

THE WATER CHERENKOV PROJECT

Jim Stewart

LBNE Collaboration Meeting

July 2009

First an Introduction

I started at BNL on June 1st as acting project manager for the water Cherenkov detector.

I worked in Germany on the HERMES experiment (medium energy physics) for 15 years and at JLAB on the photon beam for Hall-D for 1 year.

I hope we will have a fruitful collaboration!

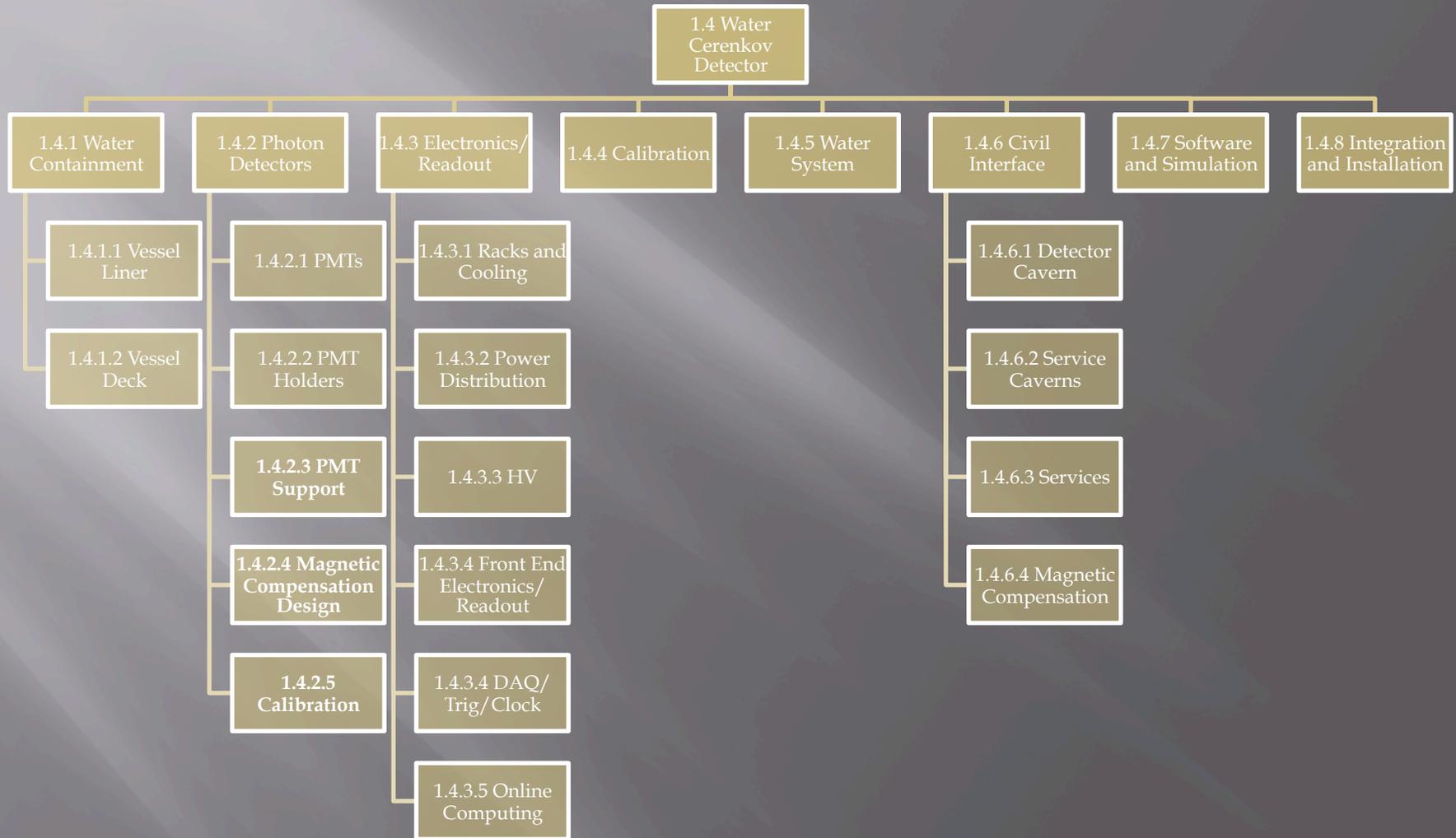
Where to start?

- ▣ Form working groups to develop the design of the individual components of the detector.
 - Keep the number of groups as low as possible to minimize the number of meetings.

- ▣ Develop a WBS to organize the project.
 - DOE mandates that the project be organized in terms of a WBS and that earned value is reported after CD-2

- ▣ Try to organize the project keeping the two needs in mind.

DOE CD-0 WBS Structure



Working Group Leaders

- ▣ Provide a contact person for the collection of activities.
- ▣ Organize meetings as needed
- ▣ Be responsible for the relevant chapters of the CDR
- ▣ Provide answers to other working groups concerning questions related to their topic
 - For example: “What is the heat load to the water cooling systems as a fn of water temperature?”
- ▣ Work out the budget and schedule together with BNL to put into the baseline.

Working Groups

- ▣ Want a group leader and a deputy to help distribute the load.
- ▣ A level 3 management structure will be needed in the not too distant future.
 - Will need to look for level 3 managers to be responsible for the level 3 WBS scope.
 - Look for group leaders who might be good managers.

What the working groups need to deliver in ~1yr

- ▣ A CDR (Version CD1)
- ▣ An alternates analysis
- ▣ A preliminary resource loaded schedule
 - This means you need a really good plan!
 - A cost range
 - Baseline for PED money. Need the exact cost for the design.
- ▣ Plus other documents which I need to look into.

Organization Considerations Options ...

1. The scope of the project is fixed at CD-2
 - Alternate technologies are possible at CD-1
 - Alternatives must be explained in the CRD and a concrete plan for how the final selection including cost impact must be estimated in detail.

However:

2. The total cost must be understood to the extent a solid cost range can be given.
 - The more alternates the more work getting a cost estimate.

We must be 100% certain we can build the detector within the cost range we quote!

List of Working Groups

- ▣ Water Containment
 - Farshid Feyzi
 - Robert Paulos
- ▣ PMTs
- ▣ Electronics/Readout
 - Ed Kearns
 - Rick Van Berg
- ▣ Calibration
 - Bob Svoboda
- ▣ Water System
 - Richard Bionta
 - Hank Sobel
- ▣ Civil Interface
 - Not sure where to put in WBS
- ▣ Software/Simulations
 - Chris Walter (Simulations)
- ▣ Integration/Installation

Bob has done most the work till now.

SET UP MAILING LISTS FOR THE WORKING GROUPS

(Thanks Milind)

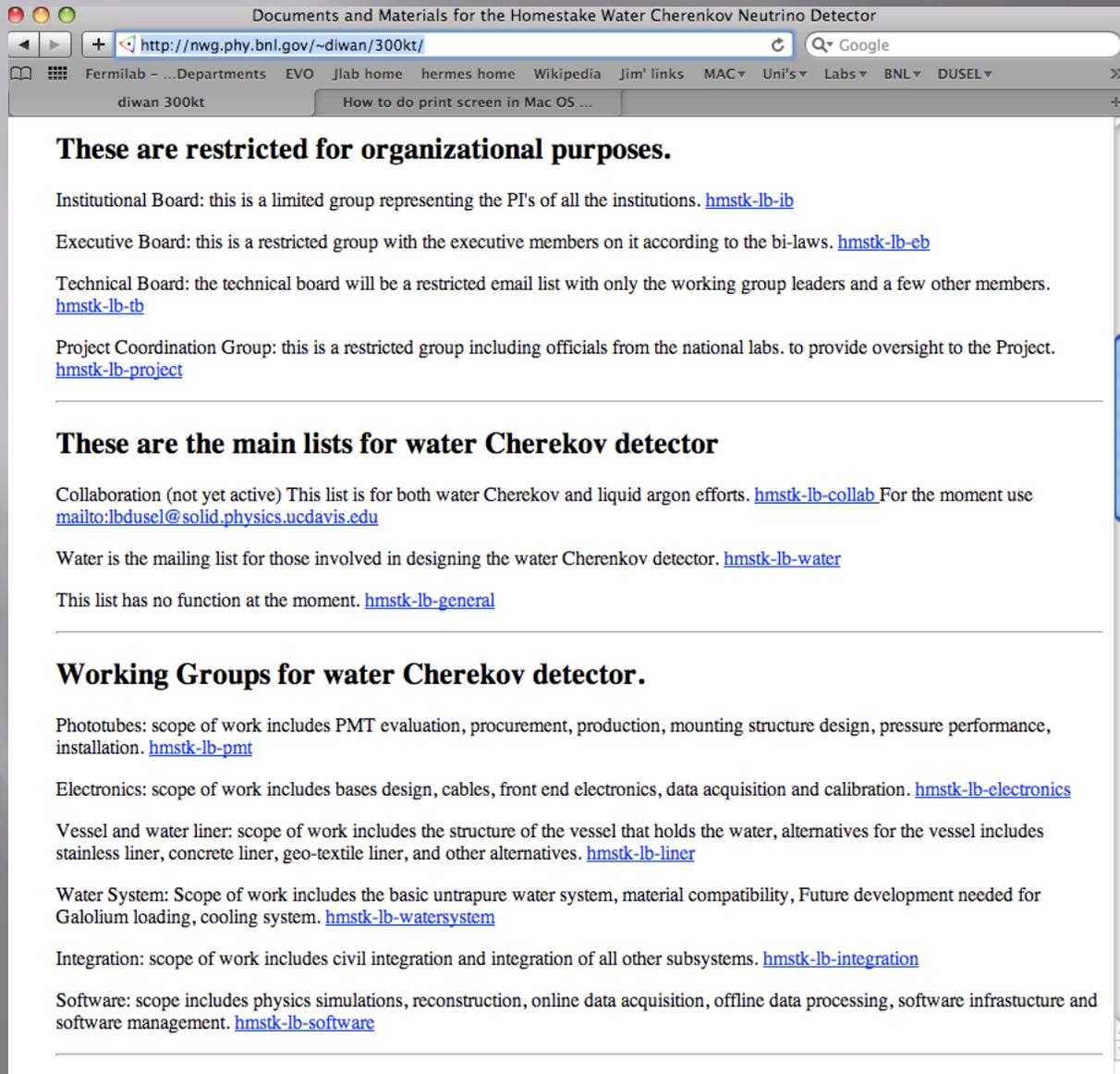
Water Cherenkov Detector Temporary Web Page

The screenshot shows a web browser window with the following content:

- Browser title: Documents and Materials for the Homestake Water Cherenkov Neutrino Detector
- Address bar: <http://nwg.phy.bnl.gov/~diwan/300kt/>
- Page title: Documents and Materials for the Homestake Water Cherenkov Neutrino Detector
- Text: This website has links to the archive of documents related to building a 300 kTon water Cherenkov detector at Homestake, the former gold mine in Lead, South Dakota.
- Text: The website has public and private content
- Text: A very brief description for the water Cherenkov detector. [PDF](#)
- Text: NEW DUSEL WIKI site. This site will become the default in some time. [WIKI for Homestake Water Cherenkov Neutrino Detector](#)
- Section: Table of contents for this web site
 - 1. [People](#)
 - 2. [Mailing lists](#)
 - 3. [Working group Calendar](#)
 - 4. [Meetings](#)
 - 1. [Oct. 12, 2007](#)
 - 2. [Nov. 3, 2007](#)
 - 3. [Apr. 23-26, 2008](#)
 - 4. [June 20, 2008](#)
 - 5. [Oct. 16-17, 2008](#)
 - 6. [Rest of the meetings on DOCDB](#)
 - 5. [FNAL BNL joint study](#)
 - 6. [Documents](#)
 - 7. [Engineering drawings](#)
 - 8. [Pressure testing of PMTs \(private\)](#)
 - 9. [Other Private pages](#)
- Section: [People](#)
- Text: This is a list of people involved in various ways in the project [Here](#)

<http://nwg.phy.bnl.gov/~diwan/300kt/>

Water Cherenkov Detector Mailing Lists



Documents and Materials for the Homestake Water Cherenkov Neutrino Detector

http://nwg.phy.bnl.gov/~diwan/300kt/

diwan 300kt

These are restricted for organizational purposes.

Institutional Board: this is a limited group representing the PI's of all the institutions. [hmstk-lb-ib](#)

Executive Board: this is a restricted group with the executive members on it according to the bi-laws. [hmstk-lb-cb](#)

Technical Board: the technical board will be a restricted email list with only the working group leaders and a few other members. [hmstk-lb-tb](#)

Project Coordination Group: this is a restricted group including officials from the national labs. to provide oversight to the Project. [hmstk-lb-project](#)

These are the main lists for water Cherekov detector

Collaboration (not yet active) This list is for both water Cherekov and liquid argon efforts. [hmstk-lb-collab](#) For the moment use <mailto:lbducel@solid.physics.ucdavis.edu>

Water is the mailing list for those involved in designing the water Cherenkov detector. [hmstk-lb-water](#)

This list has no function at the moment. [hmstk-lb-general](#)

Working Groups for water Cherekov detector.

Phototubes: scope of work includes PMT evaluation, procurement, production, mounting structure design, pressure performance, installation. [hmstk-lb-pmt](#)

Electronics: scope of work includes bases design, cables, front end electronics, data acquisition and calibration. [hmstk-lb-electronics](#)

Vessel and water liner: scope of work includes the structure of the vessel that holds the water, alternatives for the vessel includes stainless liner, concrete liner, geo-textile liner, and other alternatives. [hmstk-lb-liner](#)

Water System: Scope of work includes the basic untrapure water system, material compatibility, Future development needed for Galolium loading, cooling system. [hmstk-lb-watersystem](#)

Integration: scope of work includes civil integration and integration of all other subsystems. [hmstk-lb-integration](#)

Software: scope includes physics simulations, reconstruction, online data acquisition, offline data processing, software infrastructure and software management. [hmstk-lb-software](#)

Water Cherenkov WIKI

Main Page - DUSEL

https://wiki.bnl.gov/dusel/index.php/Main_Page

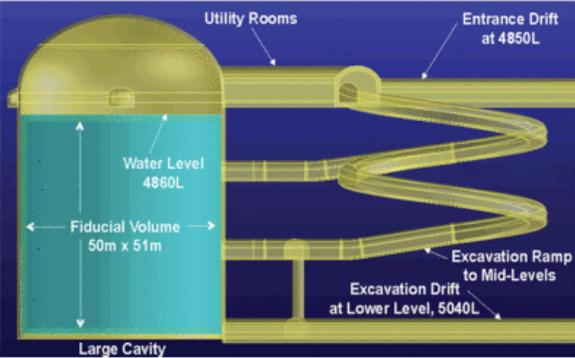
Log in / create account

article discussion edit history

Main Page

Long Baseline Neutrino Experiment's Water Cherenkov Detector

You have landed at the **LBNE Water Cherenkov Wiki!**
Please register and log in (link in upper right corner!)



LBNE water Cherenkov Working Groups

- Vessel/Liner
- Water System
- Electronics
- PMTs
- Installations/Integration
- Calibration
- Simulation/Software

Physics Analysis

ESH&Q

Meetings Reviews
Conferences Publications

Special Information:

- Email Lists
- Calendar
- Water Cherenkov Communications
- BNL LBNE docDb
- LBNE Water Cherenkov Homepage
- FermiLab Project Documents

Set \$wgLogo to the URL path to your own logo image.

navigation

- Main Page
- Community portal
- Current events
- Recent changes
- Random page
- Help
- Donations

search

Go Search

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

To create and account login as "dusel" the password is the same as the BNL docdb

https://wiki.bnl.gov/dusel/index.php/Main_Page

Mailing list page on the WIKI

Set \$wgLogo to the URL path to your own logo image.

navigation

- Main Page
- Community portal
- Current events
- Recent changes
- Random page
- Help
- Donations

search

Go Search

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

Email Lists – DUSEL

https://wiki.bnl.gov/dusel/index.php/Email_Lists

Google

Email Lists – DUSEL

How to do print screen in Mac OS ...

Log in / create account

article discussion edit history

Email Lists

Contents [hide]

- 1 H2O at LBNE mailing lists
 - 1.1 Main Mailing lists
 - 1.2 Water Cherenkov Detector working group mailing lists
 - 1.3 Organizational Mailing Lists

H2O at LBNE mailing lists [edit]

Main Mailing lists [edit]

- [LBNE water Cherenkov](#) Main mailing list for the LBNE water Cherenkov detector
- [LBNE Collaboration](#) LBNE Collaboration mailing list

Water Cherenkov Detector working group mailing lists [edit]

- [PMT working group mailing list](#) PMT evaluation, procurement, production, mounting structure design, pressure performance, installation.
- [Electronics ...](#) front end electronics, data acquisition, cables, racks, and calibration
- [vessel/liner](#) The structure of the vessel that holds the water, alternatives for the vessel includes stainless liner, concrete liner, geo-textile liner, and other
- [UltraPure water](#) basic ultrapure water system, material compatibility, Future development needed for Gallium loading, cooling system
- [integration/installation](#) civil integration and integration of all other subsystems
- [software](#) physics simulations, reconstruction, online data acquisition, offline data processing, software infrastructure and software management

Organizational Mailing Lists [edit]

- [Institutional Board](#) : This is a limited group representing the PI's of all the institutions.
- [Executive board](#) : Executive Board mailing list - executive board members only.
- [Technical Board](#) : Technical Board mailing list - technical board members only.
- [POG](#) : Project Oversight Group mailing list - POG members only.

This page was last modified 21:01, 26 June 2009. This page has been accessed 6 times. [Privacy policy](#) [About DUSEL](#) [Disclaimers](#)

Meeting Calendar

The screenshot shows a Google Calendar interface for the group 'LBNE.DUSEL'. The calendar is set to July 2009 and is displayed in a weekly view. The days of the week are labeled at the top: Sun, Mon, Tue, Wed, Thu, Fri, Sat. The dates range from 28 to 4 (Aug 1). The calendar shows several recurring events:

- 12pm FNAL DUSEL beam**: Occurs on Sun, Mon, Tue, Thu, and Sat.
- 1:30pm slot for LBNE work**: Occurs on Mon, Tue, Thu, and Sat.
- 4pm slot for LBNE work**: Occurs on Tue, Thu, and Sat.
- 1:30pm Project Coordination**: Occurs on Wed, Fri, and Sun.
- 11am near detector meeting**: Occurs on Thu, Fri, and Sun.
- 12:30pm Executive Board**: Occurs on Fri, Sun, and Aug 1.
- 4pm LBNE water system**: Occurs on Thu, Fri, and Sun.
- 4pm WC vessel/liner work**: Occurs on Tue, Thu, and Sat.
- 4pm water Cherenkov**: Occurs on Thu, Fri, and Sun.
- Collaboration meeting FNAL**: A one-time event on Wed (July 15).
- NUFACT at FNAL**: A one-time event on Sat (July 25).
- LANL INF2009 workshop**: A one-time event on Fri (July 10).

At the bottom of the calendar, it says 'Events shown in time zone: Eastern Time' and 'Google Calendar'.

Available from Milind's web page or the WIKI

Once the working groups are running I have suggested bi-weekly meetings.

Progress

	Unit	1 Steel self supporting	2 Concrete blocks	3 Unitary post- stressed concrete vessel self supporting	4 Liner on shotcrete	5 Cast concrete against rock	6 Pressure balanced wall
Fiducail Radius	m	25	25	25	25	25	25
Buffer between fiducial radius and PMT	m	1	1	1	1	1	1
PMT module thickness	m	0.5	0.5	0.5	1	1	1
Gap between PMT module and tank wall	m	0	0	0	0.2	0	0.2
Sealing/coating layer thickness	m	0.005	0.005	0.005	0.005	0.005	0.01
Tank water radius	m	26.51	26.51	26.51	27.21	27.01	27.21
Tank wall thickness top	m	0.05	0.5	1	0.1	1	0.01
Tank wall thickness bottom	m	0.12	0.5	1.0	0.1	1	0.0
Tank wall thickness average	m	0.09	0.50	1.00	0.10	1.00	0.01
Tank outer radius	m	26.63	27.01	27.51	27.31	28.01	27.22
Access/drainage/balance gap	m	2	0.2	3	0	0	0.5
Rock wall raidus	m	28.63	27.21	30.51	27.31	28.01	27.72
Tank wall mass	tonne	5989	11453	23331	2316	23755	231
Fiducial volume	cu m	100000	100000	100000	100000	100000	100000
Fiducial height	m	51	51	51	51	51	51
Tank water height	m	54	54	54	54	54	54
Tank floor thickness	m	2	2	2	2	2	2
Excavation height	m	56	56	56	56	56	56
Excavation volume (without upper part)	cu m	144155	130207	163712	131166	137978	135184
Normalized		1.04	0.94	1.19	0.95	1.00	1.00

Progress

- ▣ The water system group is meeting regularly.
 - A SOW has been developed to get an initial cost estimate for a water purification/cooling system.
 - See subgroup meeting.
 - Plan to submit soon.
- ▣ PMTs
 - Investigating pressure testing and FEA analysis possibilities
- ▣ The electronics subgroup will meet for the first time here.
- ▣ The simulations groups has met a few times.

Next Steps

- ▣ Identify missing working group leaders
- ▣ NSF - S4 proposal
 - Wait for approval then distribute funds.
- ▣ DOE – CD-0
 - Waiting for approval
 - Start setting up MOUs and preparing contracts.
 - Will hire a project manager at BNL for the water detector.
 - Begin writing CDR scientific case

Backup

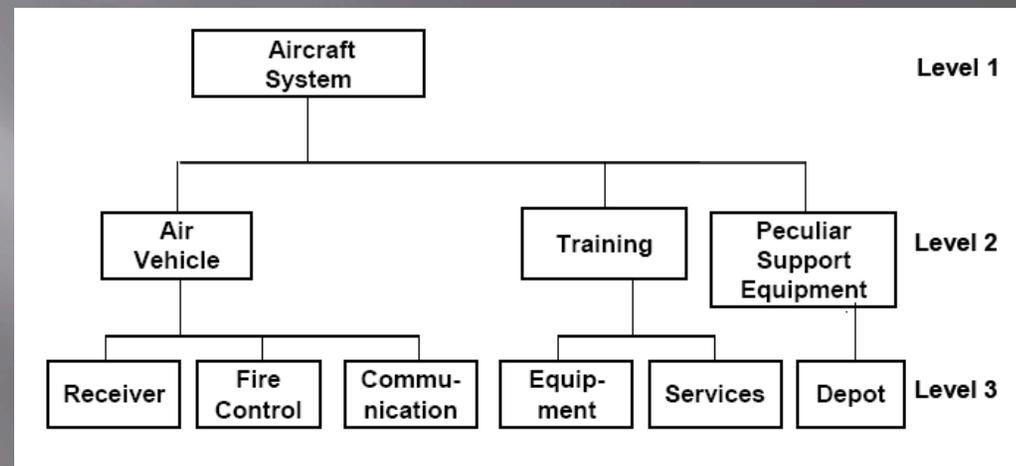
Work Breakdown Structure

Between now and when we start being reviewed for CD-1 we will need to develop the work breakdown structure for the LBNE project.

This is one reason why we need to form the working groups and start organizing. Within not too many months we need to have identified the how the work is to be divided up

Work breakdown structure

From Wikipedia, the free encyclopedia



A work breakdown structure (WBS) in project management and systems engineering, is a tool used to define and group a project's discrete work elements (or tasks) in a way that helps organize and define the total work scope of the project. A Work breakdown structure element may be a product, data, a service, or any combination. WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control. Additionally the WBS is a dynamic tool and can be revised and updated as needed by the project manager.

A Quick look at at Crit Decisions

PROJECT ACQUISITION PROCESS AND CRITICAL DECISIONS					
Project Planning Phase		Project Execution Phase			Mission
Preconceptual Planning	Conceptual Design	Preliminary Design	Final Design	Construction	Operations
• CD-0	• CD-1	• CD-2	• CD-3	• CD-4	
Approve Mission Need	Approve Preliminary Baseline Range	Approve Performance Baseline	Approve Start of Construction	Approve Start of Operations or Project Closeout	

See Page 2 for CDs on Environmental Restoration and Facility Disposition Projects

CD-0	CD-1	CD-2	CD-3	CD-4
Actions Authorized by Critical Decision Approval				
<ul style="list-style-type: none"> Proceed with conceptual design using program funds Request PED funding 	<ul style="list-style-type: none"> Allow expenditure of PED funds for design 	<ul style="list-style-type: none"> Establish baseline budget for construction Continue design Request construction funding 	<ul style="list-style-type: none"> Approve expenditure of funds for construction 	<ul style="list-style-type: none"> Allow start of operations or project closeout
Critical Decision Prerequisites				
<ul style="list-style-type: none"> Justification of mission need document Acquisition Strategy Preconceptual planning Mission Need Independent Project Review 	<ul style="list-style-type: none"> Acquisition Plan Conceptual Design Report Preliminary Project Execution Plan and baseline range Project Data Sheet for design Verification of mission need Preliminary Hazard Analysis Report 	<ul style="list-style-type: none"> Preliminary design Review of contractor project management system Final Project Execution Plan and performance baseline Independent cost estimate National Environmental Policy Act documentation Project Data Sheet for construction Draft Preliminary Safety Analysis Report Performance Baseline External Independent Review 	<ul style="list-style-type: none"> Update Project Execution Plan and performance baseline Final design and procurement packages (**) Verification of mission need Budget and congressional authorization and appropriation enacted Approval of Safety documentation Execution Readiness Independent Review 	<ul style="list-style-type: none"> Operational Readiness Review and acceptance report Project transition to operations report Final Safety Analysis Report <hr/> <p>After CD-4</p> <p>Closeout</p> <ul style="list-style-type: none"> Project closeout report

(**) To the degree appropriate to initiate construction as scheduled.

A Quick look at at Critical Decisions

1. Acquisition Plan
2. Conceptual design report
3. Preliminary project execution plan and baseline range
4. Project data sheet for design
5. Verification of mission need
6. Preliminary hazard analysis report

Acquisition Plan

- ▣ This requires knowing when we are going to purchase what.
 - We need a realistic schedule
 - We need delivery estimates for items
 - We need to have established any long lead time items which we would like to have for early procurement
 - ▣ A critical path analysis needs to have been done

Conceptual Design Report

- ▣ This is fairly clear but there are a few extras.
 - We must justify the need for the detector
 - We must perform an alternates analysis
 - ▣ Including Do nothing, other experiments, and alternates for our detector

Preliminary project execution plan and baseline range

- ▣ This will need to be based on combination of physicist estimates, engineering estimates, and quotations from companies.
- ▣ We will have to perform a risk analysis on the resulting WBS. The estimates based on estimates will be ranked with higher risk and will require a large contingency.
- ▣ This means that if the total project cost is capped then the better our estimate of the cost is, the more physics we can do!

**We must be confident
of our cost estimate**

BASELINE CHANGE CONTROL APPROVAL THRESHOLDS

1. APPROVAL AUTHORITY

Level 0 Changes - Secretarial Acquisition Executive

Level 1 Changes - Program Secretarial Officer

Level 2 Changes - Federal Project Manager as delegated by the
Operations/Field Office Manager or Program Manager

Level 3 Changes - Contractor

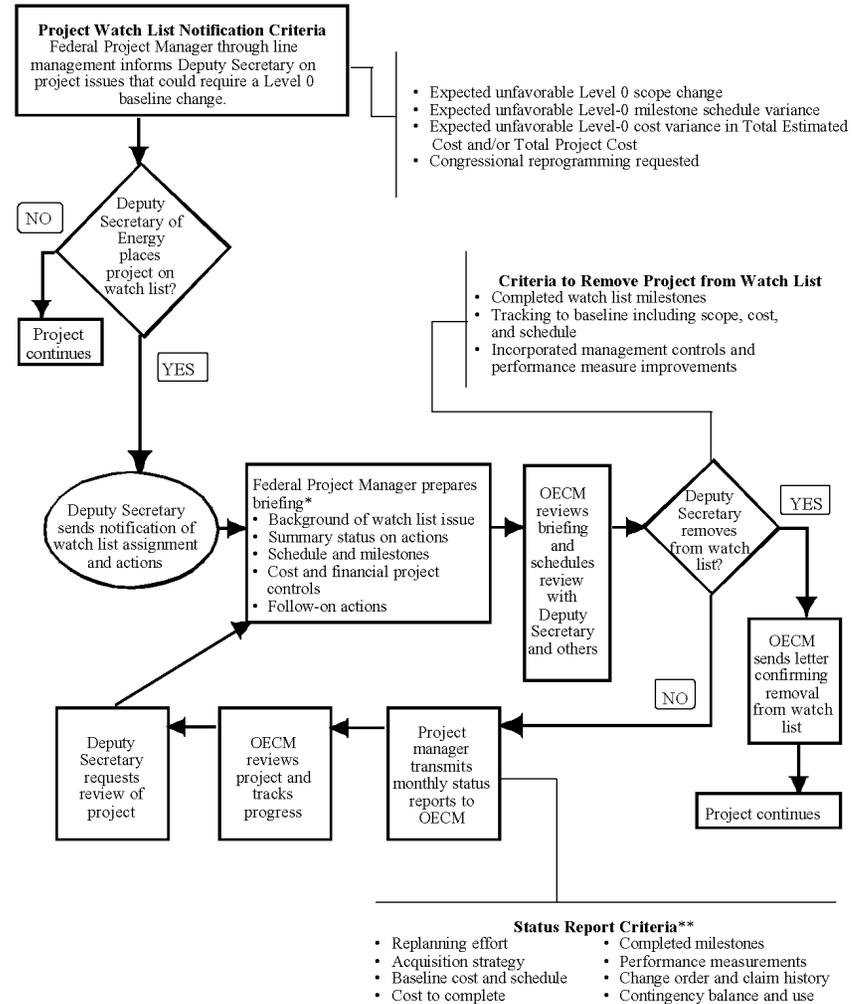
2.a MAJOR SYSTEM PROJECTS

Major System	Level 0	Level 1	Level 2/3
Technical Scope	Changes to scope that affect mission need requirements.	Changes to scope that may affect operation functions but does not affect mission need.	As defined in the Project Execution Plan.
Schedule	6 or more months increase (cumulative) in a project-level schedule milestone date.	3 to 6 months increase (cumulative) in a project-level schedule milestone date.	As defined in the Project Execution Plan.
Cost	Any increase in Total Project Cost and/or increase in Total Estimated Cost. **	Project cost sub-elements as defined in the Project Execution Plan.	As defined in the Project Execution Plan.

Baseline Change

Any change in total cost after EVMS is established is a level zero change!

CHIEF OPERATING OFFICER PROJECT WATCH LIST



* Briefing geared specifically to address reason(s) project is on watch list and proposed resolution(s)

** Status report geared to the phase of project execution

The DOE Watch List ...