

Year	2000	2001	2002	2003	2004	2005	2006	2007
Production	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Reserves	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Investment	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Revenue	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Expenses	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Profit	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000



Homestake Proposal Overview & Management Functions

Kevin T. Lesko

Homestake DUSEL

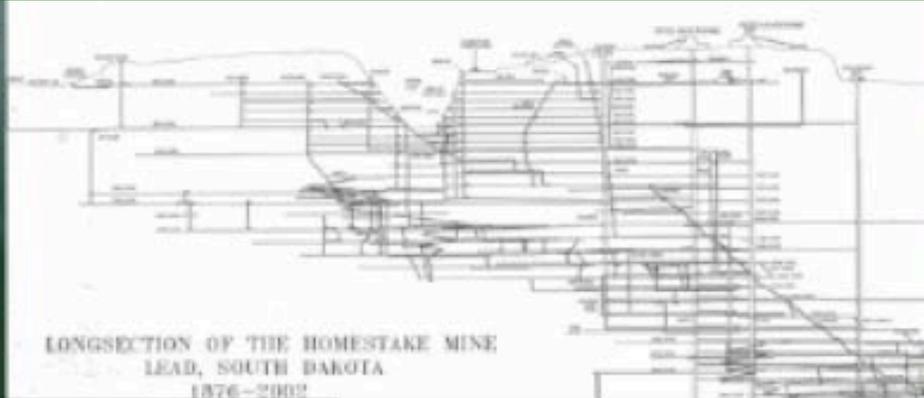
November 3, 2007



South Dakota
Science and Technology
Authority

Homestake Mining
Company

Administration Building
630 East Summit Street



Homestake Proposal Overview

LONGSECTION OF THE HOMESTAKE MINE

- **Well-Characterized Site**
 - Varied, Interesting, and Suitable Geology
 - Extensive Experience to > 8000 feet below ground
 - Available and Expandable for Decades of Research
- **Phased Approach to Developing the Facility**
 - Ability to host near-term R&D and Experimental Opportunities
 - Phased entry into the Initial Suite of Experiments
- **DUSEL Proposal Acquires and Builds on South Dakota's Investments in Developing an Interim Laboratory**
 - Infrastructure, Management, Personnel, & Scientific Programs
- **Success in Securing Independent Funding for Interim Lab**
 - Exceptional Local and Regional Support for DUSEL Goals
- **Dedicated Facility without Competition for Access, Resources, or Priorities**

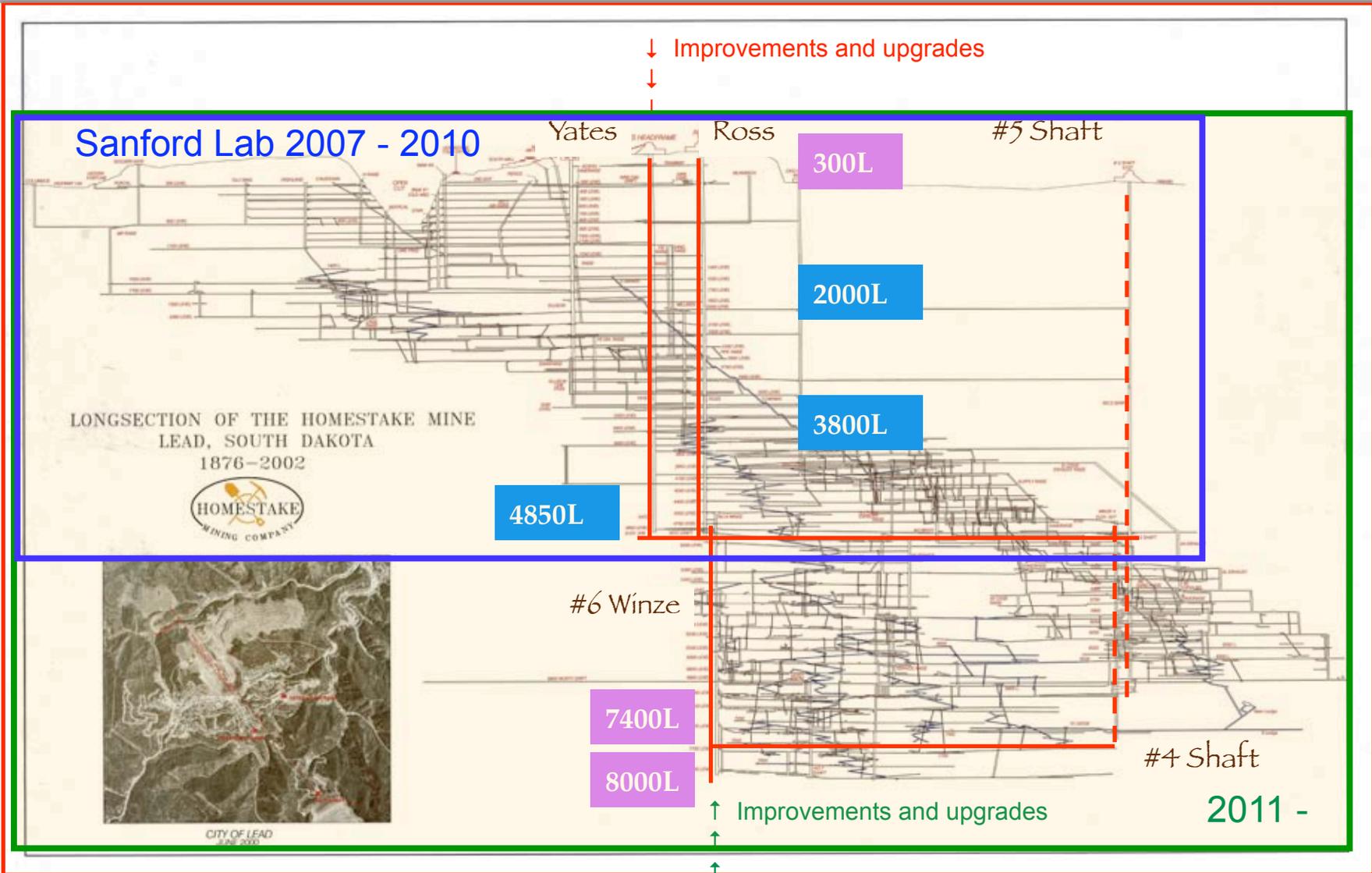
Homestake Proposal Overview

- Excellent Time-to-Science for Homestake
- Lowers Risks and Uncertainties:
 - Establishing and Developing the Facility
 - Operating the Facility
- Enhances a Rich and Advanced DUSEL Program
- Promotes Synergistic Interactions Among Disciplines
- Fosters Education and Public Outreach Programs
- Great Opportunities to Enhance the Regional Scientific, Technology and Education Positions

Homestake and Lead Aerial Photo

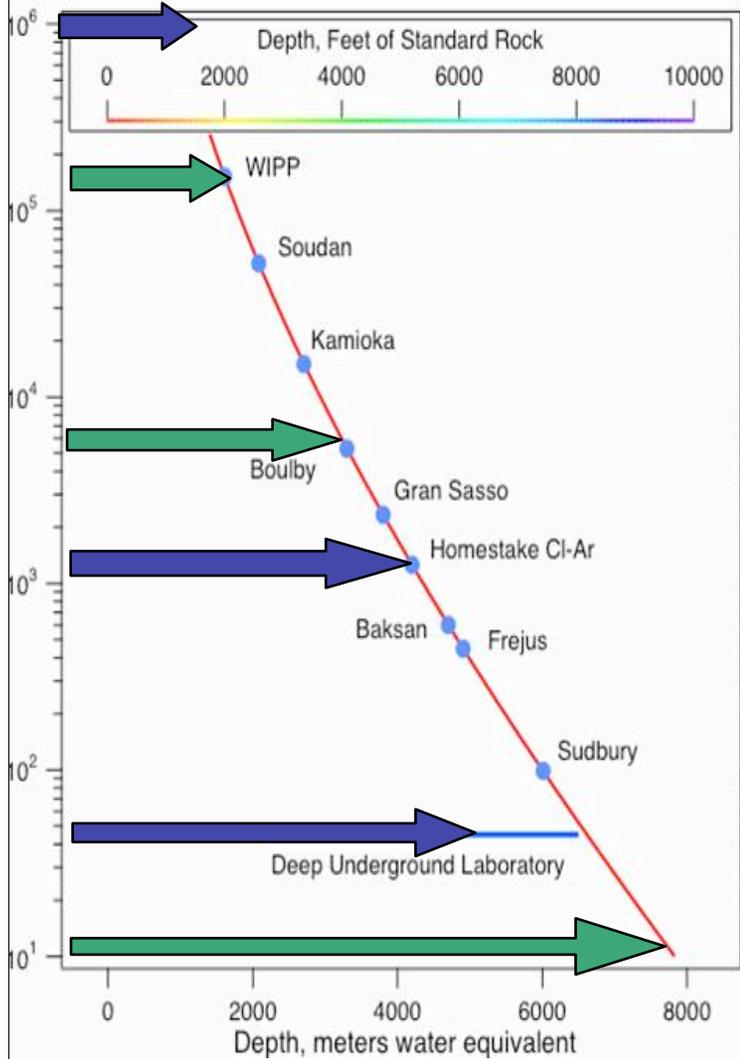


Phased approach to building DUSEL

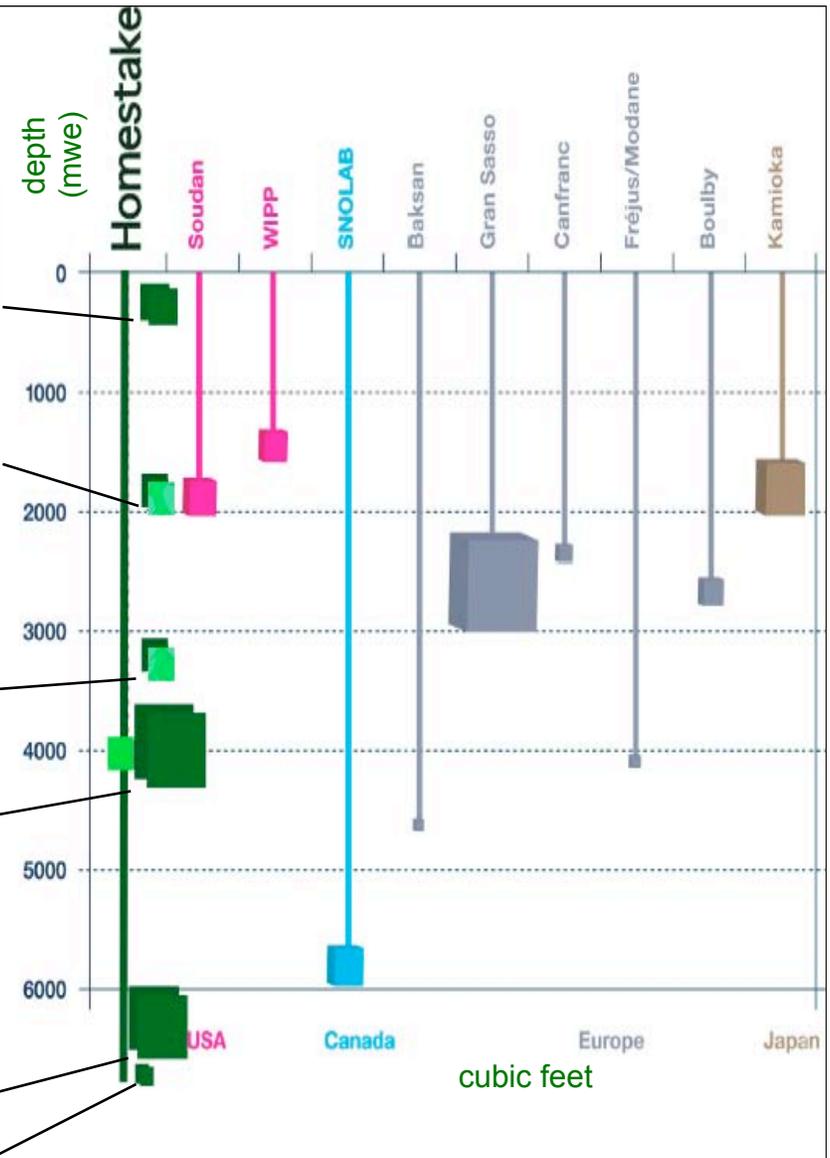


A dedicated science facility without competition or interference from mining, transportation, etc.

Campus Footprints



- 300L R&D, E&O 10k ft²
- 2000L Geo Level
- 3800L Geo Level
- 4850L Major Campus 100k ft²
- 7400L Major Campus 65k ft²
- 8000L Geo Lab



Estimates do not include MegaTon Detectors

DUSEL the Big Picture

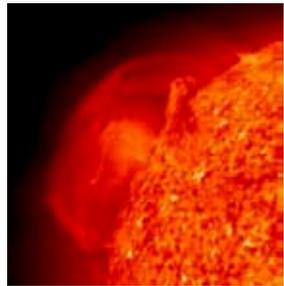
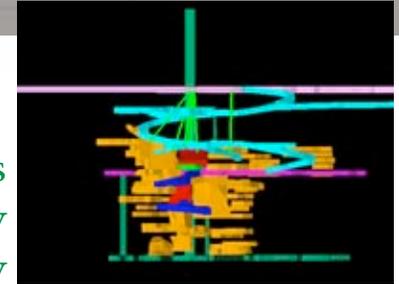


HOMESTAKE MINE

Dark Matter
Cosmology
Astrophysics
Neutron Oscillations

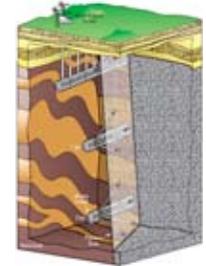
Education & Outreach

Geo-Database
Geo Modeling
Geophysics
Seismology
Fracture Study



Solar Neutrinos
Geoneutrinos
Underground
Accelerator for
Astrophysics
Gravity Waves

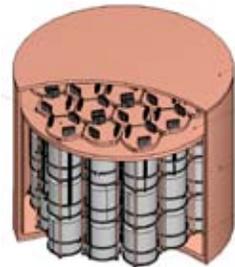
Cloud Formation
Lightning Physics
Thermal History



Coupled Processes
Rock Mechanics
Hydrology
Mineral Studies
Economic Geology

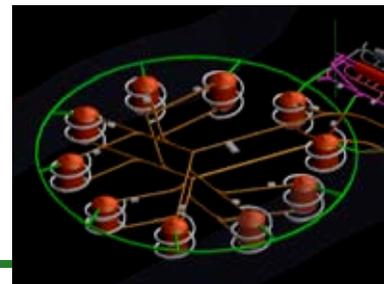
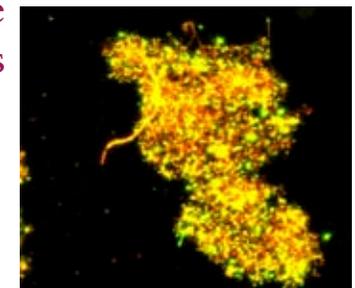


Geomicrobiology
Bioprospecting
Life at Extreme
Conditions



Neutrinoless Beta Decay
U/G Manufacturing
Low Background Counting

Geochemistry
Ecology
Environmental
Studies



Neutrino Properties
Long-baseline ν Oscillation
CP violation
MNSP Matrix
Nucleon Decay
Atmospheric Neutrinos

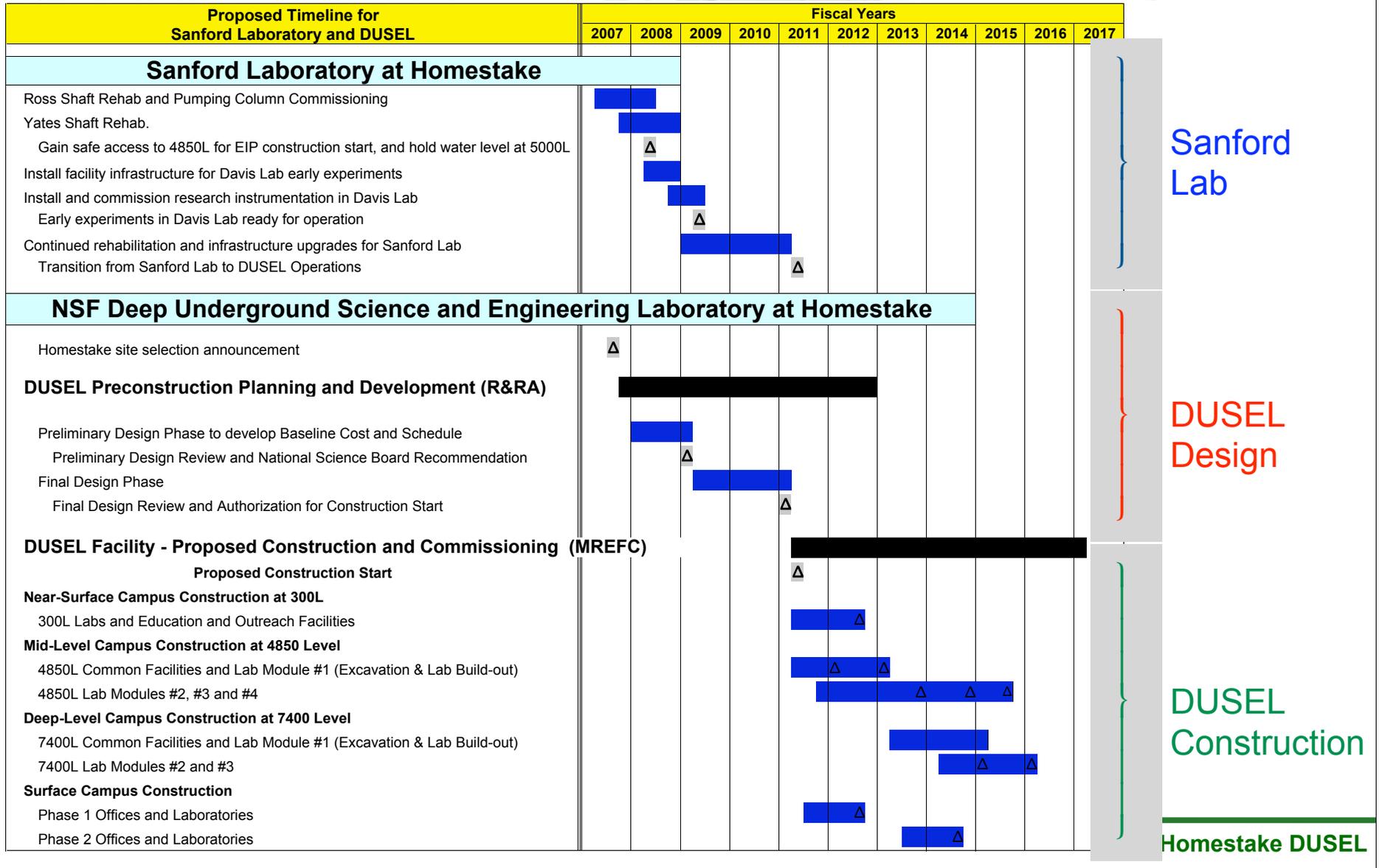
Underground
Engineering

Homeland Security

Homestake DUSEL

Summary Schedule

LONGSECTION OF THE HOMESTAKE MINE



Homestake Organization through the MREFC

Homestake DUSEL Operations: FY10 to FY15
(Concurrent with DUSEL Construction Project)

DUSEL Experimental Program Coordination Committee

National Science Foundation

Department of Energy
& Other Funding
Agencies for
Experiments

Cooperative Agreement

South Dakota
Science and
Technology Authority

Joint
Oversight

University of
California

Joint
Oversight

South Dakota
School of Mines and
Technology

User's Consortium
Executive Committee

International
Advisory Committee

Homestake DUSEL
Director

Lab Directorate

Program Advisory
Committee

Integrated Safety
Management
Oversight Committee

EH&S Director

Deputy Director for
Education and
Outreach

Deputy Director for
Research

Deputy Director for
Operations

Project Manager

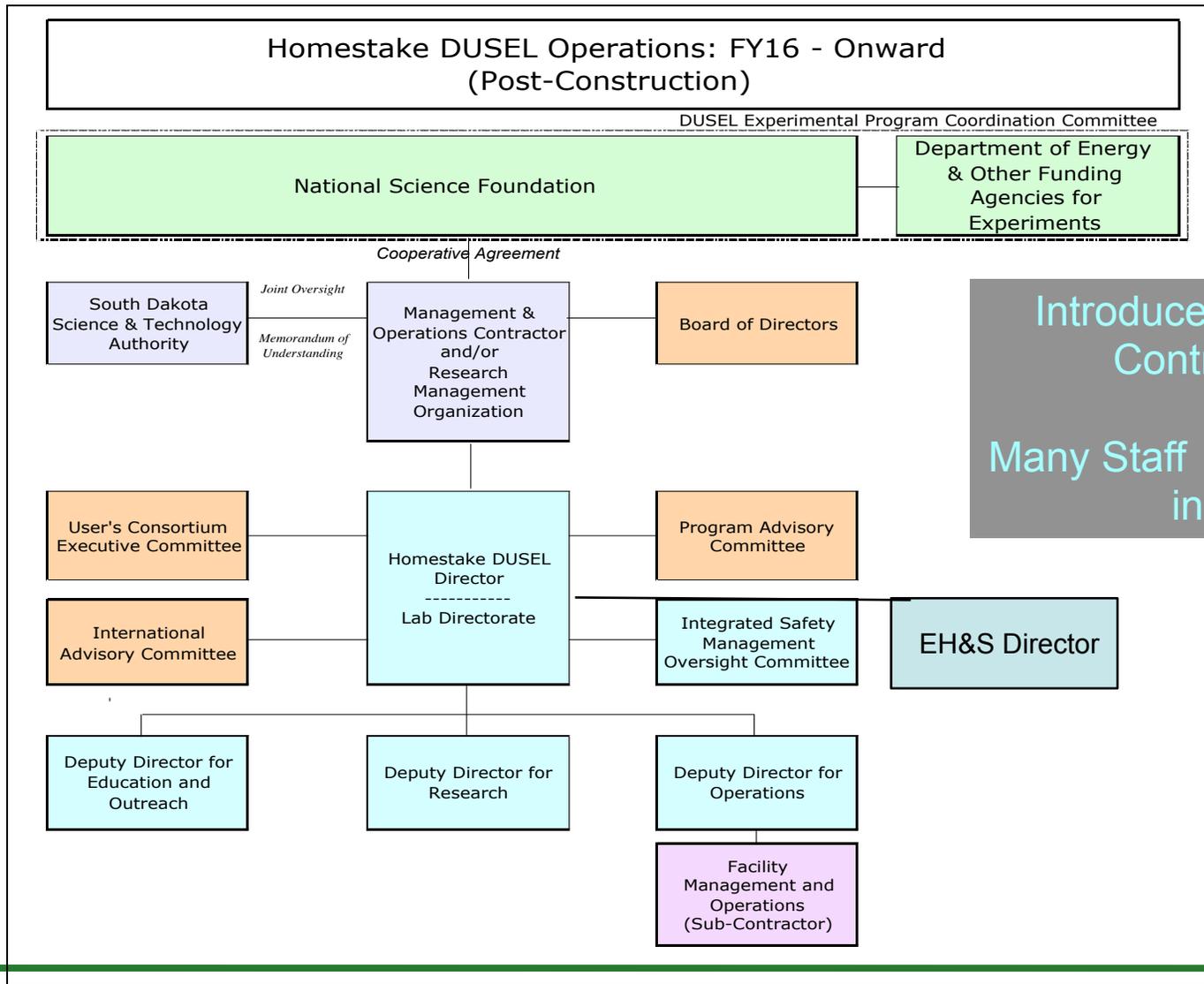
Facility
Management and
Operations
(Sub-Contractor)

Consolidate Organization to
Develop DUSEL

Many Trained Staff Transition
Directly into MREFC Efforts

Homestake DUSEL

Homestake Organization during DUSEL Operations



Introduce Laboratory M&O Contractor / Entity

Many Staff Positions Transition into DUSEL

Homestake Proposal Personnel

LONGSECTION OF THE HOMESTAKE MINE

DUSEL Project Team

Kevin T. Lesko, UC Berkeley
William Roggenthen, SDSM&T
Dave Snyder, SDSTA
Richard DiGennaro, LBNL
Liz Exter, LBNL
Dianna Jacobs, LBNL
Greg King, SDSTA
Tom Regan, SDSTA
Trudy Severson, SDSTA

Physics

Dark Matter

Andrew Hime, Los Alamos National Laboratory
Tom Shutt, Case Western Reserve

Geoneutrinos

Nikolai Tolich, UW

Long Baseline Neutrinos & Nucleon Decay

Milind Diwan, Brookhaven National Laboratory
Sasha Kopp, University of Texas, Austin
Ken Lande, University of Pennsylvania
Bill Louis, Los Alamos National Laboratory

Low Background Counting

Yuen-dat Chan, LBNL
Tina Keller, University of South Dakota
Bob McTaggart, South Dakota State University
Dongming Mei, University of South Dakota

Neutrinoless Double Beta Decay

Yuen-dat Chan, LBNL
Reyco Henning, University of North Carolina
Alan Poon, LBNL
Kai Vetter, UC Berkeley

Solar Neutrinos

Robert Lanou, Brown University
Bruce Vogelaar, Virginia Tech

Theory, Neutrinos

Hitoshi Murayama, UC Berkeley

Biology, Geoscience, and Geoengineering

Ecology, Environmental Sciences, Geomicrobiology

Sookie Bang, SDSM&T
Terry Hazen, LBNL
Tommy Phelps, ORNL

Economic Geology

Robert Bodnar, Virginia Tech
Colin Paterson, SDSM&T

Geochemistry, Heat Flow, Coupled Processes

C. Page Chamberlain, Stanford
Rick Colwell, Oregon State
Mark Conrad, LBNL
Eric Sonnenthal, LBNL

Hydrology, Rock Mechanics

Rohit Salve, LBNL
Herb Wang, University of Wisconsin
Joe Wang, LBNL

Sensors, Seismic Geophysics, Civil Engineering, Geotechnical Engineering

Steven Glaser, UC Berkeley
Lane Johnson, UC Berkeley
Chris Laughton, FNAL

Education and Outreach

Michael Barnett, LBNL
Willi Chinowsky, UC Berkeley
Stu Loken, LBNL
Dan Farrington, SDSTA
Ben Sayler, Black Hills State University

Administrative Assistance

Melissa Barclay, UC Berkeley
Laurie Gehner, SDSTA

Experience & Qualifications of the Project Team

- **Extensive Experience on Underground Research Projects, and Users' Facilities**

- Davis Chlorine Experiment - Homestake
- Sudbury Neutrino Observatory - SNO/SNOlab, Canada
- KamLAND - Mt. Ikenayama, Japan
- Borexino, XENON10 - Gran Sasso, Italy
- miniBooNE, MINOS, CDMS - FNAL
- Yucca Mountain - Nevada
- WIPP - New Mexico
- Stripa - Sweden
- Gold Mines, South Africa
- Continental Drilling
- EarthLab
- EarthScope
- Genomes To Life
- Incorporated Research Institutes for Seismology
- SECUREarth
- Advanced Light Source - LBNL
- Joint Genome Institute - LBNL



WBS High Level

Research Instrumentation and Experimental Equipment

WBS #	Work Breakdown Structure (WBS) for SDSTA Homestake Interim Laboratory (HIL) and NSF Deep Underground Science and Engineering Laboratory (DUSEL)
1	
1.1	Development Planning, Concepts and Project Support
1.1.1	Pre-Construction MREFC Planning & Development (Major Research Equipment and Facilities Construction)
1.1.2	Science and Engineering Research Programs Development
1.1.3	Project Support, Management, and Resources
1.1.4	Development Phases and Beneficial Occupancy
1.2	Facility and Research Laboratory Concepts and Requirements Definition, and Systems Engineering
1.2.1	Systems Engineering and Resources
1.2.2	Requirements Definition for Project and Facility Requirements, Constraints, for Interfaces for Concepts-Development & Options
1.2.3	System Baseline and Final Requirements Review and Approval
1.3	Integrated Systems Design: Homestake Infrastructure, Facilities and Laboratories (Scope Definition and Scope Options, Interfaces, and Work Packages for Preliminary and Detailed Design)
1.3.1	Surface Site Alterations and Upgrades - Surface Facilities, Infrastructure, and Buildings
1.3.2	300L Alterations and Upgrades
1.3.3	Infrastructure Rehabilitation for Re-Entry and Safe U/G Access
1.3.4	4850L Alterations and Upgrades
1.3.5	7400L Alterations and Upgrades
1.3.6	Subsystem Interfaces, Other Levels, Shafts, and Ramps, Development for Labs, Access, and Research Facilities, Health and Safety Systems, Monitors and Controls
1.4	Subsystems Design Packages: Homestake Site Infrastructure, Conversion and re-entry, Detailed Engineering for U/G Excavation, Surface Site Alterations and Upgrades (Phases 1 and 3)
1.4.1	Facilities and Site Infrastructure Engineering and Design: Management and Coordination
1.4.2	Surface Site Alterations and Upgrades - Surface Facilities, Infrastructure, and Buildings Design Packages and Specifications
1.4.3	300L Alterations and Upgrades: Design Packages for Excavation
1.4.4	Infrastructure Rehabilitation for Re-Entry and Safe U/G Access Design Packages and Specifications
1.4.5	4850L Alterations and Upgrades: Design Packages for Excavation
1.4.6	7400L Alterations and Upgrades: Design Packages for Excavation
1.4.7	Sanford Center for Science Education Design Package
1.5	Subsystems Design Packages: Research Equipment and Laboratories for Science and Engineering Programs - Mechanical, Structural, Electrical, Electronic, Data Acquisition and Communications Subsystems and Facility Interfaces (Phases 2 and 4)
1.5.1	Science and Engineering Programs: Engineering and Design Management and Coordination
1.5.2	Surface Laboratories, Facilities, and Research Equipment Design Packages
1.5.3	300L Laboratories and Research Support Facilities Design Packages
1.5.4	4850L Laboratories and Research Support Facilities Design Packages
1.5.5	7400L Laboratories and Research Support Facilities Design Packages
1.5.6	Other Levels and Ramps - Access, Laboratories and Research Support Facilities Design Packages

WBS #	Work Breakdown Structure (WBS) for SDSTA Homestake Interim Laboratory (HIL) and NSF Deep Underground Science and Engineering Laboratory (DUSEL)
1	
1.6	Construction, Installation, Integration and Test (Includes Facilities and Research Instrumentation)
1.6.1	Construction Management, Procurements, Permits, and Subcontracts Oversight and Coordination
1.6.2	Surface Site Alterations and Upgrades - Surface Facilities, Infrastructure, and Buildings
1.6.3	300L Alterations and Upgrades
1.6.4	Mining-to-Labs Conversion: Infrastructure Rehabilitation, Dewatering, and Upgrades for Re-Entry and Safe Access to Mid-Levels and Deep Levels
1.6.5	4850L Alterations and Upgrades
1.6.6	7400L Alterations and Upgrades
1.6.7	Other Levels and Ramps Development of Labs, Access, and Research Facilities
1.6.8	Research Instrumentation and Experimental Equipment
1.7	Inspection, Validation and Commissioning
1.7.1	Surface Site Alterations and Upgrades - Surface Facilities, Infrastructure, and Buildings
1.7.2	Mid-Levels Re-entry and Infrastructure Rehabilitation (Phase 1 Construction)
1.7.3	300L Alterations and Upgrades
1.7.4	4850L Alterations and Upgrades
1.7.5	Deep Levels Re-entry and Infrastructure Rehabilitation (DUSEL Phase 3 Construction)
1.7.6	7400L Alterations and Upgrades
1.7.7	Other Levels and Ramps Development of Labs, Access, and Research Facilities
1.8	Project Close-Out Activities and Documentation (Project Staff Function)
1.8.1	Surface Site Alterations and Upgrades - Surface Facilities, Infrastructure, and Buildings
1.8.2	Sanford Education and Visitors Center
1.8.3	Mid-Levels Re-entry and Infrastructure Rehabilitation (Phase 1 Construction)
1.8.4	300L Alterations and Upgrades
1.8.5	4850L Alterations and Upgrades
1.8.6	Deep Levels Re-entry and Infrastructure Rehabilitation (DUSEL Phase 3 Construction)
1.8.7	7400L Alterations and Upgrades
1.8.8	Other Levels and Ramps Development of Labs, Access, and Research Facilities
1.9	HIL and DUSEL Operations (FY07 to FY15)
1.9.1	Lab Directorate Staffing and Expenses
1.9.2	Science and Engineering Research Programs Staffing and Expenses
1.9.3	Education and Outreach, Training, and Research Partnerships Staffing and Expenses
1.9.4	Facility Operations and Site Services - Staff and Expenses
1.9.5	Site Operations: Allowance for Electrical Costs (excludes dewatering)
1.9.6	Site Operations: Allowance for Heating, Utilities, and City Services
1.9.7	Site Services: Outsourced Services, Equipment, Maintenance, and Subcontracts
1.9.8	Management fees and Institutional Burdens

Environment, Health & Safety

1. Environment, Health and Safety and Integrated Safety Management

1.1 Integrated Safety Management Plan

1.2 Environmental Laws, Regulations, and Best Practice

1.2.1 Regulatory Agencies and Jurisdiction

1.2.2 Permitting, Codes, Standards and Regulatory Compliance

1.2.3 Environmental Assessment and Environmental Impact Statement

1.2.4 Environmental Monitoring Program

1.3 Hazardous Material Management

1.4 Regional communication and public information

1.5 Emergency Management, Response and Communication

1.5.1 Fire Prevention, Containment, and Monitoring

1.5.2 Safeguards and Security

1.5.3 Regional resources and cooperative agreements

(continued)

Environment, Health & Safety

1. Environment, Health and Safety and Integrated Safety Management (cont.)

1.6 Safety Training Programs and Oversight

1.6.1 Staff/Employees

1.6.2 Experimenters, Students, Visitors, and Guests

1.6.3 Contractors, consultants, services

1.7 Safety Review Process, Inspection, Surveillance and Oversight

1.7.1 Construction

1.7.2 Experiments

1.7.3 Maintenance and Operations

1.8 Recycling and Waste Disposal Plans

1.9 Energy Conservation Performance and Energy Management

1.10 Facility Life Cycle Plan, De-integration and Disposal (D&D)

1.10.1 Laboratory Closure Plan

Project Execution Plan

2. Project Execution Plan

2.1 Research Objectives Summary

2.2 Preliminary Baseline Performance Key Parameters

2.3 Project Governance and Management Organizational Plan

2.3.1 Sub-awards and Organizational Responsibilities

2.4 Work Breakdown Structure (WBS)

2.4.1 WBS for MREFC Construction Project

2.4.2 WBS for Operations

2.4.3 WBS Dictionary

2.5 Project Resource-Loaded Schedule

2.5.1 Preconstruction Planning and Development

2.5.2 MREFC Construction

(Continued)

Project Execution Plan

2. Project Execution Plan (continued)

2.6 Project R&D Plan

- 2.6.1 Preliminary Site Investigation: Coring and Geotechnical Analyses
- 2.6.2 Excavation methods and technologies
- 2.6.3 Feasibility studies for Large-span Cavities
- 2.6.4 Site-specific Safety Standards and Guidelines
- 2.6.5 Underground systems and controls for hazardous materials
- 2.6.6 Underground Communications, Cyberinfrastructure, IT, and monitoring systems
- 2.6.7 Large-scale Reduced-radon Air Supply
- 2.6.8 Large-scale underground clean rooms
- 2.6.9 Large-scale purified water systems

2.7 Internal and Institutional Project Oversight and Design Review Plan

2.8 Acquisition Plan and Project Delivery Methods

(Continued)

Project Execution Plan

2. Project Execution Plan (continued)

2.9 Systems Engineering Plan

- 2.9.1 Requirements Management
- 2.9.2 Continuous Risk Management
- 2.9.3 Configuration Management
- 2.9.4 Quality Assurance and Quality Control
- 2.9.5 Value Management
- 2.9.6 Interface Control
- 2.9.7 Systems Integration, Testing, and Validation
- 2.9.8 Information, Communication and Document Management

2.10 Project Management Control System

- 2.10.1 Baseline Cost and Schedule Performance Parameters
- 2.10.2 Resource-loaded Project Schedule
- 2.10.3 Preliminary Risk Analysis and Risk Mitigation
- 2.10.4 Preliminary Cost Estimate and Contingency Analysis
- 2.10.5 Partnerships and Partnership Funding
- 2.10.6 Project Controls and Earned Value Management
- 2.10.7 Technical and Financial Oversight, Reporting, and Reviews
- 2.10.8 Change Control and Contingency Management
- 2.10.9 Project Staffing and Hiring Plan

Project Execution Plan

3. Summary: Technical Feasibility and Constructability

4. Transition to Operations

- 4.1 Operational Readiness Criteria
- 4.2 Commissioning
- 4.3 Conduct of Operations Plan
- 4.4 Operations Management Plan
- 4.5 Maintenance and Operations Plan

Operations: Sanford Lab

Operations Staff for Sanford Lab: estimated at ~ 30 to 40

South Dakota Science and Technology Authority Staffing Plan for Homestake Interim Lab Operations and Re-Entry	Year 1	Year 2	Year 3
Laboratory Directorate			
Laboratory Director	1.0	1.0	1.0
General Counsel, Permitting, Contracts	1.0	1.0	1.0
Risk Management, Insurance Procurement and Compliance	1.0	1.0	1.0
Manager - University Liaison and Industrial Research Partnerships	0.5	0.5	0.5
Communications, Regional Liaison, Public Relations	1.0	1.0	1.0
Chief Financial Officer	1.0	1.0	1.0
Human Resources, Benefits, Payroll	1.0	1.0	1.0
Director - Environment, Health, and Safety	1.0	1.0	1.0
Operations Safety Officer: Personnel Safety Programs, Inspection, and Safety Training	0.5	0.5	0.5
Emergency Response, Security, Fire Protection, and Mine Rescue Team Leader/Subcontract Manager	0.5	0.5	0.5
Industrial Hygiene, Environmental, and EH&S Subject-Matter Experts	1.0	1.0	1.0
Shipping, Receiving, Storage, Recycle & Waste Management	1.0	1.0	1.0
IT Support, Networks, Communications, Cyberinfrastructure	1.0	1.0	1.0
Operations Staff, User Liaison, Board of Dir. Liaison, and Administrative Support	7.0	7.0	7.0
SDSTA Lab Directorate Staff Subtotal	18.50	18.50	18.50
Facility Operations and Site Services Staff			
Deputy Director for Operations	1.0	1.0	1.0
Operations - Administrative Support Staff	1.0	1.0	1.0
Chief Technician for Operations, Maintenance, and Site Services	1.0	1.0	1.0
Site Services - Shift Supervisor	1.0	1.0	1.0
Site Maintenance - Electricians	1.0	1.0	1.0
Site Maintenance - Mechanical Technicians	1.0	1.0	1.0
Site Maintenance - Underground Infrastructure Maintenance Technicians (4 miners per crew)	0.0	0.0	0.0
Site Services - Hoist Operators and Drivers for Surface & U/G Transport	0.0	0.0	0.0
Site Services Staff - Coordinator for Utilities, Janitorial, and outsourced services	1.0	1.0	1.0
User Support Staff and Services	0.0	1.0	2.0
SDSTA HIL Operations Staff Subtotal	7.0	8.0	9.0
Mining-to-Labs Conversion, Re-Entry Construction Management (WBS 1.6)			
HIL Project Manager	1.0	1.0	1.0
Property Development Manager: Lead Engineer for Mining-to-Labs Re-entry, and Construction	1.0	1.0	1.0
Project Engineer for Surface Facilities - Alterations and Upgrades	0.5	0.5	0.5
Project Engineer for Underground Excavation	0.5	0.5	0.5
Consulting Electrical Engineer	0.5	0.5	0.5
Consulting Mechanical Engineer (Mine Ventilation/HVAC)	0.5	0.5	0.5
Construction Projects Administrative Support	3.0	4.0	5.0
SDSTA Construction Management Staff Subtotal	7.0	8.0	9.0
Sanford Center for Science Education Construction Management (WBS 1.6)			
Project Manager & Project Engineer for Sanford Center for Science Education, and Surface Construction	0.0	1.0	1.0
SDSTA Construction Management Staff Subtotal	0.0	1.0	1.0
Homestake Interim Lab Operations Staff Subtotal	32.5	35.5	37.5

DUSEL Planning

LONGSECTION OF THE HOMESTAKE MINE

Staff for DUSEL Planning:
estimated at ~ 10 to 20

Staffing Plan - DUSEL Pre-Construction Planning and Development (NSF - R&RA)	Year 1 FTE	Year 2 FTE	Year 3 FTE
WBS 1.1.2 Science and Engineering Research Programs Development			
DUSEL Principal Investigator for Pre-Construction Planning and Development (Physics)	1	1	1
DUSEL Pre-Construction Planning - Co-PI (Geosciences) (SD)	0.5	0.5	0.5
DUSEL Pre-Construction Planning - Senior Personnel (Engineering Sciences and Applications)	0.25	0.25	0.25
DUSEL Pre-Construction Planning - Senior Personnel (Education and Outreach) (SD)	0.1	0.1	0.1
Post Doc Scientist/Engineer	1	1	1
Research Programs Development and Administrative Support and User Services	0.5	0.5	0.5
Science and Engineering Research Programs Staff	3.35	3.35	3.4
BUDGET for DUSEL Research Programs Development: Workshops, Seminars, Consultants, Travel, and other costs (UC/LBNL)			
BUDGET for DUSEL Research Programs Development: Workshops, Seminars, Consultants, Travel, and other costs (SD)			
Science and Engineering Research Programs Expenses	0	0	0
Research Programs Development Subtotal	3.35	3.35	3.35
WBS 1.1.3 Project Management and Support Staff			
Project Manager (UC/LBNL)	1	1	1
Deputy Project Manager for Research Instrumentation and Laboratories (LBNL)		1	1
Project Controls (UC/LBNL)	0.5	0.5	0.5
Project Administrative support (UC/LBNL)	0.5	0.5	0.5
UCB/LBNL Project Management Staff Subtotal	2	3	3
SUSEL Laboratory Director (SD)	0.25	0.25	0.25
Deputy Project Manager for Facility Development (SD)	0.5	1	1
Project Business Office & Project Controls @ Homestake - Procurements & Subcontracts, HR (SD)	0.25	1	1
Project Administrative support @ Homestake (SD)	0.5	0.5	0.5
SDSTA Project Management Staff Subtotal	1.5	2.75	2.75
Project Management Subtotal	3.5	5.75	5.75
WBS 1.2 Systems Engineering Staff			
Systems Engineer (UC/LBNL) (and Chief Engr. WBS 1.5)	0	0	1.0
Chief Architect	0.75	1.0	1.0
Safety Officer for Experiments, Laboratories and Research Instrumentation (UC/LBNL)	0.25	0.25	0.25
UCB/LBNL Systems Engineering Project Staff Subtotal	1	1.25	2.25
Project Safety Officer and Quality Assurance (SD)	0.25	0.25	0.25
U/G Labs Facilities and Infrastructure Project Staff Subtotal	0.25	0.25	0.25
Systems Engineering Subtotal	1.25	1.5	2.5
WBS 1.4: Facilities and Infrastructure Engineering Staff			
Project Engineer/Architect for Surface Infrastructure and Facilities Rehab & Construction (SD)	0.5	1	1
Project Engineer for Underground Facility and Laboratories Infrastructure (SD)	0.5	1	1
Project Engineer for Underground Excavation and Geotechnical Studies (SD)	0	1	1
Facilities and Infrastructure Subtotal	1	3	3
WBS 1.5: Laboratories and Research Instrumentation Engineering Staff			
Chief Engineer for Research Instrumentation (UC/LBNL) (and Sys. Engr. WBS 1.2)	0.75	1	1
Mechanical Engineer for Research Instrumentation (UC/LBNL)	0.75	0.75	0.75
Electrical/Electronics Engineer for Research Instrumentation (UC/LBNL)		0.2	0.2
Electrical/Electronics Coordinator for Research Instrumentation (UC/LBNL)		0.2	0.2
Laboratories and Research Instrumentation Subtotal	1.5	2.15	2.15
Pre-construction Staff and Expenses SUBTOTAL	10.6	15.8	16.8

Homestake DUSEL

DUSEL Operations

LONGSECTION OF THE HONESTAKE MINE

Staff for DUSEL Operations:
estimated at ~ 70 to 140

DUSEL Staffing Plan and Operating Costs (NSF - R&RA) Concurrent with on-going construction project FY10-FY15	FY10 Q3,Q4	FY11	FY12	FY13	FY14	FY15
FTE						
DUSEL Laboratory Directorate						
Laboratory Director	0.5	1.0	1.0	1.0	1.0	1.0
Deputy Director for Science and Technology	0.5	1.0	1.0	1.0	1.0	1.0
Directorate Administrative Office and Administrative Support	1.5	2.0	3.0	4.0	5.0	6.0
Staff Subtotal	2.5	4.0	5.0	6.0	7.0	8.0
Staff Expenses (25%)						
Director's Strategic Funds for DUSEL Research Program Development						
DUSEL Science and Engineering Research Programs						
Associate Lab Director - Physics	0.5	1.0	1.0	1.0	1.0	1.0
Associate Lab Director - Geosciences	0.5	1.0	1.0	1.0	1.0	1.0
Associate Lab Director - Engineering Sciences and Applications	0.5	1.0	1.0	1.0	1.0	1.0
Coordinator/Liaison - User Support Services	0.5	1.0	1.0	1.0	1.0	2.0
Lab Technicians and Lab Coordinators for surface & u/g labs	0.5	1.0	2.0	4.0	4.0	6.0
Associate Scientist/Engineer	1.0	2.0	4.0	6.0	6.0	6.0
Post Doc Scientist/Engineer	1.5	4.0	4.0	6.0	6.0	6.0
Graduate Students	-	4.0	4.0	6.0	6.0	6.0
Undergraduate Students	-	3.0	4.0	6.0	6.0	6.0
Science and Engineering Research Programs Administrative Support	1.0	2.0	2.0	3.0	3.0	3.0
Staff Subtotal	6.0	20.0	24.0	35.0	35.0	38.0
Staff Expenses (25%)						
Education & Outreach, Training, and Research Partnerships						
Director - Education, Training, and Research Partnerships	0.5	1.0	1.0	1.0	1.0	1.0
Manager - Education & Outreach Programs, Training	0.5	1.0	1.0	1.0	1.0	1.0
Manager - University and Industrial Research Partnerships	0.25	0.5	0.5	0.5	1.0	1.0
Manager - Regional Communications, Public Relations Liaison, Visitors Center	-	0.5	0.5	0.5	1.0	2.0
Visitors Center Support, Tour Guides, Docents	-	1.0	2.0	2.0	2.0	2.0
Education and Outreach Administrative Support	0.5	1.0	2.0	3.0	4.0	4.0
Staff Subtotal	1.75	5.0	7.0	8.0	10.0	11.0
Staff Expenses (25%)						
Facility Operations, User Support, and Site Services Staff						
Deputy Director for Operations	0.5	1.0	1.0	1.0	1.0	1.0
Director - Environment, Health, Safety and Quality, Operations Safety Officer	0.25	1.0	1.0	1.0	1.0	1.0
Personnel Safety Programs, Inspection, and Safety Training	0.25	0.5	1.5	1.5	2.0	2.0
Environmental Protection Programs, Training, Monitoring	0.25	0.5	1.0	1.0	1.0	1.0
Industrial Hygiene and EH&S Subject-Matter Experts	0.5	2.0	3.0	3.0	4.0	6.0
Emergency Response, Fire Protection, and Mine Rescue Team Leader	0.5	1.0	1.0	1.0	2.0	2.0
Chief Financial Officer	0.5	1.0	1.0	1.0	1.0	1.0
Head - Business Operations, Payroll, Benefits	0.5	1.0	1.0	1.0	1.0	1.0
Procurements and Subcontracts	0.5	2.0	2.0	2.0	3.0	3.0
General Counsel, Environmental Compliance, Permitting	0.125	0.25	0.25	0.25	0.25	0.25
Manager - Human Resources	0.5	1.0	1.0	1.0	1.0	1.0
Manager - User Support, Facility Development and Site Services	0.5	1.0	1.0	1.0	1.0	1.0
Chief Engineer - Underground Infrastructure, Site Maintenance and Operations	-	-	-	0.5	1.0	1.0
Site Maintenance - Electricians	1.0	3.0	3.0	3.0	3.0	3.0
Site Maintenance - Mechanical Technicians	1.0	2.0	2.0	2.0	2.0	2.0
Site Maintenance - Underground Infrastructure Maintenance Technicians (miners) (4 miners per crew)	4.0	8.0	8.0	8.0	8.0	8.0
Site Services - U/G Shift Supervisor	1.0	2.0	3.0	3.0	3.0	3.0
Site Services - Hoist Operators and Drivers for Surface & U/G Transport	3.0	6.0	10.0	10.0	10.0	10.0
Chief Engineer - Surface Site Services, Maintenance and Operations	0.5	1.0	1.0	1.0	1.0	1.0
Site Security Coordinator	0.5	1.0	1.0	1.0	1.0	1.0
Site Services Coordinator - Utilities, Recycle/Waste Management, Janitorial	0.5	1.0	1.0	1.0	1.0	1.0
Site Services - Shipping, Receiving, Storage	0.5	1.0	1.0	1.0	1.0	1.0
Site Services - Machine/Weld Shop - Mech Tech	1.0	2.0	2.0	2.0	2.0	2.0
Site Services - Electronics Shop	1.0	2.0	2.0	2.0	2.0	2.0
Site Services - Carpenter/Paint Shop	0.5	1.0	1.0	2.0	2.0	2.0
Site Services - Assembly Shop, Instrument Operators	1.0	2.0	2.0	3.0	3.0	3.0
Site Services - IT Support, Networks, Communications, Cyberinfrastructure	0.25	1.0	2.0	2.0	3.0	3.0
Project Manager and Systems Engineer for Small Projects and User Support	-	-	-	0.5	1.0	1.0
Staff Architect	-	-	-	0.5	0.5	0.5
Staff Mechanical Engineer for Mine Ventilation, HVAC and Facilities	-	-	-	0.5	0.5	1.0
Staff Mechanical Engineer for User Instrumentation and Research Equipment	-	-	-	-	1.0	1.0
Staff Electrical Engineer	-	-	-	0.5	0.5	1.0
Staff Electrical Coordinator	-	-	1.0	1.0	1.0	2.0
Staff Cyberinfrastructure Engineer	0.25	0.5	0.5	1.0	1.0	1.0
Small Projects Technical Support	-	-	-	-	-	1.0
Small Projects Administrator	-	-	-	-	1.0	2.0
Operations Staff and Administrative Support	1.0	3.0	4.0	5.0	6.0	6.0
Staff Subtotal	21.88	48.75	59.3	65.3	73.75	79.75
Staff Expenses (25%)						
DUSEL Operations Staff Total	32.13	77.75	95.25	114.25	125.75	136.75

Staffing Summary

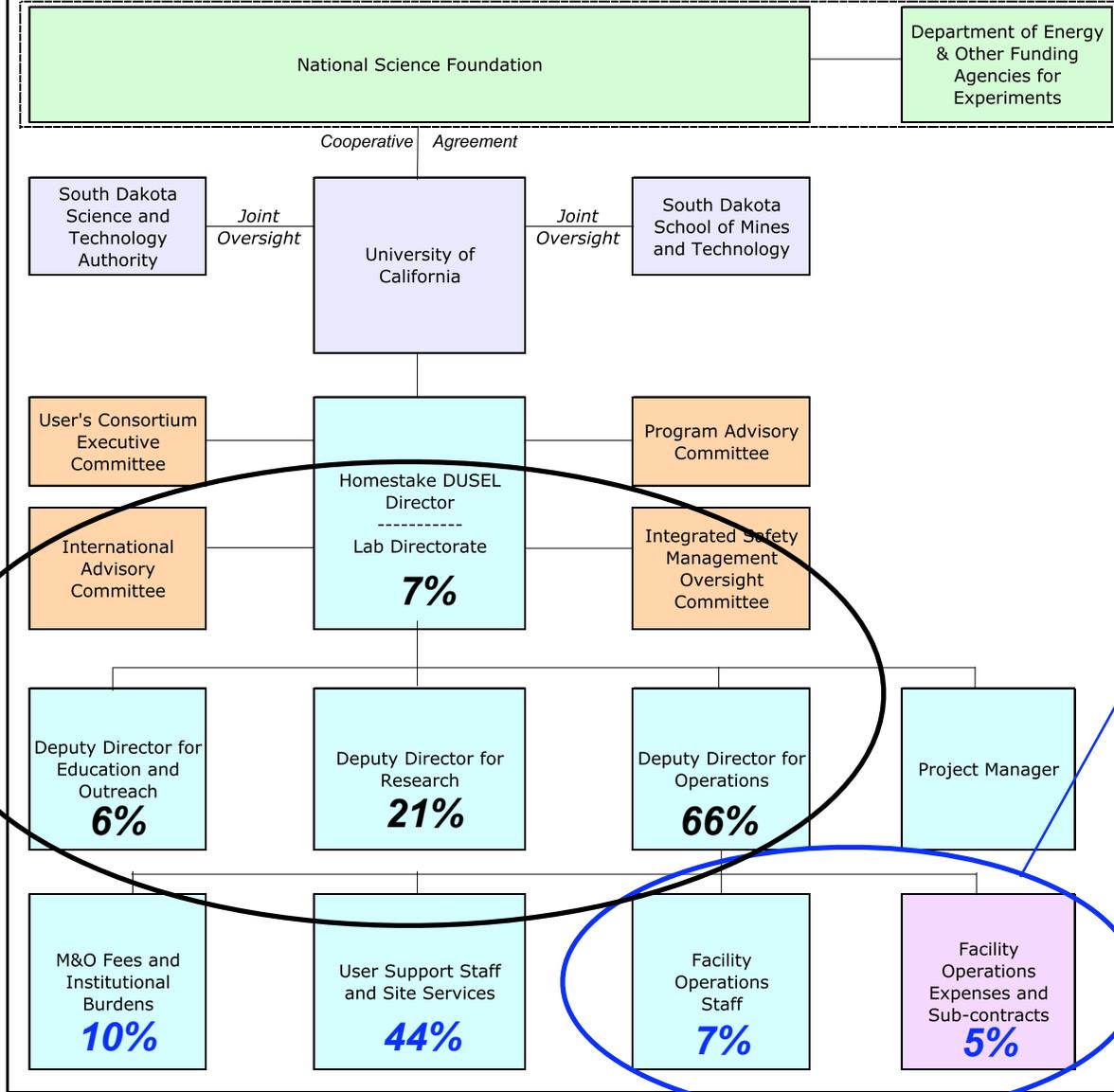
LONGSECTION OF THE HOMESTAKE MINE

	Year 1 (2008) FTE	Year 2 (2009) FTE	Year 3 (2010) FTE	Year 4 (2011) FTE	Year 5 (2012) FTE	Year 6 (2013) FTE	Year 7 (2014) FTE	Year 8 (2015) FTE	Year 9 (2016) FTE	Year 10 (2017) FTE
Sanford Laboratory	32	35	37							
DUSEL Facility Planning	11	16	17							
DUSEL Facility Construction				100	118	136	150	160	162	
DUSEL Facility Operations										140

Plus contracted services and functions

Homestake DUSEL Operations: FY10 to FY15
(Concurrent with DUSEL Construction Project)

DUSEL Experimental Program Coordination Committee



Proposed DUSEL Annual Operating Budget Distribution in FY15 among four directorates

Proposed Annual Budget: ~ \$25M (FY07\$)

Estimated 12% of the DUSEL Operating Budget is allocated for Facility Costs due to the absence of shared resources with production mining.

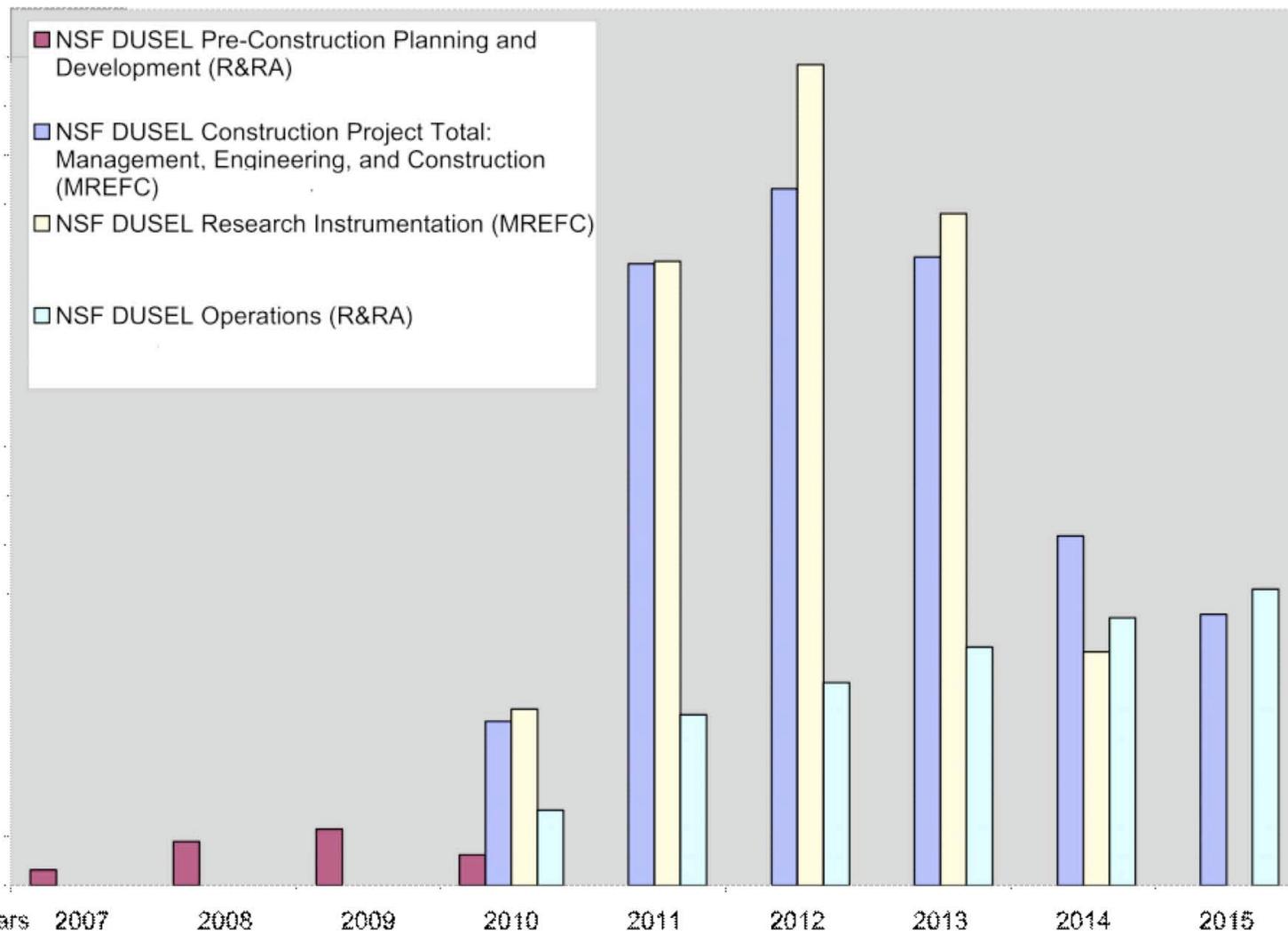
This is a relatively small premium for the advantages of a dedicated site for DUSEL.

~\$2.5M - \$3M (FY07\$)

Assumed Funding Profiles

Estimated Cost
\$K

NSF Funding Profile: Pre-Construction Planning and DUSEL Project
(incl. 3% annual escalation, with contingency, then-year-\$)



Assumed Funding Profiles

Estimated Cost
\$K

Sub-Projects Cost Profile (excluding Experimental Research Equipment) (incl. 3% annual escalation, with Contingency)

□ Project Management and DUSEL Systems Engineering

■ (1) Surface Building and Infrastructure

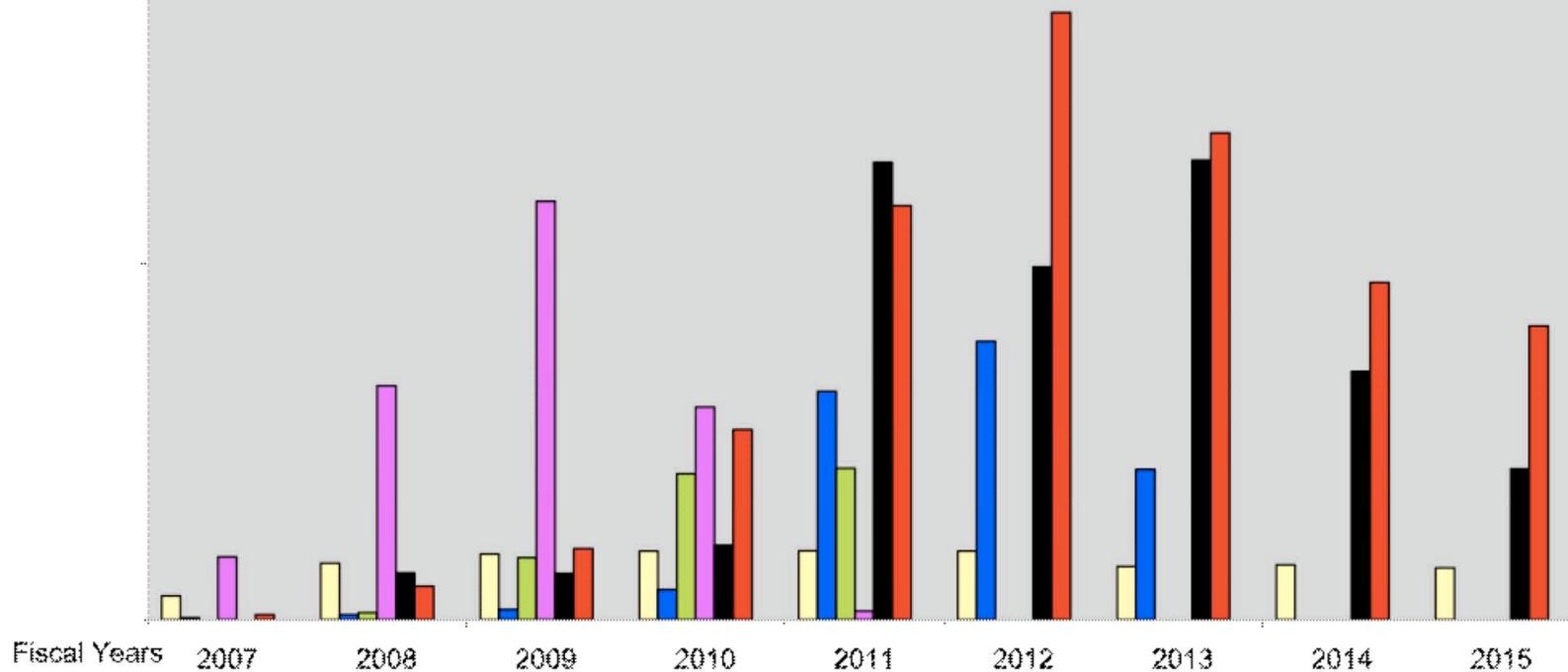
■ (2) Sanford Center for Science Education

■ (3) Mining-To-Labs: Infrastructure Rehabilitation and Re-entry

■ (4) Underground Excavation and Upgrades

■ (5) Underground Labs and Facilities

Sub-Projects TOTAL (excluding Experimental Research Equipment and Systems)



Methodology for Risk Management

- Continuous Risk Management process will be integral with Safety Management, Project Management, Systems Engineering, and Operations
- Initial steps have included Risk Identification and Preliminary Risk Analysis, with details presented in CDR and Appendices
- Risk planning has involved consultants and staff having a broad background and perspectives:

Consultants:

- Syd De Vries (Risk Identification, Basis of Estimates)
- Mark Laurenti (Basis of Estimates, cost and schedule)
- Mark Nelson, S.D. DENR (Environmental issues)
- Golder Associates (Failure Modes and Effects Analysis)

Staff and Collaborators: SDSTA Staff, notably Tom Regan (Site Conditions, Safety), Greg King, John Marks, Gary Lillehaug (former HMC engineers)
Homestake Science Collaboration members
LBNL Management (internal review)
LBNL Project Team

Risk Categories for Homestake DUSEL

LONGSECTION OF THE HOMESTAKE MINE

1. Safety
2. Environmental
3. Performance and Operations
4. Project Management

High Priority and High Visibility Risk Items:

- Personnel Injury
- Water Quality, Environmental Permitting
- Infrastructure Deterioration and Rehabilitation
- Underground Fire Hazards
- Underground Rock Failure, Rock Competency
- Poned or Stored Water Release
- Availability of Subcontractors and Equipment
- Cost and Schedule Controls, Funding Profiles

Comments on Management

- Plans require updates to reflect actual Initial Suite of Experiments and Scientific Roadmaps
- South Dakota is currently staffing the Sanford Lab Organization, Lab director, engineers, project managers, safety directors
- Project Team is currently staffing: safety director, instrumentation engineer, architect, and others