Sections:

- Review Process and Scoring Criteria (General)
- Synthetic Biology Internal Review Process (for DNA Synthesis proposals)

Review Process (General)

Proposals go through a two-step review process. First, they are evaluated for technical feasibility by JGI scientific staff. Second, proposals are considered by the scientific review panel. Each proposal is reviewed by three reviewers who each prepare written comments on the proposal's strengths and weaknesses, keyed to the review criteria (listed below). The reviews are made available to the applicants. The mean score is used to rank proposals. Recommendations on which proposals will be approved are made by JGI senior management based on the rank order established by the scientific reviewers, and projected resource availability. Final approval of the proposal list is made by the DOE after review of mission relevance. The Project Manager for each project then begins a consultative process with the proposer that culminates in the creation of a Statement of Work.

Scoring Criteria

Proposals will be judged on the following scoring criteria:

> **Scientific merit**. An important goal of this program is to direct the JGI's sequencing, synthesis, metabolomics and informatics capacity to scientific problems of great importance and of high impact on science and society. Scientific merit will be one of the most important criteria for scoring proposals, and scoring will include an evaluation of the importance of the scientific questions to be addressed and the likelihood that genomic sequencing efforts will answer them.
> **Relevance to DOE mission**. Relevance to the DOE missions of carbon cycling, biogeochemistry, or alternative energy sources will be considered during the review of all proposals. Projects of strictly biomedical relevance will not be considered.

Demonstrated capability of the applicant(s) and/or the scientific community to use the resource generated. Large-scale projects should be followed up in a timely fashion with analyses or further studies that answer important scientific questions. Proposals will be evaluated on whether scientists with expertise and the necessary skills will be ready to perform follow-up research and publications. The size and productivity of the user community will also be considered.
Amount of DOE JGI resources to be allocated. The scale of each proposal should be commensurate with its stated scientific goals. Weight will be given to the effort required for each project in order to optimize the JGI's overall contribution to scientific discovery. The JGI may suggest focusing or expanding the scope of the proposal to improve feasibility and/or project output.
Technical feasibility. Proposed projects will be evaluated for compatibility with JGI capabilities and potential sources of technical difficulty.

AI Use in Proposal Development and Review

During the submission process the proposer will be asked to describe any use of generative AI in the development of your proposal. It is recognized that AI/ML and LLMs are widely used in the modern workplace, including in science. To help ensure scientific integrity submitters are discouraged from utilizing AI or LLMs to wholly generate or create significant portions of proposals. Proposers are responsible for the accuracy and integrity of the content of their submission. The JGI is evaluating how the community is using generative AI in proposal development, and may update its review and proposal preparation instructions or guidelines as necessary in the future.

Reviewers should evaluate each proposal based on the review criteria above. The use of AI is not a criterion by which we ask reviewers to evaluate a proposal. If there are concerns of research integrity with a specific proposal (e.g. fabrication of data, claims based on non-existing or inaccurately cited references, blatant inaccuracies, or plagiarism), please reach out to Tanja Woyke.

Synthetic Biology Internal Review Process

This section provides guidance for Investigators as they prepare their JGI DNA synthesis proposal submissions in anticipation of the Synthetic Biology Internal Review process.

Background

Synthetic biology has the potential to accelerate science and bolster economic growth. However, like any new technology, synthetic biology could be misapplied or result in unintended consequences. Legitimate concerns have been raised over the intentional use of synthetic biology approaches to engineer pathogenic organisms and the accidental environmental release of genetically engineered organisms. Scientists pursuing synthetic biology research must diligently consider issues such as these.

Overview of the JGI Synthetic Biology Internal Review Process

The JGI Synthetic Biology Internal Review process seeks to assess, beyond technical and scientific merit, the broader aspects (e.g., environmental, biosafety, biosecurity) of the research proposals associated with the JGI's DNA synthesis program. The purpose of this internal review process is two-fold: 1) to assess the broader aspects of the research, request proposal modifications if issues of concern are not sufficiently addressed in the proposal, reject research proposals where issues of concern are not or can not be satisfactorily addressed, and output a paper-trail audit of the review process; and 2) to encourage and educate researchers to more extensively consider the broader aspects of their research, including beyond the immediate research itself.

All JGI DNA synthesis proposals (including those from the JGI Community Science Program and from the DOE Bioenergy Research Centers) contain a broader implications section dedicated to a brief discussion of these broader aspects. This broader implications statement should address not merely the possible rewards but also a considered statement of the risks associated with the work. These statements serve as a useful tool to protect not only the public, but the Investigators (and their institutions), as well as the JGI itself. These statements are proof of consideration and deliberation – proof of the responsible application of science. As members of the research community, we must consider risks, and be able to show our consideration of those risks – even if they are demonstrably small.

After a synthetic biology research proposal has successfully passed technical feasibility and scientific merit review, the proposal enters the JGI's Synthetic Biology Internal Review process. A JGI system administrator uploads the proposal to the Synthetic Biology Internal Review System (SBIRS) and assigns a minimum of 3 Reviewers to it. Each Reviewer reads the full proposal, makes comments on the proposal in the SBIRS, and votes in the SBIRS to

either approve the proposal or to discuss it further with the other assigned Reviewers. If not unanimously approved, the assigned Reviewers discuss the proposal in person or via telephone, and decide to approve or reject the proposal, or to require that modifications be made to the proposal to address the Reviewers' concerns. The Reviewers email the decision to a system administrator, who records the decision in the SBIRS. If the Reviewers decide to approve the proposal after discussion, the JGI Director is required to approve the proposal before work begins. The JGI Director can reject any proposal, and can require that additional modifications be made to any proposal. The entire Synthetic Biology Internal Review process should take three weeks or less (unless modifications are requested, which could delay the process by an additional three weeks or more).

Guidelines for Investigators

Investigators are strongly encouraged to use the broader implications section of the proposal to make it clear to the Reviewers that the Investigators are actively thinking about the broader implications of their research, and that they have mitigation strategies in place to address outstanding issues of concern. Note that Investigators are not expected to provide an in-depth analysis (e.g., full socio-economic analysis) of their early-stage research, but Investigators should demonstrate that they are currently considering the implications of their research, and that more in-depth analyses can and will be pursued as their research matures. Investigators should not merely write "None" or "All research will be conducted in a safe manner according to Federal regulations" in the broader implications statement, as this will lead to the Reviewers asking for proposal modifications, incurring delays of three weeks or longer. In addition, Investigators are requested to check over their proposals for spelling and grammar mistakes, which will not favorably contribute to the review process.

Investigators must explicitly state if their proposed research would:

1. Demonstrate how to make a vaccine ineffective
2. Confer resistance to antibiotics or antiviral agents
3. Enhance a pathogen's virulence or make a non-virulent microbe virulent
4. Increase transmissibility of a pathogen
5. Alter the host range of a pathogen
6. Enable a pathogen's ability to evade diagnostic or detection modalities
7. Enable the weaponization of a biological agent or toxin

Here are a couple of illustrative scenarios that may assist Investigators as they think about the broader aspects of their proposed research:

A) A plant lab is seeking to better understand plant/pathogen interactions. As part of the research plan, the researchers will develop a plant pathogen strain that no longer stimulates a response in the plant. What are the concerns around an unintentional and/or intentional uncontrolled release of this engineered pathogen? What could and should the plant lab

itself do to address these concerns, and who else could and should it collaborate with along these lines?

B) A microbiology lab is seeking to develop a more robust microbe that can break down cell walls of a wider variety of feedstocks, some of which may contain components that can impair cell growth and replication. To this end, the researchers will add exogenous catabolic and solvent-tolerance genes to a non-pathogenic microbe for the purpose of more effectively deconstructing the feedstock biomass. What consequences could result from such work if this engineered organism were to be unintentionally released from the lab? What could and should the microbiology lab itself do to address these concerns, and who else could and should it collaborate with along these lines?

Note that these two illustrative examples are by no means the only issues to consider. It is up to the Investigator (and the Reviewers) to determine the broader aspects of the proposed research.

Thinking about proposed research in a broader light may feel uncomfortable to Investigators that are unaccustomed to doing so. However, investigators should recognize that there are broader aspects, positive and negative, to all research, and that in some cases, actively considering these aspects enables the placement of mitigating strategies so as to avoid unwanted outcomes.

Responding to Modifications Required by Reviewers

As mentioned above, one possible outcome of the Internal Review process is that the Reviewers may require modifications be made to a proposal before it can be approved. When modifications are required, the Internal Review decision report that the Researcher receives will contain a section entitled “Review Committee Decision Notes” as well as a section entitled “Reviewer Comments.” Researchers should be sure to address the specific modifications requested in the “Review Committee Decision Notes” section. While Researchers may respond to any of the individual comments in the “Reviewer Comments” section, this should not be considered essential. It should be noted that, as described above, Reviewers individually comment on each proposal before discussing proposals together. During group discussion, Reviewers may collectively determine if any of the individual comments must be responded to, and if so, the Reviewers will include these points of concern in their decision notes.

Summary

Investigators are encouraged to think broadly about the aspects of their research. This will make sure that JGI DNA synthesis is not delayed, and it will start to nudge the collective research community’s cultural mindset in the right direction.