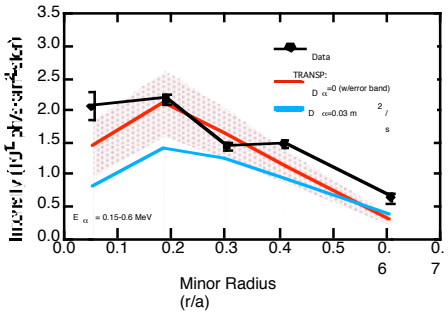
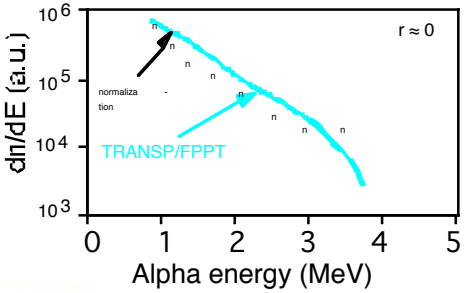
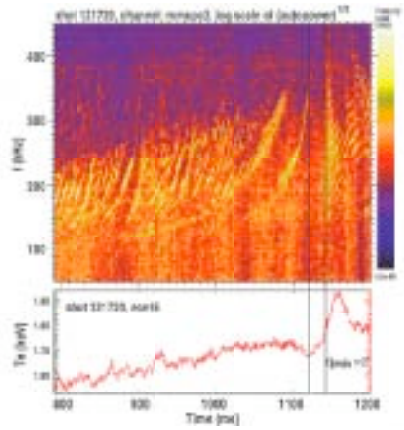
# Update on US Burning Plasma Organization Activities…

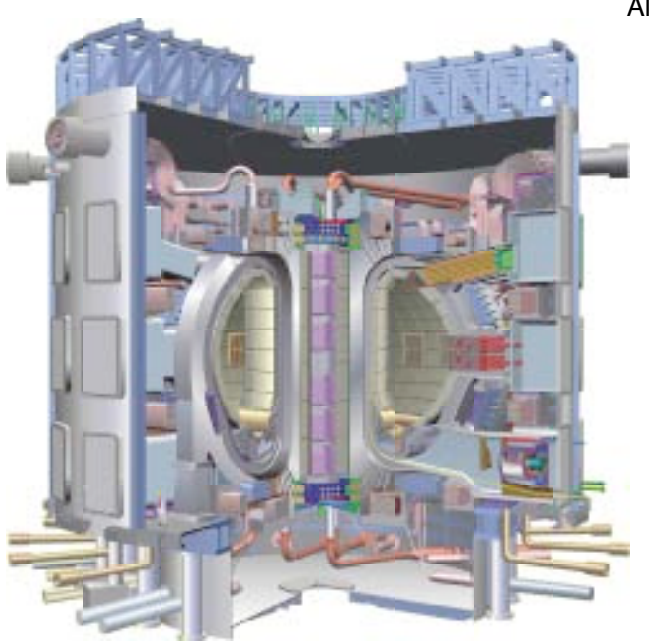
U.S. BURNING PLASMA ORGANIZATION

**Science & Technology Development today…**





**… for Burning Plasmas to come…**

R. J. Fonck

*presented to*

FESAC

Gaithersburg, MD

Mar. 1, 2006

# USBPO Development Continuing

U.S. BURNING PLASMA ORGANIZATION

- Reaching out to fusion community
- Sponsoring Burning Plasma Workshop
- Building initial structure…
- Helping develop a BP Research Plan

# The USBPO Mission Has 4 Elements…

U.S. BURNING PLASMA ORGANIZATION

*Advance the scientific understanding of burning plasmas and ensure the greatest benefit from a burning plasma experiment by coordinating relevant U.S. fusion research with broad community participation.*

# Community Discussions Provided First Directions and Structure

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- Initial guidance from earlier committees …
  - BP-PAC, BP-FESAC, UFA White Paper, BPP Draft Charter, etc.
- Discussions within Institutions
  - PPPL GA MIT ORNL LLNL
  - UCSD UCLA Columbia U Texas U Wisc
- Discussions at Technical Meetings
  - FESAC FPA UFA SOFE
  - NRC Plasma 2010 APS/DPP (plus UFA, TTF, TCC, MHD)
- Burning Plasma Workshop - ORNL Dec. 2005
- First direction evolved from these discussions
  - Will continue soliciting community input in an ongoing process …
  - Questions remain and being sorted out …

# First-cut Structure: USBPO to be Comprised of 3 Elements

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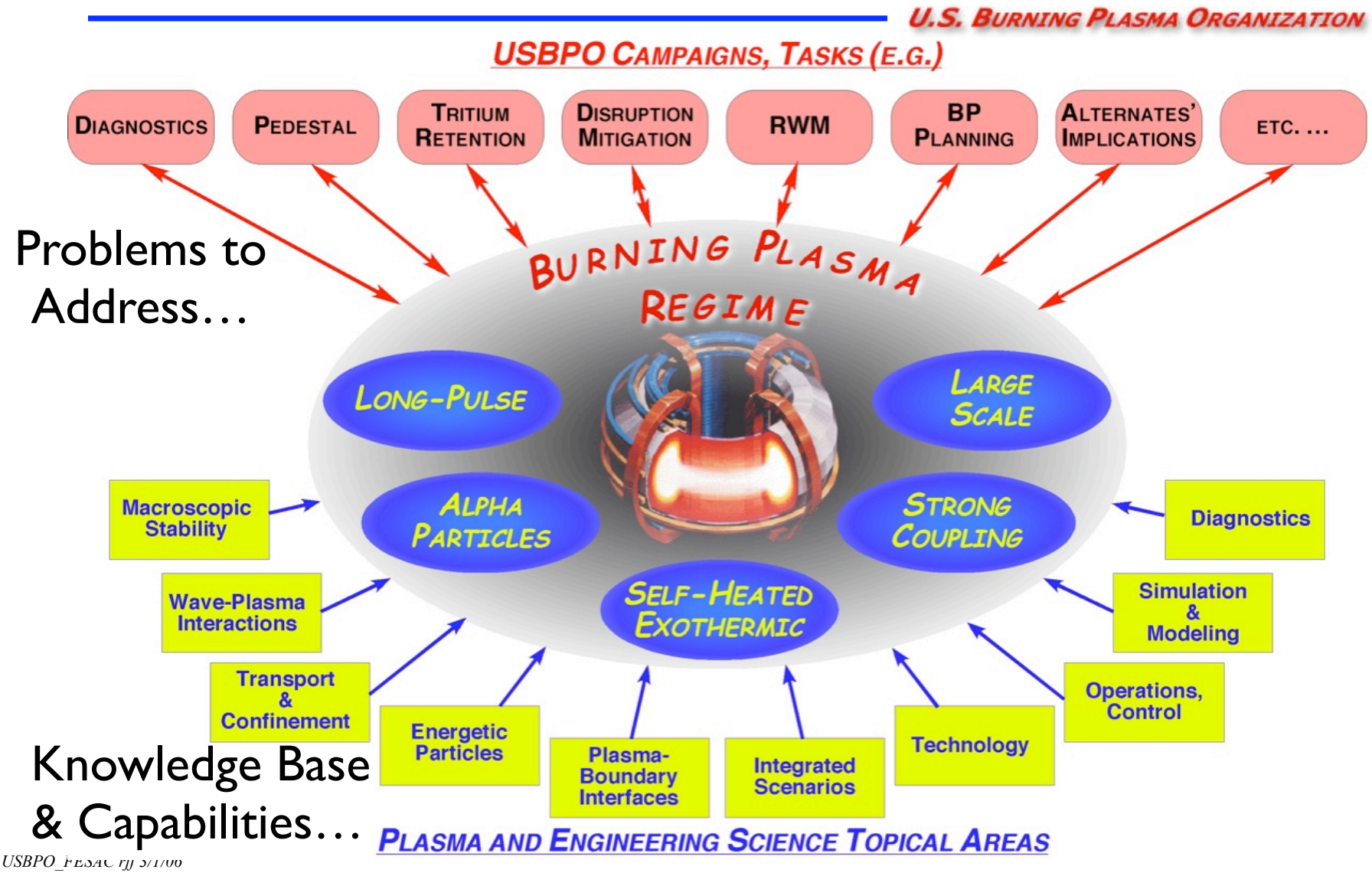
- Topical and Task Groups: Working Groups
  - Topical Group = expertise resources; charter Task Groups; standing group
  - Task Group = address specific charge; deliverable; usually short-term
- Council: Community governance of activity
  - Set Policy; create charter; oversight and guidance of activities; community input
- Directorate: Implement and Manage activities
  - Facilitate discussion, participation, and execution of BP research activities
  - Report progress and advocate BP research activities
  - Group leaders help manage activities

# USBPO: Help Apply Community Activities & Expertise to BP-Relevant Issues



# BP Workshop: Got the Process Going…

U.S. Burning Plasma Organization

- Held Dec. 7-9, 2005 @ ORNL
  - Plenary Talks
  - Breakout Group Discussions
  - Summaries from Breakout Groups
- Successful for such a quickly-called activity
  - 140 registered attendees
  - Plenary and Summaries web-cast
    - 20 institutions logged in during the sessions
  - Identified issues and concerns = LOTS of opportunities for program!
    - Did not proceed to stage of suggesting priority of what issues to tackle
  - Very optimistic about extent of US leadership in some areas …

# Breakout Group Questions: Identifying BP Issues => Tasks

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- Recent Developments
  - What major BP-related developments (theory, modeling, experiment, technology) have occurred in this area since Snowmass 2002?
- Implications and Outstanding Issues
  - What issues remain to be resolved for a successful BP experiment in ITER?
  - What are the consequences of resolving these issues, or not, in the next ~10 years?
  - What issues should be resolved by a successful BP experiment?
- What the U.S. fusion community should do
  - What contributions can/should the U.S. fusion program make to resolving these issues?
  - How should the BPO be structured to best help the community make these contributions?
- Summary Reports on BPO web site

# e.g., Breakout Discussions for Macroscopic Stability (Hegna & Navratil)

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- Some Issues
  - NTM: demonstration of ECCD stabilization @ low-q; modulated ECCD suppression
  - Ext kink/RWM: low rotation stabilization; n > 1 modes
  - m = 1/ST: excitation of other modes (NTM); physics model incomplete
  - ELMs/Pedestal: pedestal width determination; mechanism for small ELMs
  - Disruption mitigation: ITER 1st expt where this is integral to all ops!
  - 3-D equilibrium effects of increasing importance
- Consequences
  - No NTM mitigation may limit ITER in achieving performance goals
  - RWM: expands ss Q ~ 5 operation and establishes DEMO physics in ITER
- Tasks
  - Task Group needed to consider design of coils for RWM and ELM control
- Recommendations
  - Need to facilitate interfacing of ICC with BP activity

# Special Thanks to Steering Committee for Guiding Initial Formation Process!

U.S. BURNING PLASMA ORGANIZATION

S. Allen
E. Marmar
S. Milora
R. Nazikian
S. Prager
T. Taylor
J. VanDam
R. Fonck
D. Meade
G. Navratil
E. Oktay
N. Sauthoff
N. Uckan

# Status: Organization Phase and Near-Term Issues

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- Increase attention on coordination of BP activities
  - What and how - interface with existing activities?
- Establish critical elements
- Expand on workshop activity
  - Define Topical groups and solicit participation
  - Identify Issues and Tasks from Workshop
  - Continue some Group Discussions
- Help with BP Planning activity as requested

# Organizational Activities Starting

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- Directorate: Director = Ray Fonck

  Deputy Director = Tony Taylor

  Admin = Joan Welc-Lepain

- Council: Chair = Jim VanDam

  Vice-Chair = Amanda Hubbard

  + 12 nominees identified; solicitations in progress

  - In place by Budget Planning Meeting
  - Near-term Tasks: Charter development; Procedures; BP Plan review
    - Tenure and selection of Council members and group leaders to be defined
  - Whole Council meeting once established - maybe video
  - Chair and Vice-Chair meet weekly with Directorate

# Increasing Activities Planned

U.S. BURNING PLASMA ORGANIZATION

- Working Groups
  - Topical Group Signup at http://www.burningplasma.org
  - 10 Groups suggested by Workshop; 57 people registered to date
    - Identifies pool of interested parties to help with Tasks
  - Use as nucleus for activating groups over March-April period
  - Some groups starting discussions for Tasks: Diagnostics; Boundary, Control (CODAC)
- Communications
  - Video-conference and white-board standards in evaluation by Task Group
  - e-mail and web Newsletters updates to interested parties to start next week

# Task Request:
# Help Address BP Research Plan

U.S. BURNING PLASMA ORGANIZATION

- Energy Policy Act of July, 2005 calls for a Plan for US Participation in ITER
- DoE/OFES has asked USBPO to develop this Plan
  - Request for Study to develop a Plan received Feb. 16
- Approach to addressing this is proposed here
- Consultation with and feedback from FESAC integral to this effort

# Charge Letter from A. Davies, AD, OFES

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…The EPAct requires the Secretary of Energy to develop a Plan, in consultation with the Fusion Energy Sciences Advisory Committee (FESAC), for the participation of United States scientists in ITER that include:

(i) The U.S. research agenda for ITER;
(ii) Methods to evaluate whether ITER is promoting progress toward making fusion a reliable and affordable source of power; and
(iii) Description of how work at ITER will relate to other elements of US fusion program.

The EPA also requires that the Secretary shall request a review of the plan by the National Academy of Sciences.

I would like the U.S. Burning Plasma Organization (USBPO) to develop this Plan in close cooperation with the U.S. fusion community. …

…The Plan, including consultation with FESAC … must be completed by June 30, 2006. …

…Your status report on BPO to FESAC on March 1 should include your approach to prepare this Plan. …

Please let me know any obstacles you see in completing this task by June 2006.

# Approach to Addressing Charge

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- Make our highest priority activity
  - Have to move very quickly!
- Use, and be consistent as much as possible with, wealth of relevant community studies
  - DO NOT reinvent the wheel!
  - BP workshop, Facilities Report, Priorities Report, Snowmass, ITPA, BPAC, FESAC BP, PAC reports, etc.
- Form Task Group to develop report for OFES
  - Chaired by R. Fonck
  - Consisting of community stakeholders
  - Chosen by Directorate, Council Chair & Vice-Chair, and OFES with solicited input - (immediate) suggestions welcome!

# General Report Structure

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Theme: *Ensure success and gain greatest benefit from participation in ITER*

- Executive Summary
- Chap 1: Overview and timing and scope of issues
  - Plain-English presentation of plan with issues and timeline
- Chap 11: The U.S. research agenda for ITER
- Chap III: Metrics for evaluating whether ITER is promoting progress towards fusion energy
- Chap IV: Relation to other elements of the U.S. Program

# (i) The U.S. research agenda for ITER

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- WHAT scientific and technical issues need to be addressed to insure ITER's success and gain the greatest scientific benefit from ITER?
  - WHEN do we need the answers?
  - WHICH of these should the US emphasize?
    - Special interests, capabilities, etc.
  - HOW will the U.S. do it?
- WHAT do we need/want to learn from ITER?
- HOW will national program elements & participants work with ITER?
  - Role of domestic program elements in this plan
- Notes
  - Consider near-term, pre-operation, operation phases (Physics I, Physics II, Technology)
  - Adaptable to changes in ITER plans & schedule, and emerging scientific understanding

# (ii) Methods to evaluate whether ITER is promoting progress toward making fusion a reliable and affordable source of power

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- How does knowledge from ITER contribute to advancing towards fusion power? e.g.,
  - Burning Plasma Science
  - Technology, materials, nuclear science
  - Validation of predictive models & capabilities
  - Steady-state advanced tokamak
  - Innovative concepts
- How will knowledge from ITER contribute to needs identified by reactor studies (ARIES)?
- What goals are identified for the ITER program, by the ITER project, by U.S. program needs?
- What are the metrics for success toward these objectives?

# (iii) Description of how work at ITER will relate to other elements of the U.S. fusion program.ITER



- How will domestic program elements benefit from ITER participation?
- How will domestic program elements complement the BP experiments on ITER?
- How will research on ITER contribute to fusion science and theory/code validation?

# Process for addressing charges

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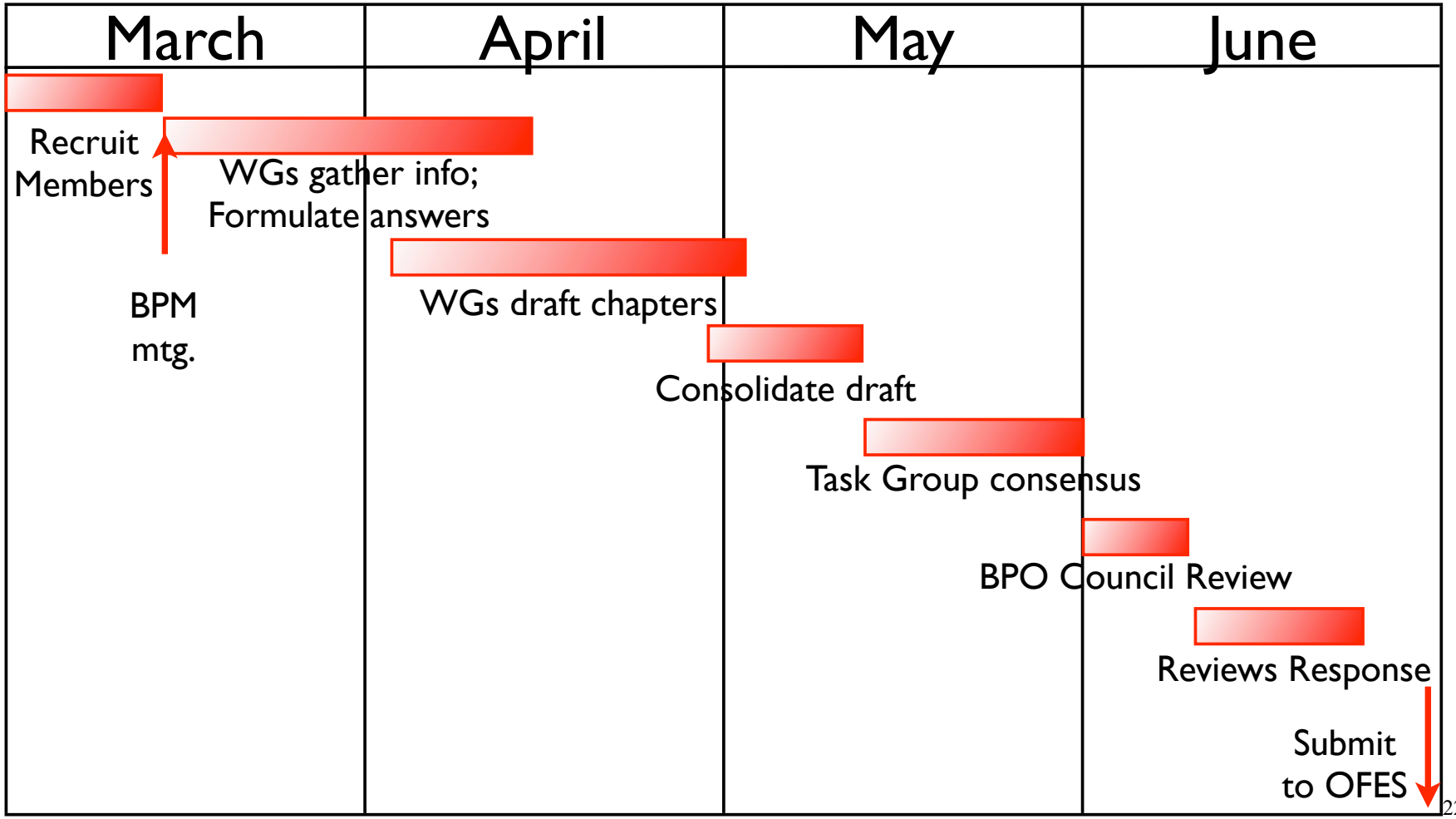
- Similar to other study committees
  - Task group of 14 people
  - Three 4-member Working Groups, each to address an individual charge
    - Interact with community for input (e.g., BP Workshop output, prior reports, solicitation, etc.)
  - Executive Committee to bring chapters and story together
    - WG leaders plus Chair and 1-2 others
  - Whole Task Group to vet total document
- Consultation and Reviews
  - Tight coordination with USIPO and ITER program
  - Review by USBPO Council
  - Interaction with FESAC members…

# Schedule for EPAct Report

U.S. Burning Plasma Organization



# Summary

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- USBPO Development is proceeding
- Successful BP Workshop held @ ORNL
- Elements of BPO developing
  - Members are joining organization
- Approach to EPAct study defined
  - FESAC comments / suggestions?