**NSF DATA MANAGEMENT PLAN *[TEMPLATE]***

**Data collection and description**
The data will include *[****1****) Provide a description of data sets and other materials to be generated; specify how much data will be produced and describe what processing the data may undergo.****2****) Explain if there are existing data with a similar focus to the data that will be produced. If so, list what they are and explain why is important to collect new data.****3****) Include types of data: physical samples, surveys, software, model outputs, simulations, measurements of X, curriculum materials and other products produced from the project.]*

**Data quality and integrity**
Data collection during the project will conform to principles outlined in NSF policies on Responsible Conduct of Research and the Open Government Directive. To ensure quality and integrity, data collection will be performed according to domain best practices and data analysis during the project will determine validity and appropriateness for data archiving. Domain best practices include *[1) Provide information about data collection practices in your domain area.
2) If new data collection techniques are being developed, describe the data.]*

**Data storage and organization***(this section applies to data storage during the active project phase)*
During the project, data will be stored to *[pick or add as many as appropriate: databases, spreadsheets, audio, video, images, text files, vector files, raster files, word processing files, other specific formats, paper records (e.g. notebooks), etc.]*. Electronic files will be stored to a computer server in *[choose all that are appropriate: local lab, department, Mines campus computing, cloud-based computing solution or at another institution]*. To achieve redundancy and protect from catastrophic failure during the project,

*[Choose all that are appropriate*

*if local lab or department server is chosen:* The Principal Investigator will perform backups on a regular schedule *[specify schedule if known]* by using external hard drives, other media or cloud computing solutions *[modify as necessary]*.

*if Mines campus network server is chosen:* Mines campus computing backs up network servers.

*if purchasing cloud-based computing or working with another institution is chosen:* The Principal Investigator will ensure adequate protections via *(choose one: the cloud-based solution or from institution X. Describe a bit on how you will ensure this protection.)]*

Directory and file naming conventions will be established at the beginning of the project and may incorporate the conventions of type, place, time, and/or date. *[Indicate if any version control will be performed and how]*.

Paper records, including laboratory notebooks, will be stored \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. *[Add the following, if appropriate: Physical samples and collections, along with paper documentation necessary to identify their sources and characteristics, will be stored in a secure campus location. Also include similar information about other types of data unique to this project.]*

**Data archiving and sharing***(this section applies to project closeout; archiving data for sharing, future research and public accessibility)*
The Principal Investigator will manage data access and use during active project work. Upon completion of the project, the Principal Investigator will evaluate, distill, and select the data for archiving. These decisions will be based on publication usage, storage location, space availability, quality, uniqueness, broader need/usage, relationship to other data sources, reproducibility, sponsor requirements, privacy, confidentiality and intellectual property rights.

For those data being archived, *[Choose a data archive mechanism below and include one and/or all of the following paragraphs about data archiving as appropriate.]*

*[****OPTION******1****) If archiving data to the Mines Institutional Repository….]* electronic data will be archived to the Mines Institutional Repository (<http://publish.mines.edu>). The repository is a service jointly provided, operated, and managed by Mountain Scholar, which is a consortium of Colorado and Wyoming academic institutions and is housed at Colorado State University. That storage facility will (a) store data in redundant, multiple, secure locations, (b) provide retrieve only access to the data to ensure integrity, (c) include data, metadata and related materials (graphs, pictures, links to dissertations and publications, etc.), and (d) be accessible by Mine’s Research Support Services to facilitate access. The storage media will conform to industry-standards for stability and accessibility.

The Mines Institutional Repository will store data and make it accessible for a minimum of 3 years *[(or as contractually required)]* after the project or final publication has ended and will conform to academic standards for stability and accessibility. *[Please note: This option requires you to pay for archival storage at $1000/TB and is best for small to medium datasets.*

*[****OPTION 2****) If archiving data on your own local lab server, department server, Mines campus server or purchased cloud-based solution….]* electronic data will be archived to a computer server in *[choose all that are appropriate: local lab, department, Mines campus computing or purchased cloud-based solution]*.

The Principal Investigator (PI) will continue to use devices and methods similar to those described during the active project storage phase. The Principal Investigator will ensure archiving, preservation and accessibility of the data for a minimum of 3 years *[(or as contractually required)]* after the project has ended/final publication has occurred.

Access will be provided to Mines faculty, students and, as appropriate, researchers at other institutions via *[describe how: email request, website* (*If a website is also a result at the end of the project, describe how it may be used to help with data archiving, sharing and public accessibility*)].

As an additional means of public access and dissemination and as an institutional record, appropriate sample data, a data product or overall project description will be provided to the Mines Institutional Repository (<http://publish.mines.edu>). The repository is a service jointly provided, operated, and managed by Mountain Scholar, which is a consortium of Colorado and Wyoming academic institutions and is housed at Colorado State University. That storage facility will (a) store data in redundant, multiple, secure locations, (b) provide retrieve only access to the data to ensure integrity, (c) include data, metadata and related materials (graphs, pictures, links to dissertations and publications, etc.), and (d) be accessible by Mine’s Research Support Services to facilitate access. The storage media will conform to industry-standards for stability and accessibility.

 *[Please note: this option requires you to perform and manage the archival data storage and budget consideration if buying your own lab server. And it expects that a data sample/ data product/ project description be deposited in the Mines Institutional Repository (there is no cost for samples less than 10GB)]*

*[****OPTION 3****) If you will be using another institution as the data archive (e.g. NCAR HPSS) write your own paragraph about how that institution archives and preserves data for future research and public accessibility. Provide appropriate web links to their policies or repository information. And include the paragraph below]*

As an additional means of public access and dissemination and as an institutional record, appropriate sample data, a data product or an overall project description will be provided to the Mines Institutional Repository (<http://publish.mines.edu>). This data sample will have associated metadata and contact information for getting further access to the broader dataset. This record at the institutional level allows Mines to keep the Mines Data Inventory up to date. *[Please note: this option requires you to perform and manage the archival data storage and budget consideration for it if purchasing cloud services or using an external repository. And it expects that a data sample/ data product/ project description be deposited in the Mines Institutional Repository (there is no cost for samples less than 10GB)]*

The existence and availability of the data sets will be communicated to sponsors in progress reports and to research peers at conferences, and they will be referenced in publications. Availability may be subject to appropriate embargo periods determined by copyright, sponsor agreements, patent and licensing provisions. *[Describe any sensitive data that may need additional confidentiality restrictions, and specify the details of those restrictions.]*

*[If you think there is an audience beyond the academic community that might use the data, include a sentence about expected audiences like*: This data has usefulness beyond the academic community such that other expected audiences might include: *[list appropriate audiences (e.g. state climatologists investigating water quality issues.)]*

**Metadata Descriptions**The Principal Investigator will provide metadata typically associated with the kind of data generation techniques described above. Some metadata may be generated as part of the data generation process. Other metadata may be generated by programmatic or manual means. Mines Research Support Services is available to advise the PI on descriptive metadata requirements.

**Data budget**
The total amount of electronic data to be archived is estimated to be *[Estimate size in GB or TB]*. To cover the cost of archival storage and access, electronic materials will be stored and made accessible at a total cost of *[choose an appropriate cost scenario]\**

 *[****1****) If using the Mines Institutional Repository as the data archive mechanism (does not include the use of the repository when it holds only a data sample/product under 10GB): use the multiplier of $1000 per TB (****ensure that the proposal budget reflects this cost as an incidental direct cost)***

*2) If using an external repository: determine if the external repository has costs that must be included*

*3) If buying other storage, cloud services or local lab servers, be sure your budget form reflects those costs in appropriate areas*

*If you need additional data management staff expertise listed within your proposal, you may include and budget for Mines staff member from Research Support Services.]*

*If you are a large data user (>10GB), contact Research Support Services to discuss the potential cost of additional active storage.*

*\*Archival storage will be charged in the final year of your project, and covers the cost of data preparation, administration, and archival storage. Storage architecture is compliant with industry standards (primary storage + replication +backup)*

***Need Additional Help?*** *If you have questions about writing data management plans, please contact Torey Battelle at Research Support Services, extension 3393 or* *battelle@mines.edu*