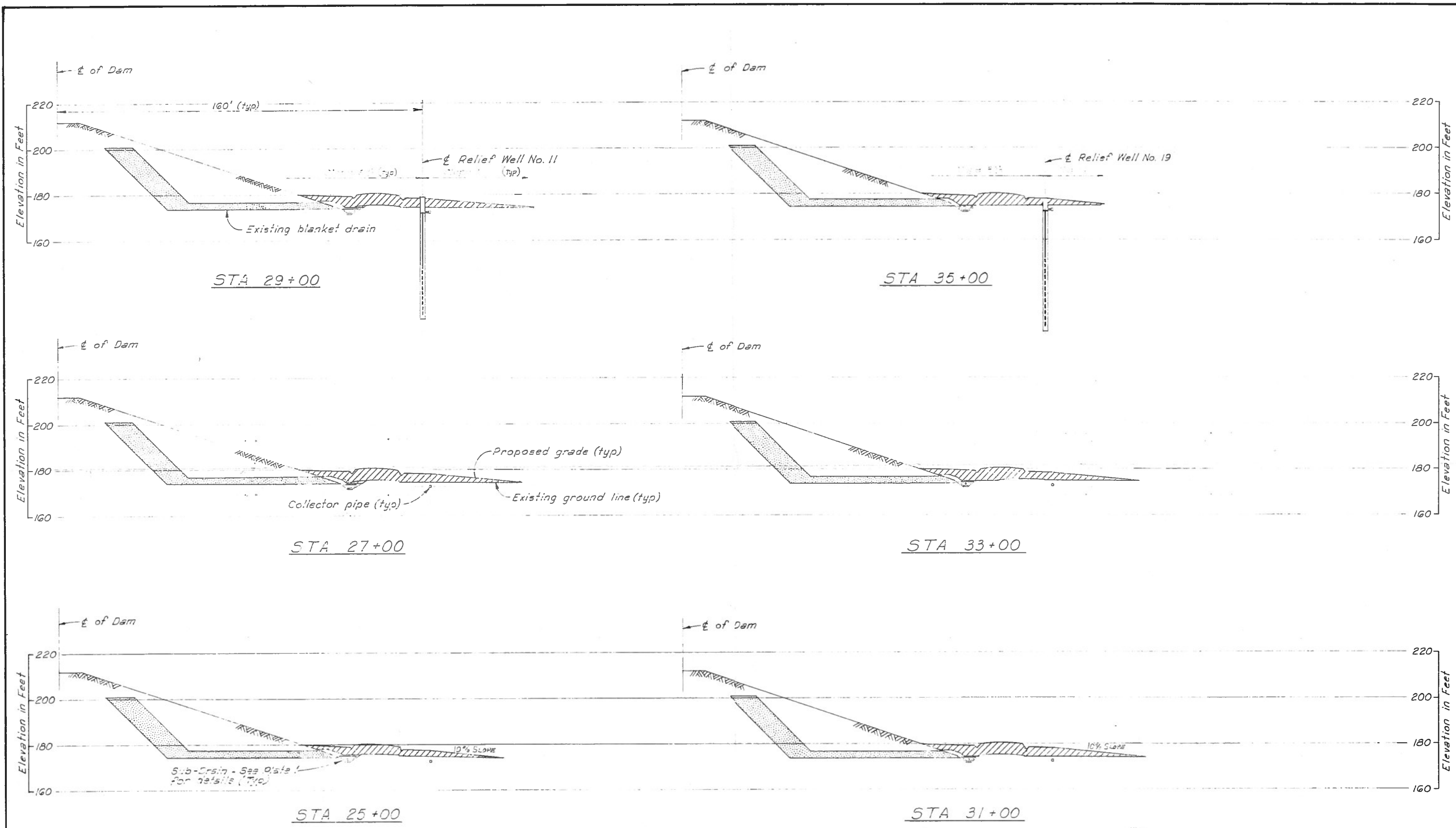
FREES, NICHOLS & ENDRESS CONSULTING ENGINEERS
FORT WORTH, TEXAS

DATE: 4-4
SCALE: AS 5
CO. 11

RECEIVED
MAY 30 1972
TEXAS WATER DEVELOPMENT BOARD

STATE OF TEXAS
R. A. THOMPSON, III
REGISTERED PROFESSIONAL ENGINEER
NO. 20,336

CHANGE ORDER
NO. 12
SHT. 2 OF 3



CHANGE ORDER
NO. 12
SHT. 3 OF 3

| | | |
|---|--|---|
| SAN JACINTO RIVER AUTHORITY CONROE, TEXAS | | |
| CONROE DAM | | |
| CROSS SECTIONS OF DRAINAGE SYSTEMS/AND BERM | | |
| DESIGNED: MCCLELLAND DRAWN: ENDRS TRACED: INC CHECKED: 1-20-72 | FREESE, NICHOLS & ENDRESS CONSULTING ENGINEERS FORT WORTH, TEXAS | DATE: 4-4-72 SCALE: AS SHOWN CO 12 SHT. 3 OF 3 |



TEXAS WATER DE
MAY 3

Table 1. Pre-Evaluation Relief Well Inspection Summary Table

| Relief Well | | Design / As-Built Data ⁽²⁾ | | | | | | | | Field Data ⁽³⁾ | | | |
|-------------------|---------|--|---------------------------------------|---|-------------------------|----------------------------|----------------------------|-------------------------------|------------------------|---------------------------|----------------------------|-------------------------|---------------------|
| | | Ground Surface EL ⁽⁵⁾ (ft) | Manhole Top EL ⁽⁴⁾ (ft) | top manhole to top riser (FNI) (ft) | Top of Riser EL (ft) | Top of Concrete EL (ft) | Top of Well Screen (ft) | Bottom of Well Screen (ft) | As-Built Depth (ft) | Measured Depth (ft) | Estimated Sediment (ft) | Estimated Flow (gpm) | Static Head (ft) |
| No. | Type | | | | | | | | | | | | |
| 1 | Manhole | 176.53 | 178.35 | 6.03 | 172.32 | 172.07 | 159.99 | 139.99 | 32.80 | 32.69 | 0.11 | 4.80 | 2.95 |
| 2 | Manhole | 176.33 | 178.48 | 6.08 | 172.40 | 172.20 | 158.11 | 138.11 | 34.77 | 34.77 | 0.00 | 3.40 | 1.75 |
| 3 | Manhole | 176.40 | 178.57 | 6.34 | 172.23 | 172.29 | 155.93 | 135.93 | 36.83 | 36.59 | 0.24 | 0.95 | 1.00 |
| 4 | Manhole | 176.76 | 178.25 | 5.98 | 172.27 | 171.97 | 154.06 | 134.06 | 38.78 | 38.66 | 0.12 | 1.50 | 0.85 |
| 5 ⁽¹⁾ | Manhole | 177.17 | 178.50 | 6.18 | 172.32 | 172.22 | 152.06 | 132.13 | 40.73 | 40.63 | 0.10 | 0.42 | 0.08 |
| 6 | Manhole | 177.94 | 178.12 | 6.10 | 172.02 | 171.84 | 149.94 | 129.97 | 42.82 | 42.47 | 0.35 | 1.55 | 2.60 |
| 7 | Manhole | 177.76 | 178.31 | 6.10 | 172.21 | 172.03 | 150.02 | 130.05 | 42.67 | 42.41 | 0.26 | 1.70 | 1.50 |
| 8 | Manhole | 177.20 | 178.39 | 6.11 | 172.28 | 172.11 | 150.02 | 130.07 | 42.59 | 42.52 | 0.07 | 1.75 | 1.40 |
| 9 | Manhole | 176.95 | 178.32 | 6.08 | 172.24 | 172.04 | 150.00 | 130.00 | 42.60 | 42.55 | 0.05 | 0.75 | 0.70 |
| 10 ⁽¹⁾ | Manhole | 176.81 | 178.35 | 6.08 | 172.27 | 172.07 | 150.12 | 130.12 | 42.95 | 41.88 | 1.07 | 1.60 | 2.00 |
| 11 | Manhole | 176.78 | 178.34 | 6.05 | 172.29 | 172.06 | 148.05 | 128.05 | 44.53 | 44.41 | 0.12 | 1.95 | 1.75 |
| 12 | Manhole | 176.72 | 178.38 | 6.11 | 172.27 | 172.10 | 148.10 | 128.10 | 44.60 | 44.26 | 0.34 | 2.15 | 1.80 |
| 13 | Manhole | 176.47 | 178.35 | 6.12 | 172.23 | 172.07 | 147.93 | 127.97 | 44.61 | 44.34 | 0.27 | 2.50 | 1.80 |
| 14 | Manhole | 176.65 | 178.53 | 6.14 | 172.39 | 172.25 | 148.03 | 128.11 | 44.62 | 44.54 | 0.08 | 1.90 | 1.75 |
| 15 | Manhole | 176.45 | 178.43 | 6.11 | 172.32 | 172.15 | 148.01 | 128.10 | 44.66 | 44.02 | 0.64 | 0.60 | 1.10 |
| 16 | Manhole | 176.23 | 178.48 | 6.08 | 172.40 | 172.20 | 145.04 | 125.11 | 47.69 | 47.68 | 0.01 | 2.00 | 2.00 |
| 17 | Manhole | 176.72 | 178.49 | 6.06 | 172.43 | 172.21 | 154.03 | 122.11 | 50.75 | 49.35 | 1.40 | 1.70 | 1.80 |
| 18 ⁽¹⁾ | Manhole | 177.33 | 178.55 | 6.11 | 172.44 | 172.27 | 154.08 | 122.13 | 50.80 | 50.65 | 0.15 | 2.75 | 2.95 |
| 19 | Manhole | 178.19 | 178.51 | 6.01 | 172.50 | 172.23 | 153.48 | 122.08 | 50.88 | 50.55 | 0.33 | 2.90 | 2.65 |
| 20 | Manhole | 178.53 | 178.56 | 6.11 | 172.45 | 172.28 | 155.87 | 123.15 | 49.09 | 48.85 | 0.24 | 3.55 | 2.20 |

Notes: (1) Water samples collected from relief wells 11/29/2017; (2) Data from reference drawings and / or well installation reports; (3) Field measurements made 11/28-29/2017; (4) Top of manhole survey - GeoSolutions 2015; (5) Ground surface EL - SJRA 12/2017.

Table 2. Water Quality Test Results

| Analyte | Units | Test Value | | |
|----------------------------|------------|-------------|---------|---------|
| | | Relief Well | | |
| | | 5 | 10 | 18 |
| Laboratory Test Results | | | | |
| Alkalinity | mg/L CaCO3 | | 240 | 214 |
| Chloride | mg/L | 128 | 42.3 | 59.6 |
| Conductivity | umhos/cm | 578 | 797 | 567 |
| Copper, Total | mg/L | <.00200 | <.00233 | <.00200 |
| Hardness | mg/L CaCO3 | 212 | 200 | 167 |
| Hardness, Ca | mg/L CaCO3 | 196 | 155 | 150 |
| Hardness, Magnesium | mg/L CaCO3 | 16 | 45 | 17 |
| Iron, Total | mg/L | 4 | 2.55 | 2.07 |
| Manganese, Total | mg/L | 0.514 | 0.294 | 1.39 |
| Nitrate as N | mg/L | 0.11 | 0.15 | 0.13 |
| OR Potential | mV | 173 | 173 | 170 |
| Orthophosphate | mg/L | 0.05 | 0.06 | 0.05 |
| pH Lab | std unit | 7.24 | 7.2 | 7.2 |
| Potassium, Total | mg/L | 1.76 | 2.28 | 2.31 |
| Silica, Total | mg/L | 39.3 | 52.7 | 46.8 |
| Sodium, Total | mg/L | 36.1 | 89.8 | 61 |
| Sulphate | mg/L | 47.5 | <5.0 | <5.0 |
| Tannin and Lignin | mg.L | 0.3 | 0.3 | 0.2 |
| TDS | mg/L | 348 | 444 | 344 |
| Zinc, Total | mg/zi | <0.00500 | 0.959 | 0.0101 |
| E Coli IDEXX | mpn/100ml | | Absent | |
| Total Coliform IDEXX | mpn/100ml | | Present | |
| Iron Related Bacteria | mpn/100ml | | 2200 | |
| Pseudomonas | mpn/100ml | | 19000 | |
| Slime Forming Bacteria | mpn/100ml | | 25500 | |
| Sulphate Reducing Bacteria | mpn/100ml | | 1400 | |
| Field Test Results | | | | |
| Test Depth | ft | 6.1 | 5.5 | 10 |
| Temperature | degree C | 22.26 | 21.94 | 21.96 |
| pH | std unit | 6.87 | 6.85 | 6.9 |
| Conductivity | umhos/cm | 573 | 787.8 | 556.5 |

Notes: Field tests performed and water sampes collected from relief wells 11/29/2017.

RELIEF WELL INSPECTION REPORT

Date: _____ Page 1 of 2
 Relief Well No.: _____
 Circle One: **Pre Maintenance / Post Maintenance**

| | | |
|----------|--------------|--------|
| Project: | Project No.: | Owner: |
|----------|--------------|--------|

| | | |
|----------------------------------|-----------------|------------|
| Inspector: _____ Printed Name | _____ Signature | _____ Date |
|----------------------------------|-----------------|------------|

General Information

| | | | |
|--------------------------------|----------------------------------|---|--|
| Relief Well Type (Circle One): | <input type="checkbox"/> Manhole | <input type="checkbox"/> Vertical Discharge | <input type="checkbox"/> Tee Discharge |
| Station/Offset: | _____ | | |
| Casing/Riser ID: | _____ | | |
| | Depth, Feet | Measured Elevation | Plan Elevation |
| Top of Manhole: | _____ | | |
| Discharge: | _____ | | |
| Sounded: | _____ | | |
| Top of Casing/Riser: | _____ | | |
| | Depth, Feet | Measured Elevation | Plan Elevation |
| Top of Well Screen: | _____ | | |
| | Sediment: _____ | | |
| | Total Depth: _____ | | |

| | |
|--------------------------|----------|
| General Condition | Comments |
|--------------------------|----------|

| | | | |
|--------------------------------|---|---|--|
| Easily Accessible: | Y | N | |
| Good Condition: | Y | N | |
| Good Rust Protection: | Y | N | |
| Good Drainage Around the Well: | Y | N | |

Mechanical Cleaning

| | | | | | | | |
|----------------------------------|--------------|--------------------------|------------|----------|----------------|--------------------|----------|
| Date: | Start Time: | End Time: | | | | | |
| As Built Depth to Top of Screen: | | | | | | | |
| Surging, Brushing, Other | Cycle Number | Depth of Screen Interval | Start Time | End Time | Sounding Depth | Sediment Thickness | Comments |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
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| | | | | | | | |

Chemical Treatment

| | | | | | | | |
|--------------------------------|--------------|------------|----------|-------------|-----------|-----------------|----------|
| Date: | Start Time: | End Time: | | | | | |
| As Built inside depth of well: | | | | | | | |
| Surging, Brushing, Other | Cycle Number | Start Time | End Time | Starting pH | Ending pH | Chemicals Added | Comments |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

11/30/2017 SCN ✓
 11/30/2017
 TRT W/OUT



EASTEX ENVIRONMENTAL LABORATORY, INC.
 P. O. Box 1089 • Coldspring, TX 77331 | P. O. Box 631375 • Nacogdoches, TX 75963-1375
 (800) 525-0508 • FAX (936) 653-3172 | (936) 569-8879 • FAX (936) 569-8951
 www.eastexlab.com

REPORT TO:

① Company: OSRA / FSI
 Address: 1577 Doro Site Rd
Conroe TX 77304
 Attn.: Ferris (Chuck)
 Phone #: _____
 Fax #: _____

INVOICE TO:

② Company: _____
 Address: _____
 Attn.: _____
 Phone #: _____
 Fax #: _____
 P.O. #: _____

Sampler's Name (please print): Shawn Simpson

Sampler's Signature: _____

Project Number: Well sampling

③ Project Name: Well Sampling/Collection Well

⑦ Containers

| Order ID | ④ Sample ID | Date | Time | D / G | C / G | PH | 2 | Flow | Temp | ⑥ Matrix | # Containers | Size | Type | Fee |
|-----------|-------------|----------|-------|-------|-------|----|---|------|------|----------|--------------|------|------|-----|
| Well 18 ✓ | | 11/29/17 | 10:23 | | | | | | | | 16 | | | |
| Well 10 ✓ | | 11/17 | | | | | | | | | 16 | | | |
| Well 5 ✓ | | 11/5 | | | | | | | | | 16 | | | |

⑧ ANALYSTE

See Attached list that was given
 Call Shawn if you need it.
 To list was misplaced or give
 ATTACH # 11/30/2017

| | | |
|-------------------------|-------------------------|-------------------------|
| Received Iced: Yes / No | Received Iced: Yes / No | Received Iced: Yes / No |
|-------------------------|-------------------------|-------------------------|

Relinquished By: (Signature) Shawn Simpson Date: 11-29-17 Time: 12:25
 Received By: (Signature) _____ Date: _____ Time: _____
 Relinquished By: (Signature) _____ Date: 11-29-17 Time: 16:15
 Received and/or Checked in By: (Signature) _____ Date: _____ Time: _____

While Copy-Follows Samples
 Yellow Copy-Laboratory
 Pink copy-Client Copy
SEE BACK FOR INSTRUCTIONS



Eastex Environmental Laboratory
 Estimate for Freese and Nichols, Inc.
 11/27/2017



11/30/2017 SLM ✓
 TEST REQUEST M

2/2

| Analysis Cost | Matrix | Method | Cost per sample/test |
|--|--------|---------------|----------------------|
| pH | Water | SM4500H+B | \$ 10.00 |
| Total Dissolved Solids | Water | SM 2540C | \$ 12.00 |
| Conductivity | Water | SM 2510B | \$ 18.00 |
| Calcium Hardness as CaCo3 | Water | SM 2340C | \$ 17.00 |
| Magnesium Hardness as CaCo3 | Water | SM 2320B | \$ 15.00 |
| Total Hardness as CaCo3 | Water | EPA 215.2 | \$ 17.00 |
| Iron | Water | EPA 200.8 | \$ 18.00 |
| Copper | Water | EPA 200.8 | \$ 18.00 |
| Zinc | Water | EPA 200.8 | \$ 18.00 |
| Sodium | Water | EPA 200.8 | \$ 18.00 |
| Potassium | Water | EPA 200.8 | \$ 20.00 |
| Chloride | Water | SM 4500-CL.c | \$ 20.00 |
| Sulfate | Water | ASTM 516-07 | \$ 20.00 |
| Nitrate as N | Water | SM 4500 NO3 F | \$ 25.00 |
| Ortho-phosphate as P | Water | SM 4500 PE | \$ 20.00 |
| Silica | Water | EPA 200.8 | \$ 20.00 |
| Tannin & Lignin | Water | Hach 8193 | \$ 30.00 |
| Manganese | Water | EPA 200.8 | \$ 18.00 |
| ORP, mV | Water | SM2580 | \$ 18.00 |
| Total Aerobic | Water | sub | \$ 165.00 |
| Sulfate Reducing Bacteria (SRB) | Water | BART-SRB | \$ 50.00 |
| Total Fungi | Water | sub | \$ 225.00 |
| Pseudomonas | Water | BART-PSM | \$ 50.00 |
| Coliforms | Water | Idexx | \$ 45.00 |
| Slime Formers | Water | BART-SLYM | \$ 50.00 |
| Anaerobic | Water | sub | \$ 375.00 |
| Iron Reducing Bateria (IRB) | Water | BART-IRB | \$ 50.00 |
| Miscellaneous Charges | | | |
| Potential Sample Handling for Subcontract sampling | | | \$ 100.00 |
| Fuel Charge | | | \$ - |
| Cost per Site | | | \$ 1,462.00 |
| Total Cost for Three Sites | | | \$ 4,386.00 |
| Estimate good for 30 days | | | |
| Other notes: | | | |
| ATP | Water | Plate Count | not available |
| ATP | Water | Luminesce | not available |
| M - Alkalinity as CaCo3 | Water | SM 2320B | not available |
| Iron Ferrous | | | not available |

TEST SAMPLES:
 WELL 5
 WELL 10
 WELL 18
 (3)

TEST SAMPLE:
 WELL 10
 (1)

Sampling instructions are general
 Wear gloves
 Run water several minutes
 Fill bottles to the top of the shoulder
 Close lids tight

For the ortho vials - open container, fill about 2/3,
 insert filter, use plunger to slowly push to bottom
 of vessel and recap.

Laboratory will preserve upon receipt.

NOTE: REFERENCE ON ALL INVOICING;
 SJR17620_0002_ΦΑΙΦ_ΛΑΚΤΙΝ
 PROJECT NAME -
 SJR17620
 LAKT LONHOE DAM RELIEF WELL
 REHABILITATION PILOT STUDY



14 December 2017

Chuck Easton
Freese and Nichols
1577 Dam Site Rd
Conroe, TX 77304

RE: Freese and Nichols

Enclosed are the results of analyses for samples received by the laboratory on 11/29/17 16:45, with Lab ID Number C7K5925. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Daniel Bowen". The signature is written in black ink and is positioned above a horizontal line.

Daniel Bowen
Laboratory Director



Freese and Nichols
1577 Dam Site Rd
Conroe TX, 77304

P.O. Box 1089 Coldspring Tx 77331
Website: eastexlabs.com
Email: eastexlab@eastex.net
Tel: 936 653 3249



LABORATORY ANALYTICAL REPORT

Project: Freese and Nichols
Sample Matrix: Water
Client Matrix: Water

Sample Date and Time: 11/29/2017 10:23
Collector: SS
Sample Type: Grab
Print Date: 12/14/2017

Well 10 C7K5925-01 (Water)

| Analyte | Result | Reporting Limit | Units | Nelac Status | Batch | Analyzed Date & Time | Method | Notes |
|---|---------|-----------------|---------------|--------------|---------|----------------------|--------------------|-------|
| Eastex Environmental Laboratory - Coldspring | | | | | | | | |
| Chloride | 42.3 | 5.0 | mg/L | A | B7K4000 | 12/05/2017 08:00 | EPA 300.0 | |
| Conductivity | 797 | 10 | µmhos/cm @25C | A | B7L0132 | 12/04/2017 08:00 | SM 2510 B | |
| Copper, Total | 0.00233 | 0.00200 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |
| E coli IDEXX | Absent | 1 | mpn/100ml | A | B7L0200 | 11/29/2017 17:00 | SM 9223 B, E. Coli | |
| Hardness | 200 | 5.00 | mg CaCO3/L | A | B7L0230 | 12/06/2017 08:00 | SM 2340 C | |
| Hardness, Ca | 155 | 5 | mg CaCO3/L | A | B7L0232 | 12/06/2017 08:00 | EPA 215.2 | |
| Hardness, Magnesium | 45 | 5 | mg CaCO3/L | N | B7L0238 | 12/06/2017 14:45 | SM 2340 B | |
| Iron Related Bacteria | 2200 | | mpn/100ml | N | B7L0525 | 12/01/2017 09:00 | BART-IRB | |
| Iron, Total | 2.55 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |
| Manganese, Total | 0.294 | 0.00100 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |
| Nitrate as N | 0.15 | 0.10 | mg/L | A | B7K4002 | 12/01/2017 09:00 | EPA 300.0 | |
| OR Potential | 173 | | mV | N | B7L1030 | 12/11/2017 09:30 | SM 2580 | 3 |
| Orthophosphate | 0.06 | 0.02 | mg/L | A | B7L0086 | 12/01/2017 09:45 | SM 4500-P E | |
| pH Lab | 7.20 | | std unit | A | B7L0131 | 12/04/2017 08:00 | SM 4500 H + B | 3 |
| Potassium, Total | 2.28 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |
| Pseudomonas | 19000 | | mpn/100ml | N | B7L0525 | 12/01/2017 09:00 | BART-FLOR | ZZb |
| Silica, Total | 52.7 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |
| Slime Forming Bacteria | 25500 | | mpn/100ml | N | B7L0525 | 12/01/2017 09:00 | BART-SLYM | ZZc |
| Sodium, Total | 89.8 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |
| Sulfate | <5.0 | 5.0 | mg/L | A | B7L0114 | 12/05/2017 08:00 | EPA 300.0 | |
| Sulfate Reducing Bacteria | 1400 | | mpn/100ml | N | B7L0525 | 12/01/2017 09:00 | BART-SRBI | ZZa |
| Tannin and Lignin | 0.3 | | mg/L | N | B7L0984 | 12/08/2017 14:00 | Hach 8193 | ZZ |
| TDS | 444 | 10 | mg/L | A | B7L0213 | 12/04/2017 14:30 | SM 2540 C | |
| Total Coliform IDEXX | Present | 1 | mpn/100ml | A | B7L0200 | 11/29/2017 17:00 | ColiGen 18 IDEXX | |
| Zinc, Total | 0.959 | 0.00500 | mg/L | A | B7L0092 | 12/02/2017 03:56 | EPA 200.8 | |

Eastex Environmental Laboratory - Coldspring

The results in this report apply to the samples analyzed in accordance with the chain of custody document.
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*NELAC Status: A=Accredited, N=Accreditation not offered, O=Not Accredited, P=Approved



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Project: Freese and Nichols
Sample Matrix: Water
Client Matrix: Water

Sample Date and Time: 11/29/2017 11:17
Collector: SS
Sample Type: Grab
Print Date: 12/14/2017

Well 18
C7K5925-02 (Water)

| Analyte | Result | Reporting Limit | Units | Nelac Status | Batch | Analyzed Date & Time | Method | Notes |
|---|----------|-----------------|---------------|--------------|---------|----------------------|---------------|-------|
| Eastex Environmental Laboratory - Coldspring | | | | | | | | |
| Chloride | 59.6 | 5.0 | mg/L | A | B7K4000 | 12/05/2017 08:00 | EPA 300.0 | |
| Conductivity | 567 | 10 | µmhos/cm @25C | A | B7L0132 | 12/04/2017 08:00 | SM 2510 B | |
| Copper, Total | <0.00200 | 0.00200 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |
| Hardness | 167 | 5.00 | mg CaCO3/L | A | B7L0230 | 12/06/2017 08:00 | SM 2340 C | |
| Hardness, Ca | 150 | 5 | mg CaCO3/L | A | B7L0232 | 12/06/2017 08:00 | EPA 215.2 | |
| Hardness, Magnesium | 17 | 5 | mg CaCO3/L | N | B7L0238 | 12/06/2017 14:45 | SM 2340 B | |
| Iron, Total | 2.07 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |
| Manganese, Total | 1.39 | 0.00100 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |
| Nitrate as N | 0.13 | 0.10 | mg/L | A | B7K4002 | 12/01/2017 09:00 | EPA 300.0 | |
| OR Potential | 170 | | mV | N | B7L1030 | 12/11/2017 09:30 | SM 2580 | 3 |
| Orthophosphate | 0.05 | 0.02 | mg/L | A | B7L0086 | 12/01/2017 09:45 | SM 4500-P E | |
| pH Lab | 7.20 | | std unit | A | B7L0131 | 12/04/2017 08:00 | SM 4500 H + B | 3 |
| Potassium, Total | 2.31 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |
| Silica, Total | 46.8 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |
| Sodium, Total | 61.0 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |
| Sulfate | <5.0 | 5.0 | mg/L | A | B7L0114 | 12/05/2017 08:00 | EPA 300.0 | |
| Tannin and Lignin | 0.2 | | mg/L | N | B7L0984 | 12/08/2017 14:00 | Hach 8193 | ZZ |
| TDS | 344 | 10 | mg/L | A | B7L0213 | 12/04/2017 14:30 | SM 2540 C | |
| Zinc, Total | 0.0101 | 0.00500 | mg/L | A | B7L0092 | 12/02/2017 04:42 | EPA 200.8 | |



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Project: Freese and Nichols
Sample Matrix: Water
Client Matrix: Water

Sample Date and Time: 11/29/2017 11:31
Collector: SS
Sample Type: Grab
Print Date: 12/14/2017

Well 5
C7K5925-03 (Water)

| Analyte | Result | Reporting Limit | Units | Nelac Status | Batch | Analyzed Date & Time | Method | Notes |
|---|----------|-----------------|---------------|--------------|---------|----------------------|---------------|-------|
| Eastex Environmental Laboratory - Coldspring | | | | | | | | |
| Chloride | 128 | 5.0 | mg/L | A | B7K4000 | 12/05/2017 08:00 | EPA 300.0 | |
| Conductivity | 578 | 10 | µmhos/cm @25C | A | B7L0132 | 12/04/2017 08:00 | SM 2510 B | |
| Copper, Total | <0.00200 | 0.00200 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |
| Hardness | 212 | 5.00 | mg CaCO3/L | A | B7L0230 | 12/06/2017 08:00 | SM 2340 C | |
| Hardness, Ca | 196 | 5 | mg CaCO3/L | A | B7L0232 | 12/06/2017 09:00 | EPA 215.2 | |
| Hardness, Magnesium | 16 | 5 | mg CaCO3/L | N | B7L0238 | 12/06/2017 14:45 | SM 2340 B | |
| Iron, Total | 4.00 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |
| Manganese, Total | 0.514 | 0.00100 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |
| Nitrate as N | 0.11 | 0.10 | mg/L | A | B7K4002 | 12/01/2017 09:00 | EPA 300.0 | |
| OR Potential | 173 | | mV | N | B7L1030 | 12/11/2017 09:30 | SM 2580 | 3 |
| Orthophosphate | 0.05 | 0.02 | mg/L | A | B7L0086 | 12/01/2017 09:45 | SM 4500-P E | |
| pH Lab | 7.24 | | std unit | A | B7L0131 | 12/04/2017 08:00 | SM 4500 H + B | 3 |
| Potassium, Total | 1.76 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |
| Silica, Total | 39.3 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |
| Sodium, Total | 36.1 | 0.100 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |
| Sulfate | 47.5 | 5.0 | mg/L | A | B7L0114 | 12/05/2017 08:00 | EPA 300.0 | |
| Tannin and Lignin | 0.3 | | mg/L | N | B7L0984 | 12/08/2017 14:00 | Haach 8193 | ZZ |
| TDS | 348 | 10 | mg/L | A | B7L0213 | 12/04/2017 14:30 | SM 2540 C | |
| Zinc, Total | <0.00500 | 0.00500 | mg/L | A | B7L0092 | 12/02/2017 04:48 | EPA 200.8 | |



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EPA 300.0 - Quality Control
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| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|--|--------|-----------------|-------|--|---------------|------|-------------|-------|-----------|-------|
| Batch B7K4000 - No Prep | | | | | | | | | | |
| Blank (B7K4000-BLK1) | | | | Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | |
| Chloride | ND | 5.0 | mg/L | | | | | | | |
| LCS (B7K4000-BS1) | | | | Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | |
| Chloride | 104 | | mg/L | 100 | 104 | 104 | 80-120 | | | |
| Matrix Spike (B7K4000-MS1) | | | | Source: C7K3614-01 Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | |
| Chloride | 262 | 5.0 | mg/L | 100 | 143 | 118 | 80-120 | | | |
| Matrix Spike Dup (B7K4000-MSD1) | | | | Source: C7K3614-01 Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | |
| Chloride | 244 | 5.0 | mg/L | 100 | 143 | 101 | 80-120 | 6.99 | 20 | |
| Batch B7K4002 - No Prep | | | | | | | | | | |
| Blank (B7K4002-BLK1) | | | | Prepared & Analyzed: 12/1/2017 9:00:00AM | | | | | | |
| Nitrate as N | ND | 0.10 | mg/L | | | | | | | |
| LCS (B7K4002-BS1) | | | | Prepared & Analyzed: 12/1/2017 9:00:00AM | | | | | | |
| Nitrate as N | 4.4425 | | mg/L | 5.00 | | 88.8 | 80-120 | | | |
| Matrix Spike (B7K4002-MS1) | | | | Source: C7K5691-01 Prepared & Analyzed: 12/1/2017 9:00:00AM | | | | | | |
| Nitrate as N | 4.8767 | 0.10 | mg/L | 5.00 | 0.5373 | 86.8 | 80-120 | | | |
| Matrix Spike Dup (B7K4002-MSD1) | | | | Source: C7K5691-01 Prepared & Analyzed: 12/1/2017 9:00:00AM | | | | | | |
| Nitrate as N | 4.8689 | 0.10 | mg/L | 5.00 | 0.5373 | 86.6 | 80-120 | 0.160 | 20 | |
| Batch B7L0086 - No Prep | | | | | | | | | | |
| Blank (B7L0086-BLK1) | | | | Prepared & Analyzed: 12/1/2017 9:45:00AM | | | | | | |
| Orthophosphate | ND | 0.02 | mg/L | | | | | | | |



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SM 4500-PE - Quality Control
Eastex Environmental Laboratory - Coldspring

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|--|--------|-----------------|-------|-------------|---------------|------|-------------|-------|-----------|-------|
| Batch B7L0086 - No Prep | | | | | | | | | | |
| LCS (B7L0086-BS1) Prepared & Analyzed: 12/1/2017 9:45:00AM | | | | | | | | | | |
| Orthophosphate | 0.24 | | mg/L | 0.250 | | 94.8 | 80-120 | | | |
| Matrix Spike (B7L0086-MS1) Source: C7K5925-01 Prepared & Analyzed: 12/1/2017 9:45:00AM | | | | | | | | | | |
| Orthophosphate | 0.56 | 0.02 | mg/L | 0.500 | 0.06 | 99.2 | 80-120 | | | |
| Matrix Spike Dup (B7L0086-MSD1) Source: C7K5925-01 Prepared & Analyzed: 12/1/2017 9:45:00AM | | | | | | | | | | |
| Orthophosphate | 0.56 | 0.02 | mg/L | 0.500 | 0.06 | 100 | 80-120 | 0.717 | 20 | |
| Batch B7L0092 - EPA 200.8 | | | | | | | | | | |
| Blank (B7L0092-BLK1) Prepared & Analyzed: 12/2/2017 12:52:07AM | | | | | | | | | | |
| Copper, Total | ND | 0.00200 | mg/L | | | | | | | |
| Iron, Total | ND | 0.100 | mg/L | | | | | | | |
| Manganese, Total | ND | 0.00100 | mg/L | | | | | | | |
| Potassium, Total | ND | 0.100 | mg/L | | | | | | | |
| Silica, Total | ND | 0.100 | mg/L | | | | | | | |
| Sodium, Total | ND | 0.100 | mg/L | | | | | | | |
| Blank (B7L0092-BLK2) Prepared & Analyzed: 12/2/2017 2:29:41AM | | | | | | | | | | |
| Zinc, Total | ND | 0.00500 | mg/L | | | | | | | |
| Blank (B7L0092-BLK3) Prepared & Analyzed: 12/2/2017 4:07:11AM | | | | | | | | | | |
| Zinc, Total | ND | 0.00500 | mg/L | | | | | | | |
| LCS (B7L0092-BS1) Prepared & Analyzed: 12/2/2017 12:57:16AM | | | | | | | | | | |
| Copper, Total | 0.103 | 0.00200 | mg/L | 0.100 | | 103 | 85-115 | | | |
| Iron, Total | 10.4 | 0.100 | mg/L | 10.0 | | 104 | 85-115 | | | |
| Manganese, Total | 0.103 | 0.00100 | mg/L | 0.100 | | 103 | 85-115 | | | |
| Potassium, Total | 10.5 | 0.100 | mg/L | 10.0 | | 105 | 85-115 | | | |
| Silica, Total | 11.1 | 0.100 | mg/L | 10.0 | | 111 | 85-115 | | | |
| Sodium, Total | 10.1 | 0.100 | mg/L | 10.0 | | 101 | 85-115 | | | |



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EPA 200.8 - Quality Control
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| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|--|--------|-----------------|-------|-------------|---------------|--|-------------|-------|-----------|-------|
| Batch B7L0092 - EPA 200.8 | | | | | | | | | | |
| LCS (B7L0092-BS2) | | | | | | | | | | |
| | | | | | | Prepared & Analyzed: 12/2/2017 2:34:52AM | | | | |
| Zinc, Total | 0.0989 | 0.00500 | mg/L | 0.100 | | 98.9 | 85-115 | | | |
| LCS (B7L0092-BS3) | | | | | | | | | | |
| | | | | | | Prepared & Analyzed: 12/2/2017 4:12:22AM | | | | |
| Zinc, Total | 0.115 | 0.00500 | mg/L | 0.100 | | 115 | 85-115 | | | |
| Matrix Spike (B7L0092-MS1) | | | | | | | | | | |
| | | | | | | Source: C7K5453-01 Prepared & Analyzed: 12/2/2017 1:12:35AM | | | | |
| Copper, Total | 0.108 | 0.00200 | mg/L | 0.100 | 0.00651 | 102 | 70-130 | | | |
| Iron, Total | 10.3 | 0.100 | mg/L | 10.0 | 0.0434 | 103 | 70-130 | | | |
| Manganese, Total | 0.136 | 0.00100 | mg/L | 0.100 | 0.0318 | 104 | 70-130 | | | |
| Potassium, Total | 21.9 | 0.100 | mg/L | 10.0 | 11.4 | 105 | 70-130 | | | |
| Silica, Total | 29.8 | 0.100 | mg/L | 10.0 | 18.6 | 112 | 70-130 | | | |
| Sodium, Total | 106 | 0.100 | mg/L | 10.0 | 93.2 | 125 | 70-130 | | | |
| Matrix Spike (B7L0092-MS2) | | | | | | | | | | |
| | | | | | | Source: C7K5747-01 Prepared & Analyzed: 12/2/2017 2:50:16AM | | | | |
| Zinc, Total | 0.182 | 0.00500 | mg/L | 0.100 | 0.0911 | 90.8 | 70-130 | | | |
| Matrix Spike (B7L0092-MS3) | | | | | | | | | | |
| | | | | | | Source: C7K5845-01 Prepared & Analyzed: 12/2/2017 4:27:45AM | | | | |
| Zinc, Total | 0.123 | 0.00500 | mg/L | 0.100 | 0.0140 | 109 | 70-130 | | | |
| Matrix Spike Dup (B7L0092-MSD1) | | | | | | | | | | |
| | | | | | | Source: C7K5453-01 Prepared & Analyzed: 12/2/2017 1:17:34AM | | | | |
| Copper, Total | 0.101 | 0.00200 | mg/L | 0.100 | 0.00651 | 94.8 | 70-130 | 6.73 | 20 | |
| Iron, Total | 9.57 | 0.100 | mg/L | 10.0 | 0.0434 | 95.3 | 70-130 | 7.54 | 20 | |
| Manganese, Total | 0.127 | 0.00100 | mg/L | 0.100 | 0.0318 | 94.7 | 70-130 | 7.28 | 20 | |
| Potassium, Total | 20.6 | 0.100 | mg/L | 10.0 | 11.4 | 91.9 | 70-130 | 6.08 | 20 | |
| Silica, Total | 28.8 | 0.100 | mg/L | 10.0 | 18.6 | 102 | 70-130 | 3.22 | 20 | |
| Sodium, Total | 98.4 | 0.100 | mg/L | 10.0 | 93.2 | 51.4 | 70-130 | 7.26 | 20 | |
| Matrix Spike Dup (B7L0092-MSD2) | | | | | | | | | | |
| | | | | | | Source: C7K5747-01 Prepared & Analyzed: 12/2/2017 2:55:15AM | | | | |
| Zinc, Total | 0.183 | 0.00500 | mg/L | 0.100 | 0.0911 | 92.2 | 70-130 | 0.783 | 20 | |



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EPA 200.8 - Quality Control
Eastex Environmental Laboratory - Coldspring

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|--|--------|-----------------|---------------|-------------|---------------|------|-------------|-------|-----------|-------|
| Batch B7L0092 - EPA 200.8 | | | | | | | | | | |
| Matrix Spike Dup (B7L0092-MSD3) Source: C7K5845-01 Prepared & Analyzed: 12/2/2017 4:32:49AM | | | | | | | | | | |
| Zinc, Total | 0.143 | 0.00500 | mg/L | 0.100 | 0.0140 | 129 | 70-130 | 15.2 | 20 | |
| Batch B7L0114 - No Prep | | | | | | | | | | |
| Blank (B7L0114-BLK1) Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | | | | | |
| Sulfate | ND | 5.0 | mg/L | | | | | | | |
| LCS (B7L0114-BS1) Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | | | | | |
| Sulfate | 35.3 | | mg/L | 30.0 | | 118 | 80-120 | | | |
| Matrix Spike (B7L0114-MS1) Source: C7K3614-01 Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | | | | | |
| Sulfate | 83.0 | 5.0 | mg/L | 30.0 | 50.6 | 108 | 80-120 | | | |
| Matrix Spike Dup (B7L0114-MSD1) Source: C7K3614-01 Prepared & Analyzed: 12/5/2017 8:00:00AM | | | | | | | | | | |
| Sulfate | 82.8 | 5.0 | mg/L | 30.0 | 50.6 | 107 | 80-120 | 0.229 | 20 | |
| Batch B7L0131 - No Prep | | | | | | | | | | |
| LCS (B7L0131-BS1) Prepared & Analyzed: 12/4/2017 8:00:00AM | | | | | | | | | | |
| pH Lab | 6.84 | | std unit | 6.86 | | 99.7 | 0-200 | | | 3 |
| Duplicate (B7L0131-DUP1) Source: C7K5925-01 Prepared & Analyzed: 12/4/2017 8:00:00AM | | | | | | | | | | |
| pH Lab | 7.14 | | std unit | 7.20 | | | | 0.837 | 20 | 3 |
| Batch B7L0132 - No Prep | | | | | | | | | | |
| Blank (B7L0132-BLK1) Prepared & Analyzed: 12/4/2017 8:00:00AM | | | | | | | | | | |
| Conductivity | ND | 10 | µmhos/cm @25C | | | | | | | |



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SM 2510 B - Quality Control
Eastex Environmental Laboratory - Coldspring

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|-----------------------------------|--------|-----------------|---------------|-------------|---------------|--|-------------|-------|-----------|-------|
| Batch B7L0132 - No Prep | | | | | | | | | | |
| LCS (B7L0132-BS1) | | | | | | Prepared & Analyzed: 12/4/2017 8:00:00AM | | | | |
| Conductivity | 966 | | µmhos/cm @25C | 1000 | | 96.6 | 80-120 | | | |
| Duplicate (B7L0132-DUP1) | | | | | | Source: C7K3614-01 Prepared & Analyzed: 12/4/2017 8:00:00AM | | | | |
| Conductivity | 1367 | 10 | µmhos/cm @25C | | 1360 | | | 0.513 | 20 | |
| Batch B7L0213 - No Prep | | | | | | | | | | |
| Blank (B7L0213-BLK1) | | | | | | Prepared & Analyzed: 12/4/2017 2:30:00PM | | | | |
| TDS | ND | 10 | mg/L | | | | | | | |
| LCS (B7L0213-BS1) | | | | | | Prepared & Analyzed: 12/4/2017 2:30:00PM | | | | |
| TDS | 292 | | mg/L | 300 | | 97.3 | 80-120 | | | |
| Duplicate (B7L0213-DUP1) | | | | | | Source: C7K3614-01 Prepared & Analyzed: 12/4/2017 2:30:00PM | | | | |
| TDS | 916 | 10 | mg/L | | 916 | | | 0.00 | 10 | |
| Batch B7L0230 - No Prep | | | | | | | | | | |
| Blank (B7L0230-BLK1) | | | | | | Prepared & Analyzed: 12/6/2017 8:00:00AM | | | | |
| Hardness | ND | 5.00 | mg CaCO3/L | | | | | | | |
| LCS (B7L0230-BS1) | | | | | | Prepared & Analyzed: 12/6/2017 8:00:00AM | | | | |
| Hardness | 100 | | mg CaCO3/L | 100 | | 100 | 80-120 | | | |
| Matrix Spike (B7L0230-MS1) | | | | | | Source: C7K5925-01 Prepared & Analyzed: 12/6/2017 8:00:00AM | | | | |
| Hardness | 700 | 5.00 | mg CaCO3/L | 500 | 200 | 100 | 80-120 | | | |



Freese and Nichols
1577 Dam Site Rd
Conroe TX, 77304

P.O. Box 1089 Coldspring Tx 77331
Website: eastexlabs.com
Email: eastexlab@eastex.net
Tel: 936 653 3249



SM 2340 C - Quality Control
Eastex Environmental Laboratory - Coldspring

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|--|--------|-----------------|-------------------------|-------------|---------------|------|-------------|-------|-----------|-------|
| Batch B7L0230 - No Prep | | | | | | | | | | |
| Matrix Spike Dup (B7L0230-MSD1) Source: C7K5925-01 Prepared & Analyzed: 12/6/2017 8:00:00AM | | | | | | | | | | |
| Hardness | 702 | 5.00 | mg CaCO ₃ /L | 500 | 200 | 100 | 80-120 | 0.285 | 20 | |
| Batch B7L0232 - No Prep | | | | | | | | | | |
| Blank (B7L0232-BLK1) Prepared & Analyzed: 12/6/2017 9:00:00AM | | | | | | | | | | |
| Hardness, Ca | ND | 5 | mg CaCO ₃ /L | | | | | | | |
| LCS (B7L0232-BS1) Prepared & Analyzed: 12/6/2017 9:00:00AM | | | | | | | | | | |
| Hardness, Ca | 100 | | mg CaCO ₃ /L | 100 | | 100 | 80-120 | | | |
| Matrix Spike (B7L0232-MS1) Source: C7K5925-01 Prepared & Analyzed: 12/6/2017 9:00:00AM | | | | | | | | | | |
| Hardness, Ca | 665 | 5 | mg CaCO ₃ /L | 500 | 155 | 102 | 80-120 | | | |
| Matrix Spike Dup (B7L0232-MSD1) Source: C7K5925-01 Prepared & Analyzed: 12/6/2017 9:00:00AM | | | | | | | | | | |
| Hardness, Ca | 670 | 5 | mg CaCO ₃ /L | 500 | 155 | 103 | 80-120 | 0.749 | 20 | |
| Batch B7L0984 - No Prep | | | | | | | | | | |
| Blank (B7L0984-BLK1) Prepared & Analyzed: 12/8/2017 2:00:00PM | | | | | | | | | | |
| Tannin and Lignin | ND | | mg/L | | | | | | | |
| Duplicate (B7L0984-DUP1) Source: C7K5925-03 Prepared & Analyzed: 12/8/2017 2:00:00PM | | | | | | | | | | |
| Tannin and Lignin | 0.3 | | mg/L | | 0.3 | | | 0.00 | 20 | |



Freese and Nichols
1577 Dam Site Rd
Conroe TX, 77304

P.O. Box 1089 Coldspring Tx 77331
Website: eastexlabs.com
Email: eastexlab@eastex.net
Tel: 936 653 3249



Notes and Definitions

| | |
|--------|--|
| ZZc | Pseudomonads and Enterics. |
| ZZb | Non-fluorescing pseudomonas. |
| ZZa | Combination of aerobic and anaerobic SRB. |
| ZZ | Analysis performed at Nacogdoches Laboratory |
| 3 | Sample analysis performed out of holding time. |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |
| POFLND | Presence of Free Liquids Not Detected |



| Collection Date | Received Date | Completed Date | Requisition |
|------------------|--------------------------|----------------|-------------|
| 11-29-2017 | 12-01-2017 | 12-09-2017 | M35852 |
| Customer | Eastex Environmental Lab | | |
| Street | 35 Eastex Lane | | |
| City, State, Zip | Coldspring, TX 77331 | | |
| Phone | (936)653-3249 | | |
| Email | dbowen@eastex.net | | |

Laboratory Results

| Sample Identification: | Well 10 | |
|-------------------------|-----------------------------|------------|
| Sample description: | Three 100mL plastic bottles | |
| Sample Matrix: | Aqueous | |
| Analyte | Results | Units |
| Aerobic Plate Count | $>3.0 \times 10^2$ | CFU/100 mL |
| Clostridium perfringens | <1 | CFU/100 mL |
| Yeast and Mold | 27 | CFU/100 mL |

***Note:**

APC resulted following 48 hours incubation at 35°C +/- 0.5° on Standard Methods Agar. Membrane Filtration Method.
Clostridium perfringens resulted following 21 hours incubation at 44°C on TSC media. Membrane Filtration Method.
Yeast and Mold resulted following 5-7days incubation at 20-25°C on SabDex Agar. Membrane Filtration Method.

Method Reference: Bacteriological Analytical Manual (BAM), USDA Food and Drug Administration

QA Review: MH

Approved by: Paul J. Pearce (DMD)

Date: 12-11-2017

Paul J. Pearce, Ph.D.

Laboratory Director

Specialist in Microbiology (SM/ASCP Board of Certification)

The results shown on this report refer only to the sample(s) tested unless otherwise stated. No further evaluation of these results is made by Nova Biologicals, Inc. This report cannot be reproduced except in full, without prior written consent of Nova Biologicals, Inc.



NOVA
BIOLOGICALS

SAMPLE SUBMISSION FORM

T.A - 1 AN-1 Fun-1

| | |
|----------|---|
| Required | Company: Eastex Environmental Lab |
| Required | Address: 35 Eastex Lane |
| Required | City state Zip: Coldspring Tx 77331 |
| Required | Phone: 9366533249 |
| Required | Compliance Monitoring for TCEQ? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| | Email (for reporting purposes): dbowen@eastex.net |
| | Fax: |

M35852

| Sample Identification | Collection date | Collection time | Test requested |
|-----------------------|---------------------|-----------------|---|
| Well 18 | 11/20/17 | 1032 | Total aerobic, anaerobic and total fungi |
| Well 10 | 11/29/17 | 1117 | Total aerobic, anaerobic and total fungi |
| Well 5 | 11/20/17 | 1131 | Total aerobic, anaerobic and total fungi |
| | | | |

Special Notes or Requirements see attached PO 112917K

| Relinquished by: | | Received by: | |
|----------------------|------|-----------------------|-----------|
| Signature: | Date | Signature: | Date |
| Printed Name/Company | Time | Printed Name/Company | Time |
| | | Dennisse Mathias | 12-1-2017 |
| | | Dennisse Mathias/NOVA | 10:00 |



P.O. Box 1089 Coldspring, Texas 77331

Website: eastexlabs.com

Email: eastexlab@eastex.net

Tel: 936 653 3249



SUBCONTRACT ORDER

Sending Laboratory:

Eastex Environmental Laboratory - Coldspring
PO Box 1089
Coldspring, TX 77331
Phone: 936-653-3249
Fax: 936-653-3172

Subcontracted Laboratory:

Nova Biologicals Lab
1775 E. Loop 336, Suite 4
Conroe, TX 77301
Phone: 936-756-5333
Fax: 936-756-5357

PO 112917K

PROJECT NAME:

Freese and Nichols

Turnaround

14 DAYS

Matrix:

Water

| Containers | Date | Time | EEL Sample ID | Sample No. | Analysis to be Performed |
|------------|----------|-------|---------------|------------|--------------------------|
| 1 | 11/29/17 | 10:23 | Well 10 | C7K5925-01 | See Nova Form |

Special Instructions:

See Attached

Received Iced Y/N Temp: _____

* Corrected PO.

Released By

Date & Time

Received By

Date & Time



EASTEX ENVIRONMENTAL LABORATORY, INC.
 P. O. Box 1089 • Coldspring, TX 77331 | P. O. Box 631375 • Nacogdoches, TX 75963-1375
 (800) 525-0508 • FAX (936) 653-3172 | (936) 569-8879 • FAX (936) 569-8951
 www.eastexlab.com

REPORT TO:

INVOICE TO:

1 Company ESRA / FSI
 Address 1577 Dam Site Rd
Conroe TX 77304
 Attn. Freder (Chuck)
 Phone # _____
 Fax # _____

2 Company _____
 Address _____
 Attn. _____
 Phone # _____
 Fax # _____
 P.O. # _____

Sampler's Name (please print) Shawn Simpson

Sampler's Signature _____

Project Number _____

3 Project Name Well Sampling/Collector Wells

Remarks: Well sampling

7 Containers

| Order ID | 4 Sample ID | D a t e | T i m e | 5 C / G | D O H | P I 2 | F I O W | T e m p | M e t e r | 6 # C O N | S I Z e | T Y P e | P r e s | Received load: Yes / No |
|----------|-------------|------------------|------------------|---------------|-------------|-------------|------------------|------------------|-----------------------|--------------------|------------------|------------------|------------------|-------------------------|
| | | | | | | | | | | | | | | |
| Well 18 | | 11/29/10 | 10:23 | | | | | | | 16 | | | | Yes / No |
| Well 10 | | 11:17 | | | | | | | | 16 | | | | Yes / No |
| Well 5 | | 11:51 | | | | | | | | 16 | | | | Yes / No |

8 A
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N
S

*See Attached list that was given
 Call Shawn if you need it.
 The list was misplaced at time.*

Relinquished By: (Signature) Shawn Simpson

Received By: (Signature) _____

Date: 11-29-17 Time: 12:25

Relinquished By: (Signature) _____

Received and/or Checked in By: (Signature) _____

Date: 11-29-17 Time: 12:45

LAB USE ONLY Sample Condition Acceptable: Y / No N Temp °C 21.15 *Therm ID _____
 Alternate Check In: (Signature) _____ Date _____ Time _____
 Received in By: (Signature) _____ Date _____ Time _____

White Copy-Follows Samples
 Yellow Copy-Laboratory
 Pink copy-Client Copy
SEE BACK FOR INSTRUCTIONS



Eastex Environmental Laboratory
Estimate for Freese and Nichols, Inc.
11/27/2017

11/30/2017 SLM ✓
TEST REQUEST MT



2/2

| Analysis Cost | Matrix | Method | Cost per sample/test |
|--|--------|---------------|----------------------|
| pH | Water | SM4500H+8 | \$ 10.00 |
| Total Dissolved Solids | Water | SM 2540C | \$ 12.00 |
| Conductivity | Water | SM 2510B | \$ 18.00 |
| Calcium Hardness as CaCo3 | Water | SM 2340C | \$ 17.00 |
| Magnesium Hardness as CaCo3 | Water | SM 2320B | \$ 15.00 |
| Total Hardness as CaCo3 | Water | EPA 215.2 | \$ 17.00 |
| Iron | Water | EPA 200.8 | \$ 18.00 |
| Copper | Water | EPA 200.8 | \$ 18.00 |
| Zinc | Water | EPA 200.8 | \$ 18.00 |
| Sodium | Water | EPA 200.8 | \$ 18.00 |
| Potassium | Water | EPA 200.8 | \$ 20.00 |
| Chloride | Water | SM 4500-CL c | \$ 20.00 |
| Sulfate | Water | ASTM 516-07 | \$ 20.00 |
| Nitrate as N | Water | SM 4500 NO3 F | \$ 25.00 |
| Ortho-phosphate as P | Water | SM 4500 PE | \$ 20.00 |
| Silica | Water | EPA 200.8 | \$ 20.00 |
| Tannin & Lignin | Water | Hach 8193 | \$ 30.00 |
| Manganese | Water | EPA 200.8 | \$ 18.00 |
| ORP, mV | Water | SM2580 | \$ 18.00 |
| Total Aerobic | Water | sub | \$ 165.00 |
| Sulfate Reducing Bacteria (SRB) | Water | BART-SRB | \$ 50.00 |
| Total Fungi | Water | sub | \$ 225.00 |
| Pseudomonas | Water | BART-PSM | \$ 50.00 |
| Coliforms | Water | Idexx | \$ 45.00 |
| Slime Formers | Water | BART-SLYM | \$ 50.00 |
| Anaerobic | Water | sub | \$ 375.00 |
| Iron Reducing Bateria (IRB) | Water | BART-IRB | \$ 50.00 |
| Miscellaneous Charges | | | |
| Potential Sample Handling for Subcontract sampling | | | \$ 100.00 |
| Fuel Charge | | | \$ - |
| Cost per Site | | | \$ 1,462.00 |
| Total Cost for Three Sites | | | \$ 4,386.00 |
| Estimate good for 30 days | | | |
| Other notes: | | | |
| ATP | Water | Plate Count | not available |
| ATP | Water | Luminesce | not available |
| M - Alkalinity as CaCo3 | Water | SM 2320B | not available |
| Iron Ferrous | | | not available |

TEST SAMPLES:
WELL 5
WELL 10
WELL 18
③

TEST SAMPLE:
WELL 10
①

Sampling instructions are general
Wear gloves
Run water several minutes
Fill bottles to the top of the shoulder
Close lids tight

For the ortho vials - open container, fill about 2/3,
insert filter, use plunger to slowly push to bottom
of vessel and recap.

Laboratory will preserve upon receipt.

NOTE: REFERENCE ON ALL INVOICING;

SJR17620_0002_ΦΑΙΦ_ΛΑΒ ΤΕΣΤΗΝ

PROJECT NAME -

SJR17620

ΛΑΒΗ ΛΟΓΩΦ ΟΑΝ ΚΕΛΙΕΦ ΚΗΦ
ΚΕΦΑΛΑΙΟΤΑΤΗΝ ΠΙΛΟΤ ΣΤΟΥΦ

Freese and Nichols Purchase Order



Issued To: Eastex Environmental Laboratory Inc
PO Box 1089
Coldspring TX 77331

P.O. Date: 12/12/2017
P.O. Number: 12347

Fax:
For: SRJ17620/0002/0A10 San Jancinto River Authority WO #6 Lake Conroe Relief Well Rehab

Invoice To: Freese & Nichols, Inc.
4055 International Plaza, Suite. 200
AccountsPayable@freese.com
Fort Worth TX 76109

Ship To: Freese & Nichols, Inc.
4055 International Plaza, Suite. 200
Tony Bosecker
Fort Worth TX 76109

Buyer: Susan Marie Johnson
Phone: 817-735-7300
Fax: 817-735-7491
Co/Org: 00 / Water Resource Dam and Levee Design

Ship Method:
FOB:
Terms:
Currency: United States Dollar

| <u>Line No</u> | <u>Description / Item No.</u> | <u>Date Required</u> | <u>Quantity</u> | <u>Measure</u> | <u>Unit Price</u> | <u>Misc Amt</u> | <u>Total</u> |
|------------------------------|-------------------------------|----------------------|-----------------|----------------|-------------------|-----------------|-----------------|
| 1 | Testing Services | 12/12/2017 | 1.00 | EACH | 3500.00 | | 3,500.00 |
| Purchase Order Total: | | | | | | | 3,500.00 |

This PO is subject to the terms and conditions in the Master Subconsultant Agreement between Eastex environmental Laboratory and Freese and Nichols, Inc. executed on December 11, 2017.

Sign _____ Date _____
Sign _____ Date _____
Accepted _____ Date _____

INSTRUCTIONS

Please be complete and accurate when filling out the Chain-of-Custody sheet, as all information will be printed on the final lab report.

- 1 REPORT TO: Name of company, address, #'s, and where you want the report sent.
- 2 INVOICE TO: Name of company, address, #'s, and where you want the report sent.
- 3 PROJECT NAME: What you will call this sample.
- 4 SAMPLE ID: How you will refer to this sample.
- 5 SAMPLE TYPE: C3=3pt Comp. C6=6pt Comp. C12=12hr Comp. C24=24hr Comp. G=Grab
- 6 MATRIX: DW=Drinking Water WW=Wastewater SO=Soil/Sludge OL=Oils
FL=Filter LE=Leachate SD=Solid RE=Resin OT=Other
- 7 CONTAINER(S)
- SIZE: 1=Gallon 2=1/2 Gallon 3=Quart/Liter 4=Pint 5=1/2 pt (250 ml)
6=125 ml/4 oz. 7=60 mls/2 oz 8-Vial 9=Other
- TYPE: P=Plastic G=Glass T=Teflon S=Sterile
- PRESERVATIVE: C=Chilled S=Sulfuric Acid N=Nitric Acid B=Base/Caustic Z=Zn Acetate
H=Hydrochloric Acid ST=Sodium Thiosulfate O=Other
- 8 ANALYSIS REQUESTED Please be as specific as possible when listing which samples get what results.

Lake Conroe Dam Relief Well Rehabilitation Pilot Study Project Summary

*Client: San Jacinto River Authority
SJRA Project No: LCPR0027.1001.2C006*

June 11, 2018



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Introduction

TerraFirma Earth Technologies, Ltd. (TF) was contracted by the San Jacinto River Authority (SJRA) to perform maintenance on three selected relief wells (RW-5, RW-10, and RW-18) along the toe of the Lake Conroe Dam in an effort to collect data to determine the best means and methods for developing a rehabilitation and maintenance program for the other seventeen relief wells.



Scope of Work

The work was broken down into several steps to both rehabilitate the selected relief wells, as well as to gather data on the efficacy of the methods employed in each step. The steps can generally be broken down as follows:

1. **Premaintenance Inspection:** This included sounding the well, performing a video inspection of the well, measuring the artesian flow, and performing a pump test to determine the specific capacity of the well.
2. **Phase 1 – Maintenance**
 - a. **Mechanical Cleaning:** This process involved utilizing a double brush to mechanically scrub the interior faces of the casing and screened portions of the relief wells.
 - b. **Post-Mechanical Inspection:** The same activities as the premaintenance inspection were repeated to determine changes in the performance of the well due to the mechanical cleaning process.

- c. Chemical Treatment: Each well was treated with a chemical solution prepared utilizing Johnson Nuwell 120 liquid acid and Nuwell 310 acid dispersant. The acid solution was jetted into each well and then surged/agitated utilizing a surge block over a period of four days to allow the solution to remove deposits from the riser and screen as well as the surrounding formation.
3. Phase 2 – Disinfection: A solution of Sodium Hypochlorite (12.5%) and Johnson Nuwell 410 chlorine enhancer was introduced into each well to disinfect them. Upon completion, the wastewater was collected into a holding tank and neutralized with Johnson Nuwell 500 Chlorout prior to being discharged into a ditch as directed by SJRA.
4. Post-Maintenance Inspection: The same activities as the pre-maintenance inspection were repeated to determine changes in the performance of the well due to the combined mechanical\chemical cleaning process.

Field Operation Summary

TF began field operations on April 18, 2018. Work on the three selected wells was substantially completed by May 14, 2018.

Premaintenance Inspections

We began the process by first performing the video inspection; however, the resulting video showed that



the well was filled with growth\deposits which made it difficult to determine the condition of the well riser and screen. It was then determined to perform the initial video inspection of the wells following the initial artesian flow tests and pump tests, to allow for the removal as much debris from the wells as possible, prior to the video inspection.

The initial artesian flow test involved placing a 6" x 5', SCH 40 PVC riser extension, fitted with a flexible coupling over the relief well, then immediately recording the rate of rise of the groundwater level within the riser extension. Problems were encountered, however, when we were unable to get a proper seal between the riser extension coupling, and the relief well head. The following day we were able to achieve a proper seal by installing a rubber O-ring inside a riser with a rigid Schedule 40 PVC Coupling. The artesian flow test was successfully performed on the 3 wells.

Following the completion of the artesian flow test, the initial pump test was performed on each of the three wells. The specific capacity for each of the three wells was determined to be 0.32 gpm/ft, 0.72 gpm/ft, and 1.20 gpm/ft for wells RW-5, RW-10, and RW-18, respectively.

Following the initial pumping test, it was decided to let each well sit overnight to allow for any suspended particulates to settle prior to performing the video inspection of the well. The video inspection was then successfully performed for each well.

Mechanical Cleaning

Prior to mechanical cleaning, each well was sounded, and the well depth recorded. Mechanical cleaning consisted of brushing of the well casing and screen utilizing a double brush assembly manufactured by Cotey Chemical Corporation. Each well was brushed for 1 minute per foot of screen/riser in 5-foot segments. Brushing of the well was followed up by running a surge block up and down along the well screen surface. A Bobcat S300, fitted with a mast fitted with a variable speed hydraulic hoist, was utilized to run both the brush and the surge block up and down within the well assembly, at the desired speeds. Upon completion of the mechanical brushing/surging, each well was airlifted into a holding tank until reasonably free and clear of debris. The waste water was allowed to settle before the clear water was decanted and discharged into a ditch on-site, as directed by SJRA. Each well was then sounded and the well depth recorded.



Post-Mechanical Inspections

Following the mechanical cleaning of the relief wells, TF performed the post-mechanical inspection of each relief well. This included sounding each well to determine the amount of debris collected in the bottom of each well, artesian flow tests, pump testing for specific capacity, and a video inspection. It was noted for each well that the mechanical cleaning made a significant visual difference in each well during the video inspection.

The specific capacity for each of the three wells was determined to be 0.35 gpm/ft, 0.71 gpm/ft, and 1.34 gpm/ft for wells RW-5, RW-10, and RW-18, respectively.

Chemical Treatment

A solution of Johnson Nuwell acid and acid dispersant was mixed in a 250 gallon tank. Per the spec, we first added 150 gallons of water to the tank, then added 12 gallons of Nuwell 120 liquid acid, followed by 4 gallons of Nuwell 310 acid dispersant. The solution was recirculated through the tank to ensure thorough mixing of the product.

The product was jetted into each relief well utilizing a high-pressure water pump, and high-pressure water supply hose fitted with a conical spray pattern tip. The injection was started at the base of each well. The hose was slowly raised, then lowered the entire length of the well, multiple times. During the injection, the water level in the wells remained below the top of the riser pipe extension. A digital pH meter was utilized to verify that at the end of the injection the pH of each was 3.0, or lower.

After the initial injection of the acid solution a double surge block was slowly raised and lowered in the well to blend the solution throughout the well column. After blending, the speed of the surging action was increased to approximately 3fps. Each well was surged for approximately 2 minutes per foot of screen and 1 minute per foot of casing. Upon completion of the surging action, the pH was again taken and product was re-introduced in the same manner as described above to ensure the well pH was maintained below 3.0.



Over the course of four days, the wells were intermittently agitated in manner described above, during normal working hours. In the original scope, it was planned to perform this work over three days, but also at night. In conjunction with SJRA and Freese and Nichols, it was determined to add a fourth day of agitation, and eliminate the nighttime agitation, due to safety concerns.

On the fourth day, each well was airlifted into a holding tank until reasonably free and clear of debris. Each well was then sounded and the well depth recorded. The holding tank was allowed to sit over the weekend to allow settlement before the wastewater was decanted from the sediment and discharged into the on-site ditch. Sediment was retained in the tank and was disposed of off-site after demobilization from the project.

Post-Maintenance Inspection

Following the chemical cleaning of the relief wells, TF performed the post-maintenance inspection of each relief well. This included sounding each well to determine the amount of debris collected in the bottom of each well, artesian flow tests, pump testing for specific capacity, and a video inspection. The only discrepancy we encountered is that the pump test for RW-10 had to be performed three times. During the first pump test, suction was lost at approximately 27'. The test was performed again using a flowrate of 10gpm. After speaking to SJRA, the test was performed a third time with the suction hose installed to 40' and the test was successfully performed at 20gpm.

The specific capacity for each of the three wells was determined to be 0.52 gpm/ft, 0.79 gpm/ft, and 1.41 gpm/ft for wells RW-5, RW-10, and RW-18, respectively.

Disinfection

A solution of sodium hypochlorite and Nuwell 410 Chlorine Enhancer was prepared to disinfect all each of the three wells to neutralize any remaining contaminants within the wells. The solution was prepared by first filling the holding tank with approximately 620 gallons of water. Next, 2.5 quarts of Nuwell 410 were added to the tank. Finally, one gallon of Sodium Hypochlorite 12.5% was added to the solution. A trash pump was utilized to recirculate the solution during the mixing process to ensure a homogenous blend throughout the solution. Prior to mixing the solution, it was noted that our quantities were generated using the documentation from the manufacturer and differed from those called for in the specifications. We were advised that our quantities were acceptable. Specifically, the amount of Sodium Hypochlorite was adjusted per the manufactures application guide to compensate for a 12.5% solution, vs the 5% solution in the specifications, and it was calculated to use 2.5 quarts of Nuwell 410 per the application guide versus the 4 gallons called for in the specification.



Starting at RW-18, the solution was jetted into the well starting at the bottom. The jetting tool was slowly raised as the solution was added. The water level in the riser extension always remained below the top of the extension indicating that the solution was penetrating into the formation surrounding the relief wells. An attempt was made to measure the chlorine concentration at the top of the well using standard pool test strips, however, they did not react to the water. TF consulted Johnson Well Products, and they determined that it was likely that our concentration was too high outside of the range for these strips. As the solution had been mixed to the manufacturers specification, we continued with the disinfection process. Once the solution had been jetted in, a surge block was placed into the well and the solution was blended for 5 minutes to ensure equal distribution of the disinfectant throughout the well. Following this, this procedure was repeated for wells RW-10, and finally RW-5.

Once the solution had been jetted into each relief well, TF began surging the wells in a cyclic manner using our double surge block, surging each for approximately 30 minutes, then repeating this at the subsequent well. After each surge period, the well was topped off with disinfectant solution. This process continued for the remainder of the day.

The following day, each well was surged a final time, then airlifted into a holding tank. Once the discharge water from all wells had been collected, a trash pump was plumbed to allow the water to be recirculated through the tank. Once recirculation had been established, Nuwell 500 Chlorout was added to neutralize the wastewater. Another attempt was made to utilize the test strips to determine the chlorine concentration of the water, but again they did not work. After consulting with SJRA, they contacted one of their personnel who used a colorimeter to measure the chlorine concentration. When a sample was taken from the tank, the meter could not read the sample due to the turbidity of the water. It was decided to allow the tank to settle overnight and retest the next day. Samples from each relief well were taken and tested, each testing well below the 2.0ppm threshold. The next day, another tank sample was taken and tested below the threshold. TF was given clearance to discharge the wastewater into the on-site ditch.

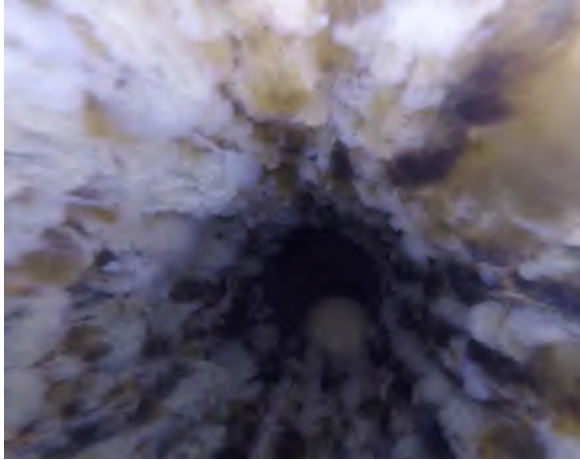
Demobilization

After the completion of the disinfection, TF reinstalled the check valves and covers at each relief well. A survey was made of the work areas to ensure that no trash or tooling was left. All of our equipment and materials were demobilized from the project site over the next two days. The only exceptions were the portable toilet and storage connex. These were picked up by the respective rental companies based on the first availability of their dispatch departments.

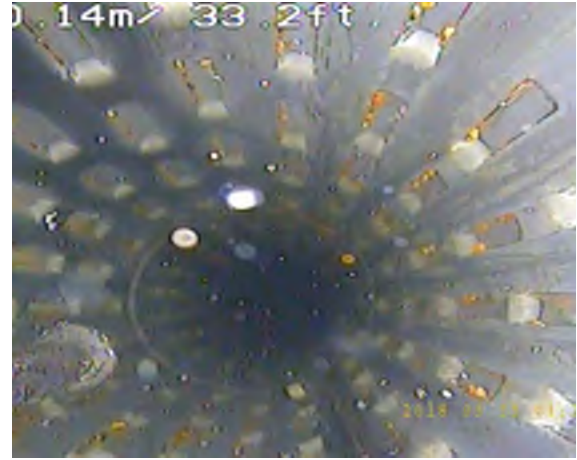
Recommendations

The following are some recommendations based on our experience during this project, and from our experience on other past well rehabilitation and maintenance projects:

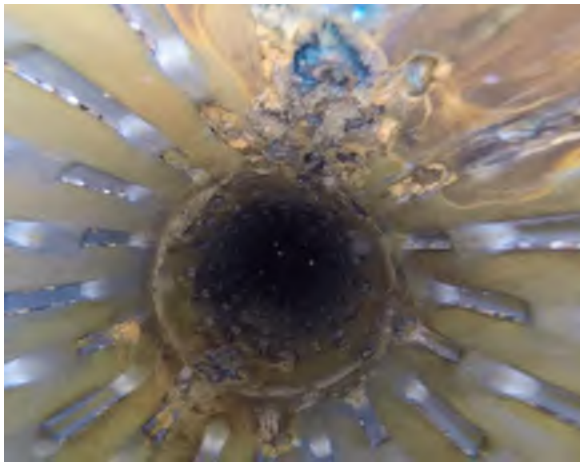
- Mechanical cleaning: We believe the method utilized on this project is an efficient means of dislodging loose deposits and scouring hardened deposits to allow for a more effective chemical treatment. If an annual maintenance program is adopted, this step may not be necessary after the initial treatment, as the deposits will not be as developed.
- Chemical treatment: We believe that this process could be modified to allow for a more cost-effective treatment of the well.
 - We have had effective results utilizing Cotey Chemical Corp's Liquid Acid Descaler product. This produce is easier to use (it is one-part) and more cost efficient.
 - The contact time/surging operations can be shortened to 24-48 hours and remain effective.
- Disinfection: The disinfection of the wells is valuable in that it can help to increase the longevity of the benefits of the treatment.



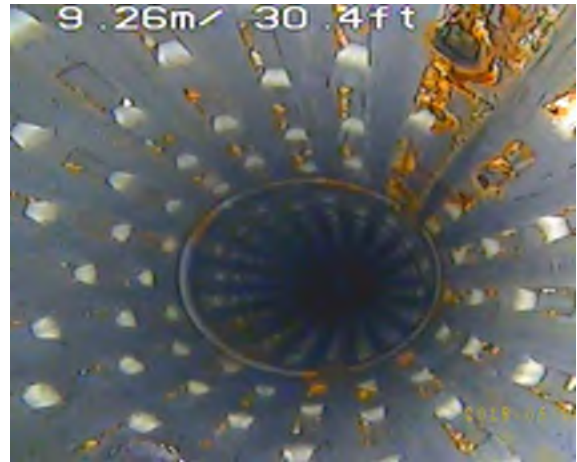
Relief Well 5: Pre-Maintenance



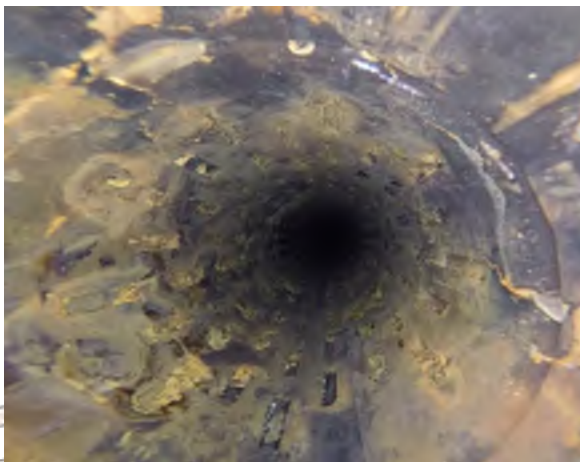
Relief Well 5: Post-Maintenance



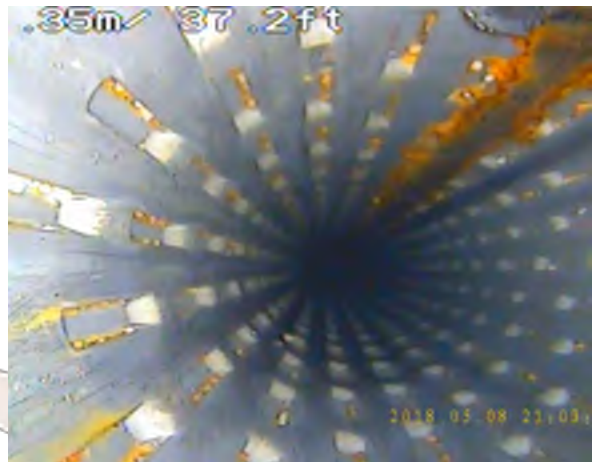
Relief Well 10: Pre-Maintenance (After Pump Test)



Relief Well 10: Post-Maintenance



Relief Well 18: Pre-Maintenance (After Pump Test)



Relief Well 18: Post-Maintenance



Getting Your Project On Firm Ground...
Before It Starts

Appendix 1: Premaintenance Inspection Reports



Job No: 480680

Well No: 5

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Pre-Maintenance

General Information

| | |
|----------------------|-----------|
| Date: | 4/18/2018 |
| Top of Manhole El: | 178.5 |
| Top of Casing El: | 172.32 |
| Top of Screen El: | 152.06 |
| Bottom of Screen El: | 132.13 |
| Total Depth: | 40.19 |
| Sounded Depth: | 40.68 |
| Sounded El: | 131.68 |

Artesian Flow Measurements

| | | | |
|------------------------------------|---------|-----------------------|--------|
| Start Time: | 11:12AM | Water Outside Casing: | 172.6 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 169.22 | 3:00 | 171.61 |
| 0:30 | 169.48 | 4:00 | 172.23 |
| 0:45 | 169.71 | 5:00 | 172.74 |
| 1:00 | 169.96 | 6:00 | 172.95 |
| 1:15 | 170.21 | 7:00 | 173.03 |
| 1:30 | 170.42 | 8:00 | 173.1 |
| 1:45 | 170.63 | 9:00 | 173.16 |
| 2:00 | 170.84 | 10:00 | 173.2 |

Pump Test

| | | | | | | | | | | | | |
|-------------|------------|------|-------|-------------|--------|-------|------------|---------|-------|------------|--|---------------|
| Target GPM: | 5 | | | Start Time: | 8:18AM | | | Static: | 174.3 | | | Recovery Data |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | | |
| 1:00 | 169.42 | 4.72 | 11:00 | 160.68 | 4.82 | 21:00 | 158.92 | 5.12 | 1:00 | 161.51 | | |
| 2:00 | 167.62 | 4.48 | 12:00 | 160.45 | 4.82 | 22:00 | 158.79 | 5.12 | 2:00 | 164 | | |
| 3:00 | 165.93 | 5.72 | 13:00 | 160.26 | 4.8 | 23:00 | 158.7 | 5.12 | 3:00 | 166.2 | | |
| 4:00 | 164.39 | 4.92 | 14:00 | 160.11 | 4.82 | 24:00 | 158.59 | 5.12 | 4:00 | 167.9 | | |
| 5:00 | 163.54 | 4.88 | 15:00 | 159.86 | 4.8 | 25:00 | 158.52 | 5.1 | 5:00 | 169.32 | | |
| 6:00 | 162.79 | 4.88 | 16:00 | 159.85 | 4.8 | 26:00 | 158.46 | 5.12 | 6:00 | 170.39 | | |
| 7:00 | 162.15 | 4.86 | 17:00 | 159.78 | 5.1 | 27:00 | 158.41 | 5.12 | 7:00 | 171.36 | | |
| 8:00 | 161.66 | 4.84 | 18:00 | 159.47 | 5.14 | 28:00 | 158.36 | 5.12 | 8:00 | 172.09 | | |
| 9:00 | 161.28 | 4.84 | 19:00 | 159.28 | 5.14 | 29:00 | 158.33 | 5.1 | 9:00 | 172.71 | | |
| 10:00 | 160.95 | 4.84 | 20:00 | 159.09 | 5.14 | 30:00 | 158.29 | 5.1 | 10:00 | 173.15 | | |

Drawdown: 16.01 GPM: 5.10 Specific Capacity: 0.318551 gpm/ft

Notes:

Bailed 3 bailers of water prior to start of artesian flow measurements. Performed initial pump test at 10gpm, but well ran dry. Reduced to 5gpm test.



Job No: 480680

Well No: 10

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Pre-Maintenance

General Information

| | |
|----------------------|-----------|
| Date: | 4/18/2018 |
| Top of Manhole El: | 178.35 |
| Top of Casing El: | 172.27 |
| Top of Screen El: | 150.12 |
| Bottom of Screen El: | 130.12 |
| Total Depth: | 42.15 |
| Sounded Depth(TOM): | 42.82 |
| Sounded El: | 130.23 |

Artesian Flow Measurements

| | | | |
|------------------------------------|--------|-----------------------|-------|
| Start Time: | 1:23PM | Water Outside Casing: | 172.9 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 172.93 | 3:00 | |
| 0:30 | 173.21 | 4:00 | |
| 0:45 | 173.46 | 5:00 | |
| 1:00 | 173.67 | 6:00 | |
| 1:15 | 173.82 | 7:00 | |
| 1:30 | 173.99 | 8:00 | |
| 1:45 | 174.15 | 9:00 | |
| 2:00 | 174.25 | 10:00 | |

Pump Test

| | | | | | | | | | | | |
|--------------------|-------------------|------------|-------------|--------------------|------------|-------------|-------------------|----------------|-------------|-------------------|----------------------|
| Target GPM: | 20 | | | Start Time: | 1:58PM | | | Static: | 174.84 | | Recovery Data |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | |
| 1:00 | 163.65 | 19.75 | 11:00 | 152.33 | 15.76 | 21:00 | 151.9 | 16.57 | 1:00 | 158.75 | |
| 2:00 | 158.86 | 19.75 | 12:00 | 152.35 | 16.84 | 22:00 | 151.84 | 16.63 | 2:00 | 163.83 | |
| 3:00 | 155.78 | 18.78 | 13:00 | 152.3 | 17 | 23:00 | 151.83 | 16.59 | 3:00 | 167.25 | |
| 4:00 | 154.43 | 16.92 | 14:00 | 152.49 | 16.98 | 24:00 | 151.83 | 16.72 | 4:00 | 168.95 | |
| 5:00 | 153.24 | 19.23 | 15:00 | 152.2 | 17 | 25:00 | 151.82 | 16.82 | 5:00 | 170.25 | |
| 6:00 | 152.28 | 18.34 | 16:00 | 152.15 | 18.18 | 26:00 | 151.85 | 17.07 | 6:00 | 171.38 | |
| 7:00 | 152.25 | 17.82 | 17:00 | 151.91 | 16.9 | 27:00 | 151.78 | 16.92 | 7:00 | 171.92 | |
| 8:00 | 152.27 | 15.98 | 18:00 | 151.88 | 16.72 | 28:00 | 151.82 | 16.59 | 8:00 | 172.44 | |
| 9:00 | 152.52 | 18.11 | 19:00 | 151.9 | 16.7 | 29:00 | 151.77 | 17 | 9:00 | 172.77 | |
| 10:00 | 152.23 | 17.65 | 20:00 | 151.95 | 16.88 | 30:00 | 151.75 | 16.55 | 10:00 | 173.05 | |

Drawdown: 23.09 GPM 16.55 Specific Capacity: 0.716761 gpm/ft

Notes:

Bailed 3 bailers of water for artesian flow test.



Job No: 480680

Well No: 18

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Pre-Maintenance

General Information

| | |
|----------------------|-----------|
| Date: | 4/18/2018 |
| Top of Manhole El: | 178.55 |
| Top of Casing El: | 172.44 |
| Top of Screen El: | 154.08 |
| Bottom of Screen El: | 122.13 |
| Total Depth: | 50.31 |
| Sounded Depth(TOM): | 50.34 |
| Sounded El: | 122.1 |

Artesian Flow Measurements

| | | | |
|------------------------------------|--------|-----------------------|--------|
| Start Time: | 3:17PM | Water Outside Casing: | 172.57 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 173.51 | 3:00 | 175.42 |
| 0:30 | 173.98 | 4:00 | 175.53 |
| 0:45 | 174.29 | 5:00 | 175.62 |
| 1:00 | 174.67 | 6:00 | |
| 1:15 | 174.85 | 7:00 | |
| 1:30 | 174.94 | 8:00 | |
| 1:45 | 175.06 | 9:00 | |
| 2:00 | 175.16 | 10:00 | |

Pump Test

| | | | | | | | | | | | |
|--------------------|-------------------|------------|-------------|--------------------|------------|-------------|-------------------|----------------|-------------|-------------------|----------------------|
| Target GPM: | 20 | | | Start Time: | 3:35PM | | | Static: | 175.93 | | Recovery Data |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | |
| 1:00 | 172.89 | 3.54 | 11:00 | 160.01 | 20.76 | 21:00 | 159.22 | 20.62 | 1:00 | 167.8 | |
| 2:00 | 167.19 | 21.43 | 12:00 | 159.86 | 20.72 | 22:00 | 159.11 | 20.58 | 2:00 | 170.96 | |
| 3:00 | 164.1 | 20.12 | 13:00 | 159.76 | 20.66 | 23:00 | 159.1 | 20.58 | 3:00 | 172.37 | |
| 4:00 | 162.82 | 19.98 | 14:00 | 159.7 | 20.66 | 24:00 | 159.09 | 20.56 | 4:00 | 173.21 | |
| 5:00 | 162.17 | 19.94 | 15:00 | 159.61 | 20.62 | 25:00 | 159.04 | 20.56 | 5:00 | 173.63 | |
| 6:00 | 161.74 | 19.88 | 16:00 | 159.56 | 20.68 | 26:00 | 159 | 20.54 | 6:00 | 173.93 | |
| 7:00 | 160.92 | 20.79 | 17:00 | 159.43 | 20.66 | 27:00 | 158.93 | 20.54 | 7:00 | 174.17 | |
| 8:00 | 160.51 | 20.79 | 18:00 | 159.36 | 20.72 | 28:00 | 158.92 | 20.54 | 8:00 | 174.41 | |
| 9:00 | 160.36 | 20.66 | 19:00 | 159.32 | 20.64 | 29:00 | 158.89 | 20.54 | 9:00 | 174.48 | |
| 10:00 | 160.16 | 20.72 | 20:00 | 158.38 | 20.64 | 30:00 | 158.84 | 20.52 | 10:00 | 174.63 | |

Drawdown: 17.09 GPM: 20.52 Specific Capacity: 1.200702 gpm/ft

Notes:



Getting Your Project On Firm Ground...
Before It Starts

Appendix 2: Post-Mechanical Inspection Reports



Job No: 480680

Well No: 5

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Post-Mechanical

General Information

| | |
|----------------------|-----------|
| Date: | 4/23/2018 |
| Top of Manhole El: | 178.5 |
| Top of Casing El: | 172.32 |
| Top of Screen El: | 152.06 |
| Bottom of Screen El: | 132.13 |
| Total Depth: | 40.19 |
| Sounded Depth(TOM): | 40.69 |
| Sounded El: | 131.67 |

Artesian Flow Measurements

| | | | |
|------------------------------------|--------|-----------------------|--------|
| Start Time: | 8:54AM | Water Outside Casing: | 172.6 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 173.1 | 5:00 | 173.59 |
| 0:30 | 173.22 | 6:00 | 173.6 |
| 0:45 | 173.24 | 7:00 | 173.61 |
| 1:00 | 173.31 | 8:00 | 173.61 |
| 2:00 | 173.42 | 9:00 | 173.62 |
| 3:00 | 173.49 | 10:00 | 173.63 |
| 4:00 | 173.54 | | |
| 5:00 | 173.57 | | |

Pump Test

| Target GPM: 5 | | | Start Time: 9:48AM | | | Static: 174.2 | | | Recovery Data | |
|---------------|------------|-------|--------------------|------------|------|---------------|------------|------|---------------|------------|
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel |
| 1:00 | 169.74 | 4.88 | 11:00 | 161.05 | 5.1 | 21:00 | 159.78 | 5.04 | 1:00 | |
| 2:00 | 168 | 4.967 | 12:00 | 160.7 | 5.08 | 22:00 | 159.67 | 5.06 | 2:00 | |
| 3:00 | 166.57 | 4.92 | 13:00 | 160.58 | 5.06 | 23:00 | 159.63 | 5.04 | 3:00 | |
| 4:00 | 165.32 | 4.88 | 14:00 | 160.37 | 5.08 | 24:00 | 159.69 | 5.04 | 4:00 | |
| 5:00 | 164.37 | 4.88 | 15:00 | 160.17 | 5.14 | 25:00 | 159.67 | 5.1 | 5:00 | |
| 6:00 | 163.48 | 4.23 | 16:00 | 160.07 | 5.16 | 26:00 | 159.62 | 5.14 | 6:00 | |
| 7:00 | 162.8 | 5.1 | 17:00 | 159.92 | 5.16 | 27:00 | 159.54 | 5.14 | 7:00 | |
| 8:00 | 162.26 | 5.1 | 18:00 | 159.88 | 5.06 | 28:00 | 159.52 | 5.16 | 8:00 | |
| 9:00 | 161.83 | 5.1 | 19:00 | 159.8 | 4.92 | 29:00 | 159.6 | 5.14 | 9:00 | |
| 10:00 | 161.37 | 5.1 | 20:00 | 159.91 | 5.04 | 30:00 | 159.56 | 5.14 | 10:00 | |

Drawdown: 14.64 GPM: 5.14 Specific Capacity: 0.351093 gpm/ft

Notes:

pH: 7.83



Job No: 480680

Well No: 10

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Post-Mechanical

General Information

| | |
|----------------------|-----------|
| Date: | 4/23/2018 |
| Top of Manhole El: | 178.35 |
| Top of Casing El: | 172.27 |
| Top of Screen El: | 150.12 |
| Bottom of Screen El: | 130.12 |
| Total Depth: | 42.15 |
| Sounded Depth(TOM): | 42.14 |
| Sounded El: | 130.13 |

Artesian Flow Measurements

| | | | |
|------------------------------------|---------|-----------------------|--------|
| Start Time: | 11:15am | Water Outside Casing: | 173.49 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 173.63 | 6:00 | 175.19 |
| 0:30 | 173.89 | 7:00 | 175.25 |
| 0:45 | 174.13 | 8:00 | 175.27 |
| 1:00 | 174.55 | 9:00 | 175.28 |
| 2:00 | 174.76 | 10:00 | 175.32 |
| 3:00 | 174.93 | 11:00 | 175.34 |
| 4:00 | 174.94 | 12:00 | 175.34 |
| 5:00 | 175.13 | 13:00 | 175.34 |

Pump Test

| | | | | | | | |
|--------------------|-------------------|--------------------|-------------|-------------------|------------|----------------------|-------------------|
| Target GPM: | 20 | Start Time: | 11:40AM | Static: | 175.06 | Recovery Data | |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel |
| 1:00 | 170.42 | 20 | 11:00 | 150.29 | 19.26 | 21:00 | 148.94 |
| 2:00 | 167.03 | 20 | 12:00 | 150 | 18.54 | 22:00 | 148.99 |
| 3:00 | 164.54 | 18.5 | 13:00 | 149.77 | 18.78 | 23:00 | 149 |
| 4:00 | 158.96 | 19.88 | 14:00 | 149.51 | 19.02 | 24:00 | 149.01 |
| 5:00 | 157.06 | 19.85 | 15:00 | 149.26 | 19.21 | 25:00 | 149.02 |
| 6:00 | 158.58 | 19.85 | 16:00 | 149.16 | 18.69 | 26:00 | 149.06 |
| 7:00 | 157.63 | 20.1 | 17:00 | 149.09 | 18.69 | 27:00 | 149.06 |
| 8:00 | 153.99 | 20.16 | 18:00 | 149.06 | 19.02 | 28:00 | 149 |
| 9:00 | 151.97 | 19.62 | 19:00 | 148.95 | 18.67 | 29:00 | 149.02 |
| 10:00 | 150.91 | 19.42 | 20:00 | 148.9 | 18.69 | 30:00 | 148.95 |

Drawdown: 26.11 GPM: 18.67 Specific Capacity: 0.715052 gpm/ft

Notes:

pH 8.3



Job No: 480680

Well No: 18

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Post-Mechanical

General Information

| | |
|----------------------|-----------|
| Date: | 4/23/2018 |
| Top of Manhole El: | 178.55 |
| Top of Casing El: | 172.44 |
| Top of Screen El: | 154.08 |
| Bottom of Screen El: | 122.13 |
| Total Depth: | 50.31 |
| Sounded Depth(TOM): | 50.34 |
| Sounded El: | 122.1 |

Artesian Flow Measurements

| | | | |
|------------------------------------|--------|-----------------------|--------|
| Start Time: | 1:52PM | Water Outside Casing: | 173.2 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 173.74 | 6:00 | 175.25 |
| 0:30 | 173.84 | 7:00 | 175.28 |
| 0:45 | 174.2 | 8:00 | 175.31 |
| 1:00 | 174.36 | 9:00 | 175.32 |
| 2:00 | 174.85 | 10:00 | 175.35 |
| 3:00 | 175.04 | 11:00 | 175.35 |
| 4:00 | 175.17 | 12:00 | 175.39 |
| 5:00 | 175.23 | 13:00 | 175.39 |

Pump Test

| | | | | | | | | | | | |
|--------------------|-------------------|------------|-------------|--------------------|------------|-------------|-------------------|----------------|-------------|-------------------|----------------------|
| Target GPM: | 10 | | | Start Time: | 2:26PM | | | Static: | 175.66 | | Recovery Data |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | |
| 1:00 | 169.76 | 7.18 | 11:00 | 168.64 | 10.77 | 21:00 | 164.91 | 14.5 | 1:00 | 170.58 | |
| 2:00 | 170.59 | 8.06 | 12:00 | 168.46 | 10.95 | 22:00 | -1275.59 | 14.55 | 2:00 | 173.04 | |
| 3:00 | 171.89 | 4.28 | 13:00 | 167.61 | 12.88 | 23:00 | 164.83 | 14.58 | 3:00 | 173.77 | |
| 4:00 | 172.52 | 4.8 | 14:00 | 166.53 | 13.48 | 24:00 | 164.79 | 14.62 | 4:00 | 174.13 | |
| 5:00 | 172.77 | 4.8 | 15:00 | 165.93 | 13.85 | 25:00 | 164.7 | 14.71 | 5:00 | 174.47 | |
| 6:00 | 172.86 | 4.85 | 16:00 | 165.56 | 14.12 | 26:00 | 164.69 | 14.72 | 6:00 | 174.69 | |
| 7:00 | 172.85 | 10.83 | 17:00 | 165.29 | 14.23 | 27:00 | 164.61 | 14.8 | 7:00 | 174.81 | |
| 8:00 | 170.54 | 11.1 | 18:00 | 165.18 | 14.31 | 28:00 | 164.59 | 14.82 | 8:00 | 174.88 | |
| 9:00 | 169.38 | 11.02 | 19:00 | 165.1 | 14.48 | 29:00 | 164.5 | 14.91 | 9:00 | 174.96 | |
| 10:00 | 168.91 | 11.02 | 20:00 | 164.93 | 14.48 | 30:00 | 164.51 | 14.9 | 10:00 | 175.06 | |

Drawdown: 11.15 GPM: 14.90 Specific Capacity: 1.336323 gpm/ft

Notes:



Getting Your Project On Firm Ground...
Before It Starts

Appendix 3: Post-Maintenance Inspection Reports



Job No: 480680

Well No: 5

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Post-Maintenance

General Information

| | |
|----------------------|----------|
| Date: | 5/7/2018 |
| Top of Manhole El: | 178.5 |
| Top of Casing El: | 172.32 |
| Top of Screen El: | 152.06 |
| Bottom of Screen El: | 132.13 |
| Total Depth: | 40.19 |
| Sounded Depth(TOM): | 40.71 |
| Sounded El: | 131.64 |

Artesian Flow Measurements

| | | | |
|------------------------------------|---------------|-----------------------|--------|
| Start Time: | 5/9/18 1:03pm | Water Outside Casing: | 172.63 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 172.82 | 3:00 | 173.61 |
| 0:30 | 172.91 | 4:00 | 173.73 |
| 0:45 | 173 | 5:00 | 173.79 |
| 1:00 | 173.05 | 6:00 | 173.8 |
| 1:15 | 173.08 | 7:00 | 173.8 |
| 1:30 | 173.15 | 8:00 | |
| 1:45 | 173.19 | 9:00 | |
| 2:00 | 173.34 | 10:00 | |

Pump Test

| Target GPM: 5 | | | Start Time: 5:36PM | | | Static: 174.37 | | | Recovery Data | |
|---------------|------------|------|--------------------|------------|------|----------------|------------|------|---------------|------------|
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel |
| 1:00 | 170 | 5.2 | 11:00 | 164.07 | 5.33 | 21:00 | 163.77 | 5.29 | 1:00 | |
| 2:00 | 168.65 | 5.16 | 12:00 | 164.05 | 5.33 | 22:00 | 163.71 | 5.29 | 2:00 | |
| 3:00 | 167.79 | 5.12 | 13:00 | 163.97 | 5.33 | 23:00 | 163.66 | 5.29 | 3:00 | |
| 4:00 | 166.97 | 5.06 | 14:00 | 163.92 | 5.39 | 24:00 | 163.61 | 5.33 | 4:00 | |
| 5:00 | 166.32 | 5.1 | 15:00 | 163.88 | 5.31 | 25:00 | 163.57 | 5.4 | 5:00 | |
| 6:00 | 165.09 | 5.36 | 16:00 | 163.86 | 5.39 | 26:00 | 163.41 | 5.52 | 6:00 | |
| 7:00 | 164.77 | 5.38 | 17:00 | 163.81 | 5.31 | 27:00 | 163.31 | 5.78 | 7:00 | |
| 8:00 | 164.49 | 5.36 | 18:00 | 163.78 | 5.29 | 28:00 | 163.17 | 5.97 | 8:00 | |
| 9:00 | 164.31 | 5.33 | 19:00 | 163.77 | 5.31 | 29:00 | 163 | 5.93 | 9:00 | |
| 10:00 | 164.12 | 5.36 | 20:00 | 163.77 | 5.29 | 30:00 | 163 | 5.93 | 10:00 | |

Drawdown: 11.37 GPM 5.93 Specific Capacity: 0.521548 gpm/ft

Notes:



Job No: 480680

Well No: 10

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Post-Maintenance

General Information

| | |
|----------------------|----------|
| Date: | 5/7/2018 |
| Top of Manhole El: | 178.35 |
| Top of Casing El: | 172.27 |
| Top of Screen El: | 150.12 |
| Bottom of Screen El: | 130.12 |
| Total Depth: | 42.15 |
| Sounded Depth: | 42.51 |
| Sounded El: | 128.94 |

Artesian Flow Measurements

| | | | |
|------------------------------------|--------|-----------------------|--------|
| Start Time: | 1:20pm | Water Outside Casing: | 173.6 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 179.17 | 3:00 | 174.47 |
| 0:30 | 173.34 | 4:00 | 174.58 |
| 0:45 | 173.72 | 5:00 | 174.67 |
| 1:00 | 173.89 | 6:00 | 174.72 |
| 1:15 | 173.96 | 7:00 | 174.72 |
| 1:30 | 174.05 | 8:00 | |
| 1:45 | 174.21 | 9:00 | |
| 2:00 | 174.29 | 10:00 | |

Pump Test

| | | | | | | | | | | | |
|--------------------|-------------------|------------|-------------|--------------------|------------|-------------|-------------------|----------------|-------------|-------------------|----------------------|
| Target GPM: | 20 | | | Start Time: | 10:30AM | | | Static: | 174.28 | | Recovery Data |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | |
| 1:00 | 163.7 | 18.71 | 11:00 | 152.41 | 18.22 | 21:00 | 151.89 | 17.8 | 1:00 | 160.18 | |
| 2:00 | 158.86 | 20.22 | 12:00 | 152.27 | 18.28 | 22:00 | 151.81 | 17.94 | 2:00 | 164.92 | |
| 3:00 | 156.05 | 19.94 | 13:00 | 152.25 | 18.11 | 23:00 | 151.79 | 17.88 | 3:00 | 168.4 | |
| 4:00 | 154.72 | 19.52 | 14:00 | 152.2 | 18 | 24:00 | 151.78 | 17.8 | 4:00 | 169.4 | |
| 5:00 | 153.97 | 19.06 | 15:00 | 152.18 | 18.07 | 25:00 | 151.8 | 17.78 | 5:00 | 170.51 | |
| 6:00 | 153.55 | 18.9 | 16:00 | 152.12 | 18.02 | 26:00 | 151.77 | 17.78 | 6:00 | 171.28 | |
| 7:00 | 153 | 18.79 | 17:00 | 152.06 | 17.78 | 27:00 | 151.77 | 17.8 | 7:00 | 171.92 | |
| 8:00 | 152.76 | 18.54 | 18:00 | 152.08 | 18 | 28:00 | 151.69 | 17.8 | 8:00 | 172.43 | |
| 9:00 | 152.67 | 18.6 | 19:00 | 151.99 | 18.06 | 29:00 | 151.71 | 17.8 | 9:00 | 172.92 | |
| 10:00 | 152.48 | 18.38 | 20:00 | 151.91 | 17.96 | 30:00 | 151.68 | 17.86 | 10:00 | 173.15 | |

Drawdown: 22.6 GPM: 17.86 Specific Capacity: 0.790265 gpm/ft

Notes:

First two pump tests ran dry (max drawdown to 27.68'). Reran test at 10 gpm. Reran again at 20gpm with suction hose down to 40' and were able to complete. We believe the suction hose broke suction at 27' on first two tests.



Job No: 480680

Well No: 18

Project: Lake Conroe Dam Relief Well Rehab Pilot

Client: San Jacinto River Authority

Relief Well Inspection Report

Post-Maintenance

General Information

| | |
|----------------------|----------|
| Date: | 5/7/2018 |
| Top of Manhole El: | 178.55 |
| Top of Casing El: | 172.44 |
| Top of Screen El: | 154.08 |
| Bottom of Screen El: | 122.13 |
| Total Depth: | 50.31 |
| Sounded Depth(TOM): | 50.22 |
| Sounded El: | 122.22 |

Artesian Flow Measurements

| | | | |
|------------------------------------|---------|-----------------------|--------|
| Start Time: | 10:15AM | Water Outside Casing: | 173.28 |
| Inside Casing Readings (EL) | | | |
| 0:15 | 174.27 | 3:00 | 175.06 |
| 0:30 | 174.49 | 4:00 | 175.07 |
| 0:45 | 174.67 | 5:00 | |
| 1:00 | 174.78 | 6:00 | |
| 1:15 | 174.87 | 7:00 | |
| 1:30 | 174.94 | 8:00 | |
| 1:45 | 174.97 | 9:00 | |
| 2:00 | 175.02 | 10:00 | |

Pump Test

| | | | | | | | | | | | |
|-------------|------------|-------|-------|-------------|---------|-------|------------|---------|--------|---------------|--|
| Target GPM: | 20 | | | Start Time: | 10:55AM | | | Static: | 175.31 | Recovery Data | |
| Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | GPM | Time | Waterlevel | |
| 1:00 | 166.86 | 20.04 | 11:00 | 161.89 | 20.6 | 21:00 | 161.31 | 20.42 | 1:00 | | |
| 2:00 | 164.89 | 22.4 | 12:00 | 161.61 | 20.56 | 22:00 | 161.25 | 20.35 | 2:00 | | |
| 3:00 | 163.89 | 20.68 | 13:00 | 161.775 | 20.385 | 23:00 | 161.13 | 20.25 | 3:00 | | |
| 4:00 | 163.37 | 20.64 | 14:00 | 161.68 | 20.5 | 24:00 | 161.11 | 20.46 | 4:00 | | |
| 5:00 | 163.21 | 20.62 | 15:00 | 161.61 | 20.44 | 25:00 | 161.1 | 20.33 | 5:00 | | |
| 6:00 | 162.71 | 20.58 | 16:00 | 161.59 | 20.5 | 26:00 | 161.06 | 20.24 | 6:00 | | |
| 7:00 | 163.32 | 20.56 | 17:00 | 161.52 | 20.4 | 27:00 | 161.11 | 20.18 | 7:00 | | |
| 8:00 | 162.3 | 20.54 | 18:00 | 161.46 | 20.4 | 28:00 | 161.11 | 20.1 | 8:00 | | |
| 9:00 | 162.18 | 20.52 | 19:00 | 161.39 | 20.44 | 29:00 | 161.09 | 20.16 | 9:00 | | |
| 10:00 | 161.98 | 20.52 | 20:00 | 161.18 | 20.44 | 30:00 | 161.1 | 20.1 | 10:00 | | |

Drawdown: 14.21 GPM 20.10 Specific Capacity: 1.414497 gpm/ft

Notes:



Getting Your Project On Firm Ground...
Before It Starts

Appendix 4: Relief Well Maintenance Logs



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-5

| Date | Time | Activity |
|-----------|---------|---------------------------------------|
| 4/18/2018 | 10:30am | started video inspection |
| 4/18/2018 | 10:38am | sound well from top of manhole 46.82' |
| 4/18/2018 | 11:10am | started flow test |
| 4/18/2018 | 11:32am | restarted flow test |
| 4/18/2018 | 11:45am | video inspection |
| 4/19/2018 | 10:38am | try to seal extentsion |
| 4/19/2018 | 11:12am | started flow test |
| 4/19/2018 | 11:23am | end of flow test |
| 4/19/2018 | 12:15pm | pump test set-up |
| 4/19/2018 | 12:26pm | Stop pump test, ran dry |
| 4/20/2018 | 8:18am | start pump test 2 at 5gpm |
| 4/20/2018 | 8:48am | end pump test |
| 4/20/2018 | 11:52am | set-up decon equipment |
| 4/20/2018 | 11:55am | started brushing well |
| 4/20/2018 | 12:57pm | end brushing of well |
| 4/20/2018 | 2:50pm | began air lift |
| 4/20/2018 | 3:10pm | stop air lift |
| 4/23/2018 | 8:54am | started artisian flow test |
| 4/23/2018 | 9:15am | end of artisian flow test |
| 4/23/2018 | 9:48am | pump test |
| 4/23/2018 | 10:30am | ph= 7.83 |
| 4/30/2018 | 5:00pm | induced product to well |
| 5/1/2018 | 7:30am | jetted well with product |
| 5/1/2018 | 9:30am | re-jetted well with product |
| 5/2/2018 | 10:10am | induce product |
| 5/2/2018 | 10:30am | ph level 2.71 |
| 5/2/2018 | 1:08pm | began surge |
| 5/2/2018 | 1:57pm | end surge |
| 5/2/2018 | 2:24pm | ph= 7.23 |
| 5/2/2018 | 2:40pm | ph= 2.97 |
| 5/2/2018 | 2:50pm | began brush |
| 5/2/2018 | 4:15pm | end brush |
| 5/2/2018 | 4:17 PM | ph= 5.70 |
| 5/3/2018 | 1:50pm | ph= 2.45 |
| 5/3/2018 | 2:00pm | began surge at screen |
| 5/3/2018 | 2:15pm | end surge |
| 5/3/2018 | 2:18pm | ph=3.75 |
| 5/3/2018 | 3:40pm | began brushing at the screen |
| 5/3/2018 | 4:00pm | end brushing |
| 5/3/2018 | 6:13pm | ph=4.65 |
| 5/3/2018 | 6:21pm | induced product |
| 5/3/2018 | 6:26pm | ph=3.37 |



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-5

| Date | Time | Activity |
|-----------|---------|--|
| 5/3/2018 | 6:27pm | induce product |
| 5/3/2018 | 6:32pm | 3.31 (calibration off) |
| 5/3/2018 | 6:36pm | began surge |
| 5/3/2018 | 7:00pm | end surge |
| 5/4/2018 | 8:30am | ph=4.22 |
| 5/4/2018 | 9:30am | airlift into tank |
| 5/4/2018 | 10:34am | end airlift |
| 5/4/2018 | 10:40am | ph= 6.6 |
| 5/7/2018 | 5:15PM | perform artesian flow test |
| 5/7/2018 | 5:22pm | end flow test |
| 5/7/2018 | 5:36pm | pump test start time |
| 5/7/2018 | 6:10pm | test end time |
| 5/8/2018 | 11:05am | induce product |
| 5/8/2018 | 11.35am | end of inducing product |
| 5/8/2018 | 12:30pm | began to agitate in screen |
| 5/8/2018 | 12:41pm | end of agitation |
| 5/8/2018 | 2:35pm | began swabbing at screen (5' for 5min.0 |
| 5/8/2018 | 3:00pm | end of swabbing |
| 5/8/2018 | 3:05pm | top off with product |
| 5/8/2018 | 4:50pm | began swabbing at screen (5' for 5min.0 |
| 5/8/2018 | 5:10pm | enf of swabbing |
| 5/8/2018 | 5:13pm | top of with product |
| 5/9/2018 | 10:13am | swab well |
| 5/9/2018 | 10:45am | end swabbing |
| 5/9/2018 | 11:13am | airlift into tank |
| 5/9/2018 | 4:28pm | mixed chlorout into tank (approx 2lbs) |
| 5/10/2018 | 8:00am | tested for chlorine levels in 1000 gallon tank (test strips not working) |
| 5/10/2018 | 8:30am | let water settle in 2000 gal., tank for discharge |
| 5/11/2018 | 10:00am | Shane tested, chlorine below threshold, discharge water into ditch as directed |



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-10

| Date | Time | Activity |
|-----------|-----------|---|
| 4/18/2018 | 12:50pm | opened manhole, took photographs. T.O.M.to static 5.62 |
| 4/18/2018 | 12:55pm | removed check valve |
| 4/18/2018 | 1:03pm | sounded well- 48.115'=130.24 |
| 4/18/2018 | 1:15pm | started flow test. Top of riser to static 6.23'. Bailed 3x. Static recharged @5.30'per chuck FNI. |
| 4/18/2018 | 1:23pm | go another round. 15 second intervals to 2 minutes |
| 4/18/2018 | 1:58pm | started pump test |
| 4/18/2018 | 2:28pm | ended pump test. Begin recovery recharge |
| 4/18/2018 | 2:40pm | pump well to clear well from slime for video |
| 4/18/2018 | 2:43pm | stop pumping |
| 4/18/2018 | 2:45pm | replace check valve/manhole cover |
| 4/19/2018 | 9:45am | began video inspection |
| 4/19/2018 | 9:55am | end video inspection |
| 4/19/2018 | 3:31pm | no airlift before brushing well |
| 4/20/2018 | 9:19am | set-up brushing and disinfected brush |
| 4/20/2018 | 9:29am | started brushing 5' for 5 mins. |
| 4/20/2018 | 10:40am | end brushing |
| 4/20/2018 | 11:35am | post brush sounding T.O.M. to B.O.M. 48.15' |
| 4/20/2018 | 1:34pm | started airlift |
| 4/20/2018 | 1:53pm | stop airlift. Per chuck, bail for well recovery and airlift more. |
| 4/20/2018 | 2:10pm | resume airlift |
| 4/20/2018 | 2:17pm | stop airlift |
| 4/23/2018 | 11:00am | post mechanical test T.O.M.- 5.64'; D.T.W.- 48.22. static 3.89' |
| 4/23/2018 | 11:15am | started artisan flow test |
| 4/23/2018 | 11:20am | end artisan flow test |
| 4/23/2018 | 11:40am | started pump test |
| 4/23/2018 | 11:47am | end pump test |
| 4/23/2018 | 11:48am | moved down to 10 gpm for pump test from 20 gpm back to 20 gpm. |
| 4/23/2018 | 12:10pm | start pump test |
| 4/23/2018 | 12:30pm | end pump test |
| 4/30/2018 | 6:00pm | induced product into well |
| 5/1/2018 | 8:30am | jetted well with product |
| 5/1/2018 | 8:45am | end of jetting product |
| 5/1/2018 | 9:00am | started surging |
| 5/1/2018 | 9:23am | end of surge |
| 5/1/2018 | 11:00am | added more product to well |
| 5/2/2018 | 11:12am | began to surge well |
| 5/2/2018 | 12:00noon | end of surge |
| 5/2/2018 | 4:35pm | ph- 6.7 |
| 5/2/2018 | 4:39pm | induce product |
| 5/2/2018 | 4:44pm | end of inducing product |
| 5/2/2018 | 4:47pm | started brushing |
| 5/2/2018 | 5:39pm | end of brushing |
| 5/2/2018 | 5:41pm | induce product |
| 5/2/2018 | 5:49pm | end of inducing products |



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-10

| Date | Time | Activity |
|-----------|---------|--|
| 5/2/2018 | 5:50pm | ph=2.78 |
| 5/3/2018 | 1:00pm | induce product ph=6.61 before; 2.1 after |
| 5/3/2018 | 1:14pm | begin surge at screen 15 mins, |
| 5/3/2018 | 1:30pm | end surge |
| 5/3/2018 | 3:04pm | ph=2.83 |
| 5/3/2018 | 3:11pm | begin brushing@screen for 20 mins. |
| 5/3/2018 | 3:32pm | end brush |
| 5/3/2018 | 3:35pm | ph=6.07 |
| 5/3/2018 | 5:26pm | ph=6.14 |
| 5/3/2018 | 5:29pm | induce product |
| 5/3/2018 | 5:33pm | ph=2.58 |
| 5/3/2018 | 5:38pm | begin surge @ screen for 20 mins. |
| 5/3/2018 | 6:04pm | end surge ph= 6.38 |
| 5/4/2018 | 10:48am | ph=6.9 |
| 5/4/2018 | 10:50am | begin airlift |
| 5/4/2018 | 11:24am | end airlift |
| 5/7/2018 | 1:20pm | Begin artesian flow test |
| 5/7/2018 | 1:35pm | Begin pump test |
| 5/7/2018 | 1:45pm | pump test ended, lost prime at 27.69' |
| 5/8/2018 | 9:08am | video inspection |
| 5/8/2018 | 9:36am | induce product |
| 5/8/2018 | 10:23am | end of inducing product |
| 5/8/2018 | 10:29am | begin swabbing |
| 5/8/2018 | 10:45am | end of swabbing |
| 5/8/2018 | 1:54pm | begin to swab @ screen |
| 5/8/2018 | 2:24pm | end of swabbing |
| 5/8/2018 | 4:10pm | begin swabbing @screen 5 for 5mins. |
| 5/8/2018 | 4:35pm | end of swabbing |
| 5/8/2018 | 4:40pm | top off with product |
| 5/9/2018 | 9:32am | swab well |
| 5/9/2018 | 10:03am | end swabbing |
| 5/9/2018 | 12:45pm | airlift into tank |
| 5/10/2018 | 8:00am | tested for chlorine levels in 1000 gallon tank (test strips not working) |
| 5/10/2018 | 8:30am | let water settle in 2000 gal., tank for discharge |
| 5/11/2018 | 10:00am | Shane tested, chlorine below threshold, discharge water into ditch as directed |
| 5/14/2018 | 10:30am | redo pump test at 20gpm with suction hose set at 40' |



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-18

| Date | Time | Activity |
|-----------|---------|--|
| 4/18/2018 | 2:59pm | remove cover, photograph manhole, remove check valve |
| 4/18/2018 | 3:01pm | measuring depth to water (static) 5.86' |
| 4/18/2018 | 3:03pm | depth to bottom from T.O.M. 56.45' |
| 4/18/2018 | | bottom of well 122.1 |
| 4/18/2018 | 3:10pm | installed extension. Depth to water static 6.51' |
| 4/18/2018 | 3:16pm | h20-3.45'. Riser 6.3 above T.O.M. |
| 4/18/2018 | 3:17pm | begin artisian flow test. Bail 6x and record recovery rise every 15 sec. |
| 4/18/2018 | 3:31pm | end of flow test |
| 4/18/2018 | 3:35pm | set up pump test. T.O.C. .86' above T.O.M. |
| 4/18/2018 | 4:05pm | pump test end, start recovery test |
| 4/18/2018 | 4:15pm | end recovery measurements |
| 4/19/2018 | 9:28am | begin video inspection |
| 4/19/2018 | 9:35am | end video inspection |
| 4/19/2018 | 1:30pm | ph test =7.33 |
| 4/19/2018 | 1:50pm | begin swabbing |
| 4/19/2018 | 2:26pm | end swabbing |
| 4/19/2018 | 2:30pm | decon airlift equipment |
| 4/20/2018 | 9:40am | setup and decon equipment |
| 4/20/2018 | 10:07am | started airlift |
| 4/20/2018 | 10:12am | setup airlift, setup 2k tank on trailer |
| 4/20/2018 | 12:01pm | restart airlift |
| 4/20/2018 | 12:15pm | stop airlift |
| 4/20/2018 | 1:16pm | start airlift with riser |
| 4/20/2018 | 1:19pm | stop airlift, clean up per chuck |
| 4/23/2018 | 1:52pm | started artisian flow test |
| 4/23/2018 | 2:12pm | end of artisian flow test |
| 4/23/2018 | 2:26pm | start of pump test; 5.88 T.O.M. 10 gpm; static 3.75' |
| 4/23/2018 | 2:57pm | end of pump test |
| 4/23/2018 | 2:58pm | start of recovery flow rate |
| 4/23/2018 | 3:18pm | end of recovery flow rate |
| 4/30/2018 | 8:30am | setup equipment |
| 4/30/2018 | 11:00am | mixing product |
| 4/30/2018 | 12:30pm | inducing product to well |
| 4/30/2018 | 1:00pm | ph= 3.0 |
| 4/30/2018 | 1:10pm | surging well |
| 4/30/2018 | 1:40pm | end of surging well |
| 5/1/2018 | 12:01pm | inducing product to well |
| 5/1/2018 | 12:30pm | end of jetting product in well |
| 5/2/2018 | 8:00am | ph-6.74 |
| 5/2/2018 | 8:30am | mix product |



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-18

| Date | Time | Activity |
|----------|---------|---|
| 5/2/2018 | 8:45am | begin inducing product to well |
| 5/2/2018 | 9:10am | ph=2.79 |
| 5/2/2018 | 10:35am | begin to surge well; 5 for 5mins. |
| 5/2/2018 | 11:00am | end of surge |
| 5/3/2018 | 11:02am | induce product |
| 5/3/2018 | 11:07am | end of inducing product |
| 5/3/2018 | 11:10am | ph=2.50 |
| 5/3/2018 | 11:18am | begin swabbing @ screen 5 for 5mins. |
| 5/3/2018 | 11:34am | end of swabbing |
| 5/3/2018 | 11:39am | ph=6.45 |
| 5/3/2018 | 2:34pm | ph=6.6 |
| 5/3/2018 | 2:38pm | begin brush @screen 20' for 15mins. |
| 5/3/2018 | 2:55pm | end of brush |
| 5/3/2018 | 4:23pm | ph-7.0 |
| 5/3/2018 | 4:33pm | inducing product to well |
| 5/3/2018 | 4:36pm | end of inducing product |
| 5/3/2018 | 4:45pm | begin surge @screen 15 mins. |
| 5/3/2018 | 5:07pm | end of surge |
| 5/4/2018 | 12:30pm | ph-7.17 |
| 5/4/2018 | 12:35pm | induce product |
| 5/4/2018 | 1:00pm | end of inducing product |
| 5/4/2018 | 2:00pm | ph 6.5 |
| 5/4/2018 | 2:05pm | began swabbing |
| 5/4/2018 | 2:55pm | end of swabbing |
| 5/4/2018 | 3:00pm | began swabbing @screen |
| 5/4/2018 | 3:00pm | end of swabbing @screen |
| 5/4/2018 | 3:30pm | began swabbing @screen |
| 5/4/2018 | 3:35pm | top off with product |
| 5/4/2018 | 3:45pm | began airlift |
| 5/4/2018 | 4:20pm | end of airlift into 2k gallon tank |
| 5/7/2018 | 10:00am | began video inspection |
| 5/7/2018 | 10:15am | began artisian flow test |
| 5/7/2018 | 10:55am | began pump test |
| 5/7/2018 | 11:25am | end of pump test |
| 5/8/2018 | 6:30am | mixed product (approx 620gal water, 1gal sod hyp, 2.5qt nuwell 410) |
| 5/8/2018 | 7:30am | began inducing product |
| 5/8/2018 | 8:30am | end inducing product (test strips dot working or reading ppm.) |
| 5/8/2018 | 8:45am | began swabbing/agitate/surge |
| 5/8/2018 | 8:50am | end swabbing |
| 5/8/2018 | 12:52pm | began swabbing 5 min for 5 ft. (30mins.) |



Well Maintenance Log

Project: Lake Conroe Dam Relief Well Rehabilitation Pilot Study
Client: San Jacinto River Authority
Well: RW-18

| Date | Time | Activity |
|-----------|---------|--|
| 5/8/2018 | 1:44pm | end swabbing |
| 5/8/2018 | 1:45pm | top off with product (chlorine) |
| 5/8/2018 | 3:21pm | began swabbing (30 mins) |
| 5/8/2018 | 4:01pm | end swabbing |
| 5/9/2018 | 8:46am | swab well |
| 5/9/2018 | 9:16am | end swabbing |
| 5/9/2018 | 2:36pm | airlift into tank |
| 5/9/2018 | 4:28pm | mixed chlorout into tank (approx 2lbs) |
| 5/10/2018 | 8:00am | tested for chlorine levels in 1000 gallon tank (test strips not working) |
| 5/10/2018 | 8:30am | let water settle in 2000 gal., tank for discharge |
| 5/11/2018 | 10:00am | Shane tested, chlorine below threshold, discharge water into ditch as directed |