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# **PIP-II Environment, Safety, Health & Quality Assurance Strategy**

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DOE Independent Project Review of PIP-II

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# Scope and Outline

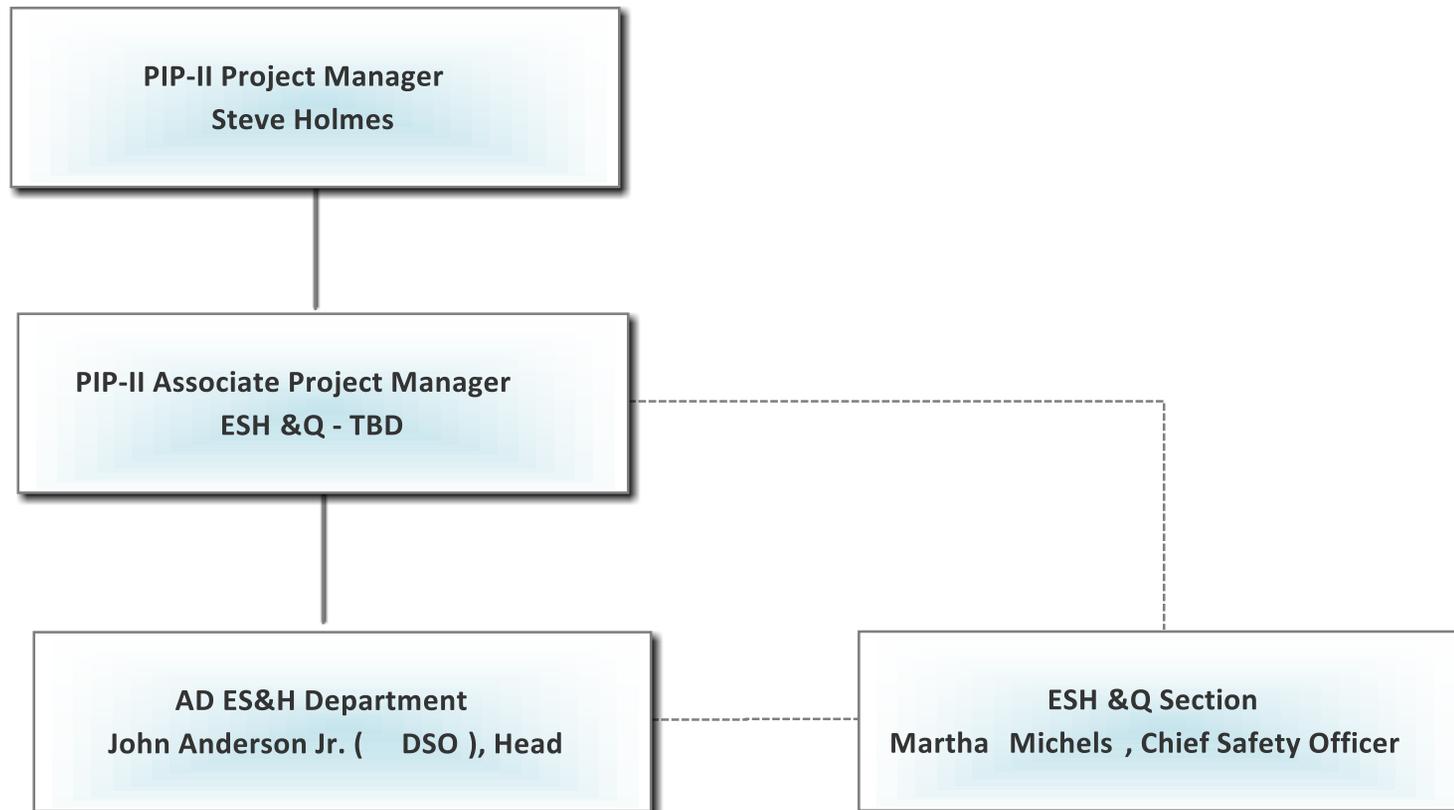
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- Scope
  - Identification and status of ESH&Q requirements for the R&D and PIP-II project phases
- Outline
  - ES&H Organization
  - Safety Regulations and Requirements
  - Three Safety Significant Project Phases
  - Requirements for Each Phase
  - Safety Aspects of International In-Kind Contributions
  - Summary

# PIP-II ESH&Q Organization

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## PIP-II Project ESH & Q Organization



# Safety Regulations and Requirements

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- Regulations
  - Safety and Health
    - Occupational Safety & Health Administration (OSHA)
      - 10 CFR 1910 General Industry Safety Requirements
      - 10 CFR 1926 Construction Safety Requirements
    - Worker Safety and Health Program 10 CFR 851
  - Radiation Safety
    - Occupational Radiation Protection 10 CFR 835
    - Safety of Accelerator Facilities DOE O 420.2C
      - DOE G 420.2-1A Implementation Guide
  - Fermilab Implementation
    - Fermilab Environment, Safety and Health Manual (FESHM)
    - Fermilab Radiological Control Manual (FRCM)
    - Provide an integrated approach to hazard controls

# Project Phases

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- Three safety significant phases
  - R&D
    - Dedicated R&D Area at CMTF
      - LEBT, RFQ, MEBT
        - Beam energy  $\leq 2.1$  MeV
      - HWR, SSR1, HEBT
        - Beam energy 10 – 25 MeV
  - PIP-II CD-0 to CD-4
    - PIP-II Design, Construction, Commissioning, and Operations
      - Beam energy 800 MeV
      - Integrates into existing accelerator complex
- Safety requirements escalate at each phase

# R&D Phase I

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- LEBT, RFQ, MEBT
  - Current Phase of R&D Efforts
  - Beam energy under neutron production threshold
    - Previous experience suggests no radiological concerns from operations
    - Confirmatory radiation surveys for each beamline modification
  - Operations covered under
    - 10CFR835, 10CFR1910, FESHM, and FRCM
  - Requirements
    - Hazard Analysis of proposed operations
    - Operational Readiness Clearance (ORC) Review
      - Subject Matter Experts review for compliance with FESHM & FRCM
      - Use this process for current R&D activities
    - Division Head Authorization for Commissioning and Operations

## R&D Phase II

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- HWR, SSR1, HEBT
  - Beam energy creates a radiological area
  - Operations covered under
    - 10CFR1910, DOE O 420.2C, FESHM, and FRCM
  - Requirements
    - PXIE enclosure meets an exemption in DOE O 420.2C
      - Room sized accelerator with one access point
      - Formal request to DOE Fermi Site Office (FSO) for concurrence
    - Hazard Analysis for proposed operations
    - Radiation Shielding Assessment
      - Preliminary Shielding Assessment already completed
    - Configuration management of interlock systems and radiation shielding
    - ORC Review
    - Division Head Authorization for Commissioning and Operations

## PIP-II Project

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- Construction project to build beam lines
- Beam energy creates a radiological area
- PIP-II linac integrates into the existing accelerator complex
- Construction, Installation, and Operations covered under
  - 10 CFR 1926, 10 CFR 1910, DOE O 420.2C, FESHM, and FRCM
- Requirements
  - CD-0
    - Develop ESH&Q Strategy
    - Unreviewed Safety Issue Determination (USID)
      - Already completed – ESH&Q DocDb # 2628 – Signed 1/3/2014

# PIP-II

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- CD-1
  - Preliminary Hazard Assessment Document
  - Implement an Integrated Safety Management Plan
  - Establish Quality Assurance Program
  
- CD-2
  - Update existing ESH&Q Documents
  - Preliminary Security Vulnerability Assessment
  
- CD-3
  - Update existing ESH&Q Documents
  - Construction Project Safety and Health Plan
  - Preliminary Radiation Shielding Assessment
    - FRCM requirement to validate shielding design before construction

# PIP-II

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- CD-4 -- Approve Start of Operations
  - Readiness for commissioning
    - Radiation Shielding Assessment
      - Approved by Chief Safety Officer
    - Safety Assessment Document
      - Approved by Director
      - Concurrence from DOE Fermi Site Office (FSO)
    - Accelerator Safety Envelope
      - Approved by Director and FSO Manager
    - Accelerator Readiness Review (ARR)
      - Readiness review by external SMEs
      - Are people, procedures, and equipment ready for commissioning
    - Closeout of ARR Pre-Start Findings
    - FSO Manager authorization to commence commissioning
    - Division Head authorization for commissioning

# PIP-II

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- CD-4 -- Approve Start of Operations
  - Transition to Operations Plan
    - Second Accelerator Readiness Review (ARR)
    - Closeout of ARR Pre-Start Findings
    - FSO Manager authorization to transition to operations
    - Division Head authorization for operations

## In-Kind Contributions

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- Items built internationally need to meet US codes and standards for use at Fermilab
  - Design
    - Codes and Standards
    - FESHM
    - Engineering Manual
  - Quality Assurance (QA) Requirements
    - Material certifications
    - Fabrication inspections
    - Post production testing requirements
  - Team Center Document Management System
    - Store requirements, engineering documents, applicable QA certifications, inspection results, and testing documents

# Summary

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- Fermilab has an established ESH&Q organization
  - PIP-II Project integrated with ESH&Q
- Established integrated safety management program
  - Dual certifications
    - OHSAS 18001 International Occupational Health and Safety Management Systems
    - ISO 14001 Environmental Management Systems
- ESH&Q Requirements and Regulations well understood

## Summary

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- Laboratory processes in place to manage each phase of the project
  - Contractor Assurance Program
  - Safety Configuration Management
  - Shielding Assessment Review Subcommittee
  - Safety Assessment Document Review Subcommittee
  - Operational Readiness Clearance Committee
  - Accelerator Readiness Review Process
- Plan in place for management of ESH&Q aspects of international in-kind contributions

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# Thank You