2nd RAI Response for Oil Well Permit Application 1366

Submitted to: Florida Department of Environmental Protection

Prepared by:

The Carol Group, Inc.

Century Oil Co., Inc.

Clementi Environmental Consulting, LLC

For: Kanter Real Estate, LLC

2601 South Bayshore Drive, Suite 1450

Miami, Florida 33133

May 23, 2016

Mineral Interests

1. **Florida law requires that an applicant acquire a lawful right to drill from a majority of the mineral interests within a drilling unit prior to applying for a drilling permit. Thank you for providing the abstract summary dated August 6, 2014. This document includes a records search beginning December 31, 1940. Please provide documentation regarding the conveyance of mineral rights prior to this date. [377.2411, F.S.]**

The applicant owns all of the mineral interests within the drilling unit. Included as **Attachment 1(a)** is a summary of the property's ownership dating back to December 31, 1940, prepared by Manson Bolves Donaldson Varn, P.A.. This summary corrects discrepancies and errors in the title report originally submitted with the permit application.

Further documentation of the conveyance of mineral rights prior to this date is not necessary; Kanter's predecessor in title acquired the property by tax deed on August 7, 1944. A copy of the tax deed is included as **Attachment 1(b)**. The tax deed sale conveyed all mineral rights to Kanter's predecessor in title. *See Caldwell v. Kemper*, 159 Fla. 231 (Fla. 1947); *Lee v. Carpenter*, 132 So.2d 433 (Fla. 2d DCA 1961); Ch. 20722, Laws of Fla. (1941) (a/k/a "Holland Tax Law").

Survey

2. **Department rule provides that routine drilling units be based on the U.S. Government Surveyed Township and Range system, and that exploratory oil wells drilled to a depth greater than 7,000 feet be located within 160-acre units (i.e., quarter-sections). The bottom hole location of these wells must be no closer than 920 feet to the nearest drilling unit boundary. [62C-26.004, F.A.C.]**

   Department rule also provides that other established lines, reference points, or methods may be used when section corners are unavailable and an inordinate amount of preliminary surveying would have to be done to establish section corners or other standard reference points. [62C-26.003(7)(c), F.A.C.] The Response indicates that the drill site has never been surveyed by the State of Florida or the federal government, and proposes that state plane coordinates be alternatively used to specify the drill site and bottom hole location. It appears that the proposed location for the drill site and bottom hole location would not shift upon establishment of section corners (if different from state plane coordinates), unlike the location of the applicant's property or the drilling unit. Because the response appears to be silent on the degree of discrepancy possible, please clarify the following:

   Whether the proposed drill site could be located on property not owned by the applicant; [377.241(2), F.S.]

No. The proposed drill site is located in the midst of approximately 9,000 acres of property owned by the applicant. See **Attachments 2(a), (b), and (c),** which show the proposed bottom hole location in relationship to the nearest section, the toe of the L-67A levee, and the surrounding Kanter property boundaries, respectively. The nearest third-party ownership interest is the right-of-way to the L-67A levee, which extends 130 feet from the centerline of the levee. The drill site is located 332 feet from the levee, more than 100 feet from the right of way.

Whether the proposed bottom hole location could be located in a drilling unit for which the applicant does not control the majority of mineral interests; [377.2411, F.S.]

No. The applicant owns all of the mineral interests in this and all of the surrounding drilling units, so the proposed bottom hole location will be located in a drilling unit for which the applicant controls a majority of mineral interests.

Whether construction of a well to the proposed bottom hole location is necessary to prevent waste or to protect correlative rights. [62C-26.004(6), F.A.C.]

The proposed bottom hole location is a routine well location, so 62C-26.004(6), F.A.C. does not apply.

3. **The Response included three maps indicating the drilling unit boundaries. There appear to be discrepancies or errors in the maps including: the drilling unit is in different locations when viewed against aerials; map 4.2(c) should say NW ¼ not NW ½; scales should be available on all maps; and, well offsets from section lines should be included on all maps. Additionally, the well offset from the section line appears to be less than 700 feet, while the application states the offset will be 920 feet. Please clarify all discrepancies.**

We have corrected all of the discrepancies in these maps. Please see **Attachment 3**.

Wildfires

4. **During the September 1, 2015 meeting between Kanter representatives and department staff, it was indicated that the property was recently affected by a wildfire. Recognizing the potential for a similar occurrence during drilling activities, please provide a plan to address potential wildfires.**

The applicant revised its safety plan to address potential wildfires. Please see **Attachment 4**.

Site Access

5. **Department rule requires that existing roads be used wherever feasible. Thank you for your response regarding use of the levees located off U.S. Highway 27 and U.S. Highway 41. It is the Department's understanding that a right of way permit will be necessary to obtain authorization from the South Florida Water Management to utilize the levees to access the site, including activities on the driveway and pad area. Any access road improvements, however, would trigger further review by the Department's oil and gas program. [62C-26.003(10), F.A.C. and 62C-30.005(2)(a), F.A.C.]**

The applicant has noted your comment.

Spoil Area

6. **Department rule requires that drilling sites be located to minimize negative impacts on the vegetation and wildlife, including rare and endangered species, and the surface water resources. The Response indicates the spoil area is intended to receive material from demucking the site. Please clarify whether locating this material on site minimizes impacts to vegetation and wildlife, including rare and endangered species, and surface water resources. [62C-26.003(10), F.A.C. and 62C-30.005(2)(b)(1), F.A.C.]**

Based on comments from the department's Environmental Resource Permitting Program, the applicant concurs that the material may no longer possess the existing soil characteristics if it is stockpiled for 10 to 30 years. Therefore, the applicant has decided not to have a spoil area and will haul the muck that would have comprised the spoil area from the site instead. This will reduce the impact to wetlands by one acre. The applicant revised the plan sheets to remove the spoil area. See **Attachment 6**.

Technical Design

7. **The application and the Response indicate that all stationary equipment containing fluids will be located in the high-density polyethylene lined containment area in order to contain those fluids in the event of leakage. It is also stated that a "containment berm surrounding the fuel tanks will retain 1.5 times the tanks' stored volume." However, the Spill Prevention and Clean-Up Plan states that the primary earthen berm will be constructed around all tanks to a height sufficient to contain 2 times the capacity of the largest tank. Please clarify the design of the primary containment area.**

The design of the primary containment area will comply with the Spill Prevention and Clean-Up Plan. The primary earthen berm will be constructed around all tanks to a height sufficient to contain 2 times the capacity of the largest tank. Included as **Attachment 7** is a revised permit application (without attachments) with this corrected information in Section 6.4.

8. **The pad layout shown in Sheet C-2.02 appears to be a revision of the layout provided in the original application; neither layout provides dimensional details of the pad. Please provide a detailed plan view of the proposed pad layout, including the external dimensions of the pad and the locations of the well, storage tank(s) and sump.**

The applicant revised Sheet C-2.02 to show dimensional details of the pad. Please see **Attachment 6**.

9. **Please provide design drawings showing the dimensions and locations of the primary containment area around the wellhead equipment and, if different, the primary containment area around the storage tanks. Please include locations of stationary equipment and tanks.**

Please see Sheet C-2.03, included with **Attachment 6**.

10. **General Note #14 (Sheet C-1.01) of the engineering construction plan set states that "disturbed areas shall be compacted (at a minimum) equal to adjacent undisturbed ground except when otherwise specified." There appears to be no specification provided for the compaction of the proposed berm and pad. Please specify the required compaction for the berm and pad, as appropriate.**

The material for the berm and pad will be compacted to not less than 95 percent of the maximum density at optimum soil moisture content +/- 2% as determined by ASTM D1557. Please see Oil Pad Fill Specification, Note 9, on Sheet C-1.01, included with **Attachment 6**.

11. **Please clarify the minimum diameter of the proposed rubble rip-rap shown on Sheet C-2.04.**

The minimum diameter of the proposed rubble rip-rap shown on sheet C-2.04 is 9.3 inches. Please see **Attachment 6**.

12. **The discharge outfall design does not indicate the presence of a non-woven geotextile fabric lain below the rip-rap, or the method to stabilize the berm and prevent erosion directly above the outfall. Please clarify whether the applicant intends to install a nonwoven geotextile fabric below the rip rap and methods taken to prevent erosion directly above the outfall.**

Please see detail 6.1 of revised Sheet C-2.06, included with **Attachment 6**, which now shows geotextile fabric at the outfall.

13. **The Response indicates that the production casing will be tested to 1,500 psi, however department rule requires the production casing to be tested to 1,500 psi or 0.2psi/ft, whichever is greater. Please clarify why 1,500 psi was used in the drilling procedure. [62C-27.005(4)(d), F.A.C.]**

The applicant will test the production casing to 1,500 psi or 0.2 psi/ft, whichever is greater. Please see the revised drilling procedure, included as **Attachment 13**.

14. **Department rule requires casing to be set and cemented in accordance with generally accepted industry standards and practices. The Response states "Kanter will use the industry standard, which is first centralizer to be placed 10 feet above the casing shoe, then every third for a distance of 300 feet" for centralizer placement and spacing. Please identify the sources relied upon that establish this as the generally accepted industry standard used for the design of centralizer spacing and validate the adequacy of the proposed centralizer placement through the entire cementing interval.**

The well driller is Ed Pollister, who has 34 years of experience drilling oil wells in the Sunniland Formation in Southwest Florida. He is one of the most experienced Sunniland Formation well drillers and is well versed in industry practices and standards. His resume is included as **Attachment 14**. Mr. Pollister, leveraging his considerable experience and observations made in the field, uses this standard when drilling Sunniland Formation wells. Mr. Pollister will coordinate with Halliburton to determine the first centralizer placement based on caliper logs and pay zone thickness, which will be determined post drilling.

Hydrogen Sulfide Safety Plan

15. **Department rule requires that the operator develop a plan to safely and effectively control any hydrogen sulfide encountered. The plan must meet generally accepted industry practices, include a personnel training and safety program, and include contingencies for notifying authorities and evacuating civilians in the event of an accident. The Response indicates that a Hydrogen Sulfide Safety Plan was developed in accordance with 30 CFR 250.490 and Chapter 26C-27.001(7), F.A.C. Please note that 30 CFR 250.490 appears to be a federal hydrogen sulfide regulation for drilling, completion, workover and production activities conducted offshore. Please clarify whether this industry standard is appropriate for onshore activities or revise your response and plan, if necessary, to include standards which are consistent with the onshore oil and gas industry (e.g., American Petroleum Institutes' Recommended Practice 49).**

Attachment 15 is a revised hydrogen sulfide Safety Plan, which is based on the standards set forth in American Petroleum Institute Recommended Practice 49.

Attachment 1(a): Summary of Ownership

Summary of Property Ownership Since 1940

- December 31, 1940 warranty deed from Leo and Miriam Rosen and J.O. Sadl to Victor J. Tatham and Earmia A. Tatham
- February 18, 1941 deed from J.O. Sadl to Victor J. Tatham and Earmia A. Tatham
- August 7, 1944 tax deed to Dallas Investment Company.
- August 22, 1944 document from Board of Trustees of the Internal Improvement Trust Fund to Everglades Drainage District conveying "right to reservations for canal purposes reserved by said Trustees in the sale of land heretofore made by them"
- 1949 deed from Trustees to Everglades Drainage District conveying "right to reservations for canal purposes reserved by said Trustees in the sale of land heretofore made by them" (the properties in this deed are all right of ways for canals)
- October 12, 1950 quit-claim deed from Everglades Drainage District to Dallas Investment Co., Victor J. Tatham, and Earmia A. Tatham (specifically grants all oil, gas and mineral rights for these lands)
- 1950 easement from Tatham and Dallas Investment Co to Flood Control District (specifically prohibits District from interfering with oil, gas and mineral rights of grantor)
- July 9, 1952 deed from Dallas Investment Co. to Victor J. Tatham
- July 9, 1952 oil, gas and mineral deed from Victor J. Tatham and Earmia A. Tatham to Shell Oil Company
- February 25, 1953 deed from Scott Loftin and John Martin to Central and South Florida Flood Control District (conveying various strips of land for canal right of ways)
- March 24, 1959 deed from Earmia A. Tatham, as Executrix of the Estate of Victor J. Tatham, to Kendall Krome Industrial Park Inc. ("**Kendall Krome**"), reserving to Tatham the rights from DB 711, page 282 (which was the 1950 easement from Tatham and Dallas Investment Co to Flood Control District which specifically prohibits District from interfering with oil, gas and mineral rights of grantor) and subject to the 1952 oil, gas and mineral deed from Tatham to Shell Oil Company
- March 31, 1959 deed from Kendall Krome to Allstate Dredge Co., but subject to DB 711, page 282 (which was the 1950 easement from Tatham and Dallas Investment Co to Flood Control District which specifically prohibits District from interfering with oil, gas and mineral rights of grantor) and subject to the 1952 oil, gas and mineral deed from Tatham to Shell Oil Company
- April 20, 1965 oil, gas and mineral lease from Thomas J. Tatham, individually and as Administrator of the Estate of Victor J. Tatham, to Humble Oil Refining Company
- March 10, 1966 rental division order from Humble Oil to Thomas L. Tatham, individually and as Adminsitrator of the Estate of Victor J. Tatham (payment for oil, gas and mineral lease)
- June 12, 1967 deed from Allstate Dredge Co. to Airo Jet Industrial City, Inc. ("**Aero Jet**") subject to the Flood District easement and the Humble oil, gas and mineral lease (mentions that Tatham is the president of Airo Jet and retains an interest in these lands)

- August 12, 1970 quit-claim deed from Thomas L. Tatham (individually and as Adminstrator to the Estate of Victor J. Tatham and executor to the Estate of Earmia A. Tatham) and Bernice Tatham to Airo Jet without any reservations
- April 1, 1975 deed (conveying one parcel) from Airo Jet to Kanter Corp. of FL
- April 6, 1975 deed (conveying three parcels) from Airo Jet to Kanter Corp. of FL
- June 10, 1976 deed (conveying three parcels) from Airo Jet to Kanter Corp. of FL
- June 29, 1976 deed (conveying two parcels) from Airo Jet to Kanter Corp. of FL
- November 8, 1978 deed (conveying two parcels) from Airo Jet to Kanter Corp. of FL
- February 10, 1982 deed from Kanter Corp of Fl to Zuckman (one parcel)
- March 24, 1983 deed from Kanter Corp of FL to The Kanter Corp subject to easements, conditions, restrictions, limitations, reservations, if any, of record (multiple parcels)
- June 3, 1996 deed from Zuckman to The Kanter Corp of FL (one parcel, same one conveyed in 1982 deed from Kanter Corp of Fl to Zuckman)
- July 22, 1996 deed from Kanter Corp of Fl to Kanter Corp Inc. (one parcel, same as above)
- April 23, 2015 conversion of Kanter Corp Inc to Kanter Real Estate, LLC

Attachment 1(b): Tax Deed

0060 (2368x3371x2 tiff)

DEED

No. 4757

STATE OF FLORIDA

COUNTY OF BROWARD

KNOW ALL MEN BY THESE PRESENTS: That whereas, Tax Certificate Nos. 1408, 1411, 1412, 1413, 1417, 1420, 1421, 1422, 1423, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443 and 1515 issued the 1st day of July, 1940, were duly filed in the office of the Clerk of the Circuit Court of this county and application made for the issuance of a tax deed based thereon; and the applicant having paid or redeemed all other taxes on the lands hereinafter described required by law to be paid or redeemed, and the costs and expenses of this sale; and due notice of sale having been published as required by law, and no person entitled so to do having appeared to redeem said land, such land was on the 7th day of August, 1944, offered for sale at the Court House door for cash to the highest bidder, and was then and there struck off and sold to Dallas Investment Co., they being the highest bidder for the same and having paid the sum of $3289.13 bid, therefore THE STATE OF FLORIDA in consideration of the premises, and in consideration of the sum of ($3289.13), Three Thousand Two Hundred Eighty Nine and 13/100 Dollars, being the amount paid upon the said tax certificates and for costs and charges, and in pursuance of the statute in such cases made and provided, has given, granted, bargained and sold, and does hereby give, grant, bargain and sell, and convey to the said Dallas Investment Co. and to its successors and assigns, forever, to its own proper use, benefit and behoof the following land situated in the county and state aforesaid and described as follows:

All E of Canal Miami Section 19 Township 50 South Range 38 East, 325 Acres.
N½ Section 28 Township 50 South Range 38 East, 320 Acres.
N½ Section 29 Township 50 South Range 38 East, 320 Acres.
N½ E of Canal, Section 30 Township 50 South, Range 38 East, 155 Acres
S½ Section 7, Township 51 South, Range 38 East, 320 Acres.
S½ Section 8 Township 51 South, Range 38 East, 320 Acres.
S½ Section 9 Township 51 South, Range 38 East, 320 Acres.
S½ Section 10 Township 51 South, Range 38 East, 320 Acres.
S½ Less FEC R/W, Section 11, Township 51 South, Range 38 East, 314.05 Acres
S½ Less FEC R/W, Section 13, Township 51 South, Range 38 East, 313.74 Acres
All Less FEC R/W, Section 14, Township 51 South Range 38 East, 632.19 Acres.
All Section 15 Township 51 South Range 38 East, 640 Acres.
All Section 16, Township 51 South, Range 38 East, 640 Acres.
All Section 17 Township 51 South, Range 38 East, 640 Acres.
All Section 18 Township 51 South, Range 38 East, 640 Acres.
All Section 19 Township 51 South, Range 38 East, 640 Acres.
All Section 20 Township 51 South, Range 38 East, 640 Acres.
All Section 21 Township 51 South, Range 38 East, 640 Acres.
All Section 22 Township 51 South, Range 38 East, 640 Acres.
All Section 23 Township 51 South, Range 38 East, 640 Acres.
All Less FEC R/W Section 24 Township 51 South Range 38 East, 632.54 Acres.
N½ Section 25 Township 51 South Range 38 East, 320 Acres.
N½ Section 26 Township 51 South Range 38 East, 320 Acres.
N½ Section 27 Township 51 South Range 38 East, 320 Acres.
N½ Section 28 Township 51 South Range 38 East, 320 Acres.
N½ Section 29 Township 51 South Range 38 East, 320 Acres.
N½ Less FEC R/W Section 30 Township 51 South Range 38 East, 312.8 Acres.
All Section 18 Township 51 South Range 39 East, 640 Acres.

in the County of Broward, State of Florida, containing 12,805.32 acres, more or less, provided, however, that said land shall continue subject and liable for any unpaid taxes thereon.

In testimony whereof, by virtue of authority in me vested by law, and for and on behalf of the STATE OF FLORIDA, I the undersigned, as

0061 (2336x3342x2 tiff)

DEED 404 PAGE 61

Clerk of the Circuit Court for the county and state aforesaid, have executed this deed and have hereunto set my official signature and seal, at Fort Lauderdale, in the County of Broward and State of Florida, this the 7th day of August, A. D. 1944.

Signed, sealed and delivered in the presence of:

E. R. Bennett (SEAL)
CLERK OF CIRCUIT COURT,
BROWARD COUNTY, FLORIDA

STATE OF FLORIDA

COUNTY OF BROWARD

On this the 7th day of August, A. D. 1944, before me, a Notary Public, personally appeared E. R. BENNETT, Clerk of the Circuit Court in and for the State and County aforesaid, to me known to be the person described in and who executed the foregoing instrument and acknowledged the execution thereof to be his own free act and deed for the uses and purposes therein mentioned.

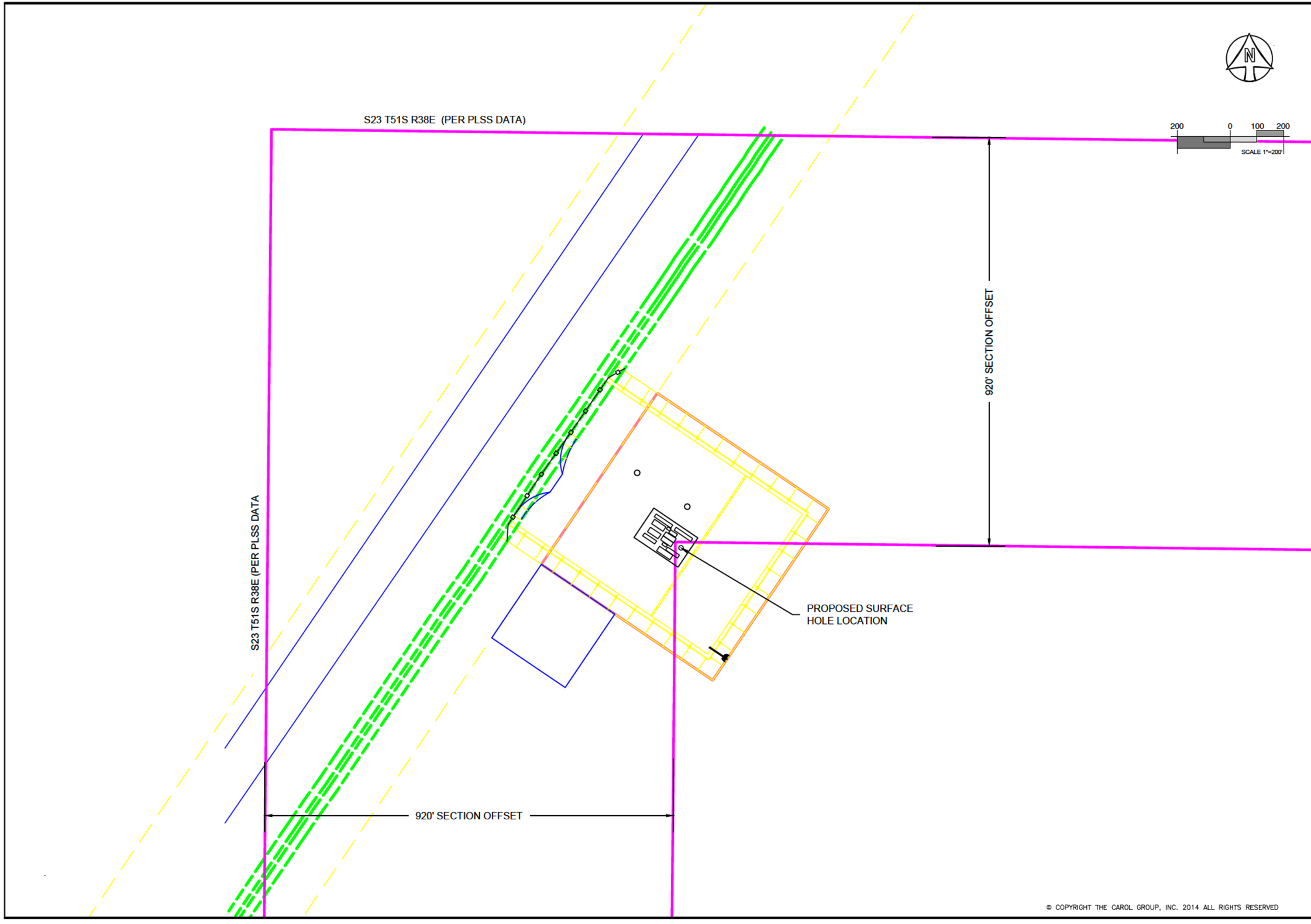
Witness my hand and official seal the date aforesaid.

NOTARY PUBLIC STATE OF FLORIDA AT LARGE

Notary Public State of
Florida at Large

My Commission Expires:

Attachment 2(a): Proposed Bottom Hole Location vs. Nearest Section



JOSEPH R. BARBER
FL REG# 79111

DRAWING IS NOT VALID WITHOUT AN EMBOSSED SEAL WITH AN ORIGINAL SIGNATURE BY THE OWNER(S) OF RECORD

REVISIONS

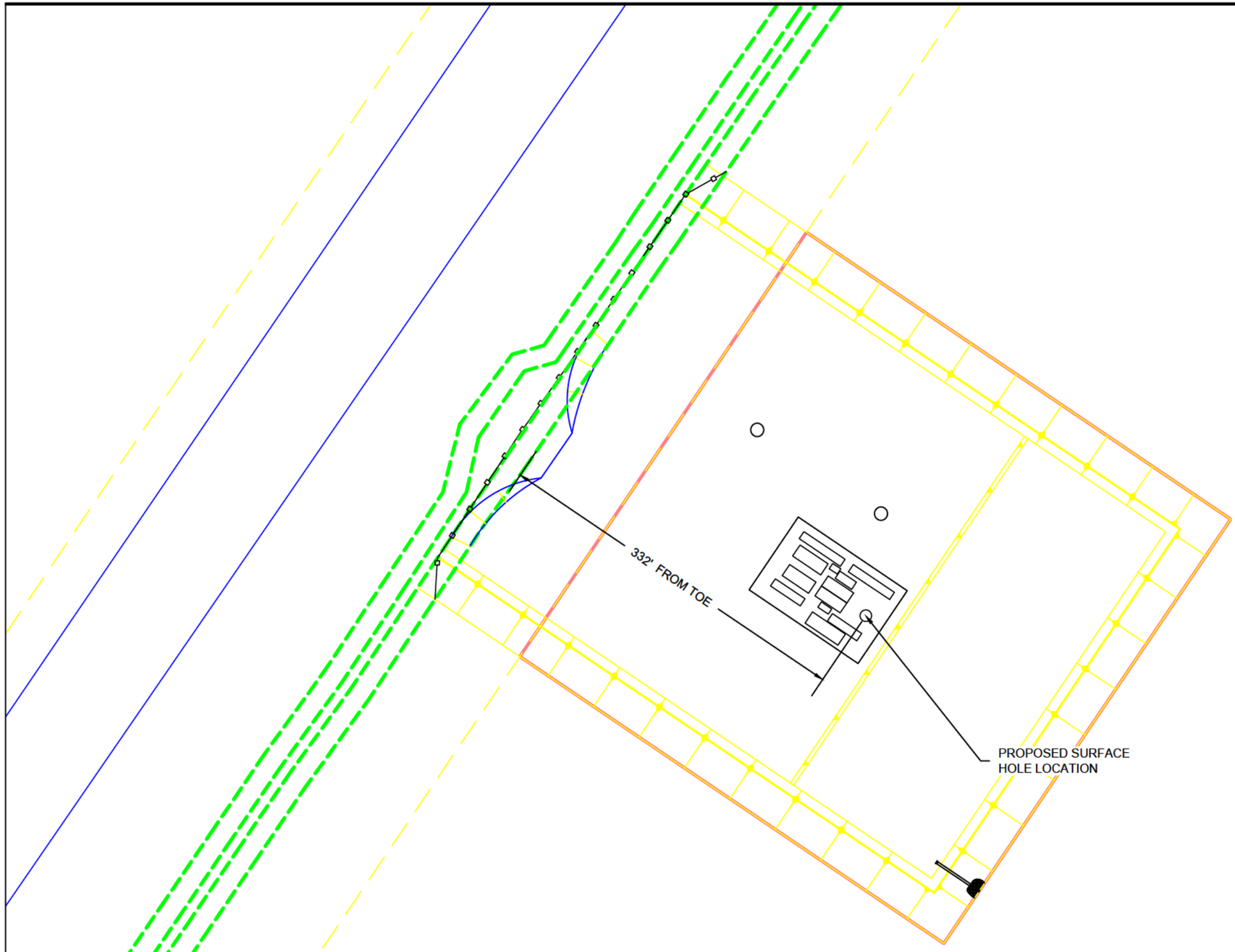
THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard Lake Placid, Fl. 33852

SECTION OFFSET EXHIBIT

KANTER 23-2
Broward County, Florida

TCG PROJECT: KA2014.03
CHECKED BY: WRH
DESIGNED BY: JRB
DATE: 09-10-2015
SHEET

Attachment 2(b): Proposed Bottom Hole Location vs. Toe of L-67A Levee



JOSEPH A. BARBER
FL PE# 73111

DRAWING IS NOT VALID WITHOUT AN EMBOSSED SEAL NEITHER ORIGINAL NOR ELECTRONIC BY THE ENGINEER OF RECORD

REVISIONS

THE CAROL GROUP, INC

Professional Engineers and Surveyors

208 Dal Hall Boulevard Lake Placid, Fl. 33852

SECTION OFFSET EXHIBIT

KANTER 23-2

Broward County, Florida

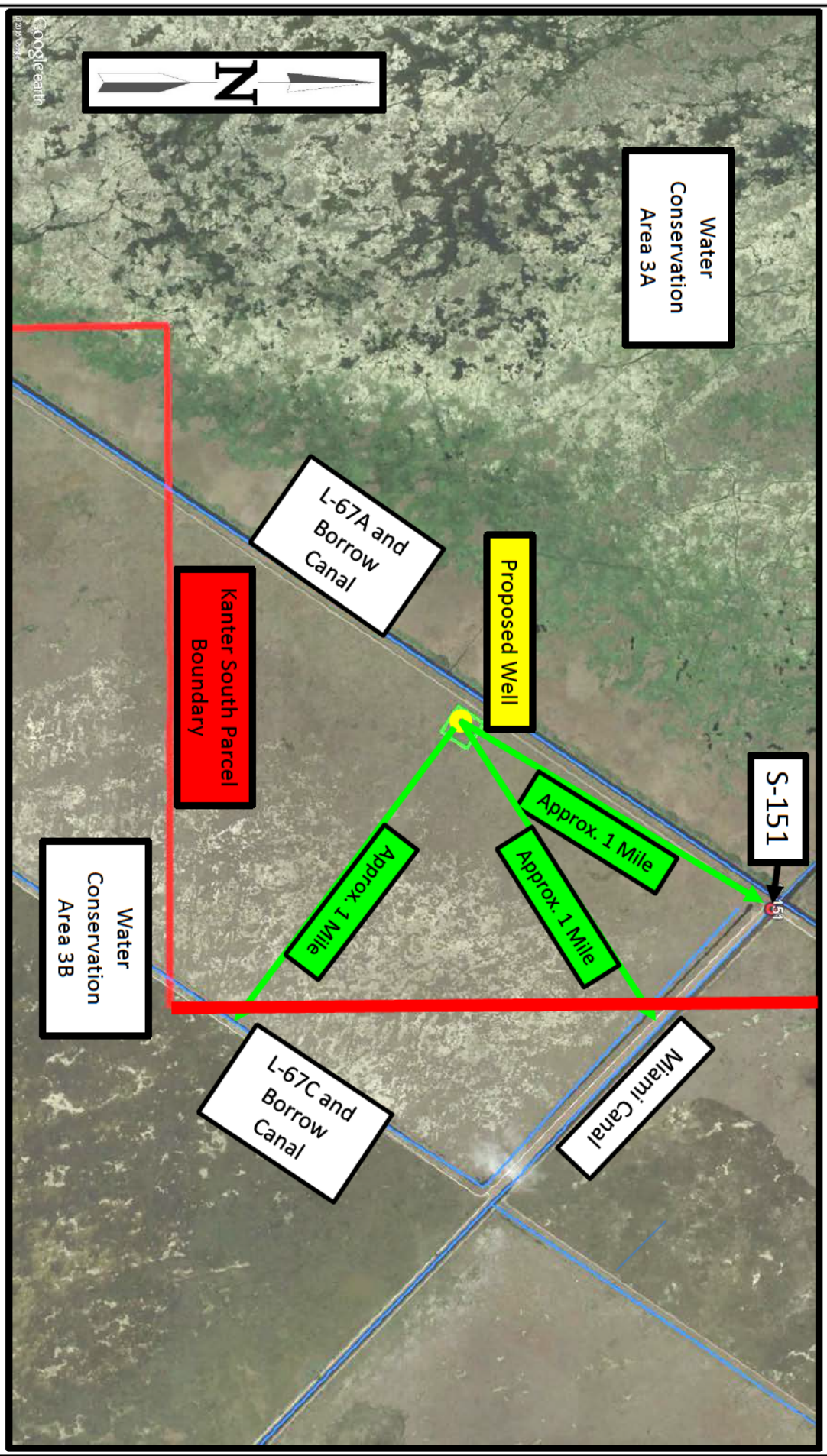
TCG PROJECT: KA2014.03

CHECKED BY: WRH | DESIGNED BY: JRB

DATE: 09-10-2015

SHEET

Attachment 2(c): Proposed Bottom Hole Location vs. Nearest Property Boundaries



SHEET NUMBER	DATE:	Kanter 23-2 Freshwater Resources Broward County, FL	THE CAROL GROUP, INC Professional Engineers and Surveyors 208 Dal Hall Boulevard Lake Placid, FL 33852
6.2	PROJECT NO.		
	FILE NO.		
	SCALE		

Attachment 3: Corrected Maps

SHEET NUMBER	DATE:	Kanter 23-2 Drilling Unit Broward County, FL	THE CAROL GROUP, INC *Professional Engineers and Surveyors* 208 Dal Hall Boulevard Lake Placid, FL 33852
4.1	PROJECT NO.		
	FILE NO.		
	SCALE		

NOTES:
[1] This is a new description.
[2] This boundary survey is to describe and stake out a 5.00 acre pad to support the location for a proposed well in the unsurveyed portion of the Everglades and located to be within the northwest 1/4 of Section 23, Township 51 South, Range 38 East, Broward County, Florida.
[3] No search of the public records has been made by this office as to the vested ownership of this property. A search of the Broward County Property Appraiser's web site does not cover its land as indicating the taxable owner.
[4] This section was never surveyed by neither the Government Land Office nor the State of Florida. Sections lines shown hereon were scaled from the SFWMD L-67A R/W map and are not to be considered as correct without a sectional survey.
[5] The bearings and distances referred to are grid U.S. Survey feet, Florida State Plane Coordinate System (FSPCS), East Zone, North American Datum of 1983 with the 2011 adjustment (NAD'83 2011). The bearing reference is a line from the found stainless steel rod identified as NGS point number FLGPS 68 to the found Corps of Engineers monument number FCE 1956 as being N34°36'52"E. The National Geodetic Survey monument designated as FLGPS 68 PID number AC4855 has a coordinate value of 893,190.63 feet north and 806,630.25 feet east as published in their data sheet retrieved August 12, 2014.
[6] All corners set are a 1" steel pipe with cap and brass disc stamped LB8003 unless otherwise indicated.
[7] The background image is the Mr. SID 2006 LABINS series.
[8] SFWMD is the abbreviation for South Florida Water Management District.
[9] R/W is the abbreviation for right of way.

DESCRIPTION OF 5 ACRE TRACT

A 5.0 acre parcel of land believed to be lying in the northwest 1/4 of the northwest 1/4 of un-surveyed Section 23, Township 51 South, Range 38 East, Broward County, Florida described as follows:

COMMENCING at a found NGS (National Geodetic Survey) 5/8" stainless steel rod accessed through a 5" aluminum logo cap stamped FLGPS 68 being further identified as PID AC4855 and having the NGS published data values of 893,190.63 feet north and 806,630.25 feet east, NAD '83 (North American Datum of 1983) 2011 adjustment and adjusted in June 2012;
Thence run N34°36'52"E a distance of 12,727.53 feet to a found 6" steel pipe filled with concrete and having a COE (US Army Corps of Engineers) brass disk identified as FCE 1956 with state plane coordinate values of 903,860.06 feet north and 812,575.24 feet east;
Thence S55°56'51"E a distance of 6.57 feet to the southeasterly L-67A right of way;
Thence N34°03'42"E along said right of way a distance of 2,264.36 feet to a set 1" steel pipe with a brass disc stamped LB8003 for the **POINT OF BEGINNING** having a northing of 905,386.00 feet and an easting of 814,037.19 feet;
From the **POINT OF BEGINNING** commence N34°03'42"E along said L-67A right of way a distance of 468.69 feet to a set 1" steel pipe with a brass disc stamped LB8003;
Thence S55°56'51"E a distance of 468.69 feet to a set 1" steel pipe with a brass disc stamped LB8003;
Thence S34°03'42"W a distance of 468.69 feet to a set 1" steel pipe with a brass disc stamped LB8003;
Thence N55°56'18"W a distance of 468.69 feet to the **POINT OF BEGINNING.**

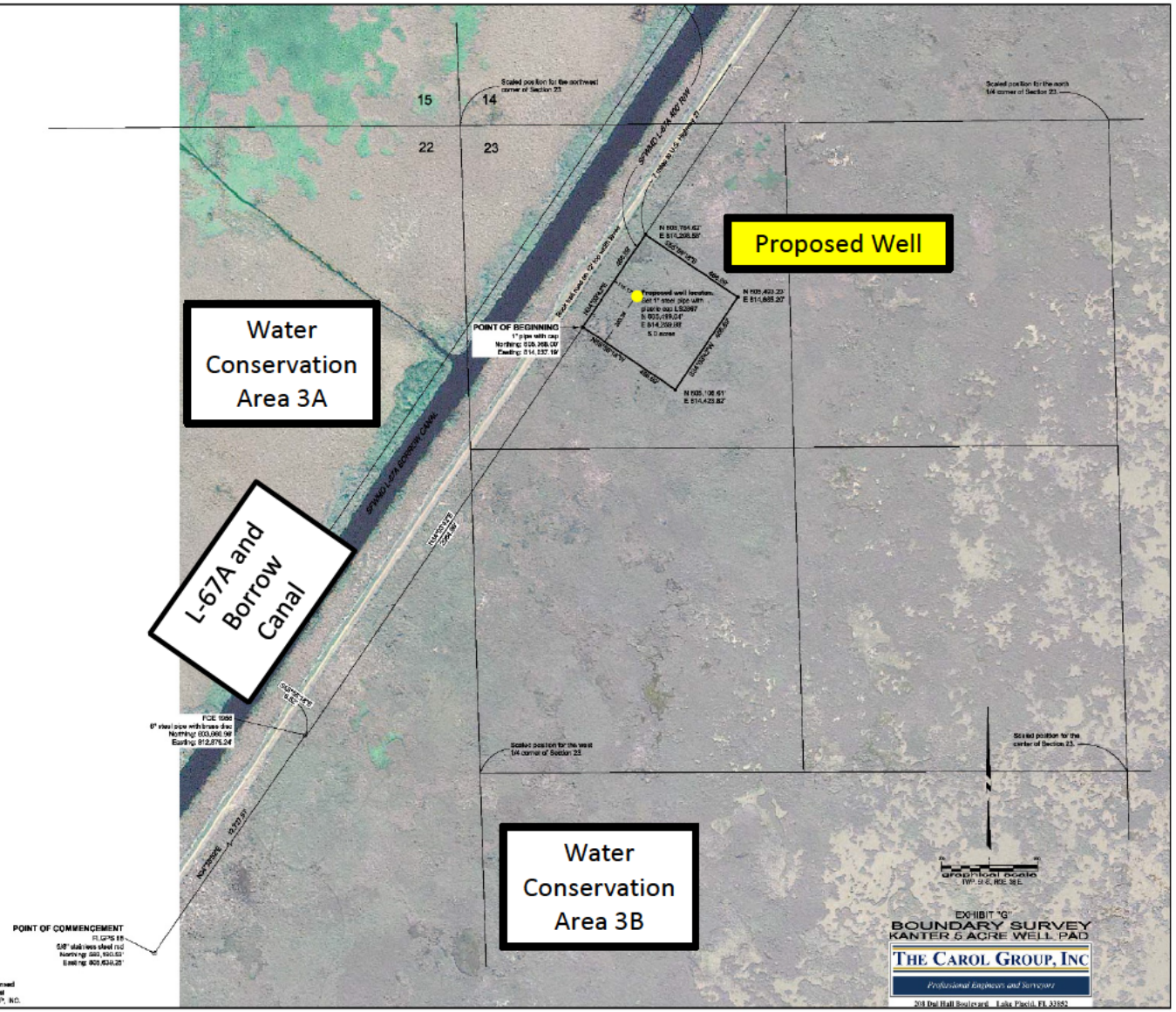
The bearings and distances referred to are grid U.S. Survey feet, Florida State Plane Coordinate System (FSPCS), East Zone, North American Datum of 1983 with the 2011 adjustment (NAD '83 2011). The bearing reference is a line from the found stainless steel rod identified as NGS point number FLGPS 68 to the found Corps of Engineers monument number FCE 1956 as being N34°36'52"E. The National Geodetic Survey monument designated as FLGPS 68 PID number AC4855 having a coordinate value of 893,190.63 feet north and 806,630.25 feet east as published in their data sheet retrieved August 12, 2014.

The majority of this Township has never been surveyed by neither the U.S. Government Land Office nor the State of Florida. The sections information is based on the scaled locations of the section lines as drawn and shown on the Central and Southern Florida Flood Control District (now South Florida Water Management District) Levee L-67A Right-of-Way and TOPO Map, Drawing Number L-67A-1, Sheet 3 of 3, dated 10-6-83, with latest revision date 6-13-86. No determination can be made as to the accuracy of this sectional information without an original survey of the township and sections within.

SURVEY FOR AND CERTIFIED TO:
Kanter Real Estate LLC
2801 Bayshore Drive
Suite 1400
Miami, FL 33133

Date: 09-06-2016
By: _____
For the Firm - Donald Howard, LS5887
THE CAROL GROUP INC., LB8003
208 Dal Hall Boulevard
Lake Placid, FL 33852

Unless it bears the signature and the original raised seal of a Florida licensed surveyor and mapper this drawing, sketch, plat or map is for informational purposes only and is not valid. Copyright © 2015 by THE CAROL GROUP, INC.

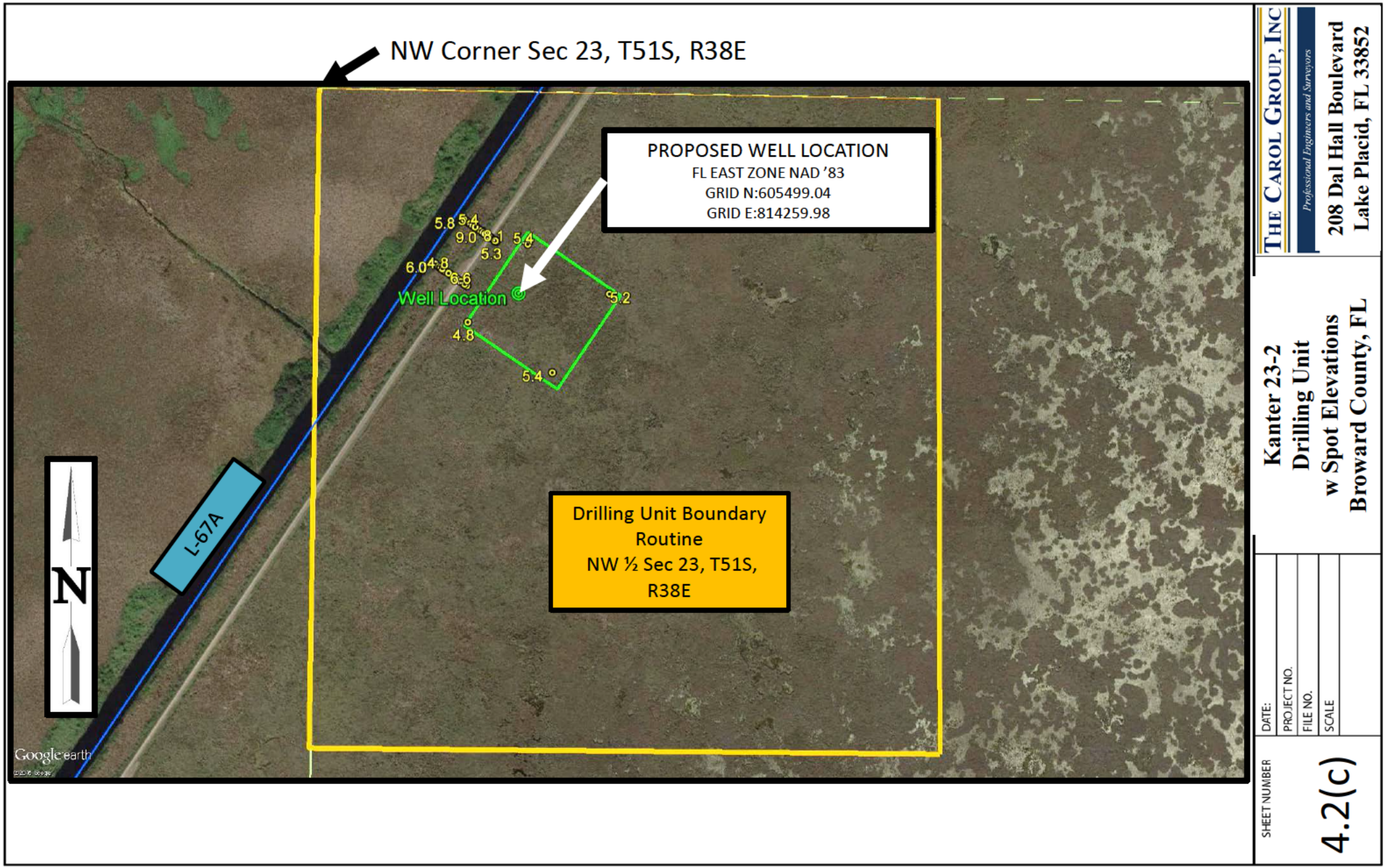


THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard
Lake Placid, FL 33852

Kanter 23-2
Site Boundary Survey
Broward County, FL

DATE:
PROJECT NO.
FILE NO.
SCALE

SHEET NUMBER
4.2(b)



THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard
Lake Placid, FL 33852

Kanter 23-2
Drilling Unit
w Spot Elevations
Broward County, FL

DATE:	
PROJECT NO.	
FILE NO.	
SCALE	

SHEET NUMBER

4.2(c)

Attachment 4: Revised Safety Manual

Century Oil Co., Inc.

Kanter Real Estate, LLC
Kanter 23-2
Broward County, FL, US

SAFETY MANUAL

Prepared By: Ed
Pollister
P.O. Box 765 Chokoloskee,
FL 34138 239-695-2276

SAFETY MANUAL
POLICY STATEMENT

The management of Pollister Drilling Corp. recognizes the importance of safety and health and is committed to providing a workplace for our employees that is free of recognized hazards. All hazards will be controlled or eliminated. The philosophies and objectives behind this commitment are as follows:

A. The safety and health of all Pollister Drilling Corp. employees is a priority.

B. All employees will be required to make safety and the safety of their coworkers a priority.

C. As a condition of employment, each individual within the organization will be expected to conduct their daily tasks in a manner consistent with the philosophy and objectives of this policy as well as any safety rules or procedures that the Company practices.

With these goals in mind the Pollister Drilling, Corp. Safety and Health Program will include:

- Providing adequate safeguards to the maximum extent that is possible.
- Conducting health and safety inspections to identify and eliminate unsafe working conditions or practices, to control health hazards, and to comply with all state and federal standards.
- Training all employees in health and safety practices.
- Providing necessary personal protective equipment and instructions for it's use and care.
- Developing, updating and enforcing health and safety rules and requiring that all Employees cooperate with these regulations.
- Investigate, promptly and thoroughly, every accident and incident to determine cause and to take action to prevent any reoccurrence.

In closing, it is imperative that every employee, no matter what level in the organization, do his or her part in supporting safety. No job or task is so important that we cannot take the time to perform it safely. Adherence to this policy and our safety program will provide safer working conditions for everyone.

DATE SIGNATURE

Orientation for New Employees

The purpose of an orientation is to introduce new workers to our company and to what is expected of them while they are working for us. This orientation includes:

- An interview that covers our industry at work and our company's Safety Program. New employees are told what is expected of them on the job, including what we may do if they fail to follow safety rules. They also will be told about employee benefits, how they will receive their pay, and what we are willing to do to help them with either on the job or personal problems.
- Tour of rig and work areas.
- Discussion of proper lifting procedures.
- Provide and train in PPE usage.
- Provide specific safety rules and procedures for areas where you will work.
- Information on how to report accidents and near miss incidents.
- Information on where to keep personal belongings.
- Information on pay procedures.
- Explanation on Lockout procedures.
- Information on the Emergency Action Plan.
- Explanation of the Confined Space Procedures.
- Explanation on the HAZCOM program.
- Explain where to find MSDS.
- Explain work place violence.
- Explain work place sexual harassment.

Pollister Drilling Corp. is very serious about safety. We want you to also think seriously about safety, both your own safety and the safety of others.

Safety is the responsibility of every employee. Most injuries occurring in our industry are preventable. One does not need to suffer an injury trying to get a job done. When you see an unsafe act or an unsafe condition, correct it yourself immediately or ask your supervisor for helping getting it corrected. If you have any problems, such as dizziness, trouble breathing, bad back, have fainting spells, personal problems, ECT, which could affect your work, let your supervisor know about it. Supervisors need to know so you won't be placed in a situation where you could hurt yourself or others.

Safety is accomplished through effective communication, sincere desire, honest effort, common sense, and support by every one. Merely talking about safety does not prevent accidents.

Your supervisor will hold periodic safety meetings for the entire crew. You are required to attend. Contribute your know-how for less experienced and ask questions if you don't understand. Please feel free to express any of your safety concerns or suggestions during these meetings individually to your supervisor, or in writing on a safety suggestion form. (This will allow you to remain anonymous if you so desire; however, this will make it difficult to provide

you special recognition if your suggestion is put into action.) Be assured that all safety suggestions and concerns will receive response.

Learn the materials in this booklet that pertain to your work. Refer to this material and to your supervisor before starting any task that may be unfamiliar to you. Be aware of other activities nearby that may create hazards to you or which may affect your work.

Responsibilities

Management will:

- Provide for all employees a work environment free from unacceptable hazards.
- Provide guidance to ensure that all injuries, vehicle collisions, near misses, fires, and any other unsafe conditions are promptly reported and investigated.
- Ensure that employees have proper tools and training to complete each job safely.
- Ensure that all employees and contractors are qualified to perform assigned tasks.
- Communicate to all employees and contractors the safety policies and procedures of the company.
- Demonstrate the level of safety that we expect. Lead by example.
- Communicate and support the use of required Personal Protective Equipment.
- Observe, resolve and discuss safe or unsafe behaviors as soon as they are observed.
- Ensure that safety and health issues are considered before awarding contracts.
- Conduct routine inspections and observations to insure unsafe conditions and behaviors are addressed.
- Conduct/assign periodic safety meetings and assure every safety meeting is properly documented.

Employees will:

- Demonstrate responsibility for their own safety and the safety of their fellow employees.
- Immediately report all injuries, vehicle collisions, near misses, fires, and any other unsafe conditions to their supervisor and if possible correct the situation immediately.
- Participate in area safety/tailgate meetings.
- Assist in incident investigations as needed.
- Observe and discuss any unsafe condition, behavior and/or practice with fellow employees and your supervisors.
- Understand and comply with all safety rules and policies that are applicable to the location.
- Know safe procedures for carrying out their job responsibilities.
- Become familiar with Emergency Action Plans.

SAFETY RULES AND REGULATIONS

Pollister Drilling Corp. will enforce compliance of its safety policies and procedures.

1. Report all injuries, near misses, vehicle collisions, fires, and any unsafe conditions or practices no matter how slight to your supervisor.
2. When lifting or moving loads, access the weight, bulkiness of the item and the route of travel. Use proper lifting techniques. When the load is too heavy for one person to lift, the worker should ask for assistance or use a mechanical lifting device.
3. Use handrails when ascending or descending stairways.
4. The use, possession and distribution of illegal drugs, weapons or unauthorized explosives while on company premises, in company vehicles, or rental/personal vehicles while on company business is prohibited.
5. Operation of equipment having a "DANGER DO NOT USE" tag is prohibited.
6. Do not use equipment that has required guards missing.
7. Finger rings, loose clothing, unsecured long hair, watches, and loose clothing should not be worn within arms length of operating machinery.
8. Always use proper tools and equipment for the assigned job. Do not use a damaged or incorrect tool to perform a task. Damaged tools are to be replaced or discarded.
9. Erect barricades, flags or barricade tape around areas of hazardous work, holes, floor openings, overhead work zones, and exposed energized circuits. Excavations should be flagged or fenced when in populated areas.
10. Fire extinguishers, eyewash stations and self-breathing apparatuses should be inspected monthly. Alarm boxes, fire doors, first aid kits and all other emergency equipment must be well maintained and readily accessible.
11. Smoking on company premises is restricted to designated areas only.
12. Whenever a safety device is removed from service and/or defeated, the appropriate supervisor and affected parties shall be notified, the device tagged, the proper remedial action taken, and the action properly documented.
13. Acts of violence or harassment towards management or another employee may be grounds for immediate discharge.
14. Horseplay and fighting are strictly prohibited.

TRAINING

Pollister Drilling Corp. employees share a responsibility for their own safety as well as safety on the job as a whole. This means that all workers should be trained in the safety practices that apply to their specific jobs. Every worker should not only know how to prevent accidents but also what to do in case an accident happens. Initial training and periodic retraining are essential if the safety program is to be effective.

All workers should be trained in safety rules and in safe use of all equipment they will operate. No worker should operate equipment for which he or she has not been trained. Periodic training sessions will be held to update and review previous training. Workers should be able to demonstrate that training has been effective. Records of training will be kept on file including training topics, time of training and who conducted the training.

If employees are required to wear P.P.E. they will be trained in the proper use and maintence of such equipment.

The following training may be given to those employees who have specific job responsibilities.

FIRE PREVENTION
FIRE EXTIGUISHER USE
ACCIDENT INVESTIGATION
PERSONAL PROTECTIVE
EQUIPMENT LOCKOUT/TAGOUT
FALL HAZARD
HAZCOM
EMERGENCY ACTION PLAN
H2S

EMERGENCY RESPONSE PROCEDURES

All emergency phone numbers shall be posted in offices, shops and at job sites.

FIRE DEPARTMENT **911**
POLICE DEPARTMENT **911**
AMBULANCE **911**
POSION CENTER **1-800-222-1222**

Evacuation and emergency procedures will be determined at each job site.
First aid kits will be in company vehicles, and in the shop.
Fire fighting policy will be determined by level of employee training.
Serious weather policy will be dictated by local policy (I.E. Tornado take cover, inclement weather alerts).

For Fires On Site

In the event of a fire the following will take place:

- The person spotting the fire will notify the other persons in the office, shop or job site to evacuate the building/site.
- The office manager will sweep the office; the shop supervisor will sweep the shop assuring that everyone exited the building.
- The persons exiting the buildings will assemble in the southeast part of the parking lot and the office manager/shop supervisor will take a head count to determine that persons evacuated and are accounted for.
- Using a cell phone call 911 to report the fire.
- Employees who have received fire extinguishers training may use a fire extinguisher to extinguish an incipient stage fires.
- In advent of a fire at a job site the tool pusher will be the person responsible for evacuation, head count, and determining an assembly area for the employees. These plans will be reviewed prior to the start of every job.

For Wildfires

- The person spotting the wildfire will notify the persons in the office, shop or job site to evacuate the building/site.
- The site manager will notify FFWCC, FDEP, SFWMD and Broward County Emergency Management.
- Berms will be sprayed with water from water tank/hydrant to retard the spread of fire to the site.
- All vehicles will be removed from the site as well as all nonessential personnel.

For Tornados

Upon hearing the local tornado alarm or a take cover warning on the radio the following will take place:

- Employees will go to the tornado shelter in the basement or restrooms of the office/shop.
- Office manager/shop supervisor will sweep the office/shop areas to assure all employees have gone to the shelter areas to take cover.

- Office manager/shop supervisor will take a head count to account for all of the persons in the office at the time of the alarm.
- Persons will remain in the shelter area until an all clear has been announced.
- In the advent of this happening in the field the shelter will be determined at the site before the job starts.

Fire Response Procedures

In case of a fire the following procedures should be used:

1. The first two minutes of a fire are the most critical. Assess the situation and SUMMON FOR HELP; activate the alarm systems (alarm box, PA system, sirens, or word of mouth) as appropriate, and evacuate the area. Notification must be made to the next level of supervision after a fire is contained. All fires will be reported to SFWMD and FWCC.
2. Only trained personnel should operate fire extinguishers and fire equipment. Never fight a fire if you do not know the cause or source or if it is beyond the initial stage.
3. Give direction to third party fire-fighting agencies.

Fire Extinguishment Procedures

1. Locate the fire fighting equipment. Note: **WHEN DISCHARGING A CARTRIDGE-TYPE EXTUIGNISHER, POINT THE FILL CAP AWAY FROM YOURSELF OR OTHERS.**
2. With any wind at your back, approach the fire and discharge the extinguisher at the base of the fire, sweeping back and fourth and advance as the fire is extinguished.
   a) The proper use of a fire extinguisher can be abbreviated to these letters

      PASS:
      Pull pin
      Aim at base of fire
      Squeeze the trigger
      Sweep from side-to-side

   b) Be sure the fire extinguishers are charged. Turn in the extinguishers for charging after every use.

3. After the fire is extinguished or if you are unable to extinguish, back away facing the fire. Never turn your back on a fire. Stand-by to ensure that an extinguished fire remains extinguished.

Fire Extinguisher Safety

In order to understand how a fire extinguishers work, you first need to know a little about fire.

Four things must be present at the same time in order to produce fire:

- Enough **oxygen** to sustain combustion,
- Enough **heat** to raise the material to its ignition temperature,
- Some sort of **fuel** or combustible material, and
- The **chemical, exothermic reaction** that is fire.

Oxygen, heat, and fuel are frequently referred to as the "Fire Triangle". Add in the fourth element, the chemical reaction, and you actually have a fire "Tetrahedron". The important thing to remember is: **Take any of these four things away, and you will not have a fire** or **the fire will be extinguished.**

Essentially, fire extinguishers put out fire by taking away one or more elements of the fire triangle/tetrahedron.

Fire safety, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.

There are basically four different types (classes) of fire extinguishers. Each is designed for use on specific types of fires.

Fire Extinguisher Ratings

Class A extinguishers should be used on fires of ordinary combustible materials (such as wood, cloth, paper, rubber, and many plastics) requiring the heat-absorbing (cooling) effects of water.

Class B extinguishers should be used on firers of combustible liquids, flammable gases, greases and similar materials where extinguishment is best done by excluding air (oxygen), inhibiting the release of combustible vapors, or interrupting the combustion chain reaction.

Class C extinguishers are suitable for use on electrically energized fires.

Class D extinguishers are designed for use on flammable metals, such as magnesium, titanium, sodium, potassium, etc..

Types of Fire Extinguishers

Dry Chemical extinguishers are usually rated for multi-purpose use. They contain an extinguishing agent and use compressed, non-flammable gas as a propellant.

Halon extinguishers contain a gas that interrupts the chemical reaction that takes place when fuels burn. These types of extinguishers are often used to protect valuable electrical equipment since they leave no residue to clean up. Halon extinguishers have a limited range, usually 4 to 6 feet, and are very expensive to refill.

Halotron extinguishers are a non-ozone depleting alternative to halon.

Water extinguishers contain water and compressed gas and should be only used on Class A (ordinary combustibles) fires.

Carbon Dioxide (CO2) extinguishers are most effective on Class B and C (liquids and electrical) fires. Because the gas disperses quickly, these extinguishers are only effective fro

How to use a Fire Extinguisher

Even though extinguishers come in a number of shapes and sizes, they all operate in a similar manner. Here's an easy way to remember how to use one: **P A S S Pull, Aim, Squeeze, and Sweep.**

Pull the pin at the top of the extinguisher that keeps the handle from being accidentally pressed.
Aim the nozzle at the base of the fire. And start about 8 feet from the fire.
Squeeze the handle to discharge the extinguisher (if you release the handle the discharge stops).
Sweep the nozzle back and forth at the base of the fire. Even after the fire appears to be out, watch it carefully, as it may re-ignite and always back away never turn your back on an extinguished fire.

REPORTING AN ACCIDENT

All Employees of Pollister Drilling Corp. should report all accidents, near misses, injuries and property damage to a supervisor immediately.

The supervisor upon report of an injury will immediately ensure employee receives necessary medical attention.

To the extent possible the supervisor should assure that the area or equipment involved is properly secured until an investigation into the incident takes place.

The supervisor will do the incident investigation and find the root cause than make sure corrective action takes place.

Any employee having a safety issue or concern should take it up with their immediate supervisor as soon as the issue arises.

Accident/Incident Investigation

Thousands of accidents/incidents occur every day. Most are caused by failure of equipment, people or the environment. Accident/incident investigations are made to determine how and why these failures occurred. By using information found during an investigation, a similar or perhaps more serious accident/incident may be prevented. Accident/incident investigations are targeted towards accident prevention and they are not conducted to place blame.

It is the duty of all employees of Pollister Drilling Corp. to aid in accident/incident investigation. Due to the nature of the business additional training may be required for this purpose.

- Accident/incident investigation has one goal and that is to prevent future accidents/incidents.
- All accidents resulting in injury or property damage and any incident with the potential to have caused injury or property damage should be investigated.
- The primary objective is to find the root cause.
- The secondary objective is to determine corrective action and to prevent an occurrence.

The investigation should:

- Be conducted as soon as possible after the accident/incident and be done at the site.
- Take samples of any chemicals if the incident involved spills, vapor release, etc.
- Photograph or make a sketch of the scene.
- Identify persons involved.
- Interview witnesses separately and as soon as possible after the incident.
- When conducting an interview look for facts not blame.
- Get complete information about the scene (machine number, equipment identification, etc.).
- Describe where incident took place including environmental conditions at the time of the incident.
- Determine corrective action to be taken and make sure it is documented and conveyed to all persons at the site.

The office manager will maintain all accident/incident reports and property loss data.

Facility/Job Site Inspections

Pollister Drilling, Corp. realizes the importance of a safe workplace environment. Therefore supervisors including those in maintence facilities, field operations, and office buildings, are required to conduct monthly (or at the start of each job on sites) inspections to determine potential hazards within the workplace. These hazards include, but are not limited to, the following examples:

- Broken steps.
- Inadequate/inoperative lighting.
- Blocked emergency exits.
- Fire extinguishers (recharged and inspected as required, accessible).
- Conditions of floors and walkways.
- Handrails.
- Electrical dangers.
- Housekeeping.
- Ensuring that first aid supplies are adequate, available and marked properly.
- Emergency Action plan posted.
- Employees instructed as to Emergency Action plan.
- Fire hazards.
- Guarding in place.
- Slip, Trip and Fall hazards.
- Employees wearing Proper Protective Equipment.
- Lockout in place (when needed).

HAZARDOUS MATERIALS

Pollister Drilling Corp. has established a written Hazard Communication (HAZCOM) program. All current and newly hired employees potentially exposed to chemicals must attend a HAZCOM training program. The program was developed to inform and train employees concerning the use and dangers associated to hazardous chemicals, controlling hazards, proper labeling of containers and understanding how to use Material Safety Data Sheets (MSDS). The written program also outlines how to handle hazard communications as it applies to other persons working on job sites.

Hazard Determination

Pollister Drilling Corp. will rely on material safety data sheets obtained from product suppliers to meet hazard determination requirements.

Labeling

1. The tool pusher will be responsible for seeing that all containers entering the work place are properly labeled.
2. All labels shall be checked for:
   - Identity of material.
   - Appropriate hazard warning for the material.
   - Name and address of the responsible party. (Only if the container is received from the manufacturer, distributor, or importer.)
   - Each employee shall be responsible for ensuring that all portable containers used in the work place are labeled with the appropriate identity and hazard warning.

Chemical Material Lists

1. A listing of all chemicals used by this company will be kept in a log located in the dog house and in the main office.

Material Safety Data Sheets (MSDS)

1. All MSDS will be kept in the dog house and in the supervisory vehicle.
2. Employees desiring a copy of a MSDS may obtain one by requesting for them in writing and giving the request to their supervisor.

Employee Information and Training

The Safety Director shall coordinate and maintain records of employee hazard communication training, including attendance rosters. Before their initial work assignment, each new employee will attend a hazard communication training class; this class will provide the following information and training.

1. Information Training

- The requirements of the MIOSHA Hazard Communication Standard
- All operations in their work area where hazardous chemicals are present
- Location and availability of the written hazard communication program, the list of

hazardous chemicals, and the MSDS

- Methods and observations that can be used to detect the presence or release of hazardous chemicals in the work place.
- Physical and health hazards of the hazardous chemicals.
- Measures the employee should take to protect themselves from these hazards.
- Details of the hazard communication program-including explanation of the labeling system and MSDS s and how employees can obtain and use hazard information.

2. The employee shall be informed that:

- The employer is prohibited from discharging, or discriminating against, an employee who exercises his or her rights to obtain information regarding hazardous chemicals used in the work place.

3. Before any new physical or health hazard is introduced into the work place, each employee who may be exposed to the substance will be given information in the same manner as during the hazard communication class.

Basic Rules and Procedures for Working with Chemicals

1. MSDS sheets must be assessable and readily available at all times. This includes a MSDS for each chemical in the facility.
2. Before a contractor begins work the site supervisor will inform them of any potential chemical hazard and make MSDS available.
3. In case of eye or skin contact with chemicals, promptly flush the area with water for an extended period (15 minutes), remove contaminated clothing and seek medical attention. Emergency eyewash and shower must be within 25 feet of corrosive material.
4. If trained promptly clean up spills using PPE, and dispose of all materials properly.
5. Do not smell or taste chemicals.
6. Do not eat, drink, smoke, chew gum or apply cosmetics in rooms where laboratory chemicals are present. Wash hands before conducting these activities.
7. Do not use glassware or utensils used in laboratory operations to handle food or beverages.
8. Do not store food or beverages in chemical storage areas.
9. All chemicals should be properly labeled and stored.

Chemical Handling and Storage

1. No container should be received, accepted or transported which has been damaged or does not have appropriate labeling.
2. Stored chemicals should be examined periodically (monthly) for replacement, deterioration and container integrity.
3. When containers are hand carried containers should be sealed
4. Incompatible chemicals must not be stored near each other.

Understanding a MSDS

A MSDS is a written information sheet about a specific hazardous chemical in order to

facilitate the employees understanding of the MSDS, a component explanation has been included.

Section 1 Manufacture and Address – self-explanatory

Section 2 Hazardous Ingredients/Identity – Here the chemical and common names of all constituents should be listed. If the products hazard determination was made as a mixture or compound then the common name of the product or chemical name of the compound will suffice.

Section 3 Physical/Chemical Characteristics – This section will tell you what to expect from the chemical. This is important to guarantee proper handling, fire and spill response procedures.

Boiling Point – The temperature at which the material will boil. If the material is mixed a range will be given.

Vapor Pressure – Tells how much vapor the material may produce. A high vapor pressure indicates that the material will readily evaporate.

Vapor Density – Tells how heavy a vapor is relative to an equal amount of air. A high vapor density will tell that a material will tend to accumulate at the bottom of tanks.

Solubility In Water – Indicates the solubility of the substance in water.

Specific Gravity – Indicates how heavy the material is relative to water.

Evaporation Rate – You must be careful when interpreting evaporation rate data. There are two commonly used bases to derive a figure. Ethyl Ether is used as bases for determining evaporation rates of highly volatile solvents. In this case, values higher than 1 indicate less rapid evaporation than ether. Butyl acetate is the standard used for less volatile solvents and values greater than 1 indicate evaporation rates greater than butyl acetate.

Melting Point – Temperature at which a solid material melts.

Appearance And Color – self-explanatory

Section 4 Fire and Explosion Hazard Data – This information is intended to help you in case of an emergency. Special attention should be taken to understand how to interpret the data quickly and correctly.

Flash Point – This figure indicates the temperature at which a material will ignite. There are two methods to determine this closed cup and open cup so the method must be spelled out.

Flammable Limits – This gives the range of concentrations of gas or vapor which will burn or explode if an ignition source is available.

Extinguishing Media – Cites the appropriate extinguishing media for the material.

Special Fire Fighting Precautions – A list of special provisions including personal protective equipment and procedures.

Unusual Fire and Expulsion Hazards - Lists any peculiarities the material may demonstrate during fire fighting procedures, For example, this section could contain the following: "Extremely flammable, water reactive, vapors heaver than air could flow along floor to alternate ignition sources."

Section 5 Reactivity Data – This information helps the user determine safe storage procedures. This section should provide information on material stability and reactivity and should state what other chemicals or substances to avoid when chandelling the material.

Stability – Tells how easily a material becomes self-reactive and under what conditions it is likely to do so.

Incompatibility – Tells what chemicals that the material come in contact with that should be avoided.

Hazardous Decomposition Or By Products – Lists hazards chemicals that are produced if the material is burned, oxidized or heated.

Hazardous Polymerization – Usually a yes, or no, response indicative of whether or not hazardous polymerization is likely to occur. If yes, then conditions by which the reaction could take place should be listed.

Section 6 Health Hazard Data – This section gives pertinent data and effects of exposure.

Routs of Entry – This information tells you how the chemical is most likely to enter the body. Also indicated should be any potential routs of entry in a foreseeable emergency situation.

Health Hazards – Indicates what potential health effects of exposure to the material are and whether the effects are acute or chronic. Acute effects are those that occur from a concentrated dose of the material over a short time. A chronic condition is usually associated with conditions associated with continuous, low level exposures.

Carcinogenicity – Tells if the material is carcinogenic or not.

Signs And Symptoms Of Exposure – The most common symptoms of exposure are described in this section.

Medical Conditions Most Generally Aggravated By Exposure – Those medical conditions generally recognized as aggravated by exposure to the material.

Section 7 Precautions For Safe Handling – This section provides specific guidelines for

handling this chemical and chemical spills and hazardous disposal.

Steps To Be Taken If Material Is Spilled Or Released – May specifically recommend materials to lean up a spill and actions to be taken to protect people.

Waste Disposal Methods – Recommendations for waste disposal meeting local, state and federal regulations.

Precautions To Be Taken In Handling And Storage – This section recommends storage methods and hazards to avoid.

Other Precautions – Other hazards, which should be noted, will be specifically addressed.

Section 8 Control Measures – This section lists protective equipment to be used, types of ventilation and general precautions to consider.

Respiratory Protection – Type of respirator to use
Ventilation – Type of ventilation suggested for working with the material.
Protective Gloves – Recommends types of gloves to be used
Eye Protection – Indicates type of eye protection.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment provides a barrier between the hazard and the person. For visitors PPE will be made available on a loaned basis.

General Guidelines

- Pollister Drilling Corp. management is responsible for conducting personal protective equipment hazard assessments for work exposures in their areas of responsibility. This assessment will be used, as the foundation for determining personal protective equipment needs.
- Personal protective equipment must meet standards established by recognized governmental and/or industry groups.
- Personal handling chemicals or other agents must wear proper eye or face protection, respiratory protection as called for in the chemicals MSDS, gloves and aprons.
- Employees are responsible for proper cleaning and storage of their assigned PPE.
- Additional eye/face protection such as goggles and/or face shields must be worn during grinding, welding, drilling, scraping or any operation where foreign objects may enter the eye.

Head Protection

- Approved hard hats are to be worn in field operations and other designated areas.
- All hard hats shall meet the minimum requirements set forth by ANSI Z89.1.1997 (type 1 or class E hardhats).

Eye Protection

- Approved safety eyewear with side shields are to be worn in the field operations and other designated areas. ANZI approved eyewear is to be worn over non- ANZI approved eyewear or any not having eye shields.
- Safety glasses must be equipped with rigid side shields and meet or exceed ANZI Z87.i.
- Filter lenses are required for arc welding or cutting.

Hearing Protection

- Hearing protection must be worn in designated high noise areas. (85 dba or higher).

Hand Protection

- Personal must wear hand protection appropriate for the assigned task when performing work that may cause injury to the hands.
- Electrical lineman's gloves are to be provided when working in voltages greater than 50 VAC and replaced or tested every six months by an approved independent laboratory. Wearers of the lineman's gloves are to test for holes or leaks before each use. Defective or damaged gloves must not be used. Any glove found defective or damaged should be destroyed and replaced immediately.

Foot Protection

- Safety shoes are required when managements PPE hazard assessment dictate the need.
- Safety shoes must meet or exceed ANZI Z41.1 (Compression and impact ratings).

Flame Resistant Clothing

- Flame resistant clothing is required when management's hazard assessment dictates the use.
- Flame resistant clothing must meet or exceed Federal Test Standard CS-191A (<2.0 second after flame and no more than 6.0 inches char length).

Fall Hazard

- Fall protection equipment shall be worn when working 6 feet or more above an established working surface.
- Fall protection equipment will be used when working conditions dictate.
- Fall protection equipment is required at all times regardless of heights when immediate danger exists below the working surface and when no guardrails are present.
- A Fall Arrest System shall consist of a full body harness, shock-absorbing lanyard, and double locking snap hook attached to a stationary approved anchor point. Other fall protection systems may include a self retracting lanyard a cable grabbing device and cable restraint system.
- Employees shall inspect the fall protection system prior to each use.
- Remove from service and item/component that has experienced a fall.

Respiratory Protection

- Respiratory protection is required when working in areas where respiratory hazards are present. Some hazards may be H2S, galvanized pipe welding, spray-painting, sandblasting and asbestos.
- Only properly trained and medically approved persons are allowed to use respirators.
- Respirators will be chosen that are proper for the associated hazard.

Confined Space

Some job sites that Pollister Drilling Corp. employees work at have confined spaces.
It is the policy of Pollister Drilling Corp. that no employees will enter a confined space. If a confined space needs to be entered the employee will contact his/her immediate supervisor immediately and not proceed with that aspect of their job. The supervisor will make arrangements for properly trained persons to do any entry.

A confined space is defined as:

- Is large enough and so configured that an employee can bodily enter and perform assigned task.
- Has limited or restricted means of entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry and egress).
- Is not designed for continuous employee occupancy.
- Contains or has the potential of containing a hazardous atmosphere.
- Contains a material that has the potential for engulfment or entrapment.
- Has a eternal configuration such that a entrant could be trapped or asphyxiated by inward converging walls or buy floor which slopes downward and tapers to a smaller cross section.
- Contains any other recognized safety or health concern.

All confined spaces at Pollister Drilling Corp. job sites will be properly identified as such. Employees who may work around confined spaces will attend a confined space awareness class.

Bloodborne Pathogens

Pollister Drilling Corp. employees who are properly trained may administer First Aid/CPR when necessary. Administering first aid is the only anticipated exposure for Pollister Drilling Corp. employees.

Pollister Drilling Corp. will ensure that all employees with occupational exposure participate in a training awareness program.

Pollister Drilling Corp. will develop and implement a written Exposure Control Plan for all employees that it can "reasonably anticipate exposure" to infectious material. The exposure control plan will be made accessible to all employees.

Exposure Determinations

1. Contaminated Sharps – any contaminated object can penetrate the skin (broken glass share steel).
2. Human Body Fluids – Blood and body fluid that is visibly contaminated with blood, seaman, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva.
3. Parenteral - Human bites, cuts, abrasions.

Employees administering first aid will be required to acquire certification in first aid/CPR training and remain updated. Employees will take every precaution when administering first aid as to eliminate exposures to infectious material.

Exposure determinations will be made without regards to the use of PPE.

Under situations in which differential between body fluids is difficult or impossible, all body fluids will be considered infectious.

Employees will immediately notify their immediate supervisor in the event of a possible exposure to bodily fluids (materials). The employee will perform any first aid required and take steps necessary to assure the safety of all around.

Employees are required to wear the specified PPE when working in potentially hazardous environments.

Pollister Drilling Corp. will take every precaution to eliminate the possibility of exposure of infectious materials to employees.

If hand washing facilities are not available at job sites Pollister Drilling Corp. will provide either an antiseptic hand cleaner and paper towels or antiseptic toilettes to its employees.

All specimens of blood or potentially infectious materials will be put into a labeled, leak proof bag for handling if a bio bag is not available.

All equipment or environmental surfaces will be cleaned and decontaminated after contact with blood or other infectious materials.

Pollister Drilling Corp. will make available the Hepatitis “B” vaccine to all employees that have occupational exposures.

The Tool Pusher will maintain an accurate record for each employee with occupational exposures.

Records will contain the following:

1. Dates and contents of training.
2. Names and job titles of attendees.

Records will be maintained for a minimum of three years.

Pollister Drilling Corp. will make available all records to employees upon written request.

LOCKOUT

The purpose of lockout is to prevent personal injury and property damage due to start-up of electrically driven machinery, electrical systems, hydraulic systems and other equipment which may under repair or maintence is being preformed.

State and federal law requires a written procedure for establishing lockout. As an employee of Pollister Drilling Corp. you will be trained and expected to follow the lockout procedure spelled out below:

- Alert all affected persons that power is being disconnected.
- Before starting repair, service or set up work on machinery or equipment the person (s) performing work shall make sure all power is disconnected (and any hazardous residual pressure removed or relieved) prior to doing such work. A padlock provided by the company shall be placed at the point of power disconnect where lockout is required by each person (s) performing work. Individual locks shall be used or an authorized employee of each crew shall be responsible for placing the lock and determining that each crewmember is clear before removing the lock (s), or a supervisor may place the lock (s) for which he/she has the only key, and assuring that all crew members are clear before removing the lock(s). Keys shall be removed from the lock(s) at the time of lockout. Before work is started on equipment or machinery a test to verify that power is disconnected will be preformed.
- No one other than the person(s) placing the lock(s) for lockout shall remove the lock(s) or restore power. (Exception: A Supervisor may remove a lock and restore power after a thorough check to verify that no person(s) will be exposed to danger by energizing machinery or equipment).
- If it is necessary for maintenance or repair of machinery or equipment to be continued into the next day or shift. The lock of the original employee(s) shall be removed by those persons in the presence of the oncoming shift who will than place their lock(s) on the disconnect. All affected employees shall be notified of this.
- A machine disconnect to an electrical source by a plug in cord shall be considered in compliance if the plug is disconnected and tagged, provided that the plug is a legal disconnecting means. (Plugs are acceptable as disconnecting means only for portable motors and 110V fixed equipment).

Fall Hazard

It is the policy of Pollister Drilling Corp. that all fall hazards can be eliminated or controlled.

Fall protection equipment shall be worn when working 6 feet or more above an established working surface (i.e. ramps, runways, and other walkways, excavations, hoist areas, holes, formwork and reinforcing steel, leading edge work, unprotected sides and edges, overhead work, roofing work, precast concrete erection, wall openings, residential construction, and other walking/working surfaces). Fall protection shall also be worn when working conditions dictate such as hazardous warnings, dangers below working surfaces, unprotected edges, and no guard rails present.

The minimum requirements for fall protection shall be a full body harness, shock absorber, double locking snap hooks, and lanyard attached to a stationary support. Other fall protection systems (i.e. inertia reel, a cable grabbing device, guardrail systems, safety net systems, positioning devise systems, and warning line systems) are available and may be used with appropriate approval. All components of a fall protection system shall meet the latest revision of ANSI A10.14.

For situations where it is necessary to unhook to change locations, secondary safety line equipment shall be provided to individuals climbing or working above the working surface to insure they are properly protected from falls at all times.

Supervisors will assess the work area to determine if the walking or working surfaces on which employees are to work have strength and structural integrity to safely support workers. Employees are not permitted to work on those surfaces until it has been determined that the surfaces have the requisite strength and structure integrity to support the employees. Once management determines that the surface is safe to work on the site supervisor will determine the type of fall protection needed.

Pollister Drilling Corp. will train employees on how to identify fall hazards, how to properly wear required fall protection, and how to inspect equipment to be worn or used if there job requires.

Electrical Safety

Electrical Safe Work Practices:

All electrical work will be done in accordance with the latest codes, standards, and regulations including, but not limited to NEC, OSHA, subpart S, and the National Electrical Safety Code (NESC, latest edition) and any State/Local standards.

Hazardous electrical maintence will only be done by qualified (according to OSHA regulations) electricians using Proper Protective Equipment. All personal protective equipment shall meet OSHA standard 1910.137 (electrical protective equipment).

All power lines shall be considered energized unless proper measures have been taken to de-energized. When work is performed near energized overhead power lines, equipment shall not be permitted within 10 feet of power lines rated 50 KV or below. For energized lines rated above 50 KV, the minimum distance between power lines and equipment or its load should be 10 feet plus
.4 inch for every 1 KV over 50 KV or twice the length of the line insulator- BUT NEVER LESS THAN 10 FEET unless the power line is de-energized.

All stored energy shall be discharged by a qualified person prior to beginning work. The qualified person must verify the equipment is de-energized and proper lockout procedures are in place prior to working on the equipment.

1. All electrical equipment shall be properly grounded and/or bonded.
2. Treat all electrical equipment as if it were energized.
3. Check the insulation and electrical cords of portable electrical tools before placing them into service. Use GFI .
4. De-Energize electrical circuits before work begins.
5. Do not contribute overloading circuits.
6. Use proper tools. Hard hats and ladders must be nonconductive.
7. Do not wear rings and loose jewelry.
8. Avoid working on electrical circuits or equipment while clothing or shoes are wet, or while hands or feet are in water.
9. When operating a disconnect standoff to one side.

Housekeeping

Good housekeeping is the most visible evidence of Pollister Drilling Corp. management and employee concern and commitment to health and safety of its employees and community. Orderliness in the work place contributes to a safe working environment by minimizing obstacles and potential safety hazards threats such as spills, trip hazards etc.

- All job sites/areas shall be kept clean and orderly, free of clutter and trash, so work may proceed in a safe and orderly manner.
- Combustible materials, such as used rags, waste, and shavings shall be kept in approved containers.
- Floors and platforms should be kept free of oil, grease, and water. Where the type of operation produces slippery conditions, approved methods shall be used to reduce the hazards.
- Stairways, aisles, permeate roadways, walkways, and material storage areas in yards shall be kept clear and free of obstructions and tripping hazards. If the material cannot be cleared, the hazard shall be clearly identified.
- Materials and supplies shall be stored in a orderly manner to prevent injuries.
- Washing and toilet facilities shall be maintained in a sanitary condition using approved disinfectants and cleaners.
- Smokeless tobacco, cigarettes, cigars, pipe ashes, and residue shall be disposed of in appropriate containers.
- Tools should be safely placed during use and promptly put away.
- Clearly identify fire-fighting and life-saving equipment and do not block the path to this equipment.
- Keep all escape routs clear and free of any obstructions.
- Cleanliness of machinery, tools, and other equipment are important housekeeping requirements.

Hot Work

The following procedures should be adhered to at a minimum when hot work is to be done. (Cutting, Welding)

1. Make sure all appropriate personnel are aware of the hot work plans.
2. PPE needs to be worn such as proper type of eyewear(helmet, hand shield, goggles, spectacles, the proper tinted devices need to be determined by what type of cutting or welding is done) protective clothing (welding gloves, spats if needed, flame retardant coveralls).
3. The supervisor or a person appointed by the supervisor shall inspect the work area for flammable materials.
4. Isolate all possible fuel sources.
5. Check the atmosphere for explosive vapors.
6. Utilize a fire watch while the hot work is being done. Maintain a fire watch for at least ten minutes after the work is done.
7. The fire watch shall have a fire extinguisher readily available and shall have been trained in its use. This person is also responsible to see that it is in good working order before and after the watch. (Inspect the Extinguisher).
8. Double check the area before it is left to make sure no sources remain.

If a break or lunch is taken during the hot work, the above procedure must be repeated and ensured before hot work resumes.

Contractor Safety

Contractors are used by Pollister Drilling Corp. to do jobs as contracted. When on job sites or under contract to Pollister Drilling Corp. all contractors will be required to abide by the following;

- Provide upon request a copy of the companies written safety policies and procedures that are applicable for the type of work to be preformed.
- Provide upon request documentation of employee safety training pertaining to applicable duties of work to be preformed.
- Co Pollister Drilling Corp.
- Contractors are required to do tailgate safety meetings.
- Contractors are required to develop Emergency Action Plans applicable to job sites that they are working on and make sure their employees are aware of these plans.
- Contractors are responsible for developing and training their employees in procedures adequate to ensure safe operations.
- Contractors are fully responsible for providing their employees with all necessary protective and safety equipment and training in its proper use.
- Contractors must have a plan to document and correct all near-miss incidents. This plan is to include reporting of these incidents by their employees.
- Contractors must abide by all applicable laws and regulations including federal and state MIOSHA, OSHA standards.

Contractors must assure that all machinery and equipment they furnish is in safe running order, inspected regularly, and maintained properly.

DISCIPLINARY POLICY

Pollister Drilling Corp. believes that all of its employees should take pride in their jobs and desire to perform them in a safe, efficient, and effective manner. The company's policy of disciplinary action sets forth the rules of conduct as currently established by the company. All employees are responsible for knowing, understanding, and abiding by these rules:

- As a condition of employment, all Pollister Drilling Corp. employees are required to participate actively in company safety programs and to follow safety regulations in the interest of on the job accident prevention.

- Willful disregard of safety practices, company rules, instructions, or the welfare of fellow employees has no place at this company. This kind of behavior may lead to injuries, damage to products or equipment and damaged relations with customers.

- Pollister Drilling Corp. considers safety to be an important aspect of job performance issues, an employee's failure to adhere to the company's safety policies or engaging in conduct, which is contrary to workplace, employee, public, or customer safety may subject an employee to disciplinary action up to and including immediate termination. Additionally, at the company's discretion, an employee may be directed to obtain safety training or retraining, as the company deems necessary.

Substance Abuse Policy

Pollister Drilling Corp. recognizes that substance abuse such as alcohol and drugs are used by individuals, sometimes too the extent that their abilities and senses are impaired. Our policy regarding substance abuse is the same if it were alcohol, illegal drugs, unreported prescription drugs, or a controlled substance.

This policy is implemented because Pollister Drilling Corp. believes that the impairment of any Pollister Drilling Corp. employee, due to his or her substance uses, is likely to result in the risk of injury to his or her and other employees or to a third party such as costumers or company guests.

"Impairment" or "being inpaired"means that an employee's normal physical or mental abilities, of faculties, while at work have been detrimentally affected by use of substances Pollister Drilling Corp. will do testing for substances defined above as follows:

1. Pre-employment.
2. Post accident per DOT if applicable.
3. Random basis per DOT if applicable.
4. Reasonable cause which is defined as:

Company belief that substance abuse exhists (such as evidence of substances, accidents, injuries on the job, fights or other behavioral symptoms, negative performances, excessive absenteeism or tardiness).

Employees who test positive may be subject to discipline up to and including termination.

Pollister Drilling Corp. will adhere to Federal Confidentiality Laws and Regulations as noted in 42 CFR, Part II.

The employee who begins work while impaired or who becomes impaired while at work has violated a Company rule and is subject to disciplinary action up to and including discharge. Likewise the use, possession, transfer, or sale of any substance on company premises including company vehicles or in any Pollister Drilling Corp. parking lot, storage area, or job site is prohibited. Further, premises of customers shall be deemed as if they were company premises with the same rule violation and disciplinary action.

Employees who are taking a prescription drugs are required to report this to their supervisor. This is for the protection of the employee and for safety purposes in case of an adverse reaction to the drug while at work, so the employee is not falsely accused of taking illegal substances.
Pollister Drilling Corp. will check employee lockers on company property and company vehicles if there is a suspicion of drug or alcohol being present.

When an employee is involved in the use, possession, transfer, or sale of a substance in

violation of this policy, Pollister Drilling Corp. may notify appropriate authorities. Such notice will be given only after such an incident has been investigated and reviewed by the employee's supervisor and management.

Pollister Drilling Corp. will assist an employee who requests help with substance abuse, if the employee asks for help. The company will not require it. Should disciplinary action be pending against an employee who asks for help, Pollister Drilling Corp. will assist, assuming that the employee remains employed; nonetheless, regular disciplinary action will proceed. If the employee is terminated, Pollister Drilling Corp. will not continue any program. Voluntary, successful participation in a recovery or rehabilitative program by an employee may be a mitigating factor in any disciplinary action depending on the facts and circumstances of each individual case. In some cases disciplinary action may be suspended, or the employee placed on probation, pending successful completion of recovery program.

Company FLEET POLICY

Pollister Drilling Corp. recognizes that employees are our most valuable asset and a key to our success. We recognize that almost half of all occupational fatalities involve traffic accidents. Thus, it is important to lie out guidelines and expectations for our employees who drive company vehicles. This is done to support employee safety, public safety and our continued success as a business.

Following are the guidelines you are to follow when using Pollister Drilling Corp. vehicles:

- Use of a company vehicle is limited to the employee. If driven home, a spouse may drive for short, occasional trips to the store, etc. Use by any other person must be approved by Management and will require a motor vehicle records check provided to Management by the primary driver.
- In order to assure adequate driving experience no one under the age of 22 will be given permission to drive company vehicles.
- Your driving record will be checked at time of hire, and following any "chargeable accident". Any serious driving offense (e.g. reckless driving, DUIL, etc.) even in your personal vehicle may lead to eliminating your driving privileges. Pollister Drilling Corp. will take action on any driver who has more than 5 points assessed in the most recent 3 year period.
- Any driver who receives a ticket involving moving violations (even in their personal vehicle) must inform Management within 48 hours.
- Driving a company vehicle is a privilege. The vehicle, as with any company property, is not to be abused. The vehicle should not be overloaded or operated in an unsafe manner. Trash should not be left in the vehicle.
- All accidents involving the company vehicle are to be reported to Management within 24 hours.
- Needless to say, State traffic laws are to be followed when operating your company vehicle. **Seat belts are to be worn by every person in the vehicle. There is to be no driving if you are under the influence of alcohol or drugs.** In this regard, State Laws are Company policy and any violation will lead to discipline up to and including termination.
- Driving requires your undivided attention. Drivers should plan accordingly. Cell phones may be used, but numbers should be stored in memory, or dialed prior to driving. Maps and instructions should be reviewed while parked.
- Drivers must conduct a 360-degree walk-around before getting into their vehicle.
- Drivers must do a tire maintence check, which includes ensuring tires have proper tread depth and properly inflated.

Safety and emergency equipment

The following safety and emergency devices are required as minimum equipment to be carried in Company vehicles and maintained in an operable condition at all times.

Supervisors may increase equipment such equipment in accordance with driver and equipment exposure, such as tire chains, hydraulic jacks, and flashlights.

- Autos – 1-First Aid Kit and 1-2 ¾ LB ABC Fire Extinguisher.
- P/U Trucks – 1-First Aid Kit. And 1-6LB BC Fire Extinguisher.

- Personal Use: Pollister Drilling Corp. allows you to operate your assigned company vehicle for personal use provided:

    1. Only you or your spouse drives the car and you are both licensed in the state where you live.
    2. If your spouse chooses to operate the company vehicle, a current MVR must be provided.
    3. You don't use the vehicle to tow trailers of any kind or to carry loads with rooftop or other luggage racks.
    4. You park the vehicle at home at no cost to Pollister Drilling Corp.

Temporary Alternative Duty
Return to Work Program

When there is a work related injury or illness and the employee is released to perform limited duty work, the employee must report to the company and present the attending physicians statements indicating the extent of restrictions and the duration of time the restrictions cover. Pollister Drilling Corp. may call the attending physician and request information to determine if they can call the employee back into the work force to do limited duties

The company will review the employee's former position and any temporary work alternative work, which might be available to determine whether the employee can be returned to work on a temporary basis.

If temporary alternative duty work is available the employee must come in to do the tasks.

If temporary alternative duty work is not available, the employee must continue to inform the company of his/her condition and the company will review what the physician's statements are. At any time during the leave the company may come up with alternate duty assignment and clear it through the attending physician and return the employee back to work.

Material Handling Equipment

All material handling equipment must have roll over protection. Although forklifts are indispensable tools for moving heavy objects, their operation and proper maintenance require special precautions and training. The use of forklifts is restricted to trained personnel that have been authorized by their supervisor to operate the forklift.

1. All operators of forklifts must be trained and re-trained every 3 years.
2. All operators of forklifts must have permit to operate a forklift.
3. Inspect forklifts before and after use, checking warning and safety devices (i.e. brakes, lights, steering, seat brake, backup alarms and hydraulic operation).
4. Seat belts must be worn when operating forklifts.
5. Make sure brakes are set and the wheels are blocked on a trailer or railcar that is being loaded or unloaded to prevent movement.
6. When the forklift is not in use the forks must be resting on the ground.
7. Handle loads that the forklift is capable of lifting safely.
8. Carry loads low with the forks tilted back.
9. Do not allow any person to stand or walk under lifted loads.
10. Do not use the forklift to raise people for overhead work without an approved, load rated platform equipped with a mast protector and having the platform properly secured to the forklift.
11. Move 55 gallon barrels on pallets, a barrel rack, in a basket, or with a barrel handling extension. Barrels must not be sandwiched together between the forks.
12. Forklift must be shut off prior to exiting the equipment.

Refresher training is required whenever one of the following occurs:

- The operator is involved in a accident or near miss.
- The operator has been observed operating the equipment is an unsafe manner.
- The operator has been determined in their evaluation to need more training.
- There are changes in the work place that could affect safe operation (i.e. different types of paving, reconfigured storage racks, new layout or restricted sight).

Hazard Assessment Form

Instructions: This hazard assessment form was developed to assist our organization with the hazard assessment requirements of the Personal Protective Equipment Standard.

Job Classification:_____Completed By _____Date_____

Head Hazards: Tasks that can cause head hazards include: Working below other workers who are using tools or materials that could fall, working on energized electrical equipment, working with chemicals, and working under machinery or processes which might cause materials or objects to fall.
Protection needed yes_____no_____Description of hazard _____

_____

EYE Hazards: Tasks that can cause eye hazards include: Working with chemicals, chipping, grinding, sanding, welding, flying objects, woodworking.

Protection needed yes_____no_____Description of hazard _____

_____

Hand Hazards: Tasks that can cause hand hazards include: cutting material, working with chemicals, working with hot items, working with cold items, working with sharp objects.
Protection needed yes_____no_____Description of hazard _____

_____

Foot Hazards: Tasks that can cause foot hazards include: Carrying or handling of material that could be dropped, performing manual material handling, and working with chemicals.
Protection needed yes_____no_____Description of hazard _____

_____

Noise Hazards: Tasks that can create noise hazards include: Grinding, running motors, running equipment, working in loud areas, metal shops, and hammering.
Protection required yes____no_____Description of hazard_____

_____

Dust/Fume/Mist Hazards: Tasks that can create a dust/fume hazard include: Working in dusty areas, grinding, welding, blowdowns, spray painting, working with chemicals.
Protection required yes_____no_____Description of hazard _____

_____

Drug and Alcohol Policy Acknowledgement

I, the undersigned employee, have received and reviewed Pollister Drilling Corp. Drug and Alcohol Policy.

_____

Signature

_____

Date

Company Safety Manual Acknowledgement

I, the undersigned employee acknowledge receipt of the Pollister Drilling Corp. Safety Manual and agree to read and study it. I also agree to abide by these guidelines to the best of my ability during my employment with Pollister Drilling Corp.

_____
Signature

_____
Date

Crown Block, Traveling Block, Hook, Kelly and Hose

Crown Block
Crown Block assemblies should be securely bolted in place. This applies particularly to the gudgeon caps to prevent the sheaves from jumping out of the bearings and falling to the derrick floor. Crown protection devices must be properly adjusted and maintained. The drawworks should be shut down when the crown block is to be greased.

Traveling Block
The sheaves of every traveling block must be guarded with suitable heavy metal nip-point guards. These guards should be designed so that they will enclose the sheaves and prevent an employee's hand from being drawn into the nip-point where the hoisting line begins contact with the sheaves. Traveling Block sheave guards must be securely fastened to the block. The drill line should be threaded through the crown block and the traveling block while the traveling block is on the derrick floor or secured to the derrick. The traveling block should be inspected and lubricated during each daylight tour.

Hook
Every drilling hook should be equipped with a well-constructed and securely fastened rotary latch, which will prevent the load from becoming disengaged from the hook. Unless positive latches are used on hooks, a wire line string should be used to prevent the elevator bails from falling should they be dislodged from the hook. Safety latches on hooks must be maintained rigid so that a jar from the lavatory will not unhook them. The hook should be kept closed whenever the block is in the derrick.

Kelly
The pressure rating of the Kelly cock must exceed maximum pressure expected to be encountered at any time during drilling or completion operations. The Kelly cock wrench must be readily accessible on the rig floor. It should be tested when the BOP equipment is tested. If the Kelly is racked in the derrick or mast, a platform should be provided for the employee to stand on when he racks the Kelly. The Kelly should remain in the rathole until the employee hook has been locked in the swivel to prevent the Kelly from disengaging during lifting or drilling.

Hose
The pump end of the drilling hose must be securely fastened to the derrick b a cable of not less than 5/8" diameter or by a chain not less than ½" thick clamped to the hose and the derrick leg. The swivel end of the hose must be secured by a similar chain or cable clamped to the body, and the other end should be fastened to the body of the swivel. Do not fasten the cable or chain to the swivel gooseneck.

A continuous steel cable should be clamped to each section of all steel drilling hose sections to

prevent any section from whipping. This cable must be anchored to the derrick leg and swivel.

Fittings and safety lines on the rotary hose must be inspected frequently to determine whether repairs or replacement might be required.

If high pumping pressure is required to start circulation, crew members should stay away from the rotary hose and the fluid end of the mud pumps as a safety measure against a rupture or gasket blowout.

Derrick, Derrick Platforms, And Accessories

Reasonable provisions should be made to prevent standard derrick and telescoping masts from overturning because of wind velocity. The guying system should be constructed in accordance with generally recognized safe practices, manufactures specifications and Safety Standards.

Portable telescoping masts should be equipped with a safety device designed to engage automatically, and thus prevent the upper section of the mast from falling at an unsafe rate of speed should the lifting mechanism fail when the upper section is being raised or lowered.

Mud system stand pipes should be securely fastened to the derrick or mast leg, or the derrick mast girts, immediately adjacent to the structure leg, unless other equivalent support is provided.

A well constructed pipe racking support, designed primarily to prevent pipe from falling, should be provided near the top of the stand pipe. This support should be so constructed that it will, with the mast, completely enclose the pipe. Pipe racking fingers should have safety lines attached to the fingers and secured to the rack to prevent any finger from falling should it be broken.

Whenever corrugated iron or other metal, or wood is attached to the derrick for the protection of employees against adverse weather, it should be secured so that it cannot be blown or shaken off the derrick.

An auxiliary means of escape must be provided from the principal inside derrick platform of a standard-type derrick and from the pipe racking platform on a mast. Standards require that the escape lines should be free of knots, splices or other obstructions. Tension of the escape must be periodically checked and adjusted to assure safe landing of the user. Tension must be such that a person descending on the escape line may stop 20 to 25 feet from the anchor point. The ground anchor point of the escape line must be located a minimum lateral distance from the derrick or mast equal to the height above the ground where the connecting point of the escape line is secured to the derrick or mast. To facilitate escape, the ground level area of not less than 10 feet from the derrick floor shall be maintained clear of equipment and supplies not in use or not part of the drilling or servicing operations.

Derrick Platforms

All derricks and portable masts must be equipped with approved fixed ladders to provide access to all work areas from the floor to the crown platform. The derrickman must be able to ascend and descend onto solid flooring on the platform before detaching the climber's safety belt and putting on the derrick working safety belt.

Platforms must be provided on masts for employees to stand on while they handle pipe or other equipment racked in or on the mast. These platforms must completely cover the space between

the working edges and the main structure member to which they are secured. A platform must be provided completely across each outer side of the mas5t adjacent to, and level with the ends of the pipe racking support. The outer edges of these platforms must be equipped with railings and toe boards. A platform must be provided inside the derrick at each elevation where an employee is normally required to handle pipe or other equipment which is racked in the derrick. The working edge of the inside derrick platforms must be placed with sufficient clearance for reasonably safe passageway of the traveling block, in such a manner that it will permit the employee working on the platform to reach the elevator safely.

The stabbing board must be at least two inches thick and ten inches wide and strong enough to support a much heavier load than the weight of the stabber. Temporary working platforms, such as stabbing boards or swabbing boards must be fastened securely to the derrick at both ends and removed immediately following use. Inside derrick platforms (stabbing board excepted) must completely cover the space from the working edge back to the derrick with bolts or equivalent fastening to resist being shifted or accidentally dislodged while operating. The outer edges of the derrick crown platforms must be equipped with standard railings and toe boards.

Derrick Safety Rules

- An employee qualified in procedures for raising and lowering the mast must be in charge of raising and lowering operations and must do both of the following: visually inspect the raising or lowering mechanism, and assure that all tools and materials not secured are removed from the mast.
- Before imposing any load on a derrick or mast, all required load guys must be properly tightened.
- Mast crown sheaves must be guarded to prevent the hoisting line from being displaced from the grooves during all operations.
- Employees on the floor should avoid being under others working in the derrick.
- Derrick safety belts must be adjusted to the wearer and fit snugly and comfortably.
- The lifeline must be securely fastened to some part of the derrick in a way that will allow the worker to move as required, but have no excess slack. Lifelines should not be fastened to the same girt as the monkey board snubbing line.
- The lifeline worn by the stabber must be attached to the first girt above the stabbing board. As an alternate method, a soft rope equipped with metal rings to which the safety line is attached may be strung across the derrick with each end secured to the sides of the derrick.
- Derrick belts and lifelines must be maintained in good condition. They must be carefully inspected at regular intervals. Damaged belts or belts subjected to in-service shock must be replaced immediately.
- Working platforms above the derrick floor must be inspected to see that there are no loose tools, boards, or other equipment on them before any work is done from the platforms. They should be inspected after each stay on the platform.
- To avoid possible injury to the hand by grabbing the fast line, the derrickman should be careful to grasp only the deadline if he has to push the traveling block away from the working platform.

- If a pipe hook is used, it should be secured to some part of the derrick with 1/4inch wire line or a material of equal strength.
- If the derrickman sees a situation developing that might result in an accident, he should immediately give alarm to persons below.
- To eliminate slipping hazards, drilling rig floors must be kept free of mud and oil as is practical. Better footing is provided if the floor is washed while the next stand of pipe is being picked up. Nonskid materials are provided in some areas to prevent slipping.
- All counterweights above drilling rig floor, when not fully encased or running in permanent guides, shall have a safety chain or wire rope safety line anchored to the derrick or mast to secure them. The chain or wire rope shall be capable of sustaining the drop load and shall limit the drop of the counterweight to not less than seven feet from the floor.
- An unguarded opening big enough to permit a person to fall through shall not exist between the beams or main supports of the crown block.
- Chain hoists and snatch blocks must not be fastened to girts because any bending of girts weakens the derrick.
- All bolts and derrick members in bolted and substructures must be inspected and bolts tightened after each move.
- Do not weld on the derrick legs without approval of the derrick manufacturer.
- Loose boards and materials not in use should be removed from the derrick floor. Nails should be pulled out as the boards are taken up. Broken floor boards should be removed and replaced immediately. All new boards should be flush with the floor floorboards already in place.
- Steps and guardrails on the derrick floor should be maintained in good condition. If it is necessary to remove them temporarily during the installation of machinery, they should be replaced with out delay.
- Pipe left standing in the derrick must be made secure so that it will not shift and cause an unnecessary strain on the derrick.

Weight Indicator

A weight indicator must be provided and used on every rig. It must be so constructed, installed and maintained that it will accurately indicate the weight of the load suspended from the hoisting lines.

Jacks

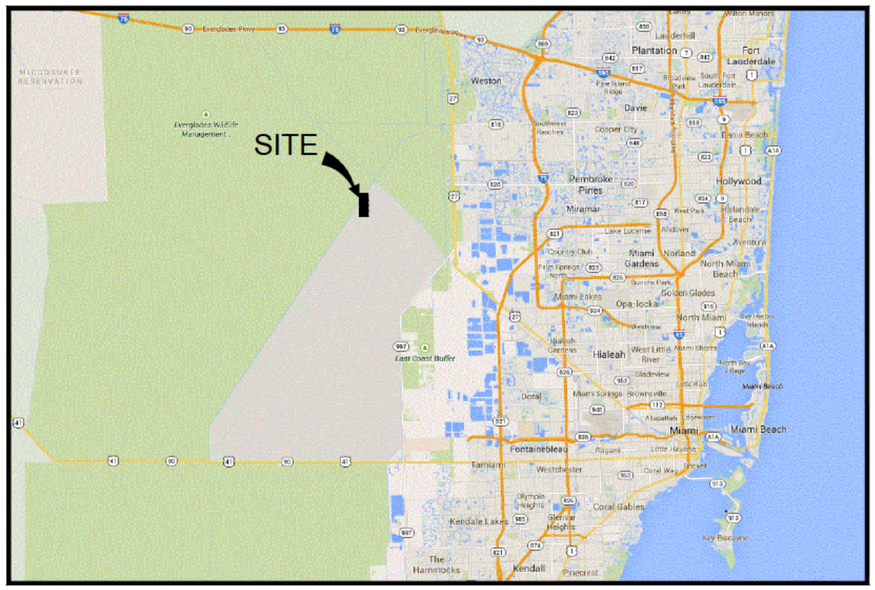
Make sure the footings for the jacks are substantial. If necessary, boards or blocks underneath should be used. Jacks should be placed so that nothing will be in the way when operating their handles. A jack should never be left standing under a load with its handle in the socket. Never rely on jacks alone to support a load which employees must work under, substantial blocking should be used as well. Leveling jacks must have a safety lock.

Attachment 6: Revised Plan Set

KANTER 23-2

BROWARD COUNTY, FLORIDA

SECTION 23, TOWNSHIP 51 S, RANGE 38 E,



LOCATION MAP

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THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 DAL HALL BOULEVARD , LAKE PLACID, FLORIDA 33852 (863) 659-1198
FL CA NO. 30023

REVISIONS:

PROJECT NO.	SET DATE
KA2014.03	01/26/2016

GENERAL NOTES:

1. THE CONTRACTOR SHALL HAVE ALL REQUIRED PERMITS IN-HAND PRIOR TO BEGINNING CONSTRUCTION, AND SHALL PERFORM ALL WORK IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMITS OBTAINED BY THE CLIENT AND THOSE PERMITS OBTAINED BY THE CONTRACTOR.

2. AT LEAST THREE CALENDAR DAYS PRIOR TO THE PRECONSTRUCTION CONFERENCE; THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL A TENTATIVE BASE CONSTRUCTION SCHEDULE, TRAFFIC CONTROL PLAN, PRECONSTRUCTION SURVEY, AND SEDIMENT AND EROSION CONTROL PLAN. NO WORK SHALL BEGIN PRIOR TO APPROVAL OF THE CONSTRUCTION SCHEDULE, TRAFFIC CONTROL PLAN, PRECONSTRUCTION SURVEY, AND SEDIMENT AND EROSION CONTROL PLAN.

3. THE CONSTRUCTION SCHEDULE SHALL DESCRIBE IN DETAIL HOW THE CONSTRUCTION IS TO BE PHASED, ESTABLISH START AND FINISH DATES FOR ALL SIGNIFICANT CONSTRUCTION ACTIVITIES, AND IDENTIFY ALL CONTROLLING ITEMS OF WORK. THE SCHEDULE IS TO BE APPROVED BY THE ENGINEER, AND SHALL BE UPDATED ON A MONTHLY BASIS TO REFLECT ACTUAL WORK PROGRESS. THE UPDATED SCHEDULE SHALL BE SUBMITTED TO THE ENGINEER NO LATER THAN THREE DAYS PRIOR TO EACH SCHEDULED MONTHLY PROGRESS MEETING. PAYMENT FOR PREPARING, UPDATING AND SUBMITTING THE SCHEDULE SHALL BE INCLUDED IN THE PAY ITEM FOR MOBILIZATION.

4. THE PRECONSTRUCTION SURVEY SHALL VERIFY THE CONTROL POINTS AND BENCH MARK ELEVATIONS PROVIDED BY THE ENGINEER AND SHALL ALSO ESTABLISH THE LOCATION AND DESCRIPTION OF ALL ADDITIONAL REFERENCE POINTS AND THE LOCATIONS, DESCRIPTIONS, AND ELEVATIONS OF ALL ADDITIONAL BENCHMARKS TO BE USED IN CONSTRUCTING THE PROJECT. THE SURVEY SHALL BE SIGNED AND SEALED BY A PROFESSIONAL SURVEYOR AND MAPPER REGISTERED IN THE STATE OF FLORIDA. SIGNIFICANT INCONSISTENCIES BETWEEN THE FIELD NOTES AND THE CONTROL POINTS AND BENCH MARK ELEVATIONS PROVIDED BY THE ENGINEER SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO ISSUANCE OF THE NOTICE TO PROCEED. PAYMENT SHALL BE INCLUDED IN THE PAY ITEM FOR MOBILIZATION.

5. THE GEOTECHNICAL INFORMATION SHOWN ON THE DRAWINGS WAS OBTAINED FOR USE IN ESTABLISHING DESIGN CRITERIA FOR THE PROJECT. THIS INFORMATION MAY NOT ACCURATELY REFLECT ACTUAL SOIL CONDITIONS AS TO THE DEPTH, EXTENT OR CHARACTER OF THE MATERIAL TO BE ENCOUNTERED IN CONSTRUCTION OF THE PROJECT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE SUCH EXAMINATION OF THE SITE OF THE WORK AS MAY BE NECESSARY TO DETERMINE THE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED.

6. THE CONTRACTOR IS RESPONSIBLE FOR PRESERVING ALL PROPERTY CORNERS AND MONUMENTS SHOWN ON THE DRAWINGS OR FOUND DURING CONSTRUCTION. IF A PROPERTY CORNER OR MONUMENT IS DESTROYED OR DISTURBED, THE CONTRACTOR WILL HAVE IT REPLACED AND CERTIFIED BY A PROFESSIONAL SURVEYOR AND MAPPER REGISTERED IN THE STATE OF FLORIDA. ALL COSTS FOR PRESERVING, REPLACING AND CERTIFYING PROPERTY CORNERS AND MONUMENTS WILL BE INCLUDED IN THE PAY ITEM FOR MOBILIZATION.

7. ANY NATIONAL GEODETIC SURVEY MONUMENT WITHIN THE LIMITS OF CONSTRUCTION MUST BE PROTECTED. IF IN DANGER OF DAMAGE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND:

   FDEP, BUREAU OF SURVEY AND MAPPING, MS 100
   3900 COMMONWEALTH BLVD.
   TALLAHASSEE, FLORIDA 32399
   (850) 245-2555 (OFFICE)
   (850) 245-2572 (FAX)

8. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF UNDERGROUND AND OTHER UTILITIES IS BASED ON INFORMATION PROVIDED BY THE UTILITY OWNERS, AVAILABLE RECORDS, AND SURVEYED FIELD INFORMATION. THE INFORMATION MAY NOT REFLECT ACTUAL CONDITIONS, INCLUDE ALL UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED, OR SHOW THE UTILITIES IN THE CORRECT HORIZONTAL OR VERTICAL LOCATIONS. THE CONTRACTOR SHALL MAKE HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS NECESSARY TO ESTABLISH THEIR LOCATIONS AND AVOID DAMAGE. THE FOLLOWING UTILITIES SHOULD BE CONTACTED FOR INFORMATION CONCERNING TYPE AND LOCATION OF THEIR FACILITIES. THE LIST MAY NOT INCLUDE ALL UTILITIES IN THE AREA.

   SUNSHINE STATE ONE-CALL OF FLORIDA 811 OR 800-432-4770 (5 DAYS NOTIFICATION PRIOR TO CONSTRUCTION)

9. ALL UTILITIES IN CONFLICT WITH CONSTRUCTION ARE TO BE ADJUSTED OR RELOCATED BY OTHERS UNLESS NOTED OTHERWISE ON THE DRAWINGS OR DIRECTED BY THE ENGINEER.

10. LIMITS OF CONSTRUCTION ARE DEFINED IN THE PLANS AND CONSIST OF ROADWAY RIGHTS-OF-WAY, CLIENT PROPERTIES, DRAINAGE RIGHTS-OF-WAY, PERMANENT DRAINAGE AND/OR UTILITY EASEMENTS, AND TEMPORARY CONSTRUCTION EASEMENTS.

11. THE CONTRACTOR SHALL PUT FORTH EVERY REASONABLE EFFORT TO MINIMIZE DISRUPTION AND DISTURBANCE OF ADJACENT PROPERTIES.

12. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL TREES AND LANDSCAPING ON ADJACENT PROPERTIES, AND WILL BE SOLELY LIABLE FOR DAMAGE TO VEGETATION ON PROPERTIES ADJACENT TO CONSTRUCTION WORK ZONES. ALL TREES WITHIN THE LIMITS OF CONSTRUCTION THAT ARE NOT IDENTIFIED ON THE PLANS TO BE REMOVED SHALL BE PROTECTED TO THE MAXIMUM EXTENT PRACTICABLE. TREE PROTECTION BARRICADES SHALL BE INSTALLED AND MAINTAINED AROUND ALL TREES THAT ARE TO BE PROTECTED AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.

13. THE CONTRACTOR SHALL NOT DISTURB GRASSING OR LANDSCAPING OUTSIDE CONSTRUCTION WORK ZONES. THE CONTRACTOR SHALL BE SOLELY LIABLE FOR DAMAGE TO VEGETATION OUTSIDE CONSTRUCTION WORK ZONES AND SHALL RESTORE AT NO COST TO THE CLIENT ANY AREAS THAT ARE DAMAGED INCLUDING AREAS WITHIN THE LIMITS OF CONSTRUCTION OR ON ADJACENT PROPERTIES USING, TO THE EXTENT PRACTICABLE, THE SAME TYPES AND SIZES OF PLANT MATERIAL THAT EXISTED PRIOR TO CONSTRUCTION.

14. DISTURBED AREAS SHALL BE COMPACTED (AT A MINIMUM) EQUAL TO ADJACENT UNDISTURBED GROUND EXCEPT WHEN OTHERWISE SPECIFIED.

15. ALL DISTURBED AREAS WITHIN CONSTRUCTION WORK ZONES ARE TO BE GRASSED EXCEPT FOR AREAS THAT ARE BELOW NORMAL WATER LEVEL. EXISTING GRASSED AREAS SHALL BE REPLANTED WITH SOD OF THE SAME GRASS TYPE AS EXISTING, UNLESS OTHERWISE SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER. SOD WILL BE USED FOR DISTURBED AREAS NOT CURRENTLY GRASSED. REINFORCEMENT MAT SHALL BE INSTALLED BENEATH SOD PLACED ON SLOPES OF 2H:1V OR STEEPER, AND THE SOD SHALL BE STAPLED. COSTS FOR REINFORCEMENT MAT, STAPLING, FERTILIZING, AND WATERING SHALL BE INCLUDED IN THE UNIT PRICE OF THE PAY ITEM FOR PERFORMANCE TURF.

16. PRIOR TO REQUESTING A FINAL INSPECTION, THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE ENGINEER FOUR COMPLETE SETS OF CERTIFIED AS-BUILT RECORD DRAWINGS AND TWO COPIES OF THE DIGITAL FILES ON CD-ROM DISKS.

17. EXCAVATED MATERIAL SHALL NOT BE DEPOSITED IN LOCATIONS WHERE IT COULD BE WASHED AWAY BY HIGH WATER OR BY STORMWATER RUNOFF, AND STOCKPILES SHALL BE COVERED OR ENCIRCLED WITH SEDIMENT CONTAINMENT DEVICES.

18. STABILIZATION MEASURES SHALL BE INITIATED FOR EROSION AND SEDIMENT CONTROL ON DISTURBED AREAS AS SOON AS PRACTICABLE, BUT IN NO CASE MORE THAN 14 DAYS AFTER CONSTRUCTION ACTIVITY IN THOSE PORTIONS OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.

19. PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL DISTURBED LAND AREAS SHALL BE COMPLETED IMMEDIATELY AFTER FINAL GRADING. WHEN IT IS NOT POSSIBLE TO PERMANENTLY PROTECT A DISTURBED AREA IMMEDIATELY AFTER GRADING OPERATIONS, TEMPORARY EROSION CONTROL MEASURES SHALL BE INSTALLED. ALL TEMPORARY EROSION CONTROL DEVICES SHALL BE MAINTAINED UNTIL PERMANENT MEASURES ARE IN PLACE AND ESTABLISHED.

SUPPLEMENTAL GENERAL NOTES:

1. ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). TOPOLOGY WAS PREPARED BY THE ENGINEER AND IS NOT CONSIDERED PART OF THE SURVEY AND IS ONLY FOR INFORMATIONAL PURPOSES.

2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PREVENTION, CONTROL, AND ABATEMENT OF EROSION, WATER POLLUTION, AND THE TRANSPORTATION OF ERODED MATERIALS OFF SITE.

3. THE CONTRACTOR SHALL PREPARE A SEDIMENT AND EROSION CONTROL PLAN TO ACCOMPANY THE STORMWATER POLLUTION PREVENTION PLAN AND THE SEDIMENT AND EROSION CONTROL PLAN INCLUDED IN THESE PLANS. THE SEDIMENT AND EROSION CONTROL PLAN SHALL BE PREPARED IN ACCORDANCE WITH THE "FLORIDA EROSION AND SEDIMENT CONTROL MANUAL" AND SHALL BE SPECIFIC TO THE MEANS, METHODS, AND SEQUENCE OF CONSTRUCTION TO BE EMPLOYED BY THE CONTRACTOR AND SHALL IDENTIFY THE TYPES AND LOCATIONS OF CONTROLS THAT ARE TO BE IMPLEMENTED DURING EACH PHASE OF CONSTRUCTION AS SHOWN ON THE APPROVED CONSTRUCTION SCHEDULE TO MINIMIZE EROSION, PREVENT THE TRANSFER OF ERODED MATERIALS ONTO ANY OFF SITE PARCEL OR INTO ANY RECEIVING WATER, AND PREVENT VIOLATING STATE AND/OR FEDERAL PERMIT REQUIREMENTS. PAYMENT FOR PREPARING AND SUBMITTING THE SEDIMENT AND EROSION CONTROL PLAN AND FOR ANY MODIFICATIONS TO THE SEDIMENT AND EROSION CONTROL PLAN DURING CONSTRUCTION WILL BE INCLUDED IN THE PAY ITEM FOR MOBILIZATION. THE SEDIMENT AND EROSION CONTROL PLAN SHALL DESCRIBE BUT NOT BE LIMITED TO THE FOLLOWING ITEMS FOR EACH PHASE OF CONSTRUCTION OPERATIONS OR ACTIVITIES:

   A. TYPES AND LOCATIONS OF ALL EROSION CONTROL DEVICES
   B. ESTIMATED TIME EROSION CONTROL DEVICES WILL BE IN OPERATION
   C. SCHEDULES FOR MONITORING AND MAINTENANCE OF EROSION CONTROL DEVICES
   D. METHODS OF MAINTAINING EROSION CONTROL DEVICES
   E.METHODS FOR CONTAINMENT OR REMOVAL OF POLLUTANTS OR HAZARDOUS WASTES
   F.NAME AND PHONE NUMBERS OF PERSON RESPONSIBLE FOR MONITORING AND MAINTAINING EROSION CONTROL DEVICES

4. NO CONSTRUCTION ACTIVITIES SHALL BEGIN UNTIL THE SEDIMENT AND EROSION CONTROL PLAN HAS RECEIVED WRITTEN APPROVAL FROM THE ENGINEER.

5. THE CONTRACTOR SHALL UPDATE THE SEDIMENT AND EROSION CONTROL PLAN AND/OR THE DEWATERING PLAN WHENEVER THERE IS A CHANGE IN CONSTRUCTION SEQUENCE OR ACTIVITIES THAT HAS A SIGNIFICANT EFFECT ON THE POTENTIAL FOR THE DISCHARGE OF POLLUTANTS OFF SITE OR INTO ANY RECEIVING WATER AND SHALL SUBMIT THE UPDATED PLAN FOR REVIEW AND APPROVAL BY THE ENGINEER.

6. EROSION AND SEDIMENT CONTROLS SHALL BE PLACED PRIOR TO OR AS THE FIRST STEP IN CONSTRUCTION AND SHALL BE IN PLACE BEFORE DISTURBING SOIL UPSTREAM OF THE CONTROL.

7. FIELD CONDITIONS MAY REQUIRE THE USE OF ADDITIONAL TYPES AND QUANTITIES OF SEDIMENT AND EROSION CONTROL DEVICES DURING CONSTRUCTION AS DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.

8. THE CONTRACTOR SHALL INSPECT ALL SEDIMENT AND EROSION CONTROL DEVICES PRIOR TO SUSPENSION OF WORK ACTIVITIES EACH DAY, IMMEDIATELY AFTER EACH RAINFALL, AND AT LEAST DAILY DURING PROLONGED RAINFALL TO ENSURE THAT THE DEVICES ARE PROPERLY LOCATED AND MAINTAINED FOR EFFECTIVENESS. ANY REQUIRED REMEDIAL ACTION SHALL BE PERFORMED IMMEDIATELY.

9. SEDIMENT TRAPPED BY THE EROSION CONTROL DEVICES IS TO BE REMOVED BY THE CONTRACTOR AFTER EACH RAIN STORM.

10. THE AMOUNT OF AREA DISTURBED AT ONE TIME SHALL BE LIMITED TO THE MINIMUM NECESSARY TO ADEQUATELY IMPLEMENT THE WORK. CONSTRUCTION OPERATIONS SHALL BE CONTROLLED TO MINIMIZE UNPROTECTED AREAS EXPOSED TO WEATHER, AND AREAS OUTSIDE THE LIMITS OF CONSTRUCTION SHALL NOT BE DISTURBED.

11. EXCAVATED MATERIAL SHALL NOT BE DEPOSITED IN LOCATIONS WHERE IT COULD BE WASHED AWAY BY HIGH WATER OR BY STORMWATER RUNOFF, AND STOCKPILES SHALL BE COVERED OR ENCIRCLED WITH SEDIMENT CONTAINMENT DEVICES.

12. STABILIZATION MEASURES SHALL BE INITIATED FOR EROSION AND SEDIMENT CONTROL ON DISTURBED AREAS AS SOON AS PRACTICABLE, BUT IN NO CASE MORE THAN 14 DAYS AFTER CONSTRUCTION ACTIVITY IN THOSE PORTIONS OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.

13. PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL DISTURBED LAND AREAS SHALL BE COMPLETED IMMEDIATELY AFTER FINAL GRADING. WHEN IT IS NOT POSSIBLE TO PERMANENTLY PROTECT A DISTURBED AREA IMMEDIATELY AFTER GRADING OPERATIONS, TEMPORARY EROSION CONTROL MEASURES SHALL BE INSTALLED. ALL TEMPORARY EROSION CONTROL DEVICES SHALL BE MAINTAINED UNTIL PERMANENT MEASURES ARE IN PLACE AND ESTABLISHED.

OIL PAD FILL SPECIFICATION:

1. SELECT FILL: SELECT FILL SHALL BE CLEAN, WELL-GRADED MATERIAL FREE FROM DEBRIS, PEAT, ROOTS, SEEDS OF NUISANCE OR EXOTIC SPECIES, ORGANIC MATERIAL, CLODS, AND STONES WITH A DIAMETER GREATER THAN 3 INCHES (76 MM) IN ANY DIRECTION. SELECT FILL SHALL HAVE AN AVERAGE ORGANIC CONTENT OF NOT MORE THAN 2%. SELECT FILL SHALL BE PLACED WHERE INDICATED ON THE DRAWINGS. SELECT FILL IS REQUIRED WHERE HIGHER CONTROL OF MATERIALS AND PLACEMENT IS NEEDED SUCH AS WATER RETAINING EMBANKMENT CORES, ROADWAY EMBANKMENTS, AND ADJACENT TO STRUCTURES. SELECT FILL MAY BE MATERIAL EXCAVATED FOR THE WORK (NATIVE) OR MAY BE IMPORTED. THE CONTRACTOR MAY BLEND NATIVE MATERIALS TO ACHIEVE A MATERIAL THAT MEETS THE REQUIREMENTS FOR SELECT FILL. SELECT FILL SHALL MEET THE FOLLOWING UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487) DESIGNATIONS, SW, SP, SC. FILL MATERIAL SHALL NOT CONTAIN ANY PARTICLES LARGER THAN 3 INCHES (76 MM) IN DIAMETER, AND THE UPPER 1-FOOT SHALL NOT CONTAIN PARTICLE SIZES LARGER THAN 2 INCHES (51 MM) IN DIAMETER.

2. RANDOM FILL: RANDOM FILL SHALL BE CLEAN, WELL-GRADED MATERIAL, THAT IS THOROUGHLY MIXED AND FREE FROM DEBRIS, CLODS, SEEDS OF NUISANCE OR EXOTIC SPECIES, AND STONES WITH A DIAMETER IN ANY DIRECTION GREATER THAN THOSE SPECIFIED IN THE BELOW TABLE. RANDOM FILL SHALL HAVE AN ORGANIC CONTENT OF LESS THAN 5% BY WEIGHT. TIGHTER RESTRICTIONS ON STONE SIZE ARE CONSIDERED IN THE TOP LAYER OF FILL, AS PER SUBSECTION 3.03 F. FINAL DRESSING OF SLOPES, IF THE AREA IS TO BE SEEDED, SODDED, OR LANDSCAPED. RANDOM FILL SHALL BE PLACED WHERE INDICATED ON THE DRAWINGS. RANDOM FILL IS REQUIRED WHERE STABLE BACKFILL IS NEEDED TO MAINTAIN SLOPES AND GRADES, BUT SHALL NOT RETAIN WATER OR BE ADJACENT TO STRUCTURES. SELECT FILL HAS A MAXIMUM PARTICLE SIZE OF 3 INCHES AND MAXIMUM COMPACTED LIFT THICKNESS OF 12 INCHES.

3. OIL PAD SHALL CONSIST OF A SELECT FILL CORE AND RANDOM BACKFILL SIDE SLOPES (UNLESS OTHERWISE INDICATED) AND SHALL BE PLACED TO THE LINES AND GRADES AS SHOWN ON THE DRAWINGS. THE LEVEE CORE IS DEFINED BY THE AREA INSIDE THE TOP OF BANK OF THE PERIMETER BERM. AT NO LOCATION SHALL THE COMPLETED TOP ELEVATION BE LOWER THAN INDICATED. COMPLETED SIDE SLOPES SHALL BE UNIFORM FROM TOP TO TOE, AND SHALLBE SMOOTHLY TRANSITIONED.

4. MATERIALS SUITABLE FOR SELECT FILL SHALL BE PLACED IN THE CORE OF THE OIL PAD IN HORIZONTAL LAYERS NOT EXCEEDING 12 INCHES IN LOOSE THICKNESS AND COMPACTED AS INDICATED.

5. RANDOM FILL SHALL BE PLACED TO ITS FINAL POSITION ON EACH SIDE OF THE SELECT FILL CONCURRENT WITH SELECT FILL PLACEMENT.

6. ROCKS EXCEEDING THE ACCEPTABLE SIZE SHALL BE EITHER STOCKPILED OR CRUSHED TO THE ACCEPTABLE SIZE FOR USE. THE ACCEPTABLE SIZES OF ROCKS ARE SHOWN IN THE DEFINITIONS SECTION OF THIS SPECIFICATION.

7. MATERIAL DEPOSITED DURING EXCAVATION WILL HAVE A HIGH MOISTURE CONTENT, AND SHALL THEREFORE BE DRIED PRIOR TO FINAL INCORPORATION IN THE LEVEE EMBANKMENT TO OBTAIN SUITABLE MOISTURE CONTENT (WITHIN PLUS OR MINUS TWO PERCENT OF OPTIMUM MOISTURE DENSITY) TO PERMIT PLACEMENT AND COMPACTION. DRYING MAY CONSIST OF ALLOWING THE MATERIAL TO DRAIN FOR A SUFFICIENT PERIOD TO ACHIEVE THE NECESSARY MOISTURE CONTENT OR BY MECHANICAL MEANS. FOLLOWING THE DRYING PERIOD, ORGANIC AND NON-ORGANIC MATERIALS SHALL BE COMPLETELY MIXED.

8. FOLLOWING MIXING, MATERIALS SHALL BE PLACED ABOVE EXISTING GRADE IN HORIZONTAL LAYERS NOT EXCEEDING 12 INCHES IN LOOSE THICKNESS AND COMPACTED.

9. THE MATERIAL SHALL BE COMPACTED TO NOT LESS THAN 95 PERCENT OF THE MAXIMUM DENSITY AT OPTIMUM SOIL MOISTURE CONTENT +/- 2% AS DETERMINED BY ASTM D1557.

10. BACKFILL IN WATER SHALL BE CONSTRUCTED BY DUMPING SUCCESSIVE LOADS IN UNIFORMLY DISTRIBUTED LAYER IN THICKNESS NECESSARY TO SUPPORT HAULING EQUIPMENT WHILE PLACING SUBSEQUENT LAYERS. THE REMAINING PORTION THAT IS 1 FOOT ABOVE THE WATER SHALL BE PLACED IN 1-FOOT LIFTS AND COMPACTED IN ACCORDANCE WITH SECTION 02200 OF THE TECHNICAL SPECIFICATIONS.

11. FINAL DRESSING OF SLOPES: FOLLOWING THE COMPLETION OF EMBANKMENT PLACEMENT AND COMPACTION, THE CONTRACTOR SHALL GRADE EMBANKMENT SLOPES AND ADJACENT TRANSITION AREAS SO THAT THEY ARE REASONABLY SMOOTH AND FREE FROM IRREGULAR SURFACE CHANGES.
   a. IN AREAS WHERE THE EMBANKMENT IS TO HAVE GRASS, SOD, OR LANDSCAPING, THE MATERIAL WITHIN THE TOP ONE FOOT SHALL BE FREE OF ANY ROCKS GREATER THAN 2 INCHES (51 MM) IN DIAMETER.
   b. THE DEGREE OF FINISH SHALL BE THAT ORDINARILY OBTAINED FROM BLADE GRADER OR SIMILAR OPERATIONS.
   C. PROVIDE ROUNDINGS AT BOTTOM OF SLOPES AND OTHER BREAKS IN GRADE.

SITE DATA SUMMARY

OWNER/APPLICANT:
NAME
STREET ADDRESS
CITY, STATE ZIP CODE

SECTION: 23 TOWNSHIP: 51S RANGE: 38E

PAD BOUNDARY AREA	= 217,799 SF	= 5.00 AC	
STORMWATER MGMT BASIN	= 252,835 SF	= 5.03 AC	
WETLAND IMPACTS	= 257,247 SF	= 5.90 AC	

5 AC SITE DEVELOPMENT AREA DATA:

BUILDING AREA	= 0 SF	= 0 AC	=0 %
PVMT. / CONC.	= 0 SF	= 0 AC	=0 %
IMPERVIOUS AREA	= 10,400 SF	= 0.24 AC	=5 %
PERVIOUS AREA	= 207,400 SF	= 4.76 AC	=95 %

JOSEPH S. BARBER
FL PE# 73111
DRAWING IS NOT VALID WITHOUT AN EMBOSSED SEAL NOR AN ORIGINAL SIGNATURE BY THE REGISTERED OF RECORD

REVISIONS

THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard Lake Placid, Fl. 33852

GENERAL NOTES

KANTER 23-2

Broward County, Florida

TCG PROJECT: KA2014.03

CHECKED BY: WRH | DESIGNED BY: JRB

DATE: 01/26/2016

SHEET C-1.01

JOSEPH A. BARBER
FL PE# 73111
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AERIAL / FLUCCS MAP

KANTER 23-2
Broward County, Florida

TCG PROJECT: KA2014.03
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DATE: 01/26/2016
SHEET C-2.01

400' SFWMD
L-67A R/W

LEVEE TOB

L-67A CANAL

4
C-2.05

2
C-2.04

60 0 30 60
SCALE 1"=60

466.69' PAD BOUNDARY

PERIMETER BERM TOB

1
C-2.04

DETENTION BERM TOB

PROPOSED WELL

PROPOSED WELL

259.15'

PROPOSED SURFACE
HOLE LOCATION

11.5'NAVD
DETENTION
BOTTOM

8' CHAINLINK FENCE
W/ GATE

100' RADIUS

466.69' PROPOSED PAD BOUNDARY

13.7' NAVD

3
C-2.05

17.4' NAVD
LEVEE TOB
MATCH DRIVEWAY
TOP

130.1'

5.1
C-2.05

39'

50'

13.5' NAVD
DRIVEWAY
ACCESS TOE

240.5'

2
C-2.04

466.69' PAD BOUNDARY

100' RADIUS

138.8'

PERIMITER BERM TOB

5
C-2.05

466.69' PAD BOUNDARY

4
C-2.05

2
C-2.04

400' SFWMD
L-67A R/W

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MASTER SITE/GRADING PLAN

KANTER 23-2

Broward County, Florida

TCG PROJECT: KA2014.03

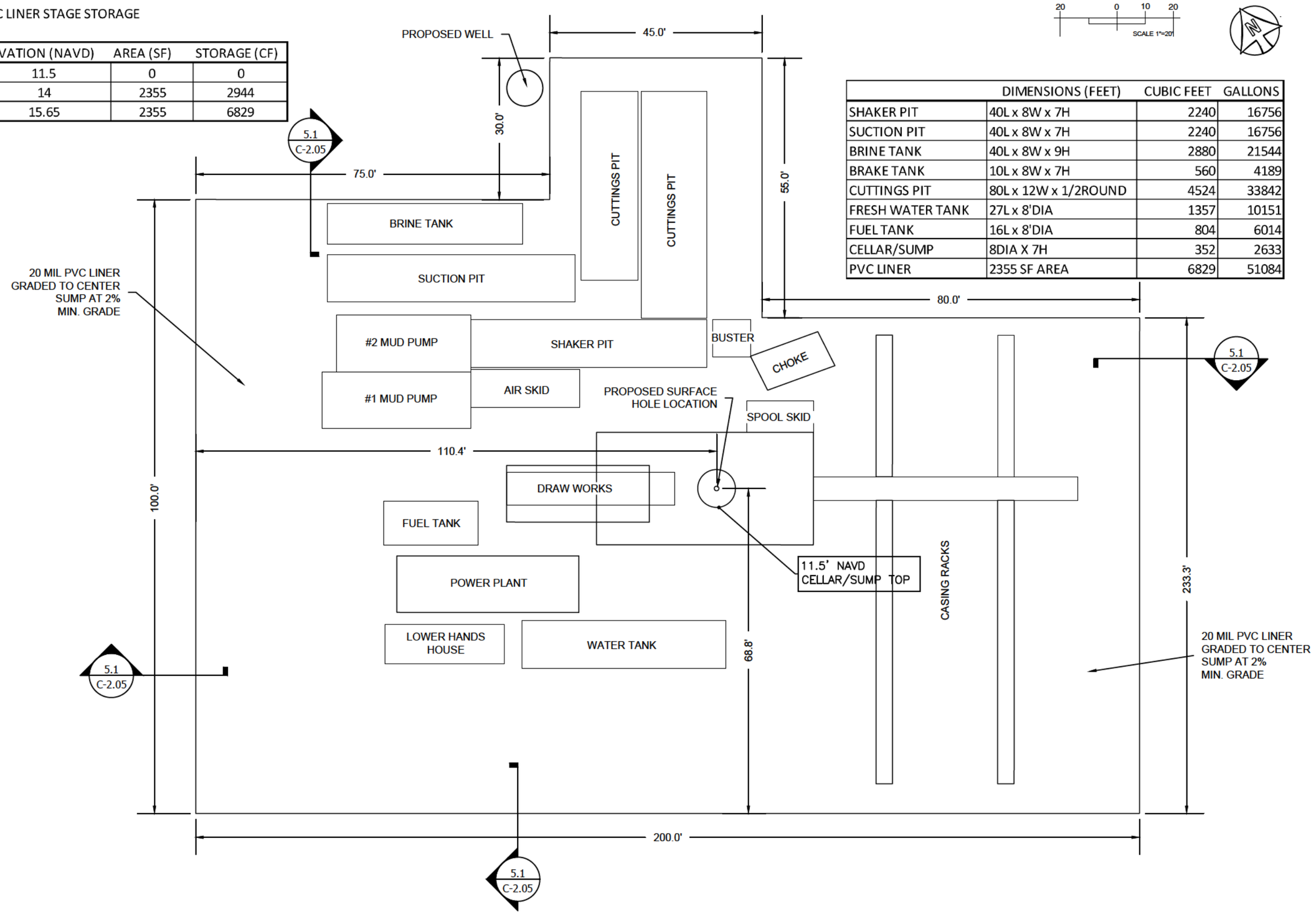
CHECKED BY: WRH | DESIGNED BY: JRB

DATE: 01/26/2016

SHEET C-2.02

PVC LINER STAGE STORAGE

ELEVATION (NAVD)	AREA (SF)	STORAGE (CF)
11.5	0	0
14	2355	2944
15.65	2355	6829



	DIMENSIONS (FEET)	CUBIC FEET	GALLONS
SHAKER PIT	40L x 8W x 7H	2240	16756
SUCTION PIT	40L x 8W x 7H	2240	16756
BRINE TANK	40L x 8W x 9H	2880	21544
BRAKE TANK	10L x 8W x 7H	560	4189
CUTTINGS PIT	80L x 12W x 1/2ROUND	4524	33842
FRESH WATER TANK	27L x 8'DIA	1357	10151
FUEL TANK	16L x 8'DIA	804	6014
CELLAR/SUMP	8DIA X 7H	352	2633
PVC LINER	2355 SF AREA	6829	51084

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208 Dal Hall Boulevard Lake Placid, FL 33852

REVISIONS

EQUIPMENT LAYOUT
KANTER 23-2
Broward County, Florida

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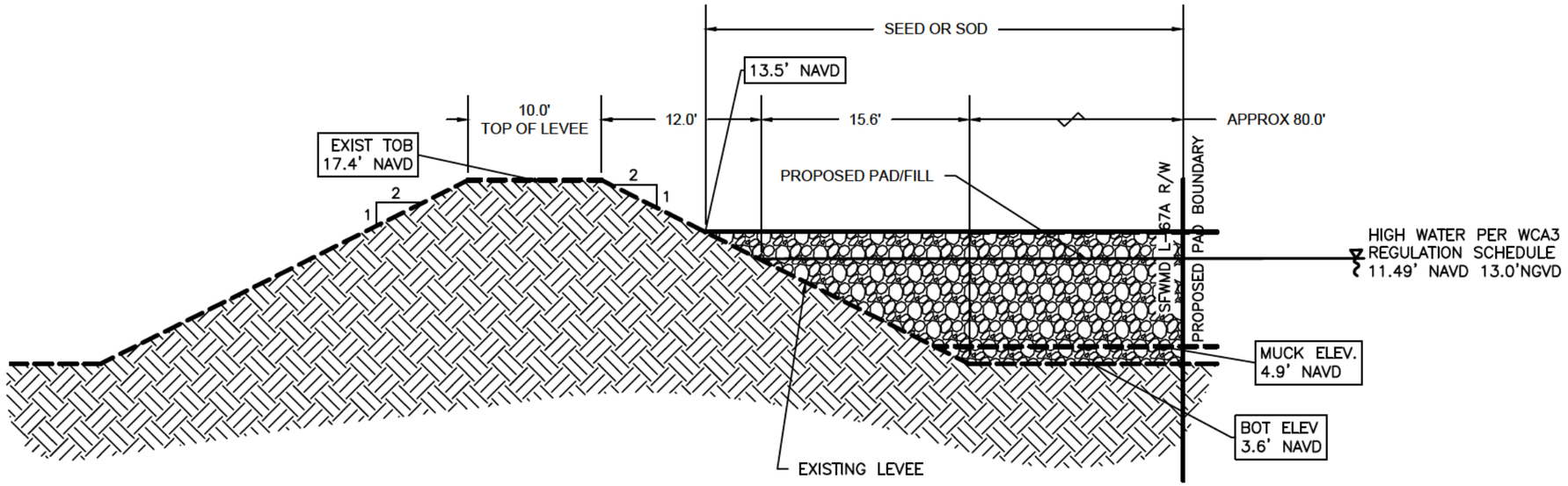
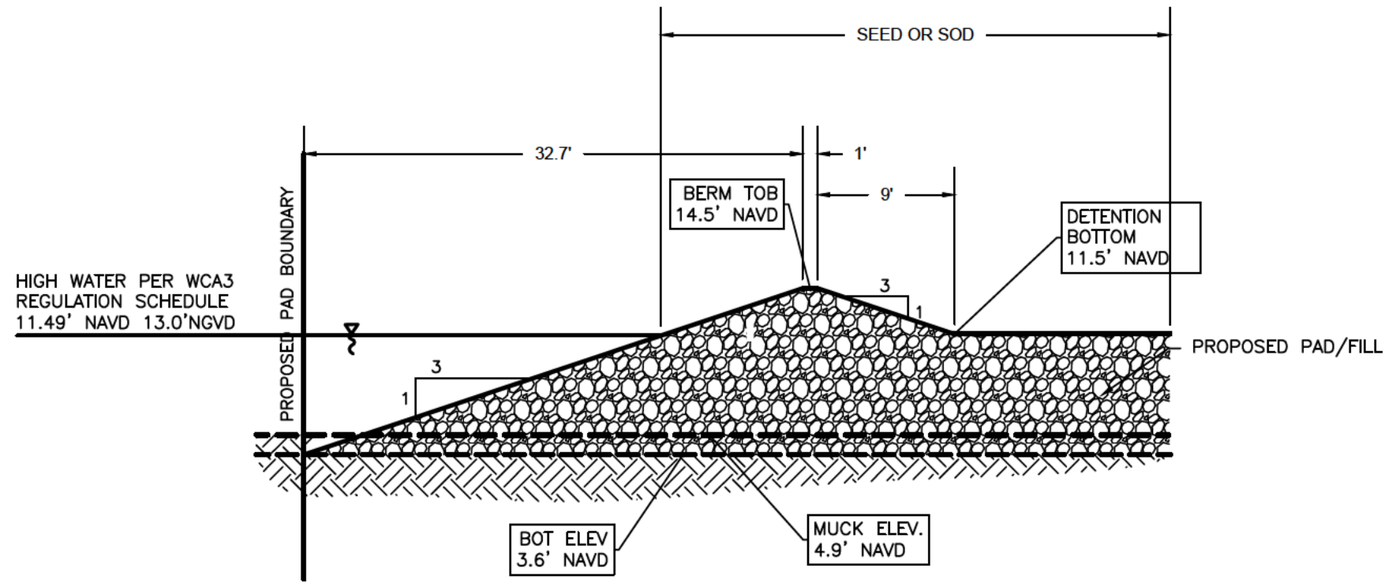
SHEET C-2.03



1 TYPICAL SECTION AT LEVEE SFWMD L-67A R/W

Scale: 1:10



2 TYPICAL SECTION AT PAD BOUNDARY

Scale: 1:10

JOSEPH R. BARBER
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208 Dal Hall Boulevard Lake Placid, Fl. 33852

REVISIONS

TYPICAL SECTIONS

KANTER 23-2

Broward County, Florida

TCG PROJECT: KA2014.03

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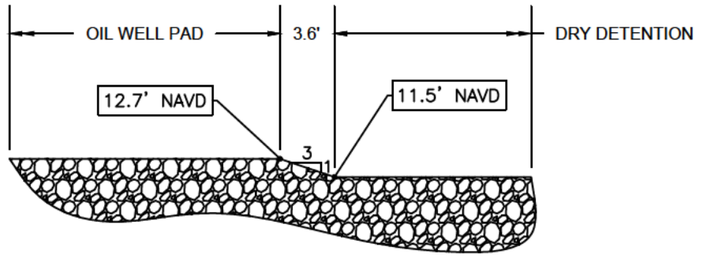
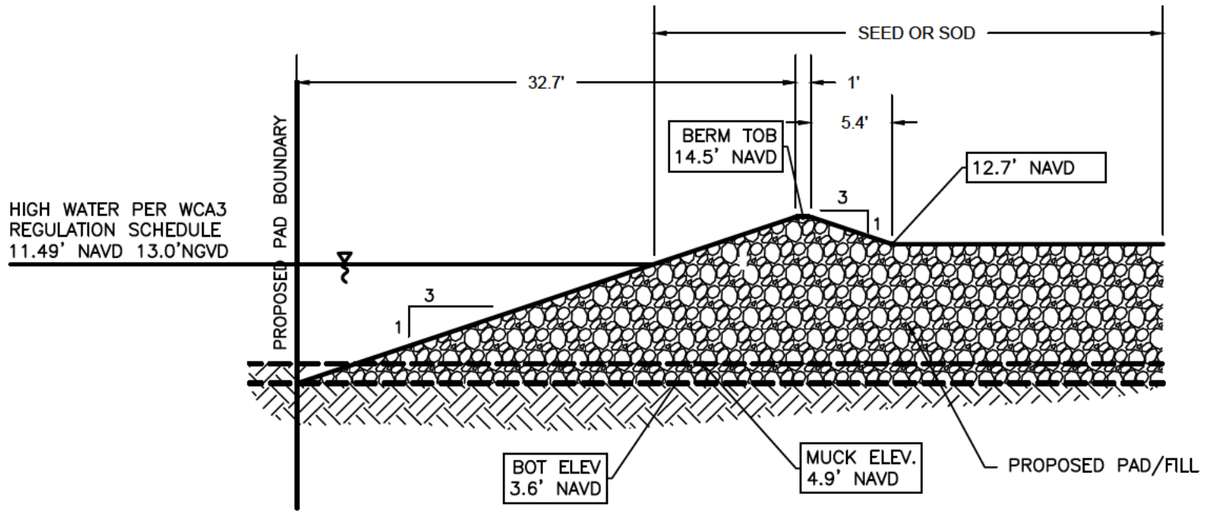
DATE: 01/26/2016

SHEET C-2.04



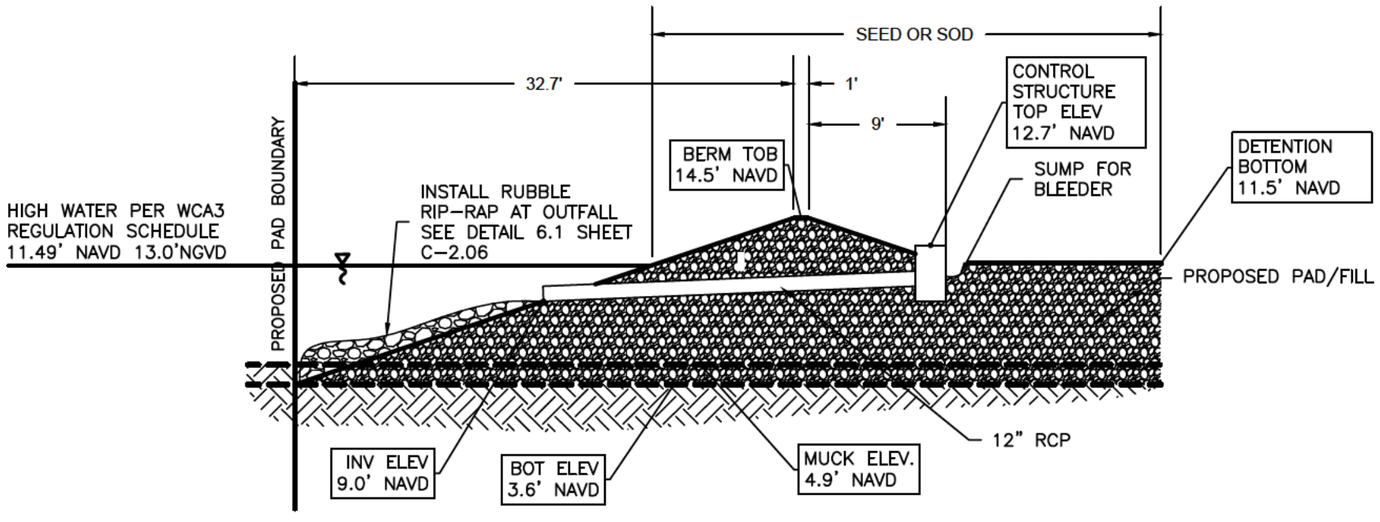
3 DETENTION TYPICAL SECTION

Scale: 1:10



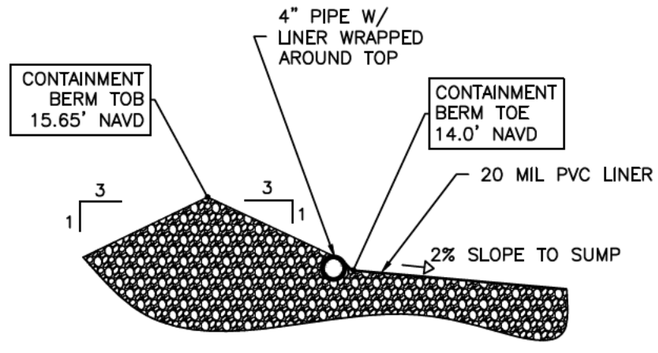
4 TYPICAL SECTION AT PAD BOUNDARY

Scale: 1:10



5 TYPICAL SECTION AT CONTROL STRUCTURE

Scale: 1:10



5.1 TYPICAL SECTION AT LINER

N.T.S.

JOSEPH S. BARBER
FL PE# 73111
DRAWING IS NOT VALID WITHOUT AN EMBOSSED SEAL WITH AN ORIGINAL SIGNATURE BY THE REGISTERED OF RECORD

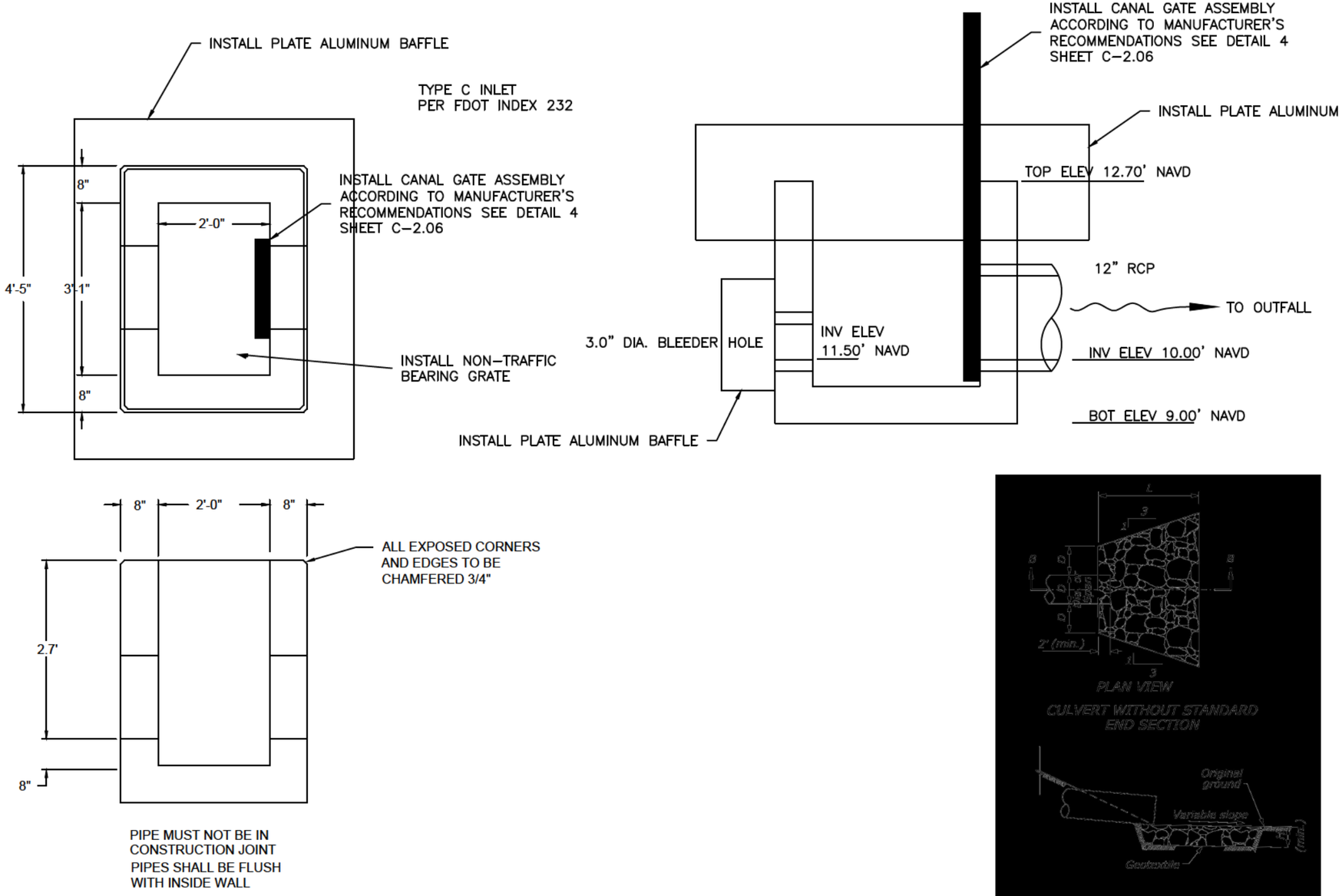
THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard Lake Placid, Fl. 33852

REVISIONS

TYPICAL SECTIONS

KANTER 23-2
Broward County, Florida

TCG PROJECT: KA2014.03
CHECKED BY: WRH
DESIGNED BY: JRB
DATE: 01/26/2016
SHEET C-2.05



6 CONTROL STRUCTURE W/ CANAL GATE INSTALLATION

N.T.S.

APRON LENGTH (L) = 5.0'
APRON DEPTH (H) = 2.0'
WIDTH AT APRON END = 6.3'
PIPE DIAMETER (D) = 1.0'

RIPRAP D50 REQUIRED = 10" OR GREATER

GEOTEXTILE MUST MEET FHWA FP–14 STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS AS SPECIFIED IN SECTION 714.01 FOR NONWOVEN CLASS I GEOTEXTILES

6.1 OUTFALL RIPRAP APRON DETAIL

N.T.S.

JOSEPH S. BARBER
FL PE# 73111
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THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard Lake Placid, Fl. 33852

REVISIONS

DRAINAGE STRUCTURE DETAIL

KANTER 23-2

Broward County, Florida

TCG PROJECT: KA2014.03

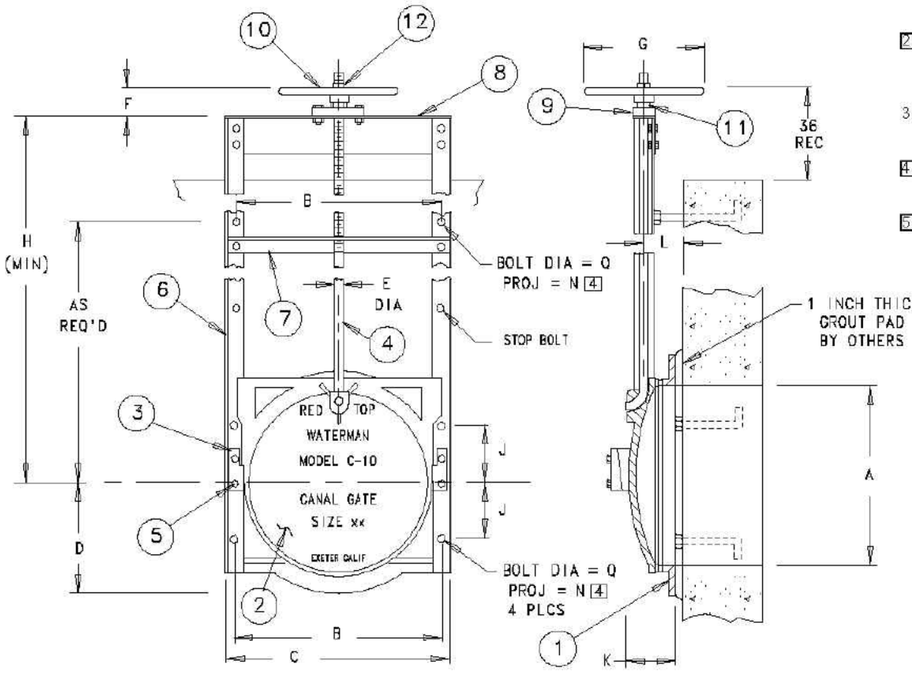
CHECKED BY: WRH | DESIGNED BY: JRB

DATE: 01/26/2016

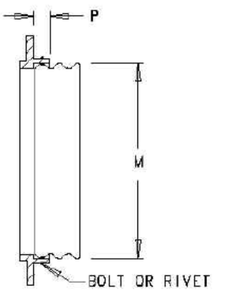
SHEET C-2.06

CANAL GATES

C-10 CANAL GATE

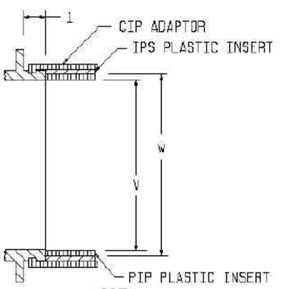


NOTES
1. [1] TYPE 2 lubricated ball bearing lift used on 48" and larger gates.
2. [2] Applies to spigotback gate only. Optional spigot, shown in separate detail.
3. All dimensions are also applicable for model CL-10 & CM-10 gates.
4. [4] Add grout pad thickness to anchor bolt projection.
5. [5] Type 3E 2:1 lift used, mounted to dual headrail.

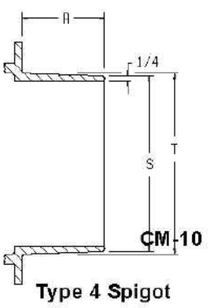


Corrugated Pipe Attached to Spigot Back Frame

PARTS LIST		
No.	**Name**	**Qty.**
1	Frame	1
2	Cover	1
3	Wedge (Right & Left)	1 ea
4	Stem	1
5	Wedge Bolts	4
6	Guide Rail	2
7	Stem Support	AR
8	Head Rail	1
9	Lift Collar	1
10	Handwheel	1
11	Lift Nut	1
12	Limit Nut	1



CIP



Type 4 Spigot

A	B	C	D	E	F	G	H	J	K	L	M [2]	N	P [2]	Q	R	S	T	V	W
6	8	9⅛	4	⅞	2⅛	10	24	3	3½	2⅝	7	3½	2¼	½	-	-	-	6.160	6.645
8	10	12	4⅞	⅞	2⅛	10	24	3	3¾	2½	9	3½	2¼	½	4	7 13/16	8	8.180	8.645
10	12	13⅞	6	⅞	2⅛	10	24	3½	3¾	2½	11	3½	2¼	½	2⅞	9⅞	10	10.220	10.770
12	14	15⅞	7	⅞	2⅛	10	24	4	3½	3	13	4	2¼	½	4	11⅞	12	12.270	12.780
14	16	17⅞	8	⅞	2⅛	10	27	4½	3¾	3½	15	4	2¼	½					
15	17	18⅞	8⅞	⅞	2⅛	10	30	5	4½	3½	16	4	2⅛	½	4	14⅞	15	-	-
16	18¾	20⅝	9⅞	⅞	2⅛	10	32	5½	4½	3½	17	4½	2¼	⅝	-	-	-	-	-
18	21	22⅞	10½	1	3⅛	12	34	6	4½	4¼	19	4½	2¼	⅝	4	17 13/16	18	-	-
20	23¼	25⅛	11¾	1	3⅛	12	38	7	4¾	4	21	4½	2¼	⅝	-	-	-	-	-
21	24	25⅞	12 5/16	1	3⅛	12	40	7	4¾	4	22	4½	2¼	⅝	-	-	-	-	-
24	27¼	29⅛	13⅞	1	3⅛	12	44	8	5¾	4½	25	4½	2¼	⅝	-	-	-	-	-
30	33¼	36⅛	17⅜	1⅛	4	15	54	10	6	4½	31	6	2¼	¾	-	-	-	-	-
36	39¾	42⅛	20½	1⅛	4	15	62	12	6¼	5⅜	37	6	2⅛	¾	-	-	-	-	-
42	45¾	48⅜	23⅝	1½	5	18	84	14	7	6	43	6	2½	¾	-	-	-	-	-
48	51¾	54⅜	26¾	1½	6	24 [1]	90	16	7⅜	6⅛	49⅛	6	2½	¾	-	-	-	-	-
54	58½	61⅛	30	2	6	30 [1]	100	18	7⅞	6½	55⅛	7	3	1	-	-	-	-	-
60	65	68	34	2	6	30 [1]	102	20	8⅛	7⅛	61⅛	8	3¼	1	-	-	-	-	-
72	77½	80¼	41	2	13	[5]	121	25½	10⅜	8¾	73¼	8	3⅜	1	-	-	-	-	-

GATE DIMENSIONS IN INCHES

Watermain INDUSTRIES, INC.

16C

7 CANAL GATE SPECIFICATION

N.T.S.

C-2.07 SHEET

01/28/2016 DATE

CHECKED BY: WAH DESIGNED BY: JHD

TCG PROJECT: KA2014.03

CANAL GATE DETAIL

KANTER 23-2

Broward County, Florida

THE CAROL GROUP, INC

Professional Engineers and Surveyors

208 Dal Hall Boulevard Lake Placid, FL 33852

REVISIONS

JOSEPH R. BARBER FL PE# 73111

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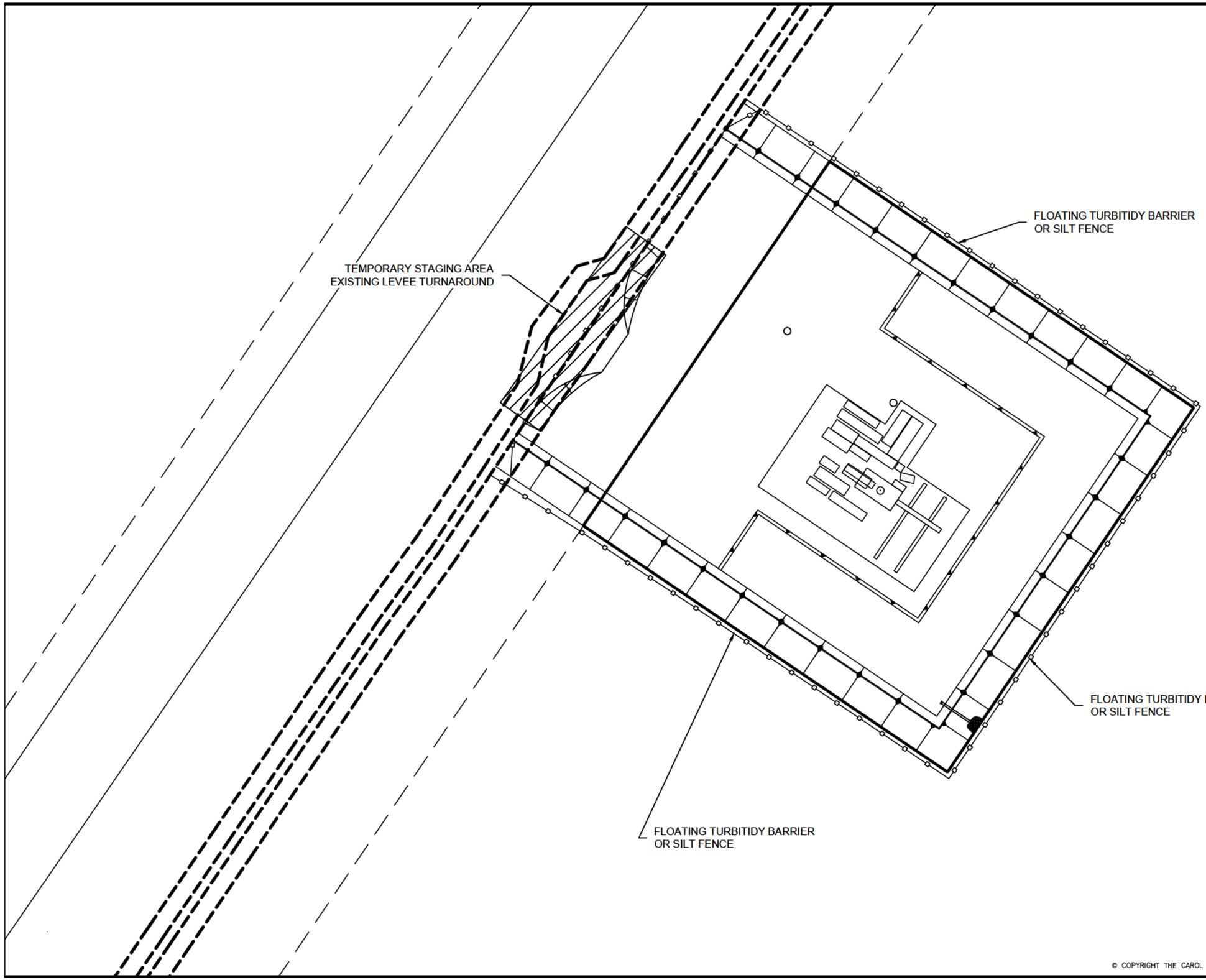

JOSEPH A. BARBER
FL PE# 73111
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THE CAROL GROUP, INC
Professional Engineers and Surveyors
208 Dal Hall Boulevard Lake Placid, Fl. 33852

STORMWATER POLLUTION PREVENTION PLAN

KANTER 23-2

Broward County, Florida

TCG PROJECT: KA2014.03

CHECKED BY: MWM | DESIGNED BY: JRB

DATE: 01/26/2016

SHEET C-3.01

Attachment 7: Revised Permit Application

Kanter Real Estate, LLC Amended Application for Drilling Permit for Kanter 23-2 Well

Submitted to: Florida Department of Environmental Protection

Prepared by:

The Carol Group, Inc.

Century Oil Co., Inc.

Clementi Environmental Consulting, LLC

For: Kanter Real Estate, LLC

2601 South Bayshore Drive, Suite 1450

Miami, Florida 33133

July 2, 2015

Revised October 16, 2015

Revised March 2, 2015

Contents

Exhibits

Exhibit A: FDEP Permit Application (Form 3)

Exhibit B:Map with Kanter Ownership

Exhibit C: C&SF Easement

Exhibit D: Technical Report Trade Secret

Exhibit E: Authorization to Conduct Business

Exhibit F: Organization Report

Exhibit G: Ownership Documents

Exhibit H: Summary of Transfer of Ownership

Exhibit I: Letter of Authorization

Exhibit J: Oil Well Depths

Exhibit K: Kanter Boundary Survey

Exhibit L: Pad Layout

Exhibit M: Pad Layout Over Aerial

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Exhibit P: Well Pad Distance to Rivers

Exhibit Q: Oil Well and Water Well locations

Exhibit R: Plat Identifying Nearest Drinking Water Well

Exhibit S: Fresh Water Resources 1 Mile Radius

Exhibit T: Safety Manual

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Exhibit V: Construction Pollution Prevention Plan

Exhibit W: Stormwater Management Calculations

Exhibit X: Well Pad Distance to Decomp

Exhibit Y: FWCC Letter

Exhibit Z: Panther Habitat Map

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Exhibit CC: Access Routes

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Exhibit EE: Bottom Hole Location

Exhibit FF: Drill Rig Equipment and BOP Drawing

Exhibit GG: Drilling Procedures

Exhibit HH: Casing Plan

Exhibit II: Cementing Program

Exhibit JJ: Wellbore Schematic

Exhibit KK: Well Control Program

Exhibit LL: Drilling Fluids Program

Exhibit MM: Resume of Ed Pollister

1.0 Introduction

Kanter Real Estate, LLC ("**Kanter**") submits this Application for Permit to Drill ("**Application**") for the proposed well known as Kanter 23-2 ("**Well**") to the Florida Department of Environmental Protection ("**FDEP**") in accordance with Chapter 62C-26.003, F.A.C. A signed FDEP permit application (Form 3) is attached as **Exhibit A**. The contents of this Application, including the attached Exhibits, include elements required under Chapter 62C-26.003, F.A.C.

Kanter owns in fee simple, including all mineral rights, approximately 20,000 acres in Water Conservation Area 3 ("**WCA 3**") in Broward County, FL. This ownership consists of two parcels, which are shown in **Exhibit B**. In 1950 an easement was granted to the Central and Southern Flood Control District for the purposes of construction, maintenance and operation of any project in the interest of flood control, reclamation, conservation and allied purposes. This easement guarantees the owners of the property access to this area "for the exploration or drilling for, or the developing, producing, storing or removing of oil, gas or other minerals . . . in accordance with sound engineering principles." A copy of the easement attached **Exhibit C**.

Kanter, based on geologic information, proposes to construct an oil well for the purposes of exploring oil reserves on 5 acres of the 20,000-acre parcel. A technical report supporting the exploration and extraction of oil at the proposed location is included as **Exhibit D**. ***This report is a trade secret, confidential, and exempt from public records law, as provided in Sections 812.081, 815.04(3), and 815.045, Florida Statutes.***

The Well will reach the Sunniland Trend, an oil-bearing geological layer of limestone that ranges across the lower Florida peninsula, from Miami to Fort Myers. It is part of the South Florida Basin, which is the largest unexplored geological basin in the lower 48 states. The lowest underground source of drinking water (USDW) is physically separated from the oil of the Sunniland Trend by more than two miles of geologic layers. These layers include multiple anhydrite layers, each of which are several hundred feet thick and all of which are impermeable. Oil in the Sunniland Trend has the consistency of liquid tar. The Sunniland Trend contains minimal amounts of natural gas, so the oil is under low pressure. As a result of the low pressure and viscous consistency, the oil does not naturally come to the surface in the manner most people associate with oil wells. Submersible pumps are required to bring the oil to the surface. Sunniland Trend oil can be refined to produce gasoline and diesel fuel, lube oils, and asphalt.

A preliminary site inspection occurred on Tuesday August 18, 2015. Representatives of FDEP Oil and Gas Section, Florida Fish and Wildlife Conservation Commission and The Carol Group were present.

2.0 Confidentiality

Kanter requests that information its submits (or that its agents submit) regarding the information developed during the drilling and operation of the Well be held confidential, including but not limited to any information pertaining to drilling reports, test results, well logging information, production reports, and any geologic interpretations relative to the Well.

The report attached as **Exhibit D** is being submitted to FDEP for permitting purposes, but it is exempt from Florida's public records law as provided in Sections 812.081, 815.04(3), and 815.045, Florida Statutes. Please redact this information accordingly, and limit its disclosure only to those employees of the

Department who need to see it in order to evaluate Kanter's permit application and, once the application is granted, Kanter's compliance with the permit. Kanter will indicate any other information that is trade secret and exempt from public records as necessary and in accordance with Florida law.

3.0 Operator

The operator and permit applicant for the Well is Kanter, whose address is:

Kanter Real Estate, LLC
2601 South Bayshore Dr., Suite 1450
Miami, FL 33133

Attached as **Exhibit E** is a copy of Kanter's authorization to conduct business in Florida. FDEP's Organization Report Form (Form 1) is attached as **Exhibit F**.

Kanter is the owner of the property on which the Well is located. A copy of all relevant ownership documents to the property and a map depicting the mineral rights for the drilling unit are attached as composite **Exhibit G**. An explanation of the property's chain of ownership and a statement of property interests are included as **Exhibit H**.

4.0 Agent/Consultants

Kanter has authorized The Carol Group, Inc. to act as agent on its behalf, as shown in the letter attached as **Exhibit I**.

5.0 Well Information

5.1 Well name

The Well name is Kanter 23-2.

5.2 Primary geological objective

The primary geological objective is the Upper Sunniland Formation. Kanter proposes that pilot hole depth be 11,800 feet MD (11,800 feet TVD), which will allow assessment the formation. Technical information supporting this depth is attached as **Exhibit J**.

The Sunniland Trend is an oil-bearing geological layer that ranges across the lower Florida peninsula, from Miami to Fort Myers. It is part of the South Florida Basin, which is the largest unexplored geological basin in the lower 48 states. The lowest underground source of drinking water (USDW) is physically separated from the oil of the Sunniland Trend by more than two miles of geologic layers. These layers include multiple anhydrite layers, each of which are several hundred feet thick and all of which are impermeable. Oil in the Sunniland Trend has the consistency of liquid tar. The Sunniland Trend contains minimal amounts of natural gas, so the oil is under low pressure. As a result of the low pressure and viscous consistency, the oil does not naturally come to the surface in the manner most people associate with oil wells. Submersible pumps are required to bring the oil to the surface. Sunniland Trend oil can be refined to produce gasoline and diesel fuel, lube oils, and asphalt.

5.3 Surface location

The drilling site is located on unimproved lands within WCA 3. The site is located in Section 23, Township 51 South, Range 38 East, Broward County, Florida, as depicted in composite **Exhibit K**. A sketch of the pad layout and an aerial photograph with the layout of the pad are provided as **Exhibits L** and **M**, respectively.

5.4 Location plat

The Well location plat, prepared by The Carol Group, Inc., is attached as **Exhibit K(1)**. In addition, topographic information is attached as **Exhibit K(2)**.

As explained at the meeting with Department staff on September 1, 2015, the area surrounding the Well site has not been previously surveyed. Producing a plat with quarter-section corners would create a hardship for Kanter. Section corners are unavailable, and an inordinate amount of preliminary surveying would have to be done to establish section corners or other standard reference points. Kanter has provided verbal and written notice and explanation of the hardship (**Exhibit N**). As provided in 61C-26.003(7)(c), F.A.C., Kanter is providing a plat made in accordance with the rules of the Board of Professional Surveyors and Mappers using state plane coordinates, which are described in Section 177.151, Florida Statutes.

6.0 Environmental

Much of the information provided in this section relates to the protection of water resources. Of note, the lowest underground source of drinking water (USDW) is physically separated from the oil of the Sunniland Trend by more than two miles of geologic layers. These layers include multiple anhydrite layers, each of which are several hundred feet thick and all of which are impermeable. Oil in the Sunniland Trend has the consistency of liquid tar. The Sunniland Trend contains minimal amounts of natural gas, so the oil is under low pressure. As a result of the low pressure and viscous consistency, the oil does not naturally come to the surface in the manner most people associate with oil wells. Submersible pumps are required to bring the oil to the surface.

To aid in evaluating this permit, both generally and as it relates to protection of water resources, Kanter includes the following exhibits:

- The construction plan set. (**Exhibit O**)
- A stormwater pollution plan for those freshwater resources (Sheet 3.01 of **Exhibit O**)
- A location plat that specifies the distance to rivers and other prominent features on an aerial of the drill site at a large scale (**Exhibit P**)
- A plat identifying the location of the Well, drill pad and water wells (**Exhibit Q**)
- A plat identifying the nearest drinking water wells to the Well (**Exhibit R**)
- A plat identifying all freshwater resources within one mile of the proposed drilling location (**Exhibit S**)
- A safety plan (**Exhibit T**)
- A spill prevention and clean-up plan (**Exhibit U**)
- A construction pollution plan (**Exhibit V**)

6.1 Stormwater

A three-foot earth berm will surround the 5-acre operating area in order to contain all stormwater on the site. Design and calculations are attached as **Exhibits O** and **W**, respectively.

Kanter is relying on the strict well construction standards in accordance with Department rule to address the potential for and control of subsurface discharges. The high-density polyethylene lined containment area (under all stationary equipment containing fluids) is primarily to contain those fluids in the event of leakage. The perimeter berm will provide secondary containment in the event of catastrophic flow from the subsurface through the wellbore. Please see **Exhibit O** for a depiction of the impervious containment area around the drilling equipment. This is intended to be the primary containment system. The impervious layer is hydraulically separated from the stormwater management system and will have a sump in the center that will collect any spills or rainwater. To be conservative, the berms for the site have been designed to contain stormwater for the entire site, including the area designated for impervious containment. A spill prevention and clean-up plan is included as **Exhibit V**. A stormwater pollution plan is included as Sheet 3.01 of **Exhibit O.**

6.2 Water supply

Kanter submitted industrial water use permit application 150728-3 for groundwater withdrawals necessitated by the drilling operations.

6.3 Wetlands, wildlife, and cultural resources

The Well location, in particular the drilling site, will impact approximately 6.83 acres of wetlands adjacent to levee L 67-A. This location is part of the southern parcel of Kanter ownership depicted in **Exhibit B**. The L 67-A and L 67-C levees and canals cut across this southern parcel. They are located off U.S. Highway 27 (State Road 25) and U.S. Highway 41 (State Road 90). These levees and canals have dramatically disrupted sheet flow, altered hydrology, and degraded the natural habitat. The drilling site area of approximately 6.83 acres is 0.0004% of the 1.5 million acres of the Everglades; 0.03% of the 20,000 acres of the Kanter property in WCA 3A and B; 0.05% of the area between L67A and L67C and 0.54% of the Kanter property between these two levees. As a result, the Well site will have negligible, if any, impact on the water resources of the area, and there will be no disruption of already seriously impacted sheetflow, vegetation, or wildlife of the area. Additionally, existing levees also provide access to the well site, so there will be no need to create additional roads.

The Well location is 237 feet off of the centerline of the levee. This location will greatly reduce the amount of construction required to create access to the drill pad, thereby reducing potential impacts. All wetland impacts will be mitigated through the acquisition of mitigation bank credits from the Hole in the Donut Mitigation Bank.

Wildlife surveys have already been conducted for WCA 3, which include the Well site. These surveys were conducted for the Comprehensive Everglades Restoration Project ("**CERP**") and for the Decompartmentalization and Sheetflow Enhancement Physical Model ("**DPM**" or "**DECOMP**") project conducted by the U.S. Army Corps of Engineers ("**Corps**") and South Florida Water Management District ("**SFWMD**"). DECOMP was constructed 11.21 miles south of the Well site along a 3,000-foot stretch of the L-67A and L-67C levees and canals in WCA 3. A map indicating the relative locations of the DECOMP project and the Well site is included as **Exhibit X**.

The Corps' April 2010 document, *Installation, Testing and Monitoring of a Physical Model for the Water Conservation Area 3 Decompartmentalization and Sheet Flow Enhancement Project Final Environmental Assessment and Design Test Documentation Report* ("**Report**"), describes wildlife in the area. Please note the following differences between the DECOMP project area described in the Report and the Well site:

- The Well site and the DECOMP project area are both located within the remnant Everglades in southeastern Florida, in an area removed from large cities and industrial areas. The Well site is located in Broward County, west of Holiday Park, while DECOMP is located in Miami-Dade County.
- The Well location is owned by Kanter, subject to a flowage easement that was granted to the Central and Southern Flood Control District in 1950. The design test and areas potentially impacted by the DECOMP project are owned by SFWMD and managed by the Florida Fish and Wildlife Conservation Commission ("**FWCC**").
- The Well is located between the L67A and L67B levees, adjacent to L67A, on the southern side of the levee. The DECOMP project is 11.21 miles south of the Well site along the L67-A levee.
- The Well site will not impact the L67A canal, while the DECOMP project had some impacts on the canal.

Regarding the general environmental condition of the area, the Report states on page 3-1:

> WCA 3 is comprised of WCA 3A (786 square miles) and WCA 3B (128 square miles) and is divided by two levees. The conservation area is predominantly a vast sawgrass marsh dotted with tree islands, wet prairies, and aquatic sloughs. A cypress forest fringes its western border along the L-28 gap and expands south to the Tamiami Trail. The historic landscape in this area was composed of sawgrass marsh and an expansive ridge and slough system with numerous tree islands, some of which were the largest in the ecosystem.
>
> The introduction of regional transportation corridors and water management systems fragmented wildlife habitat throughout the Everglades ecosystem, including the WCAs. The once vast, naturally connected landscape has been cut into a mosaic of various-sized habitat patches. The canals adjacent to the project area likely serve as an effective barrier to wildlife movement, interfering with or preventing life functions of many native wildlife species.
>
> The features associated with the DPM project would be constructed on the L-67 canal/levee system. While areas of both WCA 3A and WCA 3B will be affected, the project is expected to mainly influence WCA 3B, the receiving basin.

The FWCC's letter to the Department, dated August 4, 2015 ("**FWCC Letter**") (**Exhibit Y**) confirmed that the Well site contains the same threatened and endangered species and state species of concern as the DECOMP project area, excepting the West Indian manatee, Southeastern American kestrel, and Florida sandhill crane. The Well site also does not contain Florida panther habitat. Included as **Exhibit Z** are panther habitat maps from the DECOMP Report, which demonstrate that the Well site is outside the primary and secondary habitat zones for the Florida panther.

As described in page 3 of the FWCC Letter, "Wildlife surveys have not been conducted onsite, however the application provides a commitment to follow the U.S. Fish and Wildlife Service (USFWS) Eastern Indigo Snake Protection Plan, USFWS Habitat Management Guidelines for the Wood Stork in the Southeast Region Plan, and the USFWS Snail Kite Survey Protocol." Kanter's commitment to follow these USFWS guidelines is based on surveys performed in support of CERP. Also, because species surveys have not yet been conducted onsite and because the location of the proposed activities may impact the listed species mentioned in the FWCC Letter with the four exceptions noted in the previous paragraph), Kanter commits to obtaining wildlife surveys for the above-listed species prior to any site development activities. Kanter will ensure that wildlife surveys are conducted by qualified individuals with recent documented experience, following survey protocols established by the USFWS and the FWCC. Additionally, Kanter will coordinate with the USFWS South Florida Ecological Services Office for any necessary federal requirements.

Snail kites frequently nest in WCA 3B downstream of the Well site, and surveys for snail kites will be conducted before and during construction activities. Kanter will coordinate with the USFWS for information regarding potential impacts to this species. Additionally, if snail kites are documented near the project site, Kanter will coordinate with Tyler Beck, FWCC's Snail Kite Conservation Coordinator.

The Well site is located within the USFWS Consultation Area for the federally endangered Florida bonneted bat and potential habitat for this species may exist onsite. There is no evidence at this time of habitat suitable for bats in the immediate area because bats reside in trees, which are absent from the property. However, Kanter will take steps to determine if and how bonneted bats may be using the Well site. This could include conducting acoustic surveys to determine presence of bonneted bats and searching for potential roost sites within the Well site. For any potential roost site that is located, the potential roost site will be examined by a trained wildlife professional and the area around it will be searched for signs of bats. If Florida bonneted bats are identified, Kanter will immediately contact the USFWS and also provide that occurrence information to the FWCC.

Kanter will conduct surveys for state listed wading birds immediately prior to construction that occurs during the breeding season (January-August). Surveys will occur within 1,000 feet of the Well site because wading birds in the WCAs are unaccustomed to the level of disturbance caused by construction. If active wading bird nesting colonies are discovered within 1,000 feet of the Well site, Kanter will conduct construction activities outside of the breeding season. If this proves to not be feasible, Kanter will contact FWCC staff for technical assistance on avoidance, minimization, and potential permitting alternatives.

For Least Terns, Kanter will implement the following measures to reduce nesting potential during construction:

- Conduct construction activities outside of the breeding season (generally April through August),
- Clear the site only when ready to build, and

- Avoid leaving cleared areas with little to no activity for an extended amount of time.

If nesting is observed, Kanter will contact FWCC staff to discuss necessary nest buffers and potential permitting alternatives.

The Division of Historical Resources, Florida Department of State advises in the correspondence included as **Exhibit AA** that there are no recorded archaeological sites or other historic resources recorded within the area of the Well site, and given the environment it is unlikely that a project of this scale will lead to the disturbance of any significant resources. This project is recorded as DHR file number 2015-3766. Therefore, a cultural and archeological resources assessment will not be performed.

6.4 Site environmental management

The drilling location will have secondary containment areas around the rig substructure and the generator (including its fuel tanks). These containment areas will be covered by a high-density polyethylene liner system that will collect rainwater, oils, grease, and other fluids and direct them to a sump. A containment berm surrounding the fuel tanks will be constructed to a height sufficient to contain 2 times the capacity of the largest tank.

The list of all potentially toxic or hazardous materials to be stored on site for drilling purposes or in support of ancillary equipment is:

- Antifreeze
- Cotton Seed Hulls
- Drilling Paper
- Duo-Vis
- Fed Seal
- Floxit
- Gear oil (80-90)
- Hydraulic fluid (Series 46)
- Max Gel
- MI-Gel
- Motor oil (10W-40)
- PolySal
- Salt Gel
- Soda Ash

Duo Vis, M-I Gel, Max Gel, Salt Gel are viscosifiers. Flox-It is a flocculant. Soda Ash is used for pH control. Cotton Seed Hulls, Paper, and Fed Seal are loss circulation materials. PolySal is a water loss control agent. Gear oil, motor oil, and hydraulic fluid are lubricants. Antifreeze is a coolant. The associated Materials Safety Data Sheets for these materials are included as **Exhibit BB**.

Potential sources of spills on site are as follows: drilling fluid from pits or circulating system, water from storage tanks, fuel from fuel tanks, oils from oil containers, and oil and coolant from engines. A spill from one of these sources would be removed to a containment tank via pump (centrifugal,

diaphragm, or vacuum). Small oil spills will be removed with oil soak pads. Vacuum trucks will be on standby in the event of a larger spill and to remove contaminated fluids from the site. The bleeder from the discharge culvert will be shut in the event of any spill.

There will be a spoil area (shown in **Exhibit O**) to receive the material created from de-mucking the Well site. It will be comprised of native material and will be stored onsite. It will be stabilized by plantings of native grasses. It is not designed for stormwater management and will not be lined. It is hydraulically separated from the proposed stormwater management system.

Drill cuttings will be tested for hydrocarbons by DPS, a qualified testing company. Drill cuttings and drilling fluids will be handled and disposed in accordance with applicable hazardous waste and materials laws, which may include public landfills if the testing results indicate that is an appropriate method of disposal.

6.5 Traffic

Kanter has identified four distinct access routes along SFWMD levees. See **Exhibit CC**. A right-of-way-permit needs to be obtained from SFWMD once a preferred route is selected.

The SFWMD uses the L67-A levee and other levees accessed from State Road 27 and State Road 41 for the purposes of maintenance, construction and general access associated with the levees and the water conservation areas. Kanter will commit to utilizing equipment that is standard to ordinary district maintenance and construction activities in terms of size, capacity and/or weight restrictions. Therefore no road improvements are to be proposed or anticipated. Kanter proposes to utilize traffic control measures that include:

- Install and maintain traffic control devices, warning devices, barriers, signage and safety devices per FDOT standard specifications during construction
- Control dust through standard means
- Utilize existing ramps along the levee for passing of traffic

Kanter will also provide any other safety measures as deemed appropriate by the SFWMD.

6.6 Hydrogen sulfide contingency plan

Attached as **Exhibit DD** is Kanter's hydrogen sulfide gas contingency plan, which was prepared by Safety First in accordance with Chapter 62C-27.001(7), F.A.C. and in line with federal regulation 30 CFR 250.490. Hydrogen sulfide is not likely to occur. Out of an abundance of caution, Kanter will bring onsite a safety contractor to monitor for hydrogen sulfide 24 hours a day, starting when the well reaches 9,000 feet deep. The attached contingency plan will go into effect at 10,000 feet, which is more than 1,000 feet higher than the top of the expected hazardous hydrogen sulfide zone. Kanter has determined that this is the appropriate depth based on the U.S. Geological Survey's 1995 USGS National Oil and Gas Play-Based Assessment of the South Florida Basin.

Kanter will follow the following procedure to notify people performing recreational activities in the unlikely event of a hydrogen sulfide release:

- A Kanter representative will dispatch sufficient personnel to immediately warn Everglades Holiday Park and SFWMD personnel in the calculated radius of exposure.
- Green, yellow, or red flags will be placed along the L 67-A and Miami Canal levees within the calculated radius of exposure.
- A Kanter representative will immediately notify proper authorities, including the Broward County Sheriff's Office, Florida Highway Patrol, and any other applicable public officials and will enlist their assistance in warning people performing recreational activities within the calculated radius of exposure.
- A Kanter representative will dispatch sufficient personnel to divert traffic from the access levee and to monitor essential and non-essential traffic to the well site.

6.6 Gathering lines, pipeline, and test phase

The Well is an exploratory well. There are no plans for gathering lines or pipeline at this time. Any oil that is produced will be trucked from the site.

6.7 Housing, personnel, and security

Most of the drilling personnel will be housed off-site. Some of the drilling personnel will be housed in temporary quarters located in the Well pad area. There will be an office trailer with living quarters for the drilling supervisor and rig manager and temporary trailers for other personnel. Electricity will be provided by diesel generator sets. All wastewater will be contained in storage tanks and removed from the site by a waste contractor, and a bottled water contractor will supply drinking water. Portable toilets will be provided, and sanitary waste will be collected in holding tanks and removed by a local contractor. Water for drilling will be supplied by on-site wells.

The Well site will be secured by a six-foot chain link fence and a locked gate. Only supervisors of Well drilling activities or construction foremen for each shift will have access to a gate key.

7.0 Bottom Hole Location

The proposed bottom hole location is 920 feet FSL and 920 feet FWL at Latitude N 25.9984172 and Longitude W 80.5184033 in Section 23, Township 51 South, Range 38 East, Broward County, Florida, as depicted in **Exhibit EE**.

8.0 Drilling Rig and Equipment

A Drawworks OIME SL-5 drilling rig or equivalent will be used. The exact model used will depend upon availability. Detailed information regarding the Drawworks OIME SL-5 drilling rig is attached as **Exhibit FF(1)**, and a blowout prevention schematic is attached as **Exhibit FF(2)**.

Below is a list of all necessary equipment, materials, vehicles, and infrastructure necessary to support the test phase of the Well:

- Wireline trucks for logging and perforating
- Workover rig and support equipment to work over well
- Trucks to deliver tubing & tools (5)
- Swab rig for swab testing, tanks for swab fluids (2-3 tanks with total of 1200 bbl. Cap.),
- Pump truck and tank truck for treatment

- Water and oil trucks to haul off produced fluids
- Fuel tank and fuel truck to deliver fuel
- Test truck to test tubing
- Office trailer for supervisors
- Doghouse trailer for workover personnel
- Vehicles to transport personnel to and from site(5-10 daily)
- Garbage and sanitation service vehicles (bi-weekly)
- Portable toilets (2)

9.0 Drilling Operations

Drilling operations will consist of drilling and testing and will take place 24 hours a day for approximately 60 to 80 days. A crew of 12 to 18 persons will work on site during this time, and they will be housed as described in Section 6.7. Electricity will be provided by diesel generator sets. All wastewater will be contained in storage tanks and removed from the site by a waste contractor, and a bottled water contractor will supply drinking water. Sanitary waste will be collected in holding tanks and removed by a local contractor. Water for drilling will be supplied by on-site wells depicted in **Exhibit Q**.

10.0 Proposed Drilling Program

The drilling procedures were developed for the Well by Century Oil, Inc. and are attached as **Exhibit GG**.

10.1 Casing and cementing program

The proposed casing and cementing programs, prepared by Haliburton, are attached as **Exhibits HH** and **II**, respectively, and the proposed wellbore schematic which was developed by Century Oil, Inc. is attached as **Exhibit JJ**.

The casing and cementing program is as follows:

- 24” diameter, ½” wall thickness conductor driven to 200 ft.
- 13 3/8” 54.5-lb. J 55 ST&C casing at 1800 KB (minimum 100 ft. below USDW and then cement to surface)
- 9 5/8” 47-lb. L 80 LT&C casing at 3800 ft. KB; TOC 3300 ft.
- 8 ½” hole TD at 11,800 ft.

Please see **Exhibit II** for the cement calculations, volumes, types, and additives.

Kanter does not plan to run a drill stem test prior to running production casing. In the event production casing is run on the well, testing will proceed as follows:

- Casing will be tested to 1500 psi
- A gauge ring will be run to TD
- A cement bond log will be run
- Perforations will be made based on electric logs
- 2 7/8” 6.5#/ft. n 80 EUE tubing will be run to approximately 10,500 ft.
- Well will be swab tested for 3-10 days

- Well may be treated with 1000 gal. of 15% HCL acid after initial clean up swabbing
- If deemed commercial well will be fitted with a jet pump of rod pump for production

10.2 Well control equipment

The well control program was developed by Century Oil, Inc. and is attached as **Exhibit KK**. Rig equipment will be provided as follows:

Hole Size	Size/Pressure	Bottom-to-Top Arrangement	Low/High Test Pressures Rams/Annular
26"	N/A	N/A	N/A
17"	21 ¾" 2M	P/S/B/A	250-3,500/250-2,000
12 1/4"	21 ¾" 2M	P/S/B/A	250-3,500/250-2,000
8 ½"	11" 5M	P/B/A	250-3,500/250-2,000

Key: A = annular B = blind ram P = pipe ram S = drilling spool

10.3 Drilling fluids program

The Drilling Fluids Program was prepared by DuBar Drilling Fluids, LLC. This is the program that will be utilized for this well. It is attached as **Exhibit LL**.

11.0 Financial Security

Kanter has provided a check for a single well to the Department of Environmental Protection Petroleum Trust Account, in accordance with Chapter 62C-26.002(5)(a), F.A.C.

12.0 Oil Well Operator

Kanter has engaged Pollister Drilling as its Well driller and Century Oil as its operator. Attached as **Exhibit MM** is the resume of Ed Pollister, who is president of both companies.

Attachment 13: Revised Drilling Procedure

Permit # 1366
Kanter 23-2
Century Oil Co., Inc.
Drilling Procedure
Broward County, Florida

DRILLING PROCEDURE

1. MIRU PDC Rig #3
2. Install 20" Diverter and 6" diverter lines. Function Test.
3. Spud with 17 ½" rock bit, 9" drill collars, 6" drill collars, and 5" HWDP. Drill down to 1800' while running both pumps @ 95 spm for a combined flow rate of 600 to 800 gpm. Weight on bit from 5k-25k at a rotary speed of 60-100 rpm.
4. At 1800' sweep hole and circulate clean. POOH to bit and trip back in to 1800'. Circulate & condition mud at POOH.
5. RU casing crew, tools & stabbing board. PU and run Float shoe, one joint of 13 3/8", 54.5# J55 BT&C of casing, Float Collar, and 13 3/8", 54.5# J55 BT&C casing down to 1800'. Note: centralize w/bow springs 6' above FS, and one per joint latched over the next three casing collars.
6. Circulate & condition mud for 1 ½ casing volumes. Mix & pump cement per recommendation. Pump LEAD cement until cement is seen at surface and immediately switch over to TAIL cement. Displace TAIL cement with fresh water. Note: When cement gets to surface divert cement to open top tank.
7. After displacement, Top Off annulus with 50sx. of TAIL cement. If cement falls or fails to circulate, notify FDEP in Fort Myers.
8. Make rough cut/final cut on conductor & casing. Weld on 13 3/8" SOW x 13 3/8" 3M C-22 wellhead. Test well head to 1000#.
9. NU BOP. Test annular preventer to 1000# (High)/200#(Low). Test all floor valves, IBOP, & mud lines back to mud pumps to 3000# (High)/250#(Low).
10. RIH w/ 12 ¼" bit and slick BHA to top of cement.
11. Pressure test casing to 1000#. Drill out float collar, cement, and float shoe.
12. Drill new hole from 1800' – 2100' with both pumps for a combined flowrate of 500-800 gpm. Vary bit weight from 5k-35k at a rotary speed of 80 rpm. POOH for button bit to drill Boulder Zone cap & Boulder Zone.
13. RIH w 12 ¼" button bit drill though Boulder Zone (2100'-3500') with lost returns. Take surveys every 500'.
14. POOH & LD 9" D.C.
15. RU casing crew with tools & stabbing board. RIH w/FS, 2 jts. 9 5/8" 47#, L-80 of casing, FC, & 9 5/8" 47#, L-80 casing down to 3800'.
16. RU cement crew, cement plug container, & iron. Circulate & condition mud for one casing volume. Mix & pump cement per recommendation. Reciprocate to casing 15' and displace cement with mud. Bump plug 500# over differential pressure. Bleed back to check floats. RD cementers.

17. ND flowlines & turn buckles. RU stack lift. Break bolts @ wellhead & spacer spool. Pick up BOP's & set casing slips. Make rough cut on casing & remove spacer spool & DSA. Make final cut on casing & NU 13 5/8", 3M x 11", 5M, C-22 casing spool. Finish NU "B" section. Set BOP's & RD stack lift. NU BOP's.
18. Test "B" section flange & pack off to 2000#. Test all rams, choke manifold, & related valves to 3000# (High)/250# (Low). Test annular preventer to 1000# (High)/250# (Low). Test all floor valves, IBOP, & mud lines back to mud pumps to 3000#(High) /250# (Low).
19. RIH w/8 ½" PDC bit, 6" DC;s, & 5" DP's down to top of cement. Test casing to 1500# or 0.2#/ft., whichever is greater. Drill out FC, cement, & FS. Drill 10' of new hole & circulate bottoms up until clean. Test casing shoe to 11.0# EMW.
20. Drill down through Sunniland. Take surveys every 500'. Make frequent wiper trips every 30 hrs or however the hole dictates. Drill to 11,800' (TD) & POOH.
21. RU Well Loggers & RIH and log well per Geologist recommendations.
22. Upon evaluation, either run production casing and cement or P&A as per FDEP.
23. RD & Move out.

Attachment 14: Ed Pollister Resume

Edward B. Pollister III

PO Box 370 Everglades City, Florida 34139
(231) 631-4721 (cell)

Experience:

Cactus Drilling	Daylight Driller (MI)	1973-1976
Shell Oil Company	Drilling Tech/Foreman (MI)	1976-1978
Reef Drilling	Drilling Superintendent (MI)	1978
Freedom Drilling	Vice President (MI)	1979-1981
Pollister Drilling Corp.	President/Owner (MI,FL)	1982-present
Oil Tech Services	President/Owner (MI,FL)	2005-present

(Drilling, Plugging, Workover-Completion & Consulting on Oil and Gas Wells in Michigan, South Carolina and Florida)

Recent Projects:

Underbalance drilling of Glenwood & PDC (Arenac County)
Drilling with Diamond Impreg. Bits & Turbines
Horizontal Drilling (15,000 ft)
C02 Frac. Completion

Education/Training:

University of Michigan, Ann Arbor: Education & Natural Resources (2yrs)
Imco Mud School
Smith International, Bit,Downhole Motor School
Preston Moore Drilling Technology Two Week Seminar at O.U.
Hughes Bit Company Seminar
Shell Oil Company Well Control School One Week in Mississippi
Ansul Firefighting School in Wisconsin
Dale Carnegie Business School in Texas
Shell Oil Company Drilling Engineering Two Week Seminar in Texas
Current in H2S,First Aid,CPR , Well Control

****References will be furnished upon request.***

Attachment 15: Hydrogen Sulfide Safety Plan

H2S SAFETY PLAN

Well Name: Kanter Sunniland 23-1
Location: Sec.23 T51S R38E
Broward County, Florida
Field: Wildcat

H2S Safety Plan

Date: January 8, 2015

Location: Sec. 23 T51S R38E Broward County, Florida
920' FNL, 920' FWL

0. Introduction:

This plan was developed based on American Petroleum Industry Recommended Practice 49: Recommended Practice for Drilling and Well Servicing Operations Involving Hydrogen Sulfide. The petroleum industry, through many years of research and operating experience, has developed guidelines and standards for safe operations under conditions involving hydrogen sulfide. Continuing industry efforts, which include planning, prudent selection and layout of equipment, prudent selection of materials, operating and emergency procedures, specialized safety equipment, and appropriate personnel training, have contributed to successful and safe operations. Effective response to emergencies requires prior planning. Good engineering practice (engineering and administrative controls) dictates that operations systems be designed to minimize exposure of personnel and the public to hydrogen sulfide and sulfur dioxide.

The purpose of this plan is to provide protection for Kanter Real Estate LLC personnel, its contractors, subcontractors, and the general public whenever a potentially dangerous situation may exist from Hydrogen Sulfide (**H2S**) during drilling or production operations. H2S will be monitored starting at the shallowest zone suspected to contain H2S (10,000 ft.). If H2S conditions specified in this policy are unexpectedly encountered, provisions of this plan should be implemented as soon as possible.

1. Scope

This plan applies to oil and gas well drilling and servicing operations involving H2S by and on behalf of Kanter Real Estate, LLC at the location specified above (**Well Site**). These operations may include well drilling, completion, servicing, workover, downhole maintenance, and plug and abandonment procedures conducted with H2S present in the fluids being handled. This plan covers applicable operations, confined to the original wellbore or original total depth, and applies to the selection of materials for installation or use in the well and in the well drilling or servicing operation(s). The presence of hydrogen sulfide in these operations also presents the possibility of exposure to sulfur dioxide from the combustion of hydrogen sulfide. Section 4 discusses sulfur dioxide further.

This plan is based on a recommended practice that addresses a broad range of potential operations. Not all of the scenarios outlined in this plan will apply to the drilling activities at the Well Site. Kanter Real Estate, LLC and its contractors will implement the portions of this plan that apply to the specific conditions at the Well Site as they arise.

This plan addresses personnel training, personnel protective equipment, contingency planning and emergency procedures, classification of locations, materials and equipment, operations, rig practices, characteristics of H2S and sulfur dioxide, and evaluation and selection of H2S monitoring equipment.

2. References

This plan was developed based on American Petroleum Industry Recommended Practice 49: Recommended Practice for drilling and Well Servicing Operations Involving Hydrogen Sulfide, Third Edition, May 2001. (**Recommended Practice**). The Recommended Practice lists multiple standards, regulations, and other publications used to develop the Recommended Practice.

3. Acronyms and Abbreviated Definitions

The following abbreviations are used in this plan:

3.1 Acronyms

ACC	acceptable ceiling concentration
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
API	American Petroleum Institute
BOP	blowout preventer
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
DC	direct current
DOI	U. S. Department of Interior
DOL	U. S. Department of Labor
DOT	U. S. Department of Transportation
EMI	electromagnetic interference
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FR	Federal Register
HAZWOPER	Hazardous Waste Operations and Emergency Response
H2S	hydrogen sulfide
IDLH	Immediately Dangerous to Life or Health
ISA	Instrument Society of America
LEL	lower explosive limit
MMS	Minerals Management Service
MSDS	material safety data sheet
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association

NIOSH	National Institute for Occupational Safety and Health
NRTL	Nationally Recognized Testing Laboratory
NTIS	National Technical Information Service
OCS	outer continental shelf
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PG	Pasquill-Gifford
ppm	parts per million
RCRA	Resource Conservation & Recovery Act
REL	recommended exposure level
RFI	radio frequency interference
ROE	radius of exposure
RP	Recommended Practice(s)
RQ	reportable quantity
SARA	Superfund Amendments and Reauthorization Act
SCF	standard cubic feet
SERC	State Emergency Response Commission
SO2	sulfur dioxide
SSC	sulfide stress cracking
STEL	Short-Term Exposure Level
TLV	threshold limit value
TPQ	threshold planning quantity
TWA	time weighted average

3.2 Definitions

The following terms have the meanings ascribed to them below when used in this plan:

3.2.1 acceptable ceiling concentration (ACC): The designated level of an air contaminant to which an employee may be exposed at any time during an 8-hour shift, except for a time period and up to a concentration not exceeding the acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift.

3.2.2 action levels: The levels at which the possibility of hydrogen sulfide atmospheric concentrations greater than 10 ppm or sulfur dioxide atmospheric concentrations greater than 2 ppm may be encountered.

3.2.3 breathing zone: Generally, a hemisphere forward of the shoulders with a radius of 6 in. to 9 in.

3.2.4 continuous hydrogen sulfide monitoring equipment: Equipment capable of continuously measuring and displaying the concentration of hydrogen sulfide in ambient air.

3.2.5 enclosed facility: A three-dimensional space enclosed by more than 2/3 of the possible projected plane surface and of sufficient size to allow the entry of personnel. For

a typical building, this would require that more than 2/3 of the walls, ceiling, and floor be present. Refer to API RP 500 and RP 505.

3.2.6 essential personnel: Those individuals required to provide proper and prudent safe operations activities and those required to effect control of the hazardous hydrogen sulfide or sulfur dioxide conditions.

3.2.7 gas detection instrument: An assembly of electrical, mechanical, and chemical components designed to sense and respond continuously to the presence of chemical gases in atmospheric mixtures.

3.2.8 hydrogen sulfide (H2S): Chemical formula is H2S. A flammable, toxic gas that is heavier than air and sometimes found in fluids encountered in oil and gas producing and gas processing operations.

3.2.9 immediately dangerous to life and health (IDLH): An atmospheric concentration of any toxic, corrosive, or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individuals ability to escape from a dangerous atmosphere. The ACGIH has established 300 ppm or greater of H2S as an IDLH exposure.

3.2.10 inadequately ventilated: Ventilation (natural or artificial) that is not sufficient to prevent the accumulation of significant quantities of toxic or inert gases such that a hazard is created.

3.2.11 length-of-stain detector: A specially designed pump and colorimetric indicator tube detector (length-of-stain), with a supply of detector tubes that operates by using the pump to pull a known volume of air or gas through a detector tube. The tubes contain chemical reagents that are designed to detect the presence and display the concentration of specific gases or vapors in the sample. The length of the resultant color band in the tube indicates an instantaneous quantitative concentration of the specific chemical in the sample.

3.2.12 permissible exposure limit (PEL): TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour work week. PELs are subject to change.

3.2.13 shall: Indicates an element of the plan with universal applicability to that specific activity.

3.2.14 shelter-in-place: The concept of providing the public protection from exposure to toxic gas or vapor releases to the environment by having residents stay indoors until emergency evacuators arrive or the emergency is over.

3.2.15 short term exposure limit (STEL): A 15-minute TWA exposure that should not be exceeded at any time during a workday.

3.2.16 should: Denotes an element of the plan: 1) where a safe comparable alternative practice(s) is available; 2) that may be impractical under certain circumstances; or 3) that may be unnecessary under certain circumstances.

3.2.17 special operations: any service performed on or in a well other than the normal drilling or service operations that are accomplished in their entirety by a drilling or servicing rig.

3.2.18 sulfur dioxide (SO2): Chemical formula is SO2. A toxic product of combustion of hydrogen sulfide, normally heavier than air.

CAUTION: Inhalation of SO2 at certain concentrations can lead to injury or death. Refer to **Appendix B**.

3.2.19 temporary safe haven: Refer to shelter-in-place (3.2.14).

3.2.20 threshold limit value (TLV): Airborne concentrations of substances representing conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effects. These values may be expressed as 8-hour time weighted average (TWA), Ceiling Limits, or 15-minute Short-Term Exposure Levels (STEL). Refer to American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. TLV is a trademarked term of ACGIH.

4. Applicability

4.1 Personnel and Equipment Protection

Severity of the Well Site environment shall be assessed. As a minimum, the following measures shall be implemented:

a. Personnel protection should be provided if the work area concentration of H2S (refer to 3.2.8) exceeds 10 ppm 8-hour time weighted average (TWA) or 15 ppm as a Short Term Exposure Level (STEL) averaged over 15 minutes (refer to Appendix A); or the work area concentration of sulfur dioxide (refer to 4.16) exceeds 2 ppm as an 8-hour TWA or 5 ppm as a STEL averaged over 15 minutes (refer to Appendix B). Personnel safety provisions of this plan do not apply when:

1. the atmospheric concentration of H2S could not exceed 10 ppm (by volume) in the breathing zone; or

2. the atmospheric concentration of sulfur dioxide could not exceed 2 ppm (by volume) in the breathing zone.

b. Equipment and materials shall be selected on the basis of resistance to sulfide stress cracking and corrosion. Refer to NACE MR0175 for recommendations for

selection of equipment and materials. Some conditions may require extensive personnel safety measures but only the use of conventional equipment and materials; other conditions may require the use of special equipment and materials but only minimal personnel safety measures; still other conditions may require both. Throughout this plan, action levels for various actions are used to ensure safety of employees and the public. These action levels have been established considering threshold limit values. These TLVs are subject to change and users should check applicable government standards and regulations. A good reference source is the latest edition of the ACGIHs Threshold Limit Values and Biological Exposure Indices. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a H2S TLV of 10 ppm (8-hour TWA) and a STEL of 15 ppm averaged over 15 minutes and recommends 2 ppm as an 8-hour TWA TLV and 5 ppm as a STEL averaged over 15 minutes for sulfur dioxide. In the interest of safety and health, this standard recommends use of the ACGIH TLVs as action levels for employee safety (refer to Appendices A and B). The action levels may be modified after review and due consideration of site specific conditions, various regulatory requirements, and material safety data sheet (MSDS) information.

4.2 Initiation of Procedures

Drilling and well servicing operations requiring special materials and equipment or personnel protection should utilize guidelines recommended in this plan. Safety procedures should be initiated and training completed in advance of penetrating the shallowest zone suspected to contain H2S. If H2S conditions specified in 4.1 are unexpectedly encountered, provisions of this plan should be implemented as soon as possible.

4.3 Legal Requirements

This plan presents recommended practices and precautions deemed pertinent to protect personnel and the public from exposure to potentially hazardous concentrations of H2S and sulfur dioxide. These recommended practices recognize that owners, operators, contractors, and their employees have separate responsibilities that may be contractual in nature. It is not the intent of this plan to alter the contractual relationship(s) between the parties. In the event of any omission or conflict between this plan and legally required action(s), the requirements of laws and regulations must control. Users of this plan should review these regulations and other federal, state, and local laws to assure appropriate compliance.

5. Personnel Training:

5.1 Introduction

All personnel (including employers, employees, service companies, and contractors) will be notified of the possibility of H2S atmospheric concentrations greater than 10 ppm and SO2 atmospheric concentrations greater than 2 ppm that may be encountered in the performance of their work.

All personnel who work in an area where concentrations of H2S or SO2 may exceed the action levels shall receive H2S training prior to entering the Well Site. All employers, whether operator, contractor, or subcontractor, shall be responsible for the instruction and training of their own employees. Personnel assigned to work in areas where they may be exposed to H2S or SO2 should be trained by a H2S safety instructor.

Training will be confirmed when each person presents a certificate of completion demonstrating that he or she attended a certified H2S training class.

5.2 Minimum Training

The value of training and periodic drills in oil well drilling, servicing, and workover operations cannot be over emphasized. The uniqueness or complexity of the operation will determine the extent of training deemed necessary for assigned personnel. However, the following minimum elements will be included in operations personnel H2S training:

a. The hazards, characteristics, and properties of H2S and SO2
b. Sources of H2S and SO2
c. Proper use of H2S and SO2 detection methods used at the workplace
d. Recognition of, and proper response to, the warning signals initiated by H2S and SO2 detection systems in use at the workplace.
e. Symptoms of H2S and SO2 exposure
f. Rescue techniques and first aid to victims of H2S and SO2 exposure
g. Proper use and maintenance of breathing equipment for working in H2S atmospheres, as appropriate theory and hands-on practice, with demonstrated proficiency
h. Workplace practices and relevant maintenance procedures that have been established to protect personnel from the hazards of H2S.
i. Wind direction awareness and routes of egress.
j. Confined space and enclosed entry procedures (if applicable)
k. Emergency response procedures that have been developed for the facility or operations.
l. Locations and use of safety equipment
m. Locations of safe briefing areas

5.3 Additional Training for Onsite Supervisory Personnel

Those personnel assigned supervising responsibilities at the site shall have additional training in the following elements:

a. Supervisor responsibilities of the contingency plan.
b. Effects of H2S on components of the H2S handling system.
c. The importance of drilling fluid treating plans prior to encountering H2S.

5.4 Hydrogen Sulfide Safety Instructors

H2S safety instructors are persons who have:

a. successfully completed a course in H2S instructor training; or
b. received equivalent instruction from a company-designated H2S safety instructor or trainer.

The H2S safety instructor must participate in a recurring training program implemented to maintain proficiency of H2S safety instructors.

5.5 Training Visitors and Other Non-Regularly Assigned Personnel

Prior to entering a potentially hazardous area, visitors and other non-essential personnel shall be briefed on route(s) of egress, emergency assembly area(s), applicable warning signals, and how to respond in the event of an emergency, including use of personal protective equipment, if required. These personnel may be allowed in potentially hazardous areas only in the presence of trained personnel, after being briefed on emergency action and evacuation procedures. In the event of an emergency, these personnel shall be immediately evacuated.

5.6 Training Records

Dates, instructors, attendees, and subjects for all personnel training sessions shall be documented and appropriate records should be retained for a minimum of 1 year.

6. Detection Equipment and Personal Protection Equipment (PPE)

6.1 Introduction

This section describes detection equipment and personal protective equipment (PPE) that can be used in oil and gas drilling and well servicing and workover operations where the work area atmospheric concentration could exceed the action levels of 10 ppm of H2S or 2 ppm of SO2. In addition to providing personal protective equipment, personnel should be trained in the selection, use, cleaning, inspection, and maintenance of the PPE.

At a minimum, the following equipment will be required at the Well Site:

- One (1) 4-head H2S detector system with sufficient numbers of alarms
- H2S warning signs on location and at the entrance of the lease road.
- Four (4) SCBA (Self Contained Breathing Apparatus) with 30 minute tanks
- Two (2) Wind Socks or Flags
- Two Safe Briefing Area Signs
- Five, 5 minute Escape Packs
- One (1) Sensidyne Pump with H2S tubes
- One (1) Flare Gun Kit with Flares

6.2 Detection Equipment

Manufacturers' recommendations should be followed for the installation, maintenance, calibration and repair of detection equipment. If the atmospheric concentration could exceed action levels for H2S or SO2, detection instruments shall be available on location. In those instances where the H2S atmospheric concentration may exceed the measurement range of the detection instruments in use, an alternative instrument shall be available on location that can measure atmospheric concentrations up to 300 ppm.

If SO2 levels could exceed the action level for SO2 (e.g., during flaring or other operations producing SO2), either portable SO2 detection instruments or length-of-stain detectors, with a supply of detector tubes, shall be available on location for determining the SO2 concentration in the area and to monitor areas impacted by SO2 gas when fluids containing H2S are burned. An adequate number of fixed or portable or both type detectors should be provided for the safety of personnel working. Prior to commencement of operations, there should be a clear understanding as to who will provide detection equipment.

6.3 Fixed (Stationary) H2S Monitoring Detection Systems

Fixed H2S atmospheric monitoring systems used in oil and gas well drilling, servicing and workover operations shall include visual and audible alarm(s), located where the alarm can be seen or heard throughout the work area. The batteries of direct current (DC) systems should be checked daily during operation unless an automatic low voltage alarm is provided.

6.4 Sensor Locations and Settings and Equipment Calibration

6.4.1 Monitoring equipment (fixed or portable) should be used during all drilling, workover, and well servicing operations where there is a possibility of H2S or SO2 exceeding action levels.

According to Recommended Practice 49, sensors should be located at the following locations as appropriate:

1. Bell nipple.
2. Mud-return line receiver tank (possum belly), and/or shale shaker.
3. Pipe-trip tank.
4. Well-control fluid pit area.
5. Drillers/operators station.
6. Living quarters, if located in the close proximity to the well.
7. All other areas where H2S may accumulate that are not part of the conned space entry program.

Given the design and characteristics of the Well Site, it has been determined that automatic monitors with four (4) heads and a range of 1-99 ppm should be set to go off at 10 ppm and placed in the following locations:

1. Under the rig floor near the bell nipple

2. In the area of the shale shaker
3. Near the driller's location on the rig floor
4. At the end of the mud mixing pits.

6.4.2 Visual low level alarms shall be set to activate at 10 ppm. High level alarms shall be set no higher than 300 ppm. The high level alarm shall activate an audible evacuation alarm. For single-set point monitors, the alarm shall be set at 10 ppm.

6.5 Equipment Calibration and Testing

Monitoring equipment should be serviced, calibrated, and tested as recommended by the equipment manufacturer. Inspections, calibrations, and tests should be documented. The equipment alarms should be functionally tested at least once daily.

6.6 Breathing (Respiratory Protection) Equipment

6.6.1 General

1. Respirators should be selected on the basis of the hazards to which workers are exposed.
2. The user shall be instructed and trained in the proper use of respirators and their limitations.
3. Respirators shall be cleaned and disinfected after each use.
4. Respirators should be stored in a convenient, clean, and sanitary location.
5. Respirators should be inspected during cleaning. Worn or deteriorated parts should be replaced. Respirators for emergency use should be thoroughly inspected at least once a month and after each use.
6. Appropriate surveillance of work area conditions and degree of employee exposure or stress should be maintained.
7. Persons should not be assigned to tasks requiring the use of self-contained breathing apparatus, (SCBA) unless it has been determined that they are physically able to perform the work and use the equipment.
8. Equipment needing repair shall be appropriately tagged and removed from equipment stock until it is suitably repaired or replaced.

CAUTION: Air purifying respirators and demand type (negative pressure) air supplied breathing equipment shall not be used in oil and gas well drilling, servicing, and workover operations when a H2S or SO2 level could exceed the action levels.

The following types of respiratory protection equipment, with full-face piece, shall be used where the work area atmospheric concentration exceeds the action levels:

1. Self-Contained Breathing Apparatus (SCBA) positive-pressure/pressure-demand breathing equipment that provides respiratory protection;
2. Positive-pressure/pressure-demand air line breathing equipment coupled with a SCBA-equipped low pressure warning alarm and rated for 15 minutes (minimum); or
3. Positive-pressure/pressure-demand, air-line breathing equipment, with an auxiliary self-contained air supply (rated for a minimum of 5 minutes). This type

unit can be used for entry as long as the air line is connected to a source of breathing air. The auxiliary self-contained air supply (rated for less than 15 minutes) is suitable only for escape.

6.6.2 Storage, Inspection and Maintenance

Personal breathing equipment shall be located so that this equipment is quickly and easily available to essential personnel. Additional breathing equipment may be required by site specific contingency plans. When an alternative derrick escape means is not available, an escape-type air pack shall be readily available. Breathing equipment shall be maintained and stored in a convenient, clean, and sanitary location. All breathing equipment should be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures and damaging chemicals. The breathing equipment should be packed and stored to prevent deformation of the face piece and exhalation valve. All breathing equipment shall be checked before and after each use and inspected at least monthly to ensure that it is maintained in satisfactory condition. A record of the monthly inspection results, including dates and findings should be retained for a minimum of 12 months.

6.6.3 Face Piece Restrictions

Full-face piece breathing equipment-meeting requirements of 6.6.1 shall be used where the work area atmospheric concentration exceeds the action levels. The employer shall ensure that an employee using a tight-fitting face-piece respirator is fit tested prior to initial use of the respirator. The test should be performed using the size, style, model, or make of respirator available to the employee. Fit testing should be done annually unless changes in size, style, model, or make of respirator or changes in the individuals facial scarring, dental changes, cosmetic surgery, or obvious changes in body weight requires additional fit testing.

Facial hair which would interfere with the face-piece seal is prohibited.

Personnel shall not wear eyeglasses with temple bars that extend through the sealing edge of the face piece. Using approved adapters, corrective prescription lenses may be mounted inside the breathing apparatus face piece.

6.6.4 Respiratory Concerns

Based on recent studies it is unlikely that H2S could be inhaled through a perforated eardrum at quantities that would be harmful.

Personnel with known physiological or psychological conditions that impair normal respiration shall not be assigned to jobs involving potential exposure to a H2S or SO2 environment if use of the breathing equipment or exposure will complicate their respiratory problems. Personnel assigned job-related tasks requiring routine use of breathing equipment should have a periodic review to determine their physiological and psychological adequacy for use of this equipment.

6.6.5 Air Supply

Breathing air quality shall meet the following requirements:

1. Oxygen content 19.5% — 23.5%.
2. Hydrocarbon (condensed) content of 5 mg/m3 per cubic meter of air or less.
3. Carbon Monoxide (CO) contents of 10 ppm or less.
4. Carbon dioxide content of 1,000 ppm or less.
5. Lack a noticeable odor.

6.6.6 Breathing Air Compressors

All breathing air compressors used shall meet the following requirements.

1. Prevent entry of contaminated air into the air-supply system. Inlet air for such compressors shall be monitored when conditions arise that permit possible contamination of the inlet by toxic, flammable, or combustible gases.
2. Minimize moisture content so that the dew point at 1 atmosphere pressure is 10°F below the ambient temperature.
3. Have suitable in line air purifying sorbent beds to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions. A tag containing the most recent change date and the signature of the person authorized by the employer to perform the change should be maintained at the compressor. Electronic documentation is an acceptable alternative.
4. For compressors that are not oil lubricated, the employer shall ensure the carbon monoxide levels in the breathing air do not exceed 10 ppm.
5. For oil lubricated compressors the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

7. Contingency Planning, Including Emergency Procedures

7.1 Introduction

Operators shall evaluate operations involving H2S and SO2 to determine if contingency plans, special emergency procedures, and/or training are warranted or are required by applicable federal, state, or local regulatory agencies. The evaluation process shall identify potential emergencies and their impact on operating personnel and the general public. The contingency plan, if required, shall conform to all applicable local, state, and federal regulations regarding notifications, precautions, evacuations, and other requirements.

A contingency plan has been prepared for the Well Site and is included in **Appendix D**.

7.2 Scope

The contingency plan shall contain emergency response procedures that provide an organized immediate action plan for alerting and protecting operating personnel,

contractor personnel, and the public. Contingency plans shall consider the severity and extent of the anticipated atmospheric H2S and SO2 concentrations. Contingency plans shall consider the dispersion characteristics of H2S and SO2 (refer to **Appendix C** or other recognized dispersion modeling techniques).

7.3 Availability of Plan

The contingency plan shall be available to all personnel responsible for implementation.

7.4 Plan Information

Contingency plan provisions may be contained in several plans or in a single plan. Contingency plans for offshore operations should contain greater detail concerning transportation requirements, evacuation of non-essential personnel, safe briefing areas and the accumulation of hazardous gases in machinery and personnel spaces. Contingency plans should contain information on the following subjects, as appropriate:

a. Emergency Procedures.

1. Responsibilities of personnel.
2. Immediate action plan.
3. Notification list and communication methods.
4. Diagram showing locations of nearby residences, businesses, parks, schools, churches, roads, medical facilities, athletics facilities, other facilities, including vessels offshore where population density may be unpredictable, etc.
5. Evacuation routes and road block locations.
6. Safety equipment and supplies available (e.g., number and location of breathing equipment).

b. Characteristics of H2S and SO2.

1. Refer to **Appendix A** for H2S characteristics.
2. Refer to **Appendix B** for SO2 characteristics.

c. Facility Description, Maps, and Drawings.

1. Water injection stations.
2. Wells, tank batteries, gas conditioning facilities, and flowlines.
3. Compression facilities.
4. Safe briefing areas.

d. Training and Drills.

1. Responsibilities and duties of essential personnel.
2. Onsite or classroom (tabletop) drills.
3. Informing nearby residents on protective measures in emergency situations, as appropriate.
4. Training and attendance documentation.
5. Briefing of public officials on issues.

7.5 Immediate Action Plan

Each contingency plan should contain an Immediate Action Plan, concise instructions to be followed by designated personnel any time they receive notice of a potentially hazardous H2S or SO2 discharge. For the protection of personnel (including the general public) and abatement of the discharge, this Immediate Action Plan should include the following provisions:

a. Alert and account for facility personnel. Move away from the H2S or SO2 source and get out of the affected area.

1. Don proper personal breathing equipment.
2. Alert other affected personnel.
3. Assist personnel in distress.
4. Proceed to the designated safe briefing area.
5. Account for onsite personnel.

b. Take immediate measures to control present or potential H2S or SO2 discharge and to eliminate possible ignition sources. Emergency shutdown procedures should be initiated as deemed necessary to correct or control the specific situation. When the required action cannot be accomplished in time to prevent exposing operating personnel or the public to hazardous concentrations of H2S or SO2, proceed to the following steps, as appropriate for the site specific conditions.

1. Alert the public (directly or through appropriate government agencies), who may be subjected to potentially harmful exposure levels.
2. Initiate evacuation operations.
3. Contact the first available designated supervisor on the call list (refer to 7.4a). Notify the supervisor of circumstances and whether or not immediate assistance is needed. The supervisor shall notify (or arrange for notification of) other supervisors and other appropriate personnel (including public officials) on the notification list.
4. Make recommendations to public officials regarding blocking unauthorized access to the unsafe area and assist as appropriate.
5. Make recommendations to public officials regarding evacuating the public and assist as appropriate.

c. Notify, as required, government agencies.

d. Monitor the ambient air in the area of exposure (after following abatement measures) to determine when it is safe for re-entry.

7.6 Notification Lists

A list of emergency telephone numbers and/or emergency contacts should be prepared and maintained as a part of the contingency plan, considering the need to contact any of the following:

a. Emergency Services.

1. Ambulances.

2. Hospitals.
3. Medical personnel (e.g., doctors).
4. Helicopter services.
5. Veterinarians.

b. Government Agencies and Contacts.

1. Local emergency planning committee.
2. National response center.
3. State emergency response commission.
4. State and local law enforcement agencies.
5. Fire departments.
6. Other applicable government agencies.

c. Operator and Contractors.

1. Operator personnel.
2. Contractor personnel.
3. Applicable service companies.

d. Public.

Contacts to emergency services or law enforcement agencies should provide notification that a H2S or SO2 emergency condition exists.

7.7 Community Warning and Protection Plan

When atmospheric exposures beyond the Well Site could exceed potentially harmful exposure levels, and could affect the general public, the contingency plans should also contain a community warning and protection plan. **Appendix C** or other recognized dispersion modeling techniques should be used to determine the radii of potential H2S concentrations around the Well Site. Under certain circumstances, consideration should be given to the use of the temporary safe haven or shelter-in-place concept of protection to provide additional time for safe extraction of people from the shelters.

7.7.1 Community Warning and Protection Plan Content

The community warning and protection plan should contain information on, but not be limited to, the following subject areas.

a. A plan for the notification and evacuation of residents and occupants in the vicinity of the Well Site should the atmospheric concentration in their area reach potentially harmful exposure levels.

b. Diagrams and telephone lists showing an identification number, the location, and telephone number (if available) of all residences, schools, churches, and businesses, as well as locations of barns, pens, roads, animals, and anything else that might cause people to be present who might need to be warned or evacuated. Access and evacuation routes should be indicated on the map. Anyone requiring assistance for evacuation, such as

bedridden, wheelchair bound, etc., should be noted on the list for priority evacuation assistance.

c. Recommendations to county authorities and local emergency service organizations for the initial response to protect the public.

d. The operating conditions under which the operator representative will contact local authorities and the recommended community protection measures to be taken under those conditions.
e. Description and location of safety equipment to be provided by (1) the operator, and (2) by local authorities or services, to support the community warning and protection plan.

7.8 Well-Ignition Plan

A plan should be prepared for ignition of the well in the event such action becomes necessary. The person, with appropriate authority to ignite the well, preferably the operator representative, should be stipulated in the contingency plan. The decision to ignite the well should be made only as a last resort, and only then in a situation where it is clear that:

a. human life and property are endangered; and
b. there is no hope of controlling the well under the prevailing conditions.

In any case, if time permits, an attempt should be made to notify the designated offsite operator supervisor of the plans to ignite the well. However, the operator representative must not delay the decision if human life is threatened.

If the well is ignited, the combustion of H2S will produce SO2, which is also highly toxic (**Appendix B**). SO2 atmospheric concentration should be carefully monitored. When the atmospheric concentration of SO2 in the work area exceeds action levels, non-essential personnel shall proceed to a safe area and all essential working personnel should use proper personal breathing equipment.

The well contingency plan should contain procedures for monitoring the presence of SO2 on an area-wide basis and notification of all persons within the area to evacuate to a safe area if the SO2 exposure exceeds potentially harmful exposure levels.

Ignition may not be possible due to high concentrations of carbon dioxide or other non-combustible gases in the well fluids. If a decision is made to ignite the well, all persons shall be kept in a safe briefing area or as far from the wellbore as necessary to provide safety. Also, ignition may sometimes not be advisable due to atmospheric conditions. These eventualities should be considered during preparation of the community warning and protection plan.

7.9 Training and Drills

The value of training and drills in emergency response procedures for oil and gas operations involving H2S or SO2 cannot be overemphasized. It is important that the training convey a full appreciation of the importance of each role and the effect that each person has on implementing an effective emergency response.

Exercises or drills that simulate an emergency in which personnel perform or demonstrate their duties are important tools that can convey the importance of contingency plans and result in their being kept current. The exercise can be a tabletop or classroom discussion; or can be a realistic drill in which equipment is deployed, communication equipment is tested, and "victims" are sent to hospital facilities with simulated injuries. Public officials should be informed of (and, preferably, involved in) these exercises. After a plan is tested, it should be revised and retested until those responsible for the plan are confident the plan is operational. Refer to NRT-1: *Hazardous Materials Emergency Planning Guide*.

7.10 Updating Provisions

The contingency plan shall be periodically reviewed and updated periodically.

Operating personnel should be observant for changes that would make reconsideration and possible revisions advisable in contingency plan coverage, location(s) of monitoring or detection equipment, and location(s) of lease equipment. Some changes that should be observed and considered are new residences or residential areas, churches, stores, businesses, parks, schools, or roads; changes in well operations; and changes in lease facilities.

8 Classification of Locations

8.1 General

Locations should be evaluated on the basis of the confinement presented by the area of the site and the specific environmental conditions. Land locations may be confined by the restriction of area, method of ingress and egress, terrain, surrounding population distribution, location proximity to municipalities or public facilities, etc. Locations with unconfined boundaries make it possible to obtain maximum safety benefits from rig configurations that take advantage of terrain and prevailing winds. Rig components should be arranged on location such that prevailing winds blow across the rig in a direction that will disperse any vented gas from the areas of the wellhead, choke manifold, flare stack or line, mud/gas separator, drilling or workover fluid tanks, reserve pits, and degasser away from any potential ignition sources e.g., engines, generators, compressors, and crew quarters) and areas used for personnel assembly.

Vehicles not involved in the immediate operations should be a minimum of 100 ft from the wellbore or a distance equal to the height of the derrick or mast, whichever is greater, and in all cases should be outside the derrick or mast guyline perimeter. Comparable

safety measures should be taken when terrain, location, or other conditions do not permit this spacing.

8.2 Locations with Unconfined Boundaries

8.2.1 Access to Location

All means of access to the location should be designed so that they can be barricaded at a predetermined location if H2S or SO2 emergency conditions arise. An auxiliary access should be available so that a shift in wind direction would not preclude escape from the location. Appropriate caution signs (black on yellow, or equivalent) shall be displayed at all location entrances when the atmospheric concentration of H2S could exceed action levels, so as to indicate a potential danger might be encountered. If warning flags or flashing lights are utilized, colors should be displayed in accordance with the following conditions:

Legible warning signs, such as "HYDROGEN SULFIDE OPERATIONS—ENTER ONLY WHEN MONITORING SHOWS THE AREA TO BE SAFE" or "RESPIRATORY PROTECTION EQUIPMENT MUST BE WORN BEYOND THIS POINT," should be prominently posted at appropriate locations (e.g., entrance points) for operations where H2S may be encountered.

CONDITION I: Potential Danger To Life and Health: Well Operations Under Control.
Warning Device: Green (H2S concentration < 10 ppm).
Characterized By: Routine well operations in zones containing H2S. H2S may be present at concentrations below action levels.
General Action:
a. Check safety equipment for proper functioning. Keep it available.
b. Be alert for a condition change.
c. Follow instructions of onsite operator representative.

CONDITION II: Moderate Danger To Life and Health: Critical Well Control Operations.
Warning Device: Yellow (H2S concentration 3: > 10 ppm and < 30 ppm).
Characterized By: H2S is or potentially may be present up to 30 ppm on the well location.
General Action:
a. Stay in the "SAFE BRIEFING AREA" if not working to correct the situation.
b. Follow instructions of the onsite operator representative.
c. The onsite operator representative will follow community warning and protection plan procedures.

CONDITION III: Extreme Danger To Life and Health: Loss Of Well Control
Warning Device: Red (H2S concentration > 30 ppm).
Characterized By: H2S concentration is above or potentially may be above 30 ppm.
General Action:
a. Stay in the "SAFE BRIEFING AREA" if not working to correct the situation.
b. Follow instructions of the onsite operator representative.

c. The onsite operator representative will make appropriate notifications, activate the audible alarm and initiate the community warning and protection plan.
d. If the well is ignited, the burning H2S will be converted to SO2, which is also dangerous to life and health. Therefore, DO NOT assume that the area is safe after the gas is ignited. Continue to observe applicable emergency and safety procedures and follow the instructions of the onsite operator representative.

8.2.2 Briefing Areas

Prevailing wind data shall be considered in locating briefing areas on either side of the location at a safe distance considering prevailing winds, or at a 90-degree angle for wind direction shifts in this area. When wind is from the prevailing direction, all briefing areas should be accessible. If the wind is quartering, one briefing area shall always be accessible.

8.2.3 Wind Direction Indicators

Windsocks, wind streamers, flags, or other suitable device(s) shall be placed at points around the Well Site location. A wind direction device should be readily visible to personnel on or approaching the work location and from any briefing area. Possible locations for installations are guylines, vertical poles around the work site, the briefing areas, and the road entrances. Where practical and necessary, wind direction devices should be placed in illuminated areas.

8.2.4 Electrical Equipment

All areas should be classified in accordance with API RP 500 or RP 505.

8.2.5 Mechanical Ventilation

Mechanical ventilation (e.g., blowers or fans) may be desirable to help reduce H2S concentrations in the work area. Use of such ventilation equipment should be considered on the rig floor, around the derrick substructure, at the fluid tanks, and at any other low areas where H2S or SO2 might accumulate.

8.2.6 Burn Pits, Flare Line(s), and Flare Stack(s)

All burn pits, flare lines, and flare stacks should be located considering the prevailing wind direction. Additionally, flare lines and vents should not be pointed into the prevailing wind. Space around flares and burn pits should be cleared of brush and grass. Flare stacks should permit dispersion of SO2, which may be generated by combustion of fluid(s) containing H2S.

8.3 Locations with Confined Boundaries

Space is often very restricted in mountainous or urban areas and in arctic, marsh, and water locations where operational requirements may dictate the use of special equipment such as barges, jack-up units, or similar support components. In addition to those recommendations made for unconfined locations, consideration should be given to confined locations considering limitations imposed by confinement of personnel and restricted distribution of equipment.

9 Well Materials and Equipment

9.1 Materials Considerations

When exposed to an environment containing H2S, many materials may suddenly fail in a brittle manner. Failure occurs by a form of embrittlement known as sulfide stress cracking (**SSC**). Susceptibility of a given material to SSC increases as strength and tensile stress (residual or applied) increase. Material hardness frequently is used as an indirect measure of strength and sometimes is referenced as a limiting parameter. The failure of certain well drilling and/or servicing and production equipment used in the SSC regime could result in the uncontrolled release of H2S to the atmosphere. Such components should be made from SSC resistant materials.

Note: Due to the limited availability of qualified equipment for sour service, consideration should be given for backup equipment.

9.2 Materials Selection

Metallic materials satisfactory for use in H2S environments and the conditions under which they should be used are described in NACE MR0175. The latest revision of this standard should be consulted when selecting materials for use in H2S environments. The provisions of NACE MR0175 should be considered minimum standards, with the equipment user free to apply more stringent specifications. The material requirements of NACE MR0175 offer resistance to SSC; however, other forms of corrosion and modes of failure (such as pitting, hydrogen-induced cracking, and chloride cracking) should be considered in the design and operation of equipment. Control of failures by mechanisms other than SSC should be mitigated by chemical inhibition, material selection, and environmental controls (refer to NACE MR0175).

9.2.1 Compliance with NACE MR0175 for equipment intended for H2S service may be required by the user, depending on severity of the service. Adequate quality assurance procedures should be followed to verify compliance by the manufacturer for the original equipment and for any subsequent equipment modifications.

9.2.2 Materials not covered in NACE MR0175 that have been qualified for H2S environment service by the user or manufacturer, using recognized and acceptable testing procedures, may be used. Recognized and acceptable testing procedures are those that demonstrate that the material(s) performs as well as or superior to similar material(s) set forth in NACE MR0175, using laboratory procedures or procedures for which testing has been completed under actual or simulated environmental conditions. The suitability of materials must be supported by appropriate documentation, that should include a complete description of the materials, processing, and testing procedure. Laboratory, field, or other environmental testing results or service performance should be recorded in writing. Full documentation supporting the suitability of material(s) for the selected service should be maintained by the user, manufacturer, or both.

9.2.3 Non-metallic, resilient, rubber-like materials used in the sealing mechanisms of the various components of equipment shall be capable of sustaining the designated operating pressure, temperature, and H2S environment exposure for that particular component or assembly. Careful consideration should be given to effects of chemical elements or other conditions of the well fluids that may have detrimental effects on the seal materials. The equipment manufacturer should be consulted in selecting seals for use in H2S environments (refer to API Bull 6J).

9.3 Well Fluids

The following measures will aid in the control of SSC:

1. Minimize formation fluid influx where appropriate.
2. Use of chemical scavengers. Fluids should be closely monitored for residual scavengers.
3. Maintenance of pH 9 or higher to prevent reversible action that can release H2S from the drilling or servicing fluid. The susceptibility to SSC increases as the pH decreases.
4. Use of a drilling or servicing fluid with diesel oil or other protective fluid as the continuous phase.

9.4 Equipment Selection and Installation

9.4.1 Blowout Prevention Equipment

Blowout prevention equipment for H2S service is described in API RP 53. API Spec 16A contains product purchase specifications for annular and ram-type blowout preventers and related equipment, as well as recommended operations characteristics tests for blowout preventer equipment.

9.4.1.1 Choke Manifolds

Recommendations for selection, installation, and testing of choke manifold assemblies for use in H2S service can be found in API RP 53 and Spec 16C.

9.4.1.2 Testing

Recommended blowout preventer equipment field acceptance inspection and testing procedures are shown in API RP 53. Suggested blowout prevention equipment tests for H2S locations are contained in API RP 53.

9.4.2 Wellhead Equipment

Wellhead equipment for H2S service is described in API Spec 6A.

9.4.3 Tubular Goods

9.4.3.1 Casing and Tubing

Casing and tubing should be manufactured using materials specified in NACE MR0175 and/or API Spec 5CT. Materials not covered in NACE MR0175, which have been qualified for H2S service by the user or manufacturer following recognized and acceptable procedures may be used.

9.4.3.2 Drill Pipe

Drill pipe used as work string should be manufactured using materials speciFIed in NACE MR0175 and API Spec 5D. Materials not covered in NACE MR0175, which have been qualiFIed for H2S service by the user or manufacturer following recognized and acceptable procedures may be used.

9.4.4 Work String Tubulars

For improved SSC resistance, work string tubular products having actual (not the specified minimum) yield strengths higher than 95,000 psi should be properly quenched and tempered. However, normalized and tempered lower strength tubulars (e.g., J-55 or L-80 tubing and Grades E and X drill pipe) used as work strings and normalized and tempered kellys are acceptable. The suitability of materials for H2S environment service can be assessed by evaluation of hardness testing results or tensile test data. As pipe yield strength and service stresses increase, consideration should be given to controlling SSC. High-strength tubulars (e.g., Grades P110 tubing and S135 drill pipe) should not be used for a work string in potential H2S environments unless a properly maintained drilling or servicing fluid is used. Recommendations for minimizing sulfide stress cracking of the work string are addressed in API RP 7G.

10 Well Site Safety

10.1 Introduction

The intent of this subsection is to promote personnel safety, protection of the environment, and integrity of the facilities through use of prudent practices and methods in well drilling, completion, servicing, and workover operations.

Due to the toxic nature of H2S and SO2, precautions must be taken to ensure personnel safety during any operation (refer to 4.1 and **Appendices A and B**). When protective breathing equipment must be worn by all working personnel, all nonessential personnel shall proceed to a safe briefing area. All operations shall be conducted in accordance with applicable laws, rules, and regulations.

10.2 Planning

An operations work plan consistent with the recommendations in this document should be established. Prior to starting operations, operating company, contracting company, drilling company, service company, and other job-related representatives should discuss pertinent well data and information pertaining to the operations.

The operator or his representative should provide and review the H2S contingency plan with the drilling or servicing company representative prior to rig up of equipment. The operator should also review the service company's immediate action plan to ensure coordinated response in the event of a H2S emergency.

10.3 Daily Checks

Daily checks should be performed by the designated Well Site supervisor prior to beginning work each day. The following items should be checked:

a. The work site for the presence of H2S.
b. Wind direction indicators. The results of this check may require redesignating the safe briefing areas.
c. H2S monitoring or detection equipment and alarm (function test).
d. Placement of personal protective breathing equipment.
e. Placement of fire protection equipment.
f. Appropriate first aid equipment.

10.4 Fluid

H2S gas breaking out of stored fluid can be hazardous to personnel, especially if located in an enclosed space. Extreme caution should be exercised where there is potential that the fluid has been exposed to H2S and is stored in "mud or workover" pits, trip tanks, reserve pits, slug tanks, or other tanks.

H2S may be generated by chemical reaction between stored fluids and other materials (residual or added). Personnel should take appropriate safety precautions when entering any enclosed or restricted ventilation area which contains or has contained stored fluid. Contaminated fluid should be disposed of in a safe manner or properly treated.

10.5 H2S from Pressure Maintenance and/or Waterflooding Operations

Pressure maintenance and/or waterflooding operations may introduce bacteria that can cause water soluble H2S to develop within the producing formation over time and be present in produced fluids. Operators of such producing properties should be alert to this possibility and should warn drilling or well servicing personnel that H2S may be encountered in the performance of their normal work.

10.6 Special Precautions

Special precautions should be taken during well drilling or servicing work, such as blowing the well down, dismantling wellhead equipment and flow lines, circulating the well, pulling pumps and packers, and swabbing after acidizing operations so that hazards due to the release of trapped H2S can be avoided. All drilling and/or servicing personnel should be trained in the potential dangers of H2S and precautions to be taken when it is encountered. Continuous H2S monitors/detectors should be available when drilling, working over or servicing a well with a potentially hazardous concentration of H2S. Protective breathing equipment shall be located so that it is quickly and easily available. Mechanical ventilation equipment may be used to direct vapors in the desired direction as protection against calm or light winds. Particular emphasis should be placed on low-lying work areas, such as cellars, where hazardous concentrations may develop because of the heavier H2S or SO2 settling in these areas.

10.7 H2S and SO2 Drills

In addition to H2S and SO2 training for personnel, periodic emergency drills shall should be held. These drills should include those steps necessary to implement the emergency

procedures. Records of personnel training and emergency drills shall be documented and should be retained for a minimum of 1 year.

10.8 H2S Ignition Sources

When mixed with air, H2S can be explosive. To minimize potential sources of ignition, the following items should be considered:

a. Enforce “No Smoking” rules.
b. Locate portable generator units, dog houses, and change rooms as far from the wellbore as practical, or take appropriate safety measures.
c. Prohibit vehicles equipped with catalytic converters in the immediate vicinity of the wellbore unless measures have been taken to ensure that the area is safe from the potential of ignition. Vehicles not involved in the immediate operations should be a minimum of 100 ft (30.5 m) from the wellbore or a distance equal to the height of the derrick or mast, whichever is greater, but in all cases should be outside the derrick or mast guyline perimeter. Comparable safety measures should be taken when terrain, location, or other conditions do not permit this spacing.
d. Spark arrestors or equivalent equipment should be provided on all internal combustion engine exhausts located within 100 ft of the wellbore.
e. Restrict open flame stoves, open fires, welding operations, or other possible sources of ignition (electrical power tools, two-way radios, etc.) to designated areas.

11 Special Operations

11.1 Introduction

Although some special operations may require or be enhanced by the use of a drilling or servicing rig, most special operations can be accomplished with or without a rig on location. Adequate lighting should be provided in the work area(s) when special operations are required to be performed during the hours of darkness. Operators of potential H2S producing properties shall alert employees and special operations service contractors of the possibility of H2S and SO2 atmospheric concentrations greater than action levels may be encountered in the performance of their work.

H2S and SO2 monitoring equipment shall be provided at the work location during special operations.
Special operations include, but are not limited to, the following operations:

a. Venting Operations.
b. Wireline operations, which include all types of wireline such as multi-strand conductor (electrical) line, multi-strand non-conductor line, and single-strand (slick) line.
c. Perforating operations.
d. Snubbing operations.
e. Continuous reeled (coiled) tubing operations.
f. Freezing (plug).

g. Valve drilling and hot tapping operations.
h. Coring operations.
i. Well evaluation and testing operations.

11.2 Venting Operation

In addition to the other provisions of this recommended practice, when opening or bleeding a tool, lubricator, or any other device which has the potential to release H2S, appropriate piping should be installed to vent to a suitable remote location.

11.3 Wireline Operations

11.3.1 Wireline Lubricator Equipment

If the Well is capable of flowing, the minimum lubricator equipment should consist of:

a. Wireline valve (blowout preventer).
b. Lubricator (riser) section(s).
c. Pressure bleed valve.
d. Stuffing box or control head.

When opening or bleeding a tool, lubricator, or any other device that has the potential to release H2S, appropriate piping should be installed to vent to a remote location. Otherwise, proper personal protective breathing equipment shall be worn by all personnel involved in the operation and with a potential to be exposed to H2S.

11.3.2 Wireline Materials

Wireline materials should be suitable for the environment to which they will be subjected. Where H2S is the single chemical factor involved, several wire materials are available that are highly resistant to SSC. Consideration should be given to pretreating wirelines and slicklines with corrosion inhibitor(s) prior to running them in the well. In addition, consideration should be given to onsite inspection and field ductility testing of the wireline to detect pitting, surface damage, or embrittlement of the material that may have been incurred during operations. Some wire materials that are resistant to the effects of a H2S environment may not be adequate if other chemical elements, such as halides, are present. Halides include a class of chemical compounds commonly occurring in oil and gas wells. Examples of halide compounds that may be present in well fluids are hydrochloric acid, salt water, calcium chloride, and zinc bromide. Halides at elevated temperatures, such as are commonly present in the lower regions of the tubing string, can embrittle stainless steel wirelines. Metallurgical consultation may be required prior to running stainless steel wireline into well fluids containing halides.

11.3.3 Well Swabbing Operations

The swabbing unit should be placed upwind from the wellbore, swabbing tanks, and pits. On a still day, the prevailing wind direction should be considered in positioning the swabbing unit.

11.4 Perforating Operations

Refer to API RP 67 and RP 54 for information regarding safety in perforating operations.

11.5 Snubbing Operations

Snubbing operations should be restricted to daylight hours, excepting where existing emergency or environmental conditions dictate that such operations be performed in hours of darkness. Operations in the basket should be performed with the minimum number of essential personnel required. When working atop snubbing equipment (in the basket), an escape device shall be provided for each employee at the work level. No employee shall be allowed in the snubbing workbasket without proper equipment (e.g., self-contained air supply for escape or emergency use or an escape device being immediately available for use).

11.6 Continuous Reeled (Coiled) Tubing Operations

Refer to Section 9, "Well Materials and Equipment," for information regarding selection and use of equipment used in continuous reeled tubing operations. Cold working of continuous reeled tubing can affect material hardness. A quality control program should be implemented to monitor tubing condition.

11.6.1 Placement of the Reel Unit

The continuous reeled tubing unit should be placed upwind of the well, considering the prevailing wind direction and specific Well Site conditions. The reel unit and its conveyance should be adequately secured so as to prevent any unwanted movement.

11.6.2 Special Equipment

When possible, a flanged type connection should be used on the bottom connection of the coiled tubing blowout preventer. In pressured operations, consideration should be given to a dedicated pump cross and a second set of tubing ram preventers located below the pump cross. Wellbore fluids should not be routed to the coiled tubing operation enclosure for the purpose of instrumentation or other uses.

11.7 Freezing Operations (Plug)

Some materials may become brittle at low temperature. Prior to plug freezing operations, steel specifications should be determined to prevent low temperature damage to the material.

11.8 Valve Drilling and Hot Tapping Operations

Equipment used in valve drilling and hot tapping operations shall be suitable for H2S service. The rated working pressure of all equipment used in these operations should exceed the anticipated pressure inside equipment being drilled or tapped. Refer to API RP 2201 for additional general information regarding hot tapping operations on equipment in service.

The bleed-off ports on the lubricator and lubricator assembly should be equipped with two (2) valves in series on each port. These valves should be suitable for H2S service and shall have a rated working pressure that equals or exceeds the rated working pressure of the lubricator assembly. The outer valve should be used as the operational valve in

order to conserve the innermost valve for emergency use.

11.9 Coring Operations

Precautions should be implemented prior to pulling cores from known or suspected H2S bearing zones. Crew members should don protective breathing equipment at least 10 stands before the core barrel reaches the surface or sooner if the action levels are reached. Portable H2S monitoring equipment should be used to check the core barrel when it is opened and when the core sample is removed. Personnel should continue to utilize protective breathing equipment until the atmosphere is determined to be below action levels. Appropriate precautions should be employed for the handling and transportation of samples containing H2S. Sample containers should be made of H2S resistant materials and appropriately labeled.

11.10 Well Evaluation and Testing Operations

11.10.1 Personnel Safety Precautions During Well Testing and Evaluation

In addition to recommendations set forth in Sections 5 and 6, the following personnel safety precautions should be considered:

a. Operations should be performed with the minimum number of essential personnel required. These personnel shall utilize the necessary equipment to safely perform the operation(s) and maintain related equipment and services. Protective breathing equipment shall be located so that it is quickly and easily available to essential personnel. Atmospheric conditions should be monitored with appropriate H2S detection equipment.
b. Prior to initiation of such operations, special safety meetings shall be conducted for all personnel who will be on the rig facility, with particular emphasis on the use of proper protective breathing equipment, first aid procedures, and emergency response procedures. Only H2S qualified personnel may perform work.
c. All produced gases shall be vented and/or flared in such a manner as to ensure personnel safety. Gases from stored test fluids should also be safely vented.
d. “No Smoking” rules shall be vigorously enforced.
e. Personnel handling fluid samples from known or suspected H2S zones should exercise caution until such operations are completed. Appropriate precautions should be employed for the handling and transportation of samples containing H2S. Sample containers should be made of H2S resistant materials and appropriately labeled.

Appendix A
Physical Properties and Physiological Effects of Hydrogen Sulfide

APPENDIX A—PHYSICAL PROPERTIES AND PHYSIOLOGICAL EFFECTS OF HYDROGEN SULFIDE

A.1 Physical Data

Chemical Name: Hydrogen Sulfide
CAS Number: 7783-06-4
Synonyms: Sulfureted hydrogen, hydrosulfuric acid, dihydrogen sulfide
Chemical Family: Inorganic sulfide
Chemical Formula: H_2S
Normal Physical State: Colorless gas, slightly heavier than air. Vapor density (specific gravity) at 59°F (15°C) and 1 atmosphere = 1.189.
Autoignition Temperature: 500°F (260°C)
Boiling Point: –76.4°F (–60.2°C)
Melting Point: –117.2°F (–82.9°C)
Flammable Limits: 4.3 – 46 percent vapor by volume in air.
Solubility: Soluble in water and oil; solubility decreases as the fluid temperature increases.

Combustibility: Burns with a blue flame to produce sulfur dioxide (SO_2). Refer to Appendix B. Odor and Warning Properties: Hydrogen sulfide has an extremely unpleasant odor, characteristic of rotten eggs, and is easily detected at low concentrations; however, due to rapid onset of olfactory fatigue and paralysis (inability to smell), ODOR SHALL NOT BE USED AS A WARNING MEASURE.

A.2 Exposure Limits

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Threshold Limit Value (TLV)® of 10 ppm (8-hour TWA) and a short term exposure limit (STEL) of 15 ppm averaged over 15 minutes. (Action Level) Exposure at the STEL should not be repeated more than 4 times per day with at least 60 minutes between successive exposures in this range.

A.3 Physiological Effects

Inhalation at certain concentrations can lead to injury or death. The 300 ppm is considered by the ACGIH as Immediately Dangerous to Life and Health (IDLH). Hydrogen sulfide is an extremely toxic, flammable gas that may be encountered in the production of gas well gas, high-sulfur-content crude oil, crude oil fractions, associated gas, and waters. Since hydrogen sulfide is heavier than air, it can collect in low places. It is colorless and has a foul, rotten-egg odor. In low concentrations, H_2S sometimes can be detectable by its characteristic odor; however, smell cannot be relied on to forewarn of dangerous concentrations because exposure to high concentrations (greater than 100 ppm) of the gas rapidly paralyzes the sense of smell due to paralysis of the olfactory nerve. A longer exposure to lower concentrations has a similar desensitizing effect on the sense of smell.

It should be well understood that the sense of smell will be rendered ineffective by hydrogen sulfide, which can result in an individual failing to recognize the presence of dangerously high concentrations. Exposure to hydrogen sulfide causes death by poisoning the respiratory system at the cellular level. Symptoms from repeated exposures to low concentrations usually disappear after not being exposed for a period of time. Repeated exposures to low concentrations that do not produce effects initially may eventually lead to irritation if the exposures are frequent.

A.4 Respiratory Protection

Respiratory protection shall be worn above the action level. Refer to 6.6 for proper breathing equipment recommendations for oil and gas well drilling and servicing operations involving hydrogen sulfide.

Appendix B
Physical Properties and Physiological Effects of Sulfur Dioxide

APPENDIX B—PHYSICAL PROPERTIES AND PHYSIOLOGICAL EFFECTS OF SULFUR DIOXIDE

B.1 Physical Data

Chemical Name: Sulfur Dioxide

CAS Number: 7446-09-05

Synonyms: Sulfurous acid anhydride, sulfurous oxide, sulfuroxide

Chemical Family: Inorganic

Chemical Formula: SO_2

Normal Physical State: Colorless gas normally heavier than air.

Boiling Point: 148°F.

Flammable Limits: Non-flammable (produced from burning hydrogen sulfide).

Solubility: Readily soluble in water and oil; solubility decreases as the fluid temperature increases.

Odor and Warning Properties: Sulfur dioxide has a pungent odor associated with burning sulfur. It produces a suffocating effect and produces sulfurous acid on membranes of the nose and throat.

B.2 Exposure Limits

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends 2 ppm as an 8-hour TWA Threshold Limit Value (TLV)® and 5 ppm as a STEL averaged over 15 minutes for sulfur dioxide.

B.3 Physiological Effects

B.3.1 ACUTE TOXICITY

Inhalation at certain concentrations can lead to injury or death. 100 ppm is considered by the ACGIH as Immediately Dangerous to Life and Health (IDLH).

B.4 Respiratory Protection

Respiratory protection shall be worn above the action level. Refer to 6.6 for proper breathing equipment recommendations for oil and gas well drilling and servicing operations involving SO_2.

Appendix C
A Screening Approach to Dispersion of Hydrogen Sulfide

APPENDIX C—A SCREENING APPROACH TO DISPERSION OF HYDROGEN SULFIDE

Note: The exposure radii shown in Figures C-1 through C-4 represent estimates developed by API's Air Modeling Task Force (AQ7) using simple screening models and modeling techniques. These models should be reasonably accurate for low velocity releases of neutrally-buoyant mixtures of hydrogen sulfide and carrier gas. Figures C-1 through C-4 are useful as a conservative screening tool for high velocity releases and for light hydrogen sulfide carrier gas mixtures. Figures C-1 through C-4 are not recommended for low velocity releases of heavier-than-air hydrogen sulfide/carrier gas mixtures or of potential aerosol- generating mixtures, since these illustrations sometimes will underpredict exposure radii for these mixtures. Site specific conditions should be assessed to determine the need for additional, more rigorous modeling techniques. Users should evaluate their operations and select proper modeling applications for their specific emergency planning purposes.

C.1 Introduction

CAUTION: The material presented in Appendix C is generic in nature and is intended for emergency response planning purposes to arrive at conservative hydrogen sulfide dispersion estimates. Figures C-1 through C-4 present the screening-level, model-predicted radius of exposure (ROE) for atmospheric concentrations of hydrogen sulfide at 10, 30, 100, 300, and 500 ppm for both continuous and puff (instantaneous) releases of pure hydrogen sulfide. The ROE represents the distance from the emission source to the concentration of interest measured along the plume's centerline at ground level. Equations were developed for predicting the ROE as a function of the quantity/rate of hydrogen sulfide released for each of the hydrogen sulfide concentrations modeled and the type of release (continuous and puff). The equations and corresponding coefficients are presented in C.8 and Table C-1. Meteorological conditions typical of worst-case daytime and nighttime conditions were modeled.

Various regulations dealing with hydrogen sulfide operations prescribe a method(s) or technique(s) for ROE predictions. Such methods must be taken into account because specific compliance actions may require use of a method(s) specified by the regulation, unless use of other methods is allowed.

C.2 Methodology

Note: The ROEs shown in Figures C-1, C-2, C-3, and C-4 were predicted using standard EPA- approved modeling procedures based on Gaussian dispersion theory. The ROEs shown in Figures C-1 and C-2 were predicted by modeling a continuous, steady-state point source release of 100 percent hydrogen sulfide. The ROEs shown in Figures C-3 and C-4 were predicted by modeling an instantaneous hydrogen sulfide release. Both hydrogen sulfide release types were modeled as releases of a neutrally buoyant material under steady-state meteorological conditions. An effective plume height (release height plus plume rise) of 10 ft was used in all the modeling work. It was assumed that the predicted ROEs do not vary significantly with effective plume height in the range of 0 – 50 ft.

For the purposes of dispersion modeling, the amount of turbulence in the ambient air is categorized into defined increments or stability classes. The most widely used categories are the Pasquill-Gifford (PG) Stability Classes A, B, C, D, E, and F (Pasquill, F., *Atmospheric Diffusion,* Second Edition, John Wiley & Sons, New York, New York, 1974). PG Stability Class A denotes the most unstable (most turbulent) air conditions and PG Stability Class F denotes the most stable (least turbulent) air conditions. PG Stability Class D denotes neutral atmospheric conditions where the ambient temperature gradient is essentially the same as the adiabatic lapse rate. Under neutral conditions, rising or sinking air parcels cool or heat at the same rate as the ambient air, resulting in no enhancement or suppression of vertical air motion.

Table C-1—Linear Regression Coefficients for Mathematical Predictions of ROE as a Function of Downwind Hydrogen Sulfide Concentration and Release Quantity/Rate

Time	Type of Release	Concentration (ppm)	Coefficients A	Coefficients B
Day	Continuous	10	00.61	0.84
Day	Continuous	30	00.62	0.59
Day	Continuous	100	00.58	0.45
Day	Continuous	300	00.64	– 0.08
Day	Continuous	500	00.64	– 0.23
Night	Continuous	10	00.68	1.22
Night	Continuous	30	00.67	1.02
Night	Continuous	100	00.66	0.69
Night	Continuous	300	00.65	0.46
Night	Continuous	500	00.64	32.00
Day	Puff	10	39.00	2.23
Day	Puff	30	39.00	2.10
Day	Puff	100	39.00	1.91
Day	Puff	300	39.00	1.70
Day	Puff	500	00.40	1.61
Night	Puff	10	39.00	2.77
Night	Puff	30	39.00	2.60
Night	Puff	100	00.40	2.40
Night	Puff	300	00.40	2.20
Night	Puff	500	00.41	2.09

Notes:

1. Day Meteorological Conditions: Stability Class PG D (Neutm 1) 1 mph Wind Speed.

2. Night Meteorological Conditions: Stability Class PG F (Stable) 2.2 mph Wind Speed.

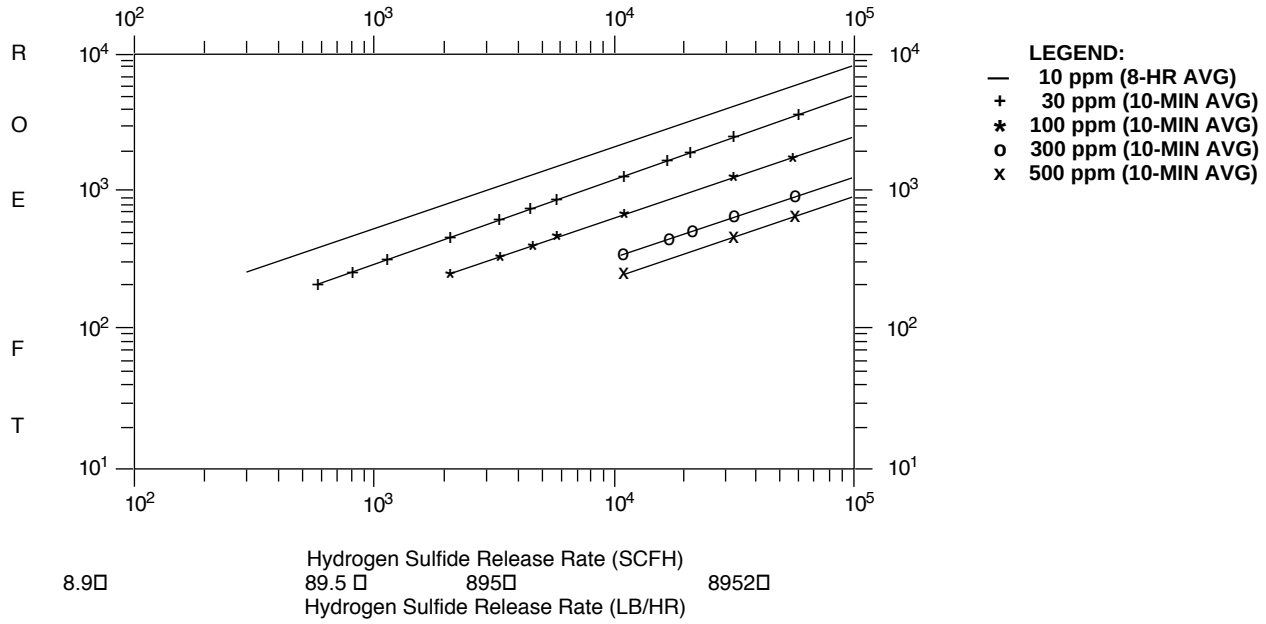

Figure C-1—Radius of Hydrogen Sulfide Exposure, Continuous Daytime Hydrogen Sulfide Releases
[PG F (Stable)—2.2 MPH Wind Speed]

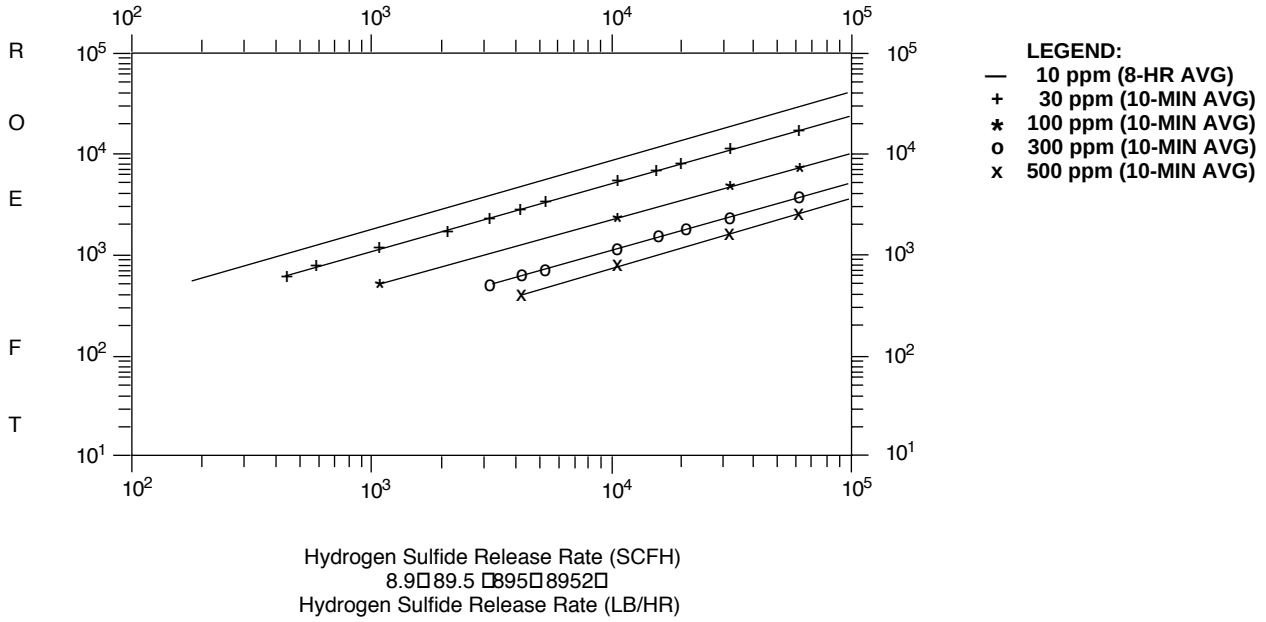

Figure C-2—Radius of Hydrogen Sulfide Exposure, Continuous Nighttime Hydrogen Sulfide Releases
[PG F (Stable)—2.2 MPH Wind Speed]

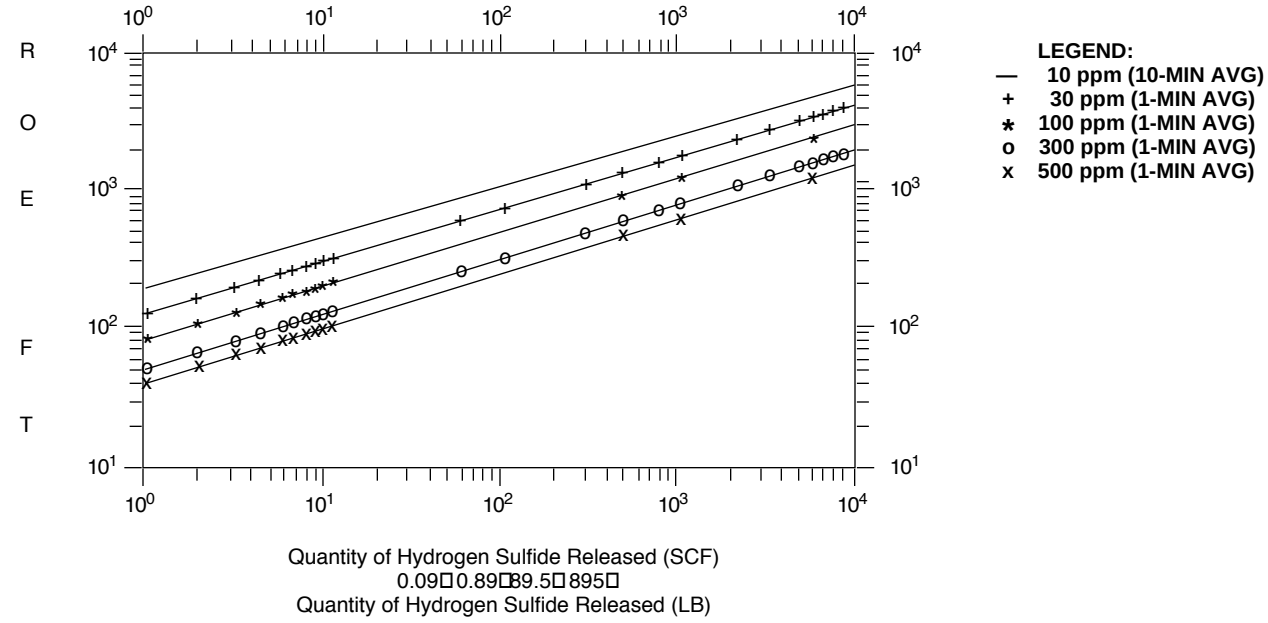

Figure C-3—Radius of Hydrogen Sulfide Exposure, Instantaneous Daytime Hydrogen Sulfide Releases [Slade A (Slightly Unstable)—5 MPH Wind Speed]

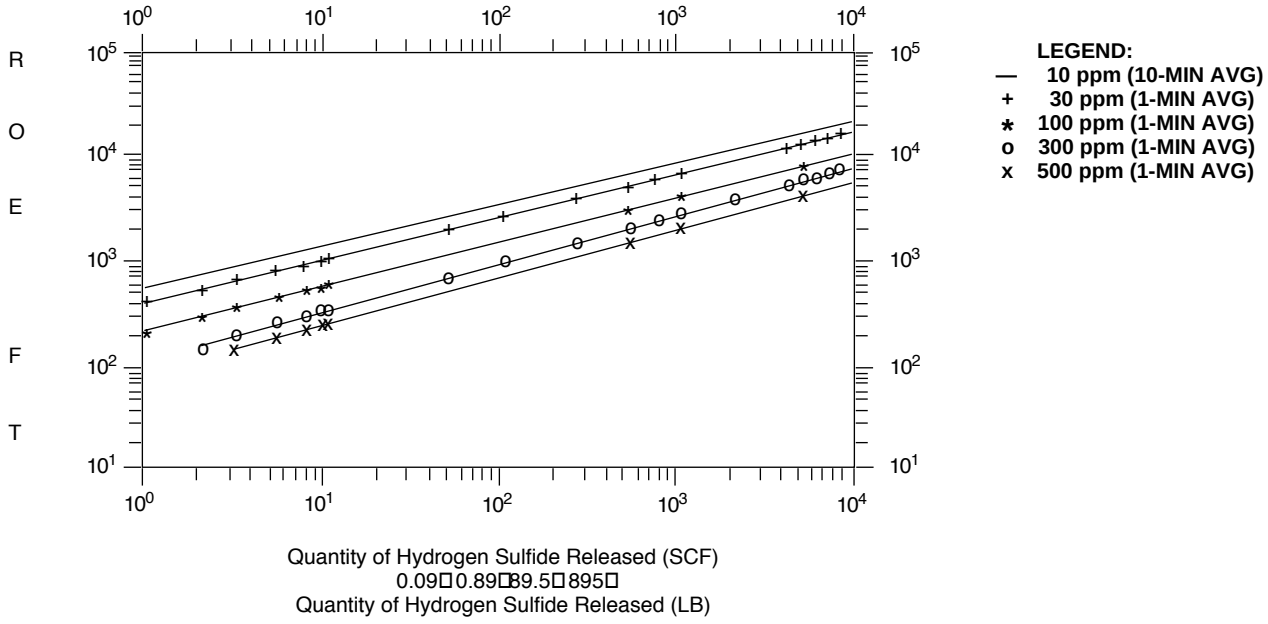

Figure C-4—Radius of Hydrogen Sulfide Exposure, Instantaneous Nighttime Hydrogen Sulfide Releases [Slade B (Neutral)—2.2 MPH Wind Speed]

Standard Pasquill-Gifford (PG) dispersion coefficients for flat, open grassland were used in the continuous hydrogen sulfide release model. The Slade (refer to NTIS-TID 24190: Slade, D.H., Meteorology and Atomic Energy, 1968) dispersion coefficients for flat, open grassland were used in the puff (instantaneous) release model. When modeling instantaneous hydrogen sulfide releases it was assumed that the downwind (x) and the crosswind (y) dispersion coefficients were equivalent. This assumption results in conservative (worst case) estimates of the ROEs. The following meteorological conditions were assumed to be representative of worst case daytime and nighttime conditions. For continuous daytime releases a neutral Stability Class (PG D) and 5 mph wind speed were chosen. For continuous nighttime releases, a stable Stability Class (PG F) and a 2.2 mph wind speed were chosen. For instantaneous (puff) daytime releases, a slightly unstable Stability Class (Slade A) and a 5 mph wind speed were chosen. For instantaneous nighttime releases, a neutral-to-stable Stability Class (Slade B) and a 2.2 mph wind speed were chosen.

The ROEs for continuous hydrogen sulfide releases at 30, 100, 300, and 500 ppm are valid for averaging times of 10 minutes to 1 hour. The ROEs shown for 10 ppm (continuous hydrogen sulfide release) are based on an 8-hour average concentration, since 10 ppm represents the 8-hour time weighted average (TWA) for hydrogen sulfide. To obtain the 8-hour 10 ppm average concentration a factor of 0.7 was used to convert the 1-hour concentrations (refer to EPA-450/4-88-009): A Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants). The ROEs for the puff (instantaneous) hydrogen sulfide releases at 30, 100, 300, and 500 ppm are valid for averaging times of 1 to 10 minutes. EPA's 0.7 conversion factor was used to obtain the 10-minute 0-ppm time averaged concentrations from instantaneous peak concentrations predicted by the model. For continuous releases, the EPA considers 10-minute and 1-hour averaging times to be equivalent. The modeling reported herein assumed that an instantaneous release would be of a very short duration (10 to 15 minutes maximum).

Brief descriptions of the models used to predict the ROEs for both continuous and puff (instantaneous) hydrogen sulfide releases are presented in C.13.

C.3 Results

ROEs for atmospheric plume-centerline, ground-level concentrations of hydrogen sulfide resulting from instantaneous and continuous hydrogen sulfide releases were predicted and are presented in Figures C-1 through C-4. Figures C-1 and C-2 present the predicted ROEs for continuous hydrogen sulfide releases during worst case daytime and nighttime meteorological conditions, respectively. Figures C-3 and C-4 present the predicted ROEs for instantaneous hydrogen sulfide releases during worst case daytime and nighttime meteorological conditions, respectively. The ROEs for concentrations of 10, 30, 100, 300, and 500 ppm were modeled for both release types. The 10 ppm concentration ROEs represent an 8-hour averaging time for the continuous hydrogen sulfide release and a 1-minute averaging time for the instantaneous release. The 30, 100, 300, and 500 ppm concentration ROEs represent a 10-minute averaging time for the continuous hydrogen sulfide release and a 1-minute averaging time for the instantaneous release. A hydrogen sulfide release rate range of 10 to 10,000 lb/hr (111.8 to 111,768 SCFH) was modeled for the continuous type release. For the puff (instantaneous) type hydrogen sulfide release, a release quantity range of 0.1 to 1,000 pounds (1.1 to 11,177 SCF) was modeled. If the hydrogen sulfide release is based on pounds, standard cubic ft (SCF) can be obtained by multiplying pounds by a factor of 11.2.

Note: The ROEs presented in Figures C-1 through C-4 are plotted against the amount of hydrogen sulfide released. For the release of a multi-component gas stream, the actual amount of hydrogen sulfide released should be used to determine the ROE.

Equation coefficients based on linear regression for predicting the ROE as a function of the release type (continuous/puff) and quantity/rate of hydrogen sulfide released for both daytime and nighttime meteorological conditions are presented in Table C-1. The equation is shown. The coefficients are applicable only over the ranges presented in Figures C-1 through C-4, and extrapolation could result in overly conservative estimates of the ROEs. Any release lasting significantly longer than 15 minutes should be interpreted as a continuous release. The modeling work presented in Appendix C assumes steady-state meteorological conditions. ROEs predicted for a long averaging time (8-hour) and long downwind distances are conservative because it is unlikely that the same meteorological conditions will persist during that time period.

C.4 Additional Considerations

The modeling work presented in Appendix C assumes a neutrally buoyant, gaseous hydrogen sulfide release in flat, rural terrain under steady-state meteorological conditions. Also, the ROEs shown in Figures C-1 through C-4 are for a generic class of hydrogen sulfide releases covering a wide range of site and release conditions. Actual ROEs will be dependent on the specifics of the type of release, release conditions, and release site. For instance, the ROEs for a release in a more urban setting where structures, buildings, etc., are present will be reduced significantly due to structure-induced turbulence. Some other conditions that could significantly affect the actual ROE include: a liquid/aerosol release, dense cloud behavior, a buoyant cloud (plume liftoff, jet release), time-dependent release (well blowout, pipeline ruptures, etc.), and complex terrain. If any of these phenomena are present, then more rigorous modeling may be necessary.

The ROE curves of Figures C-1 through C-4 should not be used when the mixture of hydrogen sulfide and carrier gas being dispersed is significantly heavier than air and the mix-

ture is released at a low velocity. If the hydrogen sulfide/carrier gas mixture specific gravity exceeds approximately 1.2, Figures C-1 through C-4 may not give conservative ROEs for all release rates and meteorological conditions. Hydrogen sulfide, as encountered in the petroleum industry, is usually a minor constituent of carrier gas, such as natural gas or carbon dioxide. Carbon dioxide has a specific gravity of 1.52. Dispersion predictions for hydrogen sulfide/carbon dioxide mixtures, using a dense gas model sometimes underpredict hydrogen sulfide ROEs for low velocity gas releases. Low velocity gas releases would include those with initial velocities less than 200 ft/sec and releases greater than 200 ft/sec involve impact of the gas jet from the leak with a nearby surface, thereby breaking the jet's momentum. Likewise. Figures C-1 through C-4 should not be used with any hydrogen sulfide/carrier gas release that potentially could form an aerosol.

Figures C-1 through C-4 can also substantially overpredict ROEs. In the case of hydrogen sulfide/carrier gas mixtures significantly lighter than air (i.e., specific gravity less than 0.8) released at low velocity, use of these illustrations may overpredict ROEs by a factor of 2 to 3. Use of these illustrations can result in overestimation of ROEs for high velocity hydrogen sulfide/carrier gas releases (i.e., gas release velocities greater than 200 ft/sec) regardless of the orientation of the release; however, this overprediction is particularly significant in the case of vertical, high-velocity releases. In such situations, the overprediction can be two orders of magnitude. The user should consult more rigorous atmospheric dispersion models.

When calculating the ROE for dilute concentrations of hazardous gases, a significant overestimation can result. For example, it would not be practical to expect higher downwind atmospheric concentrations than are present in the released gas stream. The user should consult more rigorous atmospheric dispersion models.

In summary, the composition of the hydrogen sulfide/carrier gas and the velocity and orientation of the release are critical variables, dramatically affecting predicted hydrogen sulfide ROEs. Also, other variables, such as released gas temperature and flashing or aerosol formation involving liquid containing dissolved hydrogen sulfide, can have significant impacts on ROE predictions. Accurate atmospheric dispersion techniques are, of necessity, complex. Under some circumstances, such as those mentioned above, more rigorous modeling may be required.

References and models are available to address special release scenarios. A partial list of models that may be used in such cases is shown in C.5 and C.6. API does not endorse any one particular model. Further guidance on appropriate model selection and application can be obtained from the model developers as well as other individuals experienced in this field. A specific reference to address well blowout and pipeline ruptures is "Release and Dispersion of Gas from Pipe Line Ruptures," Wilson, D.J., Department of Mechanical Engineering, University of Alberta, Edmonton, Canada.

In the event that hydrogen sulfide release quantities calculated by the user are below the ranges shown in Figures C-1 through C-4, extensions of the ROE curves are allowed to a minimum ROE of 50 ft. In some cases, ROEs of less than 50 ft may be inferred from extrapolation of the curves. Figures C-1 through C-4 were developed using an assumed release height plus plume rise of 10 ft. Actual release heights of other than 10 ft will result in different ROEs.

C.5 Proprietary Dispersion Models

Note: Users should carefully evaluate applicability of these models to prevailing conditions. A list of some proprietary models that can be used to address special site-specific scenarios follows:

CHARM (Radian Corporation): CHARM is a Gaussian puff model for continuous and instantaneous releases of gases or liquids. The model is configured to handle chemicals that are buoyant, neutrally buoyant, and heavier than air. Heavy gas dispersion is estimated using the Eidsvik model. Source components in the model include a modified version of Shell Oil Company's SPILLS model. (Radian Corp., 850 MOPAC Blvd., Austin, Texas 78759.)

FOCUS (Quest Consultants, Inc.): FOCUS is a modeling package that includes both emission rate models (two-phase discharges, pool evaporation, jet vapor releases, etc.) and dispersion models for both neutrally-buoyant and dense-gas plumes. The models can be run separately or in a linked mode. (Quest Consultants, Inc., 908 26th Avenue, NW, Suite 103, Norman, Oklahoma 73069-6216.)

TRACE (Dupont): TRACE uses a multiple Lagrangian Wall dispersion model to handle both puff and continuous releases. Wind channeling can be incorporated. Liquid evaporation and buoyancy effects are considered also. (E.I. Dupont de Nemours & Company, 5700 Corea Avenue, Westlake Village, California 91362.)

WHAZAN (Technica International): WHAZAN is a package of dispersion models for both neutrally buoyant and dense-gas plumes. Submodels are included to handle two-phase discharges, evaporation, and vapor dispersion as a free jet. The model can be run both individually and in a linked mode. (Technica International Associates, Inc., Box 187, Woodstock, Georgia 30128-4420.)

C.6 Publicly Available Models

Note: Users should carefully evaluate applicability of these models to prevailing conditions. A list of some publicly available models that can be used to address special site-specific scenarios follows:

DEGADIS (U.S. Coast Guard): DEGADIS, the Dense Gas Dispersion Model, is designed to simulate dispersion of heavier-than-air gas releases. It can handle both evaporative emissions from liquid spills and jet emissions. It is basically steady-state but simulates transient conditions by a series of

steady-state calculations. Vapor generation rate, spill area, and meteorological parameters are important inputs to the model. Information available through National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, Virginia 22161.

HEGADAS (Shell Research B.V.): HEGADAS is a dispersion model for neutrally-buoyant and dense gases. The basic model components are solutions to the advection/diffusion equations and are in the standard form of Gaussian dispersion models. The model can handle a wide variety of source types, including transient horizontal jets. Information available through National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, Virginia 22161. SLAB (Lawrence Livermore National Laboratory): SLAB is designed for application to dense gases that are emitted from liquid spills. The model considers the concentration integrated over a cross-section perpendicular to the plume centerline. The downwind variation of the integrated concentration is calculated. The size and emission rate of the liquid spill are required inputs to the model. Information available through Lawrence Livermore National Laboratory, Box 808, Livermore, CA 94550, or contact The American Petroleum Institute, Health & Environmental Sciences Department, 1220 L Street, NW, Washington, D.C. 20005.

C.7 Sample Calculations for Figures C-1 through C-4

The following calculations may be used to estimate volume and mass of hydrogen sulfide when total gas volume and its hydrogen sulfide content are known:

Continuous Release.

Assume: Release 5,000,000 SCFD of natural gas containing 8,000 ppm (by volume) of hydrogen sulfide.

Note: The user must know both the volume (or flow rate) of natural gas and its hydrogen sulfide concentration so that Figures C-1 through C-4 can be effectively used. To determine standard cubic ft per hour (SCFH) of hydrogen sulfide released, the following calculations should be performed using appropriate values for the conditions being evaluated:

$$5{,}000{,}000 \text{ SCFD} \times 8{,}000 \text{ ppm } H_2S$$
$$24{,}000{,}000 - 1{,}667 \text{ SCFH of } H_2S \text{ released}$$

To determine the pounds of hydrogen sulfide released per hour, the following calculations should be performed using appropriate values for the conditions being evaluated:

$$5{,}000{,}000 \text{ SCFD} \times 8{,}000 \text{ ppm } H_2S$$
$$267{,}605{,}634 - 150 \text{ lb./hr of } H_2S \text{ released.}$$

Instantaneous Release.

Assume: Release of 100,000 SCF of natural gas containing 8,000 ppm (by volume) of hydrogen sulfide. Also, assume this example is a daytime release, 5 mph wind speed (refer to Figure C-3).

To determine the volume (SCF) of hydrogen sulfide released the following calculations should be performed using appropriate values for the conditions being evaluated:

$$100{,}000 \text{ SCFD} \times 8{,}000 \text{ ppm } H_2S$$
$$1{,}000{,}000 - 800 \text{ SCF of } H_2S \text{ released.}$$

After applying the appropriate calculations and using known factors to arrive at either hydrogen sulfide release rate or quantity of hydrogen sulfide released, refer to the appropriate chart (Figures C-1 through C-4) or the equation in C.8 (example calculations in C.9 through C.12) for obtaining radius of exposure (ROE) information.

The following equation can be used to convert percent hydrogen sulfide to parts per million on a volume basis:

$$\text{Percent } H_2S \times 10{,}000 = \text{ppm } H_2S$$

C.8 Radius of Exposure (ROE) Calculation

Using the values of coefficients "A" and "B" in Table C-1, the radius of exposure (ROE) for various hydrogen sulfide release rates (H_2S) can be mathematically predicted using the following equation:

$$ROE = \text{Antilog } [A \times \log (H_2S) + B]$$

For a continuous release, enter the hydrogen sulfide release rate (H_2S) in standard cubic ft per hour (SCFH). For a puff (instantaneous) release, enter the quantity of hydrogen sulfide (H_2S) released in standard cubic ft (SCF).

C.9 Sample Calculation—Continuous Release (Daylight)

Determine the ROE100 ppm for a continuous release of 100 percent hydrogen sulfide gas at a rate of 11,170 SCFH in daylight (RG D stability) conditions and 5 mph wind speed. Using Table C-1, the coefficients applicable to this scenario are: A = 0.58; B = 0.45. Using the equation in C.8:

$$ROE100 \text{ ppm} = \text{Antilog } [0.58 \times \log (11{,}170) + 0.45]$$
$$= 628 \text{ ft}$$

C.10 Sample Calculation—Continuous Release (Nighttime)

Determine the ROE for a continuous release of 100 percent hydrogen sulfide gas at a rate of 11,170 SCFH in nighttime (PG F stability) conditions and 2.2 mph wind speed. Using Table C-1, the coefficients applicable to this scenarios are: A = 0.66; B = 0.69. Using the equation in C.8:

$$ROE100 \text{ ppm} = \text{Antilog } [0.66 \times \log (11{,}170) + 0.69]$$
$$= 2{,}300 \text{ ft}$$

C.11 Sample Calculation—Instantaneous Release (Daylight)

Determine the ROE100 ppm for an instantaneous release of 100 percent hydrogen sulfide gas of 1,117 SCF in daylight (Slade A stability) conditions and 5 mph wind speed. Using Table C-1, the coefficients applicable to this scenarios are: A = 0.39; B = 1.91. Using the equation in C.8:

$$\text{ROE100 ppm} = \text{Antilog}\,[0.39 \times \log(1{,}117) + 1.91]$$
$$= 1{,}255 \text{ ft}$$

C.12 Sample Calculation—Instantaneous Release (Nighttime)

Determine the ROE100 ppm for an instantaneous release of 100 percent hydrogen sulfide gas of 1,117 SCF in nighttime (Slade B stability) conditions and 2.2 mph wind speed. From Table C-1, the coefficients applicable to this scenarios are: A = 0.40; B = 2.40. Using the equation in C.8:

$$\text{ROE100 ppm} = \text{Antilog}\,[0.40 \times \log(1{,}117) + 2.40]$$
$$= 4{,}161 \text{ ft}$$

C.13 Descriptions of Gaussian and Puff Dispersion Models

C.13.1 INTRODUCTION

The emergency response Gaussian and Puff screening models are designed to predict the downwind dispersion (plume-centerline, ground-level concentration and maximum ground- level plume width as a function of downwind distance) of a neutrally buoyant, steady-state point source gaseous release under steady-state meteorological conditions. Classical EPA-approved Gaussian dispersion theory is applied in the models. The programs are in BASIC and are designed for use on personal computers. The models are described below. The program listings and runs should use the IDLH, ERPG-2, and TLV and STEL levels as the concentrations of interest because they usually are the concentration values of concern. Both models can be run for other concentrations by substituting the values of interest in place of the values for IDLH, ERPG-2, and TLV and STEL in the computer programs. Copies of the example program listings and computer runs are available on request from API, Upstream Segment, 1220 L St., NW, Washington, D.C. 20005.

C.13.2 GAUSSIAN MODEL

This model calculates the plume-centerline, ground-level concentration, and maximum ground-level plume width for a single, steady-state, continuous-point release at user- specified steady-state meteorological conditions and downwind distances. The model uses standard Gaussian dispersion modeling with Pasquill-Gifford dispersion coefficients. The user inputs the release rate, effective release height (release height plus plume rise), nominal wind speed, incremental downwind distance for which calculations are to be made, type of material released, and the stability class. A total of eight compounds are currently accepted by this model. Additional compounds can be entered by replacing compounds presently in the model. The model uses a default D Stability Class, but can be run with any of the standard Pasquill-Gifford Stability Classes (A, B, C, D, E, or F—with A being the most unstable and F being the most stable).

C.13.3 PUFF MODEL

This model calculates the plume-centerline, ground-level concentration, and maximum ground-level plume width for a single, instantaneous-point release at user-specified steady-state meteorological conditions and downwind distances. The modes uses standard Gaussian dispersion theory for an instantaneous (puff) release with Slade dispersion coefficients. User inputs to the model are the same as those used in the Gaussian model except that the total amount of material released is entered rather than the rate of release. Three values are accepted for the Stability Class (A, B, or C—with A being unstable, B being neutral, and C being stable).

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Appendix D
Contingency Plan

H2S CONTINGENCY PLAN

Well Name: Kanter Sunniland 23-1
Location: Sec.23 T51S R38E
Broward County, Florida
Field: Wildcat

H2S Contingency Plan

Date: May 5, 2015

Location: Sec. 23 T51S R38E Broward County, Florida
920' FNL, 920' FWL

Purpose:
The purpose of this plan is to provide protection for Kanter Real Estate, LLC personnel, its contractors, subcontractors, and the general public, whenever a potentially dangerous situation may exist from Hydrogen Sulfide (H2S) during the drilling or production operation.

Policy:
When H2S is encountered, if Safety First is not on location to determine H2S concentrations, all activities will cease until the proper safety equipment can be obtained to resume work. Until the equipment arrives. All personnel will be required to move to a safe distance upwind of the release.

Employee Training:
Every ***employee*** who works in an area were H2S is present or has the potential to be present shall receive H2S training prior to entering the site. This training will be confirmed by the employee presenting a certificate of completion in a certified Hydrogen Sulfide training class. In addition, The Kanter Corporation will ensure that every contractor and subcontractor's employees are adequately trained in H2S training.

Site Access:
Access to the well site during drilling and completion operations shall be limited to authorized personnel only. Variances from this policy may not be made with out prior written approval by The Kanter Corporation.

Briefing Area:

A briefing area shall be established prior to work has commenced. At a time of emergency, employees on site are to report to this area, and stay until released by the in charge person of the site. It should be located at the entrance to the location on the access road, if upwind of the well. A secondary site should also be selected if the winds are unfavorable for the primary site. Flags and/or streamers shall be used to monitor wind direction, and the briefing areas can be changed if conditions warrant such a change to avoid hazardous situations.

A safety meeting should be held prior to each shift. These safety meetings will consist of identifying the briefing areas and evacuation routes for the site.

A concentration of 10 ppm in the area shall be a sufficient H2S concentration to expand the briefing area.

Emergency Equipment:

At a minimum, the following equipment will be required at all well sites that have the potential for H2S concentrations:

<> One (1) 4 head H2S detector system with sufficient numbers of alarms
<> H2S warning signs on location and at the entrance of the lease road.
<> Four (4) SCBA (Self Contained Breathing Apparatus) with 30 minute tanks
<> Two (2) Wind Socks or Flags
<> Two Safe Briefing Area Signs
<> Five, 5 minute Escape Packs
<> One (1) Sensidyne Pump with H2S tubes
<> One (1) Flare Gun Kit with Flares

NOTE: Automatic monitors with four (4) heads and a range of 1-99 ppm should be set to go off at 10 ppm and placed in the following locations.

#1 Near Driller's location on the rig floor
#2 Under the rig floor near the Bell Nipple
#3 In the area of the shale shaker
#4 At the end of the mud mixing pits.

Preparing for and Responding to H2S Conditions

All personnel onsite will be trained over H2S characteristics and hazards, emergency procedures, and be familiar with and able to use respiratory protection.

If there is evidence of H2S concentrations of 15 ppm or higher, the on-site supervisor or his designated back-up will ensure the following steps are taken:

1. All essential operational personnel don supplied air.
2. All nonessential personnel ordered off location
3. Essential operational personnel report to their blowout positions and tool pusher is on floor.
4. Driller picks up off bottom.
5. Safety First representative called to location and determines source of H_2S with portable detector.
6. If H_2S concentration is below 100 ppm:

    - Determine action steps to best control release (circulate bottoms up, increase pH and zinc oxide concentration in drilling fluid, increase mud weight, go to flare)
    - Monitor well closely for flow
    - Sustained H_2S concentrations of 15 ppm or higher constitute a "Tier 1 emergency"

    - Supplied air may be removed when H_2S concentrations are below 15 ppm

If H_2S is above 100 ppm:

- Flare gas to separator
- Continue to monitor and treat pH and zinc oxide concentrations in drilling fluid.
- Monitor well closely for flow and raise mud weight as appropriate. If flow and H_2S is encountered while drilling the A2 or A1 Carbonate zone, continue to flare and circulate while waiting on bulk hematite.
- Continue to monitor H_2S on rig and on location perimeter
- Sustained H_2S concentrations of 100 ppm on location constitutes a "Tier 2 Emergency"

.

- Work in areas exceeding 500 ppm H_2S must be planned and approved by the onsite supervisor. If concentrations cannot be controlled, remove all personnel to an up wind area. Continue monitoring the immediate area.
- Monitor the perimeter of the site. If sustained concentrations of 15 ppm or higher are detected downwind of the location perimeter, this constitutes a "Tier 2 Emergency". Insure immediate area is free of Hunters or Hikers and contact local Sheriff's office for assistance as necessary.

Topo. Map (to be added)

A residence map of the area shall contain herein showing all private dwellings, public buildings and other areas that public personnel might be expected. The map shall also list weather they residence are full time or seasonal. The map shall have a legend that identifies a method of communicating with the residence in the event of an emergency. A copy of this contingency plan must also be made available to them if they so wish. Attempts should be made to contact all residence adjacent to the location prior to the drilling process taking place.

Landowner	**Phone #**	**Status**

There are no known Residences or improvements within a 1 mile radius.

Safety Introduction

H2S Safety Introduction:

It is intended that these voluntary recommended practices provide guidelines that will promote and maintain public safety and safe and healthy working conditions for employees engaged in the oil and gas production operations and gas processing plant operations involving Hydrogen Sulfide.

Significant amounts of produced liquid and gaseous hydrocarbons contain hydrogen sulfide in sufficient concentrations to present a potential hazard to personnel and equipment. To successfully produce, gather, treat and transport these hydrocarbons requires that the people manning the operation be trained and equipped to safely perform their duties.

Hydrogen n Sulfide is an extremely toxic gas. In fact it is almost as toxic as hydrogen cyanide. In oilfield operations, a wide range of hydrogen sulfide concentrations may be found. The effects of these concentrations also range widely from a disagreeable odor or eye irritation at low concentrations to a serious illness or even death at higher concentrations. Personnel working in areas were they may be exposed to hydrogen sulfide should be trained to recognize and understand its hazards and to protect themselves from its harmful effects.

H2S PHYSICAL & CHEMICAL CHARACTERISTICS

Some of the significant physical and chemical characteristics of hydrogen sulfide are:

1. Extreme toxicity (almost as poisonous as hydrogen cyanide)
2. Heavier than air (specific gravity of 1.189)
3. Colorless
4. Has odor of rotten eggs in low concentration, at high concentrations it is odorless.
5. Burns with a blue flame and produces SO2 (sulfur dioxide) which can cause eye and lung irritation.
6. Forms an explosive mixture with the air at concentrations between 4.3% and 46%by volume of air.
7. Soluble in water and oil but becomes less soluble as the fluid temperature increases.

Concentrations In Air

Percent By Volume	Parts Per Million By Volume	Grains Per 100 standard Cubic Feet	Milligrams Per Cubic Meter	Physiological Effects
0.000013	0.13	0.008	0.18	Obvious and unpleasant odor generally Perceptible at 0.13 ppm and quite noticeable at 4.6ppm. As the concentration increase, the sense of small fatigues and the gas can no longer be detected by odor.
0.002	10	1.26	28.83	Acceptable ceiling concentration permitted by MIOSHA
0.01	100	6.30	144.14	MIOSHA acceptable ceiling
0.02	200	12.59	288.06	Kills sense of smell rapidly. Burns eyes and throat.
0.05	500	31.49	720.49	Dizziness, loss of sense reasoning and balance. Breathing problems in a few minutes. Victim needs prompt artificial artificial resuscitation.
0.07	700	44.08	1008.55	Unconscius quickly. Breathing will stop and death will result if victim's are not rescued promptly. Artificial resuscitation is needed.
0.10+	1000+	62.98+	1440.98+	Unconscious at once. Permanent brain damage or death may result unless rescued promptly and given artificial

H2S RADIUS OF EXPOSURE

It is important to determine the concentration of hydrogen sulfide potentially present at the well bore and to calculate the radius of exposure of the gas. The **radius of exposure** is the distance from the potential leak or release of gas required for the hydrogen sulfide concentration in the air to dilute below certain designated levels (normally 100ppm).

There are three levels of compliance (I,II,III), which are applicable to the length of the radius of exposure and the presence of "public areas" within the radius of exposure. As the radius of exposure increases and/or the potential for public exposure grows, the operator's responsibilities and the number of requirements also increase. Each level of compliance builds upon the previous one and mandates additional requirements on the part of the operator.

Level I

The first level of compliance applies to all operators of facilities having hydrogen sulfide concentrations of 100ppm within a radius of exposure of 50 feet. In other words, the concentration of hydrogen sulfide will fall below the 100ppm less than 50 feet of the source of the release. Operators with facilities in this category must train employees in hydrogen sulfide safety. Contract personnel are prohibited from working at these facilities unless they are properly trained in hydrogen sulfide safety.

@ 100ppm radius of exposure less than 50 feet
- Complete H2S concentration test
- Provide training on H2S Safety
- District office notification
- Have warning signs in place

Level II

The second level of compliance affects facilities where the 100ppm exposure radius is greater than 50 feet, but less than 3,000 feet, and contains no "public areas". In addition to the requirements of the first level of compliance, operators must post warning signs on access roads and lock unattended surface facilities equipment and use locked fences or gates to deny access to the public located within one-half mile of the facility.

@ 100ppm Radius of Exposure 50 feet or greater but less than 3000 feet and contains no public area:

- H2S concentration test
- Provide training on H2S Safety
- District office notification
- Safety Materials
- Warning signs and markers
- Provide security
- Monitors on location
- Wind Indicators (Wind socks)
- Protective breathing equipment should be available

Level III

The third level of compliance applies to operations involving hydrogen sulfide when: (**a)** the 100ppm radius of exposure exceeds 50 feet and includes any part of a "public area" except a public road; (b) the 500ppm radius of exposure exceeds 50 feet and includes any part of a public road; or (c) the 100ppm radius of exposure exceeds 3000 feet. A public area is a dwelling, place of business, church, school, hospital, school bus stop, government building, a public road, all or any portion of a park, city, town village, or similar area that may be populated.

@ 100ppm radius of exposure is 50 feet or greater and includes a public area and 500ppm R.O.E. is greater than 50 feet and includes a public road. Also if 100ppm R.O.E. exceeds 3,000 feet.

- H2S concentration test
- Training in H2S safety is required
- District office notification
- Safety materials on location or in the area
- Warning signs and markers
- Security provided
- Contingency plan required
- Monitors
- Wind indicators
- Protective breathing equipment
- Choke manifold
- Flare stacks

In addition to complying with all the requirements listed above, operators falling within this category of compliance must install safety devises to establish procedures designed to prevent undetected continuing escape of hydrogen sulfide. Intentional releases must be flared.

Operators must prepare a contingency plan, which provides an organized plan of action for alerting and protecting the public within the area of exposure prior to an intentional release, or following an accidental release of potentially hazardous volume of hydrogen sulfide. Notification must be given 12 hours in advance of an intentional release or immediately in the case of an accidental release.

CALCULATION FORMULA

(1) For all operations subject to this section, the radius of exposure shall be determined, except in the case of storage tanks, by the following Pasquill-Gifford equations.

For determining the location of the 100ppm radius of exposure:

A. x=[(1.589)(mole fraction H2S (Q)] to the power of (.6258).

B. For determining the location of the 500ppm radius of exposure: x=[(0.4546)(mole fraction H2S (Q)] to the power of 9.6258). Where x= radius of exposure in feet; Q = maximum volume determined to be available for escape in cubic feet per day; H2S = mole fraction of hydrogen sulfide in the gaseous mixture available for escape.

WARNING & MARKERS

(a) For aboveground and fixed surface facilities, the operator shall post, where permitted, clearly visible warning signs on access roads or public streets if permitted by law, or roads, which provide direct access to facilities, located within the area of exposure.

(b) In populated areas such as cases of town sites and cities where the use of signs is not considered to be acceptable, then an alternative warning plan may be used to alert the public of the potential hazard.

(c) For buried lines, a marker sign shall be installed at public road crossings.

(d) Marker signs shall be installed along the pipeline, when it is located within a public are or along a public road, at intervals frequent enough in the judgment of the operator so as to provide warning to avoid the accidental rupturing of the line by excavation.

(e) The marker sign shall contain sufficient information to establish the ownership and existence of the line and shall indicate by the use of the words “Poison Gas” that a potential danger exists.

(f) Signs should be of sufficient size to be readable at a reasonable distance from the facility.

(g) New signs constructed shall use the language of “caution” and “Poison Gas” with a black and yellow color contrast.

(h) Existing signs will be acceptable if they indicate the existence of a potential hazard.

FLARING OPERATIONS

After setting 9-5/8” casing, rig the flare system top the pit. Secure all lines by staking down or chaining to a fixed object. On the pit end of the line, shall a flare head of sufficient design to that it will remain burning while exposed to high-pressure gas. Use propane as the source gas for the flare. Manifold two or more propane (100#) bottles such that one can be changed out while the other is replaced. CHECK PROPANE QUANTITIES DAILY!! Ignite the flare once drilling operations resume below 9-5/8” casing point. As a back up ignitions source, have a flare pistol on site, should the main system fail. If a flare is lit, as soon as possible give notice to locate Fire Department.

EMERGENCY CONTACT NUMBERS

Consultant	Phone
Ed Pollister	231-631-4721 (Cell) 239-695-2276 (Office/Home)

Drilling Superintendent	Phone
Ed Pollister	231-631-4721 (Cell) 239-695-2276 (Office/Home)

H2S Services	Phone
Safety First	231-258-8222

County/State Emergency Phone Numbers

County Dispatch/Fire Dept/Sheriff/Ambulance	Phone
Weston & Unincorporated West Broward County	**911**

Hospital
EMT determined

FDEP Oil & Gas Administrator	Phone
Ed Garrett (Tallahassee)	850-245-8848 (Office)

FDEP Oil & Gas Coordinator	Phone
Paul Attwood (Ft. Myers)	239-344 5721 (Office) 239-229-4293 (cell)

FDEP Field Environmental Specialist	Phone
Pierre Bruno (Ft. Myers)	239-344-5611 (Office) 239-229-4291 (Cell)

FDEP Emergency Response	Phone
Fort Myers	239-344-5600

Oil Spills	Phone
Bureau of Disaster Preparedness	239-344-5689

Air Emissions	Phone
South Florida	239-344-5651

Emergency Response Section	Phone
Major spills only – Tallahassee	850-245-2010

Federal Emergency Phone Numbers

National Response Center	Phone
Chemical & Toxic Spills	800-424-8802
EPA	Phone
Region IV – Atlanta	404-562-8700
	800-424-8802
OSHA	Phone
Regional Office –Atlanta	678-237-0400
OSHA	Phone
Fort Lauderdale Area Office	954-424-0242