Status of ITER and the US ITER Project

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Gaithersburg, MD
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Outline

- Progress on the International Front
  - ITER Organization Provisionally Established
  - ITER Project Overview
  - Construction Site Preparations
  - Design Review
- Progress on the Domestic Front
  - US ITER Project Scope & Organization
  - FY 2007 Activities & Accomplishments
  - Budget and Plans
  - Steps Toward a US ITER Project Baseline
- Summary

Progress on the International Front

Signing Ceremony – November 21, 2006
Paris, France

- After fulfilling the requirements of the Energy Policy Act of 2005, including the 120-day review period by Congress of the ITER Agreement, Dr. Ray Orbach, on behalf of the U.S., signed the ITER Joint Implementation Agreement on November 21st.

First Interim ITER Council Meeting

- **The Interim Council:**
  - **Empowered Ambassador Ikeda to exercise, on a provisional basis, the roles and functions defined for the Director-General of the ITER Organization and charged him with undertaking all measures necessary to bring the provisional ITER Organization into operation**
  - **Adopted, on a provisional basis, a) the Draft Rules of Procedure of the ITER Council, b) the Staff Regulations and, c) the Project Resource Management Regulations.**
  - **Agreed on the establishment of Management Advisory Committee (MAC) and the Science and Technology Advisory Committee (STAC) as subsidiary bodies of the Interim ITER Council**
    - **Provisional MAC held first meeting in late May 2007**
    - **First STAC meeting planned for September 2007**
  - **Approved project plan, resource estimates, and 2007 annual budget**

ITER – Key Facts

- Designed to produce 500 MW of fusion power (Q ≥ 10) for at least 400 seconds
- Will bring together many of key technologies needed for future fusion power plants
- 10 years construction, 20 years operation 5 years deactivation
- Seven Members: EU (Host), China, India, Japan, Russia, South Korea, USA

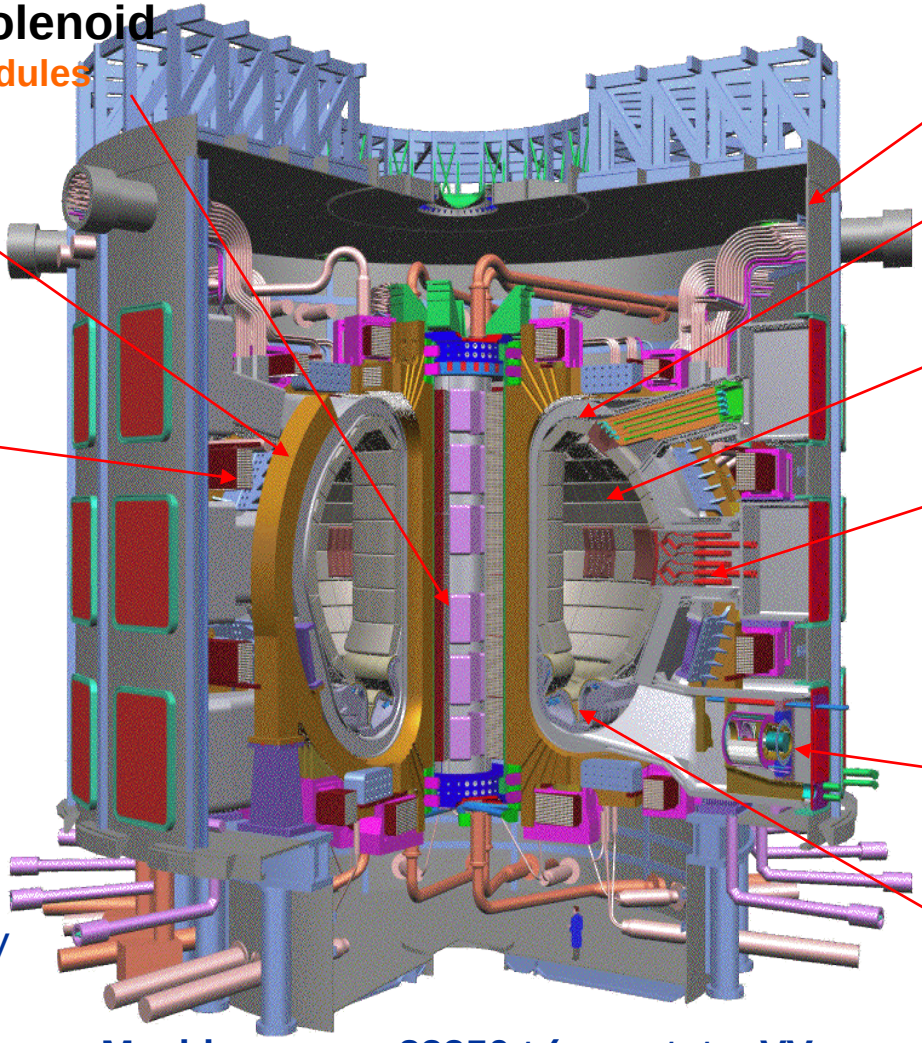
Present ITER Office Building

The Core of ITER

Central Solenoid
Nb_3Sn, 6 modules

Toroidal Field Coil
Nb_3Sn, 18, wedged

Poloidal Field Coil
Nb-Ti, 6



Cryostat
24 m high x 28 m dia.

Vacuum Vessel
9 sectors

Blanket
440 modules

Port Plug
heating/current drive, test blankets limiters/RH diagnostics

Torus Cryopumps, 8

Divertor
54 cassettes

Major Plasma Radius 6.2 m

Plasma Volume: 840 m^3

Plasma Current: 15 MA

Typical Density: 10^{20} m^{-3}

Typical Temperature: 20 keV

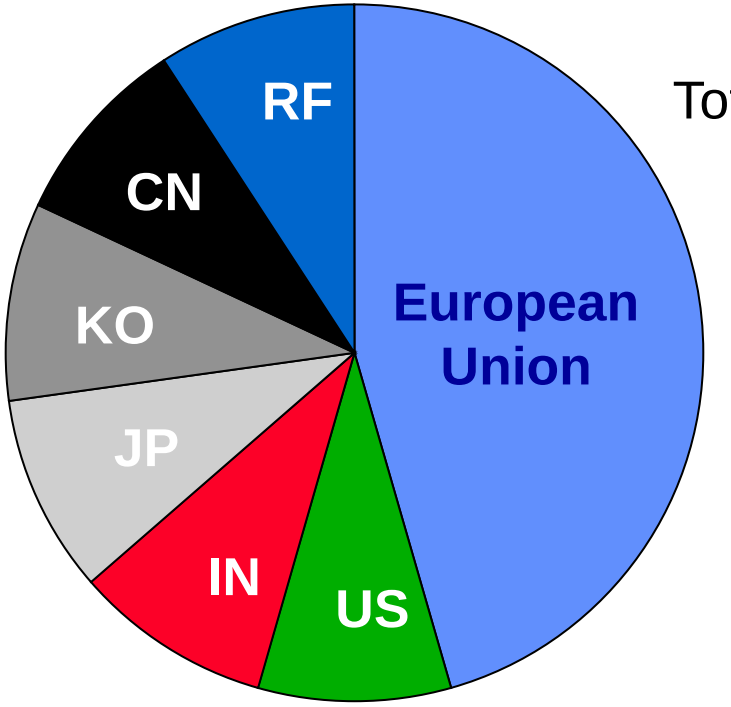
Fusion Power: 500 MW

Machine mass: 23350 t (cryostat + VV + magnets)
- shielding, divertor and manifolds: 7945 t + 1060 port plugs
- magnet systems: 10150 t; cryostat: 820 t

Construction Phase Cost Sharing

Overall sharing:

EU 5/11, other six parties 1/11 each. Overall contingency of 10% of total. Total amount: 3936 kIUA (>5B Euro-2007)



Total procurement value : 3,021 kIUA

Staff: 477 kIUA

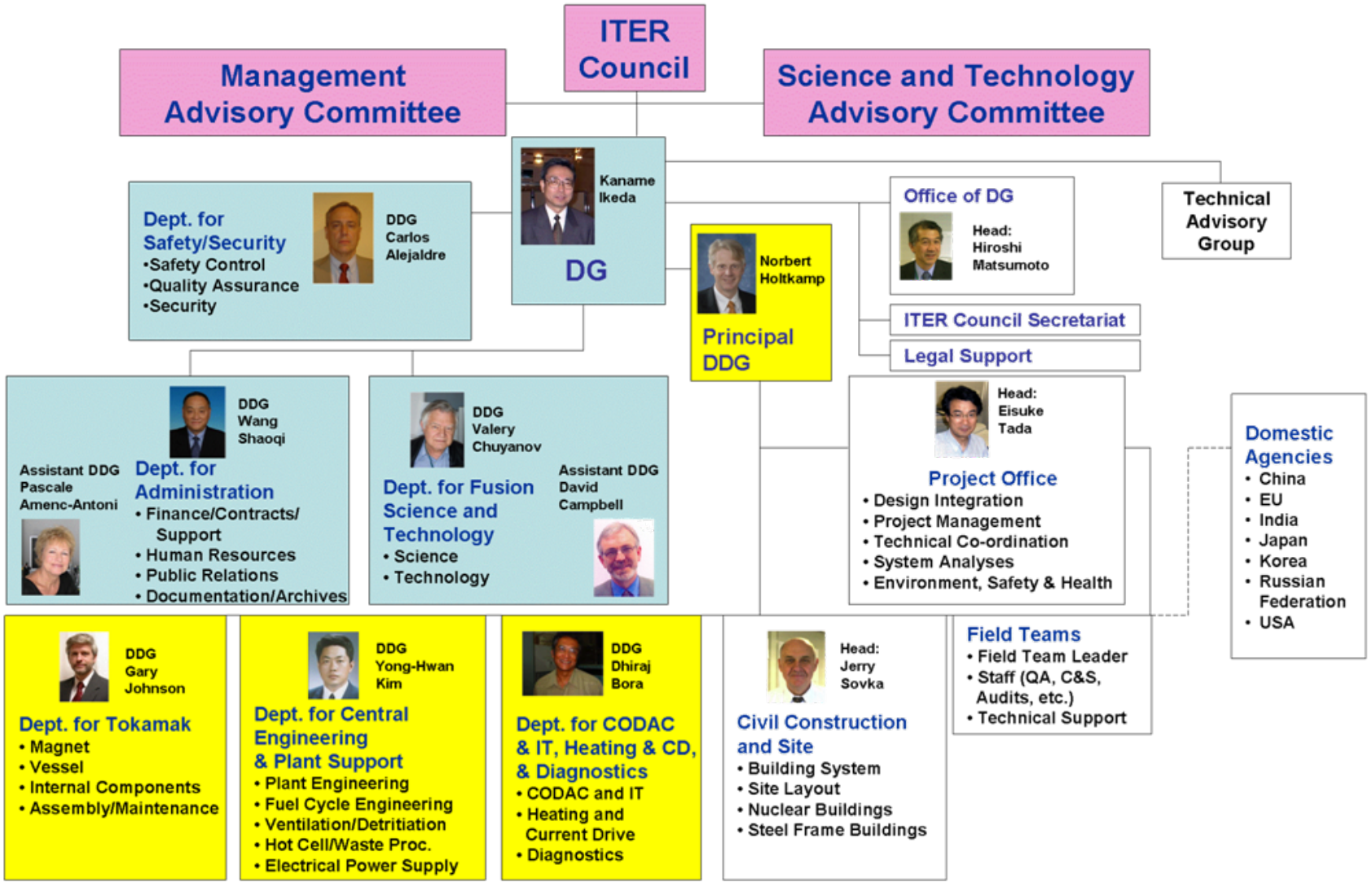
R&D: 80 kIUA

Total: 3,577 kIUA

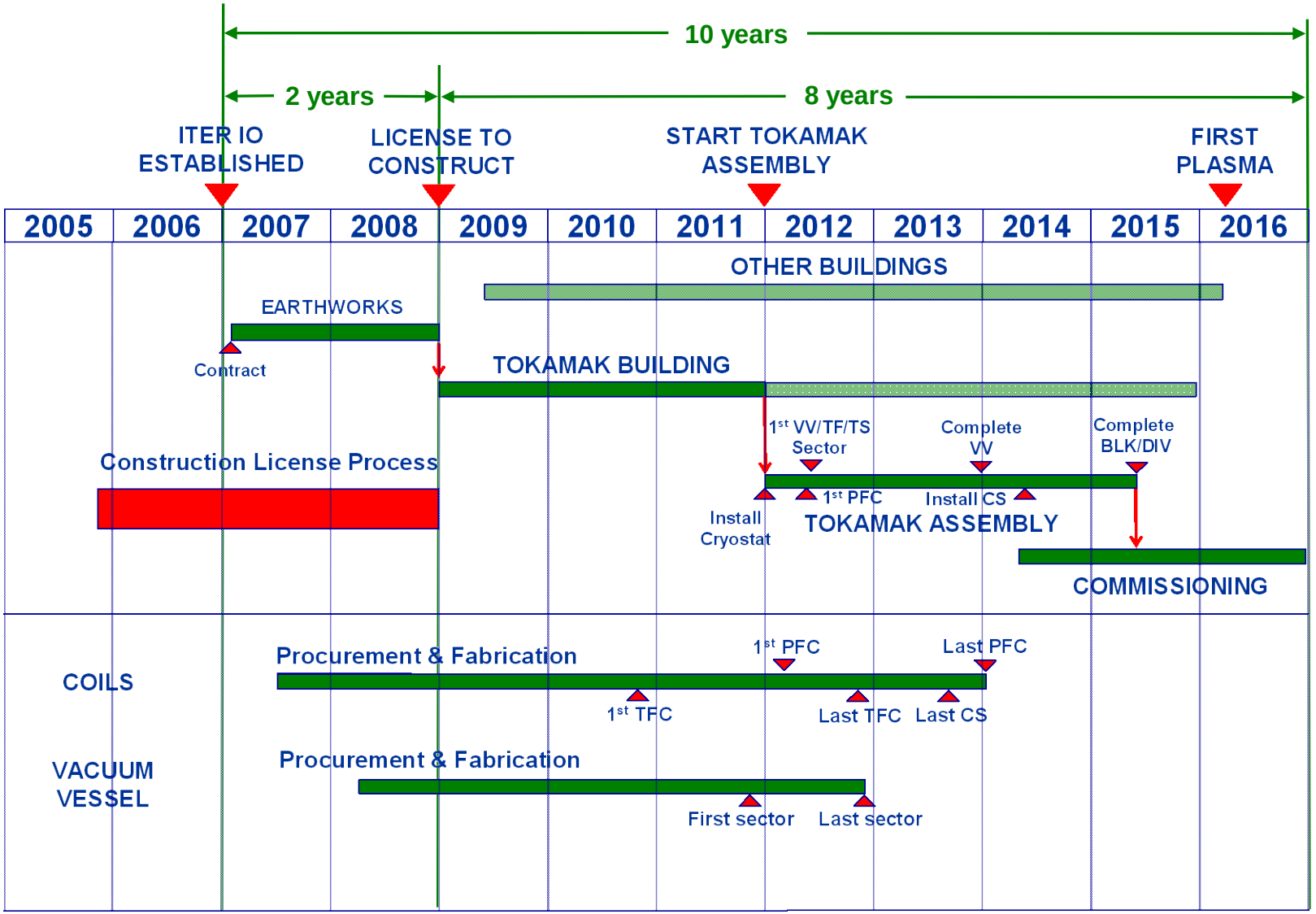
Central Reserve: 357.8 kIUA

1 k ITER Units of Account (IUA) = $1M US in 1989

Management Structure of the ITER Organization



Integrated Project Schedule (Top Down)

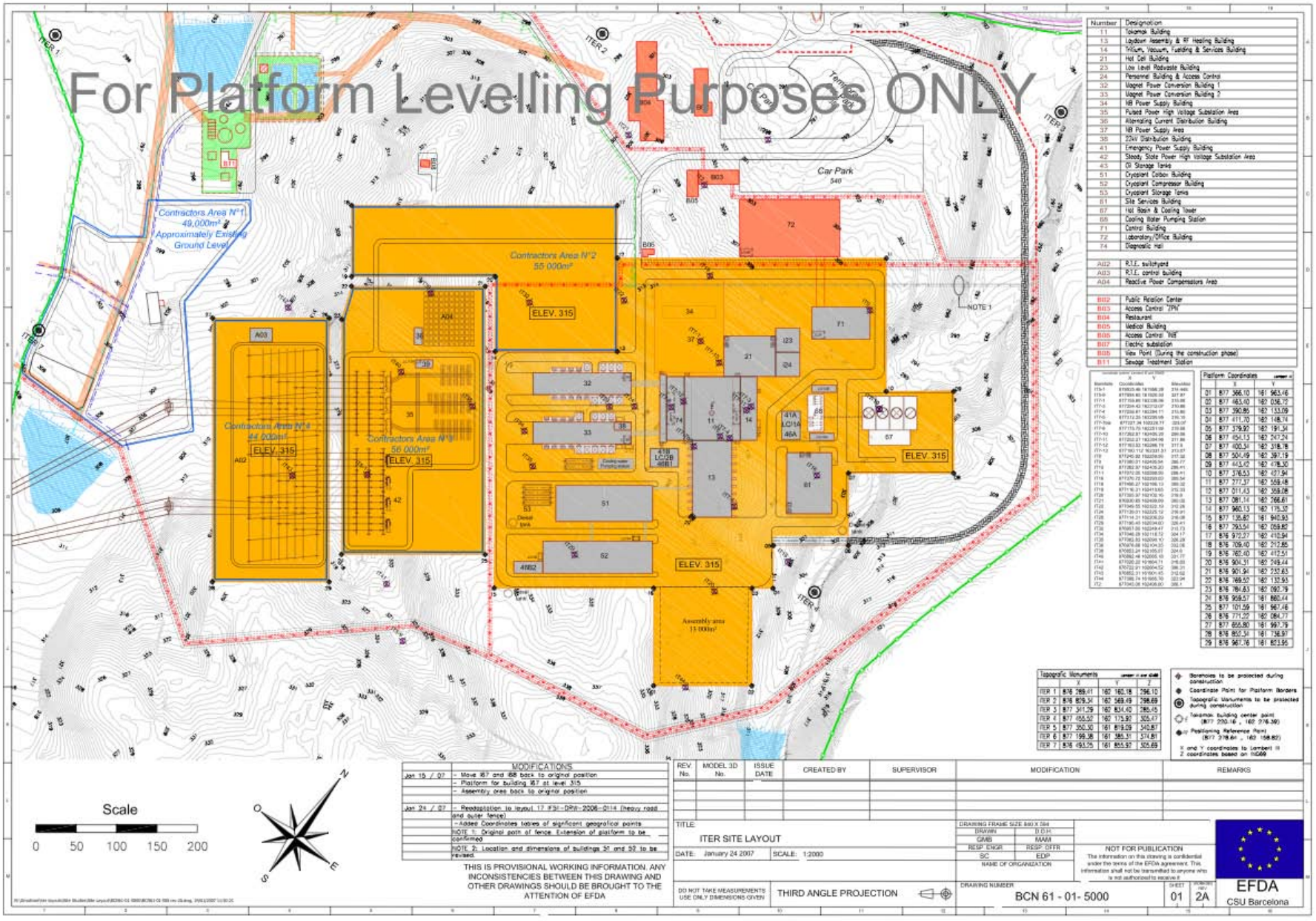


The ITER Site at CEA Cadarache

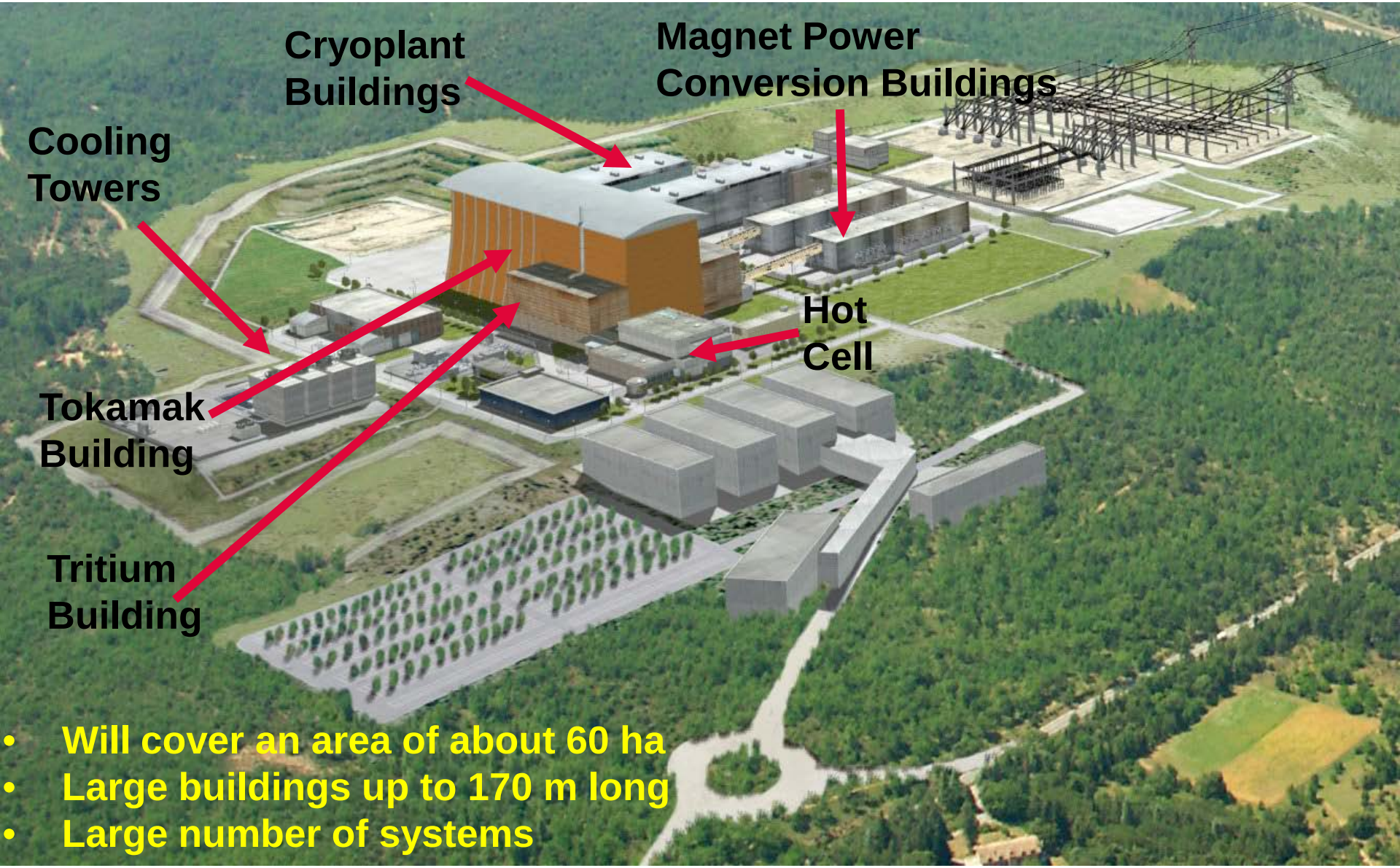
Site Preparation

Site Clearing (First Phase) was completed in February 2007

Site Preparation



The ITER Site



- Will cover an area of about 60 ha
- Large buildings up to 170 m long
- Large number of systems

Design Review

- The first goal for 2007 is to create a new Baseline Design (compared to 2001 Final Design Report) which:
  - Confirms or redefines the physics basis and requirements for the project
  - Is the basis for the procurement of the long lead items (Vacuum Vessel, Magnets, Buildings),
  - provides input for the Preliminary Safety Report
- The second goal is to broadly establish ITER design decisions by involving the worldwide fusion community (physics and engineering), and thus enable the Members to take ownership of the project
- The third goal is to broaden the knowledge base within each of the Members as needed for them to successfully procure their in-kind hardware
- For components and systems which are procured at a later date or for issues with lower priority, work will continue into the year 2008
- Eight Design Working Groups are dealing with ~ 65 high priority issues

Recent Developments

- The Broader Approach Agreement has been signed by the European Union and Japan

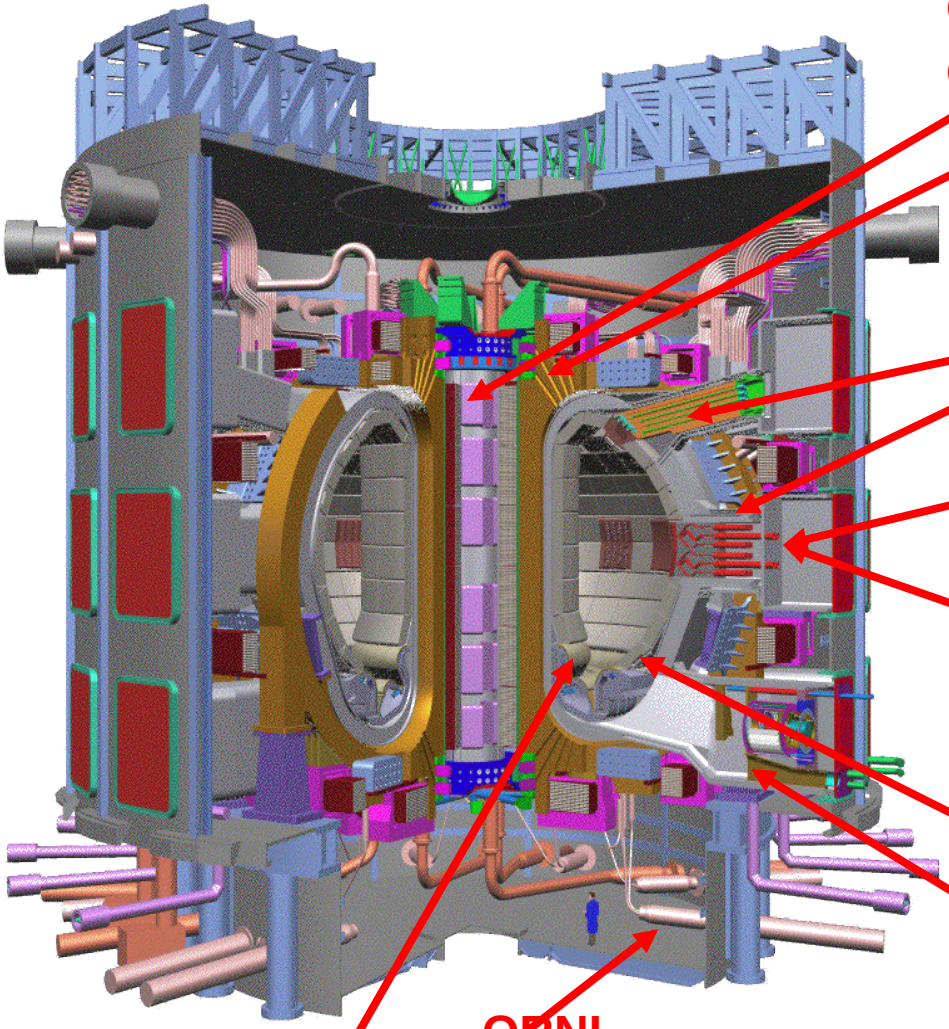
- July 2007 Interim ITER Council Meeting held in Tokyo. Key topics included:
  - Ratification (expected late this summer)
  - Report of the First MAC Meeting
  - IO Staffing Plans for 2007-08 and Accelerated Recruitment
  - Project Resource Estimates and Budget for 2007-08
  - Interim Increase in IO Procurement Authority
  - Guidelines for Procurement of In-Kind Hardware
  - Terms of Reference and Initial Charges of MAC and STAC
  - Test Blanket Module Program

Progress on the Domestic Front

US ITER Project Scope

- In-kind contributions of hardware and its delivery to France
- In-kind contribution of secondees to the IO
- Cash contributions for R&D and Common Fund expenses (e.g., direct staff, IO services, machine assembly/installation/commissioning)
- Cash contributions to the Central Reserve (upon Council approval)
- Operation of the US ITER Project Office at ORNL in conjunction with partner Labs PPPL and SRNL

US ITER In-kind Hardware Contributions



ORNL 7 Central Solenoid windings

ORNL 8% of Toroidal Field conductor

PPPL 16% of port-based diagnostics

ORNL 100% Ion Cyclotron transmission lines

ORNL 100% Electron Cyclotron transmission lines

ORNL 20% First Wall/Shield

ORNL Roughing pumps, standard components

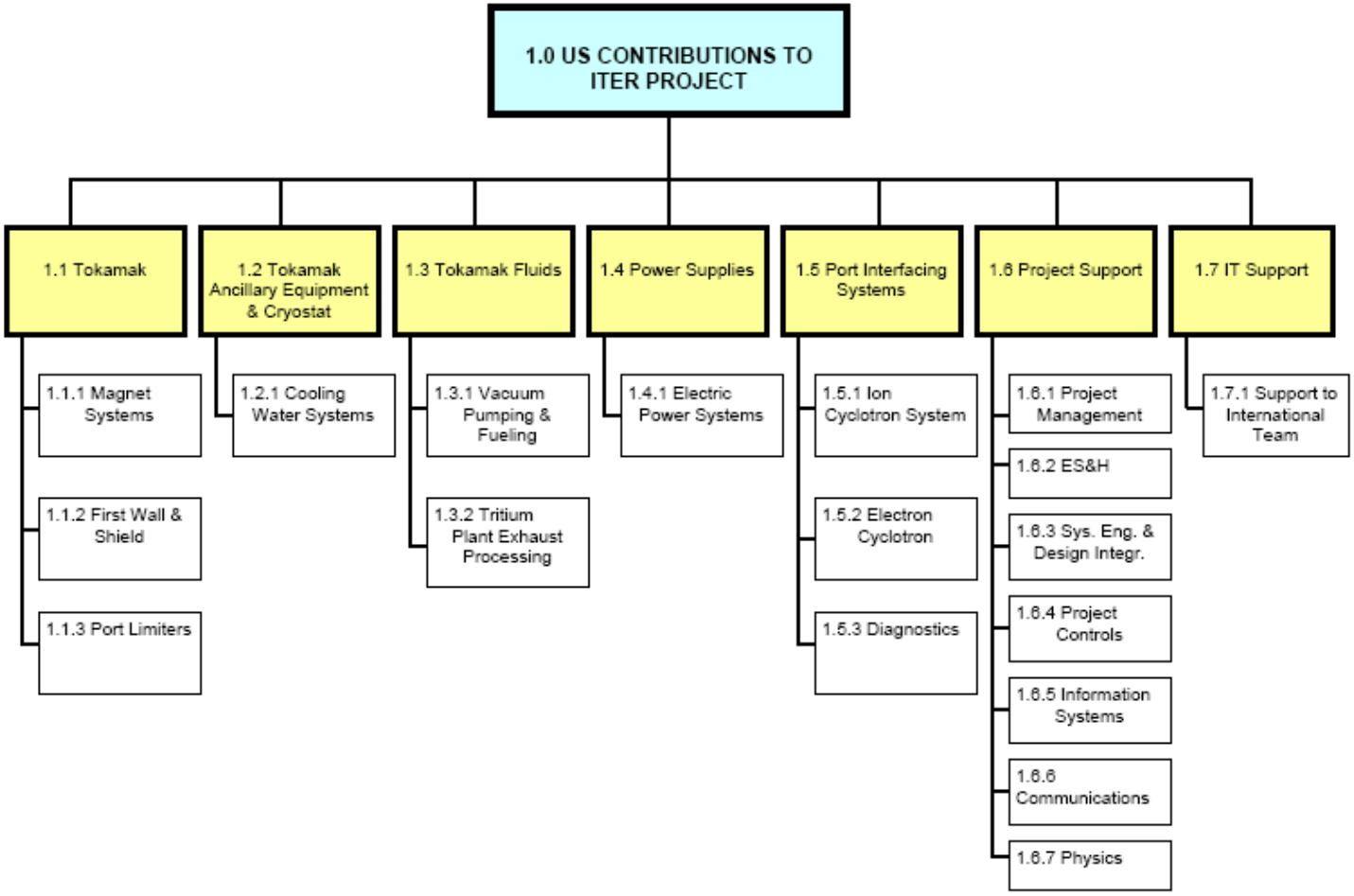
ORNL Pellet Injector

ORNL Cooling Water for divertor, vacuum vessel, …

PPPL Steady-state power supplies

SRNL Tokamak Exhaust Processing System

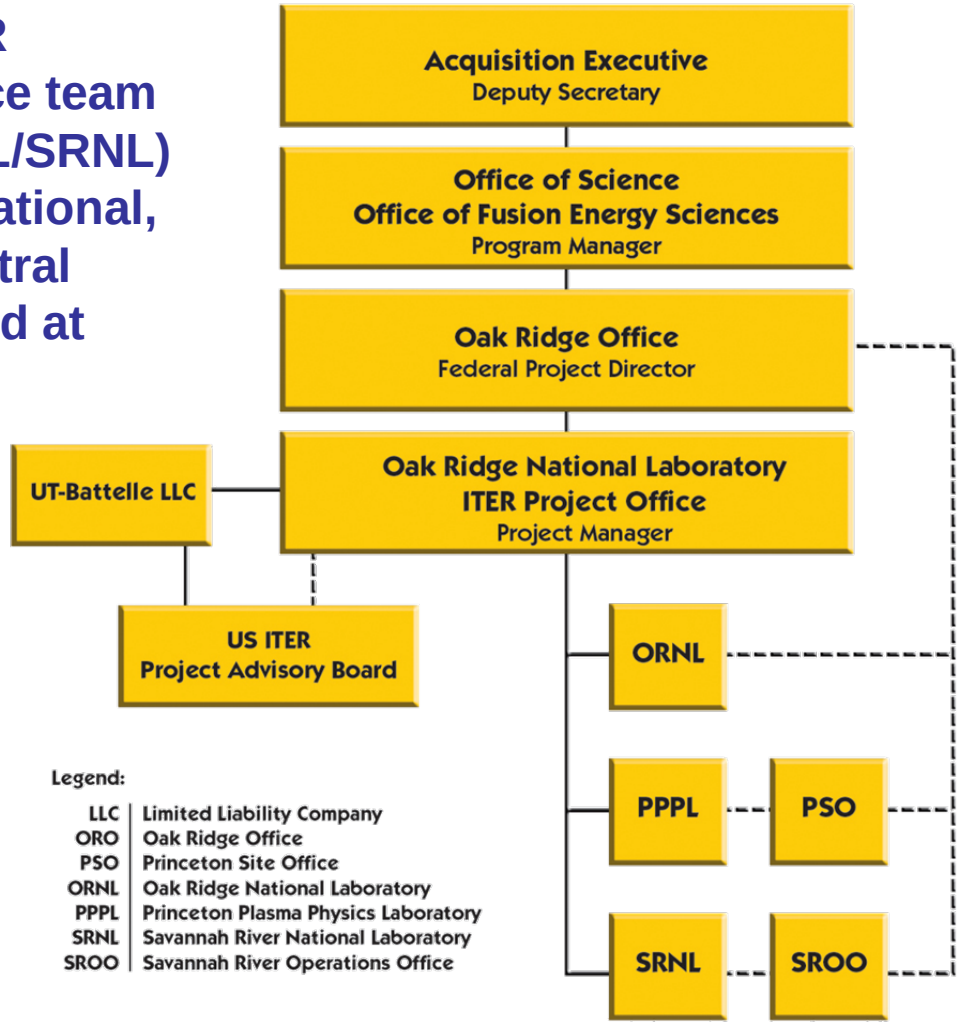
Work Breakdown Structure



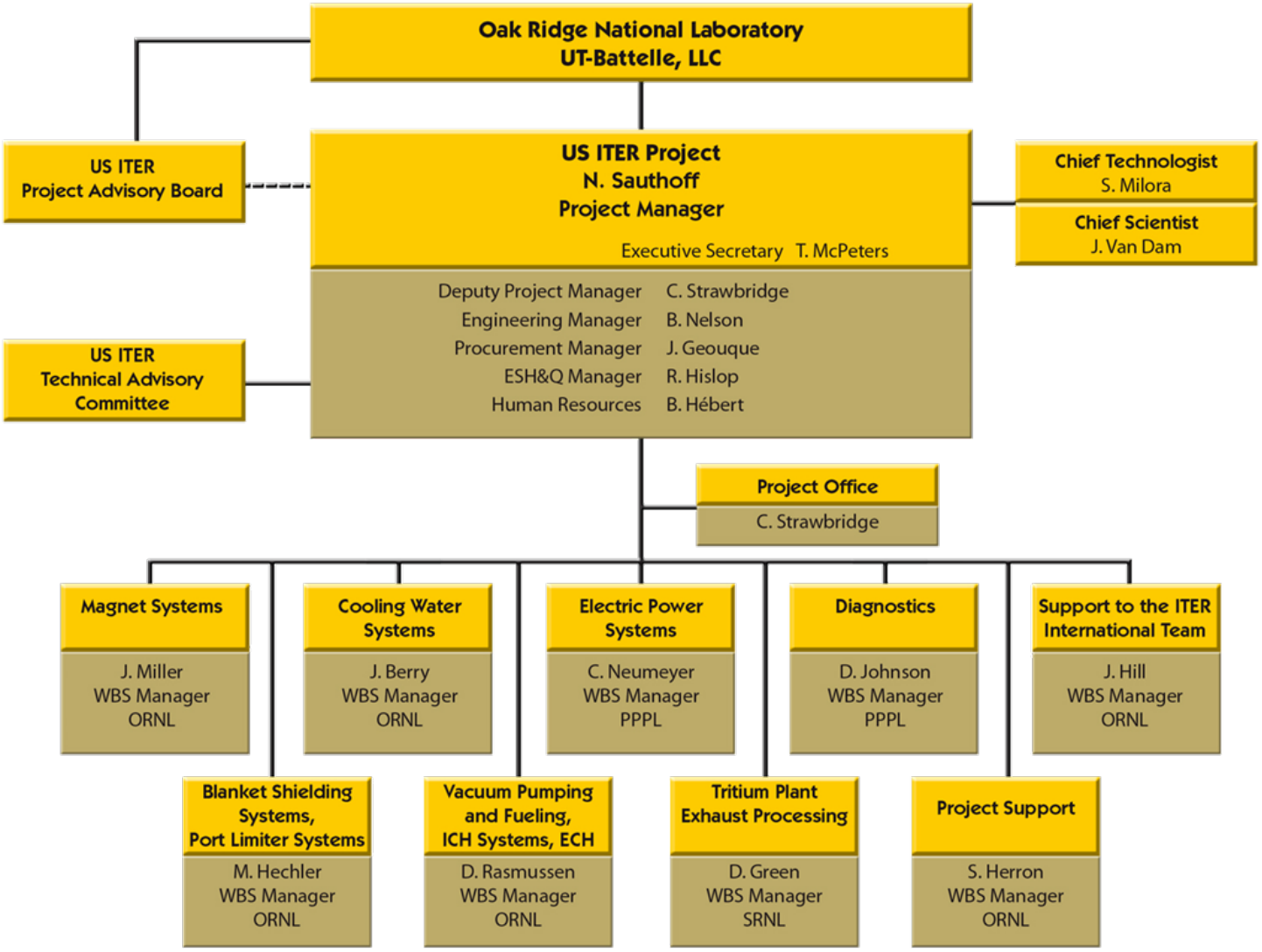
L-3 WBS Chart 06-13-06

US ITER Project Organization

The US ITER Project Office team (ORNL/PPPL/SRNL) is fully operational, with the central office located at Oak Ridge



USIPO Management Team



Ongoing US ITER Project Activities

- Emphasis is on assisting the IO with updating/ completing the overall ITER design and procurement specifications. USIPO is managing and funding the US participation in the eight Design Review Working Groups

- WBS Managers are working closely with the IO to finalize Procurement Arrangements for US hardware
  - Near-term focus is on the long-lead items: TF Magnet conductor materials, First Wall & Shield materials, Tokamak Cooling Water System piping

- Substantial R&D and design work in TF and CS Magnet Systems, First Wall, Tritium Plant, and Diagnostics

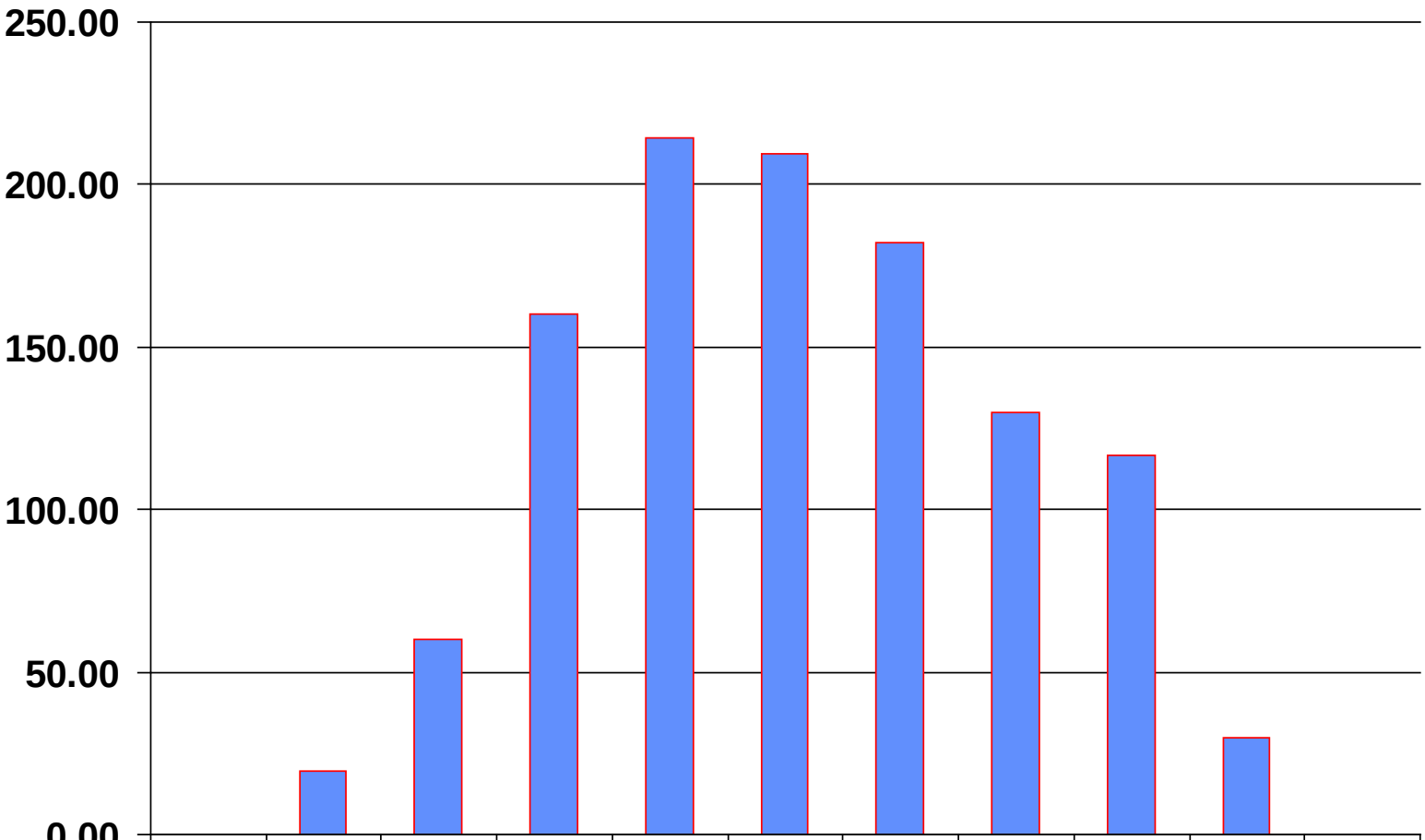
Ongoing US ITER Project Activities

- USIPO staff and selected US experts are also working closely with IO counterparts to help accelerate the build up of IO technical and Project Office capabilities
  - Tokamak Cooling Water System
  - Integrated Project Schedule
  - Design integration and change control
  - Risk assessments
  - Procurement

Management and Oversight

- Communication is key. Weekly teleconferences between USIPO/ORO and FES, plus quarterly meetings
- DOE/SC (Lehman) has conducted periodic status reviews, most recently in February and September 2006
  - Covers technical, cost, schedule, and management areas of the US ITER Project
  - Last review noted that, “the US ITER Project has made good organizational progress—a very competent and experienced team is on board.”
  - Next review planned for mid-October 2007
- Federal Project Director and Program Manager brief senior SC Management monthly (SC Project Watch List Meetings)

Preliminary US ITER Project Funding Profile for $1.122B TPC Cap



	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	
Budget request	00.0	23.91	00.06	00.061	05.412	23.902	69.181	00.031	09.611	00.03	

FY 2008 Budget Outlook

- **FY 2008 Budget Request:**
  - **Consistent with previous project Budget Authority profile ($160M) and cost cap ($1.122B).**
  - **Provides for long-lead procurement (TF conductor, First Wall/Shield, Tokamak Cooling Water piping) in addition to design/R&D.**
  - **Assumes CD-4 (Project Completion) by end of FY 2014**
  - **Both House and Senate marks support $160M**

Critical Decision Steps Toward a US ITER Project Baseline

- Preparations for CD-1 (Approve Alternative Selection & Cost Range):
  - Acquisition Strategy (including long-lead procurement authority)
  - Preliminary Project Execution Plan
  - Risk Management Plan
  - Preliminary Hazards Analysis
  - Approval target is August-September 2007

- Preparations for CD-2 (Approve Performance Baseline)
  - Timing depends on IO's completion of the Design Review and establishing a new ITER technical baseline with an Integrated Project Schedule. Now projecting CD-2 for late FY 2008.
  - Will formally establish the Total Project Cost and schedule for CD-4 (Project Completion)
  - Requires DOE External Independent Review to validate cost estimate

Summary

- The ITER Agreement is expected to enter into force in the next 2-3 months
- The ITER Organization and the seven Members are working hard at producing a new ITER baseline design and finalizing the near-term Procurement Arrangements
- The US is helping the IO build its project management and business systems infrastructure
- FY 2007-09 spans the transition to fabrication
  - Completion of R&D and prototyping
  - Completion of design work for most systems
  - Start of fabrication for long-lead items