**Project Description**

*Note: This template is provided for full proposal submissions to calls for Large-Scale Research, EMSL-ARM FICUS, and Exploratory Research. Please refer to the* [*EMSL website*](https://www.emsl.pnnl.gov/proposals#types-of-proposals) *for full submission details, including formatting requirements. All sections must comply with EMSL’s* [*dual anonymous guid**ance*](https://www.emsl.pnnl.gov/proposals/dual-anonymous-guidance)*. There is a* ***4-page limit*** *to the Project Description.* ***All italicized text should be deleted and replaced with your proposal content.***

**Title:** *The project title must be brief, scientifically or technically valid, intelligible to a scientifically or technically literate reader, and suitable for use in the public press.*

**Specific Aims*:*** *(~250 words). State the specific objectives of the research proposed (e.g., test a stated hypothesis, solve a specific problem, challenge an existing paradigm, address a critical barrier to progress in the field, or develop new technology), providing concise and unambiguous detail.*

**Mission Relevance:** *(~100 words). Clearly explain the economic or societal importance of your research and how it addresses specific mission areas and advances the science pertinent to DOE’s Biological and Environmental Research program and EMSL’s (and, if applicable, ARM’s) mission.*

**Background:** *(~400 words). Provide a concise discussion of previous work to clarify the research problem, why you want to do this study, and exactly what has been accomplished and to demonstrate why the studies need to be continued.*

**Approach or Work Plan:** *(~1500 words). Describe the work to be conducted at EMSL (and ARM, if relevant) for the entire project duration, including any preliminary, background measurements or completed tests that validate the approach. Include in-text, numbered references when relevant with full citations listed in Appendix 3. Provide a sample description (including unique characteristics such as transgenic biological material, dilute solution, environmental samples containing contaminants, etc.) and total numbers of samples with a breakdown of samples per experimental group. Detail any relevant sampling characteristics such as field sites, soil cores, organism/strain, sampling time point, etc. Describe the types of analyses to be performed, including planned data analysis relevant for the proposed work. Detail the expected contributions of EMSL and/or ARM and identify which team member will be doing each portion of the work plan using anonymized identifiers (such as PI 1, co-I 2, or Grad Student 1). If your research includes computation, provide an estimate of the computational resources needed, a description of the software involved, and a description of the team’s experience with the computational methods and software. Demonstrate why your project requires the requested resources and cannot be done elsewhere. If your proposal is accepted, EMSL and/or ARM staff will work with you to define your needs in detail based on current capabilities. For projects expected to require more than one year to complete, clearly delineate work activities for each year.*

**Appendix 1: EMSL Samples and Resources (required)**

Fill out the table below with the details about your samples, including the specific resources or instruments being requested at EMSL. For EMSL’s purposes, a sample is any material intended to be analyzed or used with EMSL resources. For 9-month Exploratory Research projects, select Year 1 as the project year. Only Year 1 resources will be entered into the User Portal during proposal submission.

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| --- | --- | --- | --- | --- | --- |
| **Project Year 1 or 2** | **Goal of Analysis** | [**Requested Resources**](https://www.emsl.pnnl.gov/science/instruments-resources) | **Sample Type** | **Total Number of Samples** | **Experimental Treatments, Conditions, and Replications Included in the Number of Samples** |
| Year 1 | Identification of 13C labeled metabolites | Liquid state NMR | soil  If other: specify | 15 | Soil from 3 sites,  5 replicate cores per site |
| Choose one. |  |  | Choose one.  If other: specify |  |  |
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**Appendix 2:** **Computing, Analytics, and Modeling Approach** (Section 1 of 2)

Check the box if computing resources are needed.

Check the box if computing resources are NOT needed.

# *Guidance for completing the Computing Resource Request (delete guidance before submission)*

*Only required if EMSL’s Computing, Analytics, and Modeling (CAM) resources and expertise are requested. Provide a written description of the proposed computational method or approach and the software to be used (****1-page maximum****).*

## *Computing Resources*

*There is no upper limit on node-hours that can be requested, but the amount of time requested must be justified and tied to the scientific aims of the proposal.*

*Tahoma allocations are awarded in units of wall-clock time expressed in node-hours, and a total of approximately 1,500,000 node-hours are available per year. Tahoma’s 160 CPU nodes each have 36 (3.1 GHz) Intel Xeon processor cores, so 10,000 Tahoma CPU node-hours are equal to 360,000 processor core-hours. The CPU nodes each have 384 GB of memory and 2 TB of on-node flash storage. Tahoma’s 24 GPGPU nodes each have 36 processor cores and 2 NVIDIA v100 GPGPUs, 1536 GB of memory, and 7 TB of on-node flash storage. Tahoma’s 10 PB global file system has a bandwidth of 100 GB/s.*

*Upon successful review and approval of a proposal, computing resources will be allocated for the analysis and archiving of experimental data generated at EMSL.* [*Additional details on Tahoma are available here.*](https://www.emsl.pnnl.gov/MSC/UserGuide/tahoma/tahoma_overview.html) *For questions regarding these requirements, contact* [*Satish Karra*](https://www.emsl.pnnl.gov/staff/satish-karra)*.*

## *Data Storage Resources*

*EMSL Computing Resources use large, shared file systems; as a result, it is important that project proposals provide a meaningful estimate of data storage needs. EMSL user projects are required to follow EMSL’s* [*Data Management Policy*](https://www.emsl.pnnl.gov/data-management-policy)*.*

**Appendix 2: Computing, Analytics, and Modeling Approach** (Section 2 of 2)

## Sensitive Data Restriction

The EMSL computing systems available to users are not approved for use with sensitive data. The processing, storage, or transmittal of sensitive data (e.g., personally identifiable information, Official Use Only, etc.) are thus prohibited on Tahoma and Aurora. Due diligence must be used to prevent inadvertent disclosure of invention, patent, or other sensitive information.

By checking this box, I confirm that the participants on this proposal will NOT process, store, or transmit sensitive data on Tahoma or Aurora.

## Computing Resource Request Table

Using the form below, provide details regarding the amount of computer resources and support needed and the amount of file storage you expect to need. See guidance on the previous page.

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| **TOTAL RESOURCES REQUESTED** | | | | | |
| **CPU Hours** (total request for first year of project) | | |  | | |
| **GPGPU Hours** (total request for first year of project) | | |  | | |
| **Data Storage** (total request for first year of project) | | |  | | |
| **REQUEST DETAILS** | | | | | |
| **Software/Code** | **Node type** (CPU or GPU) | **Estimated number of jobs** | **Estimated total node-hours** | **Relevant expertise of team members** | **EMSL support requested** (e.g., compiling code, libraries needed, training, etc.) |
| *Example entry (can be deleted):*  *DataProcessTool 2.3* | *CPU* | *20* | *10,000* | *Expert at using. Minimal experience installing Windows version. No experience with Linux version, especially installation and using HPC (GPU and parallel versions of code; shared file system; job submission system).* | *Help installing on Tahoma. Tutorial and help logging in/running jobs. Guidance/training on managing and archiving large output files to ensure compliance with EMSL data policies. Assistance to ensure reproducibility and sustainability of our workflows, e.g., using Docker or Singularity. Also, there is apparently a way to “program” the software to sweep and analyze many files using scripting; it would be helpful to learn to leverage this capability.* |
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**Appendix 3: List of References (required)**

*List all bibliographic citations following accepted scholarly practices when providing citations for source materials cited in any section of the proposal. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, the book title, the volume number, page numbers, and the year of publication.* ***Do not indicate which authors are members of the research team submitting the proposal.*** *If the document is available electronically, the website address should also be identified. In-text citations must use numbered formatting with brackets (i.e., [1] or [2-5]) corresponding to the full citation listed. This section does not have a page limit but must not be used to provide parenthetical information outside the 4-page Project Description or 1-page Computing Approach.*

**Appendix 4: CVs (required)**

*Insert abbreviated CVs (2-page maximum each) for* ***the PI and each of the co-Is****.*

**Appendix 5: Active Collaborators List (required)**

*Complete the table below of active collaborators and individuals who may represent a conflict of interest for* ***the PI and co-I(s)*** *from the past 2 years. Conflicts of interest are not required for participants identified as “Team Members.” Participation in very large collaborative efforts with an individual does not necessarily constitute a conflict of interest. Identify those who would have a personal interest in this proposal or whose unbiased judgment would be questioned by a reasonable person familiar with your relationship.*

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| **PI or Co-I Name** | **Collaborator Name** | **Institution** | **Nature of Relationship** |
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**Appendix 6: ARM Resources** (Only required for ARM-EMSL FICUS proposals.)

*Identify the resources (e.g., facilities, instrumentation, logistical support, guest instrument support, special instrument scanning strategies, enhanced soundings, data products, etc.) being requested from the ARM Facility. Please note that the ARM Facility does not purchase equipment in support of individual field campaigns or upgrade infrastructure other than its own.*

**Appendix 7: ARM Data Management Plan**

(Only required for ARM-EMSL FICUS proposals.)

*Clearly indicate what data products will be submitted to the ARM Data Archive. For collaborative purposes, indicate the collaborating agency’s data policy and how data will be shared with the ARM community. Note: Routine ARM data are available to all participants from the ARM Data Archive on a free and open basis as they become available, while data and documentation from PI/guest instrument deployments must be submitted to the ARM Data Archive no later than 6 months after the end of the campaign.*