

Fermilab's 15-Year Plan: a Head-Start on the Future

by Thomas Kirk

Note: This article is excerpted from "The Fermilab 15-Year Institutional Plan" by Thomas Kirk, which appears in its entirety in the August-September issue of Fermilab Report.

The 15-Year what? Fifteen years! Yes, Virginia, there is a Plan. Actually, there are several possible plans in an interesting document recently completed at Fermilab and presented to the U.S. Department of Energy (DOE). The Institutional Plan is periodically requested of DOE laboratories as a way of both stimulating the laboratory management to think ahead on a longer time scale and to inform the agency of directions that the national laboratories might seek to follow in future years. Earlier, the plan was set in a five-year framework. This time, the ante was raised to 15 years.

For all of you readers with weak hearts and vested interests in Fermilab's high-energy physics (HEP) program, none of the plans presented (not even variants of the plans) seek to have the Laboratory closed by the year 2002 and the site fully restored to farming. We propose and fully expect to pursue our traditional job of providing facilities for world-class high-energy physics (with the participation of scientists from all over the world) well into the next century.

In a small concession to the imperfect nature of our foresight into future events beyond our control, the Plan is developed under three basic scenarios that interact deeply with the much-discussed Superconducting Super Collider (SSC) project and with its fate at the hands of the U.S. Government. The three scenarios can be stated as follows:

- i) the SSC goes ahead at Fermilab;
- ii) the SSC goes ahead and is sited elsewhere;
- III) the SSC is delayed indefinitely or dies.

A vigorous and challenging future for Fermilab can be envisioned under any of the above circumstances, but the last possibility is tempered by the realization that the SSC's dying will more likely reflect the judgement that deficit reduction has a higher priority rather than the discovery of a serious flaw in the rationale for, or in the conceptual design of, the SSC.

Before getting into the different forces each of the scenarios brings to bear on Fermilab, it is useful to remember that we are just at the dawn of the TEVATRON physics era. Our main goal will be to exploit this exciting and powerful new facility for fixed-target and colliding-beam physics, a goal that will dominate operations here for the next 6 to 10 years, regardless of the SSC's fate. It is mainly at the point when SSC starts to do physics (rather than to build magnets and pour concrete) that the scientific and

institutional fate of the Laboratory becomes locked into the conditions of one of the noted possible scenarios.

That isn't to say the Fermilab program won't feel the presence of the SSC in its activities and plans from the beginning (or the chill of government neglect if the SSC dies). There will be manpower stresses created throughout the entire high-energy physics community by the need to build up the SSC scientific staff at a rapid rate, and there will be continuously increasing pressures to devote beamlines and accelerator time to SSC R&D for related detectors and accelerator systems. This, however, is the sort of heady challenge to the high-energy physics community and the Laboratory that has historically sparked new levels of productivity and attracted bright young people to the field.

Improving the TEVATRON

An important key to the evolution of a successful TEVATRON physics program is the ability of the accelerator to improve its operating effectiveness over time. Part of the effectiveness improvement comes from operating experience, but the larger gains are normally made through an ongoing program of machine upgrades and improvements. As part of our Institutional Plan, we have identified a formal upgrade plan for the TEVATRON accelerators ("Fermilab Collider Upgrade Plan") that continuously improves our ability to do physics.

If the SSC comes to Fermilab, the upgrade will insure that we meet the technical design requirements for a 1-TeV SSC injector. If the SSC goes elsewhere or dies, the upgrade plan insures that the physics of the TEVATRON will continue to improve over the years. Experiments that require more and more luminosity can, therefore, be confidently planned and carried out in any circumstance.

The physics output of the Laboratory will grow and prosper under the upgrade, especially the collider physics segment which can look forward to an improvement of perhaps a factor of 50 in luminosity over the six years duration of the upgrade plan. The luminosity growth will parallel the scientific evolution of the collider program in a very complementary way. The fixed-target program will realize a smaller but important factor of luminosity improvement, principally because the TEVATRON is already nearly as good a machine as a 6-kilometer ring with its fundamental space charge limitations can be! In the case of fixed-target physics, the health and vigor of the program really rests mainly on its diversity and the imagination of the scientific participants.

Now, let's look at the three postulated scenarios noted above and how they affect the plan for physics at Fermilab.

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("15-Year Plan" continued from page 1)

Scenario I - SSC at Fermilab

The big *advantage* of this scenario is that a significant part of the upgrade of the Fermilab accelerator is integrated and compatible with the needs of the SSC injector. Many of the accelerator studies will be common to both TEVATRON and SSC goals. The Laboratory will also realize the advantage of seeing a future stretching well into the 21st century as TEVATRON physics evolves into SSC physics.

The big *problem* will be the tendency of SSC Project management, regarded in the 15-Year Plan as separate from TEVATRON Physics Program management, to stress already heavily burdened Fermilab manpower. Perhaps as many as 250 professionals (scientists and engineers) will eventually migrate from TEVATRON work to SSC work. A vigorous recruiting program will need to be started as soon as the SSC buildup begins, to insure that manpower levels do not become the limiting factor in physics and SSC Project performance. The attractions of a powerful new machine for science will help in this recruiting effort.

In the latter half of the 15-year period, new physics initiatives could evolve in addition to the currently planned TEVATRON fixed-target/colliding-beam program and the anticipated program for the early years of the SSC. Such new initiatives could involve new facilities such as an intermediate energy, site-filling dedicated collider (say 3 TeV on 3 TeV or 4 TeV on 4 TeV) or a modestly upgraded fixed-target program. The physics discoveries of the early TEVATRON years will drive the facilities initiatives in the later years of this Plan.

Scenario II - SSC Sited Elsewhere

This scenario presents Fermilab with equally difficult problems. The SSC will seek at an early moment to attract away our accelerator professionals in wholesale lots. In addition to the SSC main ring, they will need to begin designing and building the entire injector accelerator chain from scratch. This will place a severe strain on Fermilab. We assume we will lose 150 or so key people who will be replaced painfully slowly at a rate not expected to exceed 50 per year. All this as we struggle to operate and improve the TEVATRON for its program of forefront physics. A stiff challenge, alright.

Assuming Fermilab can meet the challenge of rebuilding its staff and that the upgrade of the TEVATRON facilities is slowed by no more than about three years, we should be in a position to contemplate new ideas and facilities that complement the SSC program and maintain a vigorous science program at Fermilab in the latter years of the 15-year period and on into the new century.

We further observe that a vigorous and healthy scientific and test program at Fermilab for the next few years will also be extremely important to the goals of the SSC, regardless of where it is located. In such a program, the development of SSC detectors and the verification of needed accelerator physics results will evolve with as much urgency as if the SSC were being built here. The TEVATRON, after all, will still be the only 1-TeV game in town for many years!

Assuming we can surpass all of these daunting hurdles we will see a rich variety of tempting choices a few years down the road from which to select in order that we be fruitful in the shadow of SSC.

Scenario III - SSC Delayed Indefinitely or Dead

Here we assume the SSC died because it was too expensive; we are, therefore, faced with the challenge of examining all the options for maintaining a significant U.S. presence in HEP. We discuss some of these. In all cases, the base TEVATRON program mentioned above (including the continuous upgrades) must be preserved. The issue is whether Fermilab now has the responsibility to replace the SSC with a less costly but still useful new facility. We will, of course, be influenced by what is happening in Europe. To appreciate the dilemma we could face, we review the SSC rationale.

The parameters for that machine were chosen so that there would be reasonable assurance (approaching 100%) that the outstanding problems of particle physics as now perceived could be incisively addressed. This is not to say that a lesser machine would not make important discoveries - it is to say that, considering the man years of human resources and the substantial financial investment that *any* multi-TeV accelerator requires, it has seemed prudent to the U.S. community to set the parameters of the SSC so as to guarantee success. Alternate scenarios at lower cost remove the possibility of assured success; we list options:

1) Continue the base physics program and machine upgrades and support vigorous R&D towards an SSC-sized machine for a period perhaps 5-10 years later than 1994;

2) continue the TEVATRON upgrade but bias it in favor of an "SSC Little-Brother" hadron collider; with the TEVATRON as injector and the existing p source, one can build an interesting machine at, say, 10 TeV x 10 TeV with modest luminosity. The cost is about \$1 billion. The effort is 5-6 years of very hard work and the prospects for resolving the basic physics uncertainties are much reduced.

We find it hard going to explore this third option at the present time, but the two possibilities outlined here could be expanded and developed if it later becomes necessary.

So, after walking through this tour of the 15-Year Plan, we see that there are both thrilling possibilities and dire threats ahead. It is also more believable that a 15 year planning interval is not ridiculously long and that, in fact, the first bricks must be laid soon to build the edifice of future high-energy physics at Fermilab. By submitting our "Fermilab Collider Upgrade Plan" in abbreviated form to DOE in January of this year, we have already set in place the formal foundation on which the bricks of progress can be laid. The next steps are up to DOE and the U.S. Congress. Meanwhile, at Fermilab, we work in the very tangible here-and-now, bringing up the TEVATRON for physics.

Fermilab Employees' Arts and Crafts Show

An Arts and Crafts Show featuring the work of any Fermilab employee, visiting scientist, contractor, retired employee, or member of his/her immediate family is planned for October 27 through November 20, 1986. Planners hope to display the work of as many craftspersons as possible, so there is a limit of five entries per participant. Applications are available from Jean Guyer at the Information Desk in the Atrium. Applications must be returned to Jean by 5 p.m., Friday, October 24, 1986. For more information please contact Sandra Cox at ext. 2031.

Fermilab's Education Outreach Featured on Cable News Network

Recently, Cable News Network (CNN) featured Fermilab on its "Science Spot." The segment, shown nationally several times late in June, was about Fermilab's participation and leadership in the Illinois Research Corridor Summer Job Program for Superior Science and Math Teachers.

Twenty-five area high school instructors were selected from applications submitted in February, interviewed, and matched with a supervisor at one of ten Research Corridor facilities. Ten of the teachers were working at Fermilab this summer, with others scattered among AT&T, Argonne, Amoco, Nalco, and other labs. The teachers, representing 20 high schools, came from as near as West Chicago and Naperville, and as far as Crystal Lake and Argo.

Arlene Lennox of NTF, one of the voluntary promoters of this program since its inception four years ago, told CNN of several results of the program. First, the Laboratory does receive some beneficial work by the teachers. Second, the teachers reap a number of benefits: knowledge, prestige, credibility, self-esteem, and monetary gain. While many of the teachers have a rather good academic background, a summer or more of work at an institution such as Fermilab can demonstrate the practicality of their preparation in research and technological areas. There is no better way to learn and retain information than to put it to use. The teachers can better prepare their students to cope with the "real world" of high tech industry and research after being themselves employed in such activities. The community, students, and the teachers all develop an enhanced image of the competency of the teachers and the relevance of the material being taught in their high schools.

Walt Gorecki Retires

Walter Gorecki started working at Fermilab on July 1, 1970, as a Senior Model Maker. He worked in the Model Shop until 1976, when he transferred to Industrial Building II as Supervisor/Foreman.

During World War II, Walt built aerial torpedoes for the Navy at the International Harvester-McCormick Works. He then assisted the Rauland Corp. in the development of the Color Neutron Gun used in today's television tubes. Walter also worked for 15 years for Industrial Research Products, Inc., in research and development of units used in the space program.

Rich Isiminger, Walter's supervisor, said, "If it were possible for Wally to leave his pleasant personality, experience, and talent upon his retirement, the transition at Technical Support would be easy."

During retirement, Walt plans to "include all things that will be a start of a new life, as there are a lot of things to do and see."

Correction

In the last issue of *FermiNews*, the story on NTF's 10-year celebration stated that NTF had treated 1800 patients to date. NTF rechecked its figures and came up with a total of 1200 patients treated.



The teachers at Fermilab this summer were (left to right) : Mark Pennington from Waubonsie Valley working for Larry Coulson; Thomas Todd from Kaneland High School working for Tom Regan; Dane Camp from Downers Grove South working for Peter Koehler; George Eblin from Downers Grove North working for Stephen Pordes; Joseph Ciepley from Lake Park High School working for David Carey; Paul Madsen from Hinsdale South working for Win Baker; Randall Zamin from Downers Grove South working for Don Goloskie; Ernest Quigel from Crystal Lake South working for Finley Markley; Albert Wiggin from West Chicago High School working for Bill Freeman; and Edward Pettus from Glenbard West working for Sharon Lackey.

- George Eblin, Downers Grove North High School

Benefits Note

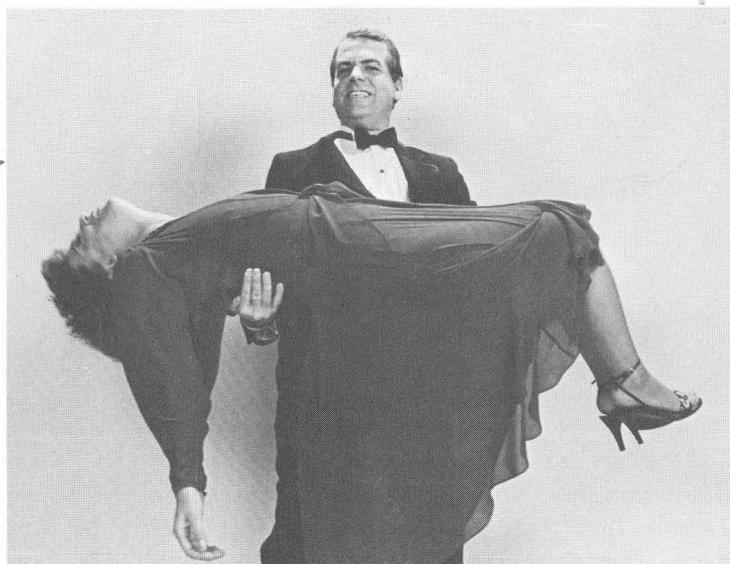
Employees who elected Connecticut General coverage at this last open-enrollment: please do not forget to review the Connecticut General *Group Insurance Plan* booklet dated March 1986. It is important that you remember to follow the Second Surgical Opinion and Pre-Certification and Continued Stay Review procedures. Information can be found on pages 9, 10, 43-45. The Connecticut General identification card also includes the Pre-Certification and Continued Stay Review procedures. If you need a copy of the Connecticut General booklet or a new I.D. card please call the Employee Benefits Office on extensions 3395 or 4361. Be sure your family members know the procedures.

World's Best 50s Party Returns!

Back by popular demand, the BRUISE BROTHERS, bigger and better than ever, will be returning to Fermilab for a party on Friday, October 3, 1986, from 5:30 to 10:30 p.m. in the Village Barn.

Under the candy stripe tent, NALREC will be featuring clowns, magicians, and palm readers for your entertainment. There will also be music by our own Homer Cunningham, The Music Man. Enjoy a steak dinner with all the trimmings for \$3.50 and hot dogs for the kids for \$1.00.

Improv Comedy with Monteith & Rand at the Fermilab Auditorium



Monteith & Rand, "the funniest, most inventive comedy team to come along in years," comes to Ramsey Auditorium at 8:00 p.m. on Saturday, October 18, 1986.

Dubbed masters of the fine art of improvisation, John Monteith and Suzanne Rand divide their program between comic sketches and improvisations concocted from audience suggestions. Name a setting, an occupation, a theatrical style, a line, or perhaps supply a few sound effects, and Sooz and Monty will create a scenario guaranteed to have you rolling in the aisles. "They are tops at showing what the proper use of body language, brains, and imagination can do to raise the level of comedy to piercing heights."

Suzanne Rand, a Chicago native, began her comedy career at Second City. She met John Monteith at The Proposition, the Boston improvisational theater. Their first team forays into comedy and improvisation were tested and refined on unsuspecting Cape Cod summer audiences in 1976. Since that time they've "left 'em laughing" in cabarets, the White House, on the Johnny Carson Show, and on Broadway.

Admission to Monteith & Rand is \$7, and tickets are available at the Information Desk in the Wilson Hall Atrium, ext. 3353 from 10:00 a.m. to noon, and 1:00 p.m. to 4:00 p.m. weekdays. Phone reservations are held for five days awaiting payment.

- Tammy Kikta

Burning Issue for Fire Prevention Week: Using a Fire Extinguisher

Since next week is observed as Fire Prevention Week, this is a good time for all of us to think about fire protection both at home and at work. Many people have become more aware of how to deal with the danger of fire and have wisely purchased home smoke detectors and fire extinguishers.

Fire extinguishers are placed in many convenient locations throughout the Lab. It is well known that quick action by someone trained in the use of a fire extinguisher can reduce the chance that their work area or their home will be destroyed. Often, personal injuries have also been greatly reduced by such actions. If a fire is found and an extinguisher is available, a choice must be made: whether to fight the fire or leave it up to the Fire Department. Unfortunately, only a few seconds are often available in which to make this most important decision. Common-sense guidelines are offered below to help you make the correct decision in the event of such an emergency.

1. First, call the Fire Department from a safe place using ext. 3131 as you would for any other emergency situation. Stay on the phone until the operator informs you that sufficient information has been obtained. The same procedure would be appropriate if you are at home and are notifying your community Fire Department.

2. Make sure everyone else has left the vicinity of the fire. Someone else should know that you may attempt to fight the fire.

3. Be sure the fire is small and confined to its immediate area of origin so that you are not attempting to fight any more than a localized fire with an extinguisher. NEVER attempt to fight a fire with an extinguisher in a place where flammable liquids or gases could be present.

4. Be sure that you have a way out and can fight the fire with your

back to the exit. This will prevent you from being cut off by the fire if your efforts fail.

5. Be sure that you have the appropriate extinguisher for the TYPE of fire present, that you know EXACTLY how to use it, and that it is in good working order and is charged. It is a good idea to review the directions posted on fire extinguishers you might want to use. Reading the directions after the fire starts is obviously NOT a good idea!

6. Use good judgement, and get out fast if you are failing to extinguish the fire, or if the fire is spreading. Don't be a hero!

Fire extinguisher classes are offered at a time convenient to you. Call the Fire Department at ext. 3428 for information and to schedule such a class.

- Fred Cload and Don Cossairt

Co-ed Volleyball League Starts

There will be open mini-clinics for all prospective Winter Volleyball League members in the Recreation Facility at 6:00 p.m. on October 6 and October 13, 1986. Veteran players will be available to offer helpful instructions to beginners.

All league players must purchase a new gym membership card before the start of league play. Team rosters must be turned in to Alma Karas, MS 216, by October 15, 1986. To sign up, or for more information, call Alma, ext. 3387, or Monica, ext. 3388.

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FermiNews - Cla\$\$ified Ad\$

FOR SALE:

Autos:

1985 NISSAN TRUCK. 4x4, white, big tires, lift kit, excellent condition, less than 12,000 miles, 2-year warranty transferrable; \$6900. Call 232-4243 after 5 p.m.

1981 DODGE K STATION WAGON. 2.6L engine, auto, A/C, delay wipers, tilt wheel, AM/FM stereo, P/S, P/B, roof rack, rear defroger, conventional spare; asking \$2400. Call David Early, ext. 3125.

1978 MERCURY MONARCH. Excellent cond., less than 45,000 miles, A/C, cruise control, P/S, P/B, AM/FM radio, tilt steering wheel, rear defrost, Landau top; \$2500/best offer. Call Jeanette, ext. 3721.

Misc:

JOHN DEERE ACCESSORIES. Rotary tiller 48", type 33, serial no. 013899M, \$200; Hyd. operated blade, 48", type 54, serial no. 020814M, \$150; Paricon trailette, 48", lawn sweeper type TE-7736, \$25. Call Jack Jagger, ext. 4848.

For the following items, call Dave, ext. 3677 or 851-0763: 18 cu. ft. Frigidaire refrigerator, \$275; 17.5 cu. ft. Sears freezer, \$175; Amana electric stove, \$150; Fan/ceiling lamp, \$50; Bedroom set, good condition, includes mirror dresser, chest, almost new mattress, \$150; Tappan antique stove, \$50.

5-1/4" DSDD FLOPPY DISKS. Package of 10, new, never used, write protect tabs and labels in package, \$7.50. Send your name and phone number and when to call to Norm Leja, MS 313 or call 682-0650.

CANNON AE-1 35mm CAMERA. Includes 50 mm lens and 80-200 Sears zoom lens, also with flash unit, filter set and camera case, excellent condition, \$300. Call Marshia, ext. 3046 or 3047.

FRIGIDAIRE AIR CONDITIONER. 5000 BTU, 120 V, brand new, used one day; paid \$260, asking \$225. Call Sherry, ext. 4025

FREE KITTENS. To good homes; also 1 male siamese. Call ext. 3621 or 393-3357 weekends & evenings.

WANTED:

A talented person to teach a Botany class. Only 3 weeks of your time with 5 great high school kids. Salary negotiable. Just outside the Fermilab gates on Rt. 59. Please call (312) 393-2996 *immediately*, and ask for Shirley DeCorte or Carmen LaFranzo. If you've got a used saddle laying about collecting dust, this school is in desperate need of one. Yes they have horses -- how else can a kid learn how to clean a barn?