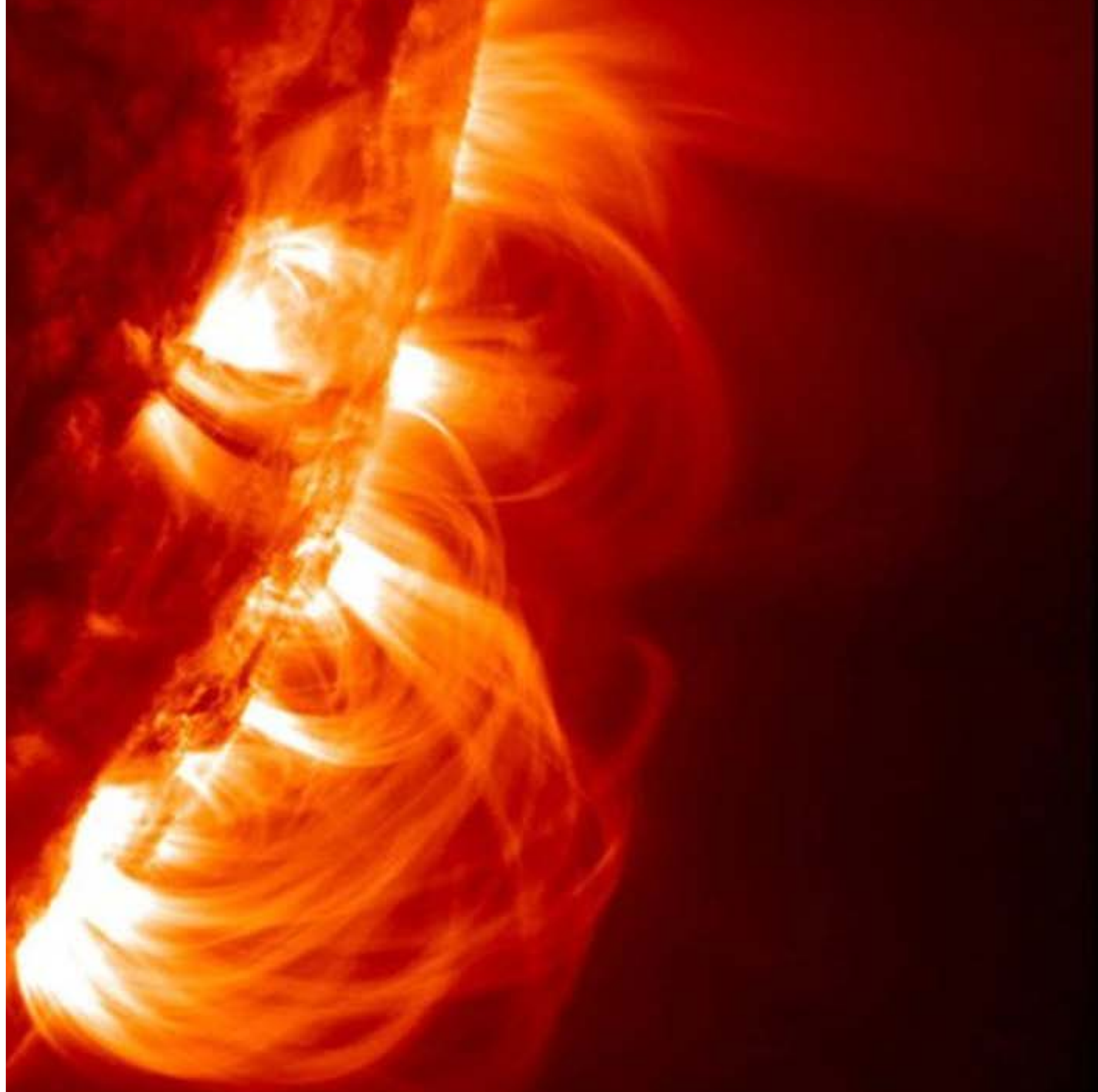


# 2018 Committee of Visitors

December 6, 2018  
FESAC Meeting

**Gertrude Patello**  
Pacific Northwest National Laboratory



## A Committee of Visitors is...

- Charged by FES/FESAC with assessing 1) the efficiency and quality of the processes used to solicit, review, recommend, monitor, and document application, proposal and award actions; and 2) the quality of the resulting portfolio including its breadth, depth, and national/international standing.
- Conducted every 3 years (4 years in this case)
- Consists of members with significant scientific expertise across the FES program elements and are drawn from academia, DOE national laboratories, other federal agencies, private sector, and other appropriate institutions
- Conducts a site visit to FES offices to receive information through presentations, document reviews, and program manager interviews to assess charge elements
- Prepare and delivers a report to FESAC for approval.

## COV Charge from Dr. J. Stephen Binkley (Jan 16, 2018)

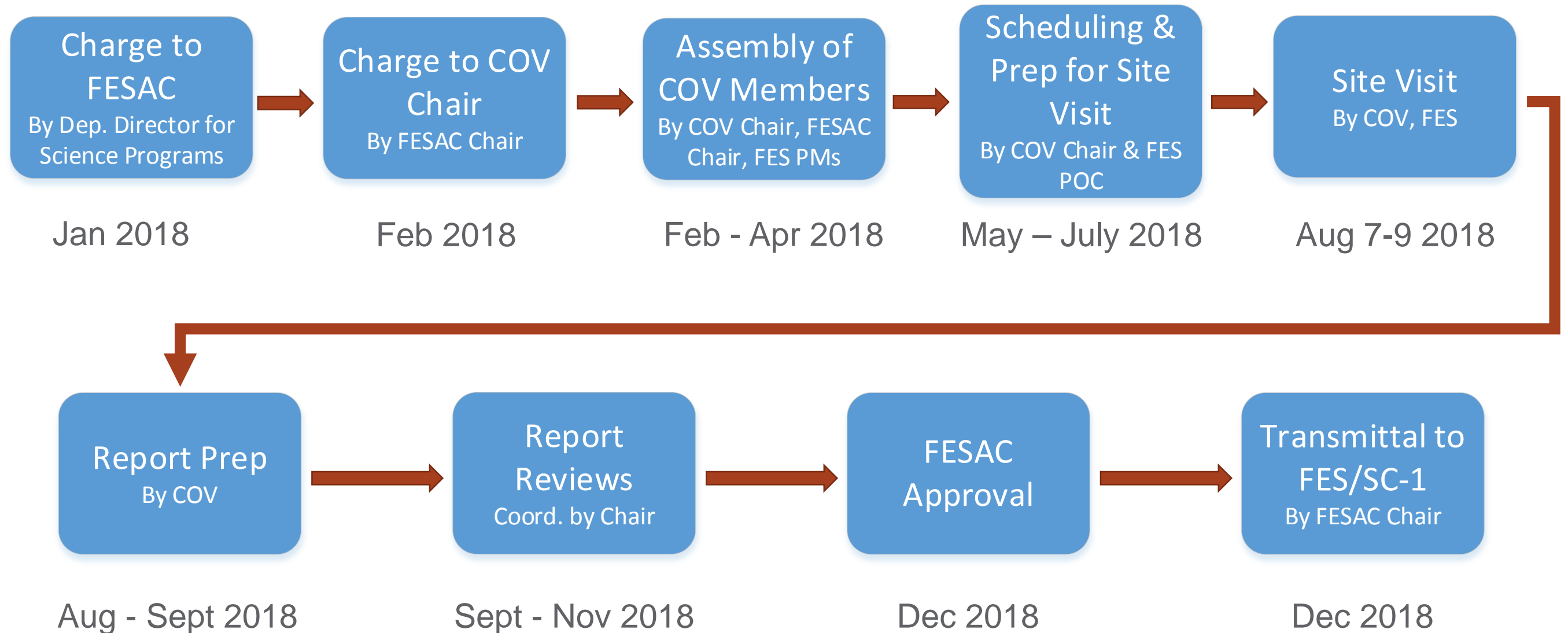
Dear Dr. Rej:

I am writing to request that the Fusion Energy Sciences Advisory Committee (FESAC) establish a Committee of Visitors (COV) to review the management processes of the Department of Energy Office of Science Fusion Energy Sciences (FES) program. The panel should consider and provide evaluation of:

- The efficiency and quality of the processes used by FES to solicit, review, recommend, monitor, and document awards and declinations for universities, national laboratories, and industry.
- The breadth, depth, and quality of the resulting program portfolio, and providing an evaluation of the program's national and international standing.
- FES's management of its portfolio of line item construction and Major Items of Equipment projects, including the U.S. Contributions to ITER project.

The last COV activity evaluated the FES program through Fiscal Year (FY) 2013. Accordingly, in this assessment the COV should review the entire FES program for activities during FY 2014, FY 2015, FY 2016, and FY 2017. The panel should also comment on FES's progress in addressing action items from the previous COV review.

# COV Process and Time Line



## 14 COV Members

- Vassilis Angelopoulos, UCLA
- Dave Arakawa, Retired ORNL site office
- Bob Cauble\*, LLNL
- Diane Demers\*, Xantho Technologies, LLC
- David Donovan, UT-Knoxville
- Rich Groebner\*, GA
- Diane Hattan, BNL
- Allison Lung, JLAB
- Jerry Navratil, Columbia U.
- Raffi Nazikian, PPPL
- Gert Patello\*, PNNL, Chair
- Fred Skiff, U. Iowa, Co-Chair
- Paul Terry\*, U. Wisconsin-Madison
- Mitchell Walker\*, Georgia Tech



\*FESAC Member

# COV topics and assignments

- Group 1: Magnetic Fusion Energy (MFE) Experiments Domestic
  - Paul Terry (U. Wisconsin-Madison)
  - Mitchell Walker (Georgia Tech)
- Group 2: MFE Experiments International and Diagnostics
  - Bob Cauble (LLNL)
  - Jerry Navratil (Columbia U.)
- Group 3: Theory and Simulation
  - Rich Groebner (GA)
  - Raffi Nazikian (PPPL)
  - Fred Skiff (U. Iowa)
- Group 4: Enabling Research and Development (E-R&D), Fusion Nuclear Science (FNS), and Materials Research (MR)
  - Diane Demers (Xantho Technologies, LLC)
  - David Donovan (UT-K)

## COV topics and assignments (cont.)

- Group 5: General Plasma Science (GPS), Exploratory Magnetized Plasma (EMP), High Energy Density Laboratory Plasmas (HEDLP), and Early Career Research Program (ECRP)
  - Vassili Angelopoulos (UCLA)
  - Gert Patello (PNNL)
- Group 6: Facility and Project Management
  - David Arakawa (Retired ORNL Site Office)
  - Diane Hatton (BNL)
  - Allison Lung (JLab)

# Report Organization

## 1.0 Introduction

1.1 Charge to the Committee of Visitors

1.2 COV Members

1.3 COV Process

1.4 Layout of the Report

## 2.0 Summary

2.1 Overarching Findings, Comments, and Recommendations

2.1.1 Efficiency and Quality of the FES Processes

2.1.2 Effect of Award Process on Portfolio

2.1.3 Management of Line Item Construction and Major Items of Equipment Projects

2.2 Recommendations on Each Topical Program

2.3 FES Response to 2014 COV Recommendations



## Report Organization (Cont.)

Appendix A : COV Charge Letter

Appendix B : Members of the COV and Assigned Groups

Appendix C : COV Agenda

Appendix D : Group 1 – Magnetic Fusion Energy Experiments Domestic

Appendix E : Group 2 – Magnetic Fusion Energy Experiments International and Diagnostics

Appendix F : Group 3 – Theory and Simulation

Appendix G : Group 4 – Enabling Research and Development, Fusion Nuclear Science, and Materials Research

Appendix H : Group 5 – General Plasma Science, Exploratory Magnetized Plasma, High Energy Density Laboratory Plasmas, and Early Career Research Program

Appendix I : Group 6 – Facility and Project Management

# Response to the Charge Element 1

## Efficiency and Quality of the FES Processes

- FES is doing a very good job in soliciting, fairly reviewing, and selecting proposals for award
- FES could strengthen its processes for documentation of selections/declinations and monitoring of awards
  - Main finding was related to variability across the programs
- FES is understaffed. FES staff are tasked with multiple significant jobs and/or working in an 'Acting' capacity.

# Response to the Charge Element 1

## Efficiency and Quality of the FES Processes

**Recommendation-1:** We recommend that FES establish a uniform standard for documenting selection/declination decision rationale within PAMS or other suitable repository. If a panel review informed the decision, it should be summarized in the repository by the program manager (PM).

**Recommendation-2:** We recommend implementing systematic documentation having uniform fields/content/format for the recording of achievements, progress, products, and recognition, whether in PAMS or other suitable repository, for universities, industry, and national laboratories.

**Recommendation-3:** We recommend that FES place a high priority on filling the vacant U.S. ITER PM position in the Facilities, Operations, and Projects Division.

## Response to the Charge Element 2

Effect of Award Process on Portfolio (breadth, depth, quality, & national and international standing)

- Significant breadth and depth in the FES program
- Breadth was impacted by budget contraction of the domestic fusion program. Focus on areas of U.S. leadership.
- FES is doing a good job of investing in and maintaining recognized excellence within their program
- Demonstrated national and international leadership
- During COV period, budget restructuring resulted in better alignment with the program's major scientific themes.

## Response to the Charge Element 2

Effect of Award Process on Portfolio (breadth, depth, quality, & national and international standing)

- Area where the quality and strength of the program could be improved is in the area of validation where there is an opportunity to cross-cut multiple programs with collaborations between theory, simulation, experiments and diagnostics

**Recommendation-4:** We recommend that FES find an effective mechanism to fund multi-faceted collaborations that target validation and involve theory, simulation, advanced-diagnostics, and experiment.

## Response to Charge Element 3

### Management of Line Item Construction and Major Items of Equipment Projects

- FES has effectively managed the execution of the U.S. ITER project
- FES appropriately managed the NSTX-U project through completion (Critical Decision 4 approval in September 2015)

**HOWEVER**

## Response to Charge Element 3

### Management of Line Item Construction and Major Items of Equipment Projects

- NSTX-U shut down in 2016, due to technical failures
- COV focused on the management of the recovery effort during the review
- FES is appropriately requiring that the NSTX-U recovery efforts be treated like a formal project.

**Recommendation-5:** Because the NSTX-U Recovery Plan will be based on an “operations project” treated like a DOE Order 413.3B project, it is critical that the FES program office formally define and document the internal roles and responsibilities for both the Research and FOP Division PMs to support the return to operations of the NSTX-U research facility.

# Response to Charge

## FES Response to 2014 COV Recommendations

- FES did a good job of responding to the 2014 COV Recommendations
- Community Input was much improved
  - Keep it up!
- FES commended for enhanced use of panel reviews
  - Consider wider use of virtual or video panel reviews
- FES commended on wider adoption of PAMS
  - Facilitated the COV review



## Group 1: Magnetic Fusion Energy (MFE) Experiments Domestic

- Transition from open solicitations to targeted FOAs for DIII-D collaboration
- Variation in internal documentation and rationale for decisions to fund or decline across the open solicitations for domestic experiments and the FOAs for DIII-D collaborations; research, diagnostics for NSTX-U; and Research on Innovative Approaches to Fusion Energy.
- DIII-D collaborations FOA decisions were well documented. Model for other parts of the program.
- Staffing shortage noted (loss of 5, gain of 2)
- FES's steps in managing grants affected by the NSTX-U outage were appropriate and effective.
- FES doing a good job of investing in and maintaining areas of recognized excellence.
- No new recommendations

## Group 2: MFE Experiments International and Diagnostics

- Programs created in this area addressed the critical needs identified by the community, were soundly selected, and were structured to achieve the recommended breadth of institutional participation.
- U.S. participation on international devices such as W7-X has been substantive
- The two-category Measurements Innovation FOA was inventive.
  - Included a high-risk, low funding category to seed new ideas
- Documentation of awards and declinations varied depending on the PM and documentation when using panel reviews was cursory.

**Recommendation-6:** Regarding the innovative solicitation “Measurement Innovations for Magnetic Fusion Systems,” FES should assess the effectiveness and/or success rate of the 13 awarded high-risk, high-reward Category-1 proposals after two years and, if the result is deemed successful, FES should consider this model approach for future solicitations.

## Group 3: Theory and Simulation

- FES is doing a very good job in soliciting, fairly reviewing, and selecting proposals for awards.
- Panel reviews used for SciDAC proposals. Improves uniformity of review process. Video panels should be considered as an option.
- Variability in progress reporting.
- Staff shortage contributes to the duration of review process
- Theory and Simulation portfolio is of very high quality, has great breadth and depth, and is producing excellent science. World leading.
- Leadership can be strengthened by increased emphasis on interaction between theory and experiment
- No new recommendations

## Group 4: Enabling Research and Development (E-R&D), Fusion Nuclear Science (FNS), and Materials Research (MR)

- Proposals received via Open Call (universities and industries) and FWP process (national laboratories); No competitive solicitations. This was a concern.
- Open call proposals were peer reviewed, FWP submissions were not.
- Panel merit reviews (2018) conducted on all projects covering the period of 2014-2017.
- University and Industry submit annual progress reports.
- National laboratory programs monitored via laboratory visits, PI visits to FES and periodic (monthly or bimonthly) discussion. No requirement for annual progress reports.

## Group 4: Enabling Research and Development (E-R&D), Fusion Nuclear Science (FNS), and Materials Research (MR) (Cont.)

**Recommendation-7:** Design and release effective targeted and competitive solicitations/FOAs (in areas of E-R&D, FNS, and MR) for narrow scientific or technical challenges that enable ideas to be openly vetted by the fusion community. The currently funded national laboratory and non-laboratory projects should (when appropriate) submit and compete within these solicitations. Use of parallel (non-laboratory and national laboratory) solicitations is suggested.

**Recommendation-8:** Utilize panels to assess the scientific and technical quality and progress of R&D activities associated with awards to national laboratories. We suggest that these are held at a minimum of once every three years (which also agrees with the most common duration of awards).

## Group 4: Enabling Research and Development (E-R&D), Fusion Nuclear Science (FNS), and Materials Research (MR) (Cont.)

- COV had difficulty judging depth of programs and national/international standing.
- Projects were leveraging U.S. world-leading capabilities such as High Flux Isotope Reactor (HFIR) at ORNL, Tritium Plasma Experiment (TPE) at Idaho National Laboratory (INL), PISCES at UC San Diego. This promotes U.S. leadership.
- Investments in upgrades and new facilities have potential to elevate the U.S. position in the associated technologies and provide opportunity for international collaborations.

## Group 4: Enabling Research and Development (E-R&D), Fusion Nuclear Science (FNS), and Materials Research (MR) (Cont.)

**Recommendation-9:** Assemble documents that capture and rapidly convey connections between FES technical priorities, projects funded through the E-R&D, FNS, and MR programs, and major project or user facilities to ensure that information needed by the COV to assess the breadth, depth, and quality of these programs is readily available. We suggest including: funds granted by FES to E-R&D, FNS, and MR projects; use (if any) by those projects of user-facilities or major-project facilities; and the key capabilities and the funding channel for (general) operations of user-facilities and major-projects that are considered elements of the E-R&D, FNS, and MR portfolio.

## Group 5: General Plasma Science (GPS), Exploratory Magnetized Plasma (EMP)

- One call during the review period. Proposals reviewed adequately and documented.
- Annual joint calls from NSF/DOE partnership in basic plasma science.
  - Excellent communication between NSF & DOE
  - Annual call allows FES flexibility
- Lack of consistency in reporting products
- GPS and EMP programs constitute a diverse and agile element of the FES driven by community priorities
- World-leading, strong program. Outstanding science.



## Group 5: High Energy Density Laboratory Plasmas (HEDLP)

- One FOA issued consistent with community workshops and strategic priorities
  - Leveraged funding from NNSA
  - High-quality reviews
- Inconsistency in reporting noted.
- Program is high quality & productive
- Demonstrated U.S. leadership

## Group 5: Early Career Research Program (ECRP)

- FES participated annually in the Office of Science Early Career Research Program solicitation
- Process was efficient and timely
- Improvement is needed in documentation of awards and declinations
- Portfolio of ECRP awards is well-balanced
- Quality of research and national and international standing was outstanding
- Tracking of publications could be improved

## In Summary

- FES has good processes in place for soliciting, reviewing and recommending awards
- There are opportunities for improvement in documenting and monitoring awards
- FES is funding high quality science leading to national and international standing
- FES is effectively managing their construction and MIE projects
- FES responded well to the 2014 COV recommendations
- 9 Recommendations resulted from the review

# Questions & Discussion

