Fermilab
FY2002 Self-assessment
Process Assessment Report
For
Division/Section_____PPD/CDF_________________

Date__9/24/02__________

Division/Section performing assessment
PPD CDF Operations Department

Name of organization that owns assessed process
PPD CDF Operations Department

Organization Strategy
How does the assessed process contribute to the accomplishment of the owning organization's mission? *The CDF experiment was proposed and built to probe the standard model in an effort to better understand the world we live in. The current level of precision of the standard model dictates that in order to make further progress in better understanding this model, very large data sets are required given the current state of accelerator technology. In order to acquire such data sets in a timely fashion, the CDF detector needs to operational when beam is in the machine. Thus the process of "Detector Uptime" is critical to the overall mission of this organization*

Names of Personnel on Assessment team
Mike Lindgren *Robert Roser*

Name of process assessed

CDF Detector Uptime

Brief description of process to be assessed

For the CDF experiment to be successful its detector needs to be available and capable of recording "physics" quality data for a substantial part of the total available time that collisions are occurring in the Tevatron. Since many of the physics measurements that the collaboration wants to make are statistics limited, it is extremely important that the detector be kept in a state where it can collect the largest data set that it is capable of.

1. Are metrics associated with this process? If so, what are they?

Detector Uptime is defined as the fraction of the time the detector is ready to take data when there are colliding beams in the Tevatron. This metric is a solid indication of whether the lab (PPD) is providing sufficient resources in a timely manner in order to keep the detector in operational condition.

"Uptime" percentage is a measurable quantity. Goals can be set with respect to this quantity that defines the degree of success that the CDF Operations Department has achieved. Those goals are outlined in this document. Reviews can examine the reasons for downtime and list what hardware and/or personnel resources are required to eliminate such downtime in the future.

In order to assign a grade for this self-assessment, we use the following criteria. If a system is working more than 75% of the time, that is considered good and gets 2 points. If a system is up more than 50% but less than 75% then that performance grade is fair and is given 1 point. If a system is up less than <50% of the time, that is considered poor and no points are given. The points are summed and the divided by the number of categories to get an average grade.

Target Value	***Rating***	***Numeric Value assigned***
>75%	*Good*	*2*
50-75%	*Fair*	*1*
<50%	*Poor*	*0*

2. What are the names of the procedures associated with this process?

List all procedure names that describe or document this process.

There are three distinct areas in which the laboratory has significant impact on the uptime efficiency of the CDF detector. They are:

- ***Process systems:*** *The detector Uptime is strongly coupled to how well CDF's process systems and detector infrastructure are working. Such systems include HVAC, chilled water, flammable gas mixing and delivery, AC power, liquid helium plant, superconducting solenoid, silicon cooling, personnel and equipment safety systems etc. There are a large number of procedures written to cover these systems – they include numbers 312,318,319,320,415,416,417,508,509. These can be found in* http://www-cdf.fnal.gov/htbin/cdfproc/listProc*. An example of such a procedure can be found in an appendix A of this document.*

- ***Fermilab CDF Group:*** *The Fermilab CDF group has specific duties and commitments to the experiment. These commitments are written down in a Memorandum of Understanding between the CDF experiment, the Fermilab CDF experimenters, and the PPD department (see appendix B). This MOU is essentially a contract between the three groups. There are currently ~30 PPD Fermilab physicists devoting 100% of their time on CDF. These physicists are responsible for the commitments detailed in the MOU—namely Central Outer Tracker, Silicon Operations, on-line data acquisition, Slow Controls, Level 2 trigger test-stand, and project management. If the resources of the Fermilab group slip with respect to the current level of commitments, this could potentially result in detector downtime.*

- ***PPD Resources:*** *The CDF experiment has an MOU with the lab with regards to specific laboratory resources that are not necessarily required full time but rather on an as-needed basis. Examples of these include engineering and technician help for specific electronics board repair, power supply repairs, specific diagnostic work, etc. When a problem arises, the amount of time it takes the lab to marshal sufficient resources to address the problem can result in a loss of detector uptime.*

3. Are these procedures being followed? Are they current?

Where a procedure would help in either maintaining a system or assists in trouble shooting a frequent class of problems, we have written them and placed them on the web for easy access. They have all been written in the past 18 months so they are still current.

4. Describe the methodology used to assess this process.

The long goal of the CDF operations department is to record "physics quality" data to tape with 95% efficiency. In other words, 95% of the time there is beam in the TeVatron, the detector is in working order and collecting data. In order to accomplish such a goal, the uptime of the detector must be close to 100%.

CDF has a number of systems in place that can be used to quantify the performance of the detector. A "down time data logger" has been implemented in our control room. If data taking is suspended for a period of more than 2 minutes, the shift crew is required to make a decision as to the underlying cause of the downtime and attribute this loss of data taking to it. In order to standardize this process, the shift crews have of order 50 categories from which to choose. The categories span the entire gamut from each detector subsystem, DAQ troubles, poor beam conditions, process systems failures, and operator error. The crews are trained in this process of assigning downtime. Our operations managers, who make all the daily decisions involved in running the experiment, check these entries to make sure the proper system is identified.

The next figure of merit is the detector good run. The shift crews have a specific set of criteria that each sub detector must meet in order for that run to be marked good – that is capable of being used in a physics analysis. If a detector does not meet the specific criteria, then its data is flagged as bad and the run is marked bad. Examples of such criteria include the loss of a VME power supply, failure of a calorimeter ADMEM electronics card, COT HV turned off, etc. Since most of the physics that the collaboration wants to do require that the entire detector be in working order, having pieces that are off is problematic.

We point out that the grading scheme highlighted in the "metric" section is for this year only. It is set with looser criteria because CDF was still in a commissioning phase part of this past year. Our final performance measures are detailed in the "opportunities for improvement" section.

5. <u>Results of the assessment:</u>

CDF experiment has put sufficient controls in place to quantify how well the experiment is doing in collecting its dataset. These tools can not only point out whether there is a problem but they have sufficient granularity to so that the experimenters know where to focus their energies in order to improve the situation.

Again, the overall goal of the CDF Operations Department is to be acquiring data at 95% efficiency. In other words, to have the experiment live and looking at beam 95% of the time there is beam in the Tevatron. Since there is some inherent downtime involved with turn-on of the experiment once beam conditions are stable, and the trigger system is designed with roughly a 1% dead time, this 95% is really about as good as CDF can do. Consequently, the detector uptime must be close to 100% in order to obtain this goal.

To better understand how well CDF has been doing over the past year, Appendix C contains two separate views of data taking efficiency. The first plot is merely a histogram of all stores. It has a long low side tail with a peak at about 80%. The average from that plot is close to 70%. This data was collected over the past year. The second plot contains the same data but is plotted as a function of time. From this one can see the learning curve we had as we commissioned and learned how to take data with the detector. CDF is currently able to collect data with an efficiency of about 80%.

Results from looking at good runs

System	Good Run Fraction	Grade
Total For CDF	*53%*	*1*
COT	*74%*	*1*
Silicon	*55%*	*1*
Process systems	*98%*	*2*
Summary		*Fair*

Results for the down time logger

SYSTEM	Downtime	Grade
COT	*15%*	*2*
Silicon	*48%*	*0*
DAQ	*15%*	*2*
Process systems (gas, power, water, HVAC, Solenoid)	*<1%*	*2*
Summary		*Fair-good*

Comments on the Good Run Statistics

- ***COT:*** *The good run fraction for the COT is low because of radiation damage on power supplies. Twelve silicon and COT power supplies were lost during a beam accident thanksgiving weekend 2001 as the result of high radiation in our collision hall. From that point on, CDF averaged about 2.7-power supply failures/week until April. Thirty-one of the 100 stores during that period were marked bad for COT. It took a task force of engineers and physicists almost 5 months to understand the problem and come up with a solution.*

- **Silicon:** *There have been 3 separate incidents over the past year in which silicon ladders were irreversibly damaged. The first incident occurred on March 30 – a beam accident occurred which caused problems in the pipeline readout for several ladders. Later there were two other incidents in which CDF was reading out the silicon while the trigger system was in an abnormal state (a combination of high number of level 1 trigger accepts and a large number of l2 rejects) which damaged either the jumpers between the R-phi and R-Z sides of a silicon plane or damaged the dense optical interface module (DOIM). After the first incident, the silicon was turned off during data taking for almost a month until sufficient accelerator interlocks were in place to minimize a reoccurrence. The silicon was also turned off for shorter periods of time after the other two incidents as well. Currently none of the 3 problems are well understood. Controls have been put into place to help protect the silicon and the L1 accept rate is now artificially kept low as a precaution. The silicon is now taking data but progress on gaining a fundamental understanding of these problems is going slow and will soon impact our physics program as luminosity increases.*

- ***Process Systems:*** *The process systems have been functioning quite well. The controls systems are very reliable and the operator coverage has allowed us to catch problems before they get to a point where data taking is impacted. The only significant outage this past year was to the solenoid. A ground fault developed in the system as a result of laminations in the high frequency chokes coming unglued and scraping away* *the insulation when power was cycled. Since this problem only occurred under full power, it was difficult to find – 4 stores of data were lost. A temporary fix has been implemented – the chokes will be rebuilt during the next significant downtime.*

Comments on the downtime logger

- **COT:** *Over the past year, the COT was down for several reasons. We had 3 occurrences of broken wires that had to be removed from the chamber. We had about 6 HV problems in which a wire had to be removed from the daisy chain and a COT VME power supply failed taking out 1/20 of all the readout electronics. In between these rare but substantial failures, the COT system has operated quite reliably.*

- ***Silicon:*** *It has taken a long time to get the silicon system to a state where it is operational. We are now at that stage. As noted above, there are 3 mysteries that may or may not be related that continue to "haunt" us. Until these are solved, we will remain vulnerable to another "accident" that will shut us off until we can understand the underlying cause.*

- ***DAQ:*** *The DAQ is currently responsible for ~50% of all downtime. That is not to say that 50% of the time we have beam in the machine we can't take data because of DAQ problems. Rather that for the current 20% downtime we have (running at 80% efficiency) half of that 20% is the result of DAQ issues. Not all of these problems are strictly DAQ problems but due to the close coupling between the hardware and readout systems, will require DAQ effort in order to solve them. The current DAQ group is doing an outstanding job making the system run as well as it does. However, to get the last 10% of dead time will require significant effort since there is no single source of problems.*

- ***Process systems:*** *The process systems have been running stably and are well maintained. It is rare that they are the cause of any significant downtime.*

Summary

CDF has had a busy year moving from the commissioning stage of the experiment to steady data taking with all of its systems in operational order. We have been in this steady data-taking mode since May 2002 and have worked hard to get the detector uptime fraction to near 80%. Given where CDF started the year, it has been very successful 12 months. However, the job is not done. We want to get our detector uptime to be close to 100%. For the purpose of this assessment, we have given ourselves a grade of "FAIR".

Identified opportunities for improvement

DAQ – Currently 50% of all detector downtime is attributed to a data acquisition failure of one type or another. The data acquisition group has done an outstanding job of making this complicated system work in reliable fashion. There is currently no single failure that can account for this loss – rather it is a series of minor problems that are only significant when taken in total. Each problem is solvable but requires attention. Strengthening this small but capable group would go a long way toward eliminating this source of trouble

COT – Fermilab has very few chamber experts resident. Over the past year, 3 wires have broken and had to be removed. One of our two primary experts, not currently resident at FNAL, had to be flown in on each occasion in order to make the repair. This type of single point failure can be a problem. Again, hiring a young associate scientist to look after the chamber and learn how to diagnose and trouble shoot problems could prevent substantial future downtime.

CDF spent some fraction of this past year commissioning the detector. Our self assessment grade took this into account. From this point forward, we plan on holding ourselves to a higher standard since we are now integrating physics quality data.
Our Grade for 2003 and beyond will be based on the following criteria. If a system is working >95% of the time, that is considered good and gets 2 points. If a system is up more than 85- 95%, that performance grade is fair and is given 1 point. If a system is up less than <85% of the time, that is poor and no points are given. The points are summed and the divided by the number of categories the Fermilab group is responsible to get an average grade.

Schedule for implementation of improvements

Over the next year we will try to strengthen the Fermilab group with several new hires – especially in the DAQ and COT systems. We will make a concerted effort to cross train those currently in the group in the different systems so that we are less dependent upon a single person.

Status of improvements from previous assessment

Not Applicable

Appendix A – A sample procedure

CDF PROC – 424 "Procedure for Opening/Closing Endplugs In the CDF Collision Hall"

This procedure details the necessary steps required to open or close the End Plugs in the CDF Collision Hall. There are two 100-ton End Plug assemblies that move in an east-west direction on a guided rail system in the collision hall. Each detector assembly is moved using a dedicated screw drive system that is capable of moving the assembly 66 inches in approximately 30 minutes. This motion is necessary to allow access to other detector systems in the collision hall. A checklist is included in this procedure that is to be used for every End Plug move.

Editorial Hand-Processed Changes Other Than Spelling
Require Co-Project Manager Approval

HPC Number	Date	Section Number	Initials
1.	________	________	________
2.	________	________	________
3.	________	________	________
4.	________	________	________
5.	________	________	________
6.	________	________	________
7.	________	________	________
8.	________	________	________
9.	________	________	________

Approvals

________________ ________________
(CDF Co-Project Manager) (Date)

________________ ________________
(Particle Physics Division Head) (Date)

(Beams Division Head) (Date)

1.0 Controlled Copies of this procedure.

Two controlled copies of this procedure will exist.

One will be held in the CDF Department Office Library.

The others will be on the CDF web page at

http://www-cdf.fnal.gov/cdfsafe/cdfproclist.html

All other copies will be marked, " INFORMATIONAL COPY ONLY "

2.0 The Procedure

The End Plugs shall be open and closed in accordance with the checklist provided in the next section. No other procedure is required for this move operation.

3.0 Checklist

The next several pages contain the checklist for moving the end plug detectors in the CDF Collision Hall. A separate checklist is to be filled out for each IMU being moved and for each direction of movement. Completed checklists are to be placed in the binder marked “Plug Move Checklists” in the CDF control room.

Appendix One: Endplug OPEN Checklist

The minimum number of personnel required to conduct this operation is five, at least 3 of which has been trained in this operation. The 5 people include the responsible engineer who manages the operation, equipment operator who operates the hydraulics, a task manager, and two observers. The observers function is to watch for any problems/interferences at the along each plug rail system, the endwall, as well as the bore of the endplug (CLC, miniplug, beam pipe) while the move is in progress. The task manager is responsible that each observer understands his role. During the move operation, no other work is to be performed in the immediate area around the equipment being moved. **NOTE: A separate checklist shall be completed for each endplug move operation.**

Plug Being Opened :____

Date of Move Operation:____

Printed Name of Responsible Engineer:____

Printed Name of Task Manager:____

Printed Name of Equipment Operator:____

Printed Name of Observers:____

Printed Name of Person Completing This Checklist:______________________________

Preoperational Inspection

Miniplug Inspection

- ☐ Inspect clc miniplug region for tools, loose cables, improper cables
- ☐ Page Sil Rad Co pager to remove BLM's and associated hardware
- ☐ Verify that eye-bolts that support carbon fiber tube shell are removed
- ☐ Remove Teflon beampipe spacer from inside CLC bore
- ☐ Verify "graboid" is attached to IMU and miniplug
- ☐ Insure that miniplug is free to "move" on its rail system – no locking set screws (both eye-bolts should be removed)
- ☐ Check no interferences on low beta quad magnet

Endwall Inspection

- ☐ Verify that curved "monkey bar" scaffolding has been removed from top of plug
- ☐ Check that nothing from cryo platform is creating interference if East plug is being moved.
- ☐ Remove cable ties which tie water hoses to relay rack

- ☐ Open Plug Relay racks and install platforms
- ☐ Verify CMX arches are pushed back to within 6 inches of silicon racks
- ☐ Inspect plug rails for debris/interferences
- ☐ Preinstall snout platform if so desired
- ☐ Install miniskirt platforms if so desired
- ☐ Loosen plug with hydraulic system
  - Pretension to 1000 lbs and check that all hydraulics are working
  - Tension to 6000 lbs and loosen nuts
- ☐ Remove hydraulics and associated equipment
- ☐ Verify that upper 4 swing bolts are elevated above the mounting forks
- ☐ Verify with MCR (x3721) that beam valves have been closed

Preparation for Move

Position spotters

- ☐ One watching each plug cable festoon (from inside CMP muon walls on lifts)
- ☐ One in plug bore watching miniplug, luminosity monitor and beampipe clearances
- ☐ One on the floor watching inside the bore, cmx power cables etc
- ☐ Drive operator positioned in front of hydraulic equipment
- ☐ Task Manager responsible for move has no assigned position

Move Operation

- ☐ Drive plug in maintaining uniform gap in bore between plug calorimeter and 30 degree covers as well as electromagnetic calorimeter and solenoid bore.
- ☐ STOP position is defined by clearance between CLC AND Miniplug. Leave a 2" stay clear gap. Roughly, this means the plug will be 7" shy of the rails end.

Note: During the move operation, the operator must remain in close proximity to the controller box so that the emergency stop button can be reached at any instant.

Secure from Move Operation

- ☐ Install platform inside 30 degree bore
- ☐ Install handrail on 30 degree bore
- ☐ Install beampipe protection inside bore
- ☐ Install lights in bore
- ☐ Clean up the area
- ☐ If beam is anticipated while end plugs are open, call MCR (x3721) and verify beam valves are open

Endplug CLOSE Checklist

The minimum number of personnel required to conduct this operation is five, at least 3 of which has been trained in this operation. The 5 people include the responsible engineer who manages the operation, equipment operator who operates the hydraulics, a task manager, and two observers. The observers function is to watch for any problems/interferences at the along each plug rail system, the endwall, as well as the bore of the endplug (CLC, miniplug, beampipe) while the move is in progress. The task manager is responsible that each observer understands his role. During the move operation, no other work is to be performed in the immediate area around the equipment being moved. **NOTE: A separate checklist shall be completed for each endplug move operation.**

Plug Being Closed :____

Date of Move Operation:____

Printed Name of Responsible Engineer:_______________________________________

Printed Name of Task Manager:____

Printed Name of Equipment Operator:____

Printed Name of Observers:____

Printed Name of Person Completing This Checklist:______________________________

Preoperational Inspection

Prepare inside of bore for plug closure

- ☐ Remove lights, extension cords, beampipe protection, platforms, shelves, handrail, ladders, etc from inside the bore
- ☐ Verify baggie seal is ok
- ☐ Check carbon fiber beam pipe stiffener is installed properly and joints taped
- ☐ Verify all rib bolts have been replaced
- ☐ Inspect all 30 degree covers to insure they are lying flat
- ☐ Vacuum inside bore to remove any loose debris
- ☐ Inspect the top of the plug to make sure it is free of debris

Miniplug Inspection

- ☐ Inspect clc miniplug region for tools, loose cables, improper cables
- ☐ Verify "graboid" is attached to IMU and miniplug

- [ ] Insure that miniplug is free to “move” on its rail system – no locking set screws (eye-bolts removed)

Endwall Inspection

- [ ] Remove all extension cords etc
- [ ] Check that nothing from cryo platform is creating interference if East plug is being moved.
- [ ] Check swing bolts on top of detector are elevated to clear mounting forks
- [ ] Verify swing bolts behind relay racks have been removed
- [ ] Verify CMX arches are pushed back
- [ ] Inspect plug rails for debris/interferences
- [ ] Verify with MCR (x3721) that beam valves are closed

Preparation for Move

Position spotters

- [ ] Add 2 measurement tapes to verify plug motion is parallel
- [ ] One watching each plug cable festoon
- [ ] One in clc bore watching miniplug, luminosity monitor and beampipe clearance
- [ ] One on the floor watching inside the bore, cmx power cables etc
- [ ] Drive operator positioned in front of hydraulic equipment
- [ ] Task Manager responsible for move has no assigned position

Move Operation

- [ ] Drive plug in maintaining uniform gap in bore between plug calorimeter and 30 degree covers as well as electromagnetic calorimeter and solenoid bore.
- [ ] When 18” from final location, stop motion, open plug relay racks and position people in there to verify that cables are not crushed by hydraulic fixturing.

Note: During the move operation, the operator must remain in close proximity to the controller box so that the emergency stop button can be reached at any instant.

Secure from Move Operation

- [ ] Tighten plug with hydraulic system and nuts
    - Pretension to 1000 lbs and check that all hydraulics are working
    - Tension to 6000 lbs and tighten nuts
- [ ] Remove hydraulics and associated equipment
- [ ] Remove the “graboid” from the IMU steel
- [ ] Install eye bolts on miniplug rails to prevent miniplug from moving
- [ ] Install Teflon beampipe spacer between pipe and CLC bore

- ☐ Page Silicon Rad Co to reinstall BLM apparatus and cables
- ☐ Clean up the area
- ☐ Remove end plug relay rack platforms and close plug relay racks (using a spotter and dressing cables behind the racks as you go)
- ☐ Tie water hoses to relay racks to prevent interference with IMU snout steel
- ☐ Check solenoid interlocks and make sure plug limit switches are properly made up
- ☐ Notify MCR that plug move is complete and beam valves should be open

4.0 Deviations from the Procedure

All deviations from the above procedure must be approved by the Department Head, after consultation with the head of the I&I group or their deputies.

5.0 Required Training and Authorized Training Personnel.

The required training for this (CDF-II 424) procedure is in the form of “hands-on” Experience gained while participating in an actual IMU move conducted by trained Personnel. All personnel participating in this operation must be approved for CDF Supervised Access or CDF Controlled Access.

LIST OF AUTHORIZED TRAINING PERSONNEL FOR THIS PROCEDURE:

Name (Last, First)	I.D.#
Carter, Harry	3236
Voirin, John	4940
Roser, Rob	11910
Moccia, Stefano	12246

Either a procedure practice run led by an authorized trainer or a verbal discussion with an authorized trainer is the only required training. This choice depends on the specific procedure being performed and experience of the trainee.

6.0 Training Materials.

A copy of this procedure

7.0 List of Trained People for this procedure.

The list of trained people for this procedure will exist in written form in the CDF Department copy of this procedure. Only CDF personnel will be trained in the procedure.

Harry Carter
Rob Roser
Pat Lukens
Stefano Moccia
Dervin Allen
John Voirin

8.0 References and Supporting Documentation

None

Appendix B -- Memorandum of understanding between the lab, the CDF experiment, and the CDF FNAL experimenters

12 January 2001

X. MOUs and the CDF Organization at Fermilab

The CDF experiment is supported by several departments at Fermilab. Within the Particle Physics Division (PPD), the CDF Department supports all Fermilab physicists active on CDF, and is the host for collaboration support. The CDF Operations Department (COD) has responsibility for the operation of the detector, drawing on technical support from PPD and the Computer Division (CD), and from all institutions in the collaboration. The CDF Offline Operations Organization (COOO) is responsible for coordinating offline computing for the collaboration, and interfaces to the CDF Computing and Analysis Department (CCAD) of the Computer Division.

Each institution in CDF collaboration has an MOU with the collaboration and FNAL describing the contributions and responsibilities. At Fermilab, the CDF Department fulfills the role of this collaborating "institution".

The functions and organization of CDOD and COOO/CCAD are described in the Operations Management Plan for the CDF Experiment in Run II.

Agreement on responsibilities and support is described in the following series of MOUs:

- CDF Department institutional MOU with the CDF Collaboration and FNAL (part of the full set of collaboration MOUs)
- CDOD MOUs
    - with PPD for operational support
    - with CD (Prep) for equipment
    - with CD for support for on-line computing
- COOO/CCAD MOUs with CD on:
    - Date handling operations
    - Support for offline desktop systems
    - Database support
    - Central Analysis System operations

- Support for the Event Data Model software
- Operations of the CDF production farms
- Support for the CDF Applications Framework, AC++

II. **Personnel and Coordination of Responsibilities.**

A. The following members of Fermi National Accelerator Laboratory are presently participants in the collaboration. This level of commitment indicated is expected to remain approximately constant for three years.

		Usual	Total CDF	Other
Name	Title	Location	Fraction	Commitmen
A. Meyer	RA	Fermi	100%	
R. Erbacher	RA	Fermi	100%	
J. Dittmann	RA	Fermi	100%	
J. Goldstein	RA	Fermi	100%	
A.-P. Colijn	RA	Fermi	100%	
T. Nelson	RA	Fermi	100%	
M. Bishai	RA	Fermi	100%	
P. Merkel	RA	Fermi	100%	
T. Miao	Physicist	Fermi	100%	
F. Chlebana	Physicist	Fermi	100%	
A. Mukherjee	Physicist	Fermi	100%	
S. Tkaczyk	Physicist	Fermi	100%	
A. Yagil	Physicist	Fermi	100%	
J. Lewis	Physicist	Fermi	100%	
P. Lukens	Physicist	Fermi	100%	
B. Flaugher	Physicist	Fermi	100%	
J. Incandela	Physicist	Fermi	100%	
J. Yoh	Physicist	Fermi	100%	

M. Binkley	Physicist	Fermi	100%	
R. Vidal	Physicist	Fermi	100%	
B. Wagner	Physicist	Fermi	100%	
J. Patrick	Physicist	Fermi	100%	
H. Jensen	Physicist	Fermi	100%	
J. Spalding	Physicist	Fermi	100%	
B. Kephart	Physicist	Fermi	100%	
C. Newman-Holmes	Physicist	Fermi	100%	
R. Culbertson	Physicist	Fermi	100%	
D. Stuart	Physicist	Fermi	100%	
S. Vejcik	Physicist	Fermi	100%	
R. Tesarek	Physicist	Fermi	100%	
P. Wilson	Physicist	Fermi	100%	
R. Roser	Physicist	Fermi	100%	
D. Glenzinski	Physicist	Fermi	100%	
T. Liu	Physicist	Fermi	100%	
J. Umesh	Physicist	Fermi	100%	
J. C. Yun	Physicist	Fermi	100%	
S. Hahn	Physicist	Fermi	100%	
J. J. Schmidt	Physicist	Fermi	100%	
B. Badgett	Physicist	Fermi	100%	
M. Albrow	Physicist	Fermi	40%	
G. Apollinari	Physicist	Fermi	25%	
A. Byon-Wagner	Physicist	Fermi		
F. DeJongh	Physicist	Fermi		
J. Elias	Physicist	Fermi		
B. Foster	Physicist	Fermi		
J. Freeman	Physicist	Fermi		

K. Maeshima	Physicist	Fermi	50%	
L. Speigel	Physicist	Fermi	50%	
A. Tollestrup	Physicist	Fermi		
W. Wester	Physicist	Fermi	75%	
L. Buckley-Geer	Physicist	Fermi		
S. Lammel	Physicist	Fermi	100%	
D. Livintsev	RA	Fermi	100%	
K. McFarland	Physicist	Fermi	100%	
P. Murat	Physicist	Fermi	100%	
M. Siket		Fermi	100%	
R. Snider	Physicist	Fermi	100%	
E. Wicklund	Physicist	Fermi	100%	
S. Wolbers	Physicist	Fermi	100%	
G. P. Yeh	Physicist	Fermi	100%	

Kennedy	Rob	CP	100	Event Data Model		CD/CDF
Lammel	Stephen	Faculty	100	Data Handling/Central systems		CD/CDF
Leininger	Mark	CP	100	Data Handling/Central systems		CD/CDF
Litvintsev	Dmitry	RA	100	Data Handling/Databases		CD/CDF
McFarland	Kevin	Faculty	100	Offline Operations Co-Head		Guest Scientis
Murat	Pasha	Faculty	100	Offline Operations Manager		CD/CDF
Siket	Miroslav	Grad Stud	100	Production Farms		Guest Scientis
Snider	Rick	Jr Faculty	100	Production Executable		CD/CDF
Wicklund	Eric	Faculty	100	Data Handling		CD/CDF
Wolbers	Steve	Faculty	100	Production Farms	Deputy Head of CD	CD/CDF
Yeh	GP	Faculty	100	Production Farms	Taiwan Affairs/NLC	CD/CDF
CDF Task Force						
Colombo	Rick	CP	100	Central Systems/Desktop Systems		CD/CDF
Cooper	Glenn	CP	100	Central Systems		CD/CDF
Glosson	Richard	CP	100	Offline Framework & Infrastructure		CD/CDF
Harrington	Jason	CP	100	Desktop Systems		CD/CDF
Herber	Randolph	CP	100	Desktop/Central/Database/Data Handling		CD/CDF
Hubbard	Paul	CP	100	Data Handling		CD/CDF
Jetton	Richard	CP	100	Central Systems		CD/CDF
Schmitz	Mark	CP	100	Desktop Systems		CD/CDF
Other Departments of Computing Division						
Kreymer	Art	Appl Phys II	100	Code Management		CD/PAT
DeBaun	Chuck	CP	100	Code Management		CD/OSS
Kowalkowski	James	CP	50	C++ Consulting	50% D0	CD/SA
Patterno	Mark	CP	50	C++ Consulting	50% D0	CD/SA
Sexton-Kennedy	Liz	CP	100	Offline Project Engineer/Framework		CD/SA
Vittone	Margherita	CP	70	Slow Controls		CD/ODS
Stanfield	Nelly	CP	70	Database Administration		CD/ODS
Bonham	Diana	CP	10	Database Administration		CD/ODS
Trumbo	Julie	CP	50	Database Consultant	50% D0	CD/ODS
Box	Dennis	CP	100	Database Interface Applications		CD/ODS
Amundson	Jim	CP	10	Code Management (SoftRelTools)		CD/ODS
Totals for CD			**29.1**			
Beams and Tech Div						
Derwent	Paul	Jr Faculty	100	SVT/Rad interlocks/BD Run II coord.		
Schlabach	Phil	Jr Faculty	20	assignable/Run II author		
Totals for BD/TD			**1.2**			

B. The coordinators for the Fermi National Accelerator Laboratory are Robert Kephart and Hans Jensen (CDF Department), William J Spalding (CDOD) and Robert Harris (COOO). Fermilab has two members of the CDF-II Executive Board, presently any two of Robert Kephart, Cathy Newman-Holmes and Morris Binkley. William Spalding and Robert Harris are ex-officio members.

V. Responsibilities of Fermi National Accelerator Laboratory

PPD CDF Department

A. ***Institutional Responsibilities***

Project: COT

One of the Project Leaders for the COT operations is Bob Wagner from FNAL. He will coordinate overall operation of the chamber and problem solving. FNAL will provide two additional Physicists (Post Docs and/or senior people) to support the operation of the COT. Currently these are Morris Binkley and one post doc, Ting Miao. FNAL is currently responsible for the low current power supplies, temperature monitoring, and parts of the readout electronics. PPD will provide technical manpower for necessary repairs and maintenance of the chamber including its gas system.

Project: Silicon Operations

FNAL has major responsibilities for the operation and maintenance of the CDF Silicon Systems. Doug Glenzinski is one of the operations leaders for this project. FNAL currently has a mix of PPD postdocs, and scientists totaling 10 people assigned to this project. In addition, technicians and engineers will be provided from the PPD through CDOD to support operation of the silicon cooling systems. The FNAL physicists responsibilities include maintenance of the hardware for the readout electronics and maintenance and operations of the cooling system hardware. (Note that the latter excludes interlocks and PLC code which is currently the responsibility of Rochester.) FNAL will also provide physicists to the pool of people who will perform silicon detector monitoring during Run IIa.

The FNAL Computing Division (CD) will provide engineering and technician support to troubleshoot the silicon readout systems built by that division. The CD PREP organization will provide repair services for both the readout electronics and the CAEN power supplies.

FNAL will continue to maintain this level of effort through the first year of Run II operations. After this period, depending on operational experience, it may be possible to reduce the number of people required while still maintaining the goal of high efficiency and "up" time. The Physicists assigned are indicated in the attached table.

Project: iFix

FNAL is responsible for the operation and maintenance of the Monitoring and Controls iFix system. Pat Lukens from FNAL is the physicists who serves as operations leader for this project. A total of 4 people from FNAL are assigned to this task; Two additional physicists, John Yoh and JC Yun, and one electrical tech/computer professional Mark Knapp. This group is charged both to maintain and to improve this system. We will continue to maintain this level of effort through the first year of Run II operations. After this period, depending on operational experience, it may be possible to reduce the number of people required while still maintaining the goal of high efficiency and "up" time.

Project: Central Calorimeter Front End Electronics

Responsible for continued maintenance of the Central Calorimeter Front End electronics (ADMEM). Typically one Post Doc and one Wilson Fellow are assigned. Engineering & Technical support will be provided by PPD as needed.

Project: Collaboration administration

The CDF Department is responsible for administration at FNAL on behalf of the CDF collaboration for all activities except operation of the detector complex which is the responsibility of CDOD . This includes providing secretarial support for the spokespersons, secretarial support for new collaborator registration, administrative support and funding for publication of CDF scientific papers, administration of the CDF office complex, financial and technical support for Xeroxes, printers, and networking in the office complex, financial and technical support for video conferencing, financial support for telephone services.

Other Project Activities:

In addition to the FNAL institutional responsibilities, the CDF Department is providing physicist labor for a variety of projects for which we do not accept continuing institutional responsibility. Examples include: XFT, trigger commissioning, detector alignment, online monitoring software, Silicon Radiation Interlocks, and Forward Physics. The personnel working on these projects are indicated in the attached table. These individuals will continue working on these service tasks at least through the commissioning phase of the experiment, but

FNAL is not committed to replace them with others beyond that time, should they no longer be available to perform these functions.

B. **Online Activities**

Project: Online/DAQ

FNAL is responsible for the operation and maintenance of the CDF online/DAQ system. Jim Patrick is the operations leader for this project. FNAL currently has a mix of PPD postdocs, associate scientists, and scientists totaling 8.5 people assigned to this project. We will continue to maintain this level of effort through the first year of Run II operations. After this period, depending on operational experience, it may be possible to reduce the number of people required while still maintaining the goal of high efficiency and "up" time. The People assigned are indicated in the attached table.

C. **Offline Activities**

Project: Tracking Software

FNAL is responsible in part for the operation and maintenance of the CDF tracking code. Avi Yagil is one of the leaders of this group. In addition Aseet Mukherjee and FNAL postdocs will participate in the development and maintenance of this software. FNAL will contribute 3 Physicists to this effort.

D. **Offline Representative**

The FNAL offline representative is Robert Harris.

E. **Deliverables**

1. List here the CDF Department deliverables [?]…
2. Tracking code [?]…

F. **Operational Activities**

1. Post Docs will participate as Aces. Senior Faculty will participate as SciCo's, DCM's, Ops Managers, and sub-project leaders.
2. Maintenance of …COT, silicon, IFIX…

G. **Supervision**

Robert Kephart is head the CDF Department in PPD. Hans Jensen serves as his deputy.

H. **Schedule**

The detector will run beginning March 2001. Offline development is in progress.

**CDF-II Memorandum of Understanding between
Fermi National Accelerator Laboratory and the CDF-II Collaboration**

__________________________________ ______________________
Fermilab Directorate date

__________________________________ ______________________
CDF-II Detector Coordination Manager date

__________________________________ ______________________
CDF-II Detector Coordination Manager date

__________________________________ ______________________
CDF-II Offline Detector Coordination Manager date

__________________________________ ______________________
CDF-II Offline Detector Coordination Manager date

__________________________________ ______________________
CDF-II Spokesperson date

__________________________________ ______________________
CDF-II Spokesperson date

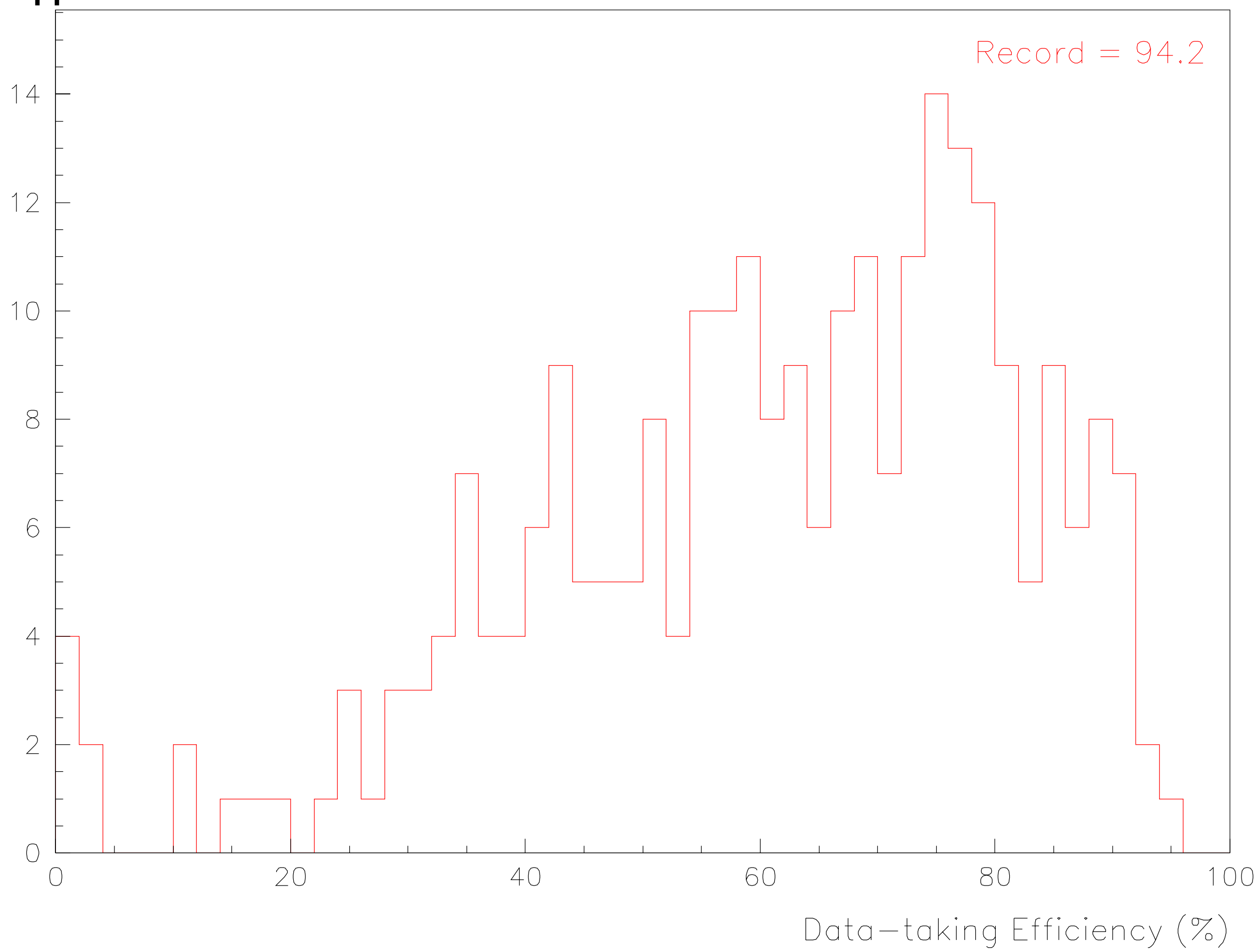
__________________________________ ______________________
PPD Div Head date

______________________________ ______________________
CDSC Head date

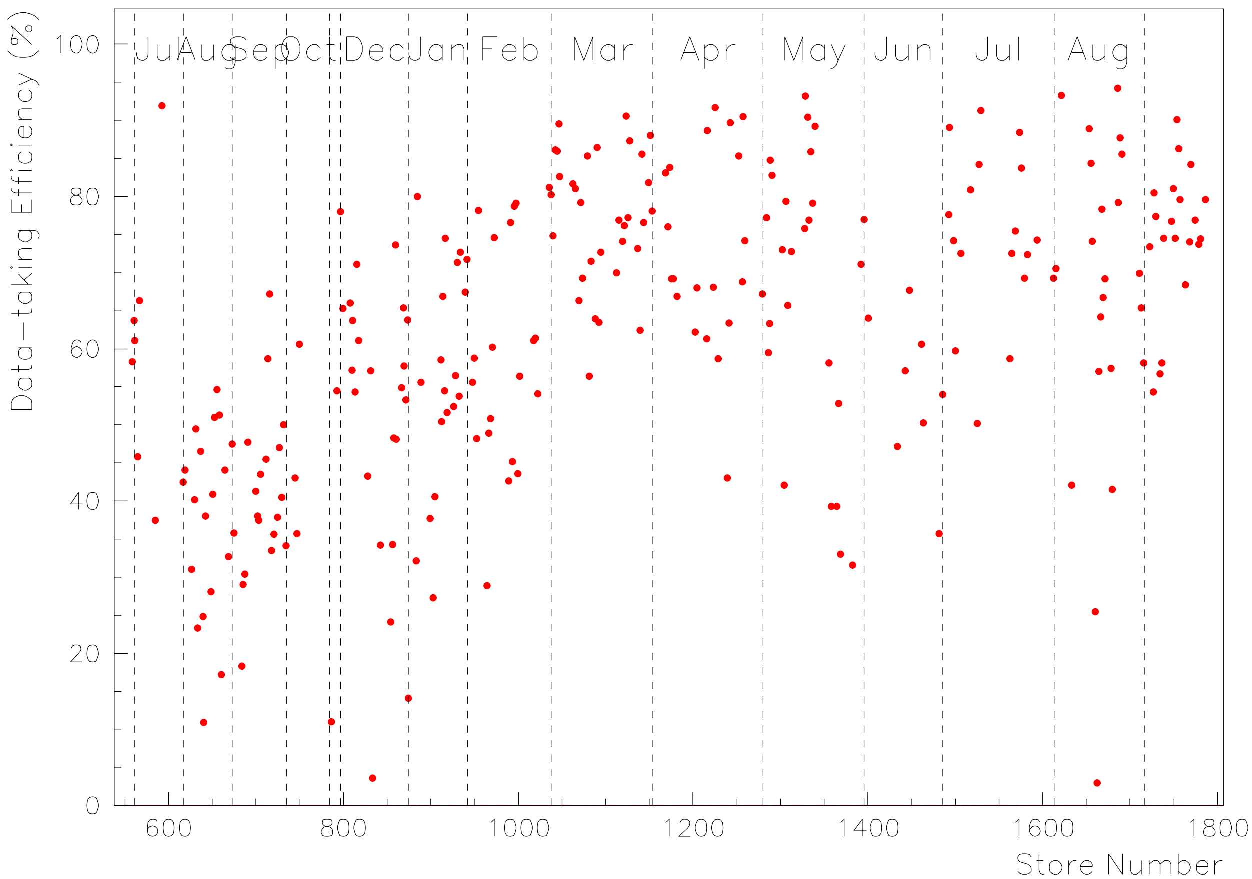
______________________________ ______________________
CDSC Head date

______________________________ ______________________
Proj. Ldrs… etc date

Appendix C



This is a histogram of CDF's data taking efficiency for the past 12 months. The long low side tail can be attributed to detector commissioning. The average from this histogram is ~70%. The best store to date is 94.2%.



This scatter plot shows the CDF data taking efficiency for every store as a function of month for the past year. One can clearly see the upward slope from the early part of the year as we commissioned the detector and learned how to use it. Currently, the data taking efficiency is about 80% and flat. Note the goal here is 95%.

Appendix D