FACILITY UTILIZATION SUMMARY -- OCTOBER 1975

In October the high energy physics research program was basically a continuation of the 400-GeV run which began in July, with primary emphasis on the neutrino program. Accelerator operation was about as reliable as in September, with beam delivered to users for some 429 of the 587 hours scheduled, but the average beam intensity rose markedly and the beam spill quality continued to show improvement. An electrostatic extraction septum of improved design was installed early in the month. After some initial problems were resolved it operated well, and significantly reduced extracted beam losses. Routine splitting of higher intensity, slow-spilled beams to the Proton and Meson Areas were thereby made possible. Further improvements were made in the parallel connections and cooling of the main-ring magnet electrical feeders which resulted in an additional 15% reduction in the cycle time, to less than 8.5 sec when the accelerator is operating at 400 GeV with a 1-sec flat-top. This produced a corresponding 15% increase in the time average beam flux delivered by the accelerator. The net result of these efforts was a record monthly total of nearly 1.9×10^{18} protons accelerated.

During the last week in October the Meson Area was off for maintenance and development, while a concentrated effort was made to supply beam to the Neutrino Area at the highest intensity, consistent with continued running for the Proton Area program. A nominal 1-sec slow-spilled beam was extracted to the external experimental areas throughout the month, with four "pings" per machine cycle sent to the deuterium-filled 30-inch bubble chamber via the bypass beam.

The Neutrino #21 and Neutrino #254 experiments continued to receive first priority attention during October. About 1.4×10^{18} protons were delivered on target for these two groups, nearly half of them during the last week of the month. Antineutrino cross-section data were collected at three energies to complete both experiments. Elsewhere in the Neutrino Area, Experiments #209, #280, and #196 were completed in the 30-inch bubble chamber, with 50,800 pictures, 39,300 pictures, and 109,500 pictures, respectively, and incident proton beams of 300 GeV, 200 GeV, and 400 GeV, respectively. An additional 70,100 pictures were taken for Experiment #295 in a run that continued into November. Particle Search #382 continued parasitic set-up and testing work in the N-1 beam for nearly three weeks using hadrons, and then, for preliminary data, exposed two emulsion stacks to muons during two shifts of priority running. The targets for Quark #276 continued to receive bombardments on the target train from all slow-spilled beam in the N-0 line.

Four Proton Area experiments ran and collected data this month. Photoproduction #87A collected a significant quantity of data using the photon beam in Proton-East following a short tuneup with neutrons. In Proton-Center, Di-Lepton #288 collected data for the first two weeks followed by two weeks of tuneup and data taking by Di-Muon #436. Photon Search #95A was collecting some preliminary data in Proton-West after about two weeks of apparatus tuneup and calibration work.

The Meson Area program involved a total of eight user groups during the three weeks of area operation. Form Factor #216 completed data taking

work for the experiment on October 1. Neutral Hyperon #8, Elastic Scattering #69A, and Neutron Elastic Scattering #248 were in various stages of data collection during this period. Hadron Jets #236A and Hadron Jets #260 were both primarily involved in tuneup, testing, and calibration of their apparatus when beam was used. Particle Search #357 collected some preliminary test data, running behind Neutral Hyperon #8 in a parasitic mode throughout this period. Neutrino #310 tested their calorimeter during a few shifts of running while sharing the beam with Hadron Jets #260.

In preparation for future running using the spectrometer, Particle Production #418 continued to collect test data at the Internal Target Area using a rotating target. At the same time, during day and evening shifts, Proton-Proton Inelastic #321 continued to test their warm hydrogen gas jets using first a 3-mil and later a 1-mil jet nozzle. They also did some calibration of their detectors. Proton-Nucleon Inelastic #317 ran during the last week of October using the cold hydrogen jet, primarily to recheck and recalibrate some modifications and additions to their detector array.

The facility utilization summary for the month of October is as follows:

I. Summary of Accelerator Operations

		Hours	
A. Accelerator use for physics research			
Accelerator physics research		57.8	
High energy physics research		429.2	
Research during other use		(74.0)	
	Subtotal		487.0

B. Other activities

	Hours	
Accelerator setup and tuning to experimental areas	16.5	
Programmed interruption	51.6	
Unscheduled interruption	189.9	
Subtotal		258.0

C. Unmanned time

Total	745.0*

II. Summaries of High Energy Physics Research Use

	# of Expts.	Hours	Results
A. Counter experiments	19	3116.4	
B. Bubble chamber experiments	4	299.6	269,800 pictures
C. Emulsion experiments	-	-	
D. Special target experiments	1	391.4	3 targets
E. Test experiments	-	-	
F. Engineering studies and tests	-	-	
G. Other beam use	-	36.7	beam tuning
	24	3844.1	

III. Number of Protons Accelerated and Delivered ($\times 10^{18}$) @ 400 GeV

A. Beam accelerated in main ring	Total	1.896
B. Beam delivered to experimental areas		
Meson Area		0.231
Neutrino Area		
Main beam (N-0)		1.269
Bypass beam (N-7)		0.011
Proton Area		0.085
	Total	1.596

*Change to Central Standard Time 0200, October 26, 1975.

IV. Beam Utilization by Experiment

	Hours	
A. Meson Area		
Neutral Hyperon # 8	295.5	
Elastic Scattering # 69A	158.2	
Form Factor # 216	18.3	
Hadron Jets # 236A	228.2	
n Elastic Scattering # 248	206.5	
Hadron Jets # 260	26.7	Tests
Neutrino # 310	90.5	Tests
Particle Search # 357	170.7	Tests
B. Neutrino Area		
Neutrino # 21A	316.2	$\int p \simeq 1.2 \times 10^{18}$
30" p-d @ 400 GeV # 196	88.5	109,450 pictures
30" p-d @ 300 GeV # 209	59.4	50,846 pictures
Neutrino # 254	72.8	$\int p \simeq 2.3 \times 10^{17}$
Quark # 276	391.4	3 targets (continuation)
30" p-d @ 200 GeV # 280	35.0	39,336 pictures
30" π^+-d @ 200 GeV # 295	116.7	70,133 pictures
Particle Search # 382	139.6	2 emulsion stacks exposed
C. Proton Area		
Photoproduction # 87A	296.6	
Photon Search # 95A	349.5	
Di-Lepton # 288	85.5	
Di-Muon # 358	15.0	
Di-Muon # 436	177.8	
D. Internal Target Area		
p-p Inelastic # 317	130.7	
p-p Inelastic # 321	53.5	
Particle Production # 418	284.6	
Total	3807.4	