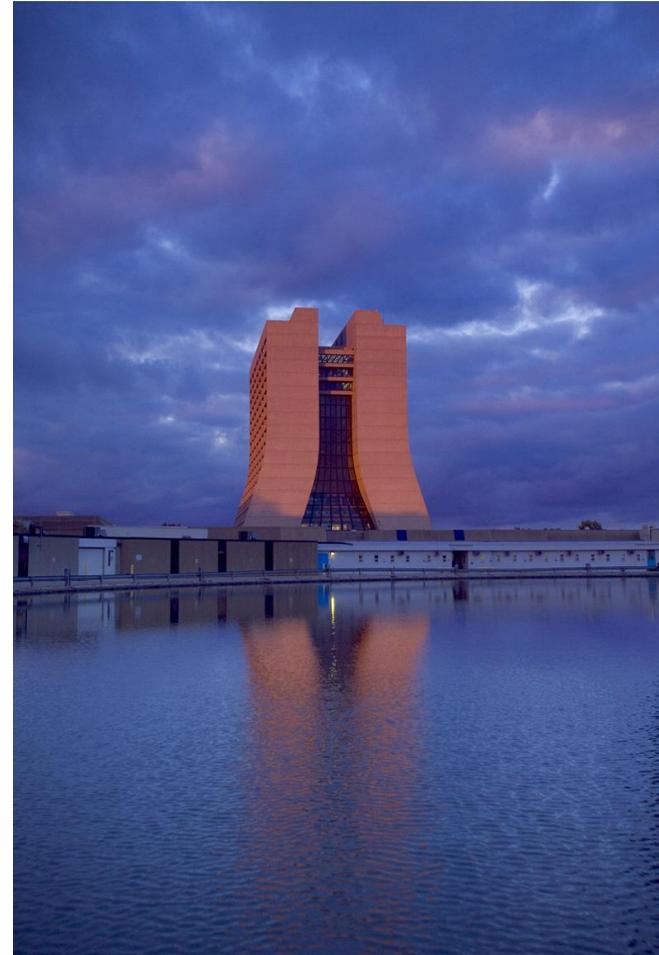




Operator Training

The First Six Months



New Operators

- Where Do They Come From?

- Colleges and Universities



- Where Do They Go?

- Back into a Different Group at Fermilab
- To a Different Laboratory
- Back to School
- To a Different Job



What Do We Look For?

- Diversity of Interests and Activities
- Curiosity
- Accomplishments
- Practical Experience
- Communication Skills
- Motivation
- Social Interaction



Yes, But Who Is Putting Back Together?



Fermi National Laboratory Statistics

➤ 66,000 Controllable Devices

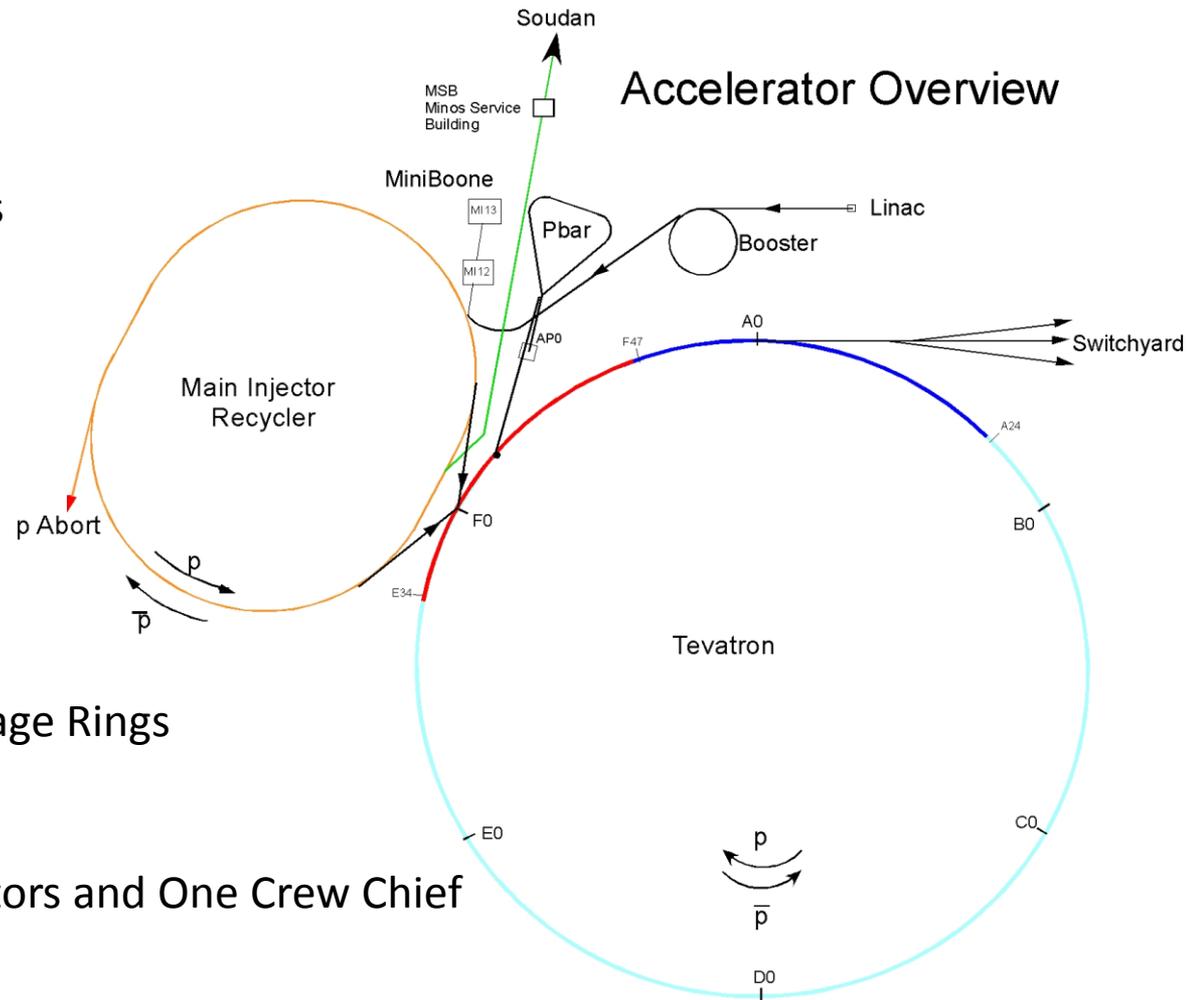
➤ 150,000 Readbacks

➤ One Main Control Room

➤ Eight Accelerators and Storage Rings

➤ Five Crews with Five Operators and One Crew Chief

➤ Operators Respond to Problems. There are No Technicians on Shift.



Fermilab Safety Training

Environmental Management System
General Employee Radiation Training
Hazard Communication
Introduction to Quality Assurance
Job Hazard Analysis
PPE (Personnel Protective Equipment)
Sexual Harassment Training for FNAL
Employees
Traffic Safety Awareness
Back Works Training
Basic Computer Security
CDF Supervised Access
CPR
Compressed Gas Cylinder Safety
Computer Workstation Ergonomics
Confined Spaces
Cryogenic Safety (General)
D0 Hazard Awareness

Electrical Safety Orientation
Electrical Safety (NFPA 70E)
Fall Protection Orientation
Fermilab Controlled Access
Fire Extinguisher Use
Hearing Conservation
Lockout/Tagout Level 2
Material Move Survey
MuCool Test Area Hazard Awareness
NuMI/MINOS Underground Safety Training
O.D.H Training
Oil Handling - Oil Pollution Prevention
Program
Pressure Safety Orientation
Protecting Personal Information at Fermilab
Radioactive Source Training (CR)
Radiological Worker (CR)
Scissors Lift Safety Training for CDF

The On the Job Training Method

- Operators Gain Experience on All Accelerators
- Theory & Terminology
- All Operators Receive Same Training
- No Expert Secrets
- OJT Provides Proof of Training



The On the Job Training Method

- Overview of Accelerators
- Many Experienced Trainers
- Checkpoints with Signoffs
- Self Directed
- Can't Learn Accelerator Operations from Book



Disadvantages of the OJT Training Method

- Must Hire Self Motivated People
- Reading Books Alone Won't Train Properly
- Operator Might Never Delve Deeper
- Amount of Information Seems Insurmountable
- Experts Want to Add More Complexity



Advantages of the OJT Training Method

- Experienced Operators Must Stay Up-To-Date
- Operators Help Refine Training
- Training Committee Reviews OJTs, Rookie Books, and Tests
- This is the Quickest Method of Training



Tools

CAMAC Card Replacement

**I- Source Preaccelerator Dome
Access**

Swapping Out
a CAMAC Card

Access I-
Preacc Dome

The Concepts OJT

Personnel Introduction

_____	_____
Trainee	Date

1. Accelerator Division, Headquarters

You have had the opportunity to be introduced to Accelerator Division Headquarters personnel, including:

_____ Roger Dixon (Division Head)

_____	_____
Trainee	Date

2. Proton Source Department

You have had the opportunity to be introduced to some Proton Source personnel, including:

_____ **Bill Pellico*** (Department Head)

Booster Group

_____ **Todd Sullivan*** (Group Leader)

_____ **Jim Lackey***

_____ **Kent Triplett***

_____ **Salah Chaurize***

Linac Group

_____ **Fernanda Garcia** (Group Leader)

_____ **Larry Allen***

_____ **Ken Quinn**

_____ **Ken Hartman***

_____ **Johnathan Walters**

_____ **Trevor Butler**

_____ **Pat Karns***

Preacc Group

_____ **Dan Bollinger** (Group leader)

_____ **Ray Hren**

_____ **Jim Wendt**

2.0 Personnel Introduction

1. Operations Department
2. Proton Source Department
3. Tevatron Department
4. Main Injector
5. Antiproton Department
6. External Beamlines
7. Controls Department
8. Cryogenic Department
9. E/E Support Department
10. Mechanical Support Department
11. RF & Instrumentation Department
12. ES&H Department

Main Control Room OJT

3.1 Administrative In-processing

Trainer Date

1. Sign-off Verification

The Introduction to OJT has been read and any unclear areas have been discussed with your mentor. When you understand what is expected of you and the training process, have your trainer sign off.

Trainee Date

2. Workbench Assigned

A workbench has been assigned to you.

Trainee Date

3. Safety Shoes

Your trainer will show you what form to fill out and explain the safety shoe procedure. Sign yourself off when you have safety shoes.

Trainee Date

4. Mailbox Assigned

You have been assigned a mailbox.

Duty Assistant Date

5. Department Training Database

Your name has been added to the department training database.

Duty Assistant Date

6. Safety Training Database

Your name has been added to the safety department training database.

Duty Assistant Date

7. Permanent Film Badge

The form requesting your permanent film badge has been completed. Use a visitor's film badge from the COM center until you receive the permanent badge.

Duty Assistant Date

8. Personal Dosimeter

You have received a personal dosimeter.

Main Control Room OJT

- **3.1 Administrative In-processing**
- **3.2 Lab & Division Required Training**
- **3.3 Operator Task Training**
- **3.4 Operator Procedure Training**

Introductory Training Part 4.0:

Walkarounds OJT

Trainee Date

1. MCR Console

Understand how to use a Console. Your knowledge should include:

- _____ 1. Know what the Index pages are.
- _____ 2. Know what the utility window is.
- _____ 3. Know how to start programs.
- _____ 4. Know how to start Fast Time plots and Snapshot plots and know when you would use each.
- _____ 5. Have a general understanding how the alarm screen works and under what conditions alarms are cleared.
- _____ 6. Know how to access IMAP servers to check your laboratory e-mail.
- _____ 7. Know how to access the machine electronic logbooks.
- _____ 8. Know how to access the MCR electronic logbook.
You knowledge should include:
 - _____ a) How to complete the shift roster.
 - _____ b) How to make logbook entries, including inserting graphics.
 - _____ c) What information should be logged or not logged.

Trainer Date

2. Common Console Tasks

You have been introduced to the following ACNET programs to complete common tasks. Your knowledge should include:

- _____ 1. Know the basic functions of the parameter page. This includes knowledge of parameter names, text descriptions, analog and digital control and readback, analog alarm limits, bypassing analog alarms, and timer references.
- _____ 2. Add your name to Phone Directory program (D17). Also, know how to search for names.
- _____ 3. Understand the procedure for logging downtime entries on D18.
- _____ 4. Understand the use of the TV Guide program D100 and be able to find various channels of interest

Accelerator Concepts OJT

Trainer	Date
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1. Accelerator Terminology

Know common accelerator terminology associated with accelerators and beam lines.

- _____ **Bucket** is the stable phase space area created by the RF where beam may exist.
- _____ A **Bunch** is the beam within a bucket, a tiny cloud of particles.
- _____ **Coalesced Bunch** is one bunch of beam that was created from several bunches of beam through RF manipulation.
- _____ **Batch** is a unit corresponding to the maximum output of one Booster cycle, which is equivalent to 84 53 Mhz bunches. In practice we send less than 84 bunches per batch due to notching the beam in Booster to create a gap for the extraction kickers.
- _____ **Multi-batching** is the process of sending more than one successive Booster batch to the MI for acceleration.
- _____ **Partial-batching** is the process of sending less than 84 bunches to the MI per booster cycle and sending the remainder to the Booster dump. This method is regularly used for sending beam to SY120.
- _____ **Turn One** turn is one circumference of Booster beam at injection. N turns are N circumferences of Booster beam at injection. The more turns, the more beam per bunch.
- _____ **Harmonic Number (h)** is the number of stable RF buckets in a machine, or the maximum number of bunches an accelerator can hold at a particular RF frequency. It can be calculated by multiplying the beam revolution period times the RF frequency.

Accelerator Concepts

1. Accelerator Terminology
2. Magnets
3. Injection/Extraction
4. RF Terminology
5. Basic RF Systems
6. Transition
7. FNAL Accelerators
8. Machines
9. LINAC for HEP (H⁻ ions)
10. LINAC for NTF (H⁻ ions)
11. Booster
12. Main Injector
13. Main Injector for Collider
14. Main Injector for Pbar
15. Tevatron
16. Tevatron Collider
17. Antiproton Source
18. Recycler
19. Water, Power, Vacuum, & Cryogenics
20. Beam Intensity Monitoring
21. Bump Theory
22. Critical devices