

MOBILE DRILL

LOG # 18

8/04 - 8/1/05

Forestry Suppliers, Inc.

1-800-647-5368

#49354 Level Book

Springhill Cone

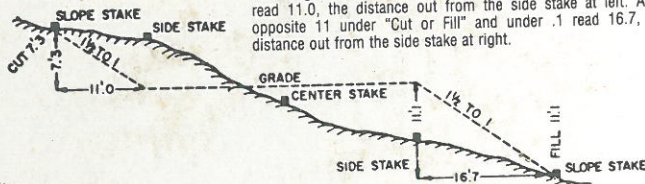


S.E.F. St Joe #4

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cut or Fill	Distance out from Side or Shoulder Stake										Cut or Fill
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

The paper in this book is made of 50% high grade rag stock with a WATER RESISTING surface sizing.

18586
Springhill 1311

Mangels Farm
Mangels Farm #2
EP ST 106 #2

[illegible]~~907-421-4023~~

1097
Team D

city of
gate

18586
Sprague 1311

Mangels Fern

1001
Mangels Farm #2

EP ST 106 #2

7-30-04

OD, LB

8 AM

GO TO HOLLEY : LSC SALES TO
P/U TRUCK : CARGO TRAILER.
TO ALACHUA. DROP OFF CARGO
TRAILER @ SITE. P/U GREEN
TRAILER.

8-31-04

OD, LB

6 PM

6 AM

127' NQ IN HOLE. CONTINUE
RUNNING IN NQ. BRIDGE @ 192'.
DRILL OUT. CONTINUE TRIPPING IN
TO 303'.

303-307 VERY HARD DRILLING. WRONG
BIT. NEED DIAMOND NOT
CRACKER JACK.

303.5-304.5 - CAUTION

306-307 - CAUTION

INNER BCL NOT PULL.
TRIP OUT NQ.

BEN DOWD ATTN US

18586
Springhill 1311Mangels Farm
18611
Mangels Farm #2ST 106 #2
Dashed #2

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8-31-04 CONT.

KC CAMES TO SITE W/ NQ2
10' CORE DR. KC 95% CERTAIN
CORE IS AVOID PARK. THUNDERBOLT
BLOW M.

MOET BILL CROSSMAN & LOOK
@ SINK IN THE PROPERTY.

CB, PAPERWORK

6 PM

9-1-04

CB, CD

6 AM

LOAD H₂O. CB CONTINUES
PAPERWORK. AWAITING CALL FROM
KC ABOUT WHETHER TO PROCEED
W/ CORING. GENERAL CONSENSUS
@ AVOID IS THAT IT IS AVOID PARK
BUT WANT MORE CORE. TO SITE
BELOW TRIPPING PIPE IN HOLE.

18536
Springhill / 311

Mangels Farm

18611
Mangels Farm #2

ST JOE #2
Dashed #2

307-311 BEN MOLDIC DOWNS
 311-70 HUE TIGHT. START PILING - 9
 pile 5' H.P. LOAD TAKE TO
 OLENO - PUT ON M-115
 STRAIN IN

END AM 6 PM

7-2-34 OS, CO 6 AM

LOAD PERSONS, CHECK OUT OF
 MOTEL. TO CHANNING FOR
 PAPERWORK & R.O. NO PAPERWORK
 TO 88 FINE BACK TO SITE
 CONTINUE PILING H.P.

9-22 L.B.-B.C.
 picked up trailer from Lee Salas
 left at 9:30 AM Travel to
 Algodunes. Tipped 100' out
 of hole. Made trip to L.ville
 for Tremi pipe & fittings.
 5:30 at hotel

9-23 Ran Trini in hole worked
from 307-285. Pumped 3 gal
cement - no gain - used 5 1/2
bags mix. Work. Continued pour
rock to 184'. Pumped cement
5 gal - Seal at 278.5' TD
Set 2" well to 193'. Ran
Trini in poured 1/3 Bag of Sand
in annulus Sand level held.
Will check tomorrow 6:00 PM

LB-BC

9-24 Cemented to 60 ft - just became
hard not rising

~~9-25 Budget early cemented to surface~~

9-29-04 CB, LB

9-30-04 CB, LB

HO LEVEL = 90'2" ALS

TD: 278.5' ALS

CSH = 193' ALS

232
60
12.922

11-29-04
KC, EH, TOM GREENHALGH
to SWANEE CO, per permit
at SRWMD for to site
set up, load water
Mangels Farm #1
Permit #
SWANEE CO

T R SEC
LAT 29° 56.232'
CON 82° 54.557'
Elev

0-2.5' push spec - 0-2 br sd 2.5.
2.5-4' push spec ~ 5' lighter than
4-6.25' push spec clayey.
6.25-8.0' push harder clay

end day. dark - 600pm
high water 1720 / miles 11784

11-30-04 8:15 start
8-10.5' - chsd + sand
- decide to move site
designate this hole #1
10.5' TD

plains
needle nose
chamber lock etc
crescent wrench

4270
4270
16563

Load

2" nipples + couplings
whale pumps + hose reel
NW csq drive head
saw horses

christmas cave bbl sys
extra longyan NQ2 shoe

Holley Arrow Pneumatics

2) EX GB charcoal

absorber element kit
Water level meter - cracker
Generator (make sure it runs)
3" DRIVE HEAD

~100' ~~Various~~ Trimmer 2"
1 1/4" & 8/4"

6x6 WOOD

MANGELS FARM #2
W#

SEC 28 T 65 R 14E

LAT 29° 54.276'

CON 82° 54.935'

Elev ~40' top

4
620 ment.
Avg
P.B.
E.A.

0-2.5' push spl - lt. yl. br
sand.

2.5-3.75' lt. yl. gy. sd.

3.75-~4.2 sd as above

~4.2-6.25' or clayey sand

6.25-8.5' orange clay sd grad
to lt. gray clay sd

8.5-11' gray clayey sand

11-~~14.8~~' - clay run ~ 11'

4" csq, 3" csq

chg over to NQ

11-14.8' clayey sand - lost

circ at bot - ls top

14.8-15.25' - ocular ls - ~3" rounded

15.25-20.25' ls w/lt. fossilif

essentially dull memory

20.25-25.25' L3 - lost circ again

~3.5' rounded

25.25-30.25' L5 as above

30.25 - 38.25° LS AS ABOVE

5

end day - 6:15 pm
Rig hours 4, 1726

12-1-04 8:00 AM START

35.25 - 40.25' AS ABOVE

40.25 - 45.25' AS ABOVE

45.25 - 50.25' IS AS ABOVE - ~~BT~~~~52-52.5' iron stained~~50.25 - 55.25' AS ABOVE - 52-52.5'
iron stained

55.25 - 60.25' same

60.25 - 65.5' AS ABOVE - btm 1/2
pinkish65.25 - 70.25' at ~ 65.5 color
change to med grey

70.25 - 75.25' med grey ls and above

75.25 - 80.25' AS ABOVE

80.25 - 85.25 AS ABOVE - slightly harder

85.25 - 90.25 same

90.25 - 95.25 - AS ABOVE to ~ 91.5'

then hard dolomite - V soft last
foot - dolosilt - most lost

95.25 - 100.25' soft - top 1.5' -

prob dolosilt - not recovered

pbl or concretion w calcite xls

new drive head
70' NW CS9

140 lb hammer
whole pop setup
+ 15 sec well

BRANDON
Bill Webster
(386) 935-0728

Re Sonny Cockrell
cockrellarchaeology@yahoo.com

thin hard dolomite ~ 4" then⁶
another cavity / ~~small~~ soft
zone - also dk VEXL zone on
non dolomite
100.25 - 105.25 small cavity at
~ 101.5

pulled 5' NQ to add 10'
to continue

- drill rod tightened up.
won't rotate or pull. buried
jacking addl. ft. - have
8' of sticking (ie stuck at
~ 60m of hole)

End day 6:30 pm
Rig hour 1733

12-2-04 KL, EH 8 AM START

- break NWJ x NQ sub base
pull inner bbl

- could get some rotation, water
pressure spikes but does leak
down - can't pull up w
drill head

Craig Ann w CS9, 140 lb
hammer etc

buy

Rope

3/8" grab hook

LEVEL

100' AIR LINE

Holley 2) Arrow pneumatic
EX 68 charcoal deodorizer
filter element

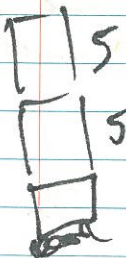
channel lock

needle nose

2' - ☐ cement wrench
submersible pump/wire etc

6x5' - ☐

60' x 10'



hammer pulled drill rod
base (~1-2' stuck at btm)
pulled NQ

12-7-04 ERIC H / DAVE P / SARAH R.
Dept TLH @ 8⁵⁰ - Arrv. ~1130
H₂O level @ 23.7' BLS
Hole to 78.8', soft @ btl

- 3" csy binds in 4", unscrews lead 4" flight. remove ALL csy, unstick 3" from 4".
- run in 3" only
- trip in 60' of 10' x 3"

* end day ~5:20pm 75' 3" standing
RIG HRS: 1738

12-8-04 Sarah & Dave

Start 7:30am

run 1 stick 7" casing

H₂O level @ 23.2' BLS

Hole open to 78.9'

Advance casing to 106' BLS w/ ~1' stickup
* 2' stick on top.

core barrel is 8'!

17' = 3' inner bbl, retriever: 14'
27' 4'
37' 5'

12/8 contd

Hole in 3' open to: 106'

Trippin X/Q core barrel / 5' stick / 10 x 10'

106' - 108.5' rubble dolostone, some dolosilt,
then grad brown burrowed sucrosic
dolostone

108.5' - 110.5' good dolostone then ~ 1' soft

115.5' material NS.

110.5' ~~115.5'~~ excellent recovery! dirty brown
friable wackestone/packstone to

115.5' - 120.5' H. gray clayey LS / wackestone.
~~115.5' 120.5'~~ gray to gray brown wackestone

120.5' - 125.5' into H. sandy wack/packstone
~~120.5' 125.5'~~ H. & / gray wackestone

end day @ 6:15pm

rig hrs 174.5

12.9.04 D. PAUL / S. RAMDEEN

start ~ 7:45am

A₂₀ level: 24.6'

hole open to: 125.5'

NEED: PIPE

SODA ASA

retriever bridge

2' 3' 5' NWJ sticks

12-9 cont'd

125.5' - 130.5' 100% rec. lt. or. pelloidal grainstone

nummulites, pelecypods.

130.5' - 135.5' soft lt or / ~~light~~ wackestone

100% rec. to harder wackestone

135.5' - 140.5' lt. or. wackestone to packstone
to lt. olive gray "dirty" LS.

* crab fossil @ end of core?

140.5' - 145.5' lt. olive gray moldic "dirty"
wacke/packstone

145.5' - 150.5' moldic & burrowed lt. olive
gray to lt. or. packstone

150.5' - ~155' ran out of H₂O, no
more drill rod. lt. olive gray to
lt. or. moldic packstone.

Fetch more H₂O, pack up & secure

site. depart 4:08pm

arr. whse 6:22pm

rights 1747

12-13-04 KC, BC - 10AM out
of town to Brantford

SWL 23.6' 6LS

unload NQ, pull 5' NQ

CEP #3

18628 core
SEP. ST. loc #4

SEP. ST. loc #2
Ostrad #2

prob top Aupk
at 156.1-158.5'

Water run Rig #1751
end day 6:30 pm

12-14-04 BAm start

run in 10^s, wash hole

155.0 - 155.6' - drill down
last of previous rod - hard
limestone / dolomite

155.6 - 160.6 - hard dolomite
top 6" - then soft / cavity
zone (2' ±) then hard dolomite

160.6 - ~ 162.6' - hard ls / dolo
then soft zone / cavity

162.6 - 165.6' - poor recovery - lots
of chatter - dark bn dolomite,
brittle, blocky fracture - organics

165.6 - ~ 167' poor recovery, dk
bn muddy dolomite - some
thin lenses / blocks / some organics

~ 167 - 170.6' hard dolo, fossil
moldic, organics inside forams

170.6 - 175.6' hard bn dolo, w echinoid
fossils

175.6 - 180.6' fed bn dolo - brittle
organic flecks

Rig has 1755
clean up site, lock up ret'n
TLH 6:15 pm

inventory drill rod + log

1-25-05

KL, EH Road put + new CS9
to Surawnee Co - MANGEL FARM
drill site

SWL 25.3' bws

Run NQ back to bottom
(wash out w pump)

core 180.6 - ~182.5' - dolomite,
hard, some crumbly - thin dk sl.
clay stringer - acted like
core bit plugged.

182.5 - 185.5 bn + gray fossil
matrix dolomite, mud-well ind
~185.5 - 191.0 as above to ~189
reverse dk bn REYL dolomite -
well ind, brittle

191 - 196 bn dolomite - some muddy
sections washed out

END day 7:30 pm
to Live Oak - kin motel
load water
Rig hours 1758

Inventory

NQ 13 x 10
20 x 5
1 x 3

NW CS9 21 x 5
8 x 10
+ 106 in hole

HW CS9 7 x 5'
+ 45 in hole
1 x 2
1 x 3

NWV 1 x 5
1 x 3

1-26-05 KC, EH 7:30 start 12
fuel, air in tires then to
side

196-201' bnt grey dolomite,
some prominent organic form
mod. well ind.
201-206' SAME
206' TD

Pull NQ / START drilling in
HW CS9 over NW
drill in 78.5' HW
WATER RAN ~ 450 GAL
Rig hours 1763
Load list

Quik gel CEMENT?
80' HW CS9
4" PVC slip caps

2"-4" HOSE CLAMPS FOR PACKERS

16TN TLH 6:45 pm

LOAD

~~1/2" clamps for the packer~~
~~3/8" grab hook~~
~~RAGGS~~
~~20' HW CS9~~
~~5' HW CS9 (3+2 in deep)~~
~~150' 2" PVC MW CASING~~
~~40' 2" PVC SON~~
~~Tef. tape~~
~~Glen tape~~
~~NWT pipe (all)~~

Butch Anthon

FAX 845-778-5916

13
 1-28-05 KC, SR 8AM start
 hook up trailer, load quick
 gel HW CS9 + NWT vods
 to Suwannee Co
 mix mud - unload & reload
 trailer (NW CS9, NQ)

Drill HW CS9 to 100'
 pull 106' NW CS9
 Rig hours 1766

RETN T2H

2-8-05 KC, BL finish loading
 up - to survey w/ paperwork
 then to site - BRIE to water
 KC chg feed cyl. bushings
 ck flw's etc
 set up whale pumps
 drill in addl. 3' tw
 mix mud

drill in tw to: ~~1205~~ ~~1200~~
 145' out of water
 w/ out of light
 End day 6:15 pm
 Rig hours 1770

SEE #3

18628 COAE
REF. ST. 106 #4

SEP ST 106 #2
Ossard #2

SPRINGHILL

Mangels Farm #1

Mangels Farm #2

quartz gel
soda ash
trash bags (?)
150' 1/2" pvc strip joint
hook joint rig 36"

2" hard pvc ends
2" strip coupling

eric delivered quartz gel,
framing wrenches etc

2-9-05 KC, BC BAM START ¹⁴

ck depth thru 4" csg
142-143' csg in hole -
141 to btm inside

Attp. Airlift - NO success
re-excavating depth. - dislodged
bridge.

drilled in HWCSS to 165'

START running NWT + 3 7/8"
REAMER

6:45
END day 6:45 pm
Rig home 1776

2-10-05 8 AM START KC, BC
TEAM to 218' (3 7/8")

pull NWT + reamer
INSTALL ~~208.1~~ 208.1'
well any.

7" point, 40' SCN, 120' csg
w 2.5" stickup

run in 1.25" reductor
to Airlift mud from hole
NOT working well nd to

Butch Ambor

(800) 926-8467

CL (845) 742-9046

~~Butch Ambor~~
~~(800) 926-8467~~
~~CL (845) 742-9046~~

Tom Ballentine

LEON Co growth +
488-9300 env
ment.



15
dilute mud - make water
rem.

Rig house 1781

END day 6:30 PM

2-11-05 KLBC 8 AM start
start diluting mud + air
lift developing well.

natural filter pack to
~188, washin filter
sand to top of screen.
continue surge + air lift
+ top off filter pack

filter pack to 165.5
well airlifting at ~159 PM

Rig house 1786

1ETN TO 2LH -

Bumper to Bumper: Incl car
600psi mud pump
pull start cord

to load

130' - 1 1/4" tremmie (ASTM)
trash bags - hd

drinking water / gabrade
putland cement
pvc glue

30-65 SAND
SAND FR. PAD
18V drill & bits
hwy lifting bail
plastic sandboxes

2/15/05

Brie; Dave @ whose 8am, to Sunnyside Co.

static WL: 28.8' BLS

RIG HPS 1786

Filter pack to: 168.3' BLS

- begin to surge well by hand
- clean; trip in ~~180'~~ 200' tremmie, surge & airlift well. filter pack dropped same, bring back up to 166'.
- Pull tremmie in 5' increments to work opposite specific screen intervals
- filter pack @ 169'

end day @ 7pm
Righs 1789

2/16/05 Brie & Dave

7:45am begin day

static H2O level: 27.1'

filter pack @ 169.2'

develop / surge well w/ tremmie to ~188'
develop / surge @ ~198'
add sand as FP drops; 143.2'

used ~ 2 bags sand by 2/16 morning

Grouting. 1st bag should get to ~ 135'
2nd bag should get to ~ 105'
→ CAVITY ~ 95'

17
2/16/05
~164.3' FP dropped
~165.3' 10:45am
~165.9 11:15am
hand surge well, then run in 200' tremmer
; airlift FP @ 166.2' 11:45am
166.2' @ 12 pm
- pull 10' tremmer, airlift @ 190'
FP @ 166.3'
- pull 10' tremmer ; hand surge, airlift @ 180'
FP @ ~~166.3'~~ 166.9' (1:18pm)
FP @ 166.9' (1:45pm) + holding.
FP @ 166.7' (2:15pm)
Go ahead; run in 45 1/2 scoops fine sand,
brings FP up to 165.1'
165.0' @ 3:26pm
- 1st bag - wasted.
2nd 1 bag grant - 157.1'
pulled 35' 4" csg.

end day @ 7:37 pm
Rig hrs: 1796

- 1st Aid kit
- neosporin / antibacterial ointment
 - hydrogen peroxide
 - tweezers

6 bags
grout
total
2/17

2/17/05 BRIE; DAVE

18

start day @ 8:00am

static H₂O level: 26.6 BLS

@ 157.2' Grout

- meet Craig @ SRWMD to pick up sand; hoist bail.

bag #3 - pumped down hole Top of grout still @ 157.2'

wash in 1 bag sand, wait: 156.5'

after 2.5 bags sand, still 156.5'

→ 6.5 bags still 156.5'

→ Craig brought us gravel - 1/2 bag, 155'

- pump 1 bag grout ~ 130' fall slightly

- pull casing up to ~ 100' (30')

check grout, 131.1'

→ pump 1 bag grout: 110'

→ pump 1 bag grout: 110'

pull 20' 4" csg, leaves 80' in hole

GO FETCH H₂O 7:47pm

REGRHS: 1797

End day @ 8pm.

SEP #3

18618 COAE
SEP ST 10E #1

SEP ST 10E #2
Osgood #2

SPRINGHILL

Mangels Farm #1

Mangels Farm #2

• Grout

• Sand

Soda ash + lid for bucket

8 gal / bag Portland
1 1/4" cap grout

10 bags
grout used,
1 wasted.

2/18/05

BRIE/DAVE

19

start day 8:30am

static H₂O level: 28.4' outside csg

grout level: 99', 80' 4" in hole

- pump 1 bag ~ 89.5' soft
- pull 4" csg, leave 30' in hole
grout @ 86.9'
- mix & pump 2 bags grout = 59.5' (~55')
- mix & pump 1ST bag grout: 31.7' (29.2')
- mix & pump 2 bags portland
- top of cement @ ~~29'~~ after 25'
mixing and pumping 6 bags
of portland

pack up, secure site depart: 3:45pm

RK HPS 1796

ARR WHS @ 6:03pm

2-22-05 HC, SR, EM 7:30 start ²⁰
to SWNN CO -

jd grout at 24.5'
pour gravel to 19' to
bridge last circ zone
pour 1/2 bag sand to 17'

Pump 5 1/2 bags of portland cement
+ 5% bentonite per bag to
surface

Setup to rehab 4" well
TEAM ~ 7' can't keep cutters
suspended. pull reamer
+ set up on lift -
lose weight 3' x 1"
start weight off top
down hole
hole clean to 58'
don't have anything to
retr. weight.

complete load up / clean up
retr. TCH

SEP ST 106 #2
Osgood #2

18628 COAE
SEP ST 106 #4

SEP #3

SPRINGHILL

Margels Farm #1

Margels Farm #2

buckets
Ketchikan Foster plate
stands

Remember 3358 Key!
for trash pump lock
SAWHORSE
10' HW CSQ

2-28-05 STEAM clean rig, 21
pipe etc

KC, EH, BC
3-1-05 CONT decon - load up
ferry to site, set up.

Brk to WATER -

auger hole to ~10'

push in 10' 6" PVC, bnd.
granular sandstone seal at top.

Rig miles 11932 / hrs 1807
END DAY 6:15 PM

3-2-05 KC, BC - 11 AM leave
QC to site

Mix mud

run 5 7/8" REAMER to ~25'
(first hard rock) - pull
+ go in w 4" CSQ to
~28'

load up / lock up
Rig hour 1810

3-3-05 ~~BC~~ BC, SR
leave for site @ 11:30 am
EH arrived @ 12:40.

22

start tripping in NWJ for
reaming.

Drilled down to 35 37'.
packed up and left to assist
Craig.

Rig hours 1812.
return to whse @ 5:05 5:05pm

3-4-05 BC, SR, EH
to site @ 11:30 am.

punched through clay layer @
~ 37.5'.

rest of hole LS. Had great circulation
TD @ 130.

@ 126.5' the head dropped. Could
not reach bottom @ 130'. Unsure
how deep cavity is.
lost circulation @ this point.

rig hours 1816

returned to warehouse @ 7pm

SPRINGHILL

Angels Farm #1

Angels Farm #2

SEF ST JOE #2
Osgood #2

SEF #3

SEF ST JOE #4

18628 COAE

3-7-05 KC, BC onsite 11:30
 pull NWT and 3 7/8" reamer
 SWL 16.0' bbs
 tape with weight touch
 soft bottom at 126'

airlift ~ 600 gal from
 btm of hole
~~125~~ 123' 2" eductor

HAL davis spe well

lock up / pack up
 rig hours 1817

3-8-05 BC, SR Arr Site 10:50am

Trip out 30' of 4"
 open hole to 126'
 reamed w/ 5 7/8 tri cone bit to
 65'.
 packed up. returned to whse @ 5:45.
 rig hours 1820

for 3-10-05

Duct tape
paper towels
Diesel fuel

3-10- pump 2 bags portland/
5% bentonite in deep
well 61' ~ 53'

3-9-05 - BC, SR arr site @

24

finished reaming to 100'.
tripped out NWJ.

Tagged bottom @ 125'.

* ran 125' of trimmy to air lift.
recovered very fine cuttings
and some larger ones came
up also.

rig hours 1823.

packed up and returned to
whse @ 6:15pm

3-10-05 KC, BC, EH
ARR site 10:30 AM

run airlift - try to examine
sediment in cavity - only
mod success

run borehole video cam -
cavity ~ 124-125'

zone 100-124' looks cryptic
- saw open hole compl.

set 100' 2" PVC wsg w
2x5" packer on end and
2x 6 1/2" packer 1 foot up

Grout

DEEP

Shallow

portland / 5th / 2

3

6

put CSQ to hand power
refusal ~ 99.5'

wash in 1/2 bag (~1') of
sand on top of fine packer
pump 2 bags portland / 5%
bentonite

Clear up / rock up

Pig house 1825

RETN WHSE 6:00 PM

=

3-11-05 KC, SR ARE site 12N

found grout at 51.8' b₁₅ Osgood 1

" " " 32.6' b₁₅ " Osgood 2

MIX + pump ⁶ bags portland + 5% bent
in Osgood 2

MIX + pump 3 bags portland + 5% bent
in Osgood 1

RETN WHSE 4:40 PM

2"

deep shallow

call Garryn re
lake - press card
- email.

supv. change - Eric

Gorman

Quick grant

850 575-8117

David Alden
(850) 591-6107 CL

DEEP —

3-14

KC, JH - ANN site 12N²⁶
fd grant at 47.8' bLS
in Osgood 2
fd grant at 50.25 in O.1

mix 9 bags portland / 5%
bentonite - + pump into #2

wash in bentonite chips 50.25 -
47.0' in Osgood deep

rig hours 1825
return when 5:30 pm

3-15-05 KC, JH, BC
lower - cement / gravel
to site arr 10:30 A.

fd grant at 18.8' bLS (sh)

DEEP
(6 bags) pour gravel to bridge
cavities 47-34'

pump 11 bags portland / bentonite

pump 4 bags in shallow well
to surface

Osgood
deep

cavities at
18.5-20
20.5-21
25 ± 27

27
growth in deep hole not coming
up. pour gravel dr.
~ 24.5 - 22' bgs (12 bags)

shallow
mix + pump 3 bags portland/bentonite
to top of grt column + make
pad

GROWTH SUMMARY

Osgood #2 shallow

2" csq 0-99.5' - dbl fin packer
99.5-47.8' 8 bags portland/5% bentonite
47.8-18.8' 9 "
18.8-surf. 7 "

24 bags $\Rightarrow$ 99' x 6" hole / 2" csq

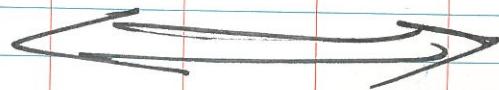
Osgood #1 (DEEP)

2" csq 0-190'
2" scw 190-240'

filter pack to 185

bags portland/bentonite 40 to 133'
62 bags gravel

- pour 28 bags gravel/sand to bridge cavity 133-129' 28
- pump 5 bags portland/bent. - fd gravel at ~ 131'
- Craig + 155 ~~bags~~ ~~portland~~ bags gravel to bridge
- Craig + 155 pump bags portland - 61'
- pump 2 bags ~ 61-51.8
- " 3 51.8-50.2' bentonite chips 50.2-47'
- pour 6 bags gravel - bridge 47-34'
- pump 11 bags portland/5% bent 34-24.5 (not coming up)
- pour 12 bags gravel 24.5-22' thru 3-15



Load
rocks ash
soda
SAND

SITE 2
LAT
CON

29
3-17 more rig to western rock
site
dig house 1828
setup (port mud) etc

3-16-05 EH, BC, JH
ARR Site 11am
fd. gravel at 22' (deep)
poured 18 bags gravel to
bridge cavities raise
btm to 16'
pump 5 bags portland to
surface + for pad

M6/drl. house 1826

≡

S.E. FARM
St. Joe #3

Permit # T200500678
compl. date
5-27-05

Western site shallow

30° 20' 13.1"
84° 13' 10.1"
avg 350 readings

30° 20' 21.5" 12.9
84° 13' 16.5" 9.9
avg 960 readings

3-17-05 KL, EH, JH
Complete loading rig - move to
site 2 (western site)
setup rig, mix mud

Rig home 1828
VETN off 6:00 pm

3-18-05 EH, SR.
830 start - lower for
supplier / water
cleared working space around
rig.

0-15' HSA; 0-5 greyish
sand, 5-10. reddish sand
10-15 reddish sand
15-20 reddish clay
21-22' hard ledge
23' soft LS

pulled HSA's - insert
23.5' 6" pvc csg to 21.5'
cleanup / rig home 1831

pu Honda generator at
John Deere
End day 7:10 pm

Load
WATER filters
shop? 550

827 SEAL
pink gel
hole
sand plug

31

3-21-05 EH, VH
install 21' 6" CSG
drill in 23' 4" CSG
drill to 27.5'
SWL 10.3' bls
retN ofc 800 pm

3-22-05 KC, VH 8 AM
to site - 6" + 4" CSG crushed
hat cover down to attp spec
- no go

spec protocol will be we will
pull new + manor + circ
mud from hole at end of
day - he will spec first
thing next morning.

reset 4" CSG + 6" CSG
drill 3 1/8" / ream to ~ 37'
retN ofc 600 pm

SEF. Farm Stobe #3

Angels Farm #2

Angels Farm #2

SEF ST JOE #2

DS9000 #2

18628 COAE
SEF. ST. JOE #4

pages
water at
30' ± 9pm
cloudy

32

3-22 KC, JH. late start -
ofc wks, load up, chg flat tire
on trailer - to site 1200pm

pull nwg + reamer
chg 3 7/8 tri-cork to 3 7/8 wing
- naver od 3.5-3.75

drilled back to btm - no
cave today.

drill to #6 43' - hard
cave at ~ 38-39'

drill to 63' - more
cavities

pull nwg for water spl.

pump hole w centr. pup
thru 2" pvc

27, 37, 47 + 57' pumping
levels

- leave 2" pvc hanging
in hole for haul to spl
thru.

Rig miler 11948 / hrs 1840

End day to 3:45 p

late 6:10 p.

16' 12"
3' 3"
12' 16"
2' 5"
3' 6"
11'

12' 5"
15'

3-24 KC, BQ - 815 start

33

SWC 16.22' below toc
42" above grade

has collected water spr
23' CSG / 57' piping level
w 63' TOTAL hole

drill in two CSG to 45'.
hole kicking off progressively water
worse -

put HW into 6" - try to
start straight

~~has kicked off~~
ream 5-7/8" to ~52'
run 4" to 57' : 6" CSG
is sinking deeper

KC drops HW string -
falls ~1', stops then
drops out of site -
top of NWJ sub / drive
head 37' bLS

Attp screwed on w NWJ
- no good - sits on sub

lockup

but drops down outside

lockup - will need wall
hook
rig hours 1846.

ARR where 6:30 PM

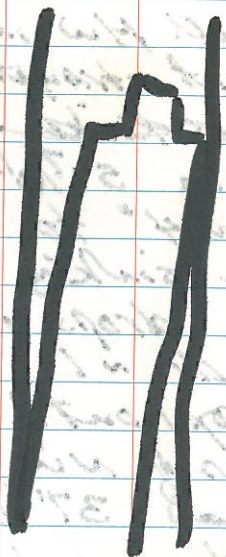
3-25-05 KC, EH

LOAD AWJ + subs, recovery
taps etc then to water +
site

SETUP trashpump to pump
mud, cuttings from hole -
lifts lots of cuttings, still
too cloudy at 12:30 to see
anything thru camera

RUN AWJ w NWS sub on
btm - lands but rotator out
off of sub

RUN AWJ w RECOVERY TAP
ON btm. - SCREWS IN -
CANNOT pull w hoist



float valve dimensions
3" x 3" x 7 3/8"

pull # Awj w horit plug
& chain - recover csq
- pulled at dead weight,
no stickiness or drag

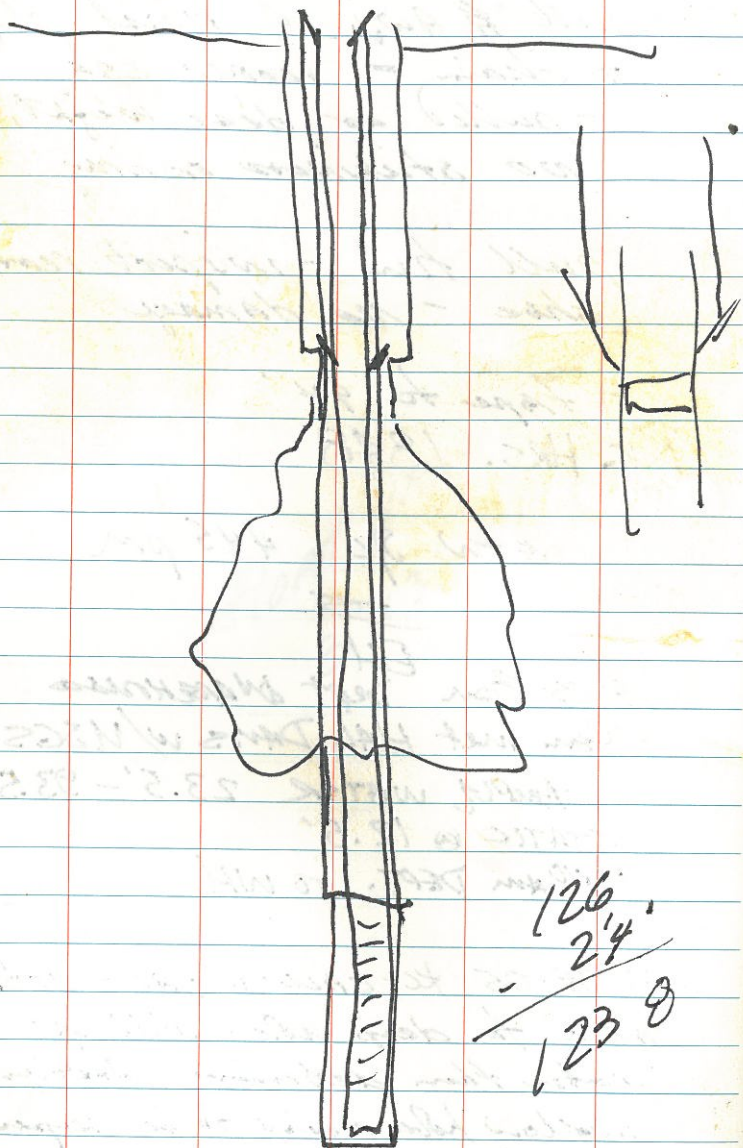
pull h/w - inspect rearing
shoe - no damage

- tape to 94'
RIG HRS. 1848

1EYN JC 445 pm

3/28/05 ^{EM} 8am DEPT DWAKHUSA
Jan met HAL DAVIS w/USGS
SAMPLE WATER 23.5' - 93.5'
STATIC @ 12.5'
1100AM DEPT. TO WH

3-28-05 KC-CALL to HAL - determ.
more to deep hole - will spc
water then determine whether
shallow hole needs to be deeper
or install in cavity 63-94'



3-29-05 KC, JH to site
start move rig - Haul & city
photographs (video) showing
for interview re proj. - some
makeup footage of drilling

KC decides - compl. shallow
well first - too much to
move and - leave aquifer open

if need well below cavity -
screen + filter pack or
open hole - grout over filter
pack or fine packer
- push two packers into place
top of cavity w/ 3" PVC

SWC 12.6' bus

Run HW CS9 to ~102 w/o drill.
Grill HW to 109'

Run varj w 3/8 tubing + reamer
hit v hard layer at 123.8'
no penetration with wing
bit. - start transport

Righours 1852
Retn of 6:20 pm

3-30-05 KC, BK
load NQ, core bbl etc.
to FGS per revised water
tank drawings, water run
then to site

- pull remaining NWT -
3 1/8" bit/reamer

Run NQ - bit at ~115 (?)

doesn't give w yesterday
manometers - rec ~ 5"

hard rock is - tape hits
bit at 117' (drill pipe)

or 114' BLS

114-119' hd br rock is/dolo

119-124' hard drl - some
chatter zones - 5' hd (4-m)
br rock dolo - some fracturing
from drilling

124-129' HARD med br dolo, some
organic lenses, some rubble.

small cavity at ~ 127.5-128

129 ~ 130 - SAME - out of water
end day Rig hours 1857

Return to whse @ 6:15 pm

3.31.05 EH, BC

9am Dept WH, GOT FUEL, WATER
10³⁰am Arrive @ SITE

~NQ hole open to 130'.

130-135 from 130-131.5 soft
LS, possibly dolosilt.

131.5-135 dolomite heavily rx

135-140 vuggy, rx dolomite

140-145 - hard sacrosic dolomite
with soft sed layers throughout
the run. possibly dolosilt.

end coring @ 145' for day.
clean up ~

left NQ hanging out @ 130'.

Checked fuel on rig okay.

rig hours: 1860.

4.1.05 KE to Springfield 8am start

pull 15' NQ, pump well w mayno
in rev (12.5pm) for ~1 hr

disconn. drill head - pump spec
for hal field test

-no clorides, no nitrogen
HAC will talk w JM. re well
const.

pull NQ, lockup head back to
JC ahead of weather
1862

ret'n where 100pm

4-5-05 BC, JH KC @ 3:00pm
 load up supplies head to site
 ~ stopped to fill Ert's truck up.
 arrive at 10:40 am.

~ set up to pull 110' of 4".

- pulled 4"

- ran video camera and pumped well.

* top of cavity observed at ~ 64.5'.

- set up well ~ open hole. Set @ 64.5' 2 in pkr, 1' + 2' above end.

- configuration of cavity appears to contain ledges once past 64.5'.

Unable to see any wall on other side of camera view. ledge drops off @ ~ 15' into it and drop pile becomes visible.

Unable to locate drilled hole past cavity. Out of camera view.

washed in 1 bag bentonite chips to seal botm of hole (on top of 2 in packers)

trammed in 4 bags portland / 5% bentonite

LOAD

- dust masks
- quick growth
- 1 in drill bit
- 1 in B/D
- tools
- in Eric's hole
- Cement
- cone barrel
- pieces + accessories
- Hitch insert
- 6 inch ~~coupling~~
- 6 inch T

40

Rig hours 1864

End day 7:00 pm

4-6-05 o/c wk Am
load up to site err 3pm

fd front at 33' b/s
pump 4 bags portland/5%
bentonite
pull 6" surface csq (10')
secure hole

4.7.05 KC, BC, JH leave whse @
11⁴⁰am arrive at site @ 12:36.

@ Cement @ 19' b/s

pump 4 bags portland/5% bentonite

move rig - set up in deep
cone hole: grade 10' NQ
(per NQ² components)
organize site

End day 6:00 pm

SE. Farm Stoe #3

Angels Farm #2

Angels Farm #2

SEF ST JOE #2
DS9000 #2

Permit #
T200500677

~~was head - not at site~~

R.F.
MEMPHIS
travel
Coke
baker

TENTATIVE Fm Picks KMC 10-06

0-18.8' UDSC
18.8-44.5' SMRK
44.5-TD SWNN?
~240.2 → ? OCAL?

4.8.05 KC, BC, JH
8¹⁵ - Load up Cement and
supplies. Head out to site.

W# 18628/250.5'

SEF ST JOE #4
CORE

S3, 100 T25 R1E
LAT 30° 20.222' 13.3"
LON 84° 13.171' 10.26"
Elev ~22'

3500 MEASUREMENTS

0-2.5' push core, gray bn sd
2.5-5.0 white + lt bn sd - grd
to chy sd
5.0-7.5 red or chy sd
7.5-9.5 w + or chy sd
9.5-12' clay

drill in ~16' 4" CSG
push ~13.5' 6" PVC w
~1.5' stickups

1868 rig house

18628 CORE
SEF ST JOE #4

4/11/05 EH, JH, KC ⁴²

12³⁰ pm Cleared PATHWAY FOR DEP. 6017

12 - ~18.5' NOSM - soft, cly, wth. ls
-18.5 - 20.5' soft, vl. resolute
fill 19.5' - pm ~ 1' cly then
some ls.

20.5 - 25.5' crm clayey ls. to ~ 24
then hard rexl ls

25.5 - 30.5 FORGOT SHOE - LOST SOME
SAMPLE
~ 50% Recovered

PACK UP
RIG HRS. 1872

MTN WARE 7:00 pm

4/12/05 8³⁰ am EH, JH
~ 11⁰⁰ am ARRIVE @ SITE

PUMP WATER FROM 1ST HOLE, MIX MUD

~~30.5 - 34.5~~
~~34.5 - 38.5~~

30.5 - 34.5 LS

34.5 - 35.5 BLUEISH CLAY

35.5 - 40.5 BLUEISH CLAY w/ pebbles

Very slow drilling, but low fluid loss.

40.5 - 45.5 - SAME AS ABOVE 1.5' LAST

45.5 - 50 - ^{LOST fluid} Degraded LS OUT OF
WATER END DAY RIG Hr 1876

8 NX6 barrel - diamond
Quick gel
SODP
NQ rocks

may have trashed the
bit - pump suction was
sucking air →

43

4-13-05 KC, JH ARK drl site 10:00
mud mud

50-50.5' 1/4" grayish ls

50.5 - ~53' ls as above then
blue gn clay + soft ls. plugged off
~53-55.5' ls, wht, lt. tan
(laminated) med - well ind

55.5-60.5' wht - lt br ls. softer than
above, more calcareous

60.5-65.5' moldic ls, soft green
in middle + lower part. some
green clay - only ~3' recovered

65.5-68' poor recovery sandy ls,
+ gn clay lenses - poor 3m cavities
plugged off

68-~69.9' v hard - ran out of
water - chert
pulled core bbl to check bit -
appear ok

cleanup site / lock up
Rig has 1801

retn whse: 5:35 pm

inner bbl slw had
cracked off + damaged inner
bbl in place

Need Pipe dope
bottled WATER

44

4-14-05 KC, EH, VH -

ofc then to site APR 11:30 AM

SWC 11.5'

run core bbl back into hole

69.9-70.5 - gray translucent chert
V slow drilling (~1/4" / minute)

70.5-71.75 chert w limestone
fragments(?) - inner bbl.

lammed - pull rods -

used appx ~1000 gallon to
drill ~1.5'

run core bbl back in

Rig hrs. 1884 end day 5:50 pm

4/15/05 EH, JH

ofc. then to INTERNATIONAL INF. DEPT 6017
then TWIN T. ref shelving

@ SITE ~10³⁰ AM CITY, WIND, USGS
present upon arrival. Looked @ core

They dept ~11¹⁵ AM

PULLED 70' + 8' ^{core} BARREL TO
ADVANCE 4' ~~core~~ TO ~34'

PACK UP Dept Rig hr. 1888

SEF ST JOE #2
DS900 #2
SEF ST JOE #4
SEF FARM #3
Hwy 441 N to Hwy 94
(past GA line, past
Cypress ck

go Rt on 94 to
dist rd opposite
lumber co pole barn
at mile post ?

go 1/4 mi to gate corner
left
follow road to hunt
camp gate then turn L
go

45
4-18-05 KC, JH. KC tied
up in the AM

ARR site 12:30 w heavy rain
EXTEND 4" CSG to - 38'
RUN 3" CSG to ~ 59'

change core bit to Alpha 10
impreg -

71.75 - 73' chert as above
then is w some chert

Rig hours 1891
RETN of 630 pm

4-20-05 KC, JH 9 AM leave the
water then to site mix mud

73 - 75.5' White ls 1st foot
then 6" chert then black mtl
ls

75.5 - 78' ls, wht, crumbly. poor
recovering this section - then
more chert - 11 lost 4" recovered
78 - 80.5' lots of chatter - only
2 fry ls recovered (.2')

light failing
spyder plate
bore seal
quit gel

Landing ring

46

pull NQ
drill in 3" CSG to: 70'
- req v high down pressure
w crackle shoe - essentially
'quit penetrating -
may need diamond shoe

- change out series 10
bit - run NQ back in -
won't go thru 3" shoe
pull NQ / pull 3" CSG
CSG shoe finished - see some
brass matrix rolled in.
Run 3" CSG back to btm
with another shoe
end day Rig hours 1896

4-21-05 KC, S.R. 9AM
leave ofc - gas stop / ~~last water~~
- air lift cuttings from btm
of corehole
Run NQ into hole - bit won't
pass end of 3" CSG (tape measure
goes full depth. - drill in
NQ to drill out ledge / straighten
tube - make WATER RUN
wash in bore seal or lost circ
MATERIAL.

80.5 - 85.5' cream / lt bn. ls.
 poor to mod ind. - some muddiness
 iron staining (may be from rods)

85.5 - 90.5' cream granular powder
 ls. poor to mod ind.

90.5 - 95.5' soft granular ls.

~50% recovery - washing

95.5 - 100.5' same, poor ind.

100.5 - 103' cm + lt bn v soft granular
 ls. - ~50% rec

103 - 105.5' cm + lt bn ls. granular
 and muddie - mod. well ind.

105.5 - 110.5' cm granular pasty
 ls. poor ind.

END CORING FOR DAY

Rig hours 1901

pm ND ~ 17'

RETN OFC 600 pm

4-22-05 KC, JA 2:30 dr of
 pump well to pump for spec
 from drill rods

Hal collects water sample
 - run drill rods bk to btm
 110.5 - 113' soft cm granular
 ls - ~50% recovery -

SEF. FARM STAGE #3

SEF. ST JOE #4

SEF ST JOE #2
 D59000 #2

80

6

79

75.5

2.75

72.75

load

Quik gel

3" csg

48

last 5" med bn hard dolomite
113-115.5' hard med bn dolomite
brittle

decide to advance 3" csg -
attp get circulation back

115.5-116' ~ 2" rock then small cavity
NO top now below table - can
work new csg - plug top of NQ

pull 3" csg chg shoe to
Langgar Alpha 2 imping
run 30' into hole -
+ storm delay 300-330
drill in 3" csg to 72.75'

rig hours 1906

return where 6:10 pm

4/25 JH, EH

8:30 ^{am} load Quik Gel, 3" casing
got water & Diesel Fuel
10:15 ^{am} @ SITE BIG TUBE LEAKING

12 noon SR arrive

Drill 3" from ~73'-78'

78: 83'

83-88'

3" CASING

88-93; 93' ~ 98.5' 49

3" Casing to ~ 98.5'

RAN TAPE INSIDE NQ to 115.5'

BEGIN CORING AGAIN. - NO CIRCULAR
115.5 - 120.5 Hard cemented LS

~ 97% RECOVERY

PACK UP SITE

RIG HRS. 1911

6:45 pm @ WH

4/26 EH, SR, JH 8:30 AM Dept WH

GOT FUEL FOR DEP 558'S USED TO FILL
RIG. STATIC WL 13.5'

Met HAL DAVIS, JOHN MORRILL

TOOK SAMPLES FROM BOTH WELLS

CONT' TO CORE w/ LIGHTNING / RAIN

120.5 - 125.5

1 pm LIGHTNING 2 pm KC. said

come back to WH

~ 3 pm Arrive @ WH

4-27-05 KC, JH 8:20 leave where

125.5 - 128' hard bn dolomite w
some softer zones - some inclined
organic laminae

Need:

<Soda ash

128 - 130.5 ^{wdm} 3" rock ⁵⁰ then ~ 1' cavity
back into mid br. dolomite.

some burrows(?) + fossil molds
130.5 - 135.5' br dolomite mostly
well ind. some burrowing - some
soft zone

135.5 - 140.5 br dolomite - dolosilt
- 4 zone at ~ 139-140
140.5 - 143.5

5-2-05 BC, SR

get water and arrive at
Site @ 10:30 am.

core samples taken until 140.5
using longear system according
to core box.

Tagged bottom @ 143.6' checked
under barrel and found core
sample in core barrel.

~140.5 - 143.5 - hard dolomite
until 142' ~ 2.5" layer of
possible dolosilt followed by
more hard dolomite.

143.5 → 145 ruggy dolostone
~~145~~ 145 - ~~147~~ ~ 147 dolomite

147 - 149.3 - cavity

149.3 - 149.6 dolostone

149.6 - ~ 149.8 cavity

150 - dolostone

150 - 155 - Several small cavities
 noted between 150.5 - 151.5'.

apx 3 cavities roughly 2-3" in
 vertical depth.

153 - 155 appears to be possibly
 dolosilt

155 - ~ 157' Hard dolomite, plugged
 inner barrel.

Pulled inner barrel, and hung the NX
 7' off the bottom.

Cleaned up site and headed
 home.

Rig hours 1920.

Return to whse 6:40 pm.

Dully mileage
 528077

HAVANA FORD
TRANSFER CASE
ball joints

DAVID HORNBY

5-3-05 KC, SR - load quick
gel + soda ash, make water stop
then to site.

pull 15' NQ - pump table then
drill stem - pump for water
sample. mud cleared out
almost immediately
pumped 9:50 - 10:20 AM

Run drill rod back to bottom
~157 - 160.5' lt bn dolomite ~1.5' then
whit. ls ~1.5' before back into dolomite
160.5 - 162.5' lt bn dolomite poor
recovery - some soft zones and/or
cavities
162.5 - 165.5' lt bn brittle dolomite
last 9-10" cm ls.
165.5 - 170.5' some ls + dolomite
fragments at top then ~15"
whit ls. ~9" dk bn dolomite then
into cm/lt gy granular ls ~35'
recovered.
170.5 - 175.5' soft granular ls whit.
cm, lt bn
175.5 - 180.5' lt bn + cm granular
ls. mostly med ind some
(cm staining / clay filled) near

180.6 - 185.5' crm granular 13

end coring for clay
leave site 5:30

Rig hours 1926

ret'n of 6:30 pm

5-4-05 KL, SR leave of 10:30
lube rig, run NQ bk to btm

185.5 - 191.25' crm 14 bn granular
to ~ 3.5' then back into
hard bn dolomite

~~set core tools on btm~~
~~with cap NQ + Adv. 3" csq~~
pull NQ to Adv 3" csq

Drill in NW csq to ~ 118'
out of water
to FGS to pu Expedition
Arr whse 6:10 pm

fuel for fresh pump

SEF. Karm Stbe #3

SEF. St Joe #4

SEF. ST Joe #2
D9900 #2

Maintenance

rapid retract valve

hyd hose leak

- chg seals R.A.D.

feed bushings + slide plates

TRAILER

2 tires

brake actuator

replace coupler

~~exchange base of kwik clamp~~

Quick Gel

RAGS

5-10-05 KC, SR ARR site 12N 54

mix mud

RUN NW csg fr ~118 to ~137

out of water

hydraulics overheating
end day

Rig / hours 1933

RETN whse 500 pm

5-11-05 KC, SR 9am start
load Quick gel sty. for water

cont. drill in NW csg

w/ csg at 143' - open hole to 150

Drill csg to ~152 - hole got tight

pulled csg to 115' before
things loosened up.

Drilled csg to 155.5 ±

on hand stuff - either bore
or casing shoe gone -

insertion siphon in ~ 1/4 bag
benzoc + ~~set~~ push csg

last 4' (mud came to
top of csg when topped off)

End day Rig hrs 1937

ARR whse 6:15 pm

5/13/05 SR, EH

SH LOADED PIPE, QUICK GEL
EH - ADMIN STUFF

LUNCH

1 pm Dept For SITE

~1:30 ARR. UNLOAD PIPE, FILL TUBES
STEAM CLEAN NEW ROD

Tripped in bit and 70 FT of
new rod.

End of Day Righours 1938

Returned to warehouse 6:40 pm

5-16-05 BC, SP

Tripped in remaining NQ
to ~ 150. Hole was tight
and NQ advanced, but cuttings
kept falling in and replugging
the hole.

decided to air lift and ran
1 1/4" trimmy to 150 and added
10' more. Large gravel size
pieces came up along with
very coarse cuttings.

Lightning detector
B-Series
9V3

for 5/17/05

★ Remember:

9 Volt batteries
Rags in a box

30° 20.222

84° 13.171

3500 maneuvers

56

packed up and left
green trailer @ site.

Rig^{BC}

Hung NQ ~ 18' off the bottom.

Rig Hours 1941

return to WHSE @ 6:45 pm

Bring back
50 NWJ

2 bx ropes
9 ambag/bags

5-17-05

KC, JR

163' NQ + core bit - less 3' string
cuttings app. at btm of bit

Air lifting cuttings unsuccessful,
run wash in NQ to 191'

- save to lower - put stuff for
airlift

NQ capacity $\sim 2.5 \text{ gal}/10'$

13.2
17.5
2.5
33.2
350
43.75

67

load NQ rods for casing
 trash pump + subs
 return Whse 5:15 pm
 Rig house 1942

5-18-05 Kc to sprayfield
 arr 12:00 pm

mix mud - attp turn in
 csq - no go - apparently
 new csq shoe worn out
 - set csq on bit + push
 csq bit at ~~155'~~ 155'
 hole open to 191
 NQ hanging at 177'
 pump pump for water spec

after purging 45 min at 109 pm
 still muddy pump for 1 hr

collect filtered water spec
 Rig house 1944

5-19-05 pull rig off site to
 replace hydraulic leak

5-19-05 KC, BC

to T.T. - look at site inv.

Air compressor + crane.

to Sonar Tractor - drop A.C. +
Wash pump for repair

- pull Mould off site - to TT
remove crane from truck to be
supplanted

drop mbl dr off at TTH Hqd for
repair truck

End miles 11964

5-24-05 KC, BC - 9AM start

for qc. water + fuel stops

set rig back upon site.

mix mud, re assemble

circ sys.

wash hole

start coring again - still no circ

191.25 - ~ 193.3 - hard bn dolomite
some molds + fractures

193.3 - 194' hard bn dolomite

194 - 195.5 - cavity or v soft - NO
resistance - NO recovery

195.5 - ~ 197.5' soft - granular
then rubbley bed below

Quick gel
cooker in ice

Jones fractal 877-5523

ingress -

fracture -

~~fracture~~

briggs -

Hydraulic fluid
STEEL tap weight

~197.5 - 200.5' hard bn dolomite
~1' then softer ls (not recovered)
- last bit NO resistance.

1/2 off

mix mud, packing
rig hydraulics V test

Rig hours 1953

5-26-05 KC, BC ARR 1pm

mix mud after setting up mud line

200.5 - 203' ~1' cavity
at top then rubble - then
hard bn/gg dolomite

203 - 205.5' - 1st st as above
then softer more friable bn dolo.

205.5 - 210.5' bn dolomite
most to well ind

210.5 - 213' bn + gg dolomite
well ind - organics? + bioturb

OUT OF WATER

Rig hrs 1956

~~Hydraulic fluid~~
~~Ext. cord~~
~~generator~~
~~San~~
~~trash pump~~

all
55 ft
down
about

5.27.05 BC, EU
ARR ~ 10:15 SET UP, FILL HYD
TANK, GENERATOR, MIX WIND
HC at NOON

drill 12 1/2' last rod back down

213 - 215.5 - NO RECOVERY

215.5 - 220.5' - only 3-4 chunks

slonik recovered ? inner bbl

latched ? - pop clean water

down rods to run tape

- dropped core -

picked up 1 10" piece of
core w inner bbl

220.5 - 223. drilled smooth -

NO recovery - go back w

different shoe

223 - 225.5' NOSM

- will pull rods + core bbl

recovered ~ 1' of core -

don't know where it came from

- depth intervals from 215. - 225.5

are any ones guess - several

chunks of core have obs. ground

marker on end

Rig hours 1960

retro 2pc
225.5 -

61

6-1-05 BC, EH
BC ^{arrived} to site @ 10:00 am
EH arrived @ 10:23 am
Hal Davis took H₂O samples

tripped in NQ and moved
trailers to get Steam cleaner.
left and BC returned to
WHSE @ 5:15 pm.
Frig hours 1962

6-2-05 BC, SR

Load up centrifugal, Help
DP with Steam cleaner.
Head to site and arrive @
~~11 am~~ 11 am.
tripped in NQ, bit plugged.
ran in inner barrel and up
unplugged it.
Bit @ 224.8, Bottom of hole @
225'

put in inner barrel to
clean out hole.

225.5 - 230.5 gray, mottled
Calcarenite

230.5 - 235.5 gray clayey
~~Calca~~ Calcalutite?

235.5 - 238.5 SAA

last foot tan rx Calcalutite
Lost a piece of core down
the hole.

packed up and returned
to WHSE @ 6:40 pm

Rig hours 1967

6/3/05

SR+EH

10:30 depart WH.

Drop trash pump at ~~SE~~ Jones Tractor
(ready on Tuesday)

got water, Secured items for

D. Paul / CME unable to drill due to lightning
Departed site @ 2:30

6-6-05 BC, BH

arrived @ site 11:20 am
 made mud and drilled
 last 2.5' of previous run.
 The 238-240.5 run used
 150 gallons of water.
 made #20 run. used it
 all. Afternoon storm
 moved in. packed up
 and returned to whse @ 5:00 pm.
 238 - 240.5 dolomitized LS
 some mottled w/organics
 • 239 - 239.8 gray rock w/
 organics.
 239.8 - 240.5 Creamy limestone
 out of water
 Rig hours 1970
 vetu whse _____

6-7-05 KC, BC ARR site 2:00 pm
 240.5 - ~ 241.25 hard grey bottle ls
 - lots of chatter poor penetration
 - pulled NQ - will run in
 series 10 impreg.
 run in ~ 140' NQ
 End day

6-8-05 KL, BC - help ⁶⁴
Craig load out trailer etc
then to Springfield
Dead water / mucky mud

drill 241.5 - 250.5 TD
SEVERAL RUNS

241.25 - ~242.5 - bn dolomite
rubbly - finely divided organic
+ clay
~242.5 - ~243.5 - CREAM ~~more~~ dense ls/
dolo - fracture w iron staining
at btm more black organic clay
243.5 - 245.5 more of the same
then lt bn ls + v hard dk bn
dolomite 248.5

245.5 - ~~248.5~~ Dolomite as above then
dolomite (not well sorted) cream
ls then bn dolomite - softer + more
porous than above, fossiliferous
249.5 - 250.5 - cream ls

250.5' TD

Thunder storm - rain when
4:30 pm
CANNOT pull suction w/ after
Moyno or trash pump

6-9-05 KC EH

65

slump diaphragm pump.

risht well ~ 2 hrs at 8-10 pm
has pair spr well

KC, EA - trip out NR, Chg
bit on core bbl - ser 2 impig

6-13-05 KC, LB - pull 4" csg
put on fd diamond shoe -
drill back down to ~ 67.5'
out of water

6-14-05 KC, EH - am ~ 11 AM
drill 4" csg to ~ 73.5'
- while drilling felt pump
then no hydraulics -
thru shaft on hyd. pumps
and/or PTO - too hot to
touch - make water run
ATTN. TO DROP GREEN TRAILOR @
LEE SALES FOR R&MR - BUT CLOSED.
6:15 BACK @ WH

6-15-05 - pull hyd. pump
& PTO - to TCH Hyd for
rebuild
trailer to Lee Salen & Nervo
time

6-20-05 KC, LB
install pump + PTO
- nd orig for suction

BC @ 12:30

6-21- KC, SR, - install hyd.
stop on pump - refill hydraulic
fluid. cks for leaks, start
drilling in 4" csg - v slow
lots of water usage
drill to ~ 83' - out of water
set pnt. csg on shallow well
Rig down 1985

end day 5:30 pm

6-22-05 KC, BC leave when
9:00 AM - WATER run / KC calls for
Dave - nda csg. - call CRAIG re csg

ck / tighten flgs on pto/pump
fix trash pump on mud line

~~ARK~~
~~DAVE~~

Chelsea PTO
mod # 440XUESX-WSXK
DATE/SN 9116

Brie returned from live oak
@ 6:45 pm

12' 6" CSG
120' 4" CSG
155.5' 3" CSG
250' fd

SLN 175-225'

67
drill in 1" CSG to ~100'
load 3" CSG at CRAIG site
to go to DAVE
Brie to meet DAVE w CSG
KC end day 330

6-23-05 KC EH - water
run, take borehole camera
to CRAIG then to site

drill in 1" CSG to ~123'
out of water

6-28-05 KC, EH, BC - deliver
TREMME to LEE + CRAIG
- pull 3" CSG - unload
unij, chg bit on 3 7/8" REAMER
~2:30 pm Rt. to warehouse

6/29/05 EH, SR

GET WATER, OBTAIN 20' MAXHUGH JR.
1/2 Sub from SERRAM SITE, 2-10's
MAXHUGH JR ROD IN A 20'.

PULLED ALL 4" ~120'

RIG HR. 1992

Lighting 3-8 @ 4pm

6-30-05 KC, CB to
Springfield in 10:AM

START REAMING 6"

REAM to 12' (btm 6" casing)
to ~73'

- pull reamer. hanging up
2 rollers on bit loose -
reducing OD(?)

- order repl. 5 7/8 button
bit for NTN ~800 + ship

END day 5:30 PM

rig hour 1996

7-5-05 off wk until bit

arr - KC, CB + BCL to Springfield
w 2 trucks/water tanks

- install new button bit
drill to ~75'

- wings on reamer hanging
up on wall - CANNOT proceed

- pull rods, break MHR

- to T&H weld to get smooth
stab. built

10' MHR w 8.25' 5 7/8 OD pipe
centered over it

1.5' clear at top 4" clear at btm

69
7-6-05 KE EH pu
5.5/8" stabilizer for the well
- run put bit on - run in
- run to 92' - tight
hit on hole - went down
back in
pull rods + reamer
- plan to put some hard
facing on stab. to make
some relief
Rig hour 2000

7-7-05 - to site, fold mast,
tidy up/tie down pending
Hurricane Dennis

7-11-05 KE, EH
tag top of cuttings at 80' bws
in reamed hole (reamed to 90')

Air lift chgs for hole to 095' bws
RTN WUSE 5:15 pm
Rig hour 2003

Remble throttle - haywire - wont
maintain set rpm - either
drops to idle or zooms to 1800rpm

shop list

- 1" x 1/8" x 3' strap
2) 3" x 2" bush
4" x 2" bush

Rags

70

7-12-05

load 2" pvc, 12 compression
- spare time for wtr truck
KC to Connie Lilen - per switches
etc for remote throttle

replace remote throttle switches

SWC 11'8" b/s

hole open to 93.25'

replace - run 2" pvc
ductor - air lift cty
fr. hole while waiting
for Eric

Back @ WH @ 6pm

7-13-05 KCH off till 11

to Connie Lilen / site

compl. switch instl.

re set 6" csq - 123'

hole open to 99.5'

set up 5 7/8" button bit +

stick stab. to cont. running

7.14.05 BC, EH left for site @ 7/

11 am. Stopped @ discount
auto.

got to site @ 11:55 am.

Had to re-drill reamer and
drilled to 114'.

Hydraulic hose bursted and
ended for day.

Clean up → BC to TLH

Hydraulics to pick up hoses.

BC returned to whse @ 5:30p

Rig Hours 2011.

7-15-05 KC, BC to site mid am
make gage/shut off valve for
inline / repl rot. hoses
comp reaming w 5 7/8"

Rig hours 2013

retn whse 500pm

7-18-05 KC, EH ~ 10:30 start
pull NWJ w 6 7/8"

run borehole camera to
ensure 6" hole centered on
corehole

go back in w NWJ + 3 7/8"
bit

SEF. ST JOE #2
DS9000 #2

SEF. ST JOE #2
NGELS FARM #2

SEF. ST JOE #4
SE. FARM STOE #3

221
70
151

3/8 bit + REAMER/W MHR
SUP = 5.75'
215' NWJ + MHR

ream to ~151
END day
rig hour 2017

7-19-05 KL, LB 8:20
stand

CONT REAMING to ~
190 - out of time
take off 25'
pu - 15'

7-20-05 KL, EH to site
~ 12N.

lower 15' picked up
turned in 25' pulled

ream to 200' - cavity fill
keeps coming into hole -
no progress

- pull well to 200 w
SEN @ 175 (CONV. w H.D.)

RAI
DAVIS

lay out eqy + screen,
set centralizers

7-21-05 KC, EH.

SAND + cement to site
pull newj w 3 7/8" reamer

run well away into hole -
blocked off 135'

run borehole video - 1
large clast occluding hole
- made bailer/bit + pushed
to btm.

run camera again - another
rock at ~155'

bailer doesn't move or
break it (30' newj w
subscr.)

will need to drill thru out
rig hours 2025

VEIN where: END day 5:30 pm

7-25-05

KC EH ~noon to site -
run in 3 7/8 bit + reamer to
drill out bridge.
Cent. ream to ~211'

SEF. Kamen Stoe #3

SEF. St Joe #4

SEF. ST JOE #2
DS9000 #2

85
Cavities - via borehole CAM.

44.5 -

47.5-55 OS hole

- to top of chert OS.

~ 109 vertical fracture

~ 110.5 - pulling water from side.

117

~ 141 - flow from side

~ 148 OS

~ 160 OS

~ 166-168

~ 192-193

CAM IV
BEGINS

75
w) water - mix mud to stab
hole while running well casing.

install well casing. gone to
~ 164' - hits ledge or
rubble won't go more

2" locking cap

7.26.05 KC & EH

pull well casing - run camera
run NWT on probe - RE run
camera - to btm. - NO rocks
dislodged on way out.

hang well casing successfully
SEN. 175-205"

RIG HR. 2030

retu whse 5:30 pm

7-27-05 KC, SR - start

filter packing - 14 bags to ~ 195'
pumping at ~ 25.30 gpm fr. well
to Walmart. more math.

- 36 bags gravel + 6 sand to
~ 194'

Shop / To do list

- Move compressor on mbl drill
- hyd. coating for mbl drill
- research options - pto/pump.
- mount 2nd hoist
- METAL TANK off CRAIG with tank 1025 perry tank on
- RESEARCH higher speed rotation motor
- lightning detector - cring
- mud like mix pump to trailer deck
- 135 gal. tank to go trailer
- pump all water tanks 2" 3" X 2" bushings
- NEW rot. pump gage (3000)
- industrial air q/c
- TO SHORES INT
- CRANE
- bumper made / rod strap tray

7-28-05 KC, EH midday - remove
Bridg
and day 5:45 pm

7-29-05 KC EH
SWL hole open to 205'
12.4' bLS

TRAMMIE 16 bags filter sand
to 165'

Rig house 2033
+ S. moving in

* ~~5' 3/4" TRAMMIE~~
~~HOLE PLUG~~
~~PAD LOCKS~~
Well Protection

8-1-05 KC, SR

tag top of filter pack 166' bLS
(was trammie 1/2 bag bentonite chips
pump 3 bags portland + 5% bent
→ 164')

3

SEP ST JOE #2
Dsgood #2

735 g of water

of grout required to grout 10 feet inside the casing for abandonment	Volume of Well	Bags of Cement (94 lb.)
2"	.22 ft.3	.2
4"	.87 ft.3	.7
6"	1.96 ft.3	1.6
8"	3.49 ft.3	2.9
10"	5.45 ft.3	4.5
12"	7.85 ft.3	6.5

$$543 + 86.86$$
 $41' =$

XII

Natural Trigonometrical Functions

Angle Sin. Tan. Sec. Cosec. Cotg. Cosin.

32	.5299	.6249	1.1792	1.887	1.600	.84805	58
10	.5324	.6289	1.1813	1.878	1.590	.84650	50
20	.5348	.6330	1.1835	1.870	1.580	.84495	40
30	.5373	.6371	1.1857	1.861	1.570	.84339	30
40	.5398	.6412	1.1879	1.853	1.560	.84182	20
50	.5422	.6453	1.1901	1.844	1.550	.84025	10
33	.5446	.6494	1.1924	1.836	1.540	.83867	57
10	.5471	.6536	1.1946	1.828	1.530	.83708	50
20	.5495	.6577	1.1969	1.820	1.520	.83549	40
30	.5519	.6619	1.1992	1.812	1.511	.83389	30
40	.5544	.6661	1.2015	1.804	1.501	.83228	20
50	.5568	.6703	1.2039	1.796	1.492	.83066	10
34	.5592	.6745	1.2062	1.788	1.483	.82904	56
10	.5616	.6787	1.2086	1.781	1.473	.82741	50
20	.5640	.6830	1.2110	1.773	1.464	.82577	40
30	.5664	.6873	1.2134	1.766	1.455	.82413	30
40	.5688	.6916	1.2158	1.758	1.446	.82248	20
50	.5712	.6959	1.2183	1.751	1.437	.82082	10
35	.5736	.7002	1.2208	1.743	1.428	.81915	55
10	.5760	.7046	1.2233	1.736	1.419	.81748	50
20	.5783	.7089	1.2258	1.729	1.411	.81580	40
30	.5807	.7133	1.2283	1.722	1.402	.81412	30
40	.5831	.7177	1.2309	1.715	1.393	.81242	20
50	.5854	.7221	1.2335	1.708	1.385	.81072	10
36	.5878	.7265	1.2361	1.701	1.376	.80902	54
10	.5901	.7310	1.2387	1.695	1.368	.80730	50
20	.5925	.7355	1.2413	1.688	1.360	.80558	40
30	.5948	.7400	1.2440	1.681	1.351	.80386	30
40	.5972	.7445	1.2466	1.675	1.343	.80212	20
50	.5995	.7490	1.2494	1.668	1.335	.80038	10
37	.6018	.7536	1.2521	1.662	1.327	.79864	53
10	.6041	.7581	1.2549	1.655	1.319	.79688	50
20	.6065	.7627	1.2577	1.649	1.311	.79512	40
30	.6088	.7673	1.2605	1.643	1.303	.79335	30
40	.6111	.7720	1.2633	1.636	1.295	.79158	20
50	.6134	.7766	1.2661	1.630	1.288	.78980	10
38	.6157	.7813	1.2690	1.624	1.280	.78801	52
10	.6180	.7860	1.2719	1.618	1.272	.78622	50
20	.6202	.7907	1.2748	1.612	1.265	.78442	40
30	.6225	.7954	1.2778	1.606	1.257	.78261	30
40	.6248	.8002	1.2808	1.601	1.250	.78079	20
50	.6271	.8050	1.2838	1.595	1.242	.77897	10

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

Angle Sin. Tan. Sec. Cosec. Cotg. Cosin.

39	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.6316	.8146	1.2898	1.583	1.228	.77531	50
20	.6338	.8195	1.2929	1.578	1.220	.77347	40
30	.6361	.8243	1.2959	1.572	1.213	.77162	30
40	.6383	.8292	1.2991	1.567	1.206	.76977	20
50	.6406	.8342	1.3022	1.561	1.199	.76791	10
40	.6428	.8391	1.3054	1.556	1.192	.76604	50
10	.6450	.8441	1.3086	1.550	1.185	.76417	50
20	.6472	.8491	1.3118	1.545	1.178	.76229	40
30	.6494	.8541	1.3151	1.540	1.171	.76041	30
40	.6517	.8591	1.3184	1.535	1.164	.75851	20
50	.6539	.8642	1.3217	1.529	1.157	.75661	10
41	.6561	.8693	1.3251	1.524	1.150	.75471	49
10	.6583	.8744	1.3284	1.519	1.144	.75280	50
20	.6604	.8796	1.3318	1.514	1.137	.75088	40
30	.6626	.8847	1.3352	1.509	1.130	.74896	30
40	.6648	.8899	1.3386	1.504	1.124	.74703	20
50	.6670	.8952	1.3421	1.499	1.117	.74509	10
42	.6691	.9004	1.3456	1.494	1.111	.74314	48
10	.6713	.9057	1.3492	1.490	1.104	.74120	50
20	.6734	.9110	1.3527	1.485	1.098	.73924	40
30	.6756	.9163	1.3563	1.480	1.091	.73728	30
40	.6777	.9217	1.3600	1.476	1.085	.73531	20
50	.6799	.9271	1.3636	1.471	1.079	.73333	10
43	.6820	.9325	1.3673	1.466	1.072	.73135	47
10	.6841	.9380	1.3711	1.462	1.066	.72937	50
20	.6862	.9435	1.3748	1.457	1.060	.72737	40
30	.6884	.9490	1.3786	1.453	1.054	.72537	30
40	.6905	.9545	1.3824	1.448	1.048	.72337	20
50	.6926	.9601	1.3863	1.444	1.042	.72136	10
44	.6947	.9657	1.3902	1.440	1.036	.71934	46
10	.6967	.9713	1.3941	1.435	1.030	.71732	50
20	.6988	.9770	1.3980	1.431	1.024	.71529	40
30	.7009	.9827	1.4020	1.427	1.018	.71325	30
40	.7030	.9884	1.4061	1.422	1.012	.71121	20
50	.7050	.9942	1.4101	1.418	1.006	.70916	10
	.7071	1.	1.414	1.414	1.	.70711	45

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

pto
Mod # 440XUESX - W5XK

SEE 4

Key on well cap.
key floor spring, old force

NOT GAMMA

GAMMA/Gamma > Nuclear source
Neutron
inductance
fluid resistance

SEF. FARM STAGE #3

SEF. ST JOE #4

WAGS FARM

SEF ST JOE #2
DS9000 #2

MODEL #

G164RTD

GOODYEAR 11R22.5

5286015

5286015

* lift moore 3200
Serial # G416W7

craig's trash pump

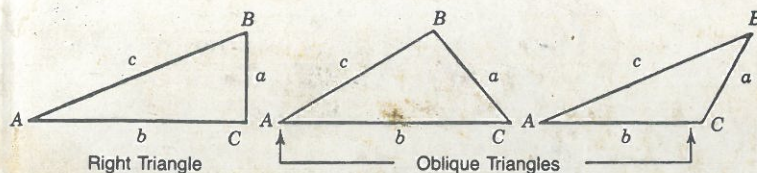
Honda GX160 (5.5)

Model # 106120

6C02-7747609

Dr Low '82
urology Assoc.

TRIGONOMETRIC FORMULAE



Solution of Right Triangles

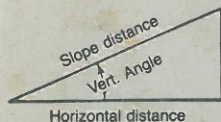
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{a}$, $\csc = \frac{c}{b}$

Given a, b	Required A, B, c	$\tan A = \frac{a}{b} = \cot B$, $c = \sqrt{a^2 + b^2} = a \sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$, $b = \sqrt{(c+a)(c-a)} = c \sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90^\circ - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90^\circ - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90^\circ - A$, $a = c \sin A$, $b = c \cos A$

Solution of Oblique Triangles

Given A, B, a	Required b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180^\circ - C$, $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$ $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a + b + c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{b c}}$ $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{a c}}$, $C = 180^\circ - (A + B)$
a, b, c	Area	$s = \frac{a + b + c}{2}$, $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$
A, b, c	Area	$\text{area} = \frac{b c \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = $5^\circ 10'$. From Table, Page IX. $\cos 5^\circ 10' = .9959$. Horizontal distance = $319.4 \times .9959 = 318.09$ ft.

Horizontal distance also = Slope distance minus slope distance times $(1 - \cos \text{ of vertical angle})$. With the same figures as in the preceding example, the following result is obtained. $\cos 5^\circ 10' = .9959$. $1 - .9959 = .0041$. $319.4 \times .0041 = 1.31$. $319.4 - 1.31 = 318.09$ ft.

When the rise is known, the horizontal distance is approximately: - the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

SEF ST JOE #2
059000 #2

WHEELS FARM

SEF. ST JOE #4

SE. FARM STOE #3