

December 11, 2007

Dr. Kenneth H. Stokoe, Director
Geotechnical Engineering Center
University of Texas at Austin
1 University Station C1792
Austin, TX 78712-0273

SUBJECT: NRC INSPECTION REPORT 99901368/2007-201, NOTICE OF
NONCONFORMANCE

Dear Dr. Stokoe:

On October 4 - 5, 2007, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Geotechnical Engineering Center's Soil Dynamics Laboratory, University of Texas at Austin (UTX) in Austin, Texas. The enclosed report presents the results of that inspection.

This was a limited scope inspection which focused on assessing your compliance with the provisions of Part 21 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 21), "Reporting of Defects and Noncompliance," and selected portions of Appendix B to 10 CFR Part 50, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." This NRC inspection report does not constitute NRC endorsement of your overall quality assurance or Part 21 programs.

During this inspection, it was found that the implementation of quality assurance requirements failed to meet certain NRC requirements imposed on you by your customers. These are discussed in the enclosed Notice of Nonconformance (NON) and NRC Inspection Report. Specifically, the NRC inspectors determined that the Soil Dynamics Laboratory does not monitor temperature and humidity controls for undisturbed soil samples, as required in the Quality Assurance Project Document (QAPD) imposed upon the Geotechnical Engineering Center by William Lettis and Associates, and MACTEC Engineering and Consulting, Inc. This nonconformance is cited in the enclosed NON, and the circumstances surrounding it are described in the enclosed report. You are requested to respond to the nonconformance and should follow the instructions specified in the enclosed NON when preparing your response.

In accordance with 10 CFR 2.390 of the NRC's "Public inspections, exemptions, requests for withholding," of 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter, its enclosures and any associated correspondence will be placed in the NRC's Public Document Room (PDR) or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To

the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

Juan D. Peralta, Chief */RA/*
Quality and Vendor Branch 1
Division of Construction Inspection
& Operational Programs
Office of New Reactors

Docket No. 99901368

Enclosures:

1. Notice of Nonconformance
2. Inspection Report No. 99901368/2007-201

K. H. Stokoe

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NOTICE OF NONCONFORMANCE

University of Texas at Austin
Geotechnical Engineering Center
1 University Station C1792
Austin, TX 78712-0273

Docket Number 99901368
Inspection Report Number 2007-201

Based on the results of a Nuclear Regulatory Commission (NRC) inspection conducted October 4-5, 2007, of activities performed at the Geotechnical Engineering Center's Soil Dynamics Laboratory, University of Texas at Austin (UTX), it appears that certain activities were not conducted in accordance with NRC requirements which were contractually imposed upon the Soil Dynamics Laboratory by William Lettis and Associates, and MACTEC Engineering and Consulting, Inc.

- A. Criterion XIII, "Handling, Storage, and Shipping," of Appendix B to 10 CFR Part 50, states in part that, "When necessary for particular products, special protective environments, such as inert gas atmosphere, specific moisture content levels, and temperature levels, shall be specified and provided."

MACTEC Engineering and Consulting, Inc., Quality Assurance Project Document (QAPD) states, in part, that the requirements of Subpart 2.20 of NQA-1-1994, titled "Quality Assurance Requirements for Subsurface Investigations for Nuclear Power Plants," were applicable to the Geotechnical Engineering Center's Soil Dynamics Laboratory scope of work. Subsection 5.2.3 of NQA-1-1994 states, in part, that undisturbed samples shall be stored in a controlled environment in which the ambient temperature and humidity are maintained at predetermined levels.

Contrary to the above:

During the tour of the Geotechnical Engineering Center's Soil Dynamics Laboratory facilities, the NRC inspectors observed that the laboratory does not monitor temperature and humidity controls for the soil samples, as required in the MACTEC's QAPD. This issue has been identified as Nonconformance 99901368/2007-201-01.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with a copy to the Chief, Quality and Vendor Branch 1, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include: (1) a description of steps that have been or will be taken to correct this item; (2) a description of steps that have been or will be taken to prevent recurrence; and (3) the dates your corrective action and preventive measures were or will be completed. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agency-wide Document Access and Management System (ADAMS), to the extent possible, it should not include any personal privacy, proprietary,

ENCLOSURE 1

or safeguards information so that it can be made available to the public without redaction. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated at Rockville, Maryland this 11th day of December 2007.

**U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND
OPERATIONAL PROGRAMS**

VENDOR INSPECTION REPORT

Report No: 99901368/2007-201

Organization: University of Texas at Austin
Geotechnical Engineering Center
Civil, Architectural and Environmental Engineering Department
1 University Station C1792
Austin, TX 78712-0273

Vendor Contact: Dr. Kenneth H. Stokoe, Director
Geotechnical Engineering Center
Civil, Architectural and Environmental Engineering Department
1 University Station C1792
Austin, TX 78712-0273
(512) 232-3689

Nuclear Industry: The Geotechnical Engineering Center's Soil Dynamics Laboratory has developed a combined torsional shear/resonant column system used for Resonant Column Torsional Shear (RCTS) testing of soil and rock samples. The results of this test are used as input to develop a site-specific ground motion response spectrum. This service is being provided to future NRC license applicants.

Inspection Dates: October 4 - 5, 2007

Inspection Team Leader: Milton Concepcion, DCIP/NRO

Inspectors: Greg Galletti, DCIP/NRO
Juan D. Peralta, DCIP/NRO
Weijun Wang, NRO/DSER/RGS
Yong Li, NRO/DSER/RGS
Wayne Bieganousky, NRO/DSER/RGS

Approved By: /RA/

Juan Peralta, Chief
Quality & Vendor Branch 1
Division of Construction Inspection & Operational Programs
Office of New Reactors

 12/11/07

Date

1.0 INSPECTION SUMMARY

The purpose of this NRC inspection was to review selected portions of the quality assurance (QA) and 10 CFR Part 21 (Part 21) controls that the Geotechnical Engineering Center's Soil Dynamics Laboratory has implemented. The Soil Dynamics Laboratory has been subcontracted by William Lettis and Associates (WLA), and MACTEC Engineering and Consulting, Inc., for the conduct of Resonant Column Torsional Shear (RCTS) testing of soil samples. This work is considered safety-related and, as a result, QA requirements were imposed on the Soil Dynamics Laboratory by WLA through MACTEC's QAPD. The NRC inspection focused on quality activities affecting previous engineering tests and analyses that the Soil Dynamics Laboratory has performed to support Early Site Permit (ESP) and Combined License (COL) applications. The inspection was conducted in the Soil Dynamics Laboratory facilities at the University of Texas (UTX) in Austin, Texas. The NRC inspection bases were:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the *Code of Federal Regulations*, and
- 10 CFR Part 21, "Reporting of Defects and Noncompliance."

1.1 VIOLATIONS

No violations were identified during this inspection.

1.2 NONCONFORMANCES

Nonconformance 99901368/2007-201-01 was identified and is discussed in Section 3.2 of this report.

2.0 STATUS OF PREVIOUS INSPECTION FINDINGS

There were no previous NRC inspections performed at the University of Texas at Austin prior to this inspection.

3.0 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 QUALITY ASSURANCE CONTROLS

a. Inspection Scope

The NRC inspectors reviewed selected portions of the Quality Assurance Project Document (QAPD) developed by MACTEC and implemented during testing activities conducted at the Soil Dynamics Laboratory to ensure that such activities were controlled by adequate quality assurance (QA) measures.

b. Observations and Findings

William Lettis and Associates (WLA) subcontracted with the Soil Dynamics Laboratory for the conduct of Resonant Column Torsional Shear (RCTS) tests. This work is considered safety-related, and QA requirements were imposed on the Soil Dynamics Laboratory by WLA. Because the Soil Dynamics Laboratory does not possess a quality assurance program that complies with the requirements of Appendix B, it was required to perform the work in accordance with MACTEC's QA program, as described by the MACTEC QAPD.

The NRC inspectors reviewed the MACTEC's QAPD, dated November 17, 2006. MACTEC developed this QAPD to provide guidance for the performance of RCTS testing. MACTEC included in its QAPD the project description, scope of work, requirements for project submittals including calibration records, digital photos, laboratory test results and data sheets, report forms, final data reports, and personnel qualification records. Additionally, the QAPD provided controls to ensure adequate staff qualification and training and availability of procedures for test activities. The QAPD imposed additional QA requirements as detailed in Subpart 2.20 of NQA-1-1994, titled "Quality Assurance Requirements for Subsurface Investigations for Nuclear Power Plants." The QAPD also stated that any discrepancy identified would be documented in a MACTEC Nonconformance and Corrective Action Report (NCAR) form.

The NRC inspectors reviewed Work Order No. 1, dated November 14, 2006, between WLA and UTX. This work order established the scope of work for the conduct of RCTS tests for the Bellefonte COL project. Exhibit B of this work order contained QA requirements for RCTS testing services. These requirements included the following: (1) implementation of the MACTEC's QA Program as outlined in the MACTEC's QAPD, (2) reporting of known or discovered discrepancies that may impact the validity of the work performed or data generated, (3) training and qualification requirements, (4) availability of calibration records with traceability to the National Institute of Standards and Technology (NIST), and availability for independent verification by MACTEC, (5) qualification and validation of software used in accordance with software QA procedures for the project, and (6) notification of any deficiencies discovered to MACTEC, and any corrective actions associated with such deficiencies.

The NRC inspectors also reviewed the "Technical Services Consulting Agreement," between MACTEC and the Soil Dynamics Laboratory director, dated August 31, 2006. This document provided the responsibilities of Dr. Kenneth H. Stokoe as an independent technical consultant for the review and approval of RCTS test results. The scope of work included analysis of data reports and reporting of final test results associated with the RCTS testing generated by the Soil Dynamics Laboratory. Specifically, Dr. Stokoe performed the review of data associated with the RCTS test, and utilized his engineering judgment to interpret and approve the final report that was issued to MACTEC. The agreement included QA requirements applicable to the scope of the activities described. These requirements included the reporting of known or discovered discrepancies that may impact the validity of the work performed or data generated and notification of any deficiencies discovered directly to MACTEC.

The NRC inspectors inquired as to the controls implemented for the reporting of defects or failures to comply in accordance with 10 CFR Part 21. During discussions with the NRC inspectors, MACTEC's Project Manager stated that MACTEC retained responsibility for the reporting requirements of 10 CFR Part 21. As stated in the procurement document, UTX is required to notify MACTEC of known discovered discrepancies that may impact the validity of the work performed or the data generated such that MACTEC may determine if reporting is required. In reviewing MACTEC project documents and records, the NRC inspectors confirmed that MACTEC conducted surveillances throughout the length of the procured services to ensure that test activities were conducted in accordance with MACTEC's QA Manual and MACTEC's QA Project Documents. In addition, the NRC inspectors confirmed that MACTEC provided training modules to indoctrinate lab personnel of the requirements of 10 CFR Part 21. The NRC inspectors held discussions with the laboratory director and MACTEC personnel and asked whether MACTEC had performed an evaluation of deviations identified during the testing of soil samples. After such discussions, the NRC inspectors learned that MACTEC had determined that no potential Part 21 issues existed concerning activities performed by the Soil Dynamics Laboratory.

c. Conclusions

The NRC inspectors concluded that the QA program controls provided by MACTEC in its QAPD are consistent with the regulatory requirements of Appendix B to 10 CFR Part 50. Based on the limited sample reviewed, the NRC inspectors also determined that procedures developed by the Soil Dynamics Laboratory were being effectively implemented to ensure the integrity and reliability of site geological test data. The NRC inspectors did not identify any issues in this area.

3.2 TEST CONTROL

a. Inspection Scope

The NRC inspectors reviewed the process used at the Soil Dynamics Laboratory for the planning and conduct of tests and processing of data. The NRC inspectors held discussions with facility personnel, and reviewed RCTS test methodology documentation, RCTS test procedures, and test records documentation to ensure that test activities were adequately controlled.

b. Observations and Findings

b.1 RCTS Test Methodology and Test Procedures

As required by the regulations, all ESP and COL applications need to include site seismic response analysis, the site-specific ground motion response spectrum (GMRS) and soil structure interaction (SSI) analysis, which use subsurface materials shear modulus degradation and damping ratio curves as inputs. Since the development of shear modulus degradation and damping ratio curves requires determination of dynamic shear modulus and damping ratio properties as function of shear strain level for

subsurface materials, it is essential that the test system and procedure are adequate to ensure high quality test results.

The NRC inspectors reviewed the test methodology implemented by the Soil Dynamics Laboratory to verify conformance with specified requirements. Technical procedure GR06-4, "Test Procedures and Calibration Documentation Associated with the RCTS and URC Tests at the University of Texas at Austin," dated April 25, 2006, contained the theoretical background and calibration and test procedures associated with the RCTS, and the description of the unconfined, free, resonant column (URC) test method. This technical procedure was developed by the Soil Dynamics Laboratory for the conduct of RCTS testing. The NRC inspectors found that this technical procedure is more comprehensive when compared with the industry standard currently utilized to determine the behavior of soils, ASTM D 4015-92 "Standard Test Methods for Modulus and Damping of Soils by the Resonant-Column Method." In a presentation to the NRC staff, the laboratory director presented detailed information regarding the theoretical background, test apparatus, procedures and data analysis of RCTS tests, based on the GR06-4 technical procedure. The NRC inspectors learned that RCTS tests have a solid theoretical basis on applying dynamic loading at varying frequencies to soil and rock column specimens up to 0.2% strain levels to determine the dynamic properties of soils and rocks. Outputs from the tests include important geotechnical parameters such as resonant frequency, dynamic shear wave velocity, shear modulus and damping ratio.

The NRC inspectors reviewed work instructions provided by WLA to the Soil Dynamics Laboratory. These instructions contained additional requirements for the RCTS lab testing of soil samples. Requirements imposed by WLA included specific confining pressure values for testing, specific sample depth, extruding, and confirmation of sample suitability. The NRC inspectors also reviewed several procedures used to perform overall system checks. The NRC inspectors reviewed a calibration procedure titled "Equipment-Generated Damping for TS Testing." This calibration test is performed using reference metal standards with negligible amounts of damping (less than 0.05%). The results of the test supply information on the equipment generated damping that is accounted for within the actual test results. Additionally, the NRC inspectors reviewed the procedure titled "Overall System Check Procedure." This procedure is performed to ensure that the RCTS test equipment is properly calibrated and setup by testing the standards and verifying that the results are consistent with historical calibration information. Prior to initiation of the actual test, the test setup is controlled via use of a checklist titled "Checklist for Setting up an Intact Soil Specimen for RCTS Testing." This checklist describes in detail the steps for preparation of the specimen and assembling the test cell.

b.2 Sample Handling and Control

The NRC inspectors reviewed a sample of test result forms used by the test performer to record pertinent information about the test sample prior to the testing. Test result forms included information regarding water content determination and sample dimensional data. In addition, the NRC staff reviewed set-up checklists, specimen data sheets, and chain of custody forms for the Bellefonte COL project. The NRC inspectors learned that samples were removed from the site and transported to UTX at Austin for dynamic

testing, and received and verified by laboratory personnel. These samples were subdivided, or "carved," and returned to the storage area. The subdivided samples were utilized for RCTS testing as denoted in the chain of custody record. After testing was completed, the samples were returned to the storage area until MACTEC requests their delivery, in accordance with contractual requirements. Samples are then sorted and placed in boxes suitably labeled for the client and project. For the Bellefonte project, the NRC inspectors confirmed that these activities were documented in chain of custody forms.

The NRC inspectors reviewed chain of custody records from MACTEC and associated with samples taken in the field and delivered to the Soil Dynamics Laboratory for testing. These records contained information such as sample ID, sample type, responsible technician, date of sample, and necessary signature of receipt and relinquishing. The chain of custody forms identified each boring by sample, provided information regarding how the sample was subdivided, and all actions taken on the sample such as cutting, carving, handling within the lab, status of the RCTS apparatus, and testing performed (e.g., fixed-free).

b.3 Observation of Laboratory Testing Activities

The NRC inspectors and technical staff toured the Soil Dynamics Laboratory to observe equipment and soil samples that are maintained in the facility. The NRC inspectors observed an RCTS test in progress for the Yucca Mountain project. During interviews with laboratory personnel, the NRC inspectors confirmed the use of instructions and procedures for the activities conducted. In addition, laboratory personnel provided detailed information related to the testing being conducted.

The NRC inspectors reviewed a sample of checklists utilized for setting up intact soil specimens for RCTS testing, and checklists for RCTS test procedures (for low-amplitude RC test procedure, high-amplitude RC test procedure, and torsional shear test procedure), that are used for the test of soil samples. Data and results tables are generated by a computer and include sample information (diameter, height, weight, water content,) as well as test cell information and confining pressure. During laboratory walkdowns, the NRC inspectors observed that the test facility housekeeping was adequate. Tests are typically conducted by two senior graduate research assistants, one responsible for test preparation and setup, and the other responsible for test result documentation. Additional graduate students may observe as part of training.

During the tour of the laboratory facilities, the NRC inspectors inquired for information regarding temperature and moisture controls in the laboratory. As required in the MACTEC's QAPD, the laboratory was required to maintain temperature controls for undisturbed soil samples. This requirement is specified in Subpart 2.20 of NQA-1-1994, "Quality Assurance Requirements for Subsurface Investigations for Nuclear Power Plants." Specifically, undisturbed samples shall be stored in a controlled environment in which the ambient temperature and humidity are maintained at predetermined levels. After discussions with the laboratory director, the NRC inspectors confirmed that moisture and temperature controls are not monitored in the laboratory. The laboratory is climate-controlled, but a record of temperature and humidity is not maintained. The NRC

inspectors determined that the absence of temperature controls in the laboratory is a nonconformance to the requirements imposed on the Soil Dynamics Laboratory by WLA and MACTEC. This issue has been identified as Nonconformance 99901368/2007-201-01.

c. Conclusions

Except for the issue identified in Nonconformance 99901368/2007-201-01, the NRC inspectors concluded that the test control program requirements provided by MACTEC and utilized by the Soil Dynamics Laboratory are consistent with the regulatory requirements of Criterion XI of Appendix B to 10 CFR Part 50. Based on the limited sample reviewed, the NRC inspectors also determined that the Soil Dynamics Laboratory's procedures in this area are being effectively implemented to ensure the integrity and reliability of site geological test results.

3.3 MEASURING AND TEST EQUIPMENT (M&TE)

a. Inspection Scope

The NRC inspectors reviewed procedures governing the calibration of test equipment and testing instrumentation utilized in the Soil Dynamics Laboratory. The NRC inspectors also reviewed test equipment and testing instrumentation calibration records, and discussed the calibration process with laboratory personnel to ensure that M&TE utilized for testing activities was adequately controlled.

b. Observations and Findings

The NRC inspectors reviewed the Soil Dynamics Laboratory's calibration procedures associated with the RCTS test equipment, and reviewed requirements and responsibilities for the control of M&TE. The NRC inspectors reviewed GR06-4, "Test Procedures and Calibration Documentation Associated with the RCTS and URC Tests at the University of Texas at Austin," Revision 0. This technical procedure contains requirements for calibration of the RCST test equipment. The NRC inspectors learned that a known, intrinsic metal sample is used to calibrate the RCTS test apparatus. These metal specimens are made of brass and aluminum tubes and are tested to obtain different resonant frequencies. Comparisons are made between theoretical solutions and test results for those metal specimens to ensure that the test apparatus is working properly. In addition, test results are reviewed and approved by the laboratory director before reporting. During discussions with MACTEC and laboratory personnel, the NRC inspectors confirmed that MACTEC conducted multiple surveillances to verify RCTS test equipment adequacy prior to the start of the testing of soil samples for the COL projects.

The NRC inspectors reviewed a sample of the instrumentation and test equipment calibration records for a range of instrument types, including the following:

- HP function generator, control number 2141A02471, calibrated on 7/27/07.
- HP universal counter, control number 2350A00797, calibrated on 7/27/07.
- Nicolet Oscilloscope, control number UT337671, calibrated on 7/21/07.

- Columbia linear variable transducer, model SH-200-S3R LVDT, control number 77002, calibrated on 07/27/07.
- Brown and Sharpe micrometer, control number 2, calibrated on 7/29/07.
- Bently NV Proximeter, control number FebGI06076 (4-R), calibrated on 7/30/07.

The NRC inspectors verified that the M&TE examined contained unique identification marks or tags, and records were available for review. The NRC inspectors also reviewed a sample of test data sheets to verify that test equipment utilized and calibration activity were identified on the test records. The NRC inspectors confirmed that M&TE utilized in the laboratory was calibrated using procedures traceable to known industry standards. Calibration records indicated the calibration procedure to be used and the applicable National Institute of Standards and Technology (NIST) traceable reference equipment used in the calibration. The calibration records sampled by the NRC inspectors were appropriately signed, independently verified by a laboratory technician, and subsequently checked by the laboratory director. Calibration data was adequately documented on each calibration record and included actual readings, tolerance, and pass/fail notation. The NRC inspectors sampled the calibration log records for several instruments to verify that the instruments were calibrated within the required periodicity.

The NRC inspectors requested information regarding software controls for computer programs utilized for test calculations. The NRC inspectors learned that software and data acquisition systems are checked by using hand calculations at the time of the initial use of the test apparatus. Additionally, each computer program automatically generates a hard-copy output every time when a test is performed, and such output is maintained as a project record with chain of custody forms. The NRC inspectors also reviewed the user's guide utilized to input all data required to run the RCTS test. This procedure provides graphical representations of the required steps to enter data and perform the system configuration.

In general, the NRC inspectors found the calibration records to be complete and that calibration activities were conducted in accordance with the QAPD periodicity requirements.

c. Conclusions

The NRC inspectors concluded that M&TE program requirements imposed by MACTEC and utilized by the Soil Dynamics Laboratory are consistent with the regulatory requirements of Criterion XII of Appendix B to 10 CFR Part 50. Based on the limited sample reviewed, the NRC inspectors also determined that the procedures developed by the Soil Dynamics Laboratory in this area are being effectively implemented to ensure the integrity and reliability of site geological test results. The NRC inspectors did not identify any issues in this area.

3.4 AUDIT AND SURVEILLANCE ACTIVITIES

a. Inspection Scope

The NRC inspectors reviewed a representative sample of audits and surveillances conducted by MACTEC and used to determine the effective implementation of QA controls during testing activities conducted at the Soil Dynamics Laboratory.

b. Observations and Findings

The NRC inspectors reviewed a sample of audit and surveillances conducted by MACTEC to verify that Soil Dynamics Laboratory personnel were performing activities in accordance with applicable standards and procurement documents. The NRC inspectors reviewed audit number UT-06, performed by MACTEC during August 20-21, 2006. This audit evaluated the implementation of QA Manual requirements related to activities performed by the Soil Dynamics Laboratory. The activities audited included: (1) capability to meet technical and quality requirements of testing, (2) order entry, (3) indoctrination and training, (4) handling, storage and shipping, (5) test and inspection, (6) software QA, (7) calibration, (8) nonconformance/corrective action, and (9) record retention requirements. No findings were identified, however, several suggestions were offered by the audit leader. The audit report reviewed adequately identified objective acceptance criteria for each area reviewed by MACTEC.

The NRC inspectors also reviewed several surveillance reports performed by MACTEC on the following dates: September 28, 2006; December 8, 2006; June 4-5, 2007; and July 7, 2007. These surveillances verified adequate performance of RCTS tests, and covered areas such as sample control, contract review, work instructions, procedures, sample trimming, testing, M&TE calibration, and reporting. The surveillances concluded that, in general, the project was being conducted in accordance with established processes and procedures.

c. Conclusions

The NRC inspectors concluded that the audits and surveillances conducted by MACTEC were of sufficient scope and depth, and consistent with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. Based on the limited sample reviewed, the NRC inspectors also determined that these audits and surveillances provided objective evidence of the effective implementation of QA controls by the Soil Dynamics Laboratory. The NRC inspectors did not identify any issues in this area.

3.5 RECORD CONTROL

a. Inspection Scope

The NRC inspectors reviewed record control and retention requirements in the MACTEC QAPD and assessed the Soil Dynamics Laboratory's document control process to verify that quality records were appropriately stored and maintained.

b. Observations and Findings

As detailed in other sections of this inspection report, the NRC inspectors reviewed a sample of test instructions, test data reports, qualification records, and calibration records to ensure that activities conducted in the Soil Dynamics Laboratory were adequately documented. For all the records reviewed, the NRC inspectors confirmed that the records were legible, traceable to the particular activity, and adequately protected. Also, controlled documents such as test records and calibration records were reviewed and approved in accordance with QA requirements for such records. The NRC inspectors verified that QA documents were adequately stored to prevent deterioration, environmental effects, damage, and loss. During discussions with laboratory personnel, the NRC inspectors confirmed that QA records are stored in binders within a fireproof storage safe with access control requirements, as required in the QAPD.

c. Conclusions

The NRC inspectors concluded that record control requirements imposed by MACTEC and utilized by the Soil Dynamics Laboratory are consistent with the regulatory requirements of Criterion XVII of Appendix B to 10 CFR Part 50. Based on the limited sample reviewed, the NRC inspectors also determined that the procedures developed by the Soil Dynamics Laboratory in this area are being effectively implemented to ensure that records of quality-related activities are properly maintained and stored. The NRC inspectors did not identify any issues in this area.

3.6 TRAINING AND QUALIFICATION OF PERSONNEL

a. Inspection Scope

The NRC inspectors reviewed training and qualification requirements and records for QA personnel and discussed the training process with cognizant laboratory personnel to ensure individuals performing test activities were adequately trained.

b. Observations and Findings

The NRC inspectors reviewed a training checklist and associated documentation for a training session conducted by MACTEC on August 21-22, 2006. The purpose of this training session was to discuss QA requirements for RCTS tests, as required in MACTEC's QAPD. The NRC inspectors reviewed the training scope and noted that it covered calibration, sample control, document control, test reporting, test performance, classification of samples, QAPD requirements, QA compliance in accordance with MACTEC's QA Manual, and reporting of defects in accordance with 10 CFR Part 21 requirements. The NRC inspectors confirmed that qualification checklists were signed by the respective individual, the MACTEC representative, and the laboratory director.

The NRC inspectors learned that an on-the-job training effort is in place in which graduate students conduct RCTS testing as part of the qualification process under the supervision of qualified, experienced graduate students. The NRC inspectors also learned that the laboratory director pre-selects these graduate student trainees based on

their knowledge and progress in classroom activities. The NRC inspectors performed a sample review of training records of personnel conducting tests to verify their current qualification to perform their respective activities. Training records and qualifications reviewed provided evidence of adequate training of RCTS personnel. In addition, the NRC inspectors conducted interviews with laboratory personnel to ensure that activities performed were commensurate with their responsibilities.

c. Conclusions

The NRC inspectors concluded that training and qualification requirements imposed by MACTEC and utilized by the Soil Dynamics Laboratory are consistent with the regulatory requirements of Criterion II of Appendix B to 10 CFR Part 50. Based on the limited sample reviewed, the NRC inspectors also determined that procedures developed by the Soil Dynamics Laboratory in this area are being effectively implemented. The NRC inspectors did not identify any issues in this area.

4.0 MANAGEMENT MEETINGS AND PERSONNEL CONTACTED

4.1 ENTRANCE AND EXIT MEETINGS

In the entrance meeting on October 4, 2007, the NRC inspectors discussed the scope of the inspection, outlined the areas to be inspected, and established interfaces with the Soil Dynamics Laboratory's Director and staff. During the exit meeting on October 5, 2007, the NRC inspectors discussed the inspection findings and observations with the Soil Dynamics Laboratory's Director and staff.

4.2 PERSONNEL CONTACTED

K. Stokoe	Director, Geotechnical Engineering Center
G. Winebrenner	Vice-President, Energy Business Practice Leader, MACTEC
J. Lynch	Senior Project Manager, MACTEC
W. Choi	Graduate Research Assistant, Soil Dynamics Laboratory
J. Bachhuber	Senior Geologist, William Lettis and Associates
B. Porter	Geotechnical Engineer, William Lettis and Associates