



# CF&S Environmental Timelines & Radiation Impacts

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Date

Event

Global Design Effort

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# Introduction

- Rod Walton, PhD [rwalton@fnal.gov](mailto:rwalton@fnal.gov)
  - **Doctorate, Biology**
  - **35 years experience (education, Illinois Environmental Protection Agency, FNAL/DOE)**
  - **FermiLab Environmental Permitting & Regulatory Compliance Expert**
- Gerard Aarons, PG/CHG [gaarons@slac.stanford.edu](mailto:gaarons@slac.stanford.edu)
  - **Masters of Science, Geology**
  - **Professional Geologist**
  - **California Licensed Hydrogeologist**
  - **20 years of experience in Environmental Assessments – Local/Regional/State/Federal regulatory compliance issues**



# Environmental Timeline

- Environmental Evaluations / Assessments / Studies needed by T<sub>0</sub> (2012)
  - **Focused consultant effort & expertise**
    - to understand and characterize the environmental aspects for Americas Region ILC (FermiLab)
  - **Initially concentrate investigation & characterization within FermiLab Boundaries**
    - to understand all of the processes & timeframes
    - to gather information and documents needed to meet all of the environmental requirements applicable to the project
  - **The requirements for an Expression of Regional Interest document will better define**
    - required environmental information can be readily generated from all preliminary work



# U.S./DOE Regulatory Crosswalk

- Air
  - Clean-Air Act
  - NESHAP (Nat'l Emissions Standards Hazardous Air Pollutants)
  - Radiological
- Water
  - Clean-Water Act
  - Flood protection
  - Navigable water ways
  - Safe Drinking-Water Act
  - NPDES – Nat'l Pollution Discharge Elimination System (permits)
- Land
  - Property Ownership
  - Federal Facilities Management
  - Cultural / Historic Resources
- Environmental Review
  - NEPA Nat'l Enviro. Policy Act (EIS)
  - Council on Enviro. Quality Regs
- Waste
  - Pollution Prevention
  - TSCA - Toxic Substances Control Act
  - RCRA – Resource Conservation & Recovery Act
  - Community Right-to-Know
- Transportation
  - HazMat Transport Act
- Energy
  - Energy Policy Act
  - Federal Energy Mgt.



# U.S./DOE Regulatory Drivers

- Things to address in an EIS
  - **Regulations, Statutes, Executive Orders, DOE Orders, etc., in general there are 5 types**
    - Formal Permits (i.e., air emissions, water discharge permits, etc.)
    - Formal or informal processes (i.e., endangered species [U.S. Fish & Wildlife], cultural/historic preservation
    - Requirements of several kinds (i.e, sustainable design of bldgs, floodplain analysis, etc.
    - Analyses of requirements – transportation studies, environmental justice studies, noise studies, etc.
    - Description of the environment and impacts (descriptions of what exists there and how it will likely be impacted)



# Environmental Timeline

- There are lots of requirements in the process – we need to know all of the what(s) and why(s)?
- In order to meet the  $T_0$  – we cannot expedite the process - **WE'LL NEED A HEAD START!**
- On average, for a project this size in the U.S. the required environmental studies range from 2 to 4 years or more
- We estimate ~ \$600K-\$1M U.S. dollars for Environmental Consulting Services alone



# Radiation Impacts

- **Isotope Production** - the dominant radioisotopes produced in water by these high-energy electron beams are by photospallation on  $^{16}\text{O}$  [Neal 1968].

– ZDR, Ch.11 pg. 775

- In order of decreasing abundance and increasing half life:

$^{16}\text{O}$	→	$^{15}\text{O}$	T1/2 = ~ 2 min.
		$^{13}\text{N}(\text{small})$	~ 10 min.
		$^{11}\text{C}$	~ 20 min.
		$^7\text{Be}$	~ 53 day
		$^3\text{H}$	~ 12.3 year



# Radiation Impacts

- **A call to arms – by the next meeting at FermiLab (Sept. 2007) the ILC Project (CF&S) needs to incorporate Radiation Physics Safety Experts (perhaps one per Region) to be able to address these radiation physics issues**
- **Soon will need to respond to various Consultant and/or Regulatory Agency queries/requests regarding plans for ILC in Americas Region**





# Toward EDR

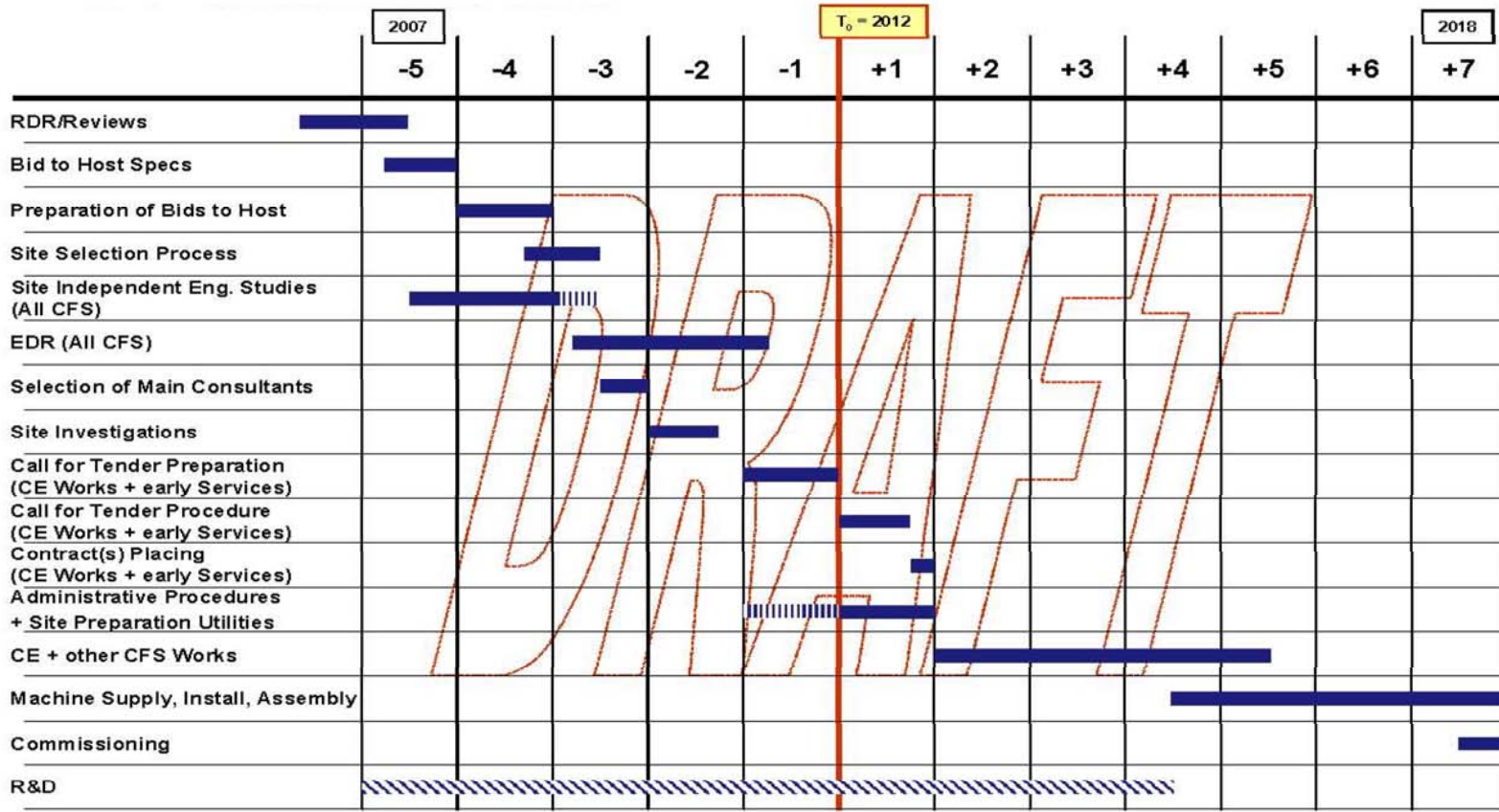
THANK YOU & QUESTIONS



# Technical Schedule

## Basis of CFS Cost Estimates (3)

### TENTATIVE OVERALL "TECHNICAL" TIME SCHEDULE



Note : International and Regional Political and Funding/Budgeting Implications on Durations have not been considered