Primary Beam and Neutrino Beam

4. **Primary Beam Overview**
    - 4.1. **Overview of Accelerator Complex**
        - 4.1.1. Linac
        - 4.1.2. Booster
        - 4.1.3. Main Injector
        - 4.1.4. LBNE Beamline
        - 4.1.5. Future Upgrades
    - 4.2. **Design Requirements for LBNE Physics**
        - 4.2.1. LBNE Primary Beam Parameters
            - 4.2.1.1. Table of Parameters (Initial 700 kW)
            - 4.2.1.2. Alignment with DUSEL
            - 4.2.1.3. Anticipated Operational Lifetime
        - 4.2.2. Primary Beam Magnets
        - 4.2.3. Requirements for 2MW Operation
    - 4.3. **Optimization of Design**
        - 4.3.1. Reliability, Losses
        - 4.3.2. Radiation Safety

5. **LBNE Primary Beam Design**
    - 5.1. **Extraction at Main Injector**
        - 5.1.1. Kickers, Lambertson Magnets
    - 5.2. **Extraction Enclosure (MI-62)**
        - 5.2.1. Separation of ANU / LBNE Beams
    - 5.3. **Transport to LBNE Target**
        - 5.3.1. Design Trajectory - Alternative A
            - 5.3.1.1. Beam Envelope / Structure
        - 5.3.2. Design Trajectory - Alternative B
            - 5.3.2.1. Beam Envelope / Structure
        - 5.3.3. Magnets and Supports
        - 5.3.4. Power Supplies
        - 5.3.5. Cooling Systems
        - 5.3.6. Vacuum Systems
        - 5.3.7. Instrumentation
            - 5.3.7.1. Position Monitors
            - 5.3.7.2. Intensity Monitors
            - 5.3.7.3. Profile Monitors
    - 5.4. **Beam Control Systems**
        - 5.4.1. Beam Tune Requirements
        - 5.4.2. Stability
            - 5.4.2.1. Position and Intensity Monitors
            - 5.4.2.2. Accuracy and Stability at Target
        - 5.4.3. Beam Permit

5.5. **Radiological Issues and Shielding**
5.5.1. Radiological Protection for Personnel
5.5.2. Ground Water Protection

6. LBNE Neutrino Beam Overview

6.1. **Design Requirements for LBNE Physics**
6.2. **Target Hall**
6.3. **Decay Region**
6.4. **Absorber Hall**
6.5. **Near Detector Hall**

7. Neutrino Beam Design

7.1. **Target Hall Complex**
7.1.1. Baffle and Vacuum Window
7.1.1.1. Baffle Design
7.1.1.2. Primary Beam Window Design
7.1.2. Targeting and Secondary Beam Section
7.1.2.1. Design Overview
7.1.2.1.1. R & D for Target Design
7.1.2.1.1.1. Material Irradiation Tests
7.1.2.1.1.2. Simulation of Designs
7.1.2.2. Targeting Station
7.1.2.2.1. Target Designs
7.1.2.2.2. Target Cooling
7.1.2.2.3. Target Replacement Procedure
7.1.2.3. Secondary Beam Focussing - Alternative A
7.1.2.3.1. Horn One Design
7.1.2.3.2. Horn Two and Three Design
7.1.2.3.3. Horn Power Supplies
7.1.2.3.4. Horn Power Transmission Lines
7.1.2.3.5. Horn Replacement Procedures
7.1.2.4. Secondary Beam Focussing - Alternative B
7.1.2.4.1. Horn One Design
7.1.2.4.2. Horn Two Design
7.1.2.4.3. Horn Power Supplies
7.1.2.4.4. Horn Power Transmission Lines
7.1.2.4.5. Horn Replacement Procedures
7.1.2.5. Shielding Design
7.1.2.5.1. Cooling System
7.1.2.5.2. Radiological Protection for Personnel
7.1.2.5.3. Ground Water Protection
7.1.3. Air- and Water-Cooling Rooms
7.1.3.1. Design Requirements
7.1.3.2. RAW Systems
7.1.3.3. Air Cooling Systems

- 7.1.3.4. Water Cooling Systems
- 7.1.3.5. Activated Air Handling Procedures
- 7.1.4. Power Supply Rooms
  - 7.1.4.1. Design Requirements
  - 7.1.4.2. Pulsed Horn Power Supplies
  - 7.1.4.3. Power Supply Cooling System
- 7.1.5. Component Extraction and Storage
  - 7.1.5.1. Design Overview
  - 7.1.5.2. Target, Horn One and Two Removal / Installation
  - 7.1.5.3. Horn Three Removal / Installation
  - 7.1.5.4. Surface Storage Facility
- 7.1.6. Accessibility and Life Safety Issues

7.2. **Decay Region**

- 7.2.1. Decay Pipe
  - 7.2.1.1. Cooling System
    - 7.2.1.1.1. Alternative A - Air Cooling
    - 7.2.1.1.2. Alternative B - Water Cooling
  - 7.2.1.2. End Caps
  - 7.2.1.3. Pressure Control
- 7.2.2. Decay Region Shield Design
  - 7.2.2.1. Design Requirements
  - 7.2.2.2. Cross Section of Concrete Shield
  - 7.2.2.3. Radiological Protection for Personnel
  - 7.2.2.4. Ground Water Protection
- 7.2.3. Accessibility and Life Safety Issues

7.3. **Absorber Hall**

- 7.3.1. Design Overview
  - 7.3.1.1. Absorber Pile
  - 7.3.1.2. Cooling System
- 7.3.2. Shield Design
  - 7.3.2.1. Radiological Protection for Personnel
  - 7.3.2.2. Ground Water Protection
- 7.3.3. Accessibility and Life Safety Issues

7.4. **Near Detector Hall**

- 7.4.1. Design Overview
  - 7.4.1.1. Radiological Protection for Personnel
  - 7.4.1.2. Ground Water Protection
- 7.4.2. Accessibility and Life Safety Issues

7.5. **Estimated Radioactive Air Release**