**DATA MANAGEMENT PLAN**

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As per the requirement of MPC on dissemination and sharing of research results the following describes the Data management Plan for this project. In the event of the PI leaving the institution, co-PI will be responsible for Data management. In the event of co-PI leaving the institution data will be shared between both PIs.

# Types of Expected Data

Primarily three types of data will be generated in this project:

1. Experimental
   1. Photoacoustic and 2D FTIR data in the form of raw spectra from samples and backgrounds.
   2. Scanning electron microscopy and transmission electron microscopy images
   3. Nanomechanical testing and AFM imaging : images, force curves, load displacement plots
2. Computational
   1. Structure files for various models of clays and fluids
   2. Structure files of minerals (different clays)
   3. Input files for running molecular dynamics for clay
   4. Output trajectory files of molecular dynamics and steered molecular dynamics
3. Also, for the education component, the following types of data will be produced;
   1. Graduate dissertations. (Please note that completion of the dissertation may not coincide with exactly the data of completion of project).
   2. Teaching materials and handouts for the advanced soil mechanics course.

# Data Retention Period

Data described in the earlier section will be retained for a minimum of three years after the conclusion of the award or after three years public release, whichever is later.

# Data Format

1. Experimental data will be saved in appropriate formats for each type
2. FTIR- in a typical spectroscopic data format pertaining to acquisition software OMNIC as well as a standard tagged ASCII
3. SEM images will be stored in TIFF format
4. Nanoindentation data and AFM force curves will be stored in a standard indentation acquisition software format that is translatable to ASCII
5. Computational data will be stored in the most detailed formats with line by line structure files (identity and coordinates), input parameters itemized line-by-line, atom trajectories stored item-by-item. Input data will be in text or psf or pdf formats. Output data will be in binary form and can be read by the visualization software (VMD).
6. Educational modules will be stored as MS powerpoint files and MS word documents with movies embedded.
7. Graduate thesis and dissertations will be archived in the university as well as pdf formats.

# Data Dissemination Plan

Public release of data will be done in earliest possible and reasonable time. In addition, NDSU publicity office will be notified for appropriate broad dissemination over public media. Data will be available immediately after dissemination.

1. Two graduate students will work on this project. The doctoral dissertations of the two students will be made available to all after appropriate submission procedures at NDSU graduate school. The students’ dissertations will have appendices that will indicate all experimental and simulations data acquisitions procedures and metadata on how the data was acquired.
2. High-quality Journals will be targeted for submission of research results and manuscripts will be submitted in a timely manner. With proper citations, the key research results from these papers will also be reported on PIs departmental websites.
3. Teaching modules on clay mechanics will be created for inclusion in an existing UG course Advanced Soil mechanics. Contents of these modules will be available through NDSU Blackboard portal with guest access allowed as well as PIs webpages.
4. Quarterly and annual reports as requested by MPC will be submitted.

# Data Storage and Preservation of Access

The data will be stored on the PIs office computers and backed up on external hard drive. A routine backup will be performed. The lead PI (DK) will be responsible for assuring data storage and access.