SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES

NOTE: OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, AND 30.

1. REQUISITION NUMBER	PAGE 1 OF 18

2. CONTRACT NUMBER	3. AWARD/EFFECTIVE DATE	4. ORDER NUMBER	5. SOLICITATION NUMBER	6. SOLICITATION ISSUE DATE
80SSC024DA001	See Block 31c		80SSC023R0001	8/11/2023

7. FOR SOLICITATION INFORMATION CALL:	a. NAME	b. TELEPHONE NUMBER *(No collect calls)*	8. OFFER DUE DATE/ LOCAL TIME
	Melissa Wagner	*228-688-1065*	9/15/2023 3:00 PM CT

9. ISSUED BY CODE

NASA
Stennis Space Center
Office of Procurement
Building 1100 Room 251H
Stennis Space Center, MS 39529-6000

10. THIS ACQUISITION IS [X] UNRESTRICTED OR [ ] SET ASIDE: % FOR:

- [ ] SMALL BUSINESS
- [ ] HUBZONE SMALL BUSINESS
- [ ] SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS (SDVOSB)
- [ ] WOMEN OWNED SMALL BUSINESS (WOSB)
- [ ] ECONOMICALLY DISADVANTAGED WOMEN-OWNED SMALL BUSINESS (EDWOSB)
- [ ] 8(A)

NORTH AMERICAN INDUSTRY CLASSIFICATION STANDARD (NAICS): 325120

SIZE STANDARD: 1,200

11. DELIVERY FOR FREE ON BOARD (FOB) DESTINATION UNLESS BLOCK IS MARKED	12. DISCOUNT TERMS	13a. THIS CONTRACT IS A RATED ORDER UNDER THE DEFENSE PRIORITIES AND ALLOCATIONS SYSTEM - DPAS (15 CFR 700)	13b. RATING / 14. METHOD OF SOLICITATION
[ ] SEE SCHEDULE		[ ]	[ ] REQUEST FOR QUOTE (RFQ) [ ] INVITATION FOR BID (IFB) [X] REQUEST FOR PROPOSAL (RFP)

15. DELIVER TO CODE

NASA
Stennis Space Center
Stennis Space Center, MS 39529-6000

16. ADMINISTERED BY CODE

NASA / Stennis Space Center
Office of Procurement
Stennis Space Center, MS 39529-6000

17a. CONTRACTOR/ OFFEROR CODE FACILITY CODE

TELEPHONE NUMBER

[ ] 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18a. PAYMENT WILL BE MADE BY CODE

https://www.nssc.nasa.gov/vendorpayment

NSSC-AccountsPayable@nasa.gov

18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED [ ] SEE ADDENDUM

19. ITEM NUMBER	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	See continuation pages *(Use Reverse and/or Attach Additional Sheets as Necessary)*				

25. ACCOUNTING AND APPROPRIATION DATA

See continuation sheet if applicable

26. TOTAL AWARD AMOUNT *(For Government Use Only)*

[X] 27a. SOLICITATION INCORPORATES BY REFERENCE (FEDERAL ACQUISITION REGULATION) FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA [X] ARE [ ] ARE NOT ATTACHED

[ ] 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA [ ] ARE [ ] ARE NOT ATTACHED

[X] 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 1 COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED

[ ] 29. AWARD OF CONTRACT: REFERENCE OFFER DATED . YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR		31a. UNITED STATES OF AMERICA *(SIGNATURE OF CONTRACTING OFFICER)*	
30b. NAME AND TITLE OF SIGNER *(Type or print)*	30c. DATE SIGNED	31b. NAME OF CONTRACTING OFFICER *(Type or print)*	31c. DATE SIGNED

SUPPLIES AND/OR SERVICES TO BE FURNISHED

This is an indefinite delivery (ID) requirements contract which will result in a firm fixed-price delivery order for the purchase of gaseous nitrogen. The Contractor shall provide all the resources (except as expressly stated in the contract as furnished by the Government) necessary to provide for NASA John C. Stennis Space Center, MS (SSC); in accordance with the Statement of Objectives (SOO) and all other requirements as specified throughout the contract. All work shall be initiated through a delivery order issued by SSC's Office of Procurement once activation and certification of the system is complete, and product/production is available. The delivery order shall be issued in accordance with FAR 52.216-18 Ordering; FAR 52.216-19 Order Limitations; and subject to the terms and conditions of this contract. The delivery order shall be subject to NFS 1852.232-77 Limitation of Funds (Fixed-Price Contract).

Note: Liquid Nitrogen direct deliveries (to specified test stands) will still be required for certain tests. This requirement will be maintained on Kennedy Space Center's Agency-wide Nitrogen and Oxygen contract.

SCHEDULE OF SUPPLIES

	Pressure		Order Limitations		
Nitrogen Specification	**Minimum (psig)**	**Maximum (psig)**	**Minimum Monthly (MCF)**	**Typical Monthly (MCF)**	**Max Monthly (MCF)**
MIL-PRF-27401G*	2,700	4,000	65,700	93,995	144,323

Note: Monthly maximum is 144,323/month. SSC will only use the maximum monthly quantities on rare occasions and will more frequently use between 65,700 MCF to 93,995 MCF monthly.

* See Performance Specification Below for full specification requirement

UNIT PRICING (To be completed by NASA using the Offeror's information provided in Attachment 2)

Product purchased and paid for is based on MCF. MCF is Thousand Standard Cubic Foot. The unit price is all inclusive of production cost. (i.e. initial plant installation, activation, system certification, ~~electrical~~, maintenance, emergency generation cost etc.) Unit pricing is for the life of the contract.

CLIN	Sub-CLINs	Monthly Total Low (mcf)	Monthly Total High (mcf)	Potential Monthly Usage (mcf)	Best Estimated Quantity / MCF (all 10 years)	Proposed Contract Unit Price (all 10 years)	Fixed Monthly Price (all 10 years)	Total Estimated Price (all 10 years)
0001	Base	Guaranteed		65,700	7,884,000			
	Tier 1	65,701	93,995	28,294	1,382,328		[redacted]	
	Tier 2	93,996	110,771	16,775	496,368			
	Tier 3	110,772	127,547	16,775	165,456			
	Tier 4	127,548	144,323	16,775	55,152			
CLIN		**Description**					**Unit of Measure**	**Proposed Price**
0002		Conclusion of the contract (reference SOO Logistics Objective #VIII, para 7)					job	
Not to Exceed Total Contract Value (Total Evaluated Price (TEP))								

Note: Base and Tier 1 figures are derived from the SOO Mean Flow Rate and will be the typically used Sub-CLINS. Tiers 2 – 4 are not guaranteed and would only be applied as needed based on actual usage/need.

Tier Note: Monthly maximum requirement 144,323/month. SSC will only use the maximum monthly quantities on rare occasions and will more frequently use between 65,701 MCF to 93,995 MCF monthly. Therefore, Base pricing shall be applied to usage up to 65,700 a month and Tier 1 pricing shall be applied between 65,701 MCF to 93,995 a month. Tier 2 pricing shall only be applied for additional monthly usage between 93,996 MCF to 110,771 MCF month (for a delta of 16,775 MCF). Tier 3 pricing shall only be applied for additional monthly usage between 110,772 MCF to 127,547 MCF monthly (for a delta of 16,775 MCF). Tier 4 pricing shall only be applied for additional monthly usage between 127,548 MCF to 144,323 MCF monthly.

For Example: (Numbers used are fictional)
SSC uses 130,000 MCF in July.

If Base is $1.50/MCF, Tier 1 is $1.00/MCF, Tier 2 is $1.50/MCF, Tier 3 is $2.00/MCF, and Tier 4 is $3.00/MCF then SSC shall pay the contractor:

Base:	$1.50	MCF * 65,700	=	$ 98,550.00
Tier 1:	$1.00	MCF * 28,294	=	$ 28,294.00
Tier 2:	$1.50	MCF * 16,775	=	$ 25,162.50
Tier 3:	$2.00	MCF * 16,775	=	$ 33,550.00
Tier 4:	$3.00	MCF * 2,456	=	$ 7,368.00
Total Monthly Invoiced Amount =				$192,924.50

PROPOSED kilo-Watt hours (kWh) USAGE: (To be completed by the offeror using their proposed approach from Technical Proposal – Root Core Requirements)

Potential Monthly Usage (mcf)	Proposed monthly kWh based on "Potential Monthly Usage"
65,700	
28,294	
16,775	
16,775	
16,775	

Note: Should the contractor exceed the energy usage in the above table, NASA will require contractor justification documenting the cause of exceeded usage. NASA expects the contractor's justification for exceeded usage to discuss the contractor's adherence to, or lack of adherence, to its processes, procedures, and methods stated in its technical proposal. NASA could potentially seek reimbursement under the Contract Disputes Act, which is a part of the contract, and states the procedure for handling disputes.

TOTAL PRICE The total Not to Exceed fixed price of this contract is identified in the table above.

PERIOD OF PERFORMANCE

This is a 12-year contract with no options. This includes an anticipated 2-year construction/activation period with a 10-year production period. In no instance will the POP exceed 12-years.

PERFORMANCE SPECIFICATION

All requirements delivered under this contract shall be provided in accordance with the following performance specification, available online at the internet address referenced below:

MIL-PRF-27401G, Type I, Grade B, Propellant Pressurizing Agent, Nitrogen
http://quicksearch.dla.mil

Product supplied shall fully meet the requirements of the applicable specification except as modified below and elsewhere in this contract.

Modified MIL-PRF-27401G Specification Requirement:

- Water (max ppm): 6 (-64.0º C Dew Point)

52.212-4 -- CONTRACT TERMS AND CONDITIONS—COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (DEC 2022)

Paragraph (a) thru (v) are incorporated by reference with the following paragraphs (a) and (g) tailored as an addenda to FAR 52.212-4:

Addenda to paragraph (a) is tailored below to add the following paragraphs:

(3) In the event the Contractor is unable to meet its contractual requirements, the Contractor may supply the deficient product from other sources at the price agreed to in the Unit Pricing Section above of this contract.
(4) If deficient product is not supplied, the Government may acquire product from other sources to the level of the quantities deficient and will seek reimbursement from the contractor via short pay on the Contractor's next applicable invoice in the amount equal to the difference between the Contractor's normal price to the Government and the price the Government paid for the product.

Addenda to paragraph (g) is tailored below to add the following paragraphs:

(3) The Contractor shall submit all vouchers and invoices using the steps described at NSSC's Vendor Payment information web site at: https://www.nssc.nasa.gov/vendorpayment. Please contact the NSSC Customer Contact Center at 1-877-NSSC123 (1-877-677-2123) with any additional questions or comments.
(4) Improper invoices. The NSSC Payment Office will notify the Contractor of any apparent error, defect, or impropriety in vouchers/invoices within seven calendar days of receipt by the NSSC Payment Office. Inquiries regarding requests for payment should be directed to the NSSC as specified in paragraph (3) of this Section.
(5) In the event that amounts are withheld from payment in accordance with provisions of this award, a separate payment request for the amount withheld will be required before payment for that amount may be made.

The following paragraphs (1) through (13) are incorporated as an addenda to FAR 52.212-4:

ADDENDA TO FAR 52.212-4, CONTRACT TERMS AND CONDITIONS—COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES

1. INCORPORATION OF CONTRACTOR'S PROPOSAL

The contractor's proposal, as revised through discussions (if applicable), and the Final Proposal Revision (if applicable), submitted in response to the solicitation, is incorporated into this contract by reference. The SOO at Attachment 1 shall govern in the event of any inconsistency between the Contractor's proposal and the requirements identified in Attachment 1 SOO.

2. CONTRACTING OFFICER'S AUTHORITY

The Contracting Officer (CO) is the only person authorized to approve changes in any of the requirements under this contract and notwithstanding any provisions contained elsewhere in this contract, the said authority remains solely in the CO. In the event the contractor effects any such change at the direction of any person other than the CO, the change will be considered to have been made without authority.

3. CONTRACTING OFFICER'S REPRESENTATIVES

The CO will designate a Contracting Officer's Representative (COR) and Alternate COR as representatives for the purpose of assisting the CO in the administration of the contract. Technical monitors, if assigned, will serve as a government representative with the authority to enforce the current contract terms and conditions. The CO is the only individual authorized to redirect the effort or in any way modify any of the terms of this contract. The COR will also communicate with the Contractor Representative any known in scope increases dealing with testing or new customers, etc., as early as possible.

4. PROPELLANT COORDINATOR

The CO will designate a Propellant Coordinator as a SSC representative for the purpose of assisting the CO and COR with the coordination of daily/monthly requirements and validating invoices prior to NASA CO and COR. Along with the COR, the Propellant Coordinator will assist with communication to the Contractor Representative with any known in scope increases (flow or pressure) dealing with testing or new customers, etc., as early as possible.

5. CONTRACTOR REPRESENTATIVE(S)

The Contractor shall designate one of its personnel to act as SSC's primary Point of Contact (POC) contract manager and delegate to this person the complete authority to decide all matters connected with this contract. The Contractor shall also designate a second employee, within the local commuting area, as alternate with the authority to act as, and on behalf of, the contract manager in the event of the absence or incapacity of the designated manager. The Contractor shall advise the CO via email of the persons so designated.

These POCs' responsibilities include but are not limited to flow and pressure change requests, specification concerns, inadvertent flow and/or pressure changes, etc.

6. SPECIFICATION REPORTING

Continuous monitoring of the product shall be required to ensure product meets the above stated specification. The COR and Alt COR shall be provided "read-only" access to the awarded contractor's monitoring system to review supplied product specifications on an ad hoc basis. The cost to provide monitoring/reporting as required in this section shall be included in the price of this contract.

7. DELIVERABLES

The contractor shall submit monthly flow reports to the COR and Propellant Coordinator that show the total monthly usage from the first day of the month to the last day of the month. The contractor shall submit monthly invoices following applicable tiered pricing to the Propellant Coordinator for review prior to submission into the specified invoicing system. To ensure product meets the required specifications, the contractor shall submit a detailed specification report with equivalent information to the DD Form 250 to the COR and Propellant Coordinator with each invoice and as requested by the CO and/or COR. The flow report, invoice, and specification report shall be submitted to the Propellant Coordinator by the 5th of each month. The contractor shall submit records of inspections and tests; maintenance records; operating plans and procedures; and other documentation upon request from the CO and/or COR.

8. QUALITY ASSURANCE, INSPECTION AND ACCEPTANCE.

(a) Unless otherwise directed by the CO, in-process inspection, end-item inspection, and test verification shall be performed by the Contractor at the Contractor's SSC onsite facility, to ensure compliance with the contract requirements. The Government may perform inspections or audits, as needed, coordinated with, and accompanied by vendor personnel at the contractor's SSC onsite facility to verify, inspect, and ensure that supplies meet the contract requirements, including calibrations, process control monitoring, drawings and specifications.

(b) The Contractor shall maintain records of inspections and tests, and these records shall be made available to the Government, upon request, during the performance of this contract.

(c) The Contractor shall develop and maintain documentation of a quality control program, including but not limited to: plant operating procedures (as they relate to quality provisions); nitrogen handling procedures; storage; analytical instrument calibrations; sampling; analysis; and ability to address issues and take corrective actions. The accuracy of the calibration standards is to be traceable to the National Institute of Standards and Technology (NIST).

(d) Operating plans, procedures, and/or other documentation shall be submitted to the Government upon request.

(e) All applicable requirements included in the delivery order, including this clause, shall be flowed down to the organization's sub-tier suppliers.

9. OTHER AGREEMENTS NEEDED

The Government intends to provide land to the successful offeror for any contractor owned equipment needed to fulfill the requirement. Current cleared space readily available is approximately 160' X 170'. Up to 350' X 1,000' can be made available with additional negotiation. A license agreement shall be required prior to onsite construction (see Attachment 1c for draft agreement). NASA will provide the successful offeror with electrical power. NASA will provide and install all hardware required for contractor connectivity to electrical utilities. NASA will supply all electrical power; however, the contractor shall be responsible for any backup generator needs necessary to ensure constant availability and reliability as needed. A tenant agreement shall be required

prior to onsite construction (see Attachment 1d for draft agreement). In the event there is a discrepancy or conflict between the contract and these agreements, the contract prevails.

10. SAFETY AND HEALTH PLAN

The Contractor's Safety and Health Plan shall be submitted with the contractor's proposal in accordance with NFS 1852.223-72, Safety and Health (Short Form) and will be incorporated into the resulting contract.

11. DISCLOSURE OF ORGANIZATIONAL CONFLICT OF INTEREST (OCI) AFTER CONTRACT AWARD.

If the Contractor identifies an actual or potential OCI, the Contractor shall make a prompt and full disclosure in writing to the CO. This disclosure shall include a description of the action the Contractor has taken or proposes to take in order or resolve the conflict.

12. SECURITY CONTROLS

Security Requirements: The Contractor shall require each employee engaged on the work site to display Government furnished identification badges and special access badges at all times. The Contractor shall upon termination of an employee, immediately deliver badges and/or passes issued to the employee to the SSC Protective Services Badging Office (Building 7001/North Reception Center or 3101/South Reception Center).

Access to Secure Areas: The work under this contract is performed in a secure area, needing specific access requirements. This secure controlled/restricted area is normally surrounded by fencing and has an entrance gate monitored by a guard or monitoring device. Access into such areas is categorized into "escorted" and "unescorted" access. All persons requiring unescorted access to a secure area shall be the subject of a favorable security investigation (security clearance) required for access to that area; however, in most cases, persons requiring access will be escorted by an approved escort official. The Contractor is responsible for providing escort services for any of its employees who are not eligible for unescorted access.

Privacy Act: The Contractor is bound by the rules as provided in the Privacy Act of 1974.

13. STENNIS SPACE CENTER CONTRACTOR EMPLOYEE BADGING

It is anticipated that performance of the requirements of this contract will require employee picture badging by SSC. Contractor requests for badging of employees shall be submitted electronically, prior to employee Enter on Duty Date, to the Propellant Coordinator (cc: COR and CO) who will enter the provided data into the Identity Management and Account Exchange (IDMAX) (also known as the "Personal Identity Verification (PIV) system"). Requests for badging will be routed electronically to any Federal civil service personnel responsible for approval prior to processing by the SSC Protective Services Office.

Contractor employees must undergo a background investigation prior to being issued a full-time Contractor badge granting access to SSC. Contractor employees not previously cleared for a full-time Contractor badge (e.g., not previously included in the NASA/SSC database) must complete the Electronic Questionnaires for Investigations Processing (EQIP) and sign the appropriate Release form(s) as soon as practicable. When these forms are completed and submitted to SSC Protective Services, the Contractor employees may be granted an extended visitor's badge granting SSC access for a period not to exceed 29 calendar days. This 29-day period is normally more than adequate for the Government to conduct its Background Investigation if the applicant's submission is truthful, accurate and complete, and there are no preexisting issues noted in the investigation. If the Contractor employee does not successfully clear the Background Investigation process within 29 calendar

days, the extended visitor badge will be revoked. Any Contractor concerns regarding the timeliness of investigation processing should be raised to the CO.

The Contractor shall establish procedures to ensure that badged Contractor employees who no longer require access to the Center process out and turn in their badge to the SSC Protective Services Badging Office (Building 7001/North Reception Center or 3101/South Reception Center). An electronic PIV Employee Termination Request must also be submitted.

52.212-5 – CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS—COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (JUN 2023)

The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial products and commercial services:

(1) 52.203-19, Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (JAN 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).
(2) 52.204-23, Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab and Other Covered Entities (NOV 2021) (Section 1634 of Pub. L. 115-91).
(3) 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment. (NOV 2021) (Section 889(a)(1)(A) of Pub. L. 115-232).
(4) 52.209-10, Prohibition on Contracting with Inverted Domestic Corporations (NOV 2015).
(5) 52.232-40, Providing Accelerated Payments to Small Business Subcontractors (MAR 2023) (31 U.S.C. 3903 and 10 U.S.C. 3801).
(6) 52.233-3, Protest After Award (AUG 1996) (31 U.S.C. 3553).
(7) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Public Laws 108-77 and 108-78 (19 U.S.C. 3805 note)).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial products and commercial services:
[*Contracting Officer check as appropriate*.]
_X_ (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (JUN 2020), with *Alternate I* (NOV 2021) (41 U.S.C. 4704 and 10 U.S.C. 4655).
_X_ (2) 52.203-13, Contractor Code of Business Ethics and Conduct (NOV 2021) (41 U.S.C. 3509)).
__ (3) 52.203-15, Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (JUN 2010) (Section 1553 of Pub. L. 111-5). (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009.)
_X_ (4) 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards (JUN 2020) (Pub. L. 109-282) (31 U.S.C. 6101 note).
__ (5) [Reserved].
__ (6) 52.204-14, Service Contract Reporting Requirements (OCT 2016) (Pub. L. 111-117, section 743 of Div. C).
__ (7) 52.204-15, Service Contract Reporting Requirements for Indefinite-Delivery Contracts (OCT 2016) (Pub. L. 111-117, section 743 of Div. C).
_X_ (8) 52.204-27, Prohibition on a ByteDance Covered Application (JUN 2023) (Section 102 of Division R of Pub. L. 117-328).
_X_ (9) 52.209-6, Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment. (NOV 2021) (31 U.S.C. 6101 note).
_X_ (10) 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matters (OCT 2018) (41 U.S.C. 2313).

__ (11) [Reserved].
__ (12) 52.219-3, Notice of HUBZone Set-Aside or Sole-Source Award (OCT 2022) (15 U.S.C. 657a).
 X (13) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (OCT 2022) (if the offeror elects to waive the preference, it shall so indicate in its offer) (15 U.S.C. 657a).
__ (14) [Reserved]
(15)(i) 52.219-6, Notice of Total Small Business Set-Aside (NOV 2020) (15 U.S.C. 644).
__ (ii) Alternate I (MAR 2020) of 52.219-6.
__ (16)(i) 52.219-7, Notice of Partial Small Business Set-Aside (NOV 2020) (15 U.S.C. 644).
__ (ii) Alternate I (MAR 2020) of 52.219-7.
_X_ (17) 52.219-8, Utilization of Small Business Concerns (OCT 2022) (15 U.S.C. 637(d)(2) and (3)).
__ (18)(i) 52.219-9, Small Business Subcontracting Plan (OCT 2022) (15 U.S.C. 637(d)(4)).
__ (ii) Alternate I (NOV 2016) of 52.219-9.
__ (iii) Alternate II (NOV 2016) of 52.219-9.
__ (iv) Alternate III (JUN 2020) of 52.219-9.
__ (v) Alternate IV (SEP 2021) of 52.219-9.
__ (19)(i) 52.219-13, Notice of Set-Aside of Orders (MAR 2020) (15 U.S.C. 644(r)).
__ (ii) Alternate I (MAR 2020) of 52.219-13.
__ (20) 52.219-14, Limitations on Subcontracting (OCT 2022) (15 U.S.C. 637s).
__ (21) 52.219-16, Liquidated Damages—Subcontracting Plan (SEP 2021) (15 U.S.C. 637(d)(4)(F)(i)).
(22) 52.219-27, Notice of Service-Disabled Veteran-Owned Small Business Set-Aside (OCT 2022) (15 U.S.C. 657f).
_X_ (23)(i) 52.219-28, Post Award Small Business Program Rerepresentation (MAR 2023)(15 U.S.C. 632(a)(2)).
__ (ii) Alternate I (MAR 2020) of 52.219-28.
__ (24) 52.219-29, Notice of Set-Aside for, or Sole-Source Award to, Economically Disadvantaged Women-Owned Small Business Concerns (OCT 2022) (15 U.S.C. 637(m)).
__ (25) 52.219-30, Notice of Set-Aside for, or Sole-Source Award to, Women-Owned Small Business Concerns Eligible Under the Women-Owned Small Business Program (OCT 2022) (15 U.S.C. 637(m)).
__ (26) 52.219-32, Orders Issued Directly Under Small Business Reserves (MAR 2020) (15 U.S.C. 644(r)).
__ (27) 52.219-33, Nonmanufacturer Rule (SEP 2021) (15U.S.C. 637(a)(17)).
_X_ (28) 52.222-3, Convict Labor (JUN 2003) (E.O.11755).
_X_ (29) 52.222-19, Child Labor-Cooperation with Authorities and Remedies (DEC 2022) (E.O.13126).
_X_ (30) 52.222-21, Prohibition of Segregated Facilities (APR 2015).
_X_ (31)(i) 52.222-26, Equal Opportunity (SEP 2016) (E.O.11246).
__ (ii) Alternate I (FEB 1999) of 52.222-26.
_X_ (32)(i) 52.222-35, Equal Opportunity for Veterans (JUN 2020) (38 U.S.C. 4212).
__ (ii) Alternate I (JUL 2014) of 52.222-35.
_X_ (33)(i) 52.222-36, Equal Opportunity for Workers with Disabilities (JUN 2020) (29 U.S.C. 793).
__ (ii) Alternate I (JUL 2014) of 52.222-36.
 X (34) 52.222-37, Employment Reports on Veterans (JUN 2020) (38 U.S.C. 4212).
_X_ (35) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496).
 X (36)(i) 52.222-50, Combating Trafficking in Persons (NOV 2021) (22 U.S.C. chapter 78 and E.O. 13627).
__ (ii) Alternate I (MAR 2015) of 52.222-50 (22 U.S.C. chapter 78 and E.O. 13627).
_X_ (37) 52.222-54, Employment Eligibility Verification (MAY 2022) (Executive Order 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial products or commercial services as prescribed in FAR 22.1803.)
__ (38)(i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA–Designated Items (May 2008) (42 U.S.C. 6962(c)(3)(A)(ii)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

__ (ii) Alternate I (MAY 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)). (Not applicable to the acquisition of commercially available off-the-shelf items.)
(39) 52.223-11, Ozone-Depleting Substances and High Global Warming Potential Hydrofluorocarbons (Jun 2016) (E.O. 13693).
__ (40) 52.223-12, Maintenance, Service, Repair, or Disposal of Refrigeration Equipment and Air Conditioners (JUN 2016) (E.O. 13693).
__ (41)(i) 52.223-13, Acquisition of EPEAT®-Registered Imaging Equipment (JUN 2014) (E.O.s 13423 and 13514).
__ (ii) Alternate I (OCT 2015) of 52.223-13.
__ (42)(i) 52.223-14, Acquisition of EPEAT®-Registered Televisions (JUN 2014) (E.O.s 13423 and 13514).
__ (ii) Alternate I (Jun2014) of 52.223-14.
__ (43) 52.223-15, Energy Efficiency in Energy-Consuming Products (MAY 2020) (42 U.S.C. 8259b).
__ (44)(i) 52.223-16, Acquisition of EPEAT®-Registered Personal Computer Products (OCT 2015) (E.O.s 13423 and 13514).
__ (ii) Alternate I (JUN 2014) of 52.223-16.
_X_ (45) 52.223-18, Encouraging Contractor Policies to Ban Text Messaging While Driving (JUN 2020) (E.O. 13513).
__ (46) 52.223-20, Aerosols (JUN 2016) (E.O. 13693).
__ (47) 52.223-21, Foams (Jun2016) (E.O. 13693).
(48)(i) 52.224-3 Privacy Training (JAN 2017) (5 U.S.C. 552 a).
__ (ii) Alternate I (JAN 2017) of 52.224-3.
_X_ (49)(i) 52.225-1, Buy American-Supplies (OCT 2022) (41 U.S.C. chapter 83).
(ii) Alternate I (OCT 2022) of 52.225-1.
__ (50)(i) 52.225-3, Buy American-Free Trade Agreements-Israeli Trade Act (DEC 2022) (19 U.S.C. 3301 note, 19 U.S.C. 2112 note, 19 U.S.C. 3805 note, 19 U.S.C. 4001 note, 19 U.S.C. chapter 29 (sections 4501-4732), Public Law 103-182, 108-77, 108-78, 108-286, 108-302, 109-53, 109-169, 109-283, 110-138, 112-41, 112-42, and 112-43.
__ (ii) Alternate I [Reserved].
__ (iii) Alternate II (DEC 2022) of 52.225-3.
__ (iv) Alternate III (JAN 2021) of 52.225-3.
__ (v) Alternate IV (Oct 2022) of 52.225-3.
__ (51) 52.225-5, Trade Agreements (DEC 2022) (19 U.S.C. 2501, *et seq*., 19 U.S.C. 3301 note).
_X_ (52) 52.225-13, Restrictions on Certain Foreign Purchases (FEB 2021) (E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).
__ (53) 52.225-26, Contractors Performing Private Security Functions Outside the United States (Oct 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; 10 U.S.C. Subtitle A, Part V, Subpart G Note).
__ (54) 52.226-4, Notice of Disaster or Emergency Area Set-Aside (Nov 2007) (42 U.S.C. 5150).
__ (55) 52.226-5, Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov2007) (42 U.S.C. 5150).
__ (56) 52.229-12, Tax on Certain Foreign Procurements (FEB 2021).
__ (57) 52.232-29, Terms for Financing of Purchases of Commercial Products and Commercial Services (NOV 2021) (41 U.S.C. 4505, 10 U.S.C. 3805).
__ (58) 52.232-30, Installment Payments for Commercial Products and Commercial Services (NOV 2021) (41 U.S.C. 4505, 10 U.S.C. 3805).
_X_ (59) 52.232-33, Payment by Electronic Funds Transfer-System for Award Management (OCT2018) (31 U.S.C. 3332).
__ (60) 52.232-34, Payment by Electronic Funds Transfer-Other than System for Award Management (Jul 2013) (31 U.S.C. 3332).
__ (61) 52.232-36, Payment by Third Party (MAY 2014) (31 U.S.C. 3332).
__ (62) 52.239-1, Privacy or Security Safeguards (AUG 1996) (5 U.S.C. 552a).

__ (63) 52.242-5, Payments to Small Business Subcontractors (JAN 2017) (15 U.S.C. 637(d)(13)).
__ (64)
(i) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (NOV 2021) (46 U.S.C. 55305 and 10 U.S.C. 2631).
__ (ii) Alternate I (APR 2003) of 52.247-64.
(iii) Alternate II (NOV 2021) of 52.247-64.
(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial products and commercial services:

[*Contracting Officer check as appropriate.*]

__ (1) 52.222-41, Service Contract Labor Standards (AUG 2018) (41 U.S.C. chapter67).
__ (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (MAY 2014) (29 U.S.C. 206 and 41 U.S.C. chapter 67).
__ (3) 52.222-43, Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (Multiple Year and Option Contracts) (AUG 2018) (29 U.S.C. 206 and 41 U.S.C. chapter 67).
__ (4) 52.222-44, Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (May 2014) (29U.S.C.206 and 41 U.S.C. chapter 67).
__ (5) 52.222-51, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (May 2014) (41 U.S.C. chapter 67).
__ (6) 52.222-53, Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements (MAY 2014) (41 U.S.C. chapter 67).
(7) 52.222-55, Minimum Wages for Contractor Workers Under Executive Order 14026 (JAN 2022).
__ (8) 52.222-62, Paid Sick Leave Under Executive Order 13706 (JAN 2022) (E.O. 13706).
__ (9) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (Jun 2020) (42 U.S.C. 1792).
(d) *Comptroller General Examination of Record*. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, as defined in FAR 2.101, on the date of award of this contract, and does not contain the clause at 52.215-2, Audit and Records-Negotiation.
(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.
(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.
(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.
(e)(1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (e)(1), in a subcontract for commercial products or commercial services. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause-
(i) 52.203-13, Contractor Code of Business Ethics and Conduct (NOV 2021) (41 U.S.C. 3509).
(ii) 52.203-19, Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (Jan 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).

(iii) 52.204-23, Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab and Other Covered Entities (NOV 2021) (Section 1634 of Pub. L. 115-91).
(iv) 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment. (NOV 2021) (Section 889(a)(1)(A) of Pub. L. 115-232).
(v) 52.204-27, Prohibition on a ByteDance Covered Application (JUN 2023) (Section 102 of Division R of Pub. L. 117-328).
(vi) 52.219-8, Utilization of Small Business Concerns (OCT 2022) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds the applicable threshold specified in FAR 19.702(a) on the date of subcontract award, the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.
(vii) 52.222-21, Prohibition of Segregated Facilities (APR 2015).
(viii) 52.222-26, Equal Opportunity (SEP 2015) (E.O.11246).
(ix) 52.222-35, Equal Opportunity for Veterans (JUN 2020) (38 U.S.C. 4212).
(x) 52.222-36, Equal Opportunity for Workers with Disabilities (JUN 2020) (29 U.S.C. 793).
(xi) 52.222-37, Employment Reports on Veterans (JUN 2020) (38 U.S.C. 4212).
(xii) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause 52.222-40.
(xiii) 52.222-41, Service Contract Labor Standards (AUG 2018) (41 U.S.C. chapter 67).
(xiv)
(A) 52.222-50, Combating Trafficking in Persons (NOV 2021) (22 U.S.C. chapter 78 and E.O 13627).
(B) Alternate I (MAR 2015) of 52.222-50 (22 U.S.C. chapter 78 and E.O. 13627).
(xv) 52.222-51, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (May 2014) (41 U.S.C. chapter 67).
(xvi) 52.222-53, Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements (MAY 2014) (41 U.S.C. chapter 67).
(xvii) 52.222-54, Employment Eligibility Verification (MAY 2022) (E.O. 12989).
(xviii) 52.222-55, Minimum Wages for Contractor Workers Under Executive Order 14026 (JAN 2022).
(xix) 52.222-62, Paid Sick Leave Under Executive Order 13706 (JAN 2022) (E.O. 13706).
(xx)
(A) 52.224-3, Privacy Training (Jan 2017) (5 U.S.C. 552a).
(B) Alternate I (JAN 2017) of 52.224-3.
(xxi) 52.225-26, Contractors Performing Private Security Functions Outside the United States (OCT 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; 10 U.S.C. Subtitle A, Part V, Subpart G Note).
(xxii) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (JUN 2020) (42 U.S.C. 1792). Flow down required in accordance with paragraph (e) of FAR clause 52.226-6.
(xxiii) 52.232-40, Providing Accelerated Payments to Small Business Subcontractors (Mar 2023) (31 U.S.C. 3903 and 10 U.S.C. 3801). Flow down required in accordance with paragraph (c) of 52.232-40.
(xxiv) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (NOV 2021) (46 U.S.C. 55305 and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.
(2) While not required, the Contractor may include in its subcontracts for commercial products and commercial services a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

52.252-2 – CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

Federal Acquisition Regulation (FAR) clauses: http://www.acquisition.gov/far/
NASA FAR Supplement (NFS) clauses: https://www.hq.nasa.gov/office/procurement/regs/NFS.pdf

FEDERAL ACQUISITION REGULATION (FAR) (48 C.F.R. Chapter 1) CLAUSES:

The following FAR clauses are included by reference:

52.204-4	Printed or Copied Double-Sided on Postconsumer Fiber Content Paper (MAY 2011)
52.204-9	Personal Identity Verification of Contractor Personnel (Jan 2011)
52.204-13	System for Award Management Maintenance (OCT 2018)
52.204-18	Commercial and Government Entity Code Maintenance (AUG 2020)
52.204-19	Incorporation by Reference of Representations and Certifications (DEC 2014)
52.245-1	Government Property (SEP 2021) Alternate I (Apr 2012)
52.245-9	Use and Charges (APR 2012)
52.246-11	Higher Level Contract Quality Requirement (Dec 2014) Fill in: (a) The Contractor shall comply with the higher-level quality standard(s) listed below. ISO 9001

The following FAR clauses are included by full text:

52.216-18 – ORDERING (AUG 2020)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from: contract award to the last day of the period of performance.

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) A delivery order or task order is considered "issued" when-

(1) If sent by mail (includes transmittal by U.S. mail or private delivery service), the Government deposits the order in the mail;
(2) If sent by fax, the Government transmits the order to the Contractor's fax number; or
(3) If sent electronically, the Government either-

(i) Posts a copy of the delivery order or task order to a Government document access system, and notice is sent to the Contractor; or
(ii) Distributes the delivery order or task order via email to the Contractor's email address.

(d) Orders may be issued by methods other than those enumerated in this clause only if authorized in the contract.

(End of clause)

52.216-19 ORDER LIMITATIONS (OCT 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than the specified minimum monthly quantity in the Schedule of Supplies above, see the specified

minimum monthly quantity in the Schedule of Supplies above; this is a guaranteed usage amount as required per the SOO and Unit Pricing section above.

(b) Maximum order. The Contractor is not obligated to honor –

(1) Any order for a single item in excess of the specified monthly max quantity in the Schedule of Supplies above;

(2) Any order for a combination of items in excess of the specified monthly max quantity in the Schedule of Supplies above; or

(3) A series of orders from the same ordering office within the specified monthly max quantity in the Schedule of Supplies above that call for quantities exceeding the limitation in paragraph (b)(1) or (2) of this section.

(c) If this is a requirements contract (i.e., includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation (FAR)), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) of this section.

(d) Notwithstanding paragraphs (b) and (c) of this section, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office within 10 Calendar days after issuance, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

(End of clause)

52.216-21 REQUIREMENTS (OCT 1995)

(a) This is a requirements contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies or services specified in the Schedule are estimates only and are not purchased by this contract. Except as this contract may otherwise provide, if the Government's requirements do not result in orders in the quantities described as "estimated" or "maximum" in the Schedule, that fact shall not constitute the basis for an equitable price adjustment.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. Subject to any limitations in the Order Limitations clause or elsewhere in this contract, the Contractor shall furnish to the Government all supplies or services specified in the Schedule and called for by orders issued in accordance with the Ordering clause. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(c) Except as this contract otherwise provides, the Government shall order from the Contractor all the supplies or services specified in the Schedule that are required to be purchased by the Government activity or activities specified in the Schedule.

(d) The Government is not required to purchase from the Contractor requirements in excess of any limit on total orders under this contract.

(e) If the Government urgently requires delivery of any quantity of an item before the earliest date that delivery may be specified under this contract, and if the Contractor will not accept an order providing for the accelerated delivery, the Government may acquire the urgently required goods or services from another source.

(f) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after 30 days after expiration of the ordering periods as specified in the Performance Period above.

(End of clause)

NASA FEDERAL ACQUISITION REGULATION SUPPLEMENT (NFS) (48 C.F.R. Chapter 18) CLAUSES:

The following NFS clauses are included by reference:

1852.204-76 Security Requirements for Unclassified Information Technology Resources (JAN 2011)
1852.215-84 Ombudsman (NOV 2011)
1852.223-70 Safety and Health Measures and Mishap Reporting (DEC 2015)
1852.223-72 Safety and Health (Short Form) (JUL 2015)
1852.223-75 Major Breach Safety & Security (FEB 2002) Alternate I (FEB 2006)
1852.237-73 Release of Sensitive Information (JUN 2005)

The following NFS clauses are included by full text:

1852.225-70 Export Licenses (FEB 2000)

(a) The Contractor shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

(b) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at John C. Stennis Space Center, where the foreign person will have access to export-controlled technical data or software.

(c) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(d) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

(End of clause)

1852.232-77 Limitation of Funds (Fixed Price Contract) (MAR 1989)

(a) Of the total price of items through _____ and _____, the sum of $TBD is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said items is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS	
Date TBD	Amounts TBD

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) of this clause up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c)(1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until TBD.

(2) If funds allotted are considered by the Contractor to be inadequate to cover the work to be performed until that date, or an agreed date substituted for it, the Contractor shall notify the Contracting Officer in writing when within the next 60 days the work will reach a point at which, if the contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause will approximate 75 percent of the total amount then allotted to the contract.

(3)(i) The notice shall state the estimate when the point referred to in paragraph (c)(2) of this clause will be reached and the estimated amount of additional funds required to continue performance to the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it.

(ii) The Contractor shall, 60 days in advance of the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it, advise the Contracting Officer in writing as to the estimated amount of additional funds required for the timely performance of the contract for a further period as may be specified in the contract or otherwise agreed to by the parties.

(4) If, after the notification referred to in paragraph (c)(3)(ii) of this clause, additional funds are not allotted by the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it, the Contracting Officer shall, upon the Contractor's written request, terminate this contract on that date or on the date set forth in the request, whichever is later, pursuant to the Termination for Convenience of the Government clause.

(d) When additional funds are allotted from time to time for continued performance of the work under this contract, the parties shall agree on the applicable period of contract performance to be covered by these funds. The provisions of paragraphs (b) and (c) of this clause shall apply to these additional allotted funds and the substituted date pertaining to them, and the contract shall be modified accordingly.

(e) If, solely by reason of the Government's failure to allot additional funds in amounts sufficient for the timely performance of this contract, the Contractor incurs additional costs or is delayed in the performance of the work under this contract, and if additional funds are allotted, an equitable adjustment shall be made in the price or prices (including appropriate target, billing, and ceiling prices where applicable) of the items to be delivered, or in the time of delivery, or both.

(f) The Government may at any time before termination, and, with the consent of the Contractor, after notice of termination, allot additional funds for this contract.

(g) The provisions of this clause with respect to termination shall in no way be deemed to limit the rights of the Government under the default clause of this contract. The provisions of this Limitation of Funds

clause are limited to the work on and allotment of funds for the items set forth in paragraph (a) of this clause. This clause shall become inoperative upon the allotment of funds for the total price of said work except for rights and obligations then existing under this clause.

(h) Nothing in this clause shall affect the right of the Government to terminate this contract pursuant to the Termination for Convenience of the Government clause of this contract.

(End of clause)

1852.245-76 List of Government Property Furnished Pursuant to FAR 52.245–1 (JAN 2011)

For performance of work under this contract, the Government will make available Government property identified in the agreed license agreement of this contract on a no charge-for-use basis pursuant to the clause at FAR 52.245– 1, Government Property, as incorporated in this contract. The Contractor shall use this property in the performance of this contract at SSC and at other location(s) as may be approved by the Contracting Officer. Under FAR 52.245–1, the Contractor is accountable for the identified property.

(End of clause)

LIST OF ATTACHMENTS

ATTACHMENT NUMBER	ATTACHMENT TITLE	PAGES
1	Statement of Objectives	4
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1b	Analysis	8
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2	Pricing Sheet	2
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Contractor shall submit Attachment 2 at the time proposals are due which will become part of the contract.

STATEMENT OF OBJECTIVES (SOO)
GASEOUS NITROGEN GENERATION SOLUTION (GNGS) CONTRACT

I. Introduction:

NASA/Stennis Space Center (SSC) seeks to contract out the production and supply of gaseous nitrogen (GN2) through an interface developed between the commercial GN2 production unit and SSC's existing piping network. SSC would thus provide adequately prepared physical space, electrical power, makeup cooling water and interface tie in valves and piping, while the awardee would provide high-purity gaseous nitrogen and any backup generator needs in accordance with the technical specifications listed within this document. The GN2 will be distributed throughout the test complex via the existing cross-country pipeline system.

II. Background:

SSC currently supplies nitrogen to its test complex and laboratories utilizing a liquid vaporization method consisting of cryogenic nitrogen pumps, heat exchangers, and a cross-country site-wide distribution piping network to provision its areas with high purity (meets MIL-PRF-27401G, Type I, Grade B requirements) high pressure (2,700 – 4,000 psi) gaseous nitrogen. Used as a pressurant during hot-fire static engine testing and continuously as a purge gas, SSC consumes on the order of 100 tons per calendar day of LN2 delivered via tank truck. Current production pressurizes to 4,000 psi and expends down to 2,700 psi on roughly a twice-daily basis. Current mean flow rate is 1,263 SCFM. The cross-country system includes approximately 15 miles of piping of various sizes and 12 accumulation tanks ranging in size from 750 $ft^3$to 1,500 ft^3. The total volume of SSC's nitrogen system is approximately 16,836 ft^3. When compressed to 4,000 psi, this volume contains on the order of 300k lbm of nitrogen, providing it significant capacitance.

SSC is in the process of adding new test areas which are estimated to consume a mean flow rate of an additional approximately 200 SCFM. Additionally, there are a number of High Purity Air (HPA) (Clean Dry Air or Missile-Grade Air) systems that are in the process of being switched to nitrogen. The estimated flow from these systems will be approximately an additional 300 SCFM. These two approximate additional flows, 200 SCFM for new areas and 300 SCFM for formerly HPA systems, combine with the current flow rate of 1,263 SCFM (1,263 SCFM + 200 SCFM + 300 SCFM) to form the total demand on the new Gaseous Nitrogen Generation System of **1,763 SCFM**. This demand will be applied as needed based on actual usage utilizing the tier pricing in the bid schedule.

III. Overall Program Objectives:

1. Reduce cost and increase reliability of procuring gaseous nitrogen.
2. Modify the way NASA receives gaseous nitrogen in order to reduce delivery risk.
3. Production facility to be located on SSC near the existing High Pressure Gas Facility (HPGF).
4. Utilize SSC's existing piping network.
5. Have a contractor provide high-purity gaseous nitrogen in accordance with the technical specifications addressed within.
6. The contractor shall design their solution/system for efficiency and energy conservation.

IV. Contract Objectives:

1. Contractor is responsible for all costs associated with any generation system
2. Contractor investment costs to be recovered from product sales only after production begins.
3. Anticipate monthly payment for product only (via all-inclusive unit price).

4. A Reimbursable Space Act Agreement (RSAA) will be required for provision of utilities and any other demand needed.
5. Contractor shall comply with the objectives addressed within for providing product at NASA's designated interface.
6. Anticipated 2-year construction of generation facilities to be located on SSC.
7. Anticipated performance period to be 10 years after production/product is available for SSC's use.
8. A RSAA and license agreement shall be required prior to onsite construction.
9. Contractor to provide their approach to address how they intend to design a solution to address our objectives.

V. Technical and Program Management Objectives.

1. Gaseous Nitrogen is required for purging and pressurization at SSC.
2. The contractor shall provide all labor, materials supplies, supervision, equipment, and services and perform all work and operations necessary to provide a gaseous nitrogen generation system at SSC.
3. The contractor shall also provide labor and material required to perform routine maintenance and repair of the contractor-provided portion of the system in accordance with contractor standard operating procedures.
4. The RSAA and license agreement shall be required prior to onsite construction. (Draft agreements will be provided with the RFP.)

VI. Performance Criteria:

SSC seeks to contract out the production and supply of GN2 delivered through an interface developed between the commercial GN2 production unit and SSC's existing piping network. The unit would be located near the HPGF, will ***replace*** the existing system, and will meet the requirements for high purity, flow and pressure.

1. **Flow and Pressure:** The contractor-provided system shall provide nitrogen at the interface point using the technical specifications below and historical data provided in Attachment 1b:

	Normal Operating Conditions	**Conservation Mode Operating Conditions***
System Design Pressure	6,000 psi	N/A
Maximum Operating Pressure	4,000 psi	4,000 psi
Minimum Allowable Pressure**	**2,700 psi**	**2,700 psi**
Mean Flow Rate	1,763 SCFM	1,500 SCFM
On Demand Rate***	3,500 SCFM	N/A
Standard Deviation****	383 SCFM	N/A

During certain periods, nominal pressure requirements may change (within the range listed above) to meet operational requirements, in which advance notice will be provided. Product being supplied at the interface shall be made available to comply with both the normal and Conservation Mode Operating conditions.

***Conservation Mode Operating Conditions include** rare occurrences where electrical power is not available due to natural disasters such as hurricanes or ice storms.

****In all cases system pressure shall be monitored and maintained above 2,700 psi by the contractor.**

*****On Demand Rate** is the ability to flow additional nitrogen above the mean flow rate in order to meet Stennis Space Center's tenant's variable test times

******The standard deviation amount provided does not include minimum and maximum flows.** Historical minimum and maximum flows are explained in detail in the chart set titled: N2 Generation Information.pptx, included in Attachment 1b. The contractor will be required to indicate how the proposed system can meet SSC's needs.

2. System provider shall provide gaseous nitrogen in compliance with:

   MIL-PRF-27401G, Type I, Grade B, Propellant Pressurizing Agent, Nitrogen

   Modified Specification Requirement:
   - Water (max ppm): 6 (-64.0° C Dew Point)

VII. Interface Assumptions:

1. The available location for any potential production facility will be near the HPGF, SSC, Mississippi.
2. Current cleared space readily available for the potential facility is approximately 160' X 170'. Up to 350' X 1,000' can be made available with additional negotiation.
3. NASA will purchase electrical power. ~~NASA will provide the contractor with access to electrical power.~~ NASA will provide and install all hardware required for contractor connectivity to those electrical power. However, it is noted that if the contractor exceeds the energy usage in the continuation pages kW table, NASA will require contractor justification documenting the cause of exceeded usage. NASA expects the contractor's justification for exceeded usage to discuss the contractor's adherence to, or lack of adherence, to its processes, procedures, and methods stated in its technical proposal. NASA could potentially seek reimbursement under the Contract Disputes Act, which is a part of the contract, and states the procedure for handling disputes.
4. The contractor shall be responsible for any backup generator needs necessary to ensure constant availability and reliability as needed. (Must maintain a minimum of 2,700 psi at all times.)
5. Makeup cooling water and associated interface piping will be provided by NASA.
6. Interface and tie-in piping to the existing system will be provided by NASA.
7. Additional assumptions are shown in the Responsibility Matrix included in Attachment 1a.

VIII. Logistics Objectives:

1. Activation and certification of the system will be required prior to production. Activation and certification will be coordinated with the contractor to verify compliance with pressure, flow and MIL-PRF-27401G requirements (as specified above).
2. The onsite production shall begin within 2 years after selection and award of the contract.
3. The contractor shall provide labor and material required to perform routine maintenance and repair of the nitrogen generation in accordance with contractor standard operating procedures.
4. Scheduled maintenance by the contractor will be on a non-interference basis with major Test Complex operations (ex: Hot-Fire Tests, Wet Dress Rehearsals, Tank Tuning, etc.) and coordinated in advance with NASA.

5. All maintenance will be performed ensuring that the sitewide pressure does not drop below 2,700 psi.
6. The contractor shall provide written options to demonstrate how the contractor could possibly handle potential mean flow increases such as would be created by bringing on stage testing, new test customers or new test stands exceeding the flow requirements in excess of what is shown in the table in Section VI.1 (potentially but not limited to 200 – 1,000 SCFM mean flow increase). Compensation for this objective is based on actual usage via tiered pricing.
7. The contractor shall provide their plan for removal of all equipment at the conclusion of the contract.
8. Product produced onsite will be provided to NASA at Stennis Space Center or authorized tenants only. Product produced onsite shall be used onsite. Excess quantities may be used to support other aspects of NASA's Mission.
9. The contractor shall comply with environmental and energy performance objectives stated in Executive Orders as well as those found in all local, state, and Federal regulations and statutes, including any Stennis Space Center specific rules. Any applicable environmental clauses will be included in the contract.

Responsibility Matrix

The purpose of this document is not to establish requirements that a vendor must utilize, but to communicate to a potential vendor what will be provided by NASA and what NASA expects a vendor to provide.

System	**Description**	NASA	Vendor	Notes
Nitrogen Generation System			X	Vendor will design, fab, install, activate, operate and maintain N2 Gen System
Nitrogen Gas Piping	Outside Battery Limits (OSBL)	X		Connection from site to existing nitrogen system
	Inside Battery Limits (ISBL)		X	All piping internal to site boundary
Electrical	Primary Electrical Power	X	~~X~~	Electrical power will be metered and paid for by ~~vendor~~ NASA
	Supply Design	X	X	Vendor provides requirements; NASA provides Electrical Supply Design
	Transmission Poles	X		
	Transformer Pad Mount	X		
	Feeded Cable	X		
	Electrical Meter	X		
	Termination Kits	X		
	EMCS Connectivity of Power Supply	X		
	Grounding Grid	X		
	Electrical Generator		X	
	Diesel / propane storage tank		X	
	Diesel / propane		X	
	Area Flood Lighting		X	
	Field Electrical Connections		X	
	Construction Power	X		Electrical power supply during Construction
Water Supply	Cooling Water Feed Connectivity Piping	X		
	Cooling Water Supply Water	X		
	EMCS Connectivity of Water Supply	X		
	Recirc Cooling Water System		X	
	Firex Water Feed Connectivity Piping	X		
	Firex Suppy Water	X		
	Water Meter	X		
	Construction Water	X		
Discharges	Condensate Discharge Composition (preliminary estimates)		X	
	Condensate Discharge Infrastructure	X		
	Non-Nitrogen Effluent Discharge Composition (preliminary estimates)		X	
	Non-Nitrogen Effluent Discharge Infrastructure	X		
Civil Work	Clear, Level and Rough Grade	X		
	Asphault 9.5mm and 12.5mm Mixtures	X		
	Gravel and Clay base		X	
	Earthwork		X	
	Culverts	X		
	Road Striping	X		
	Security Fence w/3-strand barbed wire		X	
	Dual Entrance Gate		X	
	Water drainage	X		
	Construction Lay Down Area	X		
	Concrete Pad		X	
Comms	Broadband Internet	X	X	Broadband internet connections to be made to existing outside NASA network line. NASA will run cable and conduit up to an interior space. Vendor will purchase (1) new external gateway circuit to be delivered via one of the Internet Service Providers demarked in Bldg 9357. Interior Comm Space and Rack/Cabinet supplied by vendor. Vendor purchases internet communication from service provider
Natural Gas	Natural Gas Available if requested			Can be made available upon request
Other	Freight delivery		X	Receipt of freight deliveries
	Off loading		X	Off loading of equipment received

Stennis Space Center Test Complex Nitrogen System Analysis

Formal Analysis Review
July 14, 2022

Agenda

Stennis Space Center

N2 Generation

- Overview
- Stakeholders
- Data Sources
- Analysis Development
- Analysis Process
- Barriers to Analysis of Data
- Assumptions
- Data Presentation
- Conclusions

Overview

Stennis Space Center

N2 Generation

- Purpose of Analysis
  - Provide sufficient detail about current site nitrogen flow requirements for vendors to design a replacement system
- Method of Analysis
  - Utilizing turbine flowmeter data on the liquid discharge of the high pressure pumps measures just what flows "to site" and over time gives the best measure of average utilization.

Data Sources / Analysis Development

Stennis Space Center

N2 Generation

- Initial analysis looked at liquid deliveries
  - Relatively good starting point
  - System overestimates by as much as 29% compared to liquid flow at high pressure pump
- Second analysis looked at pressure change and calculated flows based on Ideal Gas Law Calculation
  - Accurate for determining flows during depressurization events (i.e. LOX Run Tank pressurizations)
  - Inaccurate 30% of time when used during pressurization events (i.e. HPGF LN Pump operation)
- Third attempt utilized Flexim Flowmeter Data
  - High confidence in data
  - Initial placement of meters at T-Split turned out to be problematic due to line size and flow
    - 2" line size going to E-Complex forces AB complex to discharge to E when HPGF not pressurizing – causes data skewing
    - Large steady state assumptions required to estimate Cal Lab
    - Only have limited time available beginning in December 2021
- This analysis uses primarily the High Pressure Liquid Nitrogen Pump downstream flowmeter
  - Pros
    - Captures all liquid flow going to vaporizers
    - Captures nitrogen going to cal and sampling labs
    - Data analysis tool is designed for accurate measurement analysis
  - Cons
    - Tedious to assemble usable data
    - Very tedious (and error prone) to assemble multiple sets of data (any time period greater than 11 hours)

Analysis Development

Stennis Space Center — N2 Generation

- Analysis requires an annual review in order to capture system behavior during all seasons
- Need to be able to review daily and weekly flows in order to best define system operation
- Timeslice selection
  - Analysis Steering Committee met and discussed options
    - Concluded:
      - 1 week per month from April 2021 – May 2022
      - Would use first full week of each month for which data existed
      - Would treat holiday weeks as regular weeks
      - Would include high-consumption test weeks
      - Would include low-consumption weeks (such as hurricane recovery)
    - Provides a reasonable representative sample for a year of operation

Time Periods Analyzed

Stennis Space Center — N2 Generation

Other analyses:
- ✓ Feb 11-19, 2021 – Ice Storm
- ✓ Sept 5-11, 2021 – Hurricane Ida Low Flow
- ✓ Aug 3-11, 2021 – RS-25 Test Usage
- ✓ Dec 7-13, 2021 –RS-25 Test Usage (scrub)
- ✓ Dec 13-21, 2021 – RS-25 Test Usage
- ✓ Feb 6-12, 2022 – RS-25 Test Usage

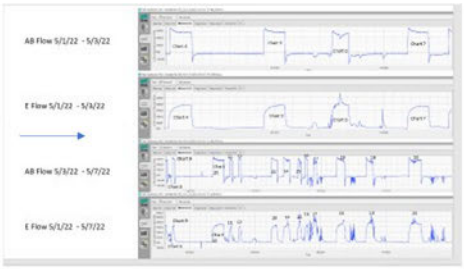
RS-25 Test Dates:

Date	Planned Duration	Actual Duration
1/28/21	500	500
4/6/21	500	500
4/28/21	650	650
5/20/21	500	500
7/14/21	500	500
8/5/21	500	500
9/30/21	500	500
12/9/21	0	0
12/15/21	500	500
1/19/22	500	500
2/3/22	0	0
2/8/22	500	500
2/24/22	500	500
3/30/22	500	500

Simplified Analysis Process

Stennis Space Center — N2 Generation

1. Assemble data for week to be reviewed
2. Create a Flexim strip chart for week to determine where pumping events are occurring. Assemble strip chart with Winplot data if time period is before 12/5/21

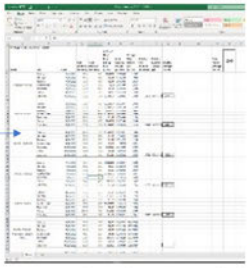


3. Measure daily flow with Winplot tools

4. Record daily flow into spreadsheet

5. Roll up daily flows into a week

6. Roll up weekly flows into a summary spreadsheet



7. Plot and analyze

Reference: SSC Nitrogen System Flow Analysis Process.docx (Desktop Procedure) for additional details regarding process

Files are located in DDMS at the following location: Products > N2GENSYS, SSC NASA > Mechanical Systems > Analysis > Nitrogen Usage at SSC

Barriers to Analysis of Data

Stennis Space Center — N2 Generation

- Gas house strategies skew understanding of flows
  - Weekend preparation/recovery
  - Holiday preparation/recovery
  - Pre-test (pre-drying) liquid packing
- Strategies required for good management of providing GN to site are counter-productive for analyzing GN consumption

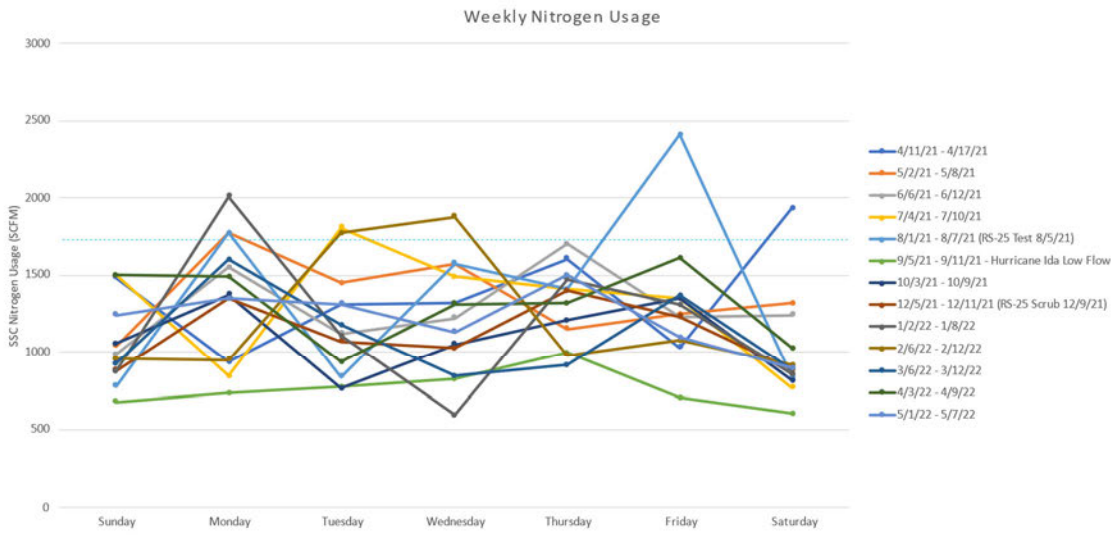
Assumptions

Stennis Space Center — N2 Generation

- Flow rates do not vary based on time of month
- Flow rate is being accurately measured by the turbine flow meter
  - Fixed cylinder volume
  - Fixed speed motor driving pump
  - High confidence in measurement
- Regulators downstream have not been changed significantly
- Analysis only looks at current (past) consumption. It does not make assumptions about future use (increases nor decreases)
- Calculations use a standard conversion factor of 93.11 standard cubic feet per gallon

Weekly Nitrogen Usage 4/11/21 – 5/7/22

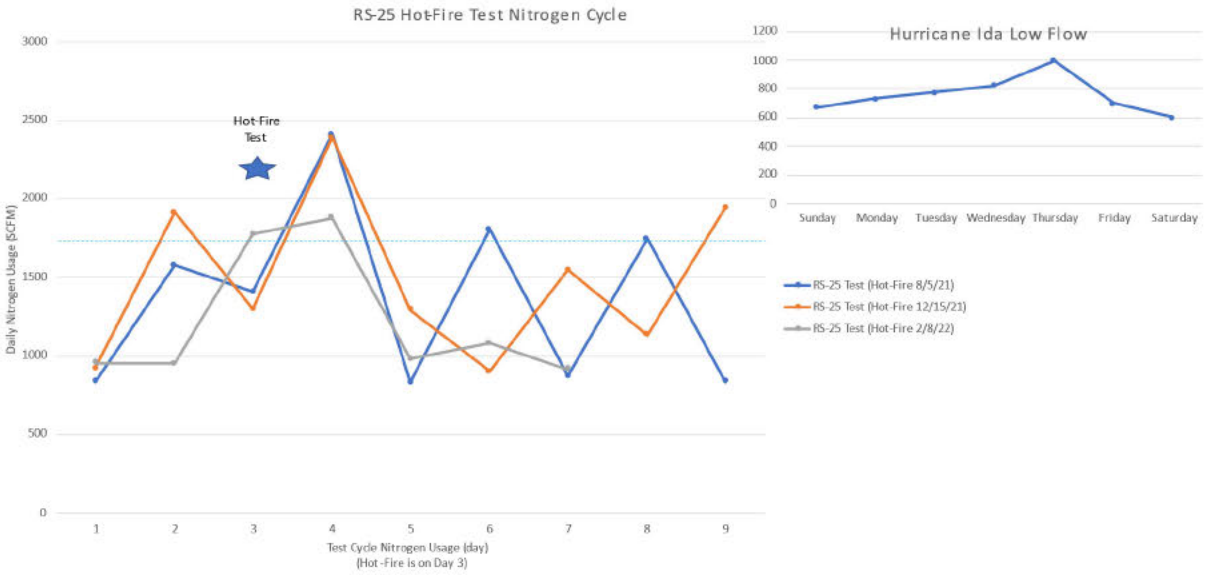
Stennis Space Center — N2 Generation



Other Flows Analyzed

Stennis Space Center

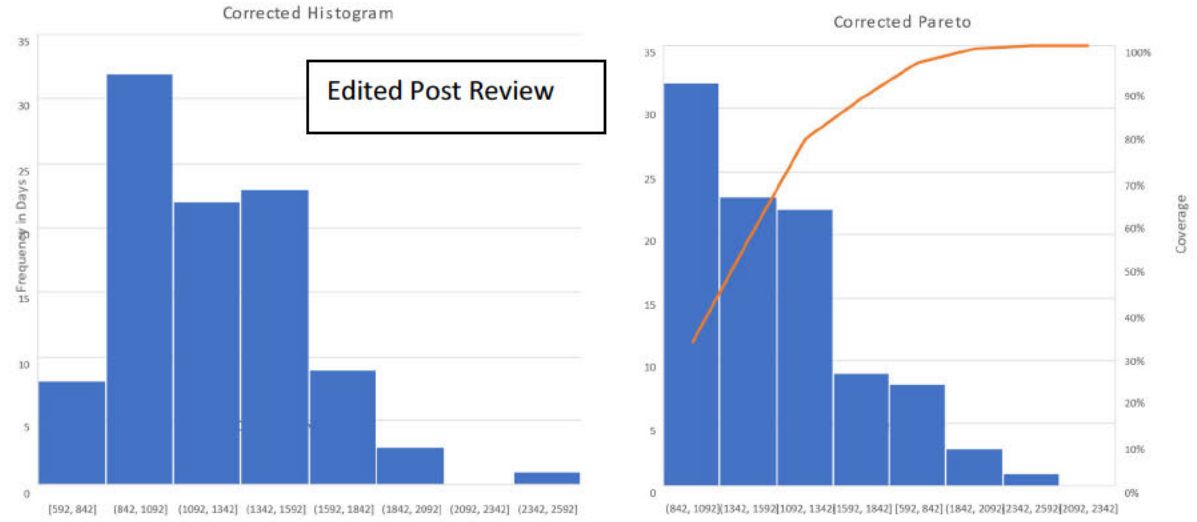
N2 Generation



Usage Statistics – Corrected Daily Statistics

Stennis Space Center

N2 Generation



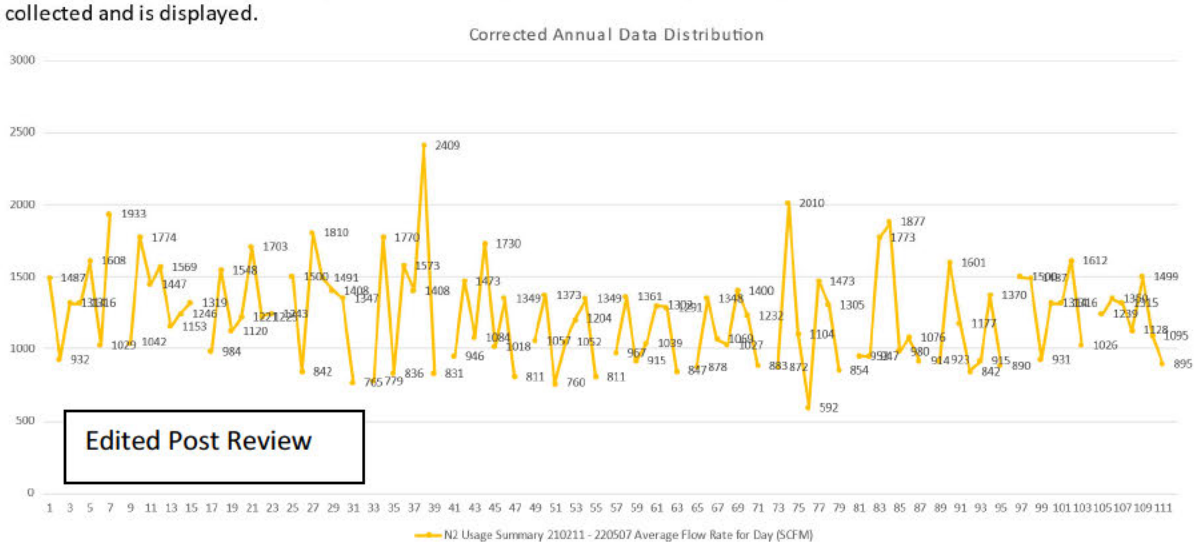
Actual Mean	1263
Actual Standard Deviation	383

This data set displayed removes Conservation Mode period as well as Liquid Packing occurrences that would not occur with a Nitrogen Generation System. Each bin represents the number of occurrences of a particular day of nitrogen use

Corrected Demand for SSC Nitrogen Use - Daily

Stennis Space Center — N2 Generation

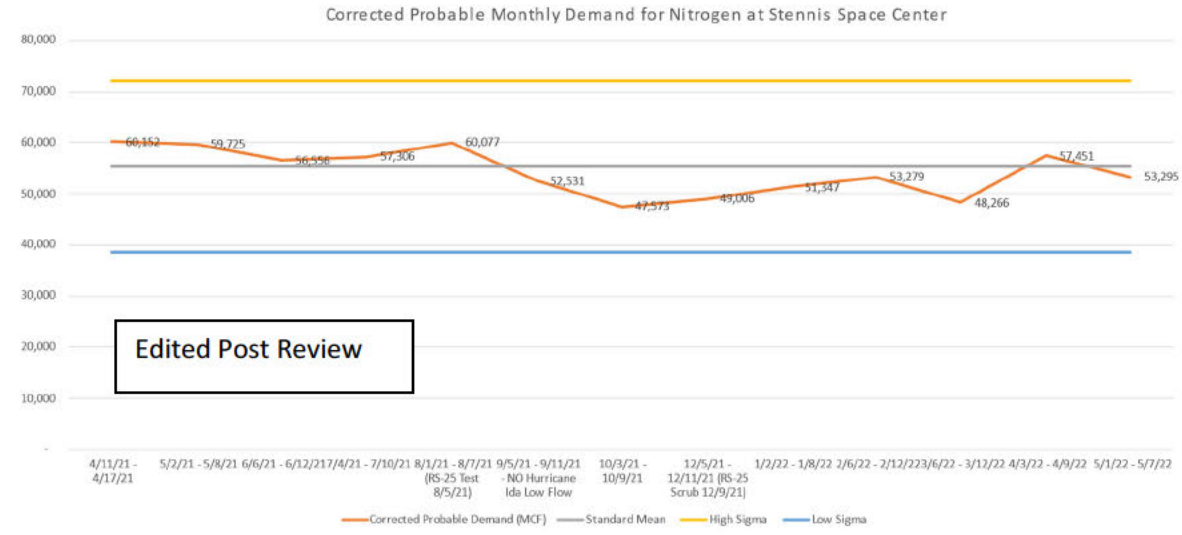
This data set removes Conservation Mode period as well as Liquid Packing occurrences that would not occur with a Nitrogen Generation System. Each point represents the average demand for a day of nitrogen use. The first week of each month was collected and is displayed.



Corrected Demand for SSC Nitrogen Use - Monthly

Stennis Space Center — N2 Generation

This data set removes Conservation Mode period as well as Liquid Packing occurrences that would not occur with a Nitrogen Generation System. Each point represents the average demand for a month of nitrogen use



Conclusions

Stennis Space Center

N2 Generation

- Sample mean flow rate: 1,263 SCFM
- Sample standard deviation: 383 SCFM
- Sample demand data results not including LN -shortage events:
  - Maximum measured:2,409 SCFM
  - Maximum credible: 2,010 SCFM
  - Minimum: 592 SCFM

Edited Post Review

This analysis provides a snapshot of Stennis Space Center's usage of nitrogen from April 2021 through May 2022. Increases and decreases to system are estimates, only, and are not included in this document.

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THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AND

FOR USE OF NASA FACILITIES

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This License becomes effective on the date of the last signature below ("Effective Date"). The Term will commence on the later of the Effective Date or the Start Date identified above, and shall expire on the earliest to occur of the following: (a) the End Date identified above, (b) the date on which the Agreement is terminated or expires, or (c) the date of termination pursuant to the Termination Provisions set out in this License.

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The Licensee's use of the Premises will not unreasonably interfere with NASA operations or the operations of other users of the Center. Any interference by Licensee with Licensor's operations or threat of damage to Licensor's property incident to the exercise of this License shall, upon written notice to the effect from Licensor, be promptly ended or corrected to the satisfaction of the Licensor. Licensor agrees it will use reasonable efforts to refrain from interfering with Licensee missions or damaging Licensee-occupied facilities.

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Licensee shall not receive, store or otherwise handle any product or material that is explosive, highly flammable or considered hazardous substance except in accordance with law and after notice to and approval by Licensor. After such notice, Licensor may require an addendum to this License prior to further work by Licensee.

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1) Licensee shall, at its sole cost and expense, keep the Premises free from dirt, rubbish, waste, debris, and vermin, and be financially responsible for repairs to areas and systems due to Licensee's own negligence or misconduct. Licensee shall indemnify and hold harmless Licensor and its related entities from any damages or costs arising from acts or omissions of Licensee or its related entities related to use of the Premises.

2) Any property of the Licensor or its related entities that is lost, damaged, or modified without authorization by Licensee or its related entities shall be promptly repaired or replaced by Licensee to the condition it was prior, as reasonably determined by Licensor. If Licensee shall fail or refuse to repair or replace such property, Licensee shall reimburse to Licensor money in an amount sufficient to compensate for the direct costs of any damages sustained by Licensor or its related entity.

3) In addition to any insurance requirements under the Agreement, Licensee shall maintain such insurance as reasonably necessary to support its obligations under this License. Such policies shall provide that the proceeds thereof shall be payable to Licensee to be used solely for the repairs or replacement of property damaged or destroyed on the Premises, with any balance of the proceeds not required for such repairs or replacement to be paid to Licensee. Nothing herein contained shall be construed as an obligation upon Licensor to perform improvements, repairs, or replacement of the Premises or any part thereof.

ARTIC E 7 TERMINATION PROVISIONS

1) This Licen may b terminated any time up n mutual written c nsent of both Parties.

2) Licensee may terminate this License at any time by providing written notice to Licensor.

3) Licensor may terminate this License upon the happening of any events delineated below.

   a) Licensee abandons or discontinues use of the Premises, with such termination being effective on the tenth (10th) calendar day after written notice to the Licensee;
   b) Termination or expiration of the Agreement for any reason, with such termination being effective as of the date of termination or expiration of the Agreement;
   c) Licensee fails to comply with any term or condition of the License, including the obligation to conduct its activities in a safe manner as defined by the applicable NASA safety standards, within ten (10) days after notice of such failure has been provided to Licensee by Licensor; or A determination by Licensor that interests of the national space program, the national defense, or the public welfare require the termination of the License. A written notice of such determination shall be given to the Licensee and termination shall be effective as of the date specified by such notice

ARTICLE 8. ALTERATIONS/MODIFICATIONS TO THE PREMISES

No physical, structural, or mechanical alterations, or modifications may be made to the Premises by Licensee, including the installation of equipment (aside from the connection of standard office machines to existing power outlets), without the prior express written approval of the Licensor. In the event Licensee seeks to implement any such alterations/modifications, Licensee shall contact the Licensor Real Property Officer in advance, and approval for such alterations/ modifications will be at the discretion of Licensor and may require the addition of an amendment or addendum to this License, in Licensor's discretion.

The Licensee will design, construct and operate a Gaseous Nitrogen generation facility and provide gaseous Nitrogen to the SSC Test Complex on a as needed basis, the facility will provide gaseous Nitrogen 24/7 on an as needed basis. At the end of the contract the licensee will return the site to its original condition.

ARTICLE 9. ACCESS AND PRIORITY

Licensor may enter the Premises as needed at all times for any purposes, including but not limited to the purpose of inspection. Licensee understands and accepts that in case of any conflict between NASA operations and Licensee's operations, as determined by Licensor in its sole discretion, Licensee will, if Licensor so directs, delay, modify or otherwise interrupt its operations on the Premises, at no cost to NASA, to accommodate NASA or other U.S. Government operations. Licensee also understands and accepts that its operations on the Premises may be hampered, from time to time, by temporary restrictions on access, such as identity checks and auto se rche by Lice sor. L censee ag ees that Licen or shall not be responsible or liab under t e L ense fo any lost t me or osts incurred by Licensee due to any disruption of its ac vities on he rem ses, rega dless of the frequency or duration of any such interruptions, inclu ing disr ptions of c mmer ial act vitie due to Center losures for any reason, or due to a y del ys in e try, loss of cess, bar ing of individual employees from NASA under federal laws authorizing such actions, limitation or withdrawal of any employee's on-Center driving privileges, or any other security action that may cause employees to be late or unavailable at their work stations, or delay arrival of parts and supplies. Licensee hereby expressly waives any claims against Licensor arising from the foregoing. Licensor shall have the ability to direct Licensee to cease immediately all activities under the License that are reasonably believed to be incompatible with safety, security, environmental protection, resource protection, or other Licensor interests.

Licensee agrees to comply with the Center's policies and procedures relating to health and safety including COVID protocols and procedures. Licensee acknowledges that any persons entering upon the Premises during the term are required to comply with Executive Order 13991, Protecting the Federal Workforce and Requiring Mask-Wearing dated January 20, 2021.

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ARTICLE 12. MODIFICATION OF LICENSE

Any modifications to this License shall be in writing and signed by the signatories to this License or their successors or designees, via amendment.

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The rights and obligations of the Parties as set forth in the provisions "Cost Reimbursement," "Vacation of Premises," "Liens," "Dispute Resolution," and "Applicable Law" shall survive such expiration or termination of this Agreement.

ARTICLE 14. DISPUTE RESOLUTION

Except for those situations where a pre-existing statutory or regulatory system exists (e.g., under the Freedom of Information Act, 5 U.S.C. § 552), all disputes concerning questions of fact or law arising under this License shall be referred by the claimant in writing to the Real Property Officer or Licensee Official, as applicable. The persons identified above for Licensor and the Licensee will consult and attempt to resolve all issues arising from the implementation of this License. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to this License, or their designees, for joint resolution. If the Parties remain unable to resolve the dispute, then the Licensor signatory or that person's designee, as applicable, will issue a written decision that will be the final agency decision for the purpose of judicial review. Nothing in this section limits or prevents either Party from pursuing any other right or remedy available by law upon the issuance of the final agency decision.

ARTICLE 15. ASSIGNMENT/TRANSFER OF RIGHTS

Licensee shall not transfer or assign this License or the rights hereunder in whole or in part.

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Upon expiration or termination of this License, Licensee shall at Licensee's expense remove all personal property, nd rem ve a y impro ement , whether emporary or p rmanent in character, made in or to the P emises by Li ensee w thin thirty (30) c endar days, o such longer time as Licensor may appr ve in wr ing of the expirat on or earlie termination o this License, and Licensee shall retu n the Pr mis to its rigin l condi ion, easonable wea and tear excepted, and except for any p p y whi h has be n r moved by Li ensor or with e approval of Licensor. If Licensee abandons the Premises, or is dispossessed by process of law or otherwise, all improvements made by Licensee and all personal property belonging to Licensee or its related entities left in the Premises, shall be deemed to be abandoned. In such event, (i) Licensor shall have no obligation to maintain such improvements or personal property remaining on the Premises on behalf of Licensee or its related entities and shall incur no liability as a result, (ii) neither Licensee nor its related entities shall have any claim of ownership therein, and (iii) Licensor shall have the right to cause such improvements or personal property remaining on the Premises to be removed or destroyed, and the Premises restored pursuant to the requirements of this License at the expense of Licensee. The Parties agree no claims against Licensor, the U.S. Government or its officers or agents shall be created by or made on account of such removal or destruction and restoration work performed by Licensor. Licensee shall reimburse Licensor on demand any reasonable sum, which may be expended by Licensor in accomplishing the removal of such property or the restoration of the Premises. The provisions of this Section shall survive any expiration or early termination of this License.

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By:_____	By:_____
Date:_____	Date: _____

LICENSE FOR USE OF NASA REAL PROPERTY
EXHIBIT A

(Buildings)

LICENSE FOR USE OF NASA REAL PROPERTY
EXHIBIT B

(DRAWINGS)

Intentionally left blank

REIMBURSABLE SPACE ACT AGREEMENT
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN C. STENNIS SPACE CENTER
AND
TENANT NAME
FOR OCCUPANCY OF FACILITIES

ARTICLE 1. AUTHORITY AND PARTIES

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)), this Agreement is entered into by the National Aeronautics and Space Administration Stennis Space Center, located at John C. Stennis Space Center, MS 39529 (hereinafter referred to as "NASA" or "NASA SSC") and TENANT NAME. located at ADDRESS (hereinafter referred to as "Partner" or "TENANT ACRONYMN"). NASA and Partner may be individually referred to as a "Party" and collectively referred to as the "Parties."

ARTICLE 2. PURPOSE

NASA SSC and Partner are establishing this fully reimbursable agreement for Partner's continued occupan y of SSC fac ities. T is Agreement cov rs all existing Partner functions at "List Location of T nant (bu ldi g)" wh ch include Tenan activities. Th purpose and description of the work that wou d don under i g eement would be pl ced here. This Agreement will go ern acti ities pertaini g to the occupan y, utilization, and operation of NASA SSC real property in support of the Partner's mission at SSC. This Agreement is strictly in relation to occupancy of the facilities identified in the Use Permit to be negotiated by the Parties and does not supersede existing agreements between the Parties for other activities being conducted at SSC.

ARTICLE 3. RESPONSIBILITIES

A. NASA SSC will use reasonable efforts to:

1. Provide Partner with the agreed-upon facility space for conducting Partner's operations, as outlined in the Use Permit to be executed between the Parties;

2. Provide Partner with the institutional services, utilities and support services, as outlined in the subsidiary Host Tenant Agreement to be executed between the Parties;

3. Provide Partner with information on any changes in reimbursable or other operational policies that could potentially impact Partner operations; and

4. Involve Partner in meetings or other forums that may be established to address matters impacting residents or issues arising between the Parties.

B. Partner will use reasonable efforts to:

1. Reimburse NASA for all costs incurred by NASA associated with Partner occupancy of SSC facilities, per the terms of this Agreement and the Use Permit to be executed between the Parties;

2. Reimburse NASA for all costs incurred by NASA associated with the provision of institutional services, utilities and support services, per the terms of this Agreement and the Host Tenant Agreement to be executed between the Parties;

3. Ensure its employees, agents and other entities residing on-site and utilizing support services comply with the provisions of the Host Tenant Agreement and Use Permit; and

4. Participate in resident agency meetings and other forums, as may be appropriate, to address reimbursable or other operational policies.

ARTICLE 4. SCHEDULE AND MILESTONES

The planned major milestones for the activities defined in the "Responsibilities" Article are as follows:

No later than 90 da s follow ng executio of thi Agr emen the Parties ag ee to execute all necessary subsidiary docum nts.

ARTICLE 5. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA an estimated cost of $XXXXX over five (5) years to carry out its responsibilities under this Agreement. The total estimated cost is based on prior year actual cost. In no event will NASA transfer any U.S. Government funds to Partner under this Agreement.

Payment must be made by Partner in advance of initiation of NASA's efforts. Advance payments shall be scheduled to ensure that funds are resident with NASA before Federal obligations are incurred in support of this Agreement. Advance payment shall be issued quarterly and must be registered with NASA fifteen (15) business days prior to start of the quarter. Tax Identification Number (TIN) is 20-2401556.

B. Payment shall be payable to the National Aeronautics and Space Administration through the NASA Shared Services Center (NSSC) (choose one form of payment):

(1) U.S. Treasury FEDWIRE Deposit System, Federal Reserve Wire Network Deposit System;

(2) Pay.gov at www.nasa.gov/centers/nssc (select "Pay NASA" Link); or

(3) Check. A check should be payable to NASA and sent to:

NASA Shared Services Center

FMD – Accounts Receivable for the Accounts of: Stennis Space Center Agreement number; SSAA-1053-0182

Building 1111
Jerry Hlass Road
Stennis Space Center, MS 39529

Payment by electronic transfer (#1 or #2, above), is strongly encouraged, and payment by check is to be used only if circumstances preclude the use of electronic transfer. All payments and other communications regarding this Agreement shall reference the Center name, title, date, and number of this Agreement.

C. NASA will not provide services or incur costs beyond the existing payment. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Agreement will be accomplished for the above estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as p ibl Partn h ll pay all co ts incur d d ha th pti n of canceling the remaining effo or prov ding addition l fund ng in orde to continue th proposed effort under the revised e timate. Shou d hi Agreem nt be term ated, or the ef ort completed at a cost less than the a reed-to stimated co t, NASA shal acc unt for any un pent funds within 180 days after completion of all effort under this Agreement, and promptly thereafter return any unspent funds to Partner.

Return of unspent funds will be processed via Electronic Funds Transfer (EFT) in accordance with 31 CFR Part 208 and, upon request by NASA, Partner agrees to complete the Automated Clearing House (ACH) Vendor/Miscellaneous Payment Enrollment Form (SF 3881).

D. Notwithstanding any other provision of this Agreement, all activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

ARTICLE 6. PRIORITY OF USE

Any schedule or milestone in this Agreement is estimated based upon the Parties' current understanding of the projected availability of NASA goods, services, facilities, or equipment. In the event that NASA's projected availability changes, Partner shall be given reasonable notice of that change, so that the schedule and milestones may be adjusted accordingly. The Parties agree that NASA's use of the goods, services, facilities, or equipment shall have priority over the use planned in this Agreement. Should a conflict arise, NASA in its sole discretion shall determine whether to exercise that priority. Likewise, should a conflict arise as between two or more non-NASA Partners, NASA, in its sole discretion, shall determine the priority as between those

Partners. This Agreement does not obligate NASA to seek alternative government property or services under the jurisdiction of NASA at other locations.

ARTICLE 7. NONEXCLUSIVITY

This Agreement is not exclusive; accordingly, NASA may enter into similar agreements for the same or similar purpose with other private or public entities.

ARTICLE 8. LIABILITY AND RISK OF LOSS

A. Partner hereby waives any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, Partner employees or the employees of Partner's related entities, or for damage to, or loss of, Partner's property or the property of its related entities arising from or related to activities conducted under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct.

B. Partner further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waiv all claims agains NASA its related ent ies, and employees of NASA and employ es of NASA s relate entiti s for injury death damag or loss arising from or related to activi es condu ted under this Ag

ARTICLE 9. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. General

1. "Related Entity" as used in this Data Rights Article means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Partner, that is assigned, tasked, or contracted to perform activities under this Agreement.

2. "Data," means recorded information, regardless of form, the media on which it is recorded, or the method of recording.

3. "Proprietary Data," means Data embodying trade secrets developed at private expense or commercial or financial information that is privileged or confidential, and that includes a restrictive notice, unless the Data is:

a. known or available from other sources without restriction;
b. known, possessed, or developed independently, and without reference to the Proprietary Data;
c. made available by the owners to others without restriction; or
d. required by law or court order to be disclosed.

4. Data exchanged under this Agreement is exchanged without restriction except as otherwise provided herein.

5. Notwithstanding any restrictions provided in this Article, the Parties are not restricted in the use, disclosure, or reproduction of Data provided under this Agreement that meets one of the exceptions in 3. above. If a Party believes that any exceptions apply, it shall notify the other Party before any unrestricted use, disclosure, or reproduction of the Data.

6. The Parties will not exchange preexisting Proprietary Data under this Agreement unless authorized herein or in writing by the owner.

7. If the Parties exchange Data having a notice that the Receiving Party deems is ambiguous or unauthorized, the Receiving Party shall tell the Providing Party. If the notice indicates a restriction, the Receiving Party shall protect the Data under this Article unless otherwise directed in writing by the Providing Party.

8. The Data rights herein apply to the employees and Related Entities of Partner. Partner shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.

9. Disclaimer of L bility:

A. NASA is not re ricted in or able f r, the , di losu e, or reproduc on of Data without a restrictive notice o for Data Par ner give or s requir d to give, the U.S. overnment without restriction.

B. Data First Produced by Partner Under this Agreement
If Data first produced by Partner or its Related Entities under this Agreement is given to NASA, and the Data is Proprietary Data, and it includes a restrictive notice, NASA will use reasonable efforts to protect it. The Data will be disclosed and used (under suitable protective conditions) only for U.S. Government purposes.

C. Data First Produced by NASA Under this Agreement
If Partner requests that Data first produced by NASA under this Agreement be protected, and NASA determines it would be Proprietary Data if obtained from Partner, NASA will use reasonable efforts to mark it with a restrictive notice and protect it for five years after its development. During this restricted period the Data may be disclosed and used (under suitable protective conditions) for U.S. Government purposes only, and thereafter for any purpose. Partner must not disclose the Data without NASA's written approval during the restricted period. The restrictions placed on NASA do not apply to Data disclosing a NASA-owned invention for which patent protection is being considered.

D. Publication of Results
The National Aeronautics and Space Act (51 U.S.C. § 20112) requires NASA to provide for the widest practicable and appropriate dissemination of information concerning its activities and the

results thereof. As such, NASA may publish unclassified and non-Proprietary Data resulting from work performed under this Agreement. The Parties will coordinate publication of results allowing a reasonable time to review and comment.

E. Data Disclosing an Invention
If the Parties exchange Data disclosing an invention for which patent protection is being considered, and the furnishing Party identifies the Data as such when providing it to the Receiving Party, the Receiving Party shall withhold it from public disclosure for a reasonable time (one (1) year unless otherwise agreed or the Data is restricted for a longer period herein).

F. Copyright Data exchanged with a copyright notice and with no restrictive notice is presumed to be published. The following royalty-free licenses apply:

1. If indicated on the Data that it was produced outside of this Agreement, it may be reproduced, distributed, and used to prepare derivative works only for carrying out the Receiving Party's responsibilities under this Agreement.

2. Data without the indication of F.1. is presumed to be first produced under this Agreement. Except as otherwise provided in paragraph E. of this Article, and in the Inventions and Patent Rights Article of this Agreement for protection of reported inventions, the Data may be reproduced, distrib ted, and use to prepare derivat ve wor s for any purp se.

G. Data Subject to Export C ntr l
Whether or not ma ked, technica data su jec to the export aws and regul tions of the United States provided to Partner under this Agreement must not be given to foreign persons or transmitted outside the United States without proper U.S. Government authorization.

ARTICLE 10. INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS

A. "Related Entity" as used in this Invention and Patent Rights Article means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Partner assigned, tasked, or contracted with to perform activities under this Agreement.

B. The invention and patent rights herein apply to employees and Related Entities of Partner. Partner shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.

C. NASA has determined that 51 U.S.C. § 20135(b) does not apply to this Agreement. Therefore, title to inventions made (conceived or first actually reduced to practice) under this Agreement remain with the respective inventing party(ies). No invention or patent rights are exchanged or granted under this Agreement. NASA and Partner will use reasonable efforts to report inventions made jointly by their employees (including employees of their Related Entities). The Parties will consult and agree on the responsibilities and actions to establish and maintain patent protection for joint invention, and on the terms and conditions of any license or

other rights exchanged or granted between them.

ARTICLE 11. USE OF NASA NAME AND NASA EMBLEMS

A. NASA Name and Initials
Partner shall not use "National Aeronautics and Space Administration" or "NASA" in a way that creates the impression that a product or service has the authorization, support, sponsorship, or endorsement of NASA, which does not, in fact, exist. Except for releases under the "Release of General Information to the Public and Media" Article, Partner must submit any proposed public use of the NASA name or initials (including press releases and all promotional and advertising use) to the NASA Associate Administrator for the Office of Communications or designee ("NASA Communications") for review and approval. Approval by NASA Office of Communications shall be based on applicable law and policy governing the use of the NASA name and initials.

B. NASA Emblems
Use of NASA emblems (i.e., NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. Partner must submit any proposed use of the emblems to NASA Communications for review and approval.

ARTICLE 12. RELEASE OF GENERAL INFORMATION TO THE PUBLIC AND MEDIA

NASA or Partner may, consistent with Federal law and this Agreement, release general information regarding its own participation in this Agreement as desired. Pursuant to Section 841(d) of the NASA Transition Authorization Act of 2017, Public Law 115-10 (the "NTAA"), NASA is obligated to publicly disclose copies of all agreements conducted pursuant to NASA's 51 U.S.C. §20113(e) authority in a searchable format on the NASA website within 60 days after the agreement is signed by the Parties. The Parties acknowledge that a copy of this Agreement will be disclosed, without redactions, in accordance with the NTAA.

ARTICLE 13. DISCLAIMER OF WARRANTY

Goods, services, facilities, or equipment provided by NASA under this Agreement are provided "as is." NASA makes no express or implied warranty as to the condition of any such goods, services, facilities, or equipment, or as to the condition of any research or information generated under this Agreement, or as to any products made or developed under or as a result of this Agreement including as a result of the use of information generated hereunder, or as to the merchantability or fitness for a particular purpose of such research, information, or resulting product, or that the goods, services, facilities or equipment provided will accomplish the intended results or are safe for any purpose including the intended purpose, or that any of the above will not interfere with privately-owned rights of others. Neither the government nor its contractors shall be liable for special, consequential or incidental damages attributed to such equipment, facilities, technical information, or services provided under this Agreement or such research, information, or resulting products made or developed under or as a result of this

Agreement.

ARTICLE 14. DISCLAIMER OF ENDORSEMENT

NASA does not endorse or sponsor any commercial product, service, or activity. NASA's participation in this Agreement or provision of goods, services, facilities or equipment under this Agreement does not constitute endorsement by NASA. Partner agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of Partner resulting from activities conducted under this Agreement, regardless of the fact that such product or service may employ NASA-developed technology.

ARTICLE 15. COMPLIANCE WITH LAWS AND REGULATIONS

A. The Parties shall comply with all applicable laws and regulations including, but not limited to, safety; security; export control; environmental; and suspension and debarment laws and regulations. Access by a Partner to NASA facilities or property, or to a NASA Information Technology (IT) system or application, is contingent upon compliance with NASA security and safety policies and guidelines including, but not limited to, standards on badging, credentials, and facility and IT system/application access.

B. With respect to any export control requirem

1. The Parties will comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. Parts 120 through 130, and the Export Administration Regulations (EAR), 15 C.F.R. Parts 730 through 799, in performing work under this Agreement. In the absence of available license exemptions or exceptions, the Partner shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data and software, or for the provision of technical assistance.
2. The Partner shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of work under this Agreement, including instances where the work is to be performed on-site at NASA and where the foreign person will have access to export-controlled technical data or software.
3. The Partner will be responsible for all regulatory record-keeping requirements associated with the use of licenses and license exemptions or exceptions.
4. The Partner will be responsible for ensuring that the provisions of this Article apply to its Related Entities.

C. With respect to suspension and debarment requirements:

1. The Partner hereby certifies, to the best of its knowledge and belief, that it has complied, and shall comply, with 2 C.F.R. Part 180, Subpart C, as supplemented by 2 C.F.R. Part 1880, Subpart C.

2. The Partner shall include language and requirements equivalent to those set forth in subparagraph C.1., above, in any lower-tier covered transaction entered into under this Agreement.

ARTICLE 16. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or five (5) years from the Effective Date, whichever comes first. Agreements can be for more than 5 years with proper Headquarters approval.

ARTICLE 17. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Agreement by providing one hundred and eighty (180) calendar days written notice to the other Party. In the event of such termination, Partner will be obligated to reimburse NASA for all costs for which the Partner was responsible and that have been incurred in support of this Agreement up to the date the termination notice is received by NASA. Where Partner terminates this Agreement, Partner will also be responsible for termination costs. oth Par ies a ree to a in good faith an use reasonab efforts to minimize any adverse consequences to the other P rty's operat ons an interests as a esult of such termination.

ARTICLE 18. CONTINUING OBLIGATIONS

The rights and obligations of the Parties that, by their nature, would continue beyond the expiration or termination of this Agreement, e.g., “Liability and Risk of Loss”, “Intellectual Property Rights”-related clauses, and “Financial Obligations” shall survive such expiration or termination of this Agreement.

ARTICLE 19. MANAGEMENT POINTS OF CONTACT

NASA Stennis Space Center	TENANT
XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX
XXXXXXX	XXXXXXX

ARTICLE 20. DISPUTE RESOLUTION

Except as otherwise provided in the Article entitled “Priority of Use,” the Article entitled

"Intellectual Property Rights – Invention and Patent Rights" (for those activities governed by 37 C.F.R. Part 404), and those situations where a pre-existing statutory or regulatory system exists (e.g., under the Freedom of Information Act, 5 U.S.C. § 552), all disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the

appropriate person identified in this Agreement as the "Management Points of Contact." The persons identified as the "Management Points of Contact" for NASA and the Partner will consult and attempt to resolve all issues arising from the implementation of this Agreement. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to this Agreement, or their designees, for joint resolution. If the Parties remain unable to resolve the dispute, then the NASA signatory or that person's designee, as applicable, will issue a written decision that will be the final agency decision for the purpose of judicial review. Nothing in this Article limits or prevents either Party from pursuing any other right or remedy available by law upon the issuance of the final agency decision.

ARTICLE 21. MODIFICATIONS

Any modification to this Agreement shall be executed, in writing, and signed by an authorized representative of NASA and the Partner.

ARTICLE 22. ASSIGNMENT

Neither this Agreement nor ny nteres arising under t wil be assigned b the Partner or NASA without the expres written cons nt of the off cials exe uting, or successor or higher- level officials possessing original or delegated authority to execute this Agreement. Tenant may only assign its interest in this agreement, with NASA SSC's consent. NASA SSC will act in good faith and not arbitrarily reject a proposed assignment, and will take into consideration such factors as: assignment would be made to a parent, subsidiary or affiliate entity which controls, is controlled by, or is under common control with Tenant; assignment would be made to any entity resulting from a merger or consolidation of Tenant, or to any person or entity which acquires all or substantially all of the assets of Tenant's business as a going concern; proposed assignee/transferee would assume in full the obligations of Tenant under this agreement; Tenant remains fully liable under this agreement.

ARTICLE 23. APPLICABLE LAW

U.S. Federal law governs this Agreement for all purposes, including, but not limited to, determining the validity of the Agreement, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

ARTICLE 24. INDEPENDENT RELATIONSHIP

This Agreement is not intended to constitute, create, give effect to or otherwise recognize a joint venture, partnership, or formal business organization, or agency agreement of any kind, and the

rights and obligations of the Parties shall be only those expressly set forth herein.

ARTICLE 25. LOAN OF GOVERNMENT PROPERTY

The parties shall enter into a NASA Form 893, Loan of NASA Equipment, for NASA equipment loaned to Partner.

ARTICLE 26. SIGNATORY AUTHORITY

The signatories to this Agreement covenant and warrant that they have authority to execute this Agreement. By signing below, the undersigned agrees to the above terms and conditions.

National Aeronautics and Space Administration John C. Stennis Space Center	Tenant
BY: _____	BY: _____
Richard J. Gilbrech, Ph.D Center Director	S gnatory Title
DATE: _____	DATE: _____

Pricing Sheet - Information Tab

Directions:

Complete block H4 - H8 and J10. Blocks I4, J4 - J8 and J11 will autopopulate based on the proposed prices.

Information:

The Total Evaluated Price for evaluation purposes will the value included in J11.

Best Estimated Quantity may vary based on actual usage. Total Contract Value will be the Not to Exceed value listed at contract award (in J11). If actual usage exceeds estimated quantity during contract performance, value increase shall be made via bilateral contract modification as needed to account for actual usage.

CLIN 0001 Information: Product purchased and paid for based on MCF. MCF is Thousand Standard Cubic Foot. The unit price is all inclusive of production (i.e. Initial plant installation, activation, system certification, ~~electrical~~, maintenance, emergency generation cost etc.). Note: Base and Tier 1 figures are derived from the SOO Mean Flow Rate and will be the typically used Sub-CLINS. Tiers 2 - 4 are not guaranteed and would only be applied as needed based on actual usage.

CLIN 0002 will be utilized at the conclusion of the contract if a follow-on is not needed or the incumbent is not the awardee of any applicable follow-on contract.

Used as a placeholder

Offerors shall submit completed Attachment 2 - Pricing Sheet in excel format when submitting proposals. Instructions are included in Attachment 5 - Provisions.

Pricing Sheet

CLIN	Sub-CLINs	Monthly Total Low (mcf)	Monthly Total High (mcf)	Potential Monthly Usage (mcf)	Best Estimated Quantity / MCF (all 10 years)	Proposed Contract Unit Price (all 10 years)	Fixed Monthly Price (all 10 years)	Total Estimated Price (all 10 years)
0001	Base	Guaranteed		65,700	7,884,000		$ -	$ -
	Tier 1	65,701	93,995	28,294	1,382,328			$ -
	Tier 2	93,996	110,771	16,775	992,736			$ -
	Tier 3	110,772	127,547	16,775	661,824			$ -
	Tier 4	127,548	144,323	16,775	496,368			$ -
CLIN		Description					Unit of Measure	Proposed Price
0002		Conclusion of the contract (reference SOO Logistics Objective #VIII, para 7)					job	
Not to Exceed Total Contract Value (Total Evaluated Price (TEP))								$0.00

Used as a placeholder

Offerors shall submit completed Attachment 2 - Pricing Sheet in excel format when submitting proposals. Instructions are included in Attachment 5 - Provisions.

REFERENCE LIST

Documents not publicly available will be provided to offerors via BOX as requested. Access request shall be sent to Melissa Wagner at melissa.r.wagner@nasa.gov.

ISO 9001	*Quality Management Systems*
MIL-PRF-27401G	*Propellant Pressurizing Agent, Nitrogen*

OSHA, Environmental Protection Agency (EPA) and other Government safety and health regulations and industry standards, as applicable

NASA References

MSFC-3535-STD	*Standard for Propellants and Pressurants used for Test and Test Support Activities at SSC and MSFC*
NPD 8730.5	*NASA Quality Assurance Program Policy*
NPR 8553.1	*NASA Environmental Management System*
NPR 8621.1	*NASA Procedural Requirements for Mishap and Close Call Reporting, Investigation, and Recordkeeping*
NPR 9501.2	*NASA Contractor Financial Management Reporting*
SCWI-1800-0005	*Hazard Communication*
SCWI-8500-0004-ENV	*Hazardous Materials, Hazardous Waste, and Solid Waste Plan*
SOI-8080-0030	*Contamination Prevention and Sample Control Procedure*
SOI-8080-0040	*Test Area Access Control*
SPLN-1040-0006	*SSC Emergency Management Plan*
SPLN-8621-0003	*John C. Stennis Space Center Mishap Preparedness and Contingency Plan*
SPLN-8715-0004	*SSC Chemical Hygiene Plan*
SPR 1600.1	*SSC Security Requirements Handbook*
SPR 8500.1	*Environmental Management System Procedural Requirements*
SPR 8730.1	*John C. Stennis Space Center Control of Nonconforming Product*
SSTD-8070-0009-CONFIG	*SSC Preparation of Form SSC-625, Certificate of Completion (CoC)*

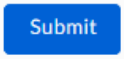
Offeror Instructions for Uploading Proposal Files in Response to a NASA Solicitation

Offerors are encouraged to check with their corporate IT staff to determine if there are firewall restrictions that would need to be addressed prior to the submission of proposal files through NASA's EFSS Box.

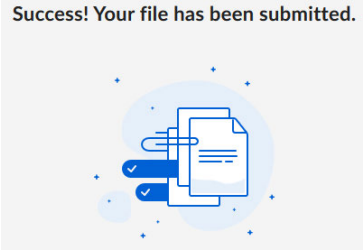
1. Click on URL provided in solicitation provision entitled "Electronic Submission of Proposals – Proposal Marking and Delivery Through NASA's EFSS Box". (e.g., https://nasagov.app.box.com/f/XX##XX#X#XX###X##X##XXX###X#XX#X)

2. "Drag and drop" or "select" proposal files to be uploaded in the provided space

3. Complete required additional proposal related data fields.

4. Click  at the bottom of the webpage.

5. The uploader will see the files being processed for upload and upon completion of the upload will receive the following message:



If the offeror is having trouble or failure uploading proposal files to NASA's EFSS Box, discuss potential firewall issues with your corporate IT staff prior to trying to resubmit the proposal files or reaching out to the contracting officer.

FAR 52.212-1 INSTRUCTIONS TO OFFERORS – COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (MAR 2023)

Paragraph (a) thru (l) are incorporated by reference. Paragraph (c) and (e) are modified as below.

Paragraph (c) is modified to read:

(c) *Period of acceptance of offers.* Replace with the following: *Period for acceptance of offers.* The offeror agrees to hold the prices in its offer firm for **120** calendar days from the date specified for receipt of offers.

Paragraph (e) *Multiple Offers* is modified to include the following additional information:

Alternate Proposals: Offerors may submit an alternate proposal that departs from the stated requirements. Such proposals shall clearly identify why the acceptance of the proposal would be advantageous to the Government. Any deviations from the SOO and/or terms and conditions of the solicitation, with the comparative advantage to the Government, shall be clearly identified and explicitly defined. The offeror shall also provide an assessment of the risks associated with the offeror's approach, including the identification of impacts and mitigation recommendations in the applicable section of the proposal. The Government reserves the right to amend the solicitation to allow all offerors an opportunity to submit revised proposals based on the revised requirements. If an alternate proposal is submitted, offerors are required to submit a separate, independent, and complete proposal that conforms to the solicitation to ensure consideration.

The following paragraphs (1) thru (8) are incorporated as an addenda:

1. **Proposal Due Date:** Offeror's complete proposal must be received as specified on Page 1 in Block 8 of the SF 1449 unless changed by an amendment. The proposal shall be on company letterhead and signed by an individual who has authority to bind the company.

2. **Amendments:** Offeror's proposal MUST acknowledge any and all amendments.

3. **Proposal Costs:**

   The Government will not pay any offeror for preparation of its proposal.

4. **Page Limitations:**

Proposal Section	Page Limit
Factor One – Technical Solution / Capability	15
Factor Two – Past Performance	10
Factor Three – Price	Unlimited
Miscellaneous Submissions	Unlimited

The page limits identified are for single sided typewritten pages. Pages are to be 8-1/2

inches by 11 inches using no less than 12-point Times New Roman character size and the margins shall be at least one inch wide. Anything in excess of the limits will not be considered. The evaluation team reserves the right to convert any non-approved font style/size into the correct font style/size, which may result in proposals exceeding the page limitations, and therefore pages being eliminated from a proposal, with no notice to the proposer. Note: Tables, Graphs and Charts not adhering to the character size requirements must be legible or they may not be part of the evaluation. Exclusions to the page limits from the page counts specified in this paragraph above include title pages and table of contents.

If final revisions are requested, separate page limitations will be specified in the Government's request for that submission.

Past Performance Matrix (Attachment 6) and Past Performance questionnaires (Attachment 7) are not included in the Past Performance page limitations. Pages submitted in excess of the limitations specified in this provision will not be evaluated by the Government and will be returned to the offeror.

Miscellaneous submissions include the SF1449 and continuation pages; SF30, as applicable; Reps and Certs, as applicable; correspondence from financial institution; and Safety and Health Plan.

5. **Protests to NASA**

In lieu of a protest to the United States Government Accountability Office (GAO), offerors may submit a protest under 48 CFR Part 33 (FAR Part 33) directly to the Contracting Officer for consideration by the Agency. Alternatively, offerors may request an independent review by the Assistant Administrator for Procurement, who will serve as or designate the official responsible for conducting an independent review. Such reviews are separate and distinct from the Ombudsman Program described at NFS 1815.7001.

Offerors shall specify whether they are submitting a protest to the Contracting Officer or requesting an independent review by the Assistant Administrator for Procurement.

Protests to the Contracting Officer shall be submitted to the email specified in the solicitation. Alternatively, requests for independent review by the Assistant Administrator for Procurement shall be addressed to the Assistant Administrator for Procurement, NASA Headquarters, Washington, D.C. 20546-0001.

6. **Electronic Submission of Proposals – Proposal Marking and Delivery Through NASA's EFSS Box**:

(a) The offeror shall submit its proposal via NASA's Enterprise File Sharing and Sync Box (EFSS Box), a FedRAMP Moderate certified platform. Electronic submissions shall not contain hidden formulas, tables, be locked, be protected, or contain links to data not included in the electronic copy. All electronic submissions should be searchable and should not contain scanned documents, except those documents that must be provided in

their native format (e.g., signature pages, prior award fee letters for past performance, DCAA/DCMA approval letters, as applicable). The offeror shall ensure documents are free from viruses and malware, as documents determined by NASA to contain a virus or malware will not be opened or evaluated. Subcontractors may submit their required proposal information separately using the instructions in this provision. The offeror shall ensure subcontractor submissions are made no later than the date and time specified for proposal submission and comply with all solicitation instructions.

(b) The offeror shall submit all proposal files to:

https://nasagov.app.box.com/f/7ff4bae1cce84cb2b506216018e452a1

(c) Electronic file names shall be limited to letters, numbers, and single spaces, with the exception of the period that is required before the file extension (e.g., .pdf), in order to successfully upload and download files from the EFSS Box system. The offeror shall not use special characters "/" or "\" in file names. The offeror shall clearly label the contents of the file and include the name of the offeror in the file name. Examples of acceptable file names are as follows (not specific to this solicitation):

Company ABC 80SSC023R0001 TC Volume.doc
Company ABC 80SSC023R0001 PP Volume.pdf
Company ABC 80SSC023R0001 Price Volume.xlsx
Company ABC 80SSC023R0001 Misc.pdf

Individual files cannot exceed 150GB per file. Unless specifically authorized by the solicitation instructions.

(e) The offeror is responsible for ensuring its proposal reaches the Government office designated in the solicitation by the date and time specified in the solicitation. The Government is not responsible for any failure attributable to the transmission or receipt of documents submitted using electronic means, including the missing of any submission requirements and established deadlines. Please note that uploading documents via EFSS Box and the transmission of the files from the offeror to the Government may not be instantaneous. To ensure timely delivery, the offeror is encouraged to submit its proposal at least 24 hours prior to the due date specified in the solicitation. The electronic submission of the proposal shall contain all information required by the solicitation to be determined responsive. Offerors are responsible for familiarizing themselves with any additional technical requirements specific to using EFSS Box that may not be enumerated within this solicitation, including but not limited to any information available through Box Support (https://support.box.com/hc/en-us).

(End of provision)

7. **Submission Requirement:**

All information and all copies of offer must be submitted no later than the date and time specified above. Proposals that arrive after the prescribed date and time specified for receipt of proposals will be considered late and treated in accordance with (FAR 52.212-1(f)(2)).

The following information shall be clearly identified and submitted with the offer. It is the offeror's responsibility to read the entire RFP, to include the terms and conditions, and submit all documents and information specified therein. At a minimum, offeror's proposal shall include the below documents and information. Failure to return all items below may render the offer nonresponsive and exclude it from further consideration for award.

1) Completed SF 1449.
2) Offeror's proposal and the information required by this Request for Proposal (RFP) including Technical Solution / Capability Proposal, Past Performance Proposal, and Price Proposal (Attachment 2) [include your Unique Entity ID in your submission]
3) Offerors are required to acknowledge all amendments (SF30(s)), if applicable, by returning a signed copy with their proposal.
4) Completed offeror Representations and Certifications, see FAR 52.212-3 below. Offerors are required to electronically provide Representation and Certifications via the System for Award Management website at www.sam.gov prior to submitting an offer or completing the representation and certifications in this solicitation.
5) Correspondence from offeror's financial institution. In order for the Government to make an affirmative responsibility determination prior to award, offerors are required to provide correspondence from its financial institution indicating offeror's standing with their financial institution and their available line of credit.
6) Safety and Health Plan

8. **Evaluation Factors:**

a. **Factor One – Technical Solution/Capability**: Offeror's technical proposal shall consist of the following elements, and address any applicable risks associated with each element as well as the approach to managing identified risks.

- **Implementation Plan:** Offerors shall submit an implementation plan that clearly demonstrates the actions the offeror will take to ensure their ability to implement a cost-effective solution (this includes power requirements provided to NASA) for NASA SSC's Gaseous Nitrogen needs throughout the projected performance period.

- **Root Core Requirements** –
    - Ability to meet the specified requirements in the SOO. Include applicable items that contribute to time needed to produce "On Demand Rate" such as:
        - System preparation time – this time will include items such as chill down and priming or whatever means are

necessary in order to be able to activate system for increased flow
    - Notification time – time necessary for vendor to be notified in advance of potential high flow activity
    - Flowrate – supplemental system output flowrate
- Address your approach, if any, for incorporating design efficiency and or energy conservation practices into your Gaseous Nitrogen Generation Solution. Include your proposed monthly kWh required for your proposed approach in the chart below to demonstrate an offeror's technical ability to design efficiency and/or conserve energy.

Potential Monthly Usage (mcf)	Proposed monthly kWh based on "Potential Monthly Usage"
65,700	
28,294	
16,775	
16,775	
16,775	

- **Increased mean flow handling capabilities** – Flexibility to meet potential mean flow increases such as would be created by bringing on stage testing, new test customers or new test stands exceeding the flow requirements in excess of what is covered by root core requirements. Provide plan to meet potential increased mean flow demands as stated in paragraph 6 of Section VIII. Logistics Objectives of the SOO.

- **Resiliency** – Ability to provide commodity regardless of adverse conditions (hurricane, ice storms, loss of commercial power, inability to receive trucks from outside of SSC, etc.). Provide your plan to meet the Performance Criteria section, especially the Conservation Mode Operating Conditions (defined by paragraph VI. Performance Criteria), of the SOO during extended adverse conditions.

- **Implementation Schedule**: Offerors shall submit a project schedule/plan addressing the time period necessary to accomplish key milestone activities necessary for preparation to provide Gaseous Nitrogen in accordance with the SOO at the NASA interface.

    - The project schedule shall cover the period from contract award through online production/supply of Gaseous Nitrogen.

- Include key Milestone events. i.e., design/plan, site preparation, key equipment procurement actions etc. as necessary.
- Include a level of detail sufficient enough to demonstrate a level of confidence for implementing your proposed solution.

- **Maintenance Plan:** Offerors shall submit a maintenance plan showing general schedules of preventative maintenance items (i.e. filter changes, pump inspection frequency, compressor preventative maintenance general task frequency, equipment downtime, etc.)

- **Conclusion of Contract Plan:** Submit the plan for removal of all equipment at the conclusion of the contract. Explain how the plan would be implemented, cost (Attachment 2), and schedule.

b. **Factor Two – Past Performance**: Offerors shall submit a past performance proposal consisting of the following:

- Offerors shall submit Past Performance for a maximum of five (5) recent and relevant customers/contracts demonstrating their ability to implement a Gaseous Nitrogen Solution similar in size, scope, and complexity to the requirements identified in this solicitation. Offerors shall provide documentation that exhibits known and demonstrated application of systems in place in industry that provides confidence in the proposed solution path.

  - **Recent:** Recent past performance is defined as being within the last five (5) years of the date listed on page 1, Block 8, of the SF 1449. Recent past performance will be evaluated as a measure of the Government's confidence in the offeror's ability to successfully perform based on previous and current contracts and work efforts.

  - **Relevant:** Relevant experience is the accomplishment of work similar in size, scope and complexity as required under this procurement which have occurred during the last five (5) years.

  - **Size**: All system sizes will be considered. However, projects having normal operating conditions similar to our requirement will be deemed more favorable. For example, a system with a higher flow rate that's recent and relevant provides more confidence than a system with a smaller flow rate that's recent and relevant.

  - **Complexity:** Complexity of demonstrated technology with providing gaseous nitrogen at approximately (+/-30%) 900,000 MCF/annually while maintaining a minimum pressure of greater than 30% less (>x -30%x = 1,890 psi) 2,700 psi.

- Offerors shall submit a matrix (Attachment 6) that includes the Contract Number/Name, Value of the project along with the point-of-contact (POC) name, phone number, and email address. Past Performance Questionnaires (Attachment 7) will only be accepted for the references listed in the Past Performance Matrix (Attachment 6).

- Offerors are responsible for ensuring Past Performance Questionnaires (Attachment 7) are provided to the appropriate POC for each of the contracts referenced in the Past Performance Matrix.

- Respondents or POCs must submit the completed Past Performance Questionnaire via email directly to the NASA Contracting Officer, Melissa Wagner, at melissa.r.wagner@nasa.gov. Questionnaires can be submitted early but must be received no later than the proposal due date/time specified in this solicitation. It is the offeror's responsibility to follow-up with the POC to ensure the questionnaire is completed and submitted to the Contracting Officer in a timely manner.

- Offerors are reminded that both independently obtained data as well as data provided by offerors in their proposal may be used to assess the offeror's past and current performance. It is the offeror's responsibility to validate all information provided by the offeror, including telephone numbers and addresses for points of contacts.

- In addition to past performance information submitted by the offeror, past performance information may be obtained through the (1) Past Performance Information Retrieval System (PPIRS), (2) Past Performance Questionnaires submitted, and (3) other sources known to the Government.

c. **Factor Three – Price Proposal**: Offerors shall submit a price proposal consisting of the completed Pricing Sheet in Attachment 2 of this RFP. Offerors shall submit a price for all CLINS to be considered responsive. The Total Evaluated Price (TEP) will be considered in determining the best value offeror; however, it will not be rated. The TEP for evaluation purposes will be the total value (in block J11) of Attachment 2, Pricing Sheet. Note: In addition to TEP, the proposed kWh chart submitted within the Root Core Requirement technical proposal will be included in the Price Evaluation Factor.

FAR 52.212-2 EVALUATION – COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (NOV 2021)

Paragraph (a) thru (c) are modified as follows:

(a) The Government will award a contract resulting from this solicitation to the responsible offeror whose offer conforming to the solicitation will be most advantageous to the Government, price and other factors considered. The following factors shall be used to evaluate offers: Technical Solution/Capability, Past Performance, and Price. Technical

Solution/Capability and Past performance are approximately equal. However, when combined Technical Solution/Capability and Past Performance are significantly more important than price.

(b) Options. None

(c) A written notice of award or acceptance of an offer, mailed or otherwise furnished to the successful offeror within the time for acceptance specified in the offer, shall result in a binding contract without further action by either party. Before the offer's specified expiration time, the Government may accept an offer (or part of an offer), whether or not there are negotiations after its receipt, unless a written notice of withdrawal is received before award.

The following paragraphs (1) thru (3) are incorporated as an addenda:

1. Basis for Contract Award

The Government intends to award one contract resulting from this solicitation to the responsible offeror whose offer, conforming to the solicitation, will be most advantageous to the Government. This procurement is being conducted utilizing Best Value Selection (BVS), which seeks to make an award based on the best combination of price and non-price factors (Technical Solution/Capability and Past Performance). BVS predefines the evaluation factors that will serve as discriminators among proposals.

2. Evaluation Process

Step One: Review for Responsiveness: The Government will review all proposals to determine if each offeror has submitted a responsive proposal, and that all required documentation complies with the solicitation instructions. Review of the System for Award Management (SAM) will be conducted to determine if an offeror has an active exclusion, as well as a review of the Offerors Representations and Certifications. Any non-responsive proposal will be handled in accordance with NFS 1815.305-70, "Identification of Unacceptable Proposals." Offerors whose proposals are found to be non-responsive in any area or offerors who have an active exclusion listed in SAM will be eliminated from the competition without further consideration, all other offers will be considered responsive and will move forward for further evaluation.

Step Two: Proposals will be assessed in terms of the evaluation factors: Technical Solution/Capability, past performance, and price. Acceptable offerors will be assigned a rating for each of the non-price factors; Technical Solution/Capability and Past Performance. Proposed prices will not be rated; however, shall be evaluated using one or more of the price analysis techniques under FAR 15.404-1(b)(2) to determine whether the offeror's proposed prices are fair and reasonable.

The Government reserves the right to award without discussions but may conduct discussions if the Government determines it is necessary. The Government may make a final determination as to whether the offeror's proposal is acceptable or unacceptable solely on

the basis of the initial proposal submitted. Accordingly, offerors are advised to submit initial proposals that are fully and clearly acceptable without additional information. Pursuant to FAR 15.306(c)(2), the competitive range may be limited for purposes of efficiency. The Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals. Offerors are cautioned that omissions or an inaccurate or inadequate response to the evaluation factors may have a negative effect on the overall evaluation.

3. Evaluation Rating Definitions

Listed below are the evaluation rating definitions that will be utilized in the evaluation of each proposal. The requirements for each factor are identified in FAR 52.212-1 above. Each offeror's proposal will be evaluated, and an appropriate rating will be determined as defined below.

In order to assist with this assessment of each offeror's proposal in the technical solution/capability and past performance factors, the evaluation team will identify and document all significant strengths, strengths, deficiencies, weaknesses, and significant weaknesses.

Significant Strength: Some aspect of the proposal that greatly enhances the potential for successful contract performance.

Strength: An aspect of the proposal that will have some positive impact on the successful performance of the contract.

Weakness: A flaw in the proposal that increases the risk of unsuccessful contract performance.

Significant Weakness: A flaw in the proposal that appreciably increases the risk of unsuccessful contract performance.

Deficiency: A material failure of a proposal to meet a Government requirement or a combination of significant weaknesses in a proposal that increases the risk of unsuccessful contract performance to an unacceptable level.

a. **Factor One – Technical Solution/Capability**: Each offeror's proposal submission shall be reviewed and compared against the required submission criteria. Also, the offeror's proposed kWh will be used to evaluate the plausibility of their proposed design efficiency along with their ability to conserve energy. After documenting each Offeror's strengths, weaknesses and/or deficiencies, the evaluation team will assign one of the following adjective ratings:

   NOTE: Each individual element will not be individually assigned an adjectival rating; however, the information for each will be considered, and the data will be consolidated into a single overall adjectival rating.

Outstanding: A comprehensive and thorough proposal of exceptional merit with one or more significant strengths. no deficiencies or significant weaknesses. Clearly addresses each of the elements supported with examples of their experience/capability.

Good: A proposal having no deficiency, and which demonstrates overall competence. One or more significant strengths have been found and strengths outbalance any weaknesses. Addresses each of the elements supported with an understanding of their experience/capability.

Acceptable: A proposal having no deficiency, and which shows a reasonably sound response. There may be strengths, weaknesses, or both. As a whole, weaknesses that are not offset by strengths do not significantly detract from the Offeror's response. Addresses each element with a limited explanation of their experience/capability.

Marginal: A proposal having no deficiency, and which has one or more weaknesses. Weaknesses outbalance any strength. Does not clearly address all the elements or lacks an explanation of their experience/capability.

Unacceptable: A proposal that has one or more deficiencies or significant weaknesses that demonstrate a lack of overall competence or would require a major proposal revision to correct. Fails to address all the elements and lacks an explanation of their experience/capability.

b. **Factor Two – Past Performance:** Using performance information submitted by the offeror, respondents to the questionnaire, and performance information independently obtained by the Government, past performance will be evaluated, and offerors will be assigned one of the confidence assessment ratings described below. Offerors with no recent relevant past or present performance history shall receive a Neutral rating, meaning the rating is treated neither favorably nor unfavorably.

NOTE: Each individual submitted Past Performance will not be individually rated on a confidence level, however, the information for each will be considered and the data will be consolidated into a single overall level of confidence rating.

Very High Level of Confidence: The offeror's relevant past performance is of exceptional merit and is very highly pertinent to this acquisition, indicates exemplary performance in a timely, efficient, and economical manner and very minor (if any) problems with no adverse effect on overall performance. Based on the offeror's performance record, there is a very high level of confidence that the offeror will successfully perform the required effort. (One or more significant strengths exist. No significant weaknesses exist.)

High Level of Confidence: The offeror's relevant past performance is highly pertinent to this acquisition; demonstrating very effective performance that would be fully responsive to contract requirements. Offeror's past performance indicates that contract

requirements were accomplished in a timely, efficient, and economical manner for the most part, with only minor problems that had little identifiable effect on overall performance. Based on the offeror's performance record, there is a high level of confidence that the offeror will successfully perform the required effort. (One or more significant strengths exist. Strengths outbalance any weakness.)

Moderate Level of Confidence: The offeror's relevant past performance is pertinent to this acquisition, and it demonstrates effective performance. Performance was fully responsive to contract requirements; there may have been reportable problems, but with little identifiable effect on overall performance. Based on the offeror's performance record, there is a moderate level of confidence that the offeror will successfully perform the required effort. (There may be strengths or weaknesses, or both.)

Low Level of Confidence: The offeror's relevant past performance is at least somewhat pertinent to this acquisition, and it meets or slightly exceeds minimum acceptable standards. Offeror achieved adequate results; there may have been reportable problems with identifiable, but not substantial, effects on overall performance. Based on the offeror's performance record, there is a low level of confidence that the offeror will successfully perform the required effort. Changes to the offeror's existing processes may be necessary in order to achieve contract requirements. (One or more weaknesses exist. Weaknesses outbalance strengths.)

Very Low Level of Confidence: The offeror's relevant past performance does not meet minimum acceptable standards in one or more areas; remedial action was required in one or more areas. Performance problems occurred in one or more areas which, adversely affected overall performance. Based on the offeror's performance record, there is a very low level of confidence that the offeror will successfully perform the required effort. (One or more deficiencies or significant weaknesses exist.)

Neutral: In the case of an offeror without a record of relevant past performance or for whom information on past performance is not available, the offeror may not be evaluated favorably or unfavorably on past performance (see FAR 15.305(a) (2) (ii) and (iv)).

c. **Factor Three – Price:** Proposed prices shall be evaluated using one or more of the price analysis techniques under FAR 15.404-1(b)(2) to determine whether the offeror's proposed prices are fair and reasonable. TEP and kWh will be considered in determining the best value offeror; however, it will not be rated. The TEP for evaluation purposes will be the total value (in block J11) of Attachment 2, Pricing Sheet. The proposed kWh chart submitted within the Root Core Requirement technical proposal will be evaluated using SSC's current kWh rate of $0.09/kWh. NASA will consider a combination of both the contractor's TEP and NASA's results from the calculated kWh usage when completing the price evaluation.

[END OF SECTION]

FAR 2.212-3 OFFEROR REPRESENTATIONS AND CERTIFICATIONS—COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (DEC 2022) ALT I (OCT 2014)

The Offeror shall complete only paragraph (b) of this provision if the Offeror has completed the annual representations and certification electronically in the System for Award Management (SAM) accessed through https://www.sam.gov. If the Offeror has not completed the annual representations and certifications electronically, the Offeror shall complete only paragraphs (c) through (v) of this provision.

(a) *Definitions*. As used in this provision—

"Covered telecommunications equipment or services" has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

Economically disadvantaged women-owned small business (EDWOSB) concern means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127, and the concern is certified by SBA or an approved third-party certifier in accordance with 13 CFR 127.300. It automatically qualifies as a women-owned small business eligible under the WOSB Program.

Forced or indentured child labor means all work or service—

(1) Exacted from any person under the age of 18 under the menace of any penalty for its nonperformance and for which the worker does not offer himself voluntarily; or

(2) Performed by any person under the age of 18 pursuant to a contract the enforcement of which can be accomplished by process or penalties.

Highest-level owner means the entity that owns or controls an immediate owner of the offeror, or that owns or controls one or more entities that control an immediate owner of the offeror. No entity owns or exercises control of the highest level owner.

Immediate owner means an entity, other than the offeror, that has direct control of the offeror. Indicators of control include, but are not limited to, one or more of the following: ownership or interlocking management, identity of interests among family members, shared facilities and equipment, and the common use of employees.

Inverted domestic corporation, means a foreign incorporated entity that meets the definition of an inverted domestic corporation under 6 U.S.C. 395(b), applied in accordance with the rules and definitions of 6 U.S.C. 395(c).

Manufactured end product means any end product in product and service codes (PSCs) 1000-9999, except—

(1) PSC 5510, Lumber and Related Basic Wood Materials;

(2) Product or Service Group (PSG) 87, Agricultural Supplies;

(3) PSG 88, Live Animals;

(4) PSG 89, Subsistence;

(5) PSC 9410, Crude Grades of Plant Materials;

(6) PSC 9430, Miscellaneous Crude Animal Products, Inedible;

(7) PSC 9440, Miscellaneous Crude Agricultural and Forestry Products;

(8) PSC 9610, Ores;

(9) PSC 9620, Minerals, Natural and Synthetic; and

(10) PSC 9630, Additive Metal Materials.

Place of manufacture means the place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government. If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

Predecessor means an entity that is replaced by a successor and includes any predecessors of the predecessor.

Reasonable inquiry has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

Restricted business operations means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate—

(1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;

(2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;

(3) Consist of providing goods or services to marginalized populations of Sudan;

(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;

(5) Consist of providing goods or services that are used only to promote health or education; or

(6) Have been voluntarily suspended."Sensitive technology"—

Sensitive technology—

(1) Means hardware, software, telecommunications equipment, or any other technology that is to be used specifically—

(i) To restrict the free flow of unbiased information in Iran; or

(ii) To disrupt, monitor, or otherwise restrict speech of the people of Iran; and

(2) Does not include information or informational materials the export of which the President does not have the authority to regulate or prohibit pursuant to section 203(b)(3)of the International Emergency Economic Powers Act (50 U.S.C. 1702(b)(3)).

Service-disabled veteran-owned small business concern—

(1) Means a small business concern—

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veteransor, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service connected, as defined in 38 U.S.C. 101(16).

Small business concern—

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in 13 CFR part 121 and size standards in this solicitation.

(2) *Affiliates*, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

Small disadvantaged business concern, consistent with13 CFR 124.1002, means a small business concern under the size standard applicable to the acquisition, that—

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by—

(i) One or more socially disadvantaged (as defined at13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States; and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding $750,000 after taking into account the applicable exclusions set forth at 13 CFR124.104(c)(2); and

(2) The management and daily business operations of which are controlled (as defined at 13.CFR 124.106) by individuals, who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

Subsidiary means an entity in which more than 50 percent of the entity is owned—

(1) Directly by a parent corporation; or

(2) Through another subsidiary of a parent corporation

Successor means an entity that has replaced a predecessor by acquiring the assets and carrying out the affairs of the predecessor under a new name (often through acquisition or merger). The term "successor" does not include new offices/divisions of the same company or a company that only changes its name. The extent of the responsibility of the successor for the liabilities of the predecessor may vary, depending on State law and specific circumstances.

Veteran-owned small business concern means a small business concern—

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned business concern means a concern which is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women

Women-owned small business concern means a small business concern—

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with 13 CFR part 127), means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States, and the concern is certified by SBA or an approved third-party certifier in accordance with 13 CFR 127.300.

(b)

(1) *Annual Representations and Certifications*. Any changes provided by the Offeror in paragraph (b)(2) of this provision do not automatically change the representations and certifications in SAM.

(2) The offeror has completed the annual representations and certifications electronically in SAM accessed through http://www.sam.gov. After reviewing SAM information, the Offeror verifies by submission of this offer that the representations and certifications currently posted electronically at FAR 52.212-3, Offeror Representations and Certifications-Commercial Products and Commercial Services, have been entered or updated in the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard(s) applicable to the NAICS code(s) referenced for this solicitation), at the time this offer is submitted and are incorporated in this offer by reference (see FAR 4.1201), except for paragraphs _____.

[*Offeror to identify the applicable paragraphs at (c) through (v) of this provision that the offeror has completed for the purposes of this solicitation only, if any.*

These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted electronically on SAM.]

(c) Offerors must complete the following representations when the resulting contract is for supplies to be delivered or services to be performed in the United States or its outlying areas, or when the contracting officer has applied part 19 in accordance with 19.000(b)(1)(ii). Check all that apply.

(1) *Small business concern*. The offeror represents as part of its offer that—

(i) It □ is, □ is not a small business concern; or

(ii) It □ is, □ is not a small business joint venture that complies with the requirements of 13 CFR 121.103(h) and 13 CFR 125.8(a) and (b). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.*]

(2) *Veteran-owned small business concern*. [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents as part of its offer that it □ is, □ is not a veteran-owned small business concern.

(3) *Service-disabled veteran-owned small business concern.* [*Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(2) of this provision.*] The offeror represents as part of its offer that—

(i) It □ is, □ is not a service-disabled veteran-owned small business concern; or

(ii)It □ is, □ is not a joint venture that complies with the requirements of 13 CFR 125.18(b)(1) and (2). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.*] Each service-disabled veteran-owned small business concern participating in the joint venture shall provide representation of its service-disabled veteran-owned small business concern status.

(4) *Small disadvantaged business concern*. [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision*.] The offeror represents, that it □ is, □ is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(5) *Women-owned small business concern*. [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision*.] The offeror represents that it □ is, □ is not a women-owned small business concern.

(6) *WOSB joint venture eligible under the WOSB Program.* The offeror represents that it □ is, □ is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture:* __.]

(7) *Economically disadvantaged women-owned small business (EDWOSB) joint venture.* The offeror represents that it □ is, □ is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture:* __.]

(8) *Women-owned business concern (other than small business concern*). [*Complete only if the offeror is a women-owned business concern and did not represent itself as a small business concern in paragraph (c)(1) of this provision*.] The offeror represents that it □ is a women-owned business concern.

(9) *Tie bid priority for labor surplus area concerns*. If this is an invitation for bid, small business offerors may identify the labor surplus areas in which costs to be incurred on account of manufacturing or production (by offeror or first-tier subcontractors) amount to more than 50 percent of the contract price:_____

(10) *HUBZone small business concern*. [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision*.] The offeror represents, as part of its offer, that–

(i) It □ is, □ is not a HUBZone small business concern listed, on the date of this representation, as having been certified by SBA as a HUBZone small business concern in the Dynamic Small Business Search and SAM, and will attempt to maintain an employment rate of HUBZone residents of 35 percent of its employees during performance of a HUBZone contract (see 13 CFR 126.200(e)(1)); and

(ii) It □ is, □ is not a HUBZone joint venture that complies with the requirements of 13 CFR 126.616(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture:* __.] Each HUBZone small business concern participating in the HUBZone joint venture shall provide representation of its HUBZone status.

(11) (Complete if the offeror has represented itself as disadvantaged in paragraph (c)(4) of this provision.)

___ Black American.

___ Hispanic American.

___ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

___ Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, Republic of Palau, Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

___ Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

___ Individual/concern, other than one of the preceding.

(d) Representations required to implement provisions of Executive Order11246-

(1) Previous contracts and compliance. The offeror represents that-

(i) It □ has, □ has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation; and

(ii) It □ has, □ has not filed all required compliance reports.

(2) *Affirmative Action Compliance*. The offeror represents that-

(i) It □ has developed and has on file, □ has not developed and does not have on file, at each establishment, affirmative action programs required by rules and regulations of the Secretary of Labor (41 CFR parts 60-1 and 60-2), or

(ii) It □ has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(e) *Certification Regarding Payments to Influence Federal Transactions (31 http://uscode.house.gov/ U.S.C. 1352)*. (Applies only if the contract is expected to exceed $150,000.) By submission of its offer, the offeror certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with the award of any resultant contract. If any registrants under the Lobbying Disclosure Act of 1995 have made a lobbying contact on behalf of the offeror with respect to this contract, the offeror shall complete and submit, with its offer, OMB Standard Form LLL, Disclosure of Lobbying Activities, to provide the name of the registrants. The offeror need not report regularly employed officers or employees of the offeror to whom payments of reasonable compensation were made.

(f) *Buy American Certificate*. (Applies only if the clause at Federal Acquisition Regulation (FAR) 52.225-1, Buy American-Supplies, is included in this solicitation.)

(1)

(i) The Offeror certifies that each end product and that each domestic end product listed in paragraph (f)(3) of this provision contains a critical component, except those listed in paragraph (f)(2) of this provision, is a domestic end product.

(ii) The Offeror shall list as foreign end products those end products manufactured in the United States that do not qualify as domestic end products. For those foreign end products that do not consist wholly or predominantly of iron or steel or a combination of both, the Offeror shall also indicate whether these foreign end products exceed 55 percent domestic content, except for those that are COTS items. If the percentage of the domestic content is unknown, select “no”.

(iii) The Offeror shall separately list the line item numbers of domestic end products that contain a critical component (see FAR 25.105).

(iv) The terms “commercially available off-the-shelf (COTS) item,” “critical component,” “domestic end product,” "end product," "foreign end product," and "United States" are defined in the clause of this solicitation entitled "Buy American-Supplies."

(2) Foreign End Products:

Line Item No.	Country of Origin	Exceeds 55% domestic content (yes/no)
_____	_____	_____
_____	_____	_____
_____	_____	_____

[*List as necessary*]

(3) Domestic end products containing a critical component:

Line Item No. ___

[*List as necessary*]

(4) The Government will evaluate offers in accordance with the policies and procedures of FAR part 25.

(g)

(1) *Buy American-Free Trade Agreements-Israeli Trade Act Certificate*. (Applies only if the clause at FAR 52.225-3, Buy American-Free Trade Agreements-Israeli Trade Act, is included in this solicitation.)

(i)

(A) The Offeror certifies that each end product, except those listed in paragraph (g)(1)(ii) or (iii) of this provision, is a domestic end product and that each domestic end product listed in paragraph (g)(1)(iv) of this provision contains a critical component.

(B) The terms "Bahrainian, Moroccan, Omani, Panamanian, or Peruvian end product," "commercially available off-the-shelf (COTS) item," "critical component," "domestic end product," "end product," "foreign end product," "Free Trade Agreement country," "Free Trade Agreement country end product," "Israeli end product," and "United States" are defined in the clause of this solicitation entitled "Buy American-Free Trade Agreements-Israeli Trade Act."

(ii) The Offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahrainian, Moroccan, Omani, Panamanian, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American-Free Trade Agreements-Israeli Trade Act."

Free Trade Agreement Country End Products (Other than Bahrainian, Moroccan, Omani, Panamanian, or Peruvian End Products) or Israeli End Products:

Line Item No.	Country of Origin
_____	_____
_____	_____

Line Item No.	Country of Origin
_____	_____

[*List as necessary*]

(iii) The Offeror shall list those supplies that are foreign end products (other than those listed in paragraph (g)(1)(ii) of this provision) as defined in the clause of this solicitation entitled "Buy American-Free Trade Agreements-Israeli Trade Act." The Offeror shall list as other foreign end products those end products manufactured in the United States that do not qualify as domestic end products. For those foreign end products that do not consist wholly or predominantly of iron or steel or a combination of both, the Offeror shall also indicate whether these foreign end products exceed 55 percent domestic content, except for those that are COTS items. If the percentage of the domestic content is unknown, select "no".

Other Foreign End Products:

Line Item No.	Country of Origin	Exceeds 55% domestic content (yes/no)
_____	_____	_____
_____	_____	_____
_____	_____	_____

[List as necessary]

(iv) The Offeror shall list the line item numbers of domestic end products that contain a critical component (see FAR 25.105).

Line Item No. ___

[List as necessary]

(v) The Government will evaluate *offers* in accordance with the policies and procedures of FAR part 25.

(2) *Buy American-Free Trade Agreements-Israeli Trade Act Certificate, Alternate II.* If Alternate II to the clause at FAR 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Israeli end products as defined in the clause of this solicitation entitled "Buy American—Free Trade Agreements—Israeli Trade Act":

Israeli End Products:

Line Item No.
_____

Line Item No.
_____
_____

[*List as necessary*]

(3) *Buy American-Free Trade Agreements-Israeli Trade Act Certificate, Alternate III*. If Alternate III to the clause at 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahrainian, Korean, Moroccan, Omani, Panamanian, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American-Free Trade Agreements-Israeli Trade Act":

Free Trade Agreement Country End Products (Other than Bahrainian, Korean, Moroccan, Omani, Panamanian, or Peruvian End Products) or Israeli End Products:

Line Item No.	**Country of Origin**
_____	_____
_____	_____
_____	_____

[*List as necessary*]

(4) *Trade Agreements Certificate*. (Applies only if the clause at FAR 52.225-5, Trade Agreements, is included in this solicitation.)

(i) The offeror certifies that each end product, except those listed in paragraph (g)(5)(ii) of this provision, is a U.S.-made or designated country end product, as defined in the clause of this solicitation entitled "Trade Agreements."

(ii) The offeror shall list as other end products those end products that are not U.S.-made or designated country end products.

Other End Products:

Line Item No.	**Country of Origin**
_____	_____
_____	_____

Line Item No.	Country of Origin
_____	_____

[*List as necessary*]

(iii) The Government will evaluate offers in accordance with the policies and procedures of FAR part 25. For line items covered by the WTO GPA, the Government will evaluate offers of U.S.-made or designated country end products without regard to the restrictions of the Buy American statute. The Government will consider for award only offers of U.S.-made or designated country end products unless the Contracting Officer determines that there are no offers for such products or that the offers for such products are insufficient to fulfill the requirements of the solicitation.

(h) *Certification Regarding Responsibility Matters (Executive Order 12689*). (Applies only if the contract value is expected to exceed the simplified acquisition threshold.)

The offeror certifies, to the best of its knowledge and belief, that the offeror and/or any of its principals–

(1) □ Are, □ are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(2) □ Have, □ have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property;

(3) □ Are, □ are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses enumerated in paragraph (h)(2) of this clause; and

(4) □ Have, □ have not, within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds the threshold at 9.104-5(a)(2) for which the liability remains unsatisfied.

(i) Taxes are considered delinquent if both of the following criteria apply:

(A) *The tax liability is finally determined*. The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(B) *The taxpayer is delinquent in making payment*. A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(ii) *Examples*.

(A) The taxpayer has received a statutory notice of deficiency, under I.R.C. §6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(B) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. §6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(C) The taxpayer has entered into an installment agreement pursuant to I.R.C. §6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(D) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. §362 (the Bankruptcy Code).

(i) *Certification Regarding Knowledge of Child Labor for Listed End Products (Executive Order 13126). [The Contracting Officer must list in paragraph (i)(1) any end products being acquired under this solicitation that are included in the List of Products Requiring Contractor Certification as to Forced or Indentured Child Labor, unless excluded at 22.1503(b).]*

(1) *Listed end products.*

Listed End Product	**Listed Countries of Origin**
_____	_____
_____	_____

(2) *Certification. [If the Contracting Officer has identified end products and countries of origin in paragraph (i)(1) of this provision, then the offeror must certify to either (i)(2)(i) or (i)(2)(ii) by checking the appropriate block.]*

(i) The offeror will not supply any end product listed in paragraph (i)(1) of this provision that was mined, produced, or manufactured in the corresponding country as listed for that product.

(ii) The offeror may supply an end product listed in paragraph (i)(1) of this provision that was mined, produced, or manufactured in the corresponding country as listed for that product. The offeror certifies that it has made a good faith effort to determine whether forced or indentured child labor was used to mine, produce, or manufacture any such end product furnished under this contract. On the basis of those efforts, the offeror certifies that it is not aware of any such use of child labor.

(j) *Place of manufacture.* (Does not apply unless the solicitation is predominantly for the acquisition of manufactured end products.) For statistical purposes only, the offeror shall indicate whether the place of manufacture of the end products it expects to provide in response to this solicitation is predominantly-

(1) □ In the United States (Check this box if the total anticipated price of offered end products manufactured in the United States exceeds the total anticipated price of offered end products manufactured outside the United States); or

(2) □ Outside the United States.

(k) *Certificates regarding exemptions from the application of the Service Contract Labor Standards* (Certification by the offeror as to its compliance with respect to the contract also constitutes its certification as to compliance by its subcontractor if it subcontracts out the exempt services.) [*The contracting officer is to check a box to indicate if paragraph (k)(1) or (k)(2) applies.*]

(1) Maintenance, calibration, or repair of certain equipment as described in FAR 22.1003-4(c)(1). The offeror □ does □ does not certify that–

(i) The items of equipment to be serviced under this contract are used regularly for other than Governmental purposes and are sold or traded by the offeror (or subcontractor in the case of an exempt subcontract) in substantial quantities to the general public in the course of normal business operations;

(ii) The services will be furnished at prices which are, or are based on, established catalog or market prices (see FAR 22.1003-4(c)(2)(ii)) for the maintenance, calibration, or repair of such equipment; and

(iii) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract will be the same as that used for these employees and equivalent employees servicing the same equipment of commercial customers.

(2) Certain services as described in FAR 22.1003-4(d)(1). The offeror □ does □ does not certify that-

(i) The services under the contract are offered and sold regularly to non-Governmental customers, and are provided by the offeror (or subcontractor in the case of an exempt subcontract) to the general public in substantial quantities in the course of normal business operations;

(ii) The contract services will be furnished at prices that are, or are based on, established catalog or market prices (see FAR 22.1003-4(d)(2)(iii));

(iii) Each service employee who will perform the services under the contract will spend only a small portion of his or her time (a monthly average of less than 20 percent of the available hours on an annualized basis, or less than 20 percent of available hours during the contract period if the contract period is less than a month) servicing the Government contract; and

(iv) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract is the same as that used for these employees and equivalent employees servicing commercial customers.

(3) If paragraph (k)(1) or (k)(2) of this clause applies–

(i) If the offeror does not certify to the conditions in paragraph (k)(1) or (k)(2) and the Contracting Officer did not attach a Service Contract Labor Standards wage determination to the solicitation, the offeror shall notify the Contracting Officer as soon as possible; and

(ii) The Contracting Officer may not make an award to the offeror if the offeror fails to execute the certification in paragraph (k)(1) or (k)(2) of this clause or to contact the Contracting Officer as required in paragraph (k)(3)(i) of this clause.

(l) *Taxpayer Identification Number (TIN) (* 26 U.S.C. 6109, 31 U.S.C. 7701). (Not applicable if the offeror is required to provide this information to the SAM to be eligible for award.)

(1) All offerors must submit the information required in paragraphs (l)(3) through (l)(5) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the Internal Revenue Service (IRS).

(2) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(3) *Taxpayer Identification Number (TIN)*.

TIN: _____.

TIN has been applied for.

TIN is not required because:

Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

Offeror is an agency or instrumentality of a foreign government;

Offeror is an agency or instrumentality of the Federal Government.

(4) *Type of organization*.

Sole proprietorship;

Partnership;

Corporate entity (not tax-exempt);

Corporate entity (tax-exempt);

Government entity (Federal, State, or local);

Foreign government;

International organization per 26 CFR1.6049-4;

Other _____.

(5) *Common parent*.

Offeror is not owned or controlled by a common parent;

Name and TIN of common parent:

Name _____.

TIN _____.

(m) *Restricted business operations in Sudan*. By submission of its offer, the offeror certifies that the offeror does not conduct any restricted business operations in Sudan.

(n) Prohibition on Contracting with Inverted Domestic Corporations.

(1) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-2(b) applies or the requirement is waived in accordance with the procedures at 9.108-4.

(2) *Representation*. The Offeror represents that–

(i) It □ is, □ is not an inverted domestic corporation; and

(ii) It □ is, □ is not a subsidiary of an inverted domestic corporation.

(o) Prohibition on contracting with entities engaging in certain activities or transactions relating to Iran.

(1) The offeror shall e-mail questions concerning sensitive technology to the Department of State at CISADA106@state.gov.

(2) *Representation and Certifications*. Unless a waiver is granted or an exception applies as provided in paragraph (o)(3) of this provision, by submission of its offer, the offeror-

(i) Represents, to the best of its knowledge and belief, that the offeror does not export any sensitive technology to the government of Iran or any entities or individuals owned or controlled by, or acting on behalf or at the direction of, the government of Iran;

(ii) Certifies that the offeror, or any person owned or controlled by the offeror, does not engage in any activities for which sanctions may be imposed under section 5 of the Iran Sanctions Act; and

(iii) Certifies that the offeror, and any person owned or controlled by the offeror, does not knowingly engage in any transaction that exceeds the threshold at FAR 25.703-2(a)(2) with Iran's Revolutionary Guard Corps or any of its officials, agents, or affiliates, the property and interests in property of which are blocked pursuant to the International Emergency Economic Powers Act (et seq.) (see OFAC's Specially Designated Nationals and Blocked Persons List at https://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx).

(3) The representation and certification requirements of paragraph (o)(2) of this provision do not apply if-

(i) This solicitation includes a trade agreements certification (*e.g.*, 52.212-3(g) or a comparable agency provision); and

(ii) The offeror has certified that all the offered products to be supplied are designated country end products.

(p) *Ownership or Control of Offeror*. (Applies in all solicitations when there is a requirement to be registered in SAM or a requirement to have a unique entity identifier in the solicitation).

(1) The Offeror represents that it □ has or □ does not have an immediate owner. If the Offeror has more than one immediate owner (such as a joint venture), then the Offeror shall respond to paragraph (2) and if applicable, paragraph (3) of this provision for each participant in the joint venture.

(2) If the Offeror indicates "has" in paragraph (p)(1) of this provision, enter the following information:

Immediate owner CAGE code: _____.

Immediate owner legal name: _____.

(Do not use a "doing business as" name)

Is the immediate owner owned or controlled by another entity: □ Yes or □ No.

(3) If the Offeror indicates "yes" in paragraph (p)(2) of this provision, indicating that the immediate owner is owned or controlled by another entity, then enter the following information:

Highest-level owner CAGE code: _____.

Highest-level owner legal name: _____.

(*Do not use a "doing business as" name*)

(q) *Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law.*

(1) As required by sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), and similar provisions, if contained in subsequent appropriations acts, The Government will not enter into a contract with any corporation that–

(i) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a

timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(ii) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(2) The Offeror represents that–

(i) It is □ is not □ a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and

(ii) It is □ is not □ a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(r) *Predecessor of Offeror.* (Applies in all solicitations that include the provision at 52.204-16, Commercial and Government Entity Code Reporting.)

(1) The Offeror represents that it □ is or □ is not a successor to a predecessor that held a Federal contract or grant within the last three years.

(2) If the Offeror has indicated "is" in paragraph (r)(1) of this provision, enter the following information for all predecessors that held a Federal contract or grant within the last three years (if more than one predecessor, list in reverse chronological order):

Predecessor CAGE code: (or mark "Unknown").

Predecessor legal name:_____.

(*Do not use a "doing business as" name*).

(s) [Reserved].

(t) *Public Disclosure of Greenhouse Gas Emissions and Reduction Goals*. Applies in all solicitations that require offerors to register in SAM (12.301(d)(1)).

(1) This representation shall be completed if the Offeror received $7.5 million or more in contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than $7.5 million in Federal contract awards in the prior Federal fiscal year.

(2) Representation. [Offeror to check applicable block(s) in paragraph (t)(2)(i) and (ii)].

(i) The Offeror (itself or through its immediate owner or highest-level owner) □ does, □ does not publicly disclose greenhouse gas emissions, i.e., makes available on a publicly accessible website the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.

(ii) The Offeror (itself or through its immediate owner or highest-level owner) □ does, □ does not publicly disclose a quantitative greenhouse gas emissions reduction goal, i.e., make available on a publicly accessible website a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.

(iii) A publicly accessible website includes the Offeror's own website or a recognized, third-party greenhouse gas emissions reporting program.

(3) If the Offeror checked "does" in paragraphs (t)(2)(i) or (t)(2)(ii) of this provision, respectively, the Offeror shall provide the publicly accessible website(s) where greenhouse gas emissions and/or reduction goals are reported:_____.

(u)

(1) In accordance with section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions), Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with an entity that requires employees or subcontractors of such entity seeking to report waste, fraud, or abuse to sign internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting such waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(2) The prohibition in paragraph (u)(1) of this provision does not contravene requirements applicable to Standard Form 312 (Classified Information Nondisclosure Agreement), Form 4414 (Sensitive Compartmented Information Nondisclosure Agreement), or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

(3) *Representation*. By submission of its offer, the Offeror represents that it will not require its employees or subcontractors to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting waste, fraud, or abuse related to the performance of a Government contract to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information (*e.g.*, agency Office of the Inspector General).

(v) *Covered Telecommunications Equipment or Services-Representation.* Section 889(a)(1)(A) and section 889 (a)(1)(B) of Public Law 115-232.

(1) The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(2) The Offeror represents that–

(i) It□ does, □ does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(ii) After conducting a reasonable inquiry for purposes of this representation, that it □ does, □ does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

(End of Provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph

identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

Federal Acquisition Regulation (FAR) Solicitation Provisions and Contact Clauses:
https://www.acquisition.gov

NASA FAR Supplement (NFS) clauses:
https://www.hq.nasa.gov/office/procurement/regs/NFS.pdf

FEDERAL ACQUISITION REGULATION (FAR) (48 C.F.R. Chapter 1) PROVISIONS:

The following FAR provisions are included by reference:

52.204-7 System for Award Management (Oct 2018)
52.204-16 Commercial and Government Entity Code Reporting (Aug 2020)
52.204-22 Alternative Line Item Proposal (Jan 2017)

The following FAR provisions are included by full text:

FAR 52.209-7 INFORMATION REGARDING RESPONSIBILITY MATTERS (OCT 2018)

(a) *Definitions*. As used in this provision—

Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (*e.g.*, Securities and Exchange Commission Administrative Proceedings, Civilian Board of Contract Appeals Proceedings, and Armed Services Board of Contract Appeals Proceedings). This includes administrative proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include agency actions such as contract audits, site visits, corrective plans, or inspection of deliverables.

Federal contracts and grants with total value greater than $10,000,000 means—

(1) The total value of all current, active contracts and grants, including all priced options; and

(2) The total value of all current, active orders including all priced options under indefinite-delivery, indefinite-quantity, 8(a), or requirements contracts (including task and delivery and multiple-award Schedules).

Principal means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (*e.g.*, general manager; plant manager; head of a division or business segment; and similar positions).

(b) The offeror □ has □ does not have current active Federal contracts and grants with total value greater than $10,000,000.

(c) If the offeror checked "has" in paragraph (b) of this provision, the offeror represents, by submission of this offer, that the information it has entered in the Federal Awardee Performance and Integrity Information System (FAPIIS) is current, accurate, and complete as of the date of submission of this offer with regard to the following information:

(1) Whether the offeror, and/or any of its principals, has or has not, within the last five years, in connection with the award to or performance by the offeror of a Federal contract or grant, been the subject of a proceeding, at the Federal or State level that resulted in any of the following dispositions:

(i) In a criminal proceeding, a conviction.

(ii) In a civil proceeding, a finding of fault and liability that results in the payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more.

(iii) In an administrative proceeding, a finding of fault and liability that results in–

(A) The payment of a monetary fine or penalty of $5,000 or more; or

(B) The payment of a reimbursement, restitution, or damages in excess of $100,000.

(iv) In a criminal, civil, or administrative proceeding, a disposition of the matter by consent or compromise with an acknowledgment of fault by the Contractor if the proceeding could have led to any of the outcomes specified in paragraphs (c)(1)(i), (c)(1)(ii), or (c)(1)(iii) of this provision.

(2) If the offeror has been involved in the last five years in any of the occurrences listed in (c)(1) of this provision, whether the offeror has provided the requested information with regard to each occurrence.

(d) The offeror shall post the information in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision in FAPIIS as required through maintaining an active registration in the System for Award Management, which can be accessed via https://www.sam.gov (see 52.204-7).

(End of provision)

The following NFS provisions are included in full text:

1852.245–81 LIST OF AVAILABLE GOVERNMENT PROPERTY (JAN 2011)

(a) The Government will make the following Government property available for use in performance of the contract resulting from this solicitation, on a no-charge-for-use basis in accordance with FAR 52.245–1, Government Property, included in this solicitation. The offeror shall notify the Government, as part of its proposal, of its intention to use or not use the property.

(b) The Government will make the following Government property available for use in performance of the contract resulting from this solicitation, on a no-charge-for-use basis in accordance with FAR 52.245–2, Government Property Installation Operation Services, as included in this solicitation. The offeror shall notify the Government of its intention to use or not use the property.

(c) The selected Contractor will be responsible for costs associated with transportation, and installation of the property listed in this provision.

List of Available Government Property

Land: Available location for any potential production facility will be near the HPGF, SSC, Mississippi (Current cleared space readily available for the potential facility is approximately 160’ X 170’ – up to 350’ X 1,000’ can be made available with additional negotiation)

(End of provision)

PAST PERFORMANCE MATRIX

This form contains Source Selection Information when completed (See FAR 2.101 and 3.104)

Offerors shall submit Past Performance for a maximum of five (5) recent and relevant customers/contracts demonstrating their ability to implement a Gaseous Nitrogen Solution similar in size, scope, and complexity to the requirements identified in this solicitation. Offerors shall complete the following matrix:

Offeror Name: _____

Contract Number/Name & Value ($)	**Reference (Name, phone number & Email)**	**SOO Section VI (Normal Operating Conditions) & Past Performance Evaluation Factors**				
		Mean Flow (1,380 – 2,146 SCFM)	**Max Pressure** (2,700 – 6,000 psi)	**Demand Flow** (>3,000 SCFM)	**Purity** (>=99.989%)	**Complexity** (Meets both 730kMCF – 1030kMCF ann. prod. & >1,890 psi min press
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐

Offerors past performance history shall address the Performance Criteria listed in the SOO Section VI as applicable for each project submitted as past performance information (PPI) including required information in the solicitation (recent, relevant, and complexity) as listed in the Past Performance Evaluation Factors.

PAST PERFORMANCE QUESTIONNAIRE

This form contains Source Selection Information when completed (See FAR 2.101 and 3.104)

Return completed attachment to Ms. Melissa Wagner at melissa.r.wagner@nasa.gov.

NAME OF OFFEROR: _____

1. CUSTOMER/AGENCY NAME: _____

   ADDRESS:_____

   TELEPHONE:_____

2. CONTRACT NUMBER:_____

3. CONTRACT TYPE:_____

4. CONTRACT AWARD AMOUNT: $_____

5. FINAL PRICE OF CONTRACT: $_____

6. VARIANCES: Explain variances from original contract value for the contract(s)

   _____

7. ORIGINAL AND MODIFIED PERIOD OF PERFORMANCE: From: _____ To: _____

8. COGNIZANT CONTRACTING OFFICER: (If commercial, customer's business manager):

NAME: _____ EMAIL: _____ TELEPHONE: _____

9. CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE (If commercial, technical manager):

NAME: _____ EMAIL: _____ TELEPHONE: _____

10. CONTRACT STATUS (if current, show percent complete; if terminated, explain why; if complete, so state)

    _____

11. DESCRIPTION OF THE WORK PERFORMED (use additional page as necessary):

NAME OF CONTRACTOR:		CONTRACT NUMBER:						
Rate the Contractor in the applicable areas according to the applicable performance criteria. See legend below for rating criteria.								
NO	CRITERIA	RATING						NOTES
	TECHNICAL							
1.	Overall quality of product produced	A	B	C	D	E	NA	
2.	Ability to follow facility rules	A	B	C	D	E	NA	
3.	Ability to analyze a customer's need and provide an acceptable solution	A	B	C	D	E	NA	
	MANAGEMENT							
4.	Overall responsiveness of management	A	B	C	D	E	NA	
5.	Ease of working with management team	A	B	C	D	E	NA	
6.	Response time to communication	A	B	C	D	E	NA	
7.	Response time for providing permits/documentation	A	B	C	D	E	NA	
	COST							
8.	Ability to minimize claims/requests for equitable adjustment	A	B	C	D	E	NA	
9.	Contractor's overall cost control measures	A	B	C	D	E	NA	
10.	Contractor's ability to provide innovative cost-savings solutions	A	B	C	D	E	NA	
	SCHEDULE							
11.	Ability to establish appropriate milestones	A	B	C	D	E	NA	
12.	Ability to meet scheduled milestones	A	B	C	D	E	NA	
13.	Flexibility in handling unforeseen events	A	B	C	D	E	NA	
	ENVIRONMENTAL / QUALITY CONTROL							
14.	Contractor's knowledge of federal, state, and local codes and regulations	A	B	C	D	E	NA	
15.	Compliance with applicable (customer/buyer) quality programs	A	B	C	D	E	NA	
16.	Contractor had sufficient quality management controls in place during performance	A	B	C	D	E	NA	
	SAFETY PROGRAM							
17.	Compliance with applicable (customer's/buyer's) safety programs (explain)	A	B	C	D	E	NA	
18.	Contractor maintained a knowledgeable/effective safety culture	A	B	C	D	E	NA	
19.	Contractor's emphasis on safety awareness	A	B	C	D	E	NA	
20.	Any documented OSHA non-compliance(s) (explain if Yes)	(Yes, No, NA)						
21.	Any safety issues identified during performance (explain if Yes)	(Yes, No, NA)						
22.	Workplace violence incidents (explain if Yes)	(Yes, No, NA)						

RATING CRITERIA:

A - Exceptional – Performance meets contractual requirements and exceeds many to the Government's benefit.

B - Very Good – Performance meets contractual requirements and exceeds some to the Government's benefit.

C - Satisfactory – Performance meets contractual requirements.

D - Marginal – Performance does not meet some contractual requirements.

E - Unsatisfactory – Performance does not meet most contractual requirements.

NOTE: If an element was not performed, the block may be left blank or an "N/A" may be inserted.

SPLN-5100-0001

John C. Stennis Space Center
Gaseous Nitrogen Generation Solution (GNGS)
Surveillance Plan

Approval

[name] Contracting Officer Representative (COR) Center Operations Directorate	Date

Concurrence

[name] Alternate Contracting Officer Representative (COR) Engineering and Test Directorate	Date

Concurrence

[name] Contracting Officer (CO) Office of Procurement	Date

Document History Log

Status/ Change/ Revision	Change Date	Originator / Phone	Description
Basic			Initial Release

1.0 PURPOSE

This plan delineates responsibilities and procedures to be used for surveillance the National Aeronautics and Space Administration (NASA) Gaseous Nitrogen Generation Solution (GNGS) acquisition to ensure quality product is received as required by the contract.

2.0 APPLICABILITY

This surveillance plan is applicable to all Contracting Officer Representative (COR), Technical Monitor (TM), as applicable, and the Contracting Officer (CO) under the GNGS Contract.

3.0 REFERENCE

This surveillance plan is prepared in response to paragraph 3.a of the COR delegation NASA Form 1634 for the GNGS contract. This plan is prepared pursuant to the Federal Acquisition Regulation (FAR) 46.401(a) and NASA FAR Supplement (NFS) 1846.4 and resulting from the inclusion of the higher-level contract quality requirement clause for ISO 9001 in the contract. All references are assumed to be the latest version unless otherwise indicated.

4.0 RESPONSIBILITIES

4.1 Contracting Officer (CO) – The CO shall ensure performance of all necessary actions for effective contracting, ensure compliance with the contract terms, and shall safeguard the interests of the United States in the contractual relationship. The CO shall also assure that the contractor receives impartial, fair, and equitable treatment under this contract. The CO is ultimately responsible for the final determination of the adequacy of the contractor's performance.

4.2 Contracting Officer's Representative (COR) – The COR is responsible for technical administration of the contract and shall assure proper Government surveillance of the contractor's performance. The COR is not empowered to make any contractual commitments or to authorize any contractual changes on the Government's behalf.

4.3 The COR and Alternate COR are responsible for performing the following surveillance functions:

a. Assuring product received is within the limits of the GNGS contract, Statement of Objectives, and Contractor's Proposal.
b. Monitoring, evaluating, and assessing contractor performance.
c. Maintenance of contract surveillance files containing documentation relative to contractor performance during the life of the contract.
d. Providing notification to the CO of any technical issues which have been identified as requiring action by the CO to effect resolution.
e. Require the contractor to provide a written corrective action plan for any issues/concerns of nonconformance to contract requirements.

5.0 SUPPLY STANDARDS

The supply standards are set in the SOO (table below) and the MIL-PRF-27401G. The Government performs surveillance to determine if the contractor exceeds, meets, or does not meet these standards.

SOO Requirements			
	Normal Operating Conditions	**Conservation Mode Operating Conditions**	**Surveillance Methods**
System Design Pressure	6,000 psi	N/A	Inspections
Maximum Operating Pressure	4,000 psi	4,000 psi	Meters
Minimum Allowable Pressure	2,700 psi	2,700 psi	Meters
Mean Flow Rate	1,763 SCFM	1,500 SCFM	Meters
On Demand Rate	3,500 SCFM	N/A	Meters
Standard Deviation	383 SCFM	N/A	Meters
Specification			
MIL-PRF-27401G Modified: Water (max ppm): 6 (-64.0° C Dew Point)			Meters, Sampling, Inspections/Audits
Environmental, Safety and Health			
Measures	**Standards**	**Requirements**	**Surveillance Method**
Environmental	Comply with all applicable environmental Federal, State and local laws, executive orders, rules and regulations.	Maintain applicable documentation and submit when required or requested.	Validated Customer Complaints and/or Inspections
Safety and Health & Personnel Safety	Comply with OSHA regulations. No Class "A" or "B" Mishaps.	Meet OSHA and Company Safety and Health Plan requirements. Investigate and report all mishaps IAW NPR 8621.1.	Validated Customer Complaints and/or Inspections

6.0 METHODS OF QA SURVEILLANCE

The following methods will be utilized to ensure product conformance.

METERS. Government-installed meters downstream of the interface will be used to ensure required flow and pressure are met.
SAMPLING. Sampling will be conducted biweekly at the tie-in location, monthly at the test stands, and randomly as needed via SSC's onsite support contractor.
INSPECTIONS/AUDIT: Government to inspections or audits, as needed, at the contractor's onsite facility to verify, inspect, and ensure that supplies meet the contract requirements.
VALIDATED USER/CUSTOMER COMPLAINTS. Relies on the customer to identify deficiencies. Complaints are then investigated and validated.

7.0 FREQUENCY OF MEASUREMENT

Sampling will be conducted biweekly at the tie-in location and monthly at the test stands, and the COR shall assess performance annually. Perform periodic inspections and audits as needed to ensure compliance with requirements.

8.0 FORMS

NASA Form 1634, Contracting Officer Representative (COR)/Alternate COR Delegation, documents the specific duties and responsibilities delegated to the COR/ACOR on the GNGS contract.

9.0 EVALUATION RATINGS

Evaluation ratings are used to determine if contractor performance exceeds, meets, or does not meet the GNGS contract. These rating definitions are found in FAR part 42 and the Contractor Performance Assessment Rating System (CPARS).

Rating	Definition
Exceptional	Performance meets contractual requirements and exceeds many to the Government's benefit. The contractual performance of the element or sub-element being evaluated was accomplished with few minor problems for which corrective actions taken by the contractor were highly effective.
Very Good	Performance meets contractual requirements and exceeds some to the Government's benefit. The contractual performance of the element or sub-element being evaluated was accomplished with some minor problems for which corrective actions taken by the contractor were effective.
Satisfactory	Performance meets contractual requirements. The contractual performance of the element or sub-element contains some minor problems for which corrective actions taken by the contractor appear or were satisfactory.
Marginal	Performance does not meet some contractual requirements. The contractual performance of the element or sub-element being evaluated reflects a serious problem for which the contractor has not yet identified corrective actions. The contractor's proposed actions appear only marginally effective or were not fully implemented.
Unsatisfactory	Performance does not meet most contractual requirements and recovery is not likely in a timely manner. The contractual performance of the element or sub-element contains a serious problem(s) for which the contractor's corrective actions appear or were ineffective.

10.0 TERM

This plan shall become effective at award of the GNGS contract and shall remain in effect for the duration GNGS contract.

Incorporated Changes from the draft Request for Proposal (DRFP)

SF 1449 Continuation Pages:

1. Reference Q&A #25: Changed Section – **SUPPLIES AND/OR SERVICES TO BE FURNISHED**:
   (a) Updated Note: Note: Liquid Nitrogen direct deliveries (to specified test stands) will still be required for certain tests. This requirement will be maintained on Kennedy Space Center's Agency-wide Nitrogen and Oxygen contract.
2. Reference Q&A #1, 4, 5, 11, 19, 20, 26, and 30: Changed Section – **SCHEDULE OF SUPPLIES**:
   (a) Updated Order Limitation numbers to reflect current mins and maxes
   (b) Updated the Note to match quantities in the chart.
3. Reference Q&A #1, 4, 5, 11, 19, 20, 26, and 30: Changed entire Section – **UNIT PRICING**:
   (a) Removed "electrical": Product purchased and paid for based on MCF. MCF is Thousand Standard Cubic Foot. The unit price is all inclusive of production (i.e. Initial plant installation, activation, system certification, ~~electrical~~, maintenance, emergency generation cost etc.). Note: Tiers 2 - 4 are not guaranteed and would only be applied as needed based on actual usage.
   (b) Added a Base guaranteed line and updated chart to reflect those changes
   (c) Added "Potential Monthly Usage" column
   (d) Added "Fixed Monthly Price" column
   (e) Updated mcf quantities throughout the table
   (f) Updated the Note under the table
   (g) Updated the mcf quantities in the Tier Note
   (h) Updated the "For Example" section to include all the changes in this section
4. Reference Q&A #4: Added Section – **(a) PROPOSED kilo-Watt hours (kWh) USAGE** including the table and note.
   (a) PROPOSED kilo-Watt hours (kWh) USAGE: (To be completed by the offeror using their proposed approach from Technical Proposal – Root Core Requirements)

Potential Monthly Usage (mcf)	Proposed monthly kWh based on "Potential Monthly Usage"
65,700	
28,294	
16,775	
16,775	
16,775	

Note: Should the contractor exceed the energy usage in the above table, NASA will require contractor justification documenting the cause of exceeded usage. NASA expects the contractor's justification for exceeded usage to discuss the contractor's adherence to, or lack of adherence, to its processes, procedures, and methods stated in its technical proposal. NASA could potentially seek reimbursement under the Contract Disputes Act, which is a part of the contract, and states the procedure for handling disputes.

5. Reference Q&A #3: Changed Paragraph – **8. QUALITY ASSURANCE, INSPECTION AND ACCEPTANCE**:

   From: (a) Unless otherwise directed by the CO, in-process inspection, end-item inspection, and test verification shall be performed by the Contractor at the Contractor's onsite facility, to ensure compliance with the contract requirements. The Government may perform inspections or audits, as needed, at the contractor's onsite facility to verify, inspect, and ensure that supplies meet the contract requirements, including calibrations, process control monitoring, drawings and specifications.

   To: (a) Unless otherwise directed by the CO, in-process inspection, end-item inspection, and test verification shall be performed by the Contractor at the Contractor's SSC onsite facility, to ensure compliance with the contract requirements. The Government may perform inspections or audits, as needed, coordinated with, and accompanied by vendor personnel at the contractor's SSC onsite facility to verify, inspect, and ensure that supplies meet the contract requirements, including calibrations, process control monitoring, drawings and specifications.

6. Reference Q&A #4: Change Paragraph – **9. OTHER AGREEMENTS NEEDED**:

   From: The Government intends to provide land to the successful offeror for any contractor owned equipment needed to fulfill the requirement. Current cleared space readily available is approximately 160' X 170'. Up to 350' X 1,000' can be made available with additional negotiation. A license agreement shall be required prior to onsite construction (see Attachment 1c for draft agreement). NASA will provide the successful offeror with ~~access to electrical utilities~~. NASA will provide and install all hardware required for contractor connectivity to those electrical utilities. ~~The contractor shall purchase~~ all electrical power. A tenant agreement shall be required prior to onsite construction (see Attachment 1d for draft agreement). In the event there is a discrepancy or conflict between the contract and these agreements, the contract prevails.

   To: The Government intends to provide land to the successful offeror for any contractor owned equipment needed to fulfill the requirement. Current cleared space readily available is approximately 160' X 170'. Up to 350' X 1,000' can be made available with additional negotiation. A license agreement shall be required prior to onsite construction (see Attachment 1c for draft agreement). NASA will provide the successful offeror with electrical power. NASA will provide and install all hardware required for contractor connectivity to electrical utilities.

NASA will supply all electrical power; however, the contractor shall be responsible for any backup generator needs necessary to ensure constant availability and reliability as needed. A tenant agreement shall be required prior to onsite construction (see Attachment 1d for draft agreement). In the event there is a discrepancy or conflict between the contract and these agreements, the contract prevails.

7. Reference Q&A #5: Changed FAR clause – **52.216-19, ORDER LIMITATIONS (OCT 1995)**: Updated section as noted below:

   From: (a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than the specified minimum monthly quantity in the Schedule of Supplies above, ~~the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.~~

   To: (a) Minimum order. When the Government requires supplies or services provided by this contract in an amount of less than the specified minimum monthly quantity listed in the Schedule of Supplies, see the specified minimum monthly quantity in the Schedule of Supplies above; this is a guaranteed usage amount as required per the SOO and Unit Pricing section above.

8. **LIST OF ATTACHMENTS**:
   (a) Changed – Attachment 9 from Historical Electric Rates to Incorporated Changes from DRFP
   (b) Reference Q&A #15 and 39: Added – Attachment 11, Geotechnical Report (Note: A previous survey for a nearby location is being included for reference. A geotechnical survey for the specific location is being completed and will be added to the Attachments as soon as available.)
   (c) Added – Attachment 12, Industry Day Documents
   (d) Reference Q&A #22: Added – Attachment 13, Utility Drawings
   (e) Reference Q&A #18: Added – Attachment 14, MS Primary Drinking Water Regulations
   (f) Removed – Note underneath table

Attachment 1 **Statement of Objectives (SOO)**:

1. Reference Q&A # 4, 11, and 30: Changed Paragraph I – **Introduction**:

   From: SSC would thus provide adequately prepared physical space, ~~access to electrical utilities~~, makeup cooling water and interface tie in valves and piping, while the awardee would provide high-purity gaseous nitrogen in accordance with the technical specifications listed within this document.

   To: SSC would thus provide adequately prepared physical space, electrical power, makeup cooling water and interface tie in valves and piping, while the awardee would provide high-purity gaseous nitrogen and any backup generator needs in accordance with the technical specifications listed within this document.

2. Reference Q&A # 4, 11, and 30: Added Paragraph III.6 – **Overall Program Objectives**:
   (a) The contractor shall design their solution/system for efficiency and energy conservation.

3. Reference Q&A # 4, 11, and 30: Changed Paragraph IV.4 – **Contract Objectives**:
   From: A Reimbursable Space Act Agreement (RSAA) will be required for ~~electrical~~ and any other demand needed.
   To: A Reimbursable Space Act Agreement (RSAA) will be required for provision of utilities and any other demand needed.
4. Reference Q&A # 4, 11, and 30: Changed Paragraph VII.3 – **Interface Assumptions:**
   From: NASA will provide the contractor with access to electrical ~~utilities~~. NASA will provide and install all hardware required for contractor connectivity to those electrical ~~utilities~~. ~~The contractor shall purchase all~~ electrical power.
   To: NASA will purchase electrical power. ~~NASA will provide the contractor with access to electrical power.~~ NASA will provide and install all hardware required for contractor connectivity to electrical power. However, it is noted that if the contractor exceeds the energy usage in the continuation pages kWh table, NASA will require contractor justification documenting the cause of exceeded usage. NASA expects the contractor's justification for exceeded usage to discuss the contractor's adherence to, or lack of adherence, to its processes, procedures, and methods stated in its technical proposal. NASA could potentially seek reimbursement under the Contract Disputes Act, which is a part of the contract, and states the procedure for handling disputes.

Attachment 1a, **Responsibility Matrix**

1. Reference Q&A # 4, 11, and 30: Changed – **Electrical** Section:
   (a) Primary Electrical Power: Responsibility changed from Vendor to NASA
   (b) Added Diesel/propane storage tank and Diesel / propane
2. Reference Q&A #16: Added – **Discharges** Section
3. Reference Q&A # 17: Added – **Natural Gas** Section

Attachment 2, **Pricing Sheet**

1. Reference Q&A #1, 4, 5, 11, 19, 20, 26, and 30: Changed – **Instructions** Tab:
   (a) Updated Column numbers in "Directions," "Information" and "BEQ" paragraphs
   (b) Updated CLIN 0001 Information:
   From: Product purchased and paid for based on MCF. MCF is Thousand Standard Cubic Foot. The unit price is all inclusive of production (i.e. Initial plant installation, activation, system certification, ~~electrical~~, maintenance, emergency generation cost etc.). Note: Tiers 2 - 4 are not guaranteed and would only be applied as needed based on actual usage.
   To: Product purchased and paid for based on MCF. MCF is Thousand Standard Cubic Foot. The unit price is all inclusive of production (i.e. Initial plant installation, activation, system certification, ~~electrical~~, maintenance, emergency generation cost etc.). Note: Base and Tier 1 figures are derived from the SOO Mean Flow Rate and will be the typically used Sub-CLINS. Tiers 2 - 4 are not guaranteed and would only be applied as needed based on actual usage.
2. Reference Q&A #1, 5, 19, and 26: Changed – **Pricing Sheet**:

(a) Added “mcf” to the header tabs
(b) Added a “Potential Monthly Usage” column
(c) Added a “Fixed Monthly Price”
(d) Added a Base Guaranteed line
(e) Updated mcfs throughout the sheet

Attachment 5, **Provisions**

1. Added FAR 52.12-1 addenda 7.2
   (a) Added: [include your Unique Entity ID in your submission]
2. Reference Q&A # 4, 11, and 30: Changed FAR 52.212-1 addenda 8.a. – **Factor One – Technical Solution/Capability**:

   From: Root Core Requirements – Ability to meet the specified requirements in the SOO. Provide your plan on how to meet the requirements stated in Section VI. Performance Criteria section of the SOO. Include applicable items that contribute to time needed to produce “On Demand Rate” such as:

   To: **Root Core Requirements** –
   - Ability to meet the specified requirements in the SOO. Include applicable items that contribute to time needed to produce “On Demand Rate” such as:
     - System preparation time – this time will include items such as chill down and priming or whatever means are necessary in order to be able to activate system for increased flow
     - Notification time – time necessary for vendor to be notified in advance of potential high flow activity
     - Flowrate – supplemental system output flowrate
   - Address your approach, if any, for incorporating design efficiency and or energy conservation practices into your Gaseous Nitrogen Generation Solution. Include your proposed monthly kWh required for your proposed approach in the chart below to demonstrate an offeror’s technical ability to design efficiency and/or conserve energy.

Potential Monthly Usage (mcf)	**Proposed monthly kWh based on "Potential Monthly Usage"**
65,700	
28,294	
16,775	
16,775	
16,775	

3. Changed FAR 52.212-1 addenda 8.c. – **Factor Three – Price Proposal**:
   (a) Updated "H10" to "J11" to match the Pricing Sheet updates
   (b) Added: Note: In addition to TEP, the proposed kWh chart submitted within the Root Core Requirement technical proposal will be included in the Price Evaluation Factor.
4. Changed FAR 52.212-2 addenda 3.a:
   From: **Factor One – Technical Solution/Capability**: Each offeror's proposal submission shall be reviewed and compared against the required submission criteria. After documenting each Offeror's strengths, weaknesses and/or deficiencies, the evaluation team will assign one of the following adjective ratings:
   To: **Factor One – Technical Solution/Capability**: Each offeror's proposal submission shall be reviewed and compared against the required submission criteria. Also, the offeror's proposed kWh will be used to evaluate the plausibility of their proposed design efficiency along with their ability to conserve energy. After documenting each Offeror's strengths, weaknesses and/or deficiencies, the evaluation team will assign one of the following adjective ratings:
5. Changed FAR 52.212-2 addenda 3.c. – **Factor Three – Price**:
   (a) Updated "H10" to "J11" to match the Pricing Sheet updates
   (b) From: **Factor Three – Price:** Proposed prices shall be evaluated using one or more of the price analysis techniques under FAR 15.404-1(b)(2) to determine whether the offeror's proposed prices are fair and reasonable. TEP will be considered in determining the best value offeror; however, it will not be rated. The TEP for evaluation purposes will be the total value (in block H10) of Attachment 2, Pricing Sheet.
   To: **Factor Three – Price:** Proposed prices shall be evaluated using one or more of the price analysis techniques under FAR 15.404-1(b)(2) to determine whether the offeror's proposed prices are fair and reasonable. TEP and kWh will be considered in determining the best value offeror; however, it will not be rated. The TEP for evaluation purposes will be the total value (in block J11) of Attachment 2, Pricing Sheet. The proposed kWh chart submitted within the Root Core Requirement technical proposal will be evaluated using SSC's current kWh rate of $0.09/kWh. NASA will consider a combination of both the contractor's TEP and NASA's results from the calculated kWh usage when completing the price evaluation.

80SSC023R0001, SSC Gaseous Nitrogen Generation Solution (GNGS)				
Draft Solicitation Questions and Answers Log				
Question No.	Reference	Question / Comment	Response	Changes
Example	*Attachment 1, SOO, Section VI(1) Chart*	*Example Question*		
1	*Page 2, Unit Pricing*	Is NASA willing to accept a more traditional pricing structure of a monthly charge and $/mscf pricing?	Yes, we have changed the pricing sheet to include a base monthly amount which is guaranteed. Also, per Attachment 5, FAR 52.212-1(e), Alternate Proposals, an offeror can submit alternate proposals that depart from the stated requirements. Offerors are required to submit a proposal that conforms to the solicitation as well as any alternate.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
2	*Addenda to FAR 52.212-4, Section 7*	Operating plans and procedures are considered proprietary. Are maintenance and inspection records satisfactory?	No, operating plans, procedures, maintenance and inspections records are required as stated in the Terms and Conditions.Vendors should mark proprietary information in their proposals as appropriate, and in accordance with procurement integrity laws, proprietary data will not be disclosed.	No change
3	*Addenda to FAR 52.212-4, Section 8*	Given detailed design and procedures are considered proprietary, committing to a NASA lead inspection won't likely be acceptable. Is NASA willing to accept data for audit purposes?	NASA will accept data as applicable to audit needs. The Government may perform inspections or audits coordinated with and accompanied by vendor personnel. Vendors should mark proprietary information in their proposals as appropriate, and in accordance with procurement integrity laws, proprietary data will not be disclosed.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
4	*Addenda to FAR 52.212-4, Section 9*	Is NASA willing to pay for power as it would likely be more economical?	Yes, NASA is changing the requirement to state NASA will pay for electricity; however, contractor shall be responsible for any backup generator needs necessary to ensure constant availability and reliability as needed. See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
5	*52.216-19 Order Limitations, (a) Minimum order*	This will be an issue with a minimum take-or-pay requirements Agreement. Please clarify.	The language in Paragraph (a) Minimum order of FAR clause 52.216-19, Order Limitations, has been updated. See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
6	*52.216-21 Requirements, (a)*	Should a requirements change result in different equipment needed, a price adjustment will be needed.	Our requirements are listed in the SOO and pricing sheet. Any change beyond that would require a contract modification.	No change
7	*52.216-21 Requirements, (b)*	Is this tied to the delivery of the on-site generator or each individual liquid nitrogen backup delivery?	No, it's not tied to the onsite generator or individual liquid nitrogen delivery; this clause is tied to the initial requirement addressed in the SOO and CLIN 0001.	No change
8	*52.216-21 Requirements, (e)*	It's typical for the Supplier to require the right to approve or deny a third-party accessing it's equipment. For a number of reasons. The main one being safety. Is NASA willing to accept these terms?	Yes, if urgent delivery is needed to be delivered directly to the supplier's system, NASA will accept those terms, and the supplier will have the right to approve or deny access to their equipment. If the urgent delivery is needed and the supplier denies access to their equipment, direct delivery from an alternate source would be delivered downstream of the interfaces and not directly to the awarded offeror's system.	No change
9	*1852.232-77 Limitation of Funds (Fixed Price Contract), (a)*	Is this referring to the life of the contract or for the period related to the construction/installation of the generated equipment?	This clause allows for incremental funding of fixed price contracts and is for the life of the contract. There will be no funding provided for construction/installation. Allotment of funds begins upon production.	No change
10	*1852.232-77 Limitation of Funds (Fixed Price Contract), (b)*	This section is pretty unclear. Is this stating that NASA can terminate at any point and only pay the amount allotted up to the time spent?	The intent of Paragraph b of the clause is to protect the Government and the contractor in the event the Government does not have funds to cover continued performance then we are forced to terminate for convenience of the Government. The termination cost would be addressed IAW 52.212-4 paragraph l. and m.	No change
11	*1852.245-76, VII Interface, 3. Electrical*	Same as above re: power. Is NASA open to purchasing the necessary power?	Yes, NASA is changing the requirement to state NASA will pay for electricity; however, contractor shall be responsible for any backup generator needs necessary to ensure constant availability and reliability as needed. See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
12	*Attachment 1a, Responsibility Matrix*	Is NASA willing to execute the civil work needed for this installation?	No, NASA requires the contractor to perform the civil work selected in the Responsibility Matrix. Each vendor has specific requirements for size, layout, loading, grounding grid, and weight bearing for a slab.	No change

13	*Gaseous Nitrogen Generation Solution Industry Day PDF; page 14, Table 1, "Grade limits for nitrogen."*	If all other quality requirements for Grade B nitrogen per MIL-PRF-27401G are met, is up to 1.4% argon acceptable?"	No, the Argon requirement is necessary for specific testing requirements and cannot be changed.	No change
14	*Attachment 1. Statement of Objective (SOO)*	N2 On-site Supply to be designed with Back-up storage tanks and pumps and existing system will not be utilized	Correct, the supplier will the provide the gaseous nitrogen as specified in the SOO, and the existing system cannot be utilized by the awarded contractor.	No change
15	*Attachment 1a. Responsibility Matrix*	NASA will provide the Geotechnical report along with RFP for vendor to provide the concrete foundation	Yes, see Attachment 11, Geotechnical Report. A previous survey from a nearby area along with the current survey is attached.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
16	*Attachment 1a. Responsibility Matrix*	Condensate discharge solution to be defined and provided by NASA Condensate discharge (water resulting from air separation process) is considered industrial process water and disposal of that water must comply with local regulations, Condensate disposal is gravity fed to the edge of the pad for the customer to dispose of in accordance with local requirements. Typically, a simple sanitary sewer connection is adequate for this type of water. We are requesting clarification concerning NASA's role and the contractor's in providing the means for this disposal.	NASA will accept the condensate discharge created by the vendor's hardware. All interface requirements including discharge composition will be worked with successful offerer upon award of contract. The design for the solution will be developed in compliance with environmental and energy performance objectives as stated in Executive Orders as well as those found in all local, state, and Federal regulations and statutes, including any Stennis Space Center specific rules.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
17	*Attachment 1a. Responsibility Matrix*	Generator fuel - Natural gas will not be available. Diesel is the preferred fuel. Please clarify on the responsibility matrix on who will provide the diesel storage tank and associated permitting	Natural Gas main header (8") is available within 250ft proximity to the proposed GNGS location, if desired. Vendor responsible for tie-ins. The contractor would be required to pay for any usage via a Reimbursable Space Act Agreement (RSAA). A draft RSAA is included as an Attachment. Any required tank will be provided by the vendor. Permitting will be performed by NASA based on the awarded contractor's solution.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
18	*Attachment 1a. Responsibility Matrix*	Cooling / makeup water - How many GPM available? Can you provide the specification of Cooling water available?	A flow rate of up to 250 GPM of potable water is available. Additional flow can be provided upon justification. SSC follows the Mississippi Drinking Water Regulations for water specifications. The specification for any chemicals, residuals, contaminants, etc. of the provided water follows public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations. The Mississippi Primary Drinking Water Regulations will be provided as an attachment. The supply line for the cooling water is listed as an 8" line. This and all interface requirements will be worked with successful offerer upon award of contract.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
19	*Attachment 2 Pricing Sheet*	The minimum monthly volume that NASA will pay is the low volume in Tier 1 which is currently 65,644 MCF/month.	Yes, we have changed the pricing sheet to include a base monthly amount which is guaranteed.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).

20	*Attachment 2 Pricing Sheet*	Recommended Pricing Strategy for 10 years - Allow vendor to include Economic Price Adjustment (EPA) with Power and Producer Price Index published by BLS (Bureau of Labor Statistics) along with the EPA model. There will be 2 EPA - 1st for On-site gas generation based on power and Producer Price Index, 2nd on Supplemental liquid Nitrogen based on transportation, power and labor.	We have changed the pricing sheet to include a base monthly amount which is guaranteed (see question 1). We've also removed the requirement for the contractor to purchase electrical power (see question 4). NASA's objective is to minimalize the need for liquid nitrogen since we intend to modify the way we receive gaseous nitrogen in order to reduce delivery risk (see SOO section 3 paragraph 2). Also, per Attachment 5, FAR 52.212-1(e), Alternate Proposals, an offeror can submit alternate proposals that depart from the stated requirements. Offerors are required to submit a proposal that conforms to the solicitation as well as any alternate.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
21	*Attachement 1c. License Agreement (Article 16)*	Contractor to remove plant in original condition within 30 days? - Please define expectations of what needs to be removed (equipment only?). It is difficult to remove the entire plant in 30 days, Atleast 6-9 months is preferred	The attached license agreement is a draft, and the terms will be agreed to by both parties. A 6 - 9 month timeframe appears to be a reasonable suggestion.	No change
22	*Attachment 1. Statement of Objective (SOO)*	What drawings of site will be available?	Proposed area for GNGS is included in Attachment 12, page 20. Utility drawings will be provided as Attachment 13. Additional drawings may be requested. Interface drawings will be developed based on interface requirements developed with successful offerer upon award of contract.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
23	*Attachment 1. Statement of Objective (SOO)*	Is there a requirement and preference for labor, HSE Requirement?	This is considered a commodity procurement with no required wage determination. See section 8 paragraph 9 for HSE.	No change
24	*Attachment 1c and 1d*	Are the terms of the agreements rigid?	The terms of the agreements are drafts. These will be finalized and agreed to by both parties after selection. If everyone is in agreement, signing an RSAA can be done in a couple of weeks to a month; if there is disagreement, it can take longer. RSAA and license agreement shall be required prior to onsite construction.	No change
25	*Attachment 1, SOO, Supplies and/or Services to be Furnished*	Per last sentence after "Note:", would NASA consider keeping the 1)bulk liquid nitrogen and storage system for backup and the 2)nitrogen generator on separate RFQ's?	1) No, the intent of this solicitation is to replace the existing liquid nitrogen delivery process. For the purpose of this solicitation, vendors should not rely on using the existing system as a backup system. (See response to #14.) 2) No, this will be one all-inclusive contract to replace the existing process. The note was not intended to address the current High Pressure Gas Facility process; this was added to inform vendors that liquid nitrogen will be delivered directly to certain test stands as needed for testing requirements. Per Attachment 5, FAR 52.212-1(e), Alternate Proposals, an offeror can submit alternate proposals that depart from the stated requirements. Offerors are required to submit a proposal that conforms to the solicitation as well as any alternate.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
26	*Attachment 1, SOO, Unit Pricing*	Would NASA consider formula escalation once a year for the nitrogen generator? Bulk liquid nitrogen?	No, we have changed the pricing sheet to include a base monthly amount which is guaranteed (see question 1). We've also removed the requirement for the contractor to purchase electrical power (see question 4). NASA's objective is to minimalize the need for liquid nitrogen since we intend to modify the way we receive gaseous nitrogen in order to reduce delivery risk (see SOO section 3 paragraph 2). Also, per Attachment 5, FAR 52.212-1(e), Alternate Proposals, an offeror can submit alternate proposals that depart from the stated requirements. Offerors are required to submit a proposal that conforms to the solicitation as well as any alternate.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).

27	*Attachment 1, SOO, Unit Pricing*	For CLIN0002, would that include removal of foundations?	Yes, per Attachment 1c, the offeror "shall return the Premises to its original condition" which includes the foundation.	No change
28	*Attachment 1, SOO, Addenda to FAR 52.212-4, Section 6*	What specifications need to be continuously monitored in addition to H2O, O2, CO2?	The contractor should perform continuous monitoring of the following specifications: purity, water, hydrocarbons, O2, H2, Ar, CO2, CO and particulates.	No change
29	*Attachment 1, SOO, Addenda to FAR 52.212-4, Section 7*	What invoicing system is NASA using?	NASA uses the Invoice Processing Platform (IPP) for invoicing. https://www.nasa.gov/centers/nssc/accounts-payable#ap-vendor-payment/	No change
30	*Attachment 1, SOO, Addenda to FAR 52.212-4, Section 9*	Would NASA consider supplying electrical power without charging the gas supplier? The reason being that we have to pay for it from post-tax dollars, which means that it cost us at least 15-20% to do so and we would then need to overcome that cost when we put in into the molecule price. NASA would save money by paying the power company directly.	Yes, NASA is changing the requirement to state NASA will pay for electricity; however, contractor shall be responsible for any backup generator needs necessary to ensure constant availability and reliability as needed. See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
31	*Attachment 1, SOO, Section VII, No.3.*	What voltage power can be supplied?	NASA can provide up to 13.4 kV.	No change
32	*Attachment 1, SOO, Section VII, No.4.*	Is there emergency power available?	No, there is no emergency power available.	No change
33	*Attachment 1a, Responsibility Matrix, Civil Work*	From our meeting, it wasn't clear whether the concrete work is in our scope or NASA's. It stated our scope in the matrix. I believe you tried to clarify that since you have to pull permits on your site, you would do all the civil work, including the concrete. I just want to make sure we're all on the same page.	No, NASA requires the contractor to perform all work selected in the Vendor column of the Responsibility Matrix. The Vendor column in the Responsibility Matrix clearly identifies concrete as well as other civil requirements. Each vendor has specific requirements for size, layout, loading, grounding grid, and weight bearing for a slab.	No change
34	*Attachment 5, Section 7, Number 1)*	What is SF 1449 and where can we find that?	The SF 1449 is the Solicitation/Contract/Order for Commercial Products and Commercial Services, and it is the first page of the RFP.	No change
35	*Attachment 5, Section 8.b.*	We have NDAs in place for all of our customers. We cannot submit any performance data, flow rates, customer names, etc. How would we satisfy this requirement?	Past Performance is a required evaluation criteria for all Government contracts. Contractors who fail to provide this informaiton or do not have this available will be given a rating of Neutral. Per the RFP: Neutral: In the case of an offeror without a record of relevant past performance or for whom information on past performance is not available, the offeror may not be evaluated favorably or unfavorably on past performance (see FAR 15.305(a) (2) (ii) and (iv)).	No change
36	*Attachment 8, Section 6.0 Methods of QA Surveillance*	Regarding the meters that NASA will install to measure flow rate: are those considered the "billing meters"? Industry standard is that we supply meters with our installation that we use to bill. We calibrate them annually and make sure that they are temperature and pressure compensated to display accurate flow rates.	No, the Government-installed flow meters referenced in the QASP will be installed downstream of the interface to ensure contractor flow and pressure requirements are met as well as for Government project/program usage. Flowmeter, pressure and temp sensors will be calibrated as per manufacturer specifications. Per Continuation Pages section 7, Deliverables, the contractor shall submit monthly flow reports using their installed meters which show the total monthly usage from the first day of the month to the last day of the month.	No change
37	*Attachment 8, Section 7.0 Frequency of Measurement*	What type of sampling is referred to in this section? Sample bombs sent to a lab for analysis? Would this be on the gas supplier's expense? These would not be necessary when continuous monitoring of the requested impurities in the nitrogen is in place.	Various sampling will be performed as per MIL-PRF-27401G paragraph 4 for both frequency and type. Samples are processed by SSC's onsite laboratory at NASA's expense. NASA uses this surveillance method to ensure product specifications.	No change

38	*No reference found*	Who is responsible for the property taxes on the installation?	Historically, SSC is not aware of any contractor being assessed property taxes under this type of situation. There are other types of state taxes that may be applicable to the contractor's activities, as the state of Mississippi does not exempt Federal Contractors from some taxes (for example Construction/Contractor's Tax and Sales/Use Tax, etc.). It is the Offerors sole responsibility to validate these requirements and satisfy themselves as to the applicability of any and all Mississippi state, local, or other taxes for which they would be responsible. This will result in an indefinite delivery requirements contract with a firm, fixed price delivery order. The contractor is responsible for including any and all elements in their price, as per FAR 52.212-4(k).	No change
39	*No reference found*	Will a geotechnical survey for the proposed site be provided showing soil load bearing capacities and any contamination?	Yes, see Attachment 11, Geotechnical Report. A previous survey from a nearby area along with the current survey is attached.	See Attachment 9, Incorporated Changes from the draft Request for Proposal (DRFP).
40	*No reference found*	Will permits be required for cooling tower blowdown?	Yes, permits are required and will be completed by NASA based on the awarded contractor's solution.	No change

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

SSC Nitrogen Generation Facility

Stennis Space Center

Preliminary Report of Subsurface Investigation and Geotechnical Engineering Evaluation

Prepared for:
SYNCOM SPACE SERVICES LLC
SESI Project No: M23-399
August 8, 2023

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August 8, 2023

SYNCOM SPACE SERVICES LLC
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NASA John C. Stennis Space Center, MS

ATTENTION: Mr. Allen Blow, QCxP
CM/PMO Manager

REFERENCE: Preliminary Report of Subsurface Investigation and
Geotechnical Engineering Evaluation
SSC Nitrogen Generation Facility
Stennis Space Center, MS
SESI Project No: M23-399

Dear Mr. Blow:

Southern Earth Sciences, Inc (SESI) has completed the subsurface investigation and preliminary geotechnical engineering evaluations for the referenced project. This report presents our understanding of the available project information, presents the information collected in our subsurface investigation, and provides our preliminary geotechnical engineering recommendations for design of the proposed facility.

We appreciate this opportunity to be of service and look forward to our continued involvement throughout Final Design and Construction Phases of this project. Please do not hesitate to contact us if you have any questions.

Sincerely,

SOUTHERN EARTH SCIENCES, INC.

Caleb Davis

Caleb Davis, E.I.
Project Manager

Matt Coaker, P.E.
Vice President
Registered, Mississippi 20350

CD/mc/er

Attachments

SYNCOM SPACE SERVICES, LLC

Preliminary Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC Nitrogen Generation Facility
Stennis Space Center, MS
SESI Project Number: M23-399
August 8, 2023

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APPENDIX 1

Test Location Plan

APPENDIX 2

CPT Sounding Logs and Soil Boring Logs

APPENDIX 3

L-Pile Analysis Results

SYNCOM SPACE SERVICES, LLC
Preliminary Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC Nitrogen Generation Facility
Stennis Space Center, MS
SESI Project Number: M23-399
August 8, 2023

1.0 PROJECT DESCRIPTION

Based on our understanding of the provided information, the project will consist of the construction of a new Nitrogen Generation Facility at Stennis Space Center. No site plan, structural loading, grading or topographic information was available at this time as final design of the facility will be conducted as part of a design-build package. We understand that the facility will include several storage tanks and towers supported by deep Augercast piling. Shallow footings and mat foundations may be considered for smaller lightly loaded infrastructure, pipe supports and miscellaneous equipment pads. Final site grades have been assumed to be within approximately 1 foot of existing site grade. No additional project information was available at the writing of this report. SES should be consulted to review project plans and details once they become available.

2.0 FIELD INVESTIGATION

A total of four (4) Cone Penetrometer Test (CPT) soundings and three (3) manual auger borings were performed within the proposed project area. CPT soundings and manual auger borings were performed by SES field crews at the approximate locations shown on the Test Location Plan included in **Appendix 1**. Test locations were located in the field by SES staff using handheld GPS accurate to within about 25 feet.

CPT_u soundings were performed in general accordance with ASTM Specification D-5778 using a truck mounted 20-ton Hogentogler Electronic CPT rig. CPT soundings were advanced to refusal at depths ranging from approximately 85 to 90 feet below the existing ground surface. Soil classifications were interpreted from methods recommended by Robertson and Campanella. Correlations between Cone Resistance values and Standard Penetration Testing "N" values were performed according to the methods developed by Robertson, Campanella and Wightman. The soil types and stratigraphy shown on the CPT Log sheets are based upon material parameters measured and evaluated as the cone is advanced. CPT Log sheets graphically showing the cone tip resistance, friction, equivalent N60-value and interpreted soil behavior type at each sounding location are attached in **Appendix 2**.

Manual auger borings were advanced to depths ranging from approximately 2 to 4 feet below existing site grades. Representative portions of soil samples obtained during the investigation were transported to our laboratory where they were examined by an engineer and visually classified in accordance with the USCS Soil Classification System. Soil Descriptions, boring depths and soil classifications are shown on the appropriate Manual Auger Boring Logs attached in **Appendix 2.**

3.0 GENERALIZED SUBSURFACE CONDITIONS

The subsurface descriptions below are generalized to highlight the major subsurface stratigraphy encountered across the site. The Soil Boring Logs and CPT Sounding Logs attached in **Appendix 2** present specific information at individual boring location including soil description, stratification, ground water level, and soil strength. This information is representative of conditions encountered at the test locations. Variations may occur and should be expected between test locations. The stratification represents the approximate boundary between subsurface materials as the actual transition may be gradual.

Soils encountered within the upper couple of feet of the site consist of loose to medium dense fine, silty and clayey sands underlain by loose clayey sand and soft to medium stiff silts and clays to a depth of 5 to 7 feet and dense sand and silty sand to a depth of approximately 12 to 15 feet. Below this level, soft to medium stiff silts and clays were encountered to a depth of approximately 35 feet underlain by very dense sand to approximately 55 feet. A thin intermediate stratum of medium stiff clay was encountered at approximately 45 to 47 feet at test locations CPT-1 and CPT-4. Medium stiff silt and clay was encountered below 55 feet to depths of approximately 83 feet. Very dense sand was encountered below this level to termination of each sounding due to refusal.

3.1 Groundwater

Groundwater was not encountered within the upper 2.5 to 4 feet of the manual auger borings. Direct groundwater level measurement was not possible at the CPT sounding locations due to hole collapse at depths ranging from 2 to 5 feet below the existing ground surface. Free water was not observed at the cave-in depth. A hole collapse often occurs at or slightly above the groundwater or saturated soil level but can also occur due to the presence of loose soils without the presence of groundwater. The shallow collapsed depths at CPT locations are likely the result of shallow saturated soil conditions or perched groundwater caused by the low permeability silty and clayey soils present within the upper few feet this site. Our experience at this site indicates that perched groundwater/saturated soil levels will fluctuate with weather conditions at the time of construction.

Estimation of hydrostatic levels using measured pore pressure data collected at the CPT sounding locations indicates that a hydrostatic level exists between depths of approximately 5 and 10 feet below ground surface. This estimation generally agrees with static groundwater levels encountered on previous nearby projects within SSC.

Groundwater depths should be verified at the time of construction for cases where groundwater variations are potentially significant for construction. The fine silty and clayey upper soils will create shallow perched water conditions after rainfall. Fluctuation in the groundwater table will occur due to variances in rainfall, elevation, drainage, types of soil encountered and other factors not evident at the time measurements were made. Reference to depth has been made with respect to the existing ground surface encountered at the time of our field investigation. Groundwater levels encountered at each test location at the time of our investigation are shown on the appropriate CPT sounding or Soil Boring Logs attached in **Appendix 2.**

4.0 FOUNDATION DISCUSSION

Our evaluation of subsurface conditions and foundation alternatives for this project has been based on the project information previously described in this report and subsurface data obtained during the investigation. In evaluating the CPT sounding data, we have used empirical correlations previously established between standard penetration resistances, cone tip and side resistance values, soil index properties and foundation stability. Soil parameters used in the evaluation were derived from the CPT sounding data using the interpretation software RAPID CPT® by Dataforensics.

Based on our limited understanding of the proposed facility, we assume that heavily loaded project components (i.e., tanks, cooling towers, etc.) will be pile supported. Pile foundations will provide positive foundation support by transferring structural loads through the soft in-situ soils to the dense sand strata encountered between depths ranging from 35 to 55 feet and beginning at depths of approximately 83 feet below existing grade. Pile foundation recommendations are outlined in the following section of this report.

The feasibility of utilizing grade supported floor slabs and small, shallow footings and mat foundations to support various lightly loaded components of this project will depend on final foundation configurations, foundation loadings, finished site grades and settlement tolerances. Detailed loading information for this project had not been developed at this time; therefore, our generalized assessment of shallow foundations should be considered preliminary until loading and grading information has been developed and structure specific evaluations of shallow foundations can be performed.

Although soils encountered within approximately the upper 2 feet of the site are reasonably competent, the softer clay soils encountered below this level to depths of approximately 5 feet will not provide uniform foundation support or a stable construction surface during construction of conventional shallow foundation. Subgrade improvement recommendations are outlined in the following sections.

The reasonably stiff silty clays and medium dense sands present between depths of approximately 5 feet and 12 to 15 feet, after limited undercutting and replacement of the upper softer soils, will be capable of supporting relatively small, lightly loaded foundations assuming that design site elevation surrounding grade supported elements will be within approximately 1 foot of the existing site elevation. Foundation loadings from relatively small shallow footings (10 ft in width or less) bearing within approximately 1.5 feet of the existing ground surface grade will dissipate with depth and effectively be supported by the reasonably competent soils within the upper 12 to 15 feet of the site without inducing significant stress increase on the deeper soft silts and clays that exist below depths of approximately 12 feet (discussed below). General recommendations for small, lightly loaded shallow foundations and floor slabs constructed within approximately 1 foot of existing site grade are outlined in the following sections of this report.

Soft compressible silts and clays exist below the upper medium stiff clayey soils and medium dense sandy soils beginning at depths of approximately 12 to 15 feet. These soils are susceptible to settlement if subjected to stresses induced by large shallow foundations (greater than approximately 8 - 10 feet in width), mat foundations, area floor loads more than approximately 125 psf, or area fill in excess of approximately 1 foot above the existing ground surface. Settlements at this site would include short term settlement that occurs during site grading and construction, as well as long-term consolidation settlement that continues for some number of months or years following completion of construction. Pile foundations will be required for support of heavy structural loadings, settlement sensitive infrastructure and in areas where final design grades will be raised above the existing ground surface by more than approximately 1 foot. Pile foundation recommendations are provided in the following sections of this report.

5.0 PILE SUPPORTED FOUNDATIONS

We have evaluated the allowable compression pile capacities for various sizes of Auger-Cast In-Place (ACIP) Piles. To assist in project planning and design, the following table presents our recommended pile penetration depths and corresponding allowable compression and tension capacities from static analysis. Pile penetration depths discussed below are referenced to the existing ground surface encountered at time of our field investigation.

TABLE 1

ALLOWABLE PILE CAPACITIES - AUGER-CAST PILING (ACP)

Recommended Pile Penetration Below Existing Ground Surface Range* (ft)	Pile Size (inches)	Allowable Compression Capacity (FOS = 2.0) (tons)	Allowable Tension Capacity (FOS = 2.5) (tons)
40**	14	25	11
	16	30	13
	18	35	15
	20	40	17
84	14	75	30
	16	90	35
	18	115	45
	20	130	50

Penetration depths referenced from existing ground surface at the time of investigation. Pile Lengths should be verified and possibly adjusted if pile cut off elevations will be more than approximately 5 feet below existing grade.

****40 ft pile penetration depth option only permissible for small pile groups (5 piles or less)***

Provided pile capacities are Allowable Capacities with an applied Factor of Safety (FOS) of 2.0 for compression and 2.5 in tension. Pile capacities have been computed using methods as presented in Das (2004) with capacity expected to develop as a result of side resistance in the upper layered clays and silts and primarily from a combination of end bearing and side resistance in the deeper medium dense to dense sands encountered between approximately 35 and 55 feet and below depths of approximately 80 feet. Pile lengths, sizes and capacities presented are based on soil-pile interaction and do not consider the structural aspects of the pile.

5.1 Down-Drag Considerations

We understand that design site grades have not been established and the amount of fill that will be placed above existing grade is not known yet. The pile capacities provided in the previous tables do not account for the effects of down-drag and are applicable for areas of the site where final design grades will be no more than approximately 1 foot above existing site elevation. If design grades will be more than approximately 1 foot above the existing ground surface, a reduction in axial compressive pile capacity will be necessary to account for negative side friction forces (down-drag) that will be induced on the piles as soft and loose materials settle and consolidate under the weight of the fill.

To manage pile settlement potential resulting from down-drag in areas where design grade will be in excess of 1 foot above existing grade, we anticipate that an approximate 20 to 40 percent reduction of compression pile capacity will be required in comparison to the estimated pile capacities provided in the previous tables. Raising design grade in excess of approximately 1 foot above existing grade and consequent down-drag pile capacity reduction may require larger or increased numbers of piles than would otherwise be needed for areas with no fill placement.

5.2 Individual Pile Settlement and Pile Group Design Considerations

We recommend installing piles at a minimum center to center spacing of 3 pile diameters. A reduction in capacity due to group effects for properly spaced piles at the recommended pile penetration depths will not be required.

Detailed structural loading information was not available at this time. Estimated settlement of individual piles properly installed to the recommended depth are expected to be less than 0.5 inch at service load. Piles installed in groups at the recommended minimum center-to-center spacing of 3 pile diameters at the recommended pile penetration depths are not expected to undergo additional settlement at service load due to group effects. We will be available to evaluate pile cap arrangements and loading information specific to this project as the design progresses.

5.3 Pile Response to Lateral Loading

Pile response to assumed shear forces applied to the pile top were evaluated using LPILE® version 13 software. LPILE software employs p-y analysis to determine deflections at the pile top under specific loading conditions. Parameters used in the analysis have been correlated from empirical data using standard penetration resistance "N" values (correlated with accepted geotechnical references), measured CPT tip and side resistances and our knowledge of and experience with similar soil conditions.

Although detailed foundation and lateral loading information has not yet been developed, we have evaluated 14, 16, 18 and 20-inch diameter Auger-Cast piles under various loading scenarios. Shear forces applied to the pile top were varied based on pile response to produce deflections of up to about 0.5 inch. The P-Y curves were factored for group effects for piles in groups using a p-multiplier of 0.8 for the front row piles and a multiplier of 0.4 for the second-row piles.

Piles were modeled using fixed head conditions with lateral loads applied at the pile top. ULTIMATE Lateral Deflection, Moment and Shear vs. Depth plots are attached in Appendix 3. Piles were modeled with no axial load or bending moment applied to the top of the pile. It should be noted however, that axial uplift loads generally reduce the lateral capacity from that indicated by this analysis, while axial compressive loads increase the lateral capacity.

An appropriate Factor of Safety should be applied by the designer depending on the sensitivity of the design to deflection or moment capacity. Evaluation of the structural capacity of the piles to withstand shear forces and bending moments generated by lateral loading is beyond the scope of this investigation and should be determined by the structural design engineer of record.

Assumed pile reinforcement configurations, concrete strength, and lateral loads resulting in approximately 0.1, 0.25 and 0.5-inch deflection for piles in first row and second row configurations are provided in the following table. Deflection, moment, and shear curves along the length of the pile corresponding to the load scenarios listed below are attached in **Appendix 3.**

TABLE 2

AUGER-CAST CONCRETE PILE LATERAL LOAD CASE SUMMARY

Pile Type and Size	Assumed Reinforcement Configuration	L-Pile® Loading Case Designation	Applied Shear Force	
			Row 1	Row 2
14-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 4 - #6 rebar	Loading Case 1	11 Kips	7.5 Kips
		Loading Case 2	8 Kips	6 Kips
		Loading Case 3	5 Kips	4 Kips
16-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 5 - #6 rebar	Loading Case 1	14.5 Kips	9.75 Kips
		Loading Case 2	11.5 Kips	8 Kips
		Loading Case 3	7.5 Kips	5 Kips
18-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 6 - #6 rebar	Loading Case 1	18 Kips	12.5 Kips
		Loading Case 2	14 Kips	10 Kips
		Loading Case 3	10 Kips	6 Kips
20-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 7 - #6 rebar	Loading Case 1	22 Kips	15.5 Kips
		Loading Case 2	17 Kips	12 Kips
		Loading Case 3	11 Kips	8 Kips

5.4 Auger-Cast Pile Installation Considerations

The equipment, experience and installation technique on the part of the contractor are crucial to successful Auger-cast pile performance. Careful monitoring and recording of the pile installation should be performed by an experienced technician to help identify possible installation problems. Piles should not be installed within 3 pile diameters of newly placed piling until the grout has cured for at least 24 hours or within 6 pile diameters until the grout has cured for at least 12 hours.

5.5 Pile Load Test Recommendations

We suggest planning to install one (1) test pile for Static Compression Load Testing within each structure area for each pile size/loading configuration. The static compressive load test should be conducted as described in ASTM Specification D1143 to at least 3 times the design load or to failure.

If design tension loads exceed 60 percent of the recommended allowable tension capacity, plans should be made to install an additional tension test pile for Static Tension Load testing at each planned compression test pile location. Tension testing of a tested compression pile is not

recommended. Static tension load testing should be conducted as described in ASTM Specification D3689 to at least 2 times the design load. Piling reinforcement for the tension test pile should be cast to allow for connection to a full-length center bar during testing. Since the purpose of the tension load test is to assess the geotechnical capacity of the soil-pile interaction (not the structural capacity of the pile), the tension test pile reinforcement should be over-designed to minimize elongation of the pile during the test. Elongation of the test pile and center bar during tension testing often causes structural failure of the pile grout near the bottom of the reinforcement cage, resulting in excessive deflection during the test that is not representative of the geotechnical performance of the pile in tension. **The test pile reinforcement, connection systems and reaction frame should be designed for the loadings specific to this project by a licensed professional structural engineer.**

Alternately, in lieu of a separate static tension load test, tension capacity could be assessed by instrumenting the compression test pile with vibrating wire strain gauges that would be used to measure and record the capacity distribution along the length of the pile. The strain gauge data would be supplemented by monitoring deflection of at least two reaction piles during the compression load test. SES will be available to discuss with the design team as the design progresses.

If pile response to lateral loading is a controlling aspect of the foundation design and lateral load testing is determined to be necessary by the project Structural Engineer, static lateral load testing may be performed on either the compression or the tension pile to at least twice the design load in accordance with ASTM D3966.

The test pile(s) should be located within the building/structure footprint to obtain representative data, but should be positioned within the structure such that it is not incorporated into the foundation system and does not interfere with construction of foundations, utilities, infrastructure, etc. Upon completion of the test pile program, the test piles should be cut off at a level such that it will not affect future construction.

All test sections, equipment and installation procedures should be the same as those to be used during production pile installation. Pile load test results would be used to verify the placement procedures and that the pile section produces the desired design capacity. Since adjustments of the pile lengths or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the direct supervision of the SES project geotechnical engineer of record. SES should be consulted to collaborate with the design team to establish detailed Pile Load Test Program recommendations once site, civil, and structural plans have been developed.

5.6 Thermal Integrity Profiling (TIP)

We recommend that installation of Auger-Cast test piles be monitored using Thermal Integrity Profiling (TIP) technology in general accordance with ASTM D7949 - *Standard Test Methods for Thermal Integrity Profiling of Concrete Deep Foundations*. The TIP system, manufactured by Pile Dynamics, Inc. (PDI) in association with Foundation and Geotechnical Engineering, LLC (FGE), uses instrumented Thermal Wire® cables and Thermal Acquisition Ports (TAPs) to measure concrete temperatures during curing. The Thermal Wire® cables have temperature sensors spaced every 12-inches along the ordered cable length and are cast into the concrete along the pile/shaft length. The battery powered Thermal Acquisition Ports automatically measure temperature at each sensor at specified time intervals (typically every 15 minutes) allowing the concrete curing process to be monitored. During the curing process, heat generated during cement hydration is recorded and used to create a profile of temperature versus depth. Analysis of the temperature measurements can then be used to evaluate concrete quality and cover at each cross section along the pile/shaft length. After the peak temperature is achieved (approximately 10 hours after placement of the concrete), the TAP box(es) are disconnected from the Thermal Wires® and connected to the TIP Processing Unit. Data is downloaded and saved to the unit's hard drive for further review, data adjustment, analysis and output. Graphical results of the collected thermal data are presented as an estimate of the vertical pile profile relative to the theoretical pile diameter. The profile will indicate changes in pile diameter or material quality within the grout column.

6.0 SHALLOW FOUNDATIONS AND GRADE SUPPORTED SLABS

The ability to utilize grade supported floor slabs and small, lightly loaded shallow footings for various components of this project will depend on final foundation configurations, foundation loads, design grades and settlement tolerances. Detailed loading information for this project had not been developed at this time. Presented in the following sections are generalized design considerations and settlement estimates for a range of foundation sizes, loads and fill heights. We recommend performing location and structure specific evaluations of shallow foundations once loading and grading information has been developed.

Proper subgrade preparation and careful foundation design will allow grade support of lightly loaded shallow footings and slabs, independent of pile supported foundations. Deep undercutting and replacement of soft soils within approximately the upper 5 feet of all areas being considered for shallow foundation and floor slab construction would be a conservative approach for reducing settlement and to minimize the potential for delays in site grading operations due to unstable soil conditions.

As a cost saving measure, it is our opinion that instead of completely excavating and replacing all soft soils within the upper 5 feet of shallow foundation areas, excavations beneath floor slab areas designed for less than 125 psf loadings and small shallow footings (5 ft square or smaller) designed bearing pressures of 500 psf or less may be limited to depths necessary to remove all topsoil, organics, and unstable soils, to allow the contractor to establish a stabilized construction platform, and to ensure placement of at least 2 feet of Imported Select Granular Fill below slab or footing subgrade elevation. Detailed subgrade preparation recommendations are outlined in the following sections.

6.1 Settlement Estimates

Foundation loadings, particularly large footing or mat foundation loadings, and placement of fill during site grading to achieve design site grade will result in significant settlement at this site. These settlements will include (1) immediate settlements due to compression of soft soils with interbedded sandy and organic lenses and undrained distortion of the soft clays and (2) primary consolidation of the soft clays and fine-grained organic soils that will occur over a period of several years. Immediate settlements will occur concurrently with the fill placement during construction or upon application of initial load (i.e., filling tanks and commissioning cooling towers, etc.) and a portion of the primary consolidation settlements will occur during construction, but most of the predicted settlement is expected to occur over a period of several years after construction.

For preliminary planning purposes, we have evaluated settlement of various foundation sizes under several different bearing pressure scenarios. A summary of foundation settlement estimates is provided in **Tables 3 and 4**. These settlement estimates are applicable to areas of the project where final design grade will be no more than approximately 1 foot above the original site grade. Settlements were estimated using constrained modulus values derived from the CPT tip stress data using several empirical correlations that we have found to be reliable in our experience with coastal plain soils along the Gulf Coast, and specifically at this site. These settlements are based on assumed soil bearing pressures, used only for illustrating settlement ranges. Bearing capacity evaluation should be performed once final grades and foundation loads are known.

TABLE 3

SHALLOW / MAT FOUNDATION SETTLEMENT ESTIMATES – AFTER LIMITED UNDERCUTTING

Foundation Dimension (ft)	Assumed Bearing Depth (ft)	Estimated Foundation Settlement[1,3,4] (inches)		
		Applied Bearing Pressure[2]		
		500 psf	1500 psf	2500 psf
2 x 2	1.5	< 0.5	---	---
4 x 4	1.5	0.5	---	---
5 x 5	1.5	1.0	---	---

Note 1 – Settlement estimates are preliminary and are to be verified based on actual structure locations, loading and final grading.

Note 2 – Applied soil bearing pressures assume that site and subgrade preparation is conducted in accordance with recommendations presented in the following sections of this report (i.e. minimum of 2 feet of imported Select Structural Fill below foundation bearing elevation). The range of soil bearing pressures in table are considered for settlement illustration purposes only. Bearing capacity checks must be performed once final grades, foundation sizes and foundation loads have been established. " --- " in the Table above indicates that allowable Soil Bearing Capacity of soft soils present between depths of approximately 2 – 5 feet would be exceeded for those particular foundation sizes and assumed bearing pressures

Note 3 – Settlements in Table 3 do not account for fill induced settlement that is predicted to range from approximately 0.5 to 0.75 inches of settlement per 1 foot of fill placed above existing grade that should be added to the settlements presented in the Table above. See Table 5

Note 4 – Settlements shown in Table 3 are for the center of a flexible, uniformly loaded area. For large, flexible foundations, settlements at the corners and the edges of the loaded area are approximately 25% and 50%, respectively, of the center settlements assuming uniform loading and soil conditions. Actual center-to-edge and center-to-corner settlements will vary depending on foundation stiffness and should be evaluated once final grades, foundation sizes and foundation loads have been established.

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TABLE 4

SHALLOW / MAT FOUNDATION SETTLEMENT ESTIMATES – AFTER 5 FT UNDERCUT

Foundation Dimension (ft)	Assumed Bearing Depth (ft)	Estimated Foundation Settlement[1,3,4] (inches)		
		Applied Bearing Pressure[2]		
		500 psf	1500 psf	2500 psf
2 x 2	1.5	< 0.5	0.5	0.75
4 x 4	1.5	< 0.5	1.0	< 1.5
5 x 5	1.5	< 0.5	1.0 – 1.25	1.5
8 x 8	1.5	0.5 - 0.75	---	---
10 x 10	1.5	0.75 - 1.0	---	---

Note 1 – Settlement estimates are preliminary and are to be verified based on actual structure locations, loading and final grading.

Note 2 – Applied soil bearing pressures assume that site and subgrade preparation is conducted in accordance with recommendations presented in the following sections of this report (i.e. minimum of 5 feet of undercutting below existing site grade and backfilling with imported Select Structural Fill). The range of soil bearing pressures in table are considered for settlement illustration purposes only. Bearing capacity checks must be performed once final grades, foundation sizes and foundation loads have been established. " --- " in the Table above indicates that settlement of soft soils present between depths of approximately 12 – 35 feet would be excessive for those particular foundation sizes and assumed bearing pressures

Note 3 – Settlements in Table 4 do not account for fill induced settlement that is predicted to range from approximately 0.5 to 0.75 inches of settlement per 1 foot of fill placed above existing grade that should be added to the settlements presented in the Table above. See Table 5

Note 4 – Settlements shown in Table 4 are for the center of a flexible, uniformly loaded area. For large, flexible foundations, settlements at the corners and the edges of the loaded area are approximately 25% and 50%, respectively, of the center settlements assuming uniform loading and soil conditions. Actual center-to-edge and center-to-corner settlements will vary depending on foundation stiffness and should be evaluated once final grades, foundation sizes and foundation loads have been established.

Presented in **Table 5** are settlement estimates for a range of fill heights. Foundation settlement estimates presented in Table 3 neglect fill settlement that will occur in areas of mass fill placement to achieve final design grade. Fill settlement will be cumulative to foundation settlement. In areas where final design elevation will be more than 1 foot above existing site grade, fill induced settlements presented in Table 5 should be added to the foundation settlements presented in Tables 3 and 4.

TABLE 5

FILL INDUCED SETTLEMENT ESTIMATES

Fill Height (feet)	Fill Induced Settlement[1] (inches)
1	0.5 to 0.75
2	0.75 to 1.5
4	2 to 3

Note 1 – Estimated fill induced settlements shown are for fill placed above existing grades over an area of wide lateral extent. Assumed unit weight of fill of 120 pcf.

6.2 Allowable Bearing Pressure

After undercutting and backfilling to a minimum depth of 2 feet below foundation bearing elevation as outlined in the following sections and as referenced in the notes for **Table 3** to bridge over and provide separation between the soft to medium stiff soils encountered between approximately 2 and 5 feet, shallow footings designed for support of pipe racks and other miscellaneous lightly loaded structures may be designed for an allowable soil bearing capacity of up to 500 psf (with a Factor of Safety = 3.0).

Alternately, after undercutting and backfilling to a depth of approximately 5 feet below existing ground surface as outlined in the following sections and as referenced in the notes for **Table 4** to remove all soft, loose organic or otherwise unsuitable soils, shallow footings designed for support of pipe racks and other miscellaneous lightly loaded structures may be designed for an allowable soil bearing capacity in the range of 1,500 to 2,500 psf (with a Factor of Safety = 3.0).

Shallow footings should bear at approximately 18 inches below surrounding grade. Minimum footing widths of 24 inches for continuous (strip) and isolated (column) footings should be observed. The bottom of foundation excavations must be dry, clean and free of loose, soft materials and construction debris prior to placement of steel or concrete. Excavations should be observed by the Geotechnical Engineer of record or their representative prior to steel or concrete placement. Concrete shall be poured as quickly as possible to avoid exposure of the footing materials to moisture changes (wetting or drying). Surface run-off water should be channeled away from the excavation and not be allowed to pond. If for any reason the excavation is required to be open for more than one (1) day, it shall be protected to minimize moisture loss/gain. The bottom of all footing excavations should be stable, free of water and debris and should be compacted to at least 95 percent of the soil's Modified Proctor maximum dry density as determined by ASTM D 1557.

6.3 Lightly Loaded Floor Slabs

Building floor slabs constructed within about 1 foot of existing grade and subjected to relatively light sustained area loading (less than about 125 psf) will generally be able to be supported on grade, assuming that subgrade soils have been properly prepared, and all soft, loose organic or otherwise unsuitable soils are excavated and replaced. To help ensure uniform floor slab support, we recommend that floor slab be constructed over at least two (2) feet of imported, compacted Select Structural Fill. Subgrade preparation recommendations for floor slab areas are outlined in the following sections.

Fill induced settlement as previously described should be accounted for in floor slab design where fill will be placed in excess of about 1 foot above existing grade and also if floor loads are expected to exceed 125 psf. Differential settlement potential resulting from site elevation variation and fill height differential is applicable to floor slabs as well and should be considered during preliminary project planning.

For slab design purposes, a modulus of subgrade reaction (*k*) 150 pci may be used. This value is provided assuming that floor slabs will bear on imported compacted clean sand or Select Structural Fill soils with a California Bearing Ratio (CBR) of at least 10.

6.4 Sub-Grade Preparation for Grade Supported Foundations and Slab Areas

Effective drainage, including ditching and positive grading, should be established during the initial stages of development and modified as necessary during construction. Once adequate site drainage is in place, the initial step in site preparation should be the complete removal of all abandoned

utilities, foundations, pavements and construction debris in previously developed areas. All topsoil, debris, organics and soft, loose or yielding soils exposed during the excavations should be completely removed from currently grassed, unimproved areas of the site. Excavations should extend laterally to at least five (5) feet beyond the perimeter of the building foundations. Excavated topsoil and organic containing material will not be suitable for structural re-use but may be stockpiled for use in non-structural and landscape areas.

Soils encountered within the upper reaches of the site consist of fine silty and clayey soils that will drain poorly, will be extremely moisture sensitive, will be difficult to move and re-compact, and are generally not ideal for direct support of shallow footings and floor slabs.

- To help provide a manageable construction surface and to help ensure uniform support of lightly loaded foundations (bearing capacity of up to 500 psf as outlined in **Table 3**) and floor slabs, we recommend placement of a minimum of two (2) feet of imported, compacted Select Structural Fill beneath foundations and floor slab subgrade elevation to bridge and provide separation between the upper fine, silty soils.

- To help reduce settlement and to provide uniform foundation support for more heavily loaded footings (1,500 to 2,500 psf as outlined in **Table 4**), we recommend undercutting to approximately 5 feet below the original ground surface and backfilling with compacted.

After site stripping and excavations (as outlined above for the respective foundation loading scenario), exposed surfaces should be leveled and compacted as much as conditions at the time of construction will allow. Care should be taken to ensure that any excessively soft or yielding soils are undercut to firmer materials and backfilled with well compacted fill. We recommend the excavation and backfilling operation should be observed by an experienced soils technician under the direct supervision of the Geotechnical Engineer of Record.

Operating heavy equipment, particularly rubber-tired equipment, on exposed sub-grade soils should be limited to proof rolling as vibrations combined with wheel and track shearing forces in the presence of excess moisture will have a softening effect on in-situ materials. If adequate precautions are not taken by the contractor to limit construction disturbance and to protect exposed natural soils from rainfall, additional undercutting, and replacement of the in-situ materials with Select Structural fill will be required.

If perched water or saturated soil conditions are encountered at the time of construction, the initial lifts of fill soil should consist of imported clean sand backfill material with less than 10 percent passing the No. 200 sieve and less than 80 percent passing the No. 40 sieve. This material should be placed to a distance of 18-inches above the saturated soil level or to within six (6) inches of final subgrade elevation, whichever is lower. This material should be placed in one (1) foot maximum lifts and tracked with a heavy dozer or excavator between lifts. The top 12 inches should be compacted to 95 percent of ASTM D1557 Modified Proctor Density. If conditions are dry at the time of construction and if compaction of imported granular fill can be achieved in the excavation bottoms, clean sand placement will not be necessary.

Select Structural Fill placed to subgrade elevation should consist of a granular fill with less than 30 percent passing the No. 200 sieve, less than 80 percent passing the No. 40 sieve and a liquid limit less than 25. This material should be compacted in lifts no thicker than one (1) foot to 95 percent of the Modified Proctor Density (ASTM D-1557).

7.0 GENERAL COMMENTS AND LIMITATIONS

While the CPT soundings and borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated test locations and on the date explored.

This report has been prepared to aid in the evaluation of this project and to assist the engineers in the project planning and structural design. At the time of writing, changes were still being considered to foundations, site grading, and other aspects of the project that could have a significant impact on the applicability or relevance of the recommendations provided in this report. SESI should be consulted as the design process continues to ensure that the recommendations provided in this report are still applicable, and that they are being properly interpreted. Additional field exploration may be warranted/required as plans develop.

This report is intended for use with regard to the specific project discussed herein as we understand it at this time, and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering work and judgments rendered meet the standard of care of our profession.

The Geotechnical Engineer of Record should be retained by the Owner in the construction phase of the project so they can observe subsurface conditions revealed during construction, confirm that design assumptions are still applicable or provide revised recommendations based on conditions encountered during construction, and to help ensure that our recommendations are properly interpreted. We recommend that Southern Earth Sciences, Inc. be retained to perform observation and field-testing services during the site preparation and foundation construction.

This report is exclusively for the use and benefit of the addressee(s) identified on the first page of this report and is not for the use or benefit of, nor may it be relied upon by any other person or entity. The contents of this report may not be quoted in whole or in part or distributed to any person or entity other than the addressee(s) hereof without, in each case, advanced written consent.

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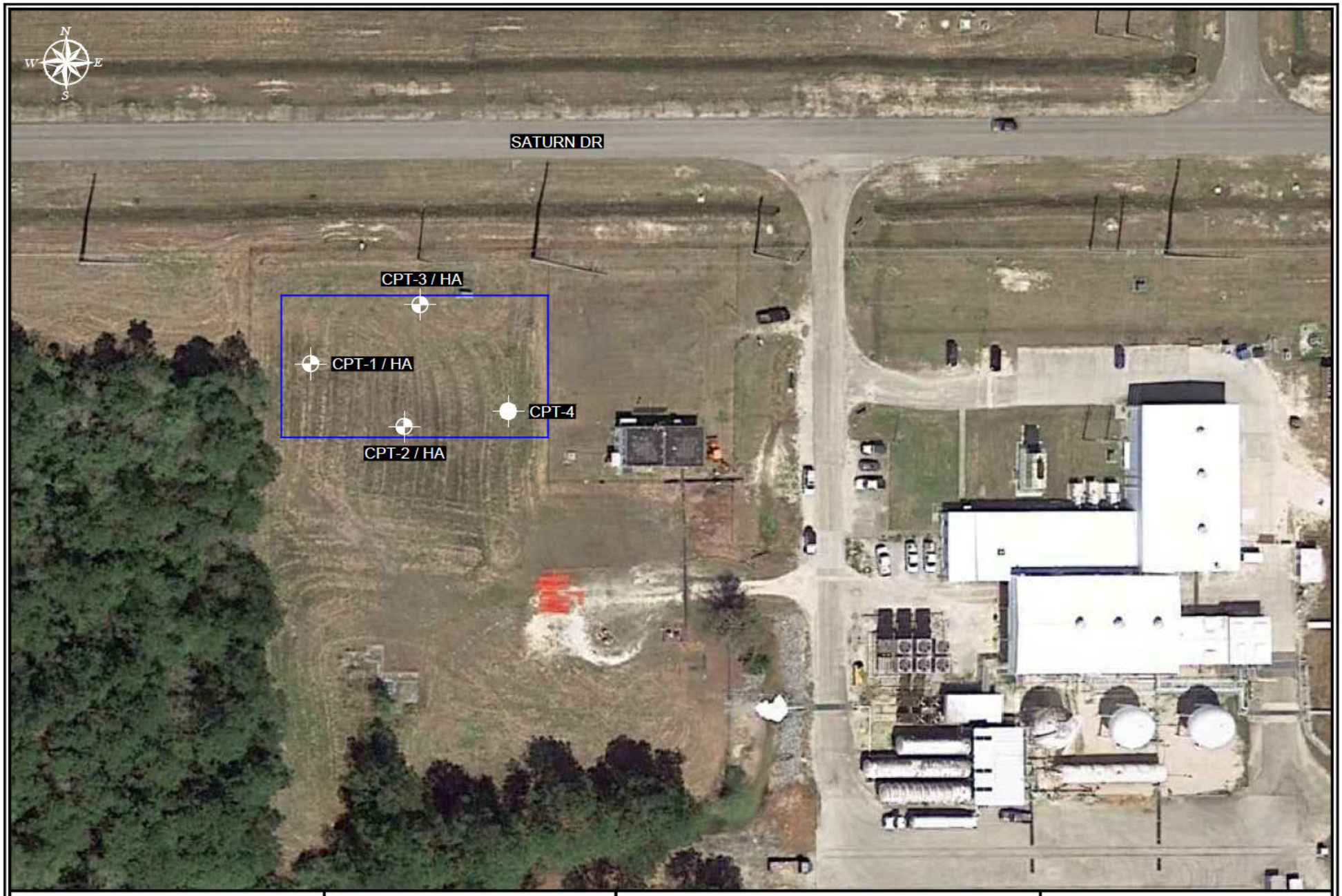
APPENDIX 1

Test Location Plan



NOT TO SCALE

CPT SOUNDING / HAND AUGER

CPT SOUNDING

NITROGEN GENERATION FACILITY
STENNIS SPACE CENTER, MS

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

TEST LOCATION PLAN
SESI JOB #: M23-399

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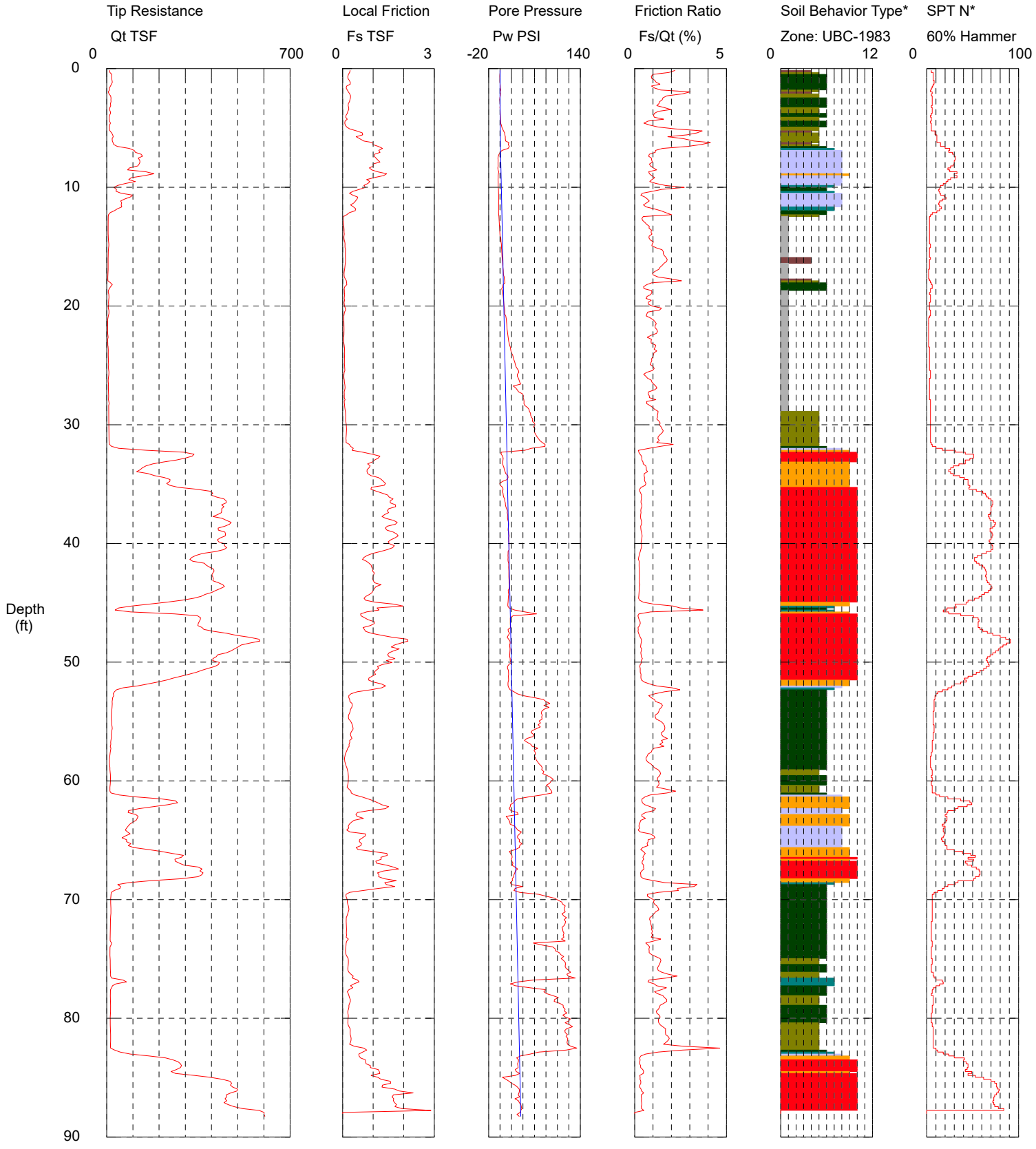
APPENDIX 2

CPT Sounding Logs and Soil Boring Logs

Southern Earth Sciences

Operator: Brandon Green
Sounding: CPT-1
Cone Used: DPG1210
GPS Data: N30.37576 W89.60093

CPT Date/Time: 7/26/2023 2:41:14 PM
Location: SSC NITROGEN FACILITY
Job Number: M23-399
Groundwater: Collapsed Dry At 4.9-ft.



Maximum Depth = 88.25 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
Refusal Due To Rebound

4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt

7 silty sand to sandy silt
8 sand to silty sand
9 sand

10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

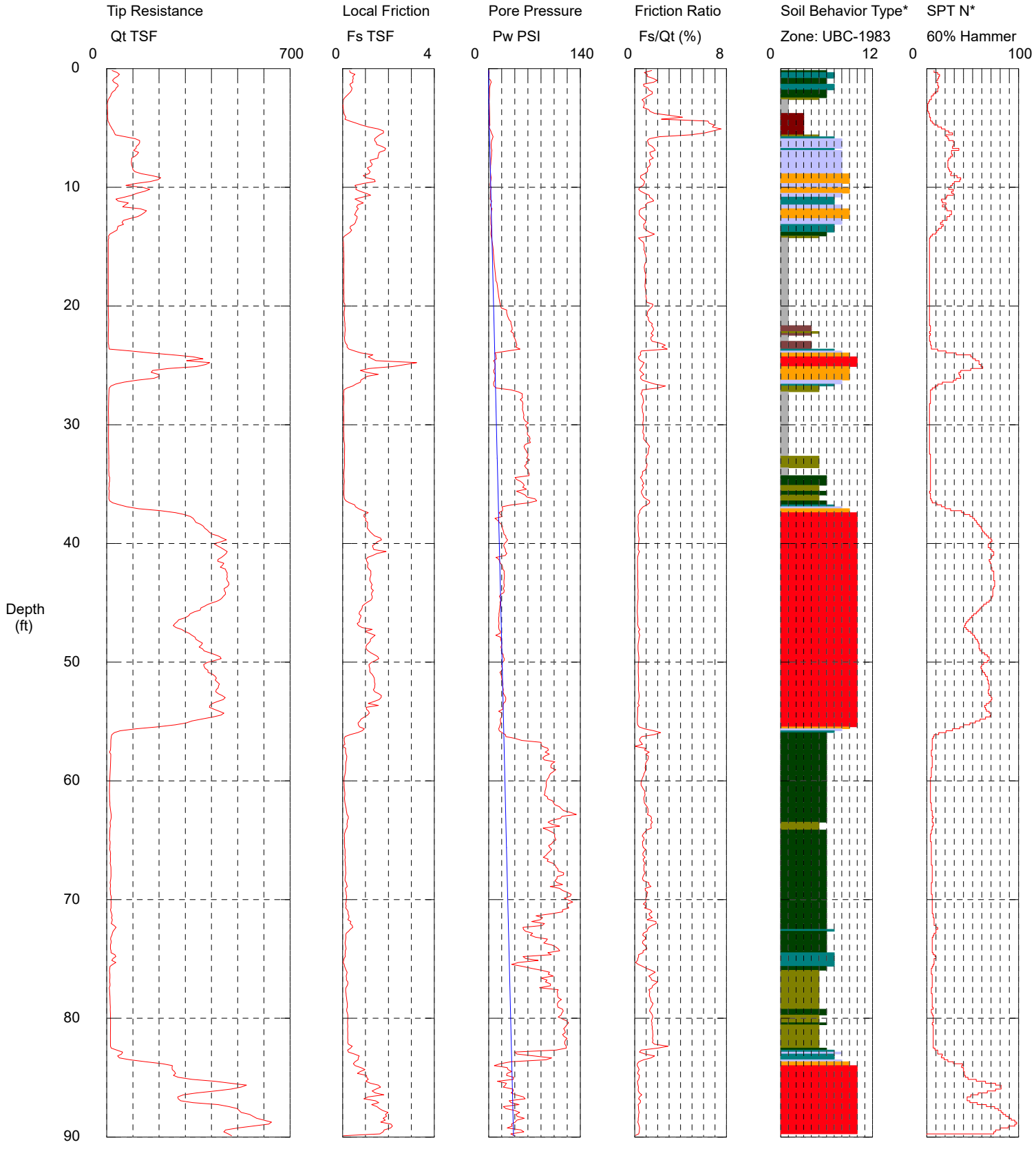
*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences

80SSC023R0001
Attachment 11

Operator: Brandon Green
Sounding: CPT-2
Cone Used: DPG1210
GPS Data: N30.37568 W89.60068

CPT Date/Time: 7/26/2023 12:52:17 PM
Location: SSC NITROGEN FACILITY
Job Number: M23-399
Groundwater: Collapsed Dry At 2.5-ft.



Maximum Depth = 90.22 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

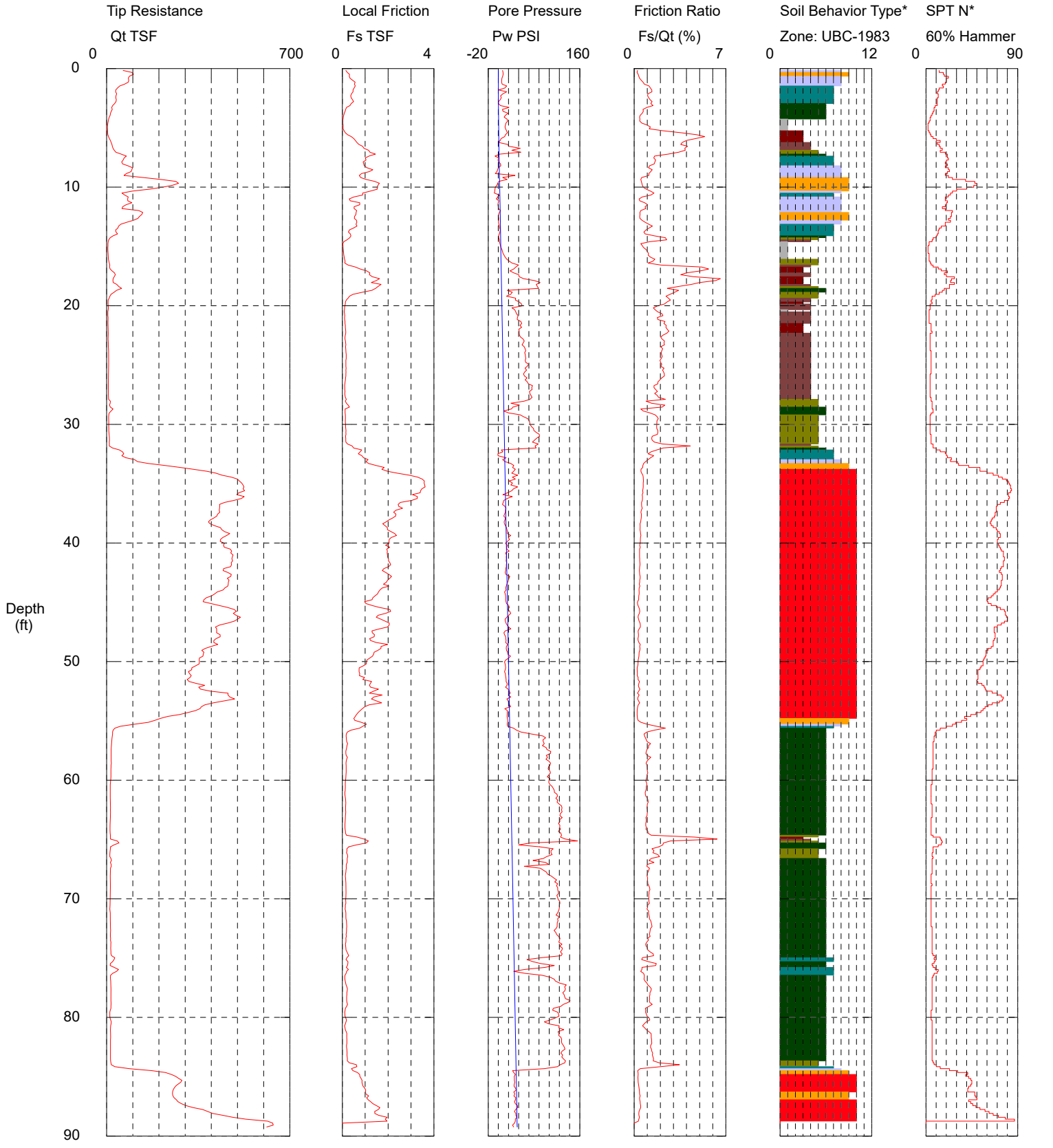
*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences

80SSC023R0001
Attachment 11

Operator: Brandon Green
Sounding: CPT-3
Cone Used: DPG1210
GPS Data: N30.37594 W89.60076

CPT Date/Time: 7/26/2023 1:43:35 PM
Location: SSC NITROGEN FACILITY
Job Number: M23-399
Groundwater: Collapsed Dry At 4.1-ft.



Maximum Depth = 89.24 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
Refusal Due To Rebound

4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt

7 silty sand to sandy silt
8 sand to silty sand
9 sand

10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

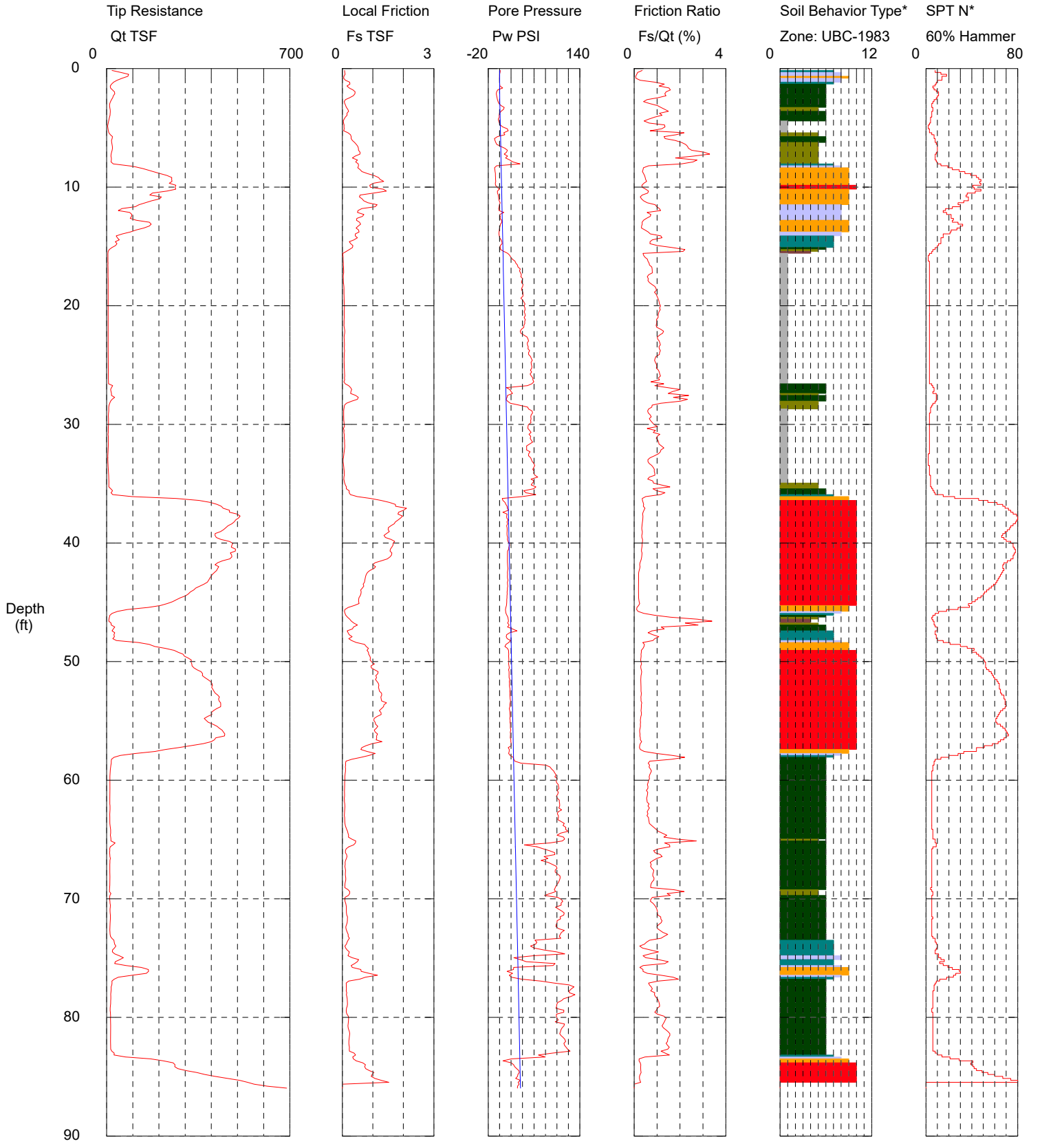
*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences

80SSC023R0001
Attachment 11

Operator: Brandon Green
Sounding: CPT-4
Cone Used: DPG1210
GPS Data: N30.37572 W89.60059

CPT Date/Time: 7/26/2023 11:46:50 AM
Location: SSC NITROGEN FACILITY
Job Number: M23-399
Groundwater: Collapsed Dry At 2.1-ft.



Maximum Depth = 85.96 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
Refusal Due To Rebound

4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt

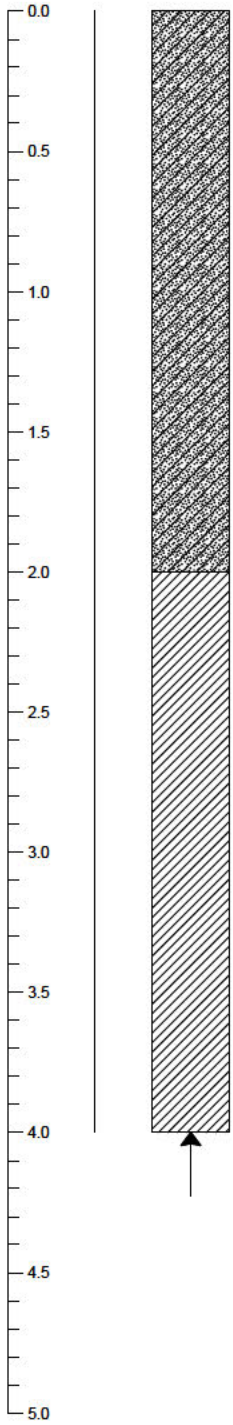
7 silty sand to sandy silt
8 sand to silty sand
9 sand

10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

SOIL BORING LOG

BORING NO.: HA-1
PROJECT: NITROGEN GENERATION FACILITY **PROJECT NO.:** M23-399
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 08/02/23 **DATE COMPLETED:** 08/02/23
WATER LEVEL: NOT ENCOUNTERED **WATER LEVEL DATE:** 08/02/23
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREEN



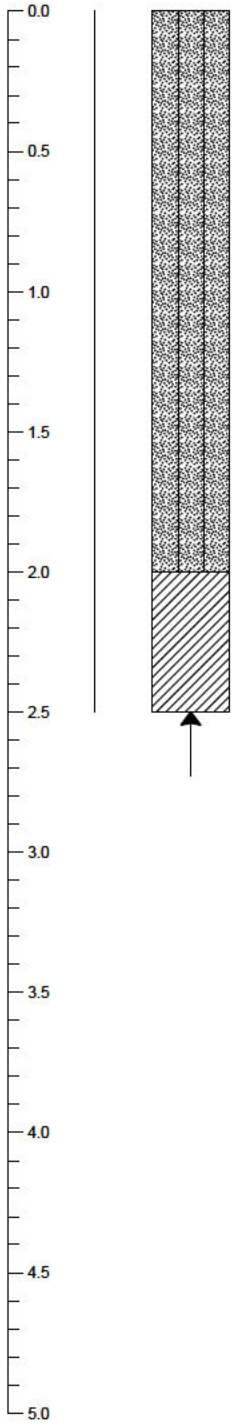
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description
0.0		SC	Brown Clayey SAND with Roots
2.0		CL	Brown CLAY
4.0			

Remarks:

SOUTHERN EARTH SCIENCES

SOIL BORING LOG

BORING NO.: HA-2
PROJECT: NITROGEN GENERATION FACILITY **PROJECT NO.:** M23-399
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 08/02/23 **DATE COMPLETED:** 08/02/23
WATER LEVEL: NOT ENCOUNTERED **WATER LEVEL DATE:** 08/02/23
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREEN



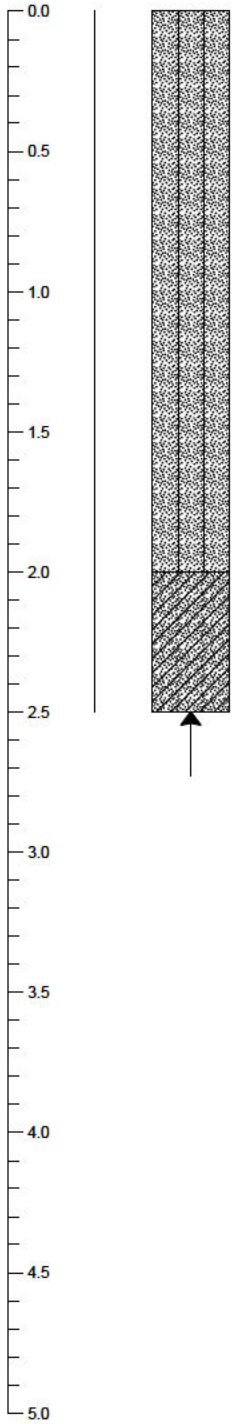
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description
0.0 – 2.0		SM	Brown Silty SAND with Roots
2.0 – 2.5		CL	Brown CLAY with Roots

Remarks:

SES SOUTHERN EARTH SCIENCES

SOIL BORING LOG

BORING NO.: HA-3
PROJECT: NITROGEN GENERATION FACILITY **PROJECT NO.:** M23-399
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 08/02/23 **DATE COMPLETED:** 08/02/23
WATER LEVEL: NOT ENCOUNTERED **WATER LEVEL DATE:** 08/02/23
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREEN



Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description
0.0		SM	Brown Silty SAND
2.0		SC	Brown and Gray Clayey SAND
2.5			

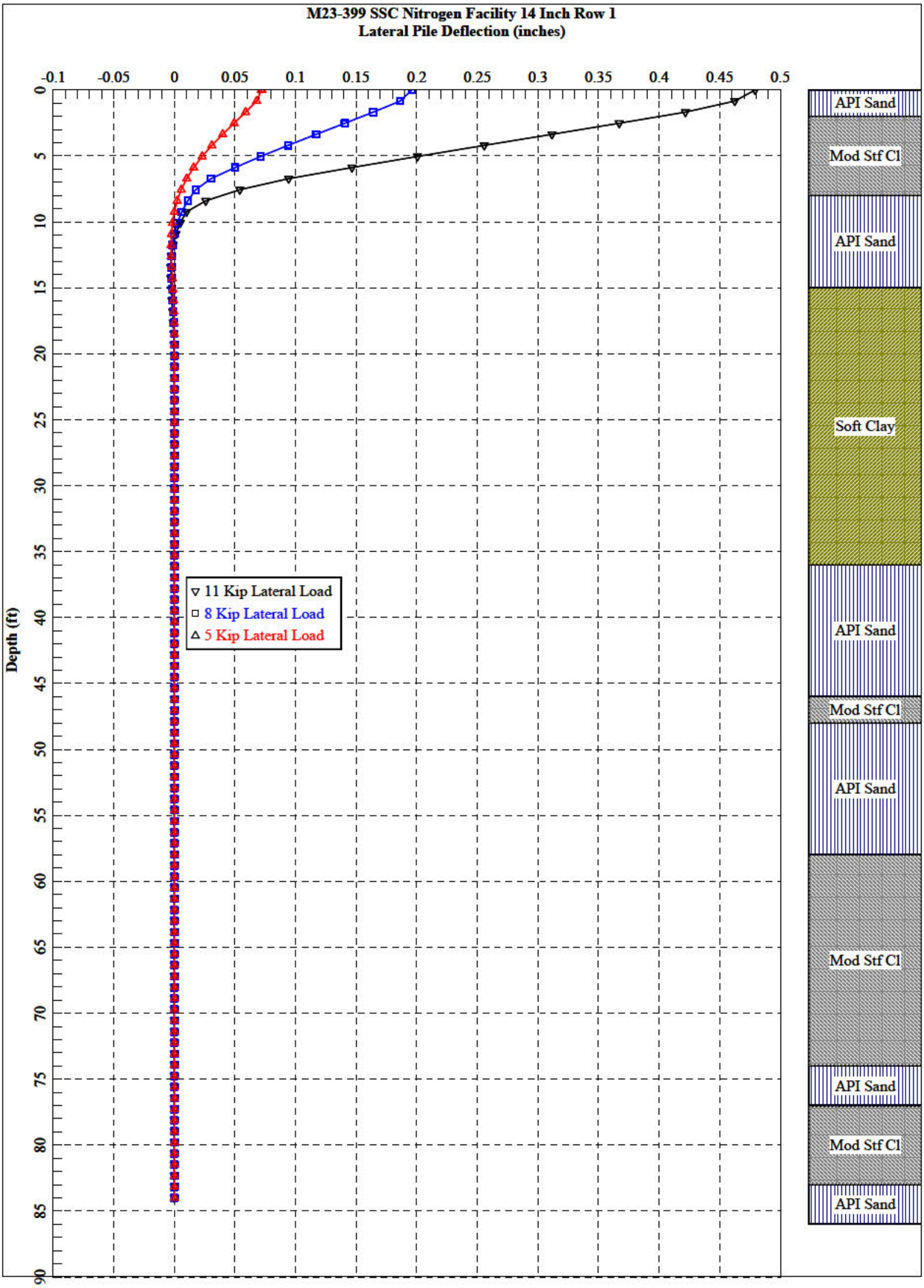
Remarks:

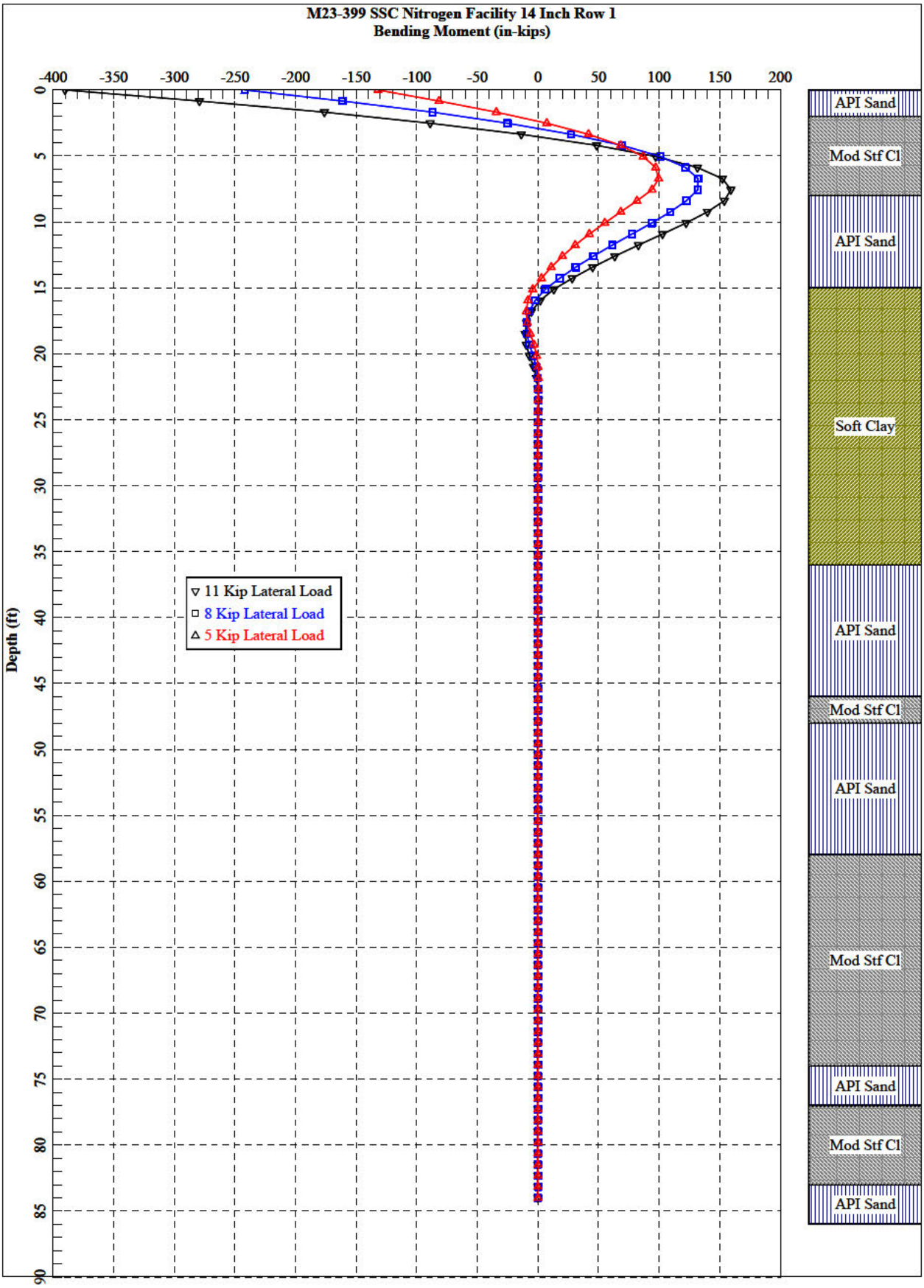
SES SOUTHERN EARTH SCIENCES

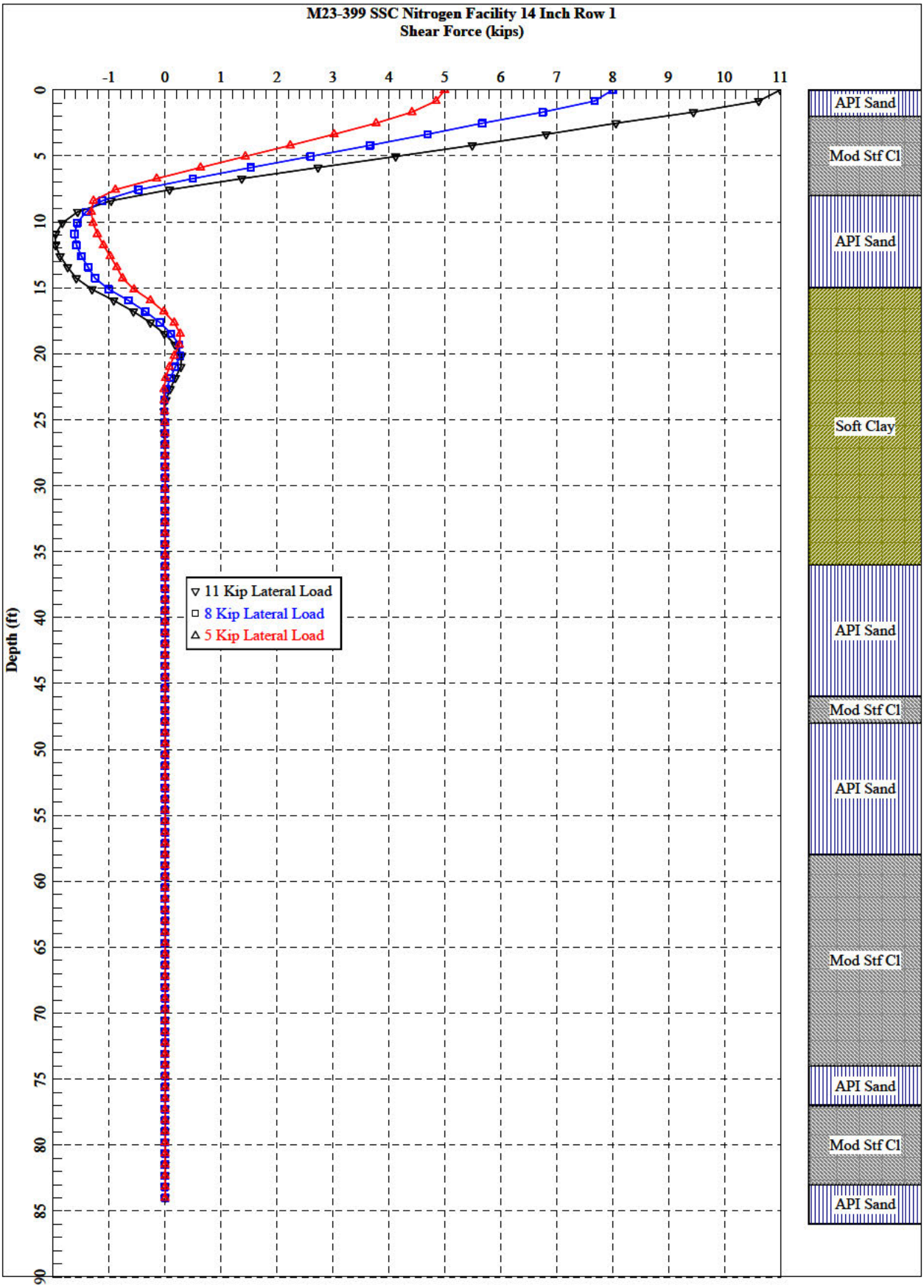
SYNCOM SPACE SERVICES, LLC
Preliminary Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC Nitrogen Generation Facility
Stennis Space Center, MS
SESI Project Number: M23-399
August 8, 2023

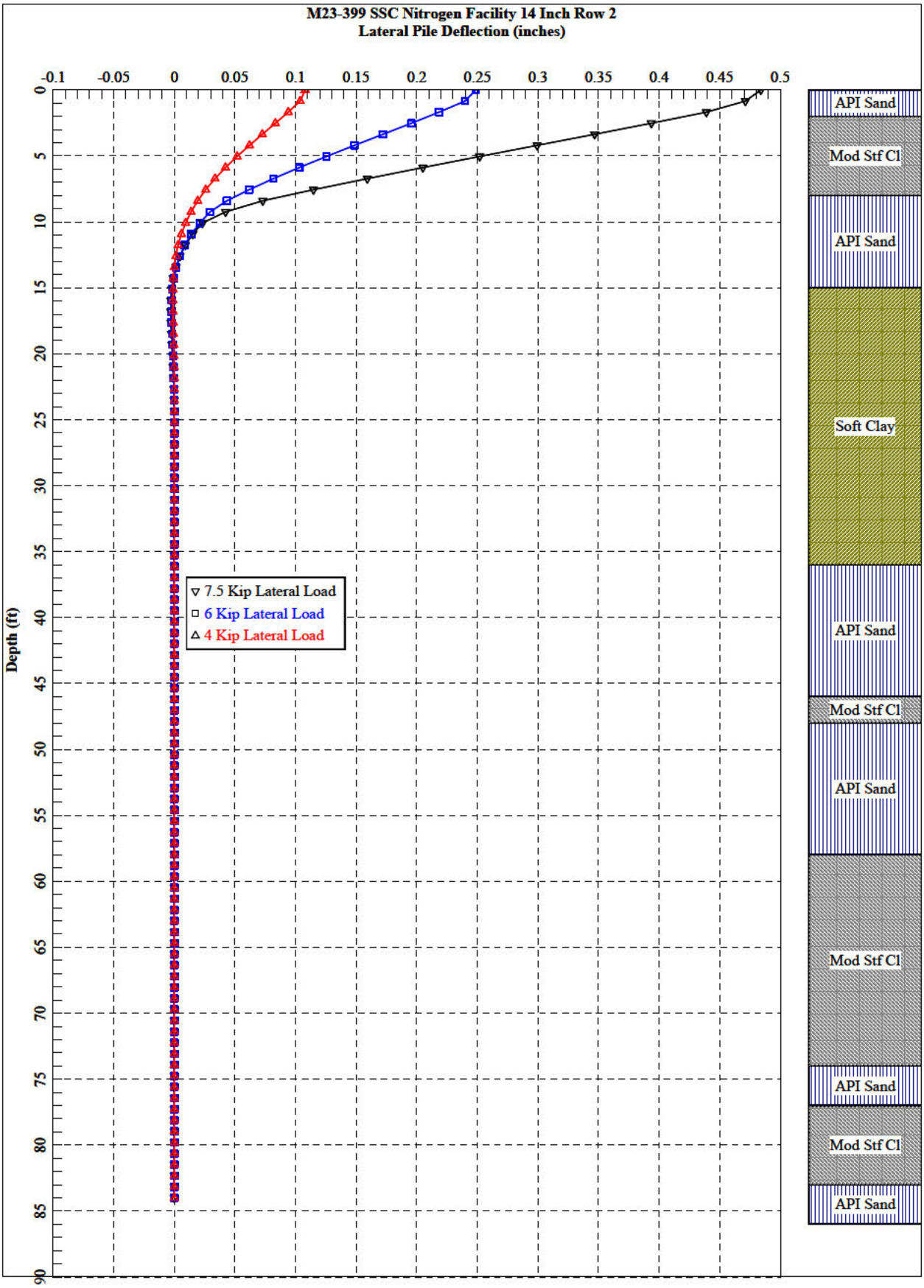
APPENDIX 3

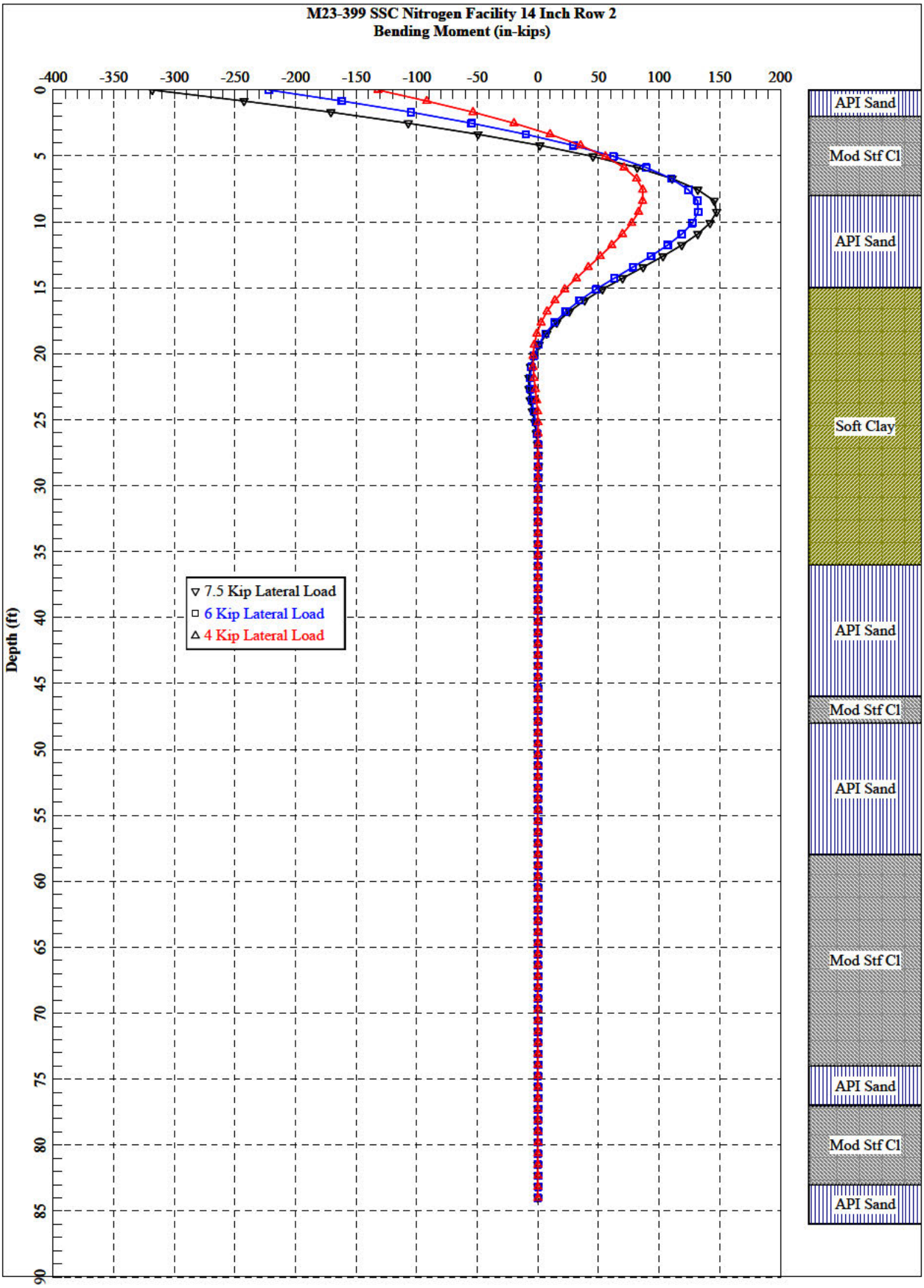
L-Pile Analysis Results

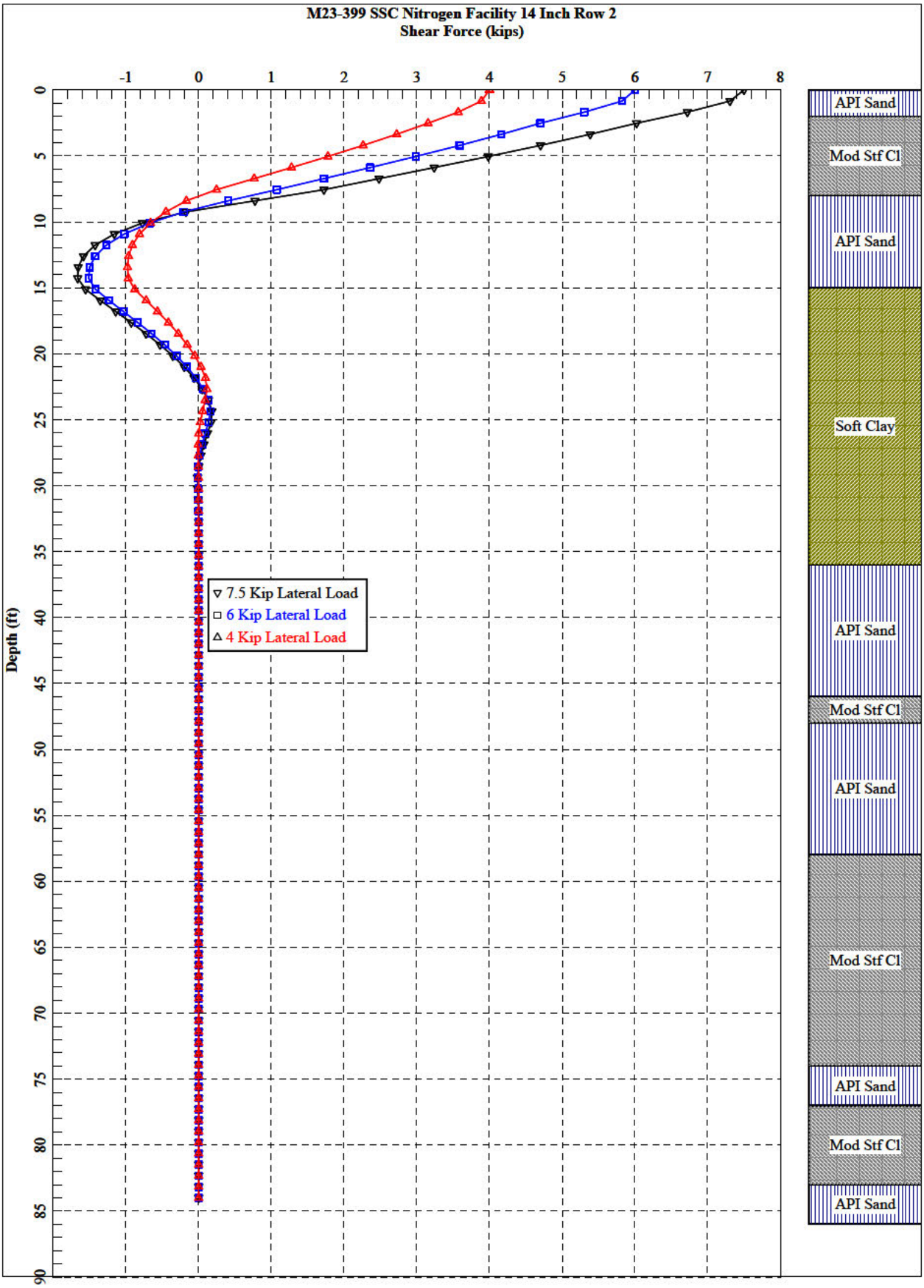

M23-399 SSC Nitrogen Facility 14 Inch Row 1
Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
11 Kip Lateral Load
8 Kip Lateral Load
5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

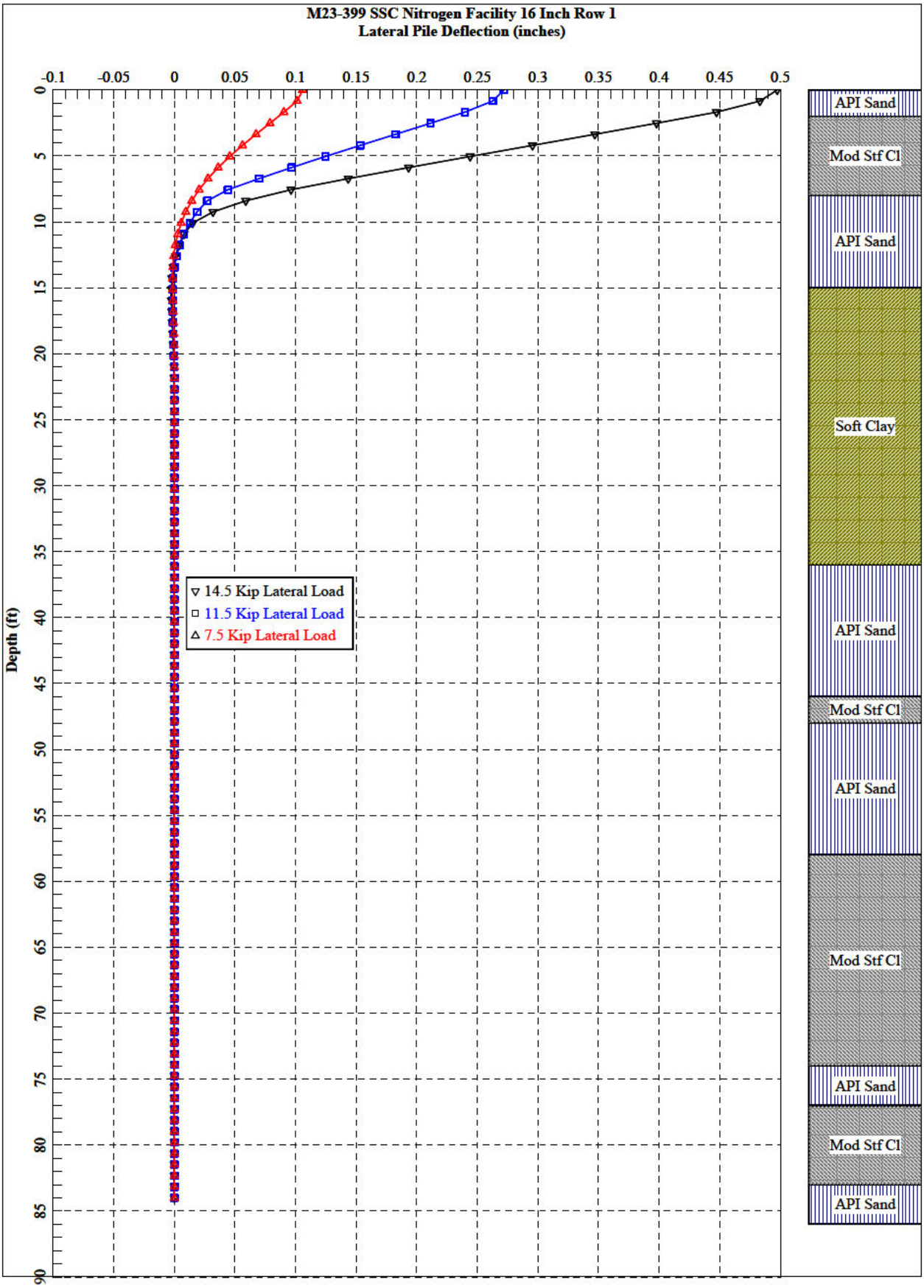

M23-399 SSC Nitrogen Facility 14 Inch Row 1
Bending Moment (in-kips)
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
150
200
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
11 Kip Lateral Load
8 Kip Lateral Load
5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

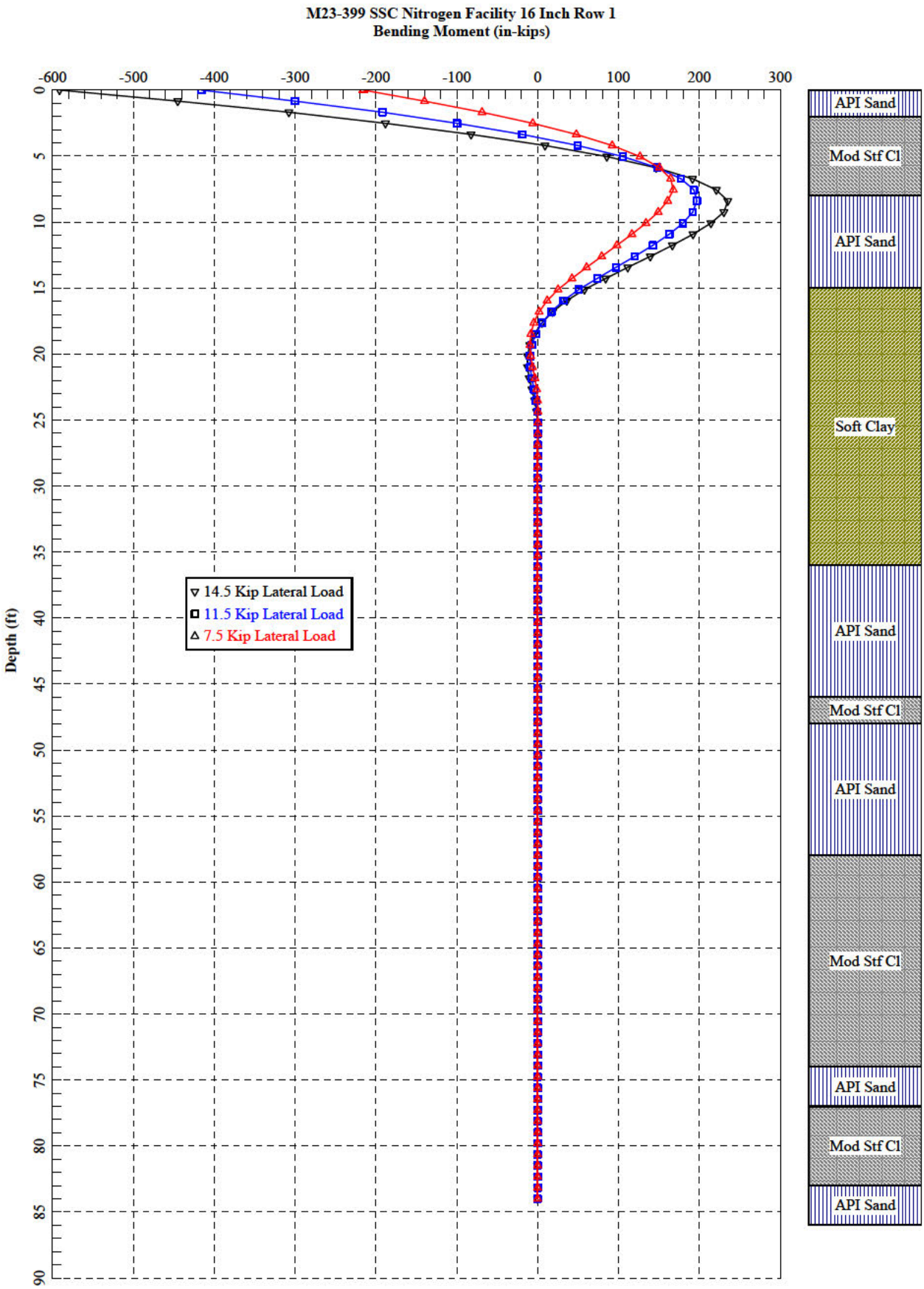

M23-399 SSC Nitrogen Facility 14 Inch Row 1
Shear Force (kips)
-1
0
1
2
3
4
5
6
7
8
9
10
11
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
11 Kip Lateral Load
8 Kip Lateral Load
5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

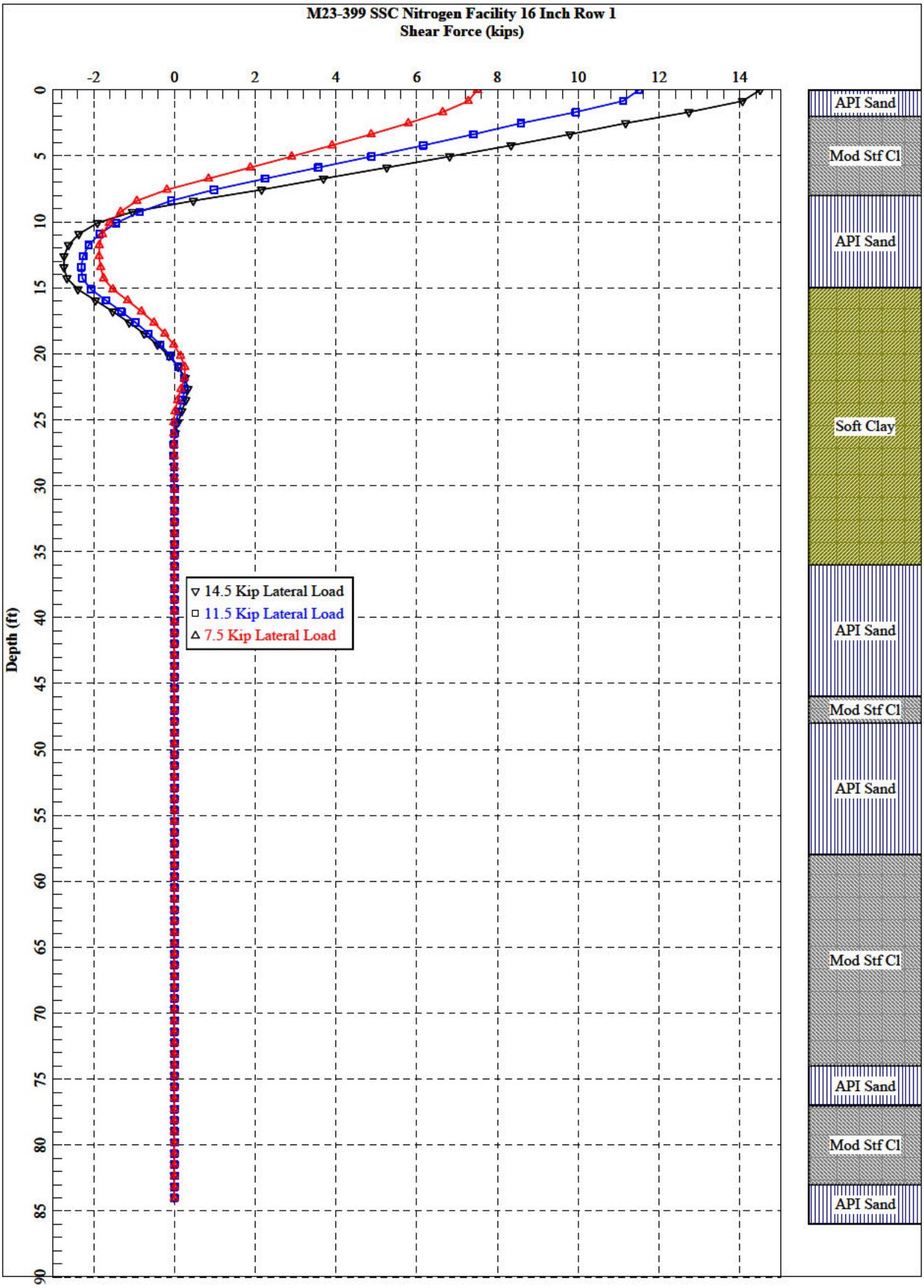

M23-399 SSC Nitrogen Facility 14 Inch Row 2
Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
7.5 Kip Lateral Load
6 Kip Lateral Load
4 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

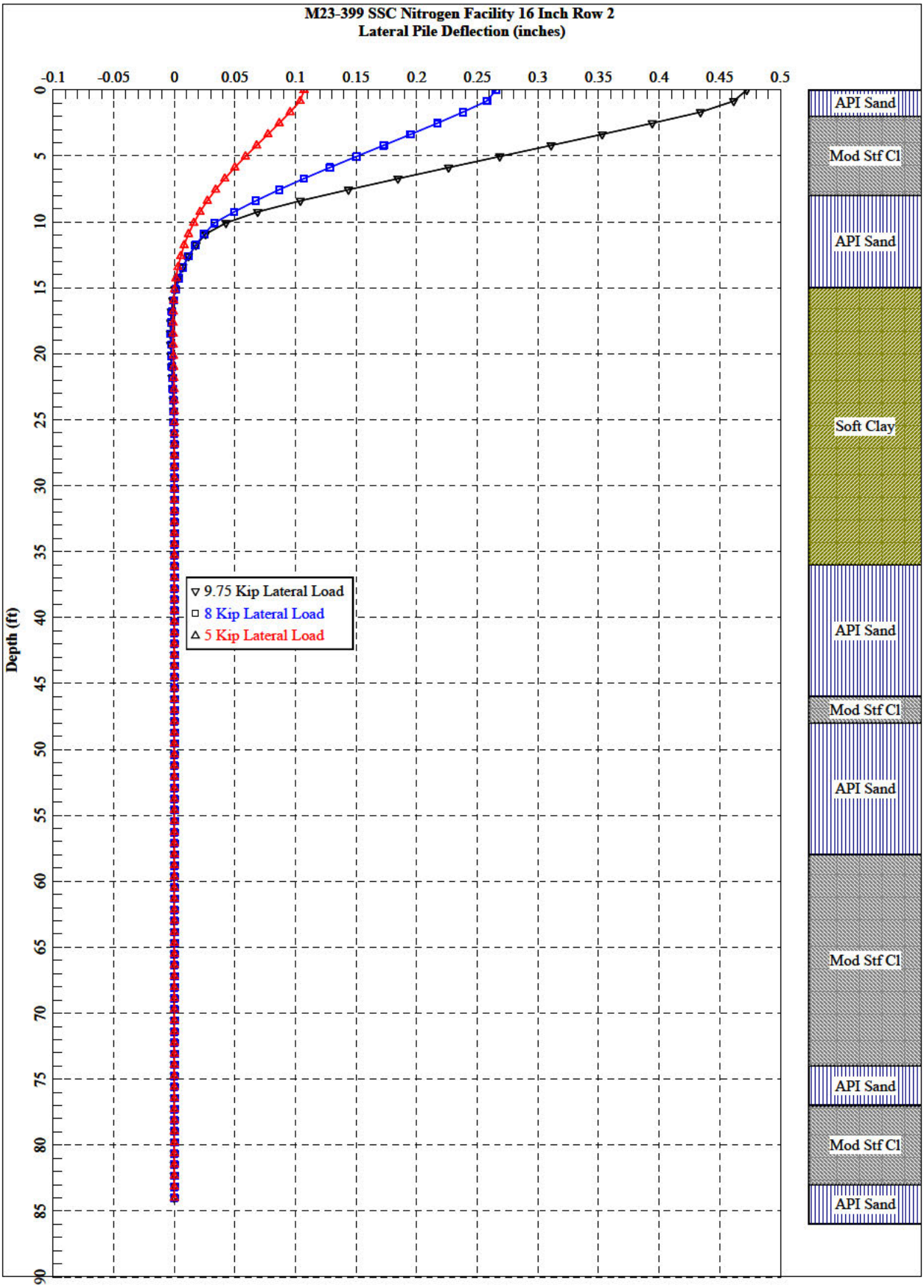

M23-399 SSC Nitrogen Facility 14 Inch Row 2
Bending Moment (in-kips)
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
150
200
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
7.5 Kip Lateral Load
6 Kip Lateral Load
4 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

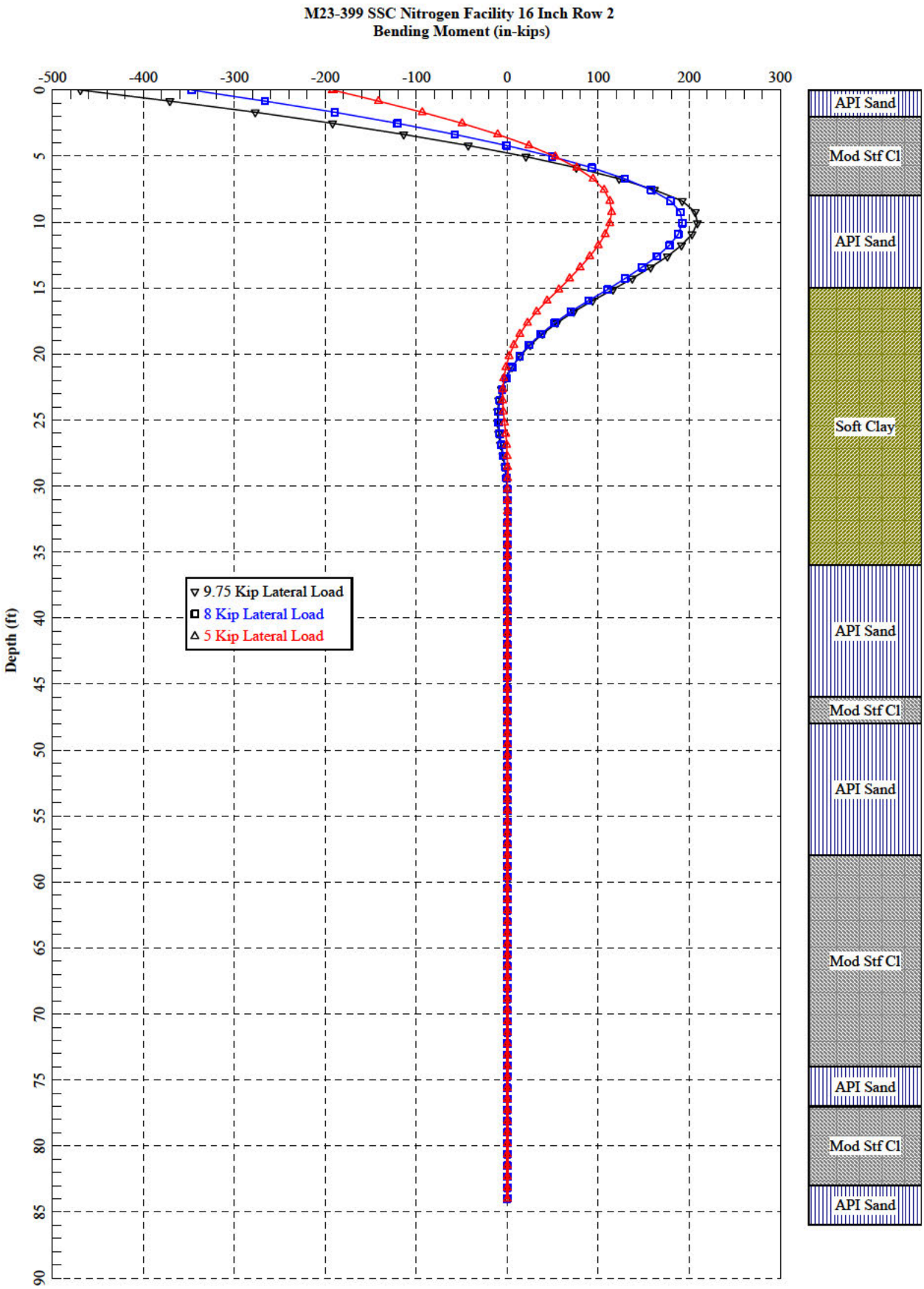

M23-399 SSC Nitrogen Facility 14 Inch Row 2
Shear Force (kips)
-1
0
1
2
3
4
5
6
7
8
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
7.5 Kip Lateral Load
6 Kip Lateral Load
4 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

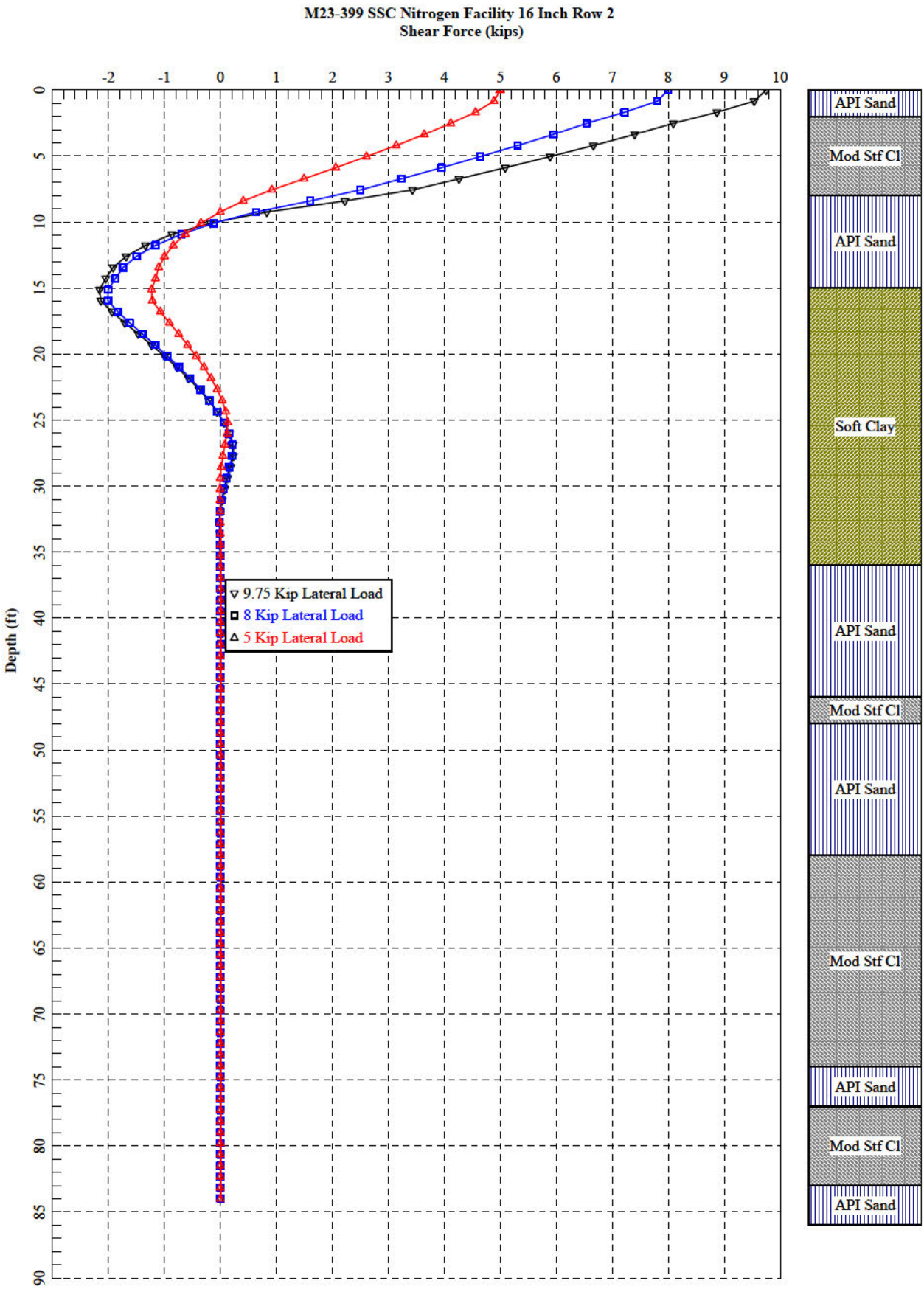

M23-399 SSC Nitrogen Facility 16 Inch Row 1
Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
14.5 Kip Lateral Load
11.5 Kip Lateral Load
7.5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

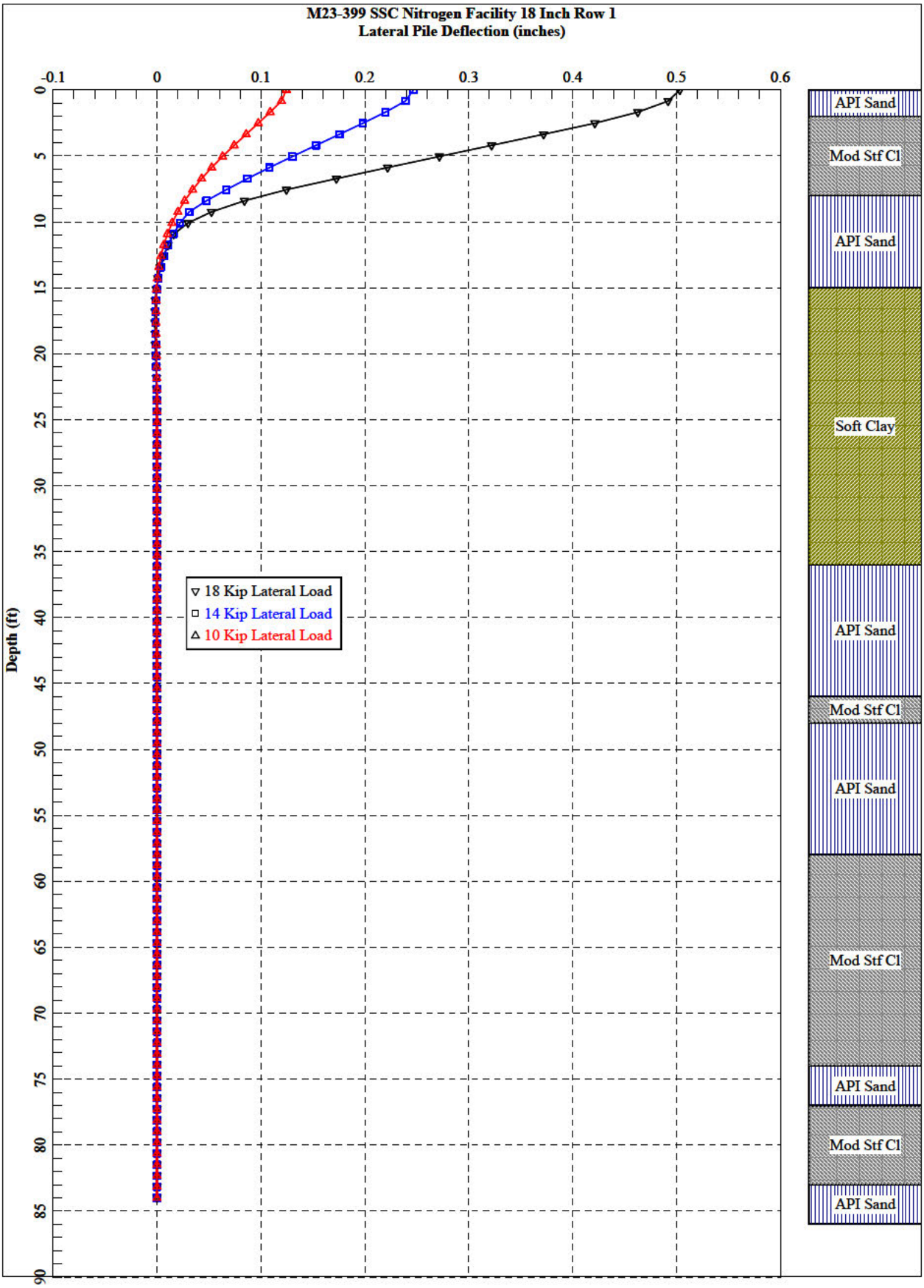

M23-399 SSC Nitrogen Facility 16 Inch Row 1
Bending Moment (in-kips)
-600
-500
-400
-300
-200
-100
0
100
200
300
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
14.5 Kip Lateral Load
11.5 Kip Lateral Load
7.5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

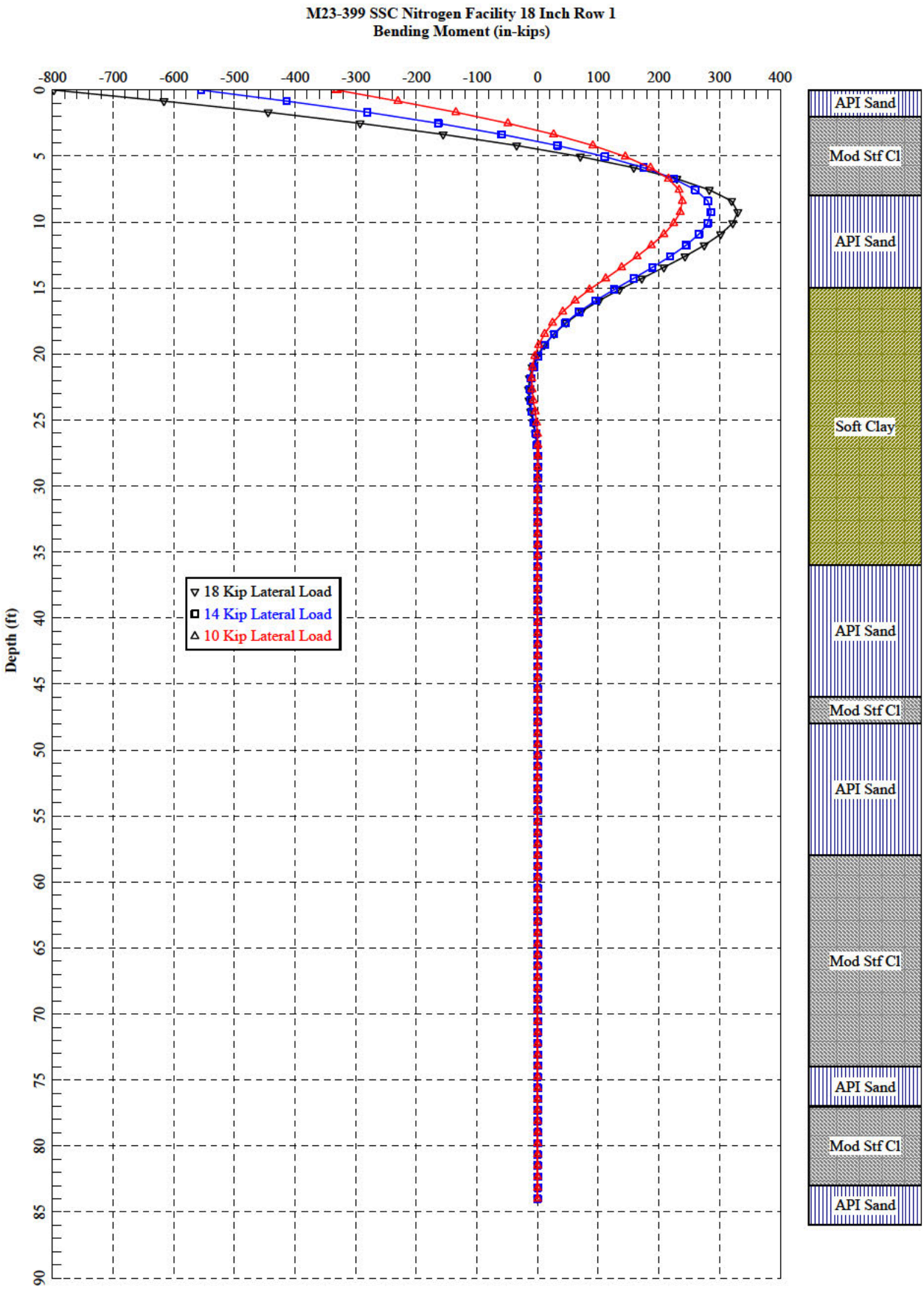

M23-399 SSC Nitrogen Facility 16 Inch Row 1
Shear Force (kips)
-2
0
2
4
6
8
10
12
14
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
14.5 Kip Lateral Load
11.5 Kip Lateral Load
7.5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

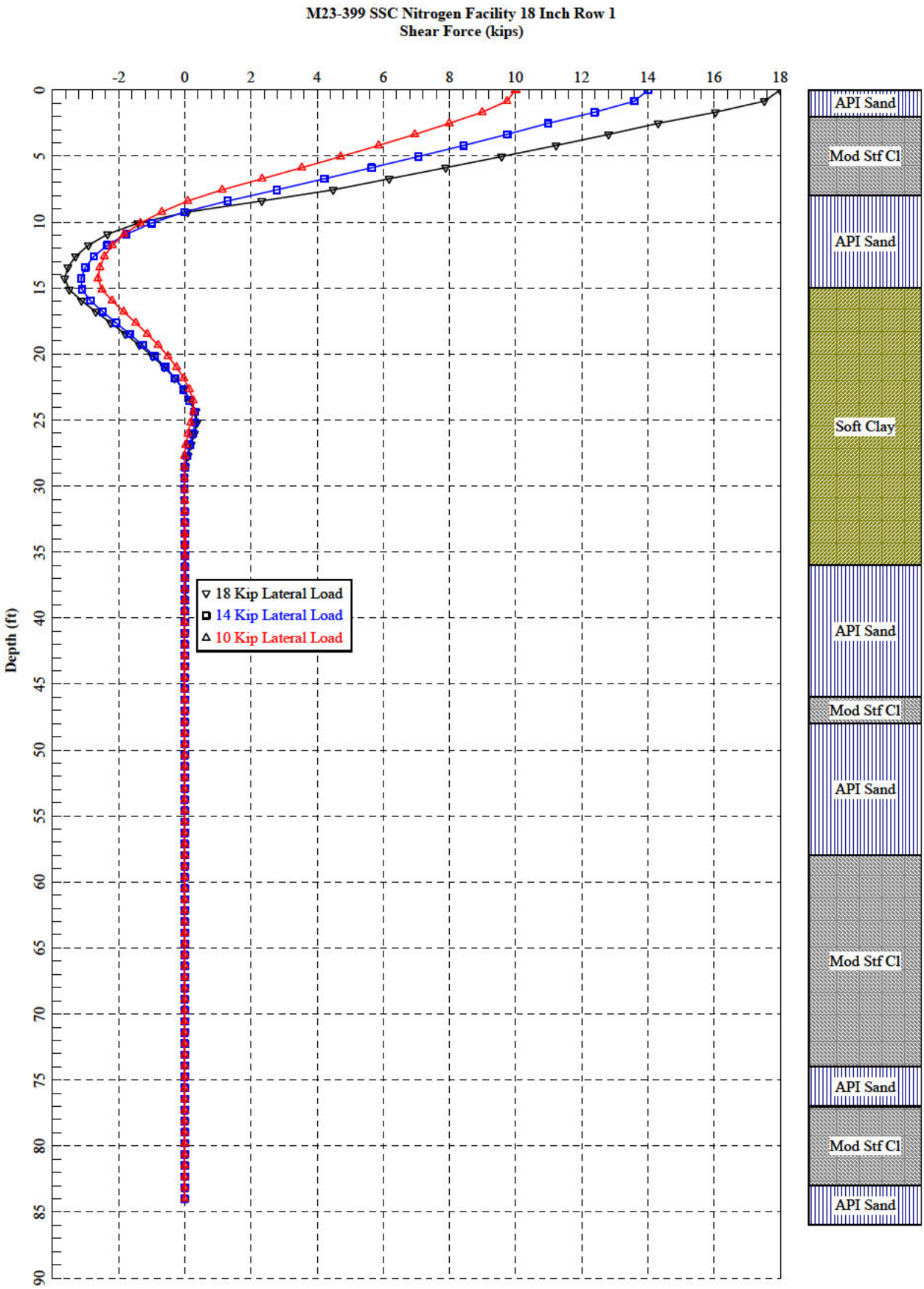

M23-399 SSC Nitrogen Facility 16 Inch Row 2
Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
9.75 Kip Lateral Load
8 Kip Lateral Load
5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

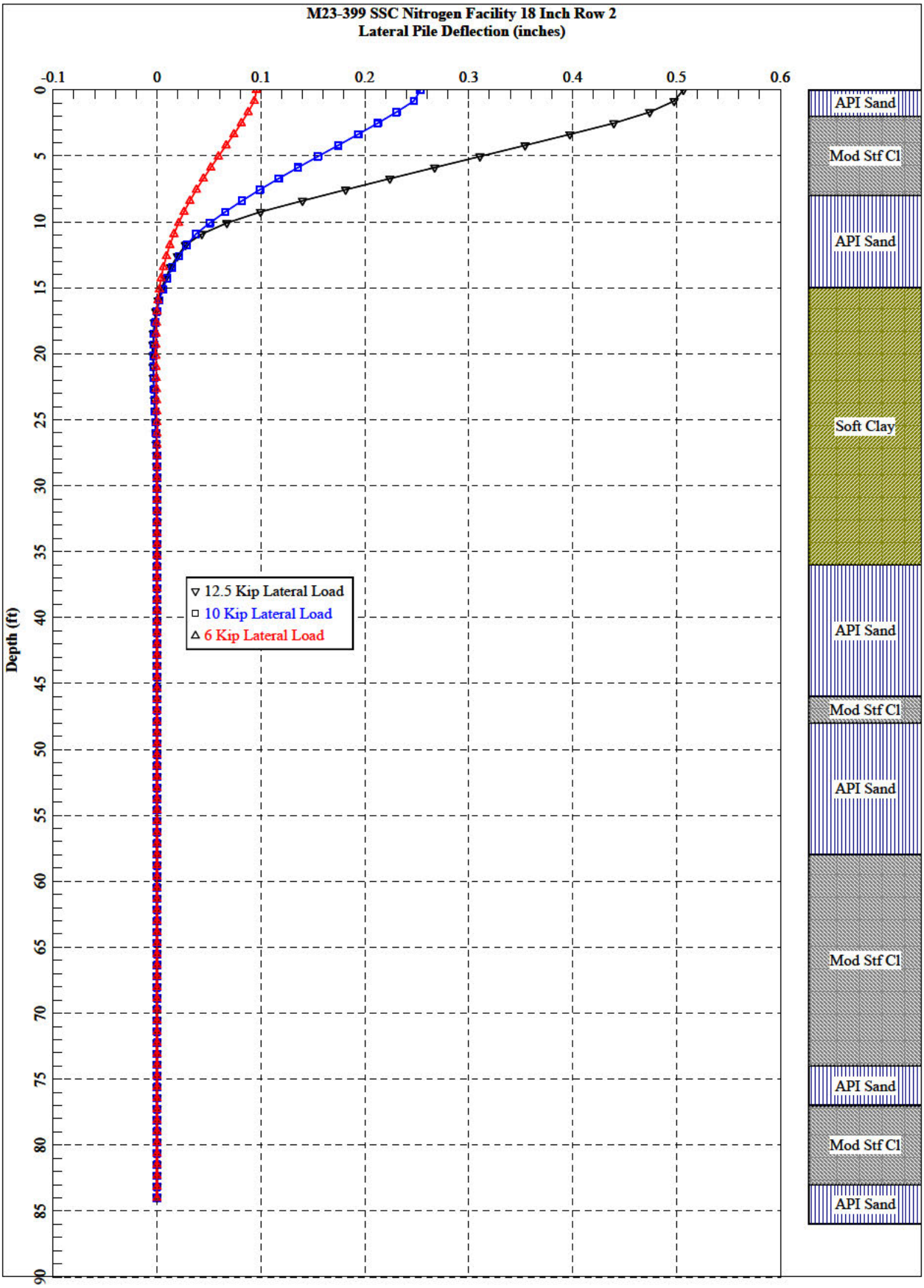

M23-399 SSC Nitrogen Facility 16 Inch Row 2
Bending Moment (in-kips)
-500
-400
-300
-200
-100
0
100
200
300
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
9.75 Kip Lateral Load
8 Kip Lateral Load
5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

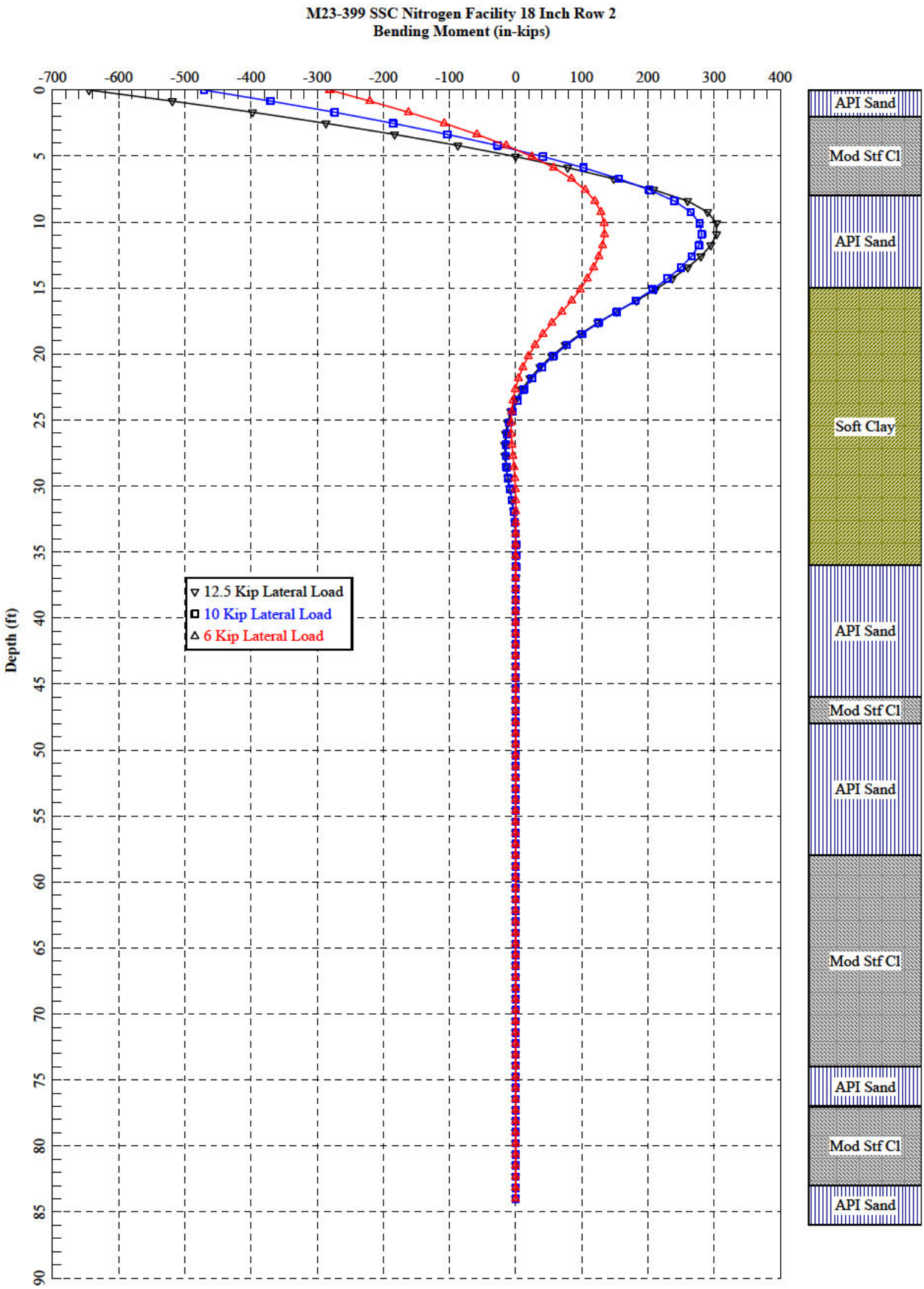

M23-399 SSC Nitrogen Facility 16 Inch Row 2
Shear Force (kips)
-2
-1
0
1
2
3
4
5
6
7
8
9
10
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
9.75 Kip Lateral Load
8 Kip Lateral Load
5 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

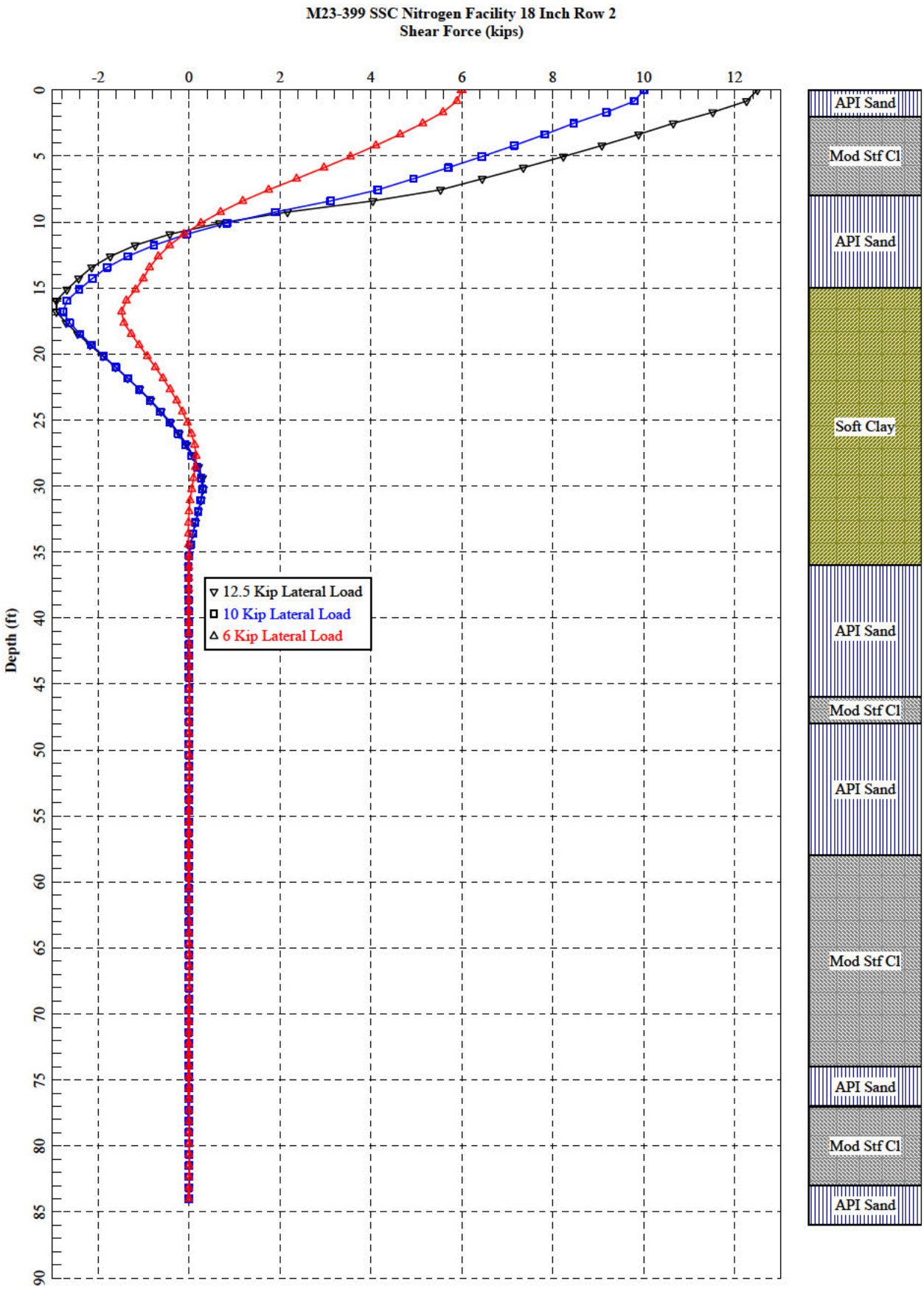

M23-399 SSC Nitrogen Facility 18 Inch Row 1
Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
18 Kip Lateral Load
14 Kip Lateral Load
10 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

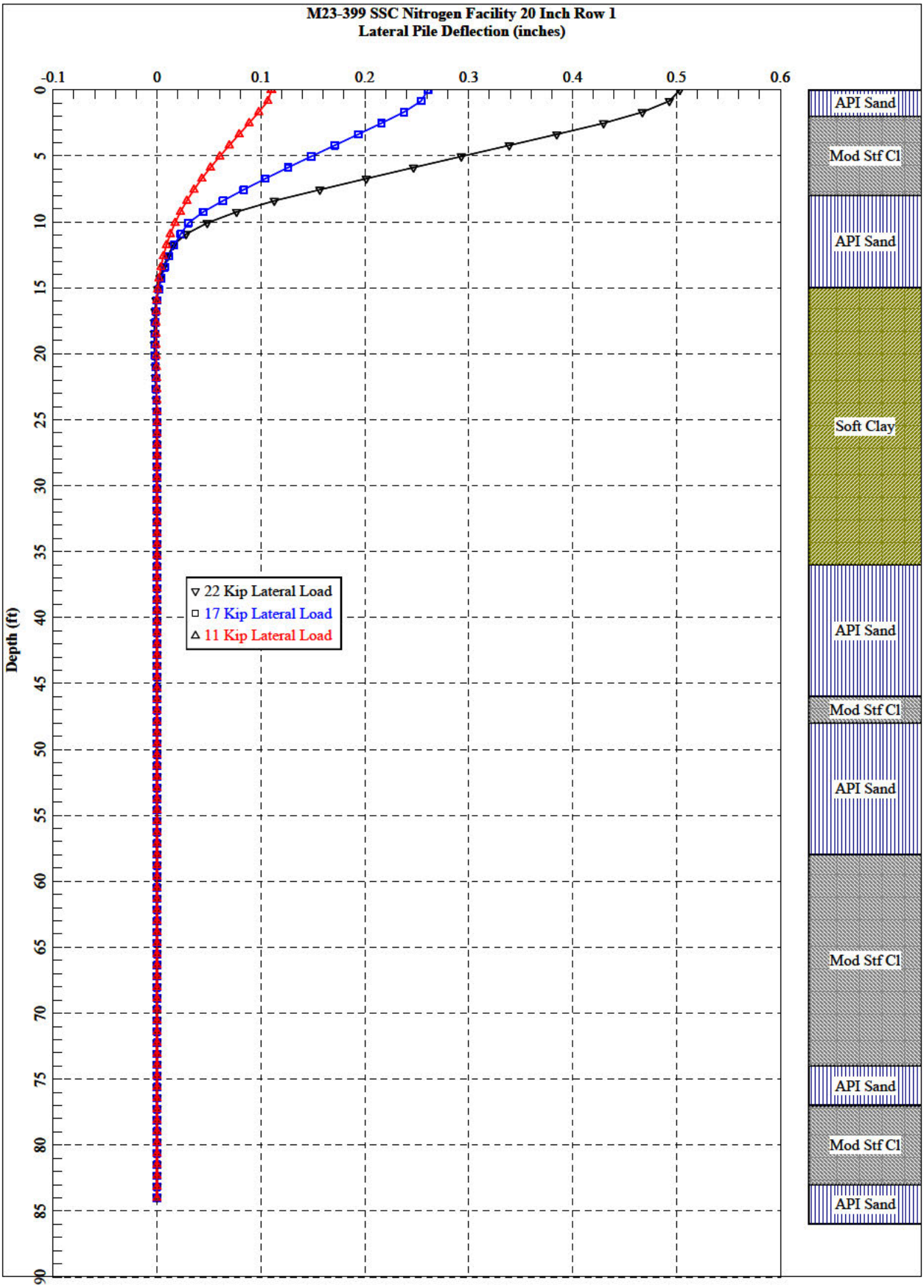

M23-399 SSC Nitrogen Facility 18 Inch Row 1
Bending Moment (in-kips)
-800
-700
-600
-500
-400
-300
-200
-100
0
100
200
300
400
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
18 Kip Lateral Load
14 Kip Lateral Load
10 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

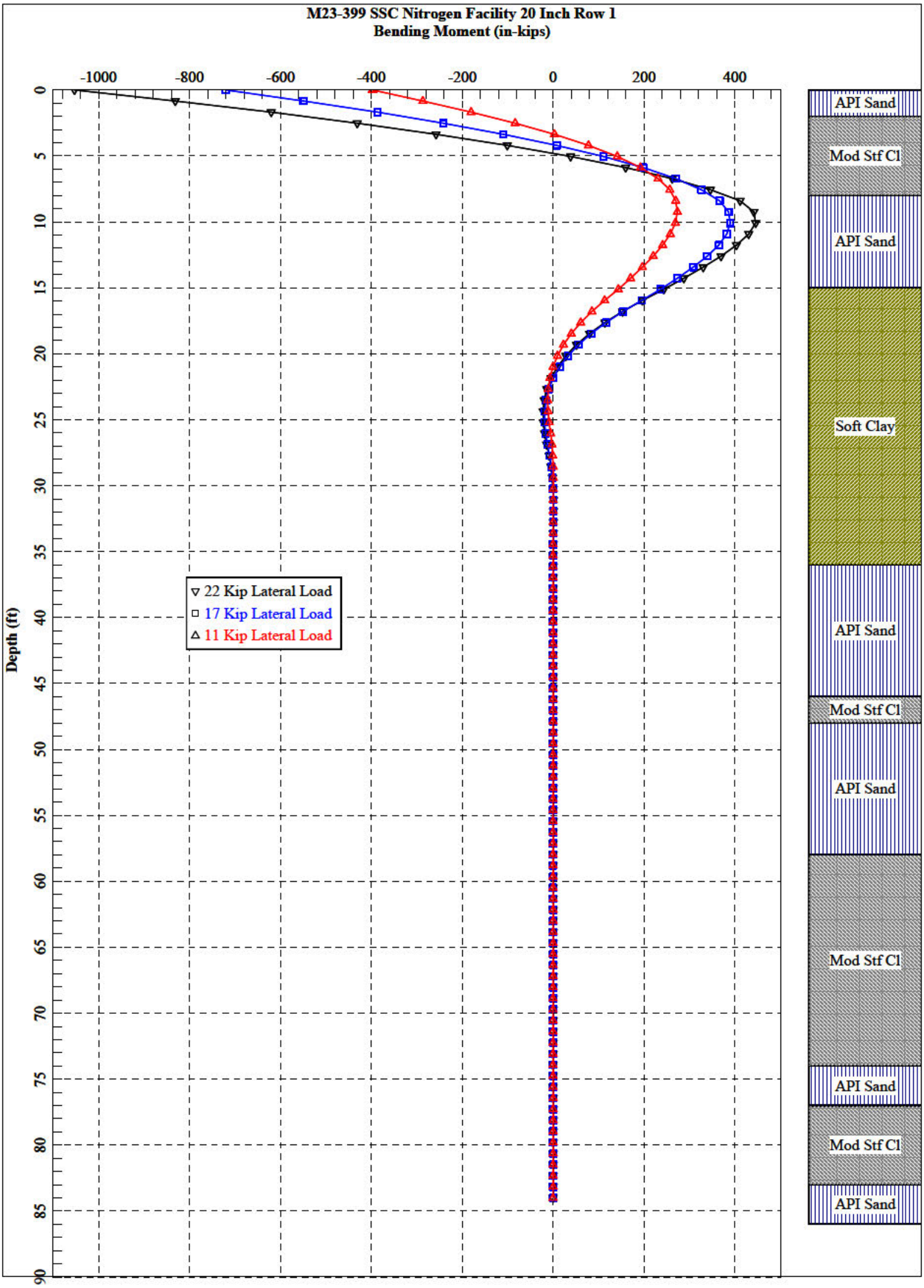

M23-399 SSC Nitrogen Facility 18 Inch Row 1
Shear Force (kips)
-2
0
2
4
6
8
10
12
14
16
18
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
18 Kip Lateral Load
14 Kip Lateral Load
10 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

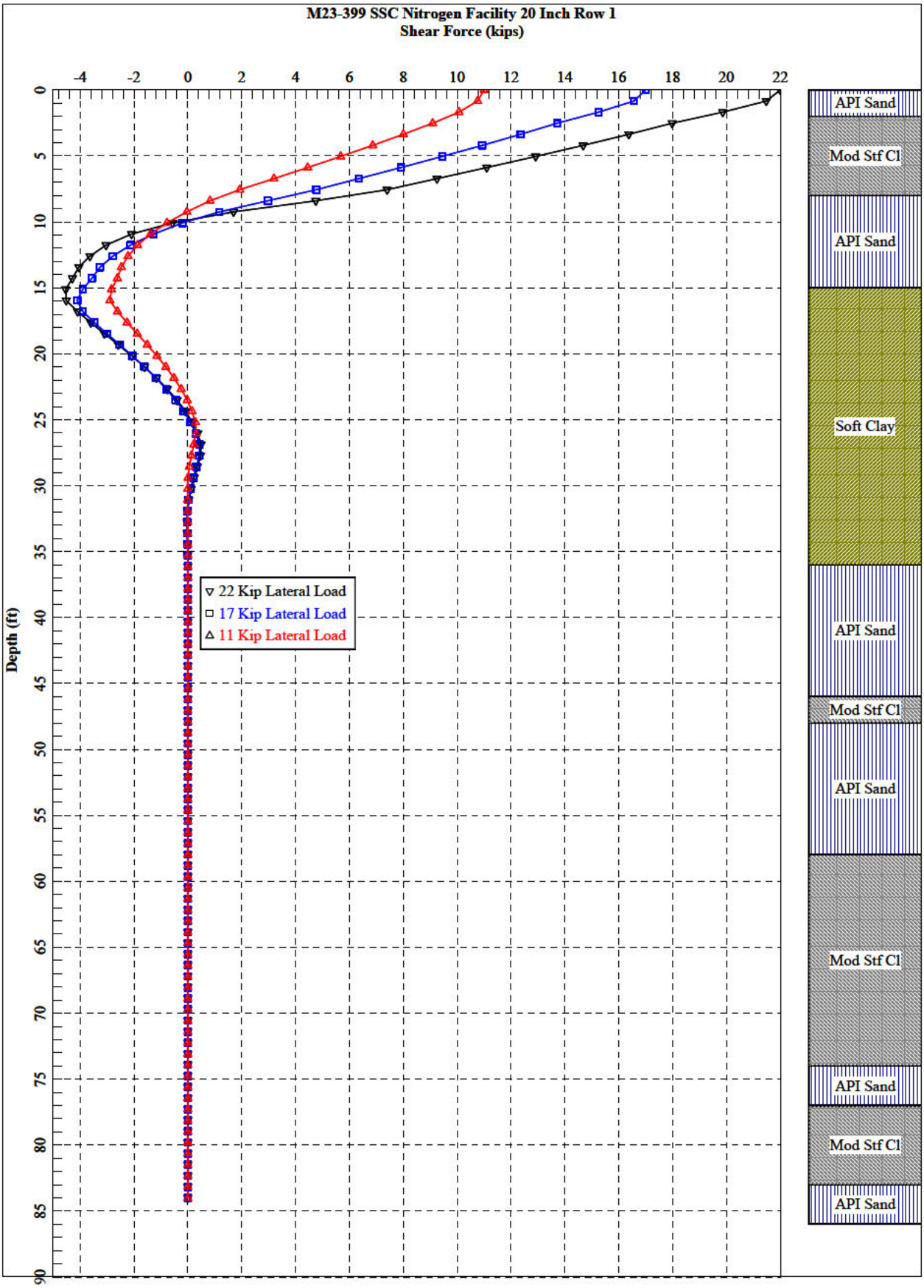

M23-399 SSC Nitrogen Facility 18 Inch Row 2
Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
12.5 Kip Lateral Load
10 Kip Lateral Load
6 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

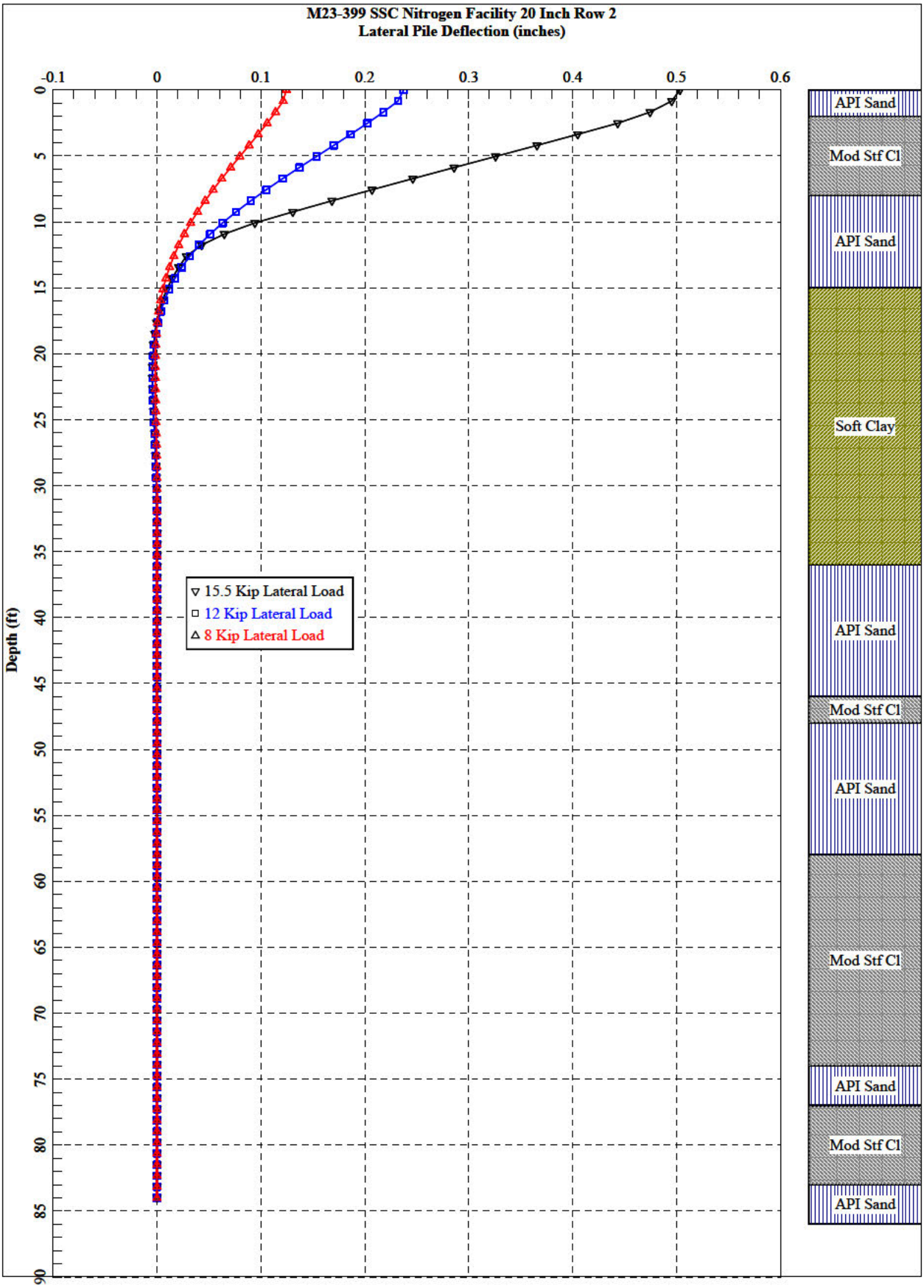

M23-399 SSC Nitrogen Facility 18 Inch Row 2
Bending Moment (in-kips)
-700
-600
-500
-400
-300
-200
-100
0
100
200
300
400
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
12.5 Kip Lateral Load
10 Kip Lateral Load
6 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

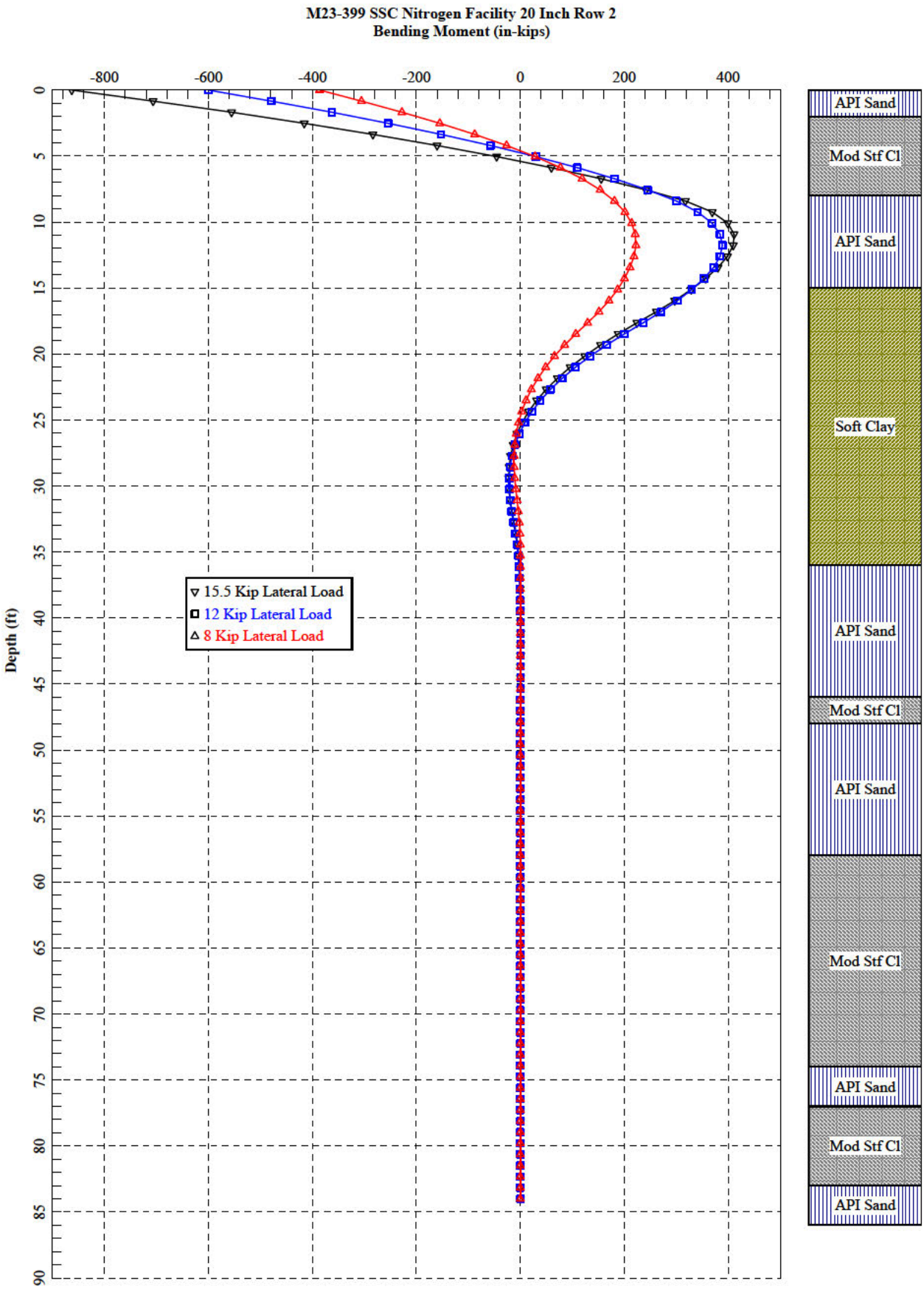

M23-399 SSC Nitrogen Facility 18 Inch Row 2
Shear Force (kips)
-2
0
2
4
6
8
10
12
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
12.5 Kip Lateral Load
10 Kip Lateral Load
6 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

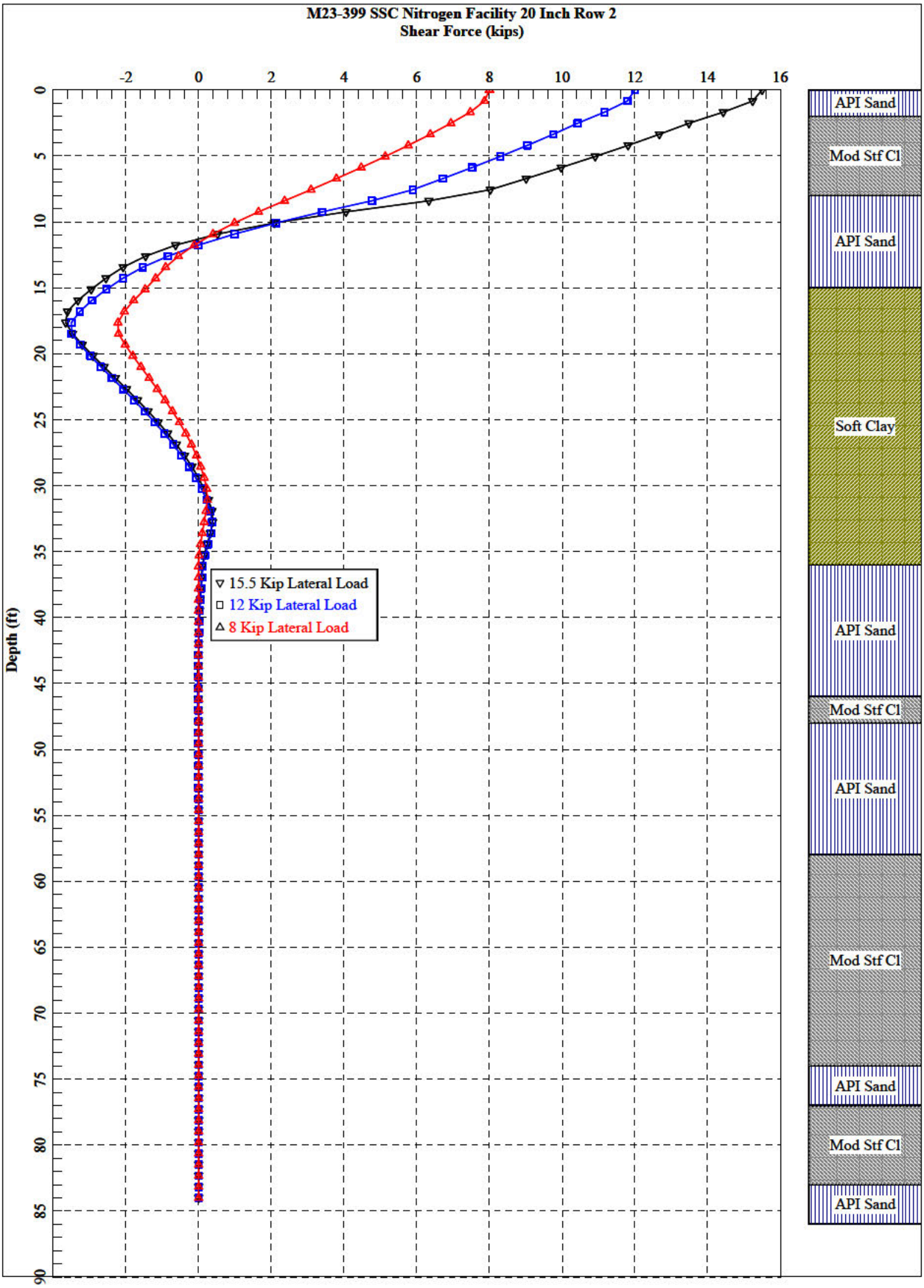

M23-399 SSC Nitrogen Facility 20 Inch Row 1
Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
22 Kip Lateral Load
17 Kip Lateral Load
11 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand


M23-399 SSC Nitrogen Facility 20 Inch Row 1
Bending Moment (in-kips)
-1000
-800
-600
-400
-200
0
200
400
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
22 Kip Lateral Load
17 Kip Lateral Load
11 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand


M23-399 SSC Nitrogen Facility 20 Inch Row 1
Shear Force (kips)
-4
-2
0
2
4
6
8
10
12
14
16
18
20
22
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
22 Kip Lateral Load
17 Kip Lateral Load
11 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand


M23-399 SSC Nitrogen Facility 20 Inch Row 2
Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
15.5 Kip Lateral Load
12 Kip Lateral Load
8 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand


M23-399 SSC Nitrogen Facility 20 Inch Row 2
Bending Moment (in-kips)
-800
-600
-400
-200
0
200
400
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
15.5 Kip Lateral Load
12 Kip Lateral Load
8 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand


M23-399 SSC Nitrogen Facility 20 Inch Row 2
Shear Force (kips)
-2
0
2
4
6
8
10
12
14
16
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
15.5 Kip Lateral Load
12 Kip Lateral Load
8 Kip Lateral Load
API Sand
Mod Stf Cl
API Sand
Soft Clay
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand
Mod Stf Cl
API Sand

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

SSC High Pressure Gas Facility Building Addition

Stennis Space Center

Report of Subsurface Investigation and Geotechnical Engineering Evaluation

Prepared for:
SYNCOM SPACE SERVICES LLC
SESI Project No: M22-009
April 15, 2022

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April 15, 2022

SYNCOM SPACE SERVICES LLC
Stennis Bldg 1100 – Rm 11162H
NASA John C. Stennis Space Center, MS

ATTENTION: Mr. Allen Blow, QCxP
CM/PMO Manager

REFERENCE: Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
SESI Project No: M22-009

Dear Mr. Snyder:

Southern Earth Sciences, Inc (SESI) has completed the subsurface investigation and geotechnical engineering evaluations for the referenced project. This report presents our understanding of the available project information, presents the information collected in our subsurface investigation, and provides our geotechnical engineering recommendations for design and construction of the proposed facility.

We appreciate this opportunity to be of service and look forward to our continued involvement throughout Final Design and Construction Phases of this project. Please do not hesitate to contact us if you have any questions.

Sincerely,

SOUTHERN EARTH SCIENCES, INC.

Caleb Davis

Caleb Davis, E.I.
Project Manager

Matt Coaker, P.E.
Vice President
Registered, Mississippi 20360

ROBERT MATTHEW COAKER
LICENSED PROFESSIONAL
ENGINEER
4/20/22
20360
STATE OF MISSISSIPPI

CD, mc

Attachments

SYNCOM SPACE CENTER

Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
SESI Project Number: M22-009
April 15, 2022

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SYNCOM SPACE CENTER

Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
SESI Project Number: M22-009
April 15, 2022

APPENDIX 1

Test Location Plan

APPENDIX 2

CPT Sounding Logs and Soil Boring Logs

APPENDIX 3

Laboratory Test Results

APPENDIX 4

L-Pile Evaluation Results
Shaft Simulated Load vs. Deflection Plot

SYNCOM SPACE CENTER
Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
SESI Project Number: M22-009
April 15, 2022

1.0 PROJECT DESCRIPTION AND STRUCTURAL LOADING INFORMATION

Based on our understanding of the provided information, the project will consist of a new building addition to the existing high pressure gas facility at Stennis Space Center. Associated access drive and paving is also planned. The addition is to have a plan area of approximately 3,800 square feet, with precast concrete walls and steel roof framing. The addition will be supported by Auger-Cast Concrete Pile Foundations and will include a grade supported slab. Outlined below is a summary of the provided loading information. No site grading, topographic or additional detailed project information was available at this time. Final site grades have been assumed to be near or within about a foot of existing site grade.

1.1 Provided Loading Information

- Max Downward Column Reaction = 53 kips
- Max Upward Column Reaction = 35 kips
- Max Lateral Column Reaction = 15 kips
- Max Floor Slab Load = 150 psf

2.0 FIELD INVESTIGATION

A total of two (2) Cone Penetrometer Test (CPT) soundings and four (4) manual auger borings were performed within the proposed building and pavement areas. CPT soundings and Soil Borings were performed by SES field crews at the approximate locations shown on the Test Location Plan included in **Appendix 1**. Test locations were located in the field by SES staff using handheld GPS accurate to within about 25 feet.

CPT_u soundings were performed in general accordance with ASTM Specification D-5778 using a truck mounted 20-ton Hogentogler Electronic CPT rig. CPT soundings were advanced to depths ranging from approximately 40 to 55 feet below the existing ground surface. Soil classifications were interpreted from methods recommended by Robertson and Campanella. Correlations between Cone Resistance values and Standard Penetration Testing "N" values were performed according to the methods developed by Robertson, Campanella and Wightman. The soil types and stratigraphy shown on the CPT Log sheets are based upon material parameters measured and evaluated as the cone is advanced. CPT Log sheets graphically showing the cone tip resistance, friction, equivalent N60-value and interpreted soil behavior type at each sounding location are attached in **Appendix 2**.

Manual auger borings were advanced to approximately 5 feet below existing site grades. Representative portions of soil samples obtained during the investigation were transported to our laboratory where they were examined by an engineer and visually classified in accordance with the USCS Soil Classification System. Soil Descriptions, boring depths and soil classifications are shown on the appropriate Manual Auger Boring Logs attached in **Appendix 2.**

3.0 LABORATORY TESTING

Laboratory testing included physical examination and general classification testing of samples obtained during the soil test boring operation. The general classification testing included Moisture Content Determination (ASTM D 2216), No. 200 Sieve Washes (ASTM D 1140), and Atterberg Limits Tests (ASTM D 4318). Test results are included on Soil Boring Logs attached in **Appendix 2** and on Laboratory Test Data Summary Sheets attached in **Appendix 3**.

4.0 GENERALIZED SUBSURFACE CONDITIONS

The subsurface descriptions below are generalized to highlight the major subsurface stratigraphy encountered across the site. The Soil Boring Logs, CPT Sounding Logs attached in **Appendix 2** present specific information at individual boring location including soil description, stratification, ground water level, soil strength and laboratory tests results. This information is representative of conditions encountered at the test locations. Variations may occur and should be expected between test locations. The stratification represents the approximate boundary between subsurface materials as the actual transition may be gradual.

Typically, beneath approximately 6 inches of topsoil (up to 1.5 feet of topsoil was encountered at HA-6), soils encountered within the upper 3 to 4 feet consist of loose to medium dense silty and clayey sands and soft to medium stiff silts and clays. Beneath 3 to 4 feet soils consist of soft silt and clay to a depth of 7 to 9 feet underlain by dense sand and silty sand to a depth of approximately 15 feet. Beneath 15 feet at location CPT-1, soft silt and clay with thin layers of medium dense silty sand and sand was encountered to a depth of 41 feet underlain by very dense sand to termination of the sounding due to refusal at 45 feet. Location CPT-2 encountered soft silt and clay to a depth of 26 feet underlain by medium dense to dense silty sand and sand to a depth of 36 feet. Below 36 feet at location CPT-2 soils consist of medium stiff silt and clay to a depth of 39 feet underlain by dense sand to a depth of 44 feet and medium stiff silt and clay to a depth of 46 feet. Beneath 46 feet soils consist of very dense sand to termination of the sounding at 55 feet beneath the existing ground surface.

4.1 Groundwater

Groundwater levels encountered across the site at the time of our investigation varied with location with several shallow auger borings not encountering water within 4 feet of the ground surface. Groundwater was encountered at approximately 3 feet below the existing ground surface at test location HA-5.

Both CPT sounding holes collapsed at depths of approximately 3 feet below the existing ground surface. Both CPT sounding holes caved in upon removal of the CPT rods with no free water being observed at the cave-in depth. A hole collapse often occurs at or slightly above the groundwater or saturated soil level but can also occur due to the presence of loose soils without the presence of groundwater. The shallow collapsed depths at both locations are likely the result of perched groundwater caused by the low permeability silty and clayey soils present within the upper reaches of much of this site.

Groundwater depths should be verified at the time of construction for cases where groundwater variations are potentially significant for construction. Fluctuation in the groundwater table will occur due to variances in rainfall, elevation, drainage, types of soil encountered and other factors not evident at the time measurements were made. Reference to depth has been made with respect to the existing ground surface encountered at the time of our field investigation. Groundwater levels encountered at each test location at the time of our investigation are shown on the appropriate CPT sounding or Soil Boring Logs attached in **Appendix 2.**

5.0 FOUNDATION CONSIDERATIONS

Due to the settlement potential of soft, compressible soils encountered between depths of about 4 to 7 feet and between 15 and 25 feet at both locations and between 30 and 40 feet at location CPT-1, conventional shallow foundations are not considered a viable alternative for support of the anticipated building at this site. The anticipated lightly loaded floor slab may be grade supported after proper subgrade preparation that will be discussed in the following sections of this report

A deep pile foundation system is recommended for support of the load bearing foundations of this structure. Pile foundations will provide positive foundation support by transferring structural loads through the upper soft in-situ soils to the dense sand strata encountered beginning at a depth of approximately 45 feet below existing grade. Pile foundation recommendations are outlined in the following section of this report.

6.0 PILE FOUNDATION RECOMMENDATIONS

Our engineering evaluations have been based on the project information previously described in this report and on subsurface information obtained during the investigation. In evaluating the CPT Soundings, we have used empirical correlations previously established between standard penetration resistances, cone tip and side resistance values, soil index properties and foundation stability. Soil parameters used in our evaluation were derived from the CPT sounding data using the interpretation software RAPID CPT® by Dataforensics. Pile capacity estimates have been developed using SHAFT version 2012 software.

6.1 Axial Pile Capacity Estimates

Provided in the following table is our recommended pile penetration depths (referenced to site grade at the time of our investigation) for Auger-Cast Concrete Piles (ACP). Additional pile types, sizes, and lengths may be considered at your request.

TABLE 1

PRESTRESSED CONCRETE PILE CAPACITIES

Recommended Penetration Below Existing Grade (feet)	Pile Size (inches)	Allowable Axial Compressive Capacity (tons)	Allowable Axial Tension Capacity (tons)
50	14	40	16
	16	50	20
	18	60	22

Allowable pile capacities presented in the previous tables are based on static capacity calculations using a Factor of Safety (FOS) of 2.0 for compression and 2.5 for tension. Piles were designed to develop their capacity from side resistance and end bearing in the very dense sand stratum encountered beginning at depths below 45 feet below the ground surface.

We have assumed that final site grade will be within about two (2) feet of existing grade. If more than about 2 feet of fill is planned, then a reduction in the allowable design compression pile capacity will be required to account for down-drag forces. Down drag forces are a result of negative

(downward) side resistance generated on the piles as soft and loose soils feet consolidate and settle as a result of fill loads.

The pile lengths, sizes and capacities presented are based on soil-pile interaction and do not consider the structural aspects of the pile. Pile lengths and penetration depths are measured from the existing ground surface.

6.2 Pile Installation Considerations

In considering the use of auger cast in-place piles, it has been our experience that the equipment, experience and installation technique on the part of the contractor are crucial to successful pile performance. Careful monitoring and recording of the auger cast pile installation should be performed by an experienced technician to help identify possible installation problems. We recommend a minimum center-to-center spacing for auger cast piles of three (3) diameters (3d). Piles should not be installed adjacent to newly placed piling until the concrete has cured for at least 24 hours.

6.3 Lateral Pile Capacity Evaluation

Pile response to assumed shear forces applied to the pile top were evaluated using LPILE® version13 software. LPILE software employs p-y analysis to determine deflections at the pile top under specific loading conditions. Parameters used in the analysis have been correlated from empirical data using standard penetration resistance "N" values (correlated with accepted geotechnical references), measured CPT tip and side resistances and our knowledge of and experience with similar soil conditions.

Although detailed foundation and lateral loading information has not yet been developed, we have evaluated 14, 16 and 18-inch diameter Auger-Cast piles under various loading scenarios. Shear forces applied to the pile top were varied based on pile response to produce deflections of up to about 0.5 inch. Piles were modeled using fixed head conditions with lateral loads applied at the pile top. ULTIMATE Lateral Deflection, Moment and Shear vs. Depth plots are attached in **Appendix 4**. Piles were modeled with no axial load or bending moment applied to the top of the pile. It should be noted however, that axial uplift loads generally reduce the lateral capacity from that indicated by this analysis, while axial compressive loads increase the lateral capacity

An appropriate Factor of Safety between 2.0 and 3.0 should be applied by the design depending on the sensitivity of the design to deflection or moment capacity. Evaluation of the structural capacity of the piles to withstand shear forces and bending moments generated by lateral loading is beyond

the scope of this investigation and should be determined by the structural design engineer of record. Assumed reinforcement scheme and Load Cases are summarized in the following Table.

TABLE 2 - AUGER-CAST CONCRETE PILE

LATERAL PILE LOAD CASE SUMMARY

Pile Type and Size	Assumed Reinforcement Configuration	L-Pile® Loading Case Designation	Applied Shear Force
14-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 5 - #5 rebar	Loading Case 1	5 kips
		Loading Case 2	10 kips
		Loading Case 3	12 kips
16-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 6 - #6 rebar	Loading Case 1	7.5 kips
		Loading Case 2	15 kips
		Loading Case 3	18.5 kips
18-inch Auger-Cast Concrete Pile (4,000 psi grout)	15 ft cage with 6 - #6 rebar	Loading Case 1	7.5 kips
		Loading Case 2	15 kips
		Loading Case 3	22.5 kips

Note – Design static ground water level selected at 3 feet below existing grade

6.4 Pile Settlement

Settlement of individual piles properly installed to the design depths and loaded to the design capacities shown in Table 1 for the respective areas of the site will be less than 1 inch at service load. Attached to assist the designers with modeling pile stiffness is a simulated load vs. deflection plot generated in the SHAFT capacity estimation program from our static capacity estimates.

Based on our experience with similar projects in comparable soil conditions, groups of piles (less than 3 to 5 piles) installed at the recommended minimum center-to-center spacing of 3 diameters (3d) or greater are expected to undergo settlements of less than 1 inch due to group effects.

6.5 Group Efficiency

The ultimate capacity of a pile cluster depends on the characteristics of the supporting soil, pile length, pile spacing, pile shape and the effects of pile installation. For a minimum center to center pile spacing of three (3) diameters, a reduction in capacity due to group effects should not be

required. We recommend using a group efficiency factor of 1.0 for this project. Group effects should be evaluated once actual pile length, capacity and layout has been established.

6.6 Test Pile Program

We will be available to assist in developing a comprehensive test pile program once foundation plans for the project have been developed. For planning and budgeting purposes, we recommend a Test Pile Program that includes installing one (1) test pile for compression load testing. If design tension loads are in excess of 60 percent of the recommended allowable tension capacity, plans should be made to install an additional tension test pile for Static Tension Load testing. Tension testing of the compression test pile is not recommended.

Test piles should be installed at locations such that they will not interfere with foundations and will not be incorporated into the planned foundations. Since adjustments of the pile lengths and/or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the direct supervision of the project geotechnical engineer of record.

Static compression load test procedures should be as described in ASTM Specification D 1143. The test procedure will be to apply units of load and obtain pile deflection readings over a period of time at each load increment until the specified load is reached. Compression tests should be conducted to failure or 3.0 times the design load. The load shall be removed in prescribed units and intervals of time.

If static tension load testing is determined to be required, tension testing should be performed on a separate pile installed and reinforced specifically for tension testing. The tension load test is described in ASTM Specification D 3689. Tension load testing of a pile that has been tested in compression is not recommended.

During Auger-Cast Pile installation, we recommend instrumenting all test piles for Thermal Integrity Profiling (TIP). The TIP system, manufactured by Pile Dynamics, Inc. (PDI) in association with Foundation and Geotechnical Engineering, LLC (FGE), measures concrete temperatures during curing using thermal instrumented cables imbedded in the concrete along the pile/shaft length. The Thermal Wire® cables consist of temperature sensors spaced every 12-inches along the ordered cable length. The TIP automatically measures temperature at each sensor at specified time intervals (typically every 15 minutes) by a battery powered Thermal Acquisition Port (TAP) allowing the concrete curing process to be monitored. During the curing process, heat generated during cement

hydration is recorded and used to create a profile of temperature versus depth. Analysis of the temperature measurements can then be used to evaluate concrete quality and cover at each cross section along the pile/shaft length. Thermal Wire® cables, Thermal Acquisition Ports (TAPs), data collection and analysis should be in accordance with ASTM D7949.

All test sections, equipment and installation procedures should be the same as those to be used during production pile installation. Pile load test results would be used to verify the placement procedures and that the pile section produces the desired design capacity. The test piles, equipment, and installation procedures should be the same as those planned for use in the foundation. Since adjustments of the pile lengths or installation procedures may be made based on the test pile installation and load test results, we recommend the test pile program and production pile installation be performed under the supervision of the SESI Project Geotechnical Engineer of Record.

7.0 GRADE SUPPORTED FLOOR SLABS

Proper subgrade preparation, including limited undercutting and backfilling with select structural fill, will allow grade support of lightly floor slabs independent of pile supported foundations. Deep undercutting and replacement of soft soils within the upper 5 to 7 feet of the entire floor slab area would be a conservative approach for reducing settlement and to minimize the potential for delays in site grading operations due to unstable soil conditions. As a cost saving measure, it is our opinion that instead of completely excavating and replacing all soft soils within the upper several feet of the entire building area, excavations beneath floor slab areas may be limited to depths necessary to remove all topsoil and organics, to allow the contractor to establish a stabilized construction platform, and to ensure placement of at least 2 feet of Imported Select Granular Fill below floor slab subgrade elevation. Detailed subgrade preparation recommendations are outlined below.

Effective drainage, including ditching and positive grading, should be established across the working areas during the initial stages of site stripping and should be modified as necessary during construction. After establishing effective site drainage, the initial step in site preparation should be the complete removal of topsoil and surface organics extending laterally to at least 5 feet outside construction areas. All excavated soils should be wasted or stockpiled for re-use in nonstructural areas.

To provide separation between foundations and the insitu silty and clayey soils, excavations should be continued to 2 feet Below floor slab subgrade elevation in the building area. Exposed surfaces should be leveled and compacted as much as conditions at the time of construction will allow. Care should be taken to ensure that any excessively soft or yielding soils are undercut to firmer materials and backfilled with

well compacted fill. We recommend the excavation and backfilling operation should be observed by and experienced soils technician under the direct supervision of the Geotechnical Engineer of Record.

If saturated conditions are encountered, the initial lifts should consist of clean sand with less than about 10 percent (by weight) passing the No. 200 mesh sieve and 70 percent or less (by weight) passing the No. 40 mesh sieve. Clean sand should be placed to a distance of 18 inches above the saturated soil level or as necessary to provide a stable surface capable of supporting compaction efforts to final subgrade elevation. Below and within one foot of the groundwater/saturated soil level, in lieu of measured compaction test, Clean Sand Fill should be thoroughly compacted with heavy tracked equipment to achieve some compaction and fill voids.

Fill materials place above the clean sand and saturated soil conditions should consist of Select Structural Fill which is defined as a sand or silty sand with 35 percent or less of the soil particles (by weight) passing the No. 200 mesh sieve, 80 percent or less of the soil particles (by weight) passing the No. 200 mesh sieve and a liquid limit of less than 25. Select Structural Fill should be placed in lifts of 8 inches of loose material and compacted to at least 98 percent of the Standard Proctor maximum dry density as determined by ASTM D698 moisture content between 1 percentage point below and 3 percentage points above the optimum moisture content.

For slab design purposes, a modulus of subgrade reaction (*k*) 150 pci may be used. This value is provided assuming that floor slabs will bear on imported compacted clean sand or Select Structural Fill soils with a California Bearing Ratio (CBR) of at least 10.

Polyethylene sheeting may be placed at the discretion of the design engineer to act as a vapor retarder where the floor will be in contact with moisture sensitive equipment or products such as tile, wood, carpet, etc. The vapor barrier and placement details should be selected by the design engineer after considering the moisture sensitivity of floor finishes and the potential effects of slab curling and cracking. Backfill in all utility line trench areas supporting slabs should be properly moisture conditioned and carefully compacted to reduce the differential backfill settlement and resulting cracking in slabs extending over these areas.

8.0 PAVEMENT DESIGN RECOMMENDATIONS

Our evaluation of site paving has been based on subsurface information obtained from the site, references to empirical correlations previously established between soil index properties and pavement/subgrade stability observed in soil conditions similar to those encountered at the subject site. Detailed traffic loading and volume information was not available at the wring of this report. An Average Daily Traffic

(ADT) Volume of approximately 5 loaded MS Concrete Trucks or MS-HS long truck vehicles was provided by the design team as the basis of pavement design for this project. The design is based on a 20-year design life. Medium duty pavement build-up recommendations for automobile parking areas have been based on the assumption that traffic will consist of passenger cars and light trucks. We should be notified if actual traffic information differs so that we may determine how these changes affect the design.

8.1 Medium Duty Asphalt Pavement

The pavement section outlined below is recommended for Medium Duty Asphalt Paving (Automobile Parking areas).

- **1.5** inches Bituminous Concrete Wearing Surface Layer
- **1.5** inches Bituminous Concrete Binder Layer
- Bituminous Tack Coat
- **6.0** inches Crushed Aggregate Base, MDOT 703.04.3 size 825B, (100 % ASTM D1557)
- **24** inches (Minimum) Clean Sand or Structural Fill Subgrade (compacted to 95% ASTM D1557)

- **Note 1:** Crushed Aggregate Base should extend one (1) foot behind curb or beyond edge of pavement
- **Note 2:** Improved Subgrade should extend two (2) feet behind curb or beyond edge of pavement

8.2 Heavy Duty Asphalt Pavement

The pavement section outlined below is recommended for Heavy Duty Asphalt Paving (Driveway or truck parking areas).

- **2.0** inches Superpave Bituminous Concrete Wearing Surface Layer
- **2.0** inches Superpave Bituminous Concrete Upper Binder Layer
- Bituminous Tack Coat
- **6.0** inches Crushed Aggregate Base, MDOT 703.04.3 size 825B, (100 % ASTM D1557)
- **24** inches (Minimum) Clean Sand or Structural Fill Subgrade (compacted to 95% ASTM D1557)

- **Note 1:** Crushed Aggregate Base should extend one (1) foot behind curb or beyond edge of pavement
- **Note 2:** Improved Subgrade should extend two (2) feet behind curb or beyond edge of pavement

8.3 Medium Duty Rigid Concrete Paving

The pavement section outlined below is recommended for Medium Duty Rigid Concrete Paving (Driveway and Truck Parking Areas).

- **7.0** inches Portland Cement Concrete
- **4.0** inches Crushed Aggregate Base, MDOT 703.04.3 size 825B, (100 % ASTM D1557)
- **24** inches (Minimum) Clean Sand or Structural Fill Subgrade (compacted to 95% ASTM D1557)

Note 1: Crushed Aggregate Base should extend one (1) foot behind curb or beyond edge of pavement
Note 2: Improved Subgrade should extend two (2) feet behind curb or beyond edge of pavement

8.4 Heavy Duty Rigid Concrete Paving

The pavement section outlined below is recommended for Heavy Duty Rigid Concrete Paving (Driveway and Truck Parking Areas).

- **8.0** inches Portland Cement Concrete
- **4.0** inches Crushed Aggregate Base, MDOT 703.04.3 size 825B, (100 % ASTM D1557)
- **24** inches (Minimum) Clean Sand or Structural Fill Subgrade (compacted to 95% ASTM D1557)

Note 1: Crushed Aggregate Base should extend one (1) foot behind curb or beyond edge of pavement
Note 2: Improved Subgrade should extend two (2) feet behind curb or beyond edge of pavement

8.5 Pavement Subgrade Preparation

Soils encountered within the upper 3 to 4 feet of this site consist of soft and loose, saturated silty and clayey soils that drain poorly and are not capable of providing satisfactory long term pavement support. Providing adequate separation between these soft upper insitu soils and final subgrade elevation will be required to help ensure satisfactory pavement performance. Subgrade preparation for pavement areas should be conducted as outlined above for grade supported floor slabs to include topsoil and organics removal placement of at least 24 inches of imported Select Granular Fill beneath final pavement subgrade elevation.

8.6 Pavement Geogrid Alternative

Based on our recent conversations, we understand that there could be existing utilities that may limit the ability to excavate and replace existing soils with the recommended minimum 24 inches of imported select structural fill. The use of geogrid may be incorporated into the pavement section to reduce the recommended Imported Select Granular Fill thickness below subgrade elevation from 24

inches to 12 inches. We recommend the use of Tensar Triaxial Geogrid Type TX-160 (or equivalent). After topsoil removal and leveling and compacting exposes surfaces as much as conditions at the time of construction will allow, the geogrid should be installed following the manufacturer's guidelines for overlapping and joining adjacent rolls. Geogrid placement should extend laterally to a minimum of 2 feet beyond the pavement perimeter.

8.7 Moisture Control and Drainage

One of the most destructive elements that a pavement will be subjected to in its design lifetime is the presence of excess moisture. The pavement sections presented in the following sections of this report are based on the assumption that effective site and subgrade drainage will be established and maintained during construction and throughout the design life of the pavement.

Pavements should be adequately sloped, and sufficient drainage provided such that excess water is allowed to run off before it can migrate into the pavement system. Sprinkler systems, if utilized in landscaped areas, should be properly installed and aimed such that they do not continually wet the paved surfaces. The use of clayey soils as backfill in nonstructural landscape islands and areas adjacent to pavements may be considered to help reduce moisture infiltration of rainfall and irrigation water into subgrade soils.

Perched groundwater and collection of rainwater within sandy fill soils during construction is possible and should be taken into consideration during the design and planning phases of this project. Trapped groundwater/collected rainwater will negatively affect the construction and service of pavements on this project. Under drains installed just above the lower permeability insitu soils within imported Select Structural Fill material as deemed necessary during construction would allow perched groundwater/collected rainwater to drain from the prepared subgrade section in into the storm water collection system. Installation of under drains should be considered at the base of sloped areas or anywhere that runoff is expected to accumulate to prevent continual saturation of the base course and subgrade soils.

Under drain materials, including the filter material, shall meet the requirements as outlined in the appropriate sections of the current edition of the MDOT Standard Specifications for Road and Bridge Construction (SSRBC). The pipe under-drain should be a 4 to 6-inch diameter perforated PVC pipe meeting the requirements of the MDOT SSRBC and installed in accordance with the current edition of the SSRBC. The geotextile filter/separation fabric shall be non-woven material meeting the

requirements of AASHTO M 288 for Class 2 Subsurface Drainage Geotextile and the appropriate sections of the MDOT SSRBC.

9.0 GENERAL COMMENTS AND LIMITATIONS

While the CPT soundings and borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated test locations and on the date explored.

This report has been prepared to aid in the evaluation of this project and to assist the engineers in the project planning and structural design. At the time of writing, changes were still being considered to foundations, site grading, and other aspects of the project that could have a significant impact on the applicability or relevance of the recommendations provided in this report. SESI should be consulted as the design process continues to ensure that the recommendations provided in this report are still applicable, and that they are being properly interpreted. Additional field exploration may be warranted/required as plans develop.

This report is intended for use with regard to the specific project discussed herein as we understand it at this time, and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering work and judgments rendered meet the standard of care of our profession.

The Geotechnical Engineer of Record should be retained by the Owner in the construction phase of the project so they can observe subsurface conditions revealed during construction, confirm that design assumptions are still applicable or provide revised recommendations based on conditions encountered during construction, and to help ensure that our recommendations are properly interpreted. We recommend that Southern Earth Sciences, Inc. be retained to perform observation and field-testing services during the site preparation and foundation construction.

SYNCOM SPACE CENTER

Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
SESI Project Number: M22-009
April 15, 2022

SYNCOM SPACE CENTER
Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
SESI Project Number: M22-009
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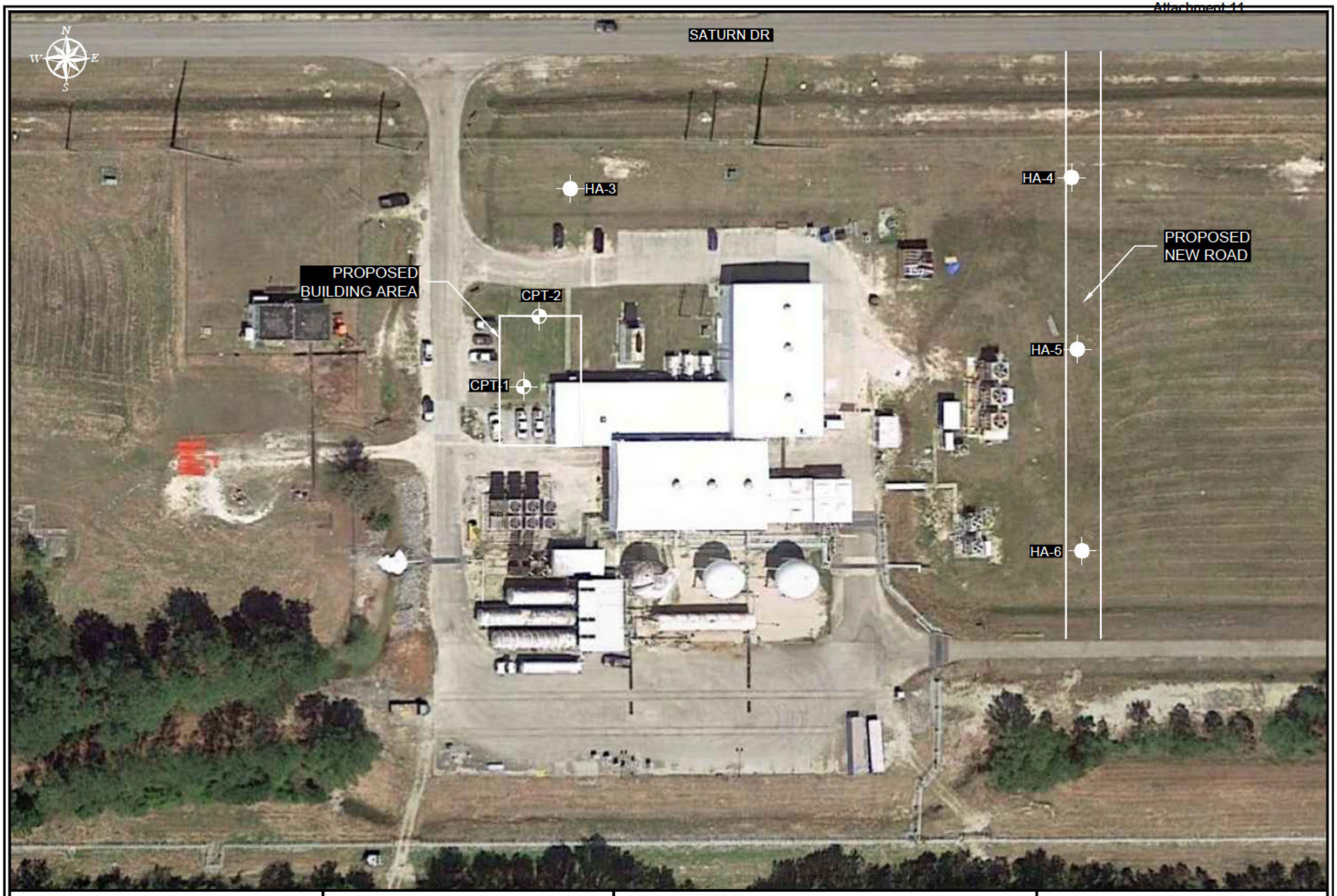
APPENDIX 1

Test Location Plan



NOT TO SCALE

CPT SOUNDING

HAND AUGER

SSC HIGH PRESSURE GAS FACILITY
BUILDING ADDITION
STENNIS SPACE CENTER, MS

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

TEST LOCATION PLAN
SESI JOB #: M22-009

SYNCOM SPACE CENTER
Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
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APPENDIX 2

CPT Sounding Logs and Soil Boring Logs

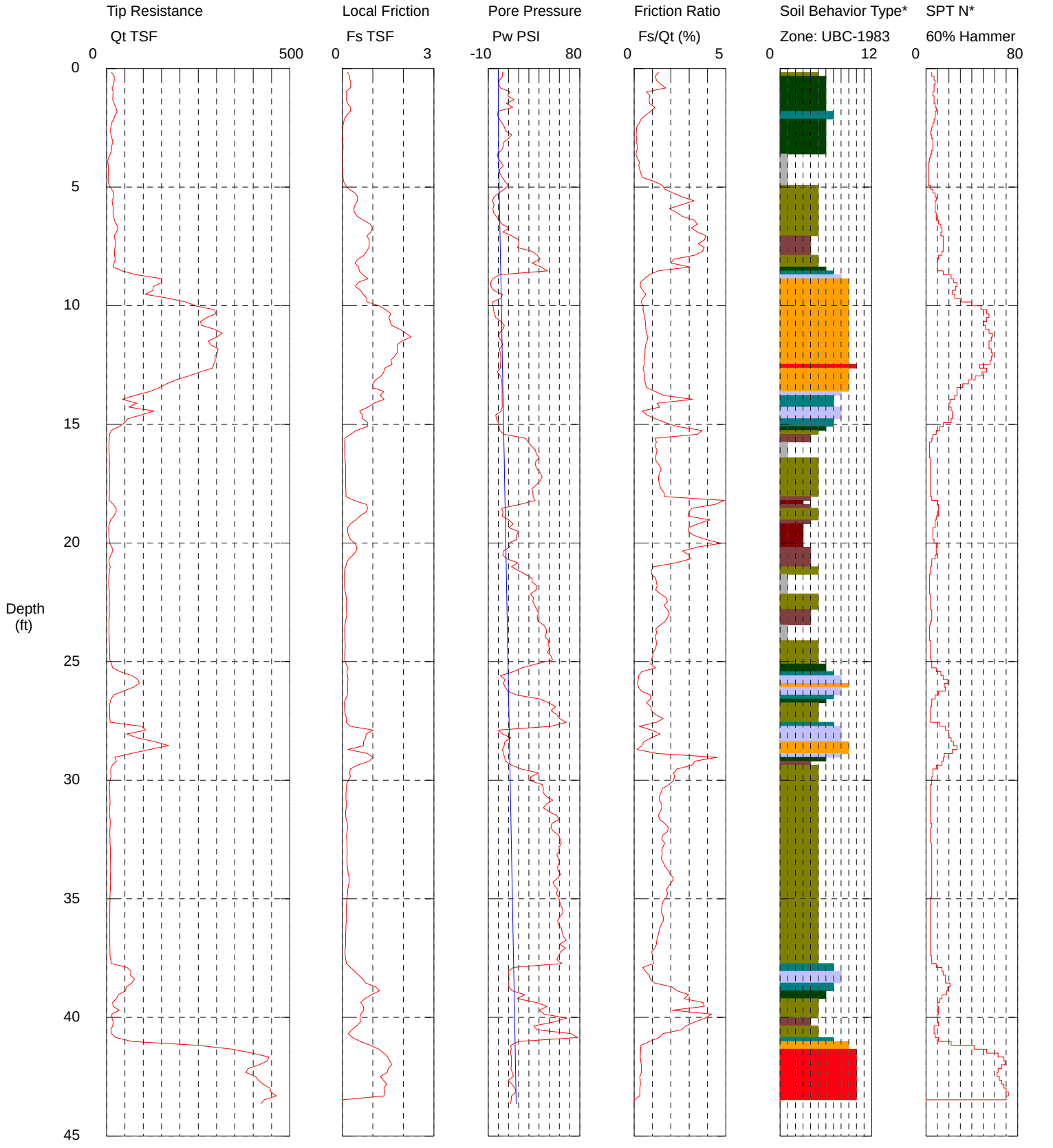
SOUTHERN EARTH SCIENCES

Southern Earth Sciences

80SSC023R0001
Attachment 11

Operator: Danny Hines
Sounding: CPT-1
Cone Used: DDG1349
GPS Data: N30.37554 W89.59976

CPT Date/Time: 1/13/2022 10:33:00 AM
Location: SSC HIGH PRESSURE GAS
Job Number: M22-009
Groundwater: Collapsed and dry at 3.1-ft.



Maximum Depth = 43.64 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

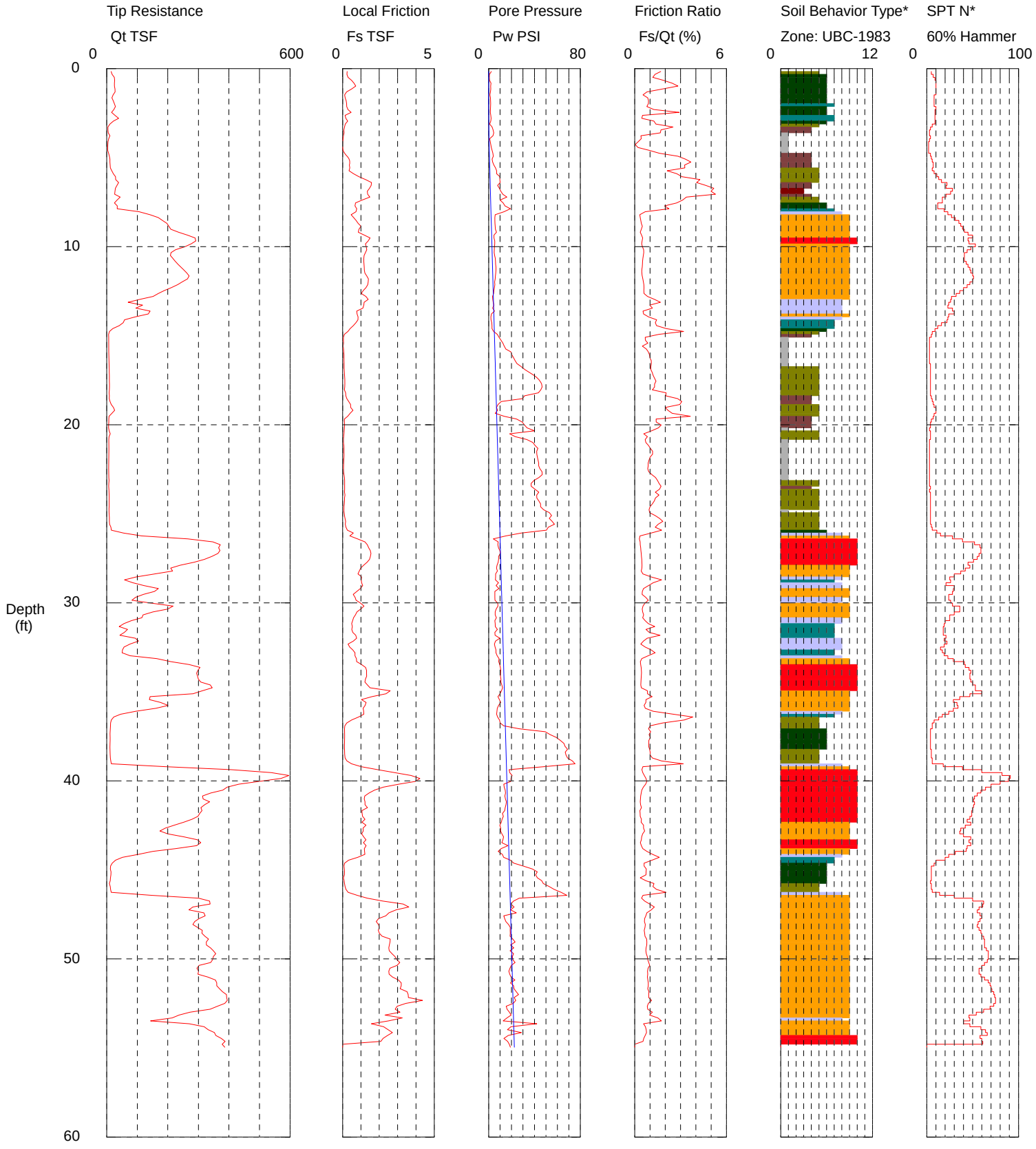
Refusal: Reaction.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences

Operator: Danny Hines
Sounding: CPT-2
Cone Used: DDG1349
GPS Data: N30.37567 W89.59972

CPT Date/Time: 1/13/2022 11:11:43 AM
Location: SSC HIGH PRESSURE GAS
Job Number: M22-009
Groundwater: Collapsed and dry at 3.1-ft.



Maximum Depth = 54.95 feet

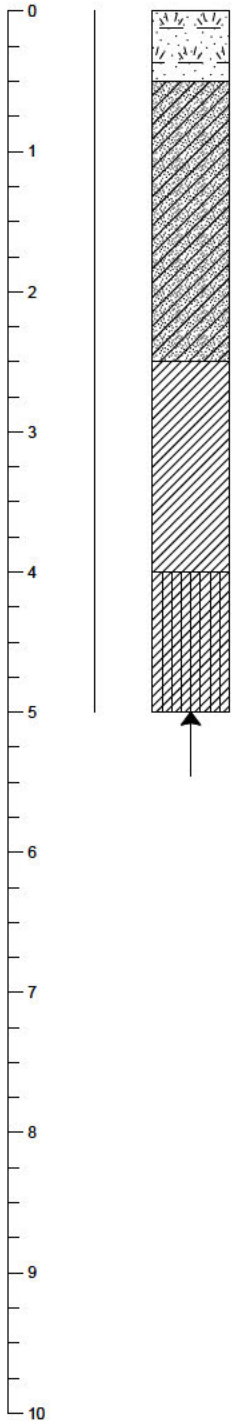
Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

SOIL BORING LOG

BORING NO.: HA-3
PROJECT: SSC HIGH PRESSURE GAS FACILITY **PROJECT NO.:** M22-009
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 01/13/22 **DATE COMPLETED:** 01/13/22
WATER LEVEL: NOT ENCOUNTERED **WATER LEVEL DATE:** 01/13/22
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREENE



Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	Moist. %	LL %	PI %	< #200 %
			TOPSOIL				
		SC	Brown Clayey SAND with Rock and Root				
		CL	Brown and Gray CLAY				
		CL-ML	Brown Silty CLAY A-4(1)	21.1	21	5	75

Remarks: N30.37591 W89.59965

SOUTHERN EARTH SCIENCES

SOIL BORING LOG

BORING NO.: HA-4
PROJECT: SSC HIGH PRESSURE GAS FACILITY **PROJECT NO.:** M22-009
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 01/13/22 **DATE COMPLETED:** 01/13/22
WATER LEVEL: NOT ENCOUNTERED **WATER LEVEL DATE:** 01/13/22
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREENE

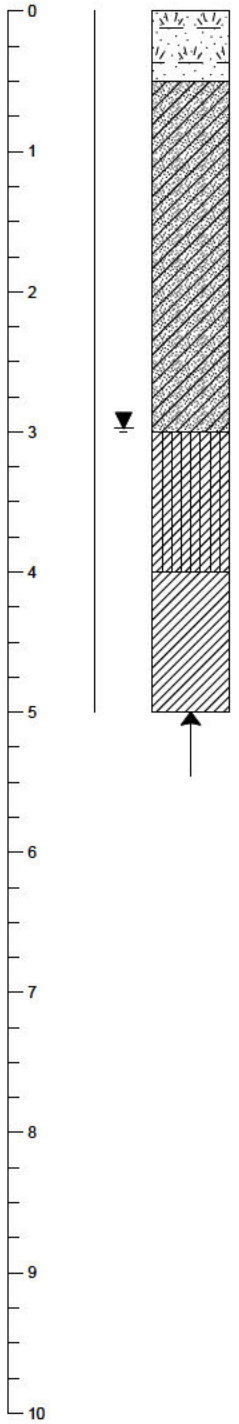
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	Moist. %	LL %	PI %	< #200 %
0			TOPSOIL				
		ML	Brown Sandy SILT				
3		CL	Brown CLAY				
4			A-4(5)	26.7	27	8	85
5							

Remarks: N30.37595 W89.59855

SOUTHERN EARTH SCIENCES

SOIL BORING LOG

BORING NO.: HA-5
PROJECT: SSC HIGH PRESSURE GAS FACILITY **PROJECT NO.:** M22-009
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 01/13/22 **DATE COMPLETED:** 01/13/22
WATER LEVEL: 3 ft **WATER LEVEL DATE:** 01/13/22
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREENE



Elevation / Depth	USCS	Description	Moist. %	LL %	PI %	< #200 %
		TOPSOIL				
	SC	Brown Clayey SAND				
	CL-ML	Brown Silty CLAY A-4(1)	26.7	21	5	70
	CL	Orange and Brown CLAY				

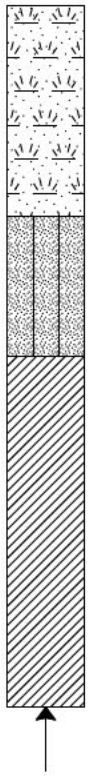
Remarks: N30.37561 W89.59857

SOUTHERN EARTH SCIENCES

GEOLOG WITH PI GFL BRARY DSM REV7-6-21.GLB SO_EARTH.GDT F:\PROJECTS\JOB FOLDERS\2022\22-009 SSC HIGH PRESSURE GAS FACILITY BUILD NG ADDITION\GINT\GINT.GPJ 3/3/22

SOIL BORING LOG

BORING NO.: HA-6
PROJECT: SSC HIGH PRESSURE GAS FACILITY **PROJECT NO.:** M22-009
PROJECT LOCATION: STENNIS SPACE CENTER, MS **METHOD:** HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN **BORING ELEVATION:** EXISTING GROUND
DATE DRILLED: 01/13/22 **DATE COMPLETED:** 01/13/22
WATER LEVEL: NOT ENCOUNTERED **WATER LEVEL DATE:** 01/13/22
GEOL / ENGR: C. DAVIS **DRILLER:** C. GREENE

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	Moist. %	LL %	PI %	< #200 %
0			TOPSOIL				
1		SM	Brown Silty SAND				
2		CL	Orange and Brown CLAY				
3							
4			A-4(4)	23.6	26	9	73
5							
6							
7							
8							
9							
10							

Remarks: N30.37522 W89.59853

SOUTHERN EARTH SCIENCES

SYNCOM SPACE CENTER
Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
Stennis Space Center, MS
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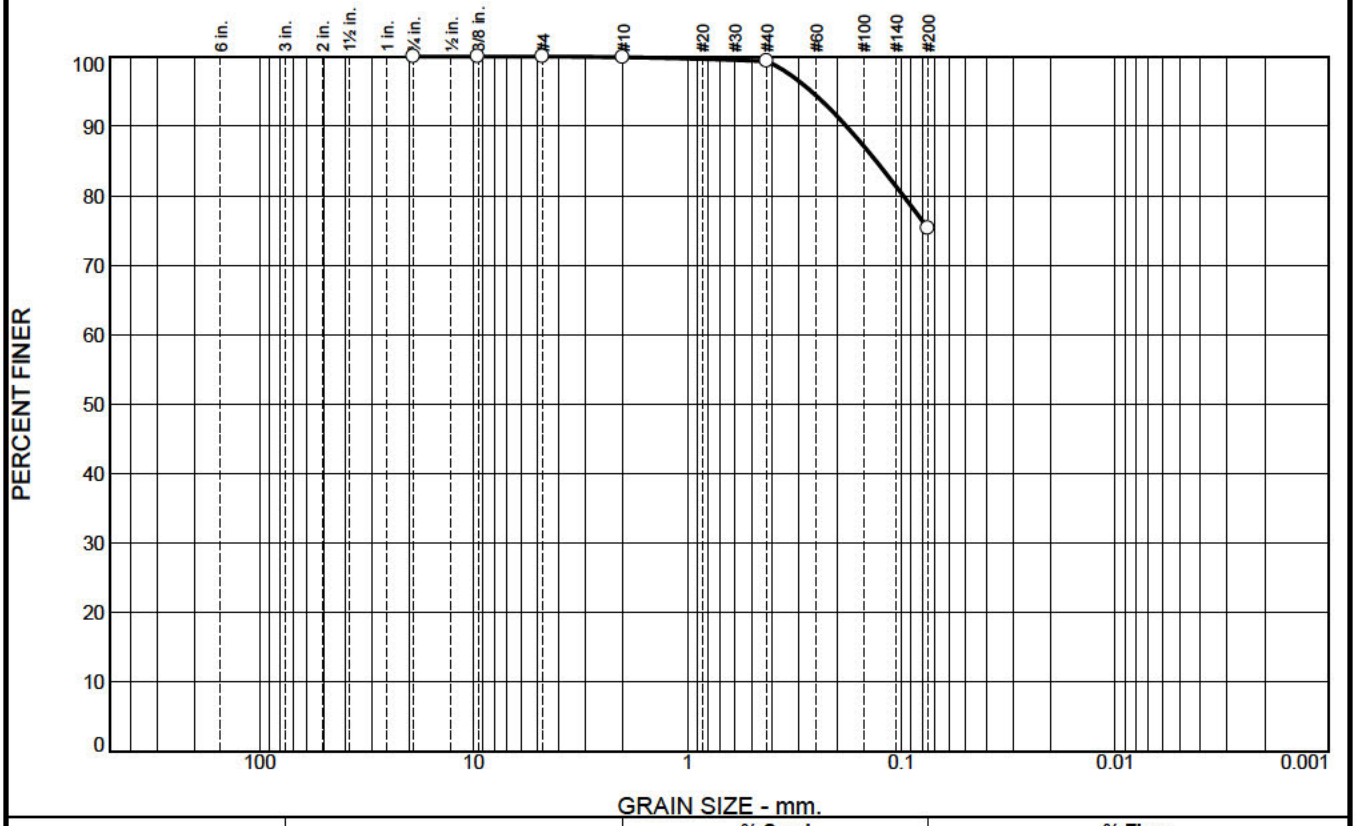
APPENDIX 3

Laboratory Test Results

Materials Testing Report	SOUTHERN EARTH SCIENCES Geotechnical | Environmental | Materials Testing	Tabulated Data Sheet
Client:	SYNCOM SPACE SERVICES LLC	**Date:** 01/31/22
Project:	SSC HIGH PRESSURE GAS FACILITY BUILDING ADDITION	**SESI Project No.** M22-009

Boring No.	*Sample No.*	*Sample Depth (ft)*	*USCS Symbol*	*AASHTO Symbol*	*Moisture Content (%)*	*Atterberg Limits*		*Passing No. 200 (%)*
						LL	*PI*	
HA-3	S-4	4.0-5.0	CL-ML	A-4(1)	21.1	21	5	75.3
HA-4	S-3	2.5-5.0	CL	A-4(5)	26.7	27	8	85.4
HA-5	S-3	3.0-4.0	CL-ML	A-4(1)	26.7	21	5	70.2
HA-6	S-4	2.5-5.0	CL	A-4(4)	23.6	26	9	72.9

Particle Size Distribution Report



% Cobbles	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0.0	0.1	0.5	24.1	75.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.9		
#40	99.4		
#200	75.3		

* (no specification provided)

Material Description

GREY SILTY CLAY W/ SAND

Atterberg Limits

PL= 16 LL= 21 PI= 5

Coefficients

D_{90}= 0.1807 D_{85}= 0.1314 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Source of Sample: HA-3 **Depth:** 4'-5'
Sample Number: S-4

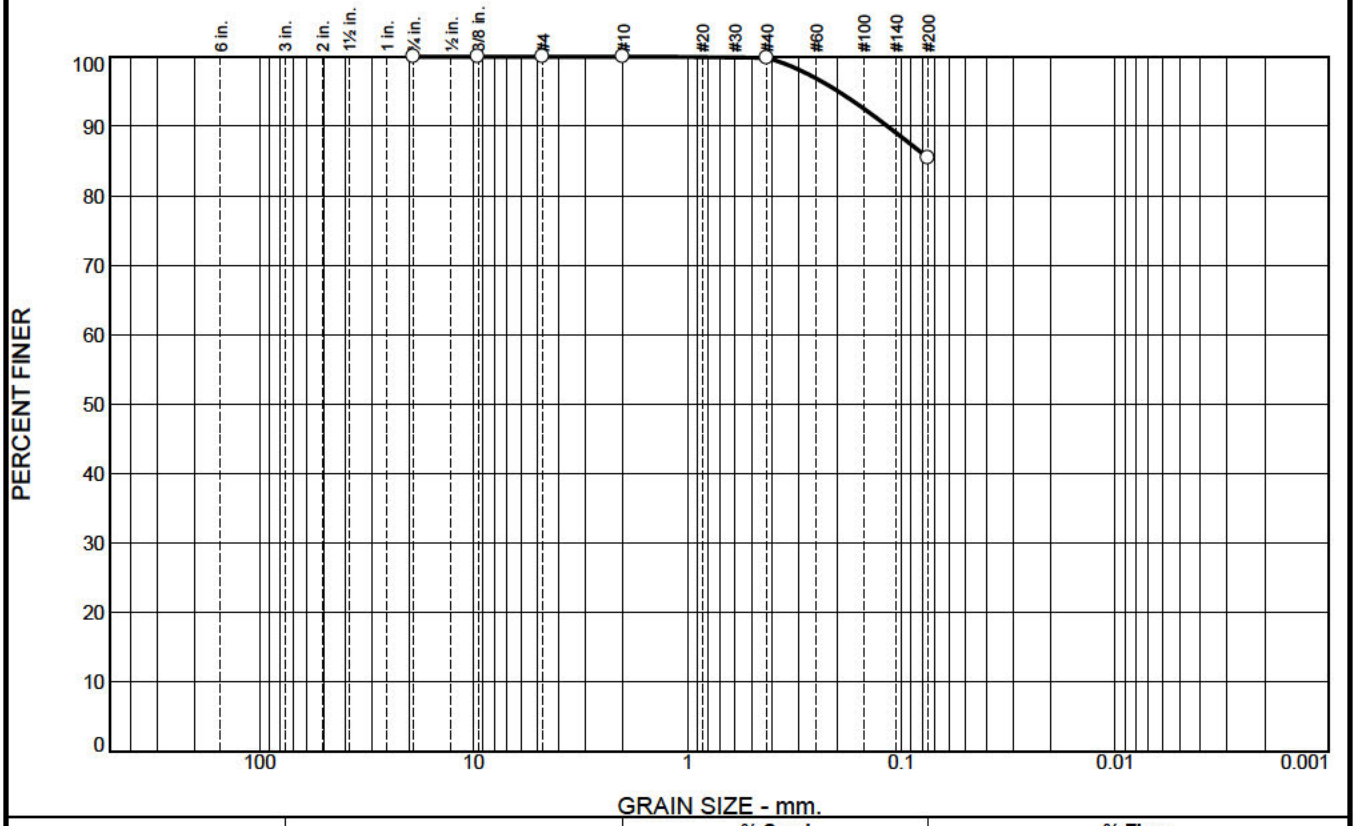
Date: 1/31/22

SOUTHERN EARTH SCIENCES
Mobile, Alabama

Client: SYNCOM SPACE SERVICES LLC
Project: SSC HIGH PRESSURE GAS FACILITY BUILDING ADDITION

Project No: M22-009 **Figure**

Particle Size Distribution Report



% Cobbles	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0.0	0.0	0.2	14.4	85.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	100.0		
#40	99.8		
#200	85.4		

* (no specification provided)

Material Description

GREY CLAY W/ SAND

Atterberg Limits

PL= 19 LL= 27 PI= 8

Coefficients

D_{90}= 0.1161 D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

Remarks

Source of Sample: HA-4 **Depth:** 2.5'-5'
Sample Number: S-3

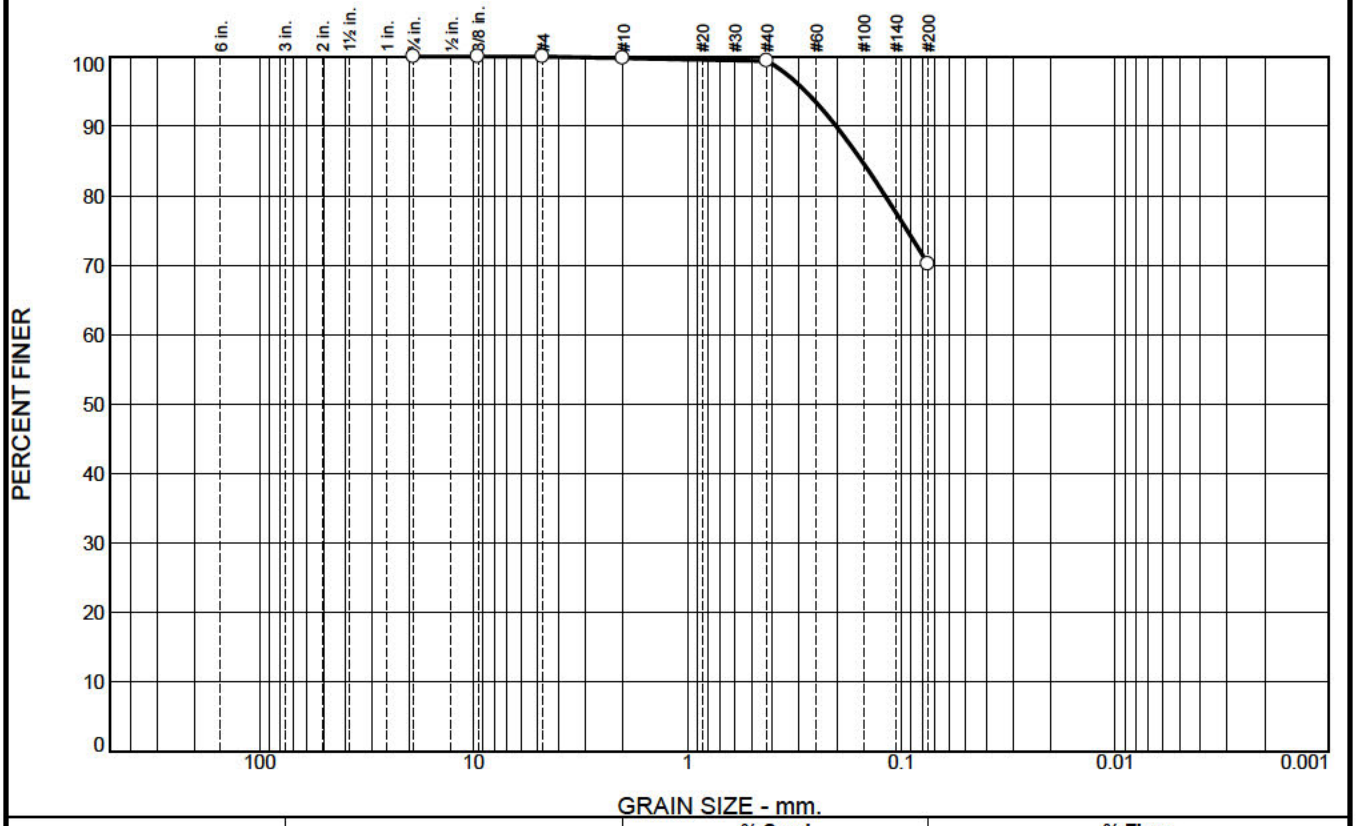
Date: 1/31/22

SOUTHERN EARTH SCIENCES
Mobile, Alabama

Client: SYNCOM SPACE SERVICES LLC
Project: SSC HIGH PRESSURE GAS FACILITY BUILDING ADDITION

Project No: M22-009 **Figure**

Particle Size Distribution Report



% Cobbles	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0.0	0.2	0.4	29.2	70.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.8		
#40	99.4		
#200	70.2		

* (no specification provided)

Material Description

GREY SANDY SILTY CLAY

Atterberg Limits

PL= 16 LL= 21 PI= 5

Coefficients

D_{90}= 0.2016 D_{85}= 0.1530 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Source of Sample: HA-5 **Depth:** 3'-4'
Sample Number: S-3

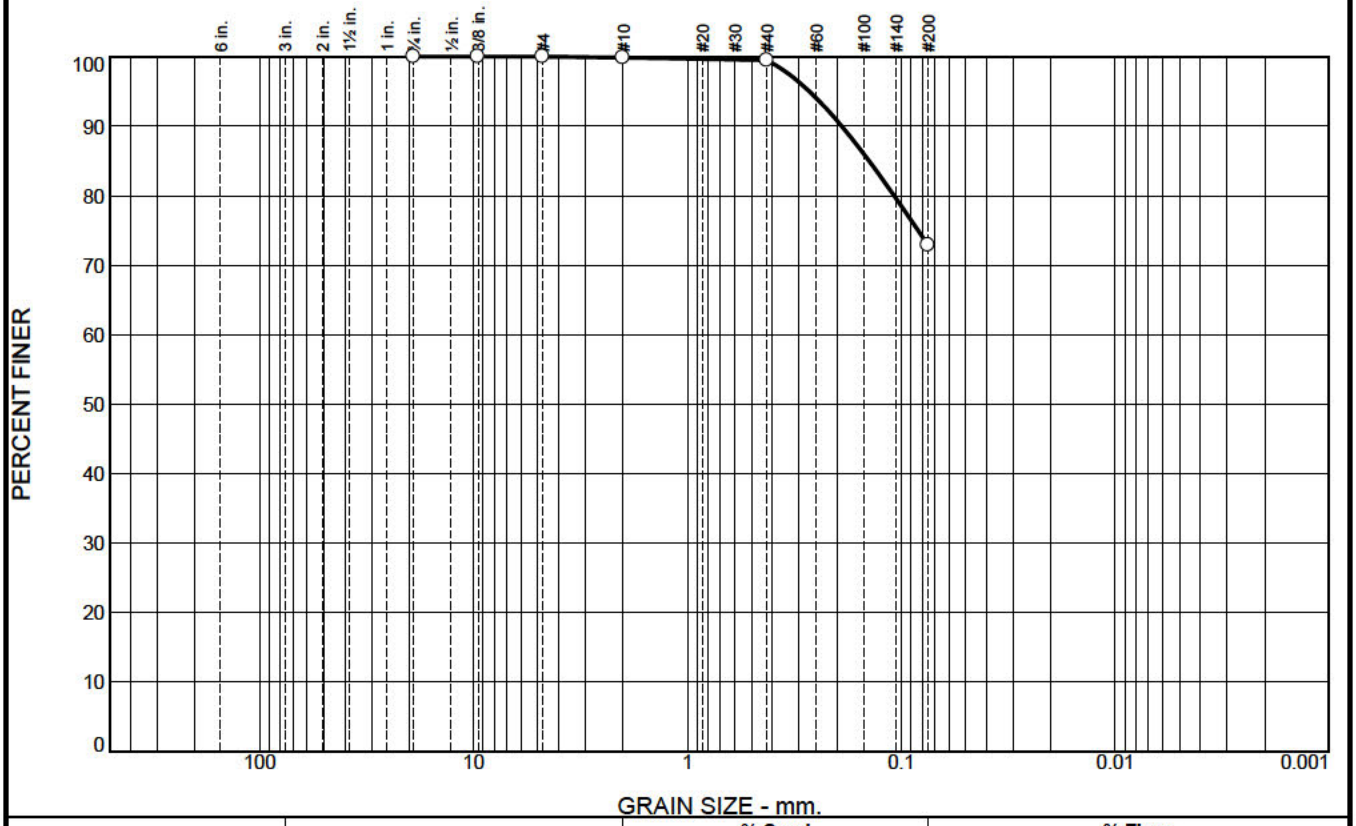
Date: 1/31/22

SOUTHERN EARTH SCIENCES
Mobile, Alabama

Client: SYNCOM SPACE SERVICES LLC
Project: SSC HIGH PRESSURE GAS FACILITY BUILDING ADDITION

Project No: M22-009 **Figure**

Particle Size Distribution Report



% Cobbles	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0.0	0.1	0.4	26.6	72.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.9		
#40	99.5		
#200	72.9		

* (no specification provided)

Material Description

GREY CLAY W/ SAND

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{90}= 0.1899 D_{85}= 0.1415 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(4)

Remarks

Source of Sample: HA-6 **Depth:** 2.5'-5'
Sample Number: S-4

Date: 1/31/22

SOUTHERN EARTH SCIENCES
Mobile, Alabama

Client: SYNCOM SPACE SERVICES LLC
Project: SSC HIGH PRESSURE GAS FACILITY BUILDING ADDITION

Project No: M22-009 **Figure**

SYNCOM SPACE CENTER
Report of Subsurface Investigation and Geotechnical Engineering Evaluation
SSC High Pressure Gas Facility Building Addition
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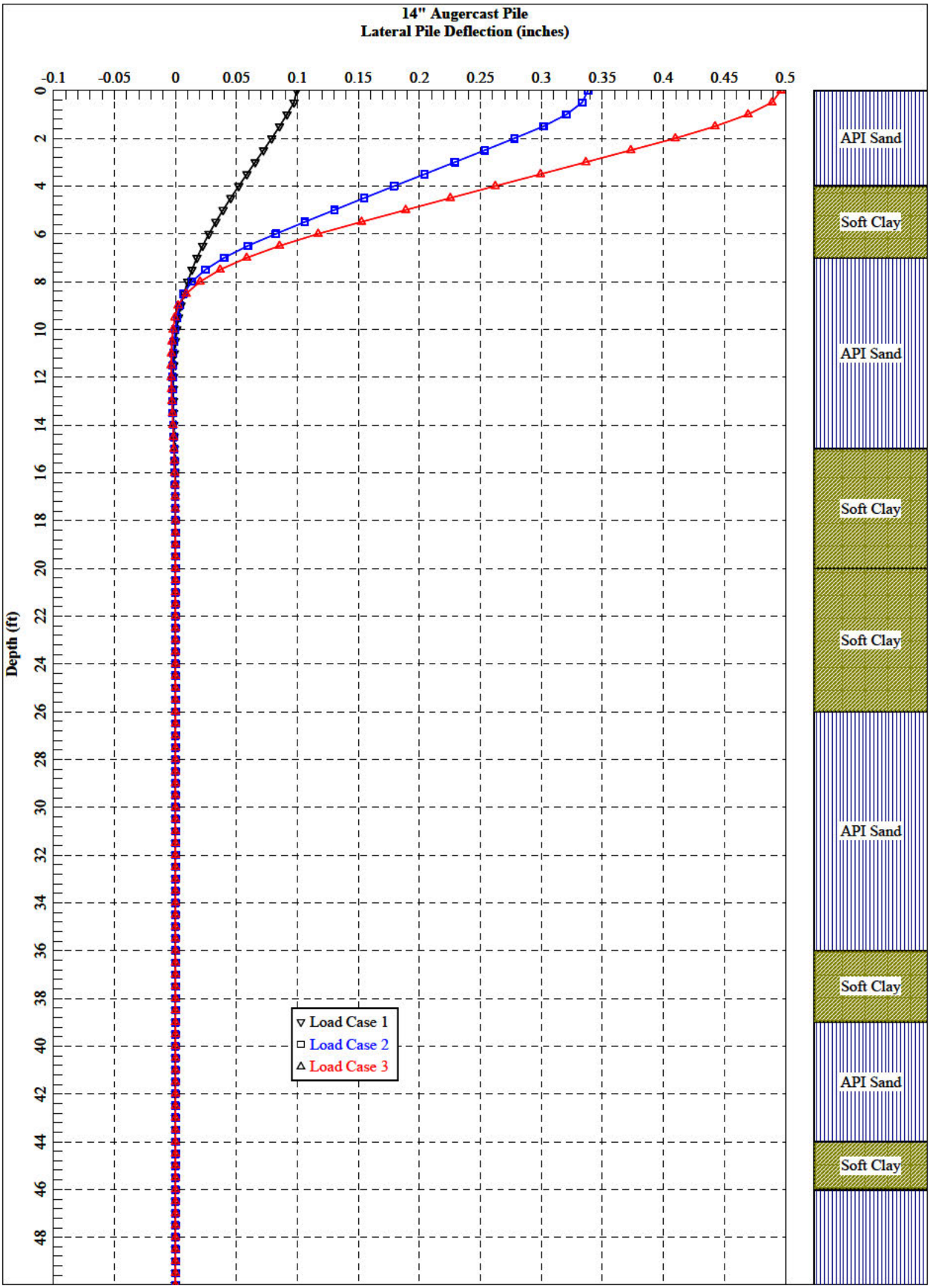
April 15, 2022

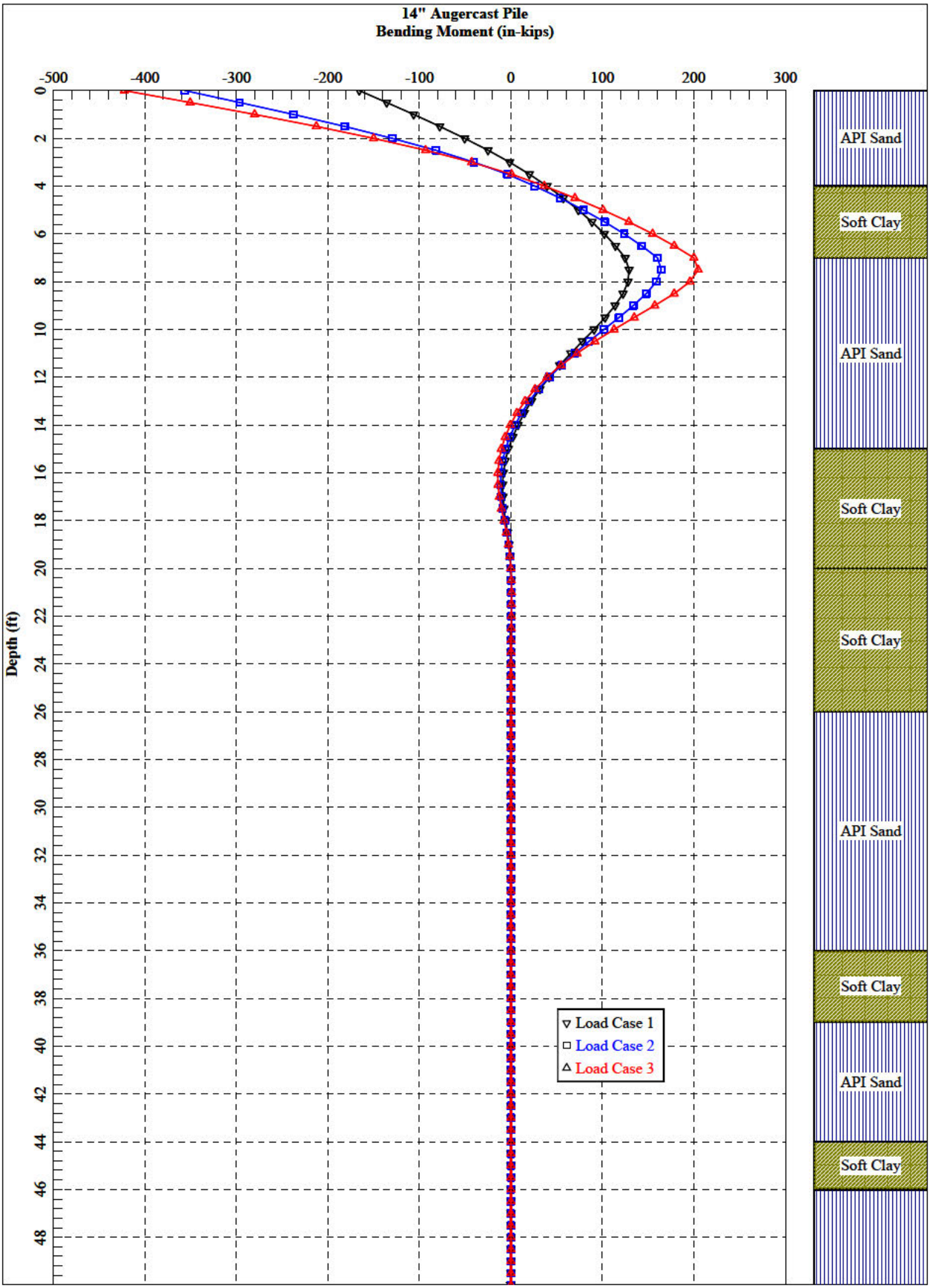
APPENDIX 4

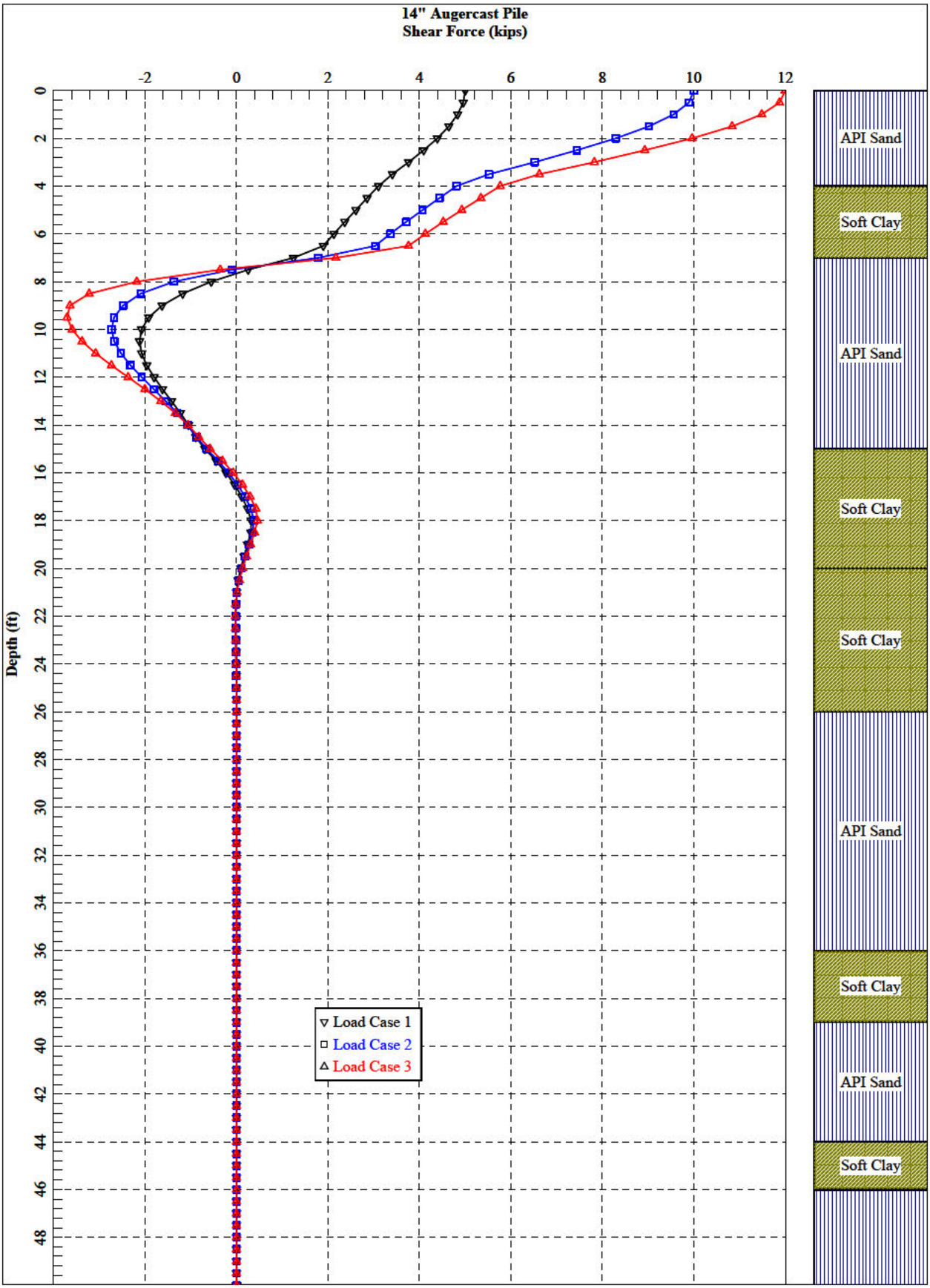
L-Pile Evaluation Results

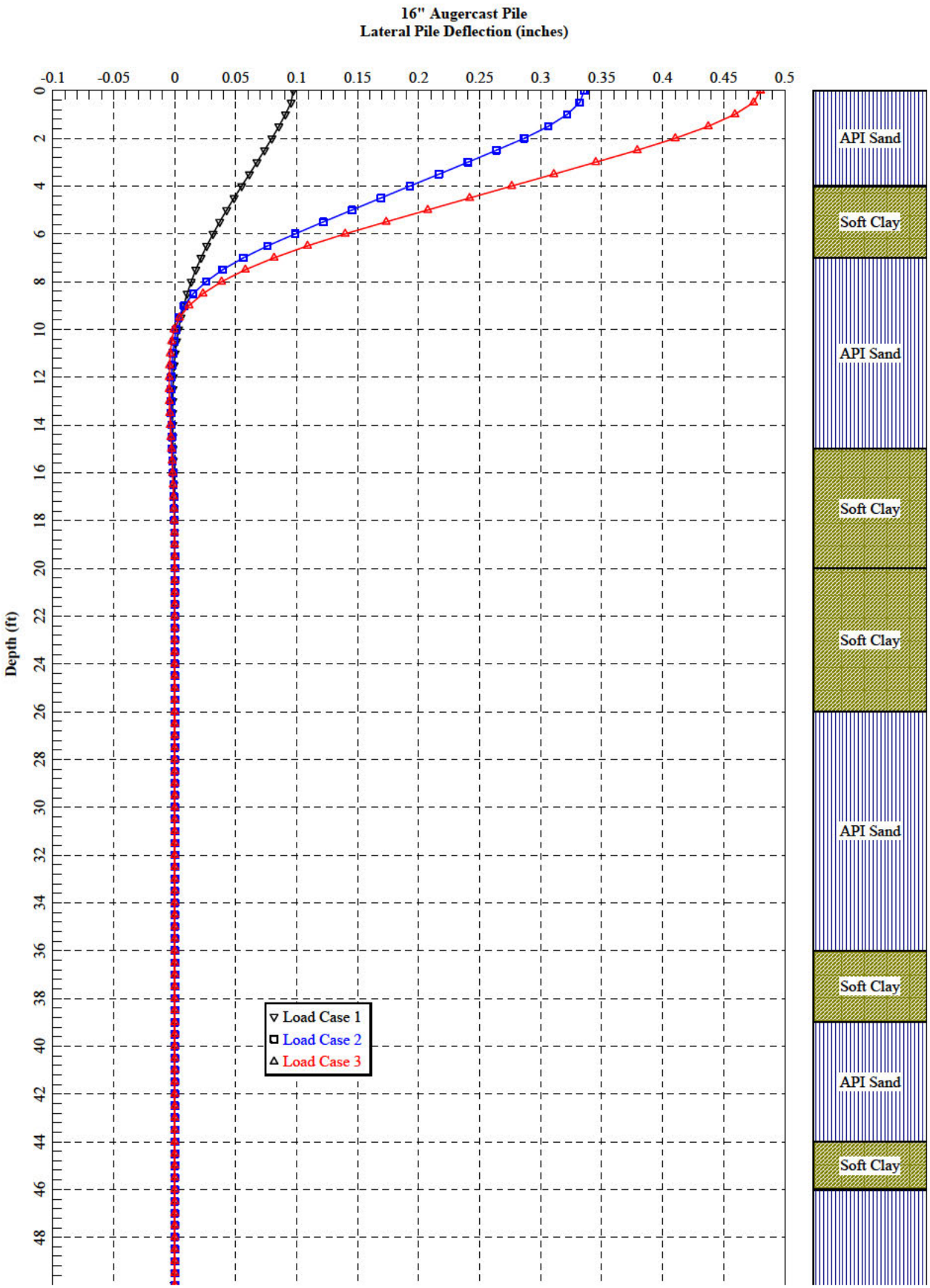
Shaft Simulated Load vs. Deflection Plot

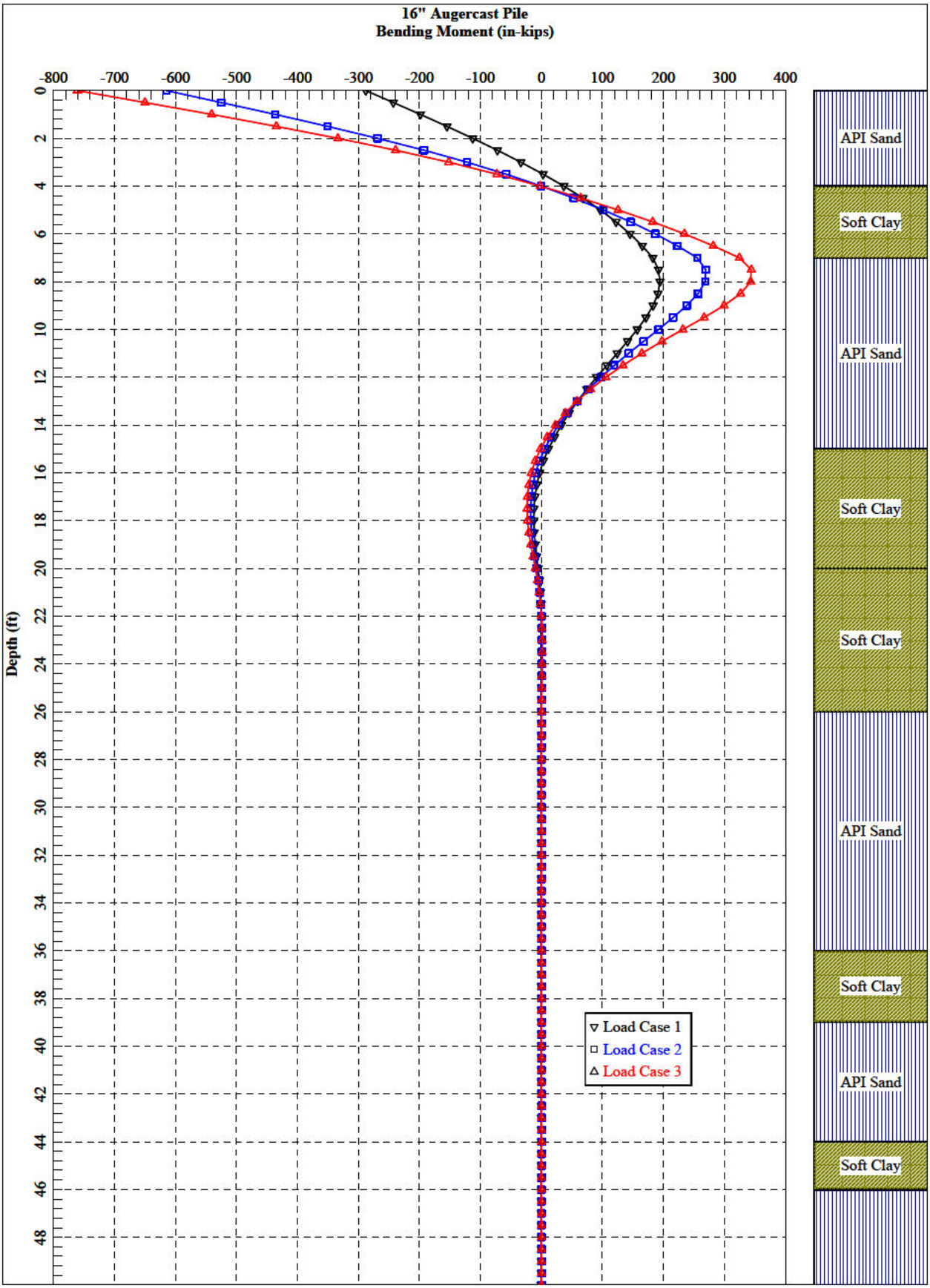
SOUTHERN EARTH SCIENCES

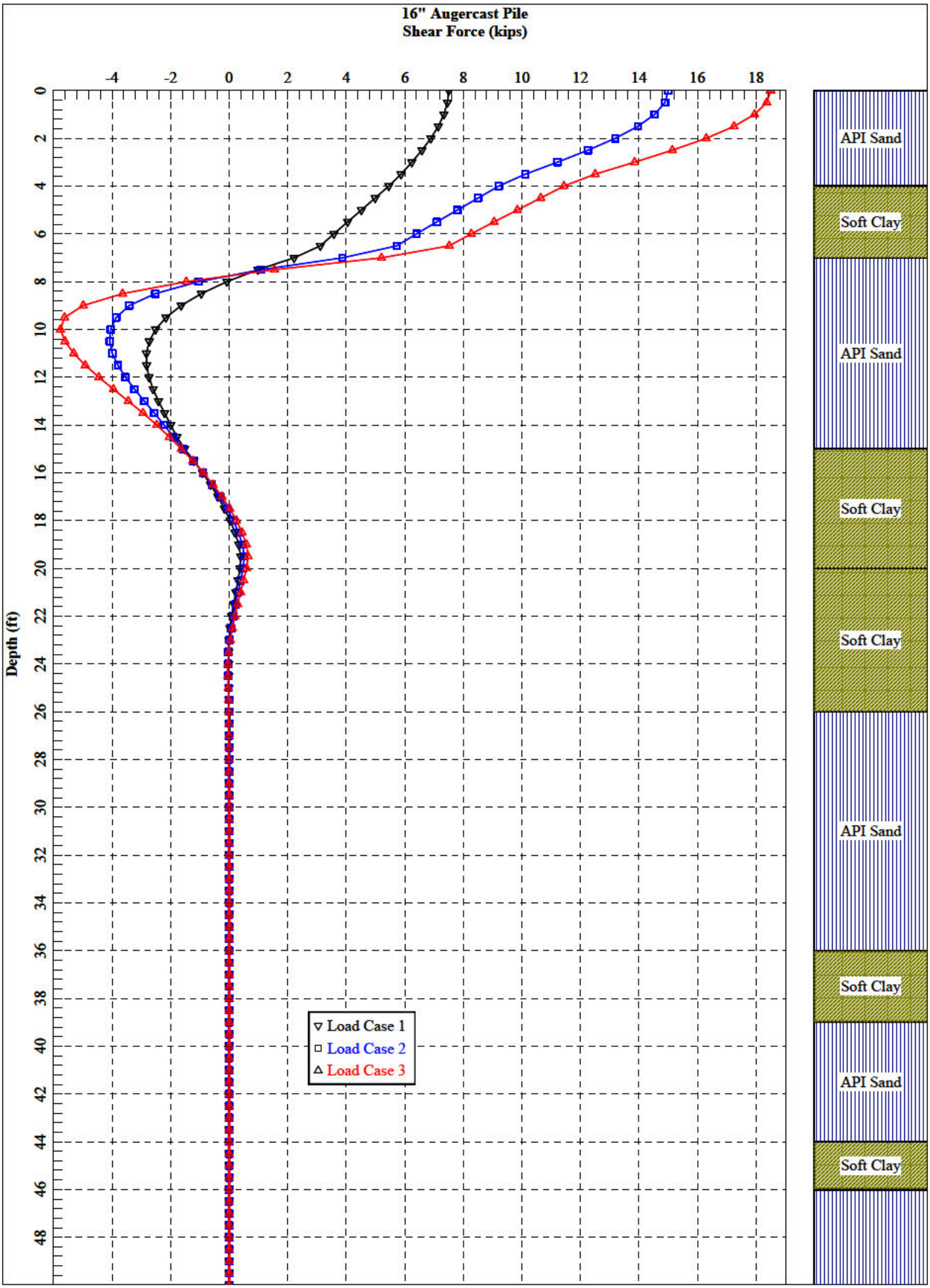

14" Augercast Pile
Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Load Case 1
Load Case 2
Load Case 3
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay

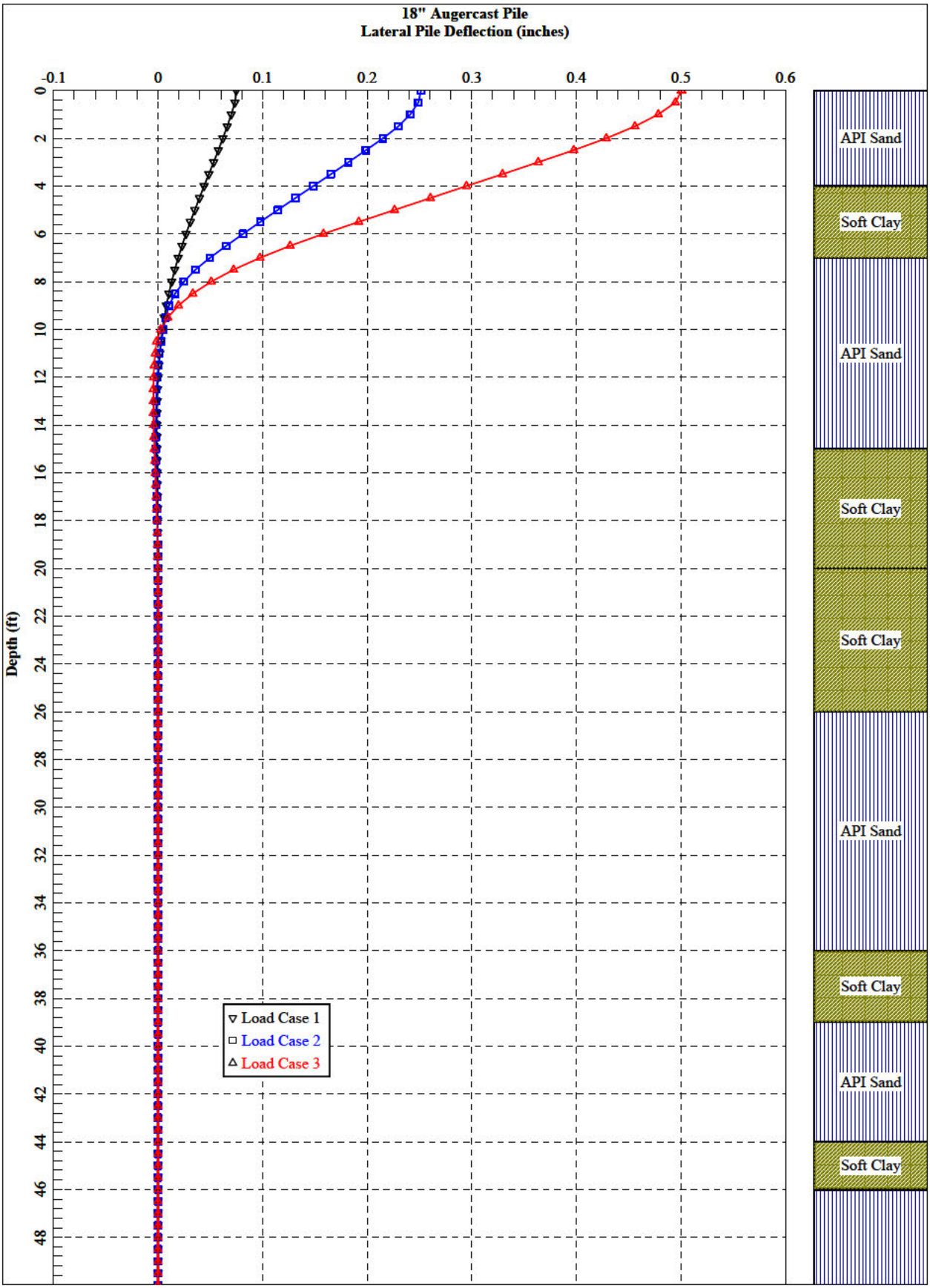

14" Augercast Pile
Bending Moment (in-kips)
-500
-400
-300
-200
-100
0
100
200
300
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay
Load Case 1
Load Case 2
Load Case 3


14" Augercast Pile
Shear Force (kips)
-2
0
2
4
6
8
10
12
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay
Load Case 1
Load Case 2
Load Case 3


16" Augercast Pile
Lateral Pile Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Load Case 1
Load Case 2
Load Case 3
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay


16" Augercast Pile
Bending Moment (in-kips)
-800
-700
-600
-500
-400
-300
-200
-100
0
100
200
300
400
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay
Load Case 1
Load Case 2
Load Case 3


16" Augercast Pile
Shear Force (kips)
-4
-2
0
2
4
6
8
10
12
14
16
18
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Load Case 1
Load Case 2
Load Case 3
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay


18" Augercast Pile
Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Depth (ft)
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4
6
8
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16
18
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28
30
32
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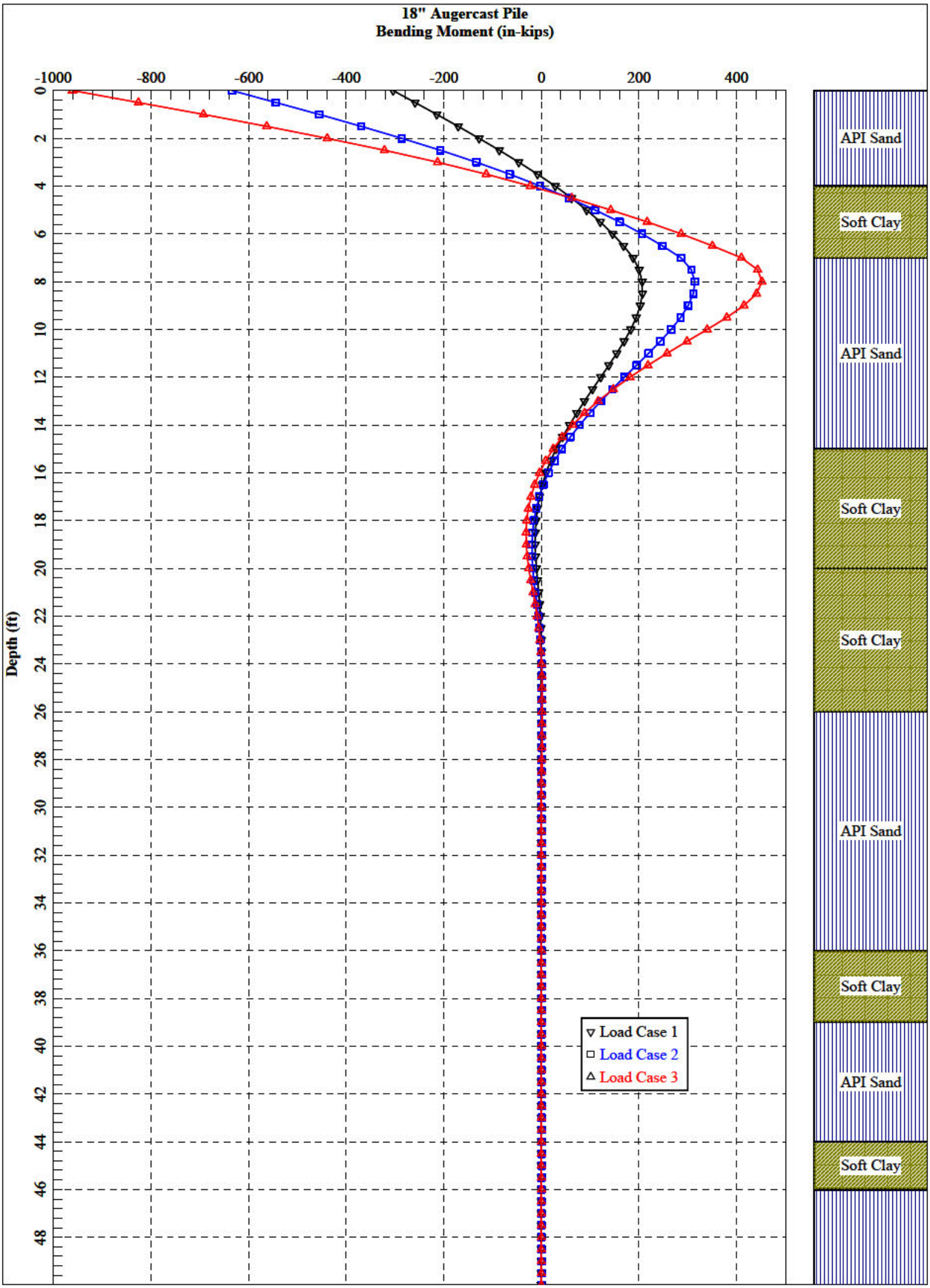
40
42
44
46
48
Load Case 1
Load Case 2
Load Case 3
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay


18" Augercast Pile
Bending Moment (in-kips)
-1000
-800
-600
-400
-200
0
200
400
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
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32
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36
38
40
42
44
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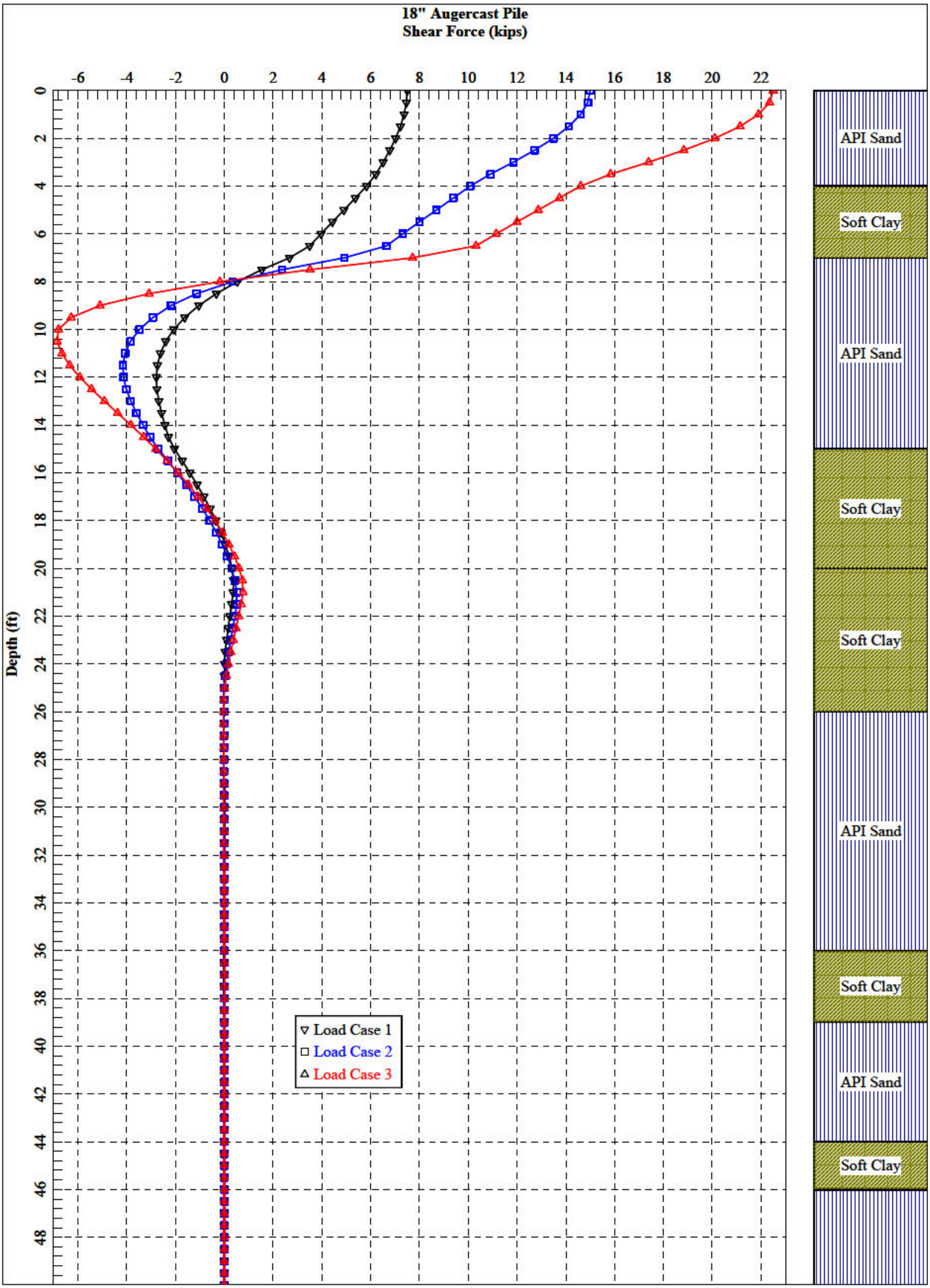
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay
Load Case 1
Load Case 2
Load Case 3


18" Augercast Pile
Shear Force (kips)
-6
-4
-2
0
2
4
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16
18
20
22
Depth (ft)
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12
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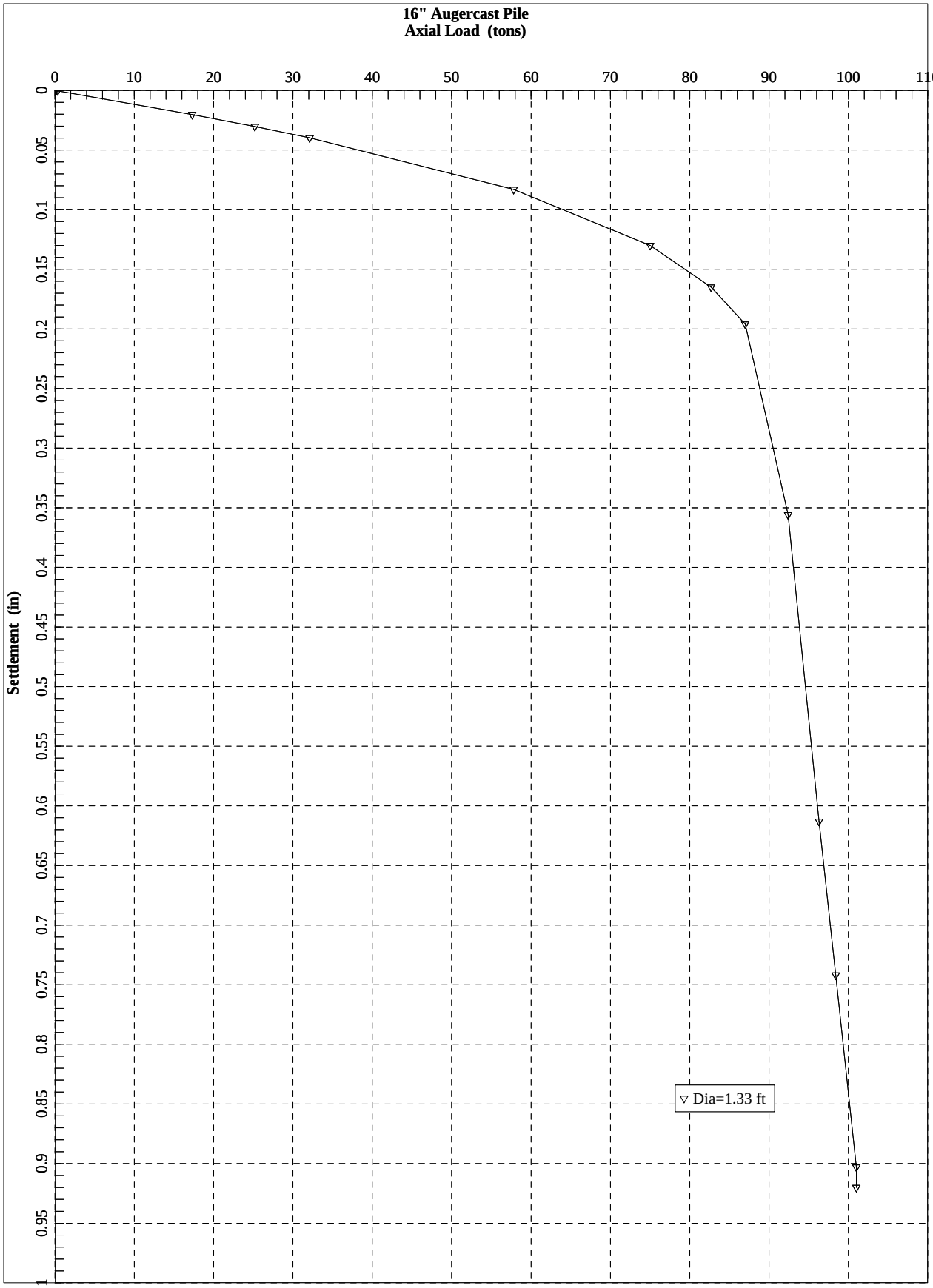
Load Case 1
Load Case 2
Load Case 3
API Sand
Soft Clay
API Sand
Soft Clay
Soft Clay
API Sand
Soft Clay
API Sand
Soft Clay


16" Augercast Pile
Axial Load (tons)
0
10
20
30
40
50
60
70
80
90
100
110
Settlement (in)
0
0.05
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0.3
0.35
0.4
0.45
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0.55
0.6
0.65
0.7
0.75
0.8
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0.9
0.95
1
▽ Dia=1.33 ft

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Pending Implementation

Design Complete On H

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N U V N

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Site Visit
80SSC023R0001
Draft RFP – Gaseous Nitrogen Generation Solution (GNGS)
June 27, 2023

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Gaseous Nitrogen Generation Solution (GNGS) Industry Day

Request for Proposal

June 27, 2023

Discussion Points

- Purpose and scope of Project
- Test Mission
- Rocket Test Complex
- Nitrogen System
- Risks of Existing System
- SSC Nitrogen Operations
- Product Quality
- Analysis
- Additional Flow Requirements
- Other Contract Features
- Communications
- Tentative Milestones
- Summary

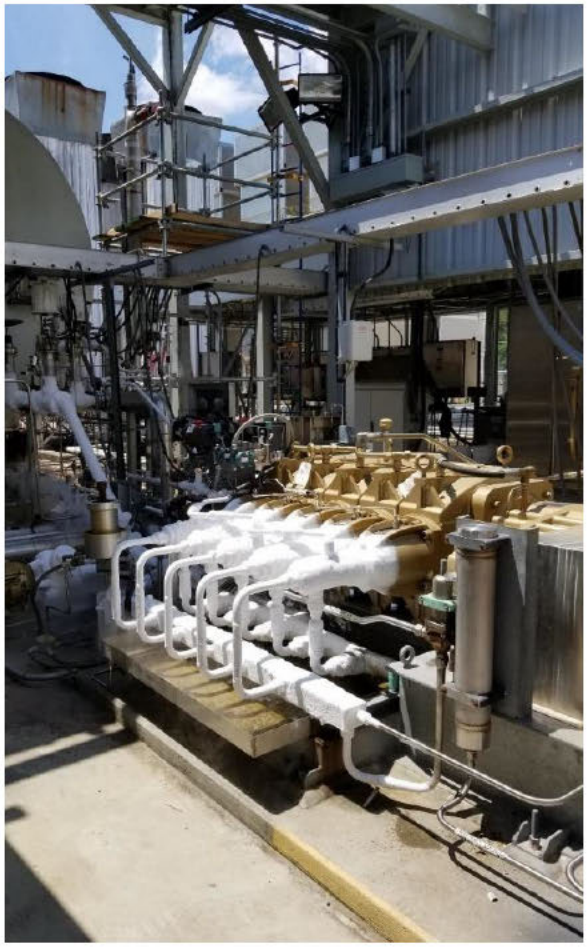
High Pressure Gas Facility at Stennis Space Center

Project Purpose and Scope

Stennis Space Center

GNGS

- The plan is for the new Gaseous Nitrogen Generation Solution to ***replace*** the High Pressure Gas Facility's production of gaseous nitrogen.
- It will reduce risk to Stennis' Operations during Liquid Nitrogen Supply Chain interruptions and is planned to reduce overall costs to NASA for nitrogen.



Stennis Space Center's Test Mission

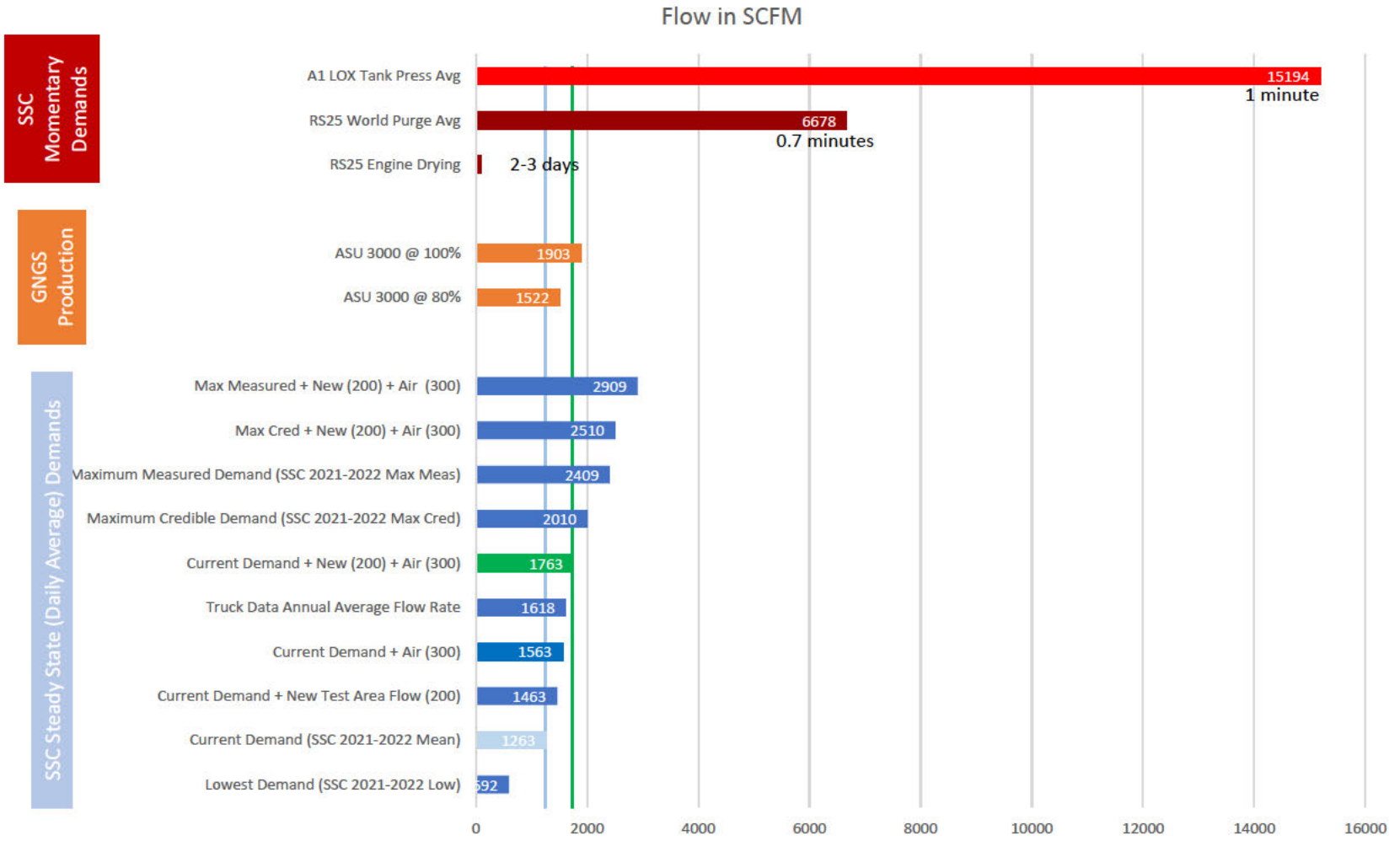
- Stennis Space Center (SSC) is NASA's largest Rocket Engine Test Facility
- The Rocket Propulsion Test Complex was constructed beginning in 1963
- A and B Test Stands were initially constructed to test Apollo Stages
- Stands were modified to begin Testing Space Shuttle Main Engines in mid-1970's
- E-Complex was constructed in the 1990's for component testing
- Today SSC's Test Complex tests a broad spectrum of engines and components
- Each program has unique uses for nitrogen

SSC's Test Complex Demand for Nitrogen

Stennis Space Center

GNGS

- Test Complex Tenants use Nitrogen for:
  - Run Tank Pressurization during Hot-Fire Tests
  - Inerting:
    - Tanks
    - Pipes/Ducts
    - Areas
  - Drying engines after Hot-Fire Tests



Nitrogen Usage at NASA's Stennis Space Center's Test Complex

Stennis Space Center GNGS

- The test stands require nitrogen to:
  - Pressurize propellant tanks
  - Inert areas after hot-fire tests
  - Maintain blanket purges for various components throughout the test complex for various reasons
- High Pressure Gas Facility (HPGF)
  - Receives 3 – 7 liquid nitrogen tanker trucks each day
  - Converts liquid nitrogen to gaseous nitrogen via 1 (almost always) of 3 liquid vaporization skids
  - Skids initiate chill-down to start the gasification process as the system pressure nears 2,700 psi
  - Skids vaporize liquid and produce high purity gas to re-pressurize the system up to 4,000 psi. At 4,000 psi the skids stop the pressurization process and the system pressure decays until the pressure nears 2,700 psi again
  - During normal operations this pressurization event occurs roughly twice daily
  - Each pressurization operation lasts one to five hours depending on site demand
  - Manual pressurizations are performed as necessary
- Occasionally programs will have minimum pressure requirements greater than 2,700 psi for specific operations (i.e. 3,400 or 3,700 psi). Those requirements are coordinated in advance with the High Pressure Gas Facility

Risks to the Test Complex as Pertaining to the Nitrogen System

Stennis Space Center

GNGS

- Continuous nitrogen purges are required to maintain systems in the test complex. Occasional events cause risks to the delivery of liquid into the system to be converted to gas such as:
  - Hurricanes
  - Ice Storms
  - Delivery interruptions
- There is always at least a remote risk that a significant-enough interruption could cause significant damage to Stennis Facilities. NASA is working to reduce that potential risk.

Simplified Existing Nitrogen System Schematic

Stennis Space Center

GNGS

- 3 Skids
- Each skid has a:
  - run tank
  - boost pump
  - ~50 GPM ACD 5-cyl pump
- 2 vaporizer banks

Note: Simplified schematic is provided for reference only

Nitrogen Simplified System Layout

Stennis Space Center

Cal & Sampling Labs

HPGF

2”

4”

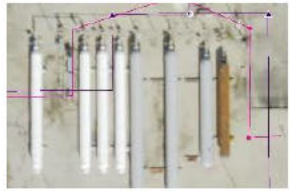
E CMPLX

2”

E-1 LV Skids

A CMPLX

4”

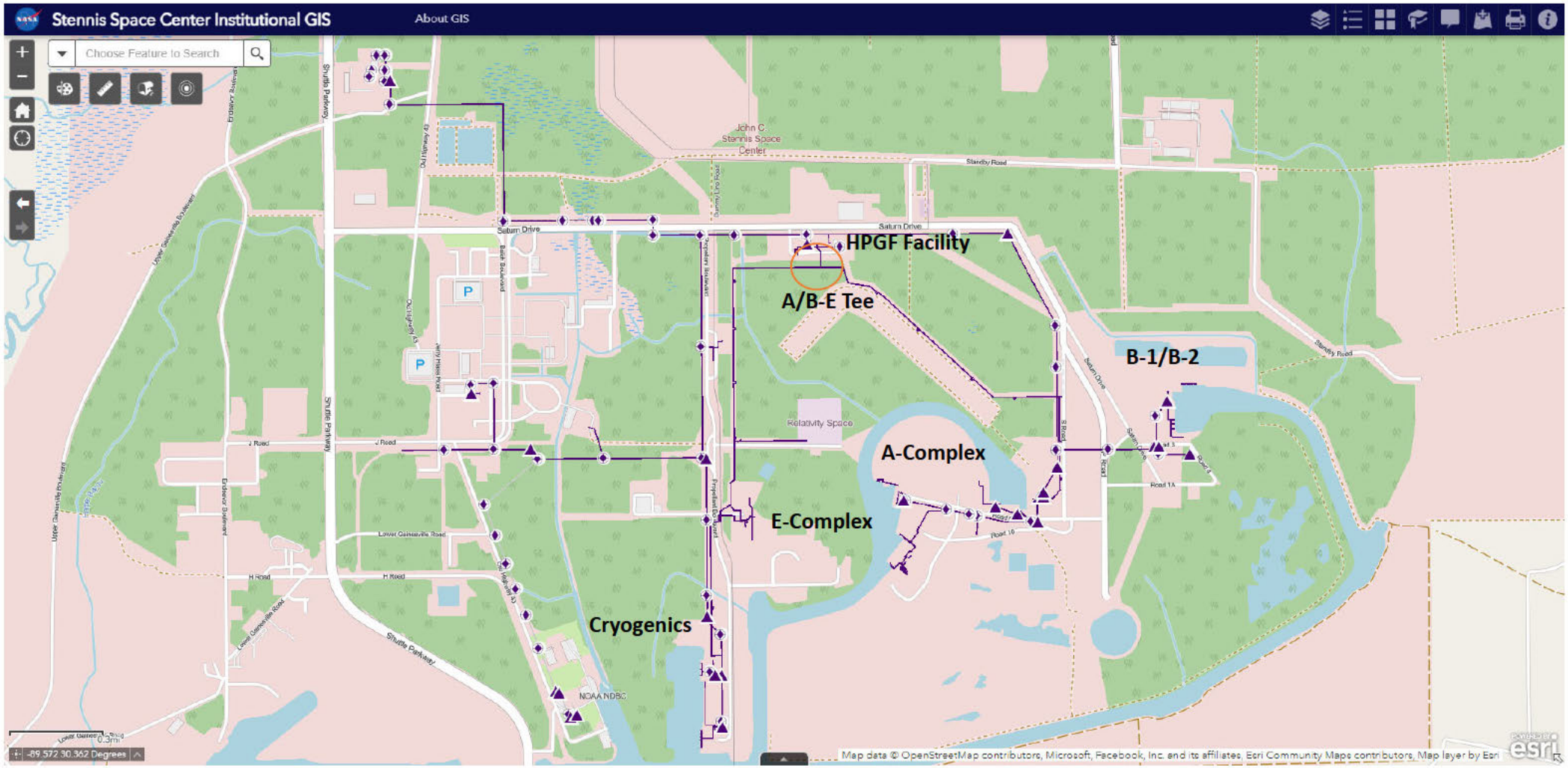


B CMPLX

SSC's Nitrogen System – Piping System

Stennis Space Center

GNGS

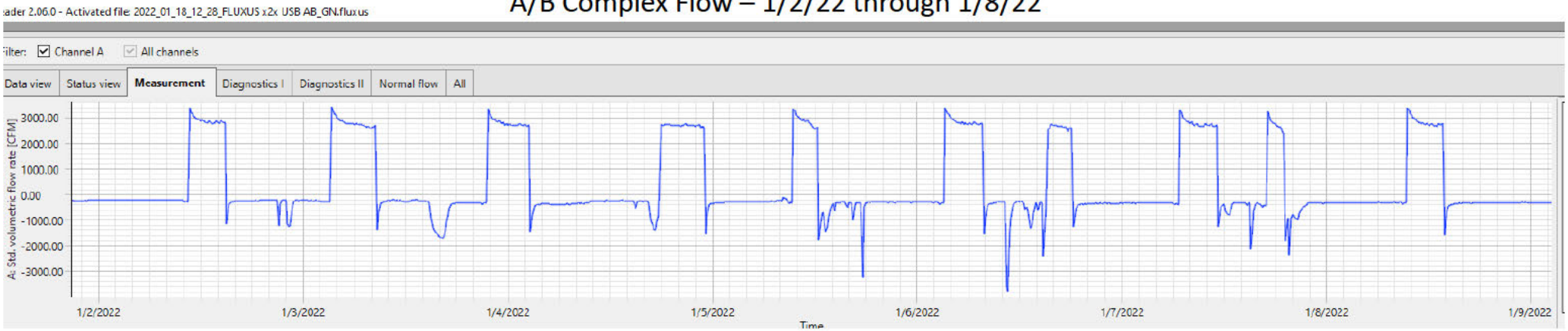


SSC's Current Production System – Typical Flows

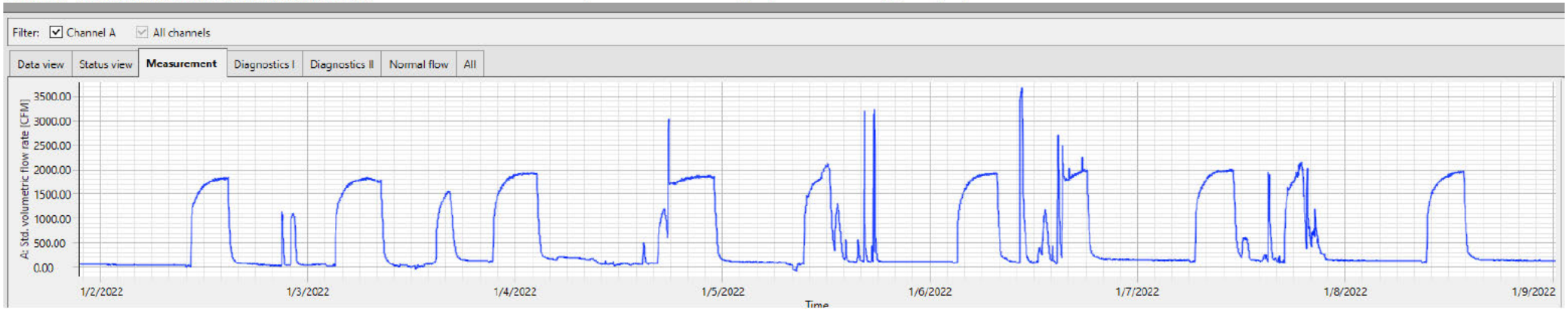
Stennis Space Center

GNGS

A/B Complex Flow – 1/2/22 through 1/8/22



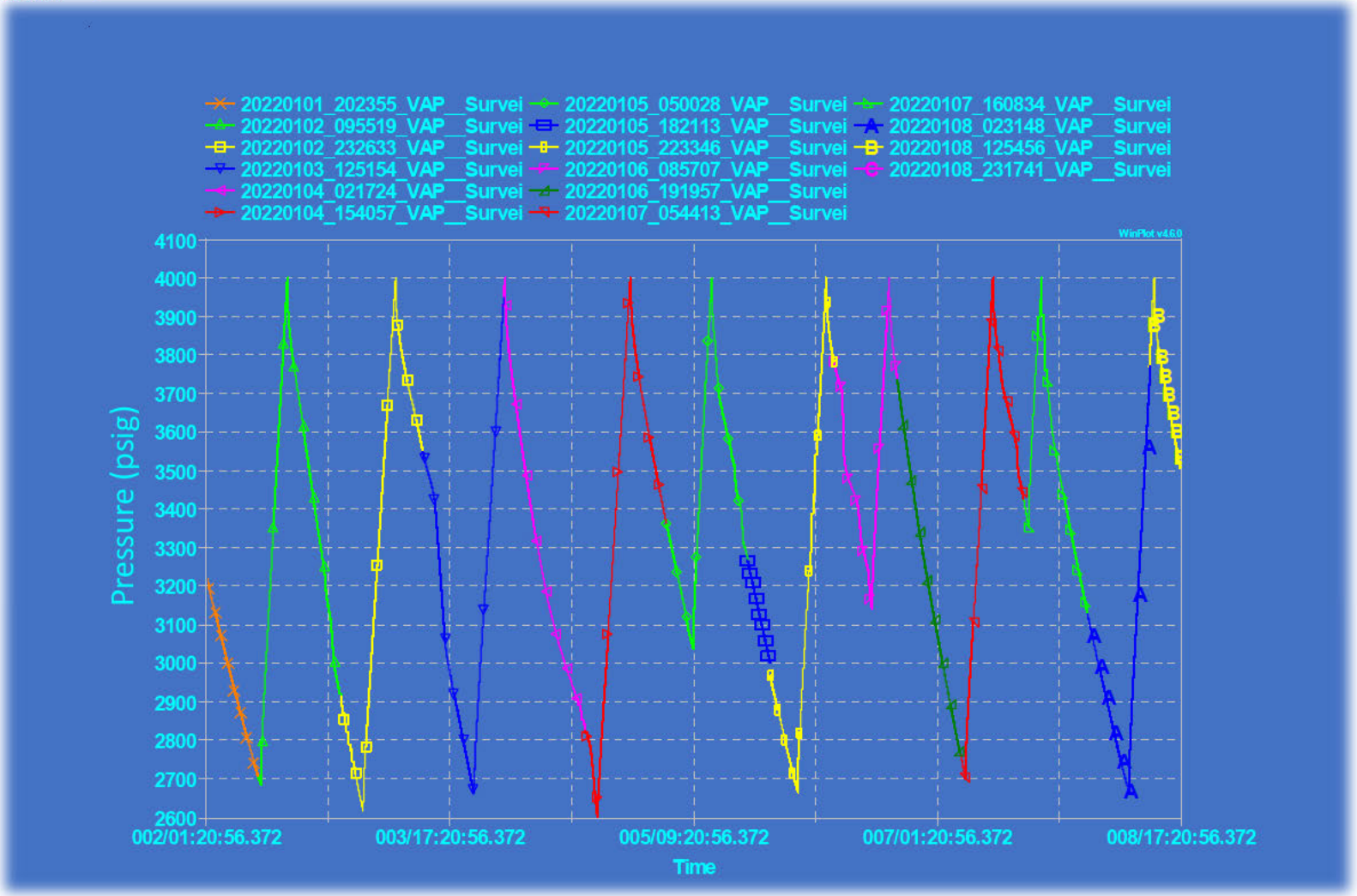
E Complex Flow – 1/2/22 through 1/8/22



SSC's Current Production System – Typical Pressure Swings

Stennis Space Center

GNGS



SSC's Nitrogen System – Quantities, Storage Capacity and General Parameters

Stennis Space Center

GNGS

- System facts and operating limits:
  - System Volume (ft^3): 16,836 ft^3
  - Total System Pipe Length >11.8 miles
  - Nitrogen mass in system @ 4000 psi (lbm): 297,167 lbm
  - Nitrogen mass in system @ 2700 psi (lbm): 214,796 lbm
  - Volume of nitrogen @ ATM of 297,167 lbm (ft^3): 4,101,794 ft^3
  - Volume of nitrogen @ ATM of 214,796 lbm (ft^3):2,964,827 ft^3
- At the highest average flow rate encountered when performing system analyses, 36,686 SCFM, it would take the system ~31 minutes to bleed down from 4,000 to 2,700 psi. **Note: this is an outflow of the system. System capacitance mitigates this short duration purge.**
- ***At the mean flow rate of 1,263 SCFM, it takes ~900 minutes or ~15 hours to decay from 4,000 psi to 2,700 psi.*** Note: 1,763 SCFM is the required mean flow for this project. Reference Chart #18.

SSC's Nitrogen System – Product Quality

Stennis Space Center

GNGS

- MIL-PRF-27401G Table 1 Grade B Requirements for Nitrogen
- High purity levels are required in order to meet rocket engine operational requirements

- Similar to Foreign Object Damage (FOD) in jet engines, impurities in gasses used in rocket engine testing can create FOD that can damage rocket engine turbines as well

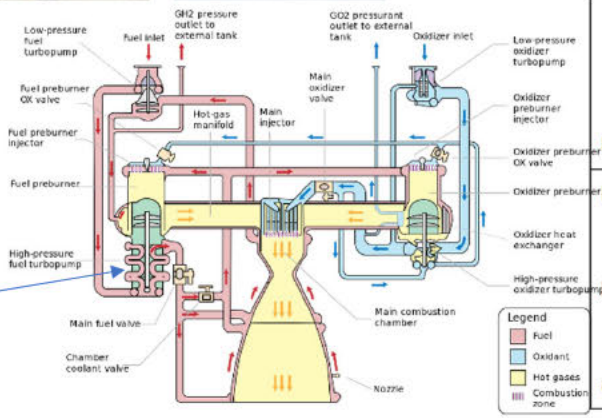


TABLE I. Grade limits for nitrogen.

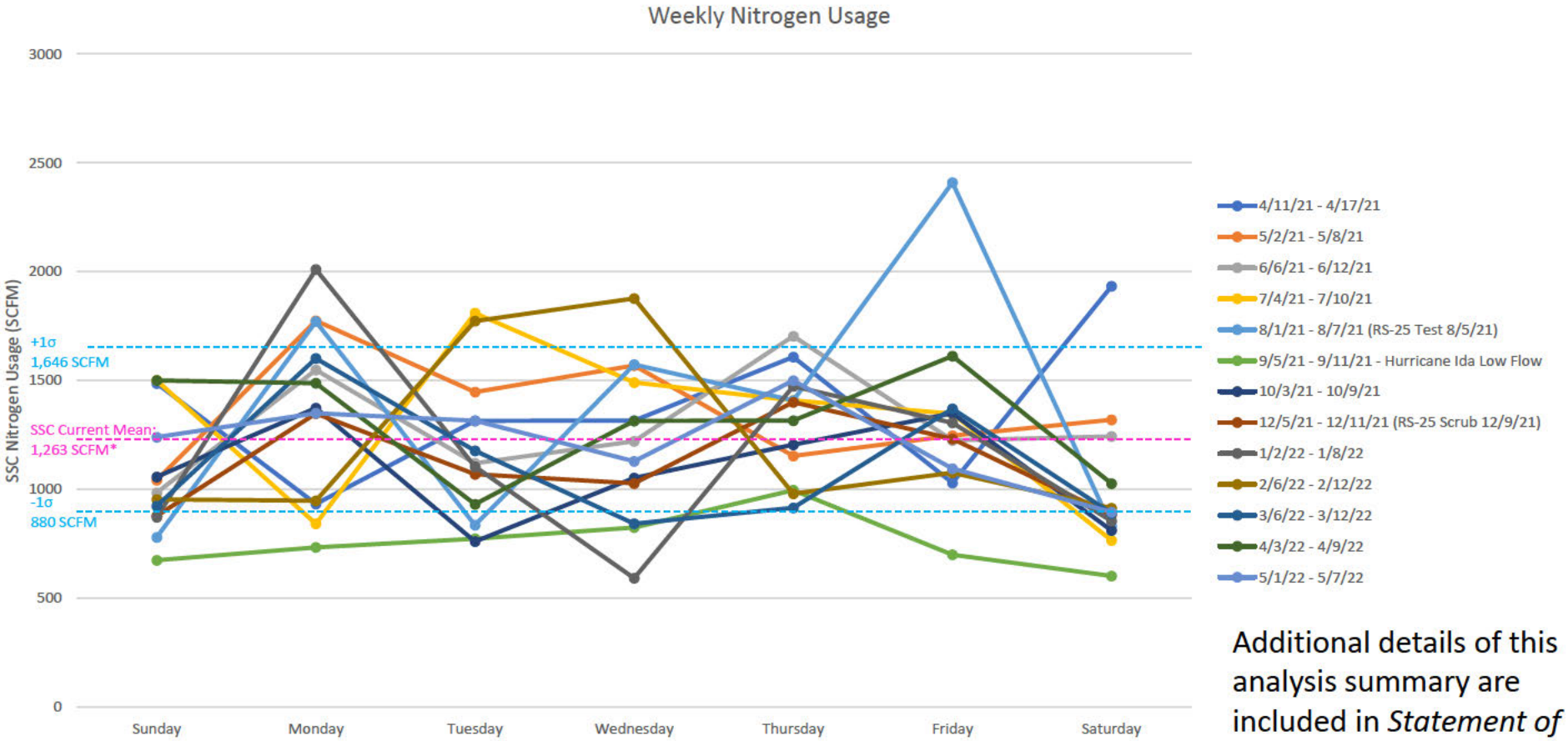
	Grade			Test Method
	A	B	C	
Purity [a, b], % by vol, min	99.5	99.99	99.995	4.4.1
Impurities, ppm by volume, max	5000 [c]	100 [c]	50 [c]	--
Water	26.3	11.5	5.7	4.4.2
Total hydrocarbons as methane	58.3	5.0	5.0	4.4.2
Oxygen	5000	50	20	4.4.2
Hydrogen	-- [d]	-- [d]	0.5	4.4.2
Argon [e]	-- [d]	20	2	4.4.2
Carbon dioxide [e]	-- [d]	5	5	4.4.2
Carbon monoxide [e]	-- [d]	5	5	4.4.2
Particulate [f], mg/L, max	1.0	1.0	1.0	4.4.3

Notes.
a. Percent nitrogen includes trace quantities of argon (Grade A), neon, and helium.
b. If direct method is required, use the alternate method found in 6.3.
c. Sum, in parts per million (ppm), of water, hydrocarbons, oxygen, and if applicable, argon, hydrogen, carbon monoxide, and carbon dioxide.
d. No limit for this grade.
e. If required by contract (see 6.2).
f. Applies only to Type II (Liquid) nitrogen. The particulate limit may be removed by the procuring activity (see 6.2).

Weekly Nitrogen Usage 4/11/21 – 5/7/22 Summary

Stennis Space Center

GNGS



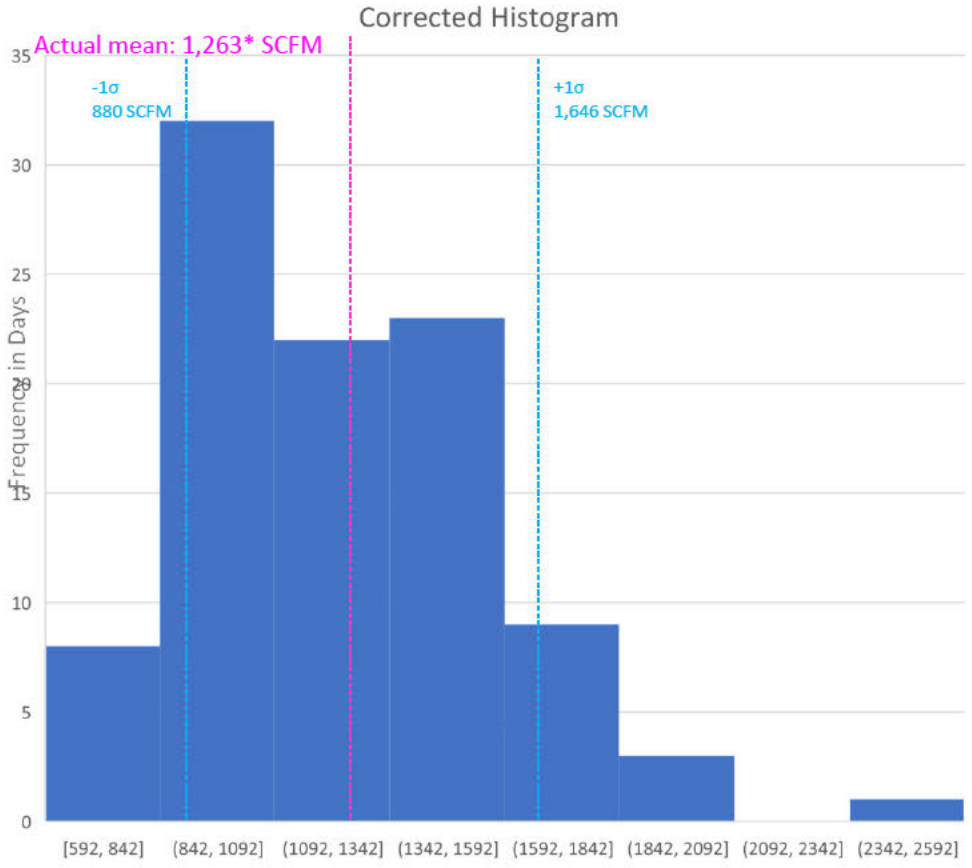
***NOTE: Additional flows (discussed on chart #18) add an additional required 500 SCFM**

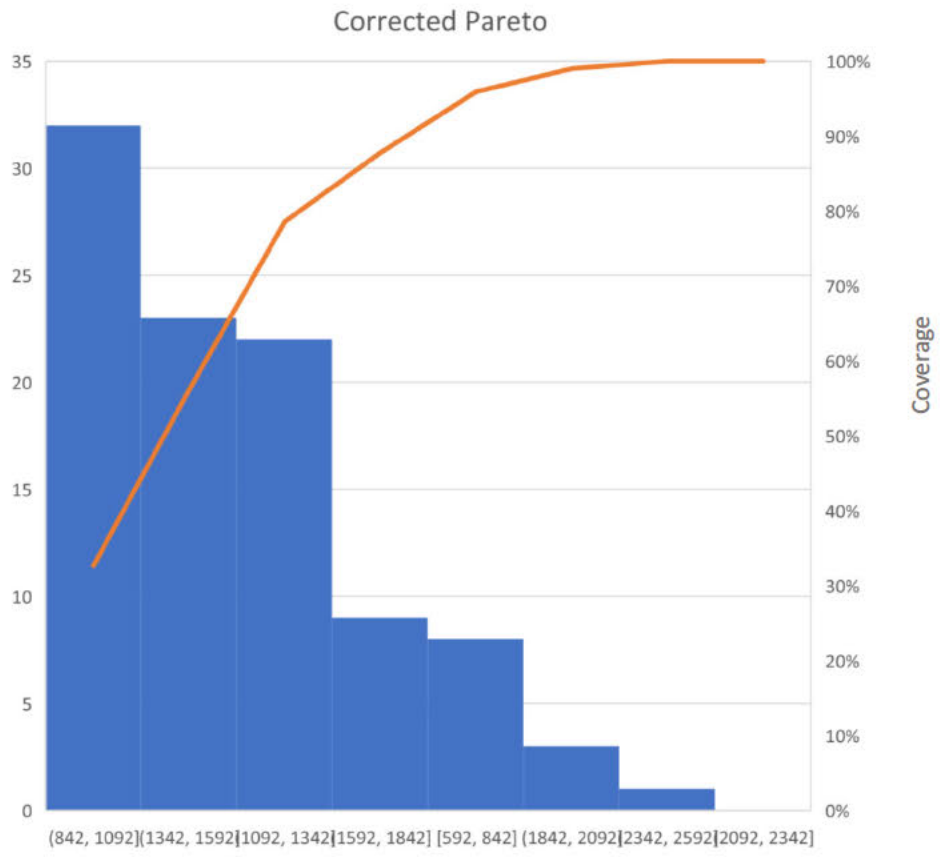
Additional details of this analysis summary are included in *Statement of Objectives, Appendix B, Analysis*

Usage Statistics – Corrected Daily Statistics

Stennis Space Center

GNGS





Actual Mean	1263
Actual Standard Deviation	+/- 383

***NOTE: additional flows (discussed on chart #18) increase the total requirement to 1,763 SCFM**

This data set displayed removes Conservation Mode period that would likely not occur with a Gaseous Nitrogen Generation Solution. Each bin represents the number of occurrences of a particular day of nitrogen use

Analysis Conclusions

Stennis Space Center

GNGS

- Sample mean flow rate: 1,263* SCFM
- Sample standard deviation: 383 SCFM
- Sample demand data results not including LN-shortage events:
  - Maximum measured: 2,409 SCFM
  - Maximum credible: 2,010 SCFM
  - Minimum: 592 SCFM

This analysis provides a snapshot of Stennis Space Center's usage of nitrogen from April 2021 through May 2022. Increases and decreases to system are estimates, only, and are not included in this document.

***NOTE: THE SAMPLE MEAN FLOW RATE IS NOT THE REQUESTED FLOW RATE. ADDITIONAL FLOWS ARE REQUIRED AND INCLUDED IN THE REQUIRED MEAN FLOW RATE OF 1,763 SCFM**

Flow Requirement

Stennis Space Center

GNGS

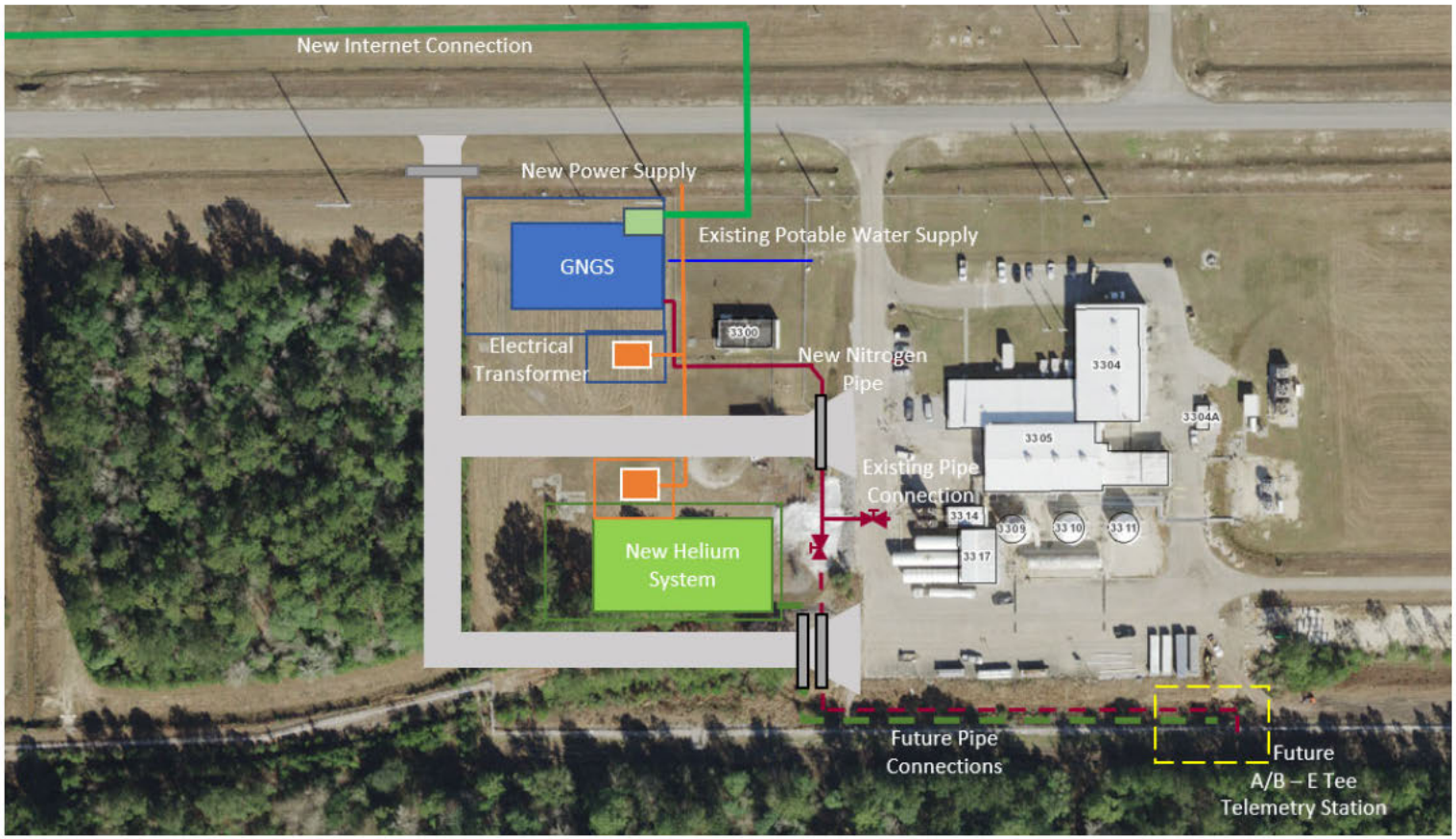
- Current requirement for nitrogen was determined through a July 2022 analysis. In addition to the current requirement, two additional flow demands have been identified.
  - High Purity Air
    - SSC is currently in the process of reducing some of its air requirements by switching to nitrogen instead
    - Will require an additional approximate 300 SCFM
  - New Test Areas
    - Since the flow analysis was completed in July 2022, new test areas have been added and additional test areas are being added
    - Will require an additional approximate 200 SCFM
- **Total Requirement for Nitrogen at Stennis Space Center**

Current Demand		High Purity Air		New Test Areas		Total Required
1,263 SCFM	+	300 SCFM	+	200 SCFM	=	**1,763 SCFM**

Proposed System Layout

Stennis Space Center

GNGS



- Currently cleared space is approximately 160’ X 170’
- Up to 350’ X 1,000’ can be made available with additional negotiation

Connection piping to be built prior to GNGS Facility completion

Connection piping to be completed in ~ FY26

Electrical Power

Stennis Space Center — *GNGS*

- All critical facilities throughout test complex are fed by 2 independent circuits. Each of these circuits are fed from opposite directions of the power grid in order to maximize power stability.
- The GNGS will be fed through a similar arrangement. This arrangement has minimized outages. Since the 2nd circuit was connected in about 2007, there have been no extended outages
  - 2 planned outages for equipment changeouts and repair have been encountered that consisted of less than 3 hours each
  - Unplanned outages have consisted of milli-seconds

- Power will be made available to the vendor via an agreement between NASA and Mississippi Power
- Power will be purchased based on NASA's current rate agreements with Mississippi Power
- Power requirements will be developed with vendor upon successful selection

Statement of Objectives Appendix A – Responsibility Matrix

System	**Description**	NASA	Vendor	Notes
Electrical	Primary Electrical Power		X	Electrical power will be metered and paid for by vendor
	Supply Design	X	X	Vendor provides requirements; NASA provides Electrical Supply Design
	Transmission Poles	X		
	Transformer Pad Mount	X		
	Feeded Cable	X		
	Electrical Meter	X		
	Termination Kits	X		
	EMCS Connectivity of Power Supply	X		
	Grounding Grid	X		
	Electrical Generator		X	
	Area Flood Lighting		X	
	Field Electrical Connections		X	
	Construction Power	X		Electrical power supply during Construction

Contract Details

Stennis Space Center

GNGS

- Vendor will be required to supply all nitrogen needs currently supplied by HPGF
- A vendor will be selected via Best Value from a Full and Open Competition and NASA will pay for nitrogen at a rate per use of nitrogen ($/MCF) (an MCF is 1,000 standard cubic feet)
- Electricity will be metered then purchased by the vendor at the rate at which the vendor uses it (NASA only pays for nitrogen out of the "end-of-the pipe")
- The vendor will be required to provide additional nitrogen to meet high demands if necessary (at a previously agreed upon rate)
- The vendor will provide all resiliency and redundancy necessary in order to have nitrogen available 100% of the timeVendor may provide product from other acceptable sources if there is an issue with vendor hardware
- NASA can supply from other sources if vendor fails to provide and withhold payment from vendor for product not provided
- The vendor will have the system ready to produce gaseous nitrogen in under two years from the date of contract award
- The vendor will provide nitrogen for the next ten years (2+10-year contract)
- CLIN 2, Conclusion of Contract, includes the removal of equipment, if a follow-on is not needed or the incumbent is not the awardee of any applicable follow-on contract

Aerial View of Site for Gaseous Nitrogen Generation Solution (GNGS)

Operations and Communications

Stennis Space Center

GNGS

- Communication Opportunities
  - Monthly reports from vendor
  - Anomaly reporting (future notifications) i.e.
    - Large demands required by test complex
    - ASU Offline so will operate via backup system
    - Exercising backup system which will create pressure fluctuations

- Pressure Demand Change Coordination
  - Minimum pressure requirement of 2,700 psi will occasionally be increased to higher pressures, such as 3,400 psi or 3,700 psi
  - These increases must be coordinated with the vendor
  - Pre-event coordination time must be addressed within proposal time (how much advance time is required?)
  - Points of contact will be established though initial communications

Tentative Milestones

Stennis Space Center

GNGS

You are here

- **June 2023**
  - Issue Draft Solicitation
- **June 2023**
  - Industry Day or Pre-Solicitation Conference
- **August 2023**
  - Issue Final Solicitation
- **Sept. 2023**
  - Finalize Proposals
  - Receive Proposals
- **Dec. 2023**
  - Award GNGS Contract
  - Develop Infrastructure Requirements
- **Jan. 2024**
  - Issue Infrastructure Development Contracts
- **Dec. 2024**
  - Complete Infrastructure Development
- **Nov. 2025**
  - Complete GNGS Construction
- **Jan. 2026**
  - Complete Activation

Legend:
NASA
Vendor
Both

Questions?

Stennis Space Center

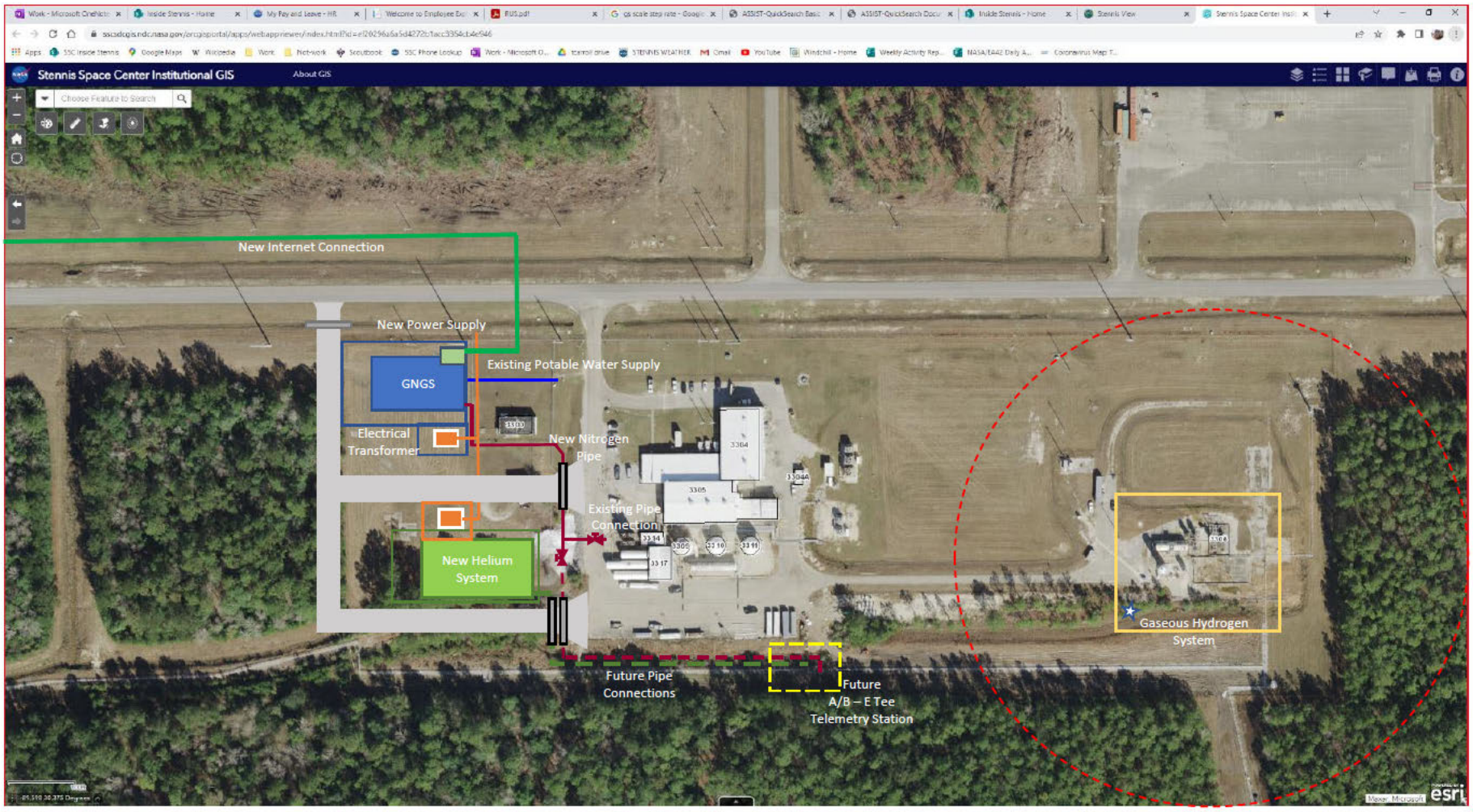
GNGS

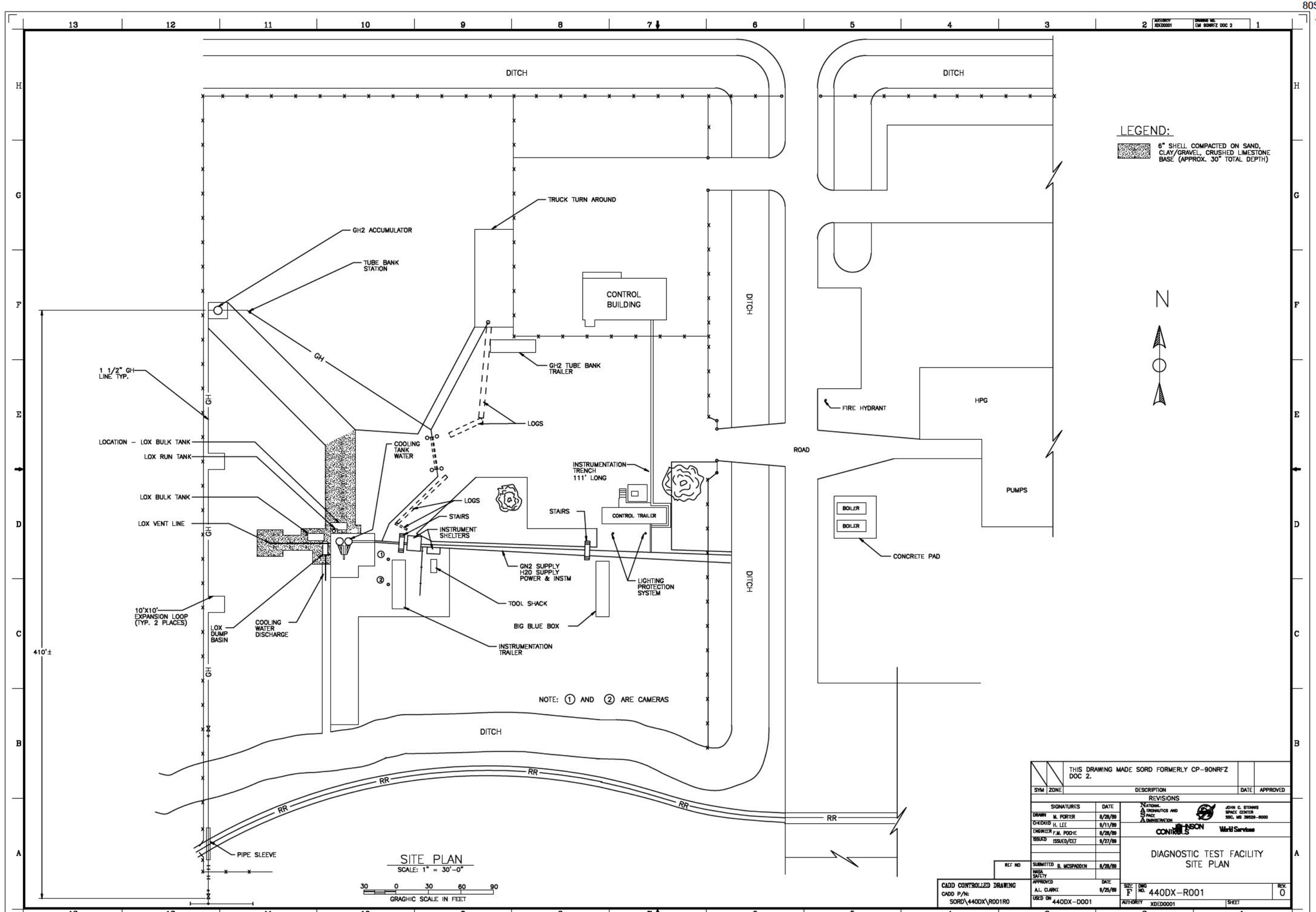
BACKUP

GNGS,Helium and Gaseous Hydrogen Systems

Stennis Space Center

GNGS





THIS DRAWING MADE SORD FORMERLY CP-90NRFZ DOC 2.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES		DATE
DRAWN	M. PORTER	8/28/89
CHECKED	H. LEE	9/11/89
ENGINEER	F.M. POCHE	8/28/89
ISSUED	ISSUED/CCT	9/27/89
SUBMITTED	B. MCSPADDEN	8/28/89
NASA SAFETY		
APPROVED	A.L. CLARK	8/25/89
USED ON	440DX-D001	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION — JOHN C. STENNIS SPACE CENTER SSC, MS 39529-6000

JOHNSON CONTROLS — World Services

DIAGNOSTIC TEST FACILITY
SITE PLAN

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CADD P/N: SORD\440DX\R001R0

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Title 15 - Mississippi Department of Health
Part 20: Bureau of Public Water Supply
Subpart 72: Public Water Supply

CHAPTER 1. MISSISSIPPI PRIMARY DRINKING WATER REGULATION Subchapter

1. General Provisions:

Rule 1.1.1. **Legal Authority**. This regulation has been promulgated under the authority of and pursuant to the Mississippi Safe Drinking Water Act of 1997 (Section 41-26-1 through Section 41-26-101, Mississippi Code of 1972, Annotated).

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.1.2. **Definitions**.

1. **Department** shall mean the Mississippi State Department of Health.

2. **Director** shall mean the Executive Officer of the Mississippi State Department of Health or his authorized agent.

3. **Municipality** shall mean a city, town, village, or other public body created by state law, or an Indian tribal organization authorized by law.

4. **Federal Agency** shall mean any department, agency, or instrumentality of the United States.

5. **Administrator** shall mean the Administrator of the U.S. Environmental Protection Agency or his authorized representative.

6. **Federal Act** shall mean the Safe Drinking Water Act of 1974, cited as Public Law 93-523, or any subsequent revisions thereto.

7. **Regulations** shall mean primary drinking water regulations promulgated by the administrator pursuant to the federal act.

8. **Backflow** shall mean the reversal of normal flow direction where water flows from the intended point of delivery towards the public water supply.

9. **Cross Connection** shall mean any direct interconnection between a public water system and a non-public water system or other source which may result in the contamination of the drinking water provided by the public water system. This definition includes any arrangement of piping where a potable water line is connected to non potable water; it may be a pipe-to-pipe connection where potable and non potable water lines are directly connected or a pipe-to-water connection

where the potable water outlet is submerged in non potable water. If the potable and non-potable source are separated by gate valves, check valves or devices other than the appropriate backflow preventer as outlined by this regulation, a cross connection exists. By-pass arrangements, jumper connections, swivel or change over assemblies, or other temporary or permanent assemblies through which, or because of which, backflow may occur are considered to be cross connections.

10. **Public water system** means a system for the provision to the public of water for Human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Furthermore, two or more water systems that are adjacent, that are owned or operated by the same supplier of water, that individually serve less than 15 service connections or less than 25 persons but in combination serve 15 or more service connections or 25 or more persons, shall also be defined as a public water system. Such term includes: Any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Such term does not include any "special irrigation district." Service connection, as used in the definition of public water system, does not include a connection to a system that delivers water by a constructed conveyance other than a pipe if:

a. The water is used exclusively for purposes other than residential uses (consisting of drinking, bathing, cooking, or other similar uses);

b. The Director or Administrator determines that alternative water to achieve the equivalent level of public health protection provided by the applicable national primary drinking water regulation is provided for residential or similar uses for drinking and cooking; or

c. The Director or Administrator determines that the water provided for residential or similar uses for drinking, cooking, and bathing is centrally treated or treated at the point of entry by the provider, a pass-through entity, or the user to achieve the equivalent level of protection provided by the applicable national primary drinking water regulation.

d. Special irrigation district means an irrigation district in existence prior to May 18, 1994, that provides primarily agricultural service through a piped water system with only incidental residential or similar use where the system or the residential or similar users of the system comply with the exclusion provisions in Section 1401(4)(B)(i)(II) or (III) of the Federal Safe Drinking Water Act.

11. **Professionally installed** shall mean installed in a workmanlike manner with no apparent errors in installation.

12. **Significant deficiencies** cause or have the potential to cause the introduction of contamination into drinking water delivered to customers of a public water supply. This could include defects in design, operation or maintenance of the source, treatment or distribution systems.

13. **Sanitary defect** is a defect that could provide a pathway for entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place.

14. **Assessment – Level 1** is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. It is conducted by the system operator or owner. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g. whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

15. **Assessment – Level 2** is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. A Level 2 assessment provides a more detailed examination of the system (including the system's monitoring and operational practices) than does a Level 1 assessment through the use of more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. It is conducted by an individual approved by the State, which may include the system operator. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the

system and the size, type, and characteristics of the distribution system. The system must comply with any expedited actions or additional actions required by the State in the case of an E. coli MCL violation.

16. **Clean Compliance History** shall mean that the public water supply has a record of no MCL violations under Title 40 Code of Federal Regulations Section 141.63 or subpart Y; no monitoring violations under 40 Code of Federal Regulations Section 141.21 or subpart Y; and no coliform treatment technique trigger exceedances or treatment technique violations under subpart Y.

17. **Seasonal System** shall mean a non-community water system that is not operated as a public water system on a year-round basis and starts up and shuts down at the beginning and end of each operating season

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.1.3. The definitions as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.2 are hereby adopted.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.1.4. **Coverage**. This regulation shall apply to each public water system in the State, except that it shall not apply to a public water system:

1. Which consists only of distribution and storage facilities which does not have any collection and treatment facilities; and

2. Which obtains all of its water from, but is not owned or operated by, a public water system to which such regulation applies; and

3. Which does not sell water to any person; and

4. Which is not a carrier which conveys passengers in interstate or intrastate commerce.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.1.5. **Variances and Exemptions**. Variances and exemptions may be issued by the Director in accordance with Sections 1415 and 1416 of the federal act. Treatment utilizing best available technology, as stipulated in Title 40 Code of Federal Regulations, Part 142, Subparts F and G, may be required in order to grant variances and exemptions under this regulation. Variances and exemptions shall not be issued if not allowed by the National Primary Drinking Water Regulations.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.1.6. **Preconstruction and Treatment Requirements**. Planning and design of improvements for existing public water systems or the creation of new community or non-transient non-community public water system shall be in accordance with the Department's current version of the *"Minimum Design Criteria for Public Water Supplies."*

1. **Siting Requirements**. Before a person may initiate construction of a new community or non-transient non-community public water system or increase the capacity of an existing community or non-transient non-community public water system, he shall submit sufficient information to the Director for evaluation of the proposed site, to determine whether the site and design of the proposed construction or modification will enable the system to comply with this regulation including Title 40 Code of Federal Regulations Sections 141.63.

2. **Plans and Specifications Approval**. Prior to advertising for bids and/or initiating construction of a new community or non-transient non-community public water system or making significant extensions or alterations to an existing community or non-transient non-community public water system which may affect the operation of that system, plans and specifications for the proposed construction shall be approved by the Director. Plans and specifications submitted to the Director for approval shall be prepared by a professional engineer licensed to practice in the State of Mississippi.

3. **Operation and Maintenance Plans**. Each applicant for a new community or non-transient non-community public water system shall submit an operation and maintenance plan for review and approval by the Director. The plan must be approved by the Director prior to beginning construction.

4. **Financial and Managerial Viability**. Each applicant for a new community or non-transient non-community public water system shall submit financial and managerial information as required by the Public Utilities Staff. Plans and specifications shall not be approved by the Director until written certification of the financial and managerial viability of the new water system is received from the Executive Director of the Public Utilities Staff.

5. **Changes to Existing Public Water Systems**. Plans and specification for changes to an existing community or non-transient non-community public water systems shall not be approved if the Director determines the changes would threaten the viability of the water system or if the changes may overload the operational capabilities of the water system.

6. **Non-Centralized Treatment Devices**. Public water systems may utilize point-of-entry devices to comply with maximum contaminant levels as stipulated in the National Primary Drinking Water regulations as published at Title 40 Code of Federal Regulations Sections 141.100 and 141.101.

7. **Ban of Use of Lead Products**. Any pipe, solder, or flux used in the installation or repair of any public water system, or any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system shall be lead free. Solders and flux are defined as "lead free" when they contain not more than 0.2 percent lead. Pipes and pipe fittings are defined as "lead free" when they contain not more than 0.25 percent lead in the wetted surface material. Plumbing fittings and fixtures intended by the manufacturer to dispense water for human ingestion are defined as "lead free" when they comply with standards established in accordance with 42 U.S.C. 300g-6(e).

8. **Lead Service Line Replacement**. It shall be the responsibility of each supplier of water to comply with the lead service line replacement requirements and lead service line reporting requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.84 and 141.90.

9. **Overloaded Public Water Systems**. Public water systems that are serving customers in excess of the design capacity as determined by the Director shall be identified as overloaded and shall immediately, upon written notification by the Director, cease adding new customers. Public water systems identified as overloaded shall not add new customers until notified, in writing, by the Director that the system's design capacity has been increased and that the water system can resume adding new customers.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 2. Maximum Contaminant Levels

Rule 1.2.1. **Microbiological**. All microbiological maximum contaminant levels, maximum contaminant level goals, and treatment technique requirements shall apply to public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.52, 141.63, 141.851, and 141.860.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.2.2. **Inorganic Chemicals**. All inorganic chemical maximum contaminant levels and action levels shall apply to public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.6, 141.11, 141.23 (d & e), 141.51, 141.60, 141.62 (b, c & d) and 141.80.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.2.3. **Organic Chemicals**. All organic chemical maximum contaminant levels shall apply to public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.50, 141.60 and 141.61.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.2.4. **Turbidity**. The maximum contaminant levels for turbidity shall apply to public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.13, 141.73 and 141.173.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.2.5. **Radionuclides**. All radionuclide maximum contaminant levels and maximum contaminant level goals shall apply to public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.15, 141.16, 141.55 and 141.66.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.2.6. **Disinfectant Residuals**, Disinfection Byproducts, and Disinfection Byproduct Precursors. All disinfectant residuals, disinfection byproduct and disinfection byproduct precursor maximum contaminant levels, operational evaluation levels, best technologies, treatment techniques, and other means available for achieving compliance shall apply to public water systems as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.53, 141.54, 141.64, 141.65, 141.130, 141.620 and 141.626.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.2.7. **Miscellaneous Contaminants**. All maximum contaminant levels not previously referenced in this regulation shall apply to public water systems as stipulated in the latest revision of the National Primary Drinking Water Regulations.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 3. Monitoring, Analytical, And Treatment Technique Requirements

Rule 1.3.1. **Coliform Sampling, Analyses, Treatment Technique Triggers and Assessment Requirements**. It shall be the responsibility of each supplier of water to comply with the treatment technique triggers, assessment requirements, and Coliform Monitoring and Analytical Requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.21 or any subsequent revisions thereto including 141.851 – 141.860 except that the following optional provisions of Title 40 Code of Federal Regulations Section 141.21, 141.854, 141.855, and 141.857 are not adopted:

1. The provision of Title 40 Code of Federal Regulations Section 141.21 (a)(2) concerning the reduction of the monitoring frequency for community water systems serving 1,000 or fewer persons;

2. The provision of Title 40 Code of Federal Regulations Section 141.21 (a)(5) concerning waiver of the time limit for sampling after a turbidity sampling result exceeds 1 NTU;

3. The provision of Title 40 Code of Federal Regulations Section 141.21 (b)(3) concerning collection of large volume repeat samples in containers of any size;

4. The provision of Title 40 Code of Federal Regulations Section 141.21 (d) concerning agents other than State personnel conducting sanitary surveys;

5. The provisions of Title 40 Code of Federal Regulations Section 141.21 (e)(2) with respect to waiver of E. Coli testing on a total coliform positive sample;

6. Provisions allowing systems to perform reduced monitoring below the minimum of monthly. All systems regardless of type and operational status will be on monthly monitoring schedules.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.2. **Inorganic Chemical Sampling and Analyses**. It shall be the responsibility of each supplier of water to comply with the inorganic chemical sampling/analysis requirements, analytical techniques, and water quality parameters as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.6, 141.23, 141.86, 141.87, 141.88 and 141.89 except that the following optional provisions of Title 40 Code of Federal Regulations are not adopted: Section 141.23 (a)(4) and Section 141.88(a)(1)(iv) which allow compositing of samples**.** The provisions of Title 40 Code of Federal Regulations, Section 141, Subpart I – Control of Lead and Copper are hereby incorporated by reference including any subsequent amendments and editions.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.3. **Organic Chemical Sampling and Analyses**. It shall be the responsibility of each supplier of water to comply with the organic chemical sampling and analysis requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.6, 141.24, 141.30 and 141.40 except that the following optional provisions of Title 40 Code of Federal Regulations are not adopted: Sections 141.24 (f) (14) and (h) (10) and Section 141.40 (n)(9) which allow compositing of samples.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.4. **Radionuclides**. It shall be the responsibility of each supplier of water to comply with the radionuclide sampling and analysis requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.25 and 141.26.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.5. **Turbidity and Source Water Sampling and Analyses.** It shall be the responsibility of each supplier of water to comply with the turbidity and source water sampling and analysis requirements and state notification procedures as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.22, 141.174, 141.560 – 141.564, 141.701 – 141.704, 141.707 and Appendix B to Subpart Q of Part 41.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.6. **Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors Sampling and Analyses**. It shall be the responsibility of each supplier of water to comply with the disinfectant monitoring, disinfection byproduct sampling, analysis and all other requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.131, 141.132, 141.531, 141.600-605, 141.620-625, 141.627, and 141.628. Compliance with this section shall be determined as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.133 and 141.620.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.7. **Ground Water Microbial Sampling and Analyses.** It shall be the responsibility of each supplier of ground water to comply with the source microbial monitoring and analytical requirements and if requested, provide any information that will allow the state to perform a hydrogeologic sensitivity assessment as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.400, 141.402, 141.853, and Subpart Y.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.8. **Filtration and Disinfection**. It shall be the responsibility of each supplier of water to comply with the filtration and disinfection analytical and monitoring requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.70, 141.71, 141.73, 141.74, 141.174, and 141.856.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.3.9. **Miscellaneous Contaminants**. It shall be the responsibility of the supplier of water to comply with the special monitoring requirements of the National Primary Drinking Water Regulation Title 40 Code of Federal Regulations Section 141.41 (special monitoring for sodium) and Section 141.42 (special monitoring for corrosivity characteristics). It shall also be the responsibility of the supplier of water to comply with all other monitoring and analysis requirements not previously

addressed in this regulation as stipulated in the National Primary Drinking Water Regulations.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 4. Sanitary Surveys.

Rule 1.4.1. **Surface Water Systems:** The Mississippi State Department of Health shall make periodic on-site surveys of each public surface water system for the purpose of determining the adequacy of the water source, facilities, equipment, watershed control program, operation and maintenance procedures and monitoring and compliance as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.63, 141.522 and 141.723. These surveys include the right to inspect all records, take water quality samples, or verify procedures, to determine compliance with this regulation. Significant deficiencies, as determined by the Department utilizing current EPA guidance manuals, shall be identified by Department staff during the conduct of sanitary surveys. Public water systems shall, upon receipt of the sanitary survey report, provide a written response to all significant deficiencies identified in the report to the Department within 45 days of receipt of the report. In this written response, the public water system shall outline its plan to correct the significant deficiencies identified in the survey report. After reviewing the public water system's written response, the Director shall require, by means of a written order, that the public water system correct the significant deficiencies within a reasonable period of time as determined by the Department.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.4.2. **Ground Water Systems:** The Mississippi State Department of Health shall make periodic on-site surveys of each public ground water system for the purpose of determining the adequacy of the water source, treatment, distribution, storage, pumps, reporting, management and operator compliance as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.63 and 141.401. These surveys include the right to inspect all records, take water quality samples, or verify procedures, to determine compliance with this regulation. Significant deficiencies, as determined by the Department utilizing current EPA guidance, shall be identified by Department staff during the conduct of sanitary surveys. Public water systems shall, upon receipt of the sanitary survey report, provide a written response to all significant deficiencies identified in the report to the Department within 30 days of receipt of the report. In this written response, the public water system shall outline its plan to correct the significant deficiencies identified in the survey report. After reviewing the public water system's written response, the Director shall require, by means of a written order, that the public water system correct the significant deficiencies within 120 days or within a reasonable period of time as determined by the Department.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.4.3. **Treatment Techniques**. It shall be the responsibility of each supplier of water to comply with the treatment techniques as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.76, 141.81, 141.82, 141.83, 141.110, 141.111, 141.135, 141.403, and 141.404. Violations as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.403 and 141.404 are hereby incorporated.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 5. Reporting, Records, And Public Notification

Rule 1.5.1. **Reporting Requirements**.

1. The supplier of water shall provide the results of all water quality analyses, assessments, corrective actions, and certifications to be utilized for compliance with this regulation to the Director as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.31, 141.35, 141.73, 141.75, 141.76, 141.90, 141.134, 141.173, 141.175, 141.405, 141.570, 141.601, 141.602, 141.629, 141.706, 141.710, 141.712, 141.860, and 141.861.

2. The supplier of water shall report to the Director the failure to comply with these regulations, including failure to comply with monitoring and analytical requirements, failure to comply with treatment technique requirements, and failure to meet maximum contaminant levels as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.31, 141.35, 141.73, 141.75, 141.76, 141.173, 141.175, 141.405, 141.860, 141.861.

3. The supplier of water shall provide proof of public notification to the Director as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.31(d), 141.90(f) and 141.405.

4. The supplier of water or consecutive ground water system shall maintain records and submit to the Director copies of all required records as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.31 (e), 141.90, 141.91, 141.75, 141.76, 141.175, 141.405, 141.721, 141.722, 141.860, and 141.861.

5. The state shall be responsible for submitting to the Administrator all information stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 142.15.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.5.2. **Public Notification and Education**. Each supplier of water shall provide public notification or education as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.35, 141.71, 141.73, 141.74, 141.85, 141.90(f), 141.170-141.174, 141.201-141.211, 141.402- 141.404(d), 141.500-141.553, 141.560, 141.564, Appendices A-C to Subpart Q, and Subpart Y of Part 141. Public notification of fluoride content is required of all public water suppliers as stipulated in Title 40 Code of Federal Regulations Section 143.5.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.5.3. **Record Maintenance**. Each supplier of water shall retain records and make such records available to the Director as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.33, 141.35, 141.75, 141.76, 141.134, 141.155, 141.175, 141.571, 141.601, 141.602, 141.629, 142.62, and 141.861.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.5.4. **Records Kept by States**. Records of currently applicable or most recent tests, measurements, analyses, decisions, and determinations performed on each public water system, including all supporting information and an explanation of the technical basis of each decision to determine compliance with applicable provisions of the Mississippi Primary Drinking Water Regulations will be maintained in accordance with the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 142.14.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.5.5. **Laboratory Certification**.

1. The Director may prescribe minimum requirements for a laboratory to be certified by the Mississippi State Department of Health to perform water quality analyses required under this regulation.

2. Each supplier of water must utilize the services of certified laboratory or party approved by the state where applicable to complete all water quality analyses as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.28, 141.705, 141.852.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 6. Filtration and Disinfection - Surface Water Treatment Rule.

Rule 1.6.1. **General Requirements**: Each public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the treatment technique requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.70.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.6.2. **Criteria for Avoiding Filtration**: In order to avoid filtration, a public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the criteria for avoiding filtration as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.71.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.6.3. **Disinfection**: A public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the disinfection requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.72.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.6.4. **Filtration**: A public water system that uses a surface water source or a ground water source under the direct influence of surface water and does not meet all of the criteria in Title 40 Code of Federal Regulations Section 141.71 for avoiding filtration must comply with the treatment requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.73.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.6.5. **Recycle Provisions**: A public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the recycle provisions as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.76.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 7. Enhanced Filtration and Disinfection - Surface Water Treatment Rule.

Rule 1.7.1. **General Requirements**: Each public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the treatment technique and microbial protection requirements as

stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.170, 141.500-141.503, 141.510-141.511, 141.520, 141.700, 141.710 – 141.720.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.7.2. **Criteria for Avoiding Filtration**: In order to avoid filtration, a public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the criteria for avoiding filtration as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.171 and 141.521.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.7.3. **Disinfection**: A public water system that uses a surface water source or a ground water source under the direct influence of surface water must comply with the disinfection, profiling and benchmarking requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.172, 141.530-141.536, 141.540-141.544, 141.708 and 141.709.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.7.4. **Filtration**: A public water system that uses a surface water source or a ground water source under the direct influence of surface water and does not meet all of the criteria in Title 40 Code of Federal Regulations Section 141.171 for avoiding filtration must comply with the monitoring, reporting, records maintenance, assessment and treatment requirements as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Sections 141.173, 141.550-141.553, and 141.560-141.564. A public water system that uses a surface water source or a ground water source under the influence of surface water shall arrange for the conduct of a comprehensive performance evaluation by the Department or a third party approved by the Department within 30 days of exceeding the filter performance triggers stipulated by the National Primary Drinking Water Regulations published under Title 40 Code of Federal Regulations Section 141.175 (b)(4). Based upon the results of this comprehensive performance evaluation, the public water system shall arrange for the completion of a composite correction program developed in accordance with current EPA guidance documents. This composite correction program shall be submitted to the Department for review and approval prior to actual implementation. The Director, after reviewing and approving the composite correction program, shall, by means of a written order, require the public water system to implement the approved composite correction program on a time schedule approved by the Department as stipulated in Title 40 Code of Federal Regulations Section 142.16(g)(1) and 142.16(j)(1).

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 8. Cross Connections

Rule 1.8.1. **Cross Connections Prohibited**. No person shall install, permit to be installed or maintain any cross connection between a public water system and any other non-public water system or a line from any container of liquids or other substances, except as specifically authorized by this regulation, unless a backflow prevention assembly is installed between the public water system and the source of contamination. Direct connections between a public water supply and sewer or storm sewer are prohibited.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.8.2. **Low Hazard Cross Connection**.

1. A connection between a public water system and a service or other water system not hazardous to health but not meeting established water quality standards for public water systems and not cross connected within its system with a potentially dangerous substance shall be considered a low hazard category cross connection. An appropriate backflow prevention assembly or device recommended by the Department for low hazard cross connections shall be installed except as provided in section 104.02(2).

2. Pursuant to Section 41-26-14(2)(b) of the Mississippi Code of 1972, as amended, the following cross connections shall be considered as low hazard posing a very low risk and shall not be required to have a backflow preventer device:

    a. Any lawn sprinkler system or lawn irrigation system that is connected to a public water system and was professionally installed regardless of whether the system is underground or above ground or whether the system has pop-up sprinkler heads.

    b. Any swimming pool that is connected to a public water system and was professionally installed or any swimming pool that is connected to a public water system and has a fill line with an anti-siphon air gap.

    c. Any water fountain or cooler that provides drinking water for human consumption that is connected to a public water system and was professionally installed.

    d. Any fire sprinkler system that contains only water or a dry pipe and no chemicals that is connected to a public water system and was professionally installed.

e. Any commercial establishment that is connected to a public water system that contains no cross connections directly with a dangerous or hazardous substance or material.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 9. High Hazard Cross Connection.

Rule 1.9.1. A connection between a public water system and a non-public water system or other source of contamination which has or may have any material in the water dangerous to health, or connected to any material dangerous to health, that is or may be handled under pressure, or subject to negative pressure, shall be considered a high hazard category cross connection. The cross connection shall be eliminated by air gap separation or shall be protected by the installation of an appropriate backflow prevention assembly or device recommended by the Department for high hazard cross connections.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.9.2. Any lawn sprinkler system or lawn irrigation system that is connected to a public water system and either injects or stores lawn chemicals or is connected to a wastewater supply shall be considered a high hazard cross connection and shall be protected by the installation of a backflow prevention assembly or device.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.9.3. Additional backflow prevention assemblies or devices shall not be required for carbonated beverage dispensers if 1) the water supply connection to the carbonated beverage dispenser is protected against backflow by a backflow prevention assembly or device that conforms to ASSE 1022 or by an air gap, and 2) the backflow prevention assembly or device and the piping downstream from the device are not affected by carbon dioxide gas.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.9.4. **Distinction Between Low and High Hazard Cross Connection**. The distinction between low hazard cross connection and high hazard cross connections shall be made by an authorized representative of the public water system subject to review by the Department.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 10. Responsibility Of Public Water Systems To Establish Cross Connection Control Programs

Rule 1.10.1. **Cross Connection Control Program**. All public water supplies shall adopt and enforce a cross connection control policy or ordinance that is no less stringent than

the provisions of this regulation; however, the adopted policy or ordinance shall not be more stringent than the provisions of House Bill 692 enacted by the 2001 Mississippi Legislature, as codified in Section 41-26-14 et. seq. of the Mississippi Code of 1972, Annotated. This policy or ordinance shall establish a cross connection control program consisting of the following:

1. Locating and eliminating unprotected cross connections.

2. Preventing the occurrence of new cross connections with the public water system.

3. Maintaining records pertaining to the location of existing backflow prevention assemblies, type and size of each assembly and results of all tests of backflow prevention assemblies by a tester certified by the Department.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.10.2. **Cross Connection Surveys**. It shall be the responsibility of each public water system to conduct surveys and on-site visits as necessary to locate existing cross connections. Single family dwellings and multi-family dwellings shall not be included in this survey unless the officials of the public water system have reason to believe that a cross connection exists. This survey shall be performed by an authorized representative of the public water system utilizing established written guidelines as published by the Department.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.10.3. Each public water system shall complete an initial cross connection survey by December 31, 2000.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.10.4. Upon completion of the required cross connection survey, the responsible official of each public water system shall certify to the Department, on forms provided by the Department, that the required survey has been properly completed in accordance with the written guidelines published by the Department.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 11. Installation of Backflow Preventers

Rule 1.11.1. Across connection is identified, the public water system shall require that the property owner eliminate the cross connection or install the proper type backflow prevention assembly.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.11.2. When a cross connection is identified, the public water system shall notify the property owner, in writing and within ten (10) days, of the existence of the cross connection and that the cross connection must be eliminated or protected.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.11.3. If the public water system determines that the cross connection is a high hazard category cross connection, it shall be eliminated or protected by the appropriate backflow preventer by June 30, 2001. If a public water system identifies an existing high hazard cross connection after June 30, 2001, the high hazard cross connection shall be eliminated or protected by the property owner within ninety (90) days of written notification by the public water system. If the property owner has an existing backflow preventer, the public water system shall allow the backflow preventer to remain in place until it fails to function properly.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.11.4. If the public water system determines that the cross connection is a low hazard cross connection, it shall be eliminated or protected by the property owner by installing an appropriate backflow preventer by June 30, 2004. If an existing low hazard cross connection is identified by a public water system after June 30, 2004, the cross connection shall be eliminated or protected by the property owner by installing an approved backflow preventer within one (1) year of written notification by the public water system. If the property owner has an existing backflow preventer, the public water system shall consider the backflow preventer approved and shall allow the installed backflow preventer to remain in place until the backflow preventer fails to function properly.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.11.5. **Public Water System Enforcement Actions**. In the event a customer refuses to comply with the cross connection control provisions of this regulation, the public water system is authorized to discontinue water service to the customer until such time as the customer complies with this regulation.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 12. Recommended Backflow Preventers

Rule 1.12.1. **List of Recommended Backflow Preventers**. The Department shall prepare and publish a list of backflow prevention assemblies recommended for use in the State of Mississippi. The Department shall routinely update this list as necessary.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.12.2. **Recommended Devices for High Hazard Cross Connections**.

1. Reduced Pressure Principle Backflow Prevention Assemblies. Backflow prevention assemblies recommended to protect high hazard cross connections shall include reduced pressure principle backflow prevention assemblies.

2. Pressure Vacuum Breaker Assemblies. Backflow prevention assemblies recommended to protect high hazard cross connections shall include pressure vacuum breaker assemblies. Pressure vacuum breaker assemblies shall not be used in locations where the vacuum breaker may be subject to back pressure and shall not be used in locations where the vacuum breaker is not higher than all downstream connections.

3. Atmospheric Vacuum Breakers. Backflow prevention devices recommended to protect high hazard cross connections shall include atmospheric vacuum breakers. Atmospheric vacuum breakers shall not be installed in locations that may be subject to back pressure, shall not be installed in locations where the vacuum breaker is not higher than all downstream locations, shall not be installed in locations with valves downstream and shall not be installed in locations of continuous use.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.12.3. **Low Hazard Cross Connections**. Backflow prevention assemblies recommended to protect low hazard cross connections shall include reduced pressure principle assemblies, pressure vacuum breaker assemblies, atmospheric vacuum breaker assemblies, and double check valve assemblies. Pressure vacuum breaker assemblies shall not be used in locations where the vacuum breaker may be subject to back pressure and shall not be used in locations where the vacuum breaker is not higher than all downstream connections. Atmospheric vacuum breakers shall not be installed in locations that may be subject to back pressure, shall not be installed in locations where the vacuum breaker is not higher than all downstream locations, shall not be installed in locations with valves downstream and shall not be installed in locations of continuous use.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 13. Installation Requirements.

Rule 1.13.1. Reduced pressure principle backflow prevention assemblies, double check valve assemblies, and pressure vacuum breaker assemblies shall be installed in a location that provides adequate access for testing and repair of the assembly.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.13.2. Reduced pressure principle backflow prevention assemblies and double check valve assemblies shall not be subject to possible flooding. Reduced pressure principle backflow prevention assemblies and double check valve assemblies shall not be located in a pit below ground level.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 14. Testing Of Backflow Prevention Assemblies

Rule 1.14.1. **Testing By Certified Tester**. When a reduced pressure principle backflow prevention assembly, double check valve assembly, or pressure vacuum breaker assembly is installed to protect a public water system against the possibility of a backflow from a customer's water service, inspection and testing of the assembly, where required by this regulation, shall be performed by an individual who has been licensed as a Certified Tester by the Department.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.2. Each backflow prevention assembly shall be inspected and tested by a Certified Tester after installation and before use by the customer. Reduced pressure principle backflow prevention assemblies and pressure vacuum breakers shall be inspected and tested at least once a year by a Certified Tester.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.3. The Certified Tester shall provide the property owner and the public water system with a written report of the inspection and test results on each assembly tested. This written report shall be on a form provided by the Department. The report shall be prepared and submitted by the Certified Tester making the inspection and test. The Certified Tester and the public water system shall retain all backflow prevention assembly test and inspection results for at least five (5) years from the date of test and inspection.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.4. Reduced pressure principle backflow prevention assemblies and pressure vacuum breaker assemblies that fail to function properly or fail the routine required test shall be repaired or replaced within thirty (30) days of identification of the failure. Double check valves that fail to function properly shall be repaired or replaced within ninety (90) days of identification of the failure.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.5. **Licensing of Certified Testers**. Each Certified Tester shall be licensed by the Department. All tester training shall be submitted to the Department for approval at least 45 days prior to the scheduled date of training. The Department shall review the instructors and course curriculum for all proposed tester training. The Department shall approve proposed tester training if it determines that the proposed training program and instructor(s) meets the Department's minimum guidelines. The Department shall develop and administer the backflow tester certification test at the conclusion of each approved tester training program. A minimum score of 70% on the Department's written examination and successful

performance of prescribed tests on a reduced pressure principle backflow prevention assembly, double check valve assembly, and pressure vacuum breaker assembly will be required for certification. Any applicant not successfully completing both the written and performance tests must attend a Department approved tester training program before taking the certification tests again. Under special circumstances and upon receipt of a written request by the applicant, the Department may allow an applicant to take the written and performance tests without attending a Department approved tester training program.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.6. The Department may issue, solely at its discretion and without testing, certification to a Tester possessing certification from a nationally recognized backflow prevention assembly tester certification program.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.7. Each Tester's certification will expire three (3) years from the date issued. To become re-certified, the Tester must successfully complete a recertification examination developed by the Department and administered by the Department or an authorized representative of the Department.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.14.8. The Certified Tester shall maintain the accuracy of the testing equipment to be used to test backflow prevention devices. The testing equipment shall be checked for proper calibration and shall be recalibrated, as needed, in accordance with the recommendations of the manufacturer. Only properly trained individuals shall perform calibration adjustments or repair or testing equipment. Calibration standards utilized in the testing or repair of this testing equipment shall have their accuracy checked and adjusted to within allowable tolerances against standard instruments traceable to the National Institute for Standards and Technology (NIST).

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 15. Suspension or Revocation of Tester's Certificate.

Rule 1.15.1. A Tester's Certificate may be revoked or suspended by the Department for just cause. Causes include, but are not limited to, the following:

1. Fraud, deception, or misrepresentation of a material fact to either the public or the Department;

2. Misfeasance, malfeasance or nonfeasance;

3. Failure to file any official reports required by the Department;

4. Failure to maintain all official records required by the Department;

5. Failure to respond to any official correspondence from the Department;

6. Failure to obey a lawful order of the Director or any duly appointed Administrative Hearing Officer of the Department;

7. Failure to exercise reasonable care or judgment in the testing of backflow prevention devices;

8. Failure to comply with the terms of a suspension of a certificate issued by the Department;

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.15.2. No Tester's Certificate will be suspended or revoked without notice to the Certificate holder and an opportunity for a hearing. Hearings shall be held in conformity with Sections 41-26-17 and 41-26-21 Mississippi Code of 1972 Annotated.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.15.3. Notwithstanding the requirement for a hearing, the Director may, if he determines that public health is threatened, issue any such orders as are deemed necessary to protect the public health, including, but not limited to, orders to individual(s) to cease all actions as a Certified Tester of backflow prevention devices in the State of Mississippi.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 16. Cross Connection Control Waivers

Rule 1.16.1. **Waivers**. The Director may issue a waiver to a public water system to any part or parts of the cross connection control provisions of this regulation if the Department deems such waiver to be appropriate and will not potentially jeopardize public health.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 17. Application And Fees For Certified Tester

Rule 1.17.1. **Filing Application**.

1. A tester desiring certification shall file an application with the Department on forms provided by the Department.

2. The Department shall review the application and supporting documents, determine the eligibility of the applicant, and issue a certificate when the minimum requirements are met.

SOURCE: Miss. Code Ann. §41-26-14

Rule 1.17.2. **Backflow Prevention Assembly Tester Certification Fees**.

1. An initial fee of fifty dollars ($50.00) shall be charged for certification as a Backflow Prevention Assembly Tester. The Department shall invoice each applicant for the $50 fee and the certificate will not be issued until the fee is received by the Department.

2. A fee of thirty dollars ($30.00) shall be charged for the renewal of a certificate. The Department shall invoice each applicant for the $30 fee and the renewal certificate will not be issued until the fee is received by the Department.

SOURCE: Miss. Code Ann. §41-26-14

Subchapter 18. Consumer Confidence Reports

Rule 1.18.1. **Purpose and Applicability**. Each community public water system shall prepare and deliver to their customers an annual consumer confidence report as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.151.

1. **Effective Dates**. The effective dates for community public water supplies to prepare and deliver annual consumer confidence reports shall be as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.152.

2. **Content of the Reports**. The content of the Consumer Confidence Reports prepared by community public water supplies shall be as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.153 and subpart Y.

3. **Required Additional Health Information**. It shall be the responsibility of each community public water supply preparing a consumer confidence report to include the required additional health information as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.154.

4. **Report Delivery**. Delivery of Consumer Confidence Reports prepared by community public water supplies shall be as stipulated in the National Primary Drinking Water Regulations as published under Title 40 Code of Federal Regulations Section 141.155.

SOURCE: Miss. Code Ann. §41-26-6

Subchapter 19. Emergency Conditions And Enforcement

Rule 1.19.1. **Emergency Conditions**. The Director is authorized to develop and implement a plan for the provision of safe drinking water in emergency circumstances for any public water system.

SOURCE: Miss. Code Ann. §41-26-6

Rule 1.19.2. **Enforcement**. Violations of any requirement of this regulation shall be subject to the enforcement provisions of the Mississippi Safe Drinking Water Act of 1997 as found at Sections 41-26-1 through 41-26-101, Mississippi Code of 1972, Annotated.

SOURCE: Miss. Code Ann. §41-26-6

Chapter 2. REGULATION GOVERNING THE CERTIFICATION OF MUNICIPAL AND DOMESTIC WATER SYSTEM OPERATORS

Subchapter 1. General Provisions

Rule 2.1.1. **Legal Authority.** This regulation has been promulgated under the authority of and pursuant to the Municipal and Domestic Water and Wastewater System Operator's Certification Act of 1986**,** Sections 21-27-201 through 21-27-221**,** Mississippi Code of 1972. Annotated**.**

*SOURCE: Miss. Code Ann. §§*21-27-207 and 41-26-6

Rule 2.1.2. **Definitions**

1. **Available** shall mean a certified waterworks operator or his/her designee employed by the water system holding a waterworks operator certification equivalent to or higher than the class of the public water system. The water system must be able to contact the certified operator or his/her designee at all times by telephone, pager or other reliable mode of communication acceptable to the Bureau of Public Water Supply to address system needs and problems as they occur.

2. **Board** shall mean the Mississippi State Board of Health.

3. **Bureau** shall mean the Bureau of Public Water Supply of the Mississippi State Department of Health.

4. **Community Water System** shall mean any water system serving piped water for human consumption to fifteen (15) or more individual service connections used year-round by consumers or regularly serving at least twenty-five (25) or more

individual consumers year-round, including, but not limited to, any collection, pretreatment, treatment, storage and/or distribution facilities or equipment used primarily as part of, or in connection with such system, regardless of whether or not such components are under the ownership or control of the operator of such system.

6. **Department** shall mean the Mississippi State Department of Health.

7. **Director** shall mean the director of the Bureau of Public Water Supply or his designated representative.

8. **Distribution System** shall mean all water mains, repumping facilities, and appurtenances past treatment.

9. **Non-transient non-community water system** shall mean a public water system that is not a community water system and that regularly serves at least twenty-five (25) of the same persons.

10. **Operator** shall mean the designated certified waterworks operator who directly supervises and is personally responsible for the daily operation and maintenance of a community or non-transient non-community public water system.

11. **Person** shall mean the state or other agency or institution thereof, any municipality, political subdivision, public or private corporation, individual, partnership, association or other entity, and includes any officer or governing or managing body of any municipality, political subdivision, or public or private corporation, or the United States or any officer or employee thereof.

12. **Responsible Charge** shall mean a waterworks operator, holding a Bureau issued waterworks operator certification at a class equivalent to or higher than the class of the water system, who is officially designated by the owner or responsible official of the water system as the operator responsible for making all decisions regarding the daily operational activities of the public water system including all components of the water system such as treatment plants, water wells, distribution systems, etc. Under special circumstances, the Director may authorize a water system(s) to have more than one operator in responsible charge.

13. **Restricted Certification** shall mean a certified waterworks operator that is given a temporary certification in order to operate a public water system that has received a change in classification or a sudden loss of their certified operator. Operators with this type of Certification are restricted to a specific public water supply temporarily until such time as the operator attends a water operator short course within three years of receiving the Restricted Certification and passes the written examination required by the Bureau. This Restricted Certification is only provided for a period of three years. The Director may extend the restricted period of time of the certification due to the experience requirements of system classification.

*SOURCE: Miss. Code Ann. §*21-27-203

Rule 2.1.3. **Certificates.** Effective July 1, 1987, all municipal and domestic community water systems must be operated by persons who are certified by the Bureau of Public Water Supply as qualified to operate such facilities. Effective July 1, 1998, all non-transient non-community public water systems must be operated by persons who are certified by the Bureau to operate such facilities.

1. Certificates of competency will be issued by the Bureau only after the applicant has passed the appropriate examination and has met the minimum requirements as specified in Subchapters 3 & 4.

2. Certifications issued in accordance with section 21-27-213 (Grandfather Clause) of the Municipal and Domestic Water and Wastewater System Operator's Certification Act of 1986, shall be valid only for the particular public water system operated by the applicant at the time the certification was issued, and then only so long as the system remains active in the same or lower classification and the operator completes the continuing education requirement found in Rule 2.6.2. (2).

3. Certifications shall be valid for three (3) years from the date of issuance, unless suspended or revoked for cause.

4. In the event of temporary loss of an operator, notice shall be immediately given to the Bureau. Continued operation of such system, without a certified operator, may proceed on an interim basis for a period not to exceed one hundred eighty (180) days, except for good cause shown upon written petition to the Director or designated representative.

5. Reciprocal certification may be issued in a comparable classification to an operator who holds a valid certification in any state, territory, or possession of the United States, provided the applicant's current certification is comparable to the class being applied for and the state from which the operator is requesting reciprocity utilizes a formal examination process. Any operator requesting reciprocal certification may request a waiver from the Director if they hold a valid certification in any state, territory or possession of the United States that does not utilize a formal examination process.

6. Any person allowed to actually make physical changes on a public water system that impact water quality or quantity must hold a waterworks operator's license issued by the Bureau at a class equivalent to or higher than the class of the public water system or be under the supervision of the certified waterworks operator for that system.

*SOURCE: Miss. Code Ann. §§*21-27-205 and 21-27-211

Subchapter 2. Classification of Public Water Systems & Operator in Responsible Charge

Rule 2.2.1. **Classes of Water Systems.** Water systems shall be classified in accordance with the criteria outlined below. Special systems which do not fall within these guidelines shall be considered as individual cases and be classified by the Bureau. All public water systems shall be under the direct supervision of a Bureau certified waterworks operator who is designated by the owner or responsible official of the system as the operator in responsible charge of the water system. In those situations where a public water system contracts with a private operating company to operate the public water system, the responsible official of the public water system may authorize the private company to designate an operator employed by the company as the operator in responsible charge of the water system. In either case, the water system shall identify, by means of the Public Water Supply Annual Report submitted each year to the Bureau, the certified operator in responsible charge of the public water system.

1. **Class E.** Water systems that purchase water only and do not provide additional treatment. This classification shall also apply to waterworks operators whose only job responsibility is the operation and maintenance of the distribution system(s). The certified operator in responsible charge or his/her designee shall be available twenty-four (24) hours a day to address system needs and problems as they occur.

2. **Class D**. Water systems with no treatment other than chlorination and/or fluoridation or direct chemical feed such as polyphosphate. The certified operator in responsible charge or his/her designee shall be available twenty-four (24) hours per day to address system needs and problems as they occur.

3. **Class C**. Water systems with aeration, pH adjustment, corrosion control or closed pressure filtration treatment facilities including zeolite softening or iron removal. The certified operator in responsible charge or his/her designee shall be available twenty-four (24) hours per day to address system needs and problems as they occur.

4. **Class B**. Water systems with two (2) or more Class C treatment facilities of different types, with iron or manganese removal facilities breaking pressure or requiring flocculation and/or sedimentation, a system utilizing membrane filtration, or ion exchange treatment. The certified operator in responsible charge or his/her designee shall be available twenty-four (24) hours per day to address system needs and problems as they occur.

5. **Class A**. Systems with surface water treatment, groundwater under the direct influence of surface water, lime softening, or coagulation and filtration for the removal of constituents other than iron or manganese. A certified class A operator shall be onsite whenever the treatment plant for a Class A public water system treating surface water is in operation. The certified operator in responsible charge

shall be available twenty-four (24) hours per day to address system needs and problems as they occur.

SOURCE: Miss. Code Ann. §21-27-205

Subchapter 3. Waterworks Operator Qualifications.

Rule 2.3.1. **Class A.** The applicant must have at least a bachelor's degree in engineering or applied sciences from an accredited college or university, at least one year of experience in a Class A or B water treatment plant, and pass the written examination required by the Bureau. Or alternatively, an applicant must be a graduate of an accredited high school or possess an equivalent (GED), have at least six (6) years of experience in a Class A or B water plant, and pass the written examination required by the Bureau. In both applicant cases, at least one (1) year of working experience must be in a Class A plant.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.3.2. **Class B.** The applicant must have graduated from an accredited high school or possess a General Equivalency Diploma (GED), have at least three (3) years of experience in the operation of a Class A, B, or C water treatment plant, of which one (1) year of working experience must be in a Class A or B water treatment plant. The applicant must also pass the written examination required by the Bureau.

SOURCE: Miss.Code Ann. §21-27-205

Rule 2.3.3. **Class C.** The applicant must have graduated from an accredited high school or possess a General Equivalency Diploma (GED), have at least two (2) years of working experience in the operation a Class A, B, C, or D water treatment plant of which one (1) year of working experience must be in a Class A, B, or C water treatment plant. The applicant must also pass the written examination required by the Bureau.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.3.4. **Class D.** The applicant must have graduated from an accredited high school or possess a General Equivalency Diploma (GED), and have at least one (1) year of working experience in operation of the same class facility as being applied for or a higher level. The applicant must also pass the written examination required by the Bureau.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.3.5. **Class E.** The applicant must have graduated from an accredited high school, or possess a General Equivalency Diploma (GED), and have at least one (1) year of working experience in the operation of the same class facility as being applied for

or a higher level. The applicant must also pass the written examination required by the Bureau.

SOURCE: Miss. Code Ann. §21-27-205

Subchapter 4. General Qualifications for all Certified Waterworks Operators

Rule 2.4.1. One (1) year of the required working experience must be earned under the direct supervision of a certified waterworks operator who holds a valid certification issued by the Bureau at a class equivalent to or higher than that for which certification is being requested. The year of supervised working experience must be obtained in a public water system of a class equivalent to or higher than that for which certification is being applied. The supervising operator must sign a certification statement verifying the successful completion of the required period of supervision. Under special circumstances, the Director may waive the requirements of this section based upon written evidence of good cause.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.4.2. To be eligible to serve as the designated certified waterworks operator for a community or non-transient non-community public water system, an operator's primary residence must be no more than fifty (50) miles from the system. Under special circumstances, the responsible official of the water system may appeal to the Director in writing for a waiver of the fifty (50) mile requirement.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.4.3. An operator whose certification has been expired for twenty-four (24) months or less shall be eligible to receive a new waterworks operator certification at a level no higher than the certification previously issued by the Bureau if he/she successfully passes the written examination required by the Bureau. To be eligible to retake the examination, the operator must comply with the provisions of Rule 2.6.1(5) of this regulation. The provisions of Rule 2.4.1 of this regulation shall be waived for applications received under this section. An operator whose certification has been expired more than twenty-four (24) months must successfully pass the written examination required by the Bureau and comply fully with the provisions of Rule 2.4.1.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.4.4. Operators who have completed special vocational training, such as special schools, correspondence courses, etc., may be given credit for some portion of the deficiency in their experience. Except that such courses cannot be substituted for the required one (1) year of supervised working experience. Approval of credits shall be at the discretion of the Director. Credit for experience shall be awarded using the following criteria:

1. Eight (8) weeks of classroom instruction will be equivalent to one-year experience.

2. Special vocational training programs that have combinations of classroom instruction and on-the-job training will be evaluated by first separating classroom instruction from on-the-job training. Credit for working experience will be given for experience on the basis of the previous criteria

3. Applicants with a four (4) year college degree will receive the equivalent of two (2) years of experience. Applicants with an associate's degree will receive the equivalent of a one (1) year of experience. Credit for each year of college successfully completed in engineering, biological sciences, mathematics, chemistry, physics or environmental sciences will be considered on a case-by-case basis at the discretion of the Director. Twenty-four (24) semester hours completed in the above courses are equal to one (1) year of experience, with a maximum credit of two (2) years.

4. Special education training or experience which does not fall within these guidelines may be considered by the Director.

SOURCE: Miss. Code Ann. §21-27-205

Subchapter 5. Application and Fees

Rule 2.5.1. **Filing Application**

1. Applicants seeking certification as a certified waterworks operator shall file an application with the Bureau.

2. The Bureau will review the application and supporting documents, determine the eligibility of the applicant, and issue a certification when the applicant meets the minimum requirements of the class requested.

SOURCE: Miss. Code Ann. §21-27-205

Rule 2.5.2. **Fees**

1. A fee of fifty dollars ($50.00) shall be charged for an initial certification in any classification and must be paid to the Bureau prior to issuance of the certification.

2. A fee of thirty dollars ($30.00) shall be charged for the renewal of an active certification and must be paid to the Bureau prior to the renewal of the certification.

3. All application fees must be received within fifteen (15) calendar days of being invoiced by the Bureau. Application fees received after fifteen days will be returned to the applicant and the applicant must reapply to the Bureau for certification or renewal. No application or fee will be accepted thirty (30) days after the expiration of a certification and the applicant must restart the certification process as outlined in Rule 2.4.3.

SOURCE: Miss. Code Ann. §21-27-207

Subchapter 6. Examinations

Rule 2.6.1. **Written Examinations**

1. The Bureau shall prepare written examinations to be used in determining knowledge, ability, and judgment of operators.

2. Examinations shall be held at places and times set by the Bureau.

3. An individual who passes an examination must be certified within three (3) years following the date the examination was taken. Otherwise, the individual will be required to pass another written examination in order to be certified.

4. Examination papers will not be returned to the individuals.

5. To be eligible to take a written examination, an individual must satisfactorily demonstrate to the Bureau that he/she has attended a Bureau sponsored waterworks operator short course within the previous twelve (12) months.

*SOURCE: Miss. Code Ann. §*21-27-215

Rule 2.6.2. **Renewal of Waterworks Operator Certificate**

1. Certifications may be renewed without examination. An application for renewal of a waterworks operator certification must be physically received by the Bureau within thirty (30) calendar days following the date the certification expires. This application must be accompanied by proof of completion of the continuing education requirements found in Rule 2.6.2(2). Upon approval of the renewal application, the applicant will be invoiced for the renewal fee. The Bureau must receive the fee prior to renewing the waterworks operator certification. Operators who file renewal applications more than thirty (30) calendar days after expiration of their certification will be denied the renewal of their certificate and must pass the appropriate written examination and reapply for certification. To be eligible to retake the examination, the operator must comply with the provisions of Rule 2.6.1(5) of this regulation.

2. Operators who have been continuously certified by the Bureau less than nine (9) years are required to obtain at least forty-eight (48) hours of related continuing education units (CEUs) per three (3) year renewal period with at least twelve (12)

hours of these CEUs in Bureau approved "Regulation and Compliance" training topics.

At the beginning of the 10th year as a certified operator or operators who have been continuously certified by the Bureau for more than nine (9) years are required to obtain at least twenty-four (24) hours of related CEUs in the three (3) year renewal period with at least twelve (12) hours of these CEUs in Bureau approved "Regulation and Compliance" training topics. All continuing education requirements must be met prior to the expiration date of the certification. These CEUs may only be obtained by attending training sessions approved by the Bureau. Approval shall be strictly at the discretion of the Bureau. Training will be evaluated by the Bureau on an hour for hour basis for continuing education credit.

SOURCE: Miss. Code Ann. §21-27-207

Rule 2.6.3. Mississippi Department of Environmental Quality approved wastewater training programs will be awarded CEU credit by the Bureau at the rate of (1) water CEU hour for every 2 wastewater CEU hours earned. The ability to receive CEU credit for wastewater hours will end January 1, 2021.

SOURCE: Miss. Code Ann. §21-27-207

Rule 2.6.4. Each certified operator is responsible for maintaining all necessary records to document the completion of the required hours of continuing education. Original documentation of the completion of the required continuing education must be submitted with the application for renewal of the operator's certification. Copies of CEU certificates will not be accepted. Additionally, the Bureau reserves the right to audit the record of CEUs obtained for any operator certification up for renewal.

Rule 2.6.5. Restricted certifications issued by the Bureau are non-renewable. In order to obtain a non-restricted waterworks operator certification, the operator shall attend a Bureau sponsored short course during the three (3) year restricted certification period. The operator must also pass the appropriate written examination at the level of classification of the water system. This requirement may be waived by the Director at his/her discretion.

SOURCE: Miss. Code Ann. §21-27-207

Subchapter 7. Record Keeping, Reporting and Job Performance

Rule 2.7.1. **Annual Reporting Requirements**

1. Each certified waterworks operator and responsible official shall sign the certification statement on the Public Water Supply Annual Report for each public water system for which he/she is the designated certified waterworks operator in responsible charge of the public water system as required by Mississippi State Law. If a public water

system fails to provide a completed Public Water System Annual Report to the Bureau within forty-five (45) days of this Report being mailed to the water system by the Bureau, the Bureau shall officially declare the public water system to be without a certified waterworks operator and the water system shall be in violation of this regulation and Mississippi State law.

2. The water system shall maintain Public Water System Operations Record documenting activities completed on the public water system by the certified waterworks operator of record or his/her designee. This record must be available for inspection by Bureau staff. The Public Water System Operations Record is the property of the public water system and must remain as part of the official records of the Public Water System.

SOURCE: Miss. Code Ann. §21-27-207

Rule 2.7.2. **Job Performance:** Each certified waterworks operator shall abide by the current edition of the Job Performance Guidelines booklet published by the Bureau of Public Water Supply. This booklet presents the minimum duties and responsibilities for Bureau certified waterworks operators and employees under their supervision in the State of Mississippi.

SOURCE: Miss. Code Ann. §21-27-207

Rule 2.7.3. **Presence of Certified Waterworks Operator during Sanitary Surveys and Inspections:** The certified waterworks operator for a public water system shall be present for the conduct of sanitary surveys and inspections by Bureau staff when requested by Bureau staff and when provided at least twenty-four (24) hours notice of the survey or inspection. Under special circumstances, this requirement may be waived by the Director provided the certified operator arranges for someone to represent him/her during the survey or inspection.

SOURCE: Miss. Code Ann. §21-27-207

Rule 2.7.4. **Waterworks Operator Certification Waiver:** The Director may waive any part or parts of this regulation if the Director determines that such waiver will not potentially jeopardize public health.

SOURCE: Miss. Code Ann. §21-27-207

Subchapter 8. Suspension or Revocation of Certification

Rule 2.8.1. A waterworks operator certification may be revoked or suspended by the Department for just cause. Causes include, but are not limited to, the following:

1. Fraud or deception;

2. An act or acts of conduct, including, but not limited to the arrest or conviction for a felony or misdemeanor, occurring on or off the job;

3. Violation of any provision of the "Mississippi Municipal and Domestic Water and Wastewater System Operators' Certification Law of 1986," or any rule or regulation of the Department promulgated there under;

4. Violation of any provision of the Federal Safe Drinking Water Act or the Mississippi Safe Drinking Water Act; or any rule or regulation, federal or state, promulgated under these laws;

5. Failure to file any official reports required by the Department;

6. Failure to maintain all official records required by the Department;

7. Failure to respond to any official correspondence from the Department;

8. Failure to obey a lawful order of the Director or any duly appointed Administrative Hearing Officer of the Department;

9. Failure to exercise reasonable care or judgment in the operation of a public water supply or in the performance of official duties; to include, but not limited to, misfeasance, malfeasance or nonfeasance;

10. Failure to comply with the terms of a suspension of certification issued by the Department.

*SOURCE: Miss. Code Ann. §*21-27-219

Rule 2.8.2. No certificate of competency will be suspended or revoked without notice to the waterworks operator and an opportunity for a hearing. Hearings shall be held in conformity with Sections 21-27-219 and 21-27-221 Mississippi Code of 1972 Annotated.

*SOURCE: Miss. Code Ann. §§*21-27-219 and 21-27-221

Rule 2.8.3. Notwithstanding the requirement for a hearing, the Department may, if it determines that public health is threatened, issue any such orders as are deemed necessary to protect the public health, including, but not limited to, orders to individual(s) to cease all actions as a certified waterworks operator in the State of Mississippi.

*SOURCE: Miss. Code Ann. §§*21-27-217 and 21-27-219

Subchapter 9. Enforcement and Appeals Procedures

Rule 2.9.1. **Procedures:** Enforcement and appeals shall be in accordance with the Municipal and Domestic Water and Wastewater System Operator's Certification Act of 1986.

*SOURCE: Miss. Code Ann. §§*21-27-217 through 21-27-221

Chapter 3 REGULATION GOVERNING FLUORIDATION OF COMMUNITY WATER SUPPLIES

Subchapter 1 GENERAL PROVISIONS

Rule 3.1.1 **Coverage**

1. This regulation shall only apply to community water systems (CWS) serving a population of at least two thousand (2,000).

2. Each CWS shall be required to acquire and install fluoridation treatment equipment capable of maintaining fluoride levels within the optimal range as defined in this regulation, and shall comply with all requirements of this regulation for the purpose of protecting the dental health of the citizens of this State. No System shall be required to comply unless sufficient funds are identified by the Department, whether by appropriation, capital outlay, grants or similar means or source of funds, as available to that system for the cost of acquiring and installing fluoridation equipment, and the cost of material required to fluoridate said system for at least one year from the date of initial installation**.**

3. A CWS that changes treatment to include fluoridation shall maintain optimal fluoridation as specified by the Bureau of Public Water Supply.

4. Any CWS that fluoridates and wishes to discontinue community water fluoridation must provide a written request to the Director of the Bureau of Public Water Supply; comply with the Bureau of Public Water Supply policy for *Discontinuation of Community Water Fluoridation for a Public Water Supply* and receive written approval from the Director of the Bureau of Public Water Supply.

SOURCE: Miss. Code Ann. § 41-26-6

Rule 3.1.2 **Definitions.**

1. **Adjusted fluoridated water system** shall mean a public water system that adjusts the fluoride concentration in the drinking water to the optimal level for consumption (within the recommended control range).

2. **Community Water System (CWS)** shall mean any water system serving piped water for human consumption to fifteen (15) or more individual service connections used year-round by consumers or regularly serving twenty-five (25) or more individual consumers year-round, including, but not limited to, any collection, pretreatment, treatment, storage and/or distribution facilities or

equipment used primarily as part of, or in connection with such system, regardless of whether or not such components are under the ownership or control of the operator of such system.

3. **Department** shall mean the Mississippi State Department of Health.

4. **Entry point** shall mean a location following one or more finished (fluoridated) water sampling points but prior to the beginning of the distribution system of the public water system.

5. **Natural fluoride content** shall mean the concentration of fluoride in milligrams per liter (mg/L) that is present in the water source from naturally occurring fluoride sources.

6. **Optimal fluoride level** in Mississippi shall mean the amount of fluoride in water that is found naturally or adjusted should be within a recommended control range of 0.6-1.2 parts per million fluoride (ppm) with the optimal fluoride level being 0.7 ppm.

7. **Parts per million** shall mean a unit of measurement that is equivalent to 1 milligram per liter (mg/L) where the density of the liquid measured is 1.0 gram per cubic centimeter (the density of water is 1.0).

8. **Public water system (CWS)** means a system for the provision to the public of water for human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year.

9. **Raw water** is defined as water that has not been treated or had fluoride injected into it by the CWS and that contains only naturally occurring levels of fluoride.

SOURCE: Miss. Code Ann. § 41-26-6

Subchapter 2 ADJUSTED FLUORIDATED WATER SYSTEM REQUIREMENTS

Rule 3.2.1 **Testing.** : A minimum number of samples shall be collected by designated CWS personnel based on the water supply's classification on different days each week at all entry points and analyzed for fluoride content. At least once each month at each entry point, designated CWS personnel shall divide (split) one sample (hereinafter referred to as the split sample) and have one portion analyzed for fluoride by designated CWS personnel and the other portion analyzed by the Department's laboratory or a private lab certified by the Department for fluoride testing.

SOURCE: Miss. Code Ann. § 41-26-6

Rule 3.2.2 **Verification.** : Designated CWS personnel shall use water sample fluoride content results to compare with a calculated fluoride dosage to verify fluoridation program operation. The calculated dosage is defined as the calculated amount of fluoride that has been added to a water system. The calculation is based on the total amount of fluoride (weight) that was added to the water system and the total amount of water (volume) that was produced plus the naturally occurring fluoride at the source.

SOURCE: Miss. Code Ann. § 41-26-6

Subchapter 3 Optimal Fluoridation Requirements

Rule 3.3.1 **Monitoring**

1. The monthly average fluoride content of all water samples requested in Rule 3.2.1 shall have fluoride content within the optimal fluoride control range defined in Rule 3.1.2.

2. The designated CWS personnel shall collect no less than the minimum number of water samples per month based on the water supply's classification from each entry point for analysis for fluoride and at least 90% of collected samples shall have fluoride content within the optimal fluoride control range defined in Rule 3.1.2.

3. The split sample result determined through analysis by designated CWS personnel shall agree with the result analyzed by the Department within a range of +/- 0.2 ppm in at least nine of 12 months during the calendar year.

4. Designated CWS personnel shall submit a report of the results of required water sample testing each month to the Department and shall include the type of fluoride chemical used.

SOURCE: Miss. Code Ann. § 41-26-6

Rule 3.3.2 **Quality Assurance**

1. MSDH Bureau of Water Supply will assess each system's compliance with this policy on a monthly basis and send letters to the Responsible Official and Operator if the system is not compliant.

2. MSDH will prepare a compliance progress report on a monthly basis that will be made available to interested parties.

3. Each CWS that complies with the optimal fluoridation requirements during the calendar year to the satisfaction of the Department shall be recognized by the Department pursuant to its health promotion policies and guidelines.

SOURCE: Miss. Code Ann. § 41-26-6

Subchapter 4 Compliance

Rule 3.4.1 **Compliance**

1. CWS that fluoridate shall list in the Consumer Confidence Report the number of months in the previous calendar year that average sample results from a certified laboratory were within the optimal range.

2. Each CWS that fluoridates shall list in the Consumer Confidence Report the percentage of all samples collected in the previous calendar year that sample results were within the optimal range.

SOURCE: Miss. Code Ann. § 41-26-6

Subchapter 5 AUTHORITY TO REQUEST RAW WATER SAMPLE

Rule 3.5.1 **Verification.** : The Department shall have the authority to request samples of the CWS raw water source seasonally for fluoride content analysis at the Department's laboratory.

SOURCE: Miss. Code Ann. § 41-26-6

Chapter 4 REGULATION GOVERNING DRINKING WATER QUALITY ANALYSIS FUND

Subchapter 1 General Provisions:

Rule 4.1.1. **Legal Authority**. This regulation has been promulgated under the authority of and pursuant to the Mississippi Safe Drinking Water Act of 1997 (Section 41-26-1 through Section 41-26-101, Mississippi Code of 1972, Annotated).

SOURCE: Miss. Code Ann. §41-26-23

Subchapter 2 Assessment and Collection of Fees

Rule 4.2.1. **Fees**. The department annually shall assess and collect fees for water quality analysis and related activities as required by the federal Safe Drinking Water Act, as amended, which shall not exceed Two Dollars and Eighty Cents ($2.80) per connection or Forty Thousand Dollars ($40,000.00) per system, whichever is less. The department annually shall adopt by rule, in accordance with the Administrative Procedures Law and following a public hearing, a fee schedule to cover all reasonable direct and indirect costs of water quality analysis and related activities as required by the federal Safe Drinking Water Act, as amended. In adopting a fee schedule, the department shall consider the recommendations of the

advisory committee created in this section, if those recommendations are made in a timely manner as provided.

SOURCE: Miss. Code Ann. §41-26-23

Rule 4.2.2. **Advisory Committee.** An advisory committee is created to study the program needs and costs for the implementation of the water quality analysis program and to conduct an annual review of the needs and costs of administering that program. The annual review shall include an independent recommendation on an equitable fee schedule for the succeeding fiscal year. Each annual review report shall be due to the department by May 1. The advisory committee shall consist of one (1) member appointed by the Mississippi Rural Water Association, one (1) member appointed by the Mississippi Municipal Association, one (1) member appointed by the Mississippi Association of Supervisors and one (1) member appointed by the Mississippi Water and Pollution Control Operators Association, Inc.

SOURCE: Miss. Code Ann. §41-26-23

Rule 4.2.3. **Payments and Penalties.** All suppliers of water for which water quality analysis and related activities as required by the federal Safe Drinking Water Act, as amended, are performed by the State Department of Health shall pay the water quality analysis fee within forty-five (45) days following receipt of an invoice from the department. In the discretion of the department, any supplier of water required to pay the fee shall be liable for a penalty equal to a maximum of two (2) times the amount of fees due and payable plus an amount necessary to reimburse the costs of delinquent fee collection for failure to pay the fee within ninety (90) days following the receipt of the invoice. Any person making sales to customers of water for residential, noncommercial or nonagricultural use and who recovers the fee required by this section or any portion thereof from any customer shall indicate on each statement rendered to customers that these fees are for water quality analyses required by the federal government under the Safe Drinking Water Act, as amended.

SOURCE: Miss. Code Ann. §41-26-23